



ThinkEdge SE450 Maintenance Manual



Machine Types: 7D8T

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.

在安裝本产品之前，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.

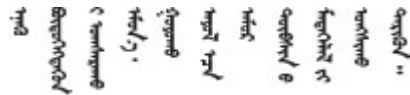
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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་སྤྱད་མ་བྱས་གོང་། སྐྱར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་མེར་བཟང་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.

Notes:

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

CAUTION:

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

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

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

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

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

- a. Go to:

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

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

Chapter 1. Introduction

ThinkEdge SE450 (Type 7D8T) 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 SE450 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. Product_name

The server comes with a limited warranty. For details about the warranty, see:
<https://support.lenovo.com/us/en/solutions/ht503310>

For details about your specific warranty, see:
<http://datacentersupport.lenovo.com/warrantylookup>

Specifications

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

Table 1. Specifications

Specification	Description
Dimension	<p>2U server</p> <p>300mm chassis</p> <ul style="list-style-type: none"> • Depth: <ul style="list-style-type: none"> – Without bezel: 298.8 mm (11.76 inches) – With bezel: 407.3 mm (16.04 inches) • Height: 86.5 mm (3.41 inches) • Width: <ul style="list-style-type: none"> Without rack latches: 444.6 mm (17.50 inches) With rack latches: 480.5 mm (18.92 inches) <p>360mm chassis</p> <ul style="list-style-type: none"> • Depth: <ul style="list-style-type: none"> – Without bezel: 358.8 mm (14.13 inches) – With bezel: 467.3 mm (18.40 inches) • Height: 86.5 mm (3.41 inches) • Width: <ul style="list-style-type: none"> Without rack latches: 444.6 mm (17.50 inches) With rack latches: 480.5 mm (18.92 inches)
Weight (Varies with configuration)	<p>Maximum:</p> <ul style="list-style-type: none"> • 300mm chassis: 14.84 kg (32.71 lbs) • 360mm chassis: 17.45 kg (38.47 lbs)
Processor (Varies with configuration)	<p>Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology.</p> <ul style="list-style-type: none"> • One processor socket • Designed for LGA 4189 sockets • Scalable up to 36 cores • Supports 6 UPI links at 10.4 GT/s <p>Heat sink:</p> <ul style="list-style-type: none"> • 1U heat sink supports processors with wattage up to 165 watt. • 2U heat sink supports processors with wattage up to 205 watt.

Table 2. Specifications

Specification	Description
Memory	<p>See “Memory module installation rules and order” in <i>Setup Guide</i> for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Slots: 10 two-way interleaved slots • Memory module types: <ul style="list-style-type: none"> – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 3200 MT/s registered DIMM (RDIMM) or 3DS RDIMM – 3DS RDIMM – Persistent Memory (PMEM) • Capacity (depending on the model) <ul style="list-style-type: none"> – RDIMM: 16 GB, 32 GB, and 64 GB – 3DS RDIMM: 128 GB – PMEM: 128 GB and 256 GB <p>Note: PMEMs can be mixed with DRAM DIMMs with capacity of more than 16 GB. See “PMEM rules” in <i>Setup Guide</i> for more information.</p> <ul style="list-style-type: none"> • Total Capacity: <ul style="list-style-type: none"> – Minimum: 16 GB – Maximum: <ul style="list-style-type: none"> – RDIMM: 512 GB – 3DS RDIMM: 1024 GB – PMEM + RDIMM in Memory Mode: 1280 GB <p>For a list of supported memory modules, see https://serverproven.lenovo.com.</p>
Storage expansion	<ul style="list-style-type: none"> • Two SATA/NVMe M.2 drives • Trayless drives: <ul style="list-style-type: none"> – Zero to two 15mm trayless SATA/NVMe¹ drives (Drive 0, 1) or – Zero to four 7mm trayless SATA/NVMe¹ drives (Drive 0, 1, 2, 3) • Hot-swap (optional)²: two 2.5-inch SAS/SATA/NVMe drive bays with front access (Drive 4, 5) <p>¹ Only non-SED NVMe drives are supported.</p> <p>² Only non-SED drives are supported.</p>
RAID	<p>The following options are available for RAID 0, 1, 10:</p> <ul style="list-style-type: none"> • ThinkSystem 4350-8i SAS/SATA 12Gb Adapter (JBOD mode only) (PCIe Slot 6) • ThinkSystem RAID 5350-8i PCIe 12Gb Adapter (PCIe Slot 6) • Intel Virtual RAID On CPU (VROC) for non-SED SATA/NVMe drives • Intel Volume Management Device (VMD) for non-SED NVMe drives

Table 3. Specifications

Specification	Description
Network	<ul style="list-style-type: none"> • One of the following OCP 3.0 Ethernet adapters <ul style="list-style-type: none"> – Intel I350-T4 PCIe 1GbE 4-port RJ45 – Intel X710-T2L 10GBASE-T 2-port – Intel E810-DA2 10/25GbE SFP28 2-port – Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port

Table 3. Specifications (continued)

Expansion slots (Varies with configuration)	<p>Up to seven slots:</p> <ul style="list-style-type: none"> Slot 1 to 2: SATA M.2 Drive 0 and 1 Slot 3 to 4 (Riser 2): <ul style="list-style-type: none"> Supports the following: <ul style="list-style-type: none"> Single-width PCI Express 4.0 x8/x16 (Slot 3, 4) Single-width PCI Express 4.0 x16/x16 (Slot 3, 4) Single/double-width PCI Express 4.0 x16 (Slot 4) Two 2.5-inch hot-swap SAS/SATA/NVMe drives (Drive 4, 5) Slot 5 to 6 (Riser 1): <ul style="list-style-type: none"> Supports the following: <ul style="list-style-type: none"> Single-width PCI Express 4.0 x16/x8 (Slot 5, 6) Single-width PCI Express 4.0 x16/x16 (Slot 5, 6) Single/double-width PCI Express 4.0 x16 (Slot 5) <p>Note: RAID adapter must be installed in Slot 6.</p> Slot 7: OCP 3.0 Ethernet adapter
Integrated functions	<ul style="list-style-type: none"> Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities. One XCC system management port on the front to connect to a systems-management network. This connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed. Two universal serial bus (USB) 3.1 ports on the front
Fans	Six (60 mm x 60 mm x 56 mm) trayless system fans with N+1 redundancy support

Table 4. Specifications

Specification	Description
Operating System	<p>Supported and certified operating systems include:</p> <ul style="list-style-type: none"> Microsoft Windows Server VMware ESXi Red Hat Enterprise Linux SUSE Linux Enterprise Server <p>References:</p> <ul style="list-style-type: none"> Complete list of available operating systems: https://lenovopress.lenovo.com/osig. OS deployment instructions: See "Deploy the operating system" in <i>Setup Guide</i>.

Table 4. Specifications (continued)

Electrical input	<p>This server supports up to two units of CFF V4 (reverse fan) power supplies. N+1 redundancy is supported when two units are installed. Following is the list of supported types:</p> <ul style="list-style-type: none"> • 1100-watt Platinum, input power 100-240 Vac • 1100-watt Titanium, input power 100-240 Vac • 1800-watt Platinum, input power 200-240 Vac • 1100-watt -48V dc <p>CAUTION:</p> <ul style="list-style-type: none"> • 240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. • Power supply with 240 V dc input cannot support hot-plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.
Minimal configuration for debugging	<ul style="list-style-type: none"> • One processor • One DRAM DIMM in slot 2 • One power supply • Two 15mm trayless drives with RAID (If OS is needed for debugging) • Six system fans (Fan 1 to 6)
Ambient temperature management	<p>Adjust ambient temperature when specific components are installed:</p> <ul style="list-style-type: none"> • Keep the ambient temperature to 35°C or lower when: <ul style="list-style-type: none"> – One or more 2.5-inch U.3 7400 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed – One or more 2.5-inch U.3 7450 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed • Keep the ambient temperature to 40°C or lower when: <ul style="list-style-type: none"> – NVIDIA A40 or L40 GPU is installed – One or more Persistent memory modules are installed – One of the following 2.5-inch drives is installed in Riser 2: <ul style="list-style-type: none"> – U.3 7400 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive – U.3 7450 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive – U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive – U.2 Multi Vendor 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive – The system comes in the following configuration: <ul style="list-style-type: none"> – 360mm chassis – Riser configuration is (Riser 1) x16/x16 + (Riser 2) x8/x16, with only three or fewer half length adapters installed. – Eight 128GB DIMMs are installed <p>Note: When four half length adapters are installed in this configuration, ambient temperature requirement is 45°C or lower.</p>

Table 5. Specifications

Specification	Description
Acoustical noise emissions	<p>The server has the following acoustic noise emissions declaration:</p> <ul style="list-style-type: none"> • Sound pressure level (LpAm) <ul style="list-style-type: none"> – Idling: 37.0 dBA (Minimal), 41.8 dBA (Typical), 41.8 dBA (GPU rich) – Operating: 47.1 dBA (Minimal), 47.1 dBA (Typical), 59.4 dBA (GPU rich) <p>Notes:</p> <ul style="list-style-type: none"> • These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296. • The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions <ul style="list-style-type: none"> – Minimal: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 4x 960G SATA SSD, 2x M.2 5300 SATA 480GB, 2x Intel E810-DA2, 2 x 1100W PSU – Typical: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 SATA 480GB, 2x NVIDIA A2 16GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2 x 1100W PSU – GPU rich: 360mm Chassis, 1x 165W/28 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 SATA 480GB, 2x NVIDIA A30 24GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2 x 1800W PSU

Table 6. Specifications

Specification	Description
Environment	<p>ThinkEdge SE450 complies with ASHARE Class A3 specifications. Depending on the hardware configuration, some models comply with ASHARE Class A4 specifications. System performance may be impacted when operating temperature is outside AHSARE A3 specification.</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating <ul style="list-style-type: none"> ASHARE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). ASHARE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft). ASHARE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft). NEBS Level 3¹: <ul style="list-style-type: none"> Operating Temperature: 5°C to 40°C. Humidity: 5%~85% RH, Non-condensing. Maximum rate of change(°C /hr) should ≤ 20 Humidity transition rate should ≤10%/hr. High Altitude Operating temperature 1829m (6000ft) to 3960m (13000ft): 5-35°C Short Term Operating Temp²: -5°C to 55°C. Server off: -10°C to 60°C (°F to °F) Shipment/storage: -40°C to 70°C (-40°F to 158°F) Maximum altitude: 3,000 m (10,000 ft) Relative Humidity (non-condensing): <ul style="list-style-type: none"> Operating <ul style="list-style-type: none"> 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) NEBS Level 3: 5%~85% RH, Non-condensing Particulate contamination <p>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 9.</p> <p>Notes:</p>

1. Configuration:

- Chassis: 300mm chassis
- Processor: 28-core 165W with standard 2U heat sink
- Memory: eight 64GB 3200MHz RDIMMs
- M.2: Two 480GB M.2 drives with SATA-RAID
- Internal storage: Four 960GB SATA drives
- PCIe adapters: Intel N810-DA2 (Slot 5), Intel ACC100 (Slot 3, 4, 6)
- No OCP
- 2x 1100W -48VDC power supplies

2. Short-term conditions: period of no more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1- year period.)

Table 6. Specifications (continued)

	<ul style="list-style-type: none">• The server is designed for standard data center environment and recommended to be placed in industrial data center.• SE450 supports use of a dust filler that is installed inside the security bezel. The dust filler has a Minimum Efficiency Rating Value (MERV) of 2, per ASHRAE Standard 52.2-2017.
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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 7. Shock and vibration specifications

SE450 system configuration	Vibration (when server is in operation)	Shock (when server is in operation)	Environmental criteria (NEBs GR63)	
			Office vibration	Earthquake test
			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 8. 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

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

² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.

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

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

Firmware updates

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
 - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
 - <https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
 - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

UpdateXpress System Packs (UXSPs)

Lenovo typically releases firmware in bundles called UpdateXpress System Packs (UXSPs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager (LXPM)	In-band ² On-Target	✓		✓		
Lenovo XClarity Controller (XCC)	Out-of-band Off-Target	✓	Selected I/O devices	✓		
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	✓	All I/O devices		✓	✓
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	✓	All I/O devices	✓ (BoMC application)	✓ (BoMC application)	✓
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	✓	All I/O devices	✓		✓
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	✓	Selected I/O devices	✓		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	✓	All I/O devices	✓		✓
Notes: 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

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/>

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

- **Lenovo XClarity 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.

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/>

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

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/lnvo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/lnvo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator to update firmware, see:

<https://pubs.lenovo.com/lxci-overview/>

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

Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

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

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

For information about powering off the server, see [“Power off the server” on page 15](#).

Power off the server

The server remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

To place the server in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see [“Power on the server” on page 14](#).

Chapter 2. Server components

See this topic to learn about components in the server.

Important product information

This section provides information to help you locate the following:

- **Machine type and model information:** 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 model number and serial number are on the ID label. The following illustration shows the location of the ID label containing the machine type, model, and serial number.
- **FCC ID and IC Certification information:** The FCC and IC Certification information is identified by a label located on the edge server as shown in the following illustration.

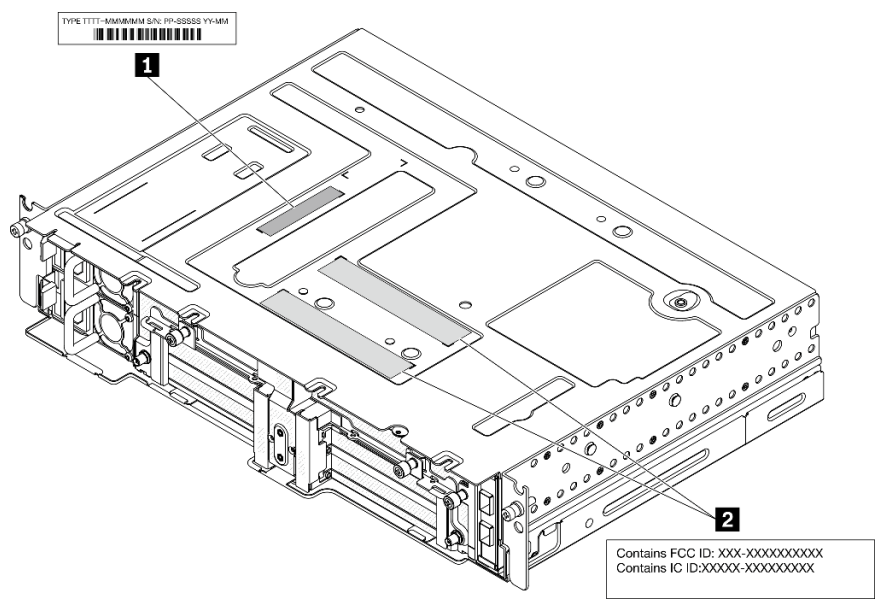


Figure 2. Location of the ID label and FCC ID/IC label

Table 9. ID label and FCC ID/IC label

1 ID label (machine type and model information)	2 FCC ID and IC Certification label
---	-------------------------------------

Network access tag

The network access tag can be found on the front of the server. You can pull way the network access tag to paste your own label for recording some information such as the hostname, the system name and the inventory bar code. Please keep the network access tag for future reference.

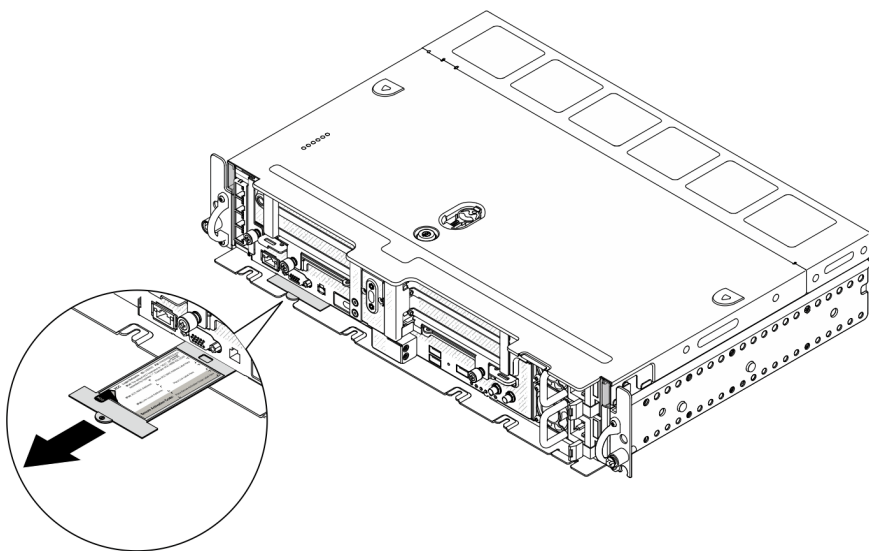


Figure 3. Location of the network access tag

QR code

In addition, the system Service Card that is located on the top cover of the server, provides a quick reference (QR) code for mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for server support.



Figure 4. SE450 QR code

Front view

See this topic to learn about the controls, LEDs, and connectors on the front of the server.

Note: All the slot/bay numbers in this topic are listed from top to bottom.

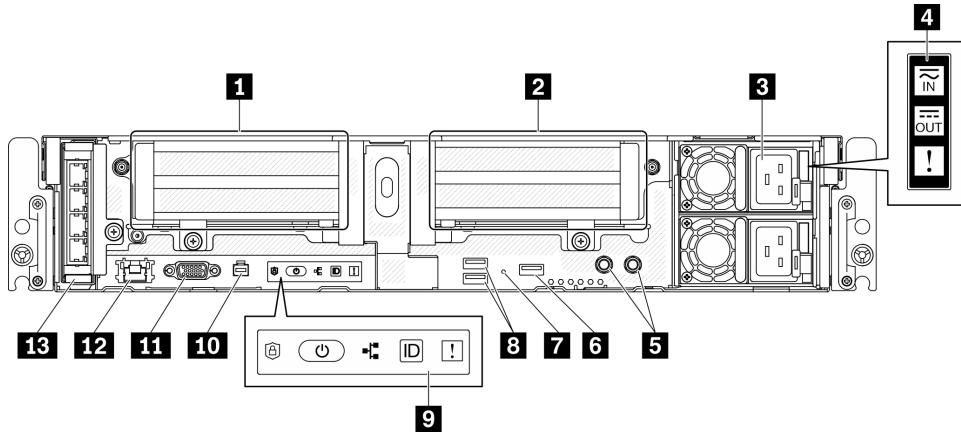


Figure 5. Front view

Table 10. Components on the front view

1	"Riser 1" on page 19 (PCIe slot 5 and 6)	8	"USB 3.0 connectors (1 and 2)" on page 21
2	"Riser 2" on page 19 (PCIe Slot 3 and 4 / Hot-swap Drive 4 and 5)	9	"Front operator panel" on page 21
3	"Power supply units" on page 20 (Bay 2 and 1)	10	"External diagnostic handset connector" on page 21
4	"Power supply LEDs" on page 20	11	"VGA connector" on page 21
5	"Threaded studs for grounding" on page 20	12	"XClarity Controller (XCC) network connector" on page 21
6	"USB 2.0 with Lenovo XClarity Controller management" on page 20	13	"OCP 3.0 adapter" on page 21 (PCIe Slot 7)
7	"NMI button" on page 20		

1 Riser 1 (PCIe slot 5 and 6)

Supports the following:

- Single-width PCI Express 4.0 x16/x8 (Slot 5, 6)
- Single-width PCI Express 4.0 x16/x16 (Slot 5, 6)
- Single/double-width PCI Express 4.0 x16 (Slot 5)

Note: RAID adapter must be installed in Slot 6.

2 Riser 2 (PCIe Slot 3 and 4 / Hot-swap Drive 4 and 5)

Supports the following:

- Single-width PCI Express 4.0 x8/x16 (Slot 3, 4)
- Single-width PCI Express 4.0 x16/x16 (Slot 3, 4)

- Single/double-width PCI Express 4.0 x16 (Slot 4)
- Two 2.5-inch hot-swap SAS/SATA/NVMe drives (Drive 4, 5)

3 Power supply units (bay 2 and 1)

This server supports up to two units of CFF V4 (reverse fan) power supplies. N+1 redundancy is supported when two units are installed. Following is the list of supported types:

- 1100-watt Platinum, input power 100-240 Vac
- 1100-watt Titanium, input power 100-240 Vac
- 1800-watt Platinum, input power 200-240 Vac
- 1100-watt -48V dc

4 Power supply LEDs

• Power input LED (green)

- **Off:** The power supply is disconnected from the ac power source or a power problem occurs.
- **Green:** The power supply is connected to the ac power source.

• Power output LED (green)

- **Green:** The server is on and the power supply is working normally.
- **Blinking green:** The power supply is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server.

To disable zero-output mode, start the Setup utility, go to System Settings > Power > Zero Output and select Disable. If you disable zero-output mode, both power supplies will be in the active state.

- **Off:** The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply.

• Power supply error LED (yellow)

- **Off:** The power supply is working.
- **Yellow:** The power supply has failed. To resolve the issue, replace the power supply.

5 Threaded studs for grounding

Connect the grounding wires to these lugs.

6 USB 2.0 with Lenovo XClarity Controller management

Connection to XClarity Controller is primarily intended for users with a mobile device running the 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 XClarity Controller. Select Network in BMC Configuration to view or modify settings.

Only one mode is supported:

• BMC only mode

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

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.

8 USB 3.0 connectors (1 and 2)

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

9 Front operator panel

See [“Front operator panel” on page 21](#) for details.

10 External diagnostic handset connector

Connect the External diagnostic handset to this connector for system diagnostics and trouble shooting. See [“External LCD diagnostics handset” on page 23](#) for details.

11 VGA connector

Connect a monitor to this connector. The maximum video resolution is 1920 x 1200 at 60 Hz.

12 XClarity Controller (XCC) network connector

Use this connector to manage the server, by using a dedicated management network. If you use this connector, the Lenovo XClarity Controller cannot be accessed directly from the production network. A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the Setup utility to configure the server to use a dedicated systems-management network or a shared network.

13 OCP 3.0 adapter (Slot 7)

The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections. See the following for port numbering:

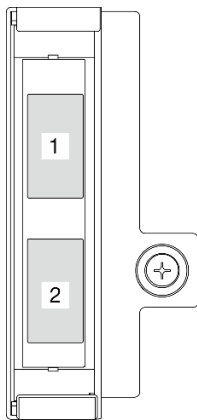


Figure 6. Port numbering: 2-port OCP 3.0 adapter

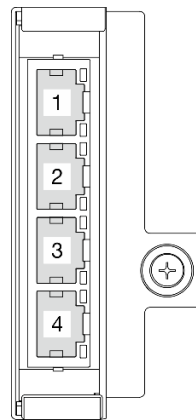


Figure 7. Port numbering: 4-port OCP 3.0 adapter

One of the Ethernet connectors on the OCP 3.0 Ethernet adapter can also function as a management connector with shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

Front operator panel

Front operation information panel contains power controls indicator LEDs.

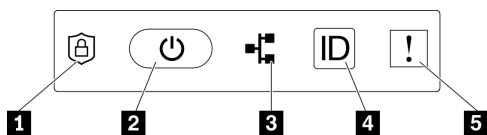


Figure 8. Front operator panel

Table 11. Front operator panel controls and indicators

1 "ThinkShield Activation LED (green)" on page 22	4 "Identification button/LED (blue) " on page 22
2 "Power button/LED (green)" on page 22	5 "System-error LED (yellow) " on page 23
3 "Network activity LED (green)" on page 22	

1 ThinkShield Activation LED (green)

The states of ThinkShield Activation LED are as following:

Solid on: ThinkShield is activated.

Flashing: ThinkShield is not activated and needs to be activated.

Off: ThinkShield is not available in this unit.

See "Activate the system" in *Setup Guide* to activate the system.

2 Power button/LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Off: Power is not present or the power adapter, or the LED itself has failed.

Flashing rapidly (4 times per second): The server is off and not ready to be turned on. The power button is disabled in this status. This will last approximately 5 to 10 seconds after power source is connected.

Flashing slowly (once per second): The server is off and ready to be turned on. Press the power button to turn on the server.

On: The server is turned on.

3 Network activity LED (green)

When this LED is blinking, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

4 Identification button/LED (blue)

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely.

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely. The states of the identification LED are as follows:

Off: Presence detection off.

Flashing rapidly (4 times per second): (on XCC firmware version 3.10 or later) The server is not activated yet and has no power permission.

Flashing slowly (once per second): Presence detection is on.

On: Presence detection is on.

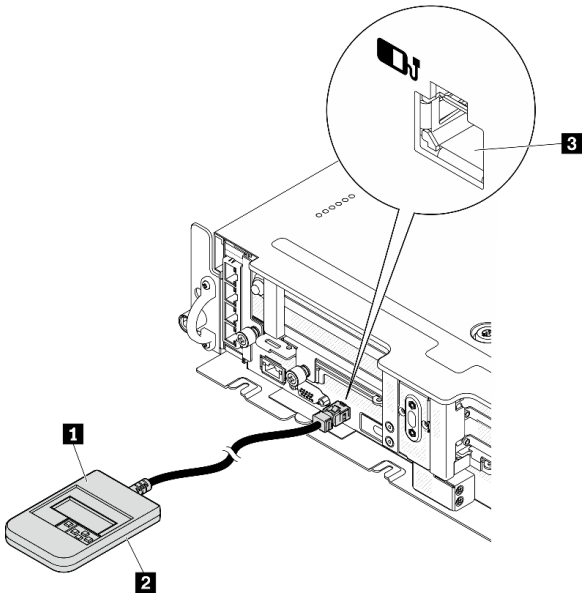
3 System-error LED (yellow)

When this yellow LED is lit, it indicates that one or more system errors have occurred. This LED can be controlled by the XCC. Detailed information is available on the External LCD diagnostics handset (see [“External LCD diagnostics handset” on page 23](#)).

External LCD diagnostics handset

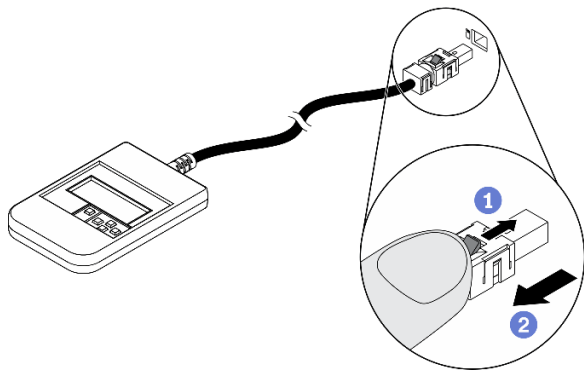
The external LCD diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the external LCD diagnostics handset

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

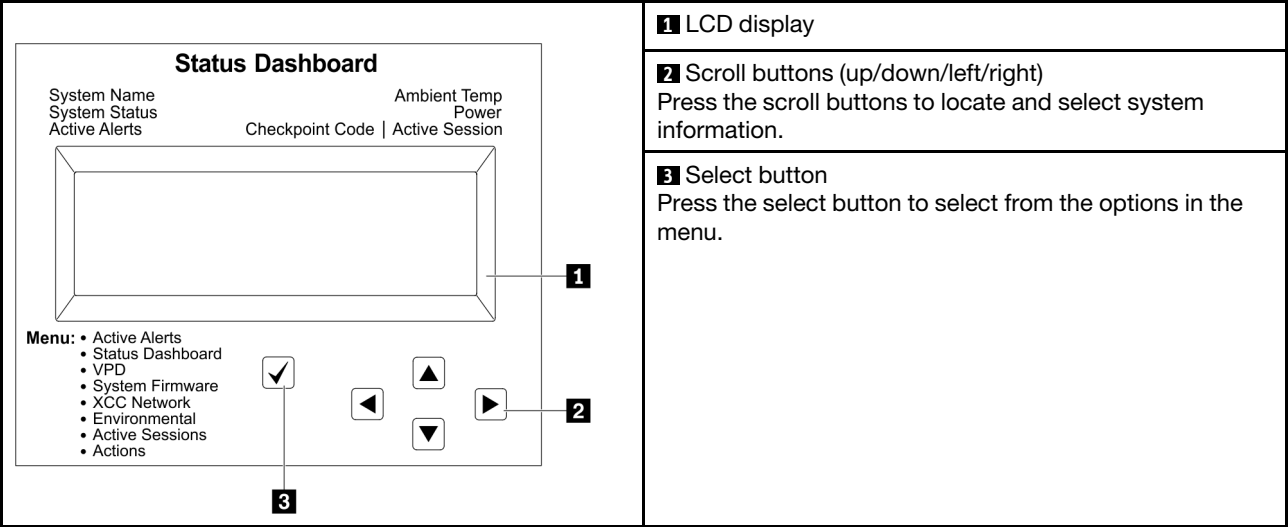
Note: When unplugging the external handset, see the following instructions: **1** Press the plastic clip on the plug forward.

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



Display panel overview

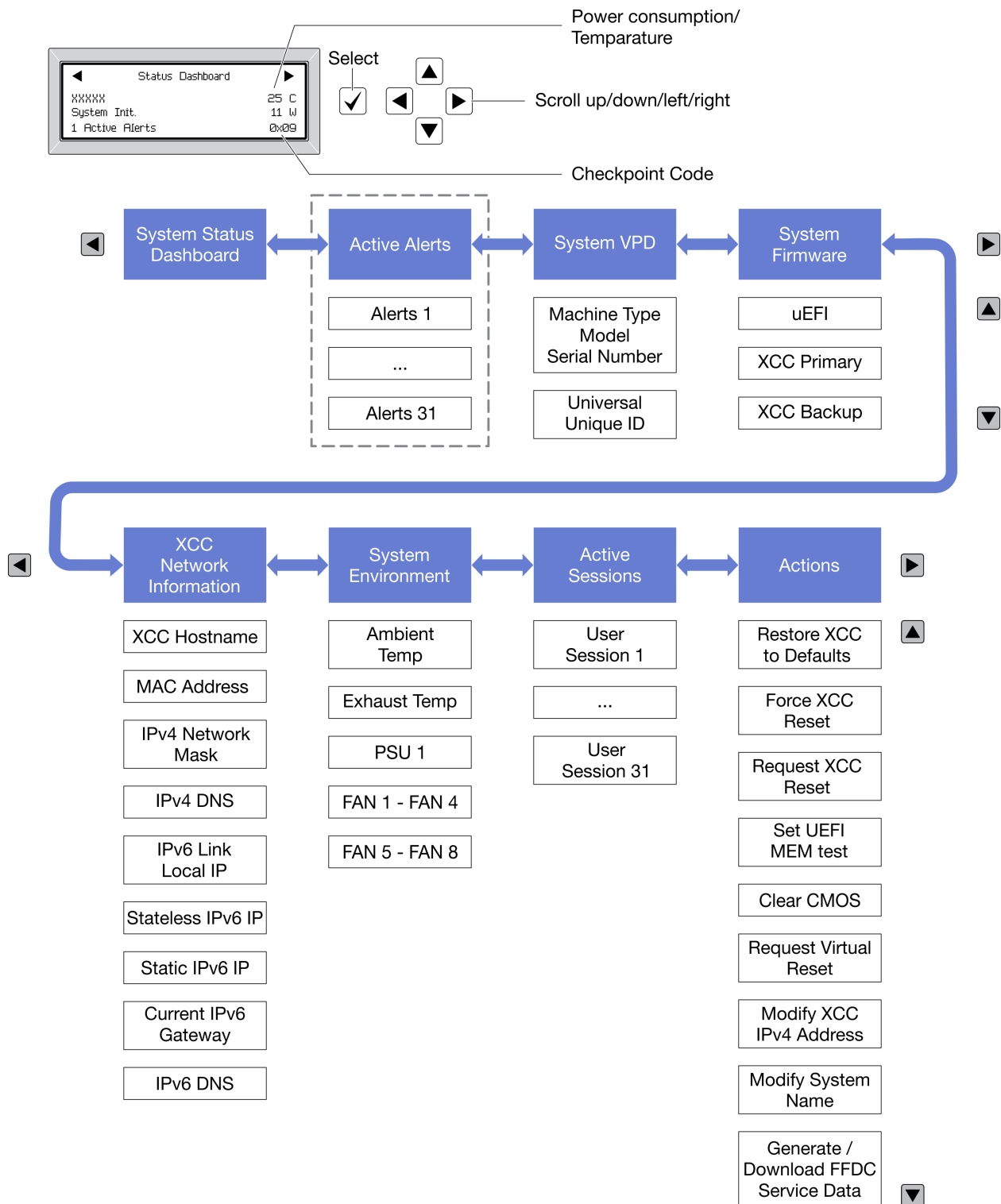
The diagnostics device consists of an LCD display and 5 navigation buttons.



Option flow diagram

The external LCD diagnostics handset 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.

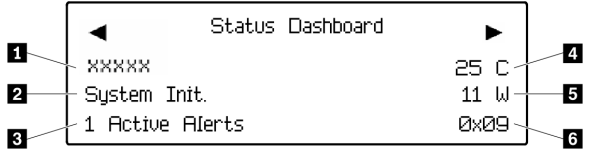


Full menu list

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
Detail 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
UEFI <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease 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 IDVersion numberRelease date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none">XCC hostnameMAC addressIPv4 Network MaskIPv4 DNSIPv6 Link Local IPStateless IPv6 IPStatic IPv6 IPCurrent IPv6 GatewayIPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x

System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none">• Ambient temperature• Exhaust temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

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

Actions

Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none">• Restore XCC to Defaults• Force XCC Reset• Request XCC Reset• Set UEFI Memory Test• Clear CMOS• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data	Request XCC Reset? This will request the BMC to reboot itself. Hold ✓ for 3 seconds

Top view

See this topic to learn about the components visible from the top of the server.

300mm chassis

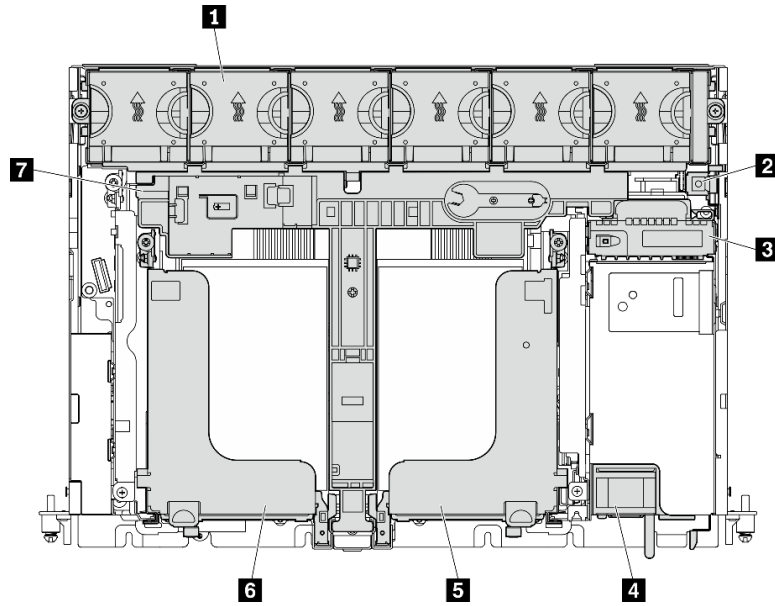


Figure 9. Top view - 300mm

Table 12. Top view - 300mm

1 Fan cage and fans (1 to 6)	5 Riser 2
2 Intrusion switch	6 Riser 1
3 Power backplane	7 Air baffle for 300mm chassis
4 Power supply units	

360mm chassis

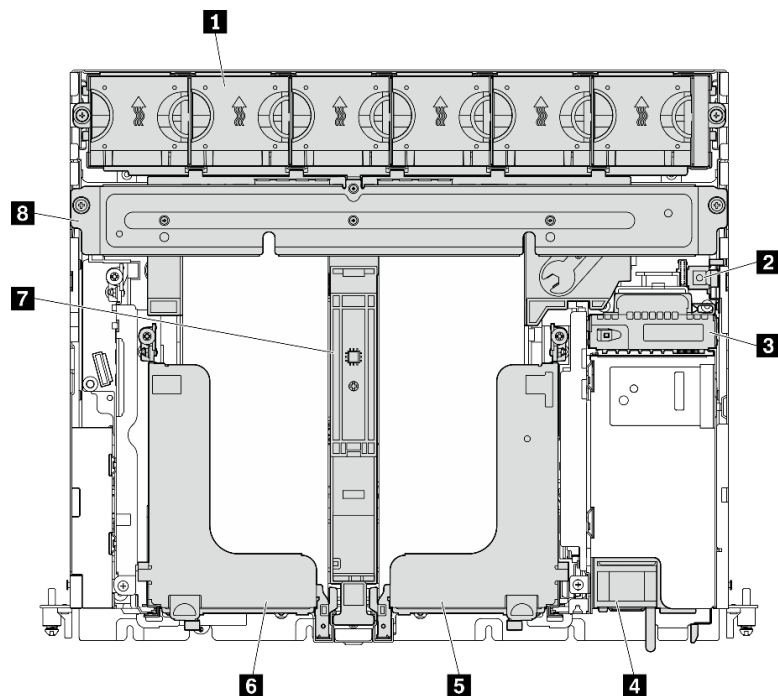


Figure 10. Top view - 360 mm

Table 13. Top view - 360mm

1 Fan cage and fans (1 to 6)	5 Riser 2
2 Intrusion switch	6 Riser 1
3 Power backplane	7 Air baffle for 360mm chassis
4 Power supply units	8 Supporting bracket

System LEDs

There are three sets of system LEDs on this server for various scenario. See this topic for details.

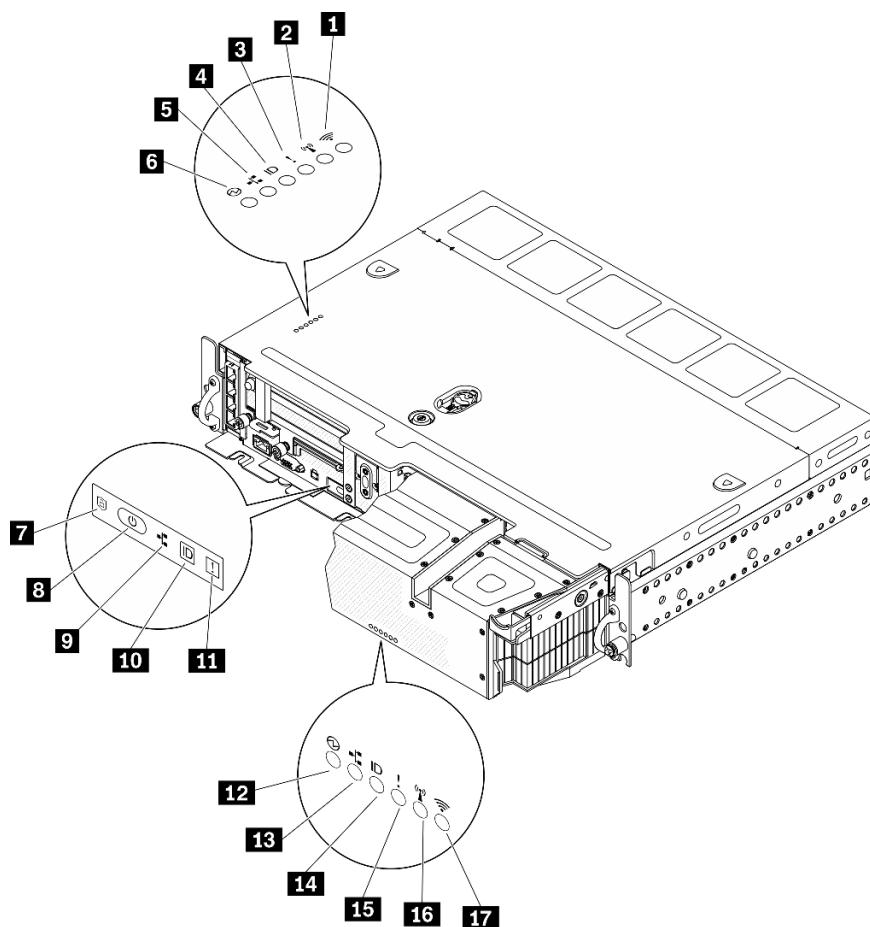


Figure 11. System LEDs

Table 14. System LEDs

LEDs visible from		
Top cover and wall-mount	Server Front view	Security bezel
1 (Reserved)	7 "ThinkShield activation LED (green)" on page 32	12 "Power LED (green)" on page 32
2 (Reserved)	8 "Power button/LED (green)" on page 32	13 "Network activity LED (green)" on page 32
3 "System-error LED (yellow)" on page 31	9 "Network activity LED (green)" on page 32	14 "Identification LED (blue)" on page 32
4 "Identification LED (blue)" on page 32	10 "Identification button/LED (blue)" on page 32	15 "System-error LED (yellow)" on page 31
5 "Network activity LED (green)" on page 32	11 "System-error LED (yellow)" on page 31	16 (Reserved)
6 "Power LED (green)" on page 32		17 (Reserved)

3 11 14 System-error LED (yellow)

When this yellow LED is lit, it indicates that one or more system errors have occurred.

4 10 14 Identification button/LED (blue)

Locate this server among a group of servers with this button. The LED can also be lit with Lenovo XClarity Administrator remotely. Following are the states of the identification LED:

- **Off:** Presence detection is off.
- **On:** Presence detection is on.
- **Flashing rapidly (4 times per second):** (on XCC firmware version 3.10 or later) The server is not activated yet and has no power permission. See Activation guide to activate the system.
- **Flashing slowly (once per second):** Presence detection on.

5 9 13 Network activity LED (green)

When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

6 8 12 Power button/LED (green)

Press this button to turn the server on and off manually. Following are the states of the LED:

- **Off:** No power supply unit is properly installed or connected, or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and not ready to be turned on yet. The power button is disabled. This will last approximately five to ten seconds after power supply units are properly installed and connected.
- **Flashing slowly (once per second):** The server is power off but ready to be turned on. Press the power button to turn on the server.
- **On:** The server is turned on.

7 ThinkShield activation LED

The states of ThinkShield Activation LED are as following:

Solid on: ThinkShield is activated.

Flashing: ThinkShield is not activated and needs to be activated.

Off: ThinkShield is not available in this unit.

See “Activate the system” in *Setup Guide* to activate the system.

System-board LEDs

See this topic to identify the light-emitting diodes (LEDs) on the system board.

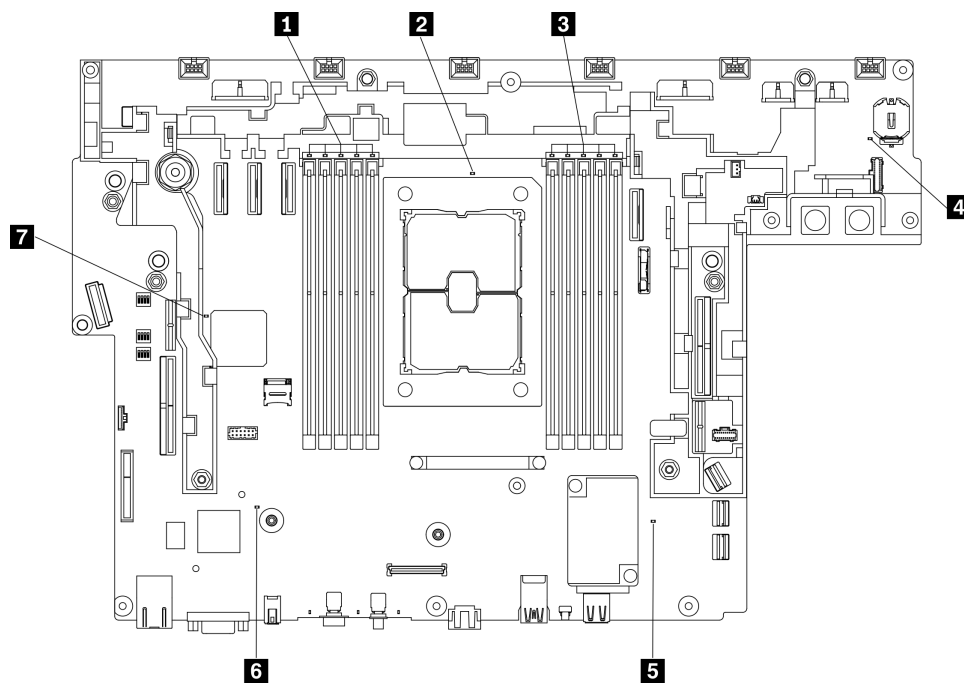


Figure 12. System-board LEDs

Table 15. System-board LEDs

1 DIMM error LED (10 to 6)	5 ME heartbeat LED
2 Processor error LED	6 XCC heartbeat LED
3 DIMM error LED (5 to 1)	7 FPGA heartbeat LED
4 System error LED	

Identifying connectors

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

System-board connectors

See this topic to identify the connectors on the system board.

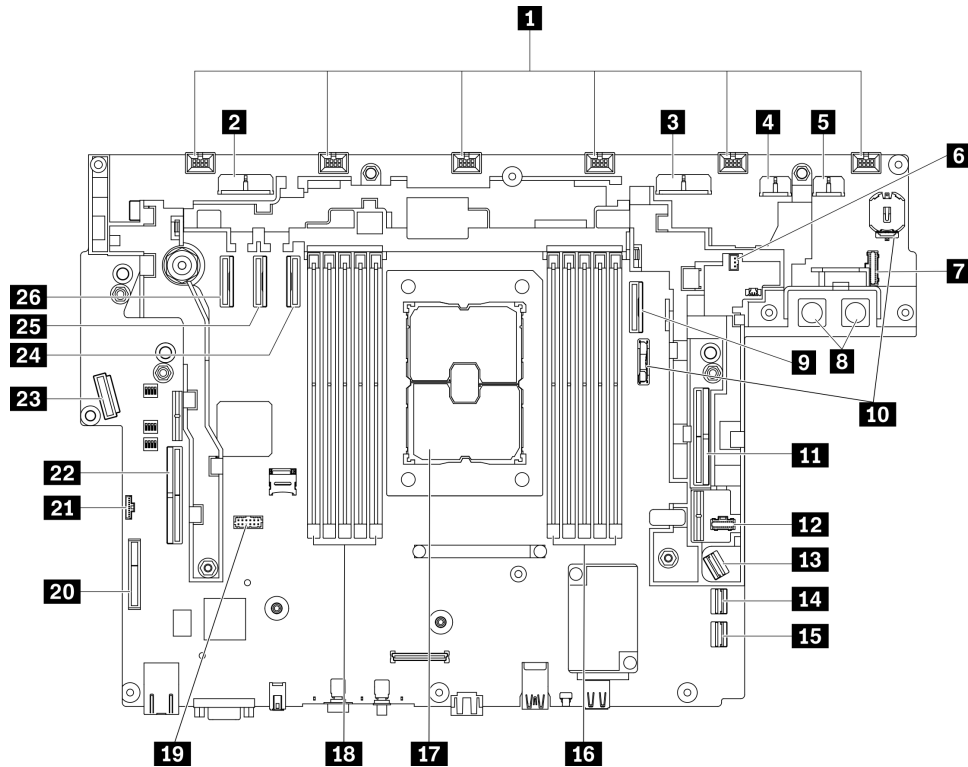


Figure 13. System board connectors

Table 16. System board connectors

1	Fan connectors (6 to 1)	14	SATA connector (0 to 3)
2	Drive power connector 2	15	SATA connector (4 to 7)
3	Drive power connector 1	16	DIMM slot 1 to 5
4	GPU power connector 2	17	Processor socket
5	GPU power connector 1	18	DIMM slot 6 to 10
6	Intrusion switch connector	19	Serial port module connector
7	Power backplane side band connector	20	(Reserved)
8	Power backplane power connector	21	Top cover/Wall-mount LED cable connector
9	PCIe connector 2	22	PCIe connector 6 (Riser 1)
10	CMOS battery (3V, CR3032) slots	23	OCP 3.0 Ethernet adapter connector
11	PCIe connector 1 (Riser 2)	24	PCIe connector 3
12	M.2 power connector	25	PCIe connector 4
13	M.2 signal connector	26	PCIe connector 5

Power backplane connectors

See this topic to locate the connectors on the power backplane.

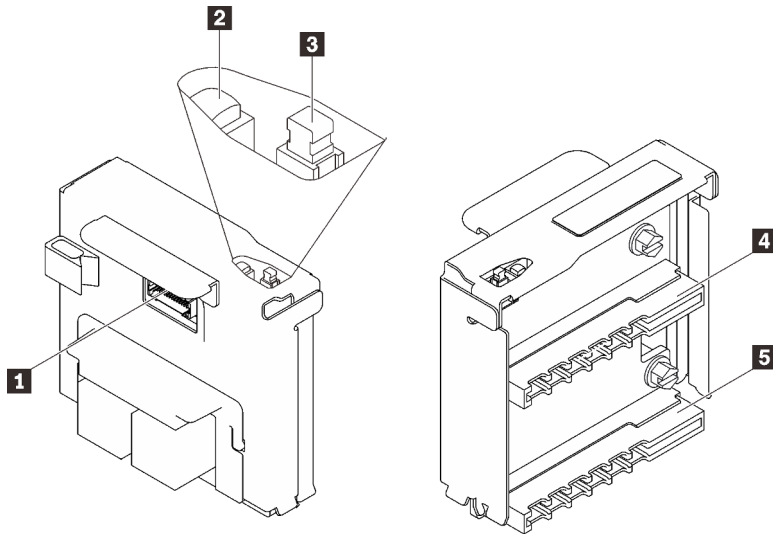


Figure 14. Power backplane components

Table 17. Power backplane components

1 Power backplane sideband connector
2 Power LED (green) ¹
3 Power switch
4 Power supply unit 2 connector
5 Power supply unit 1 connector

¹ When power LED is lit, it means there server is powered on.

PCIe riser-card connectors

See this topic to locate the connectors on the PCIe riser-cards.

Riser 1 (Slot 5 to 6)

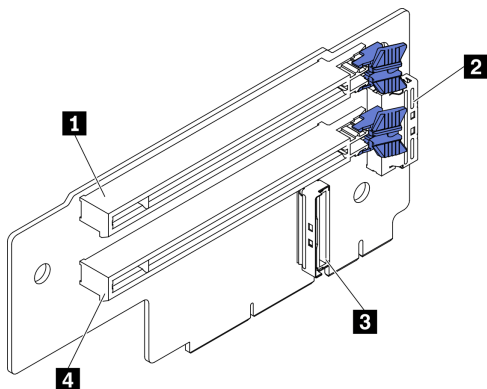


Figure 15. Riser 1 connectors

Table 18. Riser 1 connectors

1 PCIe 4.0 x8/x16 (Slot 5)	3 Riser-card connector 2 (Vertical)
2 Riser-card connector 3 (Right angle)	4 PCIe 4.0 x8/x16 (Slot 6)

Riser 2 (Slot 3 to 4)

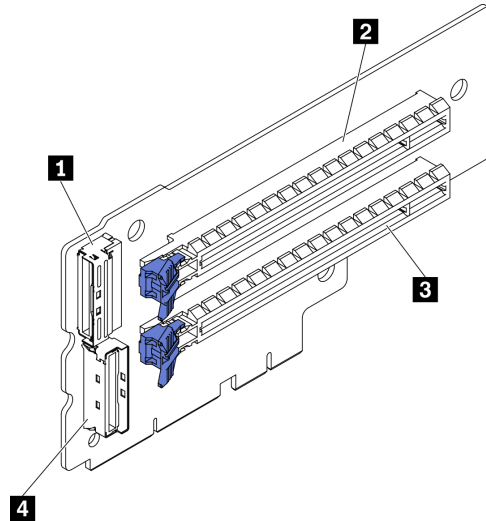


Figure 16. Riser 2 connectors

Table 19. Riser 2 connectors

1 Riser-card connector 1 (Right angle)	3 PCIe 4.0 x8/x16 (Slot 4)
2 PCIe 4.0 x8/x16 (Slot 3)	4 Riser-card connector 0 (Vertical)

Drive backplane connectors

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

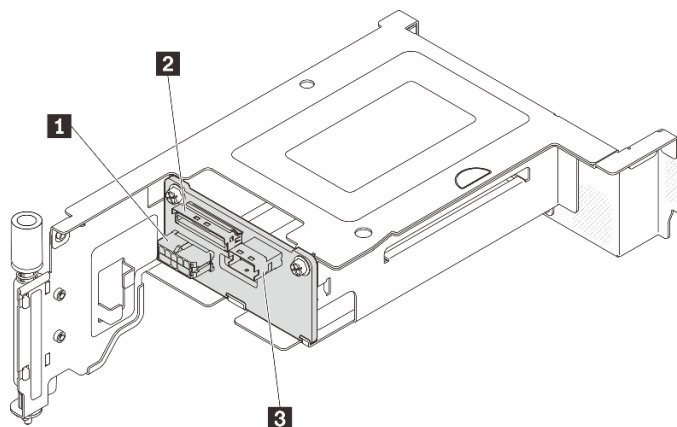


Figure 17. AnyBay drive backplane connectors

Table 20. AnyBay drive backplane connectors

1 Drive backplane power connector	3 SAS/SATA connector
2 PCIe connector (NVMe)	

System-board switches

The following illustrations show the location of the switches on the system board.

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

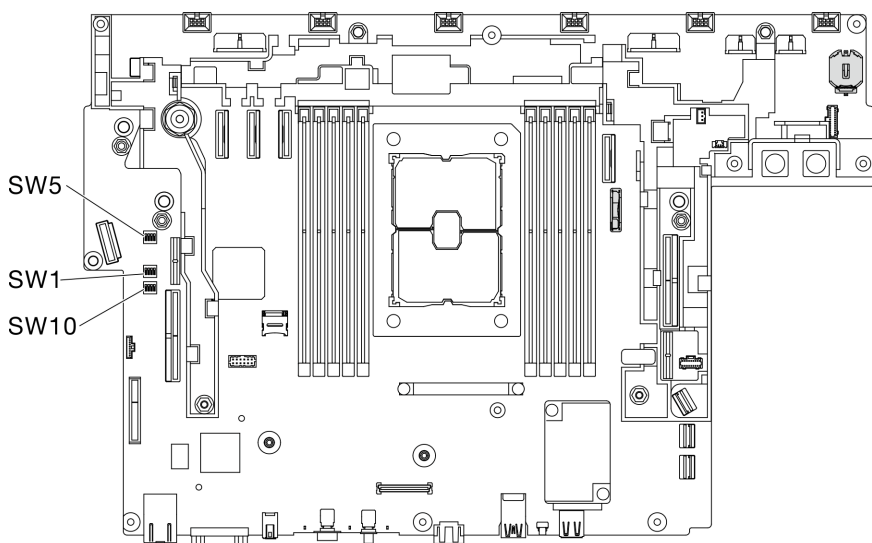


Figure 18. System-board switches

The following table describes the switches on the system board.

Table 21. System-board switches

Switches block	Switch number	Switch name	Usage description	
			On	Off
SW5	1	Machine Engine (ME) firmware security override	ME update mode	Normal (default)
SW1	1	XClarity Controller boot backup	The node will boot by using a backup of the XClarity Controller firmware	Normal (default)
	2	XClarity Controller force update	Enables XClarity Controller force update	Normal (default)
	3	Password override	Overrides the power-on password	Normal (default)
	4	Low security	Enable low security	Normal (default)
SW10	4	CMOS clear	Clears the real-time clock (RTC) registry	Normal (default)

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in https://pubs.lenovo.com/safety_documentation/, “Installation Guidelines” on page 45, “Handling static-sensitive devices” on page 47, and “Power off the server” on page 15.
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

Parts list

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

For more information about ordering the parts shown in the [Figure 19 “Server components ” on page 40](#):

<https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/parts/display/compatible>

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

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

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

Server components

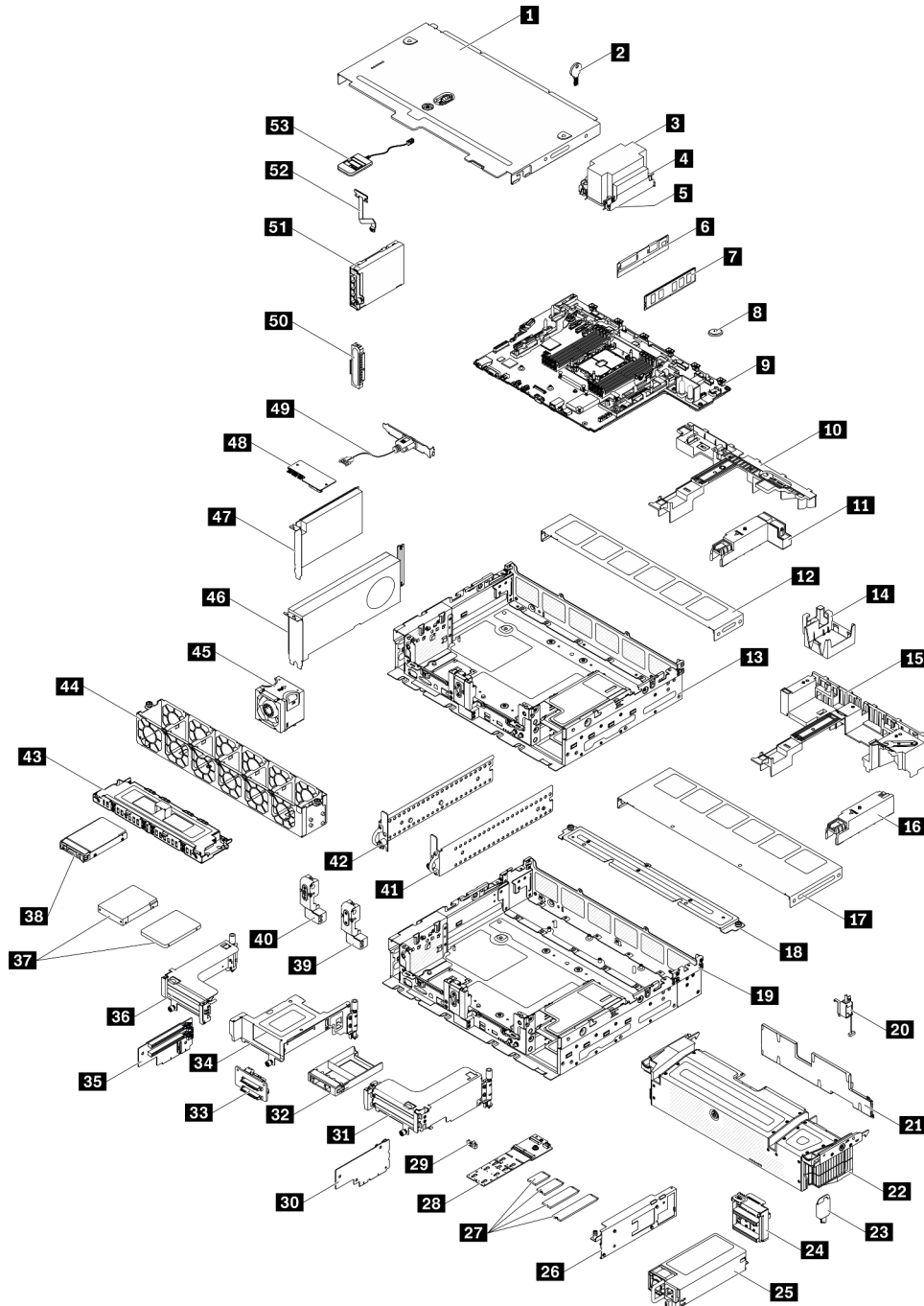


Figure 19. Server components

Table 22. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in Figure 19 “Server components ” on page 40:</p> <p>https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/parts/display/compatible</p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
1	Top cover	√			
2	Top cover key			√	
3	Heat sink			√	
4	Heat sink Torx T30 nut			√	
5	Processor			√	
6	Persistent Memory Module (PMEM)	√			
7	DRAM DIMM	√			
8	CMOS battery (CR3032)	√			
9	System board			√	
10	Air baffle (300mm chassis)	√			
11	Heat sink filler (300mm chassis)	√			
12	Fan cover (300mm chassis)	√			
13	300mm chassis			√	
14	GPU filler (360mm chassis)	√			
15	Air baffle (360mm chassis)	√			
16	Heat sink filler (300mm chassis)	√			
17	Fan cover (360mm chassis)	√			
18	Support bracket (360mm chassis)	√			
19	360mm chassis			√	
20	Intrusion switch and cable	√			
21	Security bezel dust filter	√			
22	Security bezel	√			
23	Security bezel key	√			
24	Power backplane	√			
25	Power supply unit	√			
26	M.2 backplane adapter	√			
27	M.2 drives	√			

Table 22. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
28	M.2 backplane	√			
29	M.2 retainer	√			
30	Riser card for Riser 2			√	
31	Riser 2		√		
32	2.5-inch drive filler	√			
33	AnyBay backplane			√	
34	Riser 2 AnyBay drive cage		√		
35	Riser card for Riser 1			√	
36	Riser 1		√		
37	7mm/15mm trayless drives			√	
38	2.5-inch hot-swap drives	√			
39	Security bezel cable module filler	√			
40	Security bezel cable module		√		
41	EIA bracket, left	√			
42	EIA bracket, right	√			
43	7mm/15mm trayless drive cage	√			
44	Fan cage	√			
45	Fan	√			
46	Full-length double-width PCIe adapter		√		
47	Half-length half-width PCIe adapter	√			
48	Firmware and TPM 2.0 Security Module			√	
49	Serial port module	√			
50	OCP 3.0 Ethernet adapter filler			√	
51	OCP 3.0 Ethernet adapter		√		
52	Wall mount LED cable		√		
53	External LCD diagnostics handset	√			

Power cords

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

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

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

Notes:

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

Chapter 3. 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.

For more information about ordering parts:

<https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/parts/display/compatible>

Note: To ensure compatibility of replacement units, always update the firmware of all the parts to the latest version. For more information about updating firmware, see “[Firmware updates](#)” on page 10.

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: “[Handling static-sensitive devices](#)” on page 47 and “[Working inside the server with the power on](#)” on page 47.
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkEdge SE450 Drivers and Software](#) to download firmware updates for your server.

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

- 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.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Terra-cotta on a component or an terra-cotta label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.

- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

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 adapter must be installed in each power-adapter 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 since 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 adapter 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 loss of data 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 long 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.

Air baffle replacement

See these topics to learn how to remove and install the air baffle.

Remove the air baffle

See this topic to learn how to remove the air baffle.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

To avoid possible danger, read and follow the following safety statement.

- **S012**



CAUTION:
Hot surface nearby.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).

Step 2. Proceed to the topic corresponding to the server configuration.

- [“Remove the air baffle for 300mm chassis” on page 48](#)
- [“Remove the air baffle for 360mm chassis with half-length adapters” on page 49](#)
- [“Remove the air baffle for 360mm chassis with full-length adapters” on page 49](#)

Remove the air baffle for 300mm chassis

Step 1. Lift the air baffle to remove it.

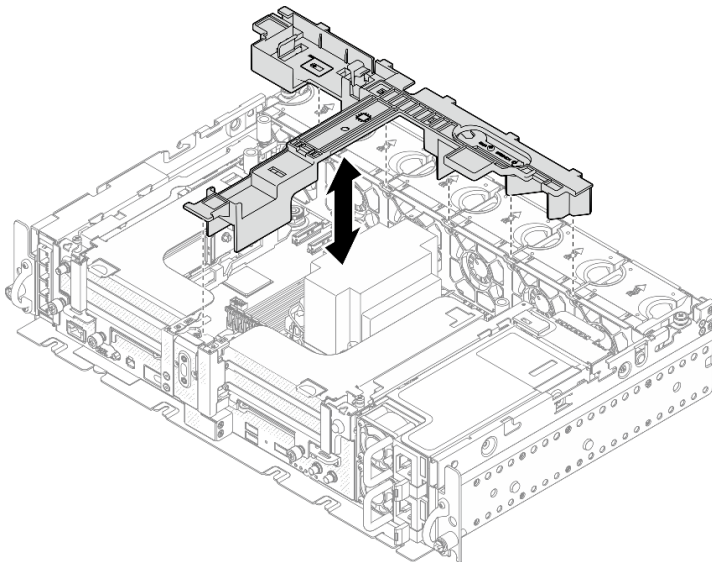


Figure 20. Removing the air baffle

Remove the air baffle for 360mm chassis with half-length adapters

Step 1. Remove the one captive screw and two thumbscrews that secure the supporting bracket to the chassis.

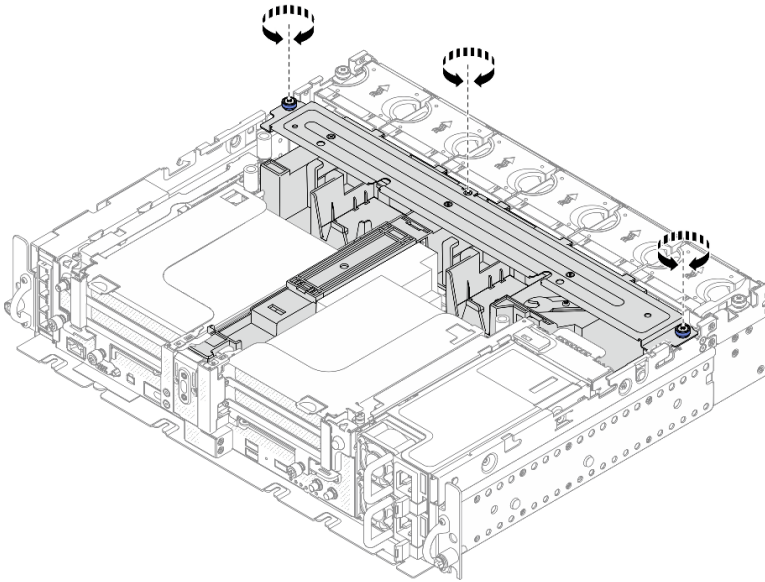


Figure 21. Releasing the air baffle assembly

Step 2. Lift the air baffle along with the supporting bracket to remove the air baffle assembly.

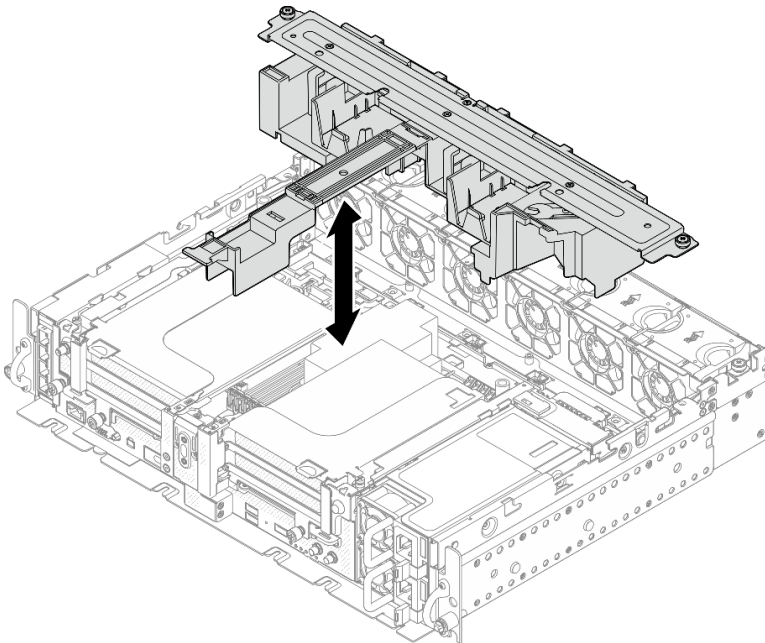


Figure 22. Removing the air baffle assembly

Remove the air baffle for 360mm chassis with full-length adapters

Step 1. Remove the supporting bracket.

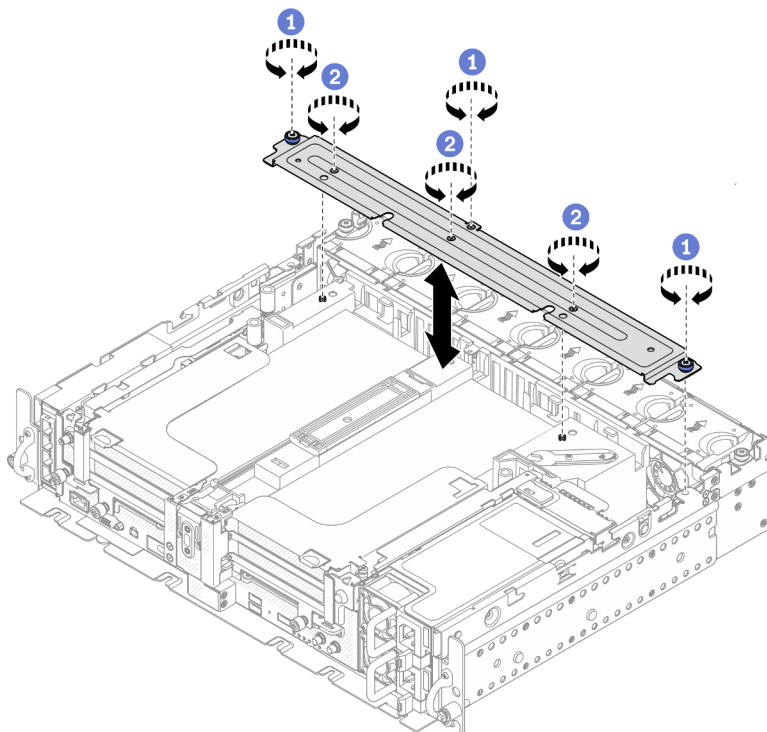


Figure 23. Removing the supporting bracket

- 1 Loosen the one captive screw and two thumbscrews that secure the bracket to the chassis.
- 2 Loosen the other three screws, and remove the bracket from the air baffle.

Step 2. Disconnect the GPU power cables from the adapters.

Note: If there is a plan of replacing GPU power cables, make sure to remove the fan cage first (see [“Remove the fans and the fan cage” on page 74](#)).

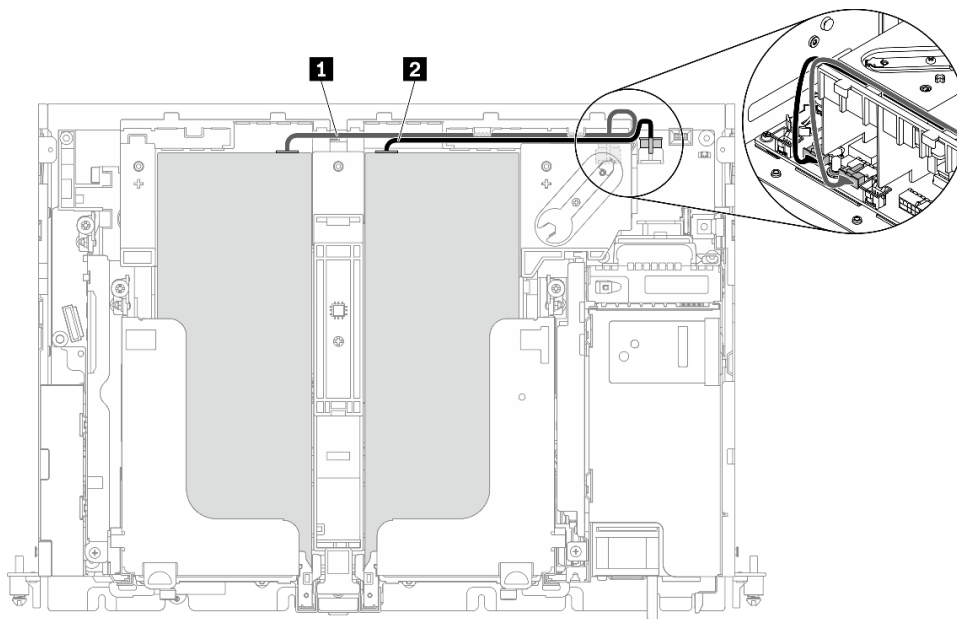


Figure 24. Cable routing for GPU power cables

Table 23. Cable routing for GPU power cables

	From	To
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

Step 3. Loosen the four captive screws; then lift and remove both PCIe riser assemblies.

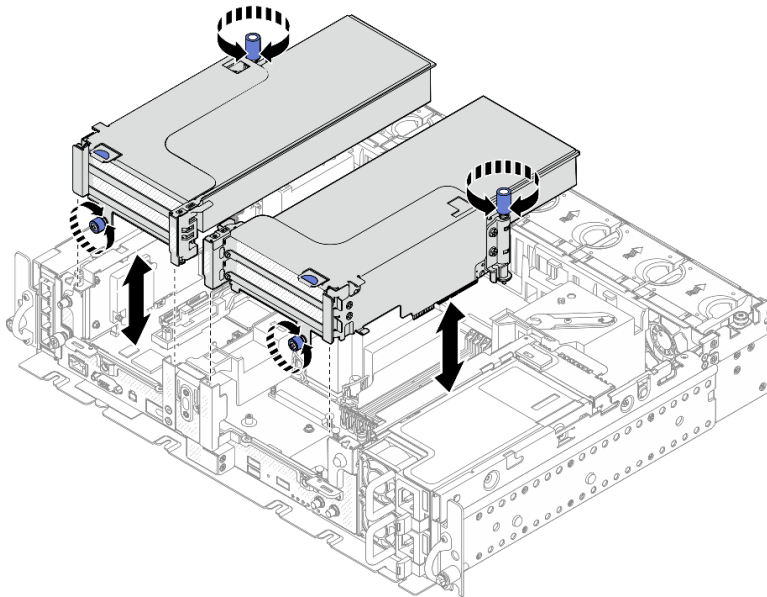


Figure 25. Removing PCIe riser assemblies with full-length adapters

Step 4. Lift the air baffle and remove it from the chassis.

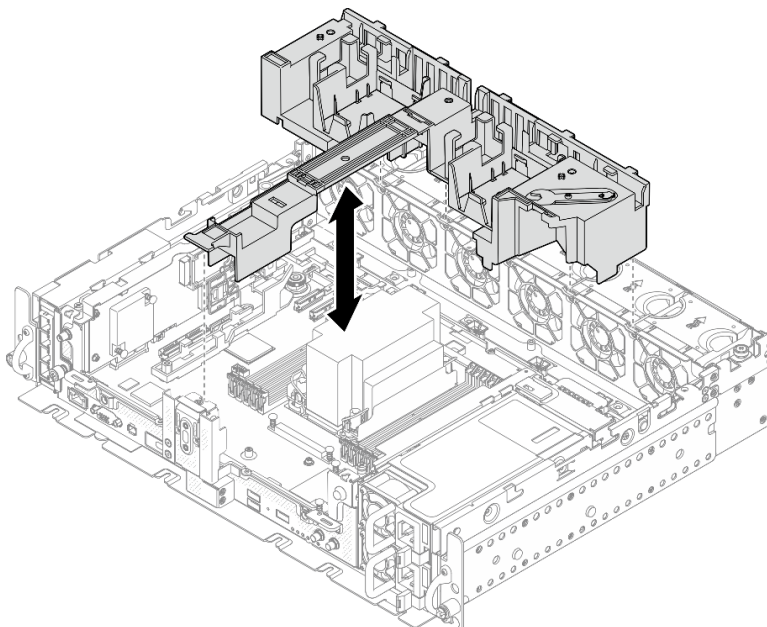


Figure 26. Removing the 360mm air baffle with full-length adapters

After this task is completed

Make sure to install the air baffle back after finishing component replacement.

Attention: Air baffle is required for the airflow that creates proper cooling. Make sure to install the proper air baffle corresponding to the system configuration before power is turned on.

[Watch the procedure on YouTube.](#)

Install the air baffle

See this topic to learn how to install the air baffle.

About this task

To avoid possible danger, read and follow the following safety statement.

- **S012**



CAUTION:
Hot surface nearby.

See to the topic corresponding to the server configuration.

- [“Install the air baffle for 300mm chassis” on page 52](#)
- [“Install the air baffle for 360mm chassis with half-length adapters” on page 54](#)
- [“Install the air baffle for 360mm chassis with full-length adapters” on page 57](#)

Install the air baffle for 300mm chassis

Procedure

Step 1. Make sure the air baffle configuration fits the present system configuration.

Attention: Fillers corresponding to system configuration are required for the airflow that does expected cooling. Make sure to install the proper fillers corresponding to the system configuration.

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

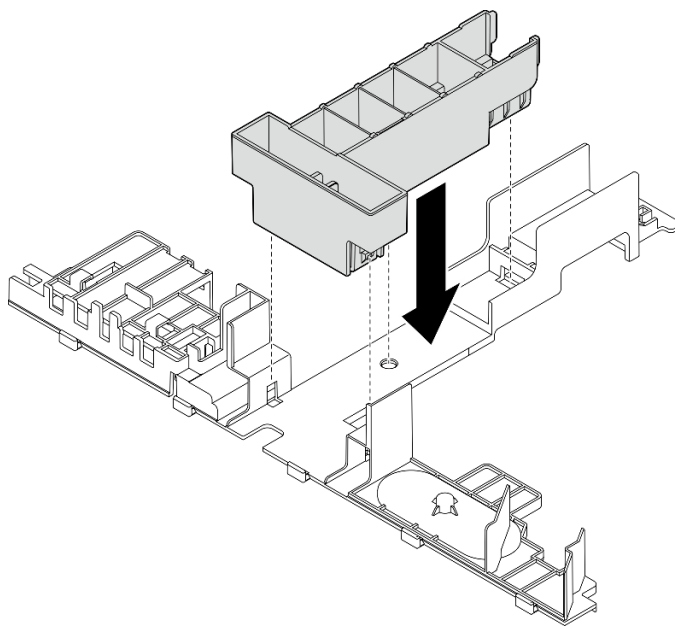


Figure 27. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

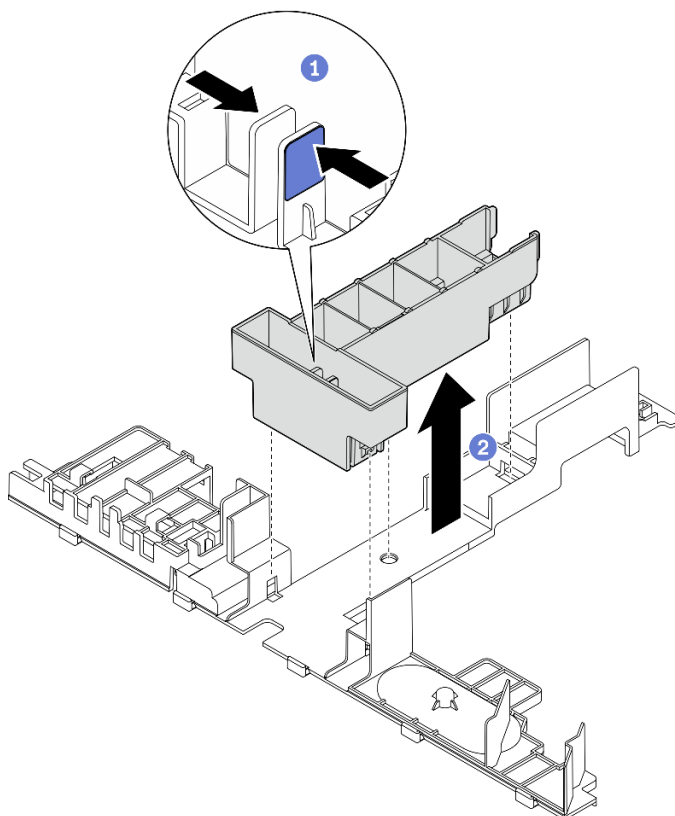


Figure 28. Removing heat sink filler

- 1 Press the release latch on the filler.
- 2 Remove the filler from the air baffle.

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

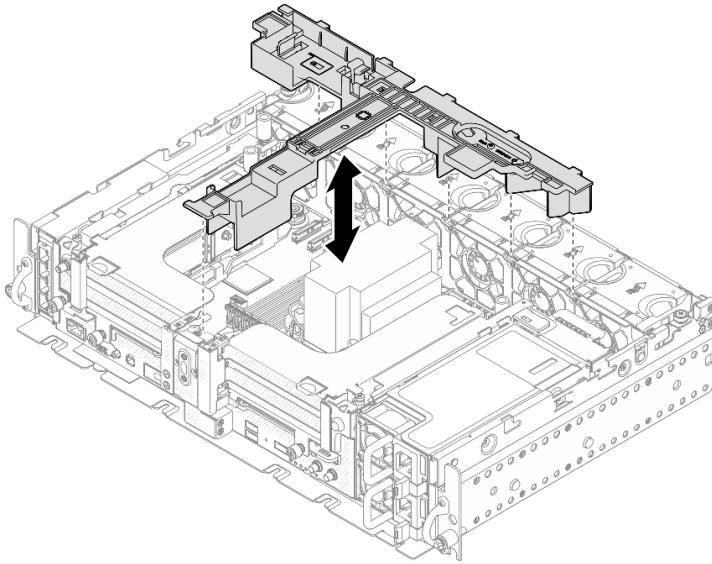


Figure 29. Installing the air baffle

Install the air baffle for 360mm chassis with half-length adapters

Procedure

Step 1. Make sure the air baffle configuration fits the present system configuration.

Attention: Fillers corresponding to system configuration are required for the airflow that does expected cooling. Make sure to install the proper fillers corresponding to the system configuration.

1. Heat sink filler

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

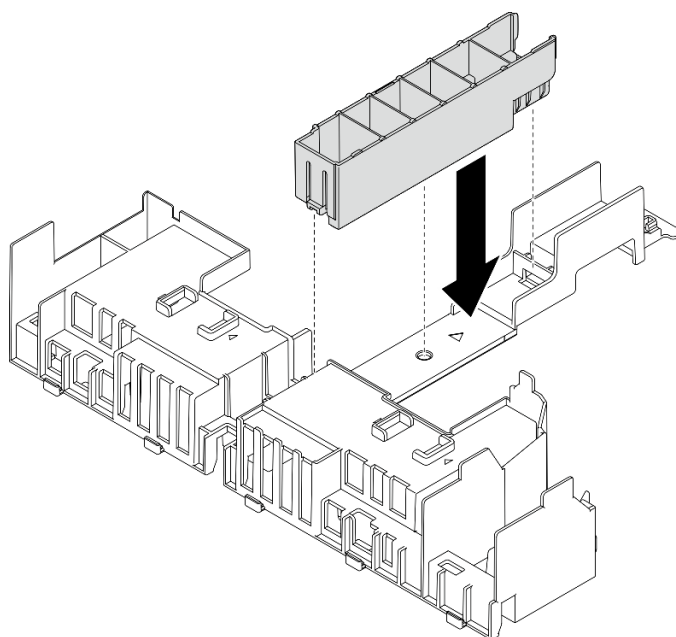


Figure 30. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

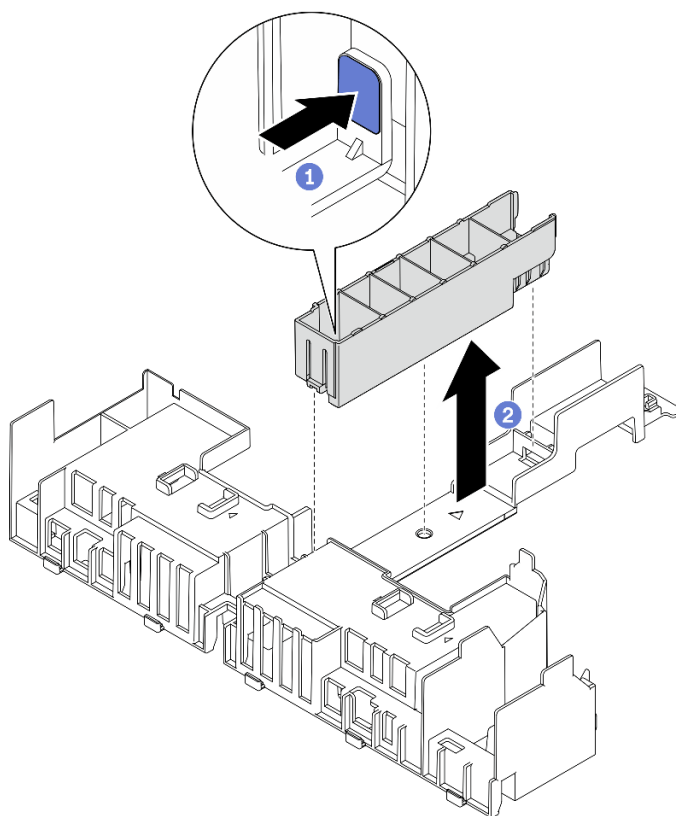


Figure 31. Installing the heat sink filler

- 1 Press the release latch on the filler.

- 2 Remove the filler from the air baffle.

2. GPU fillers

GPU fillers are required when half-length adapters are installed in a 360mm chassis. If no GPU fillers are installed, make sure to install them to the air baffle.

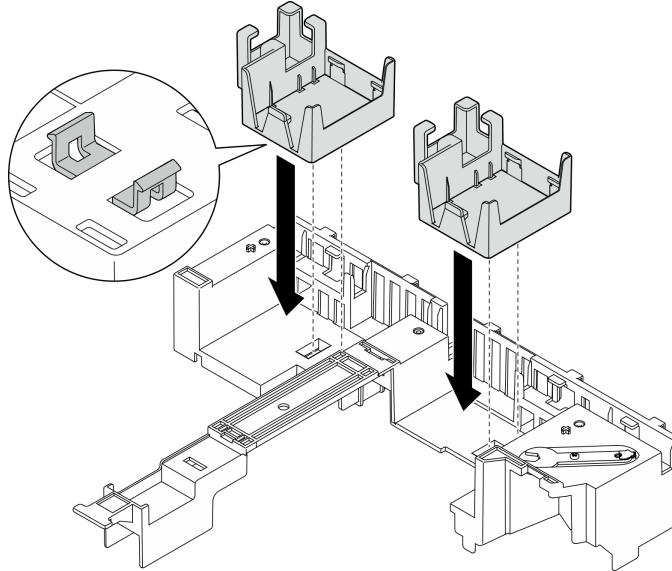


Figure 32. Installing the GPU fillers

3. Supporting bracket

The supporting bracket is required in a 360mm chassis. Secure it to the air baffle with the three captive screws as illustrated.

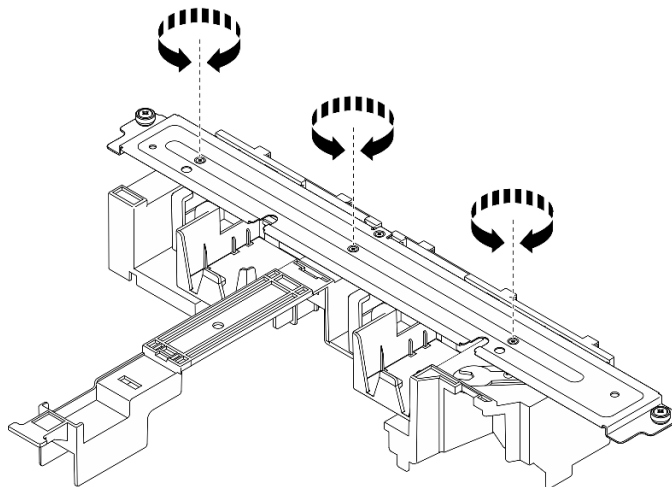


Figure 33. Securing the supporting bracket to the air baffle

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

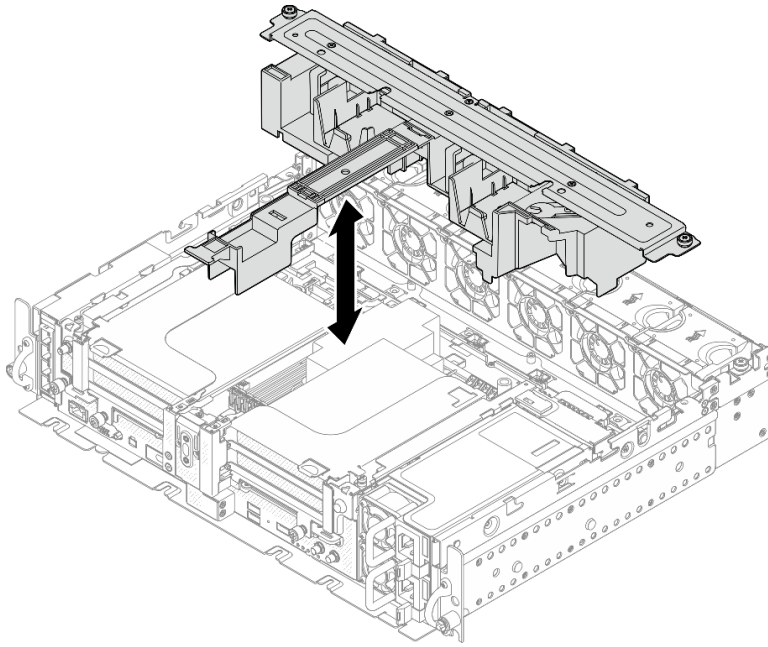


Figure 34. Installing the air baffle

- Step 3. Tighten the one captive screw and two thumbscrews to secure the supporting bracket to the chassis.

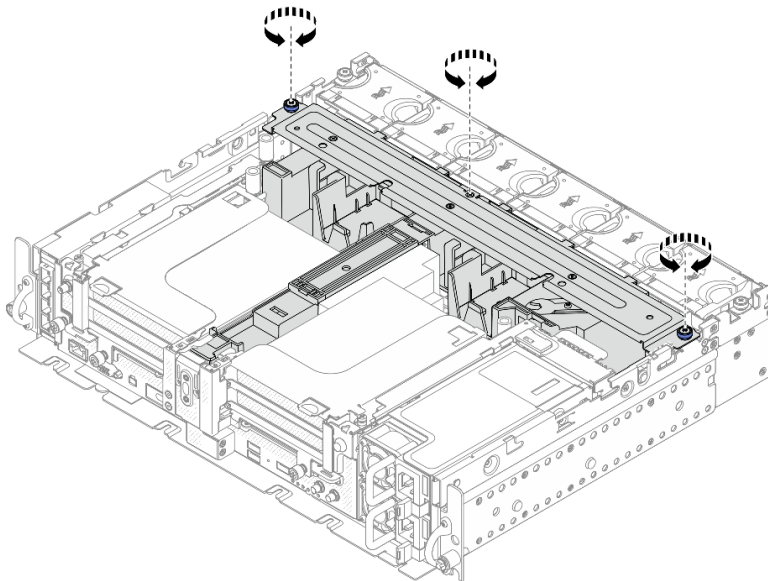


Figure 35. Securing the air baffle assembly

Install the air baffle for 360mm chassis with full-length adapters

Procedure

- Step 1. Make sure the air baffle configuration fits the present system configuration.

1. Heat sink filler

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

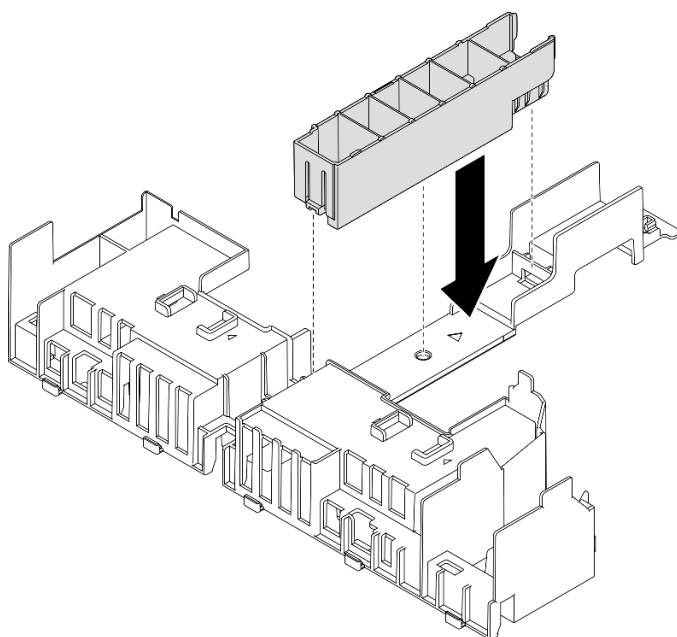


Figure 36. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

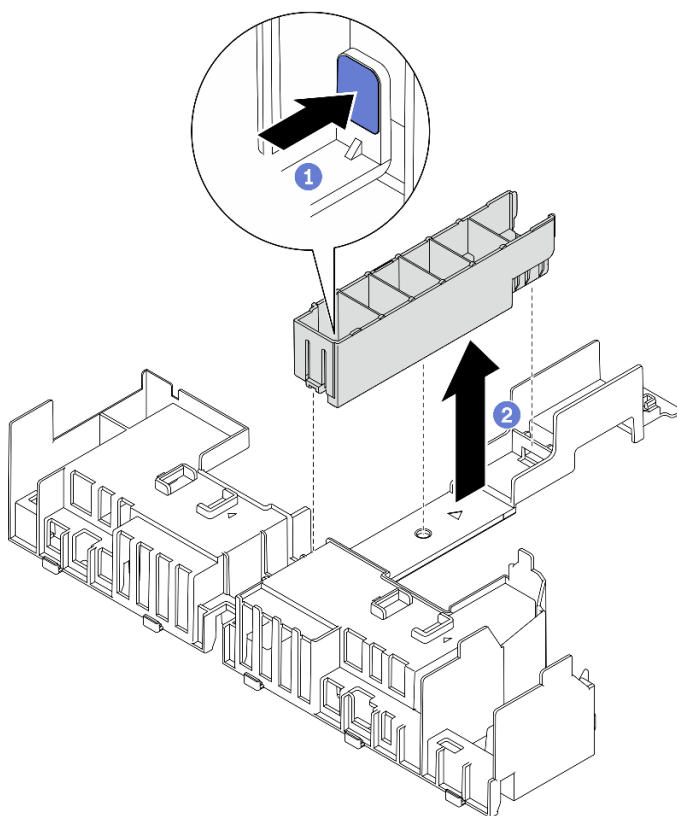


Figure 37. Installing the heat sink filler

- 1 Press the release latch on the filler.

- 2 Remove the filler from the air baffle.

2. Supporting bracket

The supporting bracket must be removed when full-length adapters are to be installed. Loosen the three captive screws to remove the supporting bracket from the air baffle.

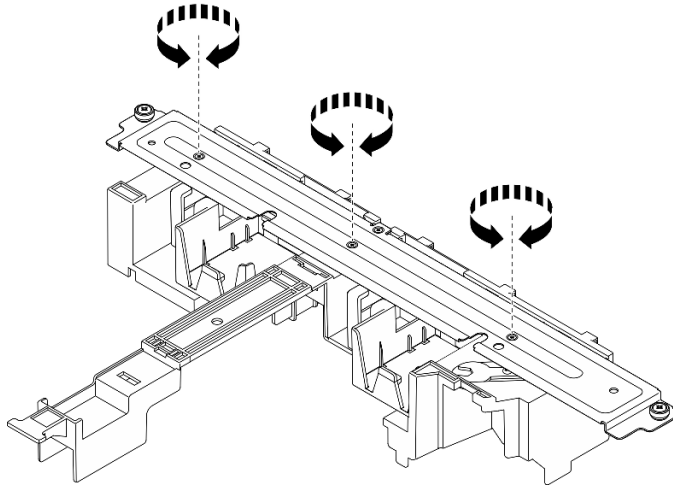


Figure 38. Removing the supporting bracket from the air baffle

3. GPU fillers

GPU fillers must be removed when full-length adapters are to be installed. If GPU fillers are installed in the air baffle, remove them.

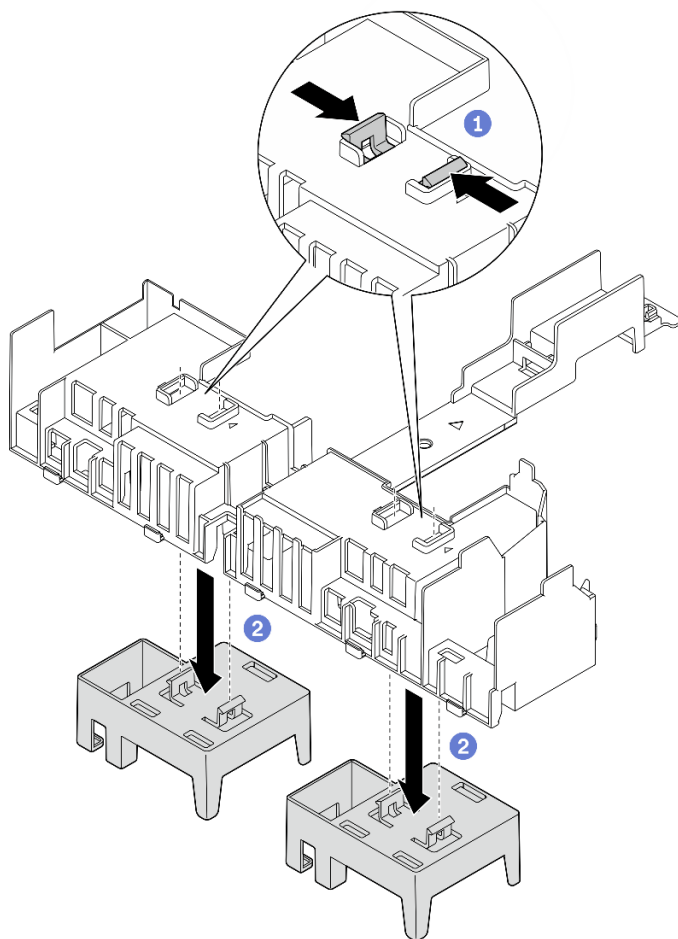


Figure 39. Removing the GPU fillers from the air baffle

- ① Pinch on the retaining feet of the GPU fillers.
- ② Remove the GPU fillers from the air baffle.

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

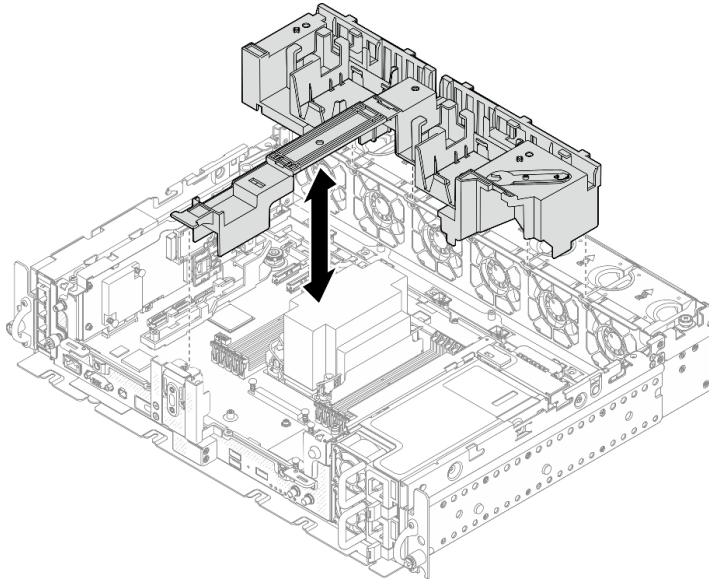


Figure 40. Installing the air baffle

Step 3. Proceed to install the risers with full-length PCIe adapters (see [“Install full-length adapters and riser assemblies \(360mm chassis\)” on page 117](#)).

After this task is completed

1. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

CMOS battery (CR2032) replacement

See these topics to learn how to remove and install the CMOS batteries.

Remove the CMOS batteries (CR2032)

See this topic to learn how to remove the CMOS batteries.

About this task

To avoid potential danger, make sure to read the following safety information.

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 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.

Consider the following when replacing the battery.

- Remove the CMOS battery will cause system lockdown. To unlock the system, contact Lenovo Support.
- 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 battery as required by local ordinances or regulations.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).

Step 2. Proceed to the section corresponding to the CMOS battery to be removed:

- [“Remove the security battery” on page 63](#)
- [“Remove the system battery” on page 63](#)

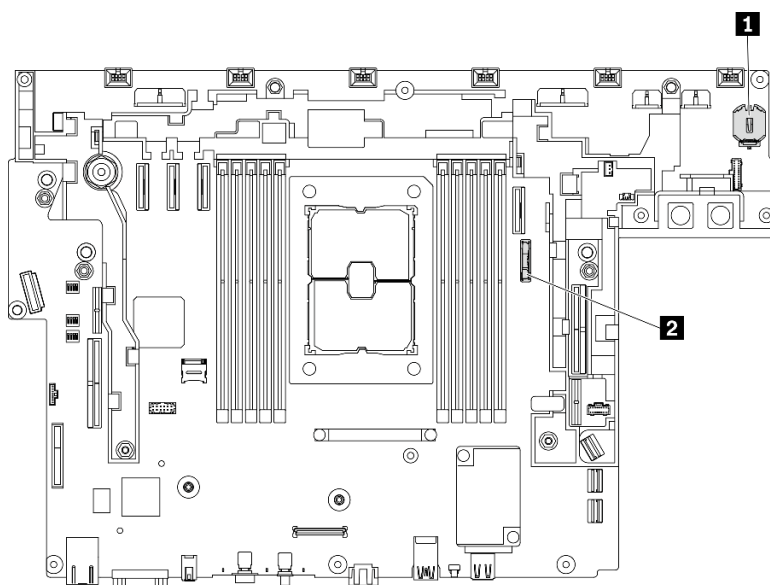


Figure 41. CMOS battery locations on the system board

1 security battery for ThinkShield

2 System battery

Remove the security battery

Procedure

- Step 1. Remove the fan cage assembly (see [“Remove the fan cage assembly” on page 76](#)).
- Step 2. Gently press on the nub on the side of the CMOS battery as illustrated; then, pivot the battery away from the seat to remove it.

Attention:

- Avoid excessive force on the CMOS battery, as it might damage the socket on the system board and result in system board replacement.
- When the security battery is removed, ThinkEdge Security Pack Enabled enters lockdown mode, while activation is required before booting up the system.

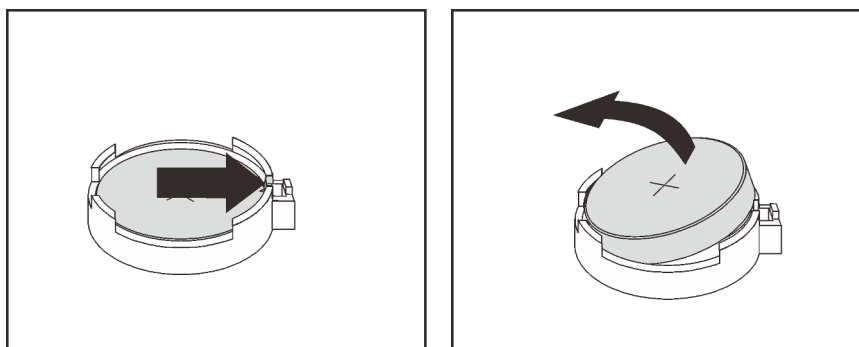


Figure 42. Removing the ThinkShield battery

Remove the system battery

Procedure

- Step 1. Remove PCIe riser 2 (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).
- Step 2. Open and hold the retaining latch; then, pivot the battery toward the positive (+) side to disengage and remove it from the seat.

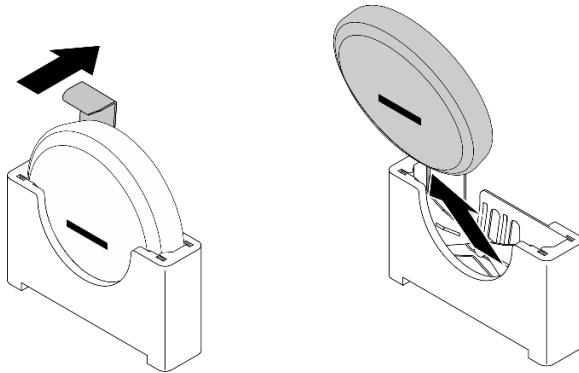


Figure 43. Removing the system battery

After this task is completed

- Install a replacement unit (see [“Install the CMOS battery \(CR2032\)” on page 64](#)).
- Dispose the component with compliance to local regulations.

[>Watch the procedure on YouTube.](#)

Install the CMOS battery (CR2032)

See this topic to learn how to install the CMOS battery (CR2032).

About this task

To avoid potential danger, make sure to read the following safety information.

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 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.

Consider the following when replacing the battery.

- Remove the CMOS battery will cause system lockdown. To unlock the system, contact Lenovo Support.
- 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 battery as required by local ordinances or regulations.

Attention:

- 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.

See the topic corresponding to the CMOS battery to be installed.

- [“Install the security battery” on page 66](#)
- [“Install the system battery” on page 66](#)

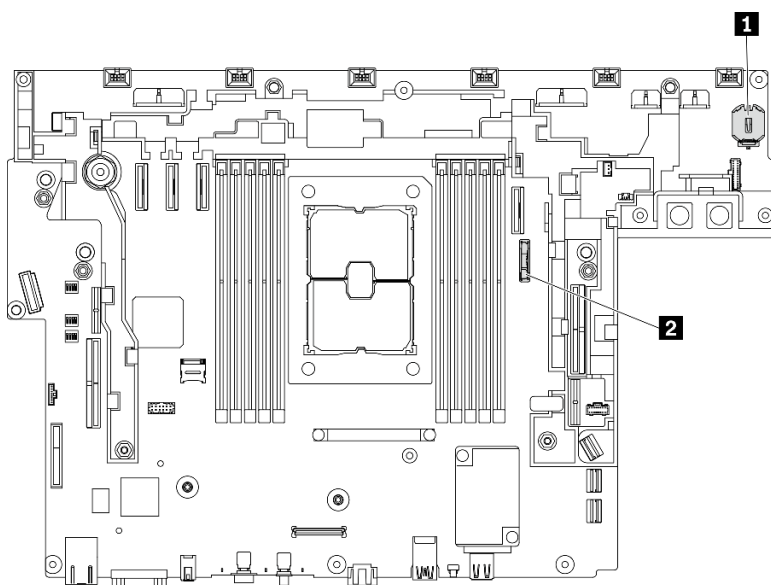


Figure 44. CMOS battery locations on the system board

1 security battery for ThinkShield	2 System battery
---	-------------------------

Install the security battery

Procedure

- Step 1. 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.
- Step 2. Place the CMOS battery on top of the socket with the positive (+) symbol facing up, and press the battery into the seat until it clicks in place.

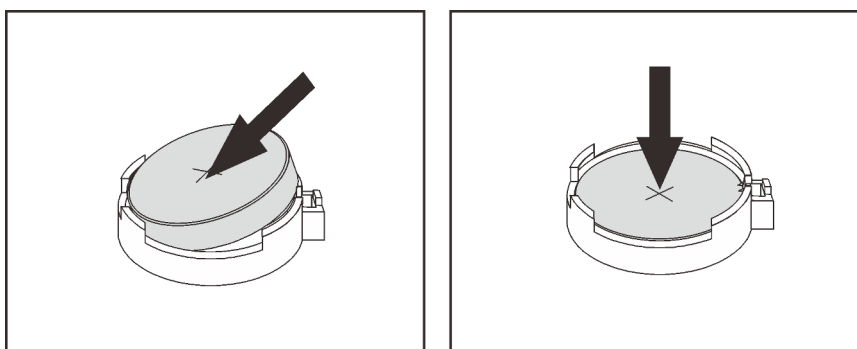


Figure 45. Installing the ThinkShield battery

After this task is completed

1. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

Install the system battery

Procedure

- Step 1. 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.
- Step 2. Align the CMOS battery with the base of the seat, with positive (+) side faces middle of the chassis. Then, pivot the top of the battery until the battery clicks in place.

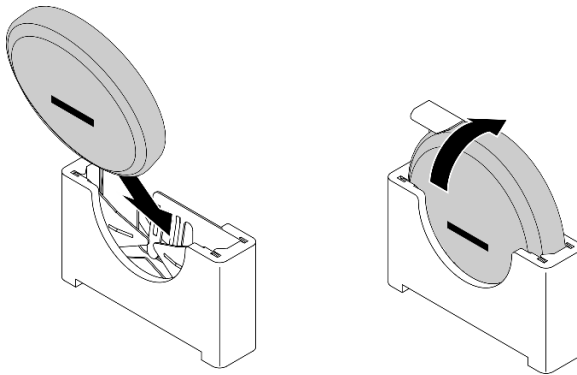


Figure 46. Installing the system battery

After this task is completed

1. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).
2. If a security battery of ThinkEdge Security Pack Enabled has been installed, activate the system (see "Activate the system" in *Setup Guide*).
3. Power on the server; then, reset date, time, and all the passwords.

[>Watch the procedure on YouTube.](#)

EIA bracket replacement

See these topics to learn how to remove, install and adjust the EIA brackets.

Remove the EIA brackets

See this topic to learn how to remove the EIA brackets.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

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

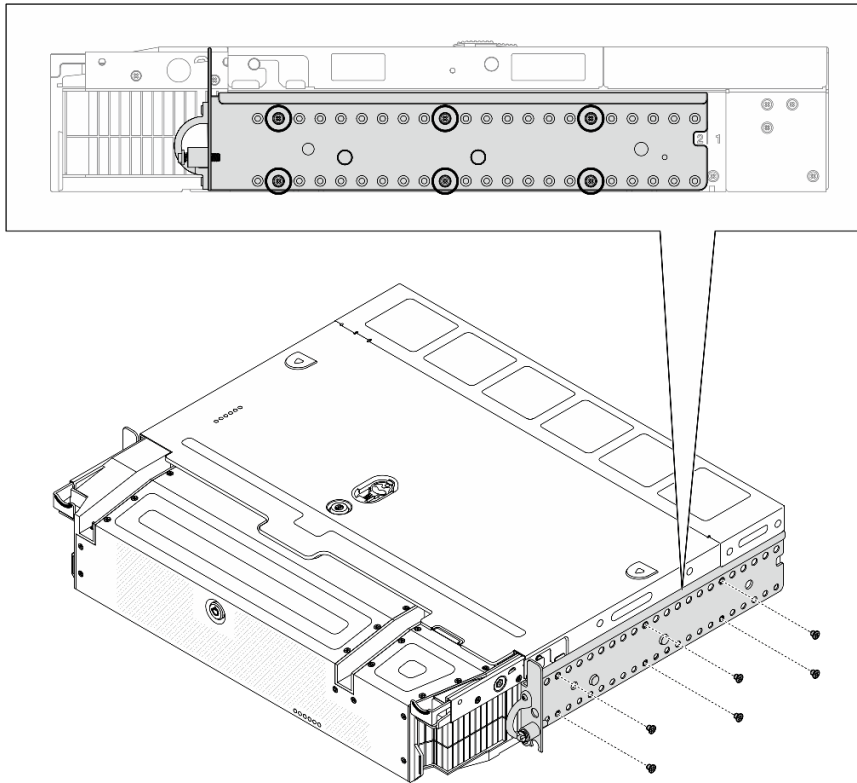


Figure 47. EIA bracket: regular depth

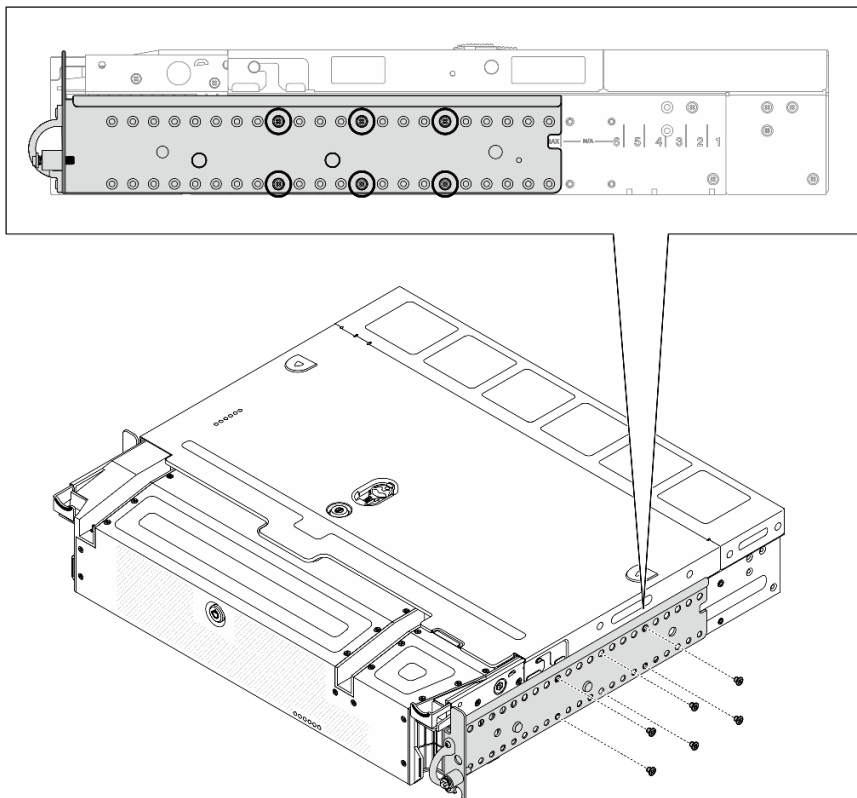


Figure 48. EIA bracket: maximal depth

[Watch the procedure on YouTube.](#)

Install the EIA brackets

See this topic to learn how to install the EIA brackets.

About this task

Procedure

Step 1. Secure each of the EIA brackets to the chassis with six screws. See the following for configuration specific details.

- **Regular** depth:

Note: Make sure to align the two brackets to the same numbers (1 to 6) on both sides of the chassis.

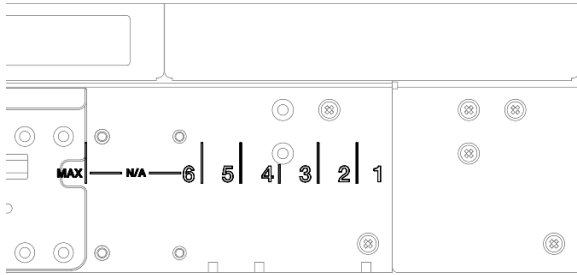


Figure 49. Regular depth mark 1 to 6

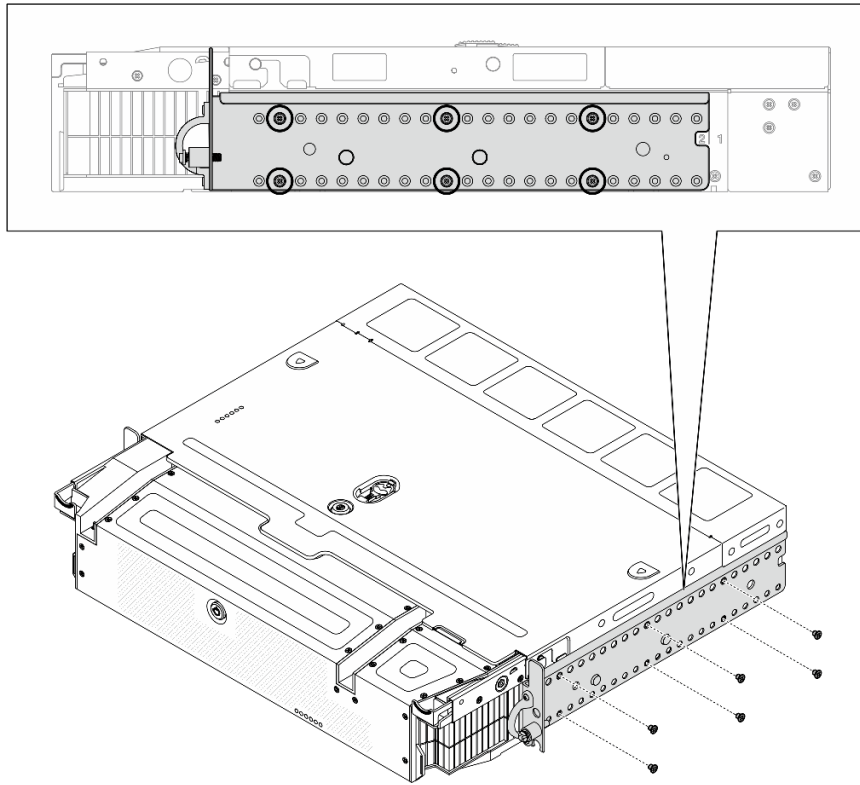


Figure 50. EIA bracket: regular depth

- **Maximal depth:**

Note: Make sure to remove the two pieces of mylar from each side of the chassis first.

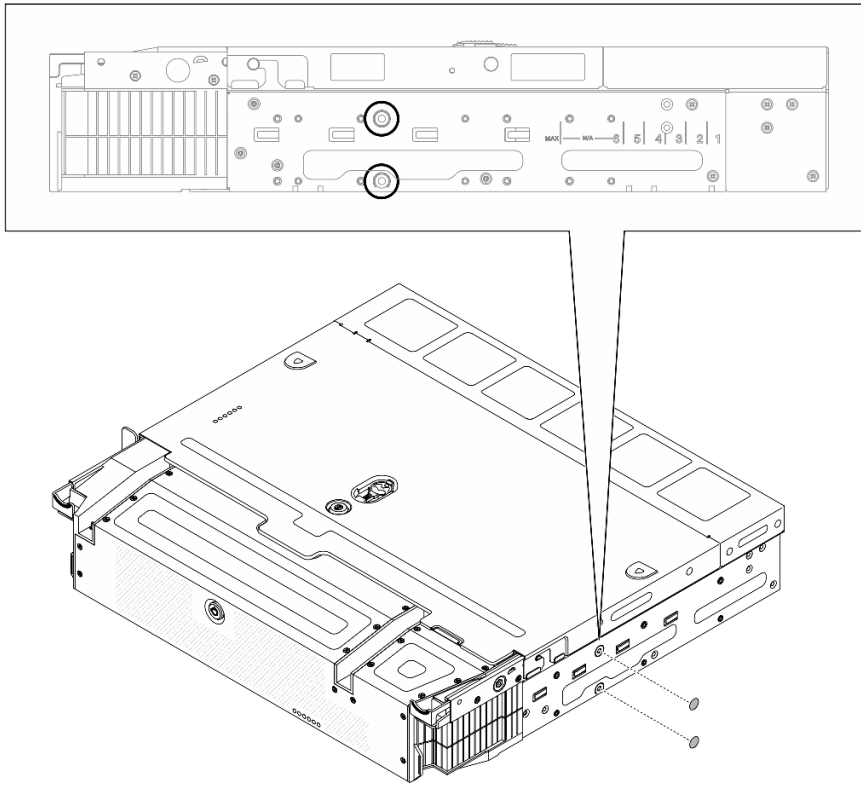


Figure 51. Remove the mylar

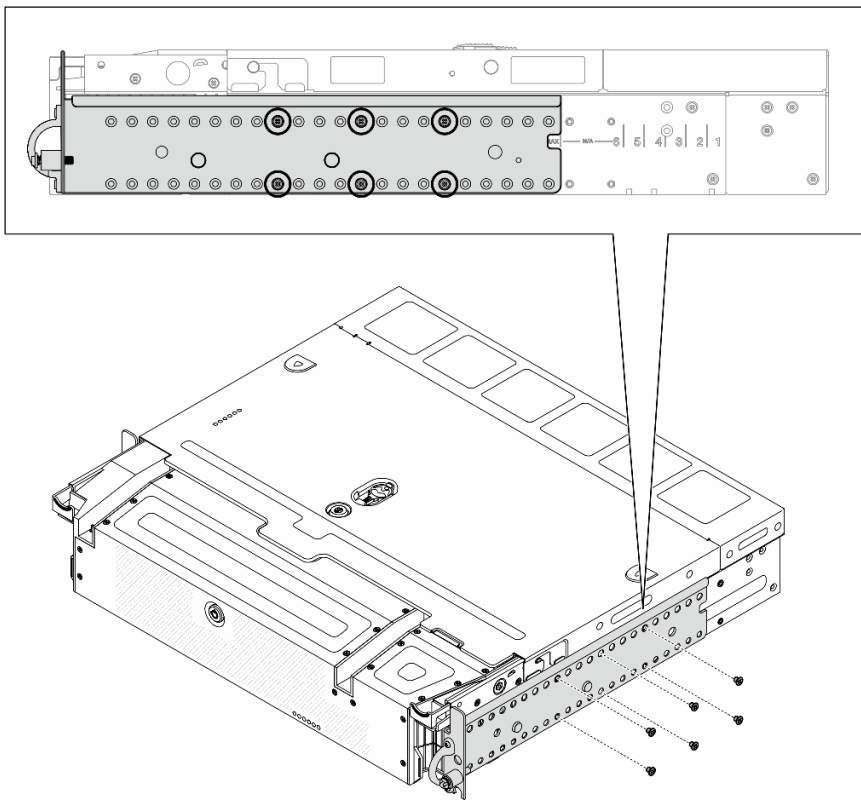


Figure 52. EIA bracket: maximal depth

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

External LCD diagnostics handset replacement

Use this procedure to remove or install the external LCD diagnostics handset.

Remove the external LCD diagnostics handset

See this topic to learn how to remove the external LCD diagnostics handset.

About this task

Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.

Step 1. Disconnect the external LCD diagnostics handset cable.

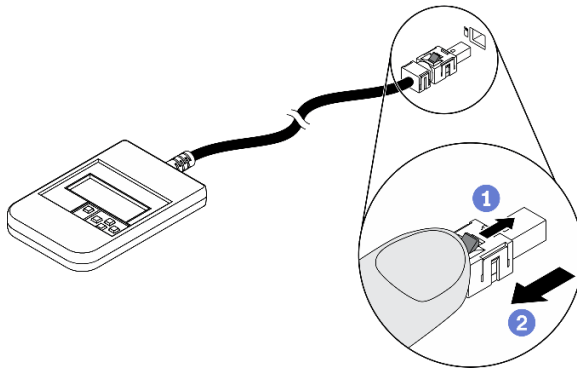


Figure 53. Disconnecting the external LCD diagnostics handset cable

- 1 Press and hold on the latch on top of the connector.
- 2 Pull and disconnect the cable from the server.

[Watch the procedure on YouTube.](#)

Install the external LCD diagnostics handset

See this topic to learn how to install the external LCD diagnostics handset.

About this task

Step 1. Align the connector on the cable with the corresponding connector on the server, and push it in.

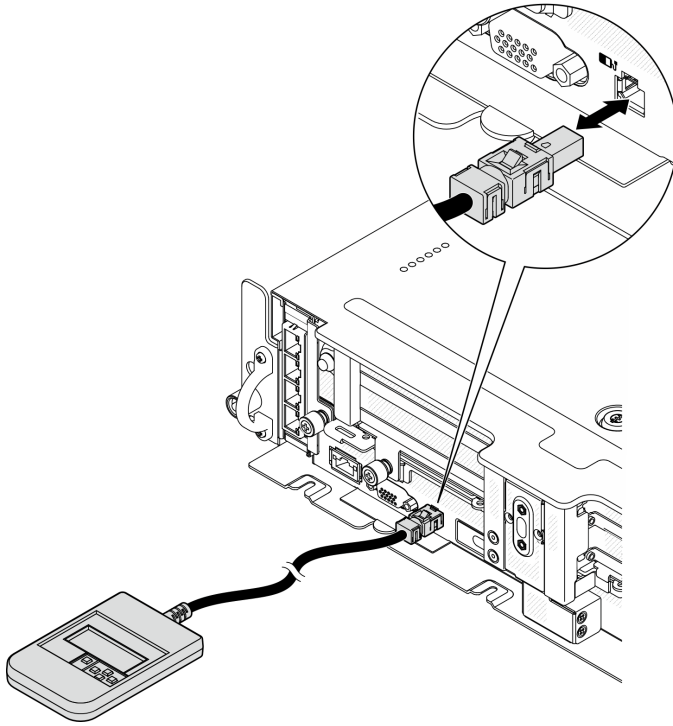


Figure 54. Connecting the external LCD diagnostics handset cable

Step 2. Attach the external LCD diagnostics handset to a metal surface with the magnetic bottom.

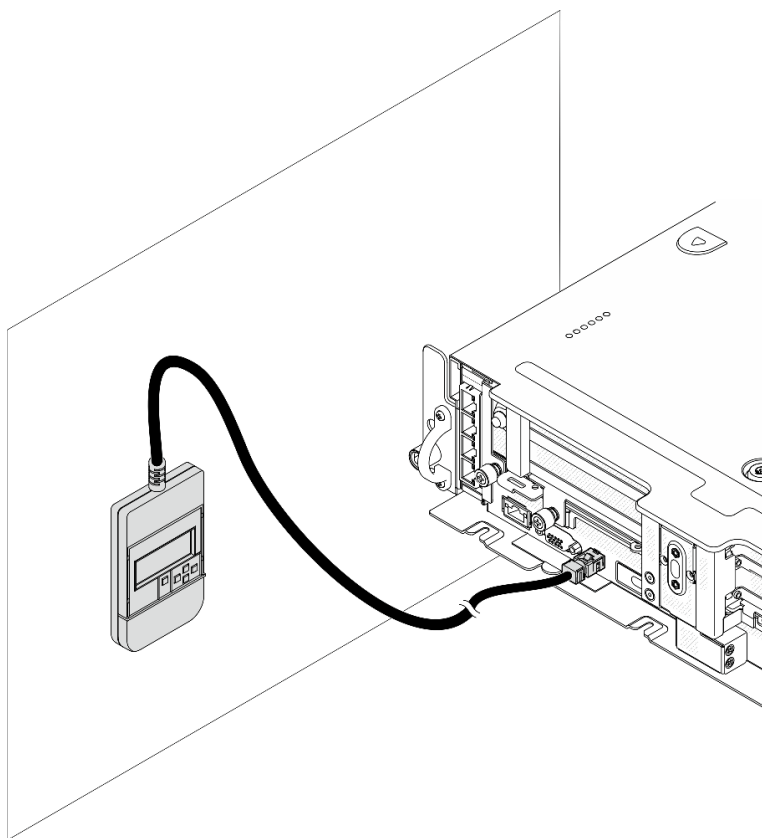


Figure 55. Attaching the external LCD diagnostics handset to a metal surface

After this task is completed

See [“External LCD diagnostics handset” on page 23](#) to start diagnostics.

[Watch the procedure on YouTube.](#)

Fan and fan cage replacement

See these topics to learn how to remove and install the fans and the fan cage.

Remove the fans and the fan cage

See this topic to learn how to remove the fans and 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.

S017



CAUTION:

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

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).

Step 2. Proceed to remove a fan or the whole fan cage.

- [“Remove a fan” on page 75](#)
- [“Remove the fan cage assembly” on page 76](#)

Remove a fan

Step 1. Remove a fan.

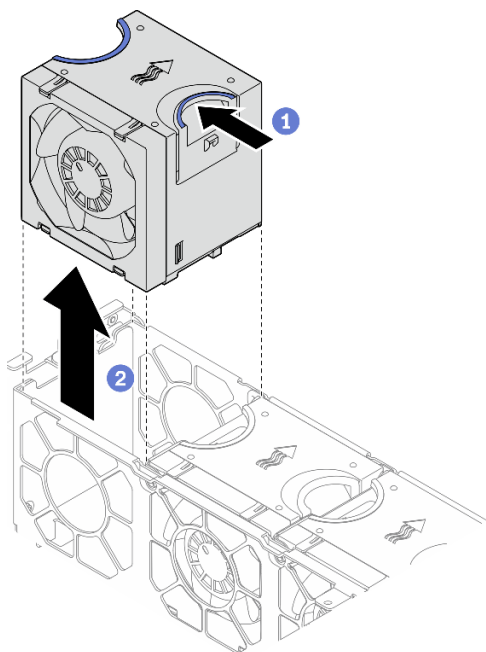


Figure 56. Removing a fan

- 1 Pinch and hold on the blue touch points on the top of the fan.
- 2 Lift the fan to remove it.

Remove the fan cage assembly

Step 1. Loosen the two captive screws on the sides of the fan cage assembly, and lift it to remove it from the chassis.

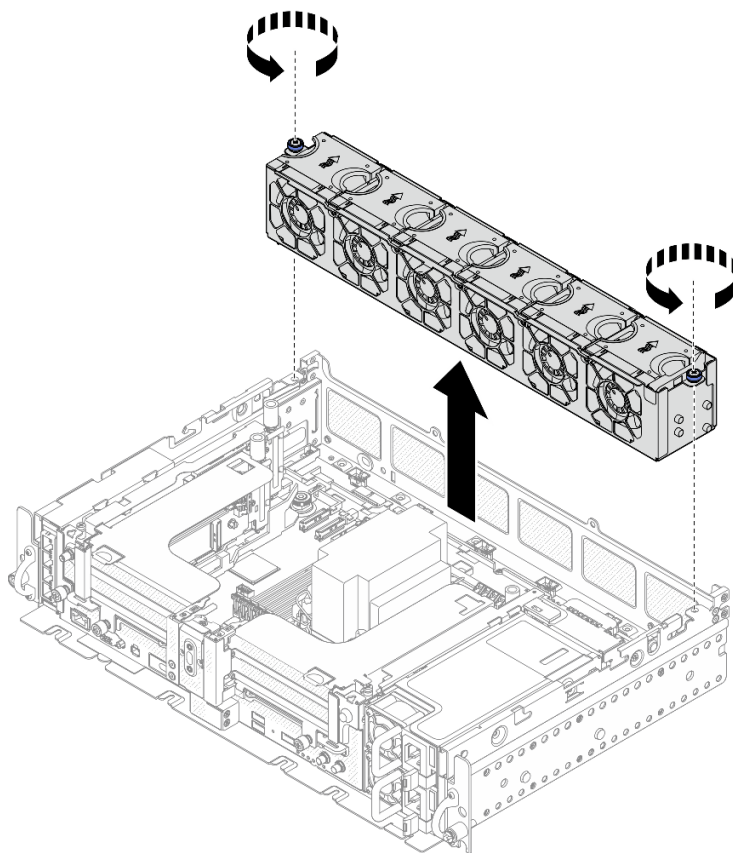


Figure 57. Removing the fan cage assembly

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.

[Watch the procedure on YouTube.](#)

Install the fan cage and the fans

See this topic to learn how to install the fan cage and the fans.

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.

S017



CAUTION:

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

Procedure

See the topic corresponding to the installation scenario.

- [“Install a fan” on page 78](#)
- [“Install the fan cage” on page 78](#)

Install a fan

Step 1. Align a fan over the fan slot in the fan cage, and insert the fan into the fan slot until it clicks into place. Repeat this procedure until all the fans are installed in the fan cage.

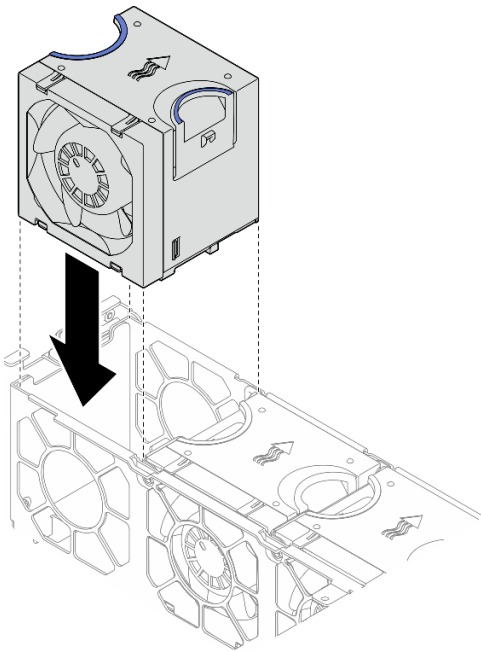


Figure 58. Installing a fan

Install the fan cage

Step 1. Before installing the fan cage, make sure to remove all the fans.

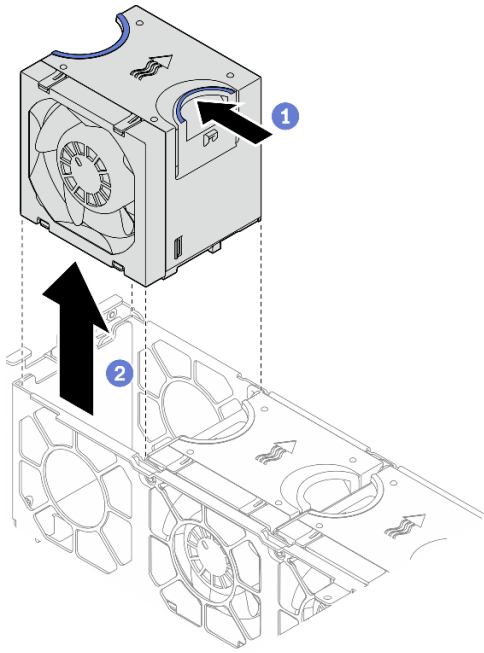


Figure 59. Removing a fan

- ① Pinch and hold on the blue touch points on the top of the fan.
- ② Lift the fan to remove it.

Step 2. Align the fan cage to the guides on both sides of the chassis, and lower it into the chassis. Then, tighten the captive screws to secure the fan cage to the chassis.

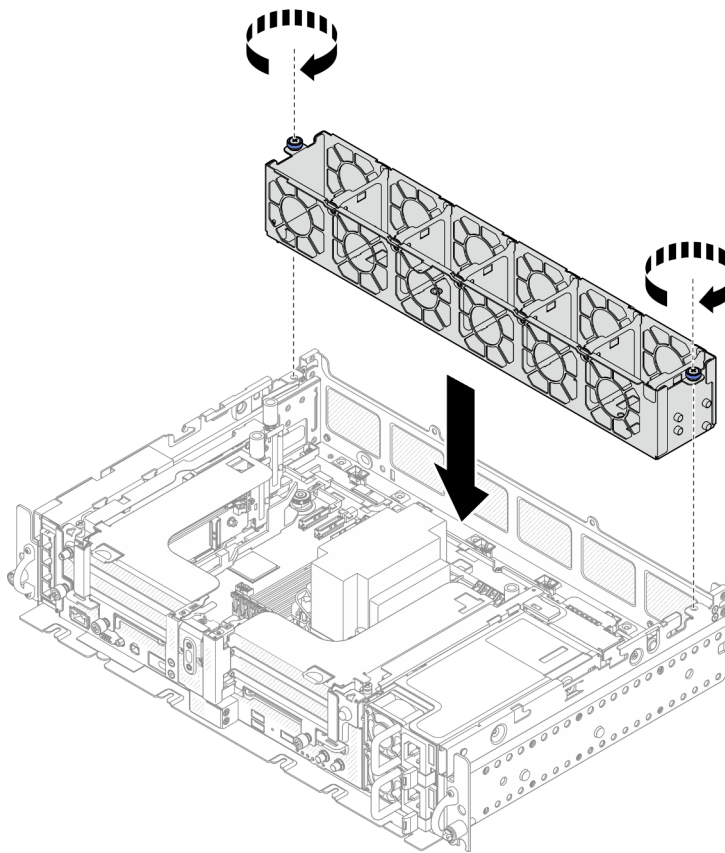


Figure 60. Installing the fan cage

Step 3. Align a fan over the fan slot in the fan cage, and insert the fan into the fan slot until it clicks into place. Repeat this procedure until all the fans are installed in the fan cage.

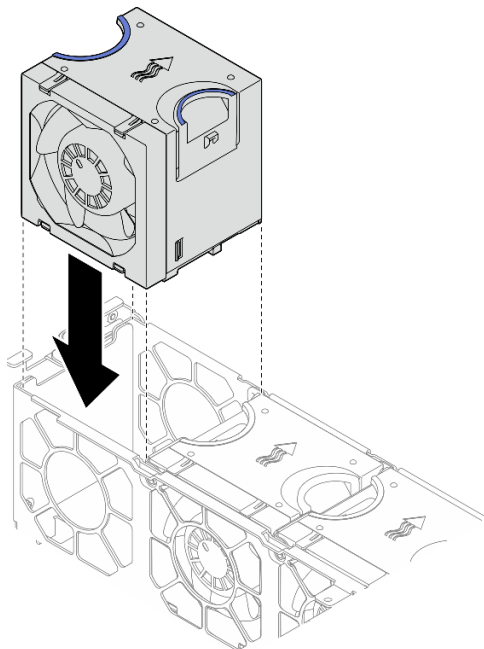


Figure 61. Installing a fan

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[>Watch the procedure on YouTube.](#)

Intrusion switch with cable replacement

See this topic to learn how to remove and install the intrusion switch with cable.

Remove the intrusion switch with cable

See this topic to learn how to remove the intrusion switch with cable.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove the fan cage assembly (see [“Remove the fan cage assembly” on page 76](#)).

Step 2. Disengage the power backplane sideband cable from the cable clip, and disconnect the intrusion cable from the connector on the system board.

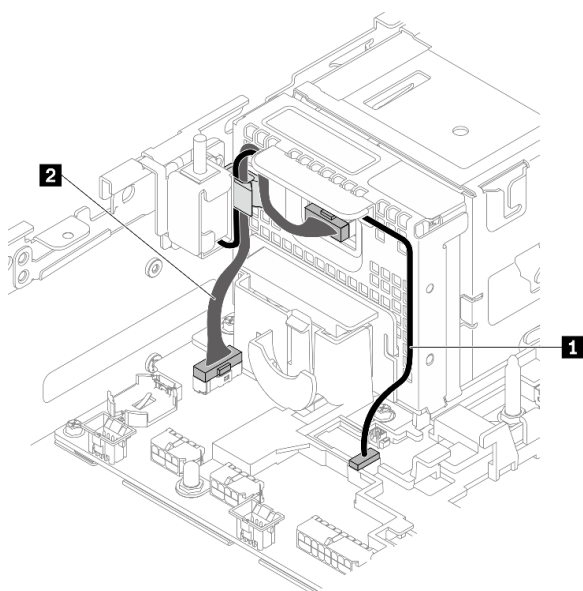


Figure 62. Cable routing for the power backplane and the intrusion switch

Table 24. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

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

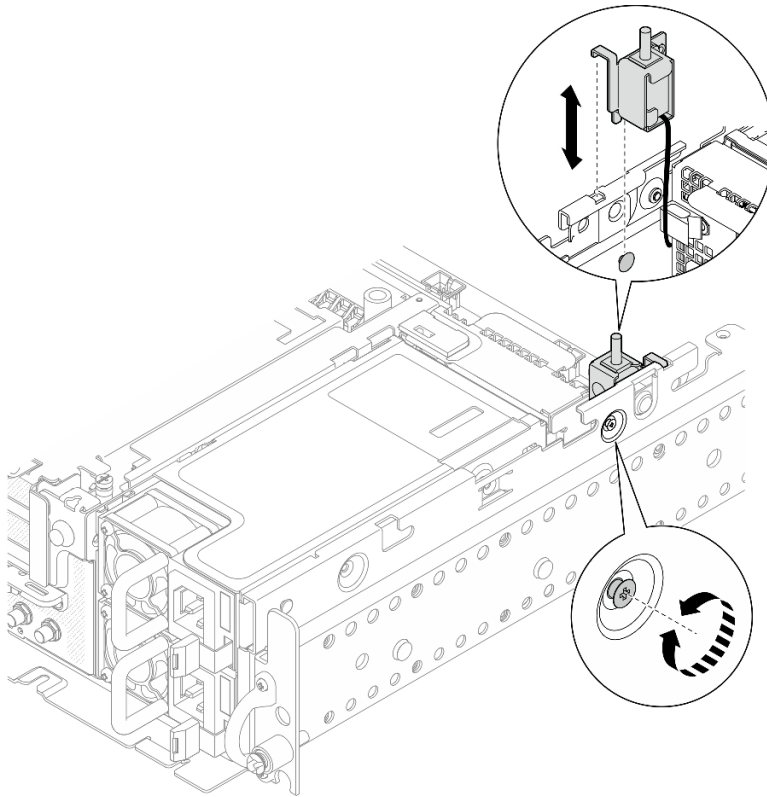


Figure 63. Removing the intrusion switch with cable

After this task is completed

- Install a replacement unit (see [“Install the intrusion switch with cable” on page 83](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the intrusion switch with cable

See this topic to learn how to install the intrusion switch with cable.

About this task

Procedure

- Step 1. Make sure the power backplane sideband cable is disengaged from the cable clip. If not, disengage it from the cable clip.

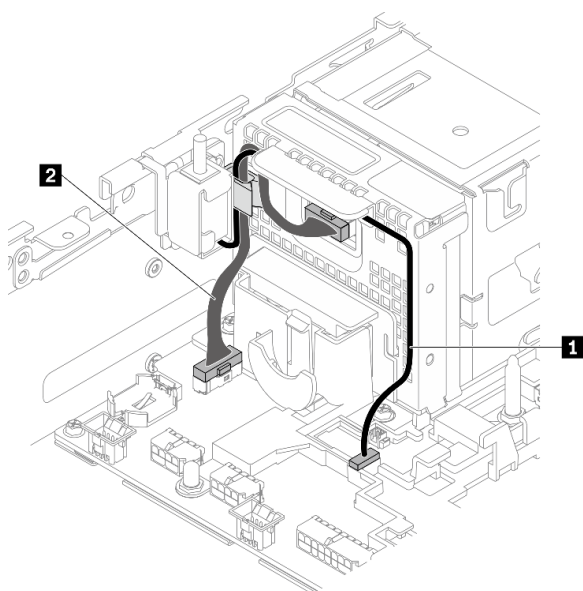


Figure 64. Cable routing for the power backplane and the intrusion switch

Table 25. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

Step 2. Align the intrusion switch with the guide slot and shoulder pin on the chassis; then, secure the intrusion switch with a screw.

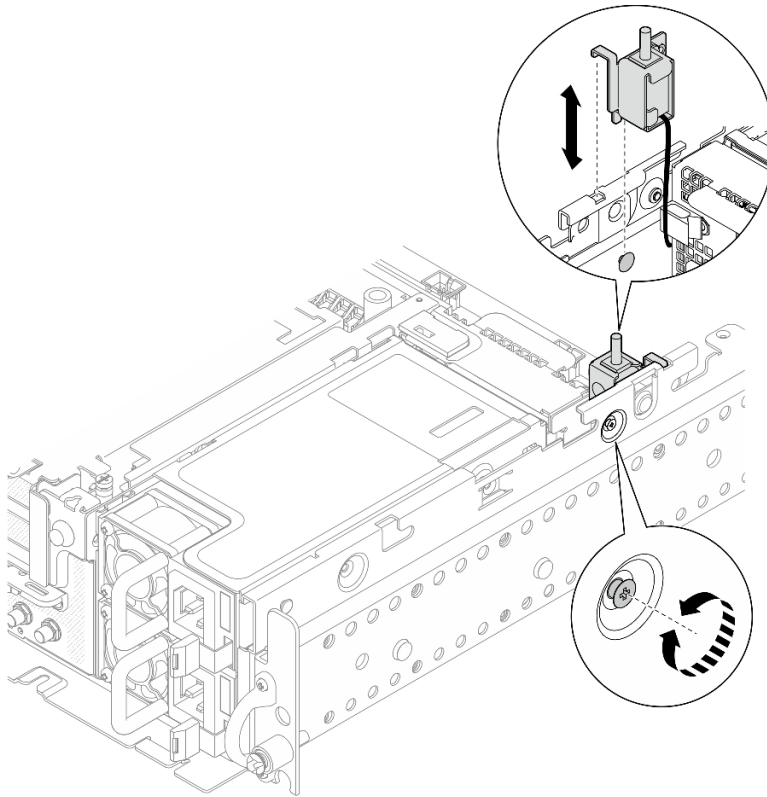


Figure 65. Installing the intrusion switch with cable

- Step 3. Route the intrusion switch with cable through the cable clip, and connect it to the connector on the system board.
- Step 4. Secure the power backplane sideband cable in the cable clip.

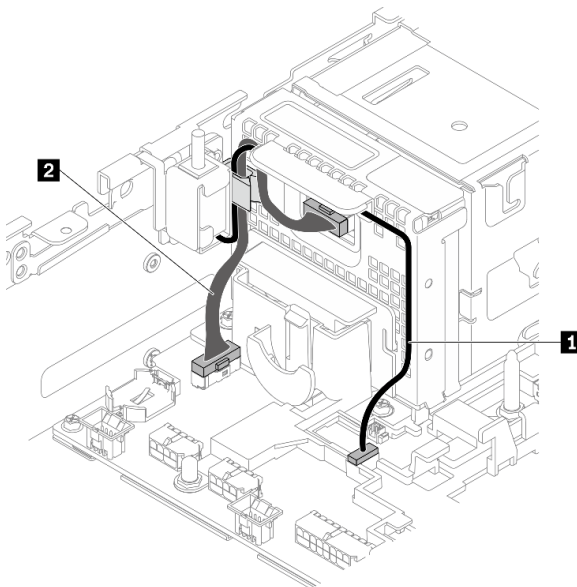


Figure 66. Cable routing for the power backplane and the intrusion switch

Table 26. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Heat sink Torx T30 nut replacement

See these topics to learn how to remove and install a heat sink Torx T30 nut.

Remove a heat sink Torx T30 nut

See this topic to learn how to remove a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

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

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).

Step 2. Remove the Torx T30 nut.

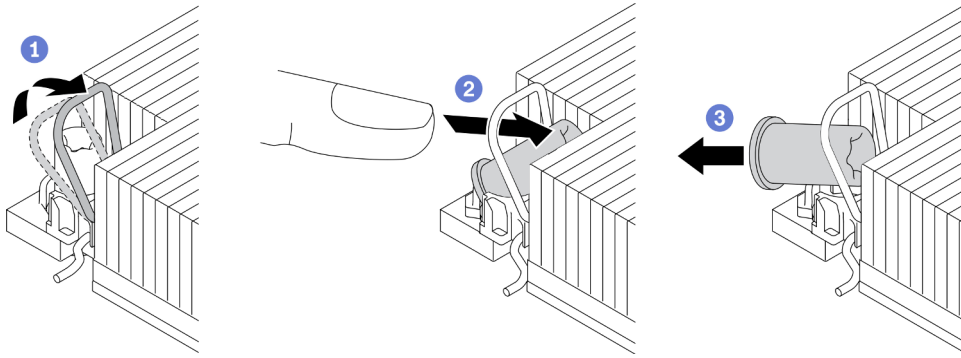


Figure 67. Removing a Torx T30 nut from the heat sink

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

- 1 Rotate the anti-tilt wire bail inwards.
- 2 Push the upper edge of the Torx T30 nut towards the center of the heat sink until it disengages.
- 3 Remove the Torx T30 nut.

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

After this task is completed

- Install a replacement unit. See “[Install a heat sink Torx T30 nut](#)” on page 87.
- 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.

[Watch the procedure on YouTube.](#)

Install a heat sink Torx T30 nut

See this topic to learn how to install a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

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

Procedure

Step 1. Install the Torx T30 nut.

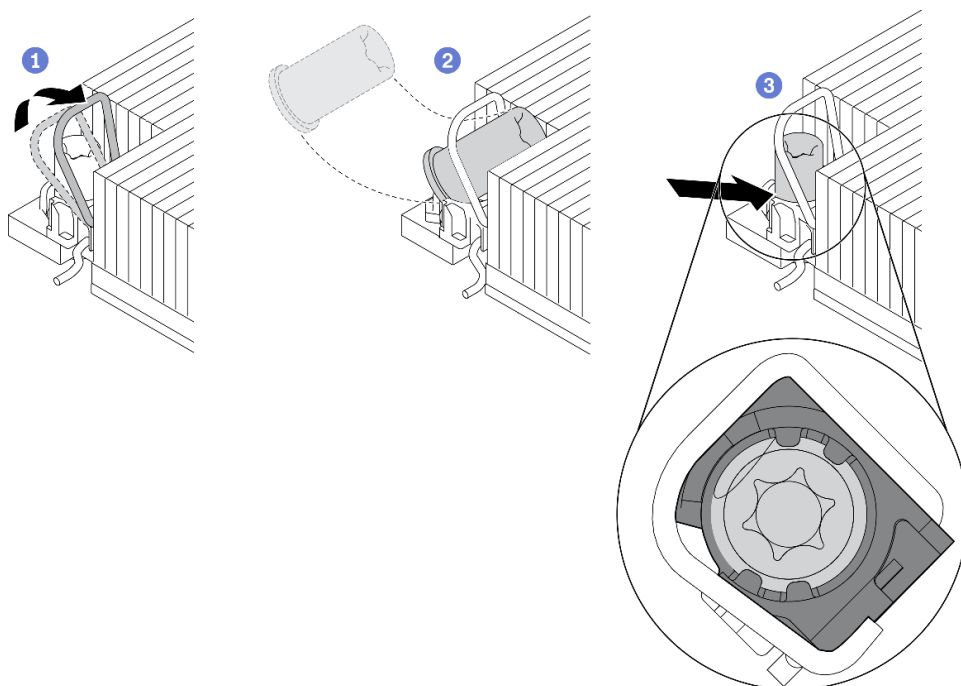


Figure 68. Installing a Torx T30 nut into the heat sink

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

- 1 Rotate the anti-tilt wire bail inwards.
- 2 Orient the Torx T30 nut under the anti-tilt wire bail; then, align the Torx T30 nut with the socket at an angle as shown.
- 3 Push the lower edge of the Torx T30 nut into the socket until it clicks into place. Make sure the Torx T30 nut is secured under the four clips in the socket.

After this task is completed

1. Make sure all four nuts are installed to the PHM, and install the PHM. See [“Install a processor and heat sink” on page 136](#).
2. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

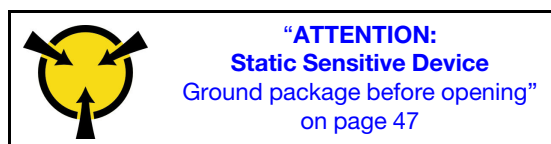
Memory module replacement

See these topics to learn how to remove and install a DIMM.

Remove a memory module

See this topic to learn how to remove a memory module.

About this task



Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 47](#):

- 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 touch. 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 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.
- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If any of the modules to be removed is PMEM:

- In the case of pure system board or expansion tray replacement, keep records of the slots in which the modules are installed, and make sure to install them back to the exact same slots after system board or expansion tray replacement.
- If the removed PMEM is to be replaced or reused in a different configuration, make sure to complete the following procedure before physically removing the module.

Attention: Without the following steps being completed, the removed PMEM will not be usable in another system or configuration.

a. Back up stored data in PMEM namespaces.

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

– **LXPM**

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

– **Setup Utility**

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

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

– **Linux** command:

```
ndctl destroy-namespace all -f
```

– **Windows** Powershell command

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

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

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

- e. Reboot the system.
2. If applicable, remove the security bezel (see “Remove the security bezel” on page 140).
3. Remove the top covers (see “Remove the top covers” on page 173).
4. Remove the air baffle (see “Remove the air baffle” on page 47).
5. Locate the memory module to be removed on the system board, and remove the corresponding components.

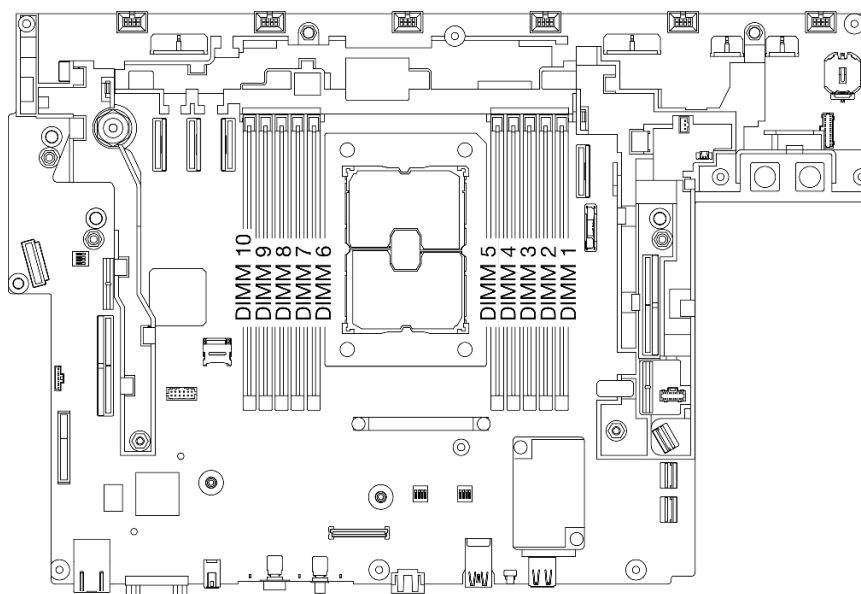


Figure 69. Memory module slots on the system board

- To remove DIMM 1 to 5: remove Riser 2.
- To remove DIMM 6 to 10: remove Riser 1.

See “Remove the PCIe riser assemblies and adapters” on page 104 for the topic corresponding to the present system configuration.

Step 2. Remove the memory module.

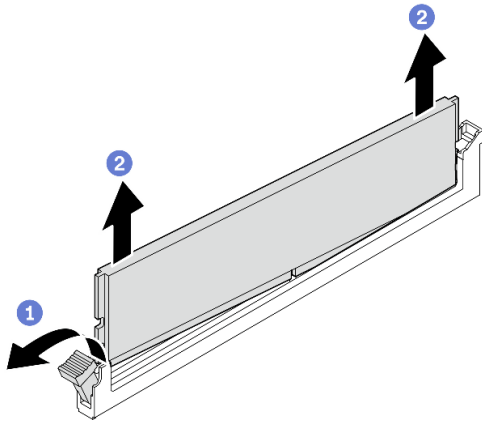


Figure 70. Removing a memory module

- ① Open the retaining clip to disengage the memory module. One end of the module will be slightly higher than the other.
- ② Grasp the memory module at both ends; then, gently lift it vertically to remove it from the slot.

After this task is completed

- Install a replacement unit (see [“Install a memory module” on page 91](#)).

Note: Make sure to install a replacement unit after removing a memory module. Otherwise, the system will execute memory downgrade to the closest supported combination, while some installed memory modules will not be recognized by the system.

- 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.

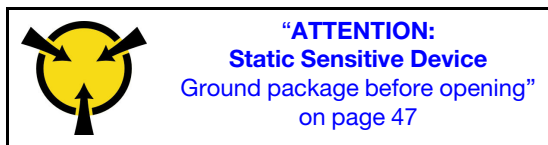
[Watch the procedure on YouTube.](#)

Install a memory module

See this topic to learn how to install a memory module.

About this task

See “Memory module installation rules and order” in *Setup Guide* for detailed information about memory configuration and setup.



Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 47](#):

- 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 touch. 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 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.
- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. If any of the modules to be installed is PMEM, make sure to complete the following procedure before physically installing the module:

1. Back up stored data in PMEM namespaces.
2. Disable PMEM security with one of the following options:
 - **LXPM**
Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - **Setup Utility**
Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
3. Delete namespaces with command corresponding to the operating system that is installed:
 - **Linux** command:

```
ndctl destroy-namespace all -f
```
 - **Windows** Powershell command

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

```
ipmctl delete -pcd
```

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

 - Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>
 - Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>
5. Reboot the system.

Step 2. Locate the slot to install the memory module in on the system board.

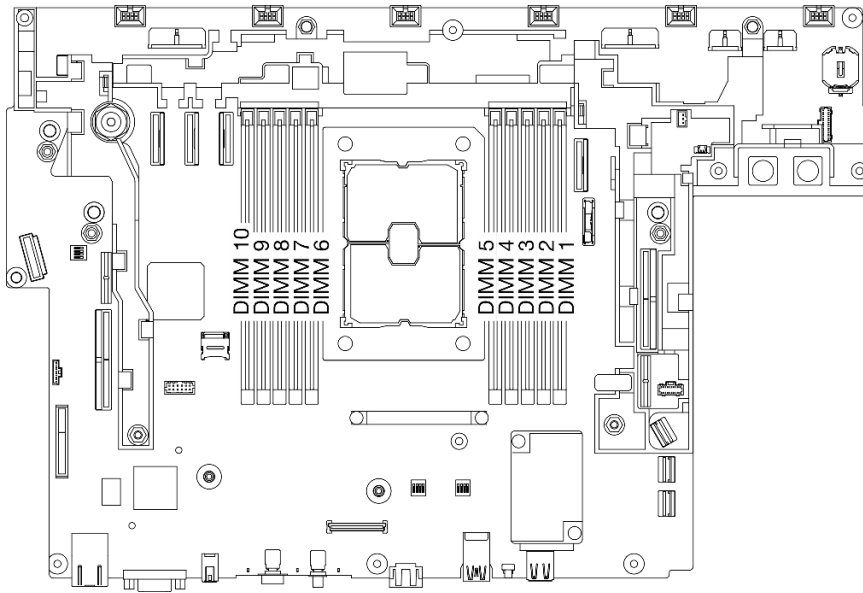


Figure 71. Memory module slots on the system board

Step 3. Install the memory module.

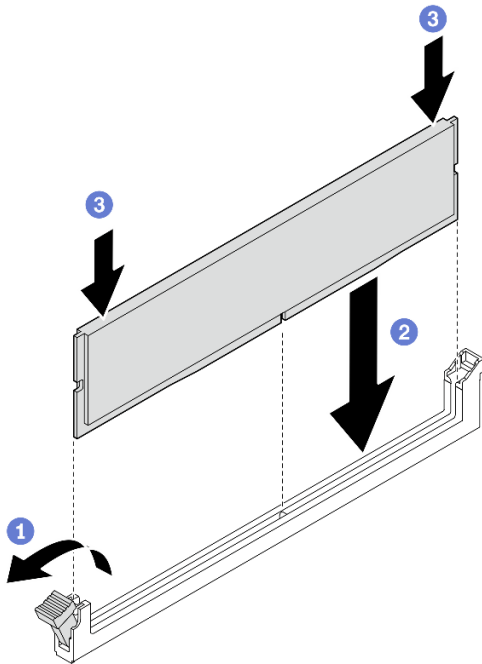


Figure 72. Installing a memory module

- 1 Open the retaining clip.
- 2 Align the memory module with the slot.
- 3 Firmly press both ends of the memory module straight down until the retaining clip snaps into the locked position.

Note: If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

After this task is completed

1. If there are plans of installing additional memory modules, proceed to install all of them.
2. If the replaced memory module is PMEM in APP Direct Mode, restore the backup data (see “PMEM rules” in *Setup Guide* for details).
3. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

M.2 boot adapter and drive replacement

See these topics to learn how to remove and install the M.2 boot adapter and drives.

Remove the M.2 boot adapter and drives

See this topic to learn how to remove the M.2 boot adapter and drives.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).

Step 2. Loosen the captive screw, and push the M.2 boot adapter slightly forward to detach it from the system board. Then, lift the M.2 boot adapter.

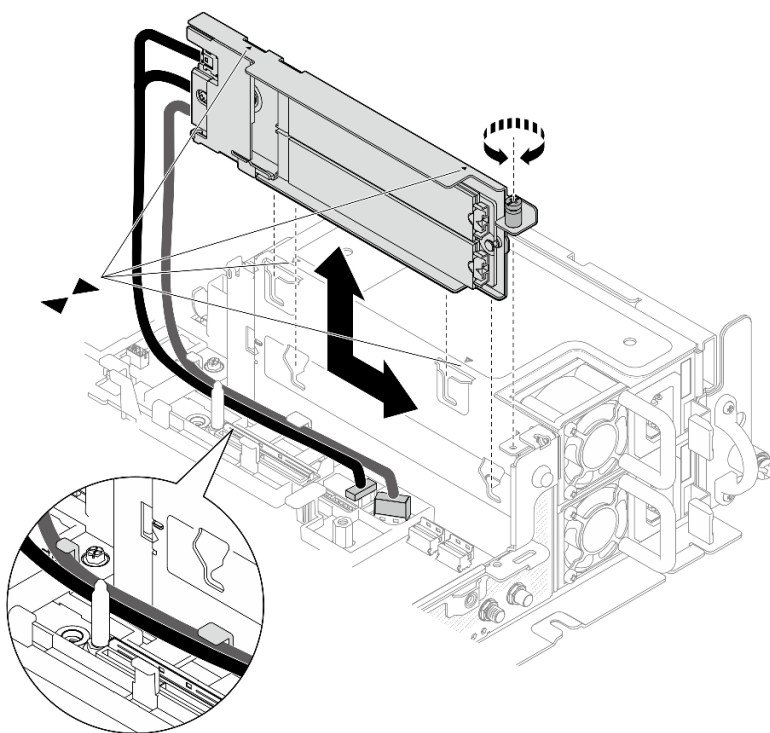
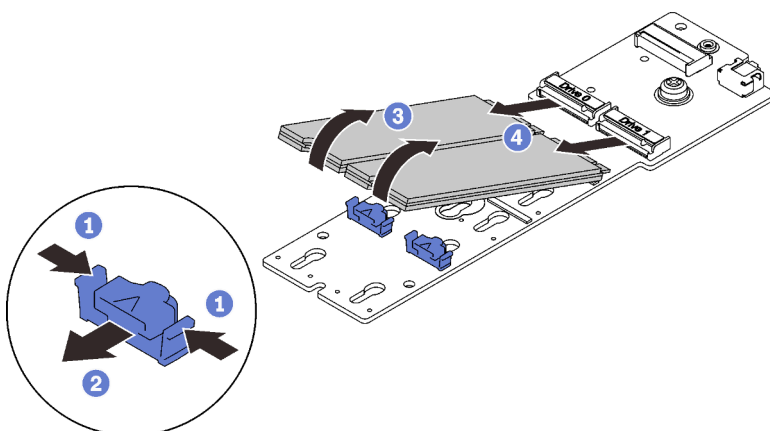


Figure 73. Removing the M.2 boot adapter

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

Figure 74. Removing the M.2 drives



- 1 Pinch and hold on the retainer clip.
- 2 Slightly push the retainer clip left to disengage the M.2 drives.
- 3 Pivot the rear side of the M.2 drives away from the backplane.
- 4 Remove the M.2 drives.

After this task is completed

- Install replacement units of M.2 drives (see [“Install the M.2 drives and boot adapter” 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.
- If there is a plan of recycling the component:

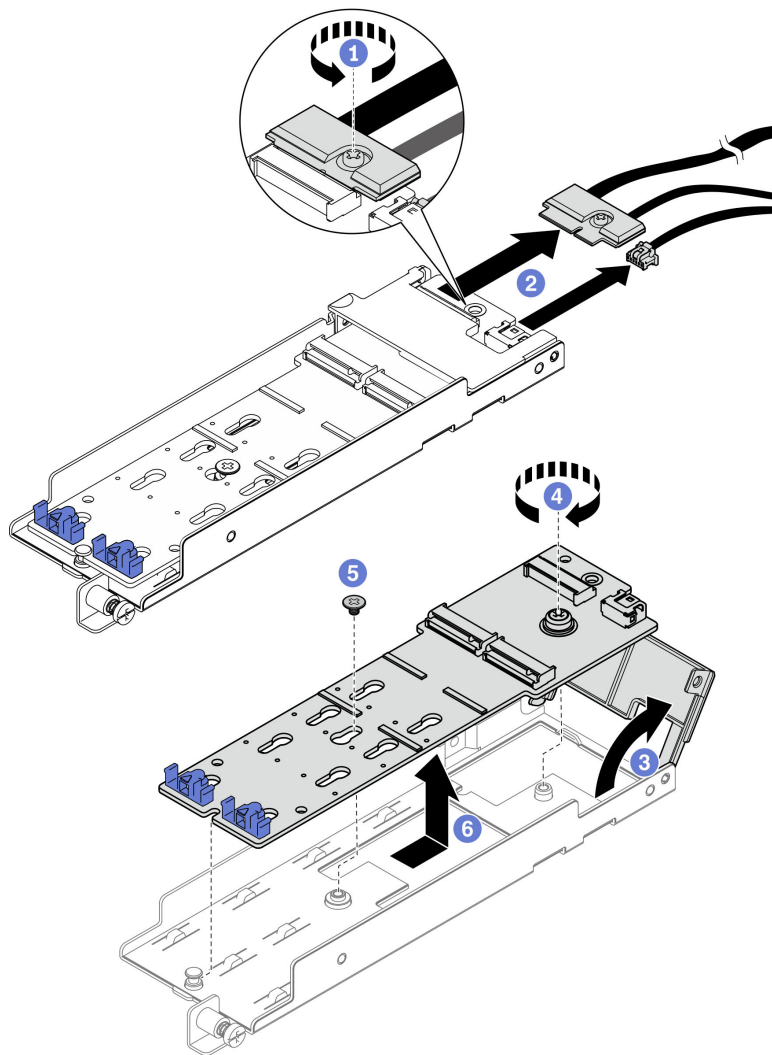


Figure 75. Disconnecting the M.2 cable

- 1 Loosen the captive screw that secure the M.2 cable to the adapter.
- 2 Disconnect the M.2 cable from the adapter.
- 3 Open the cover on the adapter.
- 4 Loosen the captive screw that secure the M.2 backplane to the adapter.
- 5 Remove the screw that secure the M.2 backplane to the adapter.
- 6 Remove the M.2 backplane from the adapter.

[Watch the procedure on YouTube.](#)

Install the M.2 drives and boot adapter

See this topic to learn how to install the M.2 drives and boot adapter.

About this task

Procedure

Step 1. If necessary, install the replacement backplane to the adapter.

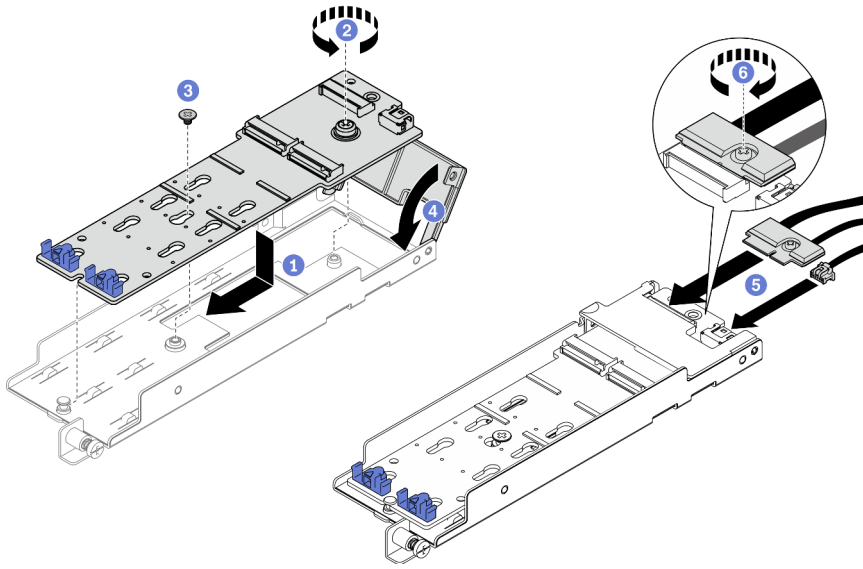


Figure 76. Installing the M.2 backplane

- 1 Align the backplane with the slot in the adapter.
- 2 Tighten the captive screw on the M.2 backplane.
- 3 Secure the M.2 backplane with a screw.
- 4 Close the adapter cover.
- 5 Connect the M.2 cable to the backplane.
- 6 Tighten the captive screw to secure the M.2 cable.

Step 2. Install the M.2 drives to the backplane.

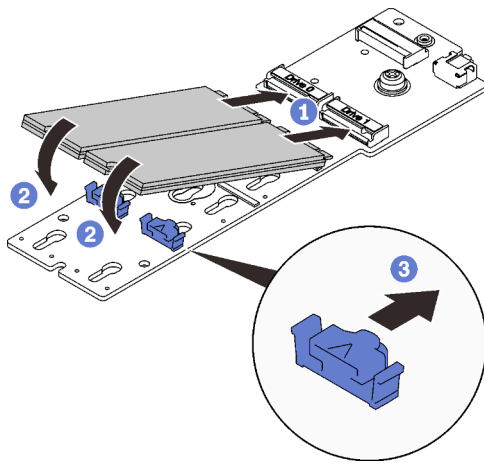


Figure 77. Installing the M.2 drives

- 1 Align the M.2 drives with the connectors.
- 2 Pivot the other end of the M.2 drives toward the backplane.
- 3 Slide the retaining clips forward to secure the drives to the backplane.

Step 3. Contain the cables between the guiding pin and the two cable clips as illustrated. Align the pointed ends of the two triangles on the adapter and the power supply cage, and lower the bracket. Then, slide the adapter backward slightly, and tighten the captive screw to secure the adapter.

Note: To spare space for proper installation, make sure to contain the cables with the two cable clips as illustrated before installing the adapter.

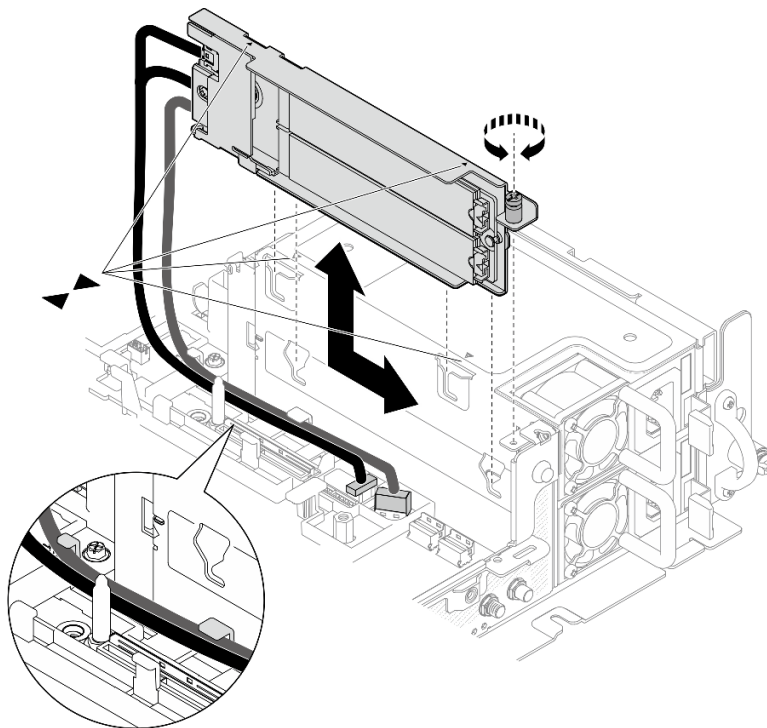


Figure 78. Installing the M.2 boot adapter

After this task is completed

1. Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).
2. Deploy the operating system (see "Deploy the operating system" in *Setup Guide*).

[Watch the procedure on YouTube.](#)

OCP Ethernet adapter replacement

See these topics to learn how to remove and install the OCP Ethernet adapter.

Remove the OCP Ethernet adapter

See this topic to learn how to remove the OCP Ethernet adapter.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).

Step 2. Loosen the captive screw, and slide the adapter out from the chassis.

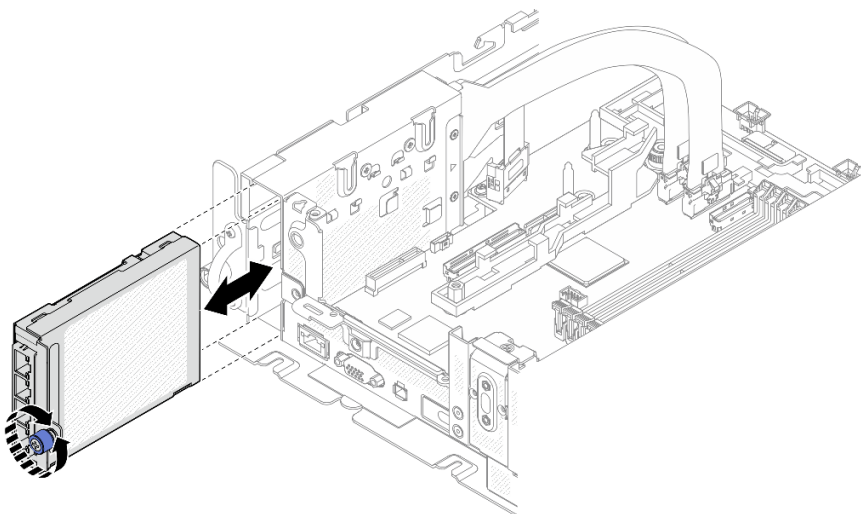


Figure 79. Removing the OCP Ethernet adapter

After this task is completed

- Install a replacement unit if necessary (see [“Install the OCP Ethernet adapter” on page 101](#)).
- 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.
- If you plan to recycle the OCP adapter, complete the following steps.
 1. Loosen the two captive screws that secure the cover to the adapter, and remove the cover.

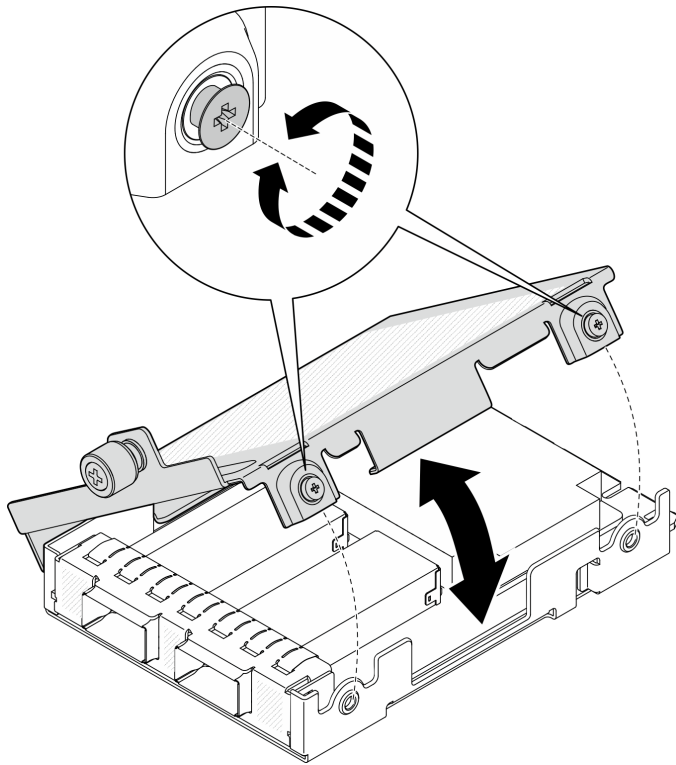


Figure 80. Disassembling the OCP adapter

2. Separate the adapter from the lower cover.

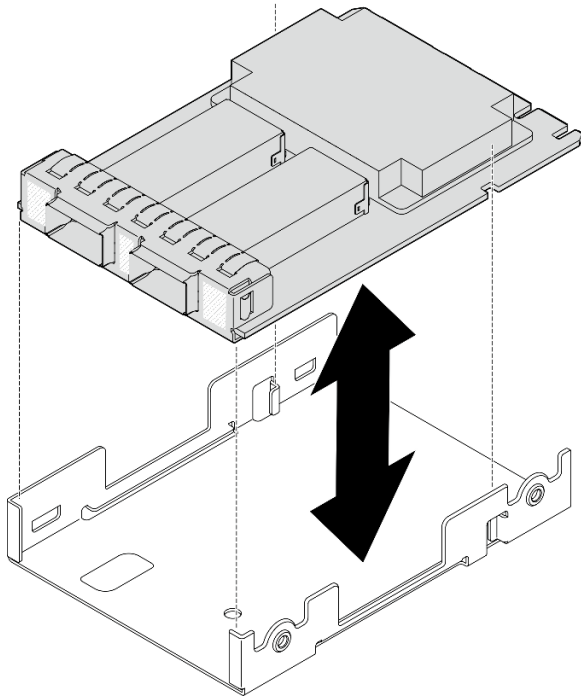


Figure 81. Disassembling the OCP adapter

3. Recycle the parts in compliance with local regulations.

[Watch the procedure on YouTube.](#)

Install the OCP Ethernet adapter

See this topic to learn how to install the OCP Ethernet adapter.

About this task

Note: Before adding a new OCP Ethernet adapter to the server, make sure the present Riser 1 adapter configuration is x16 or x16/x8, so that PCIe 4 and 5 slots on the system board are available for the OCP cable.

Procedure

- Step 1. If the OCP cable has not been installed, complete the following steps:
 - a. If necessary, remove the screw that secures the OCP filler; then, remove the filler.

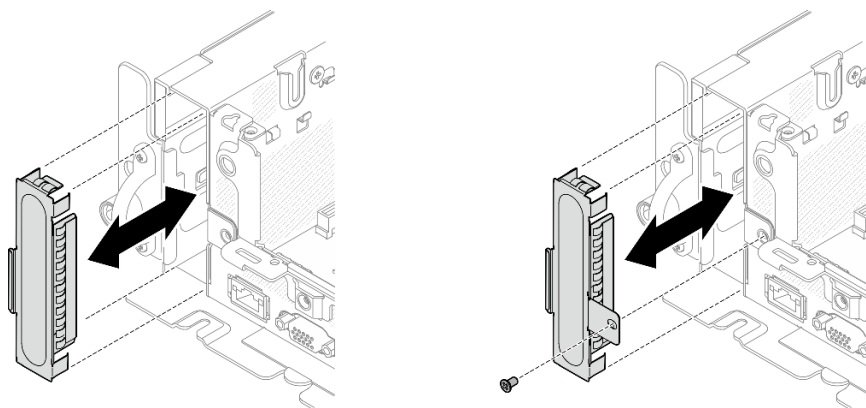
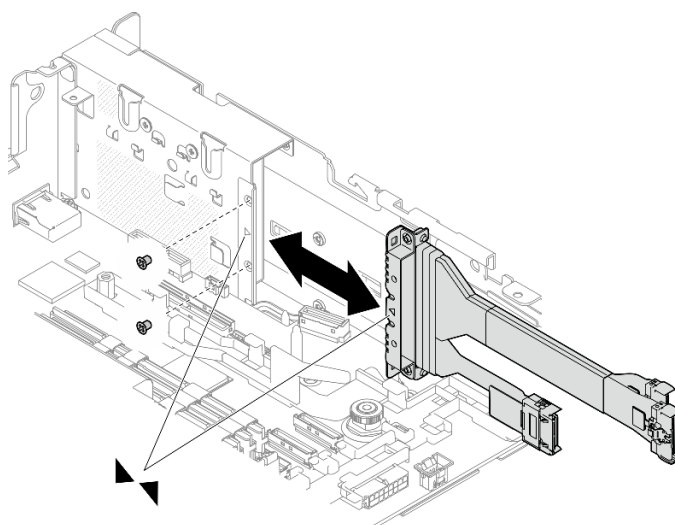


Figure 82. Removing the OCP filler

Note: There are two types of OCP filler. The one is secured with a screw, while the other is not.

- b. Remove PCIe riser 1 if applicable (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).
- c. Align the pointed ends of two triangles on the OCP cable and OCP cage, and secure the cable with two screws.

Figure 83. Installing the OCP cable



- d. Connect the OCP cable to the system board. Make sure to contain the cable with the clip as illustrated.

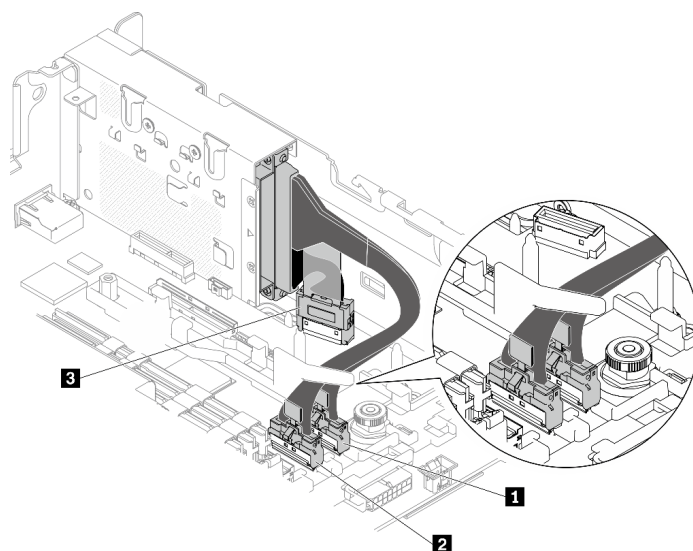


Figure 84. Cable routing for the OCP 3.0 Ethernet adapter

Table 27. Cable routing for the OCP 3.0 adapter

	From	To
1	OCP 3.0 Ethernet adapter	PCIe connector 4
2		PCIe connector 5
3		OCP connector

Step 2. Slide the OCP Ethernet adapter into the chassis, and tighten the captive screw to secure the adapter.

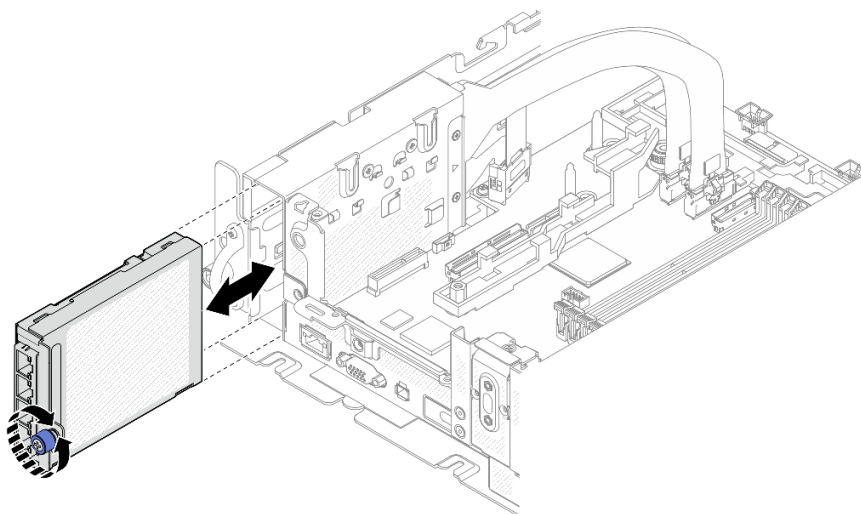


Figure 85. Installing the OCP Ethernet adapter

Step 3. Connect Ethernet cables to the OCP Ethernet adapter.

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement”](#) on page 179).

[Watch the procedure on YouTube.](#)

PCIe riser assembly and adapter replacement

See these topics to learn how to remove or install the PCIe riser assemblies, adapters, and hot-swap drive cage.

Remove the PCIe riser assemblies and adapters

See this topic to learn how to remove the PCIe riser assemblies and adapters.

About this task

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).

Step 2. Proceed to the corresponding topic to the type of PCIe riser assembly to be removed.

- Riser assemblies with half-length adapters:
 - [“Riser assembly with AnyBay drive cage” on page 105](#)
 - [“Riser assemblies with full-length adapters” on page 106](#)

Remove riser assemblies with half-length adapters

Step 1. Disconnect all the cables from the adapters and system board.

Step 2. Loosen the two captive screws; then, lift the riser assembly to remove it from the chassis.

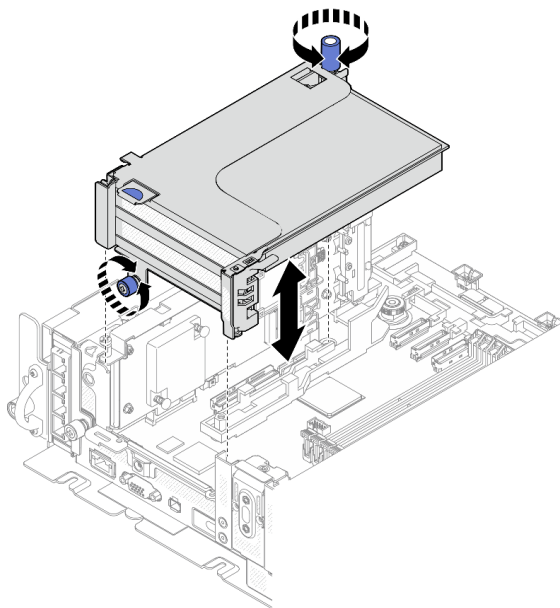


Figure 86. Removing PCIe riser 1

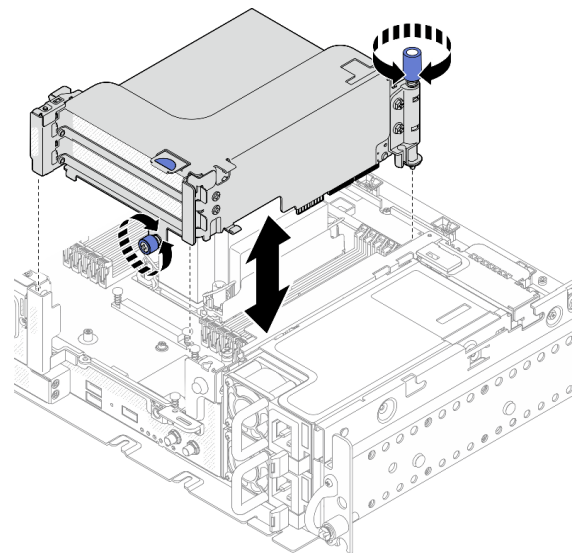


Figure 87. Removing PCIe riser 2

Step 3. Open the retainer, and remove the screws that secure the adapter to the riser.

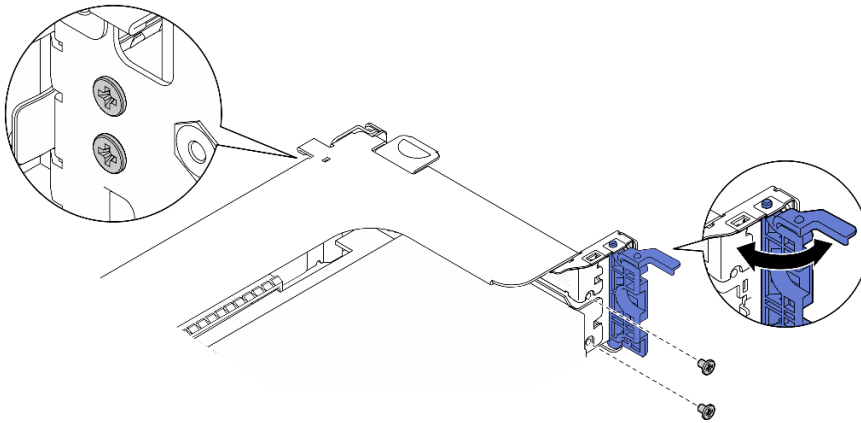


Figure 88. Removing the retaining screws

Step 4. Press on the latch to disengage the adapter from the riser, and remove the adapter.

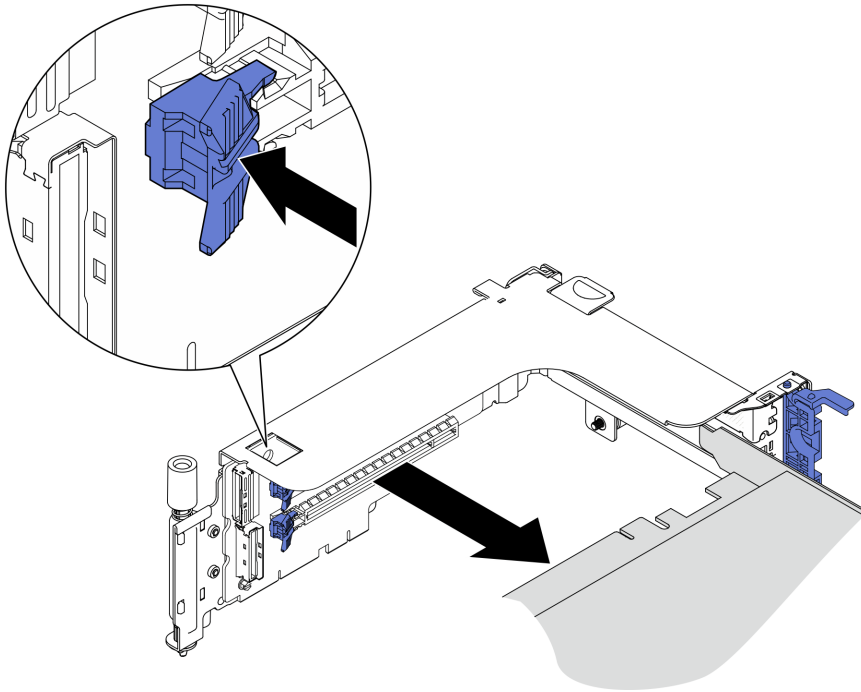


Figure 89. Removing an adapter from the riser

[Watch the procedure on YouTube.](#)

Remove PCIe riser 2 with AnyBay drive cage

Procedure

Step 1. Remove the power and signal cables from the AnyBay drive cage.

Step 2. Loosen the two captive screws; then, lift the riser assembly to remove it from the chassis.

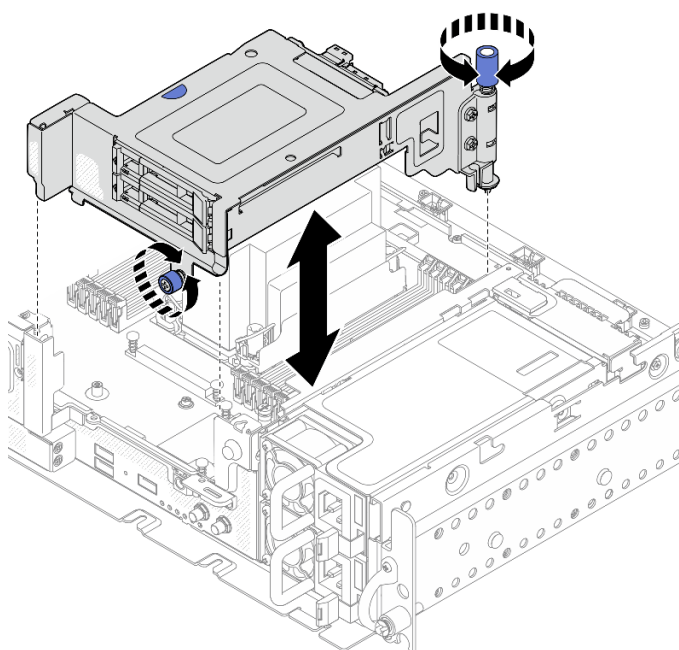


Figure 90. Removing PCIe riser 2 with drive cage

- Step 3. Gently rotate the release latch away to unlock the drive handle; then, grasp and pull the handle to remove the drive from the drive bay.

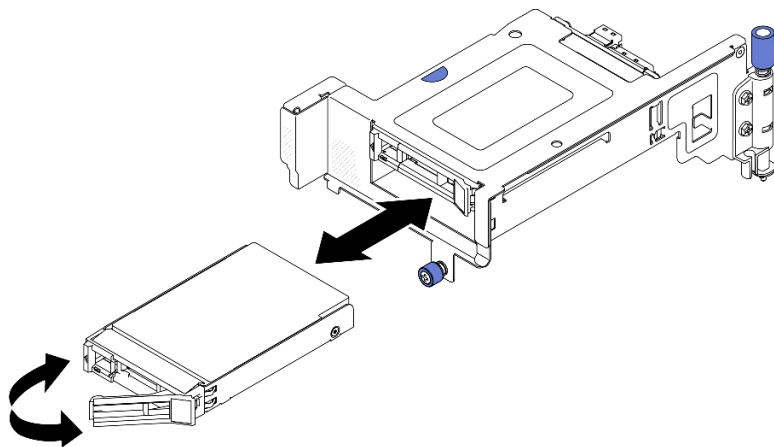


Figure 91. Removing the hot-swap drives

[Watch the procedure on YouTube.](#)

Remove PCIe riser assemblies with full-length adapters

- Step 1. Remove the supporting bracket.

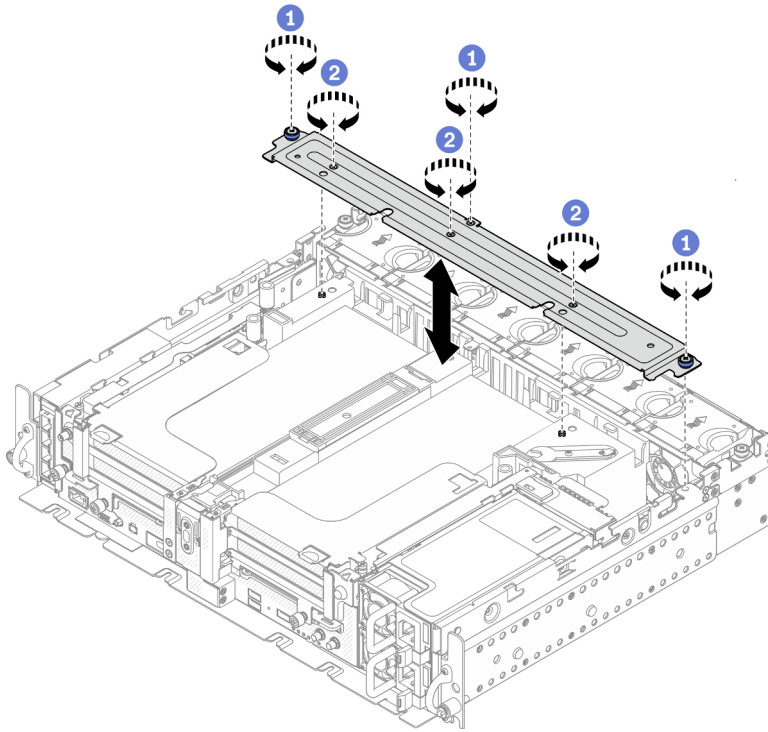


Figure 92. Removing the supporting bracket

- 1 Loosen the one captive screw and two thumbscrews that secure the bracket to the chassis.
- 2 Loosen the other three screws, and remove the bracket from the air baffle.

Step 2. Disconnect the GPU power cables from the adapters.

Note: If there is a plan of replacing GPU power cables, make sure to remove the fan cage first (see [“Remove the fans and the fan cage” on page 74](#)).

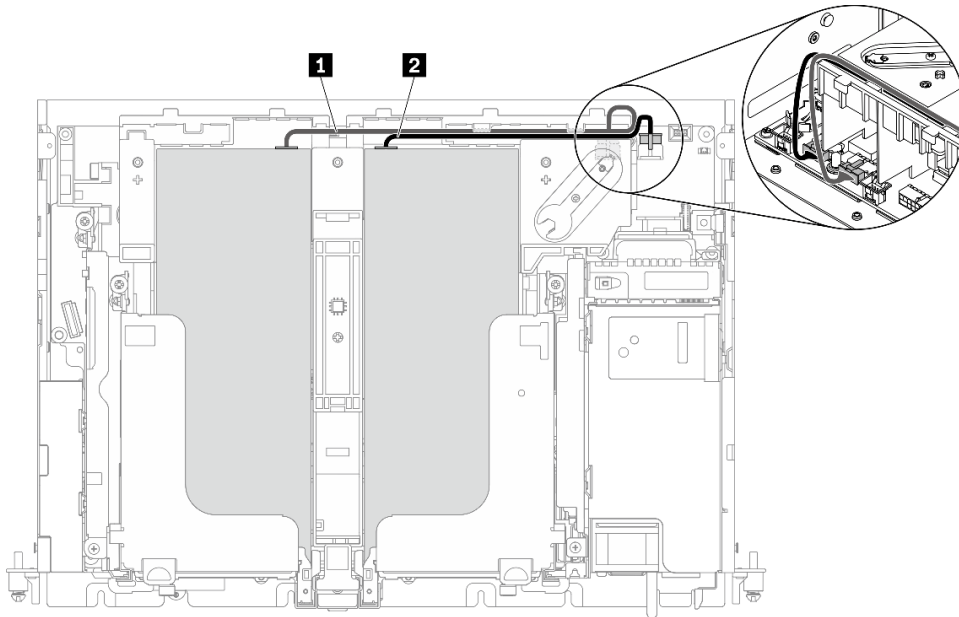


Figure 93. Cable routing for GPU power cables

Table 28. Cable routing for GPU power cables

	From	To
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

Step 3. Loosen the four captive screws; then lift and remove both PCIe riser assemblies.

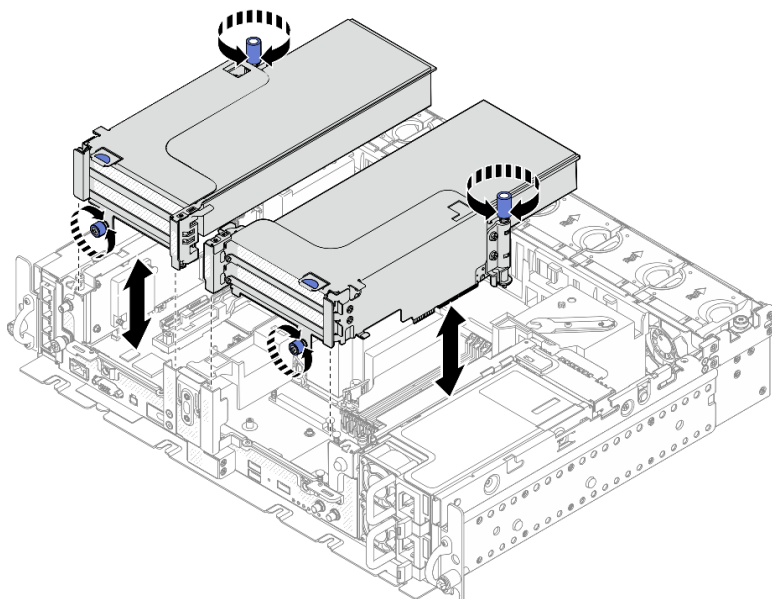


Figure 94. Removing PCIe riser assemblies with full-length adapters

Step 4. Open the retainer, and remove the screws that secure the adapter to the riser.

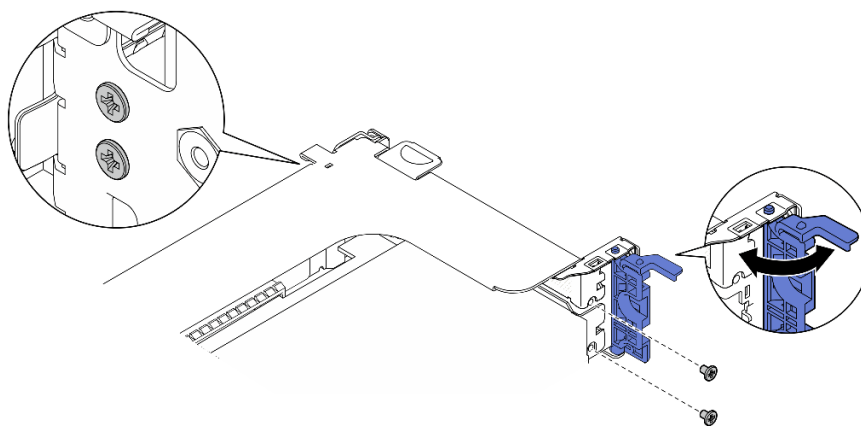


Figure 95. Removing the retaining screws

Step 5. Press on the latch to disengage the adapter from the riser, and remove the adapter.

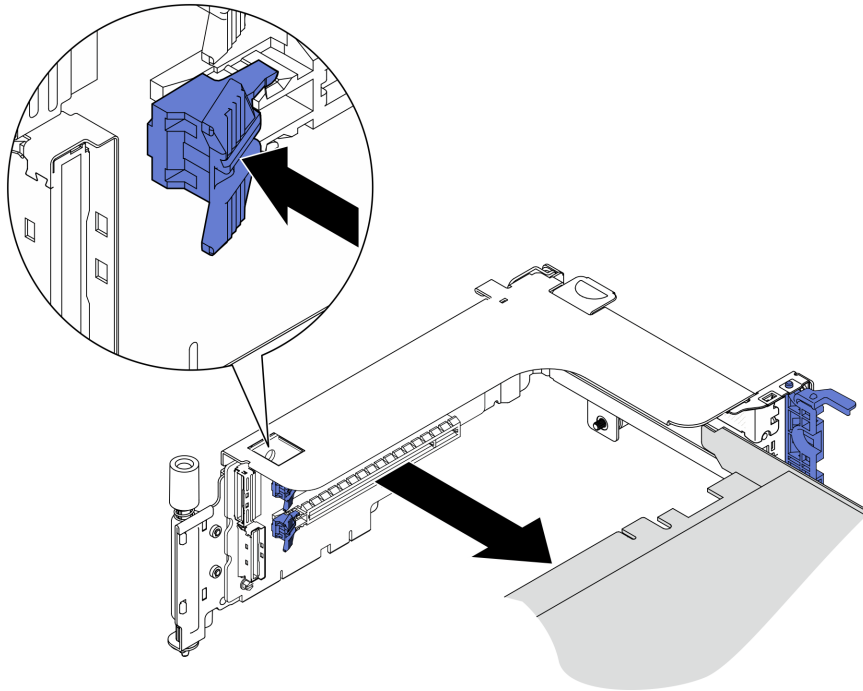


Figure 96. Removing an adapter from the riser

Step 6. If necessary, lift the air baffle and remove it from the chassis.

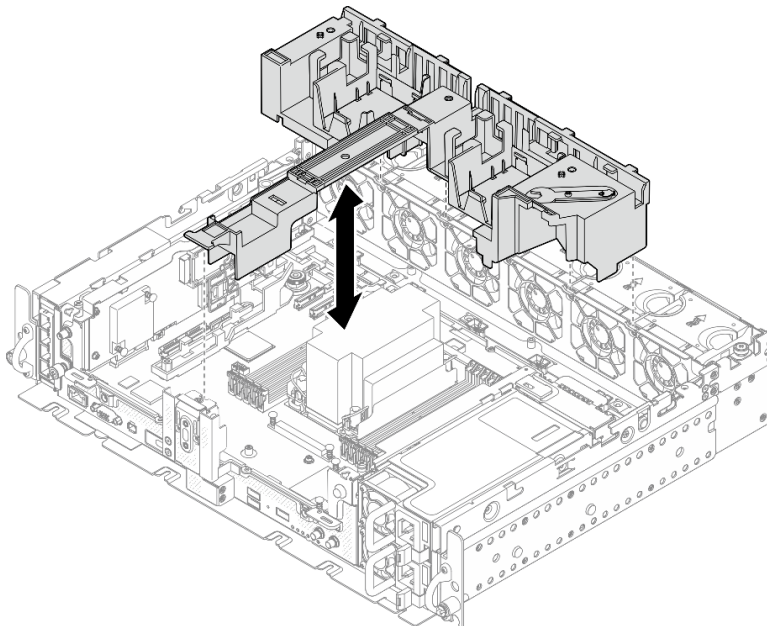


Figure 97. Removing the 360mm air baffle (with full-length adapters)

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.
- If there is a recycle plan, complete the following step corresponding to the component to be recycled:

- Remove the PCIe riser-card from the riser:

- **Riser 1**

Remove the three screws that secure the riser card to the riser.

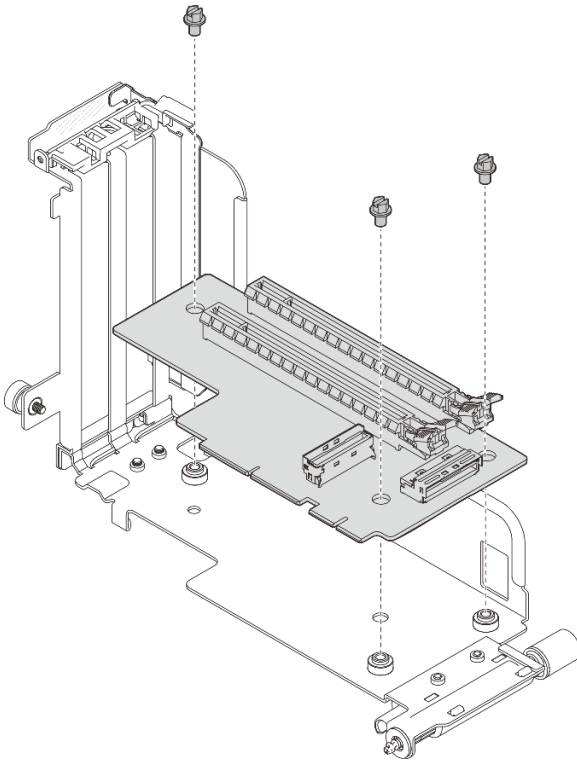


Figure 98. Disassembling Riser 1

- **Riser 2**

Remove the four screws that secure the riser card to the riser.

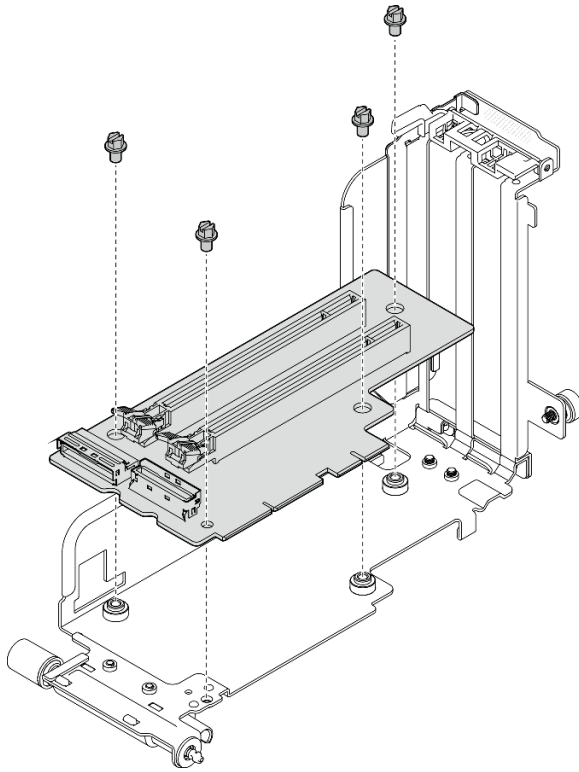


Figure 99. Disassembling Riser 2

- Remove the AnyBay drive backplane from PCIe riser 2 with AnyBay drive cage. Remove the two screws that secure the AnyBay drive backplane to the riser cage.

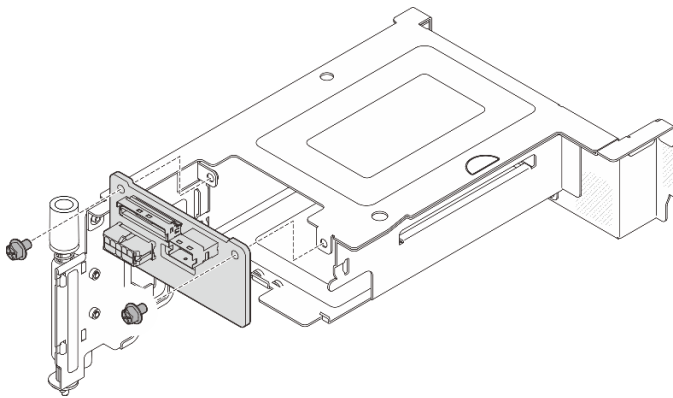


Figure 100. Disassembling the AnyBay drive cage

[Watch the procedure on YouTube.](#)

Install the PCIe adapters and riser assemblies

See this topic to learn how to install the PCIe adapters and riser assemblies.

About this task

1. Before installing the PCIe riser assemblies, make sure to complete installation and cable routing of trayless drives and the drive cage.

2. Make sure the required PCIe cables for the planned configuration are connected to the risers. See the following table for the required cables for each configuration, and connect the cable end with corresponding printing to the riser connector.

Table 29. Required PCIe cables for PCIe riser assemblies (300mm chassis)

Riser 1				Riser 2			
	x16	x16/x8	x16x16		x16	x8/x16	x16x16
Riser-card connector 3 (Right angle)			RISER3	Riser-card connector 1 (Right angle)			RISER1
Riser-card connector 2 (Vertical)		RISER2/0	RISER2/0	Riser-card connector 0 (Vertical)		RISER2/0	RISER2/0

3. Full-length adapters are supported in the configurations with 1U heat sink installed in 360mm chassis. Make sure the adapter to be installed is supported in the selected configuration.
4. Proceed to the corresponding topic to the type of PCIe adapters to be installed.
 - [“Install half-length adapters and riser assemblies” on page 112](#)
 - [“Install PCIe Riser 2 with AnyBay drive cage” on page 116](#)
 - [“Install full-length adapters and riser assemblies \(360mm chassis\)” on page 117](#)

Install half-length adapters and riser assemblies

Procedure

Step 1. If necessary, install the PCIe riser-card to the riser.

- **Riser 1**

Secure the riser card to the riser with three screws.

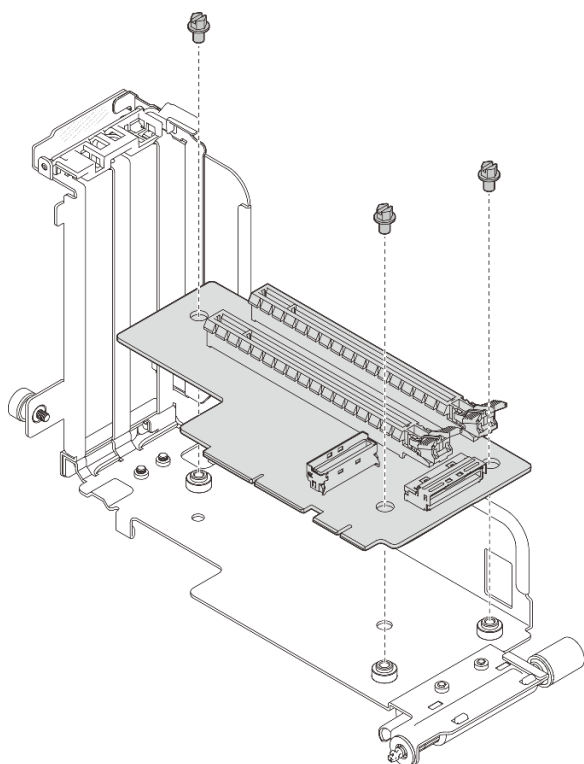


Figure 101. Installing the riser-card to Riser 1

- **Riser 2**

Secure the riser card to the riser with four screws.

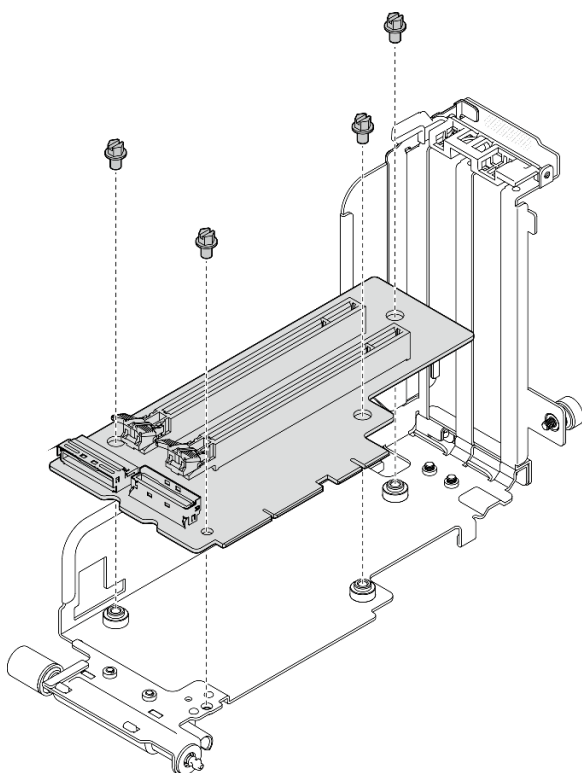


Figure 102. Installing the riser-card to Riser 2

Step 2. Align the adapter with the connector in the riser assembly, and push it in until the latch clicks in the lock position.

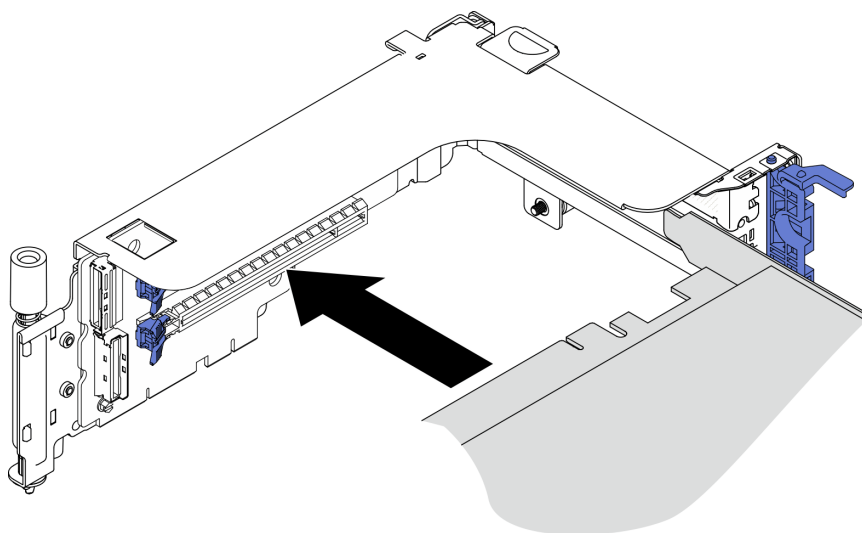


Figure 103. Installing an adapter to the riser

Step 3. Secure the adapter with screws and close the retaining latch. Two spared screws are available on the side of the riser.

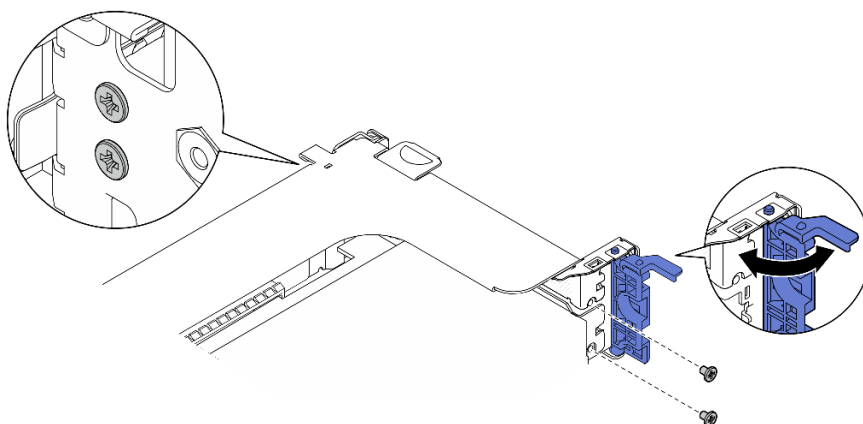


Figure 104. Securing an adapter to the riser

- Step 4. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

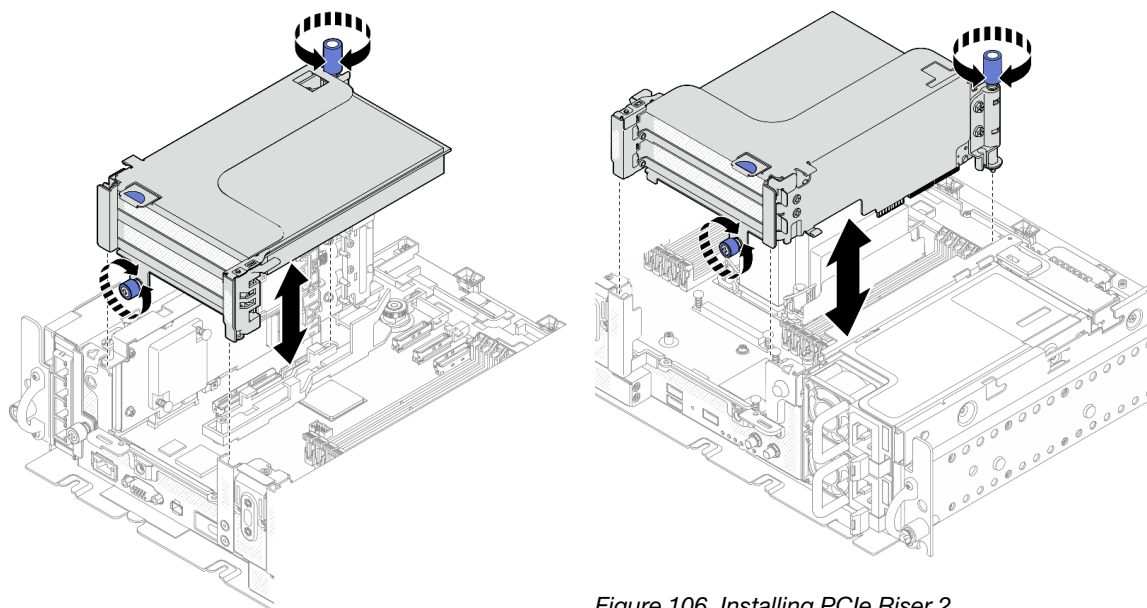


Figure 106. Installing PCIe Riser 2

Figure 105. Installing PCIe Riser 1

- Step 5. Repeat the same procedure on the other riser assembly.

If the other riser is Riser 2 with AnyBay drive cage, proceed to [“Install PCIe Riser 2 with AnyBay drive cage” on page 116](#).

- Step 6. If one RAID adapter is installed in Slot 6, connect the SAS cable to the RAID adapter. See “Cable routing: 15mm SAS/SATA drives with hardware RAID adapter” or “Cable routing: 7mm SATA drives with hardware RAID adapter” in *Setup Guide* for details.
- Step 7. Reconnect the cables if applicable.

Note: x16 + x16 configuration does not require riser cables.

[>Watch the procedure on YouTube.](#)

Install PCIe Riser 2 with AnyBay drive cage

Procedure

Step 1. If necessary, secure the AnyBay drive backplane to the riser cage with two screws.

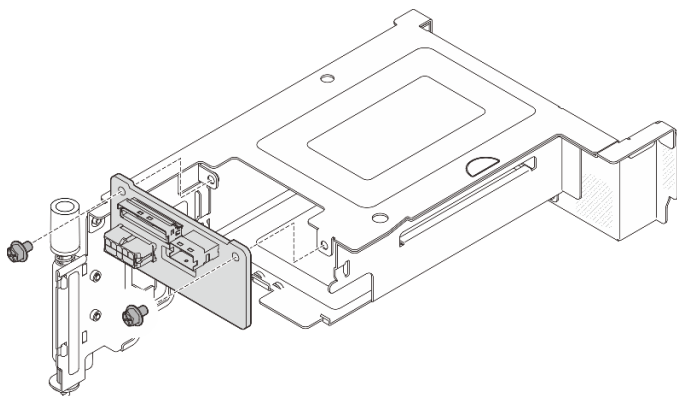


Figure 107. Installing the AnyBay backplane to the drive cage

Step 2. Gently rotate the release latch away to unlock the drive handle; then, slide the drive into the drive bay until it stops, and rotate the handle back to the locked position.

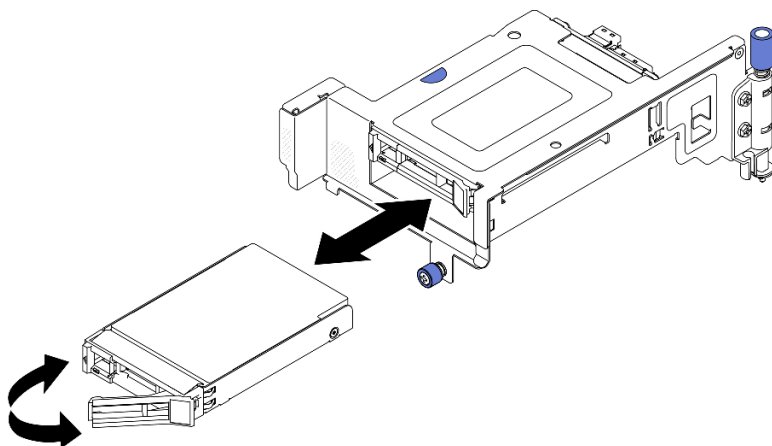


Figure 108. Installing the hot-swap drives

Step 3. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

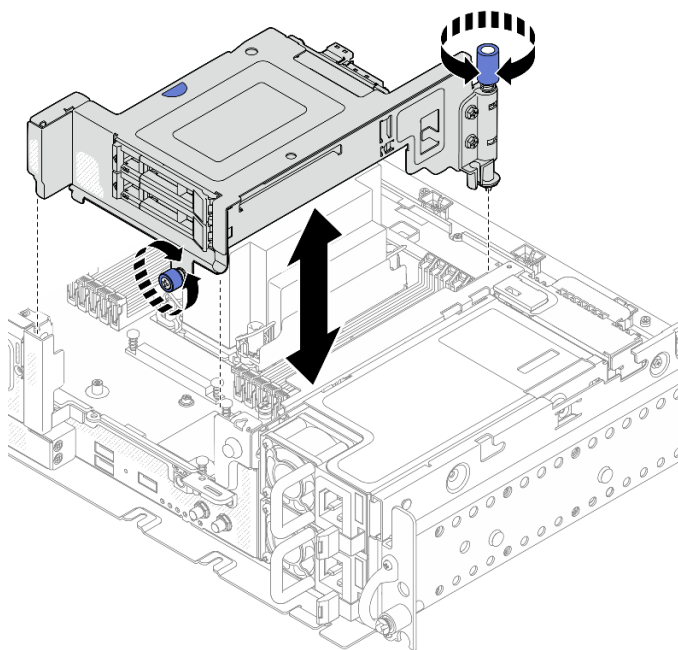


Figure 109. Installing PCIe riser 2 with AnyBay drive cage

Step 4. Reconnect the cables if applicable.

[>Watch the procedure on YouTube.](#)

Install full-length adapters and riser assemblies (360mm chassis)

Full-length adapters are supported in the configurations with 1U heat sink installed in 360mm chassis. Make sure the adapter to be installed is supported in the selected configuration.

Procedure

Step 1. If necessary, install the PCIe riser-card to the riser.

- **Riser 1**

Secure the riser card to the riser with three screws.

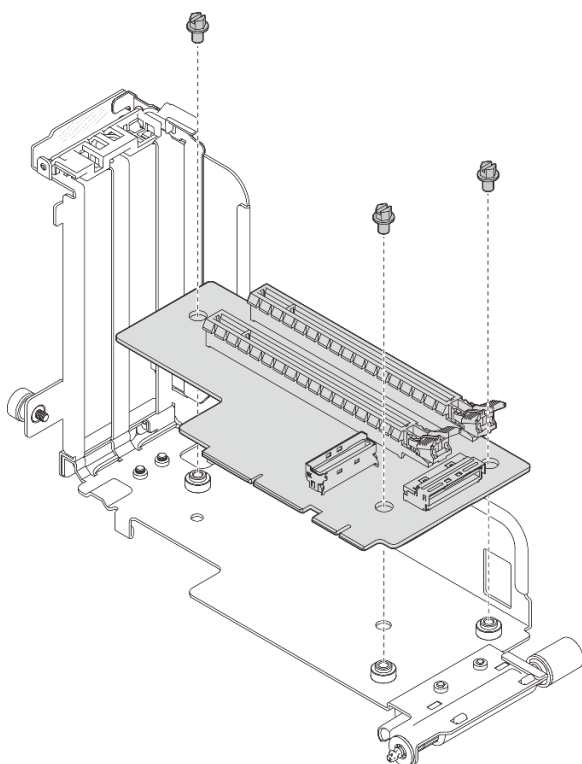


Figure 110. Installing the riser-card to Riser 1

- **Riser 2**

Secure the riser card to the riser with four screws.

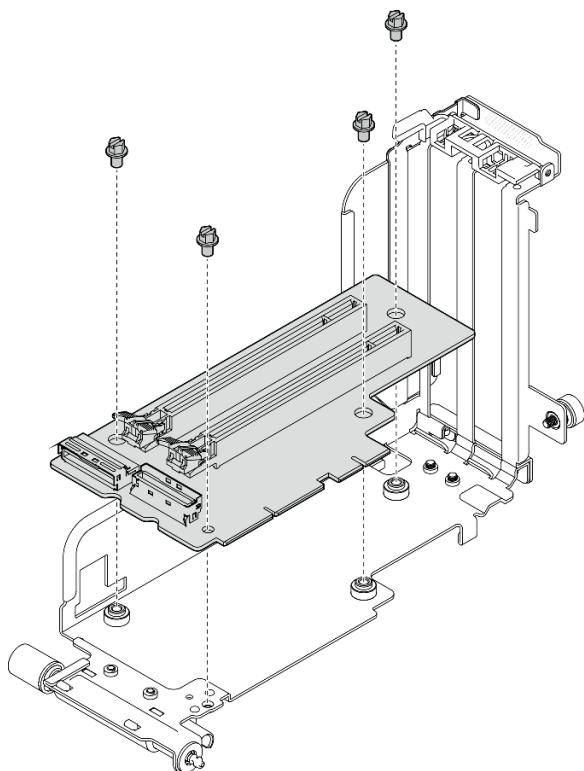


Figure 111. Installing the riser-card to Riser 2

- Step 2. Make sure the GPU power cables are connected to the system board.
- Step 3. Make sure the air baffle is installed before installing the PCIe riser assemblies.

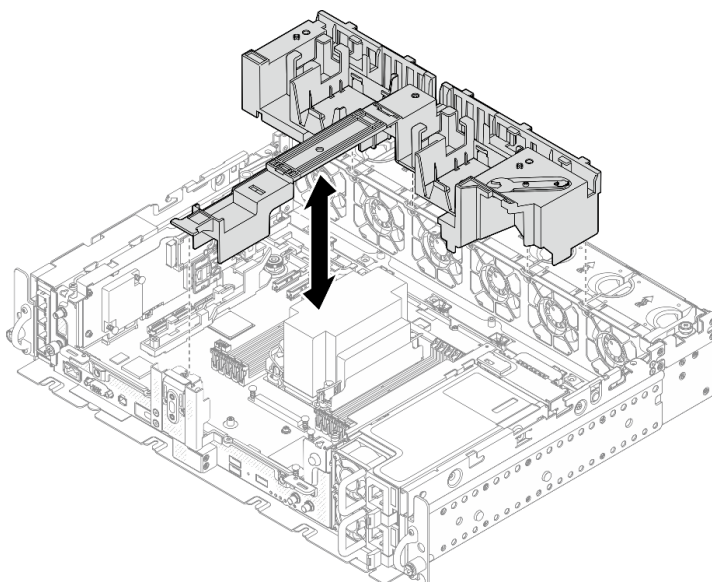


Figure 112. Installing the air baffle

Notes:

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

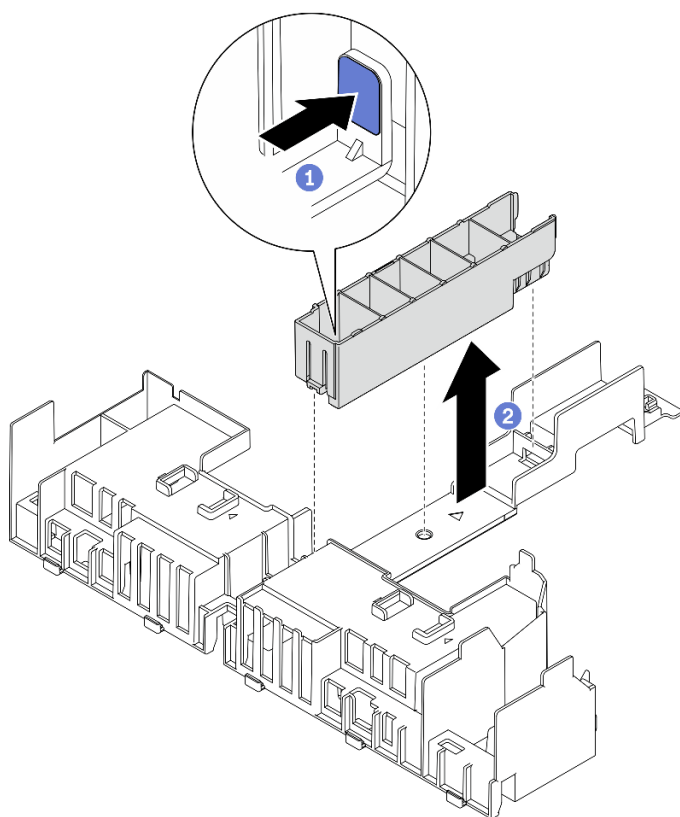


Figure 113. Installing the heat sink filler

Step 4. Align the adapter with the connector in the riser assembly, and push it in until the latch clicks in the lock position.

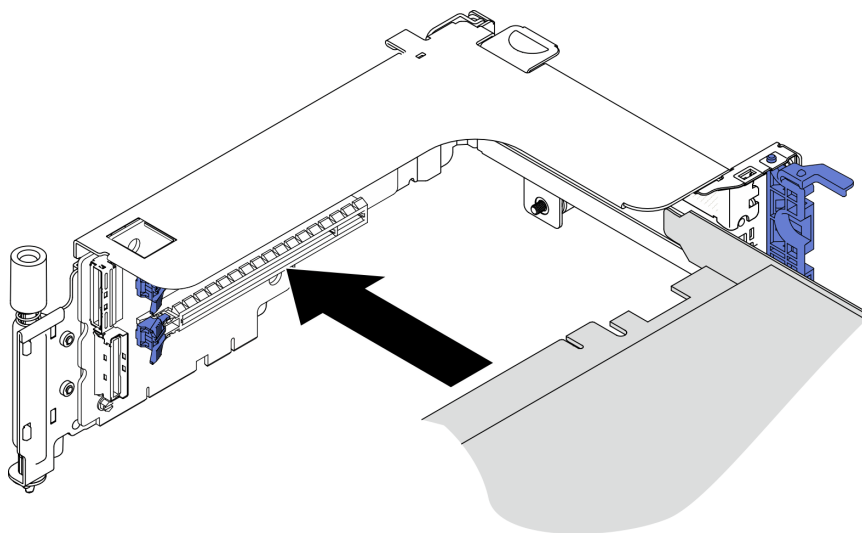


Figure 114. Installing an adapter to the riser

Step 5. Secure the adapter with screws and close the retaining latch. Two spared screws are available on the side of the riser.

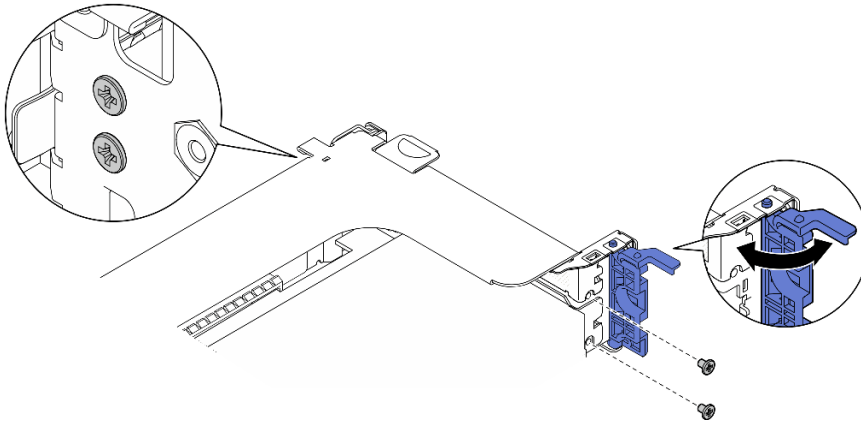


Figure 115. Securing an adapter to the riser

Step 6. Connect the GPU power cabled to the adapters.

Step 7. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

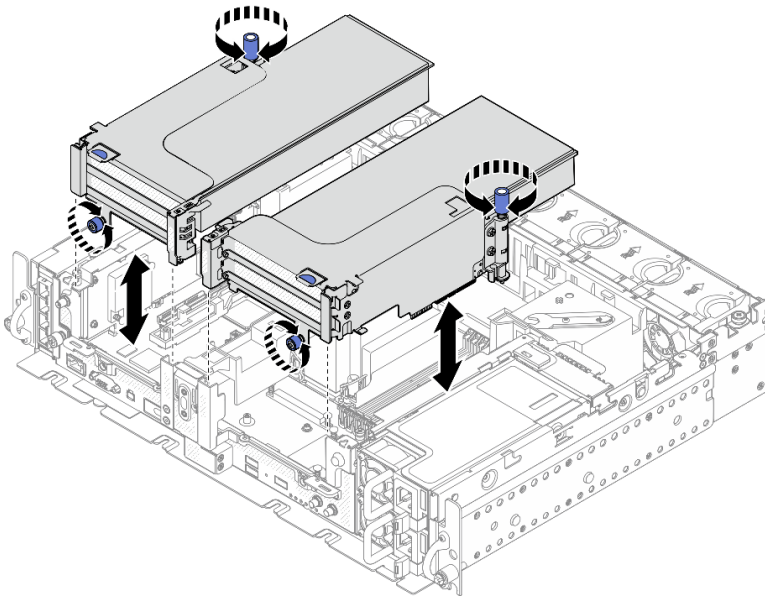


Figure 116. Installing the riser assemblies

Step 8. Route the GPU power cables as illustrated.

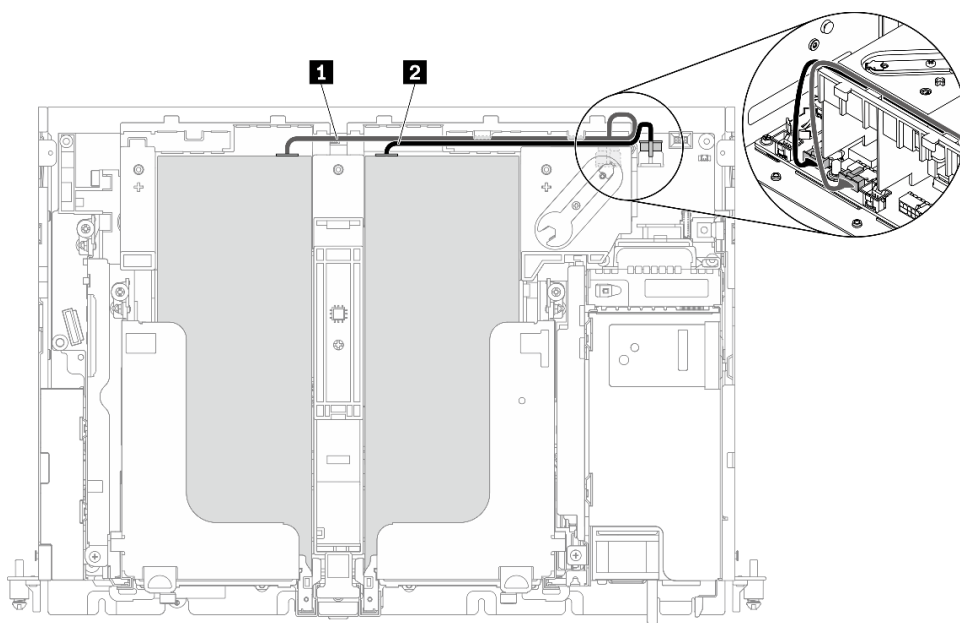


Figure 117. Cable routing for GPU power cables

Notes:

- Make sure **1** goes on top of **2**.
- Make sure to secure the power cables along the channel on the air baffle.

Table 30. Cable routing for GPU power cables

	From	To
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

Step 9. Install the supporting bracket.

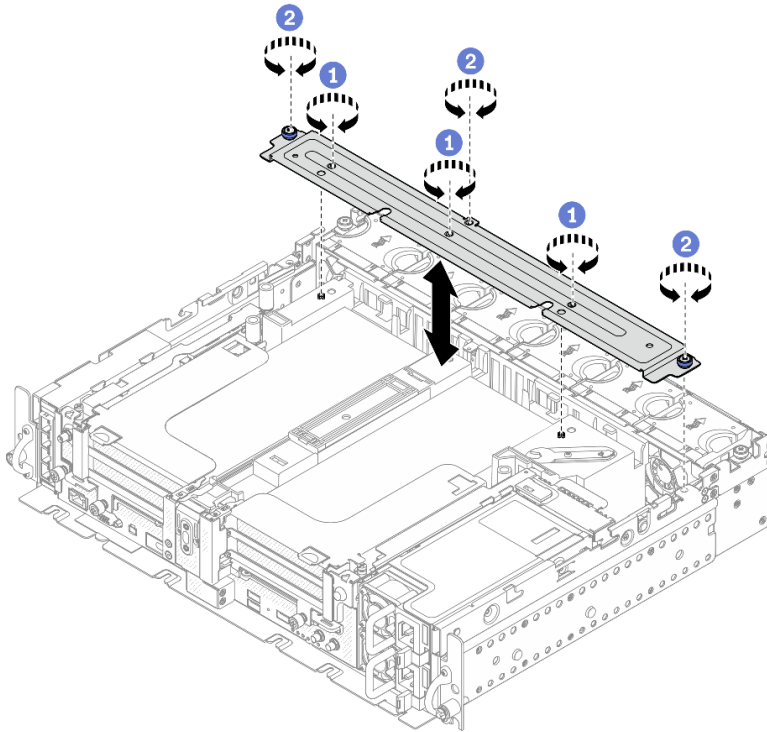


Figure 118. Installing the supporting bracket

- 1 Tighten the three screws in the middle to secure the supporting bracket from the air baffle.
- 2 Tighten the one captive screw and two thumbscrews to secure the bracket to the chassis.

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[>Watch the procedure on YouTube.](#)

Power backplane replacement

See these topics to learn how to remove and install the power backplane.

Remove the power backplane

See this topic to learn how to remove the power backplane.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove both power supplies (see [“Remove a hot-swap power supply unit” on page 126](#)).
3. Remove the top covers (see [“Remove the top covers” on page 173](#)).
4. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
5. Remove the fan cage assembly (see [“Remove the fan cage assembly” on page 76](#)).

Step 2. Disconnect the sideband cable from the power backplane, and disengage the intrusion switch cable from the power backplane.

Step 3. Hold and lift the power backplane to remove it from the chassis.

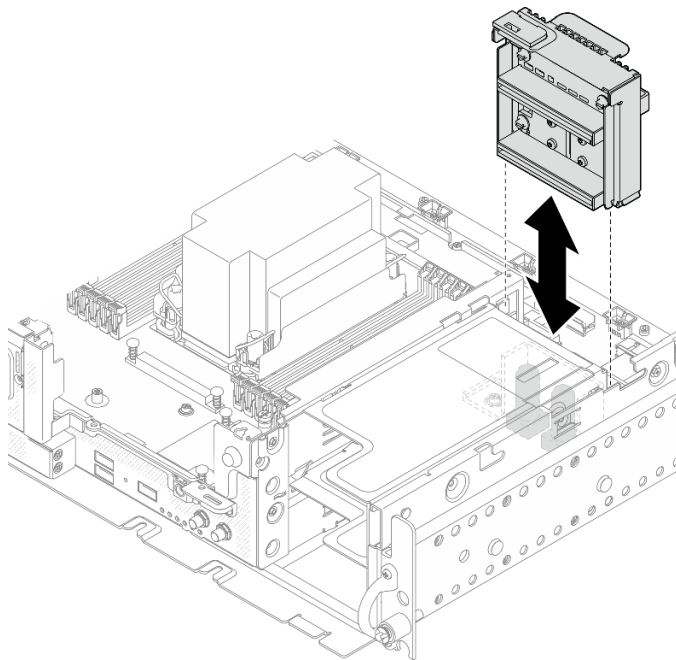


Figure 119. Removing the power backplane

After this task is completed

- Install a replacement unit (see [“Install the power backplane” 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.

[Watch the procedure on YouTube.](#)

Install the power backplane

See this topic to learn how to install the power backplane.

About this task

Procedure

Step 1. Align the power backplane with the two connectors on the system board, and lower it until it is firmly seated.

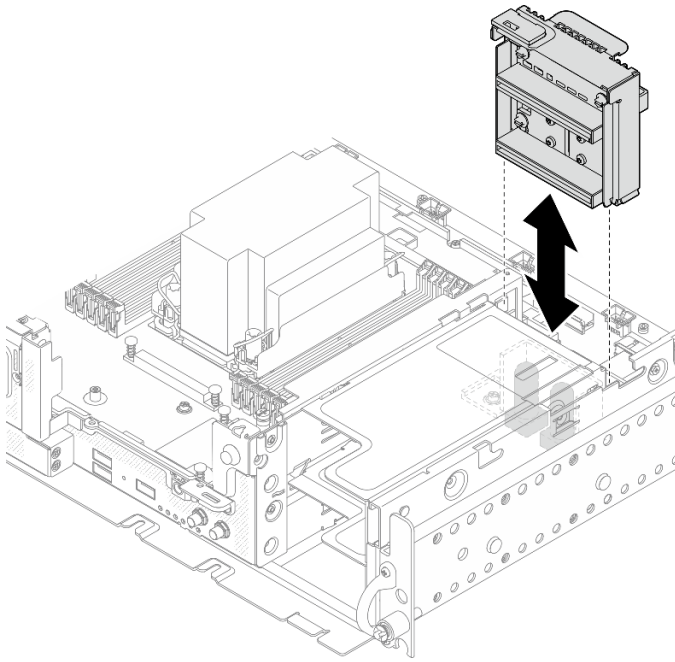


Figure 120. Installing the power backplane

- Step 2. Connect the power side band cable to the power backplane.
 Step 3. Secure the power backplane sideband cable to the cable clip.

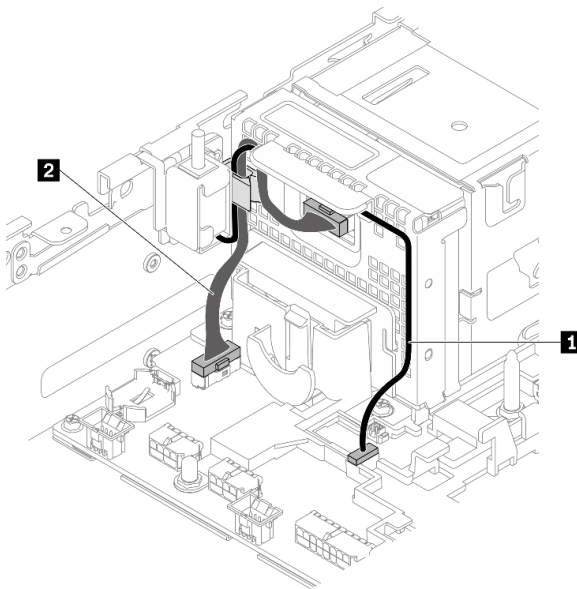
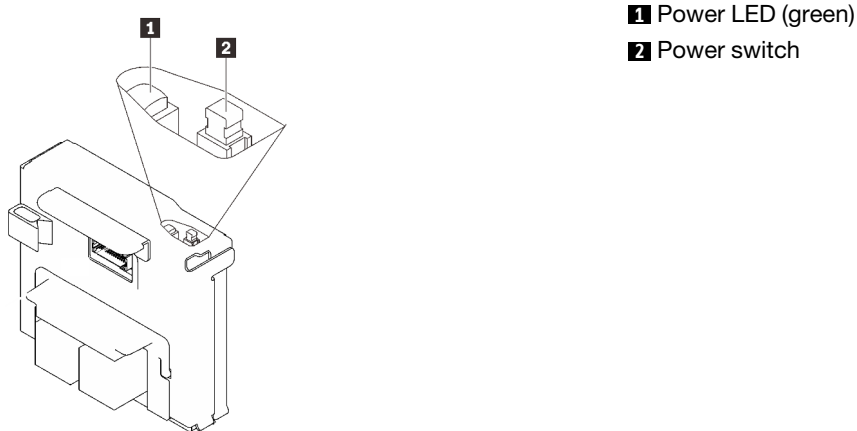


Figure 121. Cable routing for the power backplane and the intrusion switch

Table 31. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

Step 4. Power on the server. Make sure the power LED (green) is lit.



Step 5. (If available) Hook the front end of the switch cap to the power backplane, and rotate the other end to secure the cap; then apply the label to the power backplane.

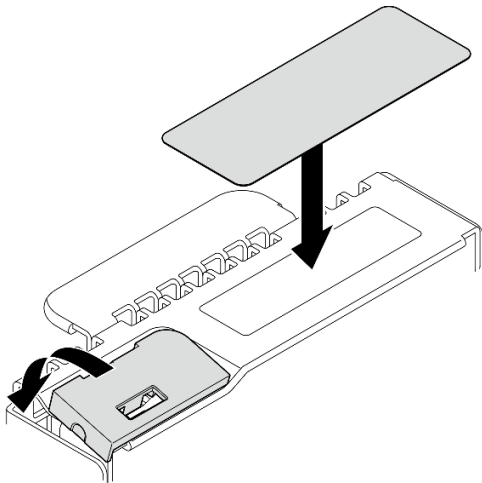


Figure 122. Applying the switch cap and label

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Power supply replacement

See these topics to learn how to remove and install a power supply unit.

Remove a hot-swap power supply unit

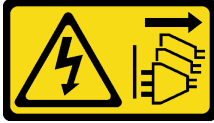
See this topic to learn how to remove a hot-swap power supply unit.

About this task

Attention: Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.

To avoid potential danger, make sure to read the following safety information.

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.

S009



CAUTION:

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

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.

Procedure

Step 1. Remove the hot-swap power supply unit.

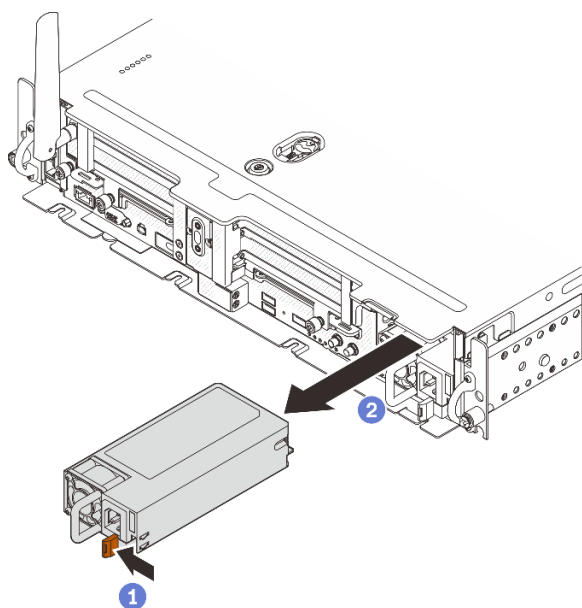


Figure 123. Removing a hot-swap power supply unit

- 1 Press and hold on the terra-cotta release tab.
- 2 Grasp the handle and slide the power supply unit out from the server.

After this task is completed

1. Install a replacement unit (see [“Install a hot-swap power supply unit” on page 128](#)).
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.

[Watch the procedure on YouTube.](#)

Install a hot-swap power supply unit

See this topic to learn how to install a hot-swap power supply unit.

About this task

To avoid potential danger, make sure to read the following safety information.

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.

S009



CAUTION:

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

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.

Procedure

Step 1. Grasp the handle on the power supply unit, and slide it into the power-supply bay until it clicks into place.

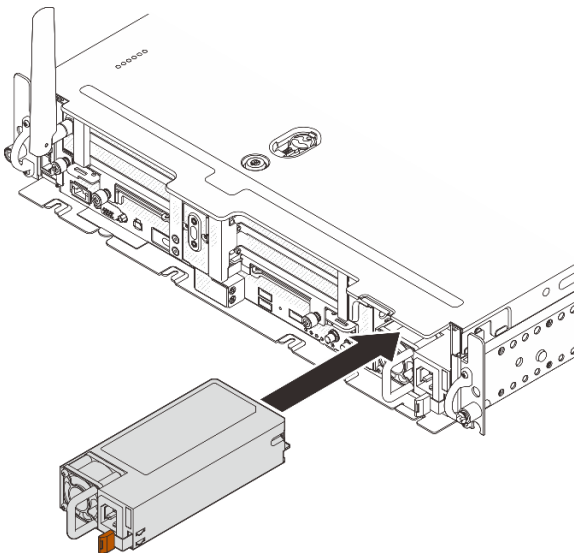


Figure 124. Installing a hot-swap power supply unit

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement”](#) on page 179).

[>Watch the procedure on YouTube.](#)

Processor and heat sink replacement

See these topics to learn how to remove and install a processor and heat sink.

Attention: Before reusing a processor, make sure that to use Lenovo proven alcohol cleaning pad and thermal grease.

Remove the processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

S002



CAUTION:

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

Attention:

- Read [“Installation Guidelines” on page 45](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- If the server is in a rack, remove it from the rack.
- The processor socket must always contain a cover or a PHM. When removing or installing a PHM, make sure to protect empty processor sockets immediately 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.

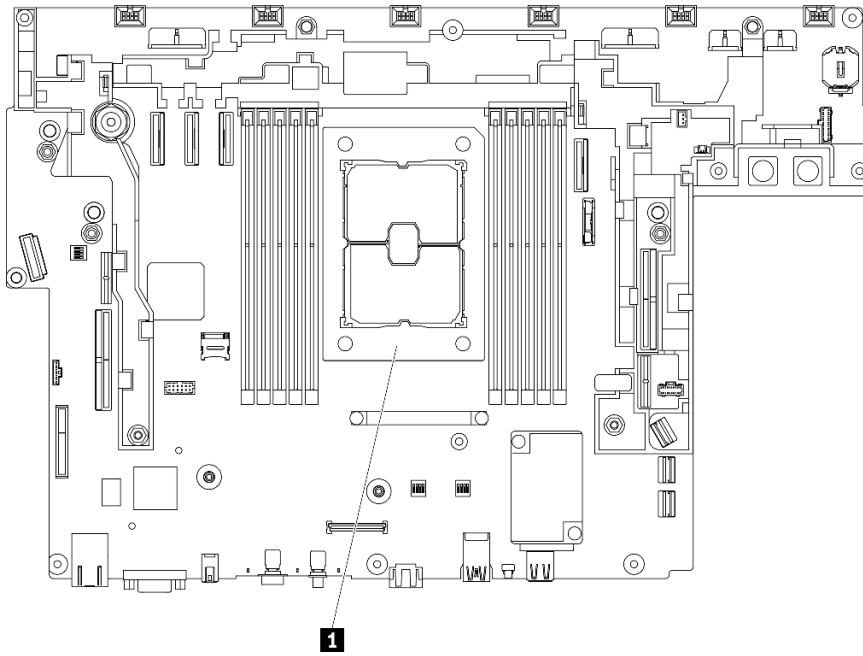


Figure 125. Processor location on the system board

Table 32. Processor locations

1 Processor

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

The following illustration shows the components of the PHM.

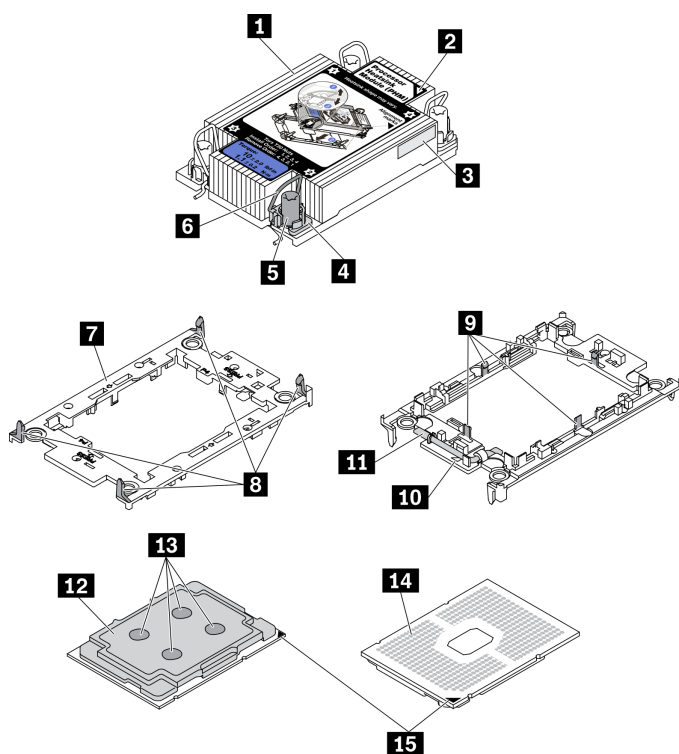


Figure 126. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).

Step 2. Remove the PHM from the system board.

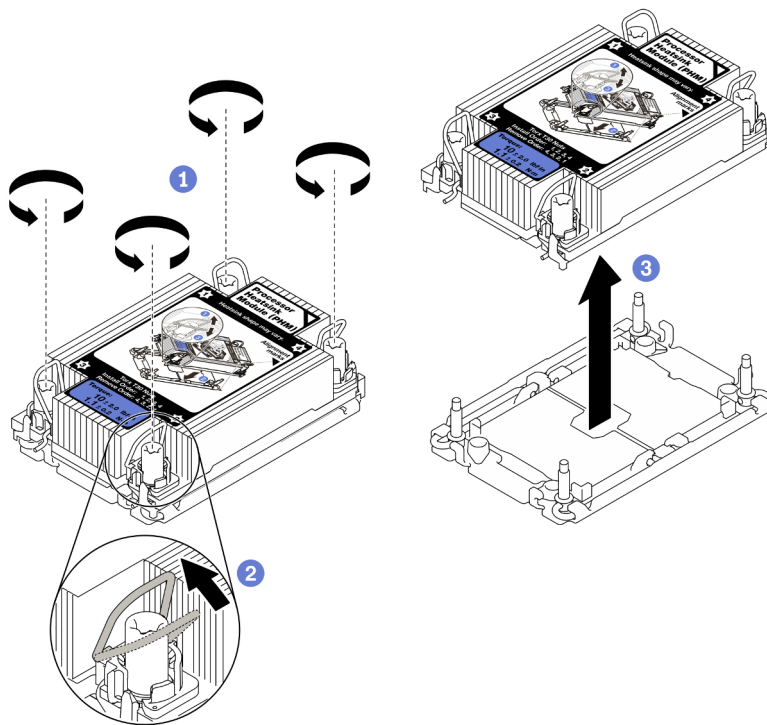


Figure 127. Removing a PHM

- 1 Fully loosen the Torx T30 nuts on the PHM *in the removal sequence shown* on the heat-sink label.
- 2 Rotate the anti-tilt wire bails inward.
- 3 Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

After this task is completed

- The processor socket must always contain a cover or a PHM. When removing or installing a PHM, make sure to protect empty processor sockets immediately with a cover.
- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are reusing the processor or heat sink, separate the processor from its retainer. See [“Separate the processor from carrier and heat sink” on page 133](#)
- If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

[Watch the procedure on YouTube.](#)

Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

About this task

Attention:

- Go over “Installation Guidelines” on page 45 to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 15).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.
- 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.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

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

Watch the procedure. A video of this procedure is available from the following link:

- https://www.youtube.com/playlist?list=PLYV5R7hVcs-DV_Ja2E7I6T-lwN_IrnJRk

Procedure

Step 1. Separate the processor from the heat sink and carrier.

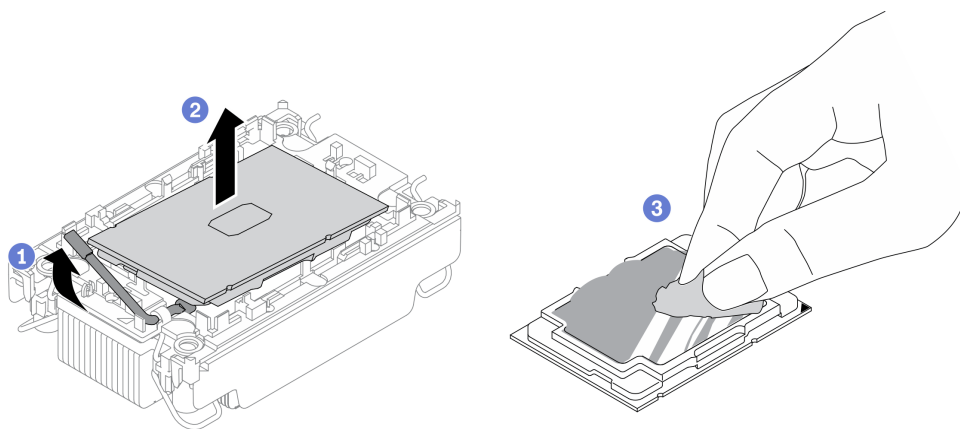


Figure 128. Separating a processor from the heat sink and carrier

Note: Do not touch the contacts on the processor.

- 1 Lift the handle to release the processor from the carrier.
- 2 Hold the processor by its edges; then, lift the processor from the heat sink and carrier.
- 3 Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 2. Separate the processor carrier from the heat sink.

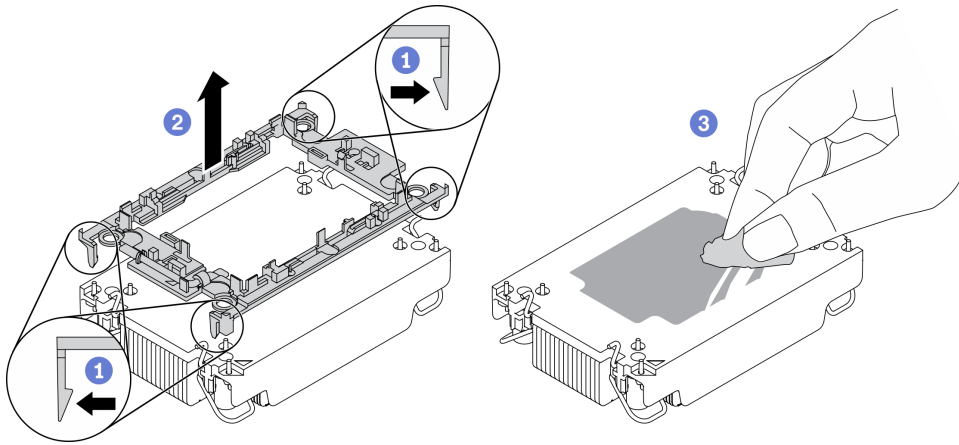


Figure 129. Separating a processor carrier the from heat sink

Note: The processor carrier will be discarded and replaced with a new one.

- ① Release the retaining clips from the heat sink.
- ② Lift the carrier from the heat sink.
- ③ Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

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 a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- 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.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.

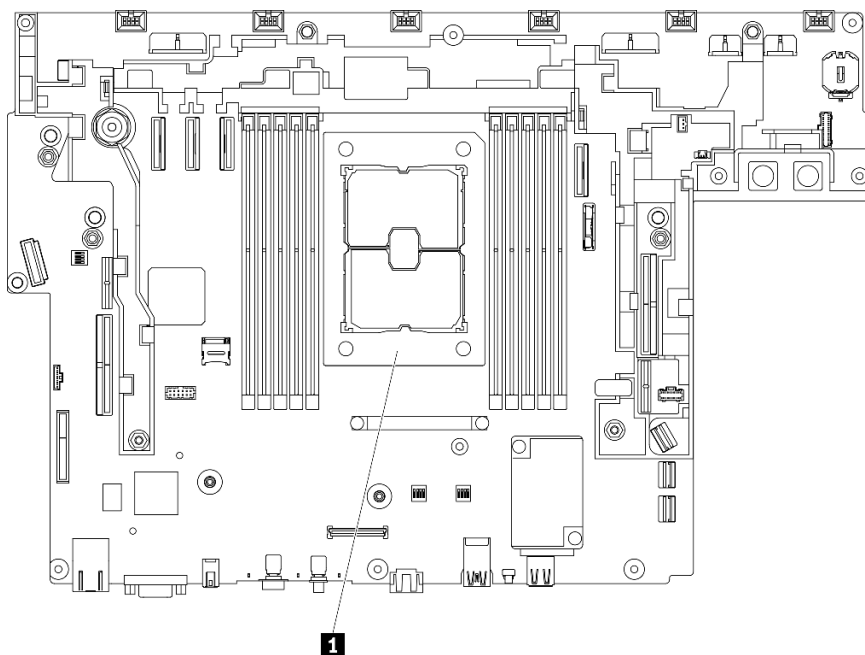


Figure 130. Processor location on the system board

Table 33. Processor locations

1 Processor

Notes:

- The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://serverproven.lenovo.com> for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “Update the firmware” in the *ThinkEdge SE450 Setup Guide*.

The following illustration shows the components of the PHM.

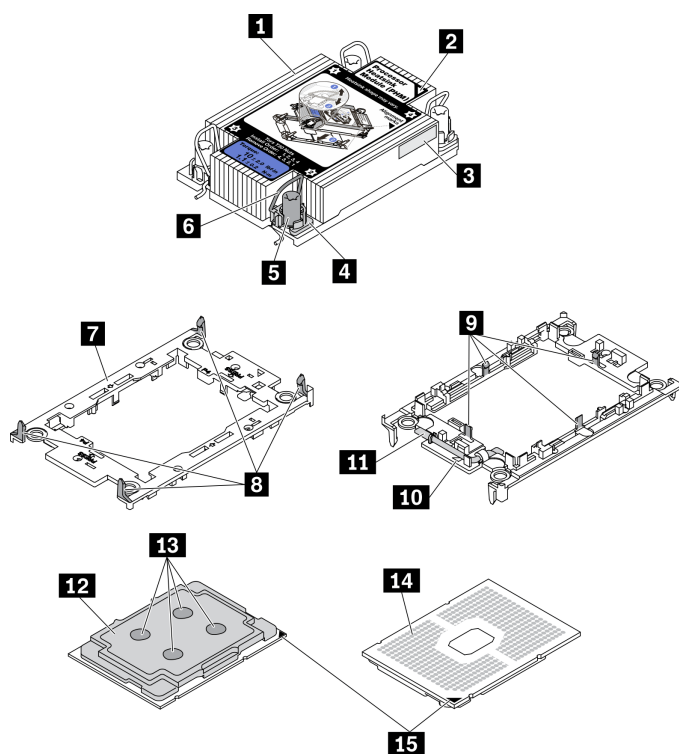


Figure 131. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

Procedure

Step 1. If you are replacing a processor and reusing the heat sink.

- a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
- b. If there is any old thermal grease on the heat sink, wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

Step 2. If you are replacing a heat sink and reusing the processor.

- a. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

Note: If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

- b. Install the processor into a new carrier.

Note: Replacement heat sinks come with both gray and black processor carriers. Make sure to use the carrier with the same color as the one you discarded earlier.

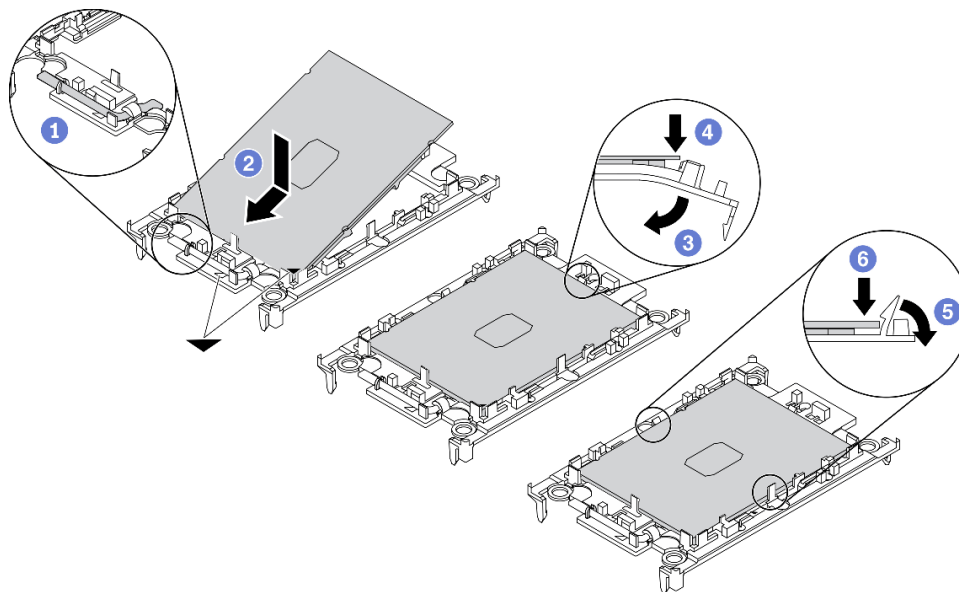


Figure 132. Installing a processor carrier

- 1 Make sure the handle on the carrier is in the closed position.
- 2 Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.
- 3 Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.
- 4 Press the processor and secure the unmarked end under the clip on the carrier.
- 5 Carefully pivot the sides of the carrier down and away from the processor.
- 6 Press the processor and secure the sides under the clips on the carrier.

Note: To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

Step 3. Apply the thermal grease.

- Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is aligned with the triangular mark in the shipping tray.
- If there is any old thermal grease on the processor, gently wipe the top of the processor with an alcohol cleaning pad.

Note: Make sure the alcohol has fully evaporated before applying new thermal grease.

- Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

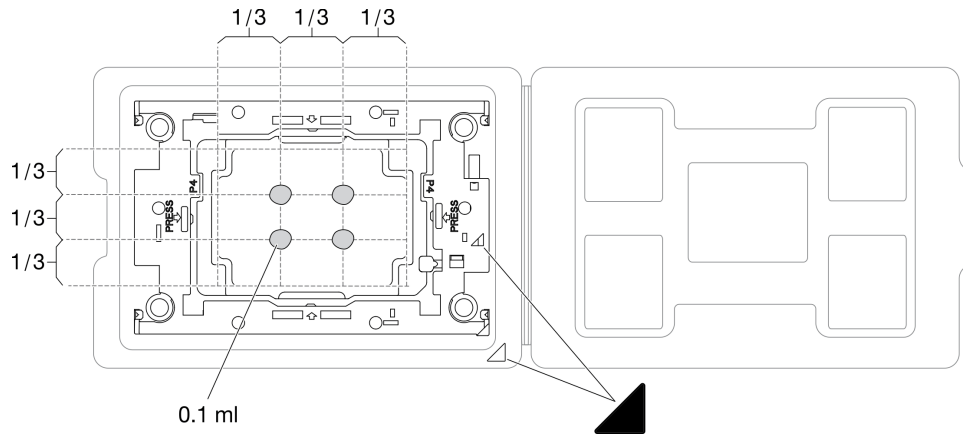


Figure 133. Thermal grease application with processor in the shipping tray

Step 4. Assemble the processor and heat sink.

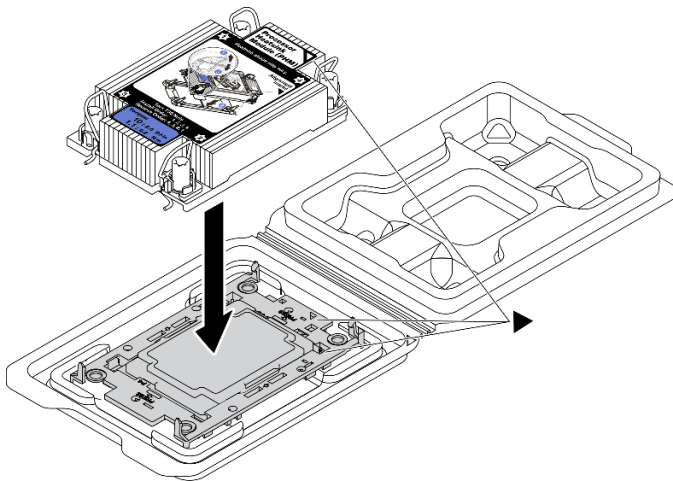


Figure 134. Assembling the PHM with processor in shipping tray

- Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.
- Install the heat sink onto the processor-carrier.

- c. Press the carrier into place until the clips at all four corners engage.

Step 5. Install the processor-heat-sink module into the system board socket.

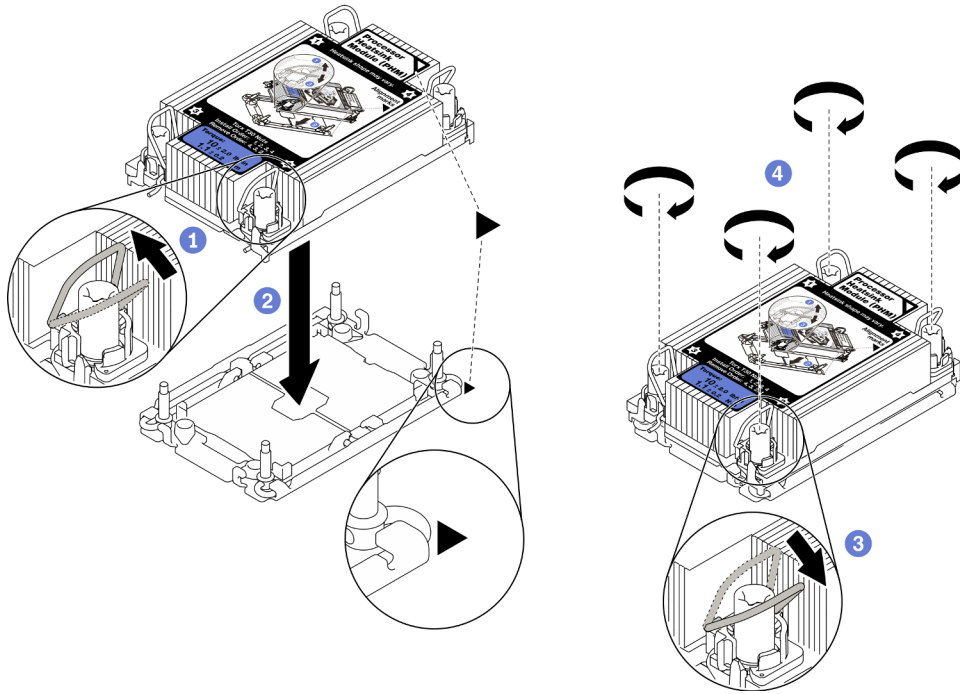


Figure 135. Installing a PHM

- 1 Rotate the anti-tilt wire bails inward.
- 2 Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.
- 3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.
- 4 Fully tighten the Torx T30 nuts *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 1.1 newton-meters, 10 inch-pounds).

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Security bezel and dust filter replacement

See this topic to learn how to remove or install the security bezel and the dust filter.

Remove the security bezel

See this topic to learn how to remove the security bezel.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Unlock the security bezel with the corresponding key. It is stored at the location as illustrated.

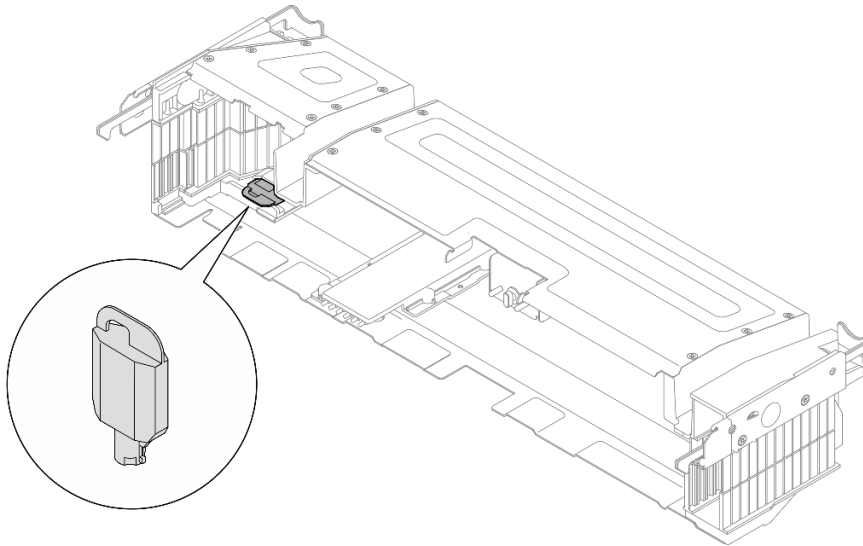


Figure 136. Security bezel key storage location

Step 2. Remove the security bezel.

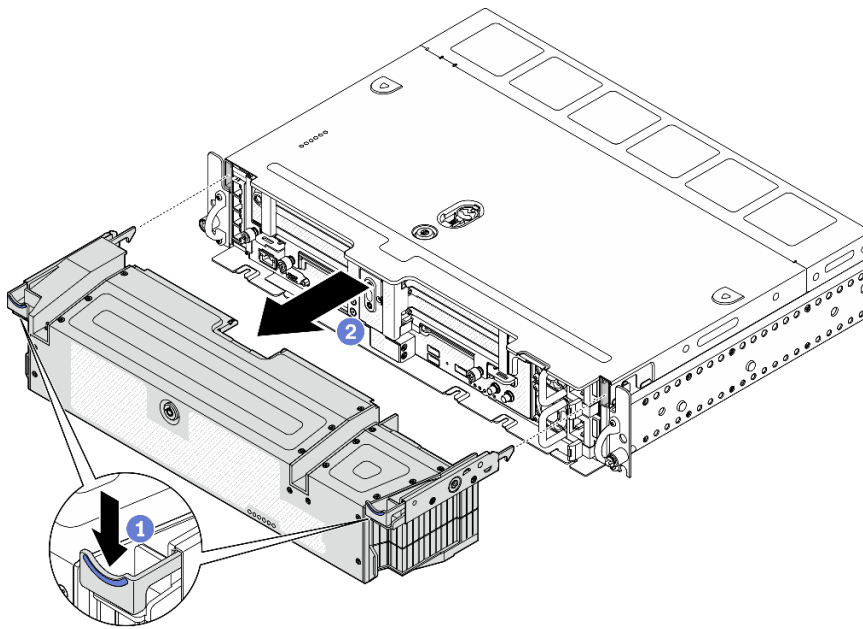


Figure 137. Removing the security bezel

- 1 Press and hold the release latches on both sides.
- 2 Slide the security bezel away from the chassis.

After this task is completed

- Proceed to replace the dust filter if necessary (see [“Remove the dust filter” on page 142](#)).

[Watch the procedure on YouTube.](#)

Remove the dust filter

See this topic to learn how to remove the dust filter.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. Remove the security bezel (see [“Remove the security bezel” on page 140](#)).

Step 2. Remove the dust filter.

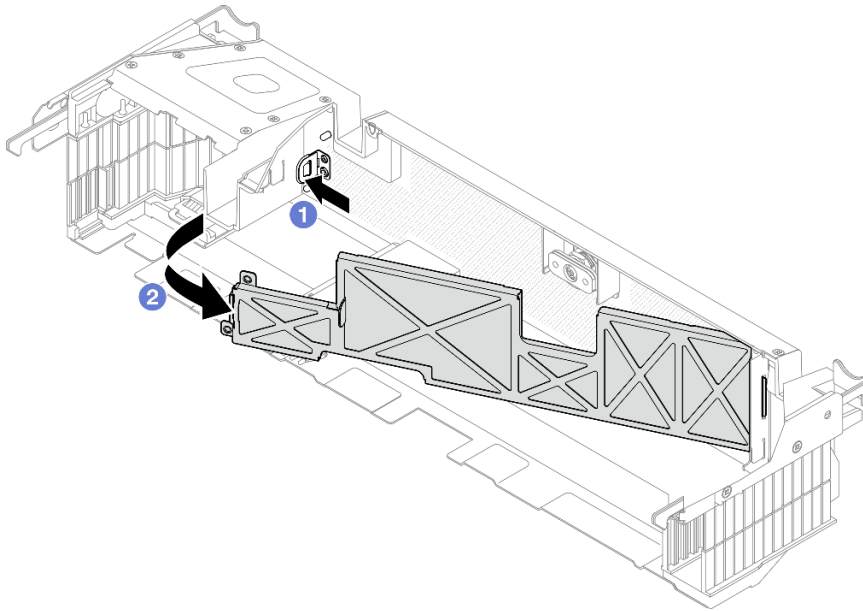


Figure 138. Removing the dust filter

- 1 Press the release latch.
- 2 Rotate the dust filter away from the security bezel.

Note: For optimal server operation, make sure to install a replacement dust filter to the server.

After this task is completed

- Install a replacement unit of dust filler (see [“Install the dust filter” on page 143](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the dust filter

See this topic to learn how to install the dust filter.

About this task

Procedure

Step 1. Install the dust filter,

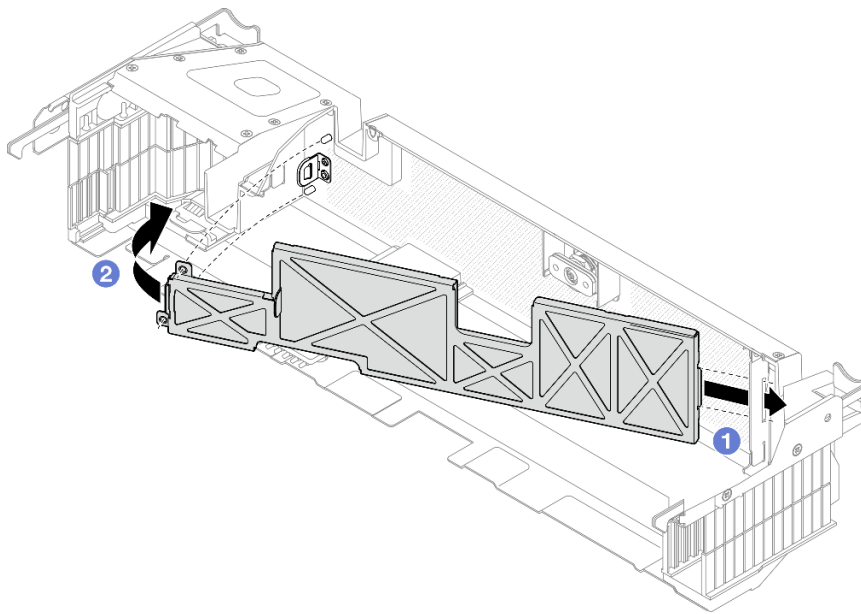


Figure 139. Installing the dust filter

- 1 Insert the right side of the dust filter into the slot in the security bezel.
- 2 Rotate the dust filter towards the security bezel until it clicks in place.

Note: Depending on the operation environment, check on the status of the dust filter at least every three months to make sure it is functional.

After this task is completed

Proceed to install the security bezel (see [“Install the security bezel” on page 144](#)).

[Watch the procedure on YouTube.](#)

Install the security bezel

See this topic to learn how to install the security bezel and the dust filter.

About this task

Procedure

Attention: When installing the security bezel for the first time:

- Make sure the security cable module is installed. If not, install it (see [“Install the security bezel cable module” on page 147](#)).
- The key that is required to lock the security bezel is stored at the location as illustrated.

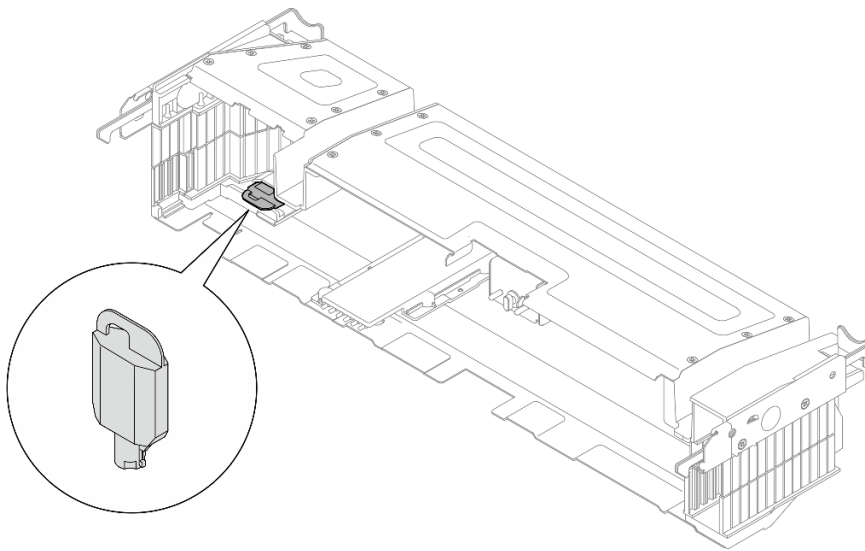


Figure 140. Security bezel key storage location

Step 1. 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.

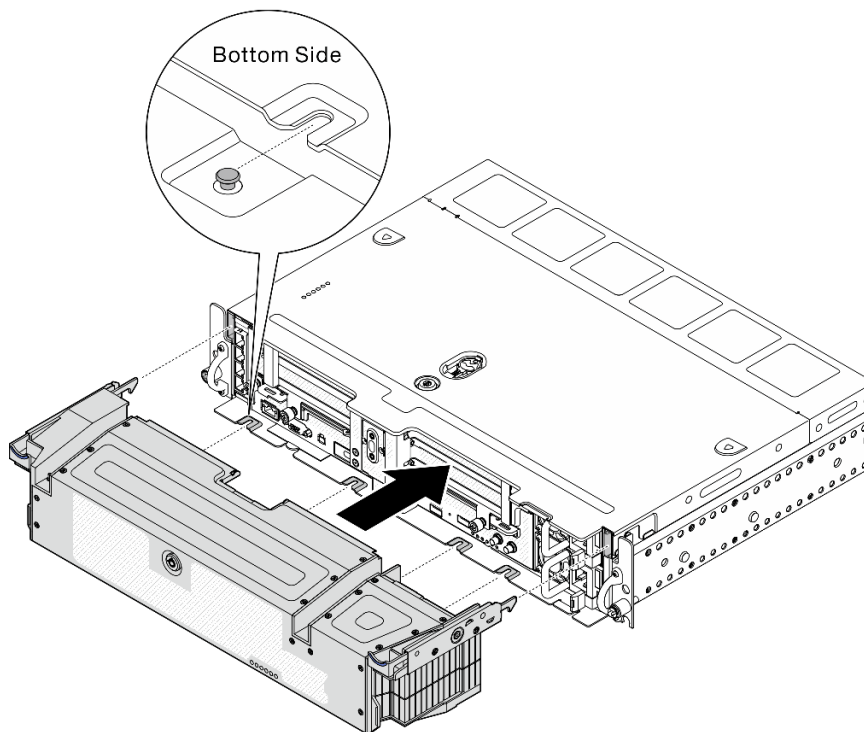


Figure 141. Installing the security bezel

Step 2. Lock the security bezel with the key.

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Security bezel cable module replacement (trained technician only)

Operation of this task must be done by trained technicians that are certified by Lenovo Service.

Remove the security bezel cable module

See this topic to learn how to remove the security bezel cable module. Operation of this task must be done by trained technicians that are certified by Lenovo Service.

About this task

Attention: Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it without proper training and qualification.

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).

Step 2. Remove the three screws that secure the security bezel cable module, and remove the module from the chassis.

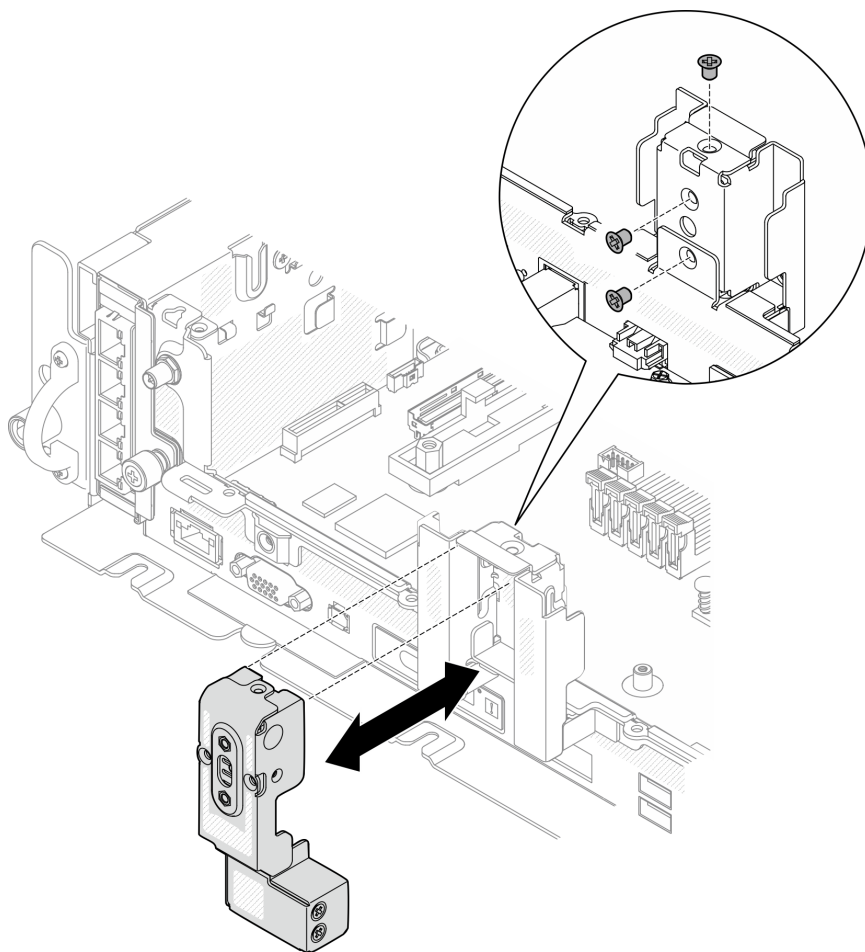


Figure 142. Removing the security bezel cable module

After this task is completed

- Install a replacement unit (see [“Install the security bezel cable module” 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.

[Watch the procedure on YouTube.](#)

Install the security bezel cable module

See this topic to learn how to install the security bezel cable module. Operation of this task must be done by trained technicians that are certified by Lenovo Service.

About this task

Procedure

Step 1. Secure the security bezel cable module with three screws as illustrated.

Attention: Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

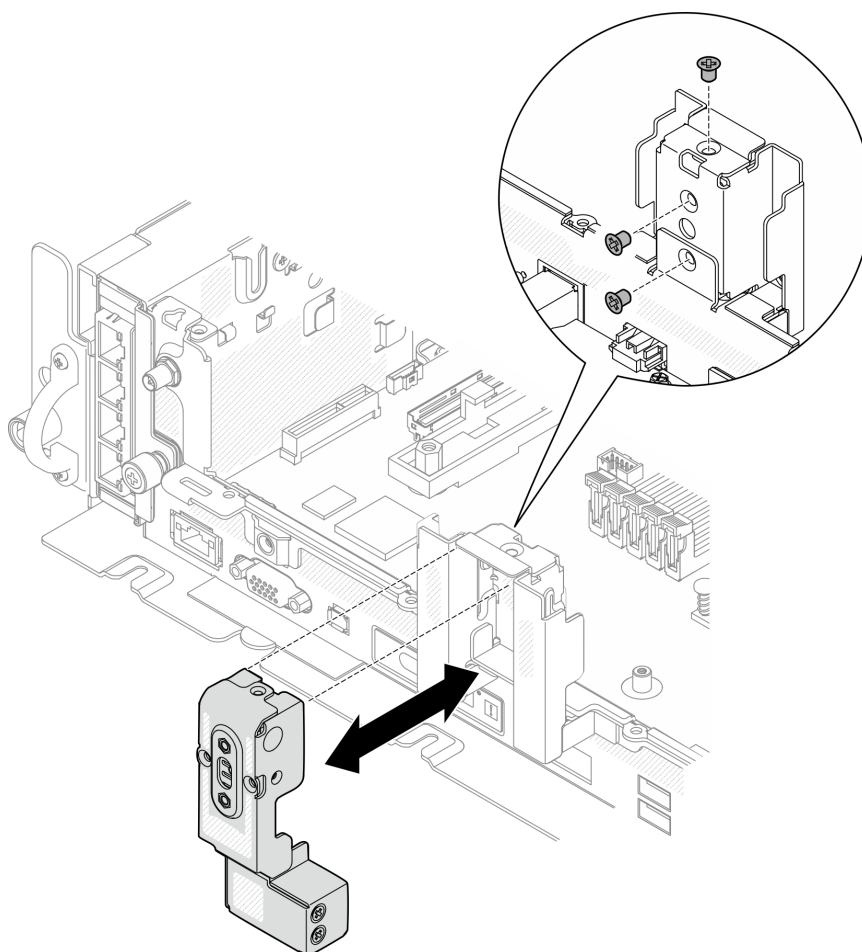


Figure 143. Installing the security bezel cable module

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Serial port module replacement

See these topics to learn how to remove and install the serial port module.

Remove the serial port module

See this topic to learn how to remove the serial port module.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).

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

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove PCIe riser 1 (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).

Step 2. Disconnect the serial port cable from the system board.

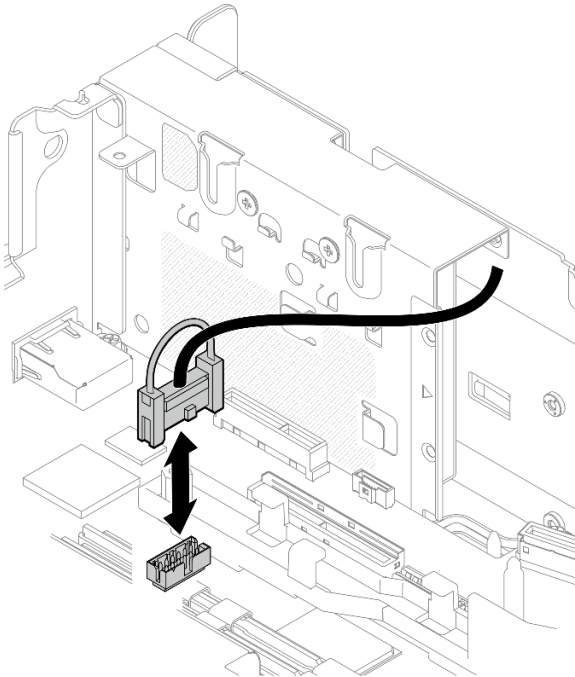


Figure 144. Disconnecting the serial port cable

Step 3. Open the retainer, and remove the screws that secures the module to the riser.

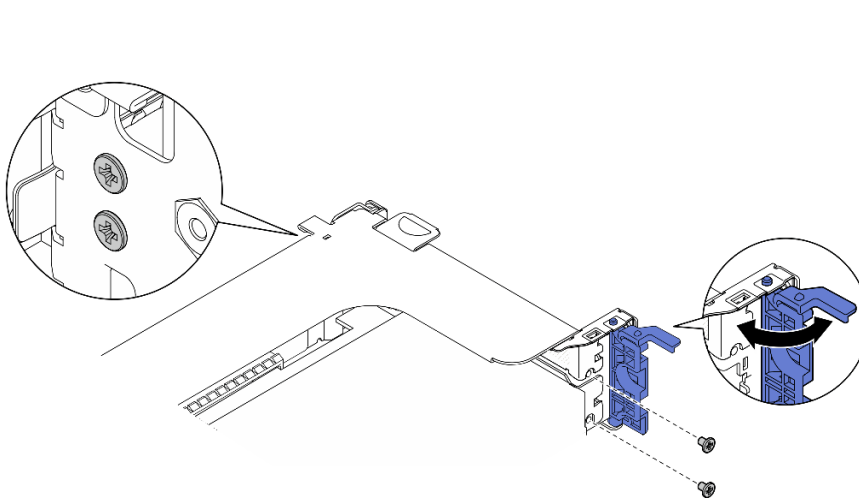


Figure 145. Disengaging the serial port module

Step 4. Remove the module from the riser.

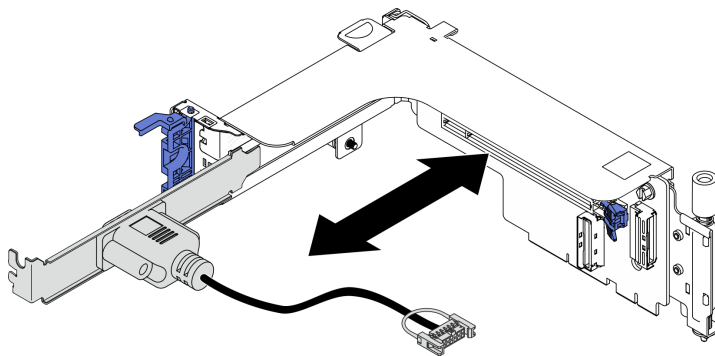


Figure 146. Removing the serial port module from the riser

After this task is completed

- Install a replacement unit (see [“Install the serial port module” on page 150](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the serial port module

See this topic to learn how to install the serial port module.

About this task

Note: This module can only be installed to PCIe Slot 6 in Riser 1.

Procedure

Step 1. Slide the module into the riser.

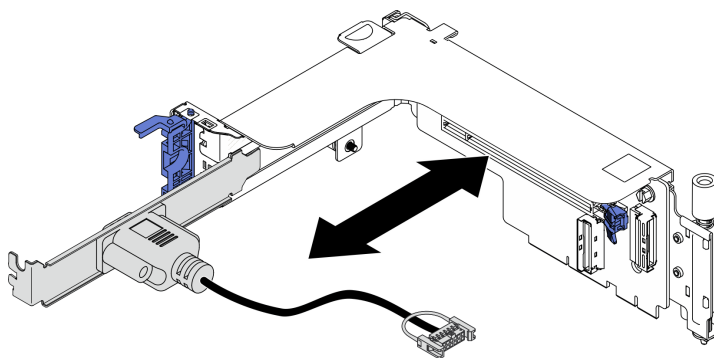


Figure 147. Installing the serial port module to the riser

Step 2. Secure the module to the riser with a screw, and close the retainer.

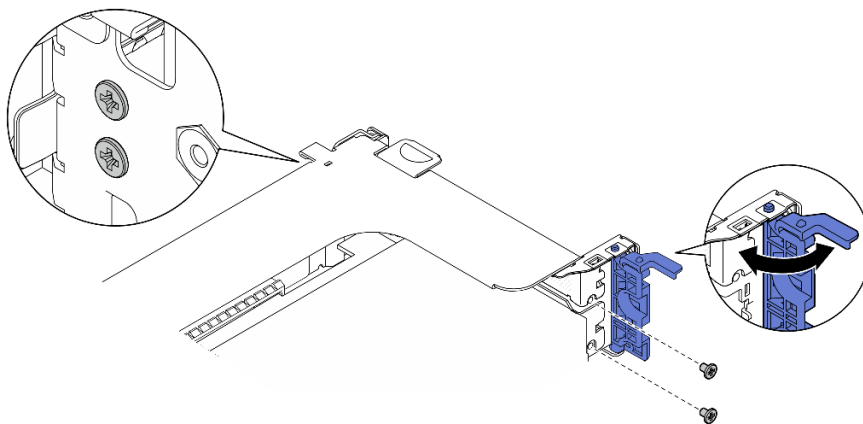


Figure 148. Securing the serial port module

Step 3. Connect the serial port cable to the system board.

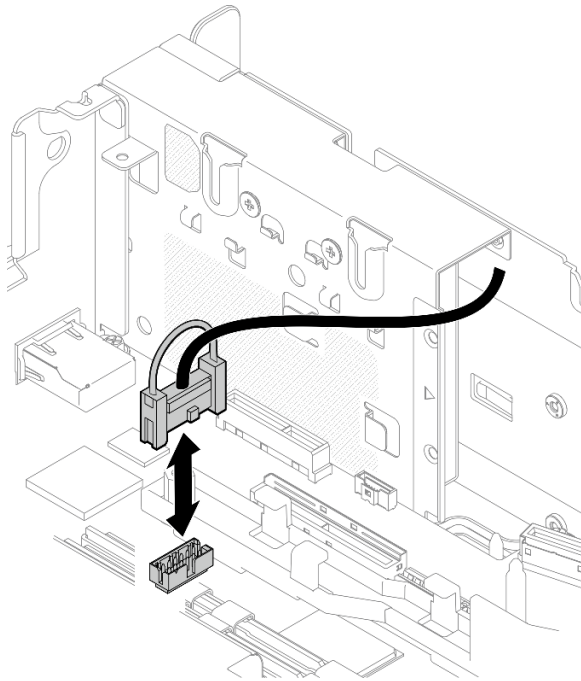


Figure 149. Connecting the serial port cable

Step 4. Proceed to install Riser 1 (see [“Install the PCIe adapters and riser assemblies” on page 111](#)).

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

System board replacement (trained technician only)

Operation of this task must be done by trained technicians that are certified by Lenovo Service.

Backup the Self Encryption Drive Authentication Key (SED AK)

After setting up ThinkEdge SE450 with Security Pack or making changes to the configuration, backing up the Self Encryption Drive Authentication Key (SED AK) is a must operation to prevent data loss in the hardware failure case.

SED Authentication Key (AK) Manager

Find SED Authentication Key (AK) Manager in Lenovo XClarity Controller to change, backup, or recover the SED AK of the server. See https://pubs.lenovo.com/xcc/dw1lm_c_ch1_introduction for more information.

Change the SED AK

- **Generate SED AK from Passphrase:** Set the password and reenter it for the confirmation. Click **Re-generate** to get the new SED AK.
- **Generate a Random SED AK:** Click Re-generate to get a Random SED AK.

Note: If System Lockdown Mode is enabled, generating SED AK function is not available.

Backup the SED AK

Set the password and re-enter it for the confirmation. Click **Start Backup** to back 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 set in **Generate SED AK from Passphrase** mode 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.

Remove the system board assembly

See this topic to learn how to remove the system board assembly. This procedure must be executed by a trained technician.

About this task

Attention:

- Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it without proper training and qualification.
- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove the fan cage assembly (see [“Remove the fan cage assembly” on page 76](#)).
5. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).
6. Remove the M.2 boot adapter (see [“Remove the M.2 boot adapter and drives” on page 94](#)).
7. Remove the OCP adapter (see [“Remove the OCP Ethernet adapter” on page 99](#)).
8. Remove both power supply units (see [“Remove a hot-swap power supply unit” on page 126](#)).
9. Remove the power backplane (see [“Remove the power backplane” on page 123](#)).
10. Remove the intrusion switch cable (see [“Remove the intrusion switch with cable” on page 81](#)).
11. Remove all the memory modules (see [“Remove a memory module” on page 88](#)).
12. Remove the Root of Trust Module (see [“Remove the Firmware and Root of Trust/TPM 2.0 Security Module” on page 171](#)).
13. Remove the processor and heat sink (see [“Remove the processor and heat sink” on page 130](#)).

14. Disconnect all the cables from the system board.

Step 2. Pull the plunger up; then, hold the plunger and the handle, and slide the system board slightly forward to disengage it from the chassis.

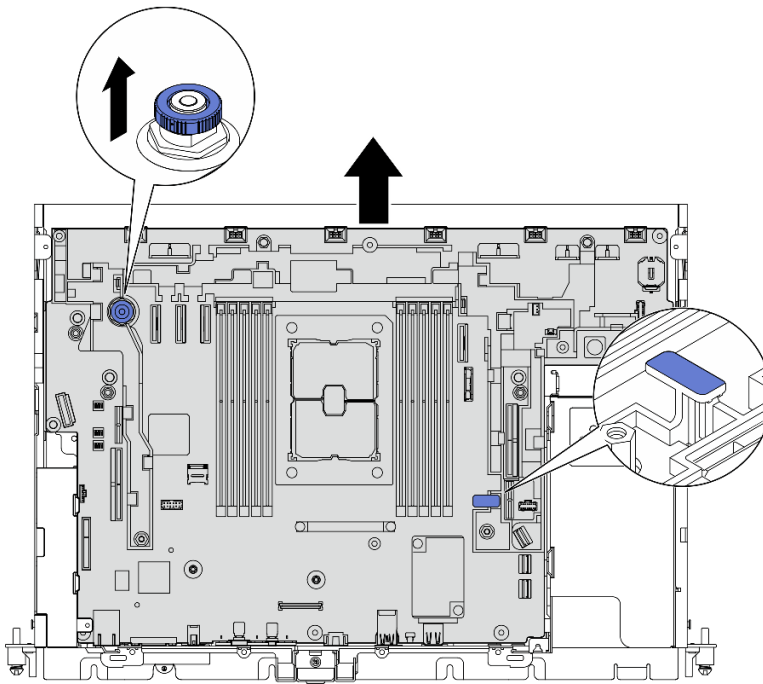


Figure 150. Disengaging the system board

Step 3. Rotate the right end of the system board up to remove the system board from the chassis.

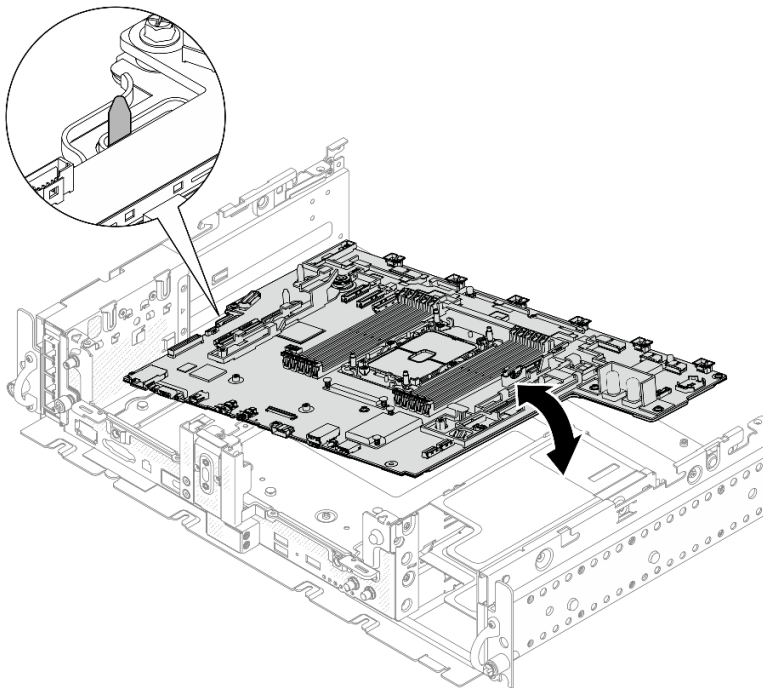


Figure 151. Removing the system board

After this task is completed

- Install a replacement unit (see [“Install the system board assembly” on page 155](#)).
- If there is a plan of recycle, remove the screws as marked in the following illustration, and separate the supporting sheet from the system board.

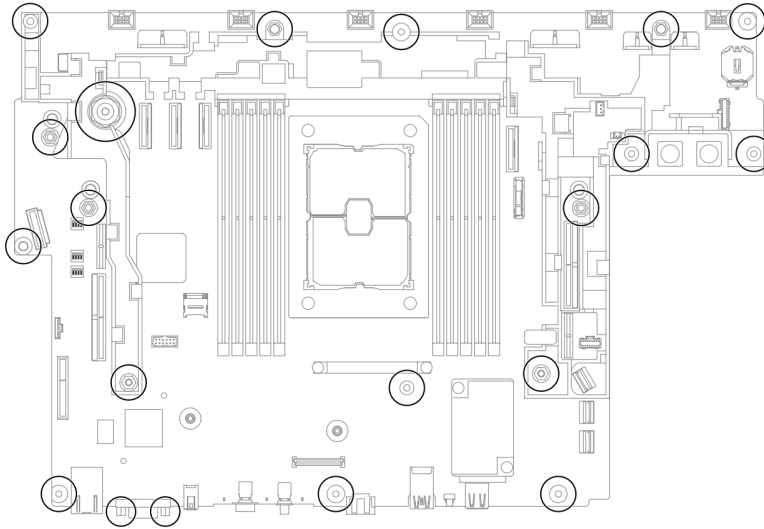


Figure 152. Recycling the system board

[Watch the procedure on YouTube.](#)

Install the system board assembly

See this topic to learn how to install the system board assembly. This procedure must be executed by a trained technician.

About this task

Attention:

- Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.
- 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.
- If an insulating pull tab is under the CMOS battery on the replacement system board, remove it.

Figure 153. Insulating pull tab removal

Procedure

- Step 1. Align the guide pin in the chassis with the slot on the left side of the system board, and lower the right end into the chassis.

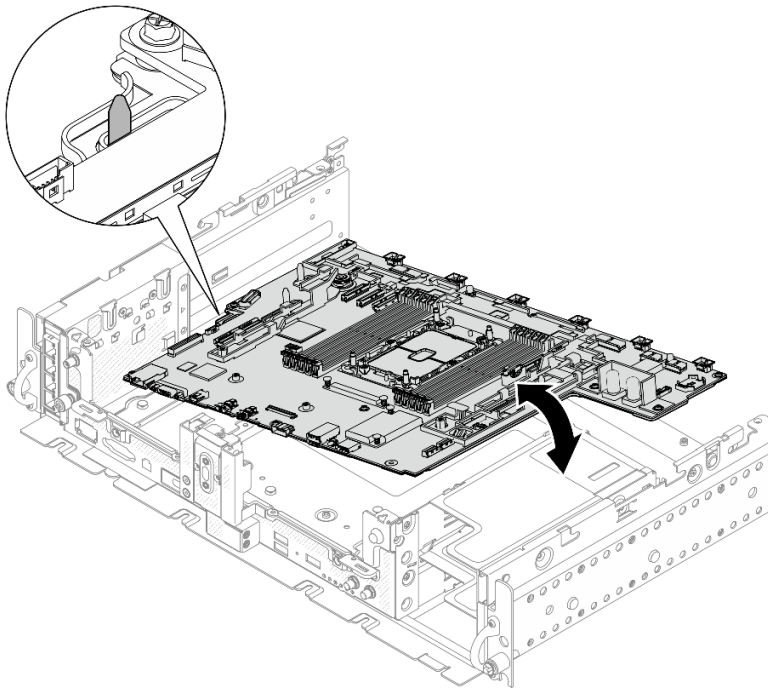


Figure 154. Installing the system board

Step 2. Hold the handle and the rear edge of the system board (where the arrow points), and slide the system board slightly backward to secure it to the chassis.

Attention: To prevent from damaging components on the system board, make sure to hold the edge where the arrow points when sliding the system board in place.

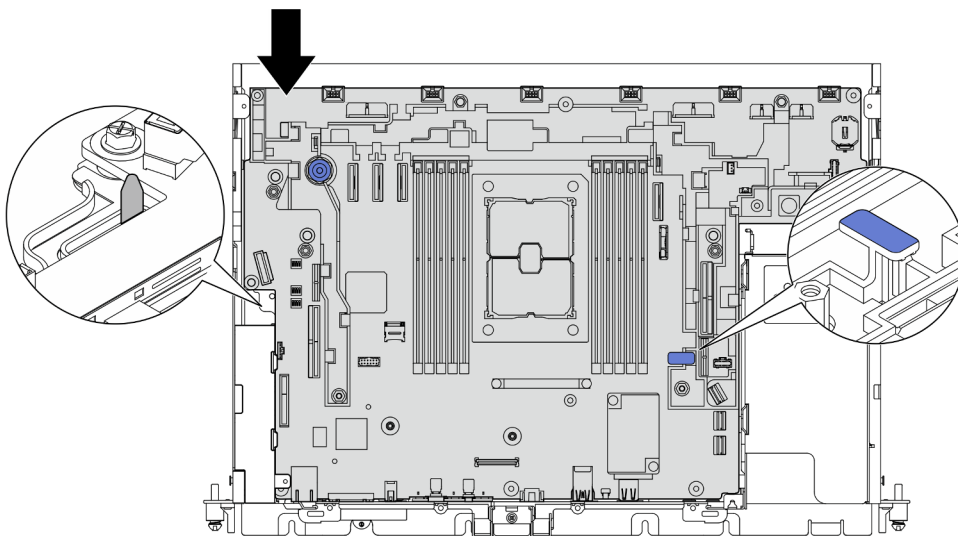


Figure 155. Securing the system board

After this task is completed

1. Re-install all the removed parts, including top covers and security bezel (if applicable).
2. Reconnect power cords and all external cables.

3. Reconfigure the server and reset the system date and time.
4. Update the machine type and serial number with Lenovo XClarity Provisioning Manager (see [“Update the machine type and serial number” on page 157](#)).
5. If SED has been enabled on this server, recover the SED AK (see [“Backup the Self Encryption Drive Authentication Key \(SED AK\)” on page 152](#)).
6. For ThinkEdge Security Pack Enabled, re-activate the system (see “Activate the system” in *Setup Guide*).
7. Optionally, enable Secure Boot (see [“Enable UEFI Secure Boot” on page 159](#)).

[Watch the procedure on YouTube.](#)

Update the machine type and serial number

After the system board is replaced by trained service technicians, the machine type and serial number must be updated.

There are two methods available to update the machine type and serial number:

- From Lenovo XClarity Provisioning Manager

To update the machine type and serial number from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the machine type and serial number.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the machine type and serial number in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the machine type and serial number:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the machine type and serial number from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
```

```
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
```

Where:

<m/t_model>

The server machine type and model number. Type xxxxyyy, where xxxx is the machine type and yyy is the server model number.

<s/n>

The serial number on the server. Type *zzzzzzz*, where *zzzzzzz* is the serial number.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[ -bmc-username <xcc_user_id> --bmc-password <xcc_password>]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc-username <xcc_user_id>
--bmc-password <xcc_password>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc-username <xcc_user_id>
--bmc-password <xcc_password>
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

xcc_external_ip

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>
```

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Secure Boot**.
4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled
```

```
--bmc <userid>:<password>@<ip_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

Trayless drive and drive cage replacement (trained technician only)

Operation of this task must be done by trained technicians that are certified by Lenovo Service.

For hot-swap drive replacement, see “[PCIe riser assembly and adapter replacement](#)” on page 104.

Remove the drive cage and trayless drives

See this topic to learn how to remove the drive cage and trayless drives.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).
5. Remove the fan cage assembly (see [“Remove the fan cage assembly” on page 76](#)).
6. Remove the M.2 boot adapter (see [“Remove the M.2 boot adapter and drives” on page 94](#)).
7. Disconnect all the signal and power cables from the system board.

Step 2. Loosen the two captive screws to disengage the drive cage, and remove it.

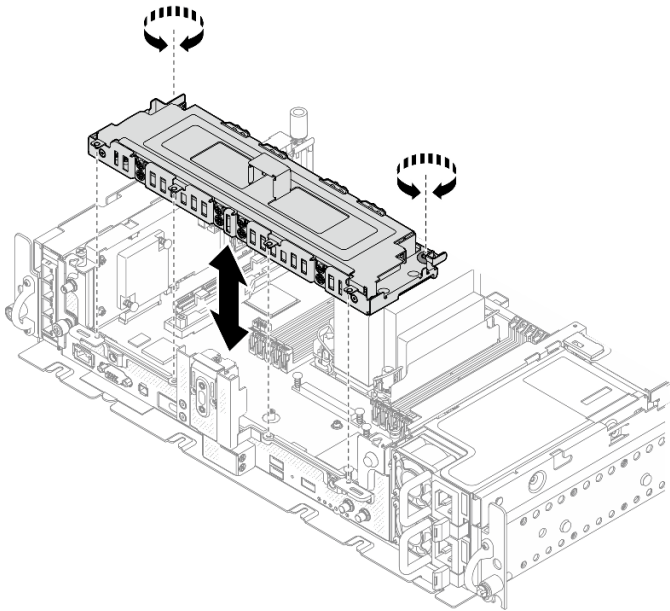


Figure 156. Removing the drive cage

Step 3. Disengage the cables from the drive cage. Then, loosen the two captive screws that secure the cover to the cage, and remove the cover.

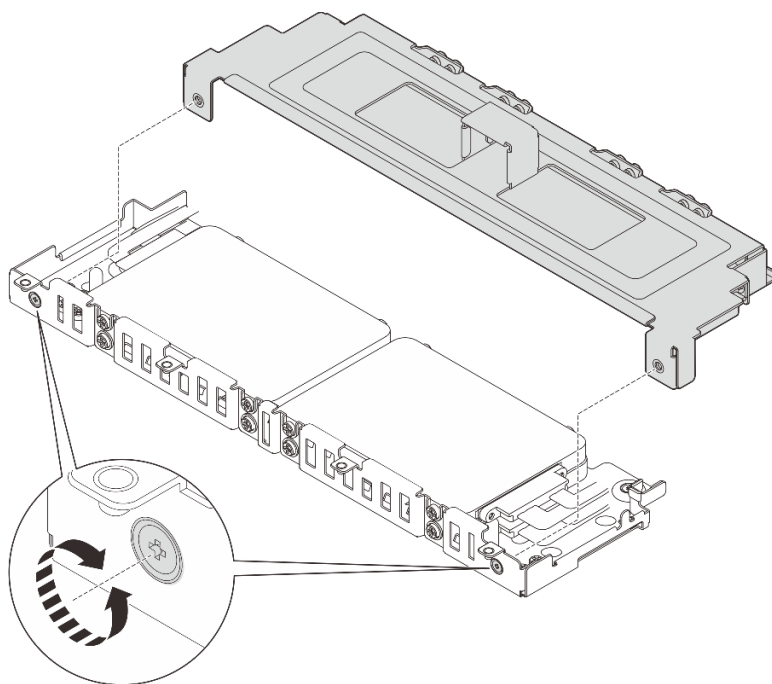


Figure 157. Removing the drive cage cover

Step 4. To remove the drives from the drive cage, proceed to the topic corresponding to the system configuration.

- [“Remove the 7mm trayless drives” on page 161](#)
- [“Remove the 15mm trayless drives” on page 163](#)

Remove the 7mm trayless drives

Procedure

Step 1. Lift the two upper drives and remove them.

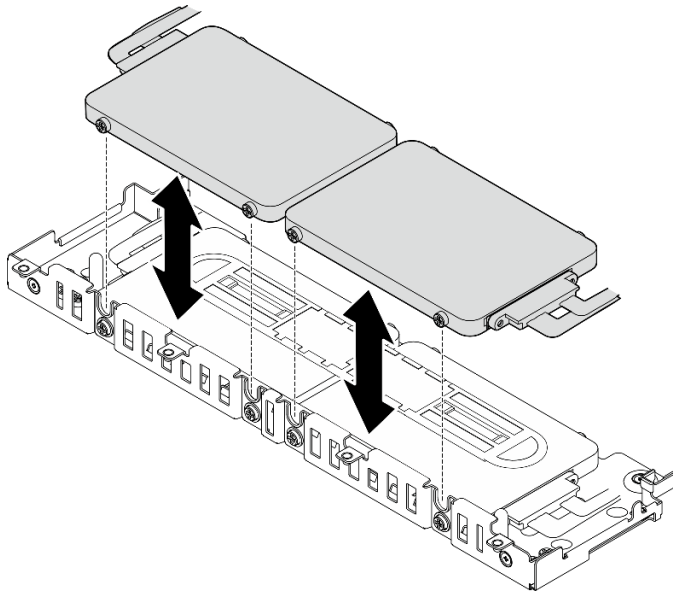


Figure 158. Removing 7mm trayless drives

Step 2. Remove the drive spacer.

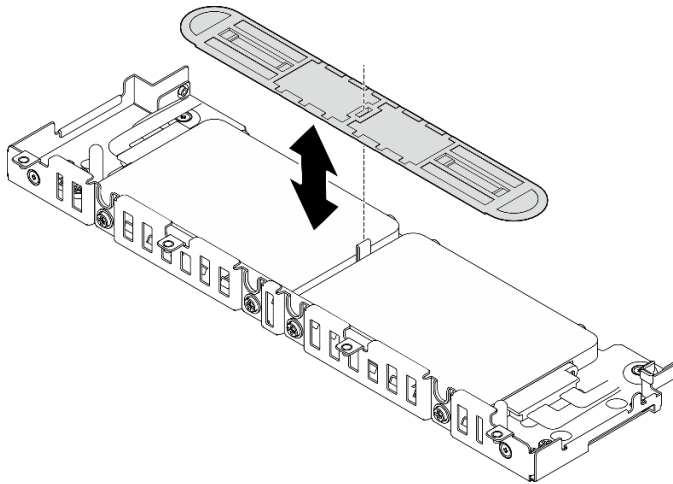


Figure 159. Removing the drive spacer

Note: Make sure to keep the spacer for future use. In the case that there is not immediate need of the spacer, store it on the bottom of the drive cage.

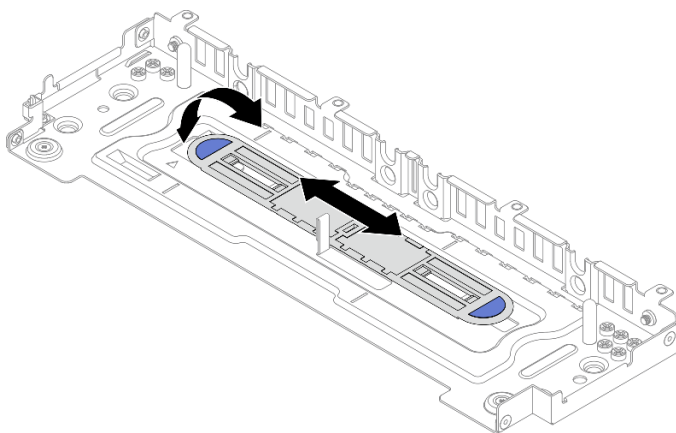


Figure 160. Spacer storage

Step 3. Slide the two lower drives out from the drive cage to remove them.

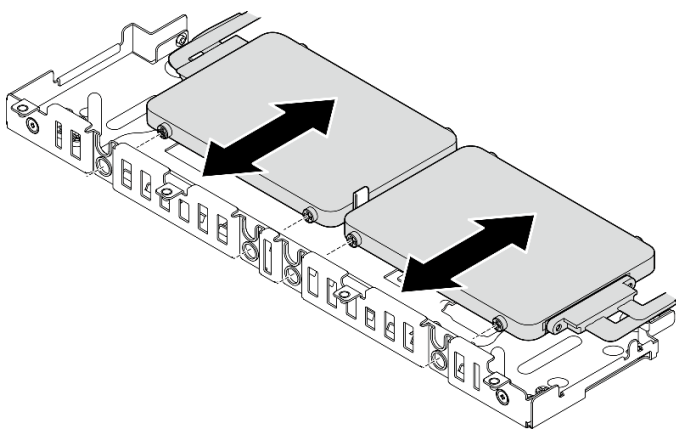


Figure 161. Removing 7mm trayless drives

Remove the 15mm trayless drives

Procedure

Step 1. Slide the two drives out from the drive cage to remove them.

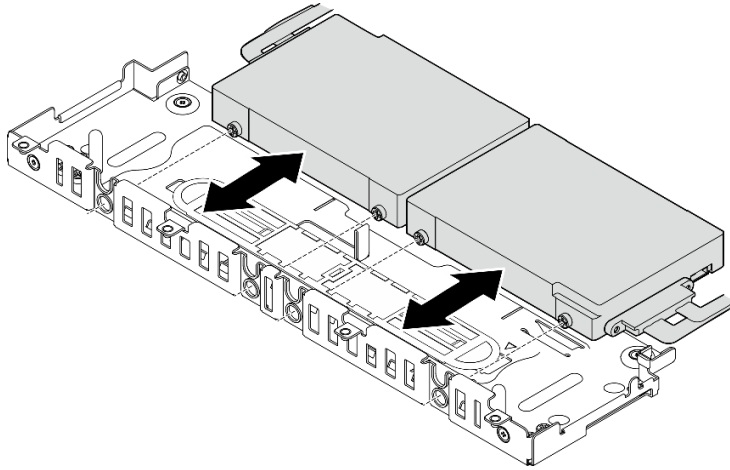


Figure 162. Removing 15mm hot-swap drives

After this task is completed

- Install replacement units (see [“Install the drive cage and trayless drives” on page 164](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the drive cage and trayless drives

See this topic to learn how to install the drive cage and trayless drives.

About this task

Start with the topic corresponding to the planned configuration:

- [“Install the 7mm trayless drives” on page 164](#)
- [“Install the 15mm trayless drives” on page 167](#)

Install the 7mm trayless drives

- Step 1. If the spacer is store on the bottom of the drive cage, slide it left slightly to disengage and remove it from the drive cage.

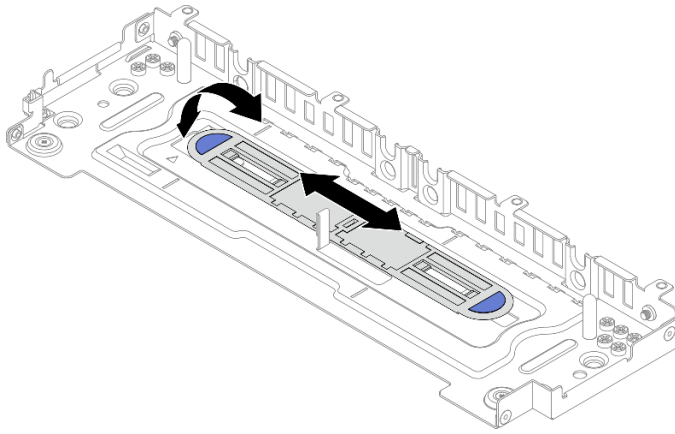


Figure 163. Disengaging the drive spacer

Step 2. Install four screws on each of the drives, and connect the cables to the drives according to the cable routing plan.

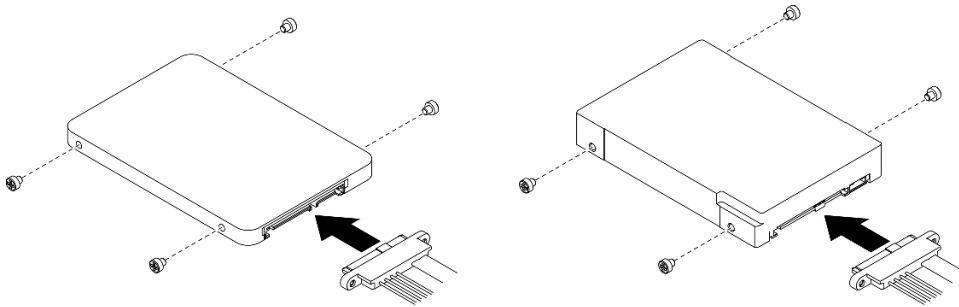


Figure 164. Installing screws and connecting drive cables

Note: 16 spared screws are kept on the drive cage as illustrated.

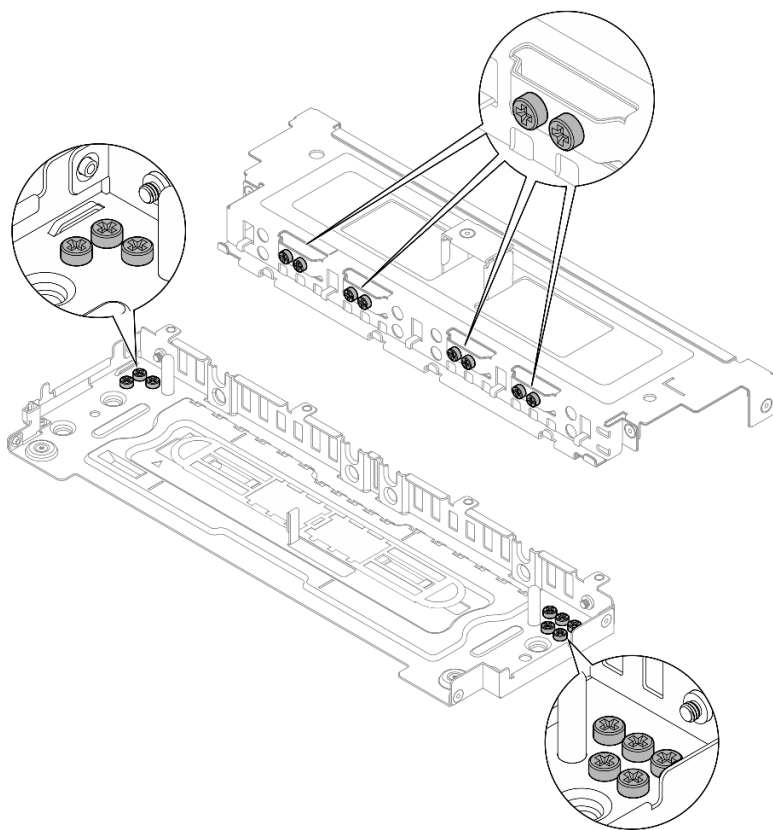


Figure 165. Spared screws on the drive cage

- Step 3. Align the screws on the two drives with the slots on the drive cage, and slide the drives in until the screws are secured in the slots.

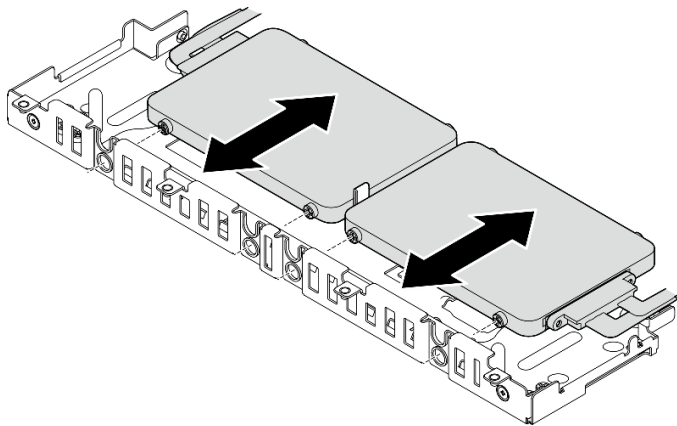


Figure 166. Installing the lower 7mm trayless drives

- Step 4. Align the slot in the middle of the drive spacer to the guiding pin in the drive cage, and place the spacer on top of the two drives.

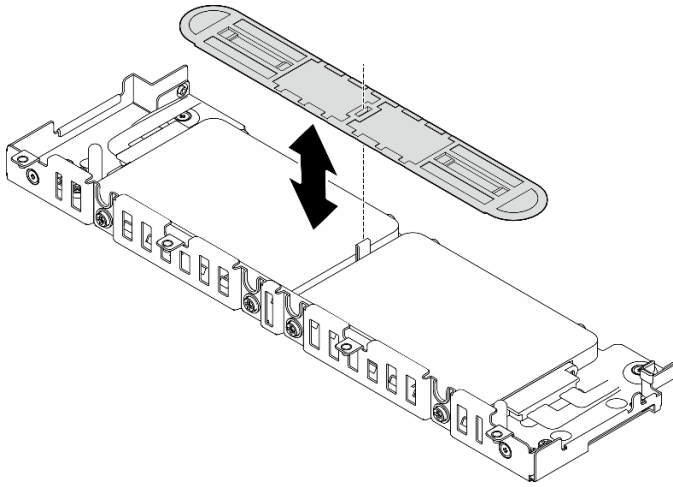


Figure 167. Placing the drive spacer

- Step 5. Align the screws on the two upper drives with the slots on the drive cage, and lower the drives until the screws are secured in the slots.

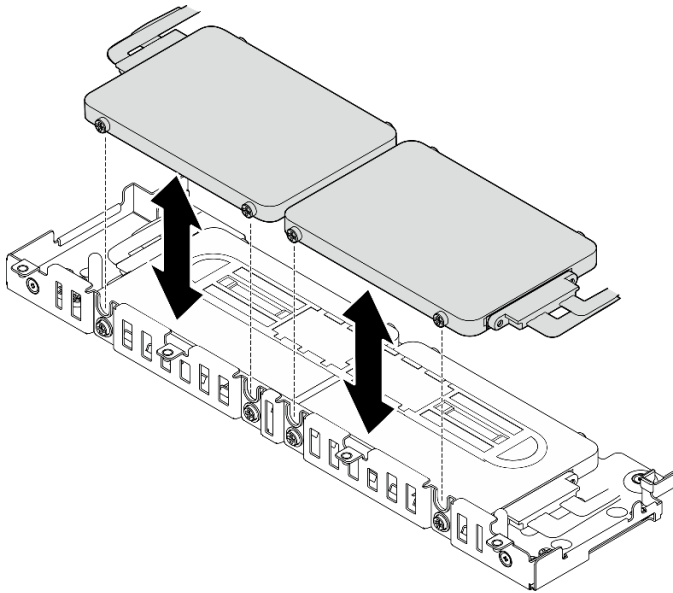


Figure 168. Installing the upper 7mm trayless drives

- Step 6. Proceed to install the drive cage (see [“Install the drive cage” on page 169](#)).

Install the 15mm trayless drives

- Step 1. Install four screws on each of the drives, and connect the cables to the drives according to the cable routing plan.

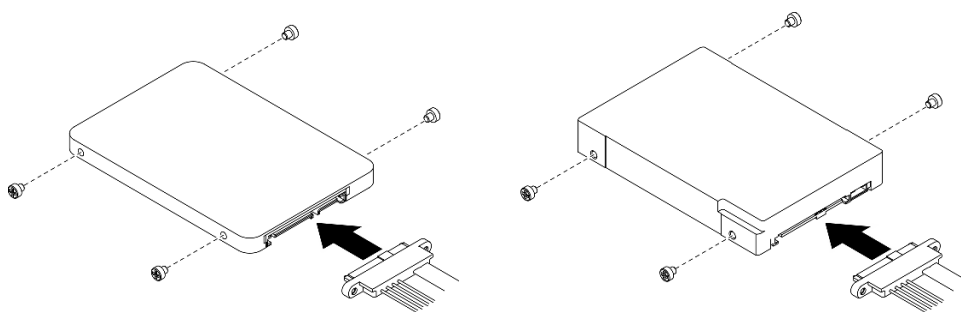


Figure 169. Installing screws and connecting drive cables

Note: 16 spared screws are kept on the drive cage as illustrated.

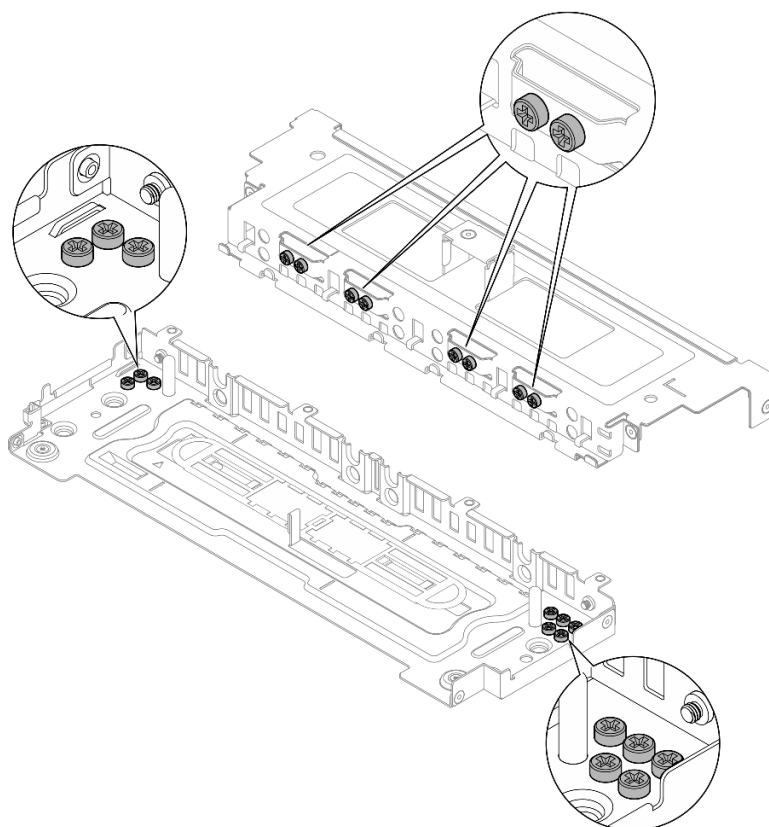


Figure 170. Spared screws on the drive cage

Step 2. Align the screws on the two drives with the slots on the drive cage, and slide the drives in until the screws are secured in the slots.

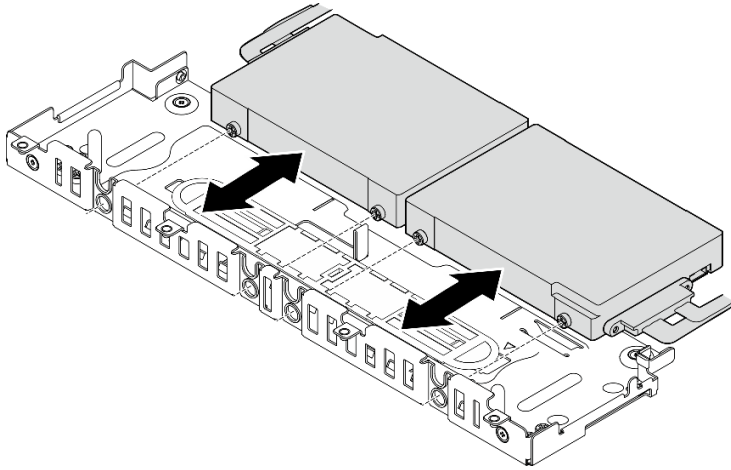


Figure 171. Installing 15mm trayless drives

Note: When the system comes with one or three drives, make sure the unused cable connector is secured with the cable band as illustrated.

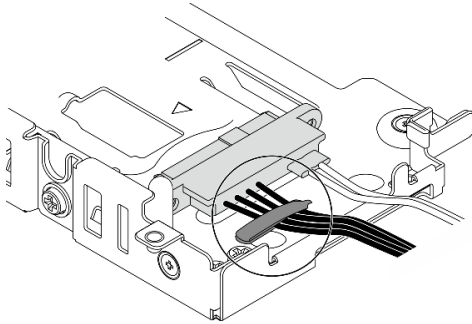


Figure 172. Cable band for 1 or 3 drive configuration

Step 3. Proceed to install the drive cage (see [“Install the drive cage” on page 169](#)).

Install the drive cage

Step 1. Align the captive screws on the cover with screw holes on the drive cage, and tighten the captive screws to secure the cover to the cage.

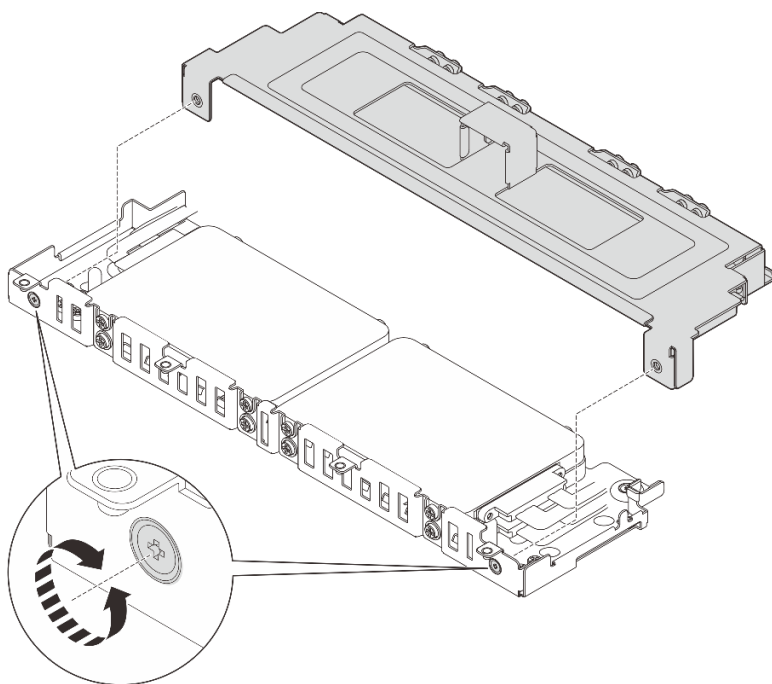


Figure 173. Installing the drive cage cover

Step 2. If applicable, contain cables to the side cable clips on the drive cage. If there are power and signal cables, make sure to contain power cables first.

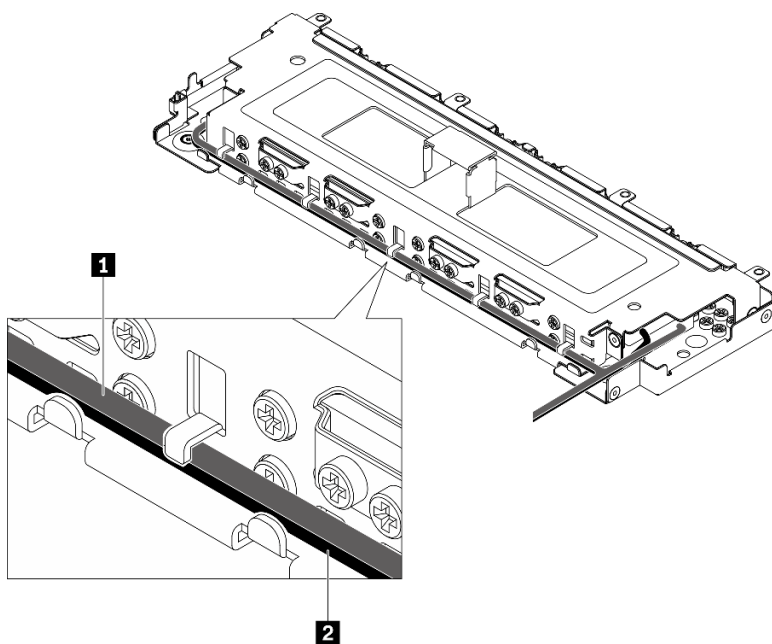


Figure 174. Routing cables through the drive cage cable clips

1 Signal cable	2 Power cable
-----------------------	----------------------

Step 3. Align the tabs on the drive cage with the guide pins on the chassis, and lower the drive cage; then, tighten the two captive screws to secure the drive cage.

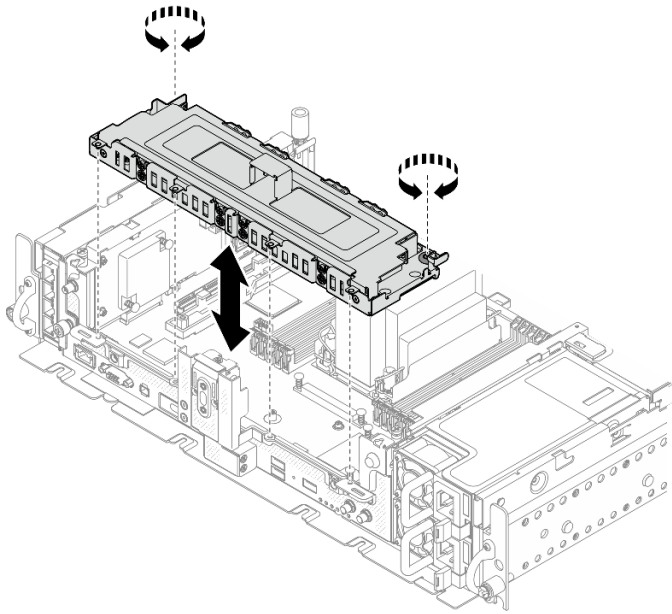


Figure 175. Installing the drive cage

After this task is completed

1. Make sure the cables are connected based on the cable routing plans (see "Cable routing for trayless drives" in *Setup Guide*).
2. Proceed to complete the parts replacement (see ["Complete the parts replacement" on page 179](#)).

[Watch the procedure on YouTube.](#)

Firmware and Root of Trust/TPM 2.0 Security Module replacement (trained technician only)

See these topics to learn how to remove and install the Firmware and Root of Trust/TPM 2.0 Security Module. Only trained technicians are allowed to do the replacement of this component.

Attention: Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do not attempt to remove or install it without proper training and qualification.

Remove the Firmware and Root of Trust/TPM 2.0 Security Module

See this topic to learn how to remove the Firmware and TPM 2.0 Security Module.

About this task

Attention:

- Go over ["Installation Guidelines" on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see ["Power off the server" on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove both PCIe riser assemblies (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).
5. Remove the trayless drive cage (see [“Remove the drive cage and trayless drives” on page 159](#)).
6. Remove the system board assembly if necessary (see [“Remove the system board assembly” on page 153](#)).

Step 2. Remove the two screws that secure the security module to the system board, and remove the module.

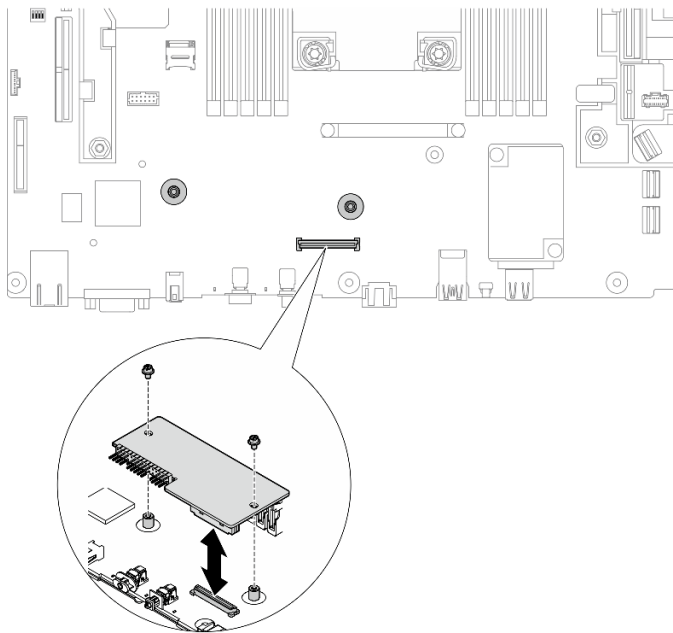


Figure 176. Removing the security module

After this task is completed

- Install a replacement unit (see [“Install the Firmware and Root of Trust/TPM 2.0 Security Module” on page 172](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the Firmware and Root of Trust/TPM 2.0 Security Module

See this topic to learn how to install the Firmware and Root of Trust/TPM 2.0 Security Module.

About this task

Procedure

- Step 1. Lower the security module until it is firmly seated on the system board.
- Step 2. Secure the security module to the system board with two screws.

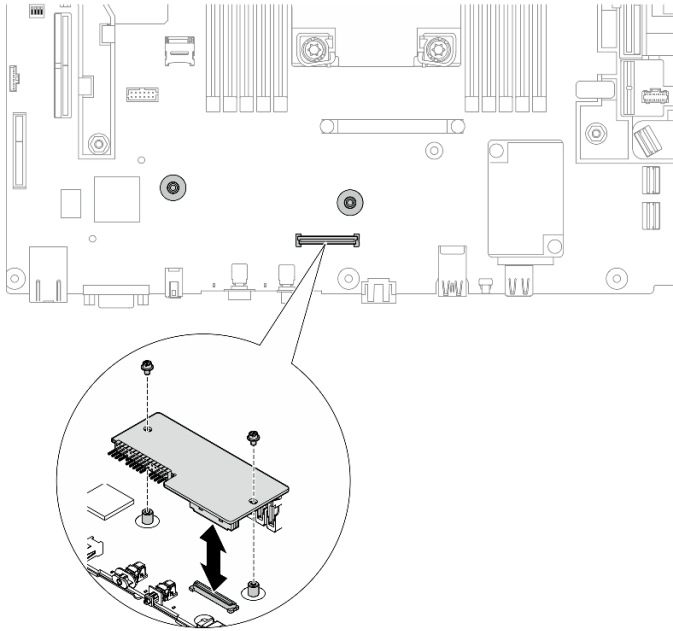


Figure 177. Installing the security module

- Step 3. Install the system board if necessary (see [“Install the system board assembly” on page 155](#)).

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Top cover replacement

See these topics to learn how to remove and install the top cover and the fan cover.

Remove the top covers

See this topic to learn how to remove the top cover and the fan cover.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Remove the top cover.

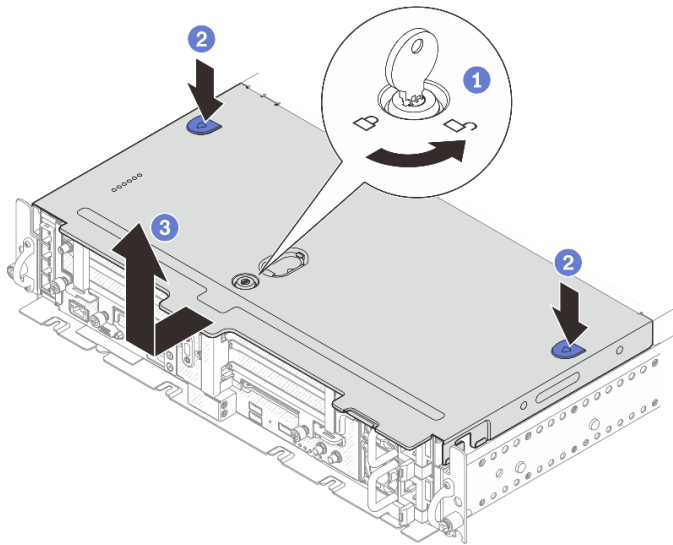


Figure 178. Removing the top cover

- 1 Unlock the top cover with the key that is stored in the key holder on the top cover.
- 2 Press and hold on the two buttons to disengage the top cover.
- 3 Slide the top cover slightly backward and remove it.

Note: If the two blue buttons cannot be pressed down, try slide the cover forward and press the buttons again.

Step 2. Press on the release buttons on both sides, and slid the fan cover slightly forward to remove it.

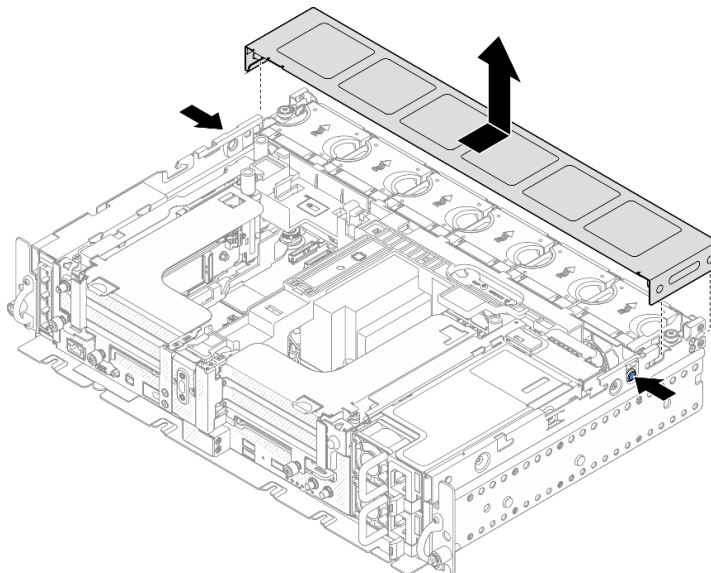


Figure 179. Remove the fan cover (300mm)

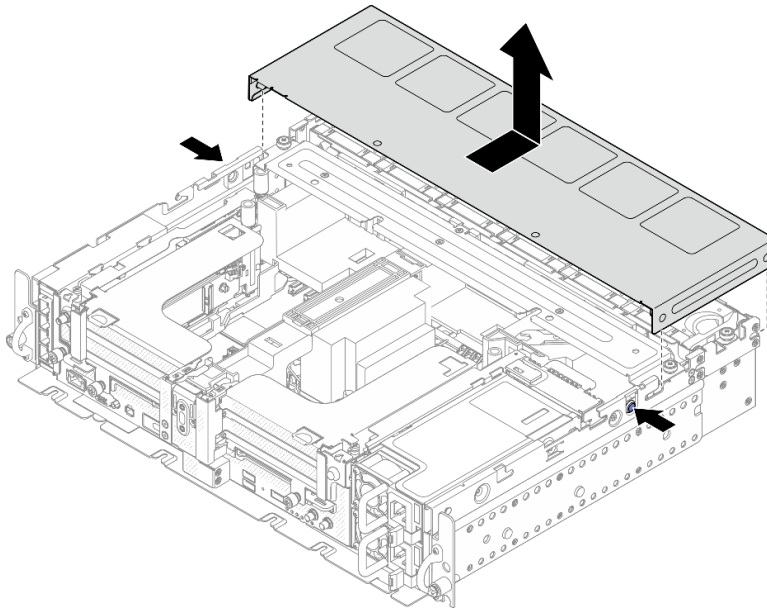


Figure 180. Remove the fan cover (360mm)

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.

[Watch the procedure on YouTube.](#)

Install the top covers

See this topic to learn how to install the top cover and the fan cover.

About this task

Procedure

Step 1. Align the top cover with the guiding slots on both sides of the chassis, and slide it forward slightly.

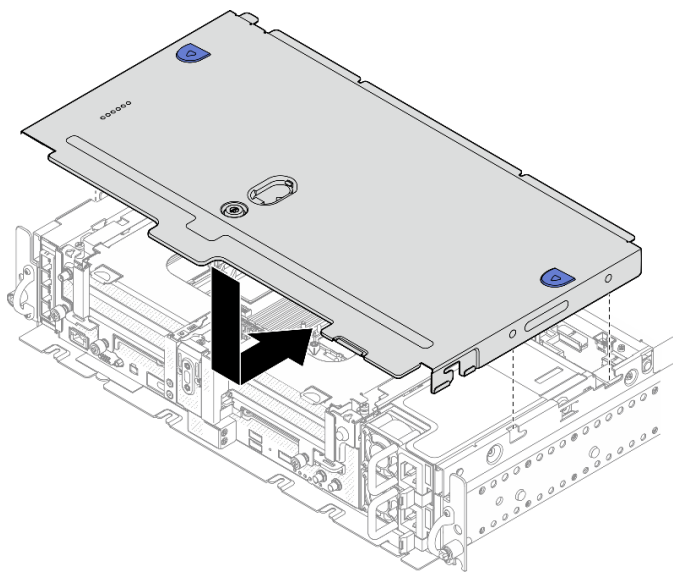


Figure 181. Installing the top cover

- Step 2. Align the fan cover with the guiding slots on both sides of the chassis, and slide it backwards slightly to secure it.

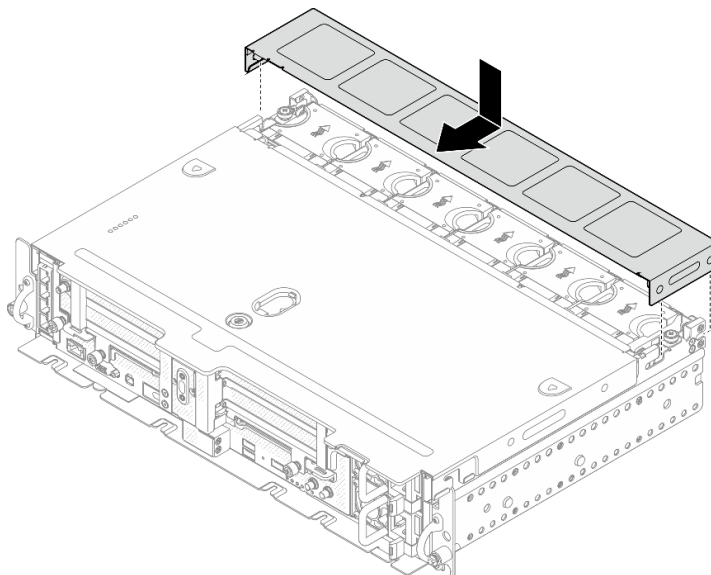


Figure 182. Installing the fan cover (300mm)

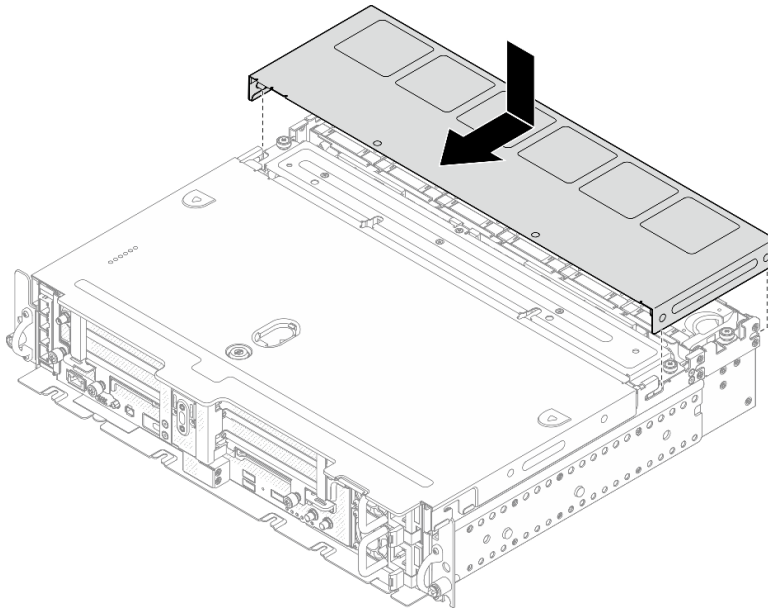


Figure 183. Installing the fan cover (360mm)

Step 3. Lock the top cover with the key, and store the key to the key holder on the top cover for future use.

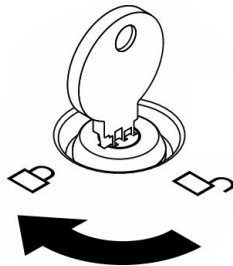


Figure 184. Locking the top cover

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[>Watch the procedure on YouTube.](#)

Wall mount LED cable replacement (trained technician only)

See these topics to learn how to remove or install the wall mount LED cable. Only trained technicians are allowed to do the replacement of this component.

Attention: Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

Remove the wall mount LED cable

See this topic to learn how to remove the wall mount LED cable.

About this task

Attention:

- Go over [“Installation Guidelines” on page 45](#) to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 15](#)).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 140](#)).
2. Remove the top covers (see [“Remove the top covers” on page 173](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 47](#)).
4. Remove PCIe riser 1 (see [“Remove the PCIe riser assemblies and adapters” on page 104](#)).

Step 2. Disconnect the cable from the system board; then, remove the two screws that secure it to the OCP cage, and remove the cable.

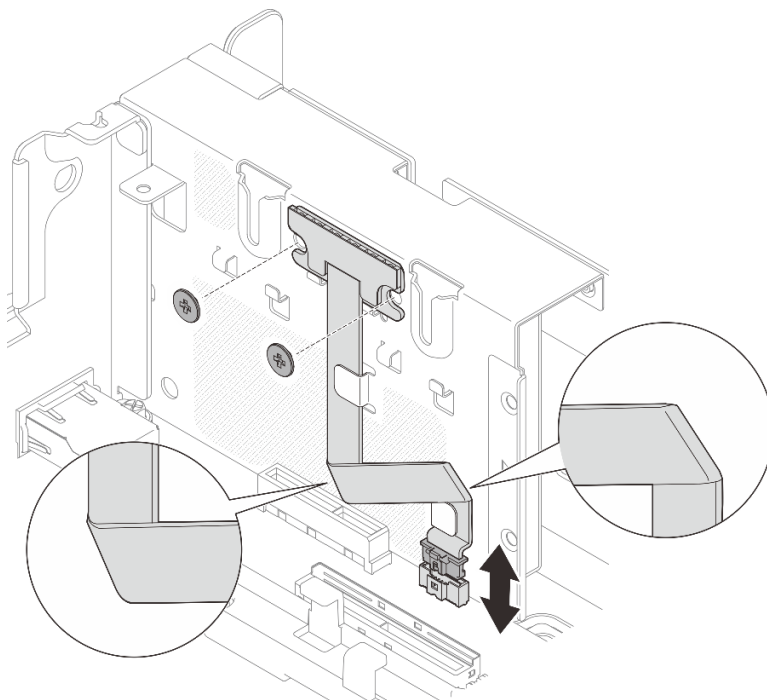


Figure 185. Removing the wall mount LED cable

After this task is completed

- Install a replacement unit (see [“Install the wall mount LED cable” on page 179](#)).
- 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.

[Watch the procedure on YouTube.](#)

Install the wall mount LED cable

See this topic to learn how to install the mount LED cable.

About this task

Procedure

- Step 1. Secure the LED panel to the OCP cage with two screws; then, bend the cable twice as illustrated, secure the cable with the cable clips, and connect the cable to the system board.

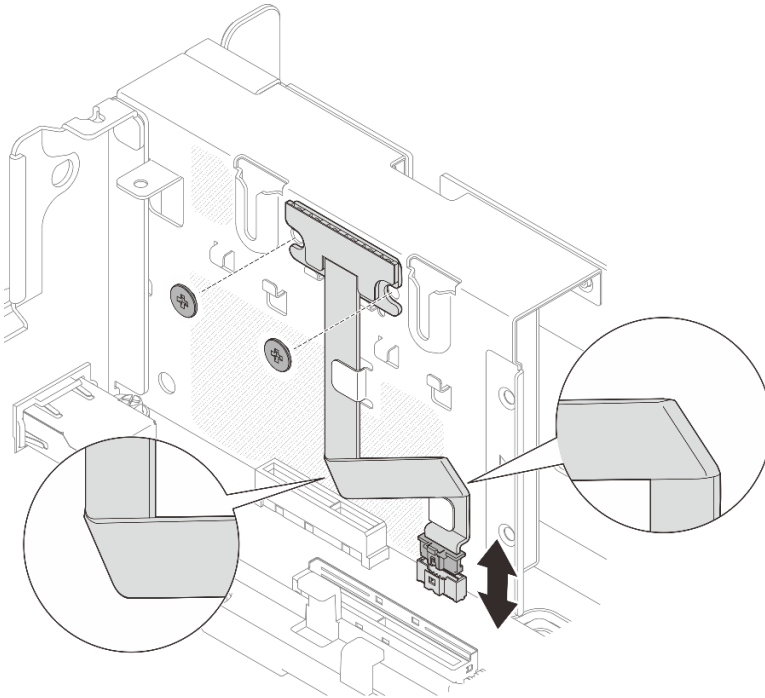


Figure 186. Installing the wall mount LED cable.

After this task is completed

Proceed to complete the parts replacement (see [“Complete the parts replacement” on page 179](#)).

[Watch the procedure on YouTube.](#)

Complete the parts replacement

Go through this checklist before completing parts replacement.

To complete parts replacement, go through the following list:

1. Ensure that all the removed components have been properly reinstalled and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to for each component that is installed.
3. If the top covers have been removed, reinstall it. See [“Install the top covers” on page 175](#).
4. If applicable, reinstall the security bezel. See [“Install the security bezel cable module” on page 147](#).
5. Reconnect external cables and power cords to the server.

Attention: To avoid component damage, connect the power cords last.

6. Update the server configuration.

- Download and install the latest device drivers: <http://datacentersupport.lenovo.com>.
- Update the system firmware. See “Firmware updates” on page 10.
- Update the UEFI configuration.
- Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: <http://datacentersupport.lenovo.com>.

Note: Make sure the latest version of ThinkSystem M.2 with Mirroring Enablement Kit Firmware is applied to avoid virtual disk/array missing after system board replacement.

Hardware disassembling for chassis recycle

See this topic to learn how to comply with regulations before recycling the chassis.

- Step 1. If applicable, remove the security bezel (see “Remove the security bezel” on page 140).
- Step 2. Remove the power supply units (see “Remove a hot-swap power supply unit” on page 126).
- Step 3. Remove the top covers (see “Remove the top covers” on page 173).
- Step 4. Remove the air baffle (see “Remove the air baffle” on page 47).
- Step 5. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 76).
- Step 6. Remove both PCIe riser assemblies (see “Remove the PCIe riser assemblies and adapters” on page 104).
- Step 7. Remove the M.2 boot adapter (see “Remove the M.2 boot adapter and drives” on page 94).
- Step 8. Remove the trayless drive cage (see “Remove the drive cage and trayless drives” on page 159).
- Step 9. Remove the power backplane (see “Remove the power backplane” on page 123).
- Step 10. Remove the OCP adapter (see “Remove the OCP Ethernet adapter” on page 99).
- Step 11. Remove the system board (see “Remove the system board assembly” on page 153).
- Step 12. Remove the security bezel cable module (see “Remove the security bezel cable module” on page 146).
- Step 13. Recycle the chassis in compliance with local regulations.

Chapter 4. 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.

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/se450/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 187. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

ThinkSystem SR650 System name: XCC0023579PK

Event Log Audit Log Maintenance History

Customize Table Clear Logs Refresh

Type: [Warning] [Error] [Info] All Source All Date

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 188. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

“Viewing Event Logs” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

The front operator panel and error LEDs

The front operator panel is a system of LEDs on various external and internal components of the server that leads you to the failed component. When an error occurs, LEDs are lit on the front operator panel on the front of the server, then on the failed component. By viewing the LEDs in a particular order, you can often identify the source of the error.

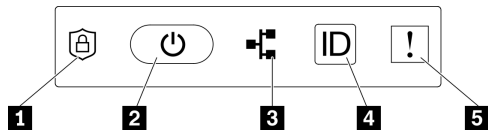


Figure 189. Front operator panel

Table 34. Front operator panel controls and indicators

1 “ThinkShield Activation LED (green)” on page 22	4 “Identification button/LED (blue)” on page 22
2 “Power button/LED (green)” on page 22	5 “System-error LED (yellow)” on page 23
3 “Network activity LED (green)” on page 22	

1 ThinkShield Activation LED (green)

The states of ThinkShield Activation LED are as following:

Solid on: ThinkShield is activated.

Flashing: ThinkShield is not activated and needs to be activated.

Off: ThinkShield is not available in this unit.

See “Activate the system” in *Setup Guide* to activate the system.

2 Power button/LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Off: Power is not present or the power adapter, or the LED itself has failed.

Flashing rapidly (4 times per second): The server is off and not ready to be turned on. The power button is disabled in this status. This will last approximately 5 to 10 seconds after power source is connected.

Flashing slowly (once per second): The server is off and ready to be turned on. Press the power button to turn on the server.

On: The server is turned on.

3 Network activity LED (green)

When this LED is blinking, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

4 Identification button/LED (blue)

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely.

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely. The states of the identification LED are as follows:

Off: Presence detection off.

Flashing rapidly (4 times per second): (on XCC firmware version 3.10 or later) The server is not activated yet and has no power permission.

Flashing slowly (once per second): Presence detection is on.

On: Presence detection is on.

5 System-error LED (yellow)

When this yellow LED is lit, it indicates that one or more system errors have occurred. This LED can be controlled by the XCC. Detailed information is available on the External LCD diagnostics handset (see [“External LCD diagnostics handset” on page 23](#)).

System-board LEDs

See this topic to identify the light-emitting diodes (LEDs) on the system board.

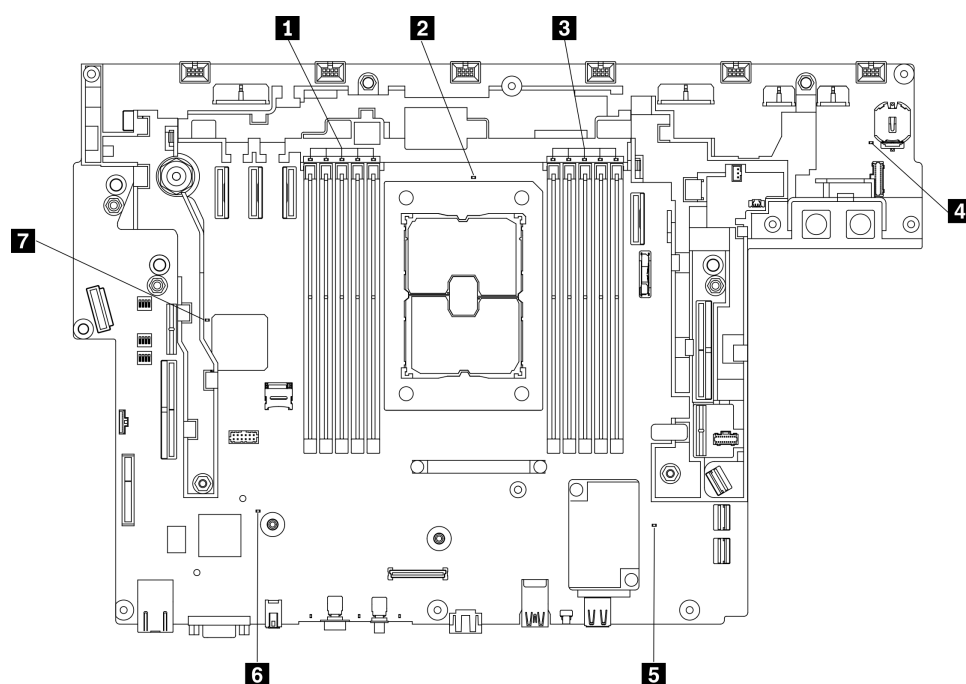


Figure 190. System-board LEDs

Table 35. System-board LEDs

1 DIMM error LED (10 to 6)	5 ME heartbeat LED
2 Processor error LED	6 XCC heartbeat LED
3 DIMM error LED (5 to 1)	7 FPGA heartbeat LED
4 System error LED	

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 minimum configuration that is supported for the server.

See [“Specifications” on page 1](#) to determine the minimum configuration for your server.

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 181](#)

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 minimum configuration that is required for the server to start. See [“Specifications” on page 1](#) to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum 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.
 - If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.
- Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Step 4. Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
 - 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 rear of 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.
- 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

See this topic to learn how 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 181](#))

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 205](#)).

Power on and power off problems

See this section to resolve issues when powering on or powering off the server.

- [“Embedded hypervisor is not in the boot list” on page 187](#)
- [“Server does not power on” on page 187](#)
- [“Server does not power off” on page 188](#)
- [“Unexpected shutdown with LED not lit” on page 188](#)

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is resolved:

1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager <F12> **Select Boot Device** at startup.
2. Make sure that the embedded hypervisor flash device is seated in the connector correctly.
3. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
4. Make sure that other software works on the server.

Server does not power on

Note: The power-control button will not function until approximately 5 to 10 seconds after the server has been connected to power.

1. If an extra optional device has been just installed, remove it and power on the server again. If the server is powered on this time, it indicates adding this optional device takes more than the system power could afford.
2. Check the power button LED:
 - If the power button LED is lit, check the system event log.
 - If there is readable system event log without uefi errors, replace the system board (see [“System board replacement \(trained technician only\)” on page 152](#)).
 - In the following cases, call Lenovo Service.
 - There is readable system event log with uefi errors.
 - There is no readable system event log.
 - If the power button LED is not lit:
 - a. Disconnect and reconnect the power cable.
 - b. Make sure the power supplies are of the same type (the system-error LED would be lit if power supply units do not match), and reseal all the units.
 - c. Check if any power supply error LED is lit (see [“Power supply LEDs” on page 20](#)), and replace the faulty unit if any is found.

If the problem persists, call Lenovo service.

The following steps are for Lenovo Service only.

1. If there is readable system event log with uefi errors, replace the Root of Trust Module (see [“Firmware and Root of Trust/TPM 2.0 Security Module replacement \(trained technician only\)” on page 171](#)).
2. If there is no readable system event log, but the power button LED is still lit, bring the following replacement units, run diagnostic isolation, and replace the faulty parts.
 - System board (see [“System board replacement \(trained technician only\)” on page 152](#))
 - Root of Trust Module (see [“Firmware and Root of Trust/TPM 2.0 Security Module replacement \(trained technician only\)” on page 171](#))
3. If the power button LED is not lit, bring the following replacement units, run diagnostic isolation, and replace the faulty parts.
 - Power backplane (see [“Power backplane replacement” on page 123](#))
 - System board (see [“System board replacement \(trained technician only\)” on page 152](#))
 - Root of Trust Module (see [“Firmware and Root of Trust/TPM 2.0 Security Module replacement \(trained technician only\)” on page 171](#))

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
 - a. Press Ctrl+Alt+Delete.
 - b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
 - c. Restart the server.
 - d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Unexpected shutdown with LED not lit

Complete the following steps until the problem is resolved:

1. Check the XCC event log, and resolve related errors if found any.
2. Reseat power supply.
3. If the error recurs, replace power supply.

Memory problems

See this section to resolve issues related to memory.

Common memory problems

- [“Multiple memory modules identified as failing or disabled” on page 188](#)
- [“Displayed system memory is less than installed physical memory” on page 189](#)
- [“Invalid memory population detected” on page 190](#)

PMEM specific problems

- [“Extra namespace appears in an interleaved region” on page 190](#)
- [“Migrated PMEMs are not supported” on page 190](#)
- [“PMEMs installed in wrong slots after system board replacement” on page 191](#)
- [“After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots” on page 191](#)
- [“Cannot create goal successfully when installing PMEMs to the system for the first time” on page 191](#)

Multiple memory modules identified as failing or disabled

Complete the following procedure to solve the problem.

1. Check XCC log to see if one of the disabled modules is malfunctioning. If so, replace the malfunctioning module and start the system to see if all the modules are properly recognized.

Note: When one memory module is malfunctioning, the system will execute memory downgrade to the closest supported combination, while some installed memory modules will not be recognized by the system.

2. Reseat the memory modules; then, restart the server.
3. 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.

4. 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.
5. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
6. 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.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the system board.

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
 - No error LEDs are lit on the operator information panel.
 - No memory module error LEDs are lit on the system board.
 - Memory mirrored channel does not account for the discrepancy.
 - The memory modules are seated correctly.
 - You have installed the correct type of memory module (see “PMEM rules” in *Setup Guide* 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.
 - If PMEMs are installed:
 - a. Refer to “PMEM rules” in *Setup Guide* and see if the displayed memory fits the mode description.
 - b. All the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
 - c. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.
2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
 - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
 - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.
4. Run memory diagnostics. When you start a solution and press the key specified in the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

Notes: When PMEMs are installed, run diagnostics based on the mode that is set presently:

- App Direct Mode:
 - Run Memory Test for DRAM memory modules.
 - Run PMEM Test for PMEMs.
- 5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
- 6. Re-enable all memory modules using the Setup utility, and then restart the server.
- 7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
- 8. (Trained technician only) Replace the system board.

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” in *Setup Guide* 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 that is displayed as “disabled.”

Extra namespace appears in an interleaved region

If there are two created namespaces in one interleaved region, VMware ESXi ignores the created namespaces and creates an extra new namespace during system booting. Delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

Migrated PMEMs are not supported

If this warning message appears, complete the following steps:

Intel Optane PMEM Interleave set (DIMM X) is migrated from another system (Platform ID: 0x00), these migrated PMEMs are not supported.

1. Move the modules back to the original system with the exact same configuration as the previous one.
2. Back up stored data in PMEM namespaces.
3. Disable PMEM security with one of the following options:

- **LXPM**

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

- **Setup Utility**

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

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

- **Linux** command:

```
ndctl destroy-namespace all -f
```

- **Windows** Powershell command

```
Get-PmemDisk | Remove-PmemDisk
```

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

```
ipmctl delete -pcd
```

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

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

6. Reboot the system, and press F1 to enter Setup Utility.
7. Power off the system.
8. Remove the modules to be reused for a new system or configuration.

PMEMs installed in wrong slots after system board replacement

If this warning message appears, complete the following steps:

DIMM **X** of Intel Optane PMEM persistent interleave set should be moved to DIMM **Y**.

1. Record each of the instructions of changing PMEM slot from XCC events.
2. Power off the system, and remove the PMEMs that are mentioned in the warning messages. It is suggested to label these PMEMs to avoid confusion.
3. Install the PMEMs in the correct slot number indicated in the warning messages. Remove the labels to avoid blocking airflow and cooling.
4. Complete replacement and power on the system. Make sure there is no similar warning messages in XCC.

Note: Do not perform any provisioning on PMEM to avoid data lost when the messages are still present in XCC events.

After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots

AC the system or restart XCC to solve this problem.

Cannot create goal successfully when installing PMEMs to the system for the first time

When seeing ones of the following messages:

- ERROR: Cannot retrieve memory resources info
- ERROR: One or more PMEM modules do not have PCD data. A platform reboot is recommended to restore valid PCD data.

Complete the following steps to solve the problem.

1. If the PMEMs have been installed in another system with stored data, perform the following steps to erase the data.
 - a. Based on the original population order, install the PMEMs to the original system where they were installed previously, and back up the data from the PMEMs to other storage devices.
 - b. Disable PMEM security with one of the following options:
 - **LXPM**
Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - **Setup Utility**
Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - c. Delete namespaces with command corresponding to the operating system that is installed:
 - **Linux** command:

```
ndctl destroy-namespace all -f
```

- **Windows** Powershell command

```
Get-PmemDisk | Remove-PmemDisk
```

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

```
ipmctl delete -pcd
```

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

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

2. Install the PMEMs back to the target system, and upgrade system firmware to the latest version without entering Setup Utility.

3. If the problem persists, overwrite PMEMs with the following ndctl command.

```
ndctl sanitize-dimm --overwrite all
```

4. Monitor the overwrite status with the following command.

```
watch -n 1 "ipmctl show -d OverwriteStatus -dimm"
```

5. When seeing all PMEM OverwriteStatus=Completed, reboot the system and see if the problem persists.

Monitor and video problems

See this topic to learn how to solve problems related to a monitor or video.

- [“Incorrect characters are displayed” on page 192](#)
- [“Screen is blank” on page 192](#)
- [“Screen goes blank when you start some application programs” on page 193](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.” on page 193](#)
- [“The wrong characters appear on the screen” on page 193](#)
- [“Management controller remote presence cannot work” on page 193](#)

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 [“Firmware updates” on page 10](#).

Screen is blank

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. If the server installed with the graphical adapters while turning on the server, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
3. 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.
4. Make sure that the correct server is controlling the monitor, if applicable.

5. Make sure that the video output is not affected by corrupted server firmware; see [“Firmware updates” on page 10](#).
6. 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.

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 [“Firmware updates” on page 10](#).

Management controller remote presence cannot work

The management controller remote presence function is unable to display the system screen when an optional video adapter is present. To use the management controller remote presence function, remove the optional video adapter or use the onboard VGA as the display device.

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 194](#)
- [“Mouse does not work” on page 194](#)
- [“KVM switch problems” on page 194](#)

- [“USB-device does not work” on page 194](#)

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 specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager system setup interface. 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.

Optional-device problems

See this topic to learn how to solve problems related to optional devices.

- [“External USB device not recognized” on page 195](#)
- [“PCIe adapter is not recognized or is not functioning” on page 195](#)
- [“A Lenovo optional device that worked previously does not work now.” on page 196](#)
- [“A Lenovo optional device that was just installed does not work.” on page 195](#)
- [“A Lenovo optional device that worked previously does not work now.” on page 196](#)

External USB device not recognized

Complete the following steps until the problem is resolved:

1. 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.
2. Use the Setup utility to make sure that the device is configured correctly.
3. 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. Check the event log and resolve any issues related to the device.
2. Validate that the device is supported for the server (see <https://serverproven.lenovo.com>).
3. Make sure that the adapter is installed in a correct slot.
4. Make sure that the proper device drivers are installed for the device.
5. Resolve any resource conflicts if running legacy mode (UEFI).
6. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.

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. 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 F1 to display the system setup interface. Whenever memory or any other device is changed, you must update the configuration.

2. Reseat the device that you just installed.
3. Replace the device that you just installed.

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. If the failing device is a SCSI device, make sure that:
 - The cables for all external SCSI devices are connected correctly.
 - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.
4. Reseat the failing device.
5. Replace the failing device.

Serial-device problems

See this topic to learn how to solve problems with serial ports or devices.

- [“Number of displayed serial ports is less than the number of installed serial ports” on page 196](#)
- [“Serial device does not work” on page 196](#)

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.
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.

Intermittent problems

See this section to solve intermittent problems.

- [“Intermittent external device problems” on page 197](#)

- [“Intermittent KVM problems” on page 197](#)
- [“Intermittent unexpected reboots” on page 197](#)

Intermittent external device problems

Complete the following procedure to solve the problem.

1. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
2. For a USB device:
 - a. Make sure that the device is configured correctly.
Restart the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager system setup interface. 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 procedure to solve the problem.

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 correctable 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 specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager system setup interface. Then, click **BMC Settings → POST Watchdog Timer**.
2. If the reset occurs after the operating system starts, 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 181](#) for information about viewing the event log.

Power problems

See this topic to learn how 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 adapter is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.

Network problems

See this topic to learn how to resolve issues related to networking.

- ["Cannot wake server using Wake on LAN" on page 198](#)
- ["Could not log in using LDAP account with SSL enabled" on page 198](#)

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 XCC system event log (see ["Event logs" on page 181](#)), make sure:
 - a. Fan 3 is running in standby mode, if Emulex dual port 10G Base-T embedded adapter is installed.
 - b. The room temperature is not too high (see ["Specifications" on page 1](#)).
 - 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

See this section to solve observable problems.

- ["The server immediately displays the POST Event Viewer when it is turned on" on page 199](#)
- ["Server is unresponsive \(POST is complete and operating system is running\)" on page 199](#)
- ["Server is unresponsive \(cannot press F1 to start System Setup\)" on page 199](#)
- ["Voltage planar fault is displayed in the event log" on page 200](#)
- ["Unusual smell" on page 200](#)
- ["Server seems to be running hot" on page 200](#)
- ["Cannot enter legacy mode after installing a new adapter" on page 200](#)
- ["Cracked parts or cracked chassis" on page 200](#)

The server immediately displays the POST Event Viewer when it is turned on

Complete the following procedure to solve the problem.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://serverproven.lenovo.com>.

3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Server is unresponsive (POST is complete and operating system is running)

Complete the following procedure to solve the problem.

- If you are in the same location as the server, complete the following steps:
 1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the server and verify that all applications are running (no applications are hung).
 3. Restart the server.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the server from a remote location, complete the following steps:
 1. Make sure that all applications are running (no applications are hung).
 2. Attempt to log out of the system and log back in.
 3. Validate the network access by pinging or running a trace route to the server from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another server in the enclosure 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 (cannot press F1 to start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager system setup interface. 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 procedure to solve the problem.

1. Revert the system to the minimum configuration. See [“Specifications” on page 1](#) for the minimally required number of processors and DIMMs.
2. Restart the system.
 - If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

Unusual smell

Complete the following procedure to solve the problem.

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 procedure to solve the problem.

Multiple servers or chassis:

1. Make sure that the room temperature is within the specified range (see [“Specifications” on page 1](#)).
2. 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.

Software problems

See this topic to learn how 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.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at <https://pubs.lenovo.com/>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software is supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
 - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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Morrisville, NC 27560
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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.

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁶⁺)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模組	—	○	○	○	○	○
處理器模組	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
電源供應器	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
電路卡	—	○	○	○	○	○
光碟機	—	○	○	○	○	○
<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.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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