Lenovo

ThinkSystem SR590
Maintenance Manual



Machine Types: 7X98 and 7X99

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

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

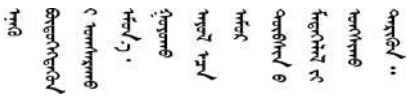
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

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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་སྤྱོད་མ་བྱས་གོང་། ཁྲིར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

.مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ

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

Safety inspection checklist

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

CAUTION:
This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards in products with hazardous energy levels.

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

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

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

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

     a. Go to:

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

     b. 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.

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Chapter 1. Introduction

The ThinkSystem SR590 server is an optimized 2U dual-socket rack server that balances expandability, connectivity, memory, performance, reliability, and manageability. It is an ideal platform for public or private cloud, small-to-medium business and enterprise workloads, which need an optimized mix of compute and storage.

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

Identifying your server

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

The machine type and serial number are on the ID label on the right rack latch in the front of the server.

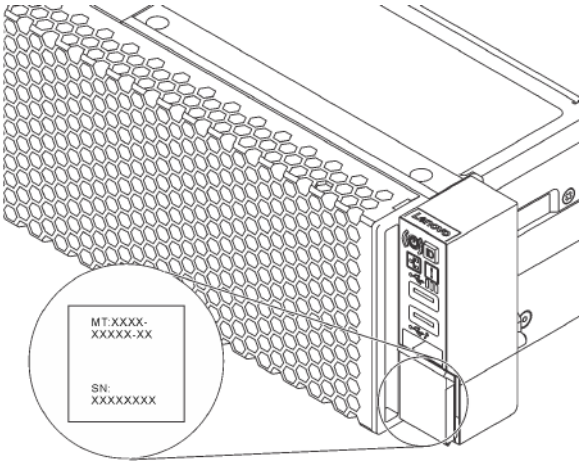


Figure 1. Location of the ID label

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XClarity Controller network access label

The XClarity Controller network access label is attached on the top side of the pull-out information tab. After you get the server, peel the XClarity Controller network access label away and store it in a safe place.

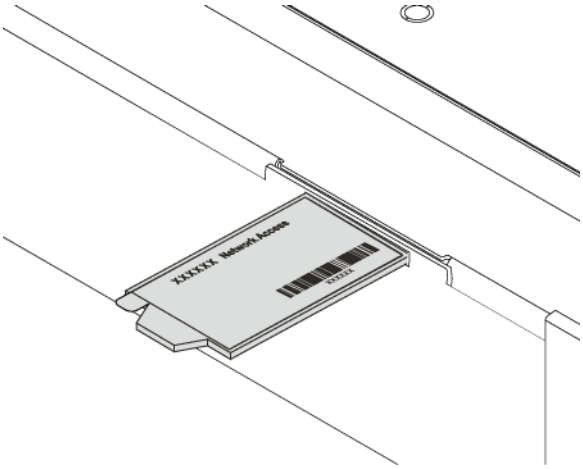


Figure 2. Location of the XClarity Controller network access label

Quick response code

The system service label, which is on the top cover, provides a quick response (QR) code for mobile access to service information. Scan the QR code with a mobile device and a QR code reader application to get quick access to the Lenovo Service web site for this server. The Lenovo Service Information Web site provides additional information for parts installation and replacement videos, and error codes for server support.

The following illustration shows the QR code: https://support.lenovo.com/p/servers/sr590



Figure 3. QR code

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
Dimension	• 2U • Height: 86.5 mm (3.4 inches) • Width: – With rack latches: 482.0 mm (19.0 inches) – Without rack latches: 444.6 mm (17.5 inches) • Depth: 763.7 mm (30.1 inches) **Note:** The depth is measured with rack latches installed, but without the security bezel installed.
Weight	Up to 28.0 kg (61.7b), depending on the server configuration
Processor (depending on the model)	• Up to two Intel® Xeon® Scalable Processors – Scalable up to 26 cores – Designed for Land Grid Array (LGA) 3647 socket – Thermal Design Power (TDP): up to 150 watts For a list of supported processors, see: http://www.lenovo.com/us/en/serverproven/ **Notes:** • All processors on the system board must be of the same type, and have the same speed, number of cores, and frequency. • For server models with twelve 3.5-inch drive bays, Intel® Xeon® 6240C processor is not supported. • For server models with 550-watt ac power and two processors, the TDP limitations of each processor vary with the drive bay configurations: – Eight 2.5-inch drive bays: no more than 125 watts – Eight 3.5-inch drive bays: no more than 125 watts – Twelve 2.5-inch drive bays: no more than 105 watts – Sixteen 2.5-inch drive bays: no more than 85 watts • When you install a processor, follow below rules to select a heat sink: – If you are going to install a processor with TDP lower than or equal to 125 watts, use the heat sink with part number 01KP655 or 01KP654. – If you are going to install one of the following processors, use the heat sink with part number 01KP652 or 01KP653: – Processor with TDP higher than 125 watts and lower than or equal to 150 watts – Intel® Xeon® 5120T, 5122, 5218T, 5220T, 6126T, 6130T, 6238, 6238M, 6238L, 6240L, 6252N, 6262V, 6240Y, 6234, 6240M, 6230T, or 8156 processor

Table 1. Server specifications (continued)

Specification	Description
Memory	For 1st Generation Intel® Xeon® Scalable Processors (Intel® Xeon® SP Gen 1): • Minimum: 8 GB • Maximum: – 512 GB using registered DIMMs (RDIMMs) – 1 TB using load-reduced DIMMs (LRDIMMs) • Type (depending on the model): – TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMMs – TruDDR4 2666, quad-rank, 64 GB LRDIMMs • Slots: 16 DIMM slots For 2nd Generation Intel® Xeon® Scalable Processors (Intel® Xeon® SP Gen 2): • Minimum: 8 GB • Maximum: – 1 TB using registered DIMMs (RDIMMs) – 2 TB using Intel Optane™ DC Persistent Memory (DCPMMs) and RDIMMs in memory mode • Type (depending on the model): – TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMMs – TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMMs – 128 GB, 256 GB, or 512 GB DCPMMs • Slots: 16 DIMM slots For a list of supported DIMMs, see: http://www.lenovo.com/us/en/serverproven/ **Notes:** • Operating speed and total memory capacity depends on the processor model and UEFI settings. • When four DCPMMs are installed, ensure that the processor TDP is lower than or equal to 125 watts.
Internal drives	The supported drives vary by models. • Up to eight 3.5-inch simple-swap SATA drives • Up to eight 3.5-inch hot-swap SAS/SATA drives • Up to twelve 3.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives supported only in drive bays 8–11 if a 3.5-inch AnyBay backplane is installed) • Up to sixteen 2.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives supported only in drive bays 4–7 if a 2.5-inch AnyBay backplane is installed) • Up to two 3.5-inch hot-swap SAS/SATA drives in the rear (supported only by server models with 12 drive bays in the front) • Up to two M.2 drives **Notes:** • Server models installed with either one processor or two processors support Non-Volatile Memory Express (NVMe) SSDs. For the server model installed with one processor, one AnyBay backplane, and one PCIe switch, no more than four NVMe SSDs can be installed.

Table 1. Server specifications (continued)

Specification	Description
	• Rear hot-swap SAS/SATA drives are supported only when the processor TDP is lower than or equal to 105 watts.
Expansion slots	• One PCIe slot on the system board • Two riser card slots on the system board • Two or three PCIe slots on the riser card For detailed information, see “Rear view” on page 22.
Input/Output (I/O) features	• Front panel: – One VGA connector (available on some models) – One XClarity Controller USB 2.0 connector – One USB 3.0 connector • Rear panel: – One VGA connector – One XClarity Controller network connector – One serial port (available on some models) – Two USB 3.0 connectors – Two Ethernet connectors – Two Ethernet connectors on the LOM adapter (available on some models)
RAID/HBA adapters (depending on the model)	• An HBA 430-8i or 430-16i SAS/SATA adapter that supports JBOD mode but does not support RAID • A RAID 530-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 • A RAID 530-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1 and 10 • A RAID 730-8i 1G Cache SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 • A RAID 730-8i 2G Flash SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8i or 930-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8e SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 **Notes:** • A software RAID controller is integrated on the system board. The software RAID controller supports JBOD mode and RAID levels 0, 1, 5, and 10. • RAID 730-8i 1G Cache SAS/SATA adapter is not available for North America. • RAID 530-8i SAS/SATA adapter cannot be mixed with RAID 730-8i 1G Cache SAS/SATA adapter. • RAID 730-8i 2G Flash SAS/SATA adapter cannot be mixed with RAID 730-8i 1G Cache SAS/SATA adapter or RAID 930-8i SAS/SATA adapter. • A RAID super capacitor module must be installed if the RAID 730-8i 2G Flash SAS/SATA adapter, RAID 930-8i or 930-16i SAS/SATA adapter, or RAID 930-8e SAS/SATA adapter is installed.

Table 1. Server specifications (continued)

Specification	Description
System fans	• One processor: three hot-swap fans (including one redundant fan) • Two processors: four hot-swap fans (including one redundant fan) **Notes:** • For server models with twelve 3.5-inch drive bays and has one of following processors installed, if one fan fails, replace it with a new fan to avoid cooling problems: Intel Xeon 5122, 6140, 6140M, 6152, 8156, 8158, 8160, 8160M, 8164, 6242, 6240, 6248, 6252, or 6210U. • If your server comes with only one processor, three system fans (fan 1 to fan 3) are adequate to provide proper cooling. However, you must keep the location for fan 4 occupied by a fan filler to ensure proper airflow.
Power supplies (depending on the model)	One or two hot-swap power supplies for redundancy support • 550-watt ac 80 PLUS Platinum • 750-watt ac 80 PLUS Platinum • 750-watt ac 80 PLUS Titanium
Electrical input	• Sine-wave input (50 Hz to 60 Hz) required • Input voltage low range: – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: – Minimum: 200 V ac – Maximum: 240 V ac **Note:** For server models with 750-watt ac 80 PLUS Titanium power supplies, 100–127 V ac input voltage is not supported. **CAUTION:** **240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**
Minimal configuration for debugging	• One processor in processor socket 1 • One memory DIMM at slot 3 • One power supply • Three system fans (fan 1 to fan 3)

Table 1. Server specifications (continued)

Specification	Description
Acoustical noise emissions	• Sound power level, idle – 4.6 bels, minimum – 4.8 bels, typical – 5.9 bels, maximum • Sound power level, operating – 4.7 bels, minimum – 4.8 bels, typical – 5.9 bels, maximum **Notes:** • These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. • The declared acoustic noise levels are based on specified configurations, which may change slightly depending on configuration/conditions.
Environment	The server is supported in the following environment: • Air temperature: – Operating: – ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – ASHRAE class A3 (for some models): 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase. – ASHRAE class A4 (for some models): 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase. – Server off: 5–45°C (41–113°F) – Shipping or storage: -40–60°C (-40–140°F) • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): – Operating: – ASHRAE class A2: 8%–80%; maximum dew point: 21°C (70°F) – ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F) – ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F) – Shipping or storage: 8%–90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 198. **Notes:**

Table 1. Server specifications (continued)

Specification	Description
	• Your server complies with ASHRAE class A2 specifications. The server performance might be impacted if one system fan fails. For server models with twelve 3.5-inch drive bays, if one system fan fails, the following Intel Xeon processors are not supported: 5122, 6140, 6140M, 6152, 8156, 8158, 8160, 8160M, 8164, 6242, 6240, 6248, 6252, or 6210U. • Depending on the hardware configuration, some models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server model must meet the following requirements at the same time: – Two power supplies are installed. – No system fan fails. – Rear hot-swap drive is not installed. – NVMe drive is not installed. – DCPMM memory is not installed. – For server models with twelve 3.5-inch drives, M.2 drive is not installed when the operating temperature is outside ASHRAE class A3 specifications. – The following processors are not installed: Intel Xeon 6136, 6140, 6140M, 6142, 6142M, 6148, 6152, 8158, 8160, 8160M, 8160T, 8164, 6242, 6240, 6248, 6252, or 6210U. For a list of supported processors, see: http://www.lenovo.com/us/en/serverproven/

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:

Note: The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator or Lenovo XClarity Essentials. For more information, see the following Tech Tip:

https://datacentersupport.lenovo.com/us/en/solutions/ht506118

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		√		√	√	√	
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	√	√			√		√

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 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/products/servers/thinksystem/sr590/7x98/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.

Complete the following steps to install ibm_rndis_server_os.inf:

Note: You only have to perform these steps if the compute node is running a Windows operating system and the ibm_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. 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 ibm_rndis_server_os.inf file and install the device.

Step 2. 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 3. When you are prompted Can Windows connect to Windows Update to search for software?, select **No, not this time**. Click **Next** to continue.

Step 4. 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 5. 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 6. When you are prompted Select a hardware type, and then click Next, select **Network adapters**. Click **Next** to continue.

Step 7. 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 8. Return to the Device Manager. **Lenovo USB Remote NDIS Network Device** appears under **Network Adapters**.

Step 9. 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 **Documentation** from the navigation pane..

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

Security advisories

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

The list of current advisories is available at the following location:
https://datacentersupport.lenovo.com/product_security/home

Power on the server

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

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

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

For information about powering off the server, see “Power off the server” on page 13.

Power off the server

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

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

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

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

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see “Power on the server” on page 13.

Chapter 2. Server components

This section provides information to help you locate your server components.

Front view

The front view of the server varies by model.

The following illustrations show the front views of server models with hot-swap drives. For server models with eight 3.5-inch drive bays, you can also install simple-swap drives if a simple-swap-drive backplate assembly is installed. Depending on the model, your server might look slightly different the illustrations.

- “Front view of server models with 2.5-inch drive bays” on page 15
- “Front view of server models with 3.5-inch drive bays” on page 17

Front view of server models with 2.5-inch drive bays

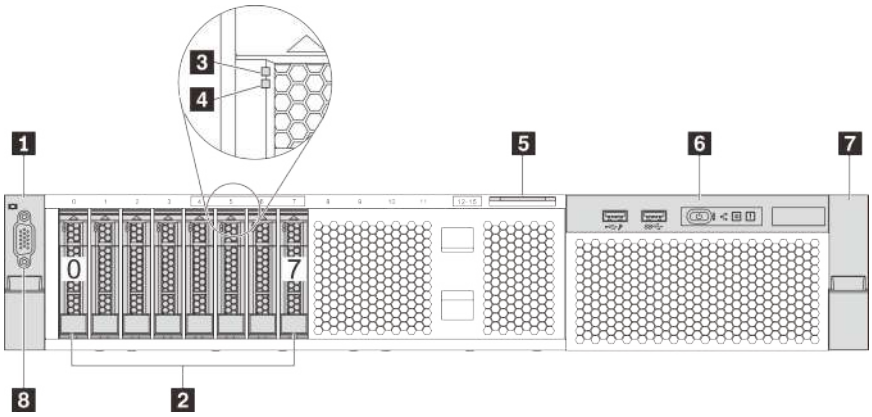


Figure 4. Front view of server models with eight 2.5-inch drive bays

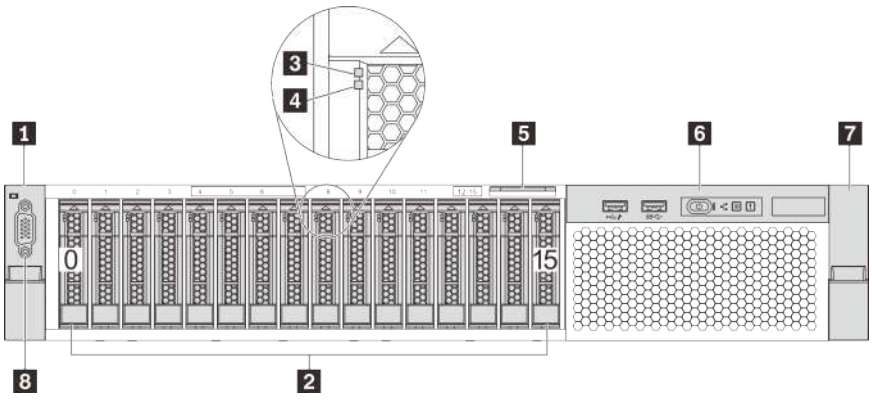


Figure 5. Front view of server models with sixteen 2.5-inch drive bays

Table 2. Components on the front of server models with 2.5-inch drive bays

1 Rack latch (left)	2 2.5-inch drive bays
3 Drive activity LED	4 Drive status LED

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Table 2. Components on the front of server models with 2.5-inch drive bays (continued)

5 Pull-out information tab	6 Front I/O assembly
7 Rack latch (right)	8 VGA connector (optional)

1 7 Rack latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas. For more information, refer to the *Rack Installation Guide* that comes with your rail kit.

2 2.5-inch drive bays

The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive fillers.

3 Drive activity LED

4 Drive status LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
Drive status LED	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.
Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

5 Pull-out information tab

The Lenovo XClarity Controller network access label of the server is attached on the pull-out information tab.

6 Front I/O assembly

For information about the controls, connectors, and status LEDs on the front I/O assembly, see “Front I/O assembly” on page 18.

8 VGA connector (optional)

Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

Front view of server models with 3.5-inch drive bays

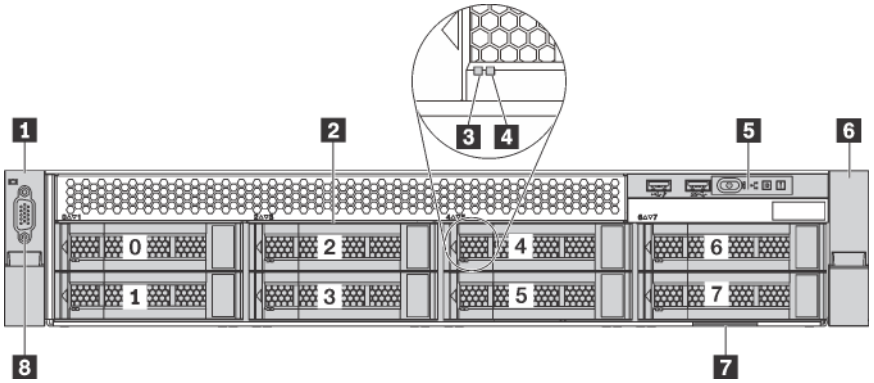


Figure 6. Front view of server models with eight 3.5-inch drive bays

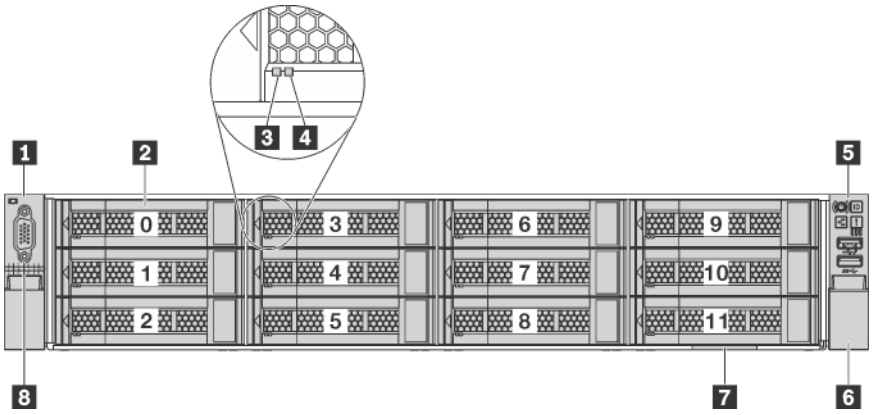


Figure 7. Front view of server models with twelve 3.5-inch drive bays

Table 3. Components on the front of server models with 3.5-inch drive bays

1 Rack latch (left)	2 3.5-inch drive bays
3 Drive activity LED	4 Drive status LED
5 Front I/O assembly	6 Rack latch (right)
7 Pull-out information tab	8 VGA connector (optional)

1 6 Rack latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas. For more information, refer to the *Rack Installation Guide* that comes with your rail kit.

2 3.5-inch drive bays

The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive fillers.

3 Drive activity LED

4 Drive status LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
Drive status LED	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.
Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

5 Front I/O assembly

For information about the controls, connectors, and status LEDs on the front I/O assembly, see “Front I/O assembly” on page 18.

7 Pull-out information tab

The Lenovo XClarity Controller network access label of the server is attached on the pull-out information tab.

8 VGA connector (optional)

Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

Front I/O assembly

The front I/O assembly of the server provides controls, connectors, and LEDs. The front I/O assembly varies by model.

The following illustrations show the controls, connectors, and LEDs on the front I/O assembly of the server. To locate the front I/O assembly, see “Front view” on page 15.

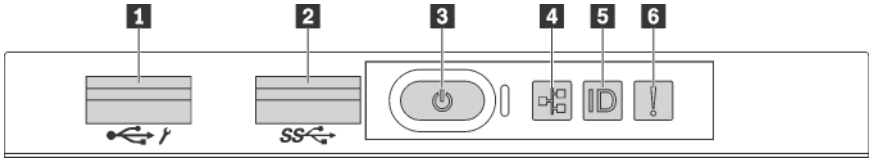


Figure 8. Front I/O assembly for server models with eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, and sixteen 2.5-inch-drive bays

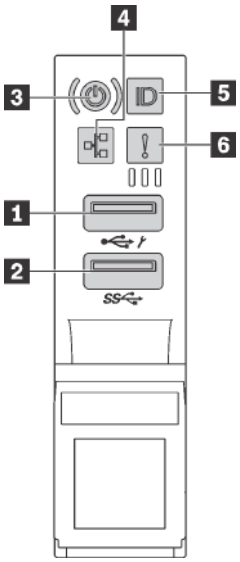


Figure 9. Front I/O assembly for server models with twelve 3.5-inch-drive bays

Table 4. Components on the front I/O assembly

1 XClarity Controller USB connector	2 USB 3.0 connector
3 Power button with power status LED	4 Network activity LED
5 System ID button with system ID LED	6 System error LED

1 XClarity Controller USB connector

Depending on the setting, this connector supports USB 2.0 function, XClarity Controller management function, or both.

- If the connector is set for USB 2.0 function, you can attach a device that requires a USB 2.0 connection, such as a keyboard, a mouse, or a USB storage device.
- If the connector is set for XClarity Controller management function, you can attach a mobile device installed with the application to run XClarity Controller event logs.
- If the connector is set to have both functions, you can press the system ID button for three seconds to switch between the two functions.

2 USB 3.0 connector

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

3 Power button with power status LED

You can press the power button to turn on the server when you finish setting up the server. You also can hold the power button for several seconds to turn off the server if you cannot turn off the server from the operating system. The power status LED helps you to determine the current power status.

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

Compatibility of the NIC LED and the network activity LED

NIC adapter	Network activity LED
LOM adapter	Support
ML2 NIC adapter	Support
PCIE NIC adapter	Not support

4 Network activity LED

The network activity LED on the front I/O assembly helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

5 System ID button with system ID LED

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

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

6 System error LED

The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power.	Check the event log to determine the exact cause of the error. For information about troubleshooting, see “Troubleshooting by symptom” on page 178.
Off	None	The server is off or the server is on and is working correctly.	None.

Rear view

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

The following illustrations show the rear view of the server.

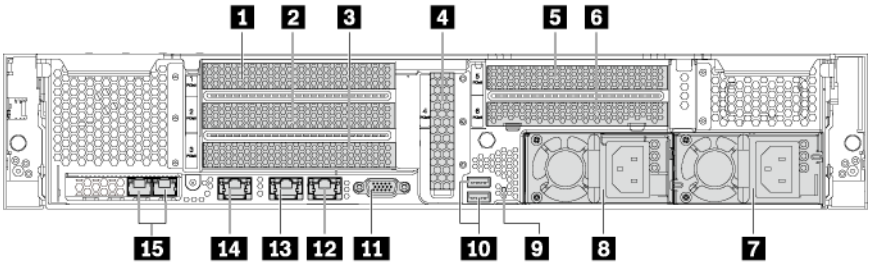


Figure 10. Rear view of server models with six PCIe slots

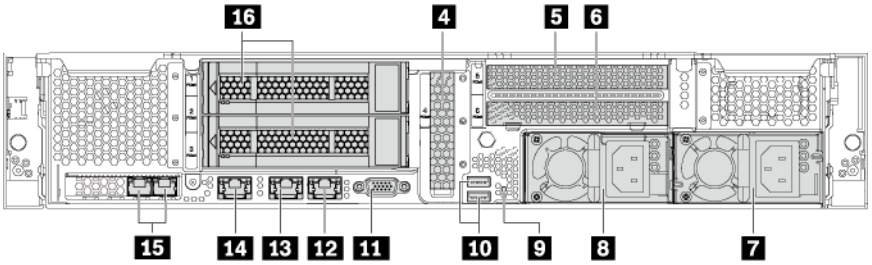


Figure 11. Rear view of server models with two rear drive bays and three PCIe slots

Table 5. Components on the rear of the server

1 PCIe slot 1	2 PCIe slot 2
3 PCIe slot 3	4 PCIe slot 4
5 PCIe slot 5	6 PCIe slot 6
7 Power supply 2 (available on some models)	8 Power supply 1
9 NMI button	10 USB 3.0 connectors
11 VGA connector	12 1Gb Ethernet connector 2 (RJ-45)
13 1Gb Ethernet connector 1 (RJ-45)	14 XClarity Controller network connector
15 Ethernet connectors on the LOM adapter	16 Rear 3.5-inch drive bays

1 2 3 4 5 6 PCIe slots

You can find the PCIe slot numbers on the rear view of the chassis.

Notes:

- Your server supports PCIe slot 5 when two processors are installed.
- PCIe slot 6 does not support PCIe adapters with external mini-SAS HD connectors.
- Only use PCIe adapters provided by Lenovo. Lenovo makes no warranty regarding non-Lenovo products or services. For a list of supported PCIe adapters, see: http://www.lenovo.com/us/en/serverproven/.

- When installing Ethernet adapters with RJ-45 connectors, follow below installation sequence:

  Table 6. Installation sequence of Ethernet adapters with RJ-45 connectors

Number of installed processor	PCIe slot
One processor	4, 2, 6, 3, 1
Two processors	4, 2, 6, 3, 5, 1

PCIe adapter slots 1, 2, and 3 on riser 1 assembly:
Your server supports three types of riser cards for riser 1 assembly.

- Type 1
  - Slot 1: PCIe x16 (x8, x4, x1), full-height, half-length
  - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length
  - Slot 3: PCIe x16 (x8, x4, x1), full-height, half-length
- Type 2
  - Slot 1: PCIe x16 (x8, x4, x1), full-height, half-length
  - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length
  - Slot 3: ML2 x8 (x8, x4, x1), full-height, half-length
- Type 3
  - Slot 1: PCIe x16 (x16, x8, x4, x1), full-height, half-length
  - Slot 2: Not available
  - Slot 3: PCIe x16 (x8, x4, x1), full-height, half-length

PCIe adapter slot 4 on system board: PCIe x8 (x8, x4, x1), low-profile

PCIe adapter slots 5 and 6 on riser 2 assembly:

- Slot 5: PCIe x16 (x16, x8, x4, x1), full-height, half-length,
- Slot 6: PCIe x16 (x8, x4, x1), full-height, half-length

7 Power supply 2 (available on some models)

8 Power supply 1

The hot-swap redundant power supplies help you avoid significant interruption to the operation of the system when a power supply fails. You can purchase a power supply option from Lenovo and install the power supply to provide power redundancy without turning off the server. On each power supply, there are three status LEDs near the power cord connector. For information about the status LEDs, see “Rear view LEDs” on page 24.

9 NMI button

Press this button to force a nonmaskable interrupt (NMI) to the processor. By this way, you can blue screen the server and take a memory dump. You might have to use a pen or the end of a straightened paper clip to press the button.

10 USB 3.0 connectors

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

11 VGA connector

Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

12 Ethernet connector 2

13 Ethernet connector 1

Used to attach an Ethernet cable for a LAN. The Ethernet connector has two status LEDs to help you identify the Ethernet connectivity and activity. See “Rear view LEDs” on page 24.

Ethernet connector 1 can be set as XClarity Controller network connector. To set Ethernet connector 1 as XClarity Controller network connector, start Setup utility, go to **BMC Settings → Network Settings → Network Interface Port** and select **Shared**. Then, go to **Shared NIC on** and select **Onboard Port 1**.

14 XClarity Controller network connector

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

15 Ethernet connectors on the LOM adapter

The LOM adapter provides two extra Ethernet connectors for network connections.

The left Ethernet connector on the LOM adapter can be set as XClarity Controller network connector. To set the Ethernet connector as XClarity Controller network connector, start Setup utility, go to **BMC Settings → Network Settings → Network Interface Port** and select **Shared**. Then, go to **Shared NIC on** and select **PHY Card**.

16 Rear 3.5-inch drive bays

Used to install up to two hot-swap drives on the rear of the server. The rear drive bays are available only on the twelve 3.5-inch-drive server model.

The number of the installed drives in your server varies by model. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

Rear view LEDs

There are several LEDs on the rear of the server.

The following illustration shows the LEDs on the rear view of server models without the rear hot-swap drive assembly. The LEDs on the rear view of server models with the rear hot-swap drive assembly are the same.

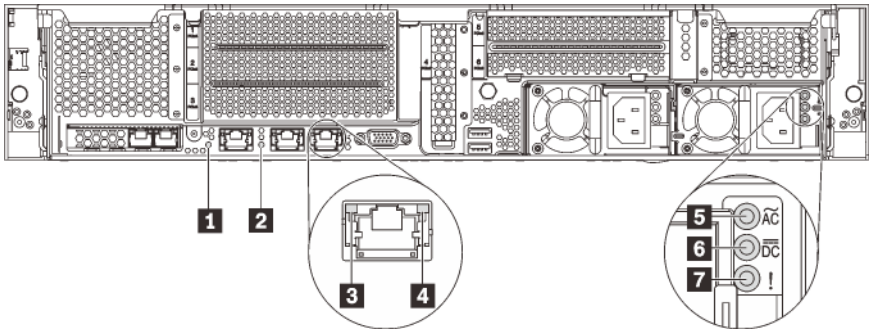


Figure 12. LEDs on the rear of the server

Table 7. LEDs on the rear of the server

1 System ID LED	2 System error LED
3 Ethernet link LED	4 Ethernet activity LED
5 Power input LED	6 Power output LED
7 Power supply error LED	

1 System ID LED

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

2 System error LED

For the detailed information, see “Front I/O assembly” on page 18.

3 Ethernet link LED

4 Ethernet activity LED

Each Ethernet connector has two status LEDs.

Ethernet status LED	Color	Status	Description
3 Ethernet link LED	Green	On	Network link is established.
	None	Off	Network link is disconnected.
4 Ethernet activity LED	Green	Blinking	Network link is connected and active.
	None	Off	The server is disconnected from a LAN.

5 Power input LED

6 Power output LED

7 Power supply error LED

Each hot-swap power supply has three status LEDs.

LED	Description
5 Power input LED	• Green: The power supply is connected to the ac power source. • Off: The power supply is disconnected from the ac power source or a power problem occurs.
6 Power output LED	• Green: The server is on and the power supply is working normally. • Blinking green: The power supply is in the zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers the entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the system. To disable zero-output mode, start the Setup utility, go to **System Settings → Power → Zero Output** and select **Disable**. If you disable the zero-out mode, both power supplies will be in the active state. • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply.
7 Power supply error LED	• Yellow: The power supply has failed. To resolve the issue, replace the power supply. • Off: The power supply is working normally

System board components

The illustration in this section shows the component locations on the system board.

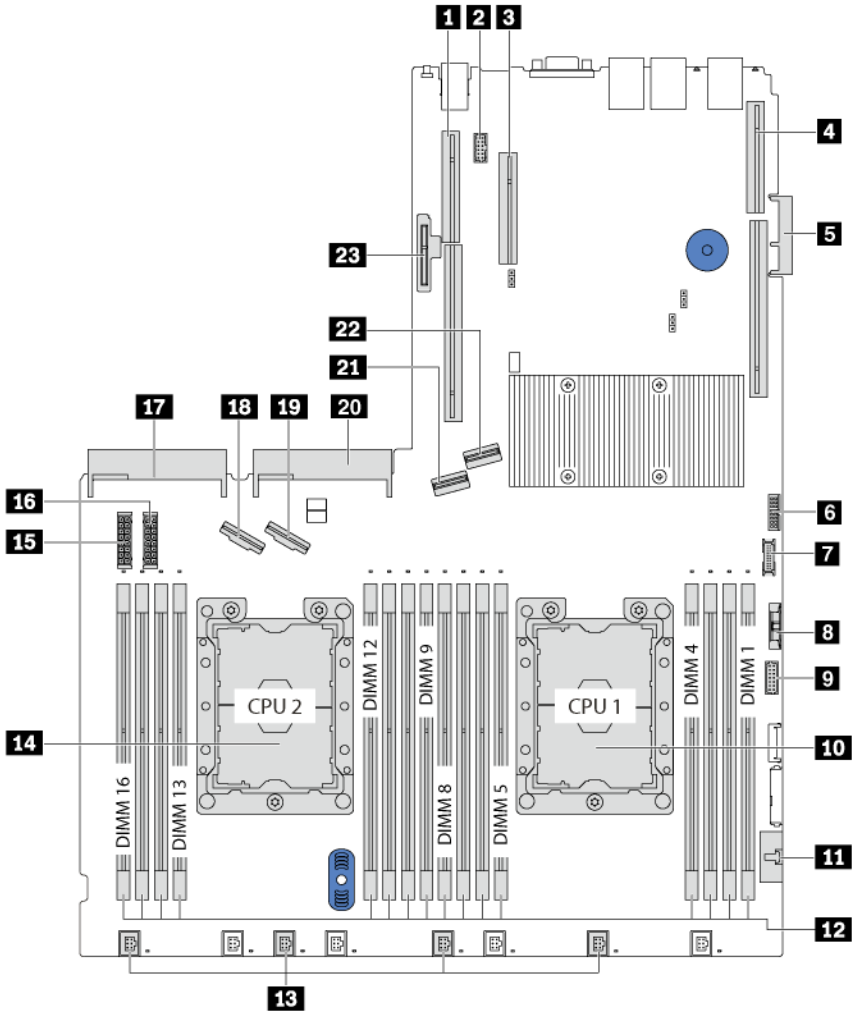


Figure 13. System board components

Table 8. Components on the system board

1 Riser 2 slot	2 Serial-port-module connector
3 PCIe slot 4	4 Riser 1 slot
5 LOM adapter connector	6 TCM[1]/TPM[2] connector (for Chinese Mainland only)
7 Front USB connector	8 CMOS battery
9 Front VGA connector	10 Processor 1 socket
11 Operator-information-panel connector	12 DIMM slots (16)
13 System fan connectors (4)	14 Processor 2 socket
15 Backplane power connector 1	16 Backplane power connector 2

Table 8. Components on the system board (continued)

17 Power supply 2 connector	18 NVMe 2–3 connector
19 NVMe 0–1 connector	20 Power supply 1 connector
21 SATA 4-7 connector	22 SATA 0-3 connector
23 M.2 module slot (SATA/PCIe slot 7)	

Notes:

- [1] Trusted Cryptography Module
- [2] Trusted Platform Module

System board LEDs

The illustration in this section shows the LEDs on the system board.

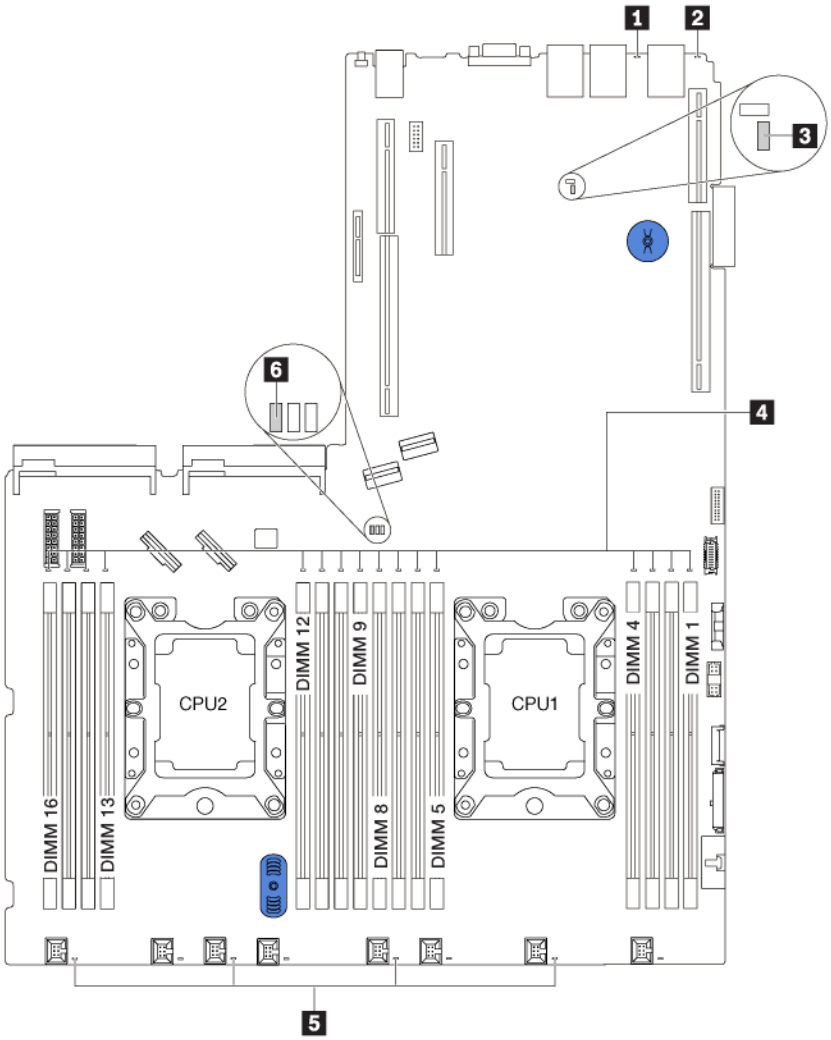


Figure 14. System board LEDs

1 System error LED	2 System ID LED
3 XClarity Controller heartbeat LED	4 DIMM error LEDs
5 System fan error LEDs	6 System power LED

System board jumpers

The following illustration shows the jumpers on the system board of your server.

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

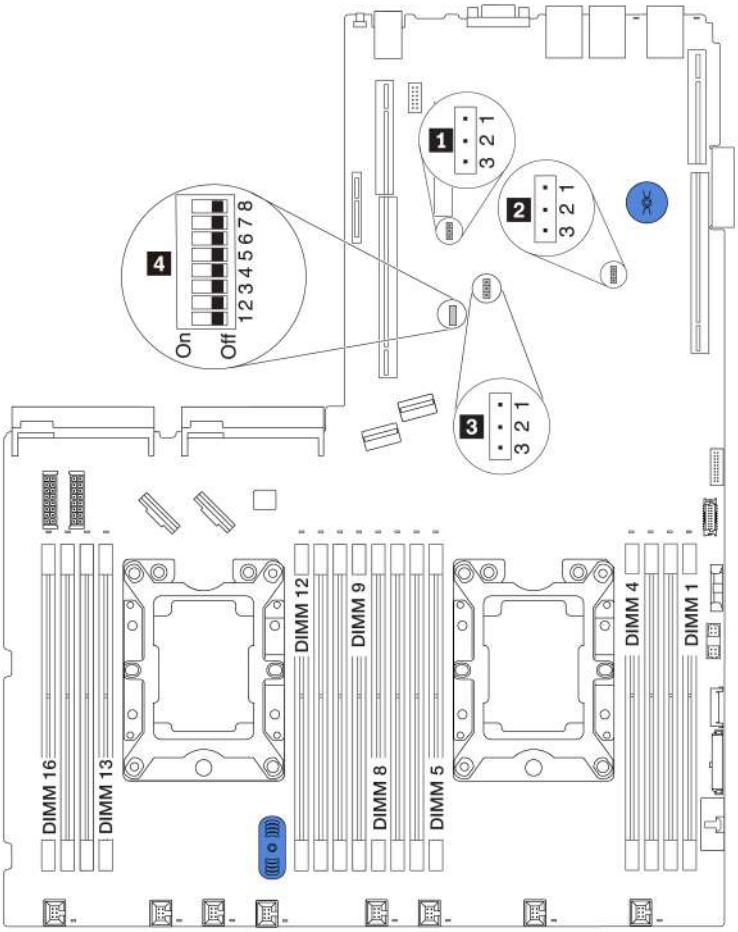


Figure 15. System board jumpers

Table 9. Jumper description

Jumper / Switch name	Jumper / Switch number	Jumper / Switch setting
1 TPM/TCM physical presence jumper	JP6	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: TPM/TCM physical presence is asserted.
2 Clear CMOS jumper	JP3	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Clear the real-time clock (RTC) registry.
3 SW6 switch block	JP8	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Enable Flash security override. **Note:** For debug only.
4 SW6 switch block	SW6 (including switches 1, 2, 3, 4, 5, 6, 7, and 8)	All the switches are in the Off position by default. • Switches 1, 6, and 8: Reserved. • Switch 2: Override power-on password switch. Changing position of this switch overrides the power-on password. Changing position of this switch does not affect the administrator password.
4 Power permission	SW6-7	The default position is Off. Changing this switch to the On position enables Power On.
4 Force XCC reset	SW6-4	The default position is Off. Changing this switch to the On position reset the Lenovo XClarity Controller.
4 Boot backup UEFI	SW6-5	The default position is Off. Changing this switch to the On position forces the tower server to boot from the backup UEFI image.
4 Force XCC update	SW6-3	The default position is Off. Changing this switch to the On position force the Lenovo XClarity.

Important:

- Before you move any jumpers, power off the server; then, disconnect all power cords and external cables. Do not open your server or attempt any repair before reading and understanding the following information:
  - http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - “Handling static-sensitive devices” on page 55
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

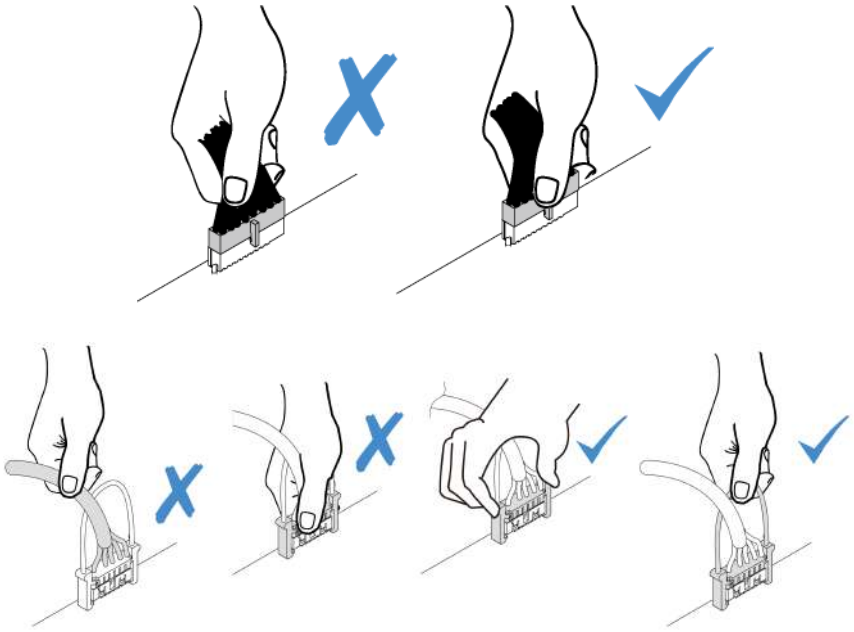
Internal cable routing

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

To connect cables, observe the following guidelines:

- Turn off 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.



VGA connector

Use the section to understand the cable routing for the VGA connector on the left rack latch.

Note: The VGA connector is available on some models.

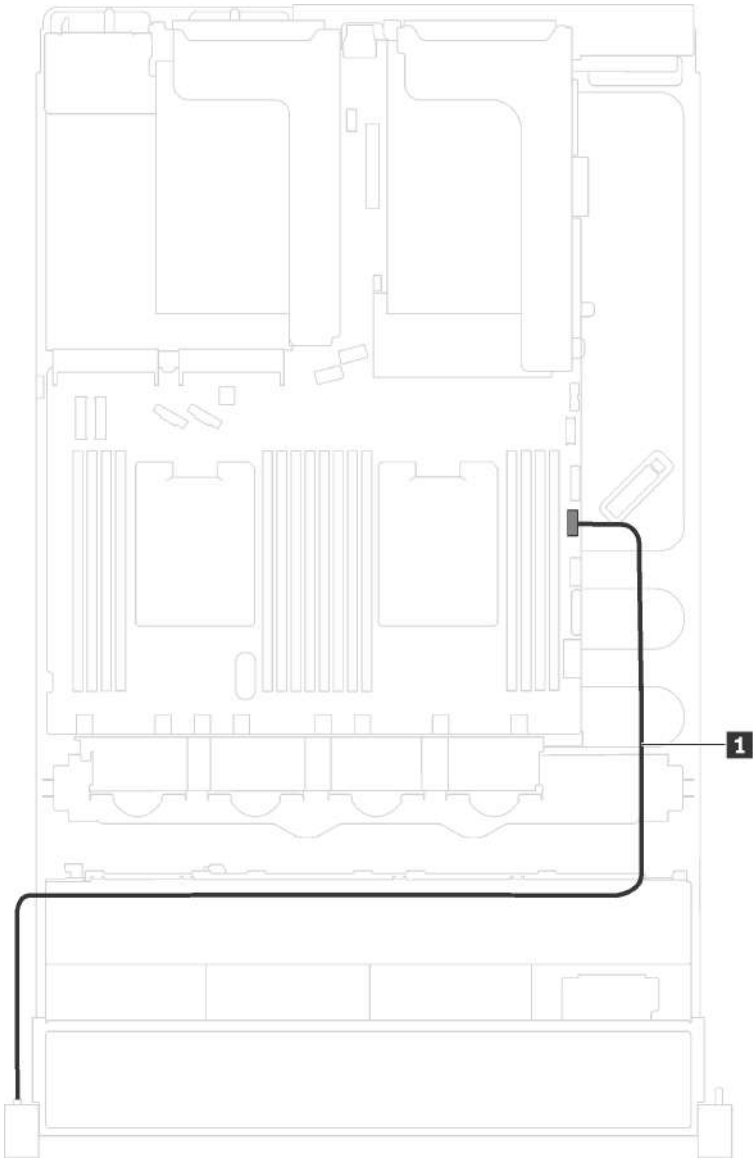


Figure 16. VGA connector cable routing

From	To
VGA cable on the left rack latch	Front VGA connector on the system board

Front I/O assembly

Use the section to understand the cable routing for the front I/O assembly.

Front I/O assembly on the chassis

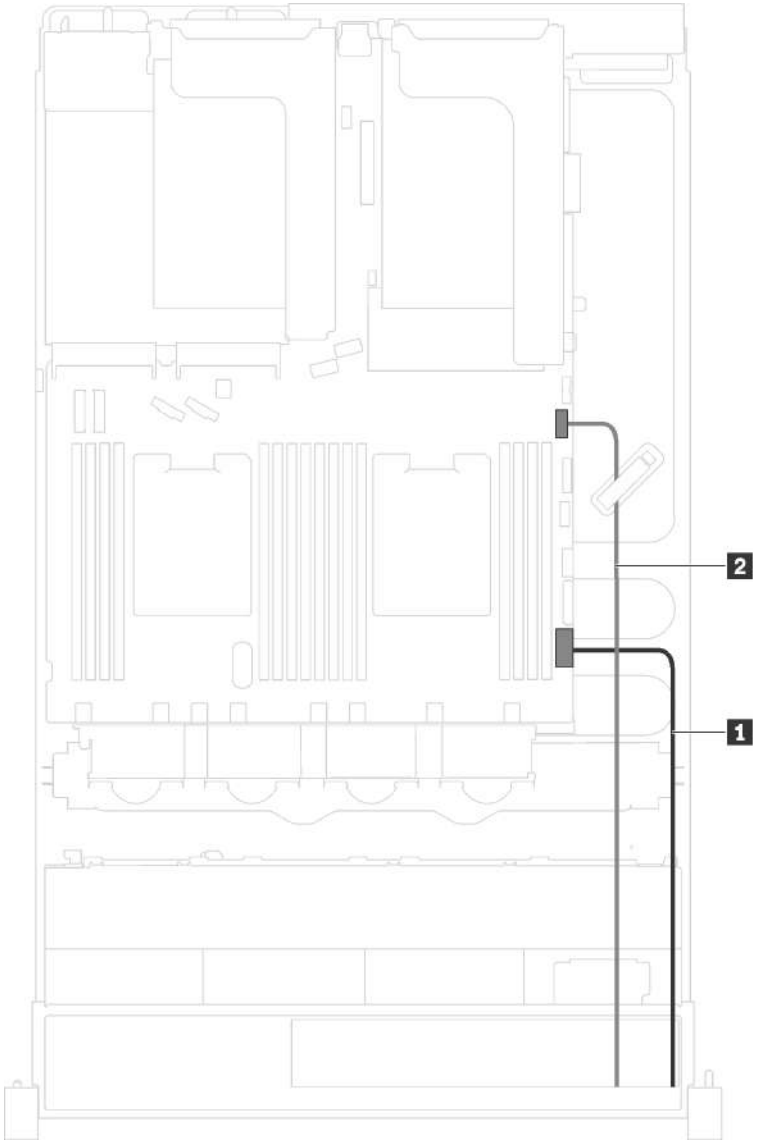


Figure 17. Cable routing for the front I/O assembly on the chassis

From	To
1 Operator-information-panel cable	Operator-information-panel connector on the system board
2 Front USB cable	Front USB connector on the system board

Front I/O assembly on the right rack latch

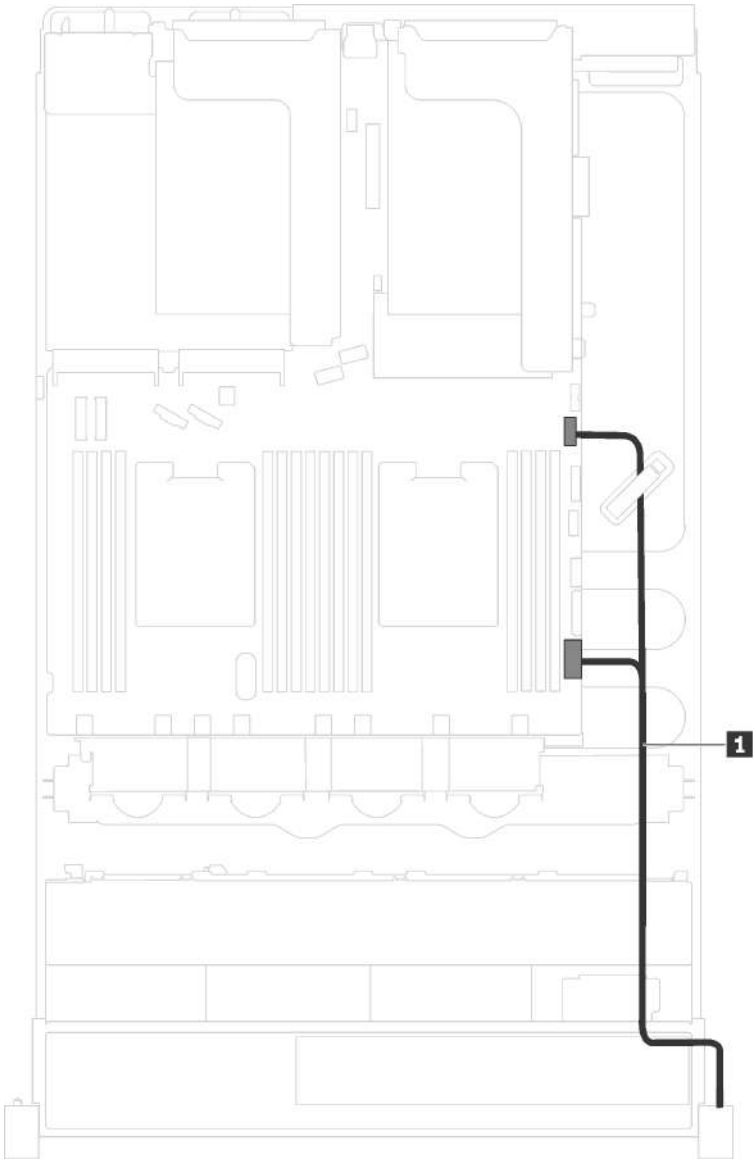


Figure 18. Cable routing for the front I/O assembly on the right rack latch

From	To
Front-I/O-assembly cable	Operator-information-panel connector and front USB connector on the system board

Backplane

Use the section to understand the cable routing for backplanes.

This topic contains the following information:

- “Server models with eight 2.5-inch drives” on page 38
- “Server models with sixteen 2.5-inch drives” on page 40
- “Server models with eight 3.5-inch drives” on page 43
- “Server models with twelve 3.5-inch drives” on page 44

Server models with eight 2.5-inch drives

Use this section to understand the cable routing for server models with eight 2.5-inch drives.

Server model: eight 2.5-inch SAS/SATA drives, one 8i RAID/HBA adapter

Note: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. In both scenarios, the cable connections are the same.

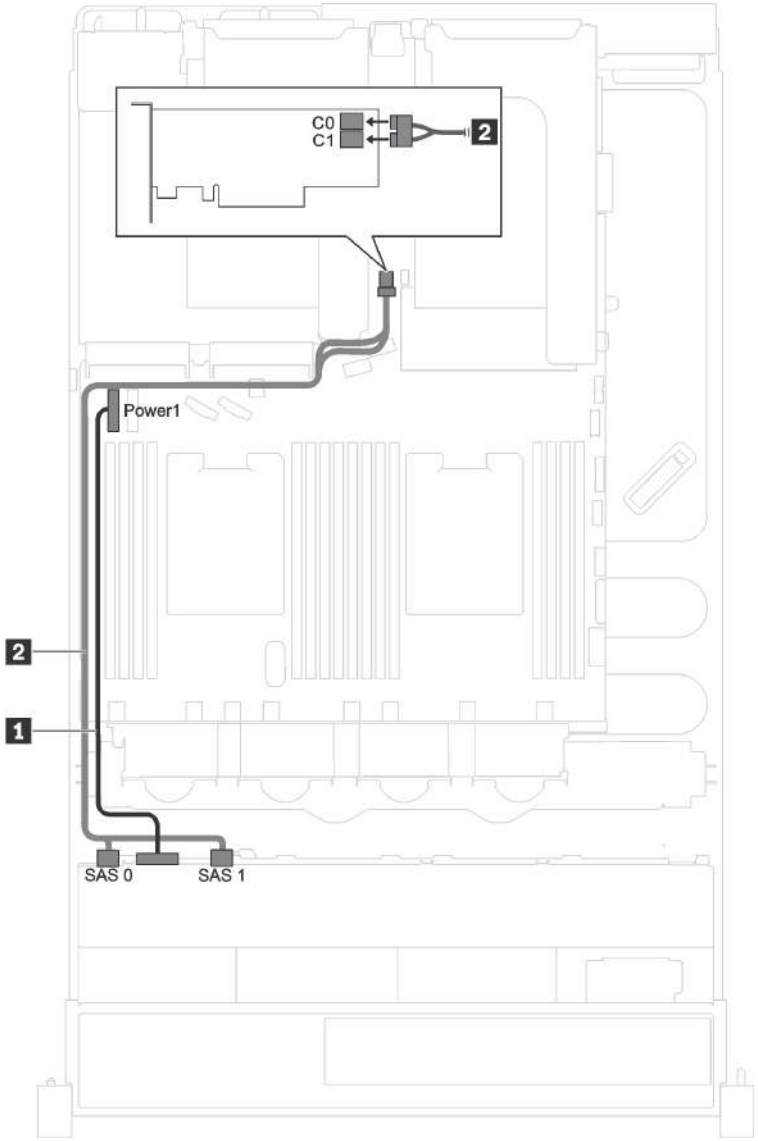


Figure 19. Cable routing for server models with eight 2.5-inch SAS/SATA drives and one 8i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0 and SAS 1 connectors on the backplane	C0 and C1 connectors on the 8i RAID/HBA adapter

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 8i RAID/HBA adapter

Note: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. In both scenarios, the cable connections are the same.

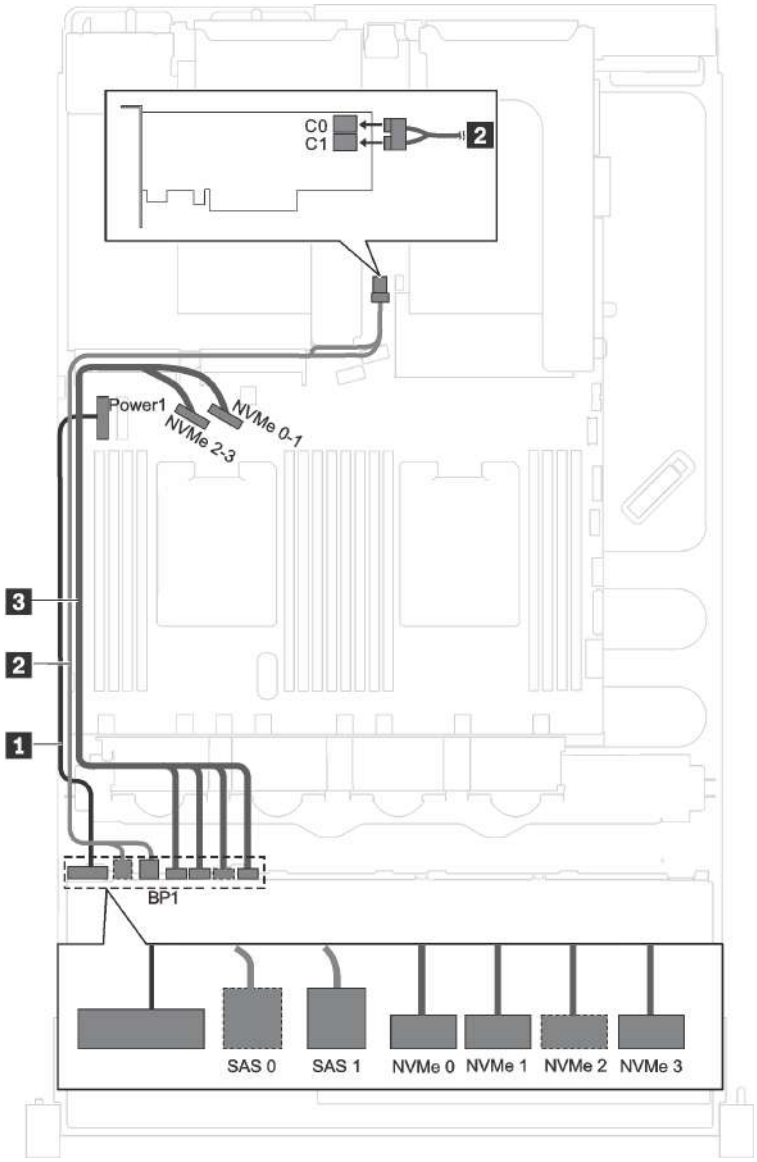


Figure 20. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 8i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0 and SAS 1 connectors on the backplane	C0 and C1 connectors on the 8i RAID/HBA adapter
3 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and 2–3 connectors on the system board

Server models with sixteen 2.5-inch drives

Use this section to understand the cable routing for server models with sixteen 2.5-inch drives.

Server model: sixteen 2.5-inch SAS/SATA drives, two 8i RAID/HBA adapters

Note: The following illustrations are based on the scenario that one RAID/HBA adapter is installed in PCIe slot 4 on the system board and the other one is installed in PCIe slot 1 on riser 1. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapters will be installed in PCIe slot 1 and PCIe slot 2 on riser 1. In both scenarios, the cable connections are the same.

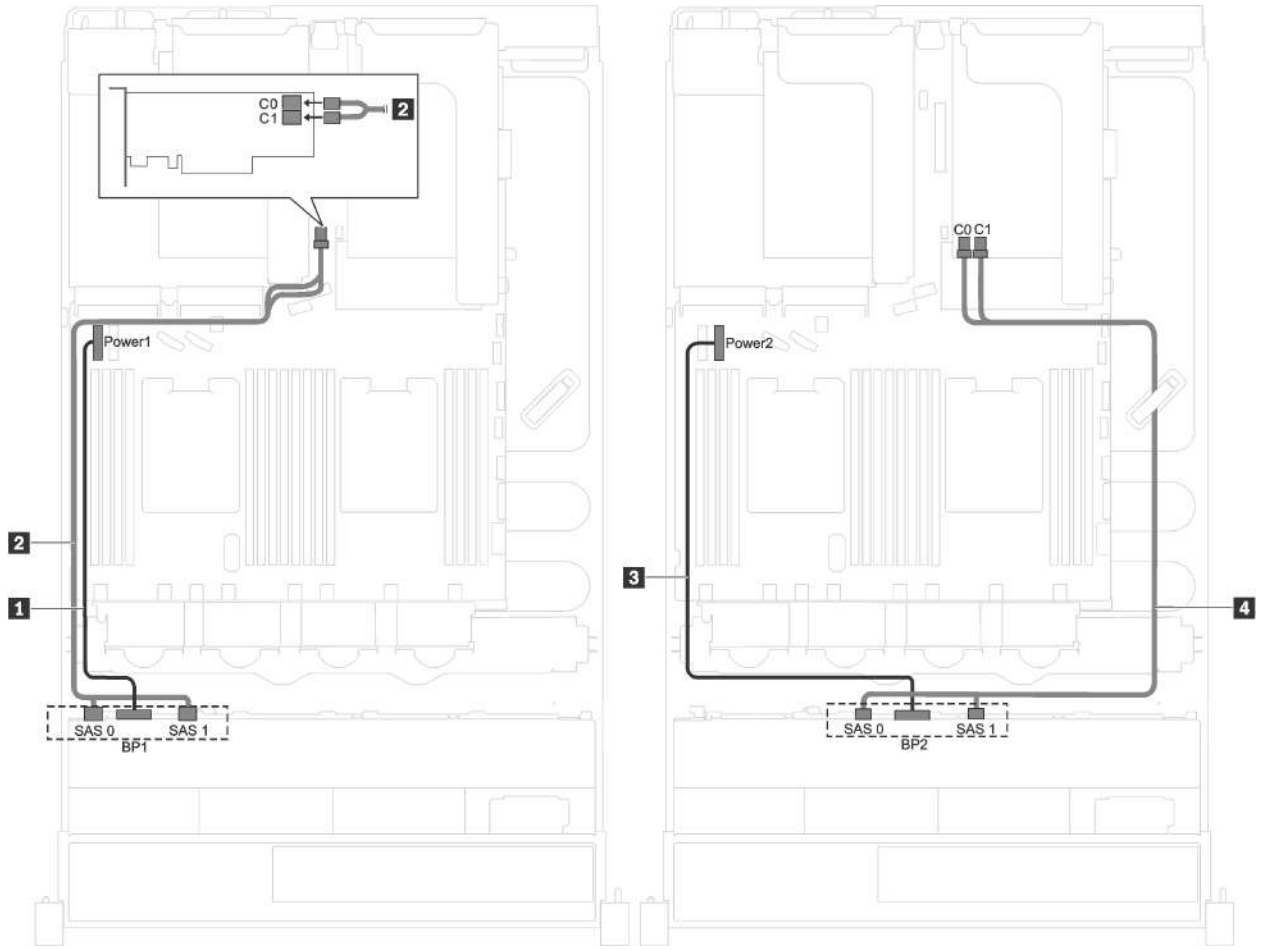


Figure 21. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives and two 8i RAID/HBA adapters

Cable	From	To
1 Power cable for backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for backplane 1	SAS 0 and SAS 1 connectors on backplane 1	C0 and C1 connectors on the 8i RAID/HBA adapter installed in PCIe slot 4
3 Power cable for backplane 2	Power connector on backplane 2	Backplane power connector 2 on the system board
4 SAS signal cable for backplane 2	SAS 0 and SAS 1 connectors on backplane 2	C0 and C1 connectors on the 8i RAID/HBA adapter installed in PCIe slot 1

Server model: sixteen 2.5-inch SAS/SATA drives, one 16i RAID/HBA adapter

Note: The following illustrations are based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. In both scenarios, the cable connections are the same.

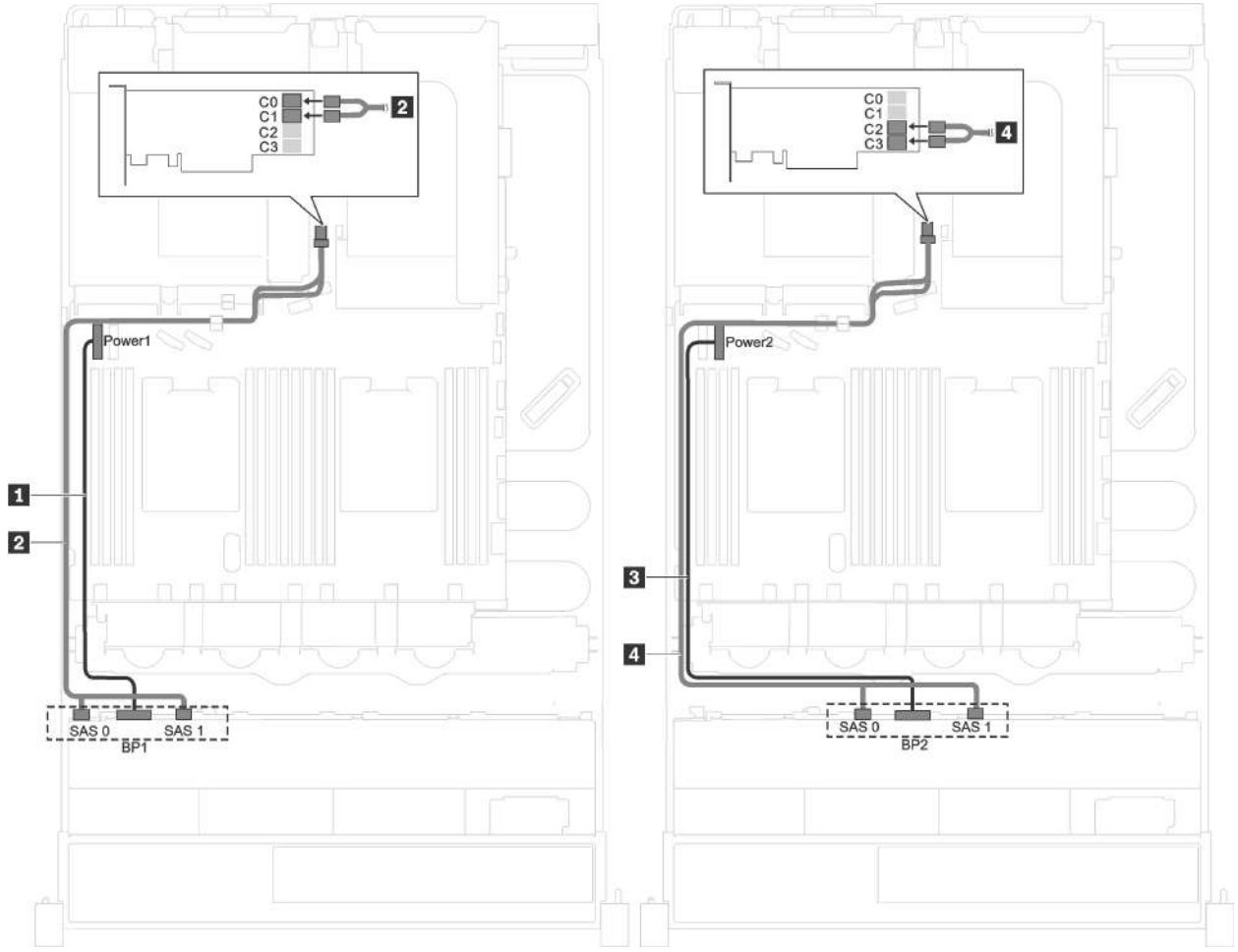


Figure 22. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives and one 16i RAID/HBA adapter

Cable	From	To
1 Power cable for backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for backplane 1	SAS 0 and SAS 1 connectors on backplane 1	C0 and C1 connectors on the 16i RAID/HBA adapter
3 Power cable for backplane 2	Power connector on backplane 2	Backplane power connector 2 on the system board
4 SAS signal cable for backplane 2	SAS 0 and SAS 1 connectors on backplane 2	C2 and C3 connectors on the 16i RAID/HBA adapter

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 16i RAID/HBA adapter

Note: The following illustrations are based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. In both scenarios, the cable connections are the same.

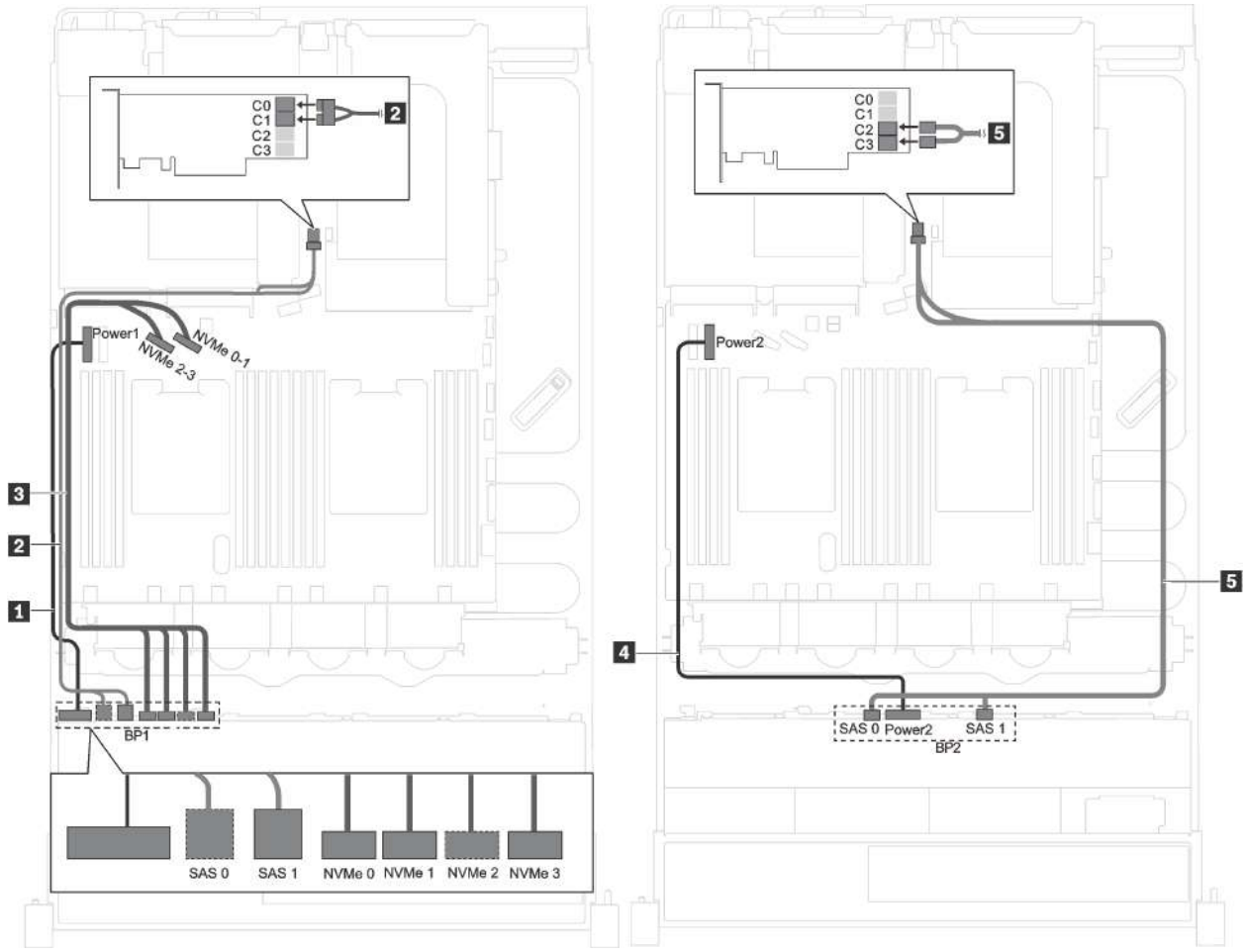


Figure 23. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 16i RAID/HBA adapter

Cable	From	To
1 Power cable for backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for backplane 1	SAS 0 and SAS 1 connectors on backplane 1	C0 and C1 connectors on the 16i RAID/HBA adapter
3 NVMe signal cable for backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 Power cable for backplane 2	Power connector on backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for backplane 2	SAS 0 and SAS 1 connectors on backplane 2	C2 and C3 connectors on the 16i RAID/HBA adapter

Server models with eight 3.5-inch drives

Use this section to understand the cable routing for server models with eight 3.5-inch drives.

Server model: eight 3.5-inch hot-swap drives, one 8i RAID/HBA adapter

Note: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. In both scenarios, the cable connections are the same.

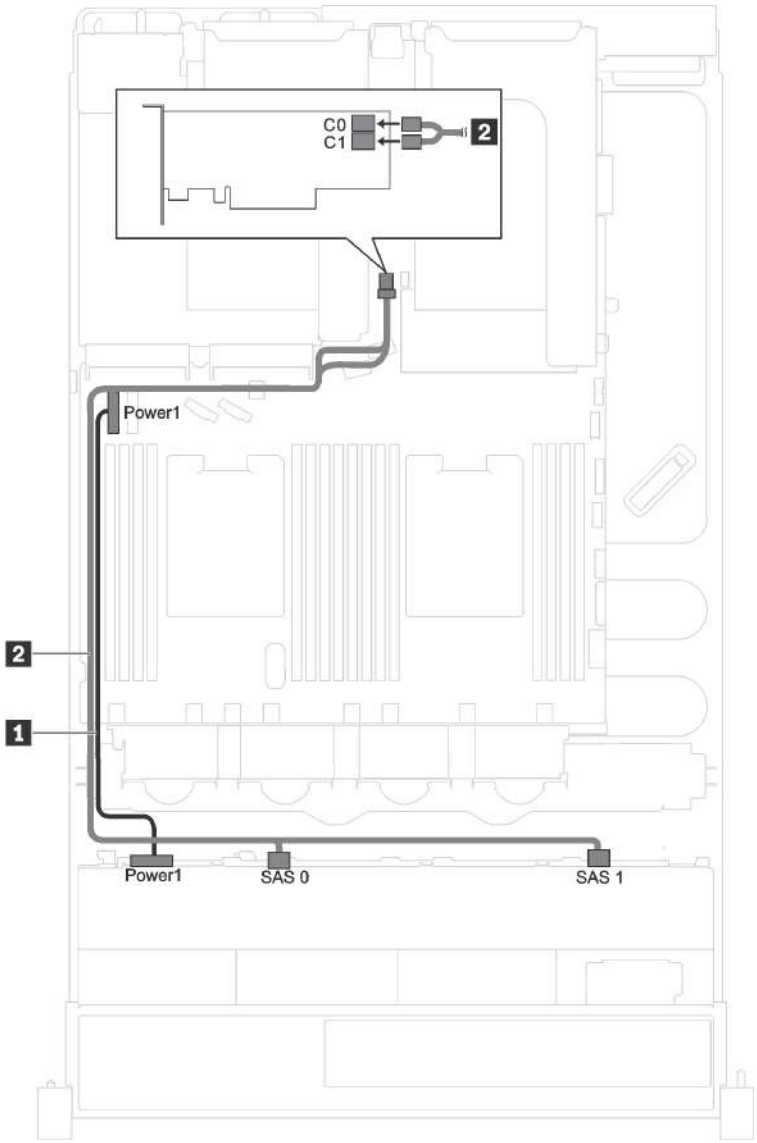


Figure 24. Cable routing for server models with eight 3.5-inch hot-swap drives and one 8i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0 and SAS 1 connectors on the backplane	C0 and C1 connectors on the 8i RAID/HBA adapter

Server model: eight 3.5-inch simple-swap drives

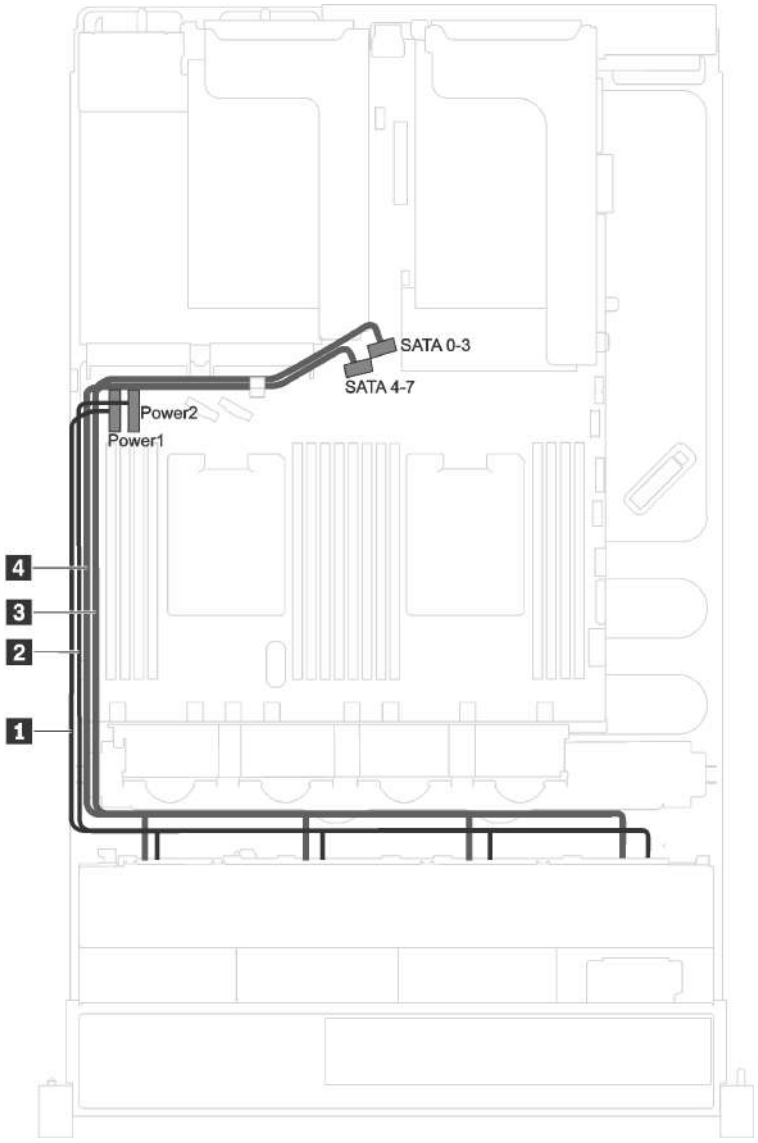


Figure 25. Cable routing for server models with eight 3.5-inch simple-swap drives

The simple-swap drive backplate assembly comes with two power cables and two signal cables. Connect the cables to the system board.

From	To
1 Power cable labeled with 0	Backplane power connector 1 on the system board
2 Power cable labeled with 1	Backplane power connector 2 on the system board
3 Mini-SAS cable labeled with 0	SATA 0-3 connector on the system board
4 Mini-SAS cable labeled with 1	SATA 4-7 connector on the system board

Server models with twelve 3.5-inch drives

Use this section to understand the cable routing for server models with twelve 3.5-inch drives.

Server model: twelve 3.5-inch SAS/SATA drives, one 16i RAID/HBA adapter

Notes: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in:

- PCIe slot 1 on riser 1 if there is no rear hot-swap drive assembly installed
- PCIe slot 6 on riser 2 if there is a rear hot-swap drive assembly installed

For both scenarios, the cable connections are the same.

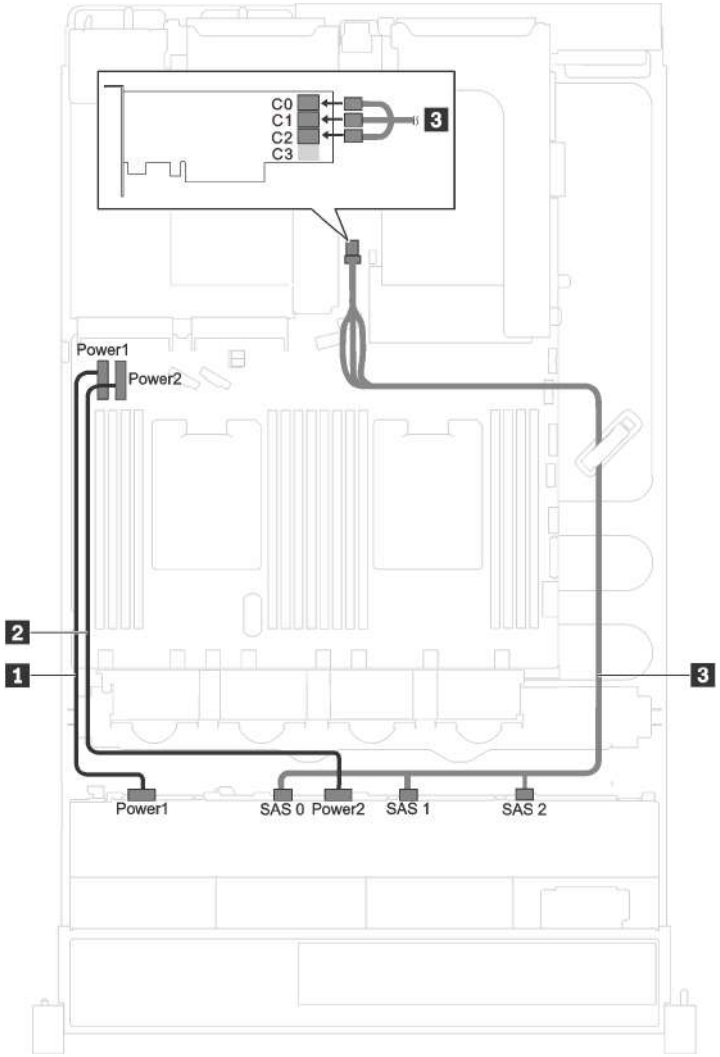


Figure 26. Cable routing for server models with twelve 3.5-inch SAS/SATA drives and one 16i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector 1 on the backplane	Backplane power connector 1 on the system board
2 Power cable	Power connector 2 on the backplane	Backplane power connector 2 on the system board
3 SAS signal cable	SAS 0, SAS 1, and SAS 2 connectors on the backplane	C0, C1, and C2 connectors on the 16i RAID/HBA adapter

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, one 8i RAID/HBA adapter

Note: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in PCIe slot 1 on riser 1. For both scenarios, the cable connections are the same.

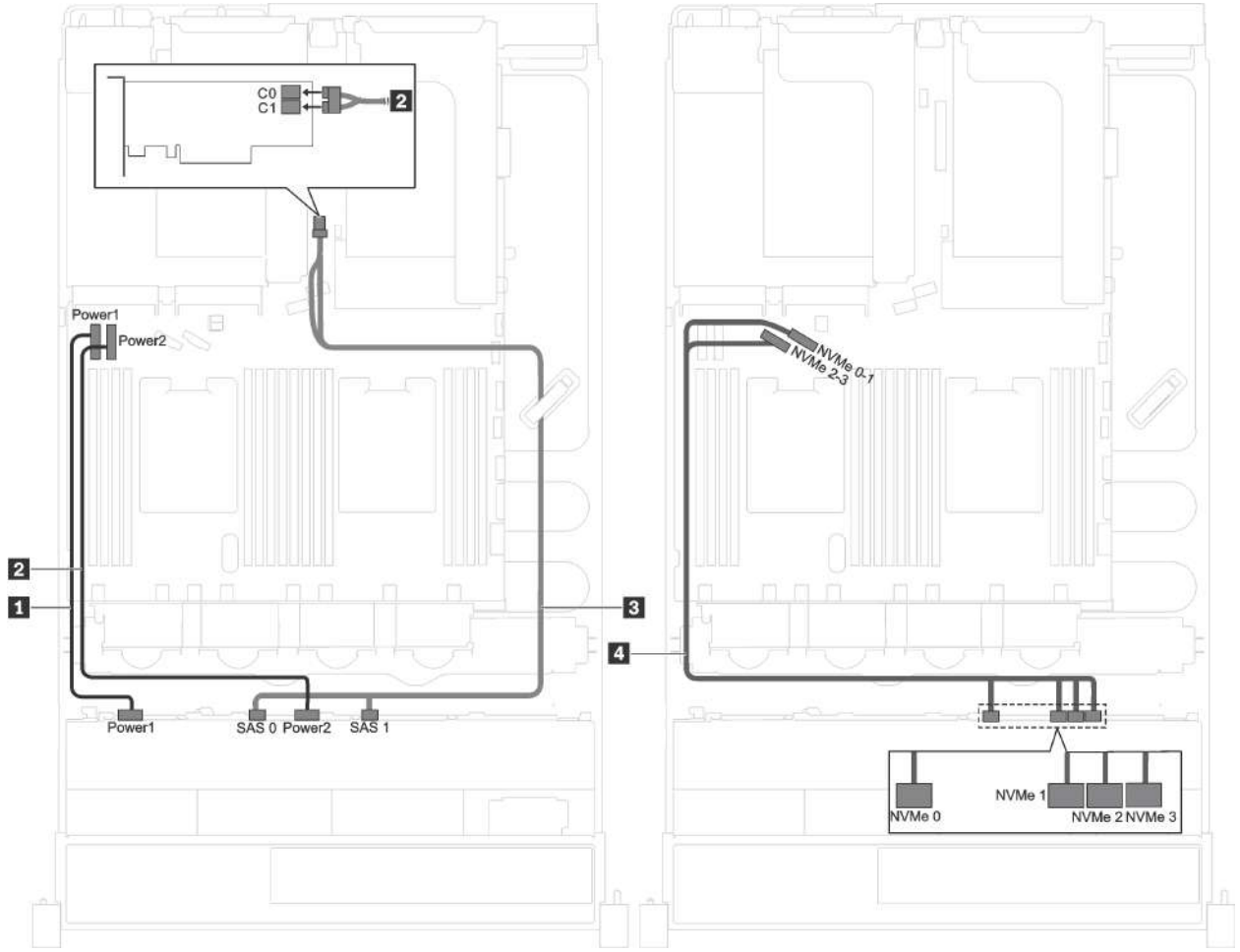


Figure 27. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, and one 8i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector 1 on the backplane	Backplane power connector 1 on the system board
2 Power cable	Power connector 2 on the backplane	Backplane power connector 2 on the system board
3 SAS signal cable	SAS 0 and SAS 1 connectors on the backplane	C0 and C1 connectors on the 8i RAID/HBA adapter
4 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and 2–3 connectors on the system board

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, one 16i RAID/HBA adapter

Notes: The following illustration is based on the scenario that the RAID/HBA adapter is installed in PCIe slot 4 on the system board. If there is a serial port module installed in PCIe slot 4, the RAID/HBA adapter will be installed in:

- PCIe slot 1 on riser 1 if there is no rear hot-swap drive assembly installed
- PCIe slot 6 on riser 2 if there is a rear hot-swap drive assembly installed

For both scenarios, the cable connections are the same.

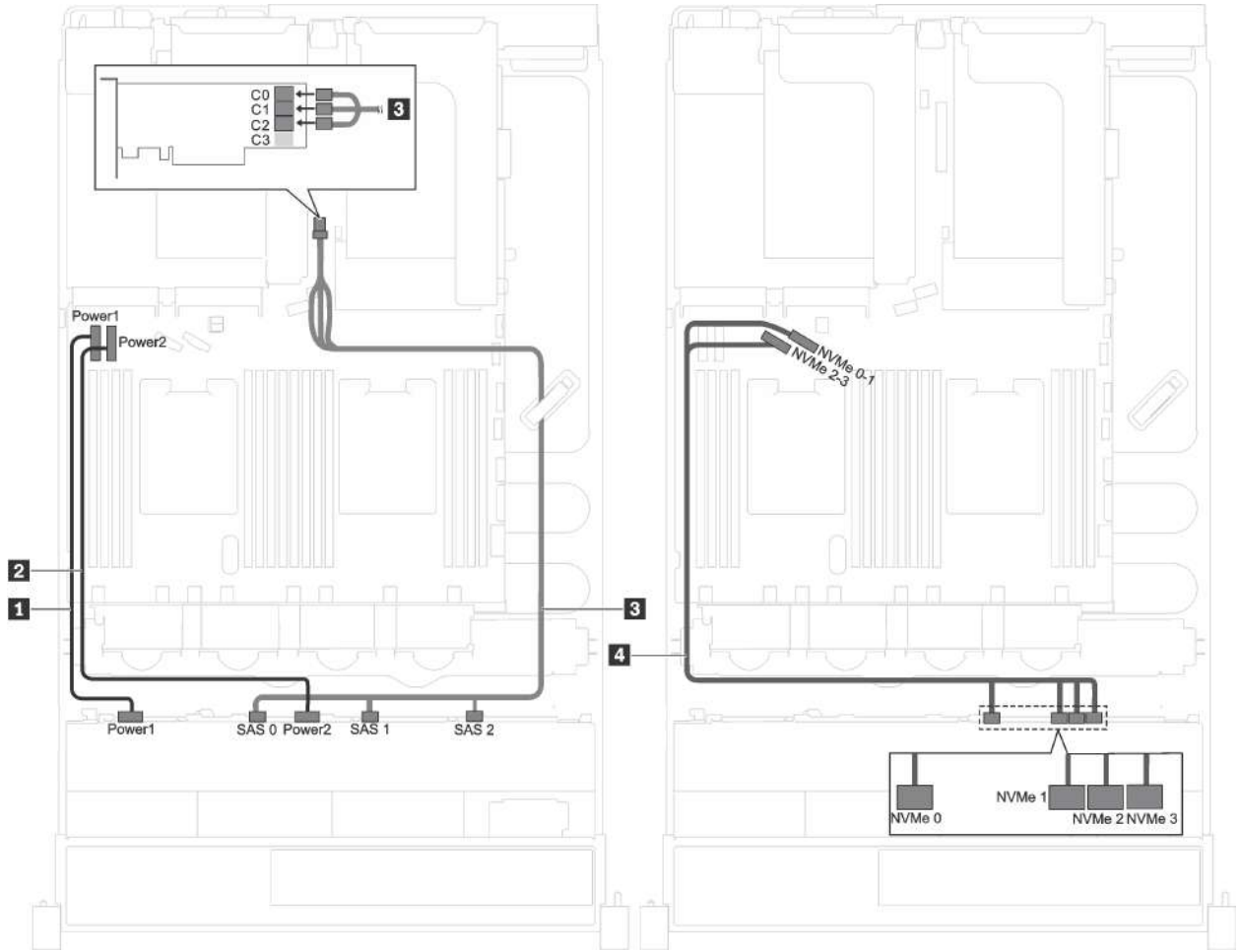


Figure 28. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, and one 16i RAID/HBA adapter

Cable	From	To
1 Power cable	Power connector 1 on the backplane	Backplane power connector 1 on the system board
2 Power cable	Power connector 2 on the backplane	Backplane power connector 2 on the system board

Cable	From	To
3 SAS signal cable	SAS 0, SAS 1, and SAS 2 connectors on the backplane	C0, C1, and C2 connectors on the 16i RAID/HBA adapter
4 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and 2–3 connectors on the system board

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 29 “Server components” on page 49:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr590/7x98/parts

Note: Depending on the model, your server might look slightly different from the following illustration. Some of the components might not be available on your server.

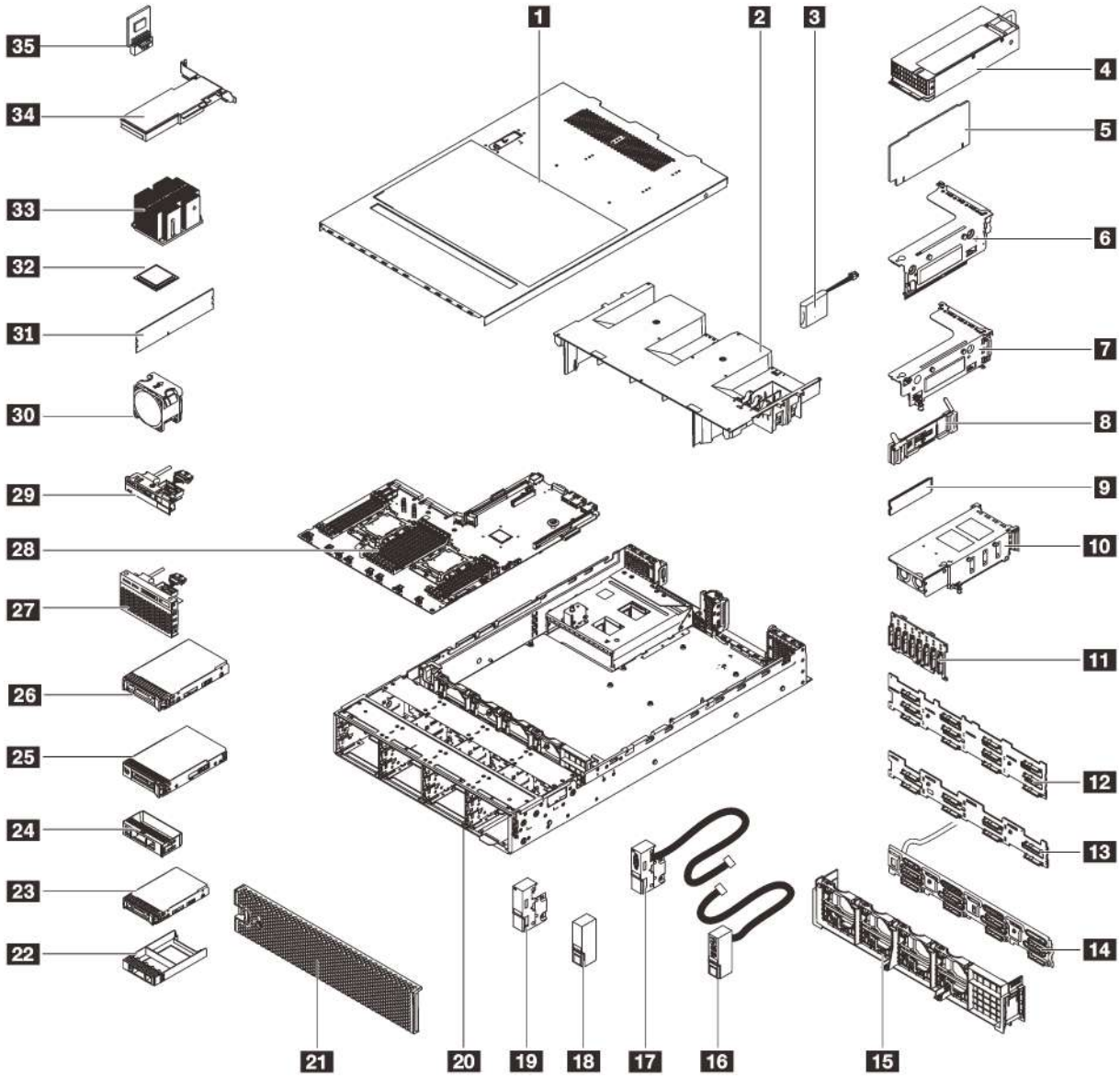


Figure 29. Server components

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 10. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 29 “Server components” on page 49, go to: http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr590/7x98/parts					
1	Top cover	√			
2	Air baffle				√
3	RAID super capacitor module	√			
4	Hot-swap power supply	√			
5	Riser card	√			
6	Riser 2 bracket	√			
7	Riser 1 bracket	√			
8	M.2 backplane	√			
9	M.2 drive	√			
10	Rear hot-swap drive assembly	√			
11	Backplane, eight 2.5-inch hot-swap drives	√			
12	Backplane, twelve 3.5-inch hot-swap drives	√			
13	Backplane, eight 3.5-inch hot-swap drives	√			
14	Simple-swap-drive backplate assembly	√			
15	Fan cage				√
16	Right rack latch, with front I/O assembly	√			
17	Left rack latch, with VGA connector	√			
18	Right rack latch, without front I/O assembly				√
19	Left rack latch, without VGA connector				√
20	Chassis			√	
21	Security bezel	√			
22	Filler, 2.5-inch drive				√
23	Storage drive, 2.5-inch, hot-swap	√			
24	Filler, 3.5-inch drive				√
25	Storage drive, 3.5-inch, simple-swap	√			

Table 10. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
26	Storage drive, 3.5-inch, hot-swap	√			
27	Front I/O assembly, server models with eight or sixteen 2.5-inch drive bays	√			
28	System board			√	
29	Front I/O assembly, server models with eight 3.5-inch drive bays	√			
30	System fan	√			
31	Memory module (DCPMM module might look slightly from the illustration)	√			
32	Processor			√	
33	Processor heat sink			√	
34	PCIe adapter	√			
35	TCM/TPM adapter (for Chinese Mainland only)			√	

Power cords

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

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

1. Go to:

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

2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power → Power Cables** to see all line cords.

Notes:

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

Chapter 3. Hardware replacement procedures

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

For more information about ordering parts:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr590/7x98/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 8.

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
  - The following guidelines are available as well: “Handling static-sensitive devices” on page 55 and “Working inside the server with the power on” on page 54.
- 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 ThinkSystem SR590 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.
- Back up all important data before you make changes related to the disk drives.

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- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

  Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

System reliability guidelines

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

Make sure the following requirements are met:

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

Working inside the server with the power on

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

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

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

Handling static-sensitive devices

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

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

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

Security bezel replacement

Use this information to remove and install the security bezel.

Note: The security bezel is available on some models.

Remove the security bezel

Use this information to remove the security bezel.



"**Read** the installation Guidelines" on page 53

To remove the security bezel, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Use the key to unlock the security bezel to the open position.

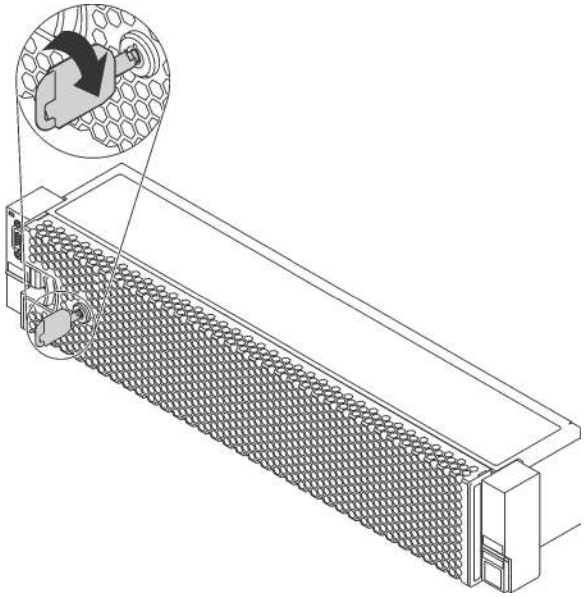


Figure 30. Unlocking the security bezel

Step 2. Press the release latch 1 and pivot the security bezel outward to remove it from the chassis.

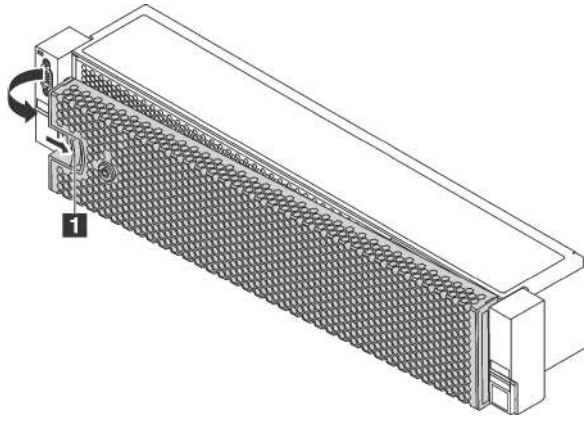


Figure 31. Security bezel removal

Attention: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Install the security bezel

Use this information to install the security bezel.



"**Read** the installation Guidelines" on page 53

Before installing the security bezel, if you have removed the rack latches, reinstall them. See "Install the rack latches" on page 63.

To install the security bezel, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Attention: Before you ship the rack with the server installed, install and lock the security bezel into place.

Step 1. If the key is held inside the security bezel, remove it out of the security bezel.

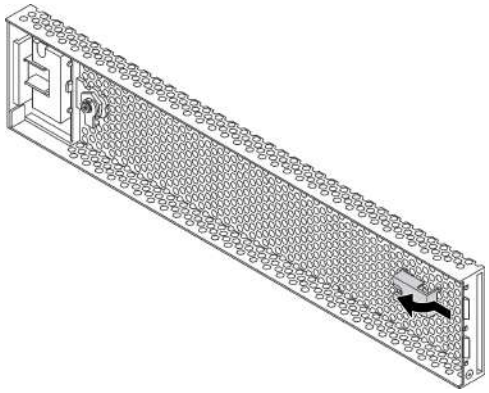


Figure 32. Key removal

Step 2. Carefully insert the tabs on the security bezel into the slots on the right rack latch. Then, press and hold the release latch 1 and pivot the security bezel inward until the other side clicks into place.

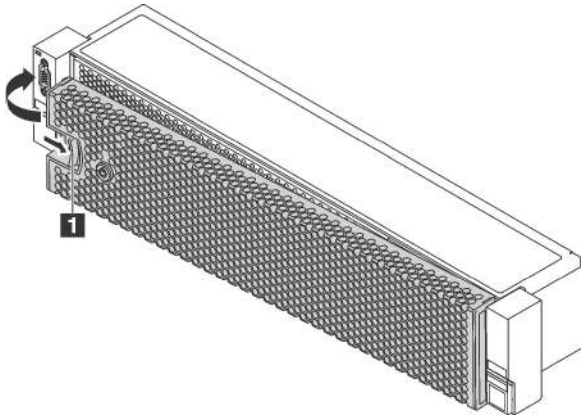


Figure 33. Security bezel installation

Step 3. Use the key to lock the security bezel to the closed position.

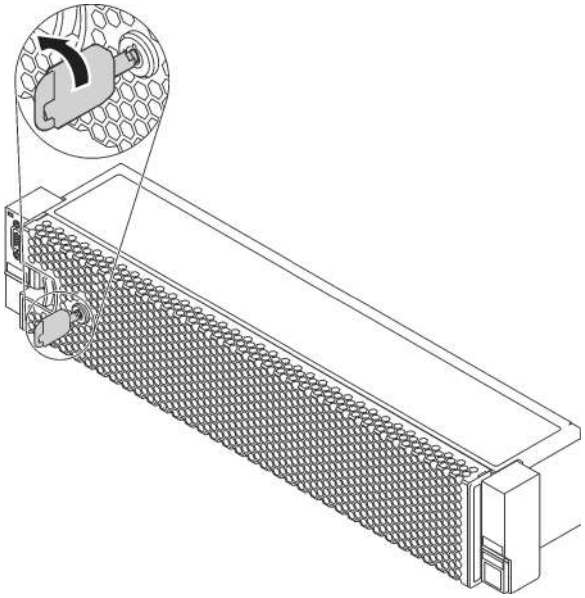


Figure 34. Locking the security bezel

Rack latches replacement

Use this information to remove and install the rack latches.

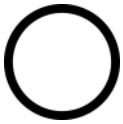
Note: Depending on the model, the left rack latch might be assembled with a VGA connector and the right rack latch might be assembled with the front I/O assembly.

Remove the rack latches

Use this information to remove the rack latches.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Note: If the rack latches are not assembled with a VGA connector or the front I/O assembly, you can remove the rack latches without powering off the server.

Before removing the rack latches:

1. If the server is installed with the security bezel, remove it first. See "Remove the security bezel" on page 56.

2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

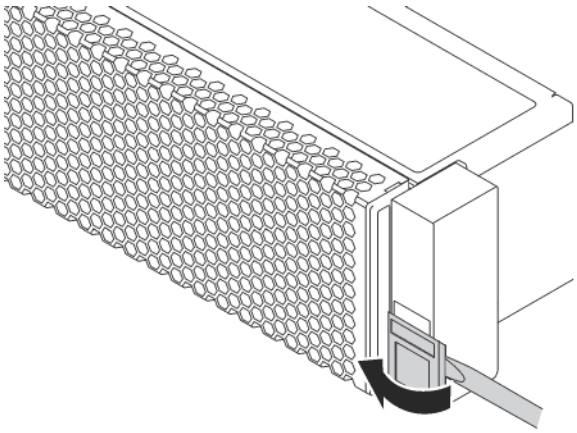


Figure 35. ID label plate removal

To remove the rack latches, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Do one of the following:

- If the rack latches are not assembled with a VGA connector or the front I/O assembly, go to the next step.
- If the rack latches are assembled with a VGA connector, the front I/O assembly, or both, complete the following steps:

1. Disconnect the VGA cable 1, the front-I/O-assembly cable 2, or both cables from the system board.

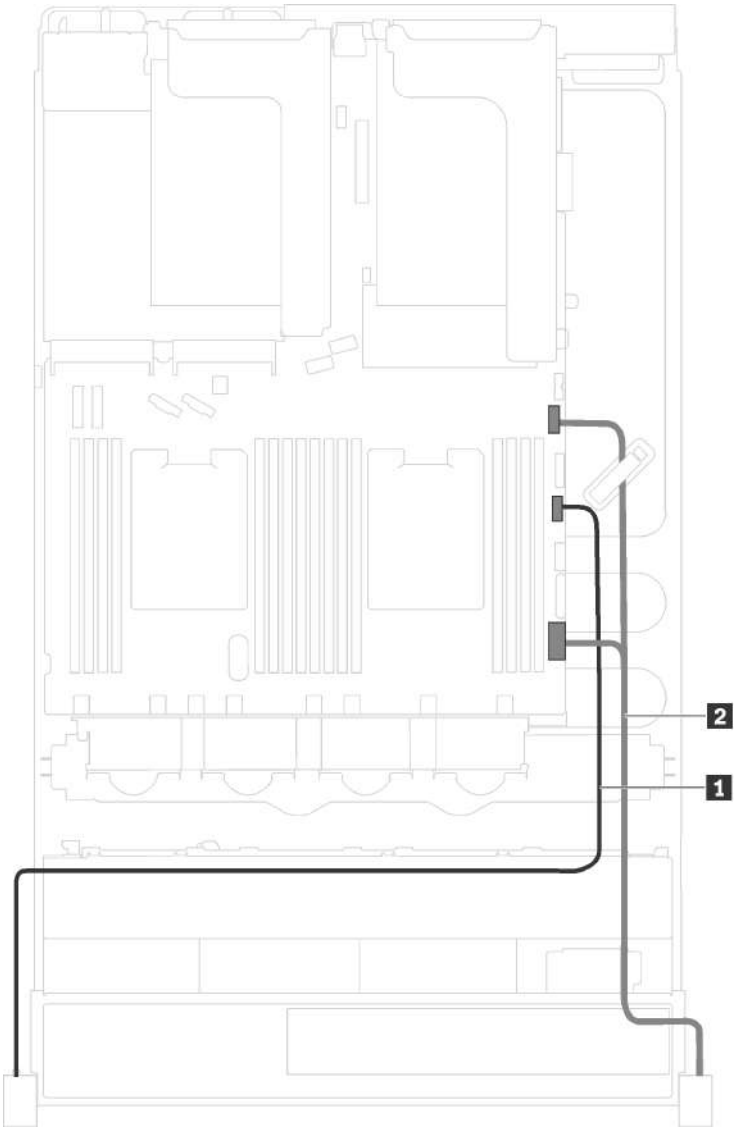


Figure 36. Cable routing for the VGA connector and the front I/O assembly on rack latches

2. Remove the screws that secure the cable retainer on the side of the server. Then, remove the cable retainer from the chassis.

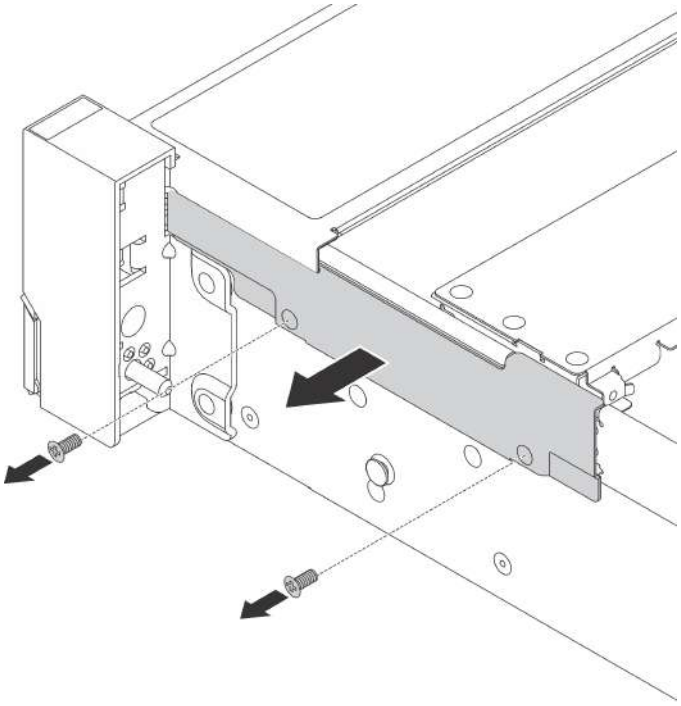


Figure 37. Cable retainer removal

Step 2. On each side of the server, remove the screws that secure the rack latch.

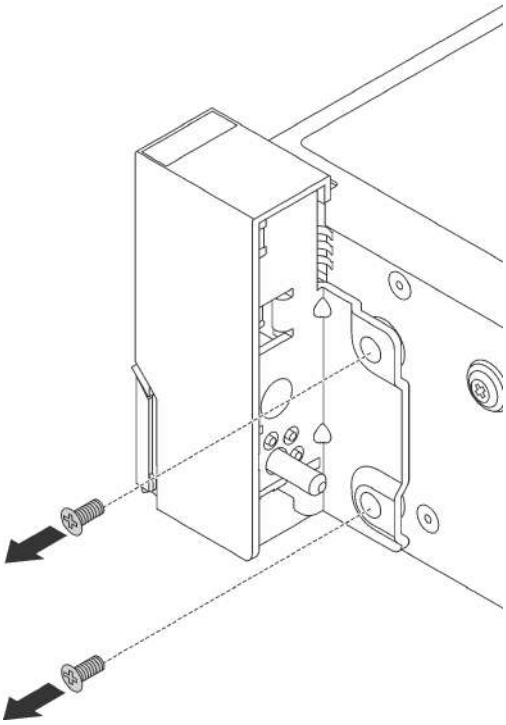


Figure 38. Screws removal

Step 3. On each side of the server, slide the rack latch forward slightly and then remove the rack latch from the chassis.

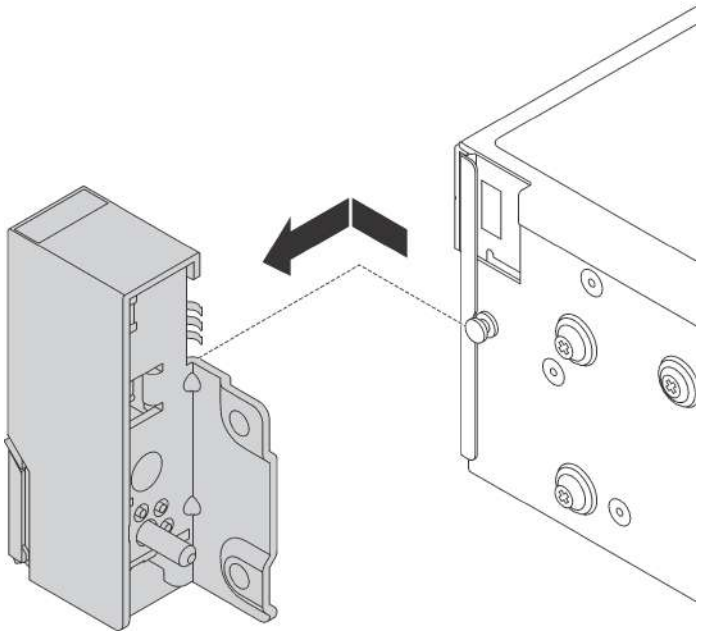


Figure 39. Rack latch removal

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

Install the rack latches

Use this information to install the rack latches.

	"**Read** the installation Guidelines" on page 53	 "**Power off** the server for this task" on page 13	 "**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Note: If the rack latches are not assembled with a VGA connector or the front I/O assembly, you can install the rack latches without powering off the server.

To install the rack latches, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Touch the static-protective package that contains the new rack latches to any unpainted surface on the outside of the server. Then, take the new rack latches out of the package and place them on a static-protective surface.

Step 2. On each side of the server, align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it backward.

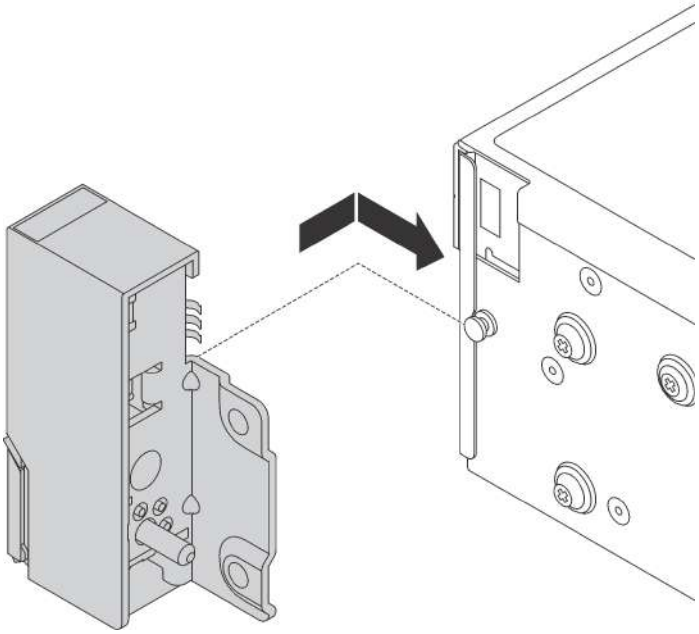


Figure 40. Rack latch installation

Step 3. Install the screws to secure the rack latch on each side of the server.

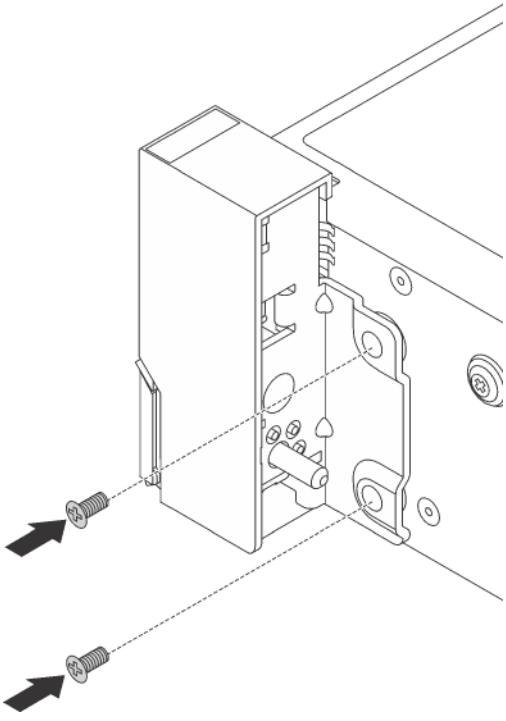


Figure 41. Screws installation

Step 4. If the rack latches are assembled with a VGA connector, the front I/O assembly, or both, complete the following steps:

1. Route the VGA cable, the front-I/O-assembly cable, or both cables across the notch on the chassis as shown. Then, install the screws to secure the cable retainer.

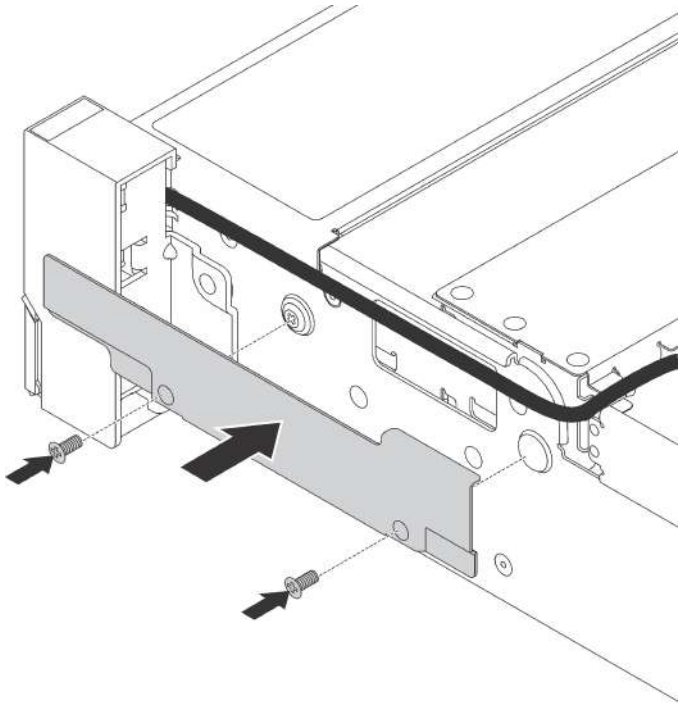


Figure 42. Cable retainer installation

2. Connect the VGA cable 1, the front-I/O-assembly cable 2, or both cables to the system board.

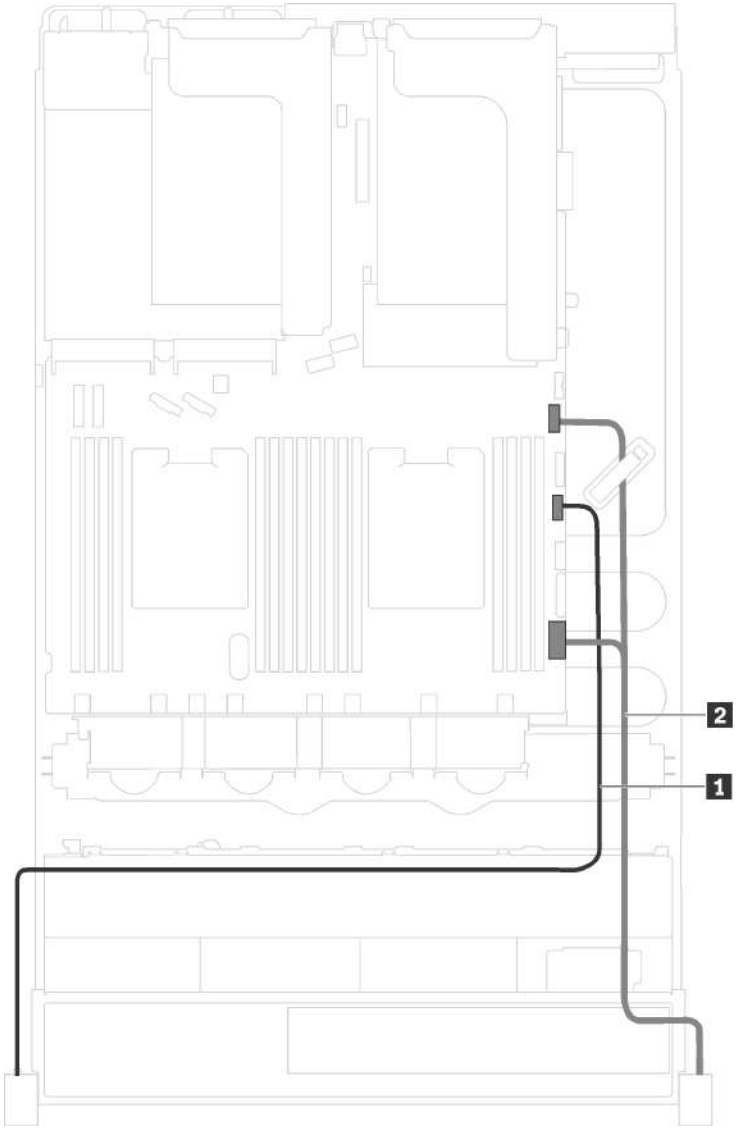


Figure 43. Cable routing for the VGA connector and the front I/O assembly on rack latches

After installing the rack latches:

1. Install the ID label plate to the right rack latch as shown.

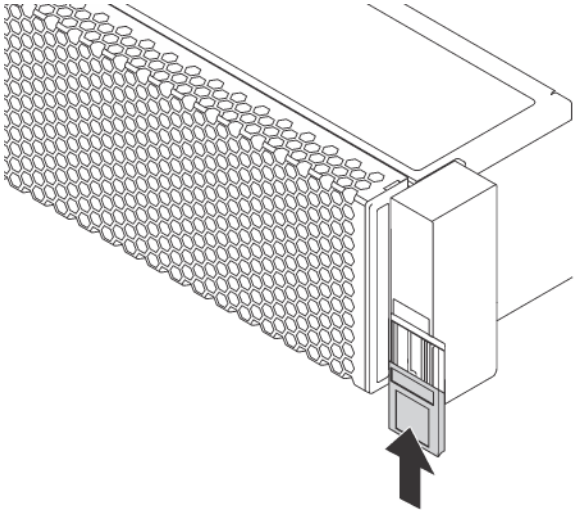


Figure 44. ID label plate installation

2. Complete the parts replacement. See “Complete the parts replacement” on page 174.

Top cover replacement

Use this information to remove and install the top cover.

S033



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S014



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

Remove the top cover

Use this information to remove the top cover.

“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Note: You can remove or install a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

To remove the top cover, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

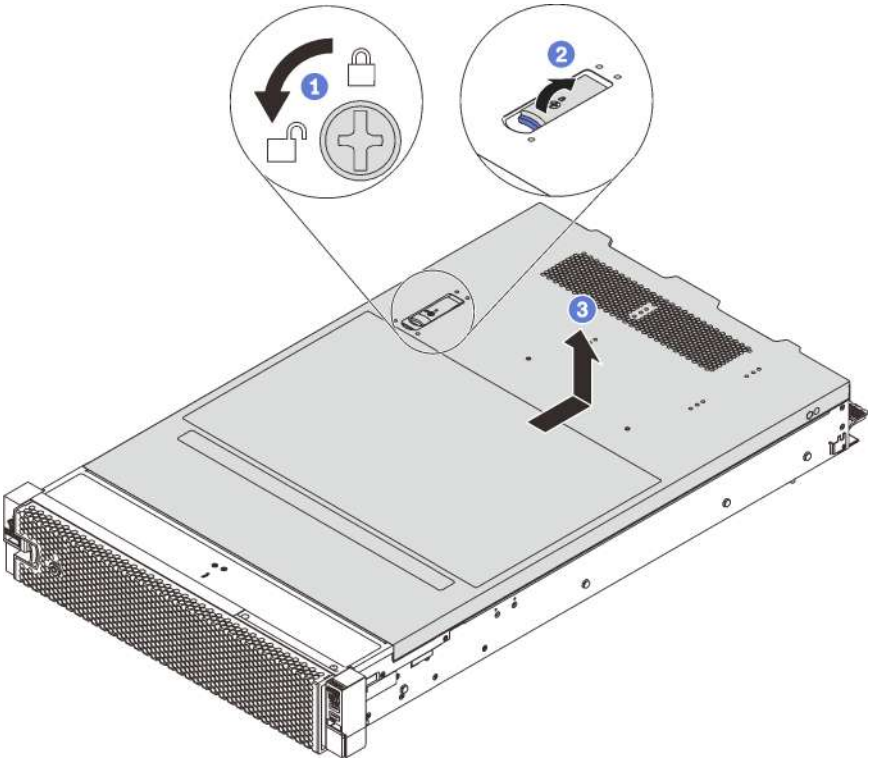


Figure 45. Top cover removal

Step 1. Use a screwdriver to turn the cover lock to the unlocked position as shown.

Step 2. Press the release button on the cover latch and then fully open the cover latch.

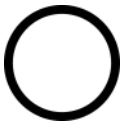
Step 3. Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

Attention:

- Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.
- For proper cooling and airflow, install the top cover before you power on the server. Operating the server with the top cover removed might damage server components.

Install the top cover

Use this information to install the top cover.

	“**Read** the installation Guidelines” on page 53	 “**Power off** the server for this task” on page 13	 “**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before you install the top cover:

1. Ensure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Ensure that all internal cables are connected and routed correctly. See “Internal cable routing” on page 33.
3. If you are installing a new top cover, attach the service label to the new top cover first if necessary.

   Note: A new top cover comes without a service label attached. If you need a service label, order it together with the new top cover. The service label is free of charge.

To install the top cover, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

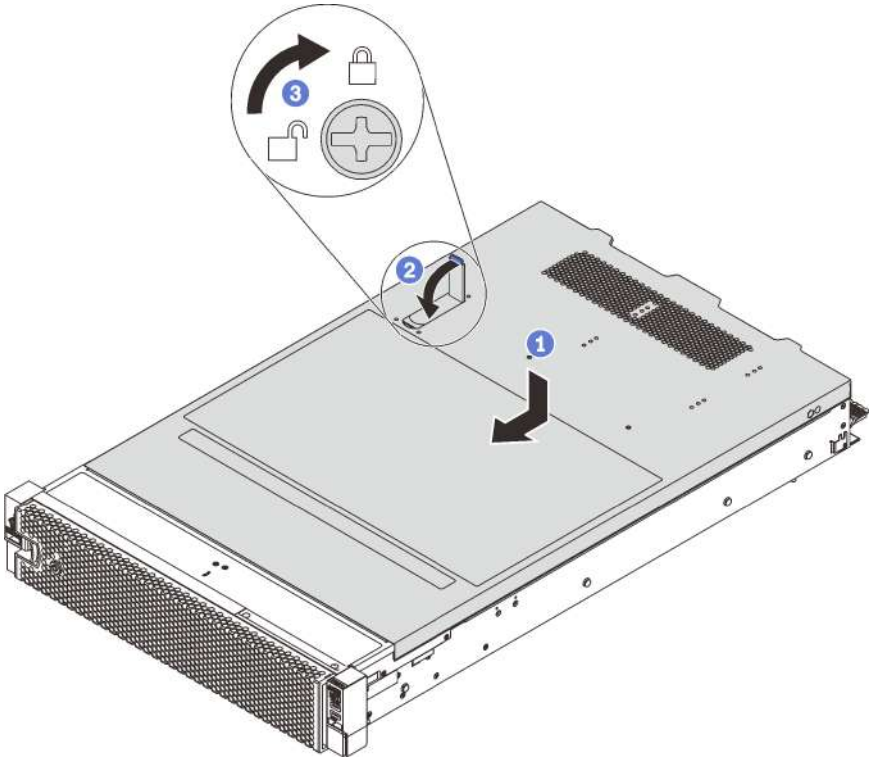


Figure 46. Top cover installation

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly. If the tabs do not engage the chassis correctly, it will be very difficult to remove the top cover later.

Step 1. Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage the guides on both sides of the chassis.

Step 2. Pivot the cover latch and slide the top cover to the front of the chassis at the same time until the top cover snaps into position. Ensure that the cover latch is closed.

Step 3. Use a screwdriver to turn the cover lock to the locked position.

After installing the top cover, complete the parts replacement. See “Complete the parts replacement” on page 174.

RAID super capacitor module replacement

Use this information to remove and install the RAID super capacitor module.

The RAID super capacitor module protects the cache memory on the installed RAID adapter. You can purchase a RAID super capacitor module from Lenovo.

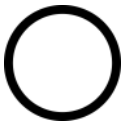
For a list of supported options, see:
http://www.lenovo.com/us/en/serverproven/

Remove a RAID super capacitor module

Use this information to remove a RAID super capacitor module.



“**Read** the installation Guidelines” on page 53



“**Power off** the server for this task” on page 13



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing a RAID super capacitor module:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Disconnect the cable of the RAID super capacitor module.

To remove a RAID super capacitor module, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

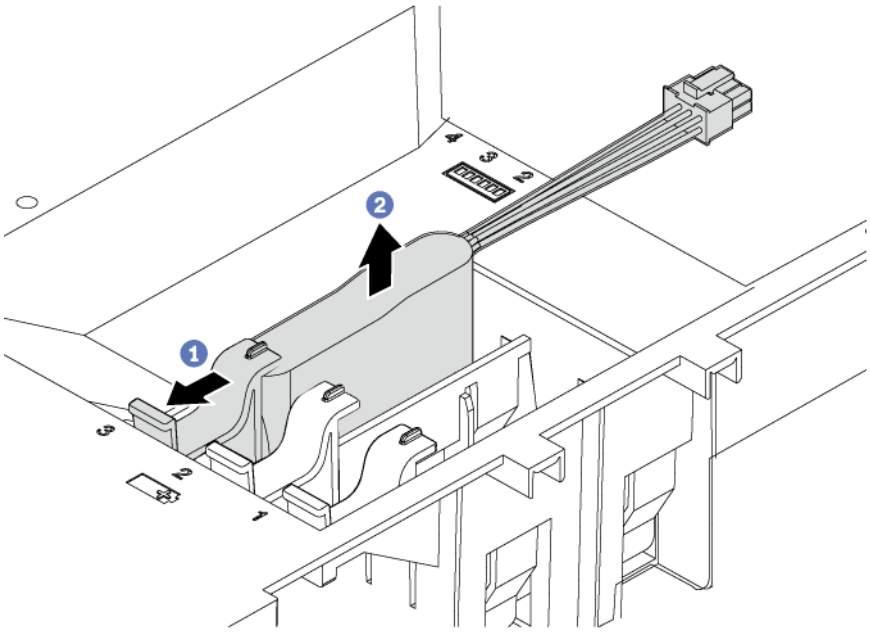


Figure 47. RAID super capacitor module removal

Step 1. Gently press the tab on the air baffle as shown.

Step 2. Remove the RAID super capacitor module from the air baffle.

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

Install a RAID super capacitor module

Use this information to install a RAID super capacitor module.

		
"**Read** the installation Guidelines" on page 53	"**Power off** the server for this task" on page 13	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before installing a RAID super capacitor module:

1. Touch the static-protective package that contains the new RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the new RAID super capacitor module out of the package and place it on a static-protective surface.
2. Locate the holder for the RAID super capacitor module on the air baffle and note the orientation of the RAID super capacitor module.

To install a RAID super capacitor module, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Gently press and hold the tab on the air baffle as shown, and insert the RAID super capacitor module into the holder on the air baffle.

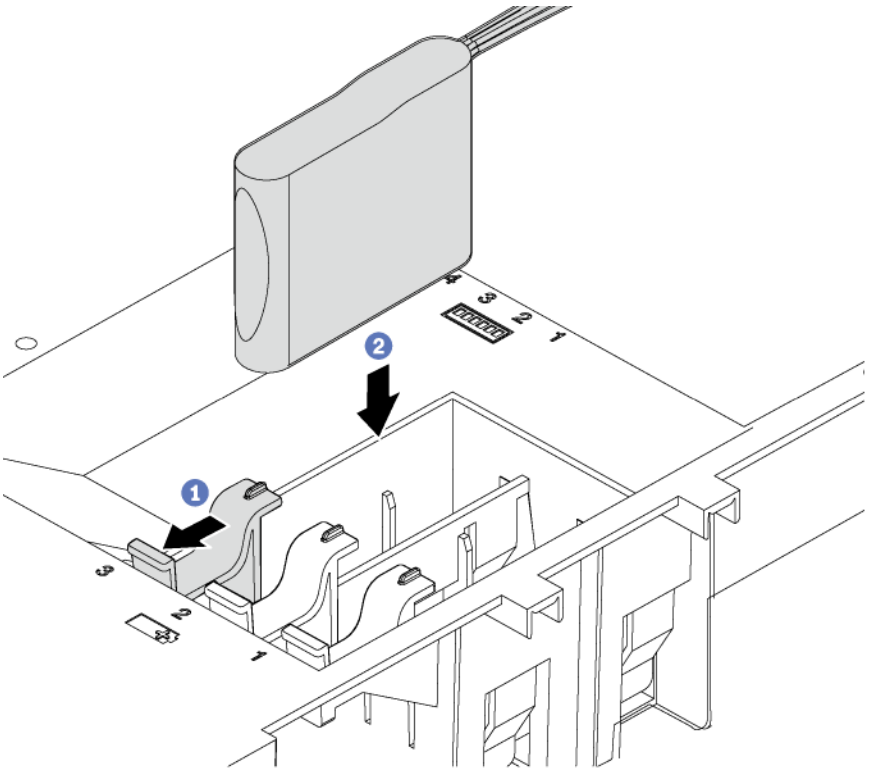


Figure 48. RAID super capacitor module installation

Step 2. Connect the RAID super capacitor module to a RAID adapter with the extension cable that comes with the RAID super capacitor module.

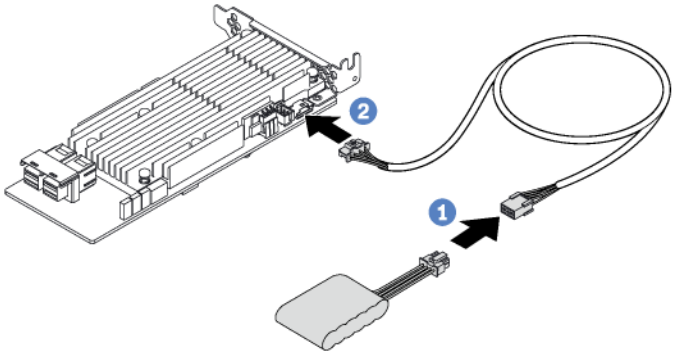


Figure 49. Connecting the RAID super capacitor module to the RAID adapter

After installing the RAID super capacitor module, complete the parts replacement. See “Completing the parts replacement” on page 174.

Air baffle replacement

Use this information to remove and install the air baffle.

S033



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S017



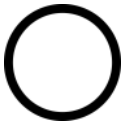
CAUTION:
Hazardous moving fan blades nearby.

Remove the air baffle

Use this information to remove the air baffle.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13

Before removing the air baffle:

1. Remove the top cover. See "Remove the top cover" on page 67.
2. If there is a RAID super capacitor module installed on the top of the air baffle, remove the RAID super capacitor module first.

To remove the air baffle, complete the following step:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Grasp the air baffle and carefully lift it out of the server.

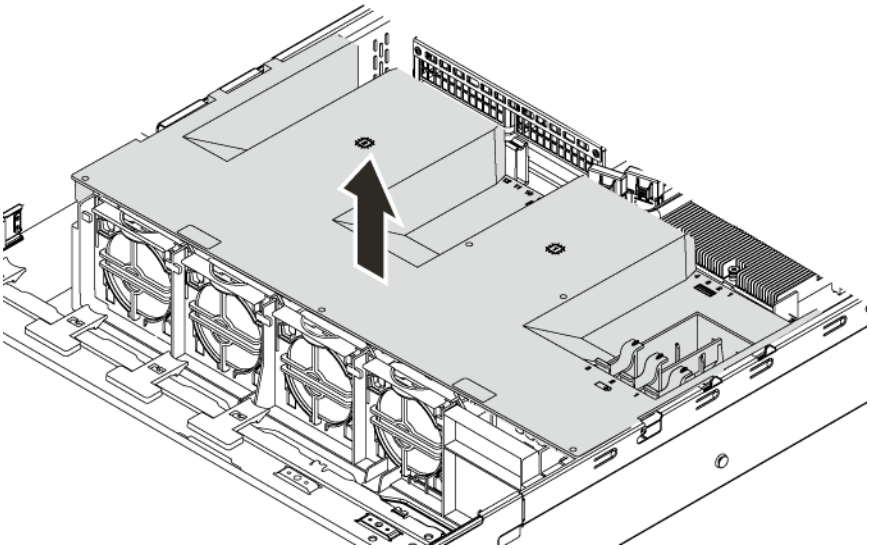
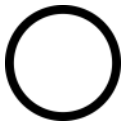


Figure 50. Air baffle removal

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

Install the air baffle

Use this information to install the air baffle.

	"**Read** the installation Guidelines" on page 53
	"**Power off** the server for this task" on page 13

To install the air baffle, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Note: Ensure that the retaining clips on each end of the DIMM connectors are closed.

Step 1. Align the air baffle tabs with the slots on both sides of the chassis. Then, lower the air baffle into the server and press the air baffle down until it is securely seated.

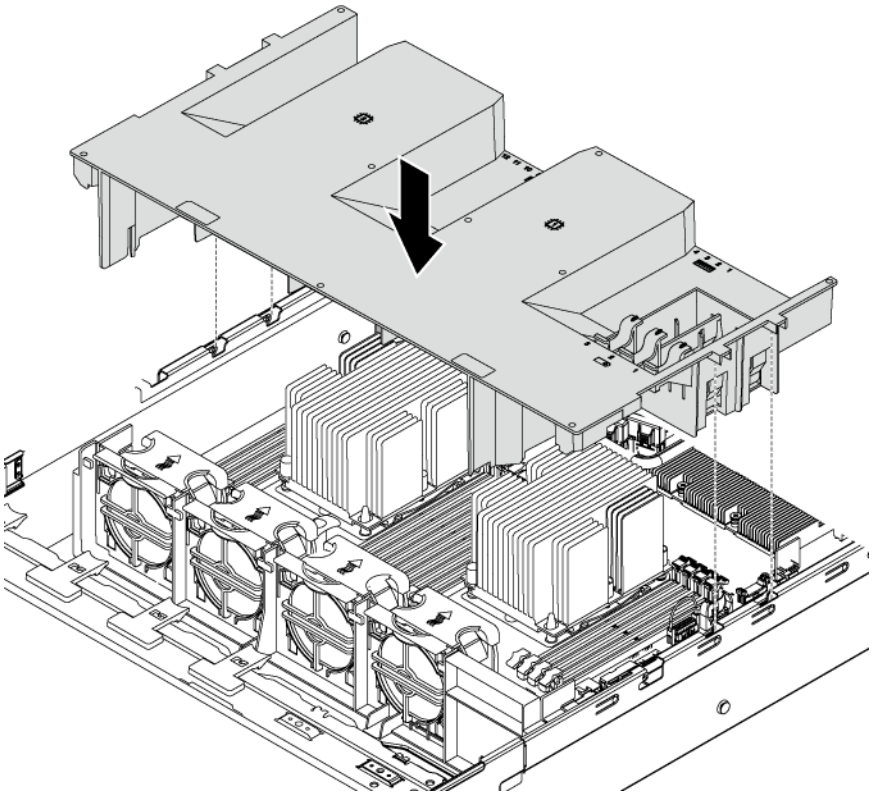


Figure 51. Air baffle installation

Step 2. Install any RAID super capacitor module that you have removed.

Complete the parts replacement. See “Complete the parts replacement” on page 174.

System fan replacement

Use this information to remove and install a system fan.

Remove a system fan

Use this information to remove a system fan. You can remove a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.



“**Read** the installation Guidelines” on page 53



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

S033



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S017



CAUTION:
Hazardous moving fan blades nearby.

Before removing a system fan:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove the air baffle. See “Remove the air baffle” on page 73.

To remove a system fan, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

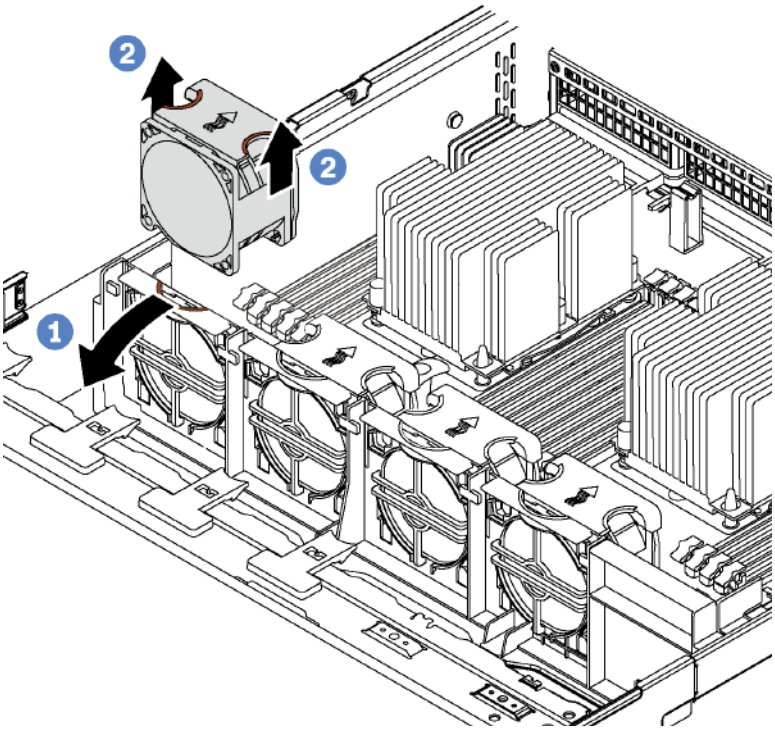


Figure 52. System fan removal

Step 1. Press the fan cage bracket to the front of the server.

Step 2. Grasp the top of the system fan with your fingers, and lift the fan out of the server.

After removing the system fan:

1. Install a new system fan or install a fan filler to cover the place. See “Install a system fan” on page 77.
2. If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Install a system fan

Use this information to install the system fan.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing a system fan, touch the static-protective package that contains the new system fan to any unpainted surface on the outside of the server. Then, take the new system fan out of the package and place it on a static-protective surface.

To install a system fan, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

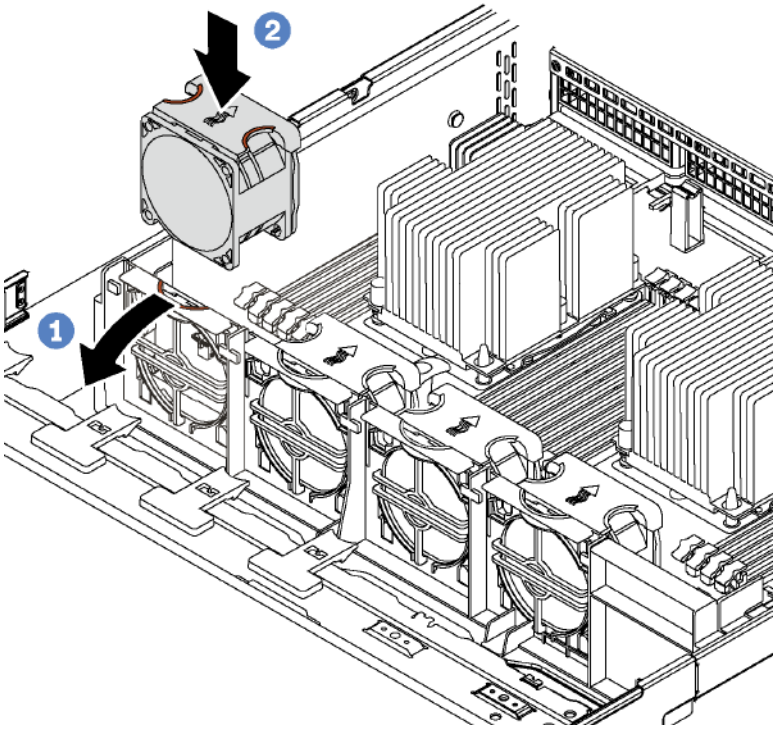


Figure 53. System fan installation

Step 1. Press the fan cage bracket to the front of the server.

Step 2. Position the system fan so that the airflow arrow on the fan points toward the rear of the server. Insert the fan into the bracket and push on top of the fan to make sure that the fan is fully seated.

Note: The correct airflow is from the front to the rear of the server.

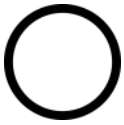
Complete the parts replacement. See “Complete the parts replacement” on page 174.

System fan cage replacement

Use this information to remove and install the system fan cage.

Remove the system fan cage

Use this information to remove the system fan cage.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing the system fan cage:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove the air baffle. See “Remove the air baffle” on page 73.
3. If you are replacing the system fan cage, remove all system fans first. See “Remove a system fan” on page 75. If you are removing the system fan cage to access other components, you can remove it with the system fans installed.

To remove the system fan cage, complete the following step:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Press the latches at both sides to release the system fan cage and carefully lift it straight up and out of the chassis.

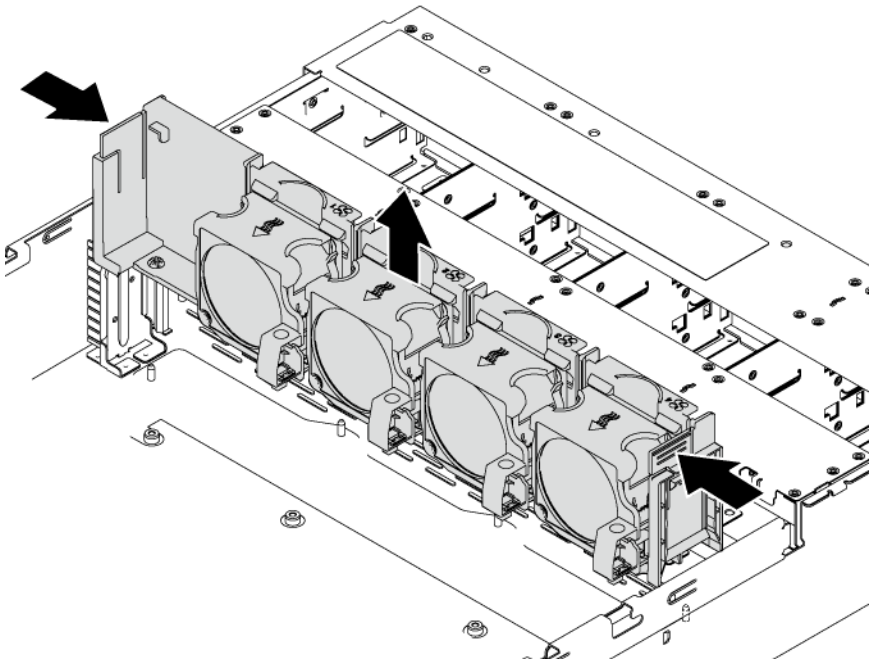
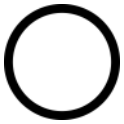


Figure 54. System fan cage removal

Install the system fan cage

Use this information to install the system fan cage.

	“**Read** the installation Guidelines” on page 53	 “**Power off** the server for this task” on page 13
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55	

Before installing a system fan cage, touch the static-protective package that contains the new system fan cage to any unpainted surface on the outside of the server. Then, take the new system fan cage out of the package and place it on a static-protective surface.

To install the system fan cage, complete the following step:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align both sides of the system fan cage with the corresponding mounting brackets in the chassis. Then, press the system fan cage straight down into the chassis. Ensure that the system fan cage is engaged with the mounting brackets at both sides.

Note: If there are system fans installed in the system fan cage, ensure that the system fans are correctly connected to the system fan connectors on the system board.

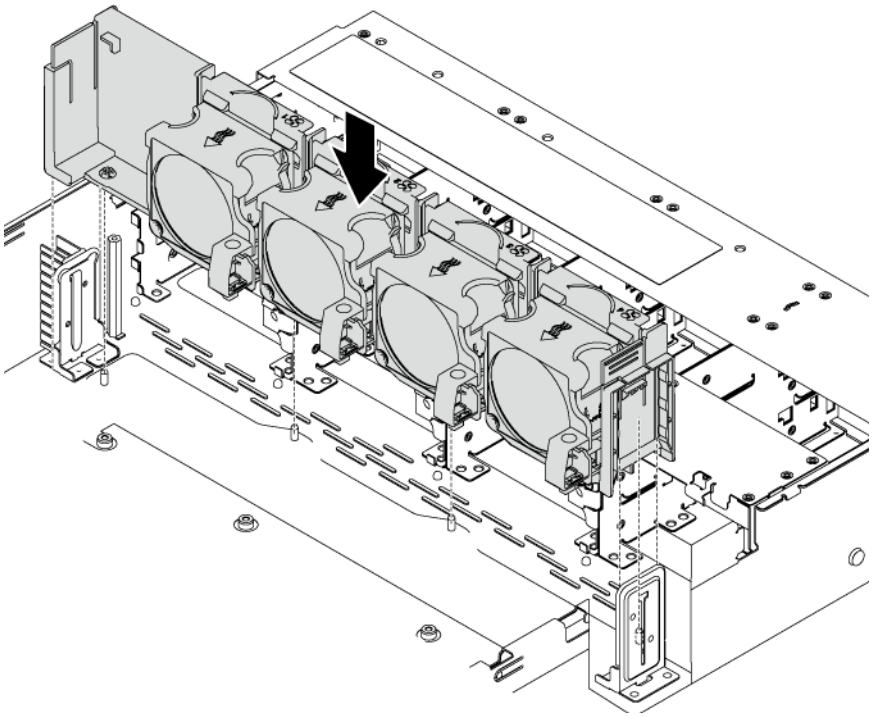


Figure 55. System fan cage installation

After installing the system fan cage:

1. If you have removed the system fans, reinstall them. See “Install a system fan” on page 77.

2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Front I/O assembly replacement

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

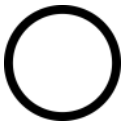
Note: Depending on the model, your server and the front I/O assembly might look different from the illustrations in this topic.

Remove the front I/O assembly

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



“**Read** the installation Guidelines” on page 53



“**Power off** the server for this task” on page 13



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Note: For server models with twelve 3.5-inch drive bays, the front I/O assembly is assembled with the right rack latch. See “Remove the rack latches” on page 59 for the removal procedures.

Before removing the front I/O assembly:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 56.
3. Disconnect the cables of the front I/O assembly from the system board. See “Front I/O assembly” on page 35.

To remove the front I/O assembly, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Table 11. Front I/O assembly removal

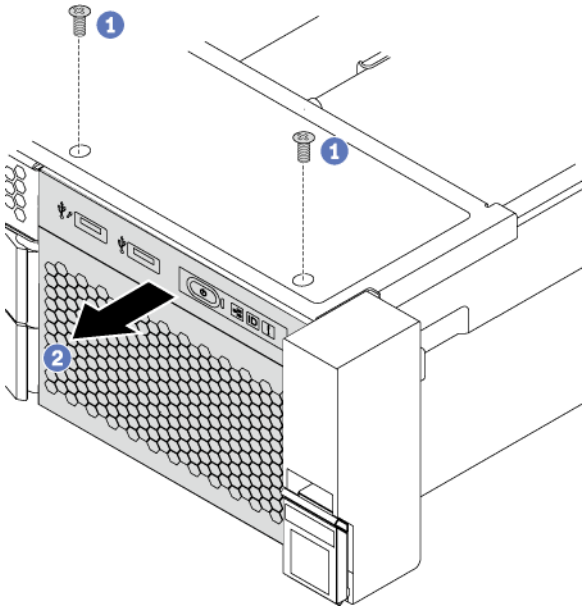


Figure 56. Server models with 2.5-inch drive bays

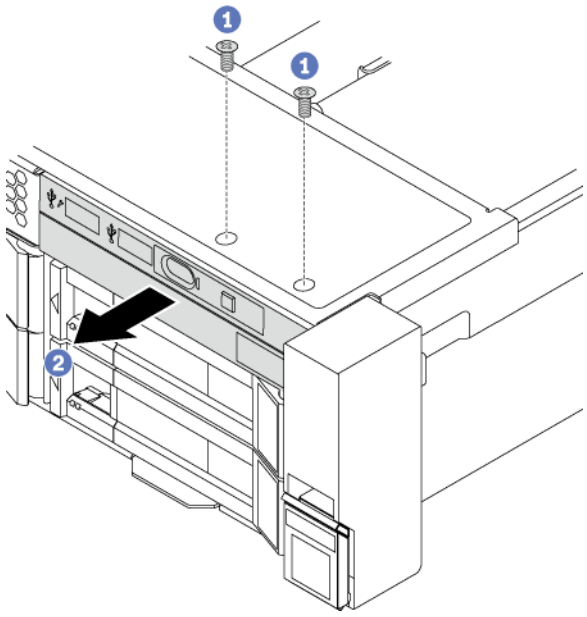


Figure 57. Server models with 3.5-inch drive bays

Step 1. Remove the screws that secure the front I/O assembly.

Step 2. Slide the front I/O assembly out of the assembly bay.

If you are instructed to return the old front I/O assembly, follow all packaging instructions and use any packaging materials that are provided.

Install the front I/O assembly

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



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Note: For server models with twelve 3.5-inch drive bays, the front I/O assembly is assembled with the right rack latch. See "Install the rack latches" on page 63 for the installation procedures.

Before installing the front I/O assembly, touch the static-protective package that contains the new front I/O assembly to any unpainted surface on the outside of the server. Then, take the new front I/O assembly out of the package and place it on a static-protective surface.

To install the front I/O assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Table 12. Front I/O assembly installation

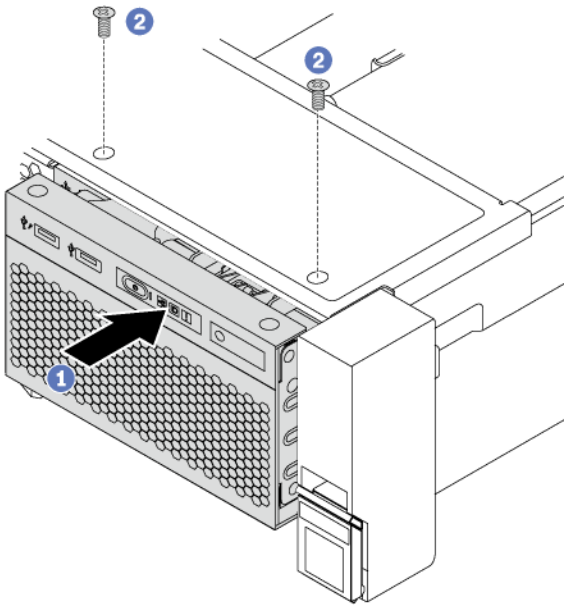


Figure 58. Server models with 2.5-inch drive bays

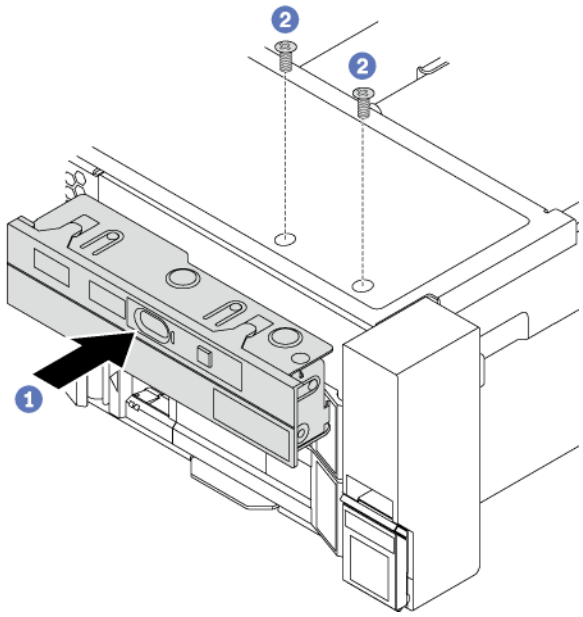


Figure 59. Server models with 3.5-inch drive bays

Step 1. Insert the front I/O assembly into the assembly bay.

Step 2. Install the screws to secure the front I/O assembly in place.

After installing the front I/O assembly:

1. Connect the cables of the front I/O assembly to the system board. See “Front I/O assembly” on page 35.
2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Hot-swap drive replacement

Use this information to remove and install a hot-swap drive. You can remove or install a hot-swap drive without powering off the server, which helps you avoid significant interruption to the operation of the system.

Notes:

- The term “hot-swap drive” refers to all the supported types of hot-swap hard disk drives, hot-swap solid-state drives, and hot-swap NVMe drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The vacant bays are either covered by an EMI-protective panel or occupied by drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.
- To avoid damage to the drive connectors, ensure that the top cover is in place and fully closed whenever you install or remove a drive.

Remove a hot-swap drive

Use this information to remove a hot-swap drive.



"**Read** the installation Guidelines" on page 53



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before removing a hot-swap drive:

1. Ensure that you have back up data on your drive, especially if it is part of a RAID array.
   - Before you make changes to drives, RAID adapters, drive backplanes, or drive cables, back up all important data that is stored on the drives.
   - Before you remove any component of a RAID array, back up all RAID configuration information.
2. If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). 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 that the installed drives are NVMe drives.
3. If the security bezel is installed, remove it. See "Remove the security bezel" on page 56.

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

To remove a hot-swap drive, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Slide the release latch to open the drive tray handle.

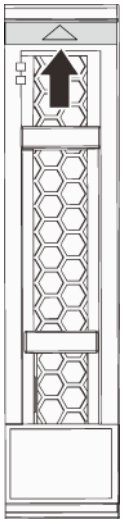


Figure 60. Opening the drive tray handle of a 2.5-inch hot-swap drive

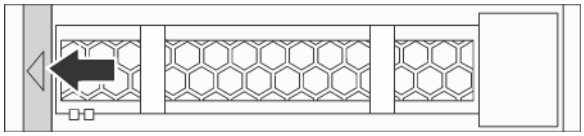


Figure 61. Opening the drive tray handle of a 3.5-inch hot-swap drive

Step 2. Grasp the handle and slide the drive out of the drive bay.

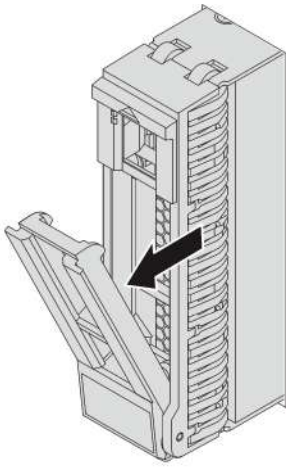


Figure 62. 2.5-inch hot-swap drive removal

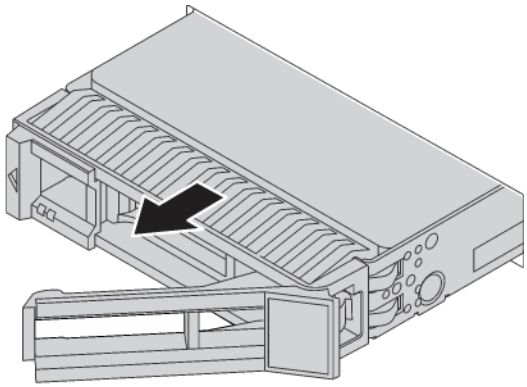


Figure 63. 3.5-inch hot-swap drive removal

After removing a hot-swap drive:

1. Install the drive filler or a new drive to cover the drive bay. See “Install a hot-swap drive” on page 84.
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap drive

Use this information to install a hot-swap drive.

	“**Read** the installation Guidelines” on page 53
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

The following notes describe the type of drives that your server supports and other information that you must consider when you install a drive.

- Depending on your server models, your server supports the following drive types:

  - NVMe SSD
  - SAS/SATA SSD
  - SAS/SATA HDD

  For a list of supported drives, see:
  http://www.lenovo.com/us/en/serverproven/
- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” on page 15.
- You can mix drives of different types, different sizes, and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
  - Drive type priority: NVMe SSD, SAS SSD, SATA SSD, SAS HDD, SATA HDD
  - Drive size priority: 2.5 inch, 3.5 inch
  - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and same capacity.
- Some server models support NVMe drives and the installed bays for NVMe drives vary by model:
  - For eight-2.5-inch-drive-bay models that support NVMe drives, you can install up to four NVMe drives in the bays 4–7.
  - For sixteen-2.5-inch-drive-bay models that support NVMe drives, you can install up to four NVMe drives in the bays 4–7.
  - For twelve-3.5-inch-drive-bay model that supports NVMe drives, you can install up to four NVMe drives in the bays 8–11.

Before installing a hot-swap drive:

1. Press the two tabs toward each other to remove the drive filler from the drive bay. Keep the drive filler in a safe place.

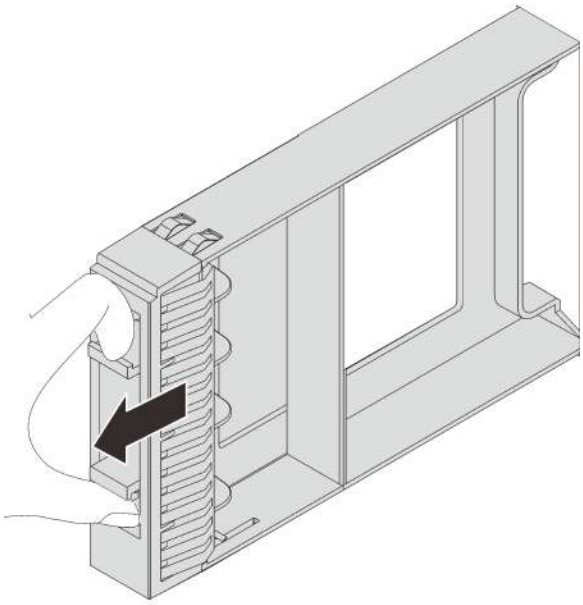


Figure 64. 2.5-inch drive filler removal

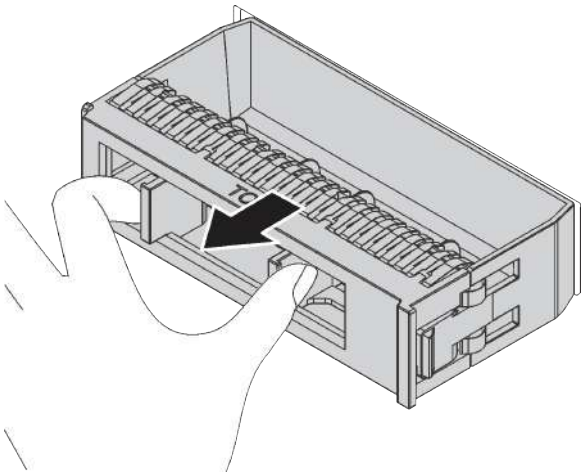


Figure 65. 3.5-inch drive filler removal

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

To install a hot-swap drive, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

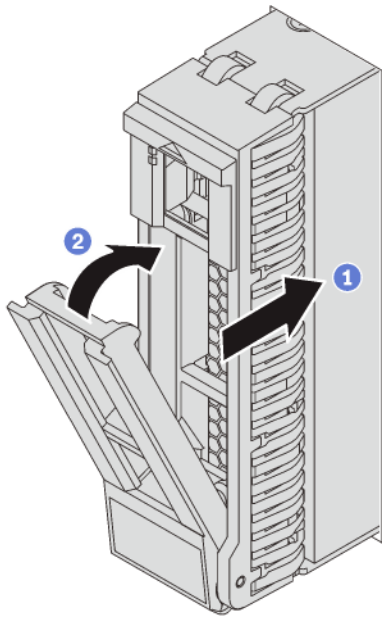


Figure 66. 2.5-inch hot-swap drive installation

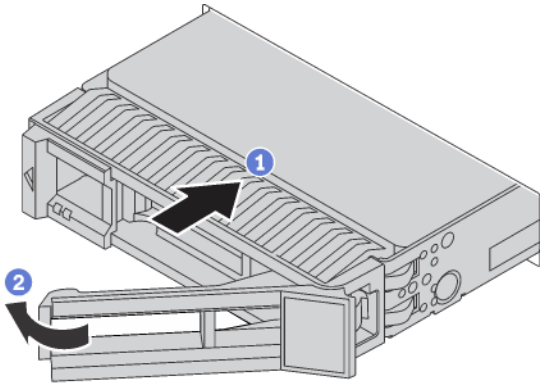


Figure 67. 3.5-inch hot-swap drive installation

Step 1. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.

Step 2. Close the drive tray handle to lock the drive in place.

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

- If the yellow drive status LED is lit continuously, that drive is faulty and must be replaced.
- If the green drive activity LED is flashing, the drive is being accessed.

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

After installing all hot-swap drives:

1. Reinstall the security bezel. See “Install the security bezel” on page 57.
2. Configure RAID information if necessary.

Simple-swap drive replacement

Use this information to remove and install a simple-swap drive.

Notes:

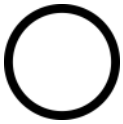
- The term “simple-swap drive” refers to all the supported types of simple-swap hard disk drives and solid-state drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The number of the installed drives in your server varies depending on the server model. The vacant bays are either covered by an EMI-protective panel or occupied by drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.
- To avoid damage to the drive connectors, ensure that the top cover is in place and fully closed whenever you install or remove a drive.

Remove a simple-swap drive

Use this information to remove a simple-swap drive.



“**Read** the installation Guidelines” on page 53



“**Power off** the server for this task” on page 13



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing a simple-swap drive:

1. Ensure that you have back up data on your drive.
2. Remove the security bezel. See “Remove the security bezel” on page 56.

Attention:

- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.
- Before you remove any component of a RAID array, back up all RAID configuration information.

To remove a simple-swap drive, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Use a screwdriver to turn the handle lock 1 to the unlocked position. The handle opens automatically.

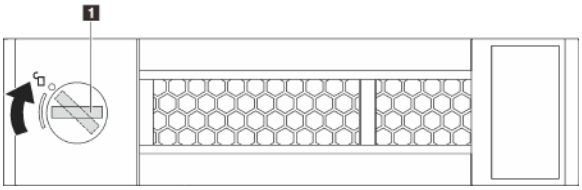


Figure 68. Opening the handle of a 3.5-inch simple-swap drive

Step 2. Pull the handle and carefully slide the simple-swap drive or the drive filler out of the front of the chassis.

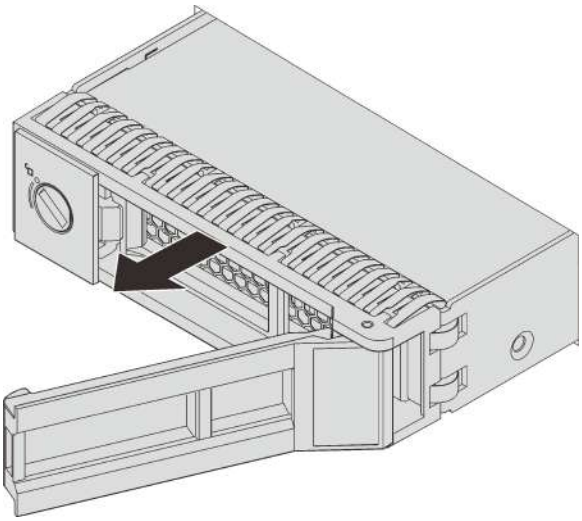


Figure 69. 3.5-inch simple-swap drive removal

After removing the simple-swap drive:

1. Install the drive filler or a new simple-swap drive.
2. If you are instructed to return the old simple-swap drive, follow all packaging instructions and use any packaging materials that are provided.

Install a simple-swap drive

Use this information to install a simple-swap drive.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

The following notes describe the type of drives that your server supports and other information that you must consider when you install a drive.

- For a list of supported drives, see http://www.lenovo.com/us/en/serverproven/.
- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive.

- You can mix drives of different types and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
  - Drive type priority: SSD, SATA HDD
  - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and with the same capacity.

Before installing a simple-swap drive:

1. Press the two tabs toward each other to remove the drive filler. Keep the drive filler in a safe place.

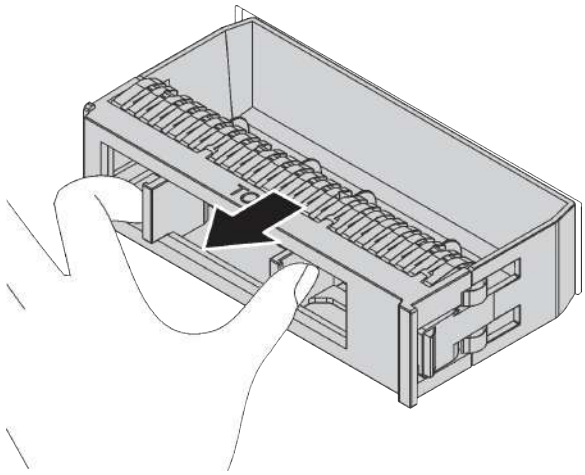


Figure 70. Drive filler removal

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

To install a simple-swap drive, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

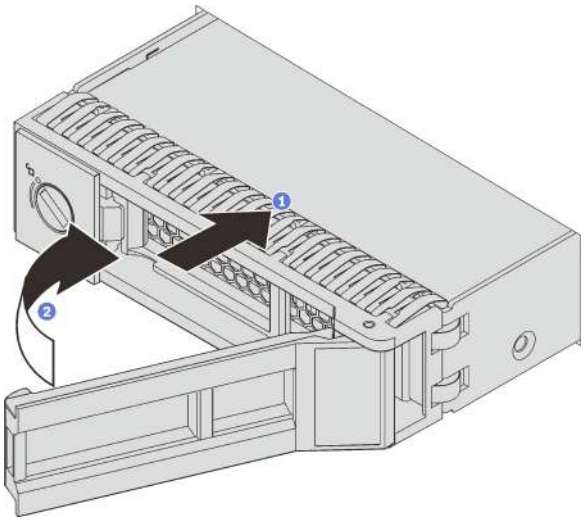


Figure 71. Simple-swap drive installation

Step 1. Ensure that the drive handle is in the open position. Slide the drive into the drive bay until it snaps into position.

Step 2. Rotate the tray handle to the closed position.

After install all simple-swap drives:

1. Reinstall the security bezel. See “Install the security bezel” on page 57.
2. Power on the server.
3. Configure RAID information if necessary.

Backplane replacement

Use this information to remove and install a hot-swap-drive backplane.

This topic contains the following information:

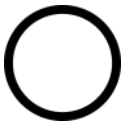
- “Remove the 2.5-inch-drive backplane” on page 90
- “Install the 2.5-inch-drive backplane” on page 91
- “Remove the 3.5-inch-drive backplane” on page 92
- “Install the 3.5-inch-drive backplane” on page 94

Remove the 2.5-inch-drive backplane

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



“**Read** the installation Guidelines” on page 53



“**Power off** the server for this task” on page 13



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

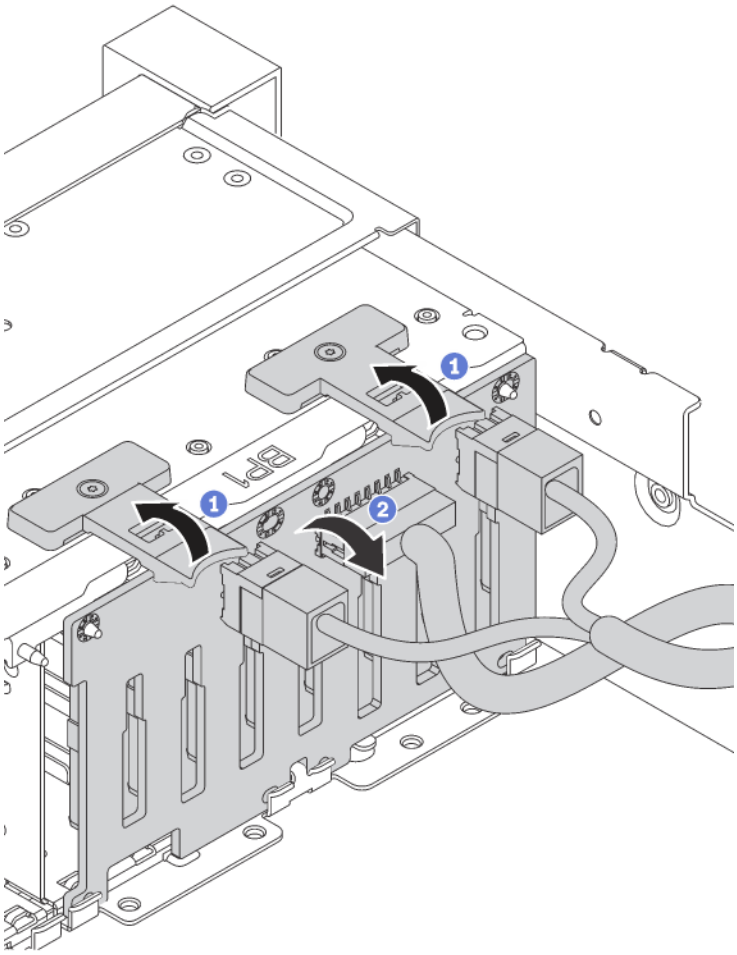
Before removing the 2.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 78.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 82.

To remove the 2.5-inch-drive backplane, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Lift the release tabs and rotate the backplane backward slightly to release it from the two pins on the chassis. Then, remove the backplane out of the chassis.

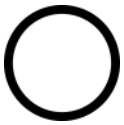


Step 2. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplane” on page 37.

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

Install the 2.5-inch-drive backplane

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

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing the 2.5-inch-drive backplane, touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.

To install the 2.5-inch-drive backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Connect the cables to the backplane.

Step 2. Align the bottom of the backplane in the slots on the bottom of the chassis. Then, rotate the backplane to vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

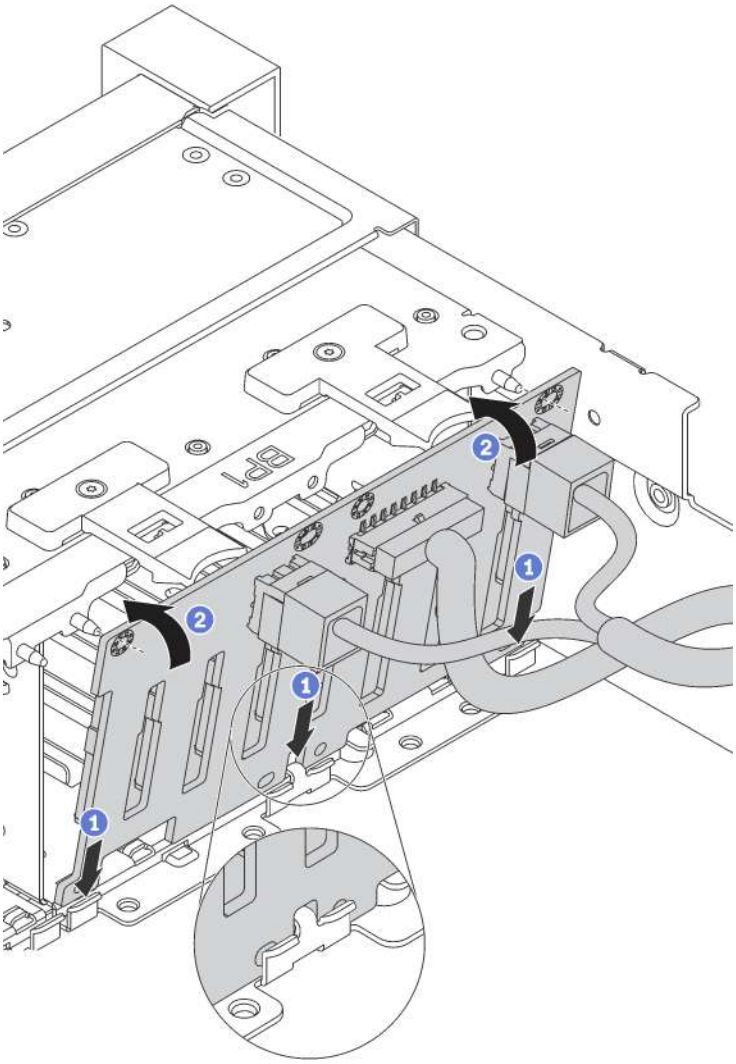


Figure 72. 2.5-inch-drive backplane installation

After installing the 2.5-inch-drive backplane:

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 84.
2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Remove the 3.5-inch-drive backplane

Use this information to remove the 3.5-inch-drive backplane.

“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Note: The procedure is based on the scenario that you want to remove the backplane for up to twelve 3.5-inch drives. The procedure is similar for the backplane for up to eight 3.5-inch drives.

Before removing the 3.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 78.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 82.

To remove the 3.5-inch-drive backplane, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

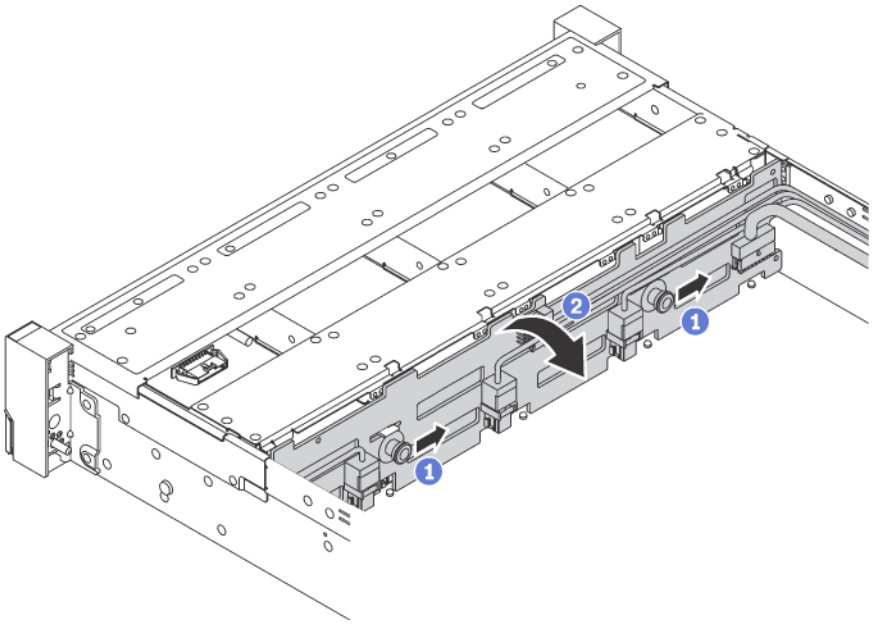


Figure 73. 3.5-inch-drive backplane removal

Step 1. Pull the release pins and slightly slide the backplane in the direction as shown.

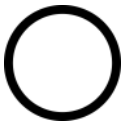
Step 2. Pivot the backplane backward slightly to release it from the four hooks on the chassis. Then, carefully lift the backplane out of the chassis.

Step 3. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplane” on page 37.

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

Install the 3.5-inch-drive backplane

Use this information to install the 3.5-inch-drive backplane.

	"**Read** the installation Guidelines" on page 53	 "**Power off** the server for this task" on page 13
	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55	

Note: The procedure is based on the scenario that you want to install the backplane for up to twelve 3.5-inch drives. The procedure is similar for the backplane for up to eight 3.5-inch drives.

Before installing the 3.5-inch-drive backplane, touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.

To install the 3.5-inch-drive backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

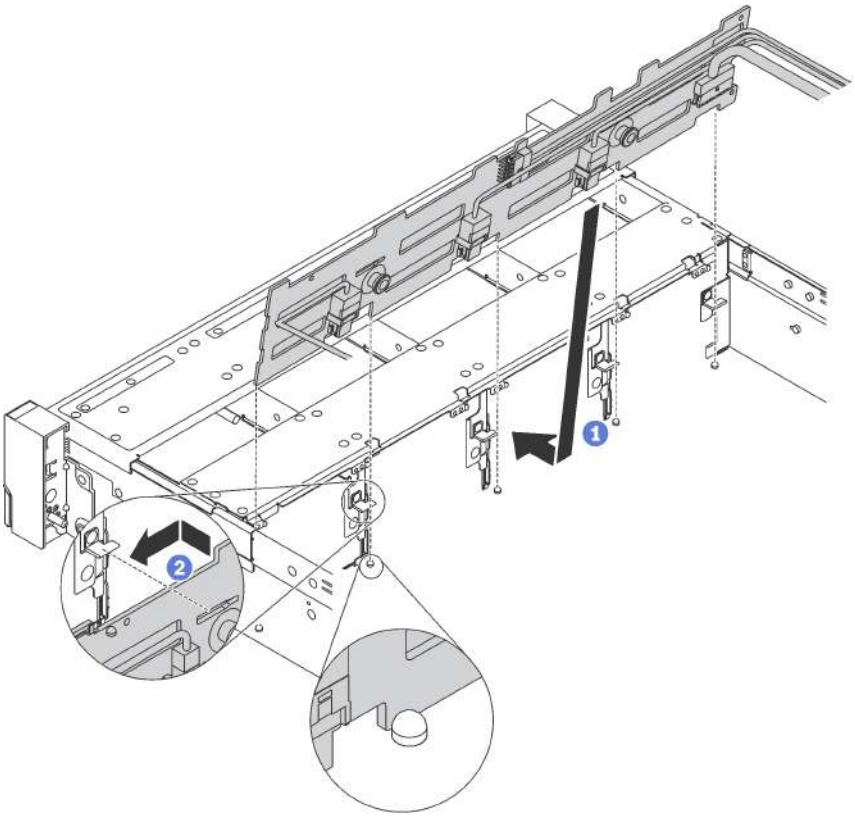


Figure 74. 3.5-inch-drive backplane installation

Step 1. Connect the cables to the backplane.

Step 2. Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.

Step 3. Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.

After installing the 3.5-inch-drive backplane:

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 84.
2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Simple-swap-drive backplate assembly replacement

Use this information to remove and install the 3.5-inch simple-swap-drive backplate assembly.

Remove the 3.5-inch simple-swap-drive backplate assembly

Use this information to remove the 3.5-inch simple-swap-drive backplate assembly.



“**Read** the installation Guidelines” on page 53



“**Power off** the server for this task” on page 13



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing the 3.5-inch simple-swap-drive backplate assembly:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 78.
3. Remove all the installed drives and drive fillers (if any) from the drive bays. See “Remove a simple-swap drive” on page 87.
4. Disconnect the cables from the system board. See “Server models with eight 3.5-inch drives” on page 43.

To remove the 3.5-inch simple-swap-drive backplate assembly, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

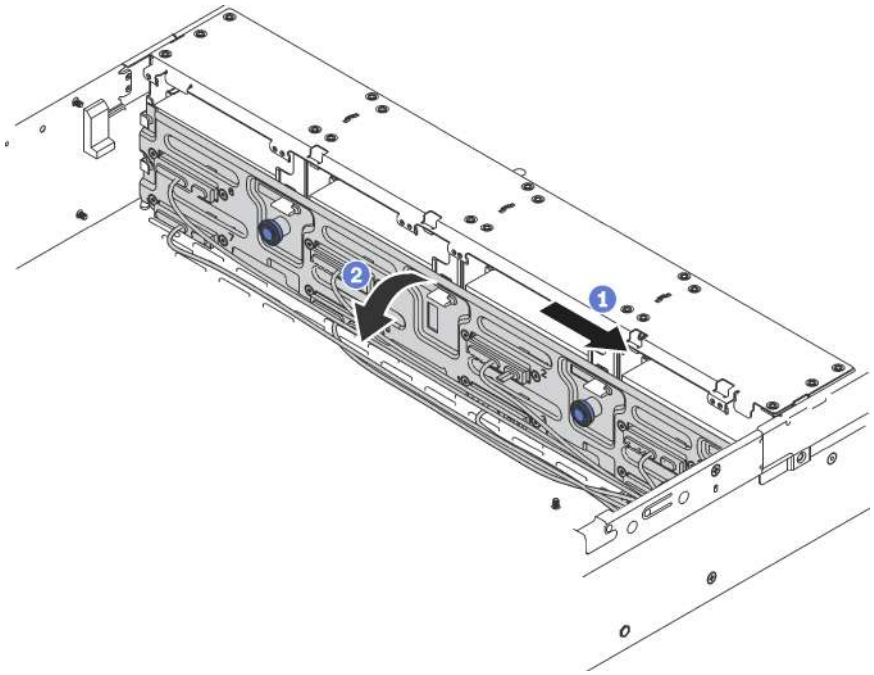


Figure 75. 3.5-inch simple-swap-drive backplate assembly removal

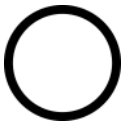
Step 1. Pull the release pins and carefully slide the backplate assembly in the direction as shown.

Step 2. Pivot the backplate assembly backward slightly to release it from the four hooks on the chassis. Then, carefully lift the backplate assembly out of the chassis.

If you are instructed to return the old simple-swap-drive backplate assembly, follow all packaging instructions and use any packaging materials that are provided.

Install the 3.5-inch simple-swap-drive backplate assembly

Use this information to install the 3.5-inch simple-swap-drive backplate assembly.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing the 3.5-inch simple-swap-drive backplate assembly, touch the static-protective package that contains the new backplate assembly to any unpainted surface on the outside of the server. Then, take the backplate assembly out of the package and place it on a static-protective surface.

To install the 3.5-inch simple-swap-drive backplate assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align the backplate assembly with the chassis and lower it into the chassis. Put the backplate assembly into place with it leaning backward slightly.

Step 2. Rotate the backplate assembly to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplate assembly. Then, slide the backplate assembly as shown until it is secured into place.

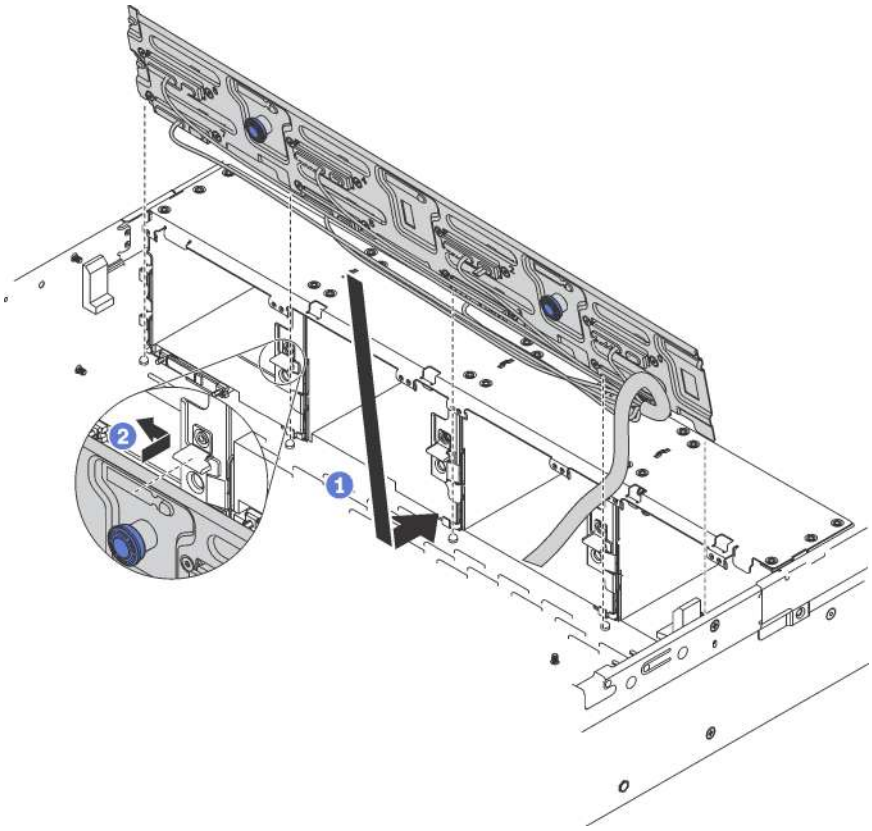


Figure 76. 3.5-inch simple-swap-drive backplate assembly installation

After installing the 3.5-inch simple-swap-drive backplate assembly:

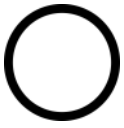
1. Install the drives or drive fillers. See “Install a simple-swap drive” on page 88.
2. Connect power and signal cables to the system board. See “Internal cable routing” on page 33.
3. Complete the parts replacement. See “Complete the parts replacement” on page 174.

Memory module replacement

Use this information to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module. This section applies to both DRAM DIMMs and DCPMMs.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing a memory module:

1. If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to:

a. Back up the stored data.

b. If the App Direct capacity is interleaved:

   1) Delete all the created namspaces and filesystems in the operating system.

   2) Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

   Note: If one or more DCPMMs are secured with passphrase, make sure security of every unit is disabled before performing secure erase. In case the passphrase is lost or forgotten, contact Lenovo service.

   If the App Direct capacity is not interleaved:

   1) Delete the namespace and filesystem of the DCPMM unit to be replaced in the operating system.

   2) Perform secure erase on the DCPMM unit that is to be replaced. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

2. Remove the top cover. See “Remove the top cover” on page 67.

3. Remove the air baffle. See “Remove the air baffle” on page 73.

Attention:

- Disconnect all power cords for this task.
- 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.

To remove a memory module, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

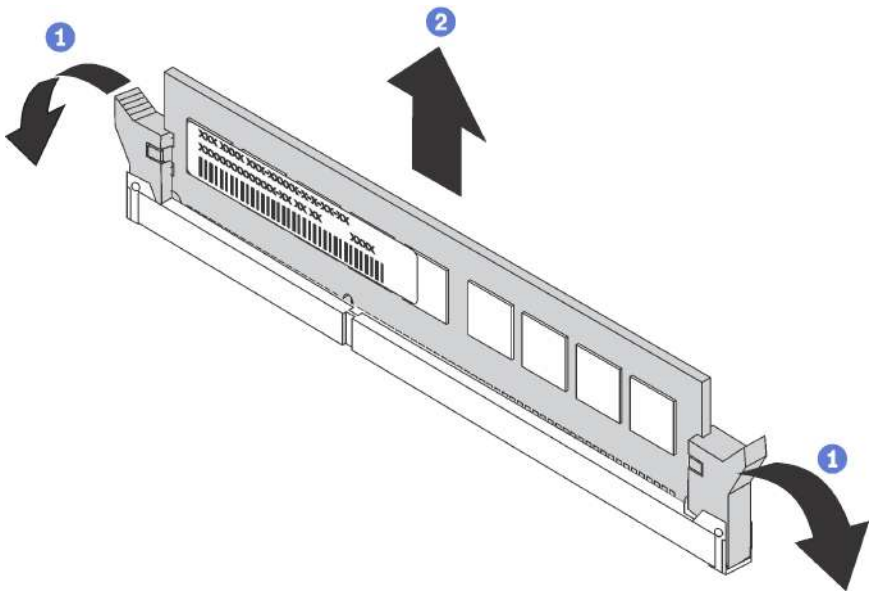


Figure 77. Memory module removal

Note: A DCPMM module looks slightly different from a DRAM DIMM in the illustration, but the removal method is the same.

Step 1. Open the retaining clips on each end of the memory slot.

Attention: To avoid breaking the retaining clips or damaging the memory slots, handle the clips gently.

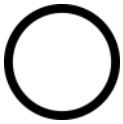
Step 2. Grasp the memory module at both ends and carefully lift it up to remove it from the slot.

After removing a memory module:

1. Install a memory filler or a new memory module to cover the slot. See “Install a memory module” on page 99.
2. If you are instructed to return the old memory module, follow all packaging instructions and use any packaging materials that are provided.

Install a memory module

Use this information to install a memory module.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing a memory module:

1. If you are installing Intel Optane DC Persistent Memory modules (DCPMM) for the first time, follow the instructions in “Intel Optane DC Persistent Memory (DCPMM) setup” in *Setup Guide*.
2. Touch the static-protective package that contains the new memory module to any unpainted surface on the outside of the server. Then, take the new memory module out of the package and place it on a static-protective surface.
3. Locate the required memory slot on the system board and ensure that you observe the installation rules and sequence. See “Memory module installation rules” on page 101.

Attention:

- Disconnect all power cords for this task.
- 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.

To install a memory module, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

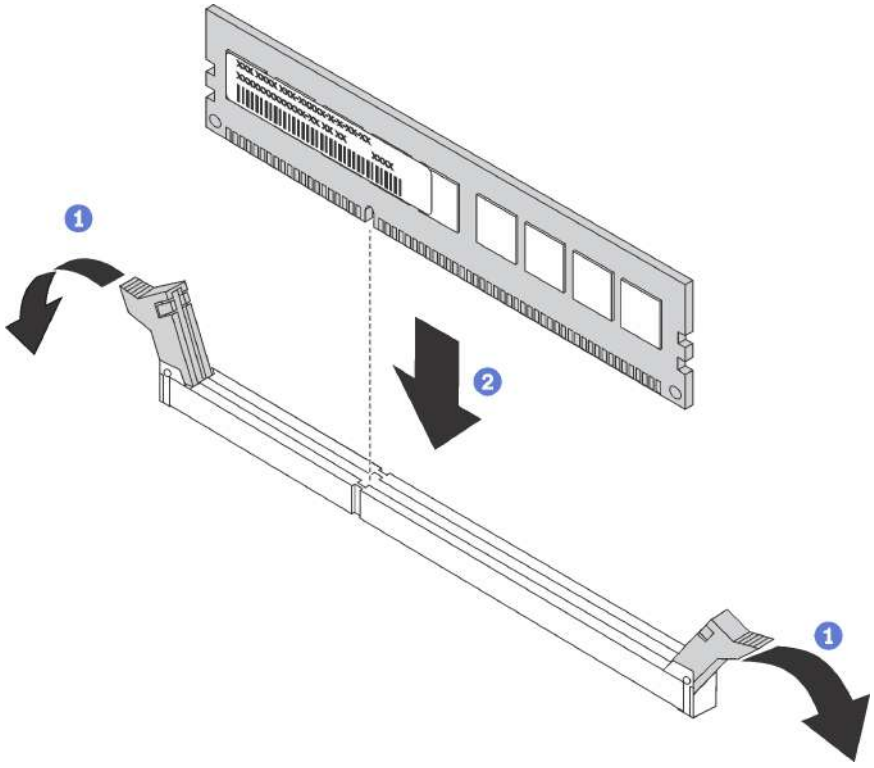


Figure 78. Memory module installation

Note: A DCPMM module looks slightly different from a DRAM DIMM in the illustration, but the installation method is the same.

Step 1. Open the retaining clips on each end of the memory slot.

Attention: To avoid breaking the retaining clips or damaging the memory slots, open and close the clips gently.

Step 2. Align the memory module with the slot, and firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

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

- If you have installed a DRAM DIMM module, complete the parts replacement. See “Complete the parts replacement” on page 174.
- If you have installed a DCPMM:
  1. Update the system firmware to the latest version (see “Update the firmware” in *Setup Guide*).
  2. Make sure the firmware of all the DCPMM units is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
  3. Configure DCPMMs and DRAM DIMMs (see “Configure DC Persistent Memory Module (DCPMM)” in *Setup Guide*).
  4. Restore the data that have been backed up if necessary.

Memory module installation rules

Memory modules must be installed in a specific order based on the memory configuration that you implement on your server.

Your server has 16 memory slots, and supports the following types of memory modules depending on the processors installed:

- For Intel® Xeon® SP Gen 1 processors:
  - TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMMs
  - TruDDR4 2666, quad-rank, 64 GB LRDIMMs
- For Intel® Xeon® SP Gen 2 processors:
  - TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMMs
  - DDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMMs
  - 128 GB, 256 GB, or 512 GB DCPMMs

For a list of supported memory options, see: http://www.lenovo.com/us/en/serverproven/

Depending on the memory modules installed, refer to below topics for detailed installation rules:.

- Without DCPMMs: “DRAM DIMM installation rules” on page 102
- With DCPMMs: “DCPMM and DRAM DIMM installation rules” on page 107

The following illustration helps you to locate the memory slots on the system board.

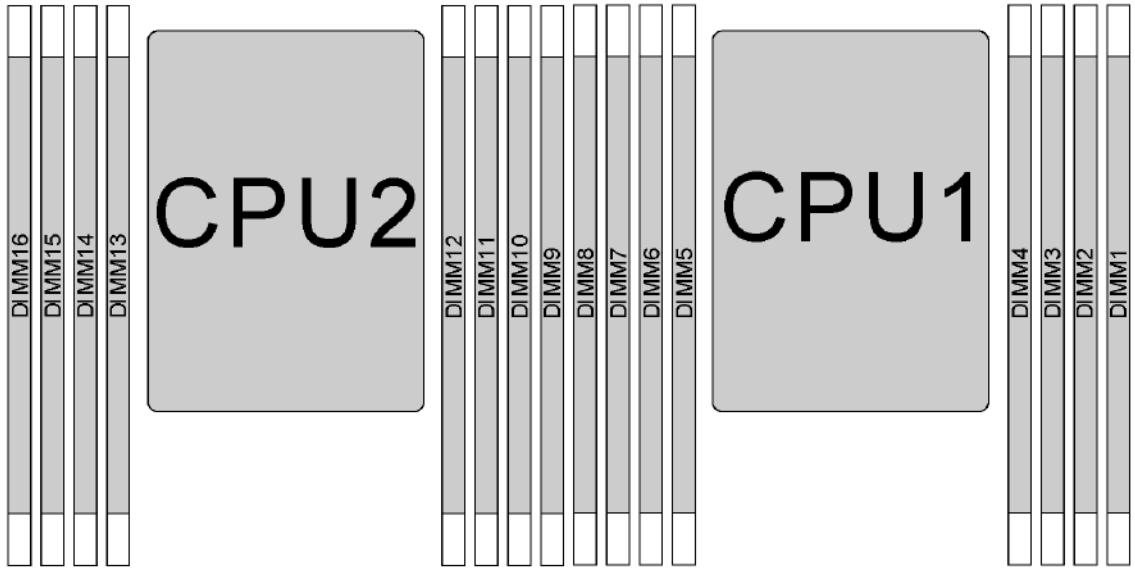


Figure 79. DIMM locations

The following table shows the relationship between the processors, memory controllers, memory channels, slots, and DIMM numbers. For each memory controller, channel 0 has two DIMM slots (slot 0, furthest from the processor, and slot 1, closest to the processor), and channel 1 and channel 2 have only one DIMM slot (slot 0).

Processor	CPU2								CPU1							
Integrated Memory Controller (iMC)	iMC1				iMC0				iMC1				iMC0			
Channel (CH)	C-H2	C-H1	CH0		CH0		C-H1	C-H2	C-H2	C-H1	CH0		CH0		C-H1	C-H2
Slot	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0
DIMM number	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

DRAM DIMM installation rules

For RDIMMs or LRDIMMs, the following memory modes are available:

- “Independent mode” on page 103
- “Mirroring mode” on page 104
- “Rank sparing mode” on page 105

Notes:

- All DIMMs to be installed must be the same type. Do not mix RDIMM and LRDIMM in the same server.

- When you install DIMMs with same rank and different capacity, install the DIMM that has the highest capacity first.
- When you install DIMMs with different rank, install the DIMM with highest rank first.

Independent mode

Independent mode provides high performance memory capability. You can populate all channels with no matching requirements. Individual channels can run at different DIMM timings, but all channels must run at the same interface frequency.

Independent mode with one processor

Note: If there are three identical DIMMs to be installed for CPU1, and the three DIMMs have the same Lenovo part number, install the DIMMs in slots 1, 2, and 3.

Table 13. Memory population order

Total DIMMs	Processor 1								Total DIMMs
	8	7	6	5	4	3	2	1	
1						3			**1**
2			6			3			**2**
3			6			3	2		**3**
4		7	6			3	2		**4**
5		7	6			3	2	1	**5**
6	8	7	6			3	2	1	**6**
7	8	7	6		4	3	2	1	**7**
8	8	7	6	5	4	3	2	1	**8**

Independent mode with two processors

Notes:

- If there are three identical DIMMs to be installed for CPU1, and the three DIMMs have the same Lenovo part number, install the DIMMs in slots 1, 2, and 3.
- If there are three identical DIMMs to be installed for CPU2, and the three DIMMs have the same Lenovo part number, install the DIMMs in slots 9, 10, and 11.

Table 14. Memory population order

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

Mirroring mode

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

Note: All DIMMs to be installed must be the same type with the same capacity, frequency, voltage, and ranks.

Mirroring mode with one processor

Table 15. Memory population order

Total DIMMs	Processor 1								Total DIMMs
	8	7	6	5	4	3	2	1	
2						3	2		**2**
3						3	2	1	**3**
4		7	6			3	2		**4**
6	8	7	6			3	2	1	**6**

Mirroring mode with two processors

Table 16. Memory population order

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

Rank sparing mode

In rank sparing mode, one rank of a DIMM works as the spare rank for the other ranks on the same channel. The spare rank is not available as system memory.

Notes:

- All DIMMs to be installed must be the same type with the same capacity, frequency, voltage, and ranks.
- Single-rank RDIMMs do not support rank sparing mode.

Rank sparing mode with one processor

Table 17. Memory population order

Total DIMMs	Processor 1								Total DIMMs
	8	7	6	5	4	3	2	1	
1						3			**1**
2			6			3			**2**
3			6			3	2		**3**
4		7	6			3	2		**4**
5		7	6			3	2	1	**5**
6	8	7	6			3	2	1	**6**
7	8	7	6		4	3	2	1	**7**
8	8	7	6	5	4	3	2	1	**8**

Rank sparing mode with two processors

Table 18. Memory population order

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

DCPMM and DRAM DIMM installation rules

For Intel Optane DC Persistent Memory (DCPMM), the following memory modes are available:

- “App Direct Mode” on page 107
- “Mixed Memory Mode” on page 109
- “Memory Mode” on page 110

Notes:

- Before installing DCPMMs and DRAM DIMMs, refer to “DC Persistent Memory (DCPMM) setup” in *Setup Guide* and make sure to meet all the requirements.
- To verify if the presently installed processors support DCPMMs, examine the four digits in the processor description. Only processors with description meeting *both* of the following requirements support DCPMMs.
  - The first digit is ***5*** or a larger number.

    Note: The only exception to this rule is *Intel Xeon Silver 4215*, which also supports DCPMM.
  - The second digit is ***2***.

  Example: *Intel Xeon **52**15L* and *Intel Xeon Platinum **82**80M*

  If the presently installed processors do not support DCPMMs, replace them with the processors that support DCPMMs.
- Supported memory capacity range varies with the following types of processors:
  - **Large memory tier (L):** The processors with **L** after the four digits (for example: *Intel Xeon 5215**L***)
  - **Medium memory tier (M):** The processors with **M** after the four digits (for example: *Intel Xeon Platinum 8280**M***)
  - **Other:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 5222*)

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

http://1config.lenovo.com/#/memory_configuration

App Direct Mode

In this mode, DCPMMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory. The total displayed system memory in this mode is the total capacity of DRAM DIMMs.

App Direct mode with one processor

Table 19. Memory population order in App Direct mode with one processor

D: DRAM DIMM; 16 GB, 32 GB, or 64 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)								
Configuration	**Processor 1**							
	8	7	6	5	4	3	2	1
1 DCPMM and 6 RDIMMs	D	D	D		**P**	D	D	D
2 DCPMMs and 6 RDIMMs	D	D	D	**P**	**P**	D	D	D

Table 20. Supported DCPMM capacity in App Direct mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	**6**	**L**	√	√	√
		M	√	√	√
		Other	√	√	√
2	**6**	**L**	√	√	√
		M	√	√	√
		Other	√	√	

App Direct mode with two processors

Table 21. Memory population order in App Direct mode with two processors

D: DRAM DIMM; 16 GB, 32 GB, or 64 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)																
Configuration	**Processor 2**								**Processor 1**							
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1 DCPMM and 12 RDIMMs	D	D	D			D	D	D	D	D	D		**P**	D	D	D
2 DCPMMs and 12 RDIMMs	D	D	D		**P**	D	D	D	D	D	D		**P**	D	D	D
4 DCPMMs and 12 RDIMMs	D	D	D	**P**	**P**	D	D	D	D	D	D	**P**	**P**	D	D	D

Table 22. Supported DCPMM capacity in App Direct mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	**12**	**L**	√	√	√
		M	√	√	√
		Other	√	√	√
2	**12**	**L**	√	√	√
		M	√	√	√
		Other	√	√	√
4	**12**	**L**	√	√	√
		M	√	√	√
		Other	√	√	

Note: To install four 512 GB DCPMMs, ensure that the processor TDP is lower than or equal to 125 watts.

Mixed Memory Mode

In this mode, some percentage of DCPMM capacity is directly accessible to specific applications (App Direct), while the rest serves as system memory. The App Direct part of DCPMM is displayed as persistent memory, while the rest of DCPMM capacity is displayed as system memory. DRAM DIMMs act as cache in this mode.

Mixed Memory Mode with one processor

Table 23. Memory population order in Mixed Memory Mode with one processor

D: DRAM DIMM; 16 GB or 32 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)								
Configuration	**Processor 1**							
	8	7	6	5	4	3	2	1
2 DCPMMs and 6 RDIMMs	D	D	D	**P**	**P**	D	D	D

Table 24. Supported DCPMM capacity in Mixed Memory Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM[1]	512 GB DCPMM[2]
2	**6**	**L**		√	√
		M		√	√
		Other		√	

Notes:
1. For 256 GB DCPMM, use 16 GB RDIMM.
2. For 512 GB DCPMM, use 16 GB or 32 GB RDIMM.

Mixed Memory Mode with two processors

Table 25. Memory population order in Mixed Memory Mode with two processors

D: DRAM DIMM; 16 GB or 32 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)																
Configuration	**Processor 2**								**Processor 1**							
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4 DCPMMs and 12 RDIMMs	D	D	D	**P**	**P**	D	D	D	D	D	D	**P**	**P**	D	D	D

Table 26. Supported DCPMM capacity in Mixed Memory Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM[1]	512 GB DCPMM[2]
4	**12**	**L**		√	√
		M		√	√
		Other		√	

Notes:
1. For 256 GB DCPMM, use 16 GB RDIMM.
2. For 512 GB DCPMM, use 16 GB or 32 GB RDIMM. To install four 512 GB DCPMMs, ensure that the processor TDP is lower than or equal to 125 watts.

Memory Mode

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache. Only DCPMM capacity is displayed as system memory in this mode.

Memory Mode with one processor

Table 27. Memory population order in Memory Mode with one processor

D: DRAM DIMM; 16 GB or 32 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)								
Configuration	**Processor 1**							
	8	7	6	5	4	3	2	1
2 DCPMMs and 6 RDIMMs	D	D	D	**P**	**P**	D	D	D

Table 28. Supported DCPMM capacity in Memory Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM[1]	512 GB DCPMM[2]
2	**6**	**L**		√	√
		M		√	√
		Other		√	

Notes:
1. For 256 GB DCPMM, use 16 GB RDIMM.
2. For 512 GB DCPMM, use 16 GB or 32 GB RDIMM.

Memory Mode with two processors

Table 29. Memory population order in Memory Mode with two processors

D: DRAM DIMM; 16 GB or 32 GB RDIMM supported P: DC Persistent Memory Module (DCPMM)																
Configuration	**Processor 2**								**Processor 1**							
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4 DCPMMs and 12 RDIMMs	D	D	D	**P**	**P**	D	D	D	D	D	D	**P**	**P**	D	D	D

Table 30. Supported DCPMM capacity in Memory Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM[1]	512 GB DCPMM[2]
4	**12**	**L**		√	√
		M		√	√
		Other		√	

Notes:
1. For 256 GB DCPMM, use 16 GB RDIMM.
2. For 512 GB DCPMM, use 16 GB or 32 GB RDIMM. To install four 512 GB DCPMMs, ensure that the processor TDP is lower than or equal to 125 watts.

CMOS battery replacement

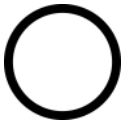
Use this information to remove and install the CMOS battery.

Remove the CMOS battery

Use this information to remove the CMOS battery.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

The following tips describe information that you must consider when removing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to the following instructions.

  Note: In the U.S., call 1-800-IBM-4333 for information about battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

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

S004



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

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

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

S002



CAUTION:

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

Before removing the CMOS battery:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

To remove the CMOS battery, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Locate the CMOS battery. See “System board components” on page 27.

Step 2. Press the battery as shown and carefully lift the CMOS battery out of the socket.

Attention:

- Do not tilt or push the CMOS battery by using excessive force.
- Failing to remove the CMOS battery properly might damage the socket on the system board. Any damage to the socket might require replacing the system board.

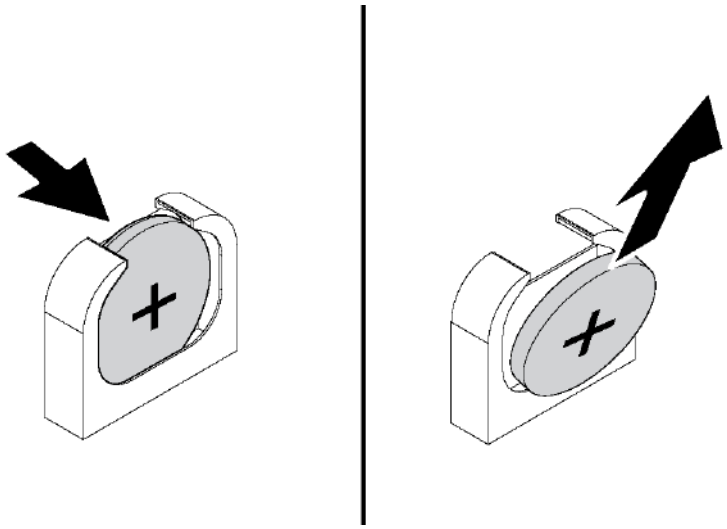


Figure 80. CMOS battery removal

After removing the CMOS battery:

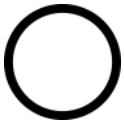
1. Install a new one. See “Install the CMOS battery” on page 113.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Install the CMOS battery

Use this information to install the CMOS battery.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

The following tips describe information that you must consider when installing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you install the CMOS battery, you must adhere to the following instructions.

  Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

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

S004



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

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

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

S002



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

To install the CMOS battery, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Touch the static-protective package that contains the new CMOS battery to any unpainted surface on the outside of the server. Then, take the new CMOS battery out of the package.

Step 2. Install the new CMOS battery as shown. Ensure that the CMOS battery is seated in place.

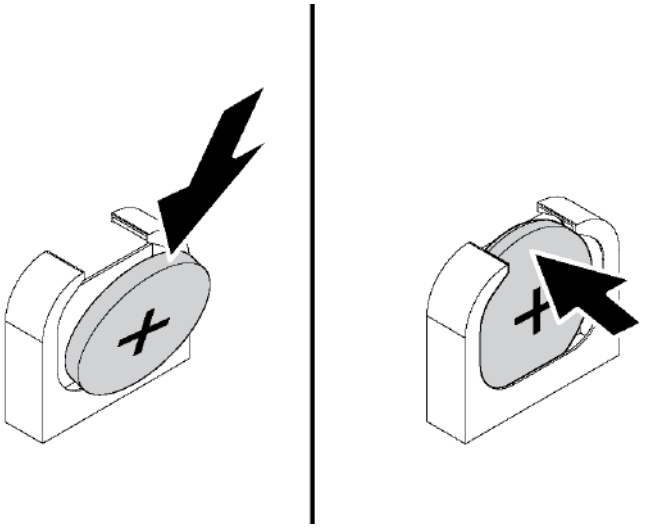


Figure 81. CMOS battery installation

After installing the CMOS battery:

1. Complete the parts replacement. See “Complete the parts replacement” on page 174.
2. Use the Setup utility to set the date, time, and any passwords.

Riser card replacement

Use this information to remove and install a riser card.

Note: Depending on the specific type, your riser card might look different from the illustrations in this topic.

Remove a riser card

Use this information to remove a riser card.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing a riser card:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

To remove a riser card, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

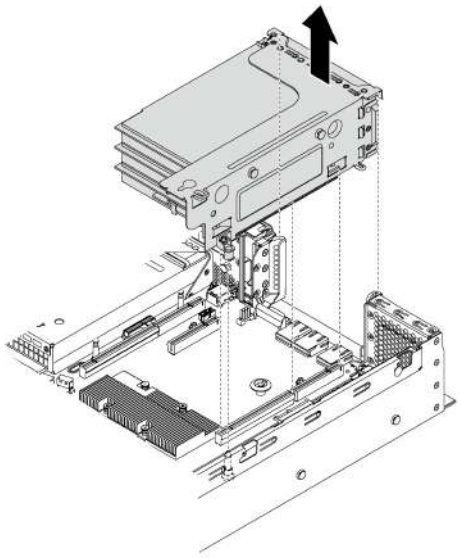


Figure 82. Riser 1 assembly removal

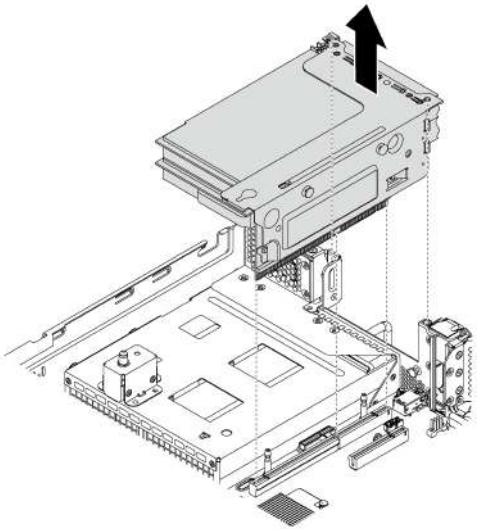


Figure 83. Riser 2 assembly removal

Step 2. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter from the riser assembly” on page 121.

Step 3. Remove the two screws that secure the failing riser card. Then, remove the failing riser card from the bracket.

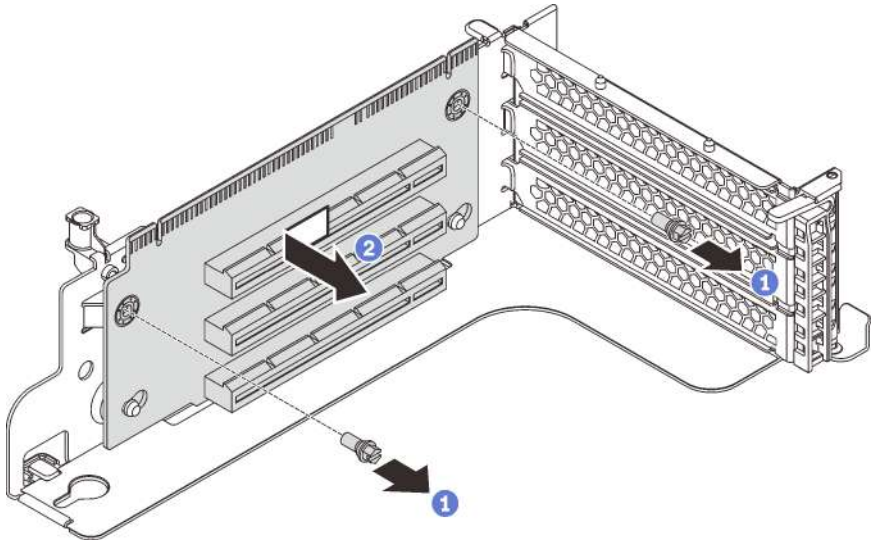
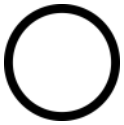


Figure 84. Riser card removal

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

Install a riser card

Use this information to install a riser card.

	“**Read** the installation Guidelines” on page 53	 “**Power off** the server for this task” on page 13	 “**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing a riser card, touch the static-protective package that contains the new riser card to any unpainted surface on the outside of the server. Then, take the new riser card out of the package and place it on a static-protective surface.

To install a riser card, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align the holes in the riser card with the mounting studs on the bracket. Then, install the riser card to the bracket in the direction as shown. Ensure that the screw holes in the riser card align with the corresponding holes in the bracket.

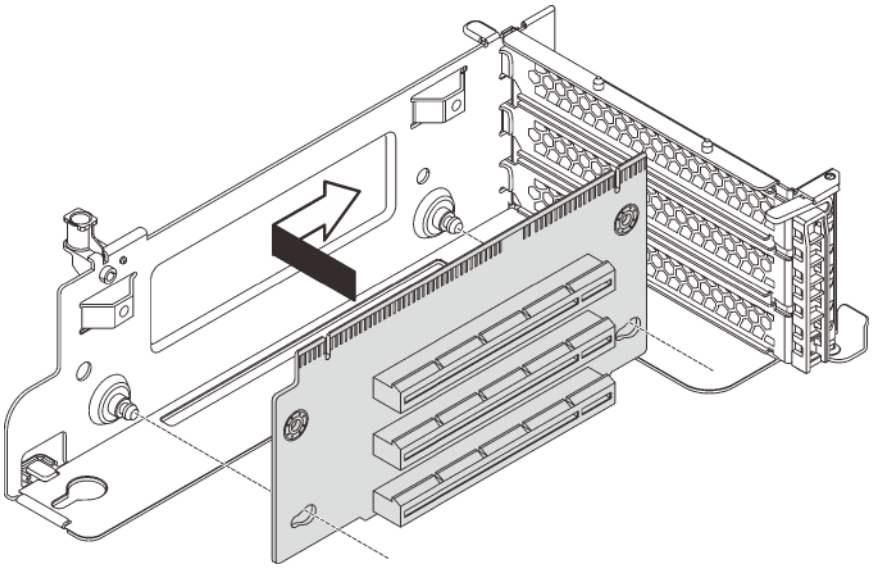


Figure 85. Riser card installation

Step 2. Install the two screws to secure the riser card to the bracket.

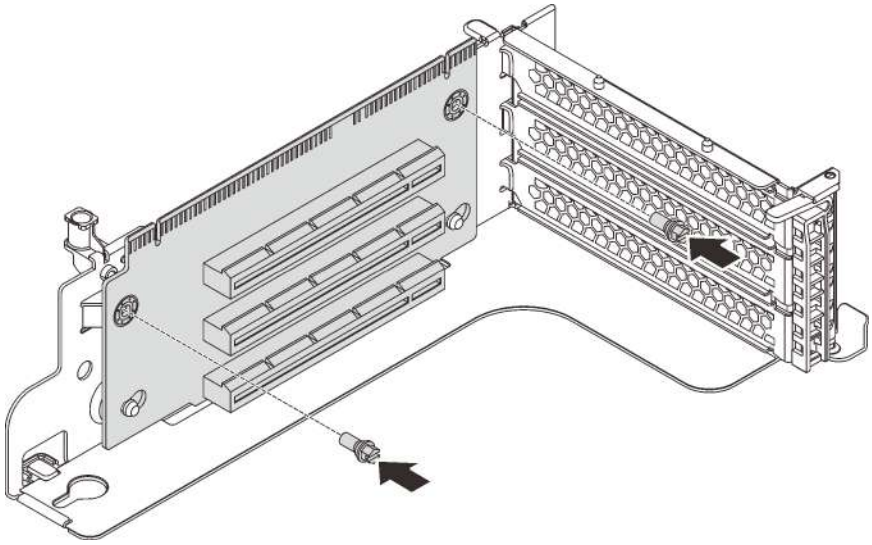


Figure 86. Installing the screws to secure the riser card

After installing the riser card:

1. Refer to your note to reconnect any cables to the removed PCIe adapters.
2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter on the riser assembly” on page 124.
3. Install the riser assembly by doing the following:
   - To install the riser 1 assembly, align the mounting stud on the system board with the corresponding hole in the riser bracket. Meanwhile, align the rear of the riser 1 assembly with the corresponding rail guides in the rear of the chassis. Then, carefully press the riser 1 assembly straight down into the chassis until it is fully seated.

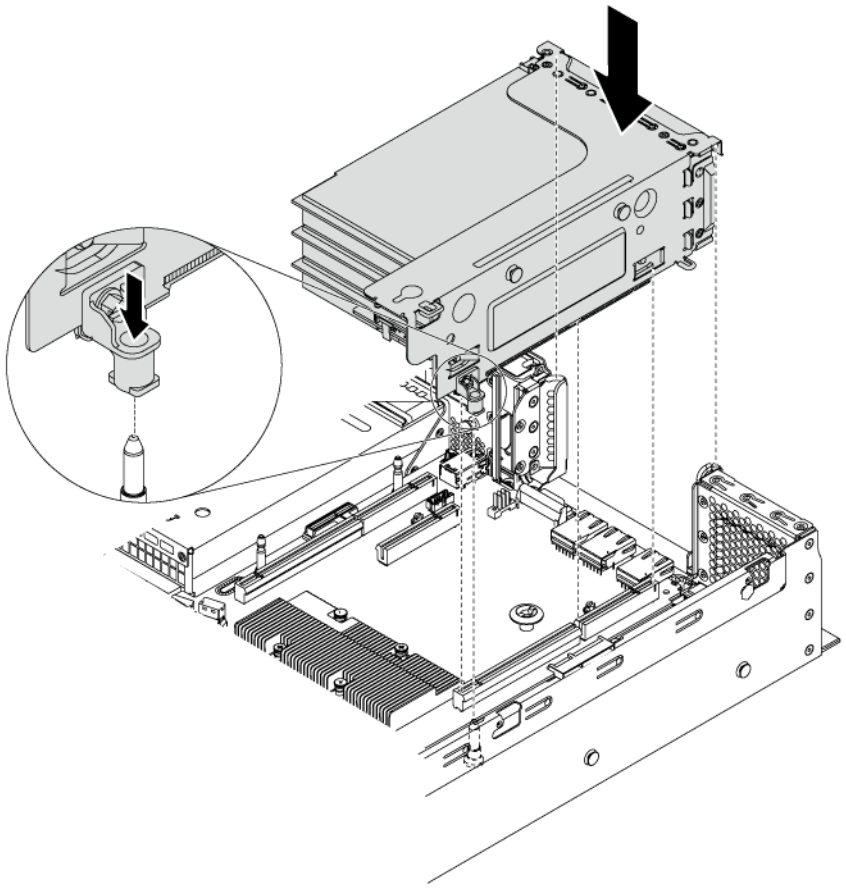


Figure 87. Riser 1 assembly installation

- To install the riser 2 assembly, align the rear of the riser 2 assembly with the corresponding rail guides in the rear of the chassis. Then, carefully press the riser 2 assembly straight down into the chassis until it is fully seated.

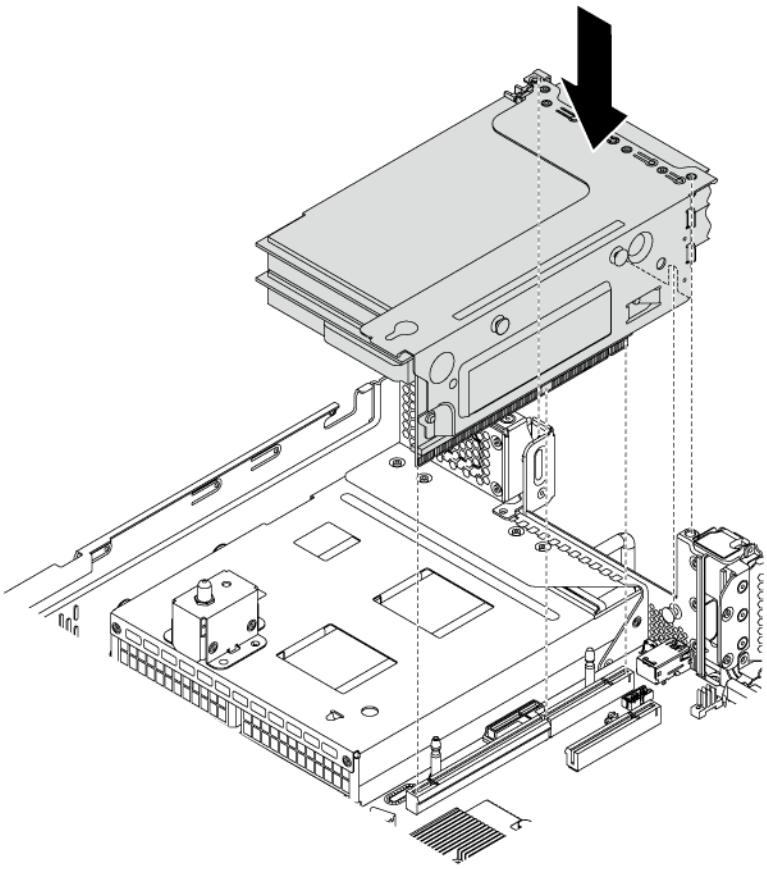


Figure 88. Riser 2 assembly installation

4. Complete the parts replacement. See “Completing the parts replacement” on page 174.

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

The PCIe adapter can be an Ethernet adapter, a host bus adapter, a RAID adapter, a PCIe solid-state drive, or any other supported PCIe adapters. PCIe adapters vary by type, but the installation and removal procedures are the same.

Note: For a list of the supported PCIe adapters, see:
http://www.lenovo.com/us/en/serverproven/

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

This topic contains the following information:

- “Remove a PCIe adapter from the riser assembly” on page 121

- “Remove a PCIe adapter from the system board” on page 122

Remove a PCIe adapter from the riser assembly

Use this information to remove a PCIe adapter from the riser assembly.

	“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13
		“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55
		

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Before removing a PCIe adapter from the riser assembly:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. Record the cable connections on the PCIe adapter and then disconnect all cables from the PCIe adapter.
3. Remove the riser assembly and lay it upside down on a flat, clean, and static-protective surface. See “Remove a riser card” on page 115.

To remove a PCIe adapter from the riser assembly, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Press the tab to pivot the PCIe adapter retention latch to the open position.

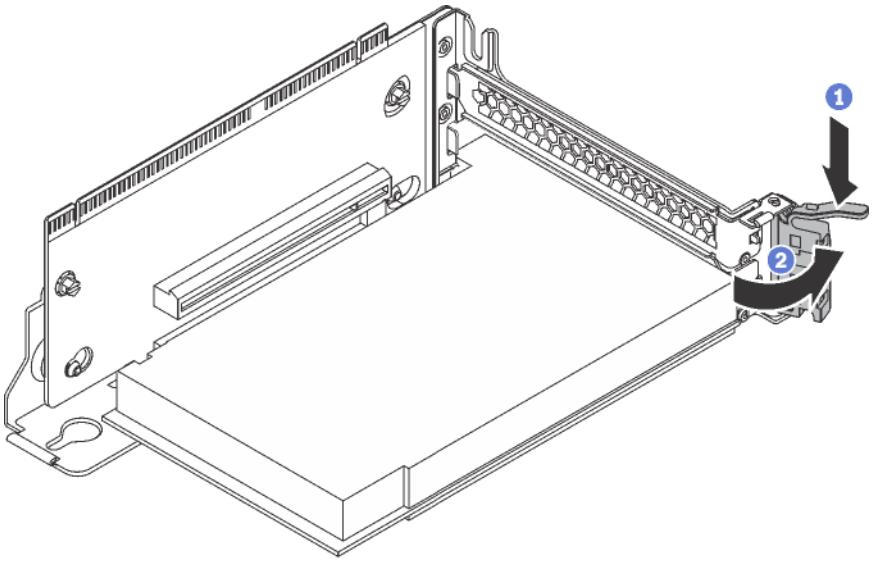


Figure 89. Opening the PCIe adapter retention latch

Step 2. Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Note: The PCIe adapter might fit tightly into the PCIe slot. If necessary, alternatively move each side of the PCIe adapter a small and equal amount until it is removed from the slot.

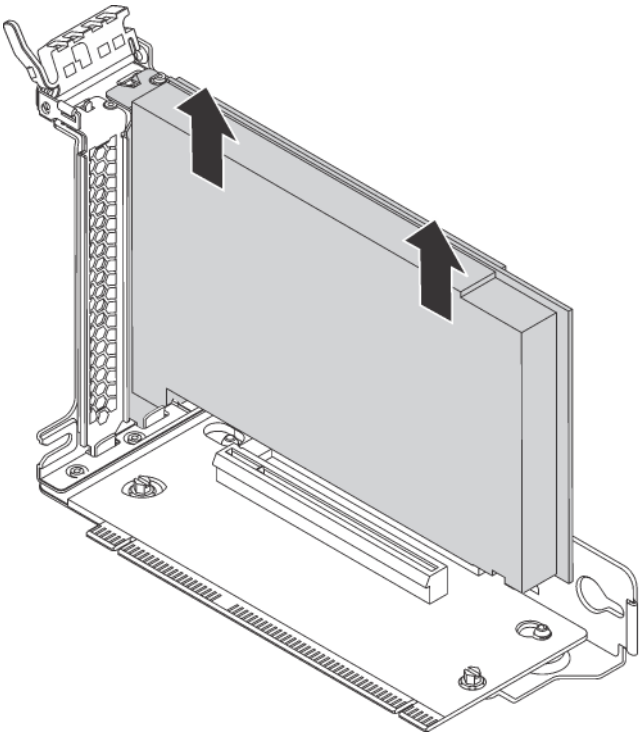


Figure 90. Removing a PCIe adapter from the riser assembly

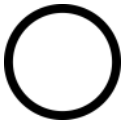
If you are instructed to return the old PCIe adapter, follow all packaging instructions and use any packaging materials that are provided.

Remove a PCIe adapter from the system board

Use this information to remove a PCIe adapter from the system board.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Before removing a PCIe adapter from the system board:

1. Remove the top cover. See "Remove the top cover" on page 67.
2. Record the cable connections on the PCIe adapter and then disconnect all cables from the PCIe adapter.

To remove a PCIe adapter from the system board, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

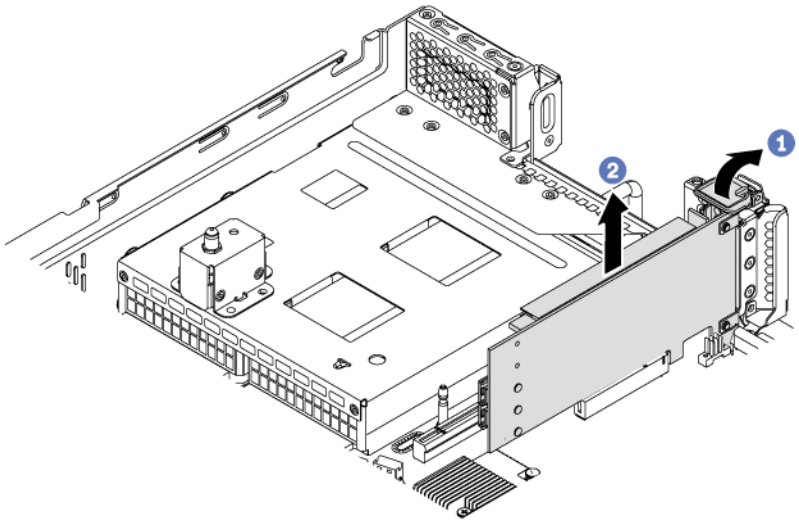


Figure 91. Removing a PCIe adapter from the system board

Step 1. Locate the PCIe slot 4. Then, pivot the PCIe adapter retention latch to the open position.

Step 2. Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

> **Note:** The PCIe adapter might fit tightly into the PCIe slot. If necessary, alternatively move each side of the PCIe adapter a small and equal amount until it is removed from the slot.

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

Install a PCIe adapter

Use this information to install a PCIe adapter on the riser assembly or on the system board.

This topic contains the following information:

- “Install a PCIe adapter on the riser assembly” on page 124
- “Install a PCIe adapter on the system board” on page 126

To identify the PCIe slots of your servers, see “Rear view” on page 22.

Notes:

- Your server supports PCIe slot 5 when two processors are installed.
- PCIe slot 6 does not support PCIe adapters with external mini-SAS HD connectors.
- Use only PCIe adapters provided by Lenovo. Lenovo makes no warranty regarding non-Lenovo products or services. For a list of supported PCIe adapters, see: http://www.lenovo.com/us/en/serverproven/.
- Follow below PCIe slot selection priority when installing an Ethernet adapter or a converged network adapter:

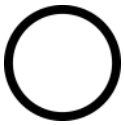
Number of installed processors	PCIe slot selection priority
One processor	4, 2, 6, 3, 1
Two processors	4, 2, 6, 3, 5, 1

Install a PCIe adapter on the riser assembly

Use the following information to install a PCIe adapter on the riser assembly.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Before installing a PCIe adapter on the riser assembly:

1. Touch the static-protective package that contains the new PCIe adapter to any unpainted surface on the outside of the server. Then, take the new PCIe adapter out of the package and place it on a static-protective surface.
2. Locate an appropriate PCIe slot. See "Rear view" on page 22 to identify the PCIe slots of your server.

To install a PCIe adapter on the riser assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

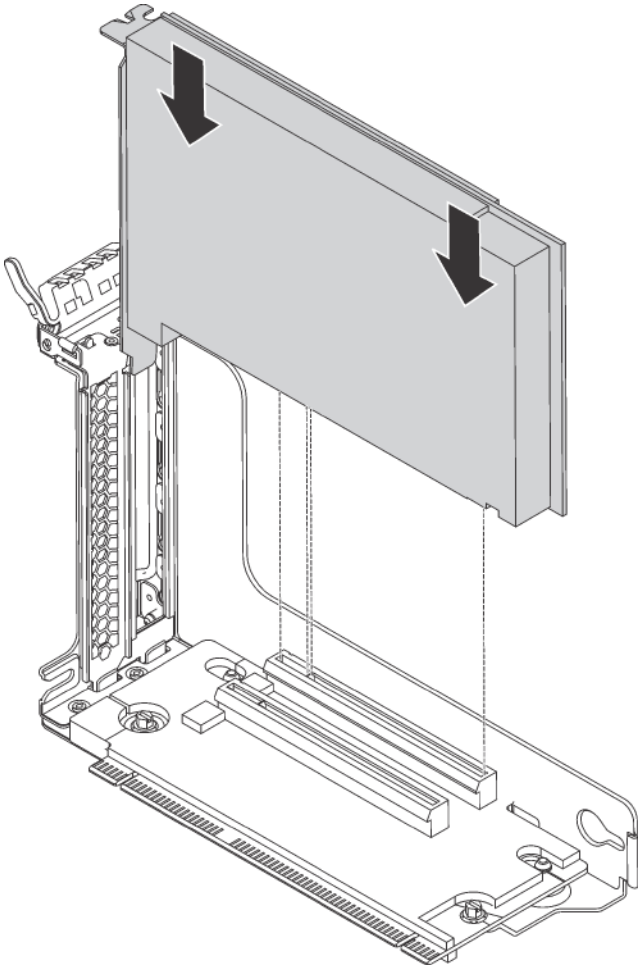


Figure 92. PCIe adapter installation

Note: Carefully handle the PCIe adapter by its edges.

Step 2. Pivot the PCIe adapter retention latch to the closed position.

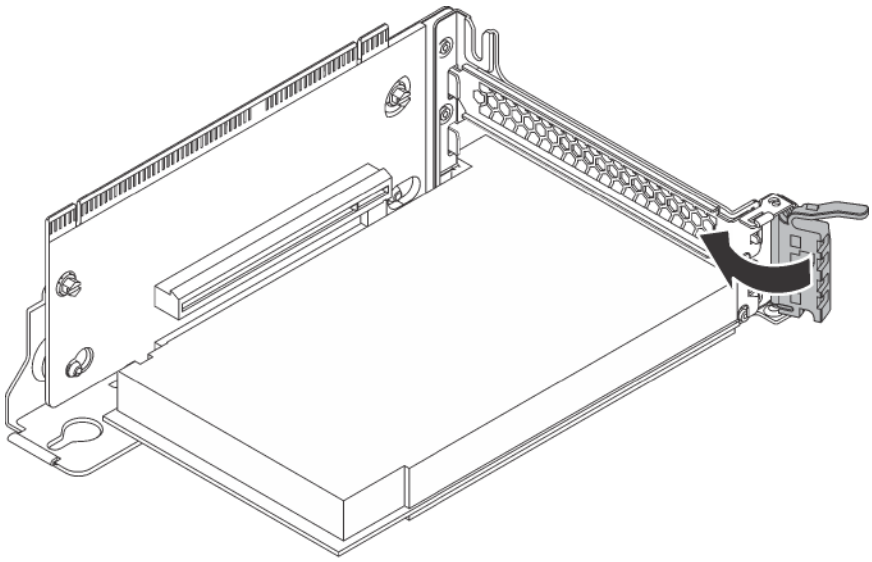


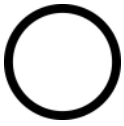
Figure 93. Closing the PCIe adapter retention latch

After installing the PCIe adapter on the riser assembly:

1. Refer to your record to reconnect the cables.
2. Reinstall the riser assembly. See “Install a riser card” on page 117.
3. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Install a PCIe adapter on the system board

Use this information to install a PCIe adapter on the system board.

	“**Read** the installation Guidelines” on page 53	 “**Power off** the server for this task” on page 13	 “**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Before installing the PCIe adapter on the system board:

1. Touch the static-protective package that contains the new PCIe adapter to any unpainted surface on the outside of the server. Then, take the new PCIe adapter out of the package and place it on a static-protective surface.
2. If the new PCIe adapter is installed with a full-height bracket, replace the full-height bracket with the low-profile bracket by doing the following:
   a. Carefully remove the screws that secure the PCIe adapter and then remove the full-height bracket from the PCIe adapter.
   b. Note the orientation and align the screw holes in the low-profile bracket with the corresponding holes in the PCIe adapter. Then, install the screws to secure the bracket to the PCIe adapter.

To install a PCIe adapter on the system board, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align the PCIe adapter with the PCIe slot. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured by the chassis.

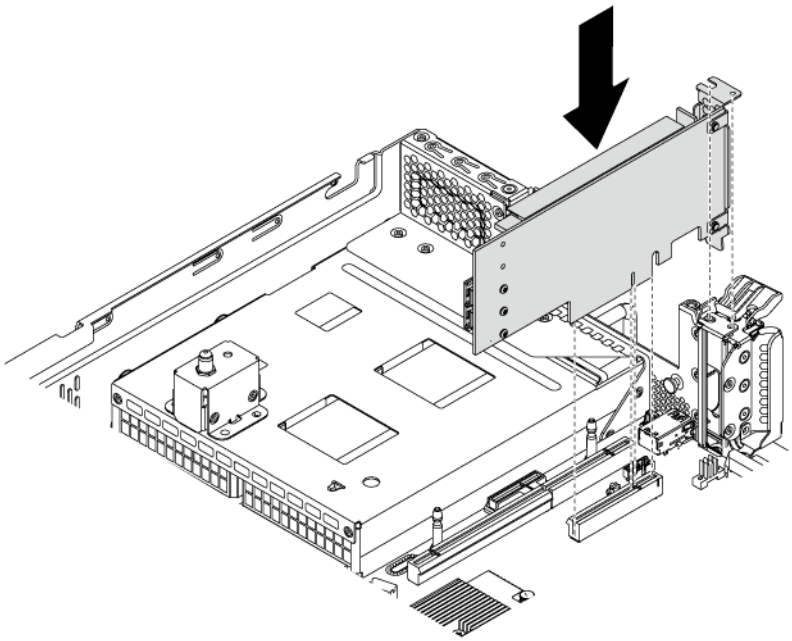


Figure 94. Installing a PCIe adapter on the system board

Step 2. Pivot the PCIe adapter retention latch to the closed position to secure the PCIe adapter in position.

After installing the PCIe adapter on the system board:

1. Refer to your record to reconnect the cables.
2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

Rear hot-swap drive assembly replacement

Use this information to remove and install the rear hot-swap drive assembly.

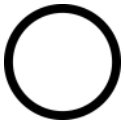
The rear hot-swap drive assembly enables you to install up to two 3.5-inch hot-swap drives in the rear of the server.

Notes:

- The term “hot-swap drive” refers to all the supported types of 3.5-inch hot-swap hard disk drives and hot-swap solid-state drives.
- The rear hot-swap drive assembly is supported only on the server models with twelve 3.5-inch-drive bays in the front of the server.

Remove the rear hot-swap drive assembly

Use this information to remove the rear hot-swap drive assembly.

		
"**Read** the installation Guidelines" on page 53	"**Power off** the server for this task" on page 13	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before removing the rear hot-swap drive assembly:

1. Remove the top cover. See "Remove the top cover" on page 67.
2. Remove the drives or drive fillers installed in the rear hot-swap drive assembly. See "Remove a hot-swap drive" on page 82.

To remove the rear hot-swap drive assembly, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Disconnect the signal cable from the rear hot-swap drive assembly.

Step 2. Grasp the rear hot-swap drive assembly by its edges and carefully lift it straight up and off the chassis.

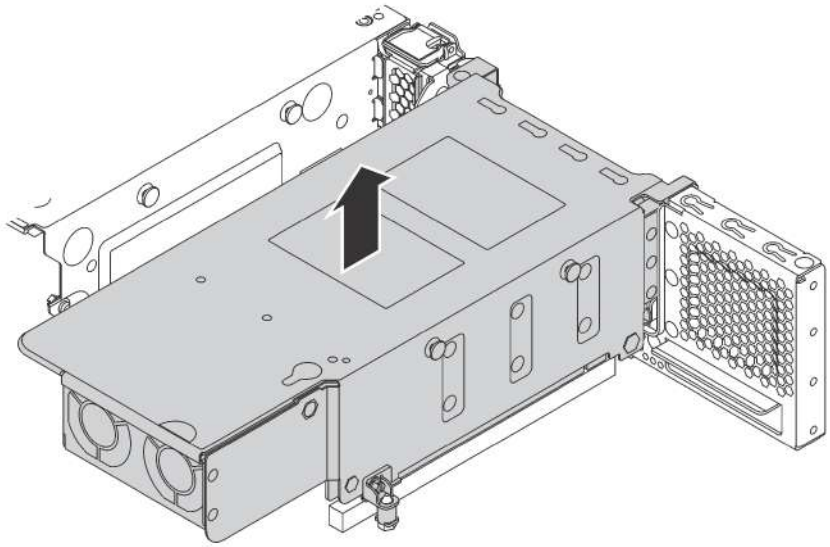
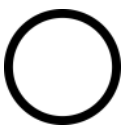


Figure 95. Rear hot-swap drive assembly removal

If you are instructed to return the old rear hot-swap drive assembly, follow all packaging instructions and use any packaging materials that are provided.

Install the rear hot-swap drive assembly

Use this information to install the rear hot-swap drive assembly.

		
"**Read** the installation Guidelines" on page 53	"**Power off** the server for this task" on page 13	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before installing the rear hot-swap drive assembly, touch the static-protective package that contains the new rear hot-swap drive assembly to any unpainted surface on the outside of the server. Then, take the new rear hot-swap drive assembly out of the package and place it on a static-protective surface.

To install the rear hot-swap drive assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Align the mounting stud on the system board with the corresponding hole in the rear hot-swap drive assembly. Meanwhile, align the rear of the rear hot-swap drive assembly with the corresponding rail guides in the rear of the chassis. Then, carefully press the rear hot-swap drive assembly straight down into the chassis until it is fully seated.

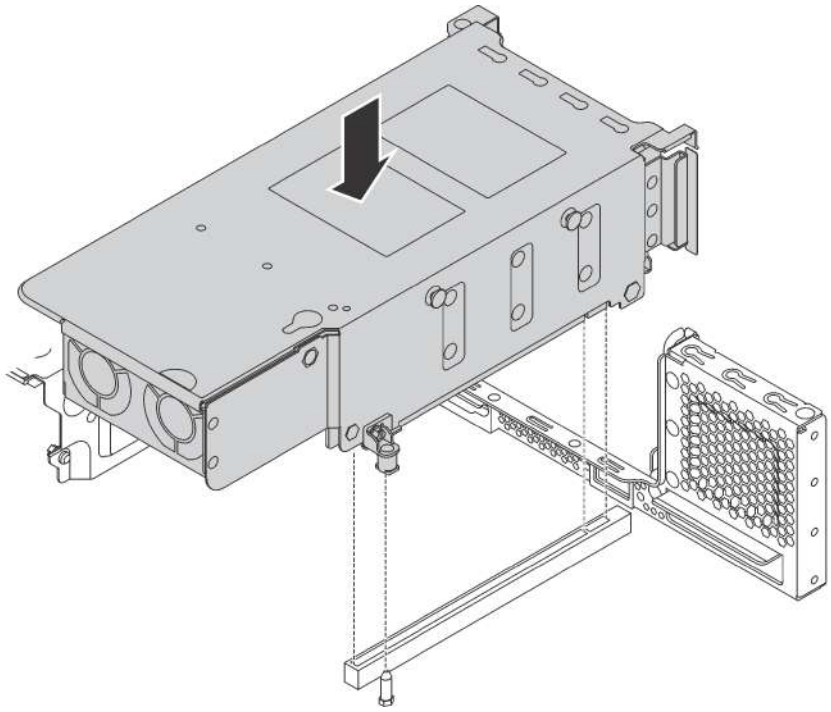


Figure 96. Rear hot-swap drive assembly installation

Step 2. Connect the signal cable of the rear hot-swap drive assembly to the RAID adapter.

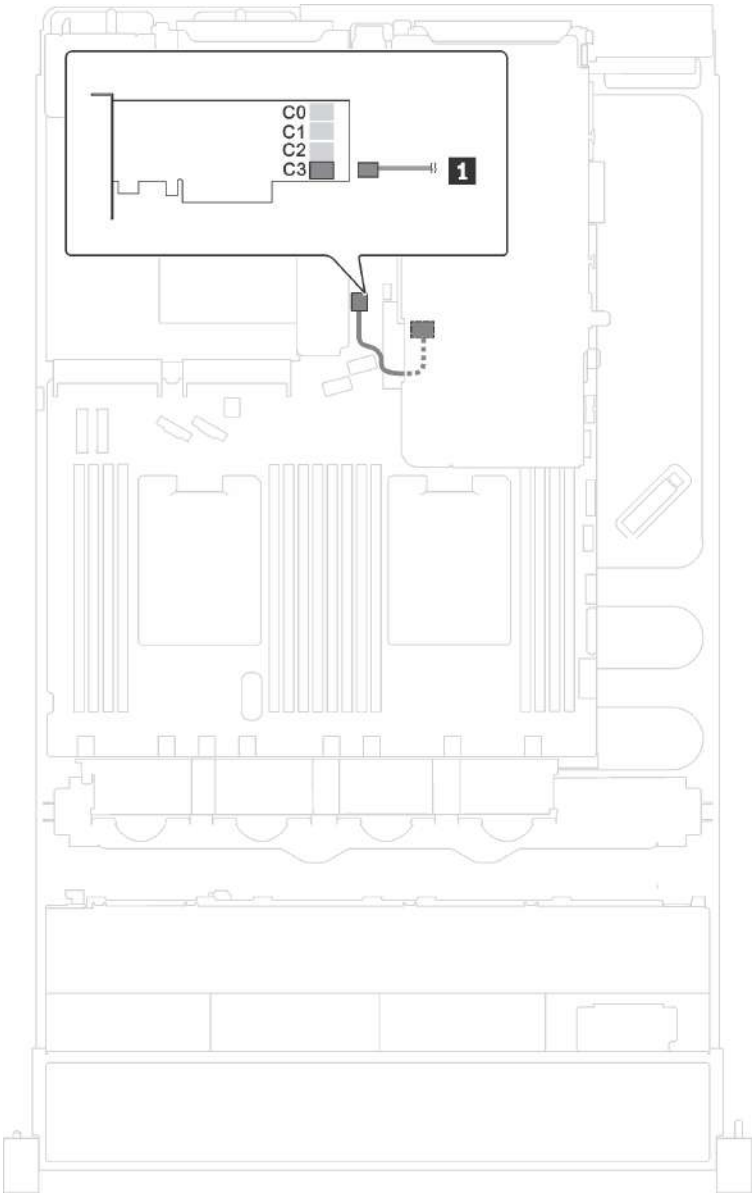


Figure 97. Cable routing for the rear hot-swap drive assembly

After installing the rear hot-swap drive assembly:

1. Reinstall the drives or drive fillers into the rear hot-swap drive assembly. See “Install a hot-swap drive” on page 84.
2. Complete the parts replacement. See “Completing the parts replacement” on page 174.

LOM adapter replacement

Use this information to remove and install the LOM adapter.

Remove the LOM adapter

Use this information to remove the LOM adapter.

“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing the LOM adapter, remove the top cover. See “Remove the top cover” on page 67.

To remove the LOM adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

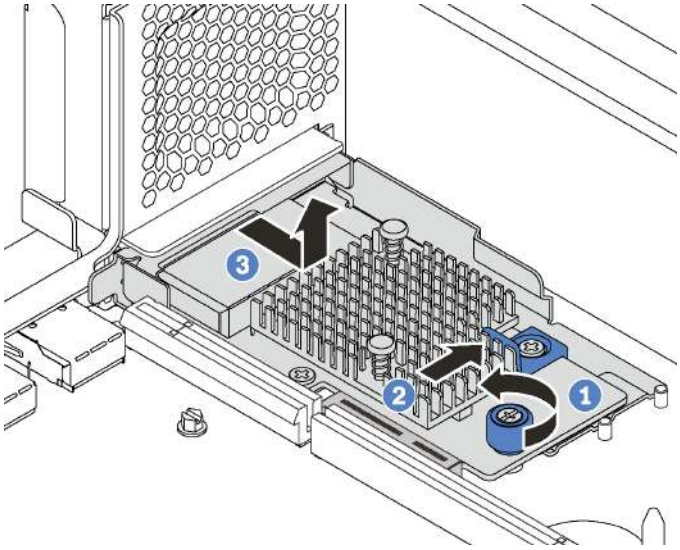


Figure 98. LOM adapter removal

Step 1. Loosen the thumbscrew that secures the LOM adapter.

Step 2. Push the LOM adapter out of the connector on the system board.

Step 3. Slide the LOM adapter as shown and lift the LOM adapter off the server as shown.

If you are instructed to return the old LOM adapter, follow all of the packaging instructions and use any packaging materials that are provided.

Install the LOM adapter

Use this information to install the LOM adapter.

“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before installing the LOM adapter, touch the static-protective package that contains the new LOM adapter to any unpainted surface on the outside of the server. Then, take the new LOM adapter out of the package and place it on a static-protective surface.

To install the LOM adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

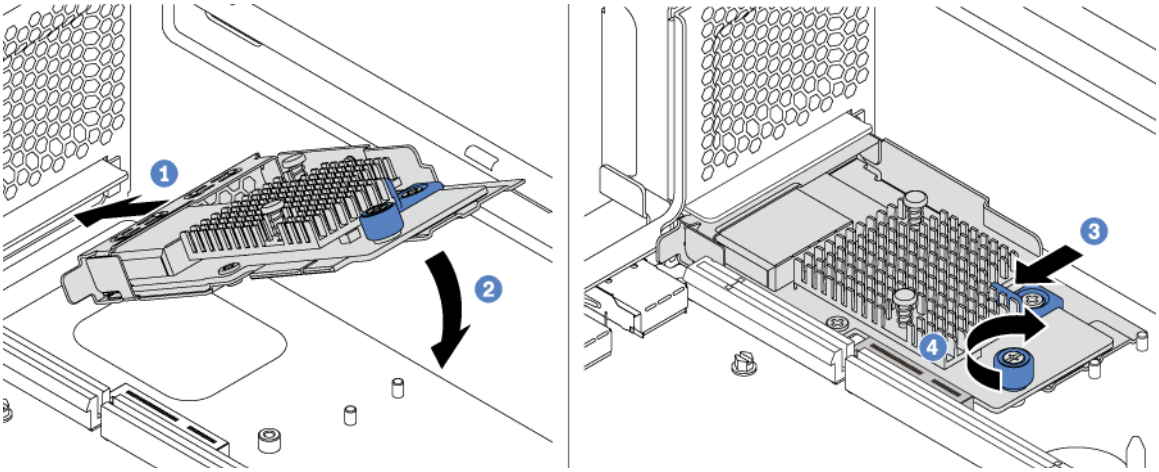


Figure 99. LOM adapter installation

Step 1. Place the LOM adapter into the connector at an angle.

Step 2. Rotate the LOM adapter down.

Step 3. Push the LOM adapter as shown to insert it into the connector on the system board.

Step 4. Tighten the thumbscrew to secure the LOM adapter.

After installing the LOM adapter, complete the parts replacement. See “Completing the parts replacement” on page 174.

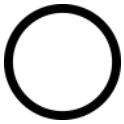
Serial port module replacement

Use this information to remove and install the serial port module.

Note: The serial port module is available only on some models.

Remove the serial port module

Use this information to remove the serial port module.

		
“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing the serial port module, remove the top cover. See “Remove the top cover” on page 67.

To remove the serial port module, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Disconnect the cable of the serial port module from the system board.

Step 2. Open the retention latch and remove the serial port module from the chassis.

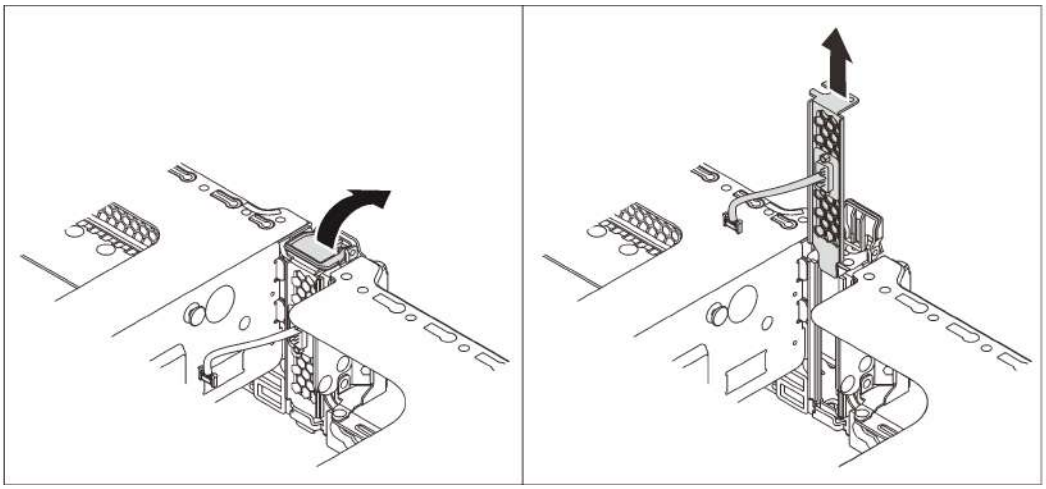


Figure 100. Serial port module removal

After removing the serial port module:

1. Install a new serial port module, a PCIe adapter, or a PCIe slot bracket to cover the place.
2. If you are instructed to return the old serial port module, follow all of the packaging instructions and use any packaging materials that are provided.

Install the serial port module

Use this information to install the serial port module.

	“**Read** the installation Guidelines” on page 53	 “**Power off** the server for this task” on page 13
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55	

Before installing the serial port module:

1. If the slot is covered with a slot bracket, open the retention latch and remove the slot bracket from the chassis. Store the bracket in case that you later remove the serial port module and need the bracket to cover the place.
2. Touch the static-protective package that contains the new serial port module to any unpainted surface on the outside of the server. Then, take the new serial port module out of the package and place it on a static-protective surface.

To install the serial port module, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Install the serial port module into the chassis and close the retention latch to secure it in position.

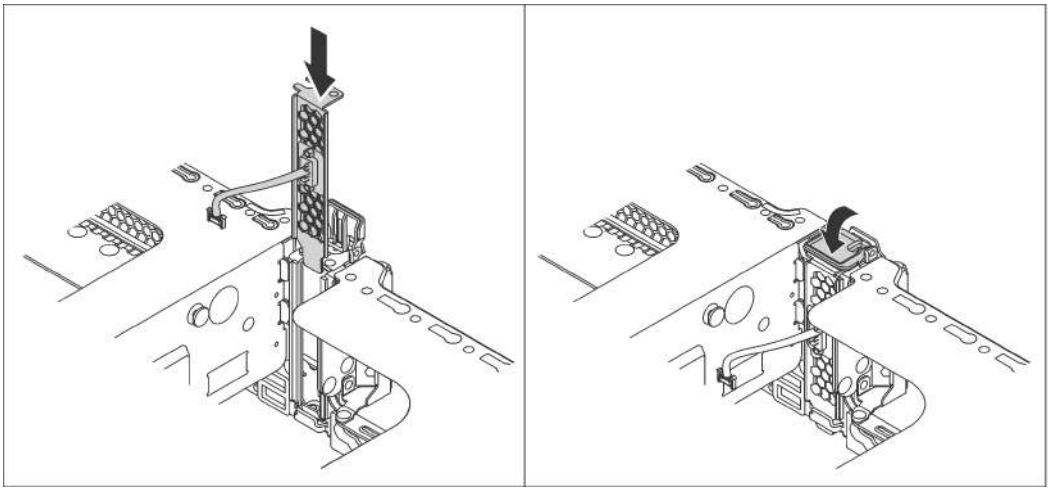


Figure 101. Serial port module installation

Step 2. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module connector, refer to “System board components” on page 27.

After installing the serial port module:

1. Complete the parts replacement. See “Complete the parts replacement” on page 174.
2. To enable the serial port module, do one of the following according to the installed operating system:
   - For Linux operating system:

     Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```
   - For Microsoft Windows operating system:
     a. Open the ipmitool and enter the following command to disable the SOL feature:

        ```
        -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
        ```
     b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

        ```
        Bcdedit /ems no
        ```
     c. Restart the server to ensure that the EMS setting takes effect.

M.2 backplane and M.2 drive replacement

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

Remove the M.2 backplane and M.2 drive

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

“**Read** the installation Guidelines” on page 53	“**Power off** the server for this task” on page 13	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

Before removing the M.2 backplane and M.2 drive:

1. Remove the top cover. See “Remove the top cover” on page 67.
2. For easier operation, remove the riser 2 assembly. See “Remove a riser card” on page 115.
3. For server models with twelve 3.5-inch hot-swap drives, if you are removing the 480 GB or 240 GB M.2 drive, remove the M.2 drive air baffle.

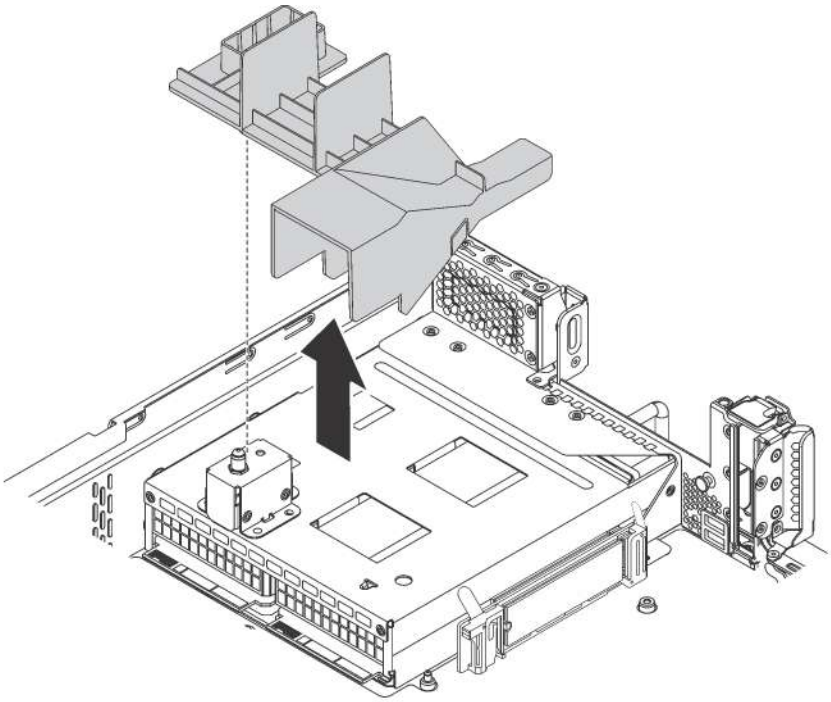


Figure 102. M.2 drive air baffle removal

To remove the M.2 backplane and M.2 drive, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Grasp the M.2 backplane at both ends and pull it straight up to remove it from the system board.

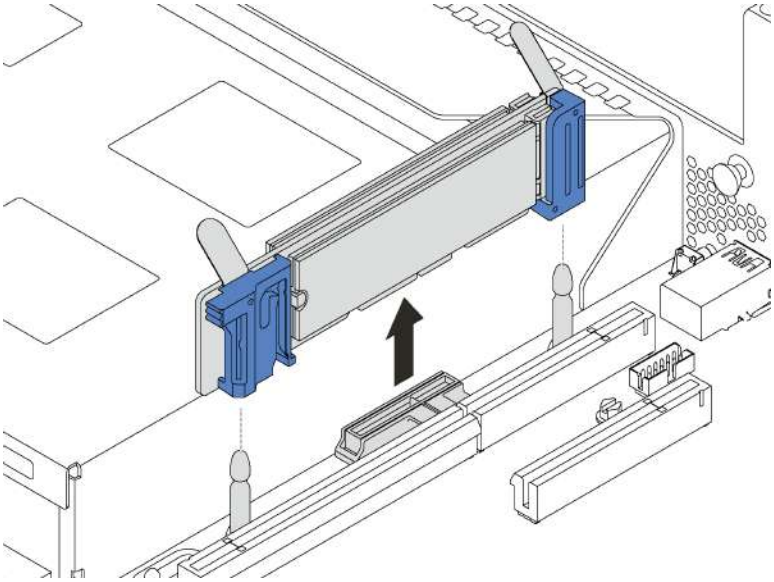


Figure 103. M.2 backplane removal

Step 2. Remove the M.2 drive from the M.2 backplane by doing the following:

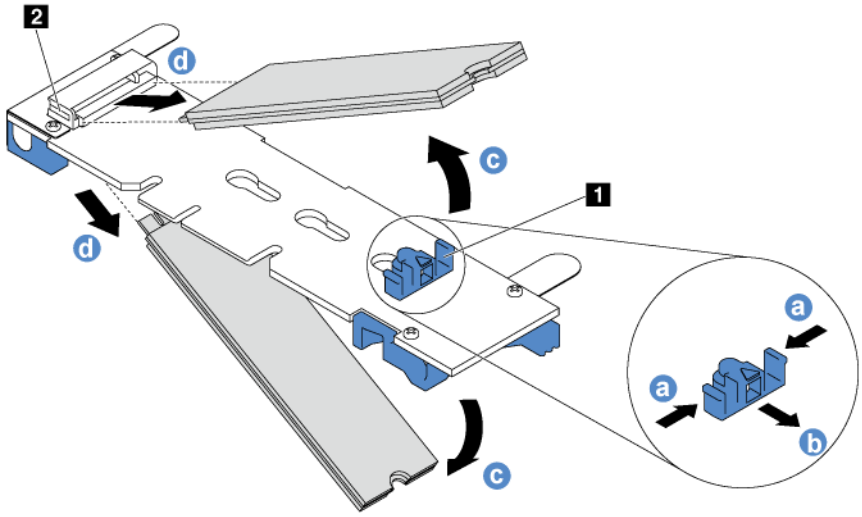


Figure 104. M.2 drive removal

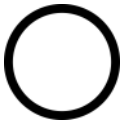
a. Press both sides of the retainer **1**.
b. Slide the retainer backward to loosen the M.2 drive from the M.2 backplane.

   Note: If the M.2 backplane has two M.2 drives, they will both release outward when you slide the retainer backward.
c. Rotate the M.2 drive away from the M.2 backplane.
d. Pull it away from the connector **2** at an angle of approximately 30 degrees.

If you are instructed to return the old M.2 backplane or M.2 drive, follow all of the packaging instructions and use any packaging materials that are provided.

Adjust the retainer on the M.2 backplane

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

	"**Read** the installation Guidelines" on page 53	 "**Power off** the server for this task" on page 13	 "**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before adjusting the retainer on the M.2 backplane, locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.

To adjust the retainer on the M.2 backplane, complete the following steps:

Watch the procedure. A video of the adjustment process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

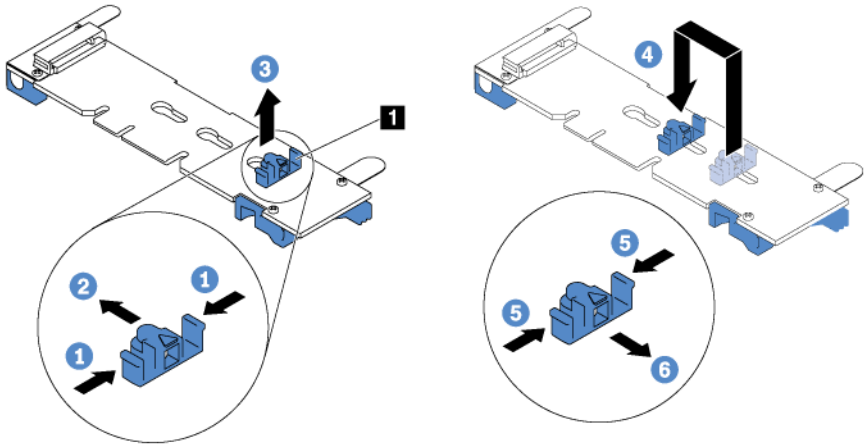
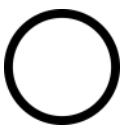


Figure 105. M.2 retainer adjustment

Step 1. Press both sides of the retainer 1.
Step 2. Move the retainer forward until it is in the large opening of the keyhole.
Step 3. Take the retainer out of the keyhole.
Step 4. Insert the retainer into the correct keyhole.
Step 5. Press both sides of the retainer.
Step 6. Slide the retainer backwards until it is seated in place.

Install the M.2 backplane and M.2 drive

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

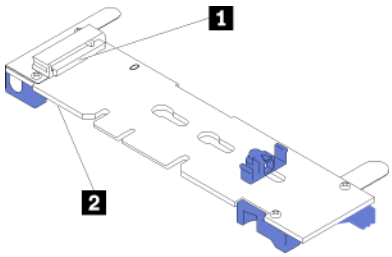
	"**Read** the installation Guidelines" on page 53	 "**Power off** the server for this task" on page 13	 "**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before installing the M.2 backplane and M.2 drive:

1. Touch the static-protective package that contains the new M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the new M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.
2. Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See “Adjust the retainer on the M.2 backplane” on page 137.
3. Locate the connector on each side of the M.2 backplane.

   Notes:

   - Some M.2 backplanes support two identical M.2 drives. When two M.2 drives are installed, align and support both M.2 drives when sliding the retainer forward to secure the M.2 drives.
   - Install the M.2 drive in slot 0 first.



1 Slot 0
2 Slot 1

Figure 106. M.2 drive slot

To install the M.2 backplane and M.2 drive, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

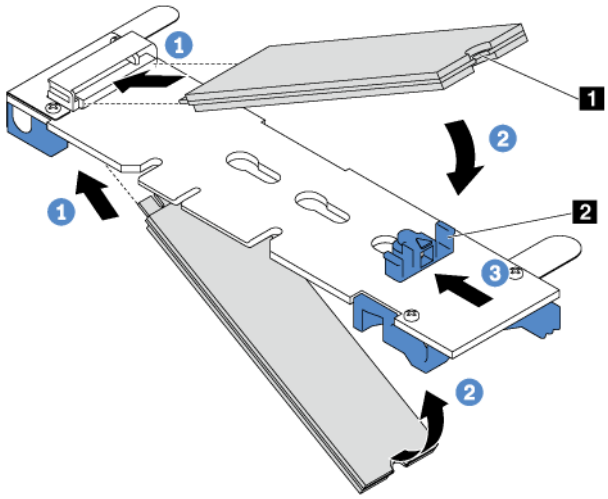


Figure 107. M.2 drive installation

Step 1. Insert the M.2 drive at an angle of approximately 30 degrees into the connector.

Note: If your M.2 backplane supports two M.2 drives, insert the M.2 drives into the connectors at both sides.

Step 2. Rotate the M.2 drive down until the notch 1 catches on the lip of the retainer 2.

Step 3. Slide the retainer forward (toward the connector) to secure the M.2 drive into place.

Attention: When sliding the retainer forward, ensure that the two nubs 3 on the retainer enter the small holes 4 on the M.2 backplane. Once they enter the holes, you will hear a soft “click” sound.

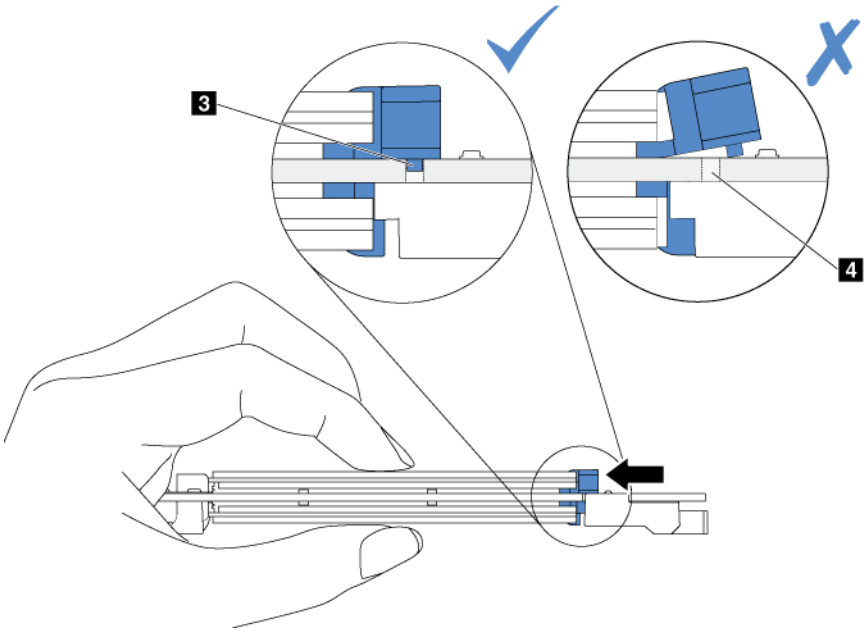


Figure 108. Instruction for sliding the retainer

Step 4. Align the blue plastic supports at each end of the M.2 backplane with the guide pins on the system board. Then, insert the M.2 backplane into the M.2 slot on the system board and press it down to fully seat it.

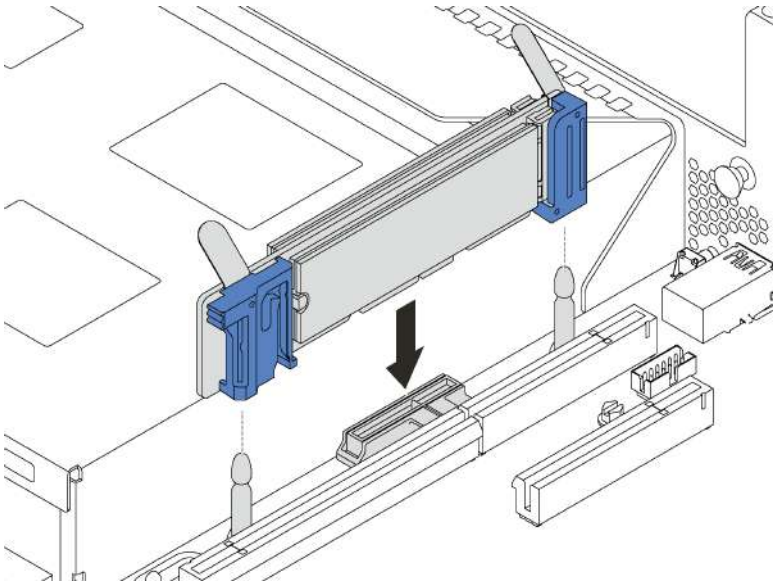


Figure 109. M.2 backplane installation

After installing the M.2 drive and M.2 backplane:

1. For server models with twelve 3.5-inch hot-swap drives, if you are installing the 480 GB or 240 GB M.2 drive, install the M.2 drive air baffle for proper airflow.

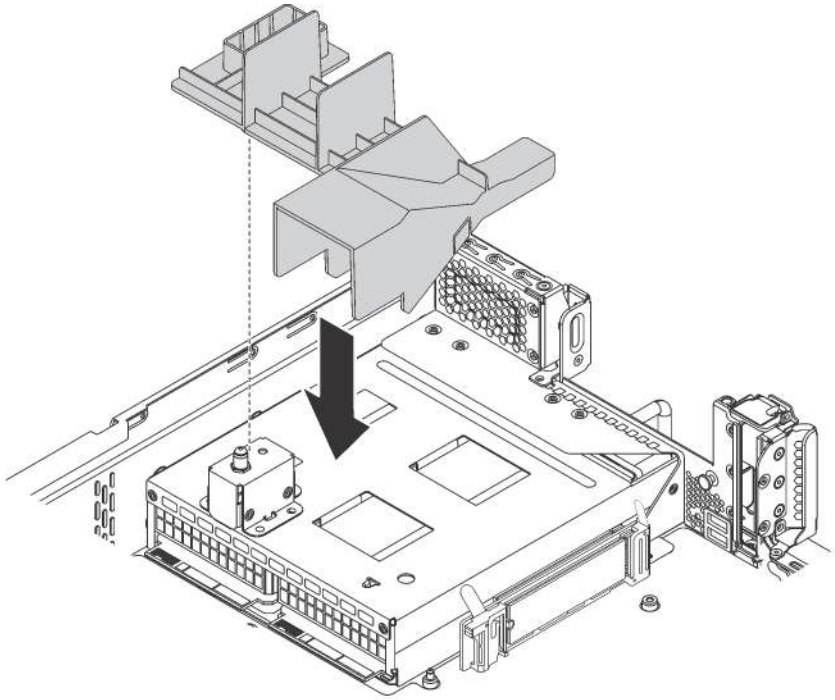


Figure 110. M.2 drive air baffle installation

2. If you have removed the riser 2 assembly, reinstall it. See “Install a riser card” on page 117.
3. Complete the parts replacement. See “Complete the parts replacement” on page 174.

Hot-swap power supply replacement

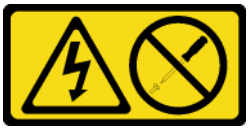
Use this information to remove and install a hot-swap power supply.

Remove a hot-swap power supply

Use this information to remove a hot-swap power supply.

	“**Read** the installation Guidelines” on page 53
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

S035



CAUTION:

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

S002



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

S001



DANGER

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

- **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 any equipment that will be attached to this product to properly wired outlets .**
- **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. 2. Attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. Remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.



Figure 111. Hot-swap power supply label on the cover

Attention: This type of power supply is hot-swap only when two power supplies are installed for redundancy. If only one power supply is installed, you must power off the server first before removing the power supply.

The following tips describe the information that you must consider when you install a power supply with dc input.

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



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

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

S035



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

S019



CAUTION:

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

S029



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 power source.**
- **Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are 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 OFF all power sources and equipment that is to be attached to this product. 2. Attach signal cables to the product. 3. Attach power cords to the product. • For ac systems, use appliance inlets. • For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety. 4. Attach signal cables to other devices. 5. Connect power cords to their sources. 6. Turn ON all the power sources.	1. Turn OFF all power sources and equipment that is to be attached to this product. • For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit. • For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables. 2. Remove the signal cables from the connectors. 3. Remove all cables from the devices.

To remove a hot-swap power supply, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

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

If you have installed the 2U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 2U CMA, do the following:

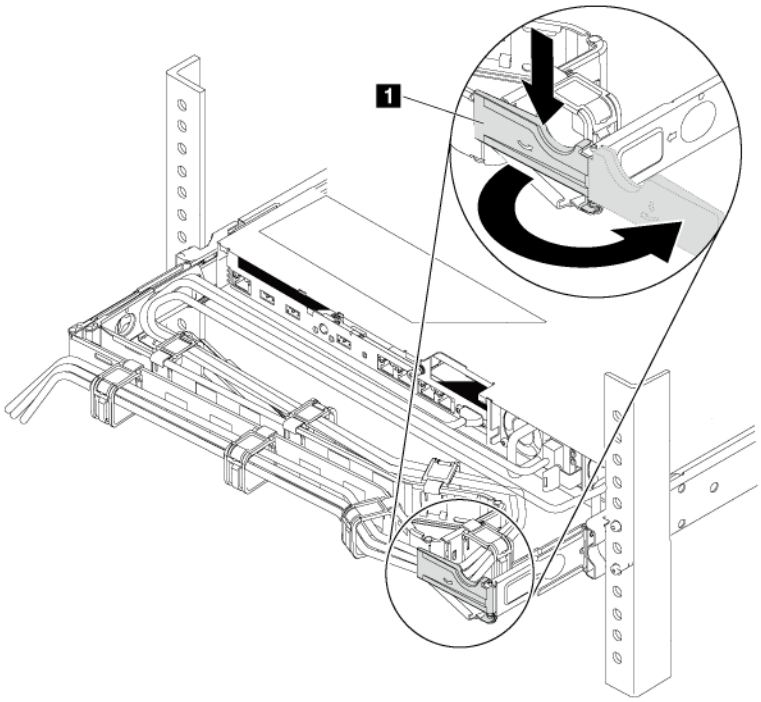


Figure 112. CMA adjustment

a. Press down the stop bracket 1 and rotate it to the open position.
b. Rotate the CMA out of the way to gain access to the power supply.

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

Note: If you are replacing two power supplies, do the power supply replacement one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply is lit. For the location of the power output LED, refer to “Rear view LEDs” on page 24.

Step 3. Press the release tab toward the handle and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

Note:

Slightly pull the power supply upwards when sliding the power supply out of the chassis, if you have installed one of the following CMA kits:

- 2U CMA Upgrade Kit for Toolless Slide Rail
- Toolless Slide Rail Kit with 2U CMA

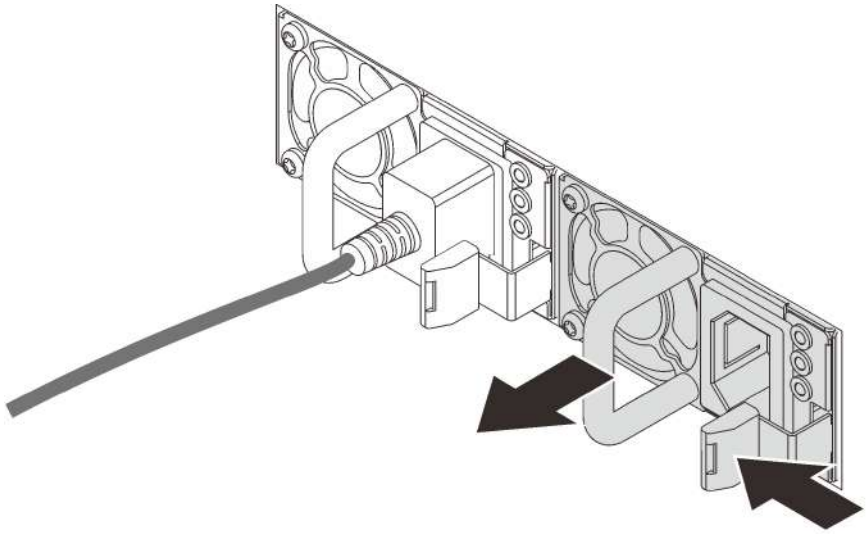


Figure 113. Hot-swap power supply removal

After removing the hot-swap power supply:

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install a hot-swap power supply” on page 145.

   Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply installed; or one has a power supply installed and the other has a power supply filler installed.

2. If you are instructed to return the old hot-swap power supply, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap power supply

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



“**Read** the installation Guidelines” on page 53



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 55

The following tips describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The standard shipping has only one power supply installed in the server. For redundancy and hot-swap support, you must install an additional hot-swap power supply. Certain customized models might be shipped with two power supplies installed.
- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:
  http://www.lenovo.com/us/en/serverproven/

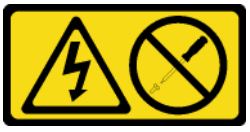
Notes:

- Ensure that the two power supplies installed on the server have the same wattage.
- If you are replacing the existing power supply with a new power supply of different wattage, attach the power information label that comes with this option onto the existing label near the power supply.



Figure 114. Hot-swap power supply label on the cover

S035



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

S002



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

S001



DANGER

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

- **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 any equipment that will be attached to this product to properly wired outlets .**
- **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. 2. Attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. Remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

The following tips describe the information that you must consider when you install a power supply with dc input.

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



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

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

S035



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

S019



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

S029



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 power source.**
- **Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are 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 OFF all power sources and equipment that is to be attached to this product. 2. Attach signal cables to the product. 3. Attach power cords to the product. • For ac systems, use appliance inlets. • For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety. 4. Attach signal cables to other devices. 5. Connect power cords to their sources. 6. Turn ON all the power sources.	1. Turn OFF all power sources and equipment that is to be attached to this product. • For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit. • For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables. 2. Remove the signal cables from the connectors. 3. Remove all cables from the devices.

Before installing a hot-swap power supply, touch the static-protective package that contains the new hot-swap power supply to any unpainted surface on the outside of the server. Then, take the new hot-swap power supply out of the package and place it on a static-protective surface.

To install a hot-swap power supply, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

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

If you have installed the 2U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 2U CMA, do the following:

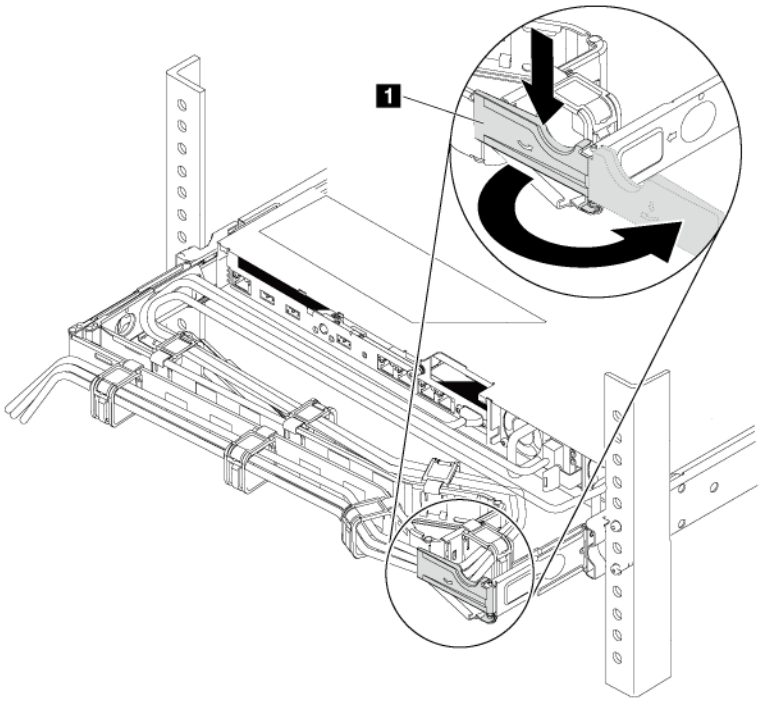


Figure 115. CMA adjustment

a. Press down the stop bracket 1 and rotate it to the open position.
b. Rotate the CMA out of the way to gain access to the power supply bay.

Step 2. If there is a power-supply filler installed, remove it.

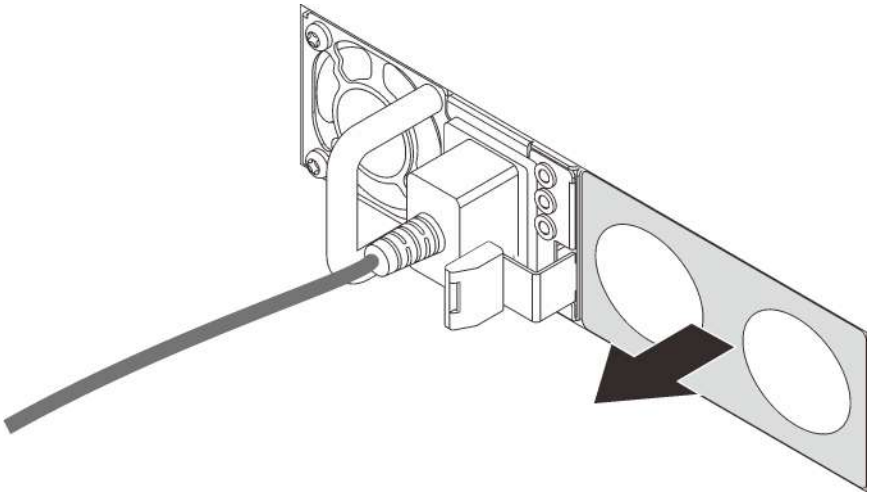


Figure 116. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

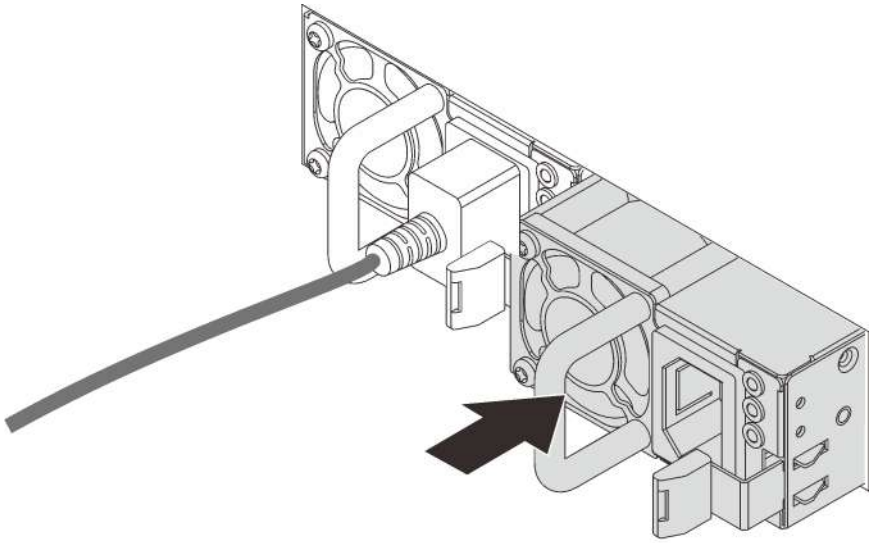


Figure 117. Hot-swap power supply installation

After installing the hot-swap power supply:

1. Connect one end of the power cord to the new power supply connector; then, connect the other end of the power cord into a properly grounded electrical outlet.
2. If the server is powered off, power on the server. Ensure that both the power input LED and the power output LED on the power supply are lit, indicating that the power supply is operating properly.

TCM/TPM adapter replacement (for Chinese Mainland only)

Use this information to remove and install the TCM/TPM adapter (sometimes called a daughter card).

Remove the TCM/TPM adapter (for Chinese Mainland only)

Use this information to remove the TCM/TPM adapter.

		
"**Read** the installation Guidelines" on page 53	"**Power off** the server for this task" on page 13	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before removing the TCM/TPM adapter, remove the top cover. See "Remove the top cover" on page 67.

To remove the TCM/TPM adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Locate the TCM/TPM connector on the system board.

Step 2. Press and hold the release latch, and then lift the TCM/TPM adapter straight up.

Notes:

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

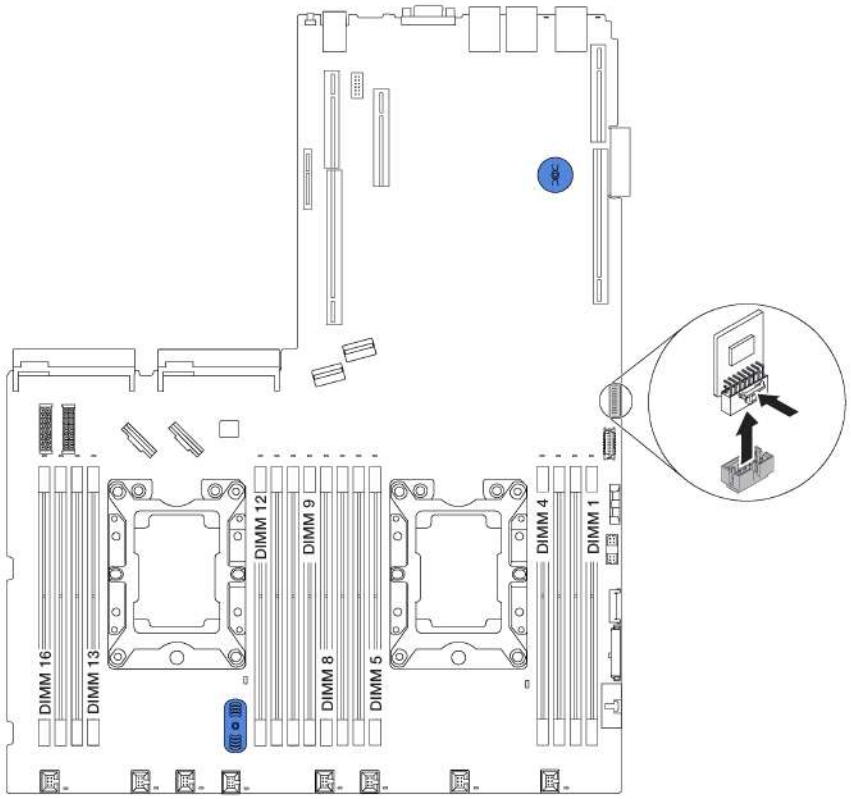
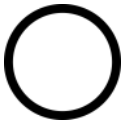


Figure 118. TCM/TPM adapter removal

If you are instructed to return the old TCM/TPM adapter, follow all packaging instructions and use any packaging materials that are provided.

Install the TCM/TPM adapter (for Chinese Mainland only)

Use this information to install the TCM/TPM adapter.

	"**Read** the installation Guidelines" on page 53	 "**Power off** the server for this task" on page 13
	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55	

Before installing the TCM/TPM adapter, touch the static-protective package that contains the new TCM/TPM adapter to any unpainted surface on the outside of the server. Then, take the new TCM/TPM adapter out of the package and place it on a static-protective surface.

To install the TCM/TPM adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Locate the TCM/TPM connector on the system board.

Step 2. Insert the TCM/TPM adapter into the TCM/TPM connector on the system board.

Notes:

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

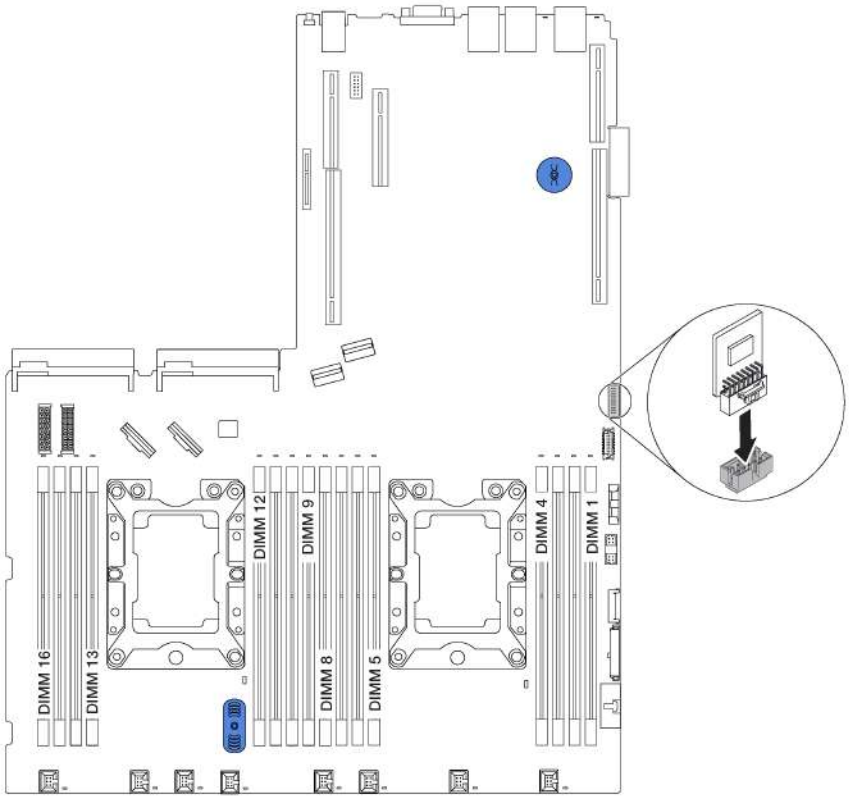


Figure 119. TCM/TPM adapter installation

After installing the TCM/TPM adapter, complete the parts replacement. See “Complete the parts replacement” on page 174.

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) and gray thermal grease (part number 41Y9292).
- Intel® Xeon® SP Gen 2 processors are supported on the system board with part number 01PE845. If you use the system board with part number 00MX680, update your system firmware to the latest level before installing an Intel® Xeon® SP Gen 2 e processor. Otherwise, the system cannot be powered on.

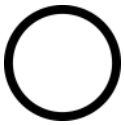
Important: The processor in your server can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating 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

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.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Attention:

- Intel® Xeon® SP Gen 2 processors are supported on the system board with part number 01PE845. If you use the system board with part number 00MX680, update your system firmware to the latest level before installing an Intel® Xeon® SP Gen 2 processor. Otherwise, the system cannot be powered on.
- 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 removing 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 top cover. See "Remove the top cover" on page 67.
2. Remove the air baffle. See "Remove the air baffle" on page 73.

3. Remove any parts and disconnect any cables that might impede your access to the PHM.

To remove a PHM, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

Step 1. Remove the PHM from the system board.

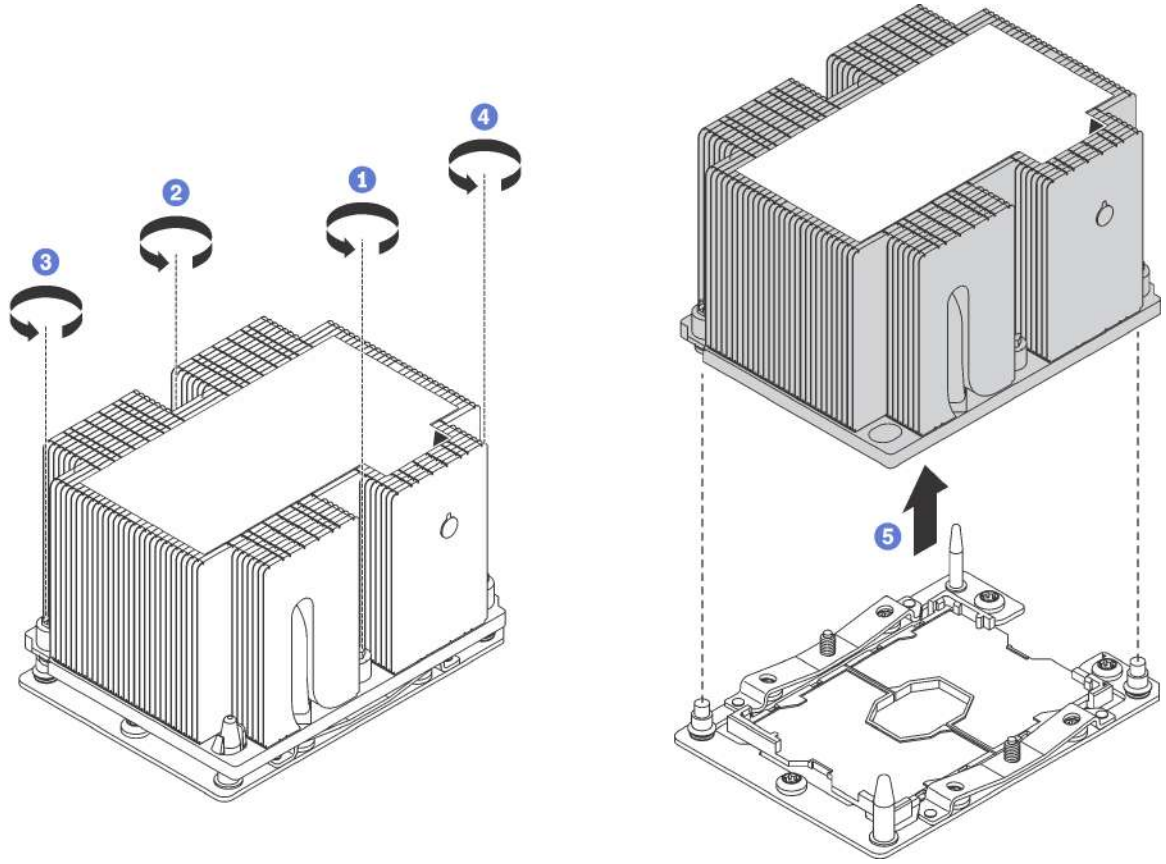


Figure 120. Removing a PHM

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 removing a PHM:

- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are removing the PHM, remove the fan 4 after you remove the PHM. Then, install a fan filler to cover the place.
- If you are replacing the processor or heat sink, separate the processor and its retainer from the heat sink.

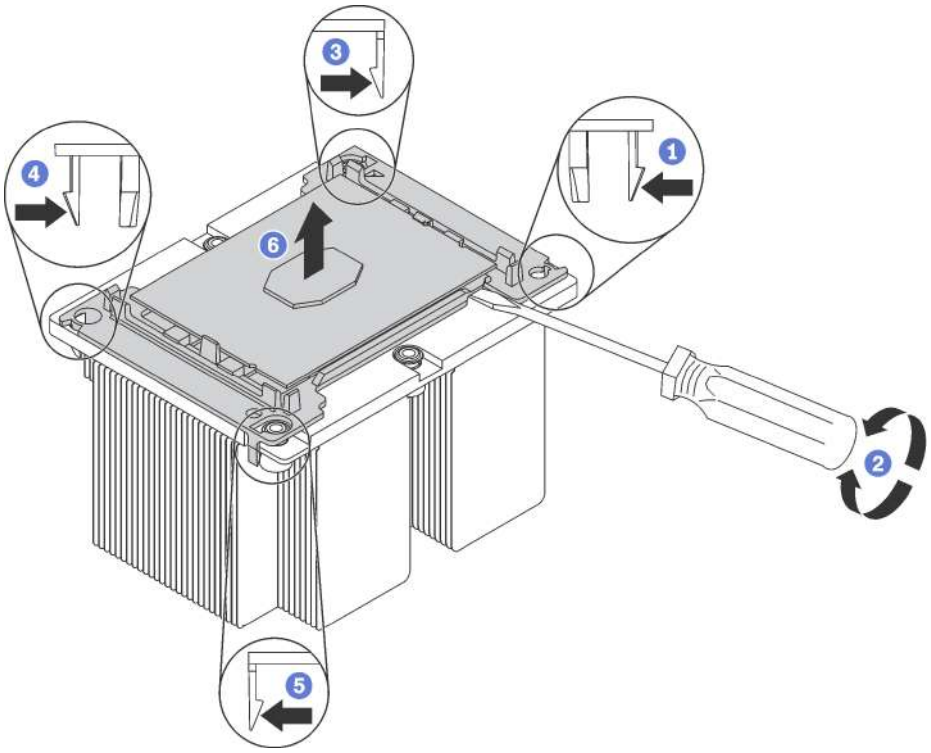


Figure 121. Separating a heat sink from a processor

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 old 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" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Attention:

- Intel® Xeon® SP Gen 2 processors are supported on the system board with part number 01PE845. If you use the system board with part number 00MX680, update your system firmware to the latest level before installing an Intel® Xeon® SP Gen 2 processor. Otherwise, the system cannot be powered on.
- 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 be of the same type, and have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See "Update the firmware" in the *ThinkSystem SR590 Setup Guide*.
- Installing an additional PHM can change the memory requirements for your system. See for a list of processor-to-memory relationships.
- When you install a processor, follow below rules to select a heat sink:
  - If you are going to install a processor with TDP lower than or equal to 125 watts, use the heat sink with part number 01KP655 or 01KP654.
  - If you are going to install one of the following processors, use the heat sink with part number 01KP652 or 01KP653:
    - Processor with TDP higher than 125 watts and lower than or equal to 150 watts
    - Intel Xeon® 5120T, 5122, 6126T, 6128, 6130T, 6138T, or 8156 processor
- 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 154.

   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.

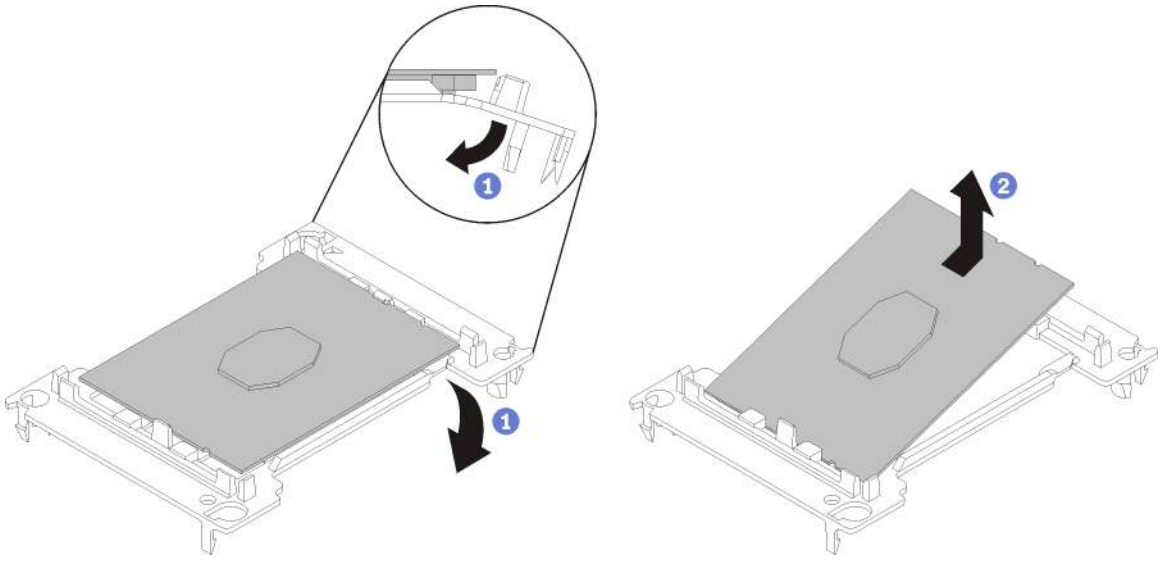


Figure 122. Removing a processor retainer

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.

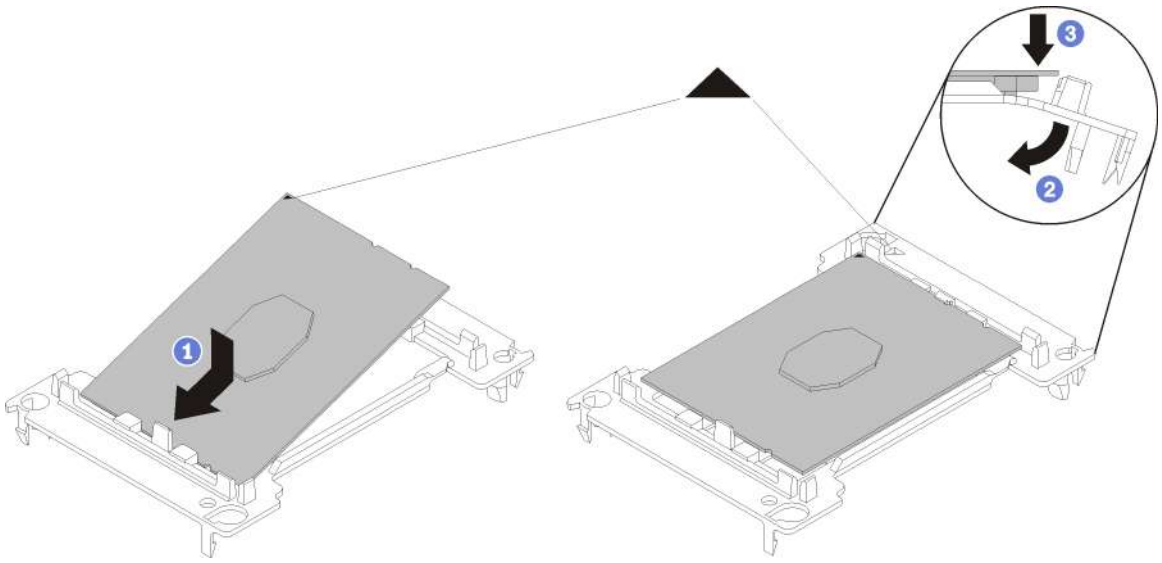


Figure 123. Installing a processor retainer

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.

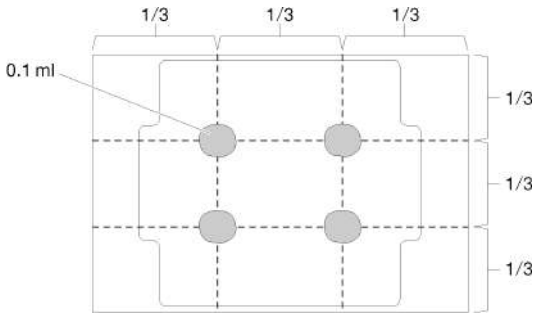


Figure 124. Thermal grease application

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.

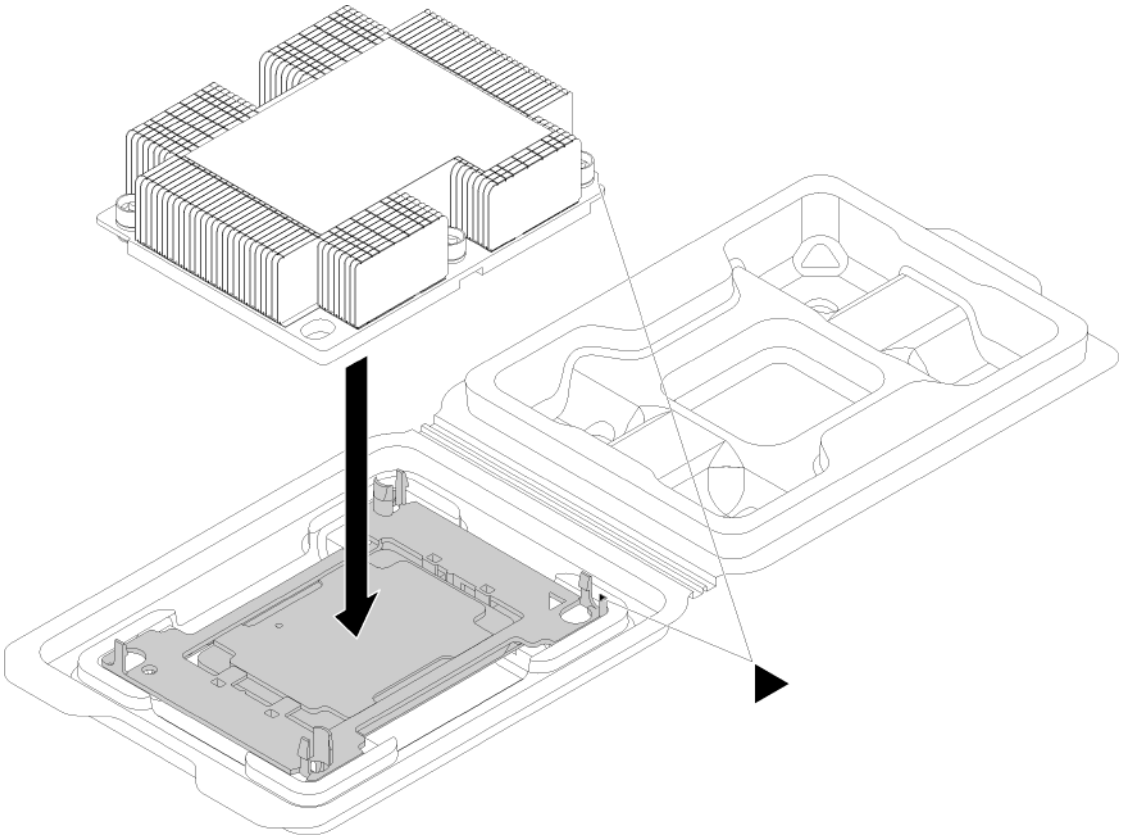


Figure 125. Assembling a PHM in the shipping tray

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.

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.

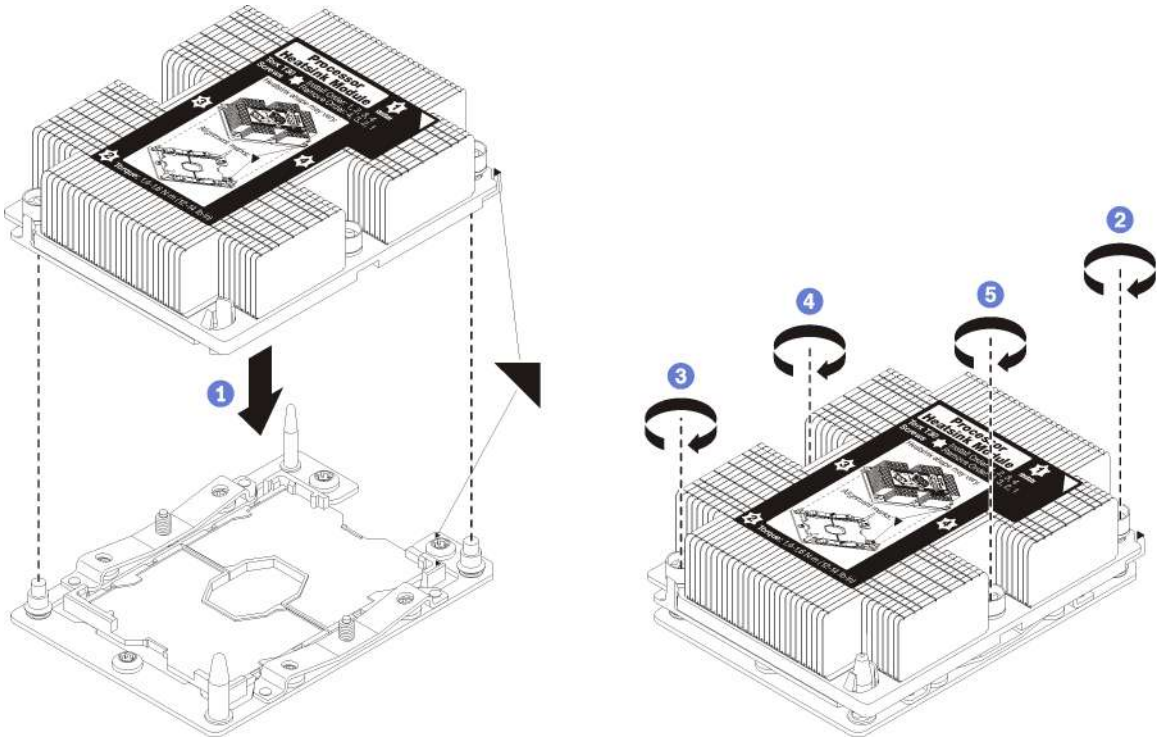


Figure 126. Installing a PHM

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:

System board replacement

Use this information to remove and install the system board.

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

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

S017



CAUTION:
Hazardous moving fan blades nearby.

S012



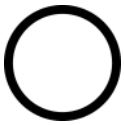
CAUTION:
Hot surface nearby.

Remove the system board

Use this information to remove the system board.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION:**
Static Sensitive Device
Ground package before opening" on page 55

Before removing the system board:

1. Remove the top cover. See "Remove the top cover" on page 67.
2. Remove the air baffle. See "Remove the air baffle" on page 73.
3. Record where the cables are connected to the system board; then, disconnect all the cables.

   Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board. Any damage to the cable connectors may require replacing the system board.
4. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place. See the related topics in this chapter.
   - System fans
   - Processor-heat-sink module (PHM)

     Note: Do not disassemble the PHM.
   - DIMMs
   - LOM adapter
   - M.2 backplane
   - Riser assemblies
   - CMOS battery
   - TCM/TPM (only available in Chinese Mainland)
5. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.
6. Remove the cable holder.

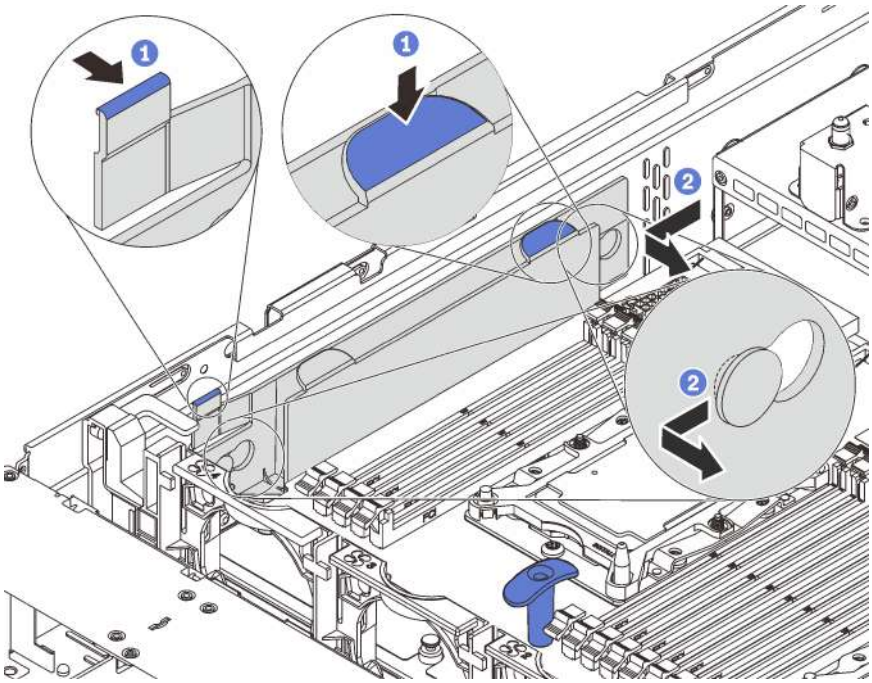


Figure 127. Cable holder removal

To remove the system board, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

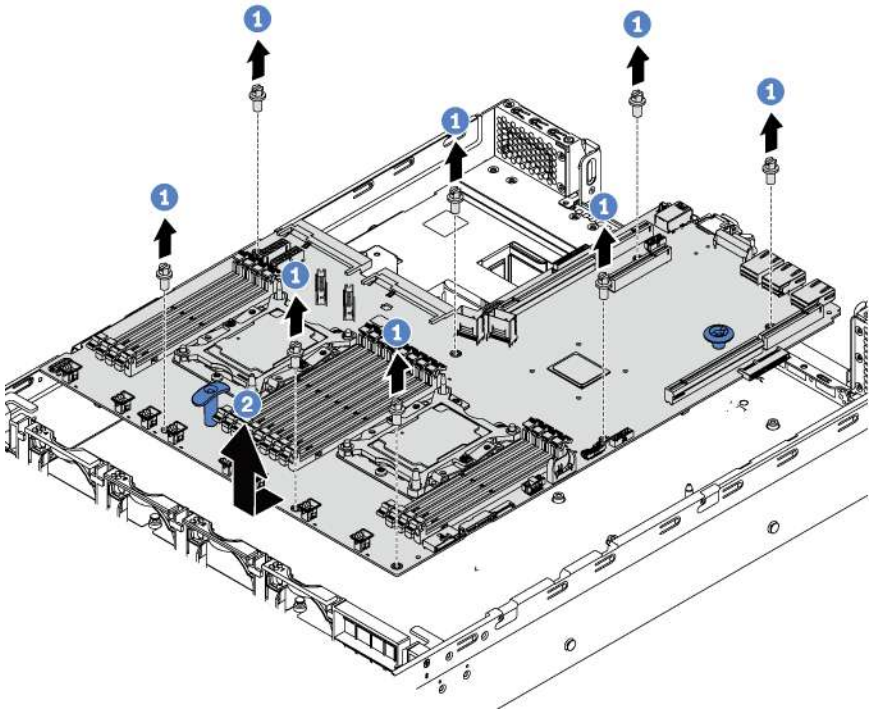


Figure 128. System board removal

Step 1. Remove the eight screws that secure the system board, and put the screws in a safe place.

Step 2. Hold the blue lift handles on the system board, slightly pull the system board towards the front of the server, and lift the system board upwards. Then, remove the system board from the server carefully.

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

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

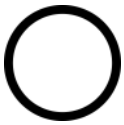
1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a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

Install the system board

Use this information to install the system board.



"**Read** the installation Guidelines" on page 53



"**Power off** the server for this task" on page 13



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 55

Before installing the system board, touch the static-protective package that contains the new system board to any unpainted surface on the outside of the server. Then, take the new system board out of the package and place it on a static-protective surface.

To install the system board, complete the following steps:

Watch the procedure. A video of the installation process is available:
- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CWR-jaBNs-3tuilrybHfUJ
- Youku: http://list.youku.com/albumlist/show/id_51276393

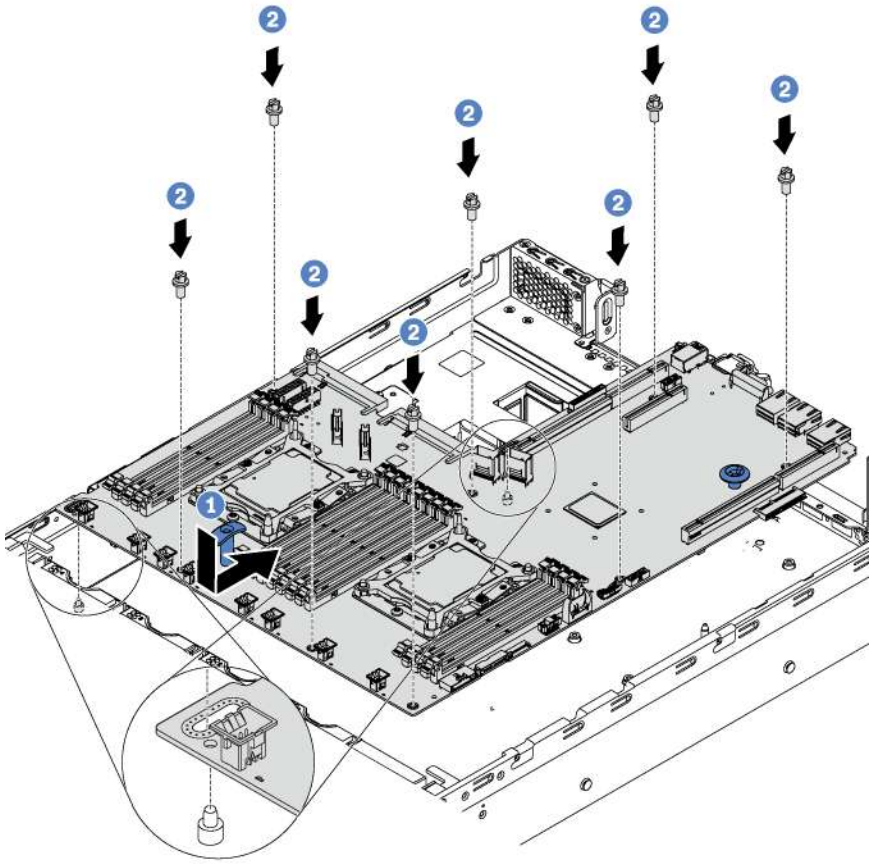


Figure 129. System board installation

Step 1. Hold the blue lift handles on the system board carefully and align the two holes in the system board with the corresponding mounting studs on the chassis as shown. Then, slide the system board to the rear of the server. Ensure that the rear connectors on the new system board are inserted into the corresponding holes in the rear panel.

Step 2. Install the eight screws to secure the system board.

After installing the system board:

1. Reinstall the cable holder.

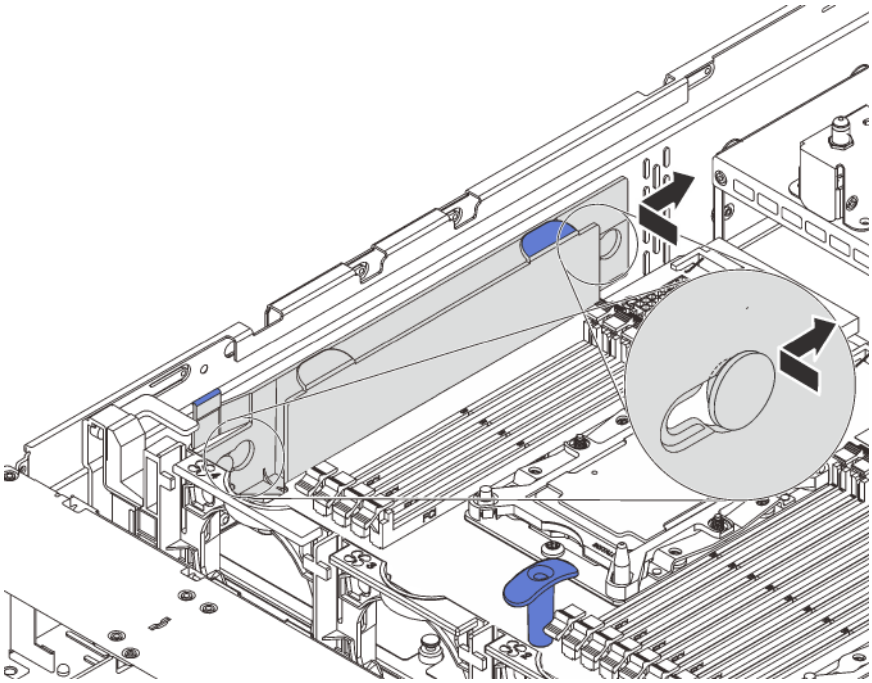


Figure 130. Cable holder installation

2. Push the power supplies into the bays until they click into place.
3. Install any components that you removed from the failing system board. See the related topics in Chapter 3 “Hardware replacement procedures” on page 53.
4. Complete the parts replacement. See “Complete the parts replacement” on page 174.
5. Update the Universally Unique Identifier (UUID) and DMI/SMBIOS data with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the UUID and DMI/SMBIOS data. See “Update the Universal Unique Identifier (UUID)” on page 166 and “Update the DMI/SMBIOS data” on page 168.
6. Enable TPM/TCM. See “Enable TPM/TCM” on page 170.
7. Optionally, enable Secure Boot.

Update the Universal Unique Identifier (UUID)

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

1. Start the server 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.

   Note: You can use Lenovo XClarity Essentials OneCLI to update the UUID for the server.

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:

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

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

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/WAN access method to access Lenovo XClarity Controller 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 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 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 server.

Update the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Lenovo XClarity Provisioning Manager to update the DMI in the UEFI-based server. Lenovo XClarity Essentials OneCLIcan be used to update the UUID in the UEFI-based server as a command line option. Lenovo XClarity Essentials OneCLI is an online tool that supports several operating systems; make sure that you download the version for your operating system.

1. Start the server 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.

Note: You can use Lenovo XClarity Essentials OneCLI to update the asset tag for the server.

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:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP 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 server machine type and model number. Type `mtm xxxxyyy`, where *xxxx* is the machine type and *yyy* is the server model number.

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

<asset_method>
The server asset tag number. Type `asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* 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/WAN access method to access Lenovo XClarity Controller 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 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. Reset the Lenovo XClarity Controller to the factory defaults. Go to https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_resettingthexcc.html for more information.

Enable TPM/TCM

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

Note: For customers in the Chinese Mainland, integrated TPM is not supported. However, customers in the Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM 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 Chinese Mainland should choose this setting if a TCM adapter is installed.
- **NationZ TPM 2.0 enabled - China only**. Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
- **TPM enabled - ROW**. Customers outside of the Chinese Mainland should choose this setting.
- **Permanently disabled**. Customers in the Chinese Mainland should use this setting if no TPM or TCM adapter is installed.

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

Notes: You can use Lenovo XClarity Essentials OneCLI to update the TPM/TCM policy. Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

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

   Note: The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is ‘Enabled’ then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.
2. Configure the TPM_TCM_POLICY into XCC:
   - For the customer in Chinese Mainland with no TCM:
     `OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_addres`
   - For the customer in Chinese Mainland that has installed TCM module on the original system (TCM module should be moved to the FRU prior to changing policy)
     `OneCli.exe config set imm.TpmTcmPolicy "TcmOnly" --override --imm <userid>:<password>@<ip_address>`
   - For the customer outside of Chinese Mainland:
     `OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>`
3. Issue reset command to reset system:
   `OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`
4. Read back the value to check whether the change has been accepted:
   `OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

   Notes:
   - If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

     imm.TpmTcmPolicy is defined as below:
     - Value 0 use string “Undefined” , which means UNDEFINED policy.
     - Value 1 use string “NeitherTpmNorTcm”, which means TPM_PERM_DISABLED.
     - Value 2 use string “TpmOnly”, which means TPM_ALLOWED.
     - Value 4 use string “TcmOnly”, which means TCM_ALLOWED.
   - Below 4 steps must also be used to ‘lock’ the TPM_TCM_POLICY when using OneCli/ASU commands:
5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked , command as below:

   `OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

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

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

   The valid value for imm.TpmTcmPolicy includes 'NeitherTpmNorTcm', 'TpmOnly' and 'TpmOnly'.

   If the imm.TpmTcmPolicy is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicy back to 'Disabled'.
8. Read back the value to check whether the ‘Lock’ is accepted or rejected. command as below:

   `OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

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

imm.TpmTcmPolicyLock is defined as below:

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

Procedure also requires that Physical Presence is enabled. The Default value for FRU will be enabled.
`PhysicalPresencePolicyConfiguration.PhysicalPresencePolicy=Enable`

Assert Physical Presence

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

There are two ways to assert the Physical Presence:

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

Notes: If the Physical Presence Policy has been disabled:

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

Assert Physical Presence through the Lenovo XClarity Controller

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

1. Log in to the Lenovo XClarity Controller interface.

   For information about logging in to the Lenovo XClarity Controller, see:

   http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.html
2. Click **BMC Configuration → Security** and verify that Physical Presence is set to **assert**.

Assert Physical Presence through the hardware

You can also assert hardware Physical Presence through the use of a jumper on the system board. For more information about asserting hardware Physical Presence through the use of a jumper, see:

System board jumpers and switches

Set the TPM version

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

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

To set the TPM version:

1. Download and install Lenovo XClarity Essentials OneCLI.
   a. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
   b. Click **Drivers & Software**.

c. Navigate to the version of Lenovo XClarity Essentials OneCLI for your operating system and download the package.

2. Run the following command to set the TPM version:

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

   To set the TPM version to version 2.0:
   ```
   OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"
              --bmc userid:password@ip_address
   ```

   To set the TPM version to version 1.2:
   ```
   OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"
             --bmc userid:password@ip_address
   ```

   where:

   - <*userid*>:<*password*> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is 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 172.

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 top cover, reinstall it. See “Install the top cover” on page 69.
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 if necessary.
   - Download and install the latest device drivers: http://datacentersupport.lenovo.com
   - Update the system firmware. See “Firmware updates” on page 8.
   - Update the UEFI configuration.
   - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter.

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are managing the server from the Chassis Management Module 2, begin with the Chassis Management Module 2 event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at:
http://thinksystem.lenovofiles.com/help/topic/7x98/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.

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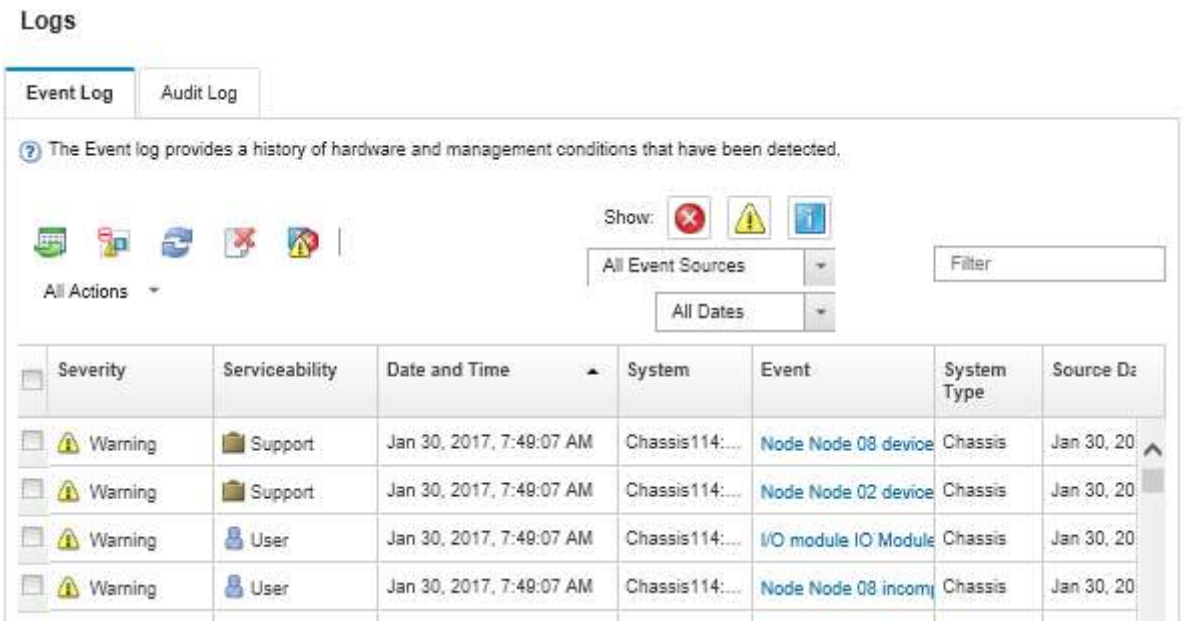


Figure 131. Lenovo XClarity Administrator event log

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.

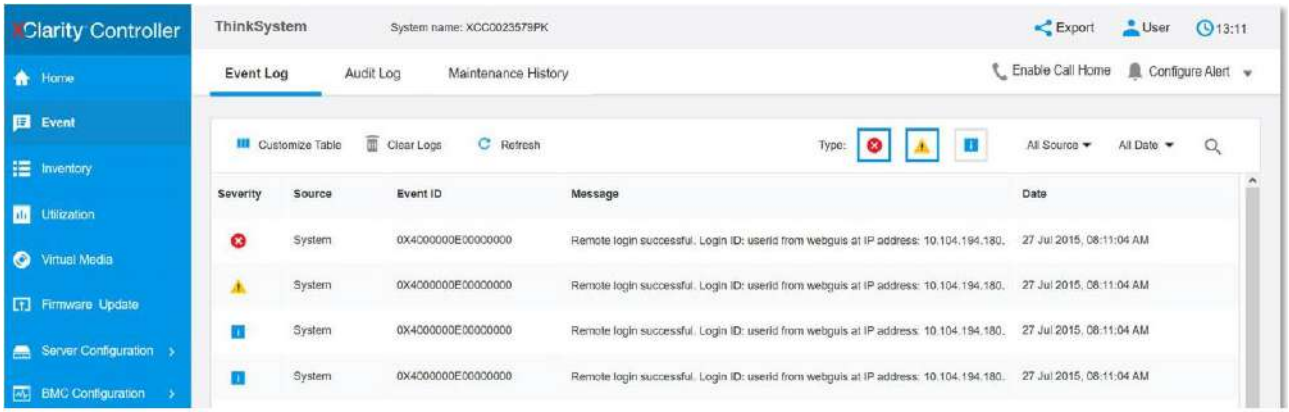


Figure 132. Lenovo XClarity Controller event log

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

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 minimal configuration for debugging, see “Specifications” on page 3.
4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 175.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See “Specifications” on page 3 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, replace the components in the minimum configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.

Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.

Step 4. Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN 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 175.
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 195).

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 179
- “The power button does not work (server does not start)” on page 179
- “Server does not power on” on page 180
- “Server does not power off” on page 180

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.

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the operator information panel cable, and then repeat steps a and b.
      - If the server starts, reseat the operator information panel.
      - If the problem remains, replace the operator information panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply do not indicate a problem.
3. Reseat the power supplies.
4. Replace each power supply, restarting the server each time:
   - DIMMs

- Power supplies

5. 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.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Reseat the power supply.
5. Replace the power supply.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
   a. Press `Ctrl+Alt+Delete`.
   b. Turn off the server by pressing the power button 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 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Memory problems

Use this information to resolve issues related to memory.

- “Displayed system memory less than installed physical memory” on page 180
- “Multiple memory modules in a channel identified as failing” on page 181
- “Attempt to change to another DCPMM mode fails” on page 182
- “Extra namespace appears in an interleaved region” on page 182

Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved:

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

1. Make sure that:
   - No error LEDs are lit on the operator information panel.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see “Specifications” on page 3 for requirements).
   - If you changed the memory, you updated the memory configuration in the Setup utility.
   - All banks of memory are enabled. The solution might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.

- There is no memory mismatch when the solution is at the minimum memory configuration.
- When DCPMMs are installed:
  a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
  b. Refer to "Intel Optane DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* and see if the displayed memory fits the mode description.
  c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see "Intel Optane DC Persistent Memory Module (DCPMM) setup" in *Setup Guide*).
  d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the solution.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.
4. Run memory diagnostics. Power on the system and press **F1** when the logo screen appears, the Lenovo XClarity Provisioning Manager interface will start. Perform memory diagnostics with this interface. Go to **Diagnostics → Run Diagnostic → Memory test** or **DCPMM test**.

   When DCPMMs are installed, run diagnostics based on the current DCPMM mode:
   - App Direct Mode
     – Run **DCPMM Test** for DCPMMs.
     – Run **Memory Test** for DRAM DIMMs.
   - Memory Mode and Mixed Memory Mode
     – Run **DCPMM Test** for App Direct capacity of DCPMMs.
     – Run **Memory Test** for memory capacity of DCPMMs.

     Note: DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.
5. Reverse the modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.

   Note: When DCPMMs are installed, only adopt this method in Memory Mode.
6. Re-enable all memory modules using the Setup Utility, and restart the system.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the node.

Multiple memory modules in a channel identified as failing

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

1. Reseat the memory modules; then, restart the solution.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the solution. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.

3. Return the removed memory modules, one at a time, to their original connectors, restarting the solution after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the solution after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the solution. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board.

Attempt to change to another DCPMM mode fails

After the DCPMM mode is changed and the system is successfully restarted, if the DCPMM mode stays the same instead of being changed, check the DRAM DIMMs and DCPMM capacity to see if it meets the requirement of the new mode (see “DC Persistent Memory Module (DCPMM) setup” in *Setup Guide*).

Extra namespace appears in an interleaved region

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

Hard disk drive problems

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

- “Server cannot recognize a hard drive” on page 182
- “Multiple hard drives fail” on page 183
- “Multiple hard drives are offline” on page 183
- “A replacement hard disk drive does not rebuild” on page 183
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 183
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 184

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.

- 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 184
- "Screen is blank" on page 184
- "Screen goes blank when you start some application programs" on page 185
- "The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted." on page 185
- "The wrong characters appear on the screen" on page 185

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 8.

Screen is blank

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server installed with the graphical adapters while turning on the server, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
   - The server is turned on. If there is no power to the server.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that corrupted server firmware is not affecting the video; see "Firmware updates" on page 8.
7. Observe the LEDs on the system board; if the codes are changing, go to step 6.
8. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. Monitor

b. Video adapter (if one is installed)
c. (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 8.

Keyboard, mouse, or USB-device problems

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

- “All or some keys on the keyboard do not work.” on page 185
- “Mouse does not work.” on page 186
- “USB-device does not work.” on page 186

All or some keys on the keyboard do not work.

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.

3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work.

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

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.

Optional-device problems

Use this information to solve problems related to optional devices.

- “External USB device not recognized” on page 186
- “PCIe adapter is not recognized or is not functioning” on page 186
- “A Lenovo optional device that worked previously does not work now. ” on page 187
- “A Lenovo optional device that was just installed does not work.” on page 187
- “A Lenovo optional device that worked previously does not work now. ” on page 187

External USB device not recognized

Complete the following steps until the problem is resolved:

1. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
2. Use the Setup utility to make sure that the device is configured correctly.
3. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Check the event log and resolve any issues related to the device.
2. Validate that the device is supported for the server (see http://www.lenovo.com/us/en/serverproven/).

3. Make sure that the adapter is installed in a correct slot.
4. Make sure that the proper device drivers are installed for the device.
5. Resolve any resource conflicts if running legacy mode (UEFI).
6. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.

Insufficient PCIe resources are detected.

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

1. 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, shut down 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.
2. Reseat the device that you just installed.
3. Replace the device that you just installed.

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

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. If the failing device is a SCSI device, make sure that:
   - The cables for all external SCSI devices are connected correctly.
   - The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
   - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.
4. Reseat the failing device.
5. Replace the failing device.

Serial-device problems

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 188
- “Serial device does not work” on page 188

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector.
2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. (Trained technician only) Replace the system board.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 188
- “Intermittent KVM problems” on page 188
- “Intermittent unexpected reboots” on page 189

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 compute node. 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 compute node.
3. Test the console breakout cable on a working compute node 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 175 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.

Network problems

Use this information to resolve issues related to networking.

- “Cannot wake server using Wake on LAN” on page 189
- “Could not log in using LDAP account with SSL enabled” on page 190

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see “Event logs” on page 175), make sure:
   a. The room temperature is not too high (see “Specifications” on page 3).
   b. The air vents are not blocked.

c. The air baffle is installed securely.

2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- "Server hangs during the UEFI boot process" on page 190
- "The server immediately displays the POST Event Viewer when it is turned on" on page 190
- "Server is unresponsive (POST is complete and operating system is running)" on page 191
- "Server is unresponsive (cannot press F1 to start System Setup)" on page 191
- "Voltage planar fault is displayed in the event log" on page 192
- "Unusual smell" on page 192
- "Server seems to be running hot" on page 192
- "Cracked parts or cracked chassis" on page 192

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

https://datacentersupport.lenovo.com/us/en/solutions/ht506118

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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

Complete the following steps until the problem is solved.

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

   You can view processor details from system setup.

To determine if the processor is supported for the server, see http://www.lenovo.com/us/en/serverproven/ .

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

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

Complete the following steps until the problem is solved.

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

Server is unresponsive (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 3 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 compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cracked parts or cracked chassis

Contact Lenovo Support.

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

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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 for your region support details.

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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Lenovo (United States), Inc.
1009 Think Place
Morrisville, NC 27560
U.S.A.
Attention: Lenovo VP of Intellectual Property

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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 31. 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.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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