



# ThinkSystem SR630 V2 Setup Guide



**Machine Types:** 7Z70 and 7Z71

**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](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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## Chapter 1. Introduction

The ThinkSystem™ SR630 V2 server is a 1U rack server designed to be highly flexible to support many kinds of Information Technology (IT) workloads. This high-performance, multi-core server is ideally suited for IT environments that require superior processor performance, input/output (I/O) flexibility, and flexible manageability.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

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.

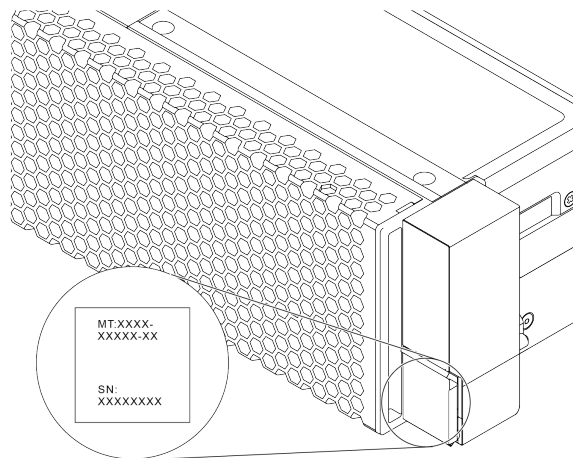


Figure 1. Location of the ID label

### XClarity Controller network access label

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

**Note:** The pull-out information tab is located on the right bottom of the front side of your server. For detailed information, see “Front view” on page 19.

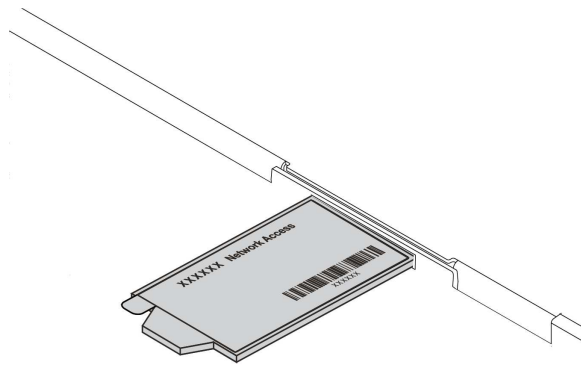


Figure 2. Location of the XClarity Controller network access label

### 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://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70>



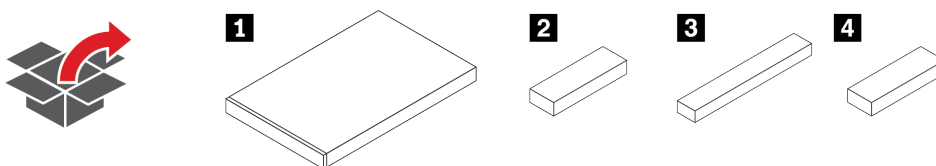
Figure 3. QR code

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## Server package contents

When you receive your server, verify that the shipment contains everything that you expected to receive.

The server package includes the following items:



**Note:** Items marked with asterisk (\*) are available on some models only.

- **1** Server
- **2** Material box, including items such as accessory kit, power cords\*, and documentation
- **3** Rail kit box\*, including the rail kit and documentation
- **4** CMA box\*, including the cable management arm

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## Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Active Energy Manager**

Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. Using Lenovo XClarity Energy Manager, you can monitor and manage the power consumption and temperature to improve energy efficiency.

- **Features on Demand**

If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

<https://fod.lenovo.com/lkms>

- **Flexible network support**

The server has an Open Compute Project (OCP) 3.0 slot for an OCP 3.0 Ethernet adapter, which provides two or four network connectors for network support.

- **Integrated Trusted Platform Module (TPM)**

This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification.

Trusted Platform Module (TPM) of version 2.0 is supported.

For more information on TPM configurations, see “Enable TPM” in the *Maintenance Manual*.

**Note:** For customers in Chinese Mainland, a Lenovo-qualified TPM 2.0 adapter (sometimes called a daughter card) may be pre-installed.

- **Large system-memory capacity**

The server supports up to 32 TruDDR4 registered DIMMs (RDIMMs) or three-dimensional stacking registered DIMMs (3DS RDIMMs). For more about the specific types and maximum amount of memory, see “[Specifications](#)” on page 5.

- **Large data-storage capacity and hot-swap capability**

Depending on different models, the server supports up to four 3.5-inch or ten 2.5-inch SAS/SATA/NVMe or 16 EDSFF drives on the front, up to two M.2 drives, and up to two 2.5-inch SAS/SATA/NVMe or two 7mm drives on the rear.

With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. It consolidates multiple management functions in a single chip on the server system board.

Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options. For additional information about the Lenovo XClarity Controller, refer to the XCC documentation compatible with your server at:

[https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

**Important:** Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go to [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).

- **Light path diagnostics**

Light path diagnostics provides LEDs to help you diagnose problems and an integrated LCD diagnostics panel or external diagnostics handset can provide additional diagnostic information. For more information about the light path diagnostics, see the following:

- [“Drive LEDs” on page 25](#)
- [“Rear view LEDs” on page 43](#)
- [“Diagnostics panel” on page 26](#)
- [“LCD diagnostics panel” on page 28](#)
- [“External LCD diagnostics handset” on page 33](#)

- **Mobile access to Lenovo Service Information website**

The server provides a QR code on the system service label, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Redundant networking connection**

The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and optional power capabilities**

The server supports a maximum of two hot-swap power supplies and eight dual-motor hot-swap fans, which provide redundancy for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails.

- **ThinkSystem RAID support**

The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0 and 1. An optional RAID adapter is available for purchase.

- **UEFI-compliant server firmware**

Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

**Note:** The server does not support DOS (Disk Operating System).



## Specifications

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

Table 1. Server specifications

Specification	Description
Dimension	<ul style="list-style-type: none"><li>• 1U</li><li>• Height: 43.0 mm (1.69 inches)</li><li>• Width: 439.2 mm (17.29 inches)</li><li>• Depth: 772.6 mm (30.42 inches)</li></ul> <p><b>Note:</b> The depth is measured without PSU handles or security bezel installed.</p>
Package weight	Up to 26.3 kg (57.98 lb)
Processor	<p>Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh Ultra Path Interconnect (UPI) topology.</p> <ul style="list-style-type: none"><li>• Up to two Intel® Xeon® processors</li><li>• Designed for Land Grid Array (LGA) 4189 socket</li><li>• Scalable up to 40 cores per socket, 80 cores in total</li><li>• Thermal Design Power (TDP): up to 270 watts</li><li>• Supports 3 UPI links up to 11.2 GT/s</li></ul> <p>For a list of supported processors, see <a href="https://static.lenovo.com/us/en/serverproven/index.shtml">https://static.lenovo.com/us/en/serverproven/index.shtml</a>.</p> <p>Only one processor is supported if you use the 8351N processor or processor with the suffix of "U".</p> <p>For technical rules for processors and heat sinks, see "Technical rules for processors and heat sinks" on page 99.</p>
Heat sink	<ul style="list-style-type: none"><li>• Standard heat sink</li><li>• High-performance heat sink (T-shape)</li></ul> <p>For technical rules for processors and heat sinks, see "Technical rules for processors and heat sinks" on page 99.</p>

Table 1. Server specifications (continued)

Specification	Description
Memory	<p>See “Memory module installation rules and order” on page 85 for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> <li>• Slots: 32 memory module slots</li> <li>• Supported memory module type: <ul style="list-style-type: none"> <li>– TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM</li> <li>– TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM</li> <li>– TruDDR4 2933, octal-rank, 256 GB 3DS RDIMM</li> <li>– TruDDR4 3200, 128 GB, 256 GB and 512 GB Intel® Optane™ Persistent Memory (PMEM)</li> </ul> </li> <li>• Minimum memory: 16 GB</li> <li>• Maximum memory: <ul style="list-style-type: none"> <li>– Without PMEMs: <ul style="list-style-type: none"> <li>– 2 TB using 32 x 64 GB RDIMMs</li> <li>– 8 TB using 32 x 256 GB RDIMMs</li> </ul> </li> <li>– With PMEMs: <ul style="list-style-type: none"> <li>– 10 TB: 16 x 128 GB 3DS RDIMMs + 16 x 512 GB PMEMs (Memory Mode) Total 10 TB installed memory capacity, of which 8 TB (PMEMs) is used as system memory and 2 TB (3DS RDIMMs) is used as cache.</li> <li>– 12 TB: 16 x 256 GB 3DS RDIMMs + 16 x 512 GB PMEMs (App Direct Mode) Total 12 TB installed memory capacity, of which 4 TB (3DS RDIMMs) is used as system memory and 8 TB (PMEMs) is used as persistent memory for storage.</li> </ul> </li> </ul> </li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• The operating speed and total memory capacity depend on the processor model and UEFI settings.</li> <li>• All Icelake Platinum and Gold CPUs support PMEM. For Icelake Silver CPUs, only processor 4314 supports PMEM.</li> <li>• When 256 GB 3DS RDIMM/512 GB PMEM is installed, the ambient temperature must be limited to 30°C or lower.</li> </ul> <p>For a list of supported memory options, see <a href="https://static.lenovo.com/us/en/serverproven/index.shtml">https://static.lenovo.com/us/en/serverproven/index.shtml</a>.</p> <p>For technical rules for memory modules, see “Memory module installation rules and order” on page 85.</p>
Operating systems	<p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server</li> <li>• VMware ESXi</li> <li>• Red Hat Enterprise Linux</li> <li>• SUSE Linux Enterprise Server</li> <li>• Canonical Ubuntu</li> </ul> <p>References:</p> <ul style="list-style-type: none"> <li>• Complete list of available operating systems: <a href="https://lenovopress.com/osig">https://lenovopress.com/osig</a>.</li> </ul>

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> <li>OS deployment instructions: Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see “Install the operating system” on page 161).</li> </ul>
Internal drives	<p>Front:</p> <ul style="list-style-type: none"> <li>Up to four 3.5-inch hot-swap SAS/SATA drives</li> <li>Up to four 3.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives</li> <li>Up to four 2.5-inch hot-swap SAS/SATA drives</li> <li>Up to eight 2.5-inch hot-swap SAS/SATA/U.3 NVMe drives</li> <li>Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives</li> <li>Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap NVMe drives</li> <li>Up to six 2.5-inch hot-swap SAS/SATA and two 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives and two 2.5-inch hot-swap NVMe drives</li> <li>Up to ten 2.5-inch hot-swap NVMe drives</li> <li>Up to ten 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives</li> <li>Up to 16 hot-swap EDSFF drives</li> </ul> <p>Inside:</p> <ul style="list-style-type: none"> <li>Up to two internal SATA or NVMe M.2 drives</li> </ul> <p>Rear:</p> <ul style="list-style-type: none"> <li>Up to two 2.5-inch hot-swap SAS/SATA or NVMe drives</li> <li>Up to two 7mm hot-swap SATA or NVMe drives</li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>M.2 and 7mm drives are not supported at the same time.</li> <li>If PMEM or 256 GB DIMM is used, rear 2.5-inch drives are not supported.</li> <li>For the server model with 16 front EDSFF drives, M.2 drives are not supported.</li> <li>For technical rules for drives, see “Technical rules for drives” on page 99.</li> </ul>
Expansion slots	<p>Depending on the model, your server supports up to three PCIe slots in the rear.</p> <ul style="list-style-type: none"> <li>PCIe x16, low-profile</li> <li>PCIe x16/x16, low-profile + low profile</li> <li>PCIe x16/x16, low profile + full-height</li> </ul> <p>For locations and technical rules for PCIe slots, see “Rear view” on page 39 and “Technical rules for PCIe adapters” on page 100.</p>

Table 1. Server specifications (continued)

Specification	Description
Graphics processing unit (GPU)	<p>Your server supports the following GPUs:</p> <ul style="list-style-type: none"> <li>• Low-profile, half-length, single-wide:               <ul style="list-style-type: none"> <li>– NVIDIA® Quadro® P620</li> <li>– NVIDIA® Tesla® T4</li> <li>– NVIDIA® A2</li> <li>– NVIDIA® Tesla® T4 16GB Base Card (for China only)</li> </ul> </li> <li>• Full-height, 3/4 length, single-wide:               <ul style="list-style-type: none"> <li>– NVIDIA® Quadro® P2200</li> </ul> </li> </ul> <p>For technical rules for GPU, see “Technical rules for GPU adapters” on page 102.</p>
Input/Output (I/O) features	<ul style="list-style-type: none"> <li>• Front:               <ul style="list-style-type: none"> <li>– One VGA connector (optional)</li> <li>– One USB 2.0 connector</li> <li>– One USB 3.2 Gen 1 (5Gbps) connector</li> <li>– One external diagnostics connector</li> <li>– One diagnostics panel (optional)</li> <li>– One LCD diagnostics panel (optional)</li> </ul> </li> <li>• Rear:               <ul style="list-style-type: none"> <li>– One VGA connector</li> <li>– Three USB 3.2 Gen 1 (5Gbps) connectors</li> <li>– Ethernet connectors on OCP 3.0 Ethernet adapter (optional)</li> <li>– One RJ45 BMC management network connector</li> <li>– One serial port (optional)</li> </ul> </li> </ul> <p>For detailed information about each component, see “Front view” on page 19 and “Rear view” on page 39.</p>

Table 1. Server specifications (continued)

Specification	Description
<p>HBA/RAID adapters (depending on the model)</p>	<p><b>Support the following RAID adapters:</b></p> <ul style="list-style-type: none"> <li>• 530-8i PCIe 12Gb RAID Adapter</li> <li>• 5350-8i PCIe 12Gb RAID Adapter</li> <li>• 530-16i PCIe 12Gb RAID Adapter</li> <li>• 540-8i PCIe 12Gb RAID Adapter</li> <li>• 540-16i PCIe 12Gb RAID Adapter</li> <li>• 930-8i 2GB Flash PCIe 12Gb RAID Adapter</li> <li>• 9350-8i 2GB Flash PCIe 12Gb RAID Adapter</li> <li>• 930-8e 4GB Flash PCIe 12Gb RAID Adapter</li> <li>• 930-16i 4GB Flash PCIe 12Gb RAID Adapter</li> <li>• 940-8i 4GB Flash PCIe Gen4 12Gb RAID Adapter</li> <li>• 940-8i 8GB Flash PCIe Gen4 12Gb RAID Adapter</li> <li>• 940-16i 4GB Flash PCIe Gen4 12Gb RAID Adapter</li> <li>• 940-16i 8GB Flash PCIe Gen4 12Gb RAID Adapter</li> <li>• 940-16i 8GB Flash PCIe Gen4 12Gb Internal RAID Adapter</li> </ul> <p><b>Support the following HBAs:</b></p> <ul style="list-style-type: none"> <li>• 430-8i SAS/SATA 12Gb HBA</li> <li>• 4350-8i SAS/SATA 12Gb HBA</li> <li>• 430-8e SAS/SATA 12Gb HBA</li> <li>• 430-16i SAS/SATA 12Gb HBA</li> <li>• 430-16e SAS/SATA 12Gb HBA</li> <li>• 440-8i SAS/SATA 12Gb HBA</li> <li>• 440-16i SAS/SATA 12Gb HBA</li> <li>• 440-16e SAS/SATA 12Gb HBA</li> <li>• 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA</li> </ul> <p>For technical rules for storage controller adapters, see “Technical rules for PCIe adapters” on page 100.</p> <p>For technical rules for RAID configuration, see “Technical rules for RAID configuration” on page 100.</p> <p>For more information about the RAID/HBA adapters, see <a href="https://lenovopress.com/lp1288-thinksystem-raid-adapter-and-hba-reference">https://lenovopress.com/lp1288-thinksystem-raid-adapter-and-hba-reference</a>.</p>
<p>System fans</p>	<p>Up to eight dual-rotor hot-swap fans (including two redundant fans)</p> <ul style="list-style-type: none"> <li>• Standard fan 4056 (21000 RPM)</li> <li>• Performance fan 4056 (28000 RPM)</li> </ul> <p>For technical rules for system fans, see “Technical rules for system fans” on page 103.</p>

Table 1. Server specifications (continued)

Specification	Description																												
Minimal configuration for debugging	<ul style="list-style-type: none"> <li>• One processor in processor socket 1</li> <li>• One memory module in slot 3</li> <li>• One power supply</li> <li>• One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)</li> <li>• Six system fans (with one processor)</li> </ul>																												
Acoustical noise emissions	<p>The server has the following acoustic noise emissions declaration:</p>																												
	<p><i>Table 2. Acoustic noise emissions declaration</i></p>																												
	<table border="1"> <thead> <tr> <th data-bbox="511 625 649 808" rowspan="2">Scenario</th> <th colspan="2" data-bbox="649 625 738 724">Sound power level (L<sub>wAd</sub>)</th> <th colspan="2" data-bbox="738 625 1023 724">Sound pressure level (L<sub>pAm</sub>):</th> <th data-bbox="1023 625 1422 808" rowspan="2">Used configuration</th> </tr> <tr> <th data-bbox="649 724 738 808">Idling</th> <th data-bbox="738 724 828 808">Operating</th> <th data-bbox="738 724 828 808">Idling</th> <th data-bbox="828 724 1023 808">Operating</th> </tr> </thead> <tbody> <tr> <td data-bbox="511 808 649 1123">Typical</td> <td data-bbox="649 808 738 1123">6.0 Bel</td> <td data-bbox="738 808 828 1123">7.1 Bel</td> <td data-bbox="738 808 828 1123">45 dBA</td> <td data-bbox="828 808 1023 1123">56 dBA</td> <td data-bbox="1023 808 1422 1123"> <ul style="list-style-type: none"> <li>• Two 165 W processors</li> <li>• Eight 64 GB DIMMs</li> <li>• Eight SAS hard disk drives</li> <li>• RAID 440-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two 750-watt power supply units</li> </ul> </td> </tr> <tr> <td data-bbox="511 1123 649 1438">Storage rich</td> <td data-bbox="649 1123 738 1438">7.5 Bel</td> <td data-bbox="738 1123 828 1438">7.7 Bel</td> <td data-bbox="738 1123 828 1438">61 dBA</td> <td data-bbox="828 1123 1023 1438">62 dBA</td> <td data-bbox="1023 1123 1422 1438"> <ul style="list-style-type: none"> <li>• Two 165 W processors</li> <li>• Sixteen 64 GB DIMMs</li> <li>• Twelve SAS hard disk drives</li> <li>• RAID 940-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two 750-watt power supply units</li> </ul> </td> </tr> <tr> <td data-bbox="511 1438 649 1774">GPU rich</td> <td data-bbox="649 1438 738 1774">7.6 Bel</td> <td data-bbox="738 1438 828 1774">8.3 Bel</td> <td data-bbox="738 1438 828 1774">62 dBA</td> <td data-bbox="828 1438 1023 1774">69 dBA</td> <td data-bbox="1023 1438 1422 1774"> <ul style="list-style-type: none"> <li>• Two 205 W processors</li> <li>• Sixteen 64 GB DIMMs</li> <li>• Ten SAS hard disk drives</li> <li>• RAID 940-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two NVIDIA Tesla T4 GPUs</li> <li>• Two 1100-watt power supply units</li> </ul> </td> </tr> </tbody> </table>	Scenario	Sound power level (L <sub>wAd</sub> )		Sound pressure level (L <sub>pAm</sub> ):		Used configuration	Idling	Operating	Idling	Operating	Typical	6.0 Bel	7.1 Bel	45 dBA	56 dBA	<ul style="list-style-type: none"> <li>• Two 165 W processors</li> <li>• Eight 64 GB DIMMs</li> <li>• Eight SAS hard disk drives</li> <li>• RAID 440-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two 750-watt power supply units</li> </ul>	Storage rich	7.5 Bel	7.7 Bel	61 dBA	62 dBA	<ul style="list-style-type: none"> <li>• Two 165 W processors</li> <li>• Sixteen 64 GB DIMMs</li> <li>• Twelve SAS hard disk drives</li> <li>• RAID 940-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two 750-watt power supply units</li> </ul>	GPU rich	7.6 Bel	8.3 Bel	62 dBA	69 dBA	<ul style="list-style-type: none"> <li>• Two 205 W processors</li> <li>• Sixteen 64 GB DIMMs</li> <li>• Ten SAS hard disk drives</li> <li>• RAID 940-16i adapter</li> <li>• Intel X710-T2L 10GBASE-T 2-port OCP adapter</li> <li>• Two NVIDIA Tesla T4 GPUs</li> <li>• Two 1100-watt power supply units</li> </ul>
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Table 1. Server specifications (continued)

Specification	Description																																			
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• The declared sound levels may change depending on configuration/conditions, for example, with high-power NICs, high-power processors and GPUs, such as ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port/2-port PCIe Adapter, ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter.</li> <li>• Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.</li> </ul>																																			
Electrical input	<p>One or two hot-swap power supplies for redundancy support:</p> <p><i>Table 3. Electrical input for power supplies</i></p> <table border="1" data-bbox="548 957 1453 1444"> <thead> <tr> <th>Power supply</th> <th>100–127 V ac</th> <th>200–240 V ac</th> <th>240 V dc</th> <th>-48 V dc</th> </tr> </thead> <tbody> <tr> <td>500-watt 80 PLUS Platinum</td> <td>√</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>750-watt 80 PLUS Platinum</td> <td>√</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>1100-watt 80 PLUS Platinum</td> <td>√</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>1800-watt 80 PLUS Platinum</td> <td></td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>750-watt 80 PLUS Titanium</td> <td></td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>1100-watt</td> <td></td> <td></td> <td></td> <td>√</td> </tr> </tbody> </table> <p><b>CAUTION:</b></p> <ul style="list-style-type: none"> <li>• <b>240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.</b></li> <li>• <b>Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.</b></li> </ul>	Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc	500-watt 80 PLUS Platinum	√	√	√		750-watt 80 PLUS Platinum	√	√	√		1100-watt 80 PLUS Platinum	√	√	√		1800-watt 80 PLUS Platinum		√	√		750-watt 80 PLUS Titanium		√	√		1100-watt				√
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750-watt 80 PLUS Titanium		√	√																																	
1100-watt				√																																

Table 1. Server specifications (continued)

Specification	Description
Environment	<p>The server is supported in the following environment:</p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Operating: <ul style="list-style-type: none"> <li>– 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.</li> <li>– 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.</li> <li>– 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.</li> </ul> </li> <li>– Server off: 5–45°C (41–113°F)</li> <li>– Shipping or storage: -40–60°C (-40–140°F)</li> </ul> </li> <li>• Maximum altitude: 3050 m (10 000 ft)</li> <li>• Relative humidity (non-condensing): <ul style="list-style-type: none"> <li>– Operating: <ul style="list-style-type: none"> <li>– ASHRAE Class A2: 8%–80%, maximum dew point: 21°C (70°F)</li> <li>– ASHRAE Class A3: 8%–85%, maximum dew point: 24°C (75°F)</li> <li>– ASHRAE Class A4: 8%–90%, maximum dew point: 24°C (75°F)</li> </ul> </li> <li>– Shipment or storage: 8%–90%</li> </ul> </li> <li>• Particulate contamination <p><b>Attention:</b> 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 13.</p> </li> </ul> <p>The server is designed for standard data center environment and is recommended to be placed in industrial data center. Depending on hardware configurations, the server complies with ASHRAE Class A2, A3, or A4 specifications with certain thermal restrictions. System performance may be impacted when operating temperature is out of permitted conditions.</p> <p>The restrictions to ASHRAE support are as follows:</p> <ul style="list-style-type: none"> <li>• The ambient temperature must be no more than 30°C if your server meets any of the following conditions: <ul style="list-style-type: none"> <li>– 205 W &lt; TDP ≤ 270 W</li> <li>– Installed with any rear 2.5-inch NVMe drive</li> <li>– Installed with any 256 GB DIMM or PMEM</li> <li>– Installed with any passive GPU</li> </ul> </li> <li>• The ambient temperature must be no more than 35°C if your server meets any of the following conditions: <ul style="list-style-type: none"> <li>– 165 W &lt; TDP ≤ 205 W</li> <li>– Installed with any front NVMe drive or rear NVMe AIC SSD</li> <li>– Installed with any 7mm boot drive</li> <li>– Installed with any M.2 NVMe drive</li> </ul> </li> </ul>



Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"><li>– Installed with any rear 2.5-inch SAS/SATA drive</li><li>• The ambient temperature must be no more than 45°C if the CPU TDP is equal to or smaller than 165 W.</li></ul>

## 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 4. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>• The copper reactivity level shall be less than 300 Å/month (around 0.0039 µg/cm<sup>2</sup>-hour weight gain).<sup>2</sup></li> <li>• The silver reactivity level shall be less than 200 Å/month (around 0.0035 µg/cm<sup>2</sup>-hour weight gain).<sup>3</sup></li> <li>• 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.</li> </ul>
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> <li>• The room air might be continuously filtered with MERV 8 filters.</li> <li>• Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.</li> </ul> <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> <li>• The deliquescent relative humidity of the particulate contamination should be more than 60% RH.<sup>4</sup></li> <li>• Data centers must be free of zinc whiskers.<sup>5</sup></li> </ul>
<p><sup>1</sup> ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p><sup>2</sup> 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<sub>2</sub>S and Cu<sub>2</sub>O grow in equal proportions.</p> <p><sup>3</sup> 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<sub>2</sub>S is the only corrosion product.</p> <p><sup>4</sup> The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p><sup>5</sup> Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

## Management options

The XClarity portfolio and other system management offerings described in this section are available to help you manage the servers more conveniently and efficiently.

## Overview

Offerings	Description
Lenovo XClarity Controller	<p>Baseboard management controller. (BMC)</p> <p>Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• CLI application</li> <li>• Web GUI interface</li> <li>• Mobile application</li> <li>• REST API</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html">https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html</a></p>
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• GUI application</li> <li>• Mobile application</li> <li>• Web interface</li> <li>• REST API</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html">http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html</a></p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• <b>OneCLI</b>: CLI application</li> <li>• <b>Bootable Media Creator</b>: CLI application, GUI application</li> <li>• <b>UpdateXpress</b>: GUI application</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="http://sysmgt.lenovofiles.com/help/topic/xclarity_essentials/overview.html">http://sysmgt.lenovofiles.com/help/topic/xclarity_essentials/overview.html</a></p>

Offerings	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based GUI tool on a single server that can simplify management tasks.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• Web interface (BMC remote access)</li> <li>• GUI application</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html">https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html</a></p> <p><b>Important:</b> Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to <a href="https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html">https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html</a>.</p>
Lenovo XClarity Integrator	<p>Series of applications that 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.</p> <p><b>Interface</b></p> <p>GUI application</p> <p><b>Usage and downloads</b></p> <p><a href="https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html">https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html</a></p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• GUI application</li> <li>• Web Interface</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://datacentersupport.lenovo.com/solutions/Invo-lxem">https://datacentersupport.lenovo.com/solutions/Invo-lxem</a></p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• GUI application</li> <li>• Web Interface</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://datacentersupport.lenovo.com/solutions/Invo-lcp">https://datacentersupport.lenovo.com/solutions/Invo-lcp</a></p>

## Functions supported by Lenovo XClarity portfolio and other offerings

Offerings		Functions							
		Multi-system mgmt	OS deployment	System configuration	Firmware updates <sup>1</sup>	Events/alert monitoring	Inventory/logs	Power mgmt	Power planning
Lenovo XClarity Controller				√	√ <sup>2</sup>	√	√ <sup>4</sup>		
Lenovo XClarity Administrator		√	√	√	√ <sup>2</sup>	√	√ <sup>4</sup>		
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ <sup>2</sup>	√	√ <sup>4</sup>		
	Bootable Media Creator			√	√ <sup>2</sup>		√ <sup>4</sup>		
	UpdateXpress			√	√ <sup>2</sup>				
Lenovo XClarity Provisioning Manager			√	√	√ <sup>3</sup>		√ <sup>5</sup>		
Lenovo XClarity Integrator		√	√ <sup>6</sup>	√	√	√	√	√ <sup>7</sup>	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√ <sup>8</sup>

### Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware, require the use of supplier tools.
2. 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, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment with the Microsoft System Center Configuration Manager (SCCM) deployment pack.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.



## Chapter 2. Server components

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

### Front view

The front view of the server varies by model. Depending on the model, your server might look slightly different from the illustrations in this topic.

Refer to the following front view for different server models:

- “Server models with four 2.5-inch front drive bays” on page 19
- “Server models with eight 2.5-inch front drive bays” on page 20
- “Server models with ten 2.5-inch front drive bays” on page 21
- “Server models with 16 EDSFF front drives” on page 21
- “Server models with four 3.5-inch front drive bays” on page 22
- “Server models with 2.5-inch front drive bays (backplane-less)” on page 23
- “Server models with 3.5-inch front drive bays (backplane-less)” on page 23
- “Server models with eight 2.5-inch front drive bays (with LCD diagnostics panel)” on page 24
- “Server models with 16 EDSFF front drives (with LCD diagnostics panel)” on page 24

#### Server model with four 2.5-inch drive bays

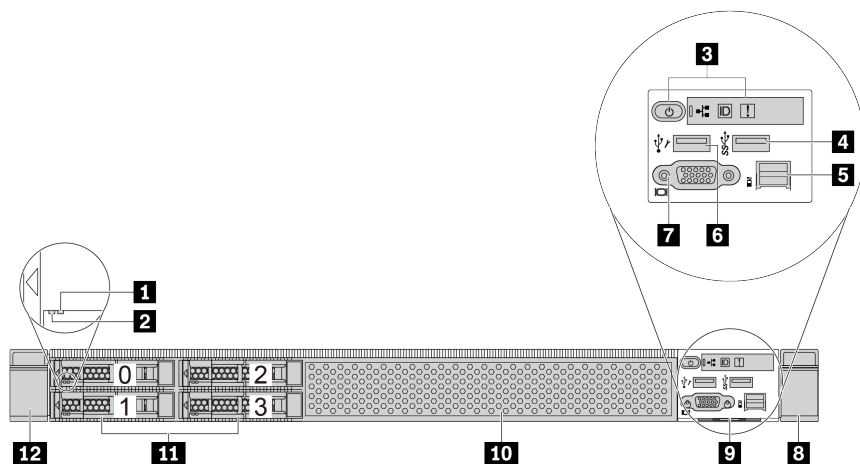


Table 5. Components on the front of the server

Callout	Callout
<b>1</b> Drive status LED	<b>2</b> Drive activity LED
<b>3</b> Diagnostics panel	<b>4</b> USB 3.2 Gen 1 (5Gbps) connector
<b>5</b> External diagnostics connector	<b>6</b> XClarity Controller USB connector
<b>7</b> VGA connector (optional)	<b>8</b> Rack latch (right)

Table 5. Components on the front of the server (continued)

Callout	Callout
<b>9</b> Pull-out information tab	<b>10</b> Drive filler (1)
<b>11</b> Drive bays (4)	<b>12</b> Rack latch (left)

**Note:** For more information about each component, see “Front components overview” on page 25.

**Server model with eight 2.5-inch drive bays**

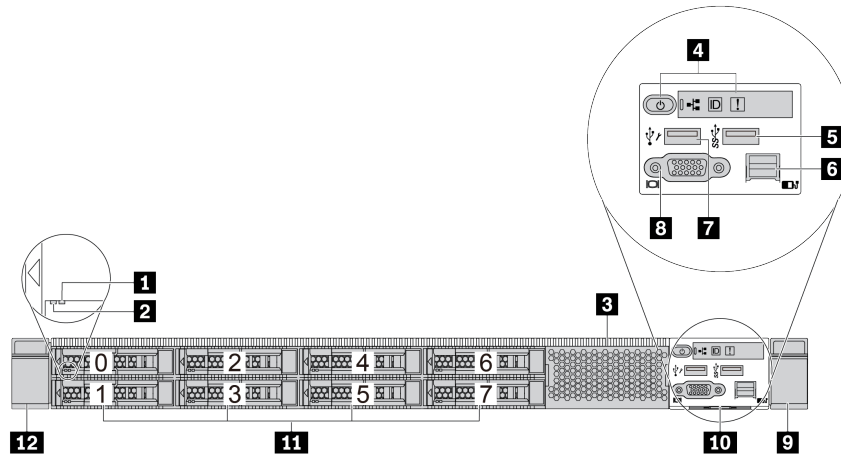


Table 6. Components on the front of the server

Callout	Callout
<b>1</b> Drive status LED	<b>2</b> Drive activity LED
<b>3</b> Drive filler (1)	<b>4</b> Diagnostics panel
<b>5</b> USB 3.2 Gen 1 (5Gbps) connector	<b>6</b> External diagnostics connector
<b>7</b> XClarity Controller USB connector	<b>8</b> VGA connector (optional)
<b>9</b> Rack latch (right)	<b>10</b> Pull-out information tab
<b>11</b> Drive bays (8)	<b>12</b> Rack latch (left)

**Note:** For more information about each component, see “Front components overview” on page 25.



### Server model with ten 2.5-inch drive bays

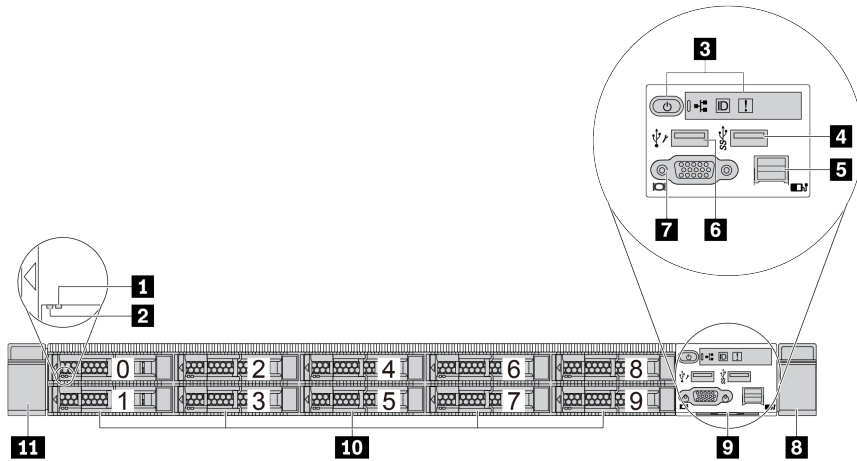


Table 7. Components on the front of the server

Callout	Callout
<b>1</b> Drive status LED	<b>2</b> Drive activity LED
<b>3</b> Diagnostics panel	<b>4</b> USB 3.2 Gen 1 (5Gbps) connector
<b>5</b> External diagnostics connector	<b>6</b> XClarity Controller USB connector
<b>7</b> VGA connector (optional)	<b>8</b> Rack latch (right)
<b>9</b> Pull-out information tab	<b>10</b> Drive bays (10)
<b>11</b> Rack latch (left)	

**Note:** For more information about each component, see “Front components overview” on page 25.

### Server model with 16 EDSFF drives

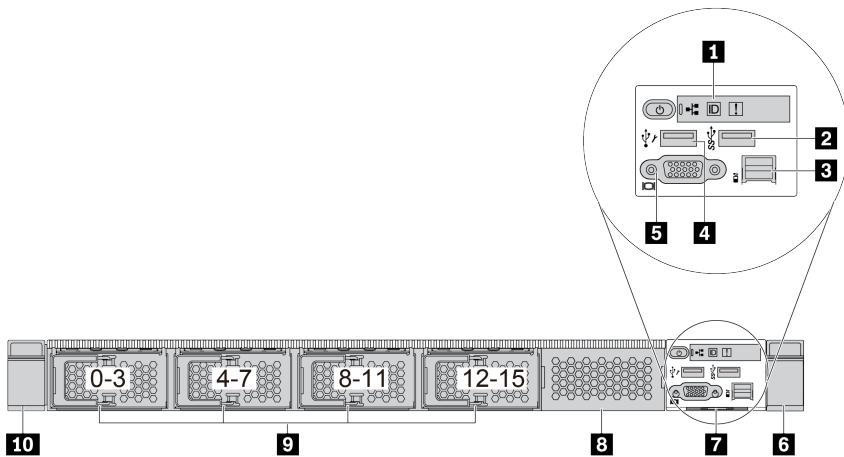


Table 8. Components on the front of the server

Callout	Callout
<b>1</b> Diagnostics panel	<b>2</b> USB 3.2 Gen 1 (5Gbps) connector
<b>3</b> External diagnostics connector	<b>4</b> XClarity Controller USB connector
<b>5</b> VGA connector (optional)	<b>6</b> Rack latch (right)
<b>7</b> Pull-out information tab	<b>8</b> Drive filler (1)
<b>9</b> Drive bays (16)	<b>10</b> Rack latch (left)

**Note:** For more information about each component, see “Front components overview” on page 25.

**Server model with four 3.5-inch drive bays**

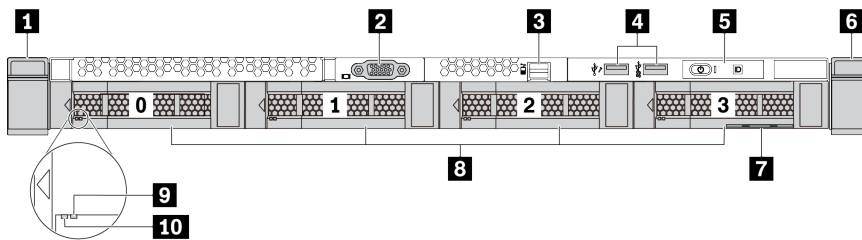


Table 9. Components on the front of the server

Callout	Callout
<b>1</b> Rack latch (left)	<b>2</b> VGA connector (optional)
<b>3</b> External diagnostics connector	<b>4</b> XClarity Controller USB connector and USB 3.2 Gen 1 (5Gbps) connector
<b>5</b> Diagnostics panel	<b>6</b> Rack latch (right)
<b>7</b> Pull-out information tab	<b>8</b> Drive bays (4)
<b>9</b> Drive status LED	<b>10</b> Drive activity LED

**Note:** For more information about each component, see “Front components overview” on page 25.

### Server model with 2.5-inch drive bays (backplane-less)

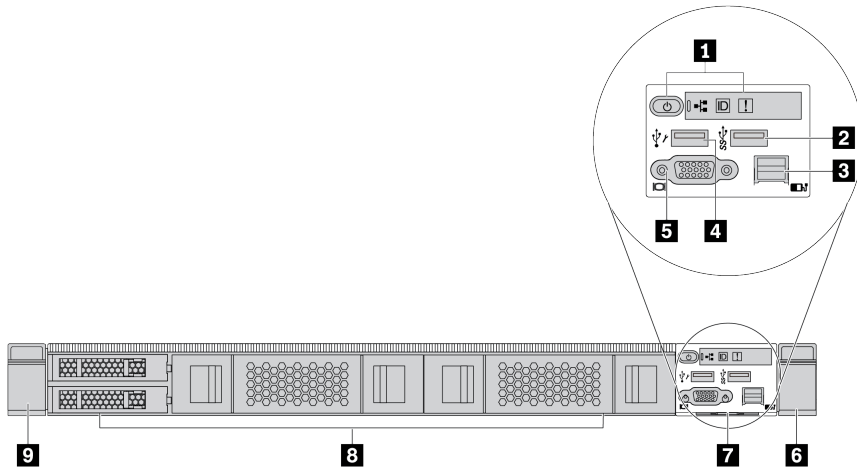


Table 10. Components on the front of the server

Callout	Callout
<b>1</b> Diagnostics panel	<b>2</b> USB 3.2 Gen 1 (5Gbps) connector
<b>3</b> External diagnostics connector (reserved)	<b>4</b> XClarity Controller USB connector
<b>5</b> VGA connector (optional)	<b>6</b> Rack latch (right)
<b>7</b> Pull-out information tab	<b>8</b> Drive fillers (4)
<b>9</b> Rack latch (left)	

**Note:** For more information about each component, see “Front components overview” on page 25.

### Server model with 3.5-inch drive bays (backplane-less)

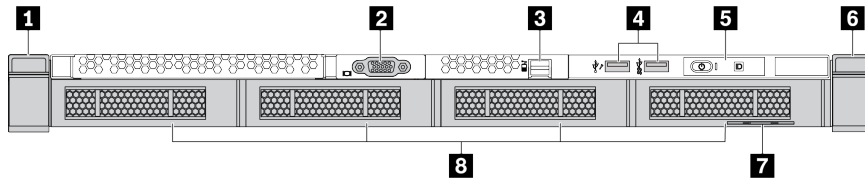


Table 11. Components on the front of the server

Callout	Callout
<b>1</b> Rack latch (left)	<b>2</b> VGA connector (optional)
<b>3</b> External diagnostics connector	<b>4</b> XClarity Controller USB connector and USB 3.2 Gen 1 (5Gbps) connector
<b>5</b> Diagnostics panel	<b>6</b> Rack latch (right)
<b>7</b> Pull-out information tab	<b>8</b> Drive fillers (4)

**Note:** For more information about each component, see “Front components overview” on page 25.

**Server model with eight 2.5-inch drive bays (with LCD diagnostics panel assembly)**

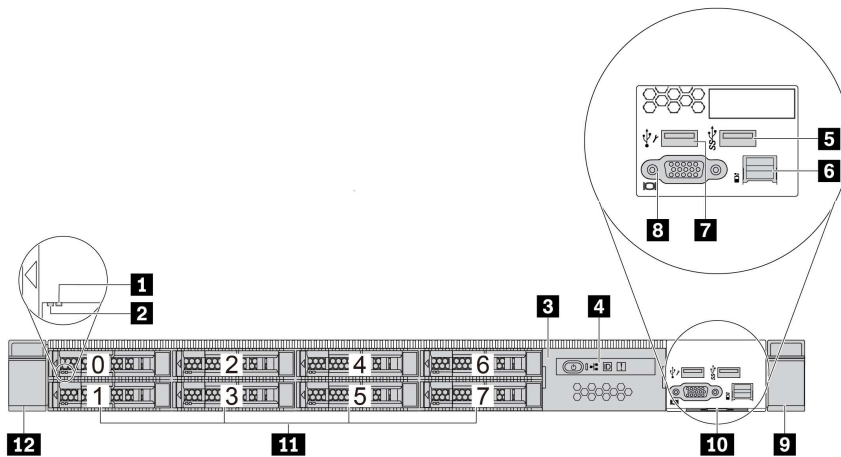


Table 12. Components on the front of the server

Callout	Callout
<b>1</b> Drive status LED	<b>2</b> Drive activity LED
<b>3</b> LCD diagnostics panel assembly	<b>4</b> LCD diagnostics panel
<b>5</b> USB 3.2 Gen 1 (5Gbps) connector	<b>6</b> External diagnostics connector
<b>7</b> XClarity Controller USB connector	<b>8</b> VGA connector (optional)
<b>9</b> Rack latch (right)	<b>10</b> Pull-out information tab
<b>11</b> Drive bays (8)	<b>12</b> Rack latch (left)

**Note:** For more information about each component, see “Front components overview” on page 25.

**Server model with 16 EDSFF drives (with LCD diagnostics panel assembly)**

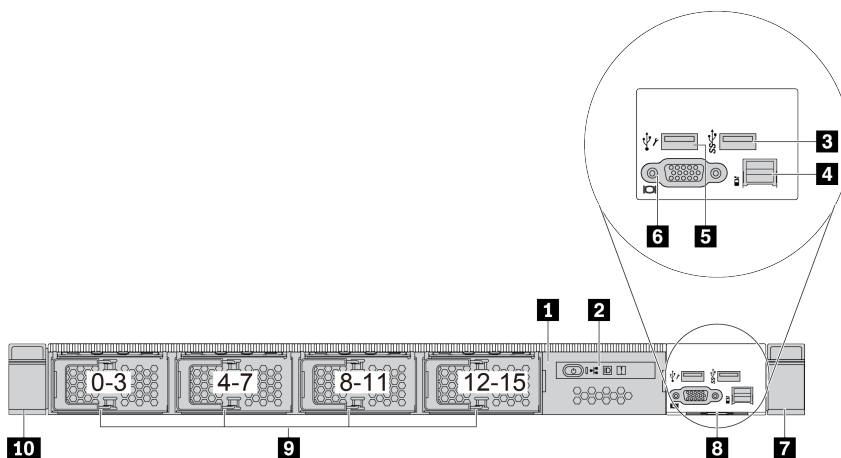


Table 13. Components on the front of the server

Callout	Callout
<b>1</b> LCD diagnostics panel assembly	<b>2</b> LCD diagnostics panel
<b>3</b> USB 3.2 Gen 1 (5Gbps) connector	<b>4</b> External diagnostics connector
<b>5</b> XClarity Controller USB connector	<b>6</b> VGA connector (optional)
<b>7</b> Rack latch (right)	<b>8</b> Pull-out information tab
<b>9</b> Drive bays (16)	<b>10</b> Rack latch (left)

**Note:** For more information about each component, see “Front components overview” on page 25.

## Front components overview

### Diagnostics panel

The diagnostics panel is integrated in front I/O assembly on some models. For information about the controls and status LEDs on the diagnostics panel, see “Diagnostics panel” on page 26.

### Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a Hard disk drive or solid-state drive.

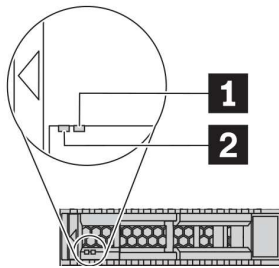


Figure 4. Drive LEDs

Drive LED	Status	Description
<b>1</b> Drive status LED (right)	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.
<b>2</b> Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

### External diagnostics port

The connector is for connecting an external diagnostics handset. For more about its functions, see “External LCD diagnostics handset” on page 33.

## Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. 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. Vacant drive bays must be occupied by drive fillers.

## LCD diagnostics panel assembly

The assembly comes with an integrated LCD diagnostics panel that can be used to quickly obtain system status, firmware levels, network information, and health information about the system. For more about the panel functions, see “LCD diagnostics panel” on page 28.

## Pull-out information tab

The Lenovo XClarity Controller network access label is attached on the pull-out information tab. The default Lenovo XClarity Controller hostname and the IPv6 Link Local Address (LLA) are provided on the tab.

For more information, see “Set the network connection for the Lenovo XClarity Controller” on page 153.

## 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.

## USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 Gen 1 (5Gbps) connectors can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

## VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

## XClarity Controller USB connector

The XClarity Controller USB connector can function as a regular USB 2.0 connector to the host OS. In addition, it can also be used to connect the server to an android or iOS device, where you can then install and launch the Lenovo XClarity Mobile app to manage the system using XClarity Controller.

For details about using the Lenovo XClarity Mobile app, refer to [http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca\\_usemobileapp.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html).

## Diagnostics panel

The diagnostics panel provides controls, connectors, and LEDs.

**Note:** Diagnostics panel with an LCD display is available for some models. For details, see “LCD diagnostics panel” on page 28 and “External LCD diagnostics handset” on page 33.

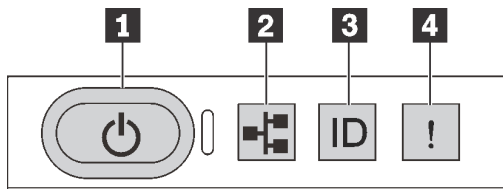


Figure 5. Diagnostics panel

### 1 Power button with power status LED

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

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

### 2 Network activity LED

Compatibility of the NIC adapter and the network activity LED

NIC adapter	Network activity LED
OCP 3.0 Ethernet adapter	Support
PCIe NIC adapter	Not support

When an OCP 3.0 Ethernet adapter is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP 3.0 Ethernet adapter is installed, this LED is off.

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. <b>Note:</b> If the network activity LED is off when an OCP 3.0 Ethernet adapter is installed, check the network ports in the rear of your server to determine which port is disconnected.

### 3 System ID button with system ID LED

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity

Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

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

#### **4 System error LED**

The system error LED helps you to determine if there are any system errors.

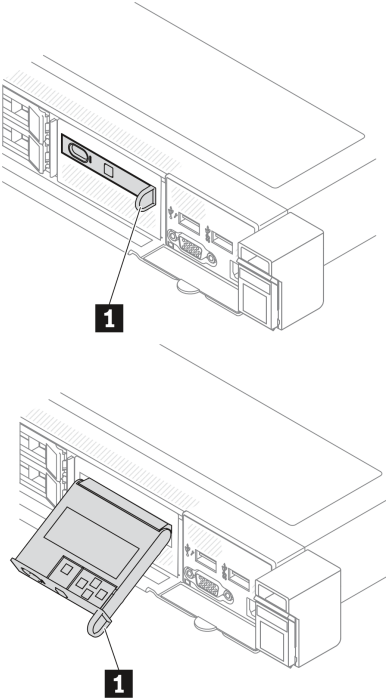
<b>Status</b>	<b>Color</b>	<b>Description</b>	<b>Action</b>
On	Yellow	<p>An error has been detected on the server. Causes might include but are not limited to the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• A hot-swap fan has been removed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	<p>Check the event log to determine the exact cause of the error. Alternatively, follow the light path diagnostics to determine if additional LEDs are lit that will direct you to identify the cause of the error.</p>
Off	None	The server is off or the server is on and is working correctly.	None.

### **LCD diagnostics panel**

The LCD diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

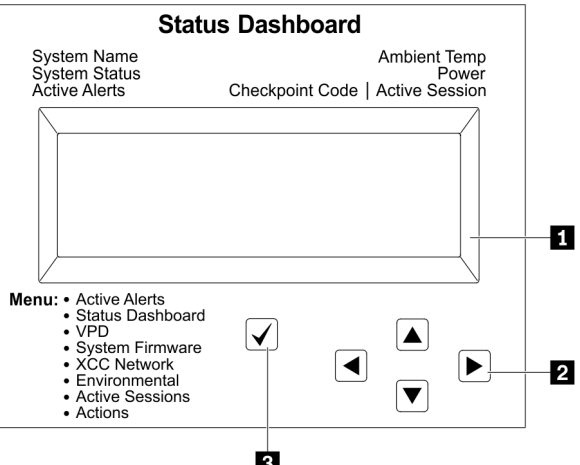


## Location of the LCD diagnostics panel

<p><b>Location</b></p>	<p>The LCD diagnostics panel is attached to the front of the server.</p> 
<p><b>Callout</b></p>	<p><b>1</b> The handle with which the panel can be pulled out from the server.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• The panel can be pushed in or pulled out regardless of the system power status.</li> <li>• When pulling it out, do it gently to avoid damage.</li> </ul>

## Display panel overview

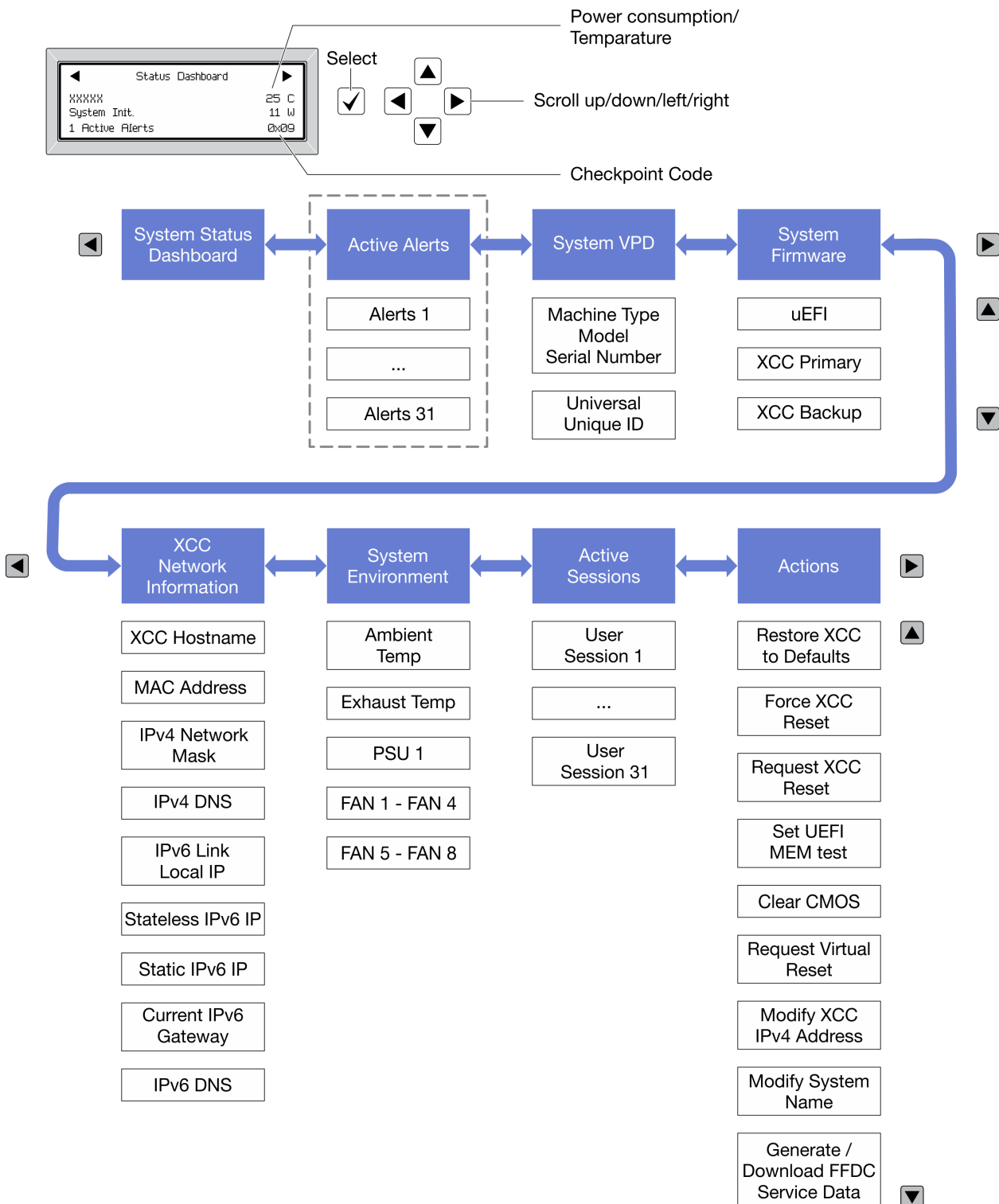
The diagnostics device consists of an LCD display and 5 navigation buttons.

	<p><b>1</b> LCD display</p> <p><b>2</b> Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.</p> <p><b>3</b> Select button Press the select button to select from the options in the menu.</p>
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## Option flow diagram

The LCD diagnostics panel displays various system information. Navigate through the options with the scroll buttons.

The external LCD diagnostics handset displays various system information. Navigate through the options with the scroll buttons.



## Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

### Home Menu (System Status Dashboard)

Home Menu	Example
<ul style="list-style-type: none"> <li>1 System name</li> <li>2 System status</li> <li>3 Active alert quantity</li> <li>4 Temperature</li> <li>5 Power consumption</li> <li>6 Checkpoint code</li> </ul>	<p>The screenshot shows a 'Status Dashboard' menu with the following items: 'xxxxxx', 'System Init.', '1 Active Alerts', '25 C', '11 W', and '0x09'. Numbered callouts point to these items: 1 points to 'xxxxxx', 2 to 'System Init.', 3 to '1 Active Alerts', 4 to '25 C', 5 to '11 W', and 6 to '0x09'.</p>

### Active Alerts

Sub Menu	Example
Home screen: Active error quantity <b>Note:</b> The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> <li>• Error message ID (Type: Error/Warning/Information)</li> <li>• Occurrence time</li> <li>• Possible sources of the error</li> </ul>	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

### System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>• Machine type and serial number</li> <li>• Universal Unique ID (UUID)</li> </ul>	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

## System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

## XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>XCC hostname</li> <li>MAC address</li> <li>IPv4 Network Mask</li> <li>IPv4 DNS</li> <li>IPv6 Link Local IP</li> <li>Stateless IPv6 IP</li> <li>Static IPv6 IP</li> <li>Current IPv6 Gateway</li> <li>IPv6 DNS</li> </ul> <p><b>Note:</b> Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN  MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx  IPv4 Network Mask :x.x.x.x IPv4 Default Gateway : x.x.x.x

## System Environmental Information

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

## Active Sessions

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

## Actions

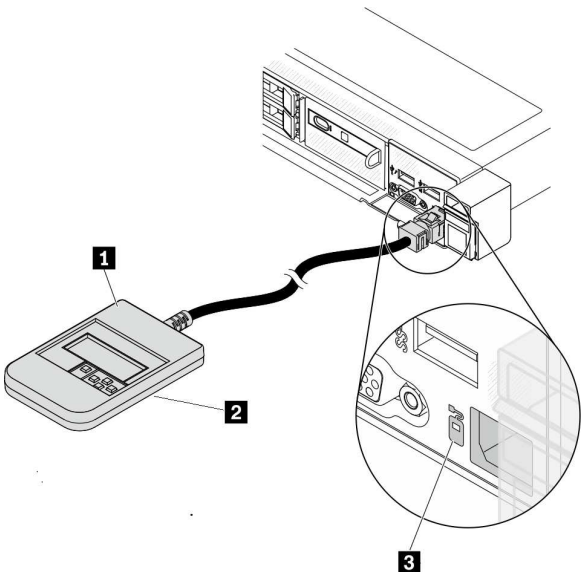
Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none"><li>• Restore XCC to Defaults</li><li>• Force XCC Reset</li><li>• Request XCC Reset</li><li>• Set UEFI Memory Test</li><li>• Clear CMOS</li><li>• Request Virtual Reseat</li><li>• Modify XCC Static IPv4 Address/Net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

## External LCD diagnostics handset

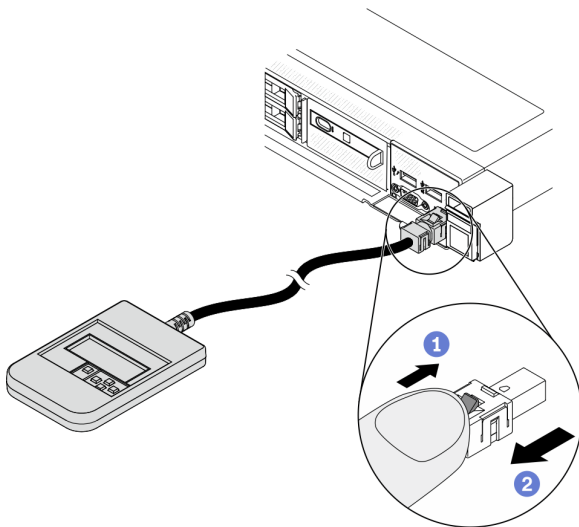
The external LCD diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

**Note:** The external LCD diagnostics handset is an optional part that needs to be purchased separately.

## Location of the external LCD diagnostics handset

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

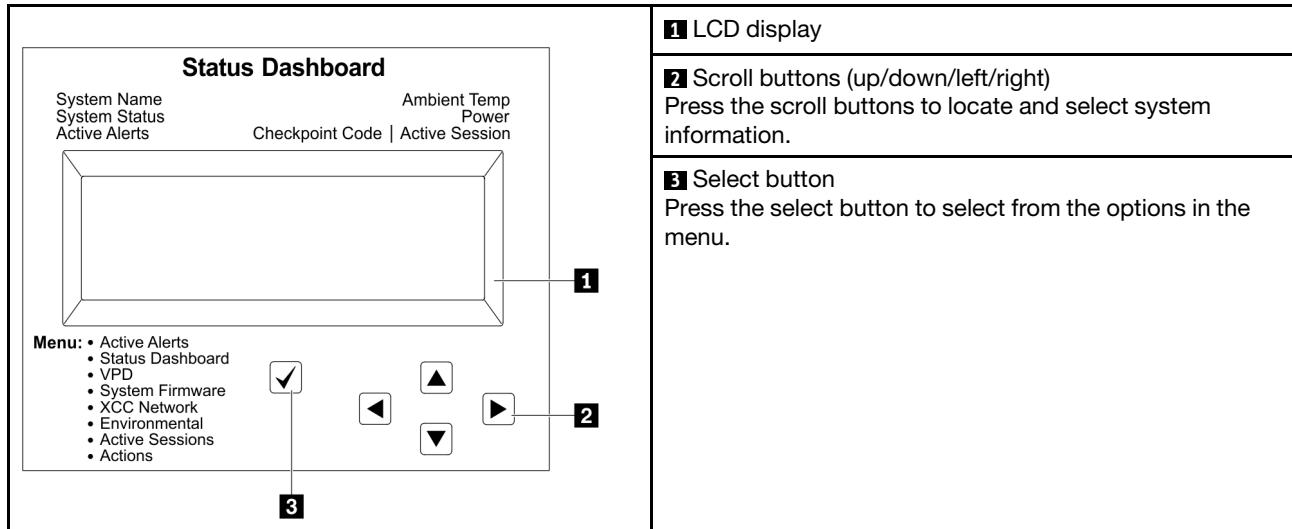
**Note:** When unplugging the external handset, see the following instructions:



- 1** Press the plastic clip on the plug forward.
- 2** Hold the clip and remove the cable from the connector.

### Display panel overview

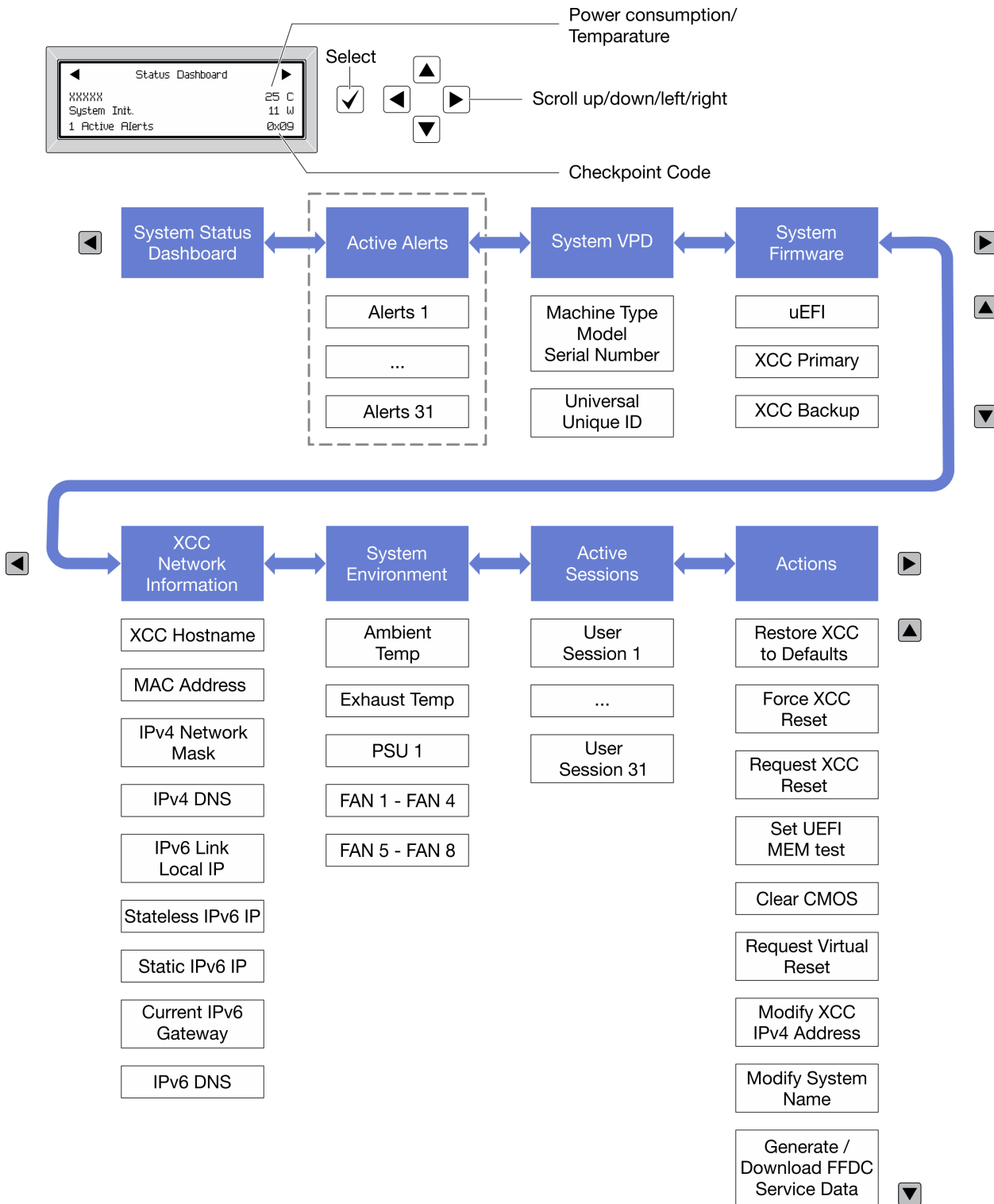
The diagnostics device consists of an LCD display and 5 navigation buttons.



### Option flow diagram

The LCD diagnostics panel displays various system information. Navigate through the options with the scroll buttons.

The external LCD diagnostics handset displays various system information. Navigate through the options with the scroll buttons.



### Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

### Home Menu (System Status Dashboard)



Home Menu	Example
<ul style="list-style-type: none"> <li>1 System name</li> <li>2 System status</li> <li>3 Active alert quantity</li> <li>4 Temperature</li> <li>5 Power consumption</li> <li>6 Checkpoint code</li> </ul>	<p>The screenshot shows a 'Status Dashboard' with the following information: <ul style="list-style-type: none"> <li>1: System name (xxxxxx)</li> <li>2: System status (System Init.)</li> <li>3: Active alert quantity (1 Active Alerts)</li> <li>4: Temperature (25 C)</li> <li>5: Power consumption (11 W)</li> <li>6: Checkpoint code (0x09)</li> </ul> </p>

### Active Alerts

Sub Menu	Example
Home screen: Active error quantity <b>Note:</b> The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> <li>• Error message ID (Type: Error/Warning/Information)</li> <li>• Occurrence time</li> <li>• Possible sources of the error</li> </ul>	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

### System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>• Machine type and serial number</li> <li>• Universal Unique ID (UUID)</li> </ul>	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xx

## System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

## XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>XCC hostname</li> <li>MAC address</li> <li>IPv4 Network Mask</li> <li>IPv4 DNS</li> <li>IPv6 Link Local IP</li> <li>Stateless IPv6 IP</li> <li>Static IPv6 IP</li> <li>Current IPv6 Gateway</li> <li>IPv6 DNS</li> </ul> <p><b>Note:</b> Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN  MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx  IPv4 Network Mask :x.x.x.x IPv4 Default Gateway : x.x.x.x

## System Environmental Information

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

## Active Sessions

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

## Actions

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

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## Rear view

The rear view of the server varies by model. Depending on the model, your server might look slightly different from the illustrations in this topic.

Refer to the following rear view for different server models:

- “Server model with three PCIe slots” on page 39
- “Server model with two PCIe slots” on page 40
- “Server model with two hot-swap 2.5-inch rear drive bays and one PCIe slot” on page 40
- “Server model with two hot-swap 7mm rear drive bays and two PCIe slots” on page 41

### Server model with three PCIe slots

The following illustration shows the rear view of server model with three PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

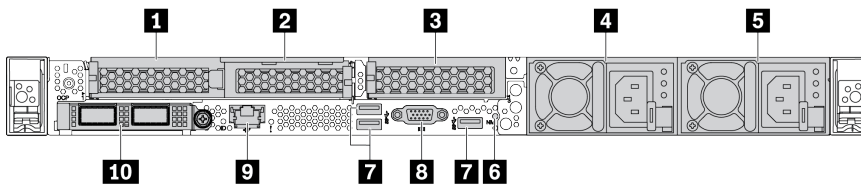


Table 14. Components on the rear of the server

Callout	Callout
<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> PCIe slot 2 on riser 1 assembly
<b>3</b> PCIe slot 3 on riser 2 assembly	<b>4</b> Power supply 2 (optional)
<b>5</b> Power supply 1	<b>6</b> NMI button
<b>7</b> USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	<b>8</b> VGA connector
<b>9</b> XClarity Controller network connector	<b>10</b> Ethernet connectors on OCP 3.0 Ethernet adapter (optional)

**Note:** For more information about each component, see “Rear components overview” on page 41.

### Server model with two PCIe slots

The following illustration shows the rear view of the server model with two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

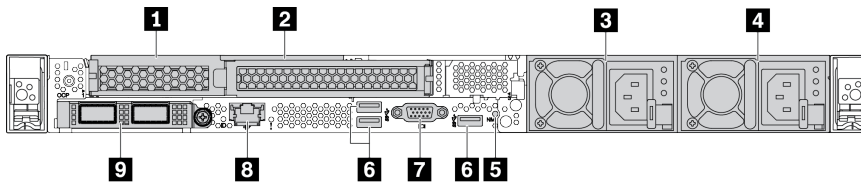


Table 15. Components on the rear of the server

Callout	Callout
<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> PCIe slot 2 on riser 1 assembly
<b>3</b> Power supply 2 (optional)	<b>4</b> Power supply 1
<b>5</b> NMI button	<b>6</b> USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
<b>7</b> VGA connector	<b>8</b> XClarity Controller network connector
<b>9</b> Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

**Note:** For more information about each component, see “Rear components overview” on page 41.

### Server model with two 2.5-inch hot-swap rear drive bays and one PCIe slot

The following illustration shows the rear view of the server model with two hot-swap drive bays and one PCIe slot. Depending on the model, your server might look slightly different from the illustration below.

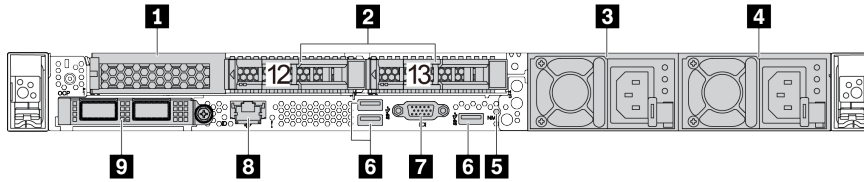


Table 16. Components on the rear of the server

<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> Rear 2.5-inch drive bays (2)
<b>3</b> Power supply 2 (optional)	<b>4</b> Power supply 1
<b>5</b> NMI button	<b>6</b> USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
<b>7</b> VGA connector	<b>8</b> XClarity Controller network connector
<b>9</b> Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

**Note:** For more information about each component, see “Rear components overview” on page 41.

### Server model with two 7mm hot-swap rear drive bays and two PCIe slots

The following illustration shows the rear view of the server model with two 7mm hot-swap rear drive bays and two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

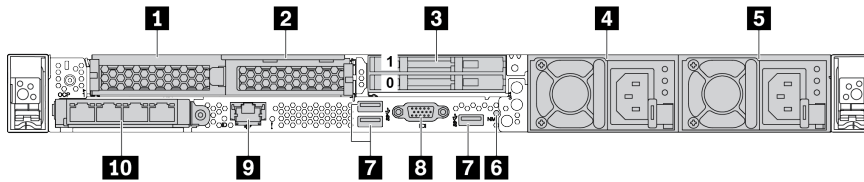


Table 17. Components on the rear of the server

<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> PCIe slot 2 on riser 1 assembly
<b>3</b> Rear 7mm drive bays (2)	<b>4</b> Power supply 2 (optional)
<b>5</b> Power supply 1	<b>6</b> NMI button
<b>7</b> USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	<b>8</b> VGA connector
<b>9</b> XClarity Controller network connector	<b>10</b> Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

**Note:** For more information about each component, see “Rear components overview” on page 41.

## Rear components overview

### Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a Hard disk drive or solid-state drive.

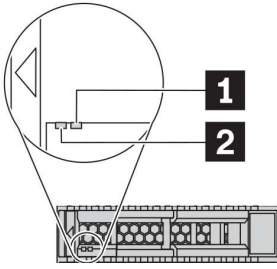


Figure 6. Drive LEDs

Drive LED	Status	Description
1 Drive status LED (right)	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.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

## Ethernet connectors



Figure 7. OCP 3.0 Ethernet adapter (two connectors, seen from the rear)

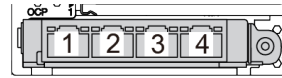


Figure 8. OCP 3.0 Ethernet adapter (four connectors, seen from the rear)

The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections.

By default, Ethernet connector 1 (the first port starting from the left in the rear server view) on the OCP 3.0 Ethernet adapter can also function as a management connector using the shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

## Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. 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. Vacant drive bays must be occupied by drive fillers.

## NMI button

Press this button to force a nonmaskable interrupt (NMI) to the processor. By this way, you can make the operating system halt (such as Windows Blue Screen of Death) and take a memory dump. You might have to use a pen or the end of a straightened paper clip to press the button.

## PCIe slots

The PCIe slots are on the rear of the server and your server supports up to three PCIe slots on riser 1 and 2 assemblies.

## Power supply units

The hot-swap redundant power supply helps 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 LEDs, see “Rear view LEDs” on page 43.

## USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 Gen 1 (5Gbps) connectors are direct connect interfaces (DCIs) for debugging, which can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

## VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

## XClarity Controller network connector

The XClarity Controller network connector can be used to attach an Ethernet cable to manage the baseboard management controller (BMC).

## Rear view LEDs

The rear of the server provides system ID LED, system error LED, Ethernet LEDs, and power supply LEDs.

### Server rear view LEDs

The following illustration shows the LEDs on the rear view of server model with two PCIe slots. The LEDs on the rear view of other server models are the same.

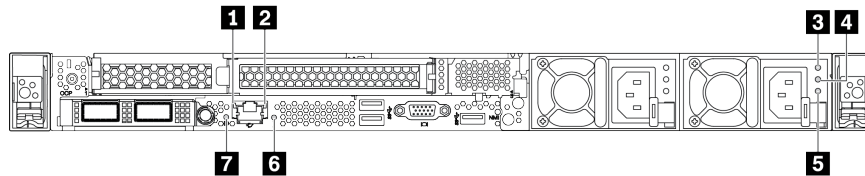


Figure 9. Rear view LEDs

Table 18. LEDs on the rear view of the server

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

### **1** Ethernet link LED **2** Ethernet activity LED

The BMC network connector has two status LEDs.

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

### 3 4 5 Power supply LEDs

Each hot-swap power supply has three status LEDs.

LED	Description
3 Power input LED	<ul style="list-style-type: none"> <li>Green: The power supply is connected to the ac power source.</li> <li>Off: The power supply is disconnected from the ac power source or a power problem occurs.</li> </ul>
4 Power output LED	<ul style="list-style-type: none"> <li>Green: The server is on and the power supply is working normally.</li> <li>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.</li> </ul> <p>To disable zero-output mode, log in to the Lenovo XClarity Controller web interface, choose <b>Server Configuration</b> → <b>Power Policy</b>, disable <b>Zero Output Mode</b>, and then click <b>Apply</b>. If you disable the zero-out mode, both power supplies will be in the active state.</p> <ul style="list-style-type: none"> <li>Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the LED is off, replace the power supply.</li> </ul>
5 Power supply error LED	<ul style="list-style-type: none"> <li>Yellow: The power supply has failed. To resolve the issue, replace the power supply.</li> <li>Off: The power supply is working normally.</li> </ul>

### 6 System error LED

The system error LED helps you to determine if there are any system errors. For details, see “Diagnostics panel” on page 26.

### 7 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.

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## System board components

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



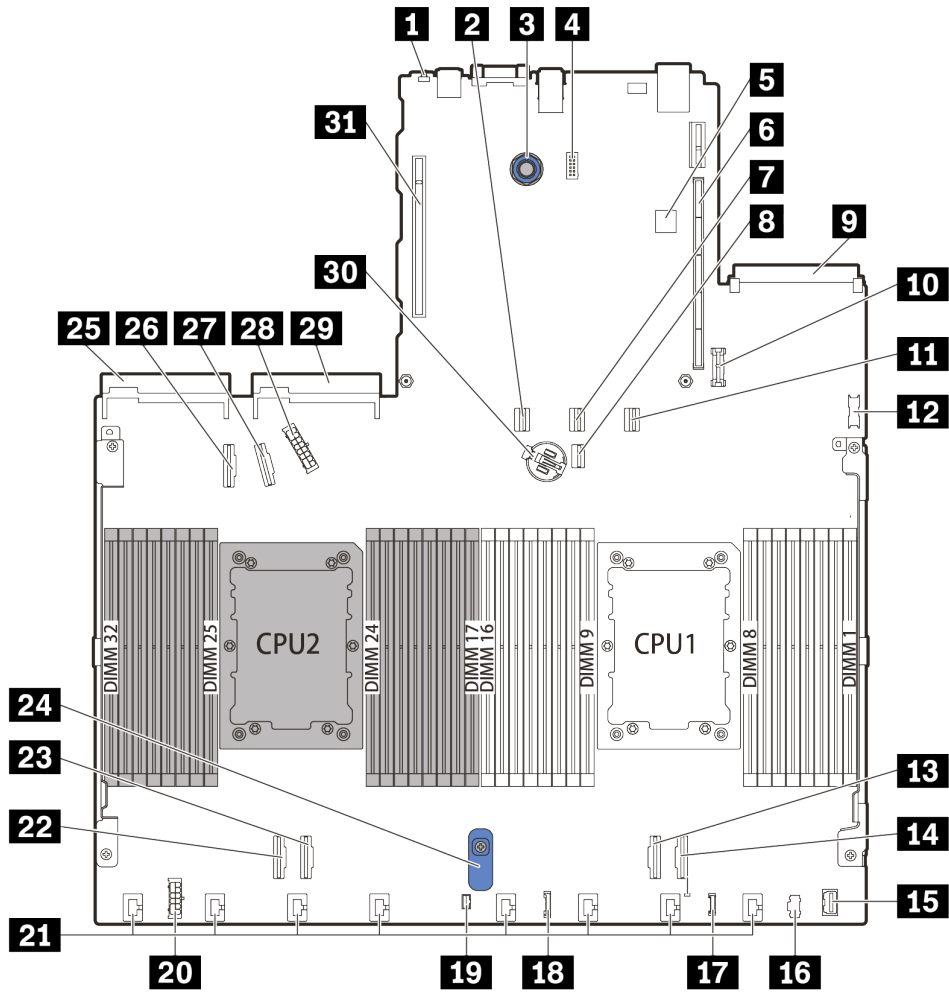


Figure 10. System board components

<b>1</b> NMI Button	<b>21</b> Fan 1-8 Connectors
<b>2</b> SATA Connector 0	<b>22</b> PCIe Connector 3
<b>3</b> System Board Release Pin	<b>23</b> PCIe Connector 4
<b>4</b> Serial Port Module Connector	<b>24</b> System Board Lift Handle
<b>5</b> Internal USB Connector	<b>25</b> Power Supply 1 Connector
<b>6</b> Riser 1 Slot	<b>26</b> PCIe Connector 5
<b>7</b> SATA Connector 1	
<b>8</b> 7mm/M.2 Signal Connector	
<b>9</b> OCP 3.0 Network Card Connector	
<b>10</b> TPM Module Connector	
<b>11</b> SATA 2/Rear Backplane Signal Connector	
<b>12</b> Front USB Connector	
<b>13</b> PCIe Connector 1	
<b>14</b> PCIe Connector 2	
<b>15</b> Front VGA Connector	
<b>16</b> M.2 Power Connector	
<b>17</b> External LCD Connector	
<b>18</b> Front Panel Connector	
<b>19</b> Intrusion Switch Connector	
<b>20</b> Internal RAID Power Connector	

<b>27</b> PCIe Connector 6	<b>28</b> Front Backplane Power Connector
<b>29</b> Power Supply 2 Connector	<b>30</b> 3V Battery (CR2032)
<b>31</b> Riser 2 slot	

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## 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 11 “Server components” on page 47:

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/parts>

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

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

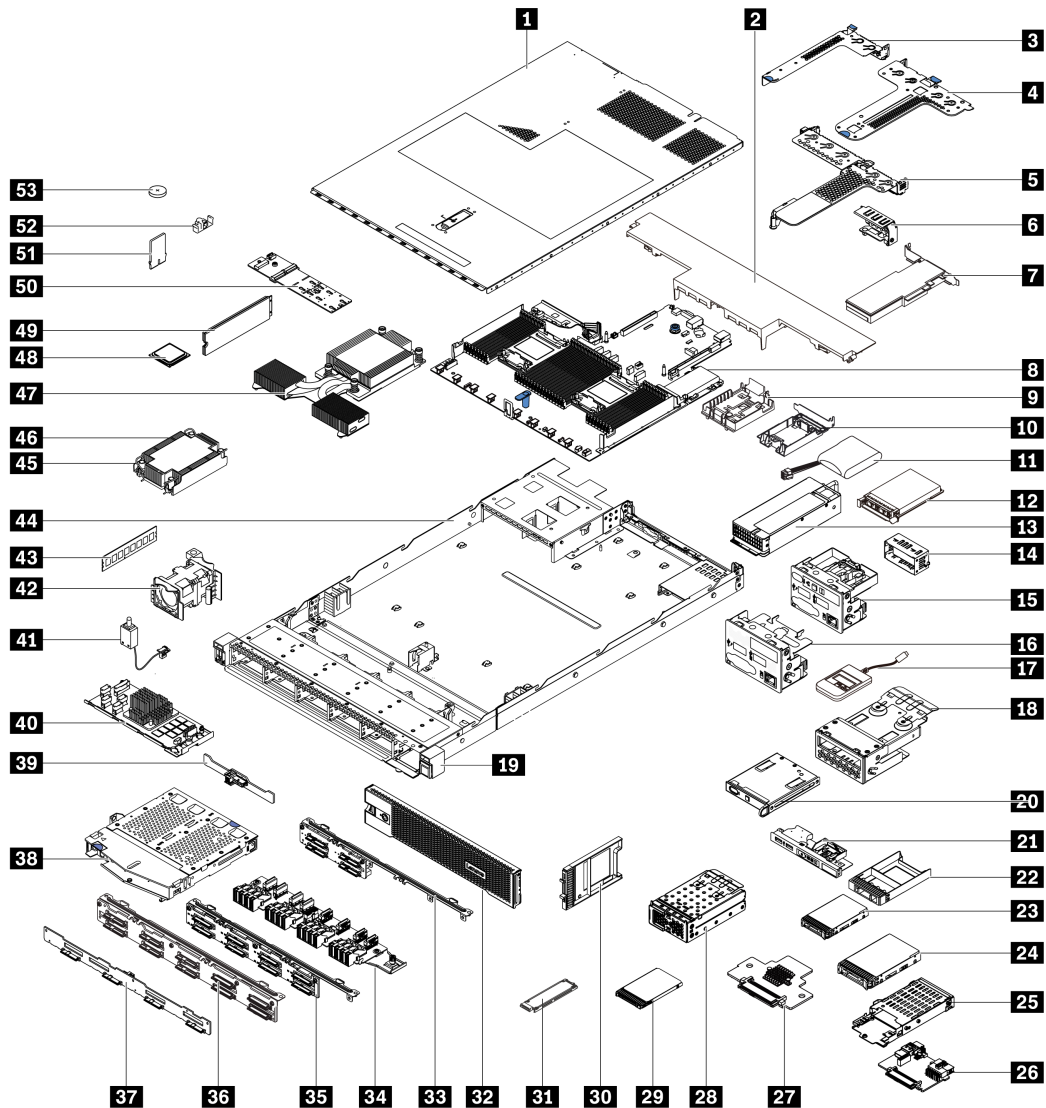


Figure 11. Server components

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 is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

**Note:** Unless otherwise specified in other agreements or contract terms, parts beyond their warranty terms and/or parts that have reached their maximum usage limitations do not qualify for warranty service.

Table 19. 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 11 “Server components” on page 47: <a href="https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/parts">https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/parts</a>					
<b>1</b>	Top cover	√			
<b>2</b>	Standard air baffle	√			
<b>3</b>	Riser assembly (LP)	√			
<b>4</b>	Riser assembly (LP+LP)	√			
<b>5</b>	Riser assembly (LP+FH)	√			
<b>6</b>	Rearwall bracket				√
<b>7</b>	PCIe adapter	√			
<b>8</b>	System board			√	
<b>9</b>	RAID super capacitor holder (on chassis)				√
<b>10</b>	RAID super capacitor holder (in riser cage)				√
<b>11</b>	RAID super capacitor	√			
<b>12</b>	OCP 3.0 Ethernet adapter	√			
<b>13</b>	Power supply unit	√			
<b>14</b>	Power supply unit filler				√
<b>15</b>	Front I/O assembly with diagnostics panel (right)	√			
<b>16</b>	Front I/O assembly	√			
<b>17</b>	External LCD diagnostics handset	√			
<b>18</b>	LCD diagnostics panel assembly	√			
<b>19</b>	EIA (right)				√
<b>20</b>	LCD diagnostics panel	√			
<b>21</b>	Front I/O assembly with diagnostics panel (top)	√			
<b>22</b>	2.5-in drive bay filler				√
<b>23</b>	2.5-inch drive	√			
<b>24</b>	3.5-inch drive	√			
<b>25</b>	7mm drive cage	√			
<b>26</b>	7mm drive backplane (bottom)		√		
<b>27</b>	7mm drive backplane (top)		√		

Table 19. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
28	4-EDSFF cage	√			
29	7mm drive	√			
30	7mm drive bay filler				√
31	EDSFF drive	√			
32	Security bezel	√			
33	4 x 2.5-inch front drive backplane	√			
34	16-EDSFF front drive backplane	√			
35	8 x 2.5-inch front drive backplane	√			
36	10 x 2.5-inch front drive backplane		√		
37	4 x 3.5-inch front drive backplane	√			
38	2 x 2.5-inch rear drive cage	√			
39	2 x 2.5-inch rear drive backplane	√			
40	Internal RAID module		√		
41	Intrusion switch cable	√			
42	Fan module	√			
43	Memory module	√			
44	Chassis			√	
45	Heat sink PEEK nut		√		
46	Standard heat sink			√	
47	Performance heat sink (T-shape)			√	
48	Processor			√	
49	M.2 drive	√			
50	M.2 backplane	√			
51	TPM adapter (for Chinese Mainland only)			√	
52	M.2 retainer clip	√			
53	CMOS battery (CR2032)				√

## Power cords

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

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

1. Go to: <http://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 of 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 of 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.

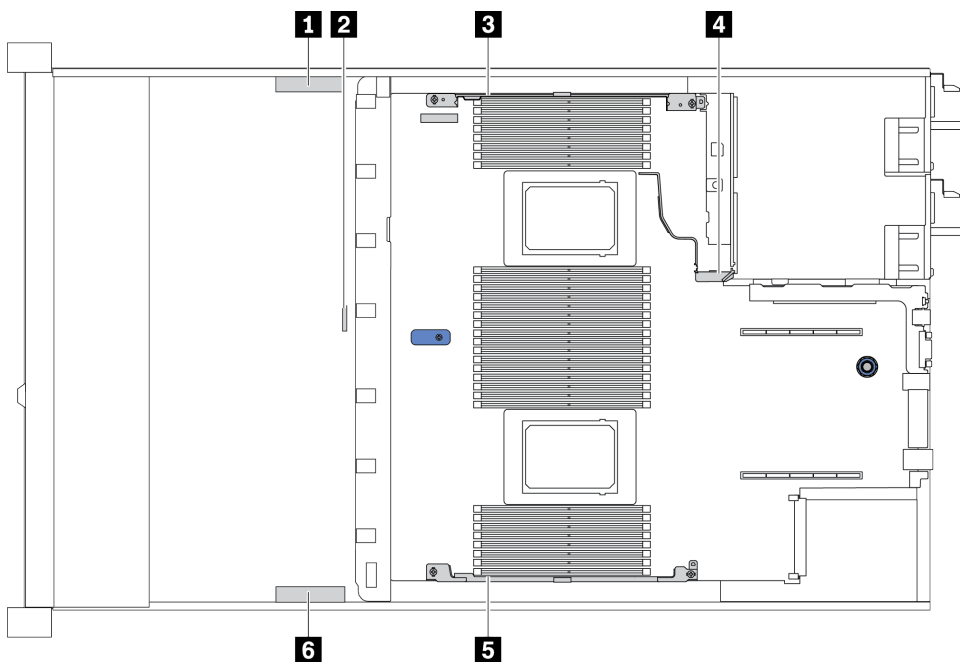
## Chapter 3. Internal cable routing

Some of the components in the server have internal cables and cable connectors. For details, see the following cable routing sections:

- [“CFF HBA/RAID adapter” on page 53](#)
- [“Front I/O” on page 54](#)
- [“Intrusion switch” on page 55](#)
- [“RAID flash power modules” on page 56](#)
- [“M.2 drive backplane” on page 58](#)
- [“16-EDSFF drive backplane” on page 59](#)
- [“7mm drive backplane” on page 60](#)
- [“2.5-inch/3.5-inch drive backplane \(power\)” on page 61](#)
- [“2.5-inch/3.5-inch drive backplane \(signal\)” on page 62](#)

Read the following guidelines carefully before you connect any cables:

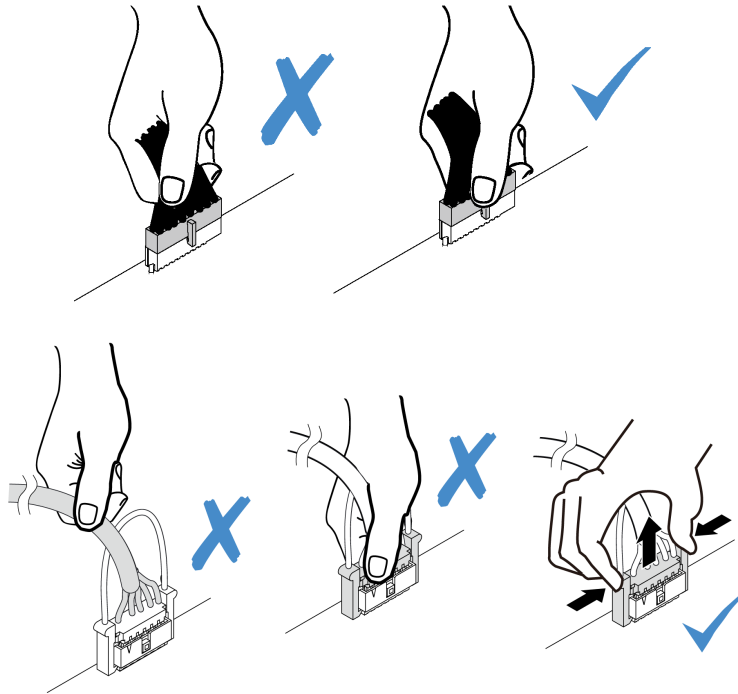
- Power off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are 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.



Cable holder	Route
<b>1 3 4</b>	Route to BP Pwr connector, RAID Pwr connector, and PCIe connectors (3, 4, 5, 6)

<b>2</b>	Route to intrusion switch cable
<b>5 6</b>	Route to FIO connector, LCD external connector, M.2 Pwr connector, VGA connector, Front USB connector, PCIe connectors (1, 2, 7, 8), 7mm/M.2 connector, SATA connectors (0, 1, 2), and RAID/HBA connectors

**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.



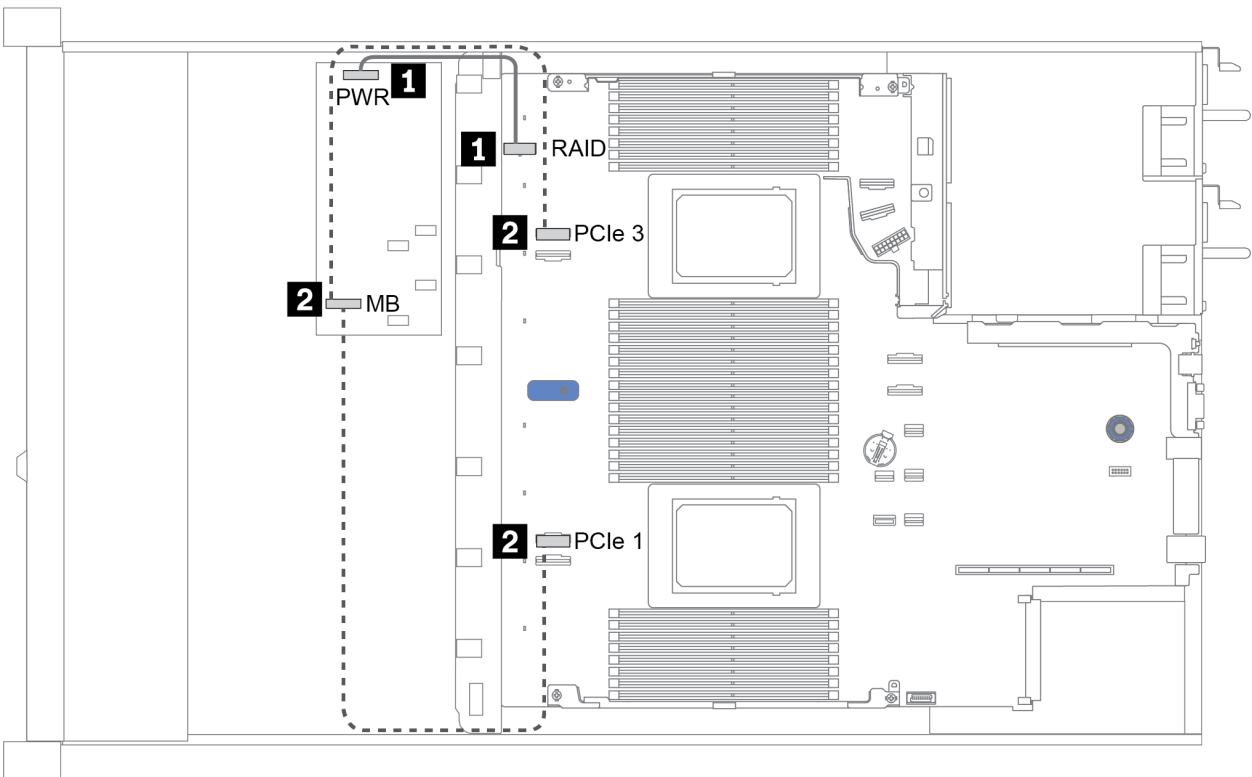


## CFF HBA/RAID adapter

Use the section to understand the power cable and input cable routing for CFF HBA/RAID adapter.

### Power cable routing for CFF HBA/RAID adapters

**Note:** The illustration only involves power cable and input cable routing. For signal cable routing of CFF HBA/RAID adapters, see “2.5-inch/3.5-inch drive backplane (signal)” on page 62



From	To
<b>1</b> Power connector on the CFF HBA/RAID adapter	Internal RAID connector on the system board
<b>2</b> Input connector on the CFF HBA/RAID adapter	PCle 1 (for server model with 8 x 2.5-inch front drive bays) or PCle 3 (for server model with 10 x 2.5-inch front drive bays)

## Front I/O

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

### Cable routing for Front I/O

**Note:** The illustration shows the cabling scenario for server models with four 3.5-inch front drive bays. Location of each connector on the front of the server varies by models. For detailed location of front I/O components for different models, see “Front view” on page 19.

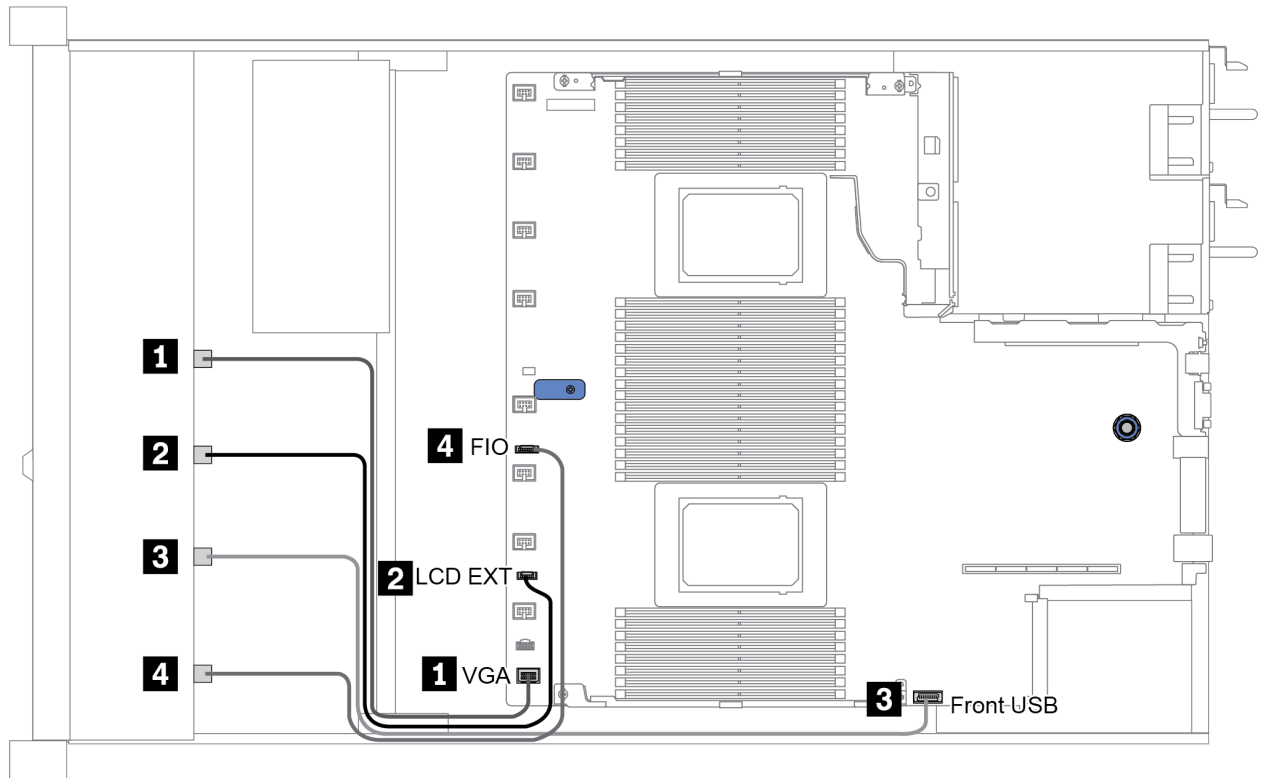


Figure 12. Cable routing for Front I/O

From	To
<b>1</b> VGA cable	VGA connector on the system board
<b>2</b> LCD external diagnostics handset cable	LCD EXT connector on the system board
<b>3</b> USB cable	Front USB connector on the system board
<b>4</b> Front diagnostic panel cable	FIO connector on the system board

## Intrusion switch

Use the section to understand the cable routing for the intrusion switch.

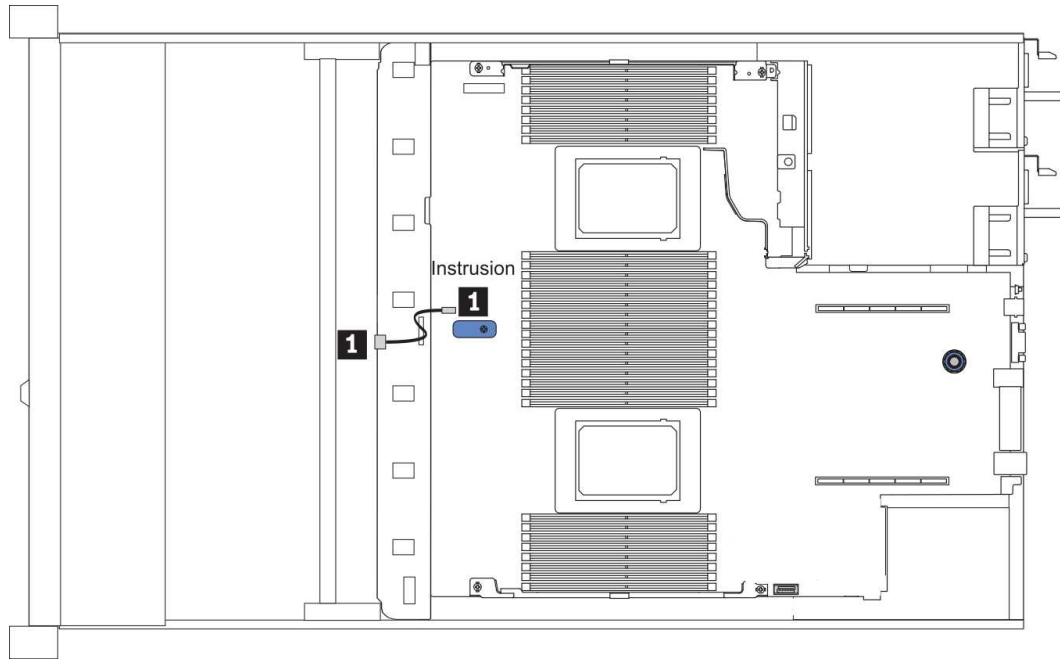


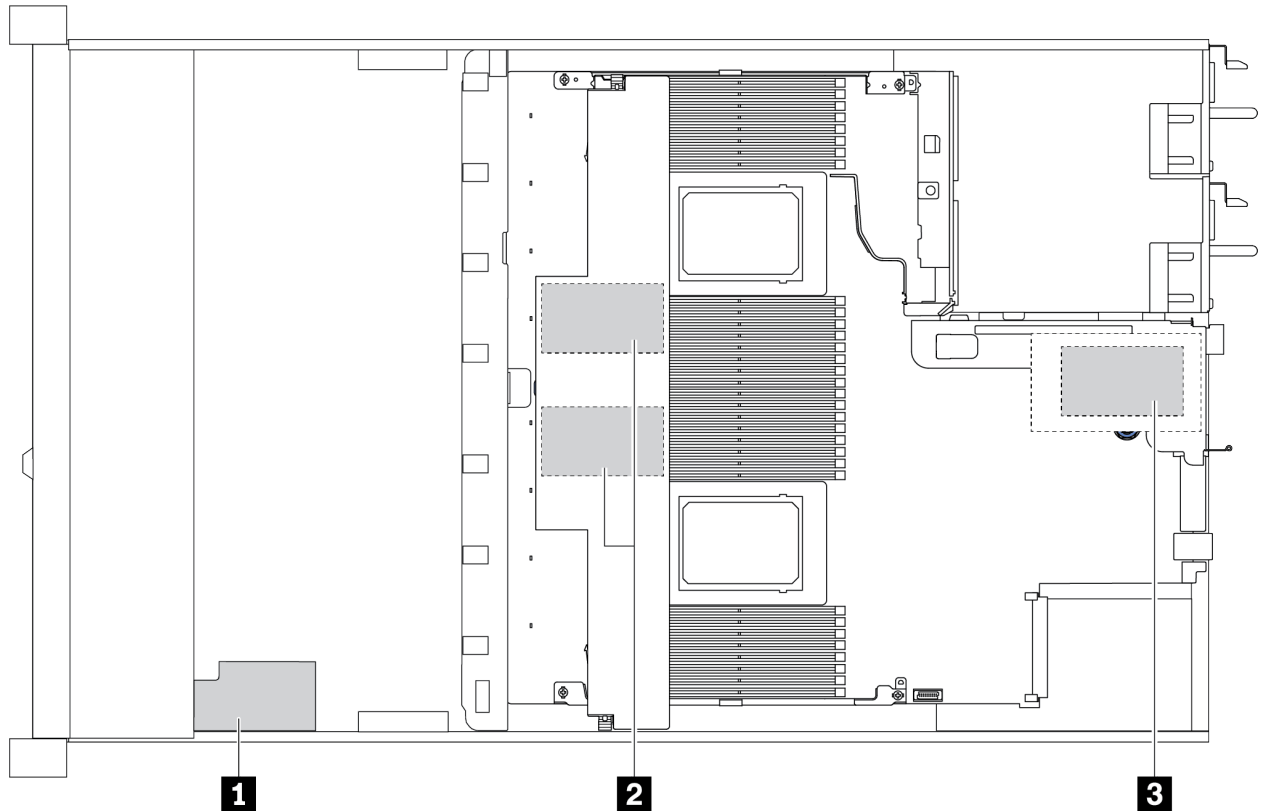
Figure 13. Intrusion switch cable routing

From	To
<b>1</b> Intrusion switch cable on the fan cage	Intrusion switch connector on the system board

## RAID flash power modules

Use the section to understand the cable routing for RAID flash power modules.

### RAID flash power module locations



No.	Location	Scenario
<b>1</b>	Super capacitor on the chassis	2.5" chassis installed with a standard or performance heat sink
<b>2</b>	Super capacitors in the air baffle	2.5" or 3.5" chassis installed with a standard heat sink
<b>3</b>	Super capacitors in the riser 1 slot	3.5" chassis installed with a performance heat sink

An extension cable is provided for each RAID flash power module for connection. Connect the super capacitor cable to the super capacitor connector on the corresponding RAID adapter as shown.

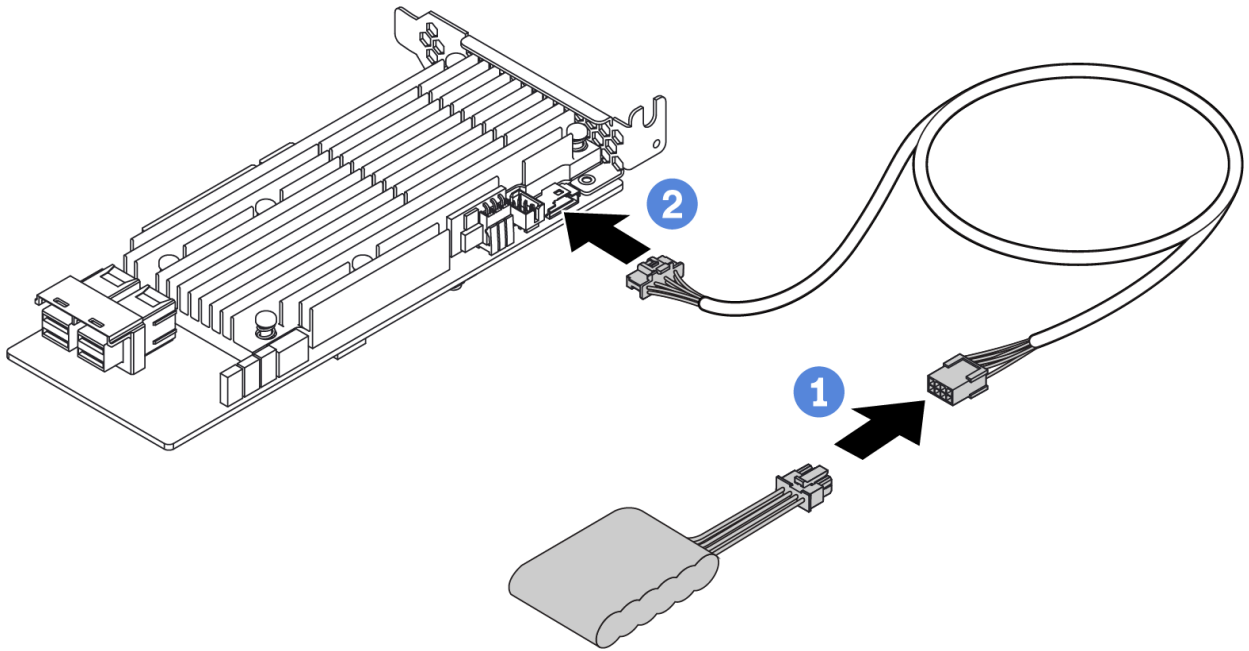


Figure 14. Power cable routing for super capacitor

From	To
RAID flash power module	Super capacitor connector on the RAID adapter

## M.2 drive backplane

This section provides cable routing information for the M.2 drives.

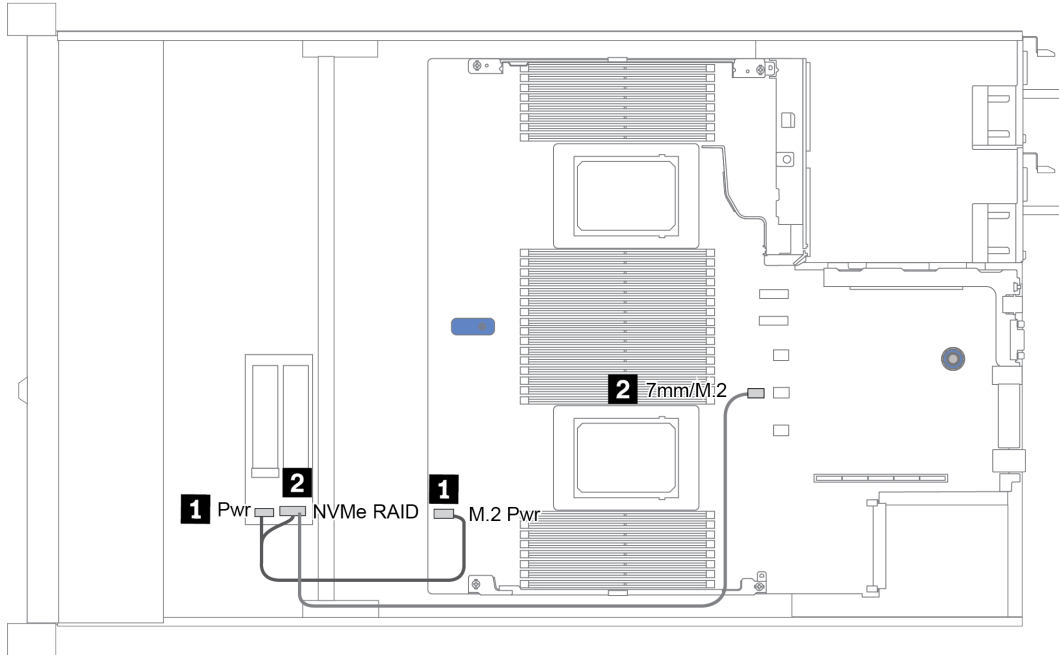


Figure 15. Cable routing for M.2 drives

From	To
<b>1</b> Power cable	M.2 power connector on the system board
<b>2</b> M.2 signal cable	7mm/M.2 signal connector on the system board

## 16-EDSFF drive backplane

This section provides cable routing information for the EDSFF drives.

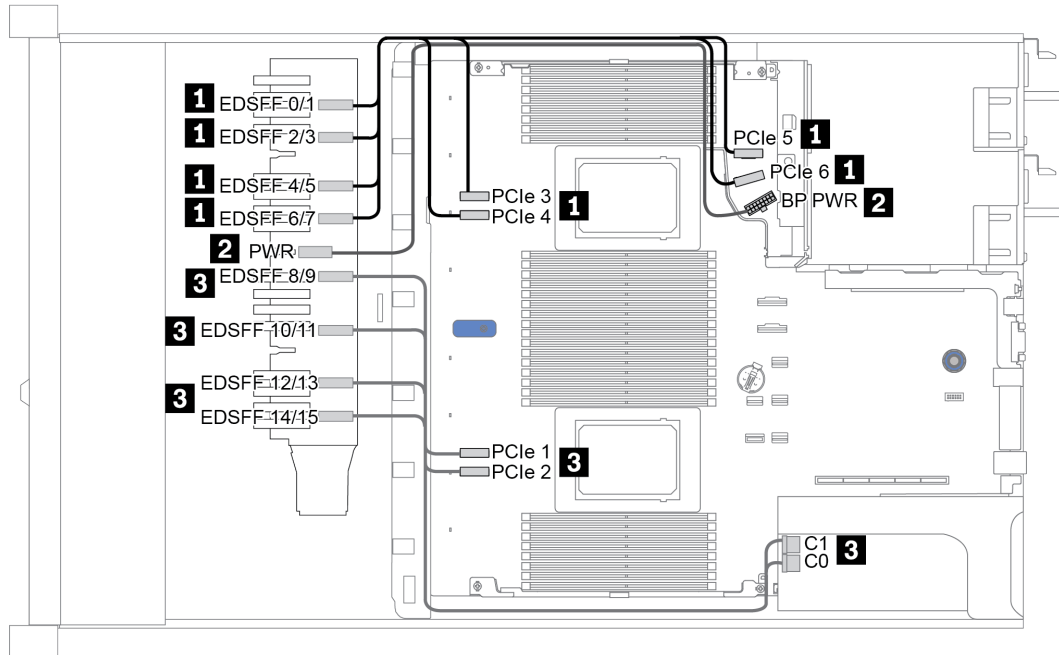


Figure 16. Cable routing for EDSFF drives

From	To
<b>1</b> EDSFF 0/1	PCIe 6
<b>1</b> EDSFF 2/3	PCIe 5
<b>1</b> EDSFF 4/5	PCIe 4
<b>1</b> EDSFF 6/7	PCIe 3
<b>2</b> Power connector on the drive backplane	Front backplane power connector on the system board
<b>3</b> EDSFF 8/9	C1 on the retimer card
<b>3</b> EDSFF 10/11	C0 on the retimer card
<b>3</b> EDSFF 12/13	PCIe 2
<b>3</b> EDSFF 14/15	PCIe 1

## 7mm drive backplane

This section provides cable routing information for the 7mm drives.

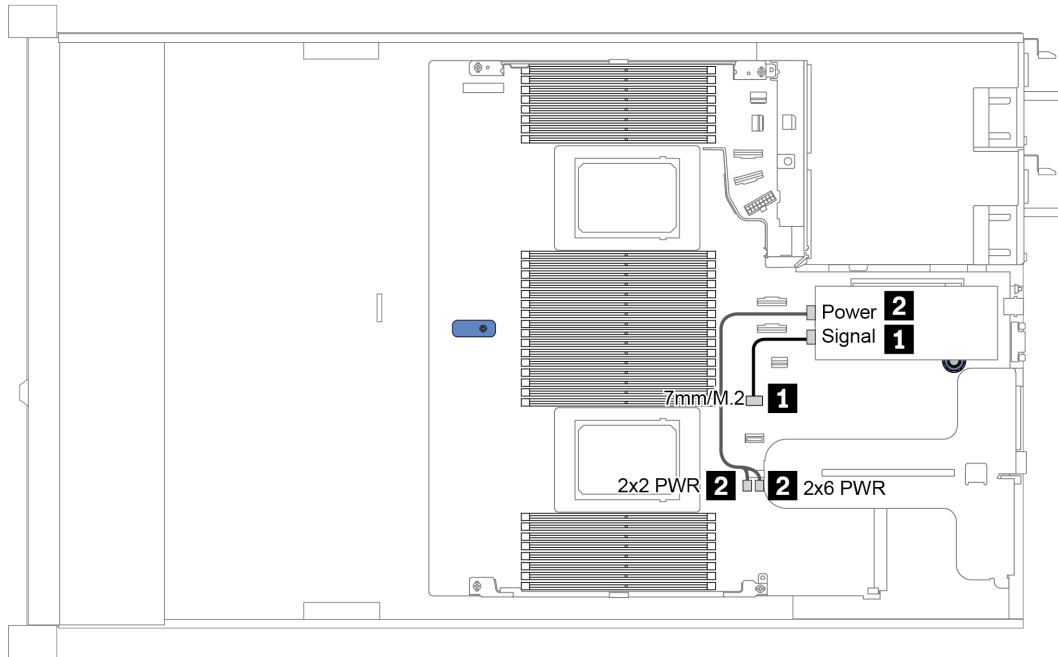


Figure 17. Cable routing for 7mm drives

From	To
<b>1</b> 7mm signal cable	7mm/M.2 signal connector on the system board
<b>2</b> Power cable	Power connectors on the rise card on the riser 1 assembly



## 2.5-inch/3.5-inch drive backplane (power)

Use the section to understand the power cable routing for 2.5-inch or 3.5-inch drive backplanes.

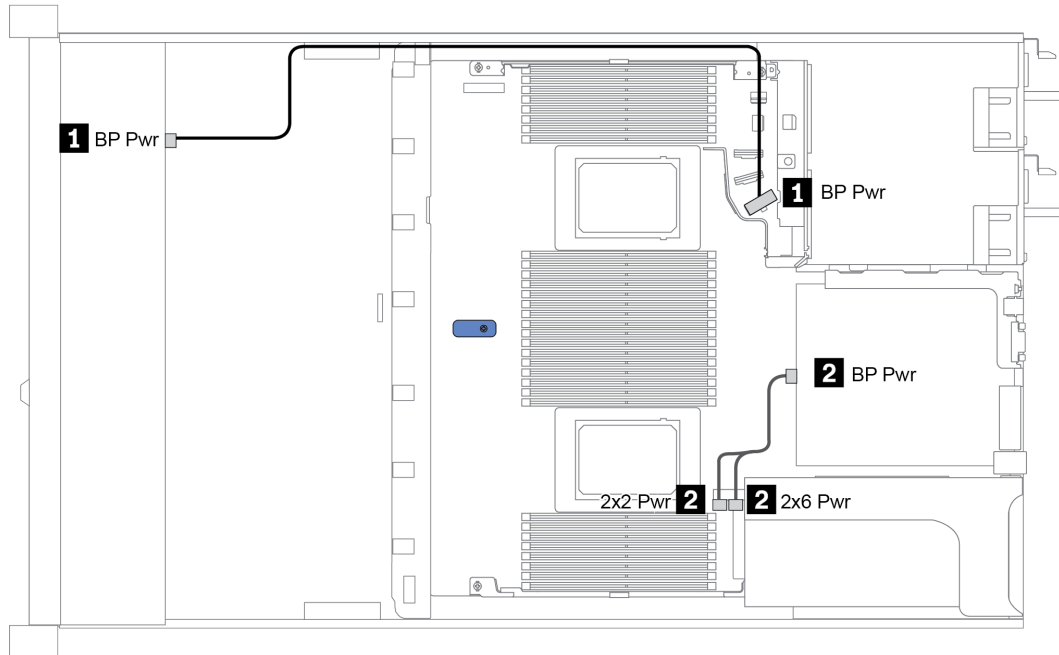


Figure 18. Backplane power cable connection

From	To
<b>1</b> Power connector on the front drive backplane	Front backplane power connector on the system board
<b>2</b> Power connector on the rear drive backplane	Power connectors on the riser card on the riser 1 assembly

---

## 2.5-inch/3.5-inch drive backplane (signal)

Use the section to understand the cable routing for signal cable connections for 2.5-inch/3.5-inch drive backplanes.

Your server supports the following server models with:

- [“4 x 3.5-inch front drive bays” on page 62](#)
- [“4 x 2.5-inch front drive bays” on page 66](#)
- [“8 x 2.5-inch front drive bays” on page 69](#)
- [“10 x 2.5-inch front drive bays” on page 75](#)

### 4 x 3.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 60.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 61.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 63
- “Cable routing with an SFF HBA/RAID adapter” on page 64
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 65

## Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 20. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1*, 2-3*	PCIe 1, PCIe 2
Front BP (SAS)	SAS	SATA 0
Rear BP (if any)	SAS	SATA 2
	NVMe 0, NVMe 1	PCIe 6

**Note:** \*NVMe 0-1 and NVMe 2-3 connectors are available only when the 4 x 3.5" AnyBay front backplane is used.

The following figure illustrates the cable routing for the onboard configuration of 4 x 3.5-inch front AnyBay drive bays with a rear 2 x 2.5-inch NVMe drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

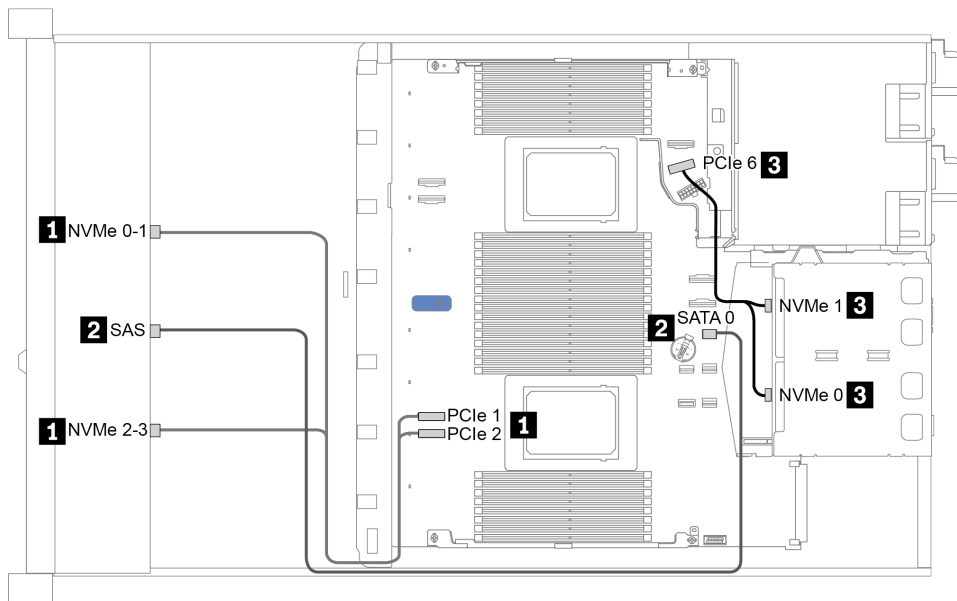


Figure 19. Cable routing for onboard configuration of 4 x 3.5-inch front AnyBay drive bays with a rear 2 x 2.5-inch NVMe drive cage

## Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 21. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1*, 2-3*	PCIe 1, PCIe 2
Front BP (SAS)	SAS	C0
Rear BP (if any)	SAS	Gen 3: C1; Gen 4: C0
	NVMe 0, NVMe 1	PCIe 6

### Notes:

- \*NVMe 0-1 and NVMe 2-3 connectors are available only when the 4 x 3.5" AnyBay front backplane is used.
- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

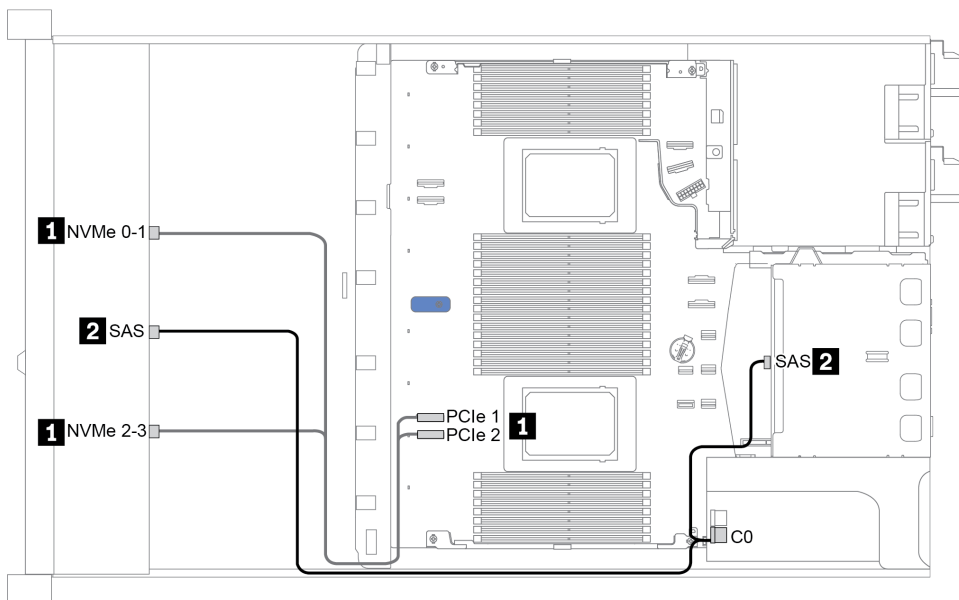


Figure 20. Cable routing for 4 x 3.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

### Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed.

Table 22. Mapping between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0	C0

**Note:** If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front U.3 drive bays with a 16i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

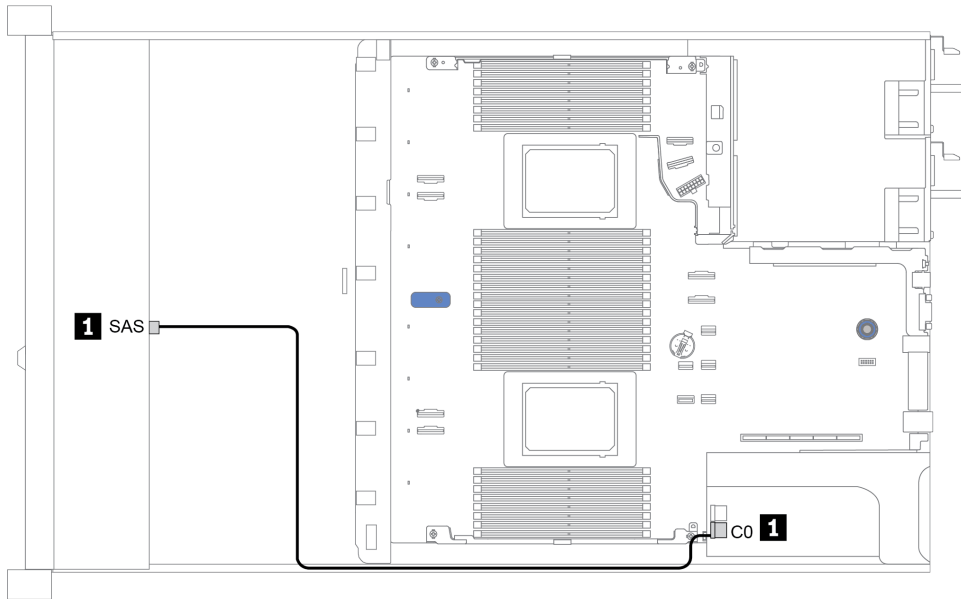


Figure 21. Cable routing for 4 x 3.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode)

## 4 x 2.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 60.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 61.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 67
- “Cable routing with an SFF HBA/RAID adapter” on page 68

### Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 23. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS	SATA 0

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

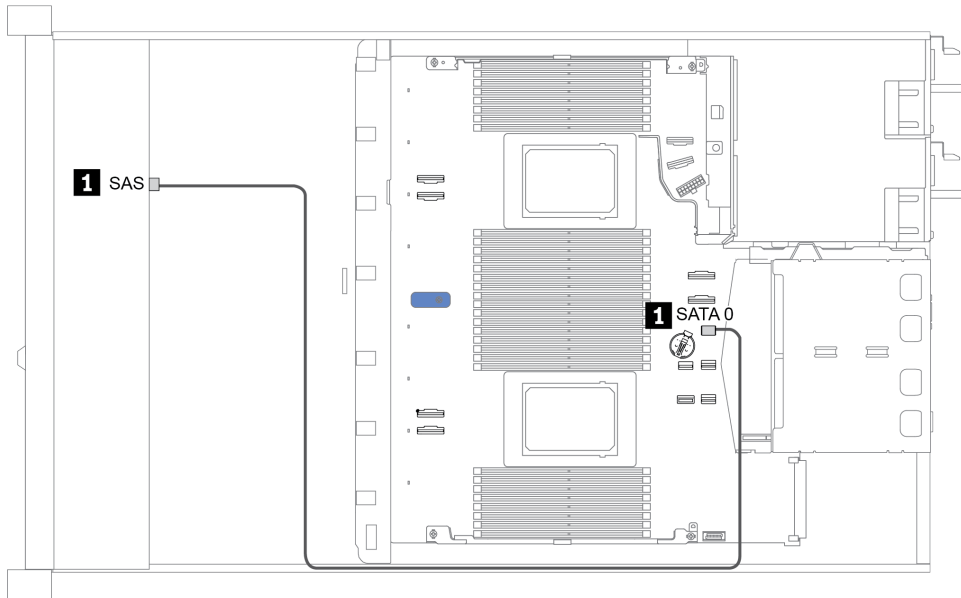


Figure 22. Cable routing for onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays

## Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 24. Mapping between backplane connectors and adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0

**Note:** Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

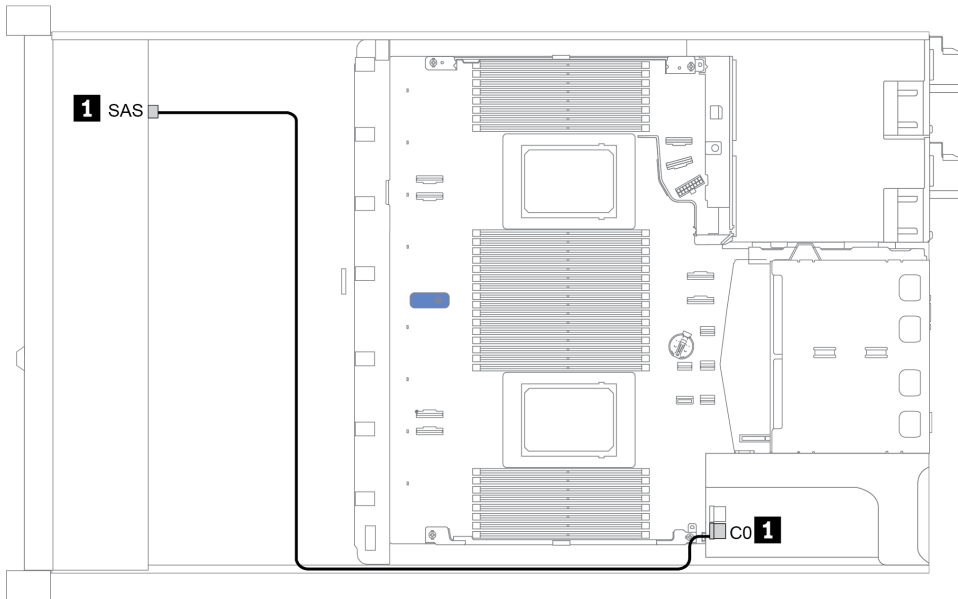


Figure 23. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4)



## 8 x 2.5-inch front drive bays

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

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 60.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 61.

To connect signal cables for a backplane for standard 8 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 70
- “Cable routing with an SFF HBA/RAID adapter” on page 71
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 72
- “Cable routing with a re-timer card for one processor” on page 73
- “Cable routing with a CFF HBA/RAID adapter” on page 74

## Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 25. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS 0	SATA 0
	SAS 1	SATA 1
Rear BP (if any)	SAS	SATA 2

The following figure illustrates the cable routing for the onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays with a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

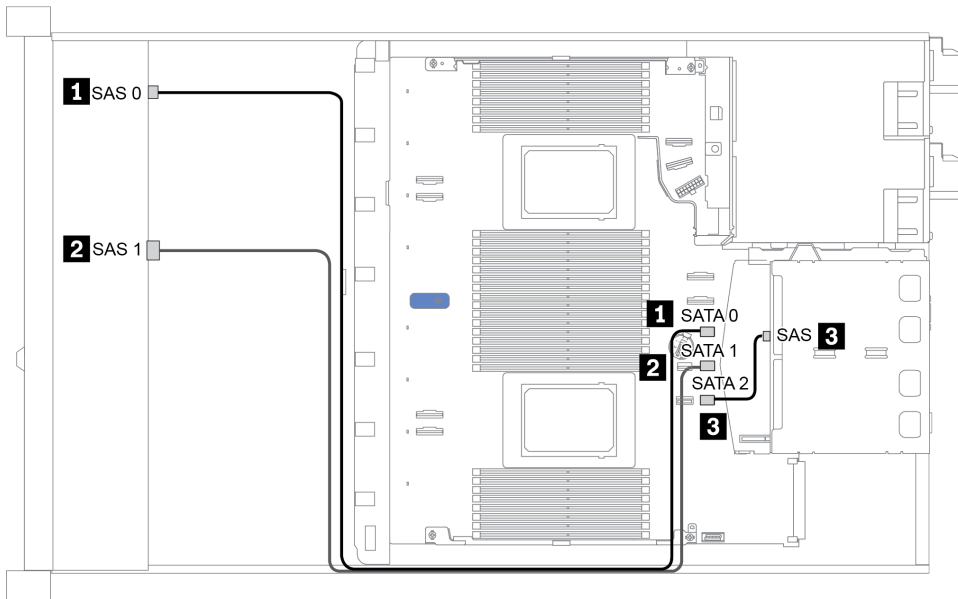


Figure 24. Cable routing for onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays with a rear 2 x 2.5-inch SAS/SATA drive cage

### Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 26. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS 0	C0
	SAS 1	Gen 3: C1; Gen 4: C0
Rear BP (if any)	SAS	SATA 2

**Note:** Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front SAS/SATA drive bays with a 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

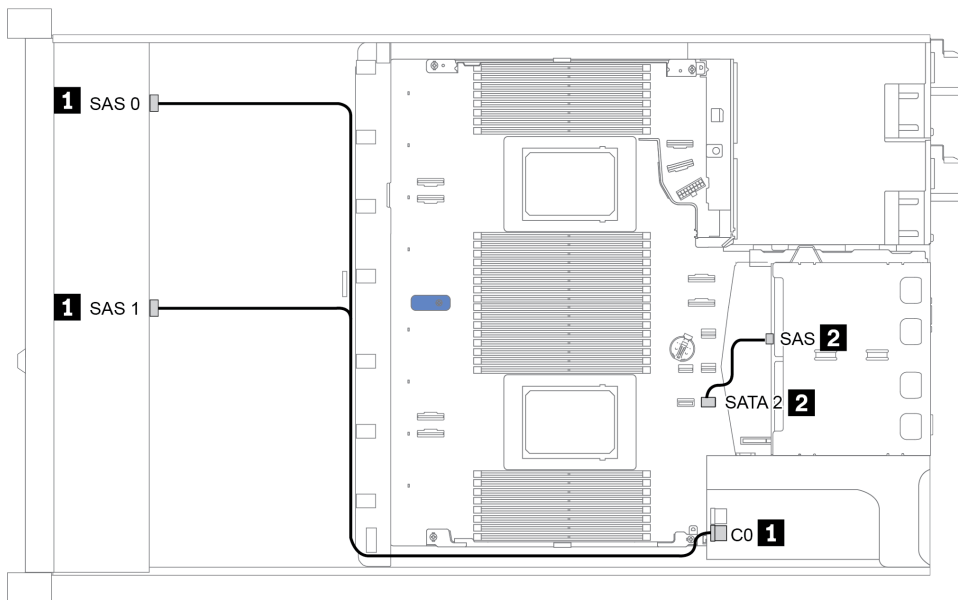


Figure 25. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

### Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed.

Table 27. Mapping between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0

#### Notes:

- For the server model with eight front 2.5-inch drives, the 10 x 2.5" AnyBay backplane is used to support the tri-mode configuration.
- If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

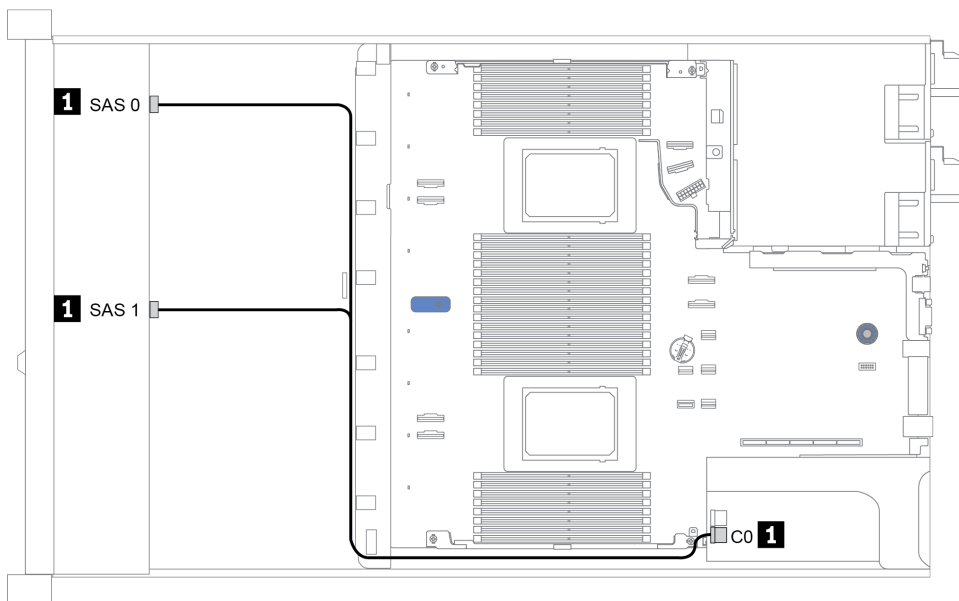


Figure 26. Cable routing for 8 x 2.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode)

### Cable routing with a re-timer card for one processor

The following table shows the mapping relationship between backplane connectors and a re-timer card for one processor.

Table 28. Mapping between backplane connectors and a re-timer card for one processor

Backplane	From	To
Front BP (NVMe)	NVMe 0–1, NVMe 2–3	PCIe 1, PCIe 2
	NVMe 4–5, NVMe 6–7	C0, C1

#### Notes:

- For the server model with eight front 2.5-inch NVMe drives, the 10 x 2.5" AnyBay backplane is used.
- If you take the front view of the chassis, when the re-timer card is installed in PCIe slot 1, the cable is routed on the right side as figure 4 illustrates; when PCIe slot 1 is occupied, install the re-timer card to PCIe slot 2, note that the cable should be routed on the left side.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front NVMe drive bays with a re-timer card. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

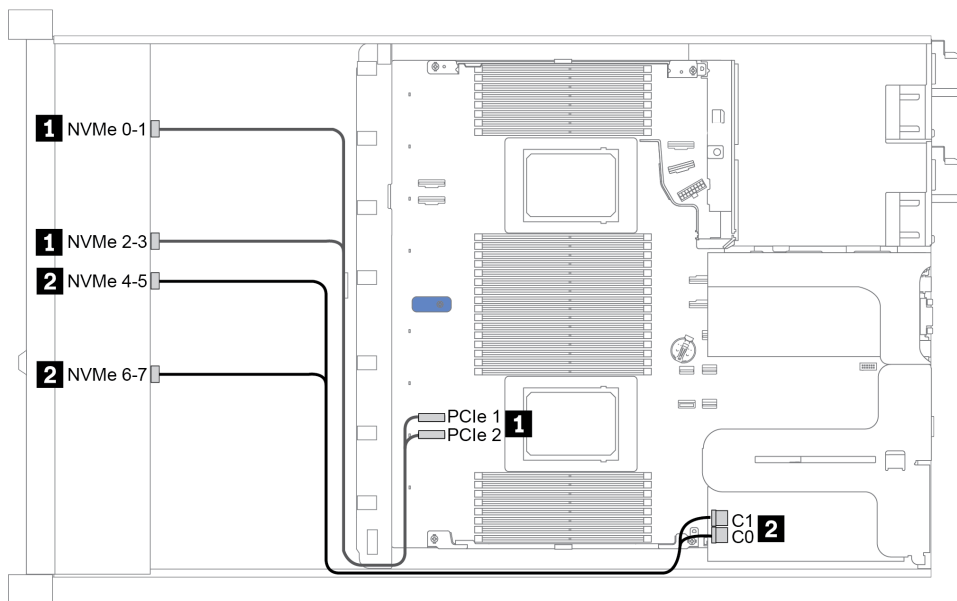


Figure 27. Cable routing for 8 x 2.5-inch front NVMe drive bays with a re-timer card for one processor

### Cable routing with a CFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and adapter connectors when a 16i CFF HBA/RAID adapter is installed.

Table 29. Mapping between backplane connectors and adapter connectors when a 16i CFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS 0	C0
	SAS 1	C1
Rear BP (if any)	SAS	C3

**Note:** For power and input cable connection of the CFF HBA/RAID adapter, refer to “CFF HBA/RAID adapter” on page 53.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

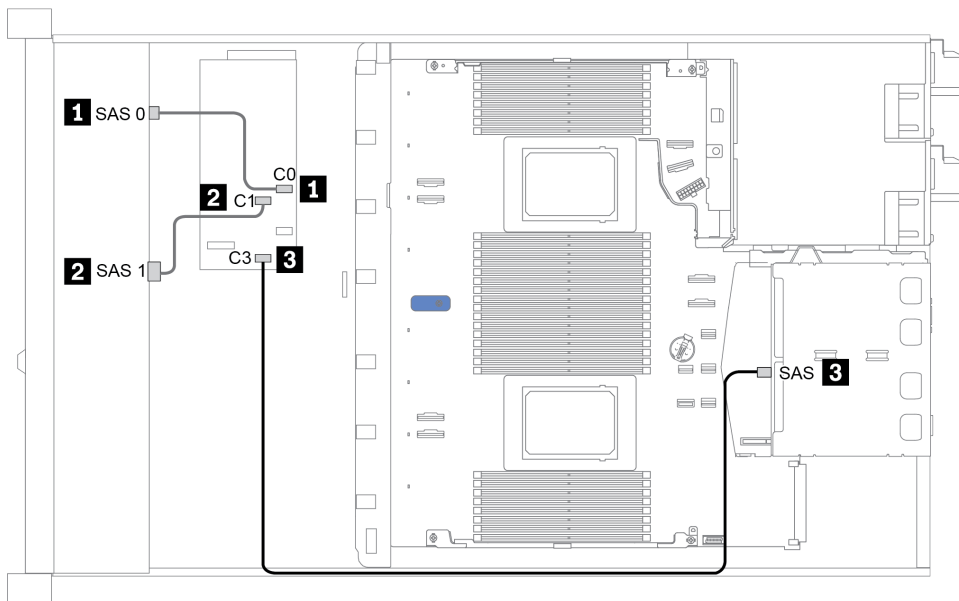


Figure 28. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage

## 10 x 2.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with ten 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 60.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 61.

To connect signal cables for a backplane for standard 10 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 76
- “Cable routing with an SFF HBA/RAID adapter” on page 77
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 78
- “Cable routing with a CFF HBA/RAID adapter” on page 79

## Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 30. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
	NVMe 4-5*, 6-7*, 8-9*	PCIe 3, PCIe 4, PCIe 5
Front BP (SAS)	SAS 0	SATA 0
	SAS 1	SATA 1
	SAS 2*	SATA 2
Rear BP (if any)	SAS	SATA 2
	NVMe 0, NVMe 1	PCIe 6

### Notes:

- \*NVMe 4-5, NVMe 6-7, and NVMe 8-9 connectors are available only when the 10 x 2.5" AnyBay front backplane is used.
- \*The SAS 2 connector only needs to be connected in the front drive scenario of 10 x 2.5" AnyBay or 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay.
- In case of front 10 x 2.5" NVMe drive bay scenario, SAS connectors on the front backplane do not need to be connected.

The following figure illustrates the cable routing for the onboard configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x NVMe) with a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

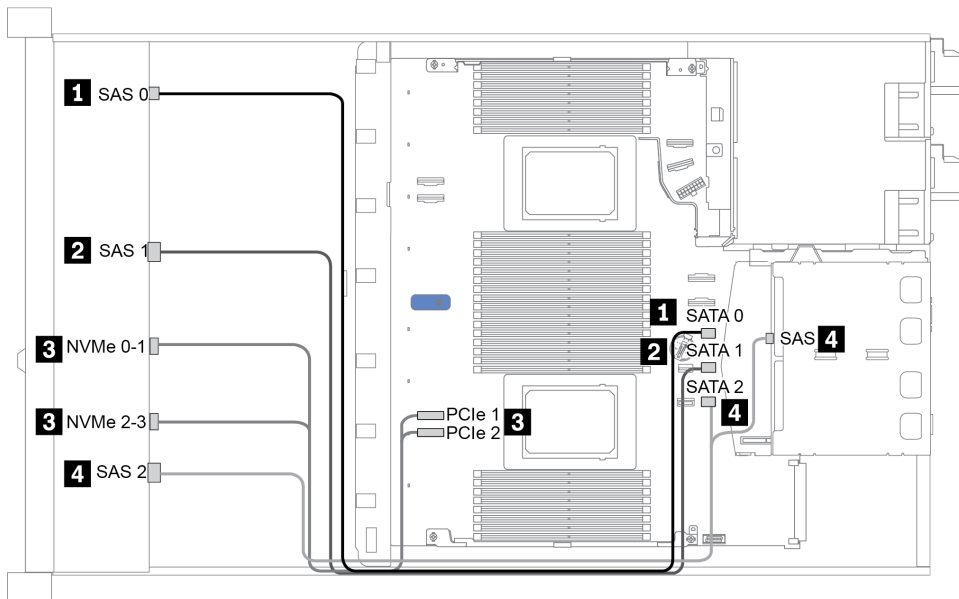


Figure 29. Cable routing for onboard configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x NVMe) with a rear 2 x 2.5-inch SAS/SATA drive cage



## Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 31. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
	NVMe 4-5*, 6-7*, 8-9*	PCIe 3, PCIe 4, PCIe 5
Front BP (SAS)	SAS 0	C0
	SAS 1	Gen 3: C1; Gen 4: C0
	SAS 2*	Gen 3: C2; Gen 4: C1
Rear BP (if any)	SAS	Gen 3: C3; Gen 4: C1
	NVMe 0, NVMe 1	PCIe 6

### Notes:

- \*NVMe 4-5, NVMe 6-7, and NVMe 8-9 connectors are available only when the 10 x 2.5" AnyBay front backplane is used.
- \*The SAS 2 connector only needs to be connected in the front drive scenario of 10 x 2.5" AnyBay or 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay.
- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front AnyBay drive bays with a 16i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

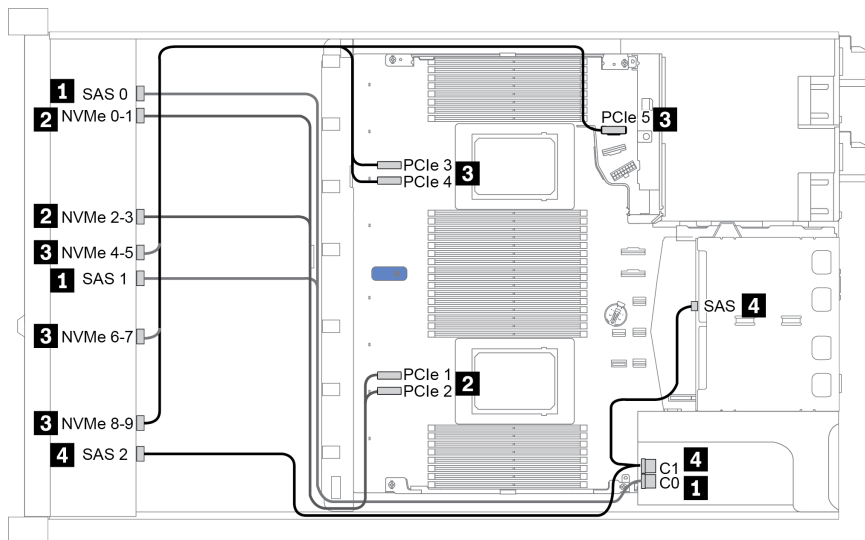


Figure 30. Cable routing for 10 x 2.5-inch front AnyBay drive bays with a 16i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

### Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 16i SFF RAID adapter (tri-mode) is installed.

Table 32. Mapping between backplane connectors and adapter connectors when a Gen 4 16i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0
	SAS 2	C1

**Note:** If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front U.3 drive bays with a 16i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

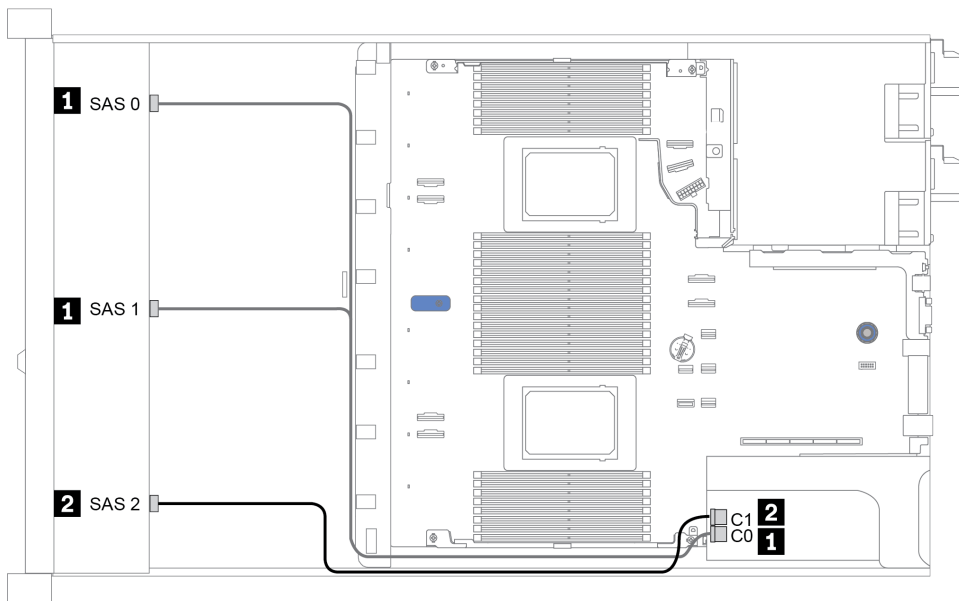


Figure 31. Cable routing for 10 x 2.5-inch front U.3 drive bays with a Gen 4 16i SFF RAID adapter (tri-mode)

### Cable routing with a CFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when a 16i CFF HBA/RAID adapter is installed.

Table 33. Mapping between backplane connectors and system board/adapter connectors when a 16i CFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
Front BP (SAS)	SAS 0	C0
	SAS 1	C1
	SAS 2	C2
Rear BP (if any)	SAS	C3
	NVMe 0, NVMe 1	PCIe 6

**Note:** For power and input cable connection of the CFF HBA/RAID adapter, refer to “CFF HBA/RAID adapter” on page 53.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x AnyBay) with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage.

Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

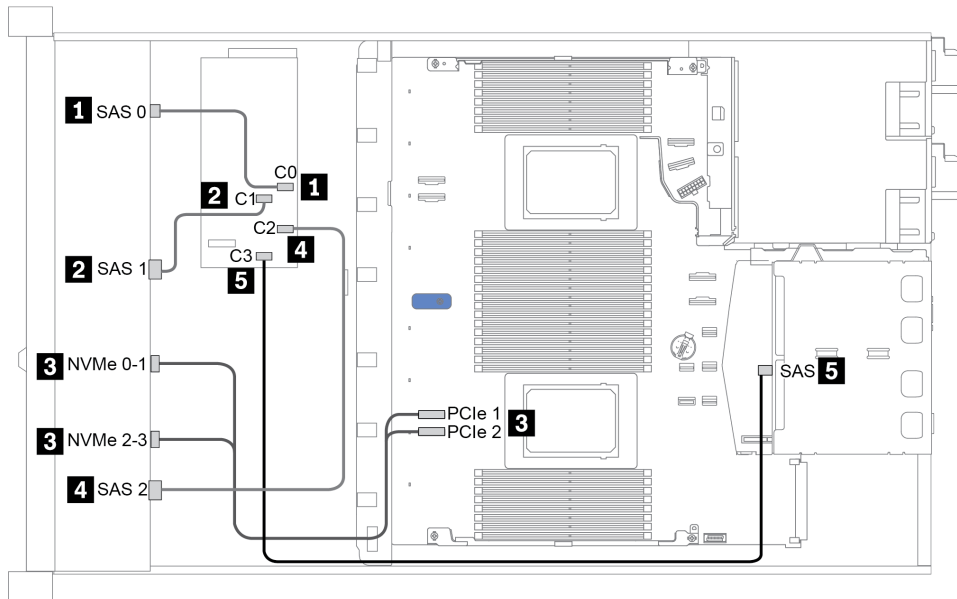


Figure 32. Cable routing for 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x AnyBay) with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage



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## Chapter 4. Server hardware setup

To set up the server, install any options that have been purchased, cable the server, configure and update the firmware, and install the operating system.

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### Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an ac power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server:

1. Unpack the server package. See “Server package contents” on page 2.
2. Set up the server hardware.
  - a. Install any required hardware or server options. See the related topics in “Install server hardware options” on page 104.
  - b. If necessary, install the server into a standard rack cabinet by using the rail kit shipped with the server. See the *Rack Installation Guide* that comes with optional rail kit.
  - c. Connect the Ethernet cables and power cords to the server. See “Rear view” on page 39 to locate the connectors. See “Cable the server” on page 151 for cabling best practices.
  - d. Power on the server. See “Power on the server” on page 151.

**Note:** You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see:

“Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at [https://sysmgmt.lenovofiles.com/help/topic/ixcc\\_frontend/ixcc\\_overview.html](https://sysmgmt.lenovofiles.com/help/topic/ixcc_frontend/ixcc_overview.html).

- e. Validate that the server hardware was set up successfully. See “Validate server setup” on page 152.
3. Configure the system.
  - a. Connect the Lenovo XClarity Controller to the management network. See “Set the network connection for the Lenovo XClarity Controller” on page 153.
  - b. Update the firmware for the server, if necessary. See “Update the firmware” on page 155.
  - c. Configure the firmware for the server. See “Configure the firmware” on page 158.

The following information is available for RAID configuration:

- <https://lenovopress.com/lp0578-lenovo-raid-introduction>
  - <https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- d. Install the operating system. See “Install the operating system” on page 161.
  - e. Back up the server configuration. See “Back up the server configuration” on page 162.
  - f. Install the applications and programs for which the server is intended to be used.

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## Installation guidelines

Use the installation guidelines to install components in your server.

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure your safety at work:  
[http://thinksystem.lenovofiles.com/help/topic/safety\\_documentation/pdf\\_files.html](http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html)
- 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 SR630 V2 Drivers and Software](#) to download firmware updates for your server.

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

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- 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, memory, or processor.
- Blue color on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

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

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

## 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:

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

### CAUTION:

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

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

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

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

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

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

## 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 after 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

Guidelines to work inside the server with the power on.

**Attention:** The server might stop and data loss 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 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

Use this information to handle static-sensitive devices.

**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.

---

## Memory module installation rules and order

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

Your server has 16 channels, 32 memory slots, and supports:

- Minimum memory:
  - 16 GB
- Maximum memory:
  - Without PMEMs:
    - 2 TB using 32 x 64 GB RDIMMs
    - 8 TB using 32 x 256 GB RDIMMs
  - With PMEMs:
    - 10 TB: 16 x 128 GB 3DS RDIMMs + 16 x 512 GB PMEMs (Memory Mode)
 

Total 10 TB installed memory capacity, of which 8 TB (PMEMs) is used as system memory and 2 TB (3DS RDIMMs) is used as cache.
    - 12 TB: 16 x 256 GB 3DS RDIMMs + 16 x 512 GB PMEMs (App Direct Mode)
 

Total 12 TB installed memory capacity, of which 4 TB (3DS RDIMMs) is used as system memory and 8 TB (PMEMs) is used as persistent memory for storage.
- Type (depending on the model):
  - TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM
  - TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM
  - TruDDR4 2933, octal-rank, 256 GB 3DS RDIMM
  - TruDDR4 3200 128 GB, 256 GB and 512 GB PMEM

For a list of supported memory options, see <https://static.lenovo.com/us/en/serverproven/index.shtml>.

### Notes:

- The operating speed and total memory capacity depend on the processor model and UEFI settings.
- All Icelake Platinum and Gold CPUs support PMEM. For Icelake Silver CPUs, only processor 4314 supports PMEM.
- When 256 GB 3DS RDIMM/512 GB PMEM is installed, the ambient temperature must be limited to 30°C or lower.
- Mixing 128 GB and 256 GB 3DS RDIMMs is not supported.

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

**Note:** It is recommended to install memory modules with the same rank in each channel.

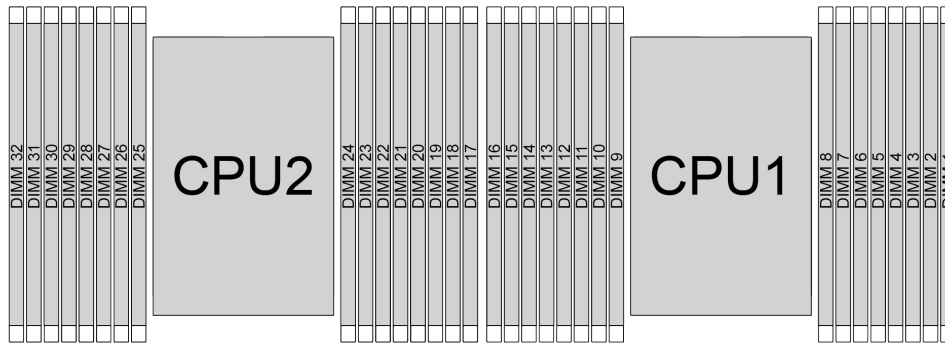


Figure 33. Memory module slots on the system board

Table 34. Memory slot and channel identification

Channel	F0	F1	E0	E1	H0	H1	G0	G1	C1	C0	D1	D0	A1	A0	B1	B0
Slot number	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

### Memory module installation guideline

- Two types of configurations are supported. Consider corresponding rules and population sequence accordingly:
  - “DRAM DIMM installation order” on page 86 (RDIMMs or 3DS RDIMMs)
  - “PMEM and DRAM DIMM installation order” on page 90
- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx nRxxx PC4-xxxx-xx-xx-xxx**. Where **n** indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).
- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup utility to enable the new DIMM manually.

### Attention:

- Mixing x4 and x8 DIMMs in the same channel is allowed.
- Always populate DIMMs with the maximum number of ranks in the farthest DIMM slot, followed by the nearest DIMM slot.
- Do not mix RDIMMs and 3DS RDIMMs in the same server.
- Mixing 128 GB and 256 GB 3DS RDIMMs is not supported.

## DRAM DIMM installation order

For RDIMMs or 3DS RDIMMs, the following memory modes are available:

- “Independent mode” on page 86
- “Mirroring mode” on page 89

### Independent mode

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation

order for independent memory mode varies based on the number of processors and memory modules installed in the server.

Follow the rules below when installing memory modules in independent mode:

- All memory modules to be installed must be of the same type.
- Memory modules from different vendors are supported.
- There must be at least one DDR4 DIMM per socket.
- In each memory channel, populate slot 0 first.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0; if the two DIMMs have the same number of ranks, populate the DIMM with a higher capacity in slot 0.
- A maximum of 8 logical ranks (ranks seen by the host) per channel is allowed.
- A maximum of two different DIMM capacities are supported per system.
  - For channels A, C, E, and G, populated DIMMs must have the same total capacity for each channel.
  - For channels B, D, F, and H, populated DIMMs must have the same total capacity for each channel, which can be different from that of the other set (channels A, C, E, and G).
- If there are more than two DIMMs, populate them in a right-and-left symmetrical manner across a CPU socket.

The following table shows the sequence of populating memory modules (with the **same capacity**) for independent mode when only one processor (CPU 1) is installed.

Table 35. Independent mode with one processor (DIMMs with the same capacity)

Configuration	DIMM slots																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 DIMM			3														
2 DIMMs			3				7										
4 DIMMs <sup>1</sup>			3				7			10				14			
6 DIMMs	1		3				7			10				14		16	
8 DIMMs <sup>1,2</sup>	1		3		5		7			10		12		14		16	
12 DIMMs	1	2	3	4			7	8		9	10			13	14	15	16
16 DIMMs <sup>1,2</sup>	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16

**Notes:**

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” on page 160 to enable this feature.

The following table shows the sequence of populating memory modules (with **different capacities**) for independent mode when only one processor (CPU 1) is installed.

Table 36. Independent mode with one processor (DIMMs with different capacities)

Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 DIMMs			3		5											

Table 36. Independent mode with one processor (DIMMs with different capacities) (continued)

4 DIMMs			3		5							12		14		
8 DIMMs <sup>1,2</sup>	1		3		5		7			10		12		14		16
12 DIMMs <sup>1,2</sup>	1		3	4	5		7	8	9	10		12	13	14		16
16 DIMMs <sup>1,2</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

**Notes:**

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” on page 160 to enable this feature.

The following table shows the sequence of populating memory modules (with the **same capacity**) for independent mode when two processors (CPU 1 and CPU 2) are installed.

Table 37. Independent mode with two processors (DIMMs with the same capacity)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 DIMMs			3													
4 DIMMs			3				7									
8 DIMMs <sup>1</sup>			3				7			10				14		
12 DIMMs	1		3				7			10				14		16
16 DIMMs <sup>1,2</sup>	1		3		5		7			10		12		14		16
24 DIMMs	1	2	3	4			7	8	9	10			13	14	15	16
32 DIMMs <sup>1,2</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2 DIMMs			19													
4 DIMMs			19				23									
8 DIMMs <sup>1</sup>			19				23			26				30		
12 DIMMs	17		19				23			26				30		32
16 DIMMs <sup>1,2</sup>	17		19		21		23			26		28		30		32
24 DIMMs	17	18	19	20			23	24	25	26			29	30	31	32
32 DIMMs <sup>1,2</sup>	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

**Notes:**

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” on page 160 to enable this feature.

The following table shows the sequence of populating memory modules (with **different capacities**) for independent mode when two processors (CPU 1 and CPU 2) are installed.

Table 38. Independent mode with two processors (DIMMs with different capacities)

Configura- tion	DIMM slots																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
4 DIMMs			3		5												
8 DIMMs			3		5							12		14			
16 DIMMs <sup>1,2</sup>	1		3		5		7			10		12		14		16	
24 DIMMs <sup>1,2</sup>	1		3	4	5		7	8		9	10		12	13	14		16
32 DIMMs <sup>1,2</sup>	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16
Configura- tion	DIMM slots																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
4 DIMMs			19		21												
8 DIMMs			19		21							28		30			
16 DIMMs <sup>1,2</sup>	17		19		21		23			26		28		30		32	
24 DIMMs <sup>1,2</sup>	17		19	20	21		23	24		25	26		28	29	30		32
32 DIMMs <sup>1,2</sup>	17	18	19	20	21	22	23	24		25	26	27	28	29	30	31	32

**Notes:**

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” on page 160 to enable this feature.

**Mirroring mode**

Memory-mirroring mode provides full memory redundancy while reducing the total system memory capacity in half. Memory channels are grouped in pairs with each channel receiving the same data. If a failure occurs, the memory controller switches from the DIMMs on the primary channel to the DIMMs on the backup channel. The DIMM installation order for memory mirroring varies based on the number of processors and DIMMs installed in the server.

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.

Follow the rules below when installing memory modules in mirroring mode:

- All memory modules to be installed must be of the same type with the same capacity, frequency, voltage, and ranks.
- Mirroring can be configured across channels, and the total DDR4 memory size of the primary and secondary channels must be the same.

The following table shows the memory module population sequence for mirroring mode when only one processor (CPU 1) is installed.

Table 39. Mirroring mode with one processor (CPU 1)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8 DIMMs	1		3		5		7			10		12		14		16
16 DIMMs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

**Note:** DIMM configurations listed in the table support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

The following table shows the memory module population sequence for mirroring mode when two processors (CPU 1 and CPU 2) are installed.

Table 40. Mirroring mode with two processors (CPU 1 and CPU 2)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 DIMMs	1		3		5		7			10		12		14		16
32 DIMMs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
16 DIMMs	17		19		21		23			26		28		30		32
32 DIMMs	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

**Note:** DIMM configurations listed in the table support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

## PMEM and DRAM DIMM installation order

This section contains information of how to install PMEMs and DRAM DIMMs properly.

When PMEMs and DRAM DIMMs are mixed in the system, the following modes are supported:

- “App Direct Mode” on page 96
- “Memory Mode” on page 97

See the following topics to learn how to set up and configure PMEMs.

- “PMEM rules” on page 91
- “Setting up the system for PMEM for the first time” on page 91

- “PMEM Management options” on page 91
- “Adding or replacing PMEMs in App Direct Mode” on page 95

### PMEM rules

Make sure to meet the following requirements when applying PMEMs in the system.

- All the PMEMs that are installed must be of the same part number.
- All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs with the same part number.

### Setting up the system for PMEM for the first time

Complete the following steps when installing PMEMs to the system for the first time.

1. Determine the mode and combination (see “App Direct Mode” on page 96 or “Memory Mode” on page 97).
2. Consider “PMEM rules” on page 91 and acquire the PMEMs and DRAM DIMMs that meet the requirements.
3. Remove all the memory modules that are presently installed (see “Remove a memory module” in *Maintenance Manual*).
4. Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see “Install a memory module” on page 112).
5. Disable security on all the installed PMEMs (see “PMEM Management options” on page 91).
6. Make sure the PMEM firmware is the latest version. If not, update it to the latest version (see [https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update\\_fw.html](https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html)).
7. Configure the PMEMs so that the capacity is available for use (see “PMEM Management options” on page 91).

### PMEM Management options

PMEMs can be managed with the following tools:

- **Lenovo XClarity Provisioning Manager (LXPM)**

To open LXPM, power on the system and press **F1** as soon as the logo screen appears. If a password has been set, enter the password to unlock LXPM.

Go to **UEFI Setup → System Settings → Intel Optane PMEMs** to configure and manage PMEMs.

For more details, see the “UEFI setup” section in the LXPM documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html).

**Note:** If the text-based interface of Setup Utility opens instead of LXPM, go to **System Settings → <F1> Start Control** and select **Tool Suite**. Then, reboot the system and press **F1** as soon as the logo screen appears to open LXPM.

- **Setup Utility**

To enter Setup Utility:

1. Power on the system and press **F1** to open LXPM.
2. Go to **UEFI Settings → System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.
3. Reboot the system, and press **F1** as soon as the logo screen appears.

Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs** to configure and manage PMEMs.

- **Lenovo XClarity Essentials OneCLI**

Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See [https://sysmgt.lenovofiles.com/help/topic/toolstr\\_cli\\_lenovo/onecli\\_t\\_download\\_use\\_tcscli.html](https://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_t_download_use_tcscli.html) to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane PMEMs details**

Select this option to view the following details concerning each of the installed PMEMs:

- Number of Intel Optane PMEMs detected
- Total raw capacity
- Total memory capacity
- Total App Direct capacity
- Total unconfigured capacity
- Total inaccessible capacity
- Total reserved capacity

Alternatively, view PMEM details with the following command in OneCLI:

```
OneCli.exe config show IntelOptanePMEM  
--bmc USERID:PASSWORD@10.104.195.86
```

**Notes:**

- *USERID* stands for XCC user ID.
- *PASSWORD* stands for XCC user password.
- *10.104.195.86* stands for IP address.

- **Goals**

- **Memory Mode [%]**

Select this option to define the percentage of PMEM capacity that is invested in system memory, and hence decide the PMEM mode:

- **0%**: App Direct Mode
- **100%**: Memory Mode

Go to **Goals → Memory Mode [%]**, input the memory percentage, and reboot the system.

**Notes:**

- Before changing from one mode to another:
  1. Back up all the data and delete all the created namespaces. Go to **Namespaces → View/Modify/Delete Namespaces** to delete the created namespaces.
  2. Perform secure erase on all the installed PMEMs. Go to **Security → Press to Secure Erase** to perform secure erase.
- Make sure the capacity of installed PMEM and DRAM DIMMs meets system requirements for the new mode (see “PMEM rules” on page 91).
- After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management → Intel Optane PMEMs → Goals** will go back to the following default selectable options:
  - **Scope:** [Platform]
  - **Memory Mode [%]:** 0
  - **Persistent Memory Type:** [App Direct]



These values are selectable options for PMEM settings, and do not represent the current PMEM status.

In addition, you can take advantage of a memory configurator, which is available at the following site: [http://1config.lenovo.com/#/memory\\_configuration](http://1config.lenovo.com/#/memory_configuration)

Alternatively, set PMEM Goals with the following commands in OneCLI:

– For Memory Mode:

1. Set create goal status.

```
OneCli.exe config set IntelOptanePMEM.CreateGoal Yes  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Define the PMEM capacity that is invested in system volatile memory.

```
OneCli.exe config set IntelOptanePMEM.MemoryModePercentage 100  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *100* stands for the percentage of capacity that is invested in system volatile memory.

– For App Direct Mode:

1. Set create goal status.

```
OneCli.exe config set IntelOptanePMEM.CreateGoal Yes  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Define the PMEM capacity that is invested in system volatile memory.

```
OneCli.exe config set IntelOptanePMEM.MemoryModePercentage 0  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *0* stands for the percentage of capacity that is invested in system volatile memory.

3. Set the PMEM mode.

```
OneCli.exe config set IntelOptanePMEM.PersistentMemoryType "App Direct"  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the PMEM mode. You can input *App Direct* for App Direct interleaved or *App Direct Not Interleaved* for App Direct not interleaved.

– **Persistent Memory Type**

In App Direct Mode, the PMEMs that are connected to the same processor are by default interleaved (displayed as **App Direct**), while memory banks are used in turns. To set them as not interleaved in the Setup Utility, go to **Intel Optane PMEMs → Goals → Persistent Memory Type [(PMEM mode)]**, select **App Direct Not Interleaved** and reboot the system.

**Note:** Setting PMEM App Direct capacity to not interleaved will turn the displayed App Direct regions from one region per processor to one region per PMEM.

- **Regions**

After the memory percentage is set and the system is rebooted, regions for the App Direct capacity will be generated automatically. Select this option to view the App Direct regions per processor.

- **Namespaces**

App Direct capacity of PMEMs requires the following steps before it is truly available for applications.

1. Namespaces must be created for region capacity allocation.
2. Filesystem must be created and formatted for the namespaces in the operating system.

Each App Direct region can be allocated into one namespace. Create namespaces in the following operating systems:

- Windows: Use *powershell* command. To create a namespace, use Windows Server 2019 or later versions.
- Linux: Use *ndctl* command.
- VMware: Reboot the system, and VMware will create namespaces automatically.

After creating namespaces for App Direct capacity allocation, make sure to create and format filesystem in the operating system so that the App Direct capacity is accessible for applications.

- **Security**

- Enable Security

**Attention:** By default, PMEM security is disabled. Before enabling security, make sure all the country or local legal requirements regarding data encryption and trade compliance are met. Violation could cause legal issues.

PMEMs can be secured with passphrases. Two types of passphrase protection scope are available for PMEM:

- **Platform:** Choose this option to run security operation on all the installed PMEM units at once. A platform passphrase is stored and automatically applied to unlock PMEMs before operating system starts running, but the passphrase still has to be disabled manually for secure erase.

Alternatively, enable/disable platform level security with the following commands in OneCLI:

- Enable security:

1. Enable security.

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Enable Security"
--bmc USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
OneCli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"
--bmc USERID:PASSWORD@10.104.195.86
```

Where *123456* stands for the passphrase.

3. Reboot the system.

- Disable security:

1. Disable security.

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Disable Security"
--bmc USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
OneCli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"
--bmc USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

- **Single PMEM:** Choose this option to run security operation on one or more selected PMEM units.

**Notes:**

- Single PMEM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.
- Always make sure to keep records of the slot number of locked PMEMs and corresponding passphrases. In the case the passphrases are lost or forgotten, the stored data cannot be backed up or restored, but you can contact Lenovo service for administrative secure erase.
- After three failed unlocking attempts, the corresponding PMEMs enter “exceeded” state with a system warning message, and the PMEM unit can only be unlocked after the system is rebooted.

To enable passphrase, go to **Security → Press to Enable Security**.

- Secure Erase

**Notes:**

- Password is required to perform Secure Erase when security enabled.
- Before executing secure erase, make sure ARS (Address Range Scrub) is done on all PMEMs or on the specific PMEMs selected. Otherwise, secure erase cannot be started on all PMEMs or the specific PMEM selected, and the following text message will pop out:

```
The passphrase is incorrect for single or multiple or all
Intel Optane PMEMs selected, or maybe there is namespace on
the selected PMEMs. Secure erase operation is not done
on all Intel Optane PMEMs selected.
```

Secure erase cleanses all the data that is stored in the PMEM unit, including encrypted data. This data deletion method is recommended before returning or disposing a malfunctioning unit, or changing PMEM mode. To perform secure erase, go to **Security → Press to Secure Erase**.

Alternatively, perform platform level secure erase with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Secure Erase Without Passphrase"
--bmc USERID:PASSWORD@10.104.195.86
```

- **PMEM Configuration**

PMEM contains spared internal cells to stand in for the failed ones. When the spared cells are exhausted to 0%, there will be an error message, and it is advised to back up data, collect service log, and contact Lenovo support.

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMEM diagnostics (see the “Diagnostics” section in the LXPM documentation compatible with your server at [https://sysmgmt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgmt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html)). To adjust the selectable percentage that the warning message requires, go to **Intel Optane PMEMs → PMEM Configuration**, and input the percentage.

Alternatively, change the selectable percentage with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.PercentageRemainingThresholds 20
--bmc USERID:PASSWORD@10.104.195.86
```

Where 20 is the selectable percentage.

### **Adding or replacing PMEMs in App Direct Mode**

Complete the following steps before adding or replacing PMEMs in App Direct Mode.

1. Back up stored data in PMEM namespaces.
2. Disable PMEM security with one of the following options:

- **LXPM**

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

- **Setup Utility**

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

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

- **Linux** command:

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

- **Windows** Powershell command  
Get-PmemDisk | Remove-PmemDisk

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

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

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

5. Reboot the system.

## App Direct Mode

In this mode, PMEMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory. Ensure that the ratio of total DRAM DIMM capacity to total PMEM capacity within a processor is between 1:1 and 1:8.

### With one processor

Table 41. Memory population in App Direct Mode with one processor (CPU 1)

<ul style="list-style-type: none"> <li>• <b>D:</b> DRAM DIMM</li> <li>• <b>P:</b> Persistent Memory Module (PMEM)</li> </ul>		DIMM slots															
Configuration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 PMEM and 6 DIMMs*	D		D		P		D			D				D		D	
1 PMEM and 8 DIMMs*	D		D	P	D		D			D		D		D		D	
2 PMEMs and 12 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D	
4 PMEMs and 4 DIMMs	P		D		P		D			D		P		D		P	
4 PMEMs and 8 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D	
8 PMEMs and 8 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D	

**Note:** Configurations with an asterisk (\*) support the not-interleaved mode only. 100% interleaved mode is not supported.

### Two processors

Table 42. Memory population in App Direct Mode with two processors (CPU 1 and CPU 2)

<ul style="list-style-type: none"> <li>• <b>D:</b> DRAM DIMM</li> <li>• <b>P:</b> Persistent Memory Module (PMEM)</li> </ul>		DIMM slots															
Configura-tion	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

Table 42. Memory population in App Direct Mode with two processors (CPU 1 and CPU 2) (continued)

2 PMEM and 12 DIMMs*	D		D		P		D			D				D		D
2 PMEM and 16 DIMMs*	D		D	P	D		D			D		D		D		D
4 PMEMs and 24 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2 PMEM and 12 DIMMs*	D		D		P		D			D				D		D
2 PMEM and 16 DIMMs*	D		D	P	D		D			D		D		D		D
4 PMEMs and 24 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

**Note:** Configurations with an asterisk (\*) support the not-interleaved mode only. 100% interleaved mode is not supported.

## Memory Mode

In this mode, PMEMs act as volatile system memory, while DRAM DIMMs act as cache. Ensure that the ratio of total DRAM DIMM capacity to total PMEM capacity within a processor is between 1:4 and 1:16.

## With one processor

Table 43. Memory Mode with one processor (CPU 1)

<ul style="list-style-type: none"> <li><b>D:</b> DRAM DIMM</li> <li><b>P:</b> Persistent Memory Module (PMEM)</li> </ul>																
Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4 PMEMs and 4 DIMMs	P		D		P		D			D		P		D		P
4 PMEMs and 8 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
8 PMEMs and 8 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

## With two processors

Table 44. Memory Mode with two processors (CPU 1 and CPU 2)

<ul style="list-style-type: none"> <li><b>D:</b> DRAM DIMM</li> <li><b>P:</b> Persistent Memory Module (PMEM)</li> </ul>																
Configura-tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
Configura-tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

## Technical rules

Refer to the below technical rules and limitations when you install the related server components.

## Technical rules for processors and heat sinks

Understanding the technical rules helps you choose the correct heat sinks, fans, and other components based on what processors are configured for your server.

### Processor quantity rules

Two CPUs and eight fans are required if your server is installed with any of the following:

- More than four NVMe SSDs (including EDSFF drives but excluding 7mm drives) connected to the front and rear backplanes
- Rear 2.5-inch NVMe SSD (excluding 7mm drive)
- 16-EDSFF drive backplane
- CFF HBA/RAID adapter used together with the 6 SATA/SAS + 4 Anybay backplane
- ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit

### Processor TDP rules

The following lists the TDP rules for different configurations.

Table 45. Processor TDP rules for different configurations

Configuration	Max. TDP	Max. ambient temperature
GPU adapter with 4 x 2.5'' SAS/SATA drive backplane used	270 W	Refer to the "Environment" section in "Specifications" on page 5.
10 x 2.5'' AnyBay drive backplane or 16-EDSFF drive backplane	250 W	
GPU adapter without 4 x 2.5'' SAS/SATA drive backplane used	220 W	
Rear 2 x 2.5'' SAS/SATA or NVMe drive backplane (excluding 7mm drive backplane)	205 W	

### Supported heat sinks for processors

The following lists the required heat sinks when different processors are installed.

Table 46. Heat sinks supported for processors

Processor TDP	Heat sink type
$\leq 205$ W	Standard
$> 205$ W	Performance

**Note:** For 6334, 4310T, 6338T, and 5320T processors, performance heat sinks must be used.

## Technical rules for drives

Understanding the technical rules for drives helps you correctly install and configure drives in the system.

### Drive installation rules

The following notes describe information that you must consider when you install a drive.

- 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 19.
- You can use drives from different vendors.
- The drives in a single RAID array must be of the same type, same size, and same capacity.
- You can mix drives of different types and different capacities in one system, but not in one RAID array. You can also use a 2.5-inch drive in a 3.5-inch drive bay.

For technical rules for RAID configuration, see “Technical rules for RAID configuration” on page 100.

## Technical rules for RAID configuration

The following notes describe information that you must consider when you configure RAID.

- For software RAID, JBOD and RAID levels 0, 1, 5, and 10 are supported.
- Onboard NVMe configuration supports JBOD and RAID levels 0, 1, 5, and 10 when Intel NVMe SSDs are used.
- Both VROC Intel-SSD-Only and VROC Premium support JBOD and RAID levels 0, 1, 5, and 10, with the former using Intel NVMe drives while the latter using non-Intel NVMe drives.
  - Bootable volumes must be in the same volume management device (VMD) domain.
  - Data volumes can be deployed across VMD domains.
  - RAID volumes across CPUs are not supported.
  - VROC must be configured by referring to the following VMD domain matrix.

Table 47. VMD domain matrix

Server model	CPU 0								CPU 1							
	VMD domain				VMD domain				VMD domain				VMD domain			
	PCIe 1		PCIe 2		1 A	1 B	1 C	1 D	PCIe 3		PCIe 4		PCIe 5		PCIe 6	
– 6 SATA/SAS + 2 AnyBay + 2 NVMe – 6 SATA/SAS + 4 NVMe	6	7	8	9												
6 SATA/SAS + 4 AnyBay	6	7	8	9												
– 10 AnyBay – 10 NVMe	0	1	2	3					4	5	6	7	8	9		
16 EDSFF	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

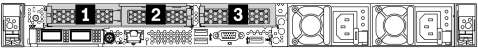
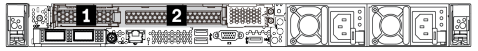
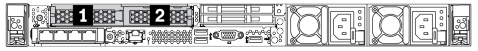
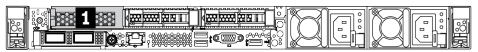
## Technical rules for PCIe adapters

Understanding the technical rules for PCIe adapters helps you correctly install and configure PCIe adapters in the system.



## PCIe adapters supported for different models

Table 48. PCIe adapters supported and their locations

Server rear view	Supported types and slot location
	<p><b>Riser 1 assembly</b></p> <ul style="list-style-type: none"> <li>Slot 1: PCIe x16 (x8, x4, x1), low-profile</li> <li>Slot 2: PCIe x16 (x8, x4, x1), low-profile</li> </ul> <p><b>Riser 2 assembly</b></p> <ul style="list-style-type: none"> <li>Slot 3: PCIe x16 (x8, x4, x1), low-profile</li> </ul>
	<p><b>Riser 1 assembly</b></p> <ul style="list-style-type: none"> <li>Slot 1: PCIe x16 (x8, x4, x1), low-profile</li> <li>Slot 2: PCIe x16 (x8, x4, x1), full-height</li> </ul> <p><b>Note:</b> One rear wall bracket must be installed next to the two PCIe slots.</p>
	<p><b>Riser 1 assembly</b></p> <ul style="list-style-type: none"> <li>Slot 1: PCIe x16 (x8, x4, x1), low-profile</li> <li>Slot 2: PCIe x16 (x8, x4, x1), low-profile</li> </ul>
	<p><b>Riser 1 assembly</b></p> <ul style="list-style-type: none"> <li>Slot 1: PCIe x16 (x8, x4, x1), low-profile</li> </ul>

To locate the PCIe slots, see “Rear view” on page 39.

## PCIe adapter installation rules and order

When installing different types of PCIe adapters, refer to the following suggested installation priority:

Table 49. Recommended installation priority for different types of PCIe adapters

1. OCP Ethernet adapter	7. InfiniBand adapter
2. Custom form factor (CFF) internal HBA/RAID adapter	8. Fiber channel adapter
3. Standard form factor (SFF) RAID adapter/Re-timer adapter	9. Network adapter
4. SFF internal HBA adapter	10. NVMe PCIe flash adapter
5. Re-timer adapter	11. External storage controller
6. GPU adapter	12. COM port bracket

When installing a specific PCIe adapter, refer to the following suggested slot installation priority:

Table 50. Recommended slot installation priority for PCIe adapters

Recommended slot installation priority	PCIe adapters
<b>Must be installed in slot 1</b>	<ul style="list-style-type: none"> <li>• SFF HBA/RAID adapter</li> <li>• ThinkSystem x16 Gen 4.0 Re-timer adapter (for 4 x NVMe)</li> </ul> <p><b>Note:</b> The RAID/HBA 4350/5350/9350-8i adapters are supported only in the server configuration with 4 x 3.5-inch SAS/SATA front bays or 8 x 2.5-inch SAS/SATA front drive bays.</p>
<b>Must be installed in slot 2 (configured as a full-height slot)</b>	<ul style="list-style-type: none"> <li>• ThinkSystem NVIDIA Quadro P2200 5GB PCIe Active GPU</li> <li>• ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter</li> </ul>
<b>Must be installed in slot 3</b>	<p>ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit</p> <p><b>Note:</b> ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit must be used together with Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter and functions as the auxiliary adapter. Two CPUs are required if both adapters are used, with the primary adapter installed in slot 1 or slot 2 while the auxiliary adapter installed in slot 3.</p>
<b>Slot 1 &gt; Slot 3 &gt; Slot 2</b>	<ul style="list-style-type: none"> <li>• ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU</li> <li>• ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU</li> <li>• NVIDIA Tesla T4 16GB Base Card (for China only)</li> <li>• NVIDIA Quadro P620 GPU</li> <li>• Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA</li> <li>• Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA</li> <li>• Mellanox ConnectX-6 Dx 10/25GbE SFP28 2-port PCIe Ethernet Adapter</li> <li>• Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter</li> </ul>
<b>Slot 2 &gt; Slot 3</b>	<p>A COM port upgrade kit needs to be installed in slot 2 or 3 as a normal PCIe adapter. In this case, a riser and bracket are needed.</p>
<b>Slot 1 &gt; Slot 2 &gt; Slot 3</b>	<p>Other PCIe adapters not mentioned above.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• For Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter, refer to the following slot priority depending on the quantity of adapters to be installed: <ul style="list-style-type: none"> <li>– Two adapters: slot 1, slot 3 or slot 2, slot 3</li> <li>– Three adapters: slot 1, slot 2, slot 3</li> </ul> </li> <li>• For Xilinx Alveo U50 100GbE 1-Port PCIe Gen4 Adapter, refer to following rules: <ul style="list-style-type: none"> <li>– The ambient temperature must be limited to 30°C or lower.</li> <li>– Use performance fans and no fan fails.</li> <li>– Only one operating system, Red Hat Enterprise Linux, is supported.</li> <li>– Do not support Vmware and Windows preload.</li> </ul> </li> <li>• The HBA 4350-8i adapter and the Intel E810-DA2 OCP adapter cannot be installed in the same system.</li> </ul>

## Technical rules for GPU adapters

Understanding the technical rules helps you choose the correct GPUs and install them in the supported slots based on what is configured for your server.

The following are rules for installing GPUs for your server:

- For GPU configuration, the CPU TDP must not be greater than 200 W. However, if the 4 x 2.5" SAS/SATA drive backplane is used or no backplane is used, the CPU TDP can support up to 270 W.
- If a passive GPU adapter is used, the performance fan must be used.
- Refer to the following slot priority when installing a GPU adapter:
  - T4, P620, A2: slot 1, slot 3, slot 2
  - P2200: slot 2 (full-height)
- When T4 or A2 is installed, the ambient temperature must be limited to 30°C or lower.
- Up to one P2200 GPU adapter is supported, while a maximum of three T4, P620 or A2 GPU adapters are supported.
- All GPUs installed must be identical.

## Technical rules for system fans

Depending on models, the server supports:

- Standard fan (21000 RPM)
- Performance fan (28000 RPM)

### Fan selection rules

The following lists the rules for selecting standard or performance fan.

Table 51. Fan selection rules for different conditions

Use	If your server meets any of the following conditions...
Standard or performance fan	TDP <= 165 W
Performance fan	<ul style="list-style-type: none"> <li>• TDP &gt; 165 W</li> <li>• Installed with the front 10 x 2.5" AnyBay drive backplane or 16-EDSFF drive backplane</li> <li>• Installed with the 2 x 2.5" rear backplane</li> <li>• Installed with any passive GPU</li> <li>• Installed with any of the following PCIe adapters:               <ul style="list-style-type: none"> <li>– ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter</li> <li>– ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter</li> <li>– Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA</li> <li>– Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter</li> <li>– Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA</li> <li>– Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter</li> <li>– ThinkSystem Xilinx Alveo U50 100GbE 1-Port PCIe Gen4 Adapter</li> </ul> </li> </ul>

### Notes:

- Standard fans are enough for low-wattage processors while you can still use performance fans for better cooling.
- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, fans 1 and 2 will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

---

## Install server hardware options

This section includes instructions for performing initial installation of optional hardware. Each component installation procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation procedures are presented in the optimum sequence to minimize work.

**Attention:** To ensure the components you install work correctly without problems, read the following precautions carefully.

- Always 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 SR630 V2 Drivers and Software](#) to download firmware updates for your server.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

## Remove the security bezel

Use this information to remove the security bezel.

### About this task

**Attention:** Read “Installation guidelines” on page 82 to ensure that you work safely.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

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

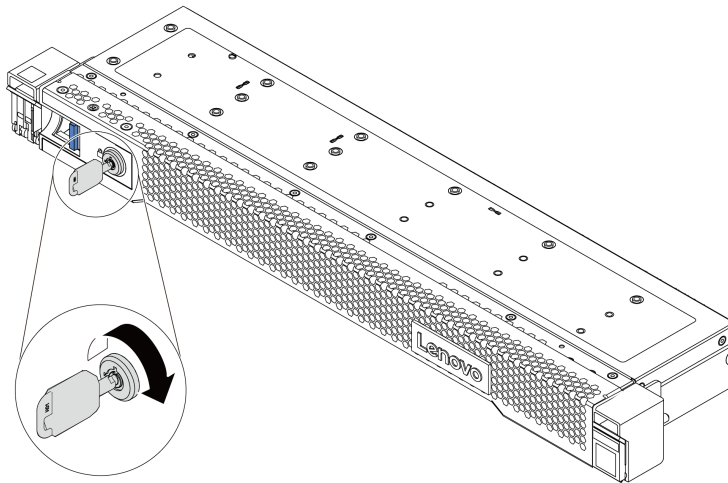


Figure 34. Unlocking the security bezel

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

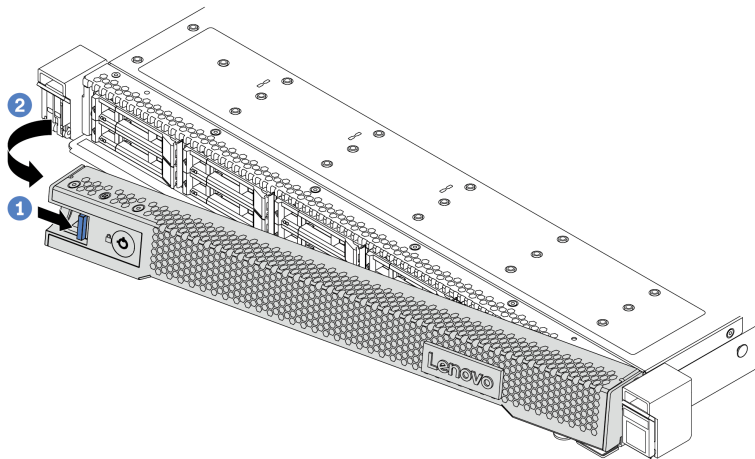


Figure 35. Security bezel removal

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

## Remove the top cover

Use this information to remove the top cover.

### About this task

**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.

**Attention:**

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

**Procedure**

- Step 1. If the server is installed in a rack, remove the server from the rack. See the Rack Installation Guide that comes with the rail kit for your server.

Step 2. Remove the top cover.

**Attention:** Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

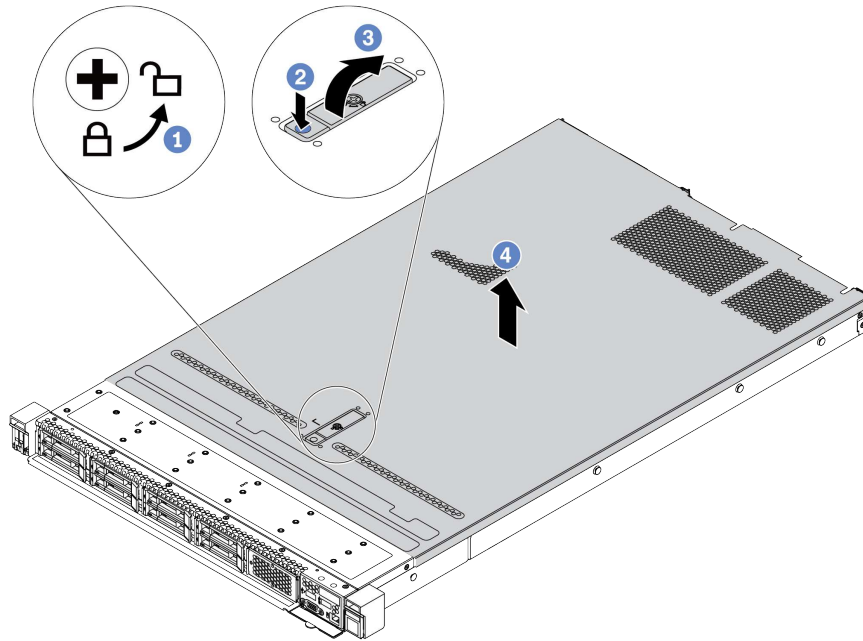


Figure 36. Top cover removal

- a. 1 Use a screwdriver to turn the cover lock to the unlocked position as shown.
- b. 2 Press the release button on the cover latch. The cover latch then gets released to some extent.
- c. 3 Fully open the cover latch as shown.
- d. 4 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.

## After you finish

Install any options you want to install.

## Remove the air baffle

Use this information to remove the air baffle.

## About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to remove might be different from the following illustrations, but the removal method is the same.

**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.**

**Attention:**

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

**Procedure**

- Step 1. If there is a RAID flash power module installed on the bottom of the air baffle, disconnect the RAID flash power module cable first.



Step 2. Grasp the air baffle and carefully lift it out of the server.

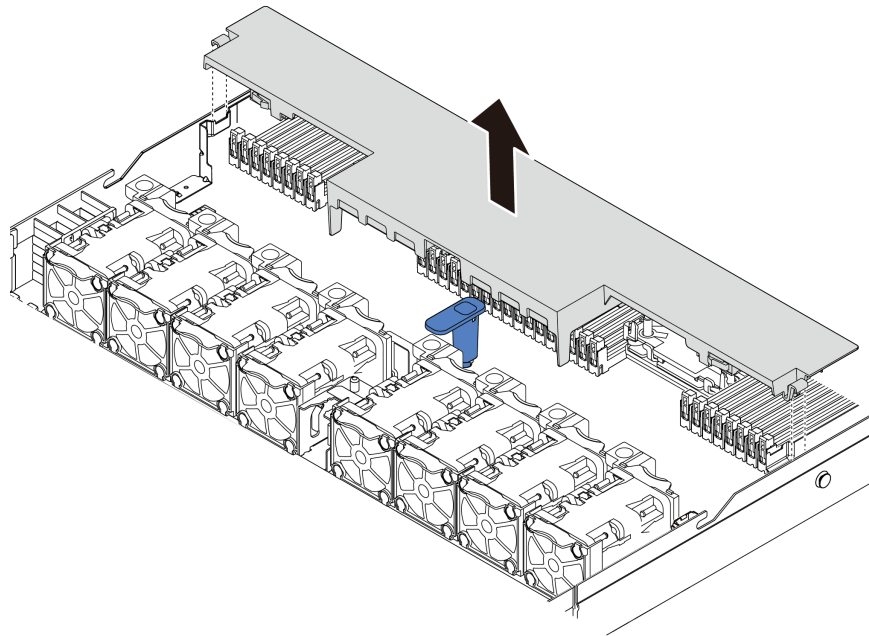


Figure 37. Air baffle removal

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

## After you finish

Install any options that you have purchased.

## Install a processor-heat-sink module

The processor and heat sink are removed together as part of a processor-heat-sink-module (PHM) assembly. PHM installation requires a Torx T30 driver.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.
- 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:**

- The heat sink, processor, and processor carrier for your system might be different than those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://static.lenovo.com/us/en/serverproven/index.shtml> for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “Update the firmware” on page 155.
- Installing an additional PHM can change memory requirements for the system. See “Memory module installation rules and order” on page 85 for a list of processor-to-memory relationships.

The following illustration shows the components of the PHM.

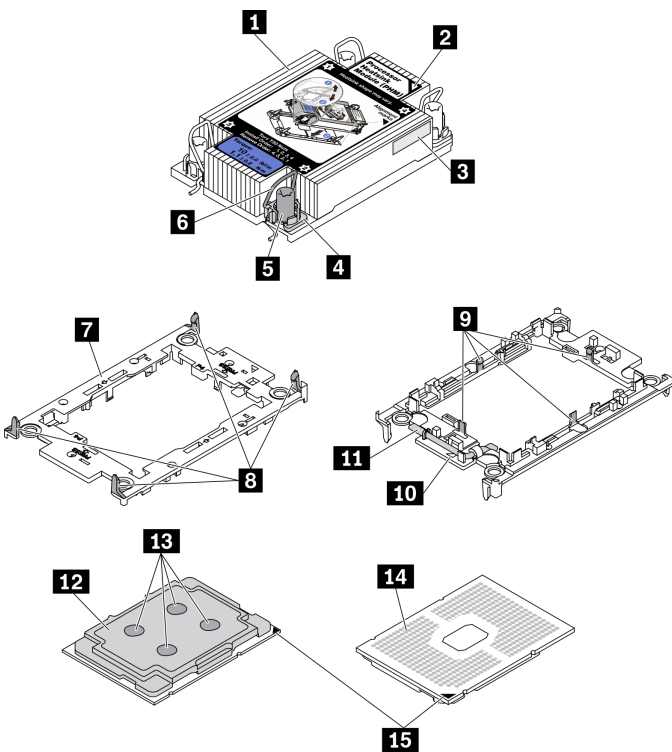


Figure 38. PHM components

<b>1</b> Heat sink	<b>9</b> Clips to secure processor in carrier
<b>2</b> Heat sink triangular mark	<b>10</b> Carrier triangular mark
<b>3</b> Processor identification label	<b>11</b> Processor ejector handle
<b>4</b> Nut and wire bail retainer	<b>12</b> Processor heat spreader
<b>5</b> Torx T30 nut	<b>13</b> Thermal grease

<b>6</b> Anti-tilt wire bail	<b>14</b> Processor contacts
<b>7</b> Processor carrier	<b>15</b> Processor triangular mark
<b>8</b> Clips to secure carrier to heat sink	

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- 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 into the system board socket.

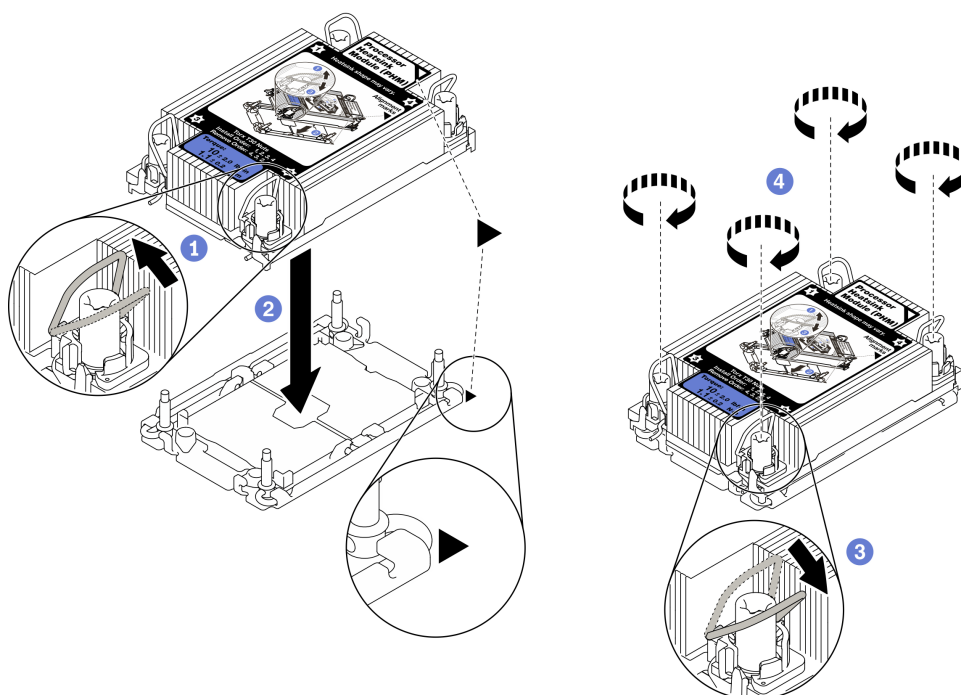


Figure 39. Installing a PHM

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

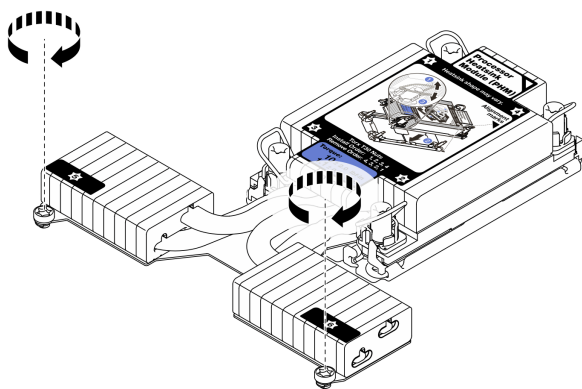


Figure 40. Tightening T-shaped heat sink screws

## After you finish

If there are memory modules to install, install them. See “Install a memory module” on page 112.

## Install a memory module

Use this information to install a memory module.

### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and 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 84:
  - 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.

## Procedure

- Step 1. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, take the memory module out of the package and place it on a static-protective surface.
- Step 2. Locate the required memory module slot on the system board.

**Note:** Ensure that you observe the installation rules and sequence in “Memory module installation rules and order” on page 85.

Step 3. Install the memory module into the slot.

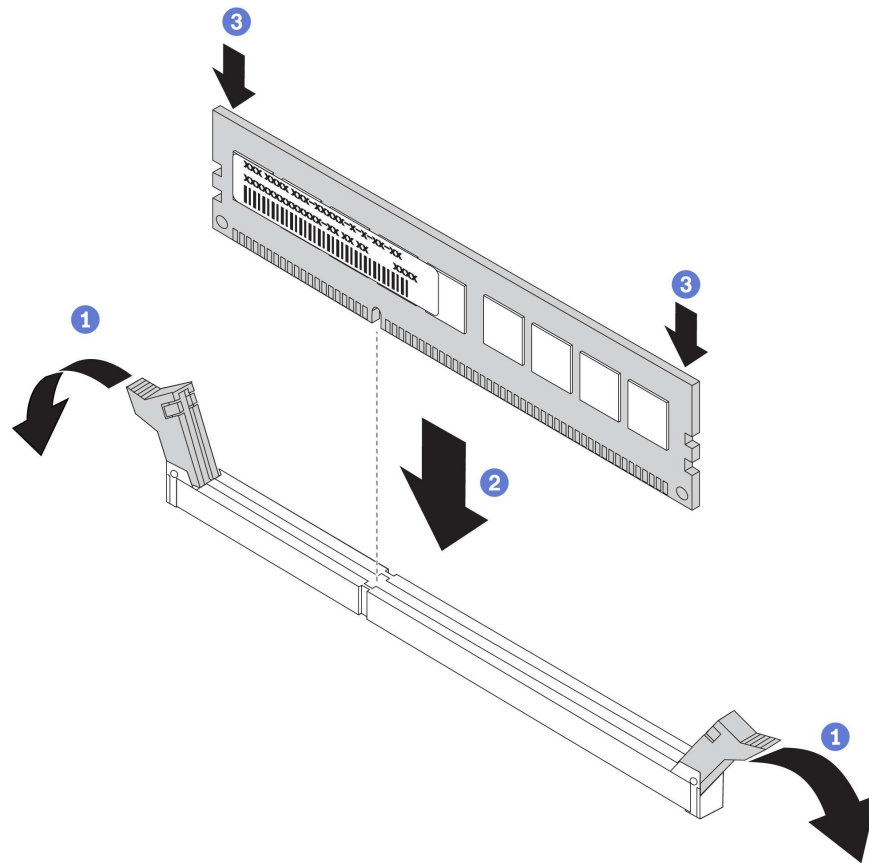


Figure 41. Memory module installation

- a. ① Open the retaining clip 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.

- b. ② Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- c. 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. In this case, open the retaining clips, remove the memory module, and then reinsert it.

## Install the front 2.5-inch drive backplane

### About this task

The following describes how to install the backplane for ten 2.5-inch hot-swap drives. You can install the backplane for four or eight 2.5-inch hot-swap drives in the same way.

#### Attention:

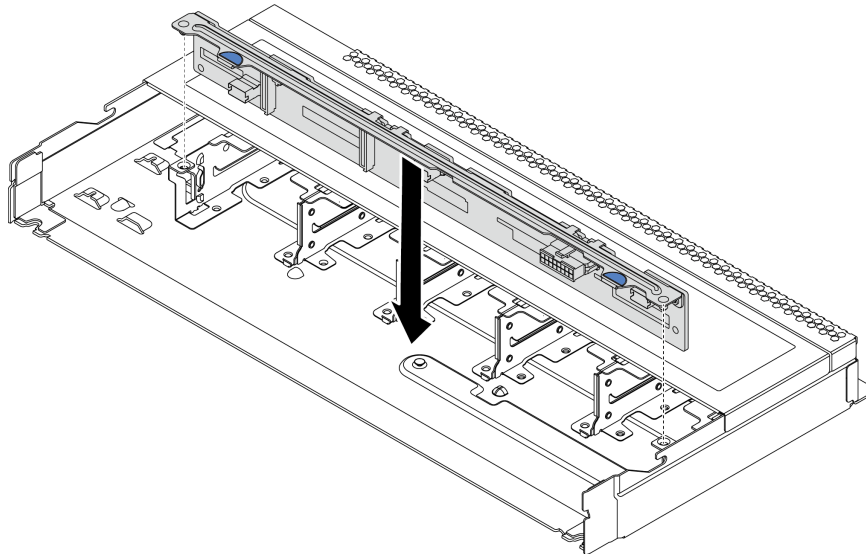
- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.
- Step 3. Align the two pins on the backplane with the corresponding holes in the chassis.



*Figure 42. Installation of backplane for ten 2.5-inch hot-swap drives*

- Step 4. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.
- Step 5. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.

### Install the front 3.5-inch drive backplane

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

#### About this task

##### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.

- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.
- Step 3. Put the backplane down into place.

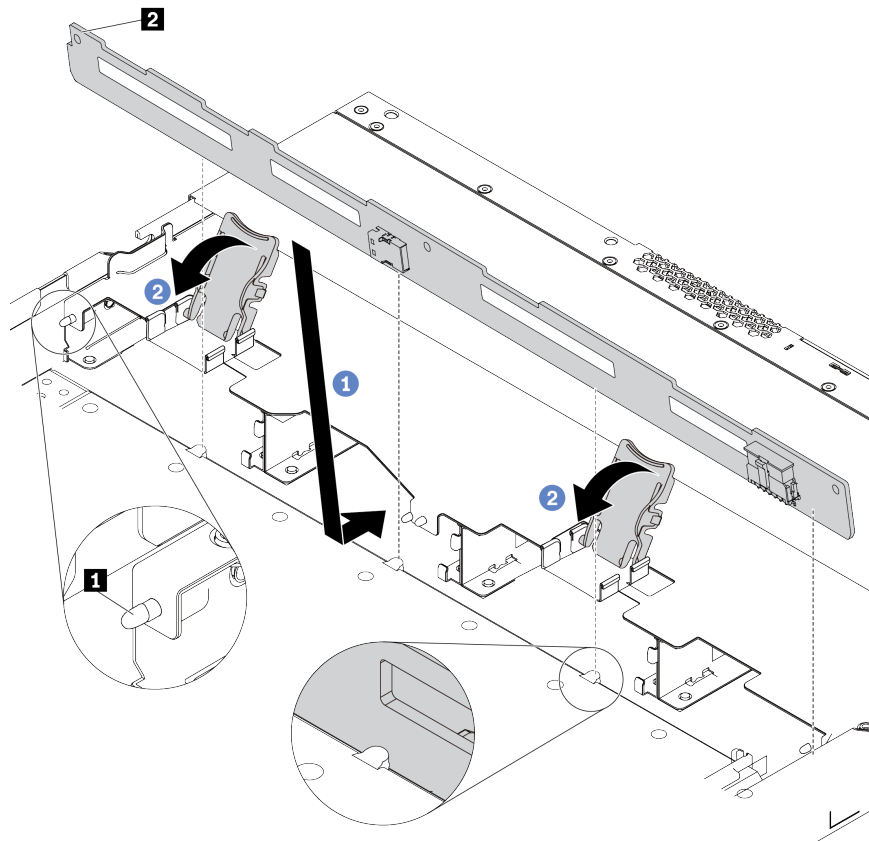


Figure 43. Installation of backplane for four 3.5-inch hot-swap drives

- 1 Put the backplane under the front I/O assembly cables, align it with the chassis, and lower it into the chassis. Put the backplane into place with it leaning backward slightly so that the three pins **1** on the chassis pass through the three holes **2** in the backplane.
- 2 Close the release latches to secure the backplane in place.

Step 4. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.

## After you finish

Reinstall all the drives and drive fillers into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 124.

## Install the front 16-EDSFF drive backplane

Use this information to install the backplane for front 16 EDSFF drives.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “16-EDSFF drive backplane” on page 59.



Step 3. Put the backplane down into place.

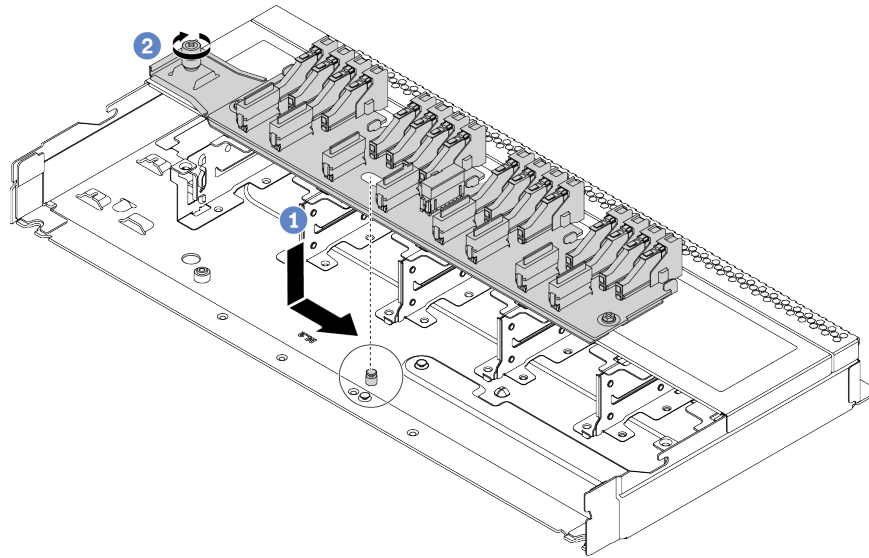


Figure 44. Installation of backplane for 16 EDSFF drives

- a. **1** Align the hole on the backplane with the pin on the chassis, place it down, and slightly slide it as shown.
- b. **2** Tighten the screw to secure the backplane.

Step 4. Connect the cables to the system board or expansion slots. See “16-EDSFF drive backplane” on page 59.

## Install the 7mm drive backplanes

Use this information to install the 7mm drive backplanes.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

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

Step 2. Install the 7mm drive backplane at the bottom.

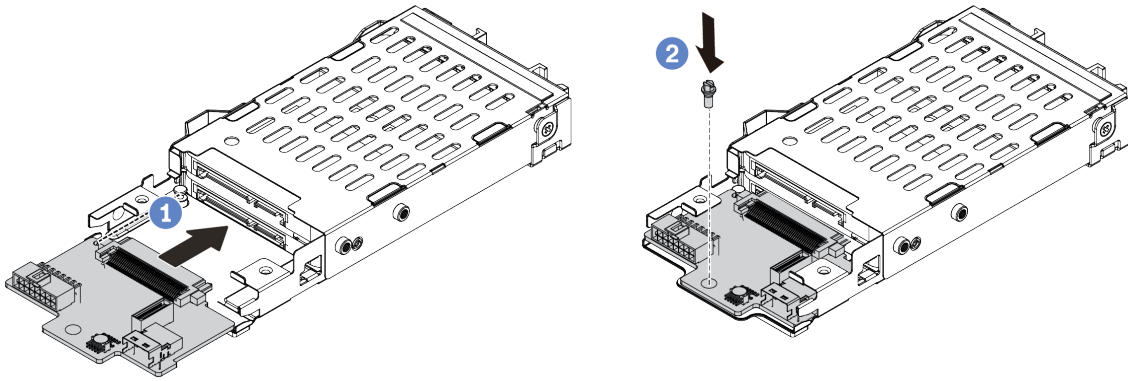


Figure 45. 7mm drive backplane installation (bottom)

- a. Align the pin on the cage and slightly slide the backplane into the cage until it is fully seated.
- b. Install the screw as shown.

Step 3. Install the 7mm drive backplane on the top.

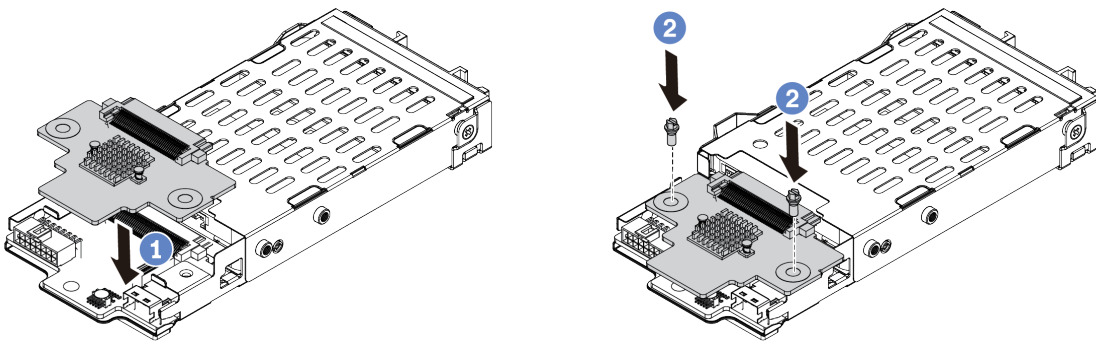


Figure 46. 7mm drive backplane installation (top)

- a. Put the backplane down on the cage as shown.
- b. Install the two screws to secure the backplane in place

Step 4. Connect the cables from the backplanes to the system board and riser slot. See “7mm drive backplane” on page 60.

### After you finish

1. Install the 7mm drive cage assembly on the rear chassis. See “Install the rear hot-swap drive assembly” on page 127.
2. Reinstall all the drives and fillers (if any) into the drive bays.

### Install the rear 2.5-inch drive backplane

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

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the rear hot-swap drive cage to any unpainted surface on the outside of the server. Then, take the rear hot-swap drive cage out of the package and place it on a static-protective surface.
- Step 2. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

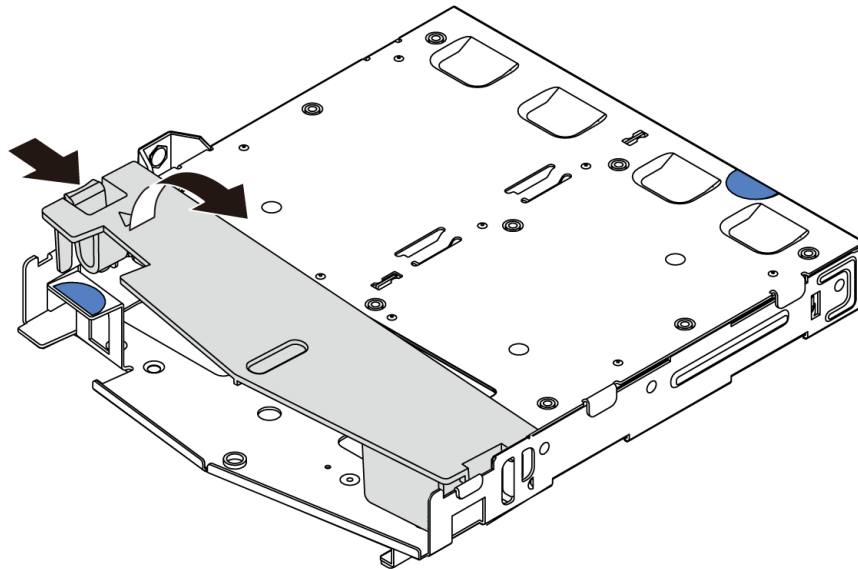


Figure 47. Air baffle removal

- Step 3. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

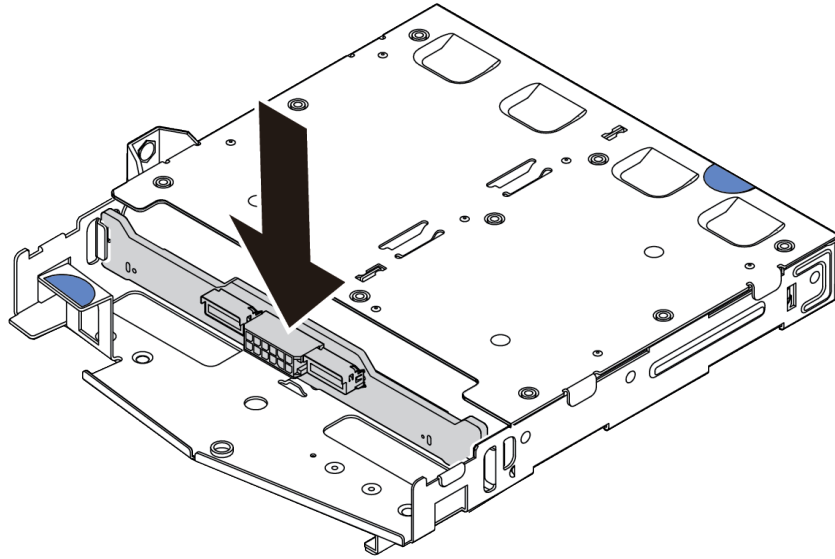


Figure 48. Rear backplane installation

- Step 4. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.
- Step 5. Install the air baffle into the rear hot-swap drive cage as shown.

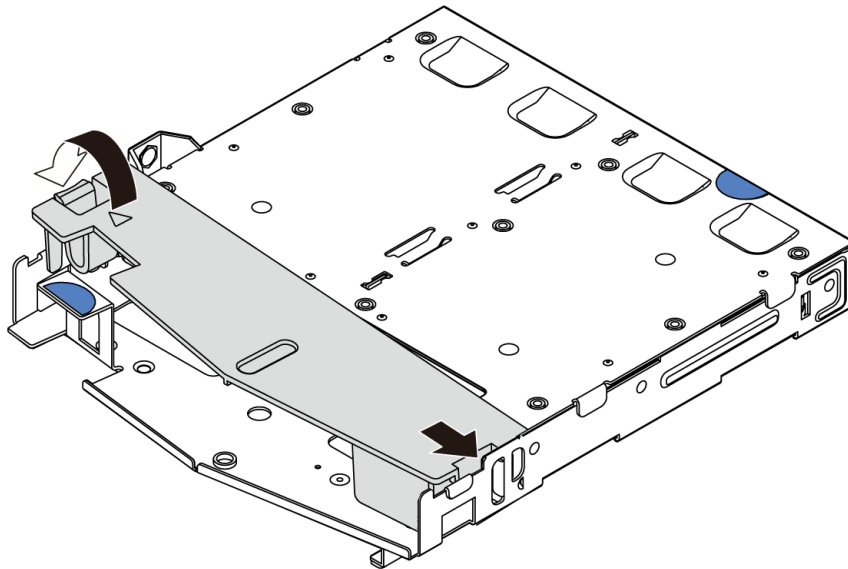


Figure 49. Air baffle installation

- Step 6. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.

### After you finish

1. Install the rear 2.5-inch drive assembly onto the chassis. See “Install the rear hot-swap drive assembly” on page 127.

2. Install the drives or drive fillers into the rear hot-swap drive assembly. See “Install a 2.5/3.5-inch hot-swap drive” on page 124.

## Install the M.2 backplane and M.2 drive

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

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.

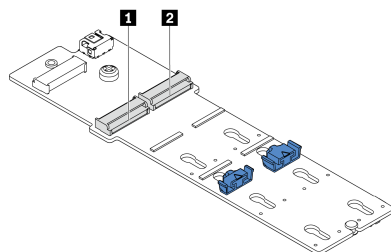
#### Notes:

- The M.2 backplane module is shipped with a loose screw, but the screw is not necessarily used for the installation.
- The M.2 backplane you want to install might be different from the following illustrations, but the installation method is the same.

- Step 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 123.

- Step 3. Locate the M.2 drive slot on the M.2 backplane.

**Note:** For some M.2 backplanes that support two identical M.2 drives, install the M.2 drive in slot 0 first.



- 1 Slot 0
- 2 Slot 1

Figure 50. M.2 drive slot

Step 4. Install the M.2 backplane onto the chassis.

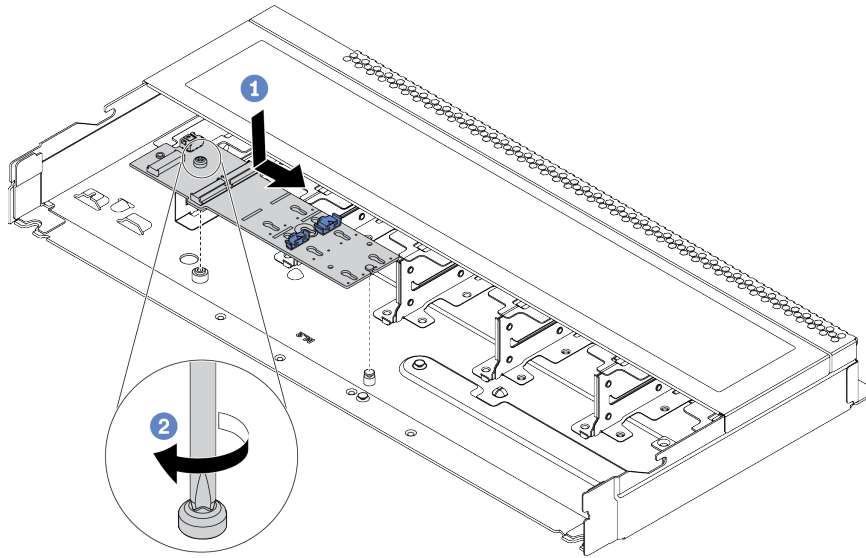


Figure 51. M.2 backplane installation

- a. Align the notch of the M.2 backplane with the pin on the chassis, and then place down the M.2 backplane.
- b. Tighten the screw to secure the M.2 backplane.

Step 5. Install the M.2 drive on the M.2 backplane.

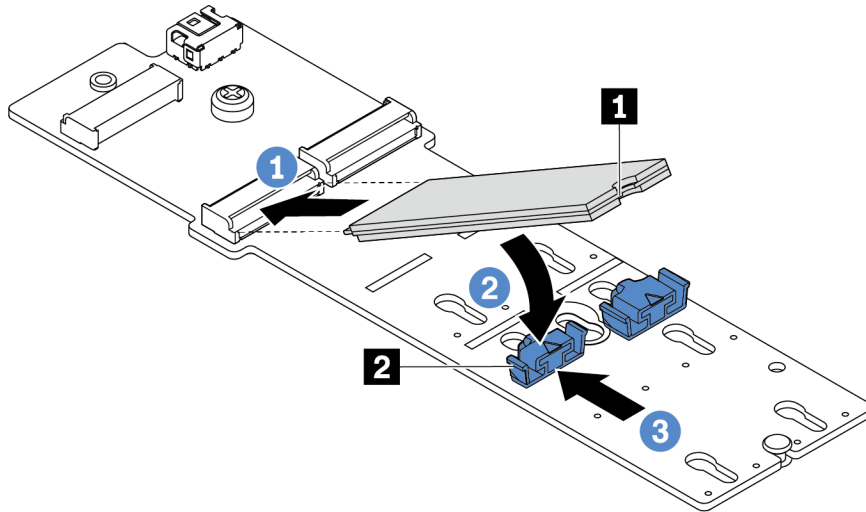


Figure 52. M.2 drive installation

- a. Insert the M.2 drive at an angle of approximately 30 degrees into the connector.
- b. Rotate the M.2 drive down until the notch **1** catches on the lip of the retainer **2**.
- c. Slide the retainer forward (toward the connector) to secure the M.2 drive into place.

Step 6. Connect the cables to the M.2 backplane and system board. See “M.2 drive backplane” on page 58.

## After you finish

Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: [https://sysmgmt.lenovofiles.com/help/topic/ixpm\\_frontend/ixpm\\_product\\_page.html](https://sysmgmt.lenovofiles.com/help/topic/ixpm_frontend/ixpm_product_page.html)

## Adjust the retainer on the M.2 backplane

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

## About this task

### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

**Note:** The M.2 backplane you want to adjust might be different from the following illustrations, but the adjustment method is the same.

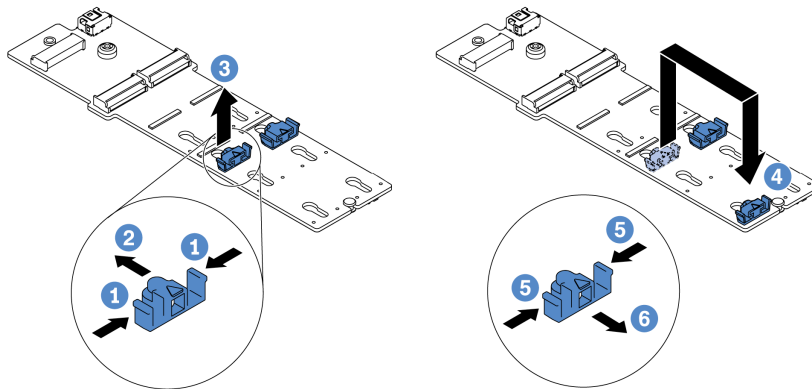


Figure 53. M.2 retainer adjustment

- Step 1. Press both sides of the retainers.
- 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 into which the retainer should be installed to accommodate the particular size of the M.2 drive you wish to install.
- Step 5. Press both sides of the retainer.
- Step 6. Slide the retainer backwards until it is seated in place.

## Install a 2.5/3.5-inch hot-swap drive

Use this information to install a hot-swap drive.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- 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.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

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

**Note:** Ensure that drive installation meets “Technical rules for drives” on page 99.

Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

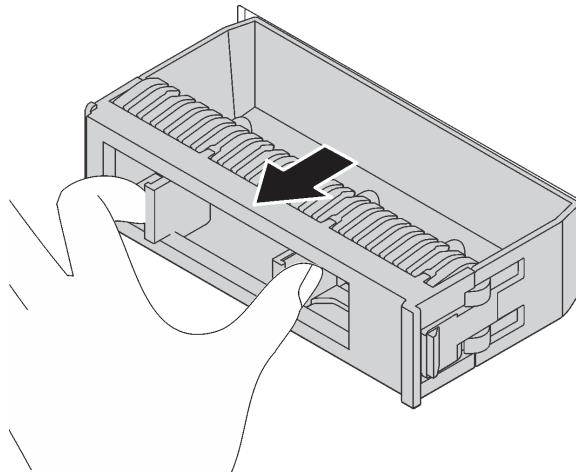


Figure 54. Drive filler removal



Step 3. Install the drive in the drive bay.

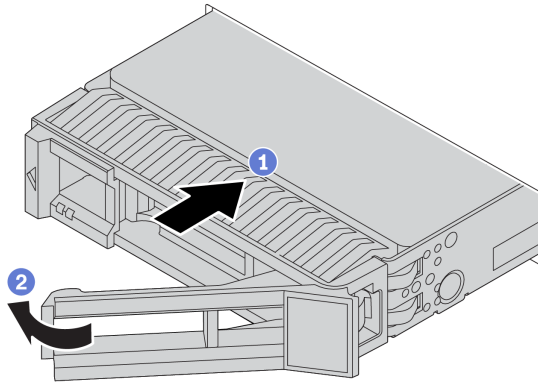


Figure 55. Hot-swap drive installation

- a. **1** Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- b. **2** Close the drive tray handle to lock the drive in place.

Step 4. Check the drive LEDs to verify that the drive is operating correctly. For details, see “Drive LEDs” on page 25.

Step 5. Continue to install additional hot-swap drives if necessary.

## Install an EDSFF drive

Use this information to install an EDSFF drive.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- 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.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvUOK>.

### Procedure

Step 1. Read “Technical rules for drives” on page 99 before you install the hot-swap drive.

Step 2. Touch the static-protective package that contains the 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.

Step 3. Remove the EDSFF drive cage cover.

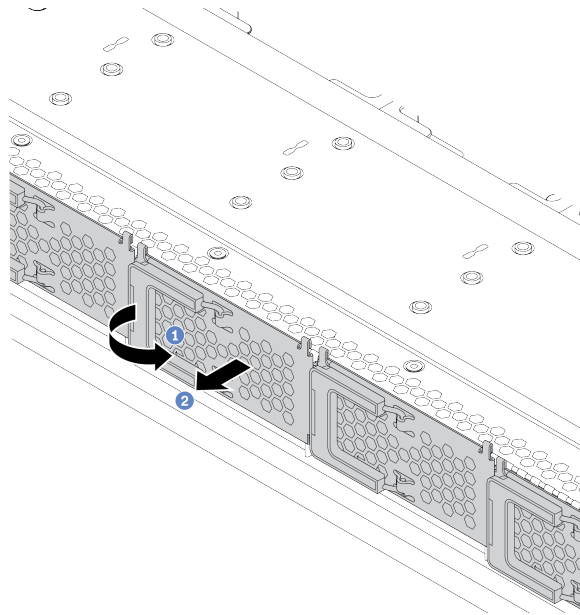


Figure 56. EDSFF drive cage cover removal

- a. ① Open the handle as shown.
- b. ② Grasp the handle and remove the drive cage cover.

Step 4. Install the EDSFF drive.

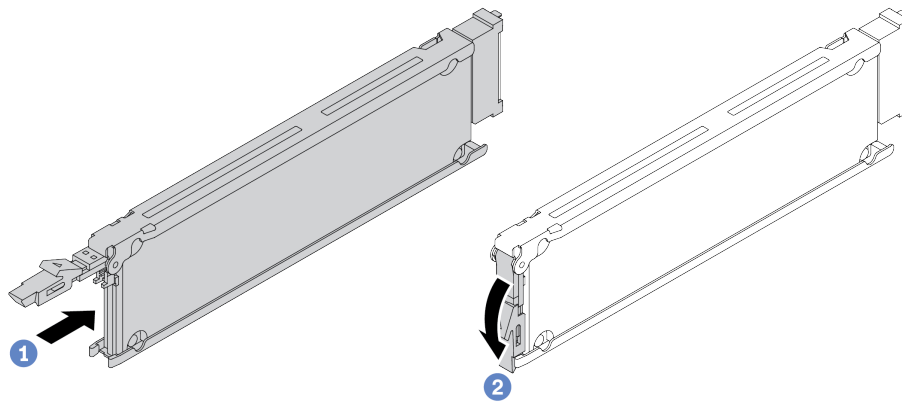


Figure 57. EDSFF drive installation

- a. ① Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- b. ② Close the drive tray handle to lock the drive in place.

Step 5. Continue to install additional hot-swap drives if necessary.

Step 6. Install the EDSFF drive cage cover.

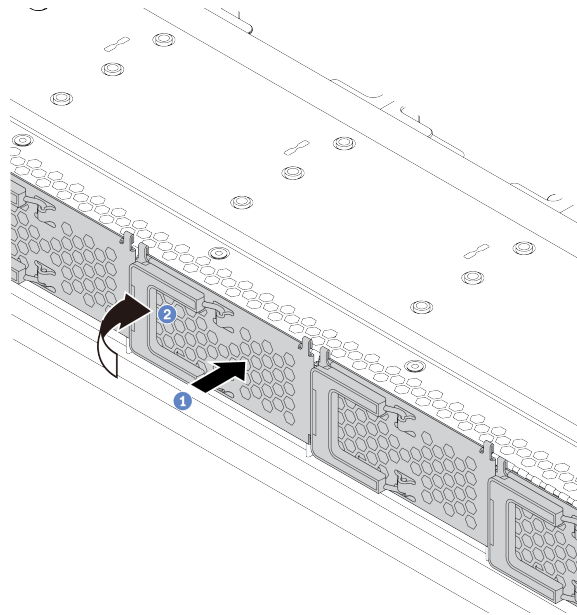


Figure 58. EDSFF drive cage cover installation

- a. **1** Install the drive cage cover in place.
- b. **2** Close the drive cage handle.

## Install the rear hot-swap drive assembly

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

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

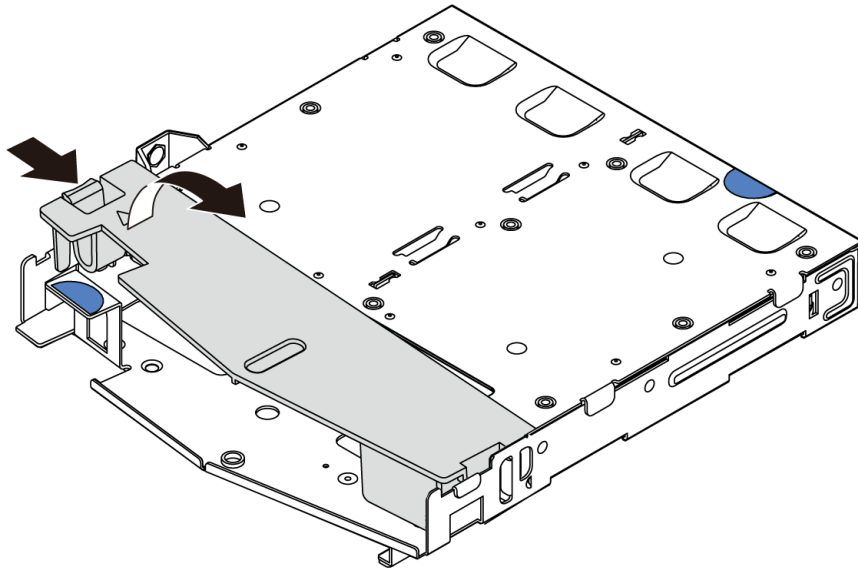
#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

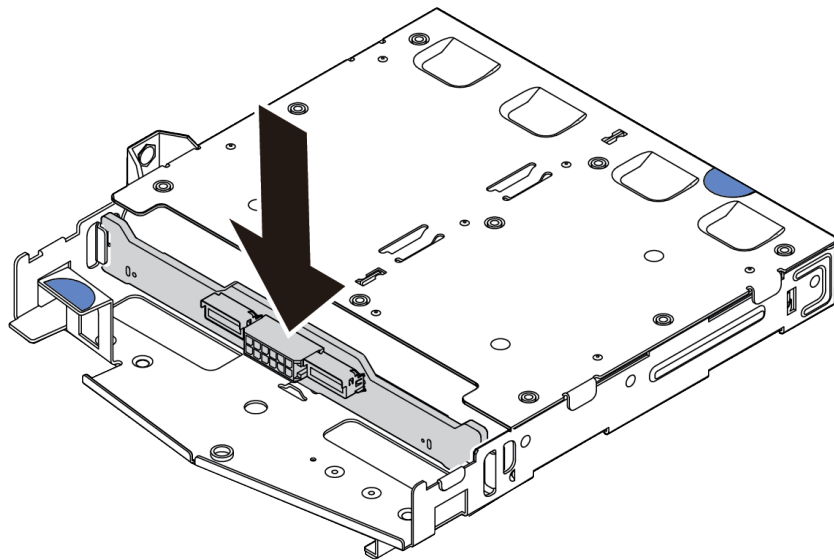
- Step 1. Touch the static-protective package that contains the rear hot-swap drive cage to any unpainted surface on the outside of the server. Then, take the rear hot-swap drive cage out of the package and place it on a static-protective surface.

Step 2. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.



*Figure 59. Air baffle removal*

Step 3. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.



*Figure 60. Rear backplane installation*

Step 4. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.

Step 5. Install the air baffle into the rear hot-swap drive cage as shown.

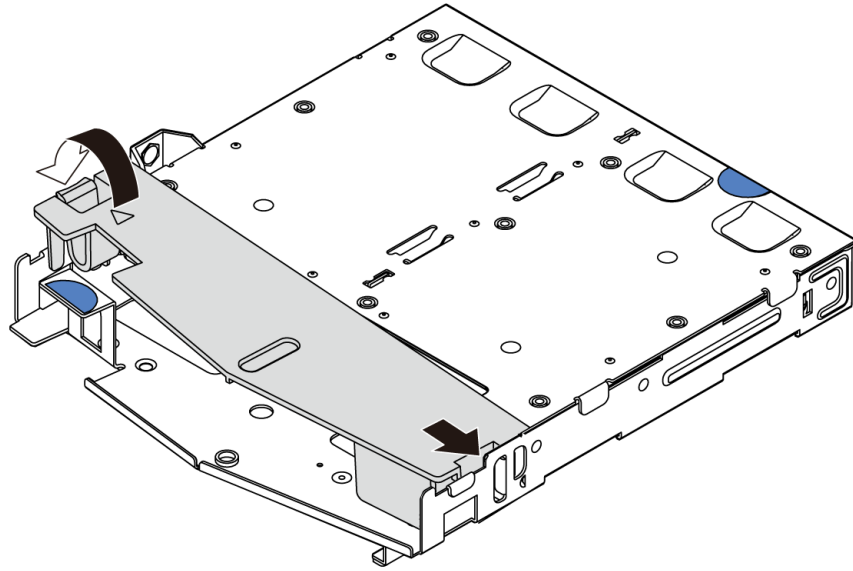


Figure 61. Air baffle installation

Step 6. Align the pins on the rear hot-swap drive cage with the corresponding hole and slot in the chassis. Then, lower the rear hot-swap drive cage into the chassis until it is fully seated.

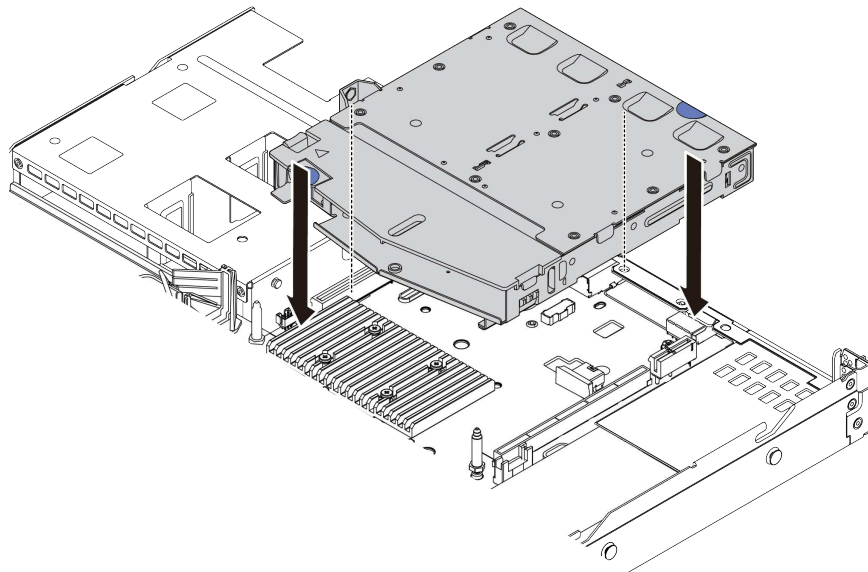


Figure 62. Rear hot-swap drive cage installation

Step 7. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 61 and “2.5-inch/3.5-inch drive backplane (signal)” on page 62.

## After you finish

Install the drives or drive fillers into the rear hot-swap drive assembly. See “Install a 2.5/3.5-inch hot-swap drive” on page 124.

## Install a PCIe adapter and riser assembly

Use this information to install a PCIe adapter and riser assembly.

### About this task

There are different types of riser assembly configurations. The procedure for installing the riser card and PCIe adapter is similar for all types of riser assembly. The following takes the LPFH riser assembly as an example.

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the PCIe adapter to any unpainted surface on the outside of the server. Then, take the PCIe adapter out of the package and place it on a static-protective surface.
- Step 2. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see “Rear view” on page 39.
- Step 3. Remove the PCIe slot filler if there is a filler installed.
- Step 4. Install the PCIe adapter and secure it to the riser assembly.

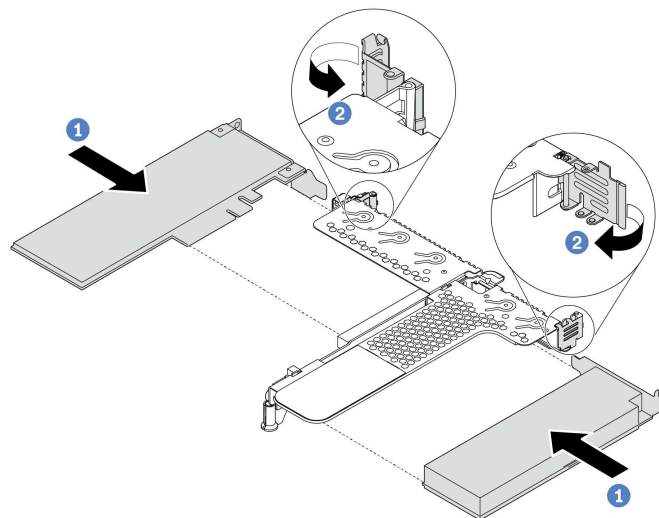


Figure 63. PCIe adapter installation into the LPFH riser assembly

- a. Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.
- b. Pivot the latch on the riser bracket to the closed position.

- Step 5. Connect cables to the PCIe adapter in the riser assembly. See Chapter 3 “Internal cable routing” on page 51.
- Step 6. Position the riser assembly on the chassis. Align the plastic clip and two pins on the bracket with the guide pin and two holes in the chassis and align the riser card with the riser slot on the system board. Then, carefully press the riser assembly straight down into the slot until it is fully seated.

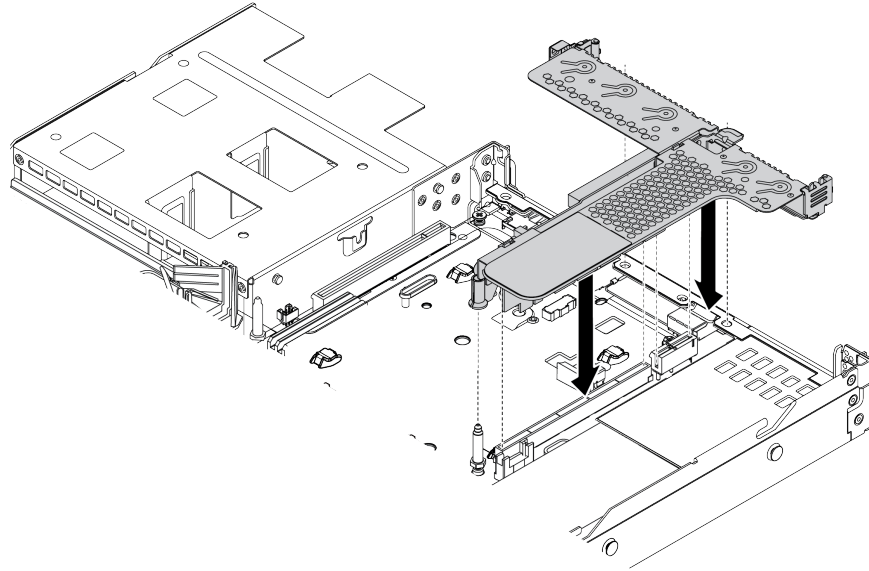


Figure 64. Riser assembly installation

- Step 7. For the LPFH riser assembly, you need to install the rear wall bracket.

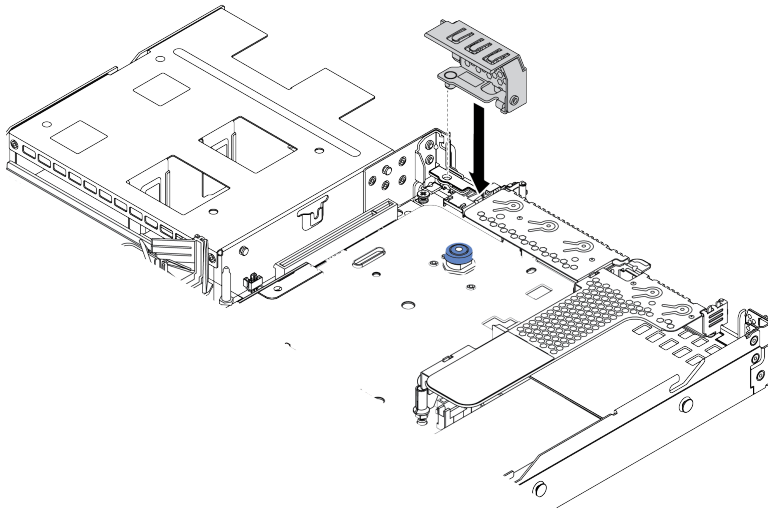


Figure 65. Rear wall bracket installation

## Install the internal RAID adapter

Use this information to install the internal RAID adapter.

### About this task

#### Attention:

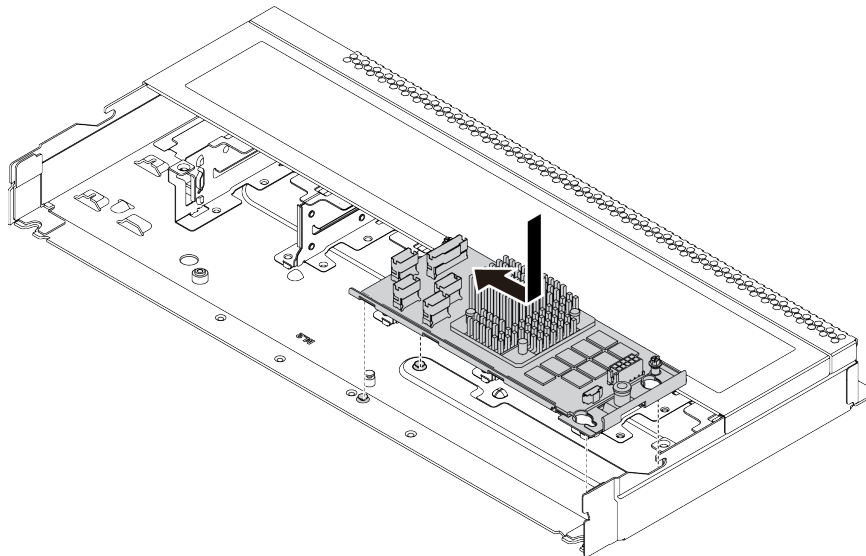
- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the internal RAID adapter to any unpainted surface on the outside of the server. Then, take the internal RAID adapter out of the package and place it on a static-protective surface.
- Step 2. Remove any components that may impede installation of the internal RAID adapter.
- Step 3. Align the notches on the tray with the pins on the chassis, place down the internal RAID adapter, and slightly slide it as shown to secure it on the chassis.



*Figure 66. Internal RAID adapter installation*

- Step 4. Connect cables to the internal RAID adapter. See “CFF HBA/RAID adapter” on page 53.

### After you finish

Reinstall the components that you have been removed for installing the internal RAID adapter.

### Install the RAID flash power module

Use this information to install the RAID flash power module.

### About this task

#### Attention:



- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

**Note:** The following illustrates the locations for super capacitor modules.

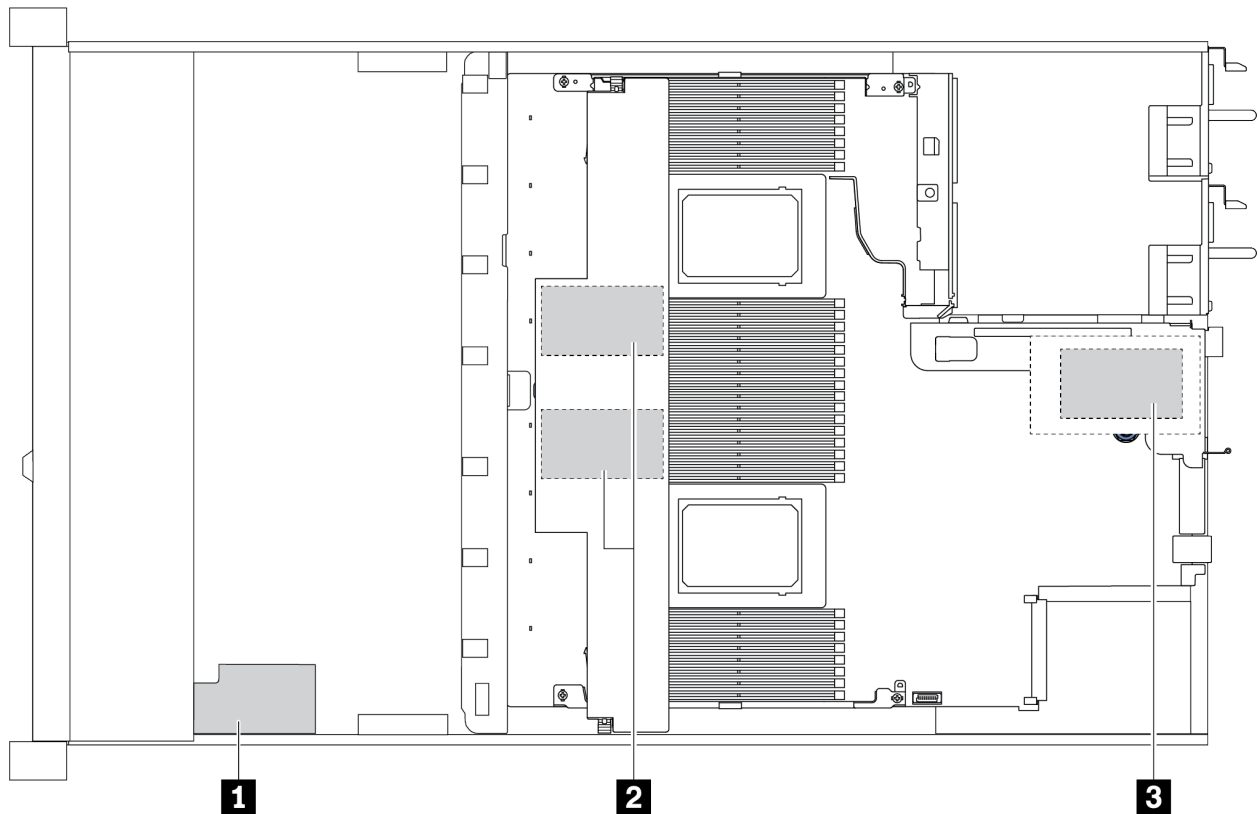


Figure 67. RAID flash power module location

### Install the RAID flash power module on the riser

Use this information to install the RAID super capacitor module on the riser.

#### About this task

##### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. Touch the static-protective package that contains the RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.
- Step 2. Install the RAID super capacitor module on the riser.

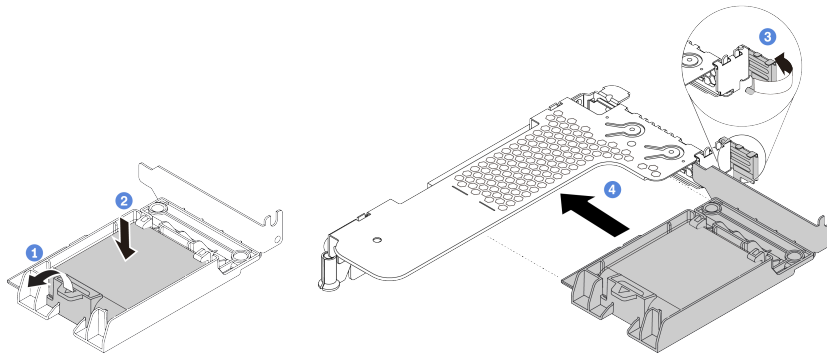


Figure 68. Installation of the RAID flash power module on the riser

- a. Open the retention clip on the holder.
- b. Put the RAID flash power module into the holder and press it down to secure it into the holder.
- c. Pivot the latch on the riser bracket to the open position.
- d. Align the RAID super capacitor assembly with the slot on the riser card. Then, carefully press the RAID super capacitor assembly straight into the slot until it is securely seated and its bracket also is secured.

## After you finish

1. Install the riser assembly on the chassis. See “Install a PCIe adapter and riser assembly” on page 130.
2. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID flash power modules” on page 56.

## Install the RAID flash power module on the air baffle

Use this information to install the RAID super capacitor module on the air baffle.

## About this task

### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

## Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmx8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. Touch the static-protective package that contains the RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.
- Step 2. Install the RAID super capacitor module on the air baffle.

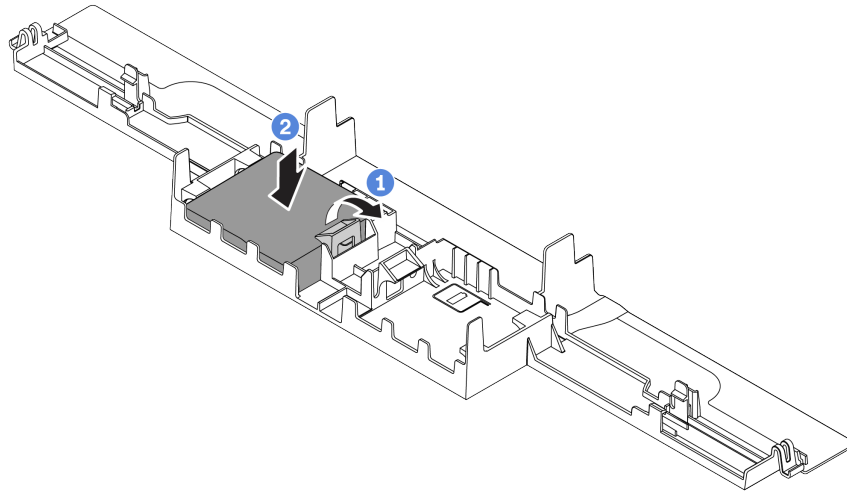


Figure 69. Installation of the RAID flash power module on the air baffle

- a. Open the retention clip on the holder.
- b. Put the RAID flash power module into the air baffle and press it down to secure it into the air baffle.

## After you finish

1. Install the air baffle on the chassis. See “Install the air baffle” on page 143.
2. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID flash power modules” on page 56.

## Install the RAID flash power module on the chassis

Use this information to install the RAID flash power module on the chassis.

## About this task

### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

## Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. Touch the static-protective package that contains the RAID flash power module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.
- Step 2. If the server comes with a tray that covers the place of the RAID flash power module on the chassis, remove it first.

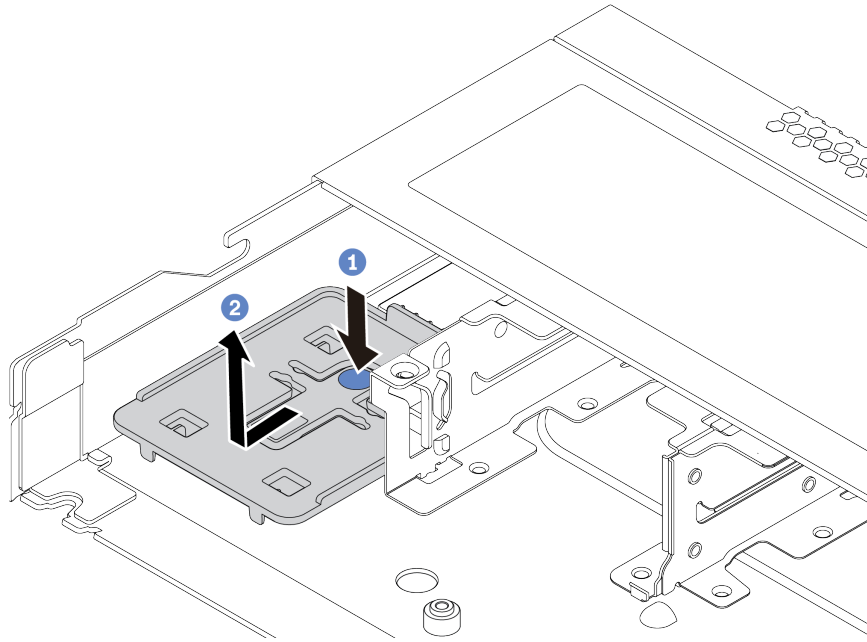


Figure 70. Tray removal

Step 3. If the server does not have a RAID flash power module holder on the chassis, install one first.

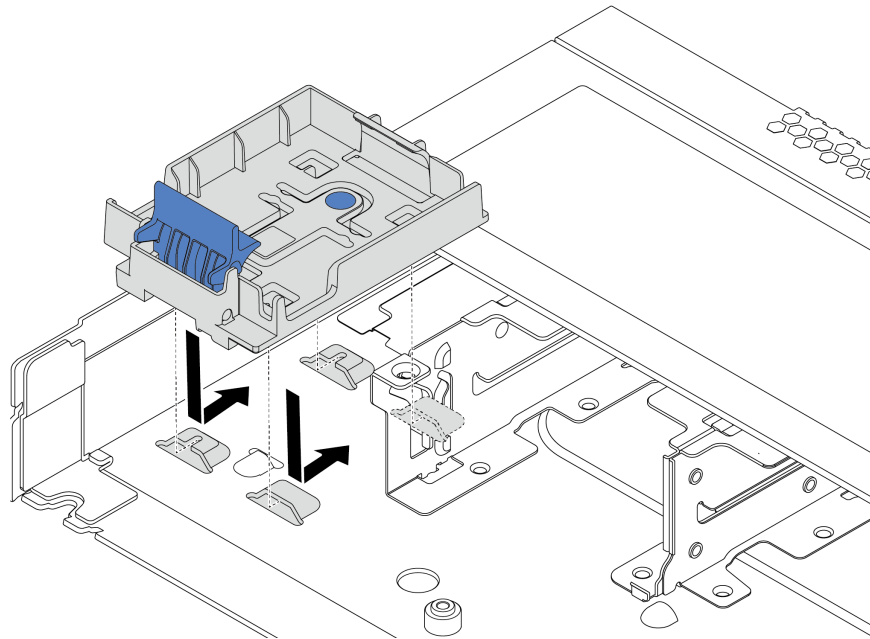


Figure 71. RAID flash power module holder installation

Step 4. Install the RAID flash power module on the chassis.

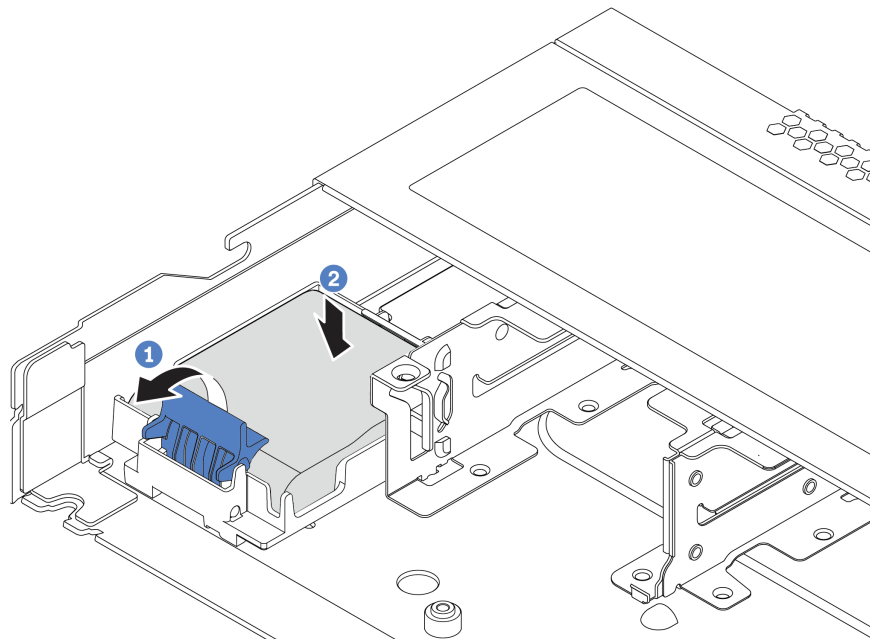


Figure 72. Installation of the RAID flash power module on the chassis

- a. Open the retention clip on the holder.
- b. Put the RAID flash power module into the holder and press it down to secure it into the holder.

## After you finish

Connect the flash power module to an adapter with the extension cable that comes with the super capacitor module. See “RAID flash power modules” on page 56.

## Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

- Step 1. Touch the static-protective package that contains the OCP 3.0 Ethernet adapter to any unpainted surface on the outside of the server. Then, take the OCP 3.0 Ethernet adapter out of the package and place it on a static-protective surface.
- Step 2. Remove the OCP bay filler if there is a filler installed.
- Step 3. Attach the OCP 3.0 Ethernet adapter label that comes with this option on the rear of the server.

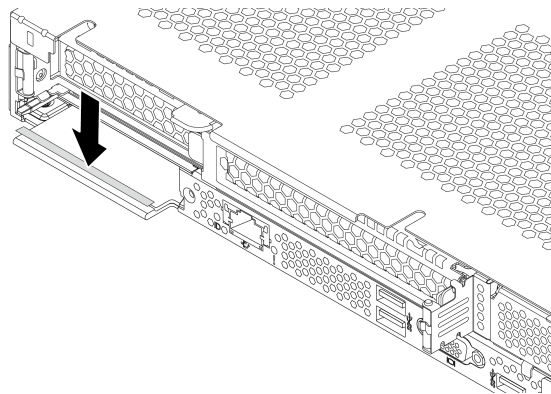


Figure 73. OCP 3.0 Ethernet adapter label installation

Step 4. Install the OCP 3.0 Ethernet adapter.

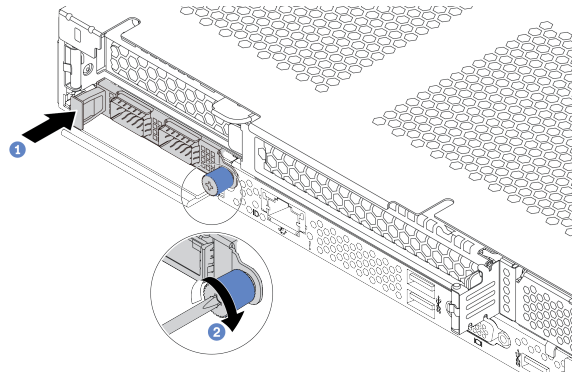


Figure 74. OCP 3.0 Ethernet adapter installation

- a. Push the OCP 3.0 Ethernet adapter as shown to insert it into the connector on the system board.
- b. Tighten the thumbscrew to secure the adapter.

**Notes:**

- Ensure that the thumbscrew is securely tightened. Otherwise, the OCP 3.0 Ethernet adapter will not get full connection and may not function.
- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, system fans will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

## Install a serial port module

Use this information to install a serial port module. Ensure that a riser card and riser bracket are available before installing the serial port module.

### About this task

**Attention:**

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Read the “Technical rules for PCIe adapters” on page 100 to ensure that you install the serial port module to a correct PCIe slot.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

### Procedure

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

Step 2. Use a 5 mm wrench to install the serial port cable into the bracket.

- a. 1 Engage the connector to the bracket.
- b. 1 Tighten two screws to ensure that the connector is securely installed to the bracket.

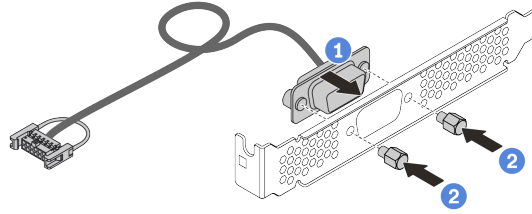


Figure 75. Assembling the serial port module

Step 3. Install the serial port module to the riser bracket.

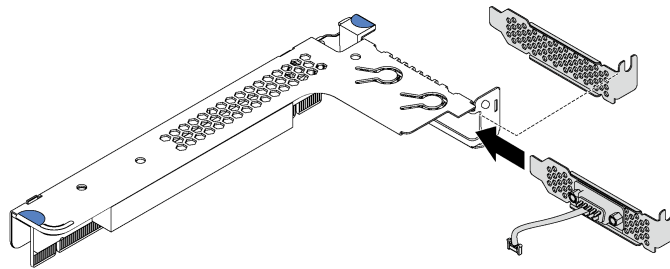


Figure 76. Installing the serial port module

Step 4. Install the riser assembly to the server.

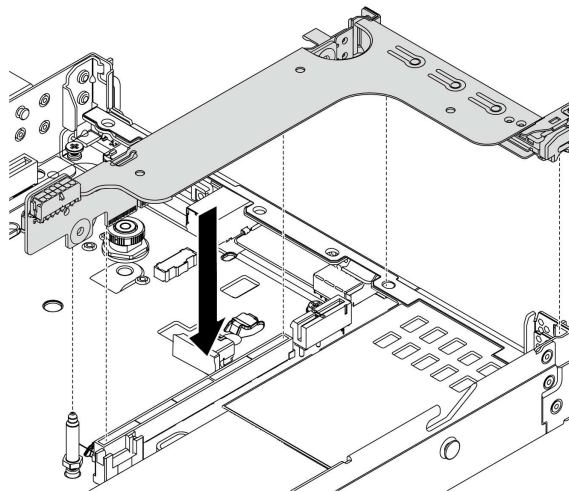


Figure 77. Installing the riser assembly

Step 5. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module connector, refer to “System board components” on page 44.

## After you finish



To enable the serial port module, do one of the following according to the installed operating system:

- For Linux operating system:

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

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

- For Microsoft Windows operating system:

1. Open the ipmitool and enter the following command to disable the SOL feature:

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

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

```
Bcdedit /ems no
```

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

## Install a system fan

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

### About this task

#### 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.**

#### **Attention:**

- Read "Installation guidelines" on page 82 to ensure that you work safely.
- 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.

#### **Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. If there is a fan filler installed, remove it.
- Step 2. Touch the static-protective package that contains the system fan to any unpainted surface on the outside of the server. Then, take the system fan out of the package and place it on a static-protective surface.

**Note:** Ensure that fan installation meets “Technical rules for system fans” on page 103.

- Step 3. Place the system fan down in the slot and then press the point on its edge to secure it in place. Ensure that the fan connector is installed correctly to the connector on the system board.

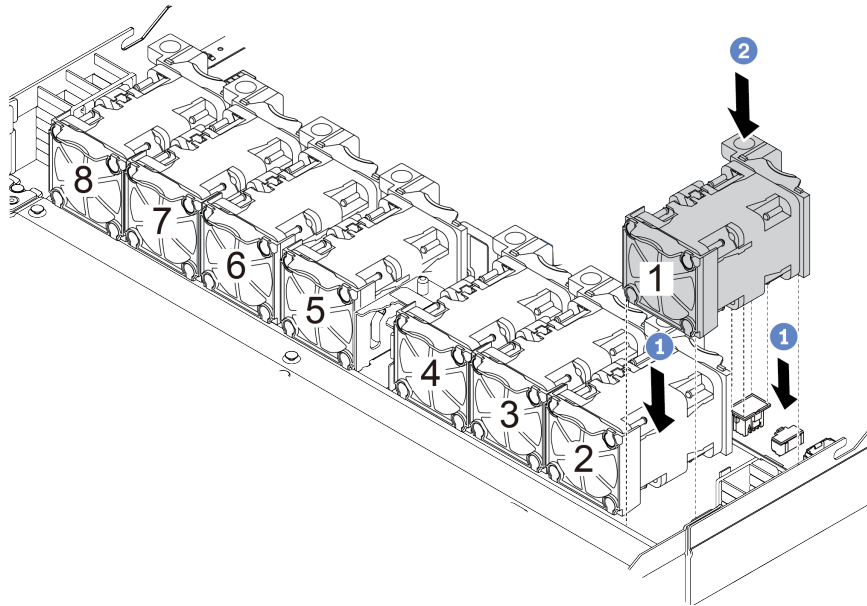


Figure 78. System fan installation

## Install an intrusion switch

Use this information to install an intrusion switch.

### About this task

#### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. Touch the static-protective package that contains the intrusion switch to any unpainted surface on the outside of the server. Then, take the intrusion switch out of the package and place them on a static-protective surface.
- Step 2. Insert the intrusion switch and push it in the direction as shown until it is fully seated.

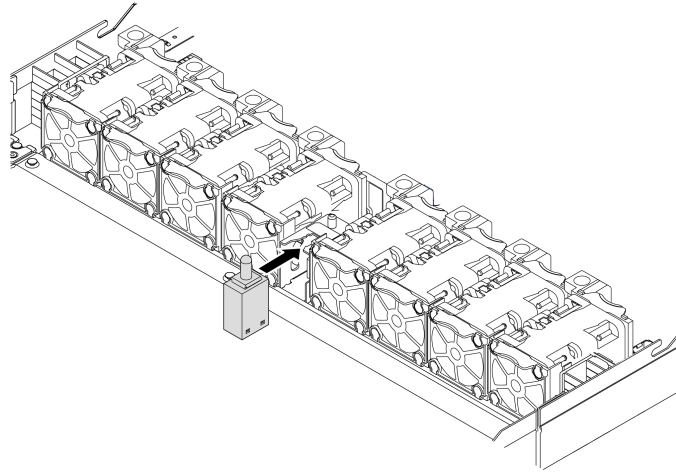


Figure 79. Intrusion switch installation

- Step 3. Connect the cable of the intrusion switch to the intrusion switch connector on the system board. See “Intrusion switch” on page 55.

## Install the air baffle

Use this information to install the air baffle.

### About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to install might be different from the following illustrations, but the removal method is the same.

#### 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.**

**Attention:**

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

**Procedure**

- Step 1. If you need to install a RAID flash power module on the bottom of the air baffle, install it first. See “Install the RAID flash power module on the air baffle” on page 134.
- Step 2. Align the direction of the air baffle according to indications on it.

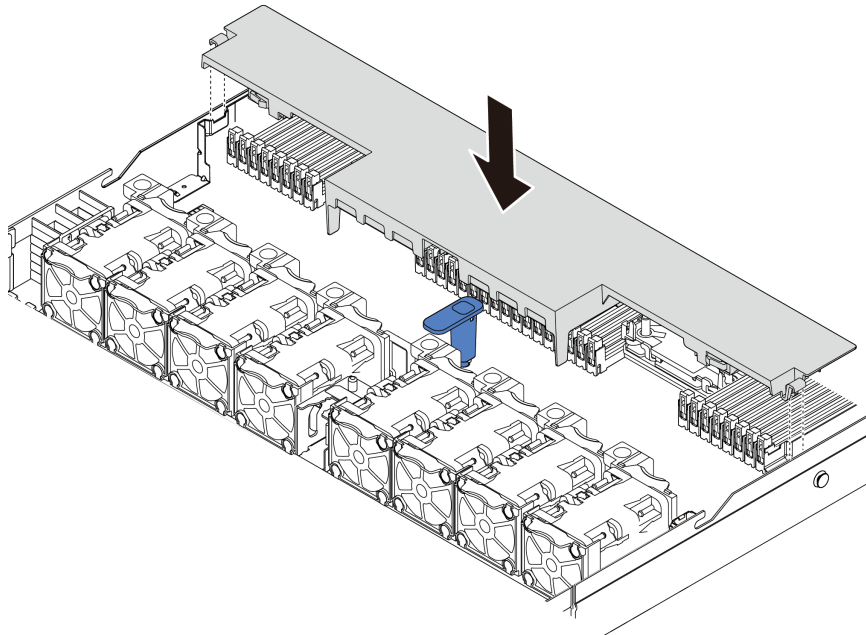


Figure 80. Air baffle installation

- Step 3. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

**After you finish**

If there is a RAID flash power module installed on the bottom of the air baffle, connect it to the RAID adapter with the extension cable that comes with the RAID flash power module.

**Install the top cover**

Use this information to install the top cover.

**S033**

**CAUTION:**

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

**S014****CAUTION:**

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

**Attention:**

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Operating the server with the top cover removed might damage server components. For proper cooling and airflow, install the top cover before you turn on the server.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

**Procedure**

Step 1. Check your server and 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.
- All internal cables are connected and routed correctly. See Chapter 3 “Internal cable routing” on page 51.

Step 2. Install the top cover to your server.

**Attention:** Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

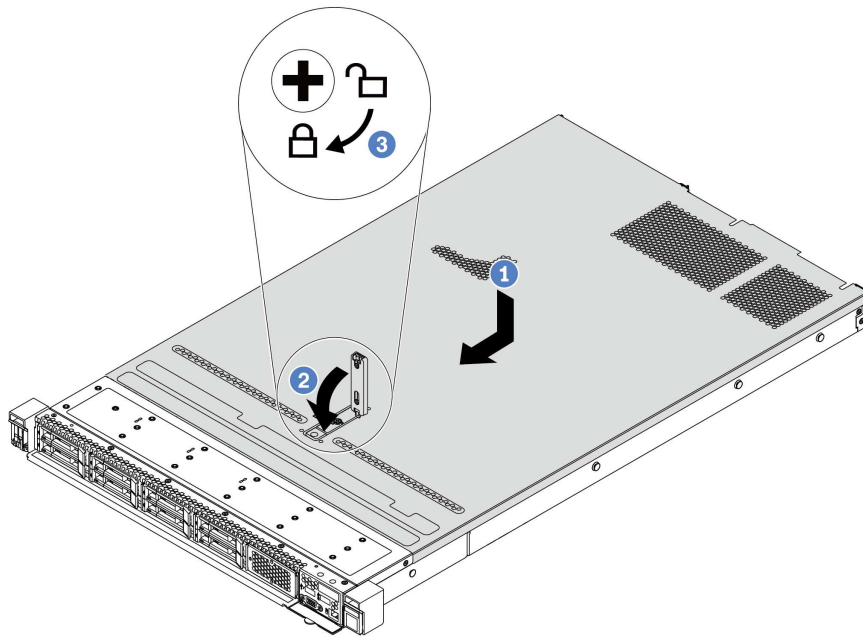


Figure 81. Top cover installation

- a. **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. Then, slide the top cover to the front of the chassis.

**Note:** Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly.

- b. **2** Press down the cover latch and ensure that the cover latch is completely closed.
- c. **3** Use a screwdriver to turn the cover lock to the locked position.

## Install a hot-swap power supply

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

### About this task

The following describes the information that you must consider when installing a power supply:

- The server is shipped with only one power supply by default. In this case, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.
- If you are replacing the existing power supply with a new power supply:
  - Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. More information about Lenovo Capacity Planner is available at: <https://datacentersupport.lenovo.com/solutions/Invo-lcp>

- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:  
<https://static.lenovo.com/us/en/serverproven/index.shtml>
- Attach the power information label that comes with this option onto the existing label near the power supply.



Figure 82. Example power supply unit label on the top cover

## Safety information for AC power supplies

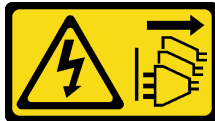
### S035



#### 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.

**Safety information for DC power supplies**

**CAUTION:**

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



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

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

**S035**

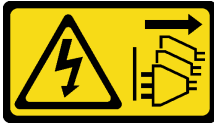


**CAUTION:**

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



## S019



### CAUTION:

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

## S029



For -48V dc power supply, electrical current from power cables is hazardous.

To avoid a shock hazard:

- To connect or disconnect -48V dc power cables when you need to remove/install redundancy power supply unit(s).

### To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

### To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

### Attention:

- Read “Installation guidelines” on page 82 to ensure that you work safely.
- 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.

### Watch the procedure

A video of this procedure is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>.

## Procedure

- Step 1. Touch the static-protective package that contains the hot-swap power supply to any unpainted surface on the outside of the server. Then, take the hot-swap power supply out of the package and place it on a static-protective surface.
- Step 2. If there is a power-supply filler installed, remove it.

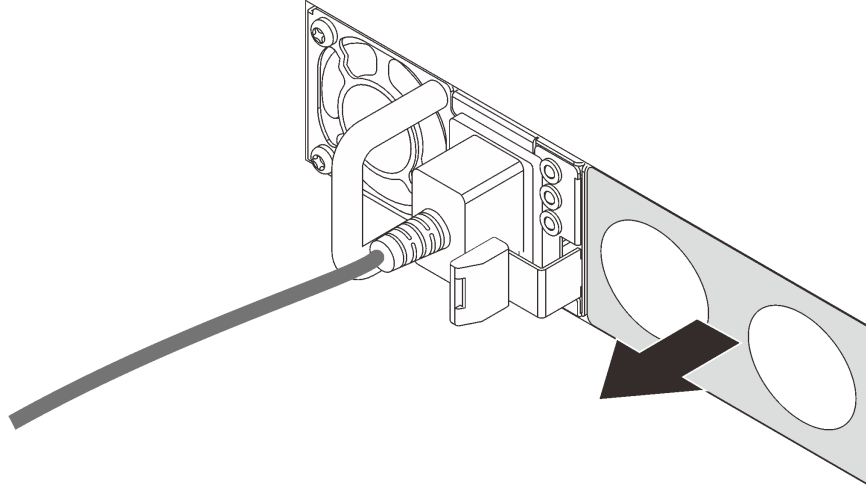


Figure 83. Hot-swap power supply filler removal

- Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

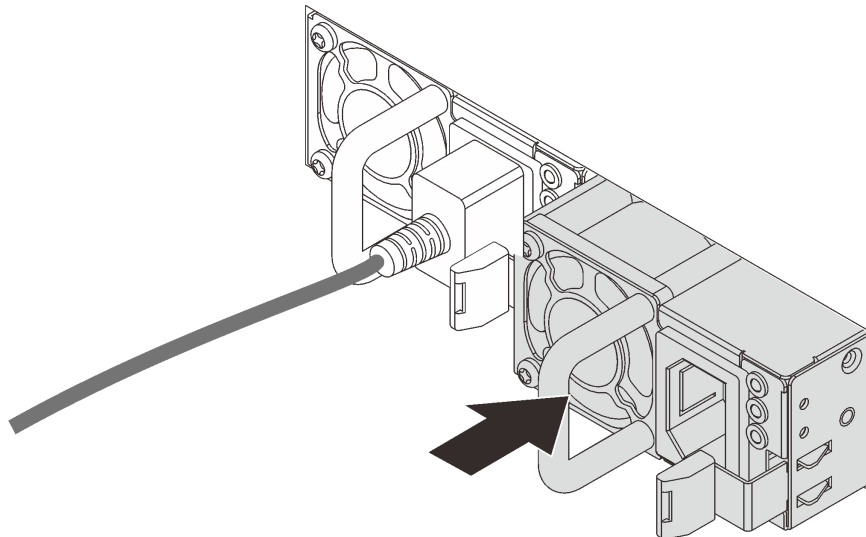



Figure 84. Hot-swap power supply installation

- Step 4. Connect the power supply unit to a properly grounded electrical outlet.
  - For 240 V DC power supply units:
    1. Turn off the server.
    2. Connect one end of the power cord to the power connector on the power supply unit.
    3. Connect the other end of the power cord to a properly grounded electrical outlet.

- For AC power supply units:
  1. Connect one end of the power cord to the power connector on the power supply unit.
  2. Connect the other end of the power cord to a properly grounded electrical outlet.
- For –48V DC power supply units:
  1. Use a slotted screwdriver to loosen the 3 captive screws on the power supply terminal block.
  2. Check the type label on the power supply block and each power cord.

Type	PSU terminal block	Power cord
Input	-Vin	-Vin
Ground		GND
Input	RTN	RTN

3. Face the groove side of each power cord pin upwards, and then plug the pins into corresponding holes on the power block. Use the table above for guidance to ensure that the pins find correct slots.
4. Tighten the captive screws on the power block. Ensure that the screws and cord pins are secured in place and no bare metal parts are shown.
5. Connect the other end of the cables to a properly grounded electrical outlet. Ensure that the cable ends find correct outlets.

---

## Install the server in a rack

To install the server in a rack, follow the instructions that are provided in the Rail Installation Kit for the rails on which the server will be installed.

---

## Cable the server

Attach all external cables to the server. Typically, you will need to connect the server to a power source, to the data network, and to storage. In addition, you will need to connect the server to the management network.

Connect the server to power.

Connect the server to the network.

Connect the server to any storage devices.

---

## Power on the server

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

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

- You can press the power button.

- The server can respond to remote power-on requests sent to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMItool, or SSH CLI.

For example, run the following command on Lenovo XClarity Essentials OneCLI to power on your server:  
`OneCli.exe ospower turnon --bmc USERID:PASSWORD@host`

For more information about running the **ospower** command, see [https://sysmgt.lenovofiles.com/help/topic/toolsctr\\_cli\\_lenovo/onecli\\_r\\_ospower\\_command.html](https://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_ospower_command.html).

If the system UEFI power policy is set to “always on”, the system will be powered on automatically when an AC source is plugged in.

For information about powering off the server, see “Power off the server” on page 152.

### System boot/startup time

The system boot/startup time varies by hardware configurations and may change depending on your server configuration and conditions.

- For typical configurations without PMEM memory modules, it takes about 3 minutes for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 1 x RAID adapter, 1 x NIC adapter

- For configurations with PMEM memory modules installed, it may take up to 15 minutes for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 16 x PMEMs, 1 x RAID adapter, 1 x NIC adapter

- For configurations with PMEM memory modules installed and Intel Volume Management Device (VMD) enabled, it may take about 20 minutes or longer for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 16 x PMEMs, 1 x RAID adapter, 1 x NIC adapter

---

## Validate server setup

After powering up the server, make sure that the LEDs are lit and that they are green.

---

## Power off the server

The server remains in a standby state when it is connected to a power source, allowing the BMC 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.
- Send remote power-off commands to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMItool, or SSH CLI.

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 151.

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## Chapter 5. System configuration

Complete these procedures to configure your system.

---

### Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

1. Start the server.
2. When you see <F1> Setup, press F1 to open up the Lenovo XClarity Provisioning Manager.
3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
  - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
  - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

**Important:** The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

- If no monitor attached to the server, you can set the network connection through the Lenovo XClarity Controller web interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see “Rear view” on page 39.

**Note:** Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab.

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see “Front view” on page 19.

**Note:** The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds).

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.
2. On your mobile device, enable USB tethering.
3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

[http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca\\_usemobileapp.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html)

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## Set front USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the front USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

### Server support

To see if your server supports accessing Lenovo XClarity Controller through the front USB port, check one of the following:

- Refer to Chapter 2 “Server components” on page 19.



- If there is a wrench icon on the USB port of your server, you can set the USB port to connect to Lenovo XClarity Controller.

### Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 second until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 19 for ID button location.
- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the “Command-line interface” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).
- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration → Network → Front Panel USB Port Manager**. For information about Lenovo XClarity Controller web interface functions, see the “Description of XClarity Controller functions on web interface” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).

### Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration → Network → Front Panel USB Port Manager**). See the “Command-line interface” and “Description of XClarity Controller functions on web interface” sections in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).

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## Update the firmware

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

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

- Best practices related to updating firmware is available at the following site:
  - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
  - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
  - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

### UpdateXpress System Packs (UXSPs)

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

### 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.

### Firmware updating tools

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Provisioning Manager (LXPM)</b>	In-band <sup>2</sup> On-Target	√		√		
<b>Lenovo XClarity Controller (XCC)</b>	Out-of-band Off-Target	√	Selected I/O devices	√		
<b>Lenovo XClarity Essentials OneCLI (OneCLI)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
<b>Lenovo XClarity Essentials UpdateXpress (LXCE)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Essentials Bootable Media Creator (BoMC)</b>	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√
<b>Lenovo XClarity Administrator (LXCA)</b>	In-band <sup>1</sup> Out-of-band <sup>2</sup> Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Integrator (LXCI) for VMware vCenter</b>	Out-of-band Off-Target	√	Selected I/O devices	√		



Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager</b>	In-band On-Target	√	All I/O devices	√		√
<b>Notes:</b> 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

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

**Note:** By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you 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.

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

“Firmware Update” section in the LXPM documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.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, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.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.

For specific details about updating firmware using Lenovo XClarity Controller, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.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).

For 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](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 firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

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

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

- **Lenovo XClarity Administrator**

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

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

- **Lenovo XClarity Integrator offerings**

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

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

[https://sysmgt.lenovofiles.com/help/topic/lxci/lxci\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html)

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## Configure the firmware

Several options are available to install and set up the firmware for the server.

**Important:** Do not configure option ROMs to be set to **Legacy** unless directed to do so by Lenovo Support. This setting prevents UEFI drivers for the slot devices from loading, which can cause negative side effects for Lenovo software, such as Lenovo XClarity Administrator and Lenovo XClarity Essentials OneCLI, and to the Lenovo XClarity Controller. The side effects include the inability to determine adapter card details, such as model name and firmware levels. When adapter card information is not available, generic information for the

model name, such as "Adapter 06:00:00" instead of the actual model name, such as "ThinkSystem RAID 930-16i 4GB Flash." In some cases, the UEFI boot process might also hang.

- **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

**Notes:** The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you press **F1**. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- *User Guide*
  - Search for the LXPM documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html)
- *UEFI User Guide*
  - [https://thinksystem.lenovofiles.com/help/topic/dcg\\_uefi/overview\\_dcg\\_uefi.html](https://thinksystem.lenovofiles.com/help/topic/dcg_uefi/overview_dcg_uefi.html)

- **Lenovo XClarity Controller**

You can configure the management processor for the server through the Lenovo XClarity Controller Web interface or through the command-line interface.

For information about configuring the server using Lenovo XClarity Controller, see:

“Configuring the Server” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

[http://sysmgt.lenovofiles.com/help/topic/toolsctr\\_cli\\_lenovo/onecli\\_c\\_settings\\_info\\_commands.html](http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_settings_info_commands.html)

- **Lenovo XClarity Administrator**

You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

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

[http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/server\\_configuring.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/server_configuring.html)

---

## Configure the memory

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

More information about optimizing memory performance and configuring memory is available at the Lenovo Press Web site:

<https://lenovopress.com/servers/options/memory>

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

[http://1config.lenovo.com/#/memory\\_configuration](http://1config.lenovo.com/#/memory_configuration)

For specific information about the required installation order of memory modules in your server based on the system configuration and memory mode that you are implementing, see “Memory module installation rules and order” on page 85.

---

## Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

**Note:** Make sure you follow the memory module population sequence for SGX configurations in “Independent mode” on page 86.

- Step 1. Restart the system. Before the operating system starts up, press **F1** to enter the Setup Utility.
- Step 2. Go to **System settings** → **Processors** → **UMA-Based Clustering** and disable the option.
- Step 3. Go to **System settings** → **Processors** → **Total Memory Encryption (TME)** and enable the option.
- Step 4. Save the changes, then go to **System settings** → **Processors** → **SW Guard Extension (SGX)** and enable the option.

---

## Configure the RAID arrays

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press Web site:

<https://lenovopress.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press Web site:

<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>

### Notes:

- Before setting up RAID for NVMe drives, follow the below steps to enable VROC:
  1. Restart the system. Before the operating system starts up, press **F1** to enter the Setup Utility.
  2. Go to **System settings** → **Devices and I/O Ports** → **Intel VMD** and enable the option.
  3. Save the changes and reboot the system.
- VROC Intel-SSD-Only supports RAID levels 0, 1, 5, and 10 with Intel NVMe drives.
- VROC Premium requires an activation key and supports RAID levels 0, 1, 5, and 10 with non-Intel NVMe drives. For more information about acquiring and installing the activation key, see <https://fod.lenovo.com/lkms>.

---

## Install the operating system

Several options are available to install an operating system on the server.

### Available operating systems

Below lists available operating systems for the server.

Supported and certified operating systems:

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Canonical Ubuntu

### Tool-based deployment

- **Multi-server context**

Available tools:

- Lenovo XClarity Administrator

[http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute\\_node\\_image\\_deployment.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html)

- Lenovo XClarity Essentials OneCLI

[http://sysmgt.lenovofiles.com/help/topic/toolsctr\\_cli\\_lenovo/onecli\\_r\\_uxspi\\_proxy\\_tool.html](http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html)

- **Single-server context**

Available tools:

- Lenovo XClarity Provisioning Manager

“OS Installation” section in the LXPM documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html)

- Lenovo XClarity Essentials OneCLI

[http://sysmgt.lenovofiles.com/help/topic/toolsctr\\_cli\\_lenovo/onecli\\_r\\_uxspi\\_proxy\\_tool.html](http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html)

### Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.

3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

---

## Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/ixcc\\_frontend/ixcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/ixcc_frontend/ixcc_overview.html).

Alternatively, you can use the **save** command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the **save** command, see:

[http://sysmgt.lenovofiles.com/help/topic/toolstr\\_cli\\_lenovo/onecli\\_r\\_save\\_command.html](http://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_r_save_command.html)

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

---

## Update the Vital Product Data (VPD)

After initial setup of the system, you can update some Vital Product Data (VPD), such as asset tag and Universal Unique Identifier (UUID).

## Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

To update the UUID from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 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 UUID.

- From Lenovo XClarity Essentials OneCLI

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

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

To update the UUID 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>

- 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.
- After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the UUID:

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

Where:

*<uuid\_value>*

Up to 16-byte hexadecimal value assigned by you.

*[access\_method]*

The access method that you 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 command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --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 command is as follows:

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

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

- Remote LAN access, type the command:

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

Where:

*xcc\_external\_ip*

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

*xcc\_user\_id*

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

*xcc\_password*

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

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

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --bmc xcc_user_id:xcc_password@xcc_external_ip
```

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

## Update the asset tag

Optionally, you can update the asset tag.

There are two methods available to update the asset tag:

- From Lenovo XClarity Provisioning Manager

To update the asset tag from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 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 asset tag information.

- From Lenovo XClarity Essentials OneCLI

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

- 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 asset tag 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 command to set the DMI:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```

Where:

*<asset\_tag>*

The server asset tag number. Type asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.

*[access\_method]*

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

- Online authenticated LAN access, type the command:

```
[--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 command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --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 command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

**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 command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>  
--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://sysmgmt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgmt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).



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## Chapter 6. Resolving installation issues

Use this information to resolve issues that you might have when setting up your system.

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your server.

- “Server does not power on (no indication that input power is connected to the server)” on page 167
- “The server immediately displays the POST Event Viewer when it is turned on” on page 167
- “Embedded hypervisor is not in the boot list” on page 168
- “Server cannot recognize a hard drive” on page 168
- “Displayed system memory is less than installed physical memory” on page 169
- “A Lenovo optional device that was just installed does not work.” on page 170
- “Voltage planar fault is displayed in the event log” on page 170

### **Server does not power on (no indication that input power is connected to the server)**

Complete the following steps until the problem is resolved:

1. Check the 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 front operator panel.
4. Check the front operator panel LCD display for error indications.
5. Check the power supply LEDs and ensure that the power supplies are functioning:
  - a. Make sure that both power supplies installed in the server are of the same type. Mixing different power supplies in the server will cause a system error.
  - b. Make sure that the power cords are correctly connected to a working electrical outlet. The power source meets the input power requirements for the installed power supplies (see the power supply labels).
  - c. Disconnect and reconnect the input power cords.
  - d. Reseat the power supplies.
  - e. Replace the power supplies one by one, and check the power button function after installing each one.
6. If the problem still cannot be resolved, please collect the failure information with system logs captured to Lenovo support.

### **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://static.lenovo.com/us/en/serverproven/index.shtml>.

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

### **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://static.lenovo.com/us/en/serverproven/index.shtml> 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/lxccc\\_frontend/lxccc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxccc_frontend/lxccc_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.

### **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 F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.
  - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
  - If neither LED is lit or flashing, check 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 F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

Based on those tests:

- If the 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.

### **Displayed system memory is less than installed physical memory**

Complete the following procedure to solve the problem.

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

1. Make sure that:
  - No error LEDs are lit on the operator information panel.
  - No memory module error LEDs are lit on the system board.
  - Memory mirrored channel does not account for the discrepancy.
  - The memory modules are seated correctly.
  - You have installed the correct type of memory module (see “PMEM rules” on page 91 for requirements).
  - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
  - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
  - There is no memory mismatch when the server is at the minimum memory configuration.
  - When PMEMs are installed:
    - a. Refer to “PMEM rules” on page 91 and see if the displayed memory fits the mode description.
    - b. If the memory is set in App Direct Mode, all the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
    - c. If PMEMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted.
    - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.
2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
  - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
  - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.

4. Run memory diagnostics. When you start a solution and press F1, the LXPM interface is displayed by default. You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

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

- App Direct Mode:
  - Run Memory Test for DRAM memory modules.
  - Run PMEM Test for PMEMs.
- Memory Mode:
  - Run both Memory Test and PMEM Test for PMEMs.

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

**Note:** When PMEMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup utility, and then restart the server.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the system board.

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

1. Check the XCC event log for any events associated with the device.
2. Make sure that:
  - The device is supported for the server (see <https://static.lenovo.com/us/en/serverproven/index.shtml>).
  - You followed the installation instructions that came with the device and the device is installed correctly.
  - You have not loosened any other installed devices or cables.
  - You updated the configuration information in system setup. When you start a server and press F1 to display the Setup Utility. Whenever memory or any other device is changed, you must update the configuration.
3. Reseat the cable connection and ensure that there is no physical damage to the cable.
4. Reseat the device that you have just installed.
5. Replace the device that you have just installed.

#### **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 5 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.

---

## Appendix A. Getting help and technical assistance

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

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

<http://datacentersupport.lenovo.com>

**Note:** This section includes references to IBM Web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

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### 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://static.lenovo.com/us/en/serverproven/index.shtml> to make sure that the hardware and software are supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
  - Check the Lenovo forums at [https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv\\_eg](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg) to see if someone else has encountered a similar problem.

#### Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

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

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

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

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## Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

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

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.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](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/toolstr\\_cli\\_lenovo/onecli\\_r\\_getinfor\\_command.html](http://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_r_getinfor_command.html).

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## Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.



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## Appendix B. Notices

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## Important notes

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

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

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

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

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

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

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

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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## Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

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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 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 <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
電源供應器	-	○	○	○	○	○
儲備設備	-	○	○	○	○	○
印刷電路板	-	○	○	○	○	○

備考1. “超出0.1 wt%”及“超出0.01 wt%”係指限用物質之百分比含量超出百分比含量基準值。  
 Note1: “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. “○”係指該項限用物質之百分比含量未超出百分比含量基準值。  
 Note2: “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. “-”係指該項限用物質為排除項目。  
 Note3: The “-” indicates that the restricted substance corresponds to the exemption.

## Taiwan import and export contact information

Contacts are available for Taiwan import and export information.

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



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