Lenovo

ThinkSystem SR550
Maintenance Manual



Machine Types: 7X03 and 7X04

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات 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.

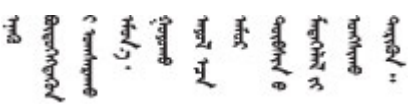
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། ·སྐྱོ་ཤི་ཡིད་གཟབ· བྱ་འདྲ་མེན་ཡོད་པའི་ཧོད་ཀྱེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

ھەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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Safety inspection checklist

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

Notes:

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

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

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

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

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

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

     a. Go to:

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

b. 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™ SR550 is a 2U all-purpose rack server with two processor sockets that combines performance, flexibility, expendability, and manageability into a package. The enterprise-quality design delivers the flexibility and scalability needed for the varied demands of 2U rack deployments for workloads in small-to-medium sized businesses and remote or branch offices. This server can tackle infrastructure, collaboration, cold storage, and line-of-business applications, as well as hosting.

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

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

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.

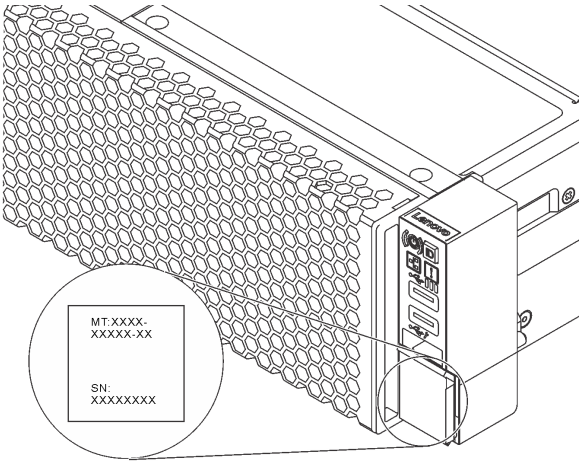


Figure 1. Location of the ID label

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.

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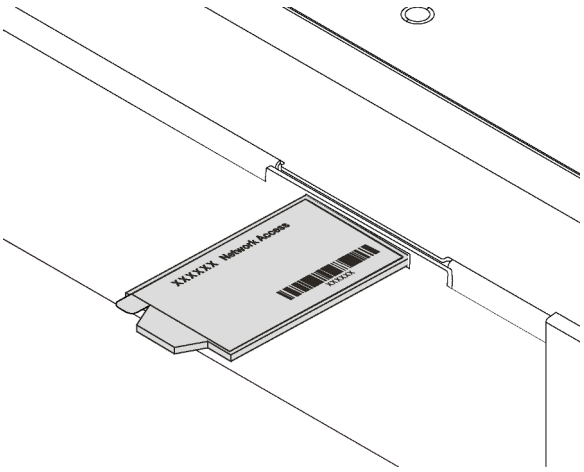


Figure 2. Location of the XClarity Controller network access label

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/sr550



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
Size	• 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 with rack latches: 763.7 mm (30.1 inches) **Note:** The depth is measured with rack latches installed, but without the security bezel installed.
Weight	Up to 26.0 kg (57.3 lb)
Processor (depending on the model)	• Up to two Intel® Xeon® Scalable Processors – Scalable up to 20 cores – Designed for Land Grid Array (LGA) 3647 socket – Multi-chip package processor architecture For a list of supported processors, see: https://serverproven.lenovo.com/ **Notes:** • For server models with twelve 3.5-inch drive bays, Intel Xeon 6230T processor is not supported. • If you are going to install Intel Xeon 6230N, 6230T, or 5220T processor, use the heat sink with part number 01KP652 or 01KP653.
Memory	For 1st Generation Intel Xeon Scalable Processor (SP Gen 1): • Minimum: 8 GB • Maximum: – 384 GB using registered DIMMs (RDIMMs) – 768 GB 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: 12 slots For 2nd Generation Intel Xeon Scalable Processor (SP Gen 2): • Minimum: 8 GB • Maximum: 768 GB • 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 • Slots: 12 slots **Note:** List of supported memory module is different for 1st generation (Skylake) and 2nd generation (Cascade Lake) Intel Xeon processors. Make sure to install compatible memory modules to avoid system error. For a list of supported DIMMs, see: https://serverproven.lenovo.com/.

Table 1. Server specifications (continued)

Specification	Description
Operating systems	Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server For a complete list of operating systems, see: https://lenovopress.com/osig For OS deployment instructions, see: “Deploy the operating system” in *Setup Guide*..
Internal drives	• Up to eight 3.5-inch simple-swap SATA drives • Up to twelve 3.5-inch hot-swap SAS/SATA drives • Up to sixteen 2.5-inch hot-swap SAS/SATA drives • Up to two internal M.2 drives
PCI Express (PCIe) slots	• One PCIe slot on system board • Three PCIe slots on the riser 1 adapter • Two PCIe slots on the riser 2 adapter For detailed information, see “Rear view” on page 22.
Input/Output (I/O) features	• Front panel: – One XClarity Controller USB connector – One USB 3.0 connector – One VGA connector (available on some models) • Rear panel: – One VGA connector – Two USB 3.0 connectors – One XClarity Controller network connector – Two Ethernet connectors – Two Ethernet connectors on the LOM adapter (available on some models)

Table 1. Server specifications (continued)

Specification	Description
RAID adapters (depending on the model)	• SAS/SATA HBA adapters – ThinkSystem 430-8i SAS/SATA 12Gb HBA – ThinkSystem 430-16i SAS/SATA 12Gb HBA – ThinkSystem 430-8e SAS/SATA 12Gb HBA – ThinkSystem 430-16e SAS/SATA 12Gb HBA – ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA – ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA – ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA • SAS/SATA RAID adapters – ThinkSystem RAID 530-8i PCIe 12Gb Adapter – ThinkSystem RAID 540-8i PCIe 12Gb Adapter – ThinkSystem RAID 730-8i 1GB Adapter – ThinkSystem RAID 730-8i 2GB PCIe Adapter – ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 940-8e 4GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter – ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter – ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter – ThinkSystem RAID 5350-8i PCIe 12Gb Adapter – ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter – ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter **Notes:** • RAID 730-8i 1G Cache SAS/SATA adapter is not available for North America. • If RAID 730-8i 1GB/2GB Cache SAS/SATA adapter is installed, ThinkSystem 2.5" PM1653/PM1655 Read Intensive/Mixed Use SAS 24Gb SSD cannot be installed. • 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. • The RAID 940 adapters can be mixed with the ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA and the ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA. • Mixing of RAID/HBA 430/530/730/930 adapters (Gen 3) and RAID/HBA 440/540/940 adapters (Gen 4) in the same system is not allowed. • RAID 930/940 series or 9350 series adapters require a RAID flash power module. • RAID 5350/9350 series adapters cannot be mixed with HBA/RAID 430/440/530/540/730/930/940 series SAS/SATA adapters.
Fans	• One processor: three system fans (including one redundant fan) • Two processors: four system fans (including one redundant fan)

Table 1. Server specifications (continued)

Specification	Description
	Notes: • 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 locations for fan 4 occupied by a fan filler to ensure proper airflow. • When the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling.
Power supplies	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
Acoustical noise emissions	• Sound power levels, idle – 4.9 bels, minimum – 5.3 bels, typical – 6.1 bels, maximum • Sound power levels, operating – 4.9 bels, minimum – 5.5 bels, typical – 6.2 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 and they may change depending on configurations/conditions. • The declared acoustic noise levels may increase greatly, if high-power components are installed, for example, some high-power NICs, CPUs, and GPUs.
Minimal configuration for debugging	• One processor in processor socket 1 • One DIMM in slot 3 • One power supply • Three system fans (fan 1 to fan 3)

Table 1. Server specifications (continued)

Specification	Description

Electrical input	• Sine-wave input (50–60 Hz) required
	• 550-watt ac and 750-watt ac Platinum input voltage range:
	  – Low range: 100–127 V ac
	  – High range: 200–240 V ac
	• 750-watt ac Titanium input voltage range: 200–240 V ac
	CAUTION:
	1. 240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.
	2. Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.
	3. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.

Environment	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
	Note: This server is designed for standard data center environment and recommended to be placed in industrial data center.
	• 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: 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: 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 8.

Table 1. Server specifications (continued)

Specification	Description
	Notes: Your server complies with ASHRAE class A2 specifications. The server performance might be impacted when the operating temperature is outside the ASHRAE A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server models must meet the following hardware configuration requirements at the same time: • Two power supplies must be installed. • No system fan fails.

Important information about EU ecodesign requirements

To meet the EU ecodesign requirements for energy-related products (ErP) Lot 9, your server must meet the following requirements:

- Minimum memory: 16 GB
- If your server is configured with one processor, these processors are not supported: Intel Xeon 3104, 3106, 3204, 4108, 4109T, 4110, 4112, 5122, 5222, 8156, and 8256.

Particulate contamination

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

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

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[3] • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

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

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

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

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

Firmware updates

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

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

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.	√[2]			√	√		√
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	√	√			√		√
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	√				√	√	√

Tool		In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Administrator Supports core system firmware and I/O firmware updates		√[1]	√[2]		√	√		
Lenovo XClarity Integrator offerings	**Lenovo XClarity Integrator for VMware vCenter** Supports all core system firmware, I/O firmware, and installed operating system driver updates		√		√	√		
	Lenovo XClarity Integrator for Microsoft Windows Admin Center Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√	√	√	√		
	Lenovo XClarity Integrator for Microsoft System Center Configuration Manager Supports all core system firmware, I/O firmware, and installed operating system driver updates	√		√		√		√

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.

The latest firmware can be found at the following site:

http://datacentersupport.lenovo.com/products/servers/thinksystem/sr550/7X03/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

- **Lenovo XClarity Integrator offerings**

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

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

  https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html

Tech Tips

Lenovo continually updates the support Web site 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 left 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 status 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 14.

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 topic provides information to help you locate the components of your server.

Front view

The front view of the server varies by model.

- “Front view of server models with 2.5-inch hot-swap drives” on page 15
- “Front view of server models with 3.5-inch hot-swap drives” on page 16
- “Front view of server models with 3.5-inch simple-swap drives” on page 18

Front view of server models with 2.5-inch hot-swap drives

The following illustrations show the front view of server models with eight and sixteen 2.5-inch hot-swap drives.

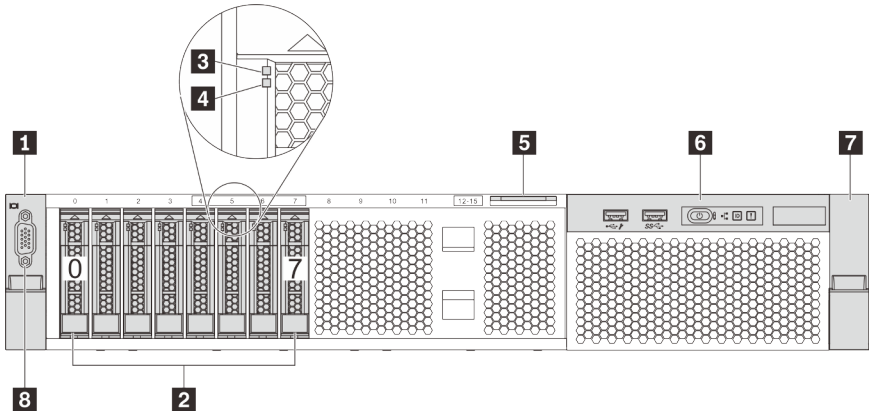


Figure 4. Front view of server models with eight 2.5-inch hot-swap drives (0-7)

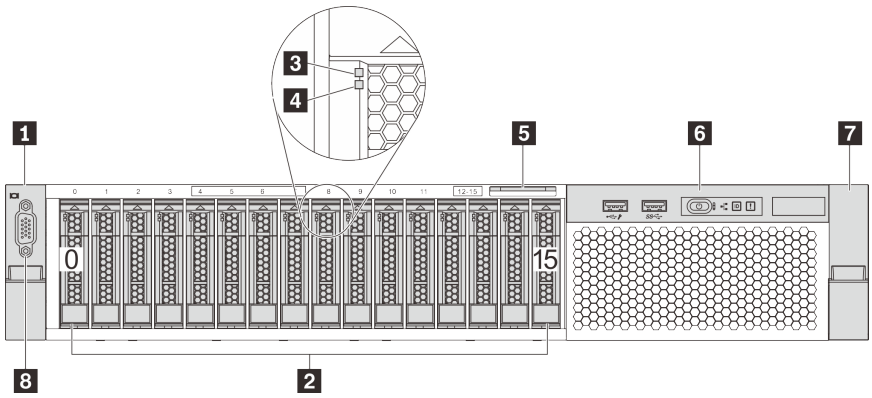


Figure 5. Front view of server models with sixteen 2.5-inch hot-swap drives (0-15)

Table 3. Components on the front of server models with 2.5-inch hot-swap drives

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

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Table 3. Components on the front of server models with 2.5-inch hot-swap drives (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 hot-swap 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 19.

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 hot-swap drives

The following illustrations show the front view of server models with eight and twelve 3.5-inch hot-swap drives.

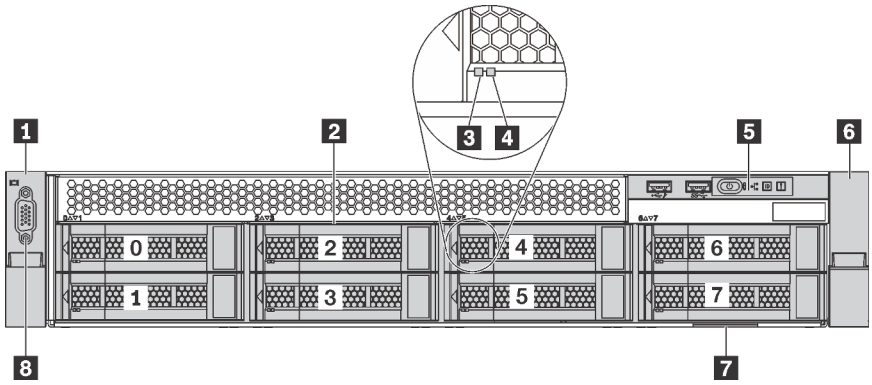


Figure 6. Front view of server models with eight 3.5-inch hot-swap drives (0-7)

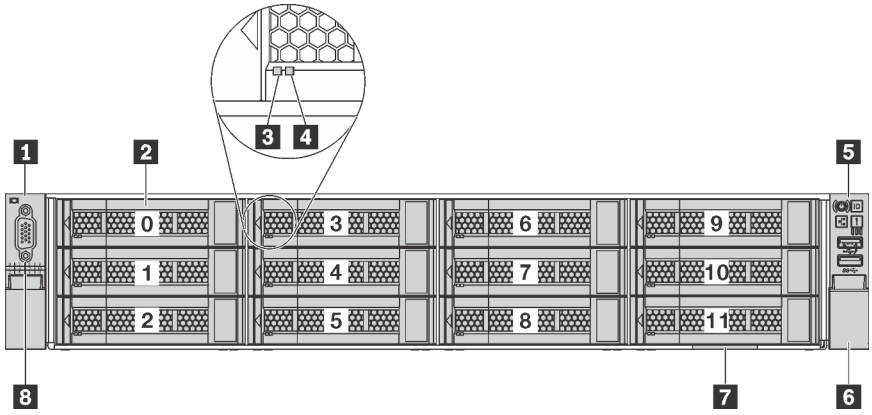


Figure 7. Front view of server models with twelve 3.5-inch hot-swap drives (0-11)

Table 4. Components on the front of server models with 3.5-inch hot-swap drives

Callout	Callout
1 Rack latch (left)	2 3.5-inch hot-swap 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 hot-swap 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 19.

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 view of server models with 3.5-inch simple-swap drives

The following illustration shows the front view of server models with eight 3.5-inch simple-swap drives.

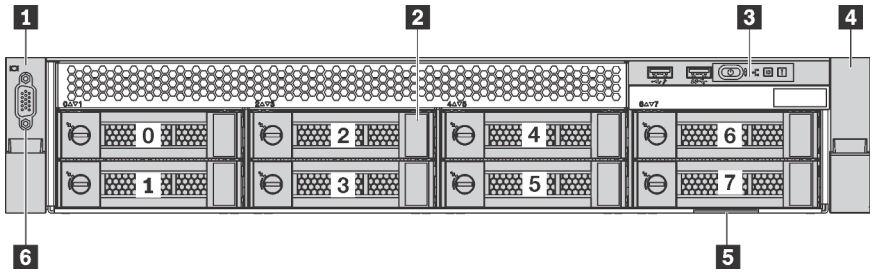


Figure 8. Front view of server models with eight 3.5-inch simple-swap drives (0-7)

Table 5. Components on the front of server models with 3.5-inch simple-swap drives

Callout	Callout
1 Rack latch (left)	2 3.5-inch simple-swap drive bays
3 Front I/O assembly	4 Rack latch (right)
5 Pull-out information tab	6 VGA connector (optional)

1 4 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 simple-swap 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 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 19.

5 Pull-out information tab

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

6 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 two types of front I/O assembly.

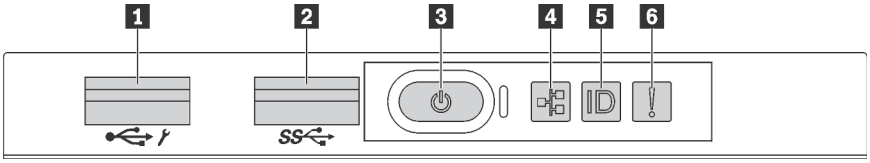


Figure 9. Front I/O assembly for server models with 2.5-inch-drive bays or eight 3.5-inch-drive bays

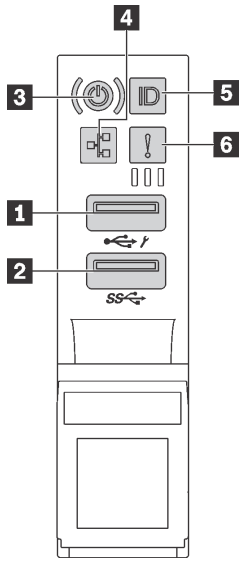


Figure 10. Front I/O assembly for server models with twelve 3.5-inch-drive bays

Table 6. Components on the front I/O assembly

Callout	Callout
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 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 ID button for three seconds to switch between the two functions.

2 USB 3.0 connector

Attach a USB-compatible device, such as a keyboard, USB mouse, or 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).

Status	Color	Description
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.

4 Network activity LED

Compatibility of the NIC adapter and the network activity LED.

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

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 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 ID button for three seconds to switch between the two functions.

6 System error LED

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 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 170 .
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 illustration shows the rear view of the server.

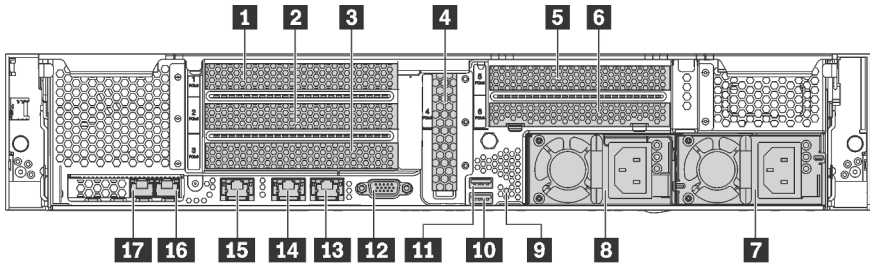


Figure 11. Rear view of the server

Table 7. Components on the rear of the server

Callout	Callout
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 connector
11 USB 3.0 connector	12 VGA connector
13 Ethernet connector 2 (RJ-45)	14 Ethernet connector 1 (RJ-45)

Table 7. Components on the rear of the server (continued)

Callout	Callout
15 XClarity Controller network connector	16 Ethernet connector on the LOM adapter
17 Ethernet connector on the LOM adapter	

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: https://serverproven.lenovo.com/.
- When installing Ethernet adapters with RJ-45 connectors, observe the following installation sequence:

  Table 8. 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 slot 1, 2, and 3 on riser 1:
There are three different risers that can be installed in riser 1.

- 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 card

PCIe adapter slot 5 and 6 on riser 2:

- 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 11 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.

12 VGA connector

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

13 Ethernet connector 2

14 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**.

15 XClarity Controller network connector

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

16 Ethernet connector on the LOM adapter

Used to attach an Ethernet cable.

17 Ethernet connector on the LOM adapter

This Ethernet connector 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**.

Rear view LEDs

There are several LEDs on the rear of the server.

The following illustration shows the LEDs on the rear of the server.

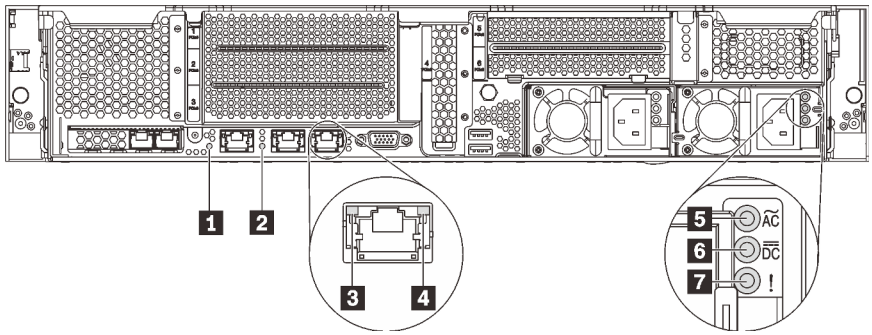


Figure 12. LEDs on the rear of the server

Table 9. LEDs on the rear of the server

Callout	Callout
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 19.

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	• Off: The power supply is disconnected from the ac power source or a power problem occurs. • Green: The power supply is connected to the ac power source.
6 Power output LED	• Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply. • Blinking green: 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. • Green: The server is on and the power supply is working normally.
7 Power supply error LED	• Off: The power supply is working normally • Yellow: The power supply has failed. To resolve the issue, replace the power supply.

System board components

The illustration in this section provides information about the components on the system board.

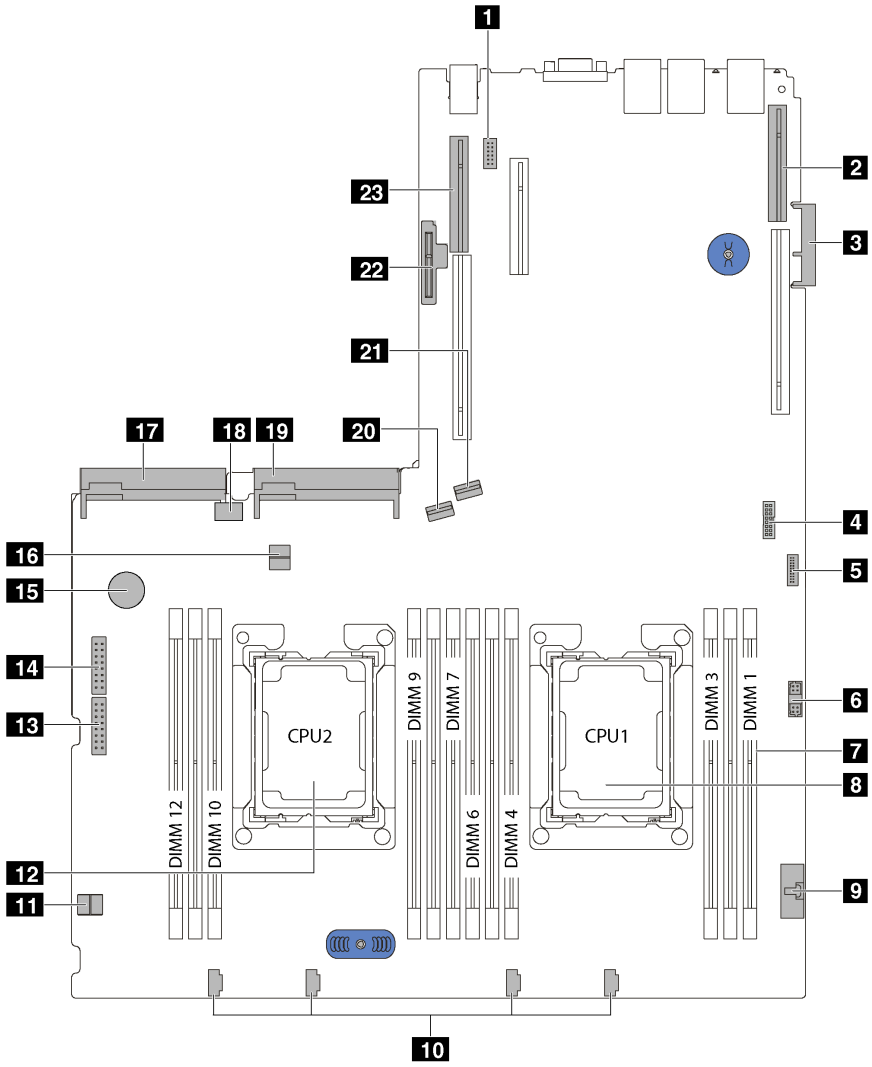


Figure 13. System board components

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

Callout	Callout
17 Power supply 2 connector	18 Internal USB connector
19 Power supply 1 connector	20 SATA 4-7 connector
21 SATA 0-3 connector	22 M.2 module slot
23 Riser 2 slot	

Notes:

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

System board switches and jumpers

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

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

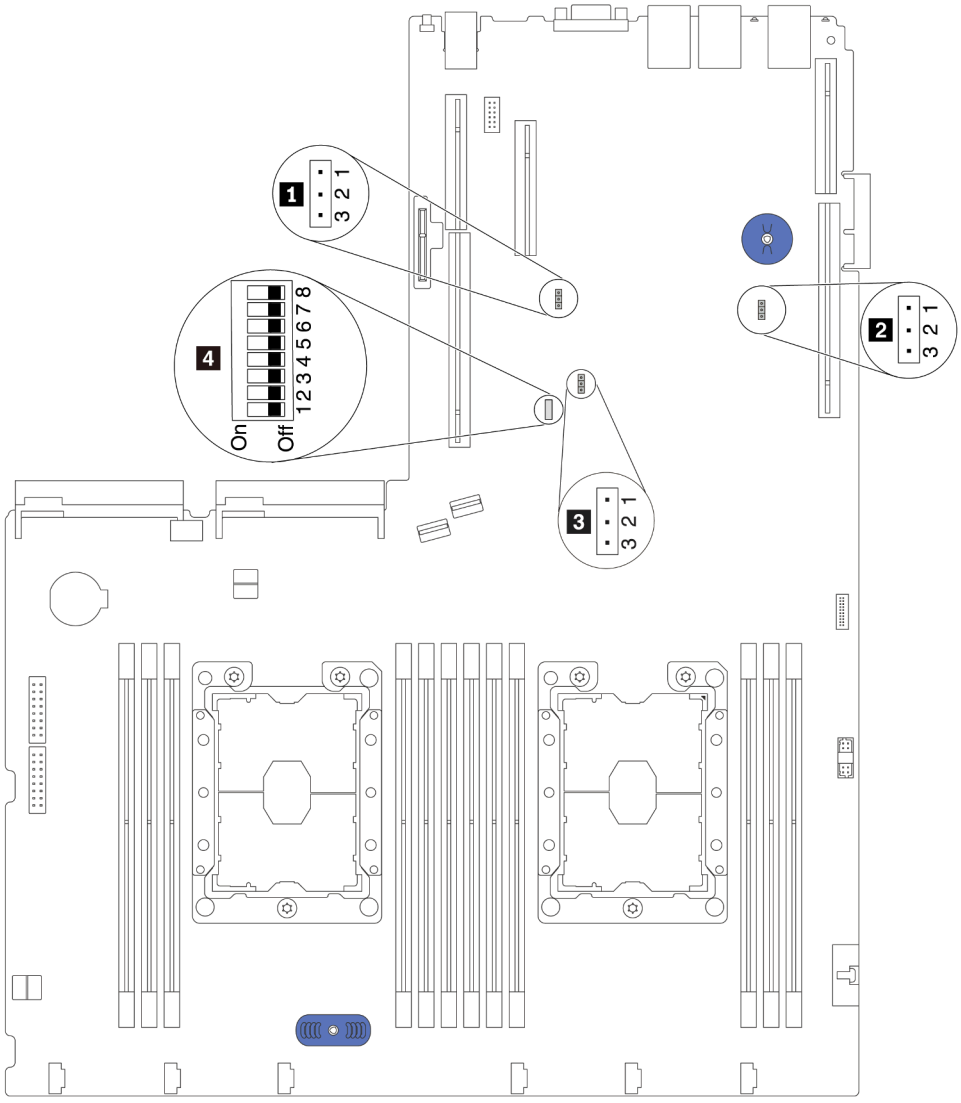


Figure 14. System-board switches and jumpers

Table 10. Jumpers and switches on the system board

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 ME firmware security override	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 (switch 7)	The default position is Off. Changing this switch to the On position enables Power On.
4 Force XCC reset	SW6 (switch 4)	The default position is Off. Changing this switch to the On position resets the Lenovo XClarity Controller.
4 Force XCC update	SW6 (switch 3)	The default position is Off. Changing this switch to the On position forces the Lenovo XClarity Controller to update to the latest version.

Important:

- Before you move the switches and jumpers, turn 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 56
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

System board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.

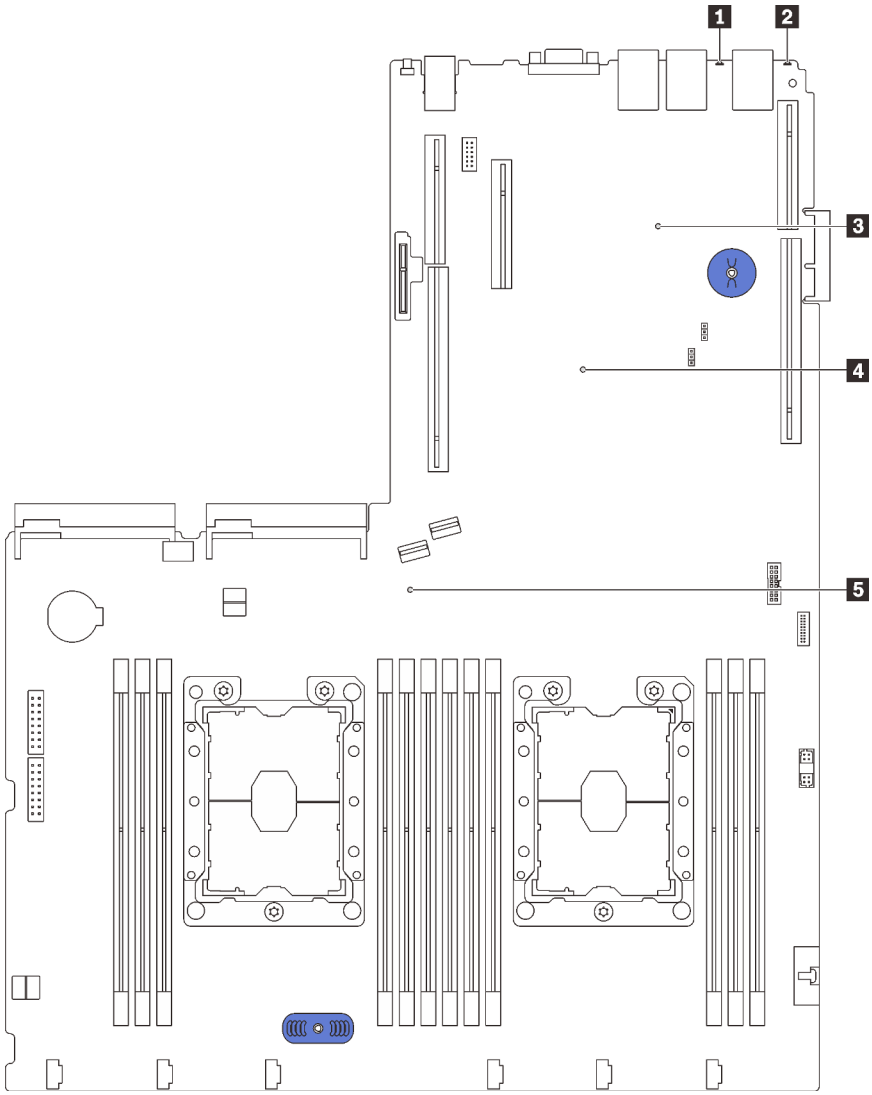


Figure 15. System board LEDs

Table 11. LEDs on the system board

Callout	Callout
1 System error LED	2 System ID LED
3 XCC heartbeat LED	4 Field-Programmable Gate Array (FPGA) error LED
5 System power LED	

Internal cable routing

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

To connect cables, observe the following guidelines:

- Power 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 relevant cables pass through the cable clips.

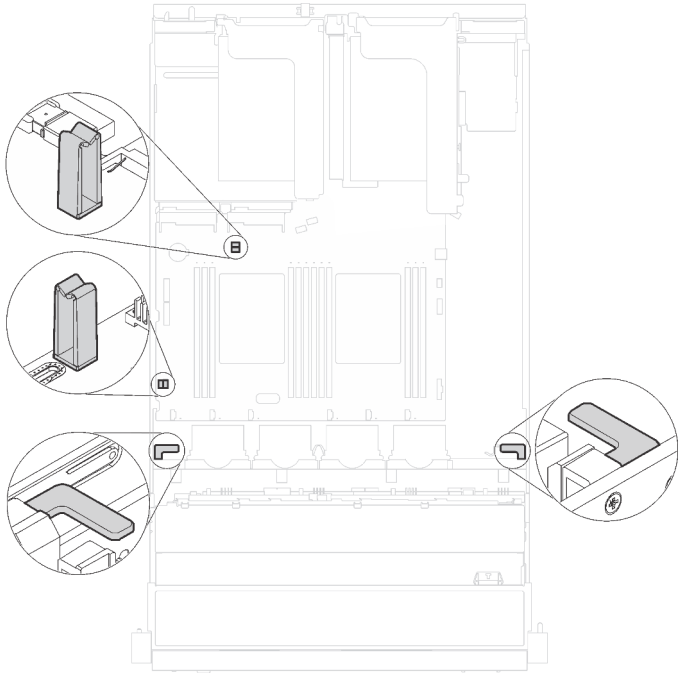
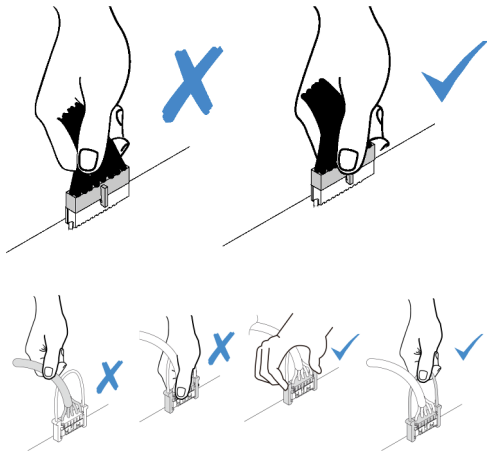


Figure 16. Cable clips

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.



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

Server models with eight 3.5-inch simple-swap drives

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

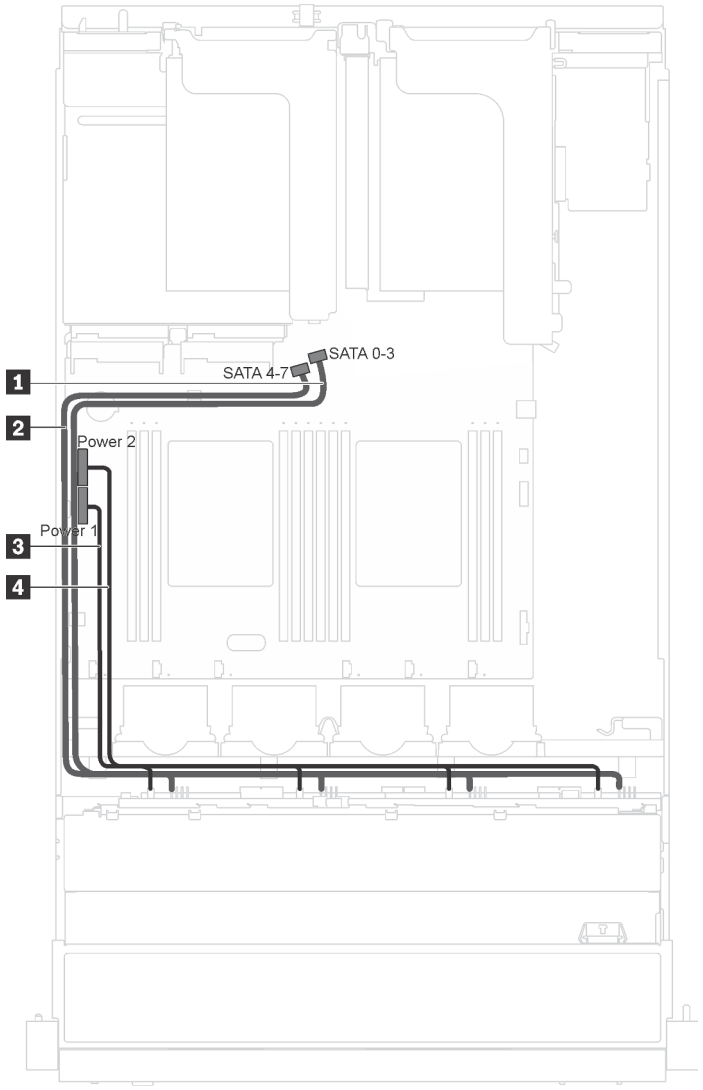


Figure 17. Cable routing for server models with eight 3.5-inch simple-swap drives

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

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

Server models with eight 3.5-inch hot-swap drives

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

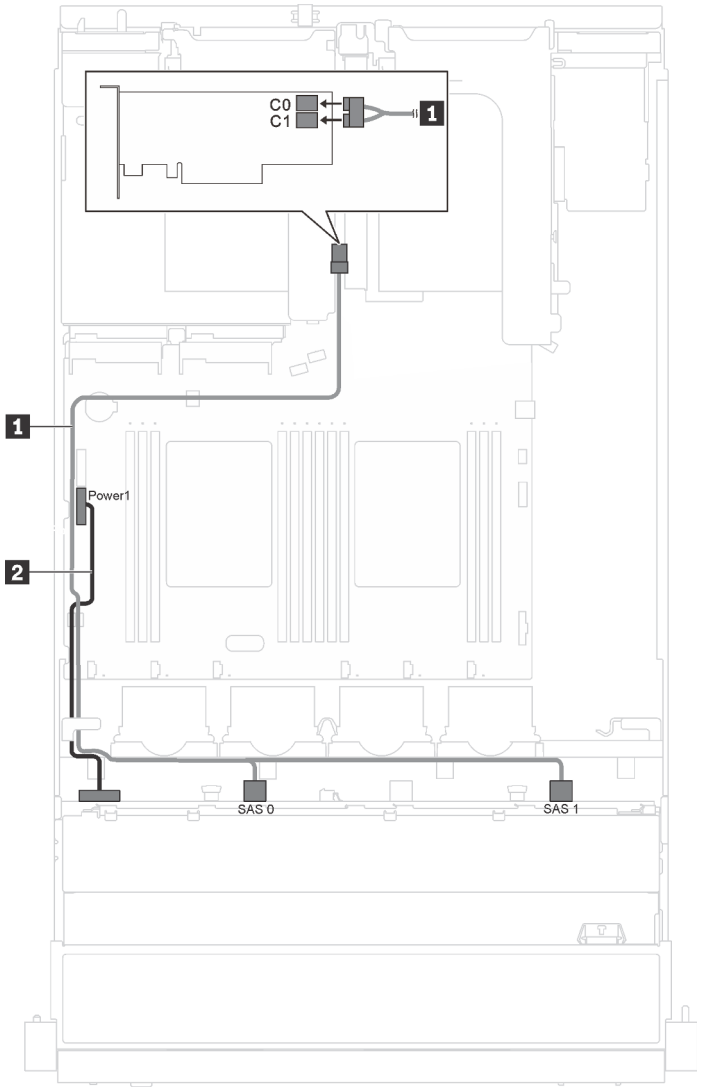


Figure 18. Cable routing for server models with eight 3.5-inch hot-swap drives

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C0C1 • Gen 4: C0
2 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

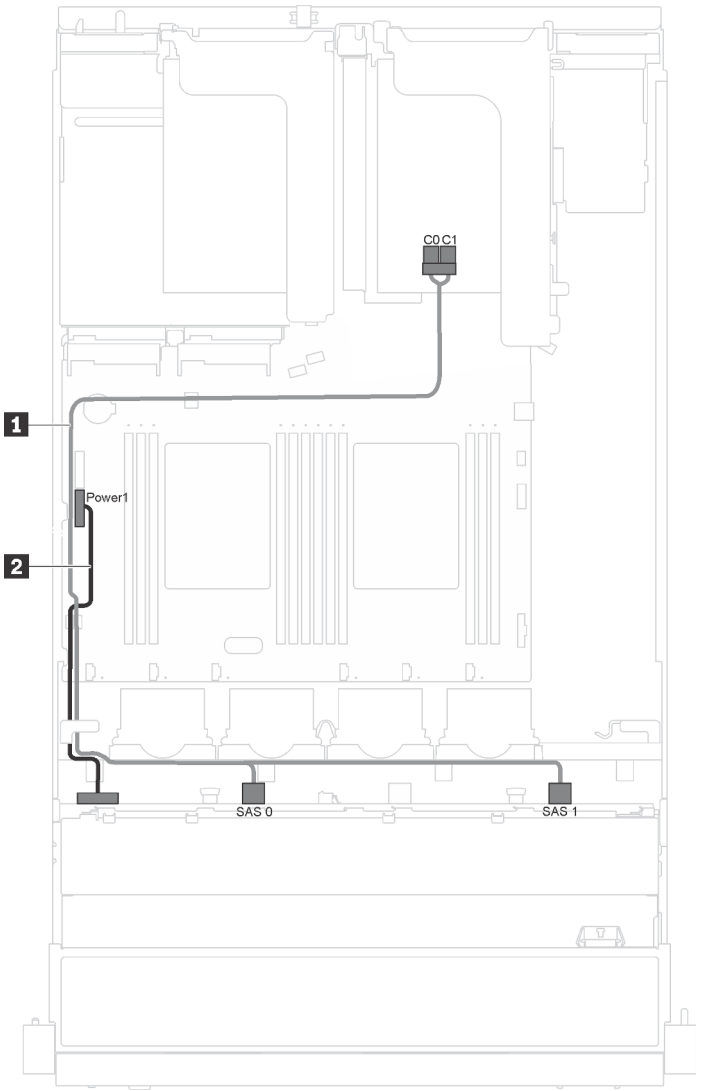


Figure 19. Cable routing for server models with eight 3.5-inch hot-swap drives and serial port module

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0
2 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

Server models with twelve 3.5-inch hot-swap drives

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

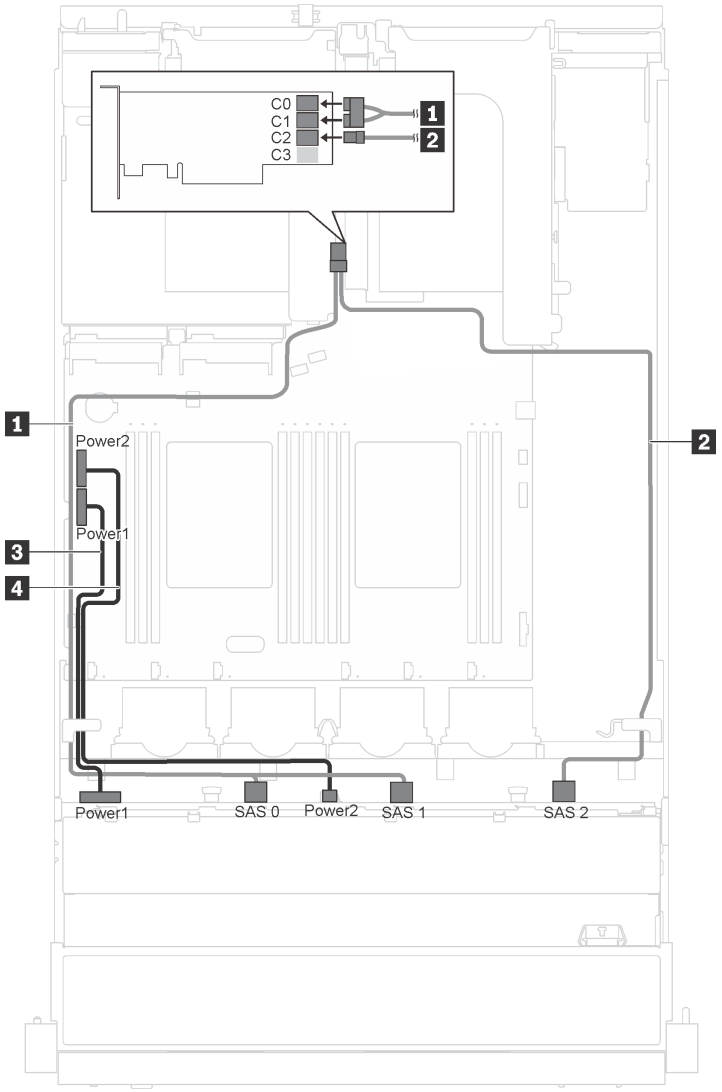


Figure 20. Cable routing for server models with twelve 3.5-inch hot-swap drives and 16i adapter

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 2 connector on the backplane	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C2 • Gen 4: C1

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

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cables (ThinkSystem SR550 3.5" SAS/SATA 12-Bay X40 RAID Cable Kit).

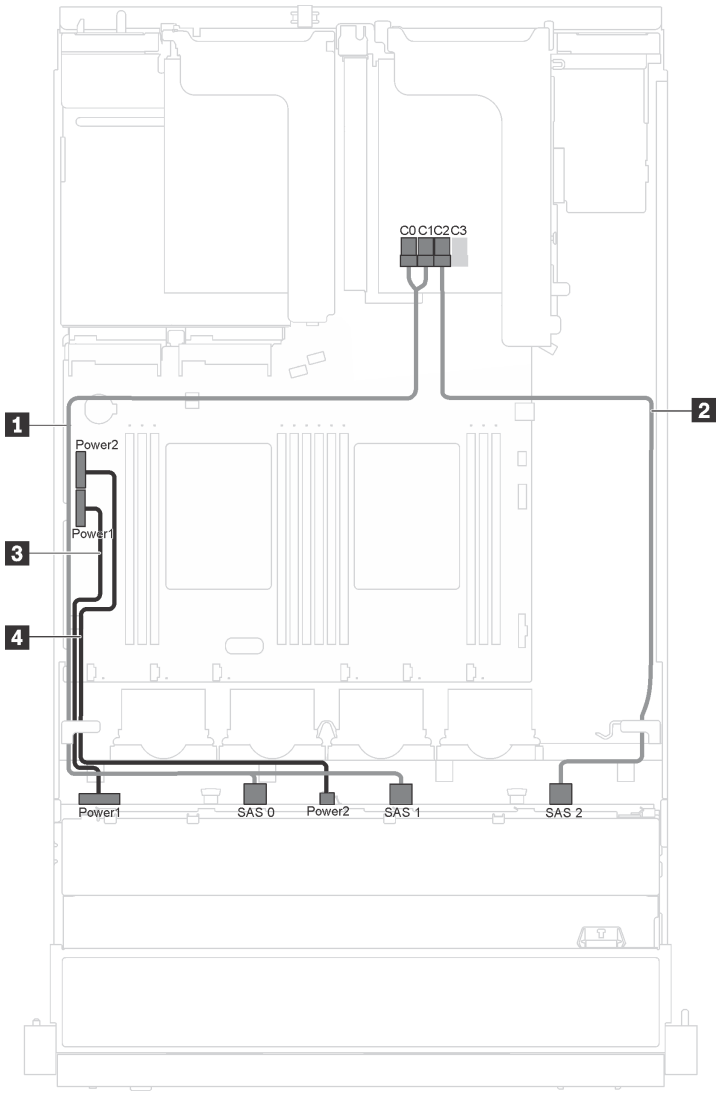


Figure 21. Cable routing for server models with twelve 3.5-inch hot-swap drives, 16i adapter, and serial port module

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 2 connector on the backplane	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C2 • Gen 4: C1
3 Power cable	Power connector 1 on the backplane	Backplane power connector 1 on the system board
4 Power cable	Power connector 2 on the backplane	Backplane power connector 2 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cables (ThinkSystem SR550 3.5" SAS/SATA 12-Bay X40 RAID Cable Kit).

Server models with eight 2.5-inch hot-swap drives

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

Note: Both 8i and 16i RAID adapters are supported in this configuration.

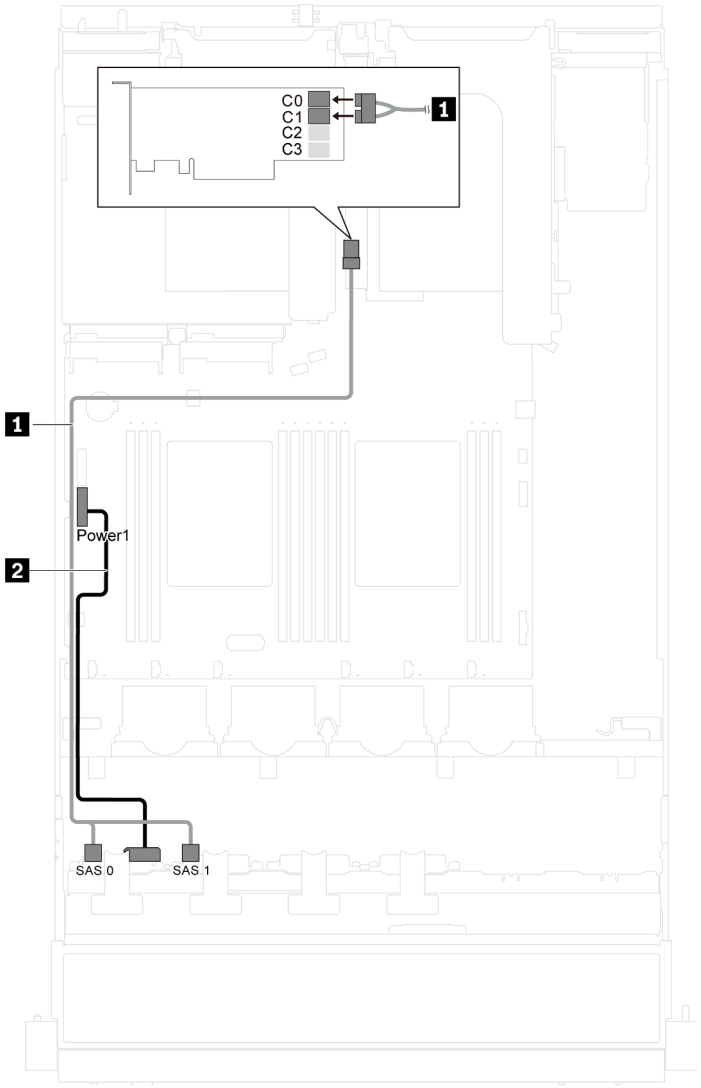


Figure 22. Cable routing for server models with eight 2.5-inch hot-swap drives

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C0C1 • Gen 4: C0
2 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

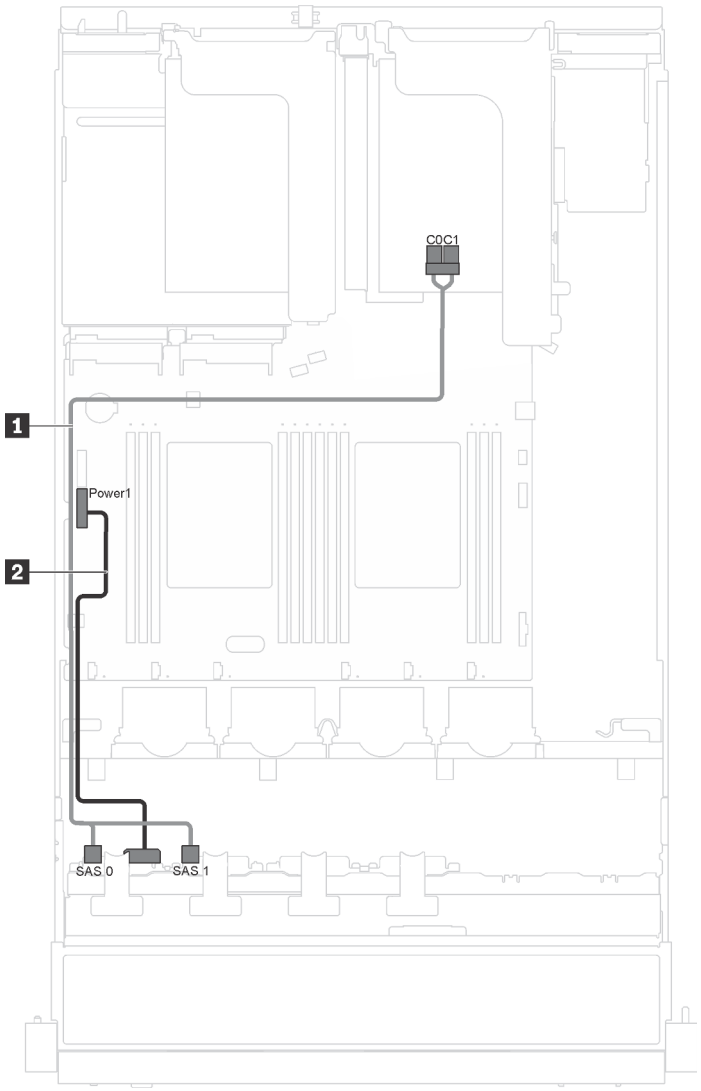


Figure 23. Cable routing for server models with eight 2.5-inch hot-swap drives and serial port module

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0
2 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

Server models with sixteen 2.5-inch hot-swap drives

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

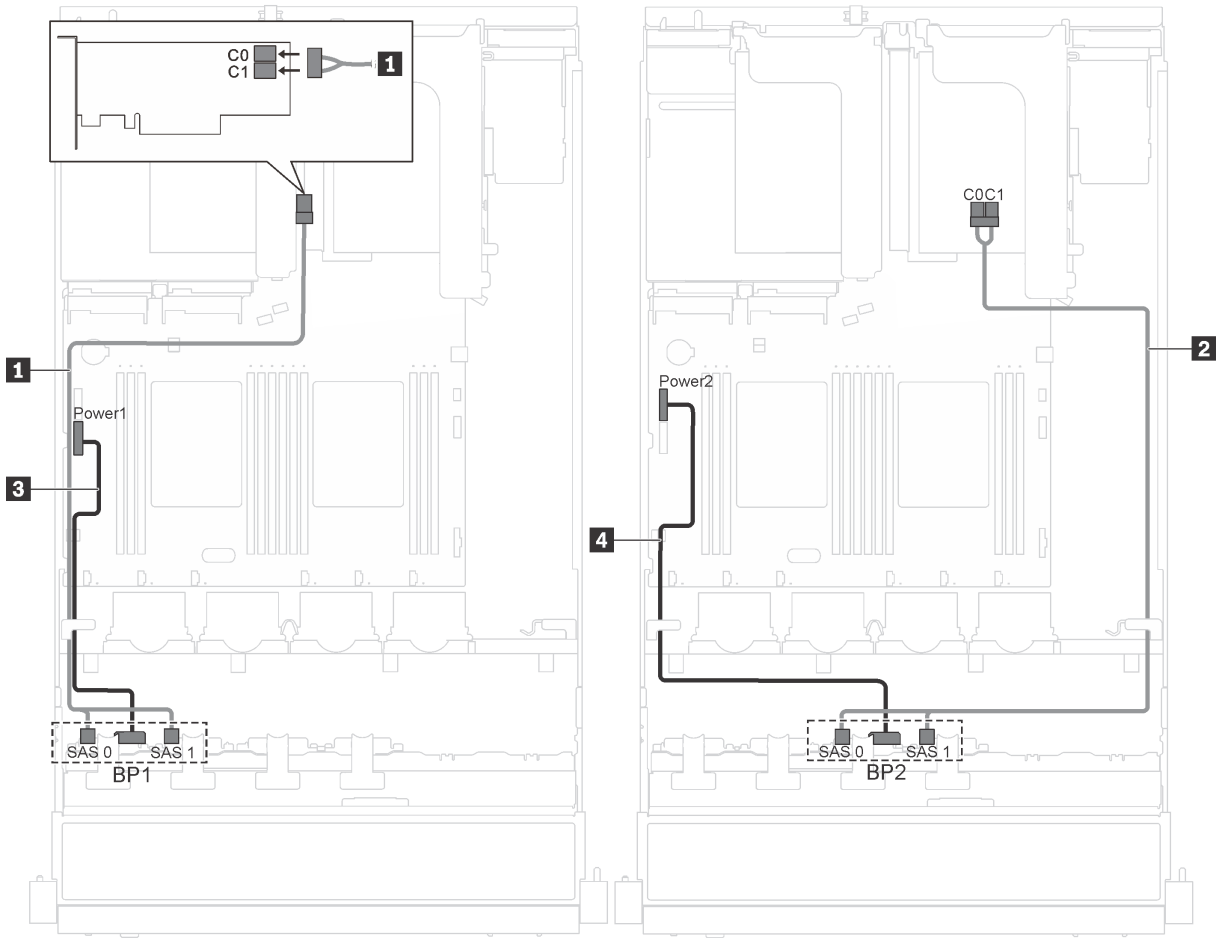


Figure 24. Cable routing for server models with sixteen 2.5-inch hot-swap drives and two 8i adapters

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 1	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 2	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0

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

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

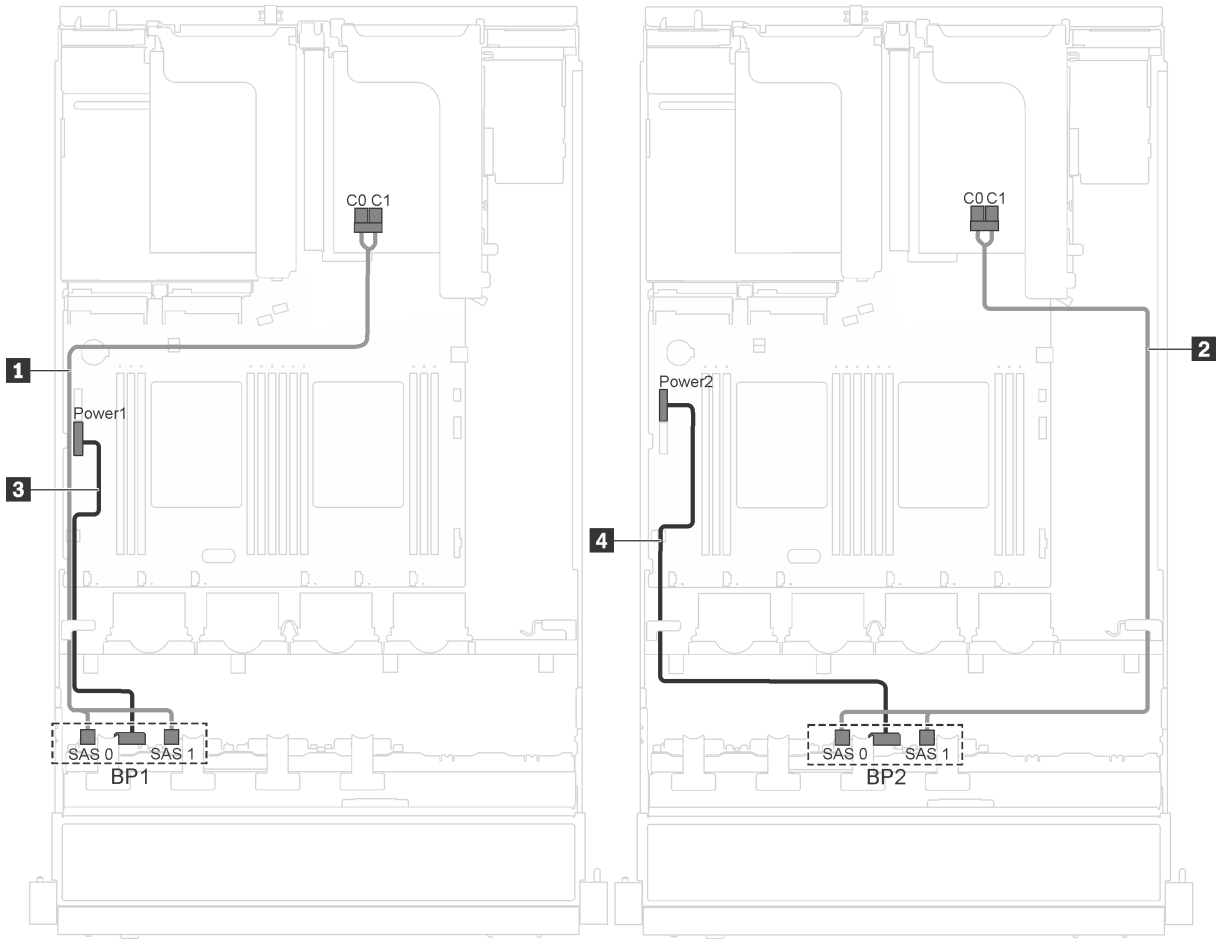


Figure 25. Cable routing for server models with sixteen 2.5-inch hot-swap drives, 8i adapters, and serial port module

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 1	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 2	HBA/RAID adapter installed in PCIe slot 2: • Gen 3: C0C1 • Gen 4: C0
3 Power cable	Power connector 1 on the backplane	Backplane 1 power connector on the system board
4 Power cable	Power connector 2 on the backplane	Backplane 2 power connector on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

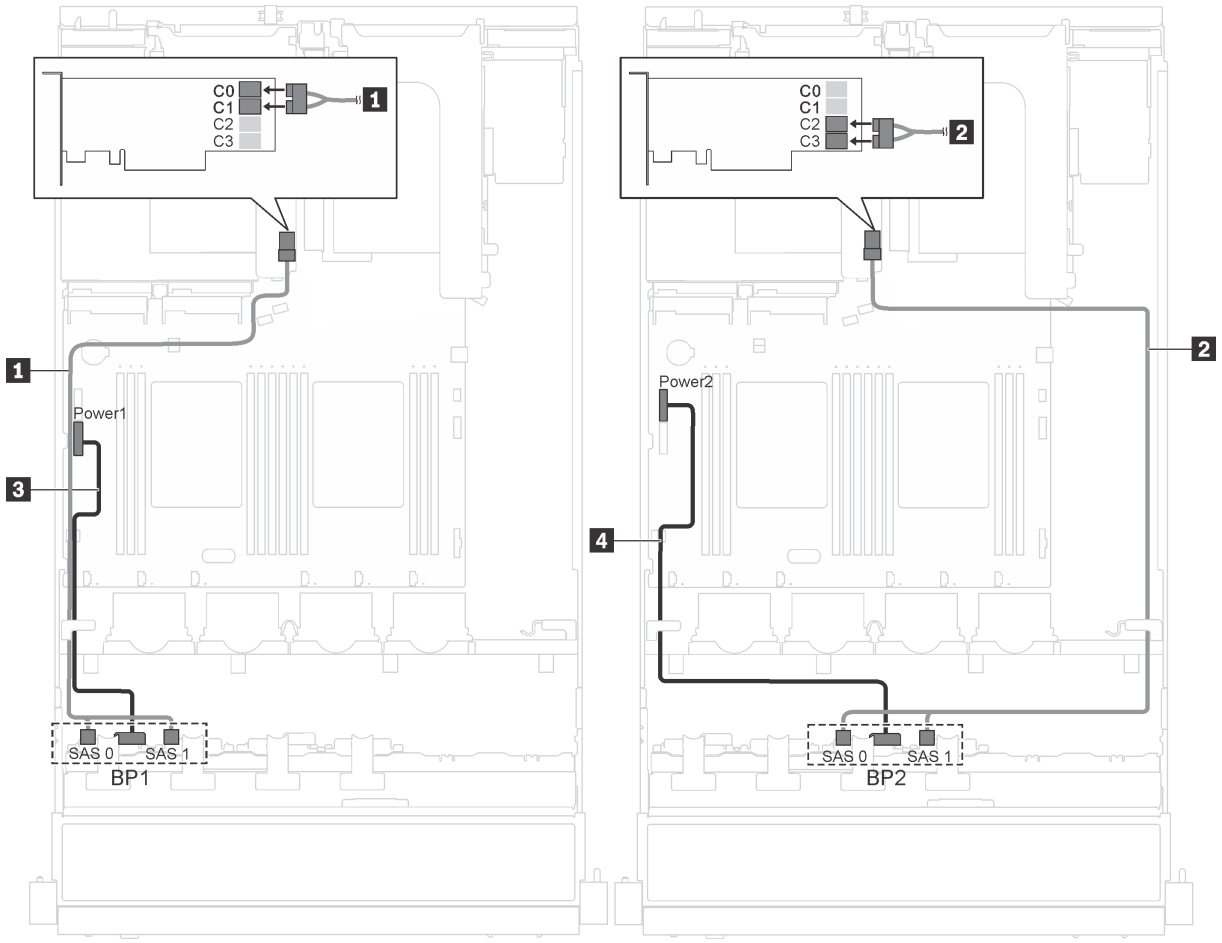


Figure 26. Cable routing for server models with sixteen 2.5-inch hot-swap drives and 16i adapter

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 1	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 2	HBA/RAID adapter installed in PCIe slot 4: • Gen 3: C2C3 • Gen 4: C1
3 Power cable	Power connector 1 on the backplane	Backplane 1 power connector on the system board
4 Power cable	Power connector 2 on the backplane	Backplane 2 power connector on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

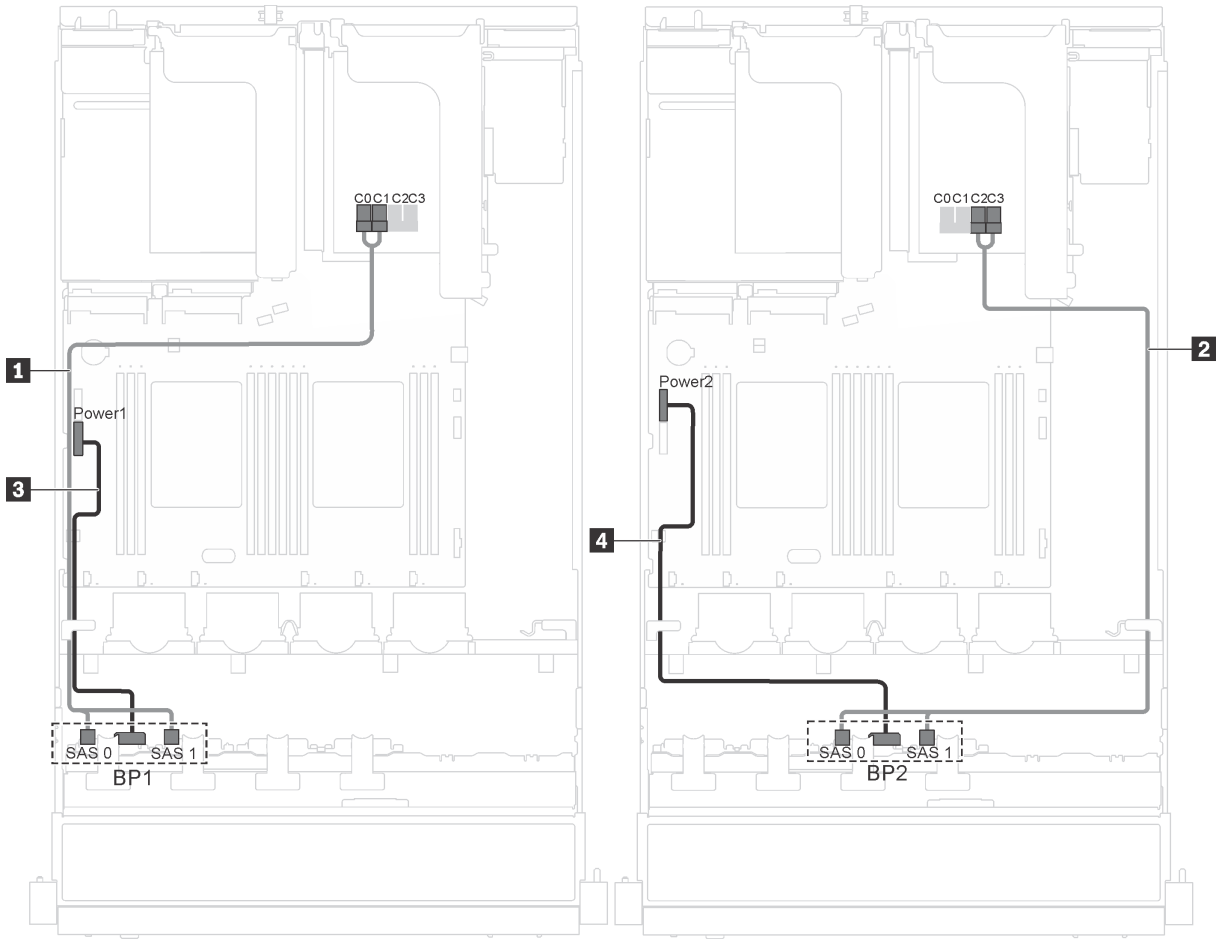


Figure 27. Cable routing for server models with sixteen 2.5-inch hot-swap drives, 16i adapter, and serial port module

Cable	From	To
1 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 1	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C0C1 • Gen 4: C0
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane 2	HBA/RAID adapter installed in PCIe slot 1: • Gen 3: C2C3 • Gen 4: C1
3 Power cable	Power connector 1 on the backplane	Backplane power connector 1 on the system board
4 Power cable	Power connector 2 on the backplane	Backplane power connector 2 on the system board

Note: *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

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 28 “Server components” on page 48, go to:

http://datacentersupport.lenovo.com/products/servers/thinksystem/sr550/7x03/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.

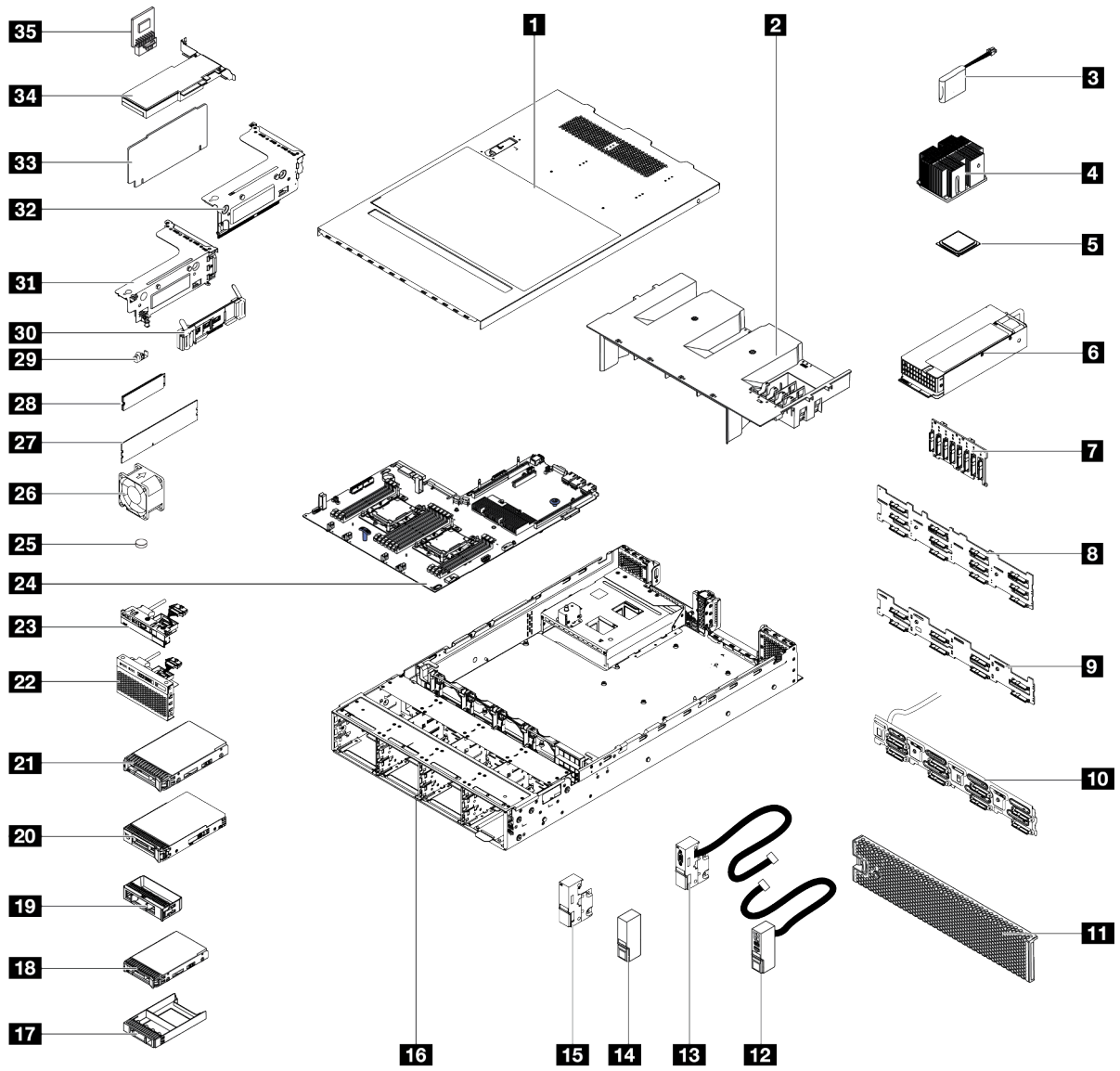


Figure 28. Server components

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

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

Table 12. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 28 “Server components” on page 48, go to: http://datacentersupport.lenovo.com/products/servers/thinksystem/sr550/7x03/parts					
1	Top cover	√			
2	Air baffle				√
3	RAID super capacitor module	√			
4	Heat sink			√	
5	Processor			√	
6	Hot-swap power supply	√			
7	Backplane, eight 2.5-inch hot-swap drives	√			
8	Backplane, twelve 3.5-inch hot-swap drives	√			
9	Backplane, eight 3.5-inch hot-swap drives	√			
10	Simple-swap-drive backplate assembly	√			
11	Security bezel	√			
12	Right rack latch, with front I/O assembly	√			
13	Left rack latch, with VGA connector	√			
14	Right rack latch, without front I/O assembly				√
15	Left rack latch, without VGA connector				√
16	Chassis			√	
17	2.5-inch hot-swap drive filler				√
18	2.5-inch hot-swap drive	√			
19	3.5-inch drive filler				√
20	3.5-inch simple-swap drive	√			
21	3.5-inch hot-swap drive	√			

Table 12. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
22	Front I/O assembly, server models with eight or sixteen 2.5-inch drive bays	√			
23	Front I/O assembly, server models with eight 3.5-inch drive bays	√			
24	System board			√	
25	CMOS battery (CR2032)				√
26	System fan	√			
27	DIMM	√			
28	M.2 drive	√			
29	M.2 retainer	√			
30	M.2 backplane	√			
31	Riser 1 bracket	√			
32	Riser 2 bracket	√			
33	Riser card	√			
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, go to:

http://datacentersupport.lenovo.com/products/servers/thinksystem/sr550/7x03/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 9.

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 56 and "Working inside the server with the power on" on page 55.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see https://serverproven.lenovo.com/.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to ThinkSystem SR550 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.

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

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

Safety inspection checklist

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

Notes:

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

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

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

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

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.

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

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

  a. Go to:

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

  b. 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.

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.

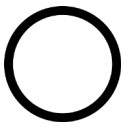
Top cover replacement

Use this information to remove and install the top cover.

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 14


"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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.

To remove the top cover, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

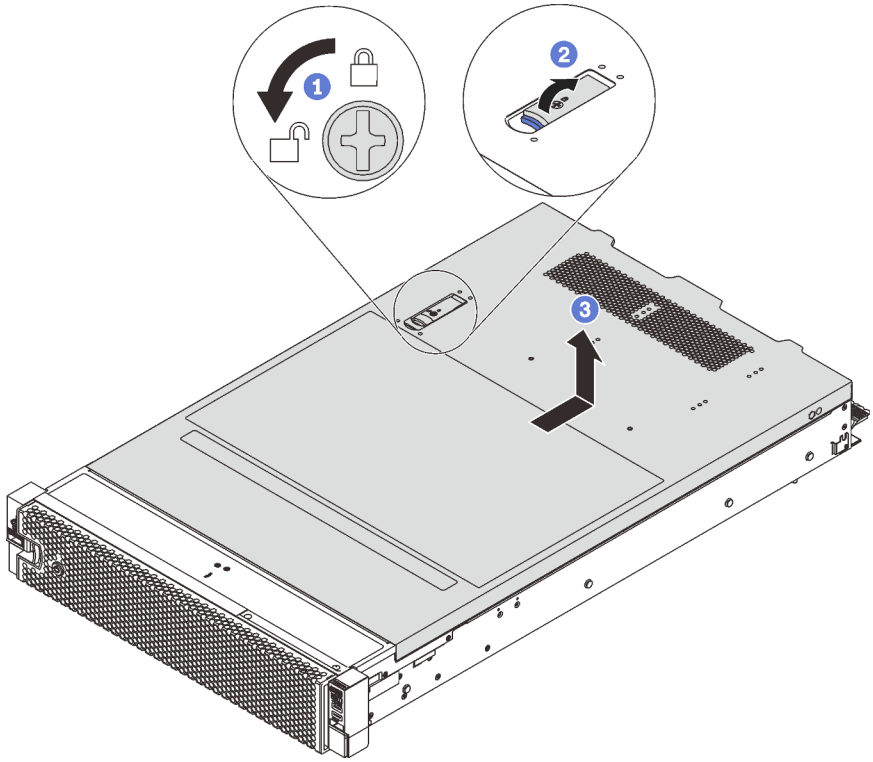


Figure 29. Top cover removal

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

Step 2. Press the release button on the cover latch and 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:

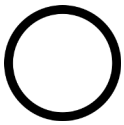
- Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.
- For proper cooling and airflow, replace the top cover before you power on the server.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing 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 correctly routed. See "Internal cable routing" on page 31.
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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

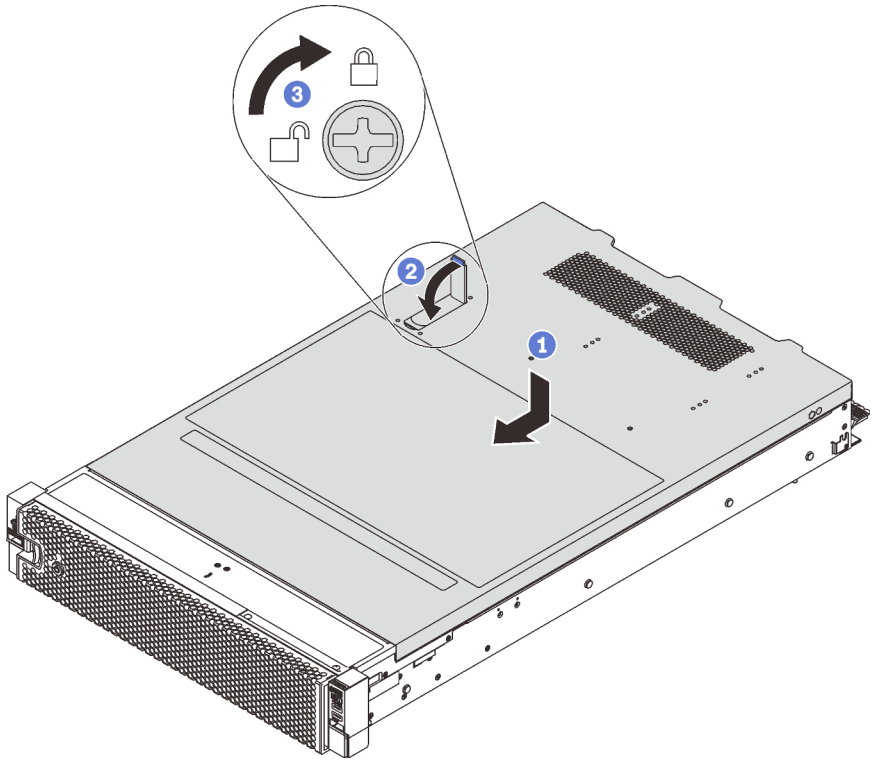


Figure 30. Top cover installation

Note: Before you slide the cover forward, ensure that the tabs on the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be difficult to remove the 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 completely closed.

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

Complete the parts replacement. See “Complete the parts replacement” on page 165.

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



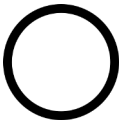
CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

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 14

Before removing the air baffle:

1. Remove the top cover. See "Remove the top cover" on page 56.
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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

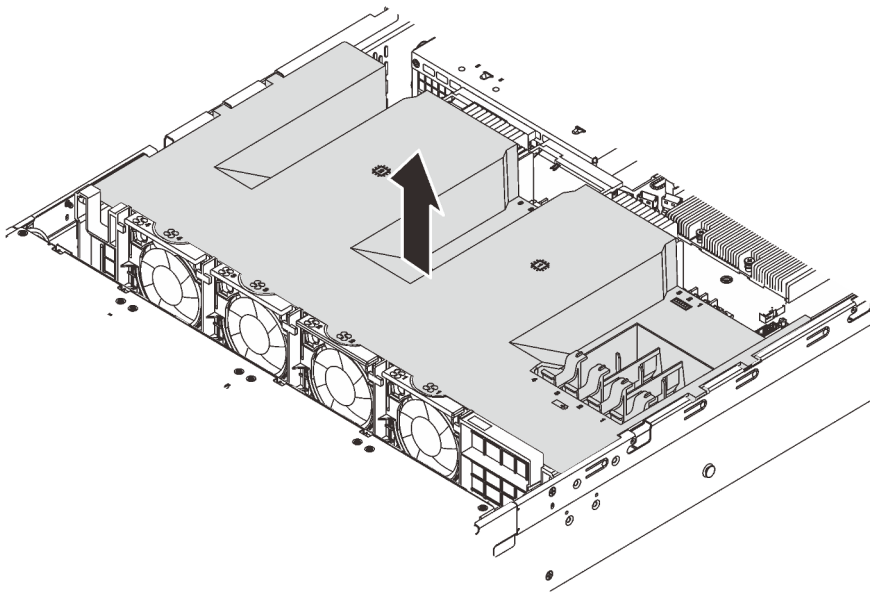


Figure 31. Air baffle removal

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

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 14

To install the air baffle, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

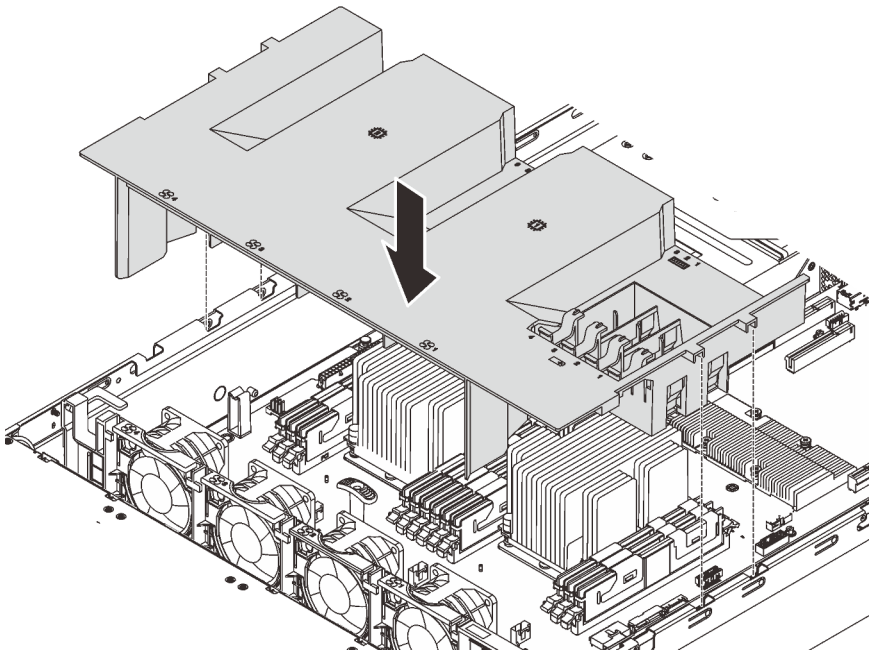


Figure 32. Air baffle installation

Step 1. Align the air baffle tabs with the slots on both sides of the chassis; then, lower the air baffle into the server.

Step 2. Press the air baffle down until it is securely seated.

Note: Close the retaining clip on each end of the DIMM slot before installing the air baffle for proper cooling.

Step 3. Install any RAID super capacitor module that you have removed.

Complete the parts replacement. See "Complete the parts replacement" on page 165.

Security bezel replacement

Use this information to remove and install the security bezel.

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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

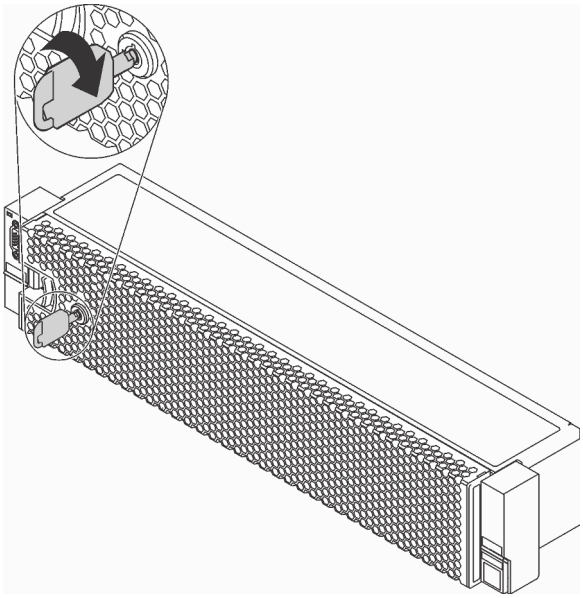


Figure 33. Unlocking the security bezel

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

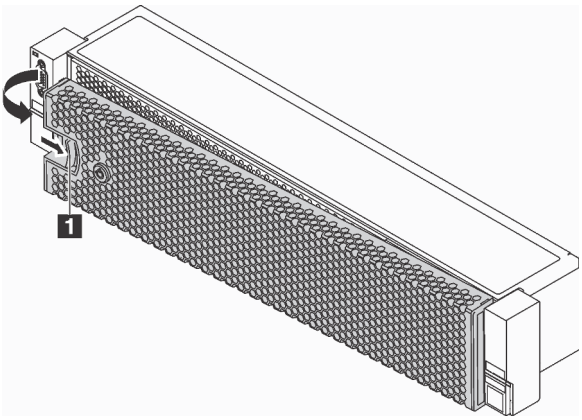


Figure 34. Security bezel removal

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 70.

To install the security bezel, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

Attention: Before you ship the rack with the server installed, reinstall 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.

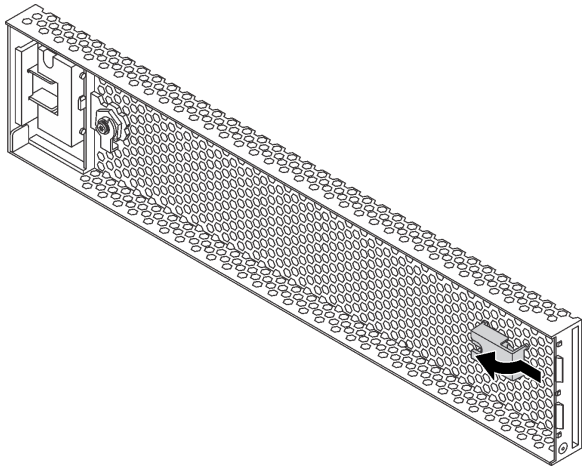


Figure 35. Key holder removal

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.

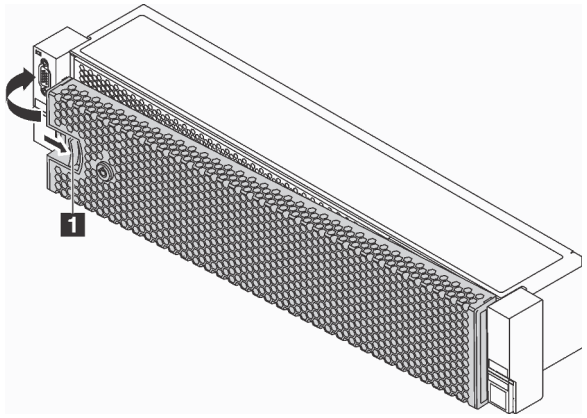


Figure 36. Security bezel installation

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

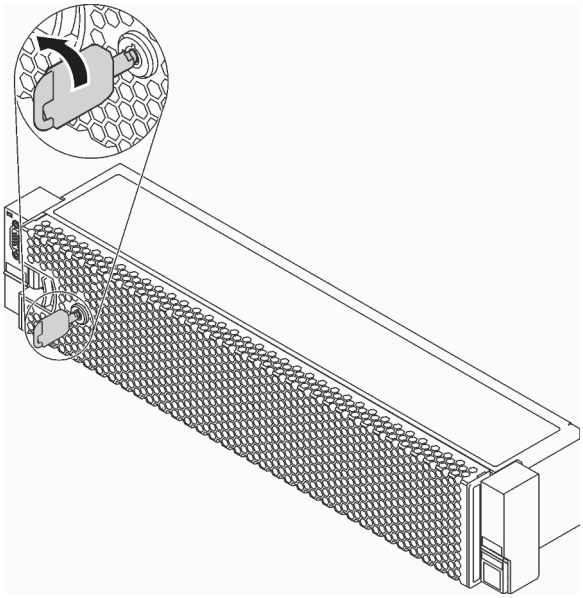


Figure 37. Locking the security bezel

Rack latch replacement

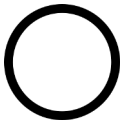
Use this information to remove and install the rack latches.

Depending on the server model, the rack latches might be assembled with a VGA connector, the front I/O assembly, or both.

Note: Your rack latches might look different from the illustrations in this topic.

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing the rack latches:

1. If you have installed the security bezel, remove it. See "Remove the security bezel" on page 62.
2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

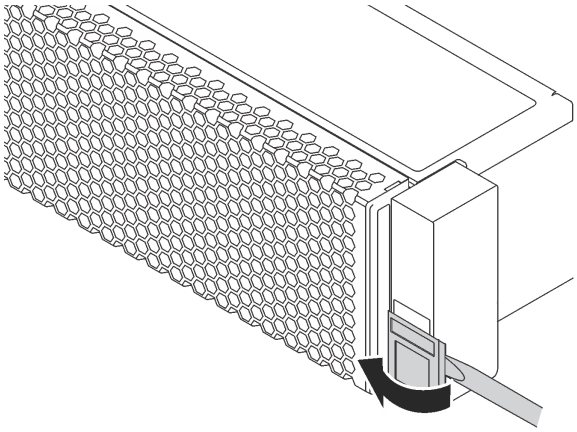


Figure 38. ID label plate removal

To remove the rack latches, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. If you are removing rack latches on the server models with twelve 3.5-inch hot-swap drives, disconnect the VGA cable 1, the front USB cable 2 and the operator-information-panel cable 3, or all cables from the system board.

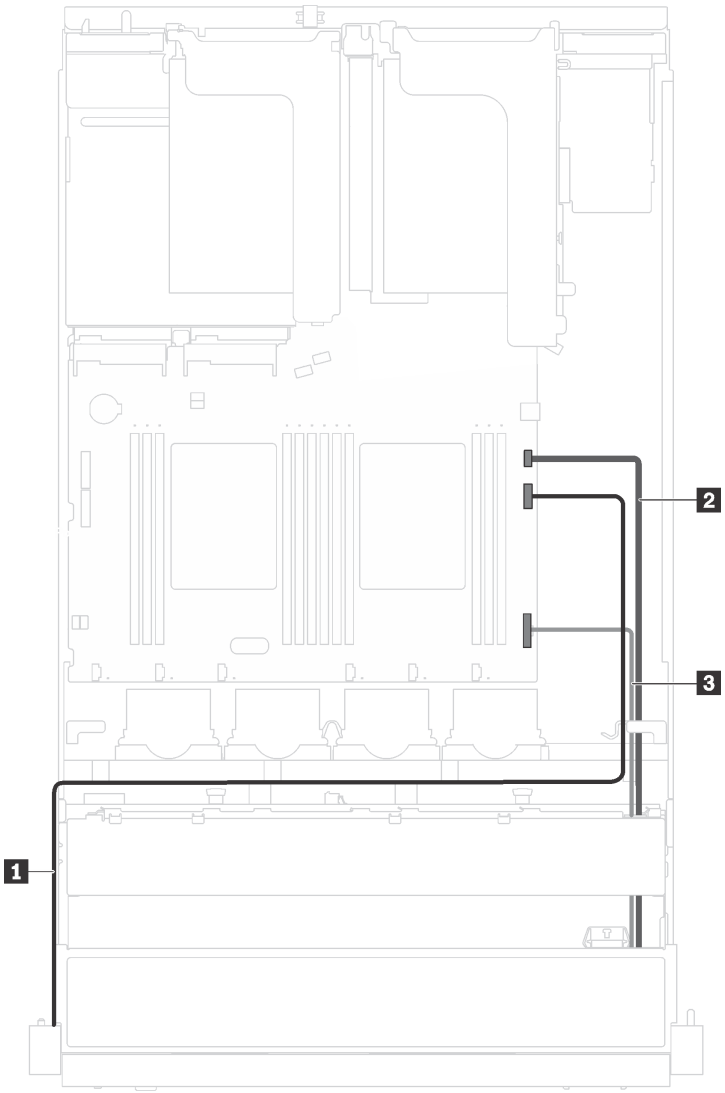


Figure 39. Cable connection for the VGA connector, the front USB connectors, and the operator information panel on rack latches

Step 2. If you are removing a rack latch with the front VGA connector on it, remove the screws that secure the cable retainer on the side of the server and then remove the cable retainer from the chassis.

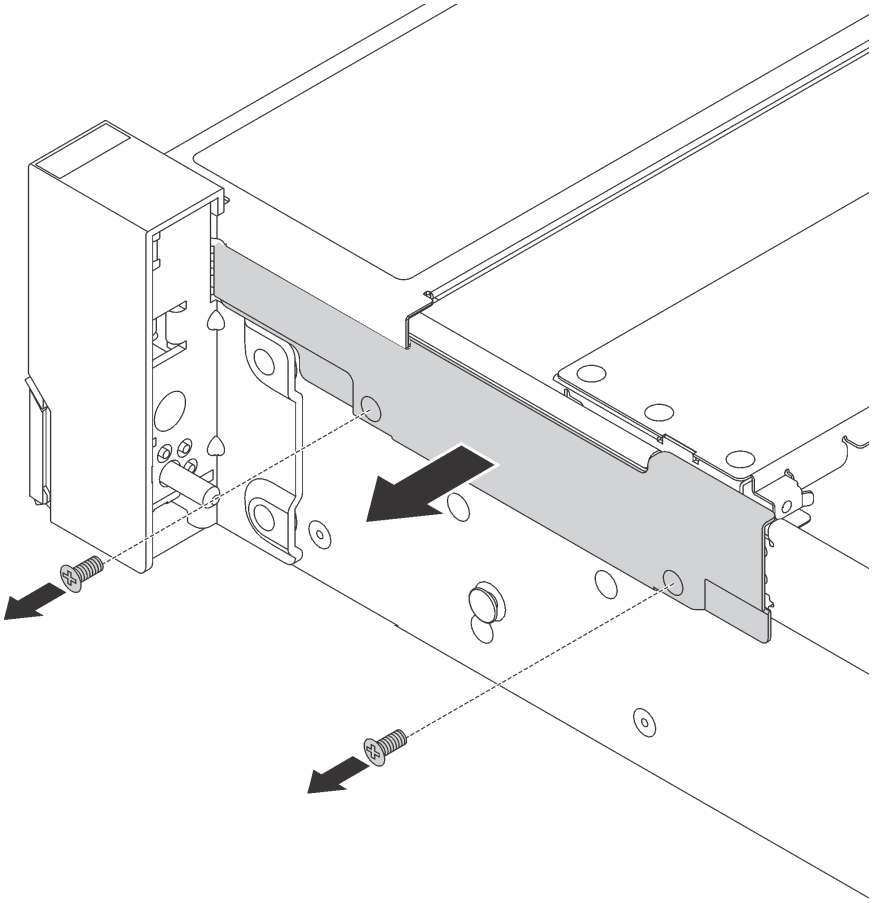


Figure 40. Cable retainer removal

Step 3. On each side of the server, remove the screws that secure the rack latch.

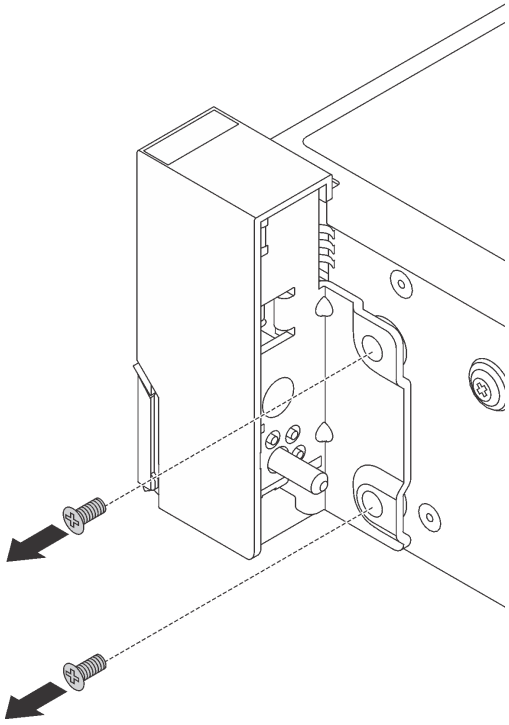


Figure 41. Screws removal

Step 4. On each side of the server, slide the rack latch forward slightly and then remove the rack latch from the chassis.

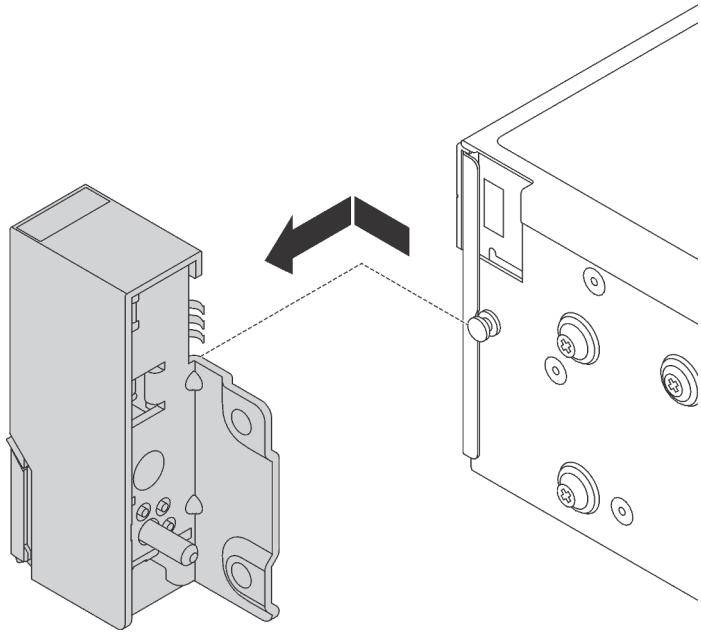


Figure 42. Rack latch removal

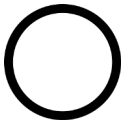
If you are instructed to return the old rack latches, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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

To install the rack latches, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. 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 to the direction as shown.

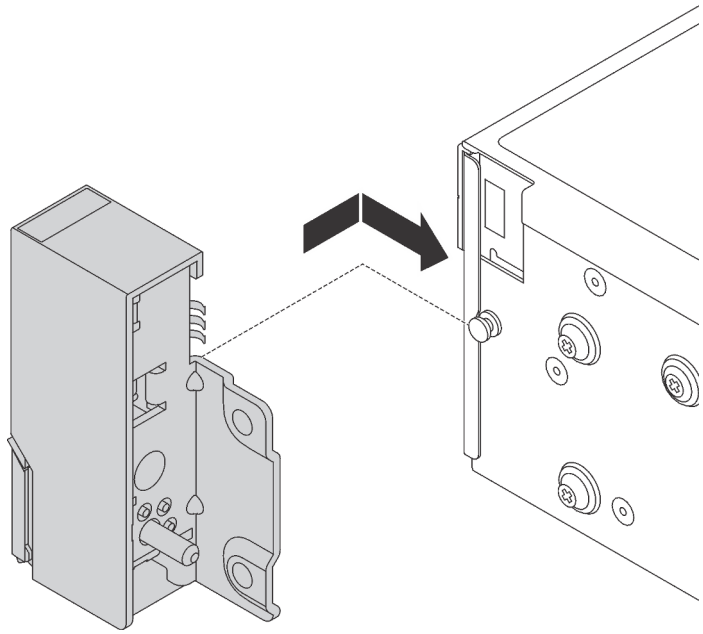


Figure 43. Rack latch installation

Step 2. Install the screws to secure the rack latch on each side of the server.

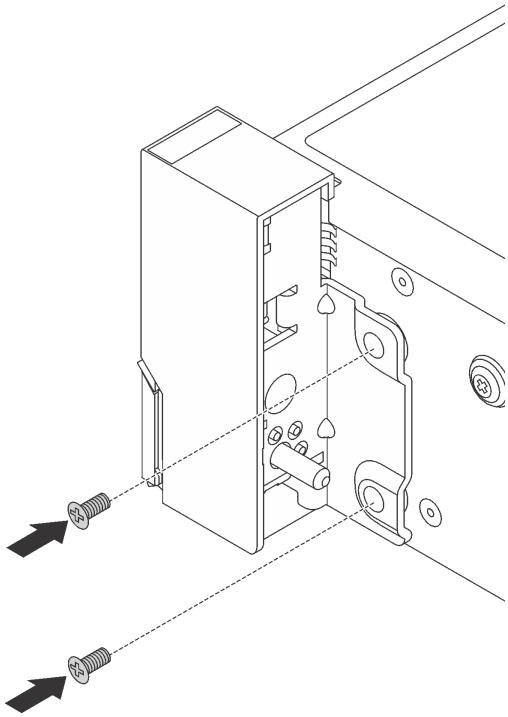


Figure 44. Screws installation

Step 3. If necessary, route the VGA cable, the front-information-panel cable, the front USB cable, or all cables along with the chassis as shown. Then, install the screws to secure the cable retainer.

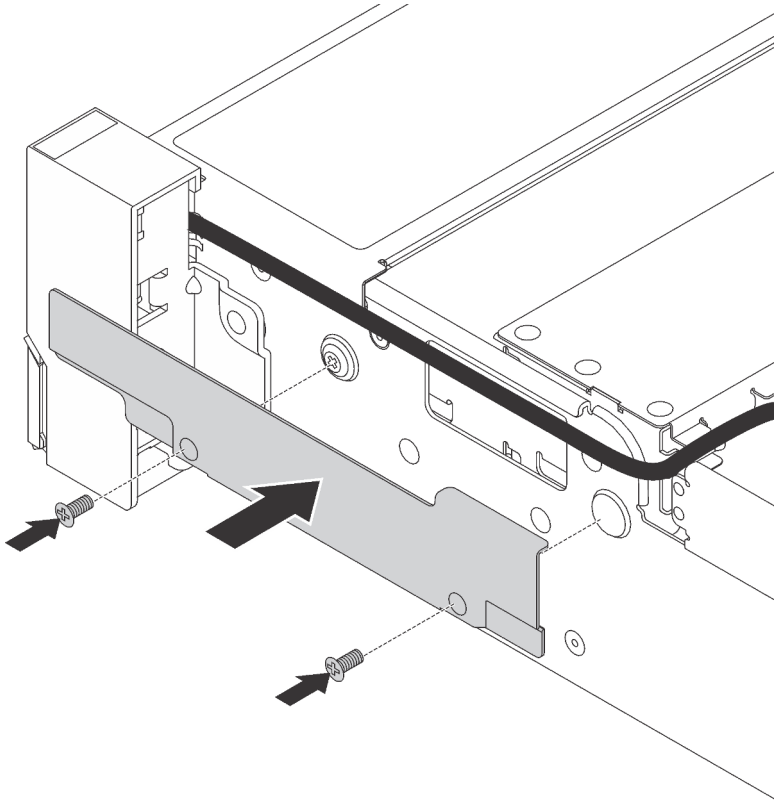


Figure 45. Cable retainer installation

Step 4. If necessary, connect the VGA cable 1, the front USB cable 2 and the operator-information-panel cable 3, or all cables to the system board.

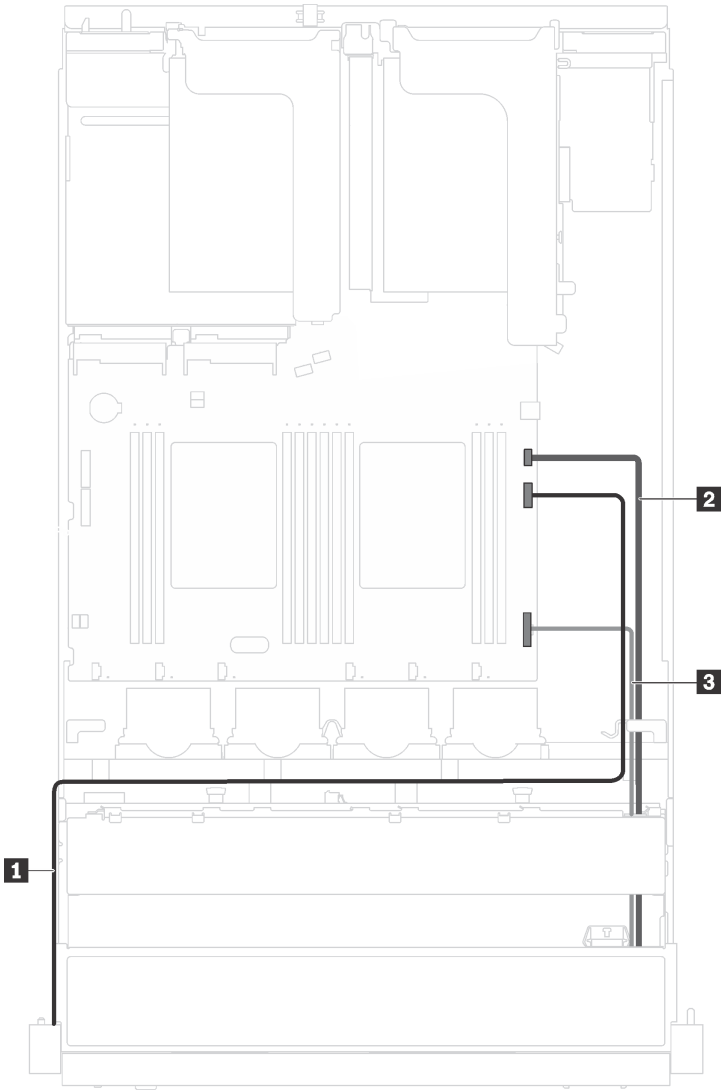


Figure 46. Cable connection for the VGA connector and front I/O assembly on rack latches

After installing the rack latches:

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

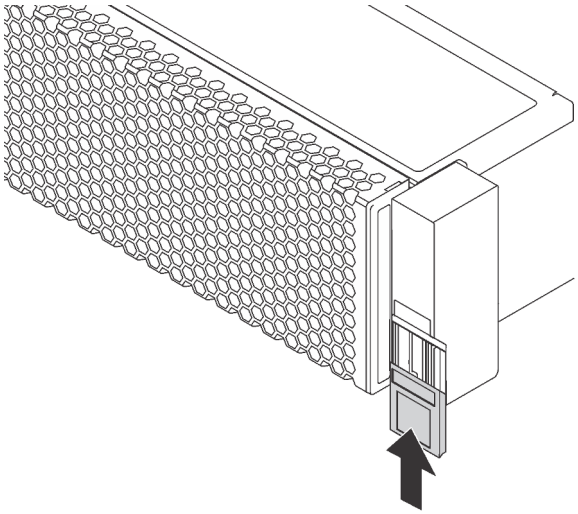


Figure 47. ID label plate installation

2. Complete the parts replacement. See “Complete the parts replacement” on page 165.

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 turning 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 and hot-swap 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 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 56

Before removing a hot-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 62.

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 hot-swap drive, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Slide the release latch to unlock the drive handle.

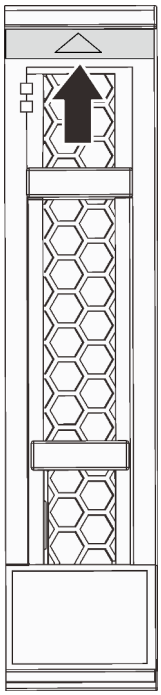


Figure 48. Opening the handle of a 2.5-inch hot-swap drive

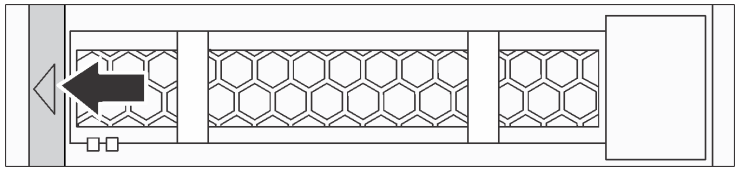


Figure 49. Opening the handle of a 3.5-inch hot-swap drive

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

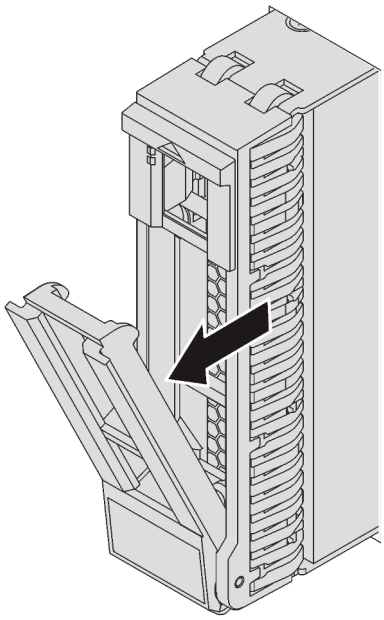


Figure 50. 2.5-inch hot-swap drive removal

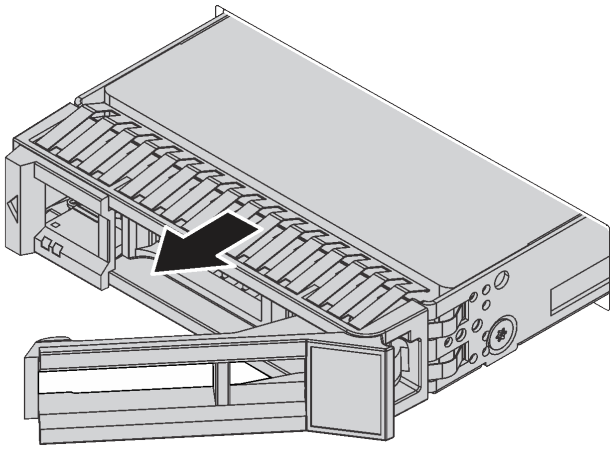


Figure 51. 3.5-inch hot-swap drive removal

After removing a hot-swap drive:

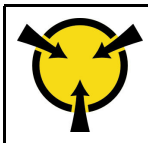
1. Install the drive filler or a new hot-swap drive.
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials that are provided.

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 56

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 https://serverproven.lenovo.com/.
- 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 and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
  - Drive type priority: solid-state drive, SAS hard disk drive, SATA hard disk drive
  - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and same capacity.

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.

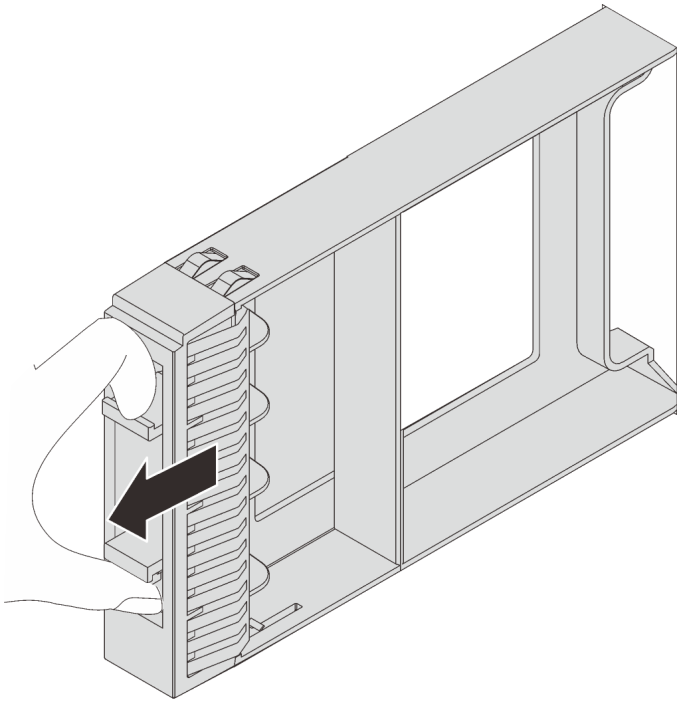


Figure 52. 2.5-inch drive filler removal

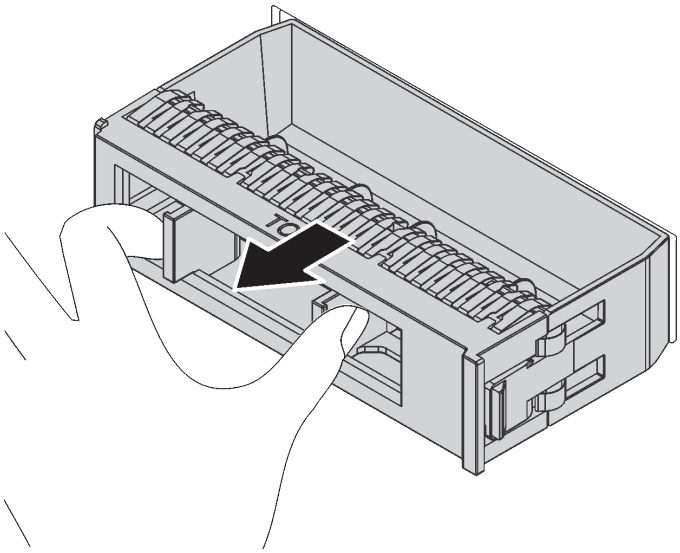


Figure 53. 3.5-inch drive filler removal

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

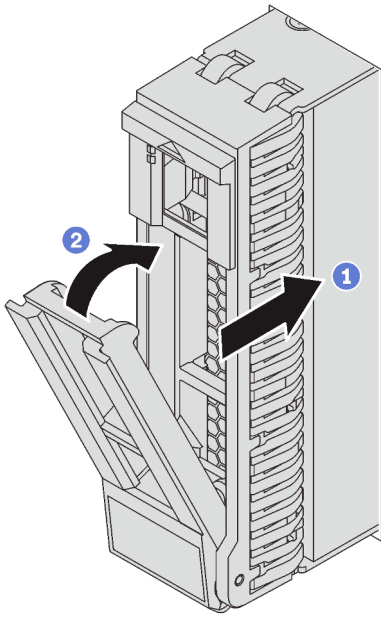


Figure 54. 2.5-inch hot-swap drive installation

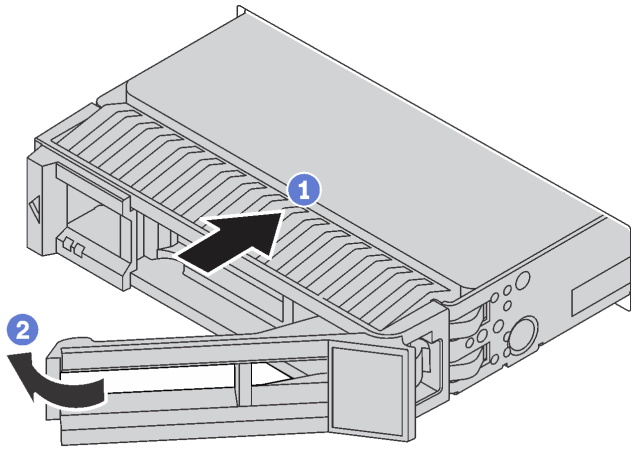


Figure 55. 3.5-inch hot-swap drive installation

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.

Step 3. Check the hot-swap drive status LED to verify that the hot-swap drive is operating correctly. If the yellow hot-swap drive status LED of a drive is lit continuously, that drive is faulty and must be replaced. If the green hot-swap drive activity LED is flashing, the drive is being accessed.

Complete the parts replacement. See "Complete the parts replacement" on page 165.

Simple-swap drive replacement

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

Notes:

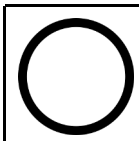
- The term "simple-swap drive" refers to all the supported types of simple-swap hard disk drives and solid-state drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment 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

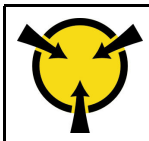
Use this information to remove a simple-swap drive.



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



"**Power off** the server for this task" on page 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 62.

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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

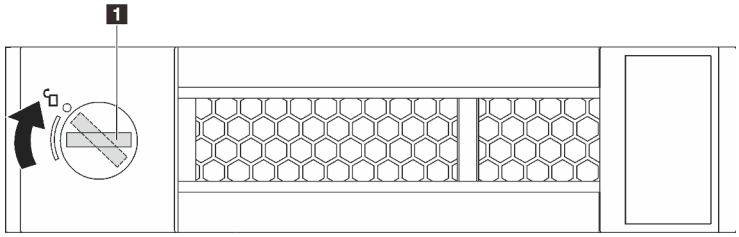


Figure 56. Opening the handle of a 3.5-inch simple-swap drive

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

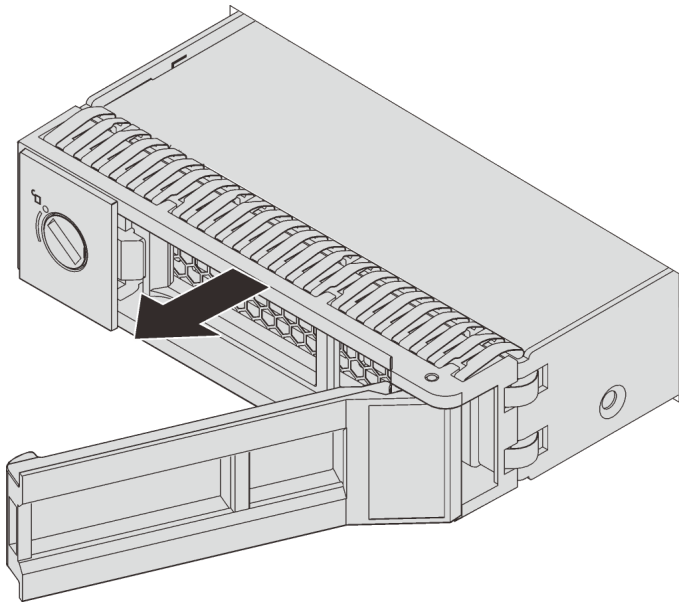


Figure 57. 3.5-inch simple-swap drive removal

After removing the simple-swap drive:

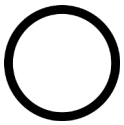
1. Install the drive filler or a new simple-swap drive.
2. If you are instructed to return the old simple-swap drive, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 https://serverproven.lenovo.com/.
- 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 and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
  - Drive type priority: solid-state drive, SATA hard disk drive
  - 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.

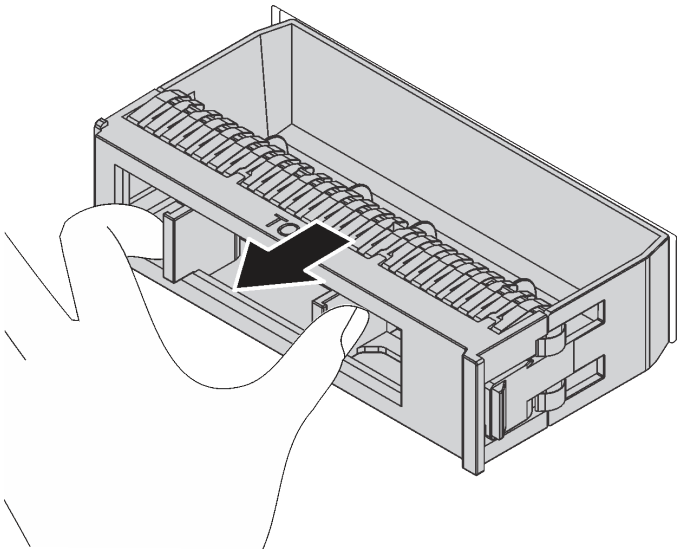


Figure 58. Drive filler removal

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

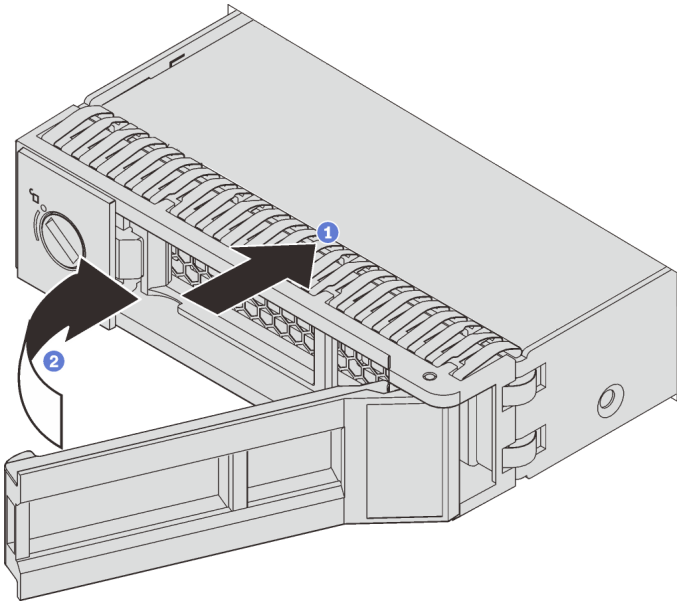


Figure 59. Simple-swap drive installation

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.

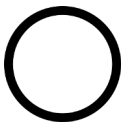
Complete the parts replacement. See "Complete the parts replacement" on page 165.

Backplane replacement

Use this information to remove and install the backplane.

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing the backplane:

1. Remove the top cover. See "Remove the top cover" on page 56.
2. Remove all the installed drives and drive fillers (if any) from the drive bays. See "Remove a hot-swap drive" on page 74.

To remove the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

Note: The following 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.

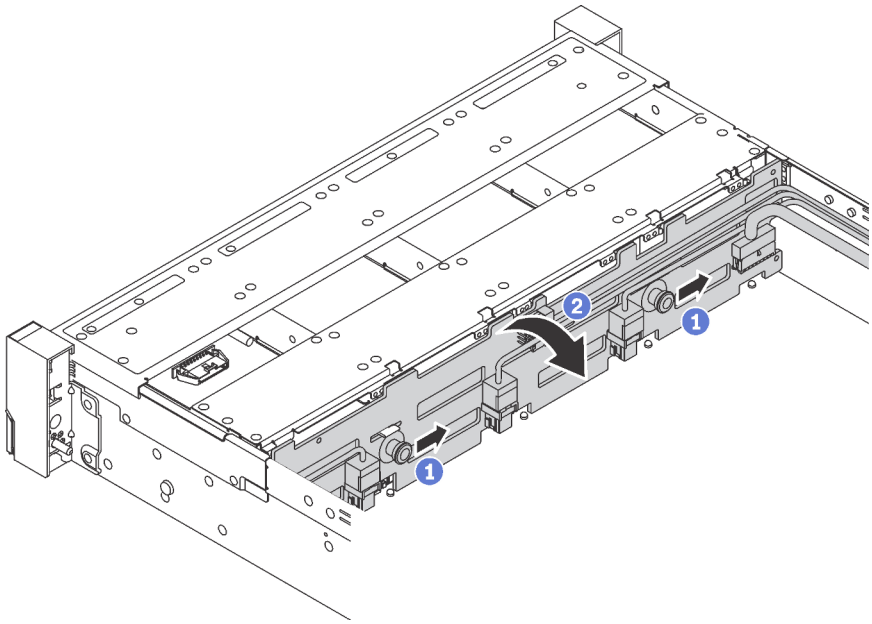


Figure 60. 3.5-inch-drive backplane removal

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. Disconnect cables from the backplane.

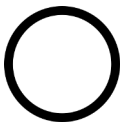
If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing the backplane, touch the static-protective package that contains the new 3.5-inch-drive backplane to any unpainted surface on the outside of the server. Then, take the new 3.5-inch-drive 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

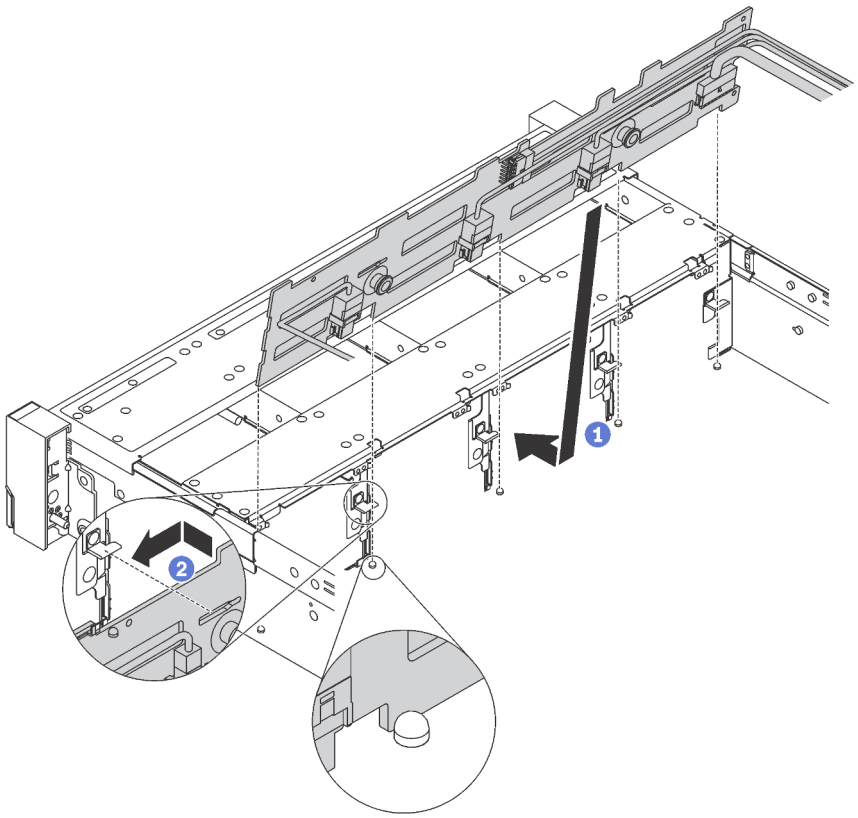


Figure 61. 3.5-inch-drive backplane installation

Step 1. Connect the cables to the backplane and align the backplane with the chassis and lower it into the chassis. Put the backplane into the front of the posts on the chassis with it leaning backward slightly.

Step 2. 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 backplane;

1. Reinstall drives or drive fillers.
2. Complete the parts replacement. See “Complete the parts replacement” on page 165.

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 14	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 56.
2. Remove all the installed drives and drive fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 74.

To remove the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

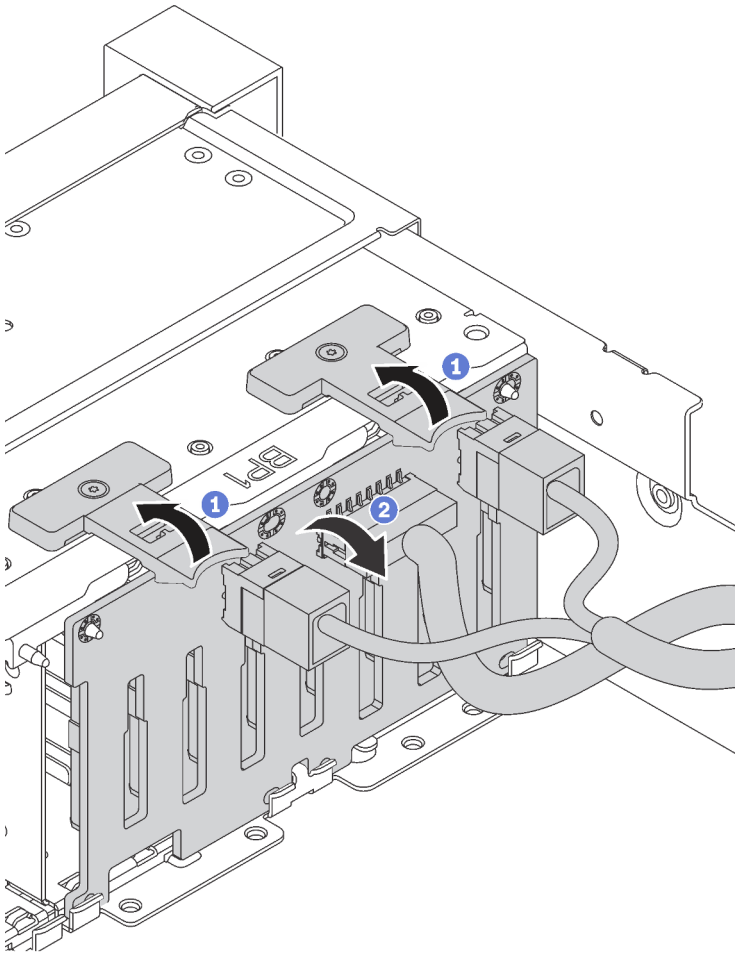


Figure 62. 2.5-inch-drive backplane removal

Step 1. Lift the release tabs and pivot the backplane backward slightly to release it from the two pins on the chassis.

Step 2. Lift the backplane out of the chassis carefully.

Step 3. Disconnect cables from the backplane.

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 14

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

Before installing the backplane, touch the static-protective package that contains the new 2.5-inch-drive backplane to any unpainted surface on the outside of the server. Then, take the new 2.5-inch-drive 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

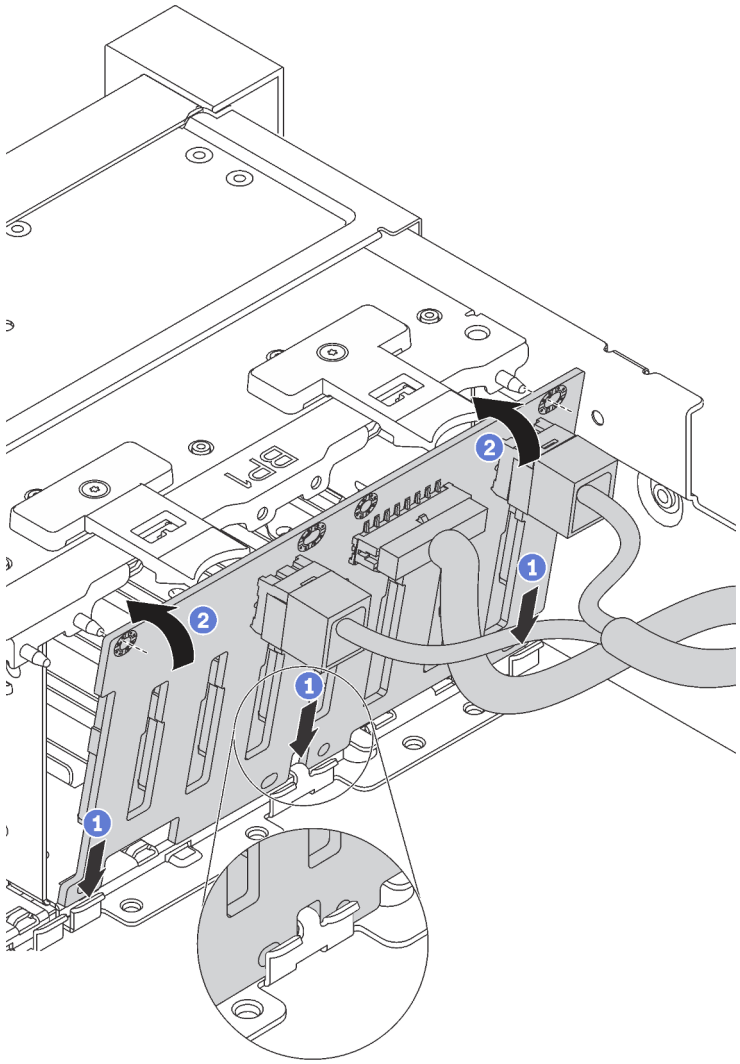


Figure 63. 2.5-inch-drive backplane installation

Step 1. Connect the cables to the backplane and align the bottom of the backplane in the slots on the bottom of the chassis.

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

After installing the backplane;

1. Reinstall drives or drive fillers.
2. Complete the parts replacement. See “Complete the parts replacement” on page 165.

Simple-swap-drive backplate assembly replacement

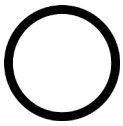
Use this information to remove and install the 3.5-inch simple-swap-drive backplate assembly.

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 14



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

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

1. Remove the top cover. See “Remove the top cover” on page 56.
2. Remove all the installed drives and drive fillers (if any) from the drive bays. See “Remove a simple-swap drive” on page 79.
3. Disconnect the cables from the system board. See “Server models with eight 3.5-inch simple-swap drives” on page 33. Then, remove the corresponding cables from the cable clips.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

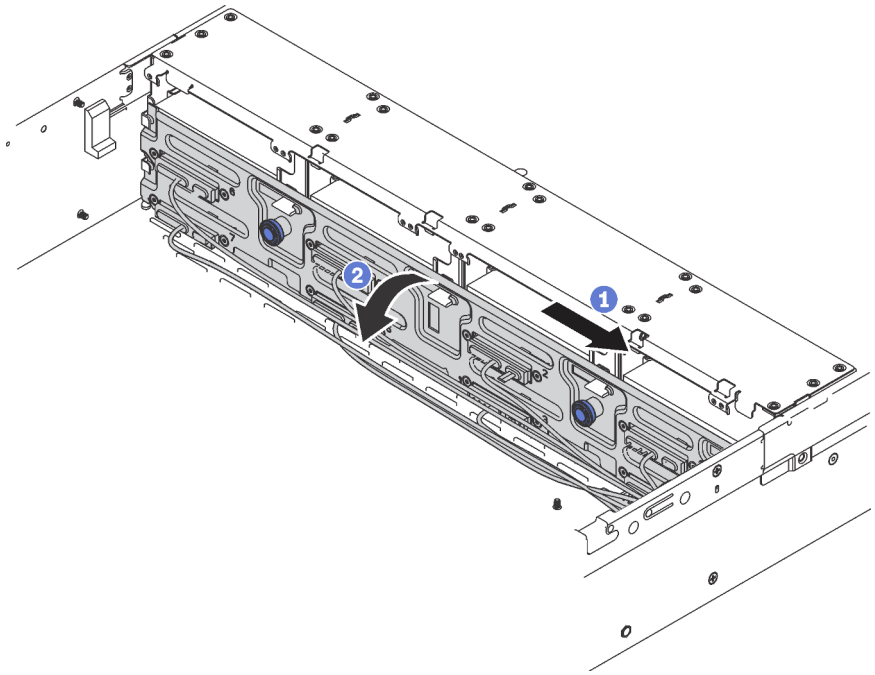


Figure 64. 3.5-inch simple-swap-drive backplate assembly removal

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.

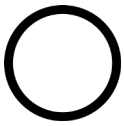
If you are instructed to return the old simple-swap-drive backplate assembly, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing the 3.5-inch simple-swap-drive backplate assembly, touch the static-protective package that contains the new 3.5-inch simple-swap-drive backplate assembly to any unpainted surface on the outside of the server. Then, take the new 3.5-inch simple-swap-drive 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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

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

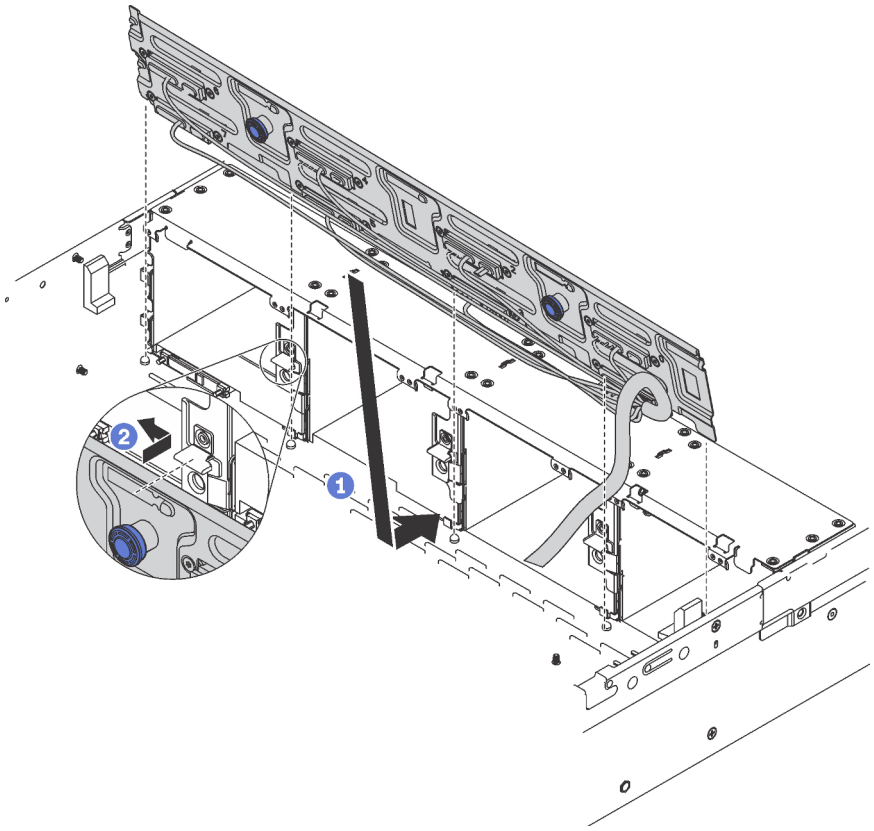


Figure 65. 3.5-inch simple-swap-drive backplate assembly installation

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 81.
2. Connect power and signal cables to the system board. See “Internal cable routing” on page 31.
3. Complete the parts replacement. See “Complete the parts replacement” on page 165.

Front I/O assembly replacement

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

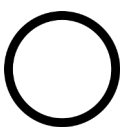
Note: Depending on the model, your server and the front I/O assembly might look different from the illustrations in this topic.

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 14



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

Before removing the front I/O assembly:

1. Remove the top cover. See “Remove the top cover” on page 56.
2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 62.
3. Disconnect the front VGA cable 1, the USB cable 2, and the operator-information-panel cable 3 from the system board.

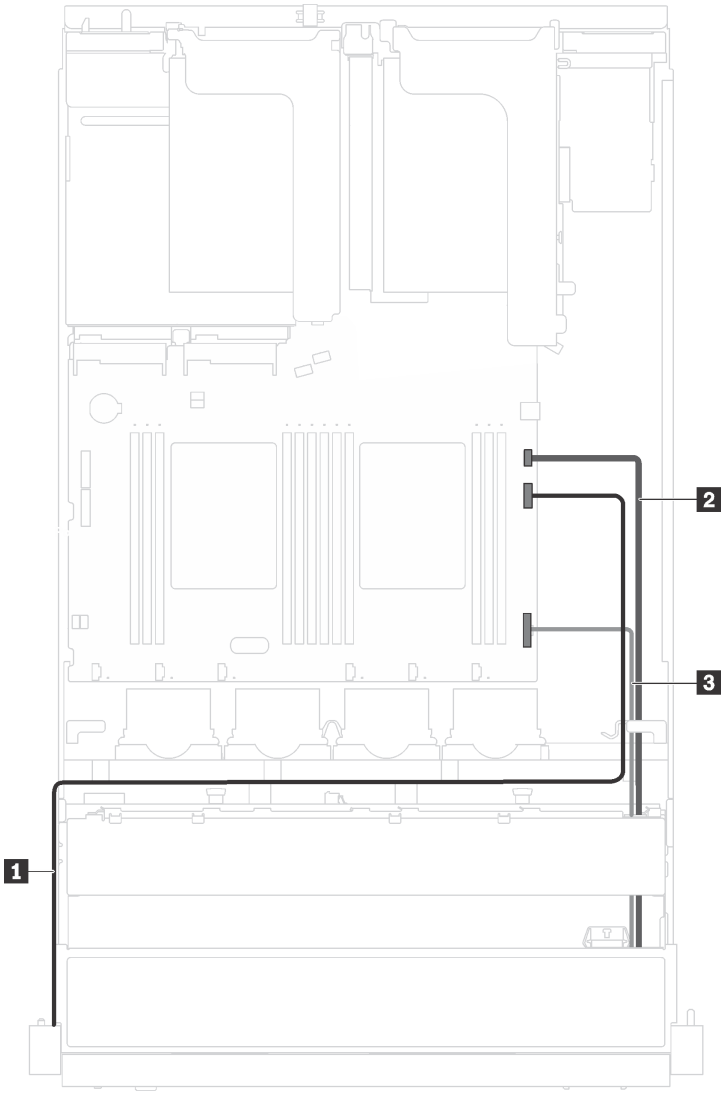


Figure 66. Front I/O assembly cable connection

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

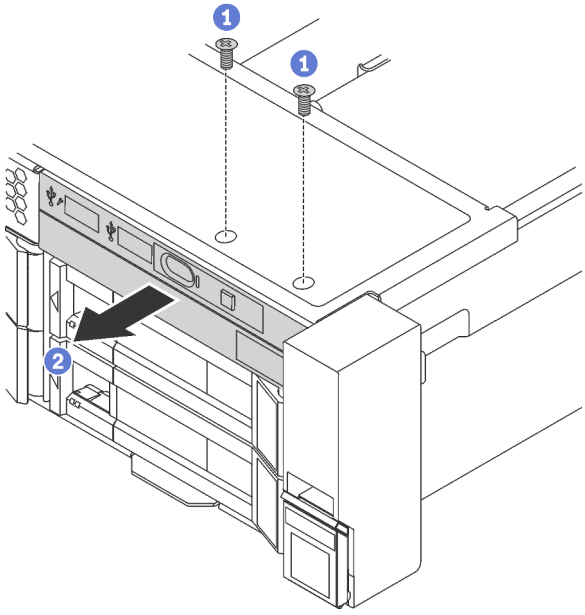


Figure 67. Front I/O assembly removal

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

Step 2. Remove the front I/O assembly from the chassis.

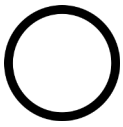
If you are instructed to return the old front I/O assembly, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before you install 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

Step 1. Insert the new front I/O assembly into the corresponding bay in the chassis. Then, install the screws to secure the front I/O assembly.

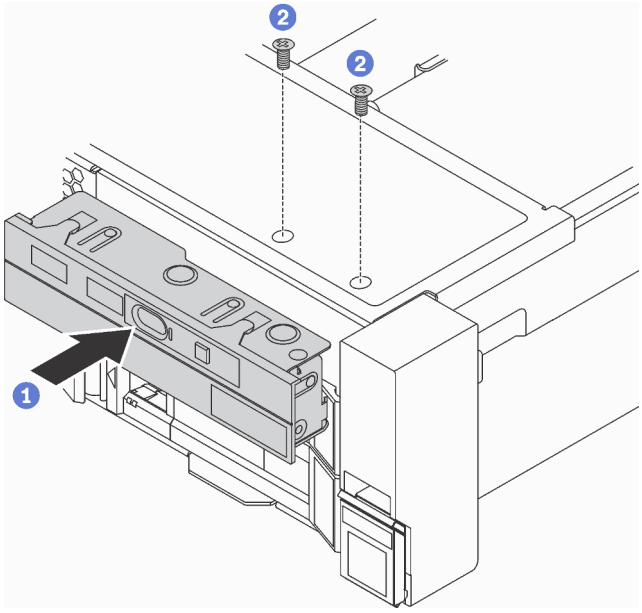


Figure 68. Front I/O assembly installation

Step 2. Connect the front VGA cable 1, the USB cable 2, and the operator-information-panel cable 3 to the system board.

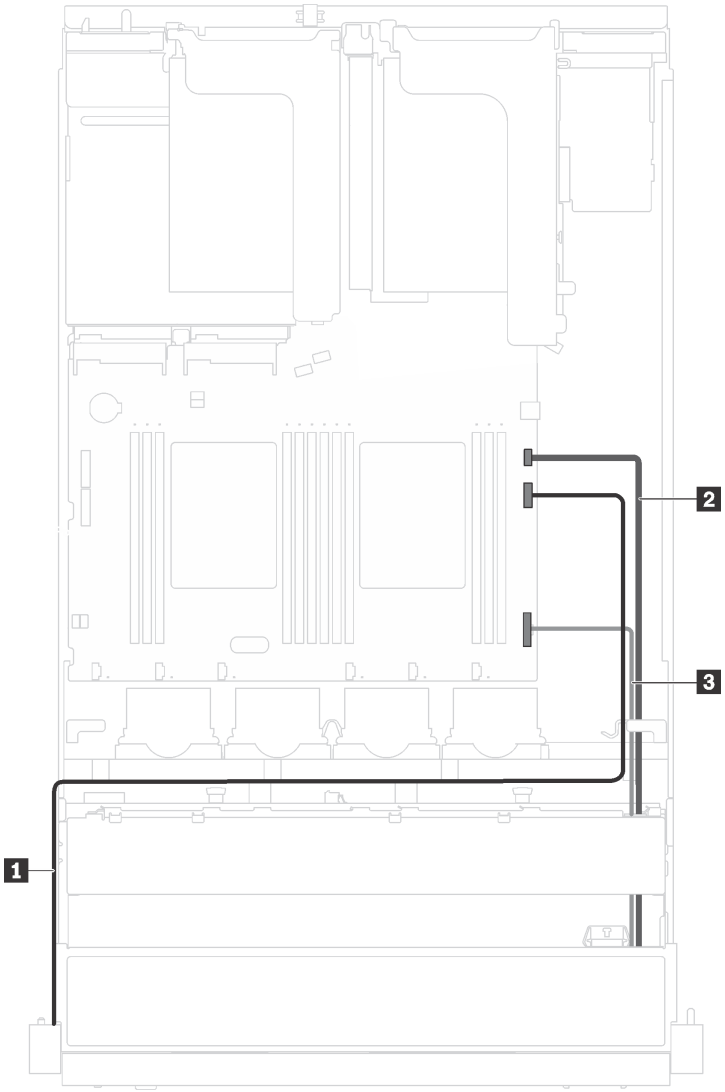


Figure 69. Front I/O assembly cable connection

After installing the front I/O assembly, complete the parts replacement. See "Completing the parts replacement" on page 165.

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.

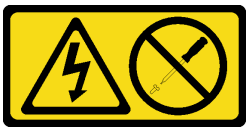


"**Read** the installation Guidelines" on page 53



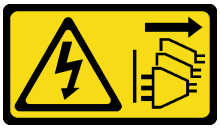
"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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:

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



Figure 70. 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 before removing the power supply.

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

CAUTION:

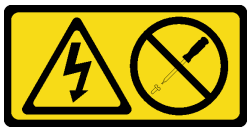
1. **240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.**
2. **Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.**
3. **In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.**



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。

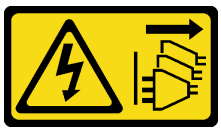
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers'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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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

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

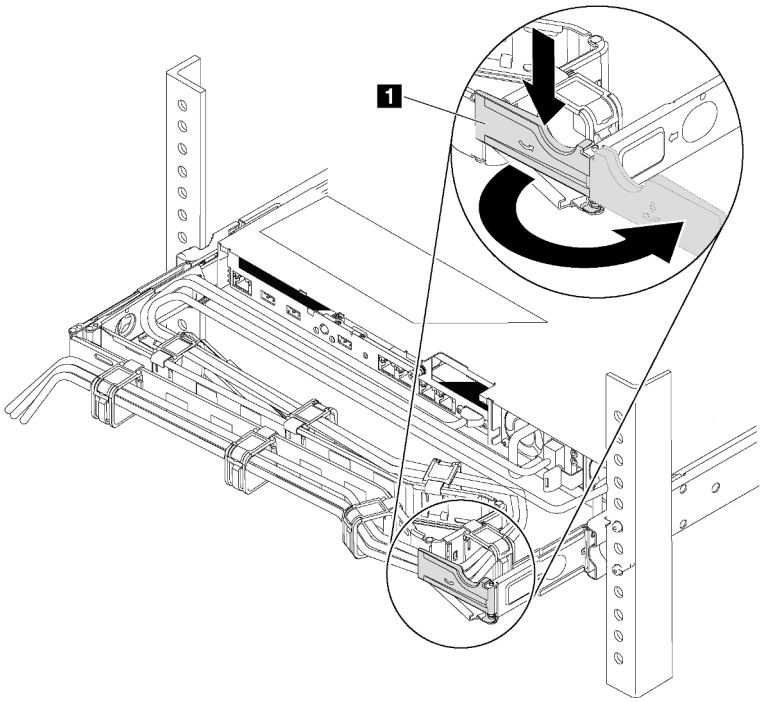


Figure 71. CMA adjustment

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.

Notes: 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

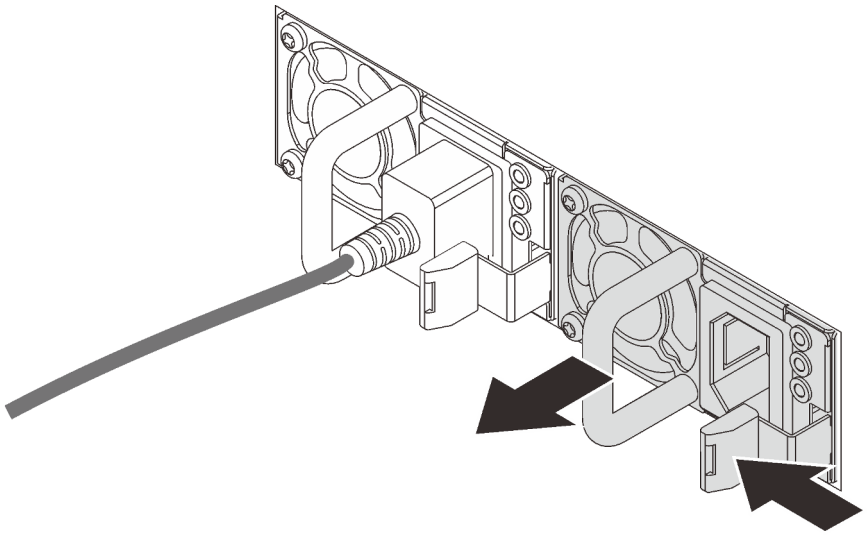


Figure 72. Hot-swap power supply removal

After removing the power supply:

- Install a power supply filler or a new power supply to cover the power supply bay.

  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.
- If you are instructed to return the old 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 56

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 https://serverproven.lenovo.com/.

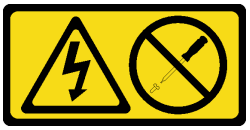
Notes:

- 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 on the top cover near the power supply.



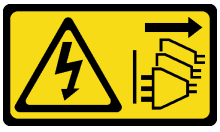
Figure 73. Hot-swap power supply label on the cover

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:

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

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

CAUTION:

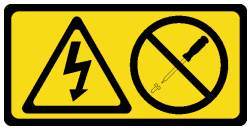
1. **240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.**
2. **Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.**
3. **In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.**



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。

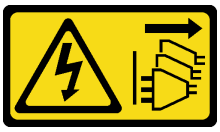
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers'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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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

Step 2. 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 ThinkSystem 2U CMA Upgrade Kit for Toolless Slide Rail or ThinkSystem Toolless Slide Rail Kit with 2U CMA, do the following:

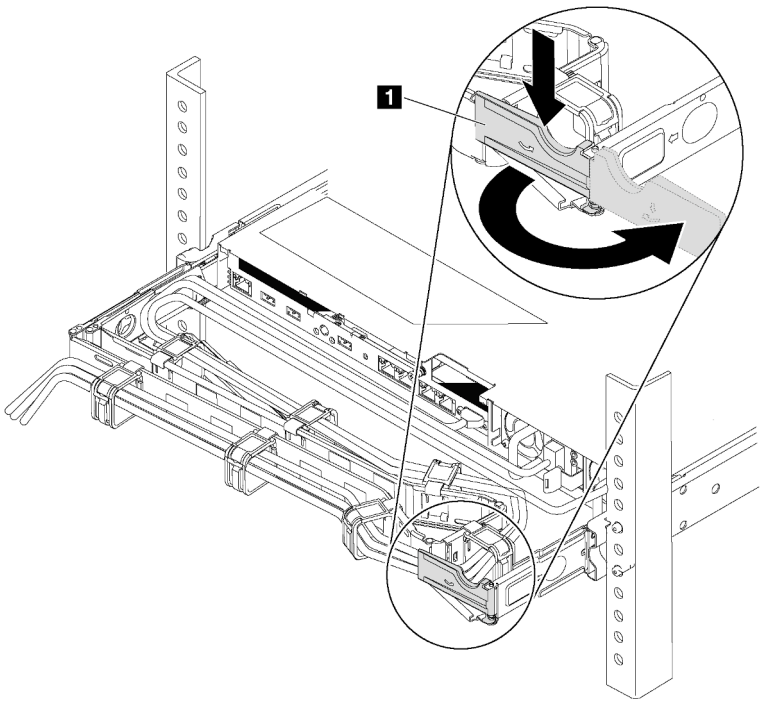


Figure 74. CMA adjustment

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 3. If there is a power supply filler installed, remove it.

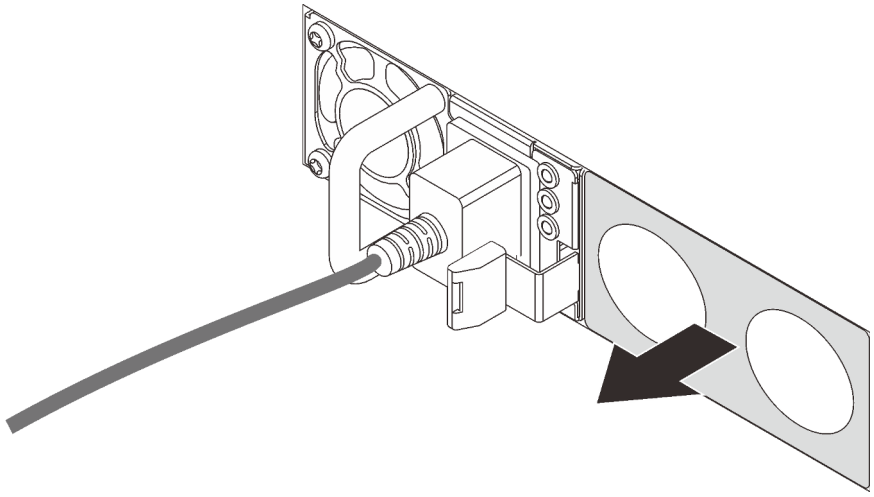


Figure 75. Hot-swap power supply filler removal

Step 4. Slide the new hot-swap power supply into the bay until the release latch clicks into place.

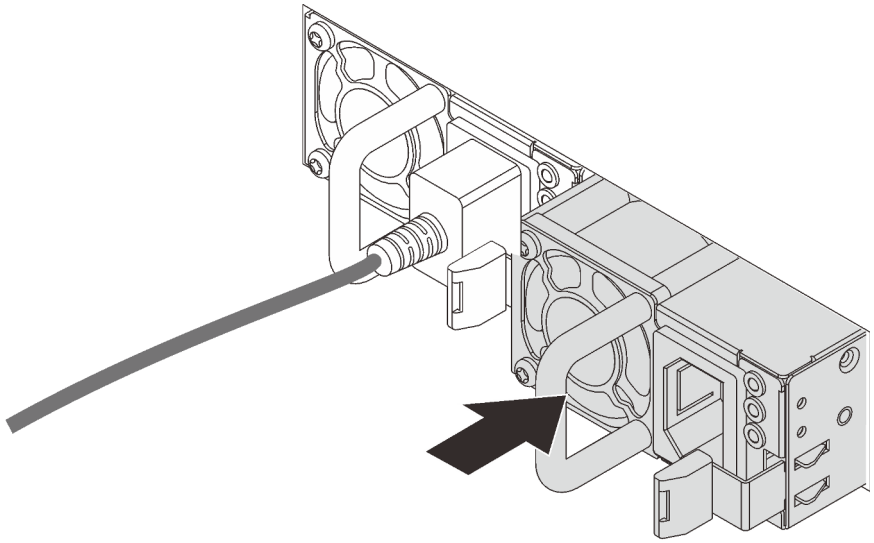


Figure 76. Hot-swap power supply installation

After installing the 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.

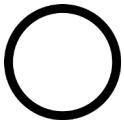
RAID super capacitor module replacement

Use this information to remove and install a 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.

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing a RAID super capacitor module, remove the top cover. See "Remove the top cover" on page 56.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Disconnect the cable of the RAID super capacitor module.

Step 2. Gently press the tab on the air baffle as shown and remove the RAID super capacitor module from the air baffle at the same time.

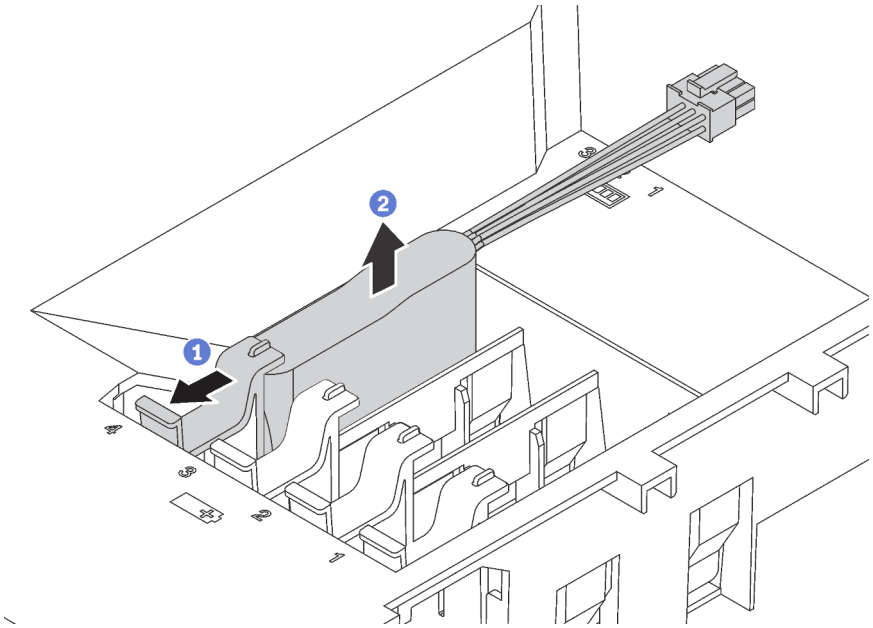


Figure 77. RAID super capacitor module removal

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 14

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

Before installing a RAID super capacitor module, 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.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Note the orientation of the RAID super capacitor module. Then, gently press the tab on the air baffle as shown and install the RAID super capacitor module onto the air baffle at the same time.

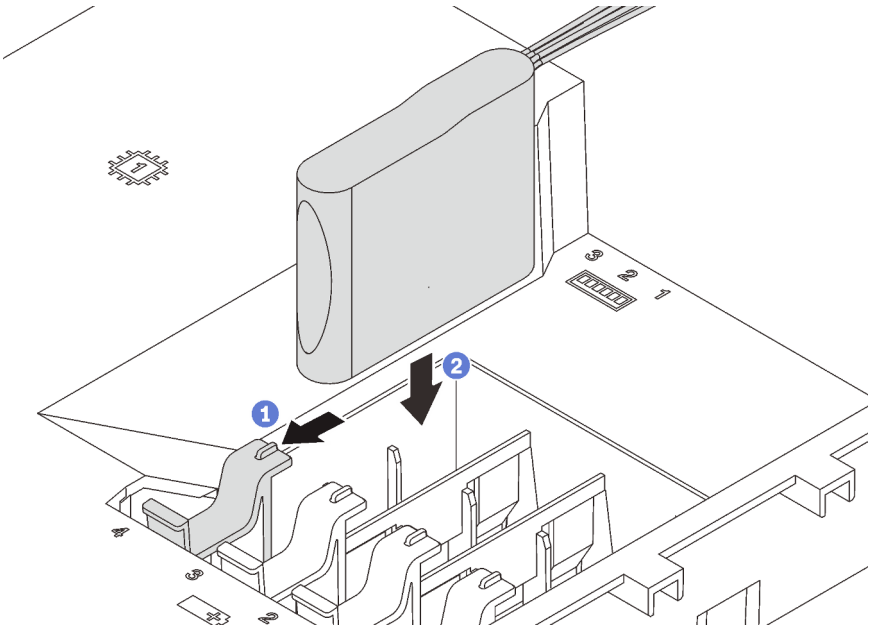


Figure 78. RAID super capacitor module installation

Step 2. Connect the RAID super capacitor module to the RAID adapter using an extension cable.

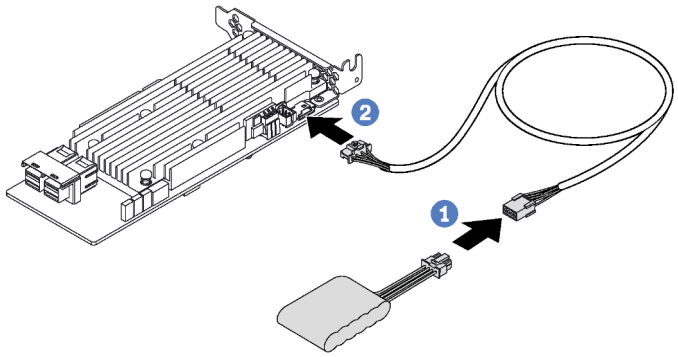


Figure 79. Connecting the RAID super capacitor module to the RAID adapter

Complete the parts replacement. See “Complete the parts replacement” on page 165.

Riser card replacement

Use this information to remove and install a riser card.

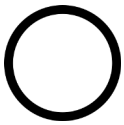
Note: The following procedure is based on the scenario that the riser card is installed on the riser card bracket 1. The procedure is similar for riser card installed on the riser card bracket 2.

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 14



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

Before removing a riser card, remove the top cover. See “Remove the top cover” on page 56.

To remove a riser card, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Disconnect related cables.

Step 2. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

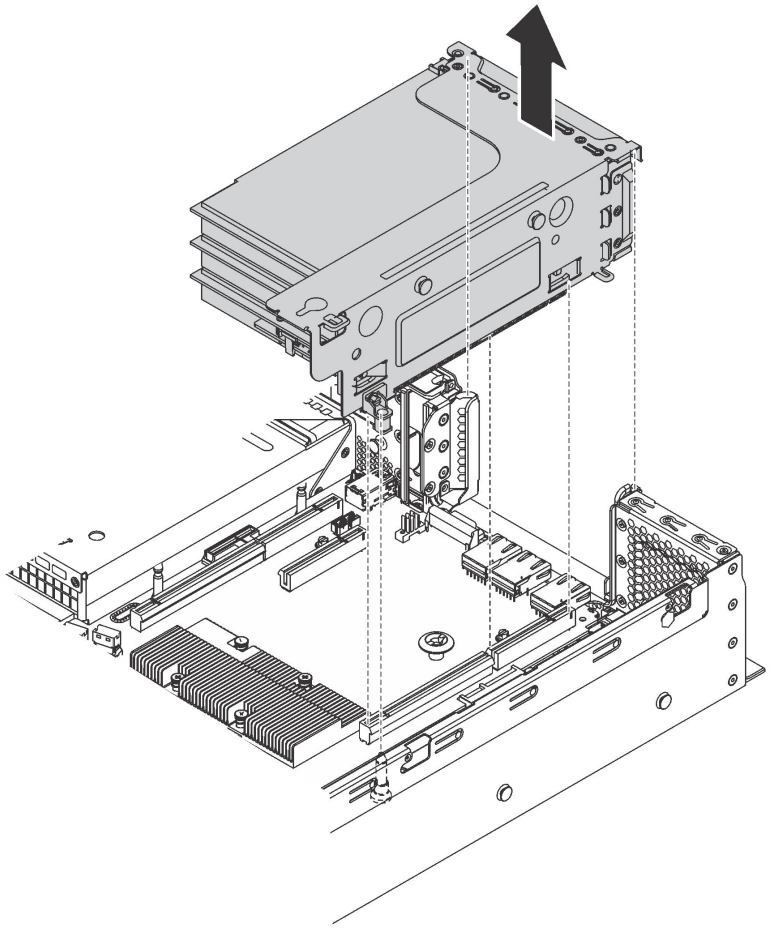


Figure 80. Riser 1 assembly removal

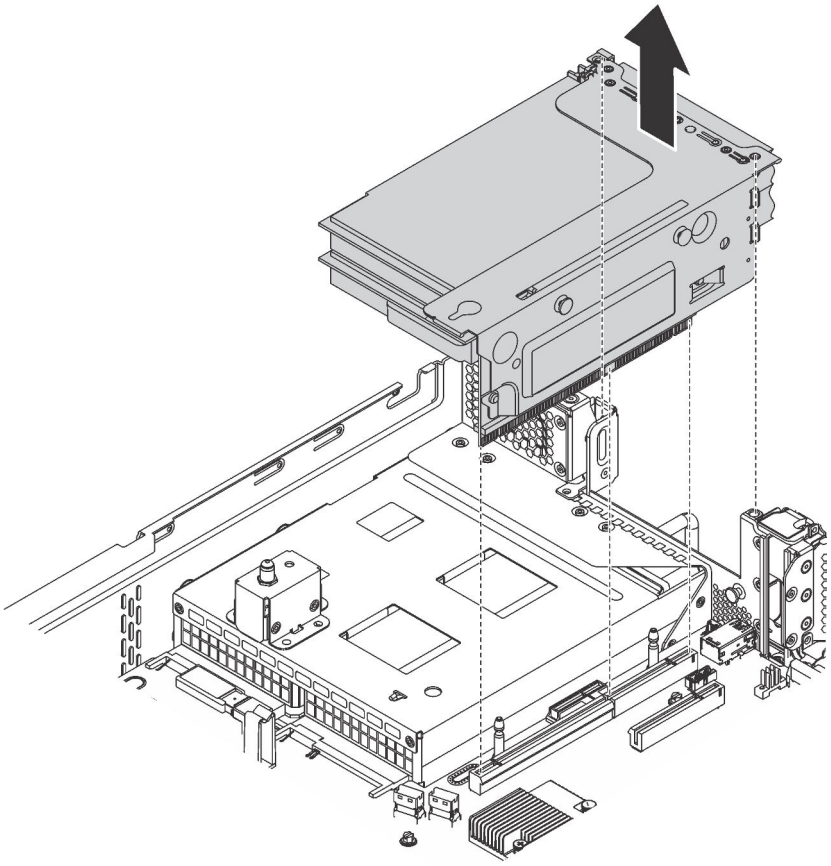


Figure 81. Riser 2 assembly removal

Step 3. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 110.

Step 4. Remove the two screws that secure the failing riser card. Then, remove the failing riser card from the bracket as shown.

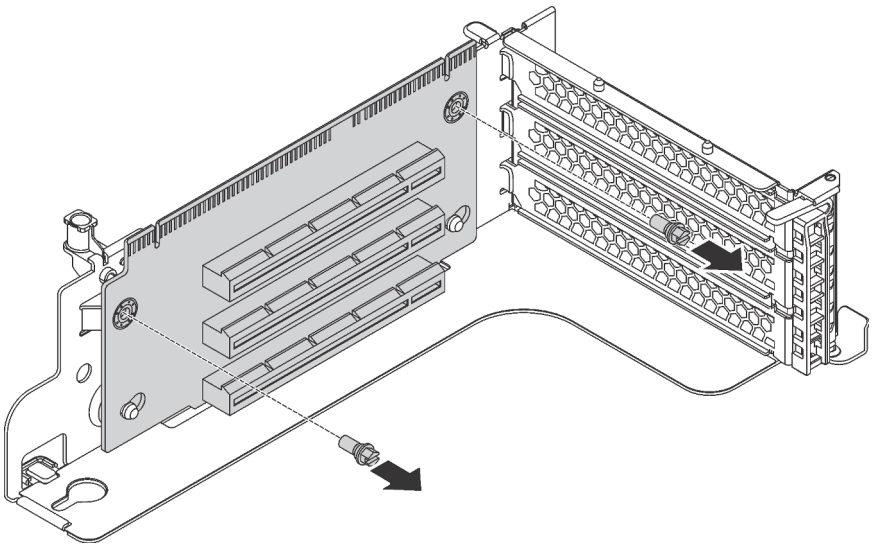


Figure 82. riser card removal

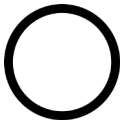
If you are instructed to return the old riser card, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Ensure the mounting studs in the bracket go through the holes in the new riser card. Push the riser card to the direction as shown to align the screw holes in the new riser card with the corresponding ones in the bracket.

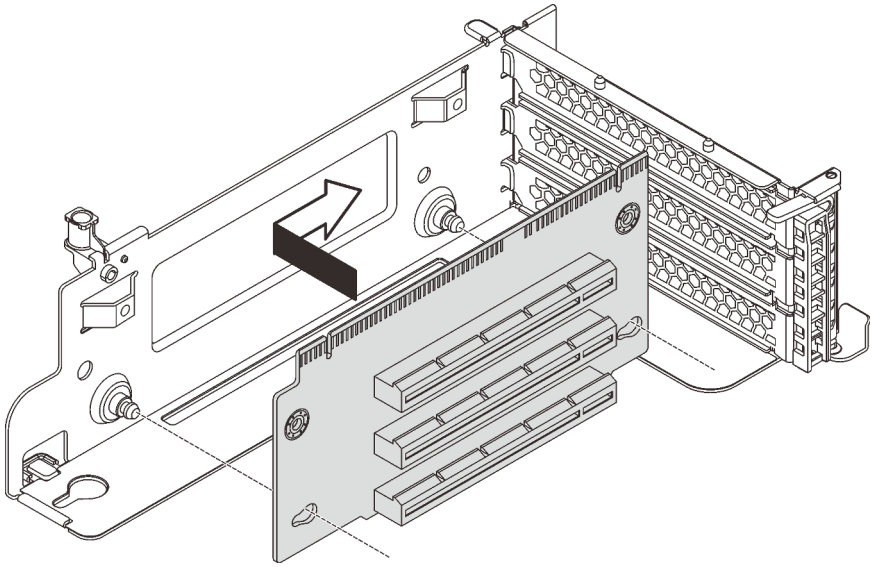


Figure 83. Riser card installation

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

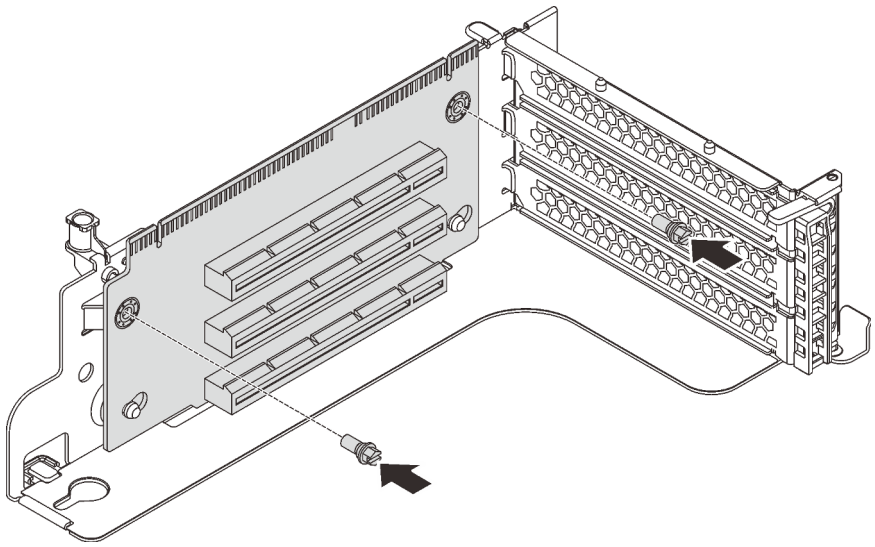


Figure 84. Installing the two screws to secure the riser card

Step 3. If necessary, reconnect any cables to the PCIe adapters. See “Internal cable routing” on page 31.

Step 4. Reinstall the PCIe adapters on the new riser card.

Step 5. Install the riser assembly by doing one of 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.

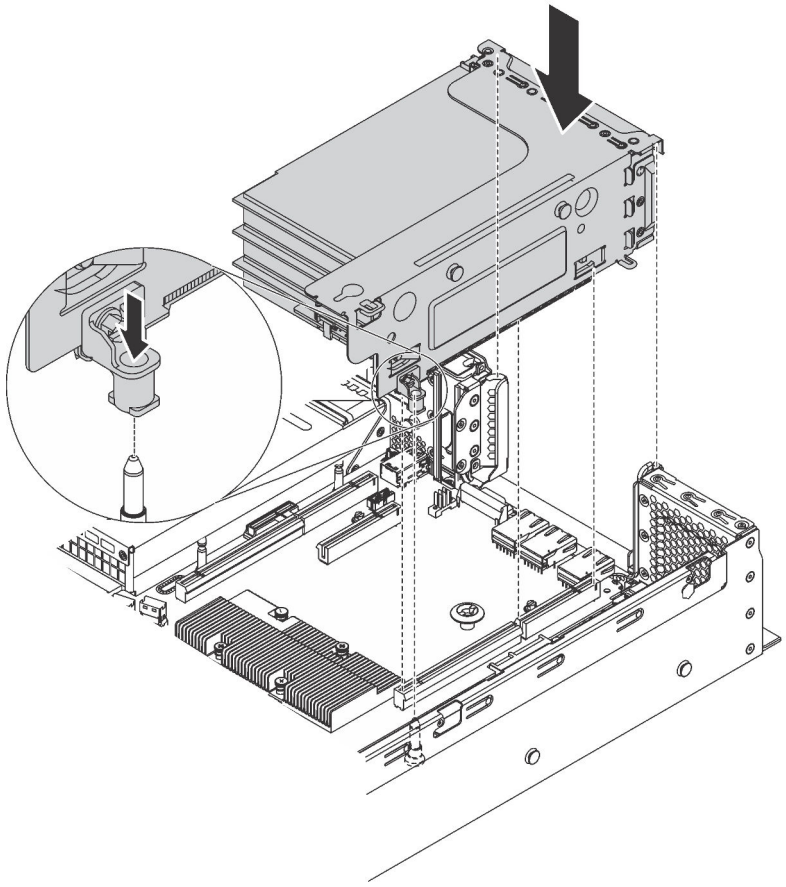


Figure 85. Riser 1 assembly installation

- 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.

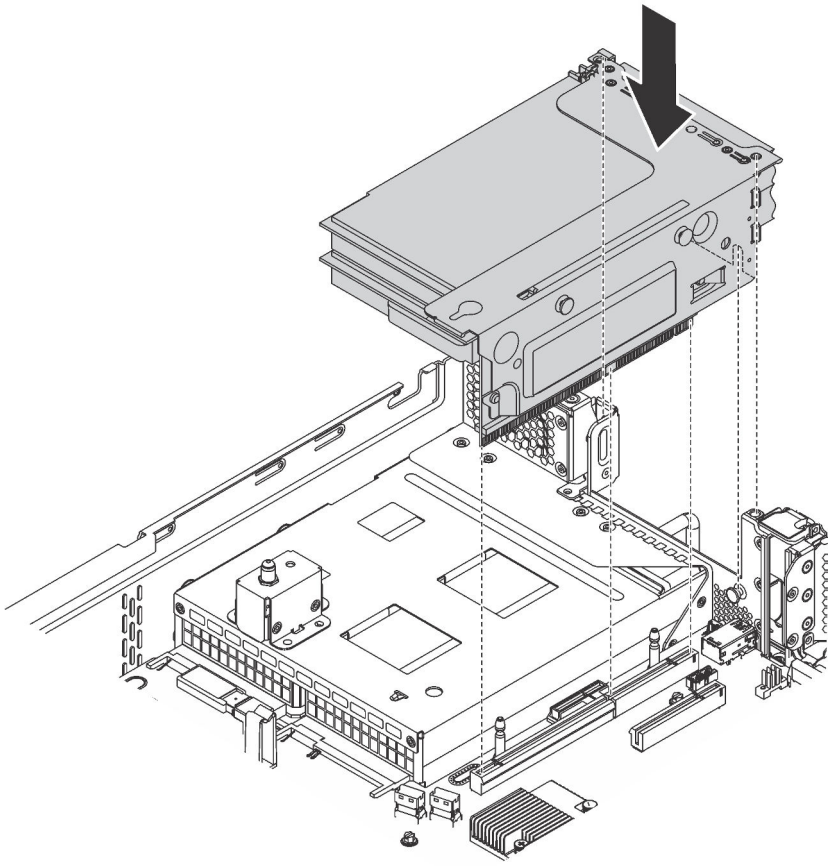


Figure 86. Riser 2 assembly installation

Note: Properly route the cables.

Complete the parts replacement. See “Complete the parts replacement” on page 165.

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 PCIe RAID adapter, or any other supported PCIe adapters.

Remove a PCIe adapter

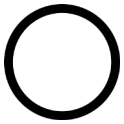
Use this information to remove a PCIe adapter.

This topic contains the following information:

- “Remove a PCIe adapter from the riser assembly” on page 110
- “Remove a PCIe adapter from the system board” on page 112

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 56.
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 104.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

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

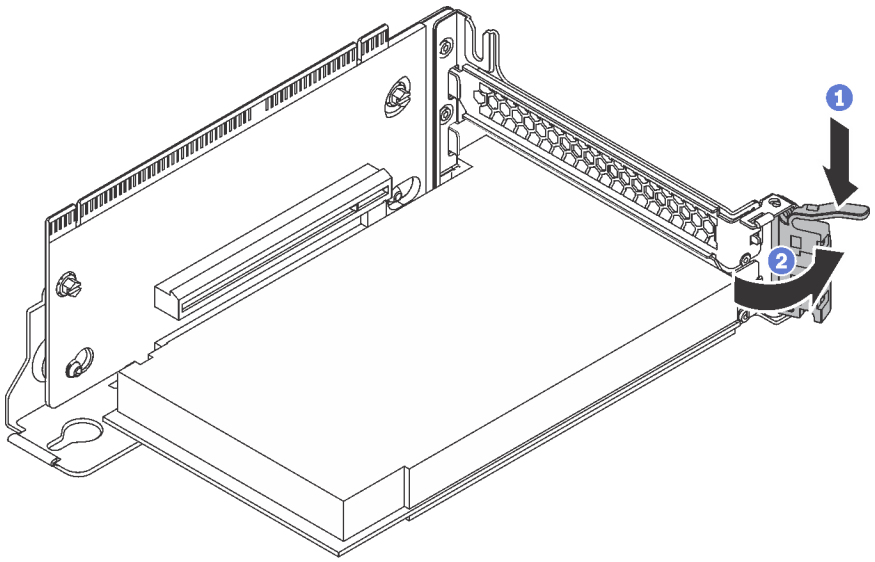


Figure 87. Opening the PCIe adapter retention latch

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.

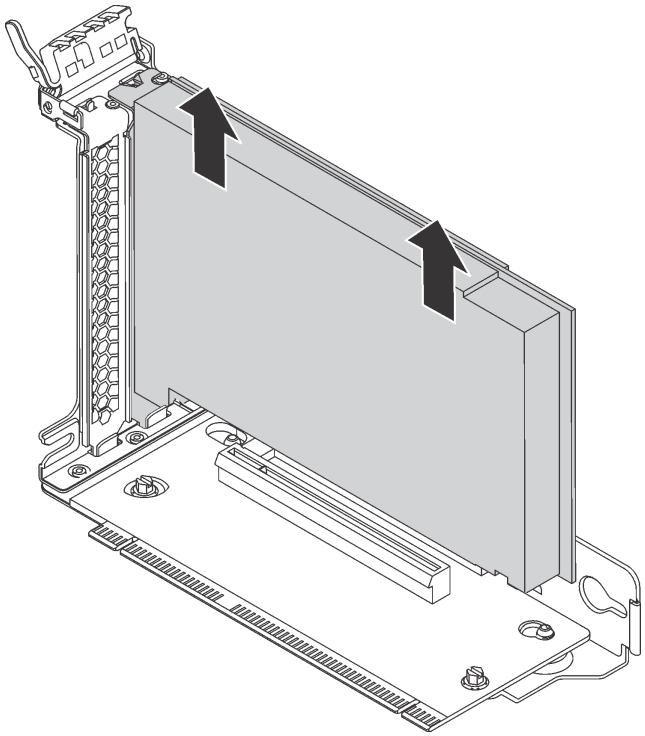


Figure 88. Removing a PCIe adapter from the riser assembly

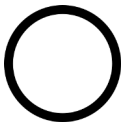
If you are instructed to return the old PCIe adapter, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 56.
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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

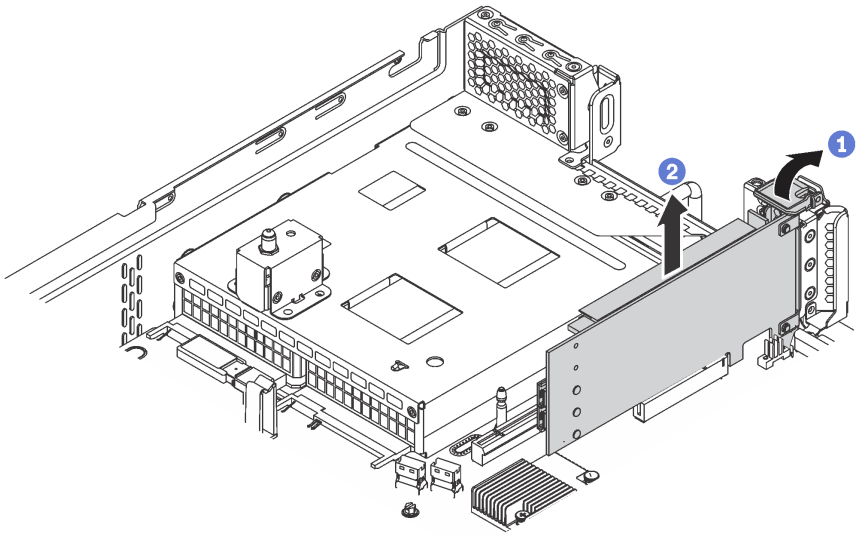


Figure 89. Removing the PCIe adapter from the system board

Step 1. 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 system board or the riser assembly.

This topic contains the following information:

- "Install a PCIe adapter on the system board" on page 114
- "Install a PCIe adapter on the riser assembly" on page 115

Notes:

- Your server supports the 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: https://serverproven.lenovo.com/.
- When installing Ethernet adapters with RJ-45 connectors, observe the following installation sequence:

Table 13. Installation sequence of Ethernet adapters with RJ-45 connectors

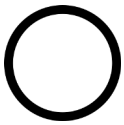
Number of installed processor	PCIe slot
One processor	4, 2, 6, 3, 1
Two processors	4, 2, 6, 3, 5, 1

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing a PCIe adapter on the system board, 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.

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.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Locate the PCIe slot 4. If the slot is covered with a slot bracket, open the retention latch and remove the slot bracket from the chassis. Store the bracket for future use.

Step 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.

Step 3. Position the PCIe adapter near 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.

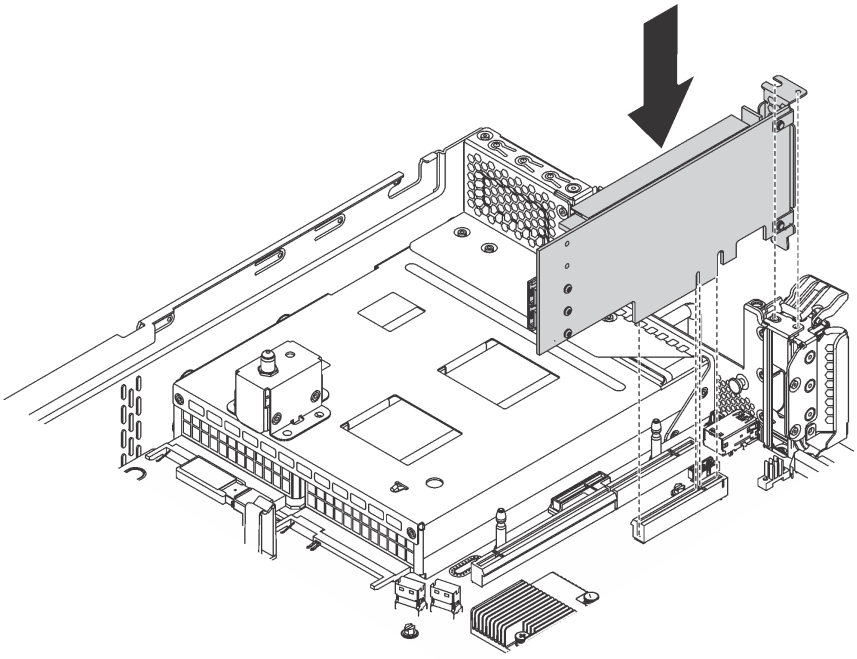


Figure 90. Installing a PCIe adapter on the system board

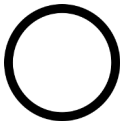
Step 4. Pivot the PCIe adapter retention latch to the closed position to secure the PCIe adapter in position.

Step 5. Depending on the type of the PCIe adapter, you might need to connect any required cables. Refer to the documentation that comes with the PCIe adapter for specific information.

Complete the parts replacement. See "Completing the parts replacement" on page 165.

Install a PCIe adapter on the riser assembly

Use this 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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing a PCIe adapter on the riser assembly, 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.

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.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Remove the riser assembly by grasping its edges and carefully lift it straight up and off the chassis. Then, lay it upside down on a flat, clean, and static-protective surface.

Step 2. Locate an appropriate PCIe slot. See “Rear view” on page 22 to identify the PCIe slots of your server.

Step 3. If the slot is covered with a slot bracket, open the retention latch and remove the slot bracket from the riser assembly. Store the bracket in case that you later remove the PCIe adapter and need the bracket to cover the place.

Step 4. Position the PCIe adapter near the PCIe slot. Then, carefully press the PCIe adapter straight into the slot until it is securely seated. Ensure that the PCIe adapter bracket is secured by the riser adapter bracket.

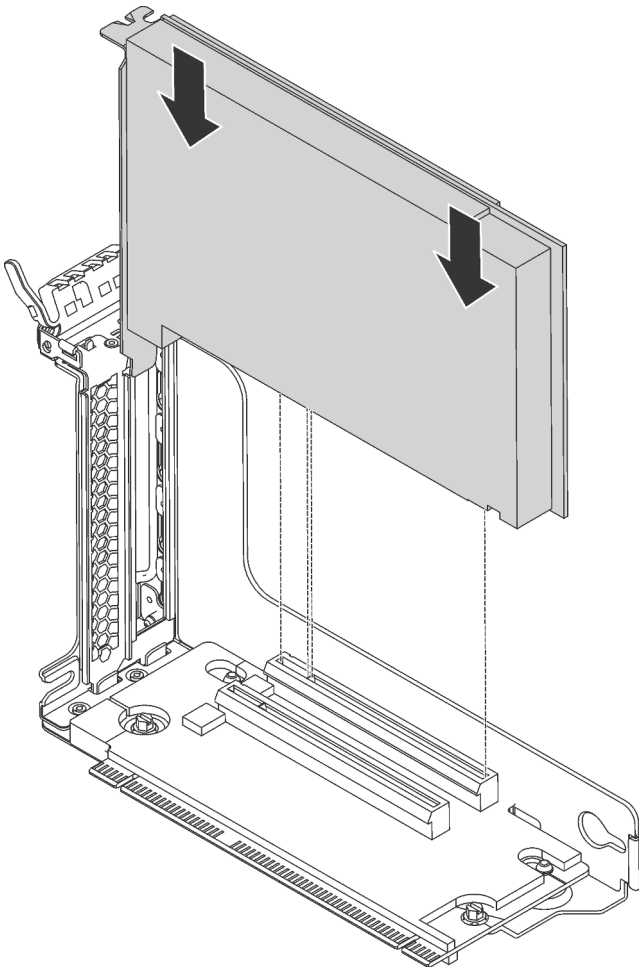


Figure 91. Installing a PCIe adapter on the riser assembly

Note: Carefully handle the PCIe adapter by its edges.

Step 5. Pivot the retention latch to the closed position to secure the PCIe adapter in position.

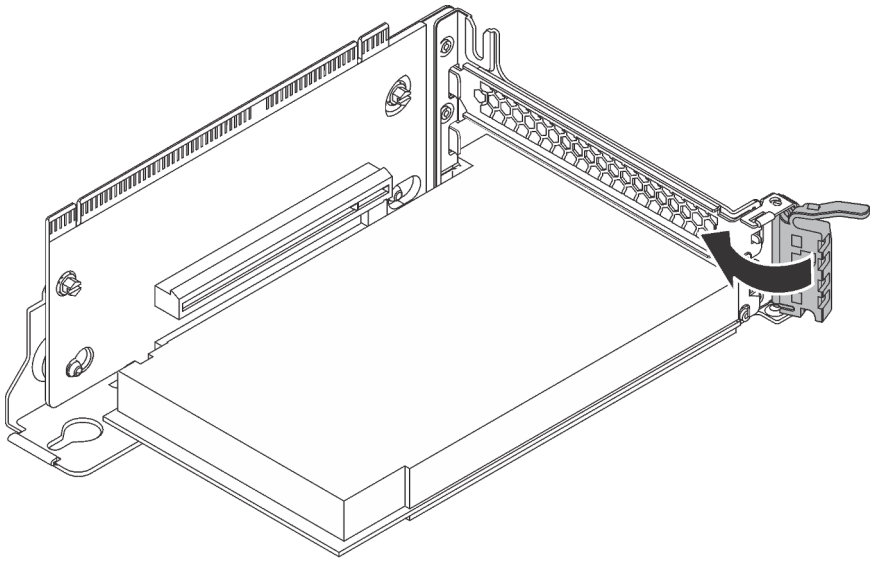


Figure 92. Pivoting the retention latch to the closed position

Step 6. Depending on the type of the PCIe adapter, you might need to connect any required cables. Refer to the documentation that comes with the PCIe adapter for specific information.

Complete the parts replacement. See "Completing the parts replacement" on page 165.

Serial port module replacement

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

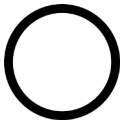
Note: The serial port module is available only on some models.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing the serial port module, remove the top cover. See "Remove the top cover" on page 56.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

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.

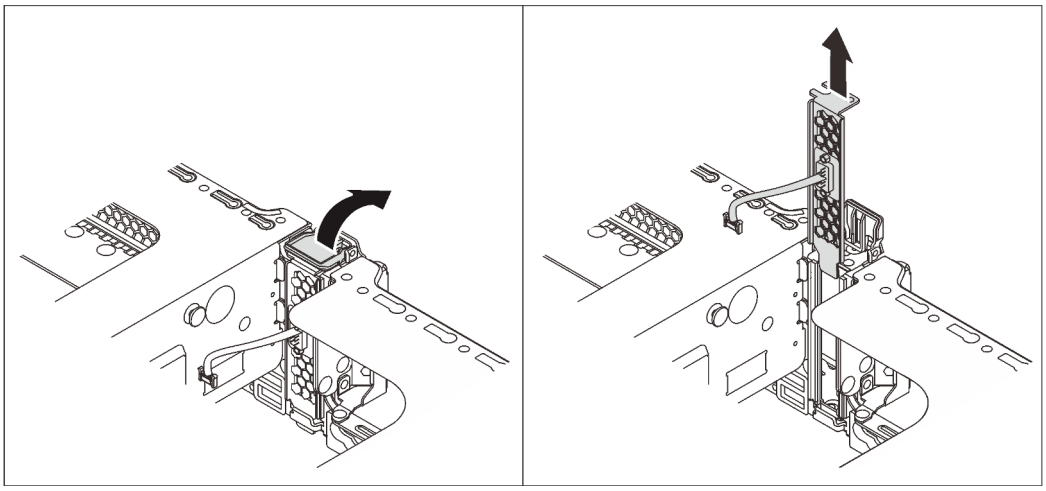


Figure 93. Serial port module removal

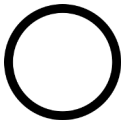
If you are instructed to return the old serial port module, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing the serial port module, 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 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.

Step 2. Install the serial port module into the chassis and close the retention latch to secure it in position.

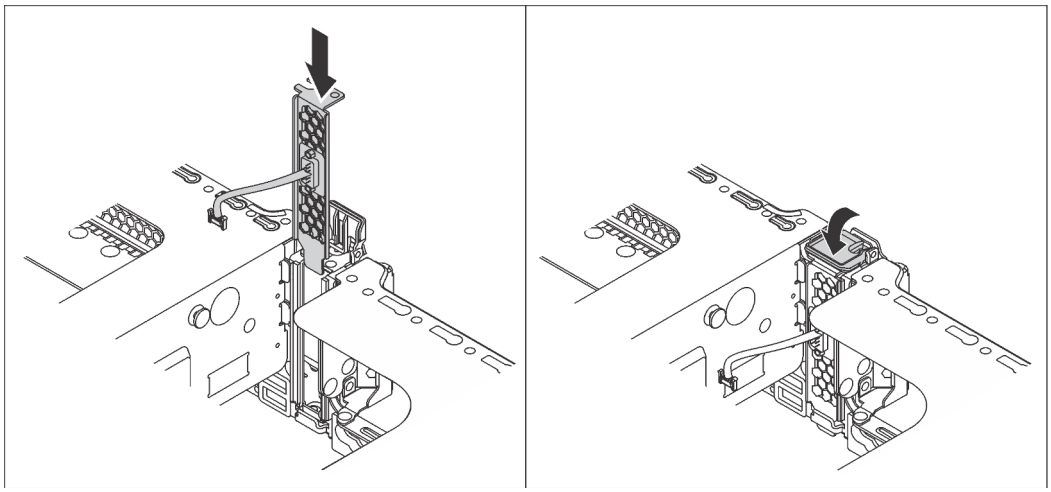


Figure 94. Serial port module installation

Step 3. Connect the cable of the serial port module to serial-port-module connector on the system board. For the location of the serial-port-module connector, see "System board components" on page 27.

After installing the serial port module:

1. Complete the parts replacement. See "Complete the parts replacement" on page 165.
2. To enable the serial port module on Linux or Microsoft Windows, do one of the followings according to the installed operating system:

   Note: If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

   - For Linux:

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

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```

   - For Microsoft Windows:
     a. Open the ipmitool and enter the following command to disable the SOL feature:

        ```
        -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
        ```

     b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

        ```
        Bcdedit /ems off
        ```

     c. Restart the server to ensure that the EMS setting takes effect.

System fan replacement

Use this information to remove and install a system fan.

S033



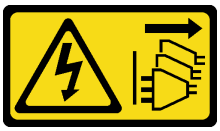
CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S009



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

S002



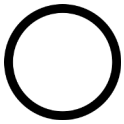
CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from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

Remove a system fan

Use this information to remove the system fan.



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



"**Power off** the server for this task" on page 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing a system fan:

1. Remove the top cover. See "Remove the top cover" on page 56.
2. Remove the air baffle. See "Remove the air baffle" on page 60.

To remove a system fan, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

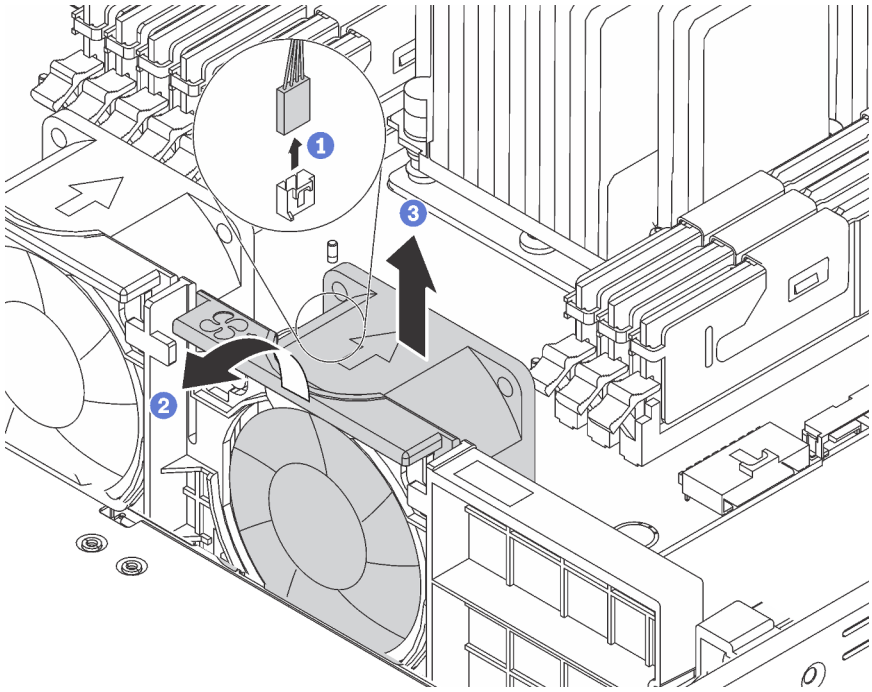


Figure 95. System fan removal

Step 1. Disconnect the fan cable from the system board.

Step 2. Press the fan cage bracket to the front of the server, grasp the top of the fan, and lift the fan out of the server.

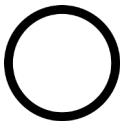
If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before installing a system fan:

1. Remove the air baffle. See "Remove the air baffle" on page 60.
2. 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

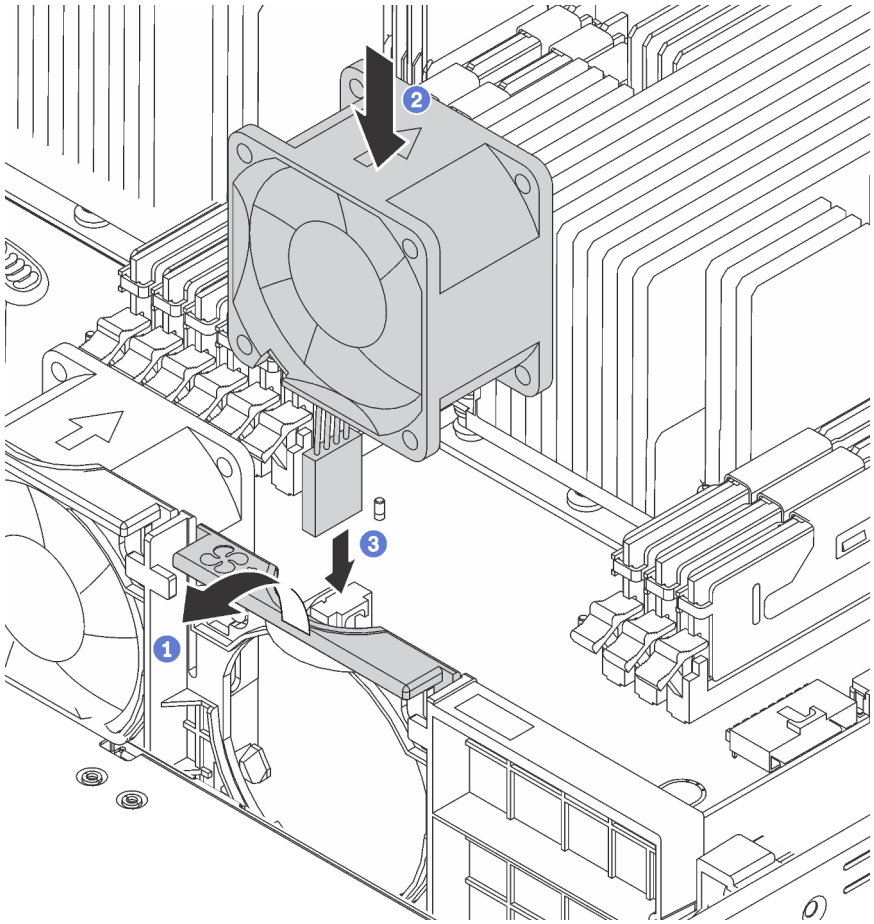


Figure 96. System fan installation

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, and insert the fan into the bracket. Ensure that the fan is fully seated in its slot in the fan bracket.

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

Step 3. Connect the fan cable to the system board.

Complete the parts replacement. See "Complete the parts replacement" on page 165.

System fan cage replacement

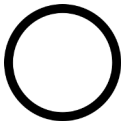
Use this information to remove and install the system fan cage.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Before removing the system fan cage:

1. Remove the top cover. See “Remove the top cover” on page 56.
2. Remove the air baffle. See “Remove the air baffle” on page 60.
3. If you are replacing the system fan cage, remove all system fans first. See “Remove a system fan” on page 120. 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 steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

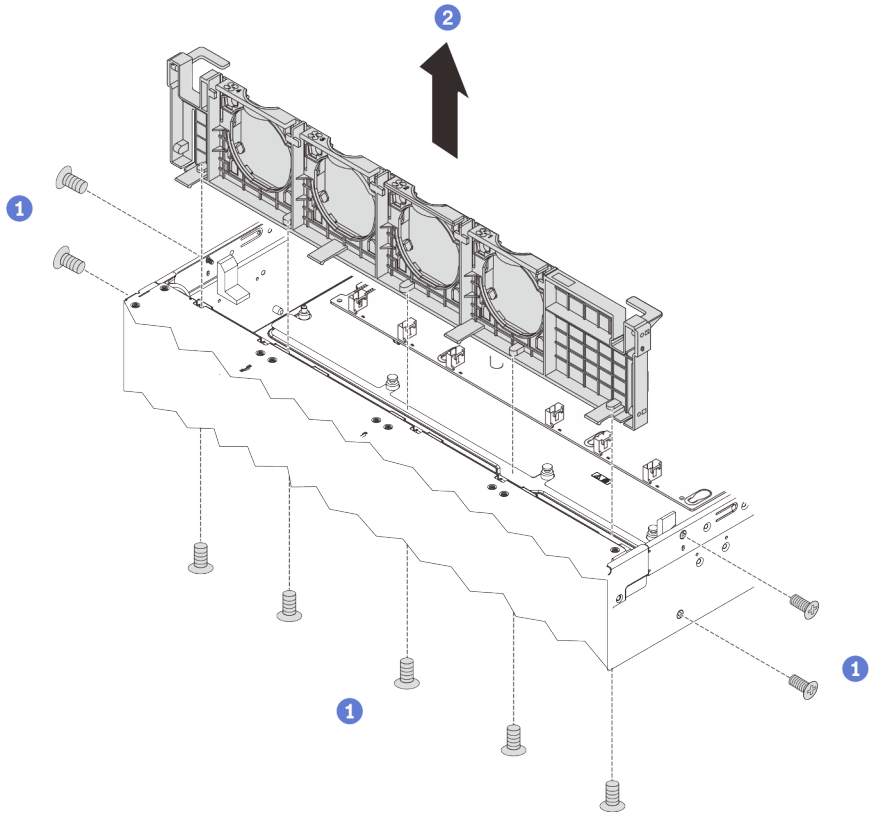


Figure 97. System fan cage removal

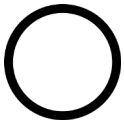
Step 1. Remove the screws that secure the system fan cage to the chassis from the exterior of the chassis.

Step 2. Grasp the system fan cage and carefully lift it out of the chassis.

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

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 14	 “**ATTENTION: Static Sensitive Device** Ground package before opening” on page 56

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 steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

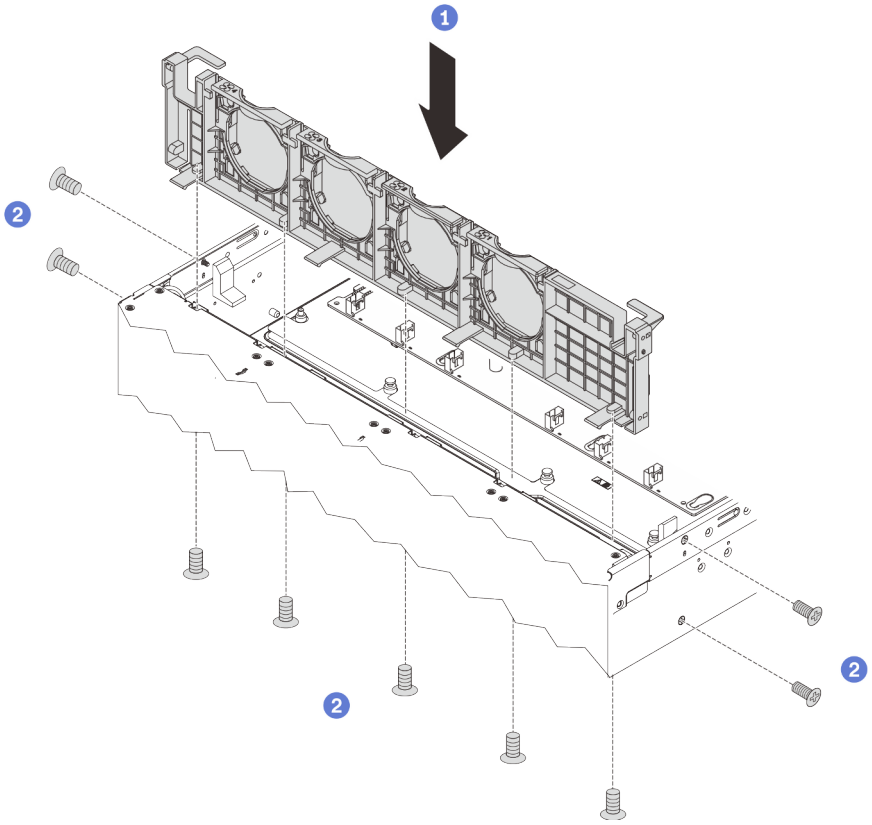


Figure 98. System fan cage installation

Step 1. Align the holes in the system fan cage with the corresponding screw holes in the chassis. Then put the system fan cage straight down into the chassis.

Step 2. Install the screws from the exterior of the chassis to secure the system fan cage to the chassis.

After installing the system fan cage:

1. Reinstall the system fans. See “Install a system fan” on page 121.
2. Complete the parts replacement. See “Complete the parts replacement” on page 165.

Memory module replacement

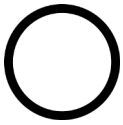
Use this information to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module.



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



"**Power off** the server for this task" on page 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention:

- Disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for "Handling static-sensitive devices" on page 56:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Before removing a memory module:

1. Remove the top cover. See "Remove the top cover" on page 56.
2. Remove the air baffle. See "Remove the air baffle" on page 60.

To remove a memory module, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

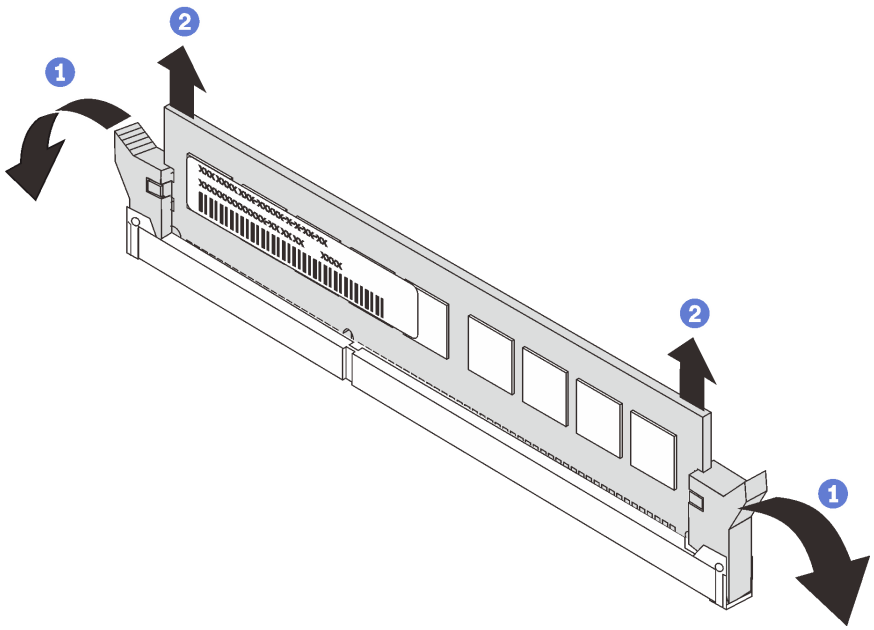


Figure 99. Memory module removal

Step 1. Carefully open the retaining clips on each end of the memory module slot.

Attention: To avoid breaking the retaining clips or damaging the memory module 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.

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

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 supports up to 6 memory modules when one processor is installed, and up to 12 memory modules when two processors are installed. The following memory configurations are supported, depending on the processors installed:

- For Intel Xeon SP Gen 1:
  - Minimum: 8 GB (only one processor installed and only one 8 GB RDIMM installed in the CPU1 DIMM3 slot)
  - Maximum:
    - 384 GB using RDIMMs (two processors installed and one 32 GB RDIMM installed in each of the 12 memory module slots)
    - 768 GB using LRDIMMs (two processors installed and one 64 GB LRDIMM installed in each of the 12 memory module slots)
  - Type:
    - TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMMs with Error Checking and Correcting (ECC) technology
    - TruDDR4 2666, quad-rank, 64 GB LRDIMMs with ECC technology

- For Intel Xeon SP Gen 2:
  - Minimum: 8 GB (only one processor installed and only one 8 GB RDIMM installed in the CPU1 DIMM3 slot)
  - Maximum: 768 GB (two processors installed and one 64 GB RDIMM installed in each of the 12 memory module slots)
  - Type:
    - TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMMs with ECC technology
    - TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMMs with ECC technology

Note: List of supported memory module is different for 1st generation (Skylake) and 2nd generation (Cascade Lake) Intel Xeon processors. Make sure to install compatible memory modules to avoid system error. For a list of supported DIMMs, see: https://serverproven.lenovo.com/.

Notes: Before installing a memory module, ensure that all memory modules to be installed must be of the same type. Your server supports the following types of memory modules:

- TruDDR4 RDIMM with ECC technology
- TruDDR4 LRDIMM with ECC technology

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

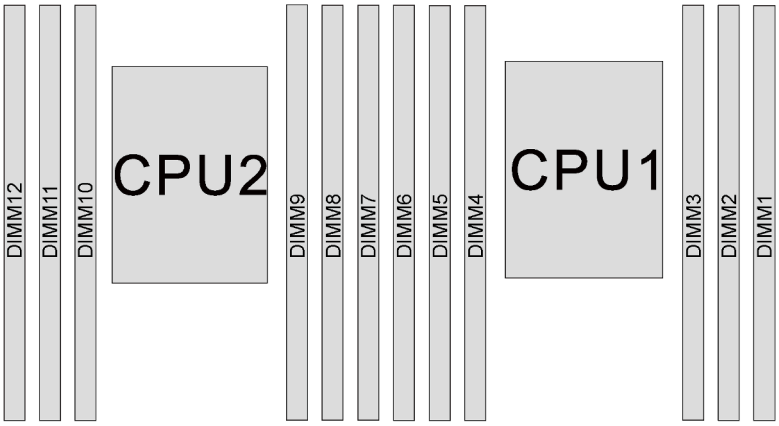


Figure 100. Memory module slots on the system board

The following memory configurations are available:
- “Independent mode” on page 127
- “Mirroring mode” on page 128
- “Rank sparing mode” on page 129

Independent mode

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

The following table shows the memory module population sequence for independent mode when only one processor (CPU1) is installed.

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

Table 14. Independent mode with one processor

Total memory modules	Processor 1						Total memory modules
	6	5	4	3	2	1	
1				3			**1**
2			4	3			**2**
3			4	3	2		**3**
4		5	4	3	2		**4**
5		5	4	3	2	1	**5**
6	6	5	4	3	2	1	**6**

The following table shows the memory module population sequence for independent mode when two processors (CPU1 and CPU2) are installed.

Notes:

- If there are three identical memory modules to be installed for CPU1, and the three memory modules have the same Lenovo part number, install the three memory modules in slots 1, 2, and 3.
- If there are three identical memory modules to be installed for CPU2, and the three memory modules have the same Lenovo part numbers, install the three memory modules in slots 7, 8, and 9.

Table 15. Independent mode with two processors

Total memory modules	Processor 2						Processor 1						Total memory modules
	12	11	10	9	8	7	6	5	4	3	2	1	
2				9						3			**2**
3				9					4	3			**3**
4			10	9					4	3			**4**
5			10	9					4	3	2		**5**
6			10	9	8				4	3	2		**6**
7			10	9	8			5	4	3	2		**7**
8		11	10	9	8			5	4	3	2		**8**
9		11	10	9	8			5	4	3	2	1	**9**
10		11	10	9	8	7		5	4	3	2	1	**10**
11		11	10	9	8	7	6	5	4	3	2	1	**11**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

Mirroring mode

In mirroring mode, each memory module 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.

Notes:

- All memory modules to be installed must be the same type with the same capacity, frequency, voltage, and rank.

- Partial Memory Mirroring is a sub-function of memory mirroring. It requires following the memory installation order of memory mirroring mode.

The following table shows the memory module population sequence for mirroring mode when one processor (CPU1) is installed.

Table 16. Mirroring mode with one processor

Total memory modules	Processor 1						Total memory modules
	6	5	4	3	2	1	
2				3	2		**2**
3				3	2	1	**3**
4		5	4	3	2		**4**
6	6	5	4	3	2	1	**6**

The following table shows the memory module population sequence for mirroring mode when two processors (CPU1 and CPU2) are installed.

Table 17. Mirroring mode with two processors

Total memory modules	Processor 2						Processor 2						Total memory modules
	12	11	10	9	8	7	6	5	4	3	2	1	
4				9	8					3	2		**4**
5				9	8					3	2	1	**5**
6				9	8	7				3	2	1	**6**
8		11	10	9	8			5	4	3	2		**8**
9				9	8	7	6	5	4	3	2	1	**9**
10		11	10	9	8		6	5	4	3	2	1	**10**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

Rank sparing mode

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

Notes:

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

Table 18. Rank sparing mode with one processor

Total memory modules	Processor 1						Total memory modules
	6	5	4	3	2	1	
1				3			**1**
2			4	3			**2**

Table 18. Rank sparing mode with one processor (continued)

Total memory modules	Processor 1						Total memory modules
	6	5	4	3	2	1	
3			4	3	2		**3**
4		5	4	3	2		**4**
5		5	4	3	2	1	**5**
6	6	5	4	3	2	1	**6**

The following table shows the memory module population sequence for rank sparing mode when two processors (CPU1 and CPU2) are installed.

Table 19. Rank sparing mode with two processors

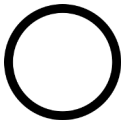
Total memory mod-ules	Processor 2						Processor 1						Total memory modules
	12	11	10	9	8	7	6	5	4	3	2	1	
2				9						3			**2**
3				9					4	3			**3**
4			10	9					4	3			**4**
5			10	9					4	3	2		**5**
6			10	9	8				4	3	2		**6**
7			10	9	8			5	4	3	2		**7**
8		11	10	9	8			5	4	3	2		**8**
9		11	10	9	8			5	4	3	2	1	**9**
10		11	10	9	8	7		5	4	3	2	1	**10**
11		11	10	9	8	7	6	5	4	3	2	1	**11**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention:

- Disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for "Handling static-sensitive devices" on page 56:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.

- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Before installing a memory module:

1. Locate the required memory module slot on the system board by referring to "Memory module installation rules" on page 126. Ensure that you observe the installation rules and sequence.
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.

To install a memory module, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

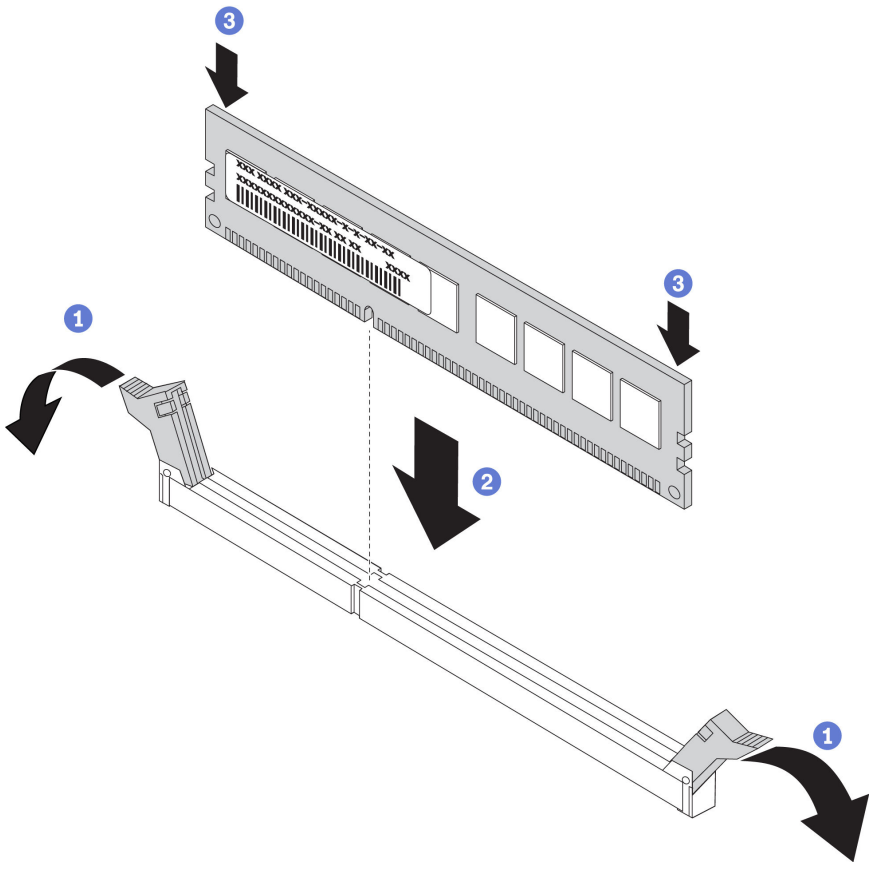


Figure 101. Memory module installation

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

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

Step 2. Align the memory module with the slot, and gently place the memory module on the slot with both hands.

Step 3. 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.

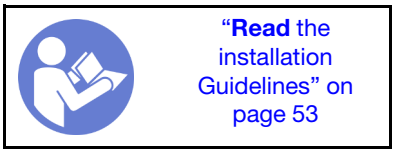
After installing the memory module, complete the parts replacement. See "Complete the parts replacement" on page 165.

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.



Before removing the LOM adapter, remove the top cover. See "Remove the top cover" on page 56.

To remove the LOM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

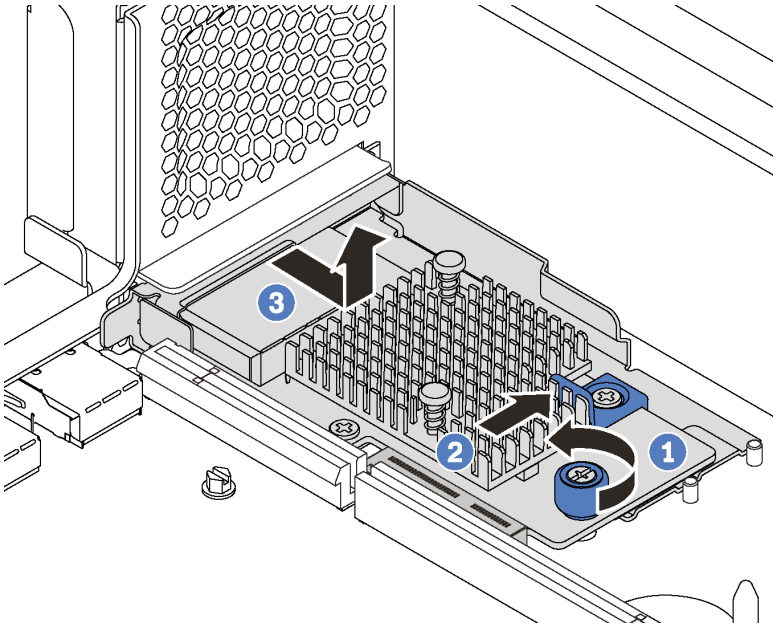


Figure 102. LOM adapter removal

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.

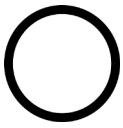
If you are instructed to return the old LOM adapter, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

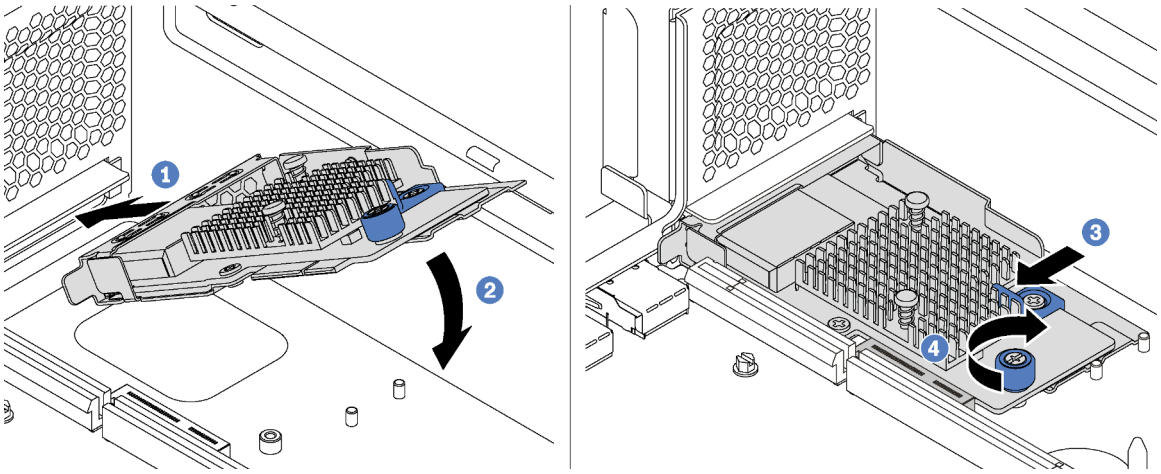


Figure 103. LOM adapter installation

Step 1. Place the LOM adapter into the connector on 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.

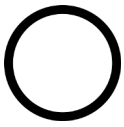
Complete the parts replacement. See "Complete the parts replacement" on page 165.

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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

1. Remove the top cover. See "Remove the top cover" on page 56.
2. For easier operation, remove the riser assembly next to the M.2 backplane. See "Remove a riser card" on page 104.
3. For server models with twelve 3.5-inch hot-swap drives, if you are removing the 480 GB M.2 drive, remove the M.2 drive air baffle.

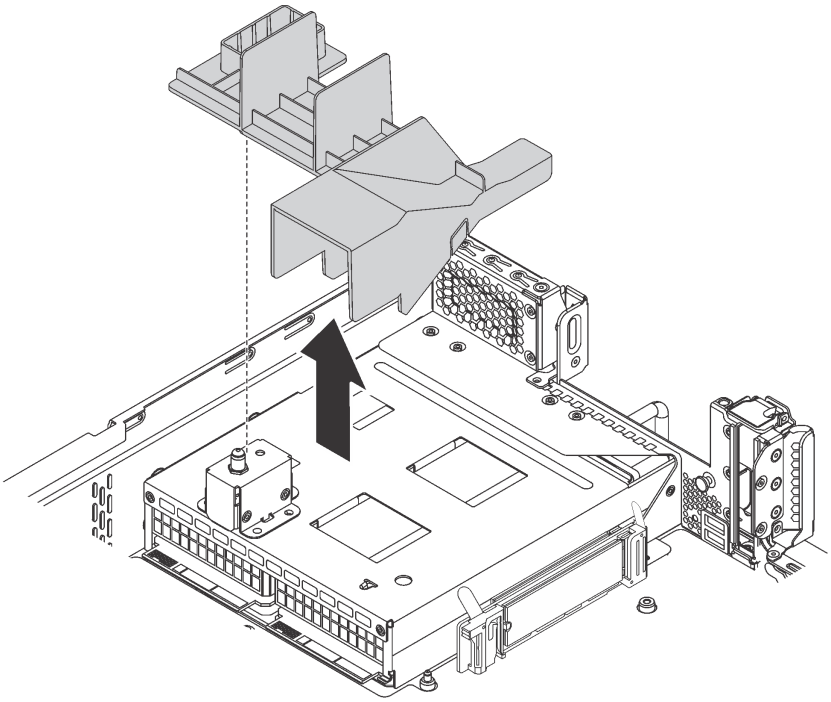


Figure 104. M.2 drive air baffle removal

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

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

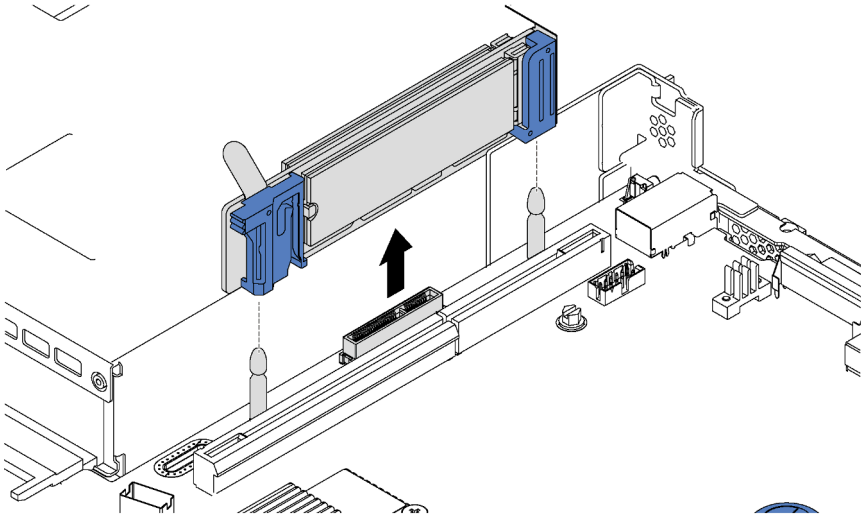


Figure 105. M.2 backplane removal

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

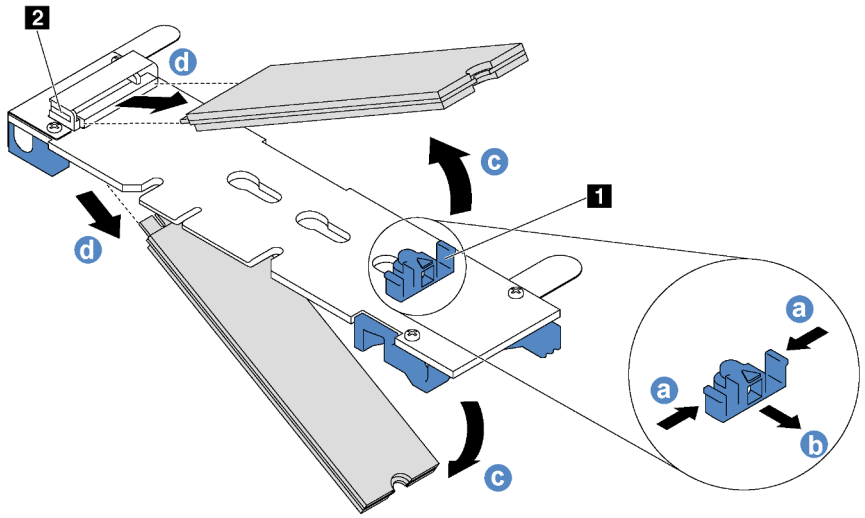


Figure 106. M.2 drive removal

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.

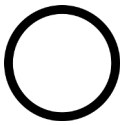
If you are instructed to return the old M.2 backplane or M.2 drive, follow all packaging instructions and use any packaging materials that are provided.

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 14



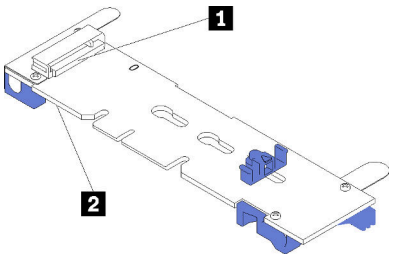
"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 140.
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 107. M.2 drive slot

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

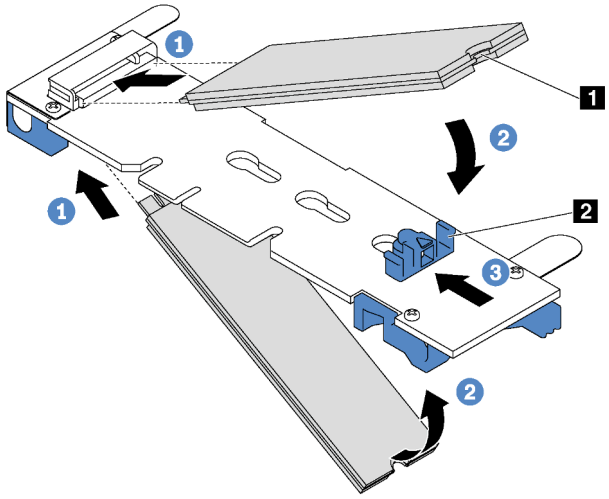


Figure 108. M.2 drive installation

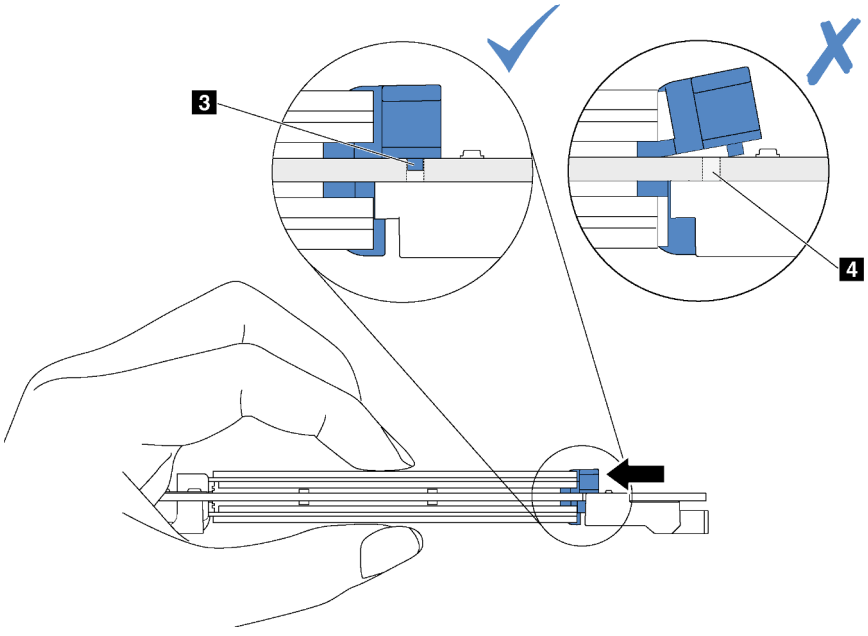
Step 1. Insert the M.2 drive at an angle of approximately 30 degrees into the connector.

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.



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.

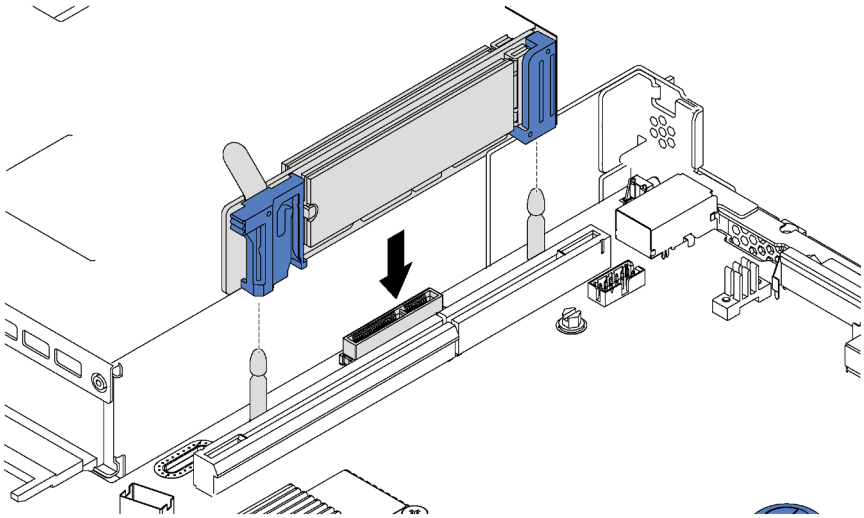


Figure 109. M.2 backplane installation

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 M.2 drive, install the M.2 drive air baffle for proper airflow.

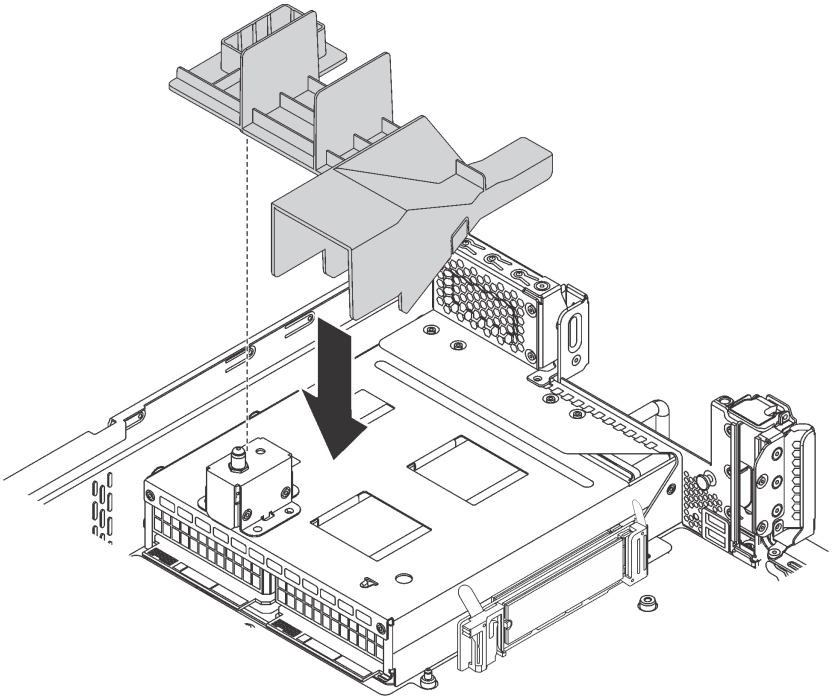


Figure 110. M.2 drive air baffle installation

2. If you have removed the riser assembly next to the M.2 backplane, reinstall it. See "Install a riser card" on page 107.
3. Complete the parts replacement. See "Complete the parts replacement" on page 165.
4. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see:

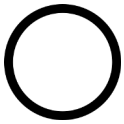
http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

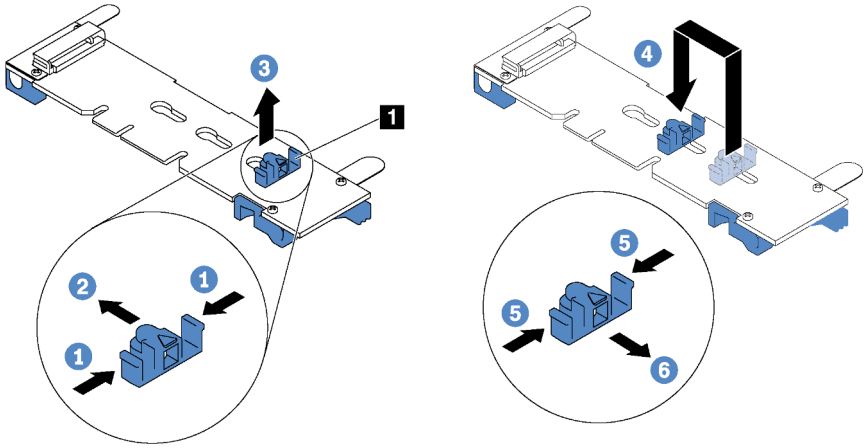


Figure 111. M.2 retainer adjustment

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.

TCM/TPM adapter replacement (for Chinese Mainland only)

Use this information to remove and install the TCM/TPM adapter (sometimes called a daughter card).

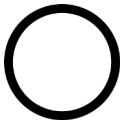
For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM adapter (sometimes called a daughter card).

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

To remove the TCM/TPM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. Remove the top cover. See "Remove the top cover" on page 56.

Step 2. Locate the TCM/TPM connector on the system board. See the "System board components" on page 27.

Step 3. Press the release latch on the TCM/TPM adapter, and lift it straight up.

Notes:

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

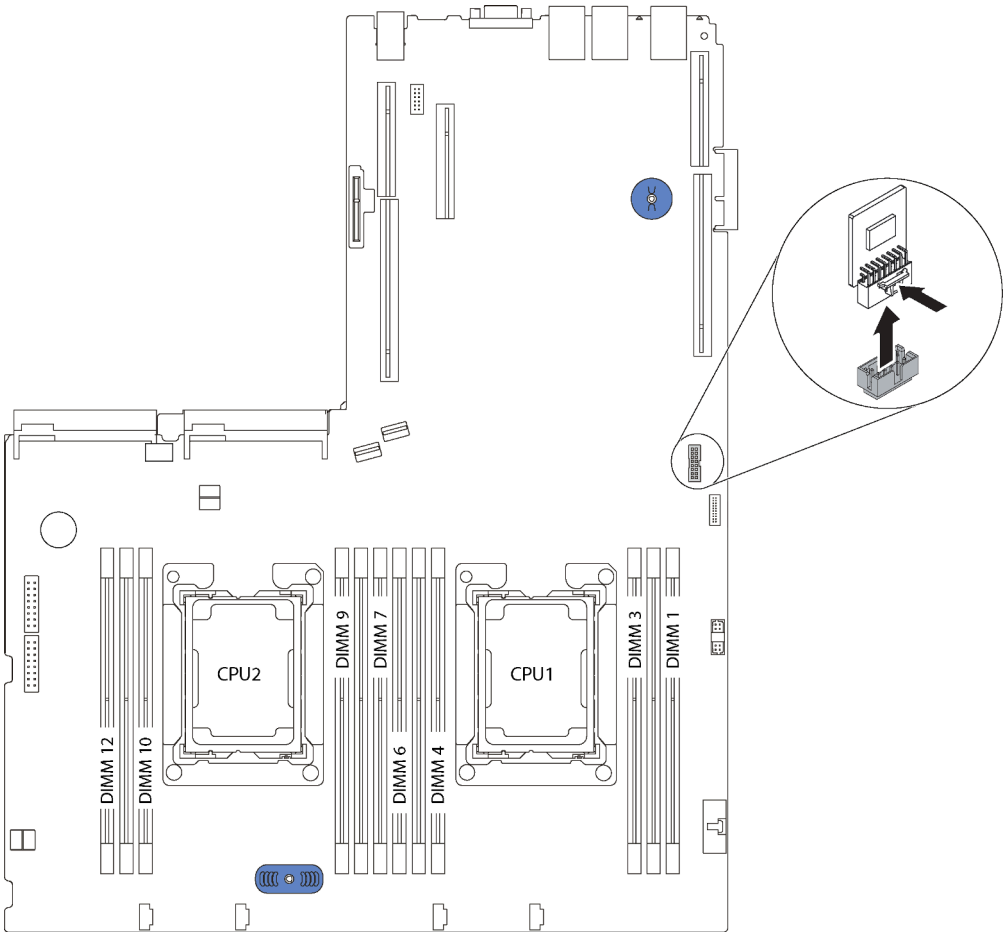
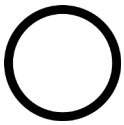


Figure 112. TCM/TPM adapter removal

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 14	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

To install the TCM/TPM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. 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.

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.

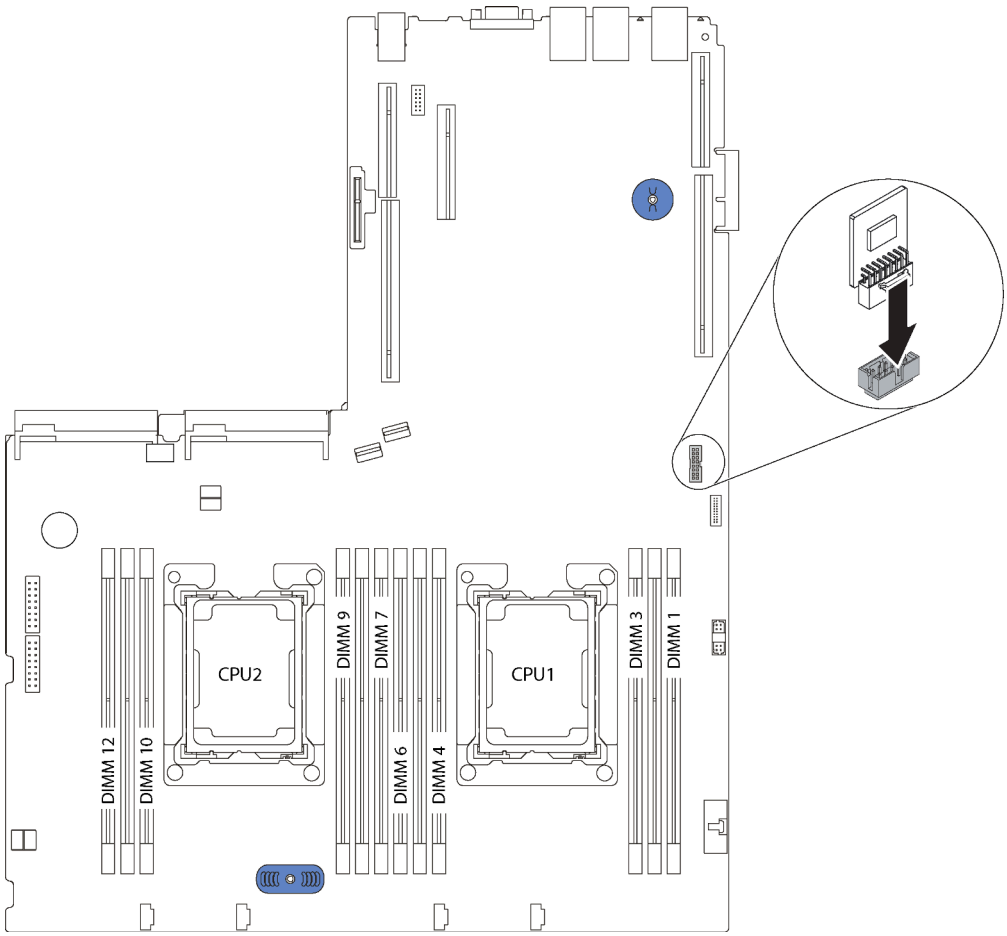


Figure 113. TCM/TPM adapter installation

After installing the TCM/TPM adapter, complete the parts replacement. See "Complete the parts replacement" on page 165.

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 01PE842. If you use the system board with part number 01GV277, update your system firmware to the latest level before installing an Intel Xeon SP Gen 2 processor. Otherwise, the system cannot be powered on.

Important: The processor in your server can throttle, temporarily lowering speed to reduce heat output, in response to thermal conditions. In instances where the throttling period is of extremely short duration (100

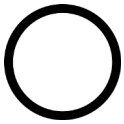
ms or less), the only indication will be an entry in the event log. In these instances the event can be ignored and processor replacement is not required.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention:

- Intel Xeon SP Gen 2 processors are supported on the system board with part number 01PE842. If you use the system board with part number 01GV277, 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.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Before 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 56.
2. Remove the air baffle. See "Remove the air baffle" on page 60.
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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

Step 1. Remove the PHM from the system board.

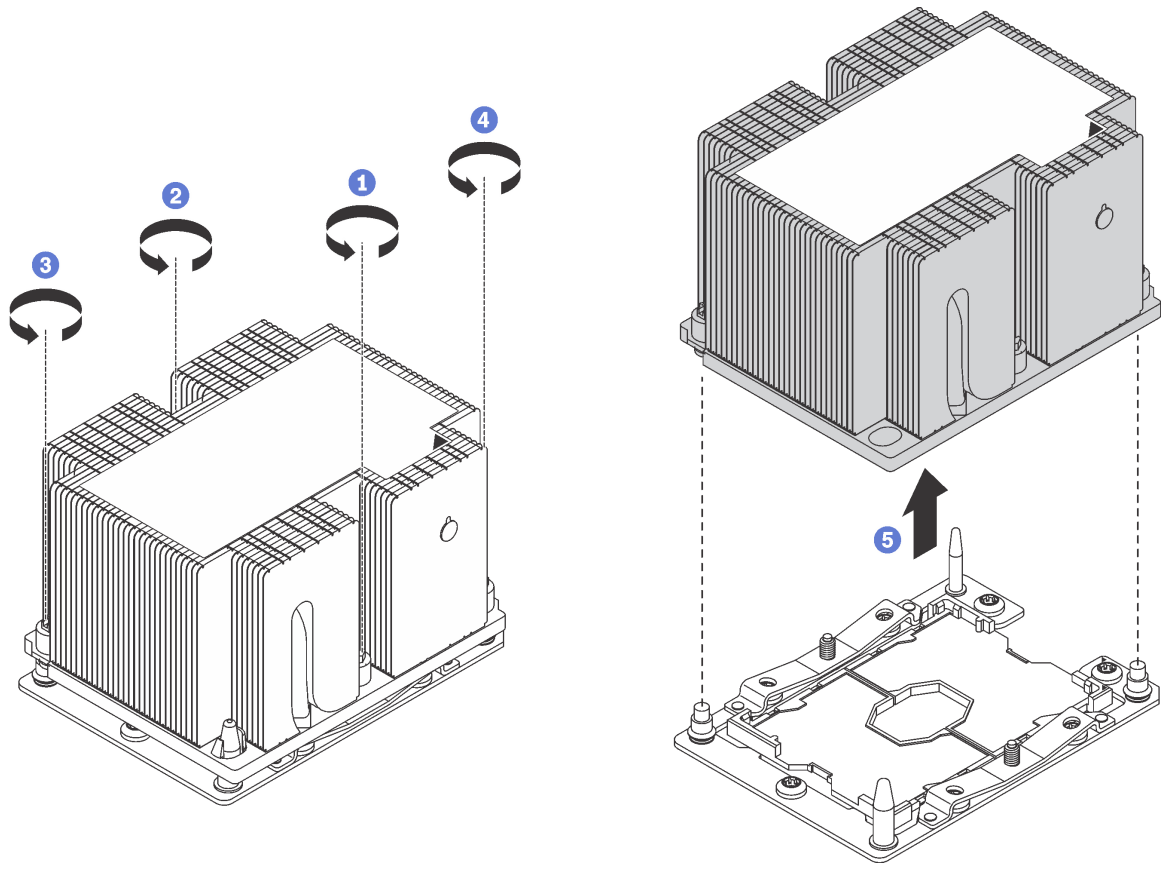


Figure 114. Removing a PHM

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.

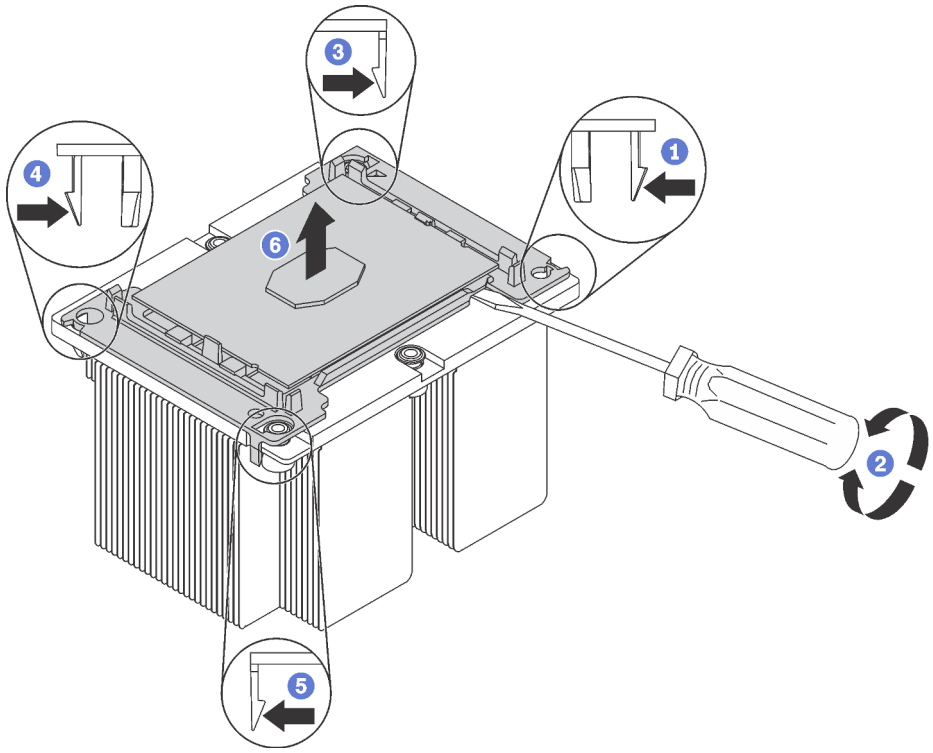


Figure 115. Separating a heat sink from a processor

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.

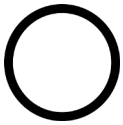
If you are instructed to return the old processor or heat sink, follow all packaging instructions and use any packaging materials that are provided.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention:

- Intel Xeon SP Gen 2 processors are supported on the system board with part number 01PE842. If you use the system board with part number 01GV277, 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.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See https://serverproven.lenovo.com/ for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See "Firmware updates" on page 9.
- Installing an additional PHM can change the memory requirements for your system. See "Memory module installation rules" on page 126 for a list of microprocessor-to-memory relationships.
- If you are going to install Intel Xeon 6230N, 6230T, or 5220T processor, use the heat sink with part number 01KP652 or 01KP653.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.

Before installing 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 144.
2. If you are replacing a heat sink, replace the processor retainer. *Processor retainers should not be reused.*

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.

a. Remove the old processor retainer.

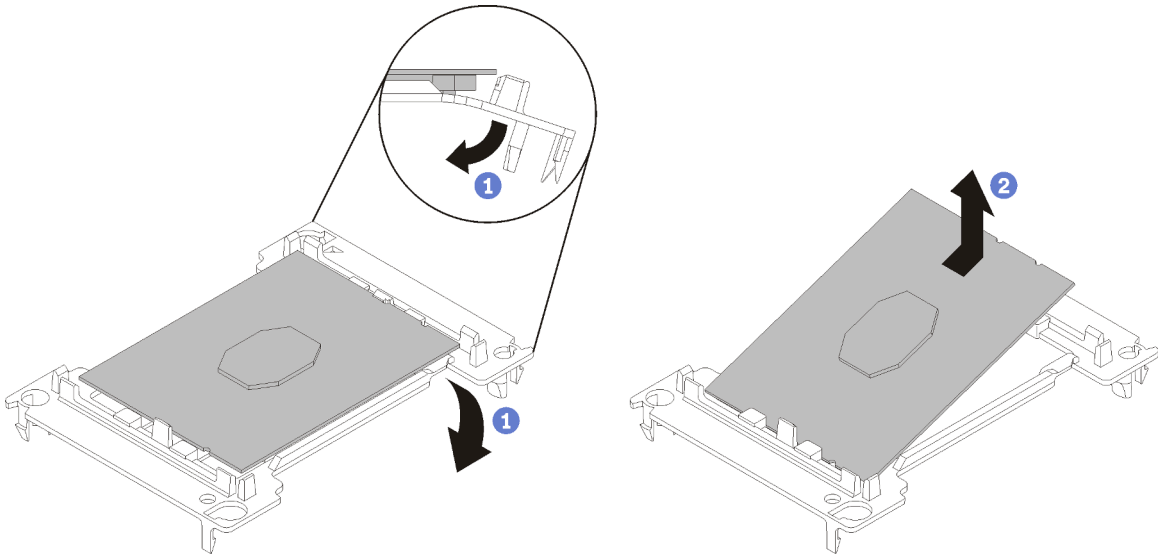


Figure 116. Removing a processor retainer

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.

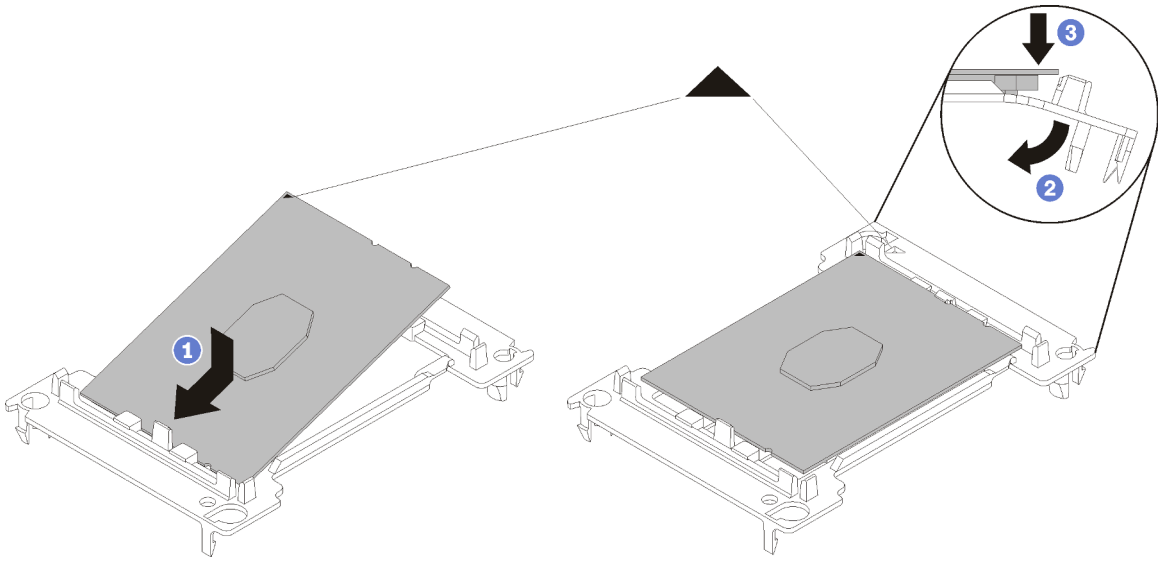


Figure 117. Installing a processor retainer

1) Position the processor on the new retainer so that the triangular marks align; then, insert the unmarked end of the processor into the retainer.

2) Holding the inserted end of the processor in place, flex the opposite end of the retainer down and away from the processor until you can press the processor under the clip on the retainer.

   To prevent the processor from falling out of the retainer after it is inserted, keep the processor-contact side up and hold the processor-retainer assembly by the sides of the retainer.

3) If there is any old thermal grease on the processor, gently clean the top of the processor using an alcohol cleaning pad.

   Note: If you are applying new thermal grease on the top of the processor, make sure to do it after the alcohol has fully evaporated.

3. If you are replacing a processor:
   a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
   b. To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.
   c. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

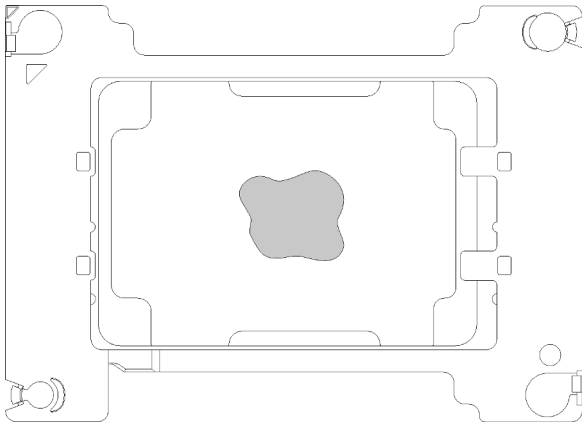


Figure 118. Proper shape of the thermal grease

4. If you are replacing a heat sink, remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

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

5. Assemble the processor and heat sink, if these components are separate.

   Notes:

   - If you are replacing a processor, install the heat sink onto the processor and retainer while the processor and retainer are in the shipping tray.
   - If you are replacing a heat sink, remove the heat sink from its shipping tray and place the processor and retainer in the opposite half of the heat sink shipping tray with the processor-contact side down. To prevent the processor from falling out of the retainer, hold the processor-retainer assembly by its sides with the processor-contact side up until you turn it over to fit in the shipping tray.

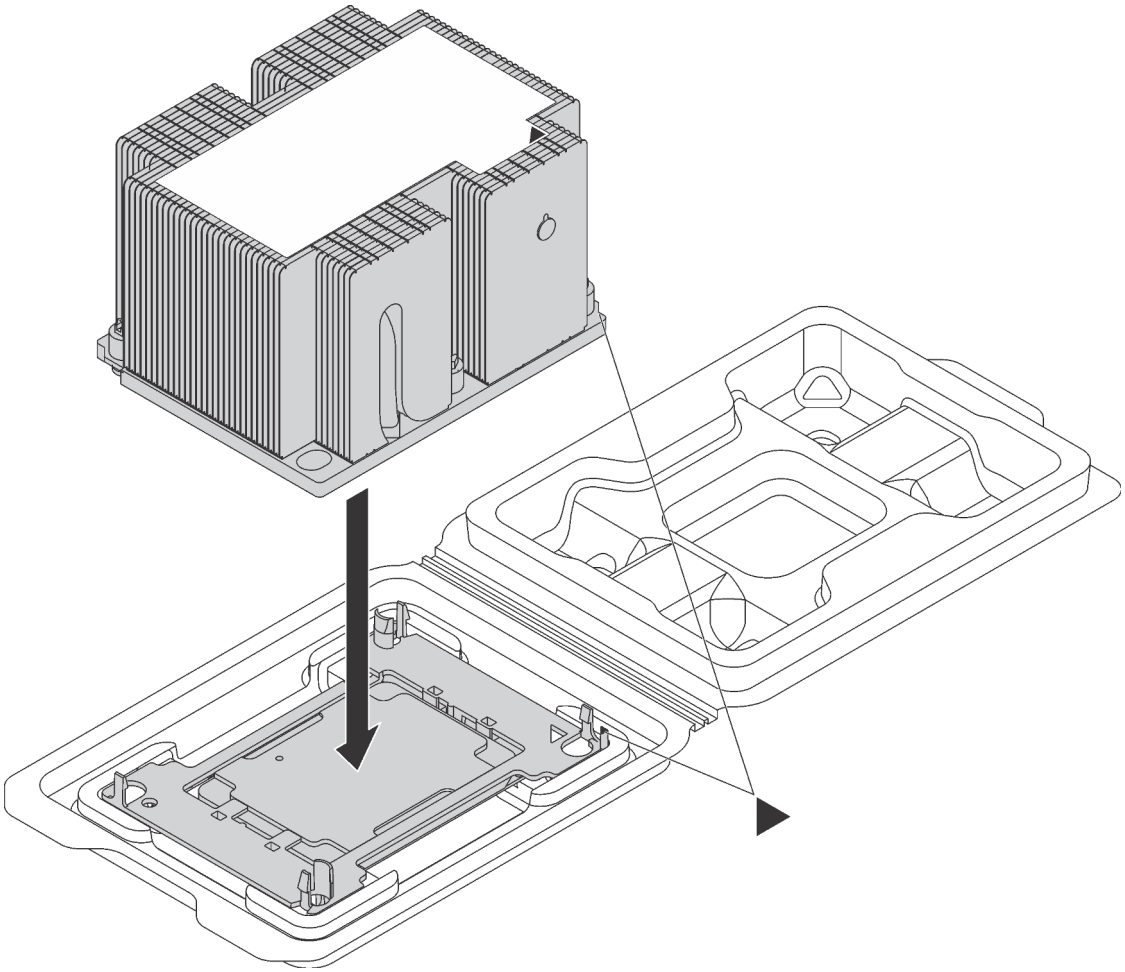


Figure 119. Assembling a PHM in the shipping tray

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.

To install a PHM, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

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.

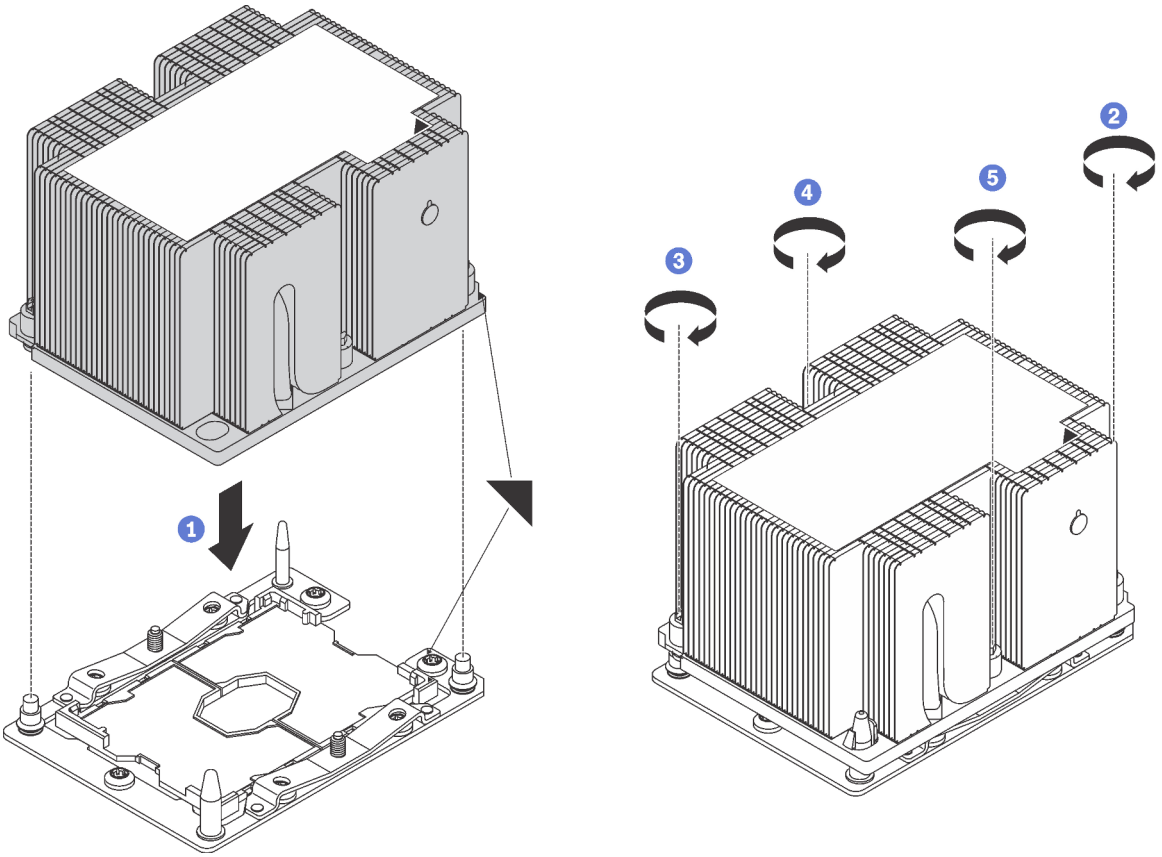


Figure 120. Installing a PHM

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 microprocessor socket. (For reference, the torque required for the nuts to fully tighten is 1.4 — 1.6 newton-meters, 12 — 14 inch-pounds).

After installing a PHM:

1. Complete the parts replacement. See “Completing the parts replacement” on page 165.

CMOS battery replacement

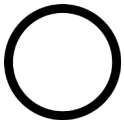
Use this information to remove and install the CMOS battery.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

The following safety information, guidelines, and 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



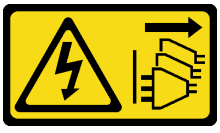
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium 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 56.
2. Remove the air baffle. See “Remove the air baffle” on page 60.

To remove the CMOS battery, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

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

Step 2. Remove the CMOS battery.

Attention:

- 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.
- Do not tilt or push the CMOS battery by using excessive force.

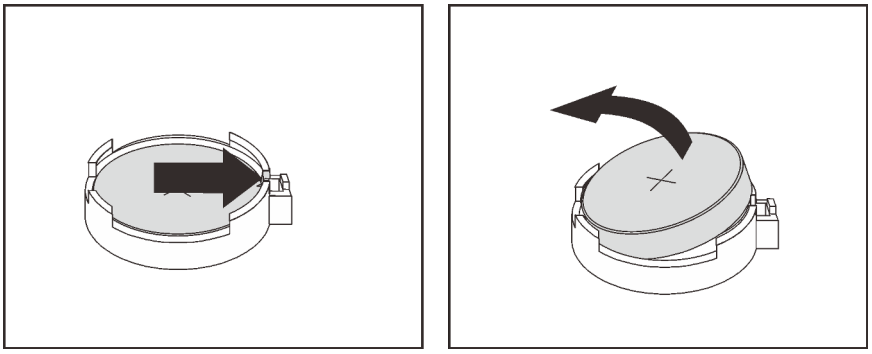


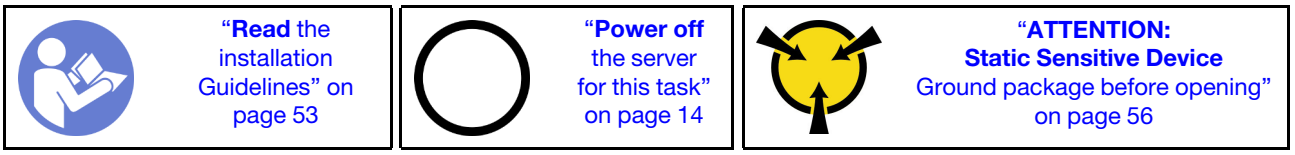
Figure 121. CMOS battery removal

After removing the CMOS battery:

1. Install a new CMOS battery.
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.



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



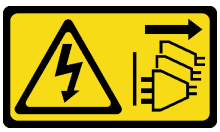
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium 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 this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

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 and place it on a static-protective surface.

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

Attention: Do not tilt or push the CMOS battery using excessive force. Any damage to the socket might require replacing the system board.

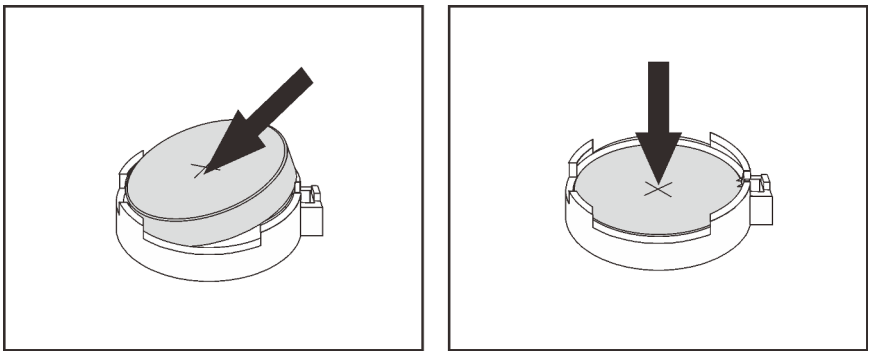


Figure 122. CMOS battery installation

After installing the CMOS battery:

1. Complete the parts replacement. See "Complete the parts replacement" on page 165.
2. Use the Setup utility to set the date, time, and any passwords.

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. Keep fingers and other body parts away.

S012



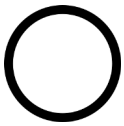
CAUTION:
Hot surface nearby.

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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention: Disconnect all power cords for this task.

Before removing the system board:

1. Remove the top cover. See "Remove the top cover" on page 56.
2. Record where the cables are connected to the system board; then, disconnect them.

   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.
3. 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.
   - Air baffle
   - System fans
   - Processor and heat sink module (PHM)

     Note: Do not disassemble the PHM.
   - Riser assembly
   - DIMMs
   - LOM adapter
   - TCM/TPM (for Chinese Mainland only)
   - M.2 module
   - PCIe adapter
   - CMOS battery
4. Pull out the power supplies a little bit. Ensure that they are disconnected from the system board.

To remove the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaldX6_HJ.

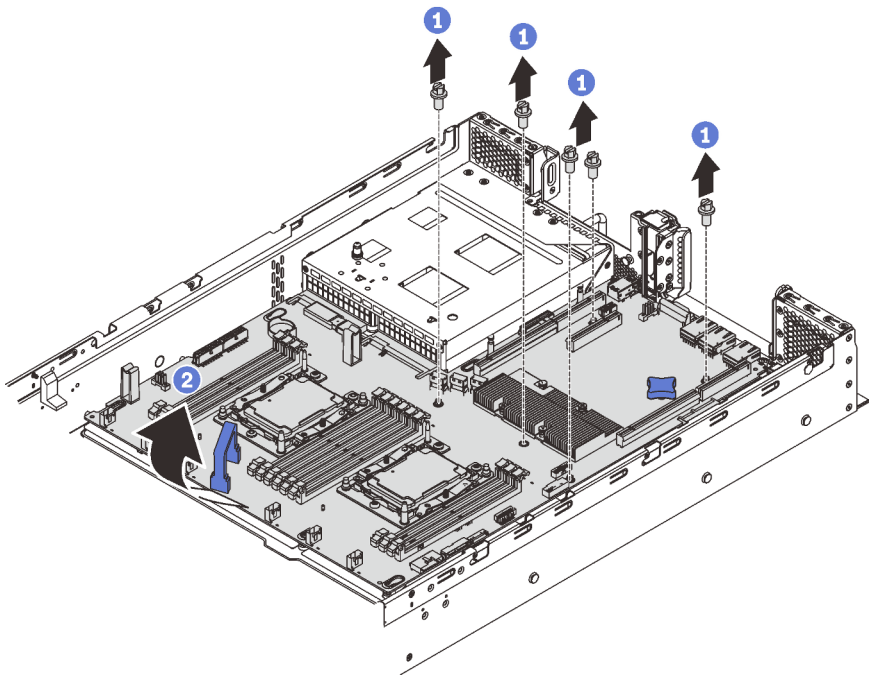


Figure 123. System board removal

Step 1. Remove the four screws that secure the system board to the chassis, and put the screws in a safe place.

Step 2. Hold the lift handles 1 and 2 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:

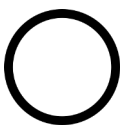
1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a 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 14



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 56

Attention: Disconnect all power cords for this task.

To install the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C9jFjZnXQ6AmTXaIdX6_HJ.

Step 1. 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.

Step 2. Hold the lift handles on the system board carefully and align the 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.

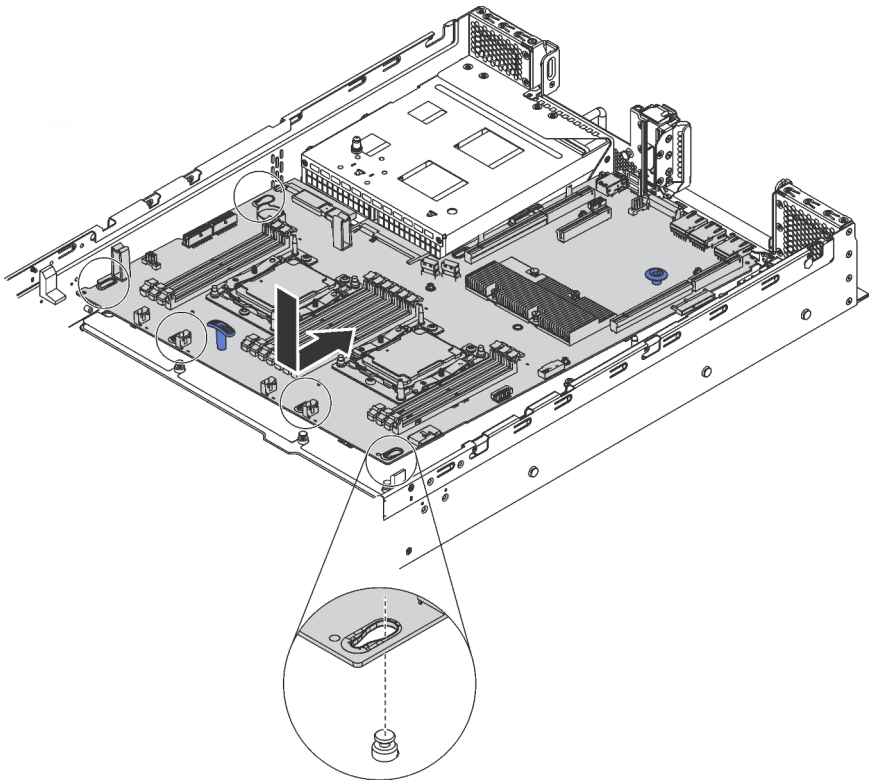


Figure 124. System board installation

Step 3. Install the four screws that you removed.

After installing the system board:

1. Push the power supplies into the bays until they click into place.
2. Install any components that you removed from the failing system board. See the related topics in Chapter 3 “Hardware replacement procedures” on page 53.
3. Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See “Update the machine type and serial number” on page 159.
4. Enable TPM/TCM. See “Enable TPM/TCM” on page 161.
5. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 164.

Update the machine type and serial number

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

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

- From Lenovo XClarity Provisioning Manager

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

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

- From Lenovo XClarity Essentials OneCLI

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

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

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

  1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

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

     ```
     onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]
     ```

     Where:

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

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

     <system model>
     The system model. Type `system yyyyyyyy`, where *yyyyyyyy* is the product identifier.

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

     – Online authenticated LAN access, type the command:
       `[--bmc-username <xcc_user_id> --bmc-password <xcc_password>]`

       Where:

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

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

Example commands are as follows:
```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc-username <xcc_user_id>
--bmc-password <xcc_password>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc-username <xcc_user_id> --bmc-
password <xcc_password>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc-username xcc_user_
id --bmc-password xcc_password
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --bmc-
username xcc_user_id --bmc-password xcc_password
```

– Online KCS access (unauthenticated and user restricted):

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

Example commands are as follows:
```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override
```

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

– Remote LAN access, type the command:
```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

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

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

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

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

Example commands are as follows:
```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc <xcc_user_id>:<xcc_
password>@<xcc_external_ip>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc <xcc_user_id>:<xcc_
password>@<xcc_external_ip>


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

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

Enable TPM/TCM

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

Note: For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a NationZ TPM adapter (sometimes called a daughter card). Customers in Chinese Mainland should download Lenovo Business Vantage to enable TCM. For more information, see href=https://datacentersupport.lenovo.com/en/en/downloads/ds548665-18alenovo_business_vantage_-release_letter-_20171205_v221770130-for-unknown-os and https://download.lenovo.com/servers/mig/2021/02/09/43299/LBV_v2.2.177.0130_readme_20180903.txt.

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

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

Set the TPM/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.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

  To set the TPM policy from Lenovo XClarity Provisioning Manager:

  1. Start the server and press the key according to the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
  2. If the power-on Administrator password is required, enter the password.
  3. From the System Summary page, click **Update VPD**.
  4. Set the policy to one of the following settings.
     - **TCM enabled - Chinese Mainland only**. Customers in Chinese Mainland should choose this setting if a TCM adapter is installed.
     - **TPM 2.0 enabled - Chinese Mainland only**. Customers in Chinese Mainland should choose this setting if a TPM 2.0 adapter is installed.
     - **TPM enabled - ROW**. Customers outside of Chinese Mainland should choose this setting.
     - **Permanently disabled**. Customers in Chinese Mainland should use this setting if no TPM or TCM adapter is installed.

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

- From Lenovo XClarity Essentials OneCLI

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

  To set the TPM policy from Lenovo XClarity Essentials OneCLI:

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

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

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

   Notes:
   - If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

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

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

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

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

   If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.
8. Read back the value to check whether the ‘Lock’ is accepted or rejected. Command as below:
   `OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

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

   imm.TpmTcmPolicyLock is defined as below:

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

Assert Physical Presence

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

There are two ways to assert the Physical Presence:

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

Notes: If the Physical Presence Policy has been disabled:

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

Assert Physical Presence through the Lenovo XClarity Controller

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

1. Log in to the Lenovo XClarity Controller interface.

   For information about logging in to the Lenovo XClarity Controller, see:

   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 switches and jumpers" on page 29

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

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

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

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

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

     https://datacentersupport.lenovo.com/solutions/HT116433
  2. Run the following command to enable Secure Boot:
     `OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc` *<userid>:<password>@<ip_address>*

     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is 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

  Note: If disabling UEFI secure boot is needed, run the following command:
  `OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc` *<userid>:<password>@<ip_address>*

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 58.
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 9.
   - Use the Lenovo XClarity Provisioning Manager to update the UEFI configuration. For more information, see: http://sysmgt.lenovofiles.com/help/topic/LXPM/UEFI_setup.html
   - Use the Lenovo XClarity Provisioning Manager to configure the RAID if you have installed or removed a hot-swap drive, a RAID adapter, or the M.2 backplane and M.2 drive. For more information, see: http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

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

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at:http://thinksystem.lenovofiles.com/help/topic/7X03/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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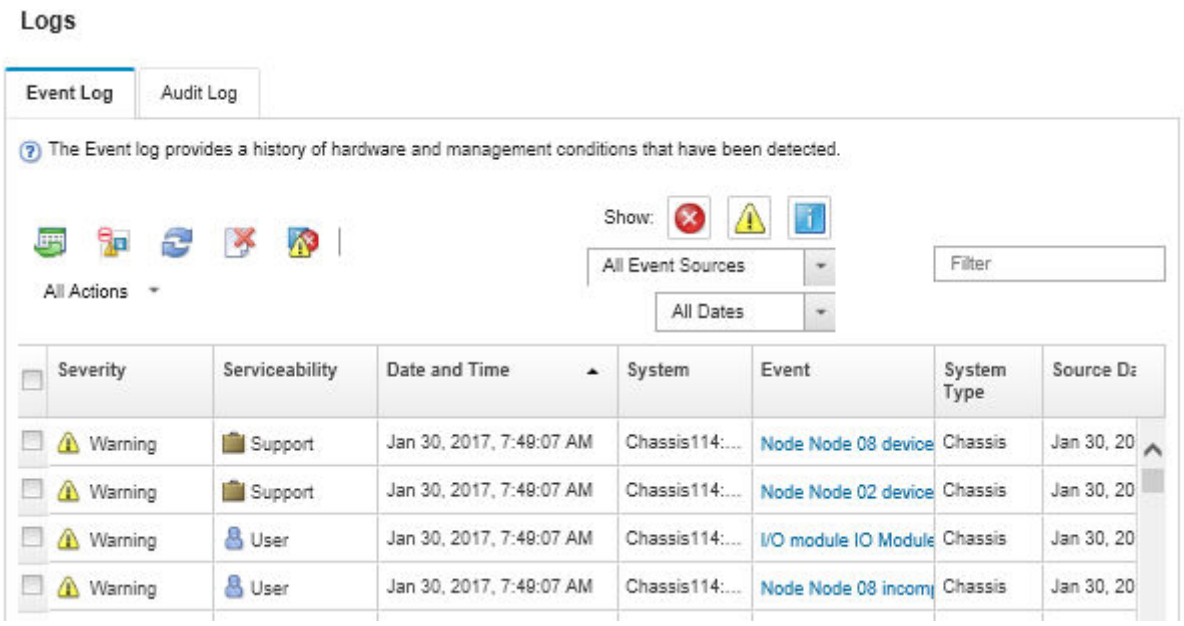


Figure 125. Lenovo XClarity Administrator event log

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.

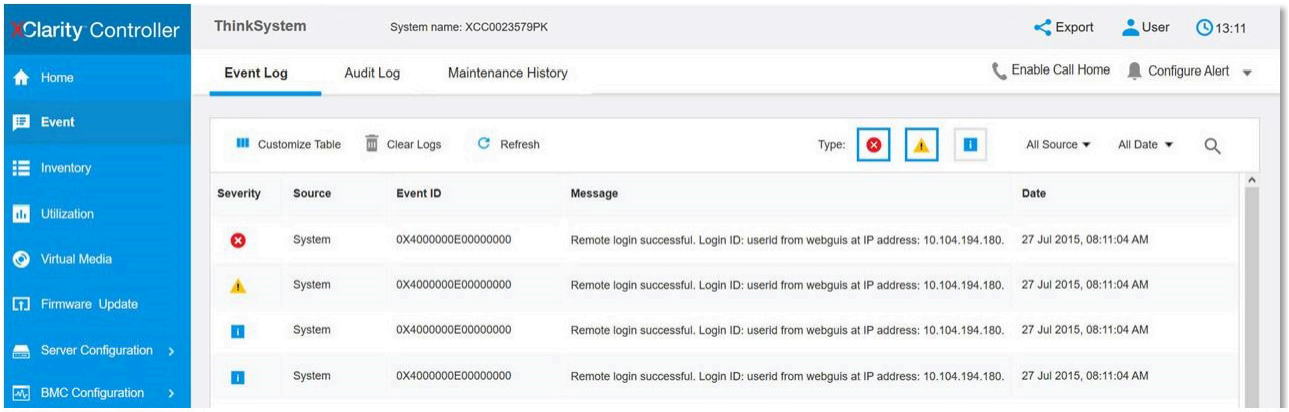


Figure 126. Lenovo XClarity Controller event log

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.
   - DIMMs until you reach the minimum configuration that is supported for the server.

   Note: For minimal configuration for debugging, see “Specifications” on page 2.
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 167

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 2 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 167.
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 189).

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 171
- “The power button does not work (server does not start)” on page 171
- “Server does not power on” on page 172
- “Server does not power off” on page 172

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.
2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check https://serverproven.lenovo.com/ to validate that the embedded hypervisor device is supported for the server.
4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Server Configuration → Boot Options**.

   For information about accessing the management controller user interface, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your server at:

   https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.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 to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the operator information panel cable, and then repeat steps 1a and 1b.
      - 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.
   - The Power button LED is lit on and flash slowly.
   - The push force is enough and with button force response.
3. If the power button LED didn't lit on or flash correctly, reseat all the power supplies and make sure AC LED on PSU rear side are lit on.

4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components lock the power permission. Replace the each power supply and check the power button function after installing the each one.
6. If everything is still done and the issue cannot be resolved, collect the failure information with system logs captured to Lenovo support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (one processor, one DIMM and one PSU without any adapter and any drive installed).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace the each power supply and check the power button function after installing the each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board replacement is necessary.

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 172
- “Multiple rows of DIMMs in a branch identified as failing” on page 173

Displayed system memory less than installed physical memory

Complete the following steps until the problem is resolved:

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

1. Make sure that:

- No error LEDs are lit on the operator information panel.
- No DIMM error LEDs are lit on the system board.
- Memory mirrored channel does not account for the discrepancy.
- The DIMMs are seated correctly.
- You have installed the correct type of memory.
- If you changed the memory, you updated the memory configuration in the Setup utility.
- All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
- There is no memory mismatch when the server is at the minimum memory configuration.

2. Reseat the DIMMs, and then restart the server.
3. Run memory diagnostics. When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
4. Check the POST error log:
   - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
   - If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Setup utility and enable the DIMM.
5. Reseat the DIMM.
6. Restart the server.

Multiple rows of DIMMs in a branch identified as failing

1. Reseat the DIMMs; then, restart the server.
2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical known good DIMM; then, restart the server. Repeat as necessary. If the failures continue after all identified DIMMs are replaced, go to step 4.
3. Return the removed DIMMs, one at a time, to their original connectors, restarting the server after each DIMM, until a DIMM fails. Replace each failing DIMM with an identical known good DIMM, restarting the server after each DIMM replacement. Repeat step 3 until you have tested all removed DIMMs.
4. Replace the lowest-numbered DIMM of those identified; then, restart the server. Repeat as necessary.
5. Reverse the DIMMs between the channels (of the same processor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.
6. (Trained technician only) Replace the system board.

Hard disk drive problems

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

- “Server cannot recognize a hard drive” on page 173
- “Multiple hard drives fail” on page 174
- “Multiple hard drives are offline” on page 175
- “A replacement hard disk drive does not rebuild” on page 175
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 175
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 175

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:
   - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.*
   - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
   - If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.
   - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
   - Replace the affected backplane signal cable.
   - Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.*

   Based on those tests:
   - If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
   - Replace the backplane.
   - If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
   - If the adapter fails the test, replace the adapter.

Multiple hard drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the hard disk drive and server are at the latest level

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple hard drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement hard disk drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green hard disk drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green hard disk drive activity LED does not flash when the drive is in use, run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.*
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow hard disk drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the hard disk drive.
5. Power on the server and observe the activity of the hard disk drive LEDs.

Note: *Depending on the LXPM version, you may see **HDD test** or **Disk Drive Test**.

Monitor and video problems

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

- “Incorrect characters are displayed” on page 175
- “Screen is blank” on page 176
- “Screen goes blank when you start some application programs” on page 176
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.” on page 176
- “The wrong characters appear on the screen” on page 177

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 9.

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 9.
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 9.

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 177
- “Mouse does not work.” on page 177
- “USB-device does not work.” on page 177

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 is not recognized” on page 178
- “PCIe adapter is not recognized or is not functioning” on page 178
- “Insufficient PCIe resources are detected.” on page 178
- “A Lenovo optional device that was just installed does not work.” on page 179
- “A Lenovo optional device that worked previously does not work now” on page 179

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
3. Use the Setup utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see https://serverproven.lenovo.com/). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.
7. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

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

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.

7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

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

1. Make sure that:
   - The device is supported for the server (see https://serverproven.lenovo.com/).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damages, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged, .
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

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 179
- "Serial device does not work" on page 180

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 180
- “Intermittent KVM problems” on page 180
- “Intermittent unexpected reboots” on page 181

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
   a. Make sure that the device is configured correctly.

      Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
   b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another 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 microprocessor 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 167 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 181
- “Could not log in using LDAP account with SSL enabled” on page 182

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 167), make sure:
   a. The room temperature is not too high (see “Specifications” on page 2).
   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 182
- "The server immediately displays the POST Event Viewer when it is turned on" on page 182
- "Server is unresponsive (POST is complete and operating system is running)" on page 183
- "Server is unresponsive (POST failed and cannot start System Setup)" on page 183
- "Voltage planar fault is displayed in the event log" on page 183
- "Unusual smell" on page 184
- "Server seems to be running hot" on page 184
- "Cannot enter legacy mode after installing a new adapter" on page 184
- "Cracked parts or cracked chassis" on page 184

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

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

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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

Complete the following steps until the problem is solved.

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

   You can view processor details from system setup.

   To determine if the processor is supported for the server, see https://serverproven.lenovo.com/.
3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. (Trained technician only) Processor

b. (Trained technician only) System board

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

Complete the following steps until the problem is solved.

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

Server is unresponsive (POST failed and cannot start System Setup)

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

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

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

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

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

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

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 2).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see *Maintenance Manual* for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

   Note: The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.
6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
- Other software works on the server.
- The software works on another server.

2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at 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 https://serverproven.lenovo.com/ to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
  - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

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.

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Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

  Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  - For more information about using the web interface to collect service data, see 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

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Morrisville, NC 27560
U.S.A.
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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional DIMM.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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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 Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
電路卡	–	○	○	○	○	○
光碟機	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝-〞係指該項限用物質為排除項目。

Note3 : The “-“ indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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