



ThinkSystem SR950 Maintenance Manual



Machine Types: 7X12, 7X11, and 7X13

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/



This equipment is not suitable for use in locations where children are likely to be present.

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>

Twenty-fifth Edition (July 2023)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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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

The ThinkSystem SR950 server is a high performance 4U rack server that supports up to eight Intel Xeon processors. It is an enterprise-class server designed for customers requiring four or more processors, large amounts of memory, and numerous I/O connections.



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. Server Specifications

Specification	Description
Size	4U server <ul style="list-style-type: none">• Height: 175.3 mm (6.90 in.)• Depth: 851 mm (33.50 in.)• Width: 447.0 mm (17.6 in.)
Weight	Approximately 32.6 kg (71.9 lbs.) to 58.7 kg (129.4 lbs.) depending on your configuration.
Processor (depending on the model)	Supports multi-core Intel Xeon processors, with integrated memory controller and Ultra Path Interconnect (UPI) <ul style="list-style-type: none">• Two processors, minimum (expandable up to eight).• Designed for the LGA 3647-0 socket• Scalable up to 224 cores (with eight processors installed) <p>For a list of supported processors, see https://serverproven.lenovo.com/ and the “Processor Options” section of the <i>ThinkSystem SR950 Product Guide</i> at http://lenovopress.com/LP0647.</p> <p>Note: If 82xx processors are installed, 60 mm x 38mm, 19K internal hot-swap fans (01PG490) must also be installed to meet CPU cooling requirements at 35°C. If 16K internal hot-swap fans are currently installed, you must validate that the system has version 2 of the ThinkSystem 2-CPU, 24-DIMM, Compute System Board (01CV978) installed in each compute tray before upgrading the fans from 16K to 19K.</p>

Table 1. Server Specifications (continued)

Specification	Description
Memory	<p>See “Memory module installation order” in <i>Setup Guide</i> for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Minimum: 32 GB • Maximum: <ul style="list-style-type: none"> – 6.2 TB using registered DIMMs (RDIMMs) or load reduction DIMMs (LRDIMMs) – 24.6 TB using three-dimensional-stacking registered DIMMs (3DS RDIMMs) – 36.9 TB using Intel® Optane™ DC persistent memory modules (PMMs) • Type: <ul style="list-style-type: none"> – PC4-21300 (DDR4-2666), operating speed depends on processor model and UEFI settings – Single-rank or dual-rank – Registered DIMM (RDIMM), load reduced DIMM (LRDIMM), or three-dimensional-stacking registered DIMM (3DS RDIMM) • Slots: 24 dual inline in each compute tray (96 DIMMs, maximum) • Supports (depending on the model): <ul style="list-style-type: none"> – 16 GB, 32 GB, 64 GB RDIMMs – 64 GB LRDIMMs – 64 GB, 128 GB, 256 GB 3DS RDIMMs – 128 GB, 256 GB, and 512 GB Intel® Optane™ DC persistent memory modules (DCPMMs) <p>Note: When Windows Server 2016 or 2019 is installed on the ThinkSystem SR950, the server cannot have greater than 20 TB of system memory installed unless Credential Guard and the Hyper-V role are both disabled. This issue will be addressed on Windows Server 2019 within a Microsoft Update at a future date. Note that Optane DIMMs are only supported on Windows Server 2019 and later.</p> <p>Note: List of supported memory module is different for 1st generation (Skylake) and 2nd generation (Cascade Lake) Intel Xeon processors. Make sure to install compatible memory modules to avoid system error. For a list of supported DIMMs, see: https://serverproven.lenovo.com/.</p>
Drive expansion	<ul style="list-style-type: none"> • Up to six SAS/SATA/NVMe drive backplanes: • Up to 24 2.5-inch hot-swap drive bays: <ul style="list-style-type: none"> – Up to 24 SATA/SAS drives (dependent on installed drive backplanes) – Up to 12 NVMe drives (dependent on installed drive backplanes) <p>See “Configurations” on page 8 for more details.</p>

Table 1. Server Specifications (continued)

Specification	Description
Expansion slots	<p>Up to seventeen expansion slots (dependent on server configuration):</p> <ul style="list-style-type: none"> • Slot 1 - 4: PCI Express 3.0 for PCIe riser-card with the following slots available depending on the riser installed: <ol style="list-style-type: none"> 1. x8/x8/x8/x8 PCIe full-height riser kit provides: <ul style="list-style-type: none"> – Slot 1: PCI Express 3.0 x8 – Slot 2: PCI Express 3.0 x8 – Slot 3: PCI Express 3.0 x8 – Slot 4: PCI Express 3.0 x8 2. x16/x16 PCIe full-height riser kit provides: <ul style="list-style-type: none"> – Slot 3: PCI Express 3.0 x16 – Slot 4: PCI Express 3.0 x16 3. x16/x16/x16/x16 PCIe full-height riser kit (8-processor systems only) provides: <ul style="list-style-type: none"> – Slot 1: PCI Express 3.0 x16 – Slot 2: PCI Express 3.0 x16 – Slot 3: PCI Express 3.0 x16 – Slot 4: PCI Express 3.0 x16 • Slot 5: PCI Express 3.0 x16 (low profile) • Slot 6: PCI Express 3.0 x16 (low profile) • Slot 7: PCI Express 3.0 x8 (low profile) <p>Note: You should not install a RAID or Host Bus Adapter card in this slot.</p> <ul style="list-style-type: none"> • Slot 8: ML2 x16 network adapter (with NC-SI support) • Slot 9: LOM adapter • Slot 10 - 15: PCI Express 3.0 for PCIe riser-card with the following slots available depending on the riser-card installed: <ol style="list-style-type: none"> 1. x8/x8/x8/x8 PCIe full-height riser kit provides: <ul style="list-style-type: none"> – Slot 10: PCI Express 3.0 x8 – Slot 11: PCI Express 3.0 x8 – Slot 12: PCI Express 3.0 x8 – Slot 13: PCI Express 3.0 x8 2. x16/x16 PCIe full-height riser kit provides: <ul style="list-style-type: none"> – Slot 12: PCI Express 3.0 x16 – Slot 13: PCI Express 3.0 x16 3. x16/x16/x16/x16 PCIe and ML2 x16 full-height riser kit (8-processor systems only) provides: <ul style="list-style-type: none"> – Slot 10: PCI Express 3.0 x16 – Slot 11: PCI Express 3.0 x16 – Slot 12: PCI Express 3.0 x16 – Slot 13: PCI Express 3.0 x16 – Slot 14: PCI Express 3.0 x16 – Slot 15: ML2 x16 network adapter (no NC-SI support)

Table 1. Server Specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> • Slot 16 - 17: x8/x8 PCIe low-profile riser kit (processor-rich systems only) provides: <ul style="list-style-type: none"> – Slot 16: PCI Express 3.0 x8 – Slot 17: PCI Express 3.0 x8 <p>See “Configurations” on page 8 for more details.</p>
Integrated functions	<ul style="list-style-type: none"> • Lenovo XClarity Controller, which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities. • Light-path diagnostics • Standard connectors (front of server): <ul style="list-style-type: none"> – DB-15 VGA port – USB 2.0 ports (two): <ul style="list-style-type: none"> – USB 2.0 for Lenovo XClarity Controller management – USB 2.0 • Standard connectors (rear of server): <ul style="list-style-type: none"> – DB-15 VGA port – DB-9 serial port – RJ-45 system-management network port. This connector is dedicated for Lenovo XClarity Controller functions and runs at 1 gigabit (Gb) speed. – USB 3.0 ports (two)
RAID controller (depending on the model)	<p>The following RAID options are available for this server:</p> <ul style="list-style-type: none"> • ThinkSystem 430-8i Basic Hardware RAID PCIe Adapter, supports RAID levels 0/1/10/5 cacheless • ThinkSystem 430-16i Basic Hardware RAID PCIe Adapter, supports RAID levels 0/1/10/5 cacheless • ThinkSystem 530-8i Basic Hardware RAID PCIe Adapter, supports RAID levels 0/1/10/5 cacheless • ThinkSystem 730-8i Value Advanced Hardware RAID 1 GB Cache PCIe Adapter, supports JBOD mode and RAID levels 0/1/5/10/50 (for Chinese Mainland only) • ThinkSystem 730-8i Value Advanced Hardware RAID 2 GB Cache PCIe Adapter, supports JBOD mode and RAID levels 0/1/5/10/50 (for Chinese Mainland only and Asian-Pacific area only) • ThinkSystem RAID 930-8i Advanced Hardware 2 GB Flash Cache PCIe Adapter, supports RAID levels 0/1/5/6/10/50/60 • ThinkSystem RAID 930-16i Advanced Hardware 4 GB Flash Cache PCIe Adapter, supports RAID levels 0/1/5/6/10/50/60

Table 1. Server Specifications (continued)

Specification	Description
Fans	<p>Up to twelve (60 mm x 38 mm) internal hot-swap system fans (dependent on server configuration)</p> <ul style="list-style-type: none"> • The six upper fans are not installed for the four-processor-limited server configuration. • Only three upper fans are installed for the storage-rich configuration. <p>Two types of fans are supported:</p> <ul style="list-style-type: none"> • 60 mm x 38mm, 16K internal hot-swap fans (01CX965) • 60 mm x 38mm, 19K internal hot-swap fans (01PG490) <p>Notes:</p> <ul style="list-style-type: none"> • Different fan types cannot be mixed within a system. All fans must be either 16K fans or 19K fans. • Before upgrading fans from 16K to 19K, you must make sure that the system has version 2 of the ThinkSystem 2-CPU, 24DIMM, Compute System Board (01CV978) installed in each compute tray.
Power supplies	<ul style="list-style-type: none"> • This server supports three types of hot-swap power supply units: <ul style="list-style-type: none"> – 1100-watt power supply <ul style="list-style-type: none"> – input voltage 110V, 220V, or 240V ac – 1600-watt power supply <ul style="list-style-type: none"> – input voltage 220V or 240V ac – 2000-watt power supply <ul style="list-style-type: none"> – input voltage 220V ac • The power subsystem supports balanced N+N redundancy operation, where N = 1 or 2. <p>CAUTION:</p> <ol style="list-style-type: none"> 1. 240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland. 2. Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel. 3. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.
Minimal configuration for debugging	<ul style="list-style-type: none"> • Two processors in processor socket 1 and 2 • Two DRAM DIMMs in slot 8 and 20 • One power supply in slot 1 • One drive with RAID adapter and backplane (If OS is required for debugging) • Six system fans (fan 1 to 6)

Table 1. Server Specifications (continued)

Specification	Description
Acoustical noise emissions (base configuration)	<ul style="list-style-type: none"> • Sound power level, idling: <ul style="list-style-type: none"> – Minimum configuration: 7.0 bels – Typical configuration: 7.0 bels – Maximum configuration: 7.8 bels • Sound power level, operating: <ul style="list-style-type: none"> – Minimum configuration: 7.0 bels – Typical configuration: 7.2 bels – Maximum configuration: 8.0 bels <p>Notes:</p> <ol style="list-style-type: none"> 1. These levels were measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. 2. The options supported in this server vary in function, power consumption, and required cooling. Any increase in cooling required by these options will increase the fan speed and generated sound level. The actual sound pressure levels measured in your installation depend upon a variety of factors, including: the number of racks in the installation; the size, materials, and configuration of the room; the noise levels of other equipment; the room ambient temperature and barometric pressure; and the location of employees in relation to the equipment.
Heat output	<p>Approximate heat output:</p> <ul style="list-style-type: none"> • Minimum configuration: 935 BTU, 275 W (in BTU per hour and watts) <ul style="list-style-type: none"> – Minimum configuration of two microprocessors, two memory modules, one M.2 adapter, and no PCIe adapters. • Maximum configuration: 21837 BTU, 6400 W (in BTU per hour and watts) <ul style="list-style-type: none"> – Maximum configuration with four 1600-watt power supplies configured for non-redundant operation under maximum loading.

Table 1. Server Specifications (continued)

Specification	Description
Environment	<ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 5° to 45°C (41° to 113°F); altitude: 0 to 3050 m (10,006 ft) derate maximum dry bulb temperature 1°C (33°F) per 125 m (410 ft) above 950 m (3,117 ft). Maximum rate of change 20°C (68°F) per hour – Server off: 5° to 45°C (41° to 113°F) – Shipment: -40°C to 60°C (-40°F to 140°F) • Humidity range (noncondensing): <ul style="list-style-type: none"> – Server on: Minimum = higher (more moisture) of -12°C (10°F) dew point and 8% to 90% relative humidity; maximum dew point: 24°C (75°F) – Server off: 8% to 90% relative humidity; maximum dew point: 27°C (80°F) – Shipment: 5% to 100% <p>Notes:</p> <ul style="list-style-type: none"> • 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 7.</p> • ASHRAE compliance information (see the “Operating Environment” section of the ThinkSystem SR950 Product Guide at http://lenovopress.com/LP0647 for specific ASHRAE compliance levels for each server configuration): <ul style="list-style-type: none"> – The server is designed for thermal compliance in ASHRAE A4 ambient environments. Certain processor and adapter configurations will limit product environmental support to ASHRAE A2 ambient conditions. – If 82xx processors are installed, 60 mm x 38mm, 19K internal hot-swap fans (01PG490) must also be installed to meet CPU cooling requirements at 35°C. – 205W processors used in an eight-socket configuration might experience a slight drop in performance under extreme workloads when the ambient temperature is above 30°C. – NVMe devices are supported up to an ambient temperature of 35°C.
Operating systems	<p>Supported and certified operating systems:</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>.

Particulate contamination

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

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

Table 2. Limits for particulates and gases

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

Configurations

The ThinkSystem SR950 is available in several configurations.

Configuration 1. Four-socket Performance

The highest-performing four-socket server, at the lowest cost when up to 12 drives is enough and without the need for a simple upgrade.

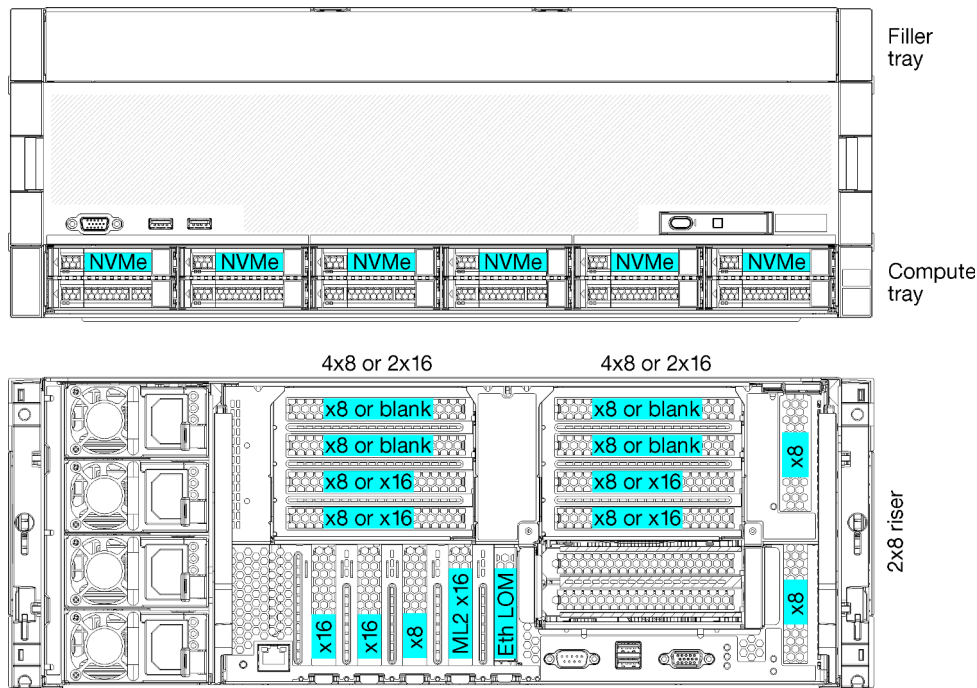


Figure 1. Four-socket performance configuration

This four-socket configuration supports the following combinations:

- Two processors (1, 2) support:
 - 12 drives (bay 0-11) with two NVMe enabled (bay 8, 10)
 - Extension slots
- Three processors (1, 2, 4)
- Four processors (1, 2, 3, 4)
- Supports 2, 3 or 4 processors (if using 5100 Series processors, 4 processors must be selected)
- 4 sockets configured in mesh topology for best performance
- 12 drive bays, 6 of which support NVMe drives (4 NVMe with 3 processors and 2 NVMe with 2 processors)
- 15 rear PCIe slots with 4 processors (10 rear slots with 3 processors, 6 rear slots with 2 processors)
- Filler installed in the upper tray area
- Can be upgraded to 8S but requires the 4S-to-8S Upgrade Option, additional components, and Lenovo hardware installation.

For more information about upgrading to the eight-socket configuration, see the following topic:

https://pubs.lenovo.com/sr950/installing_the_4S-to-8S_upgrade_option.html

Processor configurations

This configuration supports 2, or 4 processors.

- 2-processor configuration. Processors are installed in location 1 and 2.
- 3-processor configuration. Processors are installed in locations 1, 2, and 4.
- 4-processor configuration. Processors are installed in locations 1, 2, 3, and 4.

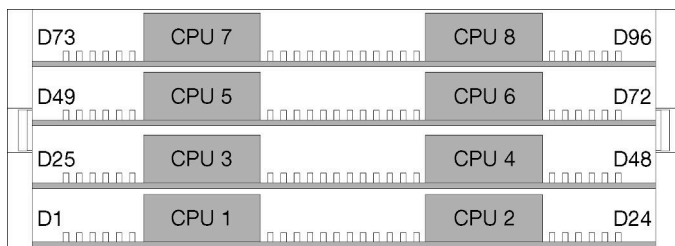


Figure 2. Processor numbering (viewed from the front of the server)

PCIe slot connectivity

The following table shows the processor to PCIe slot connectivity:

PCIe slot	Slot location	Description
1	Riser 1	4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
2		4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
3		4 ¹
4		4 ¹
5	I/O tray	2
6		2
7		1
8 (ML2)		1
9 (LOM)		1 (PCH)
10	Riser 2	3 ²
11		3 ²
12		3 ²
13		3 ²
14		Not connected.
15 (ML2)		Not connected.
16	2x8 Riser	3 ²
17		1
M.2	I/O tray	1 (PCH)
Storage adapter	Upper tray	Not connected.

PCIe slot	Slot location	Description
Storage adapter	Lower tray	1
Notes:		
1. In 2-processor configurations, processors 3 and 4 are not installed; this means slots 1-4, slot 10-13, and slot 16 are not connected		
2. In 3-processor configurations, processor 3 is not installed; this means slot 10-13, and slot 16 are not connected		

Drive bays

Drives are all located at the front of the server, 12 drives at the front of the upper tray and 12 at the front of the lower tray. Drives are connected to 4-drive backplanes in a 2-by-2 configuration, as shown in the following figure. All drive bays are 2.5-inch form factor.

Two different drive backplanes are available for the server:

- SAS/SATA backplane: Supports 4 SAS or SATA drives
- AnyBay backplane:
 - Top two drives support SAS, SATA, or NVMe interface drives (Lenovo AnyBay). The server can support up to 12 NVMe drives, depending on the server configuration. The NVMe-capable drive bays are the even-numbered bays as shown in [Figure 3 “Drive bay locations” on page 11](#).
 - Bottom two drive bays support SAS or SATA drives only

Regular 2.5-inch SAS/SATA drive bays support only SAS or SATA drives; however, the Lenovo AnyBay drive bay design allows a choice of SATA, SAS, or U.2 (NVMe) PCIe drives. This design enables the flexibility to configure some of the bays with high-performance PCIe SSDs while still using the other bays for high-capacity HDDs, which is an ideal solution for storage-tiering.

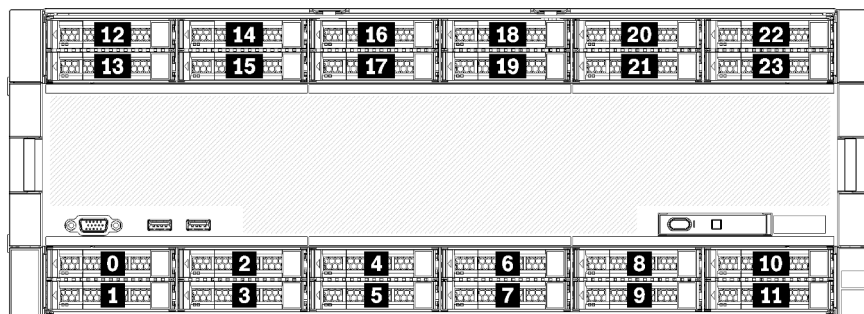


Figure 3. Drive bay locations

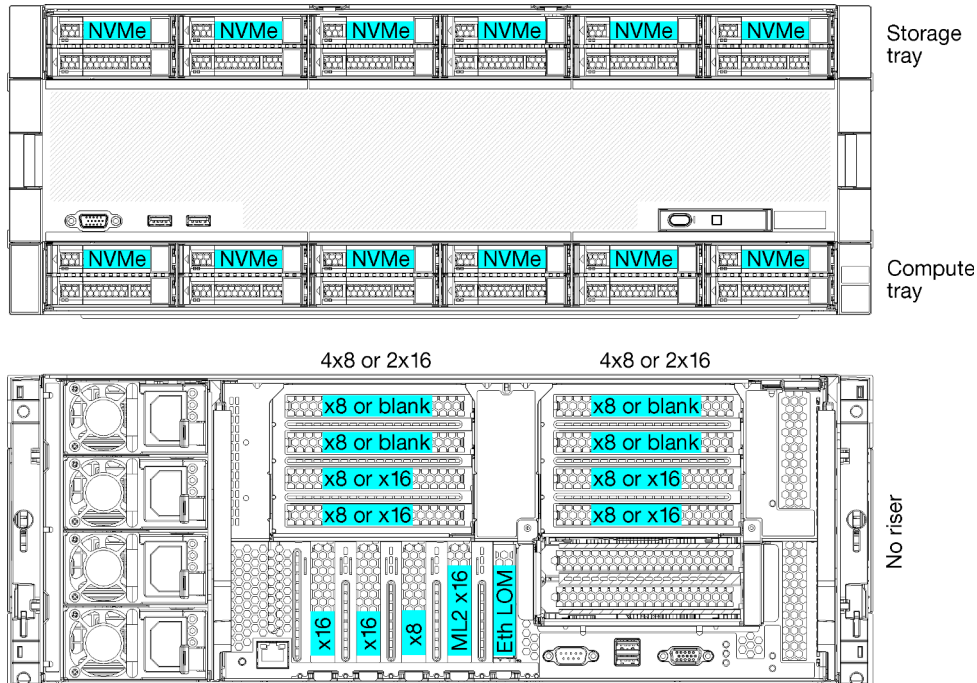
The following table lists the drive bays and NVMe support for the Four-Socket Performance configuration.

Installed processors	Maximum storage	Location of NVMe drives (see Figure 3 “Drive bay locations” on page 11)
2	12 drives (2 NVMe drives)	Bays 8, 10
3	12 drives (4 NVMe drives)	Bays 4, 6, 8, 10
4	12 drives (6 NVMe drives)	Bays 0, 2, 4, 6, 8, 10

Configuration 2. Four-Socket Performance / Storage Rich

The ThinkSystem SR950 is available in several configurations.

The highest-performing 4-socket server, when needing more than 12 drives without the need for a simple upgrade.



- Supports 2, 3 or 4 processors (if using 5100 Series processors, 4 processors must be selected)
- 4 processors configured in mesh topology for best performance
- 24 drives, 12 of which support NVMe drives (8 NVMe with 3 processors, 4 NVMe with 2 processors)
- 13 rear PCIe slots with 4 processors (9 rear slots with 3 processors, 5 rear slots with 2 processors)
- Storage tray installed in the upper tray area
- Can be upgraded to 8S but requires the 4S-to-8S Upgrade Option, additional components, and Lenovo hardware installation.

For more information about upgrading to the eight-socket configuration, see the following topic:

https://pubs.lenovo.com/sr950/installing_the_4S-to-8S_upgrade_option.html

Processor configurations

This configuration supports 2, 3, or 4 processors.

- 2-processor configuration. Processors are installed in location 1 and 2.
- 3-processor configuration. Processors are installed in locations 1, 2, and 4.
- 4-processor configuration. Processors are installed in locations 1, 2, 3, and 4.

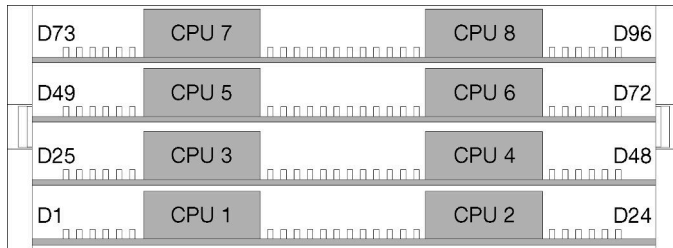


Figure 4. Processor numbering (viewed from the front of the server)

PCIe slot connectivity

The following table shows the processor to PCIe slot connectivity:

PCIe slot	Slot location	Description
1	Riser 1	4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
2		4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
3		4 ¹
4		4 ¹
5	I/O tray	2
6		2
7		1
8 (ML2)		1
9 (LOM)		1 (PCH)
10	Riser 2	3 ²
11		3 ²
12		3 ²
13		3 ²
14		Not connected.
15 (ML2)		Not connected.
16	2x8 Riser	Not connected.
17		Not connected.
M.2	I/O tray	1 (PCH)
Storage adapter	Upper tray	1

PCIe slot	Slot location	Description
Storage adapter	Lower tray	1
Notes:		
1. In 2-processor configurations, processors 3 and 4 are not installed; this means slots 1-4, slot 10-13, and slot 16 are not connected		
2. In 3-processor configurations, processor 3 is not installed; this means slot 10-13, and slot 16 are not connected		

Drive bays

Drives are all located at the front of the server, 12 drives at the front of the upper tray and 12 at the front of the lower tray. Drives are connected to 4-drive backplanes in a 2-by-2 configuration, as shown in the following figure. All drive bays are 2.5-inch form factor.

Two different drive backplanes are available for the server:

- SAS/SATA backplane: Supports 4 SAS or SATA drives
- AnyBay backplane:
 - Top two drives support SAS, SATA, or NVMe interface drives (Lenovo AnyBay). The server can support up to 12 NVMe drives, depending on the server configuration. The NVMe-capable drive bays are the even-numbered bays as shown in [Figure 5 “Drive bay locations” on page 14](#).
 - Bottom two drive bays support SAS or SATA drives only

Regular 2.5-inch SAS/SATA drive bays support only SAS or SATA drives; however, the Lenovo AnyBay drive bay design allows a choice of SATA, SAS, or U.2 (NVMe) PCIe drives. This design enables the flexibility to configure some of the bays with high-performance PCIe SSDs while still using the other bays for high-capacity HDDs, which is an ideal solution for storage-tiering.

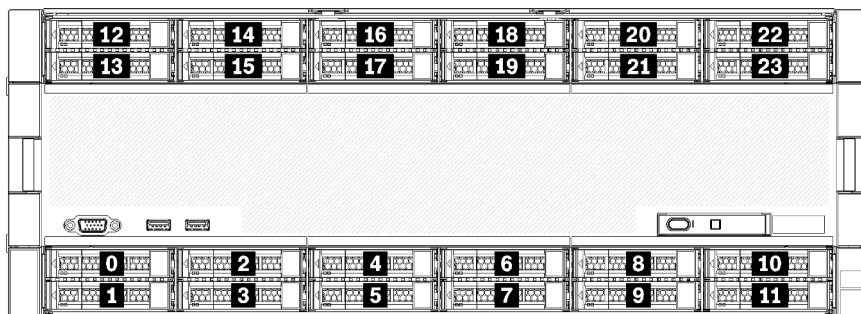


Figure 5. Drive bay locations

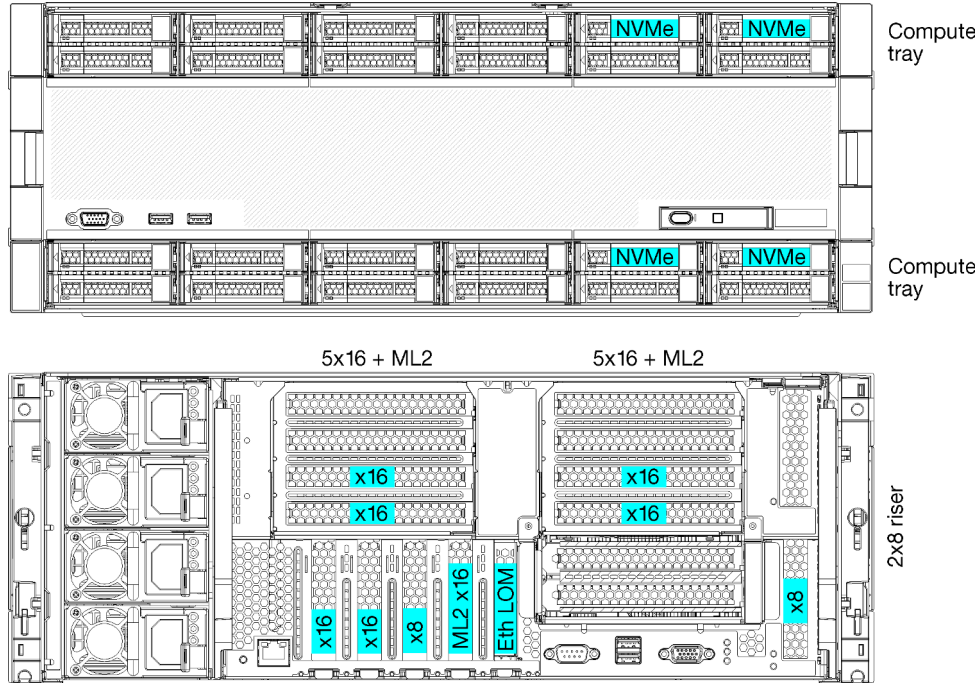
The following table lists the drive bays and NVMe support for the Four-Socket Performance configuration.

Installed processors	Maximum storage	Location of NVMe drives (see Figure 5 “Drive bay locations” on page 14)
2	24 drives (4 NVMe drives)	Bays 8, 10, and 20, 22
3	24 drives (8 NVMe drives)	Bays 4, 6, 8, 10, and 16, 18, 20, 22
4	24 drives (12 NVMe drives)	Bays 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

Configuration 3. Four-Socket Upgradable

The ThinkSystem SR950 is available in several configurations.

The lowest-cost 4-socket server capable of a simple upgrade to 8 socket and when 12 drive bays with 4 processors is enough storage.



- 2 or 4 processors, must be 8100 Series processors
- 4 processors in a ring topology
- 12 drive bays including up to 6 NVMe (2 NVMe with 2 processors)
- Up to 15 rear PCIe slots with 4 processors (6 rear slots with 2 processors)
- Filler installed in the upper tray area
- Upgradable to 8-socket with an additional compute tray and two system boards
- Once upgraded, the system will have 24 drive bays

Processor configurations

This configuration supports 2, 3, or 4 processors.

- 2-processor configuration. Processors are installed in location 1 and 2.
- 4-processor configuration. Processors are installed in locations 1, 2, 3, and 4.

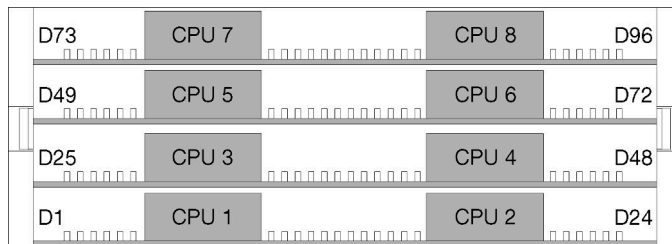


Figure 6. Processor numbering (viewed from the front of the server)

PCIe slot connectivity

The following table shows the processor to PCIe slot connectivity:

PCIe slot	Slot location	Description
1	Riser 1	4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
2		4 ¹ Not connected for 2x16. Slots 1 and 2 are not connected if the 2x16 riser is used in riser slot 1
3		4 ¹
4		4 ¹
5	I/O tray	2
6		2
7		1
8 (ML2)		1
9 (LOM)		1 (PCH)
10	Riser 2	3 ²
11		3 ²
12		3 ²
13		3 ²
14		Not connected.
15 (ML2)		Not connected.
16	2x8 Riser	3 ²
17		1
M.2	I/O tray	1 (PCH)
Storage adapter	Upper tray	Not connected.
Storage adapter	Lower tray	1
Notes: <ol style="list-style-type: none"> In 2-processor configurations, processors 3 and 4 are not installed; this means slots 1-4, slot 10-13, and slot 16 are not connected In 3-processor configurations, processor 3 is not installed; this means slot 10-13, and slot 16 are not connected 		

Drive bays

Drives are all located at the front of the server, 12 drives at the front of the upper tray and 12 at the front of the lower tray. Drives are connected to 4-drive backplanes in a 2-by-2 configuration, as shown in the following figure. All drive bays are 2.5-inch form factor.

Two different drive backplanes are available for the server:

- SAS/SATA backplane: Supports 4 SAS or SATA drives

- AnyBay backplane:
 - Top two drives support SAS, SATA, or NVMe interface drives (Lenovo AnyBay). The server can support up to 12 NVMe drives, depending on the server configuration. The NVMe-capable drive bays are the even-numbered bays as shown in [Figure 7 “Drive bay locations” on page 17](#).
 - Bottom two drive bays support SAS or SATA drives only

Regular 2.5-inch SAS/SATA drive bays support only SAS or SATA drives; however, the Lenovo AnyBay drive bay design allows a choice of SATA, SAS, or U.2 (NVMe) PCIe drives. This design enables the flexibility to configure some of the bays with high-performance PCIe SSDs while still using the other bays for high-capacity HDDs, which is an ideal solution for storage-tiering.

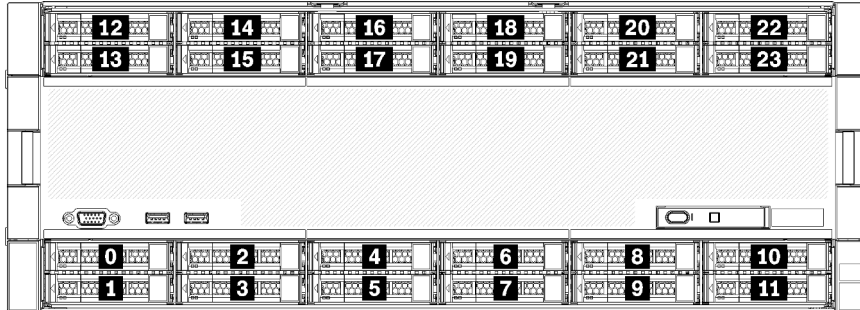


Figure 7. Drive bay locations

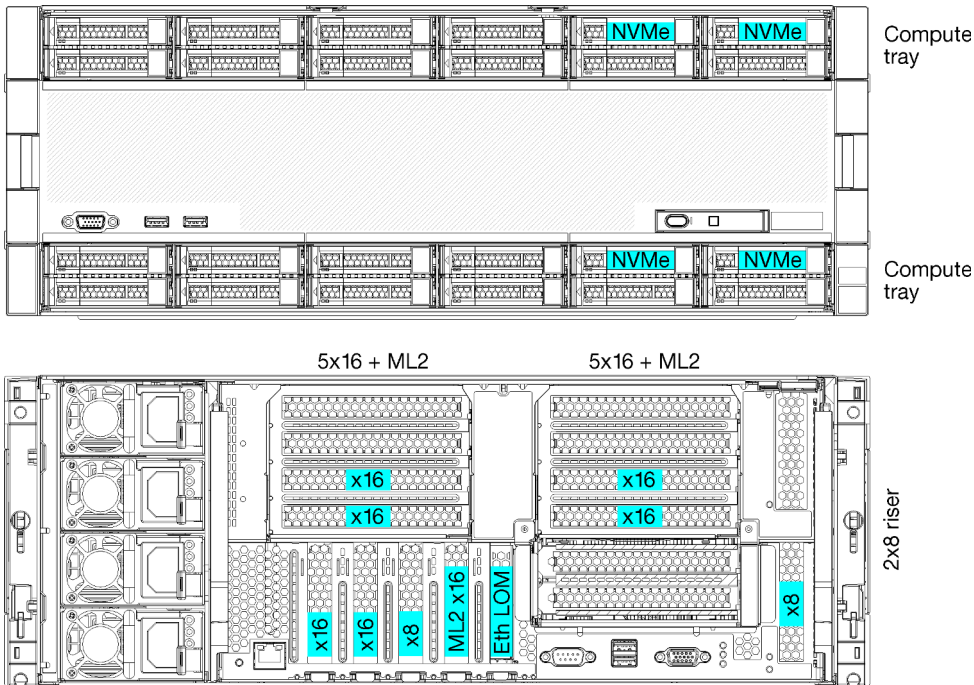
The following table lists the drive bays and NVMe support for the Four-Socket Performance configuration.

Installed process-ors	Maximum storage	Location of NVMe drives (see Figure 7 “Drive bay locations” on page 17)
2	12 drives (2 NVMe drives)	Bays 8 and 10
4	12 drives (6 NVMe drives)	Bays 0, 2, 4, 6, 8, 10

Configuration 4. Four-Socket Upgradable / Storage Rich

The ThinkSystem SR950 is available in several configurations.

A 4-socket server capable of a simple upgrade to 8-socket and needing more than 12 drive bays with 4 processors.



- Requires 4 processors, must be 8100 Series
- 4 processors in a ring topology
- 24 drive bays (including up to 4 NVMe)
- 10 rear PCIe slots
- Two compute trays, with one system board in each tray
- Upgradable to 8-socket with two additional system boards
- Once upgraded, the server will support 12 NVMe drives.

Processor configurations

This configuration requires 4 processors installed in locations 1, 2, 5 and 6

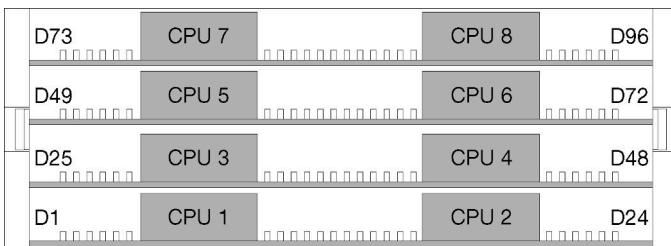


Figure 8. Processor numbering (viewed from the front of the server)

PCIe slot connectivity

The following table shows the processor to PCIe slot connectivity:

PCIe slot	Slot location	Description
1	Riser 1	Not connected

PCIe slot	Slot location	Description
2		Not connected
3		6
4		6
5		2
6	I/O tray	2
7		1
8 (ML2)		1
9 (LOM)		1 (PCH)
10		Riser 2
11	Not connected	
12	5	
13	5	
14	Not connected.	
15 (ML2)	Not connected.	
16	2x8 Riser	Not connected
17		1
M.2	I/O tray	1 (PCH)
Storage adapter	Upper tray	5
Storage adapter	Lower tray	1

Drive bays

Drives are all located at the front of the server, 12 drives at the front of the upper tray and 12 at the front of the lower tray. Drives are connected to 4-drive backplanes in a 2-by-2 configuration, as shown in the following figure. All drive bays are 2.5-inch form factor.

Two different drive backplanes are available for the server:

- SAS/SATA backplane: Supports 4 SAS or SATA drives
- AnyBay backplane:
 - Top two drives support SAS, SATA, or NVMe interface drives (Lenovo AnyBay). The server can support up to 12 NVMe drives, depending on the server configuration. The NVMe-capable drive bays are the even-numbered bays as shown in [Figure 9 “Drive bay locations” on page 20](#).
 - Bottom two drive bays support SAS or SATA drives only

Regular 2.5-inch SAS/SATA drive bays support only SAS or SATA drives; however, the Lenovo AnyBay drive bay design allows a choice of SATA, SAS, or U.2 (NVMe) PCIe drives. This design enables the flexibility to configure some of the bays with high-performance PCIe SSDs while still using the other bays for high-capacity HDDs, which is an ideal solution for storage-tiering.

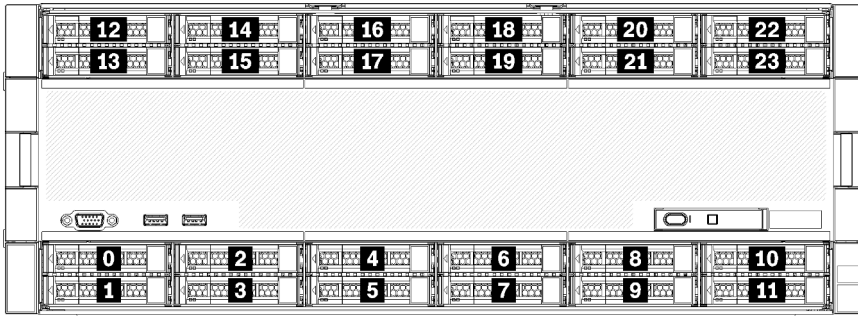


Figure 9. Drive bay locations

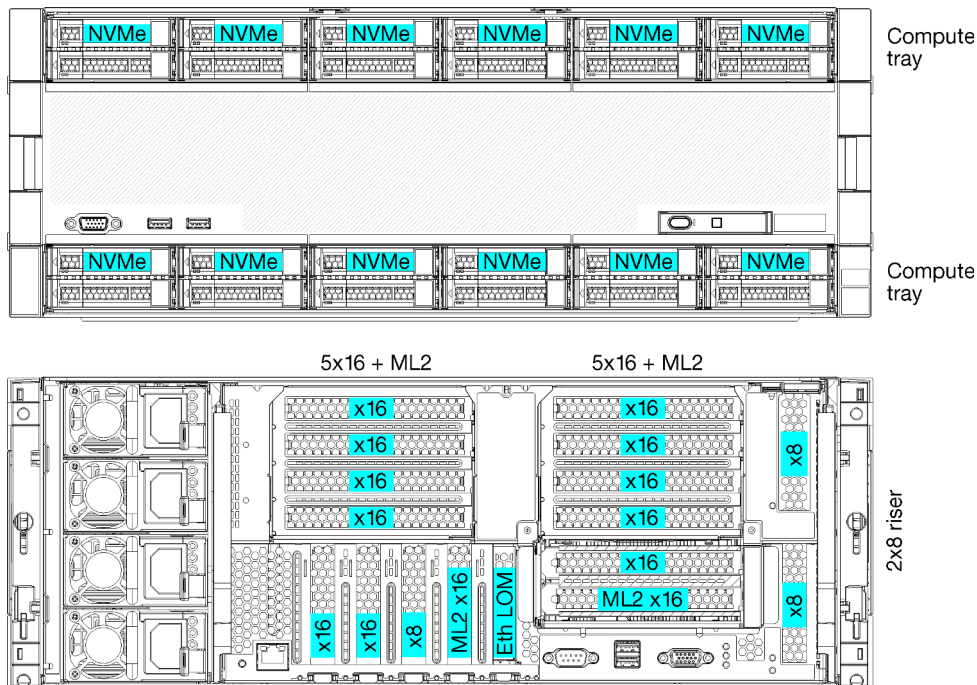
The following table lists the drive bays and NVMe support for the Four-Socket Performance configuration.

Installed processors	Maximum storage	Location of NVMe drives (see Figure 9 “Drive bay locations” on page 20)
4	24 drives (4 NVMe drives)	Bays 8, 10 and 20, 22

Configuration 5. Eight-Socket Storage Rich

The ThinkSystem SR950 is available in several configurations.

Full featured 6- or 8-socket server with up to 24 drive bays and the maximum number of PCIe x16 slots.



- Requires 6 or 8 processors, must be 8100 Series
- 24 drive bays, 12 of which support NVMe drives (8 NVMe with 6 processors)
- 17 rear PCIe slots (13 rear slots with 6 processors installed)
- Two compute trays each with two system boards

Processor configurations

This configuration supports 6 or 8 processors.

- 6-processor configuration. Processors are installed in locations 1, 2, 3, 4, 5, and 7.
- 8-processor configuration. Processors are installed in locations 1 through 8.

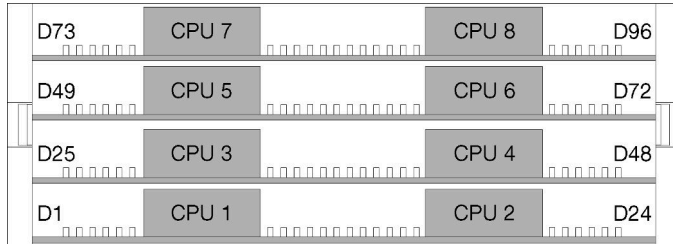


Figure 10. Processor numbering (viewed from the front of the server)

PCIe slot connectivity

The following table shows the processor to PCIe slot connectivity:

PCIe slot	Slot location	Description
1	Riser 1	8 ¹
2		8 ¹
3		6 ¹
4		6 ¹
5	I/O tray	2
6		2
7		1
8 (ML2)		1
9 (LOM)		1 (PCH)
10	Riser 2	7
11		7
12		5
13		5
14		3
15 (ML2)		3
16	2x8 Riser	3
17		1
M.2	I/O tray	1 (PCH)
Storage adapter	Upper tray	5
Storage adapter	Lower tray	1
Notes:		
1. In 6-processor configurations, processors 6 & 8 are not installed; this means slots 1-4 are not connected		

Drive bays

Drives are all located at the front of the server, 12 drives at the front of the upper tray and 12 at the front of the lower tray. Drives are connected to 4-drive backplanes in a 2-by-2 configuration, as shown in the following figure. All drive bays are 2.5-inch form factor.

Two different drive backplanes are available for the server:

- SAS/SATA backplane: Supports 4 SAS or SATA drives
- AnyBay backplane:
 - Top two drives support SAS, SATA, or NVMe interface drives (Lenovo AnyBay). The server can support up to 12 NVMe drives, depending on the server configuration. The NVMe-capable drive bays are the even-numbered bays as shown in [Figure 11 “Drive bay locations” on page 22](#).
 - Bottom two drive bays support SAS or SATA drives only

Regular 2.5-inch SAS/SATA drive bays support only SAS or SATA drives; however, the Lenovo AnyBay drive bay design allows a choice of SATA, SAS, or U.2 (NVMe) PCIe drives. This design enables the flexibility to configure some of the bays with high-performance PCIe SSDs while still using the other bays for high-capacity HDDs, which is an ideal solution for storage-tiering.

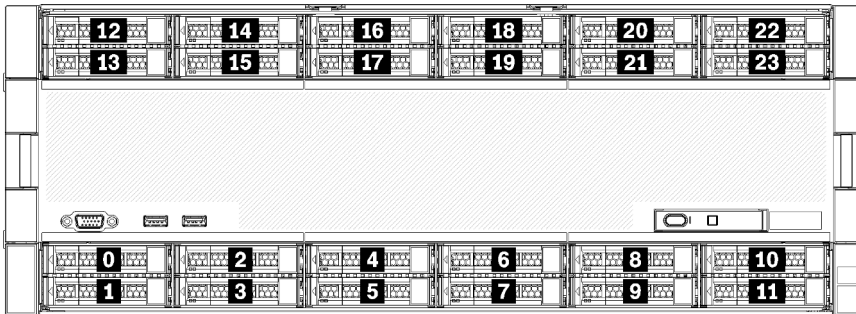


Figure 11. Drive bay locations

The following table lists the drive bays and NVMe support for the Four-Socket Performance configuration.

Installed processors	Maximum storage	Location of NVMe drives (see Figure 11 “Drive bay locations” on page 22)
6	24 drives (8 NVMe drives)	Bays 0, 2, 4, 6, 8, 10 and 12, 14
8	24 drives (12 NVMe drives)	Bays 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

PCIe slot-to-processor mapping

The following table shows the connectivity between processors and PCIe slots in the server. In situations where multiple risers can be installed (such as for PCIe adapter slots 1 and 2, the table shows the processor connectivity based on each of the riser options.

Table 3. PCIe slot-to-processor mapping

PCIe Slot	Processor (Riser if the mapping changes for different risers)
1, 2	<ul style="list-style-type: none"> • 4 (4 x8) • 8 (6 x16)
3, 4	<ul style="list-style-type: none"> • 4 (4 x8) • 4 (2 x16) • 6 (6 x16)
5, 6	2
7, 8, 9	1
10, 11	<ul style="list-style-type: none"> • 3 (4 x8) • 7 (6 x16)
12, 13	<ul style="list-style-type: none"> • 3 (4 x8) • 5 (6 x16)
14, 15, 16	3
17	1

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:
 - <http://datacentersupport.lenovo.com/products/servers/thinksystem/sr950/7X12/downloads>
- 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	√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
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:						
<ol style="list-style-type: none"> 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.

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

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

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.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

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

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

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/lno-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/lno-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 (connect input power)

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

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.

Turn on the server

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

- You can press the power button.
- The server can start or 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 \(disconnect input power\)”](#) on page 28.

Power off the server (disconnect input power)

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 LED off), you must disconnect all power cables.

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.

Place the server in standby

To place the server in a standby state (power 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 \(connect input power\)” on page 27](#).

Chapter 2. Server components

Use the information in this section to learn about each of the components associated with your server.

Identifying your server

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

Figure 12 “Location of the ID label for the ThinkSystem SR950” on page 29 shows the location of the label containing the machine type, model, and serial number.

The model number, serial number, and a barcode of this server identification information are on the ID label on the front of the server, as shown in the following illustration. You can also add other system information labels to the front of the server in the customer label spaces (1 in the following illustration).

Note: If any customer labels are placed on the removable front cover, make sure that the cover is installed on the same server where the labels were originally added.

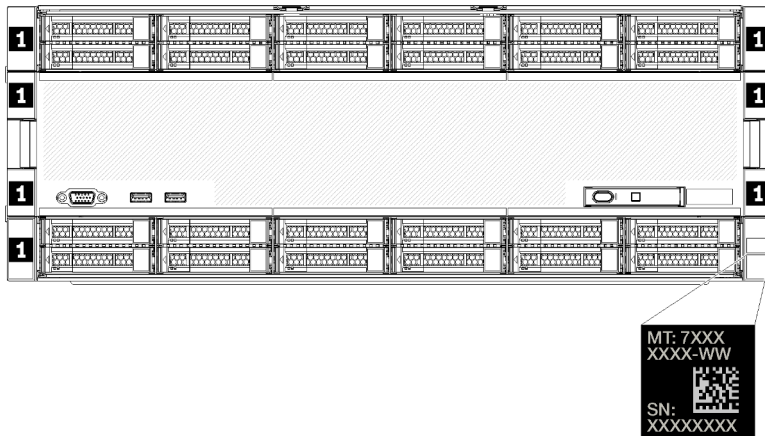


Figure 12. Location of the ID label for the ThinkSystem SR950

QR code

In addition, the service label that is located at the top rear of the system board inside the server provides a quick response (QR) code for mobile access to service information (You must disconnect all server power cords before attempting to access the system board). 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 (<https://support.lenovo.com/p/servers/sr950>). The Service Information web page provides additional information for parts installation and replacement videos, and error codes for server support.

Service Information
 Scan this QR code to access information about memory configuration, option installation, and servicing of the system.
<https://support.lenovo.com/p/servers/sr950>


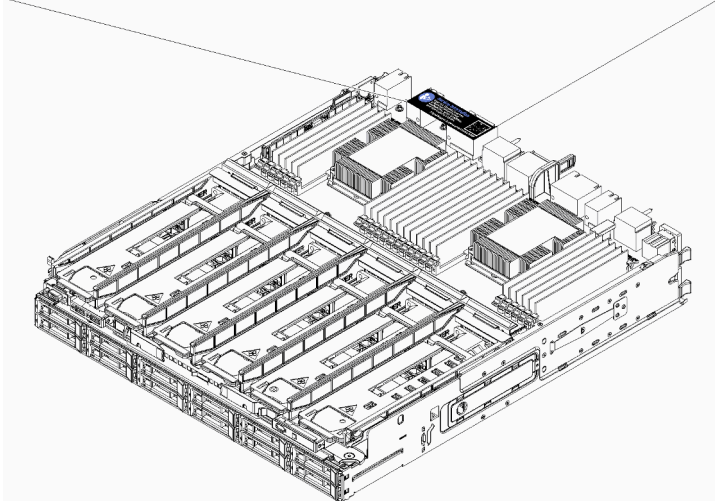



Figure 13. Service label and QR code

Network access label

The xClarity Controller (XCC) network access label is on the front of the server and must be removed before operating the system. The label provides the default IPv4 host name and default IPv6 link local address of the XCC.

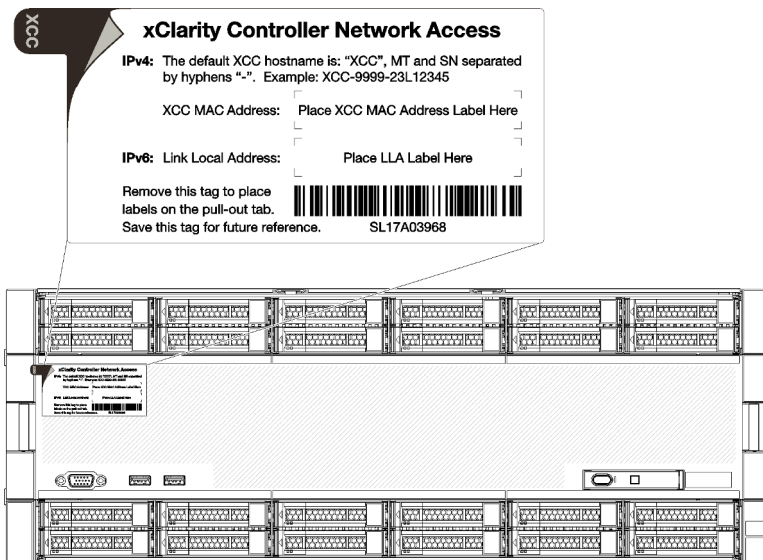


Figure 14. Network access tag

Front view

The front view of the server varies slightly by the model. In some models, components are replaced by fillers.

Front view of server

Figure 15 “Front view of the server (front cover installed)” on page 31 illustrates the front view of the server, with the front cover installed, identifying the drive bays.

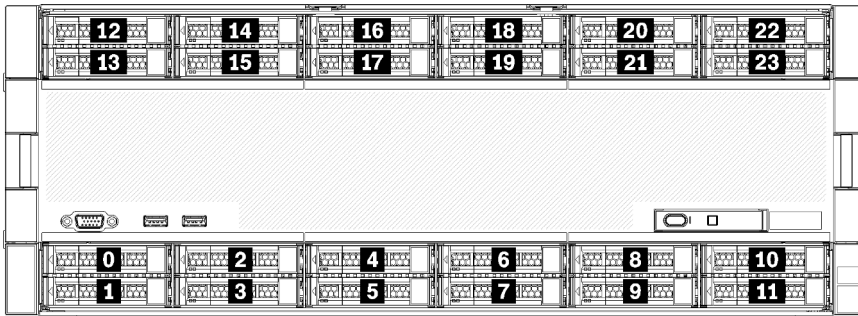


Figure 15. Front view of the server (front cover installed)

Figure 16 “Front view of the server (front cover removed)” on page 31 illustrates the front view of the server.

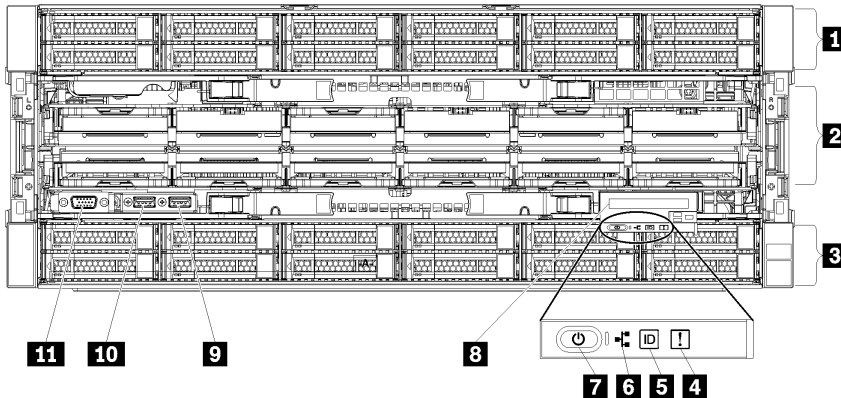


Figure 16. Front view of the server (front cover removed)

Table 4. Components on the front of the server

Callout	Callout
1 2.5-inch-drive bays (12-23) (on some models)	7 Power button and power LED
2 Fan slots (1-12)	8 Front operator panel with pull-out LCD display
3 2.5-inch-drive bays (0-11)	9 USB 2.0 port
4 System-error LED	10 USB 2.0 Lenovo XClarity Controller management port
5 System ID button/LED	11 VGA Video port
6 Network activity LED	

1 2.5-inch-drive bays (12-23) (on some models)

The drive bays are used to install 2.5-inch drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

2 Fan slots (1-12)

Install fans to these slots.

3 2.5-inch-drive bays (0-11)

The drive bays are used to install 2.5-inch drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

4 System-error LED

For information about the system-error LED, see [“Front operator panel” on page 33](#).

5 System ID button/LED

For information about the system ID button/LED, see [“Front operator panel” on page 33](#).

6 Network activity LED

For information about the network activity LED, see [“Front operator panel” on page 33](#).

7 Power button and power LED

For information about the power button and power LED, see [“Front operator panel” on page 33](#).

8 Front operator panel with pull-out LCD display

For information about the front operator panel with pull-out LCD display, see [“LCD system information display panel” on page 34](#).

9 USB 2.0 port

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

10 USB 2.0 Lenovo XClarity Controller management port

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.

Four types of settings are available:

- **Host only mode**

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

- **BMC only mode**

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

- **Shared mode: owned by BMC**

In this mode, connection to the USB port is shared by the server and XClarity Controller, while the port is switched to XClarity Controller.

- **Shared mode: owned by host**

In this mode, connection to the USB port is shared by the server and XClarity Controller, while the port is switched to the server.

11 VGA Video port

Connect a monitor to this connector.

Notes:

- When the optional front VGA connector is in use, the rear one will be disabled.
- The maximum video resolution is 1920 x 1200 at 60 Hz.

Drive LEDs

Figure 17 “Drive LEDs” on page 33 illustrates the LEDs on each drive.

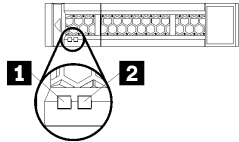


Figure 17. Drive LEDs

Table 5. Drive LEDs

Callout	Callout
1 Drive activity LED (green)	2 Drive status LED (yellow)

1 Drive activity LED (green):

Each hot-swap drive comes with an activity LED. If the LED is lit, it indicates that the drive is powered, but not actively reading or writing data. If the LED is flashing, the drive is being accessed.

2 Drive status LED (yellow):

These LEDs are on SAS or SATA hard disk drives and solid-state drives. When one of these LEDs is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Front operator panel

The following illustration shows the controls and LEDs on the front operator panel.

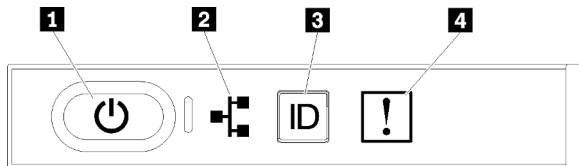


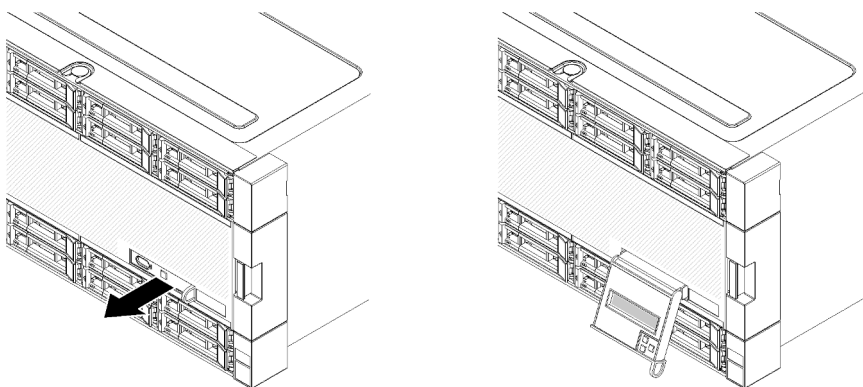
Table 6. Operator panel front controls and indicators

Callout	Callout
1 Power button and power LED	3 System ID button/LED
2 Network activity LED	4 System-error LED

- **1 Power button and power LED:** 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 supply has failed.
 - Flashing rapidly (4 times per second):** The server is turned off and is not ready to be turned on. The power button is disabled. This will last approximately 5 to 10 seconds.
 - Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power button to turn on the server.
 - On:** The server is turned on.
- **2 Network activity LED:** When this LED flickers, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.
- **3 System ID button/LED:** 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.
- **4 System-error LED:** When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. Messages on the LCD system information display panel and LEDs on other server components might also be lit to help isolate the error. This LED is controlled by the Lenovo XClarity Controller.

LCD system information display panel

The front operator panel comes with a tab, which can be pulled to access the LCD system information display panel. See [“LCD system information display panel”](#) on page 34 for more information.



LCD system information display panel

The following section includes an overview of the LCD system information display panel, which displays various types of information about the server.

The LCD system information display panel attached to the front of the server allows quick access to system status, firmware, network, and health information.

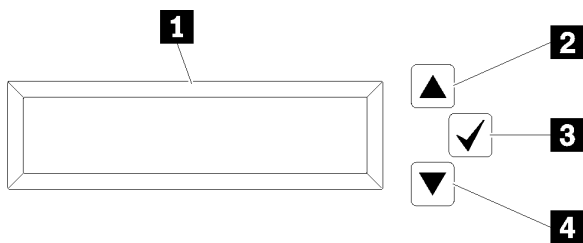


Table 7. LCD system information display panel

Callout	Callout
1 Information display panel	3 Select button
2 Scroll up button	4 Scroll down button

Note: Press the scroll-up and scroll-down buttons at the same time to refresh the LCD system information display panel.

- **2 Scroll up button:** Press this button to scroll up or scroll to the left in the main menu to locate and select the system information that you want displayed.
- **3 Select button:** Press this button to make your selection from the menu options.
- **4 Scroll down button:** Press this button to scroll down or scroll to the right in the main menu to location and select the system information that you want displayed.

Following is an example of the information on the display panel.

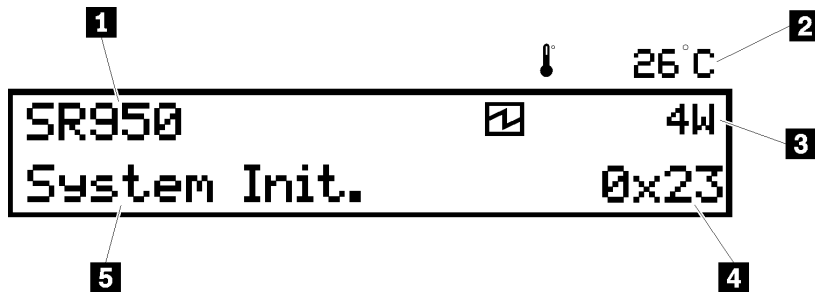
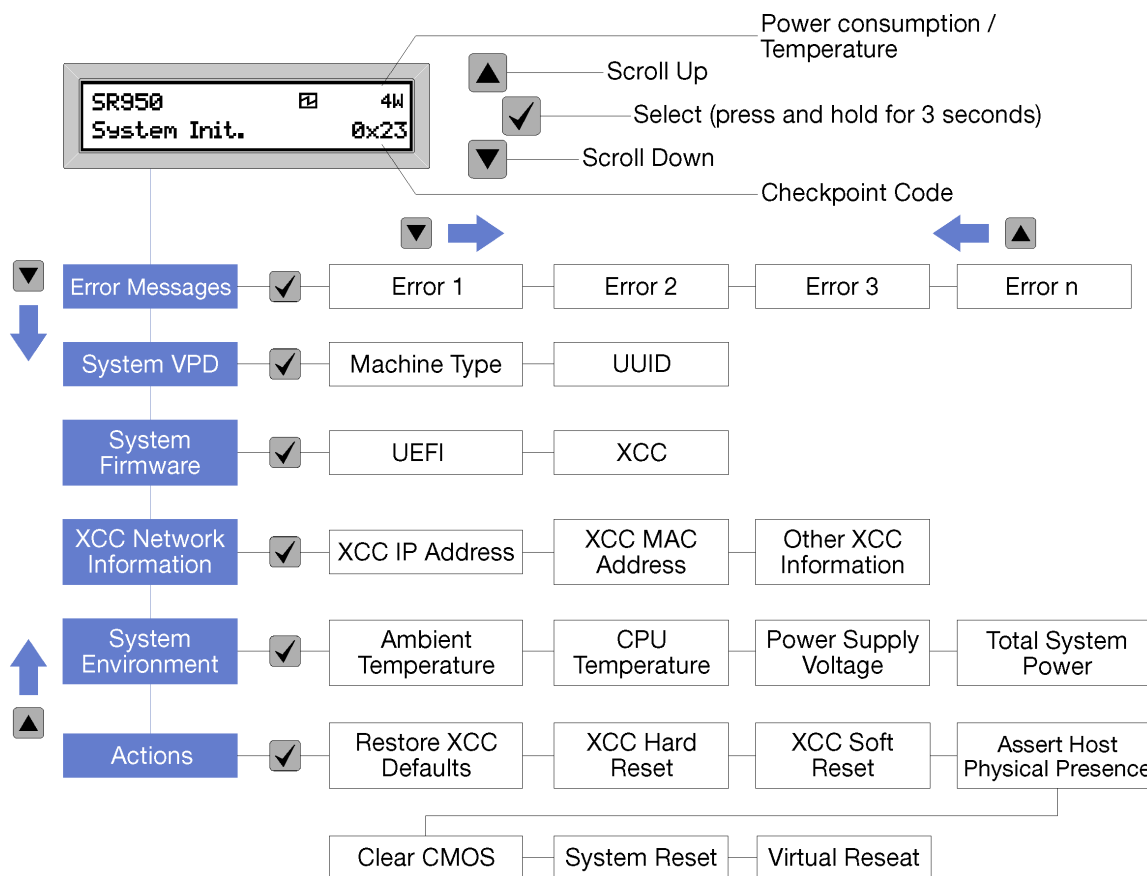


Table 8. LCD system information display information

Callout	Callout
1 System name	4 UEFI/POST code
2 Ambient temperature	5 System status
3 Estimated power consumption	

Following is an illustration of the LCD system information display panel menu options flow.



When you navigate through the hierarchy of the menu options, the LCD display panel shows information for that option with the up and down arrows. At the bottom of the hierarchy, only the up arrow is left, while at the top of the hierarchy, only the down arrow is left.

For the errors submenu set, when only one error occurs, the LCD display panel displays that error. When more than one error occurs, the LCD display panel displays the number of errors that have occurred. If no errors occur, the no error menu will be available for navigation.

To move within the menu options, use the **Scroll up** or **Scroll down** buttons, then the **Select** button to enter a submenu set.

The LCD system information display panel displays the following types of information about the server:

- Lenovo XClarity Controller (LXCC) system error log
 - Note:** The **Scroll Down** button will only function for this menu option when errors occur. A list of current errors reported by the system will be displayed.
- System VPD information
 - Machine type and serial number
 - Universal Unique Identifier (UUID) string
- System firmware levels:
 - UEFI code level
 - LXCC code level
- LXCC network information:

- LXCC hostname
- LXCC dedicated MAC address

Note: Only the MAC address that is currently in use is displayed (dedicated or shared).

- LXCC shared MAC address
- IP v4 information
- System environmental information:
 - Ambient temperature
 - Processor temperature
 - AC input voltage
 - Estimated power consumption

Rear view

The rear of the server provides access to several components, including the power supplies, PCIe adapters, serial port, and Ethernet ports.

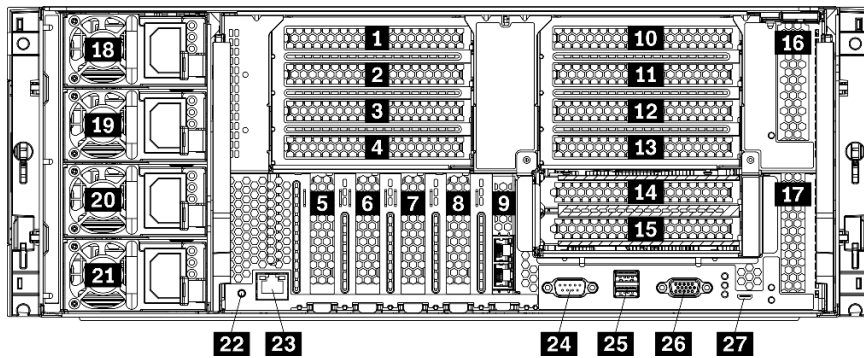


Figure 18. Rear view of the server

Table 9. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1)	15 PCIe slot 15 (on riser 2) for ML2 x16 network adapter
2 PCIe slot 2 (on riser 1)	16 PCIe slot 16 (on riser 3)
3 PCIe slot 3 (on riser 1)	17 PCIe slot 17 (on riser 3)
4 PCIe slot 4 (on riser 1)	18 Power supply 4 (optional)
5 PCIe slot 5	19 Power supply 3 (optional)
6 PCIe slot 6	20 Power supply 2 (optional)
7 PCIe slot 7	21 Power supply 1
8 ML2 x16 network adapter slot	22 NMI button
9 LOM adapter slot	23 XClarity Controller network connector (RJ45)
10 PCIe slot 10 (on riser 2)	24 Serial connector
11 PCIe slot 11 (on riser 2)	25 USB 3.0 connectors (2)

Table 9. Components on the rear of the server (continued)

Callout	Callout
12 PCIe slot 12 (on riser 2)	26 VGA video port
13 PCIe slot 13 (on riser 2)	27 Service only connector
14 PCIe slot 14 (on riser 2)	

Notes: The following PCIe “slots” are assigned to components elsewhere in the server:

- PCIe slot 18 is assigned to the RAID card in the lower tray.
- PCIe slot 19 is assigned to the RAID card in the upper tray.
- PCIe slot 20 is assigned to the M.2 backplane inside the I/O tray.

1 2 3 4 PCIe slot 1-4 (on riser 1)

Install PCIe adapters into these slots.

5 6 7 PCIe slot 5-7

Install PCIe adapters into these slots.

8 ML2 x16 network adapter slot

Install ML2 x16 network adapter into this slot.

9 LOM adapter slot

Install LOM adapter into this slot.

10 11 12 13 14 15 PCIe slot 10-15 (on riser 2)

Install PCIe adapters into these slots.

Note: Install ML2 x16 network adapter into PCIe slot 15 (on riser 2).

16 17 PCIe slot 16-17 (on riser 3)

Install PCIe adapters into these slots.

18 19 20 21 Power supply 1-4

Note: Power supply 2-4 are optional.

The hot-swap redundant power supplies help you avoid significant interruption to the operation of the system when a power supply or an input power source fails. A failed power supply can be replaced without turning off the server. You can purchase a power supply option from Lenovo and install the power supply to provide power redundancy or additional power capacity without turning off the server.

For information about minimum power supply requirements and power redundancy, see [power supply criteria in “Install a power supply” in the ThinkSystem SR950 Setup Guide.](#)

Each hot-swap power supply has three status LEDs. See [“Rear view LEDs” on page 39](#) for information.

22 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.

23 XClarity Controller network connector (RJ45)

Used to attach an Ethernet cable to manage the system using XClarity Controller.

24 Serial connector

Connect a 9-pin serial device to this connector. The serial port is shared with the XCC. The XCC can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

25 USB 3.0 connectors (2)

Used to attach a device that requires a USB 2.0 or USB 3.0 connection, such as a keyboard, a mouse, or a USB flash drive.

26 VGA video port

Used to attach a VGA-compatible video device, such as a VGA monitor.

27 Service only connector

This connector is reserved for service only.

Rear view LEDs

The illustration in this section shows the LEDs on the rear the server.

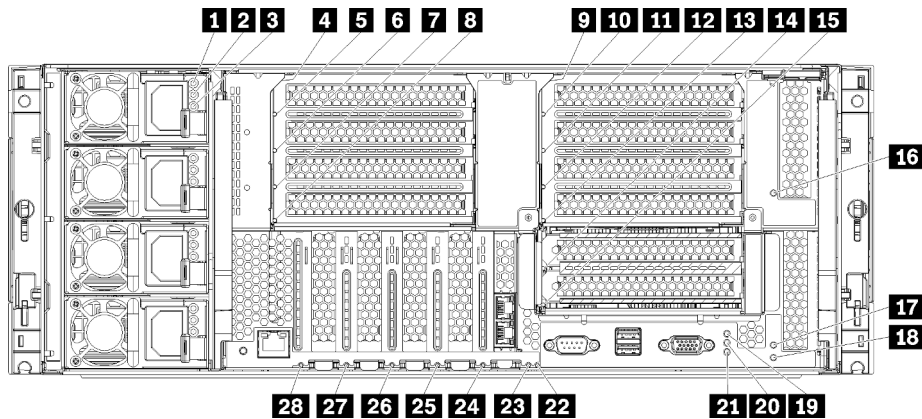


Figure 19. Rear LEDs

Table 10. Power supply LEDs

LED	Description
1 Input status (AC) (green)	<p>The input status LED can be in one of the following states:</p> <ul style="list-style-type: none"> Off: The power supply is not receiving the correct input power: either the power supply is not correctly connected to the power source, the power source is not outputting power, or the power source output does not meet the power supply input requirements (for example, a 1600-watt power supply will not run off of 120 vac input). On: The power supply is receiving the correct input power and the power supply is operating normally.
2 Output status (DC) (green)	<p>The output status LED can be in one of the following states:</p> <ul style="list-style-type: none"> Off: The server is powered off (not connected to input power), the power supply is not working correctly (Fault LED is on), or the system has overloaded the power supply (Fault LED is Off). On: The server is connected to input power (server powered on or in standby) and the power supply is working normally.
3 Fault LED (yellow)	<ul style="list-style-type: none"> Off: The power supply is working correctly. If the Output status (DC) LED is also off and the system will not power on, the system is overloading the power supply. On: The power supply has failed. Replace the power supply.

Table 11. Status LEDs

LED	Description
19 Power LED (green)	<p>The states of the power LED are as follows:</p> <p>Off: Power is not present or the power supply, or the LED itself has failed.</p> <p>Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power button is disabled. This will last approximately 5 to 10 seconds.</p> <p>Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power button to turn on the server.</p> <p>On: The server is turned on.</p>
20 System ID LED (blue)	Use this blue LED to visually locate the server among other servers. You can use Lenovo XClarity Administrator to light this LED remotely.
21 System error LED (yellow)	When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the front operator information panel. Messages on the LCD system information display panel and LEDs on other server components might also be lit to help isolate the error. This LED is controlled by the Lenovo XClarity Controller.

Table 12. Adapter LEDs

Callout	Callout
4 Riser 1 to 4 fault LED	15 Adapter 15 fault LED
5 Adapter 1 fault LED	16 Adapter 16 fault LED
6 Adapter 2 fault LED	17 Adapter 17 fault LED
7 Adapter 3 fault LED	18 Riser 16 through 17 fault LED
8 Adapter 4 fault LED	22 3v fault (system battery) LED
9 Riser 10 to 15 fault LED	23 I/O-board fault LED
10 Adapter 10 fault LED	24 LOM adapter fault LED

Table 12. Adapter LEDs (continued)

Callout	Callout
11 Adapter 11 fault LED	25 ML2 x16 network adapter fault LED
12 Adapter 12 fault LED	26 Adapter 7 fault LED
13 Adapter 13 fault LED	27 Adapter 6 fault LED
14 Adapter 14 fault LED	28 Adapter 5 fault LED

Internal connectors

The topics in this section provide information about connectors that are inside the server.

For information about external connectors on the front and rear of the server, see [“Front view” on page 30](#) and [“Rear view” on page 37](#).

System-board connectors

The following illustration shows the internal connectors on the system board.

For information about the LEDs that are available on the system board, see [“System-board LEDs” on page 223](#).

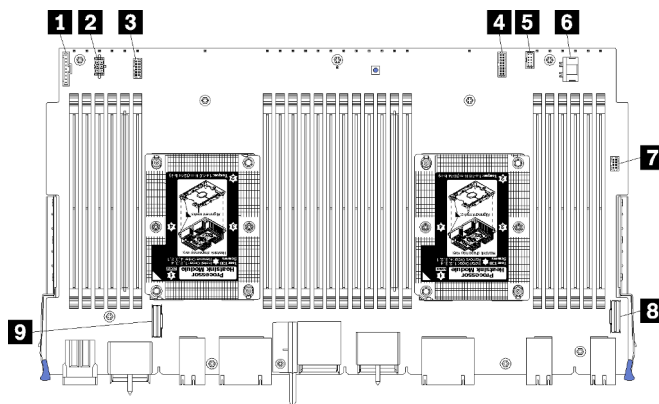


Figure 20. System-board connectors

Table 13. System-board internal connectors

Callout	Callout
1 “Front panel” connector	6 Hard disk drive “Power” connector
2 “Fan board” power connector (J56)	7 Front panel “USB” connector
3 “Fan board” signal connector (J40)	8 “PCIe/NVMe” connector
4 “Front video” connector	9 “NVMe” connector
5 Hard disk drive “Signal” connector	

Storage-board-assembly connectors

The following illustration shows the internal connectors on the storage board assembly.

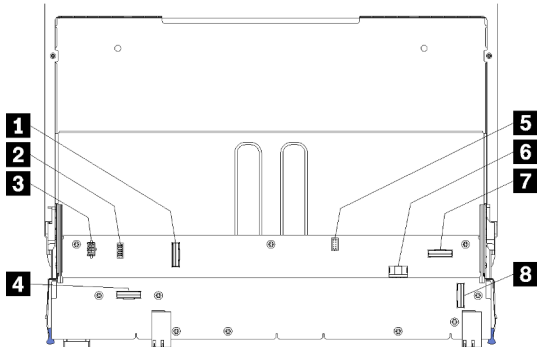


Figure 21. Storage-board-assembly connectors

Table 14. Storage-board-assembly connectors

Callout	Callout
1 “NVMe” connector	5 Hard disk signal connector (J13)
2 Fan signal connector (J5)	6 Hard disk drive power connector (J2)
3 Fan power connector (J3)	7 “PCIe” connector
4 “NVMe” connector	8 “NVMe” connector

I/O tray connectors

The following illustration shows the internal connectors on the I/O tray (including connectors of PCIe slot 5 to 8 and the LOM connector of slot 9).

For information about connectors on I/O tray risers, see [“I/O tray riser connectors” on page 44](#). For information about all external connectors on the rear of the server, including those on the I/O tray, see [“Rear view” on page 37](#).

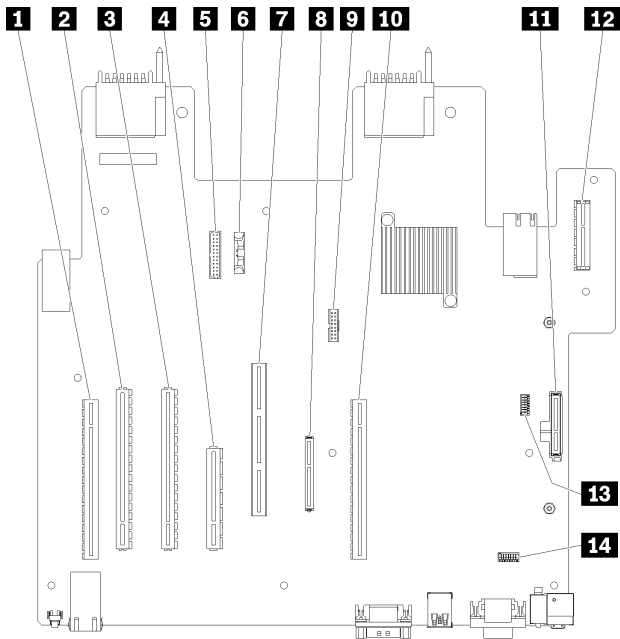


Figure 22. I/O tray connectors

Table 15. I/O tray connectors

Callout	Callout
1 Riser for slot 1 to 4 connectors (Riser 1)	8 Network (LOM) connector (slot 9)
2 PCIe3, x16, 75 watt connector (slot 5)	9 TCM connector (see “Enable TPM/TCM” on page 135)
3 PCIe3, x16, 75 watt connector (slot 6)	10 Riser for slot 10 to 15 connectors (Riser 2)
4 PCIe3, x8, 25 watt connector (slot 7)	11 M.2 SATA/PCIe (Hypervisor) backplane connector (see note following this table)
5 Signal cable to power backplane	12 Riser for PCIe slot 16 to 17 (Riser 3)
6 Battery (CR2032)	13 SW2 - Switch block 2
7 ML2 PCIe3, x16 connector (slot 8)	14 SW1 - Switch block 1
	Note: This switch block is reserved.

Notes: The following PCIe “slots” are assigned to components elsewhere in the server:

- PCIe slot 18 is assigned to the RAID card in the lower tray.
- PCIe slot 19 is assigned to the RAID card in the upper tray.
- PCIe slot 20 is assigned to the M.2 backplane inside the I/O tray.

I/O tray switches

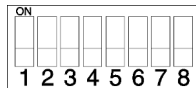
Two switch blocks are located on the I/O tray

SW1

The switch block SW1 is located near the VGA connector on the I/O tray. All switches in this switch block are reserved.

SW2

The switch block SW2 is located near the M2 SATA/PCIe backplane connector.



[Table 16 “SW2 switch block definition” on page 43](#) describes the functions of the switch block.

Table 16. SW2 switch block definition

Switch number	Default position	Description
1	Off	TPM/TCM physical presence.
2	Off	Reserved.
3	Off	Reserved.
4	Off	Clear CMOS memory. When this switch is toggled to ON, it clears the data in CMOS memory, which clears the power-on password.
5	Off	Force UEFI recovery. Changing the position of the switch to ON will force the system to boot from the recovery UEFI image.
6	Off	Force XCC backup bank. Changing the position of the switch to ON will force the system to boot from the backup XCC bank.

Table 16. SW2 switch block definition (continued)

Switch number	Default position	Description
7	Off	Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Lenovo XClarity Provisioning Manager so that you can change or delete the power-on password. You do not have to move the switch back to the default position after the power-on password is overridden. Changing the position of this switch does not affect the administrator password check if an administrator password is set.
8	Off	Reserved

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 69, “Handling static-sensitive devices” on page 71, and “Power off the server (disconnect input power)” on page 28.

I/O tray riser connectors

The following illustrations show the internal connectors on the I/O tray risers.

Up to three risers can be installed in the I/O tray. The chassis supports the following riser configurations:

• **Riser 1:**

- Slot 1 to 4 riser provides four PCIe3 x8, full height, half length connectors.
- Slot 1 to 4 riser provides four PCIe x16, full height, half length connectors. (8-socket configurations only)
- Slot 3 to 4 riser provides two PCIe3 x16, full height, half length connectors.

• **Riser 2:**

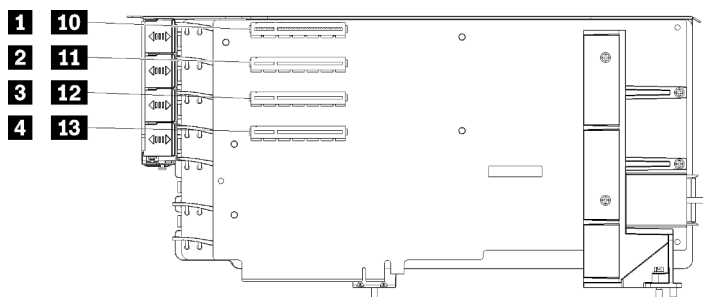
- Slot 10 to 13 riser provides four PCIe3 x8, full height, half length connectors.
- Slot 12 and 13 riser provides two PCIe3 x16, full height, half length connectors.
- Slot 10 to 15 riser provides five PCIe3 x16, full height, half length connectors and one ML2 PCIe3 x16 connector.

• **Riser 3:**

- Slot 16 to 17 riser provides two PCIe3 x8, full height, half length connectors.

Slot 1 to 4 and slot 10 to 13 riser connectors

There are four PCIe3 x8, full height, half length connectors each in the slot 1 to 4 (riser connector 1) and slot 10 to 13 (riser connector 2) risers.



Note: Callouts for slots **1** to **4** apply when the riser is installed in the riser 1 position. Callouts for slots **10** to **13** apply when the riser is installed in the riser 2 position.

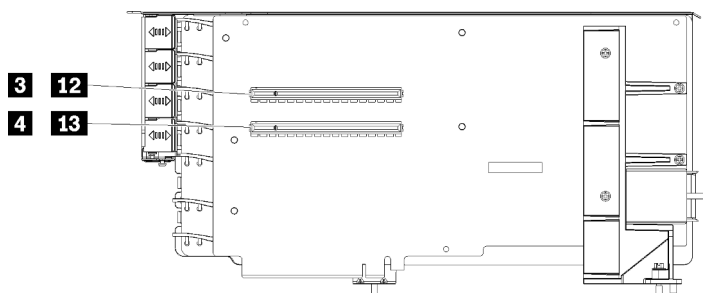
Figure 23. Slot 1 to 4 and slot 10 to 13 riser connectors

Table 17. Slot 1 to 4 and slot 10 to 13 riser connectors

Callout	Callout
1 10 PCIe3 x8 (Slot 1 or 10)	3 12 PCIe3 x8 (Slot 3 or 12)
2 11 PCIe3 x8 (Slot 2 or 11)	4 13 PCIe3 x8 (Slot 4 or 13)

Slot 3 to 4 and slot 12 to 13 connectors

There are two PCIe3 x16, full height, half length connectors in the slot 3 to 4 and slot 12 to 13 riser.



Note: Callouts for slots **3** to **4** apply when the riser is installed in the riser 1 position. Callouts for slots **12** to **13** apply when the riser is installed in the riser 2 position.

Figure 24. Slot 3 to 4 and slot 12 to 13 riser connectors

Table 18. Slot 14 to 15 riser connectors

Callout	Callout
3 12 PCIe3 x16 (Slot 3 or 12)	4 13 PCIe3 x16 (Slot 4 or 13)

Slot 10 to 15 riser connectors

There are five PCIe3 x16, full height, half length connectors and one ML2 PCIe3 x16 connector in the slot 10 to 15 riser.

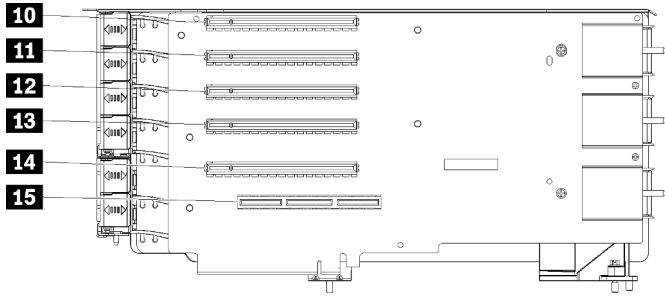


Figure 25. Slot 10 to 15 riser connectors

Table 19. Slot 10 to 15 riser connectors

Callout	Callout
10 PCIe3 x16 (Slot 10)	13 PCIe3 x16 (Slot 13)
11 PCIe3 x16 (Slot 11)	14 PCIe3 x16 (Slot 14)
12 PCIe3 x16 (Slot 12)	15 ML2 PCIe3 x16 (Slot 15)

Slot 16 to 17 riser

There are two PCIe3 x8, full height, half length connectors in the slot 16 to 17 riser.

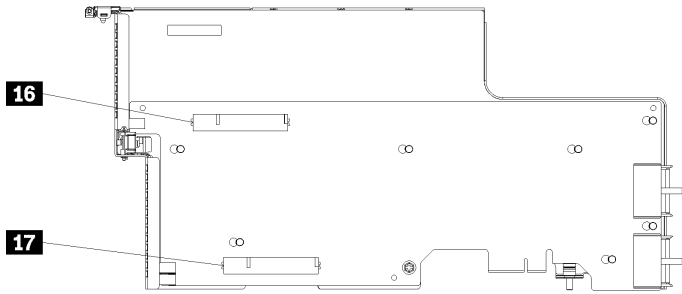


Figure 26. Slot 16 to 17 riser connectors

Table 20. Slot 16 to 17 riser connectors

Callout	Callout
16 PCIe3 x8 (Slot 16)	17 PCIe3 x8 (Slot 17)

Storage interposer connectors

The following illustration shows the internal connectors on the interposer.

Note: Some cable connectors have locks or latches that must be disengaged to disconnect the cable.

For information about interposer cable routing, see [“Cable routing for drives” on page 53](#).

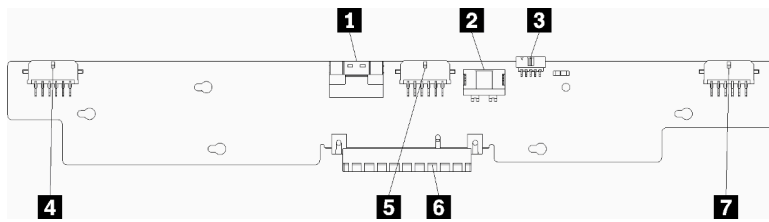


Figure 27. Storage interposer connectors

Table 21. Storage interposer connectors

Callout	Callout
1 PCIe SAS interface from system board (PCIE) (SAS only)	5 Power for drive to backplane 2 or 5 (BP 2/5)
2 Drive power from system board (POWER)	6 PCI connector to RAID card
3 Drive signal from system board (SIDE BAND)	7 Power for drive to backplane 3 or 4 (BP 3/4)
4 Power for drive to backplane 1 or 6 (BP 1/6)	

Drive backplane connectors

The following illustration shows the internal connectors on the drive backplanes.

Note: Some cable connectors have locks or latches that must be disengaged to disconnect the cable.

There are two types of drive backplane used in the server: one that controls only SAS drives and one that controls both SAS and NVMe drives. Cable routing for drive components is different for SAS and SAS/NVMe drives:

- [SAS drive backplane connectors](#)
- [SAS/NVMe drive backplane connectors](#)

For information about drive backplane cable routing, see [“Cable routing for drives” on page 53](#).

SAS drive backplane connectors

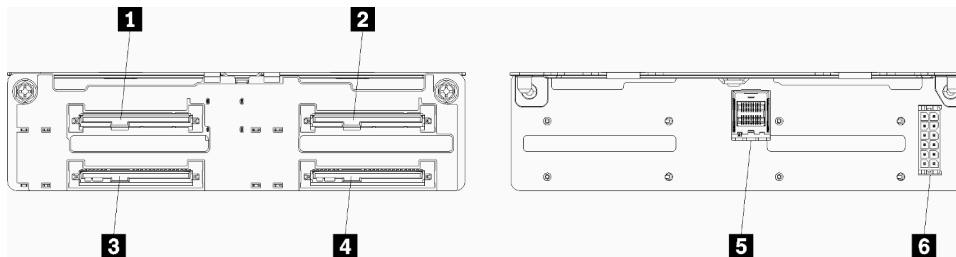


Figure 28. SAS drive backplane connectors

Table 22. SAS drive backplane connectors

Callout	Callout
1 Drive connector for SAS drives 0, 4, 8, 12, 16, and 20	4 Drive connector for SAS drives 3, 7, 11, 15, 19, and 23
2 Drive connector for SAS drives 2, 6, 10, 14, 18, and 22	5 SAS signal from RAID card
3 Drive connector for SAS drives 1, 5, 9, 13, 17, and 21	6 Backplane power from interposer

SAS/NVMe drive backplane connectors

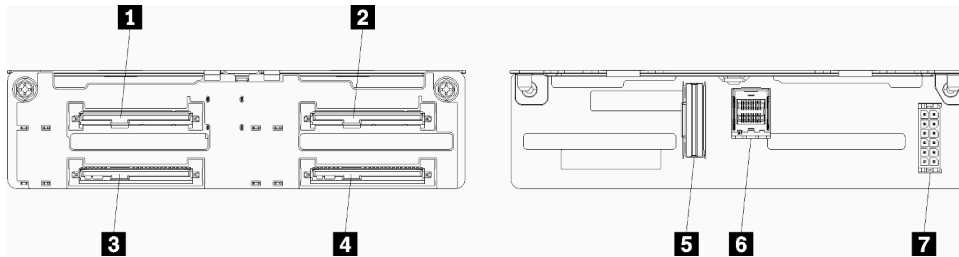


Figure 29. SAS/NVMe drive backplane connectors

Table 23. SAS/NVMe drive backplane connectors

Callout	Callout
1 Drive connector for SAS or NVMe drives 0, 4, 8, 12, 16, and 20	5 NVMe signal from compute board or storage tray
2 Drive connector for SAS or NVMe drives 2, 6, 10, 14, 18, and 22	6 SAS signal from RAID card
3 Drive connector for SAS drives 1, 5, 9, 13, 17, and 21	7 Backplane power from interposer
4 Drive connector for SAS drives 3, 7, 11, 15, 19, and 23	

Internal cable routing

Some of the components in the server have internal cables and cable connectors.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables. Failing to release them before removing the cables will damage the cable connectors or the cable sockets on circuit boards, which are fragile. Any damage to the cable connectors or cable sockets might require replacing the cables or circuit boards.

Some options, such as RAID controllers, might require additional internal cabling. See the documentation that is provided for the option to determine any additional cabling requirements and instructions.

Cable guides

Make sure that all the cables go through the cable guides, as shown in each cabling section.

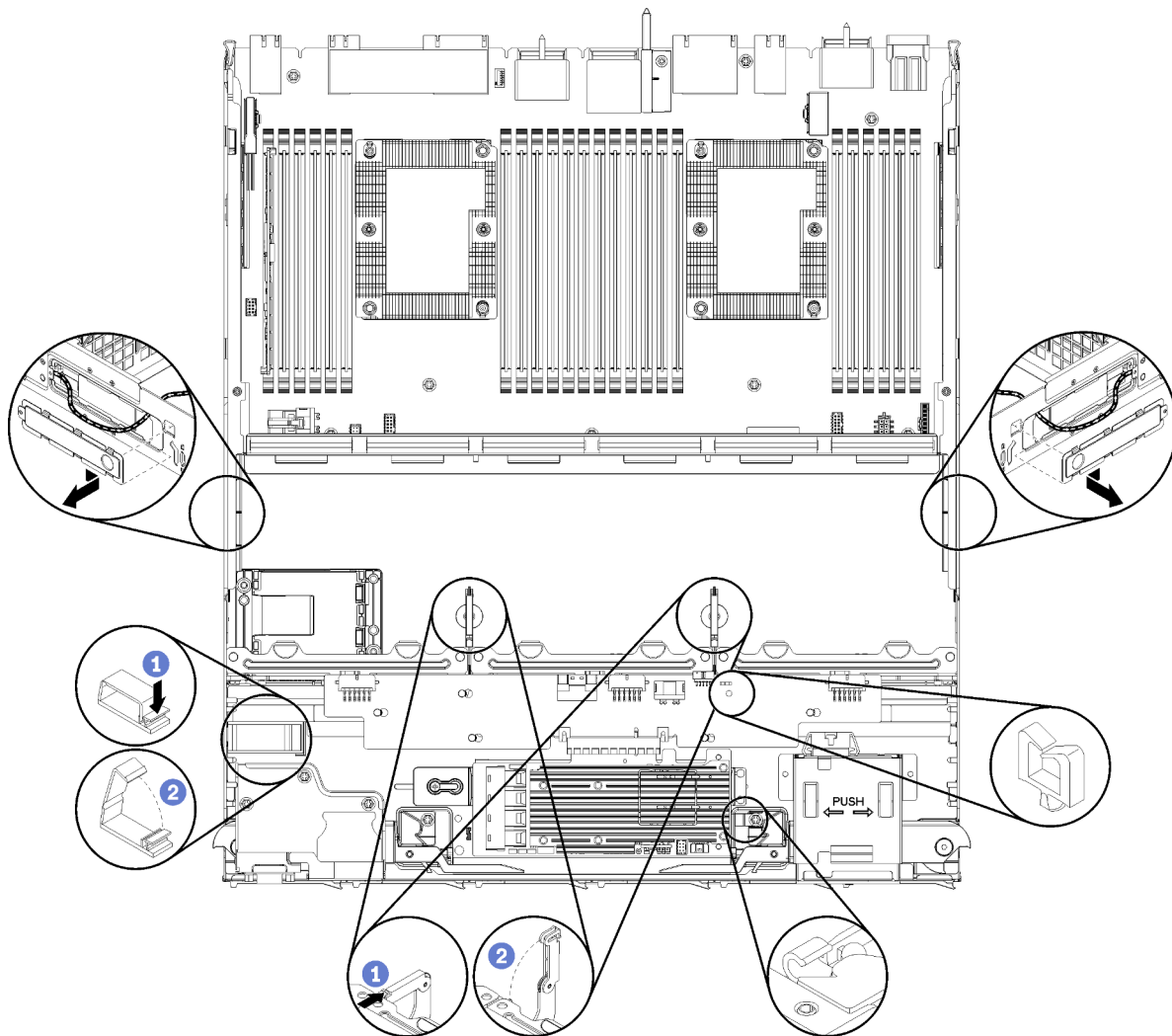


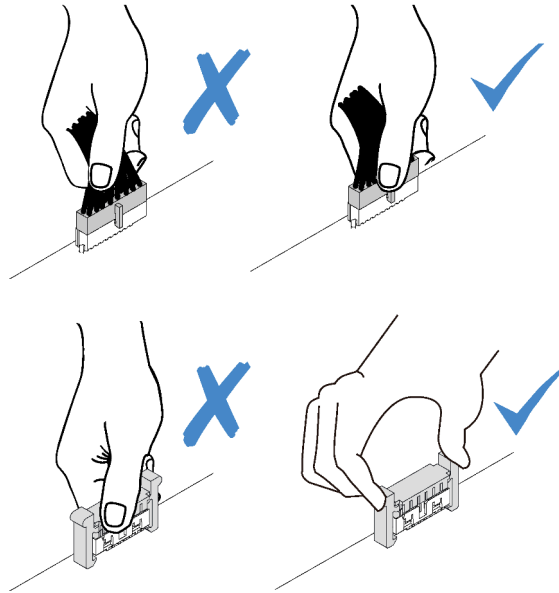
Figure 30. Cable guide locations

Connecting cables

To connect cables, observe the following guidelines:

- Disconnect all power cords from the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.
- Ensure that the relevant cables pass through the cable clips.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Any damage to the cable sockets might require replacing the system board.



Cable routing for common components

Use this section to understand how to route cables for common server components.

Cable routing for common components is different for the lower and upper trays:

- [“Common cable routing \(lower tray\)” on page 50](#)
- [“Common cable routing \(upper tray\)” on page 52](#)

Notes:

- Make sure that all the cables go through the cable guides, as shown in the illustrations. See [“Cable guides” on page 48](#) for cable guide locations and descriptions.
- Some cable connectors have locks or latches that must be disengaged to disconnect the cable.

Common cable routing (lower tray)

The following illustration shows cable routing for common components in the lower tray.

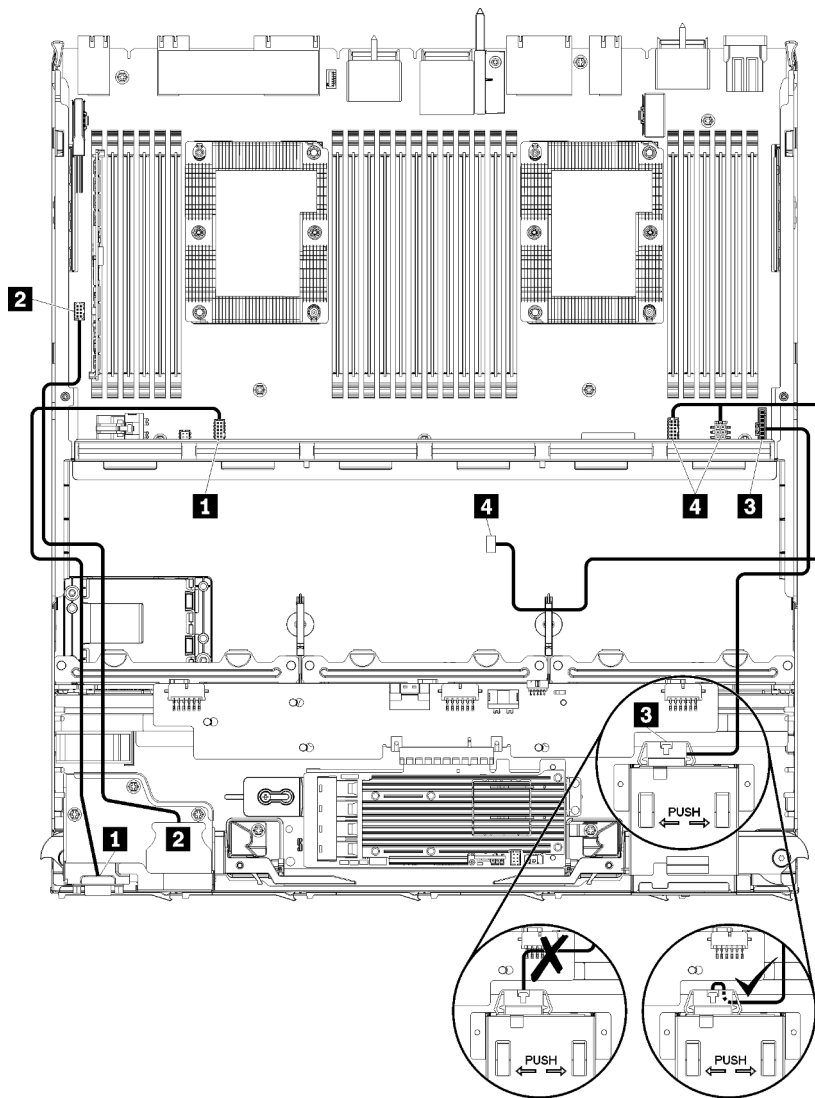


Figure 31. Cable routing, common cables (lower tray)

Table 24. Cable routing, common cables (lower tray)

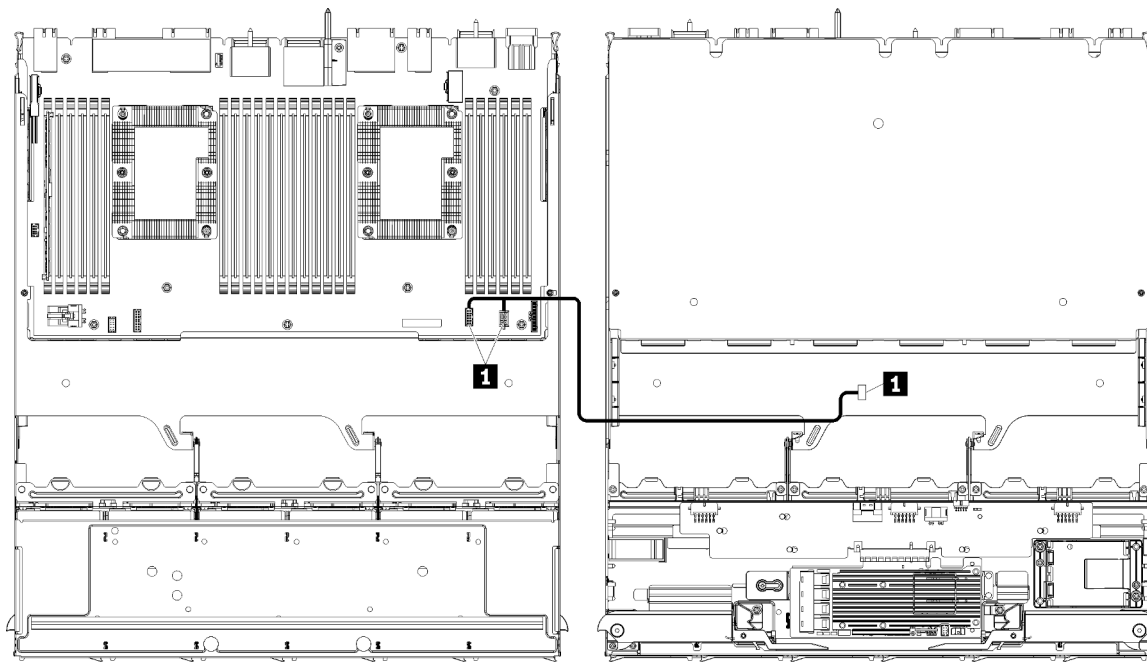
Cable	Routing
1 Front panel video port	<ul style="list-style-type: none"> • From: Front panel video port • To: Lower system board in lower compute tray, “Front video” connector (see “System-board connectors” on page 41)
2 Front panel USB ports	<ul style="list-style-type: none"> • From: Front USB ports • To: Lower system board in lower compute tray, “USB” connector (see “System-board connectors” on page 41)

Table 24. Cable routing, common cables (lower tray) (continued)

Cable	Routing
3 Control panel cable	<ul style="list-style-type: none"> • From: Control panel connector • To: Lower system board in lower compute tray, “Front panel” connector (see “System-board connectors” on page 41) <p>Attention: Make sure the operator panel cable is folded beneath the connector, as shown in Figure 31 “Cable routing, common cables (lower tray)” on page 51 to prevent the cable from pinching when the compute tray is fully assembled.</p>
4 Fan cage cable	<ul style="list-style-type: none"> • From: Fan cage connector (underside of fan cage) • To: Lower system board in lower compute tray, “Fan board” power (J56) and signal (J40) connectors (see “System-board connectors” on page 41)

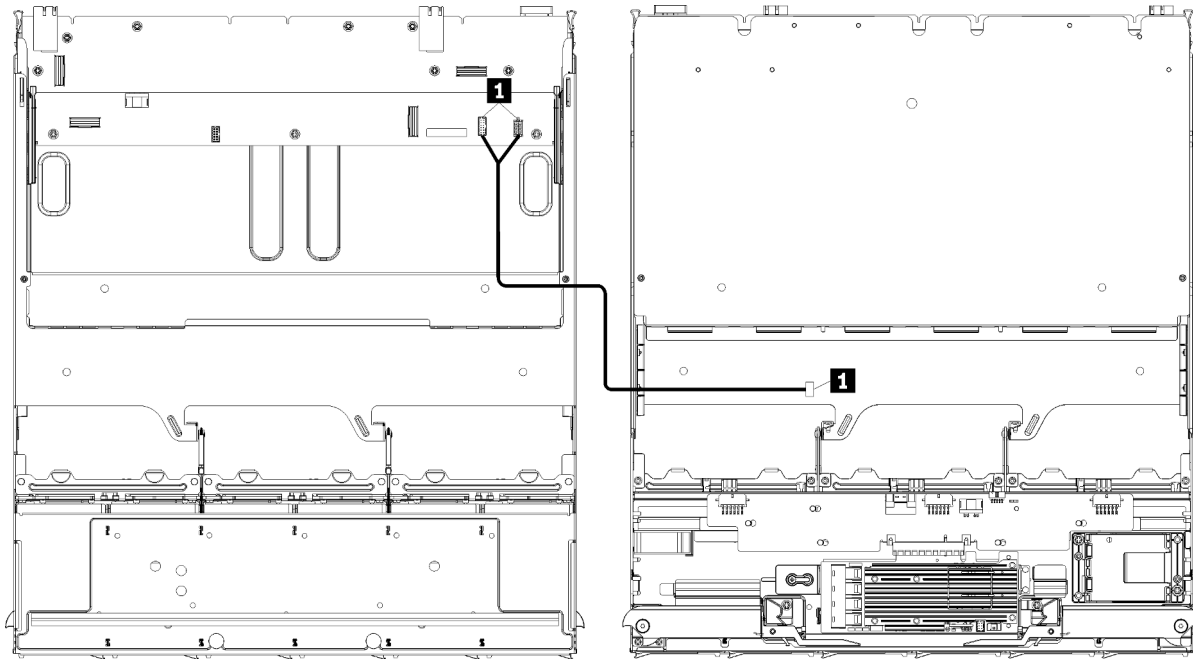
Common cable routing (upper tray)

The following illustration shows cable routing for common components in the upper tray.



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 32. Cable routing, common cables (upper tray with system board)



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 33. Cable routing, common cables (upper tray with storage-board assembly)

Table 25. Cable routing, common cables (upper tray)

Cable	Routing
1 Fan cage cable	<ul style="list-style-type: none"> • From: Fan cage connector (underside of fan cage) • To: <ul style="list-style-type: none"> – Lower system board in upper compute tray, “Fan board” power (J56) and signal (J40) connectors (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, fan power (J3) and signal (J5) connectors (see “Storage-board-assembly connectors” on page 41) <p>Note: Do not route the fan cage cable in the upper tray through any cable guides.</p>

Cable routing for drives

Use this section to understand how to route cables for drives and related components.

Cable routing for drive components is different for the lower and upper trays:

- [“Drive cable routing \(lower tray\)” on page 54:](#)
 - [Common drive cables \(lower tray\)](#)
 - [SAS drive cables \(lower tray\)](#)
 - [NVMe drive cables \(lower tray\)](#)
- [“Drive cable routing \(upper tray\)” on page 57:](#)
 - [Common drive cables \(upper tray\)](#)
 - [SAS drive cables \(upper tray\)](#)
 - [NVMe drive cables \(upper tray\)](#)

Notes:

- Make sure that all the cables go through the cable guides, as shown in the illustrations. See “[Cable guides](#)” on page 48 for cable guide locations and descriptions.
- Some cable connectors have locks or latches that must be disengaged to disconnect the cable.
- The RAID cards in the illustration might be different than the RAID card in your system. Connector locations for all RAID cards are similar.

Drive cable routing (lower tray)

Cable routing for drive components is different for SAS and NVMe drives:

- [Common drive cables \(lower tray\)](#)
- [SAS drive cables \(lower tray\)](#)
- [NVMe drive cables \(lower tray\)](#)

Common drive cables (lower tray)

Common drive cables are used by both SAS and NVMe drives.

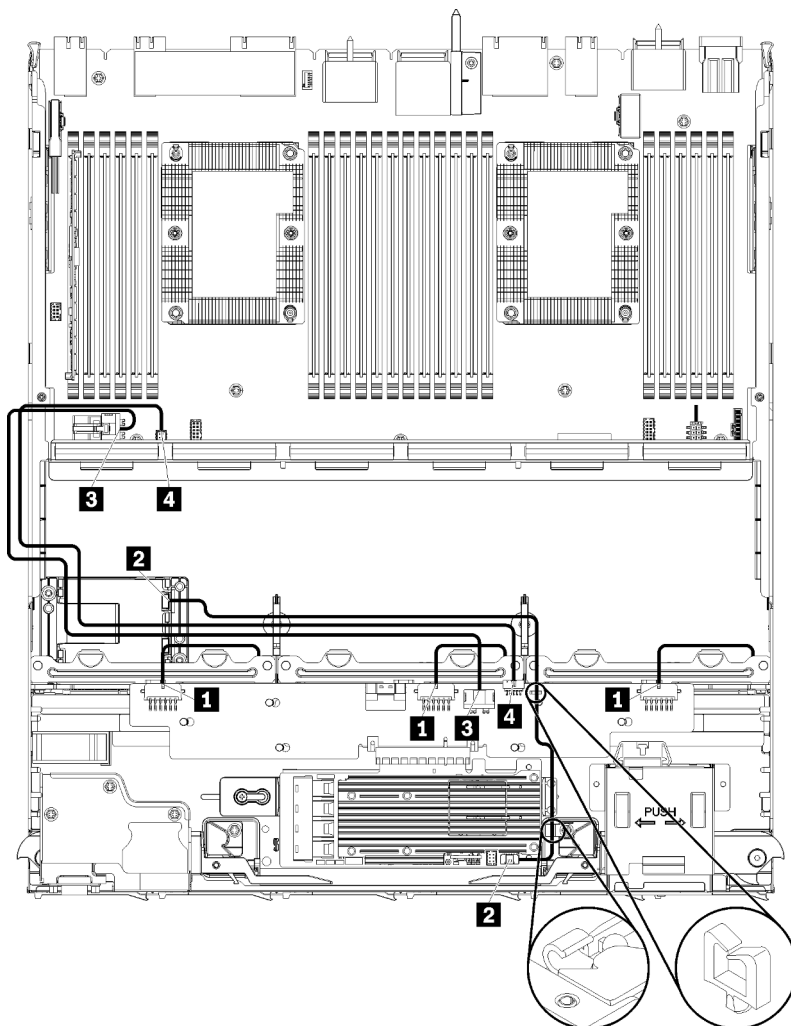


Figure 34. Cable routing, common drive cables (lower tray)

Table 26. Cable routing, common drive cables (lower tray)

Cable	Routing
1 Power to drive backplanes 1, 2, and 3	<ul style="list-style-type: none"> • From: Storage interposer (see “Storage interposer connectors” on page 46) <ul style="list-style-type: none"> – For drive backplane 1, use interposer “BP 1/6” connector – For drive backplane 2, use interposer “BP 2/5” connector – For drive backplane 3, use interposer “BP 3/4” connector • To: Drive backplane, “Power” connector (see “Drive backplane connectors” on page 47)
2 RAID flash power module	<ul style="list-style-type: none"> • From: RAID flash power module connector • To: RAID card, flash power module connector
3 Drive power	<ul style="list-style-type: none"> • From: Lower system board in lower compute tray, “POWER” connector (see “System-board connectors” on page 41) • To: Storage interposer, “POWER” connector (see “Storage interposer connectors” on page 46)
4 Drive signal	<ul style="list-style-type: none"> • From: Lower system board in lower compute tray, “Signal” connector (see “System-board connectors” on page 41) • To: Storage interposer, “SIDE BAND” connector (see “Storage interposer connectors” on page 46)

SAS drive cables (lower tray)

Common drive cables are used by only SAS drives.

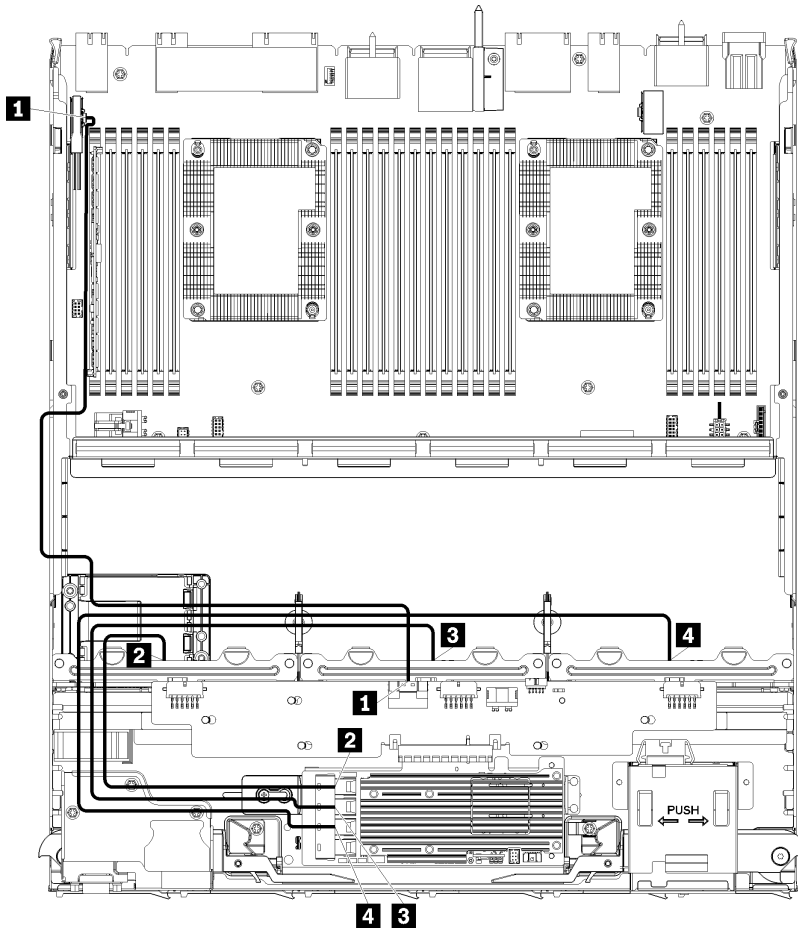


Figure 35. Cable routing, SAS drive cables (lower tray)

Table 27. Cable routing, SAS drive cables (lower tray)

Cable	Gen 3 RAID routing	Gen 4 RAID routing
1 PCIe SAS interface	<ul style="list-style-type: none"> From: Lower system board in lower compute tray, “PCIe/NVMe” connector (see “System-board connectors” on page 41) To: Storage interposer, connector “PCIe” (see “Storage interposer connectors” on page 46) 	
2 RAID interface for drive backplane 1	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C3” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	<ul style="list-style-type: none"> From: Gen 4 RAID card, “C1” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47)
3 RAID interface for drive backplane 2	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C2” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	<ul style="list-style-type: none"> From: Gen 4 RAID card, “C0” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47)
4 RAID interface for drive backplane 3	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C1” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	

NVMe drive cables (lower tray)

Common drive cables are used by only NVMe drives.

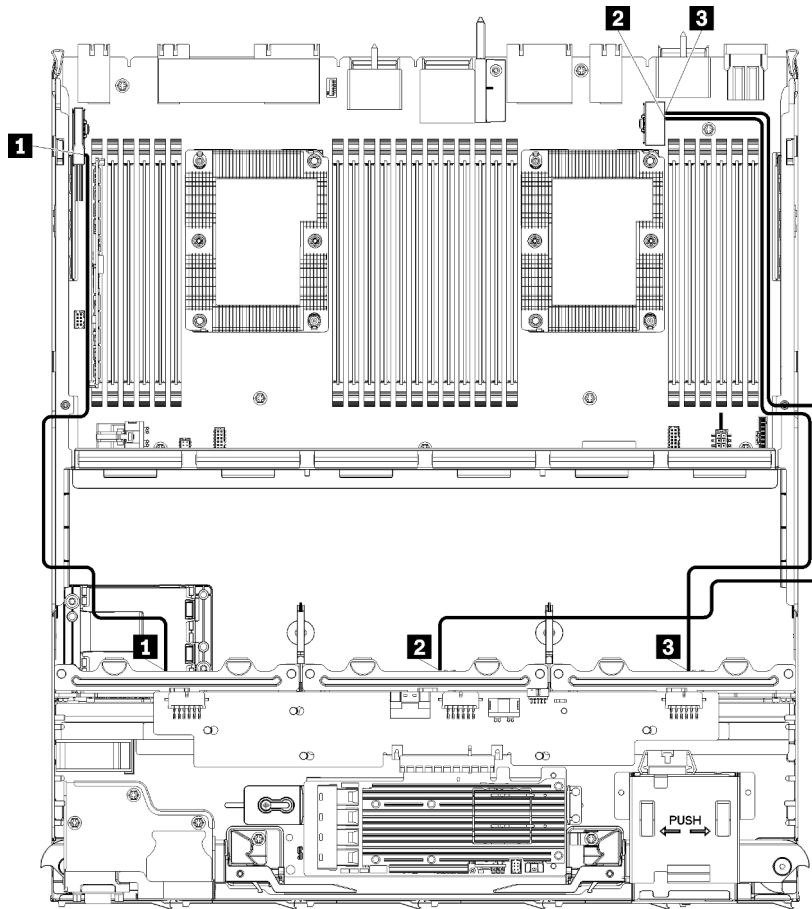


Figure 36. Cable routing, NVMe drive cables (lower tray)

Table 28. Cable routing, NVMe drive cables (lower tray)

Cable	Routing
1 Drive backplane 1 NVMe	<ul style="list-style-type: none"> • From: Upper system board in lower compute tray, “PCIe/NVMe” connector (see “System-board connectors” on page 41) • To: Drive backplane 1, connector “NVMe” (see “Drive backplane connectors” on page 47)
2 Drive backplane 2 NVMe	<ul style="list-style-type: none"> • From: Upper system board in lower compute tray, “NVMe” connector (see “System-board connectors” on page 41) • To: Drive backplane 2, connector “NVMe” (see “Drive backplane connectors” on page 47)
3 Drive backplane 3 NVMe	<ul style="list-style-type: none"> • From: Lower system board in lower compute tray, “NVMe” connector (see “System-board connectors” on page 41) • To: Drive backplane 3, connector “NVMe” (see “Drive backplane connectors” on page 47)

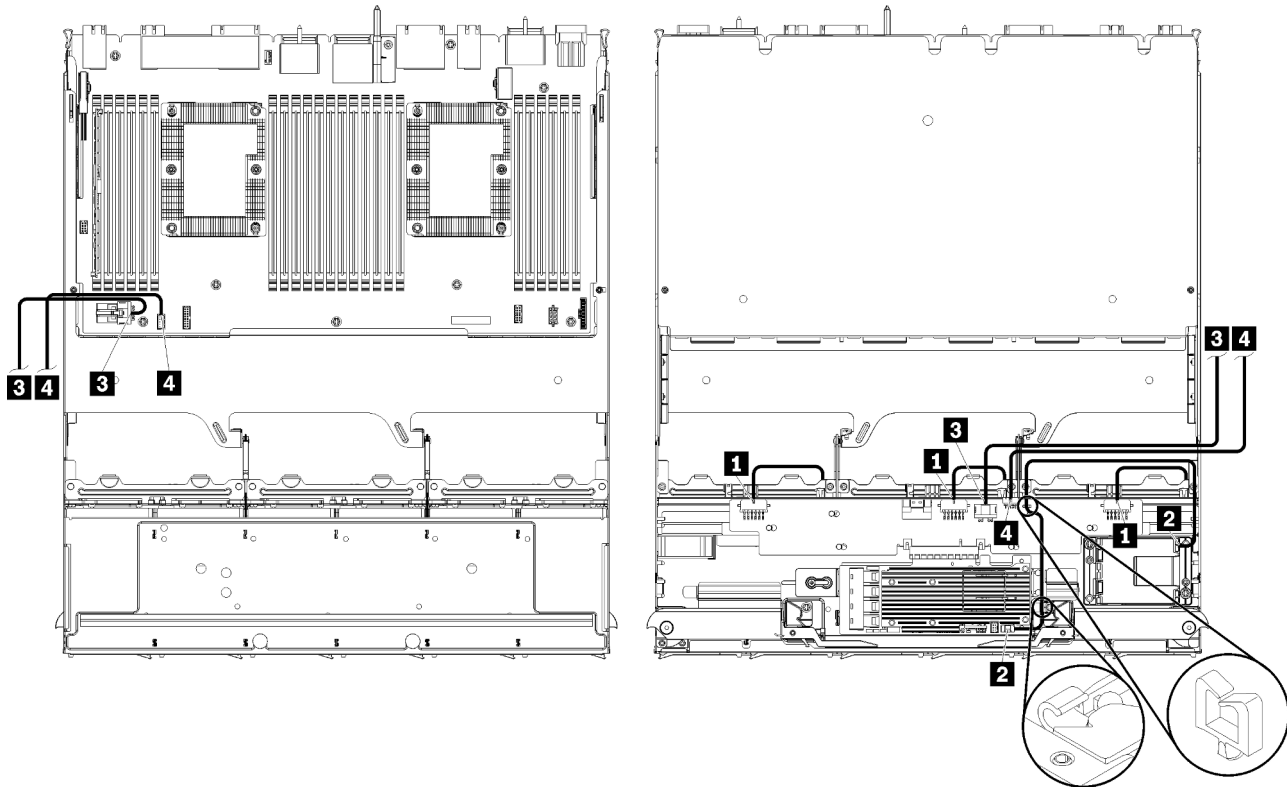
Drive cable routing (upper tray)

Cable routing for drive components is different for SAS and NVMe drives:

- Common drive cables (upper tray)
- SAS drive cables (upper tray)
- NVMe drive cables (upper tray)

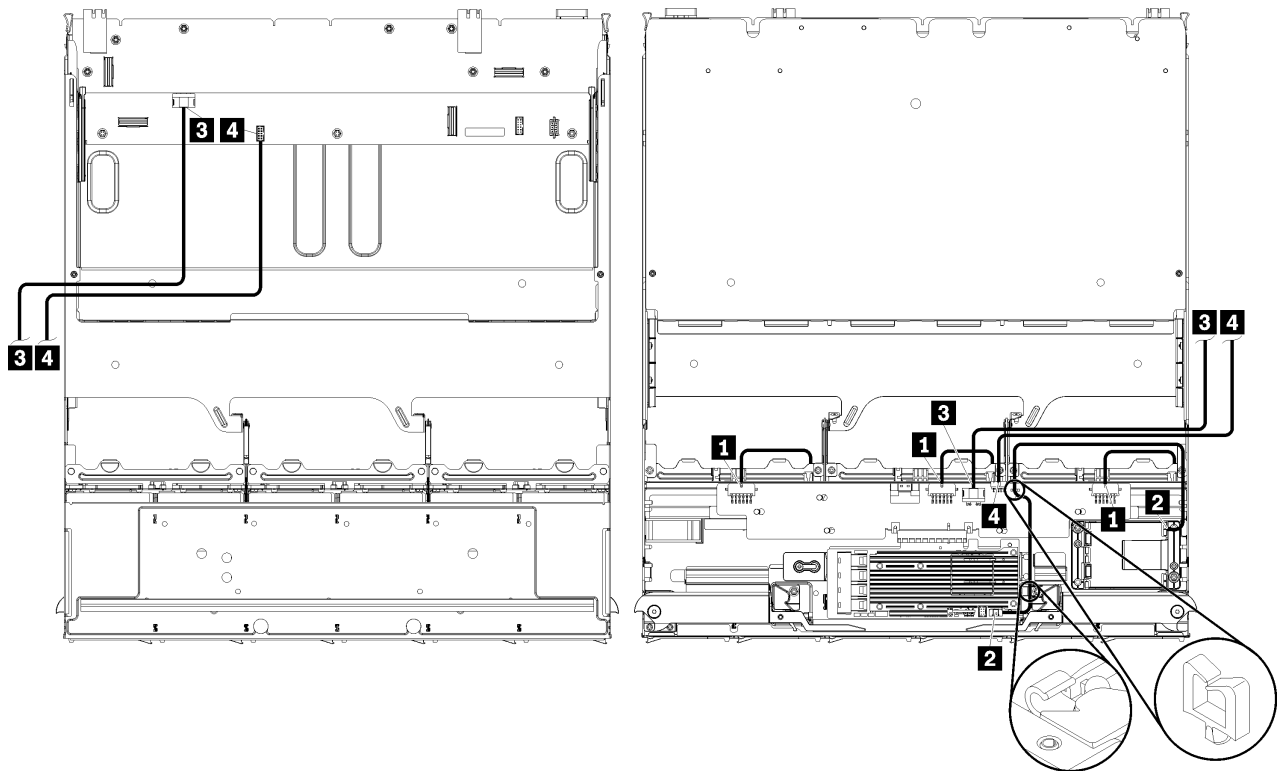
Common drive cables (upper tray)

Common drive cables are used by both SAS and NVMe drives.



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 37. Cable routing, common drive cables (upper tray with compute system board)



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 38. Cable routing, common drive cables (upper tray with storage-board assembly)

Table 29. Cable routing, common drive cables (upper tray)

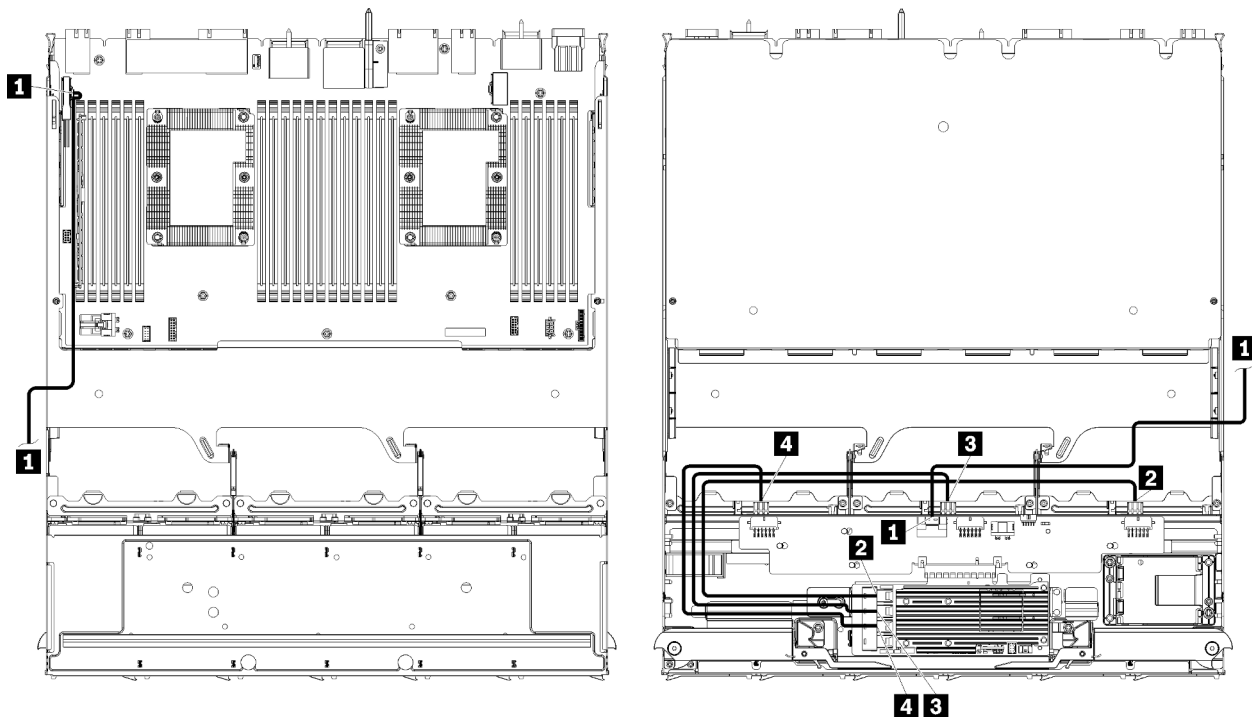
Cable	Routing
1 Power to drive backplanes 4, 5, and 6	<ul style="list-style-type: none"> • From: Storage interposer (see “Storage interposer connectors” on page 46) <ul style="list-style-type: none"> – For drive backplane 4, use interposer “BP 3/4” connector – For drive backplane 5, use interposer “BP 2/5” connector – For drive backplane 6, use interposer “BP 1/6” connector • To: Drive backplane, connector “Power” (see “Drive backplane connectors” on page 47)
2 RAID flash power module	<ul style="list-style-type: none"> • From: RAID flash power module connector • To: RAID card, flash power module connector

Table 29. Cable routing, common drive cables (upper tray) (continued)

Cable	Routing
3 Drive power	<ul style="list-style-type: none"> • From: <ul style="list-style-type: none"> – Lower system board in upper compute tray, “POWER” connector (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, hard disk drive power (J2) connector (see “Storage-board-assembly connectors” on page 41) • To: Storage interposer, “POWER” connector (see “Storage interposer connectors” on page 46)
4 Drive signal	<ul style="list-style-type: none"> • From: <ul style="list-style-type: none"> – Lower system board in upper compute tray, “Signal” connector (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, hard disk drive signal (J13) connector (see “Storage-board-assembly connectors” on page 41) • To: Storage interposer, “SIDEBAND” connector (see “Storage interposer connectors” on page 46)

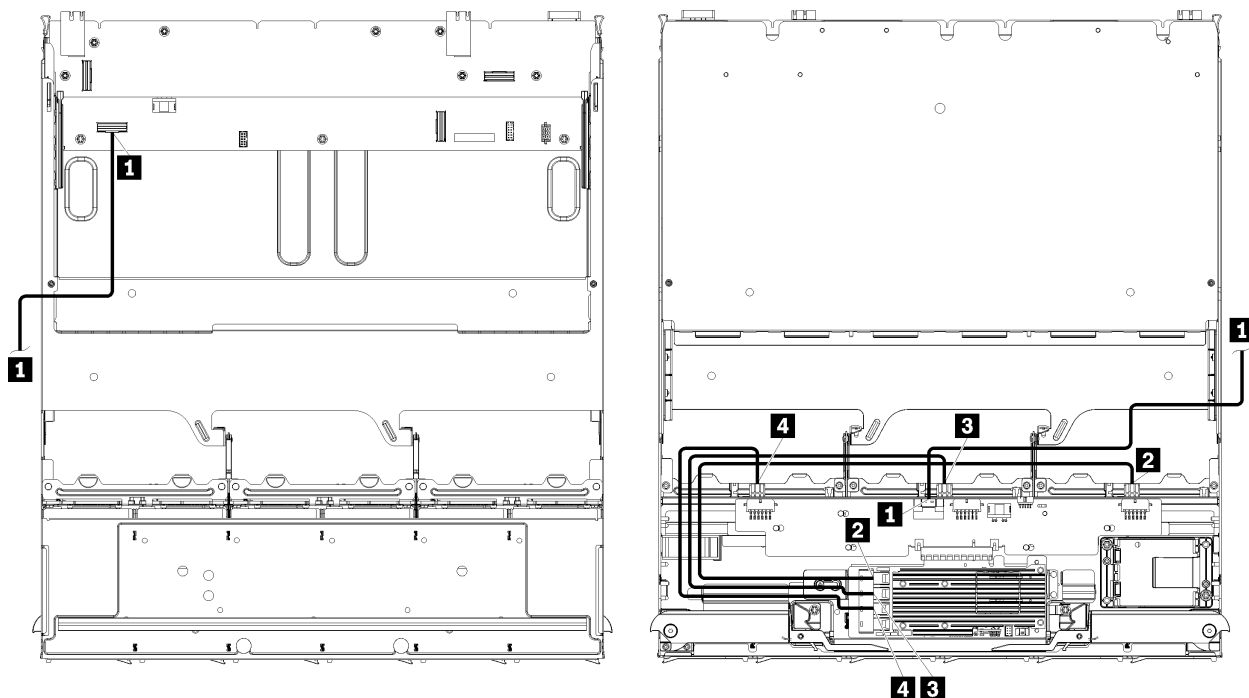
SAS drive cables (upper tray)

Common drive cables are used by only SAS drives.



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 39. Cable routing, SAS drive cables (upper tray with system board)



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

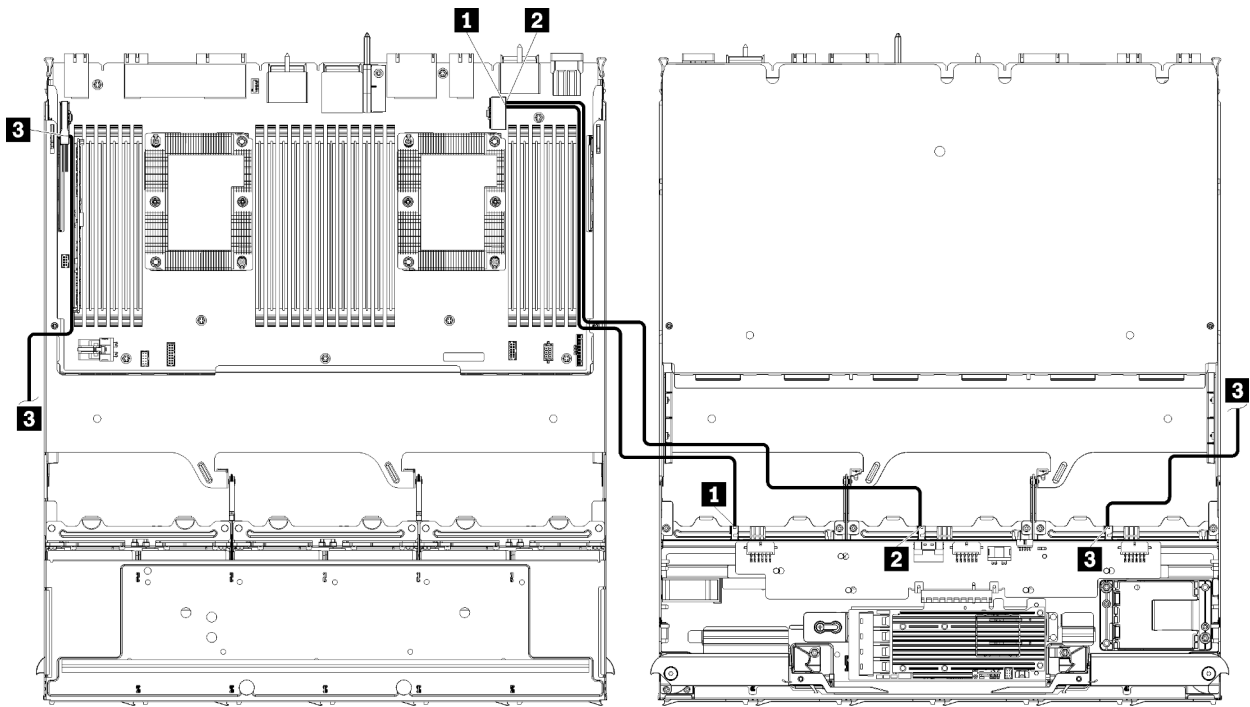
Figure 40. Cable routing, SAS drive cables (upper tray with storage-board assembly)

Table 30. Cable routing, SAS drive cables (upper tray)

Cable	Gen 3 RAID routing	Gen 4 RAID routing
1 PCIe SAS interface	<ul style="list-style-type: none"> From: Lower system board in lower compute tray, “PCIe/NVMe” connector (see “System-board connectors” on page 41) To: Storage interposer, connector “PCIe” (see “Storage interposer connectors” on page 46) 	
2 RAID interface for drive backplane 4	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C3” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	<ul style="list-style-type: none"> From: Gen 4 RAID card, “C0” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47)
3 RAID interface for drive backplane 5	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C2” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	
4 RAID interface for drive backplane 6	<ul style="list-style-type: none"> From: Gen 3 RAID card, “C1” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47) 	<ul style="list-style-type: none"> From: Gen 4 RAID card, “C1” connector To: Drive backplane, connector “SAS” (see “Drive backplane connectors” on page 47)

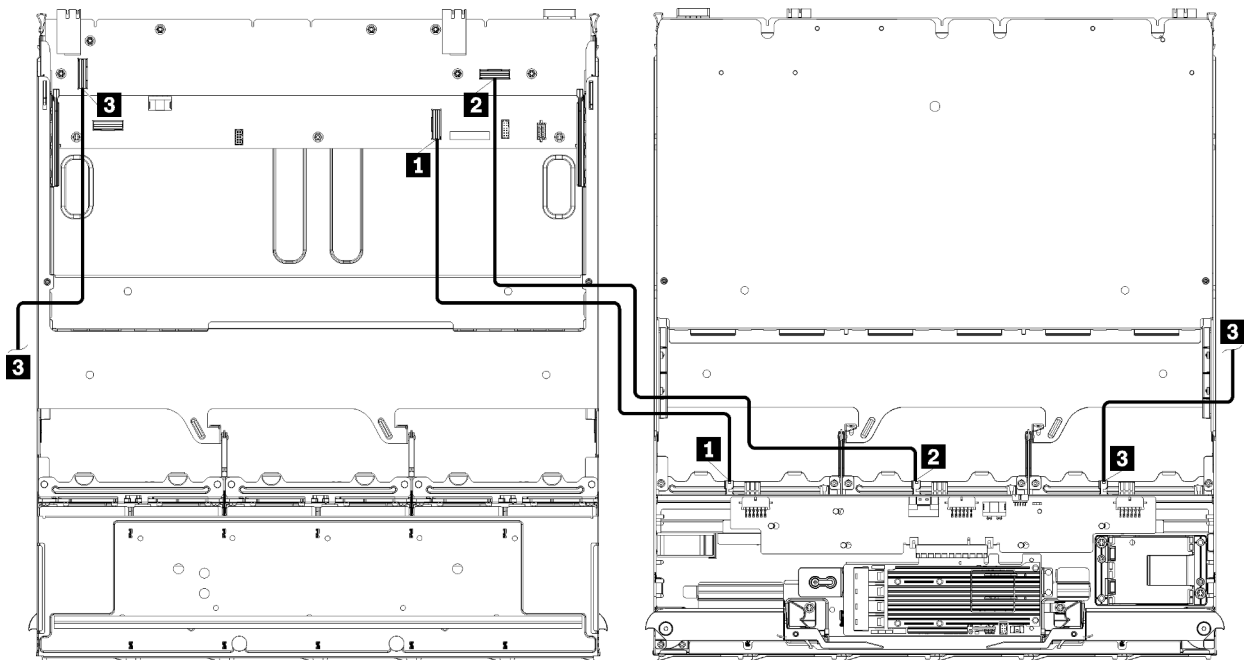
NVMe drive cables (upper tray)

Common drive cables are used by only NVMe drives.



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 41. Cable routing, NVMe drive cables (upper tray with system board)



Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 42. Cable routing, NVMe drive cables (upper tray with storage-board assembly)

Table 31. Cable routing, NVMe drive cables (upper tray)

Cable	Routing
1 Drive backplane 6 NVMe	<ul style="list-style-type: none"> • From: <ul style="list-style-type: none"> – Lower system board in upper compute tray, “PCIe/NVMe” connector (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, “NVMe” connector (see “Storage-board-assembly connectors” on page 41) • To: Drive backplane 6, connector “NVMe” (see “Drive backplane connectors” on page 47)
2 Drive backplane 5 NVMe	<ul style="list-style-type: none"> • From: <ul style="list-style-type: none"> – Upper system board in upper compute tray, “NVMe” connector (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, “NVMe” connector (see “Storage-board-assembly connectors” on page 41) • To: Drive backplane 5, connector “NVMe” (see “Drive backplane connectors” on page 47)
3 Drive backplane 4 NVMe	<ul style="list-style-type: none"> • From: <ul style="list-style-type: none"> – Upper system board in upper compute tray, “NVMe” connector (see “System-board connectors” on page 41) – Storage-board assembly in upper tray, “NVMe” connector (see “Storage-board-assembly connectors” on page 41) • To: Drive backplane 4, connector “NVMe” (see “Drive backplane connectors” on page 47)

Parts list

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

For more information about ordering the parts shown in [Figure 43 “Server components” on page 64](#):

<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr950/7X12/parts>

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

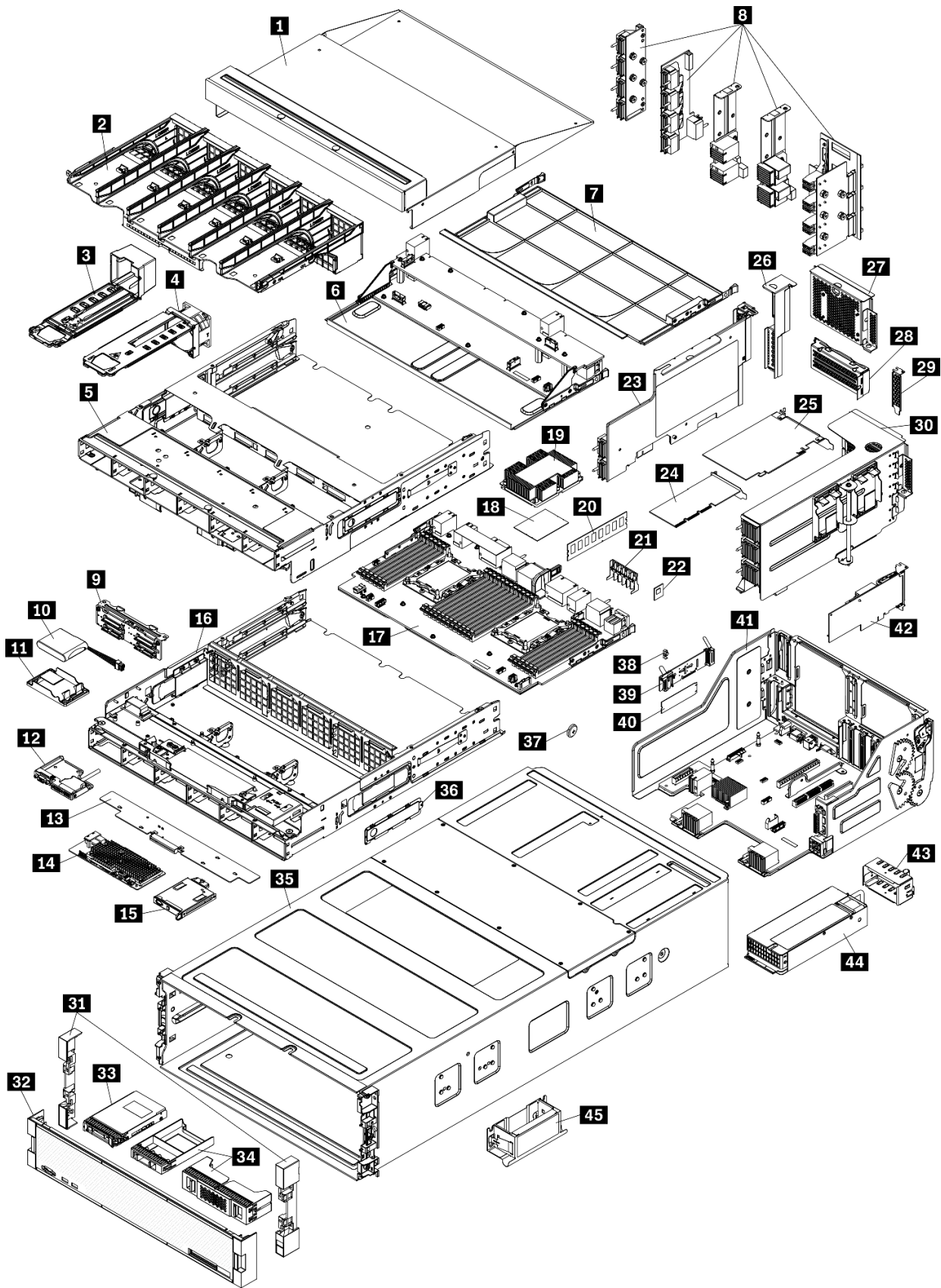


Figure 43. Server components

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.

Table 32. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 43 “Server components” on page 64: http://datacentersupport.lenovo.com/products/servers/thinksystem/sr950/7X12/parts It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Upper tray filler	√			
2	Fan cage (upper/lower)	√			
3	Fan filler	√			
4	Fan	√			
5	Upper tray	√			
6	Storage board assembly	√			
7	System board filler	√			
8	Midplanes (five types)		√		
9	Drive backplane	√			
10	RAID flash power module	√			
11	RAID flash power module bracket	√			
12	Front USB/VGA assembly	√			
13	Storage interposer	√			
14	RAID adapter	√			
15	Front operator panel	√			
16	Lower tray	√			
17	System board	√			
18	Processor			√	
19	Processor and heat sink (PHM)			√	
19	Heat sink			√	

Table 32. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
20	Memory module (DIMM)	√			
20	DC Persistent Memory Module (DCPMM)	√			
20	Memory module filler	√			
21	Memory air baffle	√			
22	TCM module	√			
23	Riser (slot 16 to 17)	√			
24	Adapter (PCIe), low profile	√			
25	Adapter (PCIe), full height	√			
26	Riser filler (slot 16 to 17)	√			
27	PCIe filler (four-slot)	√			
28	Riser bracket (slot 14 to 15)	√			
28	PCIe filler (two-slot)	√			
28	Riser bracket filler (slot 14 to 15)		√		
29	PCIe filler (single-slot)	√			
30	Riser 1 (slot 1 to 4)Riser 2 (slot 10 to 13)	√			
31	Bezel, front	√			
32	Cover, front	√			
33	Storage drive	√			
34	Drive filler (single bay or four bay)	√			
35	Chassis		√		
36	Cable covers	√			
37	System battery (CR2032)				√
38	M.2 retainer	√			
39	M.2 backplane	√			
40	M.2 drive	√			
41	I/O tray	√			
42	Adapter (LOM or ML2 x16 network)	√			
43	Power supply filler	√			
44	Power supply unit	√			
45	Chassis lift handle	√			

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:

<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr950/7X12/parts>

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see [“Firmware updates” on page 23](#).

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 71](#) and [“Working inside the server with the power on” on page 71](#).
- 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 [ThinkSystem SR950 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, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- 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 a 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:

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

Working inside the server with the power on

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

Attention: The server might stop and 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.
- 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.

Adapter replacement

Adapters are in several locations in the I/O tray that is accessed from the rear of the server. You can install up to 17 adapters in the server. The removal and installation procedures for each riser type are different and are described in the following topics:

- PCIe adapters 1 to 4: see [“Remove a PCIe adapter from slot 1 to 4” on page 72](#) and [“Install a PCIe adapter in slot 1 to 4” on page 79](#)
- PCIe adapters 5 to 8 and the LOM adapter (slot 9):
 - For PCIe adapters 5 to 8, see [“Remove a PCIe adapter from slot 5 to 8” on page 73](#) and [“Install a PCIe adapter in slot 5 to 8” on page 80](#)

- For the LOM adapter (slot 9), see [“Remove a LOM adapter from slot 9” on page 75](#) and [“Install a LOM adapter in slot 9” on page 81](#)
- PCIe adapters 10 to 15: see [“Remove a PCIe adapter from slot 10 to 15” on page 76](#) and [“Install a PCIe adapter in slot 10 to 15” on page 82](#)
- I/O adapters 16 to 17: see [“Remove an I/O adapter from slot 16 to 17” on page 77](#) and [“Install an I/O adapter in slot 16 to 17” on page 84](#)

Installation considerations for the Mellanox InnoVA™-2 Flex Open Programmable SmartNIC

Review the following guidelines before installing the Mellanox InnoVA™-2 Flex Open Programmable SmartNIC:

- If you install the Mellanox InnoVA™-2 Flex Open Programmable SmartNIC in the ThinkSystem SR950, the maximum supported ambient temperature for the system is 35°C.
- The Mellanox InnoVA™-2 Flex Open Programmable SmartNIC is **not** supported in the following adapter slots: 1, 5, and 10.
- When installing the Mellanox InnoVA™-2 Flex Open Programmable SmartNIC in a 4-socket configuration:
 - A maximum of two of these adapters can be installed in the system.
 - The Mellanox InnoVA™-2 Flex Open Programmable SmartNIC can be installed only in adapter slots 6, 7, or 17.
 - The installation of two of these adapters in contiguous, sequential slots is not supported. For example, you cannot install two adapters in slots 6 and 7.
- When installing the Mellanox InnoVA™-2 Flex Open Programmable SmartNIC in an 8-socket configuration:
 - A maximum of four of these adapters can be installed in the system.
 - The Mellanox InnoVA™-2 Flex Open Programmable SmartNIC can be installed only in adapter slots 2, 3, 4, 6, 7, 11, 12, 13, 14, 15, 16, or 17.
 - The installation of two of these adapters in contiguous, sequential slots is not supported. For example, you cannot install two adapters in slots 2 and 3.

Remove a PCIe adapter from slot 1 to 4

PCIe adapters in slot 1 to 4 are in an I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slot 1 to 4 (riser 1), open the retention latch and remove the adapter from the riser.

S002



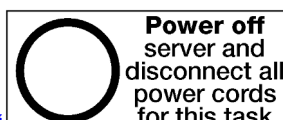
CAUTION:

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.



**Read the
Installation
Guidelines**

“ [on page 69](#) “



**Power off
server and
disconnect all
power cords
for this task**

” [on page 28](#)”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an adapter from slot 1 to 4:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 1 to 4 (riser 1). See [“Remove the riser for slot 1 to 4 \(riser 1\)” on page 187](#).

Complete the following steps to remove an adapter from slot 1 to 4.

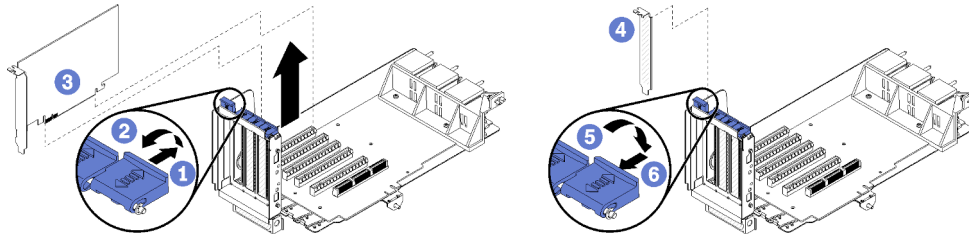


Figure 44. Adapter removal (slot 1 to 4)

Step 1. Open the retention latch.

Step 2. Disengage the adapter from its connector on the riser and lift the adapter from the riser.

After you remove the adapter:

- If you are removing the adapter and are not installing a replacement:
 1. Install a filler in the empty adapter slot and close the retention latch.
 2. Install the riser. See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193](#).
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

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

Demo video

[Watch the procedure on YouTube](#)

Remove a PCIe adapter from slot 5 to 8

PCIe adapters in slot 5 to 8 are in the I/O tray that is accessed from the rear of the server. After removing the I/O tray from the chassis, remove the adapter from the I/O tray.

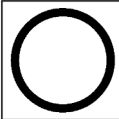
S002**CAUTION:**

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

“ on page 69 “ on page 28 ”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an adapter from slot 5 to 8:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130.](#)
2. Remove the riser for slot 1 to 4 (riser 1) to access the adapter connectors in the I/O tray. See [“Remove the riser for slot 1 to 4 \(riser 1\)” on page 187.](#)

Complete the following steps to remove an adapter from slot 5 to 8.

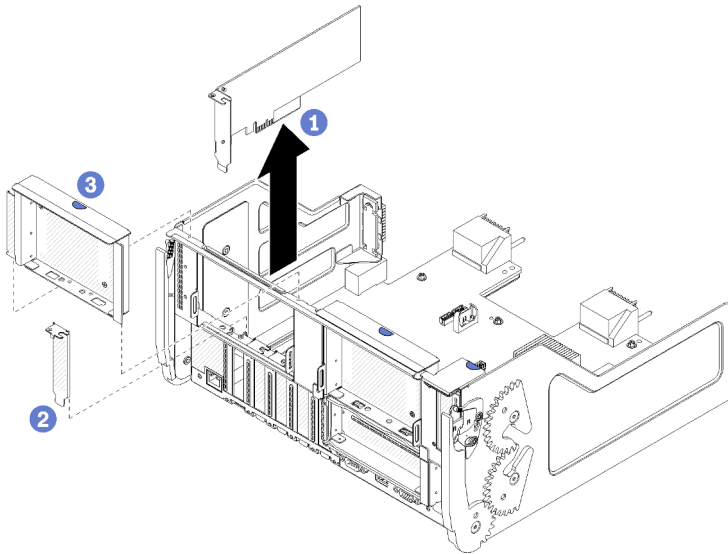


Figure 45. Adapter removal (slot 5 to 8)

Step 1. Disengage the adapter from its connector on the I/O tray and lift the adapter from the I/O tray.

After you remove the adapter:

- If you are removing the adapter and are not installing a replacement:
 1. Install a filler in the empty adapter slot.
 2. Install the riser for slot 1 to 4 (riser 1). See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193.](#)
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132.](#)

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

Demo video

[Watch the procedure on YouTube](#)

Remove a LOM adapter from slot 9

The LOM adapter in slot 9 is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray from the chassis and remove the adapter from the I/O tray.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove a LOM adapter from slot 9:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 10 to 15 (riser 2) to access the adapter connectors in the I/O tray. See [“Remove the riser for slot 10 to 15 \(riser 2\)” on page 188](#).

Complete the following steps to remove a LOM adapter from slot 9.

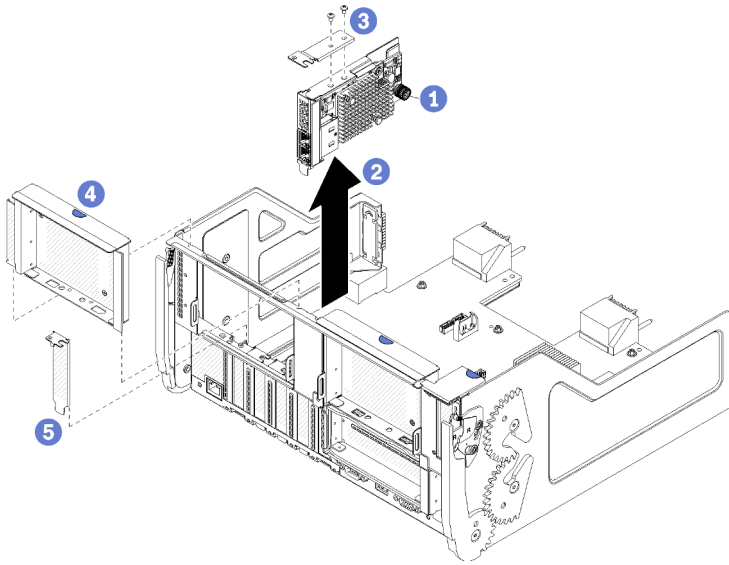


Figure 46. LOM adapter removal (slot 9)

Step 1. Fully loosen the captive thumbscrew on the side of the LOM adapter that secures it to the bracket on the I/O tray.

Step 2. Disengage the LOM adapter from its connector on the I/O tray and lift the adapter from the I/O tray.

After you remove a LOM adapter:

- If you are removing the adapter and are not installing a replacement:
 1. Install a filler in slot 9.
 2. Install the riser for slot 10 to 15 (riser 2). See [“Install the riser for slot 10 to 15 \(riser 2\)”](#) on page 195.
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray”](#) on page 132.

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

Demo video

[Watch the procedure on YouTube](#)

Remove a PCIe adapter from slot 10 to 15

PCIe adapters in slot 10 to 15 are in an I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slot 10 to 15 (riser 2), open the retention latch and remove the adapter from the riser.

S002



CAUTION:

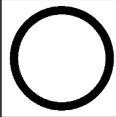
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To

remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



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Before you remove an adapter from slot 10 to 15:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See “[Remove the I/O tray](#)” on page 130.
2. Remove the riser for slot 10 to 15 (riser 2). See “[Remove the riser for slot 10 to 15 \(riser 2\)](#)” on page 188.

Complete the following steps to remove an adapter from slot 10 to 15.

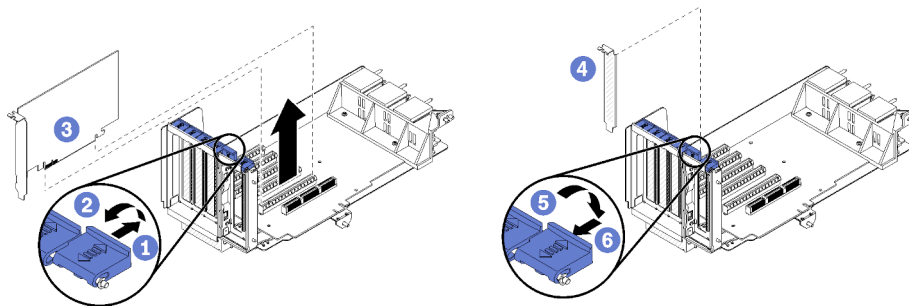


Figure 47. Adapter removal (slot 10 to 15)

Step 1. Open the retention latch.

Step 2. Disengage the adapter from its connector on the riser and lift the adapter from the riser.

After you remove the adapter:

- If you are removing the adapter and are not installing a replacement:
 1. Install a filler in the empty adapter slot and close the retention latch.
 2. Install the riser. See “[Install the riser for slot 10 to 15 \(riser 2\)](#)” on page 195.
 3. Install the I/O tray and connect all cables. See “[Install the I/O tray](#)” on page 132.

Demo video

[Watch the procedure on YouTube](#)

Remove an I/O adapter from slot 16 to 17

I/O adapters in slot 16 to 17 are in an I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slot 16 to 17, open the retention latch and remove the adapter from the riser.

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.



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Before you remove an adapter from slot 16 to 17:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 16 to 17. See [“Remove the riser for slot 16 to 17 \(riser 3\)” on page 192](#).

Complete the following steps to remove an adapter from slot 16 to 17.

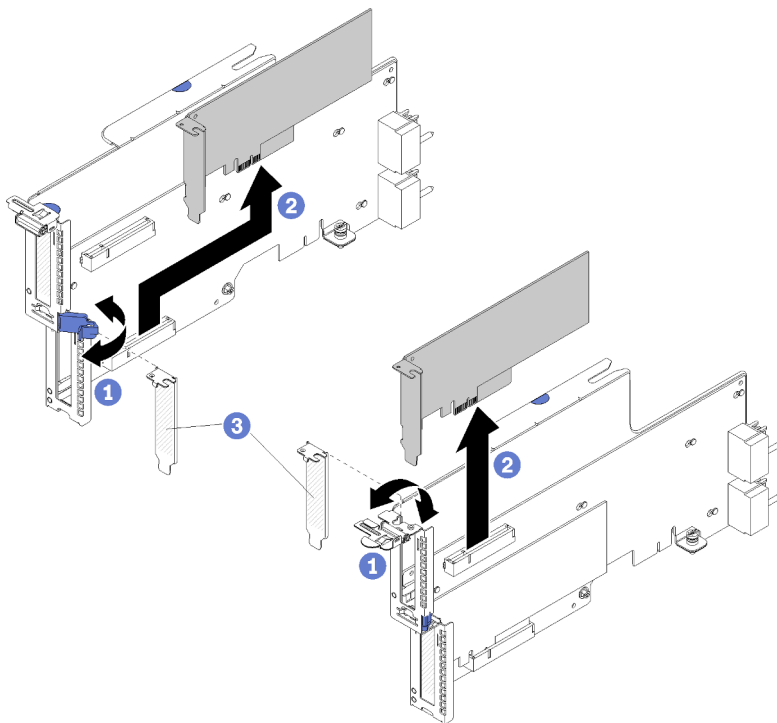


Figure 48. Adapter removal (slot 16 to 17)

Step 1. Open the retention latch.

Step 2. Disengage the adapter from its connector on the riser and lift the adapter from the riser.

After you remove the adapter:

- If you are removing the adapter and are not installing a replacement:
 1. Install a filler in the empty adapter slot and close the retention latch.
 2. Install the riser. See [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#).
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

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

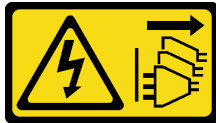
Demo video

[Watch the procedure on YouTube](#)

Install a PCIe adapter in slot 1 to 4

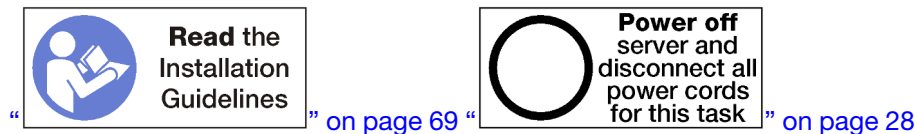
PCIe adapters in slot 1 to 4 are in an I/O tray riser that is accessed from the rear of the server. With the riser removed from the I/O tray, open the retention latch and insert the adapter in the riser; then, close the retention latch.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install an adapter in slot 1 to 4, make sure that there is no filler installed in the slot where you are installing the adapter.

Important: You must remove the riser from the I/O tray before installing an adapter. If you are installing a network adapter (with an RJ45 connector), make sure that there is sufficient clearance to disconnect the Ethernet cable from the adapter after it is installed.

Complete the following steps to install an adapter in slot 1 to 4.

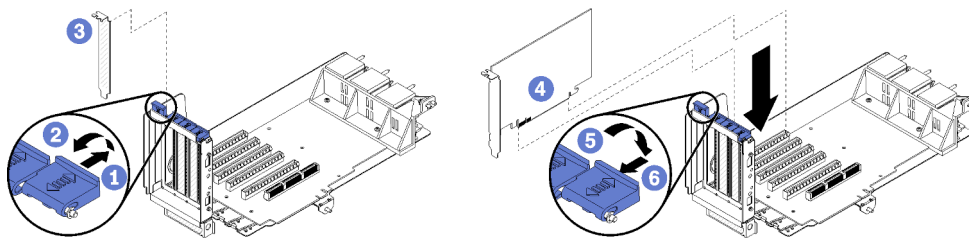


Figure 49. Adapter installation (slot 1 to 4)

Step 1. Open the retention latch.

Step 2. Align the adapter with the riser slot and insert it; then, press the adapter into the riser until the connector is fully seated.

Step 3. Close and lock the retention latch.

If you have no other operations to perform on the riser after installing an adapter in slot 1 to 4:

1. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.
2. Install the riser in the I/O tray. See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193.](#)
3. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132.](#)

Demo video

[Watch the procedure on YouTube](#)

Install a PCIe adapter in slot 5 to 8

PCIe adapters in slot 5 to 8 are in the I/O tray that is accessed from the rear of the server. With the I/O tray removed from the chassis, insert the adapter in the I/O tray.

Note: You should not install a RAID or Host Bus Adapter card in slot 7.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install a PCIe adapter in slot 5 to 8, make sure that there is no filler installed in the slot where you are installing the adapter.

Important: You must remove the riser from the I/O tray before installing an adapter.

Complete the following steps to install an adapter for slot 5 to 8.

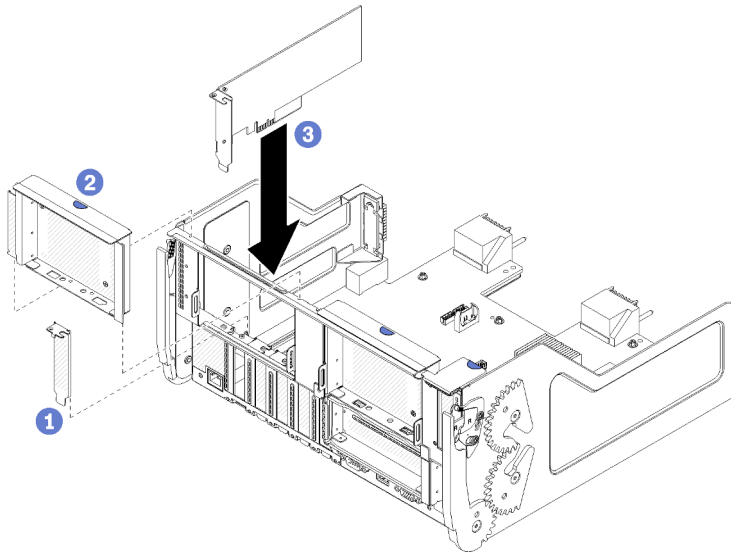


Figure 50. Adapter installation (slot 5 to 8)

Step 1. Align the adapter with the I/O tray slot and insert it; then, press the adapter into the I/O tray until the connector is fully seated.

If you have no other operations to perform on the I/O tray after installing an adapter in slot 5 to 8:

1. If any of the adapters in the I/O tray have internal cables, make sure that they are connected before installing the I/O tray.
2. Install the riser or riser filler for slot 1 to 4 (left riser). See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193](#).
3. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132](#).

Demo video

[Watch the procedure on YouTube](#)

Install a LOM adapter in slot 9

The LOM adapter in slot 9 is in the I/O tray that is accessed from the rear of the server. With the I/O tray removed from the chassis, insert the adapter in the I/O tray.

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.



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Before you install a LOM adapter in slot 9, make sure that there is no filler installed in slot 9.

Important: You must remove the riser from the I/O tray before installing an adapter.

Complete the following steps to install a LOM adapter in slot 9.

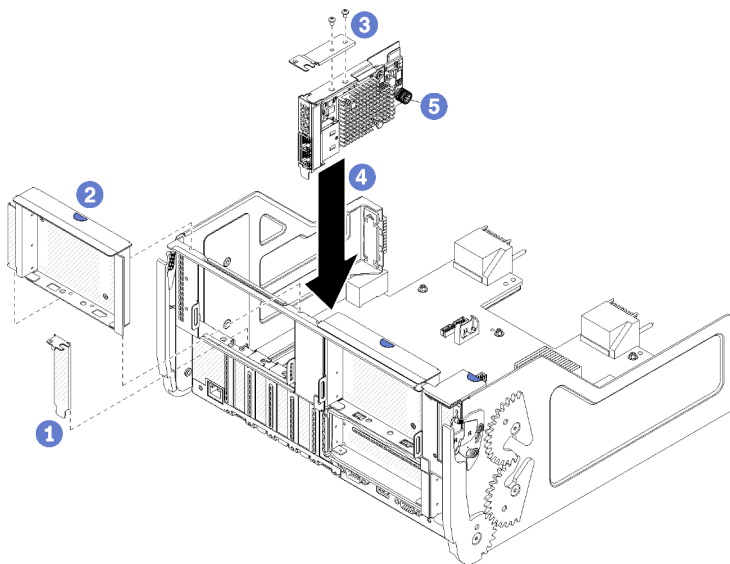


Figure 51. LOM adapter installation (slot 9)

- Step 1. Attach the extension bracket to the top of the LOM adapter using two screws.
- Step 2. Align the adapter with I/O tray slot 9 and insert it; then, press the adapter into the I/O tray until the connector is fully seated.
- Step 3. Tighten the captive thumbscrew on the side of the LOM adapter that secures it to the bracket on the I/O tray.

If you have no other operations to perform on the I/O tray after installing a LOM adapter in slot 9:

1. Install the riser for slot 10 to 15 (riser 2). See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#).
2. If any of the adapters in the I/O tray have internal cables, make sure that they are connected before installing the I/O tray.
3. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132](#).

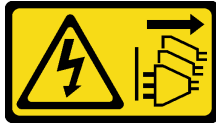
Demo video

[Watch the procedure on YouTube](#)

Install a PCIe adapter in slot 10 to 15

PCIe adapters in slot 10 to 15 are in an I/O tray riser that is accessed from the rear of the server. With the riser removed from the I/O tray, open the retention latch and insert the adapter in the riser; then, close the retention latch.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install an adapter in slot 10 to 15, make sure that there is no filler installed in the slot where you are installing the adapter.

Important: You must remove the riser from the I/O tray before installing an adapter. If you are installing a network adapter (with an RJ45 connector), make sure that there is sufficient clearance to disconnect the Ethernet cable from the adapter after it is installed.

Note: If you are installing an adapter in slot 14 or 15, the slot 14 to 15 riser bracket or a riser bracket filler must be installed on the riser. See [“Install the riser bracket for slot 14 to 15 \(riser 2\)”](#) on page 196

Complete the following steps to install an adapter in slot 10 to 15.

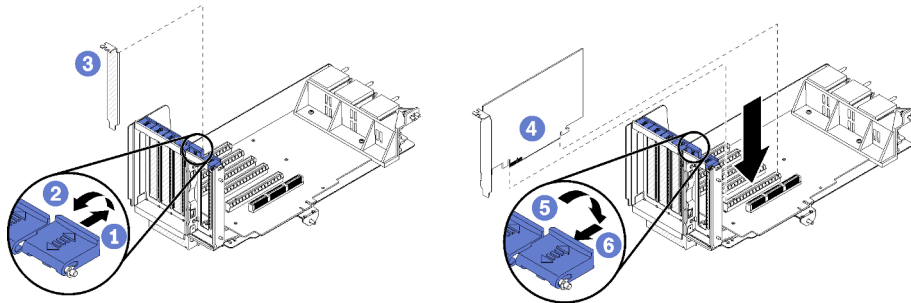


Figure 52. Adapter installation (slot 10 to 15)

- Step 1. Open the retention latch.
- Step 2. Align the adapter with the riser slot and insert it; then, press the adapter into the riser until the connector is fully seated.
- Step 3. Close and lock the retention latch.

If you have no other operations to perform on the riser after installing an adapter in slot 10 to 15:

1. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.

2. Install the riser in the I/O tray. See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193.](#)
3. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132.](#)

Demo video

[Watch the procedure on YouTube](#)

Install an I/O adapter in slot 16 to 17

I/O adapters in slot 16 to 17 are in an I/O tray riser that is accessed from the rear of the server. With the riser removed from the I/O tray, open the retention latch and insert the adapter in the riser; then, close the retention latch.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install an adapter in slots 16 or 17, make sure that there is no filler installed in the slot where you are installing the adapter.

Important: You must remove the riser from the I/O tray before installing an adapter.

Complete the following steps to install an adapter in slots 16 or 17.

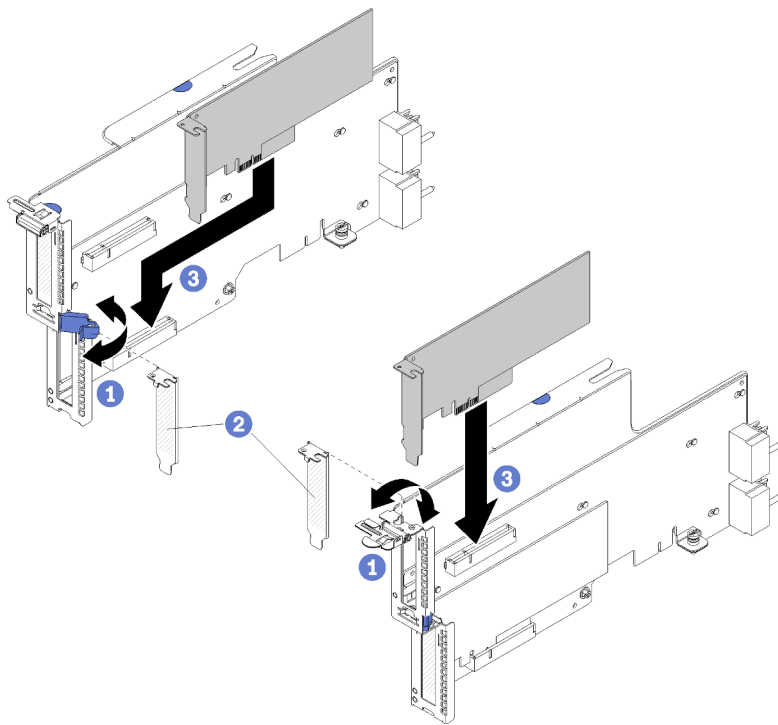


Figure 53. Adapter installation (slot 16 to 17)

- Step 1. Open the retention latch.
- Step 2. Align the adapter with the riser slot and insert it; then, press the adapter into the riser until the connector is fully seated.
- Step 3. Close and lock the retention latch.

If you have no other operations to perform on the riser after installing an adapter in slot 16 to 17:

1. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.
2. Install the riser in the I/O tray. See [“Install the riser for slot 16 to 17 \(riser 3\)”](#) on page 197.
3. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray”](#) on page 132.

Demo video

[Watch the procedure on YouTube](#)

System battery (CR2032) replacement

The system battery is in the I/O tray that is accessed from the rear of the server.

Remove the system battery

The system battery is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray from the chassis, remove the riser for slot 1 to 4 (riser 1) and the adapter in slot 8 to access the battery; then, remove the battery from the I/O tray.

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.

S005



CAUTION:

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



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Consider the following when replacing the system battery:

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free

of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

- After you replace the battery, you must reconfigure the server and reset the system date and time.

Before removing the system battery:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 1 to 4 (riser 1). See [“Remove the riser for slot 1 to 4 \(riser 1\)” on page 187](#).
3. Remove the adapter installed in slot 8. See [“Remove a PCIe adapter from slot 5 to 8” on page 73](#).
4. Locate the system battery on the I/O tray board. See [“I/O tray connectors” on page 42](#).

Complete the following steps to remove a system battery.

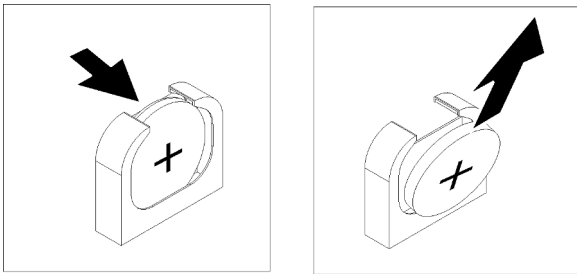


Figure 54. System battery removal

- Step 1. Gently push the top of the battery toward the center of the I/O tray to disengage it from the battery retainer.
- Step 2. Lift the battery from the retainer using your fingers.

After removing the system battery, dispose of it according to local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install the system battery

The system battery is in the I/O tray that is accessed from the rear of the server. With the I/O tray removed from the chassis, insert the system battery in the I/O tray.

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.

S005



CAUTION:

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



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

When replacing the system battery in the server:

- You must replace the system battery with another battery of the same type from the same manufacturer.
- After you replace the system battery, you must reconfigure the server and reset the system date and time.

Before installing the system battery:

To install the system battery, complete the following steps:

Complete the following steps to install a system battery.

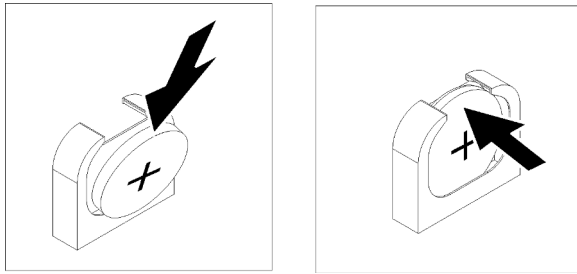


Figure 55. System battery installation

- Step 1. Follow any special handling and installation instructions that come with the replacement battery.
- Step 2. Face the positive (+) symbol toward the center of the I/O tray; then, place the battery into the battery retainer.
- Step 3. Press the top of the battery into the retainer until it clicks in place.

After installing the system battery, complete the following steps:

1. Install the adapter in slot 8. See [“Install a PCIe adapter in slot 5 to 8” on page 80](#).
2. Install the riser for slot 1 to 4 (riser 1). See [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193](#).
3. If any of the adapters in the I/O tray have internal cables, make sure that they are connected before installing the I/O tray.
4. Install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132](#).
5. Reconfigure the server and reset the system date and time. See [“System configuration” in the ThinkSystem SR950 Setup Guide](#).

Demo video

[Watch the procedure on YouTube](#)

System board replacement

System boards are in the upper or lower compute tray that is accessed from the front of the server.

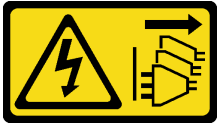
Important: Before you return the system board, make sure that you install the CPU socket covers from the new system board. To replace a CPU socket cover:

1. Take a socket cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the socket cover legs to the CPU socket assembly, pressing on the edges will avoid damage to the socket pins. You might hear a click on the socket cover when it is securely attached.
3. **Make sure** that the socket cover is securely attached to the CPU socket assembly.

Remove a system board

Remove a system board by disconnecting the cables inside the compute tray, pressing the release clips on the compute system board, and sliding it out of the compute tray.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the system board:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove compute tray where the system board is installed. See [“Remove a compute tray” on page 95](#).
3. If you are removing the lower system board in a compute tray, first remove the upper system board or filler from the compute tray to access connectors on the lower system board. See the steps below or [“Remove a system board filler” on page 93](#).

Complete the following steps to remove the compute system board:

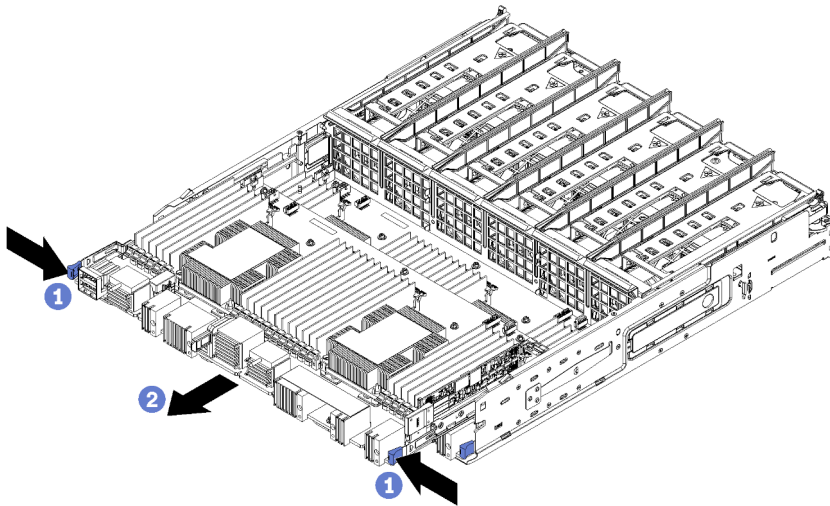


Figure 56. System board removal

Step 1. Disconnect all cables on the system board that go to connectors in the compute tray. See [“Internal cable routing” on page 48](#).

Step 2. Press the release clips and slide the system board out of the compute tray.

After you remove the system board:

- If you are replacing the system board as part of a maintenance operation, remove all of the following components from the system board; then, place them on a static-protective surface or install them on the new system board:
 - Processor (see [“Processor and heat sink replacement” on page 166](#))
 - Memory modules and memory module fillers (see [“Memory module replacement” on page 151](#))
 - Memory air baffles (see [“Memory air baffle replacement” on page 147](#))
 - Cables (see [“Internal cable routing” on page 48.](#))
- If you removed the upper system board and are not installing another system board, install a system board filler, install the compute tray, and install the front cover. See [“Install a system board filler” on page 94](#), [“Install a compute tray” on page 97](#), and [“Install the front cover” on page 111](#).
- If you removed the lower system board, it must be replaced before you reinstall the upper system board or filler.
- If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Important: Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new compute system board and orient it correctly above the CPU socket assembly on the removed system board.
 2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
 3. **Make sure** that the dust cover is securely attached to the CPU socket assembly.
- If you are planning to recycle the system board, follow the instructions in [“Disassemble the system board for recycle” on page 241](#) for compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install a system board

Install a system board by inserting it in the compute tray, pushing it in until it locks in place, and connecting the cables.

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.


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Power off server and disconnect all power cords for this task

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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install a system board, if you are replacing the system board as part of a maintenance operation, reinstall all of the following components that were removed from the original system board:

- Processor (see [“Processor and heat sink replacement”](#) on page 166)
- Memory modules and memory module fillers (see [“Memory module replacement”](#) on page 151)
- Memory air baffles (see [“Memory air baffle replacement”](#) on page 147)
- Cables (see [“Internal cable routing”](#) on page 48.)

If you are installing the lower system board in a compute tray, first remove the upper system board or filler from the compute tray to access connectors on the lower system board. See [“Remove a system board”](#) on page 89 or [“Remove a system board filler”](#) on page 93.

Complete the following steps to install the compute system board:

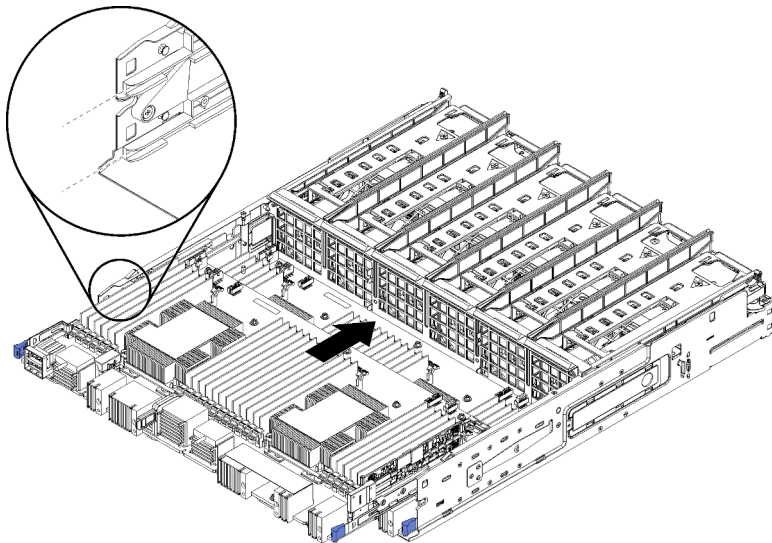


Figure 57. System board installation

- Step 1. Align the system board with the rails in the compute tray; then, insert the system board, making sure that the rails on the board fit into the slots in the compute tray.
- Step 2. Slide the system board into the compute tray until the release clips snap into the locked position.
- Step 3. Connect all cables on the system board that go to connectors in the compute tray. See [“Internal cable routing”](#) on page 48.

After you install the system board:

- If you installed the lower system board in a compute tray, slide the upper system board or filler back into the compute tray until the release clips snap into the locked position.
- If you are not installing another system board, install the compute tray and front cover. See [“Install a compute tray”](#) on page 97 and [“Install the front cover”](#) on page 111.

Demo video

[Watch the procedure on YouTube](#)

System board filler replacement

System board fillers are in the upper or lower compute tray that is accessed from the front of the server.

Remove a system board filler

Remove a system board filler by pressing the release clips on the filler, and sliding it out of the compute tray.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the system board filler:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove compute tray where the system board filler is installed. See [“Remove a compute tray” on page 95](#).

Complete the following steps to remove the compute system board filler:

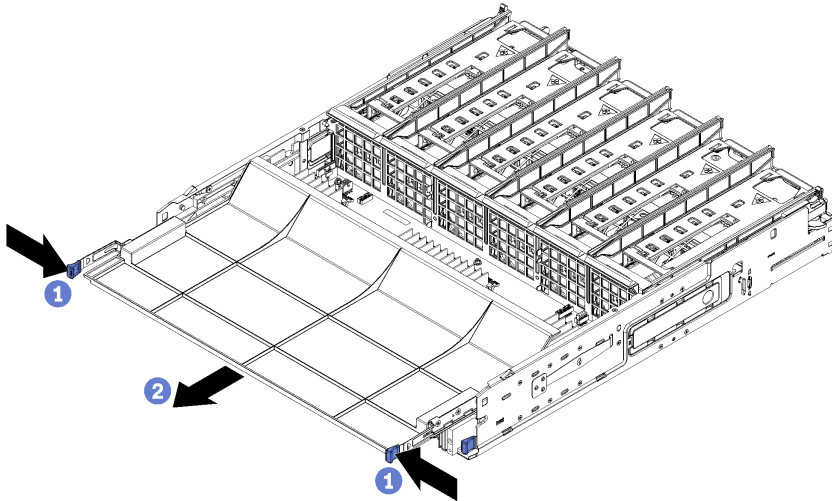


Figure 58. System board filler removal

Step 1. Press the release clips and slide the system board filler out of the compute tray.

After you remove the system board filler:

- If you are instructed to return the system board filler, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you are planning to recycle the system board filler, follow the instructions in [“Disassemble the system board filler for recycle” on page 242](#) for compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install a system board filler

Install a system board filler by inserting it in the compute tray and pushing it in until it locks in place.

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.



**Read the
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Guidelines**

“ on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install the compute system board filler:

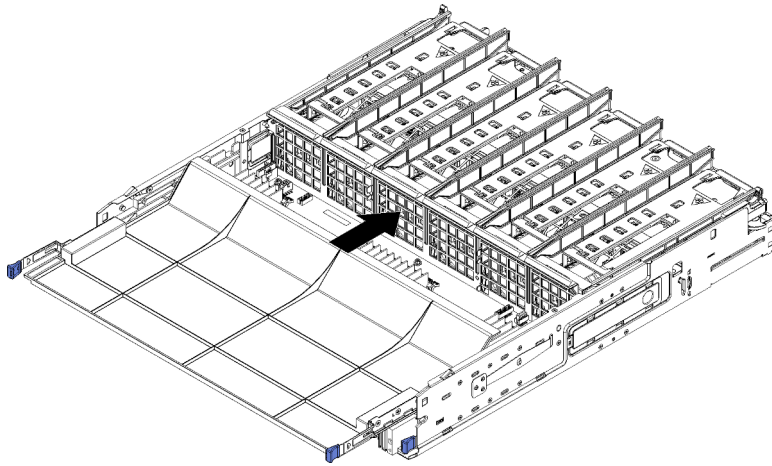


Figure 59. System board filler installation

- Step 1. Align the system board filler with the rails in the compute tray; then, insert the system board filler, making sure that the rails on the board fit into the slots in the compute tray.
- Step 2. Slide the system board filler into the compute tray until the release clips snap into the locked position.

After you install the system board filler, install the compute tray and front cover. See [“Install a compute tray” on page 97](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Upper/lower compute tray replacement

Use the following procedures to remove and install the upper or lower compute tray.

Remove a compute tray

The upper and lower compute trays are accessed from the front of the server. Open the release levers to extract the compute tray, pressing the release tabs when it stops to remove the tray fully from the chassis.

S002



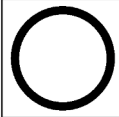
CAUTION:

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.



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“ on page 69 “ on page 28 ”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the compute tray, remove the front cover. See “[Remove the front cover](#)” on page 110.

Complete the following steps to remove the compute tray:

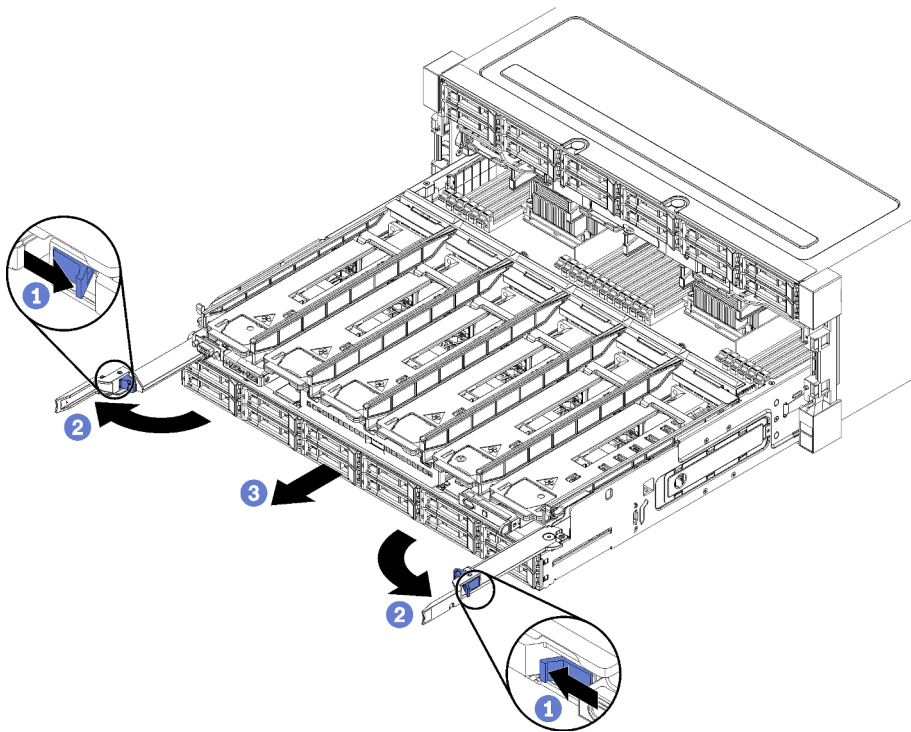


Figure 60. Compute tray removal to stop position

- Step 1. Press the button on each release lever; then, simultaneously rotate the release levers until they are perpendicular to the chassis.
- Step 2. Pull compute tray forward evenly until it stops; then, close the release levers.
- Step 3. Press the release tabs on either side of the tray; then, slide the tray fully forward evenly and remove it from the chassis.

Attention:

- Be prepared to support the full weight of the compute tray when you remove it from the chassis.
- Do not use the release levers as handles to support the compute tray.

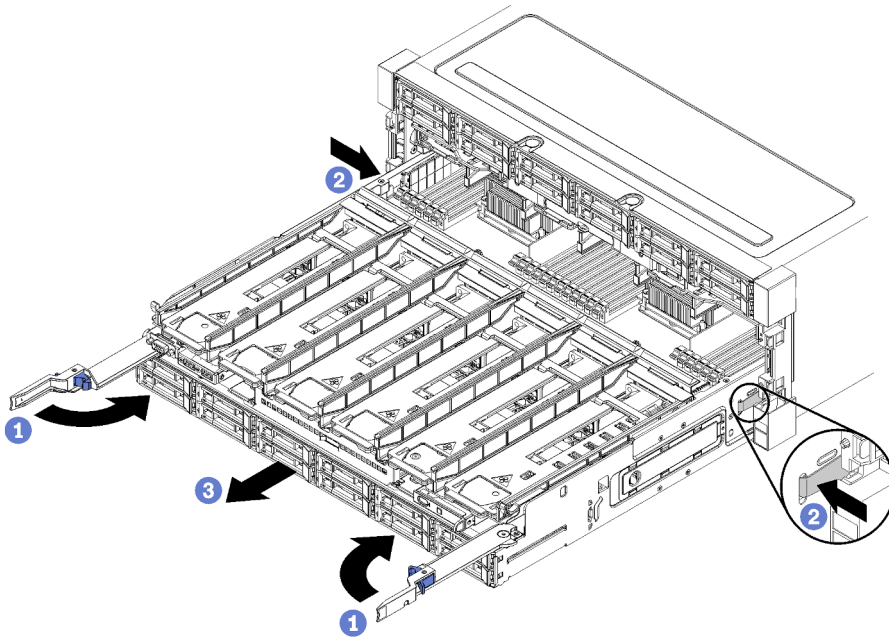


Figure 61. Compute tray removal from chassis

After you remove the compute tray:

- If you are replacing the compute tray as part of a maintenance operation, remove all of the following components from the tray; then, place them on a static-protective surface or install them on the new compute tray:
 - System boards (see “[System board replacement](#)” on page 89)
 - Fan cages (see “[Fan cage replacement](#)” on page 101)
 - Storage interposer (see “[Storage interposer replacement](#)” on page 201)
 - RAID card (see “[RAID card replacement](#)” on page 176)
 - Hard disk drive backplane (see “[Hard disk drive backplane replacement](#)” on page 118)
 - Hard disk drives and fillers (see “[Hard disk drive replacement](#)” on page 126)
 - Cables (see “[Internal cable routing](#)” on page 48)
- If you are instructed to return the compute tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a compute tray

Install a compute tray by inserting it in the front of the chassis, pushing it in until it stops, and closing the release levers.

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.



**Read the
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Guidelines**

“ [Read the Installation Guidelines](#) ” on page 69 “



**Power off
server and
disconnect all
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for this task**

” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install the compute tray:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Make sure that all internal cables are correctly routed. See [“Internal cable routing” on page 48](#).

Complete the following steps to install the compute tray when it is fully removed from the chassis:

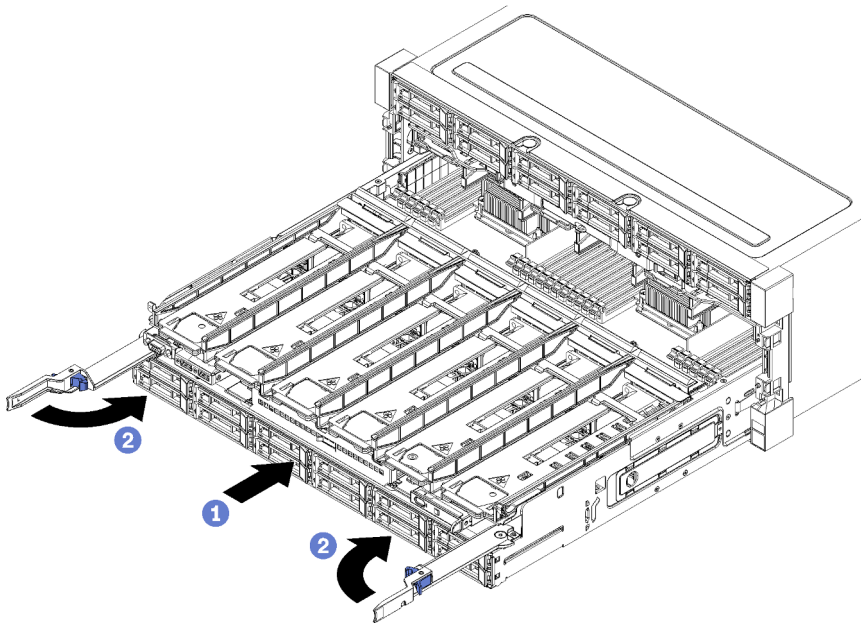


Figure 62. Compute tray installation (fully removed)

Important: Compute trays must be inserted in the chassis with the processors and memory visible from the top.

Step 1. Align the compute tray with its opening in the front of the chassis and insert.

Step 2. Fully open the compute tray release levers and push the compute tray into the chassis until it stops.

Step 3. Rotate the compute tray release levers until they lock, fully closed.

If you are done performing installation or maintenance procedures at the front of the chassis, install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Fan replacement

Use the following procedures to remove and install a fan. Fans are at the front of the server behind the front cover.

Two types of fans are supported:

- 60 mm x 38mm, 16K internal hot-swap fans (01CX965)
- 60 mm x 38mm, 19K internal hot-swap fans (01PG490)

Notes:

- Different fan types cannot be mixed within a system. All fans must be either 16K fans or 19K fans.
- Before upgrading fans from 16K to 19K, you must make sure that the system has version 2 of the ThinkSystem 2-CPU, 24-DIMM, Compute System Board (01CV978) installed in each compute tray.

Remove a fan

Press the fan handle inward toward the center of the server to release the latch; then, pull the fan forward halfway, and wait 10 seconds before pulling the fan out of the server. Fans are hot-swap devices that can be removed while the server is powered on.

S017



CAUTION:

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



“ [on page 69](#) ”

Before you remove a fan, remove the front cover. See [“Remove the front cover” on page 110](#).

Complete the following steps to remove a fan:

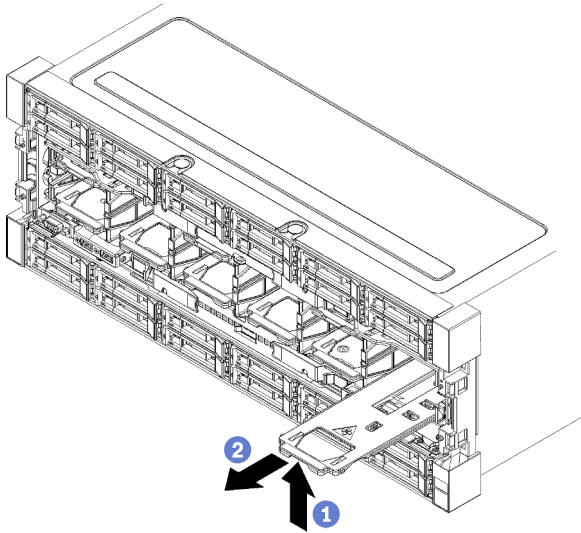


Figure 63. Fan removal

- Step 1. Press the fan handle inward toward the center of the server to release the latch; then, pull the fan forward halfway (see [Figure 63 “Fan removal” on page 100](#)), and wait 10 seconds.
- Step 2. Pull the fan forward and out of the server. The fan is connected to the fan handle via a hinge and the fan will flop downward when it is removed from the server.

To maintain system cooling, all fans must be installed in the server during operation.

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

Demo video

[Watch the procedure on YouTube](#)

Install the fan

Insert the fan in the front of the chassis; then, push it in until it stops and the latch engages. Fans are hot-swap devices that can be installed while the server is powered on.

S017



CAUTION:

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

Note: The ThinkSystem SR950 supports two types of internal hot-swap fan (a 16K fan and a 19K fan). Make sure that the fan being installed is the same type as the fan that was removed. Different fan types cannot be mixed within a system.



**Read the
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Guidelines**

“ [Read the Installation Guidelines](#) ” on page 69

Complete the following steps to install a fan:

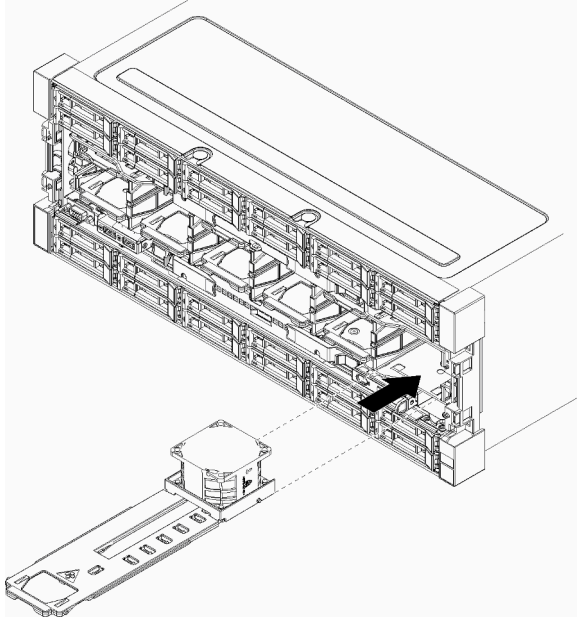


Figure 64. Fan installation

- Step 1. Align the fan with its opening in the front of the chassis and insert, making sure that the rails on the fan fit into the slots in the fan opening.
- Step 2. Push the fan into chassis until it stops and the latch engages.

If you are done performing installation or maintenance procedures at the front of the chassis, install the front cover. See “[Install the front cover](#)” on page 111.

Demo video

[Watch the procedure on YouTube](#)

Fan cage replacement

Fan cages are in the upper and lower compute trays or optional storage tray that are accessed from the front of the server. Procedures for removing and installing fan cages in the upper and lower trays are different.

Remove a fan cage (upper tray)

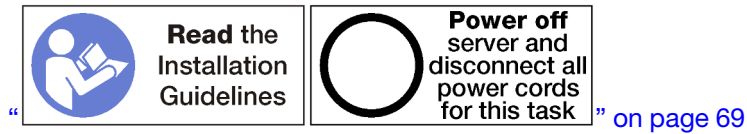
The upper fan cage is in the upper compute tray or optional storage tray that is accessed from the front of the server. After removing the upper tray, turn it upside down, press the fan cage releases, and pull the fan cage toward the front of the tray to remove it; then, disconnect the fan cage electrical connector.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an upper fan cage:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the upper compute tray or storage tray. See [“Remove a compute tray” on page 95](#) or [“Remove a storage tray” on page 207](#).
3. If you removed a compute tray and it has one or more compute system boards or a system board filler installed, remove the system boards or system board filler. See [“Remove a system board” on page 89](#) or [“Remove a system board filler” on page 93](#).
4. Turn the tray upside down.

Complete the following steps to remove an upper fan cage.

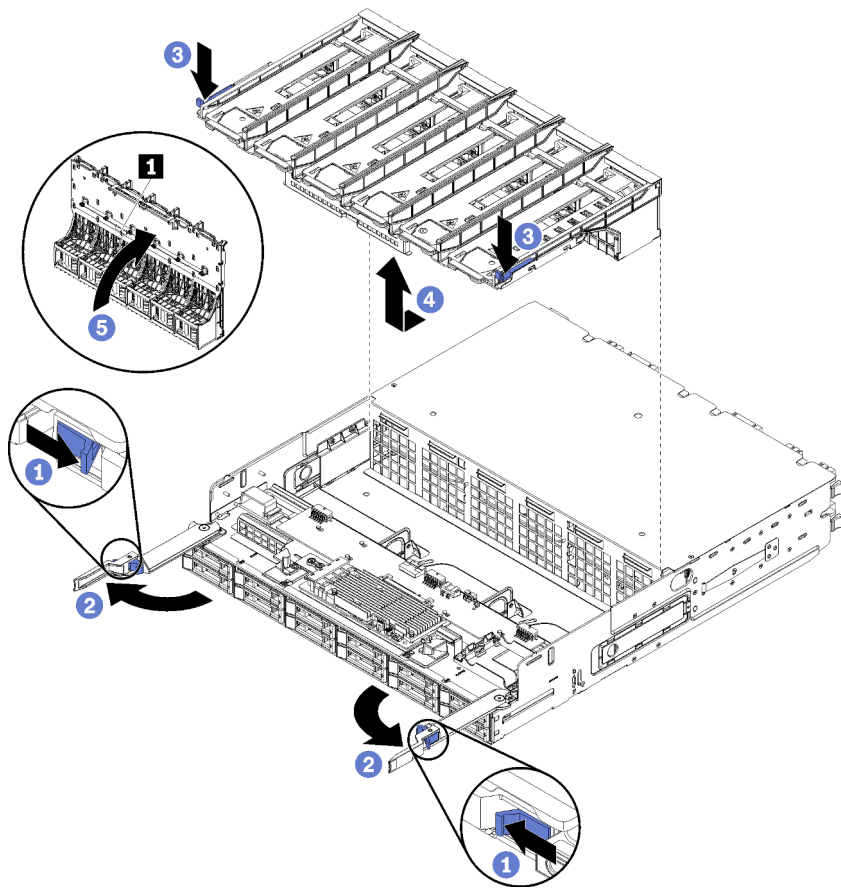


Figure 65. Upper fan cage removal

- Step 1. Press the button on each compute or storage tray release lever; then, rotate the release levers until they are perpendicular to the tray.
- Step 2. Press the fan cage releases at either side of the fan cage; then, pull the fan cage toward the front of the compute or storage tray and lift the cage slightly to access the connector on the underside of the fan cage.
- Step 3. Disconnect the cable from the connector **1** in the underside of the fan cage.

Attention: To prevent damage to components, lift the fan cage straight up when removing it from the tray.
- Step 4. Lift and remove the fan cage from the tray.

If you are instructed to return the fan cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a fan cage (lower tray)

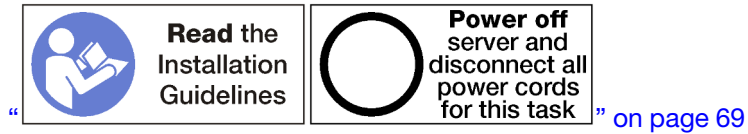
The lower fan cage is in the lower compute tray that is accessed from the front of the server. After removing the lower compute tray, press the fan cage releases and pull the fan cage toward the front of the compute tray to remove it; then, disconnect the fan cage electrical connector.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove a lower fan cage:

1. Remove the front cover. See ["Remove the front cover"](#) on page 110.
2. Remove the lower compute tray. See ["Remove a compute tray"](#) on page 95.

Complete the following steps to remove a lower fan cage.

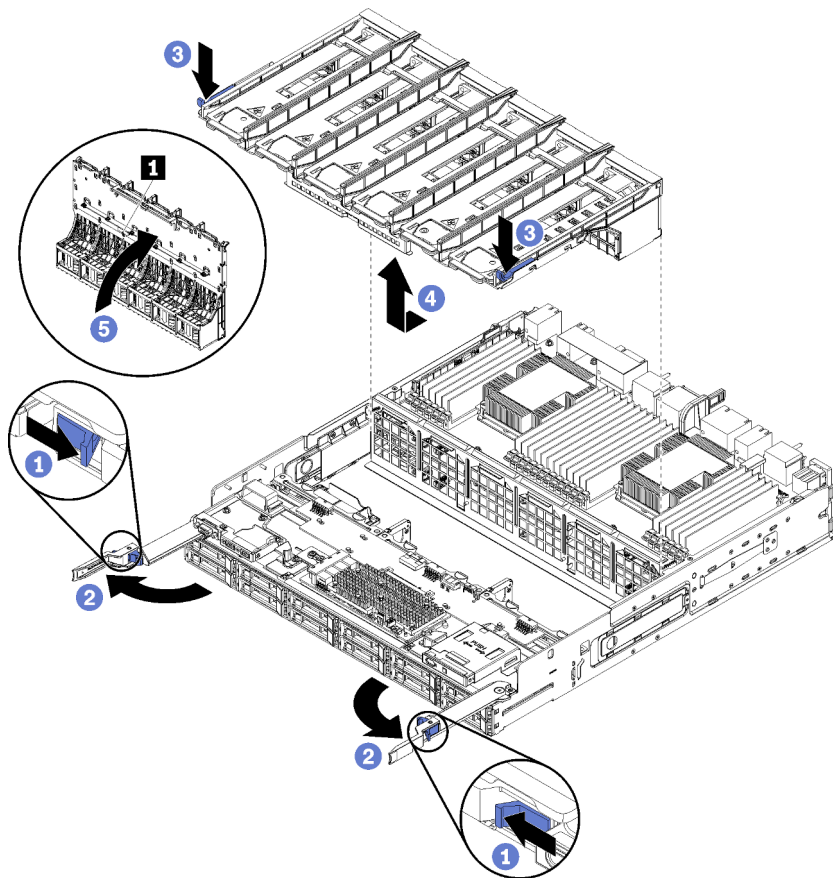


Figure 66. Lower fan cage removal

- Step 1. Press the button on each compute tray release lever; then, rotate the release levers until they are perpendicular to the tray.
- Step 2. Press the fan cage releases at either side of the fan cage; then, pull the fan cage toward the front of the compute tray and lift the cage slightly to access the connector on the underside of the fan cage.
- Step 3. Disconnect the cable from the connector **1** in the underside of the fan cage.

Attention: To prevent damage to components, lift the fan cage straight up when removing it from the tray.
- Step 4. Lift and remove the fan cage from the tray.

If you are instructed to return the fan cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a fan cage (upper tray)


The upper fan cage is in the upper compute tray or optional storage tray that is accessed from the front of the server. Fan cages are keyed and each can be used only in one type of tray (upper or lower). Numbers on the fan cages are right-side up when the compute or storage tray is installed in the chassis. Install the upper fan cage by connecting the fan cage electrical connector, inserting the fan cage in the upper tray, and pushing it backward until it locks in place.

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.

	Read the Installation Guidelines		Power off server and disconnect all power cords for this task
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“ on page 69 ”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install an upper fan cage:

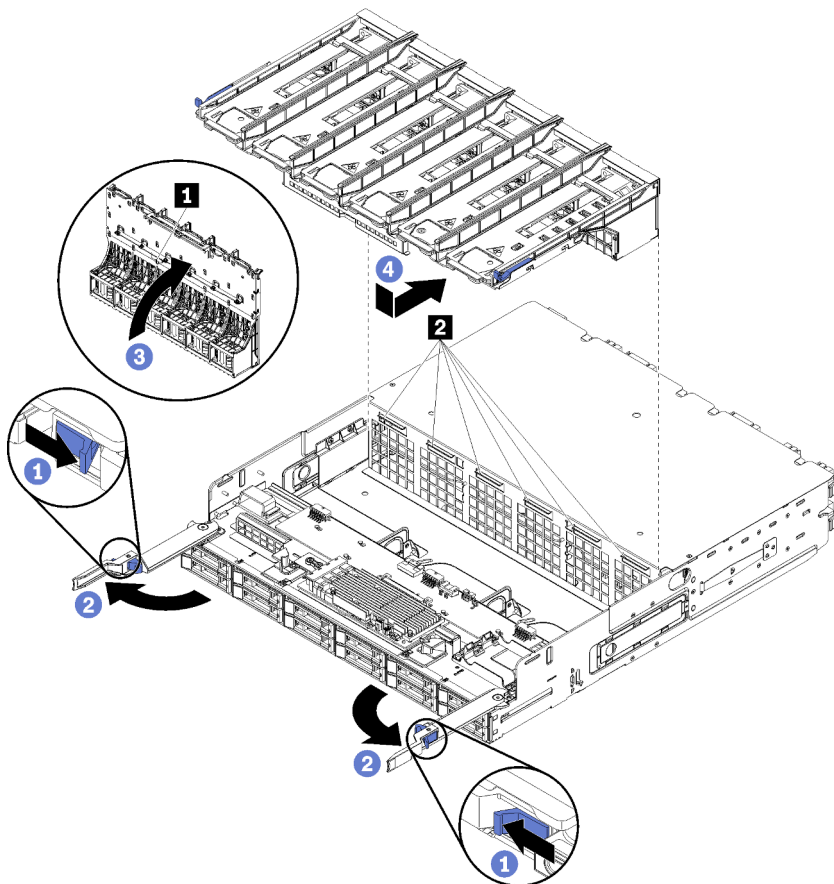


Figure 67. Upper fan cage installation

- Step 1. Make sure that the area where the fan cage installs is clear and that cables are routed to allow fan cage insertion.
- Step 2. Make sure that the compute or storage tray release levers are open and perpendicular to the tray.

Attention: To prevent damage to components, lower the fan cage straight down when inserting it in the tray.

- Step 3. Position the fan cage in the compute or storage tray, making sure that no cables are in the way; then, insert the fan cage part way into the tray.
- Step 4. Connect the cable to the connector **1** in the underside of the fan cage.
- Step 5. Insert the fan cage fully down into the tray, making sure that you do not pinch any cables.

Important: Make sure the that fan cage goes beneath all tabs on the tray when pushing it backward. The fan cage must be pushed fully back until it is against the tray bulkhead along its entire length.

- Step 6. Slide the fan cage back into the tray with the fan cage under the tabs on the tray (**2** in above illustration). Push the fan cage backward until it locks in place. If the fan cage does not move into place freely, make sure that no cables are obstructing its movement.

After you have installed the upper fan cage:

1. Close the compute or storage tray release levers.
2. Turn the tray right-side up.
3. If you removed one or more system boards or a compute system board filler from a compute tray, install the system boards or system board filler. See [“Install a system board” on page 91](#) or [“Install a system board filler” on page 94](#).
4. Install the upper compute tray or storage tray. See [“Install a compute tray” on page 97](#) or [“Install the storage tray \(fully removed\)” on page 209](#).
5. Install the front cover. See [“Install the front cover” on page 111](#).

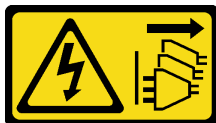
Demo video

[Watch the procedure on YouTube](#)

Install a fan cage (lower tray)

The lower fan cage is in the lower compute tray that is accessed from the front of the server. Fan cages are keyed and each can be used only in one type of Upper/lower compute tray. Numbers on the fan cages are right-side up when the compute tray is installed in the chassis. Install the lower fan cage by connecting the fan cage electrical connector, inserting the fan cage in the lower compute tray, and pushing it backward until it locks in place.

S002

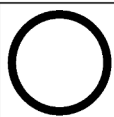


CAUTION:

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.



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**Power off
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disconnect all
power cords
for this task**

” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a lower fan cage:

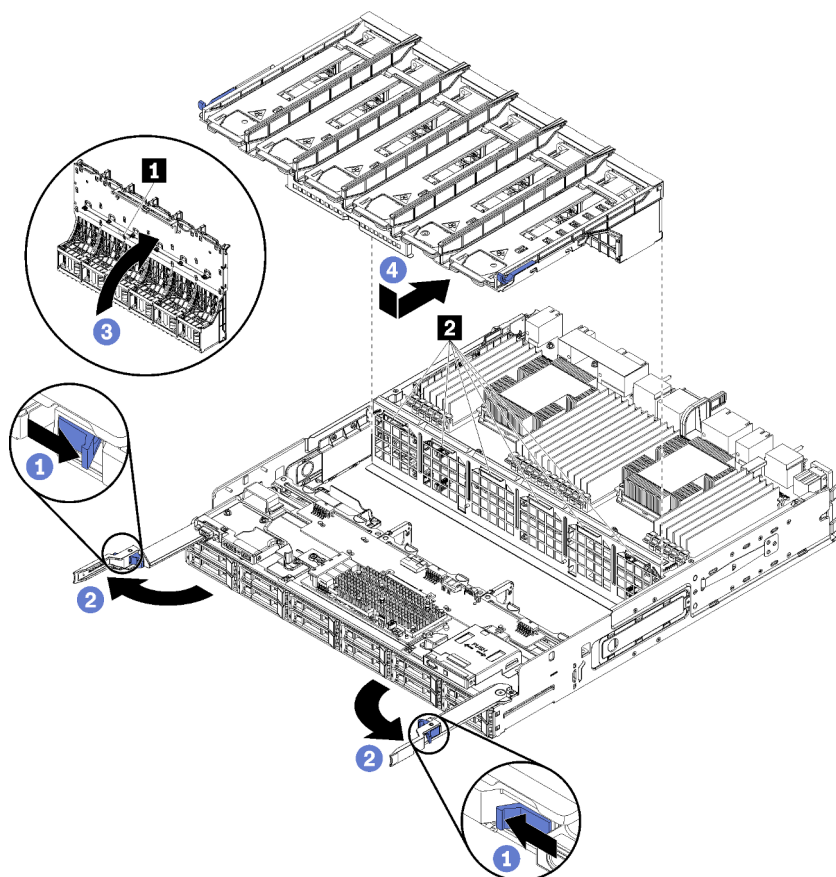


Figure 68. Lower fan cage installation

- Step 1. Make sure that the area where the fan cage installs is clear and that cables are routed to allow fan cage insertion.
- Step 2. Make sure that the compute tray release levers are open and perpendicular to the tray.
Attention: To prevent damage to components, lower the fan cage straight down when inserting it in the tray.
- Step 3. Position the fan cage in the compute tray, making sure that no cables are in the way; then, insert the fan cage part way into the tray.
- Step 4. Connect the cable to the connector **1** in the underside of the fan cage.
- Step 5. Insert the fan cage fully down into the tray, making sure that you do not pinch any cables.

Important: Make sure the that fan cage goes beneath all tabs on the tray when pushing it backward. The fan cage must be pushed fully back until it is against the tray bulkhead along its entire length.

Step 6. Slide the fan cage back into the tray with the fan cage under the tabs on the tray (2 in above illustration). Push the fan cage backward until it locks in place. If the fan cage does not move into place freely, make sure that no cables are obstructing its movement.

After you have installed the lower fan cage:

1. Close the compute tray release levers.
2. Install the lower compute tray; then, install the front cover. See “[Install a compute tray](#)” on page 97 and “[Install the front cover](#)” on page 111.

Demo video

[Watch the procedure on YouTube](#)

Front bezel replacement

Use the following procedures to remove and install the front bezels.

Remove the front bezel

Remove each front bezel by pressing the release tabs and pulling the bezel from the front of the server.

Before you remove the front bezel, make sure that you remove the front cover. See “[Remove the front cover](#)” on page 110.

Complete the following steps to remove the front bezel:

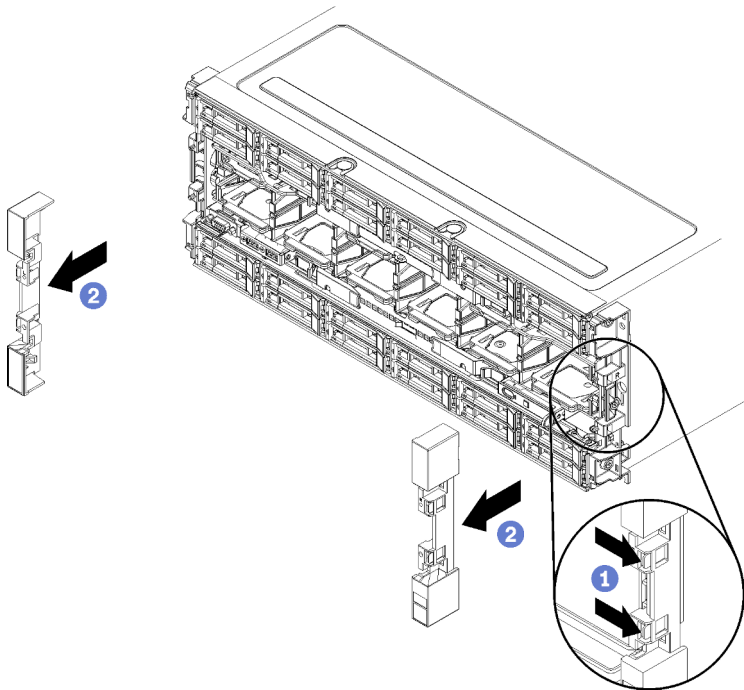


Figure 69. Front bezel removal

- Step 1. Press the release tabs on each front bezel.
- Step 2. Pull the bezel forward and remove it from the server.

Demo video

[Watch the procedure on YouTube](#)

Install the front bezel

Install each front bezel by sliding the bezel into position and pressing until it is fully seated.

Complete the following steps to install the front bezel:

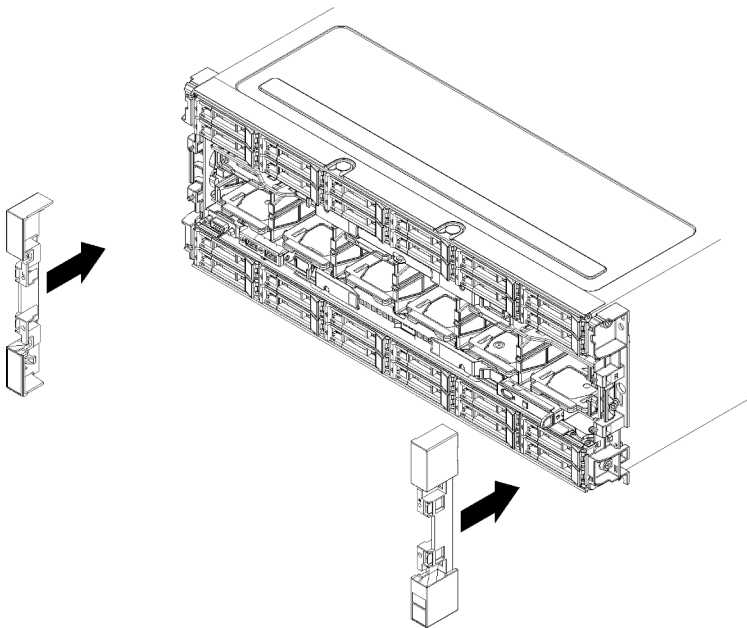


Figure 70. Front bezel installation

- Step 1. Position the bezel on the front of the server.
- Step 2. Press and slide the bezel toward the rear of the server until the release tabs engage.

Demo video

[Watch the procedure on YouTube](#)

Front cover replacement

Use the following procedures to remove and install the front cover.

Remove the front cover

Remove the front cover by pressing the release buttons and pulling the cover from the front of the server.

Complete the following steps to remove the front cover:

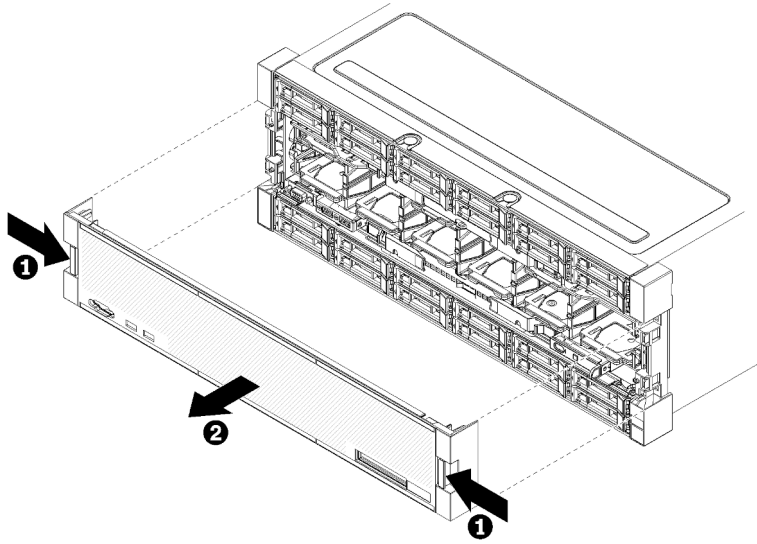


Figure 71. Front cover removal

Step 1. Press release buttons at either side of the front cover.

Step 2. Pull the cover forward and remove it from the server.

After you remove the front cover:

- If you are instructed to return the front cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you are planning to recycle the front cover, follow the instructions in [“Disassemble the front cover for recycle” on page 242](#) for compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install the front cover

Install the front cover by sliding the cover into position and pressing until it is fully seated.

Complete the following steps to install the front cover:

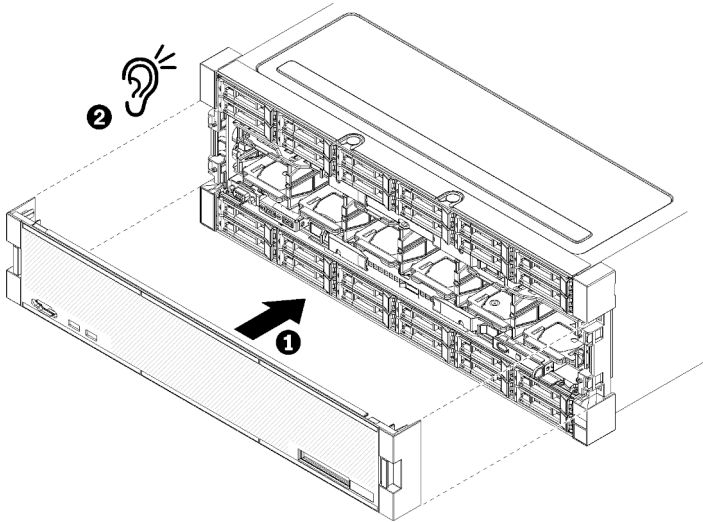


Figure 72. Front cover installation

Step 1. Position the cover on the front of the server.

Note: Make sure that the pull tab on the operator panel, used to access the LCD system information display panel, passes through the hole for the display panel on the front cover.

Step 2. Press and slide the cover toward the rear of the server until the release clips engage.

Demo video

[Watch the procedure on YouTube](#)

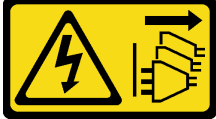
Front operator panel replacement

The front operator panels is in the lower compute tray that is accessed from the front of the server.

Remove the front operator panel

The front operator panel is in the lower compute tray that is accessed from the front of the server. After removing the lower tray, disconnect the front operator panel cable and remove the operator panel.

S002

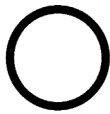


CAUTION:

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the front operator panel:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the compute tray. See [“Remove a compute tray” on page 95](#).
3. If an upper system board or system board filler is installed in the tray, remove it. See [“Remove a system board” on page 89](#).
4. Remove the lower fan cage. See [“Remove a fan cage \(lower tray\)” on page 103](#).

Complete the following steps to remove the front operator panel.

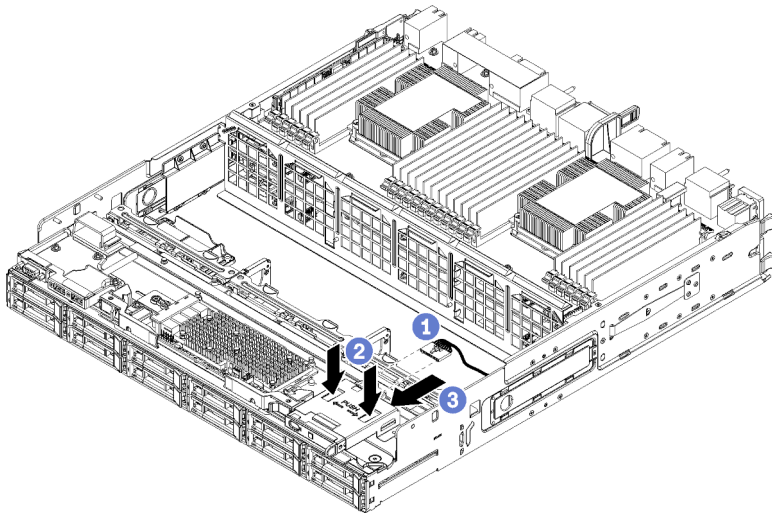


Figure 73. Front operator panel removal

Note: The operator panel connector housing with the side retaining clips remains attached to the operator panel. The operator panel cable slides into this housing.

- Step 1. Disconnect the operator panel cable from the operator panel.
- Step 2. If you are replacing the operator panel cable, disconnect the operator panel cable from the lower system board and unroute the cable. See [“Cable routing for common components” on page 50](#).
- Step 3. Press on the two release tabs on the top of the front operator panel and, pressing from the rear of the panel, carefully slide the operator panel forward.
- Step 4. Remove the front operator panel from the compute tray.

If you are instructed to return the front operator panel or cable, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the front operator panel

The front operator panel is in the lower compute tray that is accessed from the front of the server. Insert the front operator panel in the front of the lower compute tray and press the panel in until it locks in place; then, connect the operator panel cable.

S002

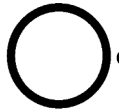


CAUTION:

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



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Complete the following steps to install the front operator panel.

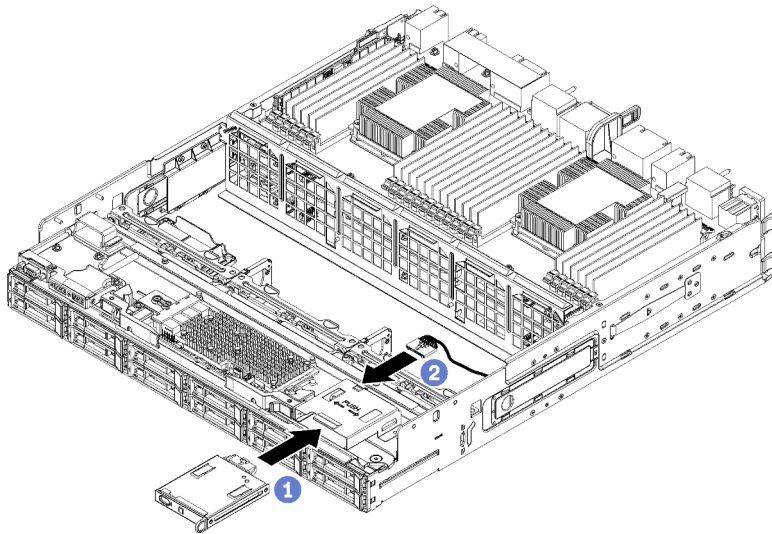


Figure 74. Front operator panel installation

Step 1. Insert the front operator panel into the front of the lower compute tray.

Note: The operator panel connector housing with the side retaining clips remains attached to the operator panel. The operator panel cable slides into this housing.

Step 2. Connect the operator panel cable to the front operator panel. Make sure the operator panel cable is folded beneath the connector, as shown in “[Cable routing for common components](#)” on page 50 to prevent the cable from pinching when the compute tray is fully assembled.

Step 3. Press the front operator panel in until the locking tabs engage.

Step 4. If you are replacing the operator panel cable, route the front operator panel cable to its connector on the lower system board and connect it. See “[Cable routing for common components](#)” on page 50.

After you have installed the front operator panel:

1. Make sure that all cables are correctly routed. See “[Cable routing for common components](#)” on page 50 and “[Cable routing for drives](#)” on page 53.
2. Install the lower fan cage. See “[Install a fan cage \(lower tray\)](#)” on page 107.
3. If you removed an upper system board or system board filler, install it. See “[Install a system board](#)” on page 91.
4. Install the compute tray; then, install the front cover. See “[Install a compute tray](#)” on page 97 and “[Install the front cover](#)” on page 111.

Demo video

[Watch the procedure on YouTube](#)

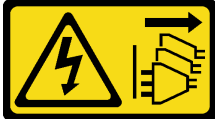
Front USB/VGA assembly replacement

The front USB/VGA assembly is in the lower compute tray that is accessed from the front of the server.

Remove the front USB/VGA assembly

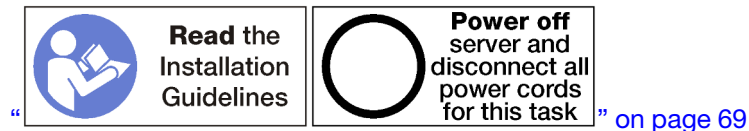
The front USB/VGA assembly is in the lower compute tray that is accessed from the front of the server. After removing the lower tray, disconnect the front USB/VGA assembly cables from the lower system board; then, remove the two screws and remove the operator panel.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the front USB/VGA assembly:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the lower compute tray. See [“Remove a compute tray” on page 95](#).
3. If an upper system board or system board filler is installed in the tray, remove it. See [“Remove a system board” on page 89](#).
4. Remove the lower fan cage. See [“Remove a fan cage \(lower tray\)” on page 103](#).

Complete the following steps to remove the front USB/VGA assembly.

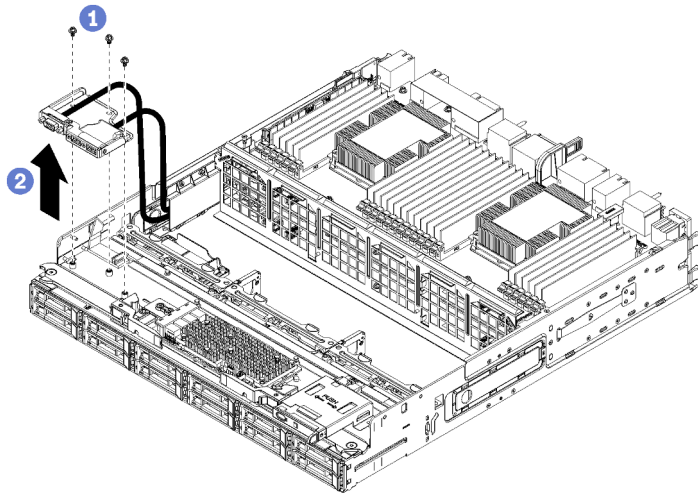


Figure 75. Front USB/VGA assembly removal

- Step 1. Disconnect the front USB/VGA assembly cables from the lower system board and unroute the cables. See [“Cable routing for common components” on page 50](#).
- Step 2. Remove the three screws on the top of the front USB/VGA assembly.
- Step 3. Remove the front USB/VGA assembly from the compute tray.

If you are instructed to return the front USB/VGA assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the front USB/VGA assembly

The front USB/VGA assembly is in the lower compute tray that is accessed from the front of the server. Position the front USB/VGA assembly in the lower compute tray and secure with two screws; then, route the front USB/VGA assembly cables to the lower compute system board and connect.

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.

	<p>Read the Installation Guidelines</p>		<p>Power off server and disconnect all power cords for this task</p>
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“ [on page 69](#) ”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install the front USB/VGA assembly.

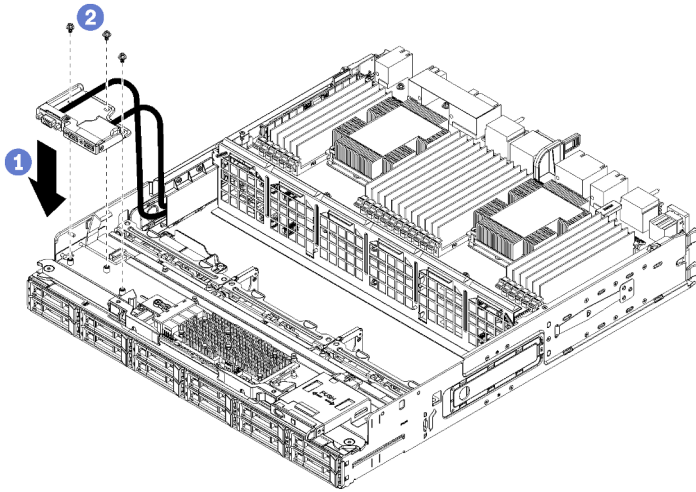


Figure 76. Front USB/VGA assembly installation

- Step 1. Position the front USB/VGA assembly in the lower compute tray.
- Step 2. Install and tighten the three screws on the top of the front USB/VGA assembly.
- Step 3. Route the front USB/VGA assembly cables to their connectors on the lower system board and connect them. See [“Cable routing for common components” on page 50](#).

After you have installed the front USB/VGA assembly:

1. Make sure that all cables are correctly routed. See [“Cable routing for common components” on page 50](#) and [“Cable routing for drives” on page 53](#).
2. Install the lower fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
3. If you removed an upper system board or system board filler, install it. See [“Install a system board” on page 91](#).
4. Install the compute tray; then, install the front cover. See [“Install a compute tray” on page 97](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Hard disk drive backplane replacement

Hard disk drive backplanes are in the upper and lower trays that are accessed from the front of the server. The removal and installation procedures for backplanes in the upper and lower trays are different.

Remove a hard disk drive backplane (upper tray)

Hard disk drive backplanes in the upper compute tray or optional storage tray are accessed from the front of the server. There are several types of hard disk drive backplane. Steps that are backplane specific are noted in each procedure.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the hard disk drive backplane:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. After noting their locations, remove any hard disk drives that are installed in the upper tray. See [“Remove a hard disk drive” on page 126](#).
3. Remove the upper compute tray or storage tray. See [“Remove a compute tray” on page 95](#) or [“Remove a storage tray” on page 207](#).
4. Turn the tray upside down.
5. Remove the fan cage. See [“Remove a fan cage \(upper tray\)” on page 101](#).

Complete the following steps to remove the hard disk drive backplane:

- Step 1. Disconnect all power and data cables on the hard disk drive backplane that go to the storage interposer or to connectors on the system board or optional storage tray. You might find it easier to disconnect cables from the backplane if you disconnect them from the storage interposer first, reconnecting them to the storage interposer after removing the backplane or installing a new one. Other cables might also need to be removed from their retaining clips or moved to the side to remove the backplane.
- Step 2. Turn the tray right-side up.
- Step 3. Remove the hard disk drive backplane.

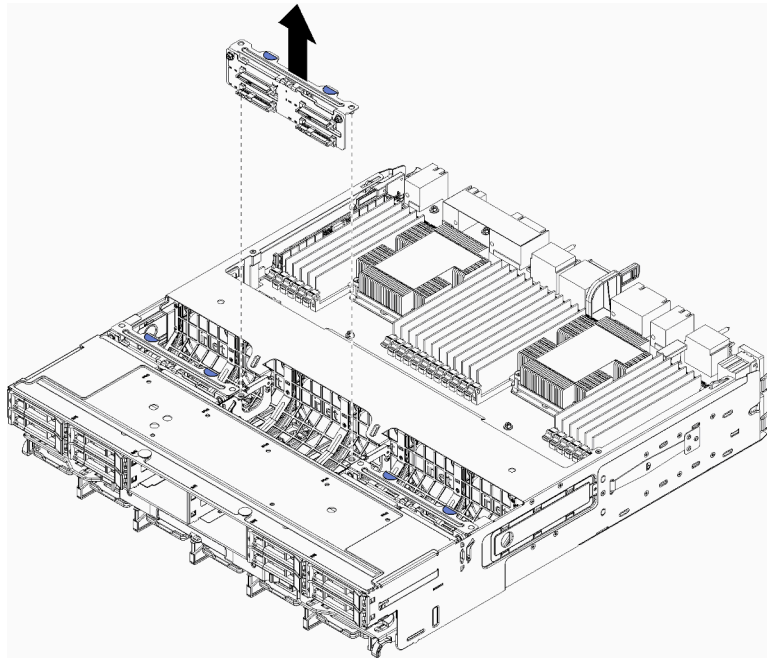


Figure 77. Hard disk drive backplane (upper) removal

Grasp the backplane and pull it up and out of the upper tray.

If you are not installing another hard disk drive backplane after you remove the hard disk drive backplane:

- Install the fan cage. See [“Install a fan cage \(upper tray\)”](#) on page 105.
- Install the upper compute tray or storage tray. See [“Install a compute tray”](#) on page 97 or [“Install the storage tray \(fully removed\)”](#) on page 209.
- Install the front cover. See [“Install the front cover”](#) on page 111.

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

Demo video

[Watch the procedure on YouTube](#)

Remove a hard disk drive backplane (lower tray)

Hard disk drive backplanes in the lower compute tray are accessed from the front of the server. There are several types of hard disk drive backplane. Steps that are backplane specific are noted in each procedure.

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.



**Read the
Installation
Guidelines**

“ on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the hard disk drive backplane:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. After noting their locations, remove any hard disk drives that are installed in the lower compute tray. See [“Remove a hard disk drive” on page 126](#).
3. Remove the lower compute tray. See [“Remove a compute tray” on page 95](#).
4. Remove the fan cage. See [“Remove a fan cage \(lower tray\)” on page 103](#).
5. Move or remove the storage interposer to access the hard disk drive backplanes. See [“Remove a storage interposer \(lower tray\)” on page 203](#).
6. Move cables and harnesses to provide a clear path for accessing the hard disk drive backplanes and their connectors.

Complete the following steps to remove the hard disk drive backplane:

- Step 1. Disconnect all power and data cables on the hard disk drive backplane that go to the storage interposer or to connectors on the system board or optional storage tray. You might find it easier to disconnect cables from the backplane if you disconnect them from the storage interposer first, reconnecting them to the storage interposer after removing the backplane or installing a new one. Other cables might also need to be removed from their retaining clips or moved to the side to remove the backplane.
- Step 2. Remove the hard disk drive backplane.

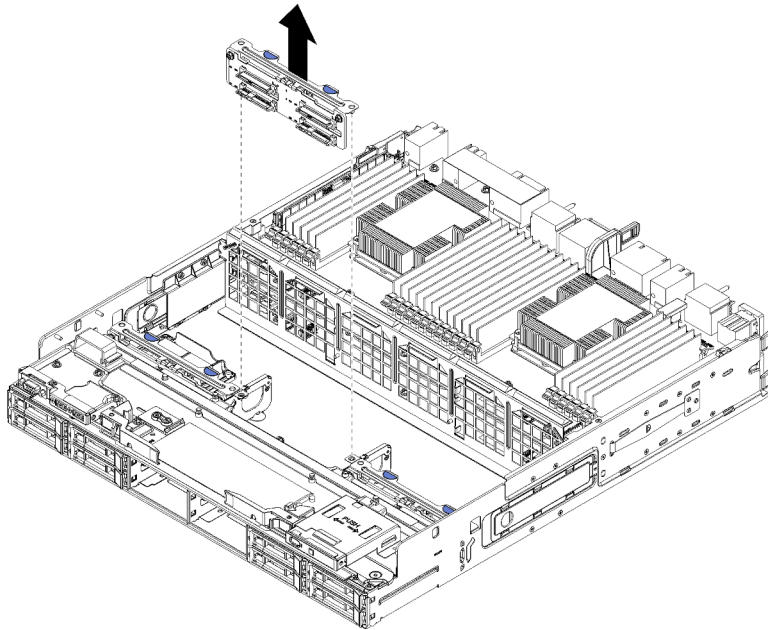


Figure 78. Hard disk drive backplane (lower) removal

Grasp the backplane and pull it up and out of the lower tray.

If you are not installing another hard disk drive backplane, after you remove the hard disk drive backplane:

- Replace or reposition the storage interposer. See [“Install a storage interposer \(lower tray\)” on page 206](#).
- Make sure that all cables are routed and connected.
- Install the fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
- Install the lower compute tray. See [“Install a compute tray” on page 97](#).
- Install the front cover. See [“Install the front cover” on page 111](#).

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

Demo video

[Watch the procedure on YouTube](#)

Install a hard disk drive backplane (upper tray)

Hard disk drive backplanes in the upper compute tray or optional storage tray are accessed from the front of the server. There are several types of hard disk drive backplane. Steps that are backplane specific are noted in each procedure.

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.



**Read the
Installation
Guidelines**

“ on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a hard disk drive backplane in the upper compute tray or optional storage tray.

- Step 1. Connect the power cable to the backplane. If this cable is connected to the storage interposer, you might find it easier to disconnect it from the storage interposer and then reconnect it to the storage interposer after the backplane is installed. See [“Cable routing for drives” on page 53](#).
- Step 2. Install the hard disk drive backplane.

Note: Existing cables might need to be removed from their retaining clips or moved to the side to install the backplane.

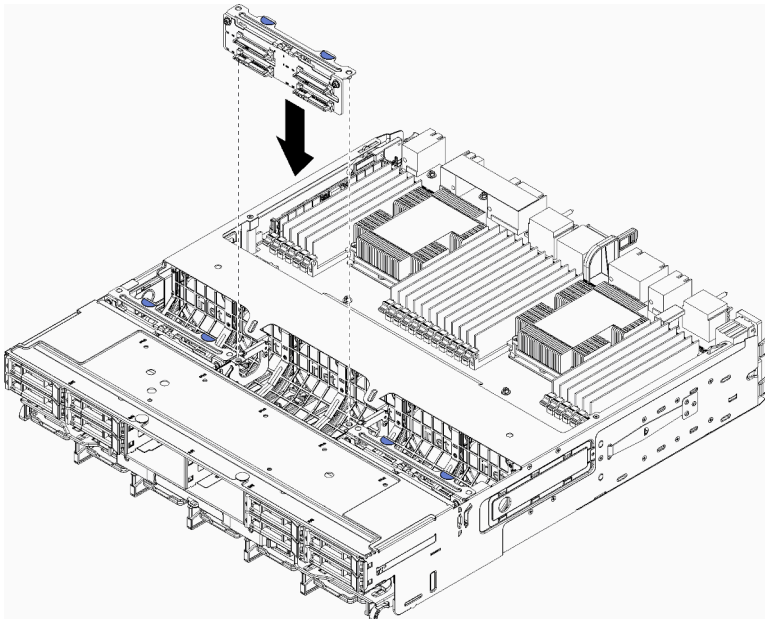


Figure 79. Hard disk drive backplane (upper) installation

Align the backplane with its location in the tray; then, insert the backplane and push it down until it is fully seated.

- Step 3. Connect the data cables to the backplane. (SAS backplanes have only one data cable. NVMe backplanes have two data cables.) See [“Cable routing for drives” on page 53](#).
- Step 4. Repeat [Step 1 on page 123](#), [Step 2 on page 123](#), and [Step 3 on page 123](#) for each hard disk drive backplane being installed in the upper tray.
- Step 5. Turn the tray upside down.

- Step 6. Route and connect the data cables. See [“Cable routing for drives” on page 53](#).
- Route each SAS data cable to its connector on the RAID adapter; then, connect the SAS cable.
 - Route each NVMe data cable to its connector on a system board or optional storage tray; then, connect the NVMe cable.
- Step 7. Make sure that all power cables are connected to the storage interposer.
- Step 8. Make sure that all of the cables are correctly routed after they have been connected.

After you install a hard disk drive backplane:

1. Install the fan cage. See [“Install a fan cage \(upper tray\)” on page 105](#).
2. Turn the tray right-side up.
3. Install the upper compute tray or storage tray. See [“Install a compute tray” on page 97](#) or [“Install the storage tray \(fully removed\)” on page 209](#).
4. Install any hard disk drives that you removed from the upper tray. Each drive should be installed in its original location. See [“Install a hard disk drive” on page 127](#).
5. Install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Install a hard disk drive backplane (lower tray)

Hard disk drive backplanes in the lower compute tray are accessed from the front of the server. There are several types of hard disk drive backplane. Steps that are backplane specific are noted in each procedure.

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.



“ [Read the Installation Guidelines](#) ” on page 69 “



Power off server and disconnect all power cords for this task ” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a hard disk drive backplane in the lower compute tray.

- Step 1. Connect the power and data cables to the hard disk drive backplane. See [“Cable routing for drives” on page 53](#).

- a. Connect the power cable to the backplane. If this cable is connected to the storage interposer, you might find it easier to disconnect it from the storage interposer and then reconnect it to the storage interposer after the backplane is installed.
- b. Connect the data cables to the backplane. (SAS backplanes have only one data cable. NVMe backplanes have two data cables.)

Step 2. Install the hard disk drive backplane.

Note: Existing cables might need to be removed from their retaining clips or moved to the side to install the backplane.

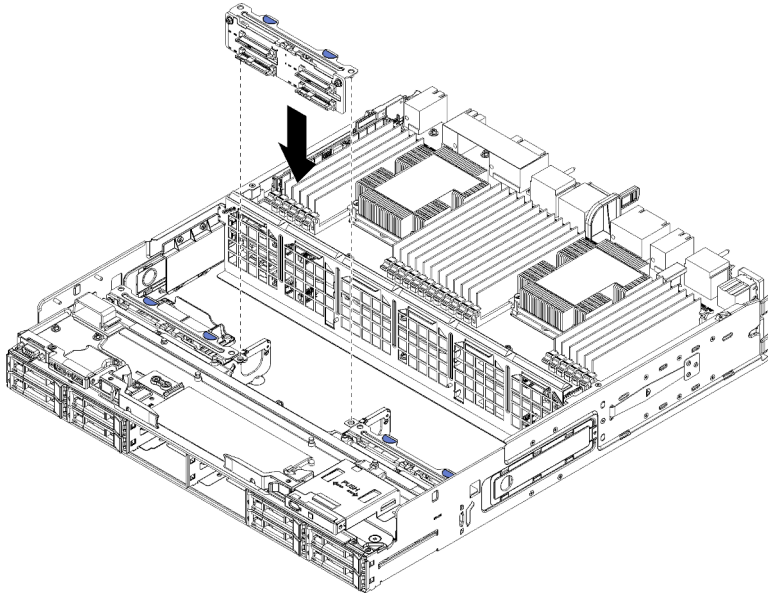


Figure 80. Hard disk drive backplane (lower) installation

Align the backplane with its location in the server; then, insert the backplane and push it down until it is fully seated.

Step 3. Repeat [Step 1 on page 124](#) and [Step 2 on page 125](#) for each hard disk drive backplane being installed in the lower compute tray.

Step 4. Route and connect the data cables. See [“Cable routing for drives” on page 53](#).

- Route each SAS data cable to its connector on the RAID adapter; then, connect the SAS cable.
- Route each NVMe data cable to its connector on the compute system board; then, connect the NVMe cable.

Step 5. Make sure that all power cables are connected to the storage interposer.

Step 6. Route any cables that were moved to access the backplanes and connectors.

After you install a hard disk drive backplane:

1. Install the storage interposer and connect all cables. See [“Install a storage interposer \(lower tray\)” on page 206](#).
2. Make sure that all of the cables are correctly routed after they have been connected.
3. Install the fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
4. Install the lower compute tray. See [“Install a compute tray” on page 97](#).

5. Install any hard disk drives that you removed from the lower compute tray. Each drive should be installed in its original location. See [“Install a hard disk drive” on page 127](#).
6. Install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Hard disk drive replacement

Use the following procedures to remove and install hard disk drives and hard disk drive fillers. Hard disk drives are at the front of the server.

Remove a hard disk drive

Open the latch handle and pull the drive to remove it from the drive bay. Hard disk drives are hot-swap devices that can be removed while the server is powered on.



Before you remove a hard disk drive:

1. Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
 - Before you make changes to disk drives, disk drive controllers, disk drive backplanes, or disk drive cables, back up all important data that is stored on hard disks.
 - Before you remove any component of a RAID array, back up all RAID configuration information.
2. If one or more NVMe solid-state drives are to be removed, make sure that the drive is shut down via the operating system (see the documentation for your operating system for information and instructions). The drive activity (green) LED is on solid for an NVMe drive that is shut down. See the labels above the drive bays to determine the type of the drive to remove. If the drive bay numbers come with the term “NVMe,” it indicates the installed drives are NVMe solid-state drives.

Attention: To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a hard disk drive or a filler panel installed in each bay.

Complete the following steps to remove a hard disk drive.

- Step 1. Make a note of the bay where the hard disk drive is installed: drives must be installed in the bay from which they were removed.
- Step 2. Remove the hard disk drive.

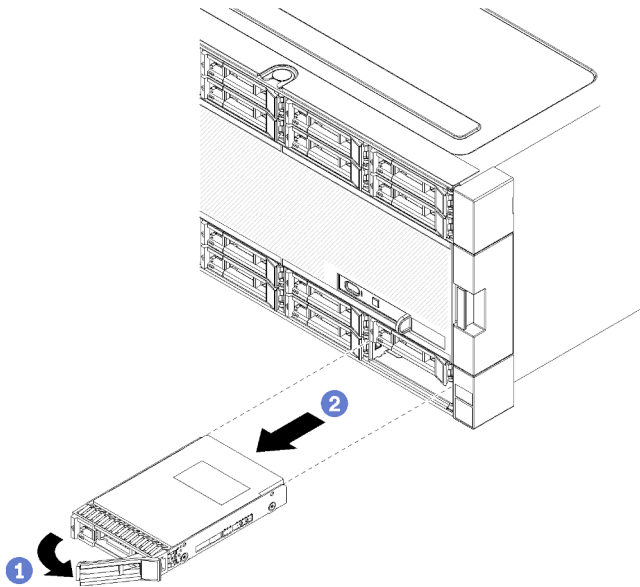


Figure 81. Hard disk drive installation

- a. Slide the release latch to unlock the drive handle; then, rotate the handle outward.
- b. Pull the handle to remove the drive from the drive bay.

After you remove the hard disk drive:

1. Install a replacement hard disk drive or filler in the empty drive bay.
2. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a hard disk drive

Insert the hard disk drive in its bay and close the latch handle to lock the drive in place. Hard disk drives are hot-swap devices that can be installed while the server is powered on.

 <p>Read the Installation Guidelines</p>	 <p>ATTENTION: Static Sensitive Device Ground package before opening</p>
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“ on page 69 “ on page 71 ”

Before you install a hard disk drive, if the hard disk drive bay contains a filler, press the release tab and pull the filler from the bay.

Hard disk drive fillers can be of two types: single-bay fillers and four-bay fillers. If you remove a four-bay filler and are not installing four hard disk drives, you must install single-bay fillers in each of the empty drive bays.

When replacing a hard disk drive that was previously installed, make sure that you install it in the same drive bay from which it was removed.

Complete the following steps to install a hard disk drive:

Note: NVMe drive bays can accept either SATA/SAS or NVMe drives.

Step 1. Determine the drive type that you can install in the bay (SATA/SAS or NVMe) based on labels stenciled on the front of the server and any drive bay labels that might have been applied to the front of the server. These labels correspond to the drive backplane types that are installed. The drive type must match the drive bay type. Drive type information is available on the package that contains the drive.

Step 2. Install the hard disk drive in the drive bay.

If the server is operating (turned on), the green activity LED on the hard disk drive should light solid, indicating that the drive is receiving power.

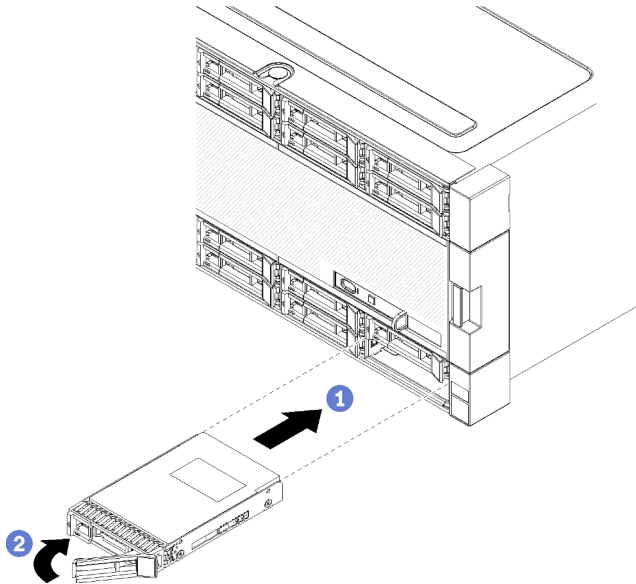


Figure 82. Hard disk drive installation

- a. Open the drive handle, align the drive with the drive bay, and insert the drive.
- b. Push the drive into the bay until the drive stops; then, rotate drive handle closed to fully seat the drive and lock it in place.

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

- If the yellow hard disk drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.
- If the green hard disk drive activity LED is lit, the drive is powered, but not actively reading or writing data. If the LED is flashing, the drive is being accessed.

Step 4. If you are installing additional hard disk drives, do so now.

After you have installed all hard disk drives:

1. Install fillers in all empty hard disk drive bays. If you removed a four-bay filler and do not install four hard disk drives in its place, place single-bay fillers in any vacant bays.
2. If the server is configured for RAID operation, you might have to reconfigure your disk arrays after you install hard disk drives. See [“RAID configuration”](#) in the *ThinkSystem SR950 Setup Guide* for information.

Demo video

[Watch the procedure on YouTube](#)

Remove a hard disk drive filler

Remove a hard disk drive filler by pressing the release tab and pulling the filler from the bay. Hard disk drive fillers can be of two types: single-bay fillers and four-bay fillers.

Complete the following steps to remove a hard disk drive filler:

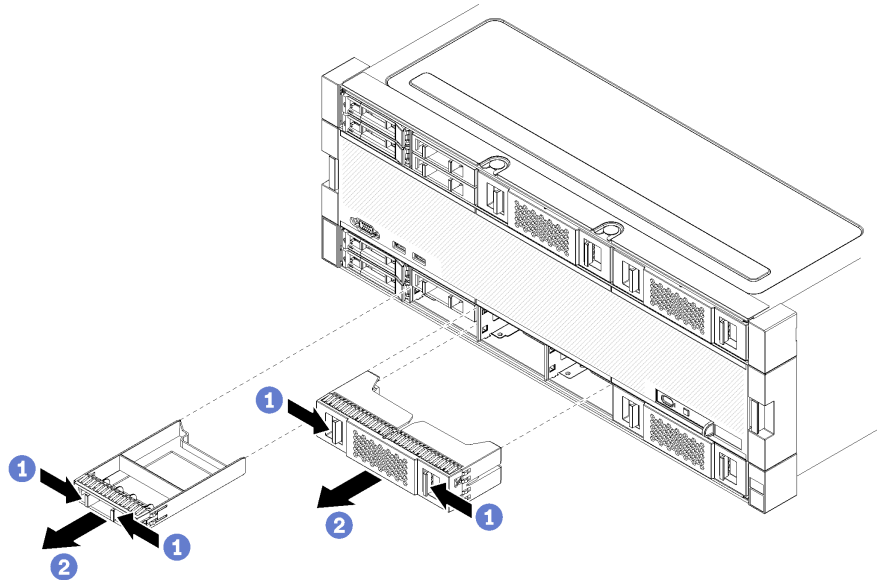


Figure 83. Hard disk drive filler removal

Step 1. Press the release tab and pull the filler from the bay

Install fillers in all empty hard disk drive bays. If you remove a four-bay filler, the vacant drive bays must be filled with a four-bay filler, hard disk drives, or single-bay fillers.

Demo video

[Watch the procedure on YouTube](#)

Install a hard disk drive filler

Insert the hard disk drive filler in the bay and press it in place. Hard disk drive fillers can be of two types: single-bay fillers and four-bay fillers.

Complete the following steps to install a hard disk drive filler:

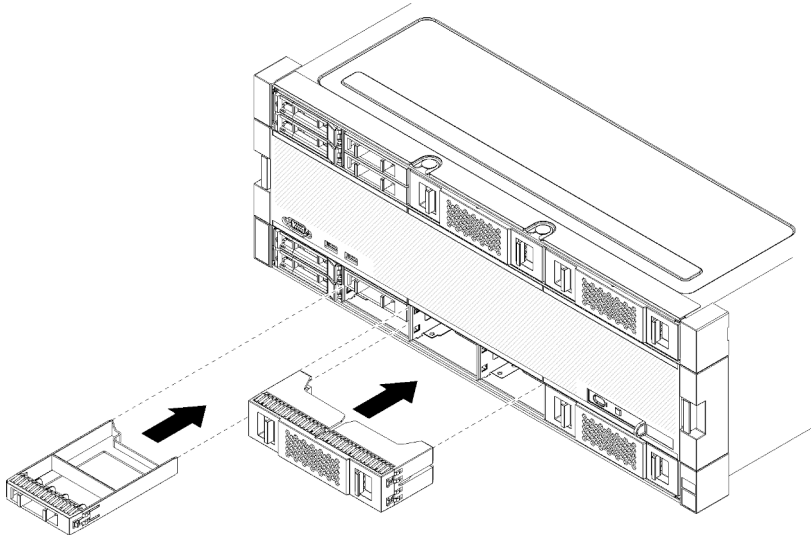


Figure 84. Hard disk drive filler installation

Step 1. Insert the filler in the hard disk drive in the drive bay and press it in place.

Install fillers in all empty hard disk drive bays. You can use either a four-bay filler or single-bay fillers in any vacant bays.

Demo video

[Watch the procedure on YouTube](#)

I/O tray replacement

The I/O tray is accessed from the rear of the server. The I/O tray is the server component that stores server identity information. This information must be transferred to the new I/O tray during maintenance replacement.

Remove the I/O tray

The I/O tray is accessed from the rear of the server. Open the release levers to extract the I/O tray. If you are removing the I/O tray as part of a maintenance replacement, you must transfer system identification information to the new I/O tray.

S002



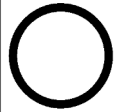
CAUTION:

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.



**Read the
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“ on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the I/O tray:

- Disconnect and label all cables connected to adapters in the I/O tray.

Note: System identification information for the ThinkSystem SR950 server is stored in the I/O tray. If you are removing the I/O tray to replace it as part of a maintenance operation, you will need to transfer system identification information to the new I/O tray, after it is installed in the server.

- If you are managing the server from Lenovo XClarity Administrator, make sure that you unmanage the server before removing the I/O tray. Then, you can manage the server again after the new I/O tray has been replaced.

Complete the following steps to remove the I/O tray.

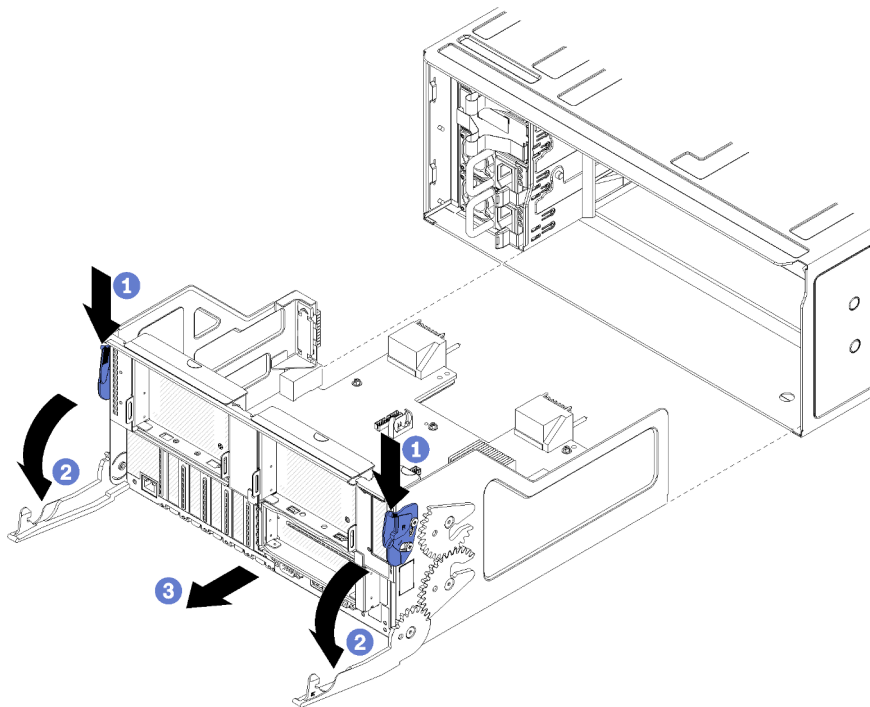


Figure 85. I/O tray removal

- Step 1. Press the button on each release lever; then, simultaneously rotate the release levers until they are perpendicular to the chassis.
- Step 2. Pull I/O tray out of the chassis.

After you remove the I/O tray:

- If you are replacing the I/O tray as part of a maintenance operation, remove all of the following components from the tray; then, place them on a static-protective surface or install them in the new I/O tray:
 - Adapters (see [“Adapter replacement” on page 71](#))
 - Risers (see [“Riser replacement” on page 187](#))
 - Cables (see [“Internal cable routing” on page 48](#))
- If you are instructed to return the I/O tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the I/O tray

Install the I/O tray by inserting it in the rear of the chassis, pushing it in until it stops, and closing the release levers. If you are installing a new I/O tray as a maintenance replacement, you must transfer system identification information as part of the new I/O tray installation.

S002



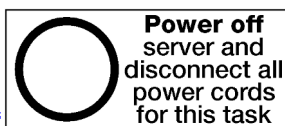
CAUTION:

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.



**Read the
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**Power off
server and
disconnect all
power cords
for this task**

” on page 28

Before you install the I/O tray:

1. Make sure that all cables, adapters, and other components in the I/O tray are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Make sure that all internal cables are correctly routed. See [“Internal cable routing” on page 48](#).

Complete the following steps to install the I/O tray:

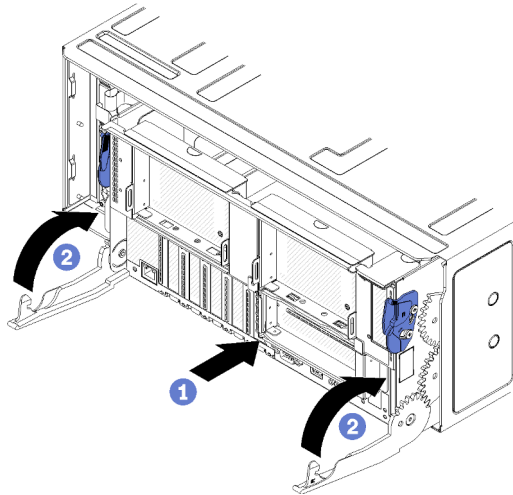


Figure 86. I/O tray installation

Attention: When inserting the I/O tray, do not hit any of the I/O tray connectors against the edge of the chassis.

- Step 1. Align the I/O tray with its opening in the rear of the chassis and insert. Position the tray toward the right side of the opening during insertion.
- Step 2. Fully open the I/O tray release levers and push the tray into the chassis until it stops.
- Step 3. Rotate the I/O tray release levers until they lock, fully closed.

After installing the I/O tray

- If you are done performing installation or maintenance procedures at the rear of the chassis, reconnect the cables. See “Cable the server” in the *ThinkSystem SR950 Setup Guide*.
- Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See “[Update the machine type and serial number](#)” on page 133.
- Enable TPM/TCM. See “[Enable TPM/TCM](#)” on page 135
- Optionally, enable Secure Boot. See “[Enable UEFI Secure Boot](#)” on page 139.

Demo video

[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]
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [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.

<system model>

The system model. Type *system yyyyyyyy*, where *yyyyyyy* is the product identifier.

[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>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc-username xcc_user_
id --bmc-password xcc_password
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --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>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override
```

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>
```

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc xcc_user_id:xcc_
password@xcc_external_ip
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --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 TPM/TCM

The server supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0

Note: For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a NationZ TPM adapter (sometimes called a daughter card). Customers in Chinese Mainland should download Lenovo Business Vantage to enable TCM. For more information, see https://datacentersupport.lenovo.com/en/en/downloads/ds548665-18alenovo_business_vantage_release_letter_20171205_v221770130-for-unknown-os and https://download.lenovo.com/servers/mig/2021/02/09/43299/LBV_v2.2.177.0130_readme_20180903.txt.

When a system board is replaced, you must make sure that the TPM/TCM policy is set correctly.

CAUTION:

Take special care when setting the TPM/TCM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

To set the TPM policy 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. Set the policy to one of the following settings.
 - **NationZ TPM 2.0 enabled - China only**. Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
 - **TPM enabled - ROW**. Customers outside of the Chinese Mainland should choose this setting.
 - **Permanently disabled**. Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

Note: Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:
`OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

Note: The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM_TCM_POLICY into XCC:
 - For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>`
 - For customers in Chinese Mainland that require to enable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "NationZTPM20Only" --override --imm <userid>:<password>@<ip_address>`
 - For customers outside Chinese Mainland that require to enable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>`
3. Issue reset command to reset system:
`OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`
4. Read back the value to check whether the change has been accepted:
`OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

Notes:

- If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.
imm.TpmTcmPolicy is defined as below:

- Value 0 use string “Undefined” , which means UNDEFINED policy.
 - Value 1 use string “NeitherTpmNorTcm”, which means TPM_PERM_DISABLED.
 - Value 2 use string “TpmOnly”, which means TPM_ALLOWED.
 - Value 4 use string “NationZTPM20Only”, which means NationZ_TPM20_ALLOWED.
- Below 4 steps must also be used to ‘lock’ the TPM_TCM_POLICY when using OneCli/ASU commands:
5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked , command as below:
`OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

The value must be 'Disabled', it means TPM_TCM_POLICY is NOT locked and must be set.
 6. Lock the TPM_TCM_POLICY:
`OneCli.exe config set imm.TpmTcmPolicyLock "Enabled"--override --imm <userid>:<password>@<ip_address>`
 7. Issue reset command to reset system, command as below:
`OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`

During the reset, UEFI will read the value from imm.TpmTcmPolicyLock, if the value is 'Enabled' and the imm.TpmTcmPolicy value is valid, UEFI will lock the TPM_TCM_POLICY setting.

Note: The valid values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.

8. Read back the value to check whether the ‘Lock’ is accepted or rejected. Command as below:
`OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

Note: If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

imm.TpmTcmPolicyLock is defined as below:

Value 1 uses string “Enabled” , which means lock the policy. Other values are not accepted.

Assert Physical Presence

Before you can assert Physical Presence, the Physical Presence Policy must be enabled. By default, the Physical Presence Policy is enabled with a timeout of 30 minutes.

There are two ways to assert the Physical Presence:

1. If the Physical Presence Policy is enabled, you can assert Physical Presence through the Lenovo XClarity Provisioning Manager or through the Lenovo XClarity Controller.
2. Switch the hardware jumpers on the system board.

Notes: If the Physical Presence Policy has been disabled:

1. Set the hardware Physical Presence jumper on the system board to assert Physical Presence.
2. Enable the Physical Presence Policy using either F1 (UEFI Settings) or Lenovo XClarity Essentials OneCLI.

Assert Physical Presence through the Lenovo XClarity Controller

Complete the following steps to assert Physical Presence through the Lenovo XClarity Controller:

1. Log in to the Lenovo XClarity Controller interface.

For information about logging in to the Lenovo XClarity Controller, see the “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

2. Click **BMC Configuration** → **Security** and verify that Physical Presence is set to **assert**.

Set the TPM version

To be able to set the TPM version, Physical Presence must be asserted.

The Lenovo XClarity Provisioning Manager or the Lenovo XClarity Essentials OneCLI can be used to set the TPM version.

To set the TPM version:

1. Download and install Lenovo XClarity Essentials OneCLI.
 - a. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
 - b. Click **Drivers & Software**.
 - c. Navigate to the version of Lenovo XClarity Essentials OneCLI for your operating system and download the package.
2. Run the following command to set the TPM version:

Note: You can change the TPM version from 1.2 to 2.0 and back again. However, you can toggle between versions a maximum of 128 times.

To set the TPM version to version 2.0:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"  
--bmc userid:password@ip_address
```

To set the TPM version to version 1.2:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"  
--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

3. Alternatively, you can use the following Advanced Settings Utility (ASU) commands:

To set the TPM version to version 2.0:

```
asu64 set TPMVersion.TPMVersion "Update to TPM2.0 compliant" --host <ip_address>  
--user <userid> --password <password> --override
```

To set the TPM version to version 1.2:

```
asu64 set TPMVersion.TPMVersion "Update to TPM1.2 compliant" --host <ip_address>  
--user <userid> --password <password> --override
```

where:

- *<userid>* and *<password>* are the credentials used to the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- *<ip_address>* is the IP address of the BMC.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

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

- 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

Note: If disabling UEFI secure boot is needed, run the following command:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_
address>
```

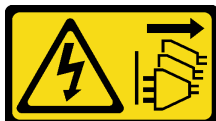
M.2 backplane replacement

The M.2 backplane is in the I/O tray that is accessed from the rear of the server.

Remove the M.2 backplane

The M.2 backplane is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray and one of the risers to gain access to the M.2 backplane, lift and remove the M.2 backplane from the I/O tray.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the M.2 backplane:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 10 to 15 (riser 2) or the riser for slot 16 to 17 to access the M.2 backplane. See [“Remove the riser for slot 10 to 15 \(riser 2\)” on page 188](#) or [“Remove the riser for slot 16 to 17 \(riser 3\)” on page 192](#).

Complete the following steps to remove the M.2 backplane.

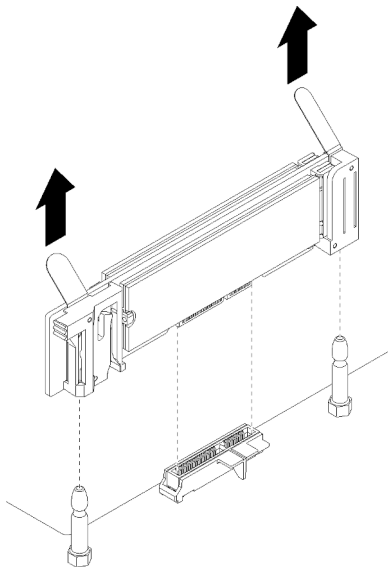


Figure 87. M.2 backplane removal

Step 1. Remove the M.2 backplane from the system board by pulling up on both ends of the backplane at the same time.

Note: Pull the M.2 backplane straight up when removing it from the system board.

After you remove the M.2 backplane:

- If you are replacing the M.2 backplane, remove any M.2 drives installed in the backplane. See [“Remove an M.2 drive” on page 143](#).
- If you are removing the M.2 backplane and are not installing a replacement:

1. Install the riser that you removed to access the M.2 backplane. See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#) or [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#).
2. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

If you are instructed to return the M.2 backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the M.2 backplane

The M.2 backplane is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray and one of the risers to gain access to the M.2 backplane, install the M.2 drives in the backplane; then, insert the backplane in the I/O tray and press it in place.

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.

 **Read the Installation Guidelines** ” on page 69 “  **Power off server and disconnect all power cords for this task** ” on page 28

Before you install the M.2 backplane, install the M.2 drives. See [“Install an M.2 drive” on page 144](#).

Complete the following steps to install the M.2 backplane.

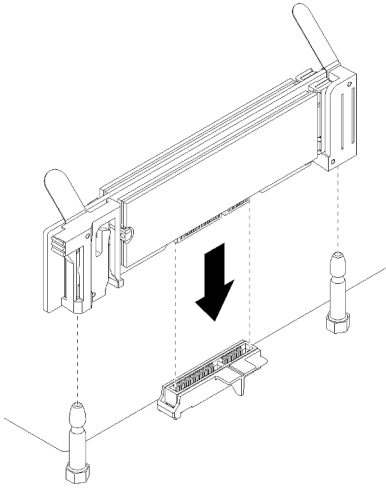


Figure 88. M.2 backplane installation

- Step 1. Align the openings in the plastic supports at each end of the M.2 backplane with the guide pins on the system board; then, insert the backplane in the system-board connector.
- Step 2. Press down on the M.2 backplane to fully seat it.

After you install the M.2 backplane, complete the following steps:

1. Install the riser that you removed to access the M.2 backplane. See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#) or [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#).
2. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).
3. See the documentation that comes with the M.2 backplane for device-driver and configuration information to complete the installation.

Demo video

[Watch the procedure on YouTube](#)

M.2 backplane retainer adjustment

The M.2 backplane retainer can be adjusted to accommodate three physical M.2 drive sizes.

Complete the following steps to adjust the M.2 backplane retainer position:

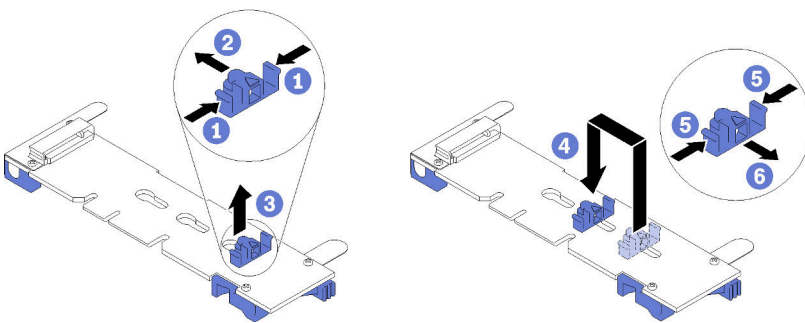


Figure 89. M.2 backplane retainer adjustment

- Step 1. Locate the correct keyhole to accommodate the retainer for the size of the M.2 drive that you are installing.

- Step 2. Press both sides of the retainer and move it toward the connector until it is in the large opening of the keyhole; then, remove the retainer from the backplane.
- Step 3. Insert the retainer into the keyhole that matches the size of your M.2 drive; then, and slide it back until the retainer locking nubs are in the holes.

Demo video

[Watch the procedure on YouTube](#)

M.2 drive replacement

M.2 drives are in the I/O tray that is accessed from the rear of the server.

Remove an M.2 drive

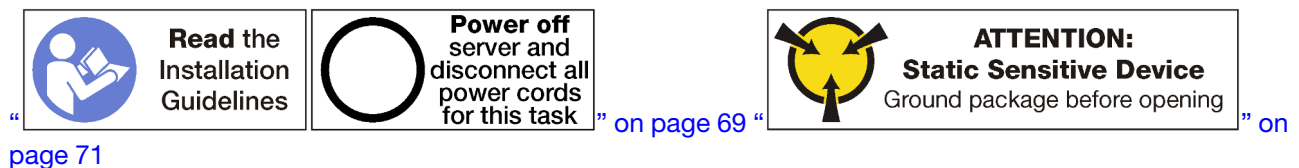
The M.2 drive is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray and the M.2 backplane, slide open the drive retainer and rotate the M.2 drive from the backplane.

S002



CAUTION:

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



Before you remove an M.2 drive:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 10 to 15 (riser 2) or the riser for slot 16 to 17 to access the M.2 backplane. See [“Remove the riser for slot 10 to 15 \(riser 2\)” on page 188](#) or [“Remove the riser for slot 16 to 17 \(riser 3\)” on page 192](#).
3. Remove the M.2 backplane from your system. See [“Remove the M.2 backplane” on page 139](#).

Complete the following steps to remove an M.2 drive.

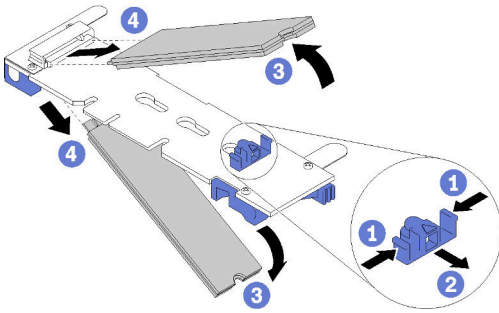


Figure 90. M.2 drive removal

Step 1. Press both sides of the drive retainer and slide it away from the connector to release the M.2 drive. If your backplane has two M.2 drives, both will release when you slide the retainer.

Step 2. Rotate the M.2 drive up from the backplane and pull it away from the connector.

After removing the M.2 drive, if you are removing the M.2 backplane and drives and not installing a replacement:

1. Install the riser that you removed to access the M.2 backplane. See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#) or [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#).
2. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

If you are instructed to return an M.2 drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install an M.2 drive

The M.2 drives are in the I/O tray that is accessed from the rear of the server. After removing the I/O tray and the M.2 backplane, insert the M.2 drives in the backplane and lock them in place with the drive retainer.

S002



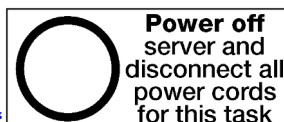
CAUTION:

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.



**Read the
Installation
Guidelines**

” on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

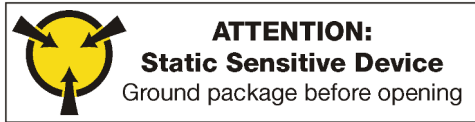
” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you install an M.2 drive, make sure that the retainer on the M.2 backplane is in the correct keyhole to accommodate the size of the M.2 drive you are installing. See “[M.2 backplane retainer adjustment](#)” on page 142.

Complete the following steps to install an M.2 drive in the M.2 backplane. “



” on page 71

Step 1. Locate the connector on each side of the M.2 backplane.

Step 2. Insert the M.2 drive.

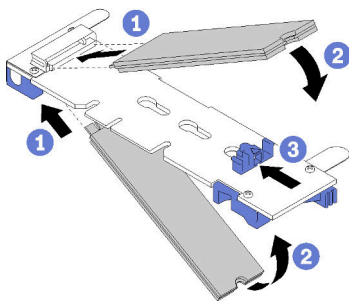


Figure 91. Inserting the M.2 drives

Insert the M.2 drive at an angle (approximately 30 degrees) into the connector and rotate it until the notch catches on the lip of the retainer

Notes:

- When installing two drives, align and support both drives before sliding the retainer forward to secure the drives.
- When only one drive is installed, it must be in slot 0.

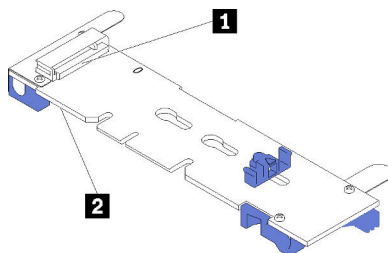


Figure 92. M.2 drive slots

Table 33. M.2 drive slots

1 Slot 0	2 Slot 1
-----------------	-----------------

Step 3. Secure the M.2 drives in the backplane.

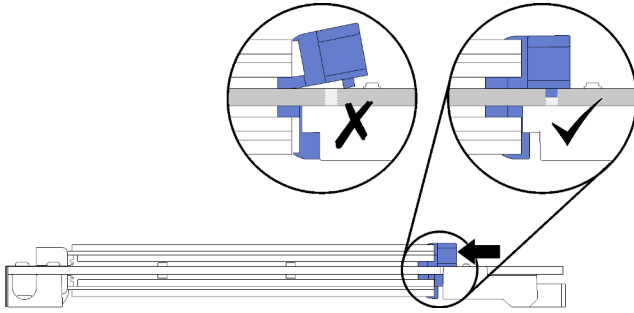


Figure 93. Securing the M.2 drives

Attention: Make sure the two nubs on the retainer are in the small holes on the M.2 backplane when the retainer is slid forward.

Slide the retainer forward (toward the connector) until you hear a soft “click” sound.

After installing an M.2 drive:

1. Install the M.2 backplane. See [“Install the M.2 backplane” on page 141](#).
2. Install the riser that you removed to access the M.2 backplane. See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#) or [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#).
3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

Demo video

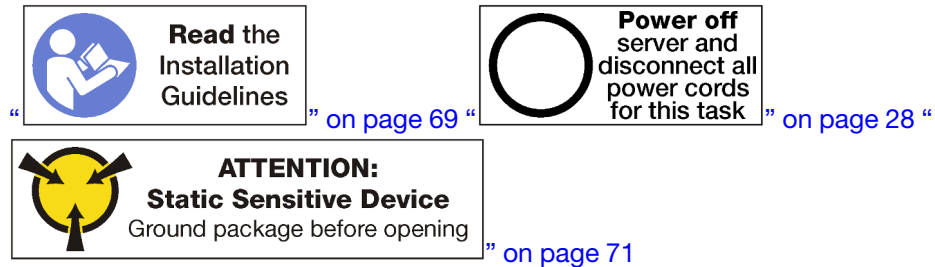
[Watch the procedure on YouTube](#)

Memory air baffle replacement

Use the following procedures to replace a memory air baffle.

Remove a memory baffle

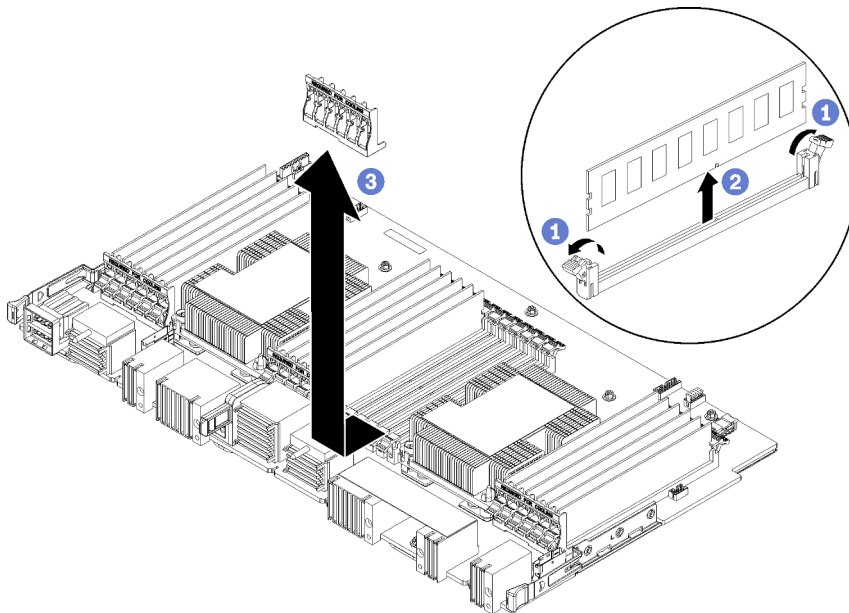
Memory air baffles are in the system boards that are accessed from the front of the server.



Before you remove a memory air baffle:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the compute tray where the system board and memory air baffles are installed. See [“Remove a compute tray” on page 95](#).
3. If you are removing a memory air baffle from the lower compute system board, remove the upper system board or system board filler. See [“Remove a system board” on page 89](#).

Complete the following steps to remove a memory air baffle.



Note: Each memory air baffle spans six memory modules.

- Step 1. Open the six pairs of memory module connector retaining clips that span the memory air baffle.
- Step 2. Slide the memory air baffle up and off of the memory module connector retaining clips; then, remove the air baffle from the compute system board.

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

Demo video

[Watch the procedure on YouTube](#)

Install a memory air baffle


Memory air baffles are in the system boards that are accessed from the front of the server.

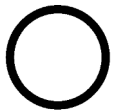
S002




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.

 **Read the Installation Guidelines** " on page 69 "

 **Power off server and disconnect all power cords for this task** " on page 28 "

 **ATTENTION: Static Sensitive Device**
Ground package before opening " on page 71

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a memory air baffle:

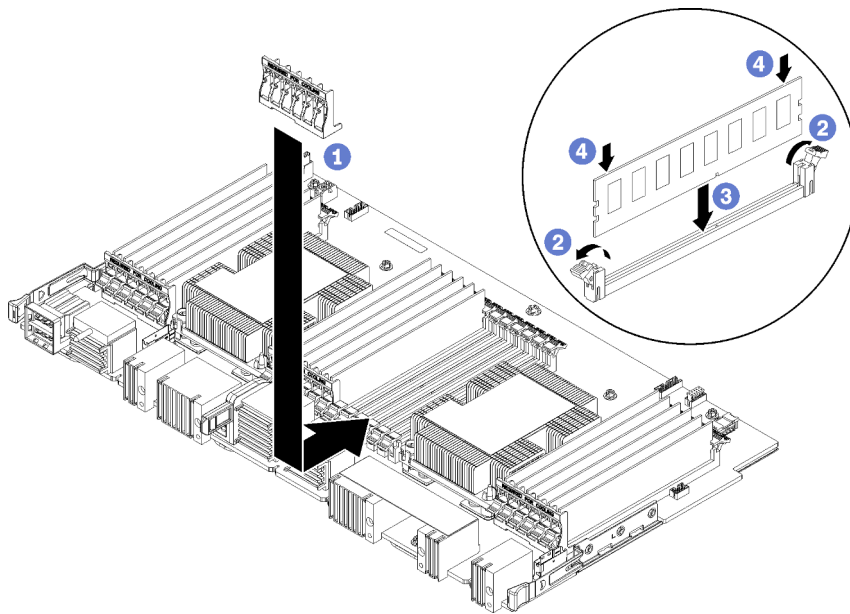


Figure 94. Memory baffle installation

Attention: To prevent damage to memory modules and memory module sockets, you must open the retaining clips at both ends of each memory module.

Note: Each memory air baffle spans six memory modules.

- Step 1. Make sure that all six pairs of memory module connector retaining clips spanning the memory air baffle are open.
- Step 2. Hold the memory air baffle so the “REQUIRED FOR COOLING” text on the baffle is right-side up and facing away from the memory modules; then, slide the lower half of the slots in the air baffle over the memory module connector retaining clips.
- Step 3. Slide the air baffle up and over the memory module retaining clips until the air baffle is positioned on the surface of the compute system board.
- Step 4. Make sure that each memory module aligns with its connector; then, seat each memory module. See [“Install a memory module” on page 153](#) for more information.

Note: Make sure that all memory module connector retaining clips spanning the memory air baffle are closed, even if a memory module is not installed in the connector.

- Step 5. After installing each memory baffle, make sure that it is secure by attempting to lift and remove it. Installation of the air baffle was performed correctly if the air baffle remains in place.
- Step 6. If you are installing additional memory air baffles, do so now.

After you install a memory air baffle:

1. Install the upper system board or system board filler, if it was removed. See [“Install a system board” on page 91](#).
2. Install the compute tray where the system board is installed. See [“Install a compute tray” on page 97](#).
3. Install the front cover. See [“Install the front cover” on page 111](#)

Demo video

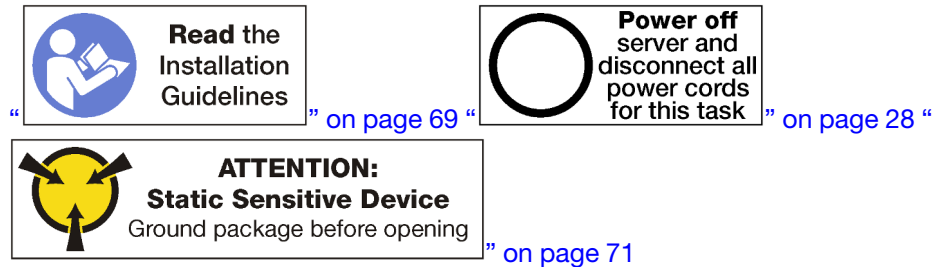
[Watch the procedure on YouTube](#)

Memory module replacement

Use the following procedures to replace a memory module.

Remove a memory module

Memory modules are in the system boards that are accessed from the front of the server.



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 71](#):

- 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.

Note: The same procedure is used to remove memory modules and memory module fillers.

Before you remove a memory module:

1. If you are removing a DCPMM in App Direct or Mixed memory mode, make sure to back up the stored data, and delete any created namespace.
2. Remove the front cover. See [“Remove the front cover” on page 110](#).
3. Remove the compute tray where the system board and memory module are installed. See [“Remove a compute tray” on page 95](#).
4. If you are removing a memory module from the lower compute system board, remove the upper system board or system board filler. See [“Remove a system board” on page 89](#).

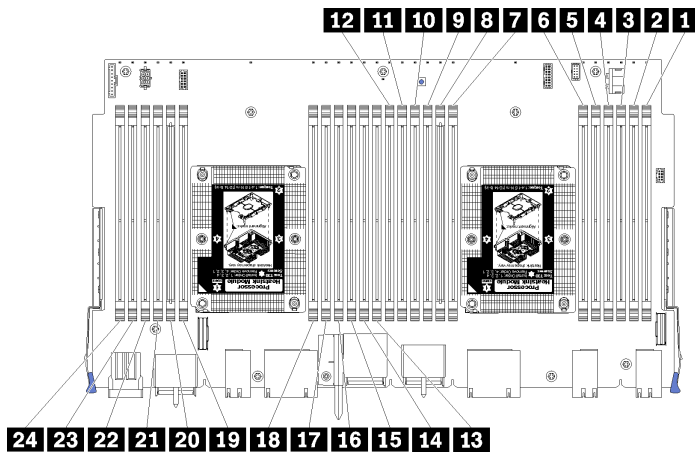
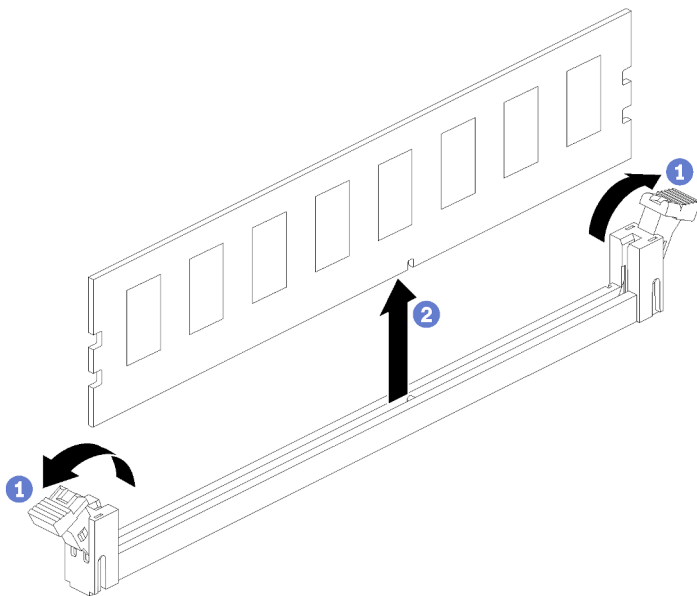


Figure 95. Memory module locations

Complete the following steps to remove a memory module.



Step 1. Open the memory module connector retaining clips to extract the memory module; then, remove the memory module.

If you are not replacing the memory module that you removed:

1. See the *ThinkSystem SR950 Memory Population Reference* for the required installation order of the remaining memory modules.
2. Install a memory module filler, that was originally provided with the PHM option, in any vacant memory module connectors.
3. Install the upper system board or system board filler, if it was removed. See [“Install a system board” on page 91](#).
4. Install the compute tray where the system board is installed. See [“Install a compute tray” on page 97](#).
5. Install the front cover. See [“Install the front cover” on page 111](#)

If you are instructed to return the memory module, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install a memory module

Memory modules are in the system boards that are accessed from the front of the server.

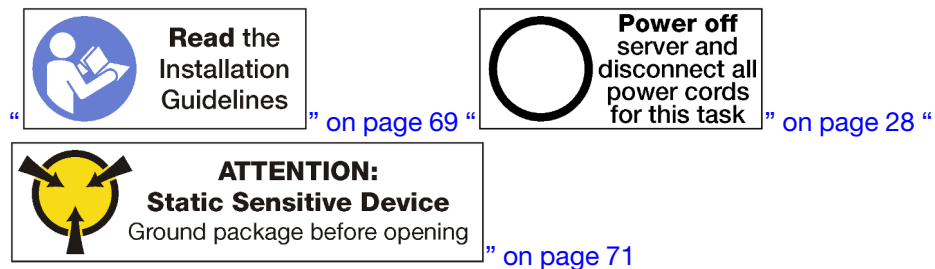
S002



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.

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



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Note: The same procedure is used to install memory modules and memory module fillers.

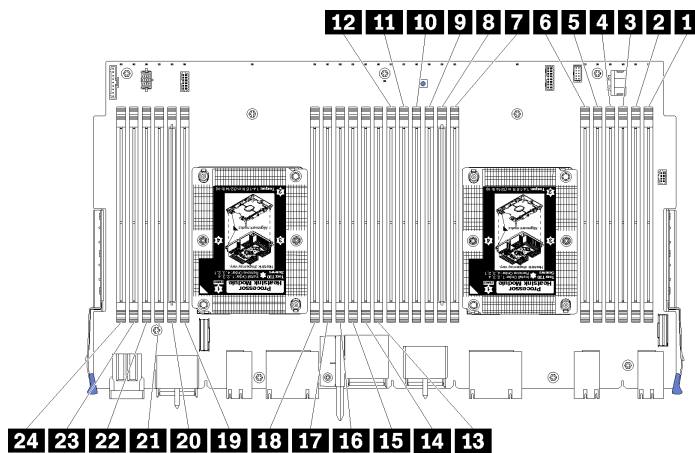


Figure 96. Memory module locations

Table 34. Memory module locations on each system board

DIMM number	System board 1 (lower board, lower tray) DIMM number	System board 2 (upper board, lower tray) DIMM number	System board 3 (lower board, upper tray) DIMM number	System board 4 (upper board, upper tray) DIMM number
1	1	25	49	73
2	2	26	50	74
3	3	27	51	75
4	4	28	52	76
5	5	29	53	77
6	6	30	54	78
7	7	31	55	79
8	8	32	56	80
9	9	33	57	81
10	10	34	58	82
11	11	35	59	83
12	12	36	60	84
13	13	37	61	85
14	14	38	62	86
15	15	39	63	87
16	16	40	64	88
17	17	41	65	89
18	18	42	66	90
19	19	43	67	91
20	20	44	68	92
21	21	45	69	93
22	22	46	70	94
23	23	47	71	95
24	24	48	72	96

Complete the following steps to install a memory module:



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 71](#):

- 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.

Step 1. Install the memory module.

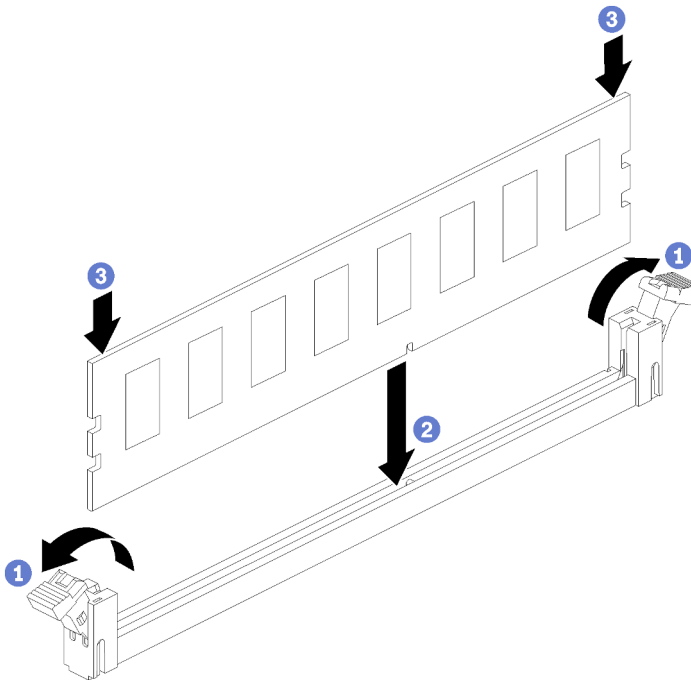


Figure 97. Memory module installation

- Open the memory module connector retaining clips. If a memory module is already installed in the connector, remove it.
- Align the keys on the memory module that you are installing with the connector; then, insert the memory module.
- Firmly press both ends of the memory module straight down into the connector until the retaining clips snap into the locked position.

Step 2. If you are installing additional memory modules, do so now.

After you install a memory module:

- Install the upper system board or system board filler, if it was removed. See [“Install a system board” on page 91](#).
- Install the compute tray where the system board is installed. See [“Install a compute tray” on page 97](#).
- Install the front cover. See [“Install the front cover” on page 111](#)
- Power on the system.
- If you have installed a DCPMM:
 - Update the system firmware to the latest version (see https://thinksystem.lenovofiles.com/help/topic/7X12/maintenance_manual_firmware_updates.html).
 - Make sure that the firmware on all of the DCPMM units is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
 - Configure DCPMMs and DRAM DIMMs (see [“Configure DC Persistent Memory Module \(DCPMM\)” in Setup Guide](#)).

- d. Restore the data that have been backed up if necessary.

Demo video

[Watch the procedure on YouTube](#)

Midplane replacement

Use the following procedures to remove and install a midplane. Midplanes are at the top of the server under the top cover. There are several types of midplane. The removal and installation procedures for each midplane type is similar.

Remove a midplane

Midplanes are at the top of the server under the top cover. To remove a midplane, remove the server from the rack; then, while the front and rear server components are still removed, remove the top cover and slide each midplane up and out of the server.

S001



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

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

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.

S014



CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

S037



CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:

Use safe practices when lifting.



Before you remove a midplane, remove the server from the rack. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at https://pubs.lenovo.com/sr950/pdf_files.html.

The following illustration identifies the various midplanes that might be installed in your server.

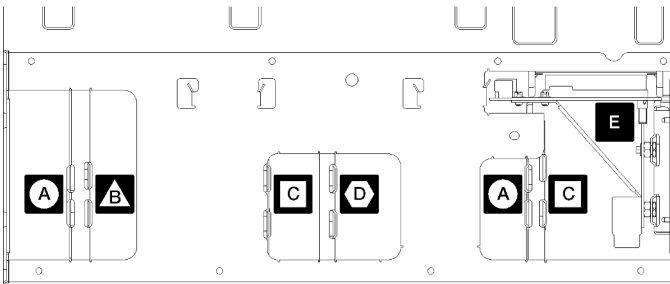


Figure 98. Midplane identification

Table 35. Adapter LEDs

Callout	Callout
A Midplane used in four-socket storage-rich configurations	D Midplane used in four-socket and eight-socket configurations
B Midplane used in four-socket and eight-socket configurations	E Power midplane used in all server configurations
C Midplane used in four-socket and eight-socket configurations	

Complete the following steps to remove a midplane:

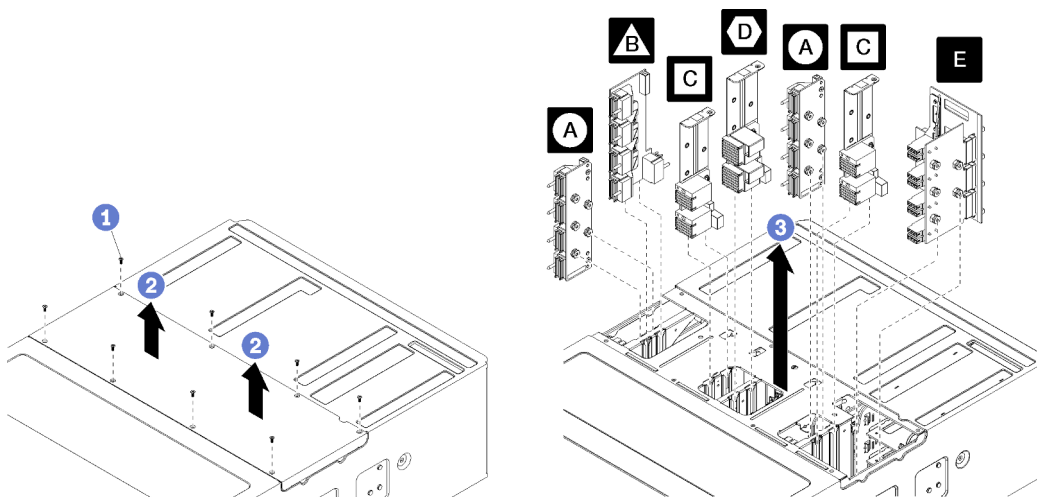


Figure 99. Midplane removal

Note: Before removing a midplane, make sure that all of the compute or storage trays, the I/O tray, and all of the power supplies are removed from the server or slid partially out.

Step 1. Remove the eight screws and lift the top cover from the server.

Step 2. Grasp each midplane by the handle and pull it up and out of the server.

If you are instructed to return a midplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a midplane

Midplanes are at the top of the server under the top cover. Insert each midplane into the top of the chassis; then, replace the top cover and secure with eight screws.

S001



 **DANGER**

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

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

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.

S014



CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

S037



CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.



“ on page 69 “



” on page 28

CAUTION:
Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a midplane:

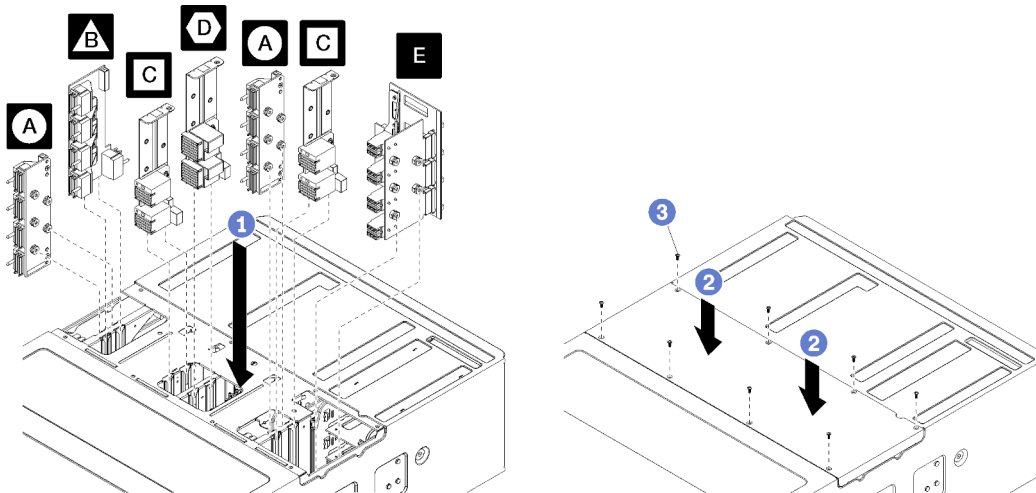


Figure 100. Midplane installation

Note: Before installing a midplane, make sure that all of the compute or storage trays, the I/O tray, and all of the power supplies are removed from the server or slid partially out.

Step 1. Align each midplane with its opening in the top of the chassis and insert, making sure that the posts on the midplane fit into the slots in the midplane opening.

Step 2. Push the midplane into chassis until it stops.

Note: There is a notch in the server top cover to indicate correct alignment. The top cover must be installed in the correct orientation so that the cover pins that help support the backplanes engage.

Step 3. Position the top cover on the server and secure it with eight screws.

Install the server in the rack and replace all components. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at https://pubs.lenovo.com/sr950/pdf_files.html.

Demo video

[Watch the procedure on YouTube](#)

Power supply replacement

Use the following procedures to remove and install power supplies and power supply fillers. Power supplies are at the rear of the server.

Remove a power supply

Press the release latch and pull the drive to remove it from the drive bay. Power supplies are hot-swap devices that can be removed while the server is powered on.

S001



DANGER

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

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

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.

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.



“ on page 69 ”

Attention: If the server is not configured for redundant power operation, power off the server before removing a power supply. See “[Power off the server \(disconnect input power\)](#)” on page 28.

Before you remove a power supply, remove the power cable from the cable hook-and-loop on the rear of the server; then, disconnect the power cable from the power supply.

Attention: To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a power supply or a filler installed in each bay.

Complete the following steps to remove a power supply.

Step 1. Remove the power supply.

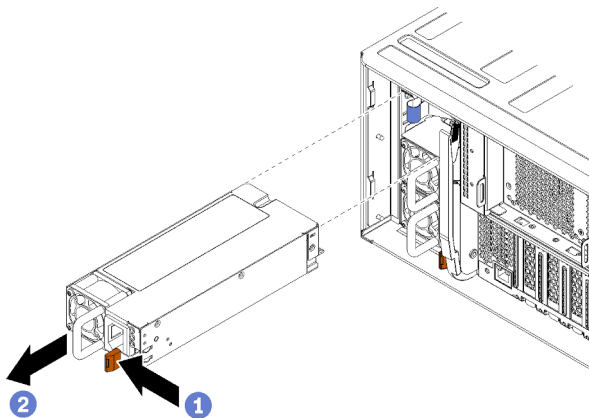


Figure 101. Power supply removal

Press the release latch toward the left and pull the drive to remove it from the drive bay.

After you remove the power supply:

1. Install a replacement power supply or filler in the empty bay.
2. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a power supply

Insert the power supply in its bay and press it in until the release tab locks. Power supplies are hot-swap devices that can be installed while the server is powered on.

S001



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

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

S002



CAUTION:

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

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.



“ [Read the Installation Guidelines](#) ” on page 69

Before you install a power supply:

1. If the power supply bay contains a filler, pull the filler from the bay.

Complete the following steps to install a power supply:

Step 1. Install the power supply in the bay.

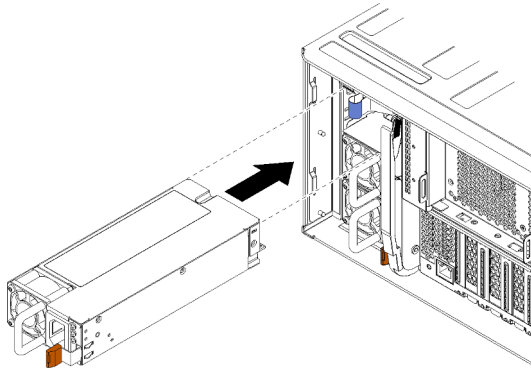


Figure 102. Power supply installation

Insert the power supply in its bay and press it in until the release tab locks.

After you have installed a power supply:

1. Connect the power cable to the power supply.
2. Route the power cable through the cable hook-and-loop on the rear of the server so that it does not accidentally become unplugged.

Demo video

[Watch the procedure on YouTube](#)

Remove a power supply filler

Remove a power supply filler by pulling the filler from the bay.

Complete the following steps to remove a power supply filler:

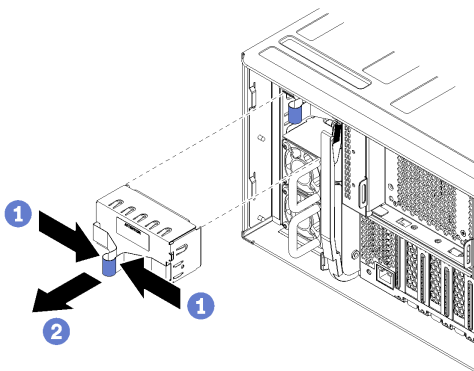


Figure 103. Power supply filler removal

Step 1. Insert a finger into the hole on the power supply filler and pull the filler from the bay

Install fillers in all empty power supply bays.

Install a power supply filler

Insert the power supply filler in the bay and press it in place.

Complete the following steps to install a power supply filler:

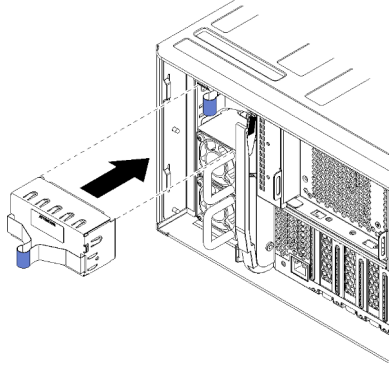


Figure 104. Power supply filler installation

Step 1. Insert the filler in the power supply in the bay and press it in place.

Install fillers in all empty hard disk drive bays.

Processor and heat sink replacement

Use the following procedures to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

Attention: Before reusing a processor or heat sink, make sure you use Lenovo proven alcohol cleaning pad and thermal grease.

Important: The processor in your server can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

Remove a processor and heat sink




Processors are in the system boards that are accessed from the front of the server. This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.

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.

 Read the Installation Guidelines	 Power off server and disconnect all power cords for this task
“ on page 69 “	” on page 28 “
 ATTENTION: Static Sensitive Device Ground package before opening	
” on page 71	

Attention:

- 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.
- 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.
- 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 electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.

- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Before you remove a PHM:

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

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the compute tray where the system board is installed. See [“Remove a compute tray” on page 95](#).
3. If you are removing a PHM from the lower system board, remove the upper system board or system board filler. See [“Remove a system board” on page 89](#).

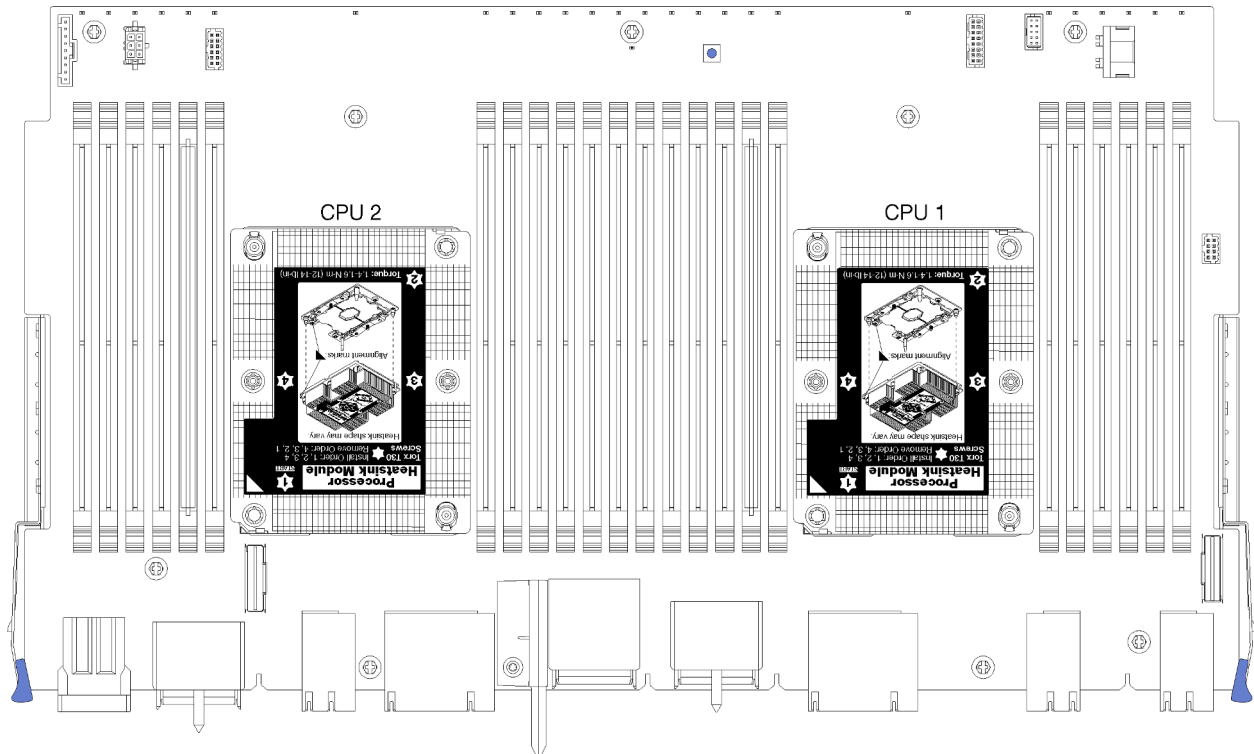


Figure 105. Processor locations on system board

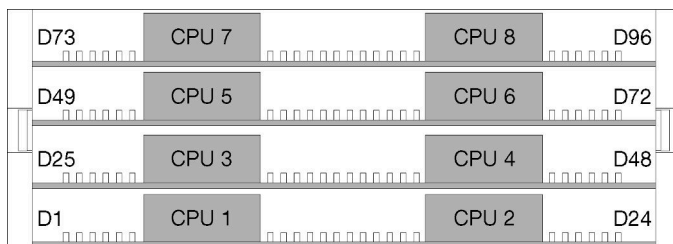


Figure 106. Processor layout for multi-processor systems (viewed from front of server)

Complete the following steps to remove a PHM.

Step 1. Remove the PHM from the system board.

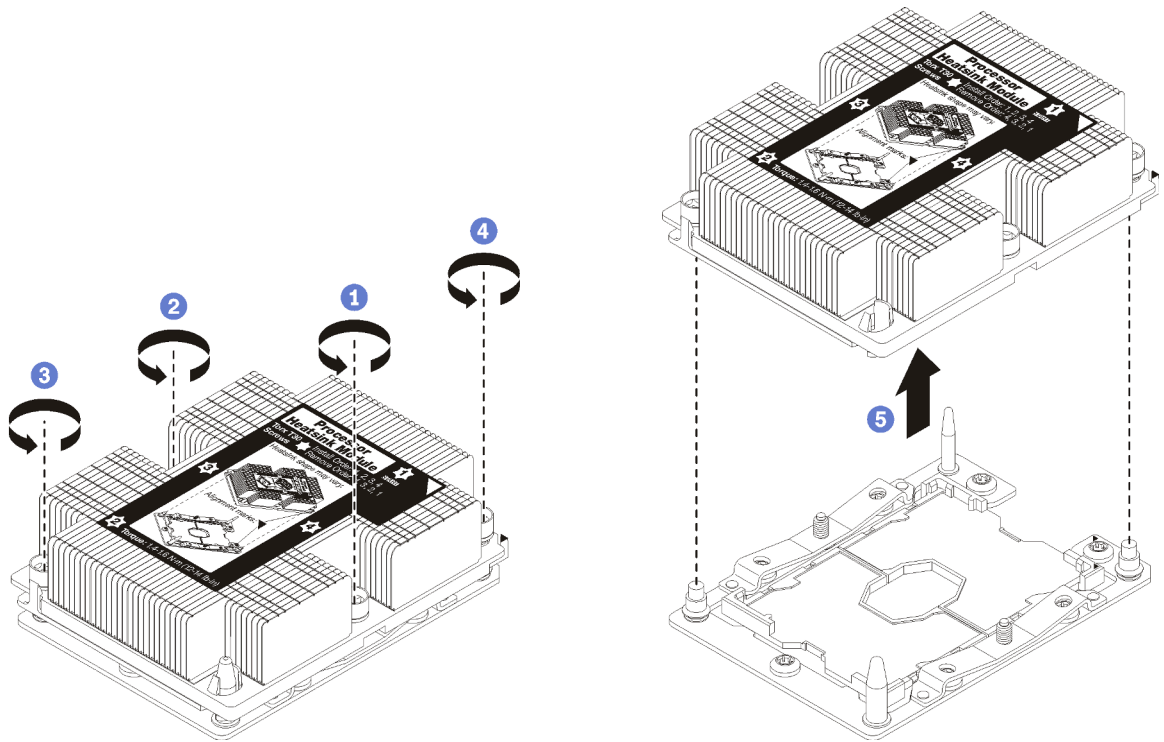


Figure 107. Removing a PHM

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

- Fully loosen the Torx T30 captive fasteners on the processor-heat-sink module *in the removal sequence shown* on the heat-sink label.
- Lift the processor-heat-sink module from the processor socket.

After you remove a PHM:

- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are replacing the processor or heat sink, separate the processor and its retainer from the heat sink.

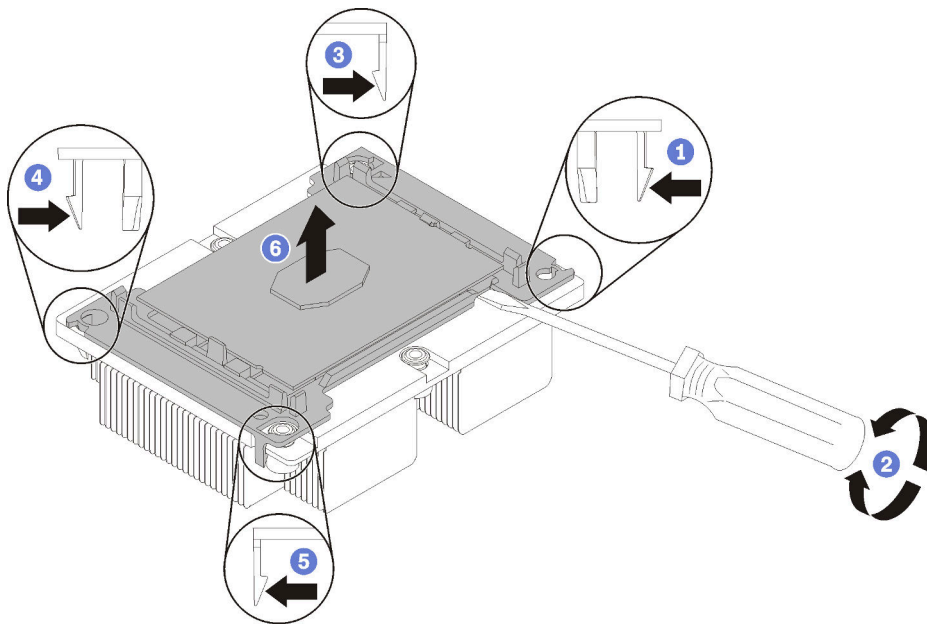


Figure 108. Separating a heat sink from a processor

1. Press the retaining clip at the corner of the processor retainer closest to the pry point; then, gently pry this corner of the retainer away from the heat sink with a flat-bladed screwdriver, using a twisting motion to break the processor-to-heat-sink seal.
2. Release the remaining retaining clips and lift the processor and retainer from the heat sink.
3. After separating the processor and retainer from the heat sink, hold the processor and retainer with the thermal-grease side down and the processor-contact side up to prevent the processor from falling out of the retainer.

Note: The processor retainer will be removed and discarded in a later step and replaced with a new one.

- If you are replacing the processor, you will be reusing the heat sink. Wipe the thermal grease from the bottom of the heat sink using an alcohol cleaning pad.
- If you are replacing the heat sink, you will be reusing the processor. Wipe the thermal grease from the top of the processor using an alcohol cleaning pad.

If you are instructed to return the processor or heat sink, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

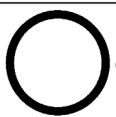
Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.



**Read the
Installation
Guidelines**

” on page 69 “



**Power off
server and
disconnect all
power cords
for this task**

” on page 28 “



ATTENTION:
Static Sensitive Device
Ground package before opening

” on page 71

Attention:

- 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.
- 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.
- 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 electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- 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 *ThinkSystem SR950 Setup Guide*.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.

Before you install a PHM:

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

1. Remove the existing PHM, if one is installed. See “[Remove a processor and heat sink](#)” on page 166.

Note: Replacement processors come with both rectangular and square processor retainers. A rectangular retainer comes attached to the processor. The square retainer can be discarded.

2. If you are replacing a heat sink, replace the processor retainer. *Processor retainers should not be reused.*
 - a. Remove the old processor retainer.

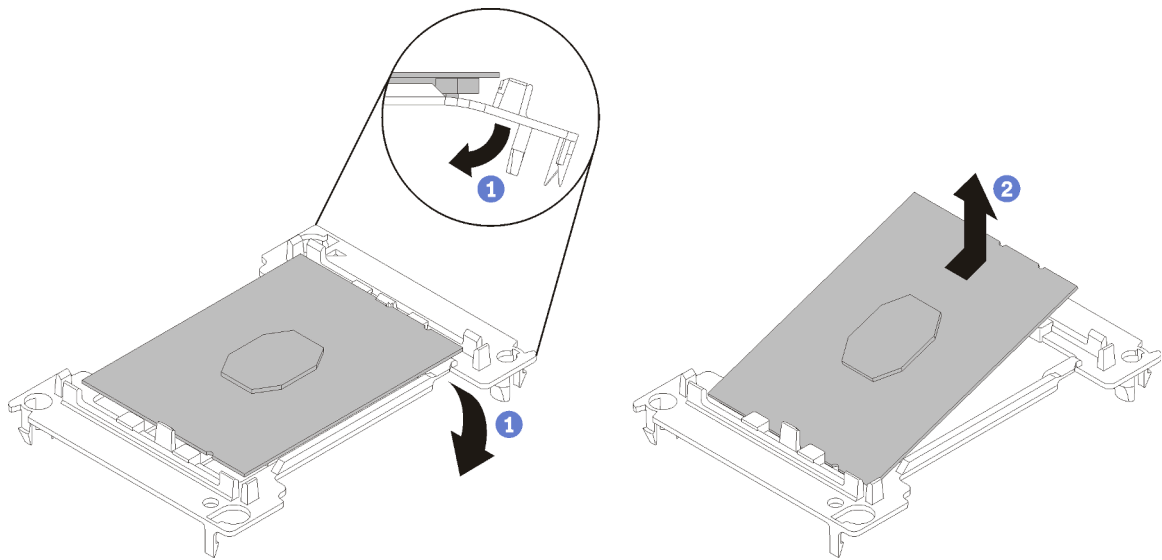


Figure 109. Removing a processor retainer

Note: When the processor is out of its retainer, hold the processor by the long edges to prevent touching the contacts or the thermal grease, if it is applied.

With the processor-contact side up, flex the ends of the retainer down and away from the processor to release the retaining clips; then, remove the processor from the retainer. Discard the old retainer.

- b. Install a new processor retainer.

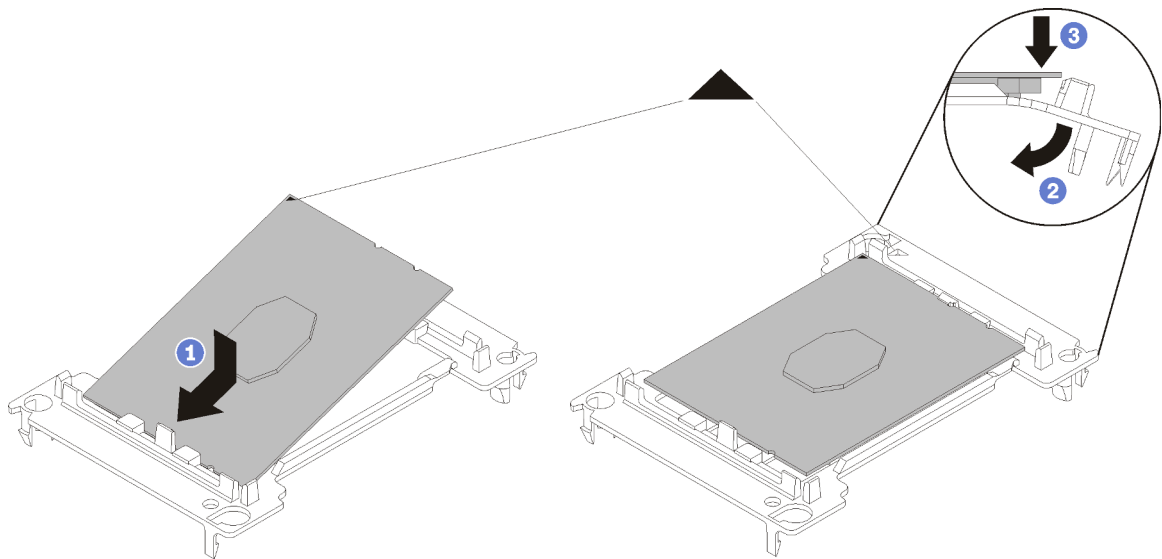


Figure 110. Installing a processor retainer

- 1) Position the processor on the new retainer so that the triangular marks align; then, insert the unmarked end of the processor into the retainer.
- 2) Holding the inserted end of the processor in place, flex the opposite end of the retainer down and away from the processor until you can press the processor under the clip on the retainer.

To prevent the processor from falling out of the retainer after it is inserted, keep the processor-contact side up and hold the processor-retainer assembly by the sides of the retainer.

- 3) If there is any old thermal grease on the processor, gently clean the top of the processor using an alcohol cleaning pad.

Note: If you are applying new thermal grease on the top of the processor, make sure to do it after the alcohol has fully evaporated.

3. If you are replacing a processor:
 - a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
 - b. To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.
 - c. Apply new thermal grease (1/2-syringe, 0.65 g) to the top of the new processor. If you have cleaned the top of the processor with an alcohol cleaning pad, make sure to apply the new thermal grease after the alcohol has fully evaporated.

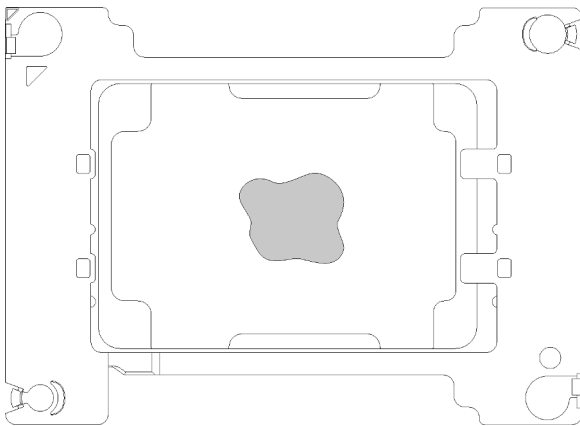


Figure 111. Thermal grease application

- 1) Carefully place the processor and retainer on a flat surface with the processor-contact side down.
 - 2) Apply half a syringe of thermal grease, approximately 0.65 g, to the center of the processor top.
4. If you are replacing a heat sink, 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.

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.

5. Assemble the processor and heat sink, if these components are separate.

Notes:

- If you are replacing a processor, install the heat sink onto the processor and retainer while the processor and retainer are in the shipping tray.
- If you are replacing a heat sink, remove the heat sink from its shipping tray and place the processor and retainer in the opposite half of the heat sink shipping tray with the processor-contact side down. To prevent the processor from falling out of the retainer, hold the processor-retainer assembly by its sides with the processor-contact side up until you turn it over to fit in the shipping tray.

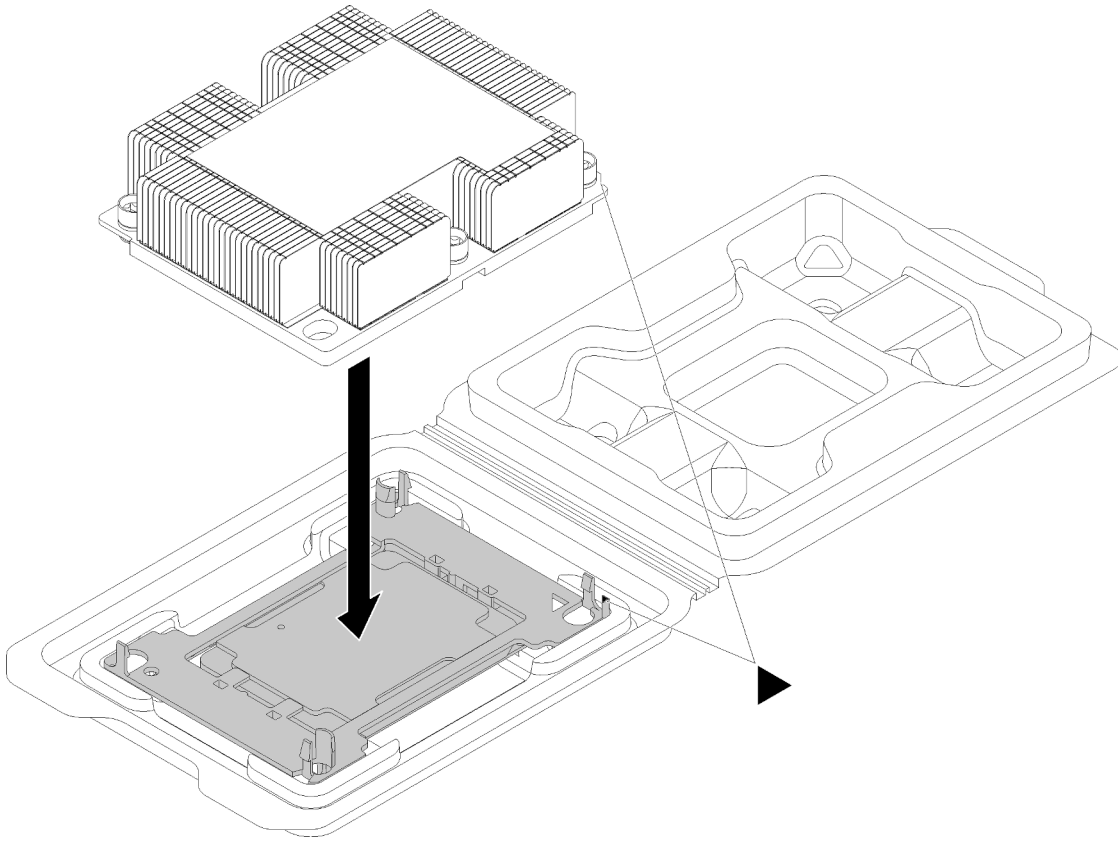


Figure 112. Assembling a PHM in the shipping tray

- a. Align the triangular marks on the processor retainer and the heat sink or align the triangular mark on the processor retainer with the notched corner of the heat sink.
- b. Insert the processor-retainer clips into the holes on the heat sink.
- c. Press the retainer into place until the clips at all four corners engage.

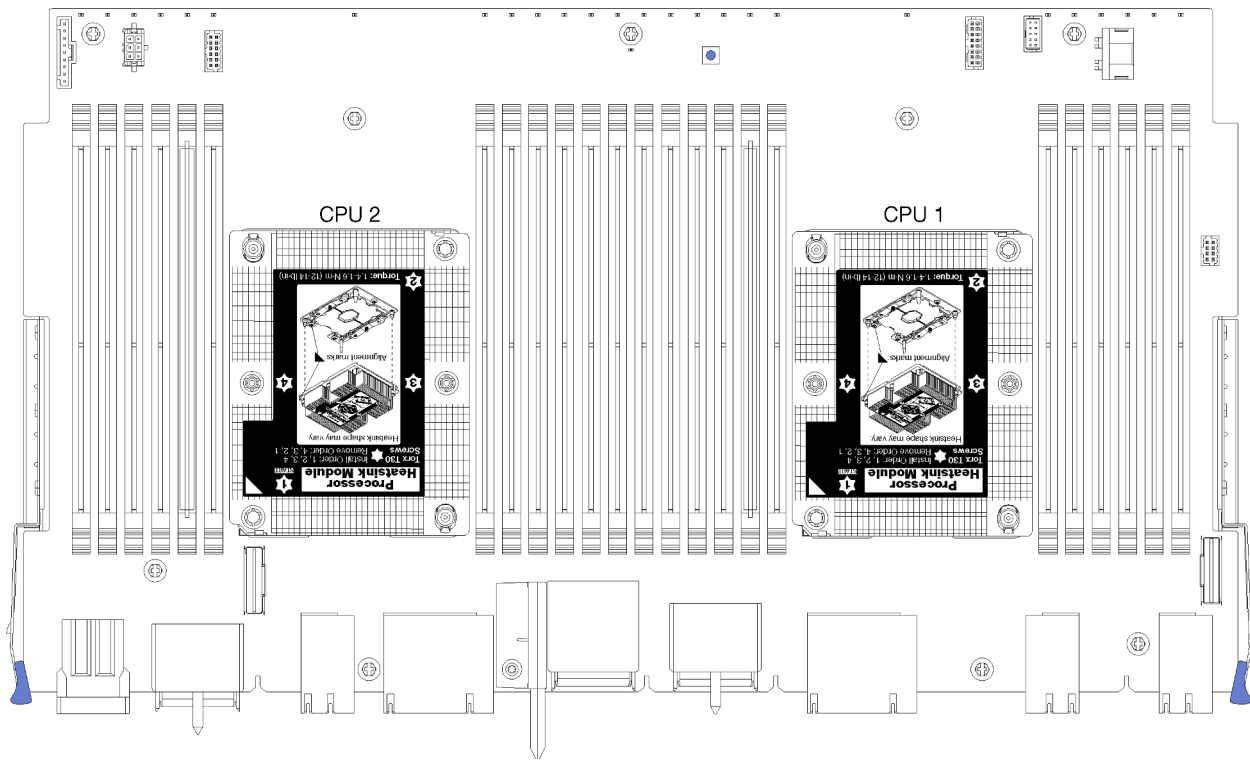


Figure 113. Processor locations on system board

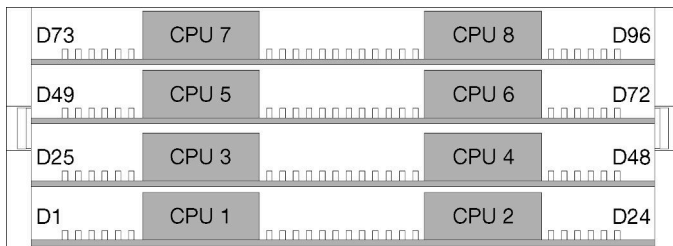


Figure 114. Processor layout for multi-processor systems (viewed from front of server)

Complete the following steps to install a PHM.

- Step 1. Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.
- Step 2. Install the processor-heat-sink module on the system board.

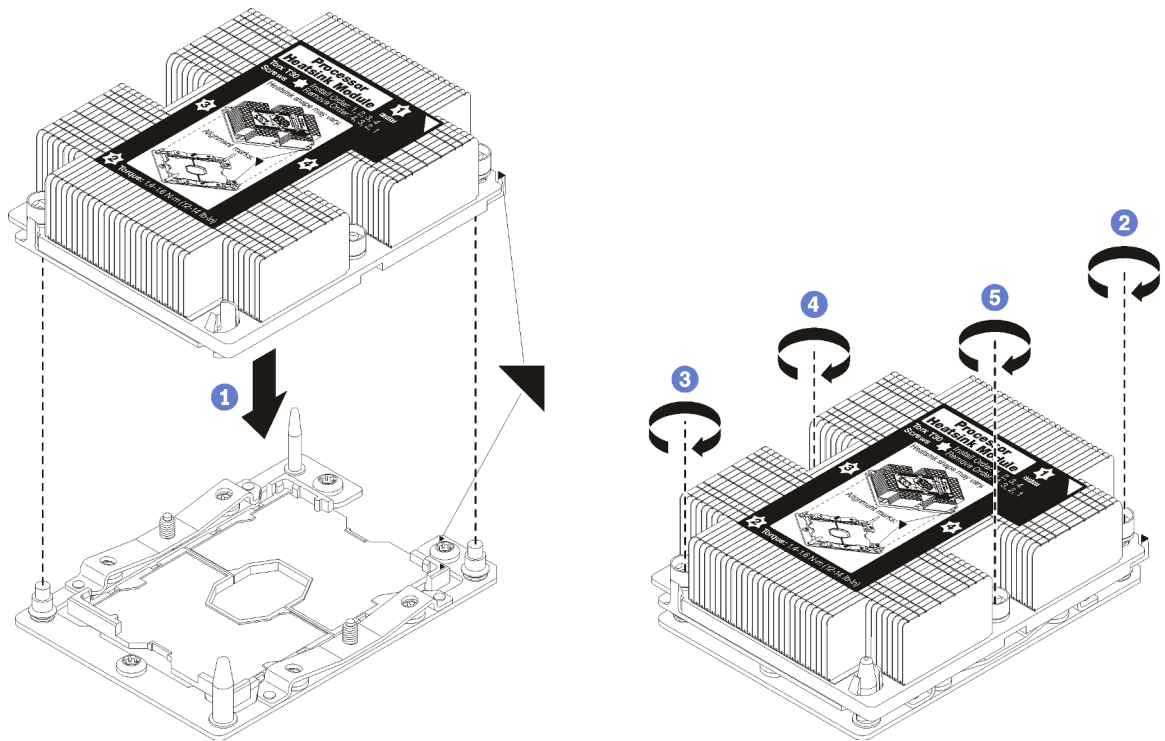


Figure 115. Installing a PHM

- a. Align the triangular marks and guide pins on the processor socket with the PHM; then, insert the PHM into the processor socket.

Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

- b. Fully tighten the Torx T30 captive fasteners *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 nuts to fully tighten is 1.4 – 1.6 newton-meters, 12 – 14 inch-pounds).

After you install a PHM:

1. Install the upper system board or system board filler, if it was removed. See [“Install a system board” on page 91](#).
2. Install the compute tray. See [“Install a compute tray” on page 97](#).
3. Install the front cover. See [“Install the front cover” on page 111](#)

Demo video

[Watch the procedure on YouTube](#)

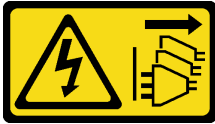
RAID card replacement

RAID cards are in the upper and lower trays that are accessed from the front of the server. Procedures for removing and installing RAID cards in the upper and lower trays are different.

Remove a RAID card (upper tray)

The upper RAID card is in the upper compute tray or optional storage tray that is accessed from the front of the server. After removing the upper tray and fan cage, disconnect the RAID card from the storage interposer; then, disconnect the three cables from the RAID card and remove it from the tray.

S002

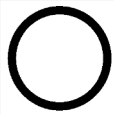


CAUTION:

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

“ [Read the Installation Guidelines](#) ” [Power off server and disconnect all power cords for this task](#) ” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an upper RAID card:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the upper compute tray or storage tray. See [“Remove a compute tray” on page 95](#) or [“Remove a storage tray” on page 207](#).
3. If you removed a compute tray and it has one or more compute system boards or a system board filler installed, remove the system boards or system board filler. See [“Remove a system board” on page 89](#).
4. Turn the tray upside down and remove the upper fan cage. See [“Remove a fan cage \(upper tray\)” on page 101](#).

Complete the following steps to remove an upper tray RAID card.

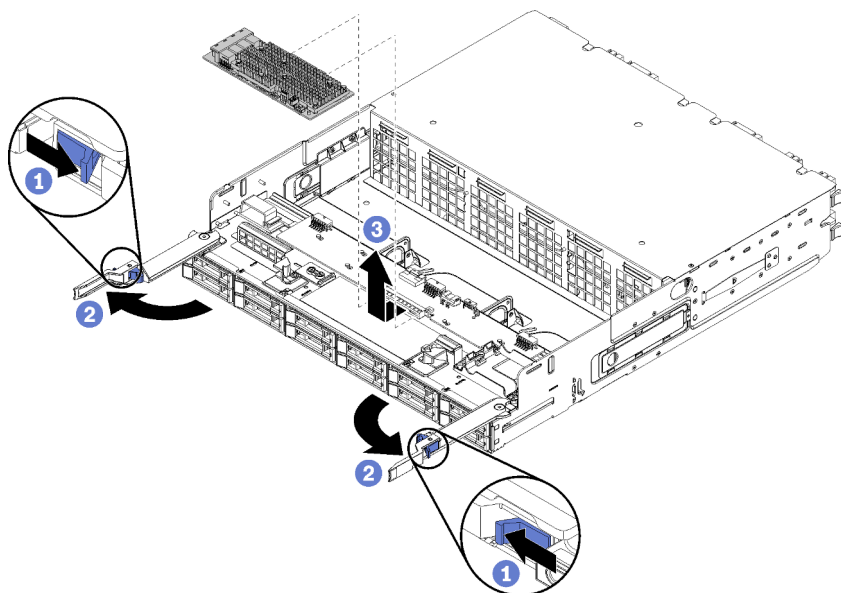


Figure 116. Upper tray RAID card removal

- Step 1. Disconnect the RAID card from the storage interposer.
- Step 2. Rotate the RAID card upward and disconnect the three cables.
- Step 3. Remove the RAID card from the tray.

If you are instructed to return the RAID card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a RAID card (lower tray)

The lower RAID card is in the lower compute tray that is accessed from the front of the server. After removing the lower compute tray and fan cage, disconnect the RAID card from the storage interposer; then, disconnect the three cables from the RAID card and remove it from the compute tray.

S002

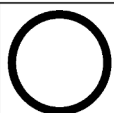


CAUTION:

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an lower RAID card:

1. Remove the front cover. See “[Remove the front cover](#)” on page 110.
2. Remove the lower compute tray or extract it to the maintenance position. See “[Remove a compute tray](#)” on page 95.
3. Remove the lower fan cage. See “[Remove a fan cage \(lower tray\)](#)” on page 103.

Complete the following steps to remove a lower RAID card.

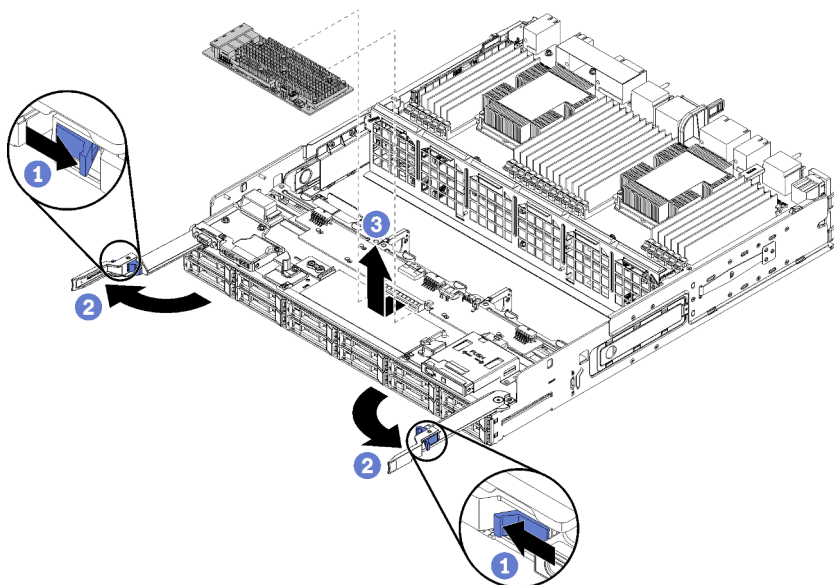


Figure 117. Lower RAID card removal

- Step 1. Disconnect the RAID card from the storage interposer.
- Step 2. Rotate the RAID card upward and disconnect the three cables.
- Step 3. Remove the RAID card from the compute tray.

If you are instructed to return the RAID card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a RAID card (upper tray)

The upper RAID card is in the upper compute tray or optional storage tray that is accessed from the front of the server. Connect the three cables to the RAID card; then, connect the RAID card to the storage interposer in the upper tray.

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.



Complete the following steps to install an upper tray RAID card:

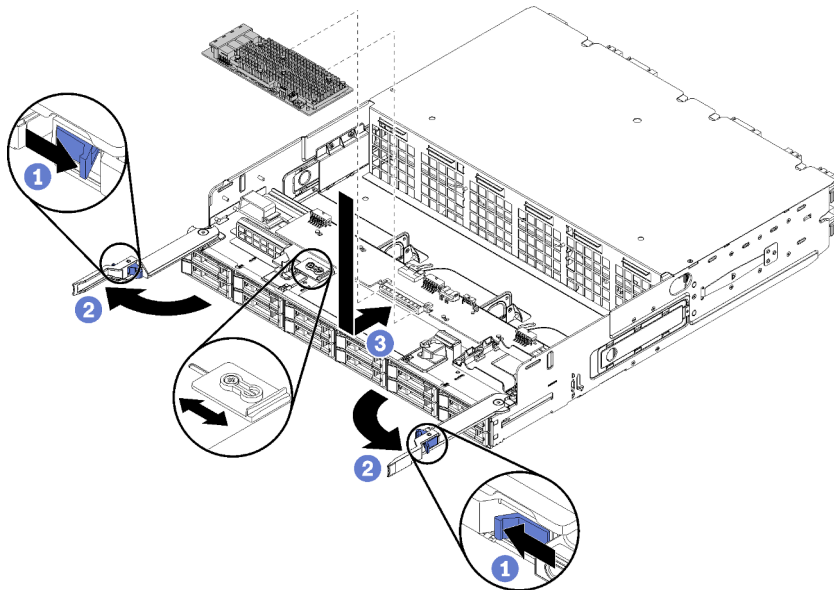


Figure 118. Upper tray RAID card installation

Note: RAID cards are available in two widths. If the RAID card that you are installing does not match the positioning of the left RAID card bracket, loosen the bracket screw, move the bracket to its other position, and tighten the bracket screw.

- Step 1. Connect the three cables to the RAID card.
- Step 2. Rotate the RAID card down and align it with the connector on the storage interposer card; then, insert the RAID card in the storage interposer card connector.

After you have installed the upper RAID card:

1. Install the upper fan cage. See [“Install a fan cage \(upper tray\)” on page 105](#).
2. Turn the tray right-side up.
3. If you removed one or more system boards or a compute system board filler from a compute tray, install the system boards or system board filler. See [“Install a system board” on page 91](#).
4. Install the upper compute tray or storage tray. See [“Install a compute tray” on page 97](#) or [“Install the storage tray \(fully removed\)” on page 209](#).
5. Install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Install a RAID card (lower tray)

The lower RAID card is in the lower compute tray that is accessed from the front of the server. Connect the three cables to the RAID card; then, connect the RAID card to the storage interposer in the lower compute tray.

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.



Complete the following steps to install a lower RAID card:

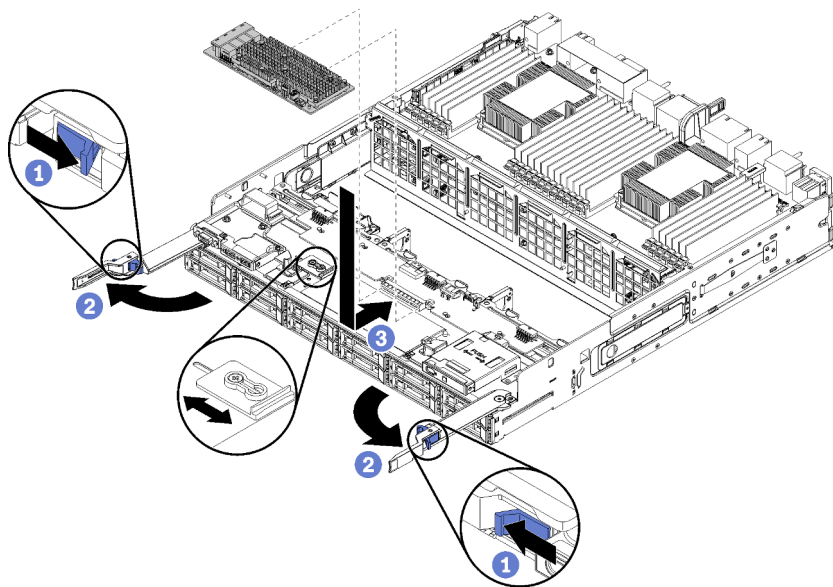


Figure 119. Lower RAID card installation

Note: RAID cards are available in two widths. If the RAID card that you are installing does not match the positioning of the left RAID card bracket, loosen the bracket screw, move the bracket to its other position, and tighten the bracket screw.

Step 1. Connect the three cables to the RAID card.

Step 2. Rotate the RAID card down and align it with the connector on the storage interposer card; then, insert the RAID card in the storage interposer card connector.

After you have installed the lower RAID card:

1. Install the lower fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
2. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See [“Install a compute tray” on page 97](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

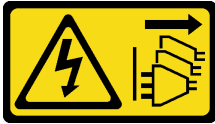
RAID flash power module replacement

RAID flash power modules are in the upper and lower trays that are accessed from the front of the server. Procedures for removing and installing RAID flash power modules in the upper and lower trays are different.

Remove a RAID flash power module (upper tray)

The upper RAID flash power module is in the upper compute tray or optional storage tray that is accessed from the front of the server. After removing the upper tray and fan cage, disconnect the RAID flash power module cable; then, remove the module from the compute tray.

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

“ [Read the Installation Guidelines](#) ” [Power off server and disconnect all power cords for this task](#) ” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an upper RAID flash power module:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the upper compute tray or storage tray. See [“Remove a compute tray” on page 95](#) or [“Remove a storage tray” on page 207](#).
3. If you removed a compute tray and it has one or more compute system boards or a system board filler installed, remove the system boards or system board filler. See [“Remove a system board” on page 89](#).
4. Turn the tray upside down and remove the upper fan cage. See [“Remove a fan cage \(upper tray\)” on page 101](#).
5. Locate the RAID flash power module in the compute tray or storage tray.

Complete the following steps to remove an upper tray RAID flash power module.

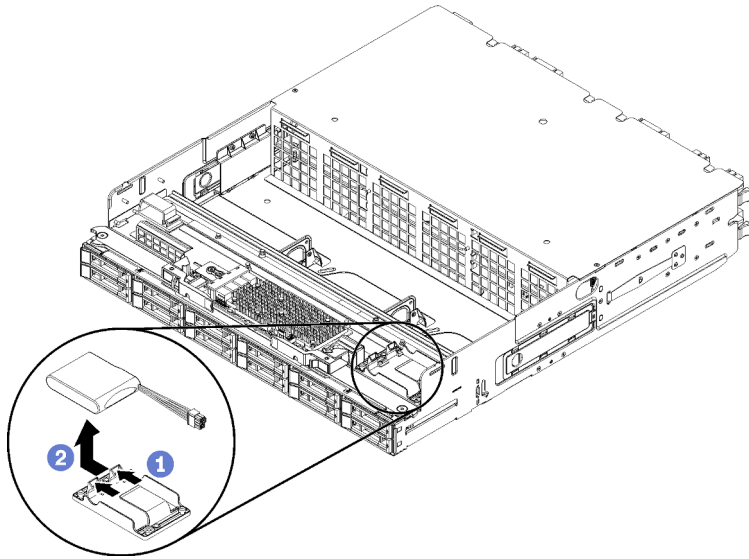


Figure 120. Upper RAID flash power module removal

- Step 1. Press the release tab and rotate the RAID flash power module upward.
- Step 2. Disconnect the cable from the RAID flash power module.
- Step 3. Remove the RAID flash power module from the compute tray or storage tray.

If you are instructed to return the RAID flash power module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a RAID flash power module (lower tray)



The lower RAID flash power module is in the lower compute tray that is accessed from the front of the server. After removing the lower compute tray and fan cage, disconnect the RAID flash power module cable; then, remove the module from the compute tray.

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.

	<p>Read the Installation Guidelines</p>		<p>Power off server and disconnect all power cords for this task</p>
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“ on page 69 ”

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove a lower RAID flash power module:

1. Remove the front cover. See “Remove the front cover” on page 110.
2. Remove the lower compute tray or extract it to the maintenance position. See “Remove a compute tray” on page 95.
3. Remove the lower fan cage. See “Remove a fan cage (lower tray)” on page 103.
4. Locate the RAID flash power module in the compute tray.

Complete the following steps to remove a lower RAID flash power module.

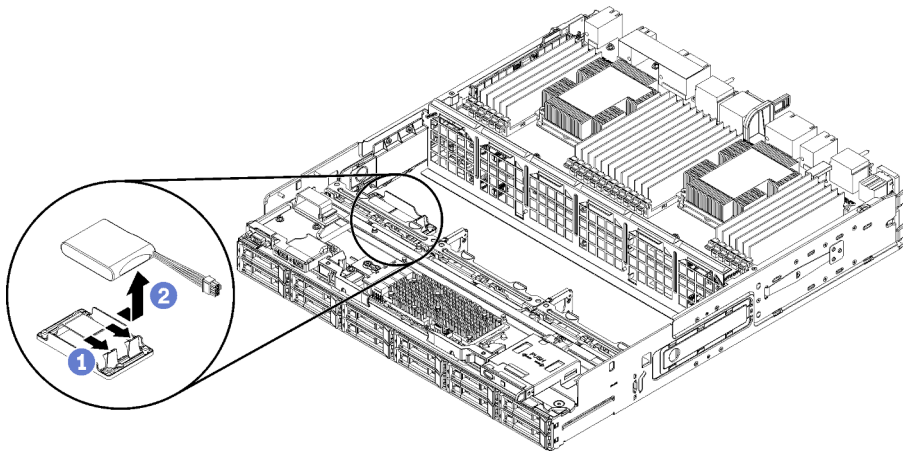


Figure 121. Lower RAID flash power module removal

- Step 1. Press the release tab and rotate the RAID flash power module upward.
- Step 2. Disconnect the cable from the RAID flash power module.
- Step 3. Remove the RAID flash power module from the compute tray.

If you are instructed to return the RAID flash power module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

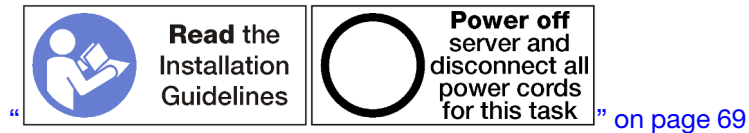
Install a RAID flash power module (upper tray)

The upper RAID flash power module is in the upper compute tray or optional storage tray that is accessed from the front of the server. Insert the RAID flash power module in its carrier; then, connect the cable.

S002

CAUTION:

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



Complete the following steps to install an upper tray RAID flash power module:

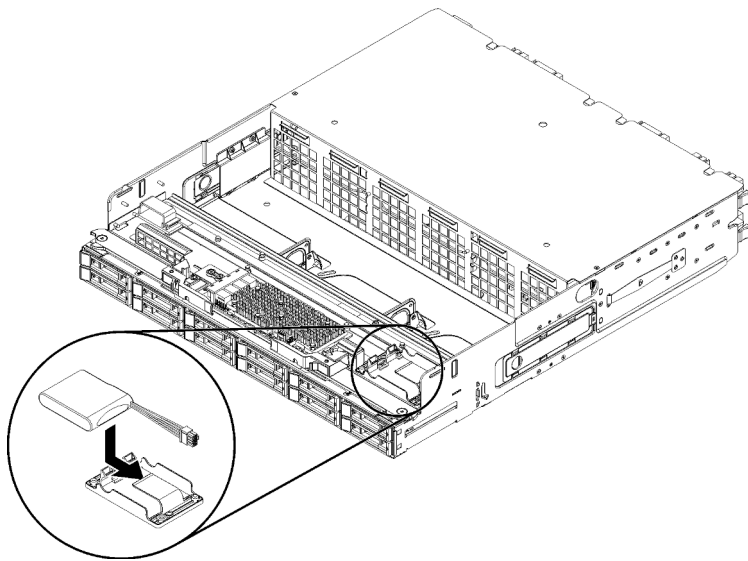


Figure 122. Upper RAID flash power module installation

- Step 1. Insert the end of the RAID flash power module into its carrier on the compute tray or storage tray.
- Step 2. Connect the cable to the RAID flash power module.
- Step 3. Rotate the RAID flash power module down into the carrier until the tab clicks in place to secure it.

After you have installed the upper RAID flash power module:

1. Make sure that all cables are correctly routed. See [“Cable routing for drives” on page 53](#) and [“Cable routing for common components” on page 50](#).
2. Install the upper fan cage. See [“Install a fan cage \(upper tray\)” on page 105](#).
3. Turn the tray right-side up.
4. If you removed one or more system boards or a compute system board filler from a compute tray, install the system boards or system board filler. See [“Install a system board” on page 91](#).
5. Install the upper compute tray or storage tray. See [“Install a compute tray” on page 97](#) or [“Install the storage tray \(fully removed\)” on page 209](#).
6. Install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Install a RAID flash power module (lower tray)

The lower RAID flash power module is in the lower compute tray that is accessed from the front of the server. Insert the RAID flash power module in its carrier; then, connect the cable.

S002



CAUTION:

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



Complete the following steps to install a lower tray RAID flash power module:

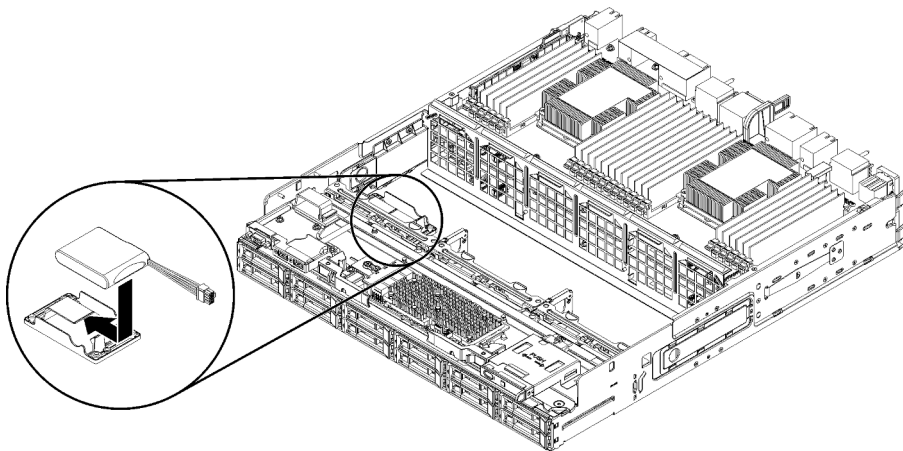


Figure 123. Lower RAID flash power module installation

- Step 1. Insert the end of the RAID flash power module into its carrier on the compute tray.
- Step 2. Connect the cable to the RAID flash power module.
- Step 3. Rotate the RAID flash power module down into the carrier until the tab clicks in place to secure it.

After you have installed the lower RAID flash power module:

1. Make sure that all cables are correctly routed. See [“Cable routing for drives” on page 53](#) and [“Cable routing for common components” on page 50](#).
2. Install the lower fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
3. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See [“Install a compute tray” on page 97](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Riser replacement

Risers are in the I/O tray that is accessed from the rear of the server. The removal and installation procedures for each riser type are different and are described in the following topics:

- Riser for slot 1 to 4 (riser 1): see [“Remove the riser for slot 1 to 4 \(riser 1\)” on page 187](#) and [“Install the riser for slot 1 to 4 \(riser 1\)” on page 193](#)

Note: There is no riser for slot 5 to 7, the ML2 x16 network adapter (slot 8), and the LOM adapter (slot 9); these adapters install directly in the I/O tray.

- Riser for slot 10 to 15 (riser 2): see [“Remove the riser for slot 10 to 15 \(riser 2\)” on page 188](#) and [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#)

Riser bracket for slot 14 to 15 (riser 2): see [“Remove the riser bracket for slot 14 to 15 \(riser 2\)” on page 191](#) and [“Install the riser bracket for slot 14 to 15 \(riser 2\)” on page 196](#)

- Riser for slot 16 and 17 (riser 3): see [“Remove the riser for slot 16 to 17 \(riser 3\)” on page 192](#) and [“Install the riser for slot 16 to 17 \(riser 3\)” on page 197](#)

Remove the riser for slot 1 to 4 (riser 1)

The riser for adapter slot 1 to 4 (riser 1) is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray, loosen the two captive screws that secure the riser to the I/O tray; then, remove the riser from the I/O tray.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the riser for slot 1 to 4, disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).

Complete the following steps to remove the riser for slot 1 to 4 (riser 1).

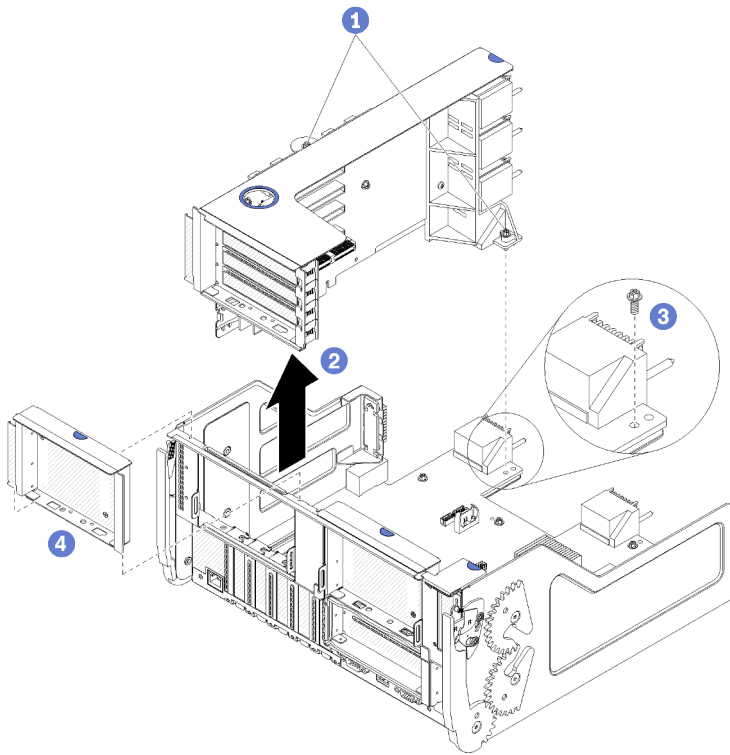


Figure 124. Riser for slot 1 to 4 (riser 1) removal

Step 1. Loosen the two captive screws (items 1 in preceding figure) that secure the riser to the I/O tray board.

Step 2. Lift the riser up and out of the I/O tray.

After you remove the riser:

- If you are replacing the riser, remove any adapters installed in the riser. See [“Remove a PCIe adapter from slot 1 to 4” on page 72](#).
- If you are removing the riser and are not installing a replacement:
 1. Install the screw that secures the I/O tray board to the I/O tray (item 3 in the figure). This screw replaces the captive screw on the rear edge of the riser below the midplane connectors. Screw location is labelled “Remove screw before installing riser” on the I/O board.
 2. Install the I/O tray fillers in adapter slot 1 to 4 (item 4 in the figure).
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

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

Demo video

[Watch the procedure on YouTube](#)

Remove the riser for slot 10 to 15 (riser 2)

The riser for adapter slot 10 to 15 (riser 2) is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray, loosen the two captive screws that secure the riser to the I/O tray; then, remove the riser from the I/O tray.

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.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the riser for slot 10 to 15, disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).

Complete the following steps to remove the riser for slot 10 to 15 (riser 2).

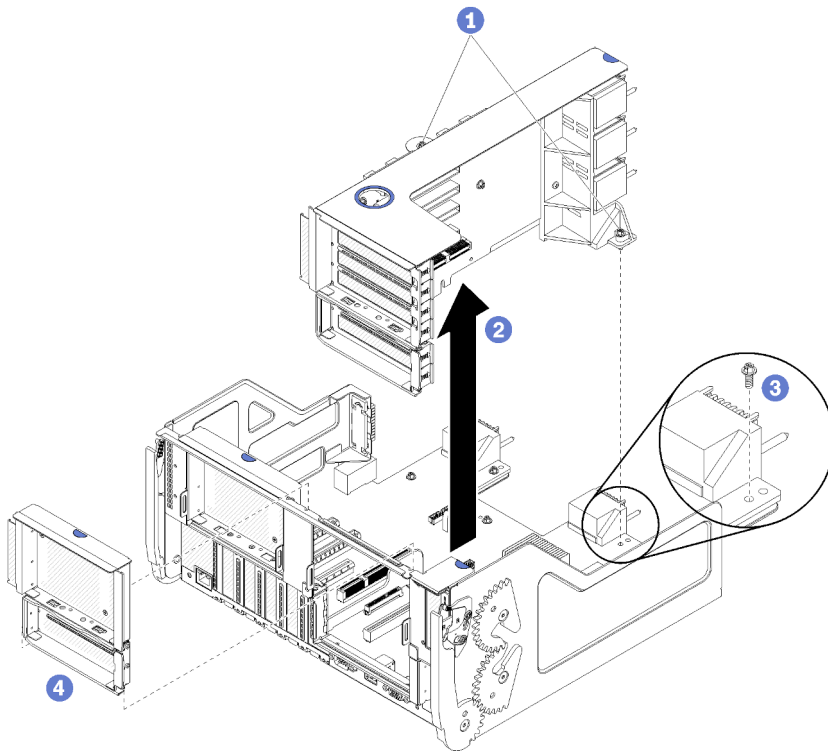


Figure 125. Riser for slot 10 to 15 (riser 2) removal

Step 1. Loosen the two captive screws (items 1 in preceding figure) that secure the riser to the I/O tray board.

Step 2. Lift the riser up and out of the I/O tray.

After you remove the riser:

- If you are replacing the riser:
 1. Remove any adapters installed in the riser. See [“Remove a PCIe adapter from slot 10 to 15” on page 76](#).
 2. If a slot 14 to 15 bracket is installed on the riser, remove it. See [“Remove the riser bracket for slot 14 to 15 \(riser 2\)” on page 191](#).
- If you are removing the riser and are not installing a replacement:
 1. Install the screw that secures the I/O tray board to the I/O tray (item 3 in the figure). This screw replaces the captive screw on the rear edge of the riser below the midplane connectors. Screw location is labelled “Remove screw before installing riser” on the I/O board.
 2. Install the I/O tray fillers in adapter slot 10 to 15 (item 4 in the figure).
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

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

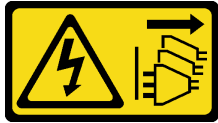
Demo video

[Watch the procedure on YouTube](#)

Remove the riser bracket for slot 14 to 15 (riser 2)

The riser bracket for slot 14 to 15 is attached to the slot 10 to 15 I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slot 10 to 15 (riser 2), release the retaining clips and remove the bracket from the riser.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the riser bracket:

1. Disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).
2. Remove the riser for slot 10 to 15 (riser 2). See [“Remove the riser for slot 10 to 15 \(riser 2\)” on page 188](#).
3. Remove any adapters that are installed in slots 14 or 15. See [“Remove a PCIe adapter from slot 10 to 15” on page 76](#).

Complete the following steps to remove the riser bracket.

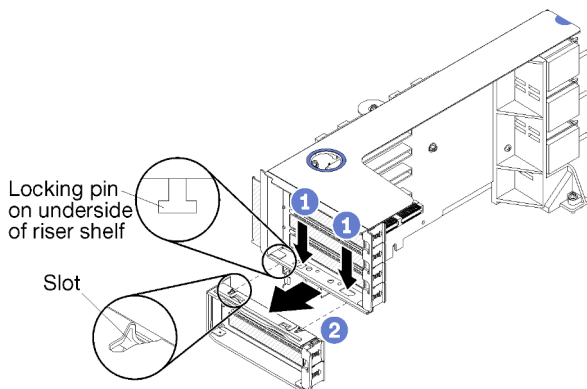


Figure 126. Riser bracket removal (slot 14 to 15)

- Step 1. Open the retaining clips.
- Step 2. Slide the bracket from the riser.

After you remove the riser bracket:

- If you are removing the riser bracket and are not installing a replacement.

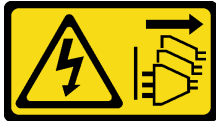
Note: If the riser bracket for slot 14 to 15 is not installed, you will not be able to install PCIe adapters in slot 14 to 15.

1. Install a filler for slot 14 to 15 on the I/O tray.
2. Install the riser. See [“Install the riser for slot 10 to 15 \(riser 2\)” on page 195](#).
3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

Remove the riser for slot 16 to 17 (riser 3)

The riser for adapter slot 16 to 17 is in the I/O tray that is accessed from the rear of the server. After removing the I/O tray, loosen the captive screw that secures the riser to the I/O tray; then, remove the riser from the I/O tray.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the riser for slot 16 to 17, disconnect and label all cables connected to adapters in the I/O tray; then, remove the I/O tray. See [“Remove the I/O tray” on page 130](#).

Complete the following steps to remove the riser for slot 16 to 17.

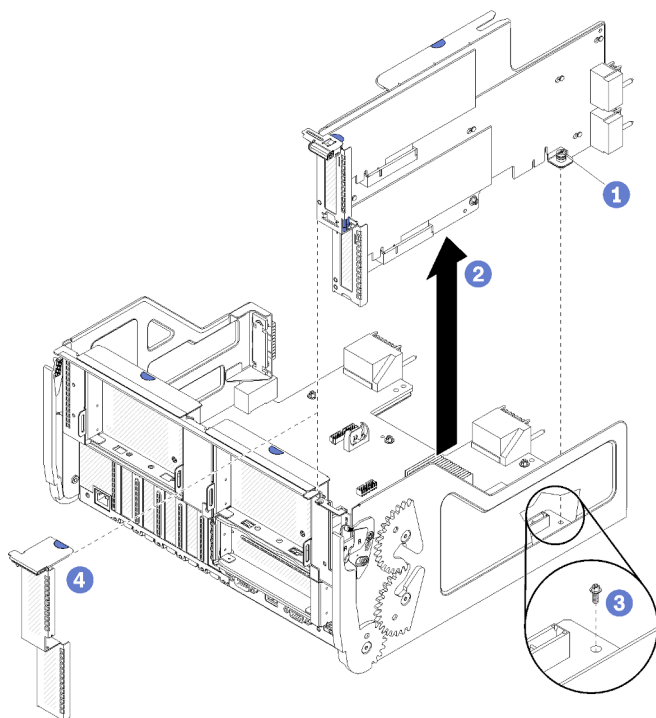


Figure 127. Riser for slot 16 to 17 removal

Step 1. Loosen the captive screw (item 1 in preceding figure) that secures the riser to the I/O tray board.

Step 2. Lift the riser up and out of the I/O tray.

After you remove the riser:

- If you are replacing the riser, remove any adapters installed in the riser. See [“Remove an I/O adapter from slot 16 to 17” on page 77](#).
- If you are removing the riser and are not installing a replacement:
 1. Install the screw that secures the I/O tray board to the I/O tray (item 3 in the figure). This screw replaces the captive screw on the rear edge of the riser below the midplane connectors. Screw location is labelled “Remove screw before installing riser” on the I/O board.
 2. Install the I/O tray fillers in adapter slot 16 to 17 (item 4 in the figure).
 3. Install the I/O tray and connect all cables. See [“Install the I/O tray” on page 132](#).

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

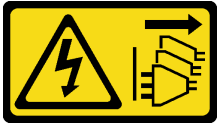
Demo video

[Watch the procedure on YouTube](#)

Install the riser for slot 1 to 4 (riser 1)

The riser for adapter slot 1 to 4 (riser 1) is in the I/O tray that is accessed from the rear of the server. After installing adapters in the riser, insert the riser in the I/O tray and secure it with two captive screws.

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.



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Before you install the riser for slot 1 to 4:

1. Make sure that there is no screw (item 2 in following figure) securing the I/O tray board to the I/O tray in a location where a captive riser screw will be installed.
2. Make sure that there are no I/O tray fillers installed in riser slot 1 to 4.
3. Install adapters in the riser. See “[Install a PCIe adapter in slot 1 to 4](#)” on page 79.
4. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.

Complete the following steps to install the riser for slot 1 to 4.

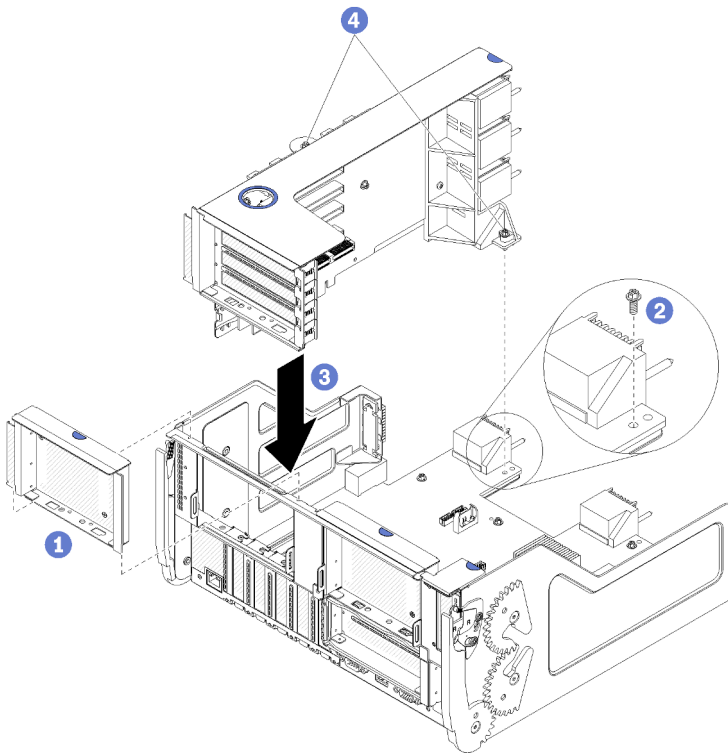


Figure 128. Riser for slot 1 to 4 (riser 1) installation

- Step 1. Align the riser with the I/O tray and insert it; then, press the riser into the I/O tray until the connector is fully seated.
- Step 2. Tighten the two captive screws (items 4 in preceding figure) that secure the riser to the I/O tray board.

If you have no other operations to perform on the I/O tray after installing the riser for slot 1 to 4, install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132](#).

Demo video

[Watch the procedure on YouTube](#)

Install the riser for slot 10 to 15 (riser 2)

The riser for adapter slot 10 to 15 (riser 2) is in the I/O tray that is accessed from the rear of the server. After installing adapters in the riser, insert the riser in the I/O tray and secure it with two captive screws.

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.



Before you install the riser for slot 10 to 15:

1. Make sure that there is no screw (item 2 in following figure) securing the I/O tray board to the I/O tray in a location where a captive riser screw will be installed.
2. Make sure that there are no I/O tray fillers installed in riser slot 10 to 15.
3. Install the slot 14 to 15 bracket, if one was removed from the old riser. See [“Install the riser bracket for slot 14 to 15 \(riser 2\)” on page 196](#).
4. Install adapters in the riser. See [“Install a PCIe adapter in slot 10 to 15” on page 82](#).
5. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.

Complete the following steps to install the riser for slot 10 to 15.

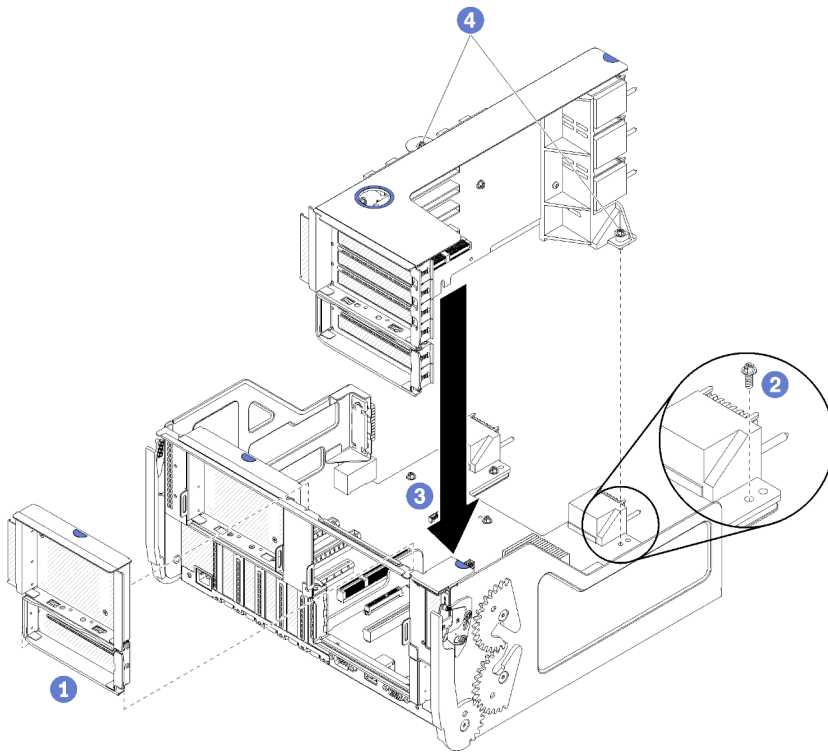


Figure 129. Riser for slot 10 to 15 (riser 2) installation

- Step 1. Align the riser with the I/O tray and insert it; then, press the riser into the I/O tray until the connector is fully seated.
- Step 2. Tighten the two captive screws (items 4 in preceding figure) that secure the riser to the I/O tray board.

If you have no other operations to perform on the I/O tray after installing the riser for slot 10 to 15, install the I/O tray in the chassis and connect all cables. See [“Install the I/O tray” on page 132](#).

Demo video

[Watch the procedure on YouTube](#)

Install the riser bracket for slot 14 to 15 (riser 2)

The riser bracket for slot 14 to 15 is attached to the slot 10 to 15 I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slot 10 to 15 (riser 2), slide the bracket onto the riser until the retaining clips engage.

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.



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Before you install the riser bracket, make sure that there is no filler installed on the I/O tray for slot 14 to 15.

Complete the following steps to install the riser bracket.

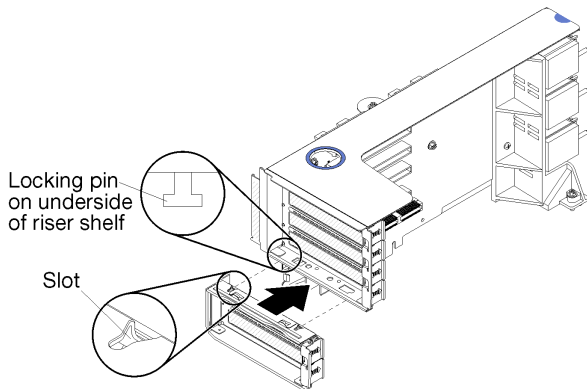


Figure 130. Riser bracket installation (slot 14 to 15)

Step 1. Align the slots on the riser bracket with the pins on the riser and slide it in place; then, press the bracket onto the riser until the retaining clips engage.

If you have no other operations to perform on the riser after installing an adapter in slot 10 to 15:

1. Install adapters in the riser. See “Install a PCIe adapter in slot 10 to 15” on page 82.
2. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.
3. Install the riser in the I/O tray. See “Install the riser for slot 10 to 15 (riser 2)” on page 195.
4. Install the I/O tray in the chassis and connect all cables. See “Install the I/O tray” on page 132.

Install the riser for slot 16 to 17 (riser 3)

The riser for adapter slot 16 to 17 is in the I/O tray that is accessed from the rear of the server. After installing adapters in the riser, insert the riser in the I/O tray and secure it with the captive screw.

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.



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Attention: Do *not* use the riser for slot 16 to 17 with four socket storage rich configurations.

Before you install the riser for slot 16 to 17:

1. Make sure that there is no screw (item 2 in following figure) securing the I/O tray board to the I/O tray in a location where a captive riser screw will be installed.
2. Make sure that there are no I/O tray fillers installed in adapter slot 16 to 17.
3. Install adapters in the riser. See “[Install an I/O adapter in slot 16 to 17](#)” on page 84.
4. If any of the adapters in the riser have internal cables, make sure that they are connected before installing the riser in the I/O tray.

Complete the following steps to install the riser for slot 16 to 17.

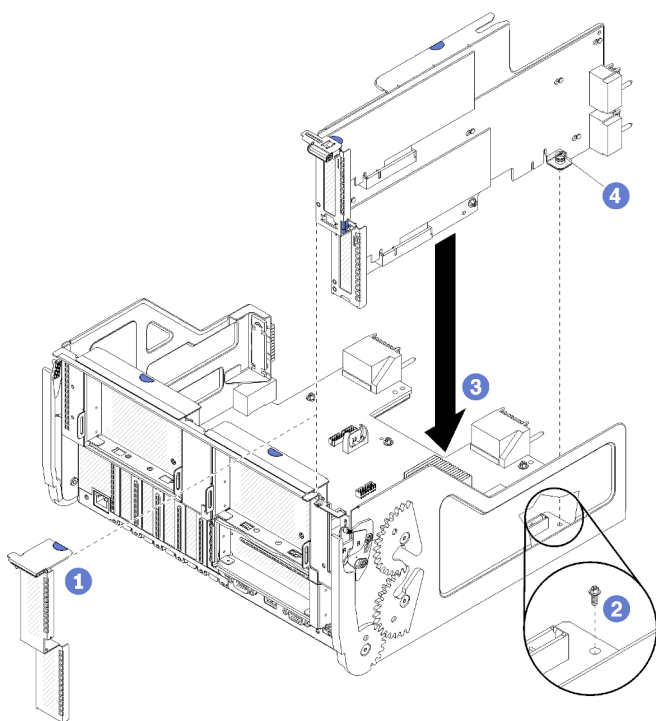


Figure 131. Riser for slot 16 to 17 installation

- Step 1. Align the riser with the I/O tray, making sure that the sides of the riser fit into the guides on the I/O tray, and insert the riser; then, press the riser into the I/O tray until the connector is fully seated.
- Step 2. Tighten the captive screw (item 4 in preceding figure) that secures the riser to the I/O tray board.

If you have no other operations to perform on the I/O tray after installing the riser for slot 16 to 17, install the I/O tray in the chassis and connect all cables. See “[Install the I/O tray](#)” on page 132.

Demo video

[Watch the procedure on YouTube](#)

Storage board assembly replacement

The storage board assembly is in the upper storage tray that is accessed from the front of the server.

Remove a storage board assembly

Remove a storage board assembly by disconnecting the cables inside the storage tray, pressing the release clips on the storage board assembly, and sliding it out of the storage tray.

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.



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CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove the storage board assembly:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the storage tray. See [“Remove a storage tray” on page 207](#).

Complete the following steps to remove the storage board assembly:

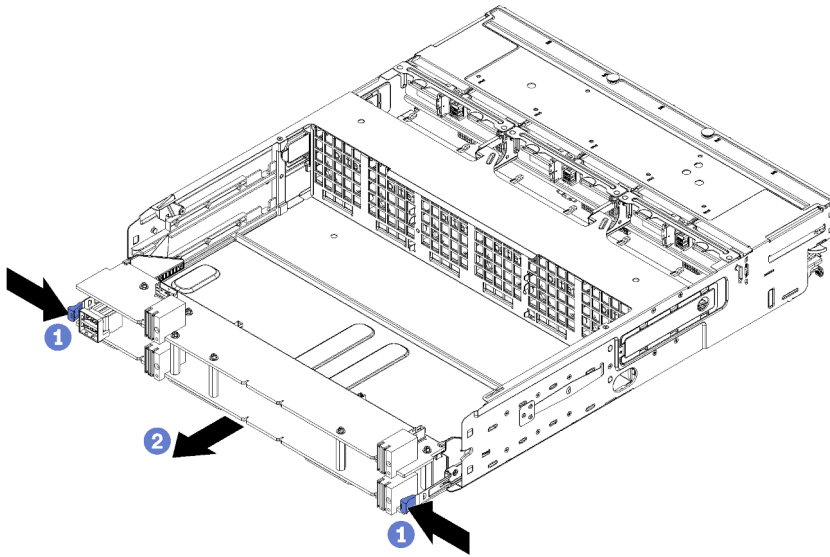


Figure 132. Storage board assembly removal

- Step 1. Disconnect all cables on the storage board assembly that go to connectors in the storage tray. See [“Internal cable routing” on page 48](#).
- Step 2. Press the release clips on the lower board of the storage board assembly and slide the storage board assembly out of the storage tray.

After you remove the storage board assembly, install the storage tray and front cover. See [“Install the storage tray \(fully removed\)” on page 209](#) and [“Install the front cover” on page 111](#).

If you are instructed to return the storage board assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a storage board assembly

Install a storage board assembly by inserting it in the storage tray, pushing it in until it locks in place, and connecting the cables.

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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.



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Complete the following steps to install the storage board assembly:

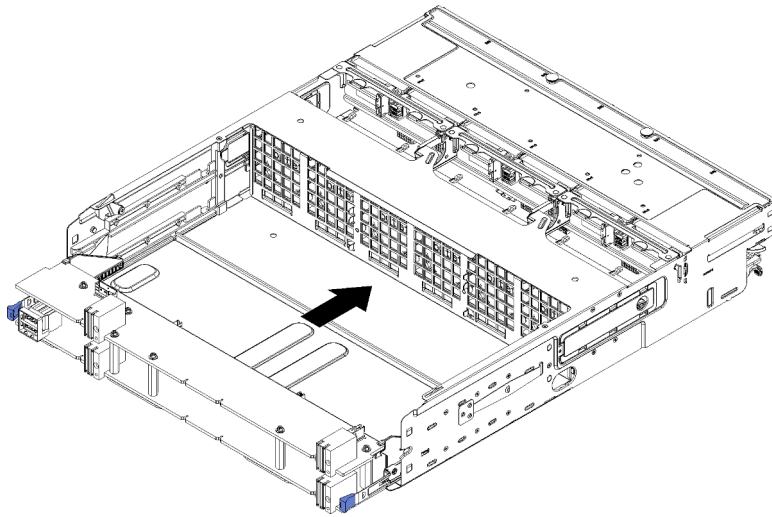


Figure 133. Storage board assembly installation

- Step 1. Align the upper and lower storage board assembly boards with the rails in the storage tray; then, insert the storage board assembly.
- Step 2. Slide the storage board assembly into the storage tray until the release clips on the lower board snap into the locked position.
- Step 3. Connect all cables on the storage board assembly that go to connectors in the storage tray. See [“Internal cable routing” on page 48](#).

After you install the storage board assembly, install the storage tray and front cover. See [“Install the storage tray \(fully removed\)” on page 209](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Storage interposer replacement

Storage interposers are in the upper and lower trays that are accessed from the front of the server. Procedures for removing and installing storage interposers in the upper and lower trays are different.

Remove a storage interposer (upper tray)

The upper storage interposer is in the upper compute tray or optional storage tray that is accessed from the front of the server. After removing the upper tray and fan cage, disconnect the RAID card from the storage interposer and lift it out of the way; then, remove the screw securing the storage interposer and remove the storage interposer from the tray.

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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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an upper storage interposer:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the upper compute tray or storage tray. See [“Remove a compute tray” on page 95](#) or [“Remove a storage tray” on page 207](#).
3. If you removed a compute tray and it has one or more compute system boards installed or a system board filler, remove the system boards or system board filler. See [“Remove a system board” on page 89](#).
4. Turn the tray upside down and remove the upper fan cage. See [“Remove a fan cage \(upper tray\)” on page 101](#).

Complete the following steps to remove an upper storage interposer.

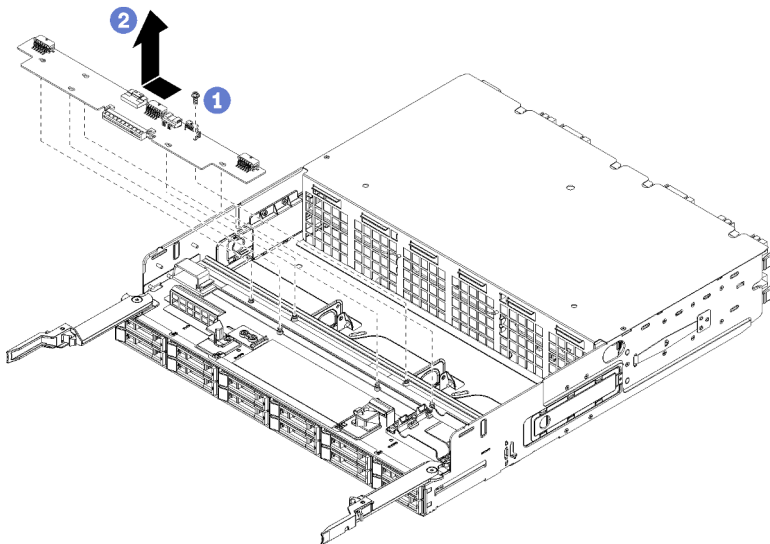


Figure 134. Upper storage interposer removal

Step 1. Disconnect all power and data cables from the storage interposer.

- Step 2. Slide the RAID card forward to disconnect the RAID card from the storage interposer; then, rotate the RAID card upward. (Leave the three cables connected to the RAID card.)
- Step 3. Remove the screw securing the storage interposer in place.
- Step 4. Slide the storage interposer to the left and remove it from the tray.

If you are instructed to return the storage interposer, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a storage interposer (lower tray)



The lower storage interposer is in the lower compute tray that is accessed from the front of the server. After removing the lower compute tray and fan cage, disconnect the RAID card from the storage interposer and lift it out of the way; then, remove the screw securing the storage interposer and remove the storage interposer from the compute tray.

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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.

“  **Read the Installation Guidelines**  **Power off server and disconnect all power cords for this task** ” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an lower storage interposer:

1. Remove the front cover. See [“Remove the front cover” on page 110](#).
2. Remove the lower compute tray or extract it to the maintenance position. See [“Remove a compute tray” on page 95](#).
3. Remove the lower fan cage. See [“Remove a fan cage \(lower tray\)” on page 103](#).

Complete the following steps to remove a lower storage interposer.

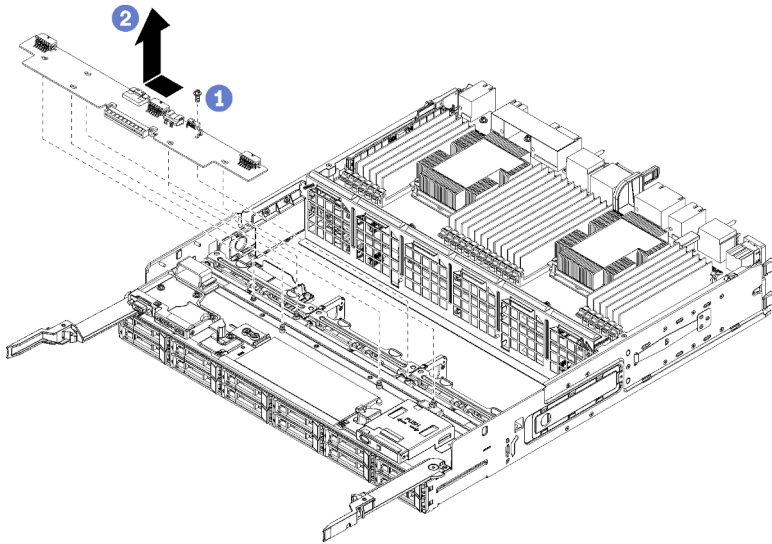


Figure 135. Lower storage interposer removal

- Step 1. Disconnect all power and data cables from the storage interposer.
- Step 2. Slide the RAID card forward to disconnect the RAID card from the storage interposer; then, rotate the RAID card upward. (Leave the three cables connected to the RAID card.)
- Step 3. Remove the screw securing the storage interposer in place.
- Step 4. Slide the storage interposer to the left and remove it from the compute tray.

If you are instructed to return the storage interposer, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a storage interposer (upper tray)

The upper storage interposer is in the upper compute tray or optional storage tray that is accessed from the front of the server. Insert the storage interposer in the upper tray and secure it with the screw; then, connect the RAID card to the storage interposer and install the fan cage and upper tray.

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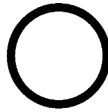


CAUTION:

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install an upper tray storage interposer:

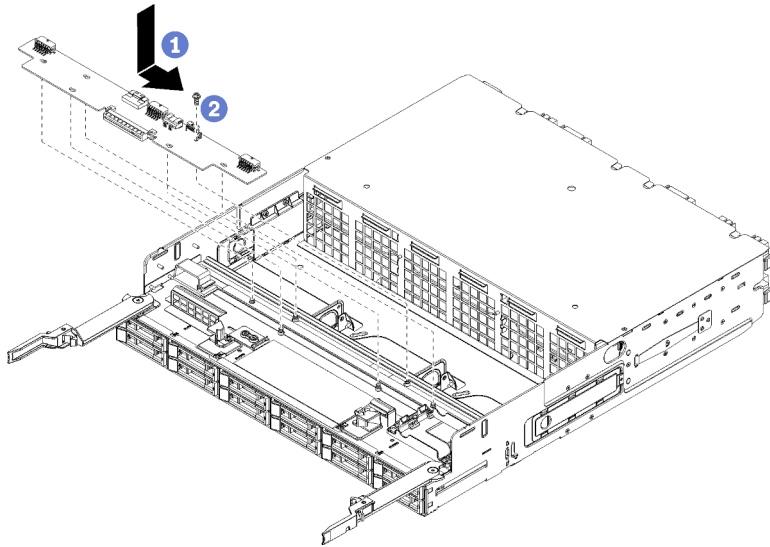


Figure 136. Upper tray storage interposer installation

- Step 1. Position the storage interposer over the pins on the tray; then, slide the storage interposer to the right.
- Step 2. Secure the storage interposer with the screw.
- Step 3. Rotate the RAID card down and align it with the connector on the storage interposer; then, insert the RAID card in the storage interposer connector.
- Step 4. Connect the power and data cables to the storage interposer.

After you have installed the upper storage interposer:

1. Install the upper fan cage. See [“Install a fan cage \(upper tray\)” on page 105](#).
2. Turn the tray right-side up.
3. If you removed one or more system boards or a compute system board filler from a compute tray, install the system boards or system board filler. See [“Install a system board” on page 91](#).
4. Install the upper compute tray or storage tray. See [“Install a compute tray” on page 97](#) or [“Install the storage tray \(fully removed\)” on page 209](#).
5. Install the front cover. See [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Install a storage interposer (lower tray)

The lower storage interposer is in the lower compute tray that is accessed from the front of the server. Insert the storage interposer in the lower compute tray and secure it with the screw; then, connect the RAID card to the storage interposer and install the fan cage and lower compute tray.

S002

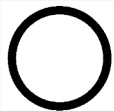


CAUTION:

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.



**Read the
Installation
Guidelines**



**Power off
server and
disconnect all
power cords
for this task**

” on page 69

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install a lower storage interposer:

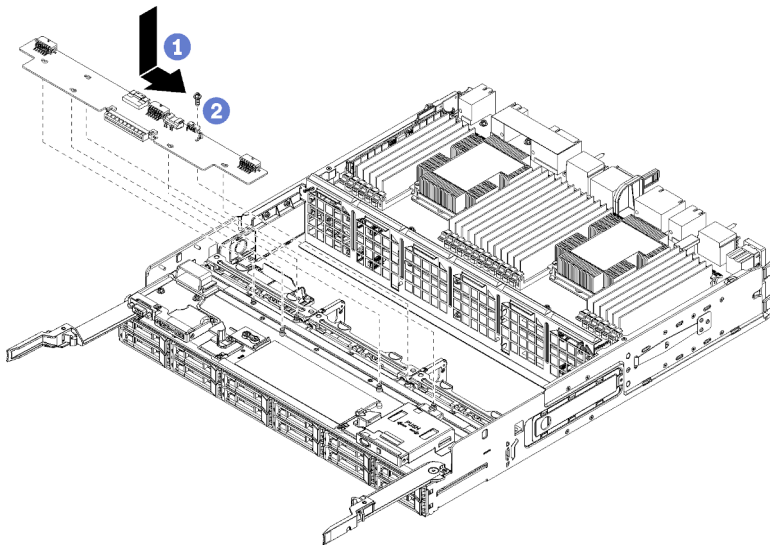


Figure 137. Lower storage interposer installation

- Step 1. Position the storage interposer over the pins on the compute tray; then, slide the storage interposer to the right.
- Step 2. Secure the storage interposer with the screw.
- Step 3. Rotate the RAID card down and align it with the connector on the storage interposer; then, insert the RAID card in the storage interposer connector.

Step 4. Connect the power and data cables to the storage interposer.

After you have installed the lower storage interposer:

1. Install the lower fan cage. See [“Install a fan cage \(lower tray\)” on page 107](#).
2. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See [“Install a compute tray” on page 97](#) and [“Install the front cover” on page 111](#).

Demo video

[Watch the procedure on YouTube](#)

Storage tray replacement

The storage tray is in the upper bay that is accessed from the front of the server. This optional device is used only in storage-rich server configurations.

Remove a storage tray

The storage tray is accessed from the front of the server. Open the release levers to extract the storage tray, pressing the release tabs when it stops to remove the tray fully from the chassis.

Attention: If you are removing a storage tray and do not plan to replace it, relocate or backup data that is on the hard disk drives in the storage tray before removing it.

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.



CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Before you remove an optional storage tray, remove the front cover. See [“Remove the front cover” on page 110](#).

Complete the following steps to remove a storage tray.

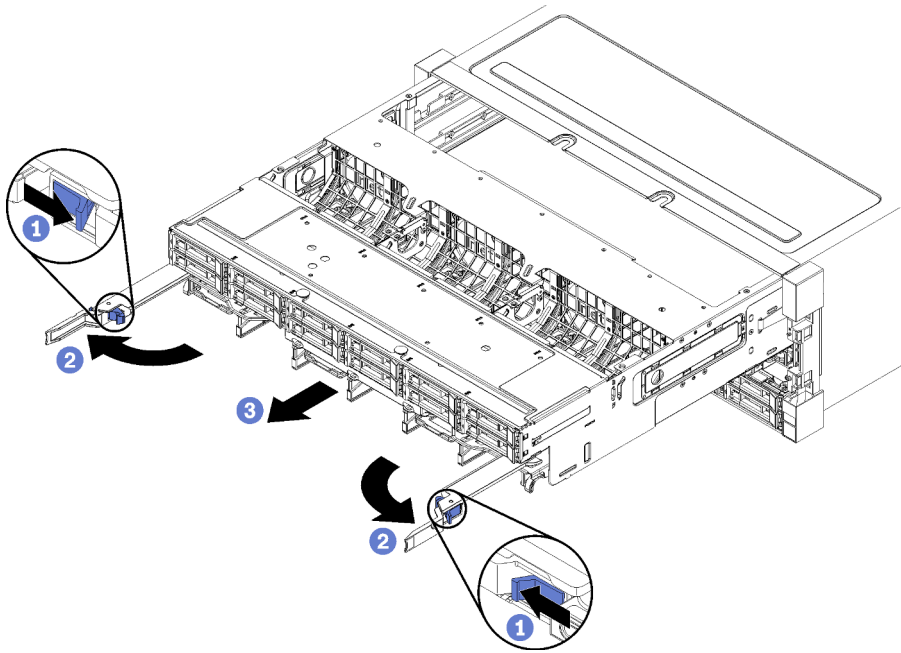


Figure 138. Storage tray removal to stop position

- Step 1. Press the button on each release lever; then, simultaneously rotate the release levers until they are perpendicular to the chassis.
- Step 2. Pull storage tray forward evenly until it stops; then, close the release levers.
- Step 3. Press the release tabs on either side of the tray; then, slide the tray fully forward evenly and remove it from the chassis.

Attention:

- Be prepared to support the full weight of the storage tray when you remove it from the chassis.
- Do not use the release levers as handles to support the storage tray.

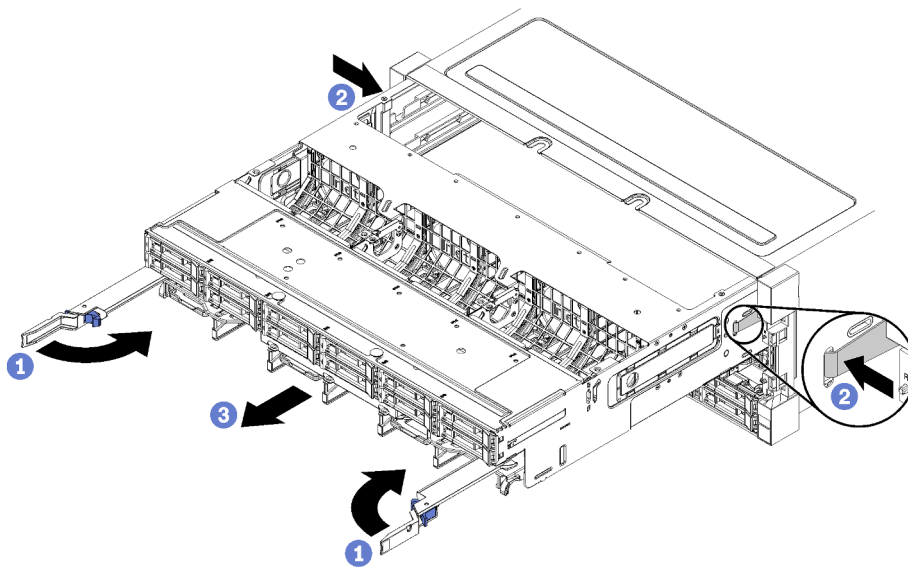


Figure 139. Storage tray removal from chassis

After you remove the storage tray:

- If you are replacing the storage tray as part of a maintenance operation, remove all of the following components from the tray; then, place them on a static-protective surface or install them on the new storage tray:
 - Storage board assembly (see [“Storage board assembly replacement” on page 199](#))
 - Fan cages (see [“Fan cage replacement” on page 101](#))
 - Storage interposer (see [“Storage interposer replacement” on page 201](#))
 - RAID card (see [“RAID card replacement” on page 176](#))
 - Hard disk drive backplane (see [“Hard disk drive backplane replacement” on page 118](#))
 - Hard disk drives and fillers (see [“Hard disk drive replacement” on page 126](#))
 - Cables (see [“Internal cable routing” on page 48](#))
- If you are instructed to return the storage tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the storage tray (fully removed)

Install the storage tray when it is fully removed by inserting it in the front of the chassis, pushing it in until it stops, and closing the release levers.

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.



Before you install an optional storage tray:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Make sure that all internal cables are correctly routed. See [“Internal cable routing” on page 48](#).

Complete the following steps to install a storage tray when it is fully removed from the chassis:

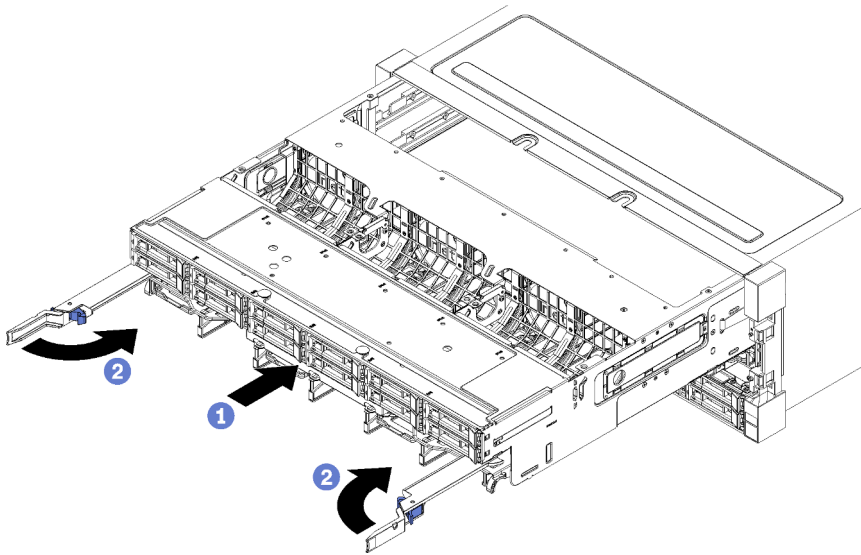


Figure 140. Storage tray installation (fully removed)

- Step 1. Align the storage tray with its opening in the upper bay at the front of the chassis and insert.
- Step 2. Fully open the storage tray release levers and push the tray into the chassis until it stops.
- Step 3. Rotate the storage tray release levers until they lock, fully closed.

If you are done performing installation or maintenance procedures at the front of the chassis, install the front cover. See [“Install the front cover” on page 111](#).

Demo video




[Watch the procedure on YouTube](#)

TCM/TPM adapter replacement (for Chinese Mainland only)

Use this information to remove and install the TCM/TPM adapter (sometimes called a daughter card).

Remove the TCM/TPM adapter (for Chinese Mainland only)

Use this information to remove the TCM/TPM adapter.

 <p>Read the Installation Guidelines</p>	 <p>Power Off the server for this task</p>
<p>“ on page 69 “</p>	
<p>” on page 28 “</p>	
 <p>ATTENTION: Static Sensitive Device Ground package before opening</p>	
<p>” on page 71</p>	

Before removing the TCM/TPM adapter, remove the top cover. See [“Remove the front cover” on page 110](#). Then, locate the TCM/TPM connector on the system board.

To remove the TCM/TPM adapter, complete the following steps:

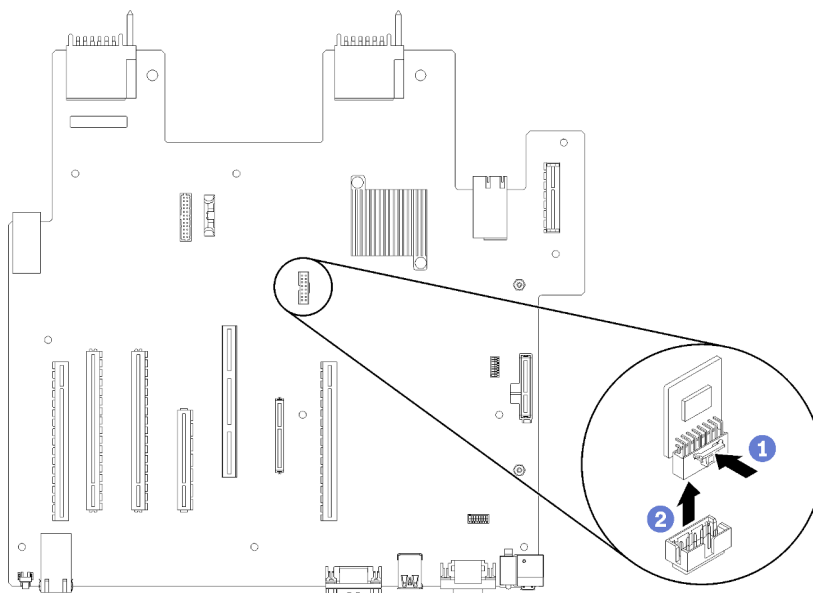


Figure 141. TCM/TPM adapter removal

- Step 1. Press and hold the release latch.
- Step 2. Lift the TCM/TPM adapter straight up.




Notes:

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

If you are instructed to return the old TCM/TPM adapter, follow all packaging instructions and use any packaging materials that are provided.

Install the TCM/TPM adapter (for Chinese Mainland only)

Use this information to install the TCM/TPM adapter.

 <p>Read the Installation Guidelines</p>	 <p>Power Off the server for this task</p>
<p>“ on page 69 “</p>	
 <p>ATTENTION: Static Sensitive Device Ground package before opening</p>	
<p>” on page 71</p>	

Before installing the TCM/TPM adapter, touch the static-protective package that contains the new TCM/TPM adapter to any unpainted surface on the outside of the server. Then, take the new TCM/TPM adapter out of the package and place it on a static-protective surface.

To install the TCM/TPM adapter, locate the TCM/TPM connector on the system board, and complete the following step:

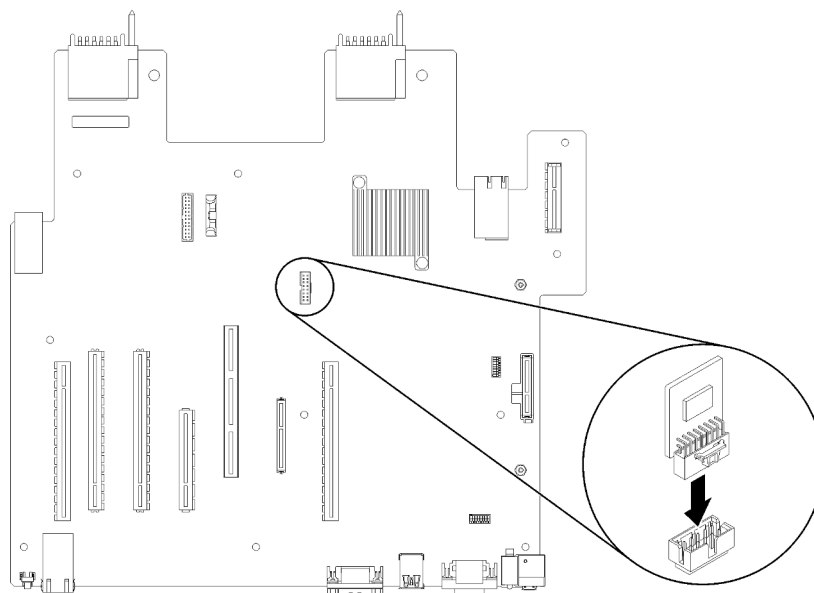


Figure 142. TCM/TPM adapter installation

Step 1. Insert the TCM/TPM adapter into the TCM/TPM connector on the system board.

Notes:

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

After installing the TCM/TPM adapter, complete the parts replacement. See [“Complete the parts replacement” on page 215](#).

Upper tray filler replacement

The upper tray filler is in the upper bay that is accessed from the front of the server. This optional component is used only in some server configurations.

Remove the upper tray filler

The upper tray filler is at the front of the server. Remove the four screws securing the upper tray filler; then, slide the filler out of the front of the server.

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.

S037



CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:

Use safe practices when lifting.



“ on page 69 “



” on page 28

Before you remove the upper tray filler, remove the server from the rack. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at https://pubs.lenovo.com/sr950/pdf_files.html.

Complete the following steps to remove the upper tray filler:

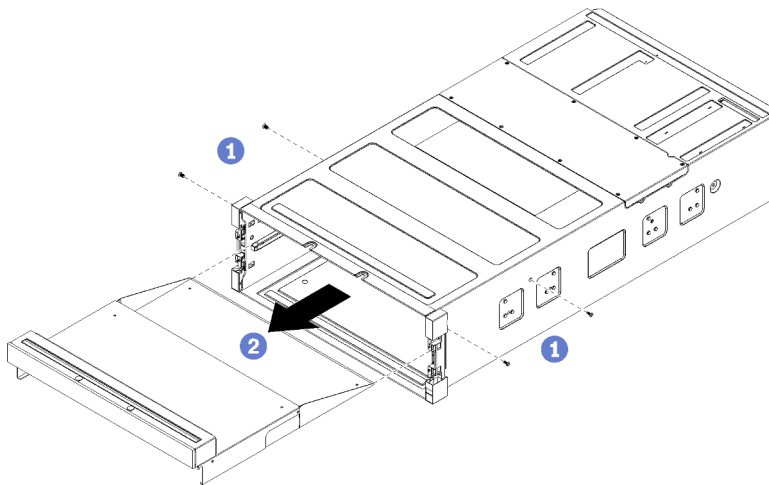


Figure 143. Upper tray filler removal

Note: Before removing the upper tray filler, make sure that the lower compute tray is removed from the server.

Step 1. Remove the four screws (two each side) securing the upper tray filler.

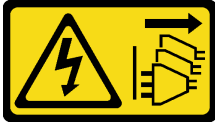
Step 2. Slide the upper tray filler out of the front of the server.

If you are instructed to return an upper tray filler, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Install the upper tray filler

The upper tray filler is at the front of the server. Insert the upper tray filler in the front of the server and secure it with four screws.

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.

S037



CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:

Use safe practices when lifting.



“ on page 69 “



” on page 28

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Complete the following steps to install the upper tray filler:

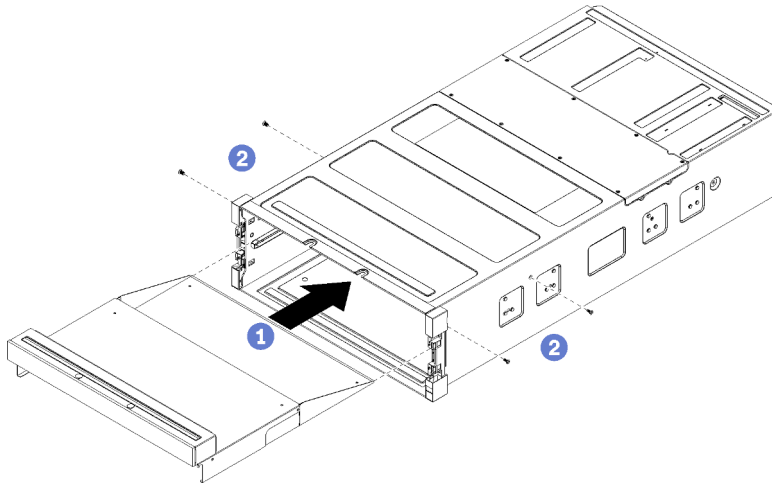


Figure 144. Upper tray filler installation

Note: Before installing the upper tray filler, make sure that the lower compute tray is removed from the server.

- Step 1. Align the upper tray filler with its opening in the upper bay at the front of the server and insert.
- Step 2. Push the upper tray filler into server until it stops, making sure that the posts on the upper tray filler fit into the slots in the upper tray filler opening.
- Step 3. Secure the upper tray filler with four screws (two each side).

Install the server in the rack and replace all components. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at https://pubs.lenovo.com/sr950/pdf_files.html.

Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If you have removed the server front cover, reinstall it. See “[Install the front cover](#)” on page 111.
4. Reconnect external cables and power cords to the server.

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

5. Update the server configuration.
 - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>.
 - Update the system firmware. See “[Firmware updates](#)” on page 23.
 - 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.

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/sr950/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:

All Event Sources

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 145. 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 System name: XCC0023579PK

Event Log Audit Log Maintenance History

Customize Table Clear Logs Refresh

Type: All Source All Date

Severity	Source	Event ID	Message	Date
Error	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
Info	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Info	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 146. 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/>

Light path diagnostics

Light path diagnostics 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.

Operator panel light path LEDs

The following illustration shows the light path diagnostic LEDs for the server, which are located on the operator information panel.

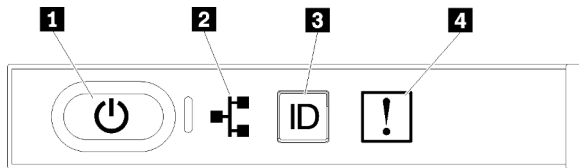


Figure 147. Operator information panel LEDs

Table 36. Light path diagnostics: Operator information panel LED status and actions

LED	Description	Action
1 Power button and power LED	Indicates power status of the server.	Not used for troubleshooting server beyond providing power status. See “ Front operator panel ” on page 33 for additional information.
2 Network activity LED	Indicates activity between the server and the Ethernet LAN.	Not used for troubleshooting server beyond providing network activity status. See “ Front operator panel ” on page 33 for additional information.
3 System ID LED (blue)	This LED is used as a presence detection LED. You can use Lenovo XClarity Controller to light this LED remotely.	Use this LED to locate the server among other servers visually.
4 System-error LED (amber)	LED on: An error has occurred.	<ol style="list-style-type: none"> 1. Check the system-locator LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 3. Save the log if necessary and clear the log afterward.

Rear light path LEDs

The following illustration shows the light path diagnostic LEDs located on the rear of the server.

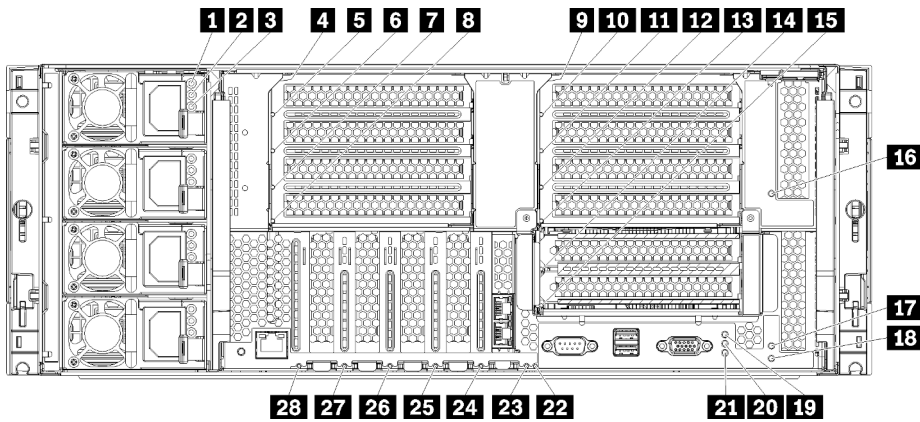


Figure 148. Rear LEDs

Table 37. Light path diagnostics: Rear LED status and actions

LED	Description	Action
1 Power supply AC power input LED (green)	Status of power supply AC power input. See “Power supply LEDs” on page 221 for detailed descriptions of the power supply LEDs.	See “Power supply LEDs” on page 221 for actions relating to the power supply LEDs.
2 Power supply DC power output LED (green)	Status of power supply DC power output. See “Power supply LEDs” on page 221 for detailed descriptions of the power supply LEDs.	See “Power supply LEDs” on page 221 for actions relating to the power supply LEDs.
3 Power supply fault LED (yellow)	Indicates a power supply malfunction. See “Power supply LEDs” on page 221 for detailed descriptions of the power supply LEDs.	See “Power supply LEDs” on page 221 for actions relating to the power supply LEDs.
5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 24, 25, 26, 27, 28 Adapter error LEDs	Indicates a malfunction for the associated adapter.	<ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 2. Save the log if necessary and clear the log afterward.
4, 9, 18 Riser error LEDs	Indicates a malfunction for the associated riser or an adapter installed in the riser.	<ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 2. Save the log if necessary and clear the log afterward.
19 Power LED (green)	Indicates the power state of the server.	Not used for troubleshooting server beyond providing power status. See power supply LEDs (1 , 2 , and 3) for additional information.
20 System ID LED (blue)	This LED is used as a presence detection LED. You can use Lenovo XClarity Controller to light this LED remotely.	Use this LED to locate the server among other servers visually.

Table 37. Light path diagnostics: Rear LED status and actions (continued)

LED	Description	Action
21 System-error LED (amber)	Indicates an error has occurred.	<ol style="list-style-type: none"> 1. Check the system-locator LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 3. Save the log if necessary and clear the log afterward.
22 3v fault (system battery) LED	Indicates a malfunction or low voltage for the 3V system battery (CR2032) in the I/O tray.	<ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 2. Save the log if necessary and clear the log afterward.
23 I/O-board fault LED	Indicates a malfunction for the I/O board or an adapter installed in the I/O board.	<ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 2. Save the log if necessary and clear the log afterward.

Power supply LEDs

This topic provides the location of the power supply LEDs.

The following minimum configuration is required for the ac power LED on the power supply to be lit:

- Power supply
- Power cord
- Appropriate input power from the power source

The following minimum configuration is required for the server to start:

- Two processors installed
- Two 16 GB DIMMs
- At least one 2.5-inch drive installed
- One functioning power supply with input power cord

Note: For troubleshooting purposes only, the server can be started with one processor, one 16 GB DIMM, no hard drives, and a single power supply with an input power cable. *This is not a supported operational configuration.*

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power LED on the front operator panel and suggested actions to correct the detected problems. See [Figure 148 “Rear LEDs” on page 220](#) for LED locations.

Power supply LEDs	Description	Action	Note
-------------------	-------------	--------	------

1 AC	2 DC	3 Error			
AC	DC	!			
On	On	Off	Normal operation		The server is functioning correctly.
Off	Off	Off	No power to the power supply, a problem with the input power source, or the power supply has failed.	<ol style="list-style-type: none"> 1. Check the input power to the server (voltage and frequency). 2. Make sure that the power cord is connected to a functioning and supported power source. 3. Replace the power supply. 	
Off	Off	On	No input power to the power supply or the power supply has detected an internal problem.	<ol style="list-style-type: none"> 1. Make sure that the power cord is connected to a functioning power source. 2. Replace the power supply. 	This happens only when a second power supply is providing power to the server
Off	On	Off	The power supply has failed.	Replace the power supply.	
Off	On	On	The power supply has failed.	Replace the power supply.	
On	Off	Off	<p>The system is shut down (server is connected to power).</p> <p>The system has overloaded the power supply.</p>	Remove options or add an additional power supply.	<p>If the system is shut down, this is a normal condition.</p> <p>The LED may go off for less than a minute then back on during an input power cycle operation initiated by the Lenovo XClarity Controller.</p>
On	On	Off	<p>The system is on (normal operation)</p> <p>The system is on (not operating): power-supply not fully seated, faulty system board, or faulty power-supply.</p>	<ol style="list-style-type: none"> 1. Reseat the power supply. 2. Replace the power-supply. 3. Replace the system board. 	It usually indicates the power supply is not fully seated.
On	Off	On	Faulty power supply.	Replace the power supply.	
On	On	On	Faulty power supply.	Replace the power supply.	

System-board LEDs

The following illustration shows the location of light path diagnostic LEDs and light path diagnostic switch on the system board. These LEDs can often identify the source of an error.

Press the light path diagnostic switch **3** to turn on the system board LEDs for a limited amount of time when the system board is removed from the chassis.

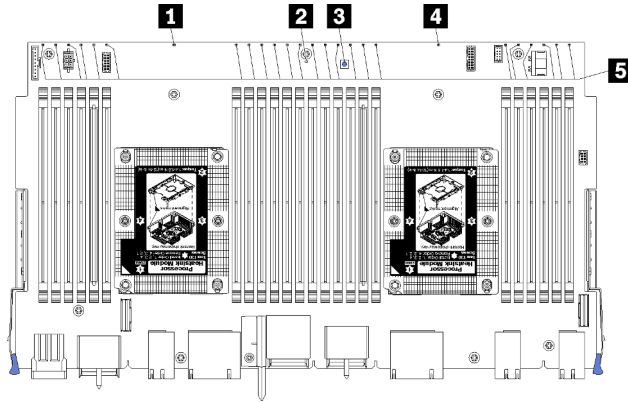


Figure 149. System-board light path LEDs

Table 38. Light path diagnostics: System-board LED status and actions

LED	Description	Action
1 Processor 2 error LED	LED on: An error has occurred with processor 2.	See “Processor problems” on page 227
2 System board error LED	LED on: An error has occurred on the system board.	Complete the following steps: <ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 2. Save the log if necessary, and clear the log afterward.
3 Light path diagnostic switch	Press the light path diagnostic switch to turn on the system board LEDs.	
4 Processor 1 error LED	LED on: An error has occurred with processor 1.	See “Processor problems” on page 227
5 Memory module 1 through 24 error LEDs	LED on: An error has occurred with the designated memory module.	See “Memory problems” on page 227

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 217](#)

Step 2. Check for short circuits, for example, if a loose screw is lying 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.

Note: See [System configuration](#) 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, see [“Power supply LEDs” on page 221](#) to 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

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
 - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
 - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

For more information about event logs, see [“Event logs” on page 217](#)

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 247](#)).

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- [“Embedded hypervisor is not in the boot list” on page 225](#)
- [“The power button does not work \(server does not start\)” on page 226](#)
- [“Server does not power on \(no indication that input power is connected to the server\)” on page 226](#)
- [“Server does not power off \(shut down\)” on page 226](#)

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.
2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check <https://serverproven.lenovo.com/> to validate that the embedded hypervisor device is supported for the server.
4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Server Configuration → Boot Options**.

For information about accessing the management controller user interface, see the XClarity Controller product documentation:

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

5. Check <http://datacentersupport.lenovo.com> for any tech tips (service bulletins) related to the embedded hypervisor and the server.
6. Make sure that other software works on the server to ensure that it is working properly.

Server does not power on (no indication that input power is connected to the server)

Complete the following steps until the problem is resolved:

1. Check the power LED on the front operator panel.
2. Check the power supply LEDs.
3. Check the front operator panel LCD display for error indications.
4. Check the event log for any events related to the server not powering on.
5. Check for any LEDs that are flashing amber.
6. Disconnect and reconnect the input power cords.
7. Make sure that the power cords are connected to a working electrical outlet that is providing the necessary levels of input power (see the power supply labels for input power requirements).
8. Reseat the power supplies.
9. Replace the power supplies.

The power button does not work (server does not start)

Note: The power button will not function until approximately 10 to 20 seconds after the server has been connected to ac power.

Check the following items to help resolve the problem:

- Verify that input power is applied to the server and that the power supplies are functioning. See “[Server does not power on \(no indication that input power is connected to the server\)](#)” on page 226.
- Make sure that the minimum number of DIMMs are installed and functional for your processor configuration.
- If you just installed an optional device, remove it, and restart the server. If the server starts, you might have installed more devices than the power supply supports.
- Make sure that the power button on the server is working correctly:

Reseat the operator information panel cable. If the problem remains, replace the operator information panel.

Server does not power off (shut down)

Complete the following steps until the problem is resolved:

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

Processor problems

Use this information to solve problems related to the processor.

- [“The server goes directly to the POST event viewer when it is turned on.” on page 227](#)

The server goes directly to the POST event viewer when it is turned on.

1. Check the light path diagnostics LEDs and the XCC event log, and resolve any errors that have occurred.
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) Reduce the system to the minimum two processor configuration, 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) Processors
 - b. (Trained technician only) System boards

Memory problems

Use this information to resolve issues related to memory.

Common memory problems

- [“Displayed system memory less than installed physical memory” on page 227](#)

DCPMM specific problems

- [“Attempt to change to another DCPMM mode fails” on page 229](#)
- [“Extra namespace appears in an interleaved region” on page 229](#)

Displayed system memory less than installed physical memory

Complete the following steps until the problem is resolved:

1. Make sure that:
 - No error LEDs are lit on the operator information panel.
 - No DIMM 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.

- If you changed the memory, you updated the memory configuration in the Lenovo XClarity Provisioning Manager.
 - 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 are no memory errors when the server is at the minimum memory configuration.
 - When DCPMMs are installed:
 - a. If the memory is set in App Direct or Mixed memory mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
 - b. Refer to “Intel Optane DC Persistent Memory (DCPMM) setup” in *Setup Guide* and see if the displayed memory fits the mode description.
 - c. If DCPMMs are recently set in Memory mode, turn it back to App Direct mode and examine if there is namespace that has not been deleted (see “Intel Optane DC Persistent Memory (DCPMM) setup” in *Setup Guide*).
 - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.
2. Reseat the DIMMs, and then restart the server.
 3. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test**.
 4. Check the POST error log:
 - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
 - If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Lenovo XClarity Provisioning Manager and enable the DIMM.
 5. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test or DCPMM test**.

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

- App Direct mode:
 - Run Memory Test for DRAM memory modules.
 - Run DCPMM Test for DCPMMs.
 - Memory and Mixed memory mode:
 - Run both Memory Test and DCPMM Test for DCPMMs.
6. Move the suspect DIMMs in one channel to another channel of the same processor that is a supported configuration, and then restart the server. If the problem is related to a memory module, replace the failing memory module.

Note: When DCPMMs are installed, only adopt this method in Memory mode.
 7. Replace the DIMM.
 8. Restart the server.

Attempt to change to another DCPMM mode fails

After the DCPMM mode is changed and the system is successfully restarted, if the DCPMM mode stays the same instead of being changed, check the DRAM DIMMs and DCPMM capacity to see if it meets the requirement of the new mode (see “Intel Optane DC Persistent Memory (DCPMM) setup” in *Setup Guide*).

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.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard drive” on page 229
- “Multiple hard drives fail” on page 230
- “Multiple hard drives are offline” on page 230
- “A replacement hard disk drive does not rebuild” on page 230
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 230
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 231

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:
 - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test.**
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
 - If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.

- Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test.***

Based on those tests:

- If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

Multiple hard drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the hard disk drive and server are at the latest level

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple hard drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement hard disk drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green hard disk drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green hard disk drive activity LED does not flash when the drive is in use, run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test.***
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow hard disk drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the hard disk drive.
5. Power on the server and observe the activity of the hard disk drive LEDs.

Note: Depending on the LXPM version, you may see **HDD test** or **Disk Drive Test**.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- [“Incorrect characters are displayed” on page 231](#)
- [“Screen is blank” on page 231](#)
- [“Screen goes blank when you start some application programs” on page 231](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.” on page 232](#)
- [“The wrong characters appear on the screen” on page 232](#)

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 23](#).

Screen is blank

1. The ThinkSystem SR950 server does not support installation of an optional video adapter. If an optional video adapter is installed in the server, remove it.
2. 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.
3. Make sure that the correct server is controlling the monitor, if applicable.
4. Make sure that:
 - The server is turned on. If there is no power to the server, the screen will be blank.
 - The monitor cables are connected correctly. If monitors are connected to both the front and rear video ports, only the monitor connected to the front video port will display information.
 - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that corrupted server firmware is not affecting the video; see [“Firmware updates” on page 23](#).
6. Observe the front operator panel LCD display for error codes.
7. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. Monitor
 - b. (Trained technician only) System board.

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 23](#).

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.

Note: The ThinkSystem SR950 server only supports connection of a USB keyboard and mouse.

- [“All or some keys on the keyboard do not work” on page 232](#)
- [“Mouse does not work” on page 233](#)
- [“KVM switch problems” on page 233](#)
- [“USB-device does not work” on page 233](#)

All or some keys on the keyboard do not work

1. Make sure that:
 - The keyboard cable is securely connected.
 - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
 - The mouse cable is securely connected to the server.
 - The mouse device drivers are installed correctly.
 - The server and the monitor are turned on.
 - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
 - The correct USB device driver is installed.
 - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Optional-device problems

Use this information to solve problems related to optional devices.

- [“External USB device is not recognized” on page 233](#)
- [“PCIe adapter is not recognized or is not functioning” on page 234](#)
- [“Insufficient PCIe resources are detected.” on page 234](#)
- [“A Lenovo optional device that was just installed does not work.” on page 234](#)
- [“A Lenovo optional device that worked previously does not work now” on page 235](#)

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the server. See the product documentation for the USB device for information about device drivers.
3. Use the Setup utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the server.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see <https://serverproven.lenovo.com/>). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot and that this slot is supported by your system configuration.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.

7. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Restart the system and press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64-Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
 - The device is supported for the server (see <https://serverproven.lenovo.com/>).
 - You followed the installation instructions that came with the device and the device is installed correctly.
 - You have not loosened any other installed devices or cables.
 - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the

“Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Whenever memory or any other device is changed, you must update the configuration.

- Make sure that the latest levels of device firmware and device drivers are installed. See “Update the firmware” in the *ThinkSystem SR950 Setup Guide* information.
2. Reseat the device that you have just installed.
 3. Replace the device that you have just installed.
 4. Reseat the cable connection and check there is no physical damage to the cable.
 5. If there is any cable damages, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that any external devices are turned on.
2. Make sure that all of the cable connections for the device are secure.
3. If the device comes with test instructions, use those instructions to test the device.
4. Reseat the cable connection and check if any physical parts have been damaged.
5. Replace the cable.
6. Reseat the failing device.
7. Replace the failing device.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 235
- “Serial device does not work” on page 235

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 Lenovo XClarity Provisioning Manager 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

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 236
- “Intermittent KVM problems” on page 236
- “Intermittent unexpected reboots” on page 236

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
 - a. Make sure that the device is configured correctly.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Devices and I/O Ports** → **USB Configuration**.

- b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup”

section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **BMC Settings → POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, do one of the followings:
 - Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
`OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
 - Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
3. See the management controller event log to check for an event code that indicates a reboot. See [“Event logs” on page 217](#) for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. The power source is providing a correct level of power to the power supply (check the power supply label for input power requirements).

Network problems

Use this information to resolve issues related to networking.

- [“Cannot wake server using Wake on LAN” on page 237](#)
- [“Could not log in using LDAP account with SSL enabled” on page 237](#)

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the LOM adapter and the server is connected to the network using its connectors, check the system-error log or ThinkSystem SR950 system event log (see [“Event logs” on page 217](#)), make sure:
 - a. The room temperature is not too high (see [“Specifications” on page 1](#)).
 - b. Airflow to the front and rear of the server are not blocked.
 - c. All fillers and internal air baffles are installed securely.
2. Reseat the LOM 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 LOM adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 238
- “The server immediately displays the POST Event Viewer when it is turned on” on page 238
- “Server is unresponsive (POST is complete and operating system is running)” on page 238
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 239
- “Voltage planar fault is displayed in the event log” on page 239
- “Unusual smell” on page 240
- “Server seems to be running hot” on page 240
- “Cannot enter legacy mode after installing a new adapter” on page 240
- “Cracked parts or cracked chassis” on page 240

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message UEFI: DXE INIT on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

<https://datacentersupport.lenovo.com/us/en/solutions/ht506118>

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the 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 steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:

1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
 3. Restart the compute node.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
 1. Make sure that all applications are running (no applications are hung).
 2. Attempt to log out of the system and log back in.
 3. Validate the network access by pinging or running a trace route to the compute node from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
 - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
 4. Restart the compute node remotely through the management interface.
 5. If the problem remains, verify that any new software has been installed and configured correctly.
 6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

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

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

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

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

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Recovery and RAS** → **POST Attempts** → **POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

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

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see [“Specifications” on page 1](#)).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see *Maintenance Manual* for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

Note: The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
 - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
 - Other software works on the server.
 - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
 3. Contact your place of purchase of the software.

Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

Disassemble the system board for recycle

Follow the instructions in this section to disassemble the system board before recycling.

Before disassembling the system board:

1. Remove the system board from the server (see [“Remove a system board” on page 89](#)).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board:

Step 1. Remove the following components as illustrated:

- Use a Torx T10 screwdriver and remove the Torx T10 screw (1 in the following illustration)
- Use a screwdriver and remove the 9 screws

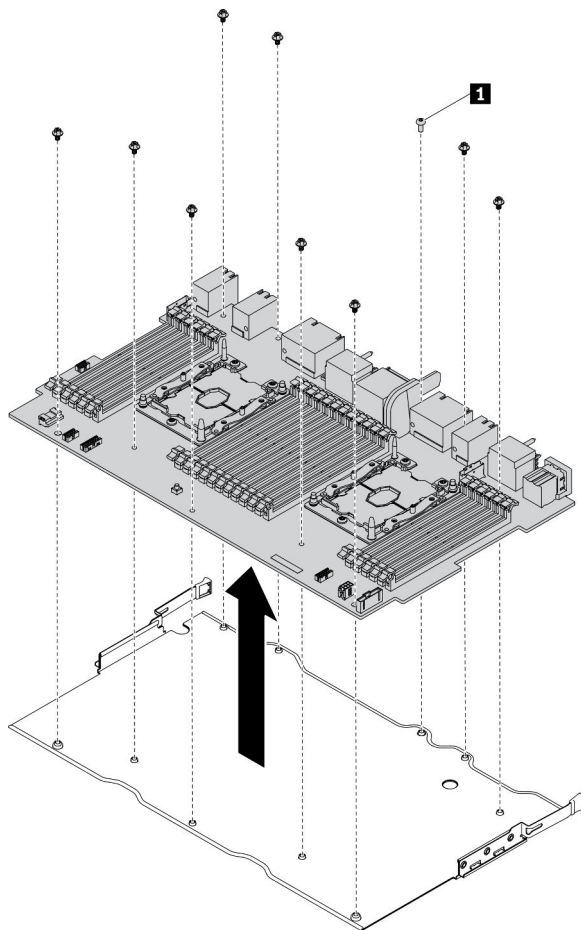


Figure 150. Disassembling the system board

Step 2. Separate the system board from the supporting sheet metal.

After disassembling the system board, comply with local regulations when recycling.

Disassemble the system board filler for recycle

Follow the instructions in this section to disassemble the system board filler before recycling.

Before disassembling the system board filler:

1. Remove the system board filler from the server (see [“Remove a system board filler” on page 93](#)).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board filler:

Step 1. Use a screwdriver and remove the six screws (three each side) on the system board filler.

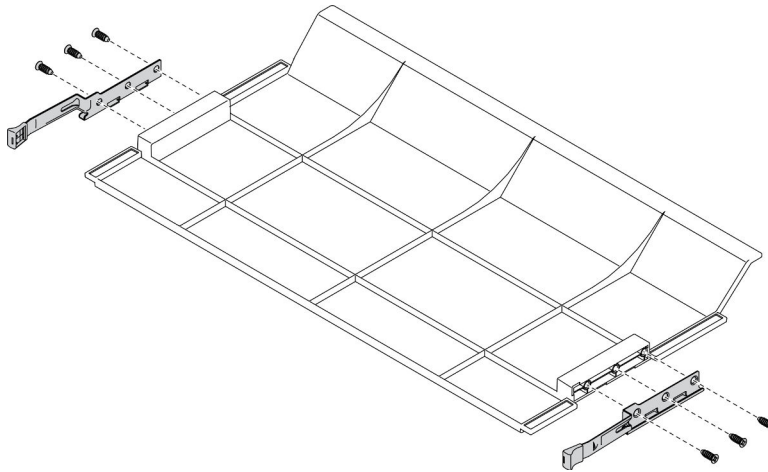


Figure 151. Disassembling the system board filler

Step 2. Separate the latches from the system board filler.

After disassembling the system board filler, comply with local regulations when recycling.

Disassemble the front cover for recycle

Follow the instructions in this section to disassemble the front cover before recycling.

Before disassembling the front cover:

1. Remove the front cover from the server (see [“Remove the front cover” on page 110](#)).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the front cover:

Step 1. Use a flat tool (such as a screwdriver or blade) to scrape away the protruding part of the following stakes as illustrated:

- Three hollow stakes

- Thirty-one spherical stakes

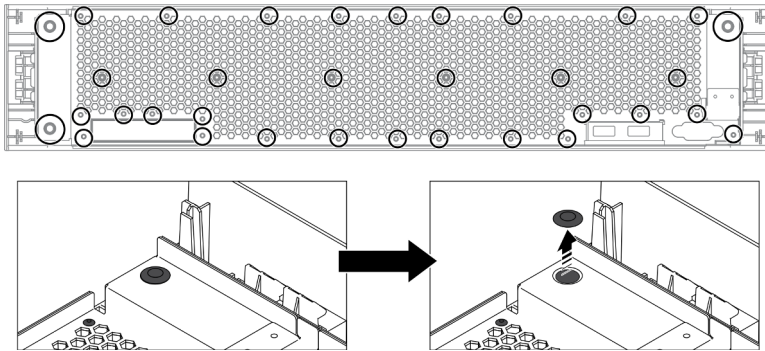


Figure 152. Removing stakes on the front cover

Step 2. Separate the sheet metal shield from the front cover.

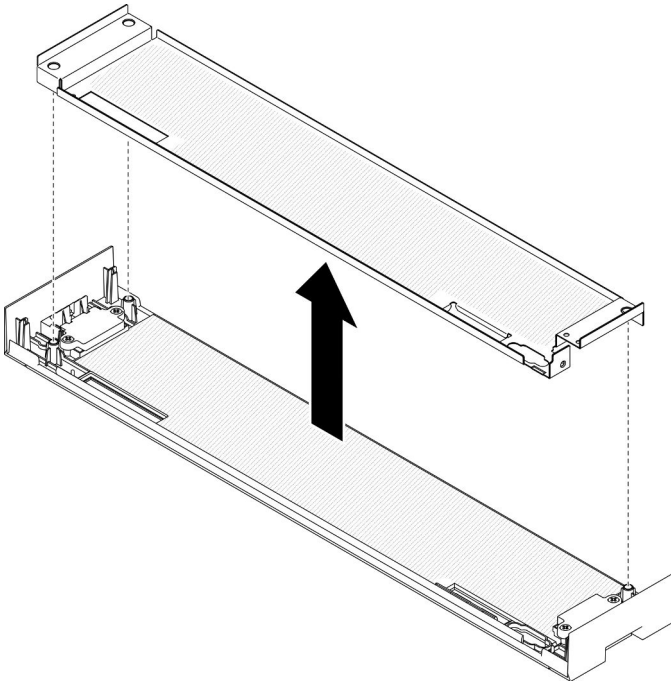


Figure 153. Separating sheet metal shield on the front cover

Step 3. Use a screwdriver and remove the four screws; then, remove the four latch springs.

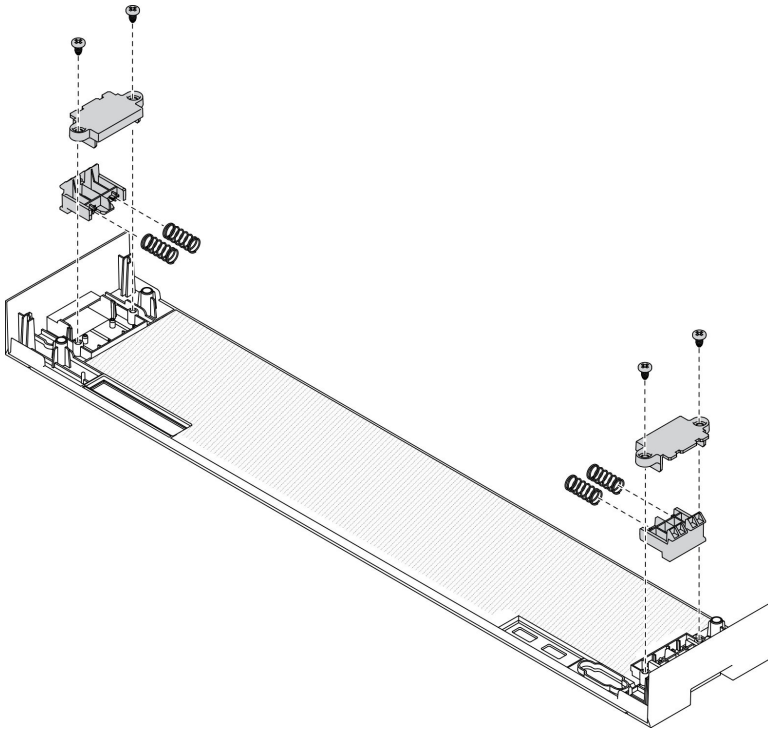


Figure 154. Removing latch springs on the front cover

After disassembling the front cover, comply with local regulations when recycling.

Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The 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 are 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.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- 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.

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Morrisville, NC 27560
U.S.A.
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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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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	-	○	○	○	○	○
印刷電路板	-	○	○	○	○	○

備考1. “超出0.1 wt%”及“超出0.01 wt%”係指限用物質之百分比含量超出百分比含量基準值。
 Note1: “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. “○”係指該項限用物質之百分比含量未超出百分比含量基準值。
 Note2: “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. “-”係指該項限用物質為排除項目。
 Note3: The “-” indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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