Lenovo

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:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html

⚠ 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

Second Edition (December 2017)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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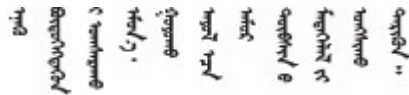
Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

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 pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྲིར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

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://lesc.lenovo.com
      b. In the Customize a Model pane:

         1) Click **Select Options/Parts for a Model**.

         2) Enter the machine type and model for your server.
      c. Click the Power tab 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 Lenovo 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://datacentersupport.lenovo.com/documents/ht100742

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
	• Height: 175.8 mm (6.9 in.)
	• Depth:
	  – EIA flange to rear: 800.0 mm (31.5 in.)
	  – Overall: 853.0 mm (33.6 in.)
	• Width:
	  – Top cover: 447.0 mm (17.6 in.)
	  – EIA flange: 483.0 mm (19.0 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) • Two processors, minimum (expandable up to eight). • Designed for the LGA 3647-0 socket • Scalable up to 224 cores (with eight processors installed) For a list of supported processors, see http://www.lenovo.com/us/en/serverproven/ and the "Processor Options" section of the *Lenovo ThinkSystem SR950 Product Guide* at http://lenovopress.com/LP0647.

Table 1. Server Specifications (continued)

Specification	Description
Memory	- Minimum: 32 GB - Maximum: 12 TB – 3.1 TB using registered DIMMs (RDIMMs) – 6.2 TB using load reduction DIMMs (LRDIMMs) – 12.4 TB using three-dimensional-stacking registered DIMMs (3DS RDIMMs) - Type: – 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): – 16 GB, 32 GB RDIMMs – 64 GB LRDIMMs – 128 GB 3DS RDIMMs
Drive expansion	- Up to six SAS/SATA/NVMe drive backplanes: - Up to 24 2.5-inch hot-swap drive bays: – Up to 24 SATA/SAS drives (dependent on installed drive backplanes) – Up to 12 NVMe drives (dependent on installed drive backplanes)

Table 1. Server Specifications (continued)

Specification	Description

Expansion slots	Up to seventeen expansion slots (dependent on server configuration):
	
	• Slot 1 - 4: PCI Express 3.0 for PCIe riser-card with the following slots available depending on the riser card installed:
	
	  1. x8/x8/x8/x8 PCIe full-height riser kit provides:
	
	    – 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:
	
	    – 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:
	
	    – 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)
	• 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:
	
	  1. x8/x8/x8/x8 PCIe full-height riser kit provides:
	
	    – 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:
	
	    – 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:
	
	    – 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)
	
	• Slot 16 - 17: x8/x8 PCIe low-profile riser kit (processor-rich systems only) provides:

Table 1. Server Specifications (continued)

Specification	Description
	– Slot 16: PCI Express 3.0 x8
	– Slot 17: PCI Express 3.0 x8

Integrated functions	• 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):
	  – DB-15 VGA port
	  – USB 2.0 ports (two):
	    – USB 2.0 for Lenovo XClarity Controller management
	    – USB 2.0
	• Standard connectors (rear of server):
	  – 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)	The following RAID options are available for this server: • 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 (RAID levels 0/1/10/5 cacheless) • ThinkSystem 730-8i Value Advanced Hardware RAID 1 GB Cache PCIe Adapter (supports RAID levels 0/1/5/10) • 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)
Fans	Up to twelve (60 mm x 38 mm) internal hot-swap system fans (dependent on server configuration) **Notes:** • 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.

Power supplies	• This server supports two types of hot-swap power supply units:
	  – 1100-watt power supply
	    – input voltage 110V or 220V ac
	  – 1600-watt power supply
	    – input voltage 220V ac
	• The power subsystem supports balanced N+N redundancy operation, where N = 1 or 2.

Table 1. Server Specifications (continued)

Specification	Description
Acoustical noise emissions (base configuration)	• Sound power, idling: 6.1 bels • Sound power, operating: 6.1 bels **Note:** 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	Approximate heat output:
	• Minimum configuration: 935 BTU, 275 W (in BTU per hour and watts)
	  – 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)
	  – Maximum configuration with four 1600–watt power supplies configured for non-redundant operation under maximum loading.

Environment	• Air temperature:
	  – 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):
	  – 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%
	Notes:
	• 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.
	• ASHRAE compliance information (see the "Operating Environment" section of the Lenovo ThinkSystem SR950 Product Guide at http://lenovopress.com/LP0647 for specific ASHRAE compliance levels for each server configuration):
	  – 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.
	  – 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.

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.

Note: 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.

Best practices related to updating firmware is available at the following location:

http://lenovopress.com/LP0656

Important 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 Operating System executing on the server's operating system.
- **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.

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

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager Limited to core system firmware only.	√			√	√		√
Lenovo XClarity Controller Supports core system firmware and most advanced I/O option firmware updates		√		√	√	√	

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Essentials OneCLI Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√				√	√
Lenovo XClarity Essentials UpdateXpress Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√			√		√
Lenovo XClarity Essentials Bootable Media Creator Supports core system firmware and I/O firmware updates. You can update the Microsoft Windows operating system, but device drivers are not included on the bootable image	√				√	√	√
Lenovo XClarity Administrator Supports core system firmware and I/O firmware updates	√	√		√	√		

The latest firmware can be found at the following site:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr950/7X12/downloads

- **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 press F1. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

  Additional information about using Lenovo XClarity Provisioning Manager to update firmware is available at:

  http://sysmgt.lenovofiles.com/help/topic/LXPM/platform_update.html

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

Notes:

– To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

Additional information about configuring Ethernet over USB is available at:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_configuringUSB.html

– 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.

Specific details about updating firmware using Lenovo XClarity Controller are available at:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_manageserverfirmware.html

- **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).

  Specific details about updating firmware using Lenovo XClarity Essentials OneCLI is available at:

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_update.html

- **Lenovo XClarity Essentials UpdateXpress**

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

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for applying firmware updates, running preboot diagnostics, and deploying Microsoft Windows operating systems.

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

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

- **Lenovo XClarity Administrator**

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

  Specific details about updating firmware using Lenovo XClarity Administrator are available at:

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

Configuring the LAN over USB interface manually

To perform a firmware update through the operating system using Lenovo XClarity Essentials OneCLI, the Lenovo XClarity Controller must be configured to use the LAN over USB interface. The firmware update package attempts to perform the setup automatically, if needed. If the automatic setup fails or if you prefer to set up the LAN over USB manually, use one of the following procedures.

Additional information about using the Lenovo XClarity Controller to enable LAN over USB is available at:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_
configuringUSB.html

Installing the LAN over USB Windows device driver

When you install a Windows operating system, there might be an unknown RNDIS device in the Device
Manager. Lenovo provides a Windows INF file that identifies this device.

You can obtain the correct version of the device driver at the following site:

Lenovo ThinkSystem SR950 Drivers and Software

Complete the following steps to install `lenovo_rndis_server_os.inf`:

Note: You only have to perform these steps if the server is running a Windows operating system and the
`lenovo_rndis_server_os.inf` file has not been previously installed. The file only has to be installed once. It is
required by Windows operating systems to detect and use the LAN over USB functionality.

Step 1. Obtain a Windows version of the server UEFI code package (see "Firmware updates" on page 6 for
more information).

Step 2. Extract the `lenovo_rndis_server_os.inf` and `device.cat` files from the firmware update package and
copy them to the `\WINDOWS\inf` subdirectory.

> **Note:** You can use the -x *path* command-line interface option to extract the files. For more
> information about this option, see the readme file that comes with the update package.

Step 3. Click **Administrative Tools ➜ Computer Management ➜ Device Manager** and find the RNDIS
Device. Click **Properties ➜ Driver ➜ Reinstall driver**. Point the server to the `\Windows\inf`
directory where it can find the `lenovo_rndis_server_os.inf` file and install the device.

Step 4. Click **Administrative Tools ➜ Device Manager**. Right-click **Network adapters** and select **Scan
for hardware changes**. A small pop-up confirms that the Ethernet device is found and installed.
The New Hardware Wizard starts automatically.

Step 5. When you are prompted `Can Windows connect to Windows Update to search for software?`, select **No,
not this time**. Click **Next** to continue.

Step 6. When you are prompted `What do you want the wizard to do?`, select **Install from a list or specific
location (Advanced)**. Click **Next** to continue.

Step 7. When you are prompted `Please choose your search and installation options`, select **Don't search. I
will choose the driver to install**. Click **Next** to continue.

Step 8. When you are prompted `Select a hardware type, and then click Next`, select **Network adapters**.
Click **Next** to continue.

Step 9. When you are prompted with the statement `Completing the Found New Hardware Wizard`, click **Finish**.
A new local area connection appears. If the message `This connection has limited or no
connectivity` is displayed, ignore this message.

Step 10. Return to the Device Manager. **Lenovo USB Remote NDIS Network Device** appears under
Network Adapters.

Step 11. Use the Lenovo XClarity Controller interface to view or set the IP address for the LAN adapter.

> Additional information about using the Lenovo XClarity Controller to configure LAN over USB is
> available at:
>
> http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_
> configuringUSB.html

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that you might have with your server. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues 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 **How-tos & Solutions**.

   Expand **Symptom** to choose a category for the type is 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
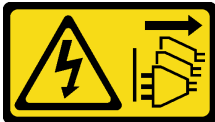
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected 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 11.

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
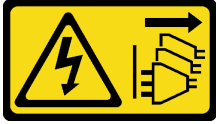
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected 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 10.

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 helps support technicians to identify your server and provide faster service.

Figure 1 "Location of the ID label for the Lenovo ThinkSystem SR950" on page 13 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 remains installed on the same server where the labels were originally added.
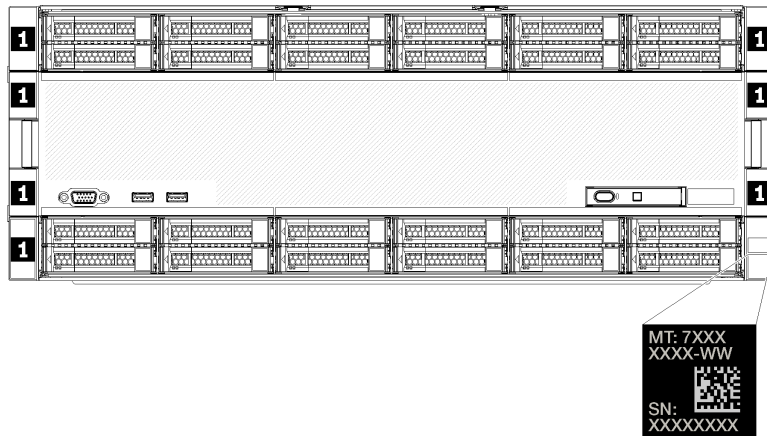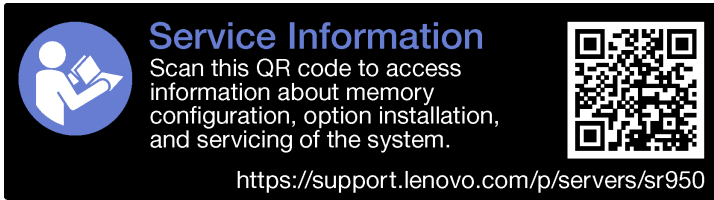
Figure 1. Location of the ID label for the Lenovo ThinkSystem SR950

QR code

In addition, the service label that is located at the top rear of the compute system board inside the server, provides a quick reference (QR) code for mobile access to service information. (You must disconnect all server power cords before attempting to access the compute 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.
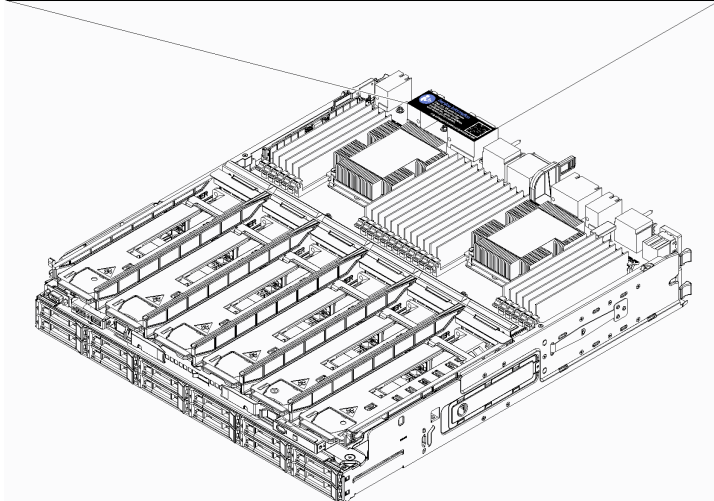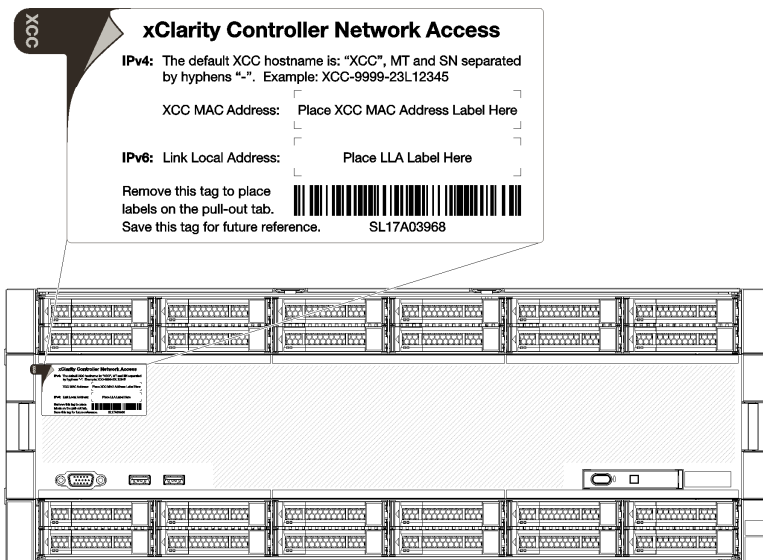
Figure 2. Service label and QR code

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 3. 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 4 "Front view of the server (front cover installed)" on page 15 illustrates the front view of the server, with the front cover installed, identifying the drive bays.
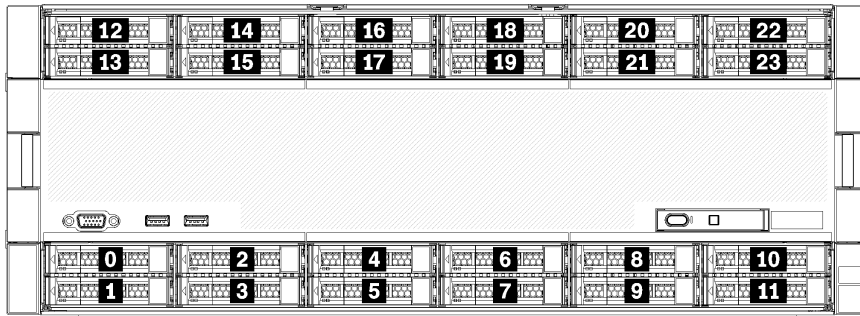
Figure 4. Front view of the server (front cover installed)

Figure 5 "Front view of the server (front cover removed)" on page 15 illustrates the front view of the server.
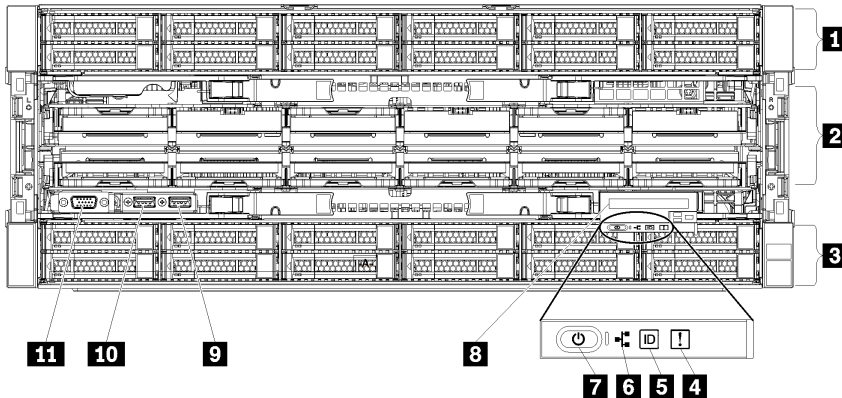
Figure 5. Front view of the server (front cover removed)

Table 2. Components on the front of the server

Callout	Callout
1 2.5-inch-drive bays (12–23) (some models)	**7** Power button and power LED (see "Front operator panel" on page 16)
2 Fans (1–12)	**8** Front operator panel with pull-out LCD display (see "LCD system information display panel" on page 17)
3 2.5-inch-drive bays (0–11)	**9** USB 2.0 port
4 System-error LED (see "Front operator panel" on page 16)	**10** USB 2.0 Lenovo XClarity Controller management port
5 System ID button/LED (see "Front operator panel" on page 16)	**11** VGA Video port
6 Network activity LED (see "Front operator panel" on page 16)	

Drive LEDs

Figure 6 "Drive LEDs" on page 16 illustrates the LEDs on each drive.
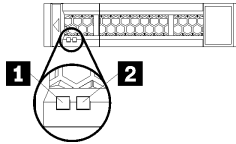
Figure 6. Drive LEDs

Table 3. 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.
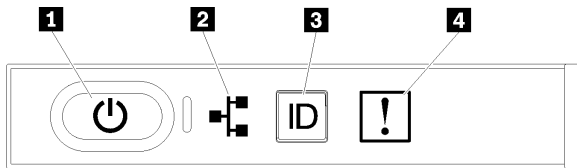
Table 4. Operator panel front controls and indicators

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, or the LED itself 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.

- **❸ 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.
- **❹ 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 17 for more information.
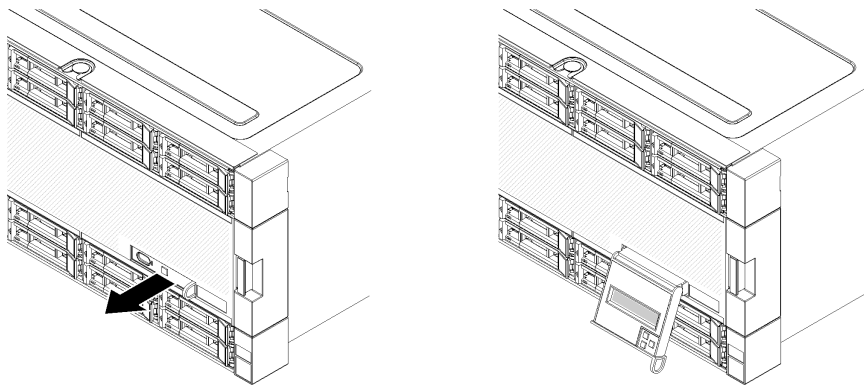
LCD system information display panel

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.
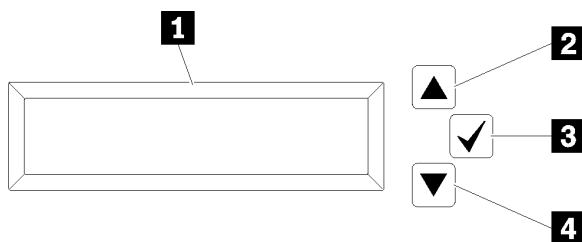
Table 5. LCD system information display panel

Callout	Callout
❶ Information display panel	**❸** Select button
❷ Scroll up button	**❹** Scroll down button

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

- **❷ 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.
- **❸ 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. The following is an illustration of the LCD system information display panel menu options flow.

Following is an example of the information on the display panel.
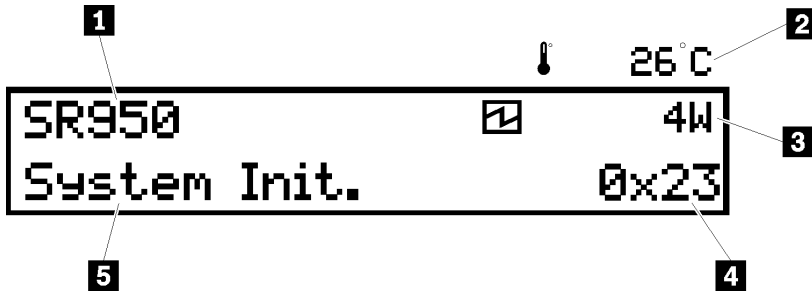
Table 6. LCD system information display information

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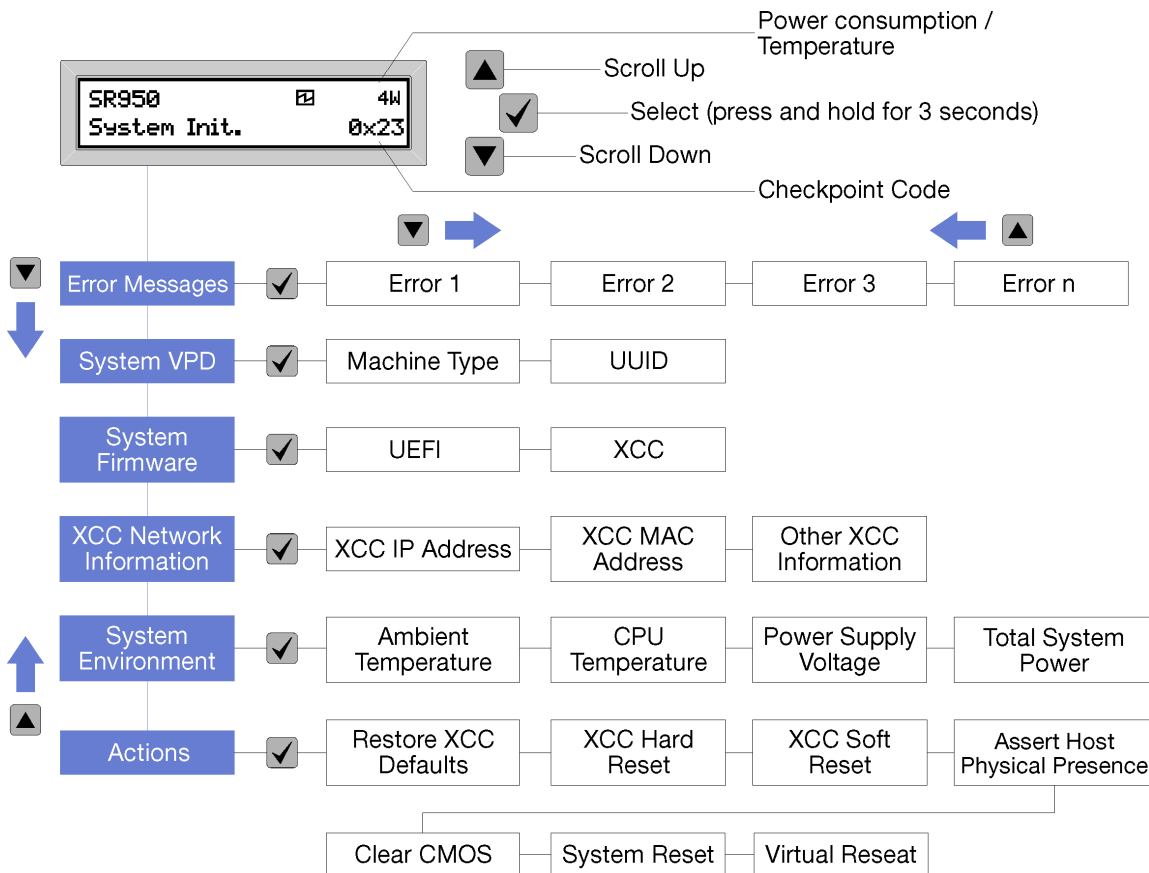
When you navigate through the hierarchy of the menu options, the LCD display panel shows information for that option with the up and down arrows. At the bottom of the hierarchy, only the up arrow is left, while at the top of the hierarchy, only the down arrow is left.

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.

Rear components

Figure 7 "Rear view of the server" on page 20 illustrates the rear view of the server.
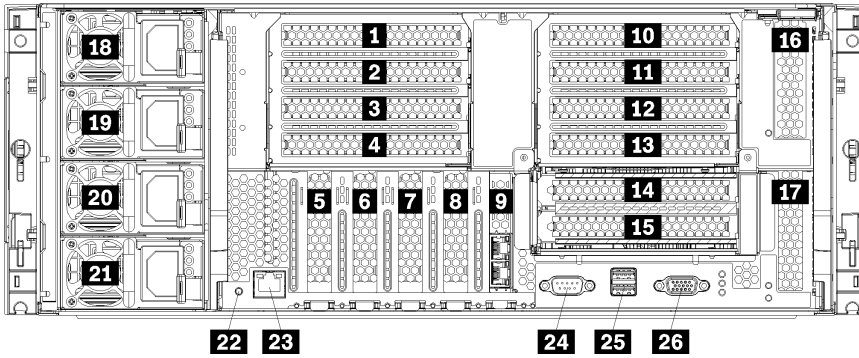
Figure 7. Rear view of the server

Table 7. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser card 1)	**14** PCIe slot 14 (on riser card 2)
2 PCIe slot 2 (on riser card 1)	**15** PCIe slot 15 (on riser card 2) for ML2 x16 network adapter
3 PCIe slot 3 (on riser card 1)	**16** PCIe slot 16 (on riser card 3)
4 PCIe slot 4 (on riser card 1)	**17** PCIe slot 17 (on riser card 3)
5 PCIe slot 5	**18** Power supply 4 (optional) — see "**1**, **2**, **3**, **4** Power supplies" on page 20
6 PCIe slot 6	**19** Power supply 3 (optional) — see "**1**, **2**, **3**, **4** Power supplies" on page 20
7 PCIe slot 7	**20** Power supply 2 (optional) — see "**1**, **2**, **3**, **4** Power supplies" on page 20
8 ML2 x16 network adapter	**21** Power supply 1 — see "**1**, **2**, **3**, **4** Power supplies" on page 20
9 LOM adapter	**22** NMI button
10 PCIe slot 10 (on riser card 2)	**23** XClarity Controller network connector (RJ45)
11 PCIe slot 11 (on riser card 2)	**24** Serial connector
12 PCIe slot 12 (on riser card 2)	**25** USB 3.0 connectors (2)
13 PCIe slot 13 (on riser card 2)	**26** VGA video port

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** **Power supplies**

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 *Lenovo ThinkSystem SR950 Setup Guide*.

Each hot-swap power supply has three status LEDs. See Figure 8 "Rear LEDs" on page 21 for information.

Rear LEDs

Figure 8 "Rear LEDs" on page 21 illustrates the LEDs on the rear of the server.
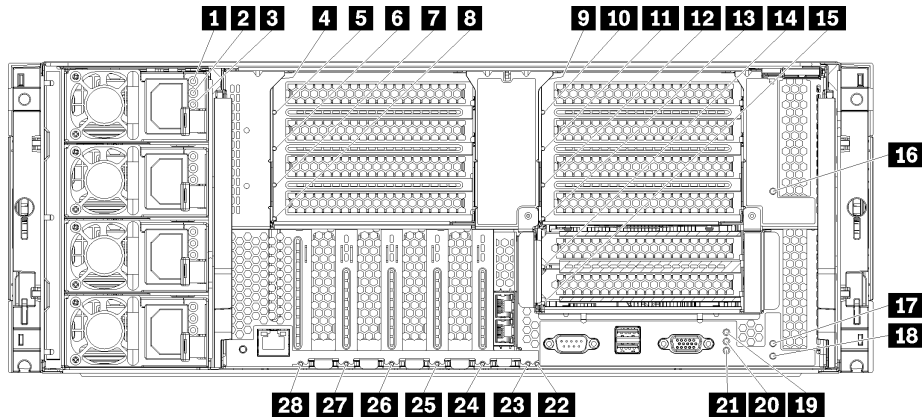
Figure 8. Rear LEDs

Table 8. Power supply LEDs

LED	Description
1 Input status (AC) (green)	The input status LED can be in one of the following states: • 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)	The output status LED can be in one of the following states: • 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)	• 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 9. Status LEDs

LED	Description
19 Power LED (green)	The states of the power LED are as follows: **Off:** Power is not present or the power supply, or the LED itself 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.
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 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 10. Adapter LEDs

Callout	Callout
4 Riser 1 through 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 through 15 fault LED	**23** I/O-board fault LED
10 Adapter 10 fault LED	**24** LOM adapter fault LED
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 14 and "Rear view" on page 19.

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 203.
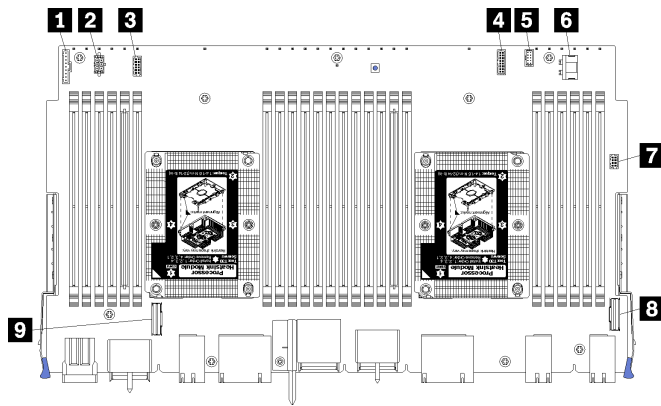
Figure 9. System-board connectors

Table 11. 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.
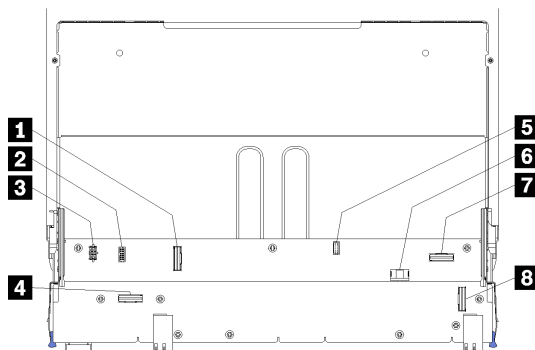
Figure 10. Storage-board-assembly connectors

Table 12. 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 (includes connectors for slots 5 through 8 and the LOM connector for slot 9).

For information about connectors on I/O-tray risers, see "I/O-tray riser connectors" on page 24. For information about all external connectors on the rear of the server, including those on the I/O tray, see "Rear view" on page 19.
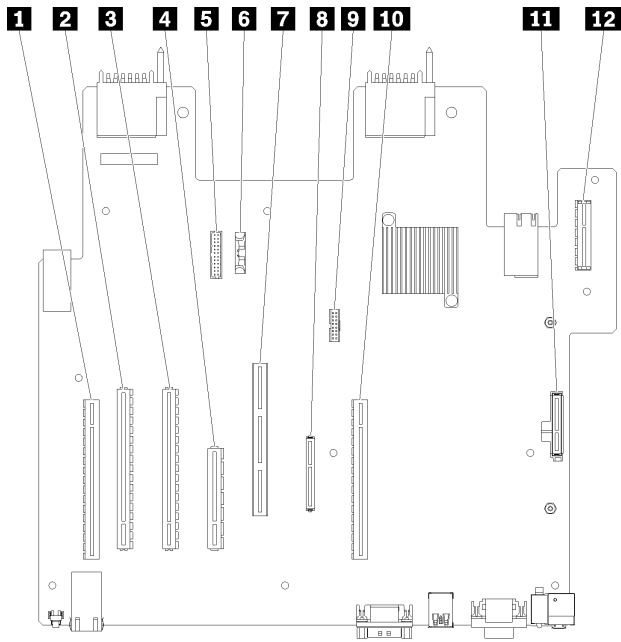
Figure 11. I/O-tray connectors

Table 13. I/O-tray connectors

Callout	Callout
1 Riser for slots 1 through 4 connector (Riser 1)	**7** ML2 PCIe3, x16 connector (Slot 8)
2 PCIe3, x16, 75 watt connector (Slot 5)	**8** Network (LOM) connector (Slot 9)
3 PCIe3, x16, 75 watt connector (Slot 6)	**9** TCM connector (see "Enable TPM/TCM" on page 191)
4 PCIe3, x8, 25 watt connector (Slot 7)	**10** Riser for slots 10 through 15 connector (Riser 2)
5 Signal cable to power backplane	**11** M.2 SATA/PCIe (Hypervisor) backplane connector (see note following this table)
6 Battery (CR2032)	**12** Riser for slots 16 and 17 connector (Riser 3)

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 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 connector:**
  - The slot 1 through 4 riser provides four PCIe3 x8, full height, half length connectors.
  - The slot 1 through 4 riser provides four PCIe x16, full height, half length connectors. (8-processor systems only)
  - The slot 3 and 4 riser provides two PCIe3 x16, full height, half length connectors.
- **Riser 2 connector:**
  - A slot 10 through 13 riser provides four PCIe3 x8, full height, half length connectors.
  - A slot 12 and 13 riser provides two PCIe3 x16, full height, half length connectors.
  - A slot 10 through 15 riser provides five PCIe3 x16, full height, half length connectors and one ML2 PCIe3 x16 connector.
- **Riser 3 connector:**
  - The slot 16 and 17 riser provides two PCIe3 x8, full height, half length connectors.

Slot 1 through 4 and slot 10 through 13 riser connectors

There are four PCIe3 x8, full height, half length connectors each in the slot 1 through 4 (riser connector 1) and slot 10 through 13 (riser connector 2) risers.
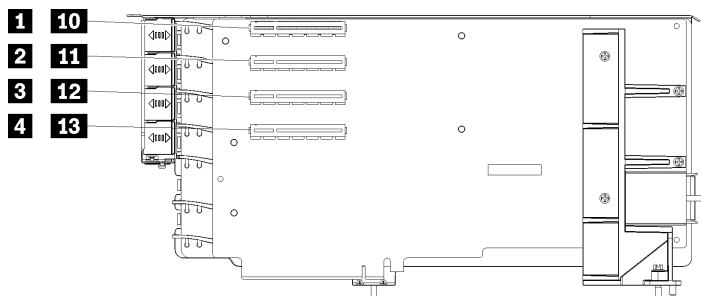
Note: Callouts for slots **1** through **4** apply when the riser is installed in the left riser position. Callouts for slots **10** through **13** apply when the riser is installed in the right riser position.

Figure 12. Slot 1 through 4 and slot 10 through 13 riser connectors

Table 14. Slot 1 through 4 and slot 10 through 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 through 4 and slot 12 through 13 connectors

There are two PCIe3 x16, full height, half length connectors in the slot 3 through 4 and slot 12 through 13 riser.
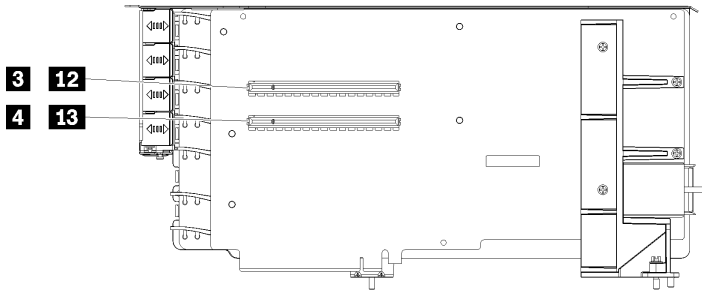
Note: Callouts for slots **3** and **4** apply when the riser is installed in the left riser position. Callouts for slots **12** and **13** apply when the riser is installed in the right riser position.

Figure 13. Slot 3 through 4 and slot 12 through 13 riser connectors

Table 15. Slot 14 and 15 riser connectors

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

Slot 10 through 15 riser connectors

There are five PCIe3 x16, full height, half length connectors and one ML2 PCIe3 x16 connector in the slot 10 through 15 riser.
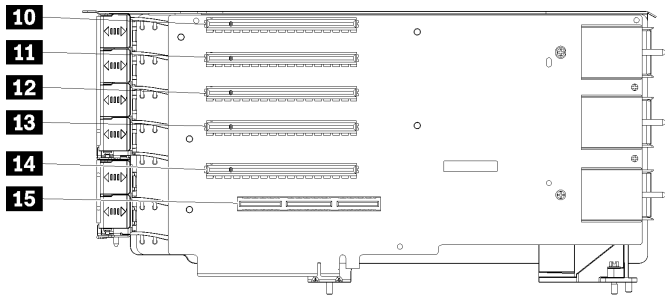
Figure 14. Slot 10 through 15 riser connectors

Table 16. Slot 10 through 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 and 17 riser

There are two PCIe3 x8, full height, half length connectors in the slot 16 and 17 riser.
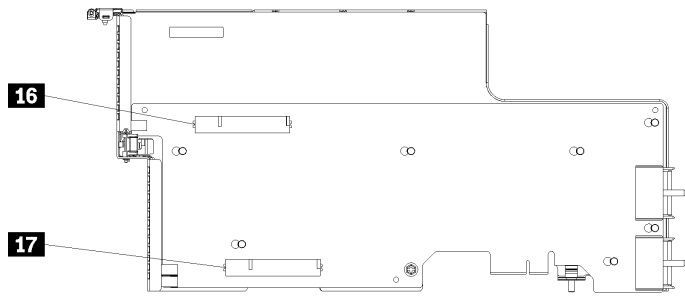
Figure 15. Slot 16 and 17 riser connectors

Table 17. Slot 16 and 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 34.
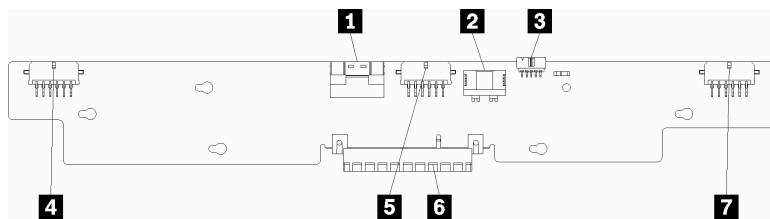
Figure 16. Storage interposer connectors

Table 18. 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 (SIDEBAND)	**7** Power for drive to backplane 3 or 4 (BP 3/4)
4 Power for drive to backplane 1 or 6 (BP 1/6)	

RAID card connectors

The following illustration shows the internal connectors on the RAID card.

There are two basic RAID card configurations.

Notes:

- The RAID cards in the illustration might be different than the RAID card in your system. Connector locations for all RAID cards is similar.

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

For information about RAID card cable routing, see "Cable routing for drives" on page 34.
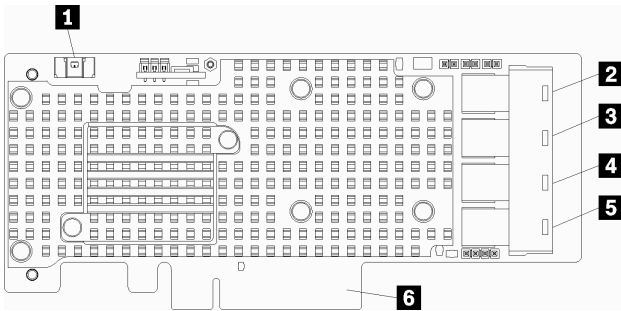
Figure 17. RAID card connectors (type 1)

Table 19. RAID card connectors (type 1)

Callout	Callout
1 RAID flash power module (J14) connector	**4** RAID connector for drive backplane 2 or 5 (SAS only)
2 Unused	**5** RAID connector for drive backplane 1 or 4 (SAS only)
3 RAID connector for drive backplane 3 or 6 (SAS only)	**6** PCI connector to storage interposer
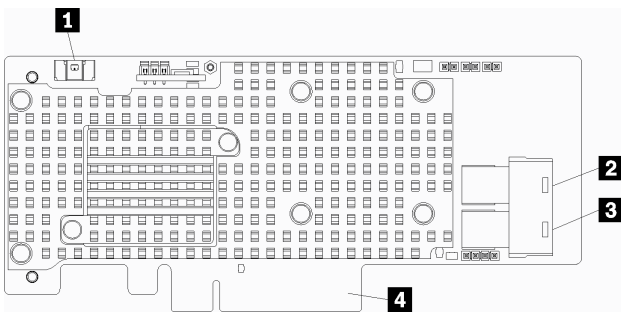
Figure 18. RAID card connectors (type 2)

Table 20. RAID card connectors (type 2)

Callout	Callout
1 RAID flash power module (J14) connector	**3** RAID connector for drive backplane 1 or 4 (SAS only)
2 RAID connector for drive backplane 2 or 5 (SAS only)	**4** PCI connector to storage interposer

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 34.

SAS drive backplane connectors
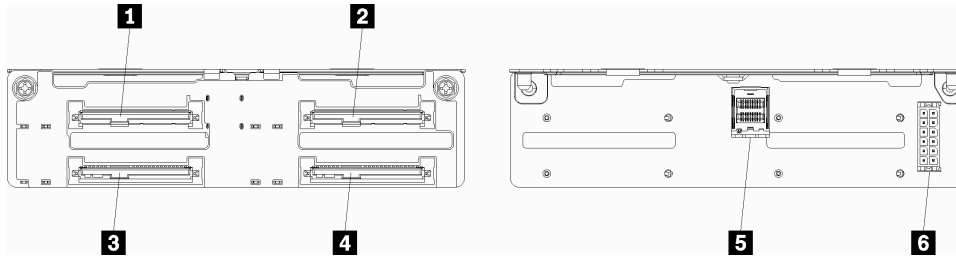
Figure 19. SAS drive backplane connectors

Table 21. 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
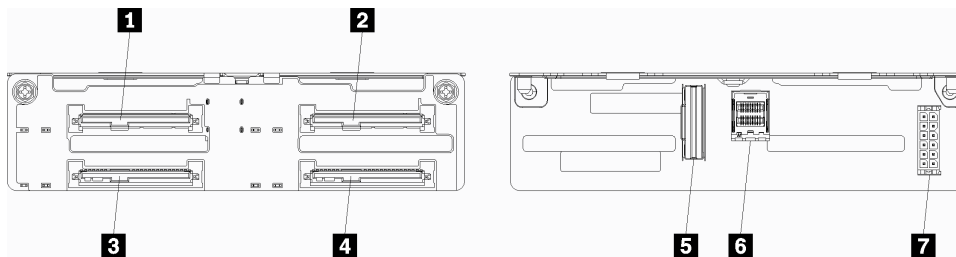
Figure 20. SAS/NVMe drive backplane connectors

Table 22. 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.
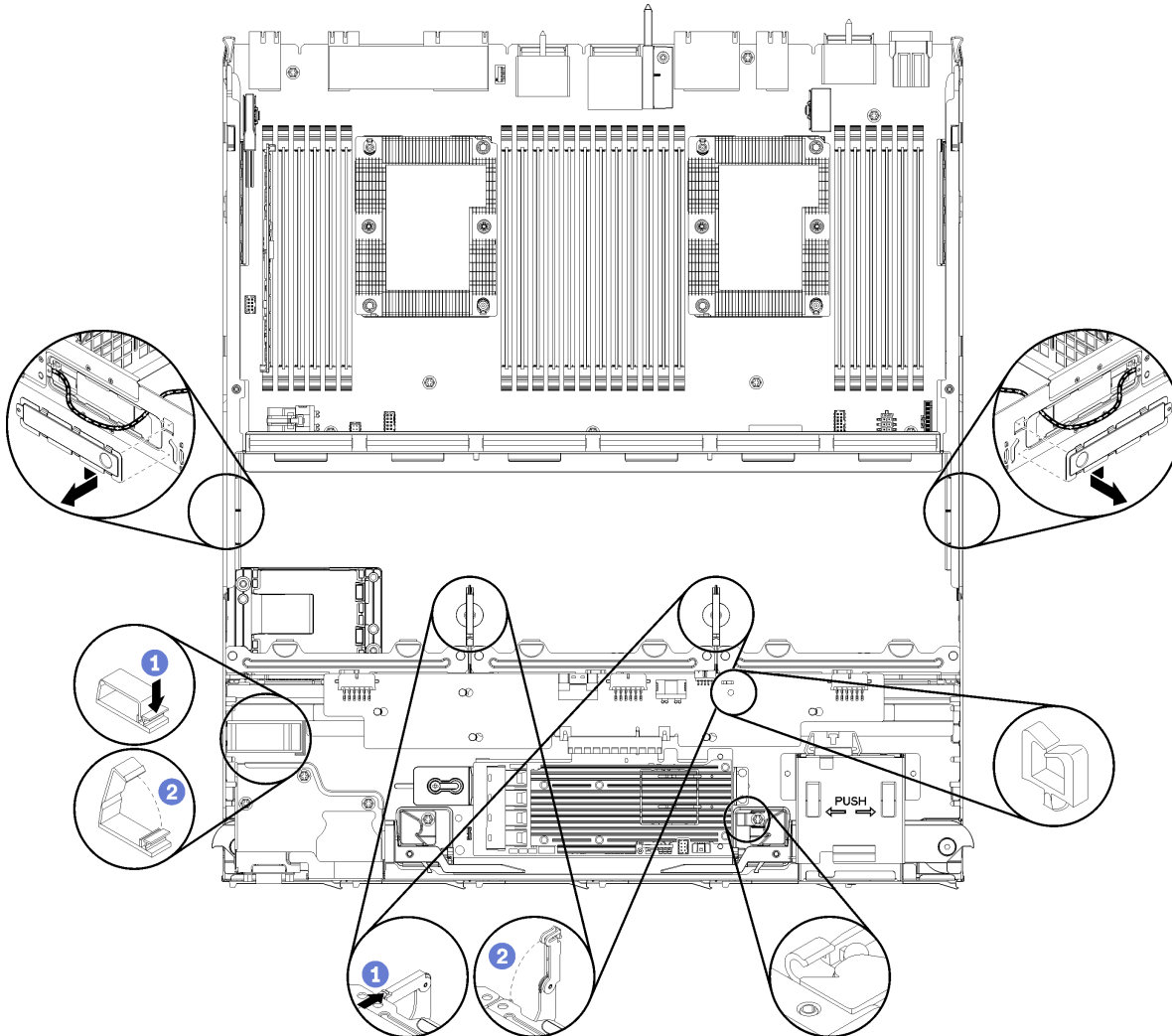
Figure 21. Cable guide locations

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.
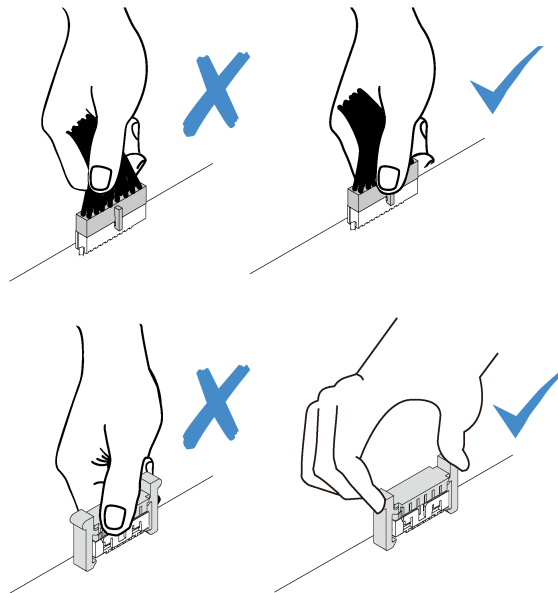
Cable routing for common components

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 31
- "Common cable routing (upper tray)" on page 33

Notes:

- Make sure that all the cables go through the cable guides, as shown in the illustrations. See "Cable guides" on page 30 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.
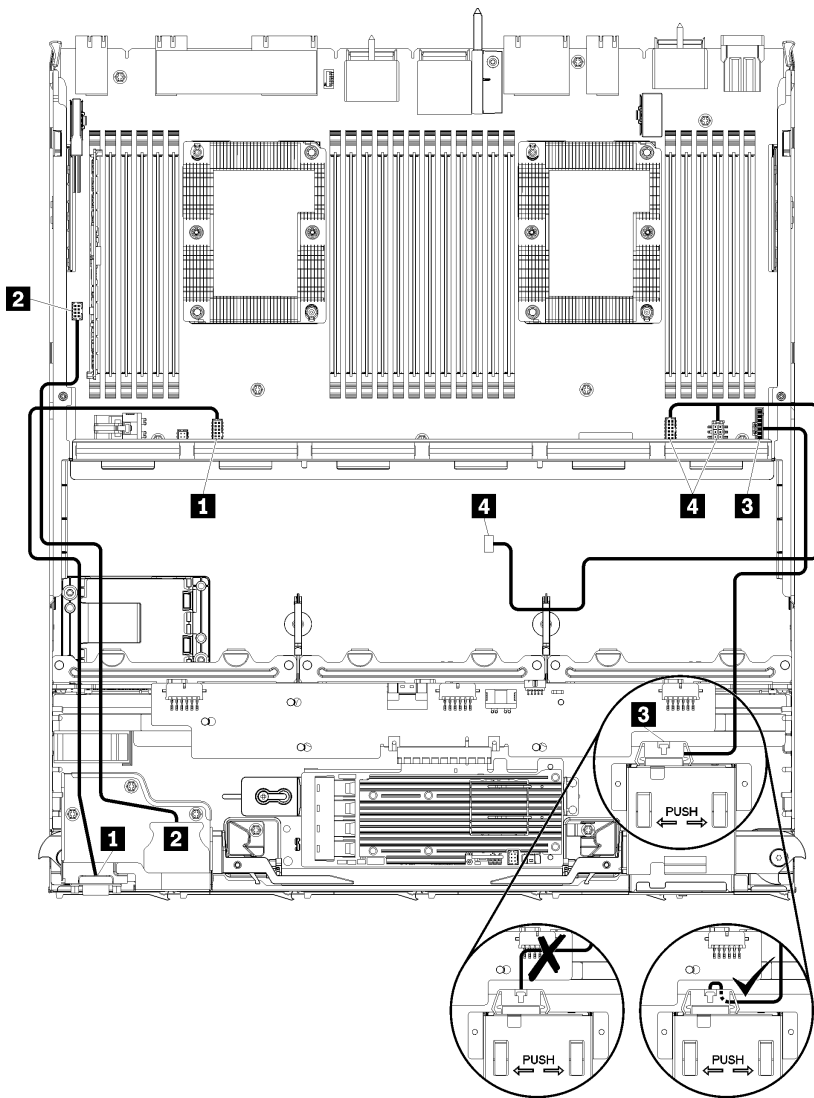
Figure 22. Cable routing, common cables (lower tray)

Table 23. Cable routing, common cables (lower tray)

Cable	Routing
1 Front panel video port	• **From:** Front panel video port • **To:** Lower compute system board in lower compute tray, "Front video" connector (see "System-board connectors" on page 22)
2 Front panel USB ports	• **From:** Front USB ports • **To:** Lower compute system board in lower compute tray, "USB" connector (see "System-board connectors" on page 22)

Table 23. Cable routing, common cables (lower tray) (continued)

Cable	Routing
3 Control panel cable	• **From:** Control panel connector • **To:** Lower compute system board in lower compute tray, "Front panel" connector (see "System-board connectors" on page 22) **Attention:** Make sure the operator panel cable is folded beneath the connector, as shown in Figure 22 "Cable routing, common cables (lower tray)" on page 32 to prevent the cable from pinching when the compute tray is fully assembled.
4 Fan cage cable	• **From:** Fan cage connector (underside of fan cage) • **To:** Lower compute system board in lower compute tray, "Fan board" power (J56) and signal (J40) connectors (see "System-board connectors" on page 22)

Common cable routing (upper tray)

The following illustration shows cable routing for common components in the upper tray.
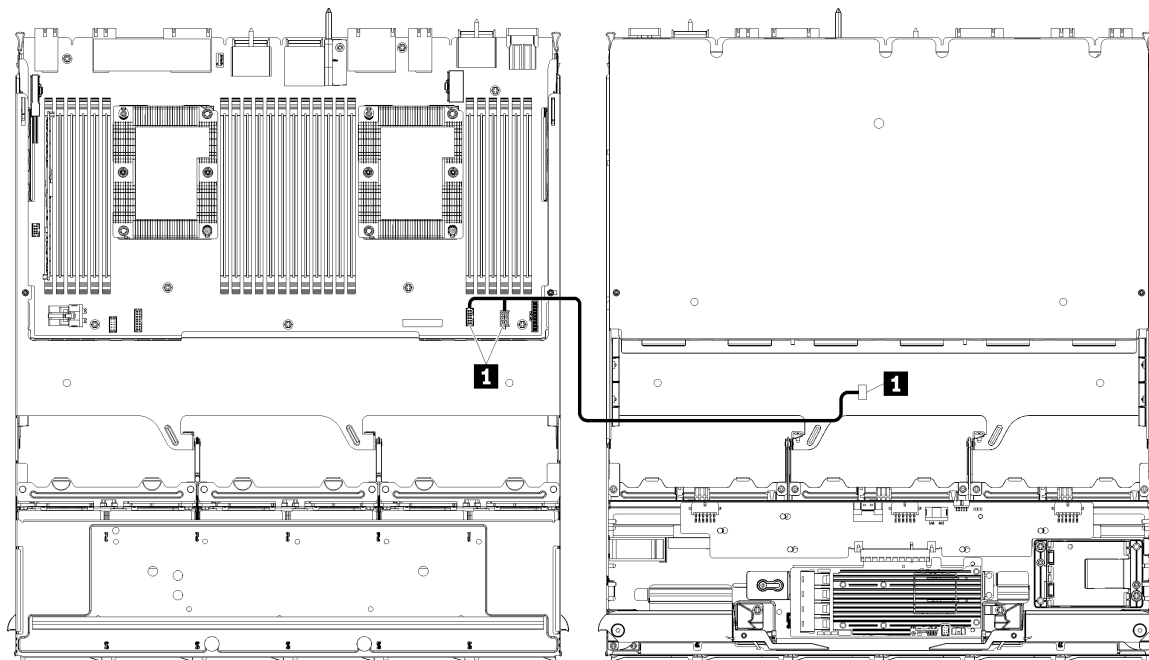
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 23. Cable routing, common cables (upper tray with compute system board)
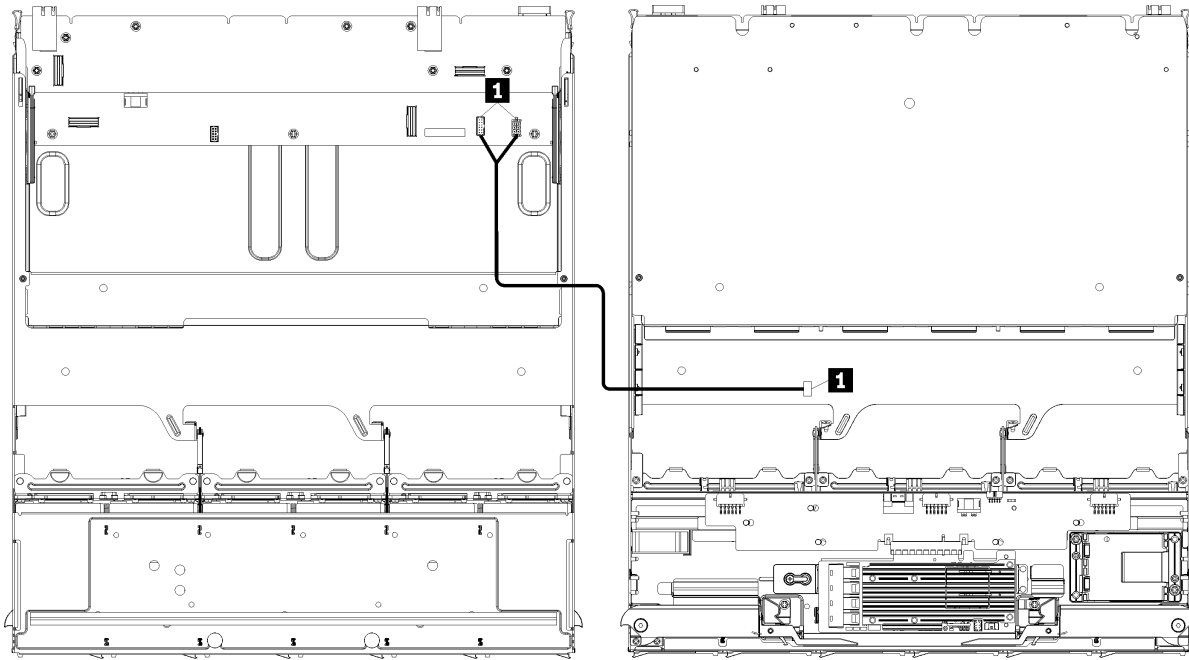
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 24. Cable routing, common cables (upper tray with storage-board assembly)

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

Cable	Routing

1 Fan cage cable	• **From:** Fan cage connector (underside of fan cage)
	 • **To:**
	   – Lower compute system board in upper compute tray, "Fan board" power (J56) and signal (J40) connectors (see "System-board connectors" on page 22)
	   – Storage-board assembly in upper tray, fan power (J3) and signal (J5) connectors (see "Storage-board-assembly connectors" on page 23)
	 Note: Do not route the fan cage cable in the upper tray through any cable guides.

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 35:
    - Common drive cables (lower tray)
    - SAS drive cables (lower tray)
    - NVMe drive cables (lower tray)
- "Drive cable routing (upper tray)" on page 38:
    - 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 30 for cable guide locations and descriptions.
- Some cable connectors have locks or latches that must be disengaged to disconnect the cable.

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.
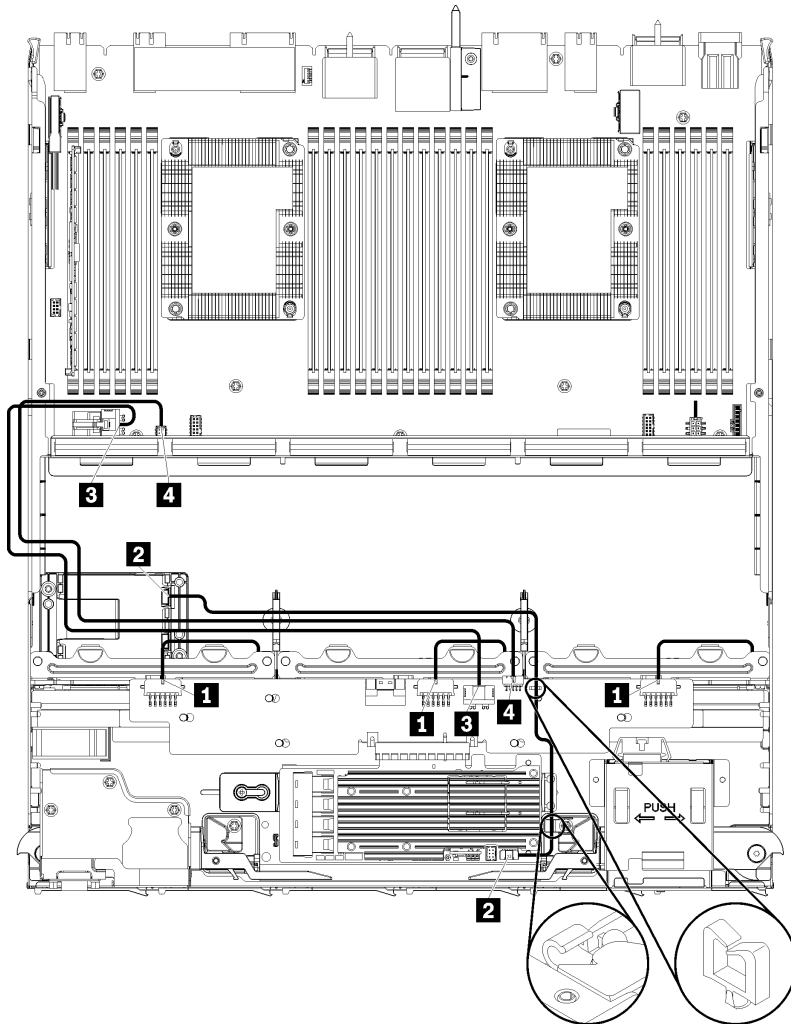
Figure 25. Cable routing, common drive cables (lower tray)

Table 25. Cable routing, common drive cables (lower tray)

Cable	Routing
1 Power to drive backplanes 1, 2, and 3	• **From:** Storage interposer (see "Storage interposer connectors" on page 27) – 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 28)
2 RAID flash power module	• **From:** RAID flash power module connector • **To:** RAID card, flash power module (J14) connector (see "RAID card connectors" on page 27)
3 Drive power	• **From:** Lower compute system board in lower compute tray, "POWER" connector (see "System-board connectors" on page 22) • **To:** Storage interposer, "POWER" connector (see "Storage interposer connectors" on page 27)
4 Drive signal	• **From:** Lower compute system board in lower compute tray, "Signal" connector (see "System-board connectors" on page 22) • **To:** Storage interposer, "SIDEBAND" connector (see "Storage interposer connectors" on page 27)

SAS drive cables (lower tray)

Common drive cables are used by only SAS drives.

Figure 26. Cable routing, SAS drive cables (lower tray)

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

Cable	Routing
1 PCIe SAS interface	• **From:** Lower compute system board in lower compute tray, "PCIe/NVMe" connector (see "System-board connectors" on page 22) • **To:** Storage interposer, connector "PCIe" (see "Storage interposer connectors" on page 27)
2 RAID interface for drive backplane 1	• **From:** RAID card, "C3" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)
3 RAID interface for drive backplane 2	• **From:** RAID card, "C2" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)
4 RAID interface for drive backplane 3	• **From:** RAID card, "C1" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)

NVMe drive cables (lower tray)

Common drive cables are used by only NVMe drives.
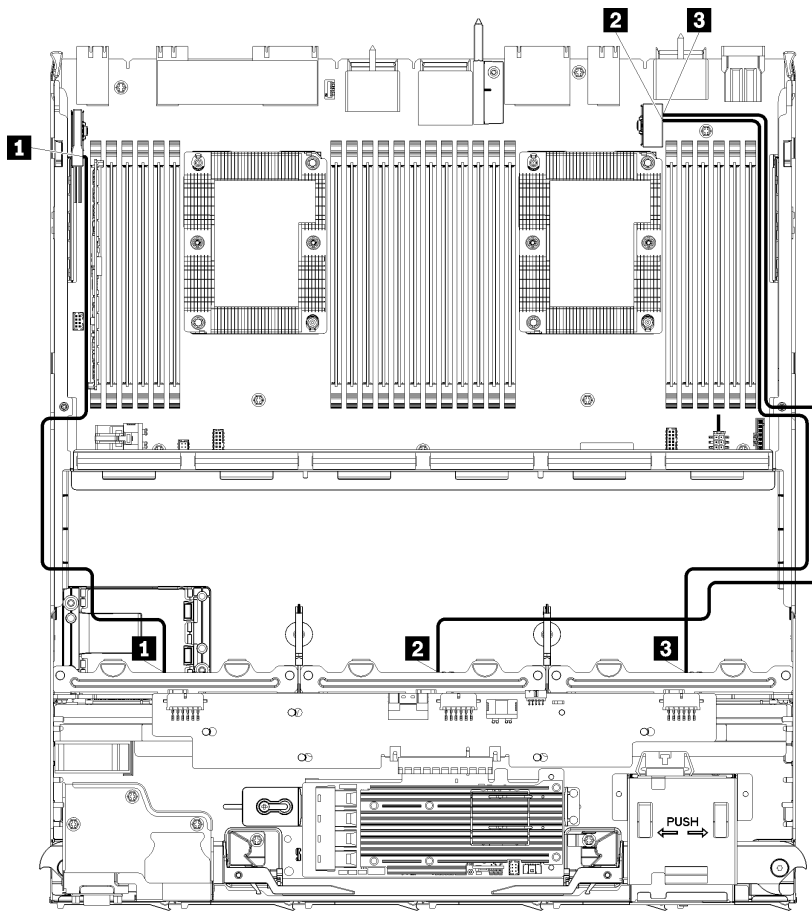
Figure 27. Cable routing, NVMe drive cables (lower tray)

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

Cable	Routing
1 Drive backplane 1 NVMe	• **From:** Upper compute system board in lower compute tray, "PCIe/NVMe" connector (see "System-board connectors" on page 22) • **To:** Drive backplane 1, connector "NVMe" (see "Drive backplane connectors" on page 28)
2 Drive backplane 2 NVMe	• **From:** Upper compute system board in lower compute tray, "NVMe" connector (see "System-board connectors" on page 22) • **To:** Drive backplane 2, connector "NVMe" (see "Drive backplane connectors" on page 28)
3 Drive backplane 3 NVMe	• **From:** Lower compute system board in lower compute tray, "NVMe" connector (see "System-board connectors" on page 22) • **To:** Drive backplane 3, connector "NVMe" (see "Drive backplane connectors" on page 28)

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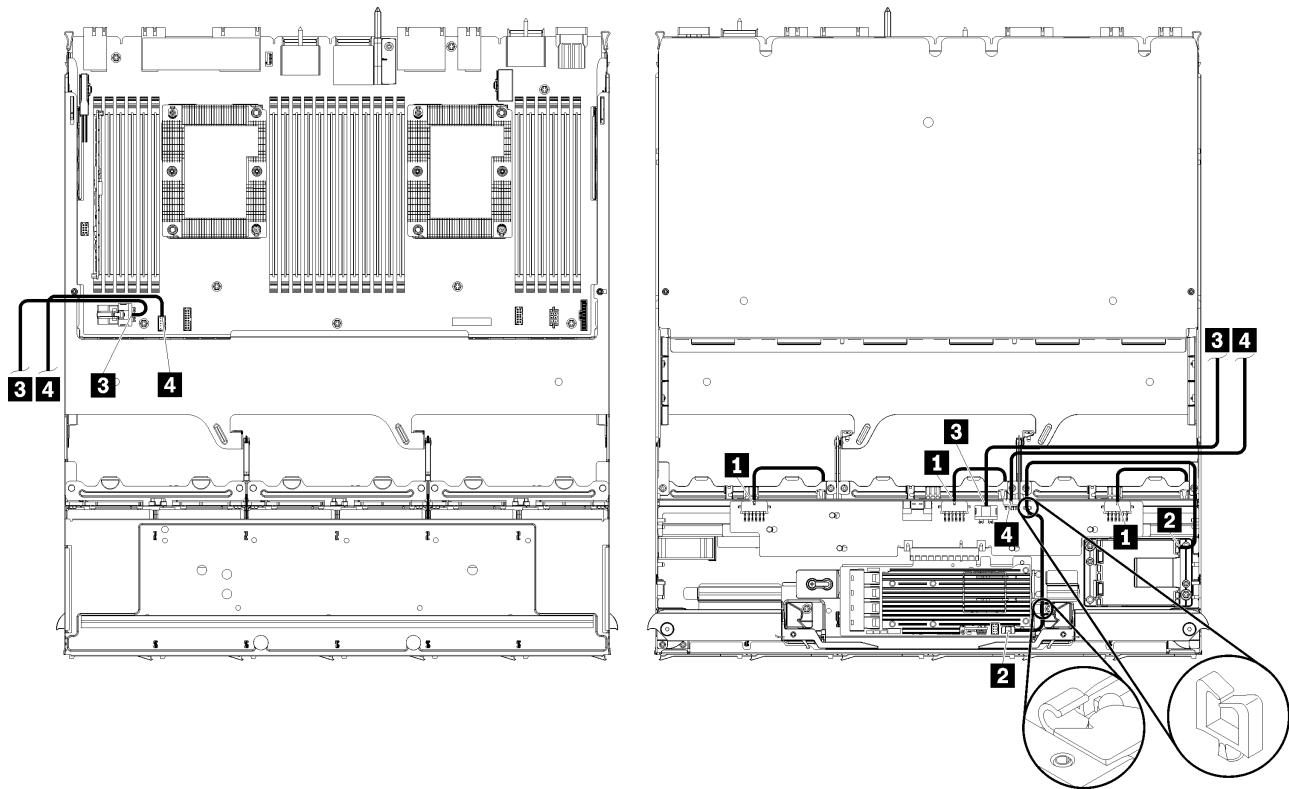
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 28. 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 29. Cable routing, common drive cables (upper tray with storage-board assembly)

Table 28. Cable routing, common drive cables (upper tray)

Cable	Routing

1 Power to drive backplanes 4, 5, and 6	• **From:** Storage interposer (see "Storage interposer connectors" on page 27)
	  – 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 28)

2 RAID flash power module	• **From:** RAID flash power module connector • **To:** RAID card, flash power module (J14) connector (see "RAID card connectors" on page 27)

Table 28. Cable routing, common drive cables (upper tray) (continued)

Cable	Routing

3 Drive power	• **From:**
	   – Lower compute system board in upper compute tray, "POWER" connector (see "System-board connectors" on page 22)
	   – Storage-board assembly in upper tray, hard disk drive power (J2) connector (see "Storage-board-assembly connectors" on page 23)
	• **To:** Storage interposer, "POWER" connector (see "Storage interposer connectors" on page 27)

4 Drive signal	• **From:**
	   – Lower compute system board in upper compute tray, "Signal" connector (see "System-board connectors" on page 22)
	   – Storage-board assembly in upper tray, hard disk drive signal (J13) connector (see "Storage-board-assembly connectors" on page 23)
	• **To:** Storage interposer, "SIDEBAND" connector (see "Storage interposer connectors" on page 27)

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 30. Cable routing, SAS drive cables (upper tray with compute system board)
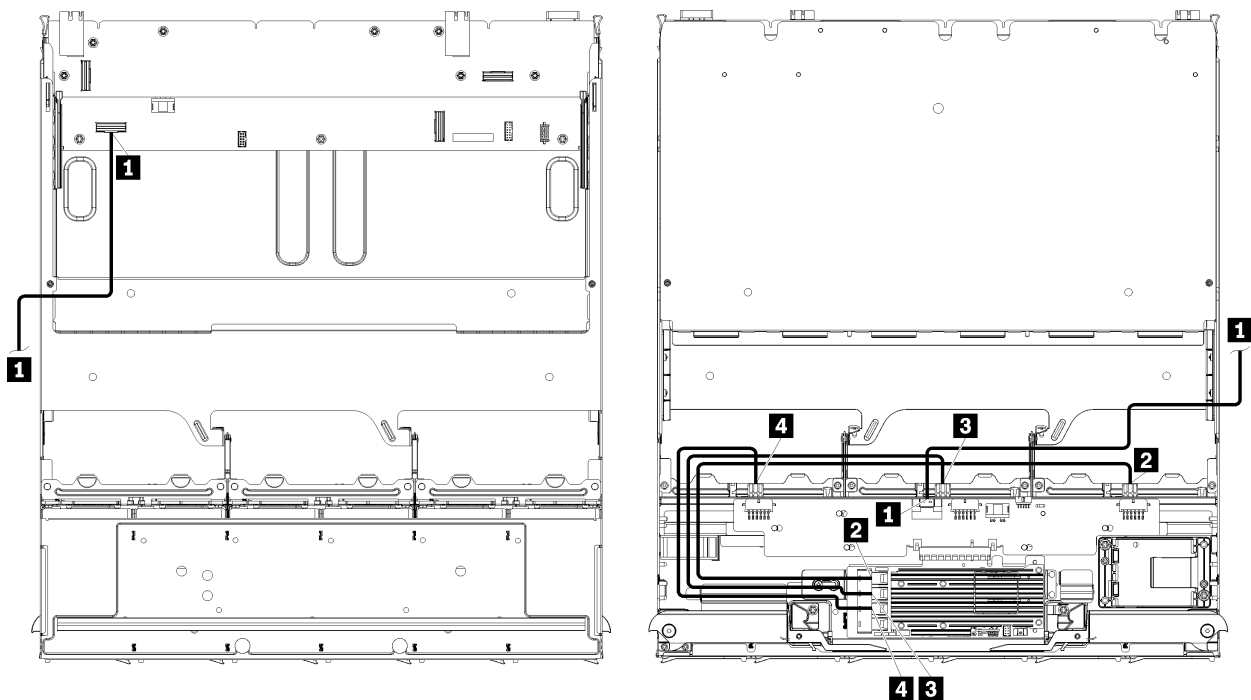
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 31. Cable routing, SAS drive cables (upper tray with storage-board assembly)

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

Cable	Routing

1 PCIe SAS interface	• **From:**
	   – Lower compute system board in upper compute tray, "PCIe/NVMe" connector (see "System-board connectors" on page 22)
	   – Storage-board assembly in upper tray, "PCIe" connector (see "Storage-board-assembly connectors" on page 23)
	 • **To:** Storage interposer, "PCIe" connector (see "Storage interposer connectors" on page 27)

2 RAID interface for drive backplane 4	• **From:** RAID card, "C3" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)
3 RAID interface for drive backplane 5	• **From:** RAID card, "C2" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)
4 RAID interface for drive backplane 6	• **From:** RAID card, "C1" connector (see "RAID card connectors" on page 27) • **To:** Drive backplane, connector "SAS" (see "Drive backplane connectors" on page 28)

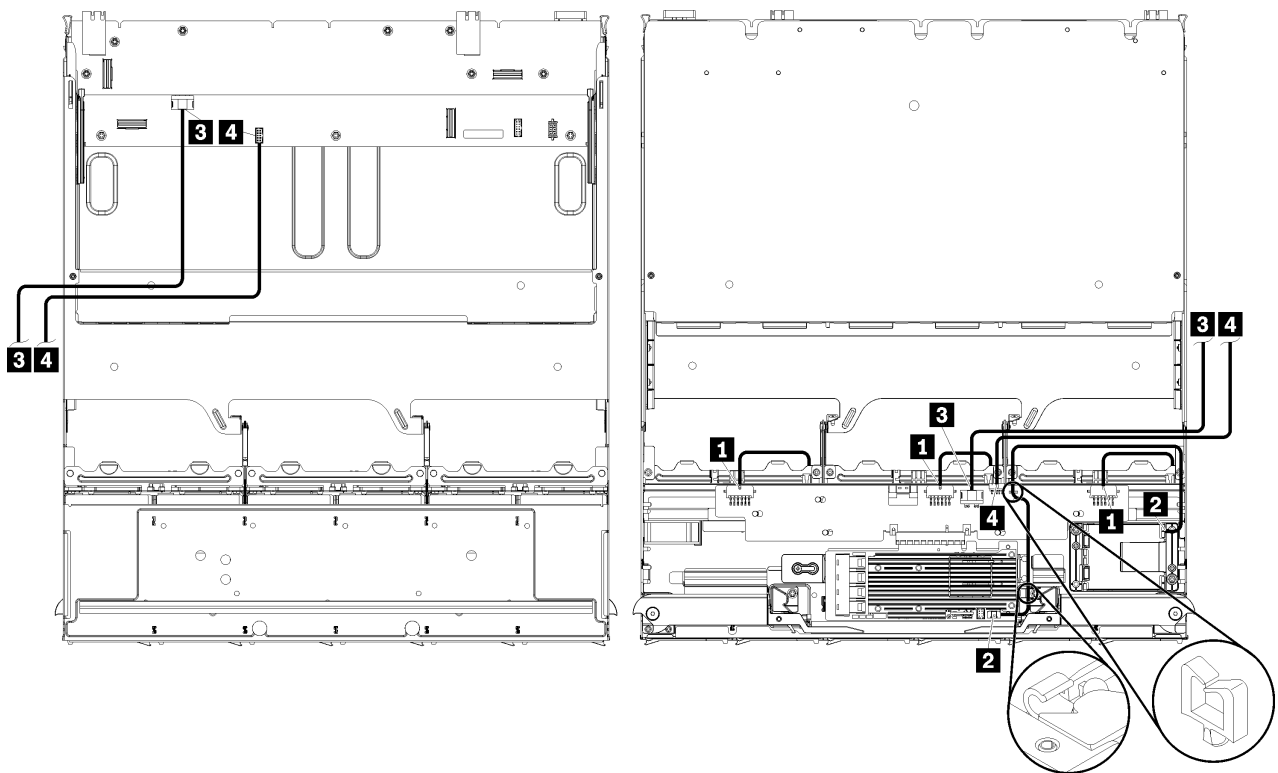**NVMe drive cables (upper tray)**

Common drive cables are used by only NVMe drives.
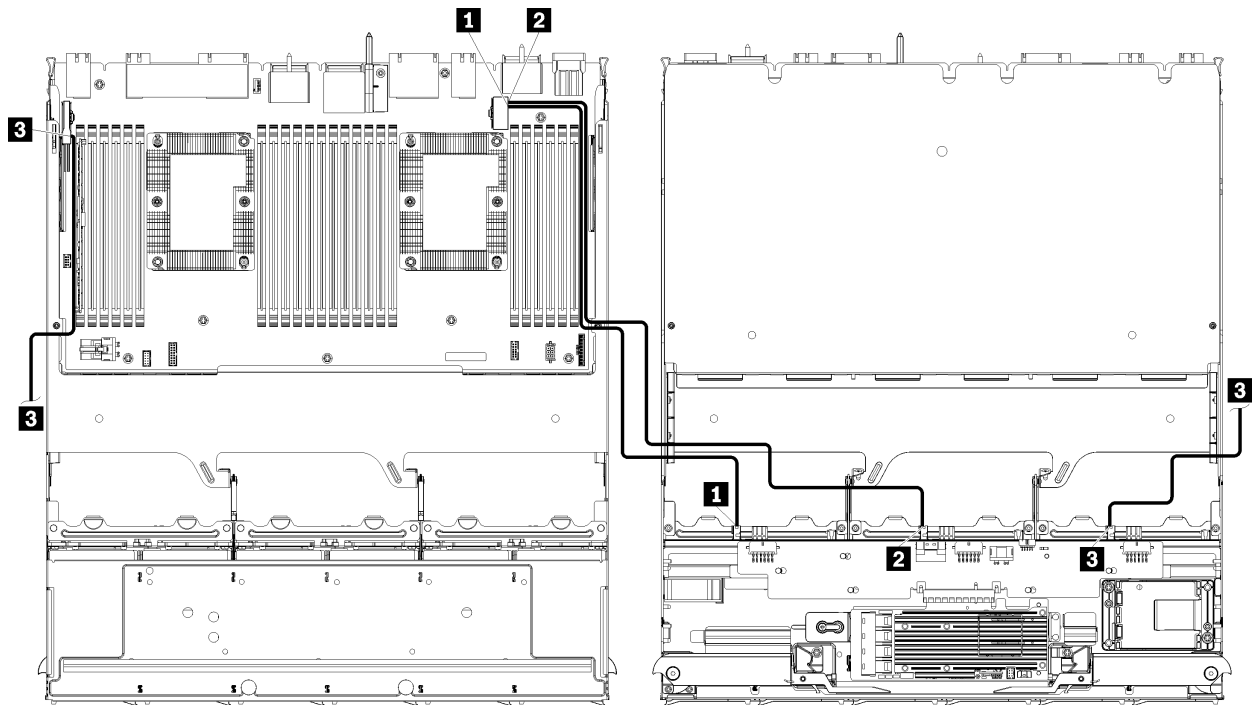
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 32. Cable routing, NVMe drive cables (upper tray with compute system board)
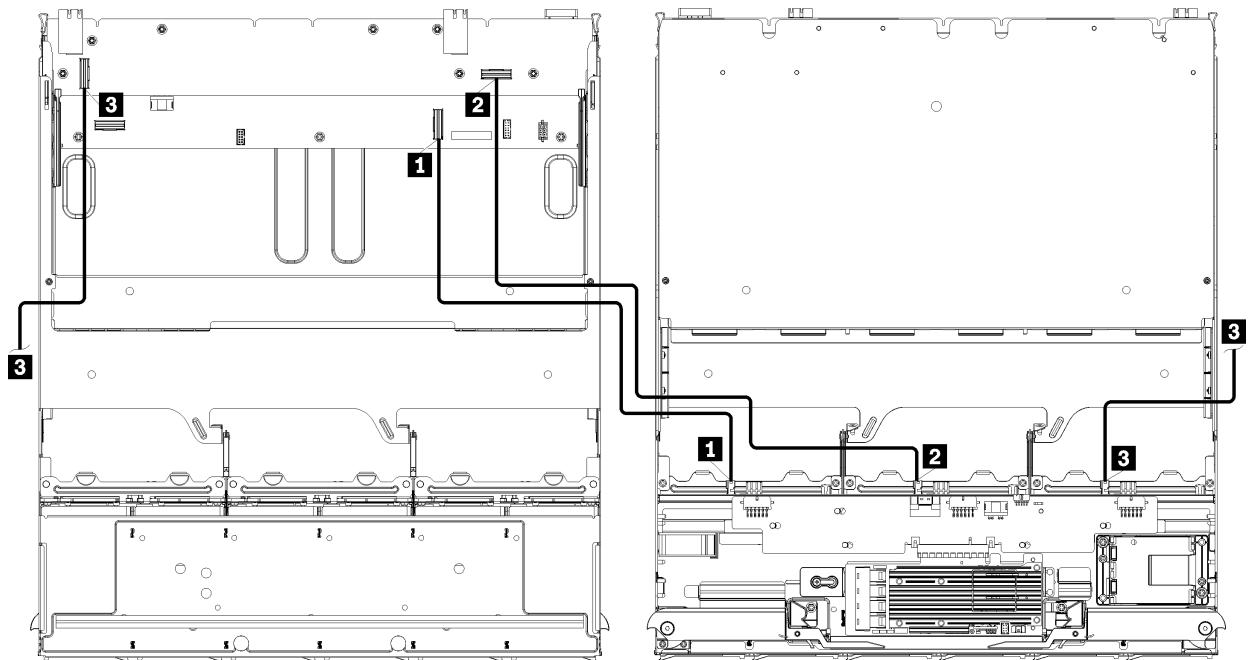
Note: In this illustration, the image on the left shows the tray right-side up and the image on the right shows the tray upside down.

Figure 33. Cable routing, NVMe drive cables (upper tray with storage-board assembly)
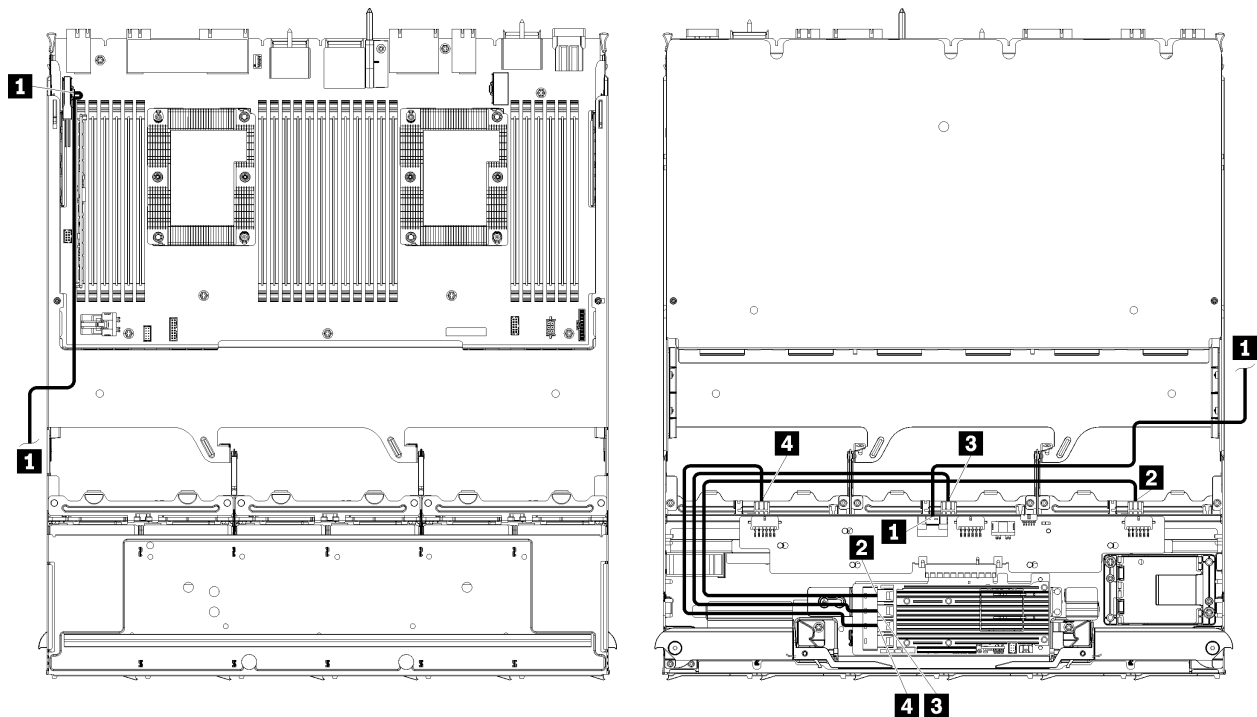
Table 30. Cable routing, NVMe drive cables (upper tray)

Cable	Routing

1 Drive backplane 6 NVMe	• **From:**
	
	  – Lower compute system board in upper compute tray, "PCIe/NVMe" connector (see "System-board connectors" on page 22)
	
	  – Storage-board assembly in upper tray, "NVMe" connector (see "Storage-board-assembly connectors" on page 23)
	
	• **To:** Drive backplane 6, connector "NVMe" (see "Drive backplane connectors" on page 28)

2 Drive backplane 5 NVMe	• **From:**
	
	  – Upper compute system board in upper compute tray, "NVMe" connector (see "System-board connectors" on page 22)
	
	  – Storage-board assembly in upper tray, "NVMe" connector (see "Storage-board-assembly connectors" on page 23)
	
	• **To:** Drive backplane 5, connector "NVMe" (see "Drive backplane connectors" on page 28)

3 Drive backplane 4 NVMe	• **From:**
	
	  – Upper compute system board in upper compute tray, "NVMe" connector (see "System-board connectors" on page 22)
	
	  – Storage-board assembly in upper tray, "NVMe" connector (see "Storage-board-assembly connectors" on page 23)
	
	• **To:** Drive backplane 4, connector "NVMe" (see "Drive backplane connectors" on page 28)

Parts list

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

For more information about ordering the parts shown in Figure 34 "Server components" on page 45:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr950/7X12/parts

Note: Depending on the model, your server might look slightly different from the illustration.
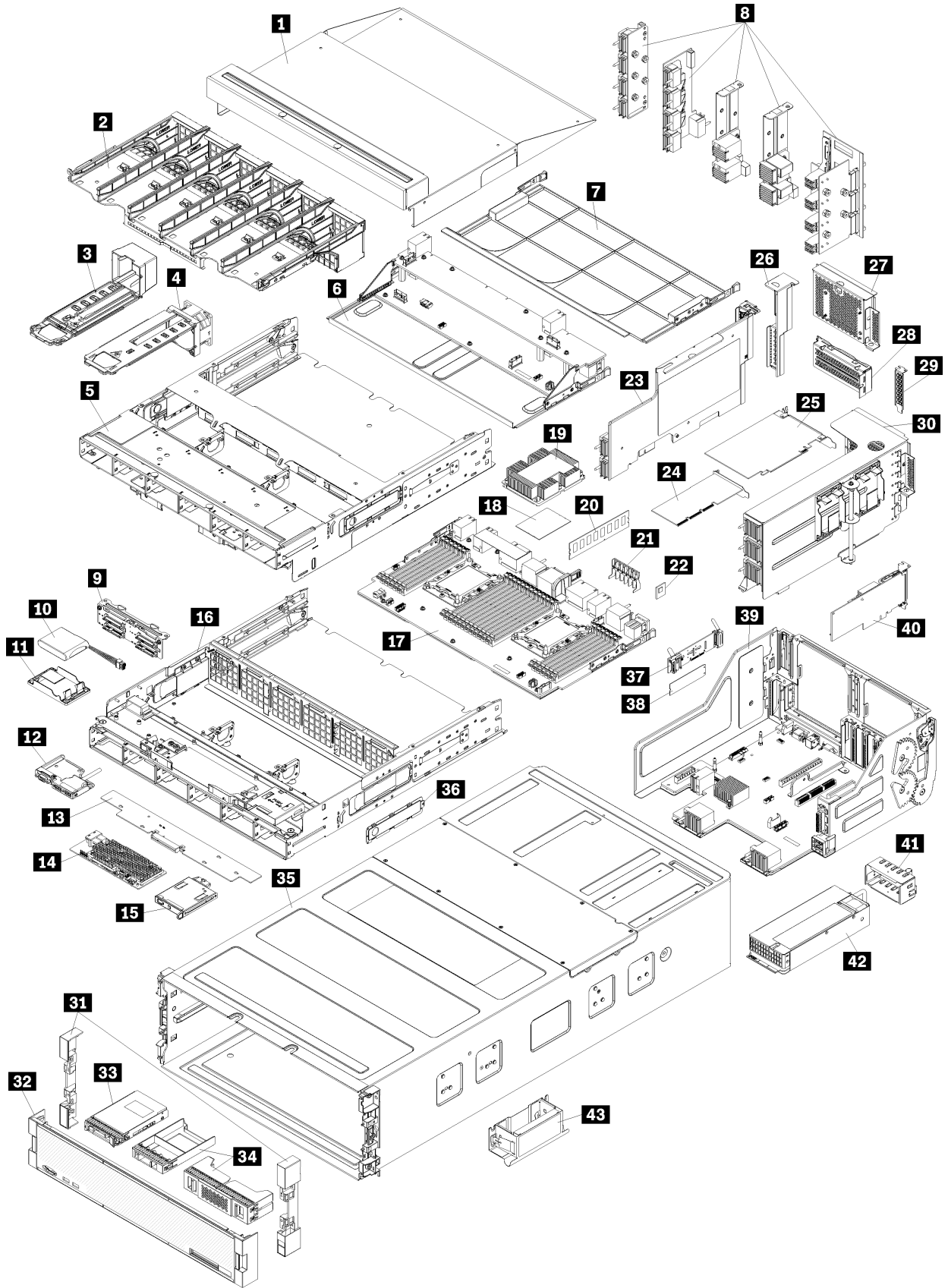
Figure 34. Server components

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:** 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 31. 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 34 "Server components" on page 45:					
http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr950/7X12/parts					
1	Upper tray filler	√			
2	Fan cage (upper)	√			
2	Fan cage (lower)	√			
3	Fan filler	√			
4	Fan	√			
5	Compute tray (upper)	√			
5	Storage tray	√			
6	Storage board assembly	√			
7	Compute system board filler	√			
8	Midplanes (five types)		√		
9	Hard disk drive backplane	√			
10	RAID flash power module	√			
11	RAID flash power module bracket	√			
12	Front USB/VGA assembly	√			
13	Storage interposer	√			
14	RAID card	√			
15	Front operator panel	√			
16	Compute tray (lower)	√			
17	Compute system board	√			
18	Processor			√	
19	Processor and heat sink (PHM)			√	
19	Heat sink			√	

Table 31. Parts listing (continued)

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

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://lesc.lenovo.com

2. In the Customize a Model pane:

   a. Click **Select Options/Parts for a Model**.

   b. Enter the machine type and model for your server (for example, 7X12CTO1WW).

3. Click the Power tab 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 help 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. Installing the 4S-to-8S Upgrade Option

If you purchased a Lenovo ThinkSystem SR950 server in a four-socket configuration, you can upgrade it to support an eight-socket configuration using the 4S Performance to 4S Upgradable Conversion Kit. The installation of the conversion kit must be done by a trained service technician.

The 4S Performance to 4S Upgradable Conversion Kit includes the following parts:

- Four midplanes (interconnect cards)
- Nine Torx-head screws (you will use eight screws, but an extra screw is included, if needed)

Important: The 4S Performance to 4S Upgradable Conversion Kit enables the Lenovo ThinkSystem SR950 server to support eight processors. However, processors are not provided with the conversion kit; you are responsible for purchasing the desired number of processors. If you install the conversion kit, all processors in the server must be 8100 Series processors.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 following 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. (C011)

Read the Installation Guidelines

Power off server and disconnect all power cords for this task

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

The process for installing the conversion kit requires that you remove the existing midplanes (interconnect cards) in the server and replace them with the midplanes provided in the conversion kit. In addition, an upper compute tray must installed in the server to take advantage of all eight processors.

- If you do not have an upper compute tray, make sure that you order the compute tray when you order the conversion kit. You will need to remove the upper-tray filler and install the compute tray in the upper position. For instructions about removing the upper tray filler and installng a compute tray, see Step 8 on page 52.

- If a storage tray is installed in the upper-tray position, you can convert the storage tray to a compute tray. For instructions about converting the storage tray to a compute tray, see Step 9 on page 53.

  Notes: Cables that connect to the storage tray are longer than the cables that connect to the compute tray. For optimal cable routing, you should replace the following cables when converting from a storage tray to a compute tray in the upper-tray position:
  - Fan cage cable. Replace part number 01GW929 with part number 01GW928.
  - Drive power cable. Replace part number 01GW930 with part number 01GW917.
  - Drive Signal cable. Replace part number 01GW931 with part number 01GW918.

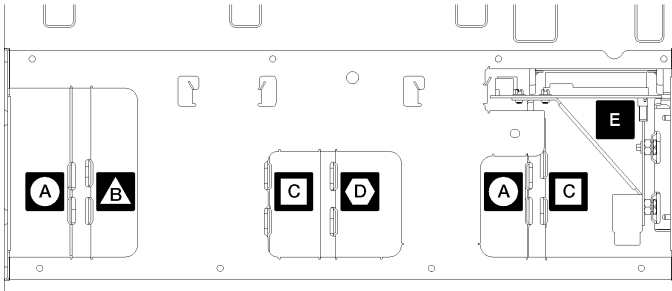The following illustration identifies the various midplanes that might be installed in your server.

Figure 35. Midplane identification

Table 32. Midplanes

Callout	Callout
Ⓐ Midplane used in four-socket storage-rich configurations	Ⓓ Midplane used in four-socket and eight-socket configurations One of these midplanes is provided in the 4S Performance to 4S Upgradable Conversion Kit.
Ⓑ Midplane used in four-socket and eight-socket configurations One of these midplanes is provided in the 4S Performance to 4S Upgradable Conversion Kit.	Ⓔ Power midplane used in all server configurations
Ⓒ Midplane used in four-socket and eight-socket configurations Two of these midplanes are provided in the 4S Performance to 4S Upgradable Conversion Kit.	

Complete the following steps to install the 4S Performance to 4S Upgradable Conversion Kit:

Step 1. Make sure that the server is powered down and disconnected from power.

Step 2. Disconnect all external cables.

Step 3. Remove the front cover. See "Remove the front cover" on page 95.

Step 4. Make sure that all compute trays, storage trays, and the I/O tray are removed from the server.

- For compute tray removal instructions, see http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/ remove_the_compute_tray.html.

- For storage tray removal instructions, see http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/ remove_the_storage_tray.html.

- For I/O tray removal instructions, see http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/ remove_the_io_tray.html.

Step 5. If the server is in a rack, remove it from the rack.

See the *ThinkSystem SR950 Rack Installation Instructions*, which is available here:

http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html

Step 6. Remove the midplanes from the server (depending on the configuration, you might need to remove up to 6 midplanes). You **must** remove midplanes A (if installed), B, C, and D. However, you do not need to remove the power midplane (midplane E). See Figure 35 "Midplane identification" on page 50 for the locations of all midplanes.

Instructions for removing the midplanes are available here:

http://thinksystem.lenovofiles.com/help/topic/7X12/remove_a_midplane.html

Note: When you remove the top cover, discard the screws. Torx-head screws are provided with the conversion kit (eight screws and an extra screw are provided).

Step 7. Install the midplanes that are provided with the conversion kit. Install **only** midplanes B, C, and D.

> **Note:** Two midplane C interconnect cards are provided in the conversion kit. Make sure that you install both of them.

Instructions for installing the midplanes are available here:

http://thinksystem.lenovofiles.com/help/topic/7X12/install_a_midplane.html

Step 8. If a filler is installed in the upper tray position, you must remove it and install a compute tray to take advantage of eight processors.

Complete the following steps to remove the upper tray filler and install a compute tray:

a. Remove the four screws (two each side) securing the upper tray filler.
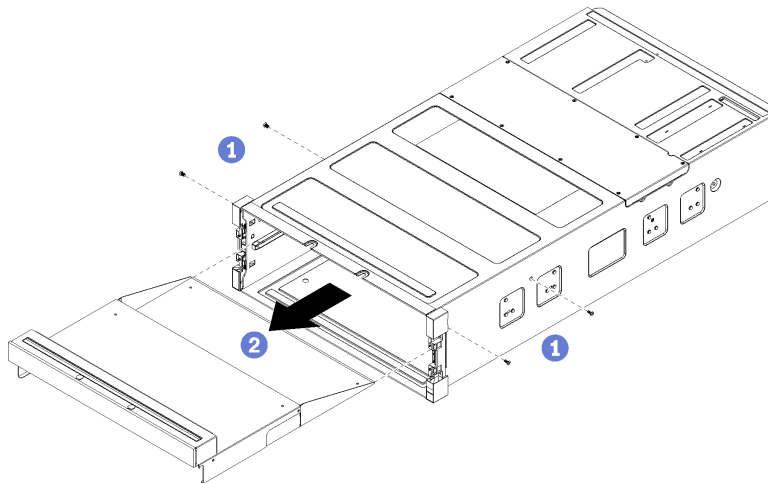
b. Slide the upper tray filler out of the front of the server.

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

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

e. Rotate the compute tray release levers until they lock, fully closed.
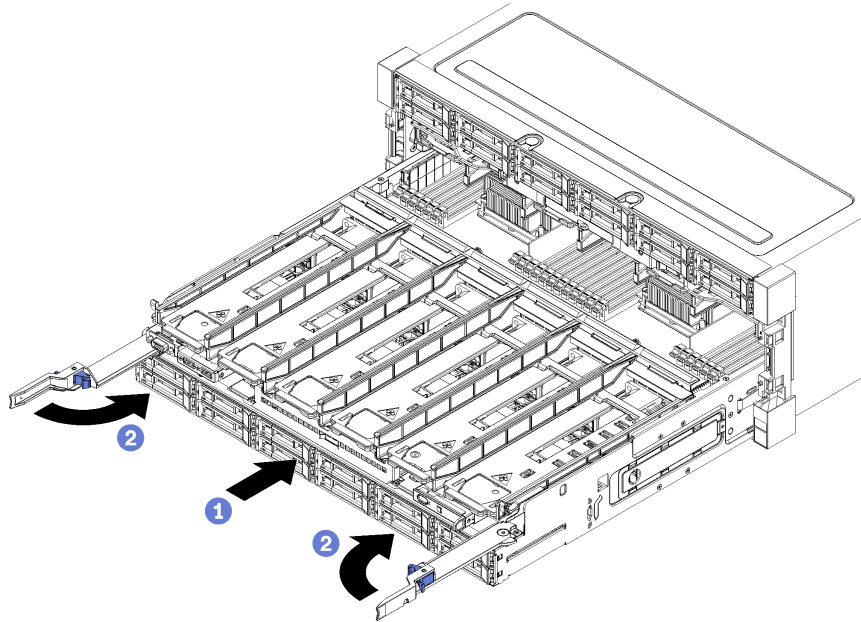
Step 9. If a storage tray is installed in the upper-tray position, you must convert it to a compute tray to take advantage of eight processors.

Notes: Cables that connect to the storage tray are longer than the cables that connect to the compute tray. For optimal cable routing, you should replace the following cables when converting from a storage tray to a compute tray in the upper-tray position:
- Fan cage cable. Replace part number 01GW929 with part number 01GW928.
- Drive power cable. Replace part number 01GW930 with part number 01GW917.
- Drive Signal cable. Replace part number 01GW931 with part number 01GW918.

Complete the following steps to convert a storage tray to a compute tray:

a. Remove the upper tray from the server if you have not already done so.

See http://thinksystem.lenovofiles.com/help/topic/7X12/remove_the_storage_tray.html.

b. Disconnect all cables from the storage boards.

See http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_common.html and http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_for_drives.html.

c. Remove the storage board assembly.

See http://thinksystem.lenovofiles.com/help/topic/7X12/remove_the_storage_board.html.

d. Install the bottom CPU board.

See http://thinksystem.lenovofiles.com/help/topic/7X12/install_the_compute_system_board.html.

e. Connect cables to the bottom CPU board.

See http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_common.html and http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_for_drives.html.

f. Install the upper CPU board.

See http://thinksystem.lenovofiles.com/help/topic/7X12/install_the_compute_system_board.html.

g. Connect cables to the upper CPU board.

See http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_common.html and http://thinksystem.lenovofiles.com/help/topic/7X12/cable_routing_for_drives.html.

h. Remove the fan fillers in fan bays 8, 10, and 12 and install fans in those bays.

See http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/install_the_fan.html.

Step 10. Install the server in a rack.

See the *ThinkSystem SR950 Rack Installation Instructions*, which is available here:

http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html

Step 11. Install all compute trays and the I/O tray that were removed in Step 4 on page 51.

- For compute tray installation instructions, see http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/install_the_compute_tray.html.
- For I/O tray installation instructions, see http://ralfss28.labs.lenovo.com:8787/help/topic/7X12/install_the_io_tray.html.

Step 12. Install the front cover. See "Install the front cover" on page 96.

After installation is complete, reconnect all external cables and power on the server.

Chapter 4. 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/us/en/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 6.

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 that you work safely.
  - A complete list of safety information for all products is available at:
    http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - "Handling static-sensitive devices" on page 56.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see http://www.lenovo.com/us/en/serverproven/.
- 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 Lenovo 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 that the latest level of code is supported for the cluster solution 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.

- 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 any other item.

- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.

- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- 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.

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 through 4: see "Remove a PCIe adapter from slots 1 through 4" on page 57 and "Install a PCIe adapter in slots 1 through 4" on page 64
- PCIe adapters 5 through 8 and the LOM adapter (slot 9):
  - For PCIe adapters 5 through 8, see "Remove an adapter from slots 5 through 8" on page 58 and "Install an adapter in slots 5 through 8" on page 65
  - For the LOM adapter (slot 9), see "Remove a LOM adapter from slot 9" on page 60 and "Install a LOM adapter in slot 9" on page 66
- PCIe adapters 10 through 15: see "Remove a PCIe adapter from slots 10 through 15" on page 61 and "Install a PCIe adapter in slots 10 through 15" on page 67
- I/O adapters 16 and 17 (riser card): see "Remove an I/O adapter from slots 16 and 17" on page 62 and "Install an I/O adapter in slots 16 and 17" on page 69

Remove a PCIe adapter from slots 1 through 4

PCIe adapters in slots 1 through 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 slots 1 through 4 (left riser), 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 that is 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

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

Before you remove an adapter from slots 1 through 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 115.

2. Remove the riser for slots 1 through 4 (left riser). See "Remove the riser for slots 1 through 4 (left riser)" on page 164.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215
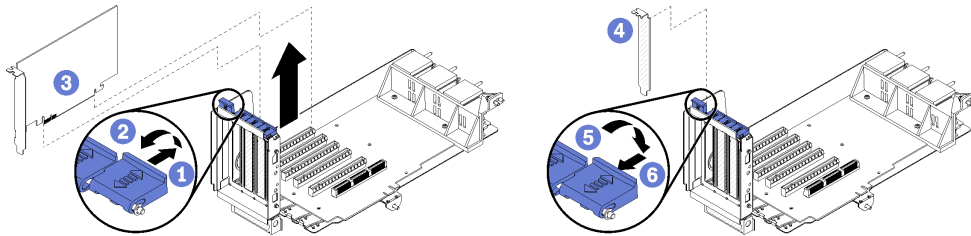

Figure 36. Adapter removal (slots 1 through 4)

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 slots 1 through 4 (left riser)" on page 170.

    3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Remove an adapter from slots 5 through 8

PCIe adapters in slots 5 through 8 and the LOM adapter in slot 9 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.
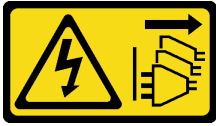
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Read the Installation Guidelines

Power off server and disconnect all power cords for this task

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

Before you remove an adapter from slots 5 through 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 115.

2. Remove the riser for slots 1 through 4 (left riser) to access the adapter connectors in the I/O tray. See "Remove the riser for slots 1 through 4 (left riser)" on page 164.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 37. Adapter removal (slots 5 through 8)

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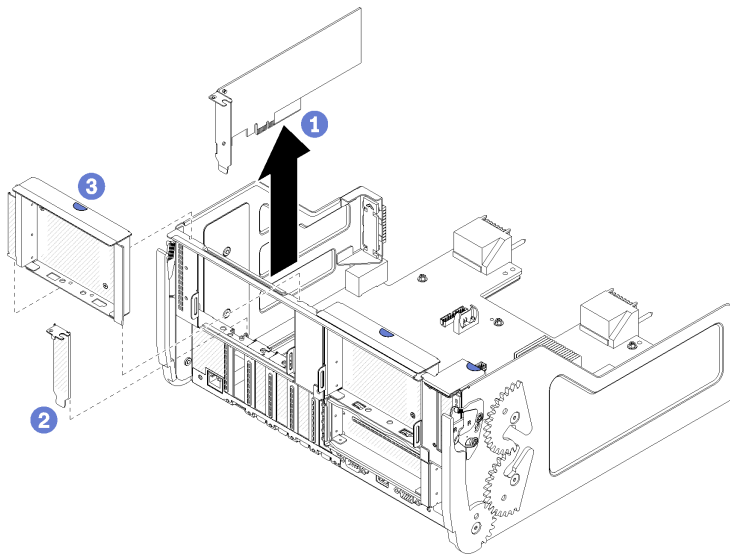
After you remove the adapter:

- If you are removing the adapter and are not installing a replacement:
    1. Install a filler in the empty adapter slot.
    2. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Remove a LOM adapter from slot 9

PCIe adapters in slots 5 through 8 and the LOM adapter in slot 9 are 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 that is 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 115.
2. Remove the riser for slots 10 through 15 (right riser) to access the adapter connectors in the I/O tray. See "Remove the riser for slots 10 through 15 (right riser)" on page 165.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
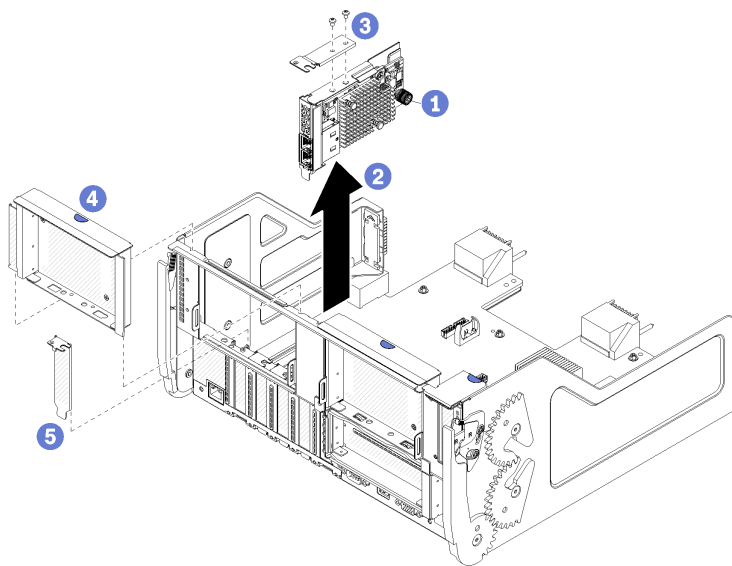- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 38. LOM adapter removal (slot 9)

Step 1. Fully loosen the captive thumbscrew on the side of the LOM adapter 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 slots 10 through 15 (right riser). See "Install the riser for slots 10 through 15 (right riser)" on page 172.

  3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

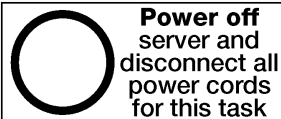## Remove a PCIe adapter from slots 10 through 15

PCIe adapters in slots 10 through 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 slots 10 through 15 (right riser), 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 that is 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 adapter from slots 10 through 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 115.

2. Remove the riser for slots 10 through 15 (right riser). See "Remove the riser for slots 10 through 15 (right riser)" on page 165.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
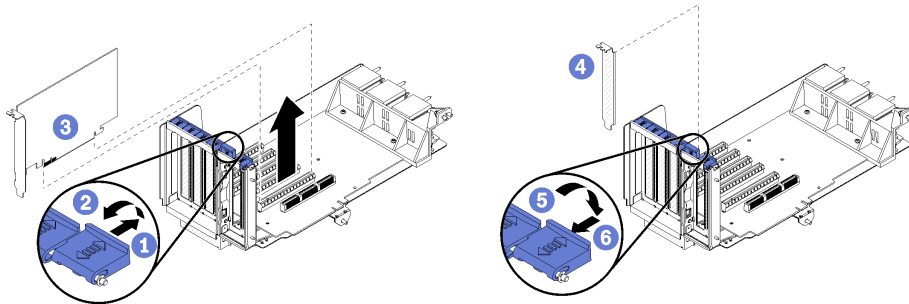- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 39. Adapter removal (slots 10 through 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 slots 10 through 15 (right riser)" on page 172.
    3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

Remove an I/O adapter from slots 16 and 17

I/O adapters in slots 16 and 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 slots 16 and 17, open the retention latch and remove the adapter from the riser.
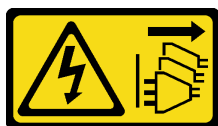
S002

CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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

Before you remove an adapter from slots 1 through 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 115.

2. Remove the riser for slots 16 and 17. See "Remove the riser for slots 16 and 17" on page 169.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 40. Adapter removal (slots 16 and 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.
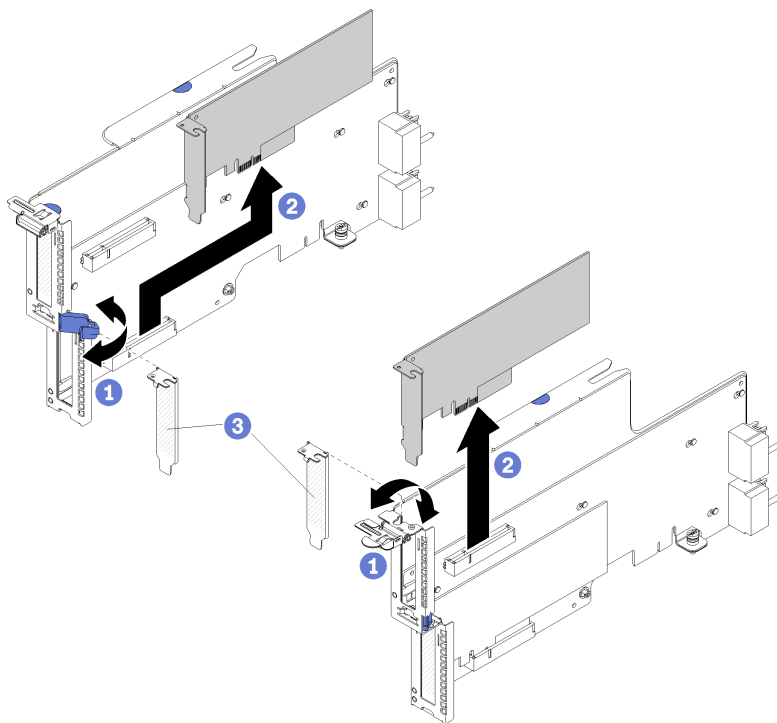
After you remove the adapter:

- 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.
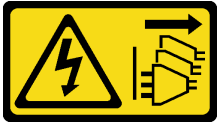
2. Install the riser. See "Install the riser for slots 16 and 17" on page 174.

3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Install a PCIe adapter in slots 1 through 4

PCIe adapters in slots 1 through 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 that is 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 slots 1 through 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 slots 1 through 4.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
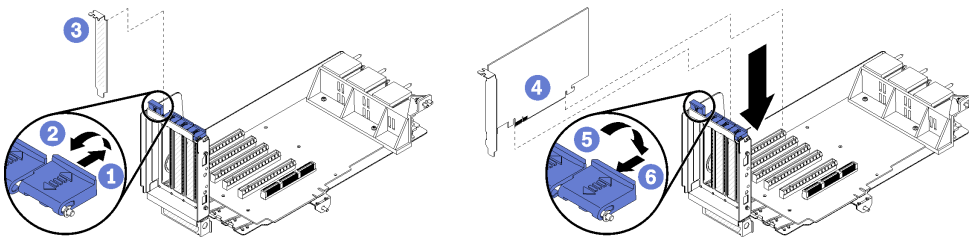- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 41. Adapter installation (slots 1 through 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 slots 1 through 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 slots 1 through 4 (left riser)" on page 170.

3. Install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

Install an adapter in slots 5 through 8

PCIe adapters in slots 5 through 8 and the LOM adapter in slot 9 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.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 slots 5 through 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 slots 5 through 8.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
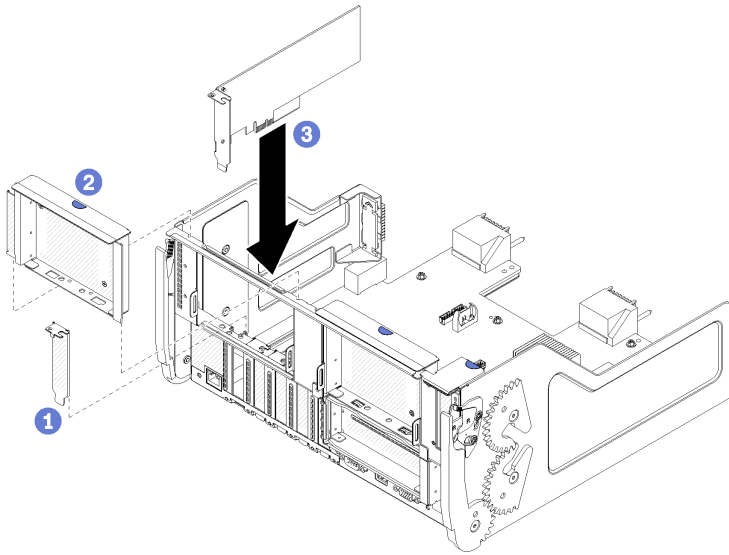- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 42. Adapter installation (slots 5 through 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 slots 5 through 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 slots 1 through 4 (left riser). See "Install the riser for slots 1 through 4 (left riser)" on page 170.

3. Install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

Install a LOM adapter in slot 9

PCIe adapters in slots 5 through 8 and the LOM adapter in slot 9 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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 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.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
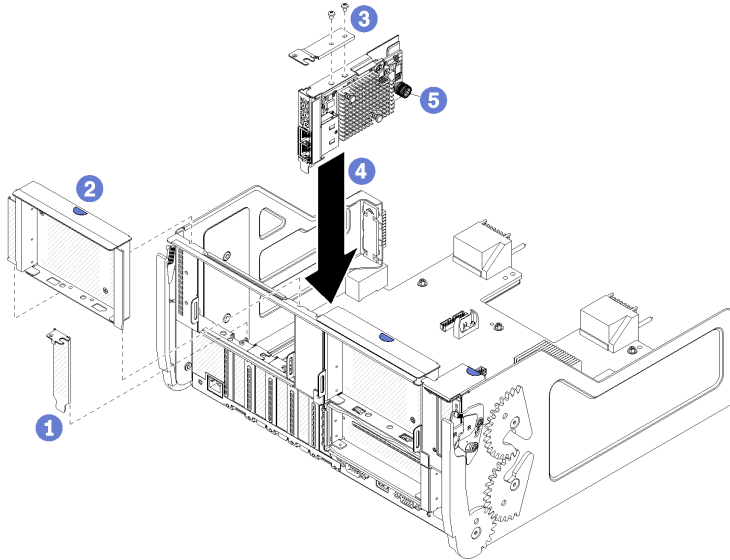- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 43. 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 slots 10 through 15 (right riser). See "Install the riser for slots 10 through 15 (right riser)" on page 172.

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 117.

Install a PCIe adapter in slots 10 through 15

PCIe adapters in slots 10 through 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 that is 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 slots 10 through 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 and 15 riser bracket or a riser bracket filler must be installed on the riser. See "Install a riser bracket for slots 14 and 15" on page 173

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
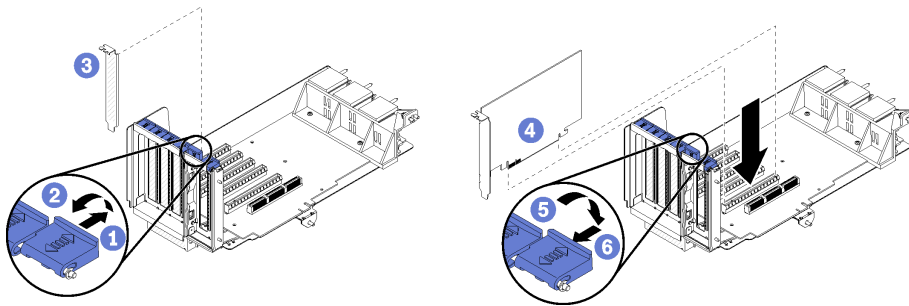- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 44. Adapter installation (slots 10 through 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 slots 10 through 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 slots 1 through 4 (left riser)" on page 170.

3. Install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

Install an I/O adapter in slots 16 and 17

I/O adapters in slots 16 and 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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 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.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
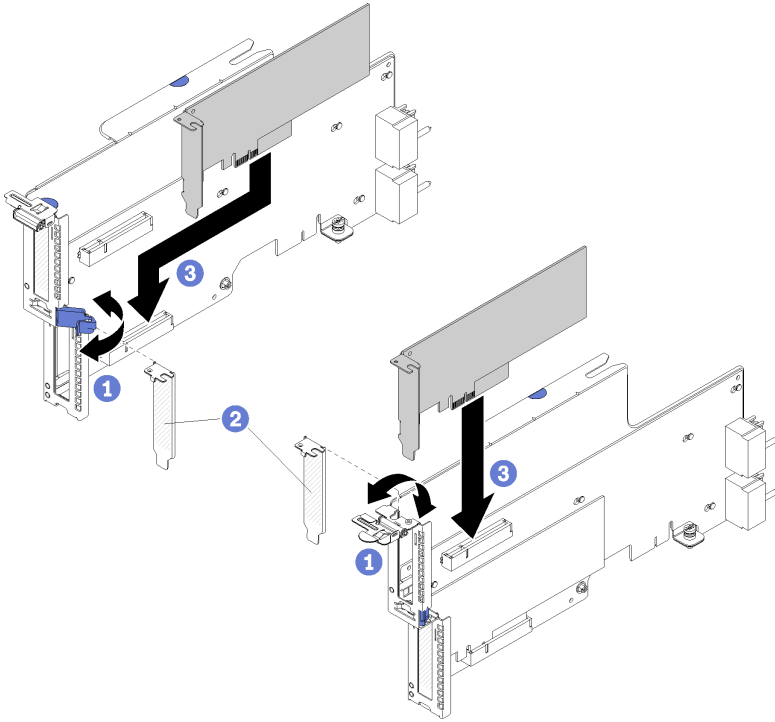- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 45. Adapter installation (slots 16 and 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 slots 1 through 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 slots 16 and 17" on page 174.

3. Install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

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 slots 1 through 4 (left riser) 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 that is 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.

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 115.

2. Remove the riser for slots 1 through 4 (left riser). See "Remove the riser for slots 1 through 4 (left riser)" on page 164.

3. Remove the adapter installed in slot 8. See "Remove an adapter from slots 5 through 8" on page 58.

4. Locate the system battery on the I/O-tray board. See "I/O-tray connectors" on page 24.

Complete the following steps to remove a system battery.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
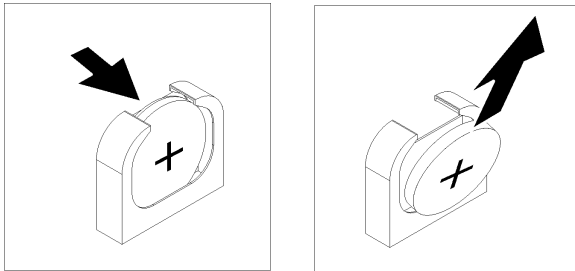- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 46. System battery removal

Step 1. Gently push the top of the battery toward the center of the I/O tray to disengage if 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.

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 that is 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.

<u>S005</u>

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.

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.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
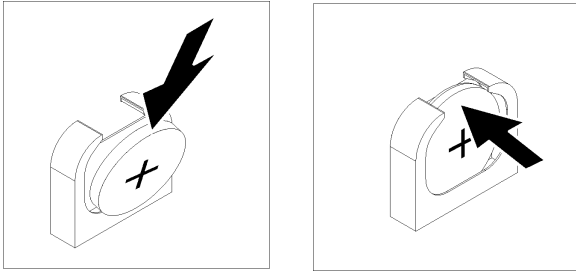- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 47. 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 an adapter in slots 5 through 8" on page 65.

2. Install the riser for slots 1 through 4 (left riser). See "Install the riser for slots 1 through 4 (left riser)" on page 170.

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 117.

5. Reconfigure the server and reset the system date and time. See "System configuration" in the *Lenovo ThinkSystem SR950 Setup Guide*.

Compute system board replacement

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

Remove a compute system board

Remove a compute 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 that is 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 compute system board:

1. Remove the front cover. See "Remove the front cover" on page 95.

2. Remove compute tray where the compute system board is installed. See "Remove a compute tray" on page 80.

3. If you are removing the lower compute system board in a compute tray, remove the upper compute system board or compute system board filler first to access connectors on the lower compute system board. See "Remove a compute system board filler" on page 77, as applicable.

Complete the following steps to remove the compute system board:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
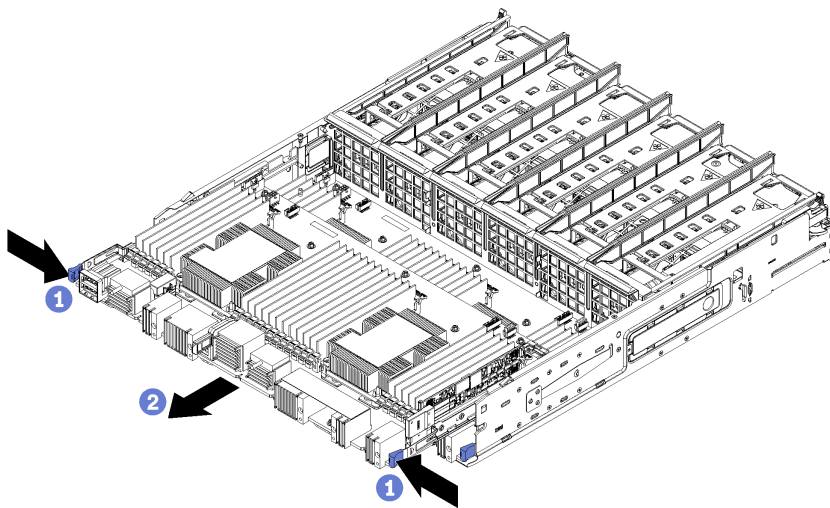- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 48. Compute system board removal

Step 1. Disconnect all cables on the compute system board that go to connectors in the compute tray. See "Internal cable routing" on page 29.

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

After you remove the compute system board:

- If you are replacing the compute system board as part of a maintenance operation, remove all of the following components from the compute system board; then, place them on a static-protective surface or install them on the new compute system board:

  - Processor (see "Processor and heat sink replacement" on page 143)

  - Memory modules and memory module fillers (see "Memory module replacement" on page 129)

  - Memory air baffles (see "Memory air baffle replacement" on page 125)

  - Cables (see "Internal cable routing" on page 29.)

- If you removed the upper compute system board and are not installing another compute system board , install a compute system board filler, install the compute tray, and install the front cover. See "Install a

compute system board filler" on page 78, "Install the compute tray (fully removed)" on page 82, and "Install the front cover" on page 96.

- If you removed the lower compute system board, it must be replaced before you reinstall the upper compute system board or filler.

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

Install a compute system board

Install a compute system board by inserting it in the compute tray, pushing it in until it locks in place, and connecting the cables.
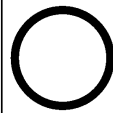
S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 a compute system board if you are replacing the compute system board as part of a maintenance operation, reinstall all of the following components that were removed from the original compute system board:

- Processor (see "Processor and heat sink replacement" on page 143)
- Memory modules and memory module fillers (see "Memory module replacement" on page 129)
- Memory air baffles (see "Memory air baffle replacement" on page 125)
- Cables (see "Internal cable routing" on page 29.)

If you are installing the lower compute system board in a tray, press the release clips and remove the upper compute system board, or filler from the compute tray to access connectors on the lower compute system board. See "Remove a compute system board" on page 74 or "Remove a compute system board filler" on page 77.

Complete the following steps to install the compute system board:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
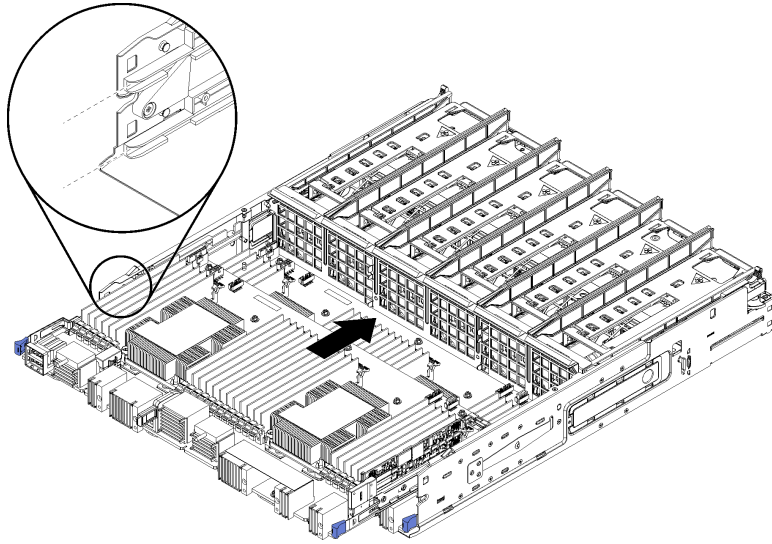- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 49. Compute system board installation

Step 1. Align the compute system board with the rails in the compute tray; then, insert the compute system board, making sure that the rails on the board fit into the slots in the compute tray.

Step 2. Slide the compute system board into the compute tray until the release clips snap into the locked position.

Step 3. Connect all cables on the compute system board that go to connectors in the compute tray. See "Internal cable routing" on page 29.

After you install the compute system board:

- If you installed the lower compute system board in a compute tray, slide the upper compute system board or filler back into the compute tray until the release clips snap into the locked position.
- If you are not installing another compute system board, install the compute tray and front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

Compute system board filler replacement

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

Remove a compute system board filler

Remove a compute 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 that is 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

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

Before you remove the compute system board filler:

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove compute tray where the compute system board filler is installed. See "Remove a compute tray" on page 80.

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

Watch the procedure. A video of the replacement process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
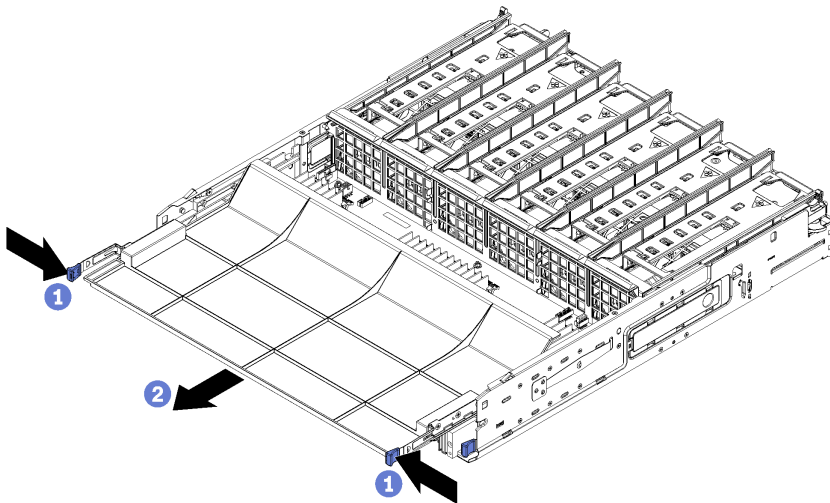• Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 50. Compute system board filler removal

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

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

Install a compute system board filler

Install a compute 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 that is 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.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
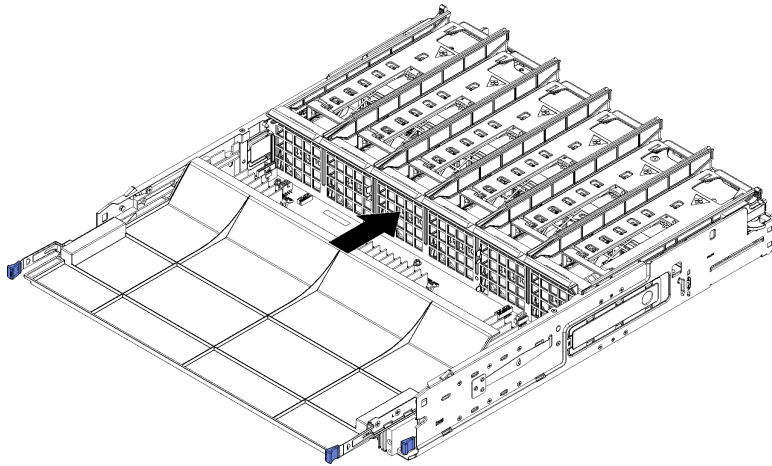- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 51. Compute system board filler installation

Step 1. Align the compute system board filler with the rails in the compute tray; then, insert the compute system board filler, making sure that the rails on the board fit into the slots in the compute tray.

Step 2. Slide the compute system board filler into the compute tray until the release clips snap into the locked position.

After you install the compute system board filler, install the compute tray and front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

Compute tray (upper or lower) 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 that is 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 compute tray, remove the front cover. See "Remove the front cover" on page 95.

Complete the following steps to remove the compute tray:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
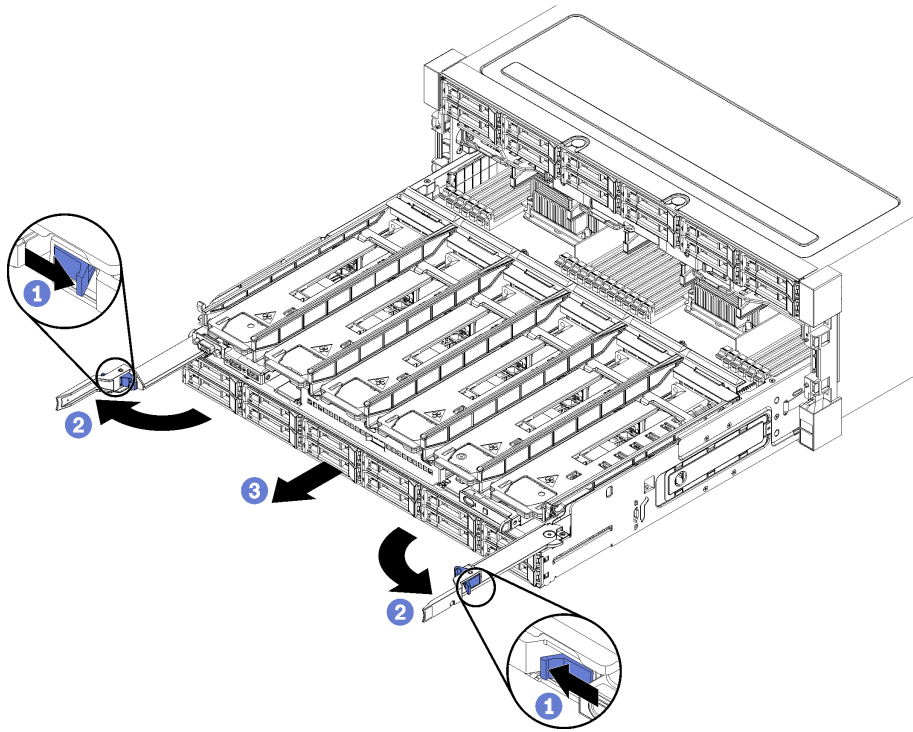- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 52. 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.
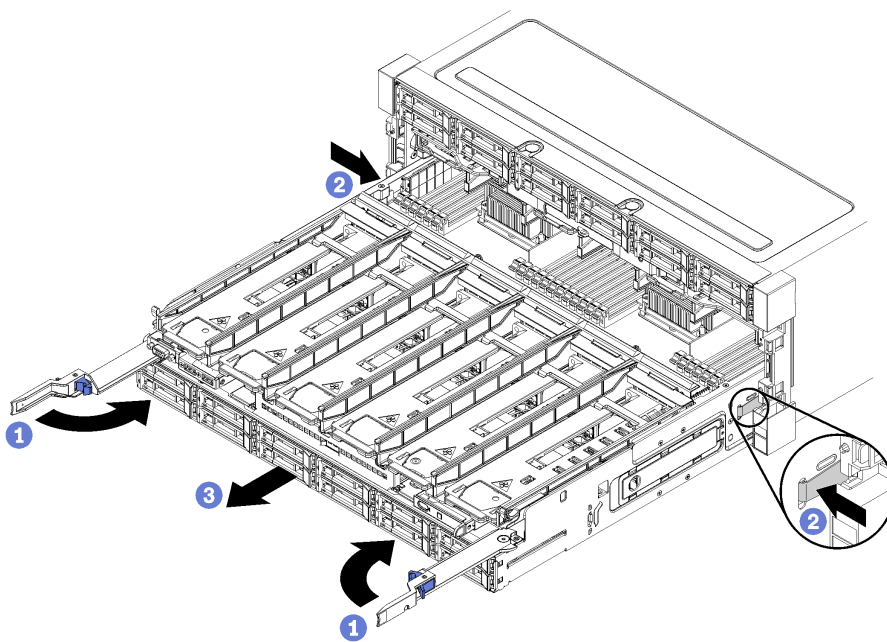
Figure 53. Compute tray removal from chassis

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:

  - Compute system boards (see "Compute system board replacement" on page 74)
  - Fan cages (see "Fan cage replacement" on page 86)
  - Storage interposer (see "Storage interposer replacement" on page 178)
  - RAID card (see "RAID card replacement" on page 153)
  - Hard disk drive backplane (see "Hard disk drive backplane replacement" on page 103)
  - Hard disk drives and fillers (see "Hard disk drive replacement" on page 110)
  - Cables (see "Internal cable routing" on page 29)

- 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.

Install the compute tray (fully removed)

Install the compute 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 that is 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 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 29.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
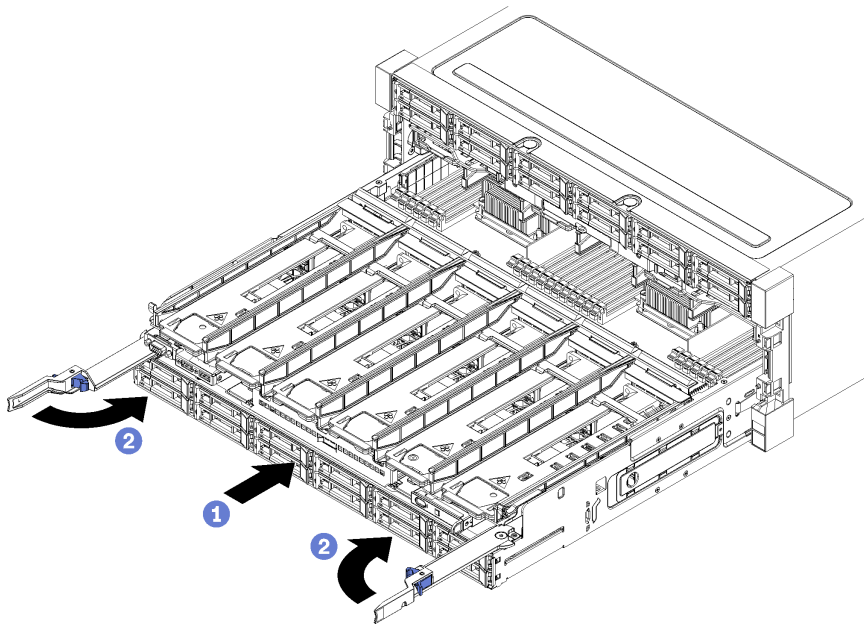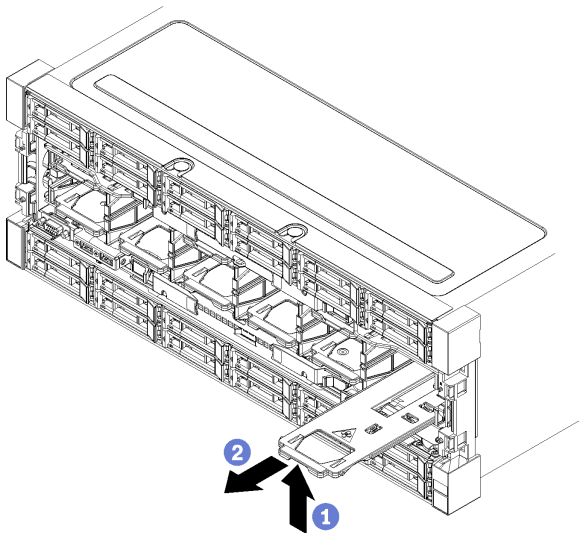- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 54. Compute tray installation (fully removed)

Important: Compute trays must 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 96.

Fan replacement

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

Remove a fan

Press the fan handle inward toward the center of the server to release the latch; then, pull the fan forward and 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.

Read the
Installation
Guidelines

Before you remove a fan, remove the front cover. See "Remove the front cover" on page 95.

Complete the following steps to remove a fan:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 55. Fan removal

Step 1.   Press the fan handle inward toward the center of the server to release the latch; then, 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.

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.

Complete the following steps to install a fan:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215
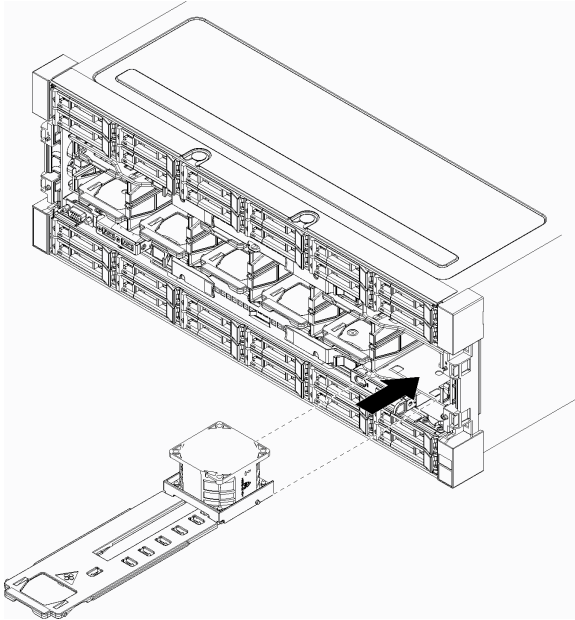
Figure 56. Fan installation

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 96.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 95.

2. Remove the upper compute tray or storage tray. See "Remove a compute tray" on page 80 or "Remove a storage tray" on page 184.

3. If you removed a compute tray and it has one or more compute system boards or a compute system board filler installed, remove the compute system boards or compute system board filler. See "Remove a compute system board" on page 74.

4. Turn the tray upside down.

Complete the following steps to remove an upper fan cage.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
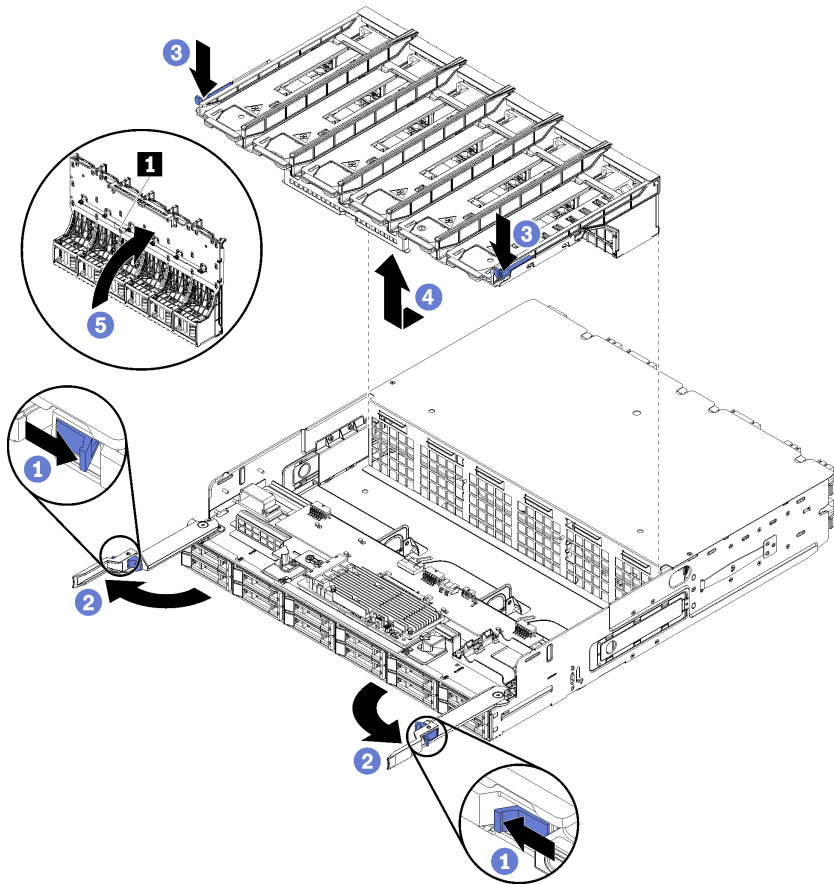- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 57. 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.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 95.

2. Remove the lower compute tray. See "Remove a compute tray" on page 80.

Complete the following steps to remove a lower fan cage.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
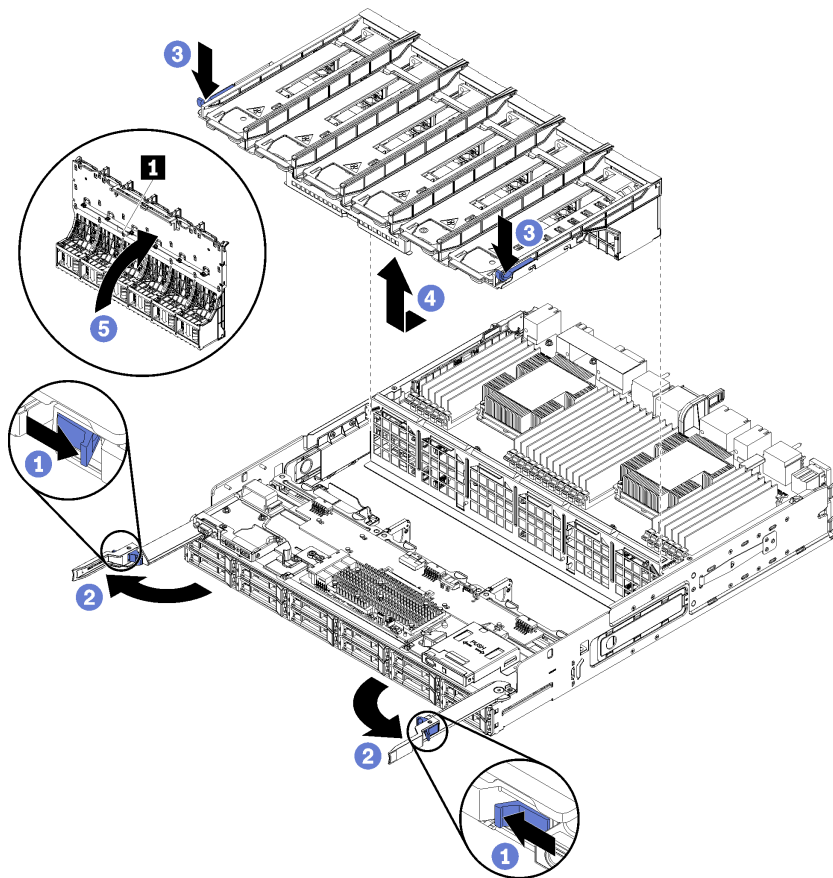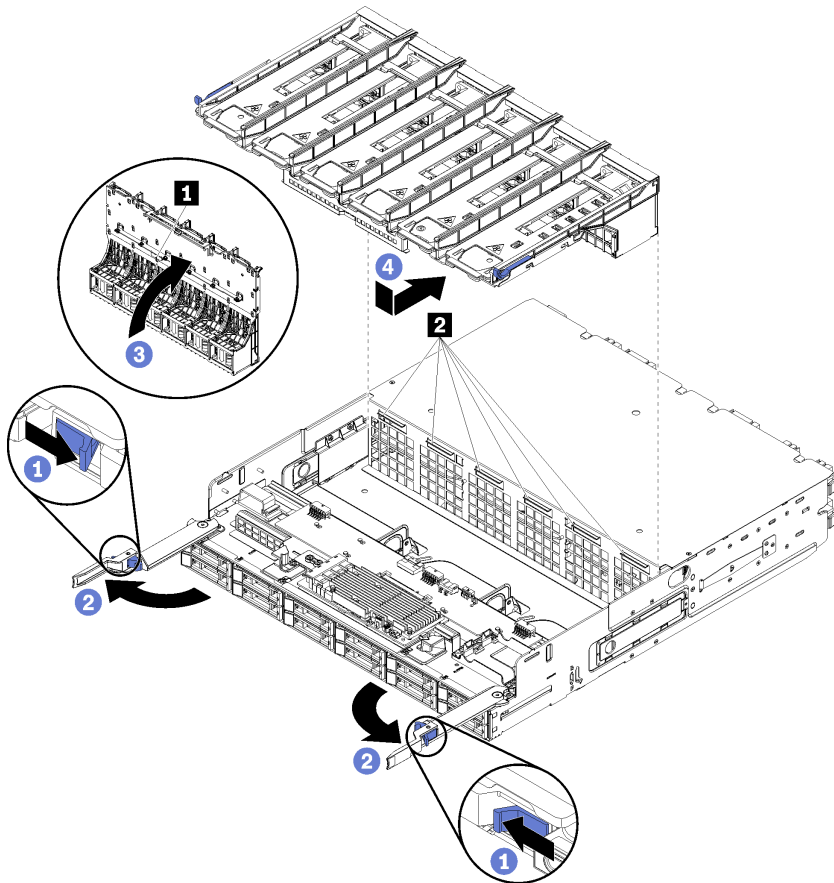- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 58. 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.

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 that is 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

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 59. 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 compute system boards or a compute system board filler from a compute tray, install the compute system boards or compute system board filler. See "Install a compute system board" on page 76.

4. Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.

5. Install the front cover. See "Install the front cover" on page 96.
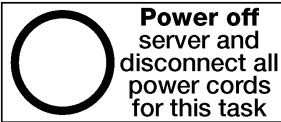
Install a fan cage (lower tray)

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 compute tray (upper or lower). 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 that is 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.

Complete the following steps to install a lower fan cage:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
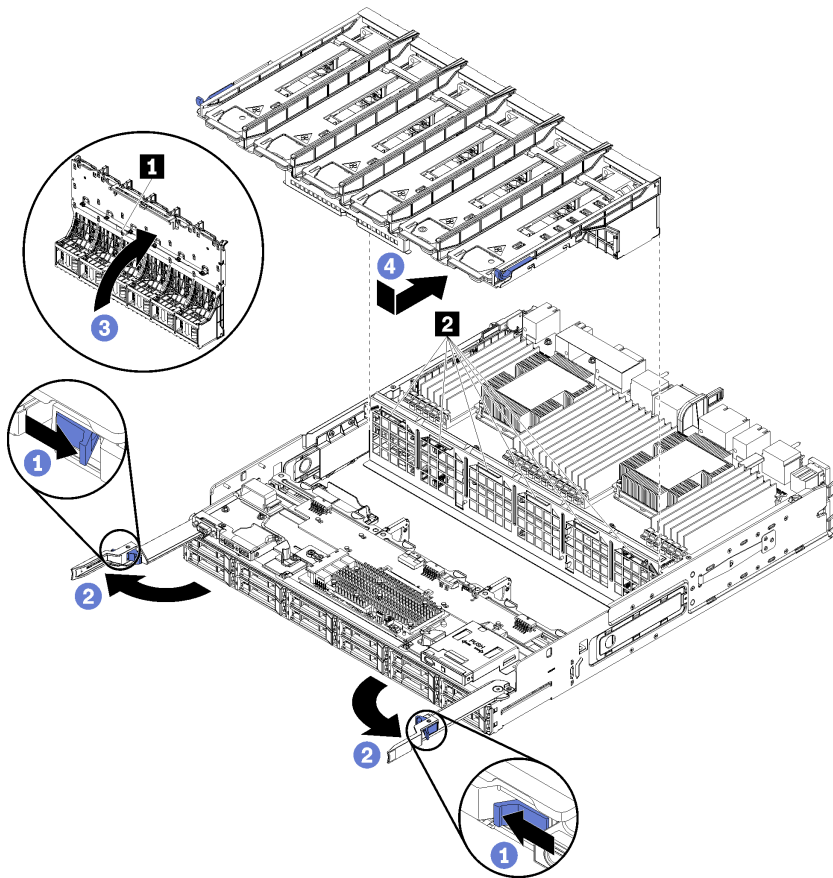- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 60. 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.

Step 5. Connect the cable to the connector **1** in the underside of the fan cage.

Step 6. 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 7. 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 the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

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 95.

Complete the following steps to remove the front bezel:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
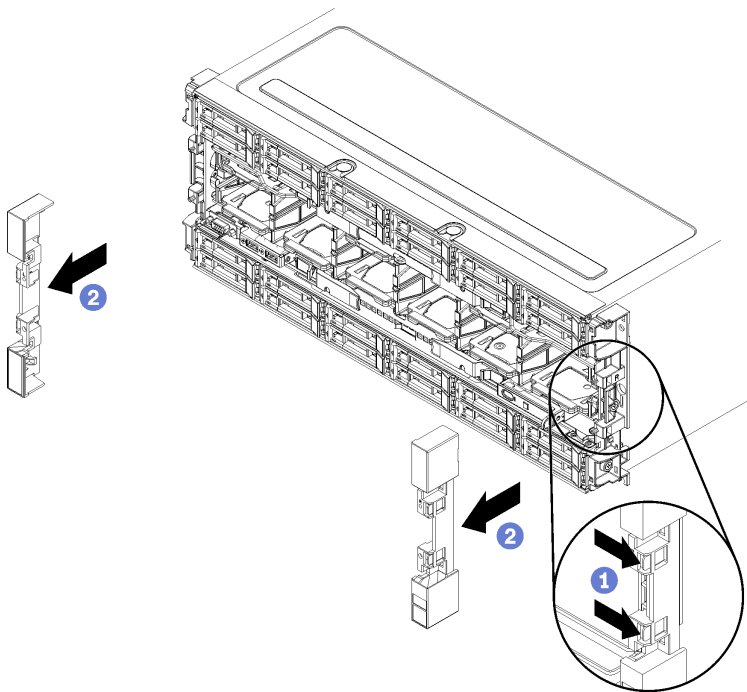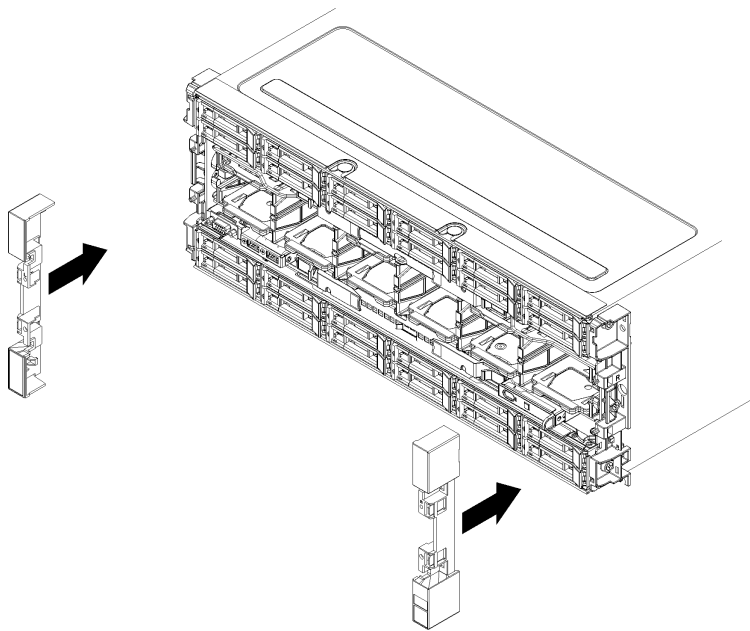- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 61. 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.

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:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
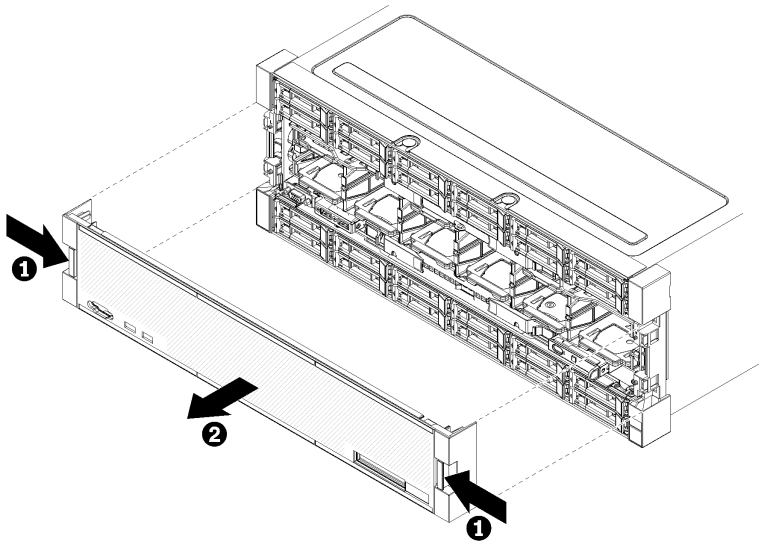- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 62. 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.

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:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
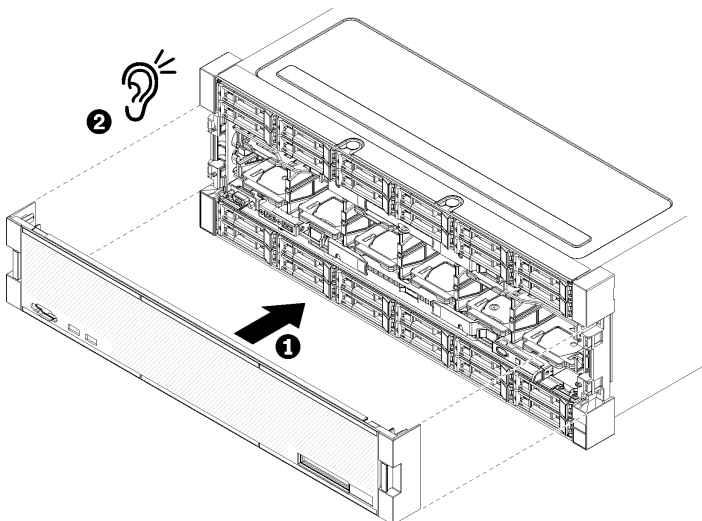- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 63. 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.

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:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 64. 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 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.

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 that is 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 operator panel:

1. Remove the front cover. See "Remove the front cover" on page 95.

2. Remove the compute tray. See "Remove a compute tray" on page 80.

3. If an upper compute system board or compute system board filler is installed in the tray, remove it. See "Remove a compute system board" on page 74.

4. Remove the lower fan cage. See "Remove a fan cage (lower tray)" on page 88.

Complete the following steps to remove the front operator panel.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
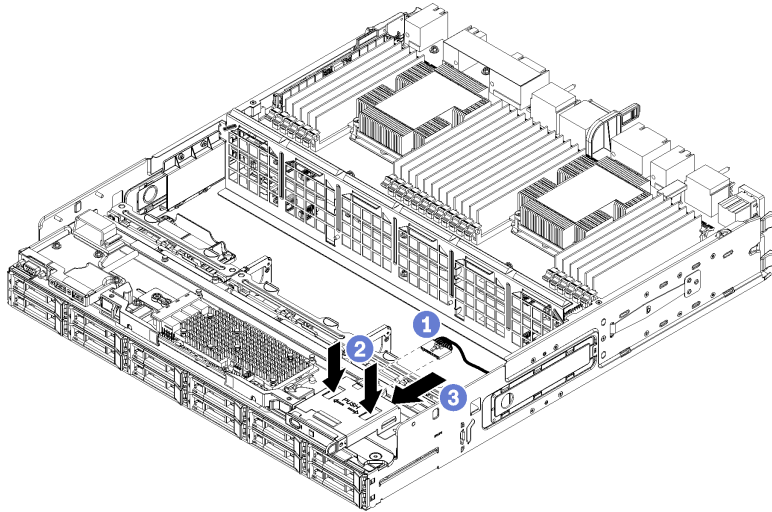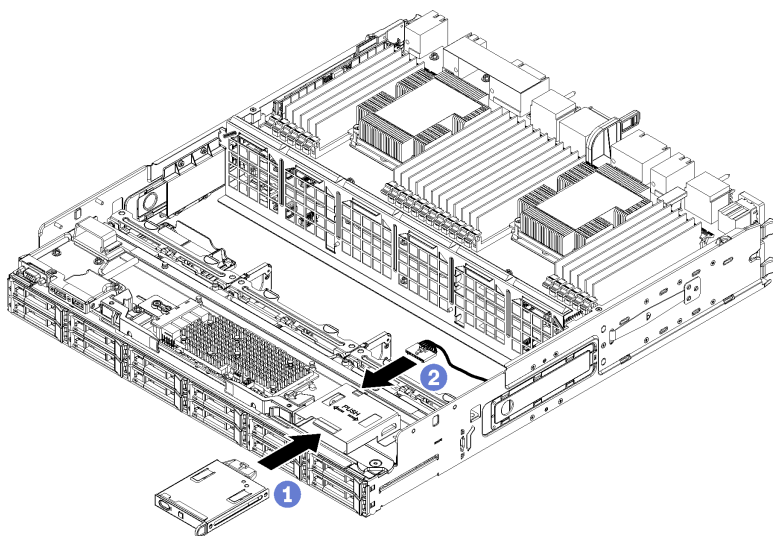- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 65. 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 compute system board and unroute the cable. See "Cable routing for common components" on page 31.

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.

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 that is 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 the front operator panel.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 66. 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 31 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 compute system board and connect it. See "Cable routing for common components" on page 31.

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 31 and "Cable routing for drives" on page 34.

2. Install the lower fan cage. See "Install a fan cage (lower tray)" on page 91.

3. If you removed an upper compute system board or compute system board filler, install it. See "Install a compute system board" on page 76.

4. Install the compute tray; then, install the front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

Front USB/VGA assembly replacement

The front USB/VGA assemblys 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 compute system board; then, remove the two screws and remove the operator panel.
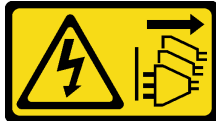
S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 95.
2. Remove the lower compute tray. See "Remove a compute tray" on page 80.
3. If an upper compute system board or compute system board filler is installed in the tray, remove it. See "Remove a compute system board" on page 74.
4. Remove the lower fan cage. See "Remove a fan cage (lower tray)" on page 88.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
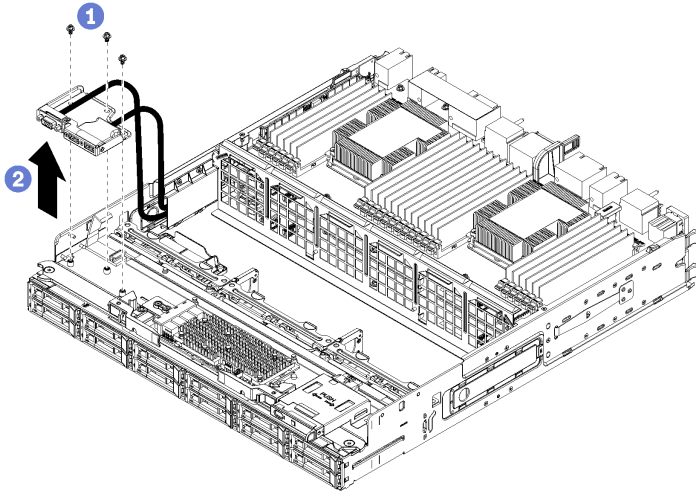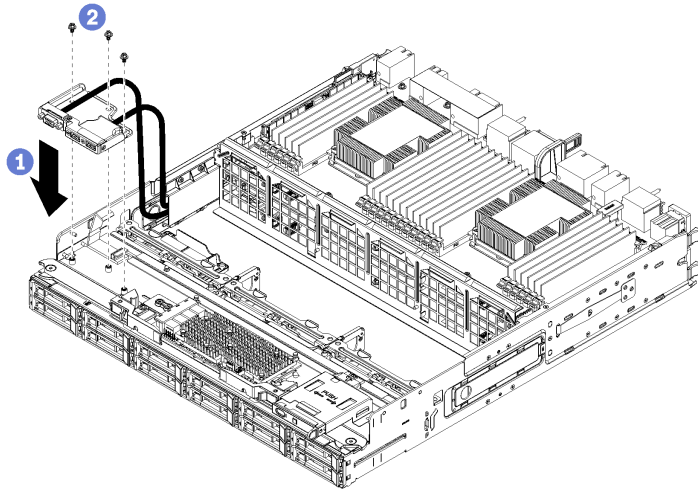- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 67. Front USB/VGA assembly removal

Step 1.   Disconnect the front USB/VGA assembly cables from the lower compute system board and unroute the cables. See "Cable routing for common components" on page 31.

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.

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 that is 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.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 68. 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 compute system board and connect them. See "Cable routing for common components" on page 31.

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 31 and "Cable routing for drives" on page 34.

2. Install the lower fan cage. See "Install a fan cage (lower tray)" on page 91.

3. If you removed an upper compute system board or compute system board filler, install it. See "Install a compute system board" on page 76.

4. Install the compute tray; then, install the front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

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 that is 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

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 95.

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 111.

3. Remove the upper compute tray or storage tray. See "Remove a compute tray" on page 80 or "Remove a storage tray" on page 184.

4. Turn the tray upside down.

5. Remove the fan cage. See "Remove a fan cage (upper tray)" on page 86.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

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 compute 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.

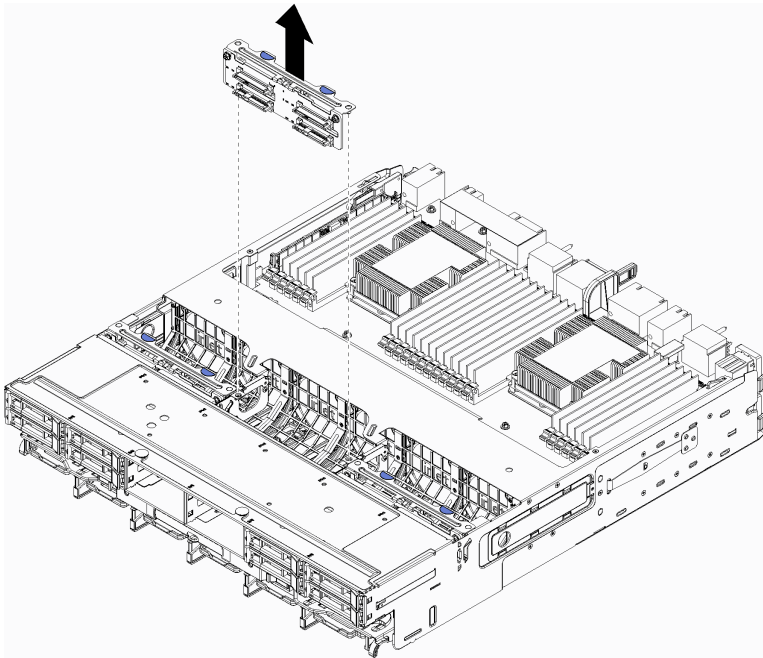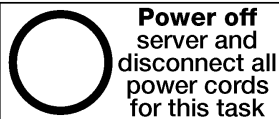Step 3. Remove the hard disk drive backplane.

Figure 69. 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 89.
- Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.
- Install the front cover. See "Install the front cover" on page 96.

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

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 that is 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 95.

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 111.

3. Remove the lower compute tray. See "Remove a compute tray" on page 80.

4. Remove the fan cage. See "Remove a fan cage (lower tray)" on page 88.

5. Move or remove the storage interposer to access the hard disk drive backplanes. See "Remove a storage interposer (lower tray)" on page 180.

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:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Step 1. Remove the hard disk drive backplane.
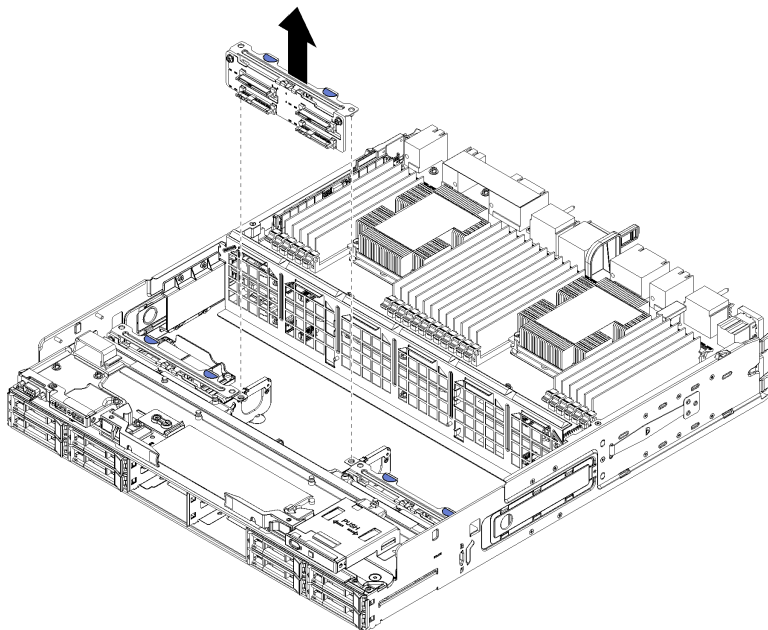
Figure 70. Hard disk drive backplane (lower) removal

Grasp the backplane and pull it up and for easier access to the power and data cable connections.

Step 2. Disconnect all power and data cables on the hard disk drive backplane that go to the storage interposer or to connectors on the compute 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 3. Lift and remove the hard disk drive backplane from the compute 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 182.

- Make sure that all cables are routed and connected.

- Install the fan cage. See "Install a fan cage (lower tray)" on page 91.

- Install the lower compute tray. See "Install the compute tray (fully removed)" on page 82.

- Install the front cover. See "Install the front cover" on page 96.

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

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 that is 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.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

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 34.

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.
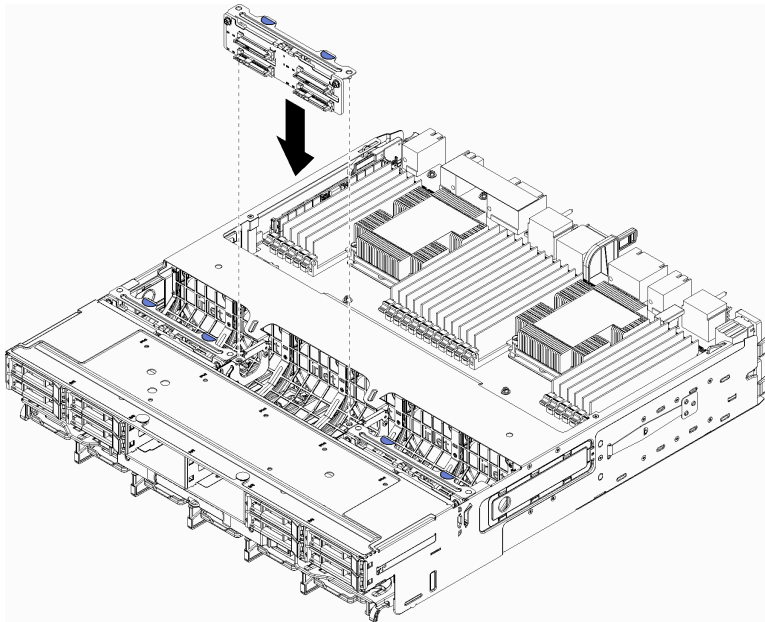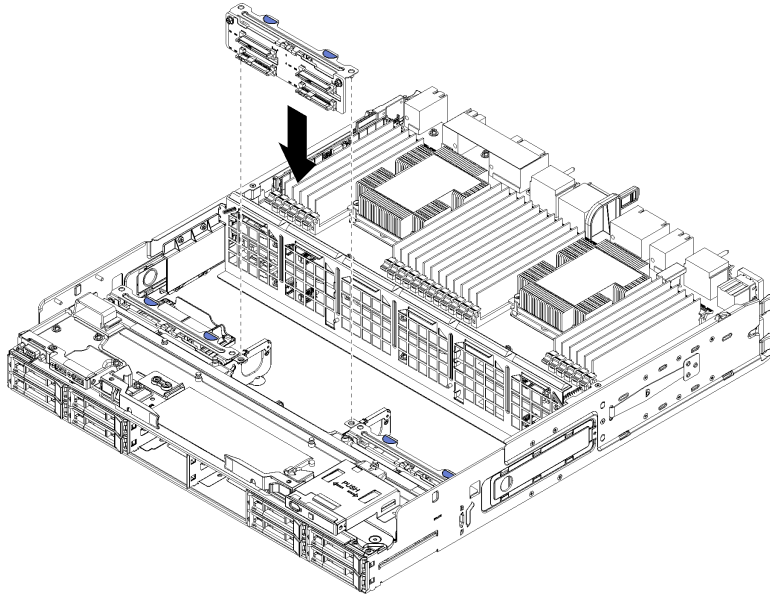

Figure 71. Hard disk drive backplane (upper) installation

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 34.

Step 4. Repeat Step 1 on page 107, Step 2 on page 108, and Step 3 on page 108 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 34.

- 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 compute 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 89.

2. Turn the tray right-side up.

3. Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.

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 112.

5. Install the front cover. See "Install the front cover" on page 96.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Step 1.   Connect the power and data cables to the hard disk drive backplane. See "Cable routing for drives" on page 34.

      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 72. 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 109 and Step 2 on page 109 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 34.

  • 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 182.

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 91.

4. Install the lower compute tray. See "Install the compute tray (fully removed)" on page 82.

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 112.

6. Install the front cover. See "Install the front cover" on page 96.

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.

Watch the procedure. A video of the installation process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
• Youku: http://list.youku.com/albumlist/show/id_50952215

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.
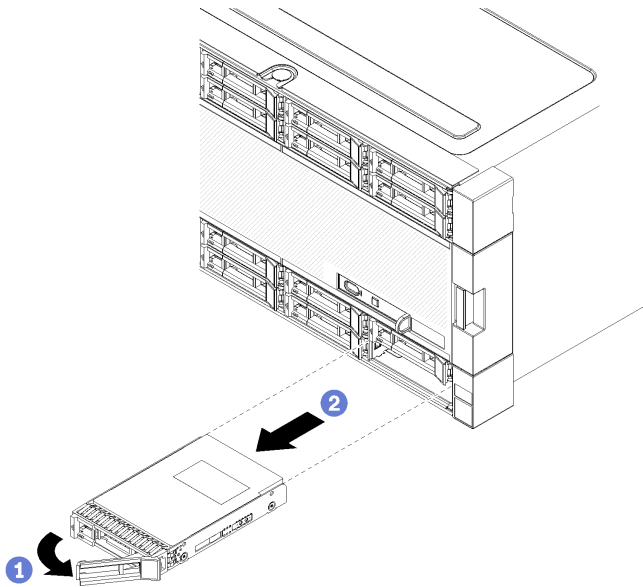
Figure 73. Hard disk drive installation

    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.

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.

Read the Installation Guidelines

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
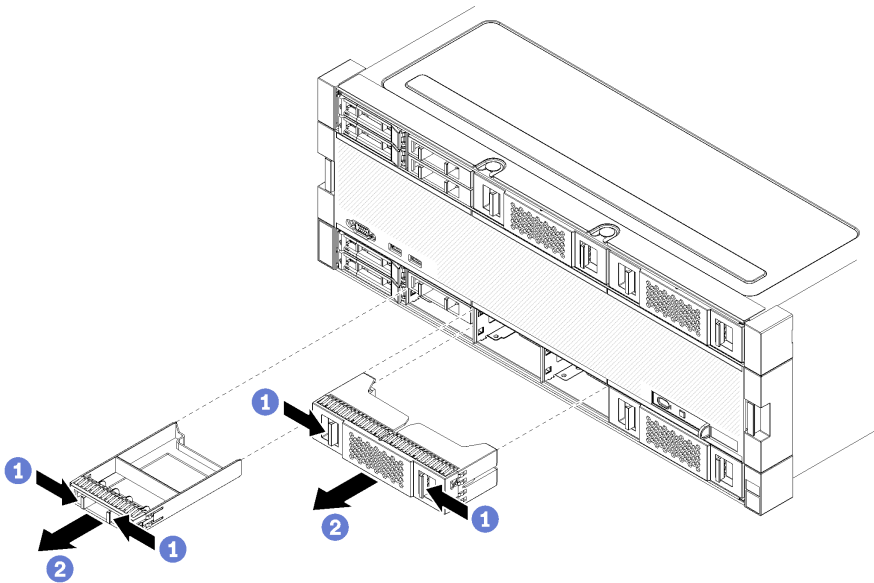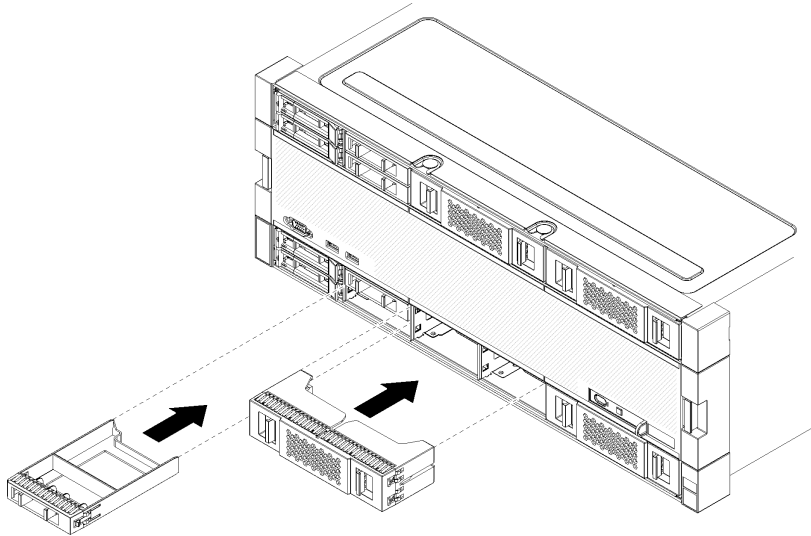- Youku: http://list.youku.com/albumlist/show/id_50952215

ATTENTION:
Static Sensitive Device
Ground package before opening
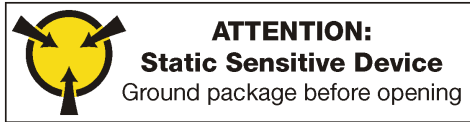
Note: NVMe drive bays can accept either SATA/SAS or NVMe drives.

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.
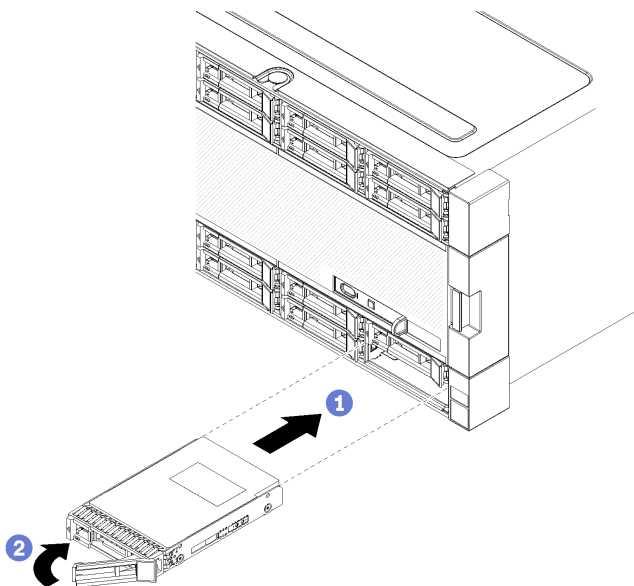
Figure 74. Hard disk drive installation

     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 *Lenovo ThinkSystem SR950 Setup Guide* for information.

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:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 75. 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.

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
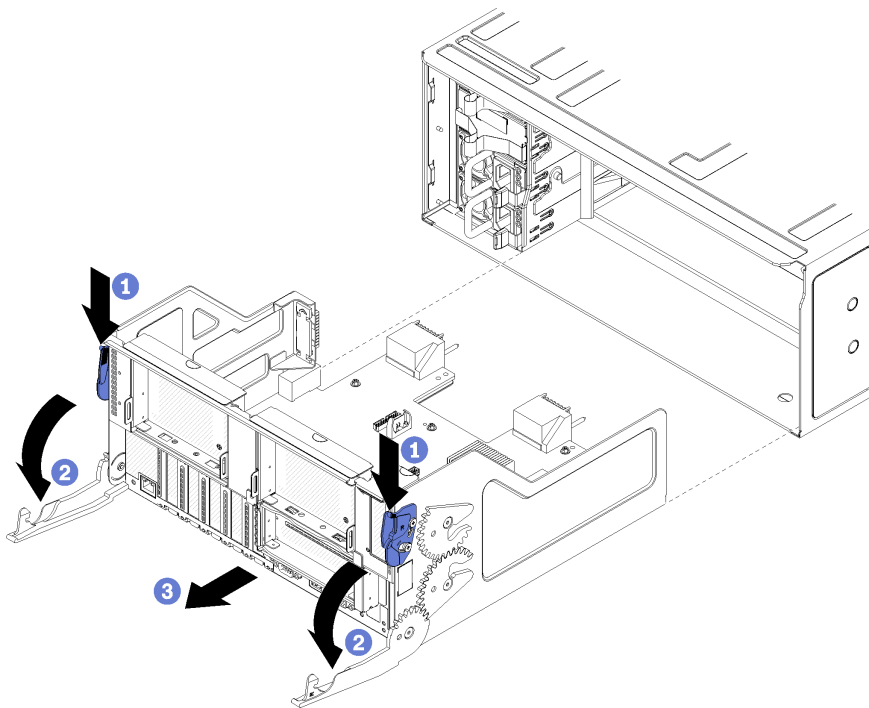- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 76. 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.

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 that is 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

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 Lenovo 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.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
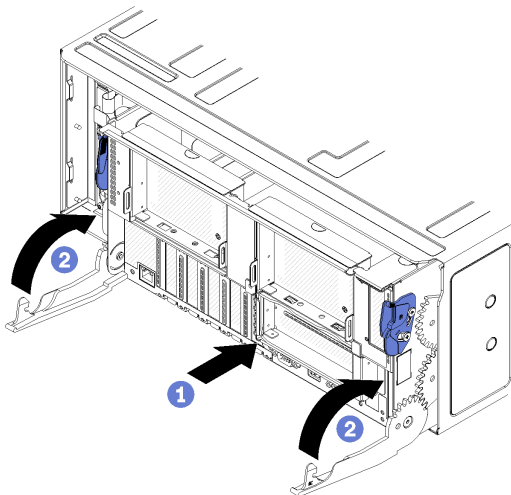- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 77. 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 57)

  - Risers (see "Riser replacement" on page 163)

  - Cables (see "Internal cable routing" on page 29)

- 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.

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 that is 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 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 29.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
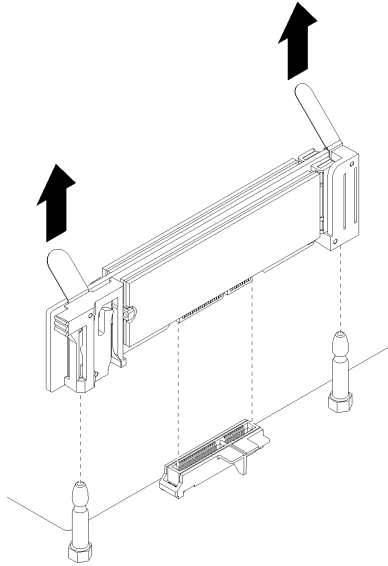- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 78. 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 *Lenovo ThinkSystem SR950 Setup Guide*.

- Update the Universal Unique Identifier (UUID). See "Update the Universal Unique Identifier (UUID)" on page 187.

- Update the SMBIOS/DMI information. See "Update the DMI/SMBIOS data" on page 189.

- Enable TPM/TCM. See "Enable TPM/TCM" on page 191

- Optionally, enable Secure Boot.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 115.

2. Remove the riser for slots 10 through 15 (right riser) or the riser for slots 16 and 17 to access the M.2 backplane. See "Remove the riser for slots 10 through 15 (right riser)" on page 165 or "Remove the riser for slots 16 and 17" on page 169.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
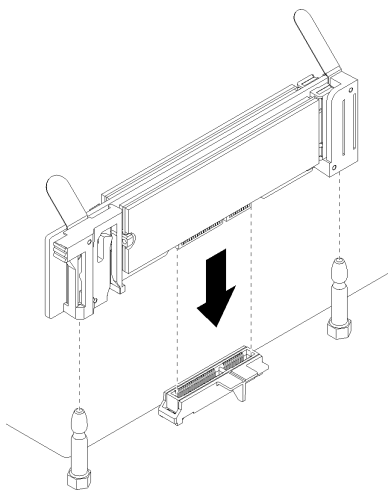- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 79. 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 121.
- 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 slots 10 through 15 (right riser)" on page 172 or "Install the riser for slots 16 and 17" on page 174.
   2. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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.

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 that is 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

Before you install the M.2 backplane, install the M.2 drives. See "Install an M.2 drive" on page 122.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
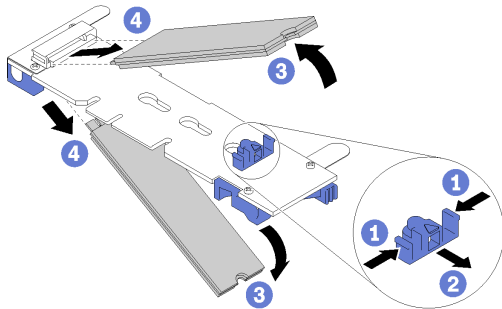- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 80. 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 slots 10 through 15 (right riser)" on page 172 or "Install the riser for slots 16 and 17" on page 174.

2. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

3. See the documentation that comes with the M.2 backplane for device-driver and configuration information to complete the installation.

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:
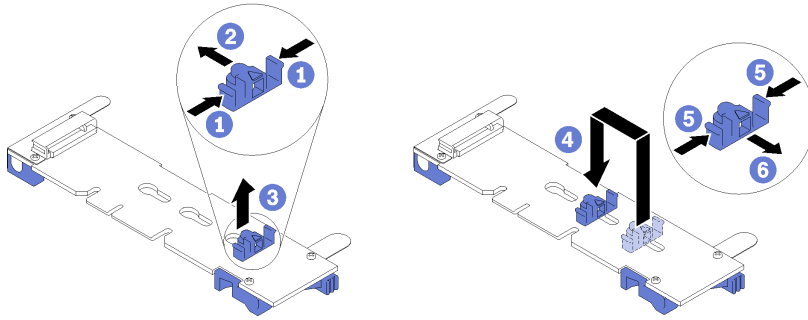
Figure 81. M.2 backplane retainer adjustment

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.

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 that is 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.
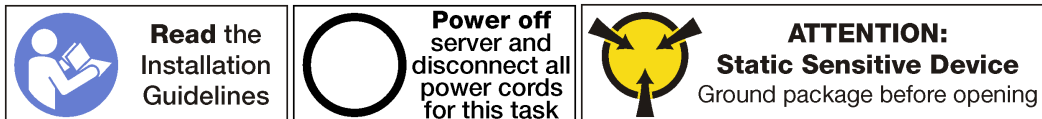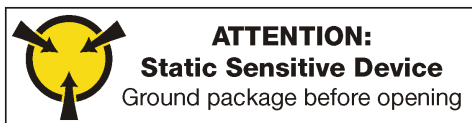

Before you remove an M.2 drive:

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 115.

2. Remove the riser for slots 10 through 15 (right riser) or the riser for slots 16 and 17 to access the M.2 backplane. See "Remove the riser for slots 10 through 15 (right riser)" on page 165 or "Remove the riser for slots 16 and 17" on page 169.

3. Remove the M.2 backplane from your system. See "Remove the M.2 backplane" on page 118.

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

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 82. 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 slots 10 through 15 (right riser)" on page 172 or "Install the riser for slots 16 and 17" on page 174.

2. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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.

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 that is 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

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 120.

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

Watch the procedure. A video of the installation process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
• Youku: http://list.youku.com/albumlist/show/id_50952215

ATTENTION:
Static Sensitive Device
Ground package before opening

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

Step 2.   Insert the M.2 drive.
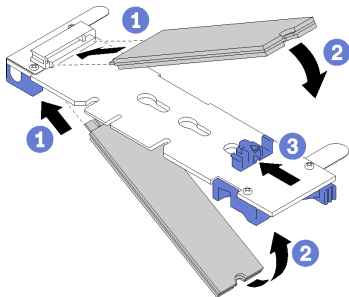
Figure 83. Inserting the M.2 drives

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.

Step 3.   Secure the M.2 drives in the backplane.
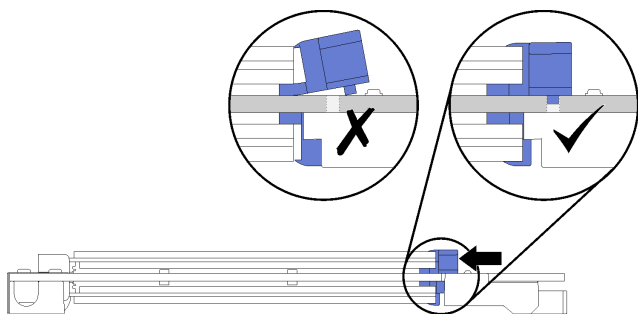
Figure 84. Securing the M.2 drives

> **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 119.
2. Install the riser that you removed to access the M.2 backplane. See "Install the riser for slots 10 through 15 (right riser)" on page 172 or "Install the riser for slots 16 and 17" on page 174.
3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

Memory air baffle replacement

Use the following procedures to replace a memory air baffle.

Remove a memory baffle

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

Read the Installation Guidelines	**Power off** server and disconnect all power cords for this task	**ATTENTION:** **Static Sensitive Device** Ground package before opening
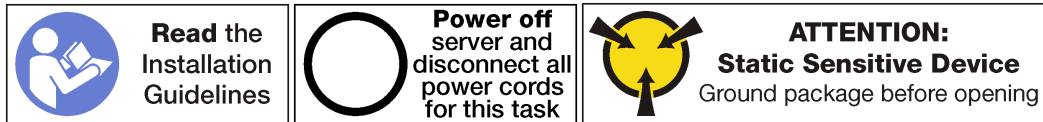
Before you remove a memory air baffle:

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the compute tray where the compute system board and memory air baffles are installed. See "Remove a compute tray" on page 80.
3. If you are removing a memory air baffle from the lower compute system board, remove the upper compute system board or compute system board filler. See "Remove a compute system board" on page 74.

Complete the following steps to remove a memory air baffle.

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
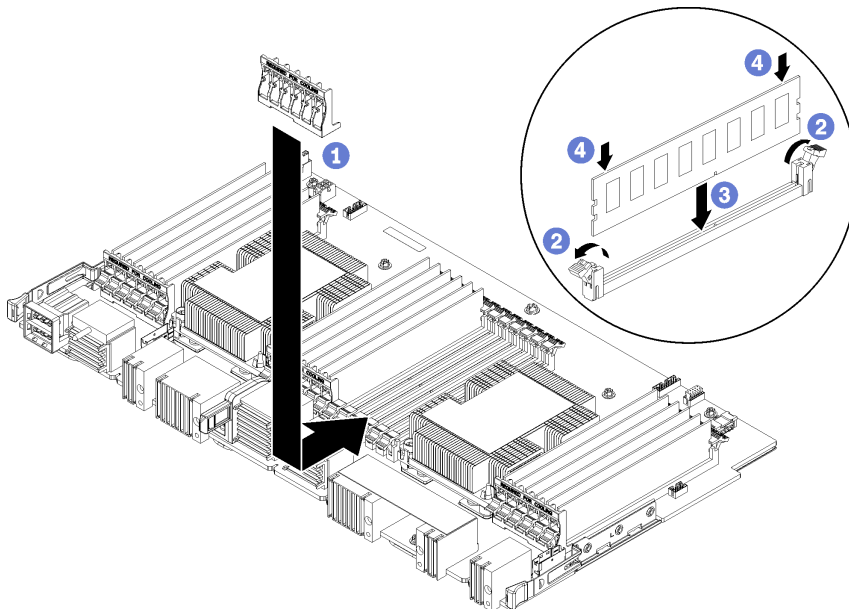- Youku: http://list.youku.com/albumlist/show/id_50952215
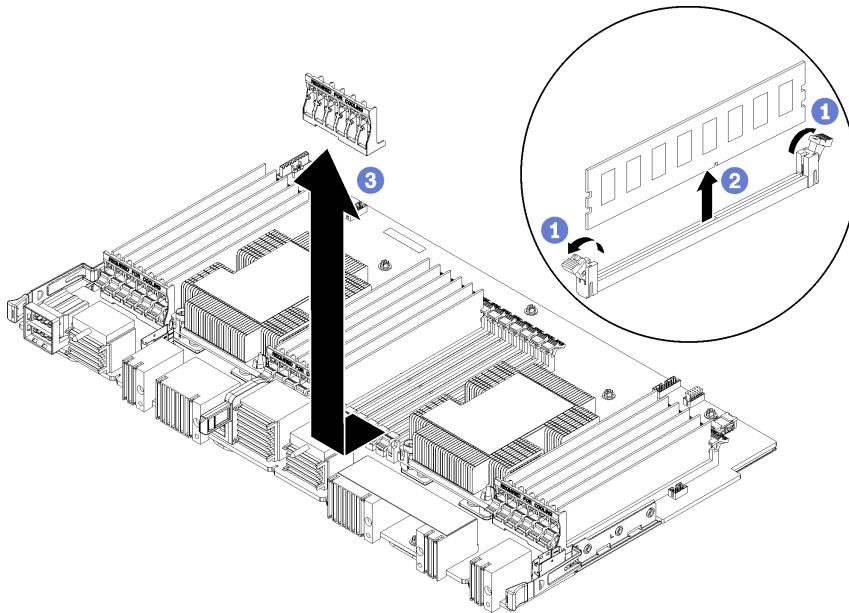
Note: Each memory air baffle spans six memory modules.

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.

Install a memory air baffle

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

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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	**ATTENTION:** **Static Sensitive Device** Ground package before opening

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 85. 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 130 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 compute system board or compute system board filler, if it was removed. See "Install a compute system board" on page 76.

2. Install the compute tray where the compute system board is installed. See "Install the compute tray (fully removed)" on page 82.

3. Install the front cover. See "Install the front cover" on page 96

Memory module replacement

Use the following procedures to replace a memory module.

Remove a memory module

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

Read the Installation Guidelines	**Power off** server and disconnect all power cords for this task	**ATTENTION:** **Static Sensitive Device** Ground package before opening

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for Handling static-sensitive devices:

- 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. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the compute tray where the compute system board and memory module are installed. See "Remove a compute tray" on page 80.
3. If you are removing a memory module from the lower compute system board, remove the upper compute system board or compute system board filler. See "Remove a compute system board" on page 74.
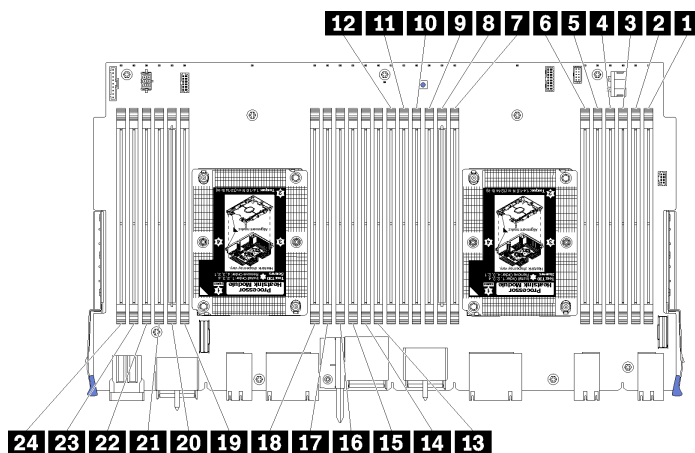
Figure 86. Memory module locations

Complete the following steps to remove a memory module.

Watch the procedure. A video of the replacement process is available:
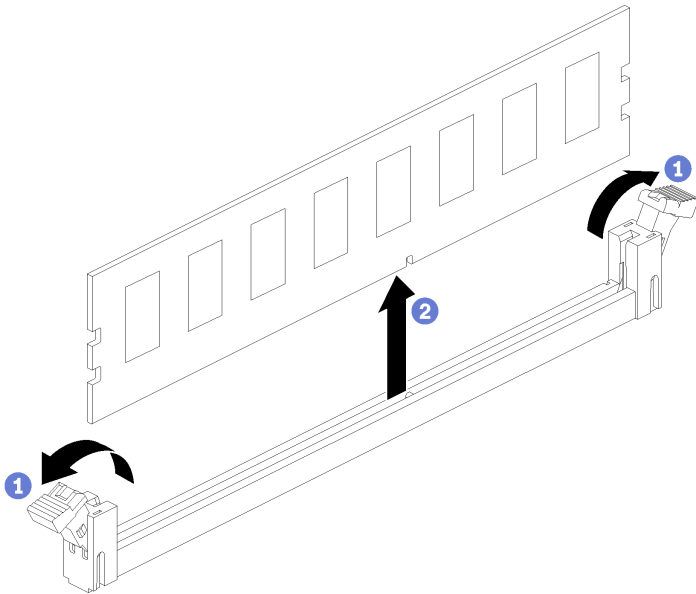
Step 1.   Open the memory module connector retaining clips to extract the memory module; then, remove the memory module.

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

1. See the *Lenovo 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 compute system board or compute system board filler, if it was removed. See "Install a compute system board" on page 76.

4. Install the compute tray where the compute system board is installed. See "Install the compute tray (fully removed)" on page 82.

5. Install the front cover. See "Install the front cover" on page 96

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

Install a memory module

Memory modules are in the compute 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 that is 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	ATTENTION: Static Sensitive Device Ground package before opening

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

Important: If you are installing a memory module that is different than the memory module you removed, see "Install a memory module" in the *Lenovo ThinkSystem SR950 Setup Guide* for additional information.

Note: The same procedure is used to install memory modules and memory module fillers.
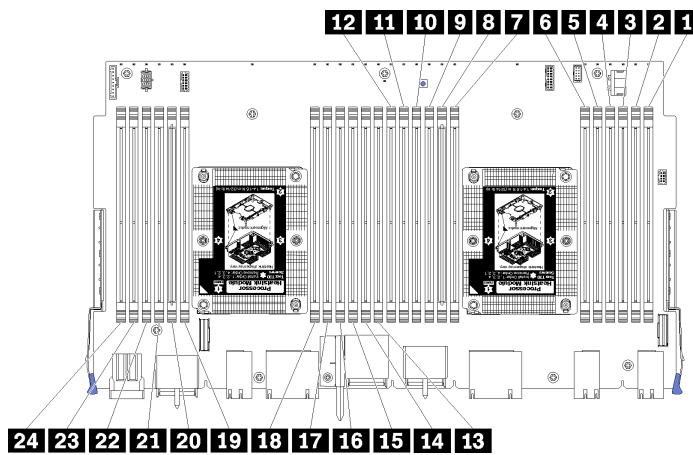
Figure 87. Memory module locations

Table 33. *Memory module locations on each compute system board*

DIMM number	Compute system board 1 (lower board, lower tray) DIMM number	Compute system board 2 (upper board, lower tray) DIMM number	Compute system board 3 (lower board, upper tray) DIMM number	Compute 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

Table 33. Memory module locations on each compute system board (continued)

DIMM number	Compute system board 1 (lower board, lower tray) DIMM number	Compute system board 2 (upper board, lower tray) DIMM number	Compute system board 3 (lower board, upper tray) DIMM number	Compute system board 4 (upper board, upper tray) DIMM number
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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

ATTENTION:
Static Sensitive Device
Ground package before opening

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for Handling static-sensitive devices:

- 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.
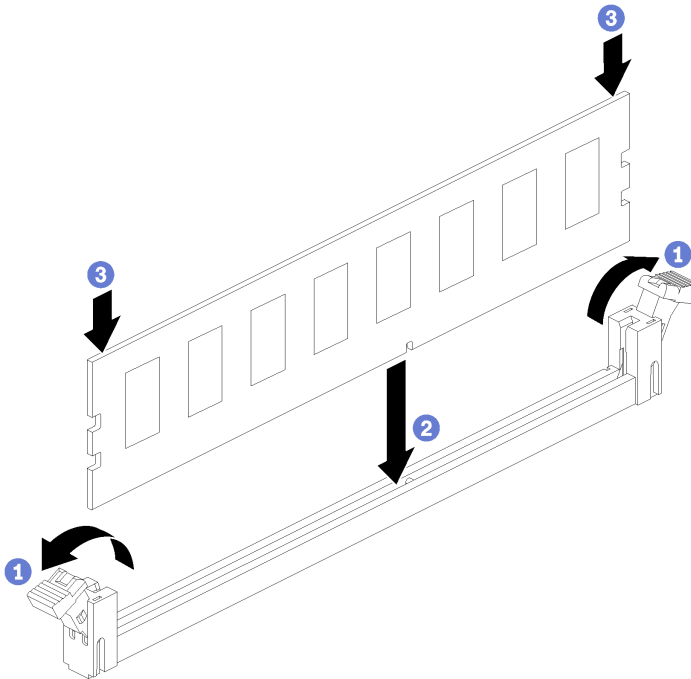
Figure 88. Memory module installation

a. Open the memory module connector retaining clips. If a memory module is already installed in the connector, remove it.

b. Align the keys on the memory module that you are installing with the connector; then, insert the memory module.

c. 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:

1. Install the upper compute system board or compute system board filler, if it was removed. See "Install a compute system board" on page 76.

2. Install the compute tray where the compute system board is installed. See "Install the compute tray (fully removed)" on page 82.

3. Install the front cover. See "Install the front cover" on page 96
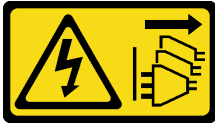
Midplane replacement

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.

S002

CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 following 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. (C011)

S036

Before you remove a midplane, remove the server from the rack. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html.

The following illustration identifies the various midplanes that might be installed in your server.
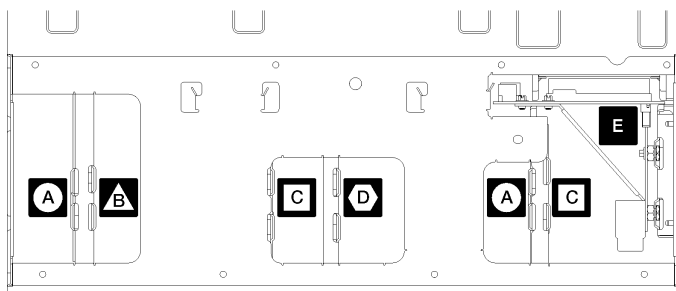
Figure 89. Midplane identification

Table 34. 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:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215
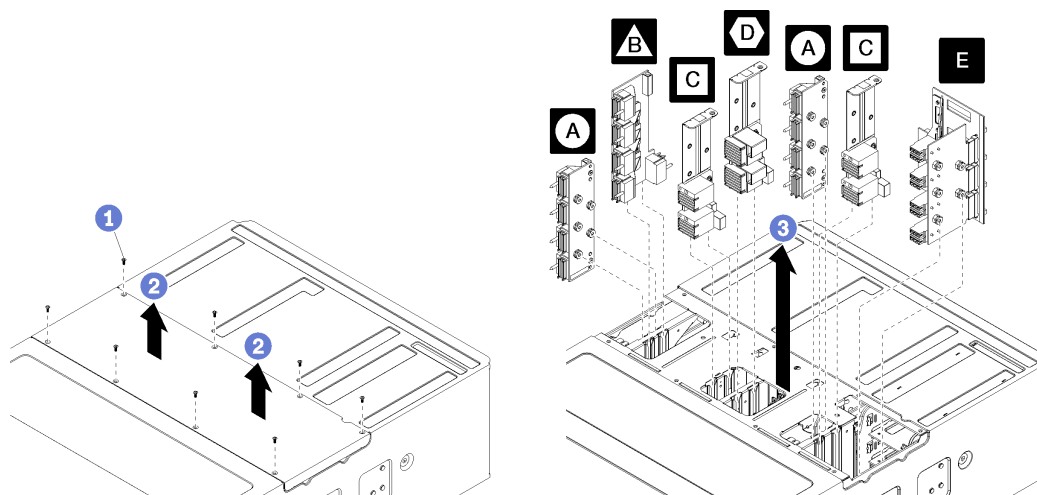
Figure 90. Midplane removal

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.

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.
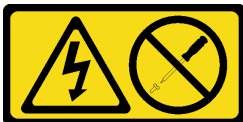
S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 following 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. (C011)

S036

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:

Watch the procedure. A video of the replacement process is available:

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
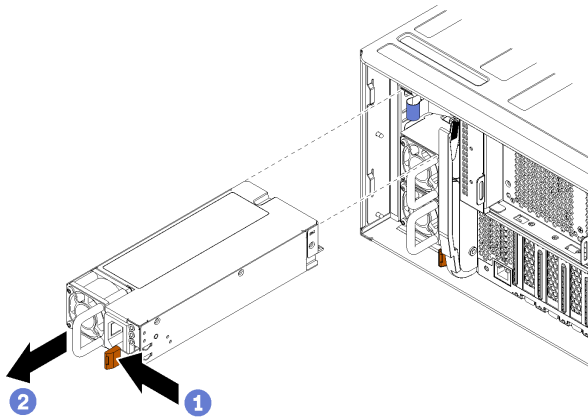- Youku: http://list.youku.com/albumlist/show/id_50952215
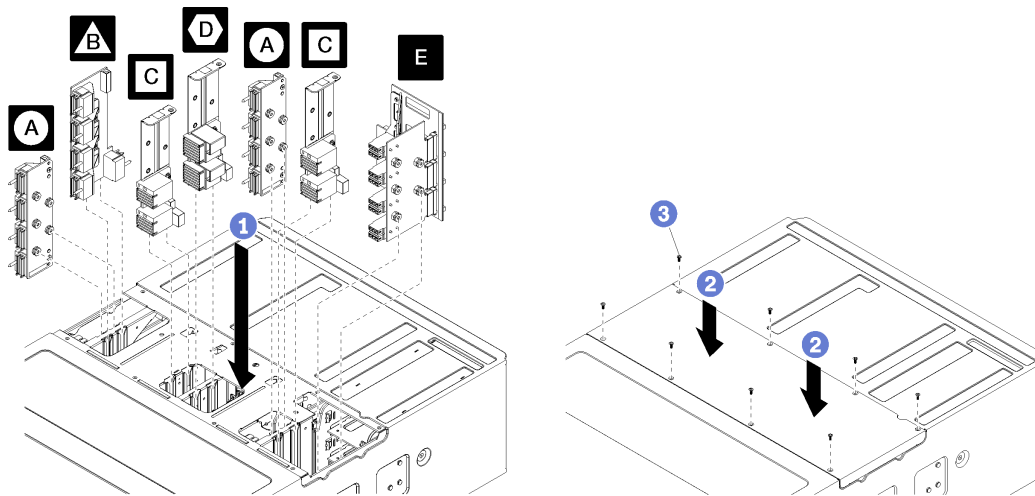
Figure 91. Midplane installation

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 http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html.

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:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**

- **Connect all power cords to a properly wired and grounded electrical outlet.**

- **Connect to properly wired outlets any equipment that will be attached to this product.**

- **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.**

- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**

- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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

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 11.

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.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215
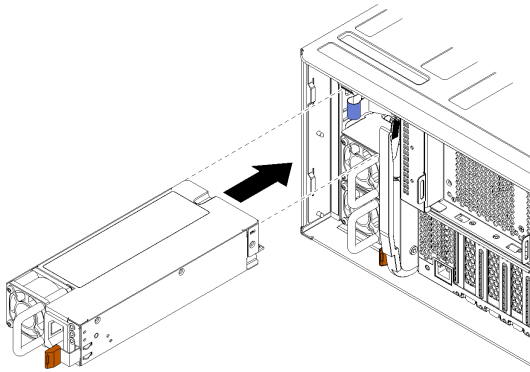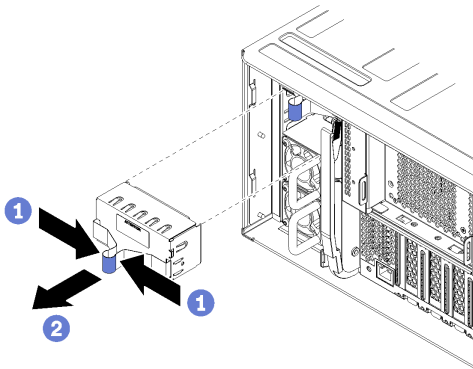
Step 1.   Remove the power supply.

Figure 92. 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.

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

⚠️DANGER

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

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**

- **Connect all power cords to a properly wired and grounded electrical outlet.**

- **Connect to properly wired outlets any equipment that will be attached to this product.**

- **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.**

- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**

- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
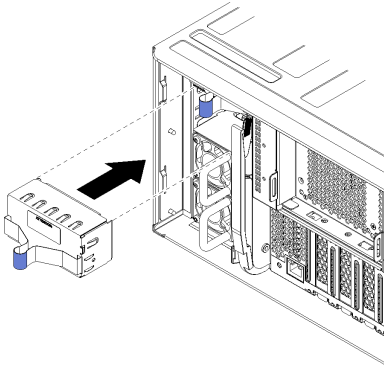- Youku: http://list.youku.com/albumlist/show/id_50952215

Step 1. Install the power supply in the bay.

Figure 93. 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.

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:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 94. 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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 95. 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 you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352). You should use blue thermal grease (part number 01KP765) when replacing the processor if that grease is available in your country. If it is not available, use gray thermal grease (part number 41Y9292).

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 compute 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 that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- 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.

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 95.
2. Remove the compute tray where the compute system board is installed. See "Remove a compute tray" on page 80.
3. If you are removing a PHM from the lower compute system board, remove the upper compute system board or compute system board filler. See "Remove a compute system board" on page 74.
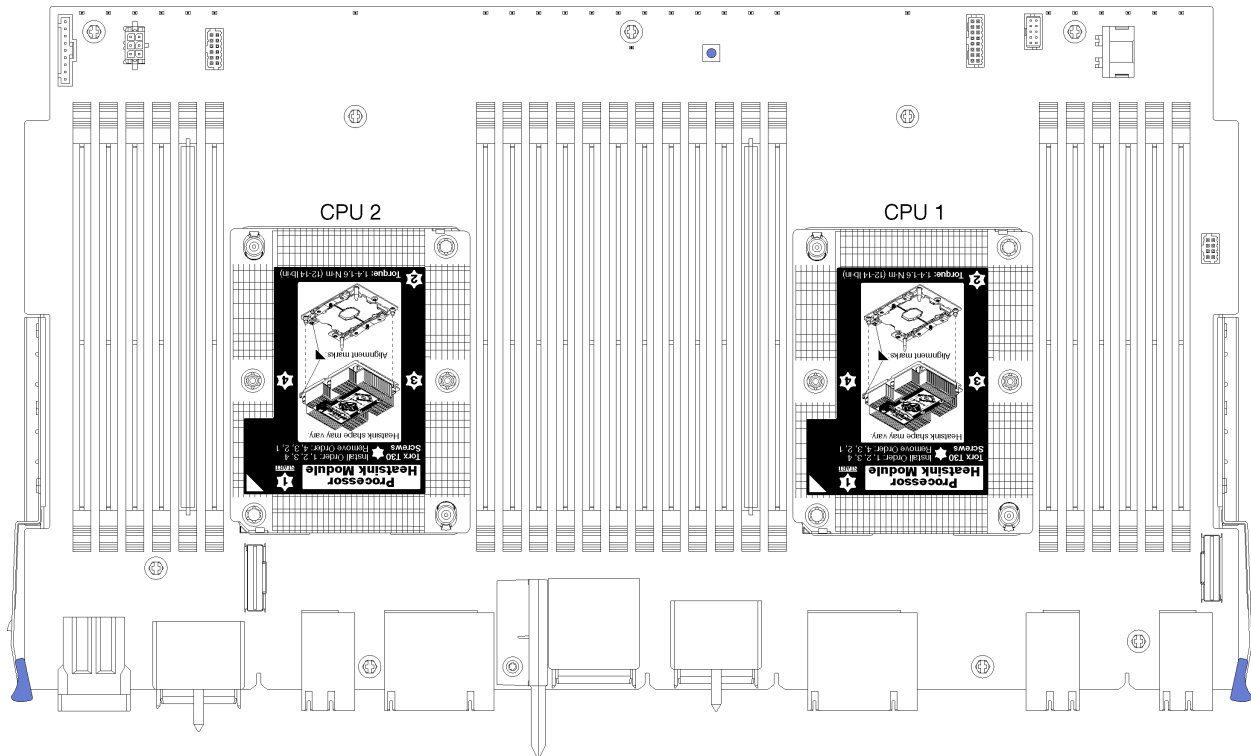
Figure 96. Processor locations on system board
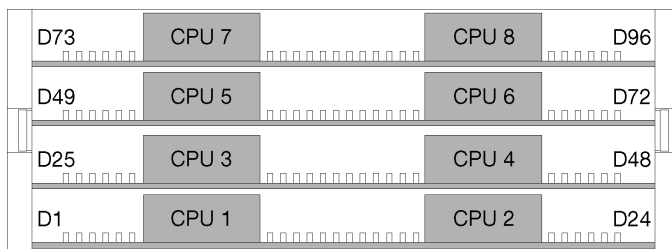
Figure 97. Processor layout for multi-processor systems (viewed from front of server)

Complete the following steps to remove a PHM.

Watch the procedure. A video of the replacement process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
• Youku: http://list.youku.com/albumlist/show/id_50952215

Step 1.   Remove the PHM from the system board.
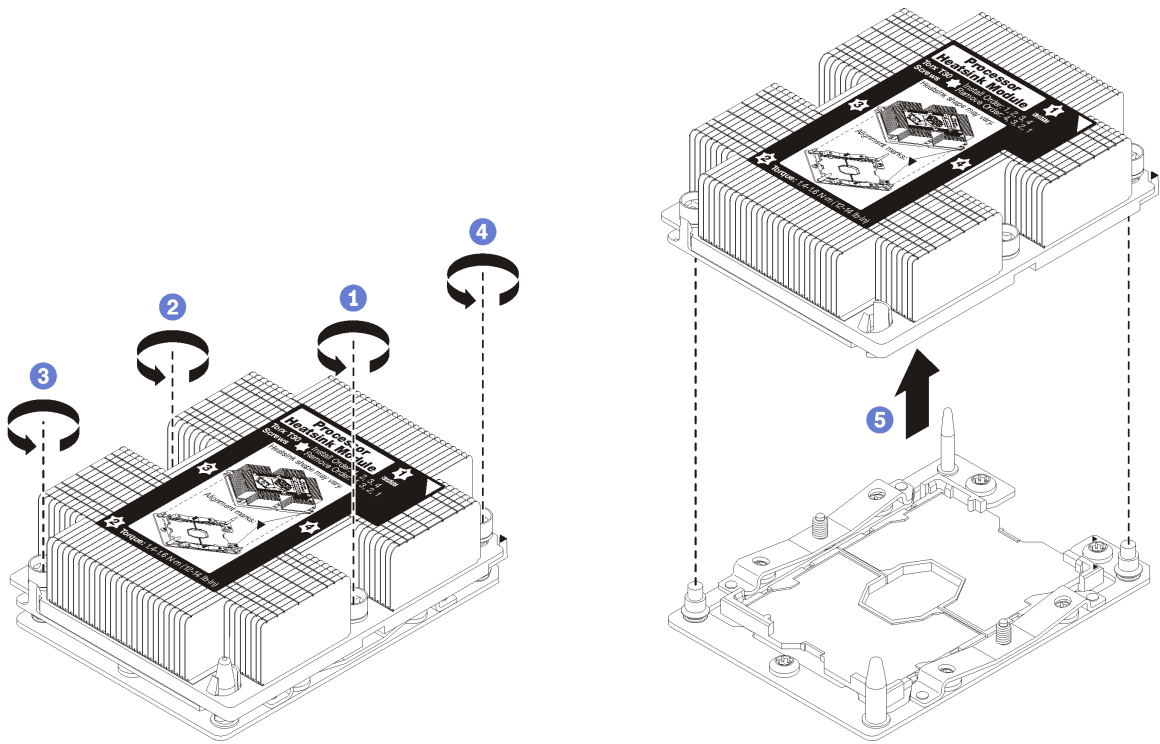
Figure 98. Removing a PHM

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

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

b. 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.
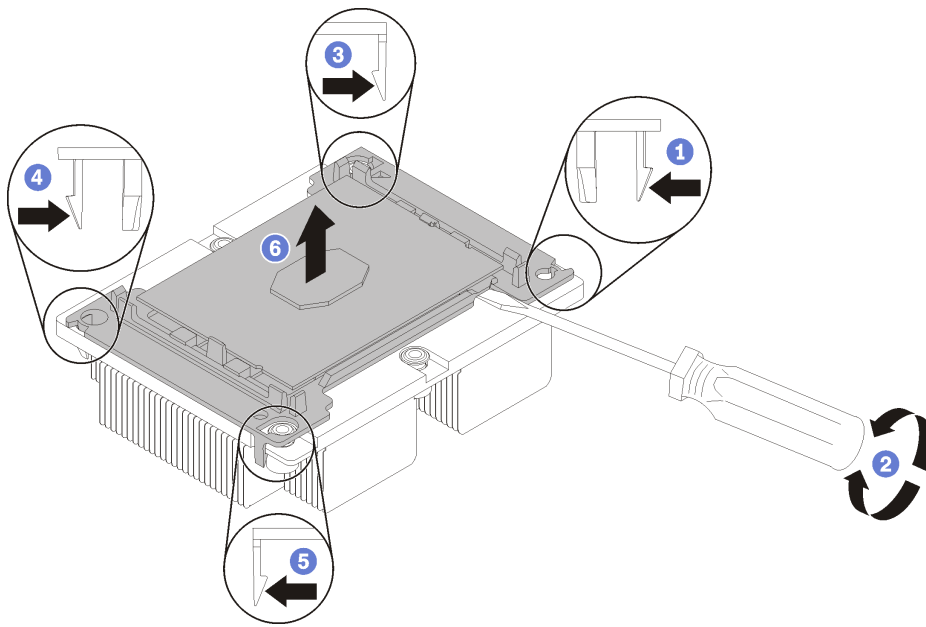
Figure 99. Separating a heat sink from a processor

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.

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	**Power off** server and disconnect all power cords for this task	**ATTENTION:** **Static Sensitive Device** Ground package before opening

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.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.

- See http://www.lenovo.com/us/en/serverproven/ 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 *Lenovo 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 143.

   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.
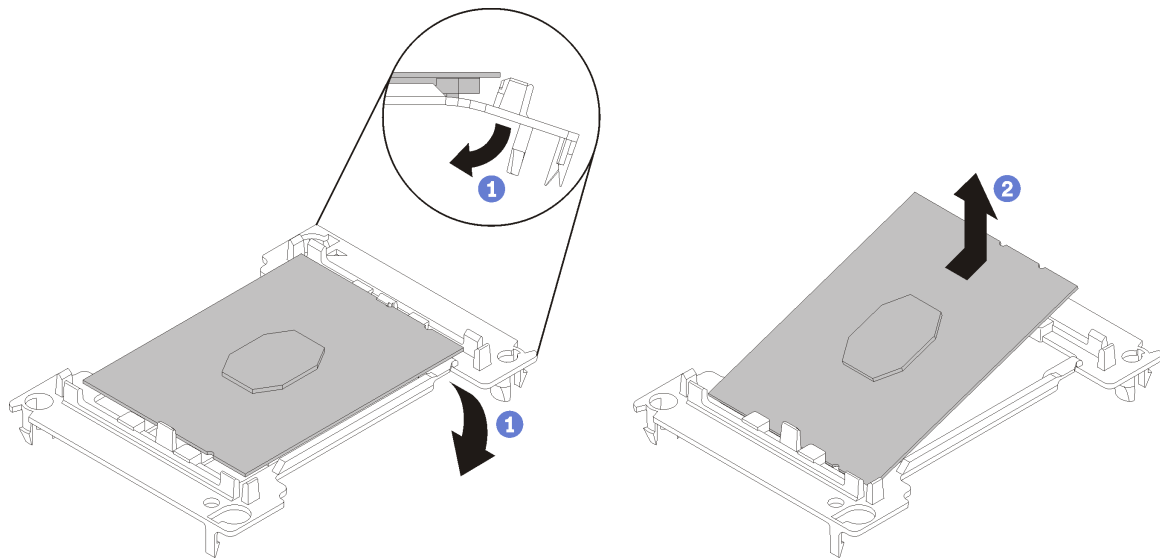
Figure 100. Removing a processor retainer

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.
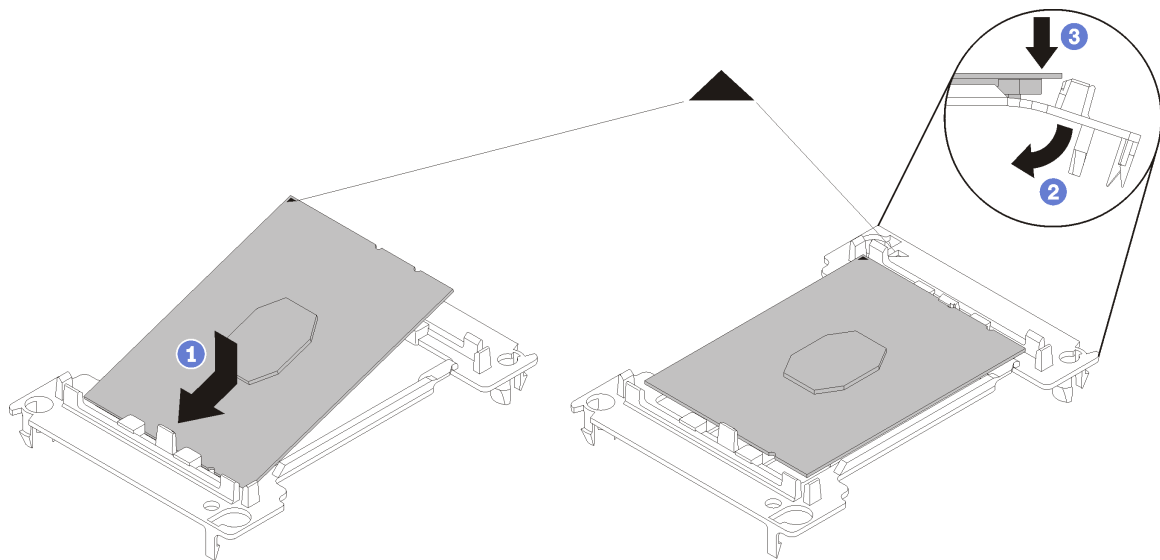
Figure 101. Installing a processor retainer

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. 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.

Attention: You should use blue thermal grease (part number 01KP765) when replacing the processor if that grease is available in your country. If it is not available, use gray thermal grease (part number 41Y9292).
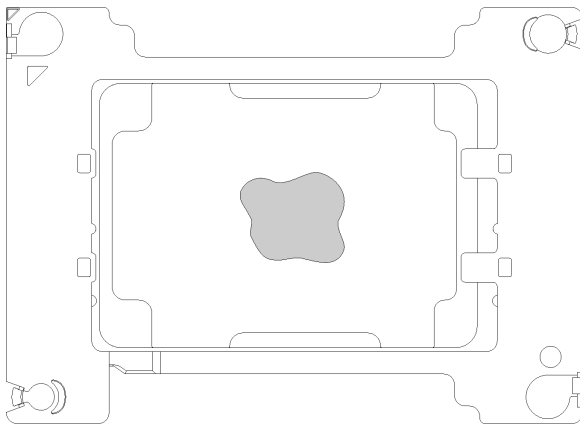
Figure 102. Thermal grease application

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 closet 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.
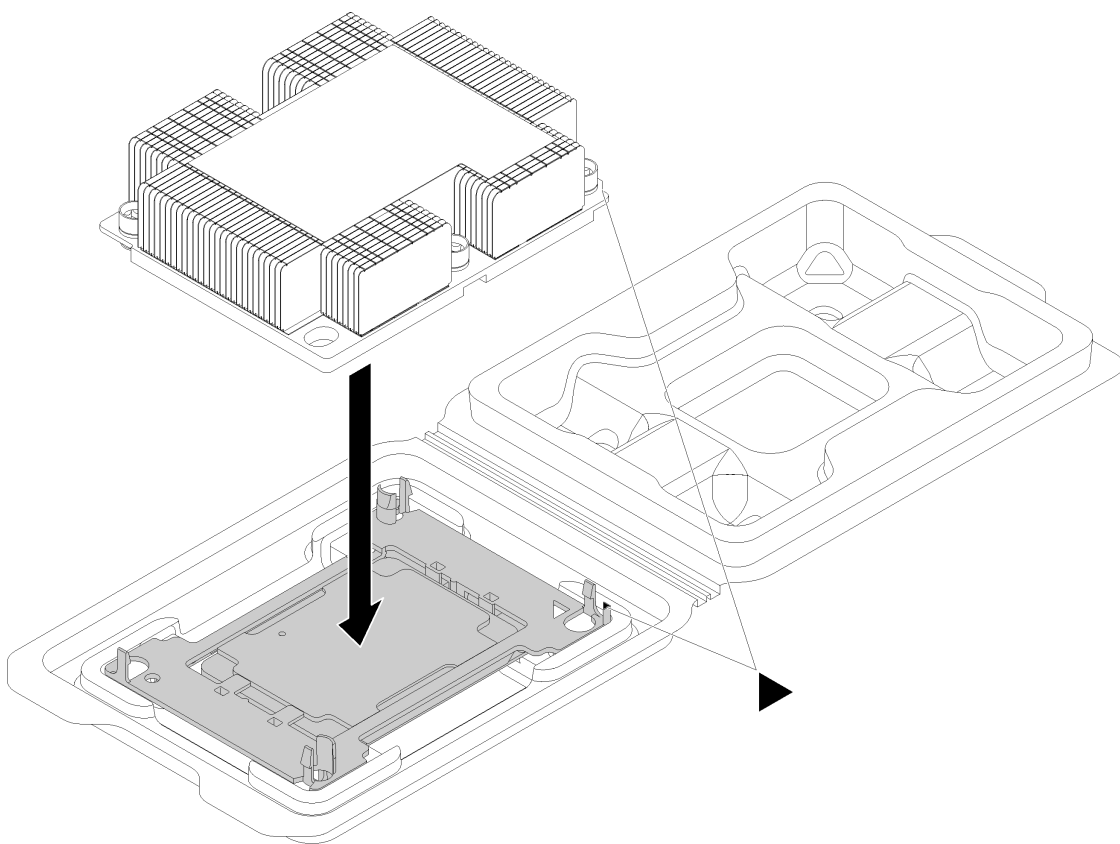
Figure 103. Assembling a PHM in the shipping tray

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.
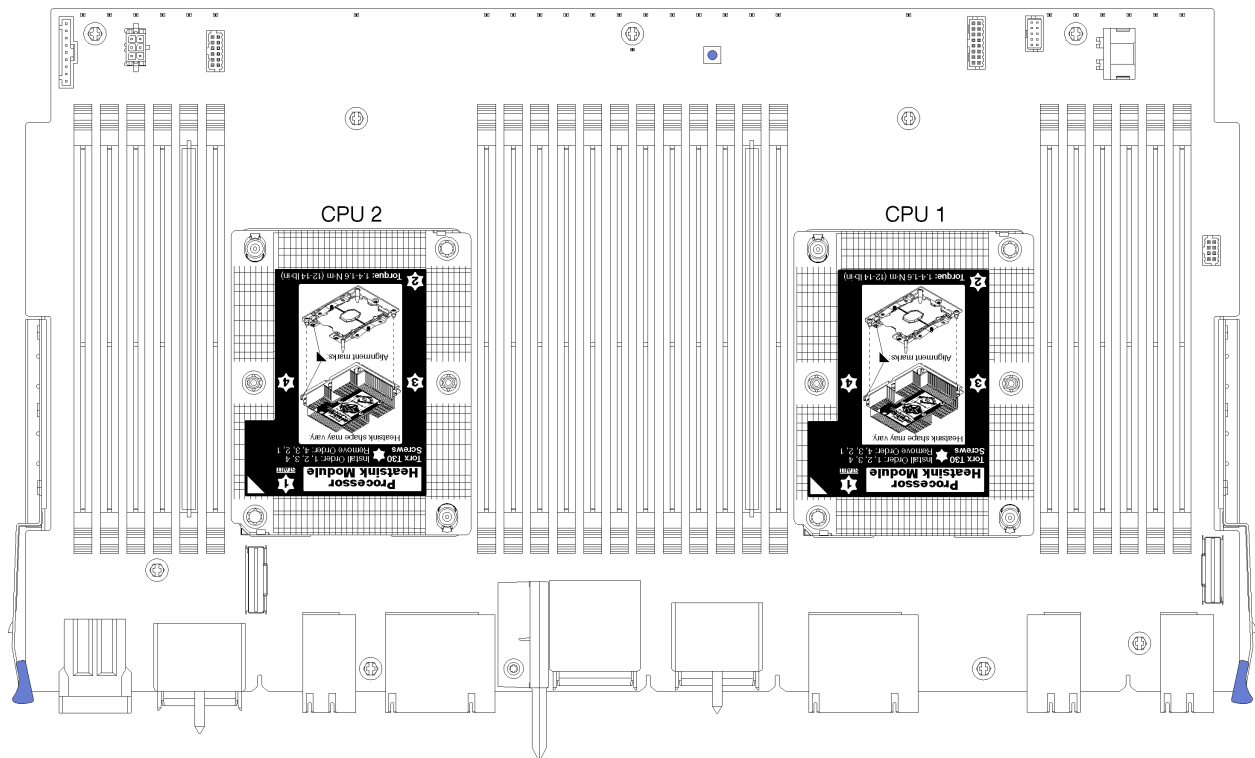
Figure 104. Processor locations on system board
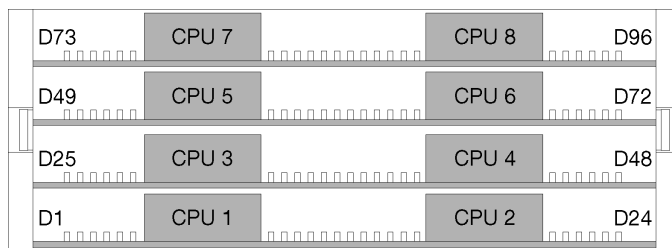
Figure 105. Processor layout for multi-processor systems (viewed from front of server)

Complete the following steps to install a PHM.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

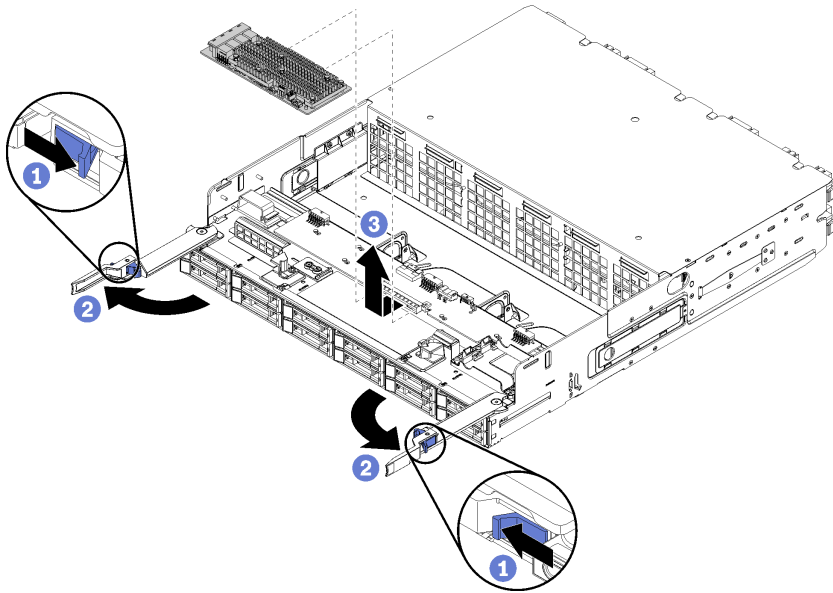Step 1.   Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.

Step 2.   Install the processor-heat-sink module on the system board.
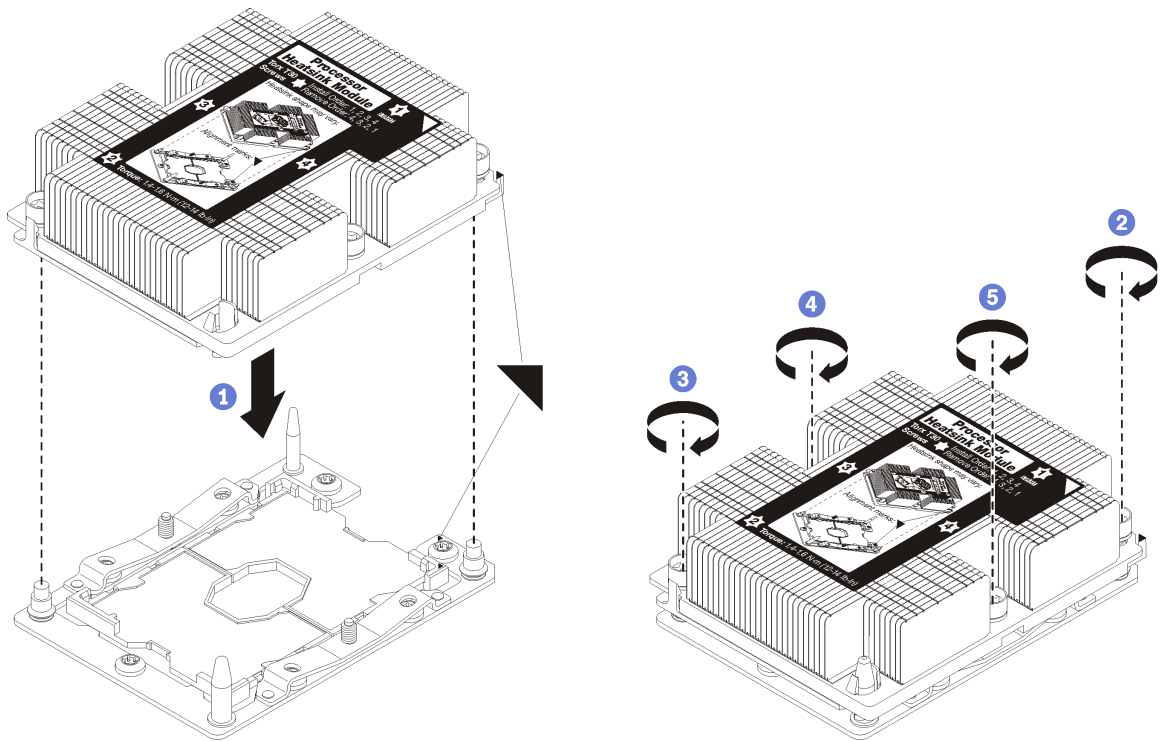
Figure 106. Installing a PHM

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 compute system board or compute system board filler, if it was removed. See "Install a compute system board" on page 76.

2. Install the compute tray. See "Install the compute tray (fully removed)" on page 82.

3. Install the front cover. See "Install the front cover" on page 96

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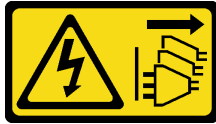
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected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

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the upper compute tray or storage tray. See "Remove a compute tray" on page 80 or "Remove a storage tray" on page 184.
3. If you removed a compute tray and it has one or more compute system boards or a compute system board filler installed, remove the compute system boards or compute system board filler. See "Remove a compute system board" on page 74.
4. Turn the tray upside down and remove the upper fan cage. See "Remove a fan cage (upper tray)" on page 86.

Complete the following steps to remove an upper tray RAID card.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
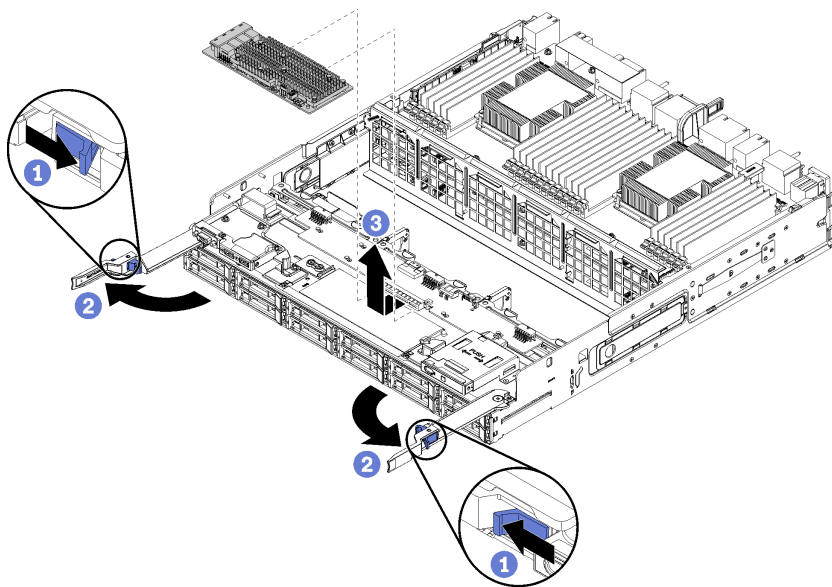- Youku: http://list.youku.com/albumlist/show/id_50952215
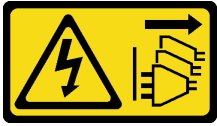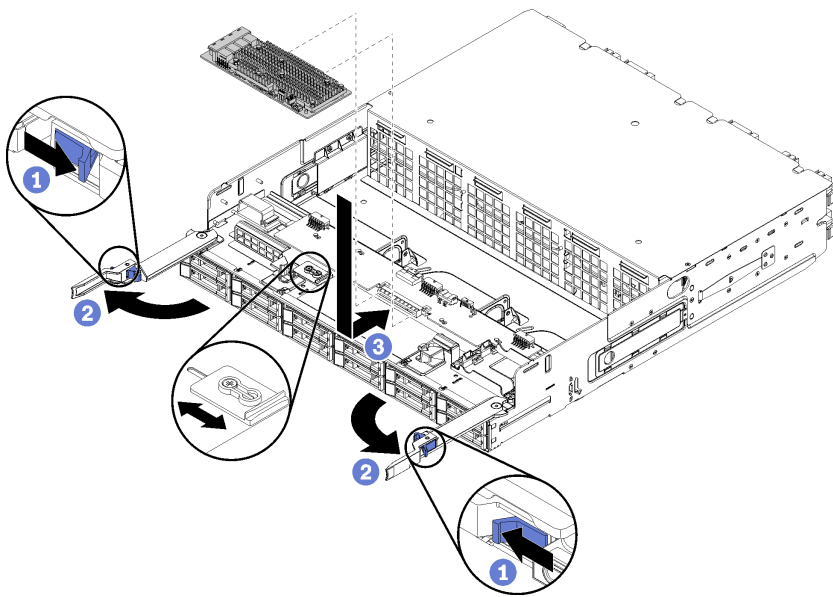
Figure 107. Upper tray RAID card removal

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.

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 that is 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 lower RAID card:

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the lower compute tray or extract it to the maintenance position. See "Remove a compute tray" on page 80.
3. Remove the lower fan cage. See "Remove a fan cage (lower tray)" on page 88.

Complete the following steps to remove a lower RAID card.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
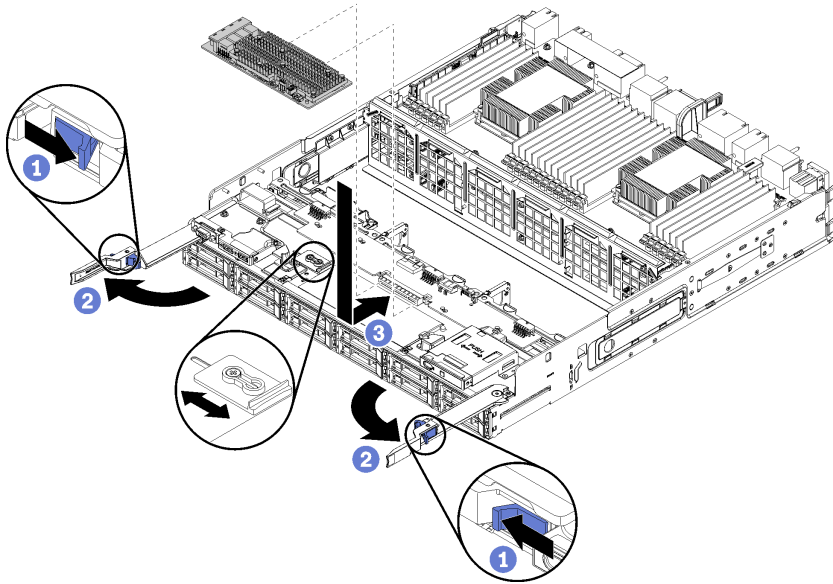- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 108. 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.

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 that is 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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 109. 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 89.
2. Turn the tray right-side up.

3. If you removed one or more compute system boards or a compute system board filler from a compute tray, install the compute system boards or compute system board filler. See "Install a compute system board" on page 76.

4. Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.

5. Install the front cover. See "Install the front cover" on page 96.

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 that is 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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
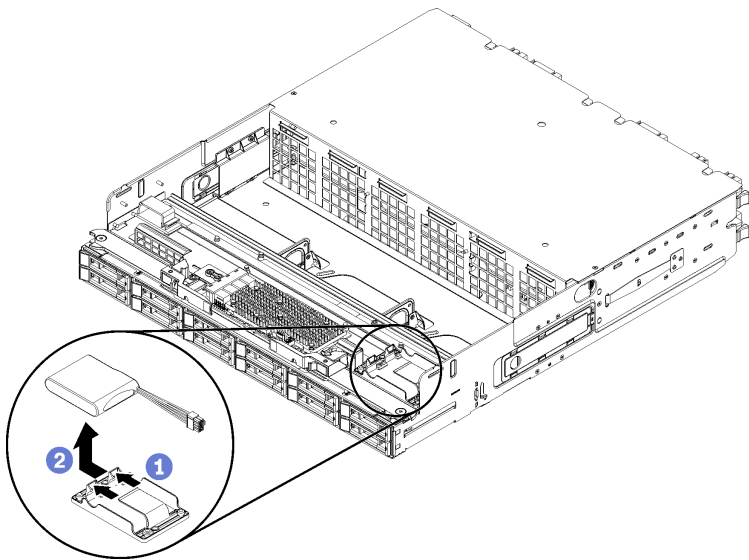- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 110. 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 91.

2. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

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 that is 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 RAID flash power module:

1. Remove the front cover. See "Remove the front cover" on page 95.

2. Remove the upper compute tray or storage tray. See "Remove a compute tray" on page 80 or "Remove a storage tray" on page 184.

3. If you removed a compute tray and it has one or more compute system boards or a compute system board filler installed, remove the compute system boards or compute system board filler. See "Remove a compute system board" on page 74.

4. Turn the tray upside down and remove the upper fan cage. See "Remove a fan cage (upper tray)" on page 86.

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.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
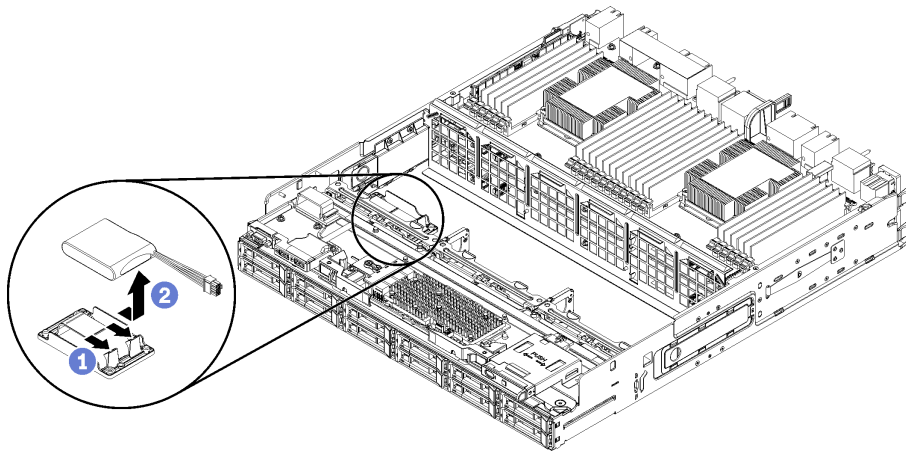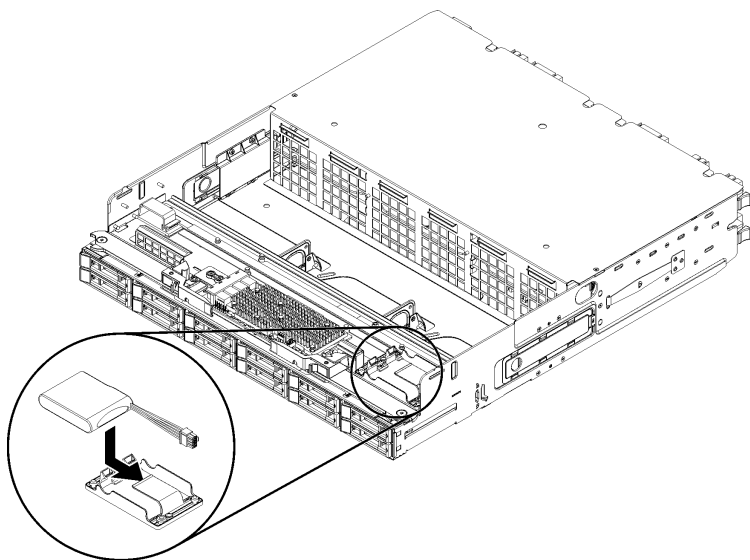- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 111. 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.

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 that is 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 RAID flash power module:

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the lower compute tray or extract it to the maintenance position. See "Remove a compute tray" on page 80.
3. Remove the lower fan cage. See "Remove a fan cage (lower tray)" on page 88.
4. Locate the RAID flash power module in the compute tray.

Complete the following steps to remove a lower RAID flash power module.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 112. 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.

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 that is 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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
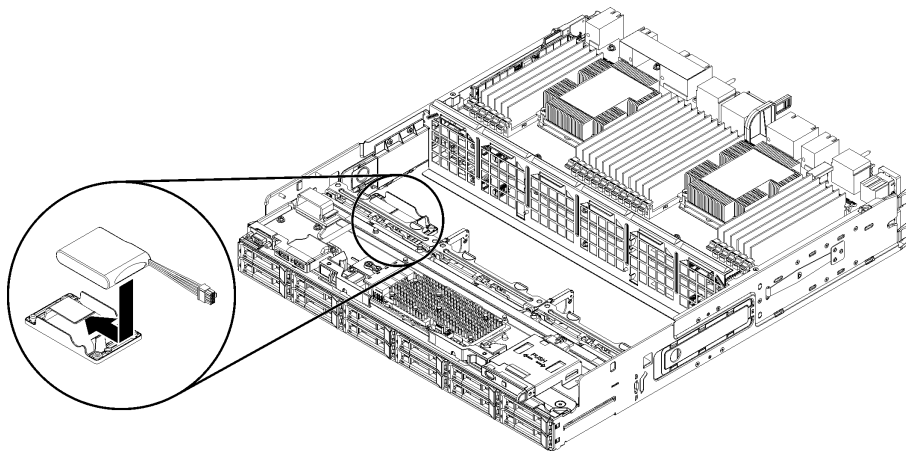- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 113. 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 34 and "Cable routing for common components" on page 31.

2. Install the upper fan cage. See "Install a fan cage (upper tray)" on page 89.

3. Turn the tray right-side up.

4. If you removed one or more compute system boards or a compute system board filler from a compute tray, install the compute system boards or compute system board filler. See "Install a compute system board" on page 76.

5. Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.

6. Install the front cover. See "Install the front cover" on page 96.

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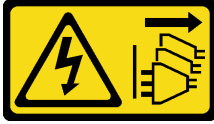
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected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

Complete the following steps to install a lower tray RAID flash power module:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
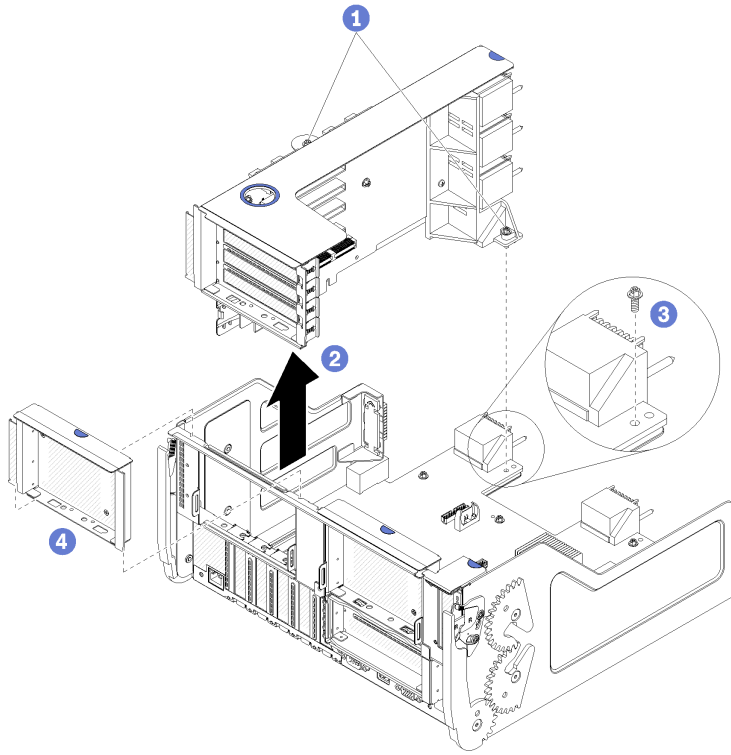- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 114. 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 34 and "Cable routing for common components" on page 31.
2. Install the lower fan cage. See "Install a fan cage (lower tray)" on page 91.
3. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

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 PCIe adapters 1 through 4 (left riser): see "Remove the riser for slots 1 through 4 (left riser)" on page 164 and "Install the riser for slots 1 through 4 (left riser)" on page 170

  Note: There is no riser for PCIe adapters 5 through 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 PCIe adapters 10 through 15 (right riser): see "Remove the riser for slots 10 through 15 (right riser)" on page 165 and "Install the riser for slots 10 through 15 (right riser)" on page 172

  Riser bracket for slots 14 and 15: see "Remove a riser bracket from slots 14 and 15" on page 167 and "Install a riser bracket for slots 14 and 15" on page 173

- Riser for I/O adapters 16 and 17 (riser card): see "Remove the riser for slots 16 and 17" on page 169 and "Install the riser for slots 16 and 17" on page 174

Remove the riser for slots 1 through 4 (left riser)

The riser for adapter slots 1 through 4 (left riser) 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 that is 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 slots 1 through 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 115.

Complete the following steps to remove the riser for slots 1 through 4 (left riser).

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
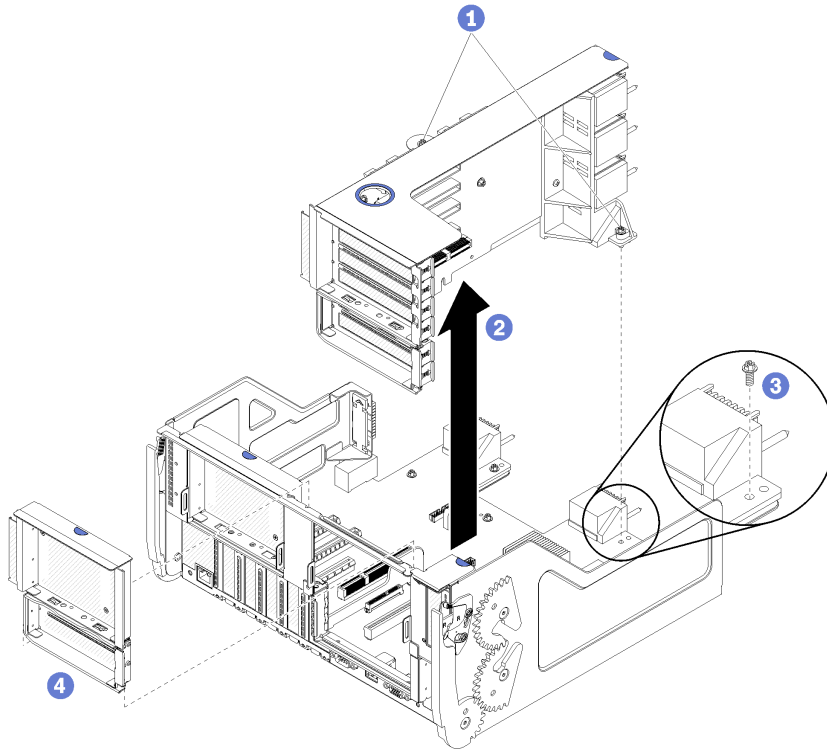- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 115. Riser for slots 1 through 4 (left riser) 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 slots 1 through 4" on page 57.
- 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 slots 1 through 4 (item 4 in the figure).
  3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Remove the riser for slots 10 through 15 (right riser)

The riser for adapter slots 10 through 15 (right riser) 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 that is 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 that is 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 slots 10 through 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 115.

Complete the following steps to remove the riser for slots 10 through 15 (right riser).

Watch the procedure. A video of the installation process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
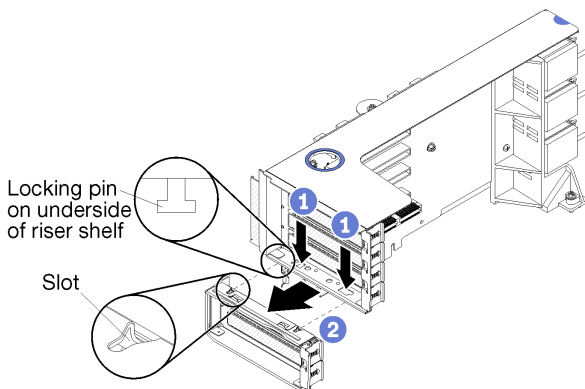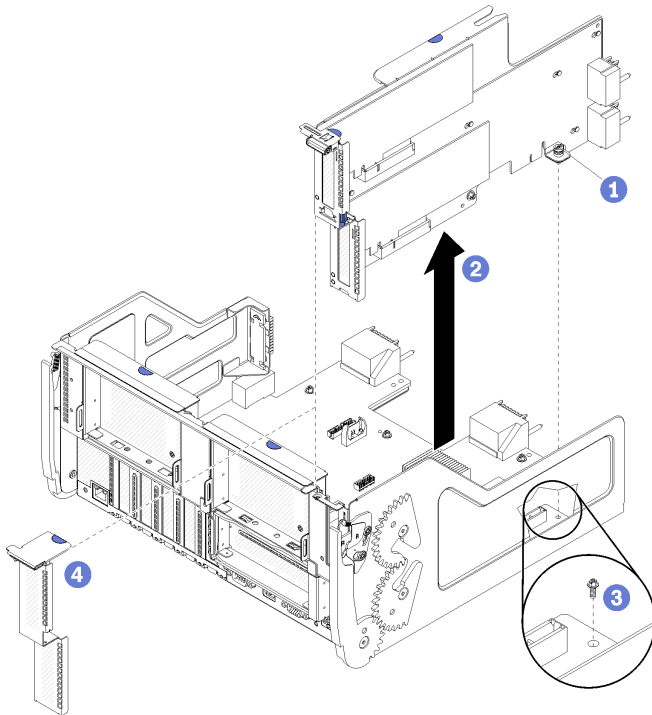• Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 116. Riser for slots 10 through 15 (right riser) 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 slots 10 through 15" on page 61.
    2. If a slot 14 and 15 bracket is installed on the riser, remove it. See "Remove a riser bracket from slots 14 and 15" on page 167.
- 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 slots 10 through 15 (item 4 in the figure).
    3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Remove a riser bracket from slots 14 and 15

The riser bracket for slots 14 and 15 is attached to the slot 10 through 15 I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slots 10 through 15 (right riser), release the retaining clips and remove the bracket from the riser.

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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

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 115.

2. Remove the riser for slots 10 through 15 (right riser). See "Remove the riser for slots 10 through 15 (right riser)" on page 165.

3. Remove any adapters that are installed in slots 14 or 15. See "Remove a PCIe adapter from slots 10 through 15" on page 61.

Complete the following steps to remove the riser bracket.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 117. Riser bracket removal (slots 14 and 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 slots 14 and 15 is not installed, you will not be able to install PCIe adapters in slots 14 and 15.

    1. Install a filler for slots 14 and 15 on the I/O tray.

    2. Install the riser. See "Install the riser for slots 10 through 15 (right riser)" on page 172.

    3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

Remove the riser for slots 16 and 17

The riser for adapter slots 16 and 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 that is 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 slots 16 and 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 115.

Complete the following steps to remove the riser for slots 16 and 17.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
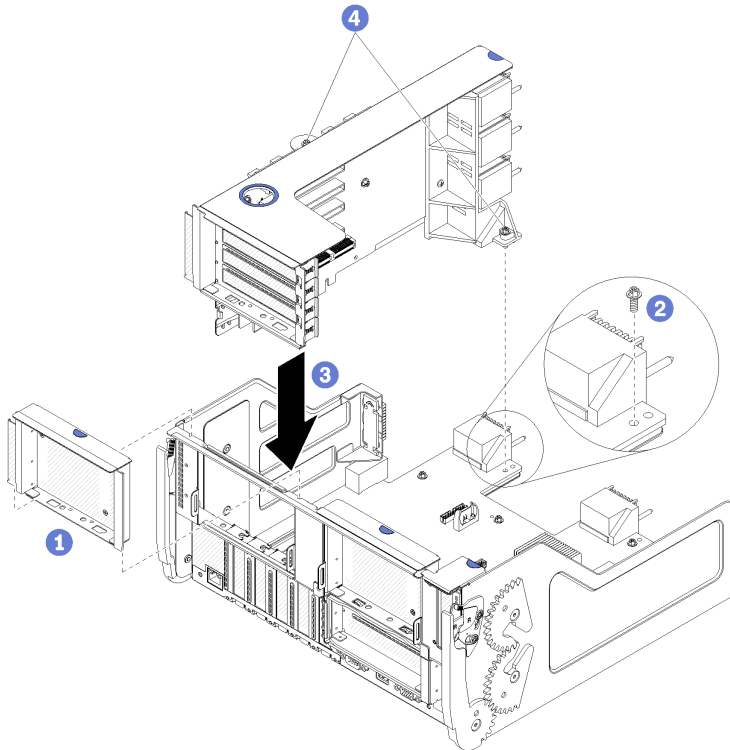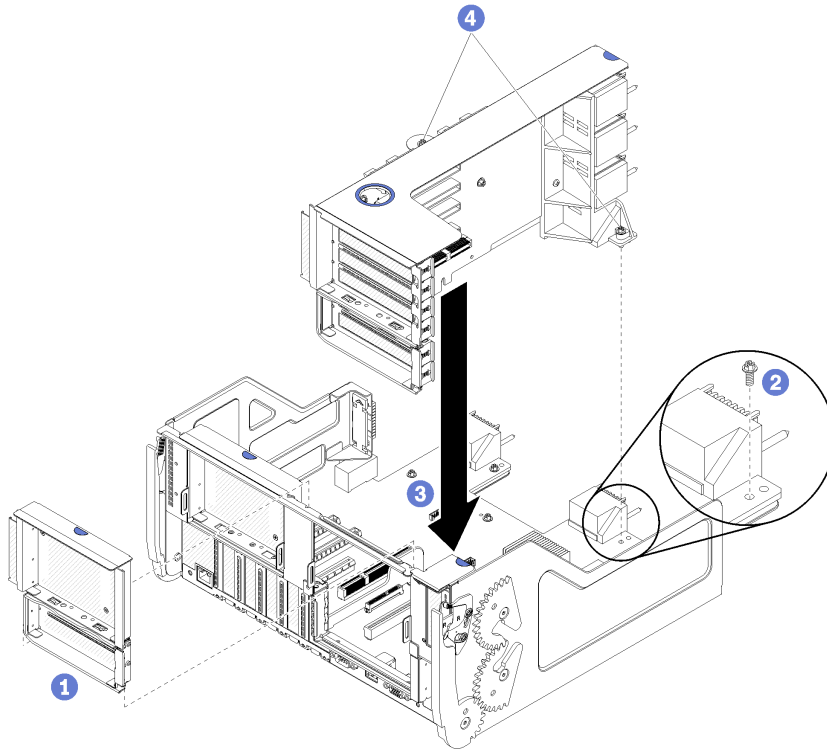- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 118. Riser for slots 16 and 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 slots 16 and 17" on page 62.
- 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 slots 16 and 17 (item 4 in the figure).
  3. Install the I/O tray and connect all cables. See "Install the I/O tray" on page 117.

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

Install the riser for slots 1 through 4 (left riser)

The riser for adapter slots 1 through 4 (left riser) 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 that is 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

Before you install the riser for slots 1 through 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 slots 1 through 4.

3. Install adapters in the riser. See "Install a PCIe adapter in slots 1 through 4" on page 64.

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 slots 1 through 4.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 119. Riser for slots 1 through 4 (left riser) 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 slots 1 through 4, install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.
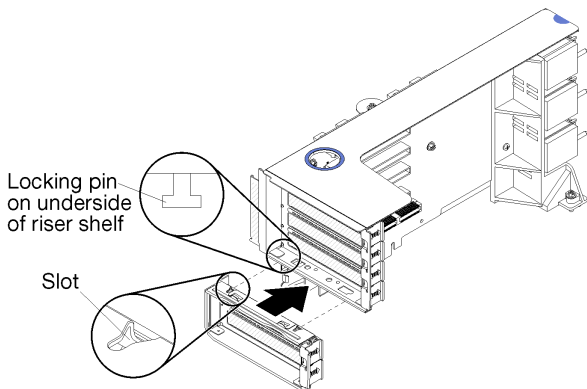
Install the riser for slots 10 through 15 (right riser)

The riser for adapter slots 10 through 15 (right riser) 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 that is 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 slots 10 through 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 slots 10 through 15.

3. Install the slot 14 and 15 bracket, if one was removed from the old riser. See "Install a riser bracket for slots 14 and 15" on page 173.

4. Install adapters in the riser. See "Install a PCIe adapter in slots 10 through 15" on page 67.

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 slots 10 through 15.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
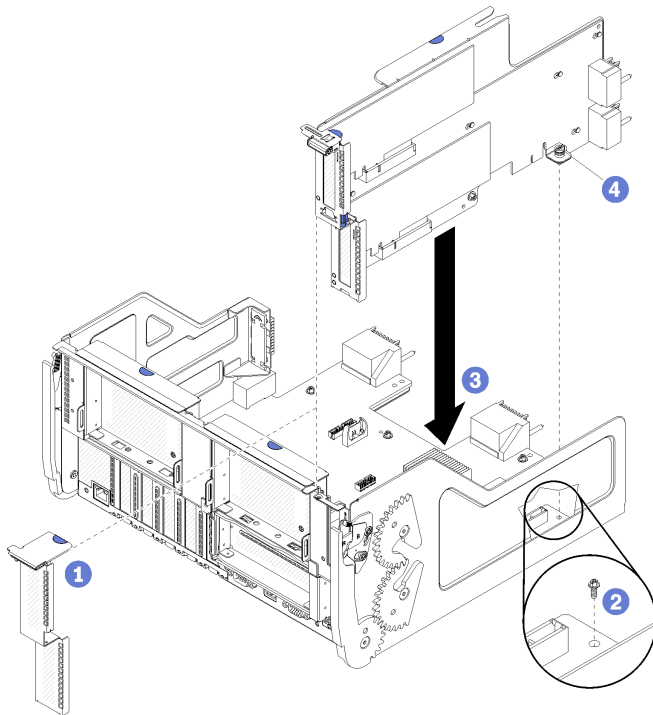- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 120. Riser for slots 10 through 15 (right riser) 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 slots 10 through 15, install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

Install a riser bracket for slots 14 and 15

The riser bracket for slots 14 and 15 is attached to the slot 10 through 15 I/O tray riser that is accessed from the rear of the server. After removing the I/O tray and the riser for slots 10 through 15 (right riser), 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 that is 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.
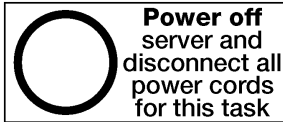
Before you install the riser bracket, make sure that there is no filler installed on the I/O tray for slots 14 and 15.

Complete the following steps to install the riser bracket.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
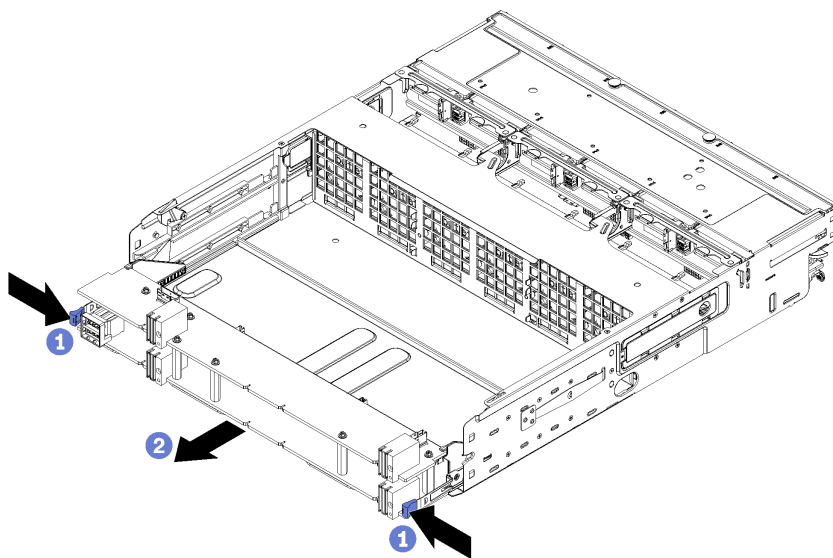- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 121. Riser bracket installation (slots 14 and 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 slots 10 through 15:

1. Install adapters in the riser. See "Install a PCIe adapter in slots 10 through 15" on page 67.
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 slots 10 through 15 (right riser)" on page 172.
4. Install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

Install the riser for slots 16 and 17

The riser for adapter slots 16 and 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 that is supplied to the device. The device also might have more than one power

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

Attention: Do *not* use the riser for slots 16 and 17 with four socket storage rich configurations.

Before you install the riser for slots 16 and 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 slots 16 and 17.
3. Install adapters in the riser. See "Install an I/O adapter in slots 16 and 17" on page 69.
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 slots 16 and 17.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
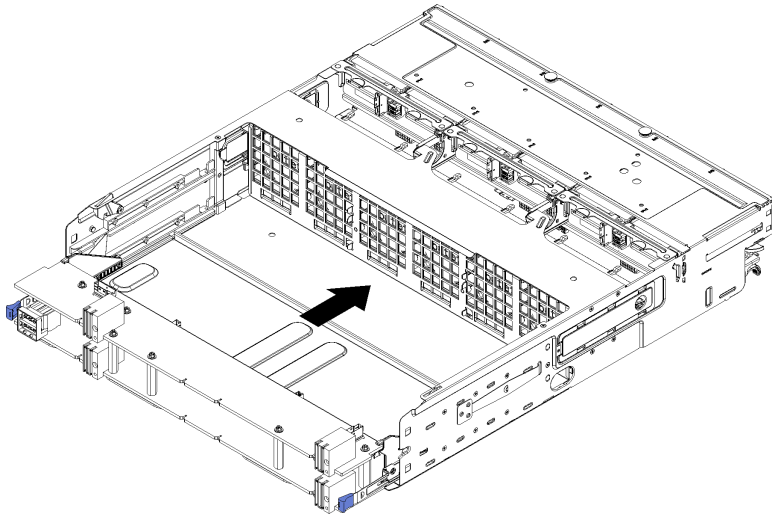- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 122. Riser for slots 16 and 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 slots 16 and 17, install the I/O tray in the chassis and connect all cables. See "Install the I/O tray" on page 117.

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.

<u>S002</u>
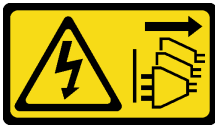
CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected 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 storage board assembly:

1. Remove the front cover. See "Remove the front cover" on page 95.

2. Remove the storage tray. See "Remove a storage tray" on page 184.

Complete the following steps to remove the storage board assembly:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
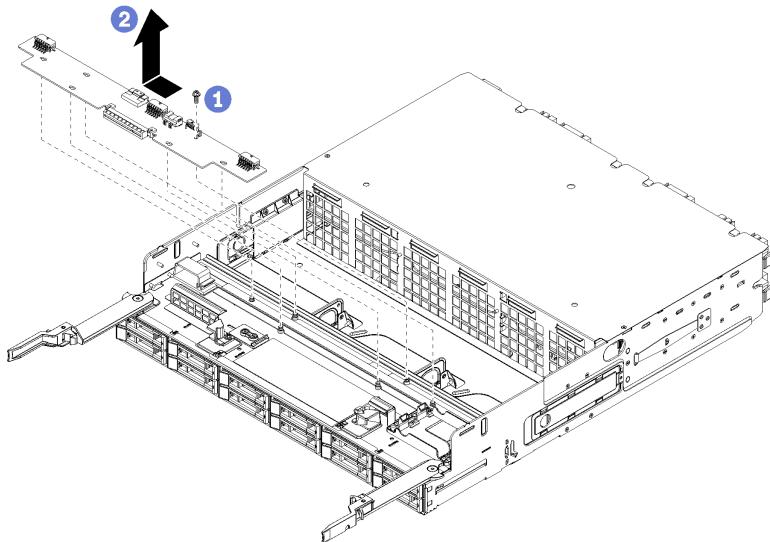- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 123. 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 29.

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 186 and "Install the front cover" on page 96.

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.

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.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 the storage board assembly:

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
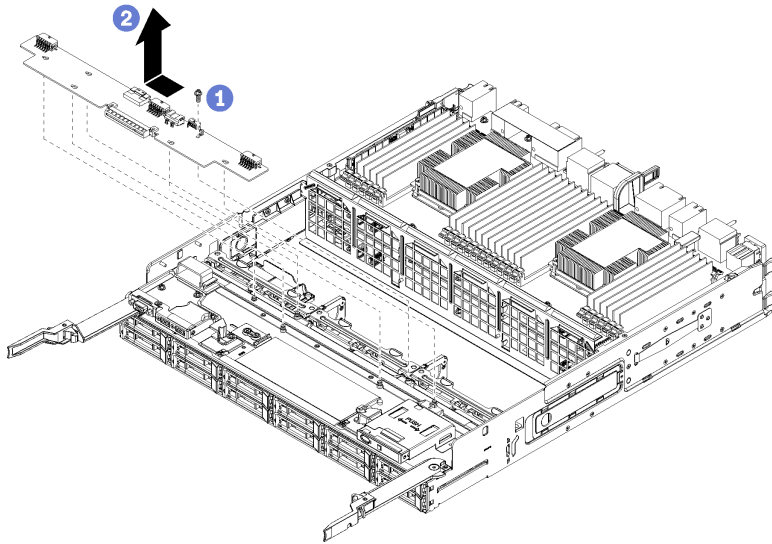- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 124. 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 29.

After you install the storage board assembly, install the storage tray and front cover. See "Install the storage tray (fully removed)" on page 186 and "Install the front cover" on page 96.

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.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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

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 95.

2. Remove the upper compute tray or storage tray. See "Remove a compute tray" on page 80 or "Remove a storage tray" on page 184.

3. If you removed a compute tray and it has one or more compute system boards installed or a compute system board filler, remove the compute system boards or compute system board filler. See "Remove a compute system board" on page 74.

4. Turn the tray upside down and remove the upper fan cage. See "Remove a fan cage (upper tray)" on page 86.

Complete the following steps to remove an upper storage interposer.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
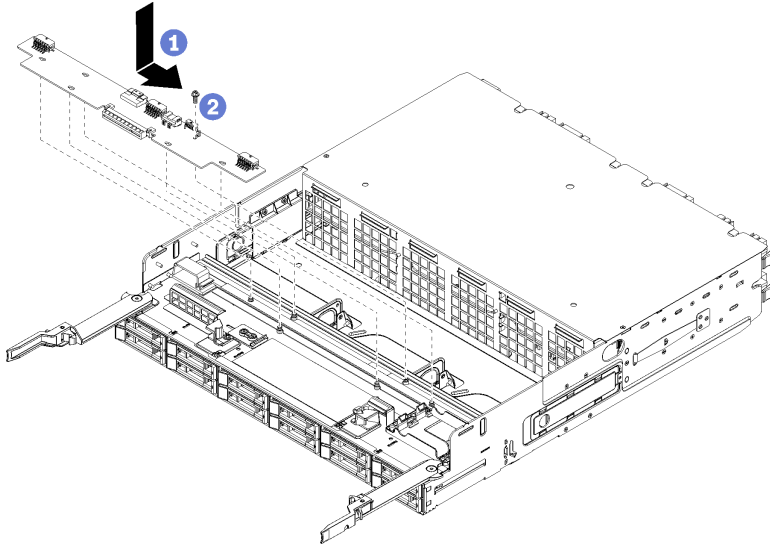- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 125. 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.

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.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 lower storage interposer:

1. Remove the front cover. See "Remove the front cover" on page 95.
2. Remove the lower compute tray or extract it to the maintenance position. See "Remove a compute tray" on page 80.
3. Remove the lower fan cage. See "Remove a fan cage (lower tray)" on page 88.

Complete the following steps to remove a lower storage interposer.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
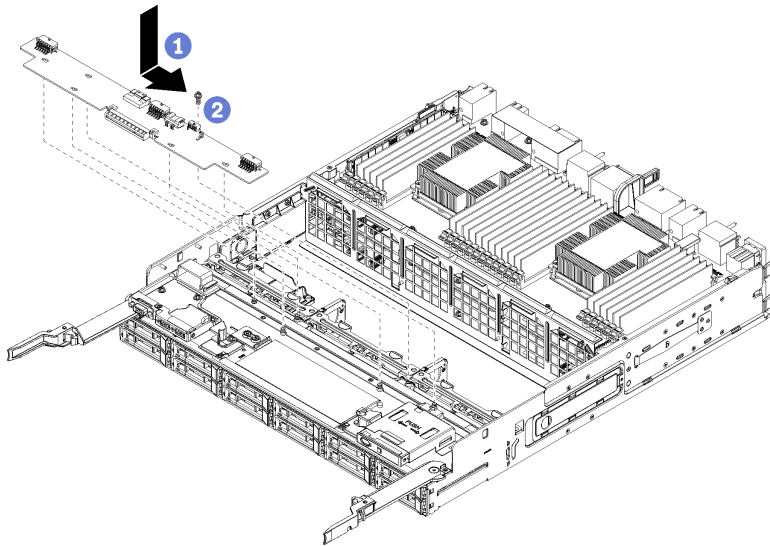- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 126. 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.

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.

S002

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.
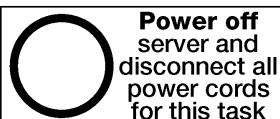
CAUTION:

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

Complete the following steps to install an upper tray storage interposer:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
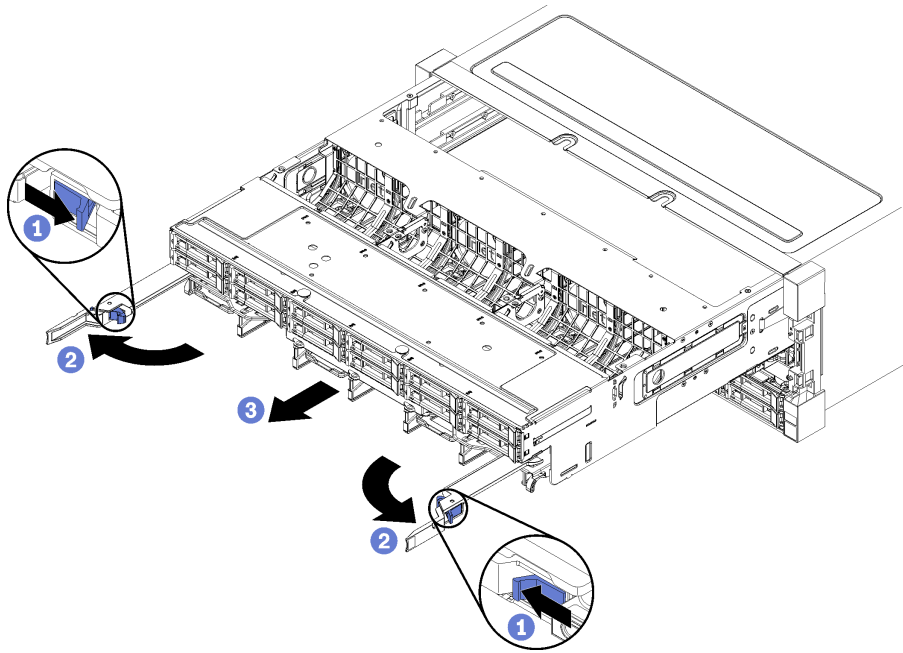- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 127. 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 89.

2. Turn the tray right-side up.

3. If you removed one or more compute system boards or a compute system board filler from a compute tray, install the compute system boards or compute system board filler. See "Install a compute system board" on page 76.

4. Install the upper compute tray or storage tray. See "Install the compute tray (fully removed)" on page 82 or "Install the storage tray (fully removed)" on page 186.

5. Install the front cover. See "Install the front cover" on page 96.

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 that is 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

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:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 128. 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 91.

2. Install the lower compute tray or place it in the normal operating position; then, install the front cover. See "Install the compute tray (fully removed)" on page 82 and "Install the front cover" on page 96.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 95.

Complete the following steps to remove a storage tray.

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
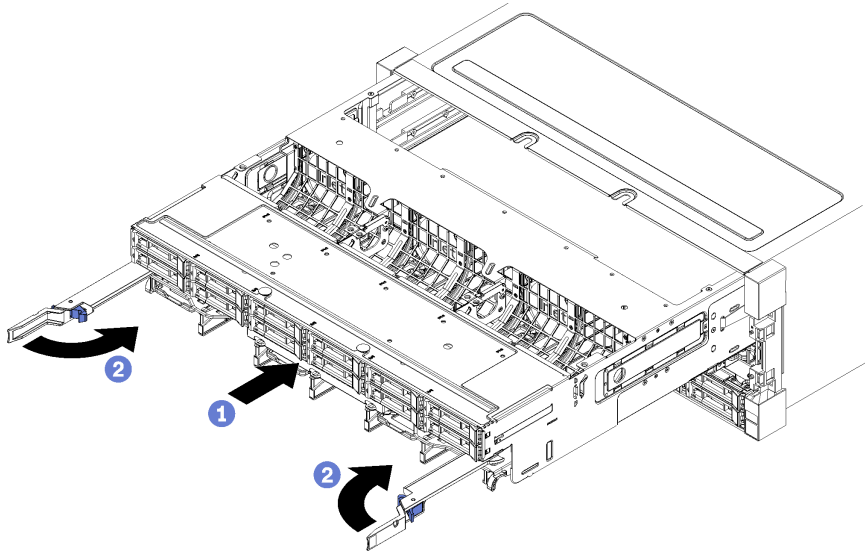- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 129. 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.
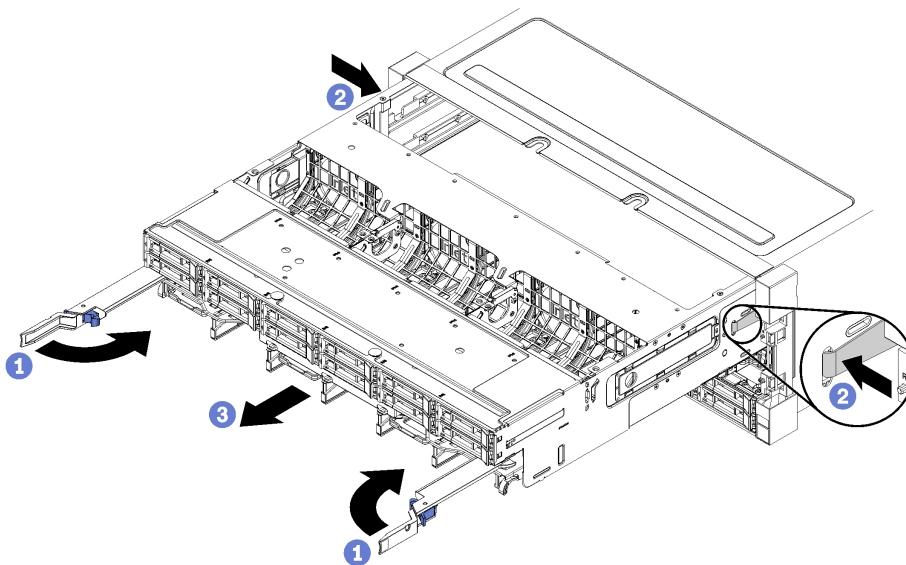
Figure 130. Storage tray removal from chassis

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 176)
  - Fan cages (see "Fan cage replacement" on page 86)
  - Storage interposer (see "Storage interposer replacement" on page 178)
  - RAID card (see "RAID card replacement" on page 153)
  - Hard disk drive backplane (see "Hard disk drive backplane replacement" on page 103)
  - Hard disk drives and fillers (see "Hard disk drive replacement" on page 110)
  - Cables (see "Internal cable routing" on page 29)

- 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.

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.

<u>S002</u>

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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 29.

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

Watch the procedure. A video of the replacement process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 131. 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 96.

Update the Universal Unique Identifier (UUID)

The Universal Unique Identifier (UUID) must be updated when the system board is replaced. Use the Lenovo XClarity Essentials OneCLI to update the UUID in the UEFI-based solution. Lenovo XClarity Essentials OneCLI is an online tool that supports several operating systems; make sure that you download the version for your operating system.

Notes: You can use Lenovo XClarity Provisioning Manager to update the UUID for the solution:

1. Start the solution and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.

2. From the System Summary page, click **Update VPD**.

3. Update the UUID.

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

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

Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

- Online from the target system, such as LAN or keyboard console style (KCS) access

- Remote access to the target system (LAN based)

Step 1. Copy and unpack the OneCLI package, which also includes other required files, to the solution. Make sure that you unpack the OneCLI and the required files to the same directory.

Step 2. After you have OneCLI in place, use the following command syntax to set the UUID:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]
```

Where:

<uuid_value>
> Up to 16-byte hexadecimal value assigned by you.

[access_method]
> The access method that you selected to use from the following methods:

- Online authenticated LAN access, type the command:

  Example that does not use the user ID and password default values:
  ```
  onecli config set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --user <user_id>
  --password <password>
  ```

  Example that uses the user ID and password default values:
  ```
  onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```

- 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:
  ```
  onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```

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

- Remote LAN access, type the command:

  Note: When using the remote LAN access method to access Lenovo XClarity Controller using the LAN from a client, the *host* and the *xcc_external_ip* address are required parameters.
  ```
  [--imm xcc_user_id:xcc_password@xcc_external_ip]
  ```

  or
  ```
  [--bmc xcc_user_id:xcc_password@xcc_external_ip]
  ```

  Where:

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

  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). The default value is PASSW0RD (with a zero 0 not an O).

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

  Example that does use the user ID and password default values:
  ```
  onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```

Step 3. Restart the Lenovo XClarity Controller.

Step 4. Restart the solution.

Update the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Lenovo XClarity Essentials OneCLI to update the DMI in the UEFI-based solution. Lenovo XClarity Essentials OneCLI is an online tool that supports several operating systems; make sure that you download the version for your operating system.

Notes: You can use Lenovo XClarity Provisioning Manager to update the asset tag for the solution:

1. Start the solution and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.

2. From the System Summary page, click **Update VPD**.

3. Update the asset tag information.

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

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

Lenovo XClarity Essentials OneCLI sets the DMI in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the DMI:

- Online from the target system, such as LAN or keyboard console style (KCS) access

- Remote access to the target system (LAN based)

Step 1. After you haveLenovo XClarity Essentials OneCLI in place, type the following commands to set the DMI:
```
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.SysEncloseAssetTag <asset_tag> [access_method]
```

Where:

<m/t_model>
> The solution machine type and model number. Type `mtm xxxxyyy`, where *xxxx* is the machine type and *yyy* is the solution model number.

<s/n>
> The serial number on the solution. Type `sn zzzzzzz`, where *zzzzzzz* is the serial number.

<asset_method>
> The solution asset tag number. Type `asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

[access_method]
> The access method that you select to use from the following methods:

> - Online authenticated LAN access, type the command:
>   `[--imm xcc_user_id:xcc_password@xcc_internal_ip]`
>   or
>   `[--bmc xcc_user_id:xcc_password@xcc_internal_ip]`
>   Where:
>
>   *xcc_internal_ip*
>   > The BMC/IMM/XCC internal LAN/USB IP address. The default value is 169.254.95.118.
>
>   *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). The default value is PASSW0RD (with a zero 0 not an O).

Notes:

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

2. If you do not specify any of these parameters, OneCLI will use the default values. When the default values are used and OneCLI is unable to access the Lenovo XClarity Controller using the online authenticated LAN access method, OneCLI will automatically use the unauthenticated KCS access method.

Examples that do use the user ID and password default values:
```
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.SysEncloseAssetTag <asset_tag>
```

- Online KCS access (unauthenticated and user restricted): You do not need to specify a value for *access_method* when you use this access method.

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

  The following commands are examples of not using the user ID and password default values:
  ```
  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.SysEncloseAssetTag <asset_tag>
  ```

- Remote LAN access, type the command:

  Note: When using the remote LAN access method to access Lenovo XClarity Controller using the LAN from a client, the *host* and the *xcc_external_ip* address are required parameters.

  ```
  [--imm xcc_user_id:xcc_password@xcc_external_ip]
  or
  [--bmc xcc_user_id:xcc_password@xcc_external_ip]
  ```
  Where:

  xcc_external_ip
  > The BMC/IMM/XCC LAN 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). The default value is PASSW0RD (with a zero 0 not an O).

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

  Examples that do use the user ID and password default values:
  ```
  onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --host <xcc_ip>
  onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --host <xcc_ip>
  onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --host <xcc_ip>
  ```

Step 2.   Restart the solution.

Enable TPM/TCM

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

Note: For customers in the People's Republic of China, TPM is not supported. However, customers in the People's Republic of China can install a Trusted Cryptographic Module (TCM) adapter (sometimes called a daughter card).

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/TCM policy

By default, a replacement system board is shipped with the TPM/TCM 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.

You can set the TPM/TCM policy from Lenovo XClarity Provisioning Manager.

Complete the following steps to set the TPM/TCM policy.

Step 1.   Start the server and when prompted, press F1 to display Lenovo XClarity Provisioning Manager.

Step 2.   If the power-on Administrator password is required, enter the password.

Step 3.   From the System Summary page, click **Update VPD**.

Step 4.   Set the policy to one of the following settings.

- **TCM enabled - China only**. Customers in the People's Republic of China should choose this setting if a TCM adapter is installed

- **TPM enabled - ROW**. Customers outside of the People's Republic of China should choose this setting.

- **Permanently disabled**. Customers in the People's Republic of China should use this setting if no TCM adapter is installed

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

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.

If the Physical Presence Policy is enabled, you can assert Physical Presence through the Lenovo XClarity Controller or through 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:

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

Set the TPM version

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

For information about accessing the Lenovo XClarity Controller interface, see:

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 PASSW0RD (zero, not an uppercase o)

   - *<ip_address>* is the IP address of the BMC.

   For more information about the Lenovo XClarity Essentials OneCLI **set** command, see:

   http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_set_command.html

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 PASSW0RD (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.

Physical Presence must be asserted if you are going to enable UEFI Secure Boot. See "Assert Physical Presence" on page 191.

For information about accessing the Lenovo XClarity Controller interface, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.html

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 when prompted, press F1 to display Lenovo XClarity Provisioning Manager.

  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  --override
                    --bmc <userid>:<password>@<ip_address>
     ```
     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

     – *<ip_address>* is the IP address of the BMC.

     For more information about the Lenovo XClarity Essentials OneCLI **set** command, see:

     http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_set_command.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 96.

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 6.
   - 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

Upper tray filler replacement

The upper tray filer 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 that is 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. (C011)

S036

Before you remove the upper tray filler, remove the server from the rack. See the *Lenovo ThinkSystem SR950 Rack Installation Instructions* at http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html.

Complete the following steps to remove the upper tray filler:

Watch the procedure. A video of the replacement process is available:

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
- Youku: http://list.youku.com/albumlist/show/id_50952215
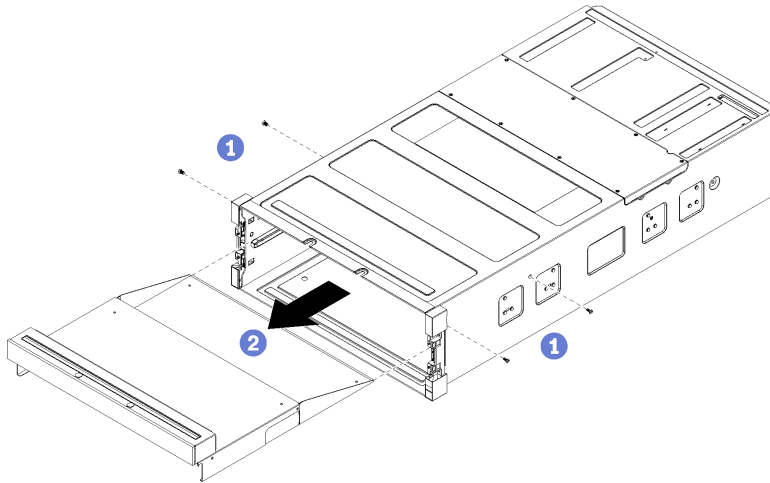
Figure 132. Upper tray filler removal

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 that is 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. (C011)

S036

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

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:

Watch the procedure. A video of the replacement process is available:
• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DbSYJFY74PoKmph7vgrkKH&playnext=1
• Youku: http://list.youku.com/albumlist/show/id_50952215

Figure 133. 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 http://thinksystem.lenovofiles.com/help/topic/7X12/pdf_files.html.

Chapter 5. 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 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:http://thinksystem.lenovofiles.com/help/topic/7X12/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.

Figure 134. 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.

Figure 135. Lenovo XClarity Controller event log

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

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/event_log.html

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.
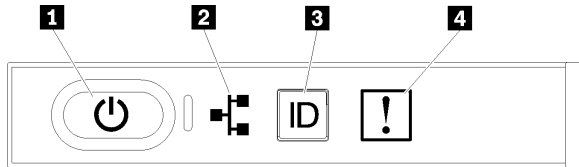
Figure 136. Operator information panel LEDs

Table 35. 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 16 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 16 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.	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.
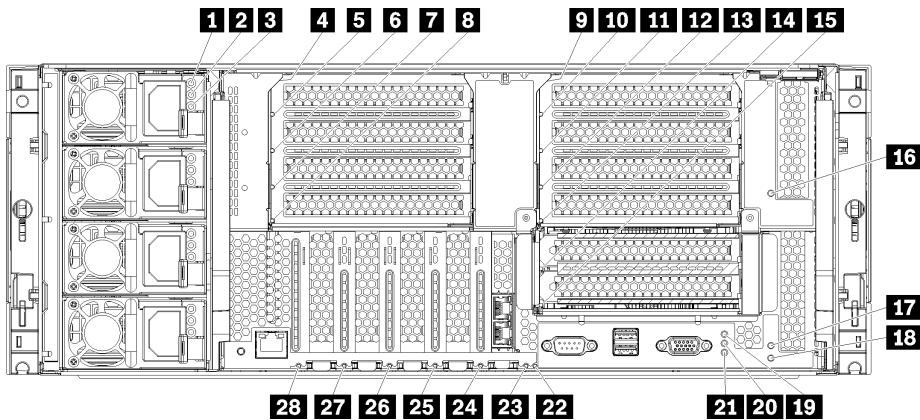
Figure 137. Rear LEDs

Table 36. 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 201 for detailed descriptions of the power supply LEDs.	See "Power supply LEDs" on page 201 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 201 for detailed descriptions of the power supply LEDs.	See "Power supply LEDs" on page 201 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 201 for detailed descriptions of the power supply LEDs.	See "Power supply LEDs" on page 201 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.	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.	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 36. Light path diagnostics: Rear LED status and actions (continued)

LED	Description	Action
21 System-error LED (amber)	Indicates an error has occurred.	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.	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.	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 137 "Rear LEDs" on page 200 for LED locations.

Power supply LEDs	Description	Action	Note

1 AC	**2** DC	**3** Error			
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.	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.	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	The system is shut down (server is connected to power). The system has overloaded the power supply.	Remove options or add an additional power supply.	If the system is shut down, this is a normal condition. 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.
On	On	Off	The system is on (normal operation) The system is on (not operating): power-supply not fully seated, faulty compute system board, or faulty power-supply.	1. Reseat the power supply. 2. Replace the power-supply. 3. Replace the compute 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.
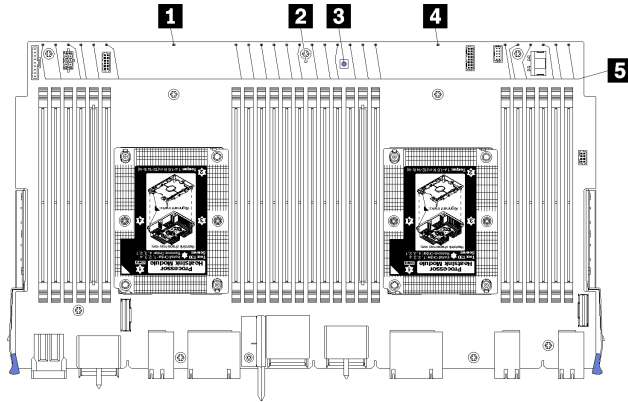
Figure 138. System-board light path LEDs

Table 37. 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 207.
2 System board error LED	LED on: An error has occurred on the system board.	Complete the following steps: 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 207.
5 Memory module 1 through 24 error LEDs	LED on: An error has occurred with the designated memory module.	See "Memory problems" on page 207.

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, 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.

   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.*
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 197

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. See "Specifications" on page 1 to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseat 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 201 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 of the server. These LEDs can help indicate which Ethernet port is experiencing a problem and help you islolate whether the problem might be with a connector, cable, hub or the network adapter installed in the server.

- 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 front of the server. The network activity LED flickers when data is active on network connections from the LOM or ML2 network adapters. 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 197)

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 221).

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 206
- "The power button does not work (server does not start)" on page 206
- "Server does not power on (no indication that input power is connected to the server)" on page 206

- "Server does not power off (shut down)" on page 207

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 http://www.lenovo.com/us/en/serverproven/ 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:

   http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.html

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 206.

- 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 207

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 http://www.lenovo.com/us/en/serverproven/

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.

- "Displayed system memory less than installed physical memory" on page 207
- "Multiple rows of DIMMs in a branch identified as failing" on page 208

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.

2. Reseat the DIMMs, and then restart the server.

3. Run memory diagnostics. When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic** ➔ **Memory test**.

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. Replace the DIMM.

6. Restart the server.

Multiple rows of DIMMs in a branch identified as failing

1. Reseat the DIMMs; then, restart the server.

2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical known good DIMM; then, restart the server. Repeat as necessary. If the failures continue after all identified DIMMs are replaced, go to step 4.

3. Return the removed DIMMs, one at a time, to their original connectors, restarting the server after each DIMM, until a DIMM fails. Replace each failing DIMM with an identical known good DIMM, restarting the server after each DIMM replacement. Repeat step 3 until you have tested all removed DIMMs.

4. Replace the lowest-numbered DIMM of those identified; then, restart the server. Repeat as necessary.

5. Reverse the DIMMs between the channels (of the same processor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.

6. (Trained technician only) Replace the system board.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- "Server cannot recognize a hard drive" on page 208
- "Multiple hard drives fail" on page 209
- "Multiple hard drives are offline" on page 209
- "A replacement hard disk drive does not rebuild" on page 210
- "Green hard disk drive activity LED does not represent actual state of associated drive" on page 210
- "Yellow hard disk drive status LED does not represent actual state of associated drive" on page 210

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 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:

- 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 F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD 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 the hard disk drive backplane (go to step Hard disk drive problems).

- 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 F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD test**.

Based on those tests:

- If the adapter 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 F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD 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.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- "Incorrect characters are displayed" on page 210
- "Screen is blank" on page 210
- "Screen goes blank when you start some application programs" on page 211
- "The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted." on page 211
- "The wrong characters appear on the screen" on page 211

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 6.

Screen is blank

1. The Lenovo 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 6.

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 6.

Keyboard, mouse, or USB-device problems

Use this information to solve problems related to a keyboard, mouse, or USB device.

Note: The Lenovo ThinkSystem SR950 server only supports connection of a USB keyboard and mouse.

- "USB-device does not work." on page 212
- "All or some keys on the keyboard do not work." on page 212
- "Mouse does not work." on page 212

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 F1 to display the Lenovo XClarity Provisioning Manager system setup interface. Then, click **System Settings ➙ Devices and I/O Ports ➙ USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

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. Run the Lenovo XClarity Provisioning Manager and enable keyboardless operation.
3. If the keyboard 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 Lenovo XClarity Provisioning Manager.
2. If the mouse is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

Optional-device problems

Use this information to solve problems related to optional devices.

- "External USB device not recognized" on page 212
- "PCIe adapter is not recognized or is not functioning" on page 213
- "A Lenovo optional device that worked previously does not work now. " on page 213
- "A Lenovo optional device that was just installed does not work." on page 213
- "A Lenovo optional device that worked previously does not work now. " on page 213

External USB device not recognized

Complete the following steps until the problem is resolved:

1. Make sure that the proper drivers are installed on the server. See the product documentation for the USB device for information about device drivers.

2. Use the Lenovo XClarity Provisioning Manager to make sure that the device is configured correctly.

3. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the server.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Check the event log and resolve any issues related to the device.

2. Validate that the device is supported for the server (see http://www.lenovo.com/us/en/serverproven/).

3. Make sure that the adapter is installed in a correct slot and that this slot is supported by your system configuration.

4. Make sure that the proper device drivers are installed for the device.

5. Resolve any resource conflicts if running legacy mode (UEFI).

6. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.

7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.

Insufficient PCIe resources are detected.

If you see an error message stating "Insufficient PCI Resources Detected," complete the following steps until the problem is resolved:

1. Remove one of the PCIe adapters.

2. Restart the system and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.

3. Click **UEFI Setup ➙ System Settings ➙ Devices and I/O Ports ➙ MM Config Base**; then, modify the setting to the lower memory capacity. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.

4. Save the settings and restart the system.

5. The action for this step will differ based on whether or not the reboot is successful.

   - If the reboot is successful, shutdown the solution and reinstall the PCIe card you removed.
   - If the reboot failed, repeat step 2 to step 5.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the server (see http://www.lenovo.com/us/en/serverproven/).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press F1 to display the system setup interface. Whenever memory or any other device is changed, you must update the configuration.
   - Make sure that the latest levels of device firmware and device drivers are installed. See "Update the firmware" in the *Lenovo ThinkSystem SR950 Setup Guide* information.

2. Reseat the device that you just installed.

3. Replace the device that you just installed.

A Lenovo optional device that worked previously does not work now.

1. Make sure that 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 failing device.

5. 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 214
- "Serial device does not work" on page 214

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 214
- "Intermittent KVM problems" on page 215
- "Intermittent unexpected reboots" on page 215

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.

2. For a USB device:

a. Make sure that the device is configured correctly.

   Restart the server and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface. Then, click **System Settings ➙ Devices and I/O Ports ➙ USB Configuration**.

b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following 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 correctable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

   To check the POST watchdog time, restart the server and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface. Then, click **BMC Settings ➙ POST Watchdog Timer**.
2. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
3. See the management controller event log to check for an event code that indicates a reboot. See "Event logs" on page 197 for information about viewing the event log.

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 216
- "Could not log in using LDAP account with SSL enabled" on page 216

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 Lenovo ThinkSystem SR950 system event log (see "Event logs" on page 197), 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.

- "The server immediately displays the POST Event Viewer when it is turned on" on page 216
- "Server is unresponsive (POST is complete and operating system is running)" on page 217
- "Server is unresponsive (cannot press F1 to start System Setup)" on page 217
- "Voltage planar fault is displayed in the event log" on page 217
- "Unusual smell" on page 218
- "Server seems to be running hot" on page 218
- "Cracked parts or cracked chassis" on page 218

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 http://www.lenovo.com/us/en/serverproven/ .

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

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

Complete the following steps until the problem is solved.

- If you are in the same location as the server, complete the following steps:
    1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
    2. If possible, log in to the server and verify that all applications are running (no applications are hung).
    3. Restart the server.
    4. If the problem remains, make sure that any new software has been installed and configured correctly.
    5. Contact your place of purchase of the software or your software provider.
- If you are accessing the server from a remote location, complete the following steps:
    1. Make sure that all applications are running (no applications are hung).
    2. Attempt to log out of the system and log back in.
    3. Validate the network access by pinging or running a trace route to the server from a command line.
        a. If you are unable to get a response during a ping test, attempt to ping another server in the enclosure to determine whether it is a connection problem or server problem.
        b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
    4. Restart the server remotely through the management interface.
    5. If the problem remains, verify that any new software has been installed and configured correctly.
    6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (cannot press F1 to start System Setup)

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

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

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

After a specified number of consecutive attempts (automatic or manual), the server to 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 F1 to display the Lenovo XClarity Provisioning Manager system setup interface. Then, click **System Settings ➙ Recovery and RAS ➙ POST Attempts ➙ POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following 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 items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
- If the system does not restart, suspect the system board.

Unusual smell

Complete the following 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 servers or chassis:

1. Make sure that the room temperature is within the specified range (see "Specifications" on page 1).
2. Check the management processor event log for rising temperature events. If there are no events, the server is running within normal operating temperatures. Note that you can expect some variation in temperature.

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. 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: This section includes references to IBM web sites and information about obtaining service. 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 the following location:

http://thinksystem.lenovofiles.com/help/index.jsp

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 http://www.lenovo.com/us/en/serverproven/ to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
    - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error

messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http:// datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://www-947.ibm.com/support/servicerequest/ Home.action 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 http:// sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_ servicesandsupport.html.

  – For more information about using the CLI to collect service data, see http://sysmgt.lenovofiles.com/help/ topic/com.lenovo.systems.management.xcc.doc/nn1ia_r_ffdccommand.html.

- **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 http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist. In the U.S. and Canada, call 1-800-426-7378.

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

China product support

To contact product support in China, go to:
http://support.lenovo.com.cn/lenovo/wsi/es/ThinkSystem.html

You can also call 400-106-8888 for product support. The call support is available Monday through Friday, from 9 a.m. to 6 p.m.

Taiwan product support

To contact product support for Taiwan:

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

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

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1009 Think Place
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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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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 38. Limits for particulates and gases

Contaminant	Limits
Particulate	- The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. - Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. - The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. - The room must be free of conductive contamination such as zinc whiskers.
Gaseous	- Copper: Class G1 as per ANSI/ISA 71.04-1985[3] - Silver: Corrosion rate of less than 300 Å in 30 days
[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. [2] 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. [3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

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:

http://thinksystem.lenovofiles.com/help/index.jsp

Taiwan BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	−	○	○	○	○	○
空氣傳動設備	−	○	○	○	○	○
冷卻組合件	−	○	○	○	○	○
內存模塊	−	○	○	○	○	○
處理器模塊	−	○	○	○	○	○
電纜組合件	−	○	○	○	○	○
電源	−	○	○	○	○	○
儲備設備	−	○	○	○	○	○
電路卡	−	○	○	○	○	○
光碟機	−	○	○	○	○	○
雷射器	−	○	○	○	○	○

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 import and export contact information

Contacts are available for Taiwan import and export information.

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