Lenovo

ThinkSystem SR630 V4
User Guide

Machine Type: 7DG8, 7DG9, 7DGA, 7DGB

Note

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

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

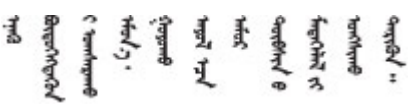
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྒྲིག་མ་བྱས་གོང་། ་སྲོར་ཀྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་ཆོད་སྡེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

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

Note: The set-up of the server is made in the server room only.

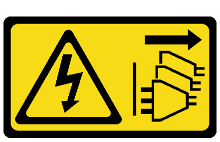
CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the IEC 62368-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes that you are qualified in the servicing of equipment 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. If your working condition necessitates the server being powered off or you intend to power off, make sure that the power cord is disconnected.

   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.

Note: Under certain circumstances, powering off the server is not a prerequisite. Refer to the precautions before conducting any tasks.

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

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

     a. Go to:

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

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

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

     d. Click **Power → Power Cables** to see all line cords.
   - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

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Chapter 1. Introduction

The ThinkSystem SR630 V4 server (7DG8, 7DG9, 7DGA, 7DGB) is a high-performance, multi-core 1U rack server designed to support many kinds of Information Technology (IT) workloads with high agility. It carries the most advanced processing and memory units and can scale up to the state-of-the-art liquid cooling solutions. This server is ideally suited for IT environments that require superior processor performance, flexible manageability, and thermal efficiency.

Figure 1. ThinkSystem SR630 V4

Features

Performance, ease of use, reliability, and expansion capabilities are 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 3 (XCC3). For additional information about Lenovo XClarity Controller 3 (XCC3), refer to https://pubs.lenovo.com/lxcc-overview/.

- **UEFI-compliant server firmware**

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

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

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

- **Active Memory**

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

- **Large system-memory capacity**

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

- **Integrated network support**

  The server comes with an integrated 1-port Gigabit Ethernet controller with an RJ-45 connector, which supports connection to a 1000 Mbps network.

- **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 models. 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 of the fan rotors fails. See "Thermal rules" on page 71 for more information.

- **Onboard RAID support**

  Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID) and JBOD to create configurations. The standard VROC provides RAID levels 0, 1, and 10. VROC Premium provides RAID levels 0, 1, 5 and 10. VROC Boot provides RAID level 1 only.

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 input the model name or machine type of your server in the search bar to navigate to the support page.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

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

Security advisories

In order to protect our customers and their data, Lenovo is committed to developing products and services that adhere to the highest security standards. 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 that 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 specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	• Processor • Memory • Internal drives • Expansion slots • Integrated functions and I/O connectors • Network • RAID support • System fan-pack • Electrical input and power policy • Minimal configuration for debugging • Operating systems	• Dimension • Weight	• 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.

- "Processor" on page 4
- "Memory" on page 4

- “Internal drives” on page 5
- “Expansion slots” on page 5
- “Integrated functions and I/O connectors” on page 5
- “Network” on page 6
- “RAID support” on page 6
- “System fan-pack” on page 6
- “Electrical input and power policy” on page 7
- “Minimal configuration for debugging” on page 8
- “Operating systems” on page 8

Processor

Processor
Supports multi-core Intel® Xeon® processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. • Up to two Intel® Xeon® 6 E-Cores series (Sierra Forest, SRF) scalable processors with the new LGA 4710-2 socket • Up to 144 cores per socket • Up to four UPI links at up to 24 GT/s • Thermal Design Power (TDP): up to 350 watts For a list of supported processors, see: https://serverproven.lenovo.com.

Memory

Memory

See “Memory module installation rules and order” on page 62 for detailed information about memory configuration and setup.
 	
• Slots: 32 dual inline memory module (DIMM) connectors that support up to:
  – 32 DDR5 DIMMs
• Memory module type:
  – TruDDR5 6400MHz RDIMM: 32 GB (2Rx8)
  – TruDDR5 6400MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
• Speed: Operating speed depends on processor model and UEFI settings.
  – 6400 MT/s for 1 DIMM per channel
  – 5200 MT/s for 2 DIMMs per channel (for 64 GB 10x4 RDIMMs)
• Minimum memory: 32 GB
• Maximum memory: 2 TB: 32 x 64 GB 10x4 RDIMMs
 	
For a list of supported memory options, see https://serverproven.lenovo.com.
 	
For technical rules for memory modules, see “Memory module installation rules and order” on page 62.

Internal drives

Internal drives
Front: • Up to four 2.5-inch hot-swap NVMe drives • Up to eight 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap NVMe drives Inside: • Up to two internal NVMe M.2 drives Rear: • Up to two 2.5-inch hot-swap NVMe drives • Up to two M.2 hot-swap NVMe drives

Expansion slots

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

Integrated functions and I/O connectors

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 3 (XCC3). For additional information about Lenovo XClarity Controller 3 (XCC3), refer to https://pubs.lenovo.com/lxcc-overview/.
• One XCC system management port on the rear to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions and runs at 10/100/1000 Mbps speed.
• A group of two or four Ethernet connectors on OCP module
• Up to four USB 3.2 Gen1 (5 Gbps) ports:
  – Two on the rear of the server
  – (Optional) Two on the front of the server
• One internal USB 3.2 Gen1 (5 Gbps) port
• External LCD diagnostics handset connector on the front of the server
• (Optional) One Mini DisplayPort on the front of the server[1]
• One VGA connectors on the rear of the server
• (Optional) One serial port connector on the rear of the server[2]
Notes:
1. The maximum video resolution is 1920 x 1200 at 60 Hz.
2. Available when the serial port cable is installed in the server.

Network

Network
• OCP module **Notes:** • The server features three OCP slots: OCP 1 and OCP 2 are located on the rear side, and OCP 3 is positioned at the front when the customer configures the front adapter assembly. • OCP module 1 and front OCP module 3 are alternatives. When front OCP module 3 is configured, OCP module 1 will be disabled. • OCP module 1 and front OCP module 3 take priority over OCP module 2.

RAID support

RAID support
Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID) and JBOD • Intel® VROC standard: requires an activation key and supports RAID levels 0, 1, and 10 • Intel® VROC Premium: requires an activation key and supports RAID levels 0, 1, 5, and 10 • Intel® VROC Boot: requires an activation key and supports RAID level 1 only

System fan-pack

System fan
• Supported fan-pack types: – Standard fan-pack 4056 (28000 RPM, single rotor) – Performance fan-pack 4056 (28000 RPM, dual rotors) • Fan redundancy: N+1 redundancy, one redundant fan rotor – One processor: three hot-swap dual-rotor system fan-packs (one redundant fan rotor) – Two processors: four hot-swap dual-rotor system fan-packs (one redundant fan rotor) **Notes:** • The redundant cooling by the fans in the server enables continued operation if one rotor fails. • When the system is powered off but still plugged in to AC power, and XCC has detected that OCP modules are installed, fan-pack 2 and 3 may continue to spin at a much lower speed. This is the system design to provide proper cooling.

Electrical input and power policy

Electrical input

Common Redundant Power Supply (CRPS) and CRPS Premium are supported as listed below:

Table 1. Electrical input for power supply units

Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc	CRPS	CRPS Premium
800-watt 80 PLUS Platinum	√	√	√		√	√
1300-watt 80 PLUS Platinum	√	√	√		√	√
800-watt 80 PLUS Titanium	√	√	√			√
1300-watt 80 PLUS Titanium	√	√	√			√
2000-watt 80 PLUS Titanium		√	√			√

One or two hot-swap power supply units for redundancy or over-subscription (OVS) support:

Table 2. Power policy for power supply units

Type	Watts	Redundancy		OVS
CRPS Premium	800-watt 80 PLUS Titanium	1+0	x	x
		1+1	√	√
	1300-watt 80 PLUS Titanium	1+0	x	x
		1+1	√	√
	2000-watt 80 PLUS Titanium	1+1	√	√
CRPS	800-watt 80 PLUS Platinum	1+1	√	x
	1300-watt 80 PLUS Platinum	1+1	√	x

Notes:

- CRPS PSUs do not support OVS, zero-output mode or vendor mixing. Zero Output Mode and Non-redundant will not be displayed on Lenovo XClarity Controller web interface when installed with CRPS PSUs.
- 1+0 indicates that the server has only one power supply unit installed and the system does not support power redundancy, while 1+1 indicates that two power supply units are installed and redundancy is supported.

CAUTION:

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

Minimal configuration for debugging

Minimal configuration for debugging
• One processor in processor socket 1 • One memory module in slot 7 • One power supply unit • One HDD/SSD drive, one M.2 drive (if OS is needed for debugging) • Three system fan-packs

Operating systems

Operating systems
Supported and certified operating systems: • Microsoft Windows Server • 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: Follow the adopted combination to install memory modules (see “Deploy the operating system” on page 296).

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 • Height: 43.00 mm (1.69 inches) • Width: – With rack latches: 481.70 mm (18.96 inches) – Without rack latches: 434.40 mm (17.10 inches) • Depth: 751.90 mm (29.60 inches) **Note:** The depth is measured with rack latches and the handle of the power supply unit included.

Weight
• Net weight: up to 18.27 kg (40.28 lb) • Gross weight: up to 28.12 kg (62.00 lb) **Note:** The gross weight includes the weights of the server, power cable, packaging, rail kit and cable management arm.

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” on page 9
- “Ambient temperature management” on page 11
- “Environment” on page 12
- “Water requirements” on page 13

Acoustical noise emissions

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

Table 3. Acoustic noise emissions declaration

Scenario	Sound power level (L_{WAd})		Sound pressure level (L_{pAm}):	
	Idling[11 on page 10]	Operating	Idling[11 on page 10]	Operating
Typical	5.5 Bel	6.0 Bel (50% CPU TDP)	43.7 dBA	48.5 dBA (50% CPU TDP)
		7.2 Bel (100% CPU TDP)		60.5 dBA (100% CPU TDP)
Storage-rich	6.2 Bel	7.8 Bel (100% CPU TDP)	51.1 dBA	65.5 dBA (100% CPU TDP)

Acoustical noise emissions

Table 3. Acoustic noise emissions declaration (continued)

Scenario	Sound power level (L_{WAd})		Sound pressure level (L_{pAm}):	
	Idling[11 on page 10]	Operating	Idling[11 on page 10]	Operating
		8.1 Bel[22 on page 10]		68.8 dBA[22 on page 10]

Notes:

1. Idle mode: The steady-state condition in which the server is powered-on but not operating any intended function.
2. The maximum of sound power and pressure output when the system is at 100% of input/output operations per second (IOPS) workload.

Table 4. Tested configuration

Scenario	System configuration
Typical	• 10 x 2.5'' chassis • 4 x standard fan-packs • 2 x 205-watt processors • 2 x standard heat sinks • 16 x 64 GB RDIMMs • 10 x 2.5'' NVMe drives • ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP adapter on slot 6 • 2 x 800-watt PSUs
Storage-rich	• 10 x 2.5'' chassis • 4 x high-performance fan-packs • 2 x 330-watt processors • 2 x performance heat sinks • 16 x 64 GB RDIMMs • 10 x 2.5'' NVMe drives • ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP adapter on slot 6 • 2 x 1300-watt PSUs

Notes:

- These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296.
- The declared sound levels may change depending on configuration/conditions.
- 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

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 13.

Environment

Environment
ThinkSystem SR630 V4 complies with ASHRAE Class A2 specifications. System performance may be affected when operating temperature is outside of AHSARE A2 specification. • Air temperature: – Operating – ASHARE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). – Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative Humidity (non-condensing): – Operating – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F) – Shipment/storage: 8% to 90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 13. **Note:** The server is designed for standard data center environment and recommended to be placed in industrial data centers. 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. Depending on hardware configurations, the server complies with ASHRAE Class H1, A2, A3, or A4 specifications with certain thermal restrictions. System performance may be impacted when operating temperature is out of permitted conditions. The restrictions to ASHRAE support are as follows (cooling by air or Processor Neptune™ Air Module (NeptAir)) : • The ambient temperature must be no more than 30°C if your server meets the following conditions: – 300 W < TDP ≤ 350 W – NeptAir module – High-performance fan-packs – Any M.2 NVMe drive – Memory modules with capacity equal to or smaller than 64 GB • The ambient temperature must be no more than 35°C if your server meets any of the following conditions: – 205 W < TDP ≤ 300 W – High-performance fan-packs – ≥ 100 GbE AOC transceiver with high-performance fan-packs – 30°C when 225 < TDP ≤ 300 – 35°C when 185 ≤ TDP ≤ 225 – Any M.2 NVMe drive – Memory modules with capacity equal to or smaller than 64 GB • The ambient temperature must be no more than 35°C if your server meets any of the following conditions: – 185 W < TDP ≤ 205 W – Standard fan-packs – PCIe network interface cards (NICs) and OCP modules – ≥ 100 GbE AOC transceiver with high-performance fan-packs – Any M.2 NVMe drive – Memory modules with capacity equal to or smaller than 64 GB The restrictions to ASHRAE support are as follows (cooling by Processor Neptune™ Core Module (NeptCore)) : • The ambient temperature must be no more than 35°C if your server meets the following conditions: – TDP ≤ 350 – NeptCore module – Standard fan-packs

Environment

– ≥ 100 GbE AOC transceiver
  – 30°C when installed with standard fan-packs
  – 35°C when installed with high-performance fan-packs
– Any M.2 NVMe drive
– Memory modules with capacity equal to or smaller than 64 GB

Water requirements

Water requirements
ThinkSystem SR630 V4 is supported in the following environment: • Maximum pressure: 3 bars • Water inlet temperature and flow rates:

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

Note: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures.

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 factors, such as temperature or moisture in the air, can influence the effect 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 5. Limits for particulates and gases

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

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

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

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

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

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

Management options

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

Overview

Options	Description
Lenovo XClarity Controller	Baseboard management controller (BMC) Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board (system board assembly). **Interface** • CLI application • Web GUI interface • Mobile application • Redfish API **Usage and downloads** https://pubs.lenovo.com/lxcc-overview/
Lenovo XCC Logger Utility	Application that reports the XCC events to local OS system log. **Interface** • CLI application **Usage and downloads** • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** https://pubs.lenovo.com/lxca/
Lenovo XClarity Essentials toolset	Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts. **Interface** • **OneCLI**: CLI application • **Bootable Media Creator**: CLI application, GUI application • **UpdateXpress**: GUI application **Usage and downloads** https://pubs.lenovo.com/lxce-overview/

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

Functions

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

Notes:

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

Chapter 2. Server components

This section includes information about the front view, rear view, and top view of the server. Front I/O modules, the system board assembly and LEDs are also illustrated in detail.

Front view

Front views vary by models. Depending on the model, the server might look slightly different from the illustrations in this topic.

Refer to the following front views for different server models:

- “Server model with four 2.5-inch drive bays” on page 19
- “Server model with four 2.5-inch drive bays and a front adapter assembly” on page 20
- “Server model with eight 2.5-inch drive bays” on page 20
- “Server model with ten 2.5-inch drive bays” on page 21
- “Server model with no backplane” on page 22

Server model with four 2.5-inch drive bays

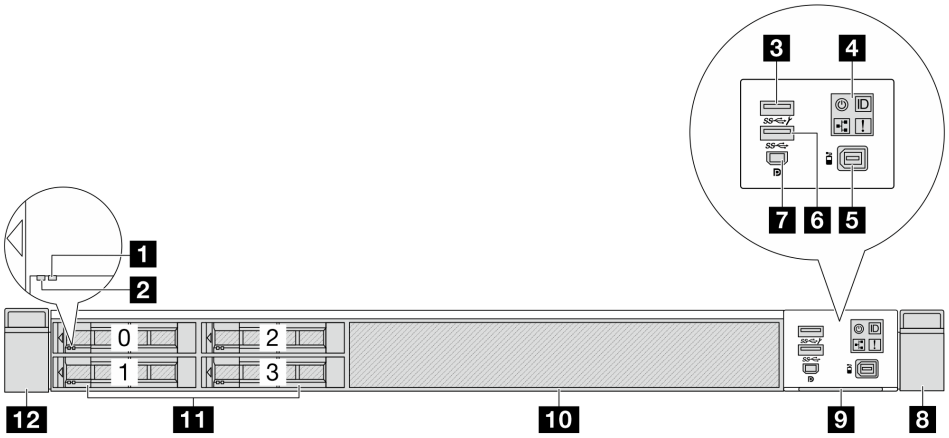

Table 6. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 USB 3.2 Gen 1 (5Gbps) connector	4 Diagnostics panel
5 External LCD connector	6 USB 3.2 Gen 1 (5Gbps) connector
7 Mini DisplayPort connector	8 Rack latch (right)
9 Pull-out information tab	10 Drive bay filler (1)
11 Drive bays (4)	12 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 22.

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

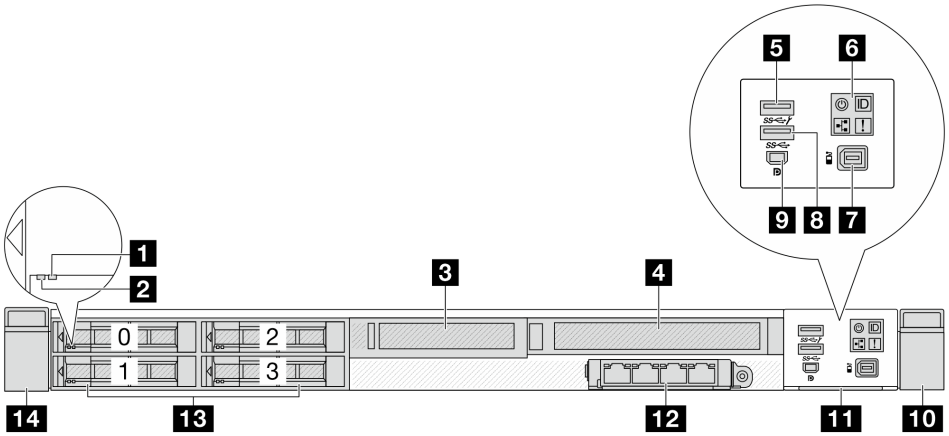


Table 7. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Front low-profile adapter assembly	4 Front full-height adapter assembly
5 USB 3.2 Gen 1 (5Gbps) connector	6 Diagnostics panel
7 External LCD connector	8 USB 3.2 Gen 1 (5Gbps) connector
9 Mini DisplayPort connector	10 Rack latch (right)
11 Pull-out information tab	12 Front OCP module
13 Drive bays (4)	14 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 22.

Server model with eight 2.5-inch drive bays

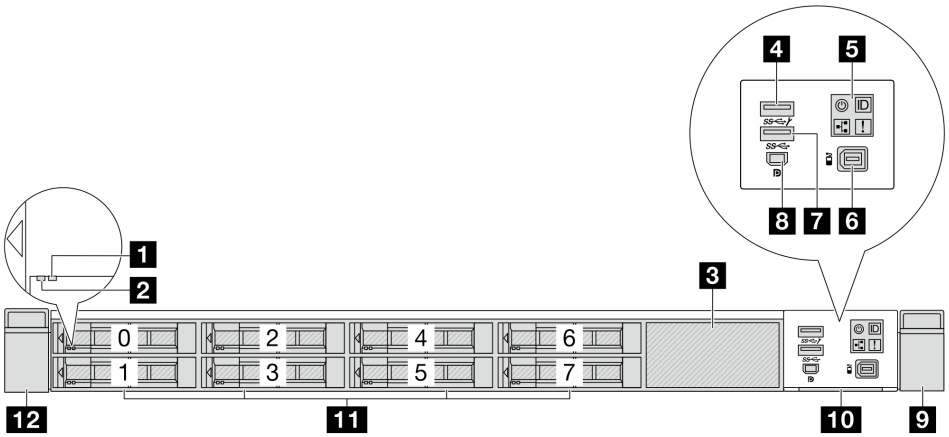


Table 8. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Drive filler (1)	4 USB 3.2 Gen 1 (5Gbps) connector
5 Diagnostics panel	6 External LCD connector
7 USB 3.2 Gen 1 (5Gbps) connector	8 Mini DisplayPort connector
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 22.

Server model with ten 2.5-inch drive bays

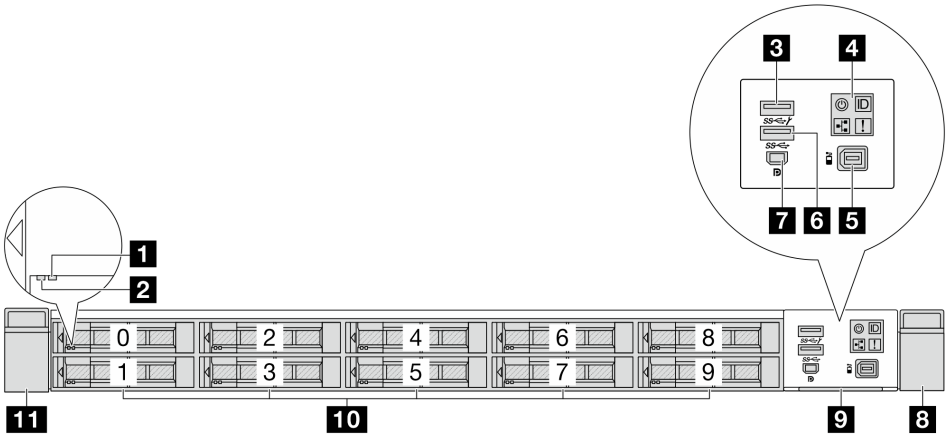


Table 9. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 USB 3.2 Gen 1 (5Gbps) connector	4 Diagnostics panel
5 External LCD connector	6 USB 3.2 Gen 1 (5Gbps) connector
7 Mini DisplayPort connector	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 22.

Server model with no backplane

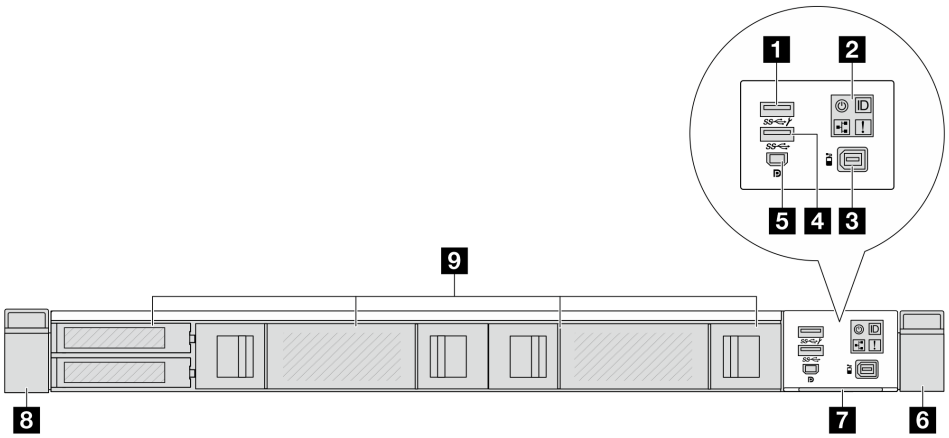


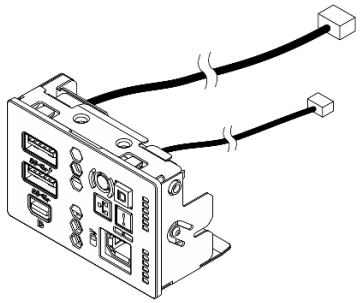
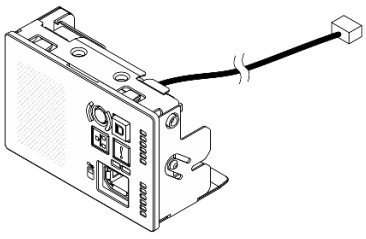
Table 10. Components on the front of the server

Callout	Callout
1 USB 3.2 Gen 1 (5Gbps) connector	2 Diagnostics panel
3 External LCD connector	4 USB 3.2 Gen 1 (5Gbps) connector
5 Mini DisplayPort connector	6 Rack latch (right)
7 Pull-out information tab	8 Rack latch (left)
9 Drive fillers	

Front components overview

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, the server supports the following front I/O modules.

 *Figure 2. FIO module with USB/MiniDP*	 *Figure 3. Standard FIO module*
The module supports two USB connectors, one MiniDP connector and a front operator panel.	The module supports a front operator panel.

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 37.

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 3.2 Gen 1 (5Gbps) connectors

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

Mini DisplayPort connector

The Mini DisplayPort, short for Mini DP, connector can be used to attach a high-performance monitor and a direct-drive monitor with a video converter, or the devices that use a Mini DP connector. The maximum video resolution is 1920 x 1200 at 60 Hz.

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 23
- “Server model with two PCIe slots” on page 24
- “Server model with two 2.5-inch hot-swap rear drive bays and one PCIe slot” on page 25
- “Server model with two PCIe slots and a Processor Neptune™ Core Module (NeptCore)” on page 26
- “Server model with a NeptCore module and rear M.2 drives” on page 26

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.

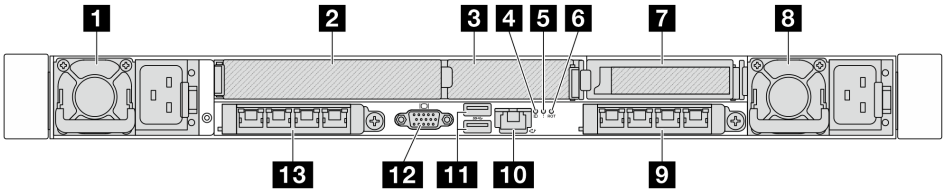


Figure 4. Rear view with two low profile and one full height PCIe adapters

Table 11. Components on the rear of the server

Callout	Callout
1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 PCIe slot 2 on riser 1 assembly	4 System ID LED
5 System error LED	6 RoT fault LED
7 PCIe slot 3 on riser 2 assembly	8 Power supply unit 2
9 Ethernet connectors on rear OCP module 2 (optional)	10 XCC system management port (10/100/1000 Mbps RJ-45)
11 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	12 VGA connector
13 Ethernet connectors on rear OCP module 1 (optional)	

Note: For more information about each component, see "Rear components overview" on page 27.

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.

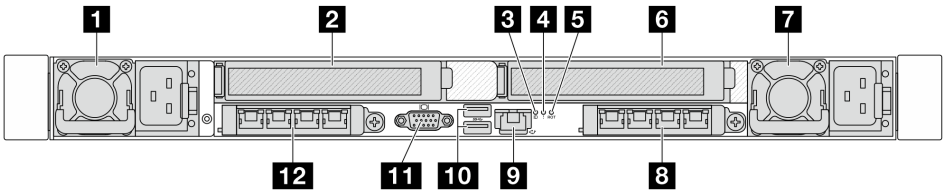


Figure 5. Rear view with two full height PCIe adapters

Table 12. Components on the rear of the server

Callout	Callout
1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 System ID LED	4 System error LED
5 RoT fault LED	6 PCIe slot 3 on riser 2 assembly
7 Power supply unit 2	8 Ethernet connectors on rear OCP module 2 (optional)
9 XCC system management port (10/100/1000 Mbps RJ-45)	10 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
11 VGA connector	12 Ethernet connectors on rear OCP module 1 (optional)

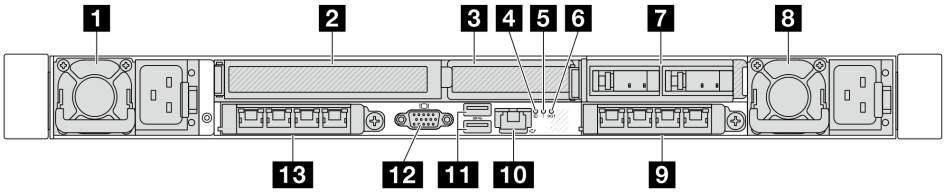


Figure 6. Rear view with one low profile and one full height PCIe adapter

Table 13. Components on the rear of the server

Callout	Callout
1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 PCIe slot 2 on riser 1 assembly	4 System ID LED
5 System error LED	6 RoT fault LED
7 Rear M.2 assembly	8 Power supply unit 2
9 Ethernet connectors on rear OCP module 2 (optional)	10 XCC system management port (10/100/1000 Mbps RJ-45)
11 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	12 VGA connector
13 Ethernet connectors on rear OCP module 1 (optional)	

Note: For more information about each component, see "Rear components overview" on page 27.

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.

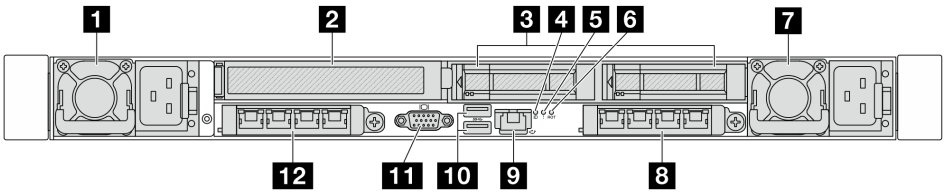


Figure 7. Rear view with one full height PCIe adapter

Table 14. Components on the rear of the server

1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 Rear 2.5-inch drive bays (2)	4 System ID LED
5 System error LED	6 RoT fault LED
7 Power supply unit 2	8 Ethernet connectors on rear OCP module 2 (optional)
9 XCC system management port (10/100/1000 Mbps RJ-45)	10 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
11 VGA connector	12 Ethernet connectors on rear OCP module 1 (optional)

Note: For more information about each component, see "Rear components overview" on page 27.

Server model with two PCIe slots and a Processor Neptune™ Core Module (NeptCore)

The following illustration shows the rear view of the server model with two PCIe slots and a Processor Neptune™ Core Module (NeptCore). Depending on the model, your server might look slightly different from the illustration below.

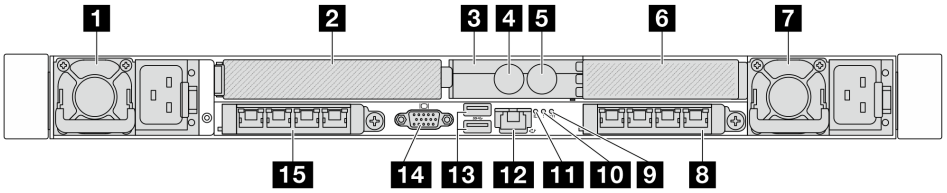


Table 15. Components on the rear of the server

1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 Hose holder	4 Inlet hose
5 Outlet hose	6 PCIe slot 3 on riser 2 assembly
7 Power supply unit 1	8 Ethernet connectors on rear OCP module 2 (optional)
9 RoT fault LED	10 System error LED
11 System ID LED	12 XCC system management port (10/100/1000 Mbps RJ-45)
13 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	14 VGA connector
15 Ethernet connectors on rear OCP module 1 (optional)	

Note: For more information about each component, see "Rear components overview" on page 27.

Server model with a NeptCore module and rear M.2 drives

The following illustration shows the rear view of the server model with a NeptCore module and rear M.2 drives. Depending on the model, your server might look slightly different from the illustration below.

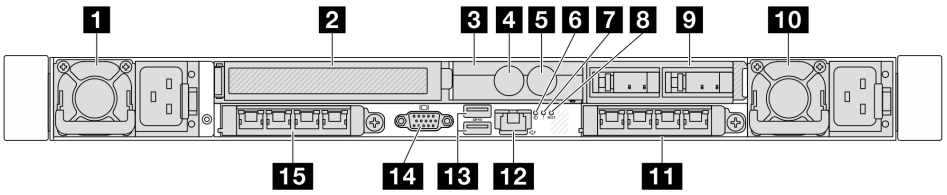


Table 16. Components on the rear of the server

1 Power supply unit 1	2 PCIe slot 1 on riser 1 assembly
3 Hose holder	4 Inlet hose
5 Outlet hose	6 System ID LED
7 System error LED	8 RoT fault LED
9 Rear M.2 drive assembly	10 Power supply unit 2
11 Ethernet connectors on rear OCP module 2 (optional)	12 XCC system management port (10/100/1000 Mbps RJ-45)

Table 16. Components on the rear of the server (continued)

13 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	14 VGA connector
15 Ethernet connectors on rear OCP module 1 (optional)	

Rear components overview

Ethernet connectors

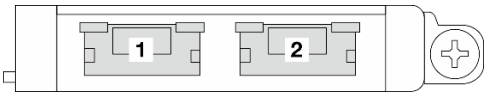


Figure 8. OCP module (two connectors)

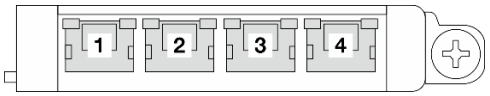


Figure 9. OCP module (four connectors)

- The OCP module provides two or four extra Ethernet connectors for network connections.
- By default, any Ethernet connector on the OCP module can also function as a management connector using the shared management capacity.

Notes:

- The server features three OCP slots: OCP 1 and OCP 2 are located on the rear side, and OCP 3 is positioned at the front when the customer configures the front adapter assembly.
- OCP module 1 and front OCP module 3 are alternatives. When front OCP module 3 is configured, OCP module 1 will be disabled.
- OCP module 1 and front OCP module 3 take priority over OCP module 2.

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.

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 “System LEDs and diagnostics display” on page 36.

USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 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.

XCC system management port (10/100/1000 Mbps RJ-45)

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

Rear LEDs

- For more information about the LEDs on the XCC system management port, see “LEDs on the XCC system management port” on page 38.
- For more information about the system error LED, RoT fault LED and system ID LED, see “System-I/O-board LEDs” on page 42.
- For more information about the LEDs on the power supply unit, see “Power-supply-unit LEDs” on page 40.

Inlet and outlet hoses

The Processor Neptune™ Core Module (NeptCore) spreads two hoses out to connect to the manifolds. The inlet hose conveys warm water from the facility to the cold plates to cool down the processors, and the outlet hose conducts hot water out of the NeptCore module to realize system cooling.

Top view

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

The following illustrations show the top views of the server without any air baffle or rear drive cage installed.

- “Top view with standard heat sinks” on page 28
- “Top view with NeptAir module” on page 30
- “Top view with NeptCore module” on page 31

Top view with standard heat sinks

This topic offers the top view of server models with standard heat sinks.

Top view with standard heat sinks

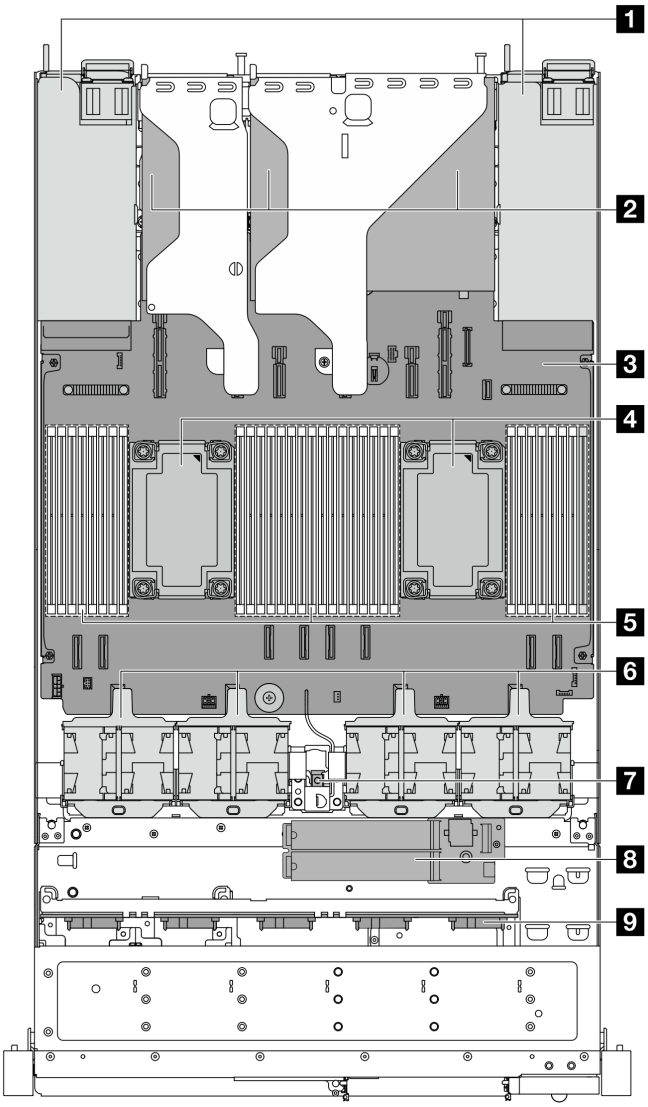


Figure 10. Top view with standard heat sinks

Table 17. Components on the top view with standard heat sinks

1 Power supply units	2 Riser assemblies
3 System board assembly	4 Processor and heat sink module
5 Memory modules	6 System fan-packs
7 Intrusion switch	8 Internal M.2 drive module
9 Front backplane	

Notes:

1. The illustration shows the server rear configuration with two riser assemblies. The server rear configurations vary by server model. For details, see "Rear view" on page 23.

2. The illustration shows the location of certain parts. Some parts may not be supported at the same time within certain configuration(s).

Top view with NeptAir module

This topic offers the top view of server models with the Processor Neptune™ Air Module (NeptAir).

Top view with the NeptAir module

The illustration below singles out the NeptAir module from other components in the chassis. The parts contained depend on the configuration of the server.

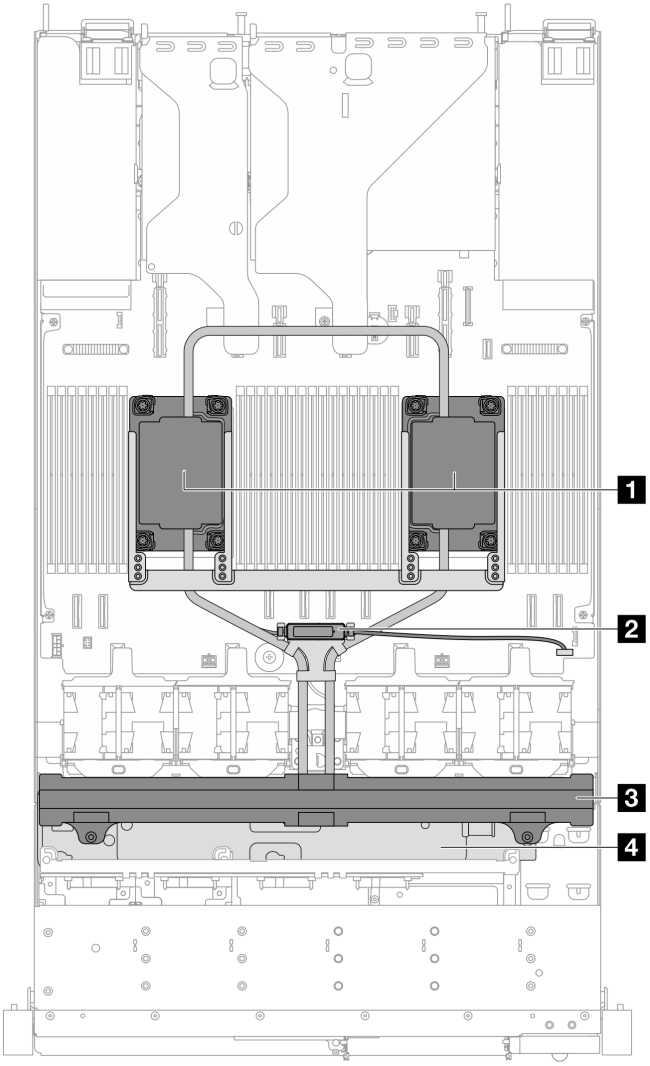


Figure 11. Top view of the NeptAir module

Table 18. Components on the top view of the NeptAir module

1 Cold plate assembly	2 Leakage detection sensor module
3 Radiator	4 Radiator holder

Top view with NeptCore module

This topic offers the top view of server models with the Processor Neptune™ Core Module (NeptCore).

Top view with the NeptCore module

The illustration below singles out the NeptCore module from other components in the chassis. The parts contained depend on the configuration of the server.

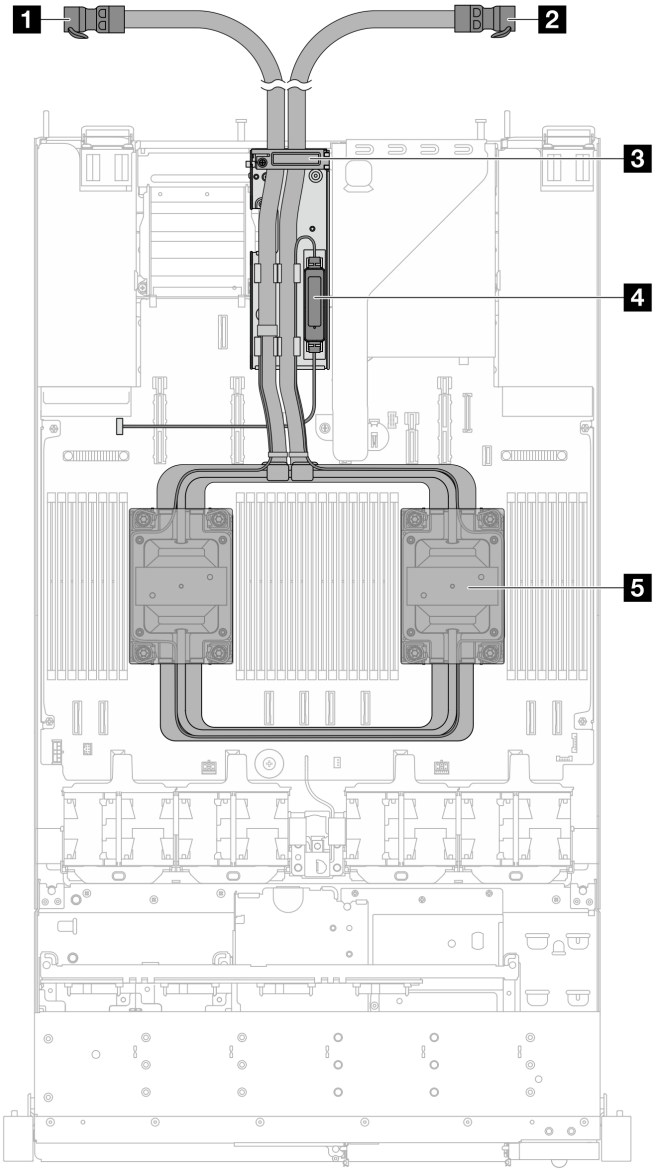


Figure 12. Top view of the NeptCore module

Table 19. Components on the top view of the NeptCore module

1 Outlet hose	2 Inlet hose
3 Hose holder	4 Leakage detection sensor module
5 Cold plate assembly	

System-board-assembly layout

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

The following illustration shows the layout of the system board assembly which consists of the system I/O board and processor board.

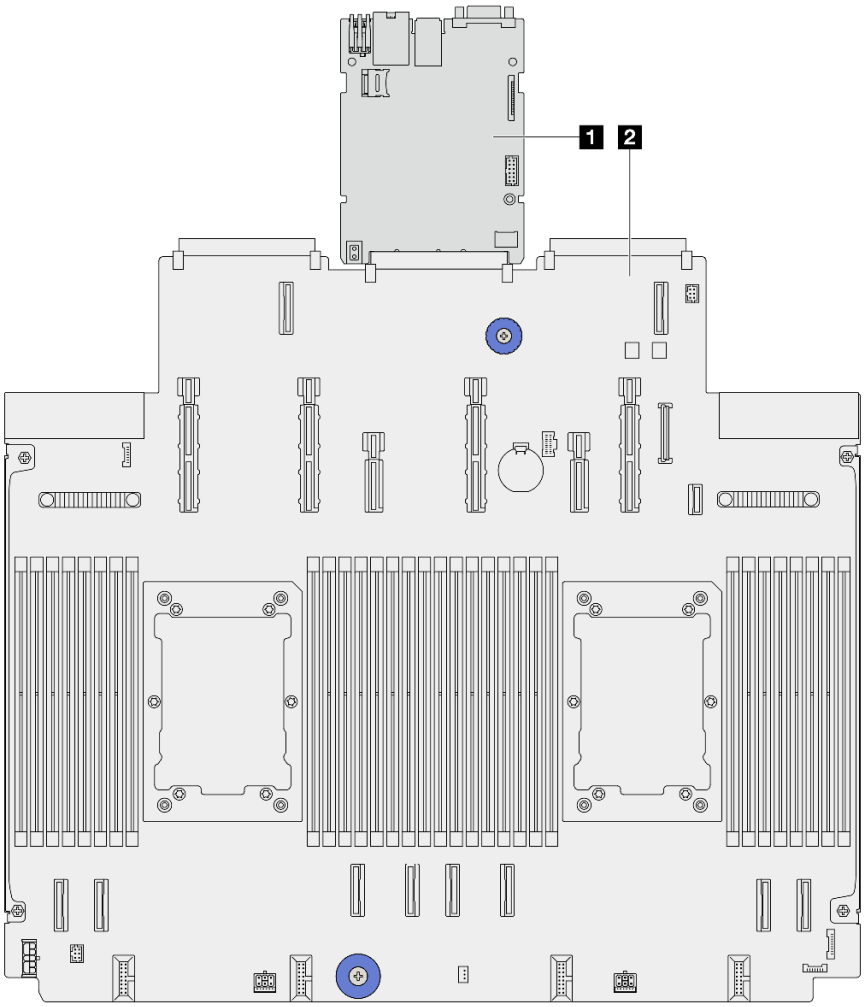


Figure 13. System-board-assembly layout

1 System I/O board	2 Processor board

For more information about the LEDs that are available on the system board assembly, see "Processor-board LEDs" on page 44.

System-board-assembly connectors

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

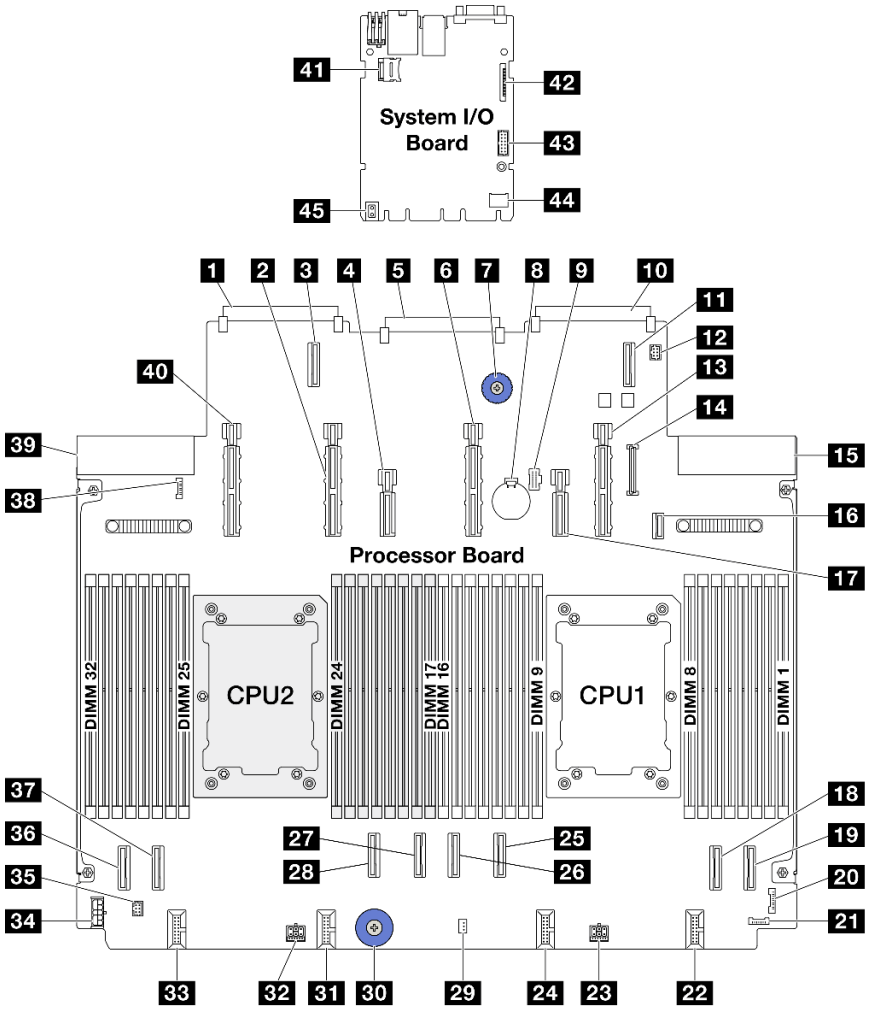


Figure 14. System-board-assembly connectors

Table 20. System-board-assembly connectors

1 OCP 3.0 network card connector 2	2 Power & PCIe connector 13
3 OCP expansion connector 2	4 Power & PCIe connector 12
5 Rear IO board connector	6 Power & PCIe connector 11
7 Lift Handle	8 3V Battery (CR2032)
9 M.2 power connector	10 OCP 3.0 network card connector 1
11 OCP expansion connector 1	12 Pump 1 Connector
13 Power & PCIe connector 9	14 Front panel USB connector
15 Power supply 1 connector	16 M.2 BP signal connector
17 Power & PCIe connector 10	18 PCIe connector 2
19 PCIe connector 1	20 FIO connector
21 Rear leak detection connector	22 Fan 1-2 connector
23 Power connector 3_A	24 Fan 3-4 connector

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

25 PCIe connector 3	26 PCIe connector 4
27 PCIe connector 5	28 PCIe connector 6
29 Intrusion switch connector	30 Lift Handle
31 Fan 5-6 connector	32 Power connector 2_A
33 Fan 7-8 connector	34 Internal RAID power connector
35 Pump 2 connector	36 PCIe connector 8
37 PCIe connector 7	38 Front leak detection connector
39 Power supply 2 connector	40 Power & PCIe connector 15
41 MicroSD connector	42 Second MGMT ethernet connector
43 Serial port connector	44 TCM connector
45 Lift Handle	

System-board-assembly switches

The following illustrations show the location of the switches on the server.

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

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 57
   - “Handling static-sensitive devices” on page 60
   - “Power off the server” on page 75
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

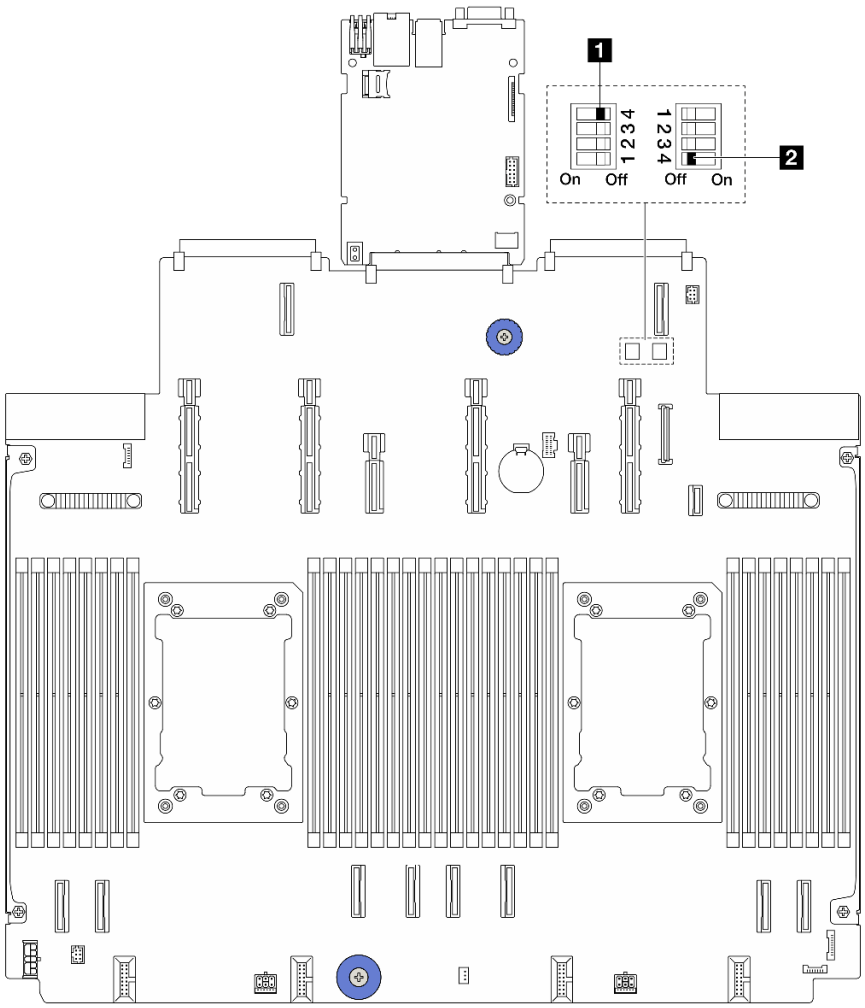


Figure 15. System-board-assembly switches

1 "Switch 1 (SW1)" on page 35	2 "Switch 2 (SW2)" on page 35

SW1 switch block

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

Table 21. SW1 switch block description

Switch-bit number	Switch name	Default position	Description
1 SW1–1	Reserved	OFF	Reserved
2 SW1–2	Reserved	OFF	Reserved
3 SW1–3	Reserved	OFF	Reserved
4 SW1–4	Clear CMOS	OFF	Clears the real-time clock (RTC) registry when switched to ON.

SW2 switch block

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

Table 22. SW2 switch block description

Switch-bit number	Switch name	Default position	Description
1 SW2–1	Reserved	OFF	Reserved
2 SW2–2	Reserved	OFF	Reserved
3 SW2–3	Reserved	OFF	Reserved
4 SW2–4	Password override	OFF	Overrides the power-on password when switched to ON.

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 36.

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 a status LED. Different colors and speeds indicate different activities or status of the drive. The following illustrations and tables describe the problems that are indicated by the activity LED and the status LED.

LEDs on hard disk drives or solid-state drives

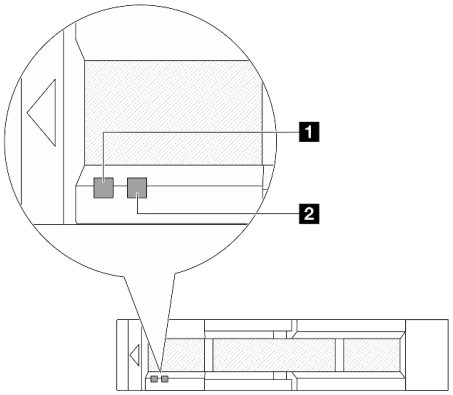


Figure 16. LEDs on hard disk drives or solid-state drives

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

Drive LED	Status	Description
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.

Front-operator-panel LEDs and buttons

The front operator panel of the server provides controls, connectors, and LEDs.

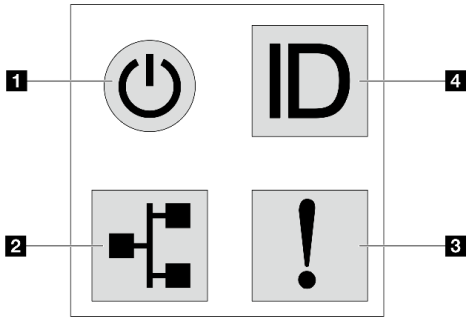


Figure 17. Diagnostics panel

1 Power button with power status LED

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 power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	There is no ac power applied to the server.

2 Network activity LED

Compatibility of the NIC adapter and the network activity LED

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

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

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

3 System error LED

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

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore).	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See "Troubleshooting by system LEDs and diagnostics display" on page 36. • Save the log if necessary. **Note:** For server models with NeptAir module or NeptCore module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see "LED on the leakage detection sensor module" on page 39.
Off	None	The server is off or the server is on and is working correctly.	None.

4 System ID button with system ID LED

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

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.

LEDs on the XCC system management port

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.

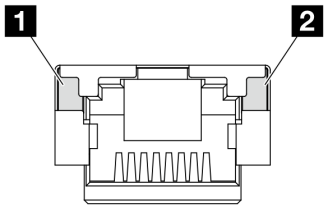


Figure 18. LEDs on the XCC system management port

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

LED on the leakage detection sensor module

This topic provides information about the LED on the leakage detection sensor module.

The leakage detection sensor module on the Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore) comes with one LED. The following illustration shows the LED on the module.

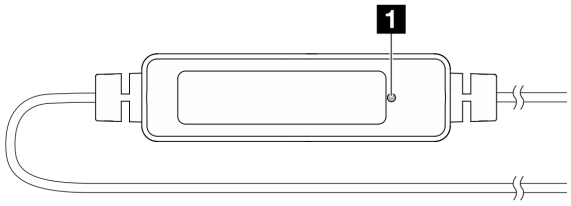


Figure 19. Leak detection LED

The following table describes the status that are indicated by the leakage detection sensor module LED.

1 Leakage detection sensor LED (green)	
Description	• On: No liquid leakage or cable break alert. • Slow blinking (about two flashes per second): Cable break alert. • Fast blinking (about five flashes per second): Liquid leak alert.
Action	• If the cable breaks, replace the NeptAir module or NeptCore module (trained technicians only). • If liquid leakage happens: – For NeptAir module problem determination and troubleshooting, see “Liquid cooling module problems (NeptAir module)” on page 315. – For NeptCore module problem determination and troubleshooting, see “Liquid cooling module problems (NeptCore module)” on page 317.

Power-supply-unit LEDs

This topic provides information about various power supply unit LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:
- One processor in processor socket 1
- One memory module in slot 7
- One power supply unit
- One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
- Three system fan-packs

The following table describes the problems that are indicated by various combinations of the power-supply unit LEDs and the power-on LED and suggested actions to correct the detected problems.

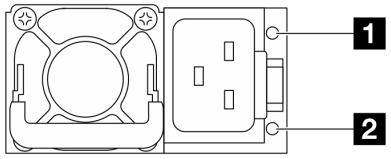


Figure 20. LEDs on a CRPS Premium *power supply unit*

LED	Description
1 Output and fault status (bi-color, green and yellow)	The output and fault status LED can be in one of the following states: • Off: The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit. • Slow blinking green (about one flash per second): 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. • Fast blinking green (about five flashes per second): The power supply unit is in firmware update mode. • Green: The server is on and the power supply unit is working normally. • Yellow: The power supply unit may have failed. Dump the FFDC log from the system and contact Lenovo back-end support team for PSU data log reviewing. Zero-output mode can be disabled via Setup Utility or Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state. • Start the Setup utility, go to **System Settings → Power → Zero Output** and select **Disable**. If you disable zero-output mode, both power supplies will be in the active state. • Log in to the Lenovo XClarity Controller web interface, choose **Server Configuration → Power Policy**, disable **Zero Output Mode**, and then click **Apply**.
2 Input status (single color, green)	The input status LED can be in one of the following states: • Off: The power supply unit is disconnected from the input power source. • Green: The power supply unit is connected to the input power source. • Blinking (1Hz): The input power is unhealthy.

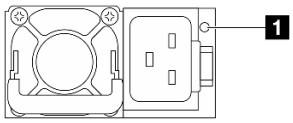


Figure 21. LED on a CRPS PSU (1)

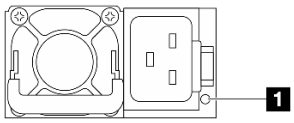


Figure 22. LED on a CRPS PSU (2)

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
On (green)	The server is on and the power supply unit is working normally.
Blinking (green, about two flashes per second)	The power supply unit is in firmware updating mode.
On (yellow)	When the power supply unit is lit yellow: • Scenario 1: one of the two power supply units has powered off or is unplugged from the power cord, and at the same time, the other one has power on. • Scenario 2: the power supply unit has failed due to one of the issues listed below: – Over-temperature protection (OTP) – Over-current protection (OCP) – Over-voltage protection (OVP) – Short circuit protection (SCP) – Fan failure

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
Blinking (yellow, about one flash per second)	The power supply unit is showing warnings, indicating over-temperature warning (OTW), over-current warning (OCW), or a slow fan speed.
Off	The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit.

System-I/O-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system I/O board.

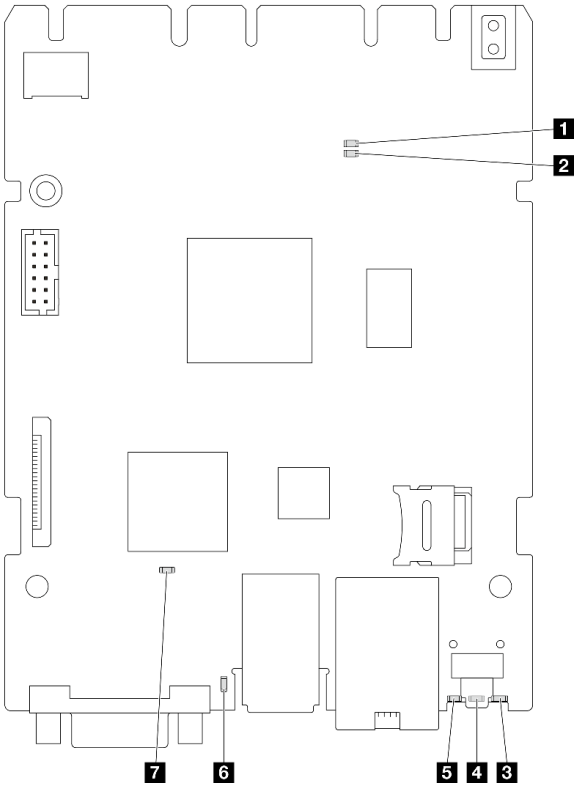


Figure 23. LEDs on the system I/O board

1 AP0 LED (green)

2 AP1 LED (green)

3 RoT fault LED (yellow)

4 System error LED (yellow)

5 System ID LED (blue)

6 XCC heartbeat LED (green)

7 SCM FPGA heartbeat LED (green)

Table 23. LEDs description

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	7 SCM FPGA heart-beat LED	6 XCC heart-beat LED	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the system I/O board.
	Blink	N/A	On	N/A	N/A	Replace the system I/O board.
	Blink	N/A	On	On	N/A	Replace the system I/O board.

Table 23. LEDs description (continued)

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	7 SCM FPGA heart-beat LED	6 XCC heart-beat LED	Actions
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power interposer board (PIB) if any. If the PSU or PIB has any error, replace it. 2. If the PSU or PIB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	On	Information only. No action is required.

4 System error LED (yellow)	
Description	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.
Action	Check system logs or internal error LEDs to identify the failed part. For more information, see "Front-operator-panel LEDs and buttons" on page 37.

5 System ID LED (blue)	
Description	The front system ID LED helps you locate the server.
Action	Each time you press the system ID button, the state of both system ID LEDs changes, and the state can be on, blinking, or off.

6 XCC heartbeat LED (green)	
Description	The XCC heartbeat LED helps you identify the XCC status. • 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.
Action	• If the XCC heartbeat LED is always off or always on, do the following: – If XCC cannot be accessed: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (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 always blinking fast over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (Trained technicians only) Replace the system I/O board. • If the XCC heartbeat LED is always blinking slow over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support.

Processor-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the processor board.

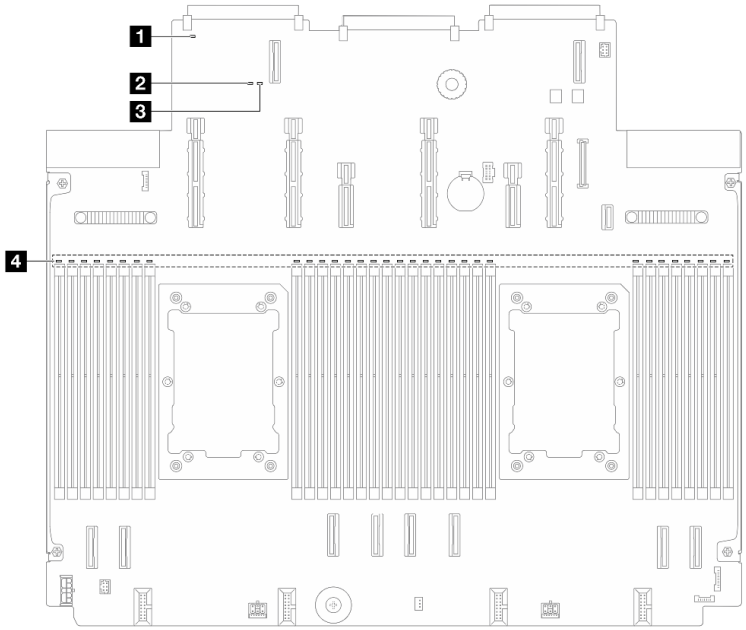


Figure 24. LEDs on the processor board

1 System error LED (yellow)

2 System status LED (green)

3 FPGA heartbeat LED (green)

4 DIMM error LEDs (amber)

Descriptions of LEDs on the processor board

1 System error LED (yellow)	
Description	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.
Action	Check system logs or internal error LEDs to identify the failed part. For more information, see "Front-operator-panel LEDs and buttons" on page 37.

2 System status LED (green)	
Description	The system status LED indicates the working status of the system. • 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.
Action	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the XCC heartbeat LED and follow the actions for the XCC heartbeat LED. • If the system status LED remains off or is blinking fast (about four flashes per second) and the system error LED on the front panel is on (yellow), the system is in a power fault status. Do the following: 1. Re-plug the power cord. 2. Remove installed adapters/devices, one at a time, until you reach the minimal configuration for debugging. 3. (Trained technicians only) If the problem remains, capture FFDC log, and replace the processor board. 4. If the problem still remains, contact Lenovo Support.

3 FPGA heartbeat LED (green)	
Description	The FPGA heartbeat LED helps you identify the FPGA status. • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working.
Action	If FPGA heartbeat LED is always off or always on, do the following: 1. Replace the processor board. 2. If the problem remains, contact Lenovo Support.

4 DIMM error LEDs (amber)	
Description	When a memory module error LED is lit, it indicates that the corresponding memory module has failed.
Action	For more information, see “Memory problems” on page 321.

Rear M.2 LEDs

This topic provides troubleshooting information for the rear M.2 drive assembly.

- “LEDs on the rear M.2 interposer” on page 46
- “LEDs on the rear M.2 backplane” on page 47

LEDs on the rear M.2 interposer

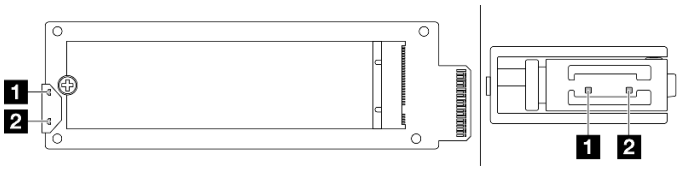


Figure 25. Rear M.2 interposer LEDs

The normal status of the LEDs on the interposer is that activity LED blinks and status LED remains off.

LED	Status and description
1 Activity LED (green)	On: The M.2 drive is idle.
	“Off: The M.2 drive appears de-asserted.” on page 46
	Blinking (about four flashes per second): The I/O activity of the M.2 drive is in progress.
2 Status LED (yellow)	On: A drive fault occurs.
	Off: The M.2 drive is working normally.
	Fast blinking (about four flashes per second): The M.2 drive is being located.
	Slow blinking (about one flash per second): The M.2 drive is being rebuilt.

Rear M.2 drive de-asserted problem

1. Hot-swap the two side-by-side M.2 drive assemblies with each other to see if the problem persists.
2. If the problem persists:
   - Scenario 1: activity LED remains off, replace the interposer. If replacing interposers does not work, it can be a power or PSoC fault, collect FFDC file and contact Lenovo Support.

- Scenario 2: both LEDs are on, access the drive information on XCC:
  - If the information is accessible but the drive remains de-asserted, replace the drive or check RAID chip log in FFDC file to see if any helpful information is available.
  - If the information is not accessible, check RAID chip log in FFDC file, replace the interposer or drive.

3. If the problem persists after replacing the interposer and drive, contact Lenovo Support.

LEDs on the rear M.2 backplane

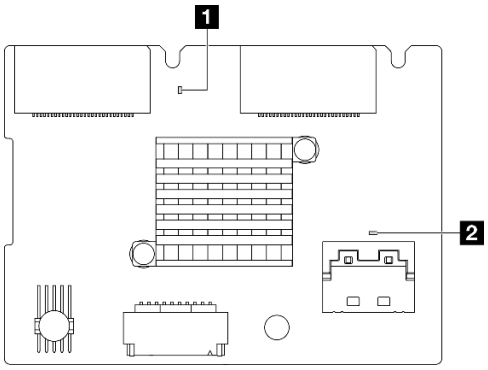


Figure 26. Rear M.2 backplane LEDs

The normal status of the LEDs on the backplane is that both system heartbeat LED and PSoC heartbeat LED blink.

LED	Status and description
1 System heartbeat LED (green)	Blinking: The M.2 backplane has power on.
2 PSoC heartbeat LED (green)	On: The PSoC firmware is not initialized or in a hung state.
	Off: Power off or in a hung state.
	Fast blinking (about one flash per second): Updating code (bootloader mode).
	Slow blinking (about one flash every two seconds): Exiting initialization (application mode).

Rear M.2 drive backplane troubleshooting procedure

- Visually inspect the LEDs on the backplane, with system power on and top cover removed.
  - If the PSoC heartbeat LED is always on or off, replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
  - If the system heartbeat LED is not blinking, it indicates that RAID chip problems occur. Replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
- If XCC event log shows PCIe errors concerning the rear M.2 drive and removing the top cover is not feasible.
  - Replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
  - Check PSoC register in the PSoC folder to further identify if PSoC is working normally:
    - If not, try to replace the backplane or update PSoC firmware. If they do not work, contact Lenovo Support.

– If yes, check if RAID chip information is accessible on FFDC file device list. If yes, replace the backplane or collect FFDC file and contact Lenovo Support; if not, replace the backplane.

Rear system LEDs

This topic provides an overview of the LEDs on the rear of the server.

Rear system LEDs of the server

The following illustration shows the LEDs on the rear view of server model with three PCIe slots. The LEDs on the rear view of other server models are the same.

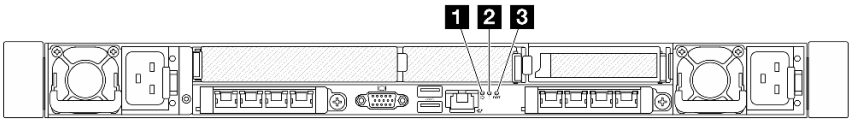


Figure 27. Rear LEDs overview

Callout	LED
1 2 3	"System-I/O-board LEDs" on page 42

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 enter the model name or machine type of your server in the search bar to navigate to the support page.
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.

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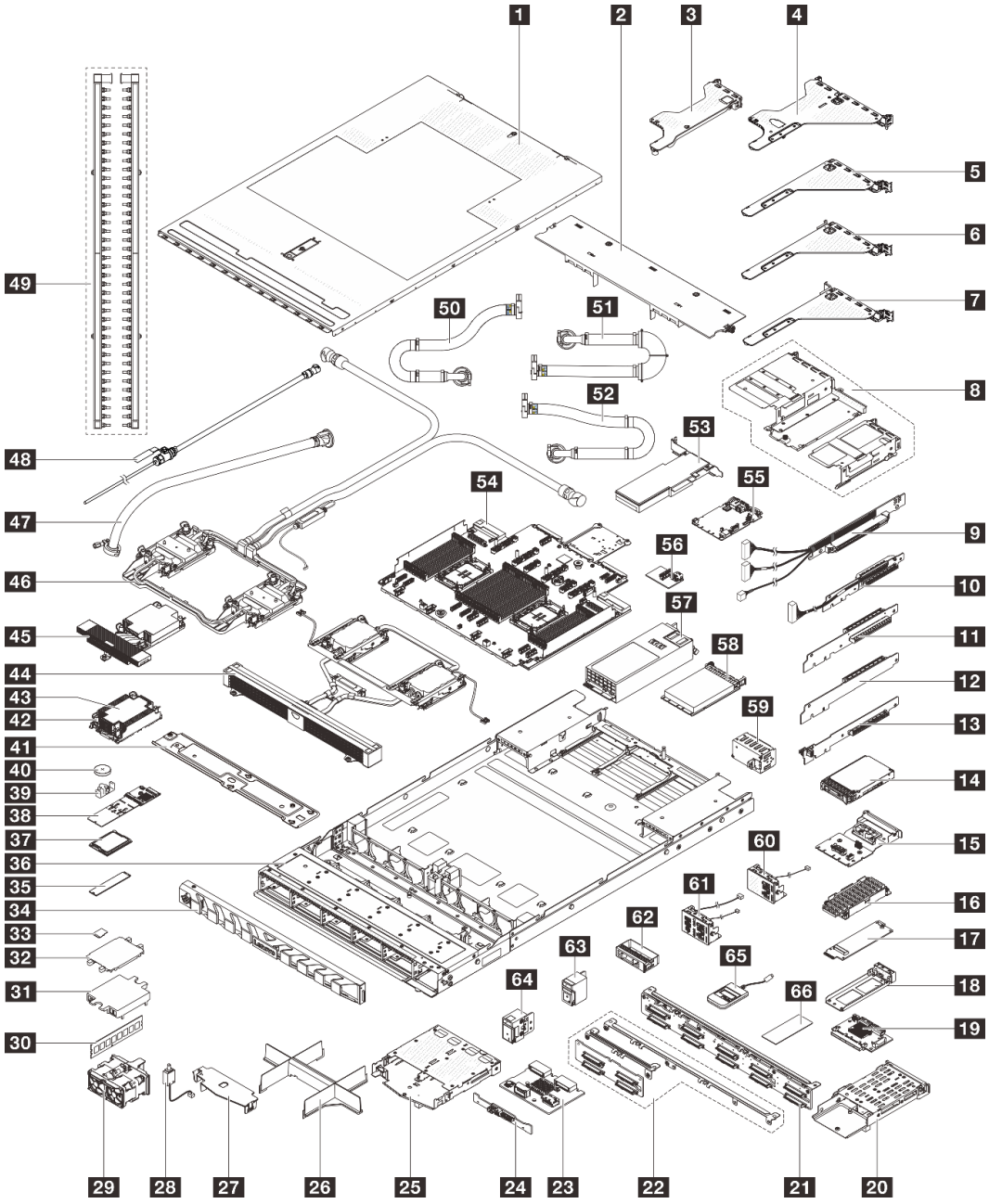

Figure 28. Server components

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.
- **FRU**: 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 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 Air baffle	T1
3 Riser bracket (low profile, LP)	T1	4 Riser bracket (low profile-full height, LP-FH)	T1
5 Riser bracket (full height, FH)	T1	6 Riser bracket (full height, FH)	T1
7 Rear riser bracket (full height, FH)	T1	8 Front riser cages	T1
9 Riser 5–4 card	T2	10 Riser 2–1 card	T2
11 Riser 2–2 card	T1	12 Riser 3 card	T1
13 Riser 1 card	T1	14 2.5-inch drive	T1
15 Rear OCP interposer card	T1	16 Rear M.2 drive assembly	T2
17 Rear M.2 adapter	T1	18 Rear M.2 adapter tray	T1
19 Front OCP interposer card	T2	20 Rear M.2 cage	T1
21 10 x 2.5-inch front drive backplane	T2	22 4 x 2.5-inch front drive backplane	T2
23 Rear M.2 backplane	T2	24 2 x 2.5-inch rear drive backplane	T2
25 2 x 2.5-inch rear drive cage	T1	26 Processor and heat sink module filler	C
27 2 x 2.5-inch rear drive cage air baffle	T1	28 Intrusion switch	T1
29 System fan-pack	T1	30 Memory module	T1
31 Cold plate cover	C	32 Processor socket cover	C
33 MicroSD card	T1	34 Security bezel	C
35 M.2 drive	T1	36 Chassis	FRU
37 Processor	FRU	38 Internal M.2 backplane	T2
39 M.2 retainer clip	T1	40 CMOS battery	C
41 Radiator holder	T1	42 Heat sink PEEK nut	T2
43 Standard heat sink	FRU	44 Processor Neptune™ Air Module (NeptAir)	FRU
45 Performance heat sink	FRU	46 Processor Neptune™ Core Module (NeptCore)	FRU
47 42U in-row hose kit	FRU	48 Bleeder kit	FRU
49 Manifolds	FRU	50 42U/48U in-rack connection hose (return side)	FRU
51 42U in-rack connection hose (supply side)	FRU	52 48U in-rack connection hose (supply side)	FRU
53 PCIe adapter	T1	54 Processor board	FRU
55 System I/O board	FRU	56 USB I/O board	T1
57 Power supply unit	T1	58 OCP module	T1
59 Power-supply-unit filler	C	60 Front I/O module (1)	T2
61 Front I/O module (2)	T1	62 2.5-inch drive bay filler	C
63 Rack latch (right)	T1	64 Rack latch (left)	T1
65 External diagnostics handset	T1	66 Rear M.2 heat sink thermal pad	FRU

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 55 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 help support technicians to identify your server and provide faster service.

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

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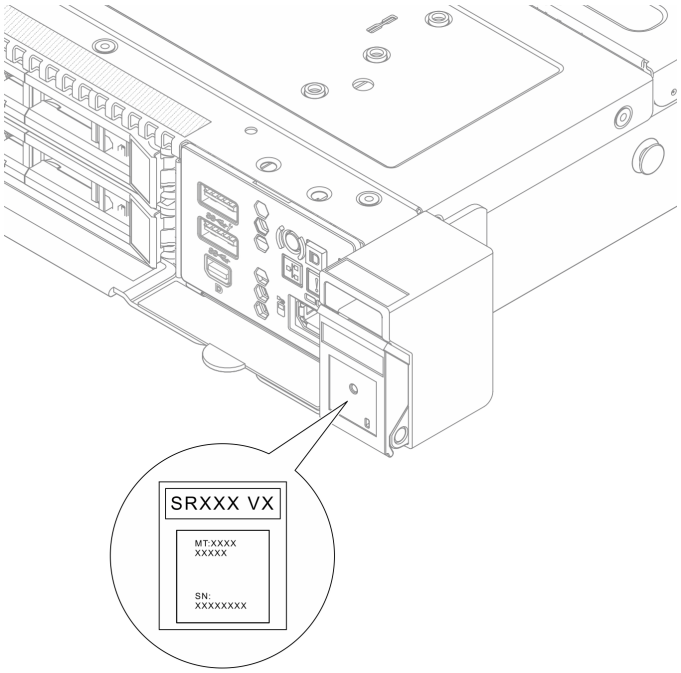

Figure 29. Location of the ID label

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller network access label is attached to the pull-out information tab in the front of the chassis, with MAC address accessible with a pull.

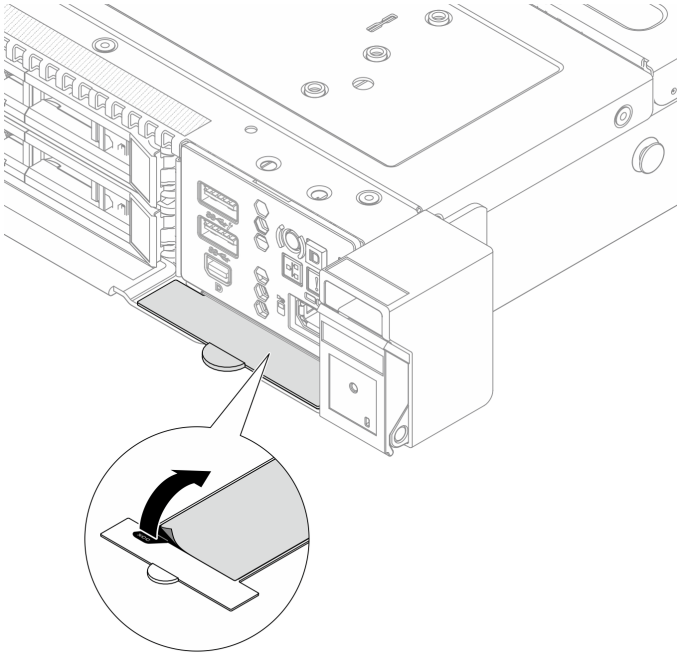

Figure 30. Lenovo XClarity Controller network access label on the pull-out information tab

Service Label and QR code

In addition, the system Service Label is located on the surface of the top cover, providing 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.

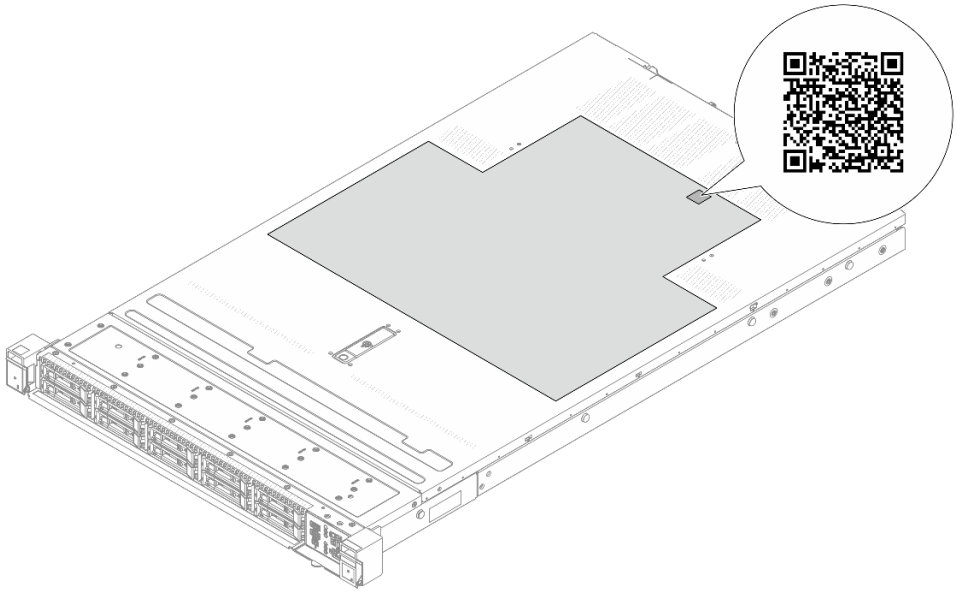

Figure 31. Service Label and QR code

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 53.
2. Install any required hardware or server options. See the related topics in Chapter 5 “Hardware replacement procedures” on page 57.
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 the rack (friction rails)” on page 85 or “Install the server to the rack (slide rails)” on page 93.
5. Connect all external cables to the server. See Chapter 2 “Server components” on page 19 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 19
   - “Troubleshooting by system LEDs and diagnostics display” on page 36

   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 6 “System configuration” on page 289.

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 that the server intends to use.

Chapter 5. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components.

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

Attention: 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 prevent exposure to static electricity which might lead to system halt and loss of data.

- 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 60 and "Handling static-sensitive devices" on page 60.
- 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 enter the model name or machine type of your server in the search bar to navigate to the support page.
  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/sr630v4/7dg8/downloads/driver-list/ and 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 Best Recipe code level menu for cluster supported firmware and driver before you update the code.
- If you replace a part, such as an adapter that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see "Update the firmware" on page 289.
- It is good practice to make sure that the server is working normally before you install an optional component.
- Keep the working area clean, and place removed components on a flat and sturdy surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.

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  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a Torx T8 and a T30 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 supply units, 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 fan-packs, 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.
- Except PSU, orange on a component or an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (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.
- PSU with a release tab is a hot-swap PSU.
- 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 that 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.

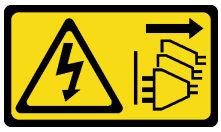
CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the IEC 62368-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes that you are qualified in the servicing of equipment 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. If your working condition necessitates the server being powered off or you intend to power off, make sure that the power cord is disconnected.

   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.

   Note: Under certain circumstances, powering off the server is not a prerequisite. Refer to the precautions before conducting any tasks.
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 unit 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 unit 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: 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 prevent exposure to static electricity which might lead to system halt and loss of data.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.

- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

Memory module installation rules and order

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

Supported memory types

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

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

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

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

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

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

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

Memory modules and processors layout

The following illustration helps you to locate the memory module slots on the processor board. The memory-channel identification table below shows the relationship between the processors, memory controllers, memory channels, and memory module slot numbers.

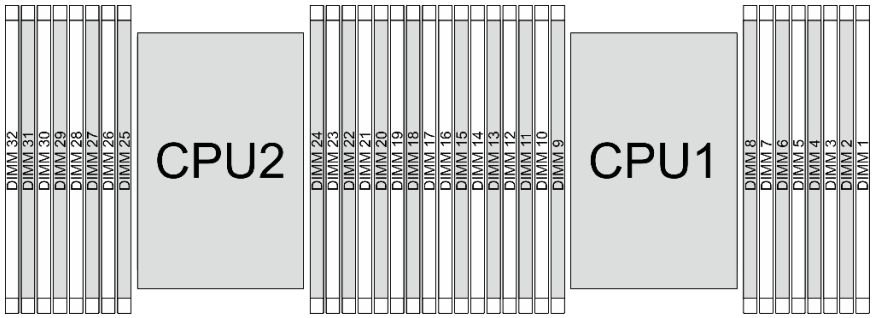


Figure 32. Memory module slots on the processor board

Table 24. Memory slot and channel identification

Processor	**CPU 1**															
Controller	iMC3				iMC2				iMC0				iMC1			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Processor	**CPU 2**															
Controller	iMC3				iMC2				iMC0				iMC1			

Table 24. Memory slot and channel identification (continued)

Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

- Slot No.: DIMM slot number in each memory channel. Each memory channel has two DIMM slots: slot 0 (further from the processor) and slot 1 (closer to the processor).
- DIMM No.: DIMM slot number on the processor board. Each processor has 16 DIMM slots.

Memory module installation guideline

- For the installation rules and population sequence, see "**Independent mode installation order**" on page 63 and "Mirroring mode installation order" on page 64.
- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup Utility to enable the new DIMM manually.

Installation order for E-Cores series processors

See the section to understand the memory module installation order for E-Cores series processors.

For RDIMMs and 10x4 RDIMMs, the following two memory modes are available.

Independent mode installation order

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

Independent mode installation rules

Follow the rules below when installing memory modules in independent mode:

- All DDR5 memory modules must operate at the same speed in the same system.
- Memory population must be identical between processors.
- Memory modules from different vendors are supported.
- In each memory channel, populate the slot farthest from the processor (slot 0) first.
- All DIMMs must be all DDR5 DIMMs.
- x8 DIMMs and x4 DIMMs cannot be mixed in a system.
- All memory modules to be installed must be of the same type.
- All memory modules in a system must have the same number of ranks.

The following table shows the sequence of populating memory modules for independent mode when only one processor (processor 1) is installed.

Table 25. Independent mode with one processor

Total DIMMs	**Processor 1**															
	16	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
8 DIMMs[Note]	16		14		12		10			7		5		3		1

Table 25. Independent mode with one processor (continued)

16 DIMMs[Note]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Note: DIMM configurations that support Software Guard Extensions (SGX). See "Enable Software Guard Extensions (SGX)" on page 294 to enable this feature.

The following table shows the sequence of populating memory modules for independent mode when two processors (processor 1 and processor 2) are installed.

Table 26. Independent mode with two processors

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

Note: DIMM configurations that support Software Guard Extensions (SGX). See "Enable Software Guard Extensions (SGX)" on page 294 to enable this feature.

Mirroring mode installation order

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

In mirroring mode, each memory module in a pair must be identical in size and architecture. The channels are grouped in pairs with each channel receiving the same data. One channel is used as a backup of the other, which provides redundancy.

Follow the rules below when installing memory modules in mirroring mode:

- All memory modules to be installed must be of the same Lenovo part number.
- Mirroring can be configured across channels in the same iMC, and the total TruDDR5 memory size of the primary and secondary channels must be the same.
- Partial Memory Mirroring is a sub-function of memory mirroring. It requires to follow the memory population for memory mirroring.

The following table shows the memory module population sequence for mirroring mode when only one processor (processor 1) is installed.

Table 27. Mirroring mode with one processor (processor 1)

Configuration	DIMM slots															
	16	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
8 DIMMs[Note]	16		14		12		10			7		5		3		1
16 DIMMs[Note]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Note: DIMM configurations that support Software Guard Extensions (SGX). See "Enable Software Guard Extensions (SGX)" on page 294 to enable this feature.

The following table shows the memory module population sequence for mirroring mode when two processors (processor 1 and processor 2) are installed.

Table 28. Mirroring mode with two processors (processor 1 and processor 2)

Configuration	DIMM slots															
	16	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
16 DIMMs[Note]	16		14		12		10			7		5		3		1
32 DIMMs[Note]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Configuration	**DIMM slots**															
	32	**31**	**30**	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**
16 DIMMs[Note]	32		30		28		26			23		21		19		17
32 DIMMs[Note]	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Note: DIMM configurations that support Software Guard Extensions (SGX). See "Enable Software Guard Extensions (SGX)" on page 294 to enable this feature.

Technical rules

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

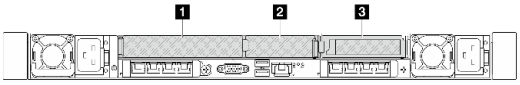
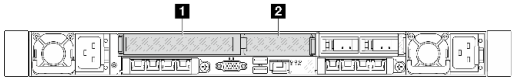
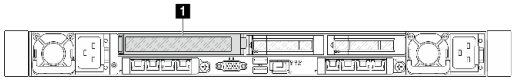
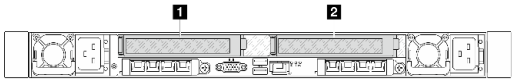
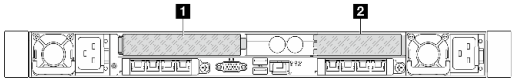
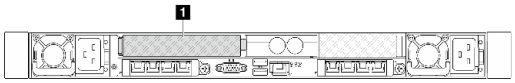
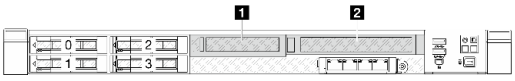
PCIe slots and adapters

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

- "PCIe slots supported for different models" on page 66
- "PCIe adapter installation rules and order" on page 66
- "Server rear configuration and riser assemblies" on page 67

PCIe slots supported for different models

Table 29. PCIe slots supported and locations

Server rear and front view	Supported types and slot location
	**Riser 1 assembly** • 1 Slot 1: PCIe 5 (x16, x8), full-height, half-length • 2 Slot 2: PCIe 5 (x16, x8), low-profile **Riser 2 assembly** • 3 Slot 3: PCIe 5 (x16), low-profile
	**Riser 1 assembly** • 1 Slot 1: PCIe 5 (x16, x8), full-height, half-length • 2 Slot 2: PCIe 5 (x16, x8), low-profile
	**Riser 1 assembly** 1 Slot 1: PCIe 5 (x16), full-height, half-length
	**Riser 1 assembly** • 1 Slot 1: PCIe 5 (x16), full-height, half-length **Riser 2 assembly** • 2 Slot 3: PCIe 5 (x16), full-height, half-length
	**Riser 1 assembly** • 1 Slot 1: PCIe 5 (x16), full-height, half-length **Riser 2 assembly** • 2 Slot 3: PCIe 5 (x16), low-profile
	**Riser 1 assembly** 1 Slot 1: PCIe 5 (x16), full-height, half-length
	**Riser 3 assembly** • 1 Slot 4: PCIe 5 (x16), low-profile **Riser 4 assembly** • 2 Slot 5: PCIe 5 (x16), full-height, half-length

PCIe adapter installation rules and order

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

Table 30. Recommended installation priority for different types of PCIe adapters

Installation priority	
1. OCP module	2. InfiniBand adapter
3. Network adapter	4. Serial port (COM) bracket

Table 31. Recommended slot installation priority for PCIe adapters

Adapter type	Recommended slot installation priority	PCIe adapters
OCP module	• Chassis with the front adapter assembly: slot 8 and 7 • Chassis without the front adapter assembly: slot 6 and 7 Maximum quantity supported: 2	ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port OCP Ethernet Adapter ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port OCP Ethernet Adapter ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port OCP Ethernet Adapter
InfiniBand adapter	Slot 5 > Slot 4 > Slot 1 > Slot 2 > Slot 3 Maximum quantity supported: 5	ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter
NIC adapter	Slot 5 > Slot 4 > Slot 1 > Slot 2 > Slot 3 Maximum quantity supported: 5	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port PCIe Ethernet Adapter ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter
	Slot 5 > Slot 1 > Slot 3 Maximum quantity supported: 3	ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port PCIe Ethernet Adapter

Server rear configuration and riser assemblies

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

Table 32. Server rear configuration and riser assemblies[1]

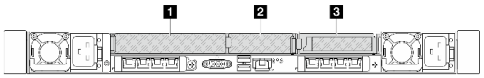
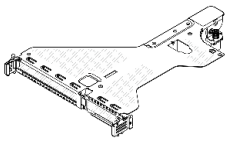
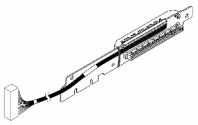
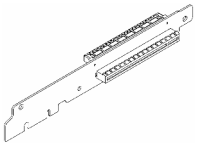
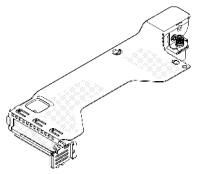
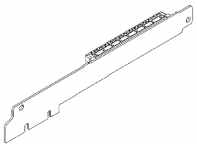
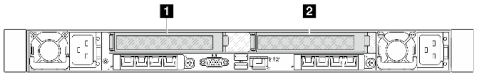
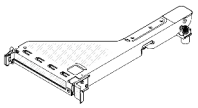
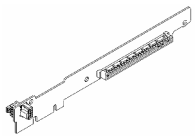
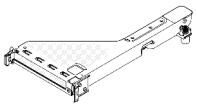
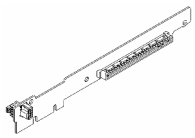
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 33. Three PCIe slots*	 *Figure 34. LP-FH riser bracket*  *Figure 35. BF[2] riser card*  *Figure 36. BF riser card*	 *Figure 37. LP riser bracket*  *Figure 38. LP riser card*
 *Figure 39. Two PCIe slots*	 *Figure 40. FH riser bracket 1*  *Figure 41. FH riser card*	 *Figure 42. FH riser bracket 2*  *Figure 43. FH riser card*

Table 32. Server rear configuration and riser assemblies[1] (continued)

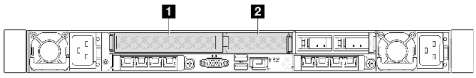
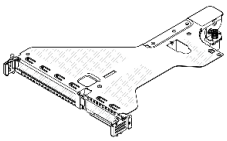
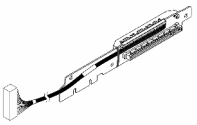
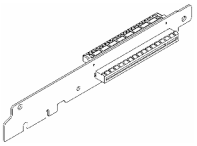
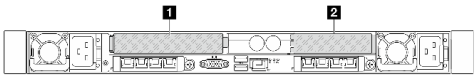
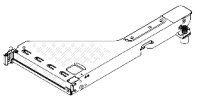
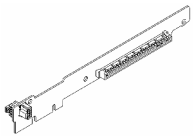
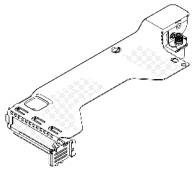
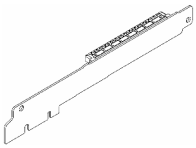
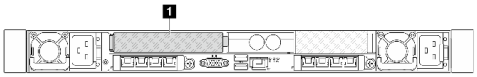
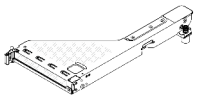
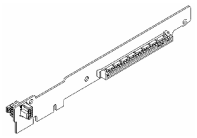
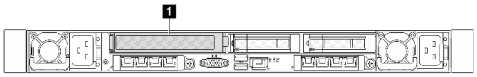
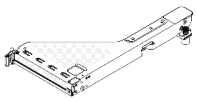
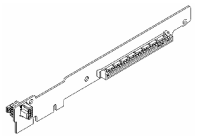
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 44. Two PCIe slots*	 *Figure 45. LP-FH riser bracket*  *Figure 46. BF[2] riser card*  *Figure 47. BF riser card*	Riser 2 assembly is not supported.
 *Figure 48. Two PCIe slots*	 *Figure 49. FH riser bracket 3*  *Figure 50. FH riser card*	 *Figure 51. LP riser bracket*  *Figure 52. LP riser card*

Table 32. Server rear configuration and riser assemblies[1] (continued)

Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 53. One PCIe slot*	 *Figure 54. FH riser bracket 3*  *Figure 55. FH riser card*	Riser 2 assembly is not supported.
 *Figure 56. One PCIe slot*	 *Figure 57. FH riser bracket 3*  *Figure 58. FH riser card*	Riser 2 assembly is not supported.

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.

Technical rules for drives

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

Drive installation rules

The following rules for drives provide information that you must consider when you install 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 19 for more details.
2. The drives in a single RAID array must be of the same type (as in hard disk drives, solid-state drives, 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.

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. Install NVMe drives in a descending bay sequence order, 9 → 8 →7...

Thermal rules

This topic provides thermal rules for the server.

- "Server models with front drive bays only" on page 71
- "Server models with front and rear drive bays" on page 72
- "Server models with NeptAir module" on page 72
- "Server models with NeptCore module" on page 73

Server models with front drive bays only

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

Configuration	• **Backplane-less configuration** • **4 x 2.5'' NVMe** • **4 x 2.5'' NVMe with two low-profile PCIe adapters**			
Max. Ambient Temp. (at sea level)	35°C			30°C
CPU TDP (watts)	185 ≤ TDP ≤ 205	205 < TDP ≤ 250	250 < TDP ≤ 300	300 < TDP ≤ 350
Heat sink	Standard	Performance	Performance	Performance
Air baffle	√	x	x	x
Fan type	Standard	Performance	Performance	Performance
DIMM capacity	≤ 64 GB	≤ 64 GB	≤ 64 GB	≤ 64 GB
Max. DIMM Qty.	32	32	32	32

Configuration	• **8 x 2.5'' NVMe** • **10 x 2.5'' NVMe**			
Max. Ambient Temp. (at sea level)	35°C		30°C	
CPU TDP (watts)	185 ≤ TDP ≤ 205	205 < TDP ≤ 250	250 < TDP ≤ 300	300 < TDP ≤ 350
Heat sink	Standard	Performance	Performance	Performance
Air baffle	√	x	x	x
DIMM capacity	≤ 64 GB	≤ 64 GB	≤ 64 GB	≤ 64 GB
Fan type	Performance	Performance	Performance	Performance
Max. DIMM Qty.	32	32	32	32

Notes:

When the server is installed with below adapters with the AOC transceiver:	Follow below rules:
• **ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter** • **ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter**	• **Must use high-performance fan-packs.** • **The ambient temperature must be limited to 27°C or lower when CPU TDP ≥ 250W.** • **The ambient temperature must be limited to 30°C or lower when CPU TDP < 250W.**

When the server is installed with rear M.2 drive assembly, must install an M.2 drive heat sink.

Server models with front and rear drive bays

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

Configuration	• **10 x 2.5'' NVMe** • **Rear 2 x 2.5'' NVMe/U.2/U.3**			
Max. Ambient Temp. (at sea level)	35°C	30°C		25°C
CPU TDP (watts)	185 ≤ TDP ≤ 205	225 < TDP ≤ 250	250 < TDP ≤ 300	300 < TDP ≤ 350
Heat sink	Performance	Performance	Performance	Performance
Air baffle	x	x	x	x
Fan type	Performance	Performance	Performance	Performance
DIMM capacity	≤ 64 GB	≤ 64 GB	≤ 64 GB	≤ 64 GB
Max. DIMM Qty.	32	32	32	32

Notes:

When the server is installed with below adapters with the AOC transceiver:	Follow below rules:
• **ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter** • **ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter**	• **Must use high-performance fan-packs.** • **The ambient temperature must be limited to 27°C or lower when CPU TDP ≥ 250W.** • **The ambient temperature must be limited to 30°C or lower when CPU TDP < 250W.**

When the server is installed with rear M.2 drive assembly, must install an M.2 drive heat sink.

Server models with NeptAir module

This section provides thermal information for server models installed with the Processor Neptune™ Air Module (NeptAir).

Configuration[1,2]	• **Backplane-less configuration** • **4 x 2.5'' NVMe** • **8 x 2.5'' NVMe** • **10 x 2.5'' NVMe**			
Max. Ambient Temp. (at sea level)	35°C			30°C
CPU TDP (watts)	185 ≤ TDP ≤ 205	205 < TDP ≤ 250	250 < TDP ≤ 300	300 < TDP ≤ 350
Heat sink	Processor Neptune™ Air Module (NeptAir)			
Air baffle	x			
Fan type	Performance			
DIMM capacity	≤ 64 GB			
Max. DIMM Qty.	32			

Notes:

1. The server models installed with NeptAir module do not support rear drives or GPUs.
2. The server models installed with NeptAir module do not support 4 x 2.5'' front drives with front adapter assembly.

When the server is installed with below adapters with the AOC transceiver:	**Follow below rules:**
• **ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter** • **ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter**	• **Must use high-performance fan-packs.** • **The ambient temperature must be limited to 27°C or lower when CPU TDP ≥ 250W.** • **The ambient temperature must be limited to 30°C or lower when CPU TDP < 250W.**

When the server is installed with rear M.2 drive assembly, must install an M.2 drive heat sink.

Server models with NeptCore module

This section provides thermal information for server models installed with the Processor Neptune™ Core Module (NeptCore).

Configuration	• **Backplane-less configuration** • **4 x 2.5'' NVMe** • **8 x 2.5'' NVMe** • **10 x 2.5'' NVMe**
CPU TDP (watts)	TDP ≤ 350
Max. Ambient Temp. (at sea level)	35°C
Max. Liquid[1] inlet Temp. (at sea level)	45°C
Heat sink	Processor Neptune™ Core Module (NeptCore)

Configuration	• **Backplane-less configuration** • **4 x 2.5'' NVMe** • **8 x 2.5'' NVMe** • **10 x 2.5'' NVMe**
Air baffle	x
Fan type	Standard[2,3]
DIMM capacity	≤ 64 GB
Max. DIMM Qty.	32

Notes:

1. The liquid flow rate for de-ionized water should be no less than 0.5 liters per minute (lpm).
2. When the server is installed with any ≥ 100 GbE AOC transceiver:
   - With standard fan-packs, the ambient temperature must be limited to 30°C or lower.
   - With high-performance fan-packs, the ambient temperature must be limited to 35°C or lower.
3. When the server is installed with rear M.2 drive assembly, must install an M.2 drive heat sink.

When the server is installed with below adapters with the AOC transceiver:	**Follow below rules:**
• **ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter** • **ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter**	• **The ambient temperature must be limited to 30°C or lower when installed with standard fan-packs.** • **The ambient temperature must be limited to 35°C or lower when installed with high-performance fan-packs.**

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 19
- “Troubleshooting by system LEDs and diagnostics display” on page 36

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 75.

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 19
- “Troubleshooting by system LEDs and diagnostics display” on page 36

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 74.

Rail replacement

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

- “Remove the rails from the rack” on page 75
- “Install the rails to the rack” on page 77

Remove the rails from the rack

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the server from the rack. See “Remove the server from the rack (friction rails)” on page 82 and “Remove the server from the rack (slide rails)” on page 89.

Step 2. Remove the M6 screws installed on the rear of the rails.

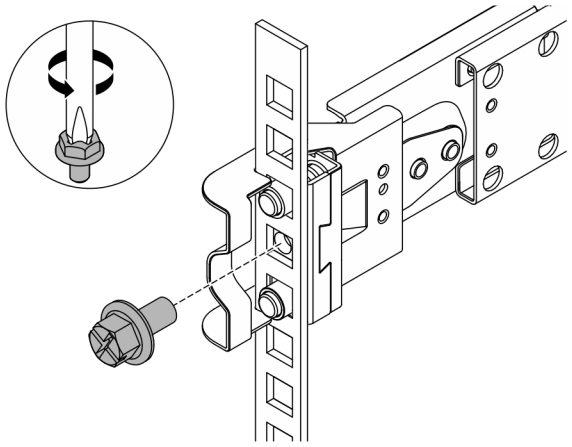


Figure 59. Removing the M6 screw

Step 3. Remove the rails from the rack.

a. Remove the rail on the front.

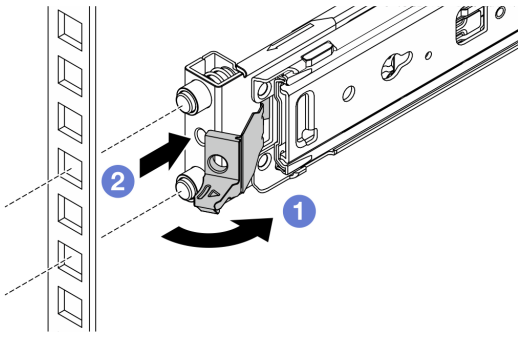


Figure 60. Removing the rail on the front

1. Open and hold the front latch to disengage the front end of the rail.
2. Push the rail forward and remove it from the rack.

b. Remove the rail on the rear.

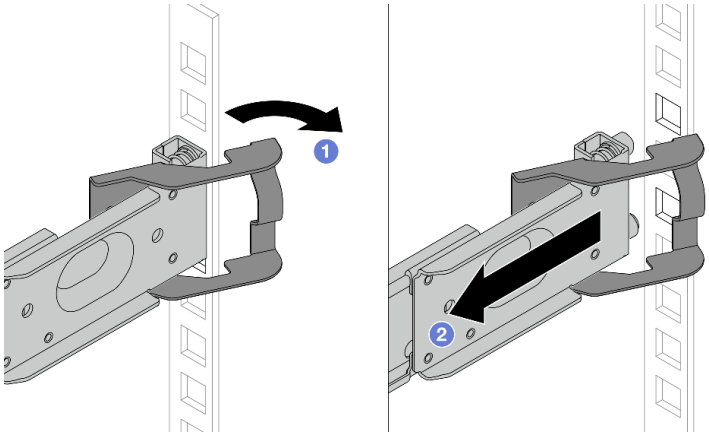


Figure 61. Removing the rail on the rear

1. Open and hold the rear latch to disengage the rear end of the rail.
2. Remove the rail from the rear mounting flanges.

After you finish

Install a replacement unit. See the instructions in *Rail Installation Guide* that comes with the rail kit. For more information, see ThinkSystem rack server rail options.

Install the rails to the rack

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

- “Install the rails to the rack (friction rail)” on page 77
- “Install the rails to the rack (slide rail)” on page 79

Install the rails to the rack (friction rail)

Follow instructions in this section to install ThinkSystem Toolless Friction Rail Kit V4 to the rack.

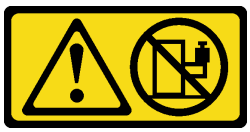
S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006



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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the “Installation Guidelines” on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

Procedure

Step 1. Install the rear mounting pins to the rack.

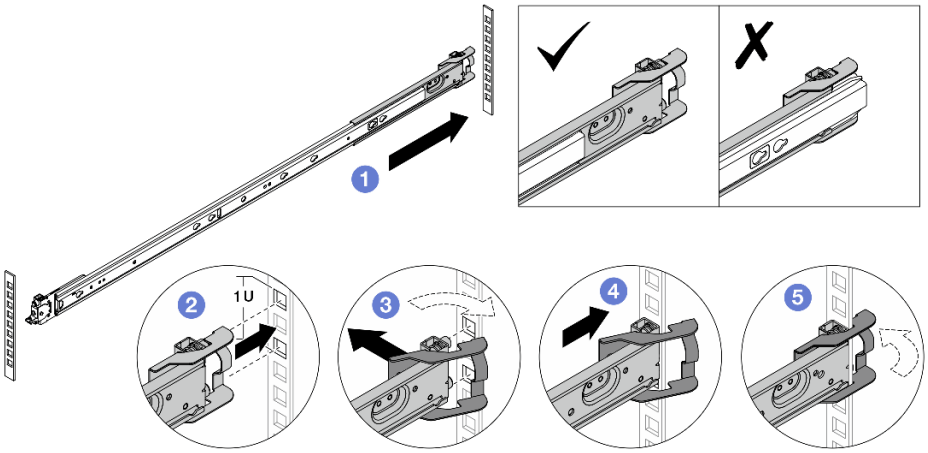


Figure 62. Installing rear mounting pins

a. 1 Extend the outer rail toward the rear mounting flanges in the rack.
b. 2 Align the mounting pins with the rear mounting flanges and set the opening of the rear latch against the rack frame.
c. 3 Push the rail toward outside of the rack until the rear latch opens.
d. 4 Push the rail toward the rear mounting flanges.
e. 5 Rotate the rear latch back to the closed position.

Step 2. Install the front mounting pins to the rack.

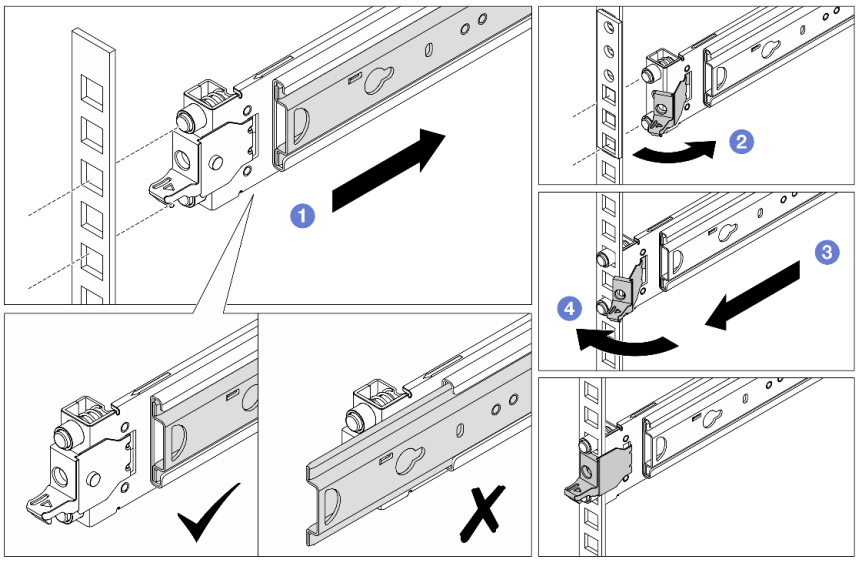


Figure 63. Installing front mounting pins

a. 1 Slide the inner rail all the way in to allow the front latch to open.

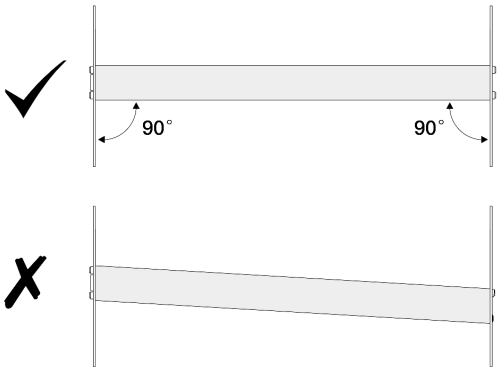
b. 2 Open the front latch and align the mounting pins with corresponding front mounting flanges.

c. 3 Pull the rail forward until the mounting pins go through the holes.

d. 4 Release the front latch to secure the rail to the rack.

Step 3. Make sure that the rail is securely engaged in the flange holes by inspecting that the hook has caught and by sliding back and forward to ensure the rail does not pop out.

Important: Make sure both ends of the rail are seated at the same height.



Step 4. Repeat Step 1 on page 78 to Step 3 on page 79 to install the other rail.

Step 5. Install the server to the rack, see “Install the server to the rack (friction rails)” on page 85.

Install the rails to the rack (slide rail)

Follow instructions in this section to install ThinkSystem Toolless Slide Rail Kit V4 and ThinkSystem Advanced Toolless Slide Rail Kit V4 to the rack.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the "Installation Guidelines" on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

Procedure

Step 1. Install the rear mounting pins to the rack.

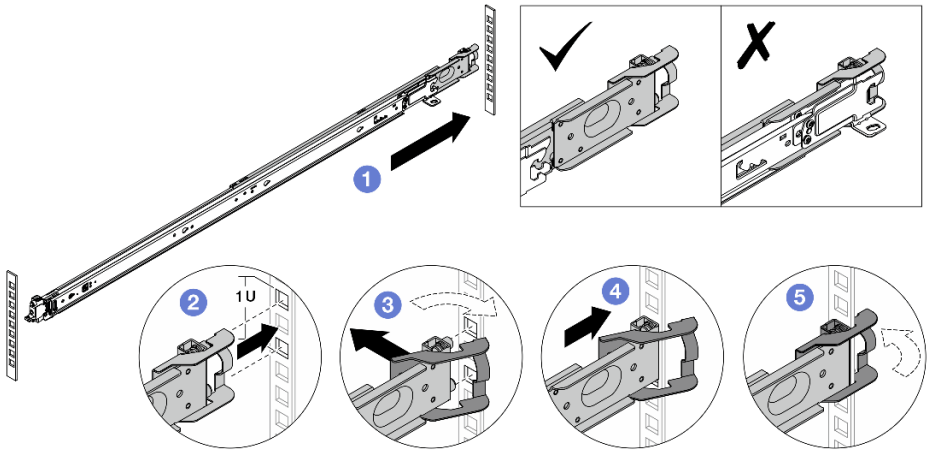


Figure 64. Installing rear mounting pins

a. 1 Extend the outer rail toward the rear mounting flanges in the rack.

b. 2 Align the mounting pins with the rear mounting flanges and set the opening of the rear latch against the rack frame.

c. 3 Push the rail toward outside of the rack until the rear latch opens.

d. 4 Push the rail toward the rear mounting flanges.

e. 5 Rotate the rear latch back to the closed position.

Step 2. Install the front mounting pins to the rack.

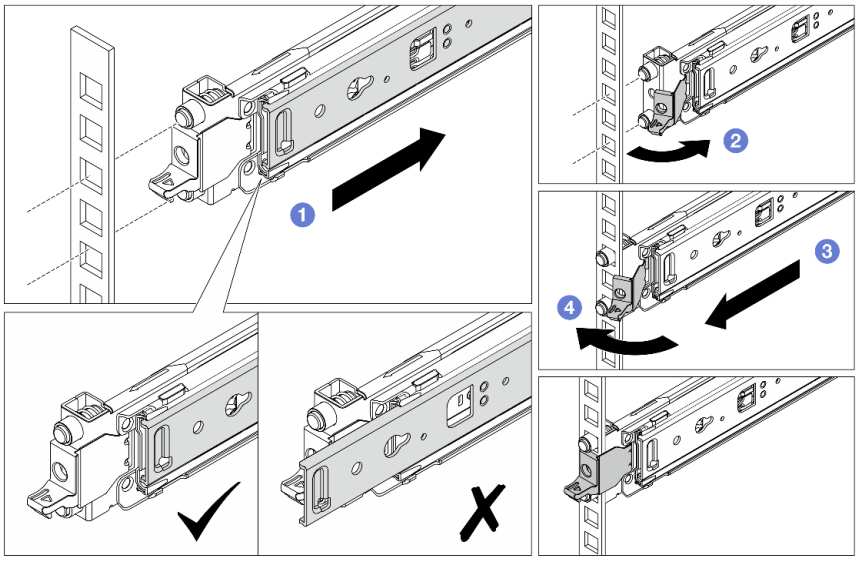


Figure 65. Installing front mounting pins

a. 1 Slide the inner rail all the way in to allow the front latch to open.

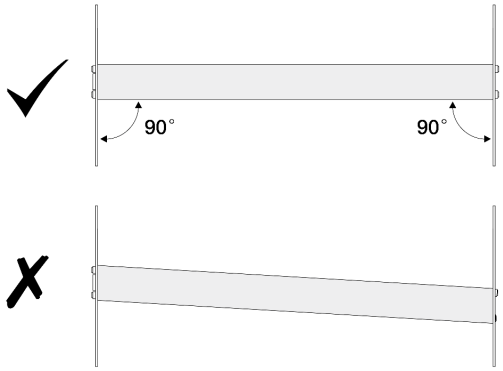
b. 2 Open the front latch and align the mounting pins with corresponding front mounting flanges.

c. 3 Pull the rail forward until the mounting pins go through the holes.

d. 4 Release the front latch to secure the rail to the rack.

Step 3. Make sure that the rail is securely engaged in the flange holes by inspecting that the hook has caught and by sliding back and forward to ensure the rail does not pop out.

Important: Make sure both ends of the rail are seated at the same height.



Step 4. Repeat Step 1 on page 80 to Step 3 on page 82 to install the other rail.

Step 5. Install the server to the rack, see “Install the server to the rack (slide rails)” on page 93.

Server replacement

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

- “Remove the server from the rack (friction rails)” on page 82
- “Install the server to the rack (friction rails)” on page 85
- “Remove the server from the rack (slide rails)” on page 89
- “Install the server to the rack (slide rails)” on page 93

Remove the server from the rack (friction rails)

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

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the "Installation Guidelines" on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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 rack latches to disengage it from the rack.

Rack front

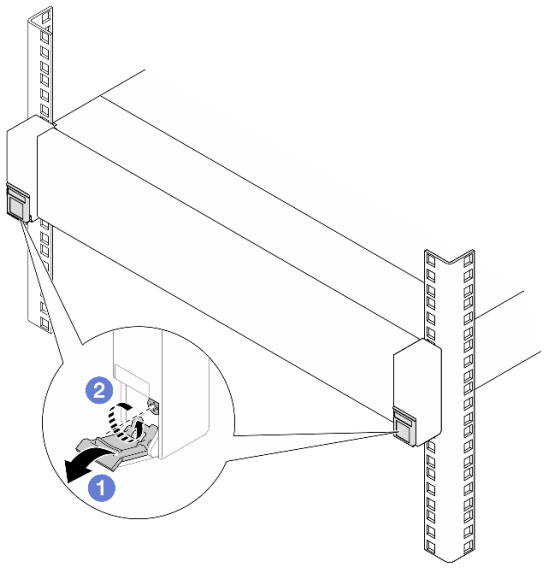


Figure 66. Loosening screws in rack latches

a. 1 Flip down the covers on the rack latches.

b. 2 Loosen the screws that secure the server.

Step 2. Slide the server all the way out until it stops and remove it from the outer rails.

CAUTION:
Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

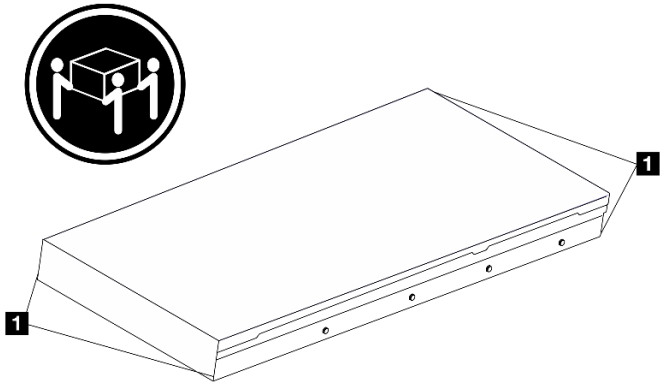


Figure 67. Lifting up the server

Rack Front

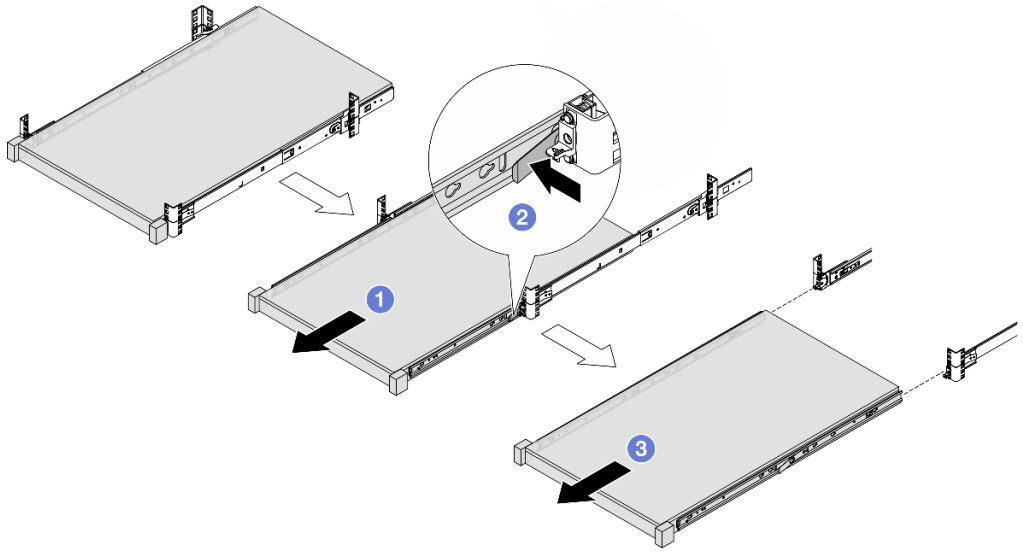


Figure 68. Removing the server

a. 1 Slide the server out until the release latches are accessible.

b. 2 Press the release latches.

c. 3 With three people, slide the server out to remove it from the outer rails. Place the server on a flat and sturdy surface.

Step 3. Remove the inner rails from the server.

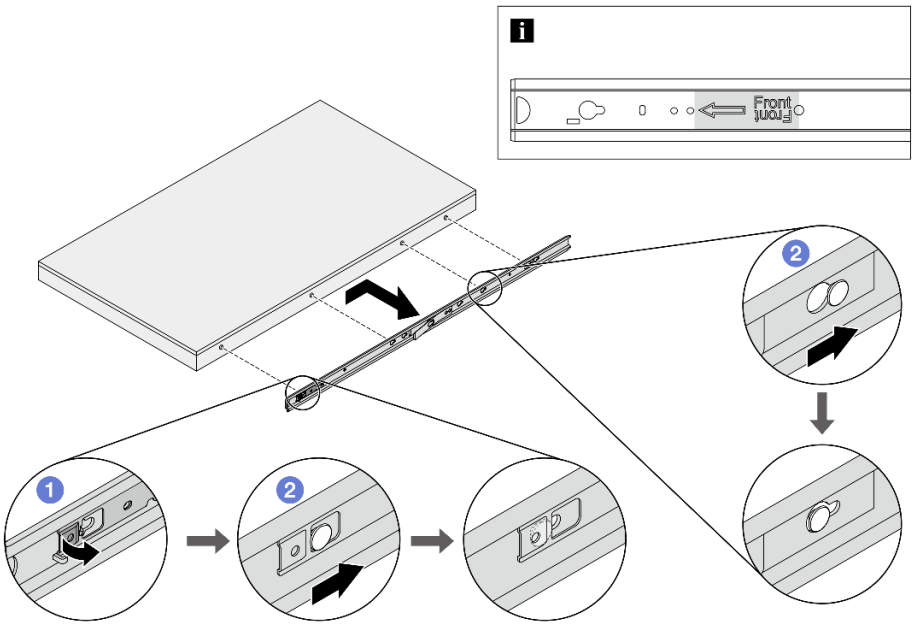


Figure 69. Removing the inner rails

a. 1 Flip the touch point to unlock the inner rail.

b. 2 Push the inner rail backwards until the T-pins on the server disengaged from the inner rail.

Step 4. Repeat the previous step to the other rail.

After you finish

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

Install the server to the rack (friction rails)

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

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the "Installation Guidelines" on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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 and remove the inner rails.

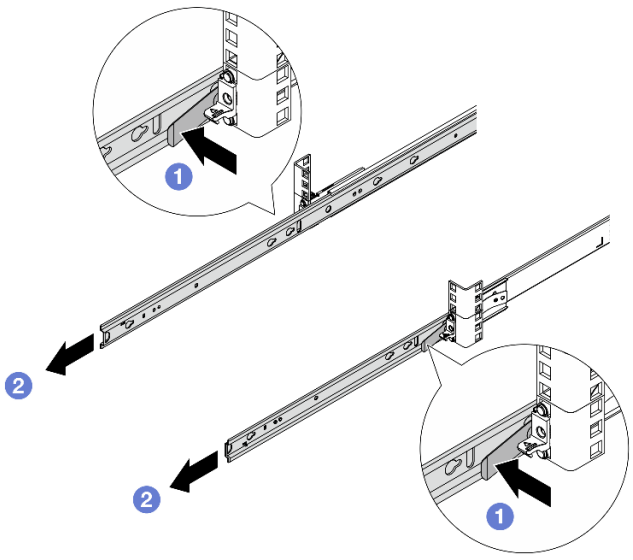


Figure 70. Removing the inner rails

a. 1 Press the release latches.

b. 2 Disengage the inner rails from the outer rails.

Step 2. Install the inner rail to the server.

Note: Make sure that the stamp “Front” always faces toward the front when assembling the inner rails to the server.

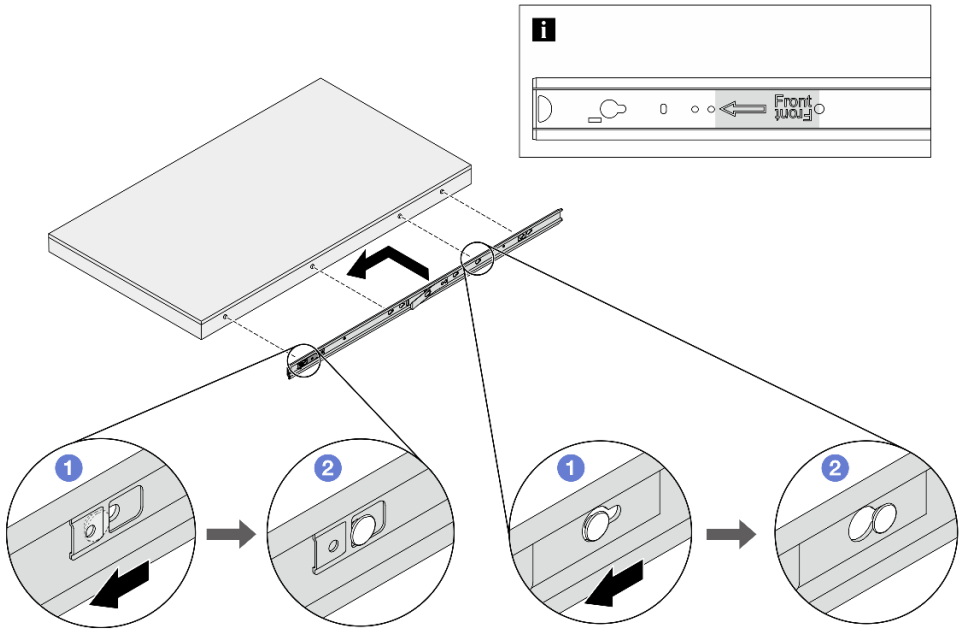


Figure 71. Installing the inner rails

a. 1 Align the slots on the inner rail with the corresponding T-pins on the side of the server.

b. 2 Slide the inner rail forwards until the T-pins lock into place.

Step 3. Repeat the previous step to the other rail.

Step 4. Carefully lift up the server with three people.

CAUTION:
Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

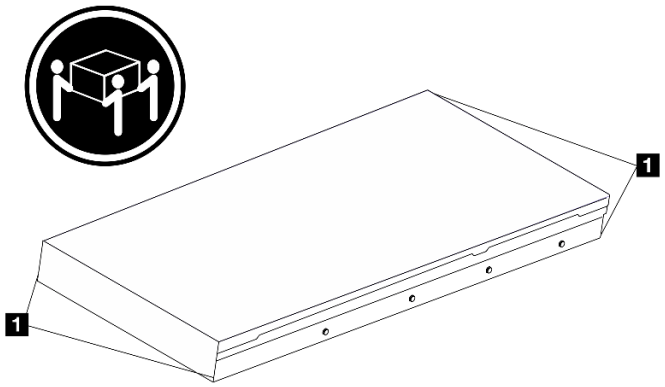


Figure 72. Lifting up the server

Step 5. From the front of the rack, install the server into the outer rails.

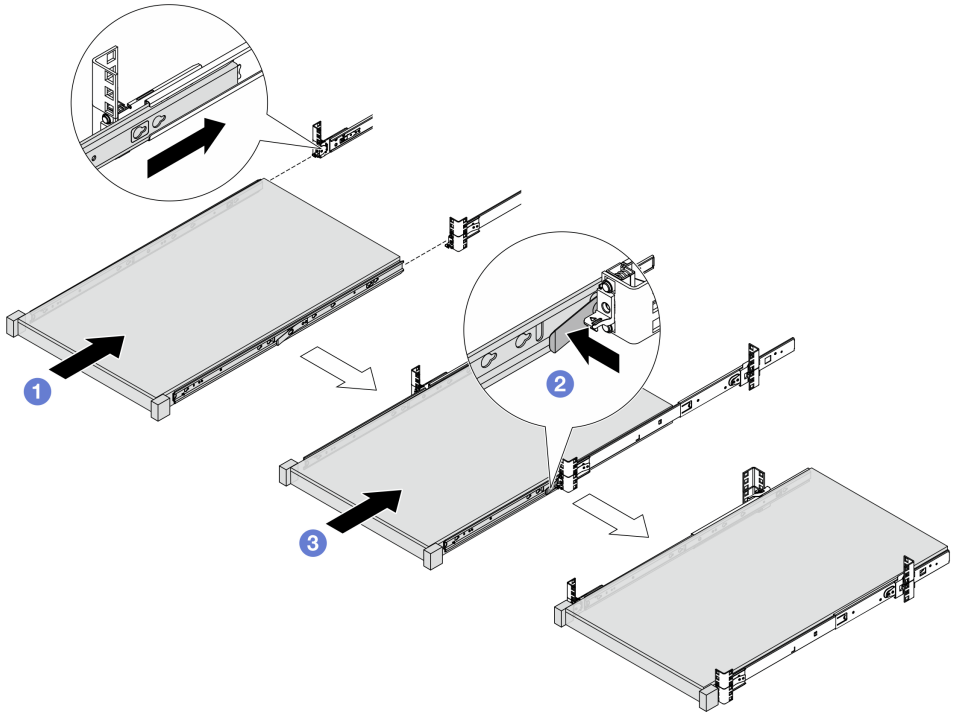


Figure 73. Installing the server

a. 1 Align the rail slots and push the server into the rack.

b. 2 Press the release latches.

c. 3 Push the server all the way into the rack until the server locks into place with a click.

Step 6. Secure the server to the rack.

a. Secure the server to the front of the rack. Fasten the two screws located on the rack latches.

Rack front

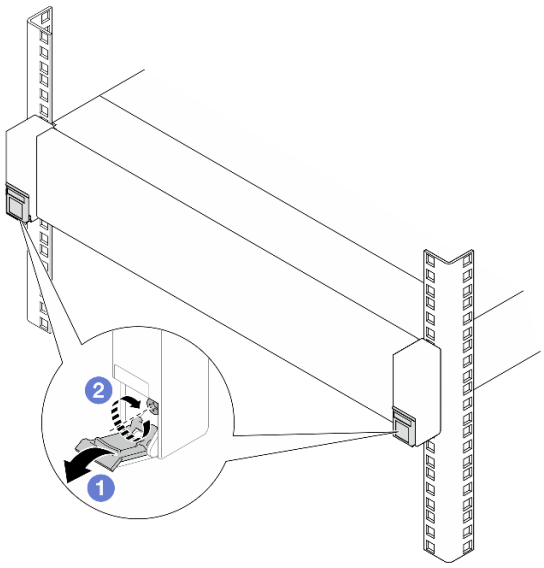


Figure 74. Securing the server to the front of the rack

1. Flip down the covers on the rack latches.
2. Tighten the screws to secure the server.

b. (Optional) Install one M6 screw to each of the rails to secure the server to the rear of the rack.

Rack rear

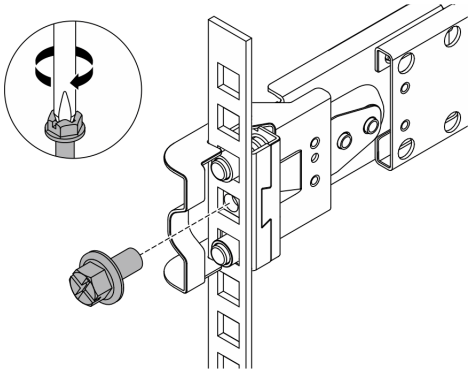


Figure 75. Securing the server to the rear of the rack

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 74.
3. Update the server configuration. See "Complete the parts replacement" on page 288.

Remove the server from the rack (slide rails)

Follow instructions in this section to remove the server from the rack equipped with slide rails.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the "Installation Guidelines" on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

Procedure

Step 1. If the rack has a cable management arm (CMA) installed, remove it first.

Step 2. Disengage the server from the rack on the front.

Rack front

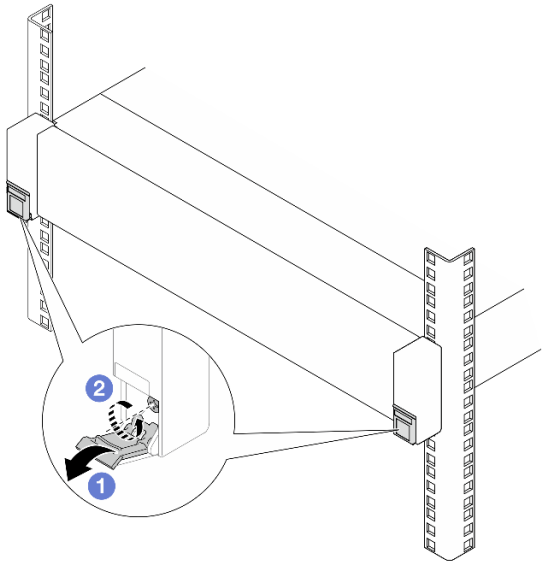


Figure 76. Disengaging server from the rack

a. 1 Flip down the covers on the rack latches.

b. 2 Loosen the screws that secure the server.

Step 3. Remove the server from the rack.

CAUTION:
Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

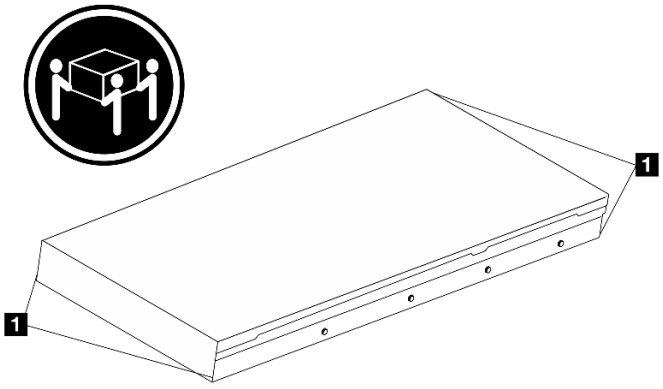


Figure 77. Lifting up the server

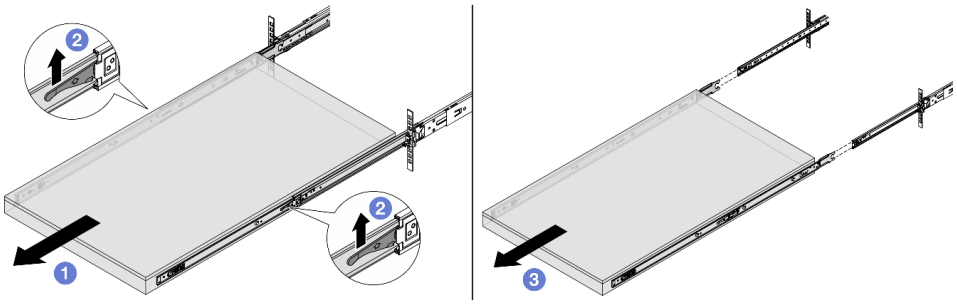


Figure 78. Pulling out the server

a. 1 Slide the server all the way out until it stops.

b. 2 Push up the latches on the rails.

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

Step 4. Remove the inner rails from the server.

Rack Front

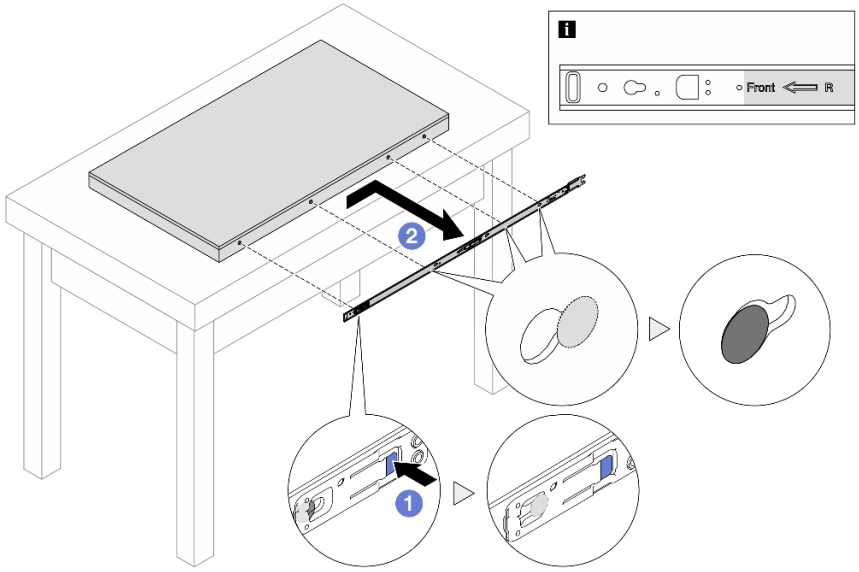


Figure 79. Removing the inner rails

a. 1 Push the blue tab to release the latch.

b. 2 Push the inner rail backwards until the T-pins on the server disengaged from the inner rail.

Step 5. Repeat the previous step to the other rail.

After you finish

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

Install the server to the rack (slide rails)

Follow instructions in this section to install the server to the rack equipped with slide rails.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the “Installation Guidelines” on page 57. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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 and remove the inner rails.

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

Rack front

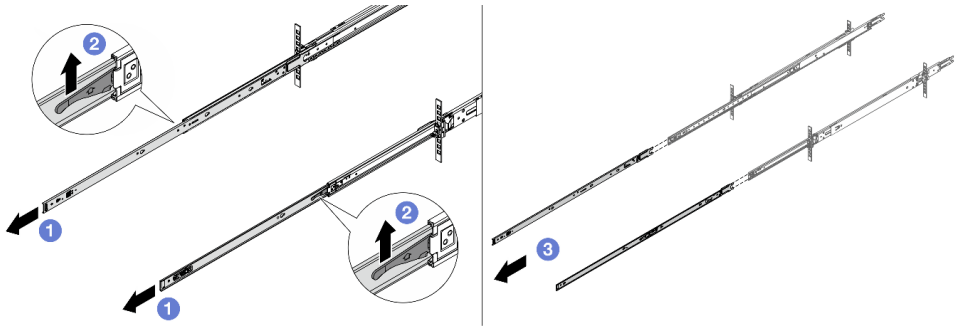


Figure 80. Pulling out the rails

a. Extend the inner rails.
b. Push up the latches to disengage inner rails from the intermediate ones.
c. Remove the inner rails.

Step 2. Install the inner rail to the server. Align the slots on the inner rail with the corresponding T-pins on the side of the server; then, slide the inner rail forwards until the T-pins lock into place with the inner rail.

Notes:

1. Make sure that the stamp “Front” always faces toward the front when assembling the inner rails to the server.
2. “L” and “R” stamps indicate the left and right sides of the rails.

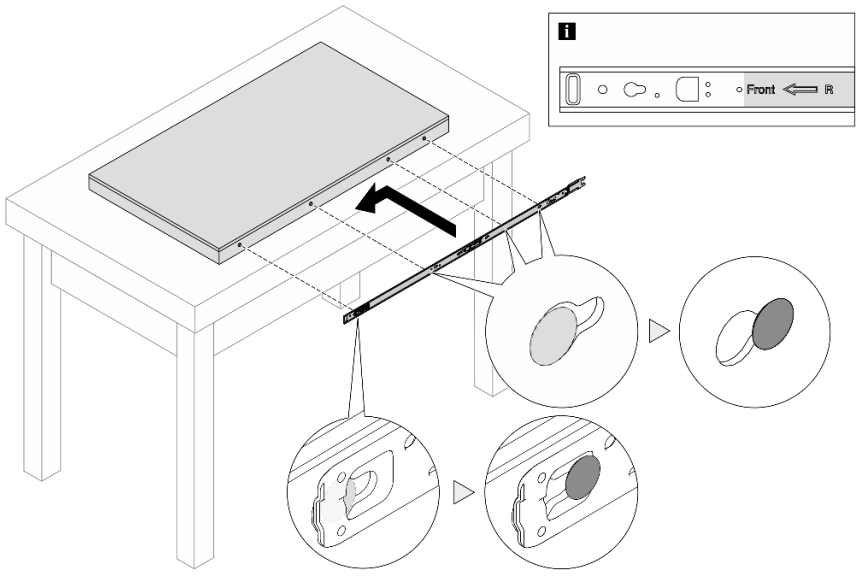


Figure 81. Installing inner rails

Step 3. Repeat the previous step to the other rail.

Step 4. Carefully lift up the server with three people.

CAUTION:

Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

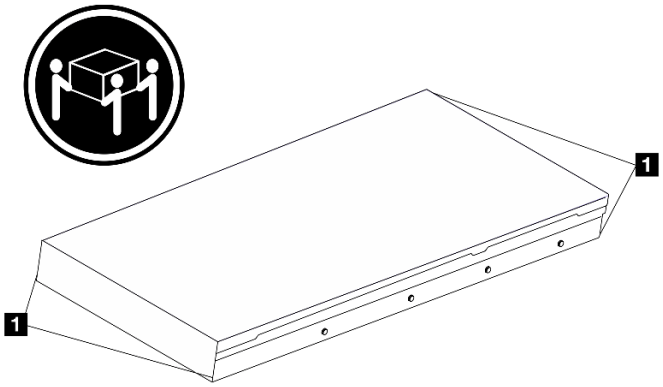


Figure 82. Lifting up the server

Step 5. From the front of the rack, install server into the rails.

Note: Before installing the inner rails to the intermediate ones, make sure that the ball retainers on both sides reach the outmost position. If the retainers are not in good position, slide them to the front until they stop.

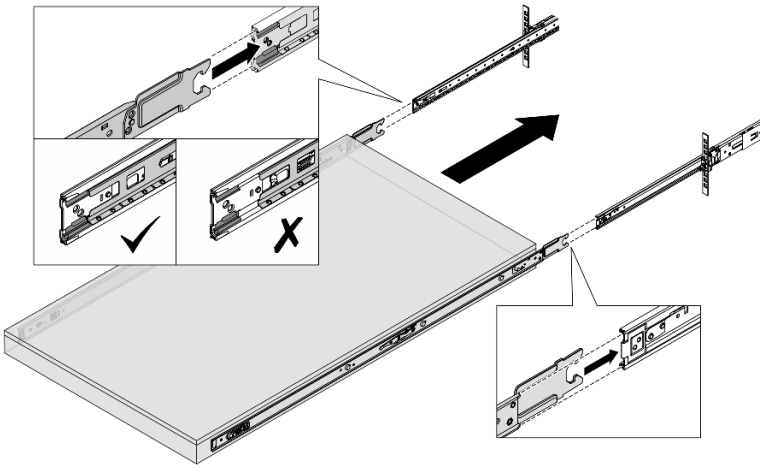


Figure 83. Interlocking rails

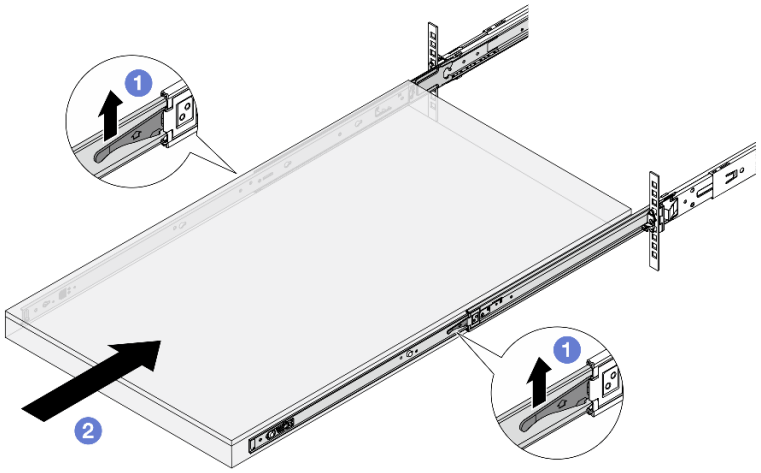


Figure 84. Locking rails and sliding in the server

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 6. Secure the server to the rack.

a. Secure the server to the front of the rack.

Rack front

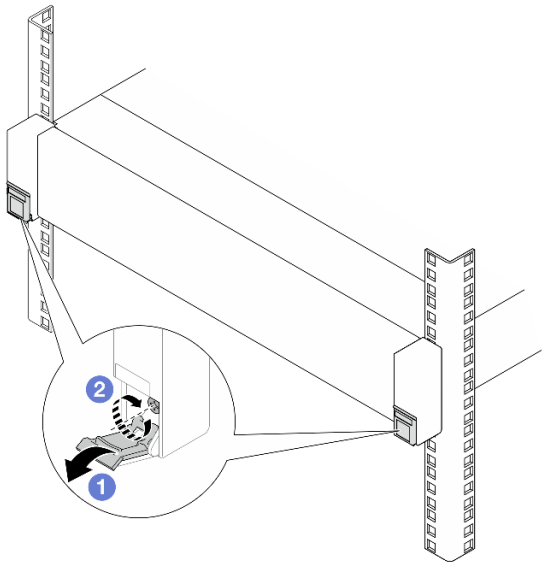


Figure 85. Securing the server to the front of the rack

1 Flip down the covers on the rack latches.

2 Tighten the screws to secure the server.

b. (Optional) Install one M6 screw to each of the rails to secure the server to the rear of the rack.

Rack rear

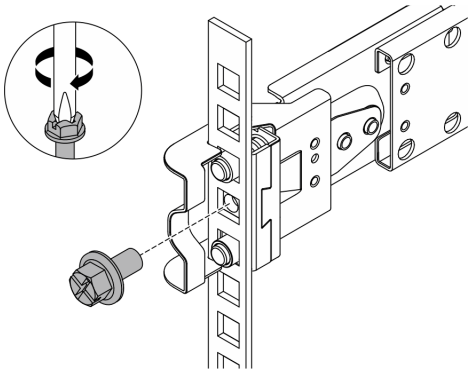


Figure 86. Securing the server to the rear of the rack

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 74.
3. Update the server configuration. See “Complete the parts replacement” on page 288.

Air baffle replacement

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

Note: Air baffles are unavailable when the performance heat sink, Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore) is installed.

- “Remove the air baffle” on page 97
- “Install the air baffle” on page 99

Remove the air baffle

Follow instructions in this section to remove the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to remove might be different from following illustrations, but the removal method is the same.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- If you intend to install memory modules in the server, you must first remove the air baffle from the server.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Grasp the air baffle and carefully lift it out of the server.

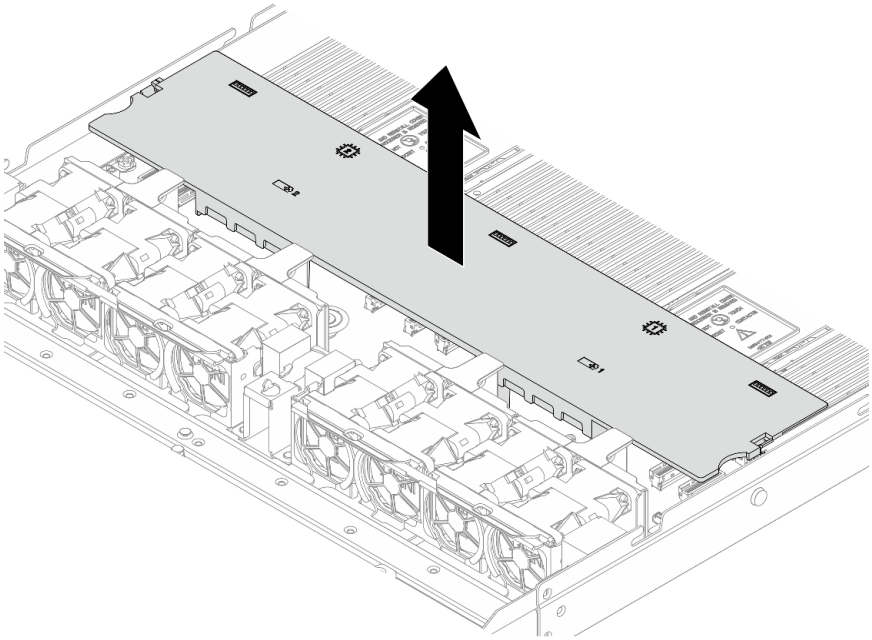


Figure 87. Air baffle removal

Attention: Operating the server with the air baffle removed might damage server components. For proper cooling and airflow, install the air baffle before you power on the server.

After you finish

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

Install the air baffle

Follow instructions in this section to install the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to install might be different from following illustrations, but the installation method is the same.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If you need to install a RAID flash power module on the back side of the air baffle, install it first.

Step 2. Align the clips on the air baffle to the sockets on the cable walls.

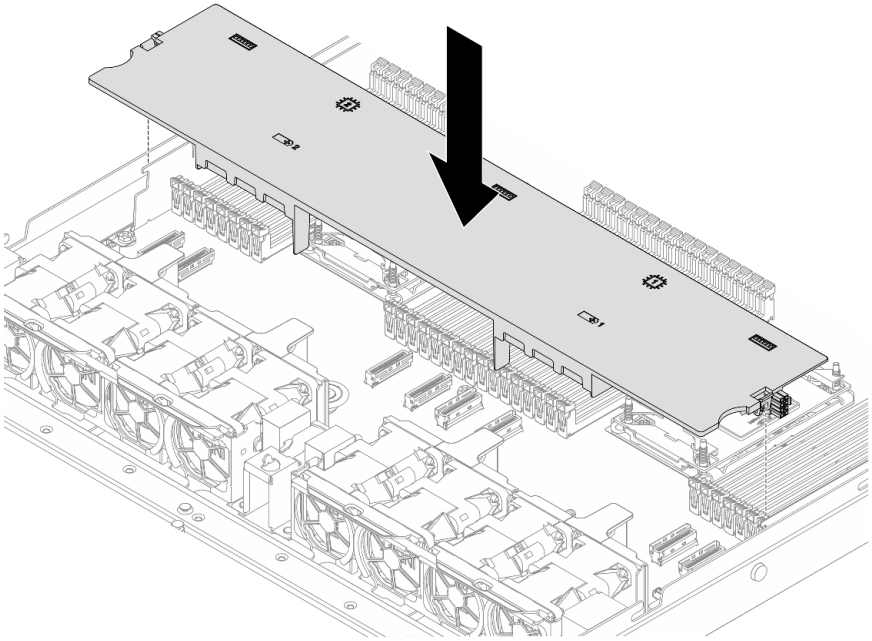


Figure 88. Air baffle installation

Step 3. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Backplane replacement

Use this information to remove and install a backplane.

- “Remove the front 2.5-inch drive backplane” on page 100
- “Install the front 2.5-inch drive backplane” on page 101
- “Remove the 2.5-inch rear drive backplane” on page 102
- “Install the 2.5-inch rear drive backplane” on page 104

Remove the front 2.5-inch drive backplane

Use this information to remove the backplane for four, eight, or 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 57 and “Safety inspection checklist” on page 58 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 75.

- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

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 129.

Step 3. Disconnect the cables from the backplane. See ***Internal Cable Routing Guide***. If the cable connectors come with protective dust caps, make sure to put them back on.

Step 4. Grasp the backplane and carefully lift it out of the chassis.

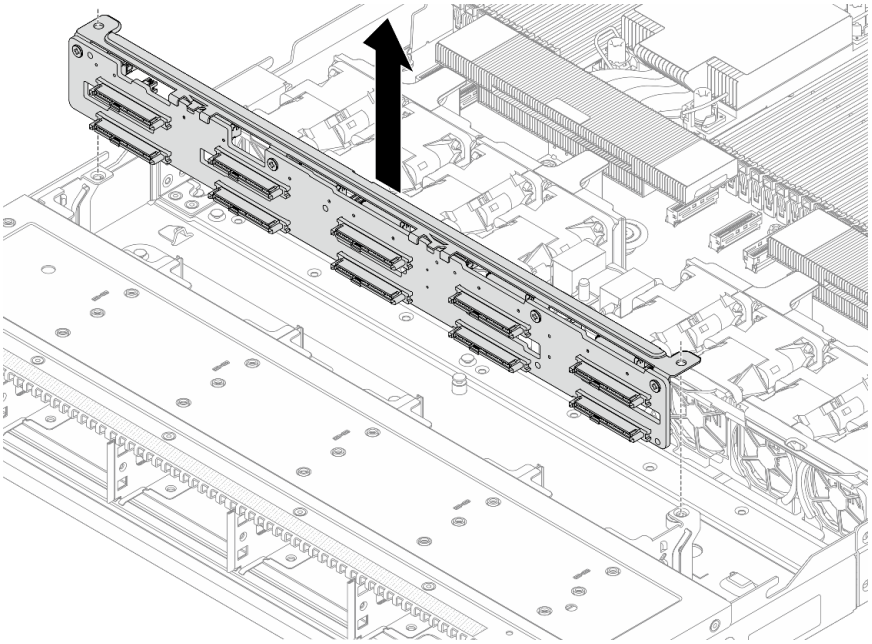


Figure 89. Removal of backplane for ten 2.5-inch hot-swap drives

After you finish

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

Install the front 2.5-inch drive backplane

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

About this task

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

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the front backplane. Align the two pins on the backplane with the corresponding holes in the chassis. Lower the backplane into the chassis.

Note: Make sure that both edges of the backplane slide into the metal rails as illustrated below.

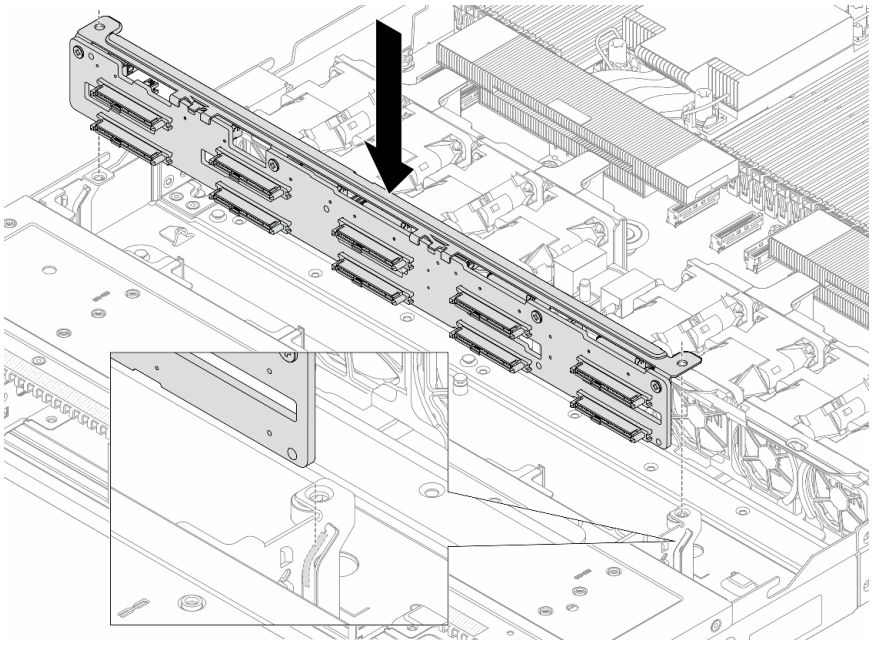


Figure 90. Installation of backplane for ten 2.5-inch hot-swap drives

Step 2. Connect the cables to the system board assembly and the backplane. See ***Internal Cable Routing Guide***. 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 fillers into the drive bays. See “Install a 2.5-inch hot-swap drive” on page 130.
2. Complete the parts replacement. See “Complete the parts replacement” on page 288.

Remove the 2.5-inch rear drive backplane

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. Remove all installed drives and fillers (if any) from the drive bays. See “Remove a 2.5-inch hot-swap drive” on page 129.

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.

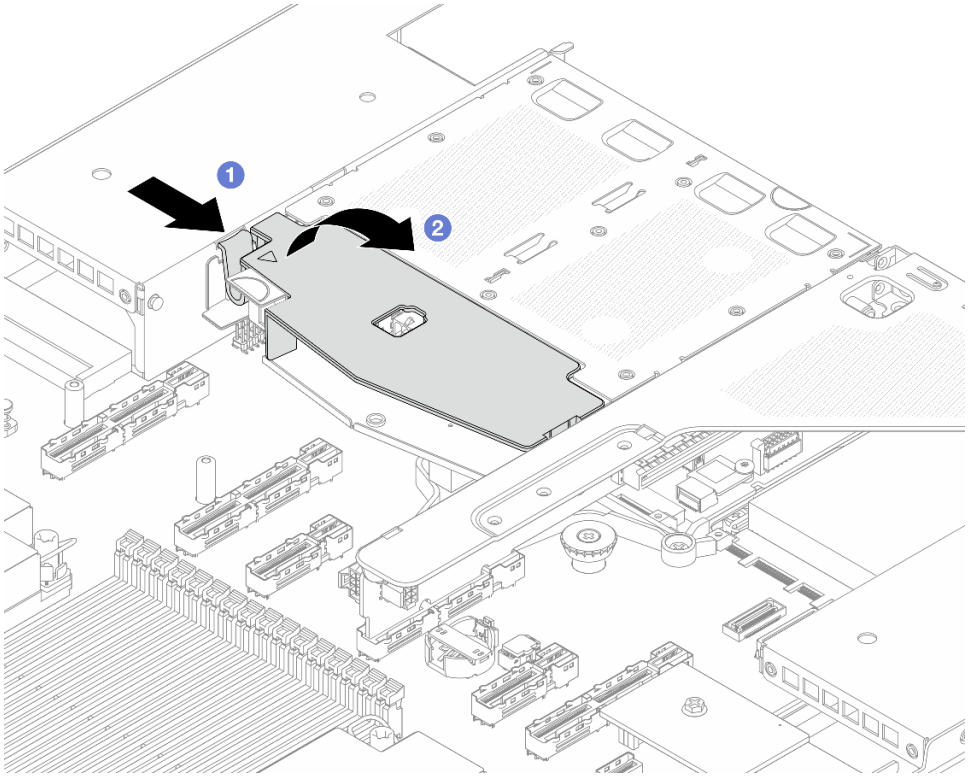


Figure 91. Air baffle removal

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. 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 ***Internal Cable Routing Guide***.

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

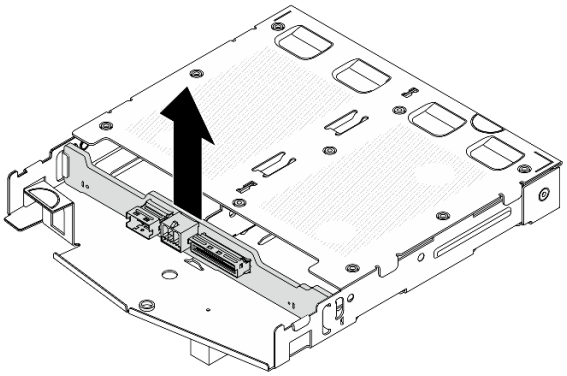


Figure 92. 2.5-inch rear drive backplane removal

After you finish

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

Install the 2.5-inch rear drive backplane

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

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

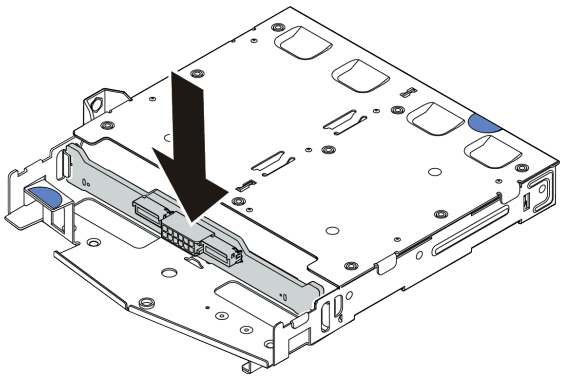


Figure 93. Rear backplane installation

Step 2. Connect the cables to the system board assembly and the backplane. See ***Internal Cable Routing Guide***. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

Step 3. Install the air baffle into the rear hot-swap drive cage as shown.

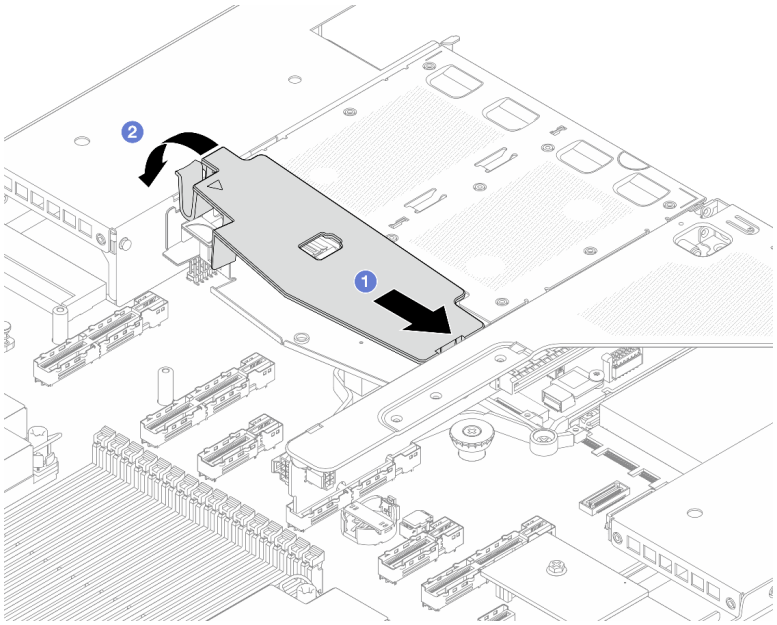


Figure 94. Air baffle installation

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.

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 130.
2. Reinstall the drive assembly to the server. See "Install the 2.5-inch rear drive assembly" on page 233.
3. Complete the parts replacement. See "Complete the parts replacement" on page 288.

CMOS battery (CR2032) replacement

Use this information to remove and install the CMOS battery (CR2032).

- "Remove the CMOS battery (CR2032)" on page 105
- "Install the CMOS battery (CR2032)" on page 107

Remove the CMOS battery (CR2032)

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/supportphonelist for your region support details.

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

S004

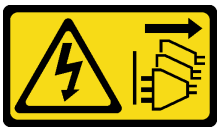
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains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

Do not:

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

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

S002



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

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.

- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

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 32.

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

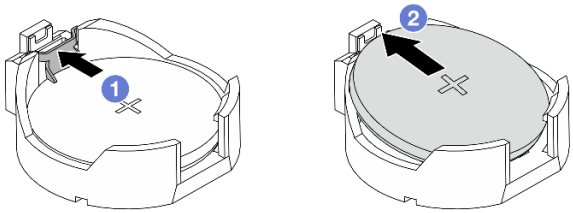


Figure 95. CMOS battery removal

1. 1 Press the clip on the CMOS battery socket.
2. 2 Remove the CMOS battery.

After you finish

1. Install a new CMOS battery. See “Install the CMOS battery (CR2032)” on page 107.
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.
3. Dispose of the CMOS battery as required by local ordinances or regulations.

Install the CMOS battery (CR2032)

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/supportphonelist for your region support details.

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

S004

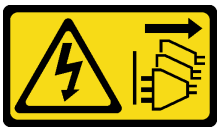
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains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

Do not:

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

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

S002



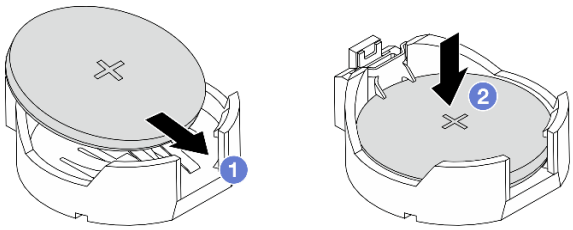
CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from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

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the CMOS battery. Ensure that the CMOS battery is seated in place.



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

1. 1 Tilt the battery and insert it to the socket.
2. 2 Press the battery down until it clicks into the socket.

Figure 96. CMOS battery installation

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. Use the Setup Utility to set the date, time, and any passwords.

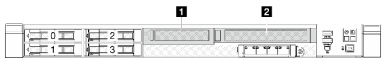
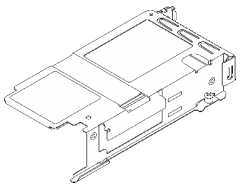
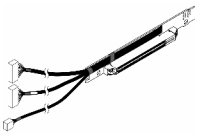
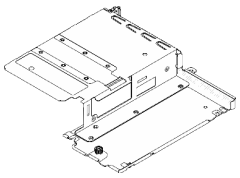
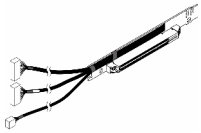
Front adapter assembly replacement

A complete front adapter 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 adapter assembly.

Server front configuration and riser assemblies

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

Table 33. Server front configuration and riser assemblies

Server front configuration	Riser 3 assembly	Riser 4 assembly
 *Figure 97. Two front PCIe slots*	 *Figure 98. LP riser bracket*  *Figure 99. Riser card*	 *Figure 100. FH riser bracket*  *Figure 101. Riser card*

- "Front riser cage replacement" on page 109
- "Front riser card and PCIe adapter replacement" on page 112

Front riser cage replacement

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

- “Remove the front riser cage” on page 110
- “Install the front riser cage” on page 111

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover, see “Remove the top cover” on page 282.

Step 2. Remove the cables connected to the processor board, see ***Internal Cable Routing Guide***.

Step 3. Remove the front riser cage.

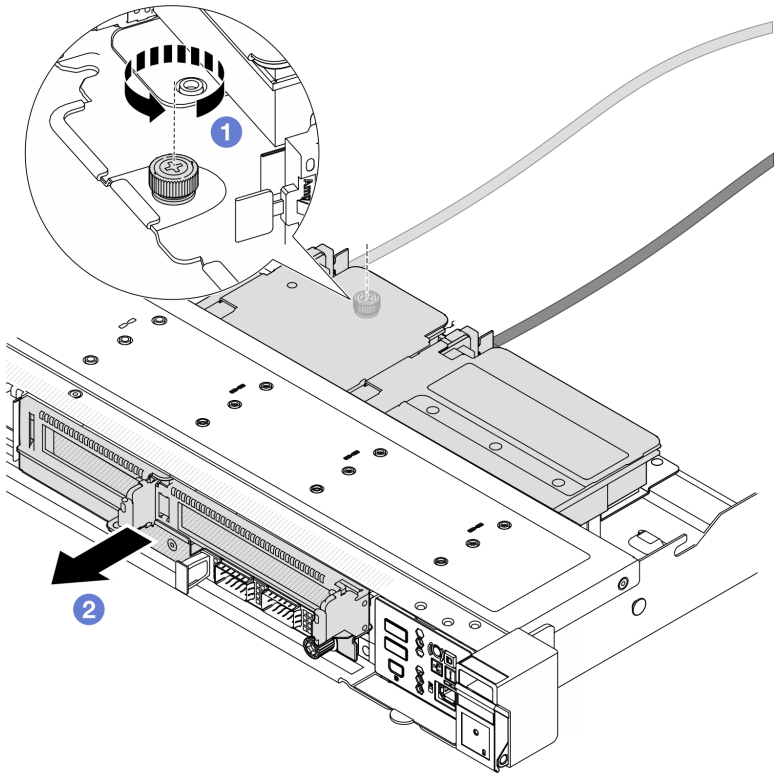


Figure 102. Removing the front riser cage

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 adapter assembly and PCIe adapter from the front riser cage, see “Remove the front riser card and PCIe adapter” on page 112.

After you finish

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

Install the front riser cage

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the front adapter assembly and PCIe adapter to the front riser cage, see “Install the front riser card and PCIe adapter” on page 115.

Step 2. Remove the top cover. See “Remove the top cover” on page 282.

Step 3. Install the front riser cage.

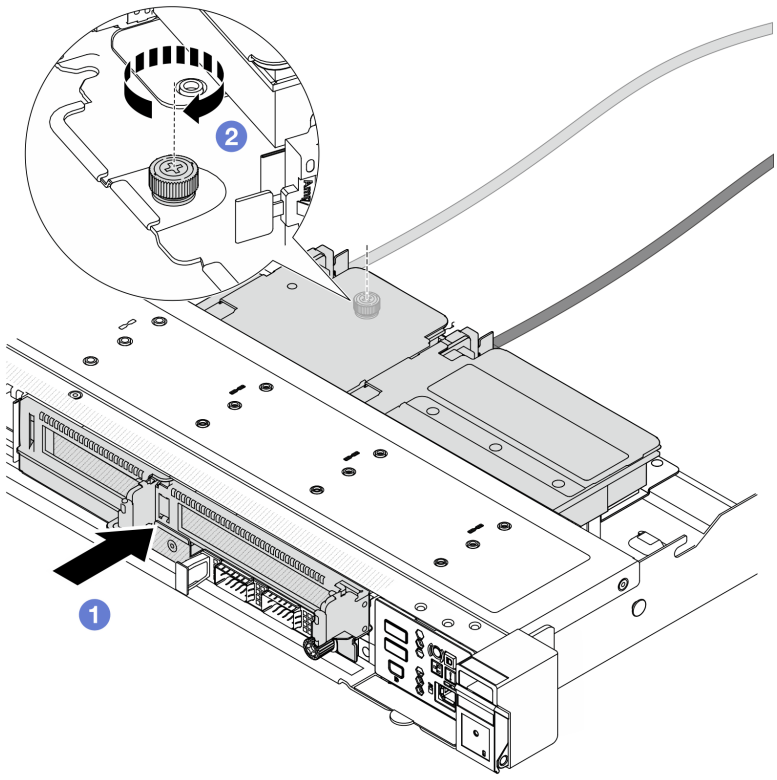


Figure 103. Installing the front riser cage

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 288.

Front riser card and PCIe adapter replacement

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

- “Remove the front riser card and PCIe adapter” on page 112
- “Install the front riser card and PCIe adapter” on page 115

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 57 and “Safety inspection checklist” on page 58 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 75.

- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the front riser cage, see “Remove the front riser cage” on page 110.

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

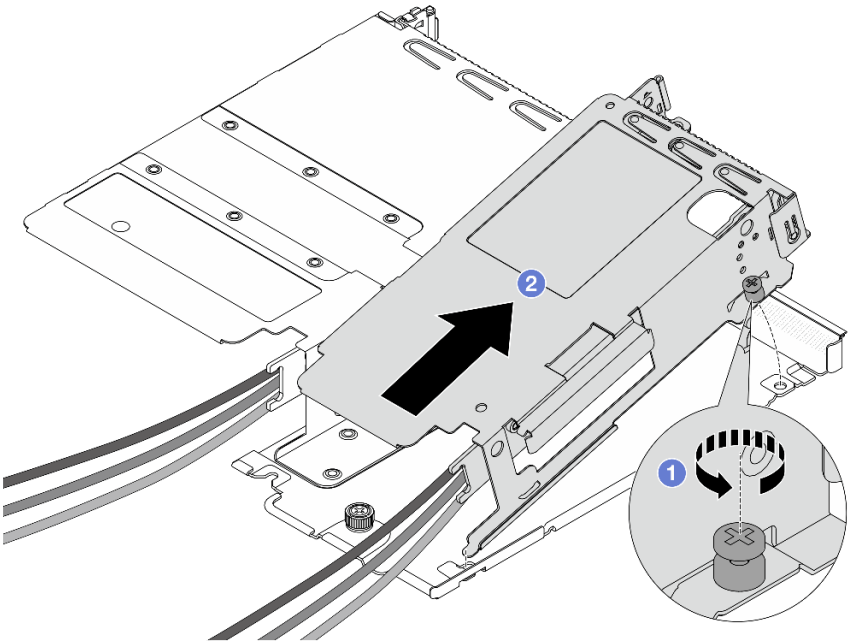


Figure 104. Separating the two cages

a. 1 Loosen the screw that secures the low-profile cage to a full-height one.

b. 2 Tilt the cage and lift it out.

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

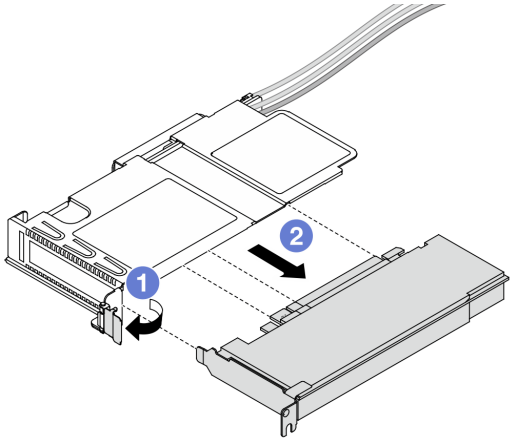


Figure 105. Removing the PCIe adapter

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 ***Internal Cable Routing Guide***.

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

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

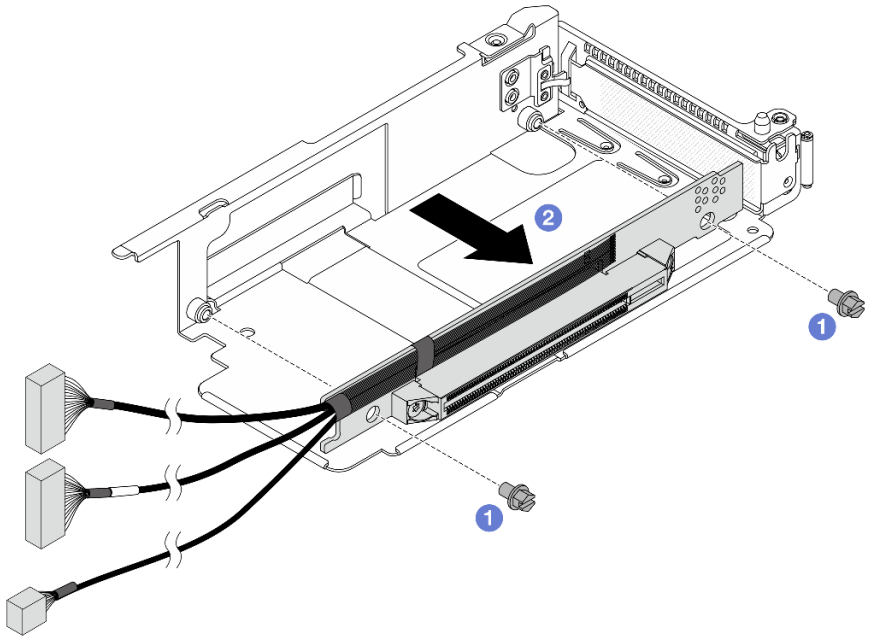


Figure 106. Removing the riser card from low-profile cage

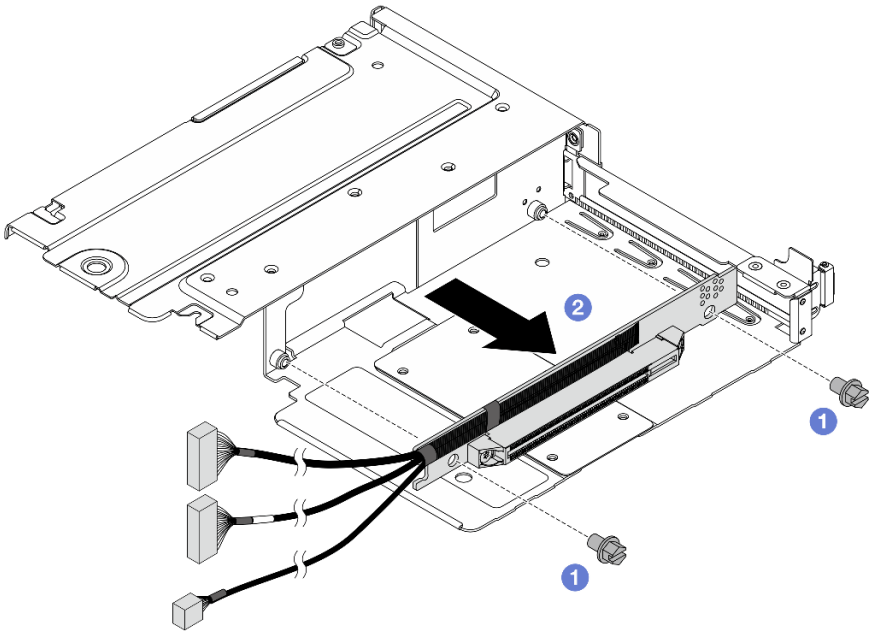


Figure 107. Removing the riser card from full-height cage

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.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the front riser cards to both cages.

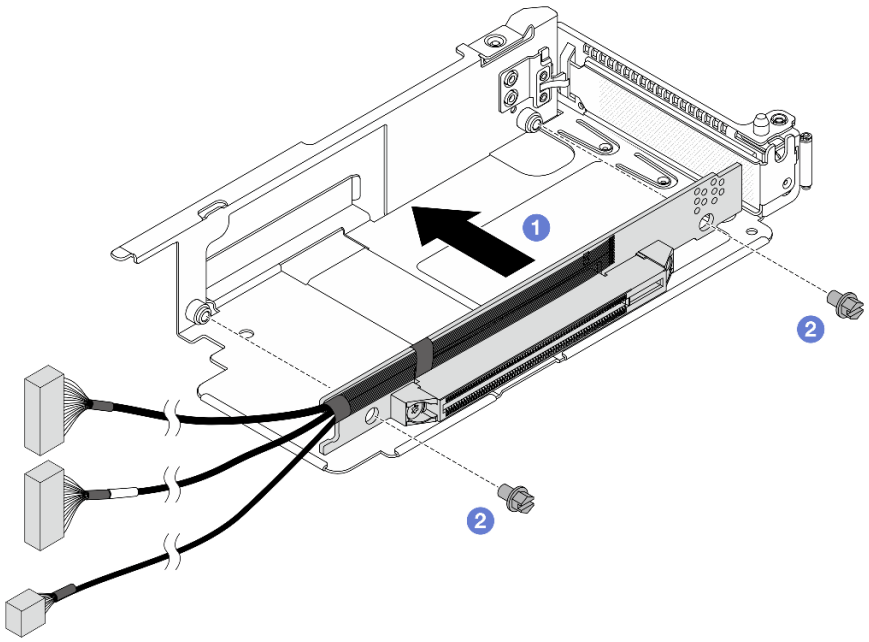


Figure 108. Installing the riser card to low-profile cage

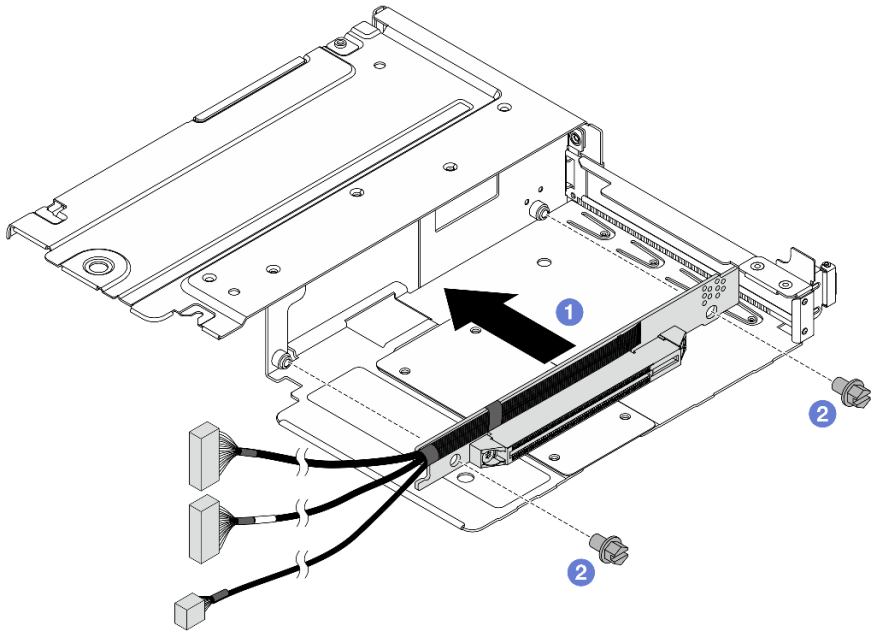


Figure 109. Installing the riser card to full-height cage

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 2. Connect the cables to the riser cards. For more details, see ***Internal Cable Routing Guide***.

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

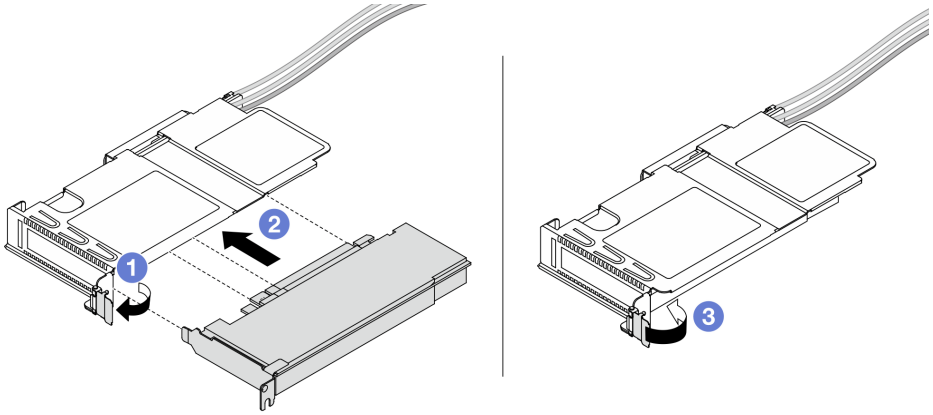


Figure 110. Installing the PCIe adapter

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 4. Repeat the previous step on the full-height cage.

Step 5. Assemble the low-profile riser cage and the full-height riser cage.

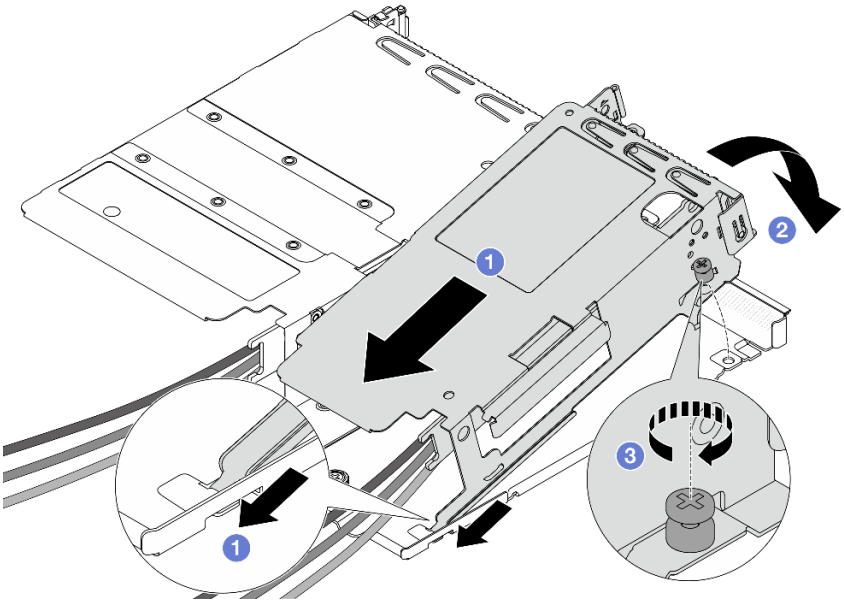


Figure 111. Assembling the two riser cages

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 288.

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 117
- “OCP interposer card replacement” on page 119

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 117
- “Install the front OCP module” on page 118

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the front OCP module.

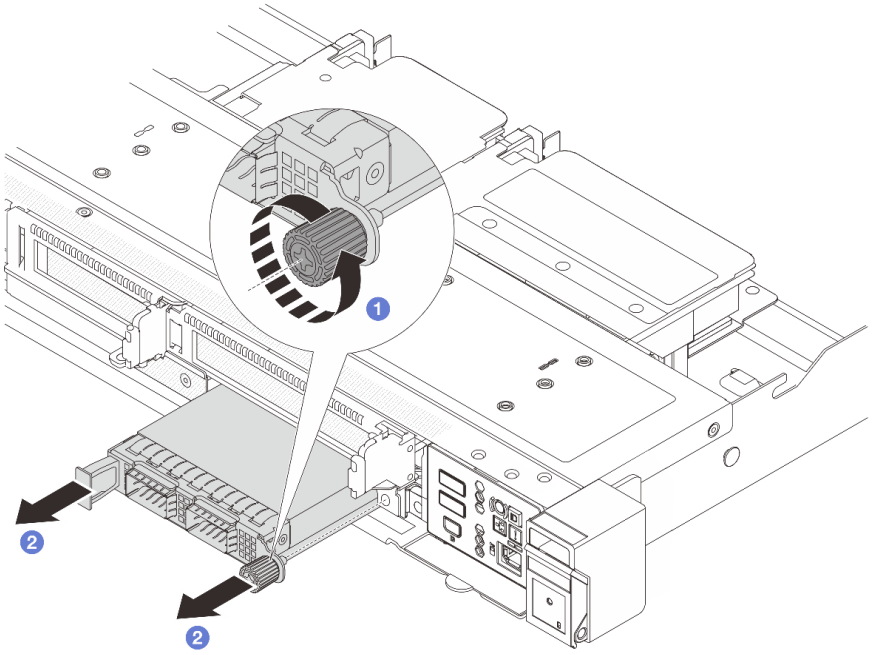


Figure 112. Removing the front OCP module

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 118.
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.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. 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.

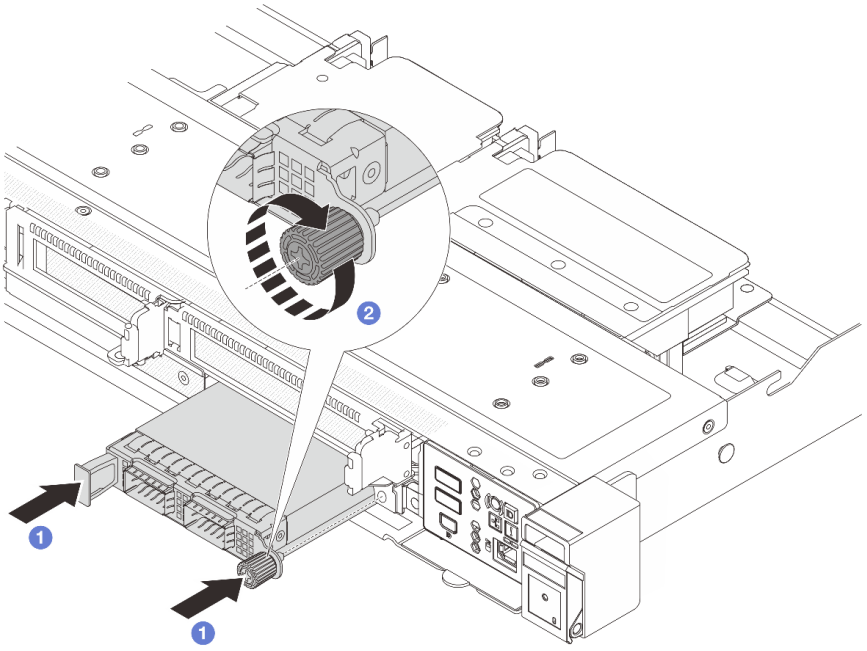


Figure 113. Installing the front OCP module

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 288.

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 120

- “Install the front OCP interposer card” on page 121
- “Remove the rear OCP interposer card” on page 122
- “Install the rear OCP interposer card” on page 123

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Remove the front riser cage. See “Remove the front riser cage” on page 110.

Step 3. Remove the front OCP module. See “Remove the front OCP module” on page 117.

Step 4. Remove the front OCP interposer card.

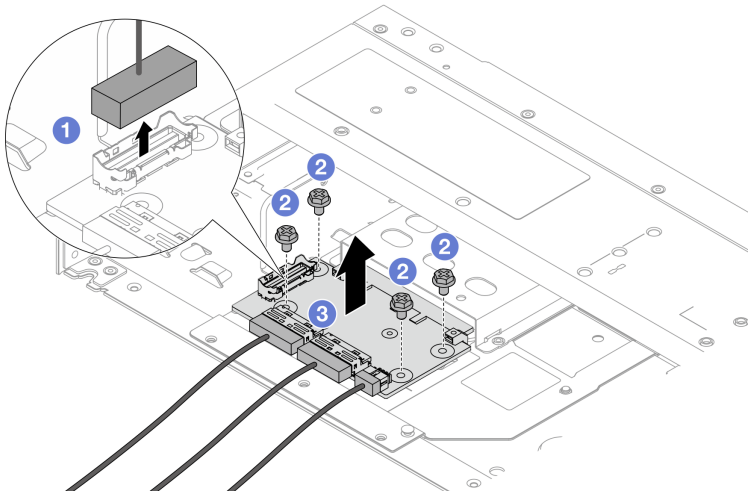


Figure 114. Removing the front OCP interposer card

a. 1 Disconnect the sideband connector to gain access to the screw underneath.

b. 2 Loosen four screws.

c. 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 ***Internal Cable Routing Guide***.

After you finish

1. Install a new front OCP interposer card. See “Install the front OCP interposer card” on page 121.
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.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Connect the cables to the front OCP interposer card. For more details, see ***Internal Cable Routing Guide***.

Step 3. Install the front OCP interposer card to the chassis.

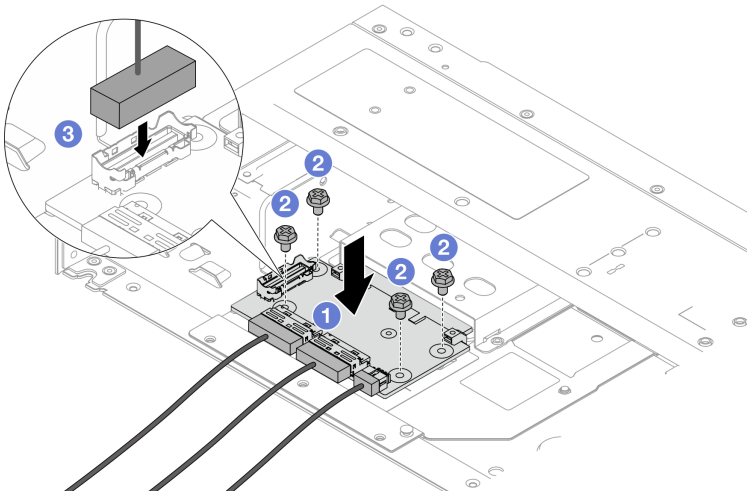


Figure 115. Installing the front OCP interposer card

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 288.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Disconnect the cables on the rear OCP interposer card. For more details, see ***Internal Cable Routing Guide***.

Step 3. Remove the rear OCP interposer card.

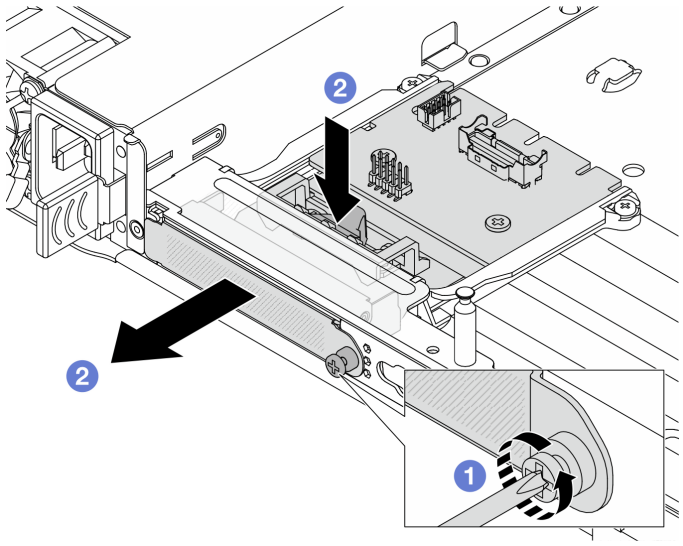


Figure 116. Removing the rear OCP interposer card

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 123.
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.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Install the rear OCP interposer card.

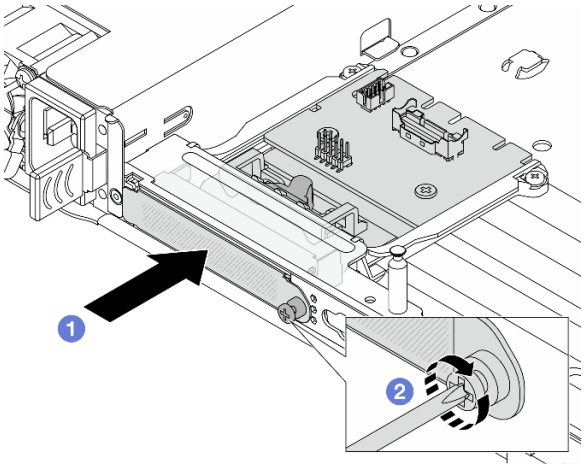


Figure 117. Installing the rear OCP interposer

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 3. Connect the cables to the rear OCP interposer card. For more details, see ***Internal Cable Routing Guide***.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Front I/O module replacement

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

- “Remove the front I/O module” on page 124
- “Install the front I/O module” on page 125

Remove the front I/O module

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 259.

Step 3. Disconnect the front I/O cables from the processor board.

Step 4. Remove the front I/O module.

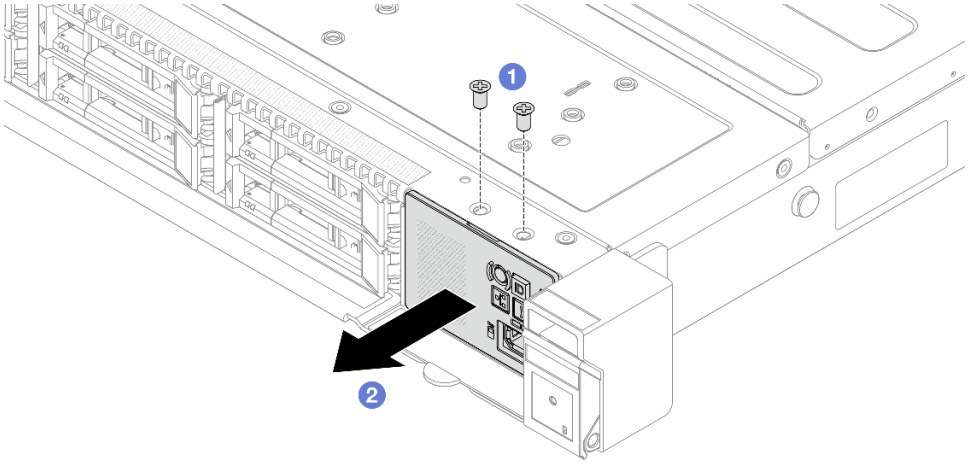


Figure 118. Remove a front I/O module on 2.5'' chassis

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

Install the front I/O module

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the front I/O module.

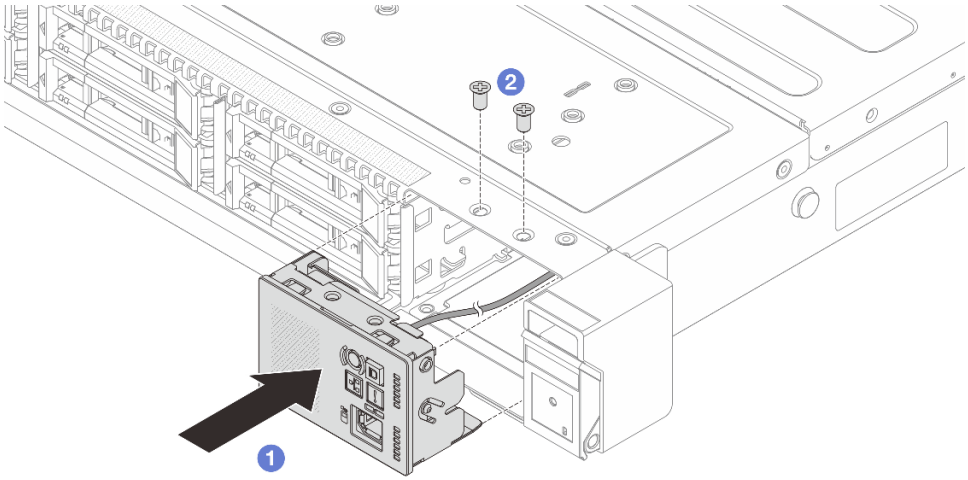


Figure 119. Install a front I/O module on 2.5'' chassis

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 processor board. See ***Internal Cable Routing Guide***.
2. Complete the parts replacement. See “Complete the parts replacement” on page 288.

Heat sink Torx T30 nut replacement

Use this information to remove and install a heat sink Torx T30 nut.

Remove a heat sink Torx T30 nut

This task has instructions for removing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

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

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. Remove the air baffle. See “Remove the air baffle” on page 97.

c. Remove the PHM. See “Remove a processor and heat sink” on page 219.

Step 2. Remove the Torx T30 nut.

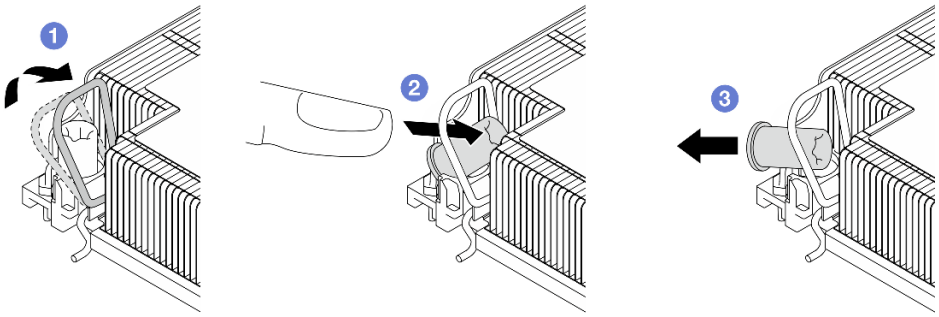


Figure 120. Removing a Torx T30 nut from the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Push the upper edge of the Torx T30 nut towards the center of the heat sink until it disengages.

c. 3 Remove the Torx T30 nut.

Attention: Visually inspect the removed Torx T30 nut, if the nut is cracked or damaged, make sure no debris or broken pieces are left inside your server.

After you finish

1. Install a new Torx T30 nut. See “Install a heat sink Torx T30 nut” on page 127.
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.

Install a heat sink Torx T30 nut

This task has instructions for installing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

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

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/sr630v4/7dg8/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 289 for more information on firmware updating tools.

Procedure

Step 1. Install the Torx T30 nut.

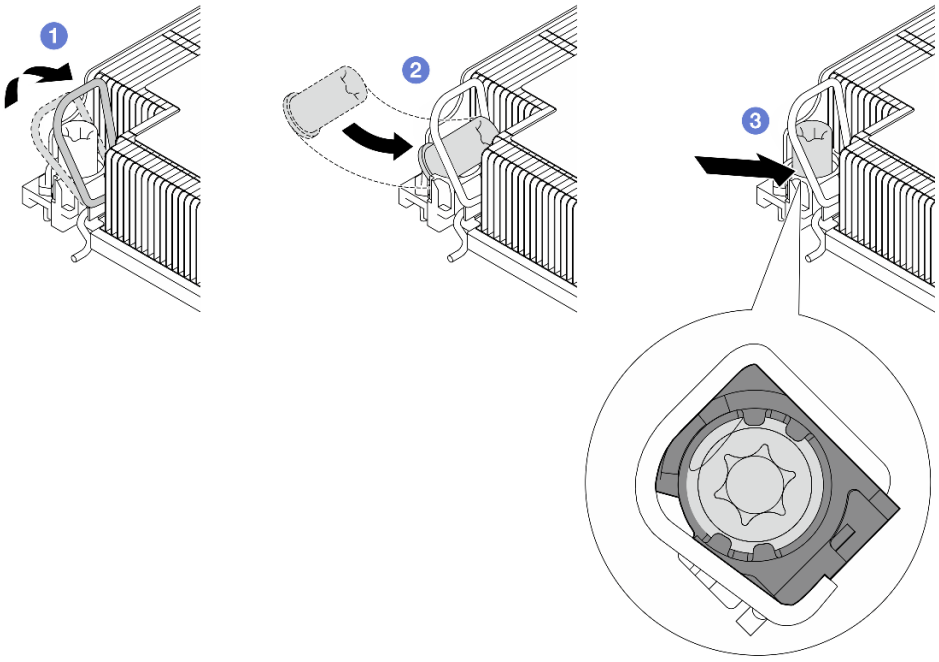


Figure 121. Installing a Torx T30 nut into the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Orient the Torx T30 nut under the anti-tilt wire bail; then, align the Torx T30 nut with the socket at an angle as shown.

c. 3 Push the lower edge of the Torx T30 nut into the socket until it clicks into place. Make sure the Torx T30 nut is secured under the four clips in the socket.

After you finish

1. Reinstall the PHM. See “Install a processor and heat sink” on page 225.
2. Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- 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 259.

Step 2. Remove a hot-swap drive.

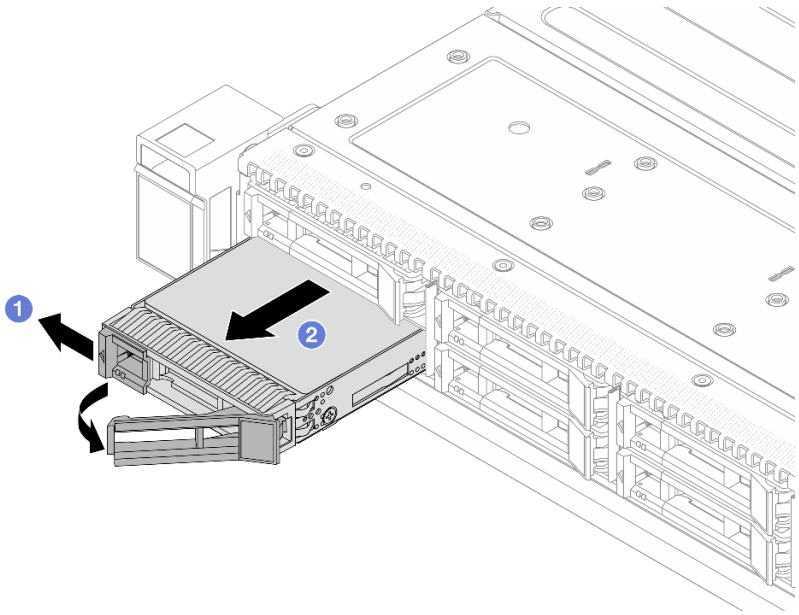


Figure 122. Remove a hot-swap drive

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

b. Open the drive handle.

c. Slide the drive out of the drive bay.

After you finish

1. Install a drive filler or a new drive to cover the drive bay.

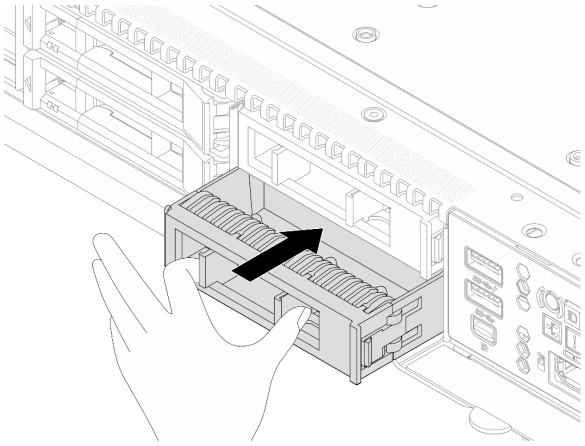


Figure 123. Install a drive filler

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.

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 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

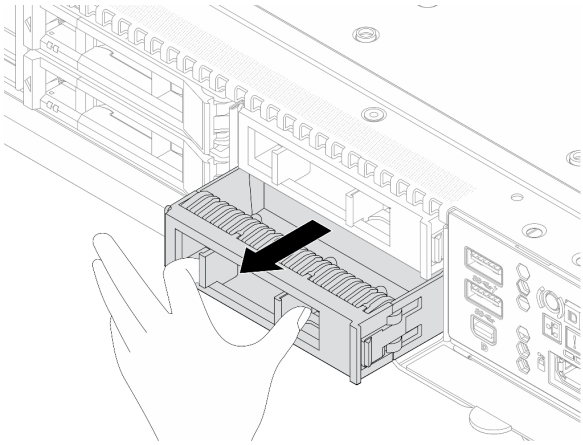


Figure 124. Remove a drive filler

Step 2. Install the drive in the drive bay.

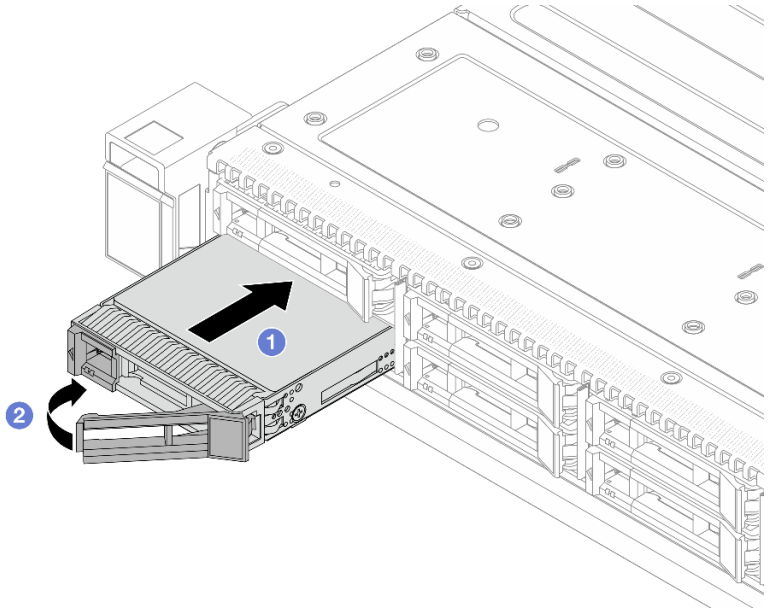


Figure 125. Hot-swap drive installation

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 3. Check the drive LEDs to verify that the drive is operating normally. For details, see "Drive LEDs" on page 36.

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

After you finish

1. Reinstall the security bezel if you removed it. See "Install the security bezel" on page 261.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:
   https://pubs.lenovo.com/lxpm-overview/.

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

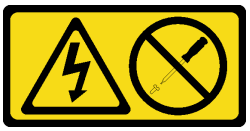
Use this information to remove a power supply unit.

About this task

If the power supply unit to be removed is the only one installed, the power supply unit is not hot-swappable. 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.

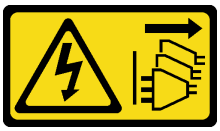
Safety information for AC power supplies

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S002



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

S001

DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

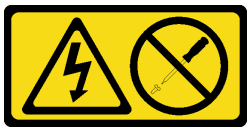
Safety information for DC power supplies

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

在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔，此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

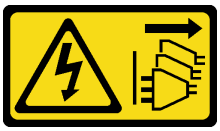
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply unit bay.

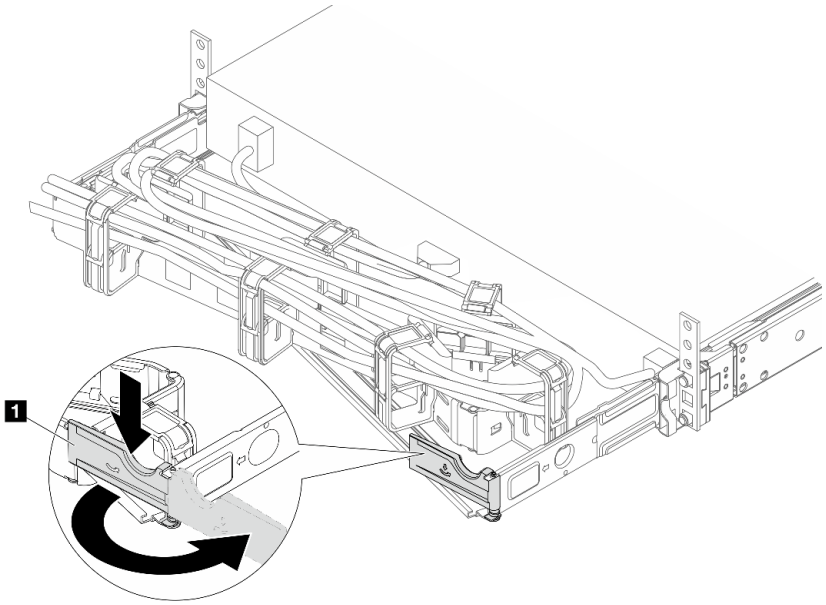


Figure 126. Adjusting the right side

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 units.

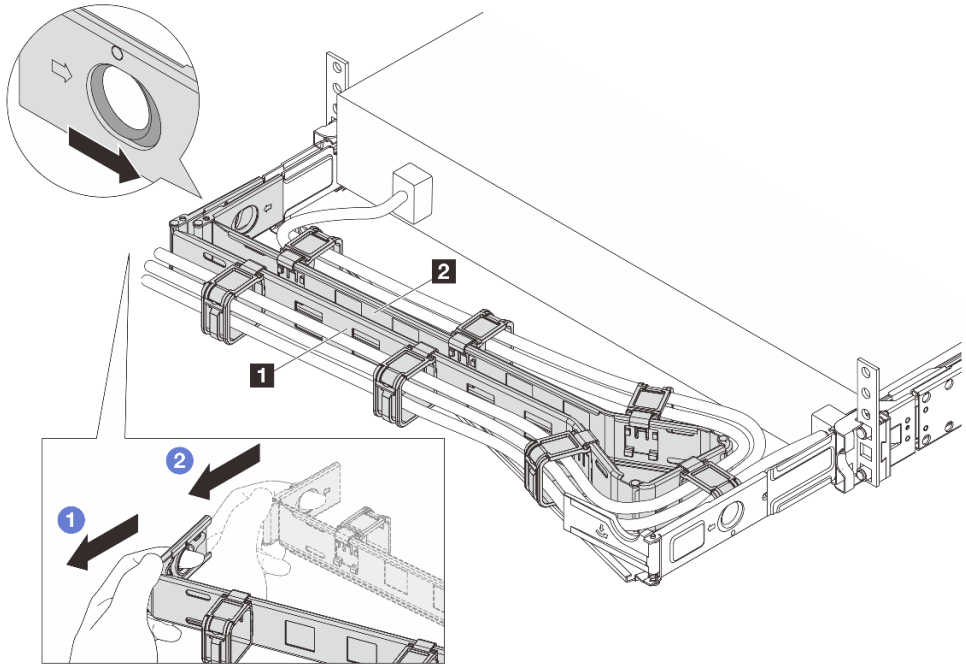


Figure 127. Removing the left side

a. 1 Press the clip as illustrated above to unlock the outer CMA 1 from the rack.

b. 2 Repeat the previous step to inner CMA 2 to unlock it.

Step 2. Disconnect the power cord from the hot-swap power supply unit.

- 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 AC power supply units, disconnect both ends of the power cord and keep it in an ESD-safe place.

Note: If you are replacing two power supply units, 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 unit until both LEDs on the firstly replaced CRPS Premium power supply unit are lit green, or the LED on a CRPS one is lit green. For the location of the power-supply-unit LEDs, refer to "Power-supply-unit LEDs" on page 40.

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.

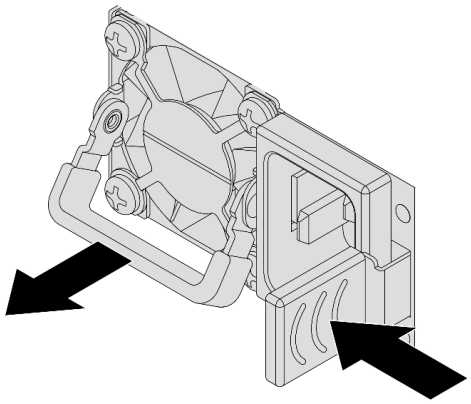


Figure 128. Hot-swap power supply removal

Step 4. Install the power-supply-unit filler to cover the power supply bay.

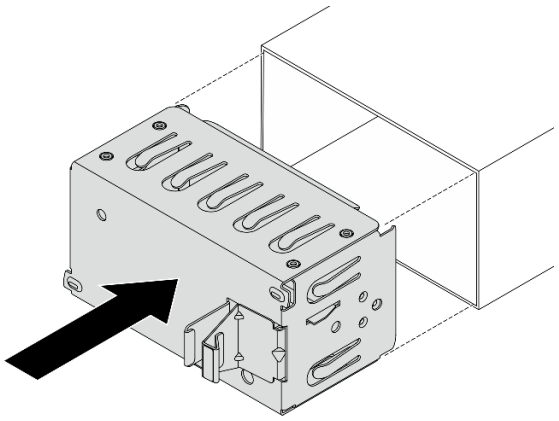


Figure 129. Power-supply-unit filler installation

After you finish

1. Install a new power supply unit to cover the power supply bay. See "Install a hot-swap power supply unit" on page 136.

   Important: To ensure proper cooling during normal server operation, both 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-unit 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.

Install a hot-swap power supply unit

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

About this task

The following describes the information that you must consider when installing a power supply unit:

- If the power supply unit to be removed is the only one installed, the power supply unit is not hot-swappable. 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.
- If you are replacing the existing power supply with a new power supply:
  - Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. More information about Lenovo Capacity Planner is available at: https://datacentersupport.lenovo.com/solutions/lnvo-lcp.
  - Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to: https://serverproven.lenovo.com.
  - Attach the power information label that comes with this option on the existing label near the power supply.

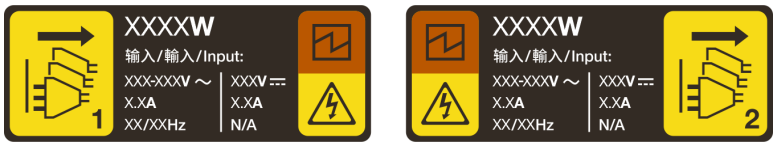
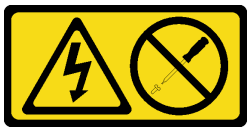


Figure 130. Example power supply unit label on the top cover

Safety information for AC power supplies

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S002

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

S001

DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

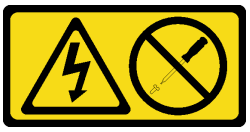
Safety information for DC power supplies

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

在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔，此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

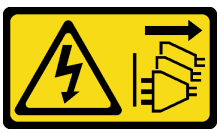
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

Attention:
- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If there is a power-supply-unit filler installed, remove it.

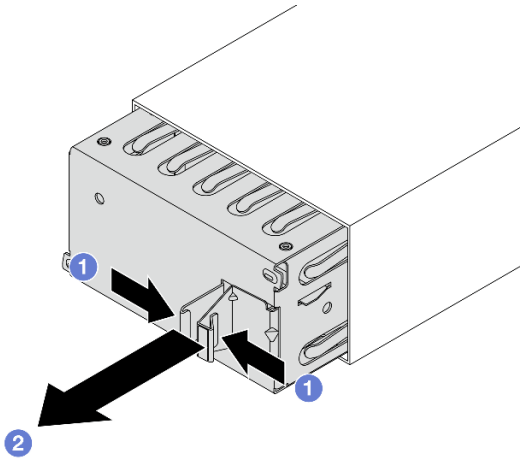


Figure 131. Hot-swap power-supply-unit filler removal

a. 1 Pinch the latches to unlock the power-supply-unit filler.

b. 2 Pull out the filler.

Step 2. Slide the new hot-swap power supply unit into the bay until it snaps into position.

Important:
- Depends on the model, the color of release tab might be different.
- If the power supply unit is to be replaced by a new one, make sure that the new one has identical color of the release tab, wattage and efficiency with the old one.

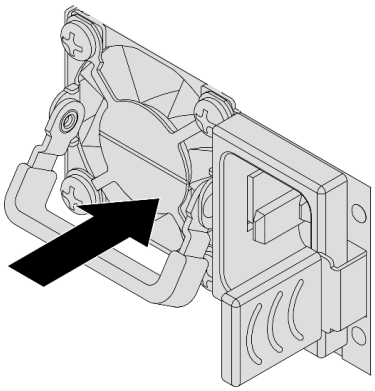


Figure 132. Hot-swap power supply installation

Step 3. 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.

Step 4. Make sure the power supply unit handle is perpendicular to the power supply unit; then, tie the power cord to the handle with the pre-attached strap as shown below.

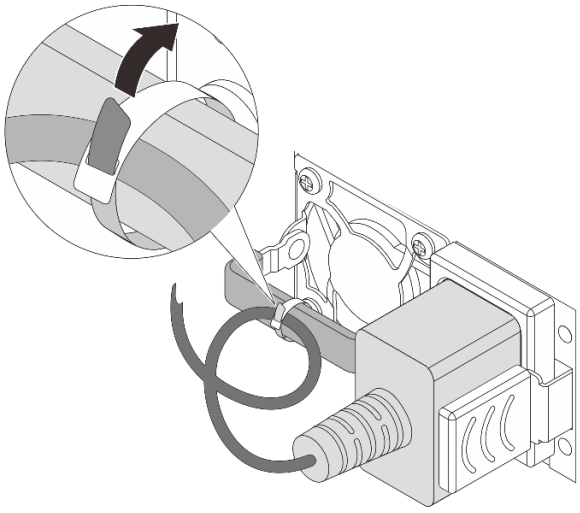


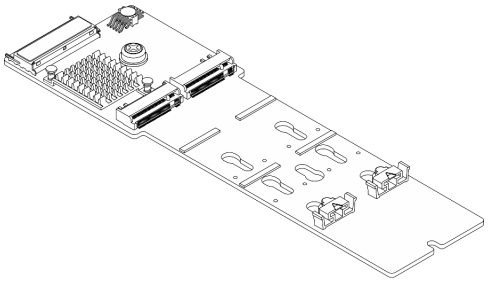
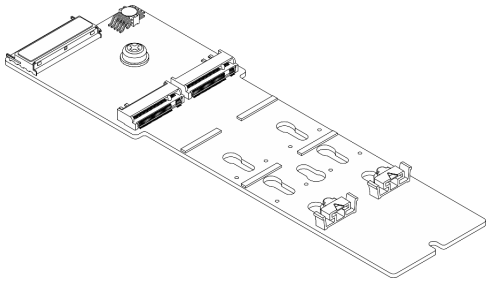
Figure 133. Routing and tying power cord

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 LEDs on the CRPS Premium power supply unit are lit green, indicating that the power supply unit is operating properly.
   - The LED on the CRPS power supply unit is lit green, indicating that the power supply unit is operating properly.

Internal M.2 backplane and M.2 drive replacement

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

	
M.2 RAID SATA/NVME 2-bay backplane	M.2 non-RAID SATA/NVMe 2-bay backplane

- “Remove the internal M.2 backplane and M.2 drive” on page 141
- “Adjust the retainer on the internal M.2 backplane” on page 143
- “Install the internal M.2 backplane and M.2 drive” on page 144

Remove the internal M.2 backplane and M.2 drive

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

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

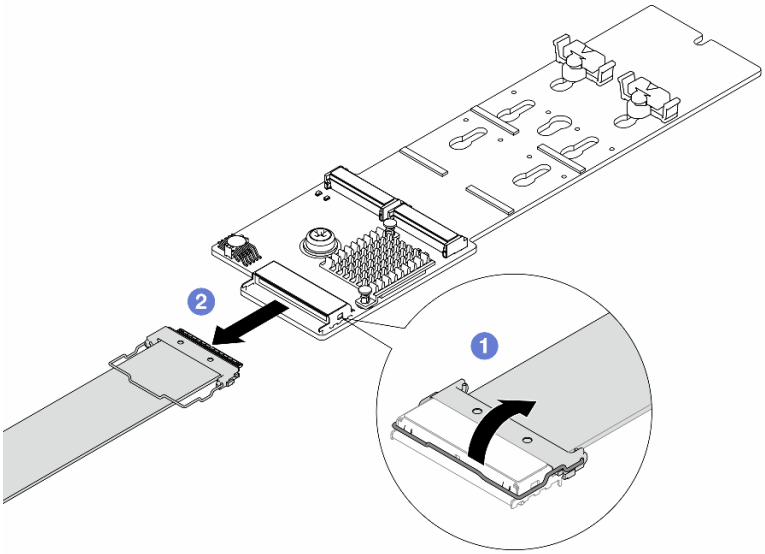


Figure 134. Disconnecting the M.2 cable

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

b. 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.

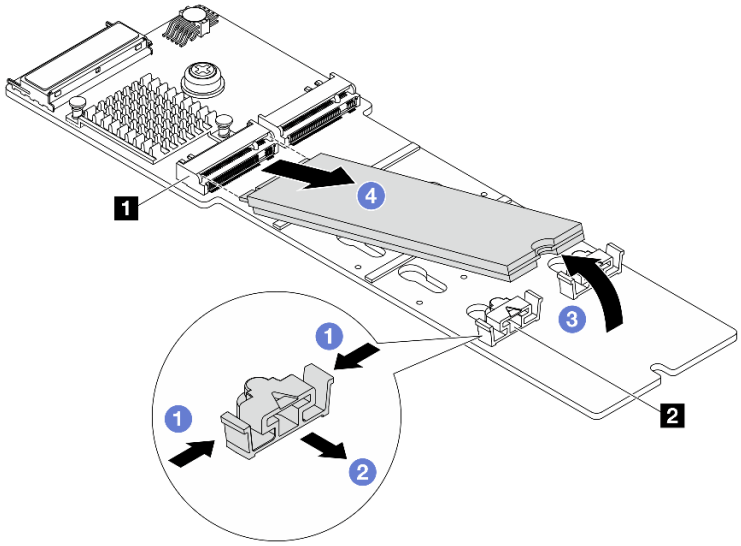


Figure 135. M.2 drive removal

a. Press both sides of the 2 retainer.

b. Slide the retainer backward to loosen the M.2 drive from the M.2 backplane.

c. Rotate the M.2 drive away from the M.2 backplane.

d. 4 Pull the M.2 drive away from the 1 connector at an angle of approximately 30 degrees.

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

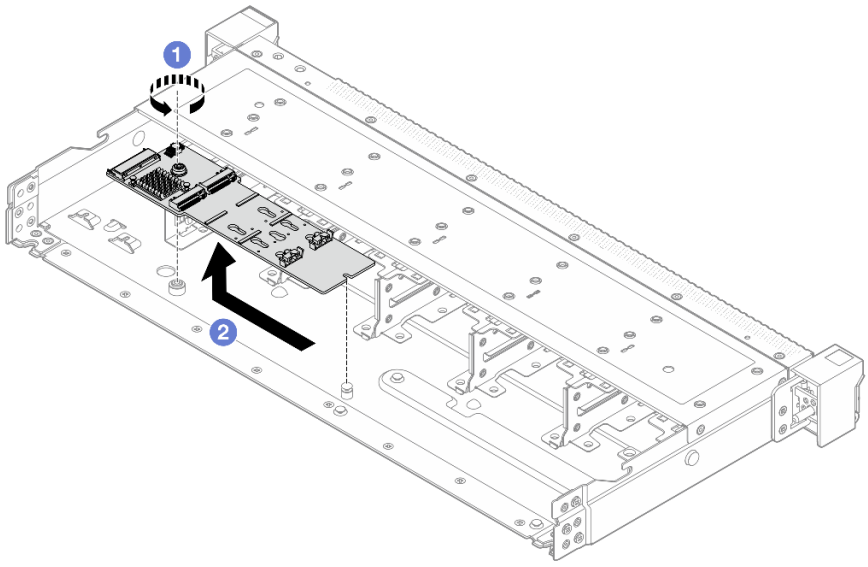


Figure 136. M.2 module removal

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.

Step 5. Disconnect all M.2 cables 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.

Adjust the retainer on the internal M.2 backplane

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Adjust the M.2 retainer.

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

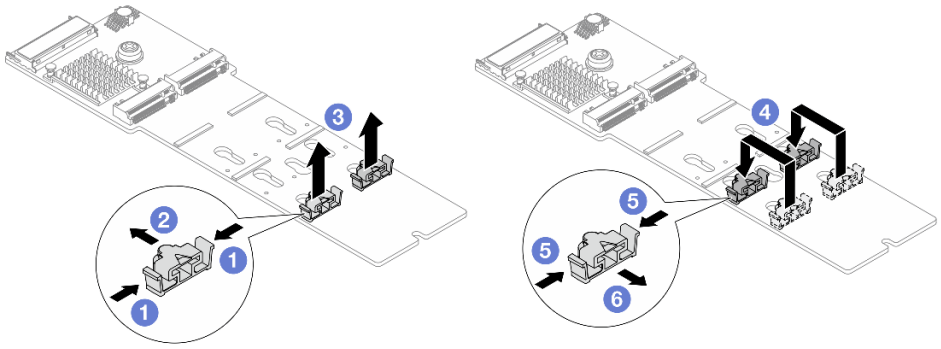


Figure 137. M.2 retainer adjustment

a. 1 Press both sides of a retainer.
b. 2 Move the retainer to the larger opening of the keyhole.
c. 3 Take the retainer out of the keyhole.
d. 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.
e. 5 Press both sides of the retainer.
f. 6 Slide the retainer until it is seated into the smaller opening of the keyhole.

Step 2. Install a new M.2 drive and backplane. See "Install the internal M.2 backplane and M.2 drive" on page 144.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 288.

Install the internal M.2 backplane and M.2 drive

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

About this task

Attention:

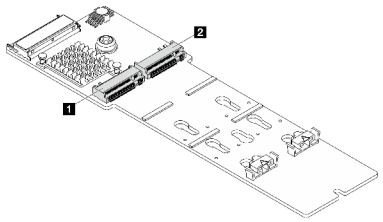
- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. 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 internal M.2 backplane" on page 143.

Step 2. 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.



1 Slot 0
2 Slot 1

Figure 138. M.2 drive slot

Step 3. Install the M.2 backplane onto the chassis.

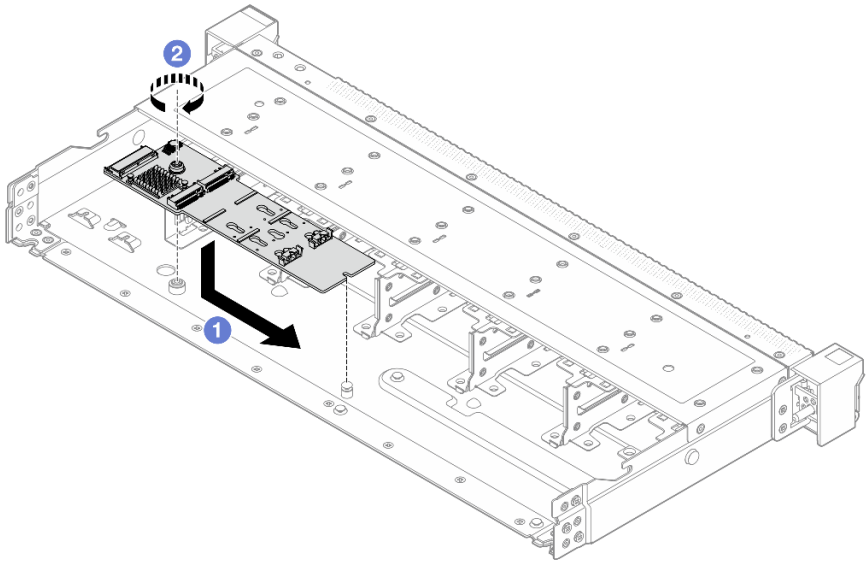


Figure 139. M.2 backplane installation

a. 1 Align the notch of the M.2 backplane with the pin on the chassis, and then place down the M.2 backplane.

b. 2 Tighten the screw to secure the M.2 backplane.

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

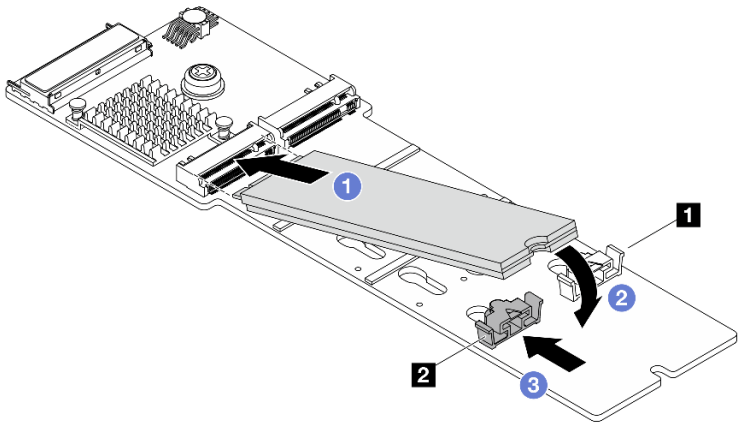


Figure 140. M.2 drive installation

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 5. Connect the cable to the M.2 backplane and processor board. See ***Internal Cable Routing Guide***.

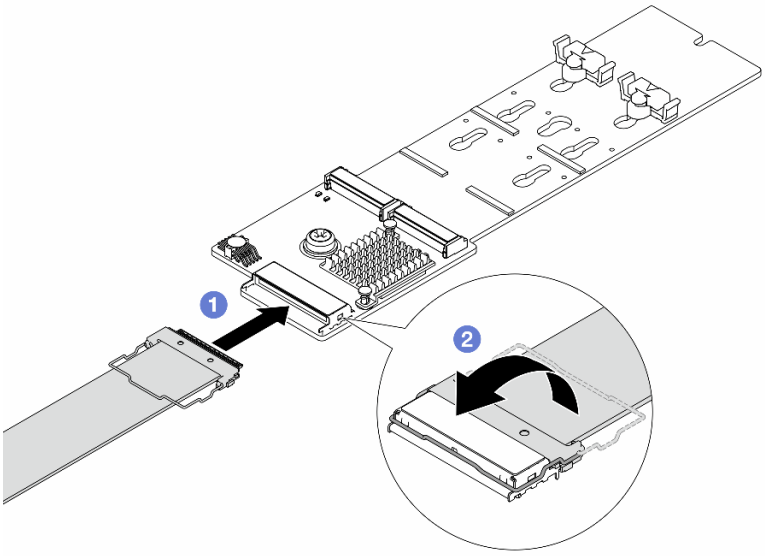


Figure 141. Connecting the M.2 cable

a. 1 Connect the M.2 cable to the M.2 backplane.

b. 2 Rotate the latch on the cable as illustrated, and press the latch down until it clicks into place.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see:

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

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” on page 147
- “Install an intrusion switch” on page 149

Remove an intrusion switch

Use this information to remove an intrusion switch.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Remove the system fan-pack 2.

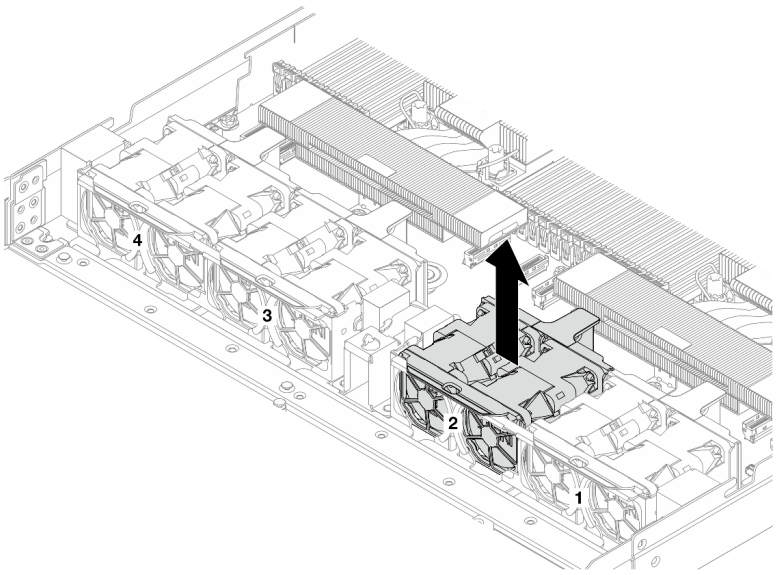


Figure 142. Removing fan-pack 2

Step 3. Remove the intrusion switch.

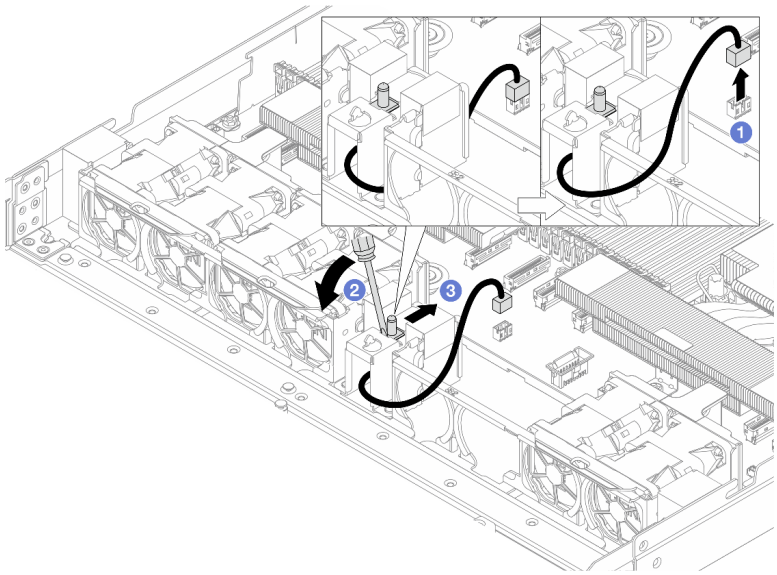


Figure 143. Removing the intrusion switch

a. 1 Disconnect the cable of the intrusion switch from the processor board. For the location of the intrusion switch connector and cable routing information, refer to "System-board-assembly connectors" on page 32 and ***Internal Cable Routing Guide***. 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 outwards.

c. 3 Slide the intrusion switch as shown to remove it.

Step 4. Re-install the system fan-pack 2. Align the four corners of the fan-pack to its socket and put it down.

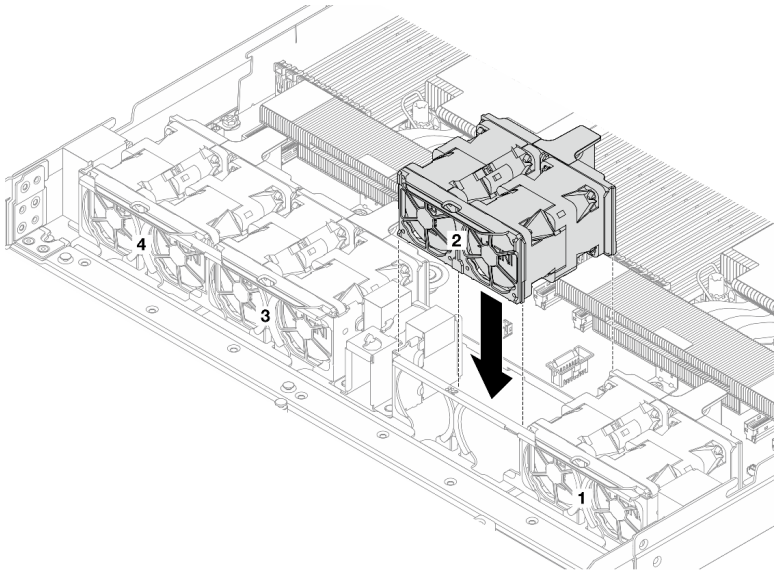


Figure 144. Re-installing fan-pack 2

After you finish

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

Install an intrusion switch

Use this information to install an intrusion switch.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the system fan-pack 2.

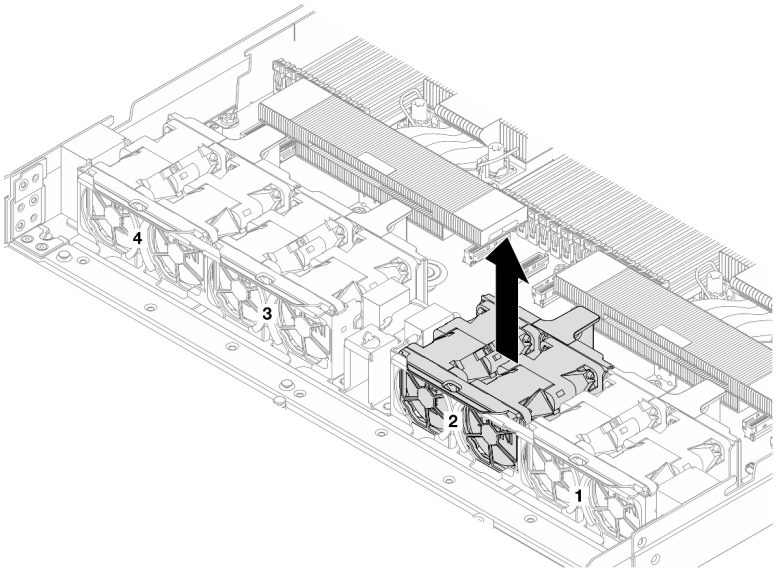


Figure 145. Removing fan-pack 2

Step 2. Install the intrusion switch.

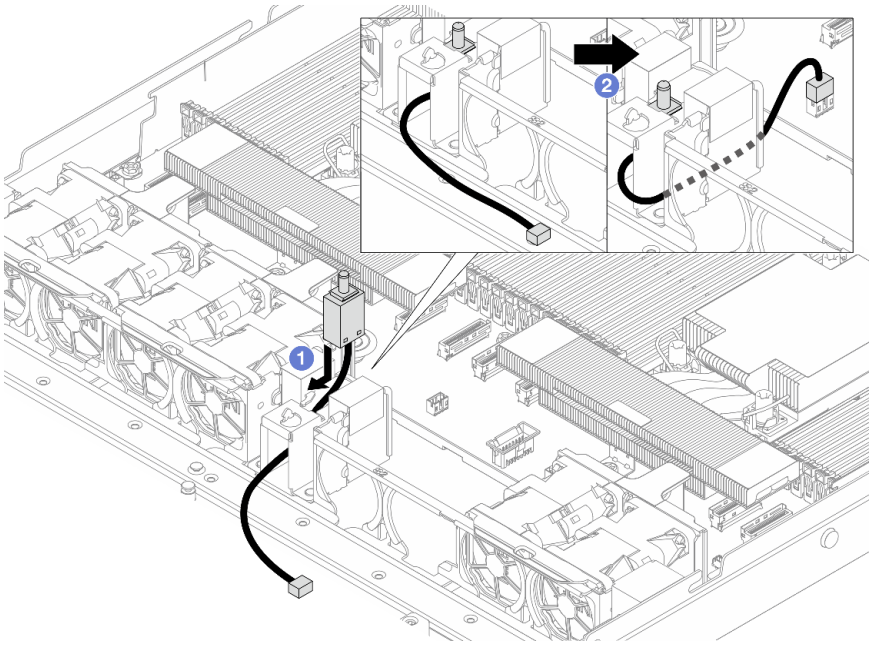


Figure 146. Installing the intrusion switch

a. 1 Insert the intrusion switch into the cage and route the cable into the cable clip.

b. 2 Connect the intrusion switch cable.

Step 3. Connect the cable of the intrusion switch to the intrusion switch connector on the processor board. See ***Internal Cable Routing Guide***.

Step 4. Re-install the system fan-pack 2. Align the four corners of the fan-pack to its socket and put it down.

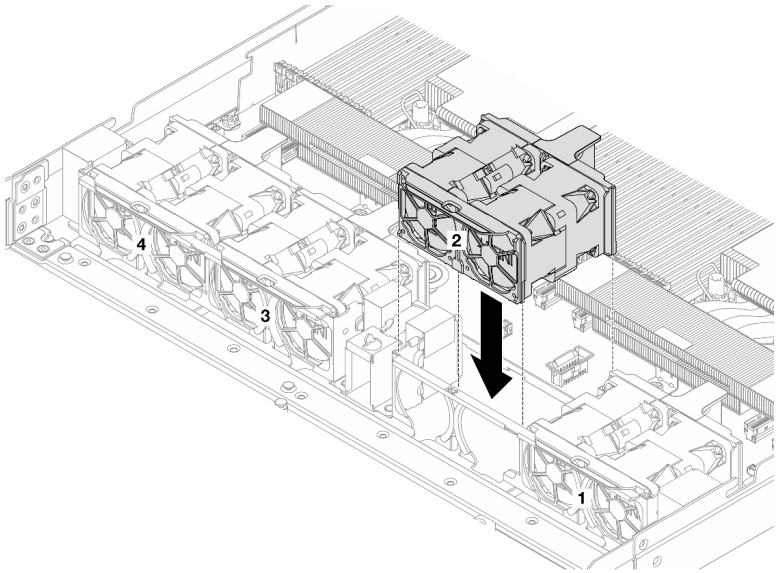


Figure 147. Re-installing fan-pack 2

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Lenovo Processor Neptune™ Air Module replacement (trained technicians only)

Follow the instructions in this section to remove and install the Processor Neptune™ Air Module (NeptAir).

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

- “Remove the Lenovo Processor Neptune™ Air Module” on page 151
- “Install the Lenovo Processor Neptune™ Air Module” on page 153

Remove the Lenovo Processor Neptune™ Air Module

Follow the instructions in this section to remove the Processor Neptune™ Air Module (NeptAir).

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

About this task

Safety information for leakage detection sensor module cable

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. To remove the server from the rack, see “Remove the server from the rack (friction rails)” on page 82 and “Install the server to the rack (slide rails)” on page 93.

Step 2. Remove the top cover. See “Remove the top cover” on page 282.

Step 3. Disconnect the leak detection cable and pump cables from the processor board. See ***Internal Cable Routing Guide***.

Step 4. Open the NeptAir module handle.

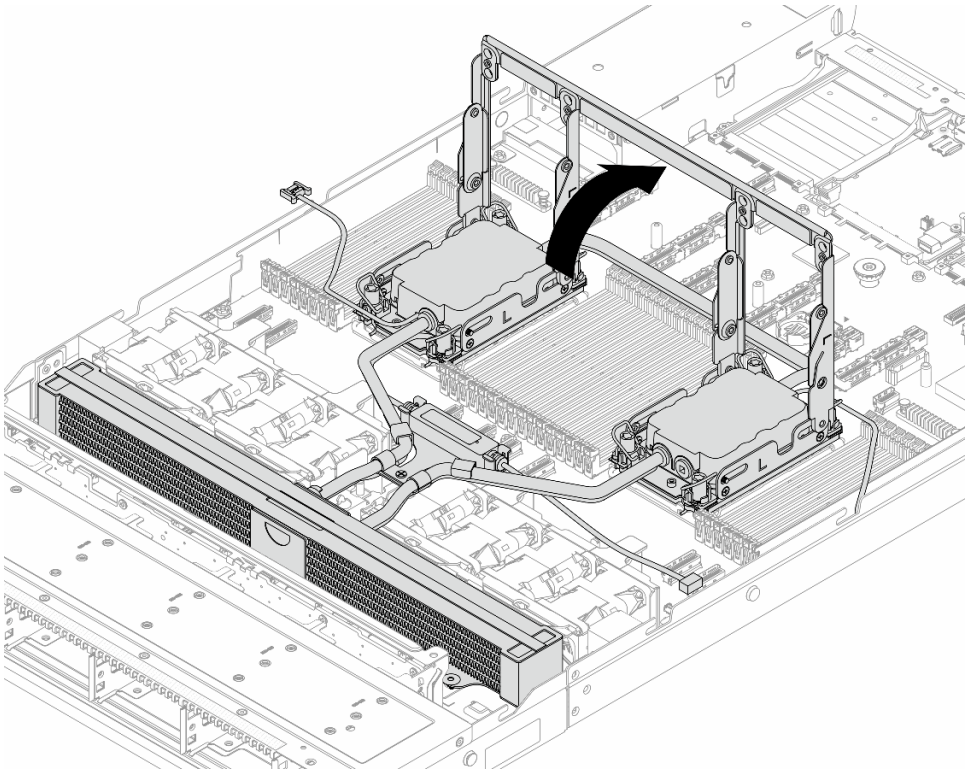


Figure 148. Opening the handle

Step 5. Disengage the NeptAir module from processors.

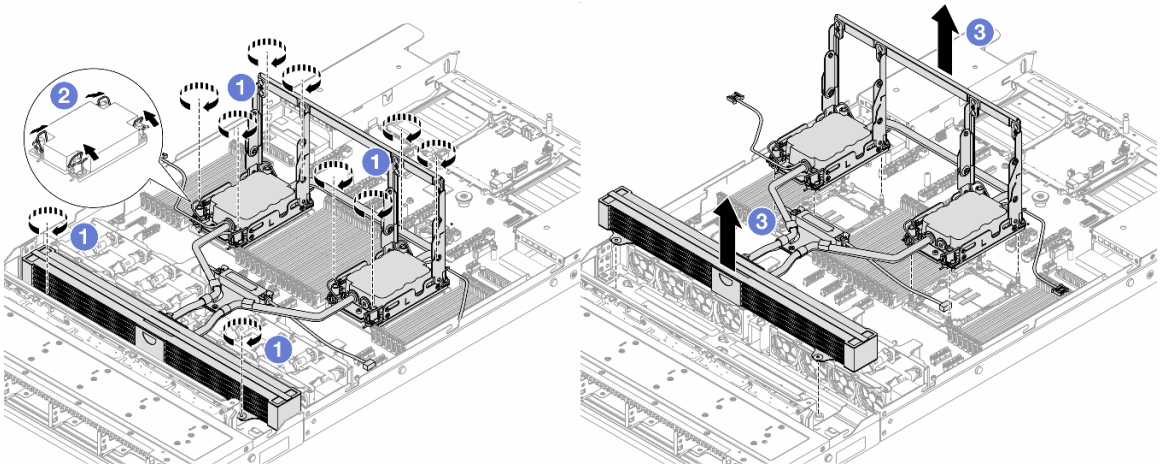


Figure 149. Removing the NeptAir module

a. 1 Fully loosen the Torx T30 nuts on the cold plate assembly and radiator.

b. 2 Rotate the anti-tilt wire bails inward.

c. 3 Carefully lift the NeptAir module from the processor sockets by the module handle (NeptAir heat sink bracket). If the NeptAir module cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the NeptAir module again.

Step 6. Place the NeptAir module on the shipping tray.

Step 7. If there is any old thermal grease on the processors and the cold plates, gently clean the processors and the cold plates with an alcohol cleaning pad.

Step 8. Separate the processor from the NeptAir module. Refer to "Separate the processor from carrier and heat sink" on page 223.

After you finish

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

Install the Lenovo Processor Neptune™ Air Module

Follow the instructions in this section to install the Processor Neptune™ Air Module (NeptAir).

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

About this task

Safety information for leakage detection sensor module cable

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

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

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. Install the radiator tray to the chassis.

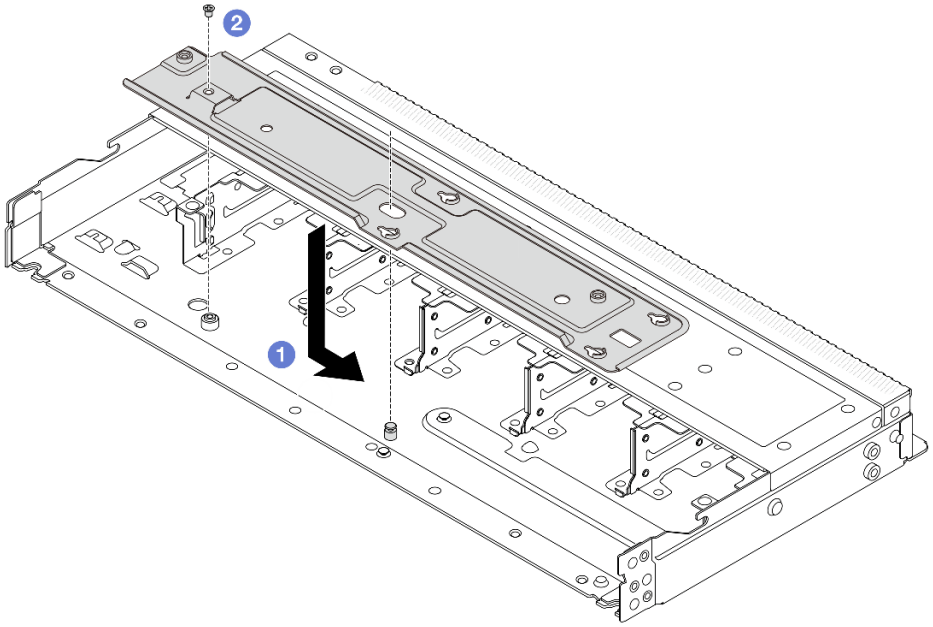
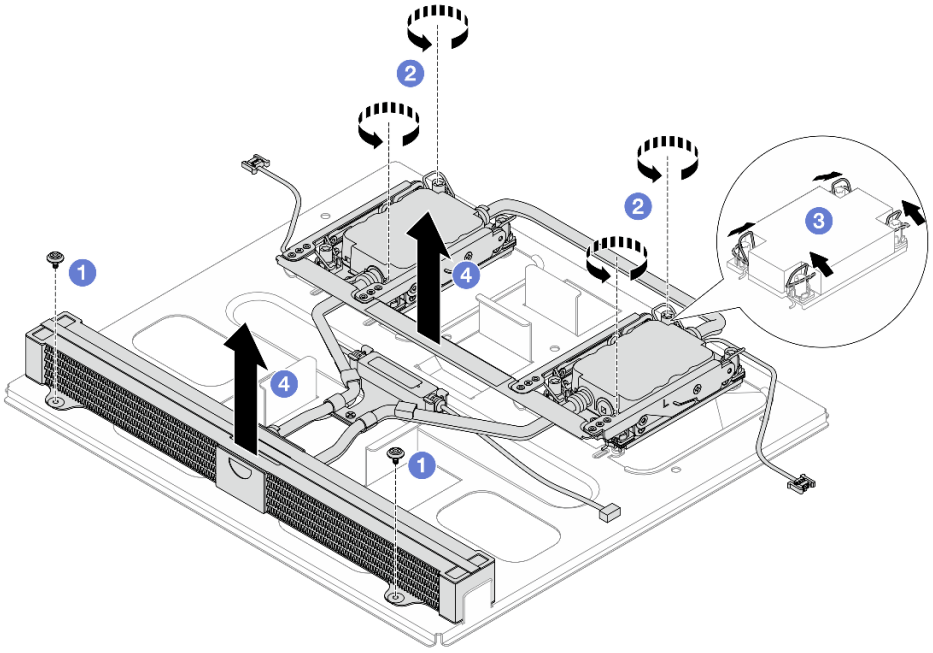


Figure 150. Installing the radiator tray

1. 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.
2. 2 Tighten the screw.

Step 2. Separate the NeptAir module from the shipping tray.



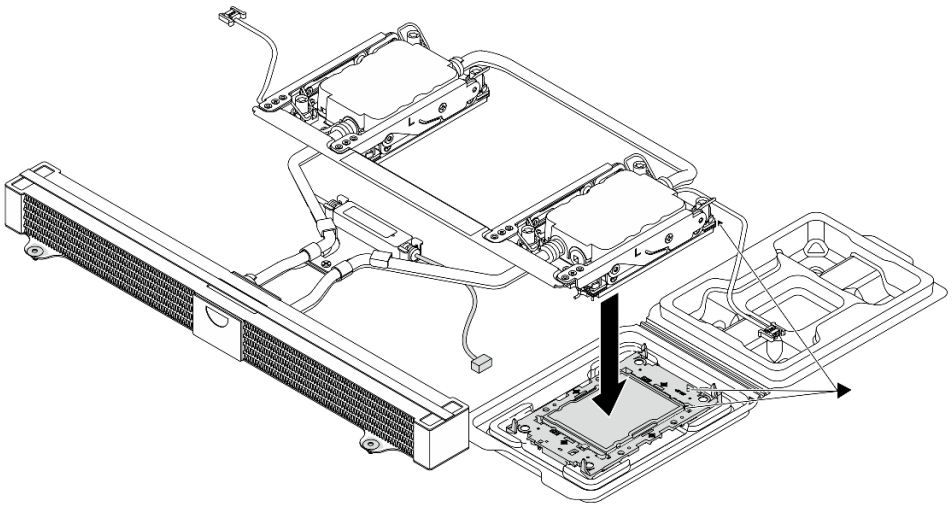
a. 1 Loosen the six screws on the NeptAir module shipping tray.

b. 2 Lift the NeptAir module by the module handle (NeptAir heat sink bracket) to separate the module from the shipping tray.

Step 3. 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 4. Install the processor to the NeptAir module.



1. Align the triangular mark on the cold plate assembly label with the triangular mark on the processor carrier and processor.
2. Install the NeptAir module onto the processor-carrier.
3. Press the carrier into place until the clips at all four corners engage.

Note: If your server only has one processor installed, generally processor 1, it is required to install a cover to the empty socket of processor 2 before proceeding with further installation.

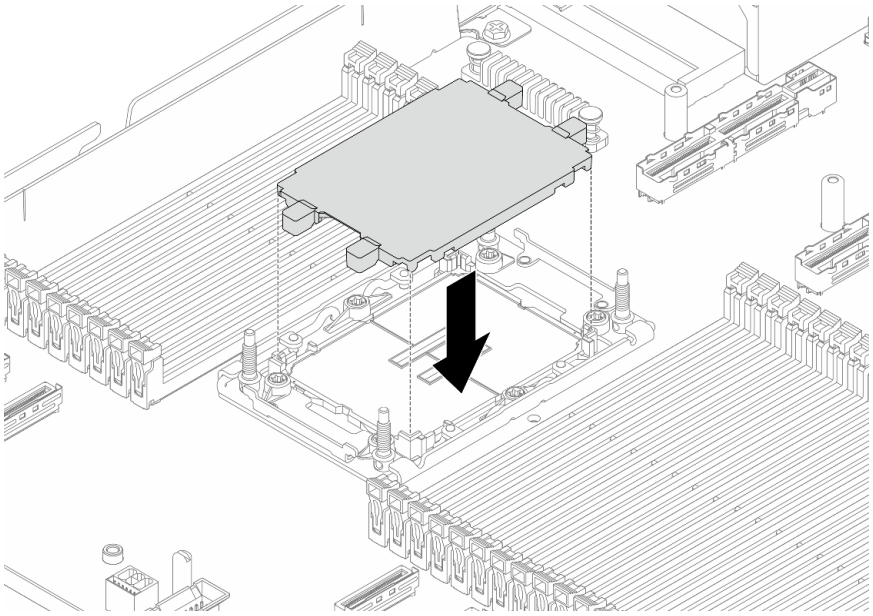


Figure 151. Install the processor socket cover

Step 5. Open the NeptAir module handle.

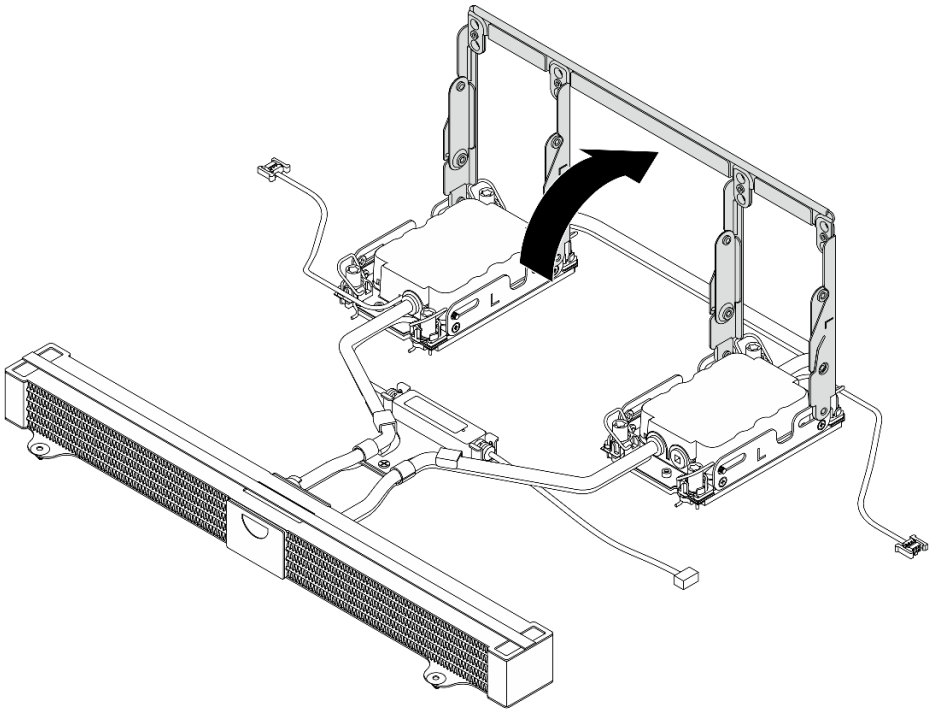
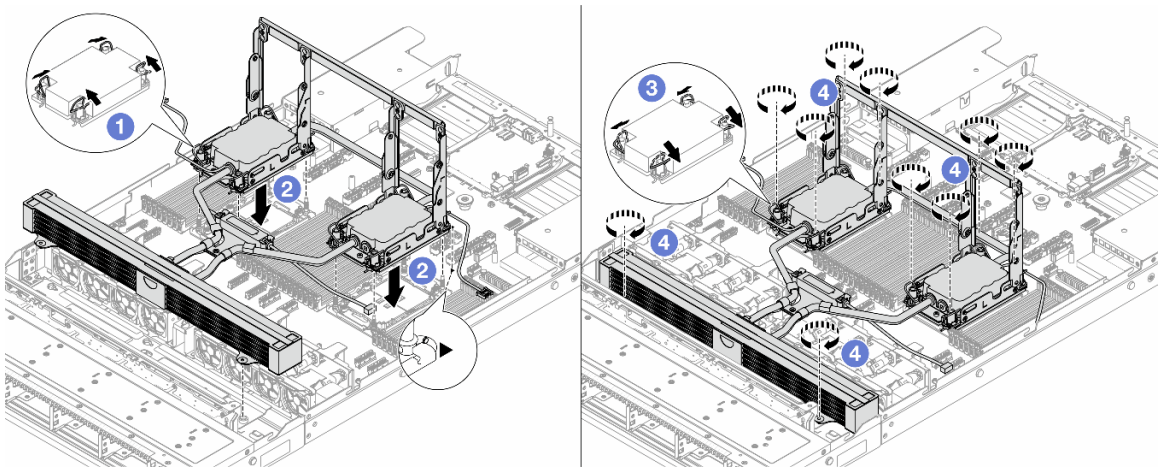


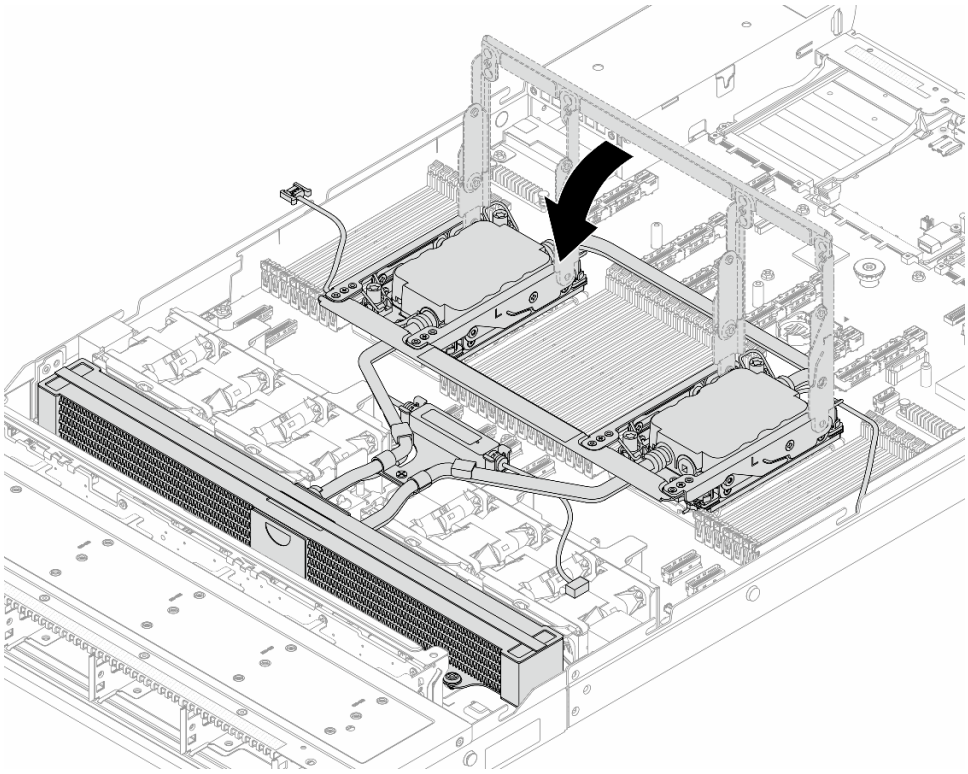
Figure 152. Opening the handle

Step 6. Install the processor-NeptAir module to the system board assembly.



1. 1 Rotate the anti-tilt wire bails inward.
2. 2 Align the triangular mark and four Torx T30 nuts on the cold plate assembly with the triangular mark and threaded posts of the processor socket; then, insert the cold plate assembly into the processor socket.
3. 3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.
4. 4 Fully tighten the Torx T30 nuts *in the installation sequence shown* on the cold plate assembly and the radiator. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the cold plate assembly and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

Step 7. Rotate the NeptAir module handle down.



Note: For leakage detection sensor module working status, see “LED on the leakage detection sensor module” on page 303.

Step 8. Connect the leakage detection sensor module cable and pump cables of the NeptAir module to the connector on the system board assembly. See ***Internal Cable Routing Guide***.

Step 9. To install the server into the rack, see “Install the server to the rack (friction rails)” on page 85 and “Install the server to the rack (slide rails)” on page 93.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Lenovo Processor Neptune™ Core Module replacement (trained technicians only)

Follow the instructions in this section to remove and install the Processor Neptune™ Core Module (NeptCore).

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

Contact Lenovo Professional Services team for help when installing the part for the first time.

- “Remove the Lenovo Processor Neptune™ Core Module” on page 158
- “Install the Lenovo Processor Neptune™ Core Module” on page 161

Remove the Lenovo Processor Neptune™ Core Module

Follow the instructions in this section to remove the Processor Neptune™ Core Module (NeptCore).

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it without proper training and qualification.
- Contact Lenovo Professional Services team for help when installing the part for the first time.

About this task

Safety information for leakage detection sensor module cable

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. To remove the quick connect plugs from the manifolds, see “Remove the manifold (in-rack system)” on page 169 or “Remove the manifold (in-row system)” on page 189.

Step 2. To remove the server from the rack, see “Remove the server from the rack (friction rails)” on page 82 and “Remove the server from the rack (slide rails)” on page 89.

Step 3. Remove the top cover. See “Remove the top cover” on page 282.

Step 4. Disconnect the leakage detection sensor module cable of the NeptCore module from the connector on the system board assembly. See ***Internal Cable Routing Guide***.

Step 5. Open the hose holder cover.

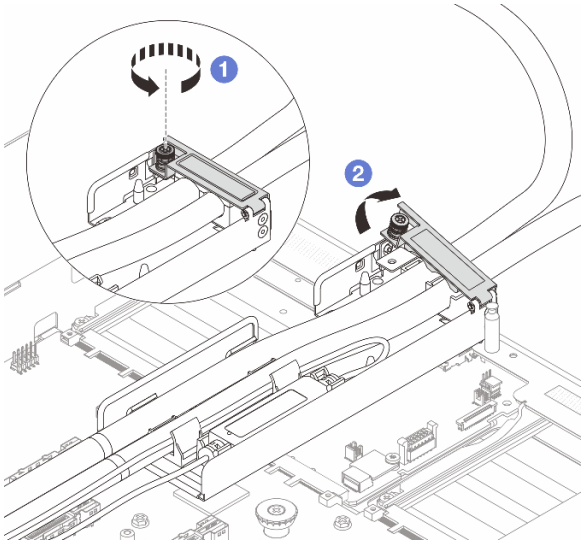


Figure 153. Opening the holder cover

a. 1 Loosen the thumbscrew on the cover.

b. 2 Open the cover.

Step 6. Disengage the hoses and leakage detection sensor module.

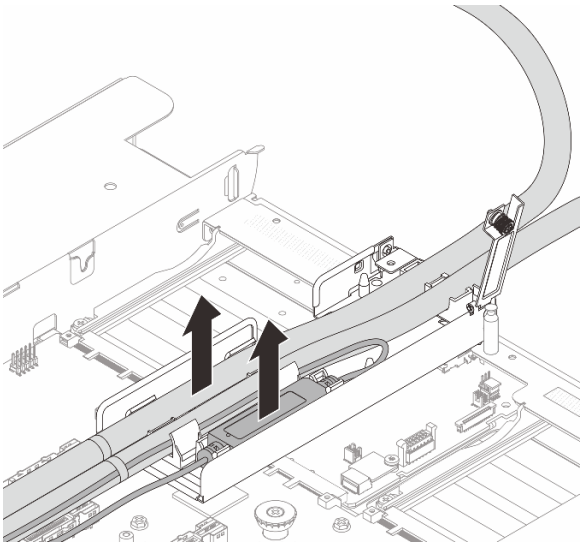


Figure 154. Disengaging the hoses and module

a. 1 Push the holder latches to both sides to unlock the module.

b. 2 Disengage the hoses and module from the hose holder.

Step 7. Disengage the NeptCore module from the processor board.

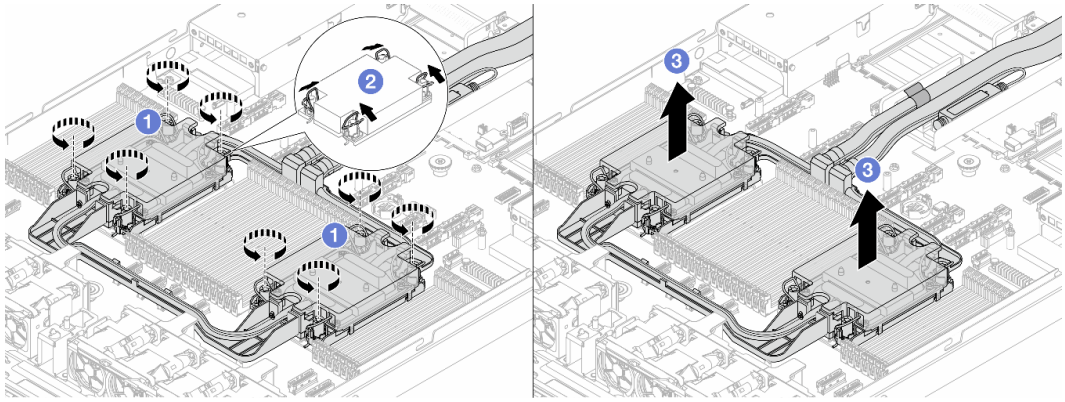


Figure 155. Removing the NeptCore module

a. 1 Fully loosen the Torx T30 nuts on the cold plate assembly.

b. 2 Rotate the anti-tilt wire bails inward.

c. 3 Carefully lift the NeptCore module from the processor sockets. If the NeptCore module cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the NeptCore module again.

Step 8. Separate the processor from the NeptCore module. Refer to "Separate the processor from carrier and heat sink" on page 223.

Step 9. If there is any old thermal grease on the processors and the cold plates, gently clean the processors and the cold plates with an alcohol cleaning pad.

Step 10. Remove the hose holder.

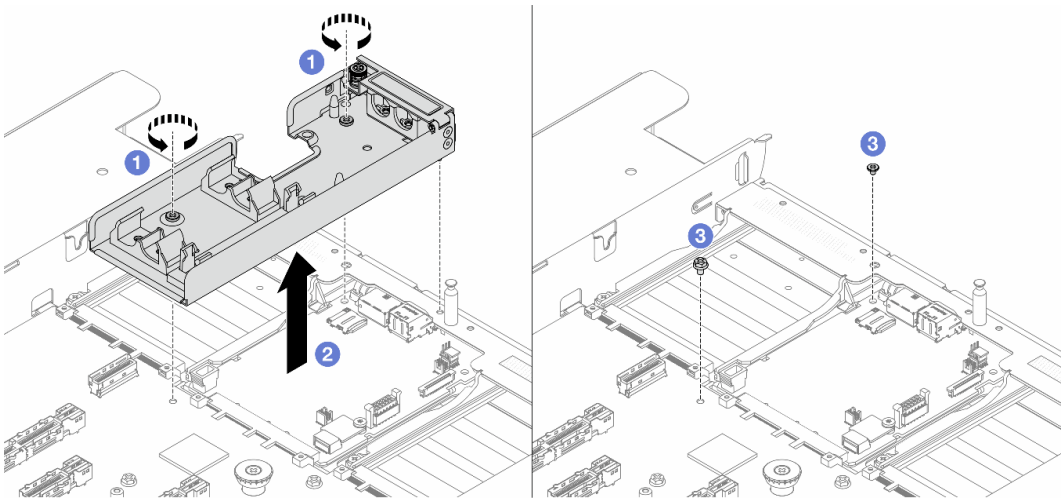


Figure 156. Removing the holder

a. Loosen the screws that locks the holder to the system I/O board and processor board.
b. Lift the holder out of the chassis.
c. Re-install the screw back to the system I/O board and 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.

Install the Lenovo Processor Neptune™ Core Module

Follow the instructions in this section to install the Processor Neptune™ Core Module (NeptCore).

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it without proper training and qualification.
- Contact Lenovo Professional Services team for help when installing the part for the first time.

About this task

Safety information for leakage detection sensor module cable

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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

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

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. Prepare your server.

a. Install the hose holder to the chassis.

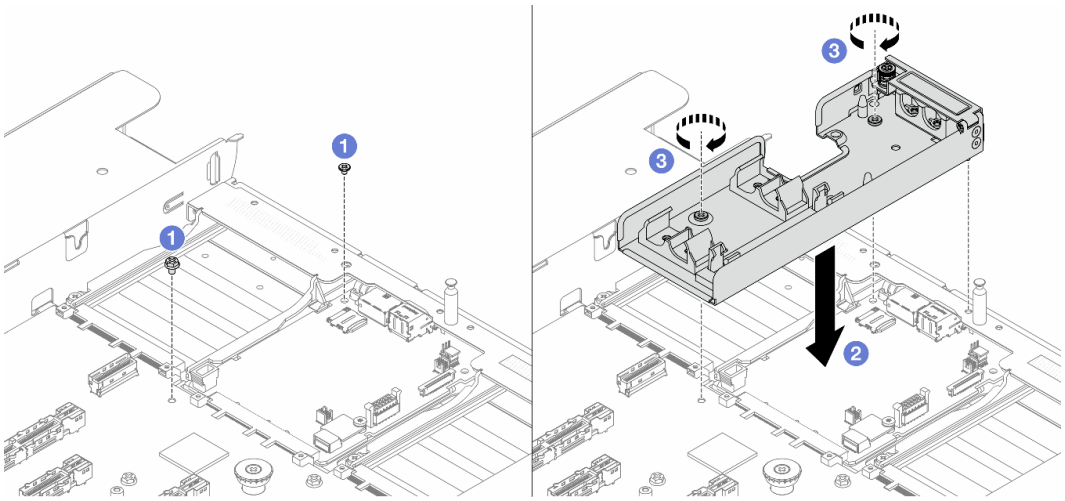


Figure 157. Installing the hose holder

1. (1) Loosen the screw on the system I/O board and processor board.
2. (2) Align the screw holes on the hose holder to the system I/O board and processor board. And align the guiding pin of the holder to the rear wall.
3. (3) Tighten the screw to secure the holder to the system I/O board and processor board.

b. Open the hose holder cover.

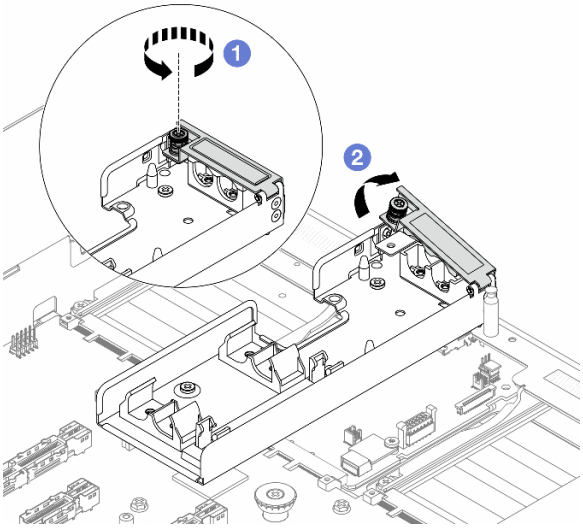


Figure 158. Opening the holder cover

1. 1 Loosen the thumbscrew on the hose holder.
2. 2 Open the latch.

Step 2. 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 3. Install the processor to the NeptCore module. For more information, see "Install a processor and heat sink" on page 225.

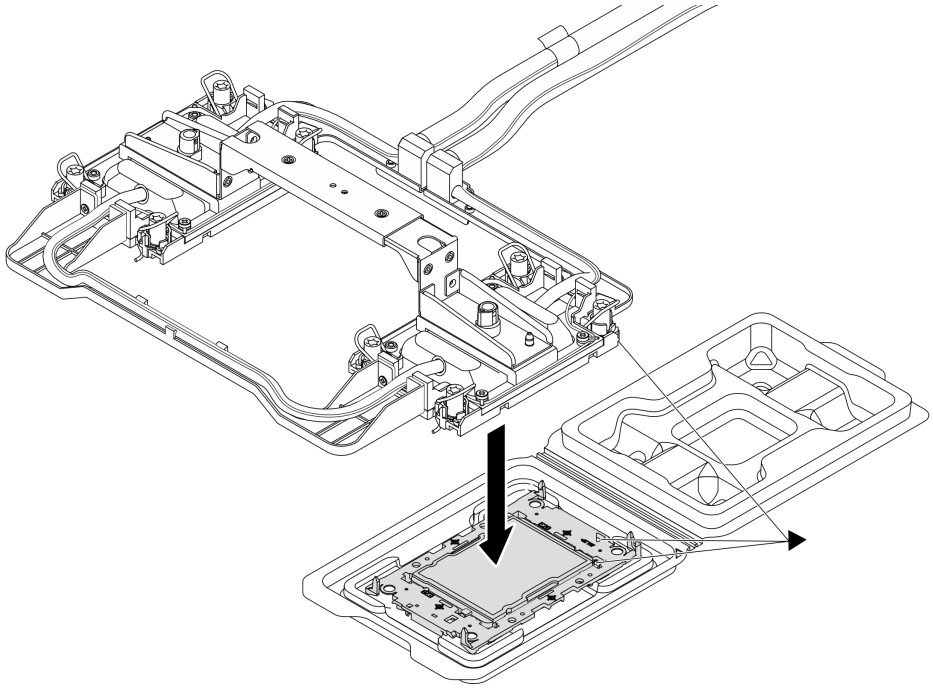


Figure 159. Installing the processor

1. Align the triangular mark on the cold plate assembly label with the triangular mark on the processor carrier and processor.
2. Install the NeptCore module onto the processor-carrier.
3. Press the carrier into place until the clips at all four corners engage.

Note: If the server only has one processor installed, generally processor 1, it is required to install a cover to the empty socket of processor 2 before proceeding with further installation.

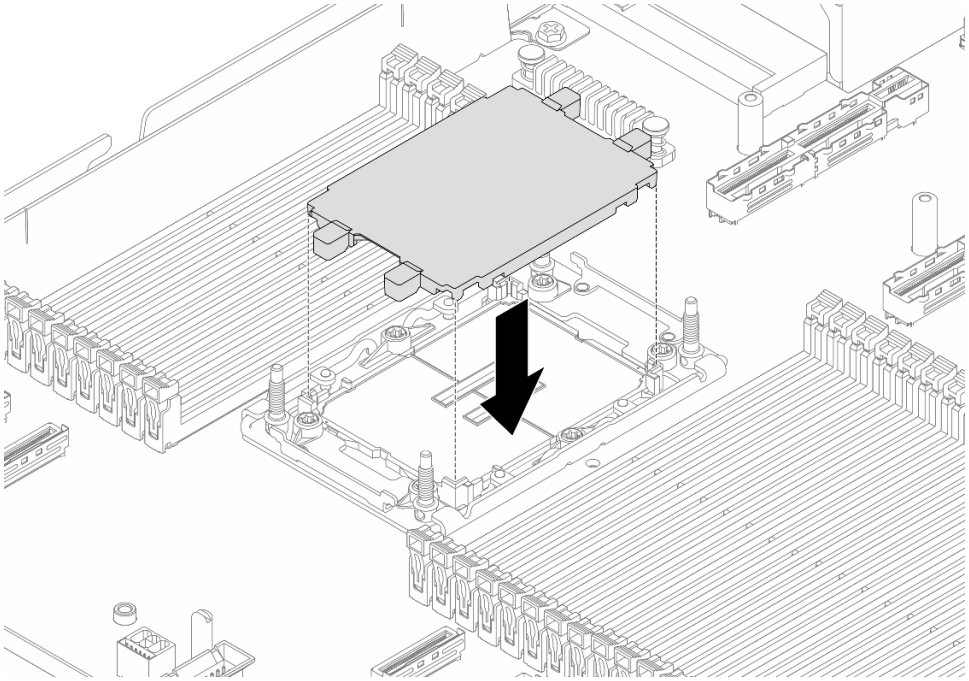


Figure 160. Install the processor socket cover

Step 4. Install the processor-NeptCore module to the system board assembly.

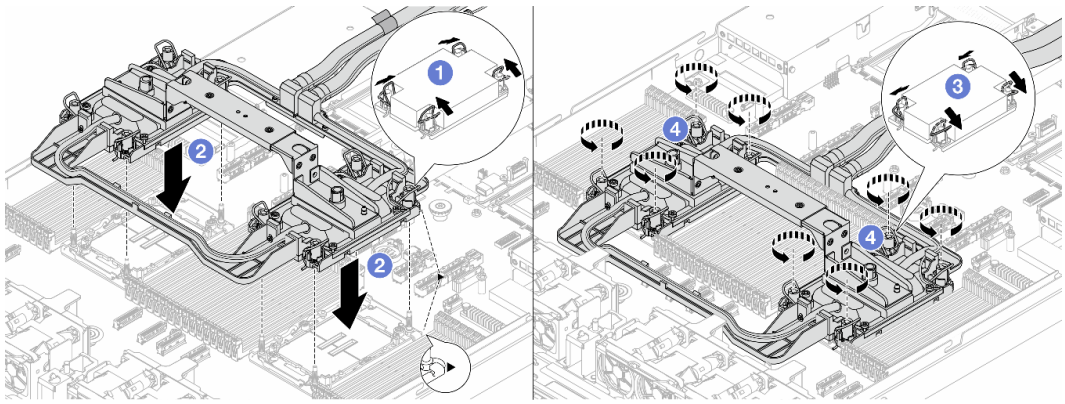


Figure 161. Installing the NeptCore module

1. (1) Rotate the anti-tilt wire bails inward.
2. (2) Align the triangular mark and four Torx T30 nuts on the cold plate assembly with the triangular mark and threaded posts of the processor socket; then, insert the cold plate assembly into the processor socket.

3. ③ Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.
4. ④ Fully tighten the Torx T30 nuts *in the installation sequence shown* on the cold plate assembly. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the cold plate assembly and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

Step 5. Remove the module handle from the NeptCore module.

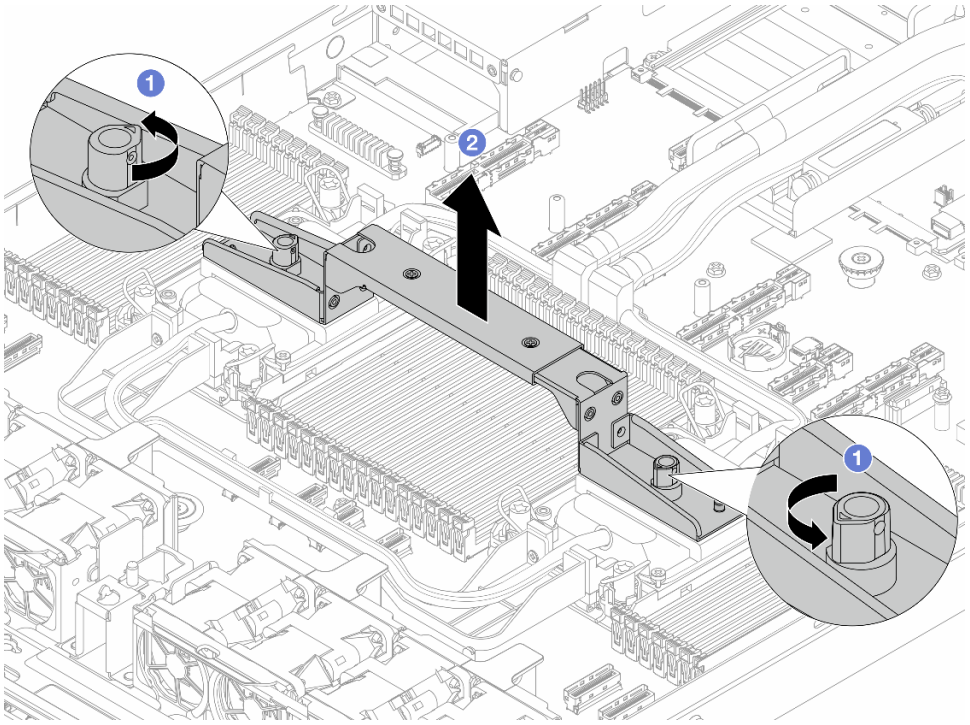


Figure 162. Removing the module handle

a. ① Rotate the screws as illustrated above to unlock the handle.
b. ② Separate the handle from NeptCore module.

Notes: A new NeptCore module comes with a handle.

1. To replace an old NeptCore module with a new one, remove the handle of the new one as illustrated above.
2. To replace processors without changing the NeptCore module, a handle is not needed. Skip Step 5 on page 165 and proceed with further installation.

Step 6. Install the cold plate covers. Press the cover down as illustrated below.

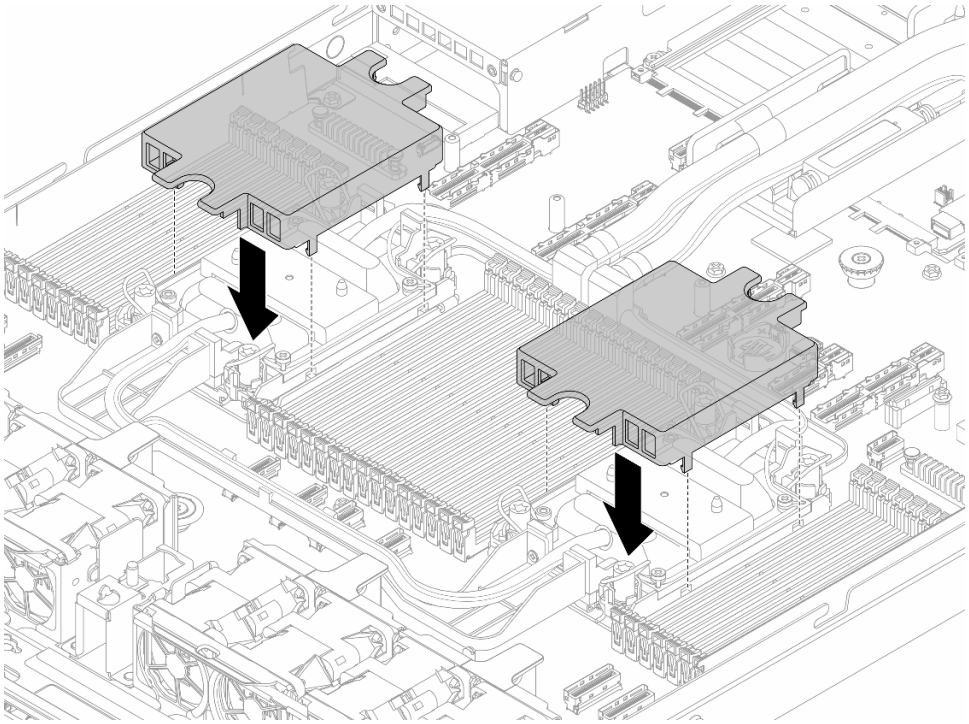


Figure 163. Installing a cold plate cover

Step 7. Place the hoses, the leakage detection sensor module and the cable.

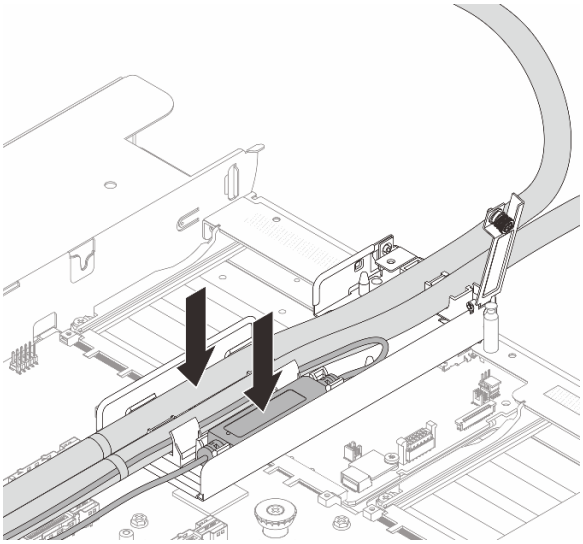


Figure 164. Placing the hoses and module

Notes:

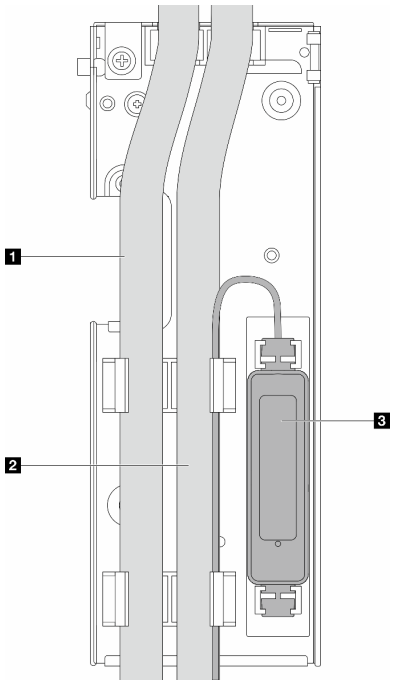


Figure 165. Installation details

- The hoses: place the middle part of the hose against the blue latch; and insert the 1 outlet and 2 inlet hoses into the holder.
- The leakage detection sensor module 3: Insert the module to the holder beside the hoses. And make sure that the side with a status LED is up and route the cable as illustrated above.
- For leakage detection sensor module working status, see "LED on the leakage detection sensor module" on page 303.

Step 8. Close the hose holder cover.

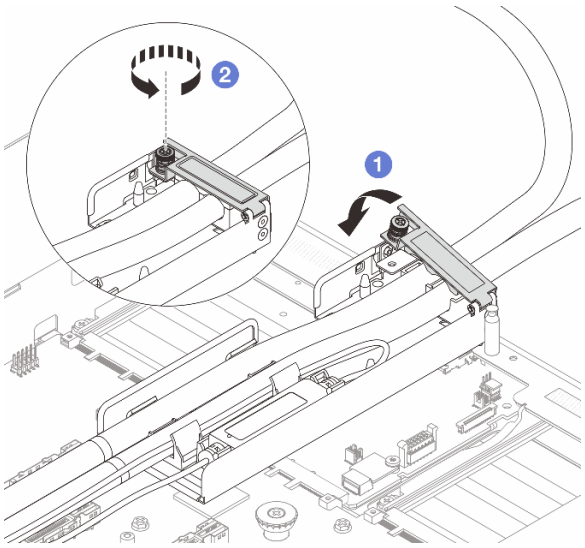


Figure 166. Closing the cover back

a. 1 Close the cover in and align the screw hole.

b. (2) Tighten the screws.

Step 9. Connect the leakage detection sensor module cable of the NeptCore module to the connector on the system board assembly. See ***Internal Cable Routing Guide***.

Step 10. Install the top cover. See "Install the top cover" on page 284.

Step 11. To install the server into the rack, see "Install the server to the rack (friction rails)" on page 85 and "Install the server to the rack (slide rails)" on page 93.

Step 12. To install the quick connect plugs to the manifolds, see "Install the manifold (in-rack system)" on page 177 or "Install the manifold (in-row system)" on page 198.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 288.

Manifold replacement (trained technicians only)

Use the following procedures to remove and install the manifolds.

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

Contact Lenovo Professional Services team for help when installing the part for the first time.

The liquid runs through the cooling system is de-ionized water. For more information about the liquid, see "Water requirements" on page 13.

The server can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

For more operation and maintenance guidelines on Coolant Distribution Unit (CDU), see Lenovo Neptune DWC RM100 in-rack Coolant Distribution Unit (CDU) Operation & Maintenance Guide.

The illustrations below present the rear views of a rack cabinet; three sets of manifolds and three sets of connection hoses. There are two labels attached to the front of the manifolds, and one label on one end of each hose.

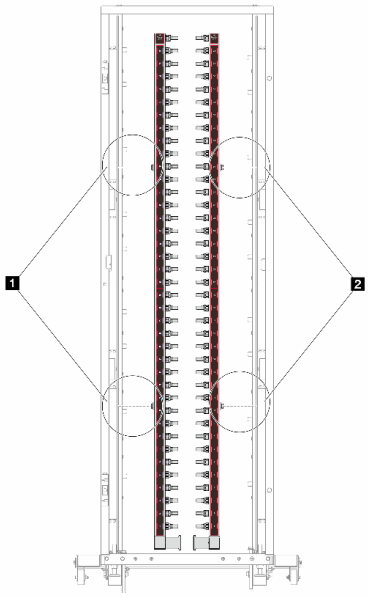


Figure 167. Manifolds in a 42U in-row system

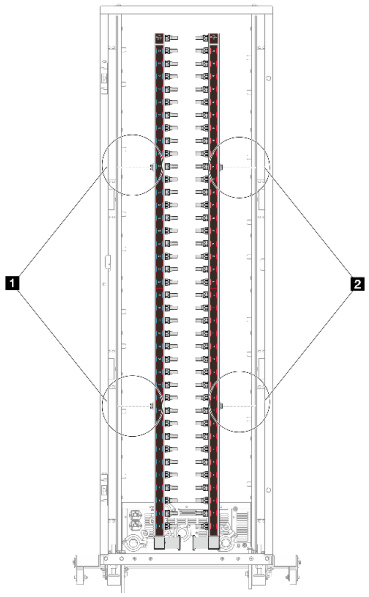


Figure 168. Manifolds in a 42U in-rack system

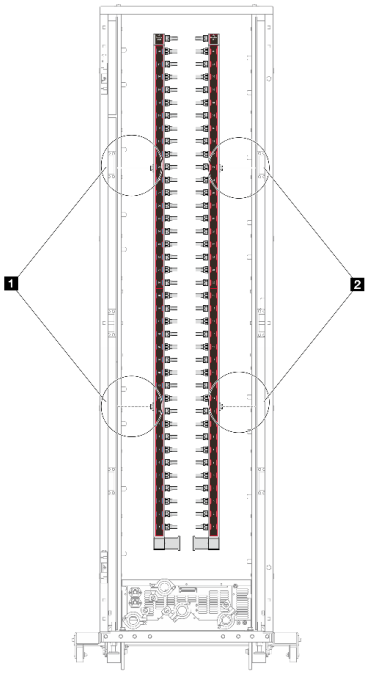


Figure 169. Manifolds in a 48U in-rack system

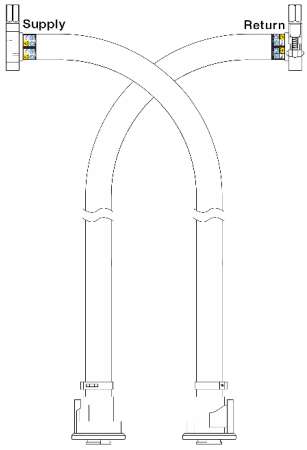


Figure 170. 42U in-row hose kit

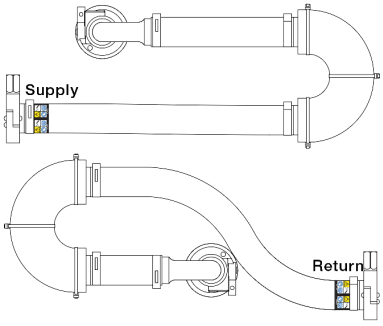


Figure 171. 42U in-rack connection set

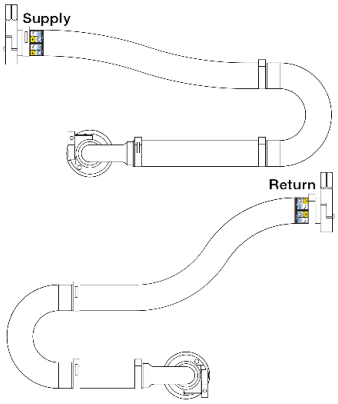


Figure 172. 48U in-rack connection set

1 Two left spools on supply manifold
2 Two right spools on return manifold

- “Remove the manifold (in-rack system)” on page 169
- “Install the manifold (in-rack system)” on page 177
- “Remove the manifold (in-row system)” on page 189
- “Install the manifold (in-row system)” on page 198

Remove the manifold (in-rack system)

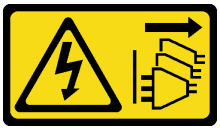
Follow the instructions to remove the manifold in an in-rack direct water cooling system.

About this task

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

CAUTION:
The liquid might cause irritation to the skin and eyes. Avoid direct contact with the liquid.

S002



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

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Ensure proper handling procedures are followed when working with any chemically treated liquid used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the liquid chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the liquid chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Power off the in-rack CDU and disconnect all power cords.

Step 2. Close both ball valves.

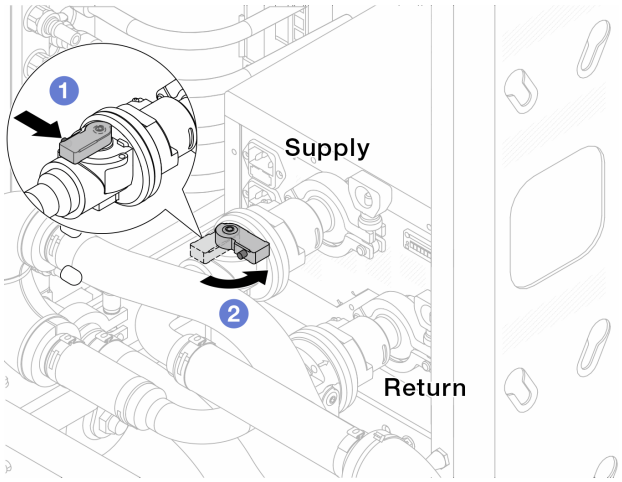


Figure 173. Closing ball valves

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to close the valves as illustrated above.

Step 3. Remove the quick connect plugs to separate the NeptCore module hoses from the manifold.

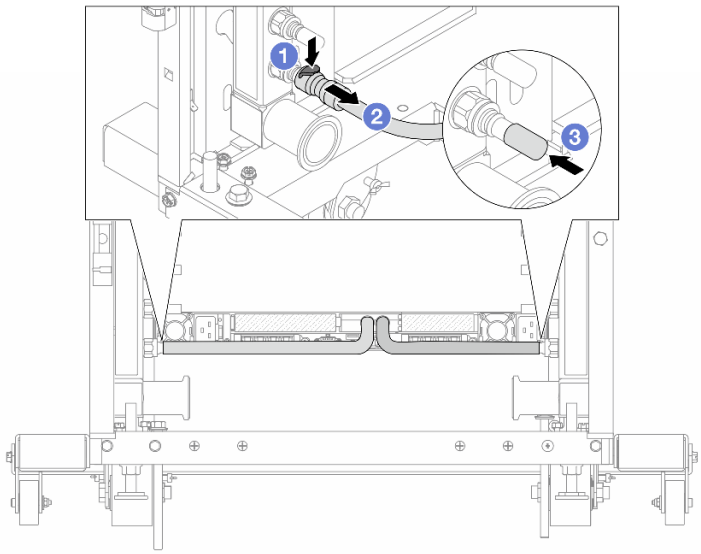


Figure 174. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 4. Repeat Step 3 on page 171 to the other manifold.

Step 5. Disengage the connection set from ball valves.

Note: Disengage the return side first, then disengage the supply side.

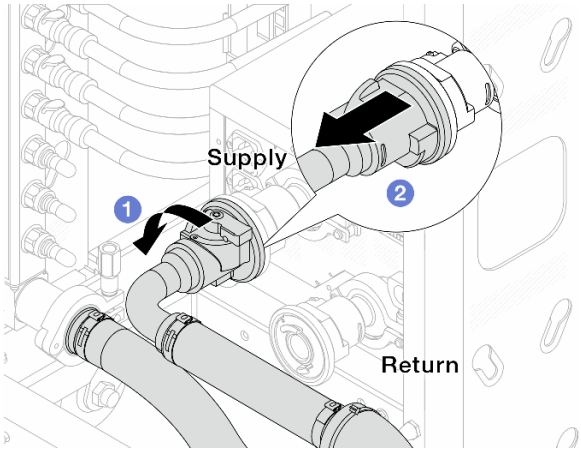


Figure 175. Removing the connection set

a. 1 Rotate the ball valve to the left.
b. 2 Pull the connection set off from ball valve.

Step 6. Remove the return manifold with the connection set attached.

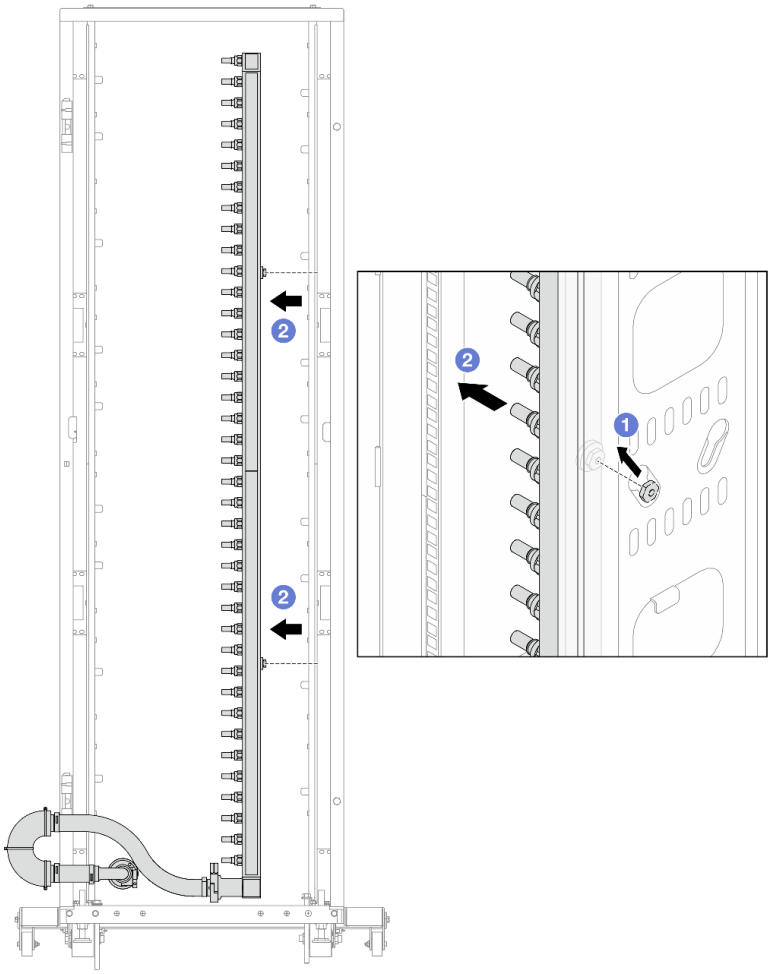


Figure 176. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the connection set attached.

Step 7. Repeat Step 6 on page 172 to the supply manifold.

Notes:

- There is remaining liquid inside the manifold and the connection set. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 8. Install the bleeder kit to the manifold supply side.

Note: This step drains the liquid with the help of a pressure difference inside and outside the supply manifold.

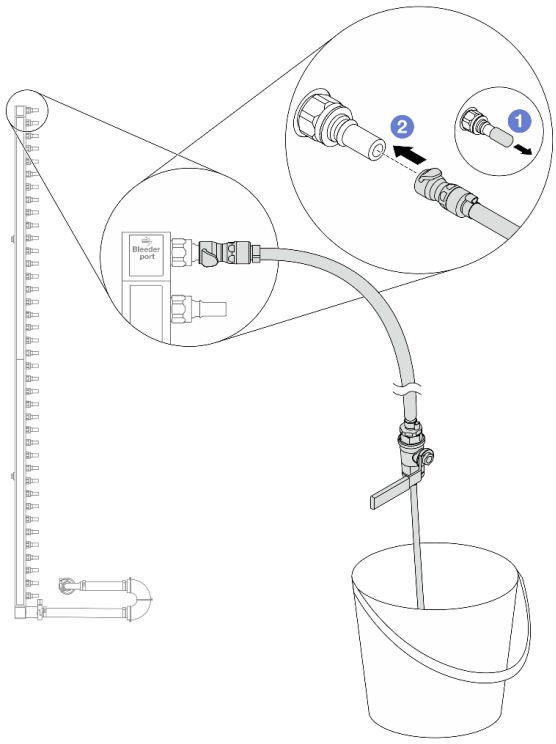


Figure 177. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

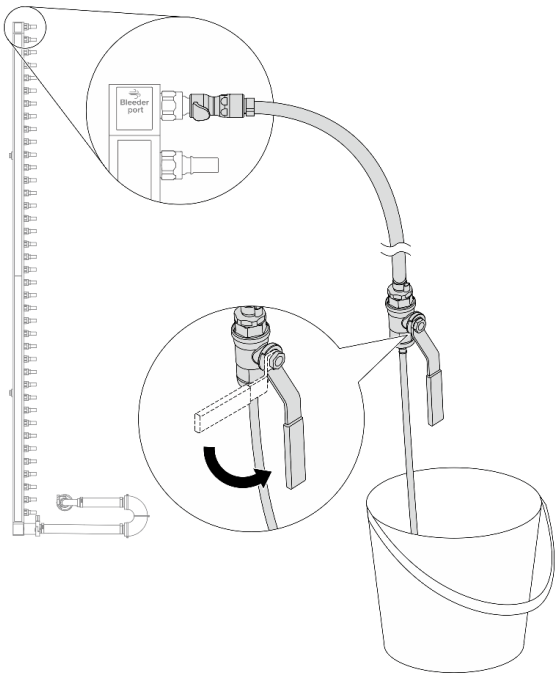


Figure 178. Opening the bleeder valve

Step 10. Install the bleeder kit to the manifold return side.

Note: This step drains the liquid with the help of a pressure difference inside and outside the return manifold.

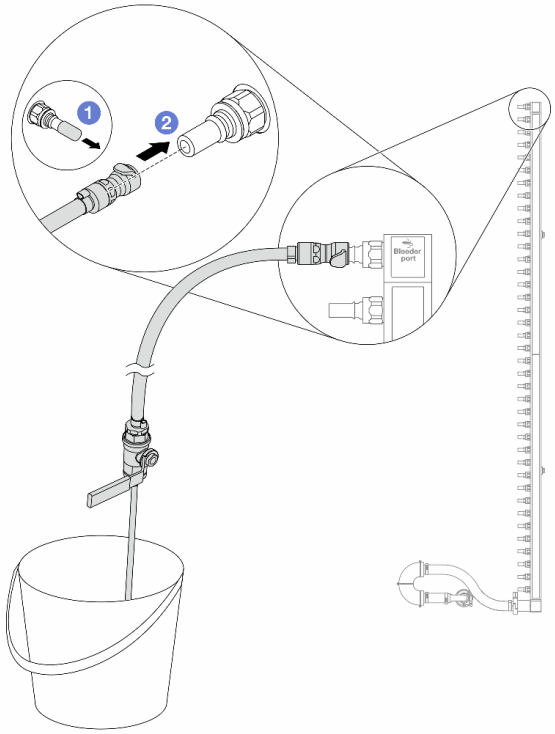


Figure 179. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

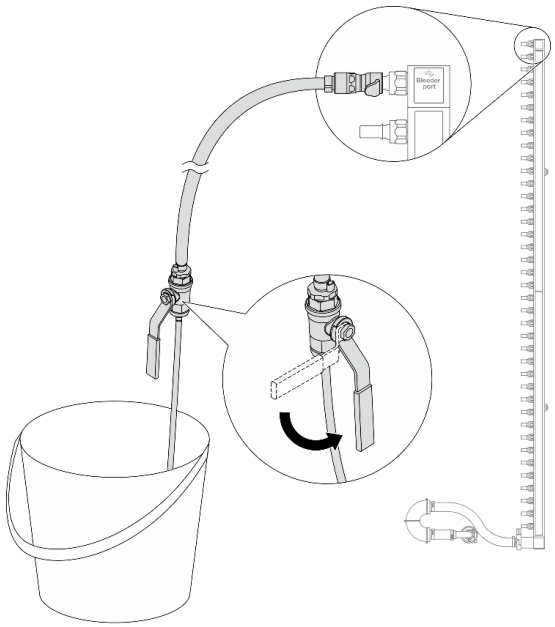


Figure 180. Opening the bleeder valve

Step 12. Separate the return manifold from the connection set in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any liquid that may drain out.

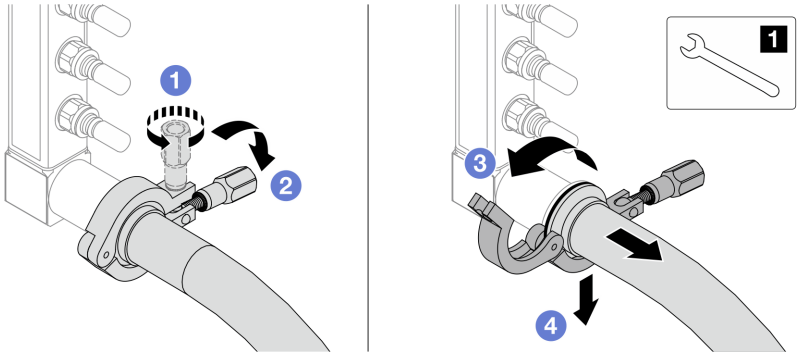


Figure 181. Separating the manifold from the connection set

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and connection set from the manifold.

Step 13. Repeat Step 12 on page 177 to the supply manifold.

Step 14. For better sanitation, keep the manifold ports and connection sets dry and clean. Re-install quick connect plug covers or any covers that protect connection sets and manifold ports.

Step 15. To remove the server from the rack, see “Remove the server from the rack (friction rails)” on page 82 and “Remove the server from the rack (slide rails)” on page 89.

Step 16. To remove the Processor Neptune™ Core Module (NeptCore), see “Remove the Lenovo Processor Neptune™ Core Module” on page 158.

After you finish

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

Install the manifold (in-rack system)

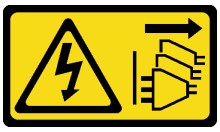
Follow the instructions to install the manifold in an in-rack direct water cooling system.

About this task

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

CAUTION:
The liquid might cause irritation to the skin and eyes. Avoid direct contact with the liquid.

S002



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

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Ensure proper handling procedures are followed when working with any chemically treated liquid used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the liquid chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the liquid chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Make sure that the in-rack CDU and other devices are not powered on, and that all external cables are disconnected.

Step 2. To install the Processor Neptune™ Core Module (NeptCore), see “Install the Lenovo Processor Neptune™ Core Module” on page 161.

Step 3. To install the server into the rack, see “Install the server to the rack (friction rails)” on page 85 or “Install the server to the rack (slide rails)” on page 93.

Step 4. Install the manifold.

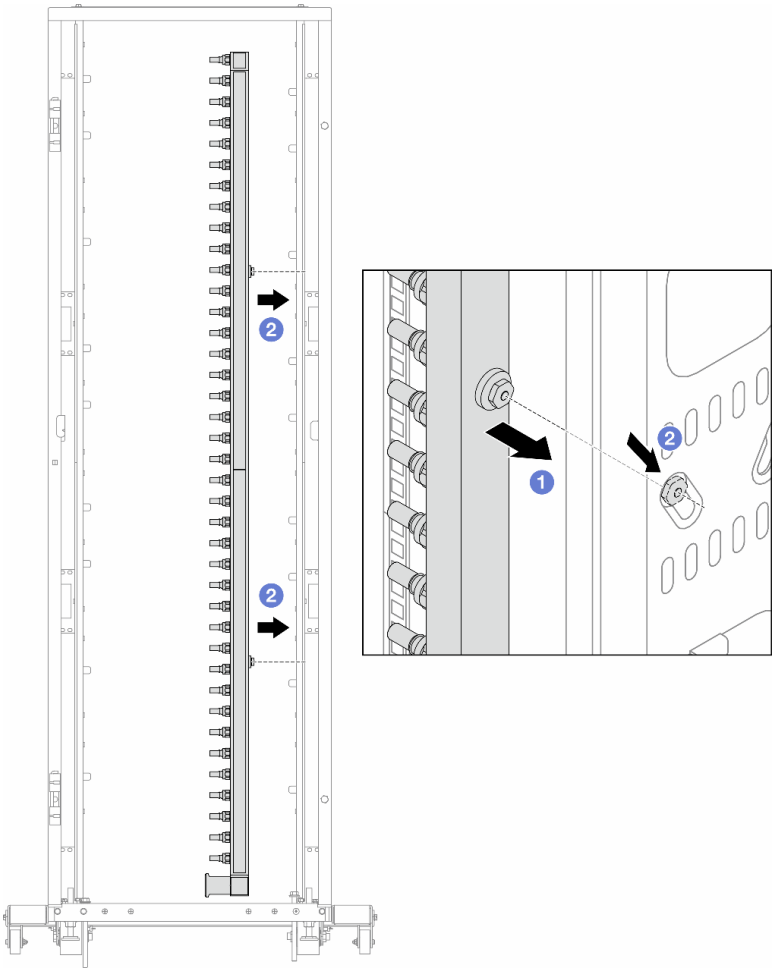


Figure 182. Installing the manifold

a. 1 Hold the manifold with both hands, and mount it onto the rack cabinet.

b. 2 Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 5. Repeat Step 4 on page 179 to the other manifold.

Step 6. Separate ball valves from connection sets.

Note: One end of a connection set comes with a detachable ball valve, and the two parts are connected by a ferrule. Remove the ferrule to separate the ball valve that is bound for CDU in Step 7 on page 181.

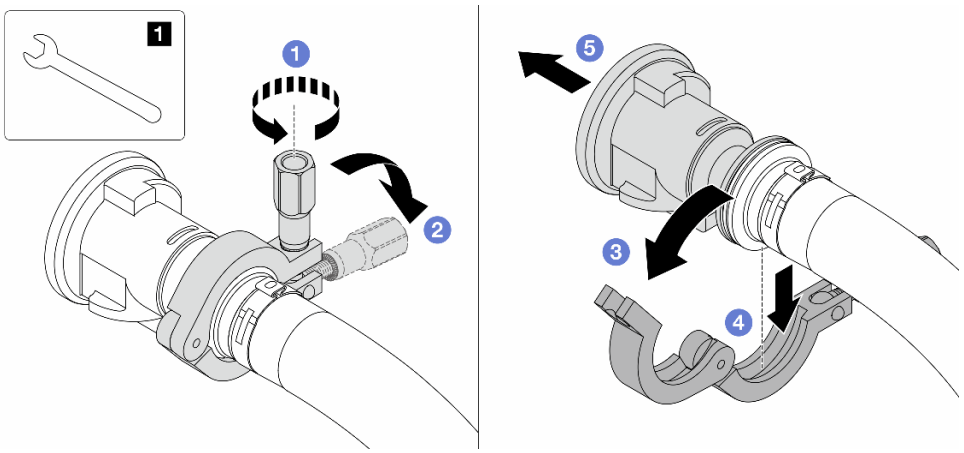


Figure 183. Separating ball valves

1	17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule.
e. 5 Remove the ball valve from connection set.

Step 7. Install ball valves to CDU.

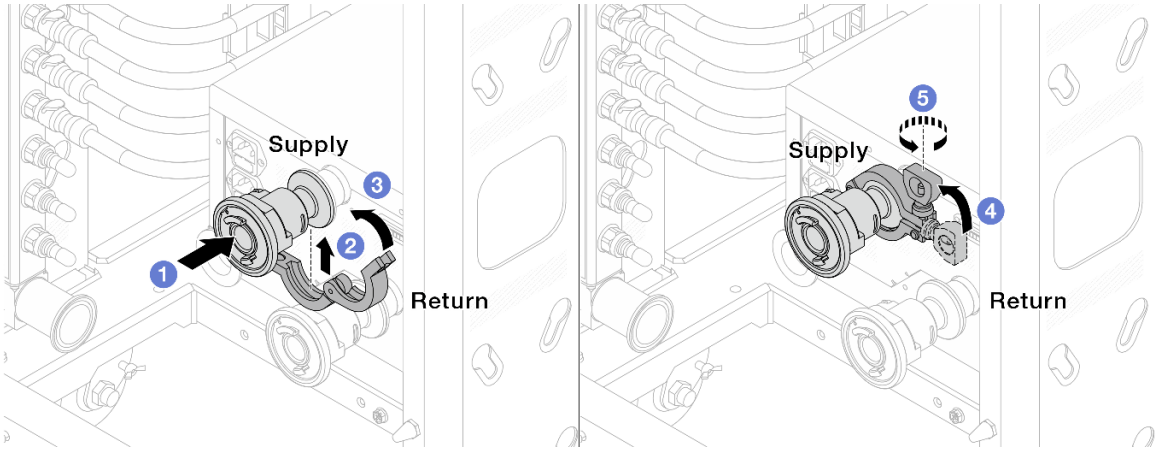


Figure 184. Installing ball valves

a. 1 Connect the ball valves to **Supply** and **Return** ports.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 8. Install the connection set to manifolds.

Note: Install the supply side first, then install the return side.

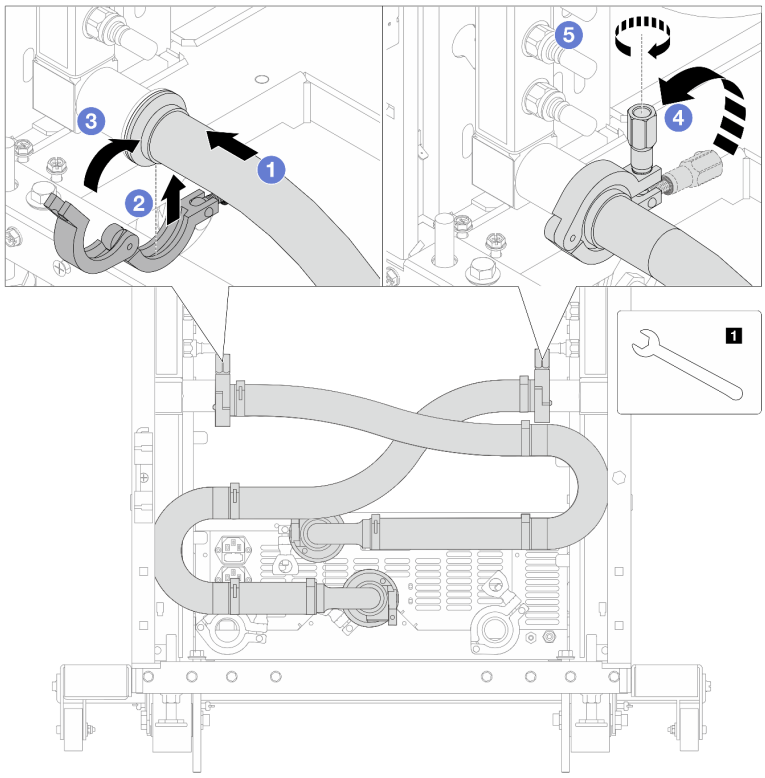


Figure 185. Installing the connection set

1 17 mm wrench

a. 1 Connect the connection set to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 9. Install the connection set to ball valves.

Note: Install the supply side first, then install the return side.

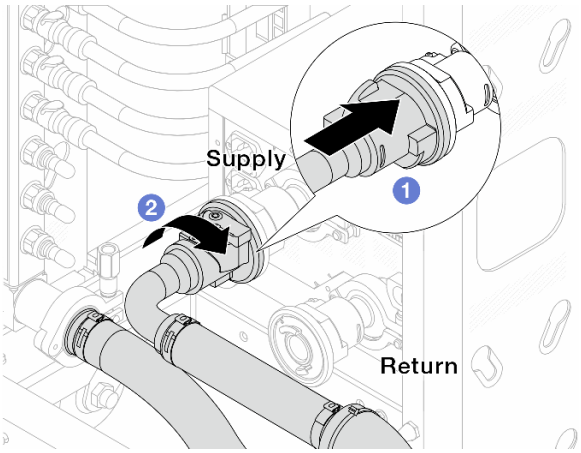


Figure 186. Connecting ball valves

a. 1 Connect ball valves.
b. 2 Rotate to the right to lock the two valves.

Step 10. Prepare the in-rack CDU.

a. Connect the feed hose to inlet port on the front.

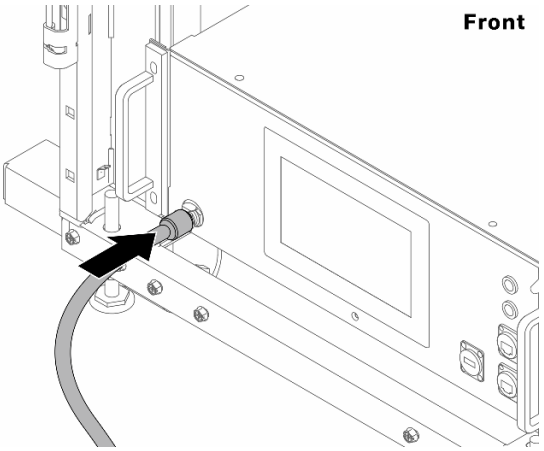


Figure 187. The front of CDU

b. Connect hoses to the drain port and bleeder port on the rear.

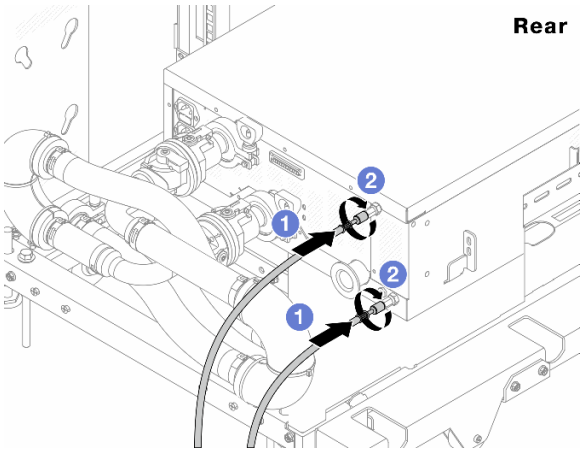


Figure 188. The rear of CDU

1. Connect both drain and bleeder hoses to CDU.
2. Rotate the connectors to the right to secure the connection.

Important:

- For more operation and maintenance guidelines, see Lenovo Neptune DWC RM100 in-rack liquid Distribution Unit (CDU) Operation & Maintenance Guide.
- For service support, associated warranty and maintenance sizing, contact Lenovo Professional Services team at cdusupport@lenovo.com.

Step 11. Install the quick connect plug to the manifolds.

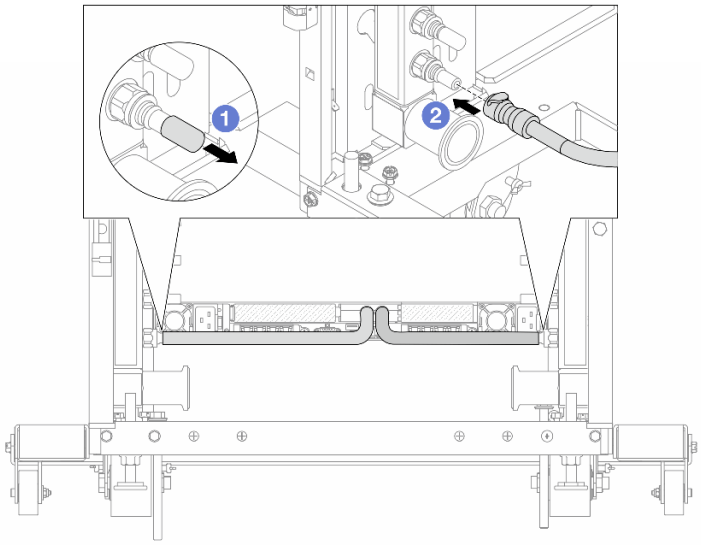


Figure 189. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 12. Install the bleeder kit to the manifold supply side.

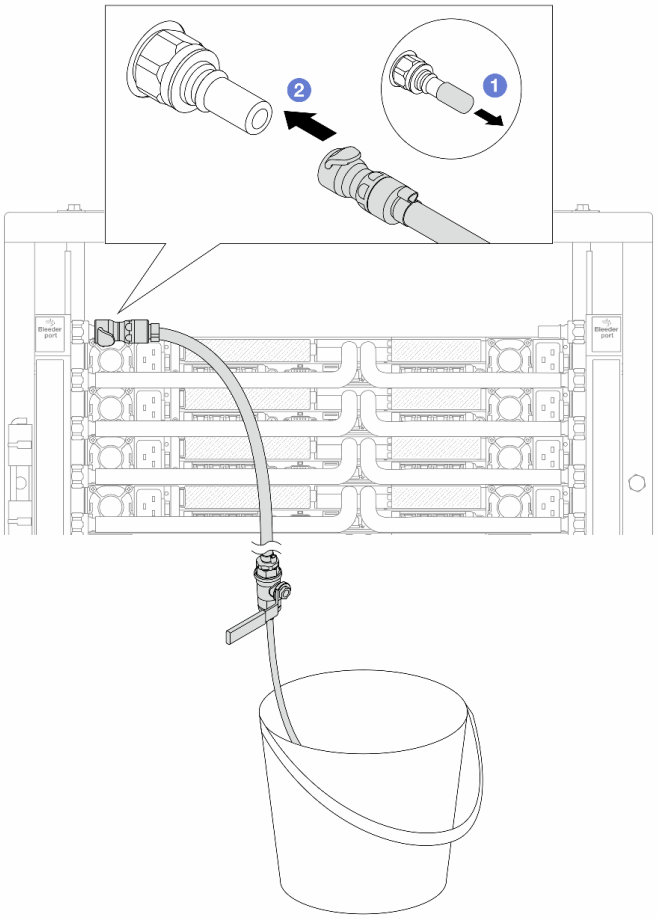


Figure 190. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 13. To push the air out of the manifolds, open ball valve switches to let liquid fill the system.

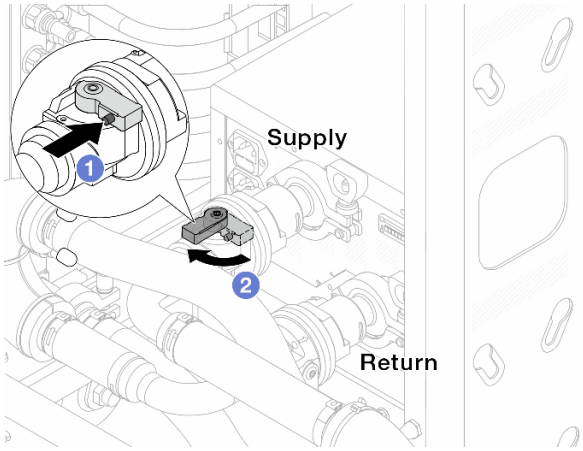


Figure 191. Opening ball valves

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to fully open the valves as illustrated above.

Attention:

- Pay close attention to the front display of CDU and maintain the system pressure at **one bar**.
- For more information about liquid temperature and system pressure requirements, see "Water requirements" on page 13.

Step 14. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

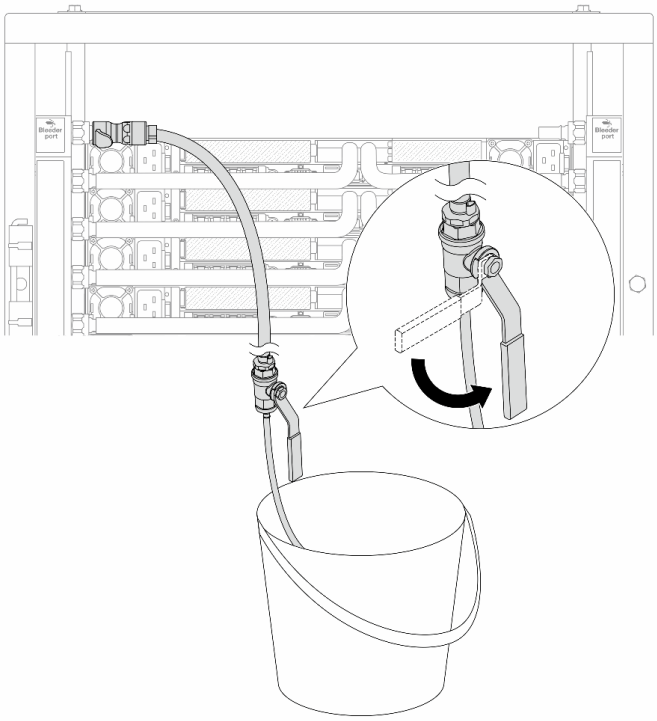


Figure 192. Opening the bleeder valve on the supply side

Step 15. Install the bleeder kit to the manifold return side.

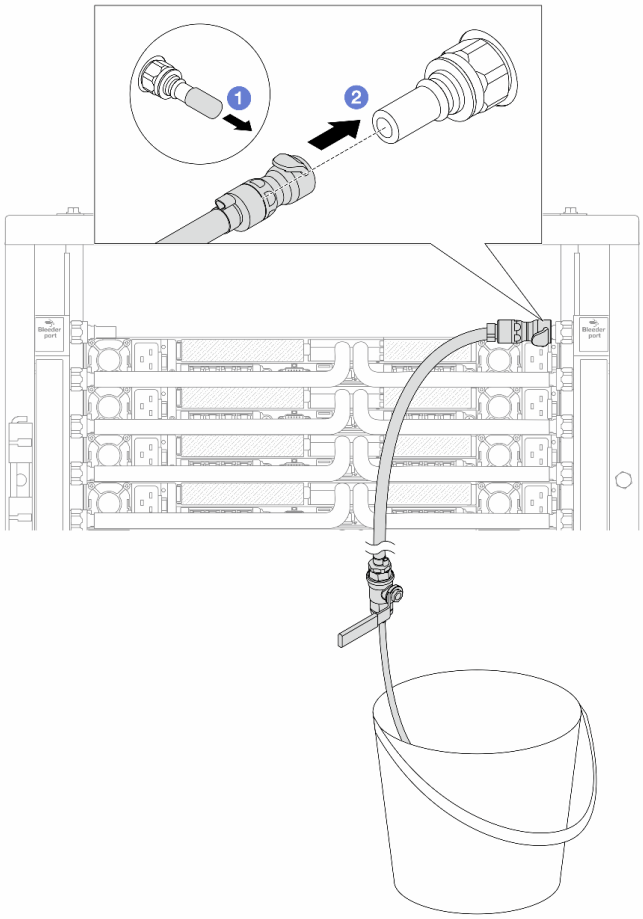


Figure 193. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 16. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

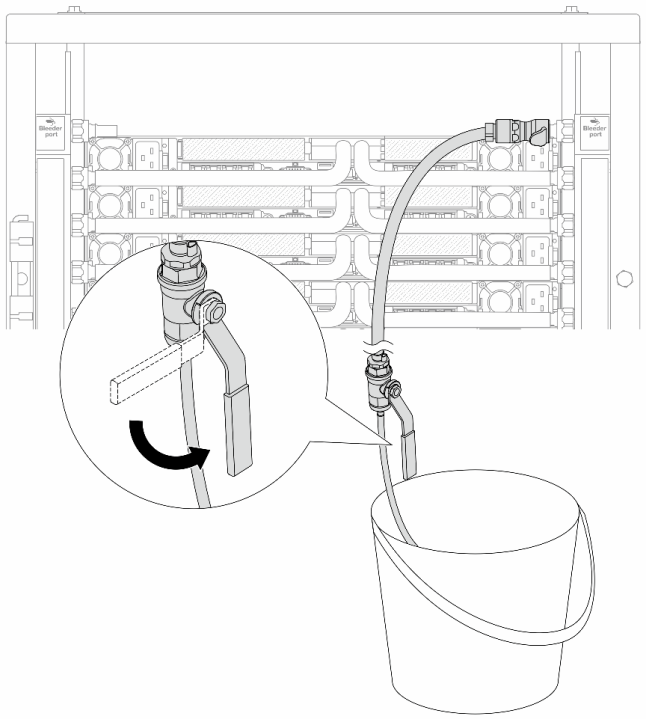


Figure 194. Opening the bleeder valve on the return side

Step 17. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

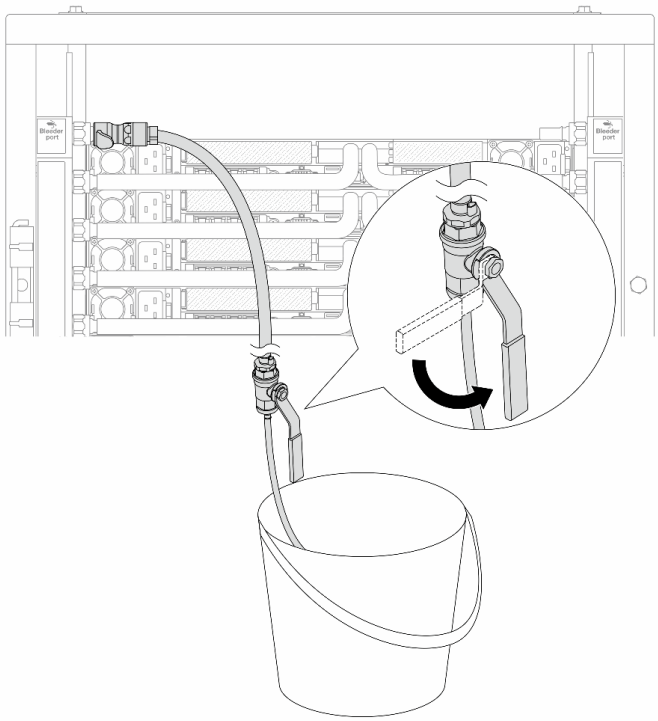


Figure 195. Opening the bleeder valve on the supply side

Step 18. Once completed, pay close attention to the front display of CDU and maintain the system pressure at **one bar**. For more information about liquid temperature and system pressure requirements, see "Water requirements" on page 13.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 288.

Remove the manifold (in-row system)

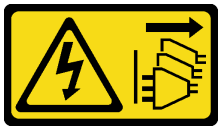
Follow the instructions to remove the manifold in an in-row direct water cooling system.

About this task

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

CAUTION:
The liquid might cause irritation to the skin and eyes. Avoid direct contact with the liquid.

S002



CAUTION:

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

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.

- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Ensure proper handling procedures are followed when working with any chemically treated liquid used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the liquid chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the liquid chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Close both ball valves.

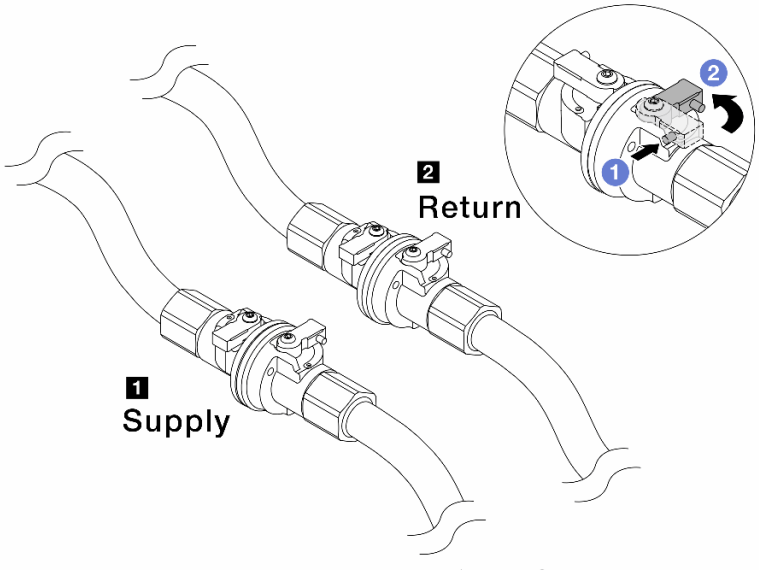


Figure 196. Closing ball valves

Note:

1 Manifold supply connects to facility supply	**2 Manifold return connects to facility return**

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switches to close the valves as illustrated above.

Step 2. Remove the quick connect plugs to separate the NeptCore module hoses from the manifold.

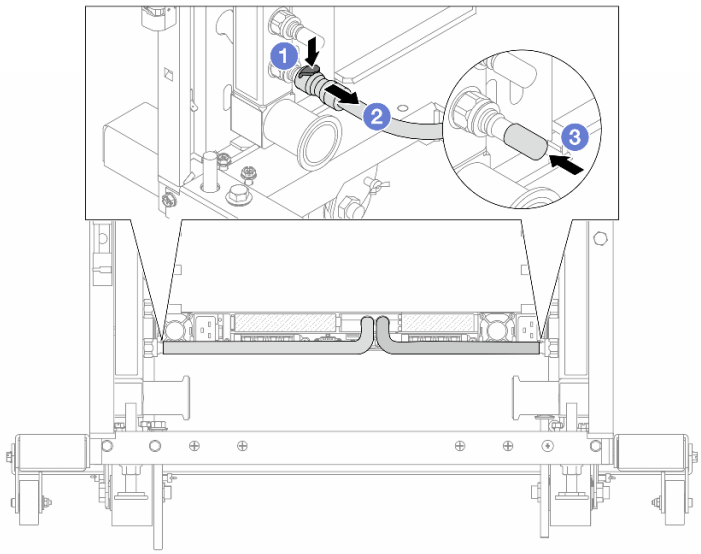


Figure 197. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 3. Repeat Step 2 on page 191 to the other manifold.

Step 4. Remove the manifold with the hose kit attached.

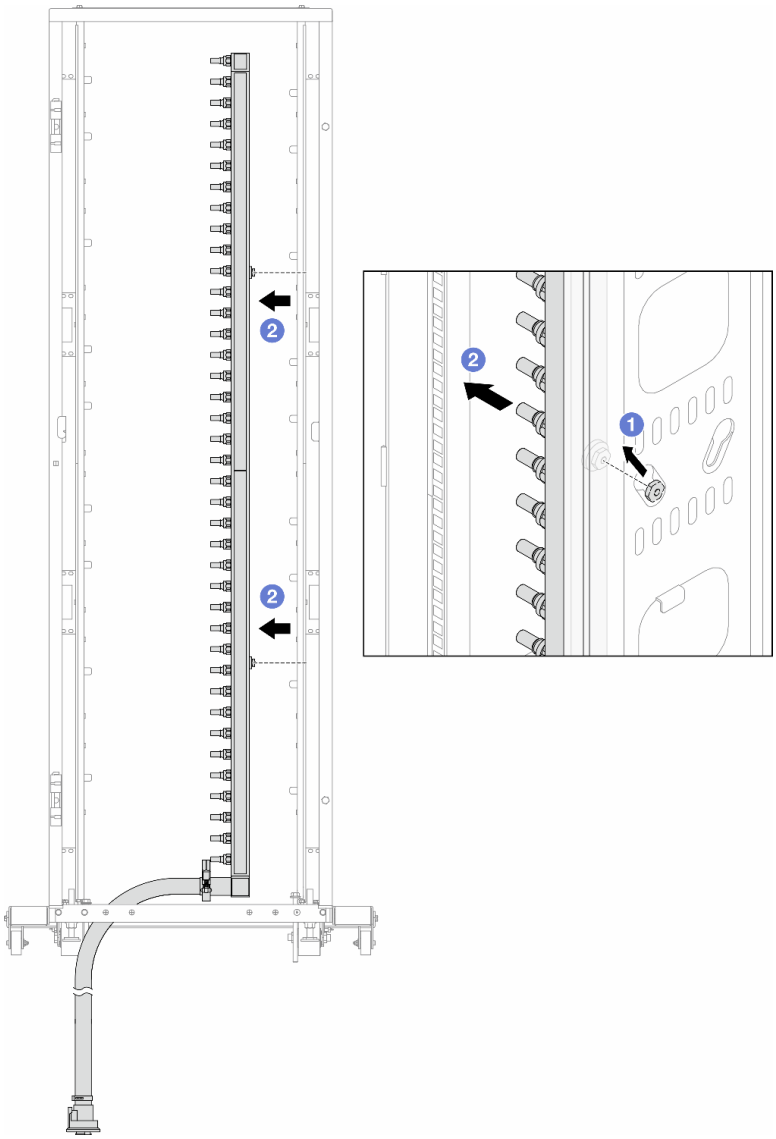


Figure 198. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the hose kit attached.

Step 5. Repeat Step 4 on page 192 to the other manifold.

Notes:

- There is remaining liquid inside the manifold and the hose kit. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 6. Install the bleeder kit to the manifold supply side.

Note: This step drains the liquid with the help of a pressure difference inside and outside the supply manifold.

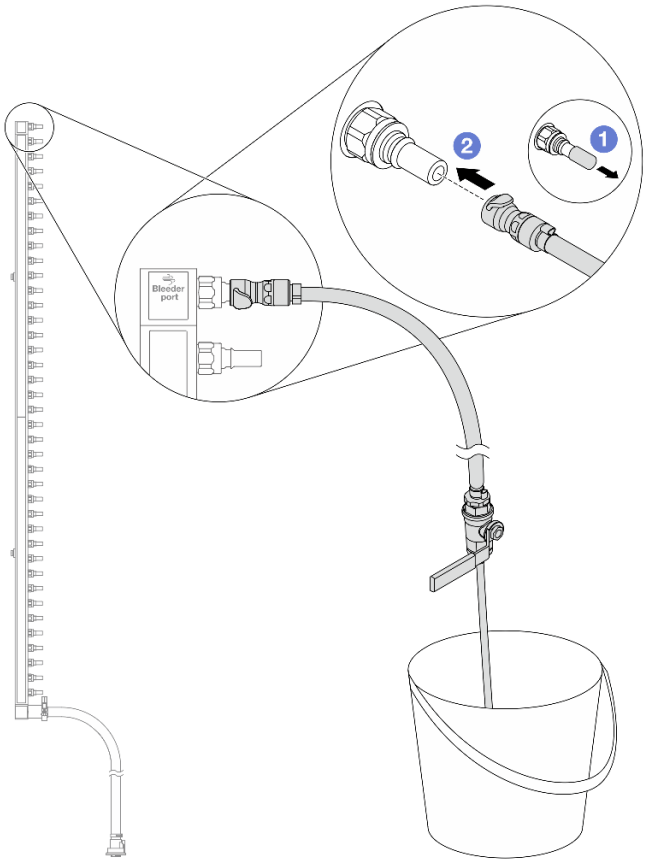


Figure 199. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 7. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

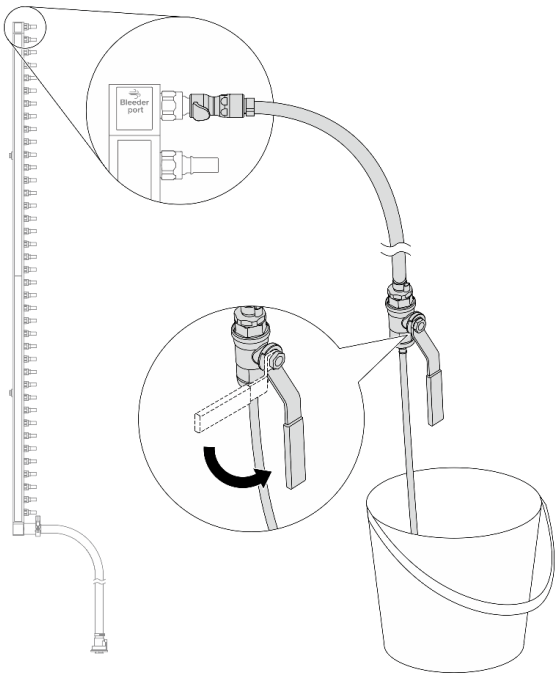


Figure 200. Opening the bleeder valve

Step 8. Install the bleeder kit to the manifold return side.

Note: This step drains the liquid with the help of a pressure difference inside and outside the return manifold.

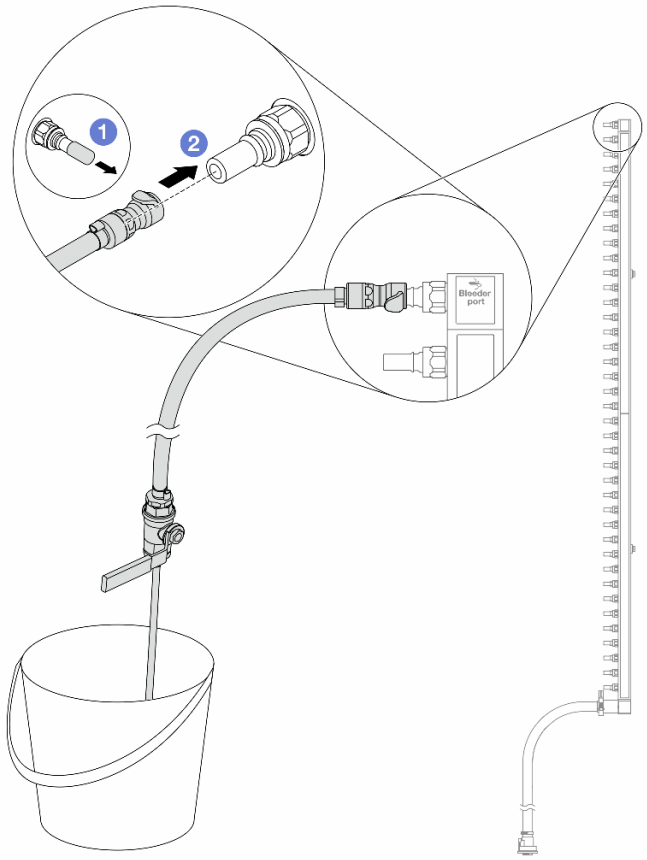


Figure 201. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

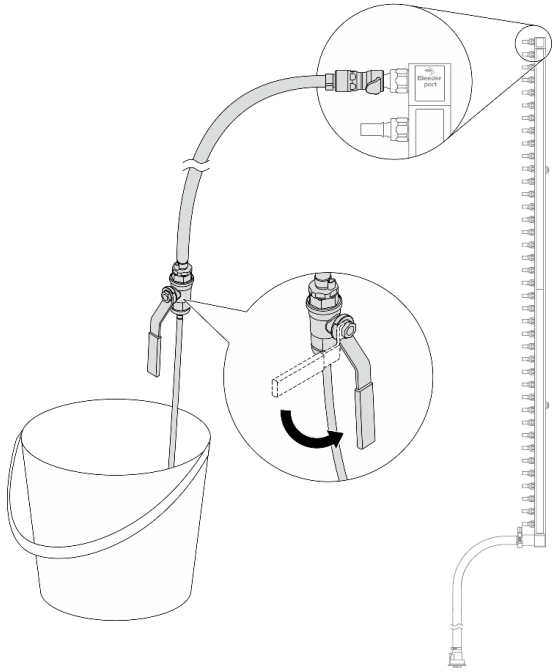


Figure 202. Opening the bleeder valve

Step 10. Separate the manifold from the hose kit in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any liquid that may drain out.

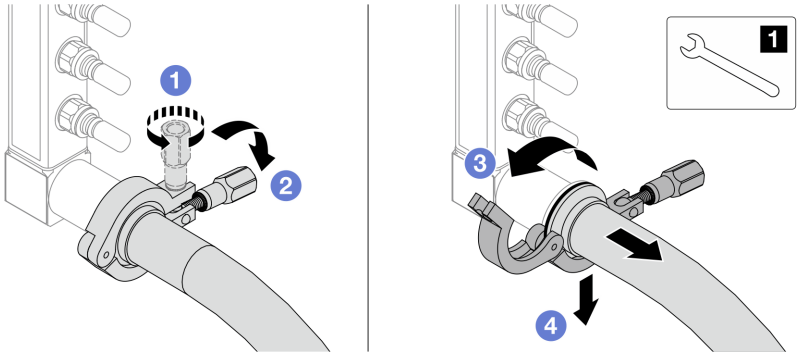


Figure 203. Separating the manifold from the hose kit

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and hose kit from the manifold.

Step 11. Repeat Step 10 on page 197 to the other manifold.

Step 12. For better sanitation, keep the manifold ports and hose kits dry and clean. Re-install quick connect plug covers or any covers that protect hose kits and manifold ports.

Step 13. To remove the server from the rack, see “Remove the server from the rack (friction rails)” on page 82 and “Remove the server from the rack (slide rails)” on page 89.

Step 14. To remove the Processor Neptune™ Core Module (NeptCore), see “Remove the Lenovo Processor Neptune™ Core Module” on page 158.

After you finish

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

Install the manifold (in-row system)

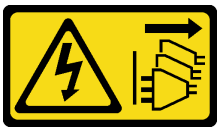
Follow the instructions to install the manifold in an in-row direct water cooling system.

About this task

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

CAUTION:
The liquid might cause irritation to the skin and eyes. Avoid direct contact with the liquid.

S002



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

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Ensure proper handling procedures are followed when working with any chemically treated liquid used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the liquid chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the liquid chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. To install the Processor Neptune™ Core Module (NeptCore), see “Install the Lenovo Processor Neptune™ Core Module” on page 161.

Step 2. To install the server into the rack, see “Install the server to the rack (friction rails)” on page 85 or “Install the server to the rack (slide rails)” on page 93.

Step 3. Install the manifold.

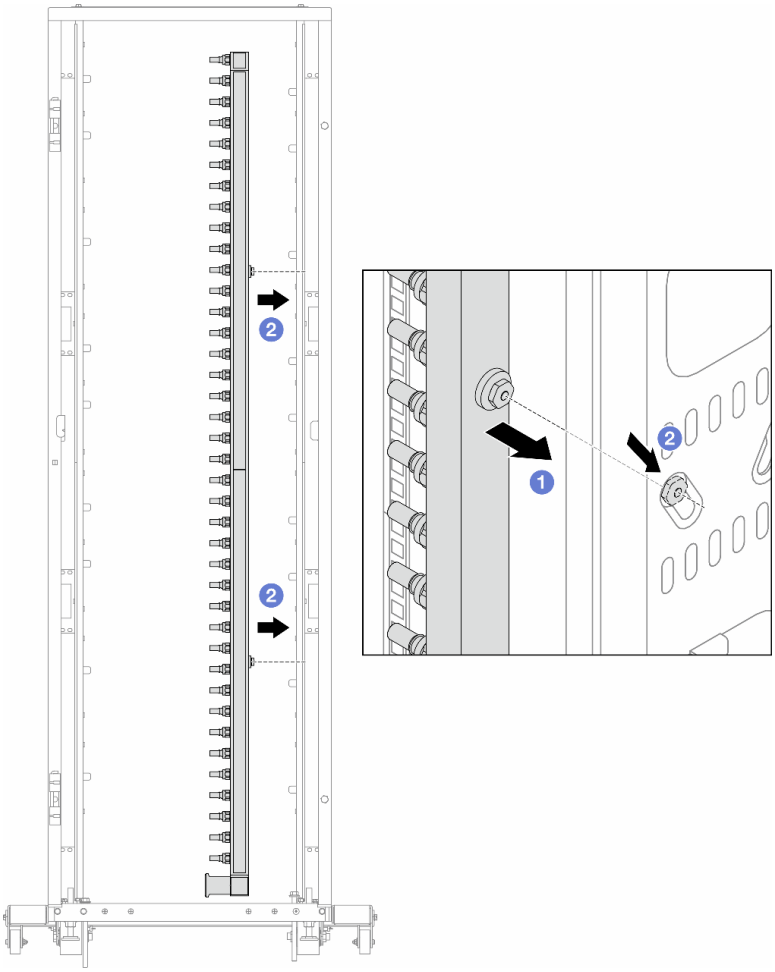


Figure 204. Installing the manifold

a. 1 Hold the manifold with both hands, and mount it onto the rack cabinet.

b. 2 Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 4. Repeat Step 3 on page 199 to the other manifold.

Step 5. Install the quick connect plug to the manifolds.

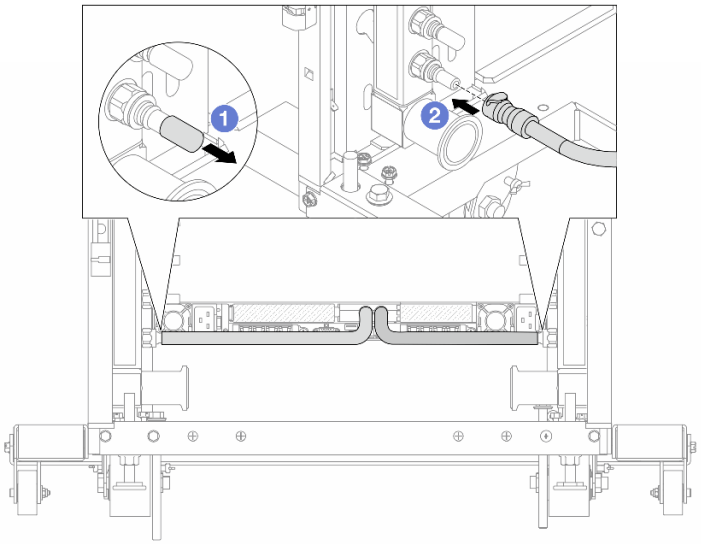


Figure 205. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 6. Install the hose kit to the manifold.

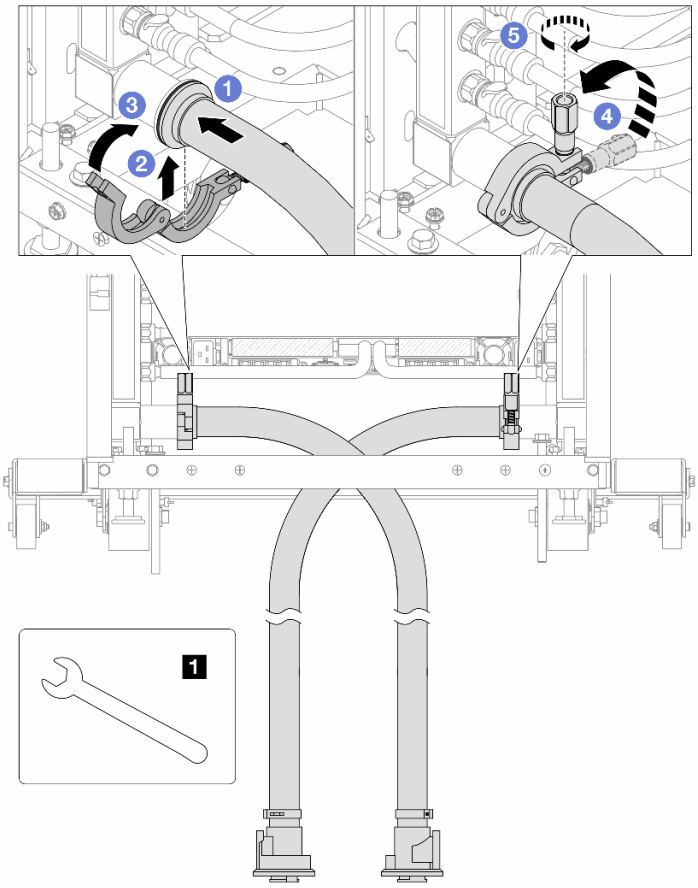


Figure 206. Installing the hose kit

1 17 mm wrench

a. 1 Connect the hose kits to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 7. Install the bleeder kit to the manifold supply side.

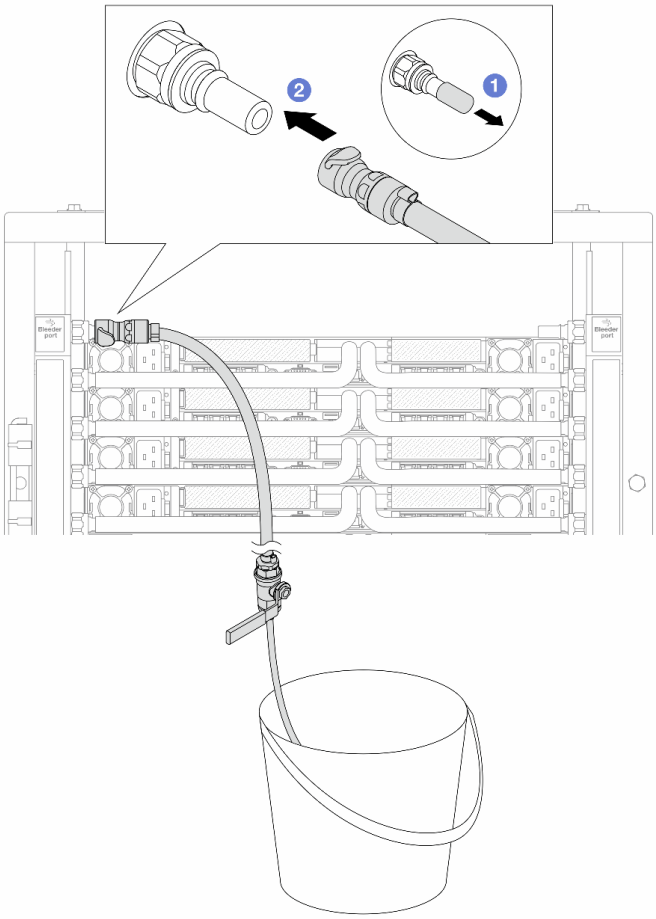


Figure 207. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 8. To push the air out of the manifold supply side, connect **facility supply** to **manifold return**.

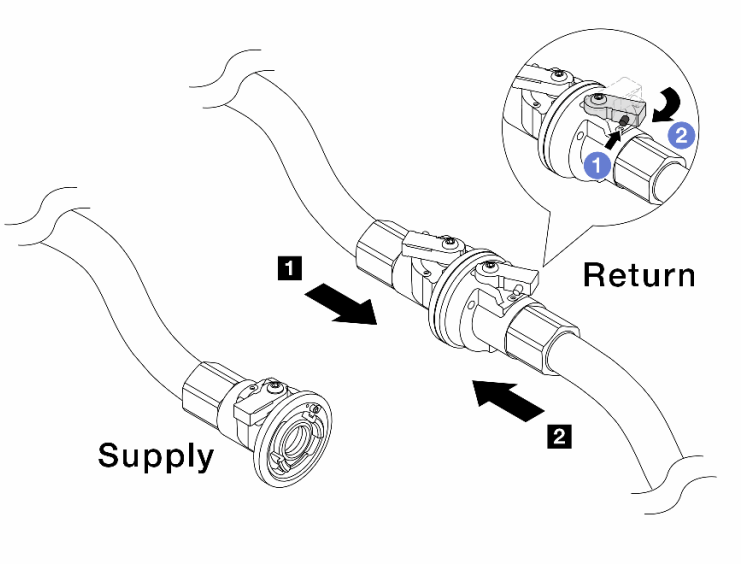


Figure 208. Facility supply to manifold return

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold return side and 2 facility supply side, while keep manifold supply side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 9. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

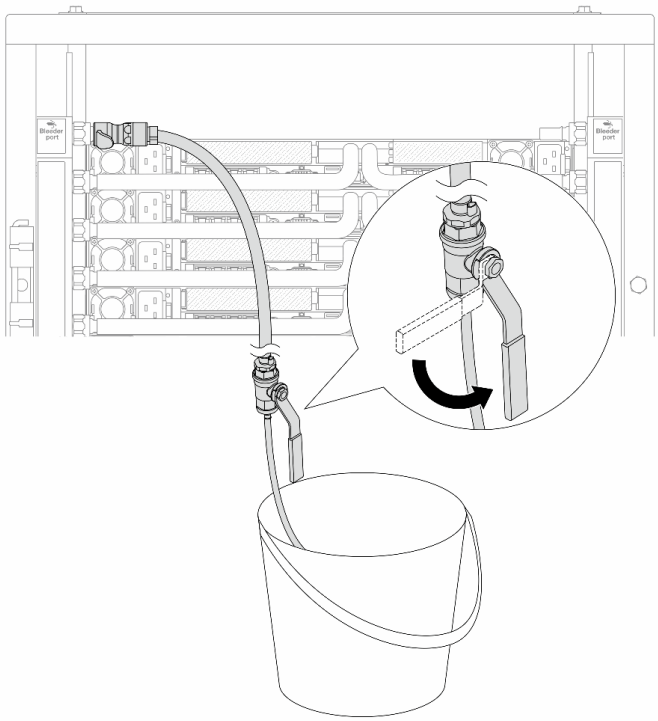


Figure 209. Opening the bleeder valve on the supply side

Step 10. Install the bleeder kit to the manifold return side.

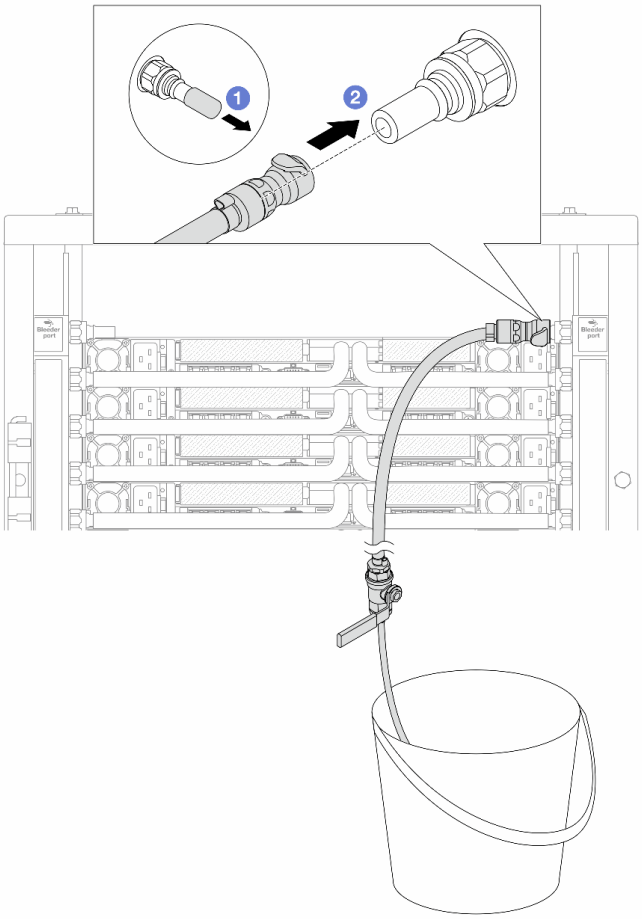


Figure 210. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. To push the air out of the manifold return side, connect **facility supply** to **manifold supply**.

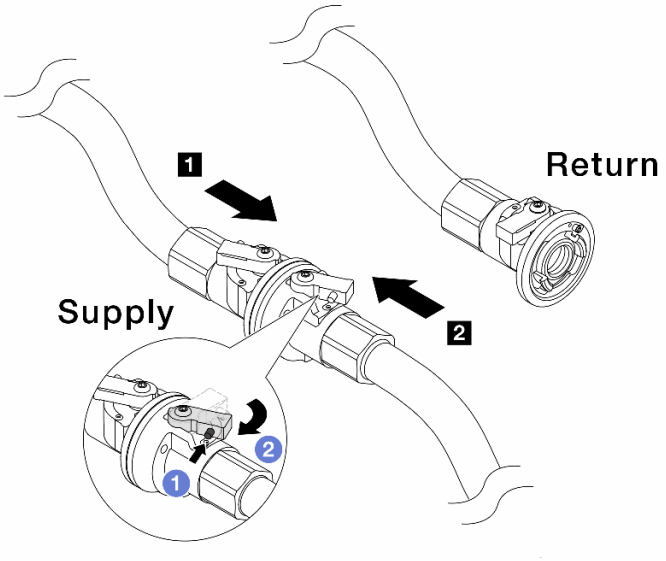


Figure 211. Facility supply to manifold supply

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold supply side and 2 facility supply side, while keep manifold return side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 12. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

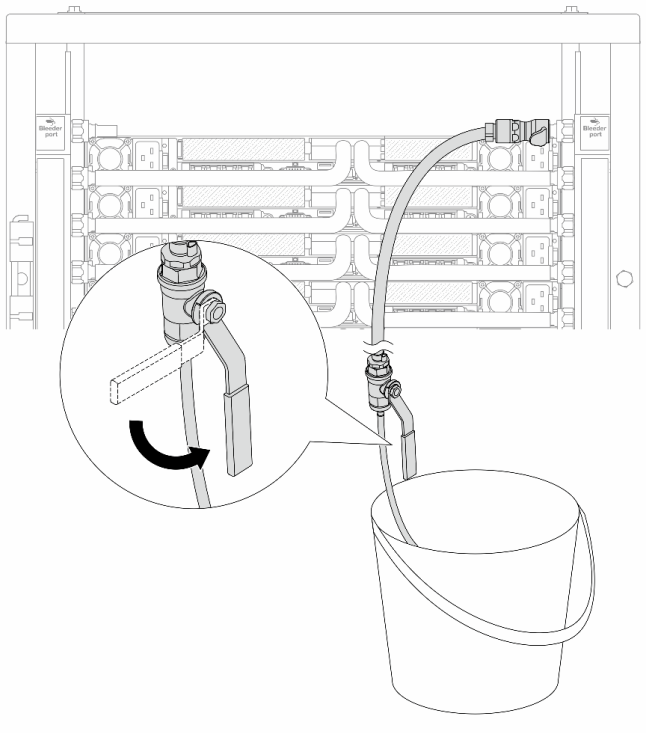


Figure 212. Opening the bleeder valve on the return side

Step 13. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

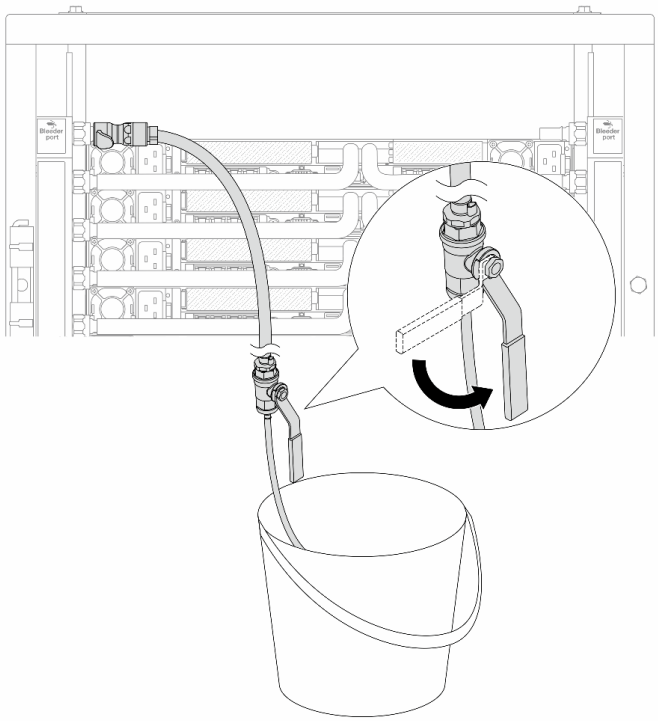


Figure 213. Opening the bleeder valve on the supply side

Step 14. Once completed, connect the supply and return of manifold and facility correspondingly. Fully open all connections on both supply and return sides.

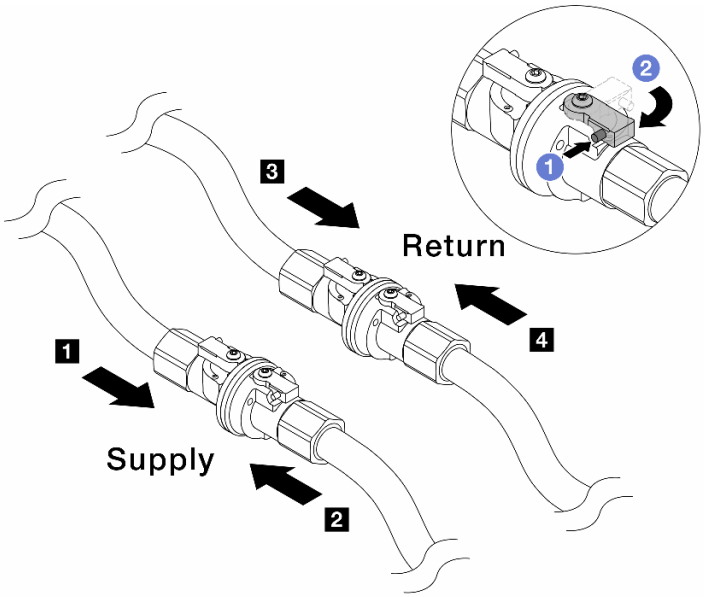


Figure 214. Opening ball valves

Note:

1 Manifold supply connects to 2 facility supply	3 Manifold return connects to 4 facility return

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to fully open the valves as illustrated above.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 57 and “Safety inspection checklist” on page 58 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 75.
- 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.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- 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 60.
  - 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 disconnect all power cords.

Step 2. Remove the top cover. See "Remove the top cover" on page 282.

Step 3. If your server comes with an air baffle, remove it. See "Remove the air baffle" on page 97.

Step 4. Remove the memory module from the slot.

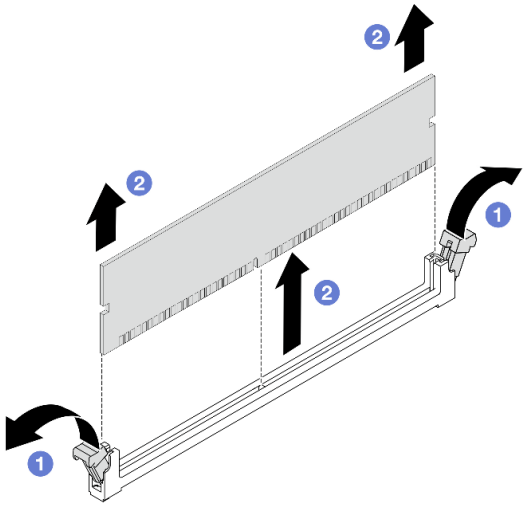


Figure 215. Memory module removal

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 211.
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.

Install a memory module

Follow instructions in this section to install a memory module.

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.

- 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.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Make sure to adopt one of the supported configurations listed in "Memory module installation rules and order" on page 62.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at "Handling static-sensitive devices" on page 60:
  - 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/sr630v4/7dg8/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 289 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. Power off the server and disconnect all power cords.

Step 2. Locate the required memory module slot on the processor board.

Note: Ensure that you observe the installation rules and sequence in "Memory module installation rules and order" on page 62.

Step 3. Install the memory module into the slot.

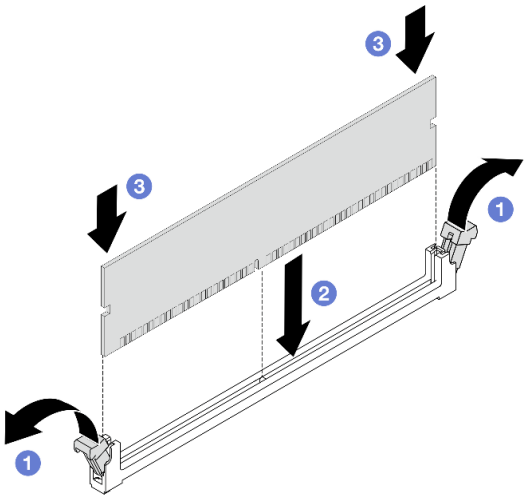


Figure 216. Memory module installation

Attention:

- Before you install a memory module into the slot, make sure that the clips are on open position, and the slot is clear of any debris.
- To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.

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

b. (2) Identify the key on the memory module and then align the key to the slot, and gently place the memory module into the slot with both hands.

c. (3) 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 288.

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 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. If your server comes with riser assemblies, remove them first, see “Remove a PCIe adapter” on page 216.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 232.

d. If your server comes with a rear M.2 drive assembly, remove it first. See “Rear M.2 assembly replacement” on page 236.

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.

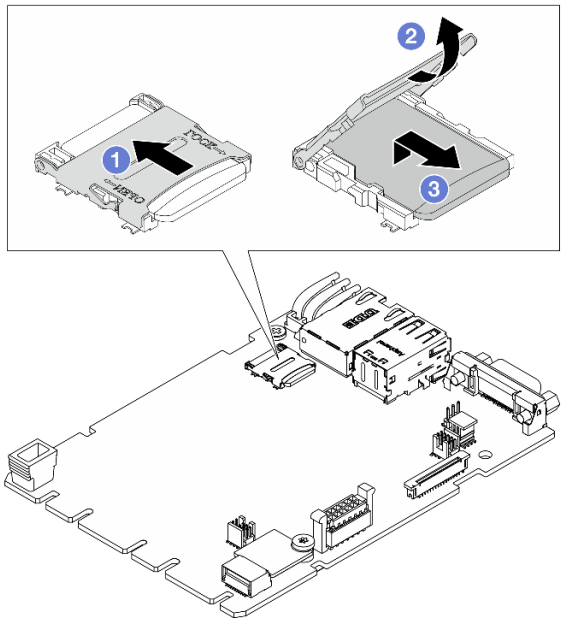


Figure 217. Removing MicroSD card

a. 1 Slide the socket lid to open position.

b. 2 Open the socket lid.

c. 3 Remove the MicroSD card from the socket.

Note: After the MicroSD card is removed, the historical data of the firmware and user data uploaded through Remote Disc On Card (RDOC) will be lost, and the firmware rollback function and extended RDOC space will not be supported. To enable the two features, it will need to install a new MicroSD 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.

Install the MicroSD card

Follow the instructions in this section to install the MicroSD card.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the MicroSD card.

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 3.

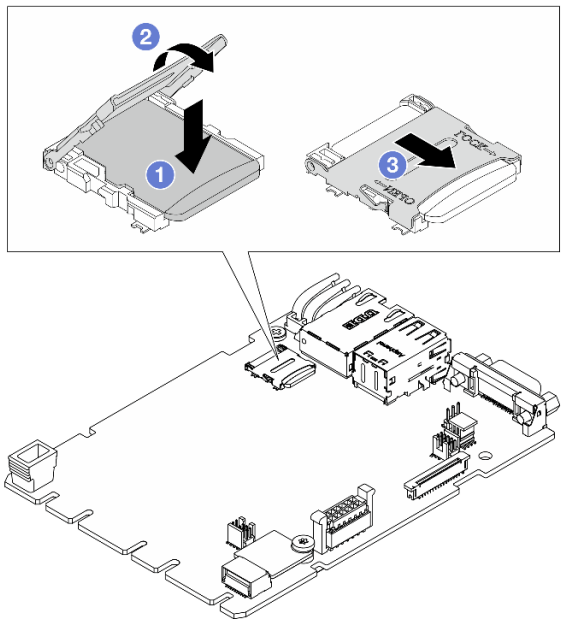


Figure 218. Installing MicroSD card

a. Place the MicroSD card into the socket.
b. Close the socket lid.
c. Slide the socket lid to lock position.

After you finish

1. Install any components that you have removed:
   a. “Install a PCIe adapter” on page 218
   b. “Install rear M.2 cage” on page 248
   c. “Install the 2.5-inch rear drive assembly” on page 233
   d. “Install the top cover” on page 284
2. Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 different types, 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 in this topic.

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Remove the riser assembly. See “Remove a rear riser card” on page 255.

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

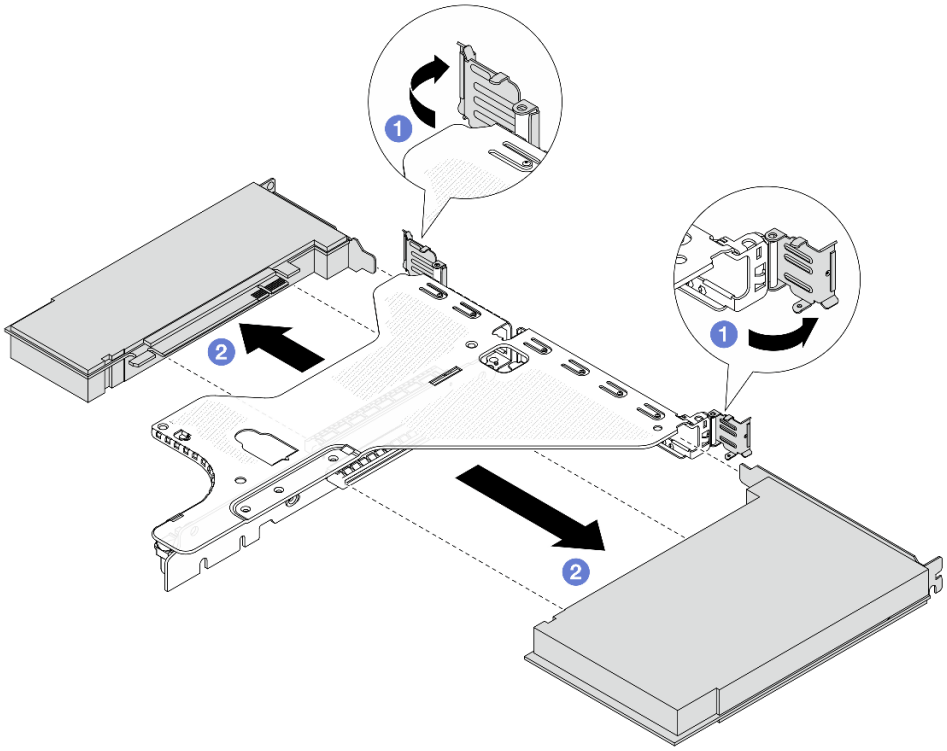


Figure 219. PCIe adapter removal from the LP-FH riser assembly

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 218.
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.

Install a PCIe adapter

Use this information to install a PCIe adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see “Rear view” on page 23.

Step 2. Install the PCIe adapter and secure it to the riser assembly.

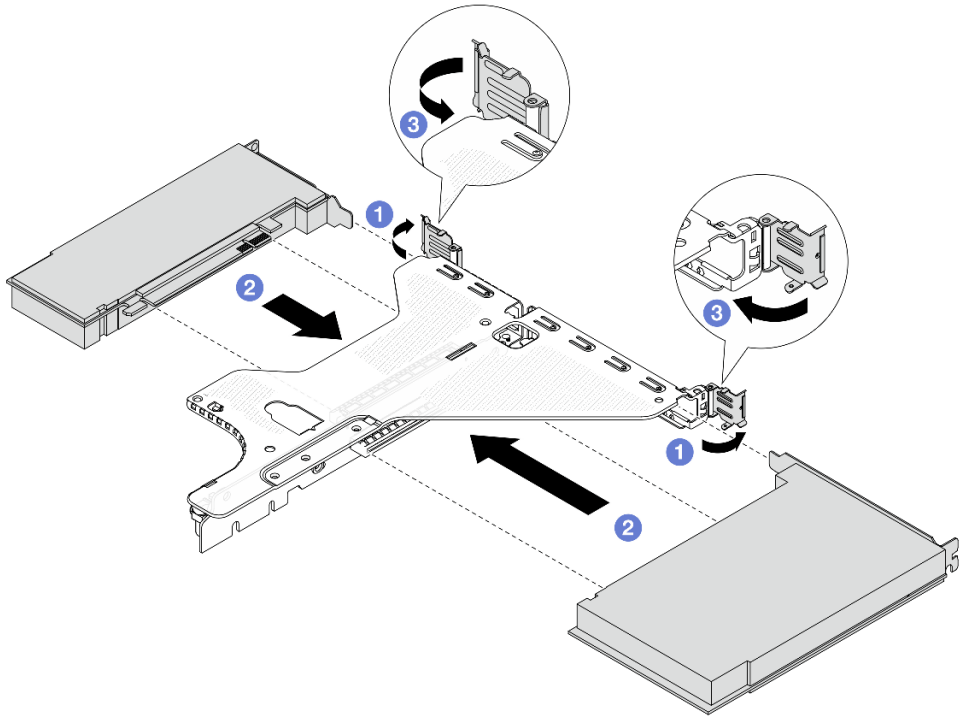


Figure 220. PCIe adapter installation into the LP-FH riser assembly

a. 1 Rotate the latch on the riser bracket 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, and its bracket is secured.

c. 3 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 65.
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 3. Connect cables to the PCIe adapter in the riser assembly. See ***Internal Cable Routing Guide***.

After you finish

1. Reinstall the riser assembly. See “Install a rear riser card” on page 257.
2. Complete the parts replacement. See “Complete the parts replacement” on page 288.

Processor and heat sink replacement (trained technicians only)

Follow the instruction in this section to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

Attention: Before you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352) and thermal grease.

Important: The processor in your server can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored, and processor replacement is not required.

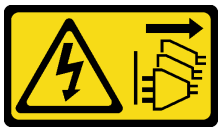
Note: This section is for processor and heat sink replacement. For the replacement of the Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore), refer to “Lenovo Processor Neptune™ Air Module replacement (trained technicians only)” on page 151 or “Lenovo Processor Neptune™ Core Module replacement (trained technicians only)” on page 158.

Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 screwdriver. 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.

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- 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 the rack (friction rails)” on page 82 or “Remove the server from the rack (slide rails)” on page 89.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets 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.
- Remove and install only one PHM at a time. If the processor board supports multiple processors, install the PHMs starting with the first processor socket.

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

The following illustration shows the components of the PHM.

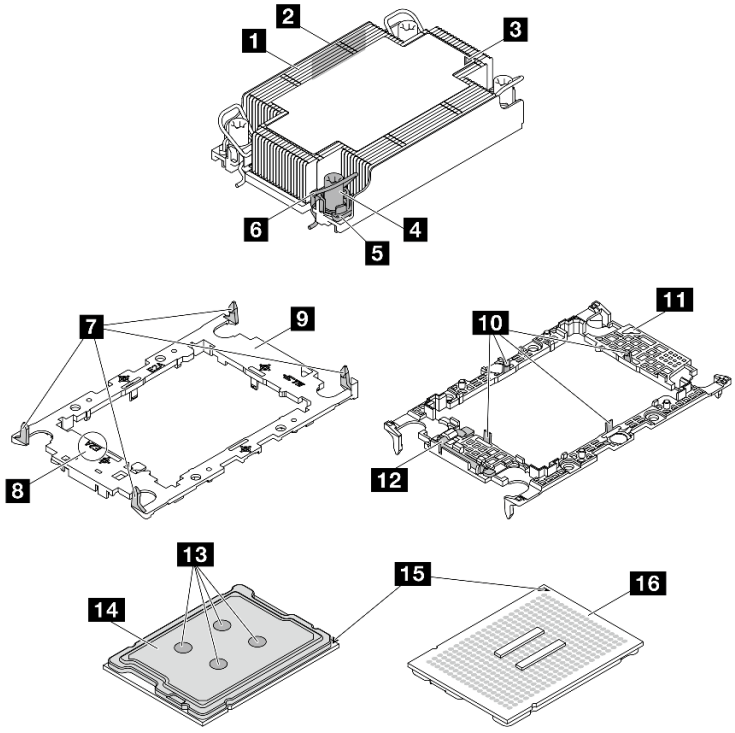


Figure 221. PHM components

1 Heat sink	9 Processor carrier
2 Processor identification label	10 Clips to secure processor in a carrier
3 Heat sink triangular mark	11 Carrier triangular mark
4 Nut and wire bail retainer	12 Processor ejector handle
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor heat spreader
7 Clips to secure carrier to a heat sink	15 Processor triangular mark
8 Processor carrier code marking	16 Processor contacts

Torque screwdriver type list	**Screw Type**
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. Remove the air baffle. See “Remove the air baffle” on page 97.

Step 2. If the processor comes with a T-shaped heat sink, fully loosen the two heat sink screws as shown.

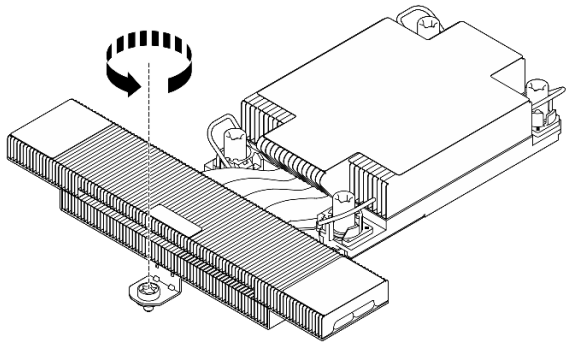


Figure 222. Loosening T-shaped heat sink screws

Step 3. Remove the PHM from the processor board.

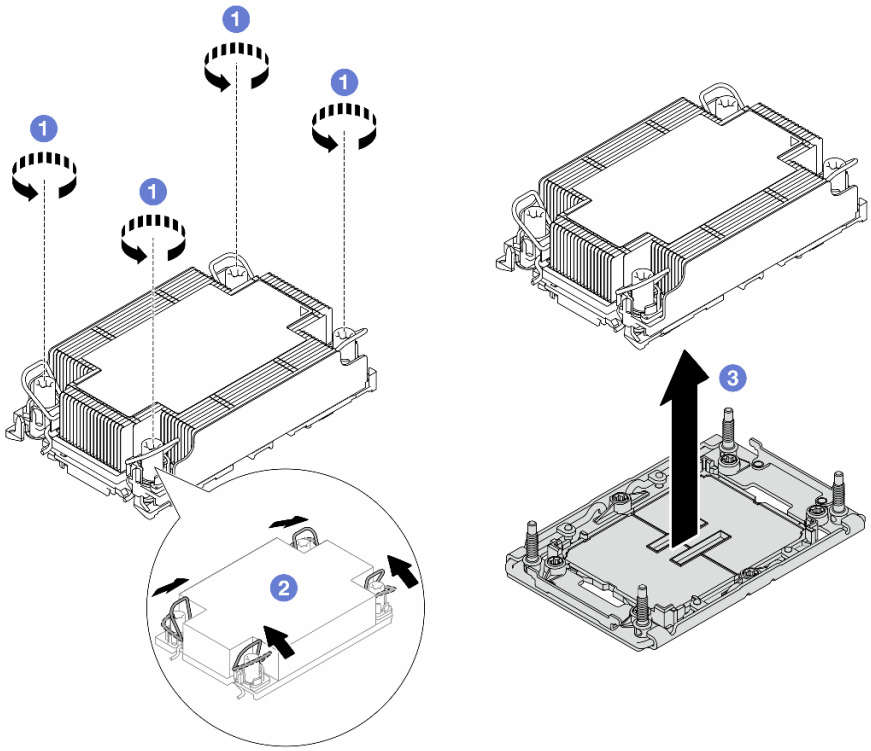


Figure 223. Removing a PHM

a. 1 Fully loosen the Torx T30 nuts on the PHM *in the removal sequence shown* on the heat-sink label.

b. 2 Rotate the anti-tilt wire bails inward.

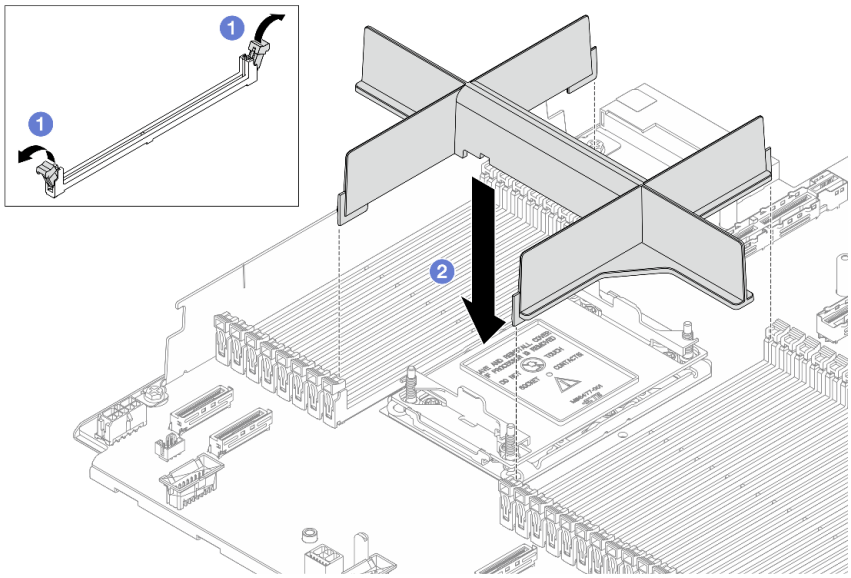
c. 3 Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

After you finish

- Each processor socket must always contain a cover or a PHM. Protect empty processor sockets with a cover or install a new PHM.
- If you are not going to install a PHM back, cover the processor socket with the socket cover and install a PHM filler.



  - 1 Open the retaining clip on each end of the memory module slots next to the left and right sides of the processor two slot.
  - 2 Align the PHM filler with the slots, and place the filler on the slots with both hands. Firmly press the filler straight down into the slots until the retaining clips snap into the locked position.
- If you are removing the PHM as part of a processor board replacement, set the PHM aside.
- If you are reusing the processor or heat sink, separate the processor from its retainer. See "Separate the processor from carrier and heat sink" on page 223.
- 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.

Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

- Do not touch the processor contacts. 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.

Note: The heat sink, processor, and processor carrier for your system might be different than those shown in the illustrations.

Procedure

Step 1. Separate the processor from the heat sink and carrier.

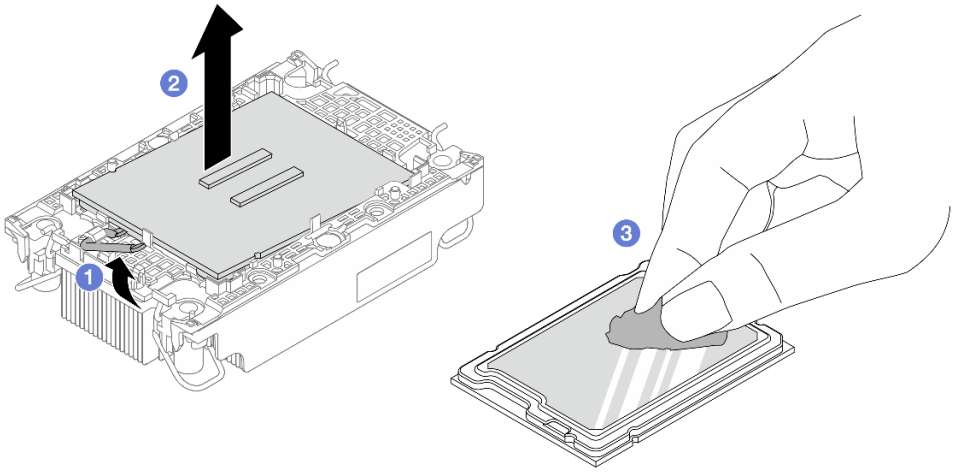


Figure 224. Separating a processor from the heat sink and carrier

Note: Do not touch the contacts on the processor.

a. 1 Lift the handle to release the processor from the carrier.

b. 2 Hold the processor by its edges; then, lift the processor from the heat sink and carrier.

c. 3 Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 2. Separate the processor carrier from the heat sink.

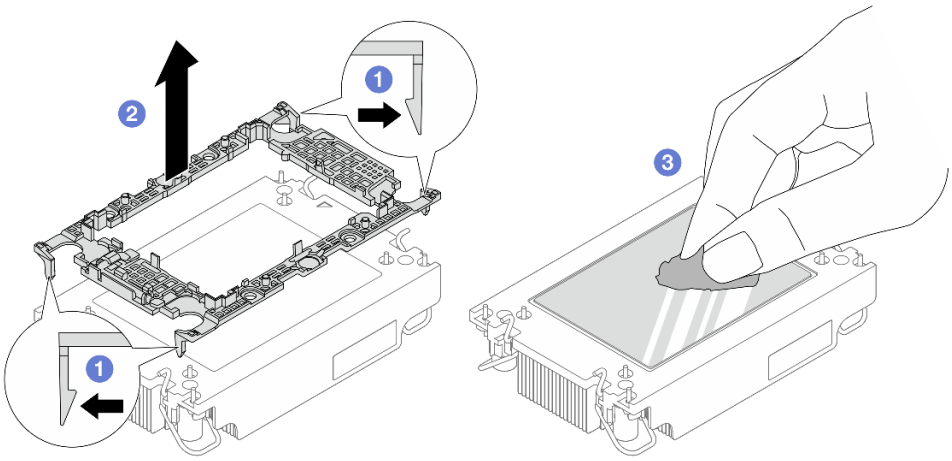


Figure 225. Separating a processor carrier the from heat sink

Note: The processor carrier will be discarded and replaced with a new one.

a. 1 Release the retaining clips from the heat sink.

b. 2 Lift the carrier from the heat sink.

c. 3 Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

After you finish

If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 screwdriver. This procedure must be executed by a trained technician.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets 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.
- Remove and install only one PHM at a time. If the processor board supports multiple processors, install the PHMs starting with the first processor socket.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See https://serverproven.lenovo.com for a list of processors supported for your server. All processors on the processor board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See "Update the firmware" on page 289.

The following illustration shows the components of the PHM.

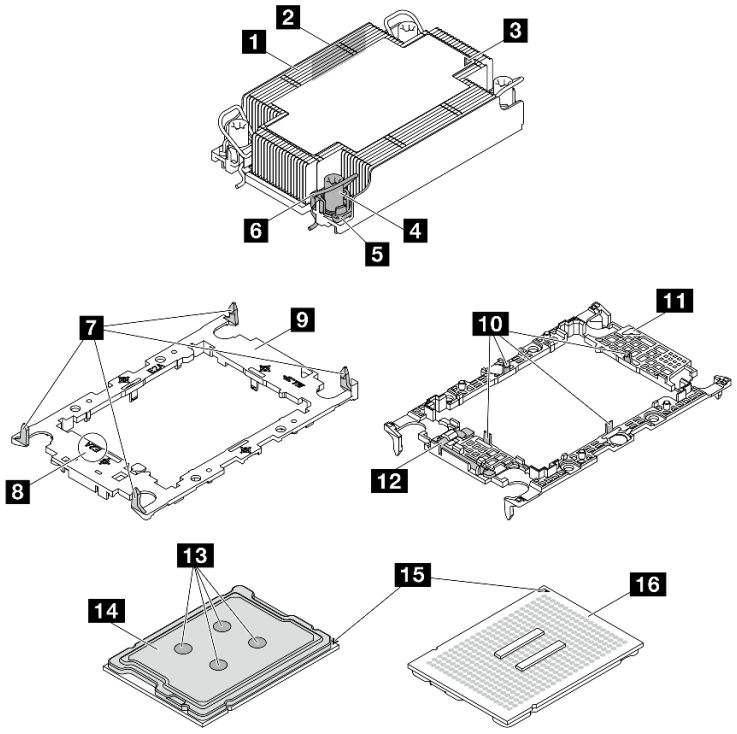


Figure 226. PHM components

1 Heat sink	9 Processor carrier
2 Processor identification label	10 Clips to secure processor in a carrier
3 Heat sink triangular mark	11 Carrier triangular mark

4 Nut and wire bail retainer	12 Processor ejector handle
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor heat spreader
7 Clips to secure carrier to a heat sink	15 Processor triangular mark
8 Processor carrier code marking	16 Processor contacts

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. If you are replacing a processor and reusing the heat sink.

a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.

b. If there is any old thermal grease on the heat sink, wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

Step 2. If you are replacing a heat sink and reusing the processor.

a. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

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.

b. Install processor in new carrier.

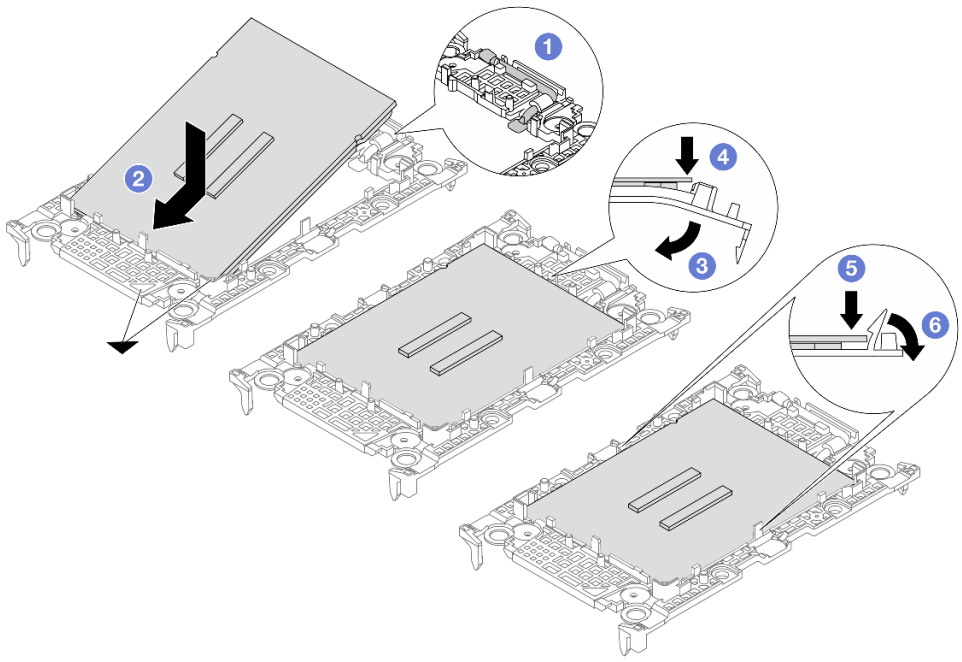


Figure 227. Installing a processor carrier

Note: Replacement heat sinks come with different processor carriers. Make sure to use the carrier with the same carrier code markings as the one discarded.

1. Make sure the handle on the carrier is in the closed position.
2. Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.
3. Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.
4. Press the processor and secure the unmarked end under the clip on the carrier.
5. Carefully pivot the sides of the carrier down and away from the processor.
6. Press the processor and secure the sides under the clips on the carrier.

   Note: To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

Step 3. Apply thermal grease.

- If you are replacing the heat sink and reusing the processor, a new heat sink comes with thermal grease and you do not need to apply new thermal grease.

  Note: To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed two years. Otherwise, wipe off the existing thermal grease and apply new thermal grease.
- If you are replacing the processor and reusing the heat sink, do the following steps to apply thermal grease:
  1. If there is any old thermal grease on the heat sink, wipe off the thermal grease with an alcohol cleaning pad.
  2. Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is oriented in the shipping tray as shown below.
  3. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

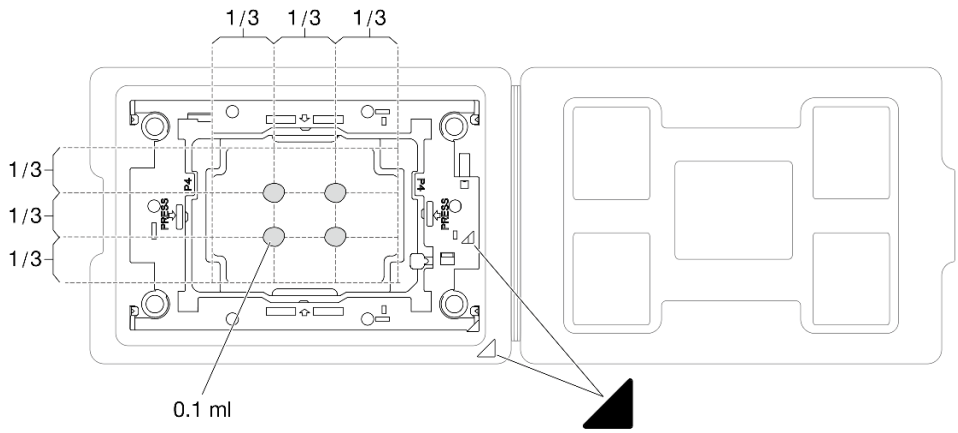


Figure 228. Thermal grease application with processor in shipping tray

Step 4. Assemble the processor and heat sink.

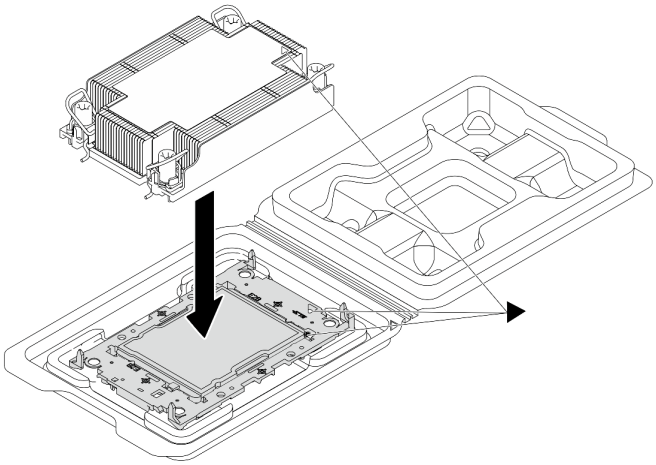


Figure 229. Assembling the PHM with processor in shipping tray

a. Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.

b. Install the heat sink onto the processor-carrier.

c. Press the carrier into place until the clips at all four corners engage.

Step 5. (Optional) If the server has been pre-installed with a PHM filler and a socket filler, generally on processor two, it is required to remove the fillers first before you proceed with further installation.

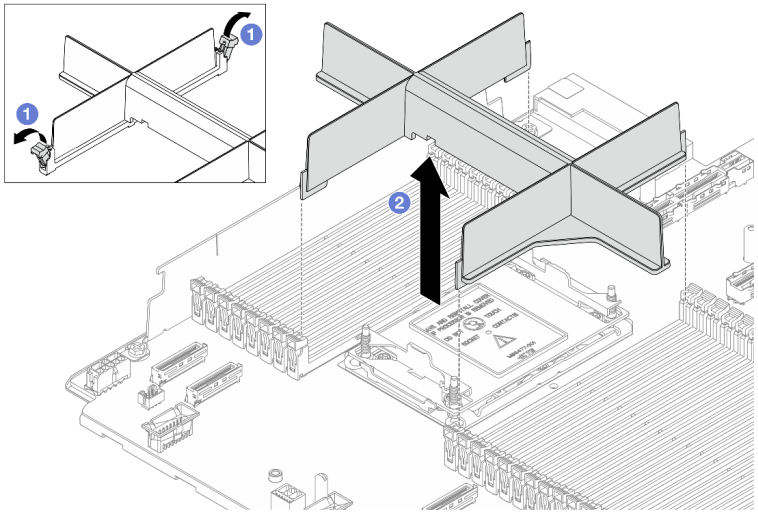


Figure 230. PHM filler removal

a. 1 Open the retaining clip on each end of the memory module slots next to the left and right sides of the processor two slot.

b. 2 Lift the PHM filler from the slots.

Step 6. Install the processor-heat-sink module to the processor board.

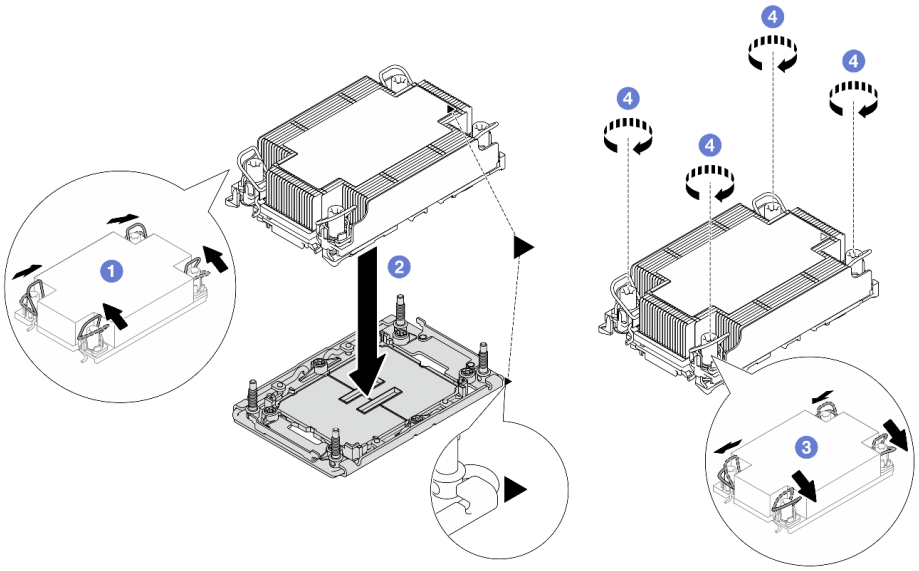


Figure 231. Installing a PHM

a. 1 Rotate the anti-tilt wire bails inward.

b. 2 Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.

c. 3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.

d. 4 Fully tighten the Torx T30 nuts *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

Step 7. If the processor comes with a T-shaped heat sink, fully tighten the two heat sink screws as shown. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

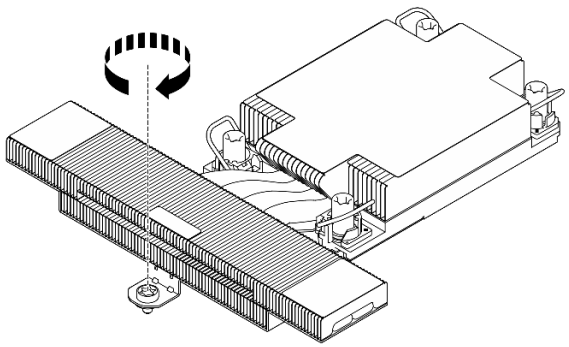


Figure 232. Tightening T-shaped heat sink screws

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If the server is installed with the security bezel, remove it first. See “Remove the security bezel” on page 259.

Step 2. Remove the rack latch.

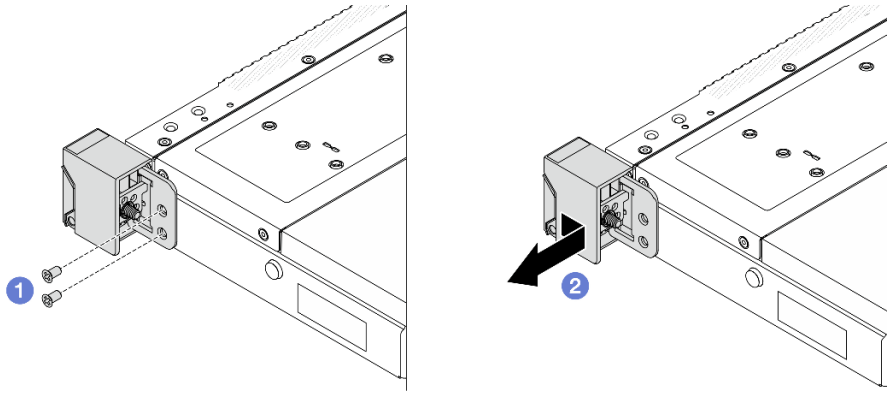


Figure 233. Rack latch removal

a. 1 On each side of the server, remove the two screws that secure the rack latch.

b. 2 On each side of the server, remove the rack latch from the chassis as shown.

After you finish

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

Install the rack latches

Use this information to install the rack latches.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the rack latch.

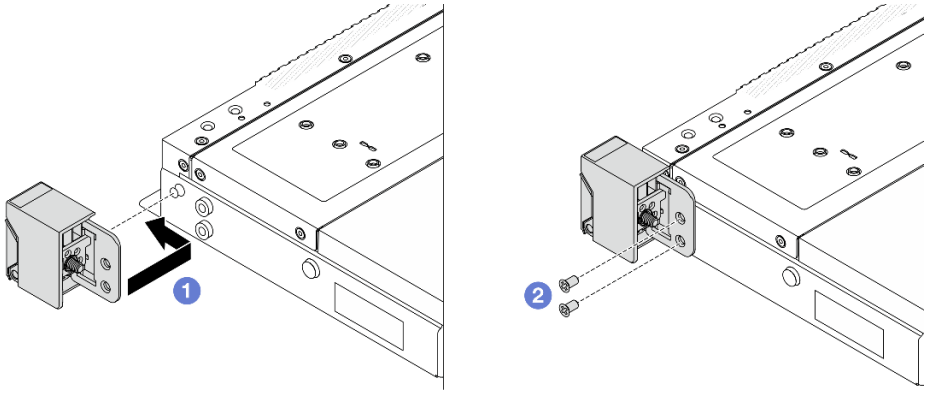


Figure 234. Rack latch installation

a. 1 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.

b. 2 Install the two screws to secure the rack latch on each side of the server.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

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

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Remove the drives or drive fillers installed in the 2.5-inch rear drive cage. See “Remove a 2.5-inch hot-swap drive” on page 129.

Step 3. Disconnect the 2.5-inch rear drive cage cables from the processor board or the PCIe adapter. See ***Internal Cable Routing Guide***.

Step 4. Hold the two blue touch points and directly lift the 2.5-inch rear drive cage out of the chassis.

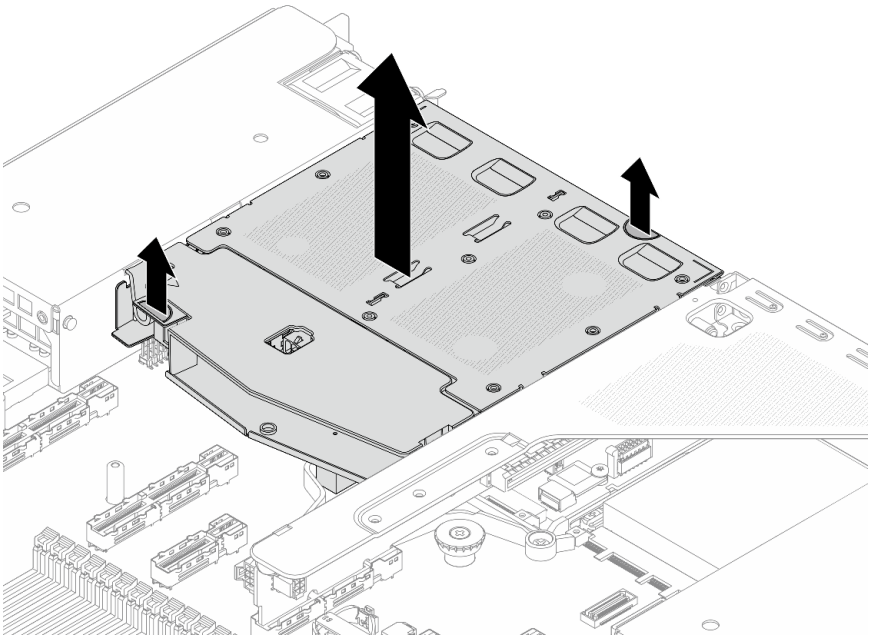


Figure 235. 2.5-inch rear drive cage removal

Step 5. If the rear backplane is reused, remove the rear backplane. See “Remove the 2.5-inch rear drive backplane” on page 102.

After you finish

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

Install the 2.5-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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Gently press and hold the tab on the 2.5-inch rear drive cage as shown and remove the air baffle from the 2.5-inch rear drive cage.

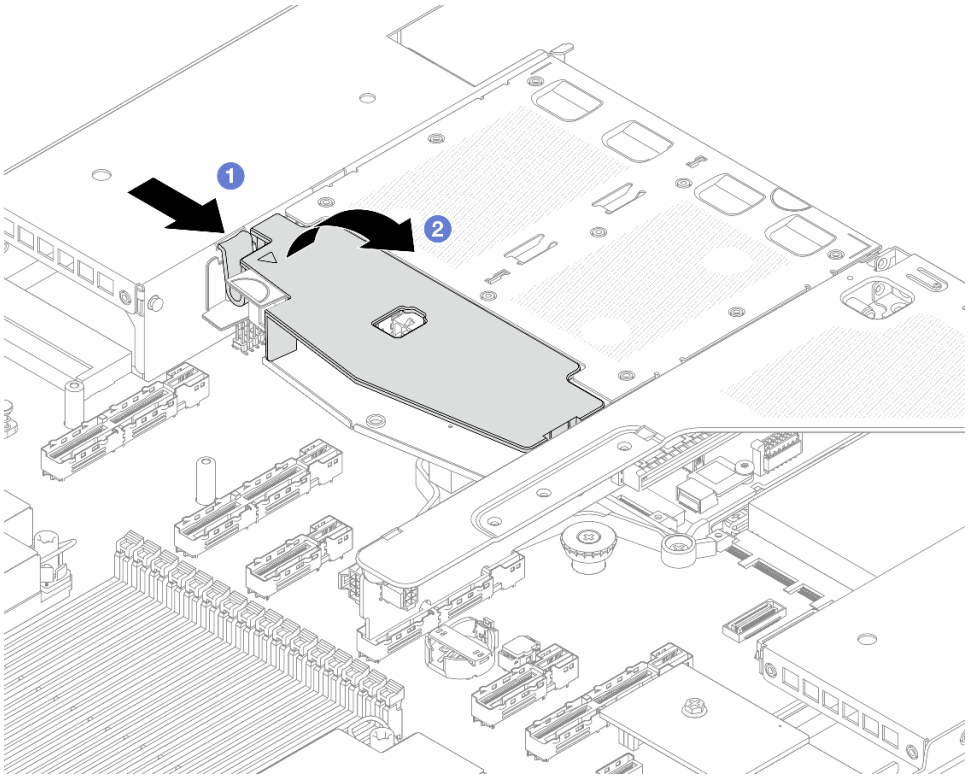


Figure 236. Air baffle removal

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 2. Align the rear backplane with the 2.5-inch rear drive cage and lower it into the 2.5-inch rear drive cage.

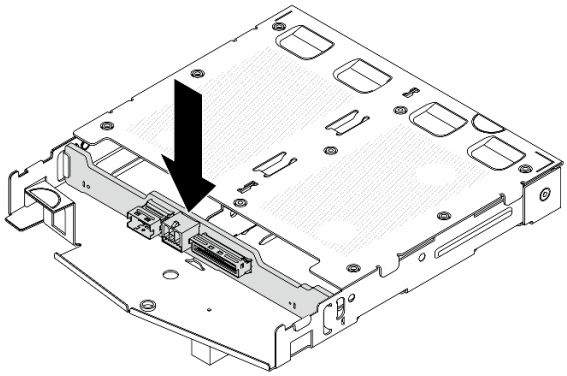


Figure 237. Rear backplane installation

Step 3. Connect the cables to the backplane.

Step 4. Install the air baffle into the 2.5-inch rear drive cage as shown.

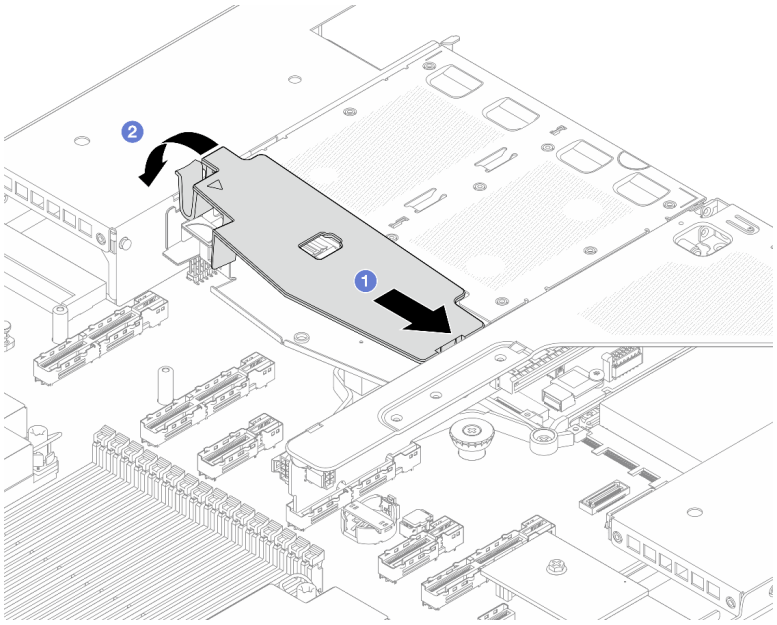


Figure 238. Air baffle installation

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. Align the pins on the 2.5-inch rear drive cage with the corresponding hole and slot in the chassis. Then, lower the 2.5-inch rear drive cage into the chassis until it is fully seated.

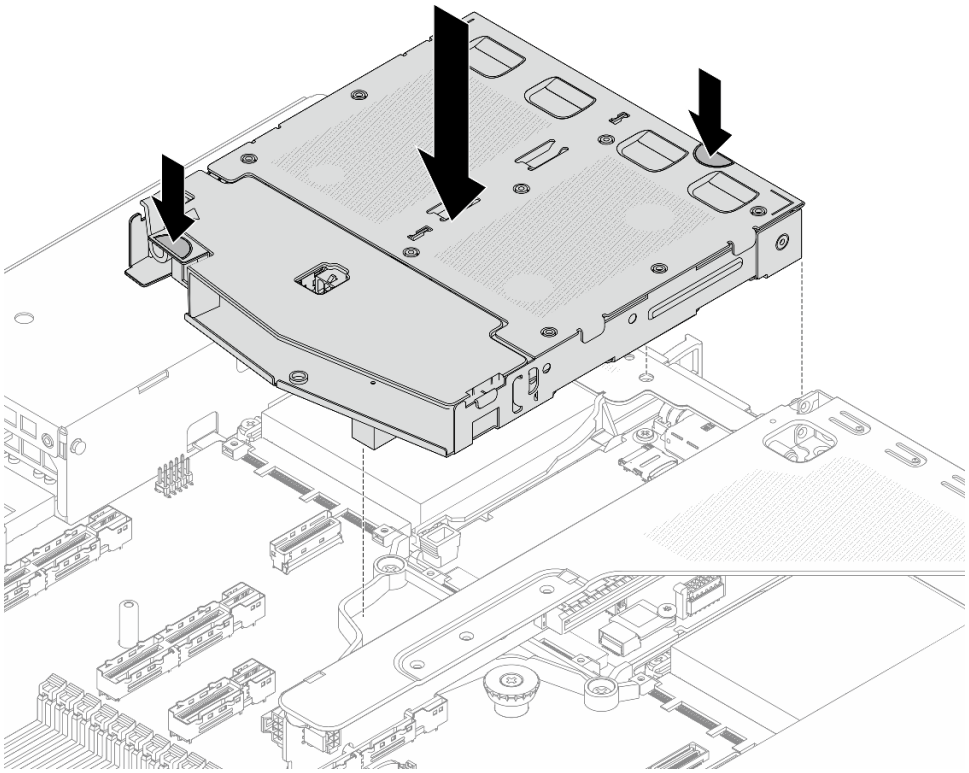


Figure 239. 2.5-inch rear drive cage installation

Step 6. Connect the cables to the processor board or expansion slots. See ***Internal Cable Routing Guide***.

After you finish

1. Reinstall the drives or drive fillers into the 2.5-inch rear drive cage. See "Install a 2.5-inch hot-swap drive" on page 130.
2. Complete the parts replacement. See "Complete the parts replacement" on page 288.

Rear M.2 assembly replacement

Follow the instructions in this section to remove and install the rear M.2 assembly.

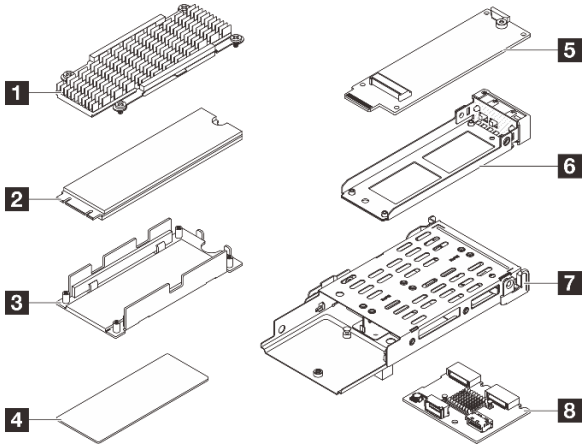


Figure 240. Parts of a rear M.2 assembly

1 Heat sink	2 M.2 drive
3 M.2 drive tray	4 Thermal pad
5 M.2 interposer	6 Interposer tray
7 Rear M.2 cage	8 Rear M.2 backplane

- “Disassemble the rear M.2 interposer and drive” on page 237
- “Assemble the rear M.2 interposer and drive” on page 240
- “Remove rear hot-swap M.2 interposer and drive assembly” on page 243
- “Install rear hot-swap M.2 interposer and drive assembly” on page 244
- “Remove the rear M.2 backplane” on page 245
- “Install rear M.2 backplane” on page 246
- “Remove the rear M.2 cage” on page 247
- “Install rear M.2 cage” on page 248

Disassemble the rear M.2 interposer and drive

Use this information to disassemble the rear M.2 interposer and drive.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the rear hot-swap M.2 interposer and drive assembly from the chassis, see “Remove rear hot-swap M.2 interposer and drive assembly” on page 243.

Step 2. Disassemble the M.2 interposer from M.2 drive.

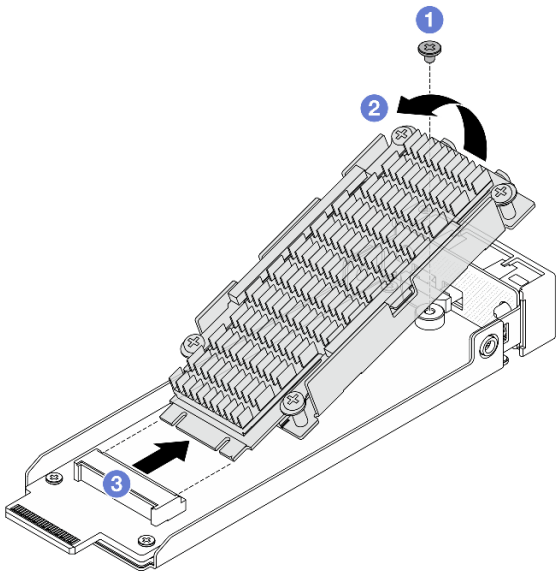


Figure 241. Disassembling M.2 interposer from drive

a. 1 Loosen one screw that locks the M.2 drive assembly.

b. 2 Lift one side of the drive assembly as illustrated above.

c. 3 Disengage the connectors.

Step 3. Remove M.2 drive assembly.

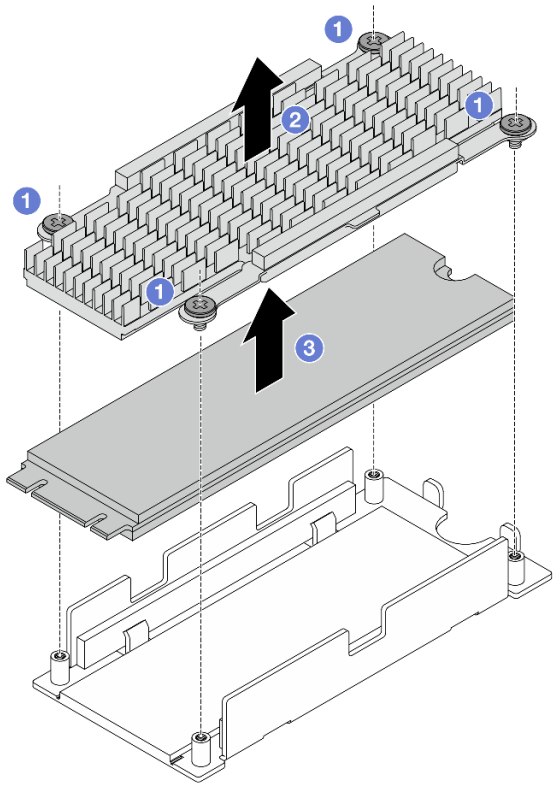


Figure 242. Removing M.2 drive

a. 1 Loosen four screws that lock the M.2 drive and a heat sink.
b. 2 Lift the heat sink off the drive tray.
c. 3 Lift the drive off the drive tray.

Step 4. Clean up the residue of the thermal pads.

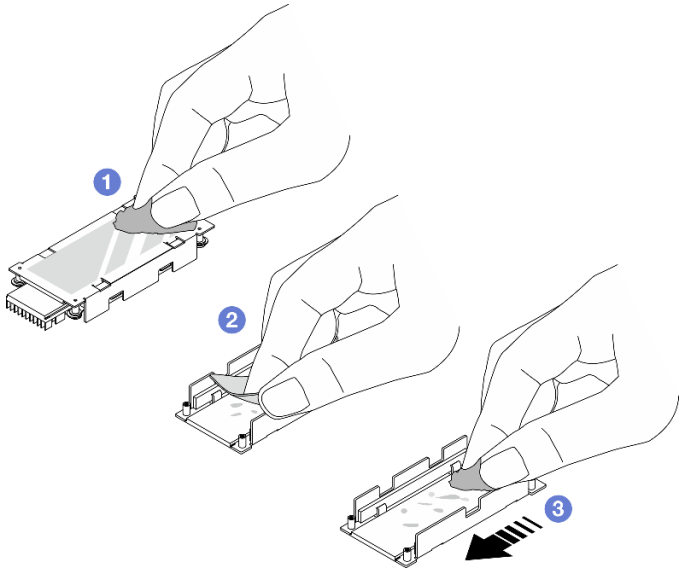


Figure 243. Cleaning thermal pads

a. 1 Clean up the thermal pad residue on the back of the heat sink with an alcohol cleaning towel.

b. 2 Peel off the pad on the drive tray.

c. 3 Clean up the residue by swiping with an alcohol cleaning towel in one direction.

Step 5. Remove the rear M.2 interposer.

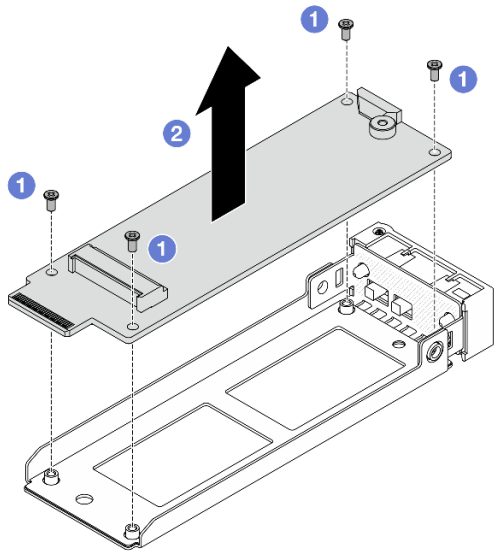


Figure 244. Removing M.2 interposer

a. 1 Loosen four screws that lock the M.2 interposer.

b. 2 Lift the interposer off the interposer tray.

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.

Assemble the rear M.2 interposer and drive

Use this information to assemble the rear M.2 interposer and drive.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the rear M.2 interposer to the interposer tray.

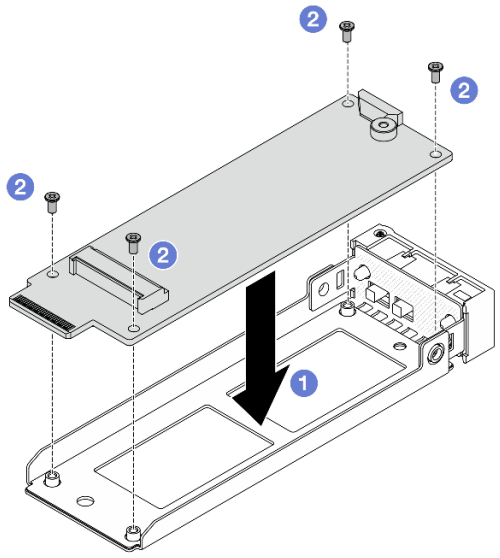


Figure 245. Installing M.2 interposer

a. 1 Align the interposer to the guiding pins on the interposer tray.

b. 2 Tighten four screws to secure the interposer.

Step 2. Peel off the films on the thermal pads.

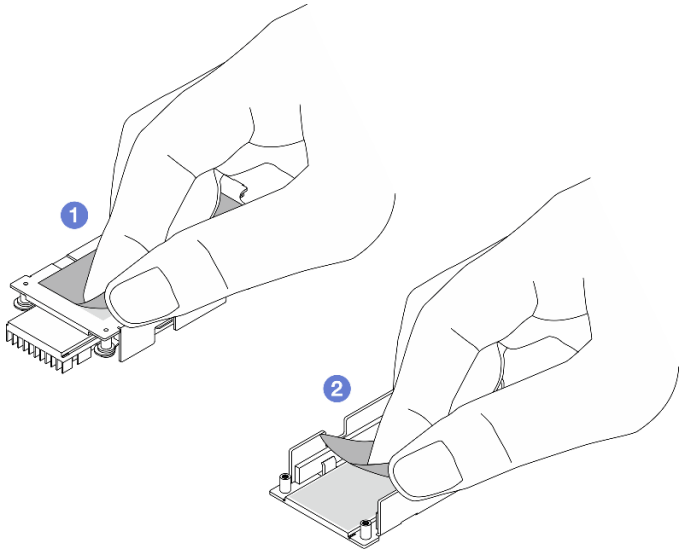


Figure 246. Peeling off the films

a. 1 Peel off the film on the heat sink thermal pad.

b. 2 Peel off the film on the tray thermal pad.

Step 3. Install the M.2 drive and a heat sink to the drive tray.

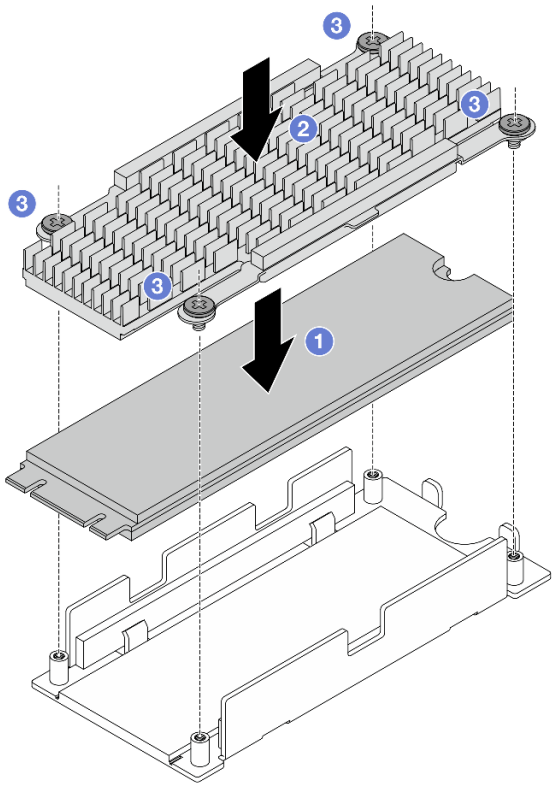


Figure 247. Installing M.2 drive

a. 1 Place the M.2 drive on the drive tray.

b. 2 Align the heat sink to the guiding pins on the drive tray.

c. 3 Tighten four screws to secure the drive and heat sink.

Step 4. Assemble the M.2 interposer and M.2 drive.

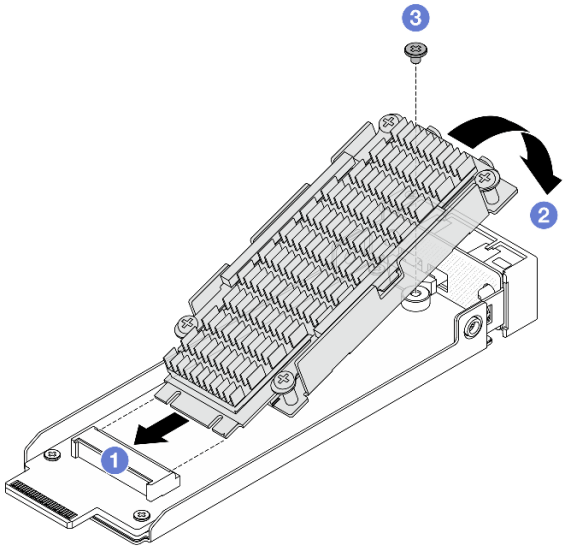


Figure 248. Assembling M.2 interposer and drive

a. (1) Tilt the M.2 drive assembly and insert the connector to the interposer slot.
b. (2) Press the drive assembly down and align a screw hole.
c. (3) Tighten one screw to secure the two assemblies.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Remove rear hot-swap M.2 interposer and drive assembly

Follow the instructions in this section to remove rear hot-swap M.2 interposer and drive assembly.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the rear M.2 interposer and drive assembly.

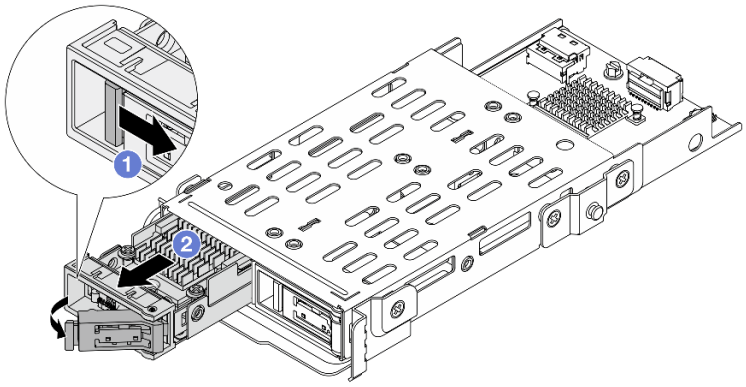


Figure 249. Removing rear M.2 drive assembly

a. 1 Slide the release latch to the right to open the drive tray handle.

b. 2 Slide the drive out of the drive bay.

After you finish

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

Install rear hot-swap M.2 interposer and drive assembly

Follow the instructions in this section to install rear hot-swap M.2 interposer and drive assembly.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Assemble the M.2 interposer and drive, see “Assemble the rear M.2 interposer and drive” on page 240.

Step 2. Install the hot-swap M.2 interposer and drive assembly to the chassis.

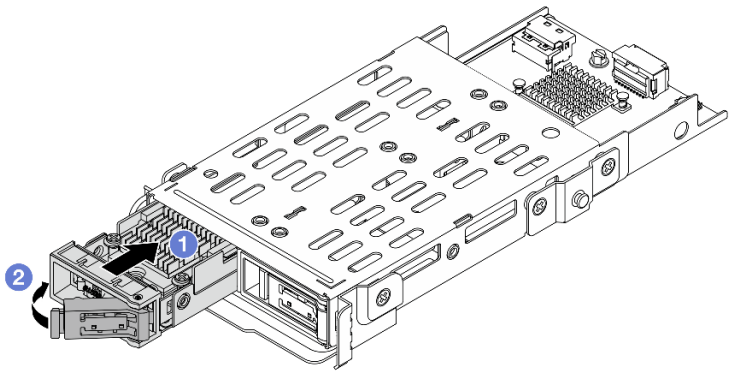


Figure 250. Installing M.2 drive assembly

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.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: https://pubs.lenovo.com/lxpm-overview/.

Remove the rear M.2 backplane

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

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 282.

Step 2. Remove the rear M.2 cage, see "Remove the rear M.2 cage" on page 247.

Step 3. Remove all rear M.2 adapter and drive assemblies, see "Remove rear hot-swap M.2 interposer and drive assembly" on page 243.

Step 4. Disconnect all the cables connected to the M.2 backplane and record them.

Step 5. Remove the rear M.2 backplane.

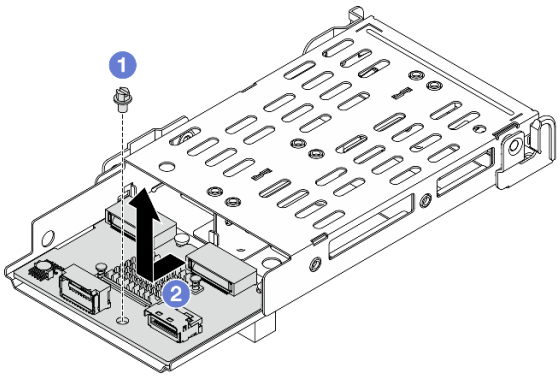


Figure 251. Removing M.2 backplane

a. 1 Loosen one screw the locks the backplane to the cage.

b. 2 Slide the backplane as illustrated above and lift it off from the cage.

After you finish

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

Install rear M.2 backplane

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

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the rear M.2 backplane to the M.2 cage.

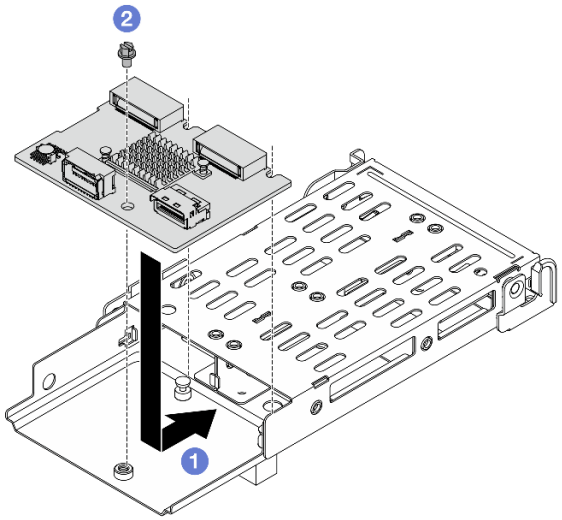


Figure 252. Installing M.2 backplane

a. 1 Place the backplane on the cage and slide it as illustrated above to engage it.

b. 2 Tighten one screw to secure it to the cage.

Step 2. Install all rear M.2 adapter and drive assemblies, see "Install rear hot-swap M.2 interposer and drive assembly" on page 244.

Step 3. Connect all cables to the M.2 backplane.

Step 4. Install the M.2 cage back into the chassis, see "Install rear M.2 cage" on page 248.

Step 5. Install the top cover, see "Install the top cover" on page 284.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: https://pubs.lenovo.com/lxpm-overview/.

Remove the rear M.2 cage

Follow the instructions in this section to remove the rear M.2 cage.

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 282.

Step 2. Disconnect all the cables connected to the M.2 backplane and record them.

Step 3. Remove the M.2 cage. Lift the cage out of the chassis.

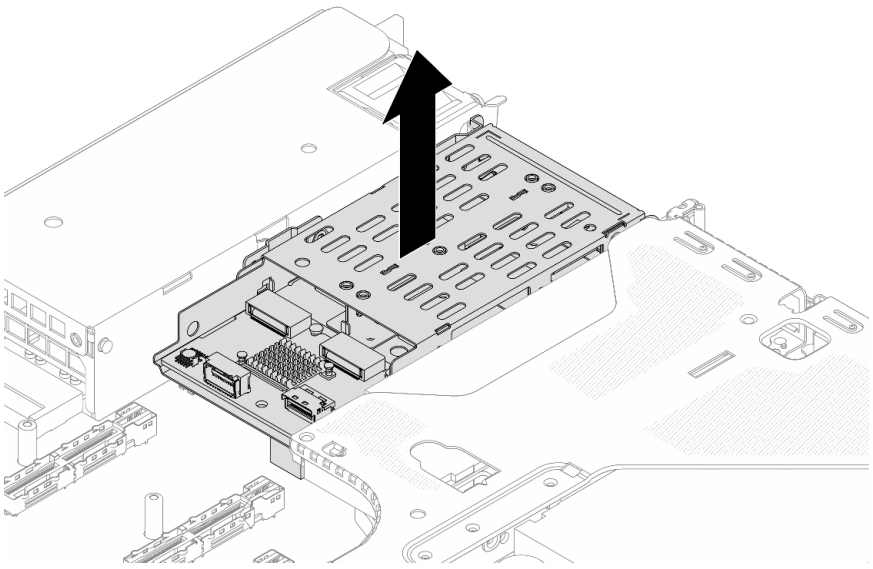


Figure 253. Removing the M.2 cage

After you finish

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

Install rear M.2 cage

Follow the instructions in this section to install the rear M.2 cage.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install all parts nested in the M.2 cage, see “Install rear hot-swap M.2 interposer and drive assembly” on page 244.

Step 2. Install the M.2 cage into the chassis. Align the guiding pins on the cage to the slots on the chassis.

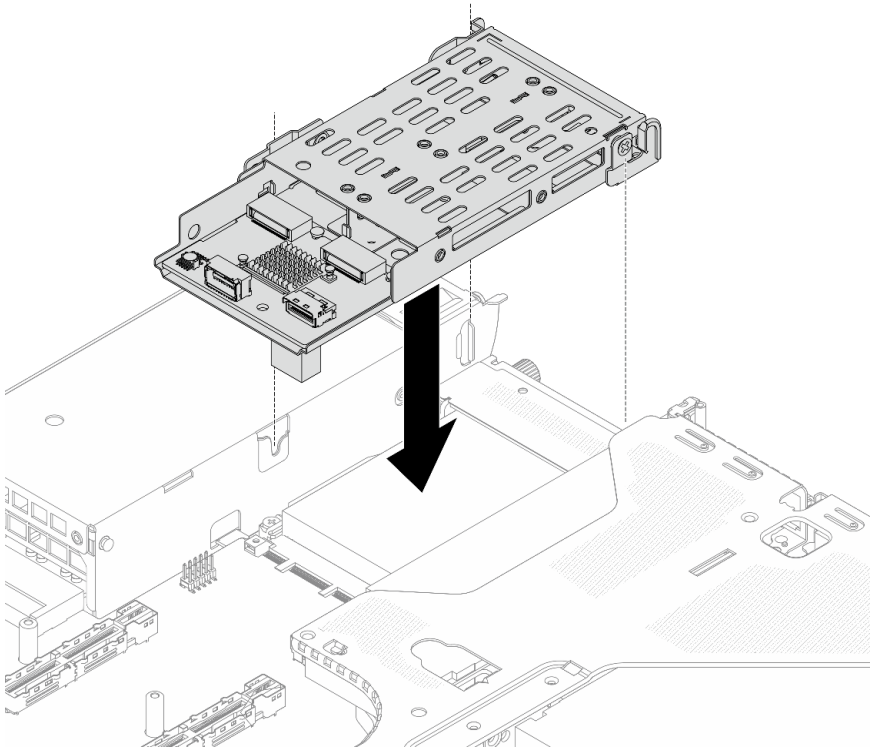


Figure 254. Installing M.2 cage

Step 3. Connect all cables to the M.2 backplane. For more information, see ***Internal Cable Routing Guide***.

Step 4. Install the top cover, see "Install the top cover" on page 284.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: https://pubs.lenovo.com/lxpm-overview/.

Rear OCP module replacement

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

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

- "Remove the rear OCP module" on page 249
- "Install the rear OCP module" on page 250

Remove the rear OCP module

Use this information to remove the rear OCP module.

About this task

Attention:

- Read "Installation Guidelines" on page 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the rear OCP module.

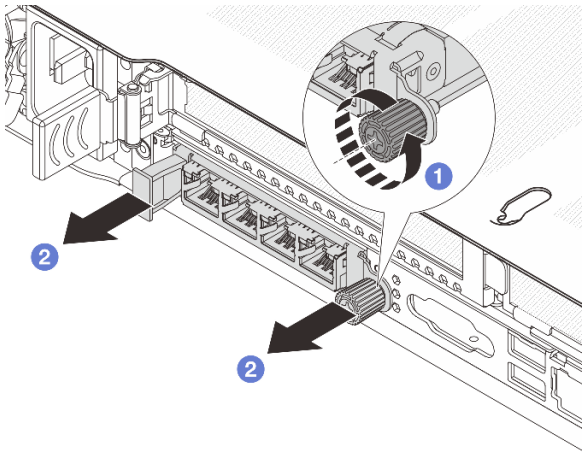


Figure 255. OCP module removal

a. 1 Loosen the thumbscrew that secures the module. Use a screwdriver if necessary.

b. 2 Pull out the OCP module as shown.

After you finish

1. Install a new OCP module or a card filler. See “Install the rear OCP module” on page 250.
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.

Install the rear OCP module

Use this information to install the rear OCP module.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the 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.

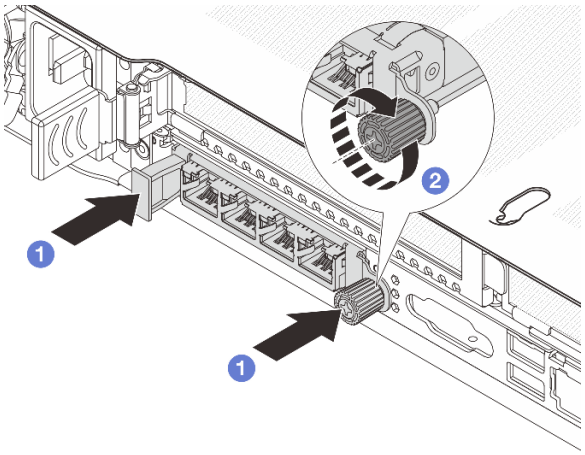


Figure 256. OCP module installation

a. (1) Push the OCP module until it is fully inserted into the connector on the processor board.

b. (2) Fully tighten the thumbscrew to secure the adapter. Use a screwdriver if necessary.

Notes:

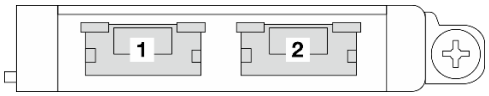


Figure 257. OCP module (two connectors)

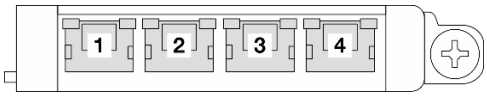


Figure 258. OCP module (four connectors)

- The OCP module provides two or four extra Ethernet connectors for network connections.
- By default, any Ethernet connector on the OCP module can also function as a management connector using the shared management capacity.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Rear riser card replacement

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

- “Server rear configuration and riser assemblies” on page 251
- “The overview of rear riser brackets” on page 254
- “The overview of rear riser cards” on page 254

Server rear configuration and riser assemblies

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

Table 34. Server rear configuration and riser assemblies[1]

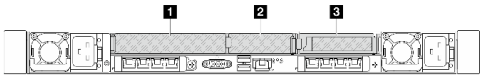
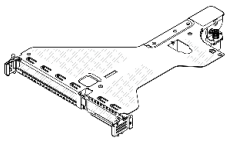
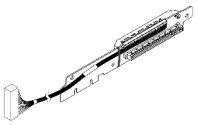
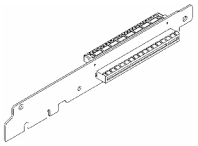
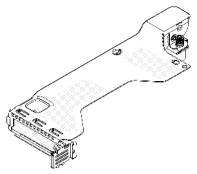
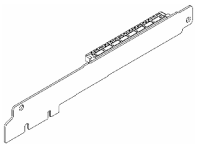
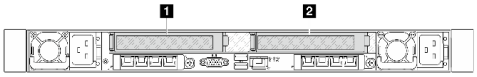
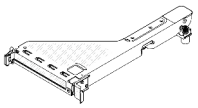
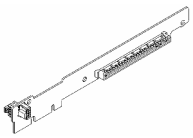
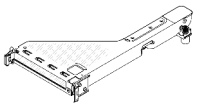
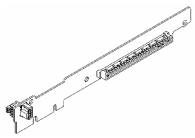
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 259. Three PCIe slots*	 *Figure 260. LP-FH riser bracket*  *Figure 261. BF[2] riser card*  *Figure 262. BF riser card*	 *Figure 263. LP riser bracket*  *Figure 264. LP riser card*
 *Figure 265. Two PCIe slots*	 *Figure 266. FH riser bracket 1*  *Figure 267. FH riser card*	 *Figure 268. FH riser bracket 2*  *Figure 269. FH riser card*

Table 34. Server rear configuration and riser assemblies[1] (continued)

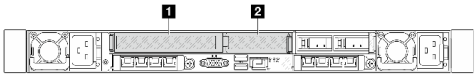
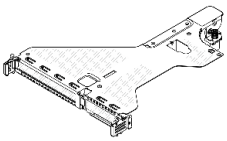
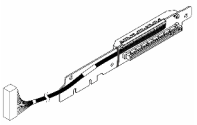
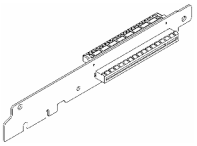
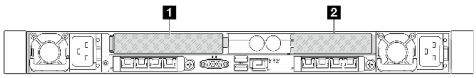
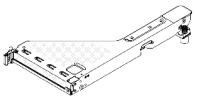
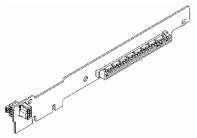
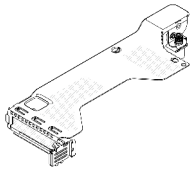
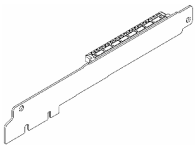
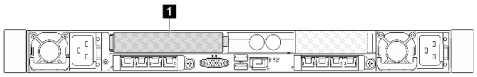
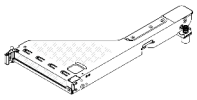
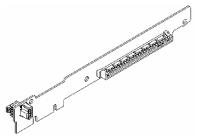
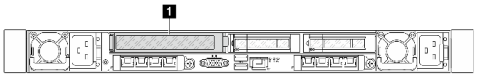
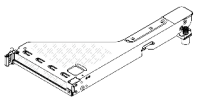
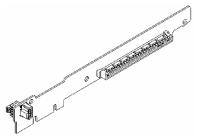
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 270. Two PCIe slots*	 *Figure 271. LP-FH riser bracket*  *Figure 272. BF[2] riser card*  *Figure 273. BF riser card*	Riser 2 assembly is not supported.
 *Figure 274. Two PCIe slots*	 *Figure 275. FH riser bracket 3*  *Figure 276. FH riser card*	 *Figure 277. LP riser bracket*  *Figure 278. LP riser card*

Table 34. Server rear configuration and riser assemblies[1] (continued)

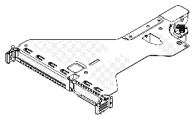
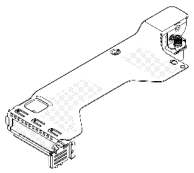
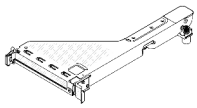
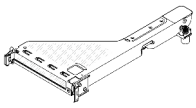
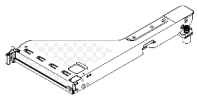
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 279. One PCIe slot*	 *Figure 280. FH riser bracket 3*  *Figure 281. FH riser card*	Riser 2 assembly is not supported.
 *Figure 282. One PCIe slot*	 *Figure 283. FH riser bracket 3*  *Figure 284. FH riser card*	Riser 2 assembly is not supported.

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 rear riser brackets

See this section to identify different riser brackets.

 *Figure 285. LP-FH riser bracket*	 *Figure 286. LP riser bracket*	 *Figure 287. FH riser bracket 1*	 *Figure 288. FH riser bracket 2*	 *Figure 289. FH riser bracket 3*

The overview of rear riser cards

See this section to identify different riser cards.

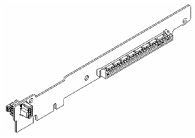
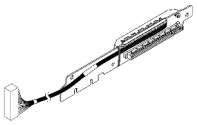
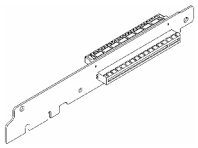
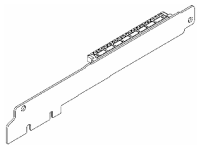
			

Figure 290. FH riser card	*Figure 291. BF cabled riser card*	*Figure 292. BF riser card*	*Figure 293. LP riser card*

Remove a rear riser card

Use this information to remove a rear riser card.

About this task

For more riser brackets supported, see “Rear riser card replacement” on page 251.

The riser assembly 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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

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. Remove the riser assembly.

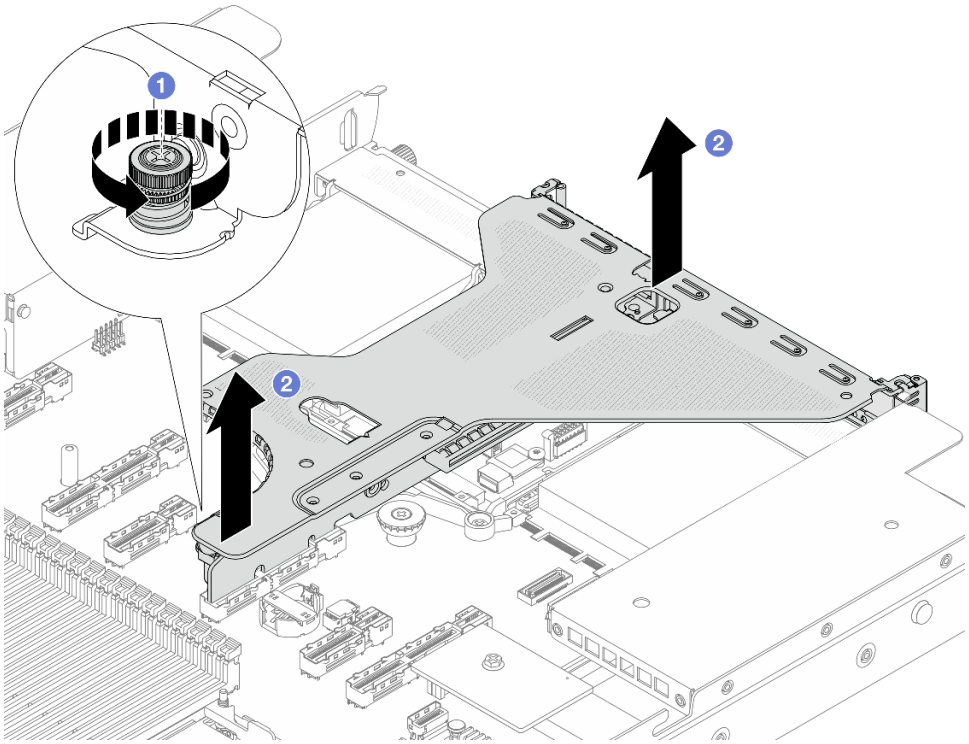


Figure 294. Riser assembly removal

a. 1 Loosen the screw that locks the riser bracket.

b. 2 Lift the bracket out of chassis.

Step 4. If necessary, remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 216.

Step 5. Disconnect the riser card cable from the system board assembly if the bracket has a cabled card installed.

Step 6. Remove the riser card from the bracket.

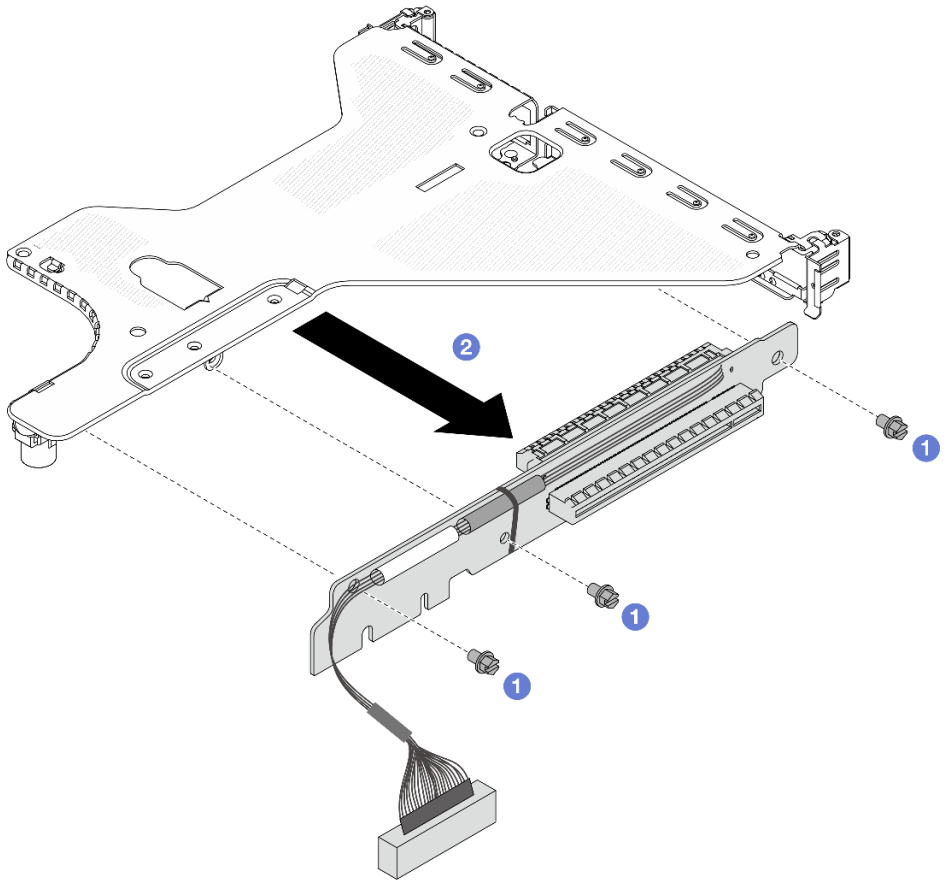


Figure 295. Riser card removal

a. 1 Remove the three screws that secure the riser card to the bracket.
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.

Install a rear riser card

Use this information to install a rear riser card.

About this task

For more riser brackets supported, see “Rear riser card replacement” on page 251.

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 LP-FH riser assembly as an example.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the riser card and secure it to the bracket.

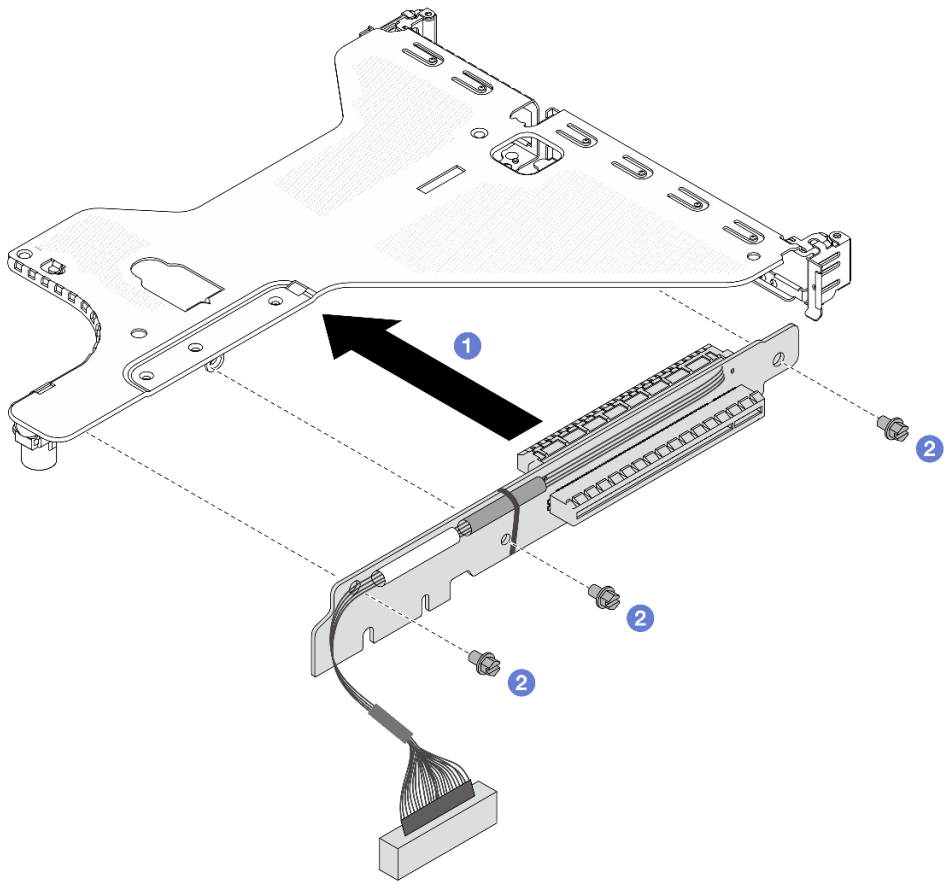


Figure 296. Riser card installation

a. 1 Align the screw holes in the riser card with the corresponding ones in the bracket.

b. 2 Install the three screws to secure the riser card to the bracket.

Step 2. If necessary, reinstall the PCIe adapters. See “Install a PCIe adapter” on page 218.

Step 3. Install the riser assembly to the server.

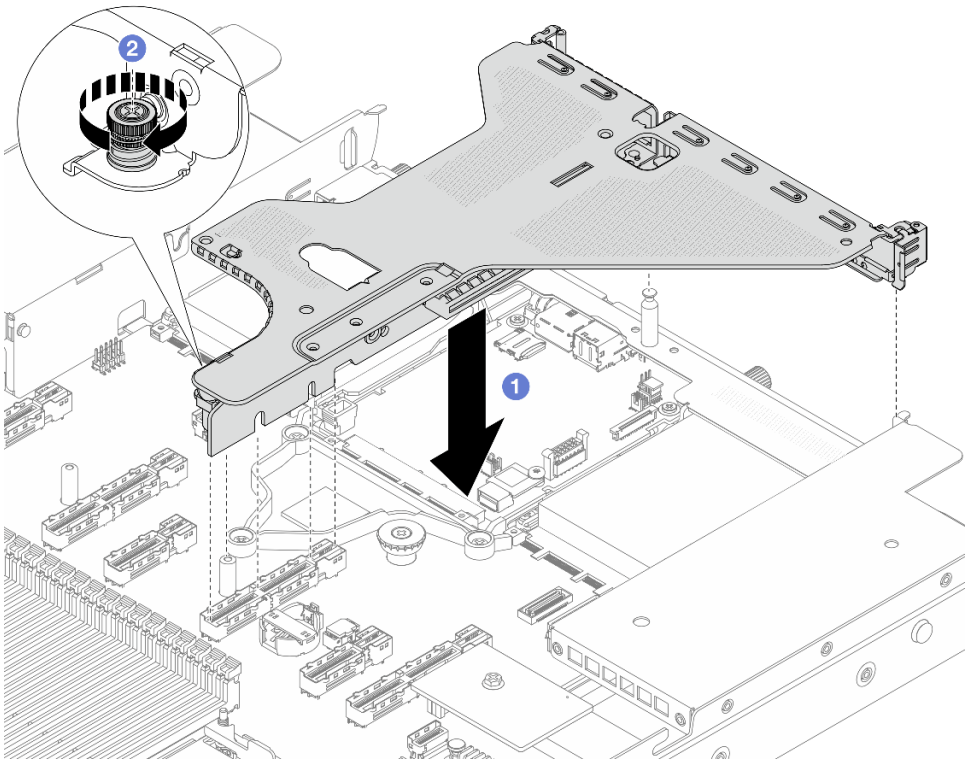


Figure 297. Riser assembly installation

a. 1 Align the clips, openings or screw holes on the riser bracket to the chassis and press the bracket down.

b. 2 Tighten the screw and ensure that the bracket is securely seated.

Step 4. Connect the cables of the PCIe adapters or the riser card. See ***Internal Cable Routing Guide*** and locate the cable routing information.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 288.

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" on page 259
- "Install the security bezel" on page 261

Remove the security bezel

Use this information to remove the security bezel.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

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

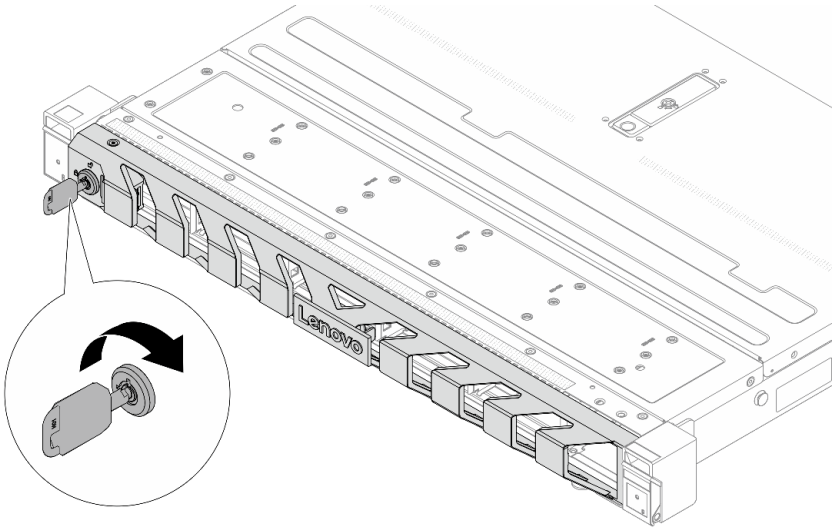


Figure 298. Unlocking the security bezel

Step 2. Remove the security bezel.

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

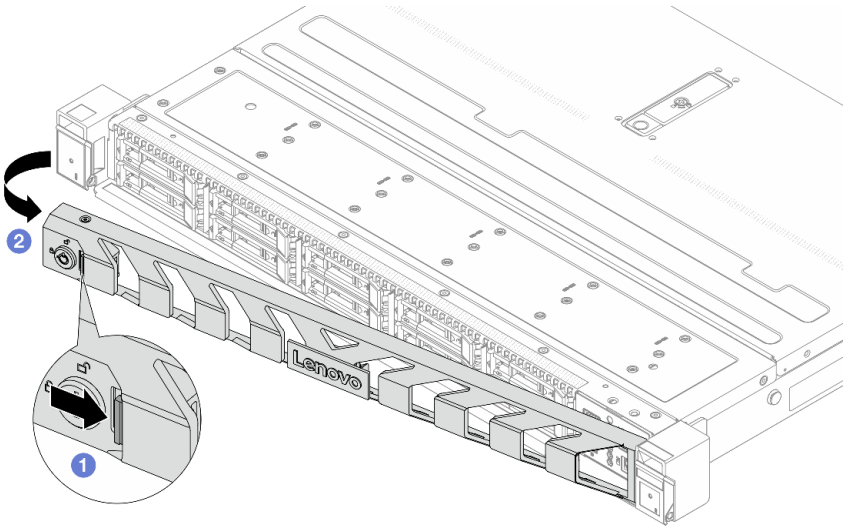


Figure 299. Security bezel removal

a. 1 Press the release latch.

b. 2 Rotate the security bezel outward to remove it from the chassis.

After you finish

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

Install the security bezel

Use this information to install the security bezel.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 to ensure that you work safely.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If you have removed the rack latches, reinstall them. See “Install the rack latches” on page 231.

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

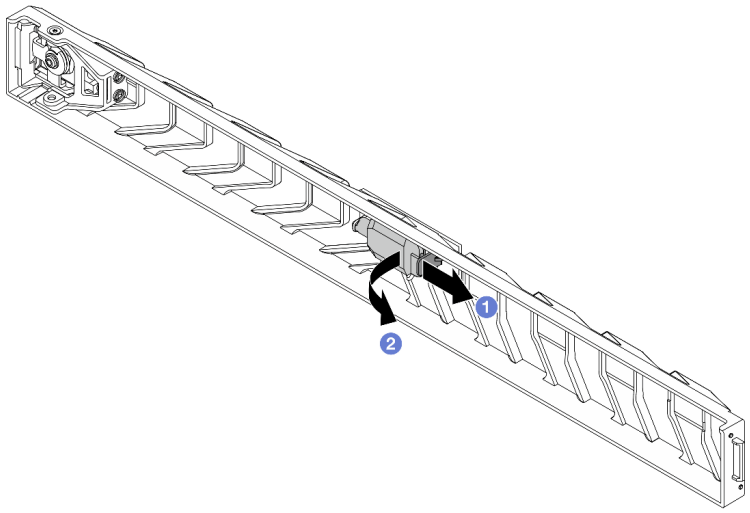


Figure 300. Key removal

a. 1 Press the latch to release the key.

b. 2 Remove the key from the retaining clip in the shown direction.

Step 3. Install the security bezel to the chassis.

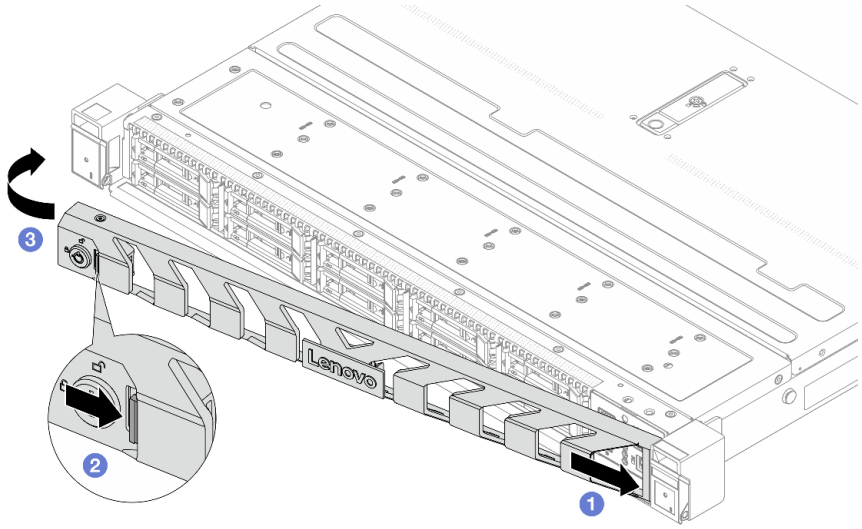


Figure 301. Security bezel installation

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.

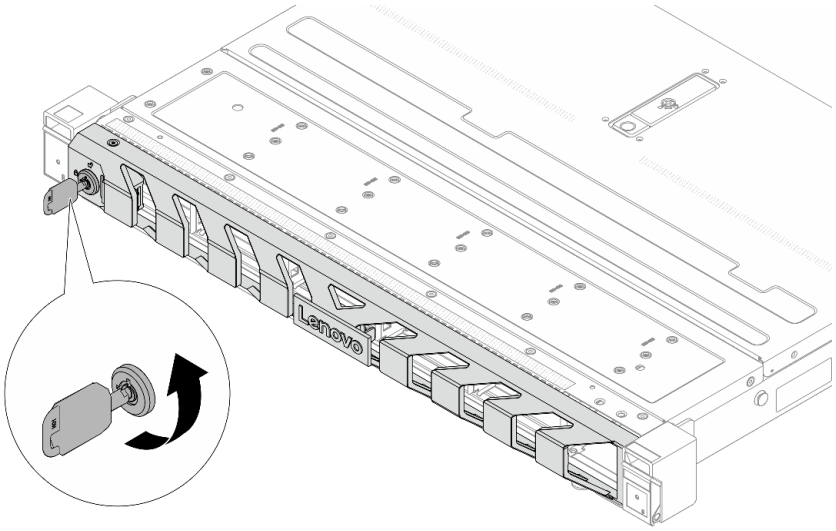


Figure 302. Locking the security bezel

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Disconnect the cable of the serial port module from the system board assembly.

Step 3. Remove the riser bracket.

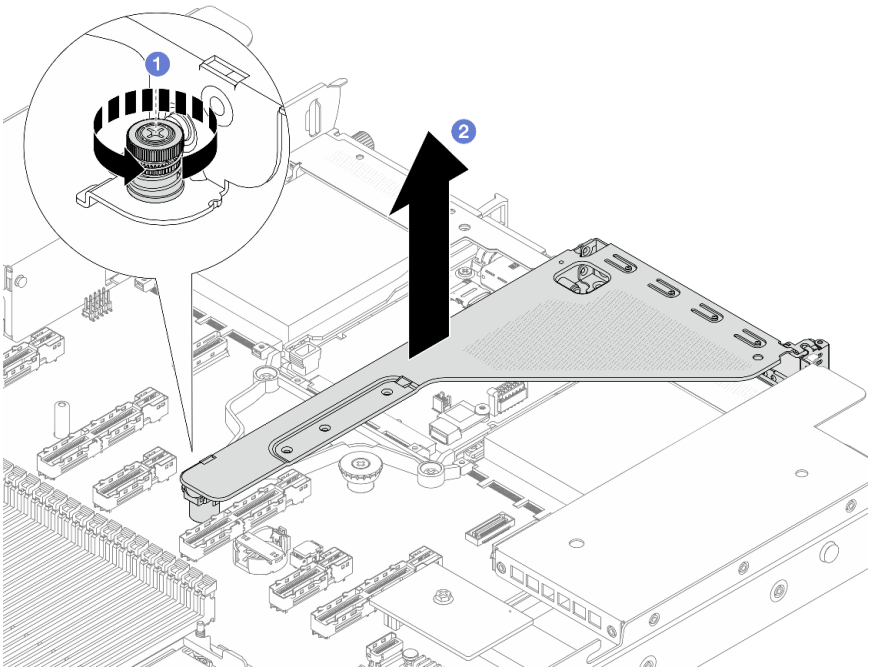


Figure 303. Removing the riser bracket

a. 1 Loosen the screw that locks the riser bracket.

b. 2 Lift the bracket out of chassis.

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

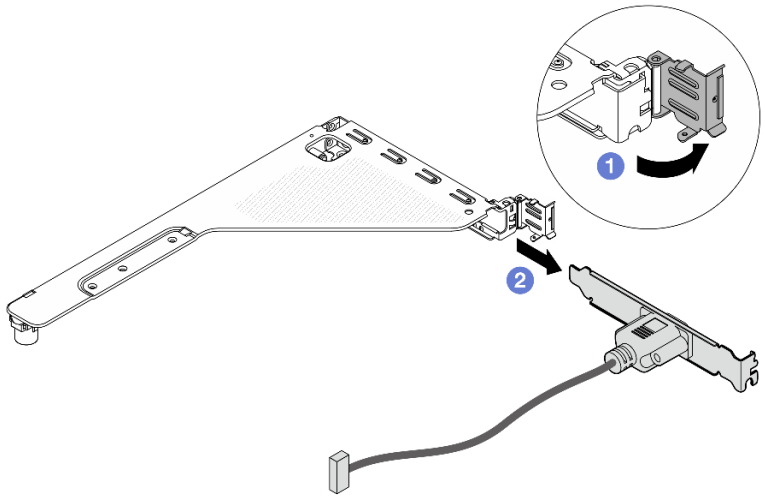


Figure 304. Removing the riser bracket

a. Open the retention latch.

b. 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.

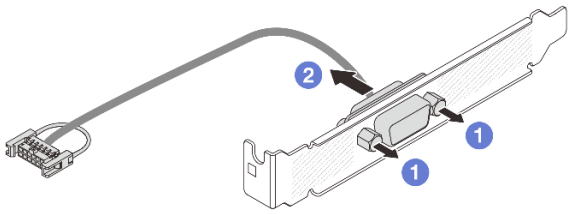


Figure 305. Disassembling the serial port module

a. Loosen the two screws.

b. 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 264 and “Install a PCIe adapter” on page 218.
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.

Install a serial port module

Use this information to install a serial port module.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.
- Read the “PCIe slots and adapters” on page 65 to ensure that you install the serial port module to a correct PCIe slot.

Procedure

Step 1. Use a 5 mm wrench to install the serial port cable into the bracket.

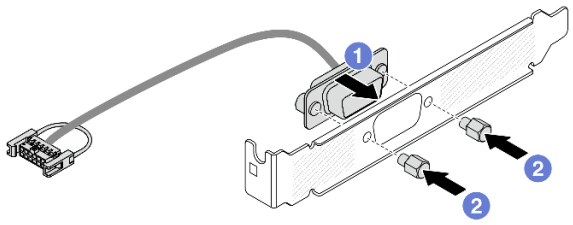


Figure 306. Assembling the serial port module

a. 1 Align the two screw holes on the cable connector to the bracket.

b. 2 Install the two screws to the bracket.

Step 2. Install the serial port module to the riser bracket.

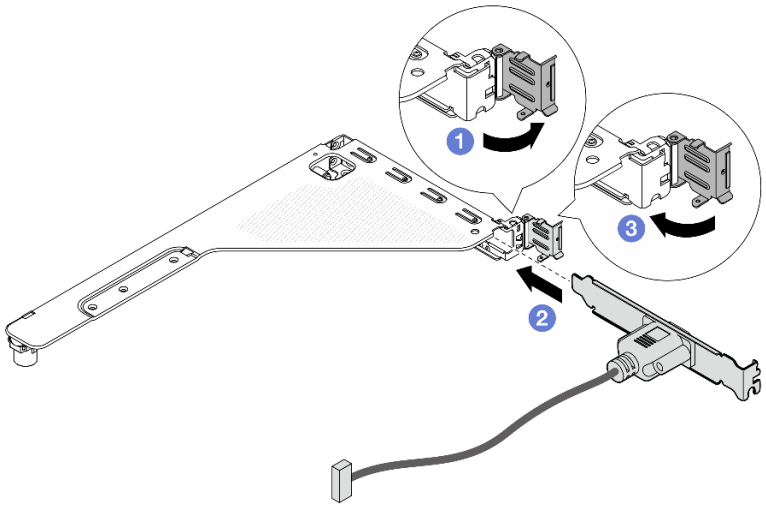


Figure 307. Installing the serial port module

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 3. Install the riser assembly to the server.

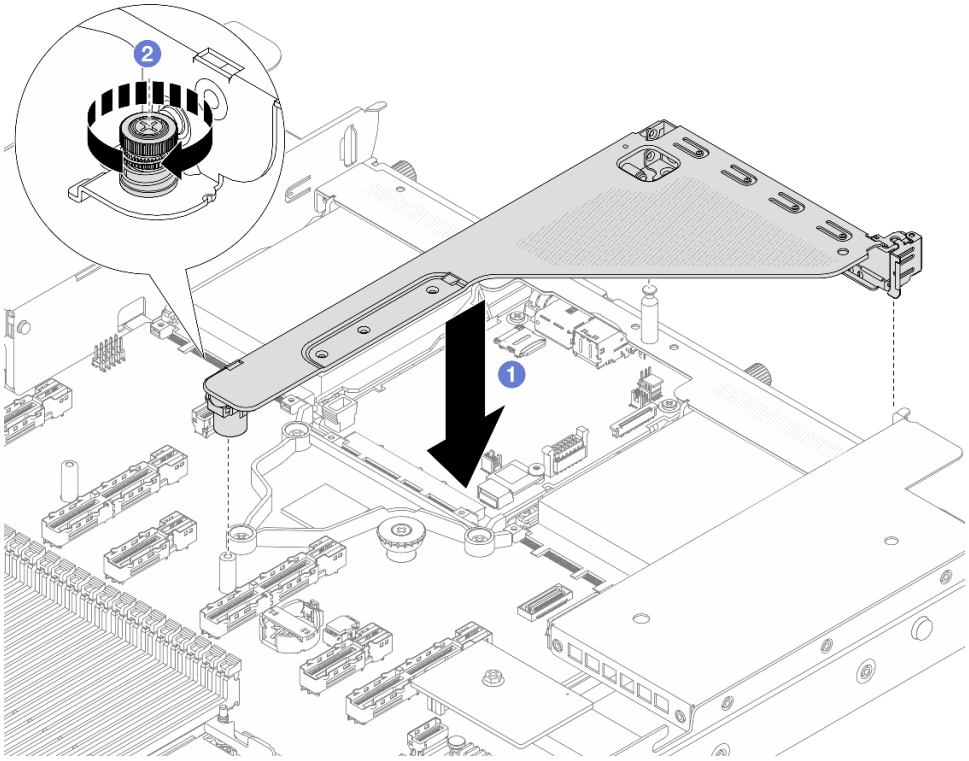


Figure 308. Installing the riser assembly

a. 1 Align the clips, openings or screw holes on the riser bracket to the chassis and press the bracket down.

b. 2 Tighten the screw and ensure that the bracket is securely seated.

Step 4. Connect the cable of the serial port module to the serial-port-module connector on the system board assembly. For the location of the serial-port-module connector, refer to "System-board-assembly connectors" on page 32.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 288.
2. From the UEFI Setup page, click **System Settings → Devices and I/O Ports → Console Redirection Settings**. Change both **Console Redirection** and **SP Redirection** setting to **Enabled**.
3. 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.

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 it without proper training and qualification.

S017

CAUTION:
Hazardous moving fan blades nearby. 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.

The following illustration shows the layout of the system board assembly which consists of the system I/O board and processor board.

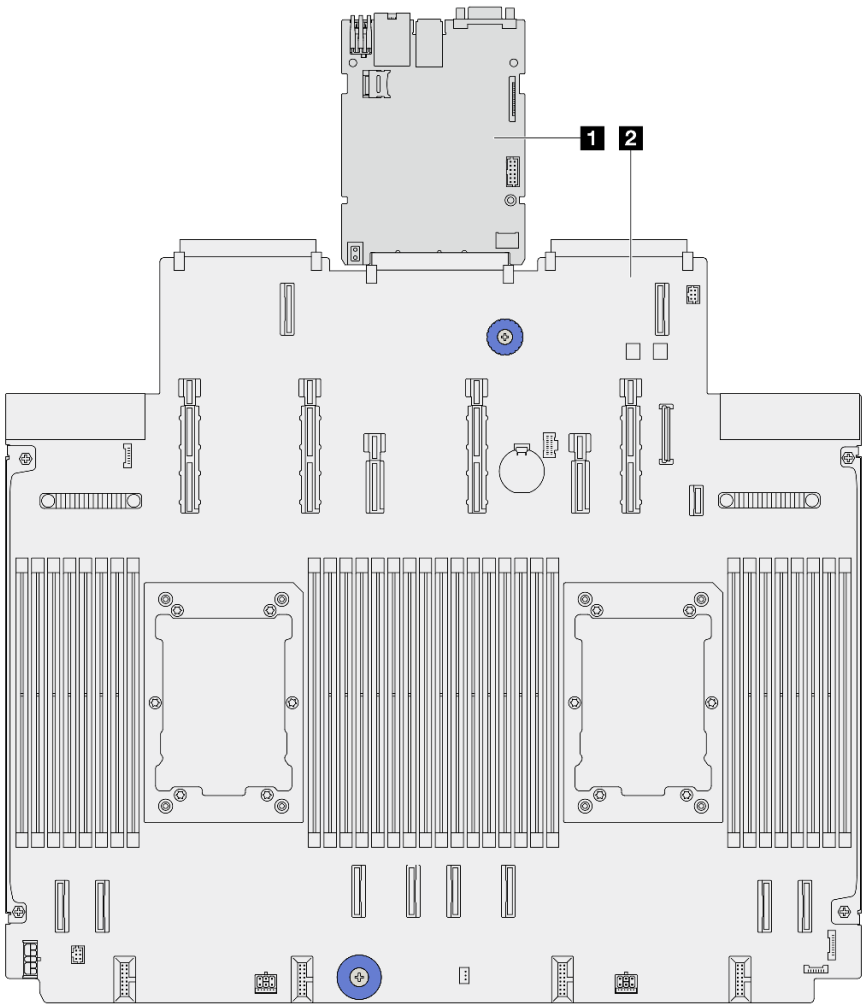


Figure 309. System-board-assembly layout

1 System I/O board	2 Processor board

System I/O board replacement (trained technicians only)

Use this section to remove and install the system I/O board, also known as Datacenter-ready Secure Control Module, from the system board assembly.

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

Remove the system I/O board

Follow the instructions to remove the system I/O board, also known as Datacenter-ready Secure Control 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 it 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.
- **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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 97.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 232.

d. 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.

e. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.
- “Processor and heat sink replacement (trained technicians only)” on page 219
- “Memory module replacement” on page 210
- “System fan-pack replacement” on page 279
- “Rear riser card replacement” on page 251
- “CMOS battery (CR2032) replacement” on page 105
- “Rear OCP module replacement” on page 249

f. Pull out the power supplies gently. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the MicroSD card, see “Remove the MicroSD card” on page 213.

Step 3. Separate the system I/O board from the processor board.

Note: To prevent the contact of the IO board from damage, pinch the handle on the IO board and pull out the IO board outward. During the entire pulling action, ensure that the IO board remains as horizontal as possible.

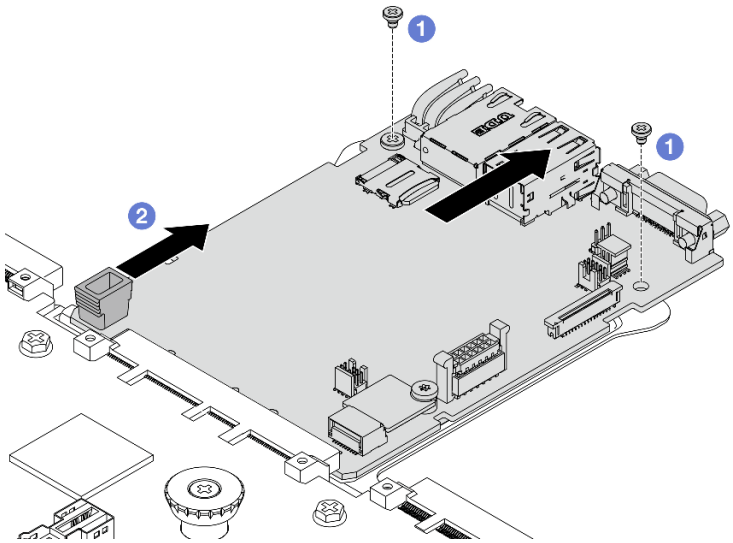


Figure 310. System I/O board removal

a. 1 Remove the screws that secure the system I/O board.

b. 2 Pinch the handle on the IO board and pull the IO board outward to disengage it from the processor board.

After you finish

Important:

- Before you return the processor board, make sure that you install the processor socket covers to the new processor board.
- If replacing a new system I/O board, transfer the MicroSD card from the old system I/O board to the new one. See “Remove the MicroSD card” on page 213 and “Install the MicroSD card” on page 215.
- If you are planning to recycle the system board assembly, follow the instructions in Appendix A “Hardware disassembling for recycle” on page 337 for compliance with local regulations.

Install the system I/O board

Follow the instructions in this section to install the system I/O board, also known as Datacenter-ready Secure Control 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 it without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the system I/O board.

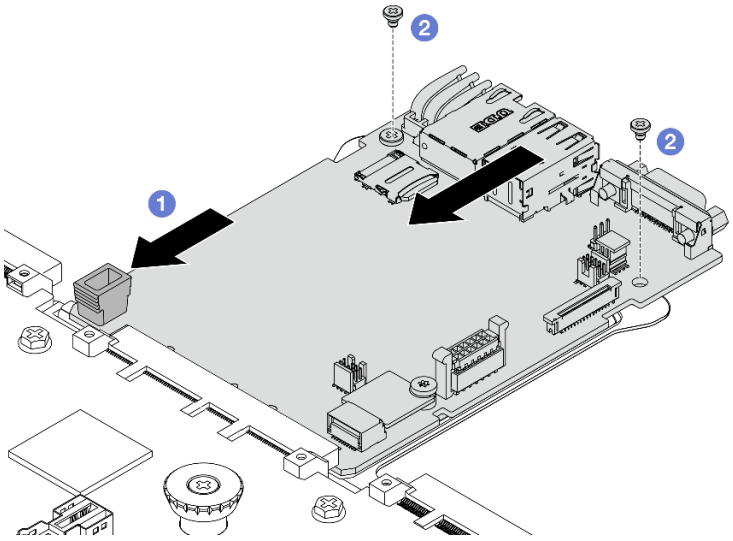


Figure 311. System I/O board installation

a. 1 Align the contacts on the system I/O board with the slots 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 contacts 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 install the system I/O board to the supporting metal sheet.

Step 2. Install the MicroSD card, see "Install the MicroSD card" on page 215.

After you finish

1. Install any components that you have removed before the removal of system I/O board.
   - "Processor and heat sink replacement (trained technicians only)" on page 219
   - "Memory module replacement" on page 210
   - "System fan-pack replacement" on page 279
   - "Rear riser card replacement" on page 251
   - "CMOS battery (CR2032) replacement" on page 105
   - "Rear OCP module replacement" on page 249
2. Properly route and secure the cables in the server. Refer to detailed cable routing information for each component in ***Internal Cable Routing Guide***.
3. Install the rear drive cage if you have removed it. See "Install the 2.5-inch rear drive assembly" on page 233.
4. Install the air baffle if you have removed it. See "Install the air baffle" on page 99.
5. Install the top cover. See "Install the top cover" on page 284.
6. Push the power supplies into the bays until they click into place.
7. Connect power cords to the server and turn on the server.

8. Update the Vital Product Data (VPD) of the system board assembly. See “Update the Vital Product Data (VPD)” on page 278. 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 53.
9. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 272.

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 UEFI.TrustedComputingGroup_TPMDevice "Disabled" --bmc <userid>:<password>@<ip_address>`

   where:

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)
   - *<ip_address>* is the IP address of the BMC.

   Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Disabled" --bmc USERID:PASSW0RD@10.245.38.64
[1s]Certificate check finished [100%][=============================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Disabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:
`OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Enabled" --bmc <userid>:<password>@<ip_address>`

Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Enabled" --bmc USERID:PASSW0RD@10.245.38.64
[1s]Certificate check finished [100%][=============================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Enabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot Configuration → Secure Boot Setting**.
4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

     To download Lenovo XClarity Essentials OneCLI, go to the following site:

     https://datacentersupport.lenovo.com/solutions/HT116433

  2. Run the following command to enable Secure Boot:
     `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Enabled --bmc <userid>:<password>@<ip_address>`

     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

     – *<ip_address>* is the IP address of the BMC.

     For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

     https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

  Note: If disabling UEFI secure boot is needed, run the following command:
  `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Disabled --bmc <userid>:<password>@<ip_address>`

Processor board replacement (trained technicians only)

Use this section to remove and install the processor board from the system board assembly.

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

Remove the processor board

Follow instructions in this section to remove the processor board.

About this task

A processor board provides different connectors or slots to connect different components or peripherals of the system for communication. The board and the supporting metal sheet constitute a base for the system board assembly. If the processor board fails, it must be replaced.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it 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.
- **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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 282.

b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 97.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 232.

d. 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.

e. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.
   - “Processor and heat sink replacement (trained technicians only)” on page 219
   - “Memory module replacement” on page 210
   - “System fan-pack replacement” on page 279
   - “Rear riser card replacement” on page 251
   - “CMOS battery (CR2032) replacement” on page 105
   - “Rear OCP module replacement” on page 249

f. Pull out the power supplies gently. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly from the chassis.

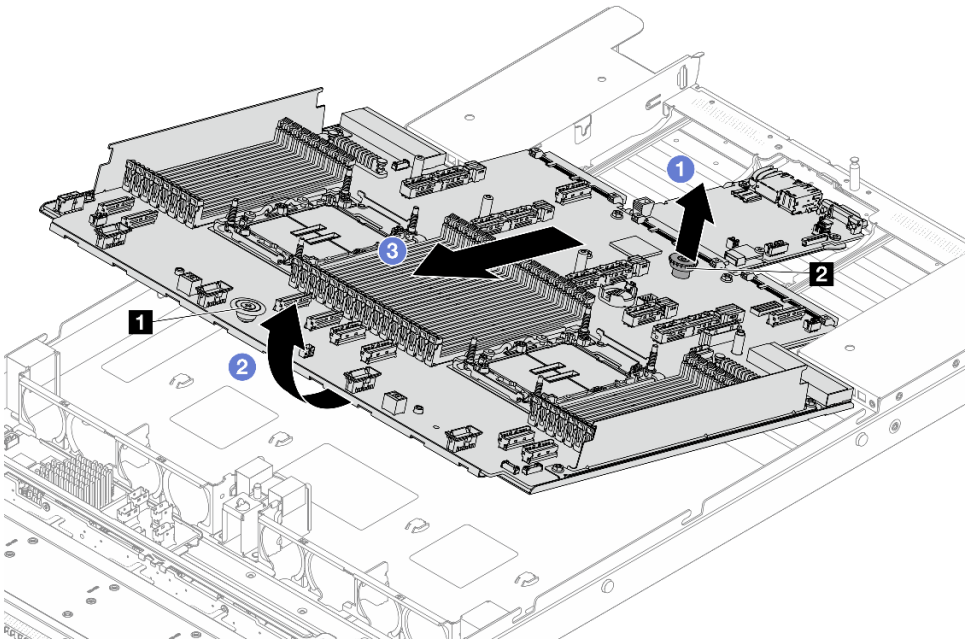


Figure 312. System board assembly removal

a. Hold the release pins 1 and 2 at the same time and lift the system board assembly up.

b. Tilt the assembly as illustrated above.

c. Slide the system board assembly toward the front of the server.

Step 3. Remove the system I/O board, see "Remove the system I/O board" on page 268.

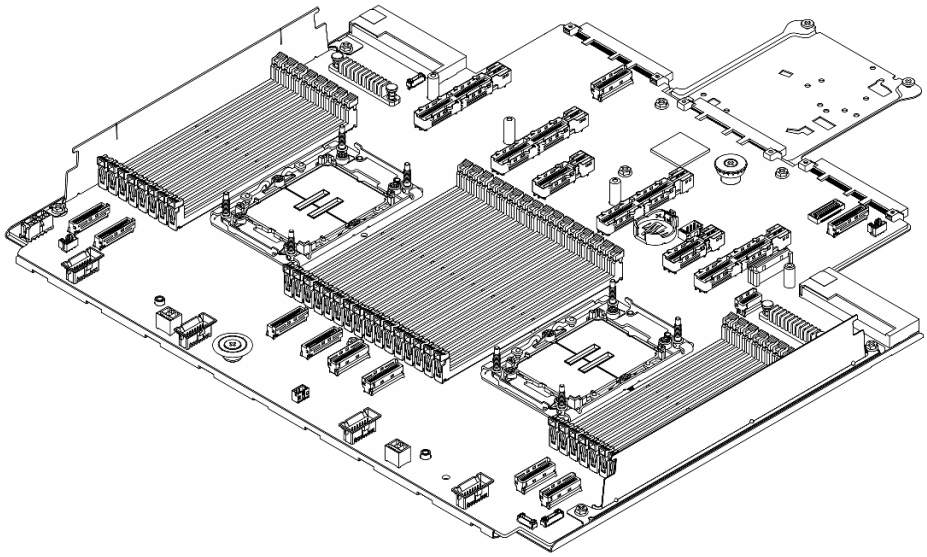


Figure 313. The processor board

Note: The processor board comes with a supporting metal sheet. No further removal is needed.

After you finish

Important: Before you return the system board assembly, make sure that the processor socket is covered. There is a processor external cap covering the processor socket on the new system board assembly. Slide the processor external cap out from the processor socket on the new system board assembly, and install the external cap on the processor socket on the removed system board assembly.

If you are planning to recycle the system board assembly, follow the instructions in Appendix A “Hardware disassembling for recycle” on page 337 for compliance with local regulations.

Install the processor board

Follow the instructions in this section to install the processor board.

About this task

A processor board provides different connectors or slots to connect different components or peripherals of the system for communication. The board and the supporting metal sheet constitute a base for the system board assembly. If the processor board fails, it must be replaced.

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

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the system I/O board, see “Install the system I/O board” on page 270.

Step 2. Install the system board assembly to the server.

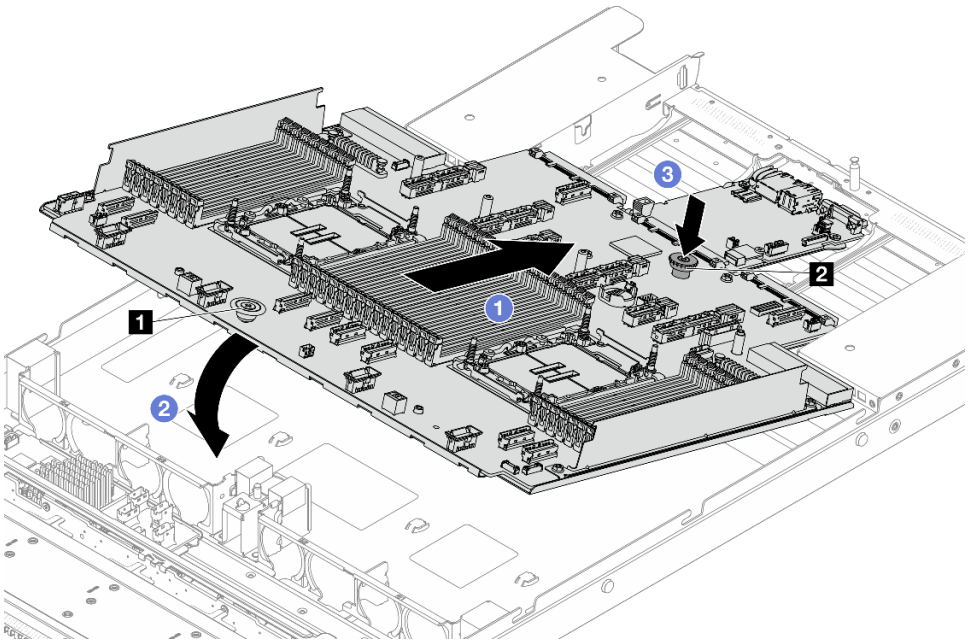


Figure 314. System board assembly installation

a. 1 Hold the release pins 1 and 2 at the same time and lift the system board assembly up.

b. 2 Lower the system board assembly into the chassis as illustrated above.

c. 3 Slide the system board assembly to the rear of the server until the system board assembly snaps into position. Ensure that:

- The rear connectors on the new system board assembly are inserted into the corresponding holes in the rear panel.
- The release pin 2 secures the system board assembly in place.

After you finish

1. Install any components that you have removed from the failing system board assembly.
   - "Processor and heat sink replacement (trained technicians only)" on page 219
   - "Memory module replacement" on page 210
   - "System fan-pack replacement" on page 279
   - "Rear riser card replacement" on page 251
   - "CMOS battery (CR2032) replacement" on page 105
   - "Rear OCP module replacement" on page 249
2. Properly route and secure the cables in the server. Refer to detailed cable routing information for each component in ***Internal Cable Routing Guide***.
3. Install the rear drive cage if you have removed it. See "Install the 2.5-inch rear drive assembly" on page 233.
4. Install the air baffle if you have removed it. See "Install the air baffle" on page 99.
5. Install the top cover. See "Install the top cover" on page 284.
6. Push the power supplies into the bays until they click into place.
7. Connect power cords to the server and turn on the server.

8. Update the Vital Product Data (VPD) of the system board assembly. See “Update the Vital Product Data (VPD)” on page 278. 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 53.
9. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 272.

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 VPD.SysInfoProdName1O <m/t_model> [access_method]`
- Updating **serial number**
  `onecli config set VPD.SysInfoSerialNum1O <s/n> [access_method]`
- Updating **system model**
  `onecli config set VPD.SysInfoProdIdentifier <system model> [access_method]`
- Updating **asset tag**
  `onecli config set VPD.SysEncloseAssetTag <asset_tag> [access_method]`
- Updating **UUID**
  `onecli config createuuid VPD.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 `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa` is the asset tag number.
[access_method]	The access method that you select to access the target server. • Online KCS (unauthenticated and user restricted): You can directly delete *[access_method]* from the command. • Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: `--bmc-username` *<user_id>* `--bmc-password` *<password>* • Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: `--bmc` *<bmc_user_id>*:*<bmc_password>*`@`*<bmc_external_IP>* **Notes:** – *<bmc_user_id>* The BMC account name (1 of 12 accounts). The default value is USERID. – *<bmc_password>* The BMC account password (1 of 12 accounts).

System fan-pack replacement

Use this information to remove and install a system fan-pack.

- "Remove a system fan-pack" on page 279
- "Install a system fan-pack" on page 281

Remove a system fan-pack

Use this information to remove a system fan-pack. 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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

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

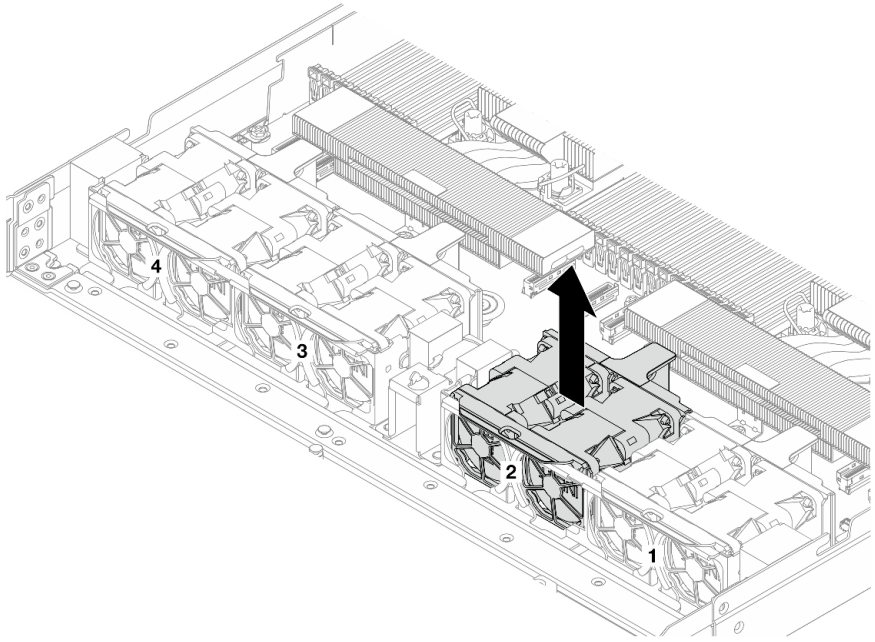


Figure 315. System fan-pack removal

After you finish

1. Install a new system fan-pack or install a fan filler to cover the place. See “Install a system fan-pack” on page 281.
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.

Install a system fan-pack

Use this information to install a system fan-pack. 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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the system fan-pack. Align the four corners of the fan to fan-pack socket and put it down.

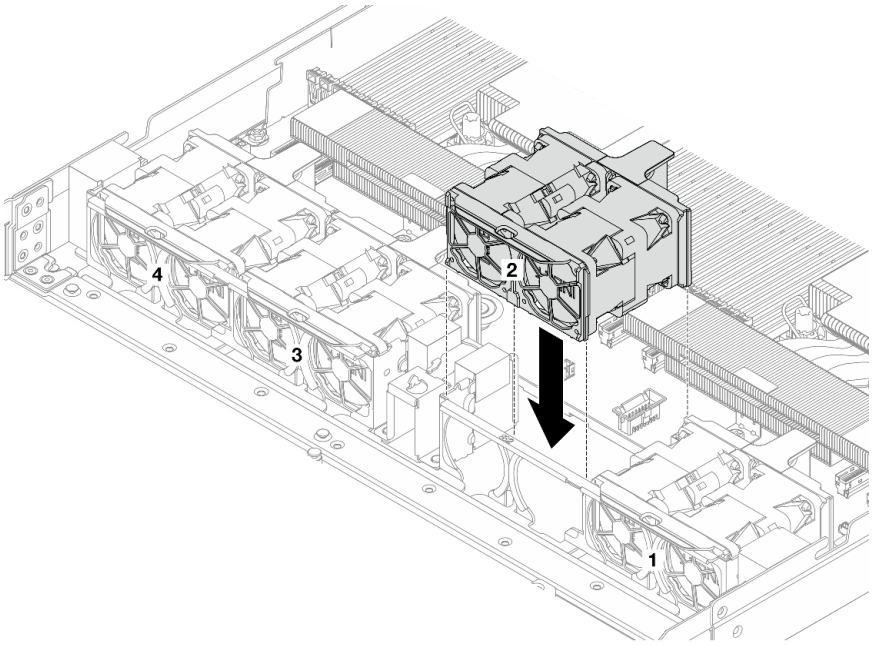


Figure 316. System fan-pack installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

Top cover replacement

Follow instructions in this section to remove and install the top cover.

- “Remove the top cover” on page 282
- “Install the top cover” on page 284

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 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. If the server is installed in a rack, remove the server from the rack. See the Rail Installation Guides that come 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.

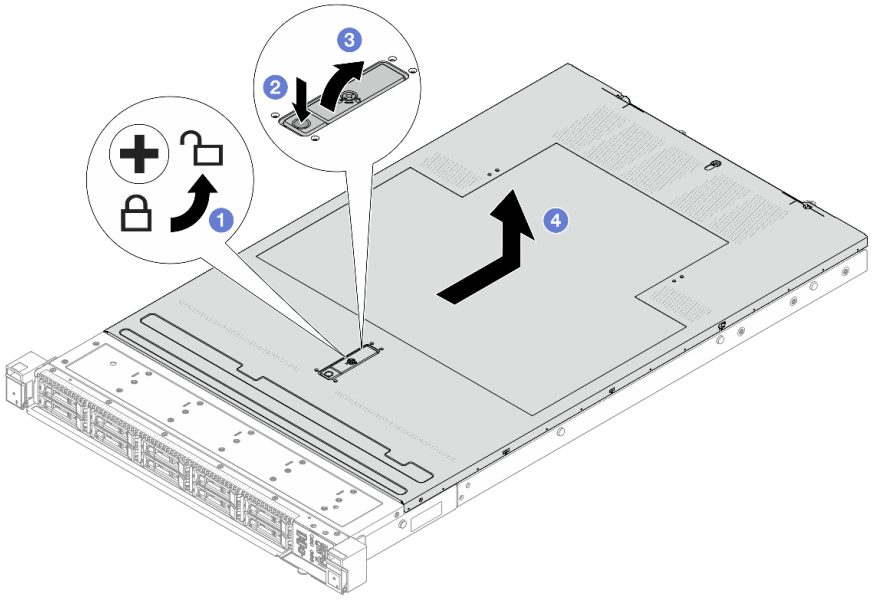


Figure 317. Top cover removal

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

1. Replace any options as required or install a new top cover. See "Install the top cover" on page 284.
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.

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 57 and "Safety inspection checklist" on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

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 ***Internal Cable Routing Guide***.

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.

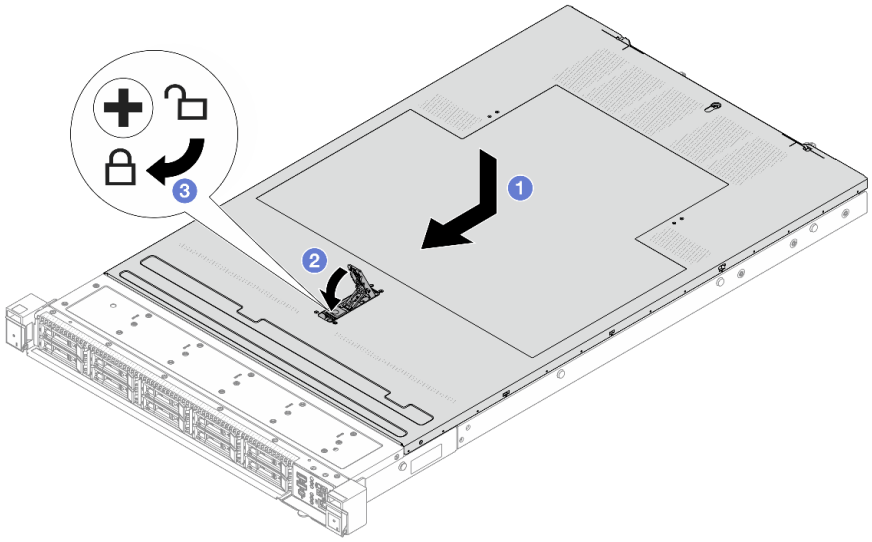


Figure 318. Top cover installation

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 288.

USB I/O board replacement

Use this section to remove and install the ThinkSystem V4 Front & Internal USB I/O Board.

- "Remove the USB I/O board" on page 285
- "Install the USB I/O board" on page 287

Remove the USB I/O board

Follow the instructions in this section to remove the USB I/O board.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 282.

Step 2. Remove the cables connected to the USB I/O board.

Step 3. Remove the USB I/O board.

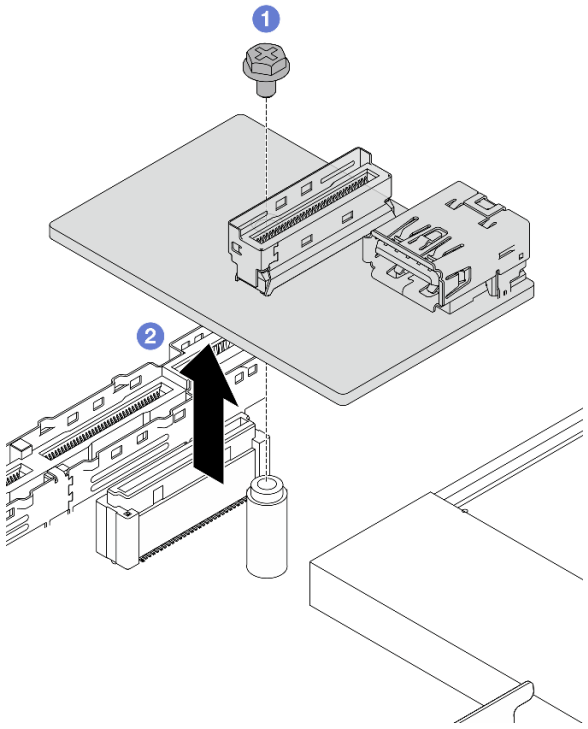


Figure 319. Removing USB I/O board

a. 1 Loosen one screw that locks the USB I/O board to the system board assembly.

b. 2 Lift the board off the connector and take it out.

After you finish

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

Install the USB I/O board

Follow the instructions in this section to install the USB I/O board.

About this task

Attention:

- Read “Installation Guidelines” on page 57 and “Safety inspection checklist” on page 58 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 75.
- Keep static-sensitive parts in their static-protective packages until installation to prevent exposure to static electricity. Handle the parts with an electrostatic-discharge wrist strap or other grounding systems. Place the parts on a static-protective surface.

Procedure

Step 1. Install the USB I/O board to the system board assembly.

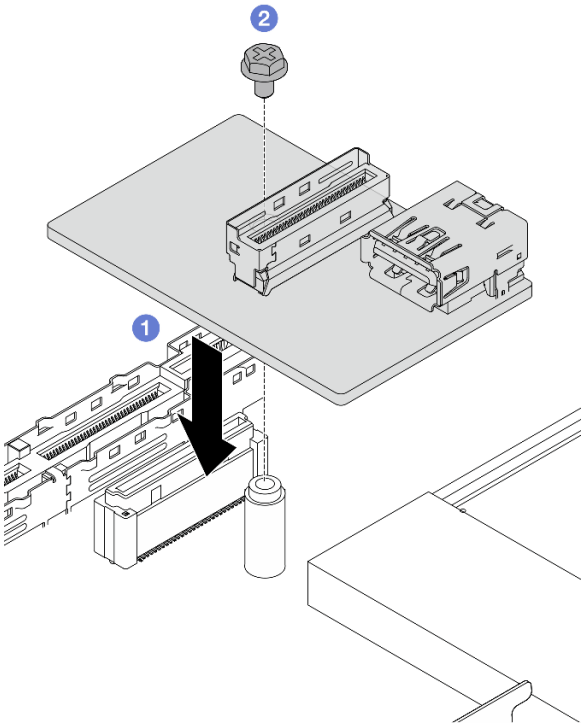


Figure 320. Installing USB I/O board

a. 1 Place the USB I/O board down as illustrated above to meet the connector on the system board assembly.

b. 2 Tighten one screw to secure the board.

Step 2. Connect the cable to the USB I/O board.

Step 3. Install the top cover, see “Install the top cover” on page 284.

Step 4. Refer to “USB I/O board problems” on page 334 to troubleshoot USB problems.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 288.

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 detailed cable routing information for each component in ***Internal Cable Routing Guide***.
3. If you have removed the top cover, reinstall it. See “Install the top cover” on page 284.
4. Reconnect external cables and power cords to the server.

   Attention: To avoid component damage, connect the power cords last.

Chapter 6. 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 19.

  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 53.

Update the firmware

Several options are available to update the firmware for the server.

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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/sr630v4/7dg8/downloads/driver-list/
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/solutions/ht509500

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update**. The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update**. The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **Update Bundles (Service Packs)**. Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Provisioning Manager (LXPM)	In-band[2] On-Target	√			√		
Lenovo XClarity Controller (XCC)	In-band[4] Out-of-band Off-Target	√	Selected I/O devices	√[3]	√		√
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√[3]		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices		√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices		√		

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.
3. Drive firmware update is only supported by the tools and methods below:
   - XCC Bare Metal Update (BMU): In-band, and requires system reboot.
   - Lenovo XClarity Essentials OneCLI: In-band, and does not require system reboot.
4. Bare Metal Update (BMU) only.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

  Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

  For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

  "Firmware Update" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

  Notes:

  – To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

    For additional information about configuring Ethernet over USB, see:

    "Configuring Ethernet over USB" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  – If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

  For additional information about using Lenovo XClarity Controller to update firmware, see:

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

  For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

  You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-xpress

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

  You can obtain Lenovo XClarity Essentials BoMC from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-bomc

- **Lenovo XClarity Administrator**

  If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

  For additional information about using Lenovo XClarity Administrator to update firmware, see:

  https://pubs.lenovo.com/lxca/update_fw

- **Lenovo XClarity Integrator offerings**

  Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

  For additional information about using Lenovo XClarity Integrator to update firmware, see:

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

Configure the firmware

Several options are available to install and set up the firmware for the server.

Note: UEFI **Legacy Mode** is not supported by ThinkSystem V4 products.

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

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- Search for the LXPM documentation version compatible with your server at https://pubs.lenovo.com/lxpm-overview/
- *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/

- **Lenovo XClarity Essentials OneCLI**

  You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

  For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity 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/

Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

Step 1. **Make sure** to refer to "Memory module installation rules and order" on page 62, which specifies whether your sever supports SGX and lists the memory module population sequence for SGX configuration. (DIMM configuration must be at least 8 DIMMs per socket to support SGX.)

Step 2. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)

Step 3. Go to **System settings → Processors → Total Memory Encryption** and enable the option.

Step 4. Save the changes, then go to **System settings → Processors → SW Guard Extension** and enable the option.

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

Intel VROC

Enabling Intel VROC

Before setting up RAID for NVMe drives, follow the below steps to enable VROC:

1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. Go to **System settings → Devices and I/O Ports → Intel® VMD technology → Enable/Disable Intel® VMD** and enable the option.
3. Save the changes and reboot the system.

Intel VROC configurations

Intel offers various VROC configurations with different RAID level and SSD support. See the following for more details.

Notes:
- Supported RAID levels varies by model. For the RAID level supported by SR630 V4, see Technical specifications.
- For more information about acquiring and installing the activation key, see https://fod.lenovo.com/lkms.

Intel VROC configurations for PCIe NVMe SSDs	Requirements
Intel VROC Standard	• Supports RAID levels 0, 1, and 10 • Requires an activation key
Intel VROC Premium	• Supports RAID levels 0, 1, 5, and 10 • Requires an activation key
Bootable RAID	• RAID 1 only • Supported by Intel® Xeon® 6 Scalable processors (formerly codenamed as Sierra Forest, SRF) • Requires an activation key

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Canonical Ubuntu

Complete list of available operating systems: https://lenovopress.lenovo.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

  https://pubs.lenovo.com/lxca/compute_node_image_deployment

  – Lenovo XClarity Essentials OneCLI

  https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

- **Single-server**

  Available tools:

  – Lenovo XClarity Provisioning Manager

  "OS Installation" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

  – Lenovo XClarity Essentials OneCLI

  https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding *OS Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to https://datacentersupport.lenovo.com/solutions/server-os.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the "OS Install Guides" area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

"Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

  Use your backup methods to back up the operating system and user data for the server.

Chapter 7. 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 input the model name or machine type of your server in the search bar to navigate to the support page.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

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

- **Lenovo Data Center Forum**
  - Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

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://pubs.lenovo.com/sr630-v4/pdf_files.

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.

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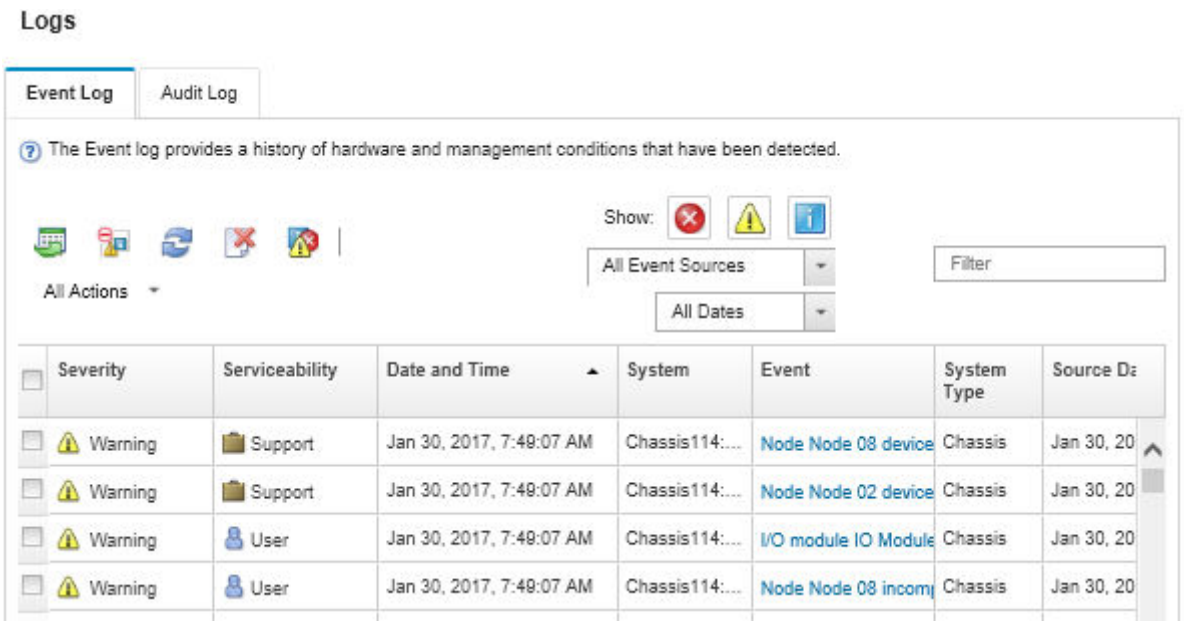


Figure 321. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

https://pubs.lenovo.com/lxca/events_vieweventlog

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.

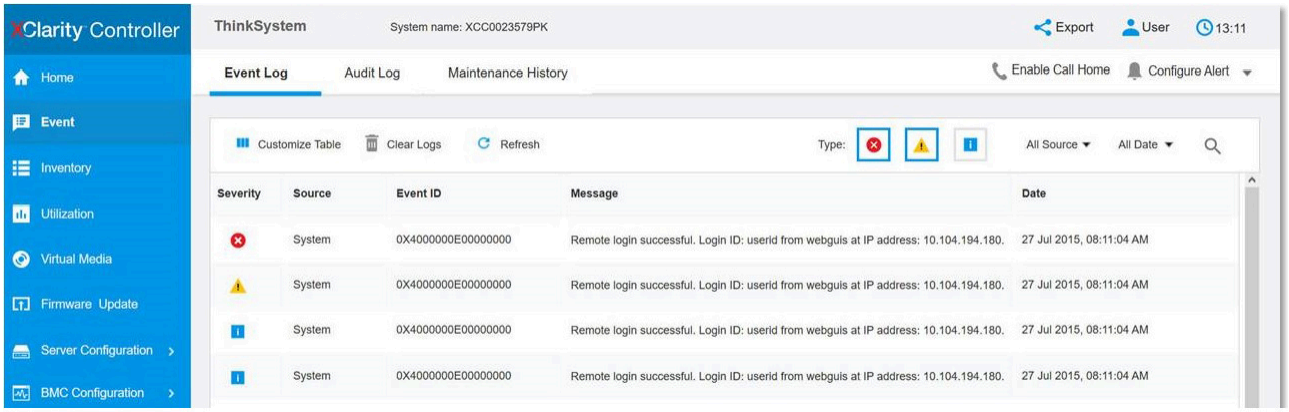


Figure 322. Lenovo XClarity Controller event log

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/.

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 a status LED. Different colors and speeds indicate different activities or status of the drive. The following illustrations and tables describe the problems that are indicated by the activity LED and the status LED.

LEDs on hard disk drives or solid-state drives

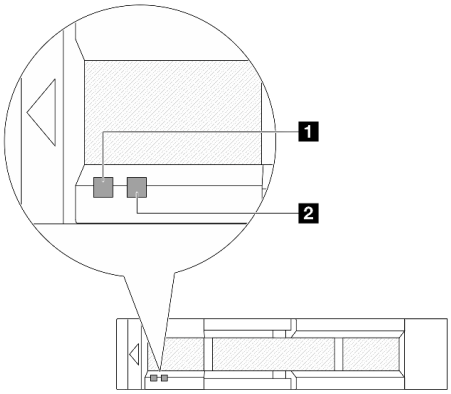


Figure 323. LEDs on hard disk drives or solid-state drives

Drive LED	Status	Description
1 Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
2 Drive status LED	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.

Front-operator-panel LEDs and buttons

The front operator panel of the server provides controls, connectors, and LEDs.

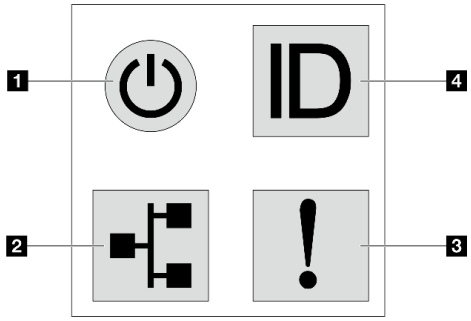


Figure 324. Diagnostics panel

1 Power button with power status LED

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 power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	There is no ac power applied to the server.

2 Network activity LED

Compatibility of the NIC adapter and the network activity LED

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

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

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

3 System error LED

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

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore).	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See "Troubleshooting by system LEDs and diagnostics display" on page 301. • Save the log if necessary. **Note:** For server models with NeptAir module or NeptCore module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see "LED on the leakage detection sensor module" on page 303.
Off	None	The server is off or the server is on and is working correctly.	None.

4 System ID button with system ID LED

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

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.

LED on the leakage detection sensor module

This topic provides information about the LED on the leakage detection sensor module.

The leakage detection sensor module on the Processor Neptune™ Air Module (NeptAir) or Processor Neptune™ Core Module (NeptCore) comes with one LED. The following illustration shows the LED on the module.

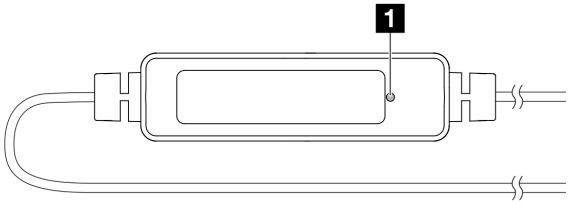


Figure 325. Leak detection LED

The following table describes the status that are indicated by the leakage detection sensor module LED.

1 Leakage detection sensor LED (green)	
Descrip-tion	• On: No liquid leakage or cable break alert. • Slow blinking (about two flashes per second): Cable break alert. • Fast blinking (about five flashes per second): Liquid leak alert.
Action	• If the cable breaks, replace the NeptAir module or NeptCore module (trained technicians only). • If liquid leakage happens: – For NeptAir module problem determination and troubleshooting, see “Liquid cooling module problems (NeptAir module)” on page 315. – For NeptCore module problem determination and troubleshooting, see “Liquid cooling module problems (NeptCore module)” on page 317.

LEDs on the XCC system management port

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.

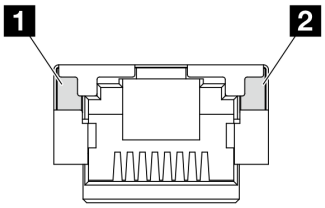


Figure 326. LEDs on the XCC system management port

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

System-I/O-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system I/O board.

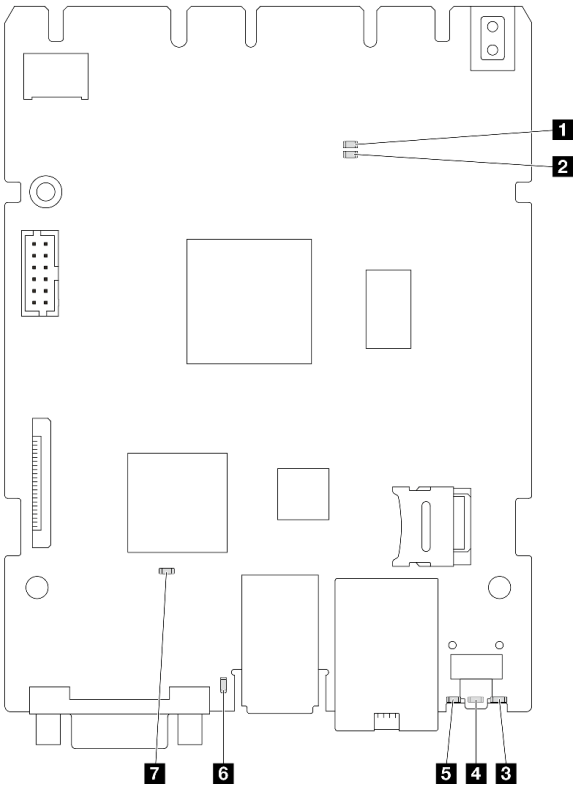


Figure 327. LEDs on the system I/O board

1 AP0 LED (green)

2 AP1 LED (green)

3 RoT fault LED (yellow)

4 System error LED (yellow)

5 System ID LED (blue)

6 XCC heartbeat LED (green)

7 SCM FPGA heartbeat LED (green)

Table 35. LEDs description

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	7 SCM FPGA heart-beat LED	6 XCC heart-beat LED	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the system I/O board.
	Blink	N/A	On	N/A	N/A	Replace the system I/O board.
	Blink	N/A	On	On	N/A	Replace the system I/O board.

Table 35. LEDs description (continued)

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	7 SCM FPGA heart-beat LED	6 XCC heart-beat LED	Actions
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power interposer board (PIB) if any. If the PSU or PIB has any error, replace it. 2. If the PSU or PIB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	On	Information only. No action is required.

4 System error LED (yellow)	
Description	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.
Action	Check system logs or internal error LEDs to identify the failed part. For more information, see "Front-operator-panel LEDs and buttons" on page 301.

5 System ID LED (blue)	
Description	The front system ID LED helps you locate the server.
Action	Each time you press the system ID button, the state of both system ID LEDs changes, and the state can be on, blinking, or off.

6 XCC heartbeat LED (green)	
Description	The XCC heartbeat LED helps you identify the XCC status. • 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.
Action	• If the XCC heartbeat LED is always off or always on, do the following: – If XCC cannot be accessed: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (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 always blinking fast over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (Trained technicians only) Replace the system I/O board. • If the XCC heartbeat LED is always blinking slow over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support.

Processor-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the processor board.

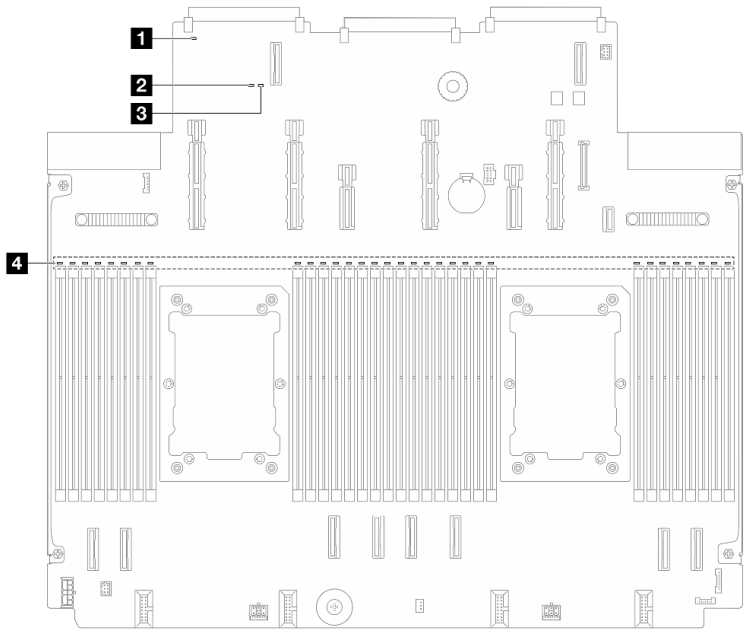


Figure 328. LEDs on the processor board

1 System error LED (yellow)

2 System status LED (green)

3 FPGA heartbeat LED (green)

4 DIMM error LEDs (amber)

Descriptions of LEDs on the processor board

1 System error LED (yellow)	
Description	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.
Action	Check system logs or internal error LEDs to identify the failed part. For more information, see "Front-operator-panel LEDs and buttons" on page 301.

2 System status LED (green)	
Description	The system status LED indicates the working status of the system. • 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.
Action	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the XCC heartbeat LED and follow the actions for the XCC heartbeat LED. • If the system status LED remains off or is blinking fast (about four flashes per second) and the system error LED on the front panel is on (yellow), the system is in a power fault status. Do the following: 1. Re-plug the power cord. 2. Remove installed adapters/devices, one at a time, until you reach the minimal configuration for debugging. 3. (Trained technicians only) If the problem remains, capture FFDC log, and replace the processor board. 4. If the problem still remains, contact Lenovo Support.

3 FPGA heartbeat LED (green)	
Description	The FPGA heartbeat LED helps you identify the FPGA status. • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working.
Action	If FPGA heartbeat LED is always off or always on, do the following: 1. Replace the processor board. 2. If the problem remains, contact Lenovo Support.

4 DIMM error LEDs (amber)	
Description	When a memory module error LED is lit, it indicates that the corresponding memory module has failed.
Action	For more information, see "Memory problems" on page 321.

Power-supply-unit LEDs

This topic provides information about various power supply unit LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:
- One processor in processor socket 1
- One memory module in slot 7
- One power supply unit
- One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
- Three system fan-packs

The following table describes the problems that are indicated by various combinations of the power-supply unit LEDs and the power-on LED and suggested actions to correct the detected problems.

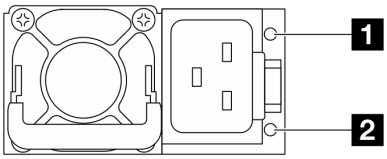


Figure 329. LEDs on a CRPS Premium *power supply unit*

LED	Description
1 Output and fault status (bi-color, green and yellow)	The output and fault status LED can be in one of the following states: • Off: The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit. • Slow blinking green (about one flash per second): 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. • Fast blinking green (about five flashes per second): The power supply unit is in firmware update mode. • Green: The server is on and the power supply unit is working normally. • Yellow: The power supply unit may have failed. Dump the FFDC log from the system and contact Lenovo back-end support team for PSU data log reviewing. Zero-output mode can be disabled via Setup Utility or Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state. • Start the Setup utility, go to **System Settings → Power → Zero Output** and select **Disable**. If you disable zero-output mode, both power supplies will be in the active state. • Log in to the Lenovo XClarity Controller web interface, choose **Server Configuration → Power Policy**, disable **Zero Output Mode**, and then click **Apply**.
2 Input status (single color, green)	The input status LED can be in one of the following states: • Off: The power supply unit is disconnected from the input power source. • Green: The power supply unit is connected to the input power source. • Blinking (1Hz): The input power is unhealthy.

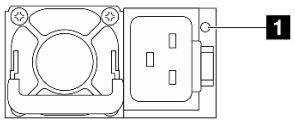


Figure 330. LED on a CRPS PSU (1)

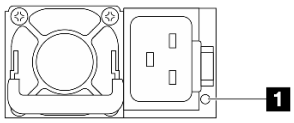


Figure 331. LED on a CRPS PSU (2)

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
On (green)	The server is on and the power supply unit is working normally.
Blinking (green, about two flashes per second)	The power supply unit is in firmware updating mode.
On (yellow)	When the power supply unit is lit yellow: • Scenario 1: one of the two power supply units has powered off or is unplugged from the power cord, and at the same time, the other one has power on. • Scenario 2: the power supply unit has failed due to one of the issues listed below: – Over-temperature protection (OTP) – Over-current protection (OCP) – Over-voltage protection (OVP) – Short circuit protection (SCP) – Fan failure

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
Blinking (yellow, about one flash per second)	The power supply unit is showing warnings, indicating over-temperature warning (OTW), over-current warning (OCW), or a slow fan speed.
Off	The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit.

Rear M.2 LEDs

This topic provides troubleshooting information for the rear M.2 drive assembly.

- "LEDs on the rear M.2 interposer" on page 311
- "LEDs on the rear M.2 backplane" on page 312

LEDs on the rear M.2 interposer

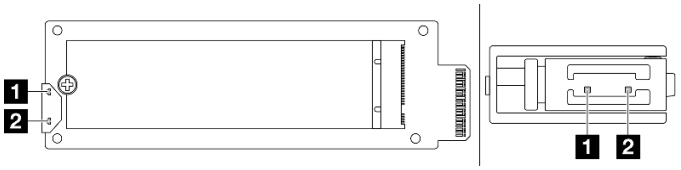


Figure 332. Rear M.2 interposer LEDs

The normal status of the LEDs on the interposer is that activity LED blinks and status LED remains off.

LED	Status and description
1 Activity LED (green)	On: The M.2 drive is idle.
	"Off: The M.2 drive appears de-asserted." on page 311
	Blinking (about four flashes per second): The I/O activity of the M.2 drive is in progress.
2 Status LED (yellow)	On: A drive fault occurs.
	Off: The M.2 drive is working normally.
	Fast blinking (about four flashes per second): The M.2 drive is being located.
	Slow blinking (about one flash per second): The M.2 drive is being rebuilt.

Rear M.2 drive de-asserted problem

1. Hot-swap the two side-by-side M.2 drive assemblies with each other to see if the problem persists.
2. If the problem persists:
   - Scenario 1: activity LED remains off, replace the interposer. If replacing interposers does not work, it can be a power or PSoC fault, collect FFDC file and contact Lenovo Support.
   - Scenario 2: both LEDs are on, access the drive information on XCC:
     - If the information is accessible but the drive remains de-asserted, replace the drive or check RAID chip log in FFDC file to see if any helpful information is available.
     - If the information is not accessible, check RAID chip log in FFDC file, replace the interposer or drive.

3. If the problem persists after replacing the interposer and drive, contact Lenovo Support.

LEDs on the rear M.2 backplane

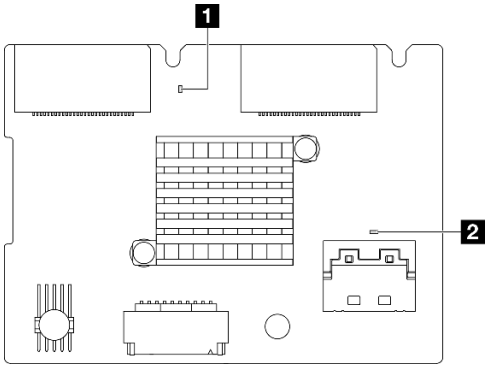


Figure 333. Rear M.2 backplane LEDs

The normal status of the LEDs on the backplane is that both system heartbeat LED and PSoC heartbeat LED blink.

LED	Status and description
1 System heartbeat LED (green)	Blinking: The M.2 backplane has power on.
2 PSoC heartbeat LED (green)	On: The PSoC firmware is not initialized or in a hung state.
	Off: Power off or in a hung state.
	Fast blinking (about one flash per second): Updating code (bootloader mode).
	Slow blinking (about one flash every two seconds): Exiting initialization (application mode).

Rear M.2 drive backplane troubleshooting procedure

- Visually inspect the LEDs on the backplane, with system power on and top cover removed.
  - If the PSoC heartbeat LED is always on or off, replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
  - If the system heartbeat LED is not blinking, it indicates that RAID chip problems occur. Replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
- If XCC event log shows PCIe errors concerning the rear M.2 drive and removing the top cover is not feasible.
  - Replace the backplane. If the problem persists after replacing, collect FFDC file and contact Lenovo Support.
  - Check PSoC register in the PSoC folder to further identify if PSoC is working normally:
    - If not, try to replace the backplane or update PSoC firmware. If they do not work, contact Lenovo Support.
    - If yes, check if RAID chip information is accessible on FFDC file device list. If yes, replace the backplane or collect FFDC file and contact Lenovo Support; if not, replace the backplane.

Rear system LEDs

This topic provides an overview of the LEDs on the rear of the server.

Rear system LEDs of the server

The following illustration shows the LEDs on the rear view of server model with three PCIe slots. The LEDs on the rear view of other server models are the same.

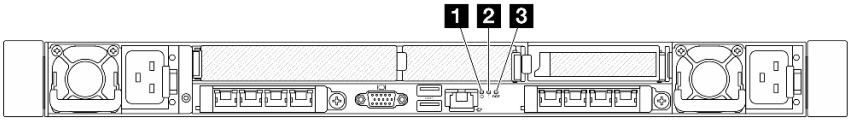


Figure 334. Rear LEDs overview

Callout	LED
1 2 3	"System-I/O-board LEDs" on page 305

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 299.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 3.

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.

Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.

Step 4. Check the Ethernet controller LEDs on the adapter and server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.

The server front panel LED is described in “System LEDs and diagnostics display” on page 36.

- The Ethernet link status LED is lit when the Ethernet controller receives a link indication from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in “Troubleshooting by system LEDs and diagnostics display” on page 301.

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of 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 299).
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 343).

Liquid cooling module problems (NeptAir module)

Use this information to resolve problems with the Processor Neptune™ Air Module (NeptAir).

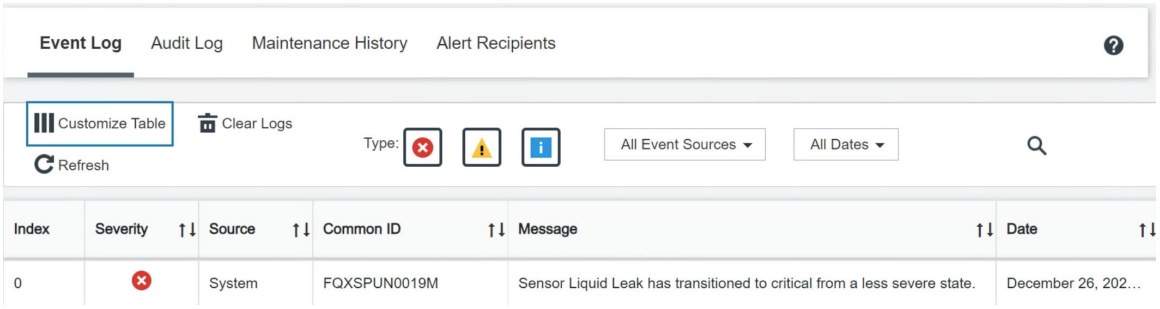
- “Liquid leak problem” on page 315
- “Cable break problem” on page 316

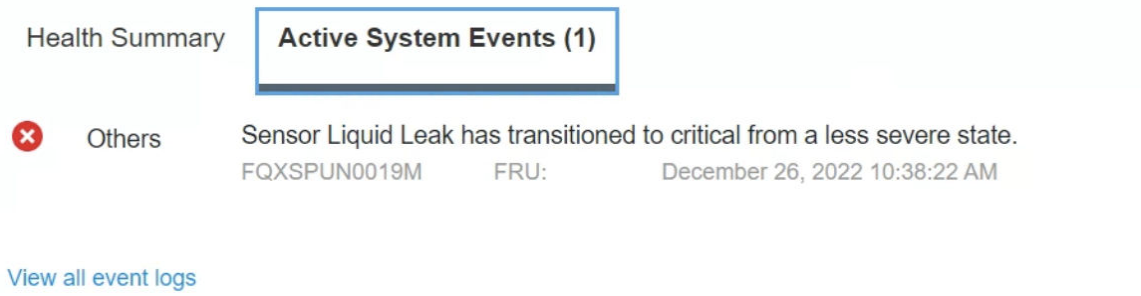
Liquid leak problem

Liquid leaks can be identified through the following practices:

- If the server is on remote maintenance,
  - A Lenovo XClarity Controller event shows:

    FQXSPCA0041N: Liquid is leaking from closed loop [CoolingSensorName].





- 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 liquid 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 liquid 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 liquid leaks may have occurred. It is required to open the top cover to check the LED status of the leakage detection sensor module. See "Front-operator-panel LEDs and buttons" on page 301 and "LED on the leakage detection sensor module" on page 303 for more details.

Steps to resolve liquid leaks

If the LED on the leakage detection sensor module is blinking green, follow the procedures to get help.

1. Check for green liquid leakage around the radiator, liquid pipes and pumps.
2. If green liquid found, power off the server and remove the NeptAir module.
3. Clean up the liquid from any components in the chassis. Inspect the server for any signs of moisture in sockets or gaps.
4. Contact Lenovo Support.

Cable break problem

A Lenovo XClarity Controller event shows:

FQXSPCA0042M: Liquid leak detector for [DeviceType] is faulty.

Steps to resolve cable break

1. Check if there is a de-assert event (FQXSPCA2042I) triggered.
2. If yes, ignore this event.
3. If not, contact Lenovo Support for detail checking.

Liquid cooling module problems (NeptCore module)

Use this information to resolve problems with the Processor Neptune™ Core Module (NeptCore).

See this section to resolve issues related to the NeptCore module.

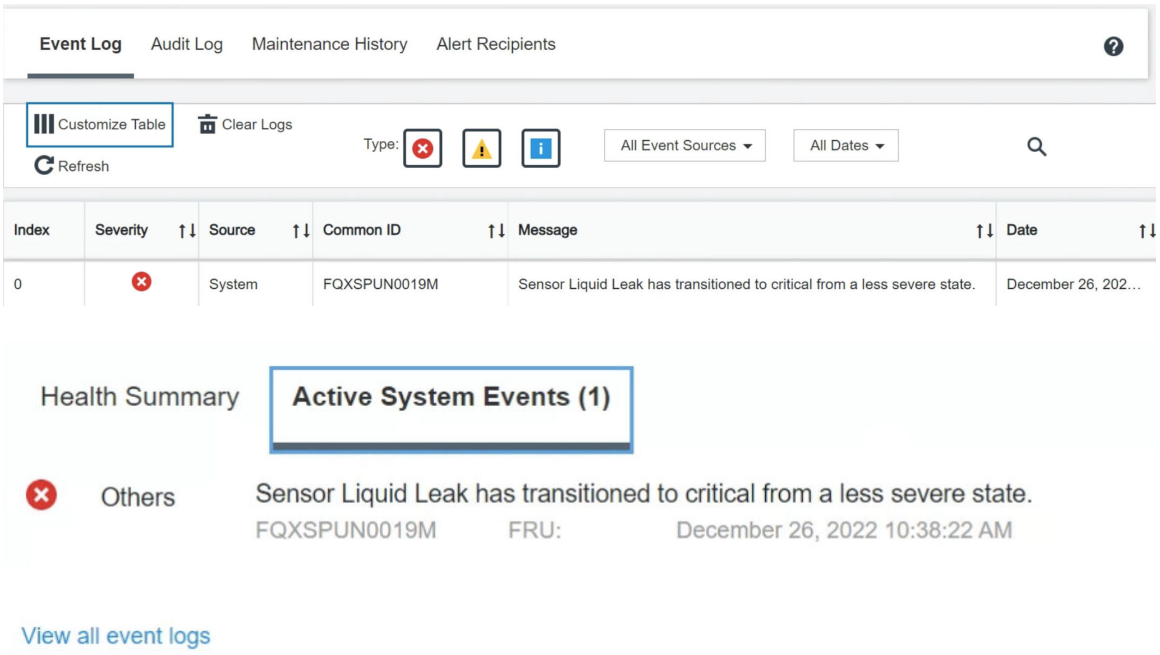
- "Liquid leak problem" on page 317
- "Cable break problem" on page 319

Liquid leak problem

Liquid leaks can be identified through the following practices:

- If the server is on remote maintenance,
  - A Lenovo XClarity Controller event shows:

    FQXSPCA0040N: Liquid is leaking from open loop [CoolingSensorName].



  - 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 liquid 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 liquid 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 liquid leaks may have occurred. It is required to open the top cover to check the LED status of the leakage detection sensor module. See “Front-operator-panel LEDs and buttons” on page 301 and “LED on the leakage detection sensor module” on page 303 for more details.

Steps to resolve liquid leaks

If the LED on the leakage detection sensor module is blinking green, follow the procedures to get help.

1. Save and back up data and operations.
2. Power off the server and remove the quick connect plugs from the manifolds.
3. Slide the server out or remove the server from the rack. See “Install the server to the rack (friction rails)” on page 85 or “Install the server to the rack (slide rails)” on page 93.
4. Remove the top cover. See “Remove the top cover” on page 282.
5. Check for liquid leaks around the outlet and inlet hoses, system board assembly, and under the cold plate covers:

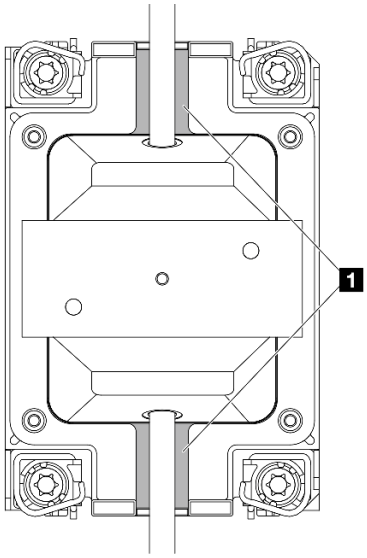


Figure 335. Leak-prone areas

Note: If leak happens, the liquid tends to collect around 1 leak-prone areas.

a. If liquid found around the hoses and system board assembly, clean up the liquid.

b. If liquid found under the cold plate covers:

   1) As illustrated below, remove at least four DIMMs from both sides to get access to the clips on the cold plate covers. To remove memory modules, see “Remove a memory module” on page 210.

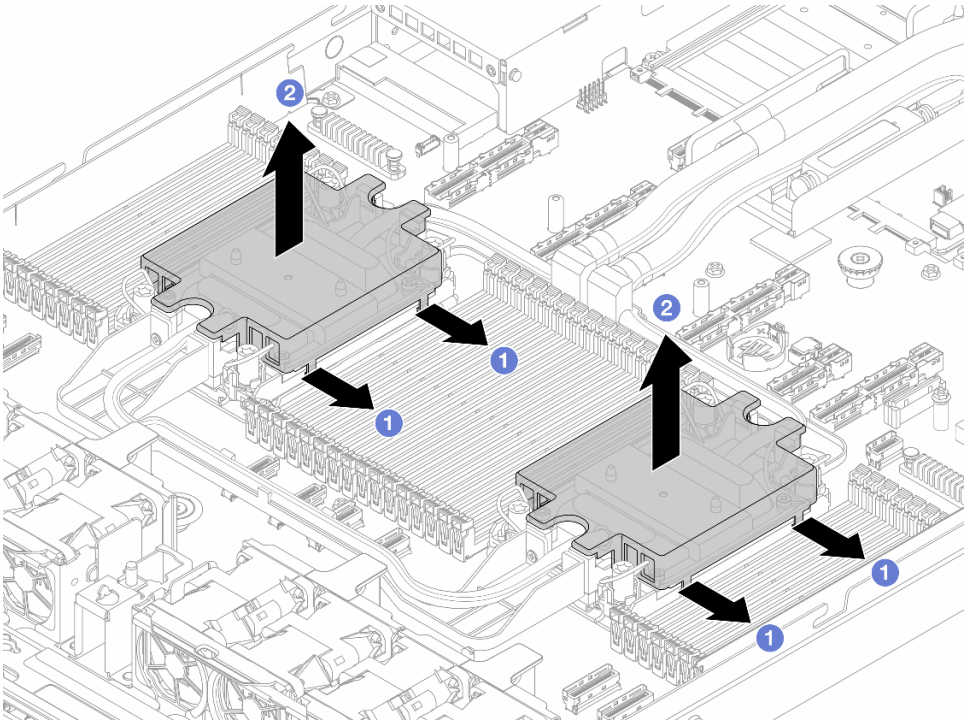


Figure 336. Removing the cold plate cover

a) 1 Open the clips.

b) 2 Remove the cold plate cover.

2) Clean up the liquid on the cold plates.

6. Check for the top cover of the server below to see if dripping happens. If yes, repeat previous steps to servers below.
7. Contact Lenovo Support.

Cable break problem

A Lenovo XClarity Controller event shows:

FQXSPCA0042M: Liquid leak detector for [DeviceType] is faulty.

Steps to resolve cable break

1. Check if there is a de-assert event (FQXSPCA2042I) triggered.
2. If yes, ignore this event.
3. If not, contact Lenovo Support for detail checking.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 320
- “Intermittent KVM problems” on page 320
- “Intermittent unexpected reboots” on page 320

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.
   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 **System Settings → Recovery and RAS → System Recovery → POST Watchdog Timer**.
2. If the reset occurs after the operating system starts, 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`
3. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 299 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 321
- “Mouse does not work” on page 321
- “KVM switch problems” on page 321
- “USB-device does not work” on page 321

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 correct USB device driver is installed.
   - The operating system supports USB devices.
2. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

- “Multiple memory modules in a channel identified as failing” on page 322
- “Displayed system memory is less than installed physical memory” on page 322
- “Invalid memory population detected” on page 323

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technicians only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technicians only) Replace the system board.

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
   - No error LEDs are lit. See “System LEDs and diagnostics display” on page 36.
   - No memory module error LEDs are lit on the system board.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see “Memory module installation rules and order” on page 62 for requirements).
   - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
   - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
   - There is no memory mismatch when the server is at the minimum memory configuration.
2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.
4. Run memory diagnostics. When you start a 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 memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory Test → Advanced Memory Test**.

5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. Re-enable all memory modules using the Setup Utility, and then restart the server.
7. (Trained technicians only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technicians only) Replace the system board.

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 62 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.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 323
- “Screen is blank” on page 323
- “Screen goes blank when you start some application programs” on page 324
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 324
- “The wrong characters appear on the screen” on page 324

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 289.

Screen is blank

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 289.
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
   d. (Trained technicians only) System board.

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 289.

Observable problems

Use this information to solve observable problems.

- "The server immediately displays the POST Event Viewer when it is turned on" on page 325
- "Server is unresponsive (POST is complete and operating system is running)" on page 325
- "Server is unresponsive (POST failed and cannot start System Setup)" on page 325
- "Voltage planar fault is displayed in the event log" on page 326
- "Unusual smell" on page 326
- "Server seems to be running hot" on page 326

- “Cracked parts or cracked chassis” on page 326

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 technicians only) Make sure that processor 1 is seated correctly.
4. (Trained technicians 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 technicians only) Processor
   b. (Trained technicians only) System board

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the 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.

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.

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 57 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 technicians and each system has its own specific IPMI raw command.
6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

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 327
- “PCIe adapter is not recognized or is not functioning” on page 327
- “Insufficient PCIe resources are detected.” on page 327
- “A Lenovo optional device that was just installed does not work.” on page 328
- “A Lenovo optional device that worked previously does not work now” on page 328

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 compute node. 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 compute node.

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. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
8. 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 → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.

8. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
9. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the server (see https://serverproven.lenovo.com).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damage, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

Performance problems

Use this information to solve performance problems.

- "Network performance" on page 328
- "Operating system performance" on page 328

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 task manager or resource manager.
2. Check for traffic congestion on the network.
3. Update the NIC device driver and firmware, or the storage device controller device driver.
4. Use the traffic-diagnostic tools that are provided by the IO-module manufacturer.

Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the compute node (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 compute node might be throttled to help with cooling. If it is throttled, reduce the workload on the compute node 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 329
- "Server does not power on" on page 329
- "Server does not power off" on page 330

The power button does not work (server does not start)

Note: After the server is connected to AC power, it will take one to three minutes for XCC to initialize. The power button does not work during the initialization.

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. Reconnect the front operator panel cable, and then repeat steps 1a and 1b.
      - If the server starts, reseat the front operator panel.
      - If the problem remains, replace the front operator panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply units work normally.
   - The power button LED is lit on and flash slowly.
   - The button-push force is sufficient and the button shows release response after pushed.
3. If the power button LED does not light on or flash correctly, reseat all the power supply units and make sure that the power input status LED is lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components have locked the power permission. Replace power supply units and check the power button function after installing each unit.
6. If all procedures are tried and the issue cannot be resolved, collect the failure information with system logs captured and contact Lenovo Support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event logs for any events related to the server not powering on.
2. Check for any LEDs that are blinking amber or yellow.

3. Check the system status LED on the system board (system board assembly). See “Processor-board LEDs” on page 307.
4. Check if the power input status LED is off or the yellow LED is lit on the power supply unit.
5. Do the AC cycle to the system, that is, power off the power supply units and re-power them on.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (one processor, one DIMM and one PSU without any adapter or any drive installed).
9. Reseat all power supply units and make sure that the power input status LED on the power supply unit is lit.
10. Replace power supply units and check the power button function after installing each unit.
11. If the issue cannot be resolved by all attempts above, call service to review the issue symptoms and see whether the system board (system board assembly) 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 button on the front operator panel 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 problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply unit 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 AC source of the power supply unit is stable within the supported range.
4. Swap power supply units to see that the issue follows which power supply unit, if the issue follows one power supply unit, then place the failing one.
5. Review the event logs and identify problem category, follow the event log actions and fix the problem.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 331
- “Serial device does not work” on page 331

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector (see “System-board-assembly connectors” on page 32).
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.
3. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
4. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
5. (Trained technician only) Replace the system board.

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 identify a drive" on page 332
- "Multiple drives fail" on page 333
- "Multiple drives are offline" on page 333
- "A replacement drive does not rebuild" on page 333
- "Green drive activity LED does not represent actual state of associated drive" on page 333
- "Yellow drive status LED does not represent actual state of associated drive" on page 333
- "U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 334

Server cannot identify a drive

Complete the following steps until the problem is solved.

1. Observe the target 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 for 45 seconds, and reinsert the drive. Make sure that the drive assembly connects to the drive backplane.
3. Observe the target 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 identified by the controller and is working correctly. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM 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/.) 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 identified 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 curving or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
   - Replace the affected backplane signal cable.
   - Replace the affected backplane.

8. Run the diagnostics tests for the drives. When you start a server and press F1, 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 drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the drive and server are at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the drive is recognized by the adapter (the green drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green drive activity LED does not flash when the drive is in use, run the diagnostics tests for the drives. When you start a server and press F1, 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.

USB I/O board problems

Use this information to solve problems related to the USB I/O board.

Introduction and troubleshooting preview

There are two USB ports on the rear of the server, integrated with the system I/O board, their signals pass through the processor board and connects to the internal USB I/O board.

One USB port is on the USB I/O board.

A cable connects the USB I/O board and two USB ports on the front I/O module.

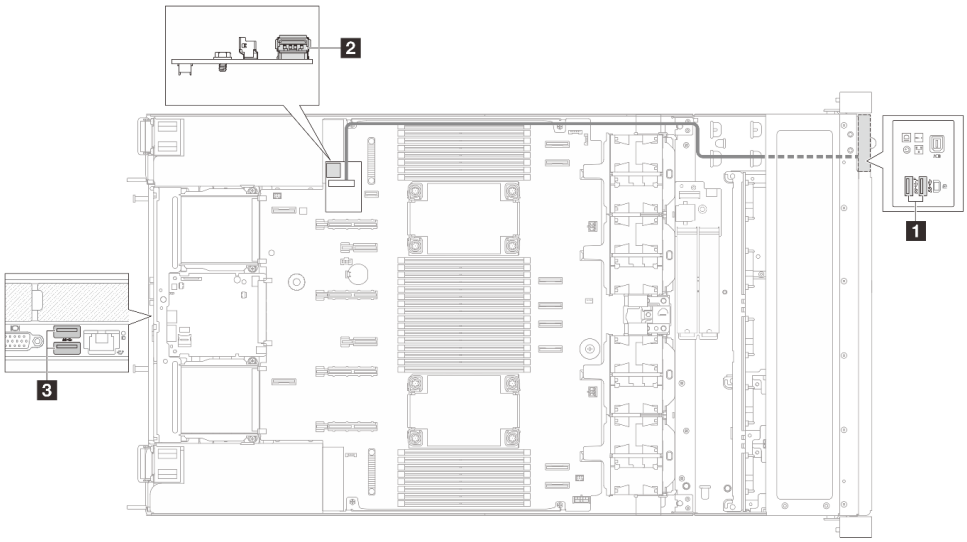


Figure 337. USB ports overview

1 USB ports on the front I/O module (front USB ports)	2 USB I/O board connector (internal USB port)	3 USB ports on the system I/O board (rear USB ports)

Front ports	Internal port	Rear ports	Replace
x	√	/	Front I/O module
/	x	√	USB I/O board
x	x	x	System I/O board

- “All or some keys on the keyboard do not work” on page 335
- “Mouse does not work” on page 335
- “USB-device (including hypervisor OS installation USB device) does not work” on page 336

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 and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
3. Replace the keyboard.
4. If the methods above do not work, plug the USB keyboard to the front, internal or rear USB port(s).
   - If the USB keyboard does not work plugging to front USB ports but works plugging to the internal port, replace the front IO module. Refer to ***Internal Cable Routing Guide*** for more cable routing information.
   - If the USB keyboard does not work plugging to the internal USB port but works plugging to the rear ports, replace the USB I/O board. Refer to “USB I/O board replacement” on page 285 for more information.
   - If the USB keyboard does not work plugging to front, internal or rear USB port(s), replace the system I/O board. Refer to “System I/O board replacement (trained technicians only)” on page 268 for more information.

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.
4. If the methods above do not work, plug the USB mouse to the front, internal or rear USB port(s).
   - If the USB mouse does not work plugging to front USB ports but works plugging to the internal port, replace the front IO module. Refer to ***Internal Cable Routing Guide*** for more cable routing information.
   - If the USB mouse does not work plugging to the internal USB port but works plugging to the rear ports, replace the USB I/O board. Refer to “USB I/O board replacement” on page 285 for more information.

- If the USB mouse does not work plugging to front, internal or rear USB port(s), replace the system I/O board. Refer to “System I/O board replacement (trained technicians only)” on page 268 for more information.

USB-device (including hypervisor OS installation USB device) does not work

1. Make sure that the operating system supports USB devices.
2. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.
3. Replace the USB device to check the device is workable.
4. If the methods above do not work, plug the USB device to the front, internal or rear USB port(s).
   - If the USB device does not work plugging to front USB ports but works plugging to the internal port, replace the front IO module. Refer to ***Internal Cable Routing Guide*** for more cable routing information.
   - If the USB device does not work plugging to the internal USB port but works plugging to the rear ports, replace the USB I/O board. Refer to “USB I/O board replacement” on page 285 for more information.
   - If the USB device does not work plugging to front, internal or rear USB port(s), replace the system I/O board. Refer to “System I/O board replacement (trained technicians only)” on page 268 for more information.

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.

Before disassembling the system board assembly:

1. Remove the system board assembly from the server. See “Remove the processor board” on page 273.
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Procedure

Step 1. Identify the screws listed below and pay attention to their quantity. Remove the screws to separate the processor board from the supporting metal sheet.

Table 36. Screw and tool information

Screw type	Quantity	Tool type
1 	9	PH2 screwdriver
2 	1	
3 	1	
4 	1	

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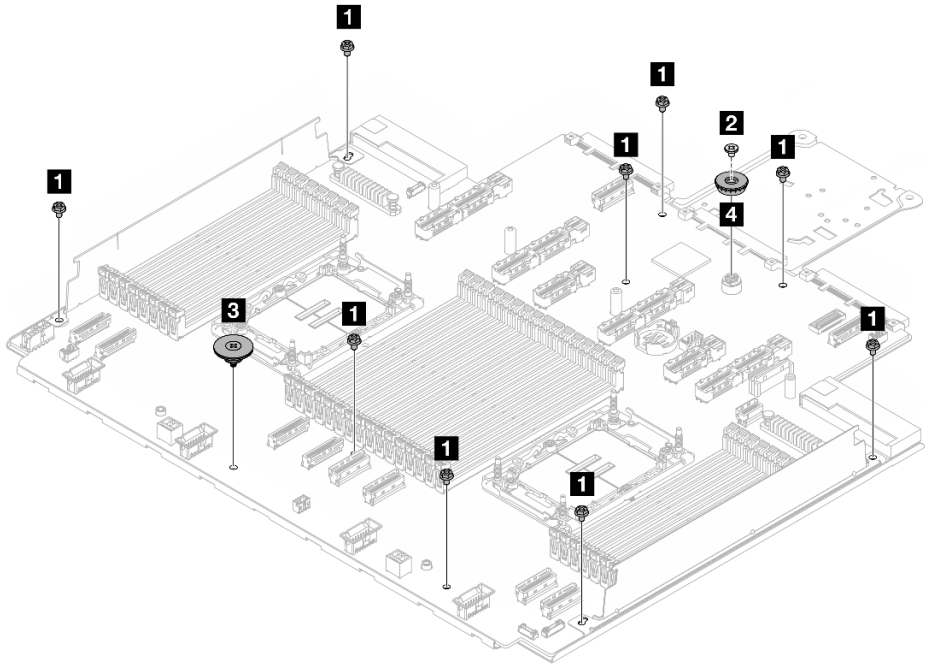

Figure 338. Disassembling the system board assembly

Step 2. Remove both cable walls 1 2 as illustrated below.

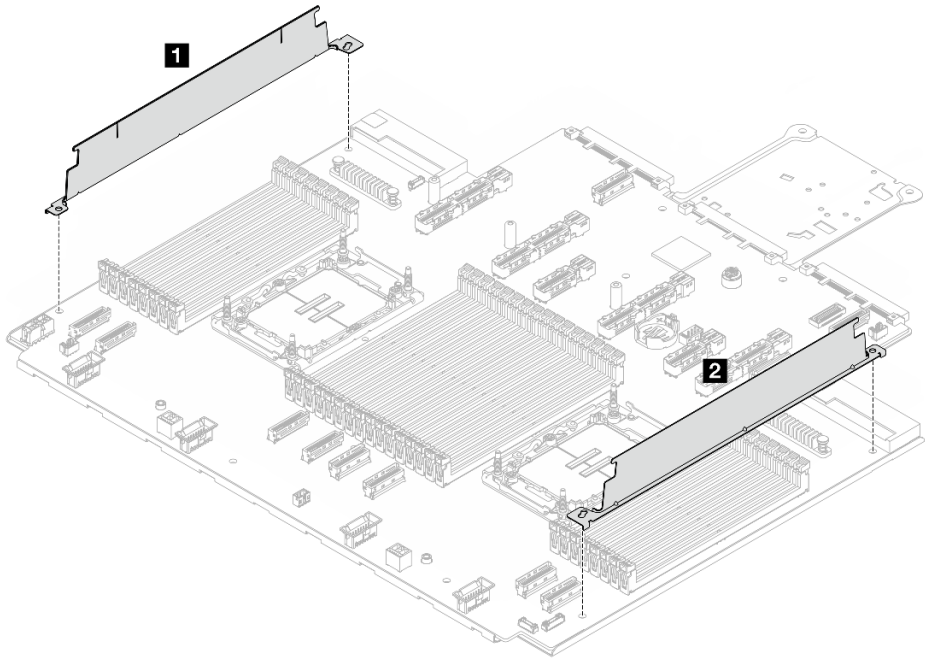

Figure 339. Removing cable walls

Step 3. Separate the processor board from the supporting metal sheet.

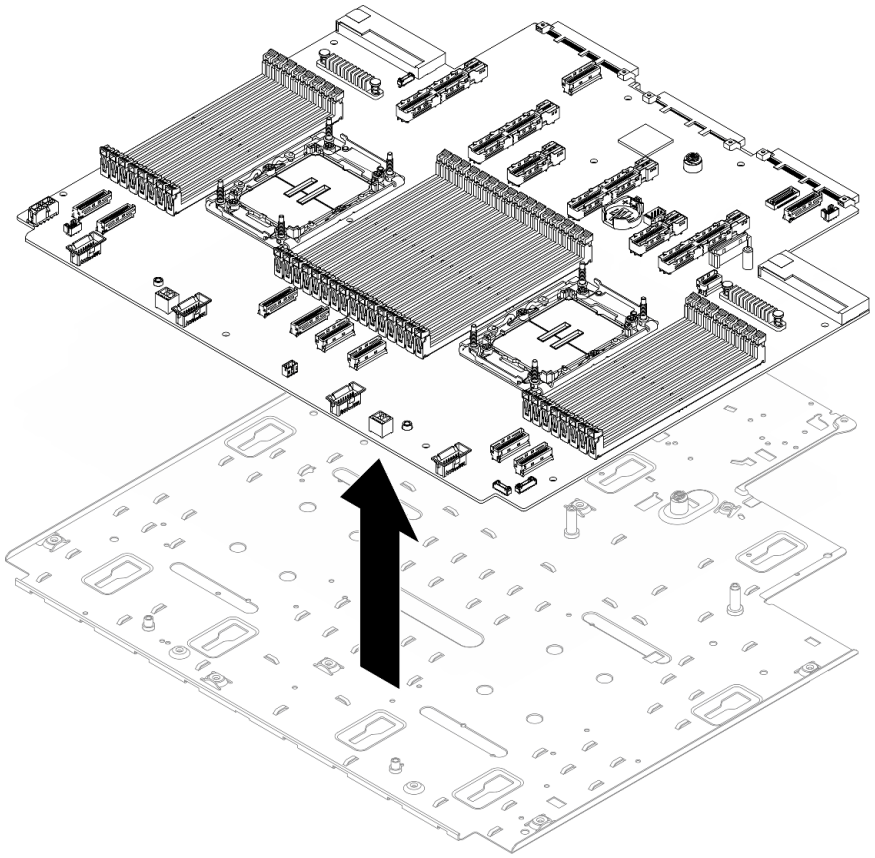

Figure 340. Separating the processor board

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/sr630v4/7dg8/downloads/driver-list/
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/#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 7 “Problem determination” on page 299 for instructions on isolating and solving issues.

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- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.

  To find the Tech Tips available for your server:

  1. Go to http://datacentersupport.lenovo.com, and input the model name or machine type of your server in the search bar to navigate to the support page.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

     Follow the on-screen instructions to choose the category for the problem that you are having.
- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see "Identify the server and access the Lenovo XClarity Controller" on page 53.
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

  Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.
- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  - For more information about using the web interface to collect service data, see the “Backing up the BMC configuration” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
  - For more information about using the CLI to collect service data, see the “XCC `ffdc` command” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at https://pubs.lenovo.com/lxca/admin_setupcallhome.
- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Appendix C. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***CMA Installation Guide***
  - Cable management arm (CMA) 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 and troubleshooting.
- ***Cable Routing Guide***
  - Cable routing information.
- ***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.

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Appendix D. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : "exceeding 0.1wt%" and "exceeding 0.01 wt%" indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : " ○ "indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝 - 〞係指該項限用物質為排除項目。

Note3 : The "-" indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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