



ThinkEdge SE455 V3 User Guide



Machine Type: 7DBY

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

https://pubs.lenovo.com/safety_documentation/

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

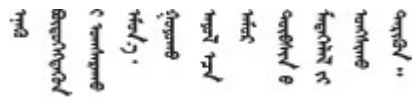
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཁུངས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་མེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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canjbinj soengq cungj vahgangj ancien siusik.

Safety inspection checklist

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

Note: This device is not intended for use in the direct field of view at visual display workplaces. To avoid incommoding reflections at visual display workplaces, this device must not be placed in the direct field of view.

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

CAUTION:

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

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

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

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

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

- a. Go to:

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

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

Chapter 1. Introduction

The ThinkEdge SE455 V3 server (Type 7DBY) is a new [edge server](#) offering. It is specifically designed to meet the needs of [edge computing](#), edge AI, hybrid cloud and workloads at the edge locations. ThinkEdge SE455 V3 is a rugged compact sized edge solution with a focus on smart connectivity, business security and manageability for the harsh environment. Built for long life and dependable performance to support your demanding IoT workloads at the Edge. Compact and rugged it is designed for the non-datacenter environment, ideal for remote locations such as retail, manufacturing and factory locations.



Figure 1. ThinkEdge SE455 V3

Features

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

Your server implements the following features and technologies:

- **Features on Demand**

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

<https://fod.lenovo.com/lkms>

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkEdge server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board (system board assembly). Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.

- **UEFI-compliant server firmware**

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

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

- **Large 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.

The server supports up to four 2.5-inch SAS/SATA/NVMe hot-swap drives in the front drive cage, and up to four optional 2.5-inch SAS/SATA/NVMe non-hot-swap drives in the internal drive cage.

Notes:

- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.
- RAID adapter/HBA is required for 2.5-inch SAS drives.

- **Lightpath Diagnostics**

Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see [“Troubleshooting by system LEDs and diagnostics display” on page 287](#).

- **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, ThinkServer, ThinkSystem and ThinkEdge servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant networking connection**

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

- **Redundant cooling**

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

- **Optional power capabilities**

The server supports up to two 1100-watt or 1800-watt power supply units.

- **RAID support**

The RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. RAID adapter with RAID 0, 1, 10, 5, 50, 6, 60 is available for purchase.

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

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

- **Lenovo XClarity Controllers System Lockdown Mode**

System lockdown will be enforced under specific circumstances to protect the server from information breach, particularly when the server is transported by non-certified carriers to remote environments. See [“System Lockdown Mode” on page 272](#) for details.

Tech Tips

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

To find the Tech Tips available for your server:

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

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

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

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

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

Specifications

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

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

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

Technical specifications

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

| Processor |
|--|
| <p>Supports AMD® EPYC™ 8004 series processors.</p> <ul style="list-style-type: none"> • Scalable up to 64 cores • Designed for LGA 4844 (SP6) socket • Supports 96 lanes of high speed I/O • Thermal Design Power (TDP): up to 200 watts • Configurable Thermal Design Power (cTDP): up to 225 watts <p>For a list of supported processors, see: https://serverproven.lenovo.com.</p> |

| Memory |
|--|
| <p>See “Memory module installation rules and order” on page 45 for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Capacity <ul style="list-style-type: none"> – Minimum: 16 GB – Maximum: 768 GB • Memory module types: <ul style="list-style-type: none"> – TruDDR5 4800MHz RDIMM – TruDDR5 5600MHz RDIMM • Slots: 6 dual inline memory module (DIMM) connectors <p>For a list of supported memory modules, see: https://serverproven.lenovo.com.</p> |

M.2 Drive

Supports up to two SATA/NVMe M.2 drives.

- Capacity
 - 128 GB
 - 240 GB
 - 480 GB
 - 960 GB

Notes: Depending on the M.2 backplane installed, SE455 V3 supports different RAID configurations.

- With SATA/x4 NVMe M.2 backplane (ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit) installed:
 - The non-RAID configuration of M.2 drives supports NVMe only.
 - The RAID configuration of M.2 drives is supported with one of the following RAID adapters:
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: SATA
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: NVMe
- With SATA/NVMe M.2 backplane (ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter) installed:
 - The non-RAID configuration of M.2 drives supports SATA/NVMe.
 - The RAID configuration of M.2 drives supports SATA/NVMe.

For a list of supported M.2 drives, see: <https://serverproven.lenovo.com>.

Storage expansion

Front drives

- Up to four 2.5-inch SAS/SATA/NVMe hot-swap drives

Note: When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.

Internal drives (optional)

- Up to four 2.5-inch SAS/SATA/NVMe non-hot-swap drives

Note: RAID adapter/HBA is required for SAS drives.

Expansion slots

Supported expansion slots vary by configuration.

- **M.2 drive bay (optional):** support up to two M.2 SATA/NVMe drives

- Slot 1 / M.2 bay 0
- Slot 2 / M.2 bay 1

Note: RAID adapter/HBA is required for M.2 SATA drives.

- **PCIe slots:** all PCIe slots support 75W

Note: Performance may degrade when a x16 PCIe adapter is installed in a x8 lane PCIe slot.

- **PCIe riser 1**

- Slot 3: x16 (Gen5 x16 lanes)
- Slot 4: x16 (Gen4 x8 lanes)
- Slot 5: x16 (Gen4 x8 lanes)

Notes:

- When the serial port module is installed, Slot 5 is not supported.
- When a double-wide GPU is installed in Slot 3, Slot 4 is not supported.

- **PCIe riser 2 (optional)**

- Slot 6: x16 (Gen4 x8 lanes)
- Slot 7: x16 (Gen5 x16 lanes)
- Slot 8: x16 (Gen4 x8 lanes)

Notes:

- Slot 6 and Slot 8 are not supported in the following configurations:
 - Front SATA drive backplane and internal NVMe drive backplane connect to the system board
 - Front NVMe drive backplane and internal NVMe drive backplane connect to the system board
- When a double-wide GPU is installed in Slot 7, Slot 6 is not supported.

- **OCP module slot**

- Slot 9: Gen5 x16 lanes (with NC-SI support)

Graphics processing unit (GPU) and accelerator

Supports one of the following:

- Up to two double-wide GPUs (Slot 3 and Slot 7)
- Up to six single-wide GPUs/accelerators

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

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
 - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.
- **Front I/O connectors**
 - One XCC system management port (10/100/1000 Mbps RJ-45) on the front to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions.
 - A group of two or four Ethernet connectors on OCP module
 - One USB 2.0 Type-A connector with Lenovo XClarity Controller management
 - Two USB 3.2 Gen 1 (5 Gbps) Type-A connectors
 - One USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support
 - One external diagnostics connector

Network

- OCP 3.0 module: Supports one OCP 3.0 Ethernet network adapter in Slot 9 (with NC-SI support)
- Supports up to six PCIe Ethernet adapters

RAID adapter

- ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: RAID 0, 1, 10, 5
- ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: RAID 0, 1, 10
- ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter: RAID 0, 1, 10, 5, 50, 6, 60

Important: **Do not** enable the SED management of RAID adapter, and **do not** connect encryption-enabled SEDs to RAID adapters. The SED management of RAID adapter might conflict with system AK management.

Notes:

Depending on the M.2 backplane installed, SE455 V3 supports different RAID configurations.

- With SATA/x4 NVMe M.2 backplane (ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit) installed:
 - The non-RAID configuration of M.2 drives supports NVMe only.
 - The RAID configuration of M.2 drives is supported with one of the following RAID adapters:
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: SATA
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: NVMe
- With SATA/NVMe M.2 backplane (ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter) installed:
 - The non-RAID configuration of M.2 drives supports SATA/NVMe.
 - The RAID configuration of M.2 drives supports SATA/NVMe.

Host bus adapter

- ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 4350-8i SAS/SATA 12Gb HBA

System fan

- Five 60 mm x 60 mm x 56 mm dual-rotor fans

Electrical input

Supports up to two units of power supplies with N+N redundancy. Following is the list of supported types:

- 1800-watt Platinum, input power 230 VAC
- 1100-watt Titanium, input power 230 VAC
- 1100-watt Platinum, input power 115-230 VAC
- 1100-watt -48V DC power supply unit

Important: Power supplies installed in the server must be with the same power rating, wattage or level.

Minimal configuration for debugging

- One processor
- One DDR5 DRAM memory modules in slot 3 (DIMM3)
- One power supply unit in PSU bay 1 (PSU1)
- One M.2 boot drive (if OS is needed for debugging)
- Five system fans

Operating systems

Supported and certified operating systems:

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

References:

- Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.
- OS deployment instructions, see “Deploy the operating system” on page 282.

Mechanical specifications

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

Dimension

- Depth:
 - Without security bezel (from the EIA brackets to the rear end of the chassis): 440.0 mm (17.32 inches)
 - With security bezel: 546.5 mm (21.51 inches)
- Height: 86.5 mm (3.41 inches)
- Width:
 - Without EIA brackets: 444.6 mm (17.50 inches)
 - With EIA brackets: 480.5 mm (18.92 inches)

Weight

Maximum: 19.36 kg (42.68 lbs)

Environmental specifications

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

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound power level (L_{WAd})
 - Idling:
 - Minimum: 5.5 Bel
 - CPU Rich: 5.5 Bel
 - GPU Rich: 5.5 Bel
 - Storage Rich: 5.8 Bel
 - Operating profile 1:
 - Minimum: 5.5 Bel
 - CPU Rich: 5.5 Bel
 - GPU Rich: 5.5 Bel
 - Storage Rich: 5.8 Bel
 - Operating profile 2:
 - Minimum: 5.5 Bel
 - CPU Rich: 6.5 Bel
 - GPU Rich: 7.4 Bel
 - Storage Rich: 6.0 Bel
- Sound pressure level (L_{pAm}):
 - Idling:
 - Minimum: 39 dBA
 - CPU Rich: 40 dBA
 - GPU Rich: 39 dBA
 - Storage Rich: 43 dBA
 - Operating profile 1:
 - Minimum: 39 dBA
 - CPU Rich: 40 dBA
 - GPU Rich: 39 dBA
 - Storage Rich: 43 dBA
 - Operating profile 2:
 - Minimum: 39 dBA
 - CPU Rich: 51 dBA
 - GPU Rich: 58 dBA
 - Storage Rich: 45 dBA

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296. Operating profile 1 is represented by 50% CPU TDP. Operating profile 2 is represented by 100% CPU TDP or 70%/30% storage write/read or 100% GPU. Testing was conducted at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ to align with ISO7779 procedures.
- The declared acoustic sound levels are based on the specified configurations, which may change depending on configuration/conditions.
 - Minimum: 1x AMD EPYC 8024P (8 core, 90W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-port OCP Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for M.2 RAID, 4x

Acoustical noise emissions

ThinkSystem 2.5" 5400 MAX 3.84TB Mixed Use SATA 6Gb HS SSD data drives with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for SATA RAID, 2x AC PSU 1100W

- CPU Rich: 1x AMD EPYC 8534PN (64 core, 175W) CPU, 1x 2U heat sink, 6x ThinkSystem 64GB TruDDR5 4800MHz (2Rx4) RDIMMs, 1x ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with M.2 RAID B540i-2i adapter for M.2 RAID, 4x ThinkSystem 2.5" U.3 7500 PRO 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD, 2x AC PSU 1100W
- GPU Rich: 1x AMD EPYC 8224P (24 core, 160W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-port OCP Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for M.2 RAID, 4x ThinkSystem 2.5" 5400 MAX 3.84TB Mixed Use SATA 6Gb HS SSD data drives with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for SATA RAID, 4x ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU, 2x AC PSU 1100W
- Storage Rich: 1x AMD EPYC 8124P (16 core, 125W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-Port PCIe Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with M.2 RAID B540i-2i adapter for M.2 RAID, 8x ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD, 2x AC PSU 1100W
- 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.

Acoustic modes and ambient temperature

Depending on the selected acoustic mode, specific components require proper ambient temperature to prevent performance degradation.

- ThinkEdge SE455 V3 supports three acoustic modes with different acoustic performance.
 - **Disabled:** The server operates at default fan speeds.
 - **Mode 1:** The server operates with sound pressure level of 45 dBA at 25°C or lower ambient temperature with proper configuration.
 - **Mode 2:** The server operates with sound pressure level of 40 dBA at 25°C or lower ambient temperature with proper configuration.
- **Notes:** For Acoustic mode 1 and mode 2:
 - 2U heat sink is necessary.
 - Throttling might momentarily occur.
- To change the acoustic mode, enter the Setup Utility and go to **System settings → Operating Modes → Acoustic mode**.
- See the corresponding table for more information of different acoustic modes and ambient temperature:
 - [Table 1 "Acoustic mode Disabled" on page 12](#)
 - [Table 2 "Acoustic mode 1" on page 15](#)
 - [Table 3 "Acoustic mode 2" on page 16](#)

Table 1. Acoustic mode Disabled

| Component | | Maximum ambient temperature |
|---|--|-----------------------------|
| <ul style="list-style-type: none"> The components not listed in this table are recommended to operate with ambient temperature lower than 55°C. If the ambient temperature is the maximum ambient temperature, performance degradation or thermal throttling might occur. | | |
| Processor | | |
| | AMD EPYC 8124P processor | 50°C |
| | AMD EPYC 8434PN, 8534PN processor with PCIe riser 2 installed Note: In configurations without PCIe riser 2, AMD EPYC 8434PN/8534PN processor supports ambient temperature up to 55°C. | 50°C |
| | AMD EPYC 8224P, 8324P, 8434P, 8534P processor | 45°C |
| Memory modules | | |
| | 64GB | 50°C |
| | 96GB or larger | 45°C |
| PCIe adapters | | |
| | Single-wide GPU adapter can operate with ambient temperature lower than 55°C. When ambient temperature is 45°C to 55°C, for a single-wide GPU adapter, power may be limited for sustained load. | |
| | <ul style="list-style-type: none"> ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter | 50°C |
| | Accelerator | 45°C |
| | Double-wide GPU adapter | 40°C |
| OCP module | | |
| | ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter | 50°C |
| Front NVMe drives | | |

Table 1. Acoustic mode Disabled (continued)

| Component | | Maximum ambient temperature |
|---------------------------------|--|-----------------------------|
| | <ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 6500 ION SSD • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7450 MAX SSD (800GB) • U.3 7500 MAX SSD (3.2TB or larger) • U.3 7500 PRO SSD (3.84TB or larger) • PS1010 SSD (7.68TB or larger) • PS1030 SSD (6.4TB or larger) • U.2 PM9A3 SSD • U.2 CD8P Read Intensive SSD (15.36TB or larger) • U.2 CD8P Mixed Use SSD (12.8TB) | 50°C |
| | <ul style="list-style-type: none"> • U.2 P5336 SSD • U.2 P5520 SSD (7.68TB or larger) • U.2 P5620 SSD (6.4TB or larger) • U.2 BM1743 SSD (61.44TB, 15.36TB) | 45°C |
| | <ul style="list-style-type: none"> • U.2 BM1743 SSD (30.72TB) • U.2 VA Read Intensive SSD (15.36TB) | 40°C |
| | <ul style="list-style-type: none"> • U.3 7450 PRO SSD (3.84TB or larger) • U.3 7450 MAX SSD (1.6TB or larger) • U.2 VA Read Intensive SSD (7.68TB or smaller) • U.2 VA Mixed Use SSD | 35°C |
| Internal SAS/SATA drives | | 45°C |
| Internal NVMe drives | | |
| | <ul style="list-style-type: none"> • U.3 7500 MAX SSD (1.6TB or smaller) • U.3 7500 PRO SSD (1.92TB or smaller) | 50°C |
| | <ul style="list-style-type: none"> • U.2 PM9D3a SSD • U.2 PM9D5a SSD | 45°C |
| | <ul style="list-style-type: none"> • U.3 7500 MAX SSD (3.2TB or larger) • U.3 7500 PRO SSD (3.84TB or larger) • PS1010 SSD (3.84TB or smaller) • PS1030 SSD (3.2TB or smaller) | 40°C |

Table 1. Acoustic mode Disabled (continued)

| Component | | Maximum ambient temperature |
|------------------------|---|-----------------------------|
| | <ul style="list-style-type: none"> • U.3 6500 ION SSD • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7450 MAX SSD (800GB) • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • PS1010 SSD (7.68TB or larger) • PS1030 SSD (6.4TB or larger) • U.2 PM9A3 SSD • U.2 CD8P SSD (7.68TB or smaller) • The following internal NVMe drives might be throttled when ambient temperature is higher than 30°C: <ul style="list-style-type: none"> – U.2 P5520 SSD (7.68TB) – U.2 P5620 SSD (6.4TB) | 35°C |
| | <ul style="list-style-type: none"> • U.2 CD8P SSD (12.8TB or larger) | 30°C |
| | <ul style="list-style-type: none"> • U.2 P5336 SSD • U.2 BM1743 SSD (61.44TB, 15.36TB) | 25°C |
| | <p>The following NVMe drives of specific capacity are not supported as internal drives:</p> <ul style="list-style-type: none"> • U.2 P5520 SSD (15.36TB) • U.2 P5620 SSD (12.8TB) • U.3 7450 PRO SSD (3.84TB or larger) • U.3 7450 MAX SSD (1.6TB or larger) • U.2 BM1743 SSD (30.72TB) • U.2 VA Read Intensive SSD • U.2 VA Mixed Use SSD | Not applicable |
| M.2 SATA drives | | 50°C |
| M.2 NVMe drives | | 45°C |

Table 2. Acoustic mode 1

| | |
|---|---|
| <p>In Acoustic mode 1, the server operates with sound pressure level of 45 dBA at 25°C or lower ambient temperature with proper configuration.</p> <ul style="list-style-type: none"> • 2U heat sink is necessary. • Throttling might momentarily occur. <p>See the following information for configurations supported in Acoustic mode 1.</p> <p>Note: When one of the components listed as "not recommended" is installed, system fan speed will impact acoustic performance. However, if the not-recommended component is lightly loaded, it may still be possible to run the server in the acoustic mode and lower the system noise.</p> | |
| Processor | <ul style="list-style-type: none"> • AMD EPYC 8024P, 8124P processor • AMD EPYC 8024PN, 8124PN, 8224PN, 8324PN processor |
| Memory modules | 16, 32, 48GB |
| PCIe adapters | <ul style="list-style-type: none"> • Supports up to two single-wide GPU adapters; the power of GPU adapters may be limited for sustained load. The following GPU adapters are supported: <ul style="list-style-type: none"> – ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC • RAID adapter and Ethernet adapter are supported. |
| Front SAS/SATA drives | Supported |
| Front NVMe drives | <ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 6500 ION SSD • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7500 PRO SSD • U.3 7450 MAX SSD (800GB) • U.3 7500 MAX SSD • PS1010 SSD • PS1030 SSD • U.2 PM9A3 SSD • U.2 PM9D3a SSD • U.2 PM9D5a SSD • U.2 CD8P SSD (12.8TB or smaller) |
| Internal SAS drives | Not recommended |
| Internal SATA drives | Supported |
| Internal NVMe drives | Not recommended |
| M.2 SATA drives | Supported |
| M.2 NVMe drives | Not recommended |

Table 3. Acoustic mode 2

| | |
|---|---|
| <p>In Acoustic mode 2, the server operates with sound pressure level of 40 dBA at 25°C or lower ambient temperature with proper configuration.</p> <ul style="list-style-type: none"> • 2U heat sink is necessary. • Throttling might momentarily occur. <p>See the following information for configurations supported in Acoustic mode 2.</p> <p>Note: When one of the components listed as "not recommended" is installed, system fan speed will impact acoustic performance. However, if the not-recommended component is lightly loaded, it may still be possible to run the server in the acoustic mode and lower the system noise.</p> | |
| Processor | <ul style="list-style-type: none"> • AMD EPYC 8024P processor • AMD EPYC 8024PN, 8124PN processor |
| Memory modules | 16, 32, 48GB |
| PCIe adapters | <ul style="list-style-type: none"> • GPU adapter and accelerator are not recommended. • RAID adapter and Ethernet adapter are supported, except for ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter. |
| Front SAS/SATA drives | Supported |
| Front NVMe drives | <ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 6500 ION SSD • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7500 PRO SSD • U.3 7450 MAX SSD (800GB) • U.3 7500 MAX SSD • PS1010 SSD (3.84TB or smaller) • PS1030 SSD (3.2TB or smaller) • U.2 PM9A3 SSD • U.2 PM9D3a SSD • U.2 PM9D5a SSD • U.2 CD8P SSD (12.8TB or smaller) |
| Internal SAS/SATA drives | Not recommended |
| Internal NVMe drives | Not recommended |
| M.2 SATA drives | Supported |
| M.2 NVMe drives | Not recommended |

Environment

ThinkEdge SE455 V3 complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3, and Class A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification.

- Air temperature:
 - Operating
 - ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
 - ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175m (574 ft) increase in altitude above 900 m (2,953 ft).
 - ASHRAE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125m (410 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)
 - Extended operation temperature (with limited configuration):
 - Server on: 5°C to 55°C (41°F to 131°F)
 - Server off: 5°C to 55°C (41°F to 131°F)

Note: See [Table 1 “Acoustic modes and ambient temperature” on page 12](#) for the supported components at different ambient temperature.

- Maximum rate of change(°C/hr) should be ≤ 20 .
- Maximum altitude: 3,050 m (10,000 ft) at operating temperature 5°C to 45°C
- Relative Humidity (non-condensing):
 - Operating temperature 5°C to 45°C: 8% to 90%
 - ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
 - ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F)
 - ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F)
 - Extended operation temperature (with limited configuration) 50 °C to 55 °C: 5% to 90%; maximum dew point: 24°C (75°F)
 - Shipment/storage: 8% to 90%
 - Humidity transition rate should be $\leq 10\%/hr$.
- Particulate contamination
 - SE455 V3 supports use of a dust filter that is installed inside the security bezel. The dust filter has a Minimum Efficiency Rating Value (MERV) of 2, per ASHRAE Standard 52.2-2017.

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 18](#).

Shock and vibration specifications

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

Table 4. Shock and vibration specifications

| ThinkEdge SE455 V3 | Vibration | Shock | Drop |
|--|--|--|-------|
| Operational, mid-rack position | 1.31Grms, 5-500 Hz, 15 min across 3 axes | 25G, 10ms, half-sine, $\pm X$, $\pm Y$, $\pm Z$ | - |
| Operational, mounted with solid surface below* | 1.31Grms, 5-500 Hz, 15 min across 3 axes | Mil Spec 810G Method 516.8 Procedure I, 40G, 11ms, 1 times bottom | - |
| Non-Operational, mid-rack position | 1.31Grms, 5-500 Hz, 15 min across 3 axes | 25G, 10ms, half-sine, $\pm X$, $\pm Y$, $\pm Z$ | - |
| Non-Operational, mounted with solid surface below* | 1.31Grms, 5-500 Hz, 15 min across 3 axes | Mil Spec 810G Method 516.8 Procedure V, 75G, 8-13ms, 1 times bottom | - |
| Non-Operational, in packaging e.g. shipment | 1.31Grms, 5-500 Hz, 15 min across 6 surfaces | - | 762mm |

*Includes lowest rack position if there is no gap between system unit base and rack unit.

Table 5. Environmental criteria (NEBs GR63)

| ThinkEdge SE455 V3 Environmental criteria (NEBs GR63) | Bench handling drop | Office vibration | Earthquake test |
|---|--|---------------------------------|------------------------|
| | Edge drop height (each edge): 100mm Free-fall drop height: 75mm | 0.21Grms, 5-100 Hz, 30 min/axis | GR63 earthquake zone 4 |

Particulate contamination

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

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

Table 6. Limits for particulates and gases

| Contaminant | Limits |
|--|--|
| Reactive gases | <p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).² The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).³ The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher. |
| Airborne particulates | <p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> The room air might be continuously filtered with MERV 8 filters. Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>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.</p> <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵ |
| <p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>⁴ The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p>⁵ Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p> | |

Management options

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

Overview

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

| Options | Description |
|--------------------------------------|---|
| Lenovo XClarity Provisioning Manager | <p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>Important: Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.</p> |
| Lenovo XClarity Integrator | <p>Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p> |
| Lenovo XClarity Energy Manager | <p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p> |
| Lenovo Capacity Planner | <p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p> |

Functions

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

Notes:

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

Chapter 2. Server components

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

Front view

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

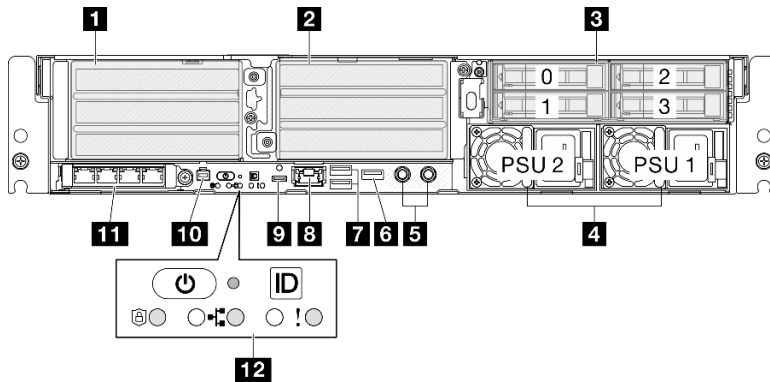


Figure 2. Front view

Table 7. Components on the front view

| | |
|---|--|
| 1 “PCIe riser 1” on page 23 | 7 “USB 3.2 Gen 1 (5 Gbps) Type-A connectors” on page 25 |
| 2 “PCIe riser 2” on page 23 | 8 “XCC system management port (10/100/1000 Mbps RJ-45)” on page 25 |
| 3 “Front drive bays” on page 24 | 9 “USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support” on page 25 |
| 4 “Power supply unit bays” on page 24 | 10 “External diagnostics handset connector” on page 25 |
| 5 “Grounding points” on page 24 | 11 “OCP 3.0 module” on page 25 |
| 6 “USB 2.0 Type-A connector with Lenovo XClarity Controller management” on page 24 | 12 “System buttons and LEDs” on page 26 |

1 / 2 PCIe riser assemblies

Install PCIe adapters into these riser assemblies. See the following table for PCIe slots corresponding to the PCIe riser assembly.

Note: Performance may degrade when a x16 PCIe adapter is installed in a x8 lane PCIe slot.

Table 8. **PCIe riser assemblies and corresponding slots**

| PCIe riser assembly | PCIe slots (top to bottom) |
|---|--|
| 1 PCIe riser 1 | <ul style="list-style-type: none"> Slot 3: x16 (Gen5 x16 lanes) Slot 4: x16 (Gen4 x8 lanes) Slot 5: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> When the serial port module is installed, Slot 5 is not supported. When a double-wide GPU is installed in Slot 3, Slot 4 is not supported. |
| 2 PCIe riser 2 Note: PCIe riser 2 is optional. The models without PCIe riser 2 come with a riser blank filler. | <ul style="list-style-type: none"> Slot 6: x16 (Gen4 x8 lanes) Slot 7: x16 (Gen5 x16 lanes) Slot 8: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> Slot 6 and Slot 8 are not supported in the following configurations: <ul style="list-style-type: none"> Front SATA drive backplane and internal NVMe drive backplane connect to the system board Front NVMe drive backplane and internal NVMe drive backplane connect to the system board When a double-wide GPU is installed in Slot 7, Slot 6 is not supported. |

3 Front drive bays (Bay 0-3)

Install 2.5-inch drives to these bays. See [“Install a front hot-swap drive” on page 108](#) for more information.

4 Power supply unit bays (PSU 1-2)

Install power supply units to these bays, and connect power cords to the power supply units. Make sure the power cords are connected properly. SE455 V3 supports the following types of power supplies:

- 1800-watt Platinum, input power 230 VAC
- 1100-watt Titanium, input power 230 VAC
- 1100-watt Platinum, input power 115-230 VAC
- 1100-watt -48V DC power supply unit

For more information on the power supply LEDs, see [“Power supply LEDs” on page 290](#).

5 Grounding points

Connect the grounding wires to these threaded studs.

6 USB 2.0 Type-A connector with Lenovo XClarity Controller management

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

Only one mode is supported:

- **BMC only mode**

In this mode, the USB port is always solely connected to Lenovo XClarity Controller.

7 USB 3.2 Gen 1 (5 Gbps) Type-A connectors (USB Port 1-2)

Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors.

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

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

See the following for more information:

- [“Set the network connection for the Lenovo XClarity Controller” on page 269](#)
- [“XCC system management port \(10/100/1000 Mbps RJ-45\) LEDs” on page 295](#)

Note: In addition to the standard 1000 Mbps data transfer rate, the XCC system management port also supports 10 Mbps, 100 Mbps speeds.

9 USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support (USB Port 3)

Connect a USB device, such as a mouse, keyboard, monitor, or other devices, to either of this connector. This connector supports display.

10 External diagnostics handset connector

Connect the external diagnostics handset to this connector. See [“External Diagnostics Handset” on page 296](#) for more details.

11 OCP 3.0 module (Slot 9)

Slot 9 is with NC-SI support.

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



Figure 3. Port numbering — 2-port OCP module

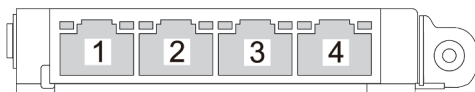


Figure 4. Port numbering — 4-port OCP 3.0 module

12 System buttons and LEDs

The buttons and LEDs provide controls and system status. The following buttons and LEDs are in this area:

- Power button with power status LED (green)
- Security LED (green)
- NMI button

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

- Network activity LED (green)
- System ID button with system ID LED (blue)
- System error LED (yellow)

See [“Front LEDs” on page 287](#) for more information.

Front I/O fillers

Install the I/O fillers when the connectors are not used. The connectors could be damaged without proper protection of the fillers.

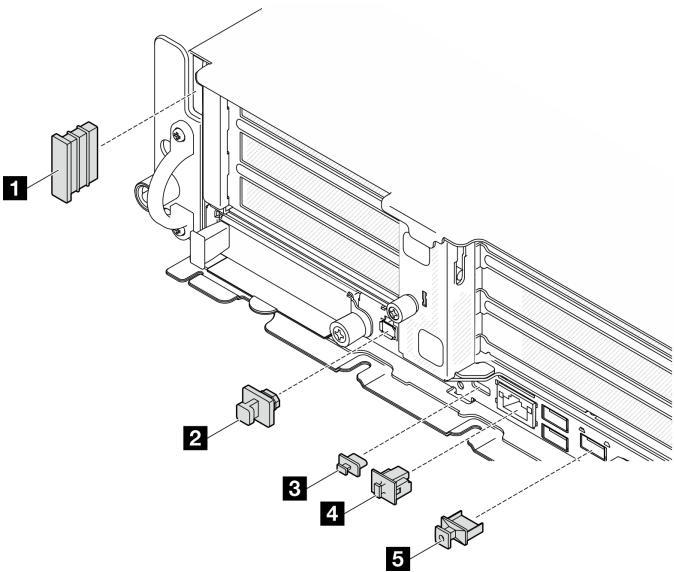


Figure 5. Front I/O fillers

| | |
|--|---------------------------------|
| 1 Security bezel slot filler (x2) | 4 RJ-45 filler (x1) |
| 2 External diagnostic handset connector filler (x1) | 5 USB Type-A filler (x3) |
| 3 USB Type-C filler (x1) | |

Top view

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

Refer to the following table for top view identification of the server

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

Top view: top layer

The following illustration is the top view after removing the top cover.

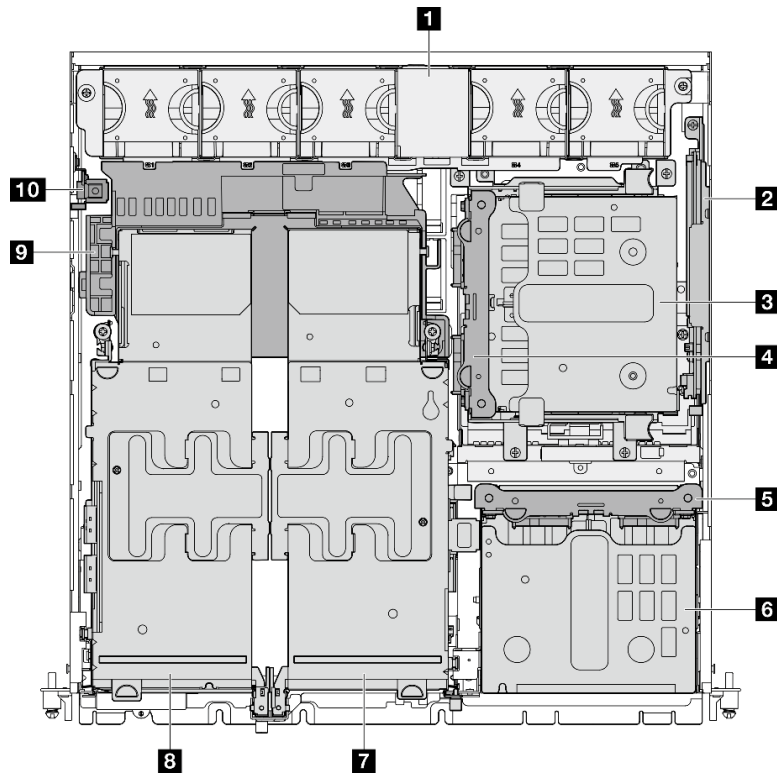


Figure 6. Top view: top layer

Table 9. Components on the top view: top layer

| | |
|--|----------------------------------|
| 1 System fans | 6 Front drive cage |
| 2 (Optional) M.2 backplane assembly | 7 (Optional) PCIe riser 2 |
| 3 (Optional) Internal drive cage | 8 PCIe riser 1 |
| 4 (Optional) Internal drive backplane | 9 Processor air baffle |
| 5 Front drive backplane | 10 Intrusion switch |

Top view: bottom layer

The following illustration is the top view after removing the top cover and the removable components on the top layer.

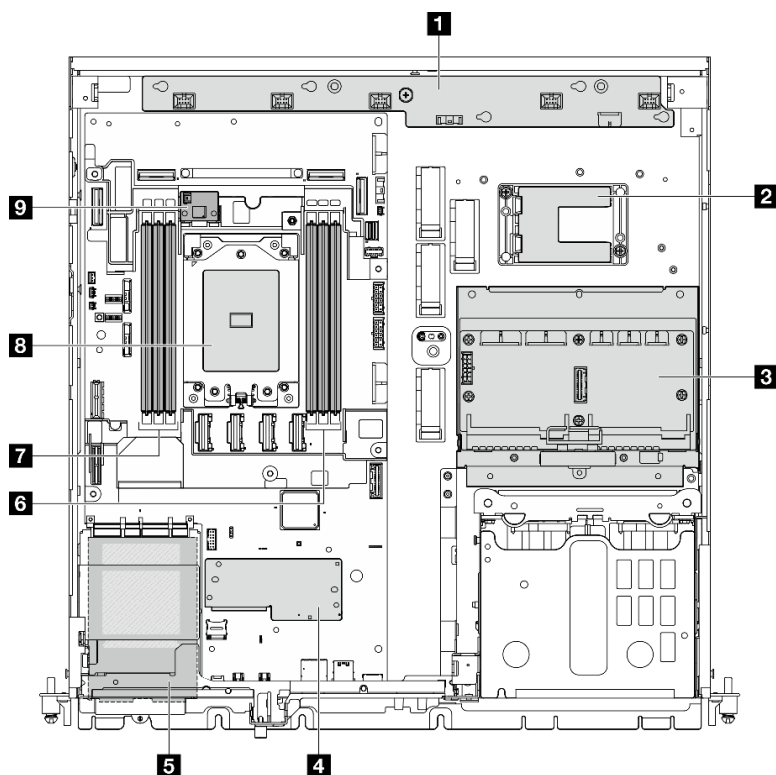


Figure 7. Top view: bottom layer

Table 10. Components on the top view: bottom layer

| | |
|---|--|
| 1 Fan control board (FCB) | 6 Memory module slots (DIMM 1-3, right to left) |
| 2 RAID flash power module holder Note: RAID flash power module (supercap) is an optional part installed in the holder. | 7 Memory module slots (DIMM 4-6, right to left) |
| 3 Power distribution board (PDB) | 8 Processor |
| 4 Firmware and RoT security module | 9 (Optional) Air flow sensor board |
| 5 OCP 3.0 module | |

System-board layout

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

For more information about the LEDs that are available on the system board, see [“System-board LEDs” on page 291](#).

System-board connectors

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

Table 11. System-board connectors (continued)

| | |
|--|---|
| 12 M.2 power connector (M.2 Sideband) | 29 Air flow sensor board connector (Air Velocity Sensor) |
| 13 Internal backplane power connector | 30 Intrusion switch connector |
| 14 Front backplane power connector | 31 3V security battery (CR2032) |
| 15 System board power 1 connector (PDB PWR 1) | 32 PCIe 10 connector |
| 16 PCIe 4 connector | 33 PCIe 11 connector |
| 17 Power distribution board signal connector (PDB Sideband) | |

System-board switches

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

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

Important:

- 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 41
 - “Handling static-sensitive devices” on page 44
 - “Power off the server” on page 51
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

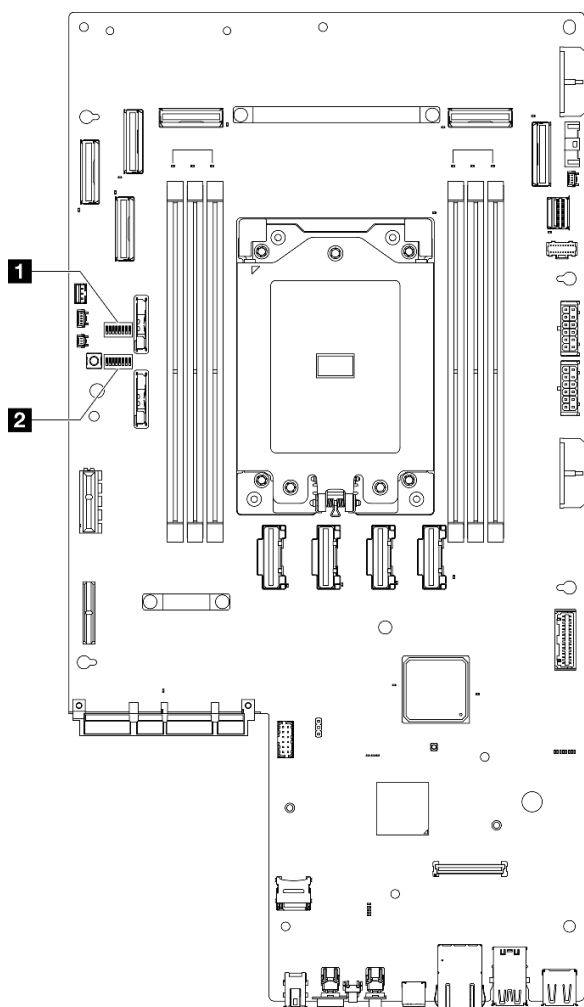


Figure 9. System-board switches

| | |
|--------------|--------------|
| 1 SW4 | 2 SW5 |
|--------------|--------------|

The following table describes the switches on the system board.

Table 12. System-board switches

| Switches block | Switch number | Switch name | Usage description | |
|----------------|---------------|----------------------------------|--|------------------|
| | | | On | Off |
| SW4 | 3 | CMOS clear | Clears the real-time clock (RTC) registry | Normal (default) |
| SW5 | 3 | XClarity Controller boot backup | The node will boot by using a backup of the XClarity Controller firmware | Normal (default) |
| | 4 | Password override | Overrides the power-on password | Normal (default) |
| | 5 | Low security | Enable low security | Normal (default) |
| | 7 | XClarity Controller force update | Enables XClarity Controller force update | Normal (default) |

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 287](#).

Chapter 3. Parts list

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

For more information about ordering parts:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your server.

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

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

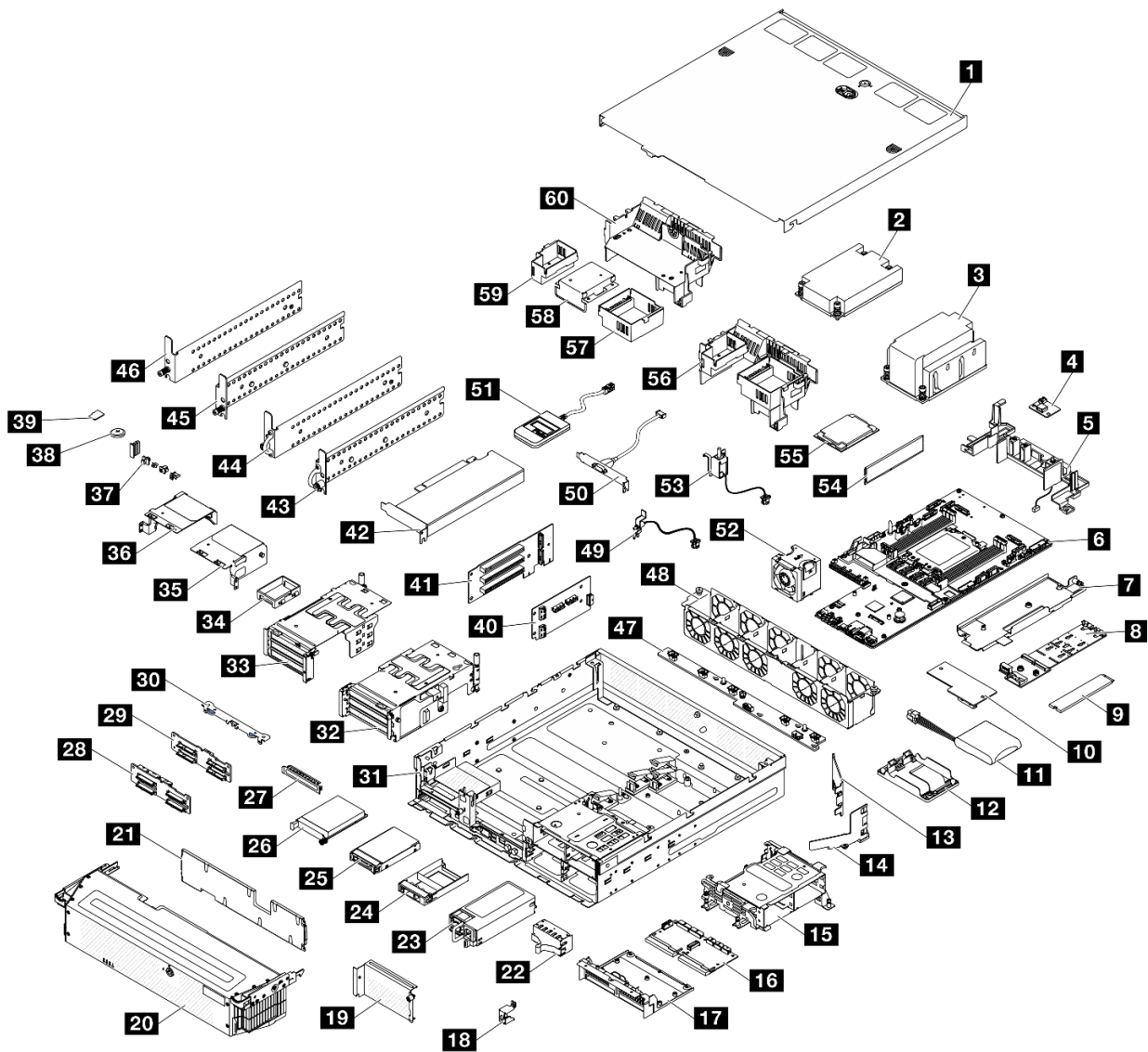


Figure 10. Server components

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

- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 13. Parts list

| Description | Type | Description | Type |
|---|------|---|------|
| For more information about ordering parts: <ol style="list-style-type: none"> 1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server. 2. Click Parts. 3. Enter the serial number to view a listing of parts for your server. | | | |
| 1 Top cover | T1 | 31 Chassis | T1 |
| 2 1U processor heat sink | F | 32 PCIe riser 2 cage | T2 |
| 3 2U processor heat sink | F | 33 PCIe riser 1 cage | T2 |
| 4 Air flow sensor board | F | 34 Low-profile filler | T1 |
| 5 Cable wall with heat sink detect switch | F | 35 PCIe riser 2 extender | T2 |
| 6 System board | F | 36 PCIe riser 1 extender | T2 |
| 7 M.2 backplane tray | T2 | 37 Front I/O fillers | T1 |
| 8 M.2 backplane | T2 | 38 CMOS battery | C |
| 9 M.2 drive | T1 | 39 MicroSD card | T1 |
| 10 Firmware and RoT security module | F | 40 Riser card for PCIe riser 2 | T2 |
| 11 RAID flash power module (supercap) | F | 41 Riser card for PCIe riser 1 | T2 |
| 12 RAID flash power module holder | T1 | 42 PCIe adapter | F |
| 13 M.2 air baffle, rear | T2 | 43 Security EIA bracket, right | T2 |
| 14 M.2 air baffle, front | T2 | 44 Security EIA bracket, left | T2 |
| 15 Internal drive cage | F | 45 Standard EIA bracket, right | T2 |
| 16 Power distribution board (PDB) | F | 46 Standard EIA bracket, left | T2 |
| 17 PDB cage | F | 47 Fan control board (FCB) | F |
| 18 Security bezel keylock bracket | T1 | 48 Fan cage | F |
| 19 Riser 2 blank filler | T2 | 49 Bezel detect switch with cable | F |
| 20 Security bezel | T1 | 50 Serial port module (COM port cable) | T2 |
| 21 Dust filter | T1 | 51 External diagnostic handset | T1 |
| 22 PSU filler | T1 | 52 Fan module | T1 |
| 23 Power supply unit | T1 | 53 Intrusion switch with cable | F |
| 24 2.5-inch drive filler | T1 | 54 Memory module | F |
| 25 2.5-inch drive | T1 | 55 Processor | F |
| 26 OCP 3.0 module | T1 | 56 Processor air baffle for 2U heat sink | T2 |
| 27 OCP filler | T1 | 57 Riser 2 filler for processor air baffle | T2 |
| 28 NVMe drive backplane | T2 | 58 Middle filler for processor air baffle | T1 |
| 29 SATA drive backplane | T2 | 59 Riser 1 filler for processor air baffle | T2 |
| 30 Backplane bracket | T1 | 60 Processor air baffle for 1U heat sink | T1 |

Power cords

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

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

1. Go to:
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.

Chapter 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in [“Server setup checklist” on page 39](#) 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.
- Material box, including items such as power cords*, accessory kit, key for security EIA brackets*, 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. You can also add other system information labels to the front of the server in the customer label spaces.

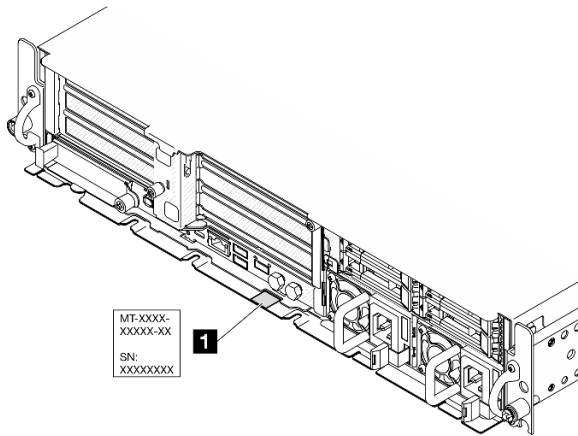


Figure 11. Location of the ID label

Lenovo XClarity Controller network access label

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

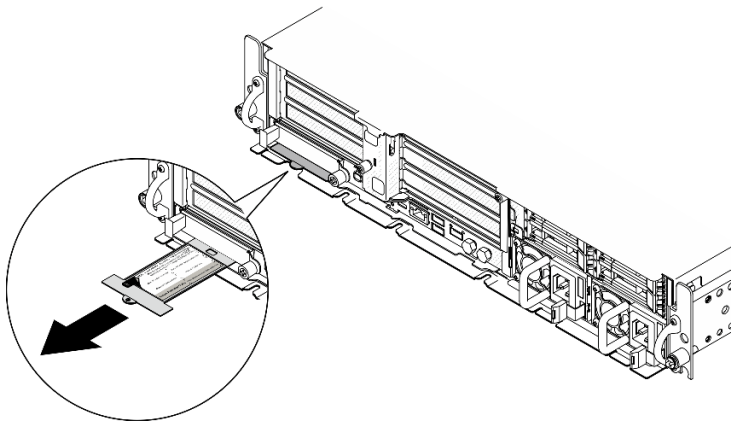


Figure 12. Lenovo XClarity Controller network access label on the pull-out information tab

Service information QR code

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

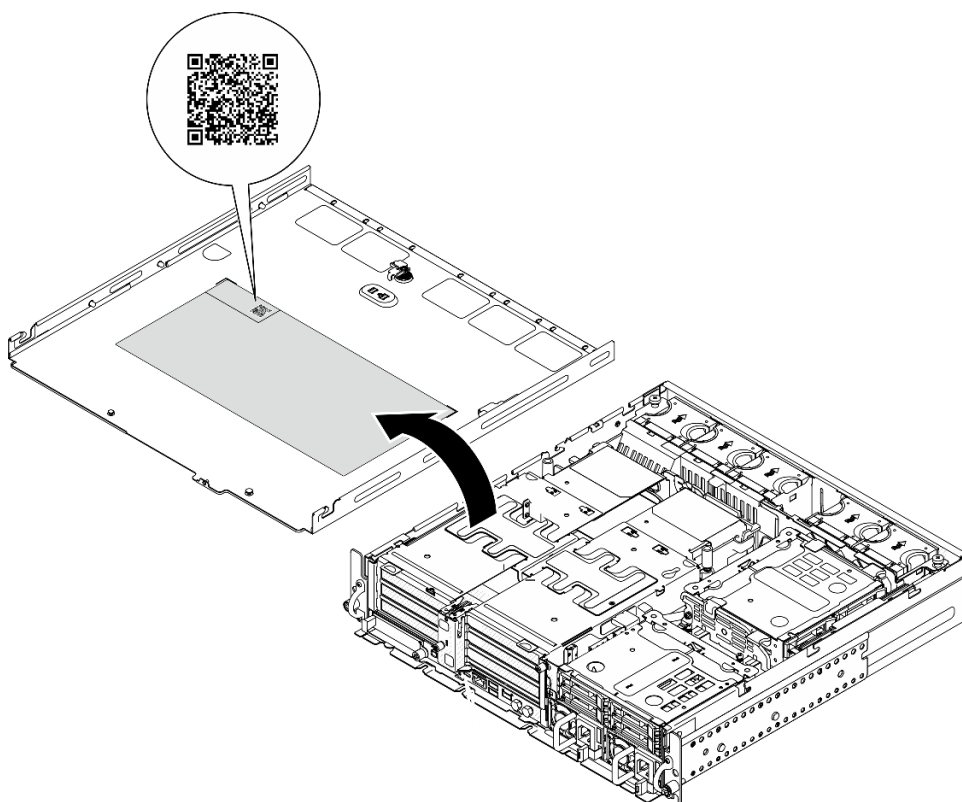


Figure 13. Service information QR code

Server setup checklist

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

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

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

Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See [“Server package contents” on page 37](#).
2. Install any required hardware or server options. See the related topics in [Chapter 5 “Hardware replacement procedures” on page 41](#).
3. If necessary, install the server into a standard rack cabinet. See [“Configuration guide” on page 51](#).
4. Connect all external cables to the server. See [Chapter 2 “Server components” on page 23](#) 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
5. If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Activate or unlock the system” on page 270](#).
 6. Power on the server.

Power button location and power LED are specified in:

- [Chapter 2 “Server components” on page 23](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 287](#)

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

Note: You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

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

See [“Troubleshooting by system LEDs and diagnostics display” on page 287](#) for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to [Chapter 7 “System configuration” on page 269](#).

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

The following information is available for RAID configuration:

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

4. Install the operating system.
5. Back up the server configuration.
6. Install the applications and programs for which the server is intended to be used.
7. Configure ThinkEdge security features. See [“Activate/unlock the system and configure ThinkEdge security features” on page 269](#).

Chapter 5. Hardware replacement procedures

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

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure your safety at work:
 - A complete list of safety information for all products is available at:
https://pubs.lenovo.com/safety_documentation/
 - The following guidelines are available as well: “Working inside the server with the power on” on page 44 and “Handling static-sensitive devices” on page 44.
- Make sure the components you are installing are supported by your server.
 - For a list of supported optional components for the server, see <https://serverproven.lenovo.com>.
 - For the option package contents, see <https://serveroption.lenovo.com/>.
- For more information about ordering parts:
 1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
 2. Click **Parts**.
 3. Enter the serial number to view a listing of parts for your server.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dbv/downloads/driver-list/> to download firmware updates for your server.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Update the firmware” on page 277.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.

- Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
- To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board (system board assembly) and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap drives, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Except PSU, orange on a component or an orange on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- 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 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: This device is not intended for use in the direct field of view at visual display workplaces. To avoid incommoding reflections at visual display workplaces, this device must not be placed in the direct field of view.

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

CAUTION:

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

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

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

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

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

 - a. Go to:
<http://dcsc.lenovo.com/#/>
 - b. Click **Preconfigured Model** or **Configure to order**.
 - c. Enter the machine type and model for your server to display the configurator page.
 - d. Click **Power → Power Cables** to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

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

Make sure the following requirements are met:

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

Working inside the server with the power on

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

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

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

Handling static-sensitive devices

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

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

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

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 4](#).

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

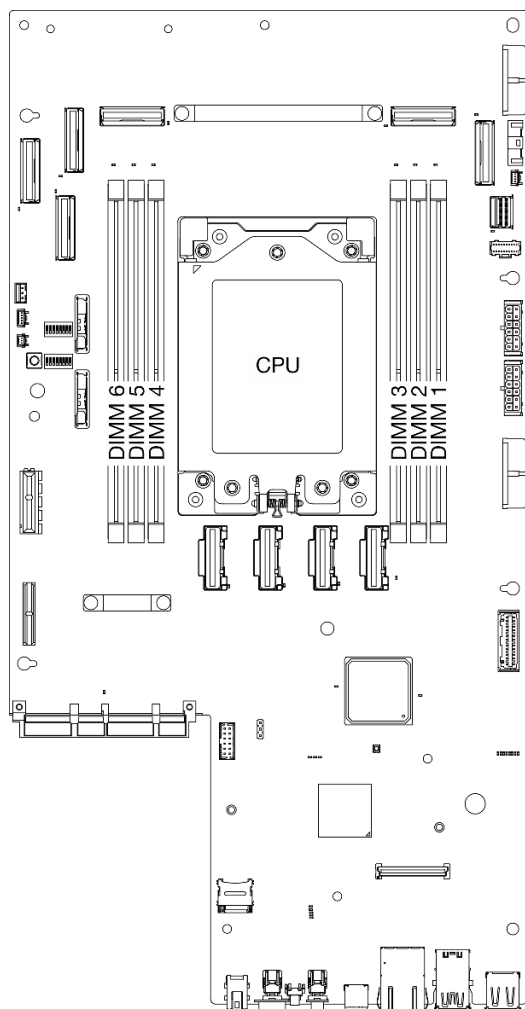


Figure 14. Memory modules and processor layout

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

Table 14. Memory slot and channel identification

| Channel number | Channel A | Channel B | Channel D | Channel E | Channel F | Channel H |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| DIMM slot number | 3 | 2 | 1 | 4 | 5 | 6 |

Memory module installation guideline

ThinkEdge SE455 V3 supports [“Independent memory mode installation order”](#) on page 47.

Consider corresponding rules and population sequence accordingly:

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

- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup Utility to enable the new DIMM manually.

Attention:

- Mixing single-rank and dual-rank DIMMs is allowed.
- Install DIMMs of the same speed for optimal performance. Otherwise, the BIOS will find and run the lowest speed among all channels.

Independent memory mode installation order

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

Independent memory mode guidelines:

- Mixing x4/x8, 16Gbit (16GB, 32GB, 64GB)/24Gbit (48GB, 96GB) DIMMs are not allowed in a system.
- When installing DIMMs with different capacities, install the DIMM with the highest capacity first, and install the DIMMs in the following sequence: Slot 3, 4, 1, 6, 2, 5.

Table 15. Independent mode memory population sequence

| Number of memory modules | Memory module slot number | | | | | | |
|--------------------------|---------------------------|---|---|-----------|---|---|---|
| | 6 | 5 | 4 | Processor | 3 | 2 | 1 |
| 1 | | | | | 3 | | |
| 2 | | | 4 | | 3 | | |
| 4 | 6 | | 4 | | 3 | | 1 |
| 6 | 6 | 5 | 4 | | 3 | 2 | 1 |

PCIe adapter installation rules and order

PCIe adapters must be installed in a specific order in the server.

Notes:

- Performance may degrade when a x16 PCIe adapter is installed in a x8 lane PCIe slot.
- For a list of the supported PCIe adapters, see <https://serverproven.lenovo.com>.

Table 16. PCIe riser assemblies and corresponding slots

| PCIe riser assembly | PCIe slots |
|--|--|
| PCIe riser 1 | <ul style="list-style-type: none"> Slot 3: x16 (Gen5 x16 lanes) Slot 4: x16 (Gen4 x8 lanes) Slot 5: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> When the serial port module is installed, Slot 5 is not supported. When a double-wide GPU is installed in Slot 3, Slot 4 is not supported. |
| PCIe riser 2 Note: PCIe riser 2 is optional. | <ul style="list-style-type: none"> Slot 6: x16 (Gen4 x8 lanes) Slot 7: x16 (Gen5 x16 lanes) Slot 8: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> Slot 6 and Slot 8 are not supported in the following configurations: <ul style="list-style-type: none"> Front SATA drive backplane and internal NVMe drive backplane connect to the system board Front NVMe drive backplane and internal NVMe drive backplane connect to the system board When a double-wide GPU is installed in Slot 7, Slot 6 is not supported. |

Depending on the selected acoustic mode, the slot priorities for different PCIe adapters might be different. See the following section corresponding to the selected configuration:

- [“Acoustic mode disabled” on page 48](#)
- [“Optimised for Acoustics - Mode 1” on page 49](#)
- [“Optimised for Acoustics - Mode 2” on page 50](#)

PCIe adapter installation rules and order: Acoustic mode disabled

| Installation priority | Component | PCIe slot priorities |
|-----------------------|--|---|
| 1 | Serial port module | 5 |
| 2 | RAID adapter/HBA: <ol style="list-style-type: none"> 1. ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter 2. ThinkSystem 4350-8i SAS/SATA 12Gb HBA 3. ThinkSystem RAID 5350-8i PCIe 12Gb Adapter 4. ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA 5. ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter | 8, 5, 4, 7 Note: If two identical RAID adapters are selected, one for M.2 boot drives and one for front/internal storage drives, the RAID adapter for storage drives is prior to the other one. |

| Installation priority | Component | PCIe slot priorities |
|-----------------------|---|----------------------|
| 3 | Double-wide GPU <ul style="list-style-type: none"> ThinkSystem NVIDIA L40 48GB PCIe Gen4 Passive GPU ThinkSystem NVIDIA L40S 48GB PCIe Gen4 Passive GPU | 7, 3 |
| 4 | ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU | 7, 3, 8, 5, 4, 6 |
| 5 | ThinkSystem Qualcomm Cloud AI 100 Notes: <ul style="list-style-type: none"> SE455 V3 supports up to three ThinkSystem Qualcomm Cloud AI 100 installed on PCIe riser 2. Make sure to install the adapter in the supported PCIe slot. | 7, 8, 6 |
| 6 | <ol style="list-style-type: none"> ThinkSystem AMD Alveo V70 Datacenter Accelerator Adapter ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC | 7, 4, 8, 5, 6, 3 |
| 7 | PCIe x16 Ethernet adapter | 7, 3, 8, 5, 4, 6 |
| 8 | PCIe x8 or x4 Ethernet adapter | 8, 5, 4, 7, 6, 3 |

PCIe adapter installation rules and order: Acoustic mode 1

| Installation priority | Component | PCIe slot priorities |
|-----------------------|---|---|
| 1 | Serial port module | 5 |
| 2 | RAID adapter/HBA: <ol style="list-style-type: none"> ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter ThinkSystem 4350-8i SAS/SATA 12Gb HBA ThinkSystem RAID 5350-8i PCIe 12Gb Adapter ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter | 8, 5, 4, 7 Note: If two identical RAID adapters are selected, one for M.2 boot drives and one for front/internal storage drives, the RAID adapter for storage drives is prior to the other one. |
| 3 | Double-wide GPU <ul style="list-style-type: none"> ThinkSystem NVIDIA L40 48GB PCIe Gen4 Passive GPU ThinkSystem NVIDIA L40S 48GB PCIe Gen4 Passive GPU | 7, 3 |

| Installation priority | Component | PCIe slot priorities |
|-----------------------|---|----------------------|
| 4 | <ol style="list-style-type: none"> 1. ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU 2. ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU 3. ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC | 7, 4, 8, 5, 6, 3 |
| 5 | PCIe x16 Ethernet adapter | 7, 3, 8, 5, 4, 6 |
| 6 | PCIe x8 or x4 Ethernet adapter | 8, 5, 4, 7, 6, 3 |

PCIe adapter installation rules and order: Acoustic mode 2

| Installation priority | Component | PCIe slot priorities |
|-----------------------|--|---|
| 1 | Serial port module | 5 |
| 2 | RAID adapter/HBA: <ol style="list-style-type: none"> 1. ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter 2. ThinkSystem 4350-8i SAS/SATA 12Gb HBA 3. ThinkSystem RAID 5350-8i PCIe 12Gb Adapter 4. ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA 5. ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter | 8, 5, 4, 7 Note: If two identical RAID adapters are selected, one for M.2 boot drives and one for front/internal storage drives, the RAID adapter for storage drives is prior to the other one. |
| 3 | PCIe x16 Ethernet adapter | 7, 3, 8, 5, 4, 6 |
| 4 | PCIe x8 or x4 Ethernet adapter | 8, 5, 4, 7, 6, 3 |

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 23](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 287](#)

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 51](#).

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 23](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 287](#)

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 50](#).

Configuration guide

Follow instructions in this section to remove and install supporting mounting configurations.

ThinkEdge SE455 V3 server is designed to support the following mounting option:

- **Rack mount:** The server can be installed into rack cabinet with corresponding rail kit.

Rack mount configuration

Follow instructions in this section to remove and install the rack mount configuration.

Remove the server from the rack

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

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.

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.

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).

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

Procedure

- Step 1. Disengage the server from the flanges.
- a. For the configurations with standard EIA brackets, loosen the two thumbscrews.

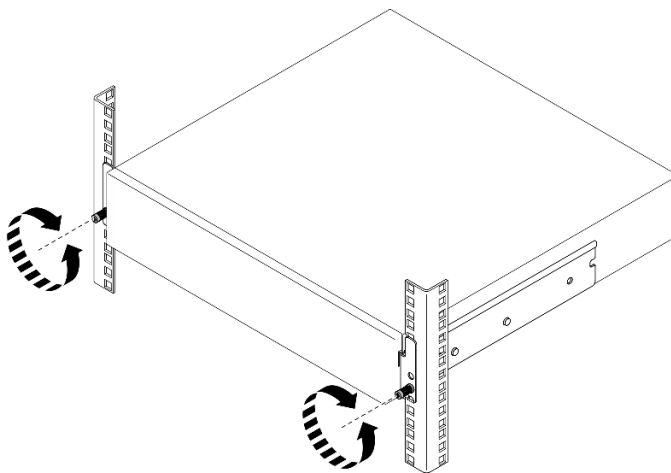


Figure 15. Disengaging server from the rack: standard EIA brackets

- b. For the configurations with security EIA brackets, loosen the two security screws with key.

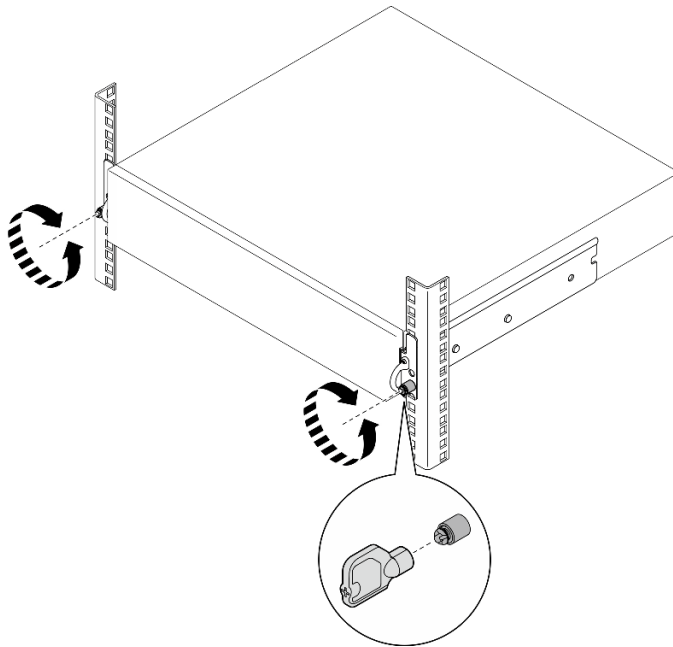


Figure 16. Disengaging server from the rack: security EIA brackets

Step 2. Remove the server from the rack.

- a. ① Carefully slide out the server until it stops.
- b. ② Depending on the rail kit, press or lift the release latches.
- c. ③ Carefully pull the server away from the rack.

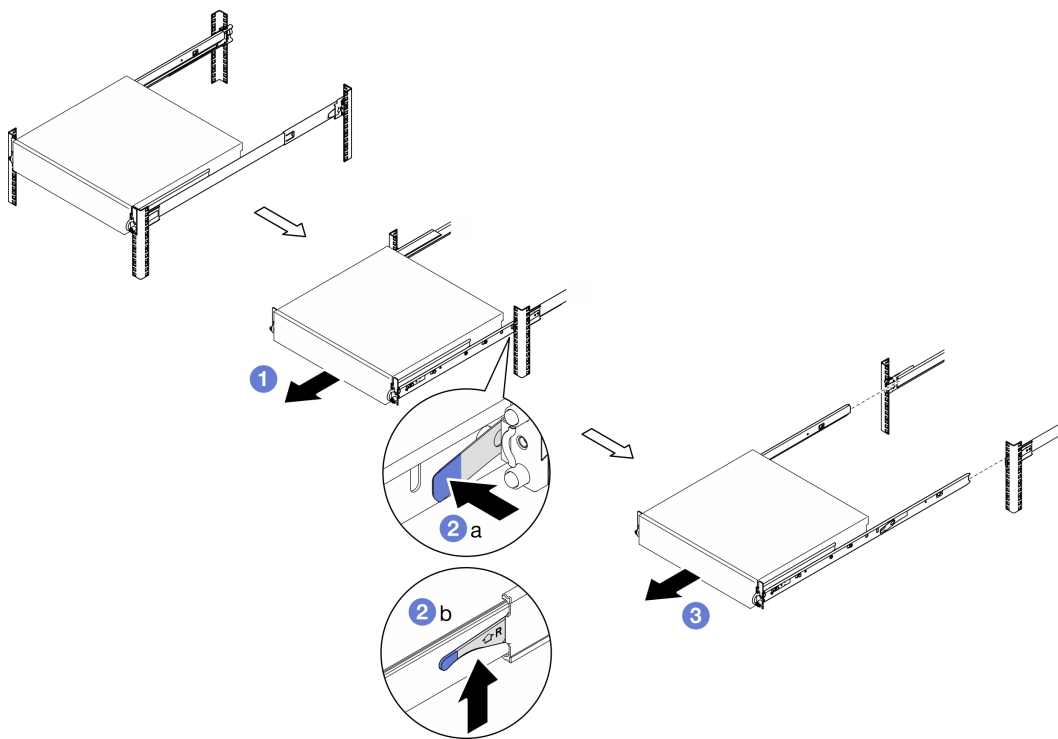


Figure 17. Removing the server from the rack

Step 3. Remove the inner rails from the server.

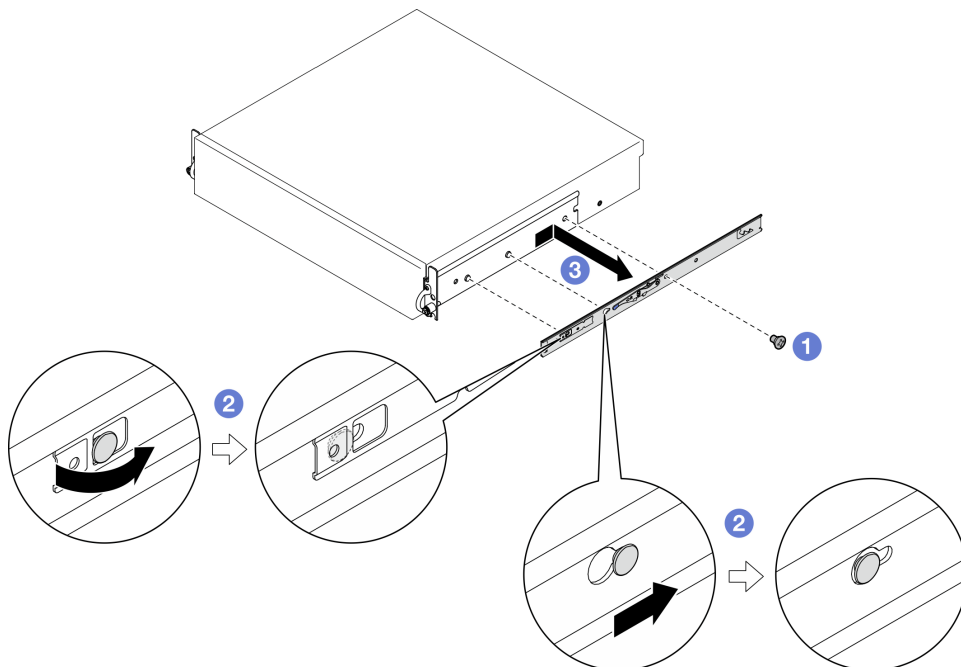


Figure 18. Removing the inner rail

a. ① Loosen the M3.5 screws that secure the inner rail.

Note: The number of screws for each inner rail varies by the rail kit and the depth of EIA brackets. See the depth mark on the side of chassis to identify the depth of EIA brackets, and refer to the following information for screw locations.

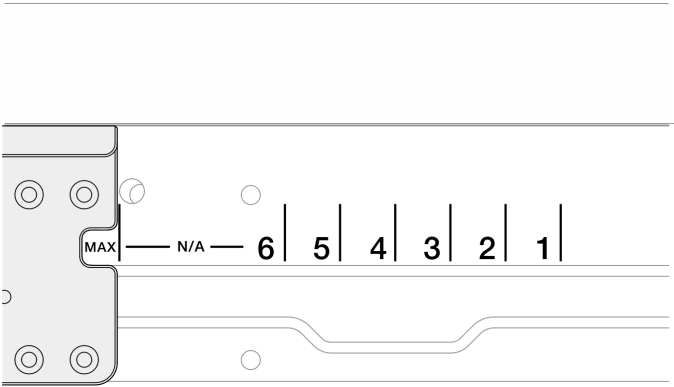


Figure 19. Depth mark for EIA brackets

| Rail kit | Depth of EIA brackets | The number of screws for each inner rail |
|---|-----------------------|--|
| ThinkEdge 600mm Ball Bearing Rail Kit or ThinkEdge 2-Post Friction Rail Kit | Any | 1 |
| ThinkEdge 1000mm Friction Rail Kit v2 | #1, #2, #3, #4 | 2 |
| | #5, #6, Max | 3 |

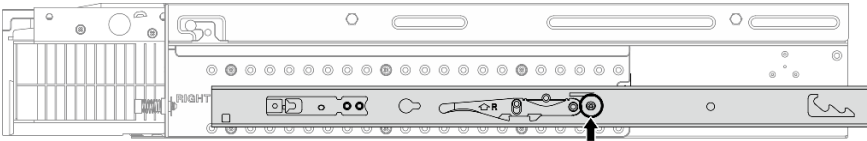


Figure 20. One screw for the inner rail of ThinkEdge 600mm Ball Bearing Rail Kit

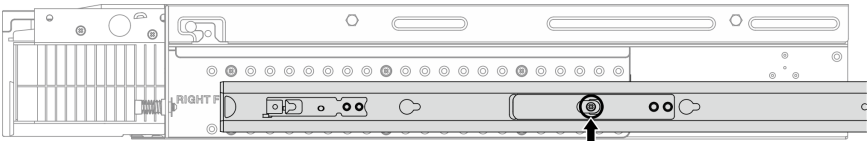


Figure 21. One screw for the inner rail of ThinkEdge 2-Post Friction Rail Kit

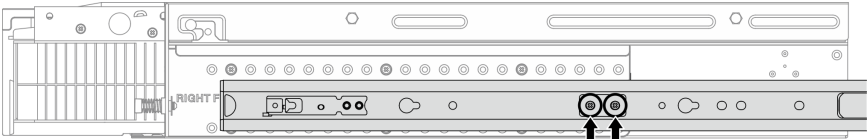


Figure 22. Two screws for the inner rail of ThinkEdge 1000mm Friction Rail Kit v2

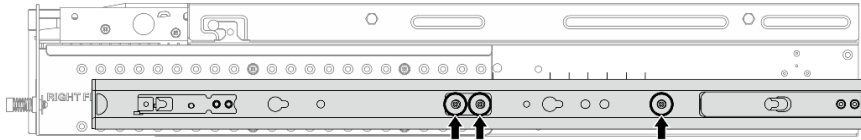


Figure 23. Three screws for the inner rail of ThinkEdge 1000mm Friction Rail Kit v2

- b. ② Slightly push the inner rail to the right to disengage the inner rail from the mounting pins on the server.
- c. ③ Remove the inner rail from the server.
- d. Repeat this procedure to remove the other inner rail.

Step 4. If necessary, remove the rail kit from the rack. See the *Rail Installation Guide* which comes with the rail kit, or download the *Rail Installation Guide* from [“Documents download” on page 327](#).

Remove the EIA brackets

Follow instructions in this section to remove the EIA brackets.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack.

Note: Depending on the configuration, the EIA brackets might look slightly different from the illustration in this section.

Procedure

Step 1. Remove the four or six screws that secure each of the EIA brackets to the chassis, and remove the brackets from the chassis.

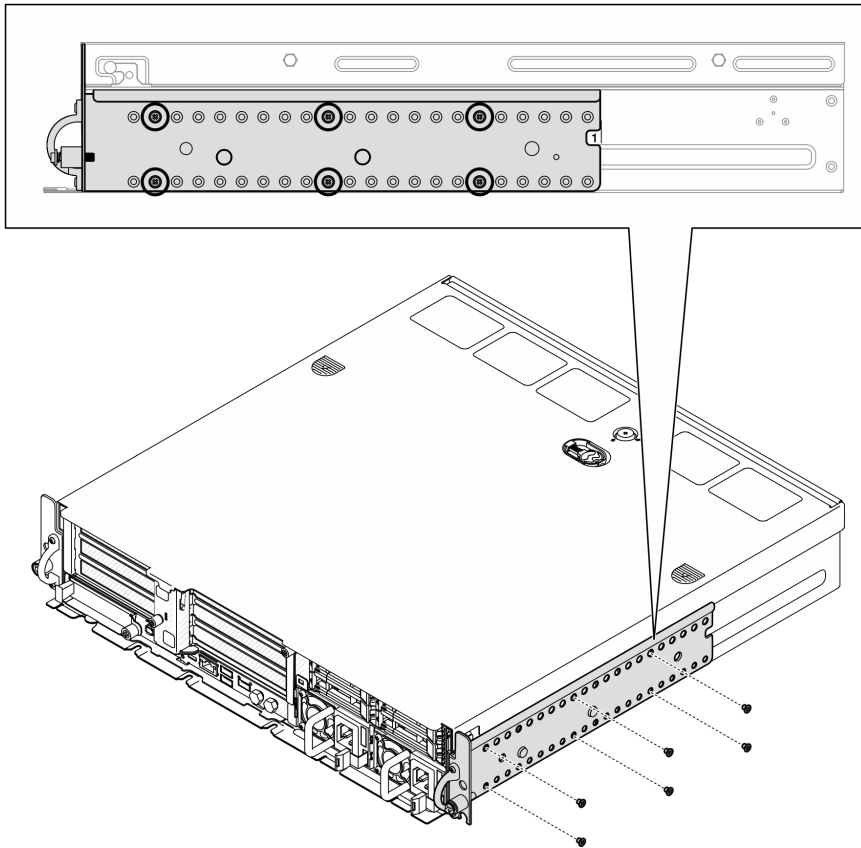


Figure 24. EIA bracket regular depth 1 to 6: six screws

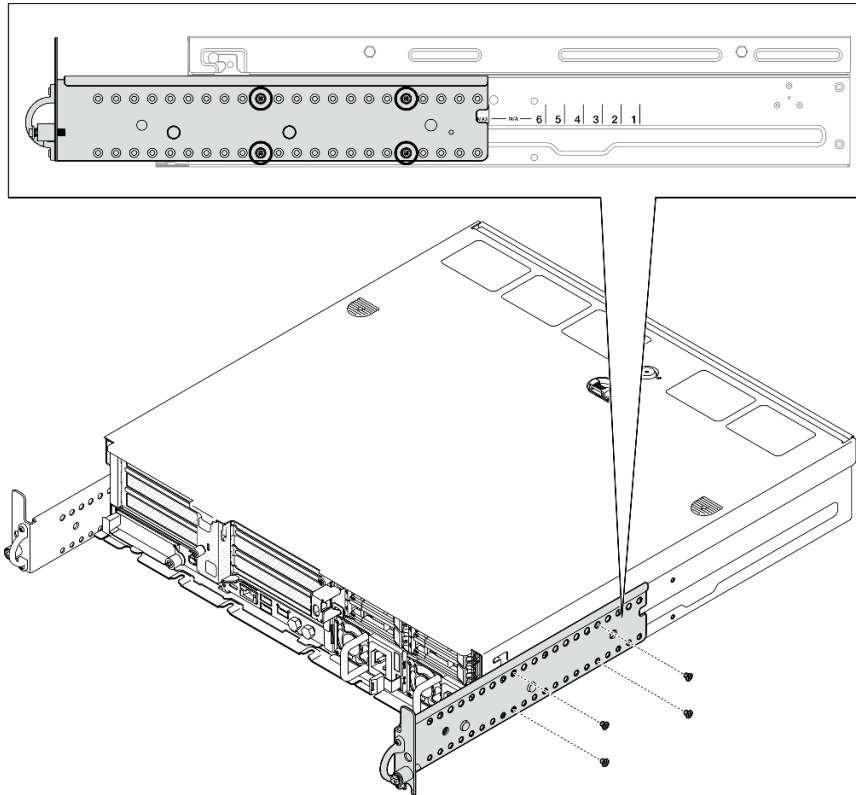


Figure 25. EIA bracket maximal depth for security bezel: four screws

After this task is completed

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 EIA brackets

Follow instructions in this section to install the EIA brackets.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Note: Depending on the configuration, the EIA brackets might look slightly different from the illustration in this section.

Procedure

- Step 1. Secure each of the EIA brackets to the chassis with four or six screws. Make sure to align the two brackets to the same numbers (1 to 6) or the “MAX” mark on both sides of the chassis.

Note: The EIA brackets are designed as adjustable. To ensure sufficient space for security bezel or the external cables at front of the server, adjust the depth of EIA brackets according to the operation environment.

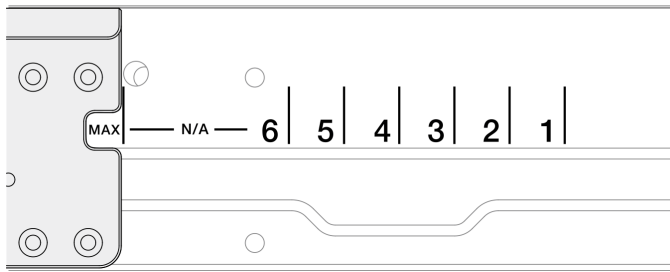


Figure 26. Depth mark for EIA brackets

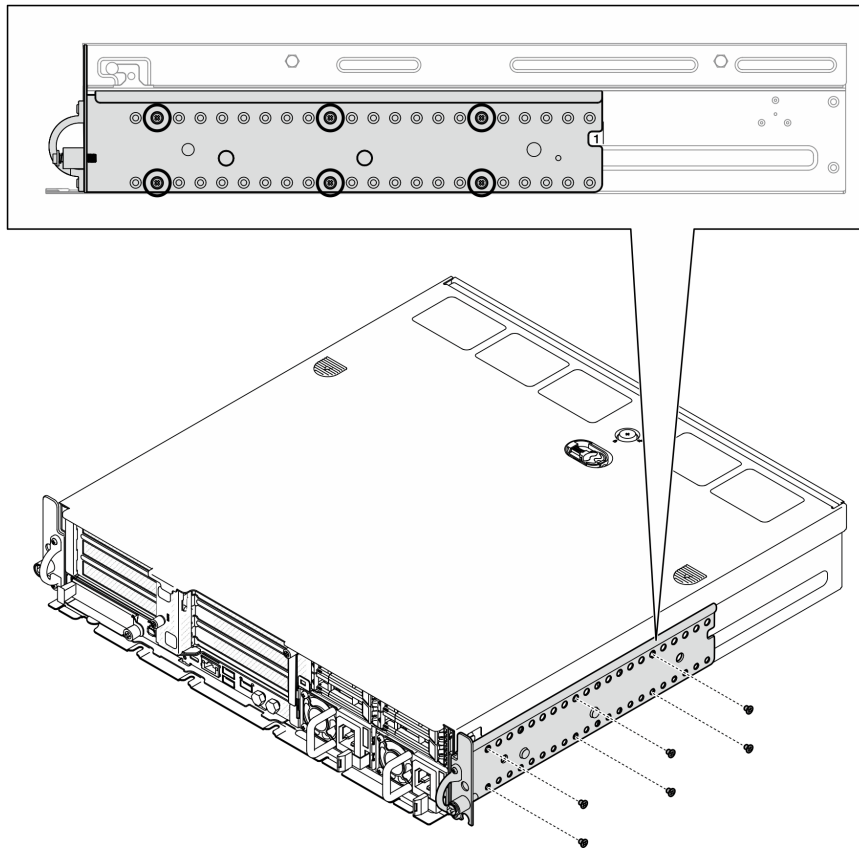


Figure 27. EIA bracket regular depth 1 to 6: six screws

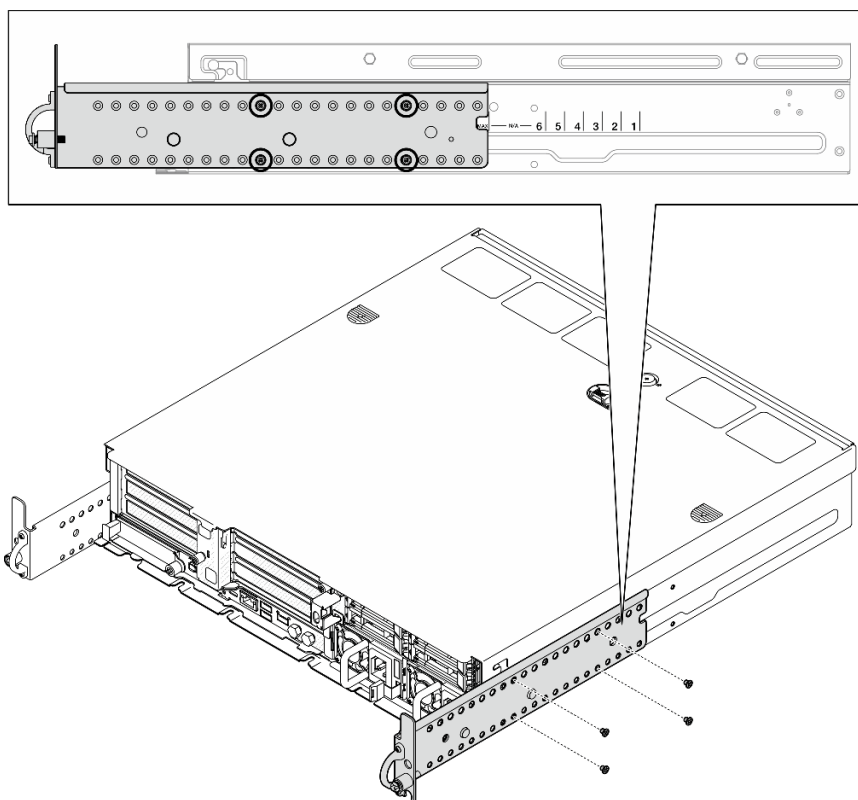


Figure 28. EIA bracket maximal depth for security bezel: four screws

After this task is completed

If the server was installed in a rack, reinstall the server into the rack. See [“Install the server to the rack” on page 60](#).

Install the server to the rack

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

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.

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.

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Procedure

- Step 1. Make sure the rail kit is installed to the rack properly. See the *Rail Installation Guide* which comes with the rail kit, or download the *Rail Installation Guide* from [“Documents download” on page 327](#).
- Step 2. Make sure the EIA brackets are installed properly. See [“Install the EIA brackets” on page 58](#).
- Step 3. Install the inner rails to the server.

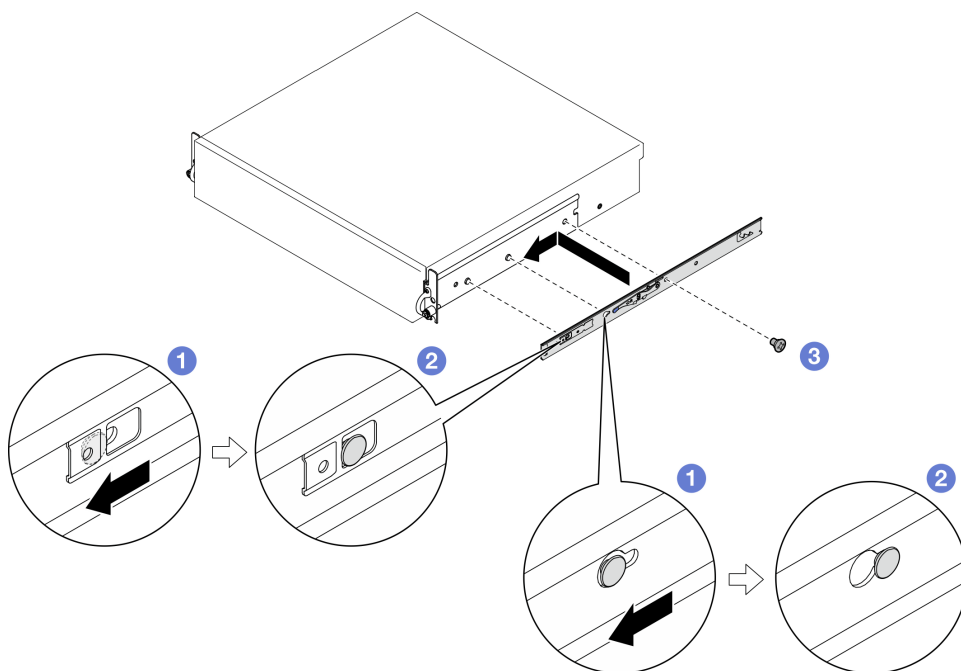


Figure 29. Installing the inner rail

Attention: There are “L” and “R” logos marked on the front of inner rails which represent the left rail and the right rail. Ensure correct rails are installed to the rack accordingly.

- 1 Align the mounting holes on the inner rail with the corresponding rail mounting pins on the side of the server.
- 2 Push the inner rail as shown until the mounting pins on the server are locked in place.
- Tighten M3.5 screws to secure the inner rail to the server.

Note: The number of screws for each inner rail varies by the rail kit and the depth of EIA brackets. See the depth mark on the side of chassis to identify the depth of EIA brackets, and refer to the following information for screw locations.

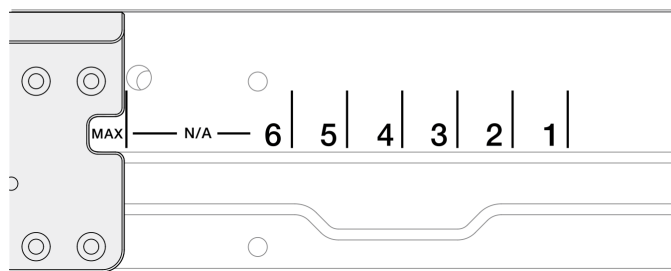


Figure 30. Depth mark for EIA brackets

| Rail kit | Depth of EIA brackets | The number of screws for each inner rail |
|---|-----------------------|--|
| ThinkEdge 600mm Ball Bearing Rail Kit or ThinkEdge 2-Post Friction Rail Kit | Any | 1 |
| ThinkEdge 1000mm Friction Rail Kit v2 | #1, #2, #3, #4 | 2 |
| | #5, #6, Max | 3 |

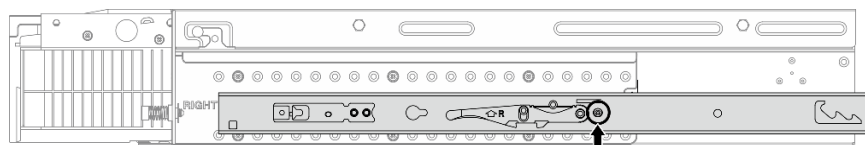


Figure 31. One screw for the inner rail of ThinkEdge 600mm Ball Bearing Rail Kit

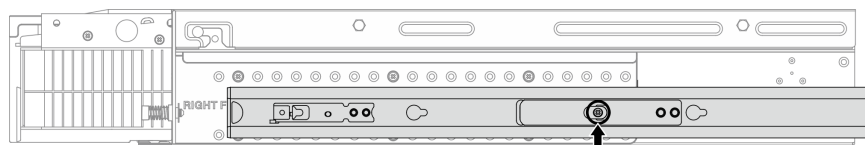


Figure 32. One screw for the inner rail of ThinkEdge 2-Post Friction Rail Kit

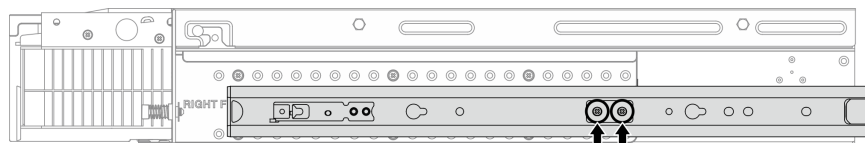


Figure 33. Two screws for the inner rail of ThinkEdge 1000mm Friction Rail Kit v2

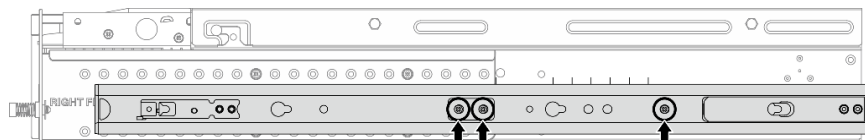


Figure 34. Three screws for the inner rail of ThinkEdge 1000mm Friction Rail Kit v2

- d. Repeat this procedure to install the other inner rail.

Step 4. Install the server to the rack.

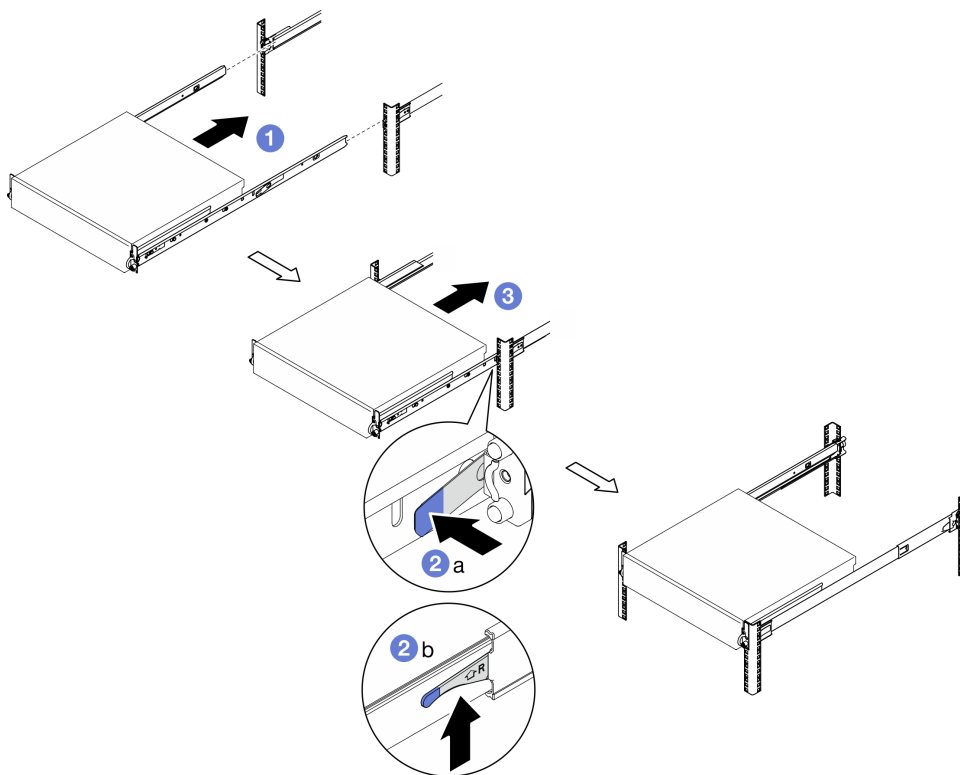


Figure 35. Installing the server to the rack

- a. ① Carefully lift the server and align the server with the rails on the rack; then, position the server as shown and push it into the rack.
- b. ② Depending on the rail kit, press or lift the release latches.
- c. ③ Push the server all the way into the rack until the server locks into place with a click.

Step 5. Secure the server to the rack.

- a. For the configurations with standard EIA brackets, fasten the two thumbscrews.

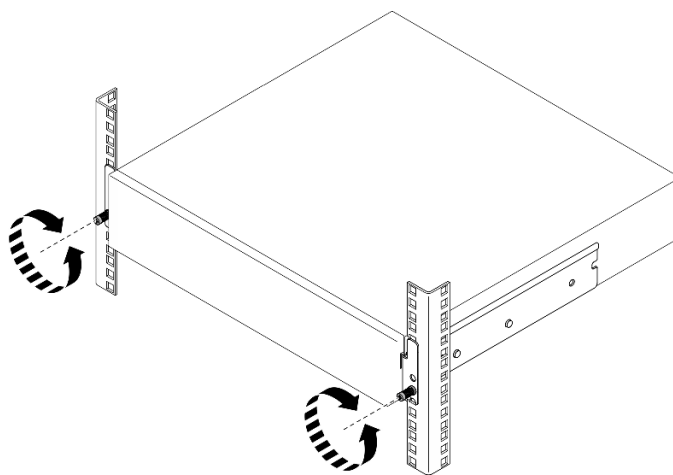


Figure 36. Securing the server to the rack: standard EIA brackets

- b. For the configurations with security EIA brackets, fasten the two security screws with key. Store the key for future use.

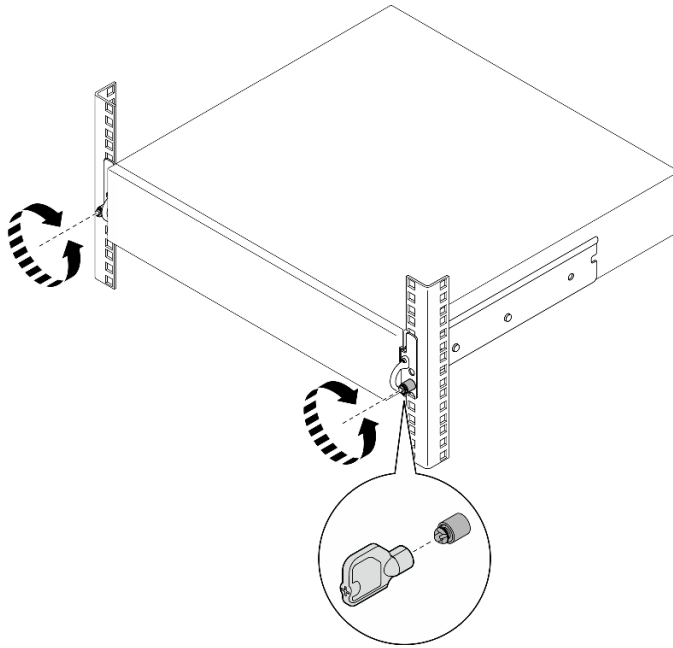


Figure 37. Securing the server to the rack: security EIA brackets

After this task is completed

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 50](#).
3. If applicable, reinstall the security bezel. See [“Install the security bezel” on page 210](#).

Node component replacement

Follow instructions in this section to remove and install the node components.

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.

Air baffle replacement

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

Remove the M.2 air baffle

Follow instructions in this section to remove the M.2 air baffle.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- c. If applicable, remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).
- d. If applicable, remove internal drive cage. See [“Remove the internal drive cage” on page 114](#).

Step 2. Loosen the two screws that secure the M.2 air baffle; then, remove the air baffle.

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

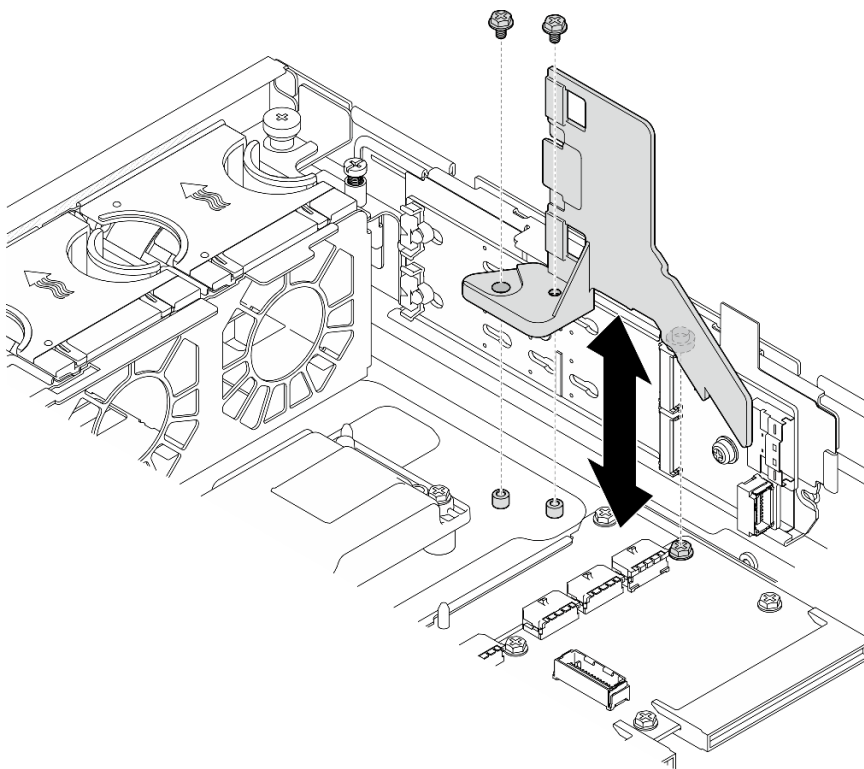


Figure 38. Removing the M.2 air baffle for configuration with internal drive cage

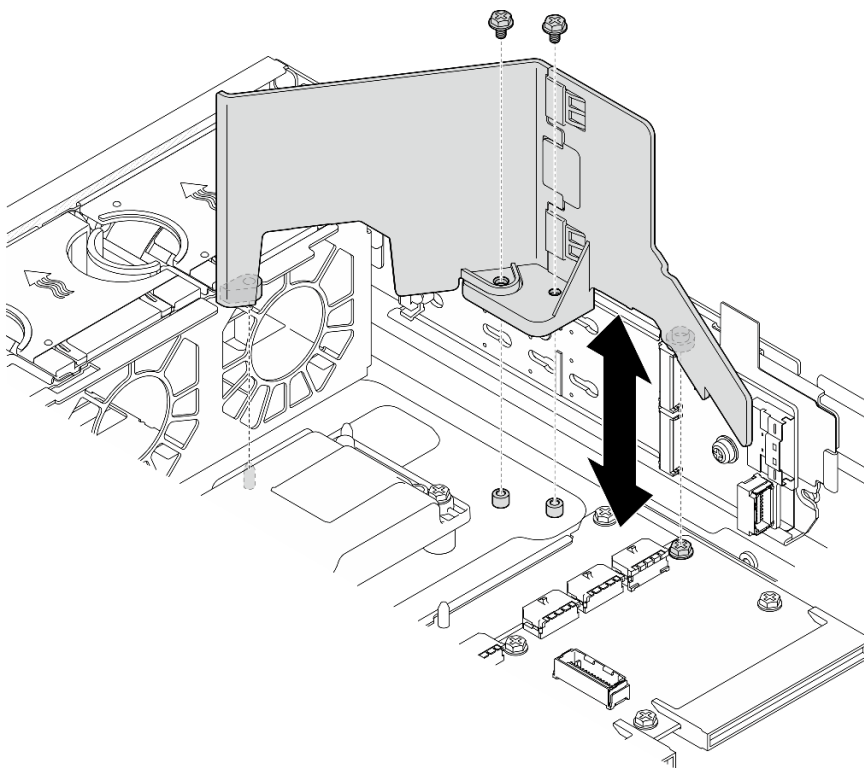


Figure 39. Removing the M.2 air baffle for configuration without internal drive cage

Step 3. If necessary, separate the front half and rear half of the M.2 air baffle.

- a. Press the nubs to disengage the rear half.
- b. Separate the rear half from the front half.

Note: For the configurations with internal drive cage, install only the front half of the M.2 air baffle.

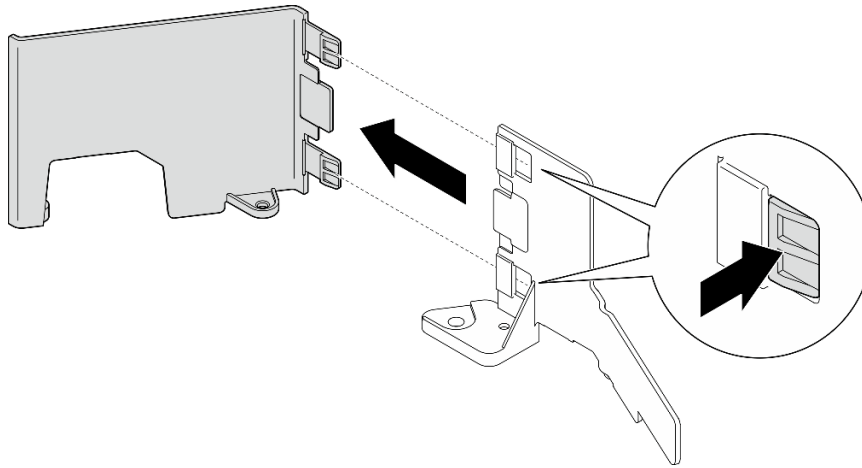


Figure 40. Separating the parts of M.2 air baffle

After this task is completed

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

Demo Video

[Watch the procedure on YouTube](#)

Install the M.2 air baffle

Follow instructions in this section to install the M.2 air baffle.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Procedure

- Step 1. Make sure that the M.2 air baffle is corresponding to the selected configuration. If the configuration is **without** internal drive cage, combine the front half and rear half of the M.2 air baffle.
 - a. Align the small tabs of the rear half with the notches of the front half as shown.
 - b. Slide the rear half toward the front half until the rear half clicks into place.

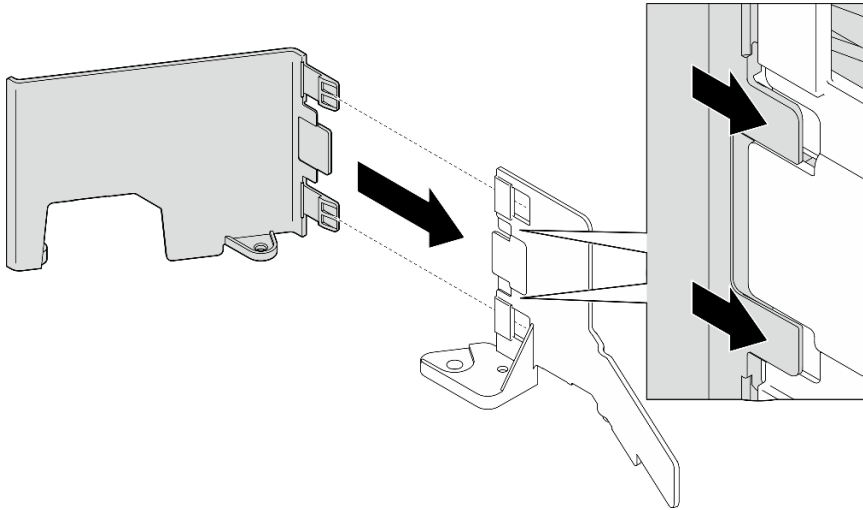


Figure 41. Combining the parts of M.2 air baffle

Step 2. Install the M.2 air baffle.

- a. Align the M.2 air baffle with the guide pins on the chassis and the screw on the power distribution board; then, lower the air baffle until it is seated in place.
- b. Fasten two screws to secure the air baffle.

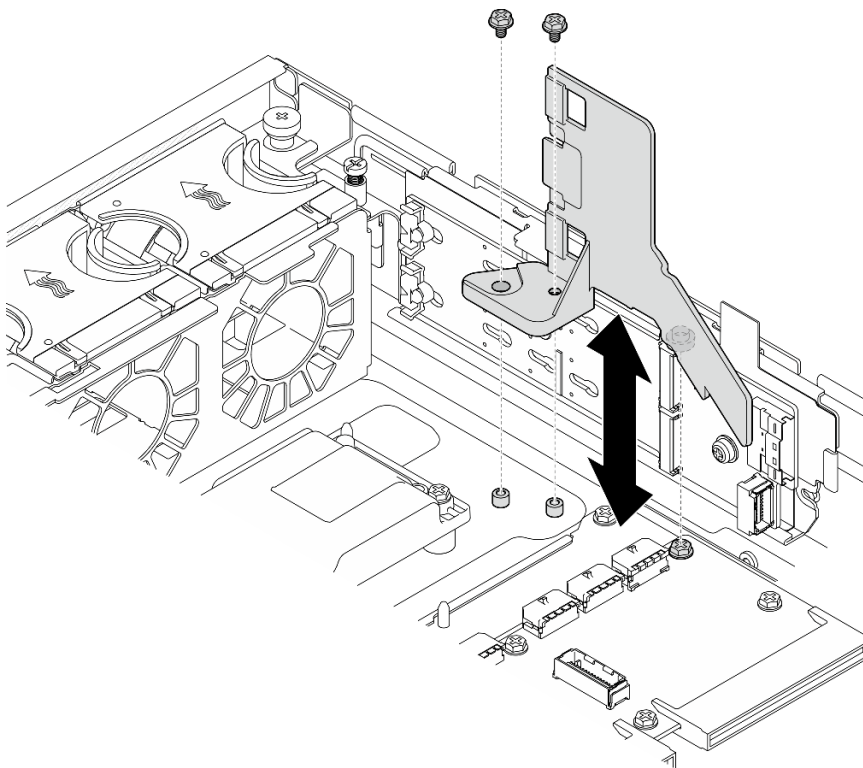


Figure 42. Installing the M.2 air baffle for configuration with internal drive cage

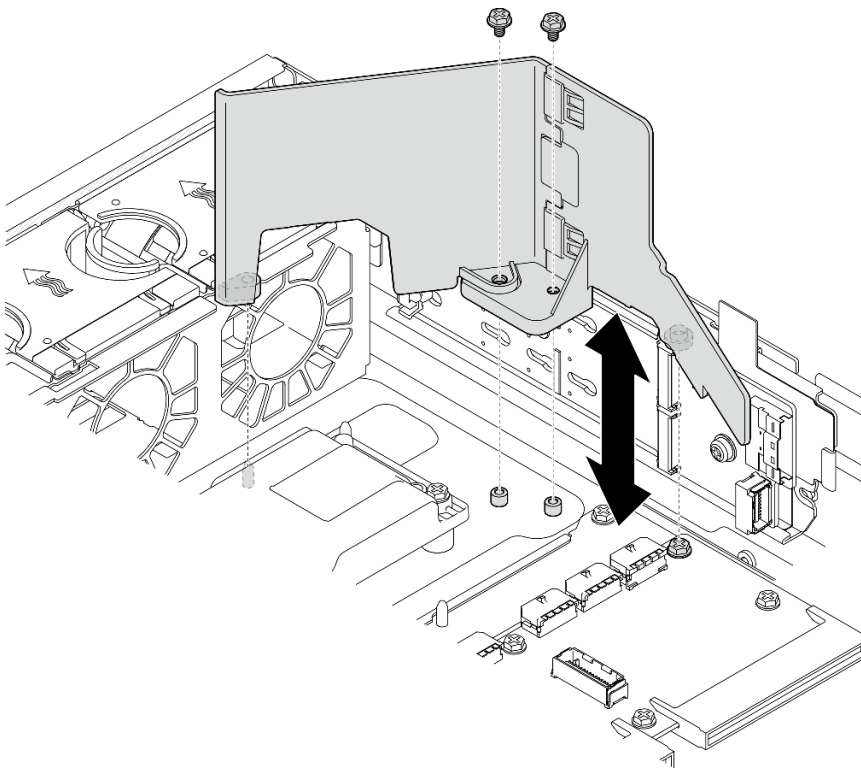


Figure 43. Installing the M.2 air baffle for configuration without internal drive cage

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Remove the processor air baffle

Follow instructions in this section to remove the processor air baffle.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Note: Depending on the configuration, the air baffle might look slightly different from the illustration in this section.

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).

Note: For the configurations with GPU power cable, disengage all the GPU power cables from the processor air baffle before removing PCIe riser assembly.

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

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

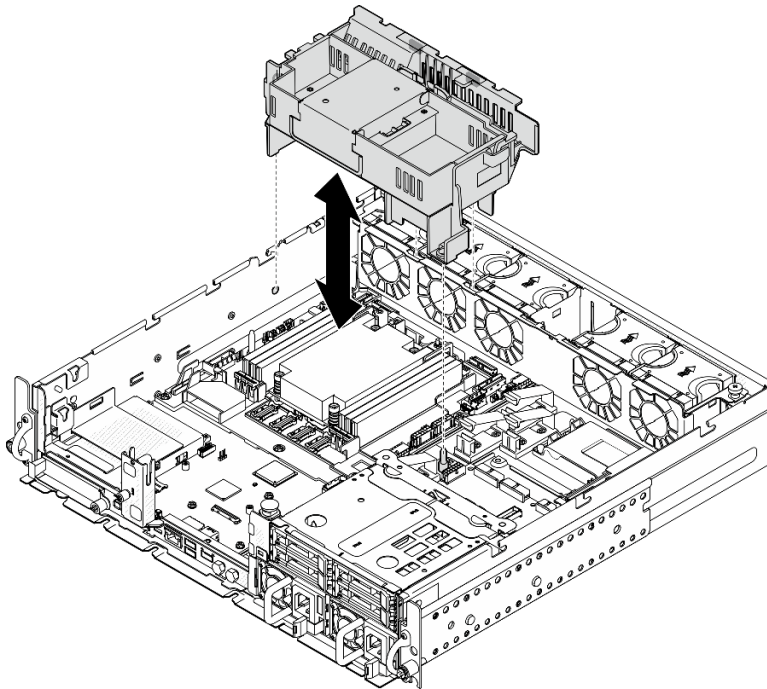


Figure 44. Removing the air baffle for 1U heat sink

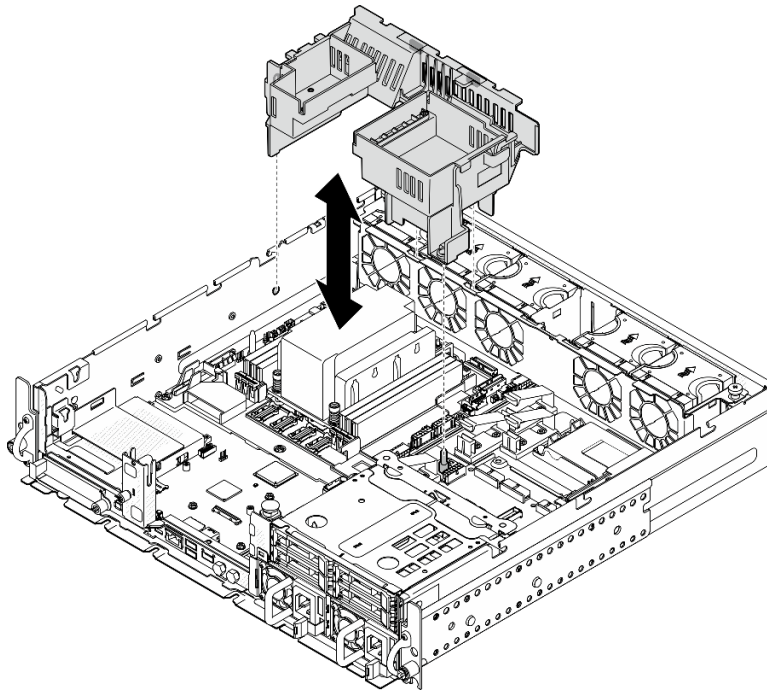


Figure 45. Removing the air baffle for 2U heat sink

After this task is completed

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

Demo Video

[Watch the procedure on YouTube](#)

Change the processor air baffle combination for 1U heat sink

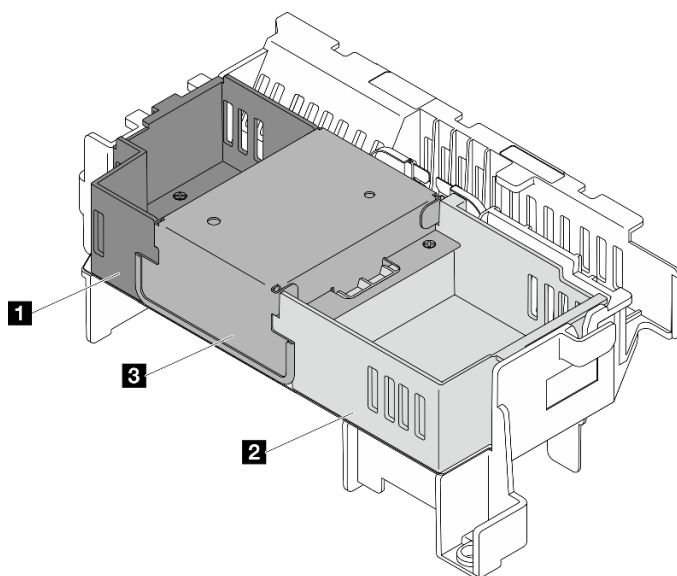
Follow instructions in this section to change the processor air baffle combination for the configurations with 1U heat sink.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Identify the parts of the processor air baffle supporting different configurations with 1U heat sink.



| | |
|-------------------------|------------------------|
| 1 Riser 1 filler | 3 Middle filler |
| 2 Riser 2 filler | |

Table 17. Processor air baffle combination

| | | PCIe riser 2 | | |
|--------------|-----------------|-----------------|---------------|--------------|
| | | With FL adapter | No FL adapter | No adapter |
| PCIe riser 1 | With FL adapter | | 2 | 2 |
| | No FL adapter | 1 | 1 2 3 | 1 2 3 |
| | No adapter | 1 | 1 2 3 | 1 2 3 |

Procedure

Step 1. If necessary, remove or install the riser 1 filler.

- a. To remove the filler, loosen the screw that secures the filler; then, grasp and lift the filler from the air baffle.
- b. To install the filler, align the filler with the edge of the air baffle, and lower the filler down until the guide pins on the bottom of the filler are seated in place; then, fasten one screw to secure the filler.

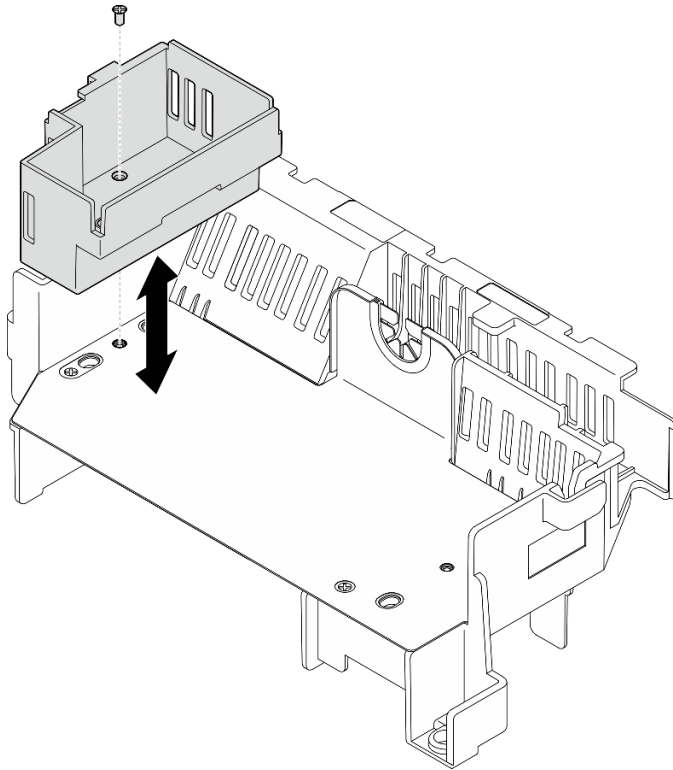


Figure 46. Replacing the riser 1 filler

- Step 2. If necessary, remove or install the riser 2 filler.
- a. To remove the filler, loosen the screw that secures the filler; then, grasp and lift the filler from the air baffle.
 - b. To install the filler, align the filler with the edge of the air baffle, and lower the filler down until the guide pins on the bottom of the filler are seated in place; then, fasten one screw to secure the filler.

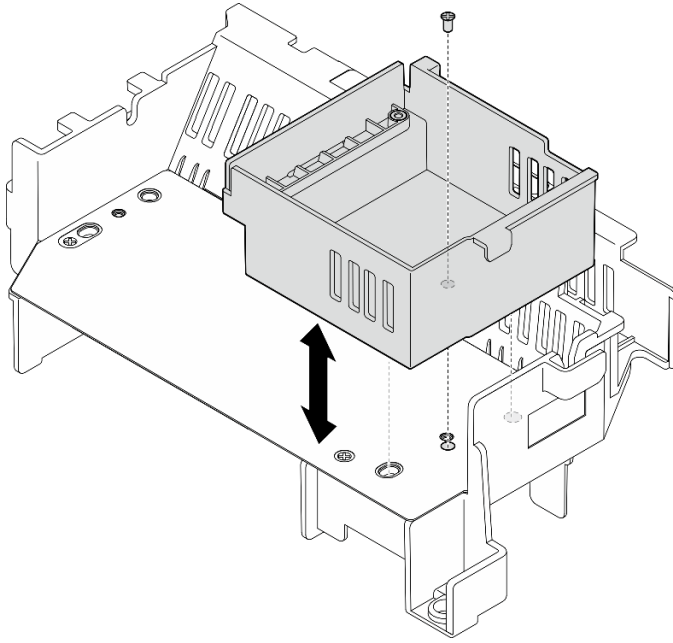


Figure 47. Replacing the riser 2 filler

Step 3. If necessary, remove or install the middle filler.

- a. To remove the filler, loosen the four screws that secure the filler; then, grasp and lift the filler from the air baffle.
- b. To install the filler, align the filler with the edge of the riser 1 filler and riser 2 filler, and lower the middle filler down until it is seated in place; then, fasten four screws to secure the filler.

Important: For proper cooling and airflow, make sure to install the middle filler with the orientation as shown.

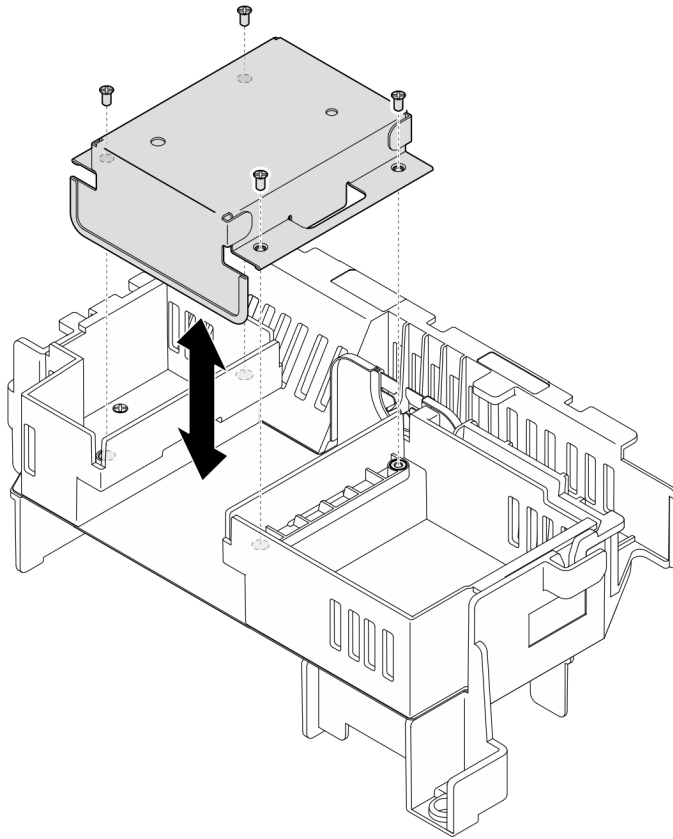


Figure 48. Replacing the middle filler

Install the processor air baffle

Follow instructions in this section to install the processor air baffle.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Note: Depending on the configuration, the air baffle might look slightly different from the illustration in this section.

Procedure

- Step 1. If necessary, change the processor air baffle combination according to the selected configuration. See [“Change the processor air baffle combination for 1U heat sink” on page 72](#).
- Step 2. Align the air baffle with guide pins on the chassis and the slots on the fan cage; then, lower the air baffle down until it is firmly seated.

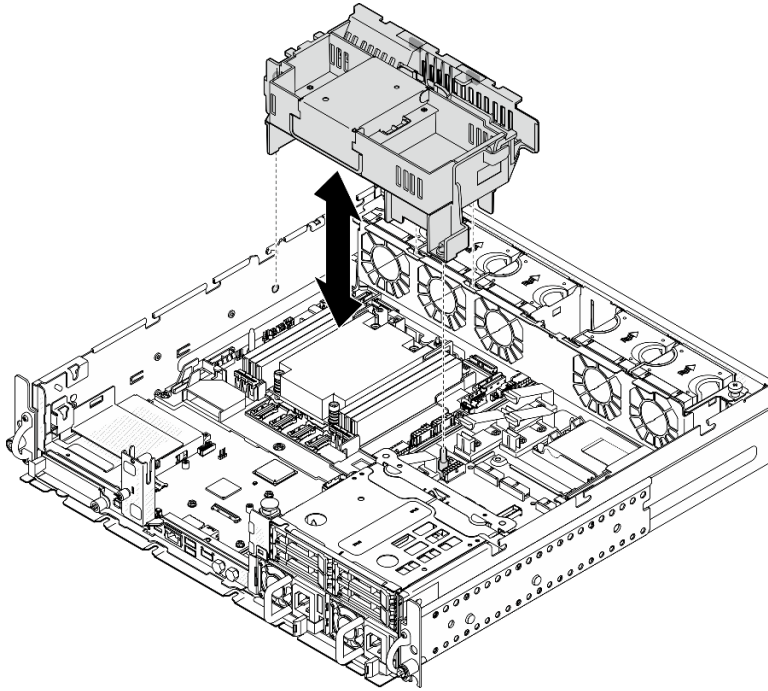


Figure 49. Installing the air baffle for 1U heat sink

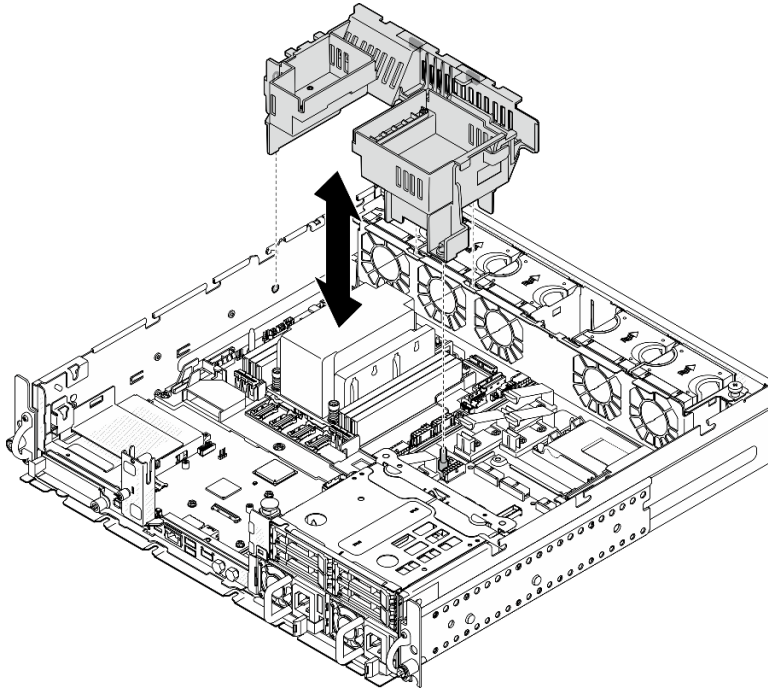


Figure 50. Installing the air baffle for 2U heat sink

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Air flow sensor board replacement

Follow instructions in this section to remove and install the air flow sensor board.

Remove the air flow sensor board

Follow the instructions in this section to remove the air flow sensor board.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Loosen the two screws that secure the air flow sensor board; then, slightly slide the air flow sensor board backwards, and lift it up to remove it.

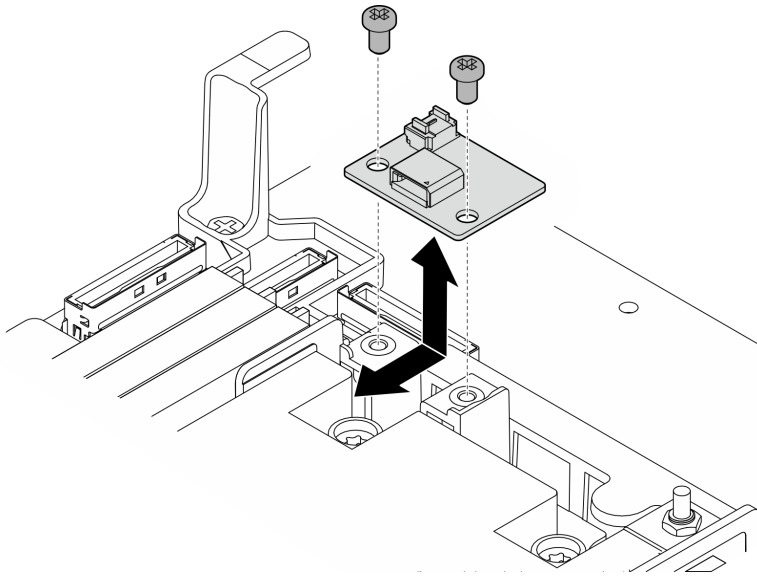


Figure 51. Removing the air flow sensor board

Step 3. Disconnect the cable from the air flow sensor board.

After this task is completed

- Install a replacement unit. See [“Install the air flow sensor board” on page 79](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the air flow sensor board

Follow the instructions in this section to install the air flow sensor board.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

- Step 1. Make sure the air flow sensor cable is connected to the system board properly. See [“System-board connectors for cable routing” on page 244](#) to locate Air flow sensor board connector (Air Velocity Sensor).
- Step 2. Connect the cable to the air flow sensor board.
- Step 3. Install the air flow sensor board.
 - a. Lower down the air flow sensor board to the cable wall; then, slide it forward until it is seated in place.
 - b. Fasten two screws to secure the air flow sensor board.

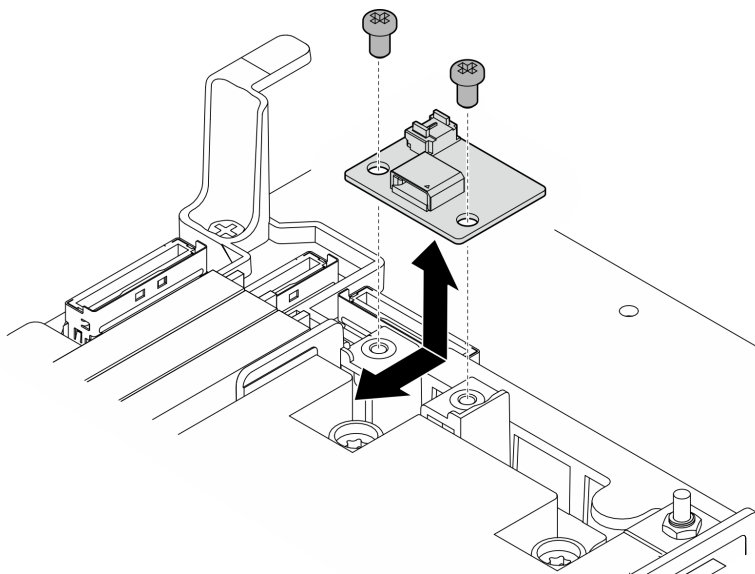


Figure 52. Installing the air flow sensor board

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Bezel detect switch with cable replacement

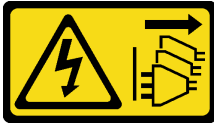
Follow instructions in this section to remove and install the bezel detect switch with cable.

Remove the bezel detect switch with cable

Follow the instructions in this section to remove the bezel detect switch with cable.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Disconnect the bezel detect switch cable from the system board.

Step 3. Remove the bezel detect switch.

- a. ① Loosen the screw that secures the bezel detect switch.
- b. ② Pinch and pivot the switch to disengage it from the chassis.
- c. ③ Slide the switch to remove it.

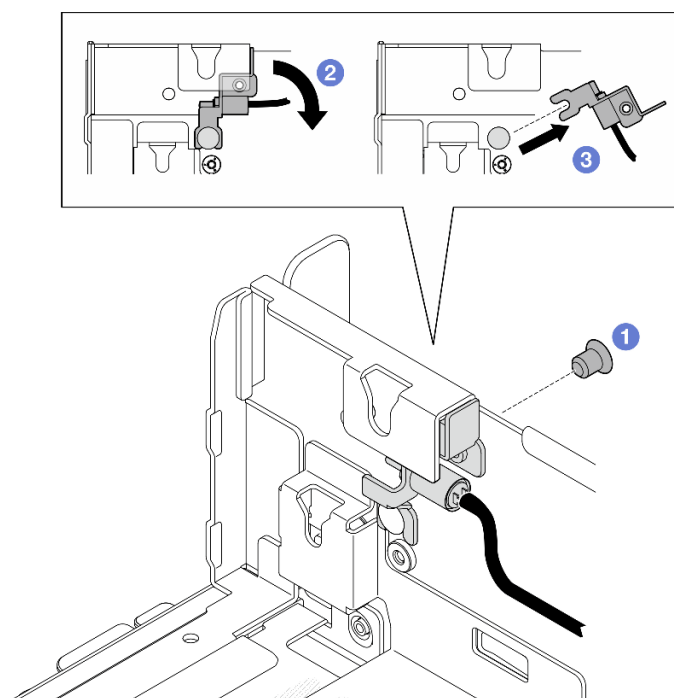


Figure 53. Removing the bezel detect switch

After this task is completed

- Install a replacement unit. See [“Install the bezel detect switch with cable” on page 82](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the bezel detect switch with cable

Follow the instructions in this section to install the bezel detect switch with cable.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the bezel detect switch.

- 1 Align the opening of the bracket with the guide pin on the chassis; then, slide the bezel detect switch toward the guide pin.
- 2 Pivot the switch as shown until it is seated in place.
- 3 Fasten one screw to secure the switch.

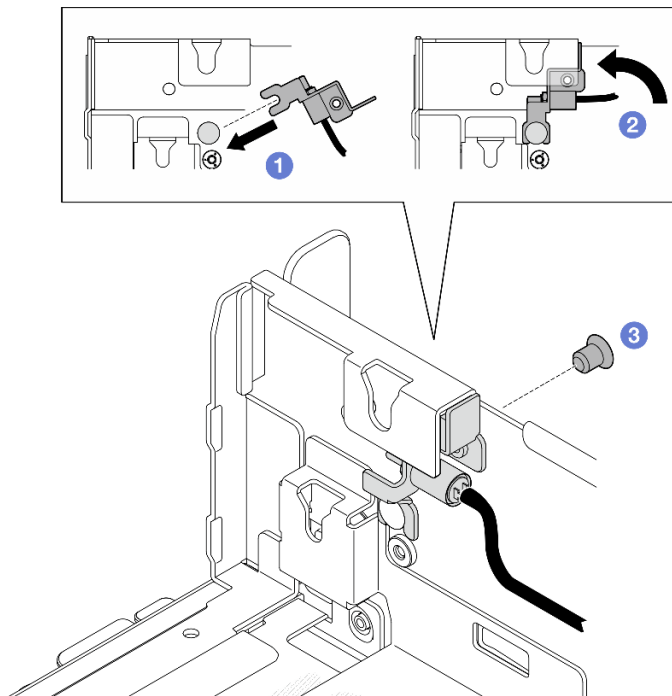


Figure 54. Installing the bezel detect switch

Step 2. Connect the bezel detect switch cable to the system board. See [“System-board connectors for cable routing” on page 244](#) to locate Bezel detect connector.

After this task is completed

- Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
- With the bezel detect switch installed, when the system is powered on, XCC would generate a detecting message referring security bezel as "sub-chassis".

Demo Video

[Watch the procedure on YouTube](#)

Cable wall with heat sink detect switch replacement

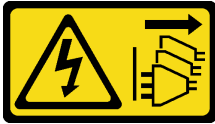
Follow instructions in this section to remove and install the cable wall with heat sink detect switch.

Remove the cable wall with heat sink detect switch

Follow the instructions in this section to remove the cable wall with heat sink detect switch.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- d. If applicable, remove the air flow sensor board. See [“Remove the air flow sensor board” on page 78](#).
- e. Remove the intrusion switch. See [“Remove the intrusion switch with cable” on page 123](#).
- f. If applicable, disconnect the cables from PCIe 8, 9, 10, 11 connector on the system board, and remove the cables that are routed through the cable wall. See [“System-board connectors for cable routing” on page 244](#) to locate the connectors.

Step 2. Disconnect the heat sink detect switch cable from the system board.

Step 3. Loosen the two screws that secure the cable wall; then, lift the cable wall to remove it.

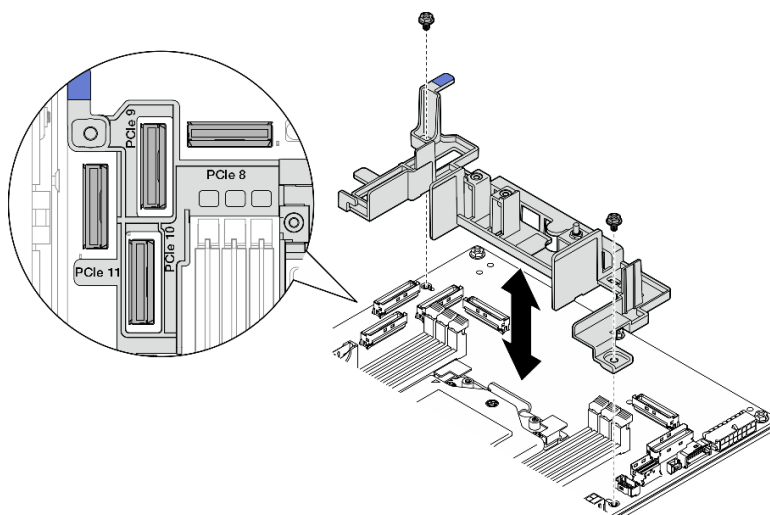


Figure 55. Removing the cable wall

After this task is completed

- Install a replacement unit. See [“Install the cable wall with heat sink detect switch” on page 85](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

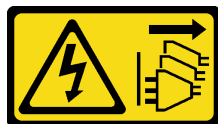
[Watch the procedure on YouTube](#)

Install the cable wall with heat sink detect switch

Follow the instructions in this section to install the cable wall with heat sink detect switch.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Procedure

- Step 1. Align the cable wall with the screw holes on the system board; then, lower down the cable wall. Make sure that the PCIe 9, 10, 11 connectors are in the holes of the cable wall.
- Step 2. Fasten two screws to secure the cable wall.

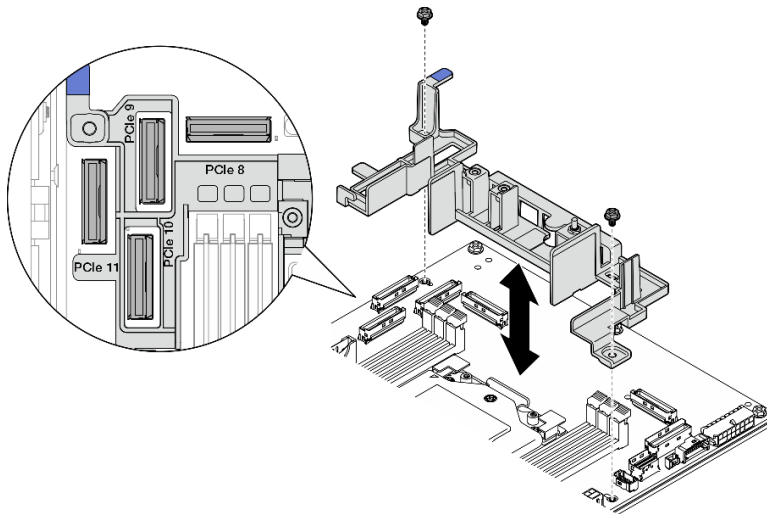


Figure 56. Installing the cable wall

- Step 3. Connect the heat sink detect switch cable to the system board. See [“System-board connectors for cable routing” on page 244](#) to locate Heat sink detect connector.

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

CMOS battery (CR2032) replacement

Follow instructions in this section to remove and install a CMOS battery (CR2032).

Remove a CMOS battery (CR2032)

Follow instructions in this section to remove a CMOS battery (CR2032).

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.

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.

S005**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Consider the following when replacing the CMOS battery.

- Lenovo has designed this product with user safety in mind. The lithium battery must be handled properly to avoid potential danger. Make sure to follow instructions in this topic while replacing the battery.
- The CMOS battery must be replaced with another unit of the same type (CR2032).
- For high temperature operation environment, it is recommended to use CR2032HR instead.
- After replacement is completed, it is required to reconfigure the server and reset the system date and time.
- Dispose of the CMOS battery as required by local ordinances or regulations.
- 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.

Notes: If one of the following situations occurs, the system enters System Lockdown Mode and needs to be activated or unlocked. See [“Activate or unlock the system” on page 270](#).

- The 3V security battery (CR2032) is replaced.
- When Chassis Intrusion Detection is **Enabled** in Lenovo XClarity Controller, the 3V system battery (CR2032) is replaced, or CMOS is cleared.

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Locate the CMOS battery to be removed:

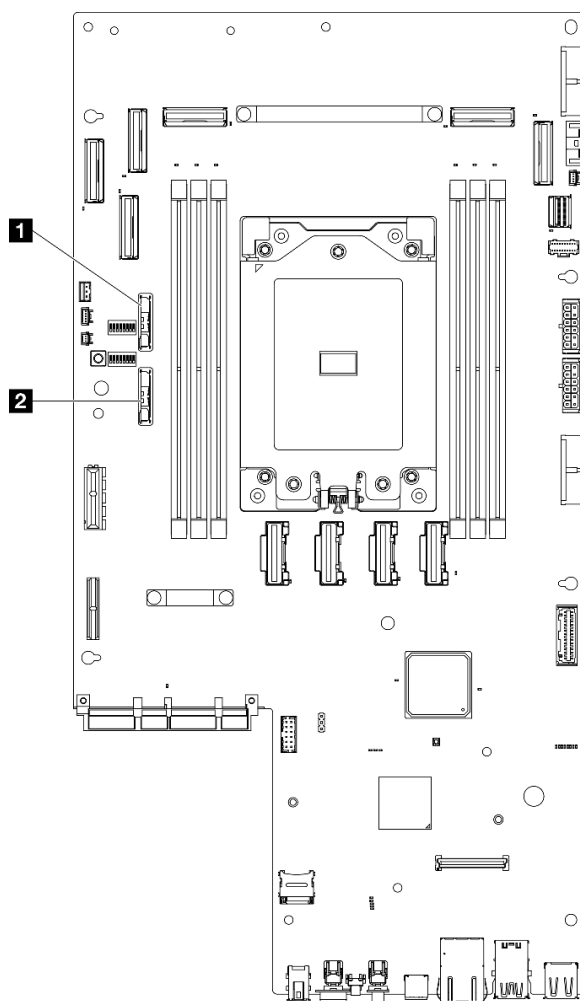


Figure 57. CMOS battery locations on the system board

| | |
|---------------------------------------|-------------------------------------|
| 1 3V security battery (CR2032) | 2 3V system battery (CR2032) |
|---------------------------------------|-------------------------------------|

Notes: If one of the following situations occurs, the system enters System Lockdown Mode and needs to be activated or unlocked. See [“Activate or unlock the system” on page 270](#).

- The 3V security battery (CR2032) is replaced.
- When Chassis Intrusion Detection is **Enabled** in Lenovo XClarity Controller, the 3V system battery (CR2032) is replaced, or CMOS is cleared.

Step 3. Open the retaining latch to disengage the battery; then, lift the battery to remove it from the seat.

Attention: Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the system board. Any damage to the socket may require replacing the system board.

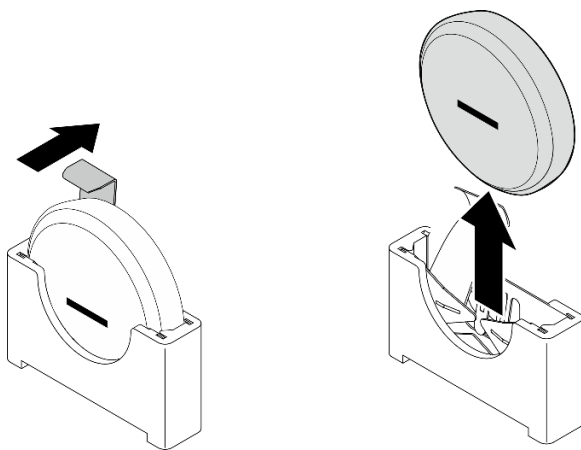


Figure 58. Removing the CMOS battery

After this task is completed

1. Dispose of the CMOS battery as required by local ordinances or regulations.
2. Install a replacement unit. See [“Install a CMOS battery \(CR2032\)” on page 90](#).

Demo Video

[Watch the procedure on YouTube](#)

Install a CMOS battery (CR2032)

Follow instructions in this section to install a CMOS battery (CR2032).

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.

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.

S005



CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Consider the following when replacing the CMOS battery.

- Lenovo has designed this product with user safety in mind. The lithium battery must be handled properly to avoid potential danger. Make sure to follow instructions in this topic while replacing the battery.
- The CMOS battery must be replaced with another unit of the same type (CR2032).
- For high temperature operation environment, it is recommended to use CR2032HR instead.
- After replacement is completed, it is required to reconfigure the server and reset the system date and time.
- Dispose of the CMOS battery as required by local ordinances or regulations.
- 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.

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- To avoid potential damage, **do not** let the CMOS battery contact any metal surface.
- Make sure that all the server power cords are disconnected from power source before performing this procedure.

Procedure

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

Step 2. Locate the CMOS battery socket on the system board.

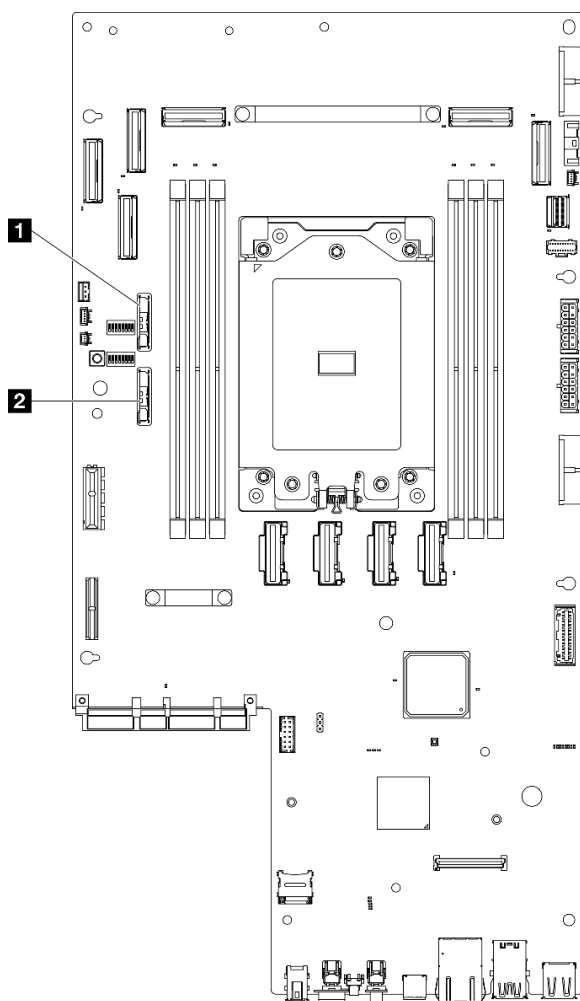


Figure 59. CMOS battery locations on the system board

| | |
|---------------------------------------|-------------------------------------|
| 1 3V security battery (CR2032) | 2 3V system battery (CR2032) |
|---------------------------------------|-------------------------------------|

Notes: If one of the following situations occurs, the system enters System Lockdown Mode and needs to be activated or unlocked. See [“Activate or unlock the system” on page 270](#).

- The 3V security battery (CR2032) is replaced.
- When Chassis Intrusion Detection is **Enabled** in Lenovo XClarity Controller, the 3V system battery (CR2032) is replaced, or CMOS is cleared.

Step 3. Align the CMOS battery with the base of the seat, with negative (-) side faces middle of the chassis. Then, pivot the top of the battery until the battery clicks in place.

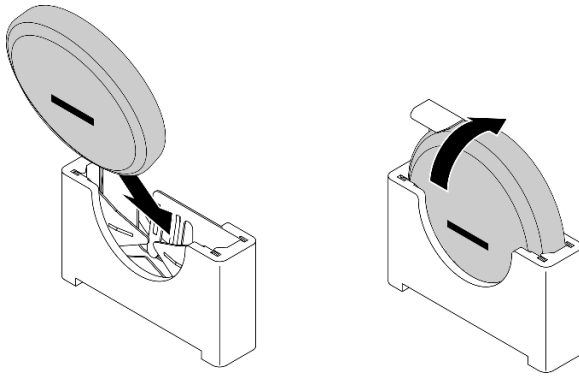


Figure 60. Installing the CMOS battery

After this task is completed

1. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
2. If one of the following situations occurs, the system enters System Lockdown Mode and needs to be activated or unlocked. See [“Activate or unlock the system” on page 270](#).
 - The 3V security battery (CR2032) is replaced.
 - When Chassis Intrusion Detection is **Enabled** in Lenovo XClarity Controller, the 3V system battery (CR2032) is replaced, or CMOS is cleared.
3. Power on the server; then, reset date, time, and all the passwords.

Demo Video

[Watch the procedure on YouTube](#)

Fan module replacement

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

Remove a fan module

Follow instructions in this section to remove a fan module.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).

Step 2. Remove the fan module.

- 1 Pinch and hold the blue touch points on top of the fan module.
- 2 Lift the fan module out of the chassis.

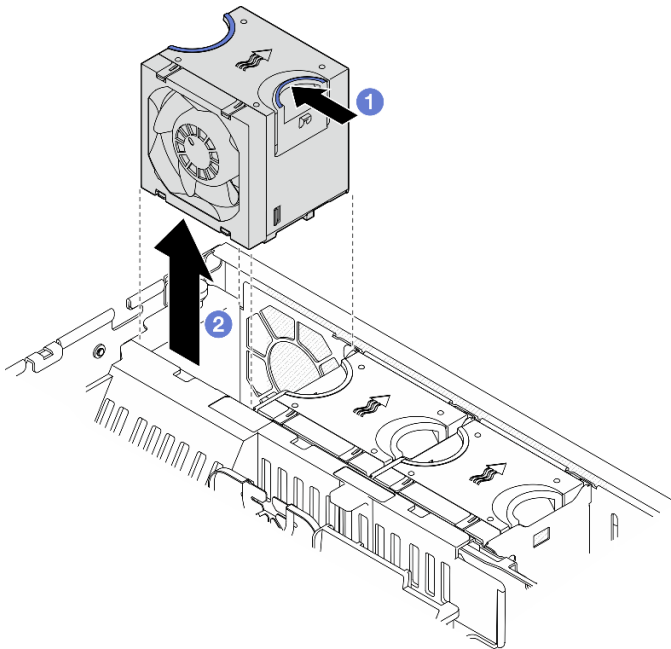


Figure 61. Removing a fan module

After this task is completed

- Install a replacement unit. See [“Install a fan module” on page 94](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install a fan module

Follow instructions in this section to install a fan module.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the fan to the fan slot in the fan cage; then, insert the fan into the fan cage and press it until it clicks into place.

Note: Press the fan to make sure it is seated correctly on the fan control board.

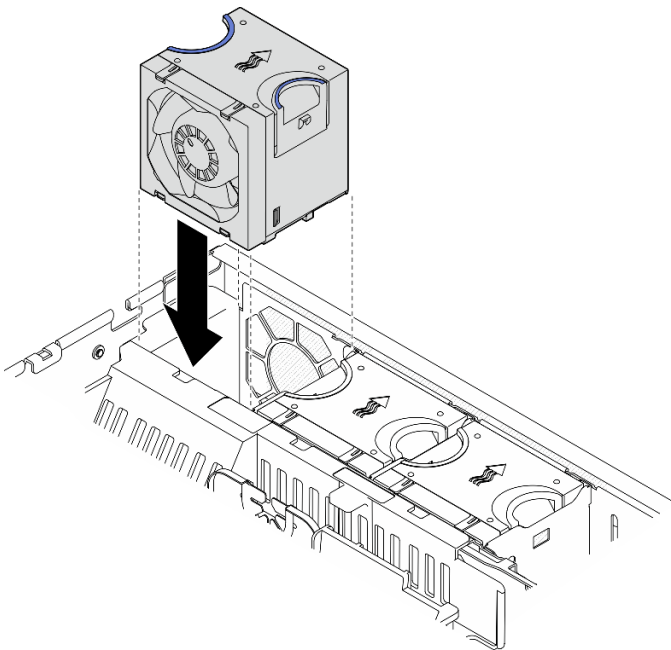


Figure 62. Installing a fan

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Fan cage and fan control board (FCB) replacement

Follow instructions in this section to remove and install the fan cage and the fan control board (FCB).

Remove the fan cage

Follow instructions in this section to remove the fan cage.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- d. Remove all the fan modules. See [“Remove a fan module” on page 93](#).

Step 2. Remove the fan cage.

- a. ① Loosen the two thumbscrews on the sides of the fan cage.
- b. ② Lift the fan cage up until the guide pin on the chassis is seated in the large opening of the guiding slot on fan cage.
- c. ③ Move the cage forward and remove it from the chassis.

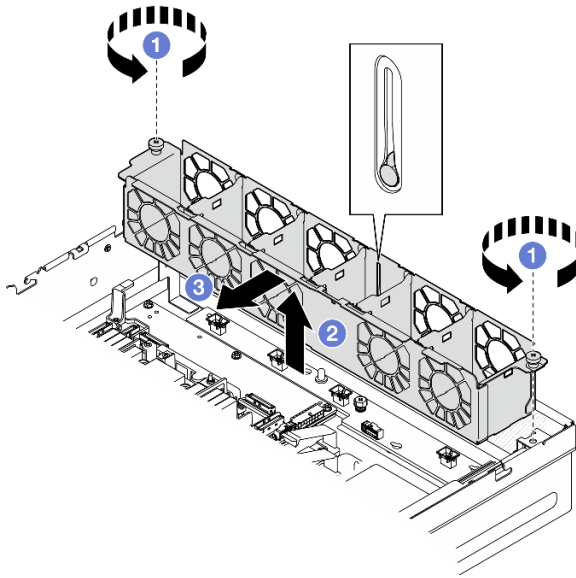


Figure 63. Removing the fan cage

After this task is completed

- If necessary, proceed to remove the fan control board. See [“Remove the fan control board \(FCB\)” on page 97](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove the fan control board (FCB)

Follow the instructions in this section to remove the fan control board (FCB).

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the fan modules. See [“Remove a fan module” on page 93](#).
- Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- Remove the fan cage. See [“Remove the fan cage” on page 96](#).

Step 2. Disconnect all the cables from the fan control board.

Step 3. Remove the fan control board.

- ① Loosen the thumbscrew that secures the fan control board.
- ② Slide the fan control board until the guide pins on the chassis are seated on the large opening of the keyholes; then, lift the fan control board to remove it.

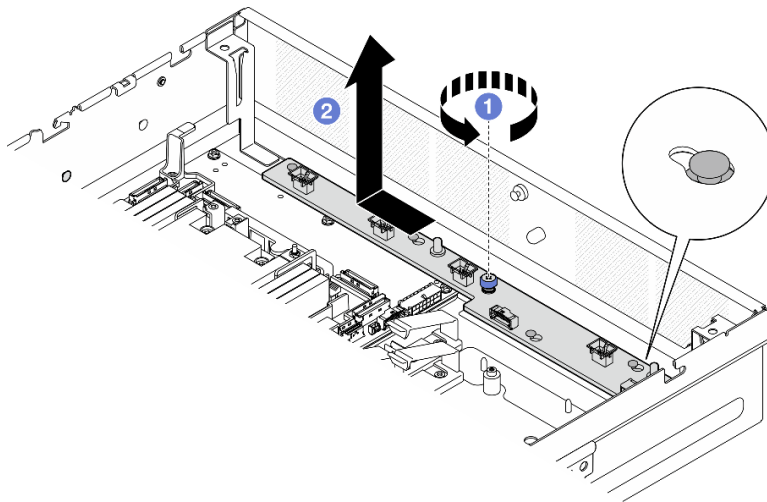


Figure 64. Removing the fan control board

After this task is completed

- Install a replacement unit. See [“Install the fan control board \(FCB\)” on page 98](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the fan control board (FCB)

Follow the instructions in this section to install the fan control board (FCB).

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the fan control board.

- 1 Align the fan control board with the guide pins on the chassis; then, lower down and slide the fan control board until the guide pins are seated in the small opening of the keyholes.
- 2 Fasten the thumbscrew to secure the fan control board.

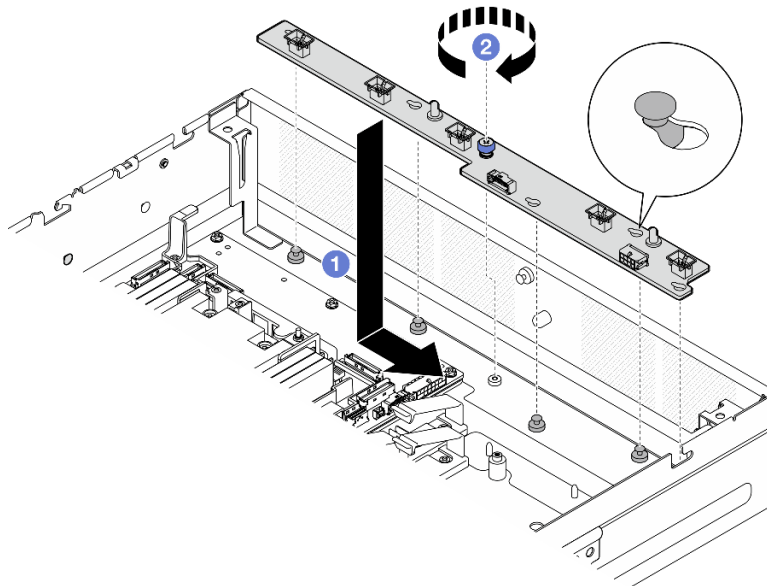


Figure 65. Installing the fan control board

Step 2. Connect the cables to the fan control board. See [“Power distribution board \(PDB\) and fan control board \(FCB\) cable routing” on page 246](#).

After this task is completed

1. Reinstall the fan cage. See [“Install the fan cage” on page 100](#).
2. Reinstall all the fan modules. See [“Install a fan module” on page 94](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install the fan cage

Follow instructions in this section to install the fan cage.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Before reinstalling the fan cage, make sure to remove all the fan modules from the fan cage. See [“Remove a fan module” on page 93](#).
- b. Make sure the fan control board is installed properly. See [“Install the fan control board \(FCB\)” on page 98](#).

Step 2. Install the fan cage.

- a. ① Push the fan cage toward the chassis until the guide pin is seated in the large opening of the guiding slot on fan cage.
- b. ② Lower the fan cage down into the chassis.
- c. ③ Fasten the two thumbscrews to secure the fan cage.

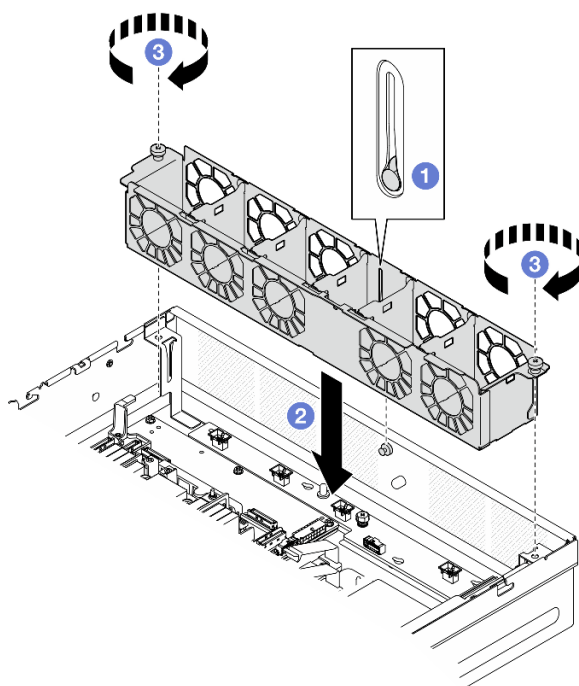


Figure 66. Installing the fan cage

After this task is completed

1. Reinstall all the fan modules. See [“Install a fan module” on page 94](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Front hot-swap drive and front drive backplane replacement

Follow instructions in this section to remove and install the front hot-swap drives and the front drive backplane.

Remove a front hot-swap drive

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

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.

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

Notes:

- Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.
- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 223](#) for more information.

Procedure

Step 1. Locate the front hot-swap drive to be removed.

Table 18. Front drive bay numbering (viewed from the front)

| | |
|-------|-------|
| Bay 0 | Bay 2 |
| Bay 1 | Bay 3 |

Step 2. Remove the hot-swap drive.

- 1 Slide the release latch to unlock the drive handle.
- 2 Rotate the drive handle to the open position.
- 3 Grasp the handle and slide the drive out of the drive bay.

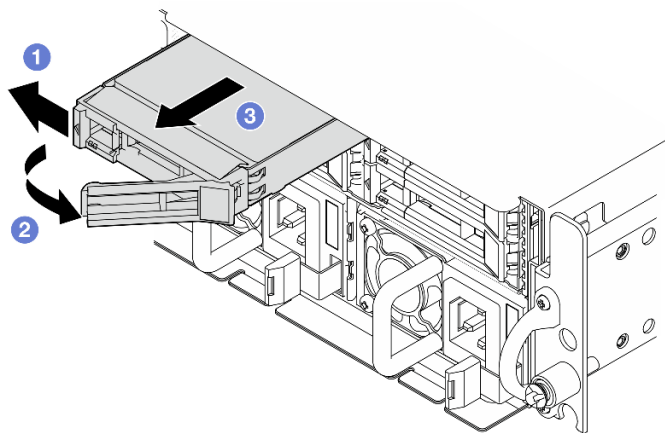


Figure 67. Removing a front hot-swap drive

After this task is completed

- Install a new drive or drive filler into the vacant drive bay. See [“Install a front hot-swap drive” on page 108](#).

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

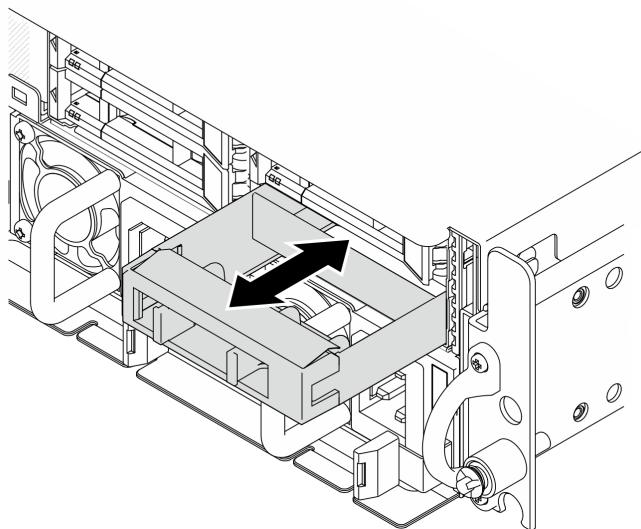


Figure 68. Installing a drive filler

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

Demo Video

[Watch the procedure on YouTube](#)

Remove the front drive backplane

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

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Note: Depending on the configuration, the drive backplane might look slightly different from the illustration in this section.

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the front drives. See [“Remove a front hot-swap drive” on page 101](#).

Step 2. Pinch the blue touch points on the backplane bracket as shown; then, lift the backplane to remove it.

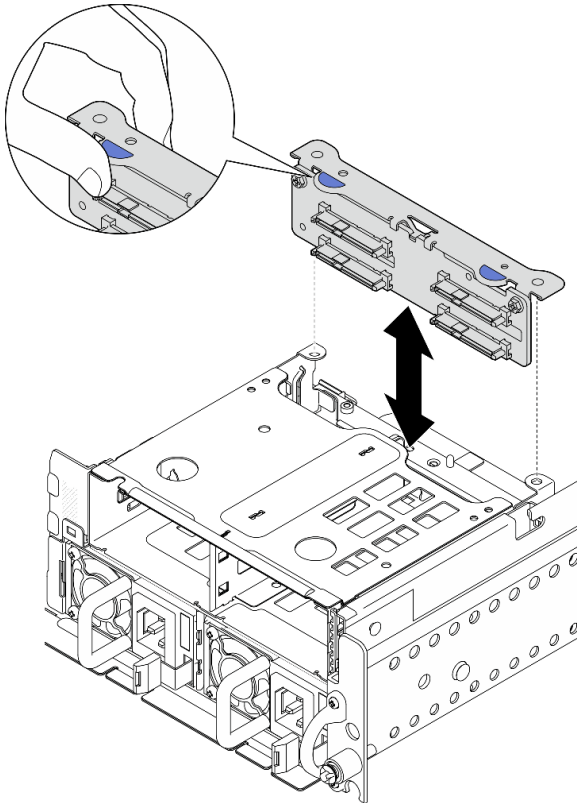


Figure 69. Removing the front drive backplane

Step 3. Disconnect the cables from the drive backplane.

Step 4. If necessary, loosen the two screws to separate the drive backplane from the backplane bracket.

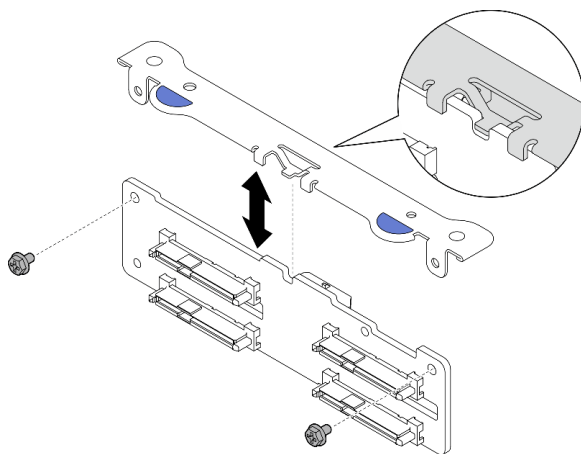


Figure 70. Separating the drive backplane from the backplane bracket

After this task is completed

- Install a replacement unit. See [“Install the front drive backplane” on page 105](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the front drive backplane

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: Depending on the configuration, the drive backplane might look slightly different from the illustration in this section.

Procedure

- Step 1. If necessary, assemble the backplane with the backplane bracket.
- Align the notch of the backplane with the nub of the bracket; then, insert the backplane to the bracket until the backplane is seated in place.
 - Secure the backplane with two screws.

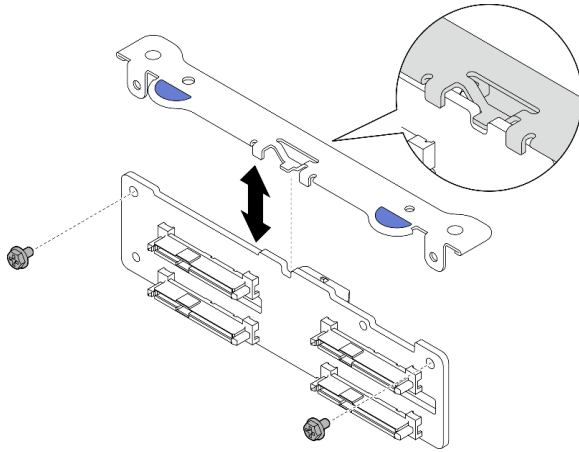


Figure 71. Securing the backplane to the backplane bracket

- Step 2. Connect the power and signal cables to the drive backplane.

Note: For configurations with front and internal drive backplanes, and both the backplanes connect to x350 RAID adapter, make sure to connect the signal cable from C0 connector of the RAID adapter to the front backplane.

- Step 3. Pinch the blue touch points on the backplane bracket as shown; then, press the backplane into the slot until it clicks into place.

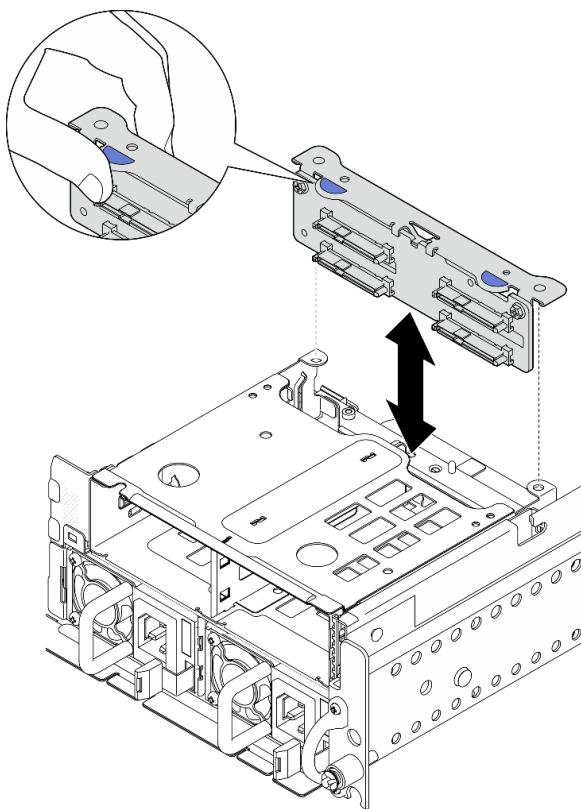


Figure 72. Installing the front drive backplane

- Step 4. Make sure the front drive backplane cables are secured in the cable clip on the front drive cage. If necessary, route the front backplane power cable into the cable clip; then, route the front backplane signal cable into the cable clip.

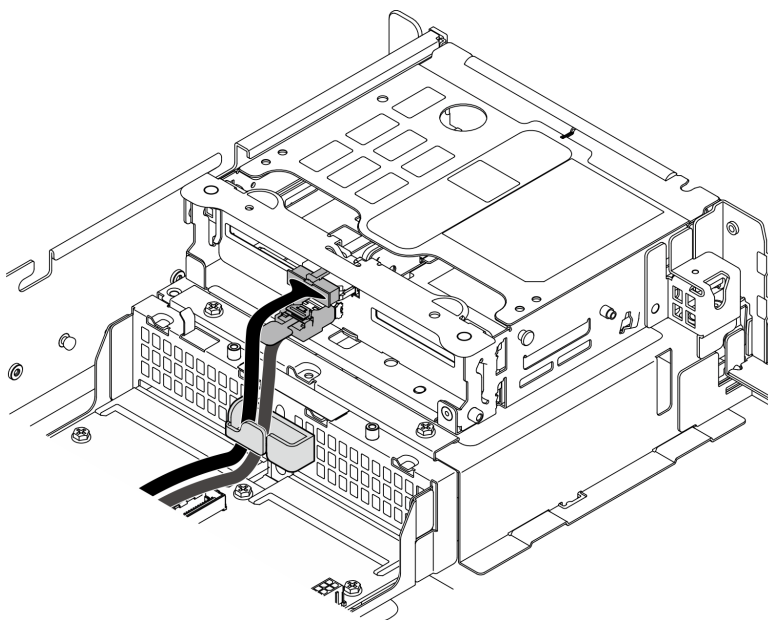


Figure 73. Front drive backplane cable routing

After this task is completed

1. Reinstall the drives and drive bay fillers (if any) into the front drive bays. See [“Install a front hot-swap drive” on page 108](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install a front hot-swap drive

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

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

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

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive.

Table 19. Front drive bay numbering (viewed from the front)

| | |
|-------|-------|
| Bay 0 | Bay 2 |
| Bay 1 | Bay 3 |

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/thinkedge/se455v3/7dbv/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 277](#) for more information on firmware updating tools.

Procedure

Step 1. If a drive filler is installed in the drive bay, remove it first. Keep the drive filler in a safe place for future use.

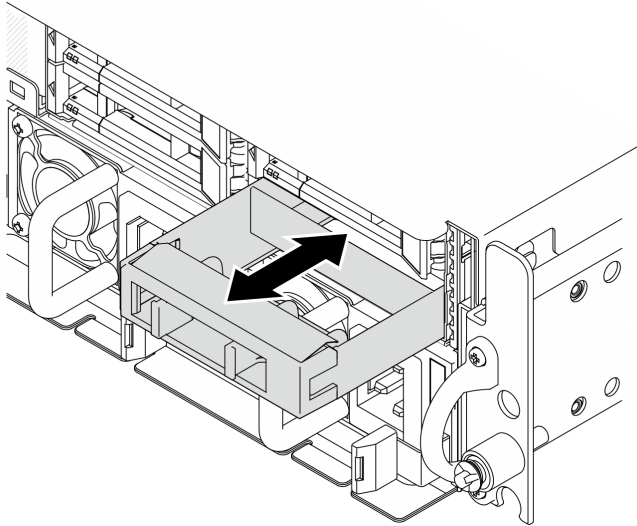


Figure 74. Removing a drive filler

Step 2. Install the drive.

- a. ① Slide the drive into the drive bay, and push it until it stops.
- b. ② Rotate the handle back to the locked position.

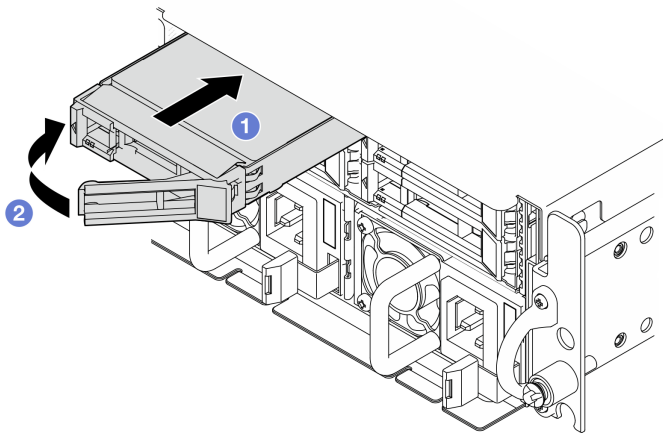


Figure 75. Installing a front hot-swap drive

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

After this task is completed

1. After an SED is installed, if SED encryption is enabled on the system, reboot the system.

Note: When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 223](#) for more information.

2. Check the drive status LED to verify that the drive is operating correctly.
 - If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.
 - If the green drive activity LED is flashing, the drive is being accessed.
3. If the server is configured for RAID operation through a RAID adapter, you might have to reconfigure your disk arrays after you install drives. See [RAID configuration](#) for more information.

Demo Video

[Watch the procedure on YouTube](#)

Internal drive, drive cage, and drive backplane replacement

Follow instructions in this section to remove and install the internal drives, drive cage, and drive backplane.

Remove an internal drive

Follow instructions in this section to remove an internal drive.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

- Step 1. Make preparation for this task.
- Remove the top cover. See [“Remove the top cover” on page 237.](#)
- Step 2. Pinch and lift the handles to pivot the internal drive cage up.

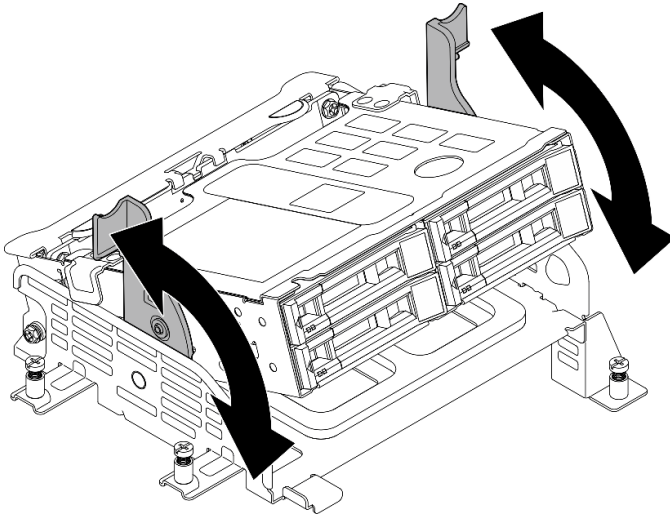


Figure 76. Pivoting the internal drive cage

- Step 3. Locate the internal drive to be removed.

Table 20. Internal drive bay numbering (viewed from the front of the internal drive cage)

| | |
|-------|-------|
| Bay 4 | Bay 6 |
| Bay 5 | Bay 7 |

- Step 4. Remove the internal drive.
- 1 Slide the release latch to unlock the drive handle.
 - 2 Rotate the drive handle to the open position.
 - 3 Grasp the handle and slide the drive out of the drive bay.

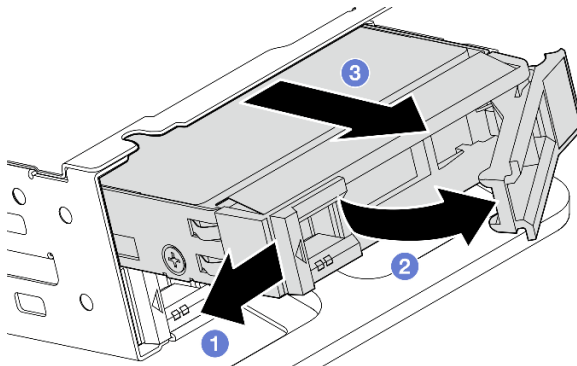


Figure 77. Removing an internal drive

After you finish

- Install a replacement unit. See [“Install an internal drive” on page 121.](#)

- If there is no replacement internal drive to be installed, pinch the handles and press the internal drive cage down; then, complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove the internal drive backplane

Follow instructions in this section to remove the internal drive backplane.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Note: Depending on the configuration, the drive backplane might look slightly different from the illustration in this section.

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- Pinch the handles and press the internal drive cage down.

Step 2. If applicable, disengage the following cables from the cable clip of the processor air baffle.

1. The blue signal cable of PCIe riser 2
2. Power cable of internal drive backplane
3. Signal cable of internal drive backplane

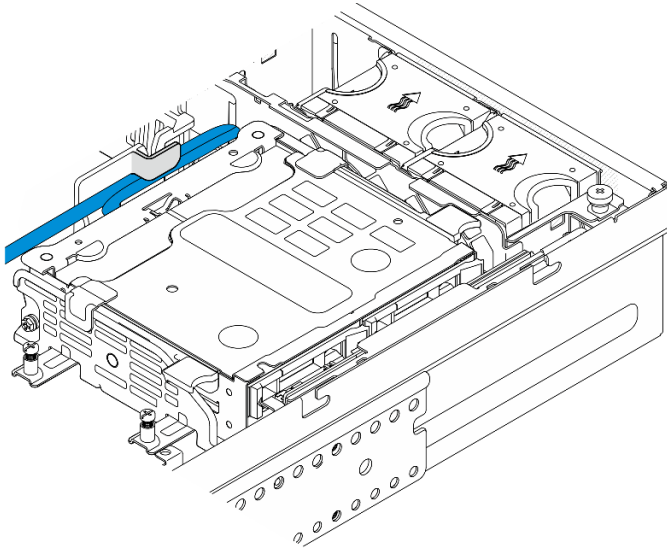


Figure 78. Cables secured by the cable clip of processor air baffle

- Step 3. Pinch the blue touch points on the backplane bracket as shown; then, lift the backplane to remove it.

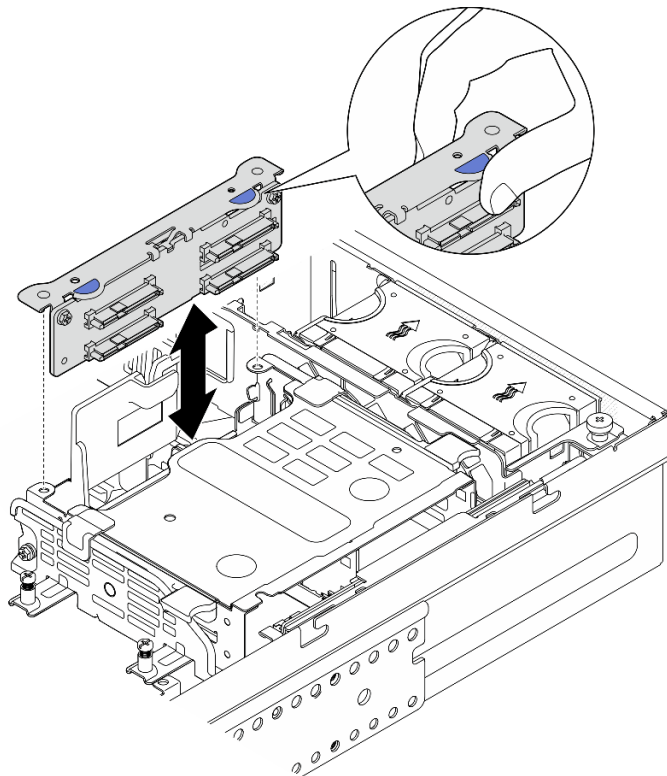


Figure 79. Removing the internal drive backplane

- Step 4. Disconnect the cables from the drive backplane.
 Step 5. If necessary, loosen the two screws to separate the drive backplane from the backplane bracket.

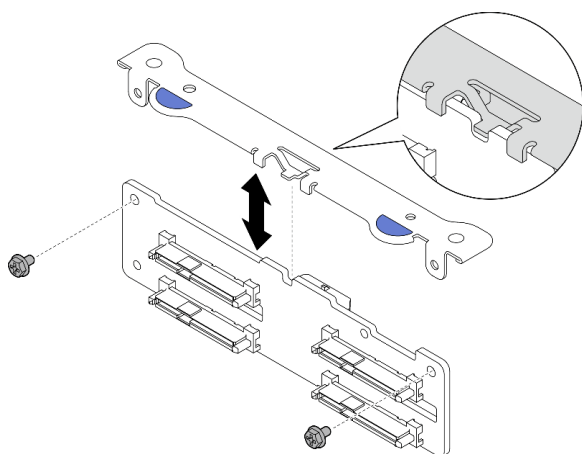


Figure 80. Separating the drive backplane from the backplane bracket

After this task is completed

- Install a replacement unit. See [“Install the internal drive backplane” on page 117](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove the internal drive cage

Follow instructions in this section to the internal drive cage.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- c. Remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).

Step 2. Loosen the four captive screws on the internal drive cage; then, lift the internal drive cage to remove it.

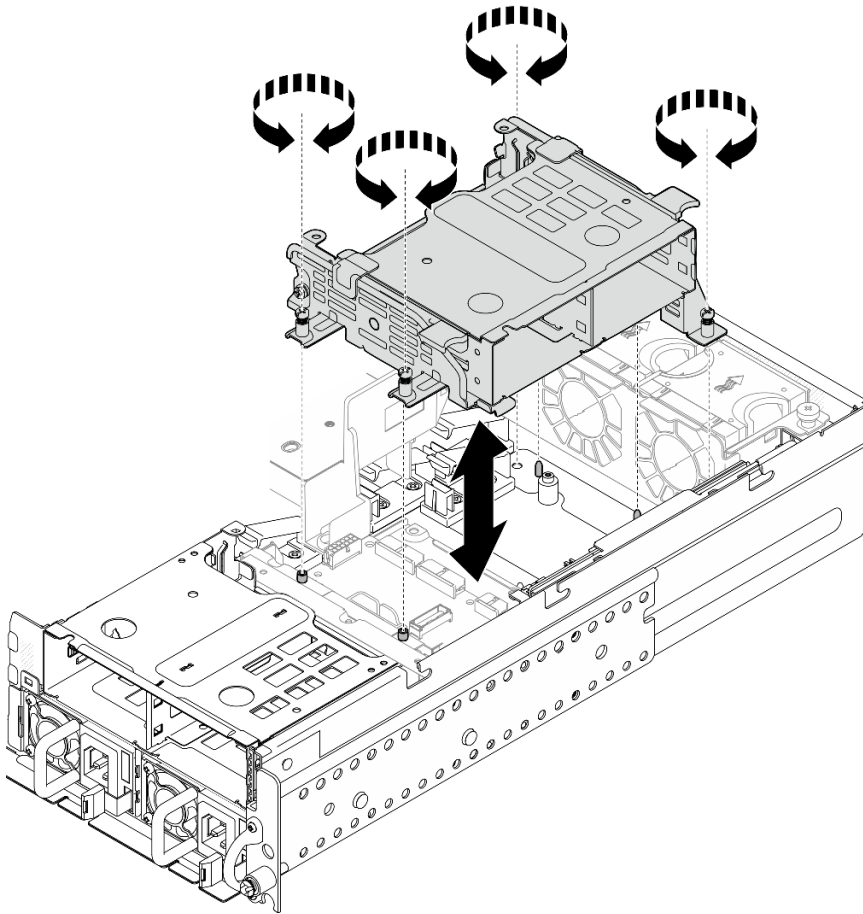


Figure 81. Removing the internal drive cage

After this task is completed

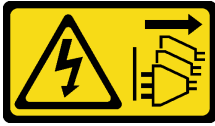
- Install a replacement unit. See [“Install the internal drive cage” on page 115](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the internal drive cage

Follow instructions in this section to install the internal drive cage.

**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.

About this task**Attention:**

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

Procedure

- Step 1. To avoid interfering with the internal drive cage, route the cables for internal drive backplane to the cable clip on the processor air baffle to fix the cables.

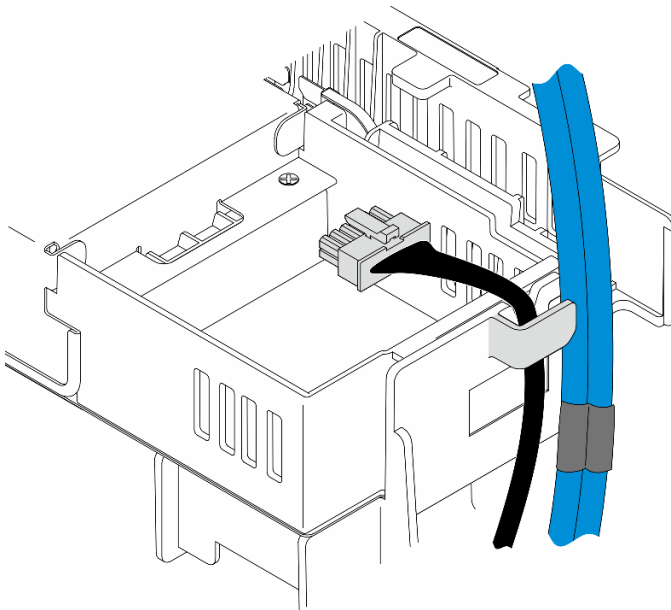


Figure 82. Internal backplane cables on cable clip

- Step 2. Install the internal drive cage.
- a. Align the internal drive cage with the guide pins on the chassis; then, lower the internal drive cage down.

Note: Make sure the cables of PCIe riser 2 and front drive backplane are not covered by the internal drive cage.

- b. Fasten the four captive screws to secure the internal drive cage.

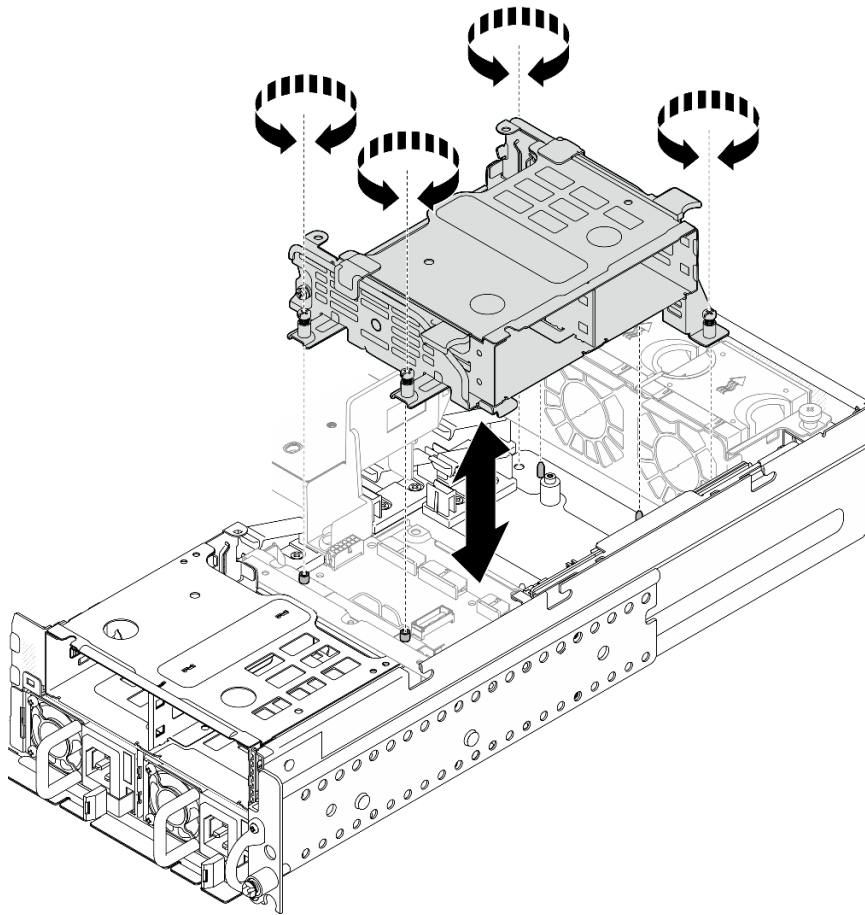


Figure 83. Installing the internal drive cage

After this task is completed

1. Proceed to install the internal drive backplane. See [“Install the internal drive backplane” on page 117](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install the internal drive backplane

Follow instructions in this section to install the internal drive backplane.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: Depending on the configuration, the drive backplane might look slightly different from the illustration in this section.

Procedure

- Step 1. If necessary, assemble the backplane with the backplane bracket.
- a. Align the notch of the backplane with the nub of the bracket; then, insert the backplane to the bracket until the backplane is seated in place.
 - b. Secure the backplane with two screws.

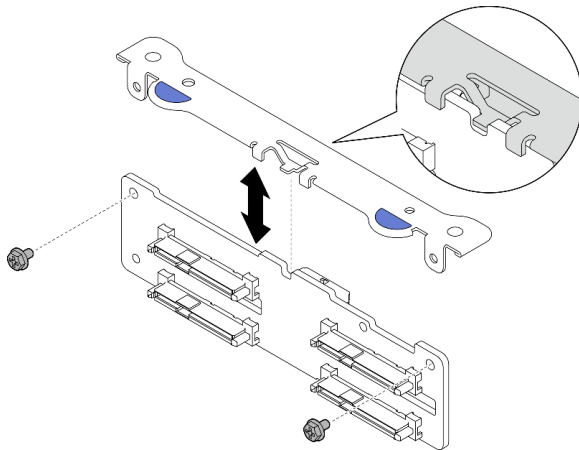


Figure 84. Securing the backplane to the backplane bracket

- Step 2. Release the internal backplane power and signal cables from the cable clip on the processor air baffle.

Note: The number of internal backplane signal cables varies by configurations.

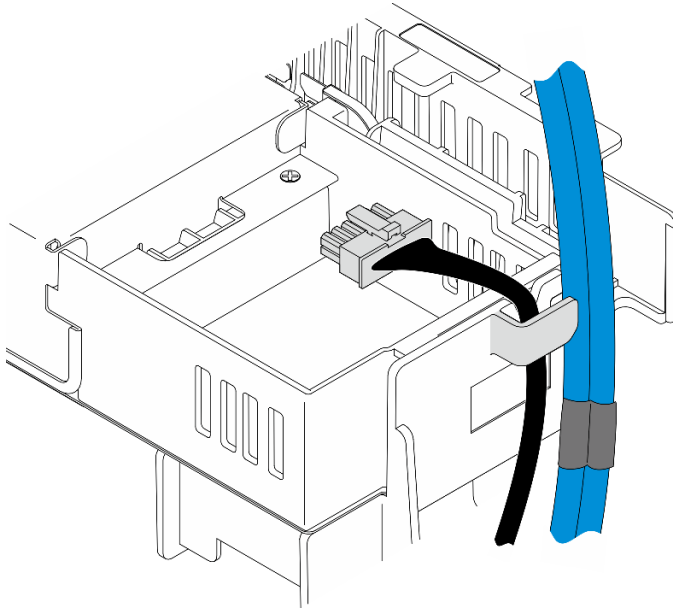


Figure 85. Internal backplane cables on cable clip

- Step 3. Connect the power and signal cables to the drive backplane.
- Step 4. Pinch the blue touch points on the backplane bracket as shown; then, press the backplane into the slot until it clicks into place.

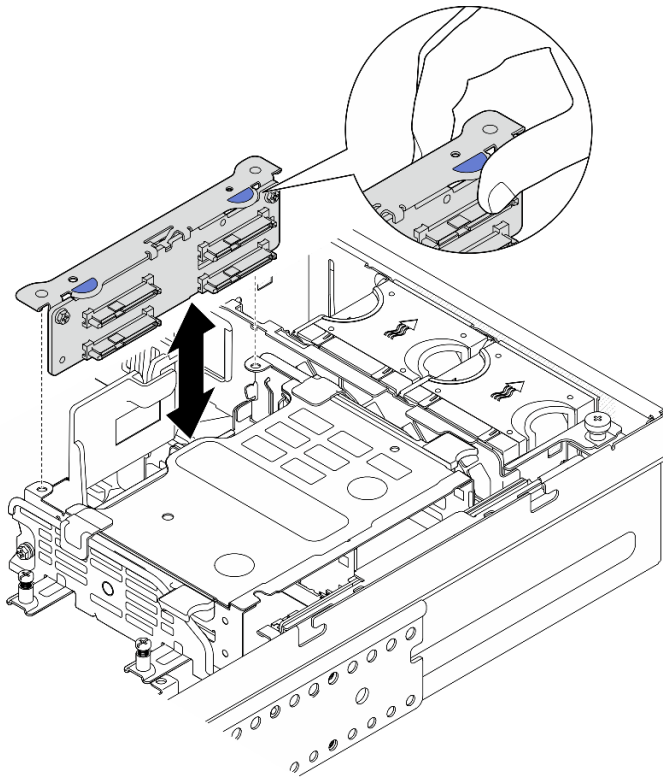


Figure 86. Installing the internal drive backplane

- Step 5. Manage the cables.

- a. If applicable, press the following cables down and make sure that the cables are under the cable clip of the processor air baffle.
 1. Signal cable of internal drive backplane
 2. Power cable of internal drive backplane
 3. The blue signal cable of PCIe riser 2

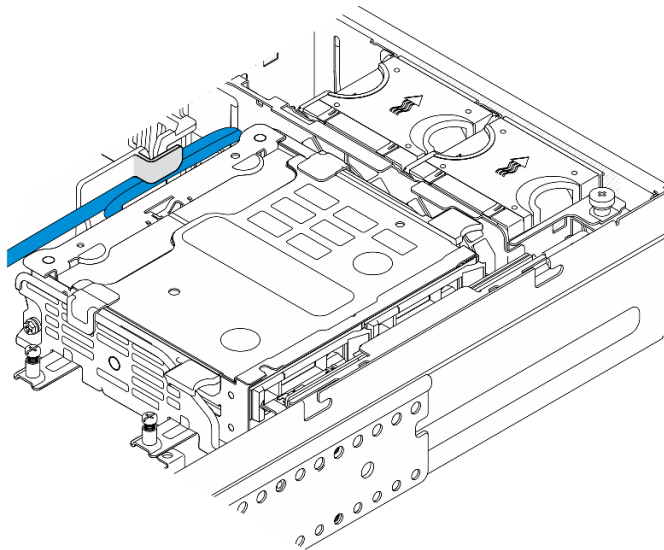


Figure 87. Internal drive backplane cable routing

- b. Press the silver signal cable of PCIe riser 2 down to the space between the front drive backplane and the internal drive cage.

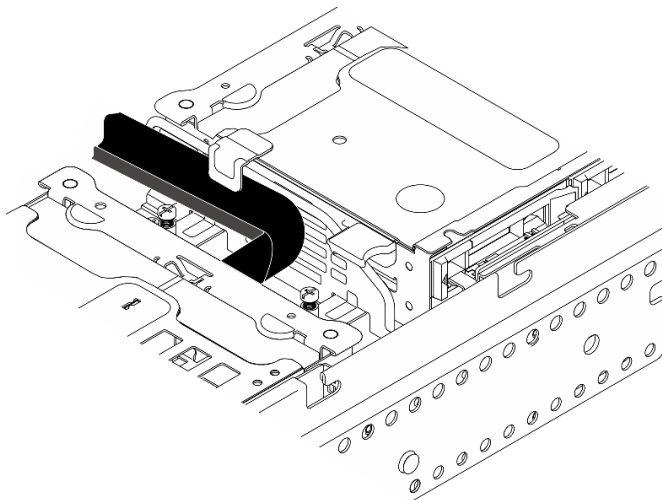


Figure 88. Front drive backplane cable routing

After this task is completed

1. Reinstall the drives into the internal drive bays. See [“Install an internal drive” on page 121](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install an internal drive

Follow instructions in this section to install an internal drive.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

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

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- The drive bays are numbered to indicate the installation order. Follow the installation order when you install a drive.

Table 21. Internal drive bay numbering (viewed from the front of the internal drive cage)

| | |
|-------|-------|
| Bay 4 | Bay 6 |
| Bay 5 | Bay 7 |

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/thinkedge/se455v3/7dbv/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 277 for more information on firmware updating tools.

Procedure

Step 1. If applicable, pinch and lift the handles to pivot the internal drive cage up.

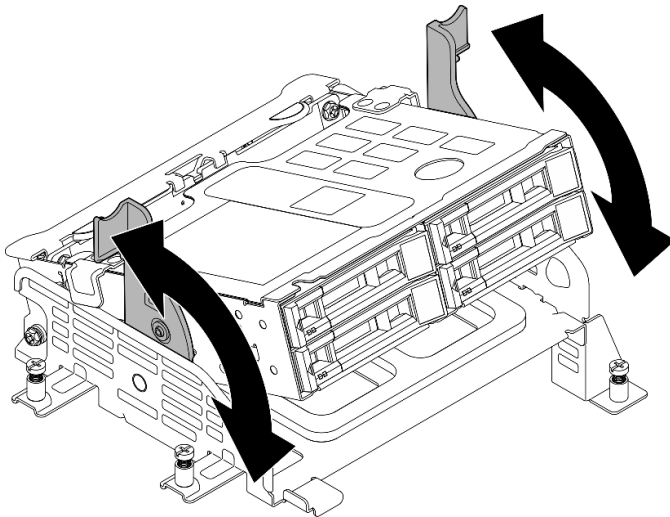


Figure 89. Pivoting the internal drive cage

Step 2. Install the drive.

- 1 Slide the drive into the drive bay, and push it until it stops.
- 2 Rotate the handle back to the locked position.

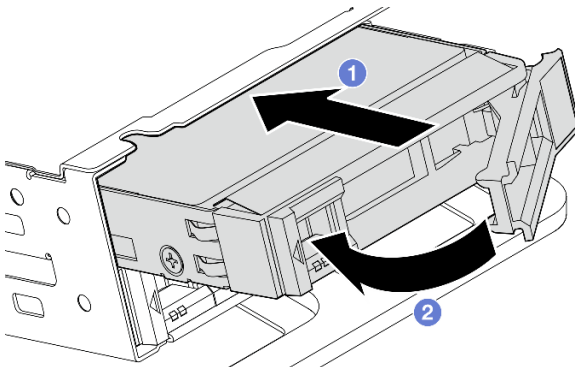


Figure 90. Installing an internal drive

Note: If necessary, repeat this procedure to other internal drives to be installed.

Step 3. Pinch the handles and press the internal drive cage down.

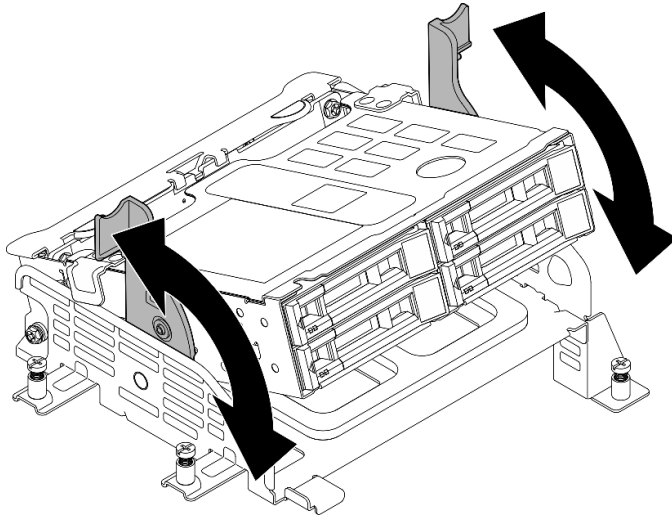


Figure 91. Pivoting the internal drive cage

After this task is completed

1. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
2. If the server is configured for RAID operation through a RAID adapter, you might have to reconfigure your disk arrays after you install drives. See [RAID configuration](#) for more information.

Demo Video

[Watch the procedure on YouTube](#)

Intrusion switch with cable replacement

Follow instructions in this section to remove and install the intrusion switch with cable.

Remove the intrusion switch with cable

Follow the instructions in this section to remove the intrusion switch with cable.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Disconnect the intrusion switch cable from the system board.

Step 3. Loosen the captive screw that secures the intrusion switch, and pull the intrusion switch up to remove it.

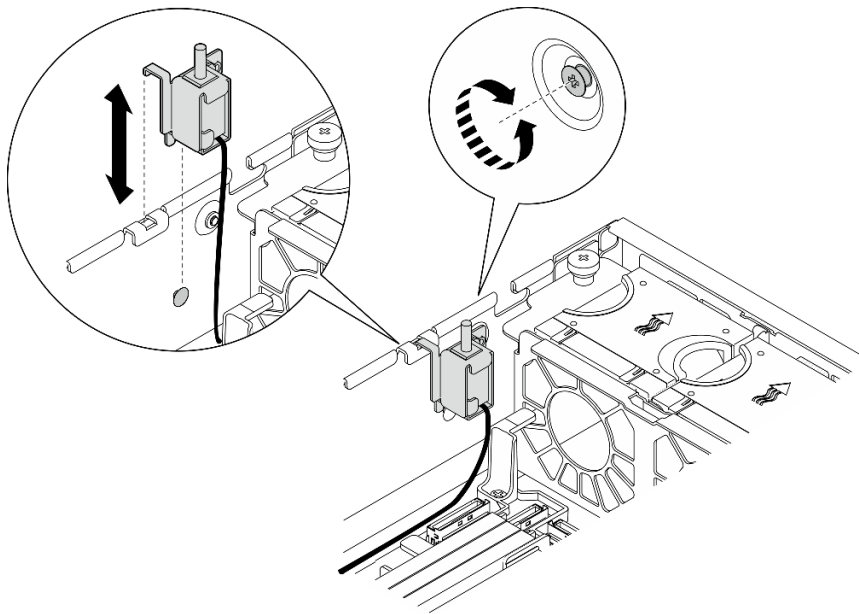


Figure 92. Removing the intrusion switch with cable

After this task is completed

- Install a replacement unit. See [“Install the intrusion switch with cable” on page 124](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

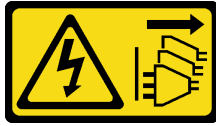
Demo Video

[Watch the procedure on YouTube](#)

Install the intrusion switch with cable

Follow the instructions in this section to install the intrusion switch with cable.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

- Step 1. Align the intrusion switch with the guide slot and shoulder pin on the chassis; then, insert the intrusion switch until it is seated in place.
- Step 2. Press the intrusion switch toward the chassis; meanwhile, fasten the captive screw to secure the intrusion switch.

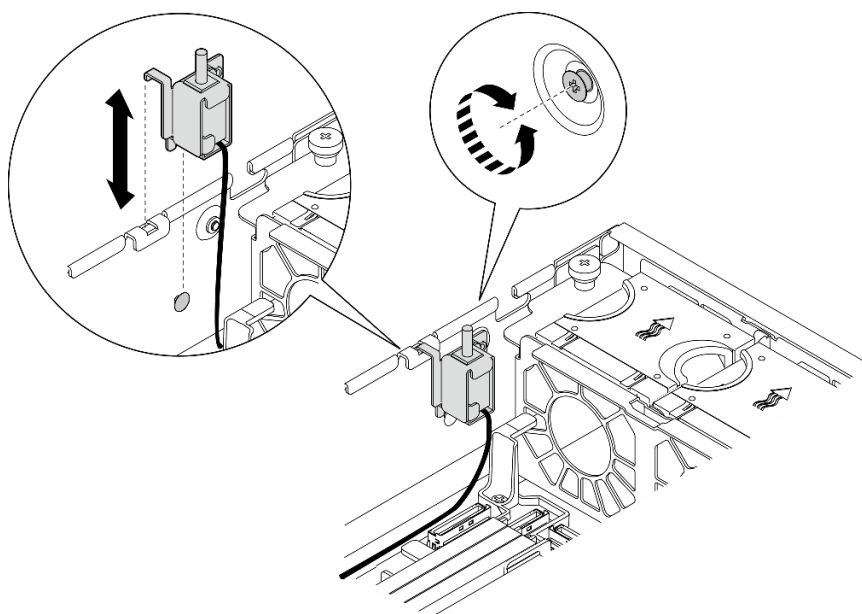


Figure 93. Installing the intrusion switch

Step 3. Connect the intrusion switch cable to the system board. See [“System-board connectors for cable routing” on page 244](#) to locate Intrusion switch connector.

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

M.2 backplane assembly and M.2 drive replacement

Follow instructions in this section to remove and install the M.2 backplane assembly, M.2 drive and M.2 backplane.

Remove the M.2 backplane assembly

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).

Step 2. Remove the M.2 backplane assembly.

- a. ① Loosen the captive screw that secures the M.2 backplane assembly.
- b. ② Pinch the pull tape and the blue touch point, and slide the M.2 backplane assembly backward to disengage it from the chassis; then, lift the assembly up to remove it.

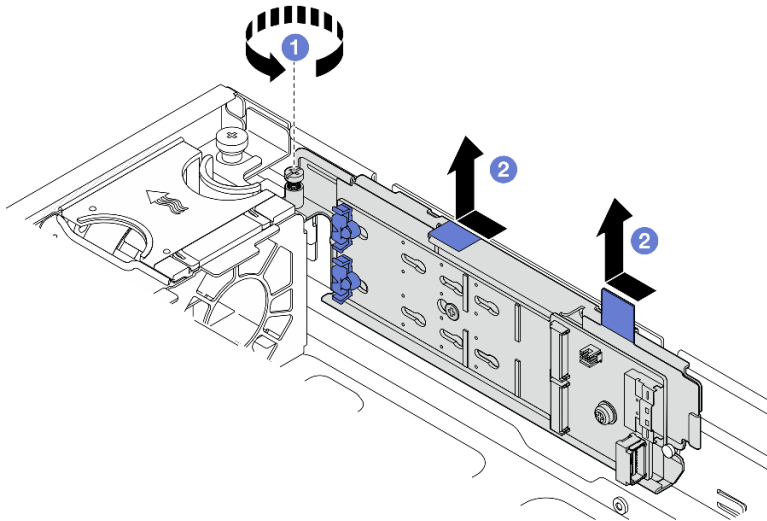


Figure 94. Removing the M.2 backplane assembly

Step 3. Disconnect the cables from the M.2 backplane.

SATA/x4 NVMe M.2 backplane

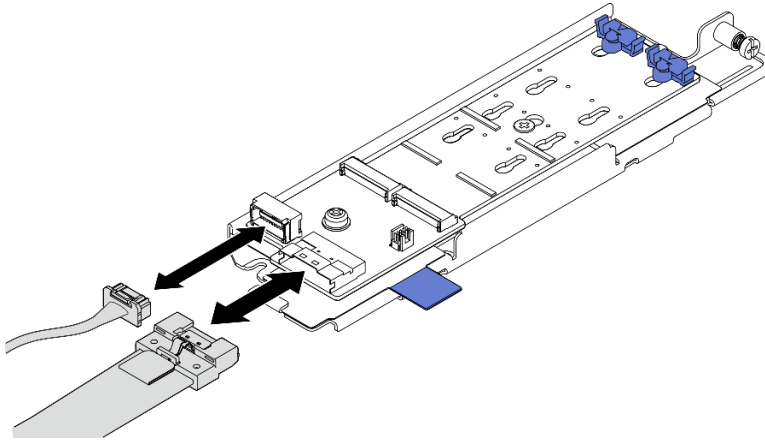


Figure 95. Disconnecting cable from SATA/x4 NVMe M.2 backplane

SATA/NVMe M.2 backplane

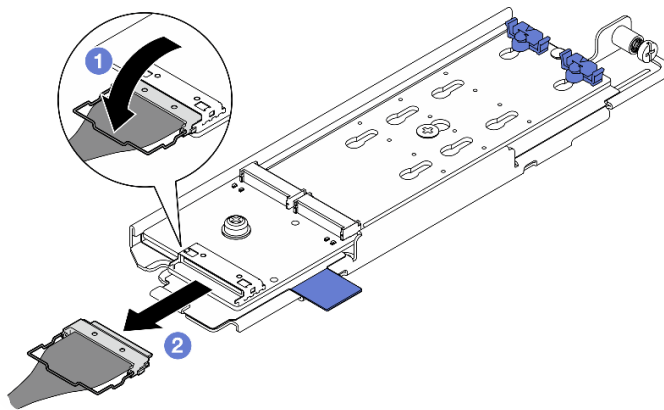


Figure 96. Disconnecting cable from SATA/NVMe M.2 backplane

1. ① Unhook the wire bail on the cable from the connector.
2. ② Disconnect the cable from the M.2 backplane.

After this task is completed

- If necessary, proceed to remove the M.2 drives. See [“Remove an M.2 drive” on page 128](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

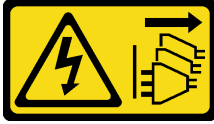
Demo Video

[Watch the procedure on YouTube](#)

Remove an M.2 drive

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

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.

About this task**Attention:**

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 126](#).

Step 2. Locate the M.2 drive to be removed.

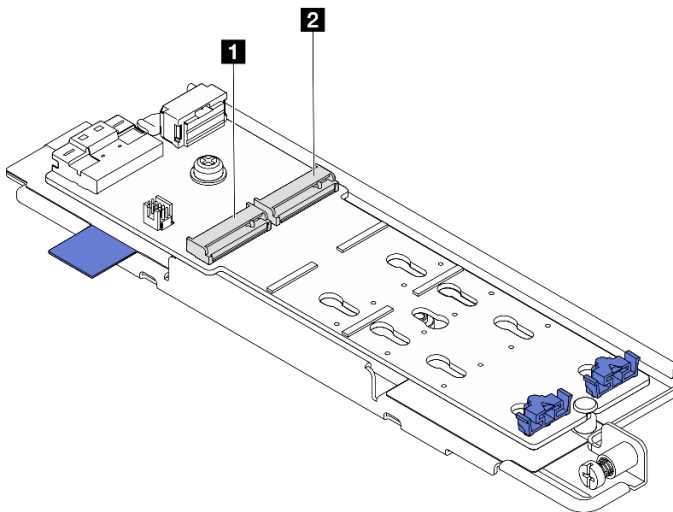


Figure 97. M.2 drive slot numbering

| | |
|-----------------------------|-----------------------------|
| 1 M.2 Bay 0 / Slot 1 | 2 M.2 Bay 1 / Slot 2 |
|-----------------------------|-----------------------------|

Step 3. Remove the M.2 drive.

- a. ① Press both sides of the retainer ②.
- b. ② Slide the retainer away from the M.2 drive.
- c. ③ Lift the rear end of M.2 drive up.
- d. ④ Pull the M.2 drive away from the slot ①.

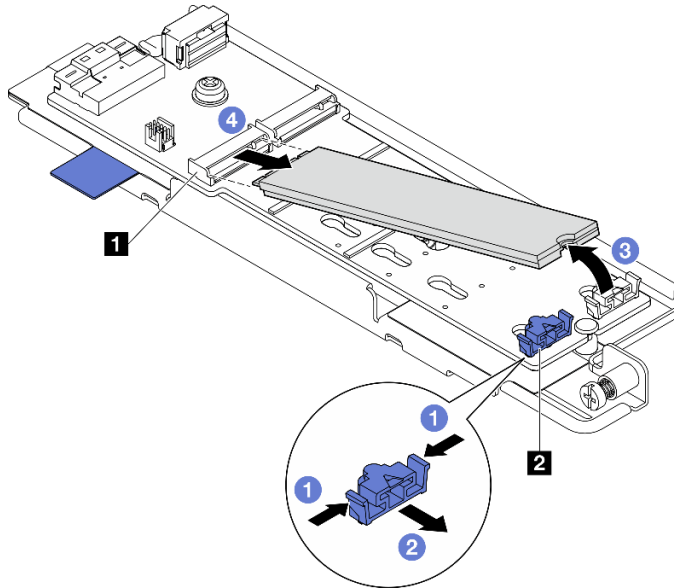


Figure 98. Removing an M.2 drive

Note: If necessary, repeat this procedure to the other M.2 drive to be removed.

After this task is completed

- Install a replacement unit. See “Install an M.2 drive” on page 135.
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove the M.2 backplane

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 126](#).
- a. If necessary, remove the M.2 drives. See [“Remove an M.2 drive” on page 128](#).

Step 2. Remove the M.2 backplane from the tray.

- a. ① Loosen the screw that secures the M.2 backplane.
- b. ② Loosen the captive screw on the M.2 backplane.

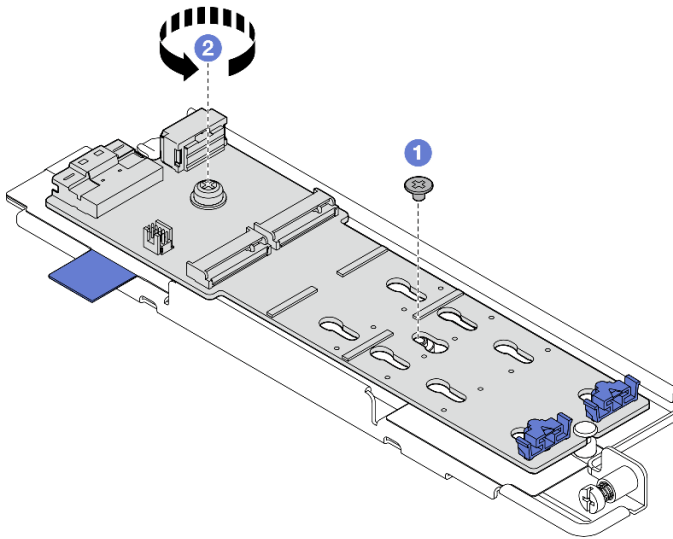


Figure 99. Removing the M.2 backplane

- a. ① Lift the connector side of the M.2 backplane up at an angle.
- b. ② Remove the M.2 backplane

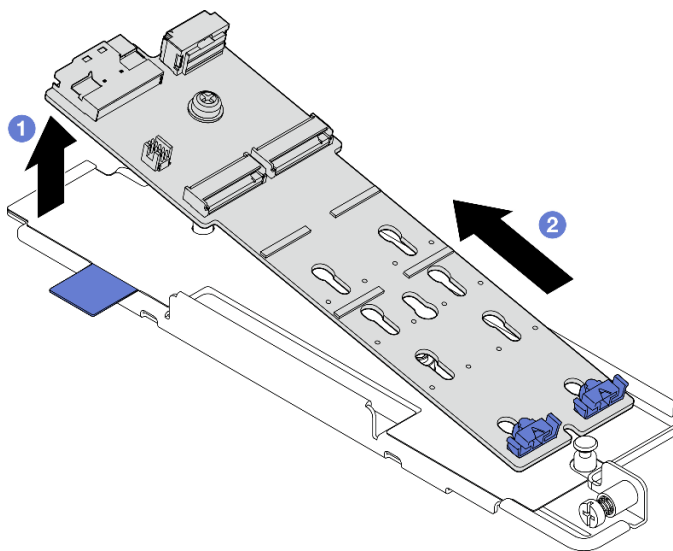


Figure 100. Removing the M.2 backplane

After this task is completed

- Install a replacement unit. See [“Install the M.2 backplane” on page 132](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the M.2 backplane

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Procedure

Step 1. Install the M.2 backplane to the tray.

- 1 Align the notch of the M.2 backplane with the guide pin on the tray; then, insert the backplane at an angle.
- 2 Lower down the connector side of the M.2 backplane to the tray.

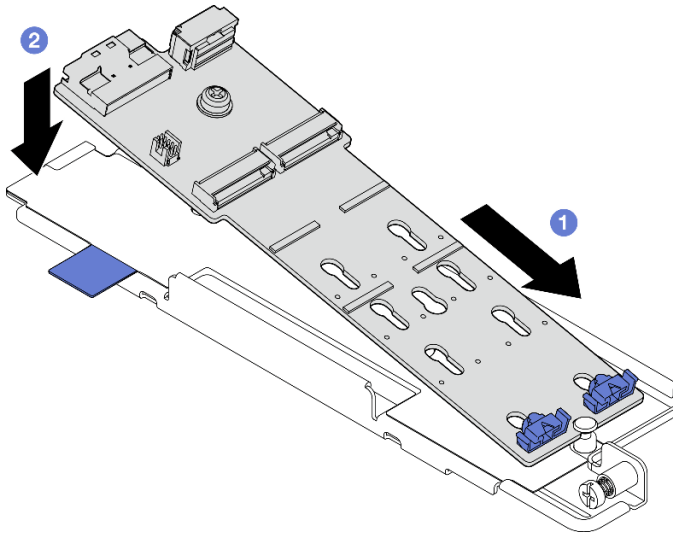


Figure 101. Installing the M.2 backplane

- 1 Fasten the captive screw on the M.2 backplane.
- 2 Fasten one screw to secure the M.2 backplane.

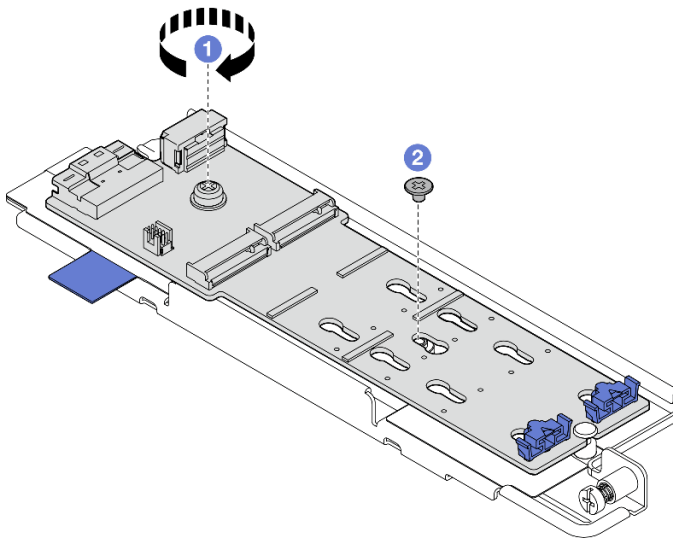


Figure 102. Installing the M.2 backplane

After this task is completed

1. If necessary, install the M.2 drives. See [“Install an M.2 drive” on page 135](#).
2. Proceed to install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 137](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Adjust the retainer on the M.2 backplane

Follow instructions in this section to adjust the retainer on the M.2 backplane.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Procedure

- Step 1. Locate the retainer to be adjusted.
- Step 2. Select the correct keyhole that can accommodate the particular size of the M.2 drive to be installed.
- Step 3. Adjust the M.2 retainer.
- a. ① Press and hold both sides of the retainer.
 - b. ② Move the retainer forward until it is in the large opening of the keyhole.
 - c. ③ Take the retainer out of the keyhole.
 - d. ④ Insert the retainer into the correct keyhole.
 - e. ⑤ Press and hold both sides of the retainer.
 - f. ⑥ Slide the retainer toward the small opening of the keyhole until it is seated in place.

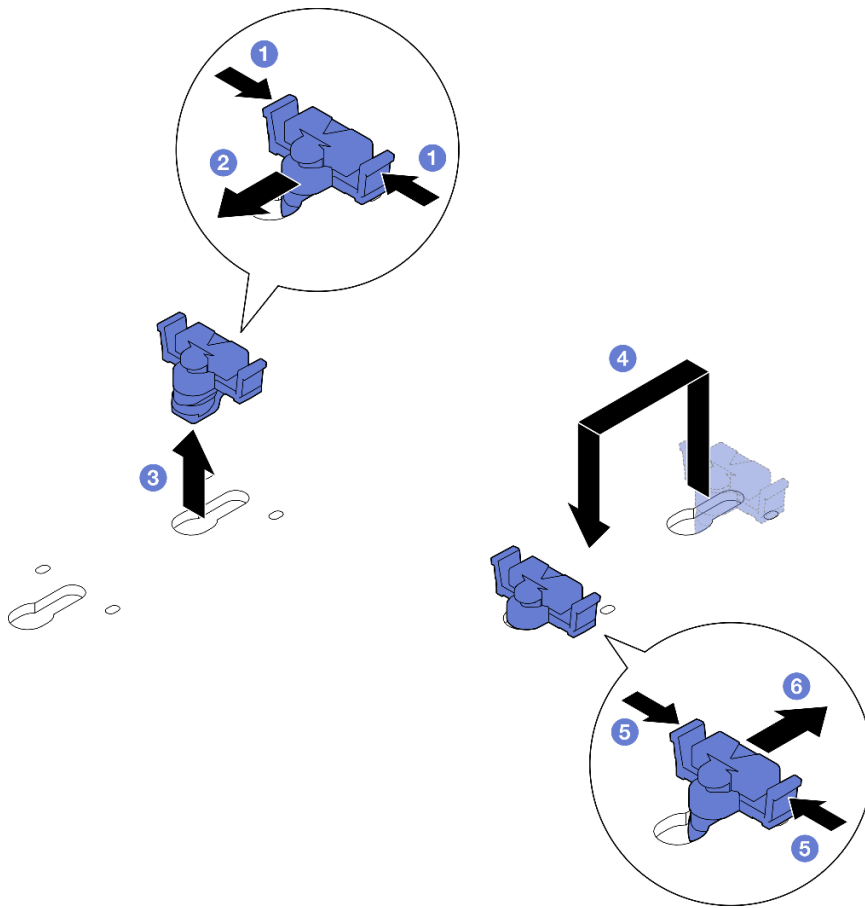


Figure 103. Adjusting the M.2 retainer

Install an M.2 drive

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

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

Procedure

Step 1. Locate the M.2 drive slot to install the M.2 drive.

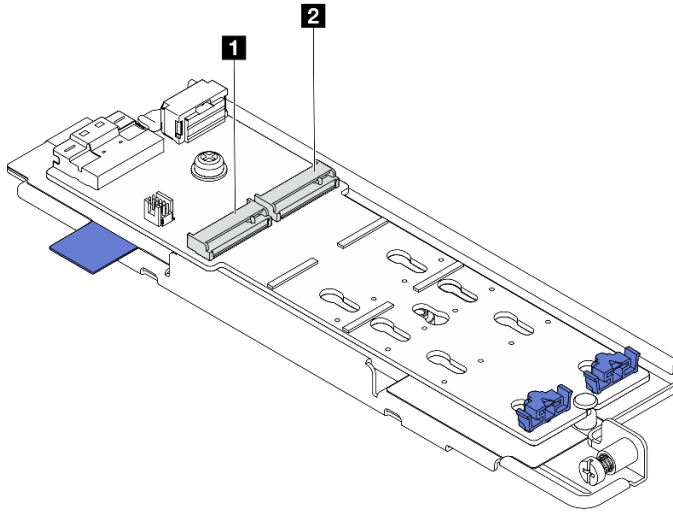


Figure 104. M.2 drive slot numbering

| | |
|-----------------------------|-----------------------------|
| 1 M.2 Bay 0 / Slot 1 | 2 M.2 Bay 1 / Slot 2 |
|-----------------------------|-----------------------------|

Note: If the configuration is with only one M.2 drive, install the M.2 drive in **M.2 Bay 0 / Slot 1**.

Step 2. If necessary, adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive to be installed. See [“Adjust the retainer on the M.2 backplane” on page 134](#).

Step 3. Install the M.2 drive.

- 1 Hold the M.2 drive at an angle of approximately 30 degrees, and insert it into the M.2 slot.
- 2 Lower the M.2 drive down to the M.2 backplane.
- 3 Slide the retainer toward the M.2 drive to secure the drive in place.

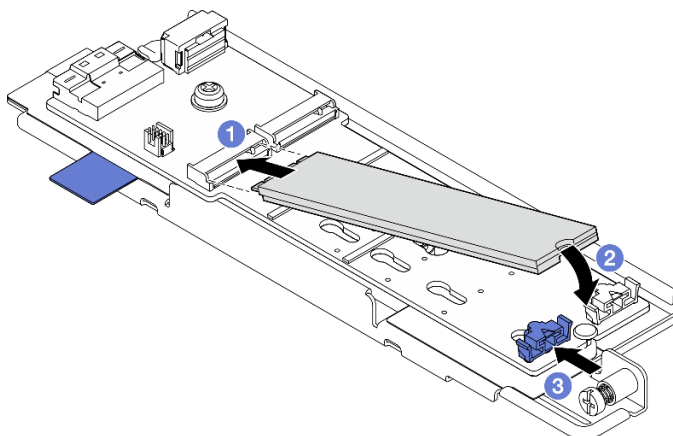


Figure 105. Installing an M.2 drive

Note: If necessary, repeat this procedure to the other M.2 drive to be installed.

After this task is completed

- Proceed to install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 137](#).
- Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

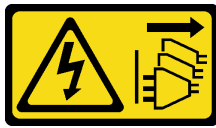
Demo Video

[Watch the procedure on YouTube](#)

Install the M.2 backplane assembly

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

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/thinkedge/se455v3/7dby/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 277](#) for more information on firmware updating tools.

Procedure

Step 1. Connect the M.2 signal and power cables to the M.2 backplane.

SATA/x4 NVMe M.2 backplane

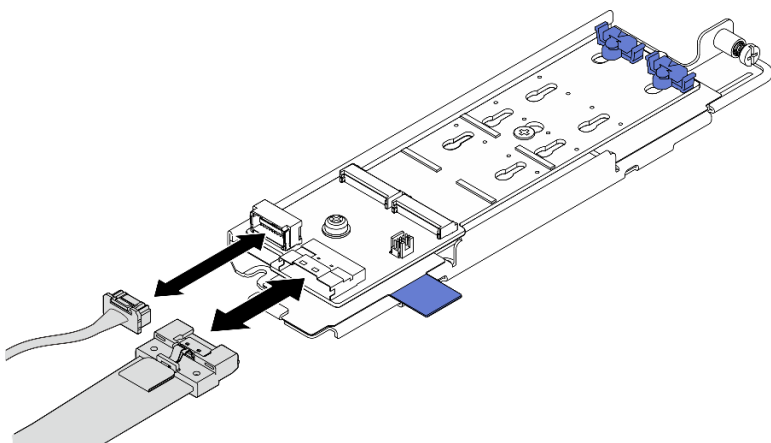


Figure 106. Connecting cable to SATA/x4 NVMe M.2 backplane

SATA/NVMe M.2 backplane

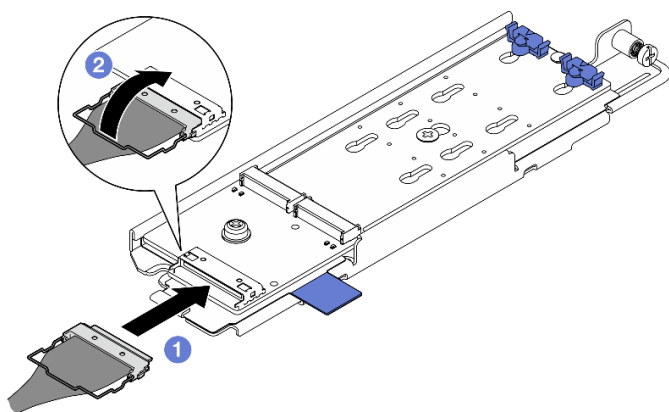


Figure 107. Connecting cable to SATA/NVMe M.2 backplane

1. ① Connect the cable to the M.2 backplane.
2. ② Hook the wire bail on the cable onto the connector.

Note: When installing the M.2 backplane assembly for the first time, do the cable routing for M.2 backplane. See [“M.2 backplane cable routing” on page 248](#).

Step 2. Install the M.2 backplane assembly.

- a. ① Pinch the pull tape and the blue touch point, and align the M.2 backplane assembly with the guide pins on the chassis; then, lower the assembly down to the chassis, and push the assembly forward until it clicks into place.
- b. ② Fasten the thumbscrew to secure the M.2 backplane assembly.

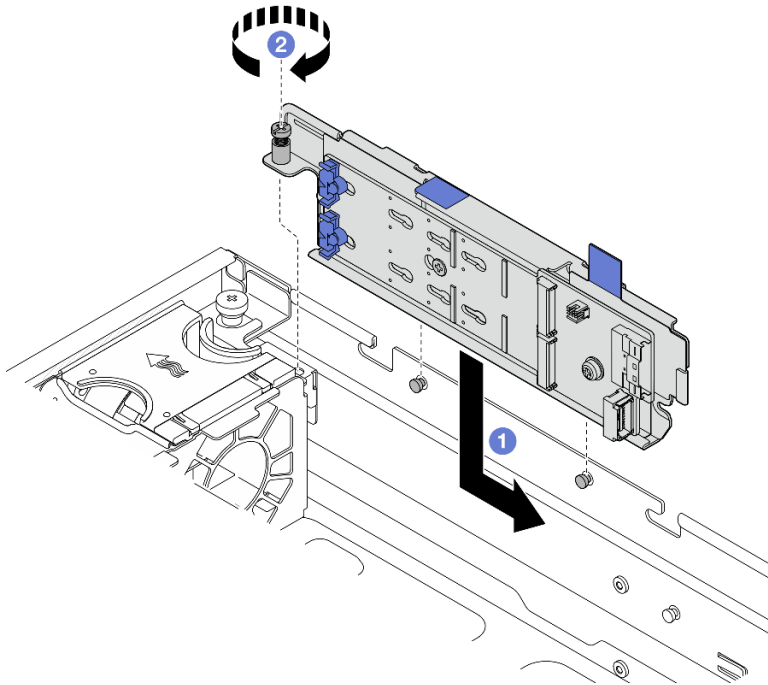


Figure 108. Installing the M.2 backplane assembly

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Memory module replacement

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

Remove a memory module

Use this information to remove a memory module.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for [“Handling static-sensitive devices” on page 44](#).
 - 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.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- Locate the memory module slots and determine which memory module you want to remove from the server.

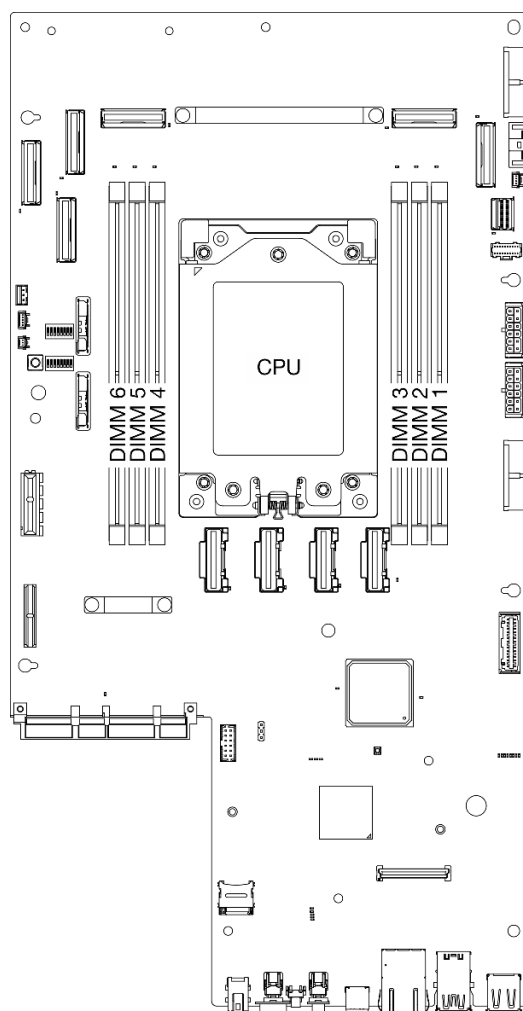


Figure 109. Memory modules and processor layout

Step 2. Remove the memory module from the slot.

- a. ① Open the retaining clip to disengage the memory module.
- b. ③ Grasp the memory module at both ends and carefully lift it out of the slot.

Attention:

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

Note: If necessary, due to space constraints, use a pointed tool to open the retaining clips. Place the tip of the tool in the recess on the top of the retaining clip; then, carefully rotate the retaining clip away from the memory module slot. Make sure to use firm and solid pointed tool to open the latch. Do not use pencils or other fragile tools.

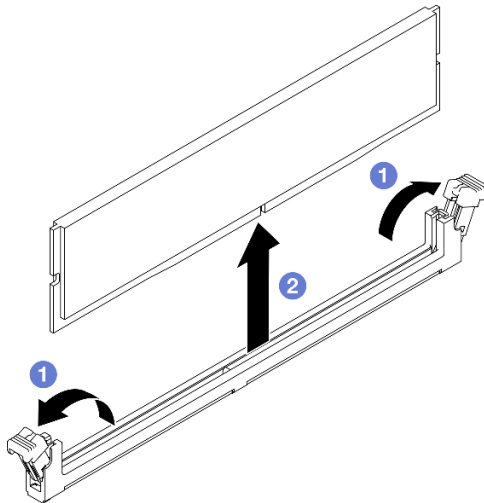


Figure 110. Removing a memory module

After this task is completed

1. Install a replacement unit. See [“Install a memory module” on page 142](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install a memory module

Follow instructions in this section to install a memory module.

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.

About this task

See “[Memory module installation rules and order](#)” on page 45 for detailed information about memory configuration and setup.

Attention:

- Read “[Installation Guidelines](#)” on page 41 and “[Safety inspection checklist](#)” on page 42 to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Make sure to adopt one of the supported configurations listed in “[Memory module installation rules and order](#)” on page 45.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at “[Handling static-sensitive devices](#)” on page 44:
 - 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:

- Mixing x4/x8, 16Gbit (16GB, 32GB, 64GB)/24Gbit (48GB, 96GB) DIMMs are not allowed in a system.
- Before installing 24 Gb DRAM RDIMMs, make sure to update the UEFI firmware to the latest version first, then remove all existing 16 Gb DRAM RDIMMs.

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/thinkedge/se455v3/7dby/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 277 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. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, take the memory module out of the package and place it on a static-protective surface.

Step 3. Locate the required memory module slot on the system board.

Note: Ensure that you observe the installation rules and sequence order in [“Memory module installation rules and order” on page 45](#).

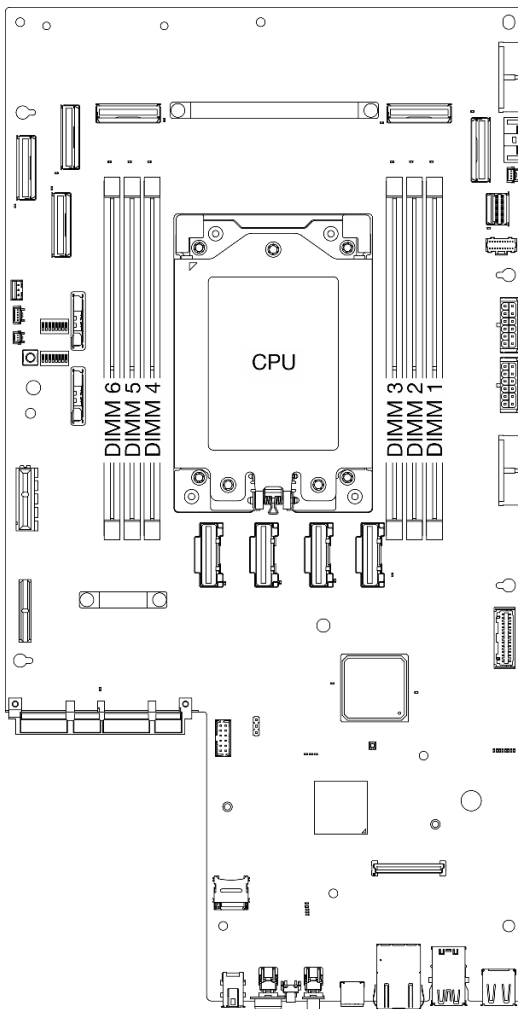


Figure 111. Memory modules and processor layout

Step 4. Install the memory module into the slot.

- a. Make sure the retaining clips are in the fully-open position.
- b. ① Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- c. ② Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

Attention:

- To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.
- If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

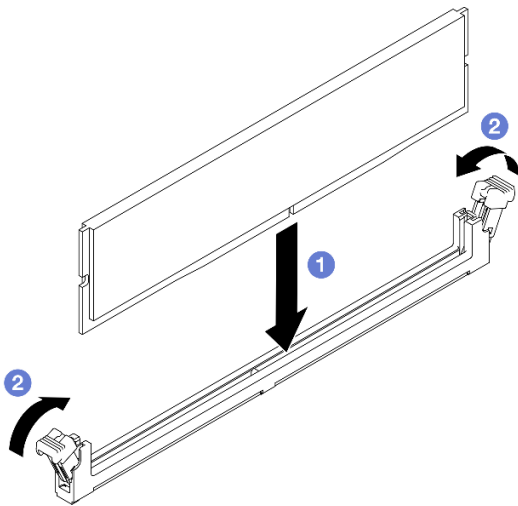


Figure 112. Installing a memory module

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

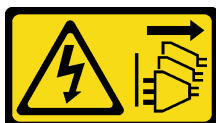
MicroSD card replacement

Follow instructions in this section to remove and install the MicroSD card.

Remove the MicroSD card

Follow instructions in this section to remove the MicroSD card.

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.

About this task**Attention:**

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove the firmware and RoT security module. See [“Remove the firmware and RoT security module” on page 219](#).

Step 2. Locate the MicroSD socket on the system board. See [“System-board connectors” on page 28](#).

Step 3. Remove the MicroSD card

- a. ❶ Slide the socket lid to the open position.
- b. ❷ Lift open the socket lid.
- c. ❸ Remove the MicroSD card from the socket.

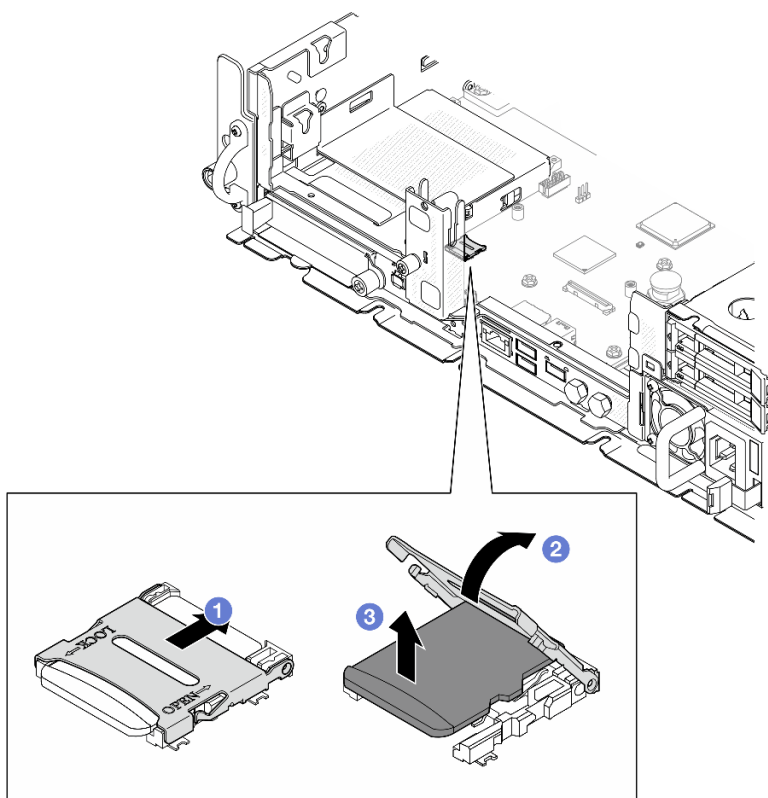


Figure 113. Removing the MicroSD card

After this task is completed

- Install a replacement unit. See [“Install the MicroSD card” on page 147](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

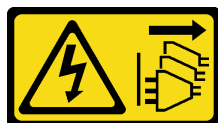
Demo Video

[Watch the procedure on YouTube](#)

Install the MicroSD card

Follow instructions in this section to install the MicroSD card.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Locate the MicroSD socket on the system board. See [“System-board connectors” on page 28](#).

Step 2. Install the MicroSD card.

- a. ① Place the MicroSD card into the socket.
- b. ② Close the socket lid.
- c. ③ Slide the socket lid to the lock position.

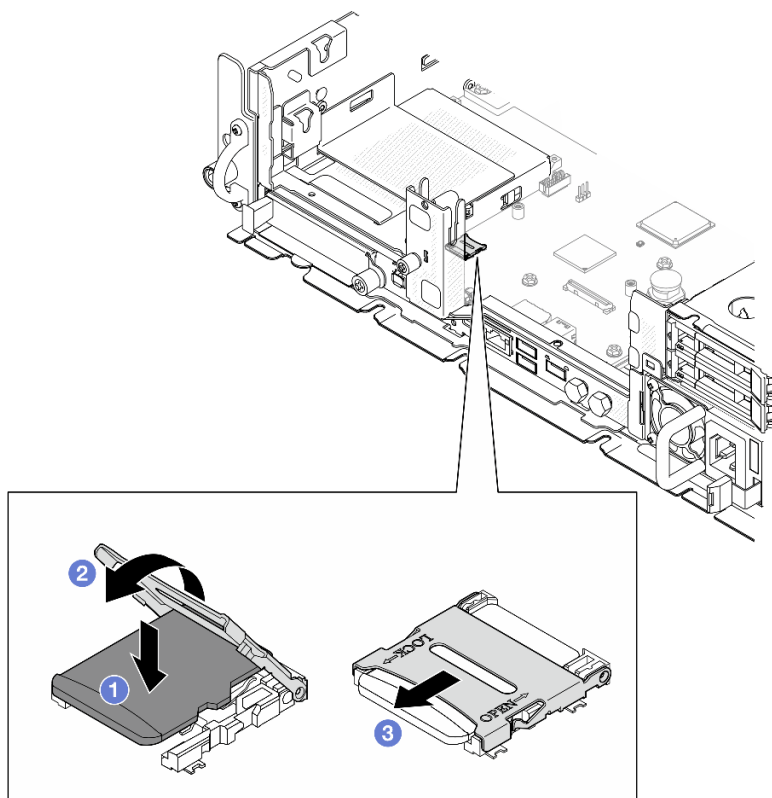


Figure 114. Installing the MicroSD card

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

OCP module replacement

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

Remove the OCP module

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

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Remove the OCP module.

- a. ① Loosen the thumbscrew that secures the OCP module. Use a screwdriver if necessary.
- b. ② Grasp the handle, and slide the OCP module out.

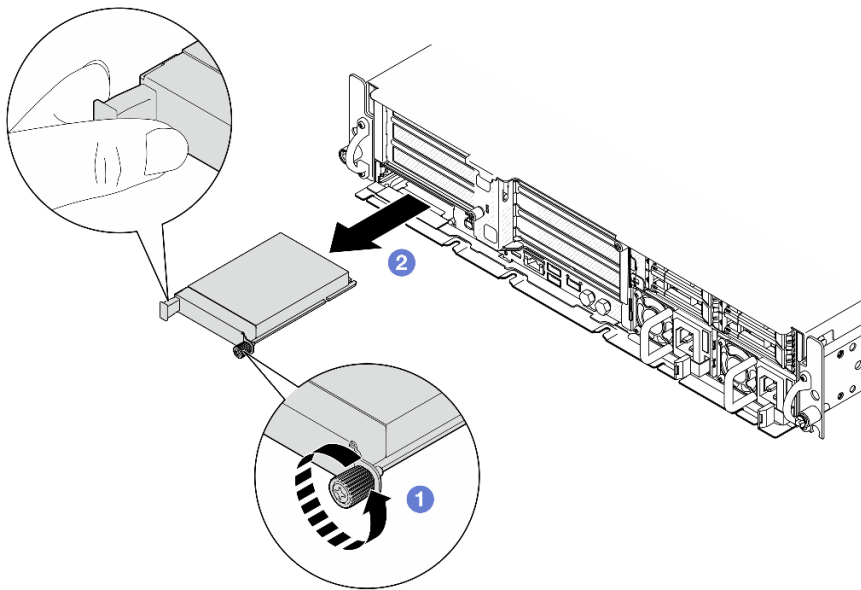


Figure 115. Removing the OCP module

After this task is completed

1. Install a replacement unit or an OCP filler into the empty slot. See [“Install the OCP module” on page 150](#).

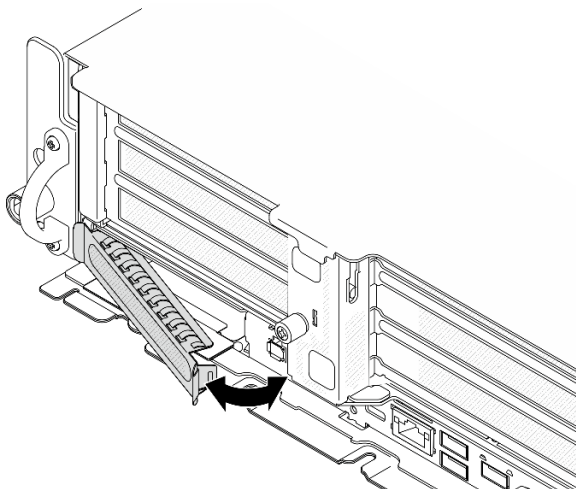


Figure 116. Installing the OCP filler

To install an OCP filler, insert one side of the filler into the slot; then, pivot the other side into the slot until the filler is firmly seated.

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

Demo Video

[Watch the procedure on YouTube](#)

Install the OCP module

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

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

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/thinkedge/se455v3/7dbv/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 277](#) for more information on firmware updating tools.

Procedure

- Step 1. If an OCP filler is installed in the slot, remove the filler.
- a. Disengage one side of the filler from the slot. Use a flat-head screwdriver if necessary.
 - b. Remove the filler from the slot.

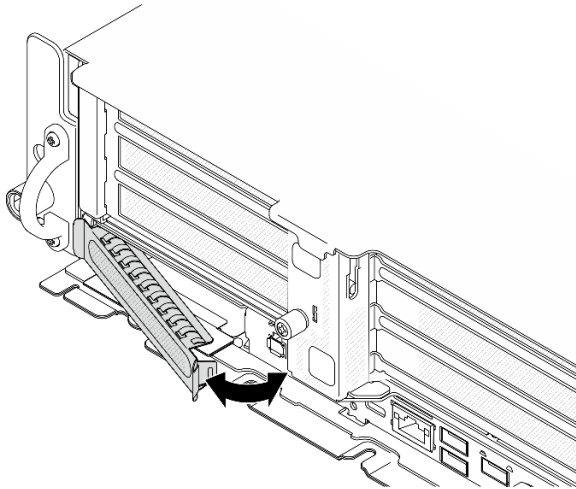


Figure 117. Removing the OCP filler

Step 2. Install the OCP module.

- a. ❶ Slide the OCP module into the slot until it is fully seated.
- b. ❷ Tighten the thumbscrew to secure the OCP module. Use a screwdriver if necessary.

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

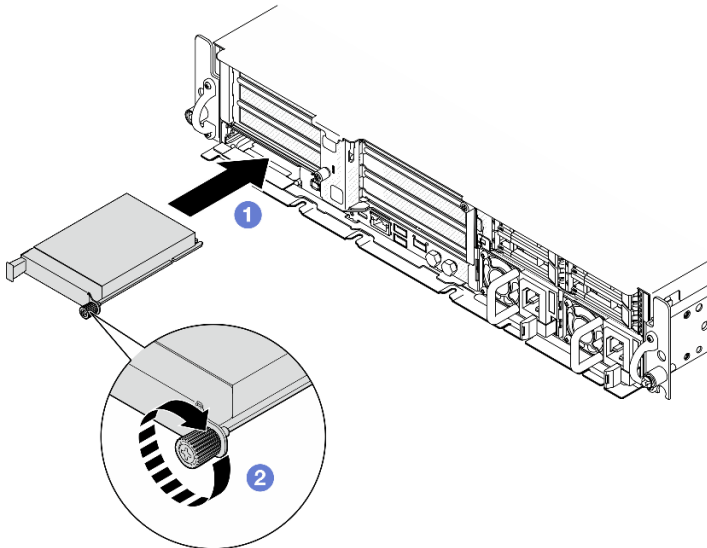


Figure 118. Installing the OCP module

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

PCIe riser assembly and adapter replacement

Follow instructions in this section to remove and install the PCIe riser assemblies and adapters.

Remove the PCIe riser assembly

Follow the instructions in this section to remove the PCIe riser assemblies.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Note: Depending on the configuration, the PCIe riser assembly might look slightly different from the illustration in this section.

Procedure

- Step 1. Make preparation for this task.
 - a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- Step 2. Proceed to the section corresponding to the PCIe riser assembly to be removed:
 - [“Remove PCIe riser 1” on page 152](#)
 - [“Remove PCIe riser 2” on page 154](#)

Remove PCIe riser 1

Procedure

- Step 1. If applicable, disengage all the GPU power cables from the cable guide of the processor air baffle.

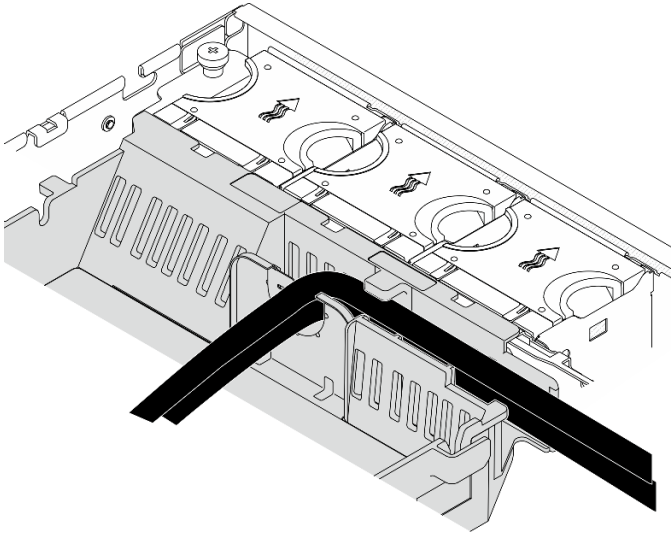


Figure 119. GPU power cables on processor air baffle

Step 2. Disengage the signal cable from the space between the processor air baffle and the chassis.

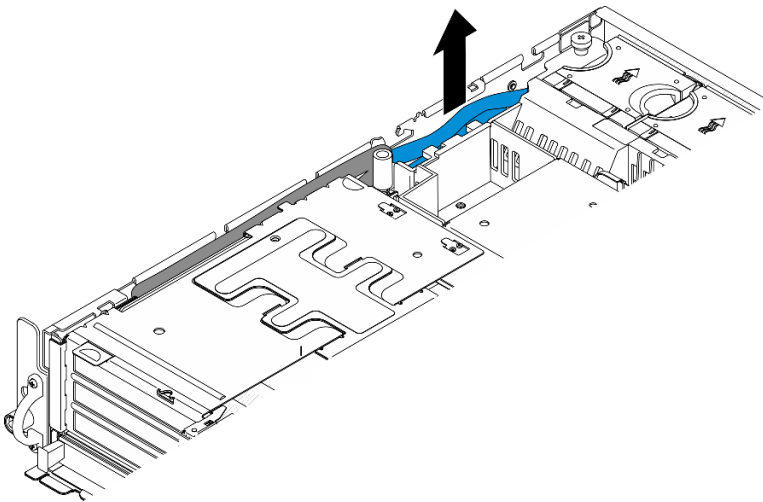


Figure 120. Disengaging PCIe riser 1 signal cable

Step 3. Loosen the two captive screws; then, lift the riser assembly from the chassis.

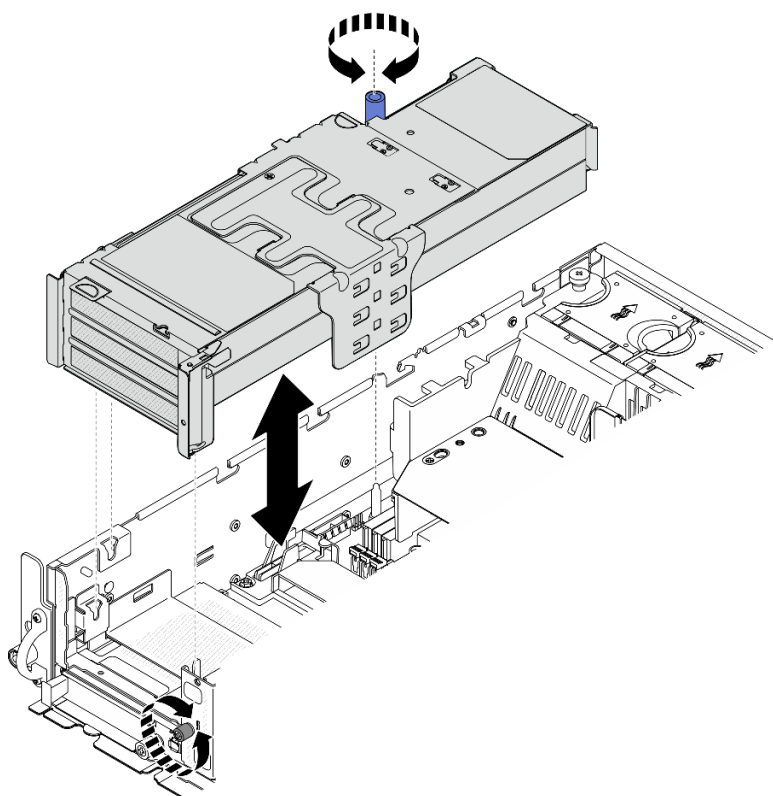


Figure 121. Lifting PCIe riser 1

- Step 4. Disconnect all the cables from the PCIe adapters; if the serial port module is installed, disconnect the serial port cable from the system board. Then, place PCIe riser 1 aside the chassis.

Note: Do not disconnect the cables from the riser card.

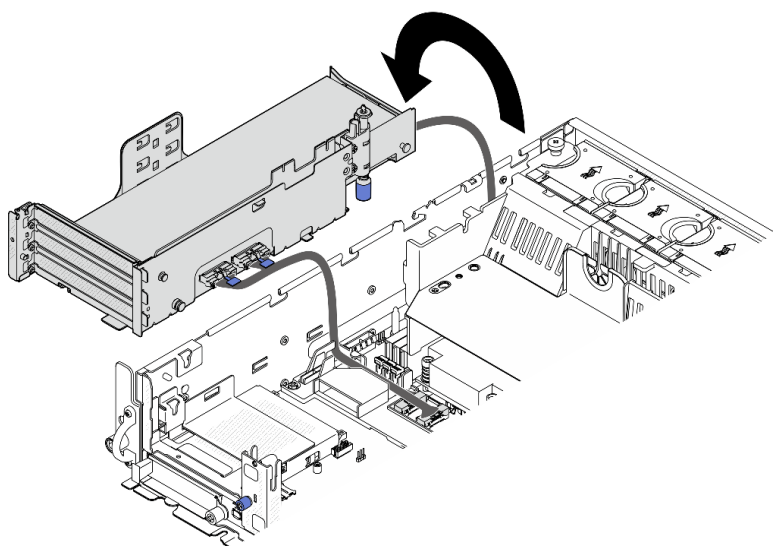


Figure 122. Placing PCIe riser 1 aside the chassis

Remove PCIe riser 2

Procedure

- Step 1. If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- Step 2. If applicable, lift the internal drive backplane from the chassis.
- If applicable, disengage the following cables from the cable clip of the processor air baffle.
 1. The blue signal cable of PCIe riser 2
 2. Power cable of internal drive backplane
 3. Signal cable of internal drive backplane

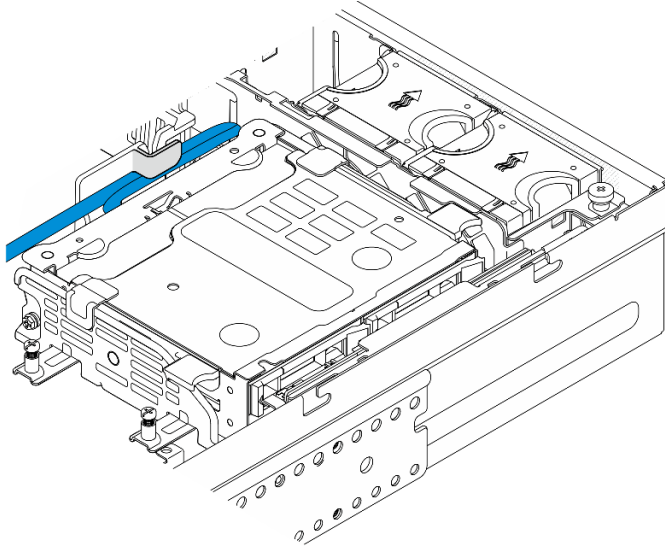


Figure 123. Cables secured by the cable clip of processor air baffle

- Pinch the blue touch points on the backplane bracket; then, lift the backplane.
- Place the internal drive backplane on the top of the fan cage for easier operation.

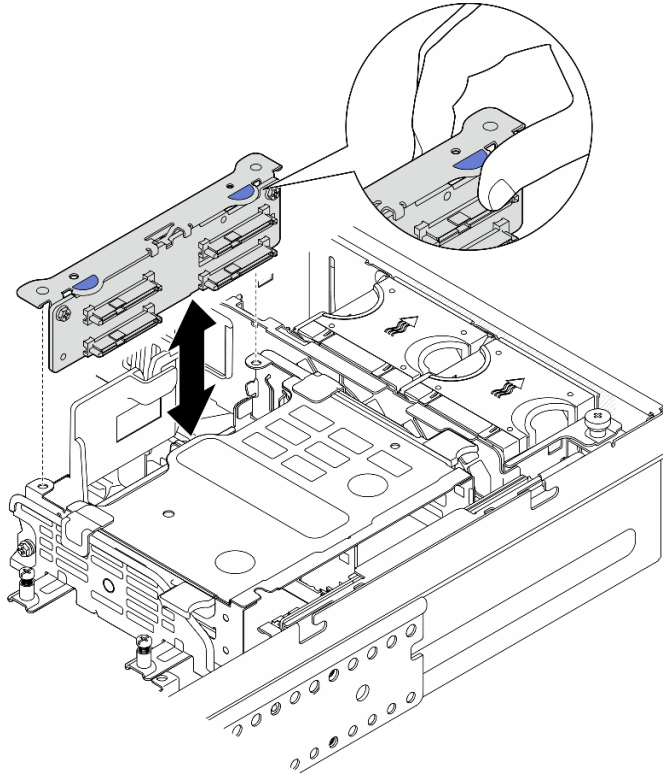


Figure 124. Removing the internal drive backplane

Step 3. If applicable, disengage all the GPU power cables from the cable guide of the processor air baffle.

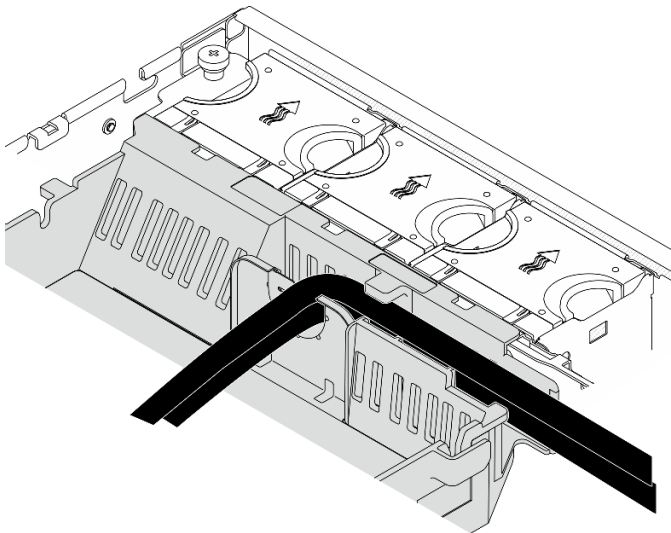


Figure 125. GPU power cables on processor air baffle

Step 4. Loosen the two captive screws; then, lift the riser assembly from the chassis.

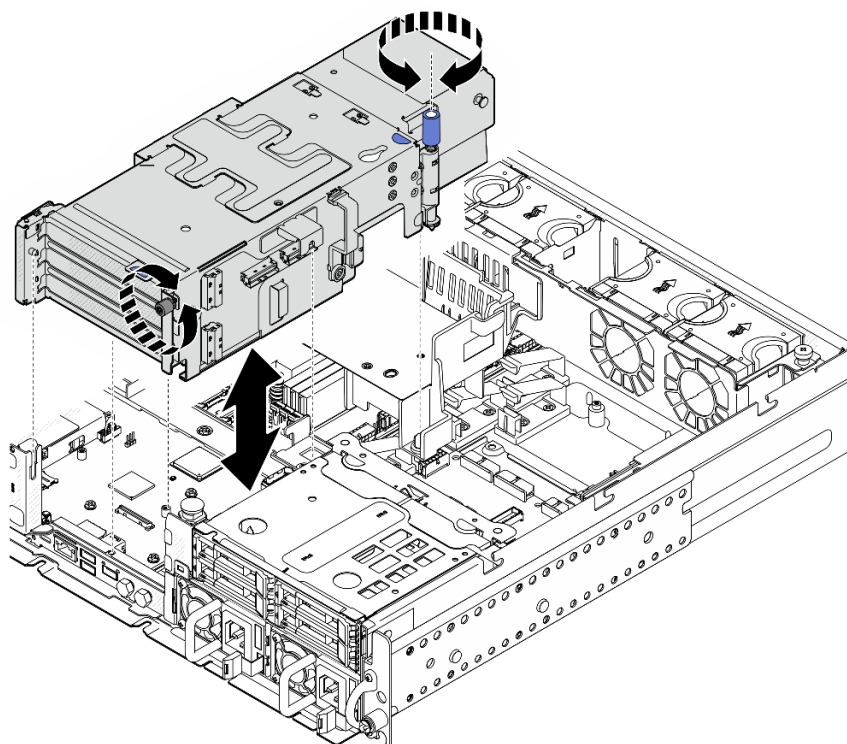


Figure 126. Lifting PCIe riser 2

Step 5. Disconnect all the cables from the PCIe adapters; then, place PCIe riser 2 on the front drive cage.

Note: Do not disconnect the cables from the riser card.

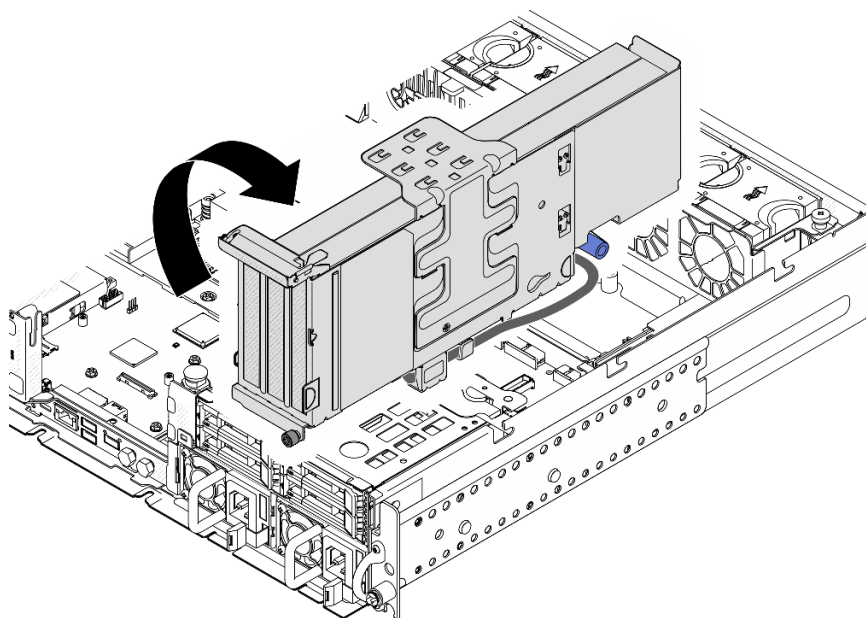


Figure 127. Placing PCIe riser 2 aside the chassis

After this task is completed

- If necessary, proceed to remove the PCIe adapter. See [“Remove a PCIe adapter” on page 158](#).

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

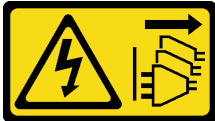
Demo Video

[Watch the procedure on YouTube](#)

Remove a PCIe adapter

Follow the instructions in this section to remove a PCIe adapter.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Note: Identify the parts of the PCIe riser assembly supporting PCIe adapters with different length and height.

| | Low-profile PCIe adapter | Full-length PCIe adapter |
|---|--------------------------|--------------------------|
| Side support bracket (for all configurations) | √ | √ |
| Low-profile filler | √ (one for each slot) | |
| Extender | | √ |

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove PCIe riser 1 or PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).

Step 2. Remove the side support bracket.

-  Loosen the screw that secures the bracket.

- b. ② Slightly push the bracket outward to disengage it; then, lift it from the riser assembly.

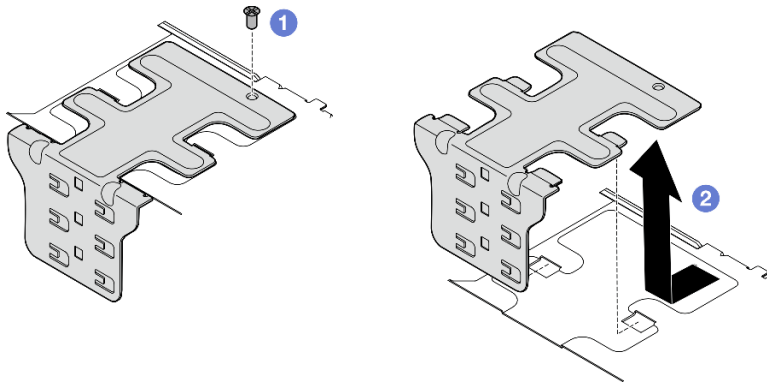


Figure 128. Removing the side support bracket

Step 3. If necessary, remove the low-profile fillers.

- a. ① Press the tab of the filler to disengage it from the side support bracket. Use a pointed tool if necessary.

Note: If necessary, use firm and solid pointed tool. Do not use pencils or other fragile tools.

- b. ② Remove the filler from the side support bracket.

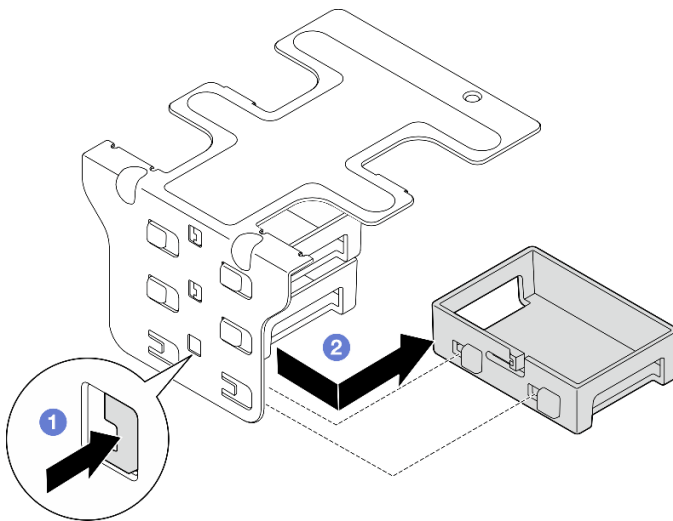


Figure 129. Removing a low-profile filler

Step 4. Open the retainer, and remove the screw that secures the adapter if applicable.

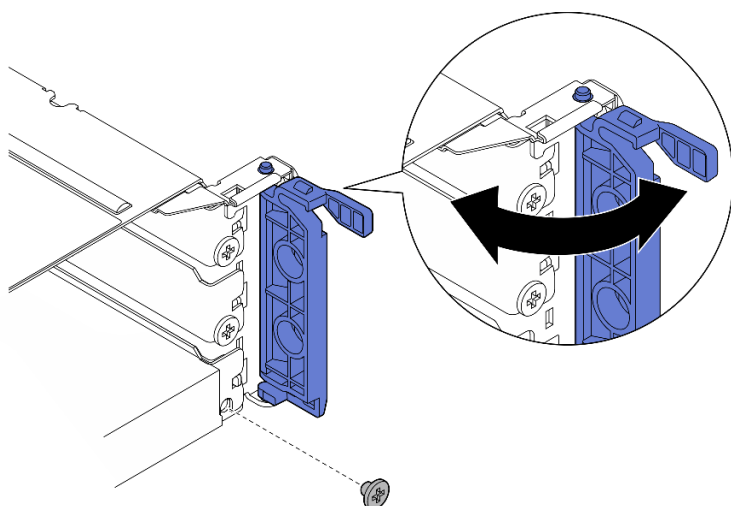


Figure 130. Removing the retaining screw

Step 5. Carefully slide the adapter out of the slot.

Note: If no replacement adapter is to be installed in the slot, install the slot filler.

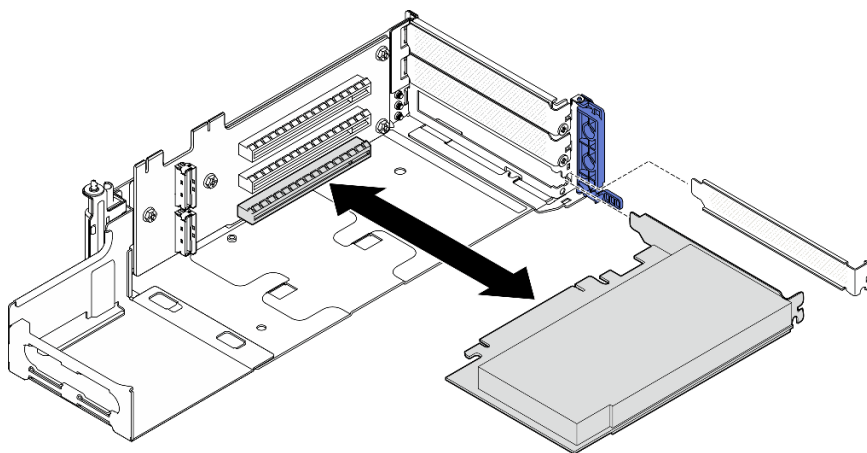


Figure 131. Removing a PCIe adapter from PCIe riser 1

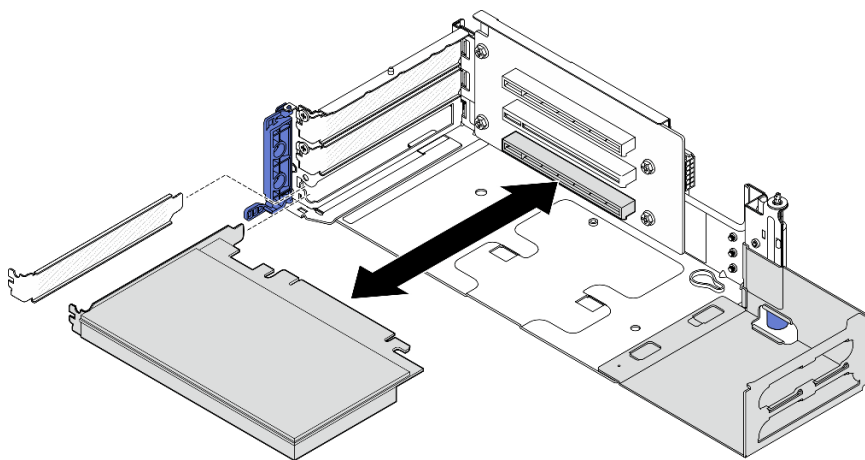


Figure 132. Removing a PCIe adapter from PCIe riser 2

Step 6. If no full-length adapter is to be installed in the riser assembly, remove the extender.

- a. ① Loosen the two screws that secure the extender.
- b. ② Slightly push the extender outward to disengage it; then, remove it from the riser assembly.

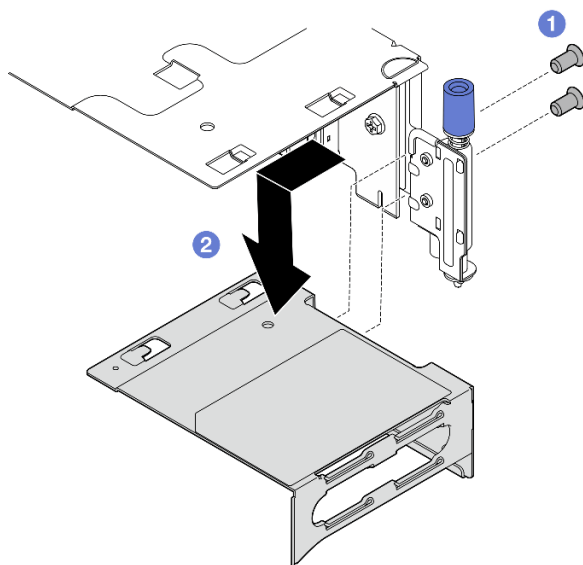


Figure 133. Removing the extender from PCIe riser 1

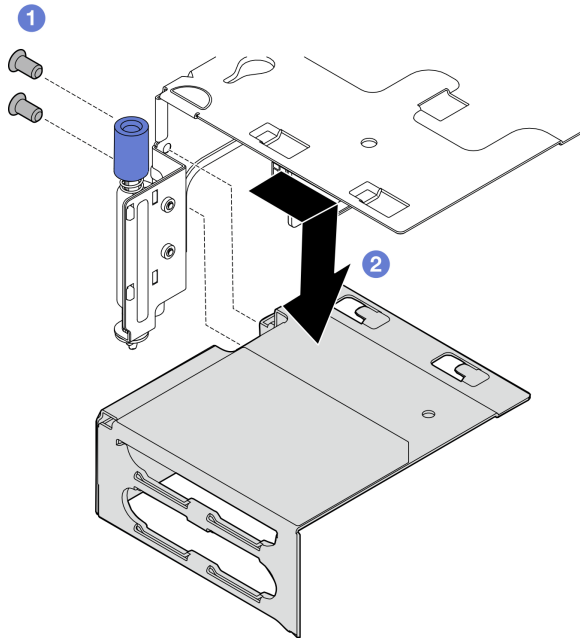


Figure 134. Removing the extender from PCIe riser 2

After this task is completed

- If necessary, proceed to remove the PCIe riser card. See [“Remove the PCIe riser card” on page 175](#).
- Install a replacement unit. See [“Install a PCIe adapter” on page 162](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install a PCIe adapter

Follow the instructions in this section to install a PCIe adapter.

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.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 41 and “[Safety inspection checklist](#)” on page 42 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 51.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Make sure to follow the PCIe adapter installation rules and order. See “[PCIe adapter installation rules and order](#)” on page 47.

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/thinkedge/se455v3/7dby/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 277 for more information on firmware updating tools.

Note: Identify the parts of the PCIe riser assembly supporting PCIe adapters with different length and height.

| | Low-profile PCIe adapter | Full-length PCIe adapter |
|---|--------------------------|--------------------------|
| Side support bracket (for all configurations) | ✓ | ✓ |
| Low-profile filler | ✓ (one for each slot) | |
| Extender | | ✓ |

Procedure

Step 1. If any full-length adapter is to be installed in the riser assembly, install the extender.

- 1 Align the extender with the slots on the riser cage; then, insert and push the extender until it is seated in place.
- 2 Fasten two screws to secure the extender.

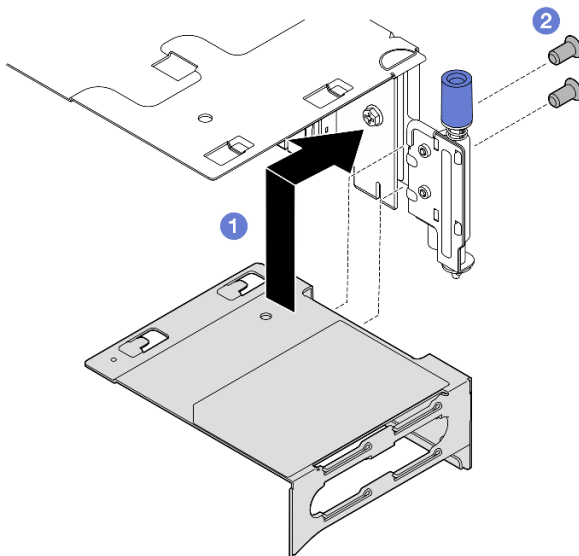


Figure 135. Installing the extender to PCIe riser 1

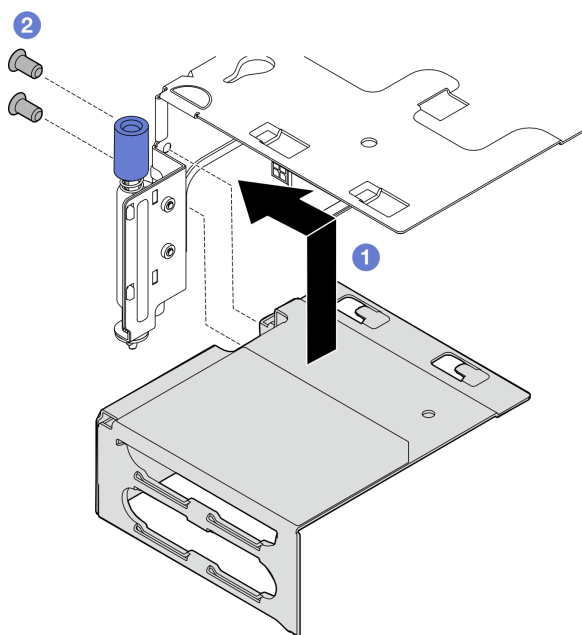


Figure 136. Installing the extender to PCIe riser 2

Step 2. Install the PCIe adapter to the riser assembly.

Important: Make sure to follow the PCIe adapter installation rules and order. See [“PCIe adapter installation rules and order” on page 47](#).

- a. If a slot filler is installed, remove the filler.
- b. Align the adapter with the slot; then, carefully slide the adapter into the slot until it is firmly seated.

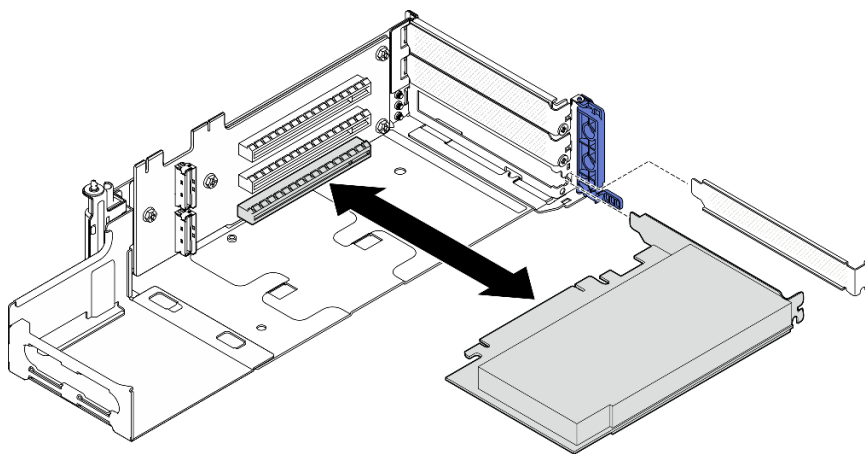


Figure 137. Installing a PCIe adapter to PCIe riser 1

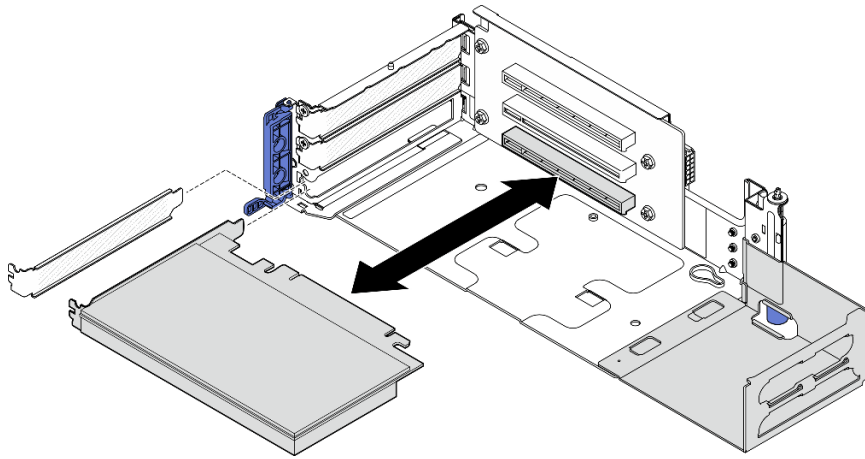


Figure 138. Installing a PCIe adapter to PCIe riser 2

Step 3. Fasten one screw to secure the adapter; then, close the retainer.

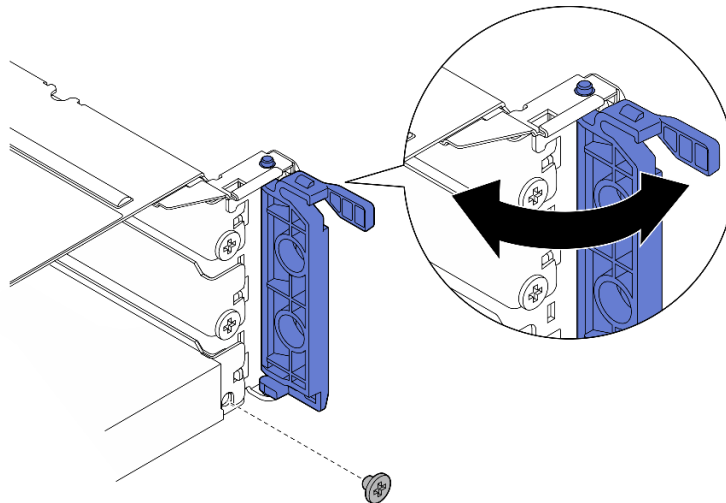


Figure 139. Installing the retaining screws

Note: Depending on the configuration, spared screws might be available on the side of the riser assembly. Use the spared screw to secure the adapter if necessary.

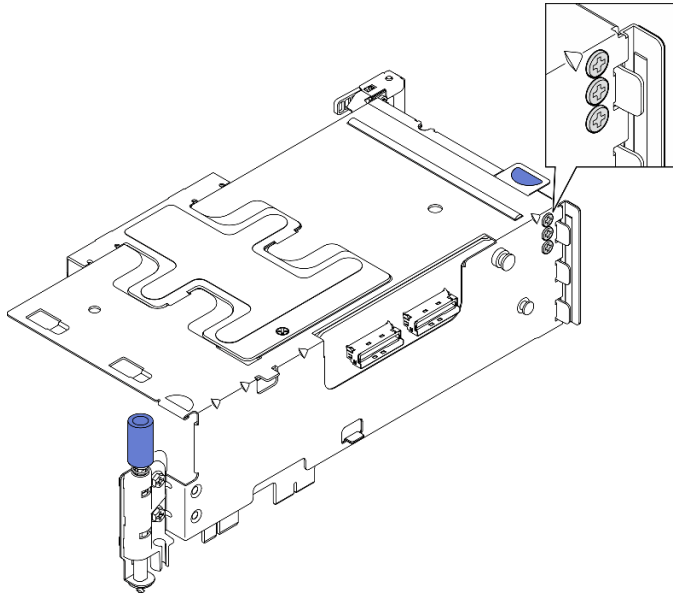


Figure 140. Spared screws on PCIe riser 1

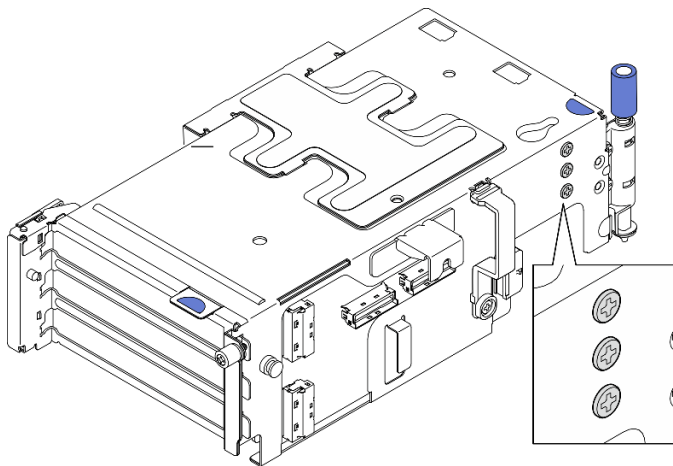


Figure 141. Spared screws on PCIe riser 2

- Step 4. For low-profile adapters, install the low-profile fillers.
- a. Push the filler toward the side support bracket.
 - b. Slide the filler as shown until it is seated in place.

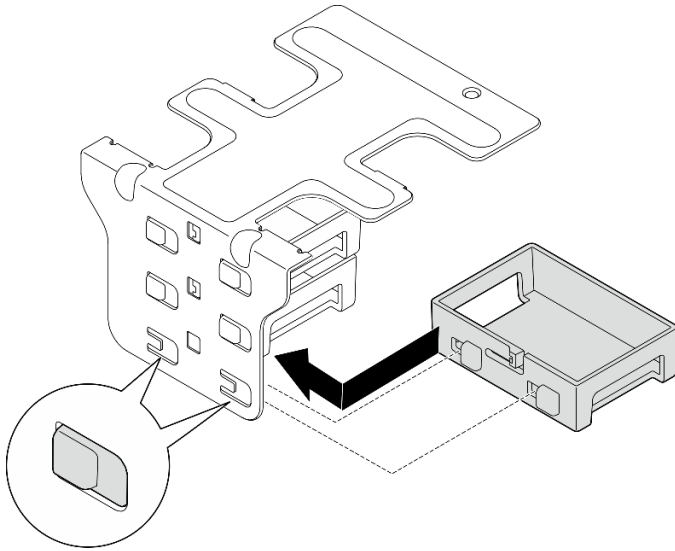


Figure 142. Installing a low-profile filler

Step 5. Install the side support bracket.

- a. ① Lower the bracket down to the riser assembly; then, push the bracket toward the riser assembly until it is seated in place.
- b. ② Fasten one screw to secure the bracket.

Note: Make sure that the two tabs on the side of side support bracket are seated under the edge of riser cage.

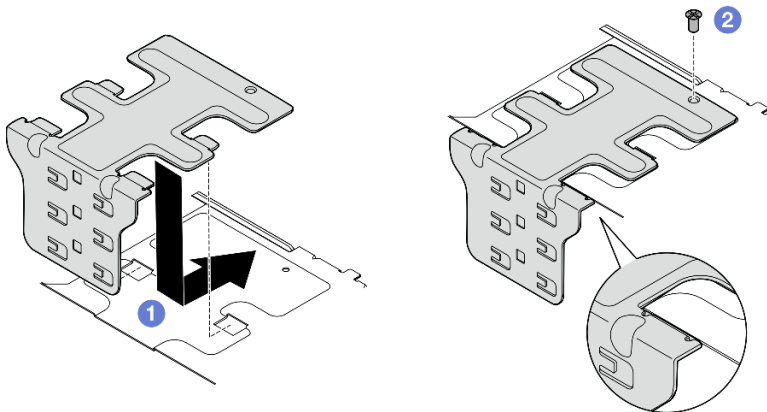


Figure 143. Installing the side support bracket

After this task is completed

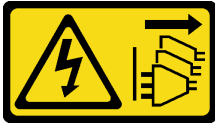
Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install the PCIe riser assembly

Follow the instructions in this section to install the PCIe riser assembly.



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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: Depending on the configuration, the PCIe riser assembly might look slightly different from the illustration in this section.

Procedure

Step 1. Make preparation for this task.

- a. Make sure the processor air baffle is installed properly. See [“Install the processor air baffle” on page 76](#)
- b. If ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter is installed, make sure the RAID flash power module is installed properly. See [“Install a RAID flash power module to the holder” on page 202](#).

Step 2. Proceed to the section corresponding to the PCIe riser assembly to be installed:

- [“Install PCIe riser 1” on page 168](#)
- [“Install PCIe riser 2” on page 171](#)

Install PCIe riser 1

Procedure

Step 1. Make sure the signal cables of PCIe riser 1 are routed properly.

- a. Route the **blue** signal cable along the intrusion switch as shown.
- b. Route the **silver** signal cable through the cable wall. Press the cable down toward the system board to avoid interfering with the retaining clips of memory module slots.

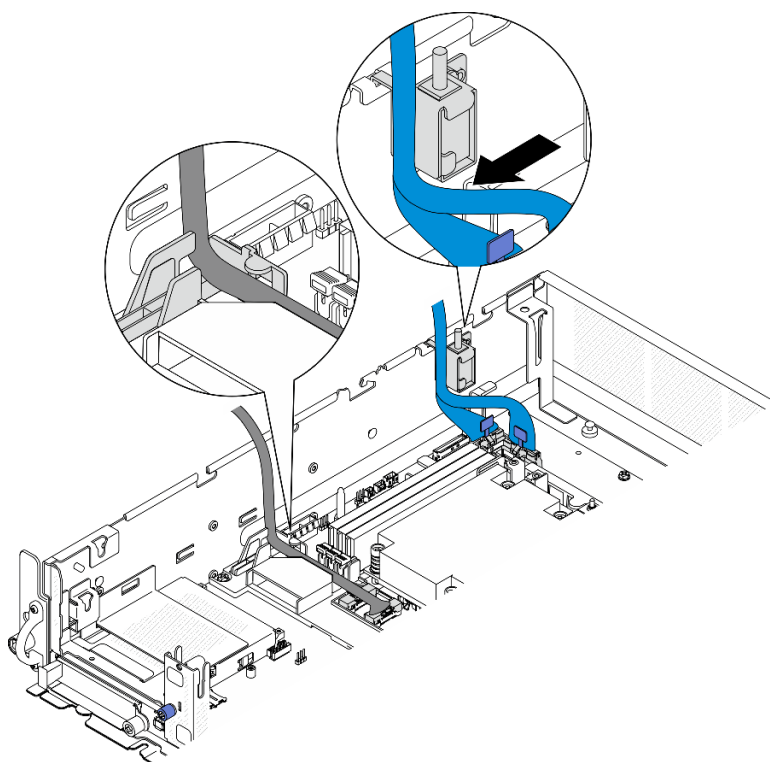


Figure 144. PCIe riser 1 cable routing

Step 2. Connect all the required cables to the PCIe adapters.

Notes: Depending on the configuration, connect the following cables to the PCIe adapters if necessary:

- GPU power cable to double-wide GPU adapter
- RAID flash power module extension cable to ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
- Backplane signal cable to RAID adapter/HBA
 - Front BP + internal BP to x350 RAID adapter:
 - C0 connector to front BP
 - C1 connector to internal BP
 - For other configurations with drive backplane connecting to RAID adapter, connect the backplane signal cable to C0 connector of RAID adapter.
- M.2 signal cable to C0 connector of RAID adapter/HBA

Step 3. If the serial port module is installed, connect the serial port cable to the system board. See [“System-board connectors for cable routing” on page 244](#) to locate Serial port connector (COM).

Step 4. Install PCIe riser 1.

- a. Align the riser assembly with the guide slots on the chassis; then, lower the riser assembly until it is firmly seated.

Note: When lowering the riser assembly down, make sure to route the PCIe adapter cables away from the heat sink.

- b. Fasten the two captive screws to secure the riser assembly.

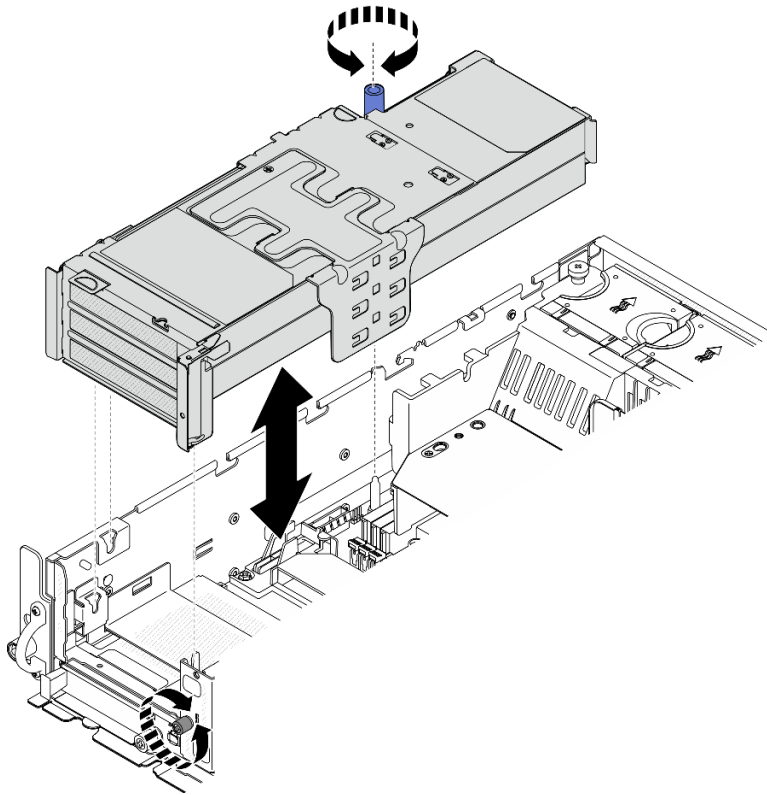


Figure 145. Installing PCIe riser 1

Step 5. Manage the signal cables.

- a. ① Manage the blue signal cable into the space between the processor air baffle and the chassis.

Note: Make sure that the blue signal cable does not cover the guide slot for the top cover.

- b. ② Manage the silver signal cable into the space between PCIe riser 1 and the chassis.

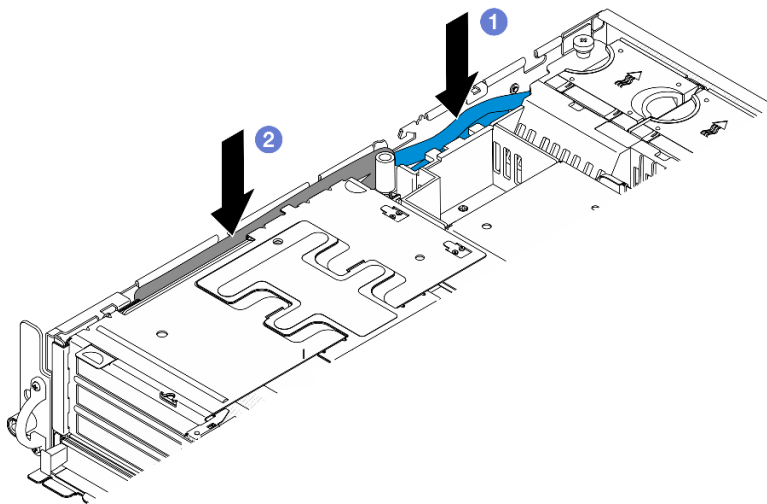


Figure 146. Managing PCIe riser 1 signal cables

Step 6. If applicable, manage all the GPU power cables into the cable guide of the processor air baffle.

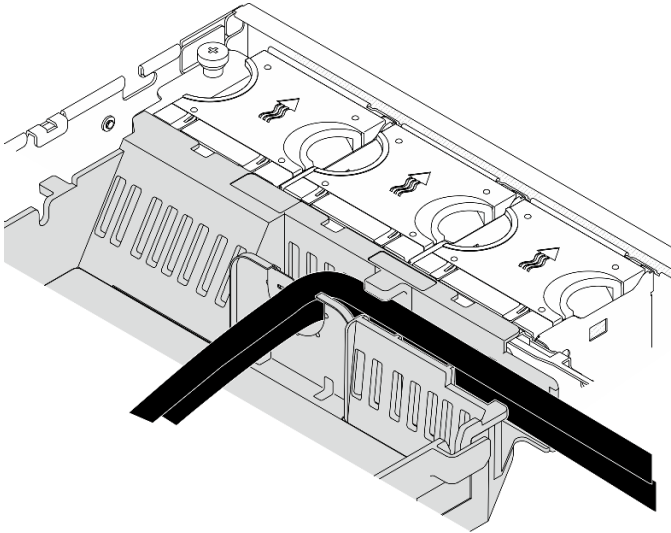


Figure 147. GPU power cables on processor air baffle

Install PCIe riser 2

Procedure

Step 1. If the riser blank filler is installed, remove the riser blank filler.

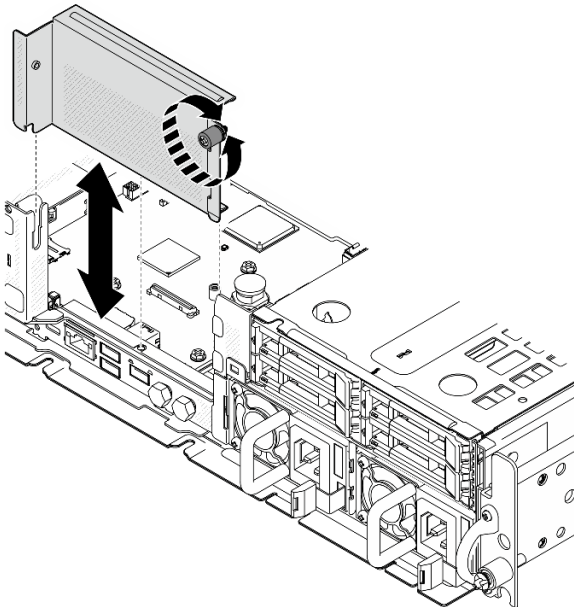


Figure 148. Removing the riser blank filler

Step 2. Make sure the signal cables of PCIe riser 2 are routed properly.

- a. If applicable, secure the **blue** signal cable in cable clip **A**.
- b. Route the **silver** signal cable through the cable wall; then, secure the cable in cable clip **C**. Press the cable down toward the system board to avoid interfering with the retaining clips of memory module slots.

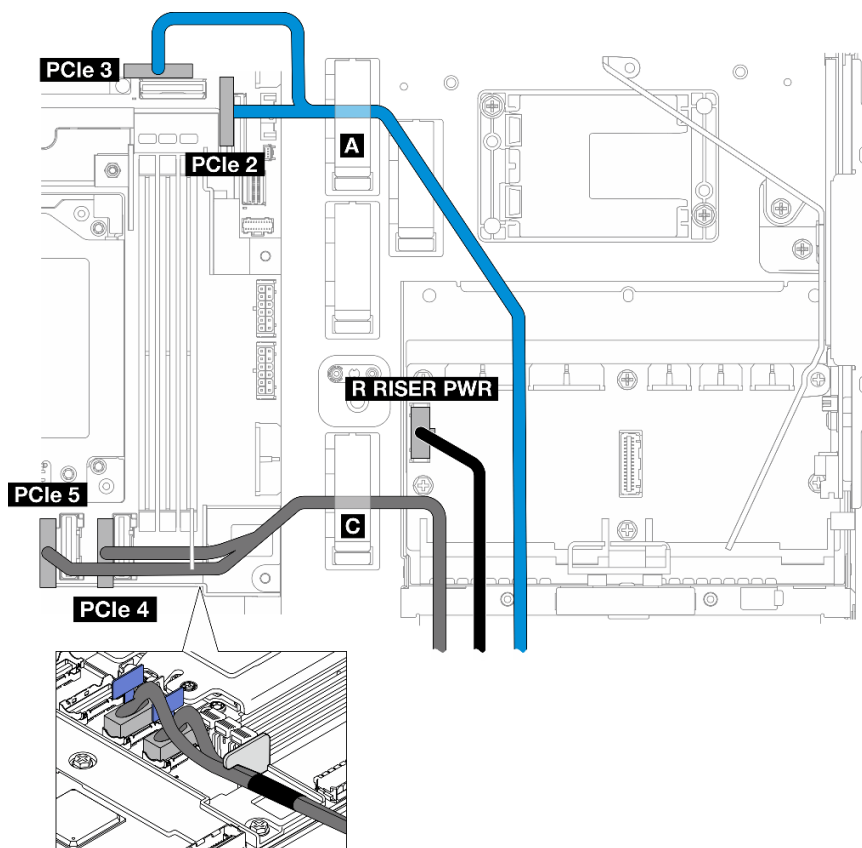


Figure 149. PCIe riser 2 cable routing

Step 3. Connect all the required cables to the PCIe adapters.

Notes: Depending on the configuration, connect the following cables to the PCIe adapters if necessary:

- GPU power cable to double-wide GPU adapter
- RAID flash power module extension cable to ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
- Backplane signal cable to RAID adapter/HBA
 - Front BP + internal BP to x350 RAID adapter:
 - C0 connector to front BP
 - C1 connector to internal BP
 - For other configurations with drive backplane connecting to RAID adapter, connect the backplane signal cable to C0 connector of RAID adapter.
- M.2 signal cable to C0 connector of RAID adapter/HBA

Step 4. Install PCIe riser 2.

- a. Align the riser assembly with the guide slots on the chassis; then, lower the riser assembly until it is firmly seated.

Note: When lowering the riser assembly down, make sure to route the PCIe adapter cables away from the heat sink.

- b. Fasten the two captive screws to secure the riser assembly.

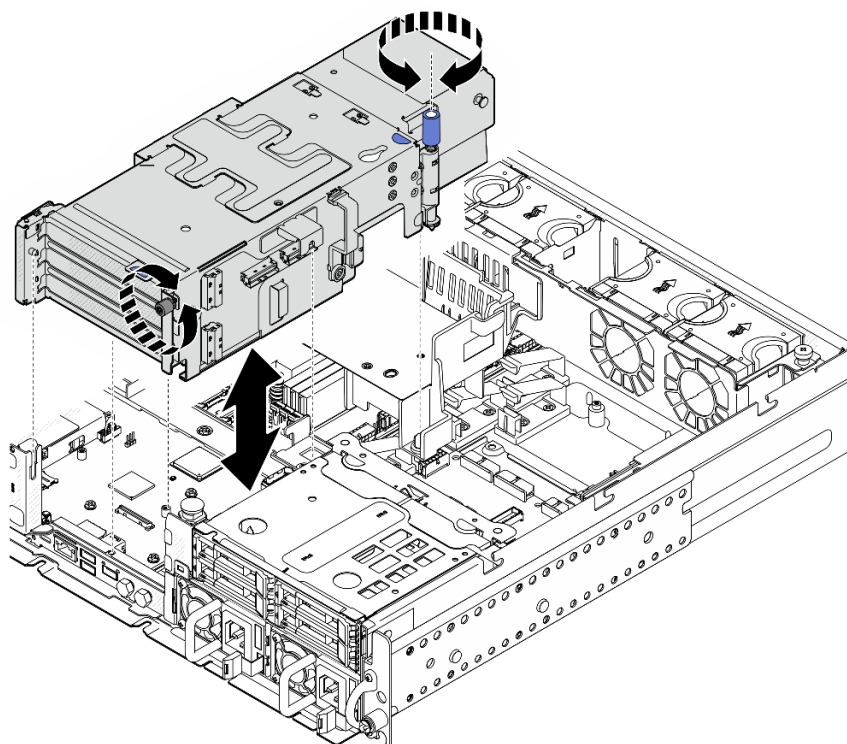


Figure 150. Installing PCIe riser 2

Step 5. If applicable, manage all the GPU power cables into the cable guide of the processor air baffle.

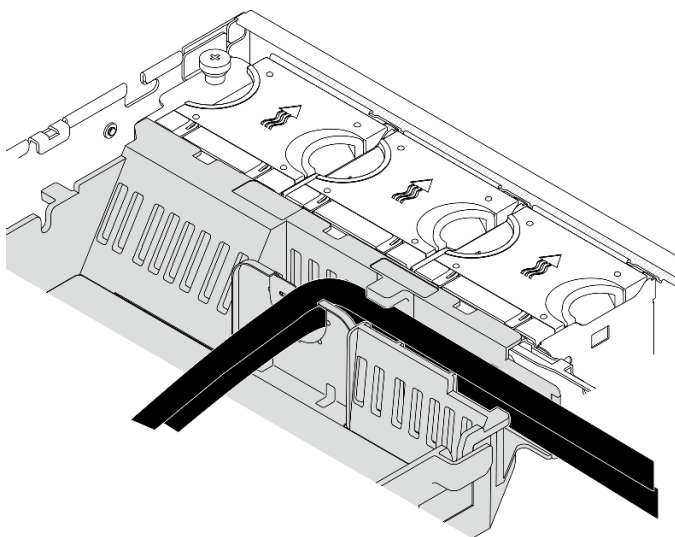


Figure 151. GPU power cables on processor air baffle

Step 6. If applicable, reinstall the internal drive backplane. Pinch the blue touch points on the backplane bracket as shown; then, press the backplane into the slot until it clicks into place.

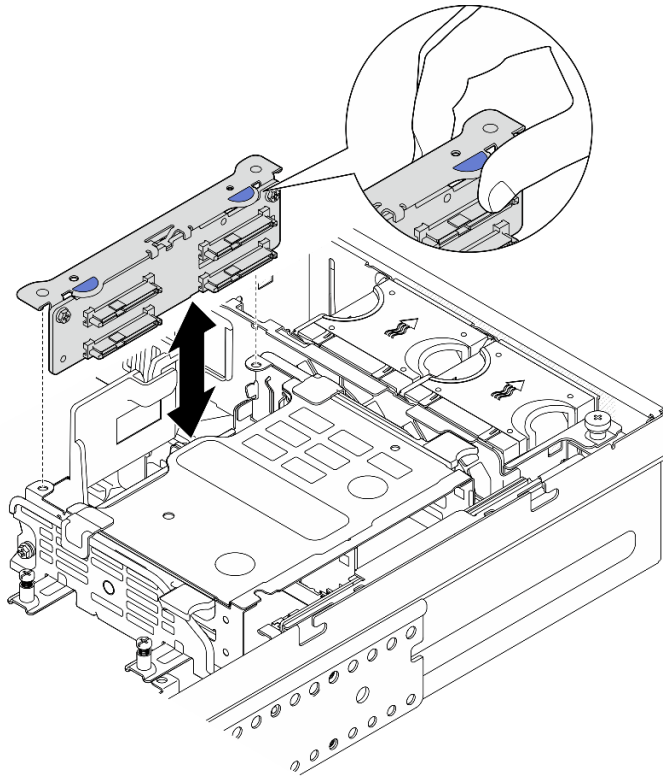


Figure 152. Installing the internal drive backplane

Step 7. If applicable, press the following cables down and make sure that the cables are under the cable clip of the processor air baffle.

- Signal cable of internal drive backplane
- Power cable of internal drive backplane
- The blue signal cable of PCIe riser 2

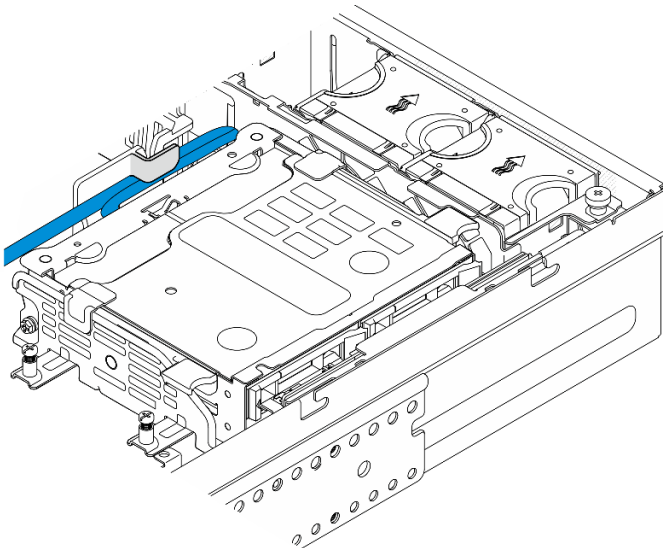


Figure 153. Managing the cables

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

PCIe riser card replacement

Follow instructions in this section to remove and install the PCIe riser cards.

Remove the PCIe riser card

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. Remove PCIe riser 1 or PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- c. Remove all the PCIe adapters from the riser assembly. See [“Remove a PCIe adapter” on page 158](#).

Step 2. Disconnect all the cables from the riser card.

Notes: To remove the blue signal cable from PCIe riser 2, after disconnecting the cable, press **2** the cable clip to disengage it from the slot; then, remove the cable. Insert the cable clip back to the slot if necessary.

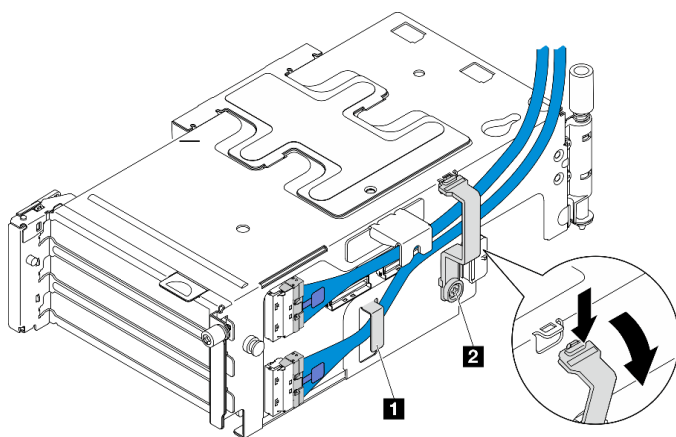


Figure 154. PCIe riser 2 cable routing

The blue signal cable is not supported in the following configurations:

- Front SATA drive backplane and internal NVMe drive backplane connect to the system board
- Front NVMe drive backplane and internal NVMe drive backplane connect to the system board

Step 3. Loosen the four screws that secure the riser card; then, remove the riser card.

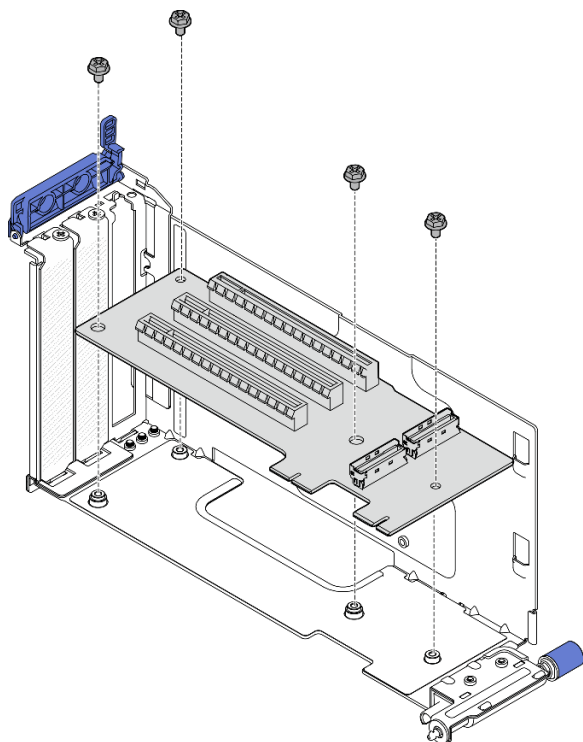


Figure 155. Removing the riser card from PCIe riser 1

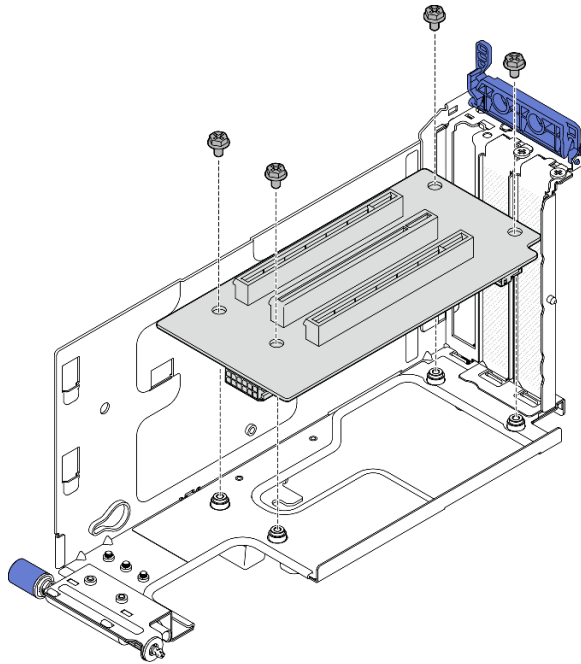


Figure 156. Removing the riser card from PCIe riser 2

After this task is completed

- Install a replacement unit. See [“Install the PCIe riser card” on page 177](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the PCIe riser card

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

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

See the section corresponding to the PCIe riser card to be installed.

- [“Install the PCIe riser card to PCIe riser 1” on page 178](#)
- [“Install the PCIe riser card to PCIe riser 2” on page 180](#)

Install the PCIe riser card to PCIe riser 1

Procedure

Step 1. Align the holes on the riser card with the guide pins on the riser cage; then, fasten four screws to secure the riser card.

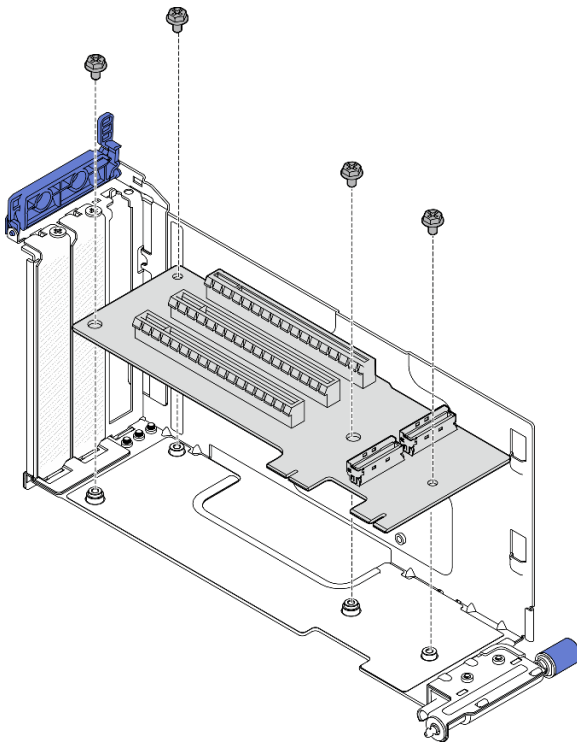


Figure 157. Installing the riser card

- Step 2. Connect the **blue** signal cable to PCIe riser 1.
- 1 Connect the cable to MCIO3 connector.
 - 2 Connect the cable to MCIO4 connector.
 - 3 Route the cable as shown.

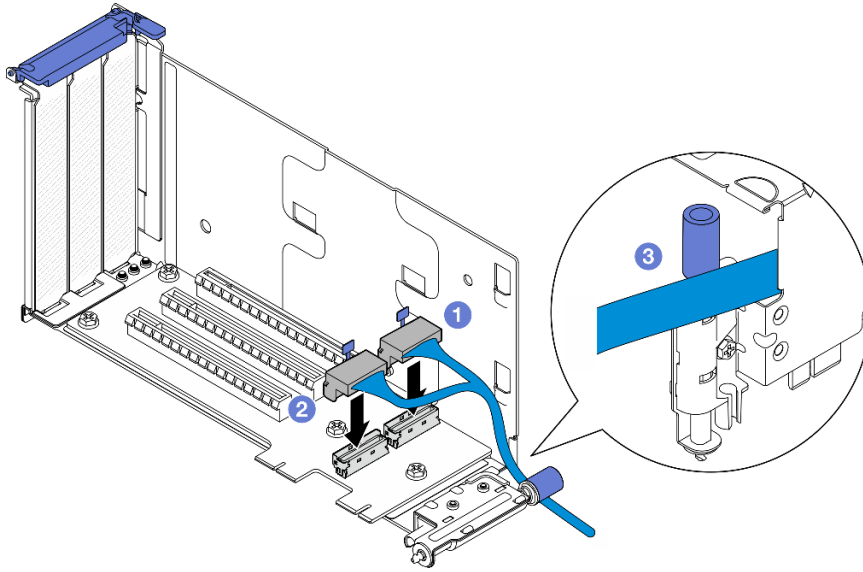


Figure 158. PCIe riser 1 cable routing

- Step 3. Connect the **silver** signal cable to PCIe riser 1.
- a. ① Connect the cable to MCIO2 connector.
 - b. ② Connect the cable to MCIO1 connector.

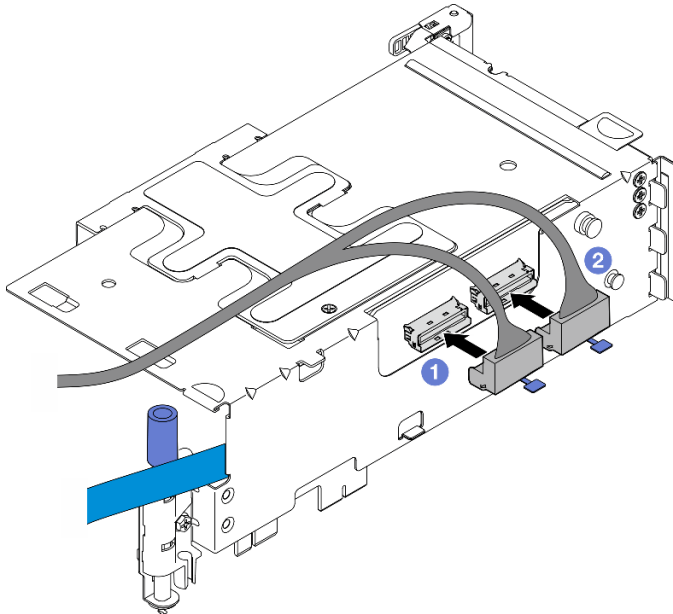


Figure 159. PCIe riser 1 cable routing

After this task is completed

1. Proceed to install PCIe adapters. See [“Install a PCIe adapter” on page 162.](#)
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239.](#)

Demo Video

[Watch the procedure on YouTube](#)

Install the PCIe riser card to PCIe riser 2

Procedure

Step 1. Align the holes on the riser card with the guide pins on the riser cage; then, fasten four screws to secure the riser card.

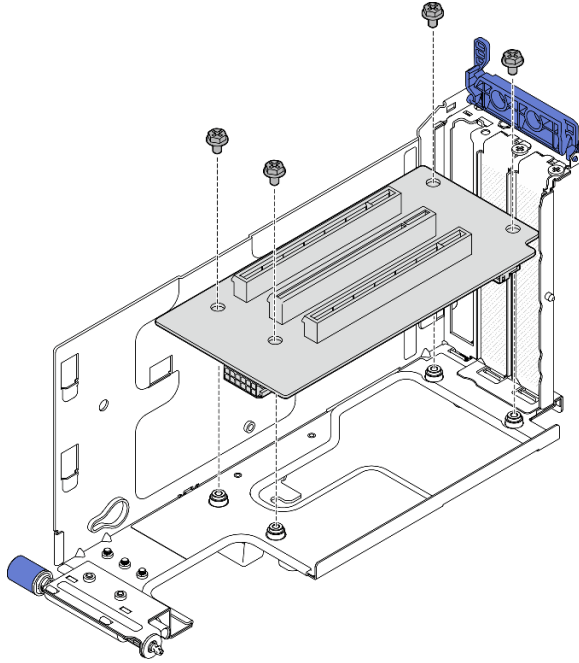


Figure 160. Installing the riser card

Step 2. Connect power and signal cables to PCIe riser 2. The number of signal cables varies by configuration.

a. (Optional) Connect the **blue** signal cable to MCIO3 and MCIO4 connectors. Press **2** the cable clip to disengage it from the slot; then, route the cable into the cable clips.

Notes: The blue signal cable is not supported in the following configurations:

- Front SATA drive backplane and internal NVMe drive backplane connect to the system board
- Front NVMe drive backplane and internal NVMe drive backplane connect to the system board

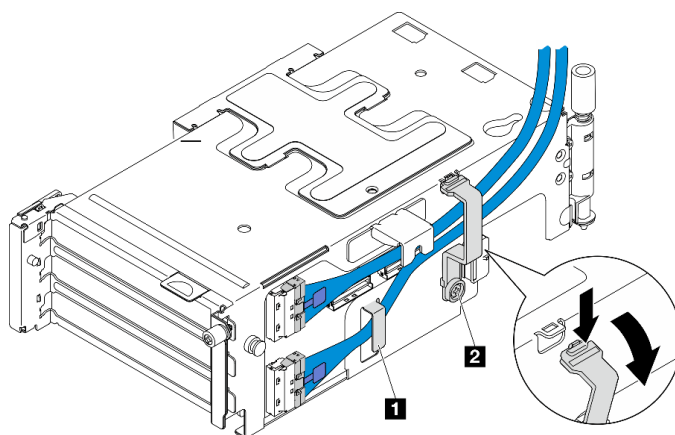


Figure 161. PCIe riser 2 cable routing

1 2 Cable clips

- b. Route the **silver** signal cable into the cable clip, and connect the cable to MCIO2 connector; then, connector the cable to MCIO1 connector.
- c. Press and hold **1** the cable clip, and move it toward the riser cage; then, release the cable clip to restore it back to the slot. Make sure the cables are secured in the cable clip as shown.
- d. Connect **2** the power cable to the power connector.

Note: Route the power cable inwards as shown. Do not place the silver signal cable between the power cable and the riser cage.

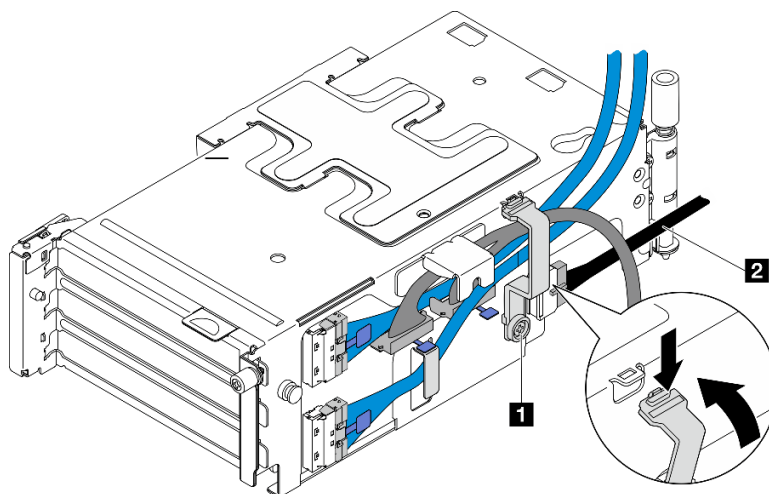


Figure 162. PCIe riser 2 cable routing

1 Cable clip

2 Power cable

After this task is completed

1. Proceed to install PCIe adapters. See [“Install a PCIe adapter” on page 162.](#)
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239.](#)

Demo Video

[Watch the procedure on YouTube](#)

Power distribution board and PDB cage replacement

Follow instructions in this section to remove and install the power distribution board and the PDB cage.

Remove the power distribution board and PDB cage

Follow the instructions in this section to remove the power distribution board and PDB cage.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove all the power supply units. See [“Remove a hot-swap power supply unit” on page 187](#).
- b. Remove the top cover. See [“Remove the top cover” on page 237](#).
- c. If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- d. If applicable, remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).
- e. If applicable, remove internal drive cage. See [“Remove the internal drive cage” on page 114](#).
- f. Remove the M.2 air baffle. See [“Remove the M.2 air baffle” on page 66](#).
- g. If applicable, remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 126](#).
- h. Disconnect all the cables from the front drive backplane.
- i. Place PCIe riser 2.
 1. Remove PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
 2. If applicable, disengage the silver signal cable of PCIe riser 2 from cable clips.

3. Place PCIe riser 2 to the left hand side, away from the power distribution board.

Note: If necessary, remove the RAID flash power module holder for easier operation. See [“Remove the RAID flash power module holder” on page 204](#).

- Step 2. Disconnect all the cables from the power distribution board.

Note: 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 power distribution board.

- Step 3. Loosen the six screws that secure the power distribution board; then, remove the power distribution board from the PDB cage.

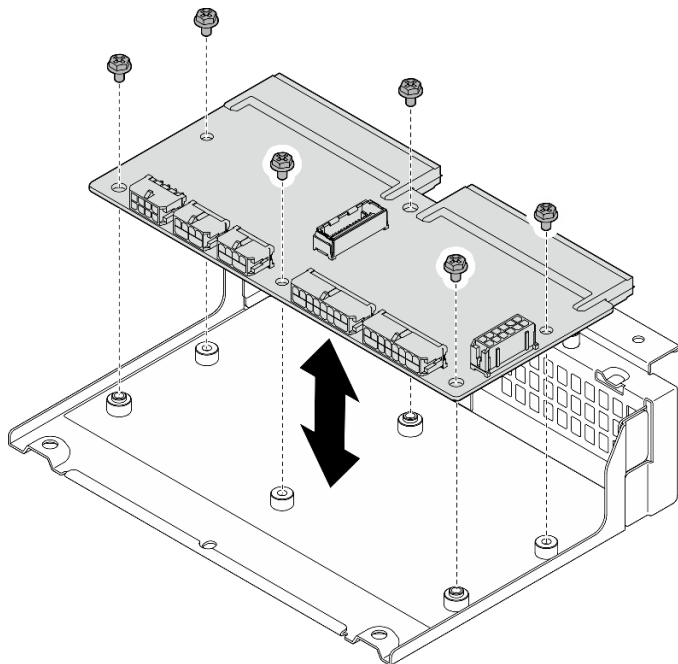


Figure 163. Removing the power distribution board

- Step 4. Loosen the four screws that secure the PDB cage; then, lift the PDB cage to remove it.

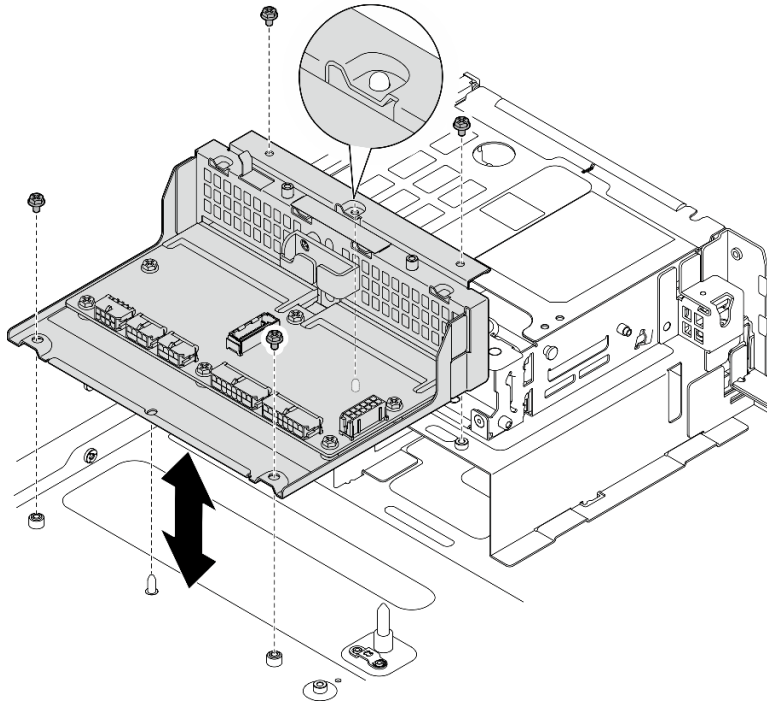


Figure 164. Removing the PDB cage

After this task is completed

1. Install a replacement unit. See [“Install the power distribution board and PDB cage” on page 184](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the power distribution board and PDB cage

Follow the instructions in this section to install the power distribution board and PDB cage.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the PDB cage to the chassis.

- Align the PDB cage with the guide pins on the chassis; then, lower the PDB cage down to the chassis.
- Fasten four screws to secure the PDB cage.

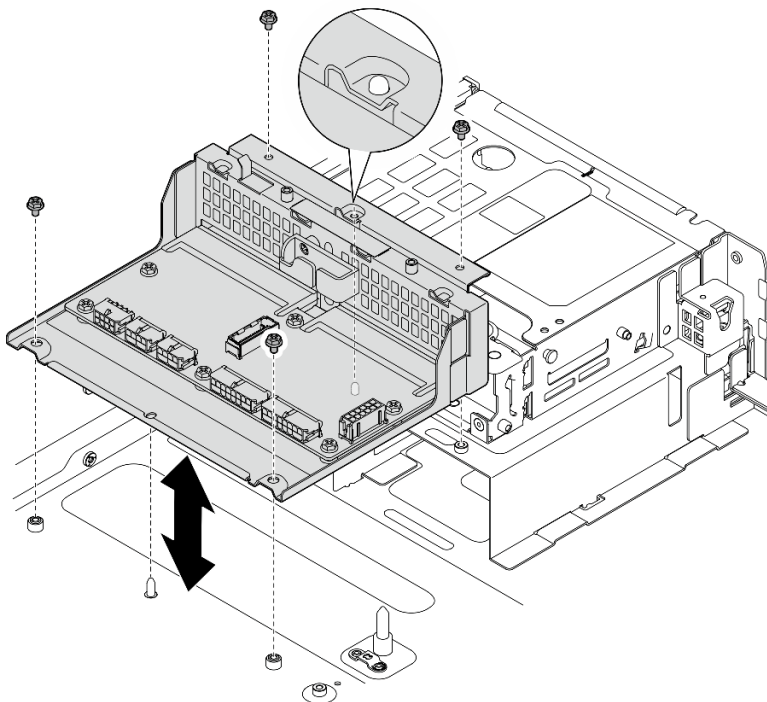


Figure 165. Installing the PDB cage

Step 2. Fasten six screws to secure the power distribution board onto the PDB cage.

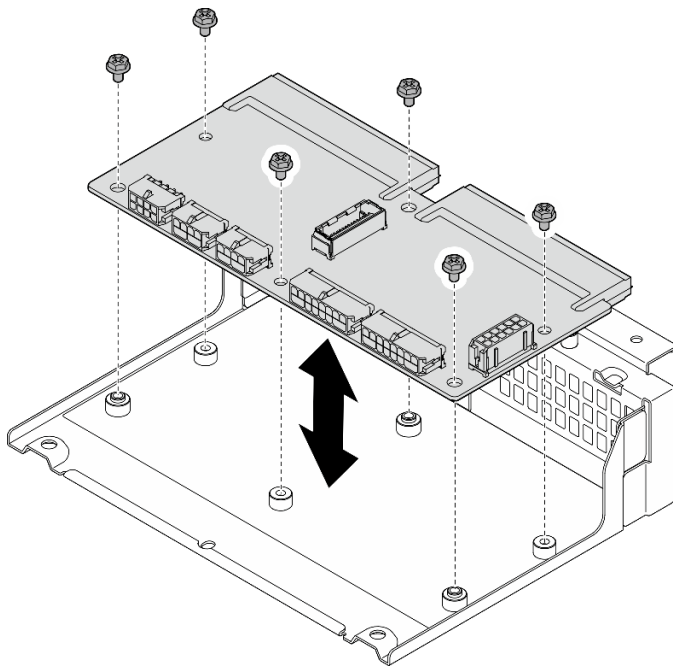


Figure 166. Installing the power distribution board

Step 3. Connect the cables to the power distribution board.

Notes:

- Reconnect all the required cables to the same connectors on the power distribution board as the defective power distribution board.
- To replace the PDB cables, do the cable routing for power distribution board. See [“Power distribution board \(PDB\) and fan control board \(FCB\) cable routing” on page 246.](#)

After this task is completed

1. If the RAID flash power module holder is removed, reinstall the holder. See [“Install the RAID flash power module holder” on page 205.](#)
2. If applicable, secure the silver signal cable of PCIe riser 2 into cable clips. See [“PCIe riser card cable routing” on page 251.](#)
3. Reinstall PCIe riser 2. See [“Install the PCIe riser assembly” on page 167.](#)
4. Reconnect the cables to the front drive backplane.
5. If applicable, reinstall the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 137.](#)
6. Reinstall the M.2 air baffle. See [“Install the M.2 air baffle” on page 68.](#)
7. If applicable, reinstall the internal drive cage. See [“Install the internal drive cage” on page 115.](#)
8. If applicable, reinstall the internal drive backplane. See [“Install the internal drive backplane” on page 117.](#)
9. If applicable, reinstall all the internal drives. See [“Install an internal drive” on page 121.](#)
10. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
11. Reinstall the top cover. See [“Install the top cover” on page 238.](#)
12. Reinstall all the power supply units. See [“Install a hot-swap power supply unit” on page 189.](#)

13. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Power supply unit replacement

Follow instructions in this section to remove and install a power supply unit.

Remove a hot-swap power supply unit

Follow instructions in this section to remove a hot-swap power supply unit.

S001



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.

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.

S029





DANGER

For -48V dc power supply, electrical current from power cords is hazardous.

To avoid a shock hazard:

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
 - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- Make sure you have a power supply unit filler available if some power supply bays will be left empty after the removal.

Procedure

Step 1. ① Press and hold the terra-cotta release tab.

Step 2. ② Grasp the handle, and pull the power supply unit out of the server.

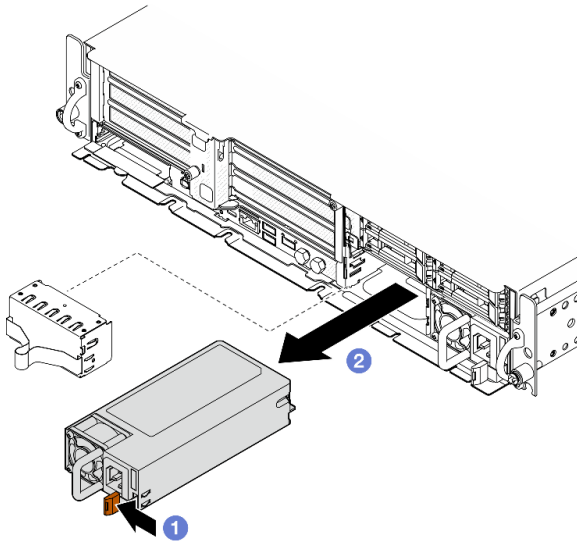


Figure 167. Power supply unit removal

After this task is completed

1. Install a power supply or power supply filler as soon as possible. See [“Install a hot-swap power supply unit” on page 189](#).

Important: During normal operation, each power supply bay must contain either a power supply unit or a power supply filler for proper cooling.

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

Demo Video

[Watch the procedure on YouTube](#)

Install a hot-swap power supply unit

Follow instructions in this section to install a hot-swap power supply unit.

S001





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.

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.

S029



For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:

- To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
 - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

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.

About this task**Attention:**

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make preparation for this task.

- a. If the configuration is with only one power supply unit, install the power supply unit in **PSU bay 1** (the right bay).
- b. If the configuration is with two power supply units, make sure the power supply units are with the same brand, power rating, wattage and efficiency level.
- c. If a power supply filler is installed in the bay, pull the filler out of the bay.

Note: During normal operation, each power supply bay must contain either a power supply unit or a power supply filler for proper cooling.

Step 2. Make sure the label on the power supply is facing up; then, grasp the handle and slide it into the power supply bay until it clicks into place.

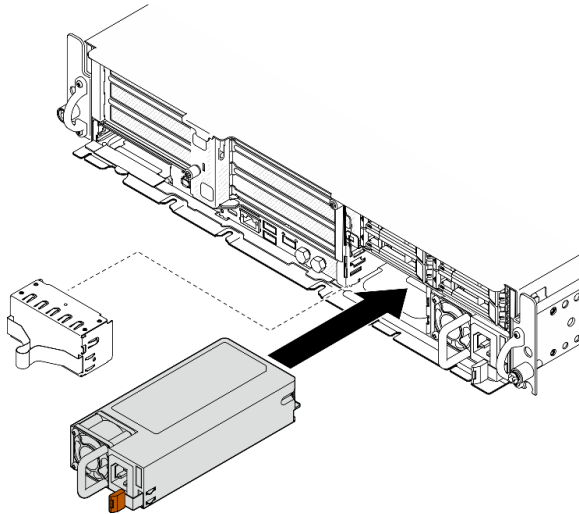


Figure 168. Installing a power supply unit

- Step 3. Connect the power supply unit to a properly grounded electrical socket with a power cord.
- Step 4. Make sure that the AC power LED on the power supply unit is lit, indicating that the power supply unit is operating correctly.

After this task is completed

- Check the PSU LEDs to verify that the PSU is operating correctly. See [“Power supply LEDs” on page 290](#).
- Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Processor and heat sink replacement (trained technician only)

Follow the instruction in this section to remove or install a processor or a heat sink.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install the part without proper training and qualification.
- Before replacing a processor, check the current PSB fuse policy. (Lenovo service technician only) See *Service process before replacement* at [Service process for updating PSB fuse state](#).
- After replacing a processor, ensure that the processor fuse status is expected without unexpected XCC event logs. (Lenovo service technician only) See *Service process after replacing a processor* at [Service process for updating PSB fuse state](#).

Attention:

- Before reusing a processor or heat sink, make sure you use Lenovo proven alcohol cleaning pad and thermal grease.
- Each processor socket must always contain a cover or a processor. When replacing a processor, protect the empty processor socket with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

Remove a heat sink

Follow instructions in this section to remove a heat sink. This task requires a Torx T20 driver. The procedure must be executed by a trained technician.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).

- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).

Step 2. Remove the heat sink.

Notes:

- Do not touch the contacts on the bottom of the processor.
 - Keep the processor socket clean from any object to prevent possible damages.
- ① Fully loosen all the screws on the heat sink **in the removal sequence shown** on the heat-sink label.
 - ② Carefully lift the heat sink from the processor socket.

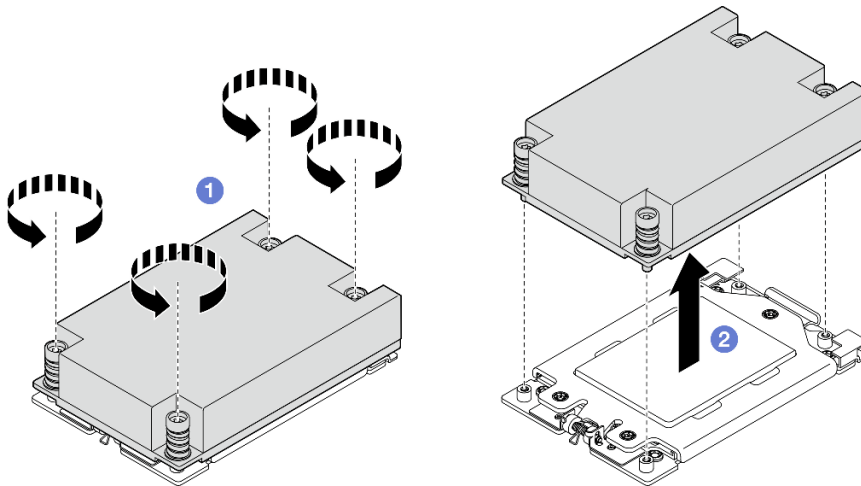


Figure 169. 1U heat sink removal

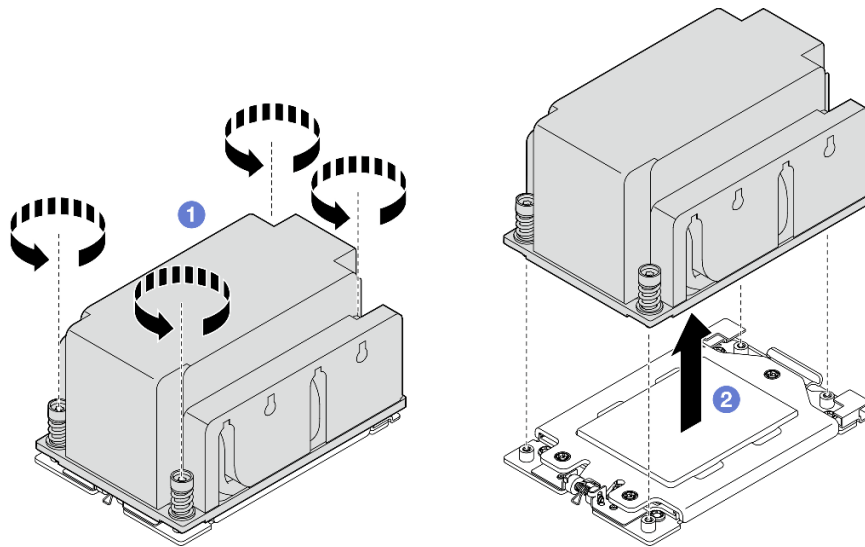


Figure 170. 2U heat sink removal

After this task is completed

1. If you are replacing a heat sink, install a new heat sink. See [“Install a heat sink” on page 198](#).
2. If you are replacing a processor, remove the processor. See [“Remove a processor” on page 195](#).
3. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove a processor

Follow instructions in this section to remove a processor. This task requires a Torx T20 driver. The procedure must be executed by a trained 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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- The system will load factory default UEFI settings when the processor is removed. Back up the UEFI setting before processor removal.

Procedure

Step 1. Make preparation for this task.

- Back up the UEFI setting.
- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See [“Remove the PCIe riser assembly” on page 152](#).
- Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- Remove the heat sink. See [“Remove a heat sink” on page 193](#).

Step 2. ❶ Use a Torx T20 screwdriver to loosen the three captive screws; then, slightly lift up the retention frame.

Step 3. ❷ Slightly lift up the rail frame in the direction shown. The processor in the rail frame is spring-loaded.

Step 4. ❸ Hold the tab of the processor carrier and slide the processor carrier out of the rail frame.

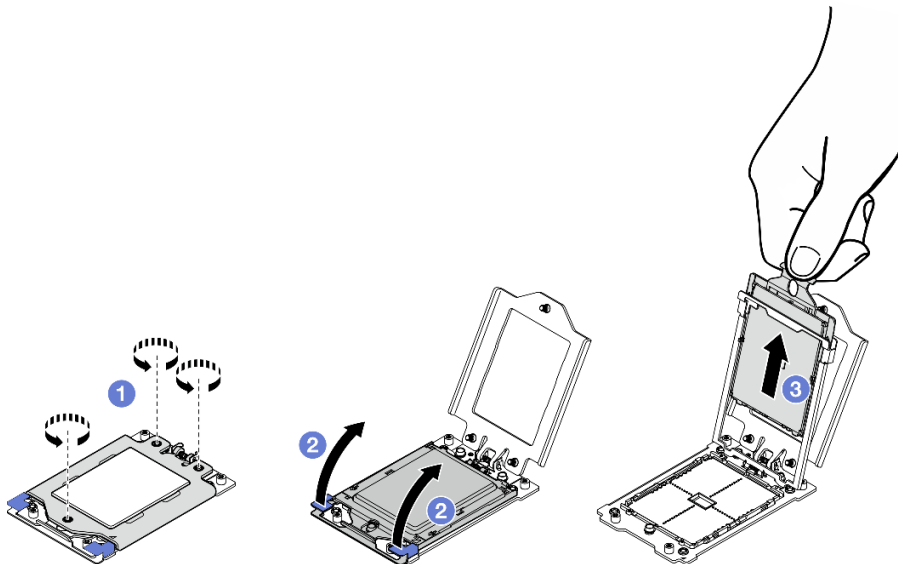


Figure 171. Processor removal

After this task is completed

1. Install a replacement unit. See [“Install a processor” on page 197](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install a processor

Follow instructions in this section to install a processor. This task requires a Torx T20 driver. The procedure must be executed by a trained 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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Notes:

- See <https://serverproven.lenovo.com> for a list of processors supported for your server.
- Before you install a new processor, update your system firmware to the latest level. See [“Update the firmware” on page 277](#).

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/thinkedge/se455v3/7dbx/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 277](#) for more information on firmware updating tools.

Procedure

Step 1. Remove the processor socket cover.

Step 2. Install the processor.

- a. ① Slide the processor carrier into the rail frame.
- b. ② Push the rail frame down until the blue latches lock into place.
- c. ③ Close the retention frame.
- d. ④ Use a Torx T20 screwdriver to tighten the three captive screws.

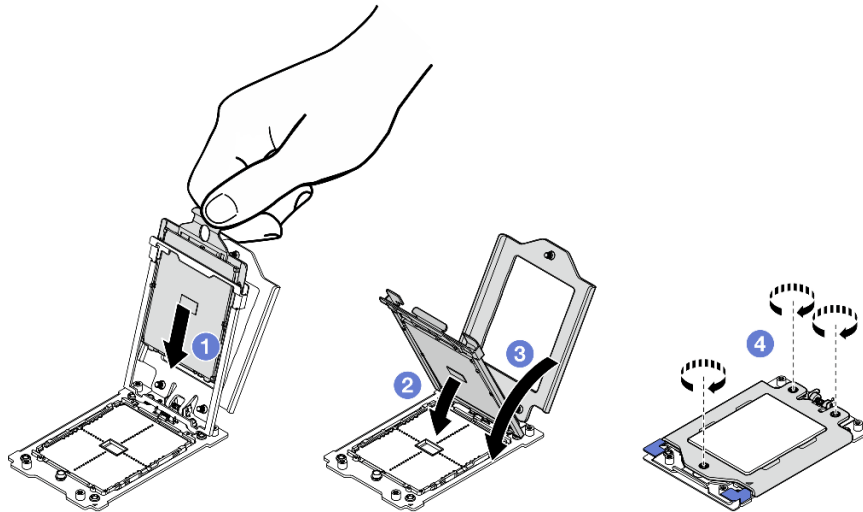


Figure 172. Processor installation

After this task is completed

1. Install the heat sink. See [“Install a heat sink” on page 198](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Install a heat sink

Follow the instructions in this section to install a heat sink. This task requires a Torx T20 driver. The procedure must be executed by a trained 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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Record the processor identification label.

To replace a processor and reuse the heat sink:

1. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
2. Wipe off old thermal grease on the heat sink with an alcohol cleaning pad.

To replace a heat sink and reuse the processor:

1. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location.

Note: If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

2. Wipe off old thermal grease on the heat sink with an alcohol cleaning pad.
3. Check whether the manufacturing date on the new heat sink exceeds two years.
 - If yes, wipe off the thermal grease on the new heat sink with an alcohol cleaning pad, and go to [Step 2 on page 199](#)
 - If no, go to [Step 3 on page 199](#)

Step 2. Apply new thermal grease on the top of the processor with a syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

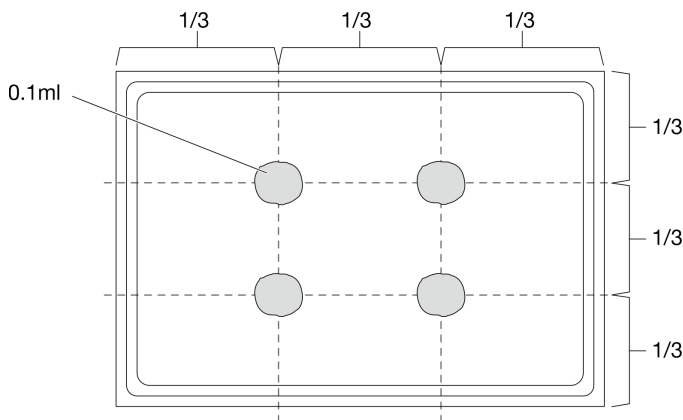


Figure 173. Thermal grease application

Step 3. Install the heat sink.

- a. ① Align the captive screws on the heat sink with the screw holes on the processor socket; then install the heat sink on the processor socket.
- b. ② Partially tighten all the screws with proper torque **in the installation sequence shown** on the heat-sink label, and repeat the procedure until all the screws are fully-tightened.

Note: For reference, the torque required to tighten the screws is 12.0+/- 1.2 lbf-in, 1.36+/- 0.14 N-M.

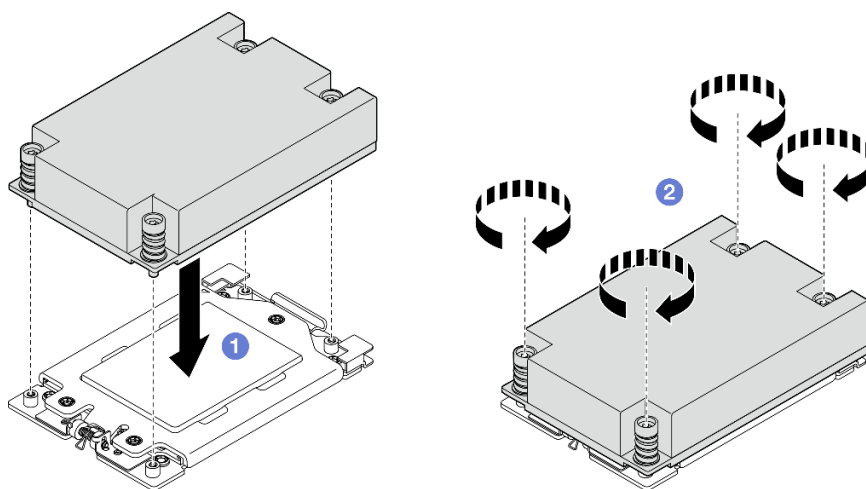


Figure 174. 1U heat sink installation

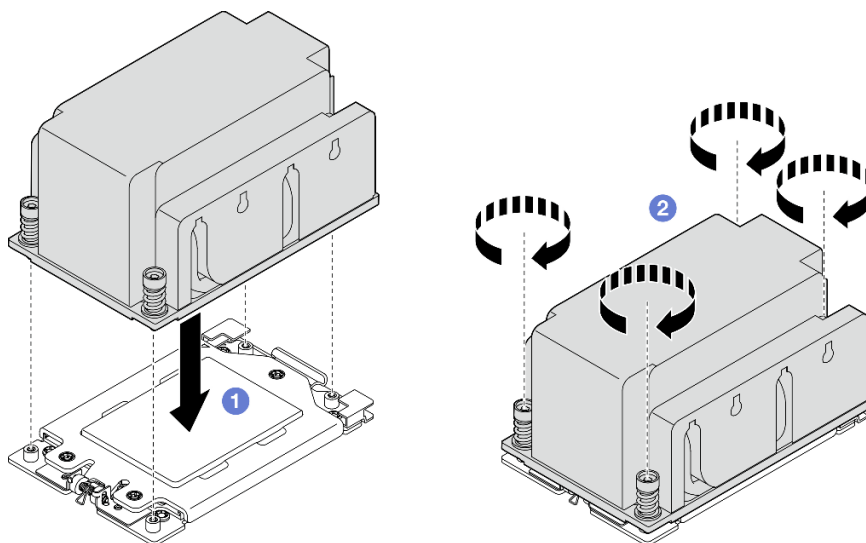


Figure 175. 2U heat sink installation

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

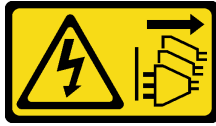
RAID flash power module (supercap) replacement

Follow instructions in this section to remove and install a RAID flash power module (supercap).

Remove a RAID flash power module from the holder

Follow the instructions in this section to remove a RAID flash power module from the holder.

About this task

**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 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- If applicable, remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).
- If applicable, remove internal drive cage. See [“Remove the internal drive cage” on page 114](#).

Step 2. Remove the RAID flash power module from the holder.

- 1 Pull back the retention clips; meanwhile, hold the RAID flash power module, and pivot the cable side of the module to disengage it from the holder.
- 2 Remove the RAID flash power module from the holder.

Note: Be careful **not to** grasp the cables of the RAID flash power module.

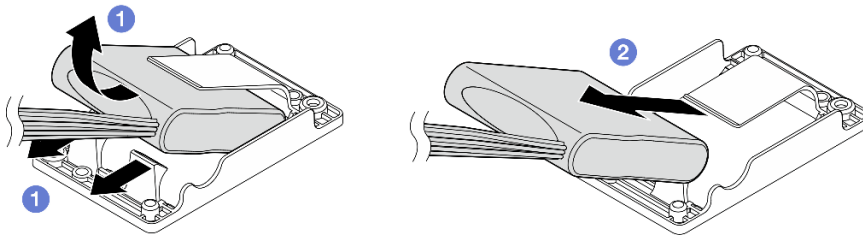


Figure 176. Removing the RAID flash power module

Step 3. Disconnect the RAID flash power module from the extension cable.

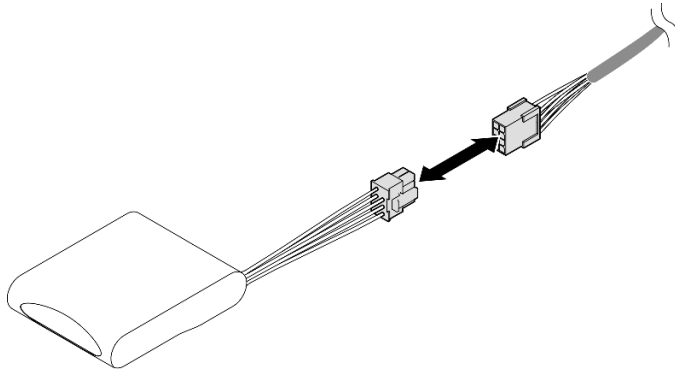


Figure 177. Disconnecting the extension cable

After this task is completed

- Install a replacement unit. See [“Install a RAID flash power module to the holder” on page 202](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install a RAID flash power module to the holder

Follow the instructions in this section to install a RAID flash power module to the holder.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Connect the extension cable to the RAID flash power module.

Notes:

- Make sure that the extension cable is secured in cable clip **6**.

See [“RAID flash power module \(supercap\) cable routing” on page 254](#) for details.

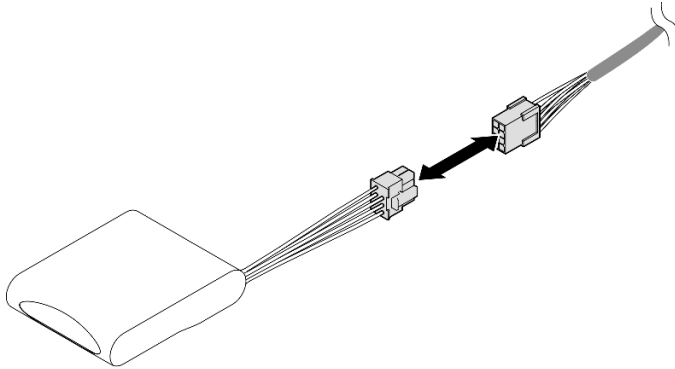


Figure 178. Connecting the extension cable

Step 2. Install the RAID flash power module.

- 1 Insert the RAID flash power module into the holder with the orientation shown in the illustration. Make sure that the end of the module is placed as shown.
- 2 Pull back the retention clips; meanwhile, press the cable side of the flash power module down until it is seated in place.

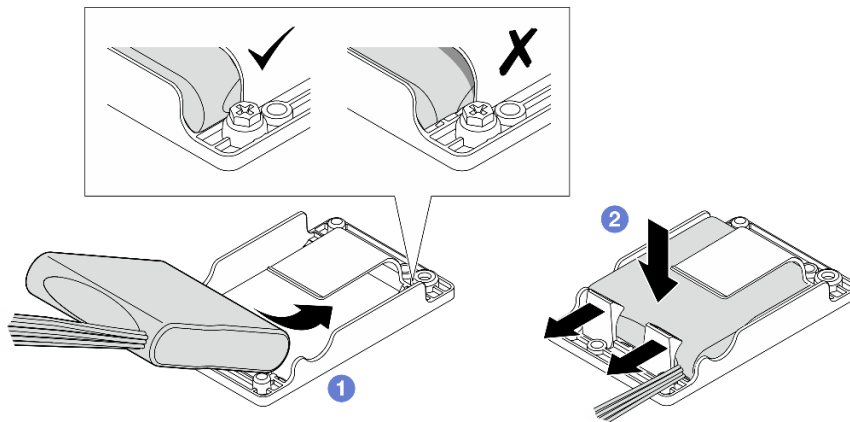


Figure 179. Installing the RAID flash power module

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

RAID flash power module holder replacement

Follow instructions in this section to remove and install the RAID flash power module holder.

Remove the RAID flash power module holder

Follow the instructions in this section to remove the RAID flash power module holder.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Remove the top cover. See [“Remove the top cover” on page 237](#).
- b. If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- c. If applicable, remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).
- d. If applicable, remove internal drive cage. See [“Remove the internal drive cage” on page 114](#).
- e. If applicable, disconnect the RAID flash power module from the extension cable.

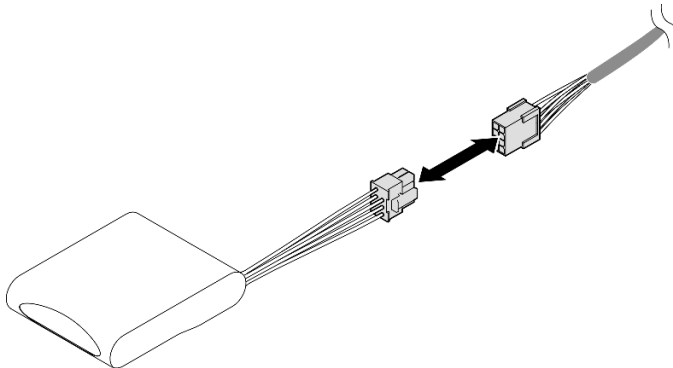


Figure 180. Disconnecting the extension cable

- Step 2. Loosen the two screws that secure the RAID flash power module holder; then, lift the holder to remove it from the chassis.

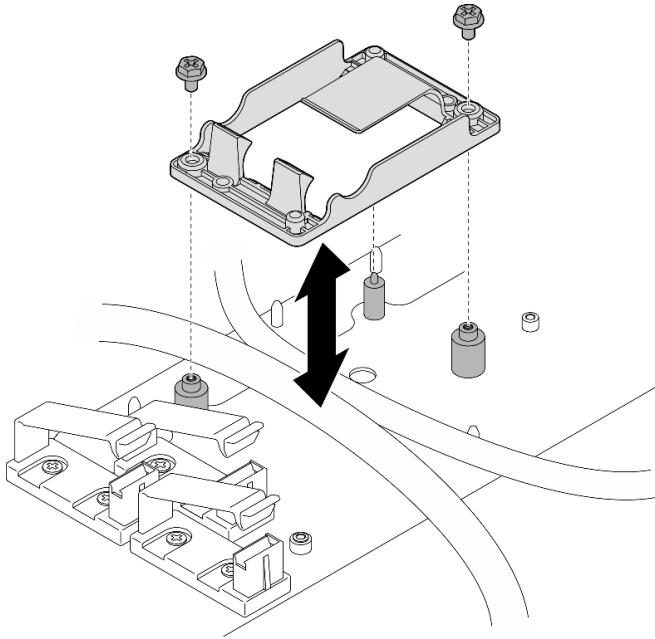


Figure 181. Removing the RAID flash power module holder

After this task is completed

- Install a replacement unit. See [“Install the RAID flash power module holder” on page 205](#).
- 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 RAID flash power module holder

Follow the instructions in this section to install the RAID flash power module holder.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the RAID flash power module holder.

- a. Align the RAID flash power module holder with the guide pins on the chassis; then, lower the holder down to the chassis.

Notes: Make sure that the holder secures the following cables:

- System-board power 2 cable
 - FCB power cable
- b. Fasten two screws to secure the RAID flash power module holder.

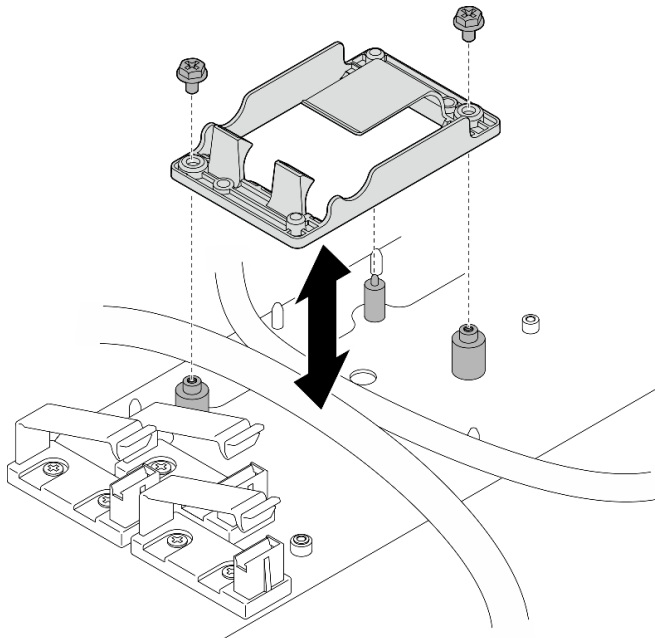


Figure 182. Installing the RAID flash power module holder

After this task is completed

- If applicable, connect the RAID flash power module to the extension cable.

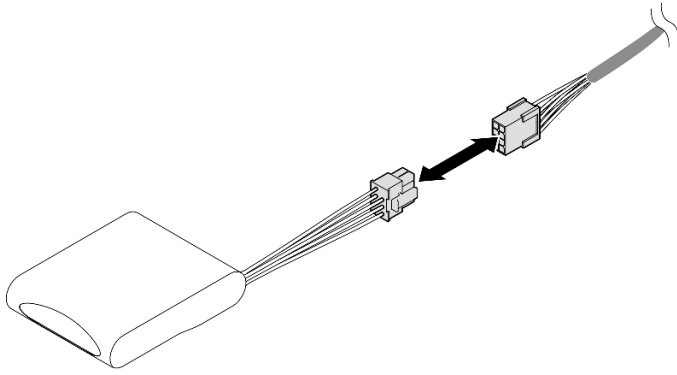


Figure 183. Connecting the extension cable

- Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Security bezel and dust filter replacement

Follow instructions in this section to remove or install the security bezel and the dust filter.

Remove the security bezel

Follow instructions in this section to remove the security bezel.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Procedure

- Step 1. Unlock the security bezel with the corresponding key.
- Step 2. Remove the security bezel.
- 1 Press and hold the release latches on both sides.
 - 2 Slide the security bezel away from the chassis.

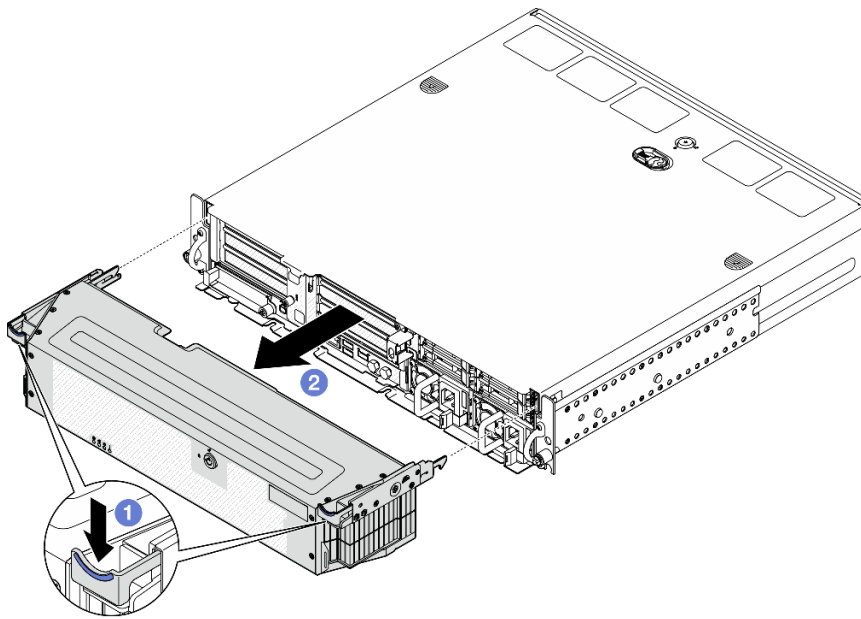


Figure 184. Removing the security bezel

After this task is completed

- If necessary, proceed to replace the dust filter. See [“Remove the dust filter” on page 208](#).
- If the server will operate without security bezel, install security bezel slot fillers to protect the slots. See [“Front I/O fillers” on page 26](#) to identify the fillers.
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Remove the dust filter

Follow instructions in this section to remove the dust filter.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Procedure

- Step 1. Make preparation for this task.
- a. Remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Step 2. Remove the dust filter.
- a. ① Press the release latch.
 - b. ② Rotate the dust filter away from the security bezel.

Note: For optimal server operation, make sure to install a replacement dust filter.

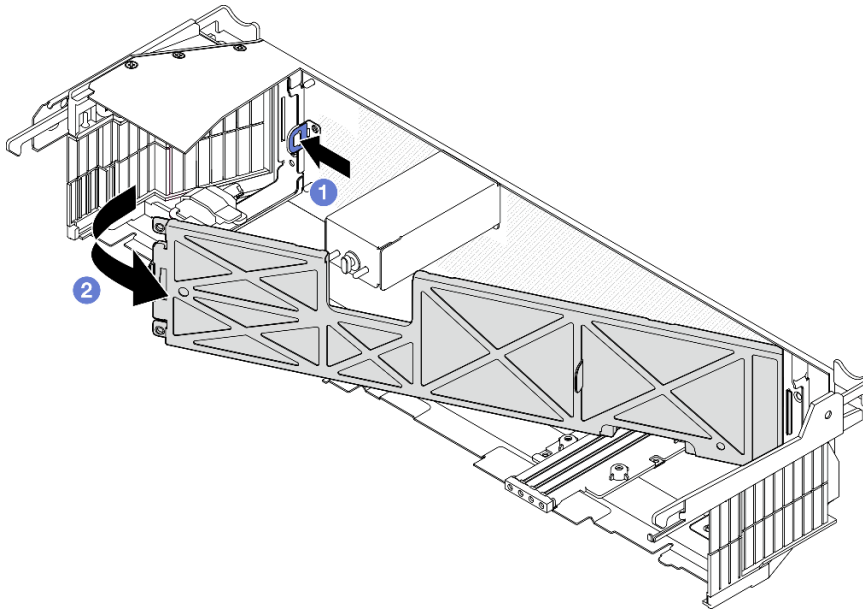


Figure 185. Removing the dust filter

After this task is completed

- Install a replacement unit. See [“Install the dust filter” on page 209](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the dust filter

Follow instructions in this section to install the dust filter.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Depends on the operating environment, check the status of the dust filter at least every 3 months to make sure it is functional.

Important: With air flow sensor board installed, SE455 V3 BMC supports dust filter measurement to check the status of the dust filter. Log in to Lenovo XClarity Controller web interface, and go to **Utilization → Fan Speed (RPM) → Dust Filter Measurement** to take the measurement by selecting **Run immediately (once)**, or by setting a regular schedule. See [“Set dust filter measurement” on page 275](#) for more information.

- When taking the measurement, the fans will operate at full fan speed for about 30 seconds.
- After taking the measurement, see Lenovo XClarity Controller Event Log for the status of dust filter. For proper operation, replace the dust filter according to the action suggestions in the generated event.

Procedure

Step 1. Install the dust filter.

- a. ① Insert the right side of the dust filter into the slot in the security bezel.
- b. ② Pivot the dust filter towards the security bezel until it is seated in place. Make sure the guide pins on the security bezel is seated in the holes on the dust filter.

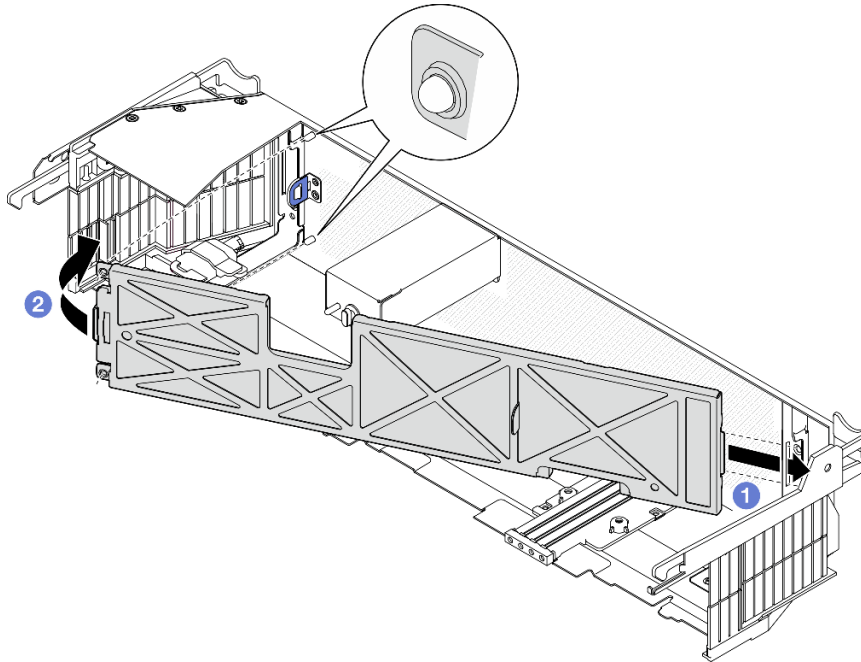


Figure 186. Installing the dust filter

After this task is completed

Proceed to install the security bezel. See [“Install the security bezel” on page 210](#).

Demo Video

[Watch the procedure on YouTube](#)

Install the security bezel

Follow instructions in this section to install the security bezel.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

Important: When installing the security bezel for the first time, the key that is required to lock the security bezel is stored at the location as illustrated:

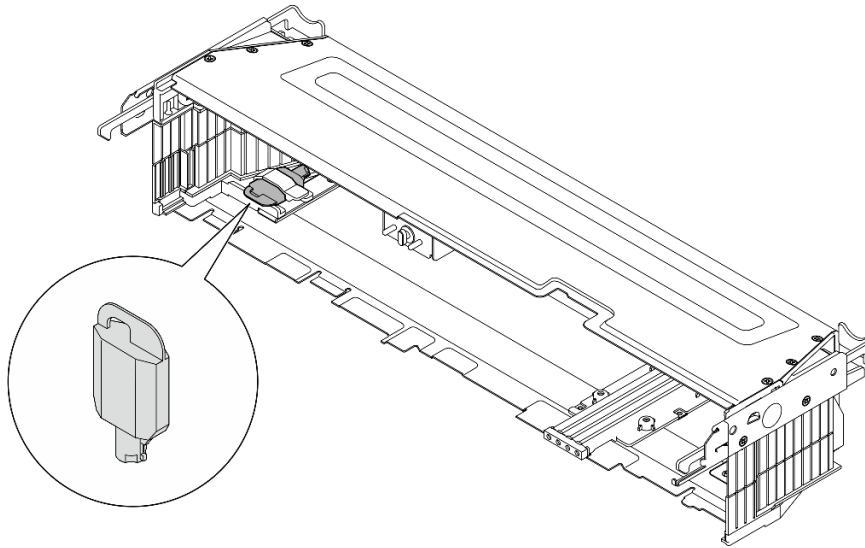


Figure 187. Security bezel key storage location

Procedure

Step 1. Make preparation for this task.

- a. Make sure the following components are installed properly:
 - Air flow sensor board (see [“Install the air flow sensor board” on page 79](#))
 - Bezel detect switch with cable (see [“Install the bezel detect switch with cable” on page 82](#))
 - Security bezel keylock bracket (see [“Install the security bezel keylock bracket” on page 214](#))
- b. Connect the power cable and other necessary external cables to the node.
- c. Power on the server and any peripheral devices. See [“Power on the server” on page 50](#).

Note: When the security bezel is installed, the buttons and connectors on the front of the server are not accessible.

Step 2. If the security bezel slot fillers are installed, remove the fillers. See [“Front I/O fillers” on page 26](#) to identify the fillers.

Step 3. Align the bottom guide pins of the security bezel with the slots on the chassis, and insert the bezel hooks in the slots on both sides.

Note: Make sure that the external cables go through both sides of the security bezel.

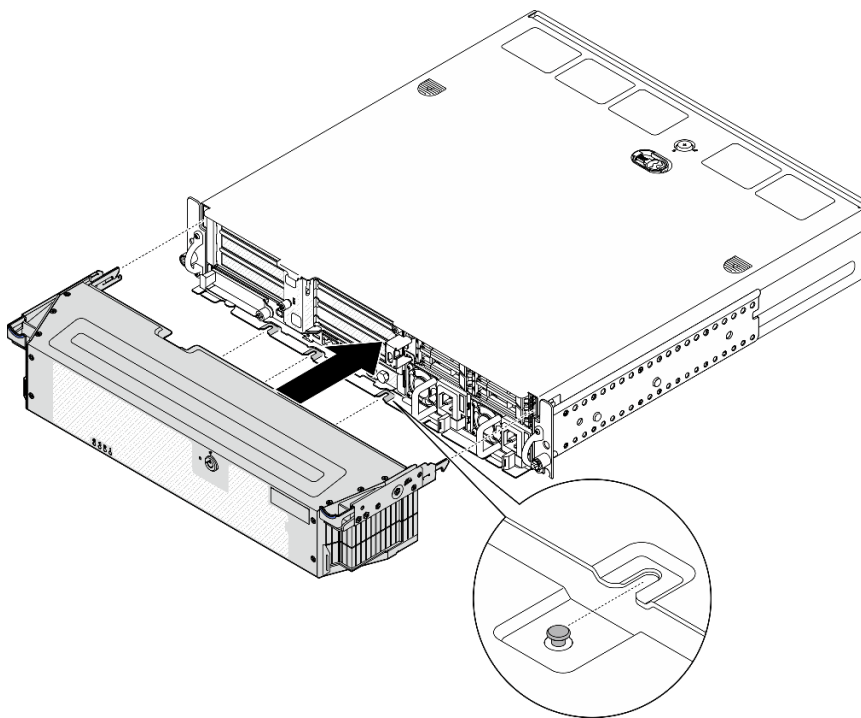


Figure 188. Installing the security bezel

Step 4. Lock the security bezel with the key, and store the key for future use.

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Security bezel keylock bracket replacement

Follow instructions in this section to remove or install the security bezel keylock bracket.

Remove the security bezel keylock bracket

Follow instructions in this section to remove the security bezel keylock bracket.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Loosen the screw that secures the security bezel keylock bracket.

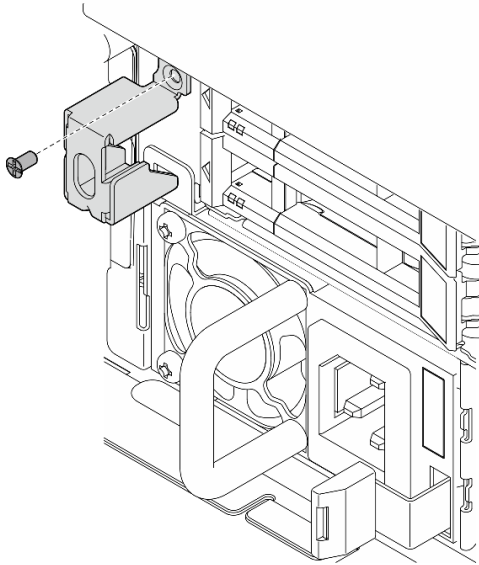


Figure 189. Removing the security bezel keylock bracket

Step 2. Pinch and pivot the security bezel keylock bracket away from the chassis; then, remove the bracket.

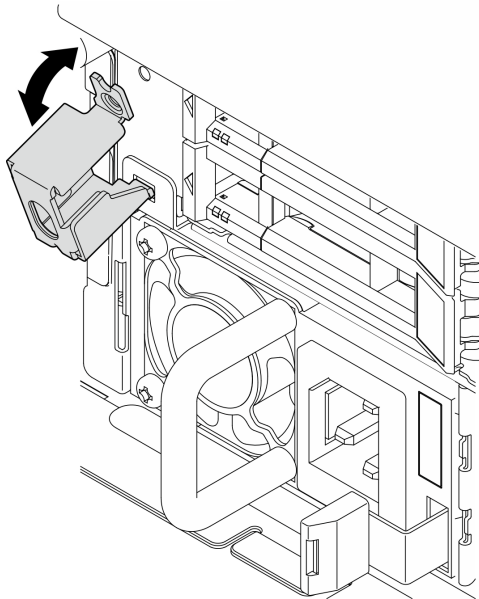


Figure 190. Removing the security bezel keylock bracket

After this task is completed

- Install a replacement unit. See [“Install the security bezel keylock bracket” on page 214](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the security bezel keylock bracket

Follow instructions in this section to install the security bezel keylock bracket.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).

Procedure

- Step 1. Insert the lower end of security bezel keylock bracket into the slot on the chassis; then, push the bracket toward the chassis.

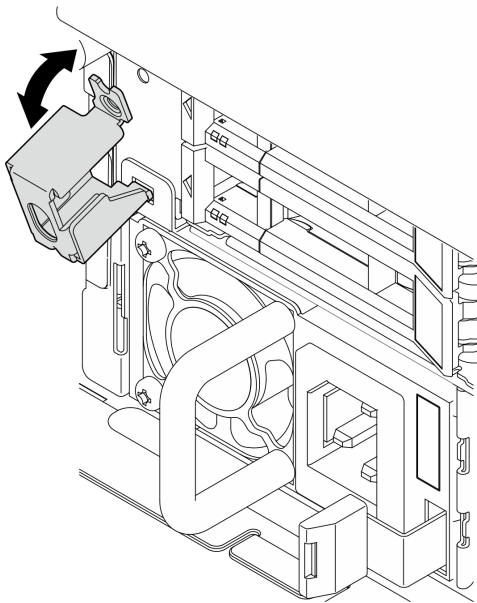


Figure 191. Installing the security bezel keylock bracket

- Step 2. Fasten one screw to secure the bracket.

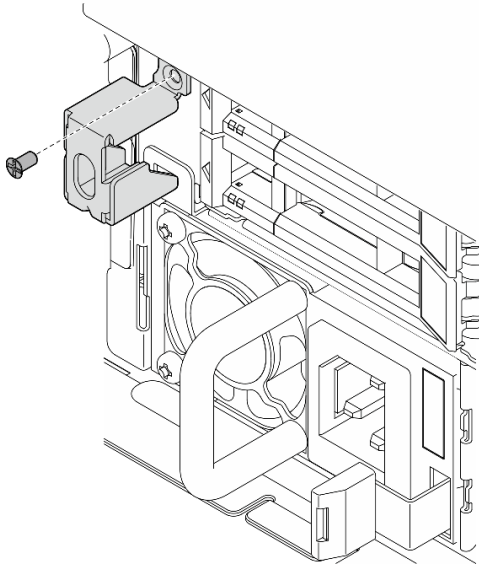


Figure 192. Installing the security bezel keylock bracket

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Serial port module replacement

Follow instructions in this section to remove or install the serial port module.

Remove the serial port module

Follow instructions in this section to remove the serial port module.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.

- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- Remove the top cover. See [“Remove the top cover” on page 237](#).
- Remove PCIe riser 1. See [“Remove the PCIe riser assembly” on page 152](#). The serial port cable is disconnected from the system board when removing PCIe riser 1.

Step 2. Open the retainer, and remove the screw that secures the module.

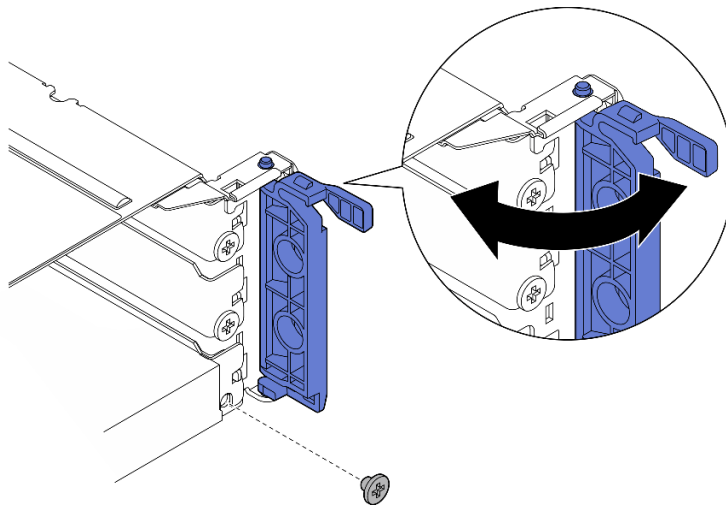


Figure 193. Removing the retaining screw

Step 3. Carefully slide the module out of the slot.

Note: If no replacement module or adapter is to be installed in Slot 5, install the slot filler.

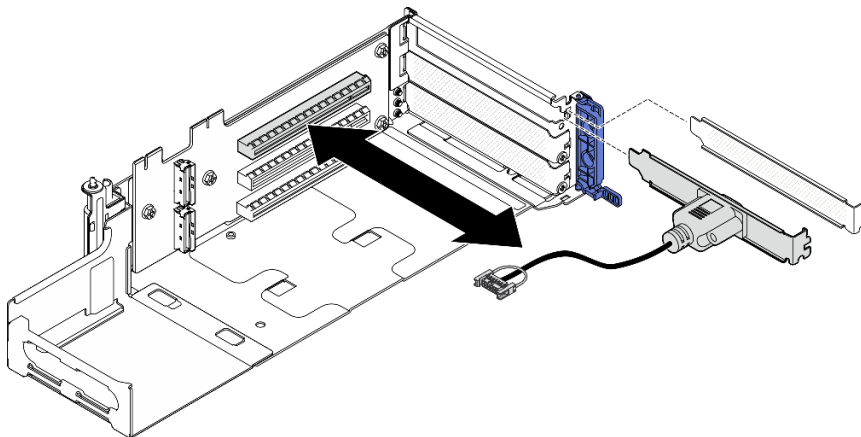


Figure 194. Removing the serial port module

After this task is completed

- Install a replacement unit. See [“Install the serial port module” on page 217](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the serial port module

Follow instructions in this section to install the serial port module.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: The serial port module can only be installed to Slot 5 in PCIe riser 1.

Procedure

Step 1. Install the serial port module.

- a. If a slot filler is installed, remove the filler.
- b. Align the module with the slot; then, carefully slide the module into the slot until it is firmly seated.

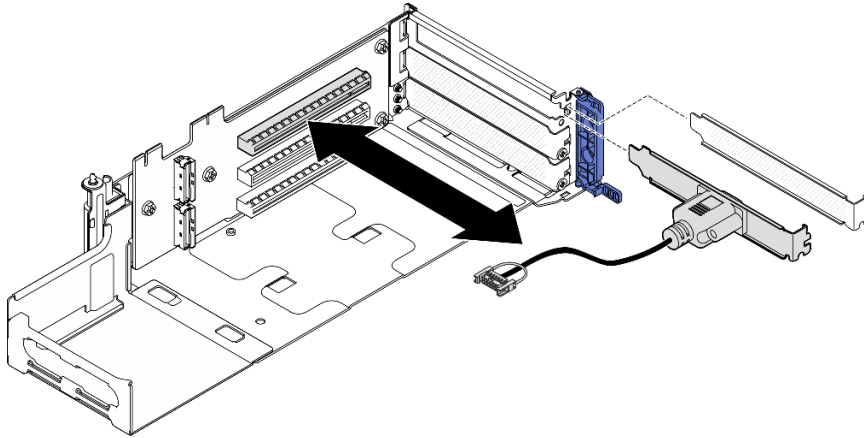


Figure 195. Installing the serial port module

Step 2. Fasten one screws to secure the module; then, close the retainer.

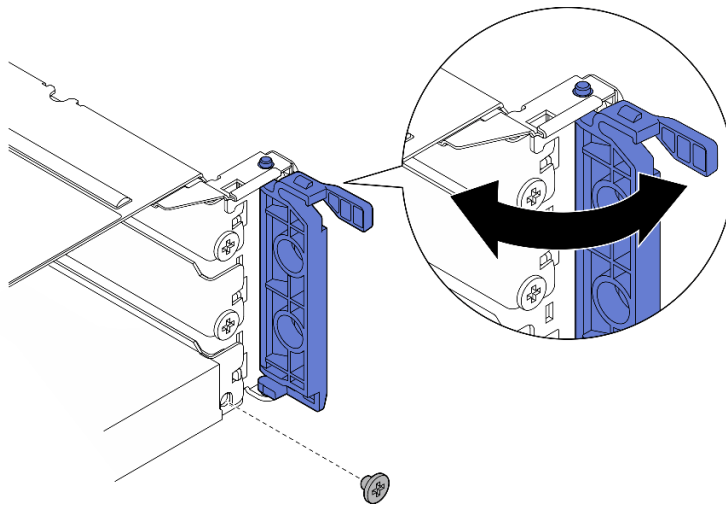


Figure 196. Installing the retaining screws

Step 3. Proceed to install PCIe riser 1. Connect the serial port cable to the system board when installing PCIe riser 1. See [“Install the PCIe riser assembly” on page 167](#).

After this task is completed

1. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
2. To enable the serial port module on Linux or Microsoft Windows, do one of the followings according to the installed operating system:

Note: If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

- For Linux:

Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- For Microsoft Windows:

- a. Open the ipmitool and enter the following command to disable the SOL feature:
`-I lanplus -H IP -U USERID -P PASSWORD sol deactivate`
- b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:
`Bcdedit /ems off`
- c. Restart the server to ensure that the EMS setting takes effect.

Demo Video

[Watch the procedure on YouTube](#)

System board replacement (trained technician only)

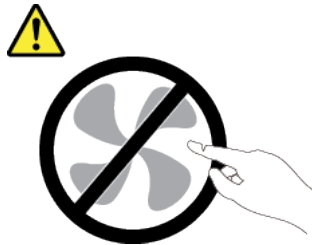
Follow instructions in this section to remove and install the system board.

Important:

- This task must be operated by trained technicians.
- If you need to replace a processor board and a firmware and RoT security module together, do the following:
 - Check the current PSB fuse policy before replacement. (Lenovo service technician only) See *Service process before replacement* at [Service process for updating PSB fuse state](#).
 - Ensure that the processor fuse status is expected without unexpected XCC event logs after replacement. (Lenovo service technician only) See *Service process after replacing a processor board and a firmware and RoT security module together* at [Service process for updating PSB fuse state](#).

CAUTION:

Hazardous moving parts. Keep fingers and other body parts away.



CAUTION:



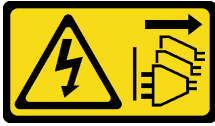
The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

Remove the firmware and RoT security module

Follow instructions in this section to remove the Firmware and Root of Trust Security Module (firmware and RoT security module).

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.

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

Attention:

- Read “[Installation Guidelines](#)” on page 41 and “[Safety inspection checklist](#)” on page 42 to ensure that you work safely.
- If applicable, remove the security bezel. See “[Remove the security bezel](#)” on page 207.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “[Power off the server](#)” on page 51.
- If the server is installed in a rack, remove the server from the rack. See “[Remove the server from the rack](#)” on page 51.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.

Procedure

Step 1. Make preparation for this task.

- a. Perform OneCLI commands to back up the UEFI settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command.
- b. Perform both OneCLI commands and XCC actions to back up the XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command and https://pubs.lenovo.com/xcc2/NN1ia_c_backupthexcc.html.
- c. Remove the top cover. See “[Remove the top cover](#)” on page 237.
- d. Remove all the PCIe assemblies. If the configuration comes with PCIe riser 2 and internal drives, remove all the internal drives, and lift the internal drive backplane before removing PCIe riser 2. See “[Remove the PCIe riser assembly](#)” on page 152.

Step 2. Remove the firmware and RoT security module.

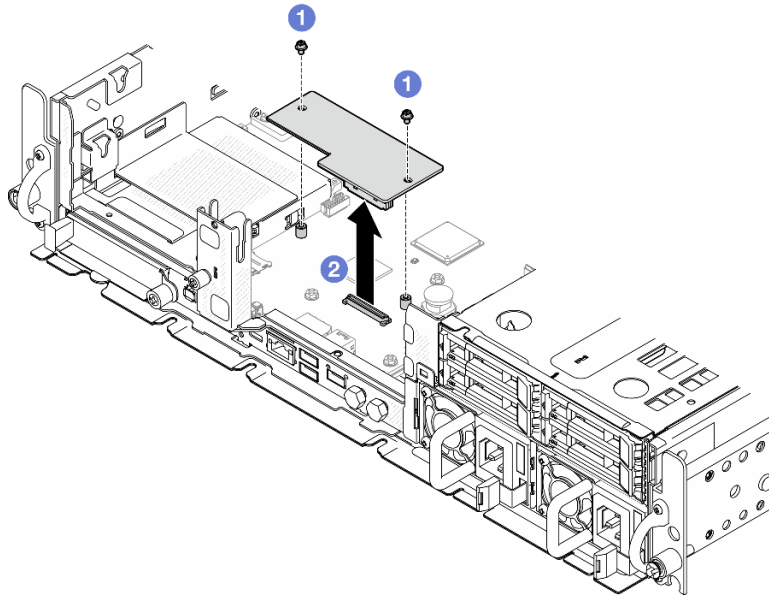


Figure 197. Firmware and RoT security module removal

- a. ① Loosen the two screws on the firmware and RoT security module.
- b. ② Lift the firmware and RoT security module out of the chassis.

After this task is completed

1. Install a replacement unit. See [“Install the firmware and RoT security module” on page 221](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo Video

[Watch the procedure on YouTube](#)

Install the firmware and RoT security module

Follow instructions in this section to install the Firmware and Root of Trust Security Module (firmware and RoT security module).

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.

About this task

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

Attention:

- Read “[Installation Guidelines](#)” on page 41 and “[Safety inspection checklist](#)” on page 42 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 51.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.

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

- Go to <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dby/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 277 for more information on firmware updating tools.

Procedure

Step 1. Install the firmware and RoT security module to the server.

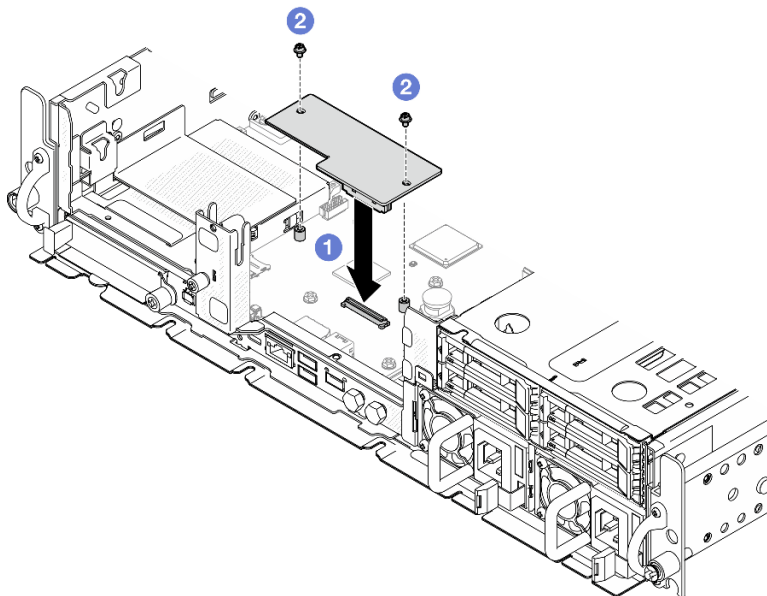


Figure 198. Firmware and RoT security module installation

- 1 Lower the firmware and RoT security module onto the system board and ensure that the connector on the module is correctly inserted into the slot on the system board.
- 2 Tighten the two screws to secure the firmware and RoT security module in place.

After this task is completed

1. Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).
2. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. (Lenovo service technician only) See <https://glosse4lenovo.lenovo.com/wiki/glosse4lenovo/view/How%20To/System%20related/How%20to%20do%20RoT%20Module%20FW%20update%20on%20ThinkSystem%20V3%20machines/>.
3. Perform OneCLI commands to restore the UEFI settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command.
4. Perform both OneCLI commands and XCC actions to restore the XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command and https://pubs.lenovo.com/xcc2/NN1ia_c_restorethexcc.html.
5. Optionally, do the following if needed:
 - Hide TPM. See [“Hide/observe TPM” on page 234](#).
 - Update the TPM firmware. See [“Update the TPM firmware” on page 235](#).
 - Enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 236](#).

Demo Video

[Watch the procedure on YouTube](#)

Manage the Self Encryption Drive Authentication Key (SED AK)

For ThinkEdge SE455 V3 with self-encrypted drives (SED) installed, the SED AK can be managed in Lenovo XClarity Controller. After setting up the server or making changes to the configuration, backing up the SED AK is essential to prevent data loss in the hardware failure case.

SED Authentication Key (AK) Manager

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → SED Authentication Key (AK) Manager** to manage the SED AK.

Notes: The operation of SED AK Manager is not allowed in the following conditions:

- System Lockdown Mode is in **Active** state. SED AK is locked until the system is activated or unlocked. See [“Activate or unlock the system” on page 270](#) to activate or unlock the system.
- Current user does not have the authority to manage SED AK.
 - To generate, backup, and recover the SED AK with passphrase or backup file, the role of XCC user should be **Administrator**.
 - To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

SED encryption

The status of SED encryption can be changed from Disabled to Enabled. Complete the following process to enable SED encryption.

1. Press **Enabled** button.
2. Select the SED AK generation method:
 - **Generate key using Passphrase:** Set the password and re-enter it for the confirmation.
 - **Generate key randomly:** A Random SED AK will be generated.
3. Press **Apply** button.

Attention:

- Once SED encryption is Enabled, it cannot be changed back to Disabled.
- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.
- When SED encryption is enabled, if emergency XCC password reset is performed, the SED AK stored in the server will be cleared as the default action. Data stored on the SED will no longer be accessible unless the SED AK is restored. Backing up the SED AK is strongly advised to reduce the risk of data loss. See [“Emergency XCC Password Reset” on page 274](#) for more information.

Change the SED AK

- **Generate key using Passphrase:** Set the password and re-enter it for the confirmation. Click **Re-generate** to get the new SED AK.
- **Generate key randomly:** Click **Re-generate** to get a Random SED AK.

Backup the SED AK

Set the password and re-enter it for the confirmation. Click **Start Backup** to backup the SED AK; then, download the SED AK file and store it safely for future use.

Note: If you use the backup SED AK file to restore a configuration, the system will ask for the password that you set here.

Recover the SED AK

- **Recover SED AK using Passphrase:** Use the password that was set in **Generate key using Passphrase** to recover the SED AK.
- **Recover SED AK from Backup file:** Upload the backup file generated in **Backup the SED AK** mode and enter the corresponding backup file password to recover the SED AK.
- **Recover SED AK from Automatic backup:** After system board replacement, use automatic backup to recover the SED AK for the installed SED.

Note: To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

Remove the system board

Follow instructions in this section to remove the system board.

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.

S012



CAUTION:
Hot surface nearby.

About this task

Important:

- Removing and installing this component requires trained technicians. **Do not** attempt to remove or install the part without proper training.
- When replacing the system board, always update the server with the latest firmware or restore the pre-existing firmware. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.
- When removing the memory modules, label the slot number on each memory module, remove all the memory modules from the system board, and set them aside on a static-protective surface for reinstallation.
- **When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board.**

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).

Procedure

Step 1. Make preparation for this task.

- a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.
- b. If SED encryption is enabled, maintain a backup of SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 223](#).
- c. If applicable, export Lenovo Features on Demand activation key. See the “License Management” section in the XCC documentation compatible with the server at <https://pubs.lenovo.com/lxcc-overview/>.
- d. Save the system configuration to an external device with Lenovo XClarity Essentials.
- e. Save the system event log to external media.
- f. If applicable, remove the OCP module. See [“Remove the OCP module” on page 149](#).
- g. Remove the top cover. See [“Remove the top cover” on page 237](#).
- h. If applicable, remove all the internal drives. See [“Remove an internal drive” on page 110](#).
- i. If applicable, remove the internal drive backplane. See [“Remove the internal drive backplane” on page 112](#).
- j. If applicable, remove internal drive cage. See [“Remove the internal drive cage” on page 114](#).
- k. Remove all the PCIe assemblies. See [“Remove the PCIe riser assembly” on page 152](#).
- l. Remove the processor air baffle. See [“Remove the processor air baffle” on page 70](#).
- m. Remove the intrusion switch. See [“Remove the intrusion switch with cable” on page 123](#).

- n. Remove all the fan modules. See [“Remove a fan module” on page 93](#).
- o. Remove the fan cage. See [“Remove the fan cage” on page 96](#).
- p. Remove the fan control board (FCB). See [“Remove the fan control board \(FCB\)” on page 97](#).
- q. If applicable, remove the air flow sensor board. See [“Remove the air flow sensor board” on page 78](#).
- r. Make sure to 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. See [“Remove a memory module” on page 139](#).
- s. Remove the firmware and RoT security module. See [“Remove the firmware and RoT security module” on page 219](#).
- t. If applicable, remove the MicroSD card from the system board to install it onto the new system board. See [“Remove the MicroSD card” on page 145](#).
- u. Remove the heat sink and the processor. See [“Remove a heat sink” on page 193](#) and [“Remove a processor” on page 195](#).

Step 2. Disconnect all the cables from the system board. While disconnecting the 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.

Step 3. Pull the plunger up; then, hold the plunger and the handle, and slide the system board slightly backward to disengage it from the chassis.

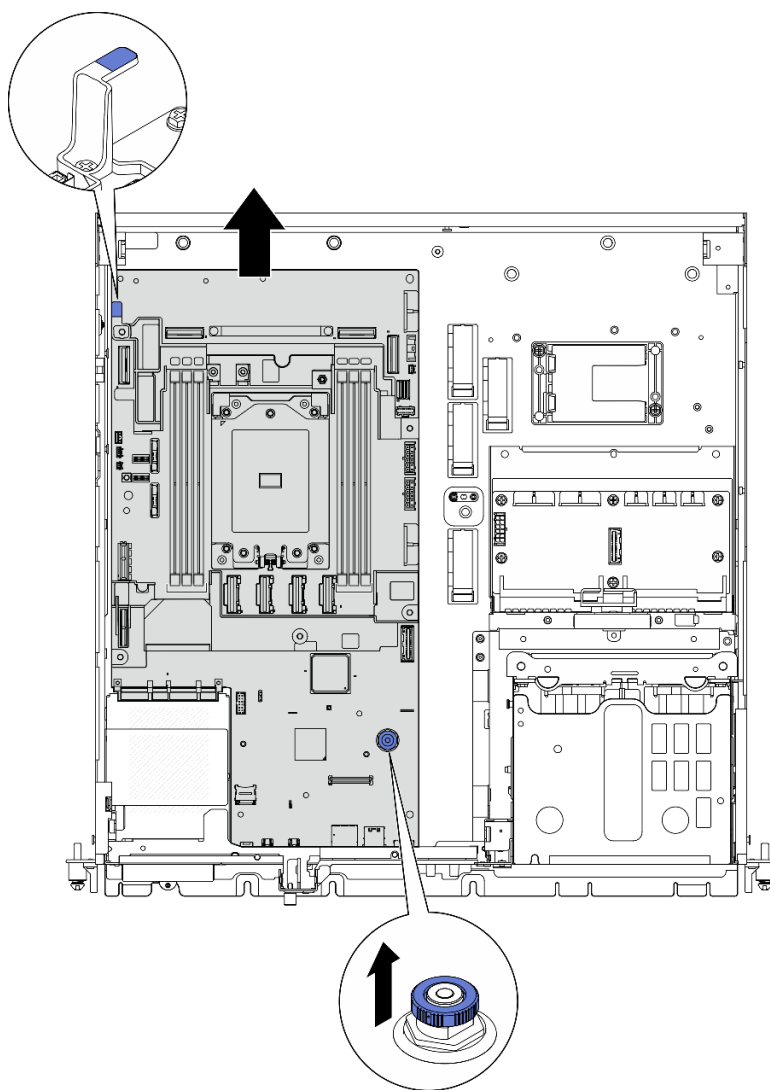


Figure 199. Disengaging the system board

Step 4. Rotate the left end of the system board up to remove the system board from the chassis.

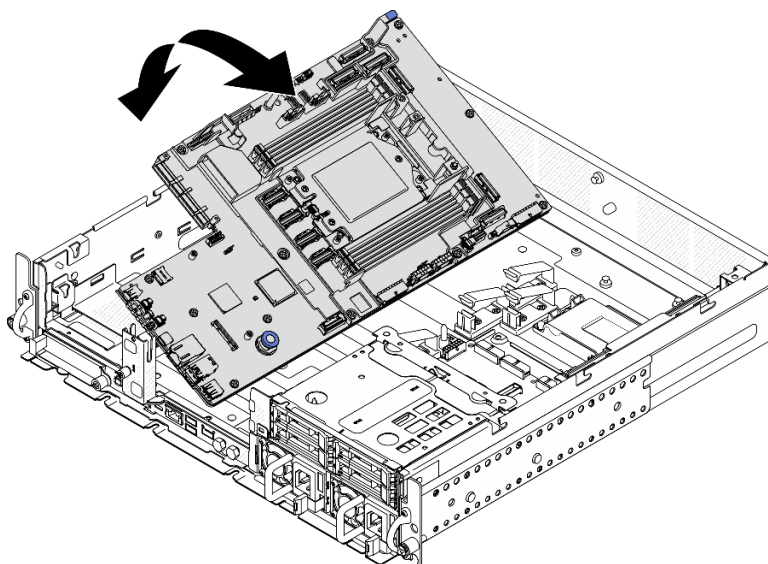


Figure 200. Removing the system board

After this task is completed

- Install a replacement unit. See [“Install the system board” on page 228](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Important: Before you return the system board, make sure that you install the processor socket cover from the new system board. To replace a processor socket cover:

1. Take a socket cover from the processor socket assembly on the new system board and orient it correctly above the processor socket assembly on the removed system board.
 2. Gently press down the socket cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the socket cover is securely attached.
 3. **Make sure** that the socket cover is securely attached to the processor socket assembly.
- If you plan to recycle the component, see [“Disassemble the system board for recycle” on page 321](#).

Demo Video

[Watch the procedure on YouTube](#)

Install the system board

Follow instructions in this section to install the system board.

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.

S012



CAUTION:
Hot surface nearby.

About this task

Important: Removing and installing this component requires trained technicians. **Do not** attempt to remove or install the part without proper training.

Attention:

- Read “[Installation Guidelines](#)” on page 41 and “[Safety inspection checklist](#)” on page 42 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 51.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

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/thinkedge/se455v3/7dbv/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 277 for more information on firmware updating tools.

Procedure

Step 1. Place the right end of the system board into the chassis; then, lower the left end of the system board into the chassis.

Note: Make sure that the system board does not cover any cables in the chassis.

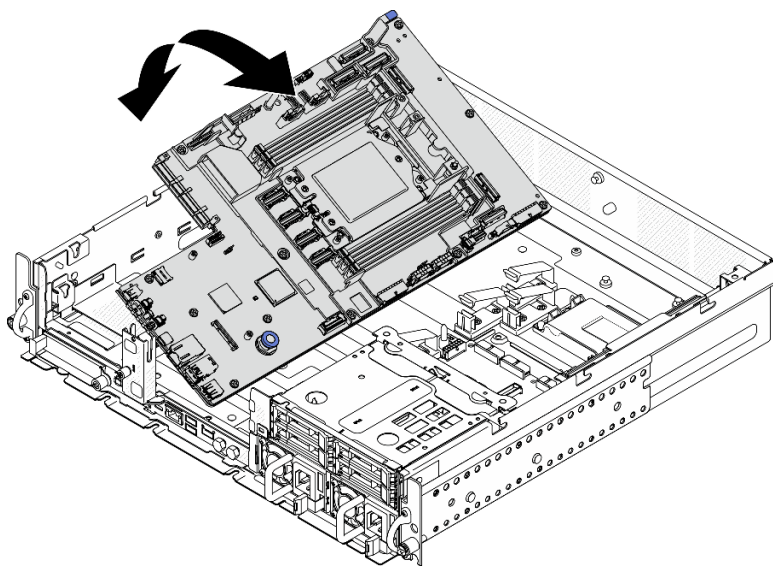


Figure 201. Installing the system board

Step 2. Hold the handle and the plunger, and slide the system board slightly forward until it clicks into place.

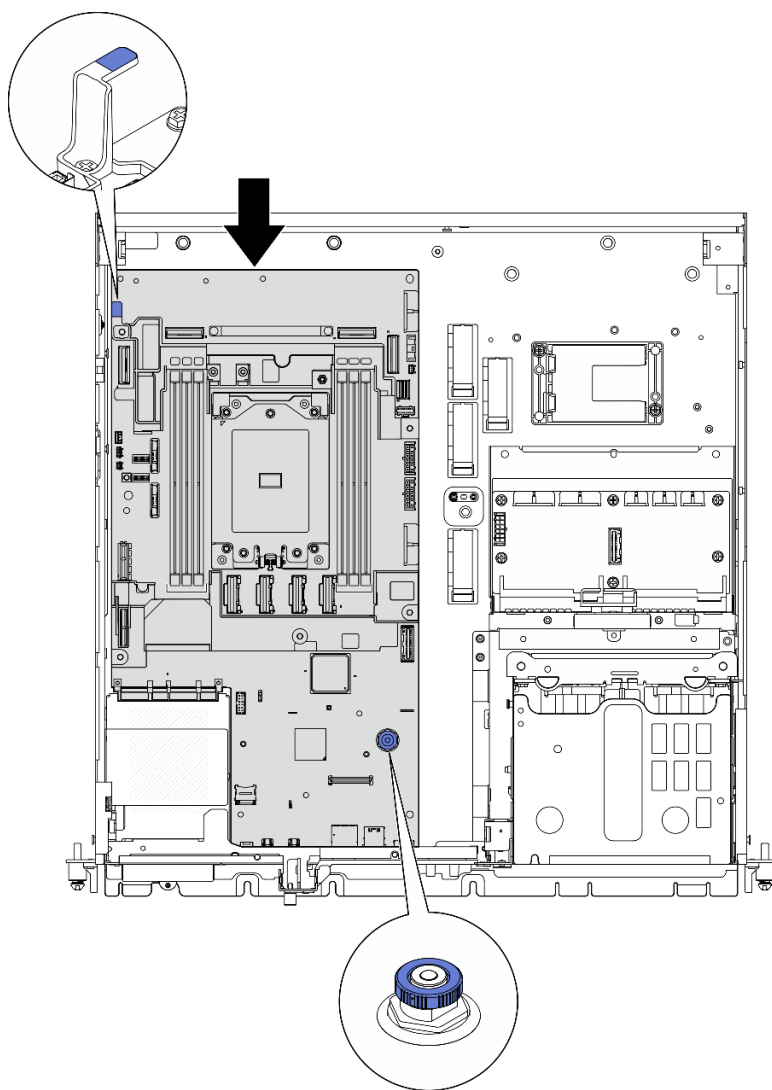


Figure 202. Securing the system board

- Step 3. Peel away the XClarity Controller network access label on the processor socket cover, and attach it to the network access tag on the front of the server.

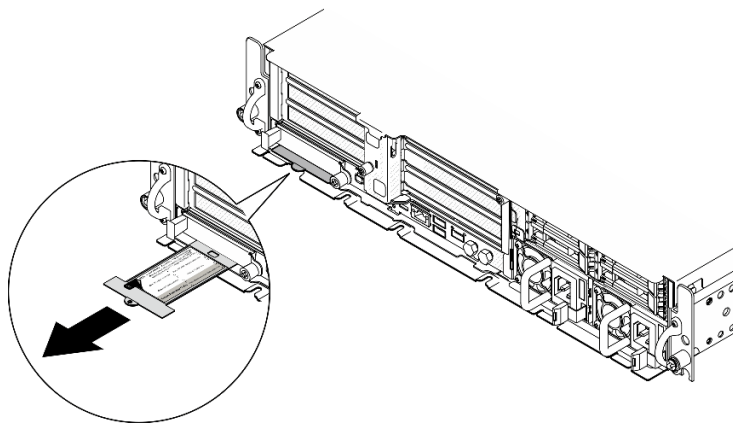


Figure 203. Lenovo XClarity Controller network access label on the pull-out information tab

After this task is completed

1. Reinstall the processor and the heat sink. See [“Install a heat sink” on page 198](#) and [“Install a processor” on page 197](#).
2. Reconnect all the required cables to the same connectors on the system board as the defective system board.
3. If applicable, reinstall the MicroSD card. See [“Install the MicroSD card” on page 147](#).
4. Reinstall the firmware and RoT security module. See [“Install the firmware and RoT security module” on page 221](#).
5. Reinstall all the memory modules. See [“Install a memory module” on page 142](#).
6. If applicable, reinstall the air flow sensor board. See [“Install the air flow sensor board” on page 79](#).
7. Reinstall the fan control board. See [“Install the fan control board \(FCB\)” on page 98](#).
8. Reinstall the fan cage. See [“Install the fan cage” on page 100](#).
9. Reinstall all the fan modules. See [“Install a fan module” on page 94](#).
10. Reinstall the intrusion switch. See [“Install the intrusion switch with cable” on page 124](#).
11. Reinstall the processor air baffle. See [“Install the processor air baffle” on page 76](#).
12. Reinstall PCIe riser 1 and PCIe riser 2. See [“Install the PCIe riser assembly” on page 167](#).
13. If applicable, reinstall the internal drive cage. See [“Install the internal drive cage” on page 115](#).
14. If applicable, reinstall the internal drive backplane. See [“Install the internal drive backplane” on page 117](#).
15. If applicable, reinstall all the internal drives. See [“Install an internal drive” on page 121](#).
16. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
17. Reinstall the top cover. See [“Install the top cover” on page 238](#).
18. If applicable, reinstall the OCP module. See [“Install the OCP module” on page 150](#).
19. If the server was installed in a rack, reinstall the server into the rack. See [“Install the server to the rack” on page 60](#).
20. Reconnect the power cords and any cables that you removed.
21. Reset the system date and time.
22. Update the vital product data (VPD). See [“Update the Vital Product Data \(VPD\)” on page 233](#).

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 37](#).

23. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. See [“Update the firmware” on page 277](#).
24. If applicable, install Lenovo Features on Demand activation key. See the “License Management” section in the XCC documentation compatible with the server at <https://pubs.lenovo.com/lxcc-overview/>.
25. Update the public key. See the “Update Device Key” section of https://download.lenovo.com/servers_pdf/thinkshield-web-application-user-guide-v2.pdf for more details.

Notes:

- The role of Lenovo ID should be **Maintenance User** to update the public key in ThinkShield Key Vault Portal web interface or ThinkShield mobile app.
- (Lenovo service technician only) See https://glosse4lenovo.lenovo.com/wiki/glosse4lenovo/view/How%20To/System%20related/ThinkEdge/HowTo_update_PublicKey_after_board_replacement/ for the details.

26. If hiding TPM or updating TPM firmware is needed, see [“Hide/observe TPM” on page 234](#) or [“Update the TPM firmware” on page 235](#).
27. Optionally, enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 236](#).
28. Reconfigure the following ThinkEdge security features if necessary.
 - a. Change System Lockdown Control status to ThinkShield Portal. See [“Activate or unlock the system” on page 270](#)
 - b. Enable SED encryption. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 223](#).
 - c. Recover SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 223](#).
 - d. Enable security features. See [“System Lockdown Mode” on page 272](#).
 - e. Change the emergency XCC password reset settings. See [“Emergency XCC Password Reset” on page 274](#).

Demo Video

[Watch the procedure on YouTube](#)

Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).


- **(Required)** Machine type
- **(Required)** Serial number
- **(Required)** System model
- (Optional) Asset tag
- (Optional) UUID

Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager

Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Click  on the top right corner of the Lenovo XClarity Provisioning Manager main interface.
3. Click **Update VPD**; then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**
`onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]`
- Updating **serial number**
`onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]`
- Updating **system model**
`onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]`
- Updating **asset tag**

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```

- **Updating UUID**

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]
```

| Variable | Description |
|-----------------|--|
| <m/t_model> | The server machine type and model number. Type xxxxyyyyyy, where xxxx is the machine type and yyyyyy is the server model number. |
| <s/n> | The serial number on the server. Type zzzzzzzz (length 8-10 characters), where zzzzzzzz is the serial number. |
| <system model> | The system model on the server. Type system yyyyyyyy, where yyyyyyyy is the product identifier. |
| <asset_tag> | The server asset tag number. Type aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number. |
| [access_method] | <p>The access method that you select to access the target server.</p> <ul style="list-style-type: none"> • Online KCS (unauthenticated and user restricted): You can directly delete [access_method] from the command. • Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: --bmc-username <user_id> --bmc-password <password> • Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: --bmc <bmc_user_id>:<bmc_password>@<bmc_external_IP> <p>Notes:</p> <ul style="list-style-type: none"> – <bmc_user_id> The BMC account name (1 of 12 accounts). The default value is USERID. – <bmc_password> The BMC account password (1 of 12 accounts). |

Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Unified Extensible Firmware Interface (UEFI) or Lenovo XClarity Essentials OneCLI.

Using UEFI

For details, see “Hide TPM from OS” in *UEFI User Guide* at <https://pubs.lenovo.com/uefi-overview/>.

Using Lenovo XClarity Essentials OneCLI

To disable TPM, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" -bmc <userid>:<password>@<ip_address>
```

where:

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- <ip_address> is the IP address of the BMC.

Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Disabled" --bmc USERID:PASSWORD@10.245.38.64
[Is]Certificate check finished [100%][=====>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Disabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" -bmc <userid>:<password>@<ip_address>
```

Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Enabled" --bmc USERID:PASSWORD@10.245.38.64
[Is]Certificate check finished [100%][=====>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Enabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

Note: TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

TPM firmware version

Follow the procedure below to see the TPM firmware version:

From Lenovo XClarity Provisioning Manager

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Trusted Platform Module** → **TPM 2.0** → **TPM Firmware Version**.

Update the TPM firmware

To update the TPM firmware, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc  
<userid>:<password>@<ip_address>
```

where:

- <x.x.x.x> is the target TPM version.
e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc  
<userid>:<password>@<ip_address>
```

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o).
- <ip_address> is the IP address of the BMC.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot Configuration → Secure Boot Setting**.
4. Enable Secure Boot and save the settings.

Note: If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Enabled --bmc  
<userid>:<password>@<ip_address>
```

where:

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- <ip_address> is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

Note: If disabling UEFI secure boot is needed, run the following command:


```
OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Disabled --bmc <userid>:<password>@<ip_
address>
```

Top cover replacement

Follow instructions in this section to remove and install the top cover.

Remove the top cover

Follow instructions in this section to remove the top cover.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) 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 51](#).
- If the server is installed in a rack, remove the server from the rack. See [“Remove the server from the rack” on page 51](#).
- If applicable, remove the security bezel. See [“Remove the security bezel” on page 207](#).

Procedure

Step 1. Remove the top cover.

- a. ① Unlock the top cover with the key that is stored in the key holder on the top cover.

Important: Before moving the top cover, make sure that the keylock is in the unlock position.

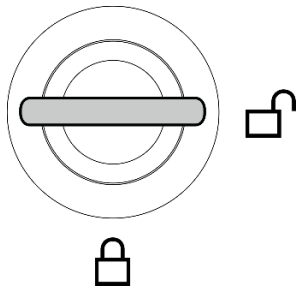


Figure 204. Unlock position of the keylock

- b. ② Press and hold on the button and the blue touch point to disengage the top cover.
- c. ③ Slide and lift the cover to remove it from the chassis; then, place it on a flat clean surface.

Attention:

- Service label is located on the inside of the top cover.
- For proper cooling and air flow, install the top cover before you power on the server. Operating the server with the top cover removed might damage server components.

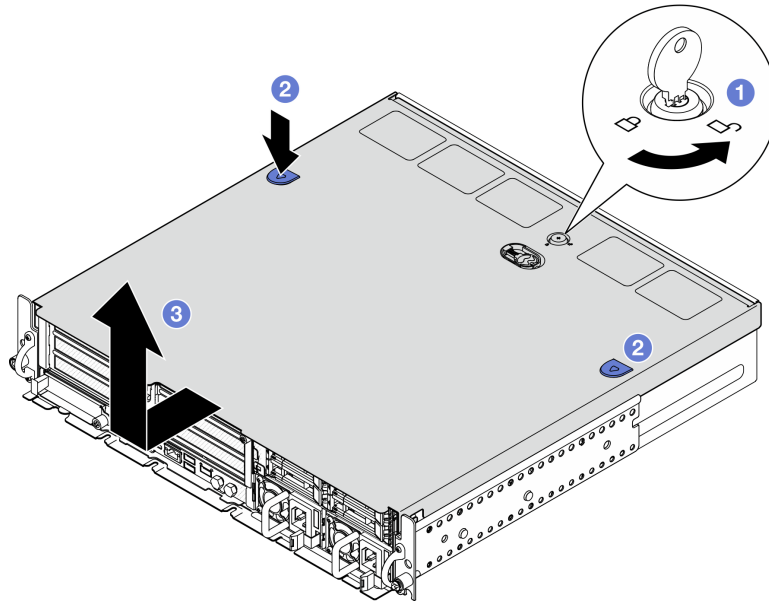


Figure 205. Removing top cover

After this task is completed

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

Demo Video

[Watch the procedure on YouTube](#)

Install the top cover

Follow instructions in this section to install the top cover.

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.

About this task

Attention:

- Read [“Installation Guidelines” on page 41](#) and [“Safety inspection checklist” on page 42](#) to ensure that you work safely.
- Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
- Make sure that all internal cables are correctly routed. See [Chapter 6 “Internal cable routing” on page 241](#).

Procedure

Step 1. Install the top cover.

- 1 Align the top cover with the guiding slots on both sides of the chassis; then, slide it backwards until it is firmly seated.
- 2 Lock the top cover with the key, and store the key to the key holder on the top cover for future use.

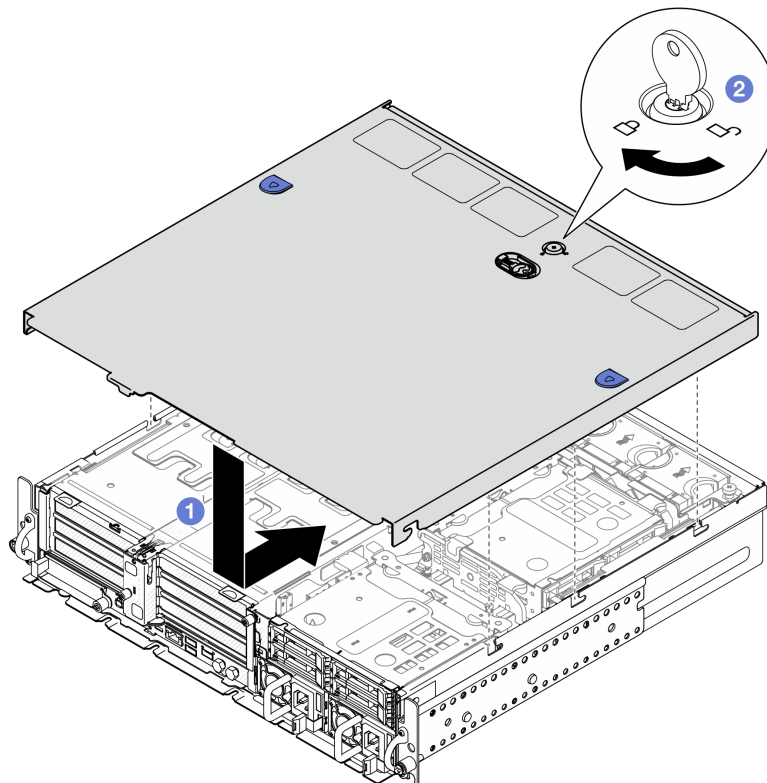


Figure 206. Installing top cover

After this task is completed

Complete the parts replacement. See [“Complete the parts replacement” on page 239](#).

Demo Video

[Watch the procedure on YouTube](#)

Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If applicable, reinstall the air baffles. See [“Install the processor air baffle” on page 76](#) and [“Install the M.2 air baffle” on page 68](#).

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

4. Reinstall the top cover. See [“Install the top cover” on page 238](#).
5. If the server was installed in a rack, reinstall the server into the rack. See [“Install the server to the rack” on page 60](#).
6. Reconnect the power cords and any cables that you removed.

Attention: To avoid component damage, connect the power cords last.

7. Install the I/O fillers when the connectors are not used. The connectors could be damaged without proper protection of the fillers. See [“Front I/O fillers” on page 26](#).
8. Activate or unlock the server if necessary. See [“Activate or unlock the system” on page 270](#).
9. Power on the server and any peripheral devices. See [“Power on the server” on page 50](#).
10. If applicable, reinstall the security bezel. See [“Install the security bezel” on page 210](#).
11. Update the server configuration.
 - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>.
 - Update the system firmware. See [“Update the firmware” on page 277](#).
 - Update the UEFI configuration. See <https://pubs.lenovo.com/uefi-overview/>.
 - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See <https://pubs.lenovo.com/lxpm-overview/> for the LXPM documentation compatible with your server.

Chapter 6. Internal cable routing

See this section to do cable routing for specific components.

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

Identifying connectors

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

Drive backplane connectors

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

Two types of drive backplanes are supported in this server:

SAS/SATA backplane

See this section to locate the connectors on the SAS/SATA drive backplane.

- ❶ Power connector
- ❷ SAS/SATA connector

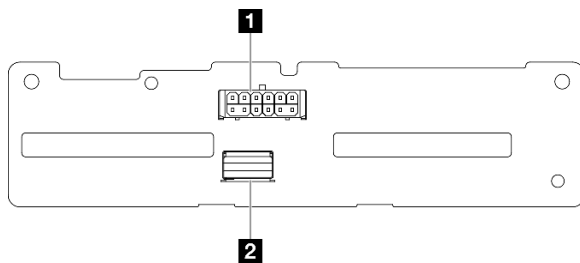


Figure 207. SAS/SATA backplane connectors

NVMe backplane

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

- ❶ NVMe 2-3
- ❷ NVMe 0-1
- ❸ Power connector

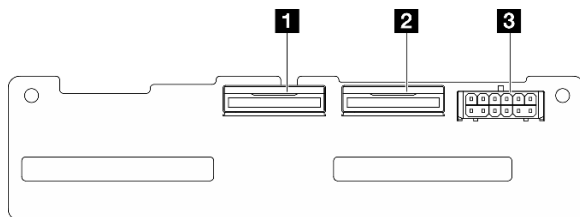


Figure 208. NVMe backplane

Fan control board (FCB) connectors

See this section to locate the connectors on the fan control board.

- 1 Fan 1 connector
- 2 Fan 2 connector
- 3 Fan 3 connector
- 4 Fan 4 connector
- 5 Fan 5 connector
- 6 Fan power connector
- 7 Fan sideband connector

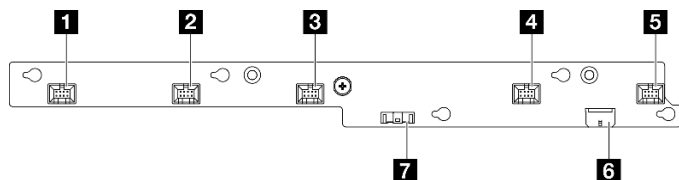


Figure 209. Fan control board connectors

Power distribution board connectors

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

- 1 System board power connector 1
- 2 System board power connector 2
- 3 GPU 1 power connector
- 4 GPU 2 power connector
- 5 Fan power connector
- 6 PDB sideband connector
- 7 PSU 1 power connector
- 8 PSU 2 power connector
- 9 Riser 2 power connector (R RISER PWR)

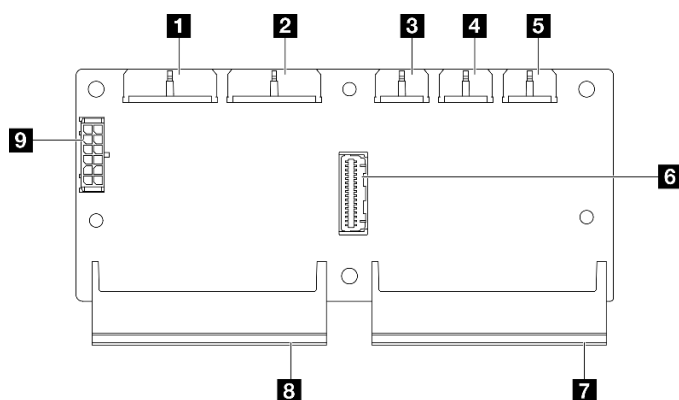


Figure 210. Power distribution board connectors

PCIe riser card connectors

See this section to locate the connectors on the PCIe riser cards.

Two types of PCIe riser cards are supported in this server:

PCIe riser 1 riser card

See this section to locate the connectors on the PCIe riser 1 riser card.

- ❶ MCIO 2 connector
- ❷ MCIO 1 connector

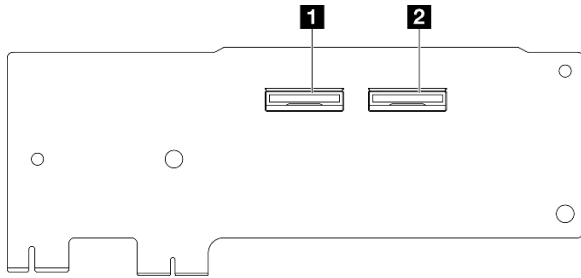


Figure 211. PCIe riser 1 riser card

- ❶ PCIe x16 (Gen5 x16) slot
- ❷ PCIe x16 (Gen4 x8) slot
- ❸ PCIe x16 (Gen4 x8) slot
- ❹ MCIO 3 connector
- ❺ MCIO 4 connector

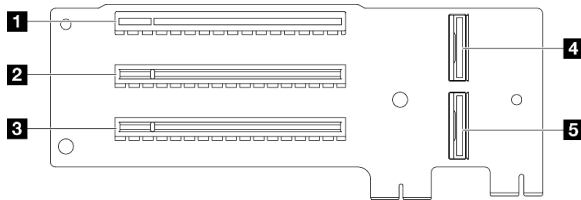


Figure 212. PCIe riser 1 riser card

PCIe riser 2 riser card

See this section to locate the connectors on the PCIe riser 2 riser card.

- ❶ MCIO 3 connector
- ❷ MCIO 4 connector
- ❸ MCIO 1 connector
- ❹ MCIO 2 connector
- ❺ Riser 2 power connector

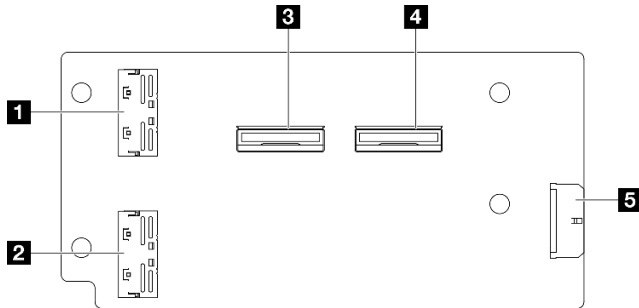


Figure 213. PCIe riser 2 riser card

- ❶ PCIe x16 (Gen4 x8) slot
- ❷ PCIe x16 (Gen5 x16) slot
- ❸ PCIe x16 (Gen4 x8) slot

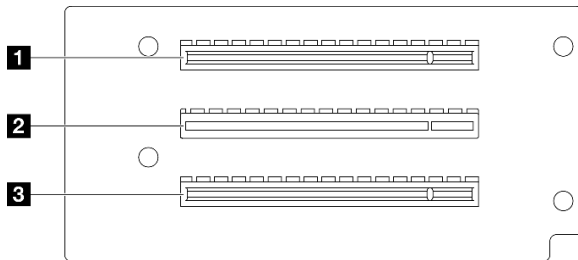


Figure 214. PCIe riser 2 riser card

System-board connectors for cable routing

The following illustrations show the internal connectors on the system board that are used for internal cable routing.

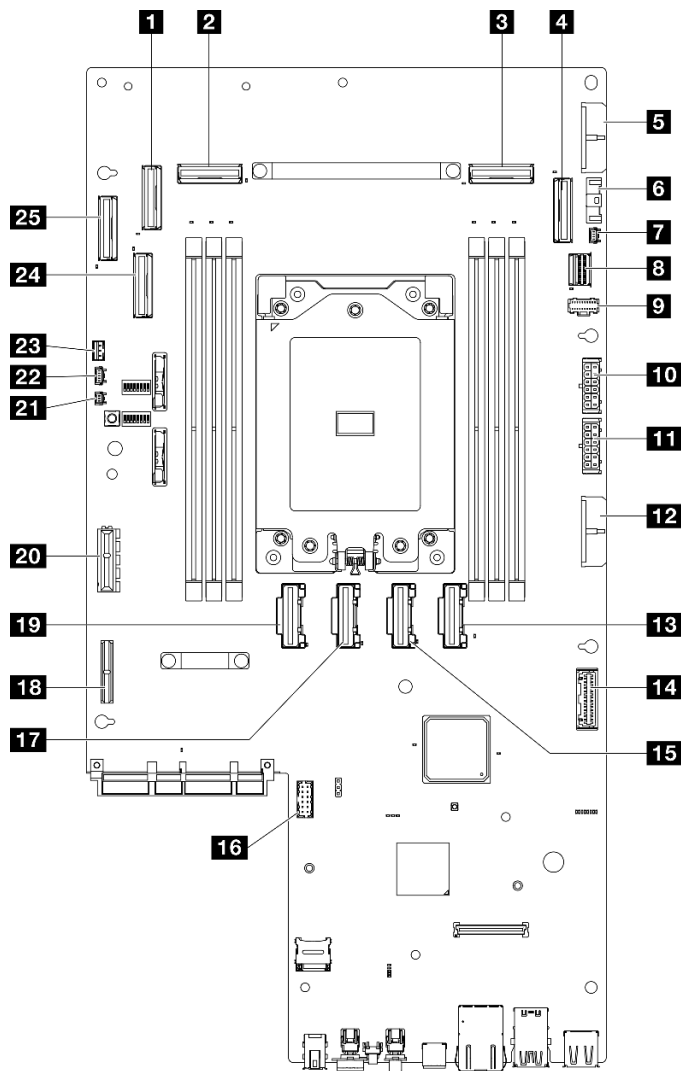


Figure 215. System-board connectors

Table 22. System-board connectors

| | |
|---|--|
| 1 PCIe 9 connector | 14 Power distribution board signal connector (PDB Sideband) |
| 2 PCIe 8 connector | 15 PCIe 5 connector |
| 3 PCIe 3 connector | 16 Serial port connector (COM) |
| 4 PCIe 2 connector | 17 PCIe 6 connector |
| 5 System board power 2 connector (PDB PWR 2) | 18 Riser 1 power connector |
| 6 Fan signal connector (FCB Sideband) | 19 PCIe 7 connector |
| 7 Heat sink detect connector | 20 Riser 1 signal connector (Riser1 Sideband) |
| 8 M.2 signal connector (PCIe 1) | 21 Bezel detect connector |
| 9 M.2 power connector (M.2 Sideband) | 22 Air flow sensor board connector (Air Velocity Sensor) |
| 10 Internal backplane power connector | 23 Intrusion switch connector |

Table 22. System-board connectors (continued)

| | |
|--|-----------------------------|
| 11 Front backplane power connector | 24 PCIe 10 connector |
| 12 System board power 1 connector (PDB PWR 1) | 25 PCIe 11 connector |
| 13 PCIe 4 connector | |

Power distribution board (PDB) and fan control board (FCB) cable routing

Follow the instructions in this section to learn how to do cable routing for the power distribution board (PDB) and fan control board (FCB).

This section provides cable routing instructions for the following cables:

| Cable | From | To |
|--|-------------------------------------|--|
| 1 FCB sideband cable, 120mm | FCB: Fan sideband connector | System board: Fan signal connector (FCB Sideband) |
| 2 System-board power 2 cable, 220mm | PDB: System board power connector 2 | System board: System board power 2 connector (PDB PWR 2) |
| 3 FCB power cable, 150mm | FCB: Fan power connector | PDB: Fan power connector |
| 4 PDB sideband cable, 250mm | PDB: PDB sideband connector | System board: Power distribution board signal connector (PDB Sideband) |
| 5 System-board power 1 cable, 200mm | PDB: System board power connector 1 | System board: System board power 1 connector (PDB PWR 1) |

Complete the following procedure to route the cables properly.

Procedure

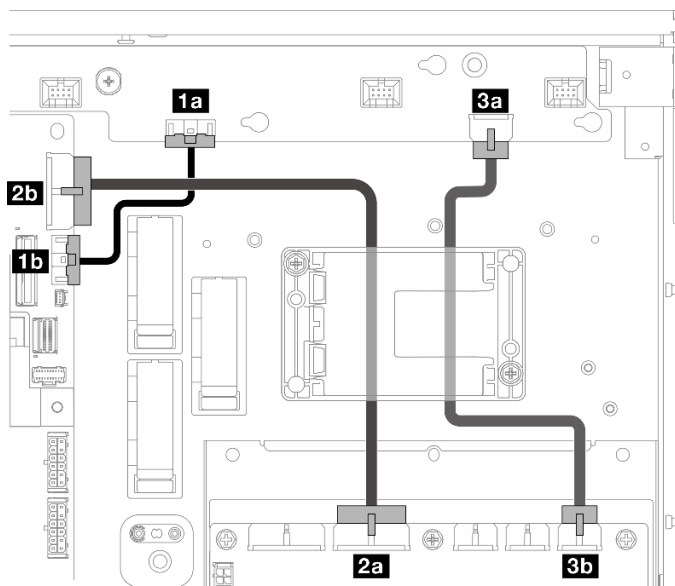


Figure 216. PDB and FCB cable routing

Step 1. Connect **1** FCB sideband cable to the following connectors:

- **1a** Fan sideband connector on the fan control board
- **1b** Fan signal connector (FCB Sideband) on the system board

Note: Do not route cable **1** into any cable clip.

Step 2. Connect **2** System-board power 2 cable to the following connectors:

- **2a** System board power connector 2 on the PDB
- **2b** System board power 2 connector (PDB PWR 2) on the system board

Note: Place cable **2** above cable **1**.

Step 3. Connect **3** FCB power cable to the following connectors:

- **3a** Fan power connector on the fan control board
- **3b** Fan power connector on the PDB

Step 4. Install the flash power module holder to secure cable **2** and **3** under the holder. See [“Install a RAID flash power module to the holder” on page 202.](#)

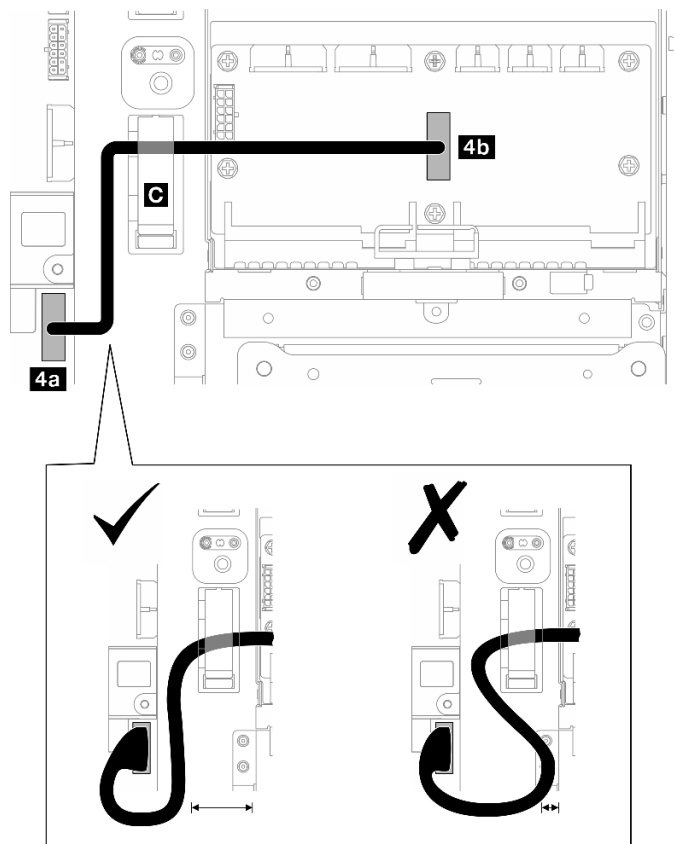


Figure 217. PDB sideband cable routing

Step 5. Connect **4** PDB sideband cable.

- a. Open cable clip **C**.
- b. Connect the cable to **4a** Power distribution board signal connector (PDB Sideband) on the system board.
- c. Route the cable into cable clip **C**.

- d. Connect the cable to **4b** PDB sideband connector on the PDB.
- e. Route the cable away from the PSU cage as shown.

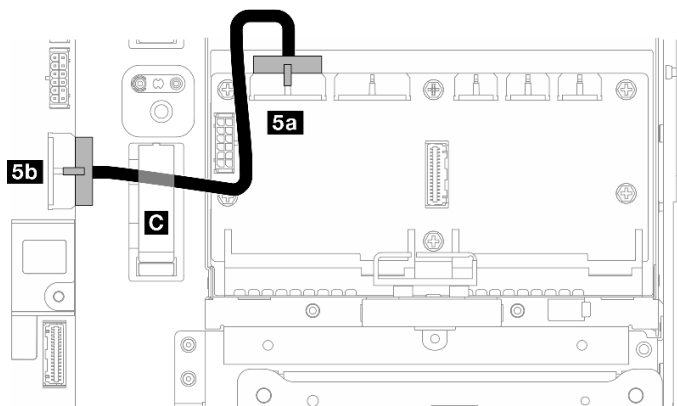


Figure 218. System-board power 1 cable routing

Step 6. Connect **5** System-board power 1 cable.

- a. Connect the cable to **5a** System board power connector 1 on the PDB.
- b. Route the cable into cable clip **c**.
- c. Twist the cable as shown, and connect it to **5b** System board power 1 connector (PDB PWR 1) on the system board.
- d. Close cable clip **c** to secure the cables.

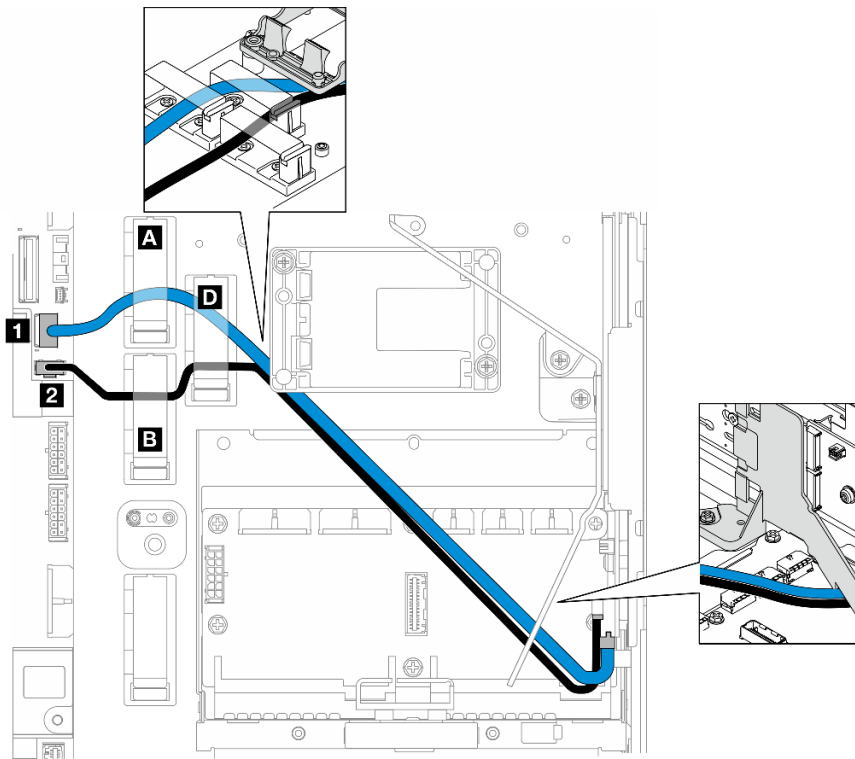
M.2 backplane cable routing

Follow the instructions in this section to learn how to do cable routing for the M.2 backplane.

Proceed to the section corresponding to the selected configuration.

| Configuration | Cable |
|---|--|
| “M.2 backplane to system board” on page 249 | <p>For SATA/x4 NVMe M.2 backplane:</p> <ul style="list-style-type: none"> One M.2 power cable, 350mm One M.2 signal cable, Slimline-LP x4 to Slimline x8, 400mm <p>For SATA/NVMe M.2 backplane:</p> <ul style="list-style-type: none"> One M.2 signal and power cable, 400mm |
| “M.2 backplane to RAID adapter” on page 250 | <p>For SATA/x4 NVMe M.2 backplane:</p> <ul style="list-style-type: none"> One M.2 power cable, 350mm One of the following M.2 signal cable: <ul style="list-style-type: none"> To x350 RAID adapter: One M.2 signal cable, MiniSAS-HD x4 to Slimline x8, 500mm To x40 RAID adapter: One M.2 signal cable, Slimline x8 to Slimline x8, 500mm |

To system board



Complete the following procedure to route the cables properly.

Procedure

Step 1. Connect the cables to the connectors on the system board.

- M.2 signal cable / signal branch of M.2 signal and power cable to **1** M.2 signal connector (PCIe 1)
- M.2 power cable / power branch of M.2 signal and power cable to **2** M.2 power connector (M.2 Sideband)

Step 2. Route the M.2 signal cable / signal branch of M.2 signal and power cable through the retainers in the following order.

- a. Cable clip **A**
- b. Cable clip **D**
- c. Corner of the RAID flash power module holder (as shown in the top callout in the above illustration)
- d. Under the M.2 air baffle (as shown in the right callout in the above illustration)

Step 3. Route the M.2 power cable / power branch of M.2 signal and power cable through the retainers in the following order.

- a. Cable clip **B**
- b. Cable clip **D**
- c. Corner of the RAID flash power module holder (as shown in the top callout in the above illustration)
- d. Under the M.2 air baffle (as shown in the right callout in the above illustration)

Step 4. Proceed to connect the cables to the M.2 backplane assembly and install the assembly. See [“Install the M.2 backplane assembly” on page 137](#).

To RAID adapter

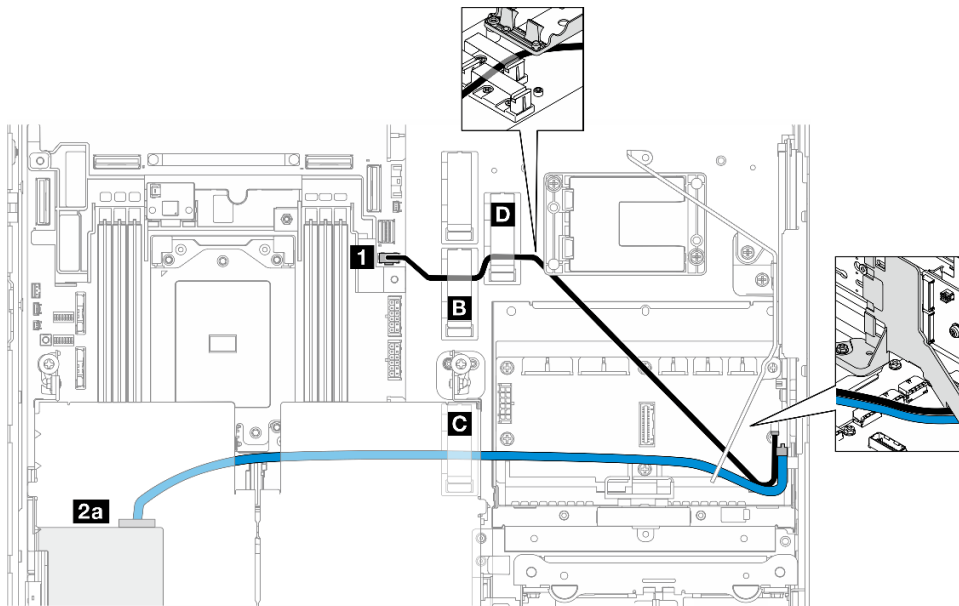


Figure 219. RAID adapter on PCIe riser 1

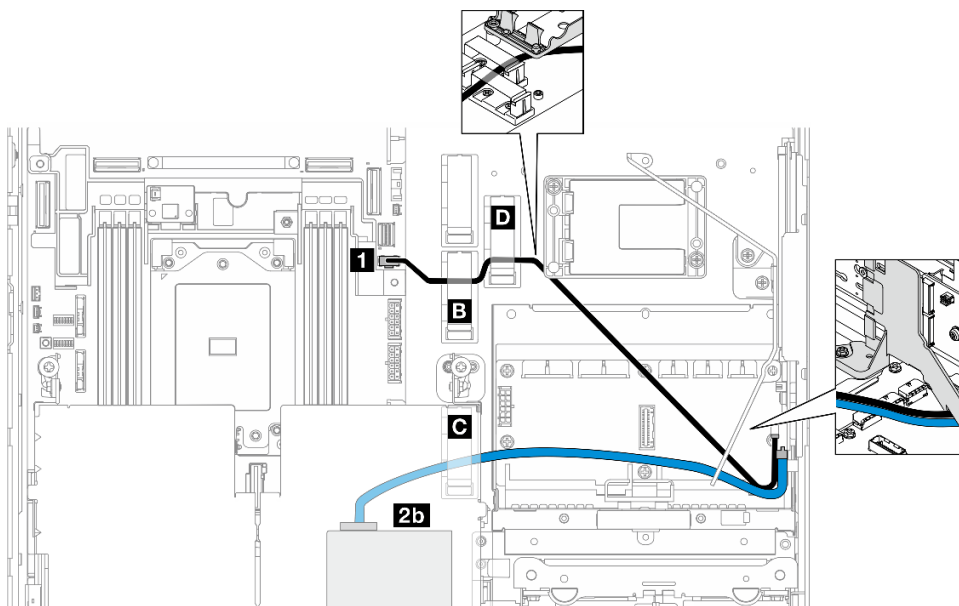


Figure 220. RAID adapter on PCIe riser 2

Complete the following procedure to route the cables properly.

Procedure

- Step 1. Connect M.2 power cable to **1** M.2 power connector (M.2 Sideband) on the system board.
- Step 2. Route the M.2 power cable through the retainers in the following order.

- a. Cable clip **B**
 - b. Cable clip **D**
 - c. Corner of the RAID flash power module holder (as shown in the top callout in the above illustration)
 - d. Under the M.2 air baffle (as shown in the right callout in the above illustration)
- Step 3. Route M.2 signal cable through cable clip **C**.
- Step 4. Proceed to connect M.2 signal cable to C0 connector of the RAID adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).
 - **2a** C0 connector of RAID adapter on PCIe riser 1
 - **2b** C0 connector of RAID adapter on PCIe riser 2
- Step 5. Proceed to connect the cables to the M.2 backplane assembly and install the assembly. See [“Install the M.2 backplane assembly” on page 137](#).

PCIe riser card cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser cards.

See the corresponding section to complete the PCIe riser card cable routing:

- [“PCIe riser 1 riser card cable routing” on page 251](#)
- [“PCIe riser 2 riser card cable routing” on page 252](#)

PCIe riser 1 riser card cable routing

This section provides cable routing instructions for the following cables:

| Cable | Color | From: PCIe riser 1 | To: system board |
|-----------------------------------|--------|--------------------|------------------|
| Riser 1 signal cable, 280mm/320mm | Blue | MCIO3, MCIO4 | PCIe 8, PCIe 9 |
| Riser 1 signal cable, 375mm/360mm | Silver | MCIO1, MCIO2 | PCIe 6, PCIe 7 |

Complete the following procedure to route the cables properly.

Procedure

- Step 1. Make sure the riser card is installed on the riser cage, and the required cables are connected to the riser card properly. See [“Install the PCIe riser card” on page 177](#).
- Step 2. Connect the signal cables to the system board and route the cables.
 - a. Connect the **blue** signal cable to PCIe 8 and PCIe 9 connectors on the system board.
 - b. Connect the **silver** signal cable to PCIe 6 and PCIe 7 connectors on the system board.
 - c. Route the **blue** signal cable along the intrusion switch as shown.
 - d. Route the **silver** signal cable through the cable wall. Press the cable down toward the system board to avoid interfering with the retaining clips of memory module slots.

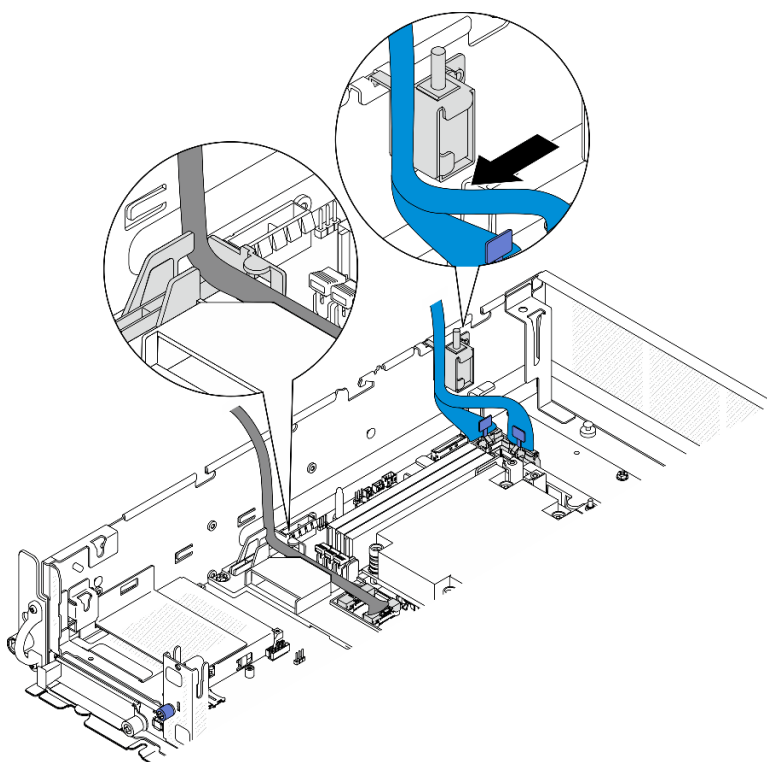


Figure 221. PCIe riser 1 cable routing

PCIe riser 2 riser card cable routing

This section provides cable routing instructions for the following cables:

| Cable | Color | From: PCIe riser 2 | To: system board |
|------------------------------------|--------|--------------------|------------------|
| Riser 2 signal cable, 450mm/450mm* | Blue | MCIO3, MCIO4 | PCIe 2, PCIe 3 |
| Riser 2 signal cable, 400mm/385mm | Silver | MCIO1, MCIO2 | PCIe 4, PCIe 5 |

*The blue signal cable is not supported in the following configurations:

- Front SATA drive backplane and internal NVMe drive backplane connect to the system board
- Front NVMe drive backplane and internal NVMe drive backplane connect to the system board

Complete the following procedure to route the cables properly.

Procedure

- Step 1. Make sure the riser card is installed on the riser cage, and the required cables are connected to the riser card properly. See [“Install the PCIe riser card” on page 177](#).
- Step 2. Connect the power and signal cables to the system board and route the cables

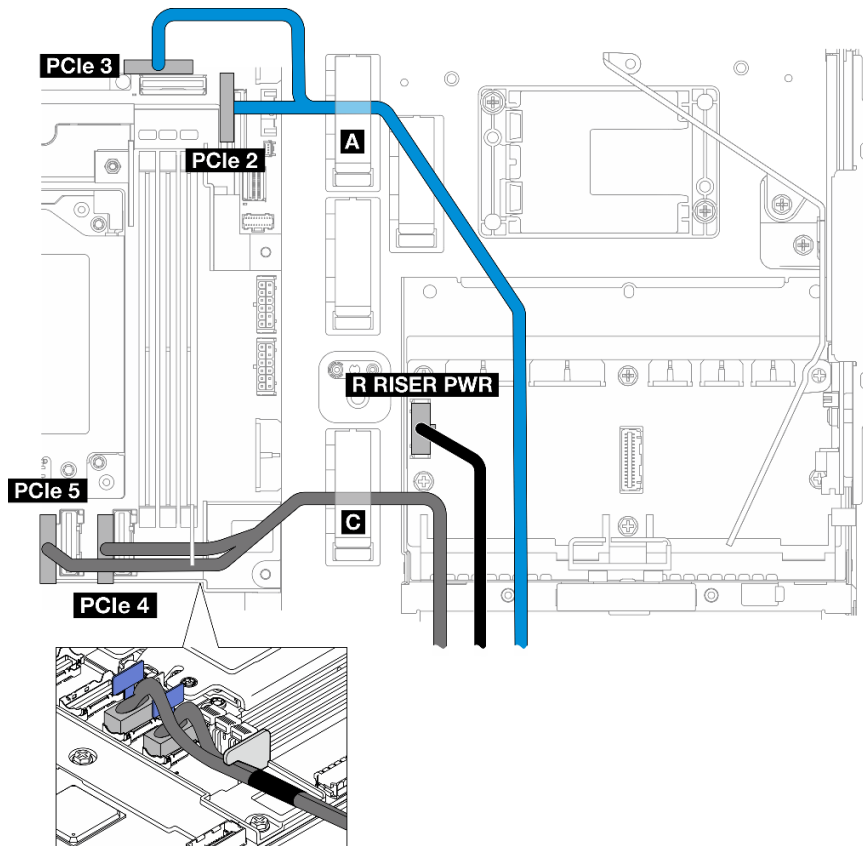


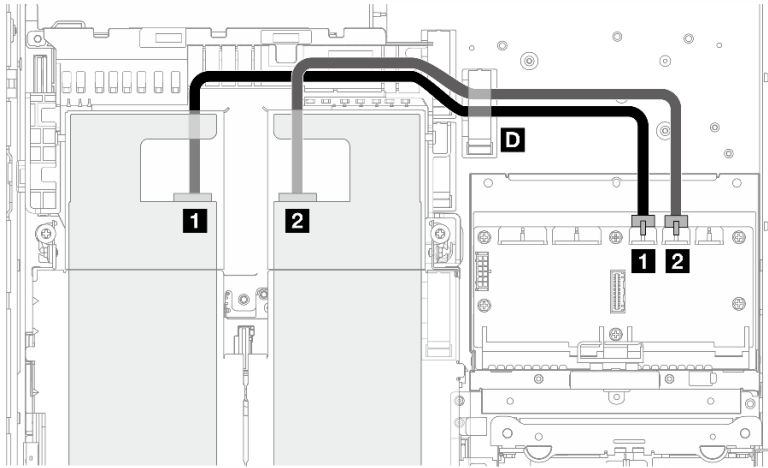
Figure 222. PCIe riser 2 cable routing

- If applicable, connect the **blue** signal cable to PCIe 2 and PCIe 3 connectors on the system board.
- Connect the power cable to Riser 2 power connector (R RISER PWR) on the power distribution board.
- Connect the **silver** signal cable to PCIe 4 and PCIe 5 connectors on the system board.
- If applicable, secure the **blue** signal cable in cable clip **A**.
- Route the **silver** signal cable through the cable wall; then, secure the cable in cable clip **C**. Press the cable down toward the system board to avoid interfering with the retaining clips of memory module slots.

GPU power cable routing

Follow the instructions in this section to learn how to do cable routing for the GPU power cables.

This section provides cable routing instruction for GPU power cable, 450mm.



Complete the following procedure to route the cables properly.

Procedure

- Step 1. Connect the GPU power cable to the corresponding connector on the power distribution board.
- For GPU adapter on PCIe riser 1: **1** GPU 1 power connector
 - For GPU adapter on PCIe riser 2: **2** GPU 2 power connector
- Step 2. Secure the GPU power cable in cable clip **D**.
- Step 3. Proceed to connect the cable to the GPU adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).

Note: Make sure to manage all the GPU power cables into the cable guide of the processor air baffle when installing the PCIe assembly.

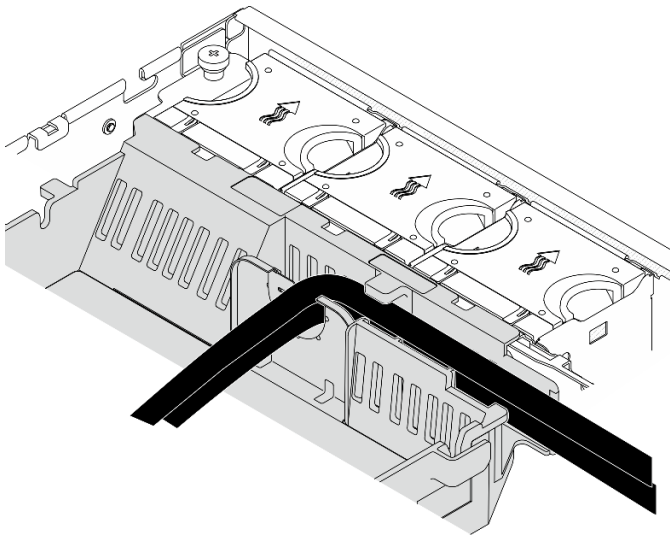


Figure 223. GPU power cables on processor air baffle

RAID flash power module (supercap) cable routing

Follow the instructions in this section to learn how to do cable routing for the RAID flash power module (supercap).

This section provides cable routing instruction for RAID flash power module extension cable (supercap cable), 330mm.

Note: Install the RAID flash power module when ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter is installed.

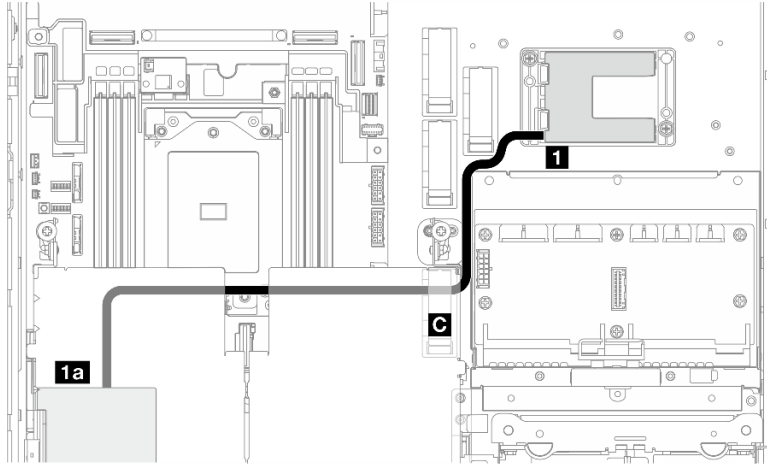


Figure 224. RAID adapter on PCIe riser 1

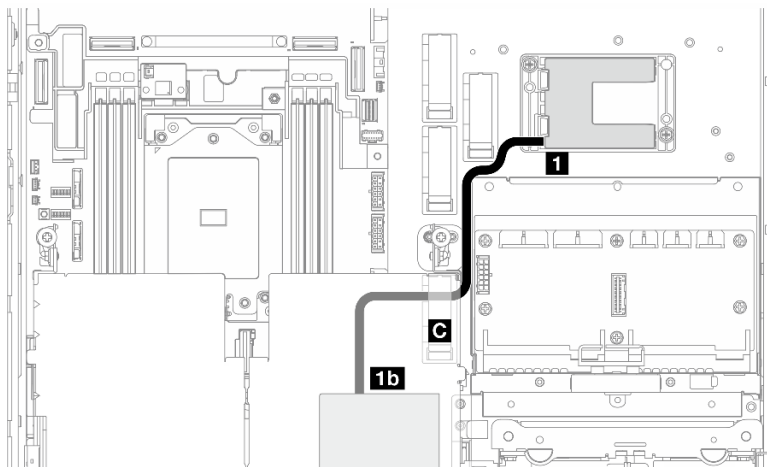


Figure 225. RAID adapter on PCIe riser 2

Complete the following procedure to route the cables properly.

Procedure

- Step 1. Connect the extension cable to **1** RAID flash power module.
- Step 2. Secure the extension cable in cable clip **C**.
- Step 3. Proceed to connect the cable to the 940-9i RAID adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).
 - **1a** 940-8i RAID adapter on PCIe riser 1
 - **1b** 940-8i RAID adapter on PCIe riser 2

Drive backplane cable routing

Follow the instructions in this section to learn how to do cable routing for the drive backplanes.

Complete the following procedure to route the cables properly.

Connect BP power cables to the system board

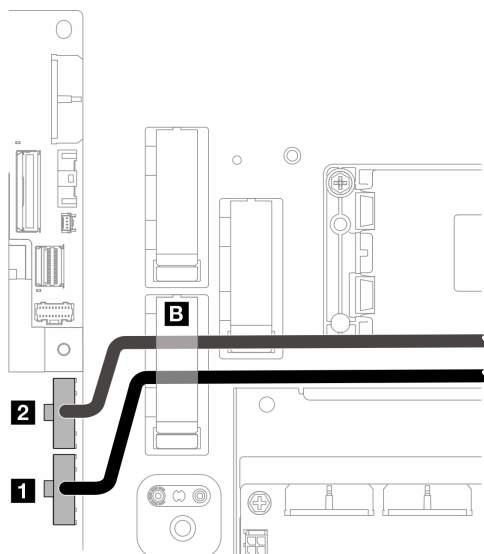


Figure 226. BP power cables

| Cable | From: system board | To |
|---|------------------------------------|---|
| 1 Front BP power cable, 320mm | Front backplane power connector | Front drive backplane: power connector |
| 2 Internal BP power cable, 200mm | Internal backplane power connector | Internal drive backplane: power connector |

1. Connect the BP power cable(s) to the system board.
 - a. Connect the front BP power cable to **1** Front backplane power connector.
 - b. For configuration with internal drive backplane, connect the internal BP power cable to **2** Internal backplane power connector.
2. Secure the power cables in cable clip **B**.

Note: Make sure to place BP power cables **under** the blue signal cable of PCIe riser 2.


BP signal cable routing

Proceed to the section corresponding to the selected configuration.

| Configuration | BP signal cable |
|---|---|
| “RAID to front SATA + internal SATA BP” on page 257 | Front BP + internal BP to x350 RAID adapter: <ul style="list-style-type: none">• Two SAS/SATA cables for x350 adapters, MiniSAS-HD x4 to Slimline x4, 400mm |

| Configuration | BP signal cable |
|---|--|
| | Front BP + internal BP to x40 RAID adapter: <ul style="list-style-type: none"> One SAS/SATA Y-cable for x40 adapters, 400mm/350mm |
| | Front BP to x350 RAID adapter: <ul style="list-style-type: none"> One SAS/SATA cable for x350 adapters, MiniSAS-HD x4 to Slimline x4, 400mm |
| | Front BP to x40 RAID adapter: <ul style="list-style-type: none"> One SAS/SATA cable for x40 adapters, Slimline x8 to Slimline x4, 400mm |
| “System board to front NVMe + internal NVMe BP” on page 258 | <ul style="list-style-type: none"> Front BP: One NVMe cable for front BP, 560mm/540mm Internal BP: One NVMe cable for internal BP, 300mm/250mm |
| “System board to front SATA + internal SATA BP” on page 260 | One SATA Y-cable, 520mm/400mm |
| “System board to front SATA + internal NVMe BP” on page 260 | <ul style="list-style-type: none"> Front BP: One SATA cable for front BP, 520mm Internal BP: One NVMe cable for internal BP, 300mm/250mm |
| “System board to front NVMe BP” on page 261 | One NVMe cable for front BP, 560mm/540mm |
| “System board to front SATA BP” on page 262 | One SATA cable for front BP, 520mm |
| “RAID to front SATA + system board to internal NVMe BP” on page 263 | <ul style="list-style-type: none"> Front BP <ul style="list-style-type: none"> to x350 RAID adapter: One SAS/SATA cable for x350 adapters, MiniSAS-HD x4 to Slimline x4, 400mm to x40 RAID adapter: One SAS/SATA cable for x40 adapters, Slimline x8 to Slimline x4, 400mm Internal BP: One NVMe cable for internal BP, 400mm/400mm |
| “System board to front NVMe + RAID to internal SATA BP” on page 264 | <ul style="list-style-type: none"> Front BP: One NVMe cable for front BP, 560mm/540mm Internal BP <ul style="list-style-type: none"> to x350 RAID adapter: One SAS/SATA cable for x350 adapters, MiniSAS-HD x4 to Slimline x4, 400mm to x40 RAID adapter: One SAS/SATA cable for x40 adapters, Slimline x8 to Slimline x4, 400mm |

RAID to front SATA + internal SATA BP

1. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
2. Secure the required BP signal cables in cable clip .

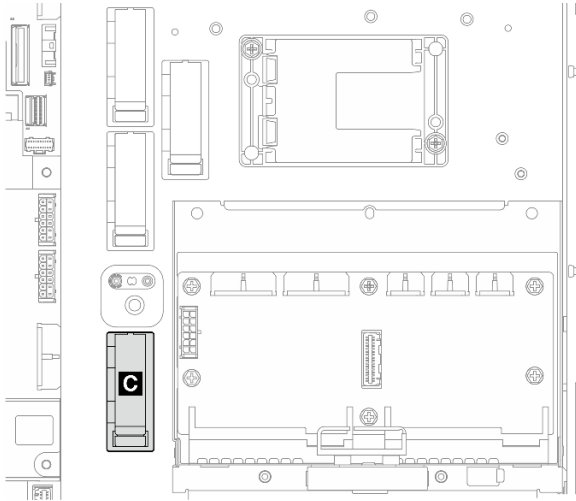


Figure 227. Cable clip C

- x40 RAID adapter: one signal cable to C0 connector
 - x350 RAID adapter:
 - Front BP only: one signal cable to C0 connector
 - Front and internal BP: two signal cables
 - C0 connector to front BP
 - C1 connector to internal BP
3. Proceed to connect the BP signal cable(s) to the RAID adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).
 4. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front NVMe + internal NVMe BP

Note: This configuration does not support Slot 6 and Slot 8 on PCIe riser 2.

1. Connect the internal BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 2
 - b. PCIe 3

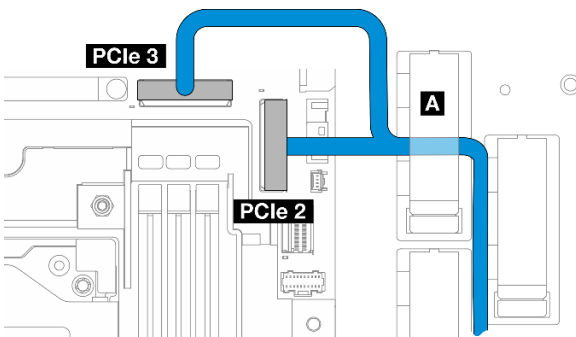


Figure 228. Internal BP signal cable

Note: Bend the cable as shown.

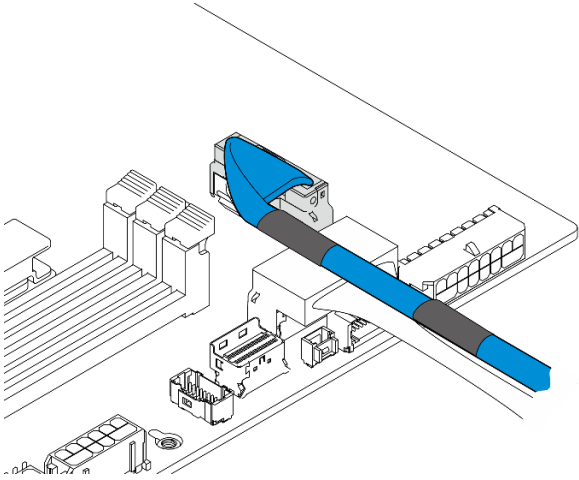


Figure 229. Internal BP signal cable

2. Secure the internal BP signal cable into cable clip **A**.
3. Connect the front BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 11
 - b. PCIe 10

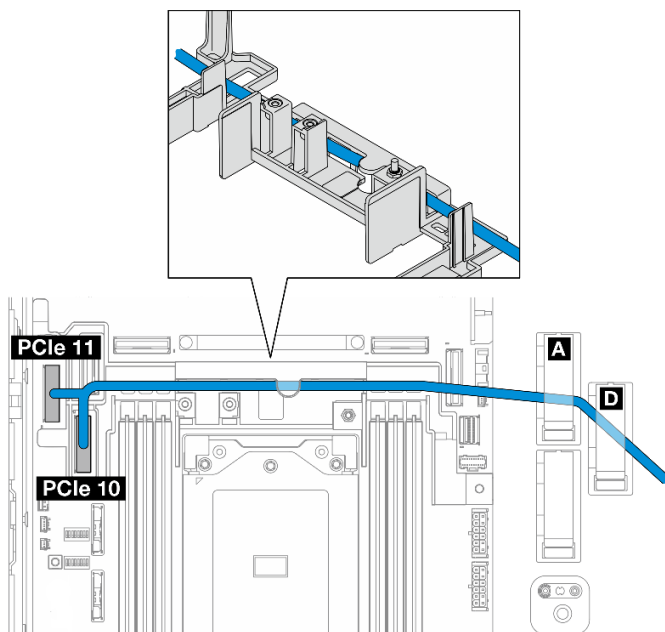
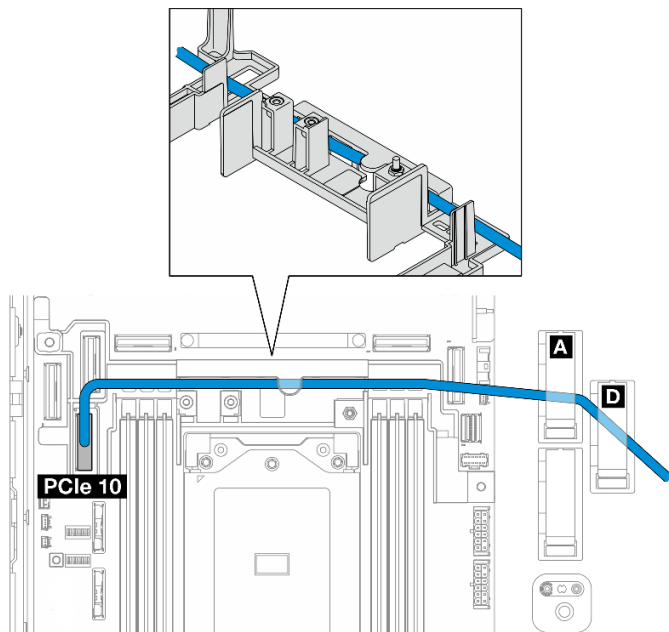


Figure 230. Front BP signal cable

4. Route the front BP signal cable through the cable wall; then, secure the cable into cable clip **A** and **D**.
5. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
6. Install the PCIe riser assemblies. See [“Install the PCIe riser assembly” on page 167](#).
7. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front SATA + internal SATA BP



1. Connect the BP signal cable to PCIe 10 connector on the system board.
2. Route the BP signal cable through the cable wall.
3. Secure the internal BP signal cable into cable clip **A**.
4. Secure the front BP signal cable into cable clip **A** and **D**.
5. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
6. Install the PCIe riser assemblies. See [“Install the PCIe riser assembly” on page 167](#).
7. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front SATA + internal NVMe BP

Note: This configuration does not support Slot 6 and Slot 8 on PCIe riser 2.

1. Connect the internal BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 2
 - b. PCIe 3

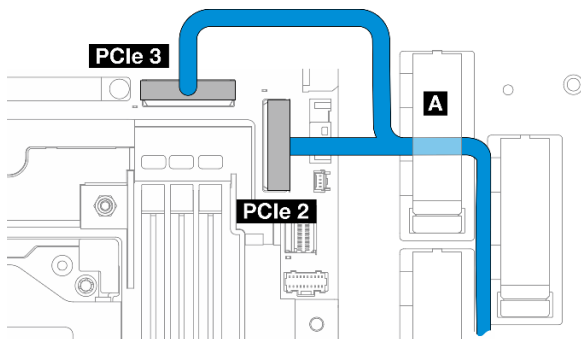


Figure 231. Internal BP signal cable

Note: Bend the cable as shown.

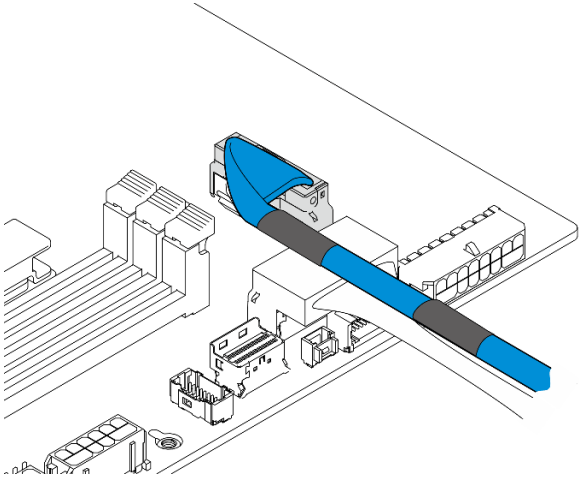
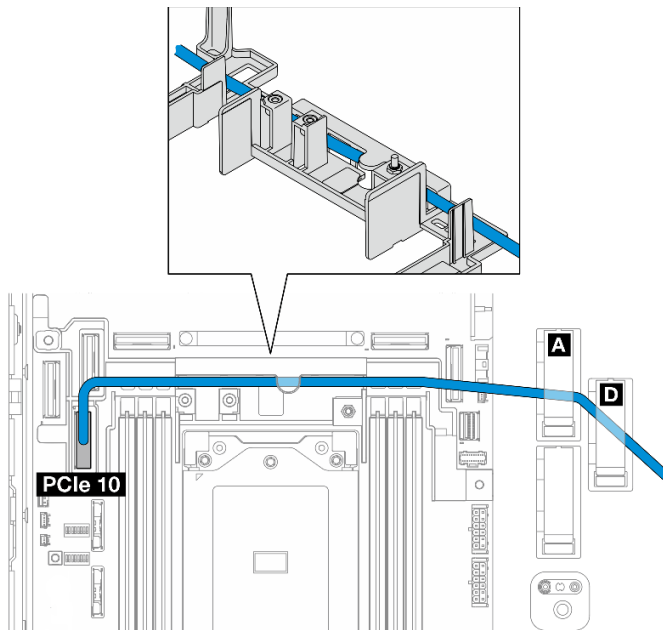


Figure 232. Internal BP signal cable

2. Secure the internal BP signal cable into cable clip **A**.
3. Connect the front BP signal cable to PCIe 10 connector on the system board.



4. Route the front BP signal cable through the cable wall; then, secure the cable into cable clip **A** and **D**.
5. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
6. Install the PCIe riser assemblies. See [“Install the PCIe riser assembly” on page 167](#).
7. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front NVMe BP

1. Connect the front BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 11
 - b. PCIe 10

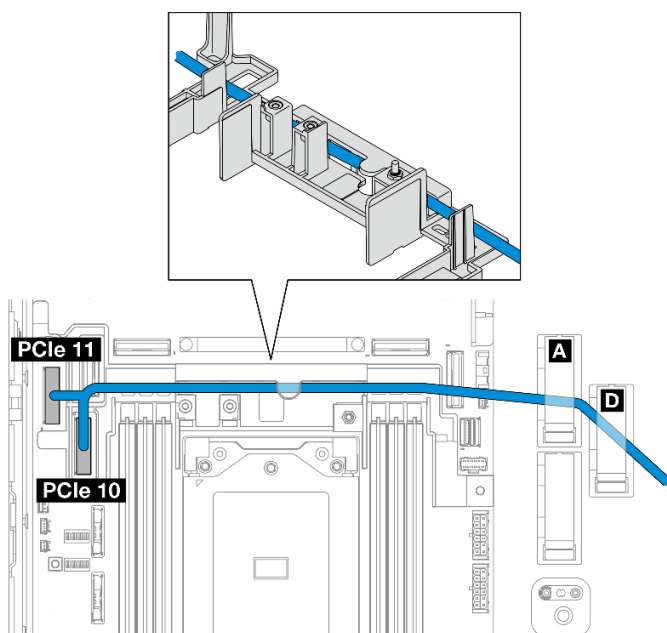
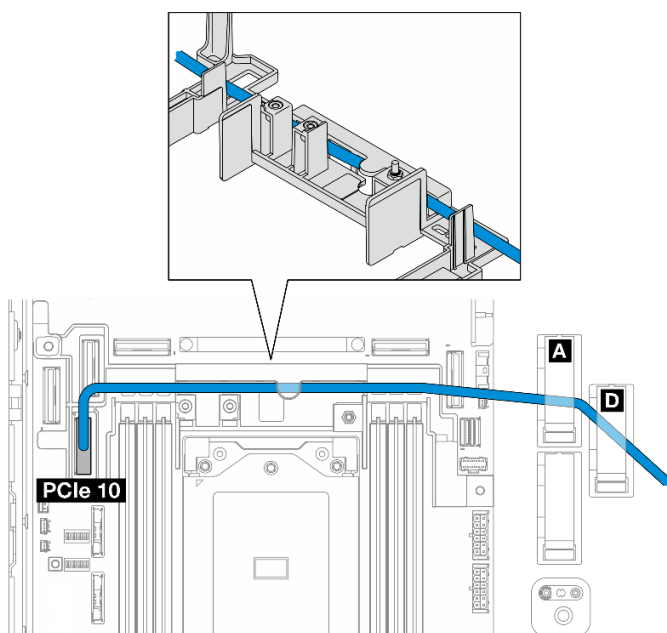


Figure 233. Front BP signal cable

2. Route the front BP signal cable through the cable wall; then, secure the cable into cable clip **A** and **D**.
3. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
4. Install the PCIe riser assemblies. See [“Install the PCIe riser assembly” on page 167](#).
5. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front SATA BP

1. Connect the front BP signal cable to PCIe 10 connector on the system board.

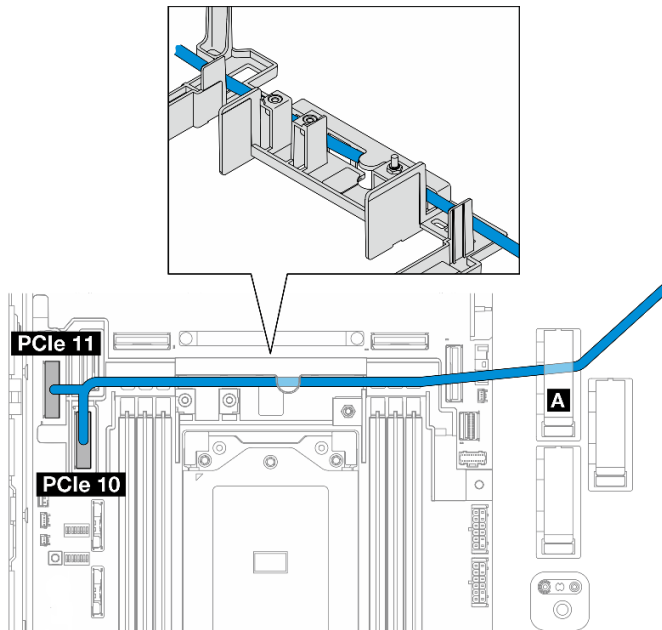


2. Route the front BP signal cable through the cable wall; then, secure the cable into cable clip **A** and **D**.

3. Install the processor air baffle. See [“Install the processor air baffle”](#) on page 76.
4. Install the PCIe riser assemblies. See [“Install the PCIe riser assembly”](#) on page 167.
5. Proceed to [“Complete the BP cable routing”](#) on page 265.

RAID to front SATA + system board to internal NVMe BP

1. Connect the internal BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 11
 - b. PCIe 10



2. Route the internal BP signal cable through the cable wall; then, secure the cable into cable clip **A**.

Note: Route one cable branch through the cable wall first; then, route the other through the cable wall.

3. Secure the front BP signal cable in cable clip **C**.

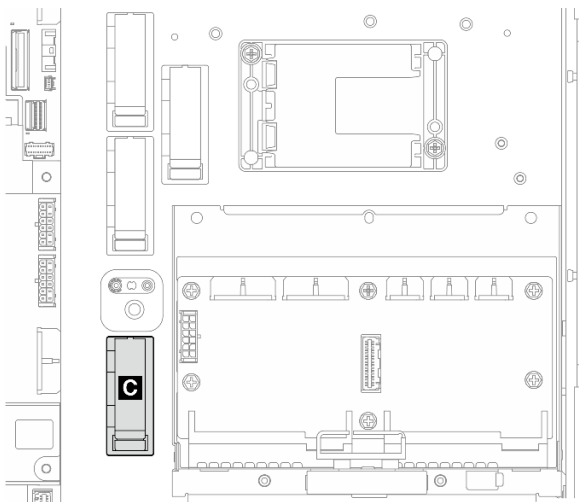


Figure 234. Cable clip C

4. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
5. Proceed to connect the front BP signal cable to C0 connector of the RAID adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).
6. Proceed to [“Complete the BP cable routing” on page 265](#).

System board to front NVMe + RAID to internal SATA BP

1. Connect the front BP signal cable to the connectors on the system board in the following order:
 - a. PCIe 11
 - b. PCIe 10

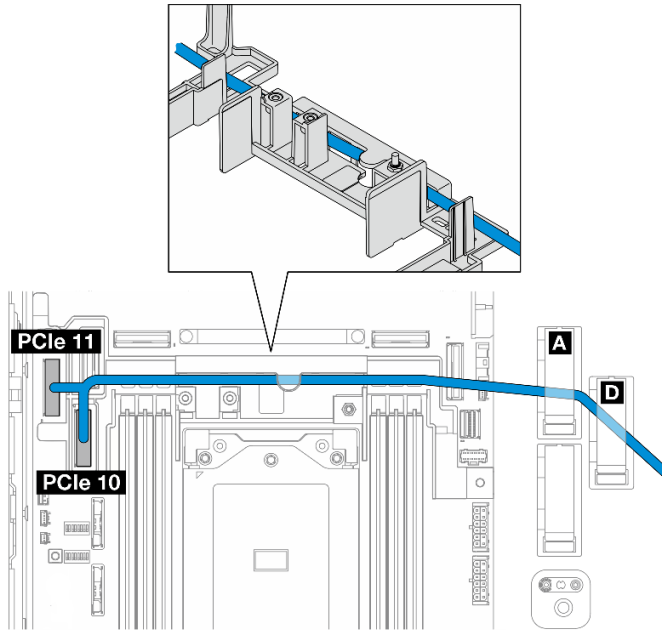


Figure 235. Front BP signal cable

2. Route the front BP signal cable through the cable wall; then, secure the cable into cable clip **A** and **D**.

Note: Route one cable branch through the cable wall first; then, route the other through the cable wall.

3. Secure the internal BP signal cable in cable clip **C**.

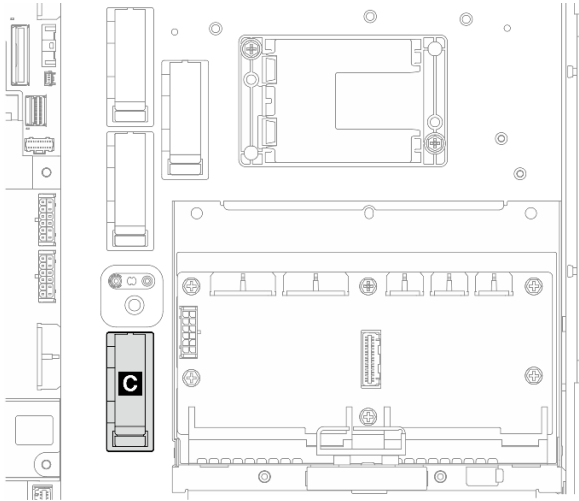


Figure 236. Cable clip C

4. Install the processor air baffle. See [“Install the processor air baffle” on page 76](#).
5. Proceed to connect the internal BP signal cable to C0 connector of the RAID adapter on PCIe riser assembly, and install the assembly. See [“Install the PCIe riser assembly” on page 167](#).
6. Proceed to [“Complete the BP cable routing” on page 265](#).

Complete the BP cable routing

Manage the front backplane cables

1. Install the front drive backplane. See [“Install the front drive backplane” on page 105](#).

Note: For configurations with front and internal drive backplanes, and both the backplanes connect to x350 RAID adapter, make sure to connect the signal cable from C0 connector of the RAID adapter to the front backplane.

-

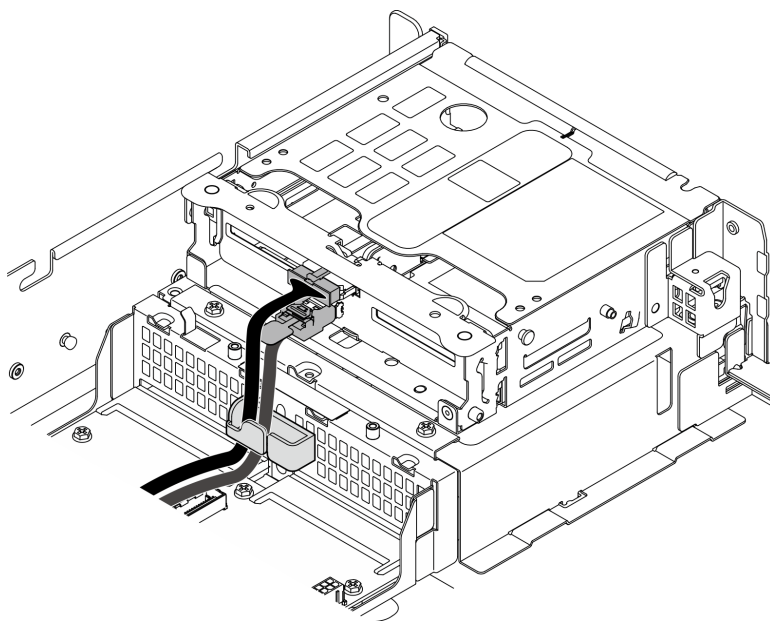


Figure 237. Front drive backplane cable routing

Make sure the front drive backplane cables are secured in the cable clip on the front drive cage. If necessary, route the front backplane power cable into the cable clip; then, route the front backplane signal cable into the cable clip.

2.

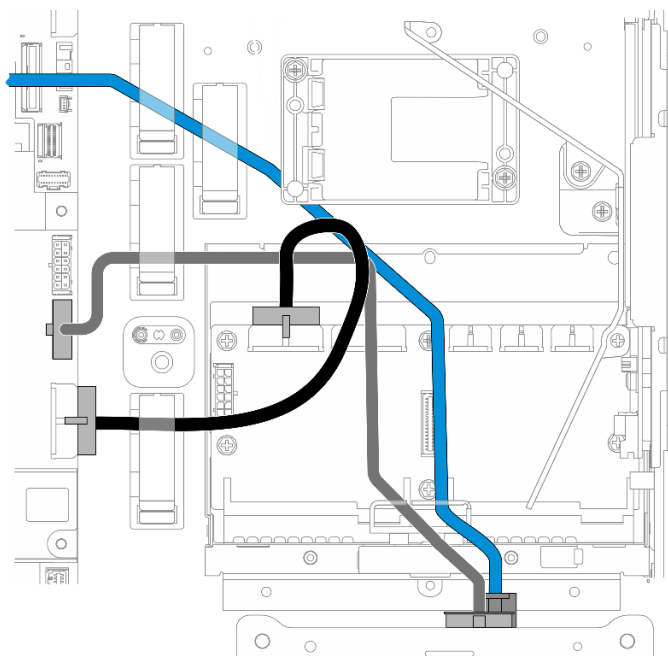


Figure 238. Front drive backplane cable routing

Route the front BP cables.

- a. For the configuration with front BP signal cable connected to the system board, route the front BP signal cable under the corner of the flash power module holder.

- b. Route the front BP power cable under System-board power 1 cable.
3. For configuration with internal drive backplane, proceed to [“Manage the internal BP cables” on page 267](#)
4. For configuration without internal drive backplane, press down the blue signal cable of PCIe riser 2, and make sure the cable is under the cable clip on the processor air baffle.

(Optional) Manage the internal BP cables

Complete the following procedures in the listed order to manage the internal BP cables.

1. Install the internal drive cage. See [“Install the internal drive cage” on page 115](#).
2. Install the internal drive backplane. See [“Install the internal drive backplane” on page 117](#).

Chapter 7. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

1. Start the server.
2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
 - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
 - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

Activate/unlock the system and configure ThinkEdge security features

ThinkEdge SE455 V3 supports ThinkEdge unique security features. With the security features enabled, the system will enter System Lockdown Mode when tamper events occur, and encrypted data can not be accessed before the system is activated or unlocked. The status of ThinkEdge unique security features can be changed in Lenovo XClarity Controller.

Setup the security features

Complete the following steps to setup the security features:

1. If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Activate or unlock the system” on page 270](#).
2. Maintain backup of SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 273](#).

3. Configure the security features in Lenovo XClarity Controller. See [“System Lockdown Mode” on page 272](#) to change the status of security features.

Note: The following sections contain the procedure of configuring ThinkEdge security features in Lenovo XClarity Controller web interface. For more information, see <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

Customer's responsibility:

- Keep the Secure Activation Code (provided in flyer).
- To use ThinkShield Edge Mobile Management App, prepare proper USB cable for mobile phone if necessary.
- Maintain backup of SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 273](#).
 - Set and remember the password of SED AK backup file to restore SED AK in the future.
- Engage IT department so they can help to claim or activate device when required.
- Confirm if the SE455 V3 system is claimed by your organization. If not, work with IT department to claim the device.
- Confirm the wireless (network) connectivity is working. Service technician cannot help examine the network connection of the device.
- Move SE455 V3 system to a safe working place for service.
- Place SE455 V3 system back to the working place after service.

Activate or unlock the system

Being shipped, encountering tamper events, or receiving lockdown command from Lenovo management software, the server would be in System Lockdown Mode for security. Before operation, the server needs to be activated or unlocked to be able to boot up and go fully functional. Complete the steps in this topic to activate or unlock the system.

If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Front LEDs” on page 287](#) to locate the security LED.

System Lockdown Mode Control

To distinguish whether the system needs to be activated or unlocked, see **System Lockdown Control** status on the home page of Lenovo XClarity Controller web interface. System Lockdown Control status would be one of the following:

- **ThinkShield Portal:** The system can be activated through ThinkShield Key Vault Portal. See [“Activate the system” on page 271](#) to activate the system.
- **XClarity Controller:** The system can be unlocked through Lenovo XClarity Controller. See [“Unlock the system” on page 272](#) to unlock the system.

Important:

- When System Lockdown Control status is XClarity Controller, if XClarity Controller is reset to defaults, the default credentials can be used to login to XClarity Controller and unlock the system. It is important to use security controls such as an UEFI PAP to prevent unauthorized users from executing an XClarity Controller reset to defaults. For the highest level of security, it is recommended to set System Lockdown Control to ThinkShield Portal.
- Once the System Lockdown Control status is changed to ThinkShield Portal, it cannot be changed back to XClarity Controller.

- To set System Lockdown Control to ThinkShield Portal, use Lenovo XClarity Essentials UpdateXpress. See “Upgrading lockdown control mode” section in <https://pubs.lenovo.com/lxce-ux/> for the details.

Activate the system

Complete the following steps to activate the system through ThinkShield Key Vault Portal.

Have a Lenovo ID with proper permission

Before activating a system for the first time, make sure to have a Lenovo ID with proper permission to log in to the ThinkShield Key Vault Portal web interface or ThinkShield mobile app.

Note: The role of Lenovo ID should be **Organization Admin**, **Maintenance User** or **Edge User** to activate the system.

- For Lenovo ID setup, see <https://passport.lenovo.com>.
- To log in to the Lenovo ThinkShield Key Vault Portal, see <https://portal.thinkshield.lenovo.com>.

Activation methods

There are different methods to activate the system through ThinkShield Key Vault Portal. Depending on the environment of the server, decide the most suitable way to activate the system.

• Mobile App activation

For Mobile App activation method, you will need an Android or iOS based smart phone with cellular data connection.

1. Connect the power cable to your ThinkEdge SE455 V3.
2. Download the ThinkShield Edge Mobile Management App from Google Play Store or Apple App Store to your Android or iOS based smart phone (search term: “ThinkShield Edge”).
3. Log-in to the ThinkShield Edge Mobile Management App using your Organization registered ID.
4. When App instructs to do so, connect USB cable with USB mobile phone charging cable to the ThinkEdge SE455 V3.

Note: When the smart phone prompts for the USB connection purpose, choose data transfer.

5. Follow the “Activate Device” on-screen instructions to complete secure activation of the system.
6. When activated successfully, ThinkShield Edge Mobile Management App will provide “Device Activated” screen.

Note: For the detailed steps, see *ThinkShield Edge Mobile Management Application User Guide* in <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

• Portal automatic activation

Note: To activate the system through ThinkShield Key Vault Portal web interface for the first time, the system should be claimed by your organization. **Machine Type**, **Serial Number**, and **Activation Code** are required to claim a device. For more information of claiming the device, see <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

1. Connect the power cable to your ThinkEdge SE455 V3.
2. Connect the XClarity Controller Management Ethernet port to a network that has access to the internet.

Note: Outbound TCP port 443 (HTTPS) must be open for activation to occur.

3. Log in to the ThinkShield Key Vault Portal with your Organization registered ID.

4. If the server is not claimed by your organization, claim the server. Add the device by clicking the **Claim device** button in **Device Manager**. Enter machine type, serial number, and secure activation code in the corresponding fields.
5. From the **Device Manager**, select the server you plan to activate and click **activate**. The status of the server will change to Ready.
6. Server will be activated within 15 minutes and power on automatically. After successful activation, the status of the server will change to Active on the ThinkShield Key Vault Portal.

Notes:

- If the server activation is not initiated within 2 hours after the power cable plug in, perform a disconnect then re-connect of the power cable to your ThinkEdge SE455 V3.
- For the detailed steps, see *ThinkShield Key Vault Portal Web Application User Guide* in <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

Unlock the system

Important:

- When System Lockdown Control status is XClarity Controller, if XClarity Controller is reset to defaults, the default credentials can be used to login to XClarity Controller and unlock the system. It is important to use security controls such as an UEFI PAP to prevent unauthorized users from executing an XClarity Controller reset to defaults. For the highest level of security, it is recommended to set System Lockdown Control to ThinkShield Portal. See “[System Lockdown Mode Control](#)” on page 270 for the details.

Complete the following steps to unlock the system in Lenovo XClarity Controller web interface

Notes: To unlock the system, the role of XCC user should be one of the following:

- Administrator
 - Administrator+
1. Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → System Lockdown Mode**.
 2. Press **Active** button, and then press **Apply** button. When the status of System Lockdown Mode switches to Inactive, the system is unlocked.

System Lockdown Mode

See this topic to learn about System Lockdown Mode and related features in Lenovo XClarity Controller.

When System Lockdown Mode is active, the system can not be booted up, and the access to SED AK is not allowed.

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → System Lockdown Mode** to configure the security features.

Note: When the **System Lockdown Mode Control** status on the home page of Lenovo XClarity Controller web interface is XClarity Controller, the status of System Lockdown Mode can be changed in XCC. See “[Activate or unlock the system](#)” on page 270 for more information.

Chassis Intrusion Detection

When Chassis Intrusion Detection is **Enabled**, the system detects physical movements of the top cover. If the top cover is opened unexpectedly, the system enters System Lockdown Mode automatically.

Manage the Self Encryption Drive Authentication Key (SED AK)

For ThinkEdge SE455 V3 with self-encrypted drives (SED) installed, the SED AK can be managed in Lenovo XClarity Controller. After setting up the server or making changes to the configuration, backing up the SED AK is essential to prevent data loss in the hardware failure case.

SED Authentication Key (AK) Manager

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → SED Authentication Key (AK) Manager** to manage the SED AK.

Notes: The operation of SED AK Manager is not allowed in the following conditions:

- System Lockdown Mode is in **Active** state. SED AK is locked until the system is activated or unlocked. See [“Activate or unlock the system” on page 270](#) to activate or unlock the system.
- Current user does not have the authority to manage SED AK.
 - To generate, backup, and recover the SED AK with passphrase or backup file, the role of XCC user should be **Administrator**.
 - To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

SED encryption

The status of SED encryption can be changed from Disabled to Enabled. Complete the following process to enable SED encryption.

1. Press **Enabled** button.
2. Select the SED AK generation method:
 - **Generate key using Passphrase:** Set the password and re-enter it for the confirmation.
 - **Generate key randomly:** A Random SED AK will be generated.
3. Press **Apply** button.

Attention:

- Once SED encryption is Enabled, it cannot be changed back to Disabled.
- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.
- When SED encryption is enabled, if emergency XCC password reset is performed, the SED AK stored in the server will be cleared as the default action. Data stored on the SED will no longer be accessible unless the SED AK is restored. Backing up the SED AK is strongly advised to reduce the risk of data loss. See [“Emergency XCC Password Reset” on page 274](#) for more information.

Change the SED AK

- **Generate key using Passphrase:** Set the password and re-enter it for the confirmation. Click **Re-generate** to get the new SED AK.
- **Generate key randomly:** Click **Re-generate** to get a Random SED AK.

Backup the SED AK

Set the password and re-enter it for the confirmation. Click **Start Backup** to backup the SED AK; then, download the SED AK file and store it safely for future use.

Note: If you use the backup SED AK file to restore a configuration, the system will ask for the password that you set here.

Recover the SED AK

- **Recover SED AK using Passphrase:** Use the password that was set in **Generate key using Passphrase** to recover the SED AK.
- **Recover SED AK from Backup file:** Upload the backup file generated in **Backup the SED AK** mode and enter the corresponding backup file password to recover the SED AK.
- **Recover SED AK from Automatic backup:** After system board replacement, use automatic backup to recover the SED AK for the installed SED.

Note: To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

Emergency XCC Password Reset

When emergency XCC password reset is performed, the SED AK stored in the server will be cleared at default for security. Check the emergency XCC password reset settings to enhance data security and prevent data loss.

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → Emergency XCC Password Reset** to see the settings.

Emergency XCC password reset

If both XCC and UEFI password are lost, emergency XCC password reset feature allows the user to regain the access by resetting XCC password. Emergency XCC password reset feature does not include the normal XCC password reset methods, which can be performed with authorized access to tools like XCC, UEFI, BoMC, OneCLI, etc. See the following information to learn the capability of emergency XCC password reset feature.

For ThinkEdge SE455 V3, emergency XCC password reset can be performed by the following methods:

1. Reset XCC password with ThinkShield Edge Mobile Management App

When the server's System Lockdown Control status is ThinkShield Portal, users with proper permission can perform emergency XCC password reset through mobile app.

See [“Activate or unlock the system” on page 270](#) for the details of System Lockdown Mode and mobile app settings.

For *ThinkShield Edge Mobile Management Application User Guide*, see <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

2. Revert XCC to defaults with External Diagnostics Handset

ThinkEdge SE455 V3 supports External Diagnostics Handset. With the handset connecting to server, XCC can be reverted to default settings. See [“External Diagnostics Handset” on page 296](#) for more information.

When XCC is reverted to default settings by External Diagnostics Handset, depending on the settings, the XCC password might be reset at the same time.

If necessary, change the settings in XCC.

- When using an external diagnostics handset to revert XCC to default settings, do you wish to reset the XCC password at the same time?
 - The default status is **Disabled**. Press the button to change the status to **Enabled**.

Important: If the server's System Lockdown Mode status is XClarity Controller, enable emergency XCC password reset would cause a risk to security because the default credentials can be used to login to XCC after reset. It is recommended to keep the status as **Disabled**.

Clear SED AK as part of Emergency XCC Password Reset

When SED encryption is enabled, if emergency XCC password reset is performed, the SED AK stored in the server will be cleared as the default action. Data stored on the SED will no longer be accessible unless the SED AK is restored. Backing up the SED AK is strongly advised to reduce the risk of data loss. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 273](#) for more information.

The clearing SED AK action can be changed in XCC.

- Clear SED AK as part of Emergency XCC Password Reset
 - The default status is **Enabled**. Press the button to change the status to **Disabled**.

Important: When the server's System Lockdown Mode status is XClarity Controller and Clear SED AK is disabled, the data in SED might be accessed by login with default credentials after password reset. To prevent security risk, it is recommended to keep Clear SED AK as **Enabled**.

Note: If users reset XCC password not by emergency XCC password reset but by tools like XCC, UEFI, BoMC, OneCLI, etc., the SED AK stored in the server will not be cleared.

Set dust filter measurement

With air flow sensor board installed, SE455 V3 BMC supports dust filter measurement to check the status of the dust filter.

Log in to Lenovo XClarity Controller web interface, and go to **Utilization → Fan Speed (RPM) → Dust Filter Measurement** to take the measurement by selecting **Run immediately (once)**, or by setting a regular schedule.

Note: When taking the measurement, the fans will operate at full fan speed for about 30 seconds.

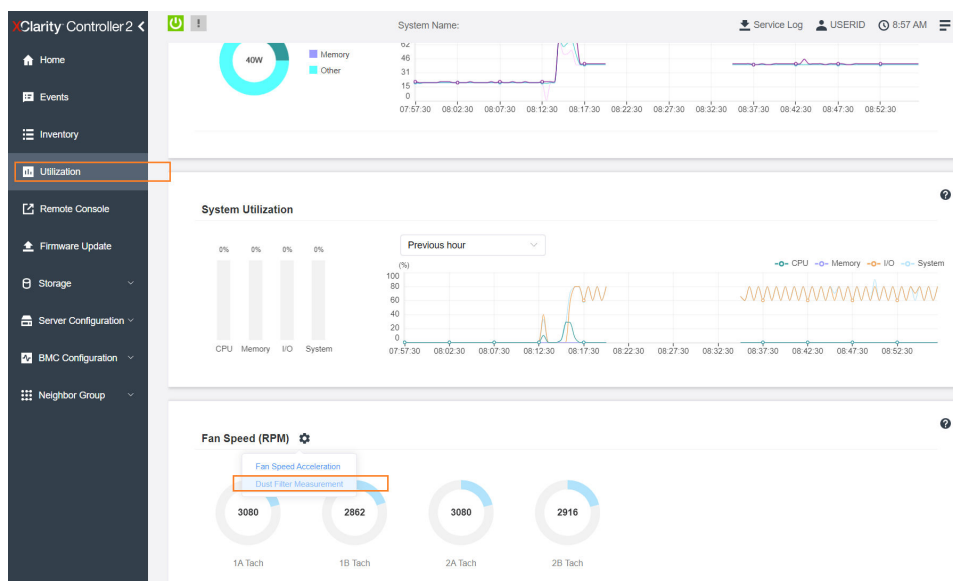


Figure 239. Dust filter measurement

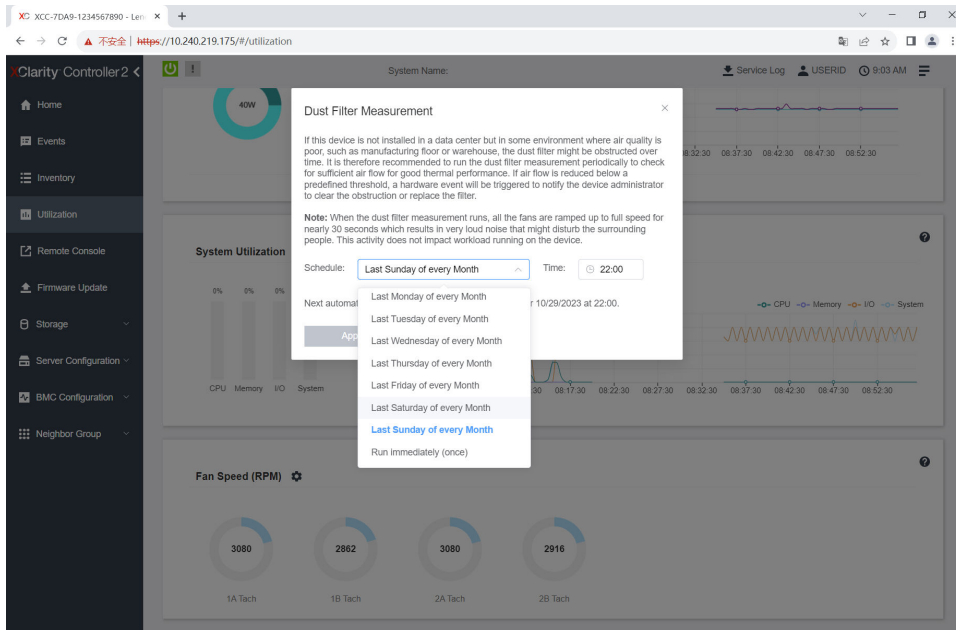


Figure 240. Dust filter measurement settings

After taking the measurement, see Lenovo XClarity Controller Event Log for the status of dust filter. For proper operation, replace the dust filter according to the action suggestions in the generated event.

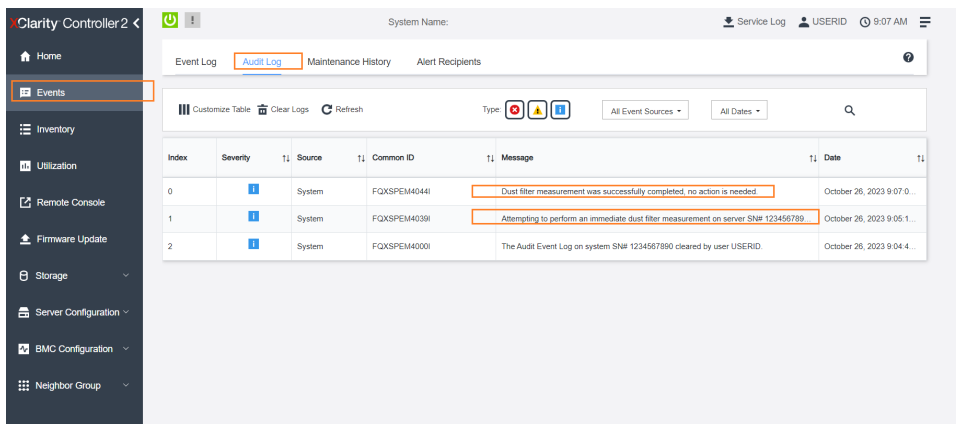


Figure 241. Dust filter measurement events

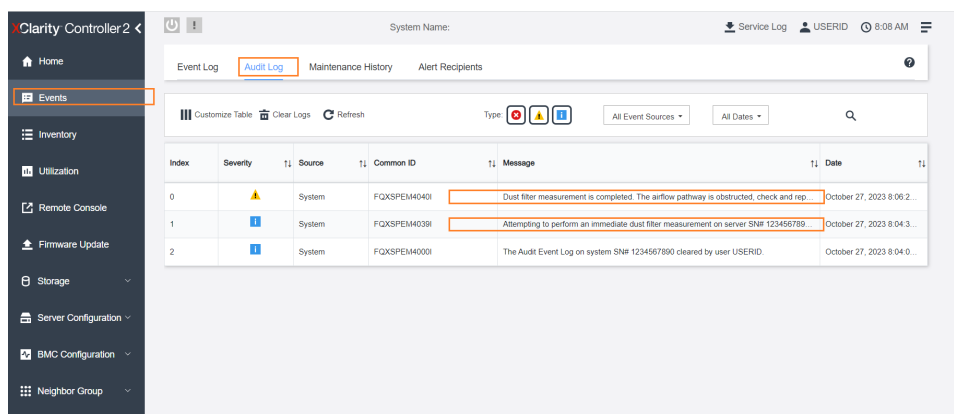


Figure 242. Dust filter measurement events

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
 - <https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices>
- The latest firmware can be found at the following site:
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dby/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
 - <https://datacentersupport.lenovo.com/solutions/ht509500>

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **Update Bundles (Service Packs).** Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver

updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

| Tool | Update Methods Supported | Core System Firmware Updates | I/O Devices Firmware Updates | Drive Firmware Updates | Graphical user interface | Command line interface | Supports Update Bundles (Service Packs) |
|---|--|------------------------------|------------------------------|------------------------|--------------------------|-------------------------|---|
| Lenovo XClarity Provisioning Manager (LXPM) | In-band ² On-Target | ✓ | | | ✓ | | |
| Lenovo XClarity Controller (XCC) | In-band ⁴ Out-of-band Off-Target | ✓ | Selected I/O devices | ✓ ³ | ✓ | | ✓ |
| Lenovo XClarity Essentials OneCLI (OneCLI) | In-band Out-of-band On-Target Off-Target | ✓ | All I/O devices | ✓ ³ | | ✓ | ✓ |
| Lenovo XClarity Essentials UpdateXpress (LXCE) | In-band Out-of-band On-Target Off-Target | ✓ | All I/O devices | | ✓ | | ✓ |
| Lenovo XClarity Essentials Bootable Media Creator (BoMC) | In-band Out-of-band Off-Target | ✓ | All I/O devices | | ✓ (BoMC application) | ✓ (BoMC application) | ✓ |
| Lenovo XClarity Administrator (LXCA) | In-band ¹ Out-of-band ² Off-Target | ✓ | All I/O devices | ✓ | ✓ | | ✓ |
| Lenovo XClarity Integrator (LXCI) for VMware vCenter | Out-of-band Off-Target | ✓ | Selected I/O devices | | ✓ | | |

| Tool | Update Methods Supported | Core System Firmware Updates | I/O Devices Firmware Updates | Drive Firmware Updates | Graphical user interface | Command line interface | Supports Update Bundles (Service Packs) |
|---|---|------------------------------|------------------------------|------------------------|--------------------------|------------------------|---|
| Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center | In-band Out-of-band On-Target Off-Target | ✓ | All I/O devices | | ✓ | | ✓ |

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.
3. Drive firmware update is only supported by the tools and methods below:
 - XCC Bare Metal Update (BMU): In-band, and requires system reboot.
 - Lenovo XClarity Essentials OneCLI:
 - For OneCLI version earlier than 5.0.0:
 - For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot.
 - For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.).
 - For OneCLI 5.0.0 and later versions: In-band, and does not require system reboot.
4. Bare Metal Update (BMU) only.

• **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

• **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

Notes:

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For additional information about using Lenovo XClarity Controller to update firmware, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

https://pubs.lenovo.com/lxca/update_fw

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator to update firmware, see:

<https://pubs.lenovo.com/lxci-overview/>

Configure the firmware

Several options are available to install and set up the firmware for the server.

Note: UEFI **Legacy Mode** is not supported by ThinkSystem V4 products.

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

From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- Search for the LXPM documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- *UEFI User Guide* at <https://pubs.lenovo.com/uefi-overview/>

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity Administrator**

You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

Specific details about configuring the server using Lenovo XClarity Administrator are available at:

https://pubs.lenovo.com/lxca/server_configuring

- **Lenovo XClarity Controller**

You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

For information about configuring the server using Lenovo XClarity Controller, see:

“Configuring the Server” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

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

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

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

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

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

<https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

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

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.

Tool-based deployment

- **Multi-server**

Available tools:

- Lenovo XClarity Administrator

https://pubs.lenovo.com/lxca/compute_node_image_deployment

- Lenovo XClarity Essentials OneCLI

https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager
“OS Installation” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

Chapter 8. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Web resources

- **Tech tips**

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

To find the Tech Tips available for your server:

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

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

- **Lenovo Data Center Forum**

- Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

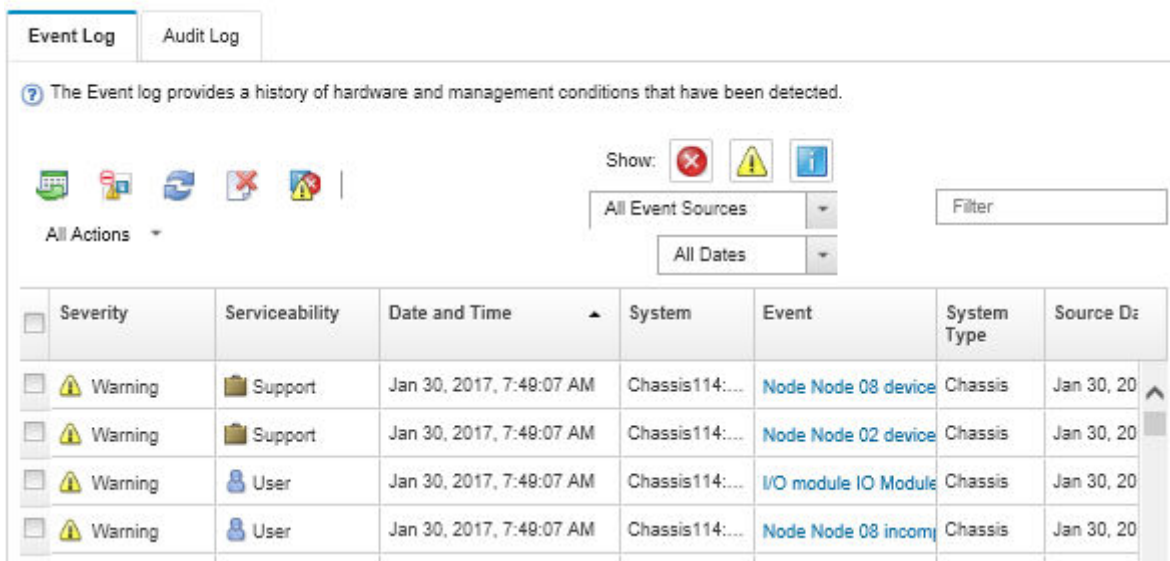
An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or 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/se455-v3/pdf_files.html.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

Logs



The Event log provides a history of hardware and management conditions that have been detected.

Show: [Warning] [Error] [Info]

All Event Sources [Filter]

All Dates [All Dates]

| Severity | Serviceability | Date and Time | System | Event | System Type | Source ID |
|----------|----------------|--------------------------|----------------|----------------------|-------------|------------|
| Warning | Support | Jan 30, 2017, 7:48:07 AM | Chassis114:... | Node Node 08 device | Chassis | Jan 30, 20 |
| Warning | Support | Jan 30, 2017, 7:48:07 AM | Chassis114:... | Node Node 02 device | Chassis | Jan 30, 20 |
| Warning | User | Jan 30, 2017, 7:48:07 AM | Chassis114:... | I/O module IO Module | Chassis | Jan 30, 20 |
| Warning | User | Jan 30, 2017, 7:48:07 AM | Chassis114:... | Node Node 08 incom | Chassis | Jan 30, 20 |

Figure 243. Lenovo XClarity Administrator event log

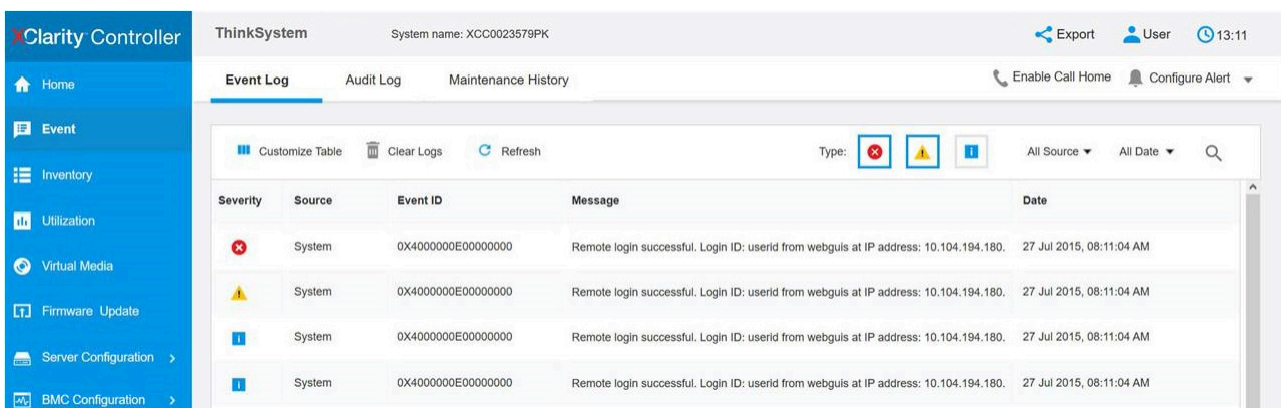
For more information about working with events from XClarity Administrator, see:

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.



ThinkSystem System name: XCC0023579PK

Event Log Audit Log Maintenance History

Customize Table Clear Logs Refresh

Type: [Warning] [Error] [Info]

| Severity | Source | Event ID | Message | Date |
|----------|--------|--------------------|---|--------------------------|
| Warning | System | 0X4000000E00000000 | Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180. | 27 Jul 2015, 08:11:04 AM |
| Warning | System | 0X4000000E00000000 | Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180. | 27 Jul 2015, 08:11:04 AM |
| Warning | System | 0X4000000E00000000 | Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180. | 27 Jul 2015, 08:11:04 AM |
| Warning | System | 0X4000000E00000000 | Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180. | 27 Jul 2015, 08:11:04 AM |

Figure 244. 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/lxccc-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.

The following table describes the problems that are indicated by drive activity LED and drive status LED.

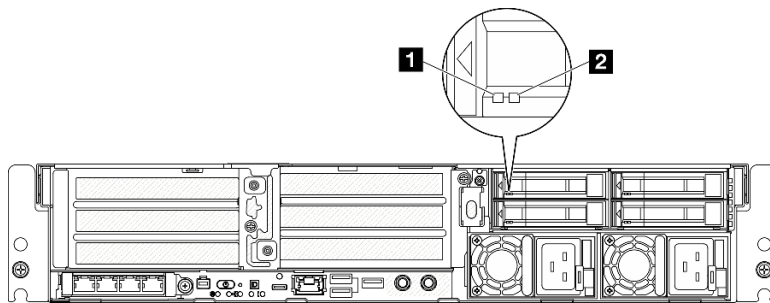


Figure 245. Drive LEDs

| LED | Description |
|-------------------------------------|---|
| 1 Drive activity LED (green) | Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use. |
| 2 Drive status LED (yellow) | The drive status LED indicates the following status: <ul style="list-style-type: none">• The LED is lit: the drive has failed.• The LED is flashing slowly (once per second): the drive is being rebuilt.• The LED is flashing rapidly (three times per second): the drive is being identified. |

Front LEDs

This topic provides information about the buttons and LEDs at front of the server.

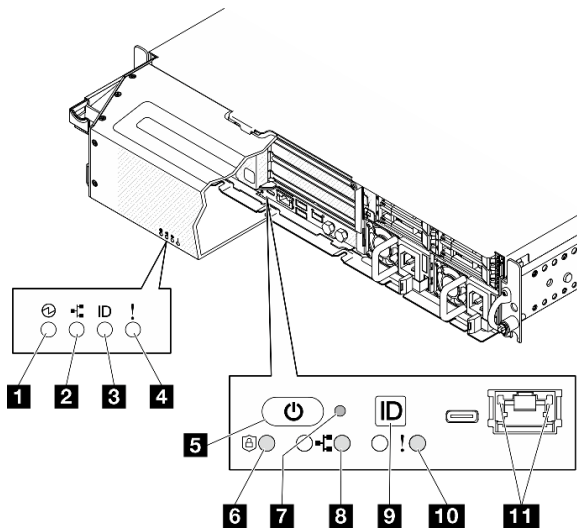


Figure 246. Front LEDs

Table 23. Front LEDs

| LEDs visible from | |
|---|--|
| Security bezel | Server front view |
| 1 “Power status LED (green)” on page 288 | 5 “Power button with power status LED (green)” on page 288 |
| 2 “Network activity LED (green)” on page 289 | 6 “Security LED (green)” on page 289 |
| 3 “System ID LED (blue)” on page 289 | 7 “NMI button” on page 289 |
| 4 “System error LED (yellow)” on page 289 | 8 “Network activity LED (green)” on page 289 |
| | 9 “System ID button with system ID LED (blue)” on page 289 |
| | 10 “System error LED (yellow)” on page 289 |
| | 11 “XCC system management port (10/100/1000 Mbps RJ-45) LEDs (green)” on page 289 |

1 Power status LED (green) / 5 Power button with power status LED (green)

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

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

2 / 8 Network activity LED (green)

When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

3 System ID LED (blue) / 9 System ID button with system ID LED (blue)

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

4 / 10 System Error LED (yellow)

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

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

6 Security LED (green)

The states of security LED are as following:

Solid on: The server is operating with security feature enabled.

Blinking: The server is in System Lockdown Mode. Activate or unlock the system for operation.

Off: No security feature is enabled on the server.

7 NMI button

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

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

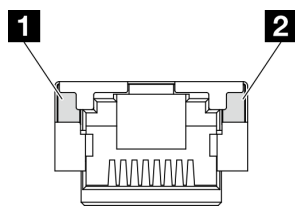


Figure 247. XCC system management port (10/100/1000 Mbps RJ-45) LEDs

| LED | Description |
|---|--|
| 1 XCC system management port (10/100/1000 Mbps RJ-45) link LED | Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> Off: The network link is disconnected. Green: The network link is established. |
| 2 XCC system management port (10/100/1000 Mbps RJ-45) activity LED | Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> Off: The server is disconnected from a LAN. Blinking: The network is connected and active. |

Power supply LEDs

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

The following minimal configuration is required for the server to start:

- One processor
- One DDR5 DRAM memory modules in slot 3 (DIMM3)
- One power supply unit in PSU bay 1 (PSU1)
- One M.2 boot drive (if OS is needed for debugging)
- Five system fans

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

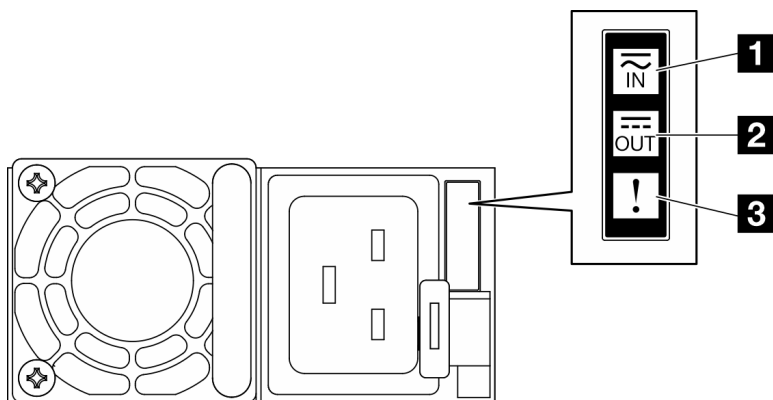


Figure 248. Power supply LEDs

| LED | Description |
|------------------------|--|
| 1 Input status | <p>The input status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Off: The power supply is disconnected from the AC power source. • Green: The power supply is connected to the AC power source. |
| 2 Output status | <p>The output status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply. • Blinking green (about one flash each 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. <p>Zero-output mode can be disabled via Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state.</p> <ul style="list-style-type: none"> – Log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. • Green: The server is on and the power supply is working normally. |
| 3 Fault LED | <ul style="list-style-type: none"> • Off: The power supply is working normally • Amber: The power supply may have failed. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing. |

System-board LEDs

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

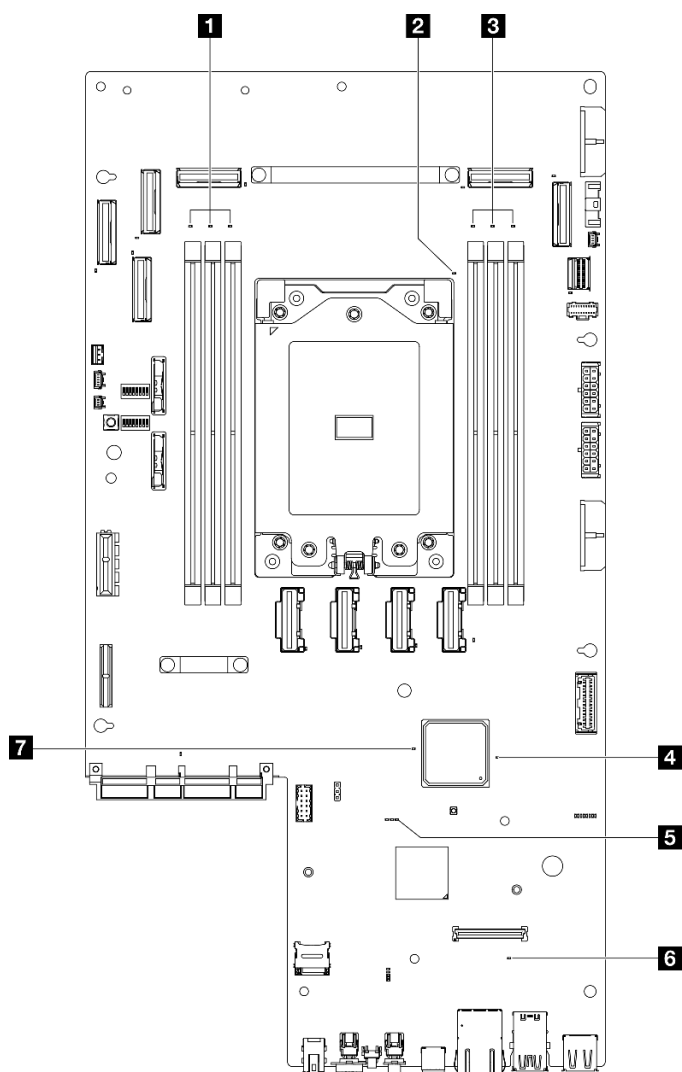


Figure 249. System-board LEDs

Table 24. System board LEDs description and actions

| LED | Description | Action |
|--------------------------------------|--|---|
| 1 DIMM 4-6 error LED (amber) | LED on: an error has occurred to the DIMM the LED represents. | For more information, see “Memory problems” on page 306 . |
| 2 Processor error LED (amber) | LED on: an error has occurred to the processor the LED represents. | Replace the processor. |
| 3 DIMM 1-3 error LED (amber) | LED on: an error has occurred to the DIMM the LED represents. | For more information, see “Memory problems” on page 306 . |

Table 24. System board LEDs description and actions (continued)

| LED | Description | Action |
|--|---|---|
| 4 FPGA power status LED (green) | <p>The FPGA power LED helps to identify different FPGA errors.</p> <ul style="list-style-type: none"> • LED blinking rapidly (four times per second): The FPGA permission is delayed. • LED blinking slowly (once per second): The FPGA is ready to power on. • LED on: The FPGA power is on. | <p>If FPGA power status LED is always blinking rapidly over 5 minutes, do the following:</p> <ul style="list-style-type: none"> • If XCC can be accessed: <ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 2. Save the log if necessary, and clear the log afterwards. • If XCC cannot be accessed: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support. |
| 5 XCC heartbeat LED (green) | <p>The XCC heartbeat LED helps to identify the XCC status.</p> <ul style="list-style-type: none"> • Blinking (1 Hz, about one flash per second) : XCC is working normally. • Blinking at other speeds or always on: XCC is at the initial phase or is working abnormally. • Off: XCC is not working. | <ul style="list-style-type: none"> • If the XCC heartbeat LED is always off or always on, do the following: <ul style="list-style-type: none"> – If XCC cannot be accessed: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. (Trained technician only) Replace the system board. – If XCC can be accessed: <ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 2. Save the log if necessary, and clear the log afterwards. • If the XCC heartbeat LED is always blinking fast over 5 minutes, do the following: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. (Trained technician only) Replace the system board. • If the XCC heartbeat LED is always blinking slow for over 5 minutes, do the following: |

Table 24. System board LEDs description and actions (continued)

| LED | Description | Action |
|-------------------------------------|--|---|
| | | <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support. |
| 6 System error LED (amber) | LED on: an error has occurred. | <p>Complete the following steps:</p> <ol style="list-style-type: none"> 1. Check the identification LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 3. Save the log if necessary, and clear the log afterwards. |
| 7 FPGA heartbeat LED (green) | <p>The FPGA heartbeat LED helps to identify the FPGA status.</p> <ul style="list-style-type: none"> • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working. | <p>If FPGA heartbeat LED is always off or always on, do the following:</p> <ol style="list-style-type: none"> 1. (Trained technician only) Replace the system board. 2. If the problem remains, contact Lenovo Support. |

Firmware and RoT security module LEDs

The following illustrations show the light-emitting diodes (LEDs) on the Firmware and Root of Trust Security Module (firmware and RoT security module).

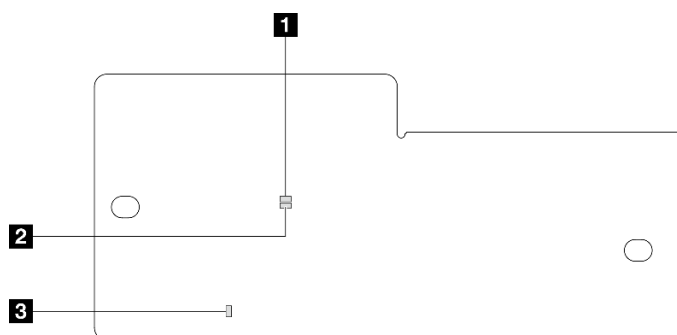


Figure 250. LEDs on the firmware and RoT security module

| | | |
|--------------------------|--------------------------|----------------------------------|
| 1 AP0 LED (Green) | 2 AP1 LED (Green) | 3 Fatal Error LED (Amber) |
|--------------------------|--------------------------|----------------------------------|

Table 25. LEDs description

| Scenario | AP0 LED | AP1 LED | Fatal Error LED | FPGA heart-beat LED ^{note} | XCC heart-beat LED ^{note} | Actions |
|--|---------|---------|-----------------|-------------------------------------|------------------------------------|--|
| RoT security module fatal firmware failure | Off | Off | On | N/A | N/A | Replace the firmware and RoT security module. |
| | Blink | N/A | On | N/A | N/A | Replace the firmware and RoT security module. |
| 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: <ul style="list-style-type: none"> 1. Check the power supply unit (PSU) or power backplane. If the PSU or power backplane has any error, replace it. 2. If the PSU or power backplane is good, replace the system 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 | On | N/A | Off | N/A | N/A | Information only. No action is required. |
| UEFI firmware authentication failure | N/A | Blink | Off | N/A | N/A | Information only. No action is required. |
| UEFI firmware is recovered from authentication failure | N/A | On | Off | N/A | N/A | Information only. No action is required. |
| System is OK (FPGA heartbeat LED is On) | On | On | Off | On | Blink (1 Hz) | Information only. No action is required. |

Note: For locations of the FPGA LED and XCC heartbeat LED, see [“System-board LEDs” on page 291](#).

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

This topic provides information on LEDs of XCC system management port (10/100/1000 Mbps RJ-45).

The following table describes the problems that are indicated by LEDs on XCC system management port (10/100/1000 Mbps RJ-45).

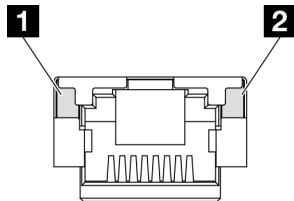


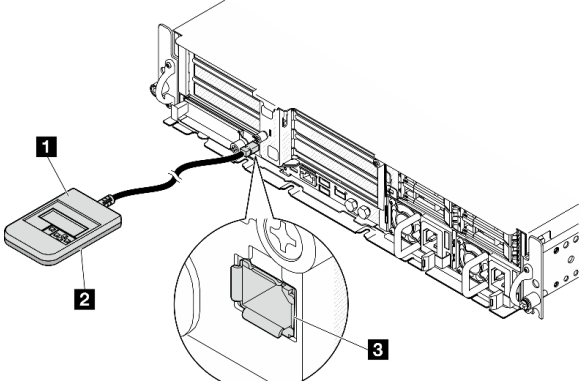
Figure 251. XCC system management port (10/100/1000 Mbps RJ-45) LEDs

| LED | Description |
|---|--|
| 1 XCC system management port (10/100/1000 Mbps RJ-45) link LED | Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> Off: The network link is disconnected. Green: The network link is established. |
| 2 XCC system management port (10/100/1000 Mbps RJ-45) activity LED | Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> Off: The server is disconnected from a LAN. Blinking: The network is connected and active. |

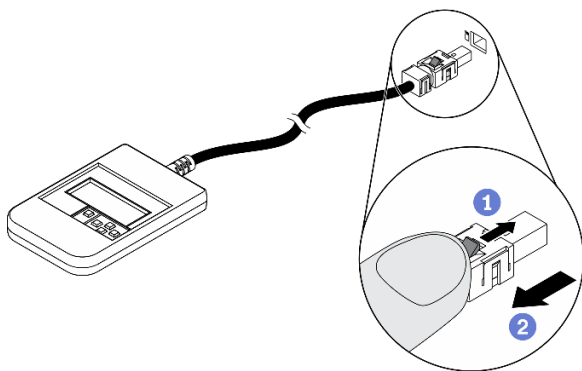
External Diagnostics Handset

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

Location of the External Diagnostics Handset

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

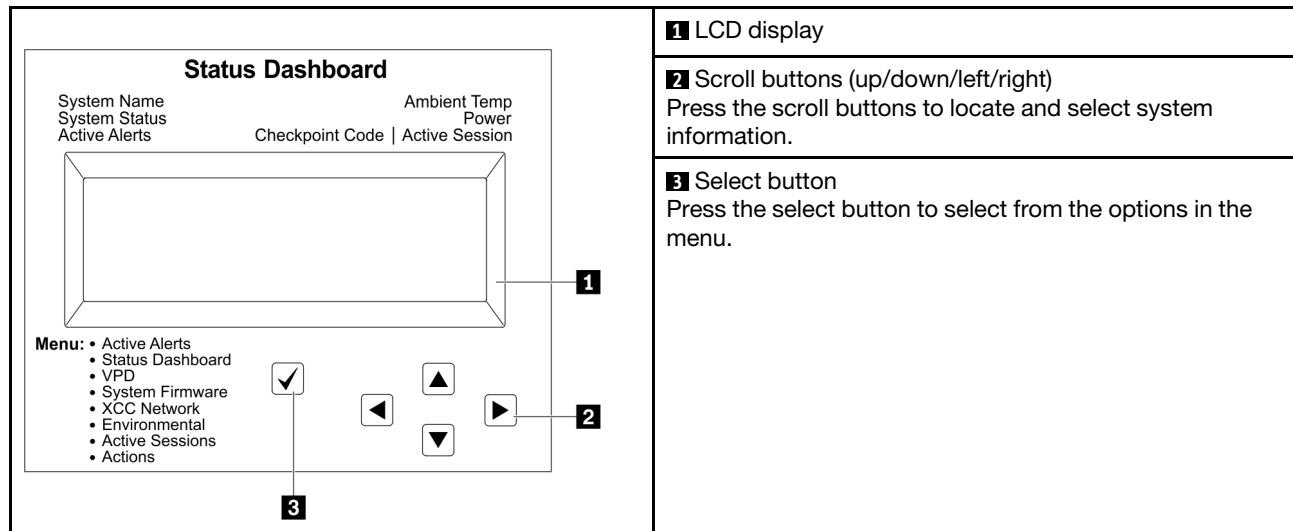
Note: When unplugging the External Diagnostics Handset, see the following instructions:



- 1** Press the plastic clip on the plug forward.
- 2** Hold the clip and remove the cable from the connector.

Display panel overview

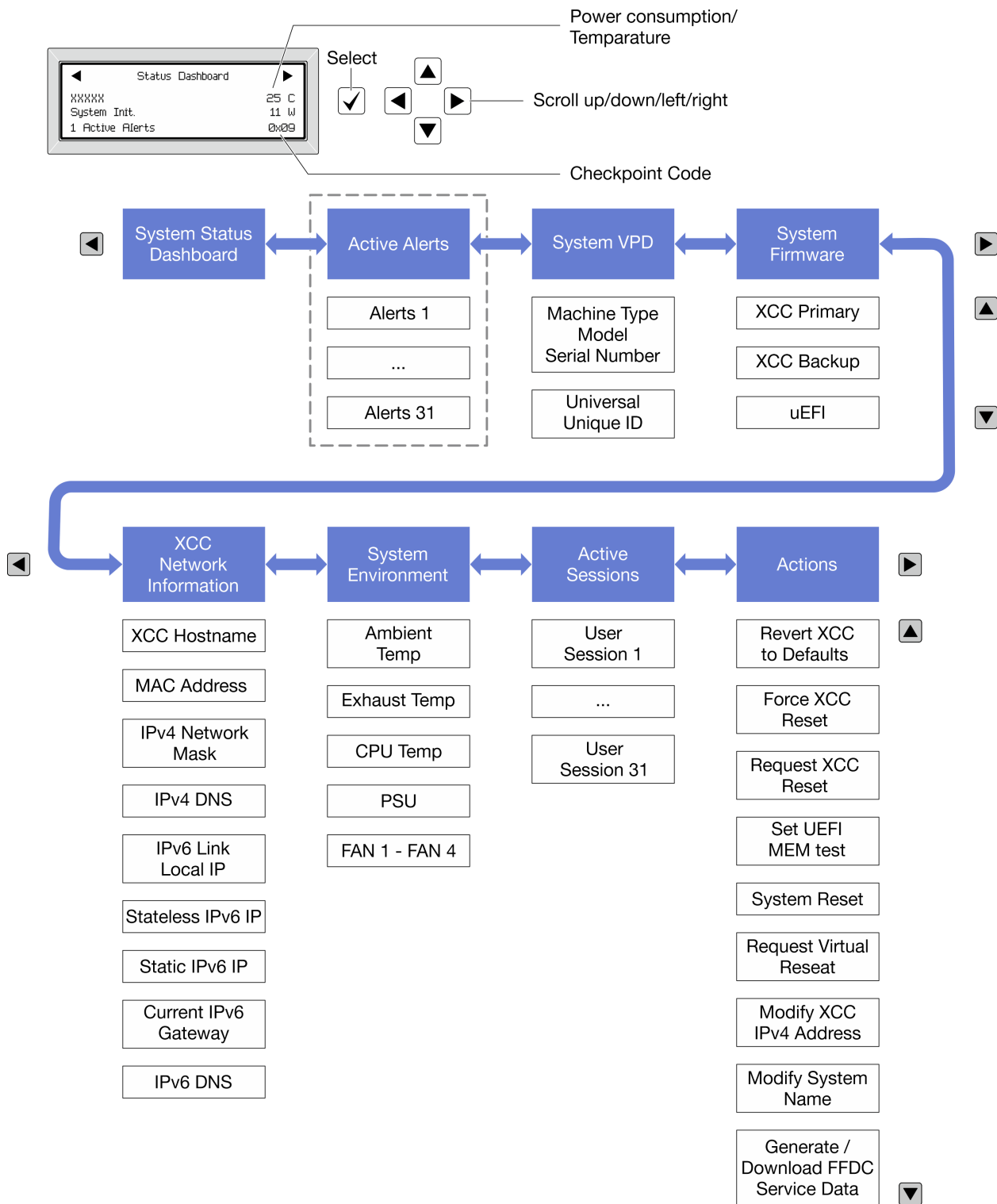
The diagnostics device consists of an LCD display and 5 navigation buttons.



Option flow diagram

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

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

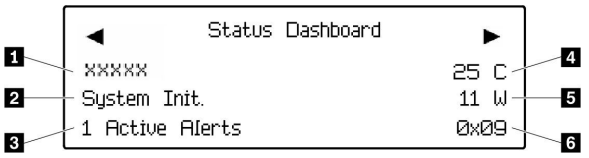


Full menu list

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

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

Home Menu (System Status Dashboard)

| Home Menu | Example |
|--|--|
| 1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code |  <p>The screenshot shows a 'Status Dashboard' with the following information: 'xxxxxx' (1), 'System Init.' (2), '1 Active Alerts' (3), '25 C' (4), '11 W' (5), and '0x09' (6).</p> |

Active Alerts

| Sub Menu | Example |
|---|---|
| Home screen: Active error quantity Note: The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation. | 1 Active Alerts |
| Details screen: <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error | Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error |

System VPD Information

| Sub Menu | Example |
|--|--|
| <ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) | Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx |

System Firmware

| Sub Menu | Example |
|---|---|
| XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date | XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07 |
| XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date | XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30 |
| UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date | UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26 |

XCC Network Information

| Sub Menu | Example |
|---|---|
| <ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p> | XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x |

System Environmental Information

| Sub Menu | Example |
|--|--|
| <ul style="list-style-type: none">Ambient temperatureExhaust temperatureCPU temperaturePSU statusSpinning speed of fans by RPM | Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM |

Active Sessions

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

Actions

| Sub Menu | Example |
|--|---|
| Several quick actions are available: <ul style="list-style-type: none">Revert XCC to DefaultsForce XCC ResetRequest XCC ResetSet UEFI Memory TestRequest Virtual ReseatModify XCC Static IPv4 Address/Net mask/GatewayModify System NameGenerate/Download FFDC Service Data | Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds |

Important: Before reverting XCC to Defaults, read the following section to make sure the server is with proper security settings.

ThinkEdge security feature: improving data security

When XCC is reverted to default by External Diagnostics Handset, depending on the settings, the XCC password might be reset at the same time.

If the server's System Lockdown Mode status is XClarity Controller, once the XCC password is reset, unauthorized users can use the default credentials to login to XCC.

With ThinkEdge security features, the following security settings are adjustable. Make sure to configure the settings to prevent data loss:

- When reverting XCC to default by External Diagnostics Handset, the XCC password will be reset or not. (Default: The XCC password will not be reset.)

- When the XCC password is reset by External Diagnostics Handset or mobile app, the SED AK stored in the server will be cleared or not. (Default: The SED AK will be cleared.)

For the details of security feature settings, see [“Emergency XCC Password Reset” on page 274](#).

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 4](#).

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 285](#).

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 4](#).

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, which come with the server are installed and that they are at the latest level.
- Step 2. Make sure that the Ethernet cable is installed correctly.
 - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
 - Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.
- Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.
- Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.

The server front panel LED is described in [“Troubleshooting by system LEDs and diagnostics display” on page 287](#).

- 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 287](#).

- 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 285](#)).

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 325](#)).

Fan problems

See this section to resolve issues related the to fans.

- [“Abnormally high RPM \(revolutions per minute\)” on page 304](#)

Abnormally high RPM (revolutions per minute)

Complete the following steps until the problem is solved.

1. Check the Lenovo XClarity Controller event log and the system error log for information to make sure if any of the fans or rotors of the fans fail. Replace the failed fan.
2. With air flow sensor board installed, SE455 V3 BMC supports dust filter measurement to check the status of the dust filter. Log in to Lenovo XClarity Controller web interface, and go to **Utilization → Fan Speed (RPM) → Dust Filter Measurement** to take the measurement by selecting **Run immediately (once)**, or by setting a regular schedule. When taking the measurement, the fans will operate at full fan speed for about 30 seconds. Make sure the high RPM is not caused by dust filter measurement.
3. Check to see if the system inlet perforation or heatsinks are clogged.
4. Make sure that all air baffles are correctly installed in the server.
5. Check the thermal grease on the processor, and make sure it's not contaminated.

Intermittent problems

Use this information to solve intermittent problems.

- [“Intermittent external device problems” on page 304](#)
- [“Intermittent KVM problems” on page 305](#)
- [“Intermittent unexpected reboots” on page 305](#)

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
 - a. Make sure that the device is configured correctly.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation)

compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Devices and I/O Ports** → **USB Configuration**.

- b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **BMC Settings** → **POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, do one of the followings:
 - Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
`OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
 - Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
3. See the management controller event log to check for an event code that indicates a reboot. See “[Event logs](#)” on [page 285](#) 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 306](#)
- “[Mouse does not work](#)” on [page 306](#)
- “[KVM switch problems](#)” on [page 306](#)
- “[USB-device does not work](#)” on [page 306](#)

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. Make sure that the USB configuration options are set correctly in system setup.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

Common memory problems

- [“Multiple memory modules in a channel identified as failing” on page 307](#)
- [“Displayed system memory is less than installed physical memory” on page 307](#)
- [“Invalid memory population detected” on page 308](#)

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 technician only) Replace the system board (system board assembly).

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 [“Troubleshooting by system LEDs and diagnostics display” on page 287](#).
 - No memory module error LEDs are lit on the system board (system board assembly).
 - 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 45](#) 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. Re-enable all memory modules using the Setup Utility, and then restart the server.
5. (Trained technician only) Replace the system board (system board assembly).

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 45](#) 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 308](#)
- [“Screen is blank” on page 308](#)
- [“Screen goes blank when you start some application programs” on page 308](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 309](#)
- [“The wrong characters appear on the screen” on page 309](#)

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 277](#).

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
 - The server is turned on and there is power supplied to the server.
 - The monitor cables are connected correctly.
 - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that the video output is not affected by corrupted server firmware; See [“Update the firmware” on page 277](#).
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 technician only) System board (system board assembly)

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 277](#).

Network problems

Use this information to resolve issues related to networking.

- [“Cannot wake server using Wake on LAN” on page 309](#)
- [“Could not log in using LDAP account with SSL enabled” on page 310](#)

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see [“Event logs” on page 285](#)), make sure:
 - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
 - b. The room temperature is not too high (see [“Specifications” on page 3](#)).
 - c. The air vents are not blocked.
 - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.

4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 310
- “The server immediately displays the POST Event Viewer when it is turned on” on page 310
- “Server is unresponsive (POST is complete and operating system is running)” on page 311
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 311
- “Voltage planar fault is displayed in the event log” on page 311
- “Unusual smell” on page 312
- “Server seems to be running hot” on page 312
- “Cannot enter legacy mode after installing a new adapter” on page 312
- “Cracked parts or cracked chassis” on page 312

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message UEFI: DXE INIT on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

<https://datacentersupport.lenovo.com/solutions/ht506118>

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the system LEDs and diagnostics display.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://serverproven.lenovo.com>.

3. (Trained technician only) Make sure that processor is seated correctly.
4. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. (Trained technician only) Processor

- b. (Trained technician only) System board (system board assembly)

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the server, complete the following steps:
 1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the server and verify that all applications are running (no applications are hung).
 3. Restart the server.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the server from a remote location, complete the following steps:
 1. Make sure that all applications are running (no applications are hung).
 2. Attempt to log out of the system and log back in.
 3. Validate the network access by pinging or running a trace route to the server from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another server at the same location with the unresponsive one to determine whether it is a connection problem or server problem.
 - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
 4. Restart the server remotely through the management interface.
 5. If the problem remains, verify that any new software has been installed and configured correctly.
 6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board (system board assembly).

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “[Specifications](#)” on [page 3](#) for the minimally required number of processors and DIMMs.

2. Restart the system.

- If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
- If the system does not restart, suspect the system board (system board assembly).

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

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 41](#) for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

Note: The IPMI raw command should only be used by trained technician and 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 server is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- [“External USB device is not recognized” on page 313](#)
- [“PCIe adapter is not recognized or is not functioning” on page 313](#)
- [“Insufficient PCIe resources are detected.” on page 313](#)
- [“A Lenovo optional device that was just installed does not work.” on page 314](#)
- [“A Lenovo optional device that worked previously does not work now” on page 314](#)

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. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.

7. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → 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. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. 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 314
- “Operating system performance” on page 314

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, 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 315](#)
- [“Server does not power on” on page 315](#)

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
 - a. Disconnect the server power cords.
 - b. Reconnect the server power cords.
 - c. Reseat the front operator panel cable, and then repeat steps 1a and 2b.
 - If the server starts, reseat the front operator panel.
 - If the problem remains, replace the front operator panel.
2. Make sure that:
 - The power cords are correctly connected to the server and to a working electrical outlet.
 - The LEDs on the power supply do not indicate a problem.
 - The Power button LED is lit on and is flashing slowly.
 - The push force is enough and with button force response.
3. If the power button LED is not lit on or is not flashing correctly, reseat all the power supplies and make sure AC LED on PSU rear side are lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components lock the power permission. Replace the each power supply and check the power button function after installing the each one.
6. If everything is still done and the issue cannot be resolved, collect the failure information with system logs captured to Lenovo support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board (system board assembly).
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.

6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (see [“Technical specifications” on page 4](#)).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace the each power supply and check the power button function after installing the each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board (system board assembly) replacement is necessary.

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 is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is to follow the event log actions to resolved the problems.

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 316](#)
- [“Serial device does not work” on page 316](#)

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 connectors” on page 28](#)).
2. Reseat the following components:
 - a. Failing serial device.
 - b. Serial cable.
3. Replace the following components:

- a. Failing serial device.
 - b. Serial cable.
4. (Trained technician only) Replace the system board (system board assembly).

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
 - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

 - The software is designed to operate on the server.
 - Other software works on the server.
 - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

Storage drive problems

Use this information to resolve issues related to the storage drives.

- “Server cannot recognize a hard drive” on page 317
- “Multiple hard drives fail” on page 318
- “Multiple hard drives are offline” on page 318
- “A replacement hard disk drive does not rebuild” on page 318
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 319
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 319

Server cannot recognize a hard drive

Note: When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:
 - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPm is displayed by default. (For more information, see the “Startup” section in the LXPm documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.

- If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
 5. Reseat the backplane power cable and repeat steps 1 through 3.
 6. Reseat the backplane signal cable and repeat steps 1 through 3.
 7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.
 - Replace the affected backplane.
 8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

Based on those tests:

- If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

Multiple hard drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the hard disk drive and server are at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple hard drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement hard disk drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green hard disk drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green hard disk drive activity LED does not flash when the drive is in use, run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow hard disk 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 hard disk drive.
5. Power on the server and observe the activity of the hard disk drive LEDs.

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 for recycle

Follow the instructions in this section to disassemble the system board before recycling.

About this task

Before disassembling the system board:

1. Remove the system board from the server. See [“Remove the system board” on page 224](#).
2. Remove the cable wall with heat sink detect switch. See [“Remove the cable wall with heat sink detect switch” on page 84](#).
3. Refer to local environmental, waste or disposal regulations to ensure compliance.

Procedure

- Step 1. Loosen the three screws that secure the front cable wall with PH2 screwdriver, and remove the cable wall from the system board.

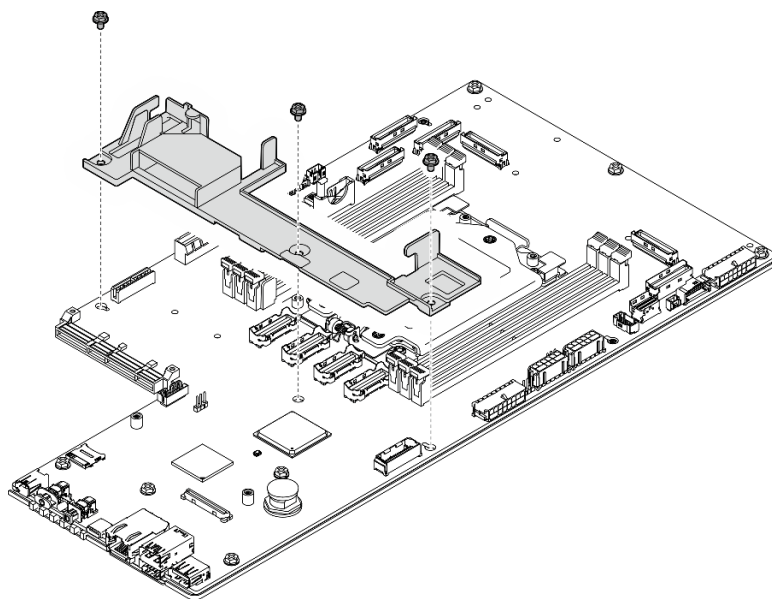


Figure 252. Disassembling the system board

- Step 2. Remove the following components as illustrated, and separate the system board from the supporting sheet metal.
- Seven screws (PH 2 screwdriver)
 - One guide pin (7 mm hex head screwdriver, inner depth \geq 25mm)
 - One plunger (16mm hex head screwdriver, inner depth \geq 10mm)

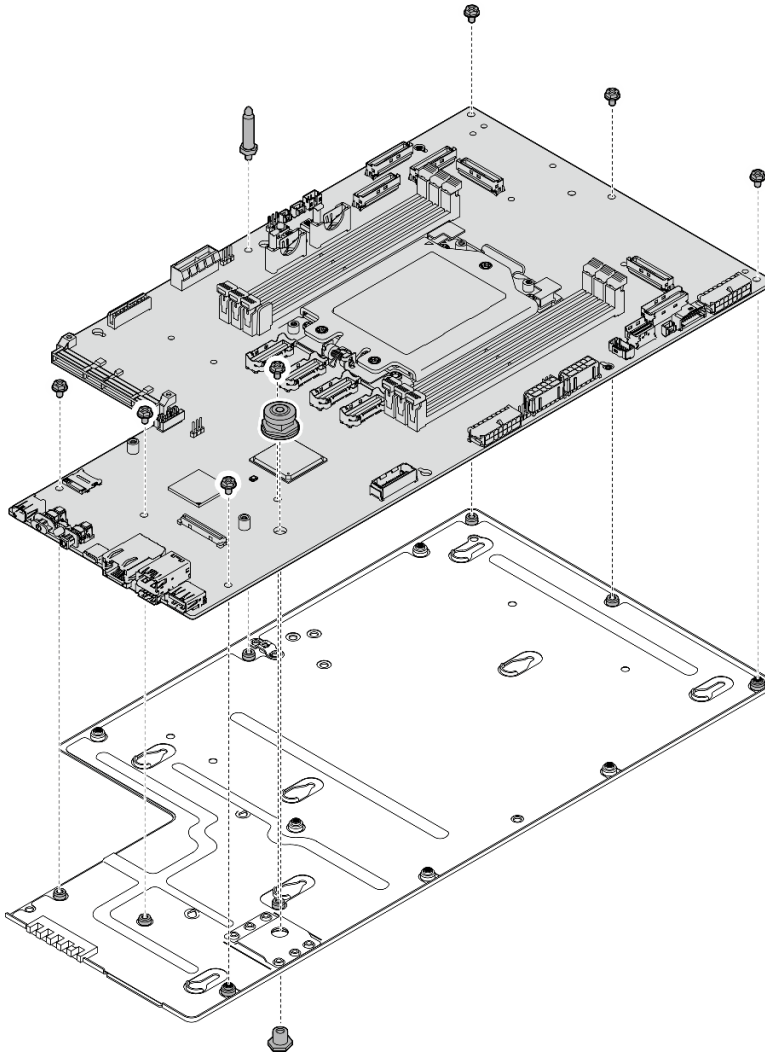


Figure 253. Disassembling the system board

After this task is completed

After disassembling the system board, recycle the unit 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/thinkedge/se455v3/7dby/downloads/driver-list/>
 - Operating system support center
 - <https://datacentersupport.lenovo.com/solutions/server-os>
 - Operating system installing instructions
 - <https://pubs.lenovo.com/thinkedge#os-installation>
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software are supported by your product.
- Refer to [Chapter 8 “Problem determination” on page 285](#) for instructions on isolating and solving issues.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **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 37.
- 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/supportphonenumberlist> for your region support details.

Appendix C. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://pubs.lenovo.com/se455-v3/pdf_files.html

- **Rail Installation Guides**
 - Rail installation in a rack
- **Activation Guide**
 - Activation process and activation code
- **User Guide**
 - Complete overview, system configuration, hardware components replacing, and troubleshooting.

Selected chapters from *User Guide*:

 - **System Configuration Guide** : Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
 - **Hardware Maintenance Guide** : Installing hardware components, cable routing, and troubleshooting.
- **Messages and Codes Reference**
 - XClarity Controller, LXPM, and uEFI events
- **UEFI Manual**
 - UEFI setting introduction

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkEdge SE455 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dbby/downloads/driver-list/>
- Lenovo Data Center Forum
 - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkEdge SE455 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dbby>
- Lenovo License Information Documents
 - <https://datacentersupport.lenovo.com/documents/Invo-eula>
- Lenovo Press website (Product Guides/Datasheets/White papers)

- <https://lenovopress.lenovo.com/>
- Lenovo Privacy Statement
 - <https://www.lenovo.com/privacy>
- Lenovo Product Security Advisories
 - https://datacentersupport.lenovo.com/product_security/home
- Lenovo Product Warranty Plans
 - <http://datacentersupport.lenovo.com/warrantylookup>
- Lenovo Server Operating Systems Support Center website
 - <https://datacentersupport.lenovo.com/solutions/server-os>
- Lenovo ServerProven website (Options compatibility lookup)
 - <https://serverproven.lenovo.com>
- Operating System Installation Instructions
 - <https://pubs.lenovo.com/thinkedge#os-installation>
- Submit an eTicket (service request)
 - <https://support.lenovo.com/servicerequest>
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
 - <https://datacentersupport.lenovo.com/solutions/ht509500>

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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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:

Taiwan Region BSMI RoHS declaration

| 單元 Unit | 限用物質及其化學符號 Restricted substances and its chemical symbols | | | | | |
|---|--|------------------|------------------|--|--|--|
| | 鉛Lead (PB) | 汞Mercury (Hg) | 鎘Cadmium (Cd) | 六價鉻 Hexavalent chromium (Cr ⁶⁺) | 多溴聯苯 Polybrominated biphenyls (PBB) | 多溴二苯醚 Polybrominated diphenyl ethers (PBDE) |
| 機架 | ○ | ○ | ○ | ○ | ○ | ○ |
| 外部蓋板 | ○ | ○ | ○ | ○ | ○ | ○ |
| 機械組零件 | — | ○ | ○ | ○ | ○ | ○ |
| 空氣傳動設備 | — | ○ | ○ | ○ | ○ | ○ |
| 冷卻組零件 | — | ○ | ○ | ○ | ○ | ○ |
| 內存模組 | — | ○ | ○ | ○ | ○ | ○ |
| 處理器模組 | — | ○ | ○ | ○ | ○ | ○ |
| 電纜組零件 | — | ○ | ○ | ○ | ○ | ○ |
| 電源供應器 | — | ○ | ○ | ○ | ○ | ○ |
| 儲備設備 | — | ○ | ○ | ○ | ○ | ○ |
| 印刷電路板 | — | ○ | ○ | ○ | ○ | ○ |
| <p>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。</p> <p>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.</p> <p>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。</p> <p>Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—” 係指該項限用物質為排除項目。</p> <p>Note3 : The “—” indicates that the restricted substance corresponds to the exemption.</p> | | | | | | |

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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 進口商地址: 台北市南港區三重路 66 號 8 樓
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