



ThinkSystem SR650 Setup Guide



Machine Types: 7X05 and 7X06

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

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

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

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Chapter 1. Introduction

The ThinkSystem™ SR650 server is a 2U rack server designed for performance and expansion for various IT workloads. With the modular design, the server is flexible to be customized for maximum storage capacity or high storage density with selectable input/output options and tiered system management.

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.

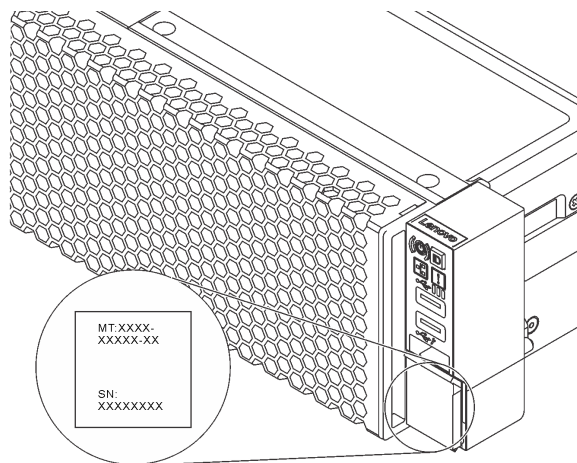


Figure 1. Location of the ID label

XClarity Controller network access label

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

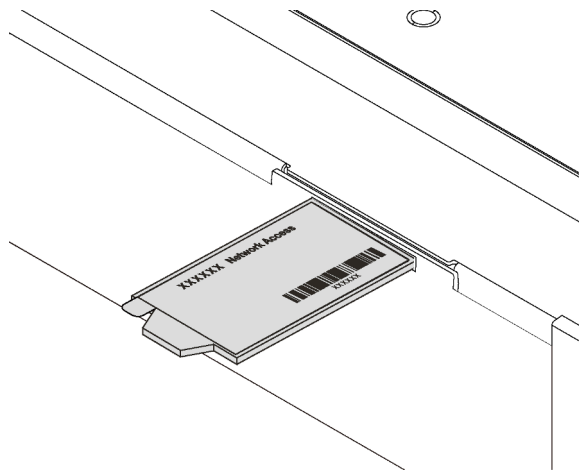


Figure 2. Location of the XClarity Controller network access label

Quick response code

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

The following illustration shows the QR code: <https://support.lenovo.com/p/servers/sr650>

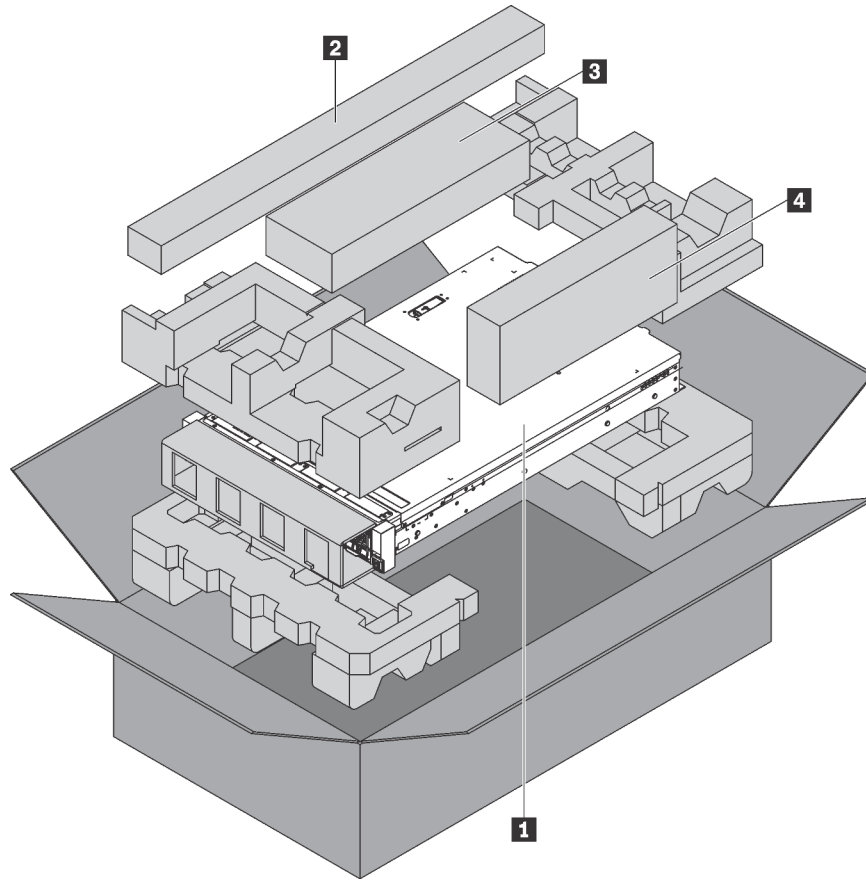


Figure 3. QR code

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.

- ❶ Server
- ❷ Rail kit*. Detailed instructions for installing the rail kit are provided in the package with the rail kit.
- ❸ Cable management arm*
- ❹ Material box, including items such as accessory kit, power cords* and documentation

Features

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.

Your server implements the following features and technologies:

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller 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, see:

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

- **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).

- **Large system-memory capacity**

The server supports registered DIMMs (RDIMMs), load-reduced DIMMs (LRDIMMs), three-dimensional stack registered DIMMs (3DS RDIMMs) and DC Persistent Memory Modules (DCPMMs). For more information about the specific types and maximum amount of memory, see [“Specifications” on page 5](#).

- **Flexible network support**

The server has a connector for the LOM 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) has two versions - TPM 1.2 and TPM 2.0. You can change the TPM version from 1.2 to 2.0 and back again.

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

Note: For customers in the Chinese Mainland, a Lenovo-qualified TPM 2.0 adapter or a Trusted Cryptographic Module (TCM) adapter (sometimes called a daughter card) may be pre-installed.

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

The server models support a maximum of fourteen 3.5-inch hot-swap SAS/SATA storage drives or a maximum of twenty-four 2.5-inch hot-swap SAS/SATA/NVMe storage drives.

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

- **Light path diagnostics**

Light path diagnostics provides LEDs to help you diagnose problems. For more information about the light path diagnostics, see:

- [“Front I/O assembly” on page 24](#)
- [“Rear view LEDs” on page 29](#)
- [“System board LEDs” 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 and 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 six 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.

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">• 2U• Height: 86.5 mm (3.4 inches)• Width:<ul style="list-style-type: none">– With rack latches: 482.0 mm (19.0 inches)– Without rack latches: 444.6 mm (17.5 inches)• Depth: 763.7 mm (30.1 inches) <p>Note: The depth is measured with rack latches installed, but without the security bezel installed.</p>
Weight	Up to 32.0 kg (70.6 lb), depending on the server configuration

Table 1. Server specifications (continued)

Specification	Description
Processor (depending on the model)	<ul style="list-style-type: none"> Up to two Intel® Xeon® Scalable Processors <ul style="list-style-type: none"> Designed for Land Grid Array (LGA) 3647 socket Scalable up to 28 cores Thermal Design Power (TDP): up to 205 watts <p>For a list of supported processors, see:</p> <p>https://static.lenovo.com/us/en/serverproven/index.shtml</p> <p>Notes:</p> <ul style="list-style-type: none"> Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processor is supported only when the following requirements are met: <ul style="list-style-type: none"> The server chassis is the twenty-four 2.5-inch-bay chassis. The operating temperature is equal to or less than 30°C. Up to eight drives are installed in the drive bays 8–15. Intel Xeon 6144, 6146, 8160T, 6126T, 6244, and 6240Y processor, or processors with TDP equal to 200 watts or 205 watts (excluding 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R) are supported only when the following requirements are met: <ul style="list-style-type: none"> The server chassis is the twenty-four 2.5-inch-bay chassis. Up to eight drives are installed in the drive bays 8–15 if the operating temperature is equal to or less than 35°C, or up to sixteen drives are installed in the drive bays 0–15 if the operating temperature is equal to or less than 30°C. For server models with sixteen/twenty/twenty-four NVMe drives, two processors are needed, and the maximum supported processor TDP is 165 watts. For server models with twenty-four 2.5-inch and twelve 3.5-inch-drive bays, if Intel Xeon 6144 and 6146 processors installed, the operating temperature is equal to or less than 27°C. Intel Xeon 6154, 8168, 8180, and 8180M processors support the following server models: eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, or sixteen 2.5-inch-drive bays. For server models with sixteen 2.5-inch and eight 3.5-inch drive bays, the operating temperature is equal to or less than 30°C. Intel Xeon 6246, 6230T, and 6252N processors support the following server models: eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, or sixteen 2.5-inch-drive bays. If two TruDDR4 2933, 128 GB 3DS RDIMMs are installed in one channel, the operating temperature is equal to or less than 30°C.
Memory	<p>For 1st Generation Intel Xeon Scalable Processor (Intel Xeon SP Gen 1):</p> <ul style="list-style-type: none"> Slots: 24 memory module slots Minimum: 8 GB Maximum: <ul style="list-style-type: none"> 768 GB using registered DIMMs (RDIMMs) 1.5 TB using load-reduced DIMMs (LRDIMMs) 3 TB using three-dimensional stack registered DIMMs (3DS RDIMMs) Type (depending on the model): <ul style="list-style-type: none"> TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMM TruDDR4 2666, quad-rank, 64 GB LRDIMM TruDDR4 2666, octa-rank, 128 GB 3DS RDIMM <p>For 2nd Generation Intel Xeon Scalable Processor (Intel Xeon SP Gen 2):</p> <ul style="list-style-type: none"> Slots: 24 DIMM slots Minimum: 8 GB Maximum: <ul style="list-style-type: none"> 1.5 TB using RDIMMs 3 TB using 3DS RDIMMs 6 TB using DC Persistent Memory Module (DCPMM) and RDIMMs/3DS RDIMMs in Memory Mode Type (depending on the model):

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> – TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMM – TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM – TruDDR4 2933, single-rank or dual-rank, 16 GB/32 GB/64 GB Performance+ RDIMM – TruDDR4 2666, quad-rank, 64 GB 3DS RDIMM – TruDDR4 2933, quad-rank, 128 GB 3DS RDIMM – TruDDR4 2933, quad-rank, 128 GB Performance+ 3DS RDIMM – 128 GB/256 GB/512 GB DCPMM <p>DCPMM installation rules:</p> <ul style="list-style-type: none"> • DCPMMs are not supported if any GPU is installed. • DCPMMs only support the following server models: eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, or sixteen 2.5-inch-drive bays. The 256 GB and 512 GB DCPMMs only support server model with eight 2.5-inch-drive bays. • If the processors with TDP equal to 200 watts or 205 watts are installed, DCPMMs are supported only when the following requirements are met: <ul style="list-style-type: none"> – Two power supplies are installed. – For server models with sixteen 2.5-inch and eight 3.5-inch drive bays, the operating temperature is equal to or less than 30°C. – No Mellanox ConnectX-6, Innova-2 FPGA, or PCIe NVMe add-in-card (AIC) installed. <p>Notes:</p> <ul style="list-style-type: none"> • Memory dummy is required when any of the following hardware configuration requirement is met: <ul style="list-style-type: none"> – Processors with TDP more than 125 watts installed – Any of following processors installed: 5122, 8156, 6128, 6126, 4112, 5215, 5217, 5222, 8256, 6226, 4215, 4114T, 5119T, 5120T, 4109T, 4116T, 6126T, 6130T, 6138T, 5218T, 6238T – GPU installed – Server model: twenty-four 2.5-inch-drive bays, twelve 3.5-inch-drive bays (except for Chinese Mainland) • For the server model with the processors with TDP less than 125 watts installed and without memory dummy installed, the memory performance might be degraded if one fan fails. • Operating speed and total memory capacity depend on the processor model and UEFI settings. • For a list of supported memory modules, see: https://static.lenovo.com/us/en/serverproven/index.shtml
Operating systems	<p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server <p>References:</p> <ul style="list-style-type: none"> • Complete list of available operating systems: https://lenovopress.com/osig. • OS deployment instructions: “Deploy the operating system” on page 234.

Table 1. Server specifications (continued)

Specification	Description
Internal drives	<p>The supported drives vary by models.</p> <ul style="list-style-type: none"> • Up to eight 3.5-inch hot-swap SAS/SATA drives • Up to twelve 3.5-inch hot-swap SAS/SATA drives • Up to twelve 3.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives are supported only in drive bays 8–11) • Up to eight 2.5-inch hot-swap SAS/SATA drives • Up to eight 2.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives are supported only in drive bays 4–7) • Up to sixteen 2.5-inch hot-swap SAS/SATA drives • Up to sixteen 2.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives are supported in drive bays 4–7 and bays 12–15) • Up to sixteen 2.5-inch NVMe drives (NVMe drives are supported in drive bays 0–15) • Up to sixteen 2.5-inch NVMe drives with eight SAS/SATA drives (NVMe drives are supported in drive bays 0–15) • Up to twenty 2.5-inch NVMe drives (NVMe drives are supported in drive bays 0–19) • Up to twenty-four 2.5-inch hot-swap SAS/SATA drives • Up to twenty-four 2.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives are supported in drive bays 4–7, bays 12–15, and bays 20–23) • Up to twenty-four 2.5-inch NVMe drives (NVMe drives are supported in drive bays 0–23) • Up to two 3.5-inch hot-swap SAS/SATA drives in the rear • Up to two M.2 drives <p>Notes:</p> <ul style="list-style-type: none"> • NVMe drives means Non-Volatile Memory express drives. • If the operating temperature is equal to or less than 30°C, the server models installed with Xeon 6137, 6154, 6242R, 6246R, 6248R, 6250, 6256, 6258R, 8168, 8180, and 8180M processor support no more than eight NVMe drives. • For server models with sixteen/twenty/twenty-four NVMe drives: <ul style="list-style-type: none"> – The maximum power for installed PCIe card is 25 watts. – The SSD add-in-card (AID) is not supported. – The minimum power supplies should be 1100 watts. • For server models with sixteen/twenty/twenty-four NVMe drives, the maximum memory module is 128 GB, and DCPMM is not supported.
Expansion slots	<ul style="list-style-type: none"> • One PCIe slot on the system board • One RAID adapter slot on the system board • Two riser card slots on the system board • Two or three PCIe slots on the riser card <p>For detailed information, see “Rear view” on page 26.</p>
Input/Output (I/O) features	<ul style="list-style-type: none"> • Front panel: <ul style="list-style-type: none"> – One VGA connector (available on some models) – One XClarity Controller USB connector – One USB 3.0 connector • Rear panel: <ul style="list-style-type: none"> – One VGA connector – One XClarity Controller network connector – One serial port (available on some models) – Two USB 3.0 connectors – Two or four Ethernet connectors on the LOM adapter (available on some models)

Table 1. Server specifications (continued)

Specification	Description
Graphics processing unit (GPU)	<p>Your server supports the following GPUs or processing adapters:</p> <ul style="list-style-type: none"> Full-height, full-length, double-slot GPUs or processing adapters: AMD MI25, AMD V340, NVIDIA® M10, NVIDIA M60, NVIDIA P40, NVIDIA P100, NVIDIA P6000, NVIDIA RTX5000, NVIDIA RTX A6000, NVIDIA V100, NVIDIA V100S, NVIDIA A100, A16, and A30. Full-height, full-length, single-slot GPU: NVIDIA P4000, NVIDIA RTX4000, and Cambricon MLU100-C3 Full-height, half-length, single-slot GPU: NVIDIA V100, NVIDIA A10 Half-height, half-length, single-slot GPU: NVIDIA A2 Low-profile, half-length, single-slot GPUs: NVIDIA P4, NVIDIA P600, and NVIDIA P620, NVIDIA T4, and Cambricon MLU270-S4 <p>Note: The NVIDIA V100 GPU has two types of form factor: full-height full-length (FHFL) and full-height half-length (FHHL). Hereinafter the full-height full-length V100 GPU is called as the FHFL V100 GPU; the full-height half-length V100 GPU is called as the FHHL V100 GPU.</p> <p>GPU installation rules:</p> <ul style="list-style-type: none"> For Intel Xeon SP Gen 2 with the supported system board, you can install up to five NVIDIA A2, NVIDIA P4 or NVIDIA T4 GPUs in PCIe slots 1, 5, 6, 2 and 3. For Cambricon MLU100-C3 processing adapters, you can only install two adapters in slots 5 and 6, or install four adapters in slots 1, 2, 5 and 6. Before installing a GPU, ensure that the air baffle in your server is appropriate for the GPU. For more information about the air baffle, refer to “Important information about the air baffle and GPU” on page 15. To install a full-height GPU, or the NVIDIA P4 GPU, you need to use the GPU thermal kit. For more information, see “Install a GPU with the GPU thermal kit” on page 191. For NVIDIA P600, NVIDIA P620, NVIDIA P4000, NVIDIA RTX4000, and FHHL V100 GPUs, you can install up to three GPUs in PCIe slots 1, 5, and 6. For the other supported GPUs, you can install up to two GPUs in PCIe slots 1 and 5. NVIDIA A100 is only supported in the server models with the UEFI firmware (V2.80 or higher) and XCC firmware (V5.40 or higher). If NVIDIA A100 is installed, the operating temperature must be equal to or less than 35°C. If NVIDIA A100 is installed in the riser 2 assembly, use the ThinkSystem SR650 2FH Riser BKT NVFF5 bracket to fit with NVIDIA A100. Up two NVIDIA A30 GPUs are supported and the operating temperature must be equal to or less than 35°C. If NVIDIA A30 is installed in the riser 2 assembly, use the ThinkSystem SR650 2FH Riser BKT NVFF5 bracket to fit with NVIDIA A30. If one fan fails, the GPU performance might be degraded. If NVIDIA A16 is installed, the operating temperature must be equal to or less than 35°C. If NVIDIA RTX A6000 is installed in the riser 2 assembly, use the ThinkSystem SR650 2FH Riser BKT NVFF5 bracket to fit with NVIDIA RTX A6000. <p>Notes:</p> <ul style="list-style-type: none"> If NVIDIA P4 is installed in PCIe slot 1, PCIe slot 5, or both slots, keep PCIe slot 2, PCIe slot 6, or both slots unoccupied. For server models installed with three NVIDIA P4 can be installed in PCIe slot 1, PCIe slot 5, and PCIe slot 6 at the same time, the operating temperature must be equal to or less than 35°C. If up to five NVIDIA P4 GPUs are installed, the server models support no more than eight 2.5-inch hot-swap SAS/SATA/NVMe drives and the operating temperature must be equal to or less than 35°C. For server models installed with FHHL V100 GPU, NVIDIA T4 or Cambricon MLU270-S4 GPU, the operating temperature must be equal to or less than 30°C. If one NVIDIA T4 or Cambricon MLU270-S4 GPU is installed, install in slot 1. For server models installed with one CPU, if two NVIDIA T4 or Cambricon MLU270-S4 GPUs are installed, install in slot 1 and slot 2. For server models

Table 1. Server specifications (continued)

Specification	Description
	<p>installed with two CPUs, if two NVIDIA T4 or Cambricon MLU270-S4 GPUs are installed, install in slot 1 and slot 5.</p> <ul style="list-style-type: none"> For server models installed with one CPU, if three NVIDIA T4 or Cambricon MLU270-S4 GPUs are installed, install in slot 1, slot 2 and slot 3. For server models installed with two CPUs, if three NVIDIA T4 or Cambricon MLU270-S4 GPUs are installed, install in slot 1, slot 5 and slot 6. Four NVIDIA T4 or Cambricon MLU270-S4 GPUs are supported only for server models installed with two CPUs, and installed in slot 1, slot 2, slot 5, and slot 6. Five NVIDIA T4 or Cambricon MLU270-S4 GPUs are supported only for server models installed with two CPUs, and installed in slot 1, slot 2, slot 3, slot 5, and slot 6. NVIDIA T4 GPU cannot be mixed with NVIDIA A2 GPU. If NVIDIA P600, NVIDIA P620, NVIDIA P4000, NVIDIA RTX4000, NVIDIA P6000, NVIDIA RTX A6000, or NVIDIA RTX5000 GPU is installed, the fan redundancy function is not supported. If one fan fails, power off the system immediately to prevent GPU overheat and replace the fan with a new one. Cambricon MLU100-C3 processing adapter supports CentOS 7.6 when used in combination with Intel Xeon SP Gen 2, and supports CentOS 7.5 when used in combination with Intel Xeon SP Gen 1. <p>GPU installation requirements:</p> <p>GPU is supported only when the following hardware configuration requirements are met at the same time:</p> <ul style="list-style-type: none"> Server model: eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, or sixteen 2.5-inch-drive bays Processor: High Tcase type; TDP less than or equal to 150 watts <p>Notes:</p> <ul style="list-style-type: none"> For server models with eight 2.5-inch-drive bays, if the server is installed with GPUs (except for GPU model NVIDIA P4, NVIDIA T4, NVIDIA V100 FHHL, NVIDIA P600, NVIDIA P620, NVIDIA P4000, NVIDIA RTX4000, NVIDIA P6000, NVIDIA RTX A6000, and NVIDIA RTX5000) and the operating temperature is equal to or less than 30°C, the TDP should be less than or equal to 165 watts. For server models with eight 3.5-inch-drive bays or sixteen 2.5-inch-drive bays, if server is installed with NVIDIA T4 or Cambricon MLU270-S4 GPU, the TDP should be less than or equal to 150 watts. For server models with eight 2.5-inch-drive bays, if the server is installed with up to four NVIDIA T4 or Cambricon MLU270-S4 GPUs, the TDP can be more than 150 watts, if the server is installed with five NVIDIA T4 or Cambricon MLU270-S4 GPUs, the TDP should be less than or equal to 150 watts. Drive: no more than four NVMe drives installed, and no PCIe NVMe add-in-card (AIC) installed. Power supply: for one GPU, 1100-watt or 1600-watt power supplies installed; for two or three GPUs, 1600-watt power supplies installed
RAID adapters (depending on the model)	<ul style="list-style-type: none"> Onboard SATA ports with software RAID support (Intel VROC SATA RAID, formerly known as Intel RSTe) <p>Note: VROC is not supported with the VMware ESXi yet.</p> <ul style="list-style-type: none"> Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID) <ul style="list-style-type: none"> VROC Intel-SSD-Only (also known as Intel VROC standard): supports RAID levels 0, 1, 5, and 10 with Intel NVMe drives only VROC Premium: supports RAID levels 0, 1, 5, and 10 with non-Intel NVMe drives <p>Note: VROC is not supported with the VMware ESXi yet.</p>

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> • An HBA 430-8e or 430-16e SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 430-8i or 430-16i SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 440-8e SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 440-8i or 440-16i SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 4350-8i or 4350-16i SAS/SATA adapter that support JBOD mode but does not support RAID • A RAID 530-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 • A RAID 530-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, and 10 • A RAID 540-8i or 540-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, and 10 • A RAID 730-8i 1GB Cache SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 • A RAID 730-8i 2GB Cache SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 730-8i 4GB Flash SAS/SATA adapter with CacheCade (for some models only) that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8e SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8i, 930-16i, or 930-24i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 940-8e 4GB SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 940-8i, 940-16i, 940-32i, or 940-8e 4GB SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 5350-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, and 10 • A RAID 9350-8i 2GB or 9350-16i 4GB SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50 and 60 <p>Notes:</p> <ul style="list-style-type: none"> • A RAID super capacitor module must be installed if the RAID 540-16i, 930-8e, 930-8i, 930-16i, 930-24i, 940-8e 4GB, 940-8i, 940-16i, or 940-32i SAS/SATA adapter is installed. • If 730-8i-2G Cache SAS/SATA adapter is installed, 730-8i-1G or 930-8i SAS/SATA adapter cannot be installed. • If RAID 730-8i 1GB/2GB Cache SAS/SATA adapter is installed, ThinkSystem 2.5" PM1653/PM1655 Read Intensive/Mixed Use SAS 24Gb SSD cannot be installed. • HBA 440-8i/440-16i SAS/SATA adapter and RAID 940-8i/940-16i/940-32i SAS/SATA adapter cannot be installed in the inner raid adapter slot. • RAID 540-8i/540-16i SAS/SATA adapter cannot be installed in the inner raid adapter slot 7. • HBA/RAID 4350-8i, 4350-16i, 5350-8i, 9350-8i or 9350-16i SAS/SATA adapter can only be installed in the PCIe slots 1, 2, 3, 4, 5, and 6 in the server models with 2.5-inch drives, and can only be installed in the PCIe slots 4, 5, and 6 in the server models with 3.5-inch drives. • HBA/RAID 430-8i, 430-16i, 530-8i, 530-16i, 730-8i, 930-8e, 930-8i, or 930-16i SAS/SATA adapter can only be installed in the PCIe slots 1, 2, 3, 4, 5, 6, and 7 in the server models with 2.5-inch drives, and can only be installed in the PCIe slots 4, 5, 6 and 7 in the server models with 3.5-inch drives. • RAID 930-24i SAS/SATA adapter can only be installed in the PCIe slots 1, 2, 3, 5, and 6 in the server models with 2.5-inch drives.

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> HBA/RAID 940-8e 12GB SAS/SATA adapter can only be installed in the PCIe slots 1, 2, 3, 4, and 5.
System fans	<ul style="list-style-type: none"> One processor: five hot-swap fans (including one redundant fan) Two processors: six hot-swap fans (including one redundant fan) <p>Notes:</p> <ul style="list-style-type: none"> When the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling. For server models installed with Intel Xeon 6137, 6144, 6146, 6154, 6242R, 6246R, 6248R, 6250, 6256, 6258R, 8168, 8180, and 8180M, if one fan fails, the server performance might be degraded. If your server comes with only one processor, five system fans (fan 1 to fan 5) are adequate to provide proper cooling. However, you must keep the location for fan 6 occupied by a fan filler to ensure proper airflow. For server models with sixteen/twenty/twenty-four NVMe drives, the maximum operating temperature is 30°C. The server performance might be degraded at 27° C or above 27°C if one fan fails.
Power supplies (depending on the model)	<p>One or two hot-swap power supplies for redundancy support</p> <ul style="list-style-type: none"> 550-watt ac 80 PLUS Platinum 750-watt ac 80 PLUS Platinum 750-watt ac 80 PLUS Titanium 1100-watt ac 80 PLUS Platinum 1600-watt ac 80 PLUS Platinum
Electrical input	<ul style="list-style-type: none"> Sine-wave input (50 Hz to 60 Hz) required Input voltage low range: <ul style="list-style-type: none"> Minimum: 100 V ac Maximum: 127 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 200 V ac Maximum: 240 V ac <p>Note: For server models with 750-watt ac 80 PLUS Titanium or 1600-watt ac 80 PLUS Platinum power supplies, 100–127 V ac input voltage is not supported.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> 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. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.
Minimal configuration for debugging	<ul style="list-style-type: none"> One processor in processor socket 1 One memory DIMM on slot 5 One power supply one HDD or M.2 (If OS is needed for debugging) Five system fans (fan 1 to fan 5)

Table 1. Server specifications (continued)

Specification	Description
Acoustical noise emissions	<ul style="list-style-type: none"> • Sound power levels, idle <ul style="list-style-type: none"> – 4.9 bels, minimum – 5.1 bels, typical – 6.1 bels, maximum • Sound power levels, operating <ul style="list-style-type: none"> – 5.1 bels, minimum – 5.1 bels, typical – 6.2 bels, maximum <p>Notes:</p> <ul style="list-style-type: none"> • These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. • The declared acoustic noise levels are based on specified configurations and they may change depending on configurations/conditions. • The declared acoustic noise levels may increase greatly, if high-power components are installed, for example, some high-power NICs, CPUs, and GPUs.
Environment	<p>The server is supported in the following environment:</p> <p>Note: This server is designed for standard data center environment and recommended to be placed in industrial data center.</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase. – ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase. – Server off: 5–45°C (41–113°F) – Shipping or storage: -40–60°C (-40–140°F) • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE class A2: 8%–80%; maximum dew point: 21°C (70°F) – ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F) – ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F) – Shipping or storage: 8%–90% • Particulate contamination <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server.</p> <p>Note: Your server complies with ASHRAE class A2 specifications. The server performance might be impacted when the operating temperature is outside the ASHRAE A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server models must meet the following hardware configuration requirements at the same time:</p> <ul style="list-style-type: none"> • Two power supplies installed • NVMe drives not installed • PCIe flash adapter not installed • ThinkSystem QLogic QL41134 PCIe 10Gb 4-Port Base-T Ethernet Card not installed • Mellanox ConnectX-6 and Innova-2 FPGA not installed. • 240 GB or 480 GB M.2 drives not installed

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> • GPU not installed • Certain processors not installed: <ul style="list-style-type: none"> – Processors with TDP more than or equal to 150 watts not installed – For server models with twenty-four 2.5-inch drives or twelve 3.5-inch drives, the following frequency optimized processors not installed: Intel Xeon 4112, 4215, 5122, 5215, 5217, 5222, 6126, 6128, 6132, 6134, 6134M, 6137, 6226, 6242R, 6246R, 6248R, 6250, 6256, 6258R, 8156, and 8256 processors

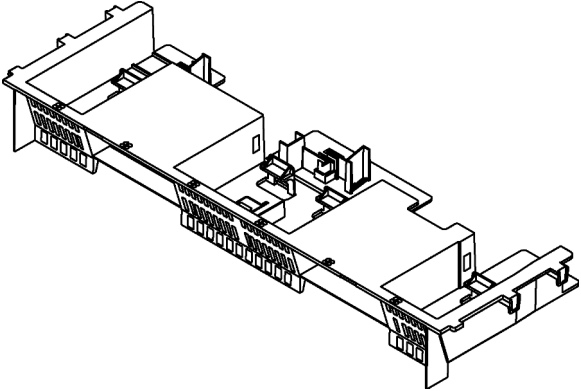
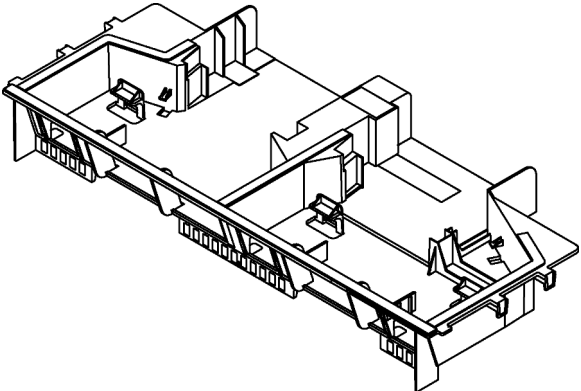
Important information about EU ecodesign requirements

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

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

Important information about the air baffle and GPU

There are two types of air baffle for your server. Depending on the GPU model, select the appropriate air baffle for your server.

Air baffle type	Supported GPU model
<p>Standard air baffle</p> 	<ul style="list-style-type: none">• NVIDIA A2• NVIDIA P600• NVIDIA P620• NVIDIA T4• Cambricon MLU270-S4
<p>Large-size air baffle</p> 	<ul style="list-style-type: none">• AMD MI25• AMD V340• Cambricon MLU100-C3 processing adapter• NVIDIA A10• NVIDIA A16• NVIDIA A30• NVIDIA A100• NVIDIA M10• NVIDIA M60• NVIDIA P40• NVIDIA P100• NVIDIA P4000• NVIDIA P6000• NVIDIA RTX4000• NVIDIA RTX A6000• NVIDIA RTX5000• NVIDIA V100• NVIDIA V100S• NVIDIA P4 <p>Note: If you are installing the NVIDIA P4 or the FHHL V100 GPU, install an additional air baffle first. If you are installing one NVIDIA A10 or installing two NVIDIA A10 GPUs on two riser adapter, install an additional air baffle first. If you are installing two NVIDIA A10 GPUs on one riser adapter, install the FHFL GPU holder first. For more information, see “Install a GPU with the GPU thermal kit” on page 191.</p>

Notes:

- For server models without GPU installed, select the standard air baffle.
- Before installing the large-size air baffle, ensure that the height of the installed heat sinks is 1U to leave adequate space for installing the large-size air baffle.

Particulate contamination

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

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

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).² The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).³ The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> The room air might be continuously filtered with MERV 8 filters. Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>⁴ The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p>⁵ Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

Management offerings

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>Interface</p> <ul style="list-style-type: none">• CLI application• Web GUI interface• Mobile application• REST API <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/product_page.html</p>
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none">• GUI application• Mobile application• Web interface• REST API <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/ug_product_page.html</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>Interface</p> <ul style="list-style-type: none">• OneCLI: CLI application• Bootable Media Creator: CLI application, GUI application• UpdateXpress: GUI application <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/xclarity_essentials/overview.html</p>

Offerings	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_about.html</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>Interface</p> <p>GUI application</p> <p>Usage and downloads</p> <p>https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application • Web Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/lnvo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application • Web Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/lnvo-lcp</p>

Functions

Offerings	Functions							
	Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Events/alert monitoring	Inventory/logs	Power mgmt	Power planning
Lenovo XClarity Controller			√	√ ²	√	√ ⁴		
Lenovo XClarity Administrator	√	√	√	√ ²	√	√ ⁴		

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

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, 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.
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

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

Front view

The front view of the server varies by model.

The illustrations in this topic show the server front views based on the supported drive bays.

Notes:

- Your server might look different from the illustrations in this topic.
- The chassis for sixteen 2.5-inch-drive bays cannot be upgraded to the chassis for twenty-four 2.5-inch-drive bays.

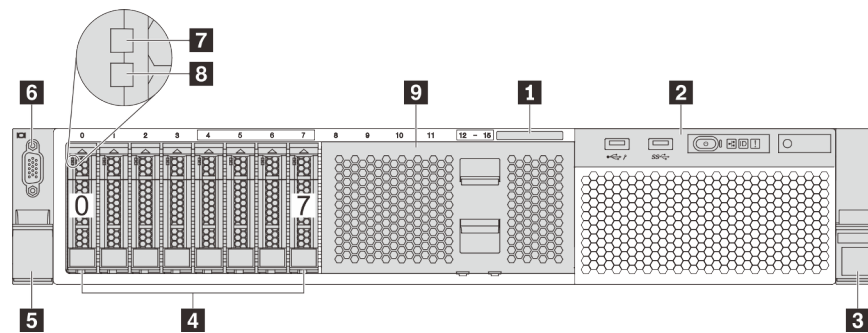


Figure 4. Front view of server models with eight 2.5-inch drive bays (0–7)

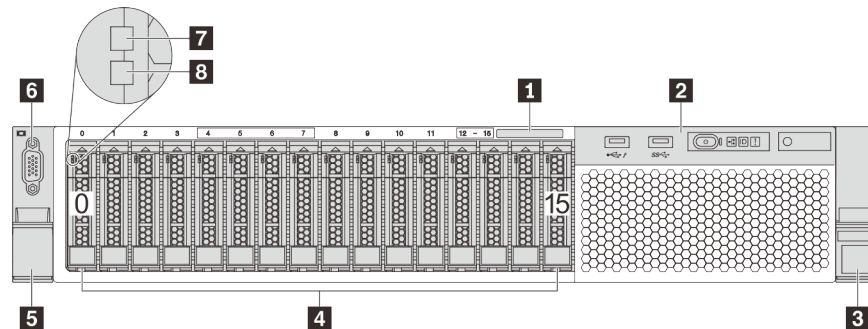


Figure 5. Front view of server models with sixteen 2.5-inch drive bays (0–15)

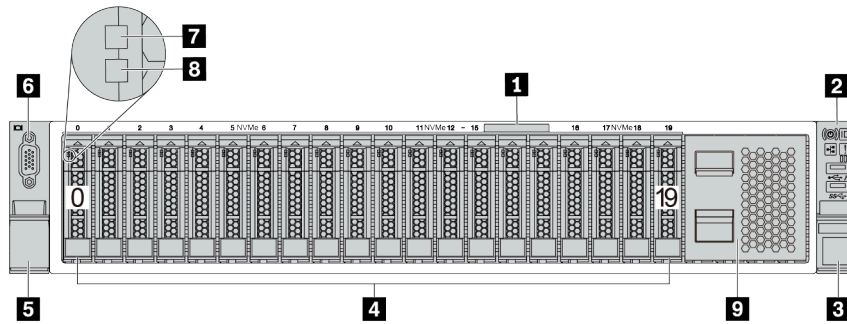


Figure 6. Front view of server models with twenty 2.5-inch drive bays (0–19)

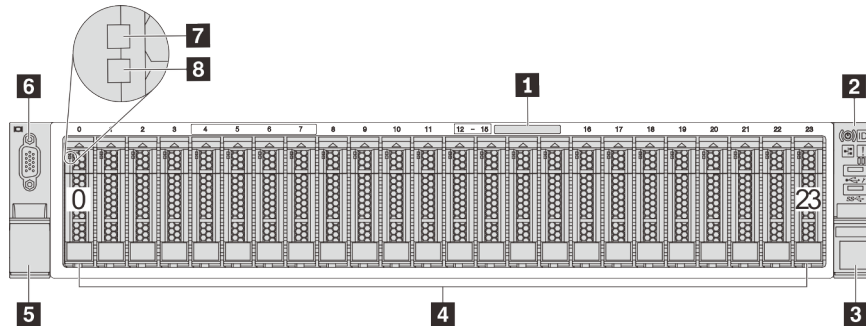


Figure 7. Front view of server models with twenty-four 2.5-inch drive bays (0–23)

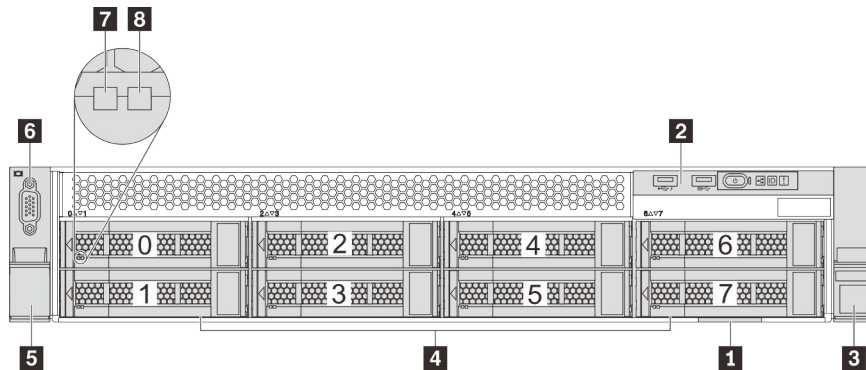


Figure 8. Front view of server models with eight 3.5-inch drive bays (0–7)

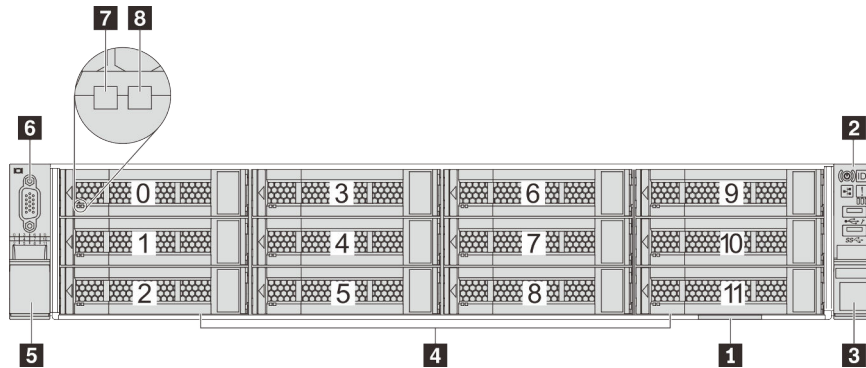


Figure 9. Front view of server models with twelve 3.5-inch drive bays (0–11)

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

Callout	Callout
1 Pull-out information tab	2 Front I/O assembly
3 Rack latch (right)	4 Drive bays
5 Rack latch (left)	6 VGA connector (available on some models)
7 Drive activity LED	8 Drive status LED
9 Drive bay filler	

1 Pull-out information tab

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

2 Front I/O assembly

For information about the controls, connectors, and status LEDs on the front I/O assembly, see [“Front I/O assembly” on page 24](#).

3 5 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.

4 Drive bays

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

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

6 VGA connector (available on some models)

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

7 Drive activity LED

8 Drive status LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
7 Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
8 Drive status LED	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.

Drive LED	Status	Description
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.

9 Drive bay filler

The drive bay filler is used to cover vacant drive bays.

Front I/O assembly

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

The following illustrations show the controls, connectors, and LEDs on the front I/O assembly of the server. To locate the front I/O assembly, see [“Front view” on page 21](#).

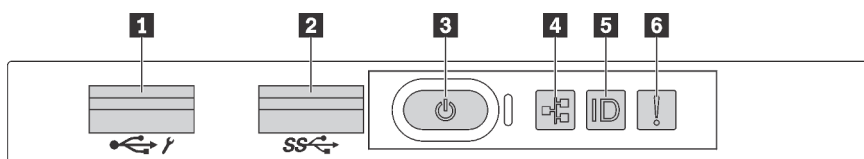


Figure 10. Front I/O assembly for server models with eight 3.5-inch-drive bays, eight 2.5-inch-drive bays, and sixteen 2.5-inch-drive bays

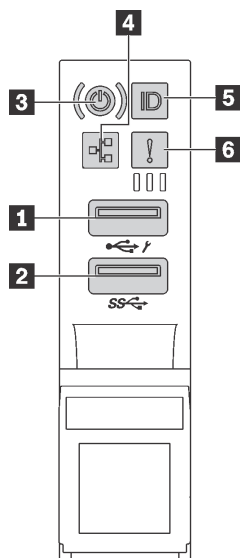


Figure 11. Front I/O assembly for server models with twelve 3.5-inch-drive bays and twenty-four 2.5-inch-drive bays

Table 4. Components on the front I/O assembly

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

1 XClarity Controller USB connector

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

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

For more information, see [“Set the network connection for the Lenovo XClarity Controller” on page 223](#).

2 USB 3.0 connector

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

3 Power button with power status LED

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

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

4 Network activity LED

Compatibility of the NIC adapter and the network activity LED

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

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

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

5 System ID button with system ID LED

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

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

6 System error LED

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

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

Rear view

The rear of the server provides access to several connectors and components.

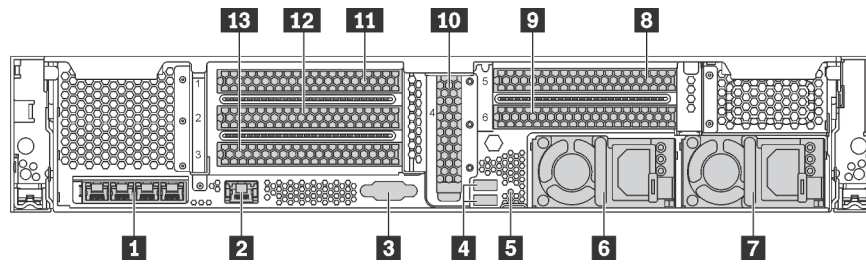


Figure 12. Rear view of server models with six PCIe slots

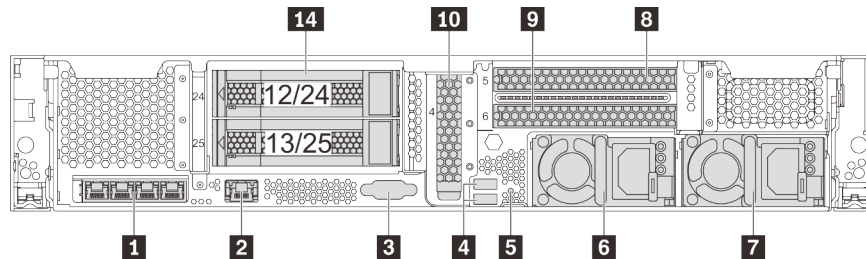


Figure 13. Rear view of server models with two rear 3.5-inch drive bays (12/13 or 24/25) and three PCIe slots

Table 5. Components on the rear of the server

Callout	Callout
1 Ethernet connectors on the LOM adapter (available on some models)	2 XClarity Controller network connector
3 VGA connector	4 USB 3.0 connectors (2)
5 NMI button	6 Power supply 1
7 Power supply 2 (available on some models)	8 PCIe slot 5 (on riser 2)
9 PCIe slot 6 (on riser 2)	10 PCIe slot 4 (with a serial port module installed on some models)
11 PCIe slot 1 (on riser 1)	12 PCIe slot 2 (on riser 1)
13 PCIe slot 3 (on riser 1)	14 Rear 3.5-inch drive bays (2)

1 Ethernet connectors on the LOM adapter (available on some models)

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

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

2 XClarity Controller network connector

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

3 VGA connector

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

4 USB 3.0 connectors (2)

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

5 NMI button

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

6 Power supply 1

7 Power supply 2 (available on some models)

The hot-swap redundant power supplies help you avoid significant interruption to the operation of the system when a power supply fails. You can purchase a power supply option from Lenovo and install the power supply to provide power redundancy without turning off the server.

On each power supply, there are three status LEDs near the power cord connector. For information about the status LEDs, see [“Rear view LEDs” on page 29](#).

8 9 10 11 12 13 PCIe slots

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

Notes:

- Your server supports PCIe slot 5 and PCIe slot 6 when two processors are installed.
- Do not install PCIe adapters with small form factor (SFF) connectors in PCIe slot 6.
- Observe the following PCIe slot selection priority when installing an Ethernet card or a converged network adapter:

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

PCIe slots 1, 2, and 3 on riser 1:

There are five different riser cards that can be installed in riser 1.

- Type 1
 - Slot 1: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 3: PCIe x16 (x8, x4, x1), full-height, half-length
- Type 2
 - Slot 1: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 3: ML2 x8 (x8, x4, x1), full-height, half-length
- Type 3
 - Slot 1: PCIe x16 (x16, x8, x4, x1), full-height, half-length/full-height, full-length

- Slot 2: Not available
- Slot 3: PCIe x16 (x8, x4, x1), full-height, half-length
- Type 4
 - Slot 1: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 2: Not available
 - Slot 3: ML2 x16 (x16, x8, x4, x1), full-height, half-length
- Type 5
 - Slot 1: PCIe x16 (x16, x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length/full-height, full-length
 - Slot 3: PCIe x16 (x16, x8, x4, x1), full-height, half-length

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

PCIe slots 5 and 6 on riser 2:

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

14 Rear 3.5-inch drive bays (2)

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

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

Rear view LEDs

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

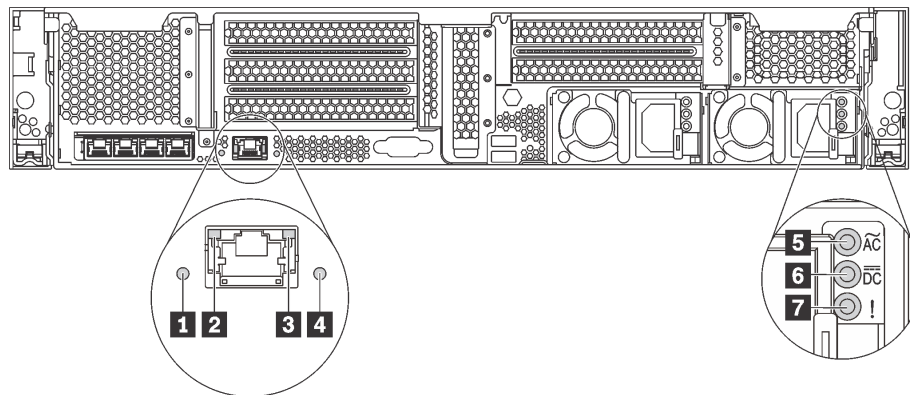


Figure 14. Rear view LEDs of the server

Table 6. LEDs on the rear of the server

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

1 System ID LED

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

2 3 Ethernet status LEDs

The XClarity Controller network connector has two status LEDs.

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

4 System error LED

The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see [“Front I/O assembly” on page 24](#).

5 Power input LED

6 Power output LED

7 Power supply error LED

Each hot-swap power supply has three status LEDs.

LED	Description
5 Power input LED	<ul style="list-style-type: none"> Green: The power supply is connected to the ac power source. Off: The power supply is disconnected from the ac power source or a power problem occurs.
6 Power output LED	<ul style="list-style-type: none"> Green: The server is on and the power supply is working normally. Blinking green: The power supply is in 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 entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server. To disable zero-output mode, start the Setup utility, go to System Settings → Power → Zero Output and select Disable. If you disable zero-output mode, both power supplies will be in the active state. Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply.
7 Power supply error LED	<ul style="list-style-type: none"> Yellow: The power supply has failed. To resolve the issue, replace the power supply. Off: The power supply is working normally.

System board components

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

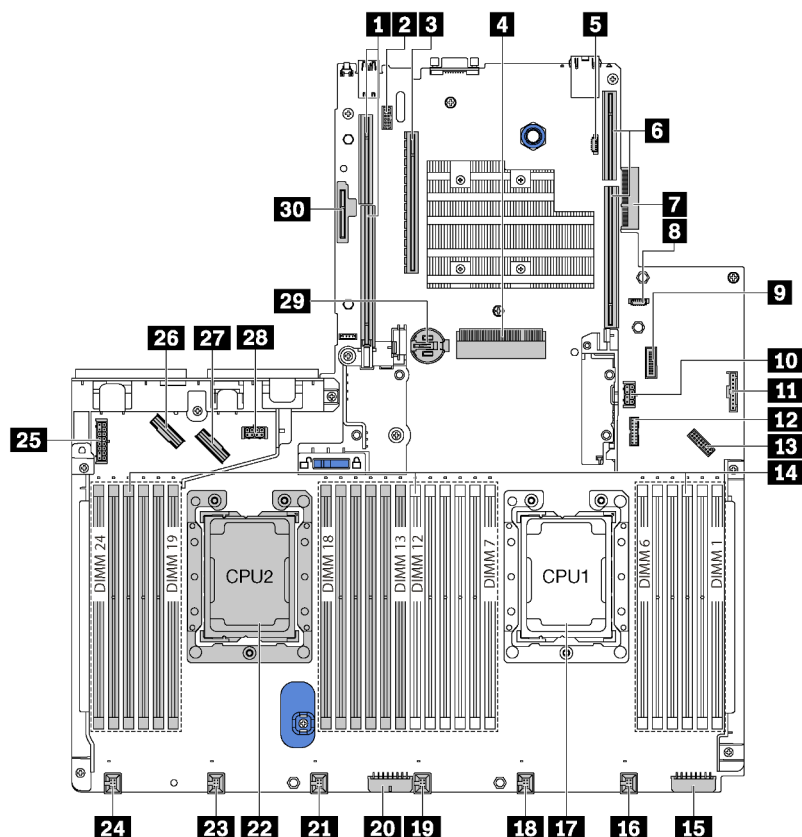


Figure 15. System board components

Table 7. Components on the system board

Callout	Callout
1 Riser 2 slot	2 Serial-port-module connector
3 PCIe slot 4	4 RAID adapter slot
5 BIOS ROM programming connector	6 Riser 1 slot
7 LOM adapter connector	8 XCC ROM programming connector
9 Front USB connector	10 GPU power connector 2
11 Operator-information-panel connector	12 TCM ¹ /TPM ² connector (for Chinese Mainland only)
13 Front VGA connector	14 memory module slots (24)
15 Backplane power connector 3	16 System fan 1 connector
17 Processor 1 socket	18 System fan 2 connector
19 System fan 3 connector	20 Backplane power connector 2
21 System fan 4 connector	22 Processor 2 socket

Table 7. Components on the system board (continued)

Callout	Callout
23 System fan 5 connector	24 System fan 6 connector
25 Backplane power connector 1	26 NVMe 2–3 connector
27 NVMe 0–1 connector	28 GPU power connector 1
29 CMOS battery	30 M.2 module slot (SATA / PCIe slot 8)

Notes:

- ¹ Trusted Cryptography Module
- ² Trusted Platform Module

System board LEDs

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

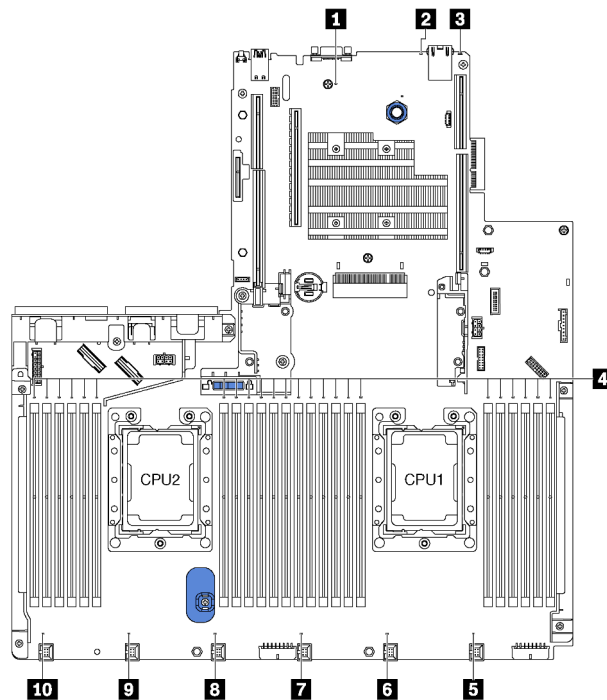


Figure 16. System board LEDs

Table 8. LEDs on the system board

Callout	Callout
1 System power LED	2 System ID LED
3 System error LED	4 memory module error LEDs (24)
5 Fan 1 error LED	6 Fan 2 error LED
7 Fan 3 error LED	8 Fan 4 error LED
9 Fan 5 error LED	10 Fan 6 error LED

1 System power LED

When this LED is lit, it indicates that the server is powered on.

2 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.

3 System error LED

When this yellow LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see [“Front I/O assembly” on page 24](#).

4 memory module error LEDs

When a memory module error LED is lit, it indicates that the corresponding memory module has failed.

5 6 7 8 9 10 Fan error LEDs

When a fan error LED is lit, it indicates that the corresponding system fan is operating slowly or has failed.

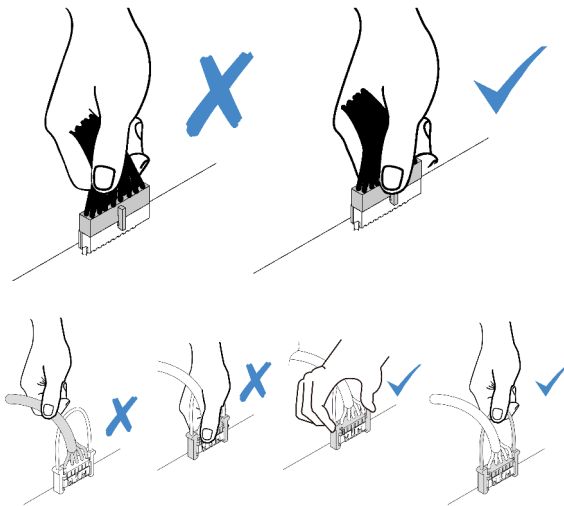
Internal cable routing

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

To connect cables, observe the following guidelines:

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

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



GPU

Use the section to understand the cable routing for the GPUs.

Server models with up to two GPUs

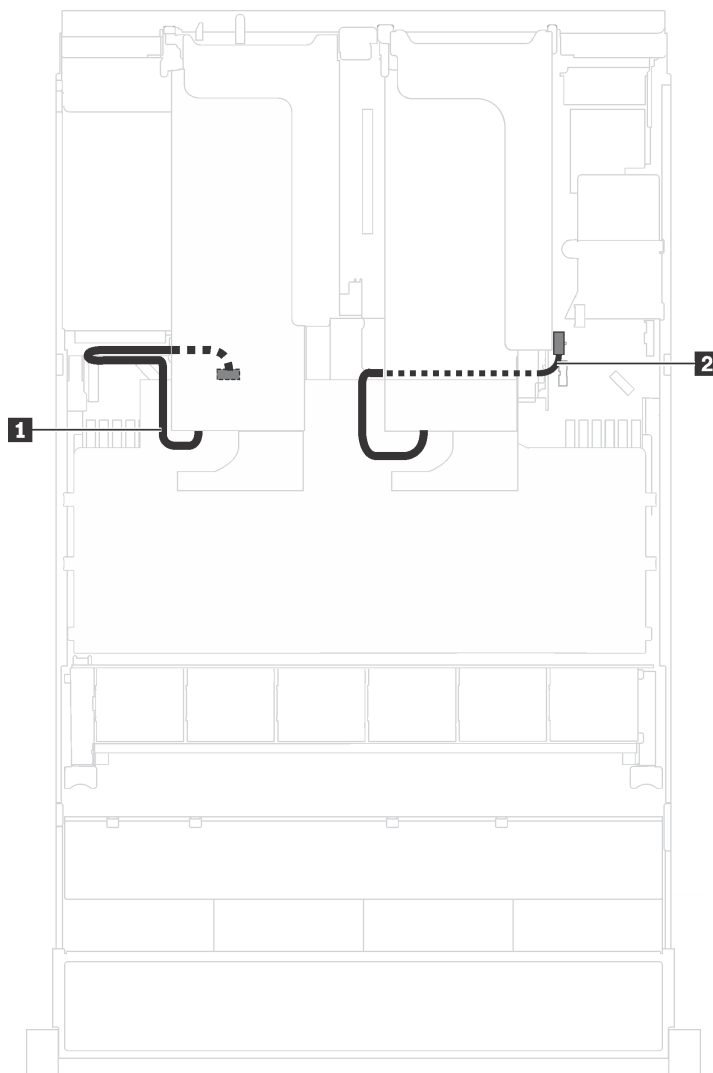


Figure 17. Cable routing for server models with up to two GPUs

Cable	From	To
1 GPU power cable	Power connector on the GPU installed in PCIe slot 5	GPU power connector 1 on the system board
2 GPU power cable	Power connector on the GPU installed in PCIe slot 1	GPU power connector 2 on the system board

Server models with up to three GPUs

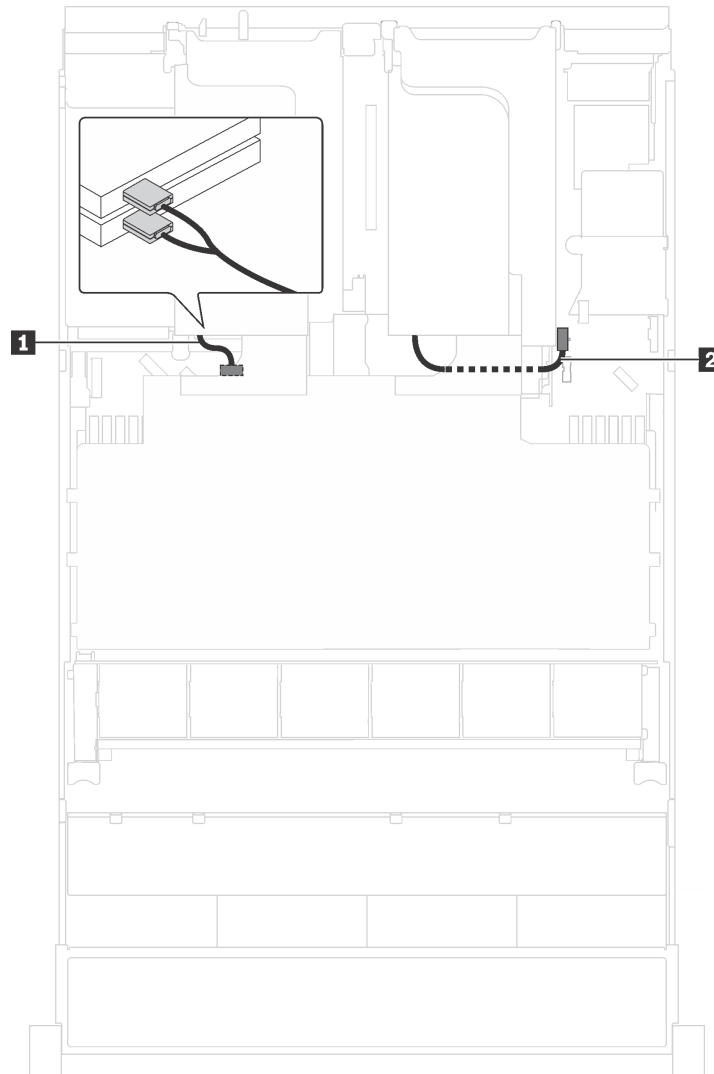


Figure 18. Cable routing for server models with up to three GPUs

Cable	From	To
1 GPU power cable	Power connectors on the GPUs installed in PCIe slots 5 and 6	GPU power connector 1 on the system board
2 GPU power cable	Power connector on the GPU installed in PCIe slot 1	GPU power connector 2 on the system board

Server models with two Cambricon MLU100-C3 processing adapters

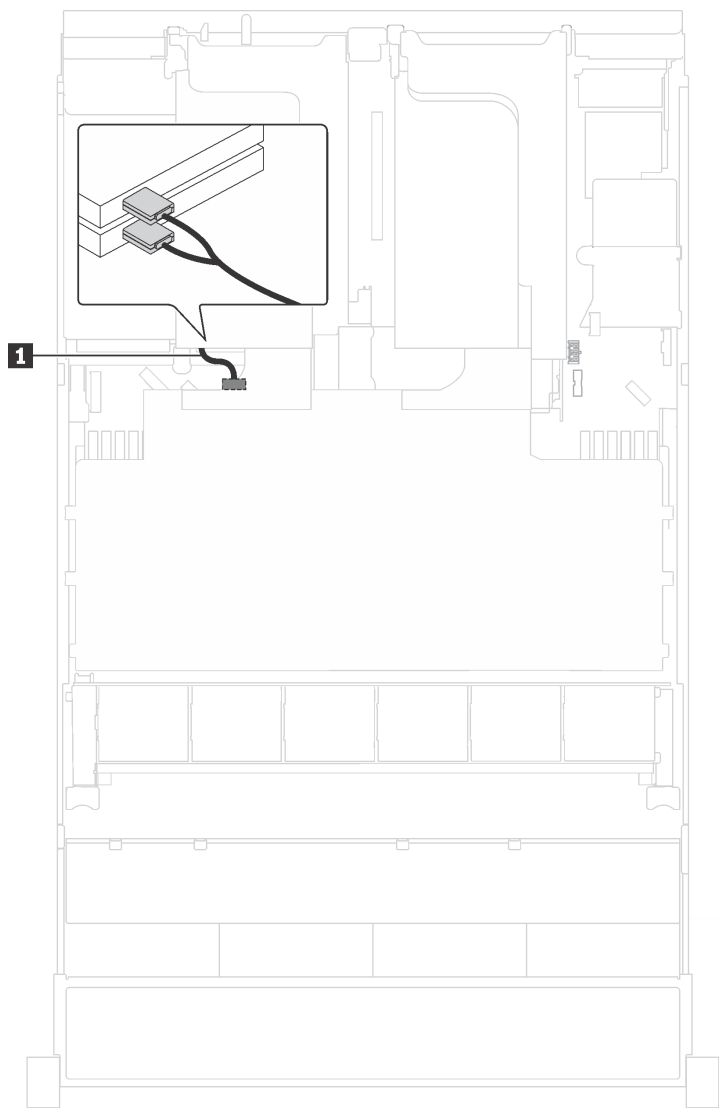


Figure 19. Cable routing for server models with two Cambricon MLU100-C3 processing adapters

Cable	From	To
1 GPU power cable	Power connectors on the adapters installed in PCIe slots 5 and 6	GPU power connector 1 on the system board

Server models with four Cambricon MLU100-C3 processing adapters

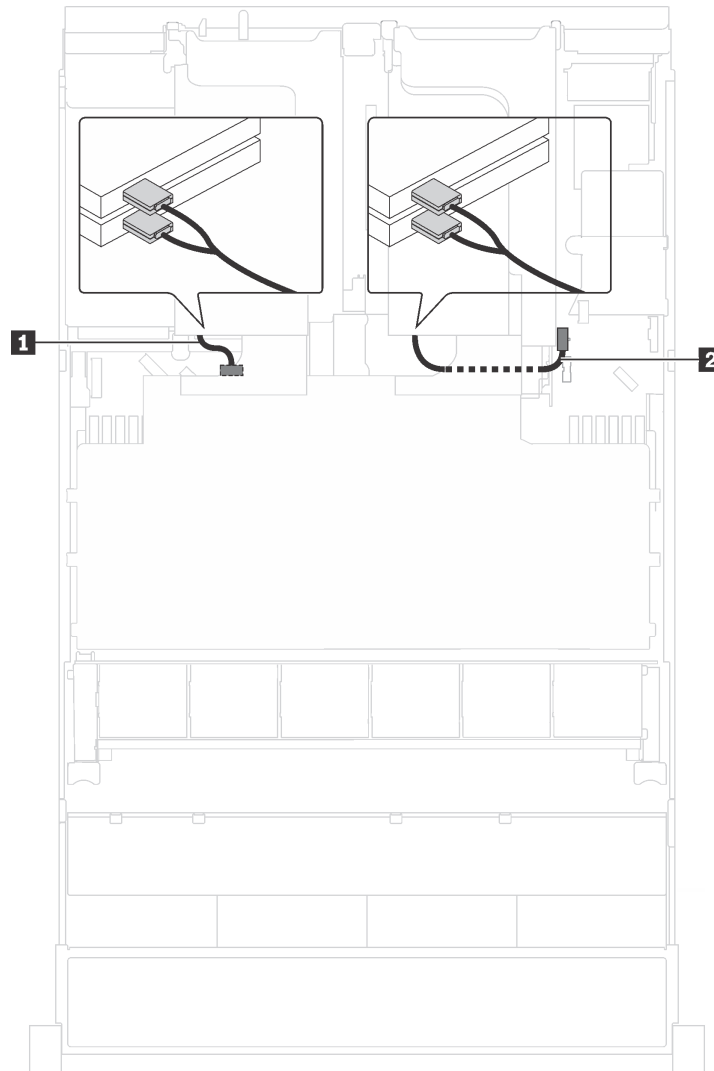


Figure 20. Cable routing for server models with four Cambricon MLU100-C3 processing adapters

Cable	From	To
1 GPU power cable	Power connectors on the adapters installed in PCIe slots 5 and 6	GPU power connector 1 on the system board
2 GPU power cable	Power connectors on the adapters installed in PCIe slots 1 and 2	GPU power connector 2 on the system board

Backplane

Use the section to understand the cable routing for backplanes.

This topic contains the following information:

- [“Server models with eight 2.5-inch drives” on page 40](#)
- [“Server models with sixteen 2.5-inch drives” on page 56](#)
- [“Server models with twenty 2.5-inch drives” on page 81](#)

- “Server models with twenty-four 2.5-inch drives” on page 82
- “Server models with eight 3.5-inch drives” on page 132
- “Server models with twelve 3.5-inch drives” on page 135

Before you route cables for backplanes, observe the adapter priority and the PCIe slot selection priority when installing the NVMe switch adapter or a RAID adapter.

- Adapter priority: NVMe switch adapter, 24i RAID adapter, 8i HBA/RAID adapter, 16i HBA/RAID adapter
- PCIe slot selection priority when installing the NVMe switch adapter:

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

- For server models with sixteen/twenty/twenty-four NVMe drives (with two processors installed):

Server models	PCIe slot selection
Sixteen NVMe drives	1, 4, 6, 7
Twenty NVMe drives	1, 4, 5, 6, 7
Twenty-four NVMe drives	1, 2, 4, 6, 7

- PCIe slot selection priority when installing a 24i RAID adapter:

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

- PCIe slot selection priority when installing a 8i or 16i HBA/RAID adapter:

Number of installed processors	PCIe slot selection priority
One processor	7, 4, 2, 3, 1
Two processors	7, 4, 2, 3, 1, 5, 6

Notes:

- The PCIe slot 7 refers to the RAID adapter slot on the system board.
- If the rear hot-swap drive assembly is installed, PCIe slots 1, 2, and 3 will become unavailable because the space is occupied by the rear hot-swap drive assembly.
- The adapter priority of the 530-16i or 930-16i RAID adapter adapter can be higher than the 930-8i RAID adapter when both 16i RAID adapter and 8i RAID adapter are chosen.
- Oversubscription may exist in some configurations installed with NVMe 810-4P/1610-8P/1611-8P switch adapters. For details, see <https://lenovopress.lenovo.com/lp1050-thinksystem-sr650-server#controllers-for-internal-storage>.

Server models with eight 2.5-inch drives

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

Server model: eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 16i HBA/RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **3** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

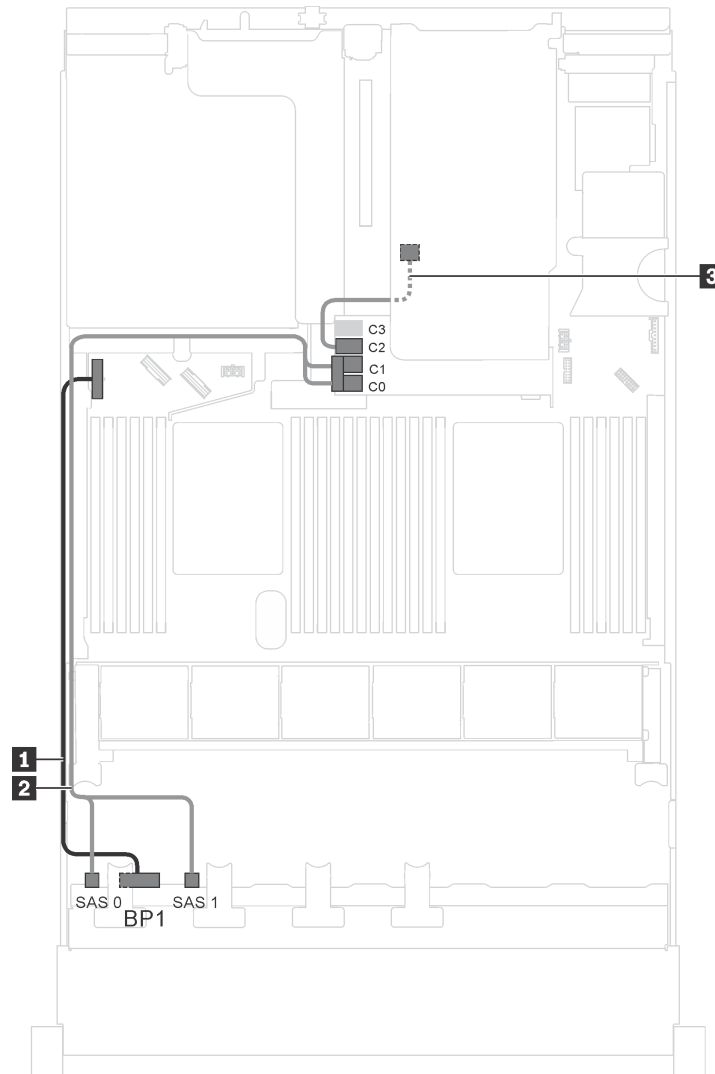


Figure 21. Cable routing for server models with eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server model: eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 24i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **3** might not be available on your server.

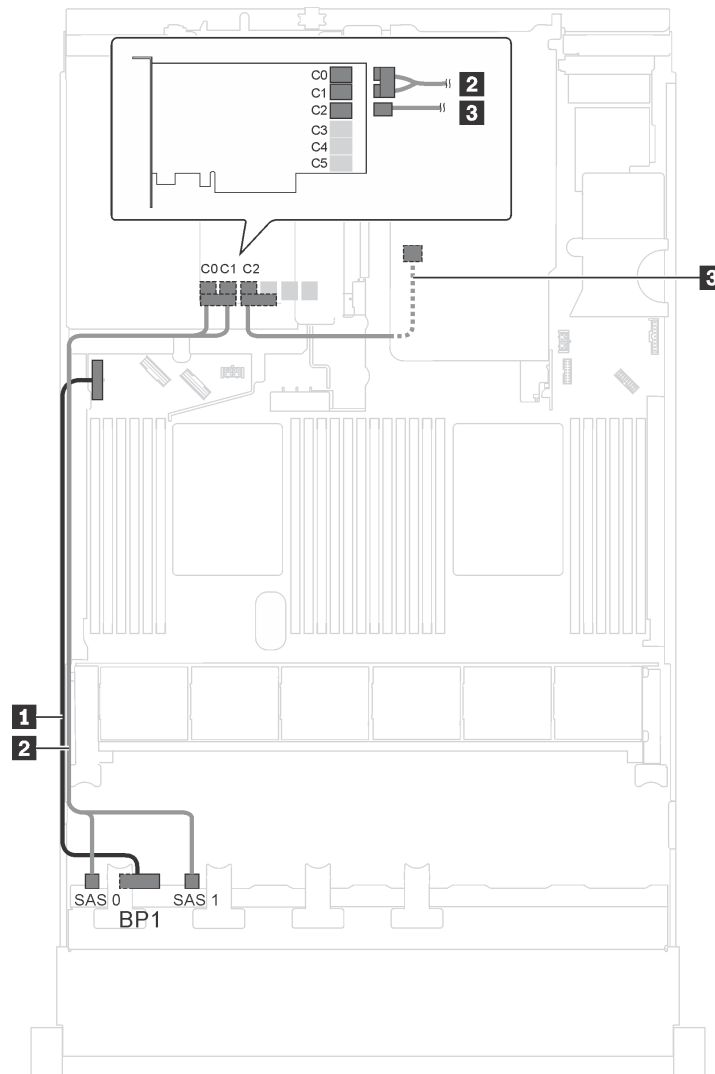


Figure 22. Cable routing for server models with eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on front backplane	C0 and C1 connectors on the 24i RAID adapter
3 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C2 connector on the 24i RAID adapter

Server model: eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 32i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **3** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

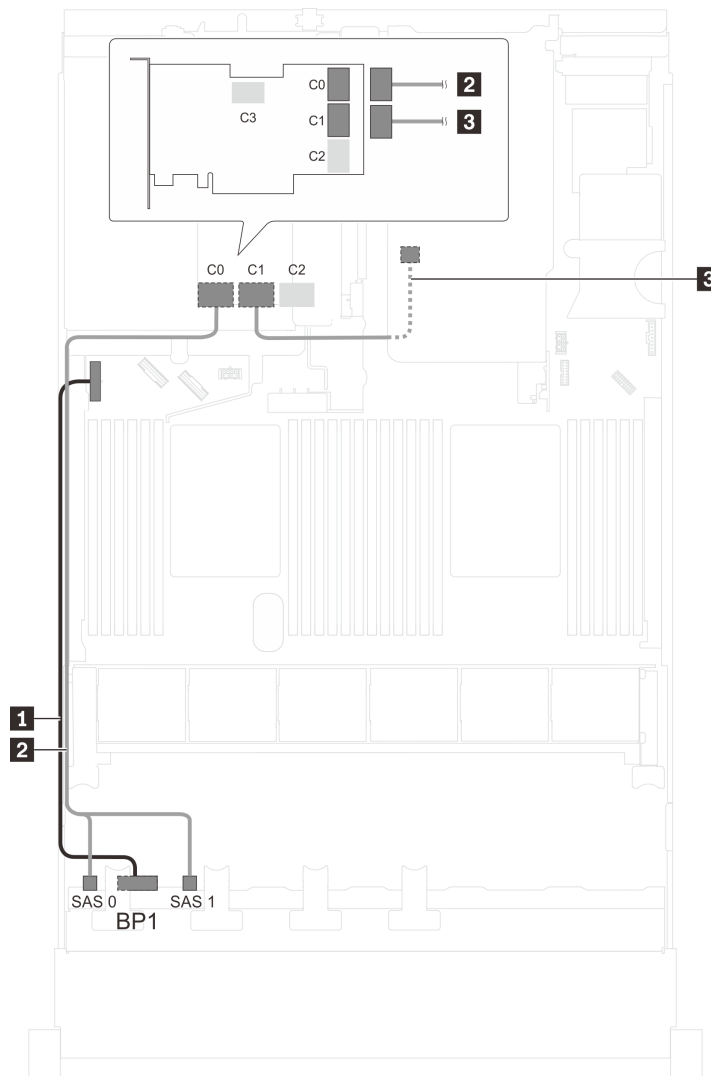


Figure 23. Cable routing for server models with eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	C0 connector on the 32i RAID adapter
3 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	C1 connector on the 32i RAID adapter

Server model: eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 4 might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

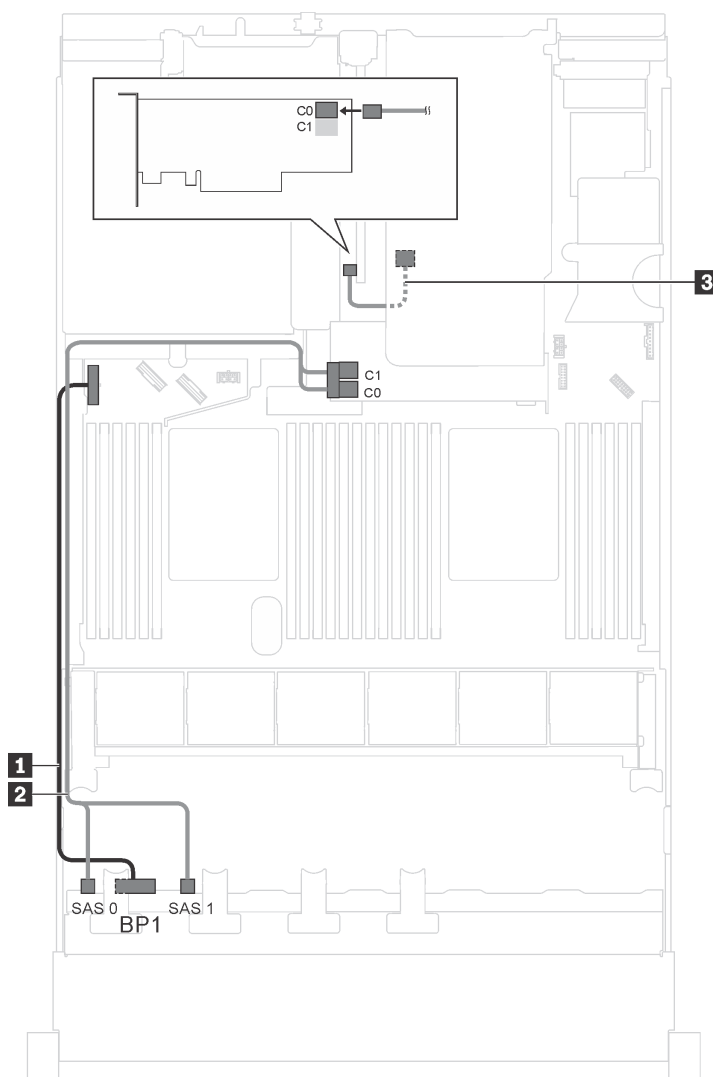


Figure 24. Cable routing for server models with eight 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and two 8i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0 Gen 4: C0

Server model: eight 2.5-inch SAS/SATA drives, one 730-8i 4G Flash SAS/SATA RAID adapter with CacheCade

Note: This configuration is available for some models only.

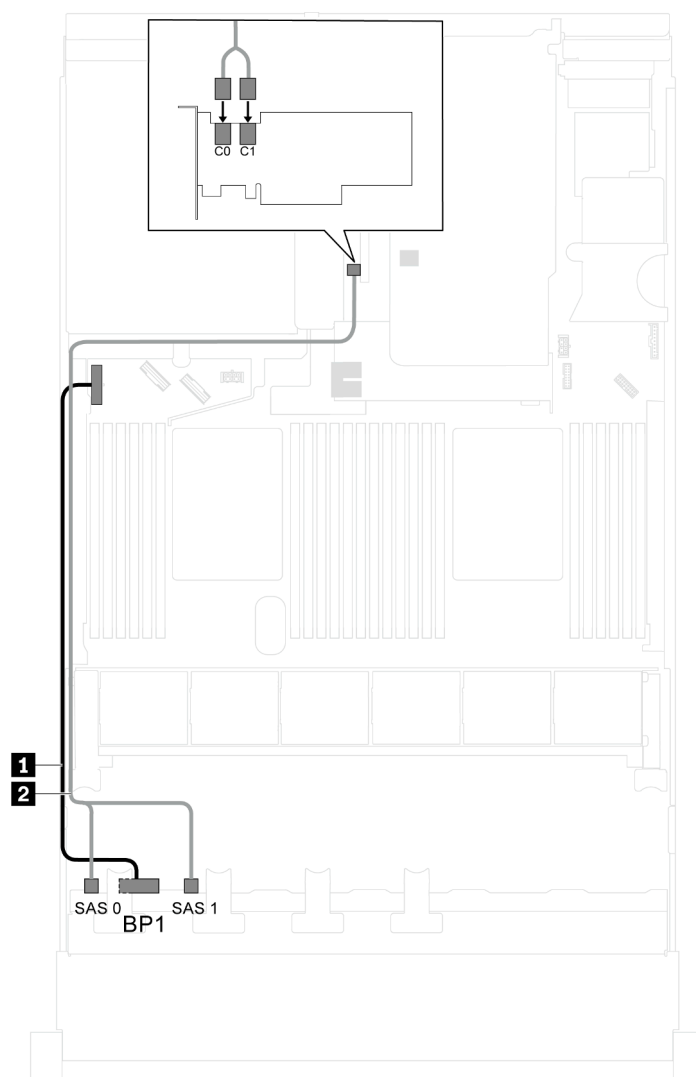


Figure 25. Cable routing for server models with eight 2.5-inch SAS/SATA drives, and one 730-8i 4G Flash SAS/SATA RAID adapter with CacheCade

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

Server model: eight 2.5-inch SAS/SATA drives, Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processors, one 8i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

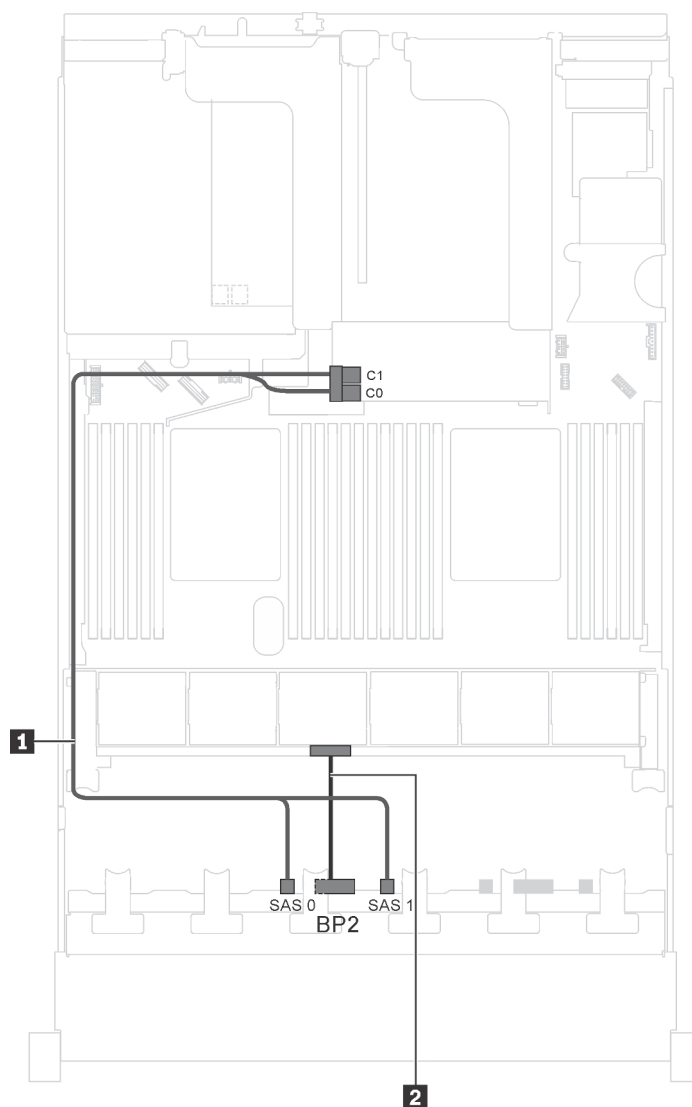


Figure 26. Cable routing for server models with eight 2.5-inch SAS/SATA drives, Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processors, and one 8i HBA/RAID adapter

Cable	From	To
1 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
2 Power cable for front backplane	Power connector on front backplane	Backplane power connector 2 on the system board

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 4 might not be available on your server.

- Gen 4 HBA/RAID adapter cannot be installed in the inner RAID adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

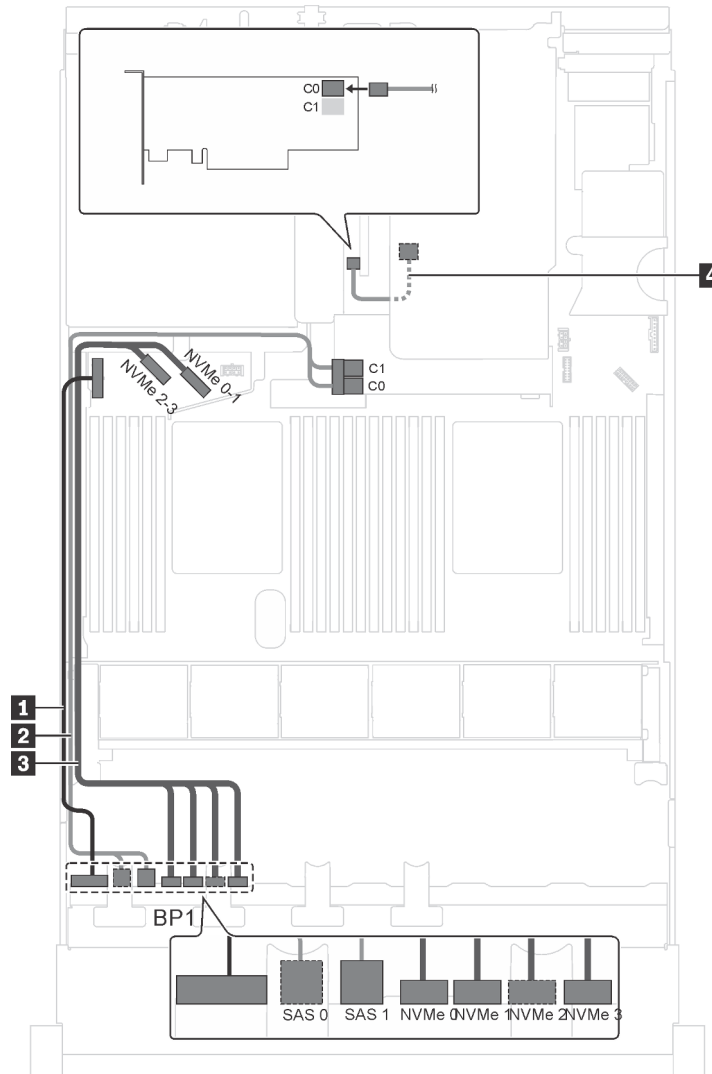


Figure 27. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and two 8i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0

Cable	From	To
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter installed in PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **4**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **4** might not be available on your server.

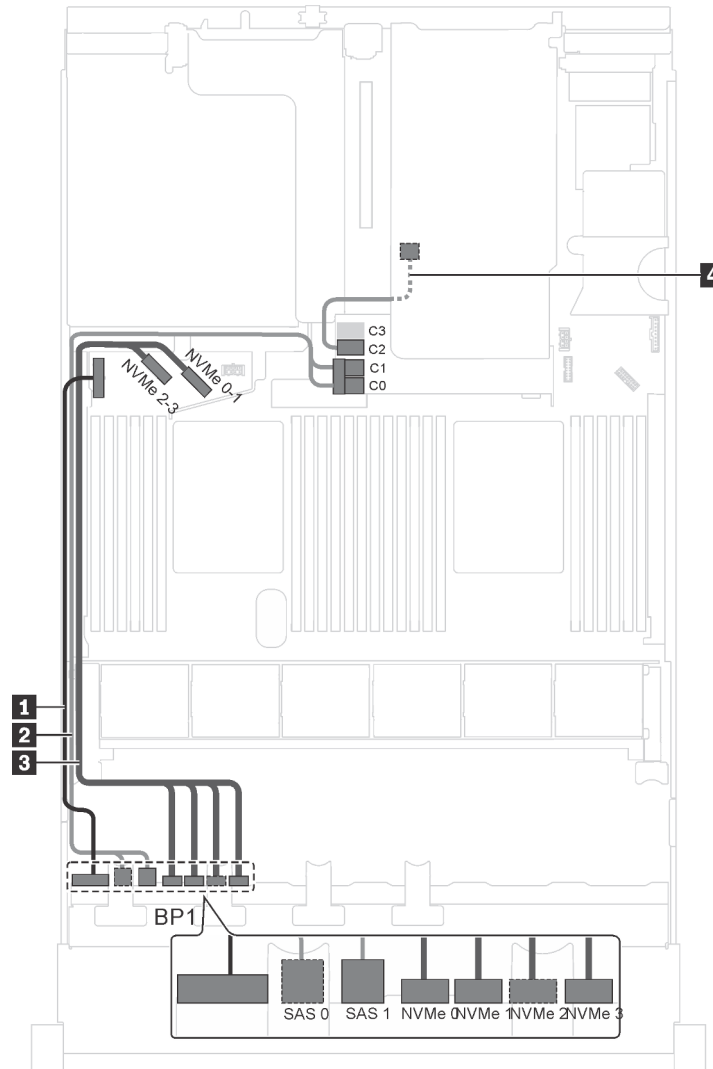


Figure 28. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0

Cable	From	To
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 24i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **4** might not be available on your server.

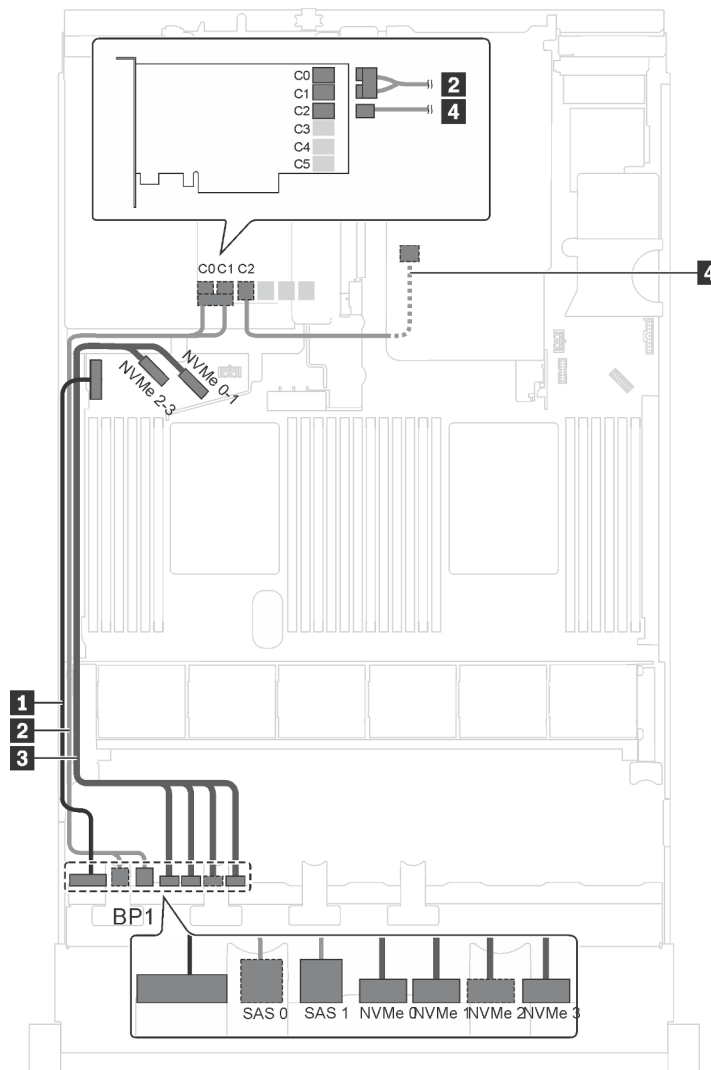


Figure 29. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on front backplane	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 5
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C2 connector on the 24i RAID adapter installed in PCIe slot 5

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 32i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **4** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **4**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

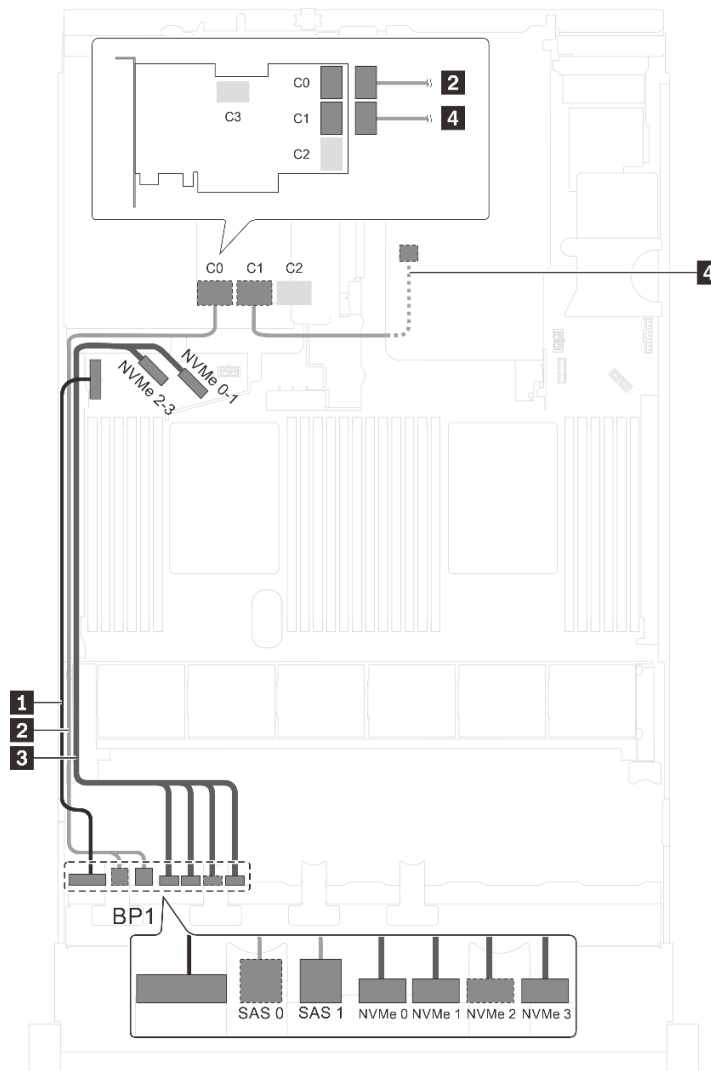


Figure 30. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on front backplane	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	C0 connector on the 32i RAID adapter on PCIe slot 5
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane	NVMe 0-1 and NVMe 2-3 connectors on the system board
4 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	C1 connector on the 32i RAID adapter on PCIe slot 5

Server model: four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processors, one 8i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.

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

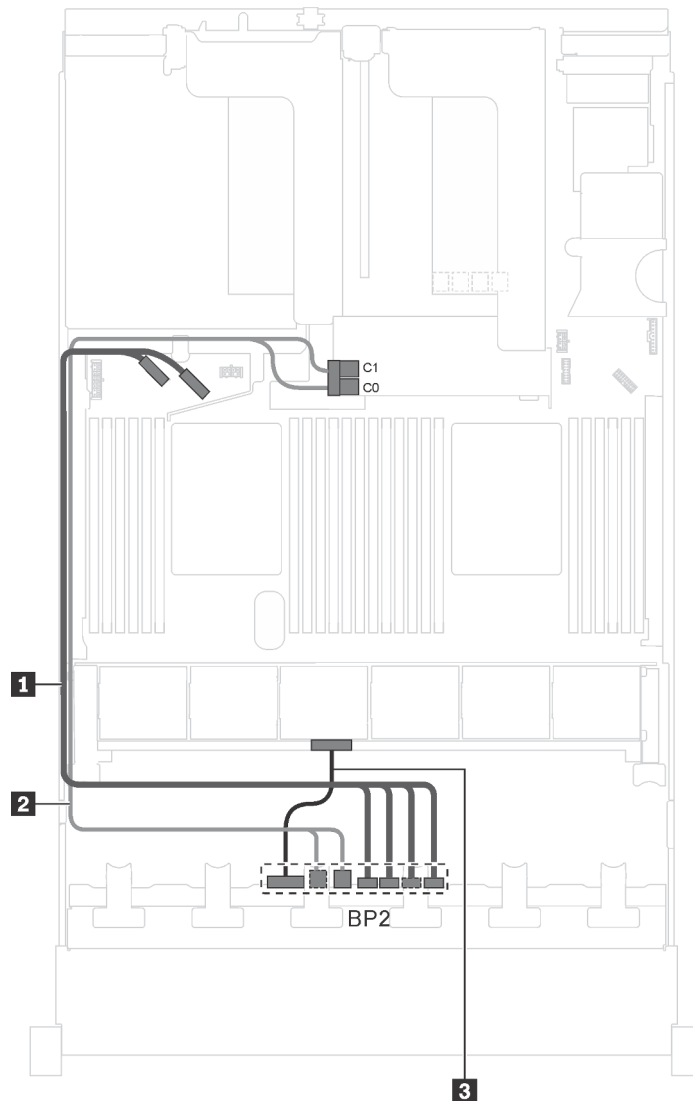


Figure 31. Cable routing for server models with four 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processors, and one 8i HBA/RAID adapter

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on front backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 Power cable for front backplane	Power connector on front backplane	Backplane power connector 2 on the system board

Server models with sixteen 2.5-inch drives

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

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

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

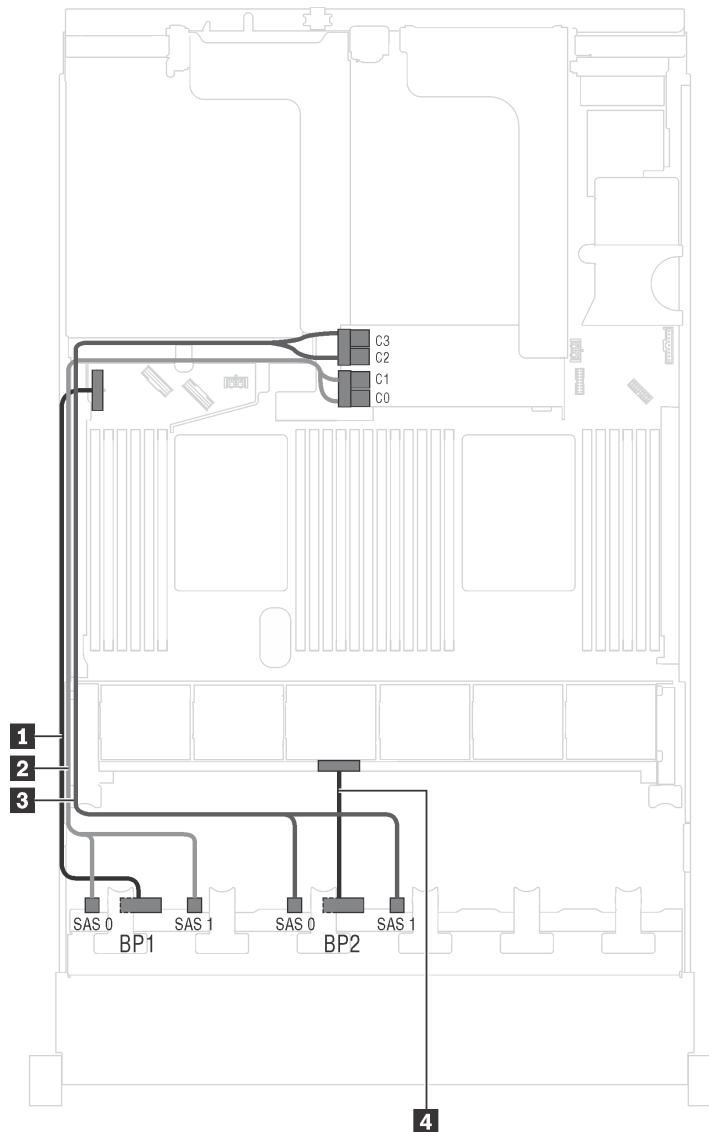


Figure 32. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 3 8i HBA/RAID adapter, one Gen 3 16i HBA/RAID adapter

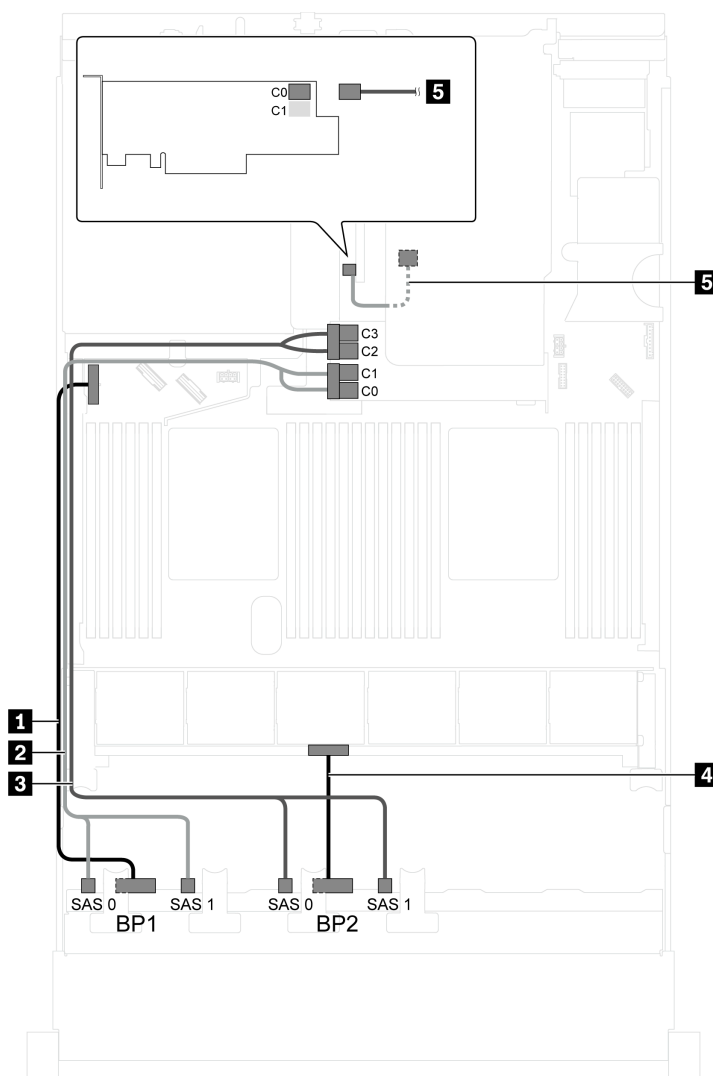


Figure 33. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 3 8i HBA/RAID adapter, and one Gen 3 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors of Gen 3 16i HBA/RAID adapter on the RAID adapter slot
3 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors of Gen 3 16i HBA/RAID adapter on the RAID adapter slot
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C0 connector of 8i HBA/RAID adapter on PCIe slot 4

Server model: sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 4 8i HBA/RAID adapter, one Gen 4 16i HBA/RAID adapter

Notes: When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:

- Cable **2/3**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
- Cable **5**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

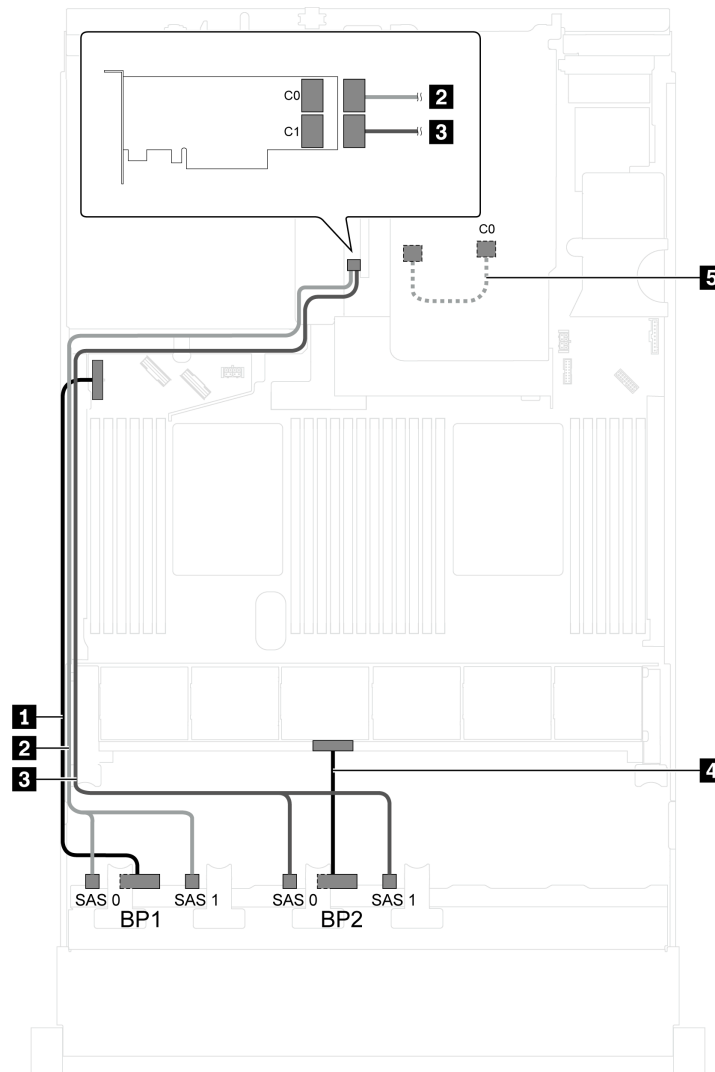


Figure 34. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 4 8i HBA/RAID adapter, and one Gen 4 16i HBA/RAID adapter

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

Cable	From	To
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C0 connector of Gen 4 8i HBA/RAID adapter on PCIe slot 2

Server model: sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 24i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **5** might not be available on your server.

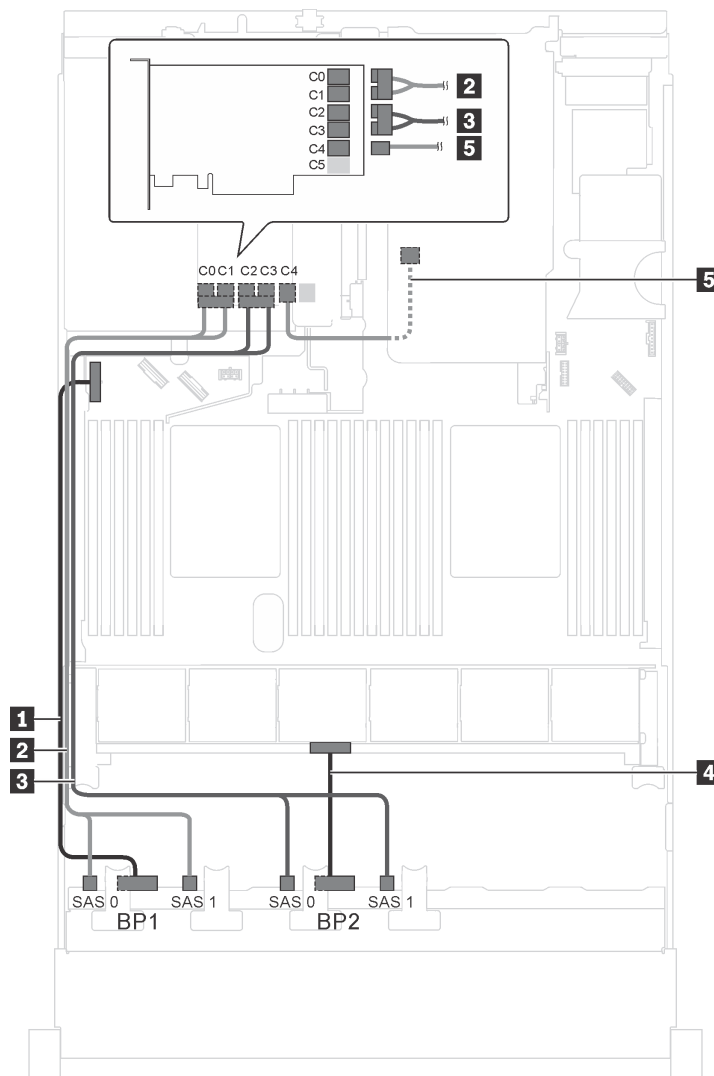


Figure 35. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 5
3 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C4 connector on the 24i RAID adapter installed in PCIe slot 5

Server model: sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 32i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **5** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable:
 - Cable **2/3**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **5**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

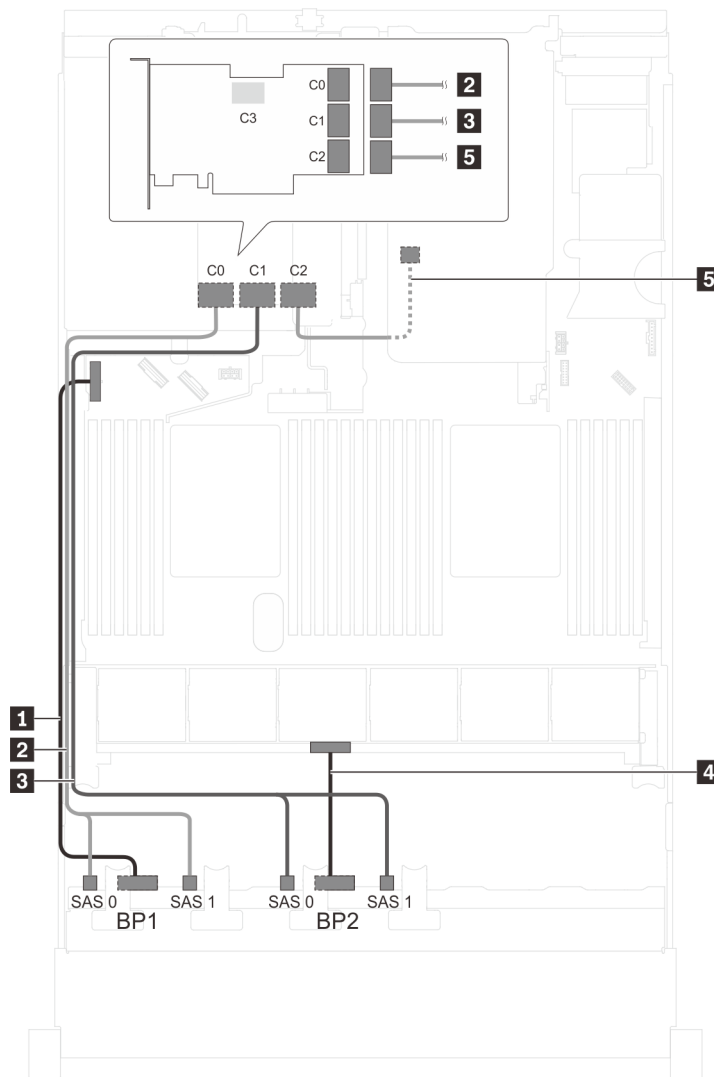


Figure 36. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 5
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	C2 connector on the 32i RAID adapter on PCIe slot 5

Server model: sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, three 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 5 might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/3**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **5**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

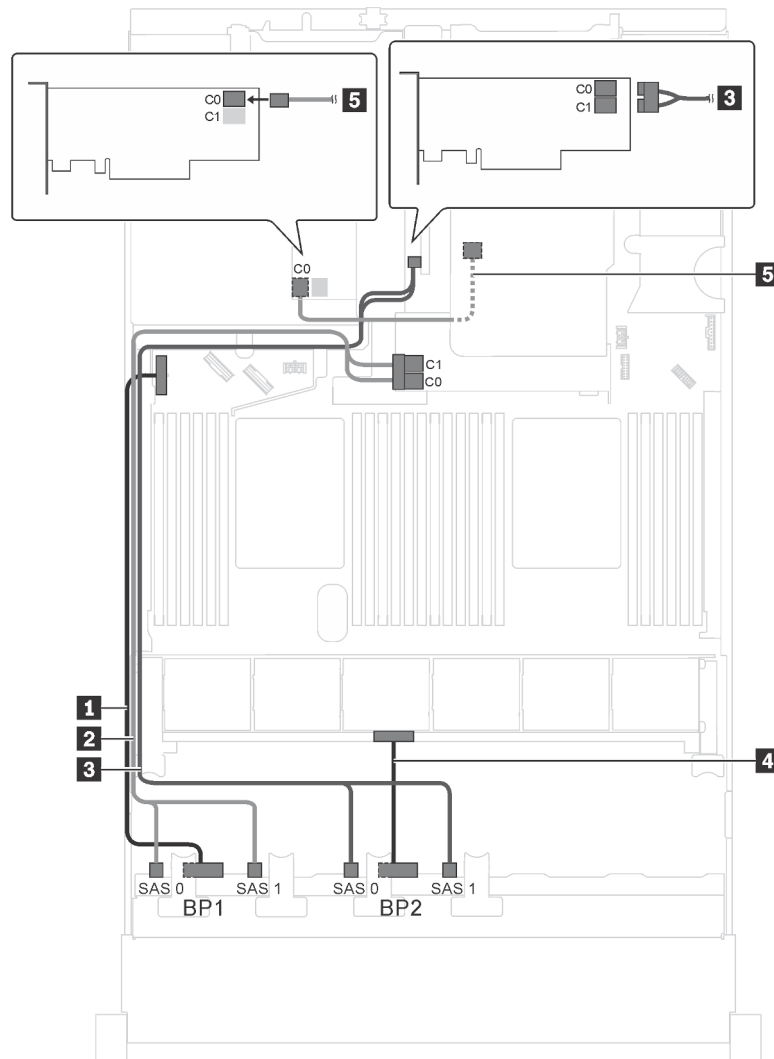


Figure 37. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and three 8i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0

Cable	From	To
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter installed in PCIe slot 5 <ul style="list-style-type: none"> Gen 3: C0 Gen 4: C0

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

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

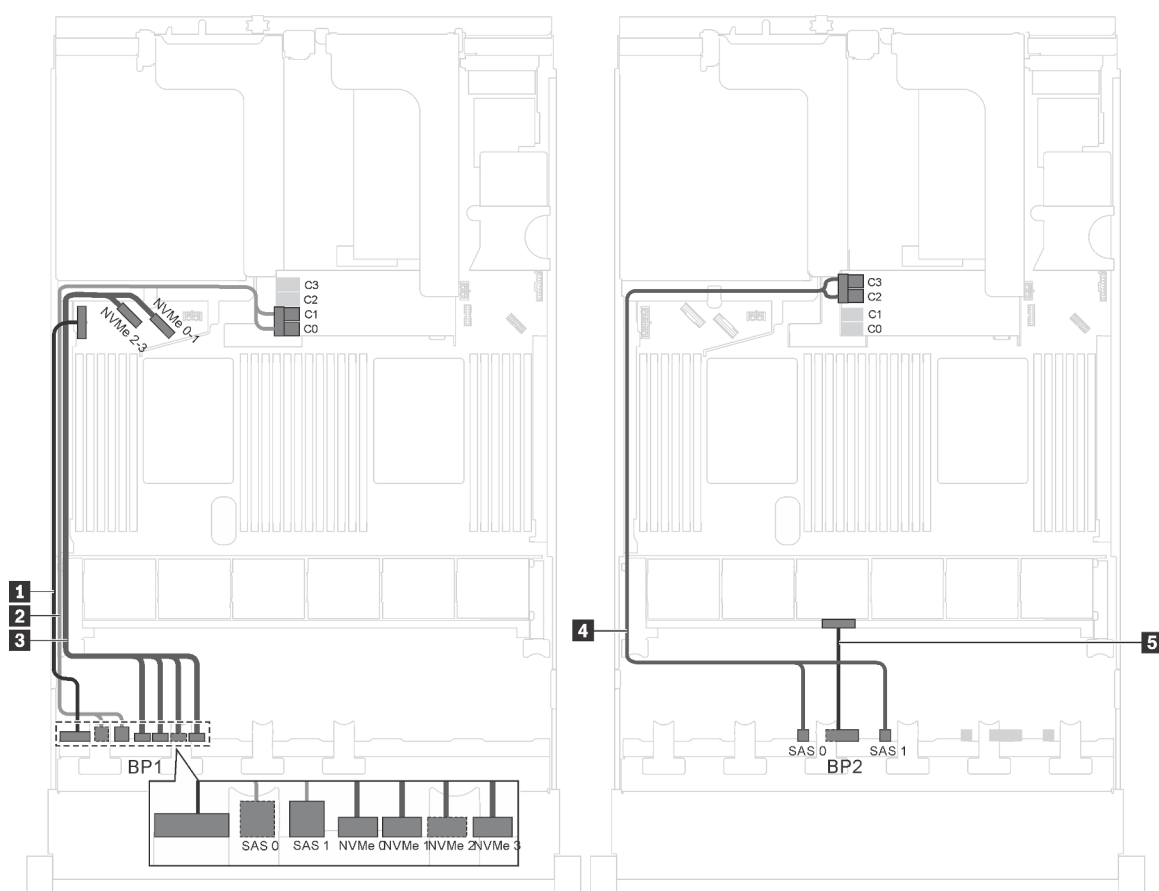


Figure 38. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter

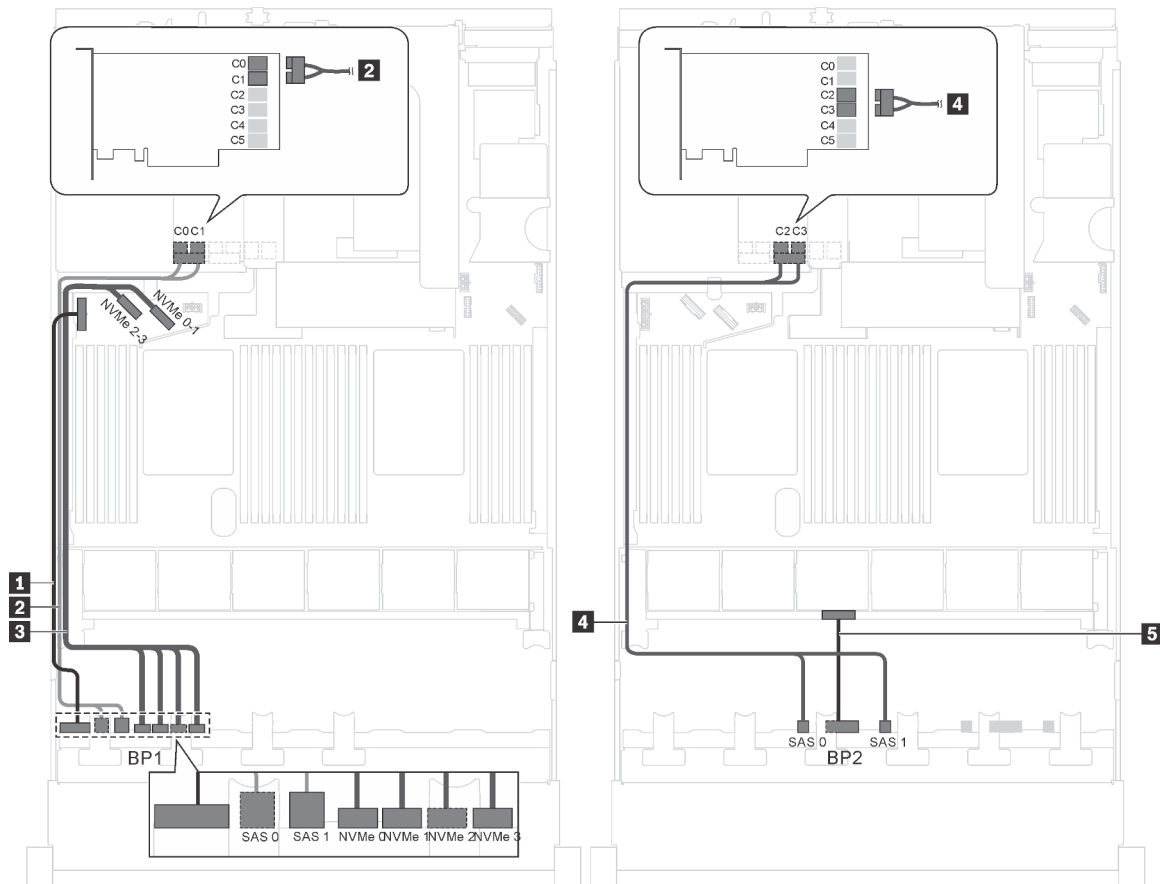


Figure 39. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on backplane 1	C0 and C1 connectors on the 24i RAID adapter on the riser assembly
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter on the riser assembly
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Note: The 24i RAID adapter can be installed in riser assembly 1 or riser assembly 2.

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter

Notes:

- The 32i RAID adapter can be installed in riser assembly 1 or riser assembly 2.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

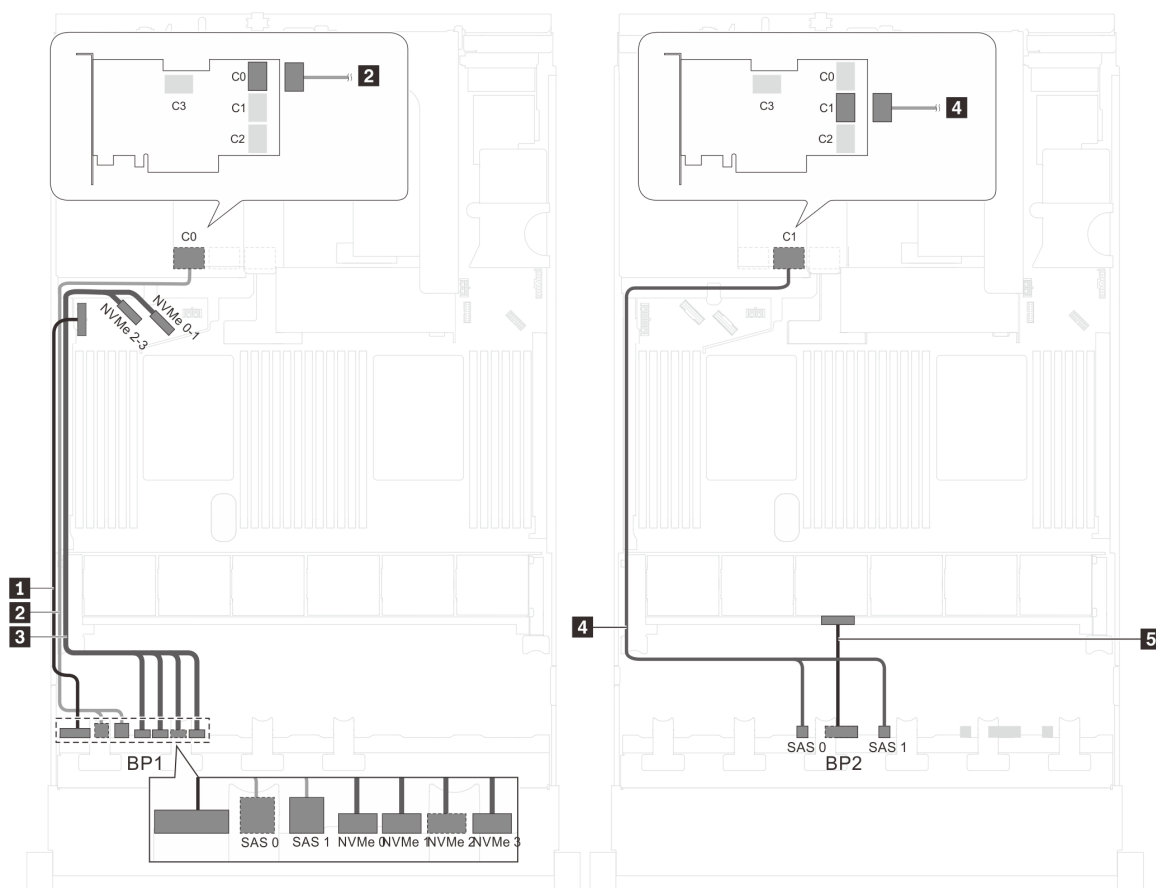


Figure 40. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on backplane 1	C0 connector on the 32i RAID adapter on the riser assembly
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on the riser assembly
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/4**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit

- Cable **6**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

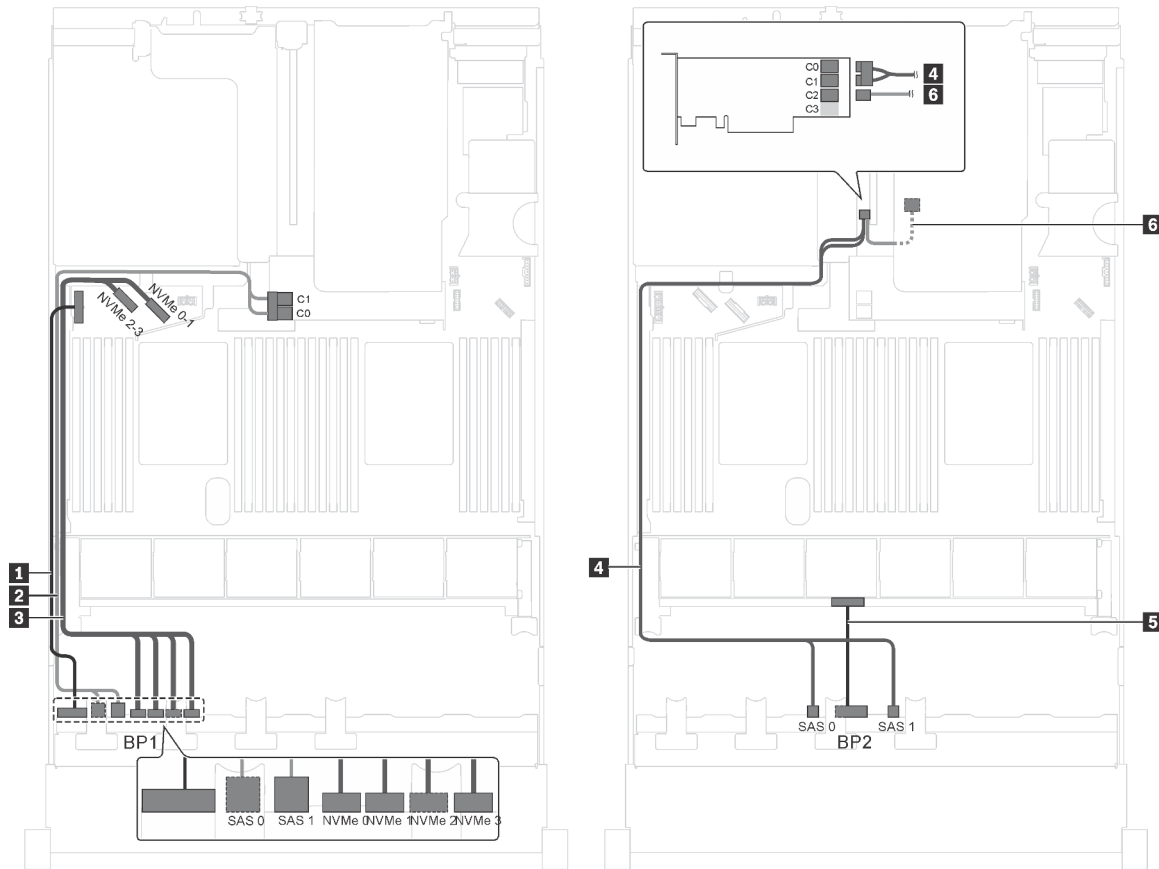


Figure 41. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 24i RAID adapter

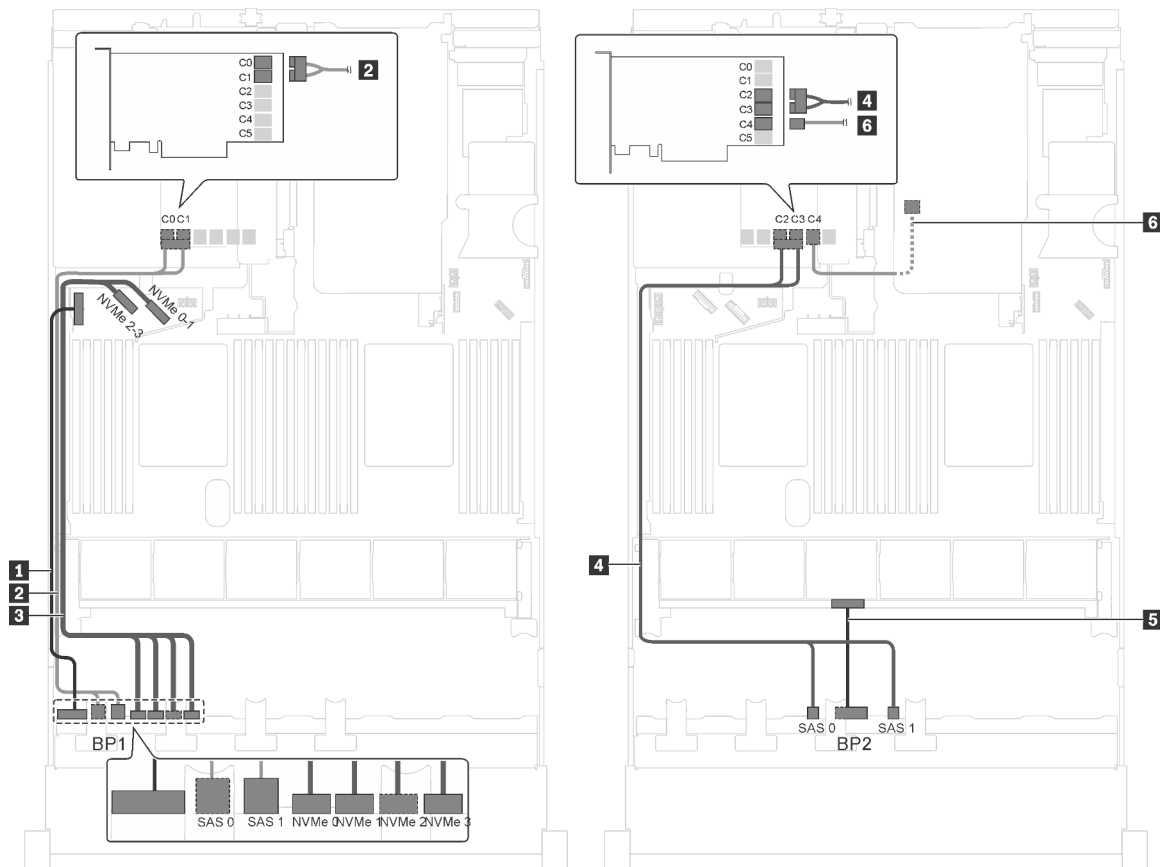


Figure 42. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 5
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 5
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C4 connector on the 24i RAID adapter installed in PCIe slot 5

Server model: twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 32i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable:
 - Cable **2/4**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **6**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

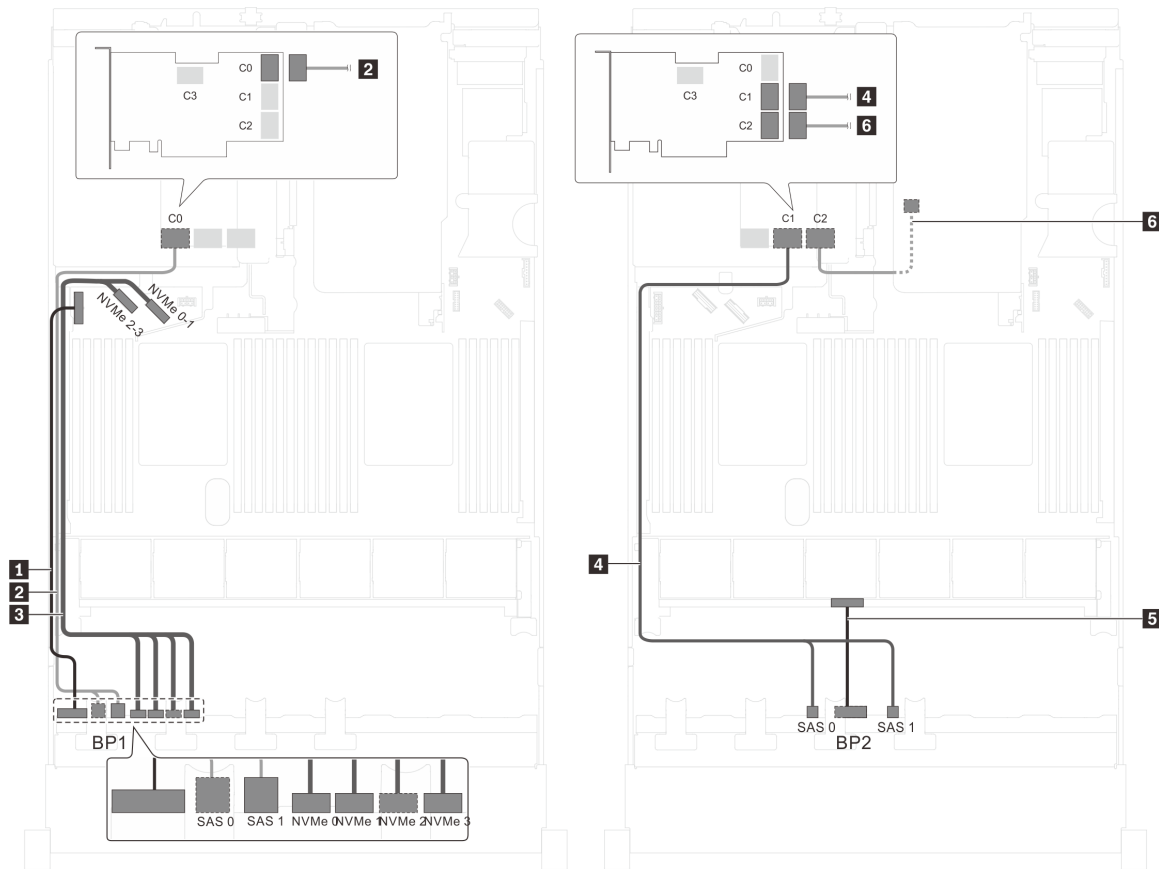


Figure 43. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 5
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 5
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	C2 connector on the 32i RAID adapter on PCIe slot 5

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

Notes:

- The cable routing illustration is based on the scenario that the NVMe switch adapter is installed in PCIe slot 1. If the NVMe switch adapter is installed in PCIe slot 5 or PCIe slot 6, route the NVMe signal cable for front backplane 2 along the left side of the chassis.
- Gen 4 HBA/RAID adapter cannot be installed in the inner RAID adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

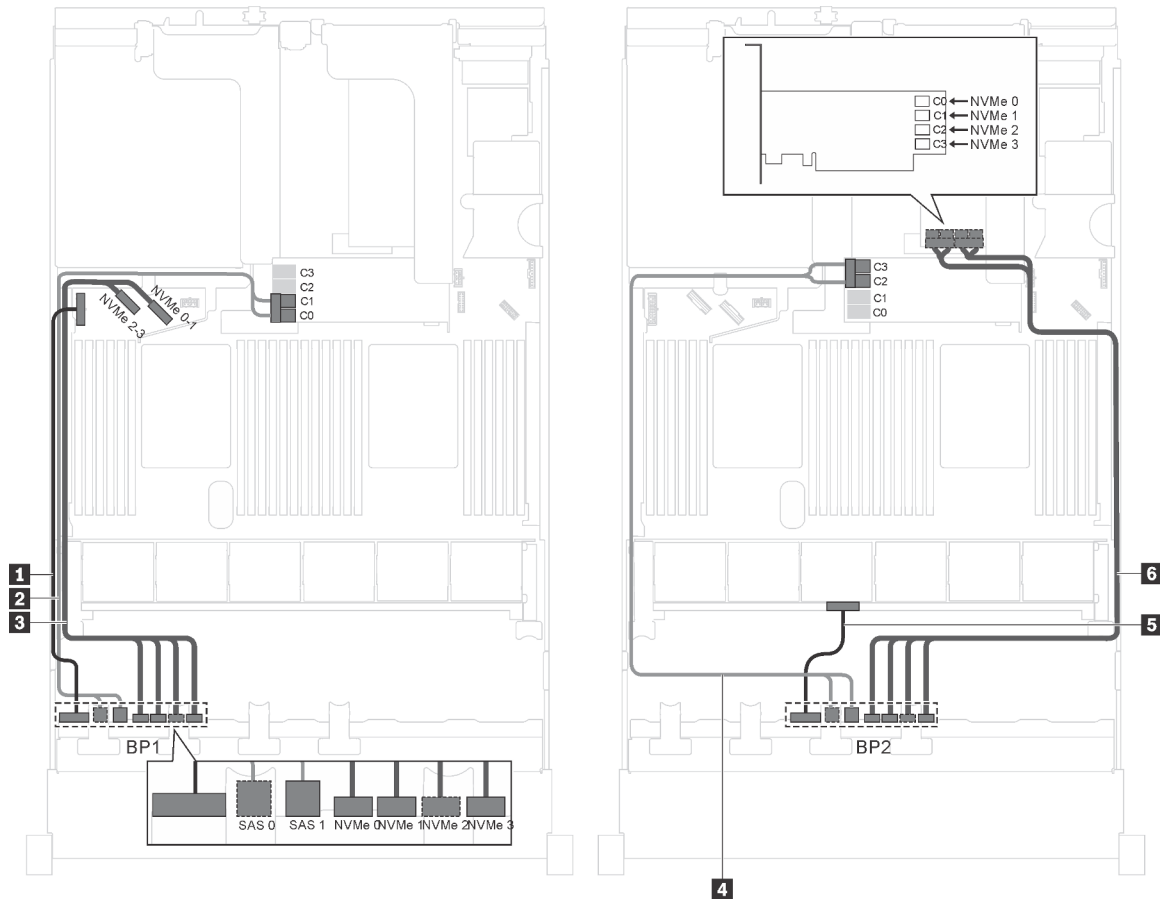


Figure 44. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 16i HBA/RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board

Cable	From	To
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1

Server model: eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 16i HBA/RAID adapter, one NVMe 1611–8P switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

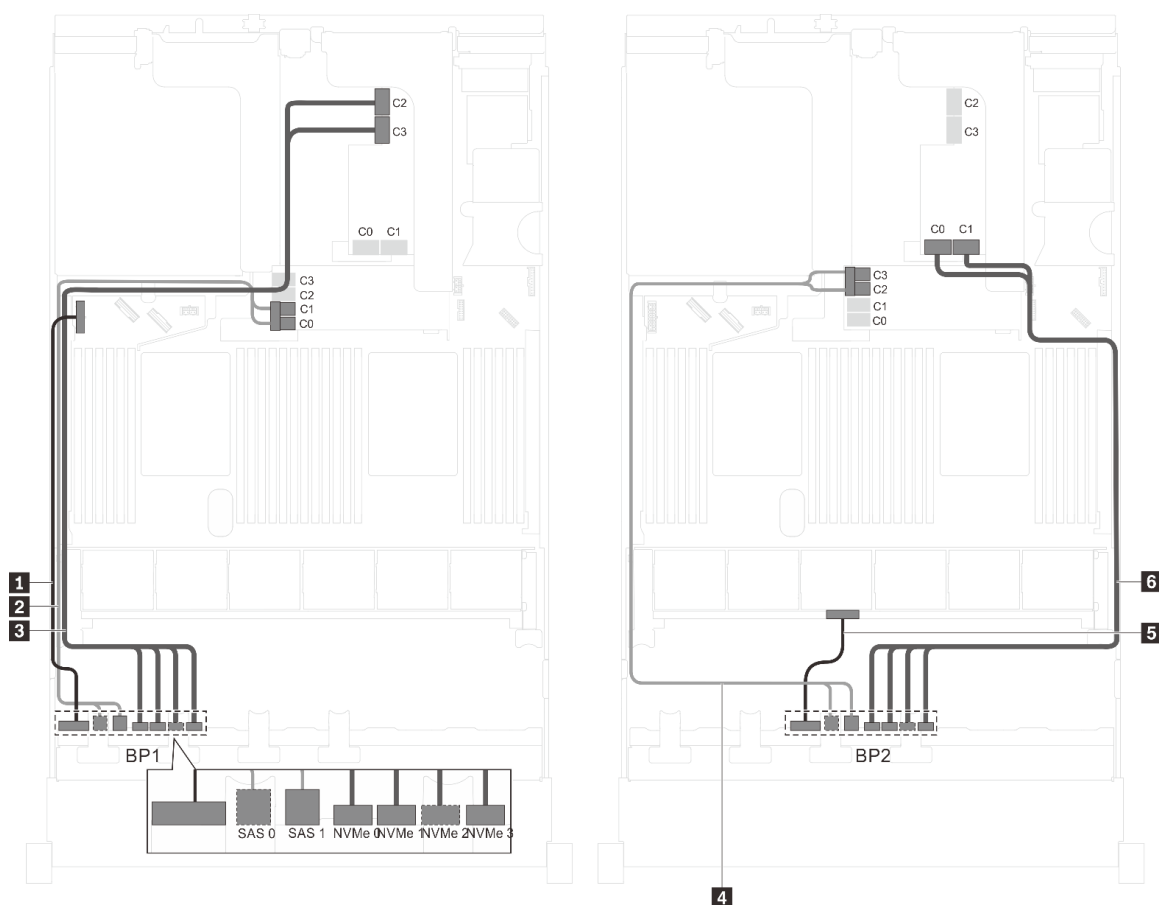


Figure 45. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 16i HBA/RAID adapter, and one NVMe 1611–8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on backplane 1	C2 and C3 connectors on the NVMe 1611–8P switch adapter installed in PCIe slot 1
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0 and C1 connectors on the NVMe 1611–8P switch adapter installed in PCIe slot 1

Server model: eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, one NVMe switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).
 - Cable **2/3**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

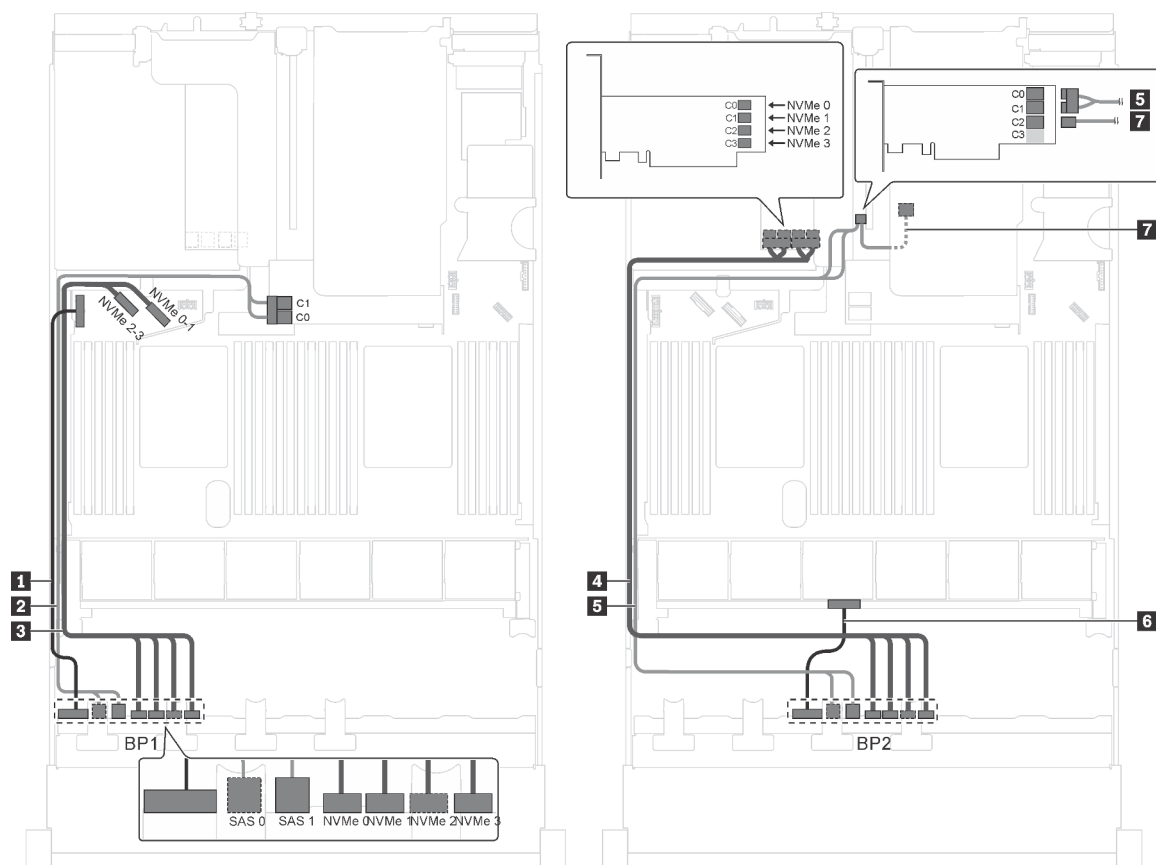


Figure 46. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0

Cable	From	To
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server model: eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, three 8i HBA/RAID adapters, one NVMe switch adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 6 might not be available on your server.
- Depending on the model, if the NVMe switch adapter is installed in PCIe slot 1, route the NVMe signal cable along the right side of the chassis.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/5**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

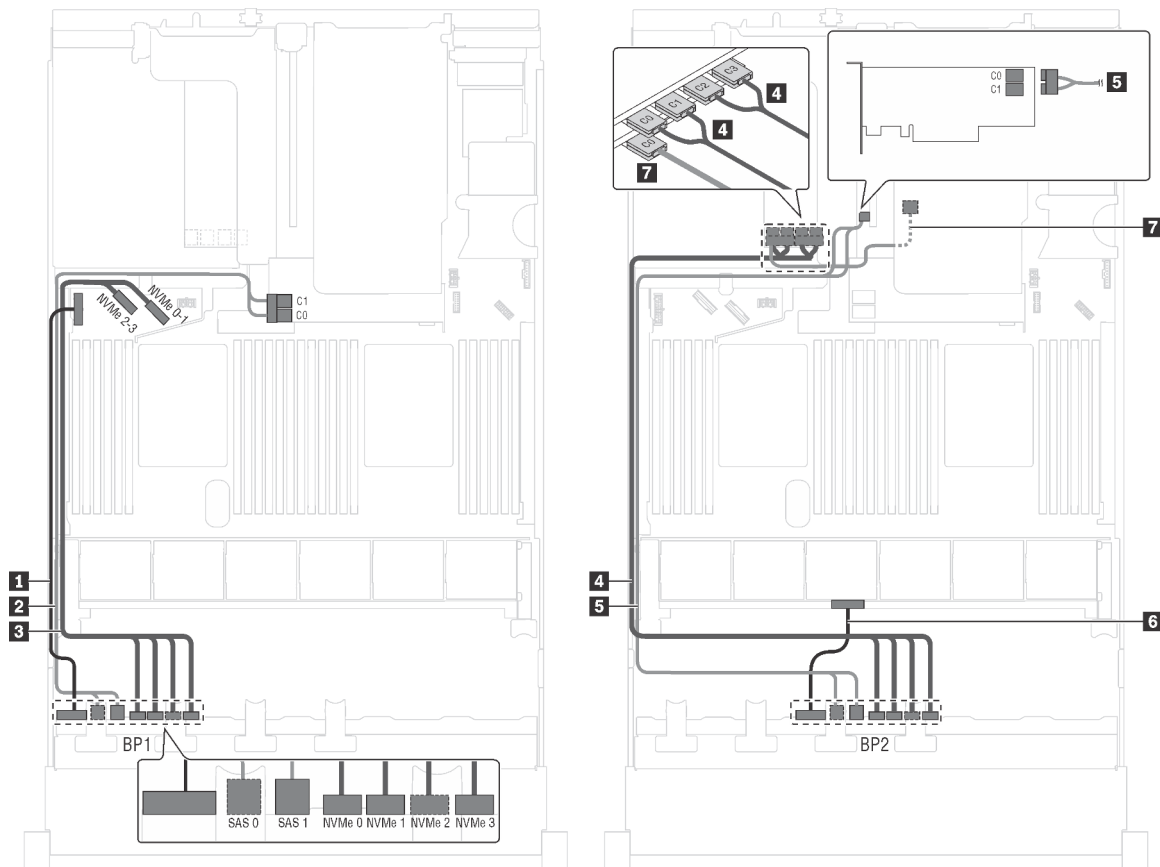


Figure 47. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, three 8i HBA/RAID adapters, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter installed in PCIe slot 6 <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 24i RAID adapter, one NVMe switch adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **7** might not be available on your server.

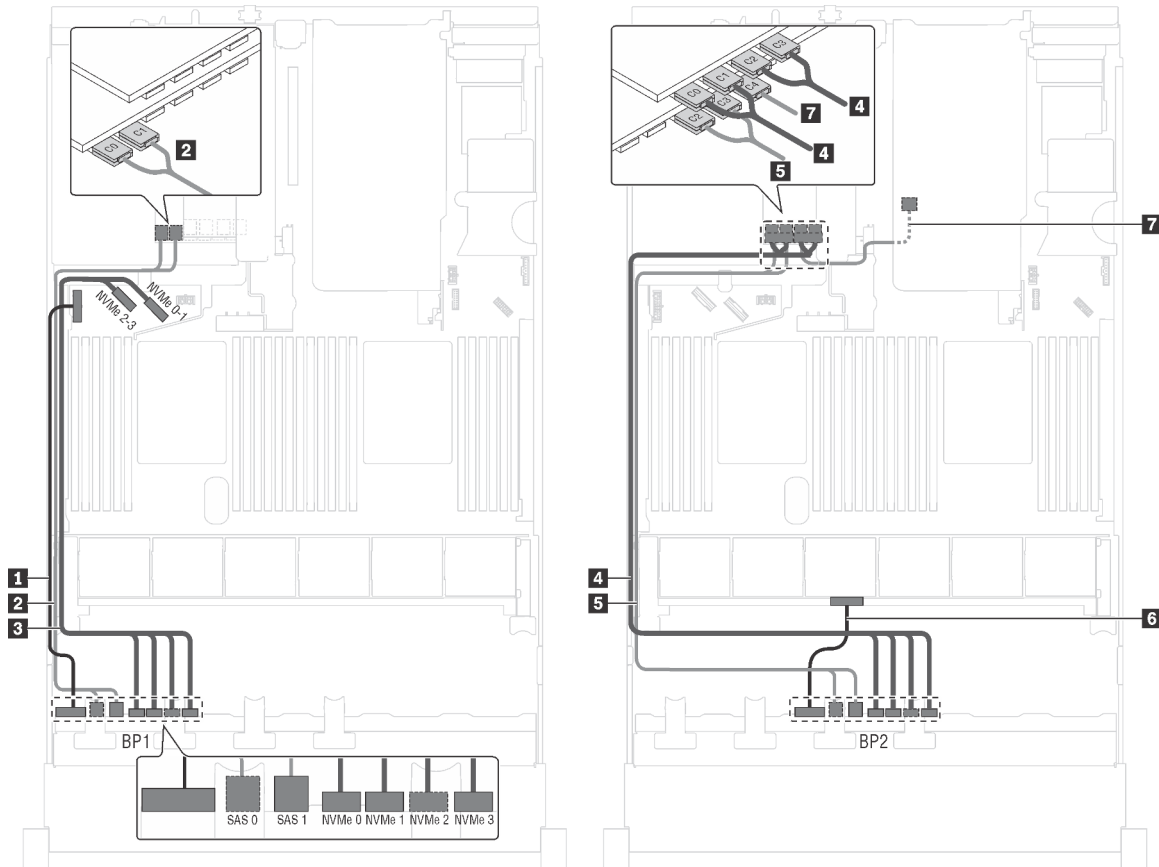


Figure 48. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 24i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 6

Cable	From	To
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C4 connector on the 24i RAID adapter installed in PCIe slot 6

Server model: eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 32i RAID adapter, one NVMe switch adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **7** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable:
 - Cable **2/4**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **6**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

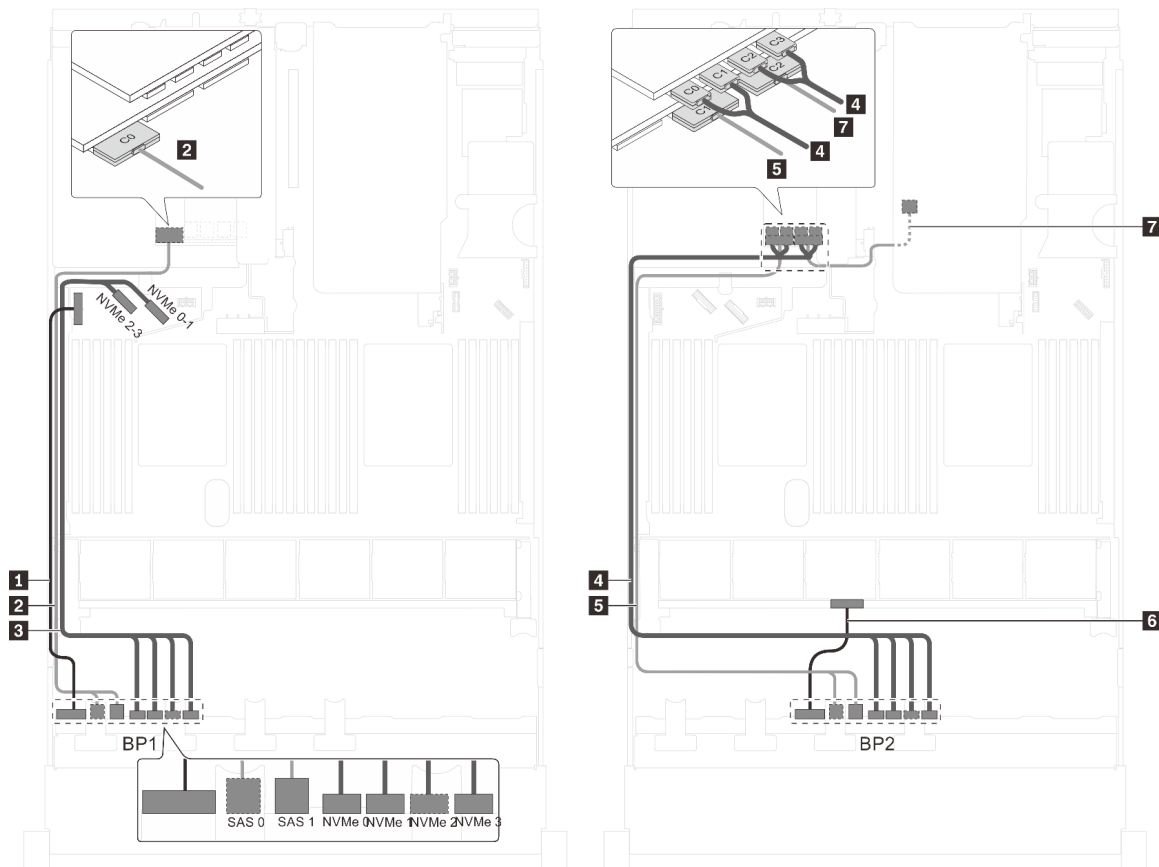


Figure 49. Cable routing for server models with eight 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 32i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 6
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	C2 connector on the 32i RAID adapter on PCIe slot 6

Server model: sixteen 2.5-inch NVMe drives, two NVMe 810-4P switch adapters, two NVMe 1610-4P switch adapters

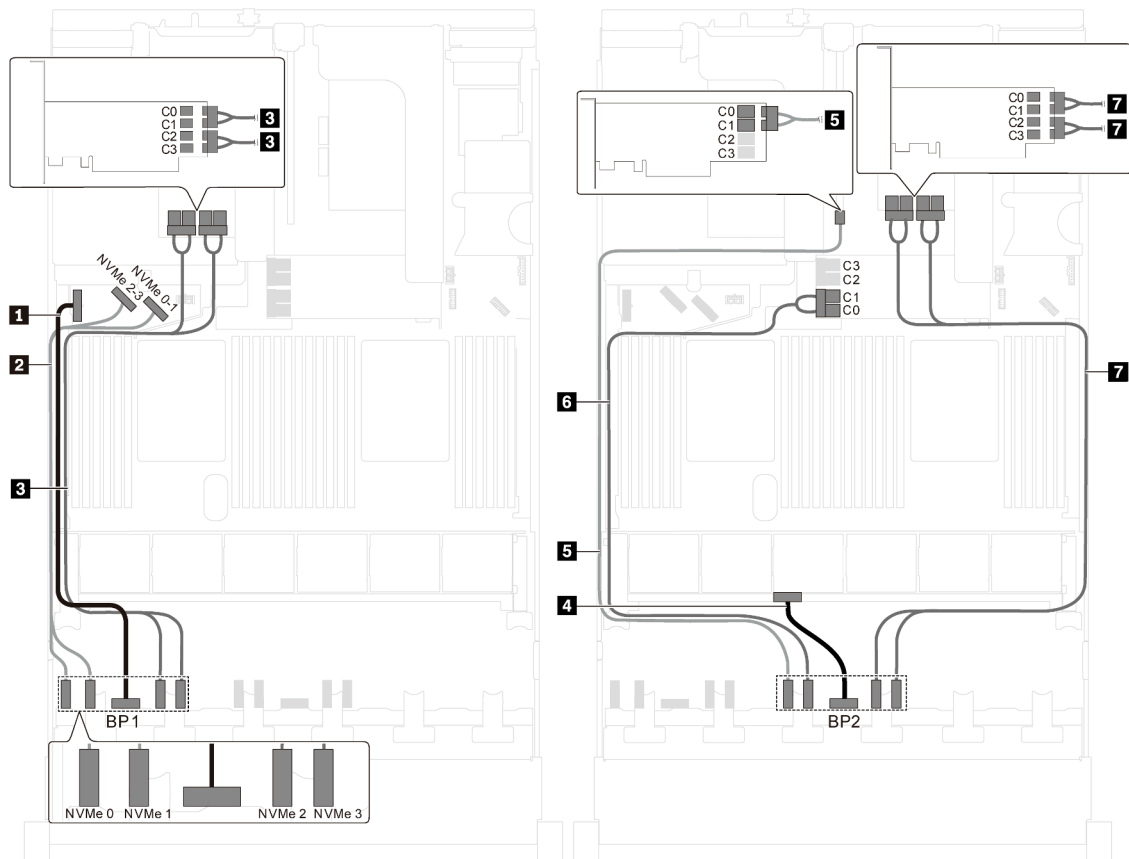


Figure 50. Cable routing for server models with sixteen 2.5-inch NVMe drives, two NVMe 810-4P switch adapters, and two NVMe 1610-4P switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0 and NVMe 1 connectors on front backplane 1	NVMe 2–3 and NVMe 0–1 connectors on the system board
3 NVMe signal cable for front backplane 1	NVMe 2 and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 6
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 NVMe signal cable for front backplane 2	NVMe 0 connector on front backplane 2	C0 and C1 connector on the NVMe 810-4P switch adapter installed in PCIe slot 4
6 NVMe signal cable for front backplane 2	NVMe 1 connector on front backplane 2	C0 and C1 connector on the NVMe 810-4P switch adapter installed in RAID adapter slot on the system board
7 NVMe signal cable for front backplane 2	NVMe 2 and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 1

Server model: sixteen 2.5-inch NVMe drives, two NVMe 1611-8P switch adapters

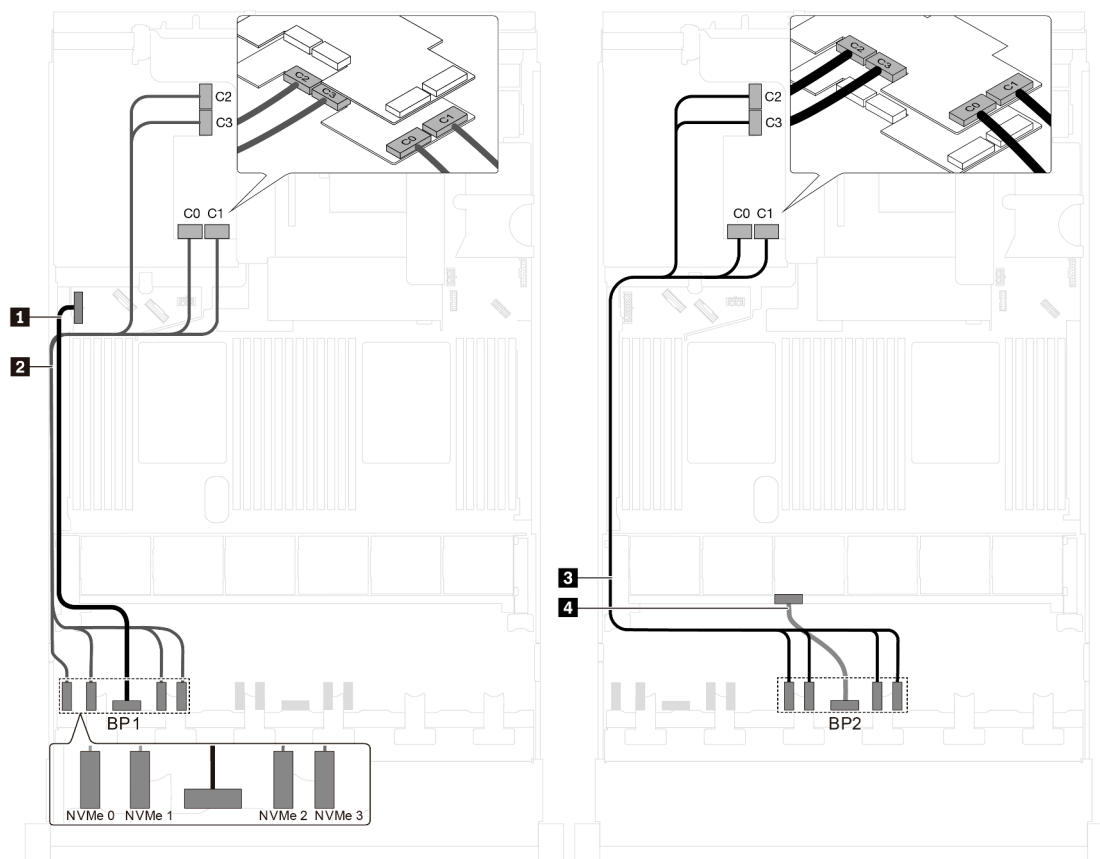


Figure 51. Cable routing for server models with sixteen 2.5-inch NVMe drives, and two NVMe 1611-8P switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server models with twenty 2.5-inch drives

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

Server model: twenty 2.5-inch NVMe drives, two NVMe 810-4P switch adapters, three NVMe 1610-4P switch adapters

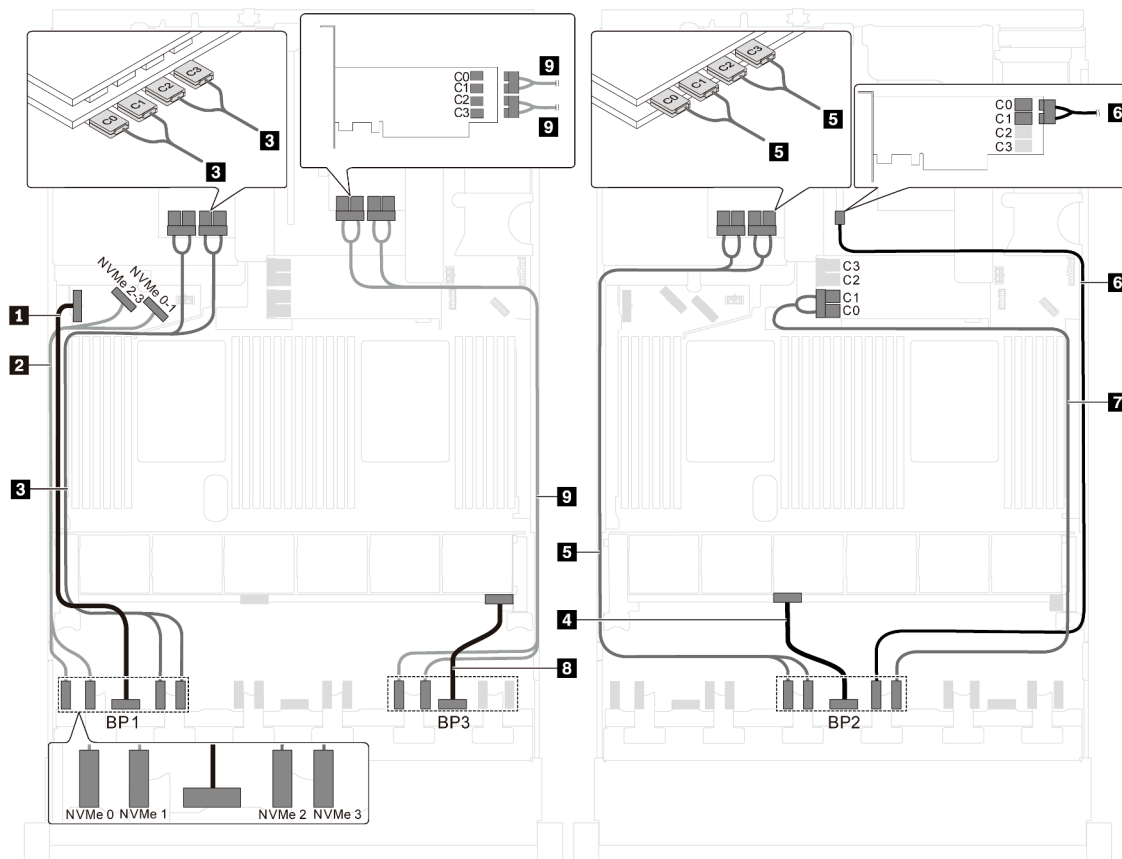


Figure 52. Cable routing for server models with twenty 2.5-inch NVMe drives, two NVMe 810-4P switch adapters, and three NVMe 1610-4P switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0 and NVMe 1 connectors on front backplane 1	NVMe 2–3 and NVMe 0–1 connectors on the system board
3 NVMe signal cable for front backplane 1	NVMe 2 and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 6
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 NVMe signal cable for front backplane 2	NVMe 0 and NVMe 1 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 5
6 NVMe signal cable for front backplane 2	NVMe 2 connector on front backplane 2	C0 and C1 connectors on the NVMe 810-4P switch adapter installed in PCIe slot 4
7 NVMe signal cable for front backplane 2	NVMe 3 connector on front backplane 2	C0 and C1 connectors on the NVMe 810-4P switch adapter installed in RAID adapter slot on the system board
8 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
9 NVMe signal cable for front backplane 3	NVMe 0 and NVMe 1 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 1

Server models with twenty-four 2.5-inch drives

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

Server model: twenty-four 2.5-inch SAS/SATA drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

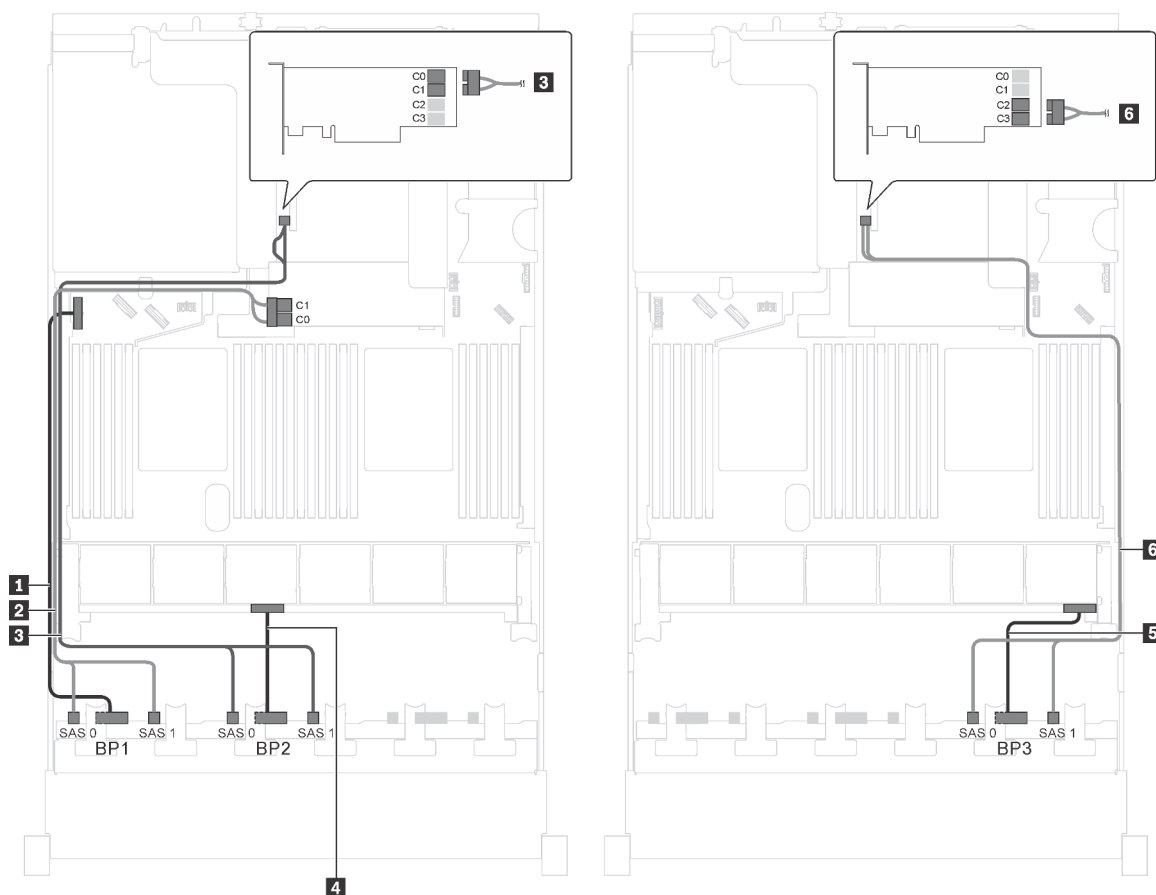


Figure 53. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, one 8i HBA/RAID adapter, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1

Server model: twenty-four 2.5-inch SAS/SATA drives, one 24i RAID adapter

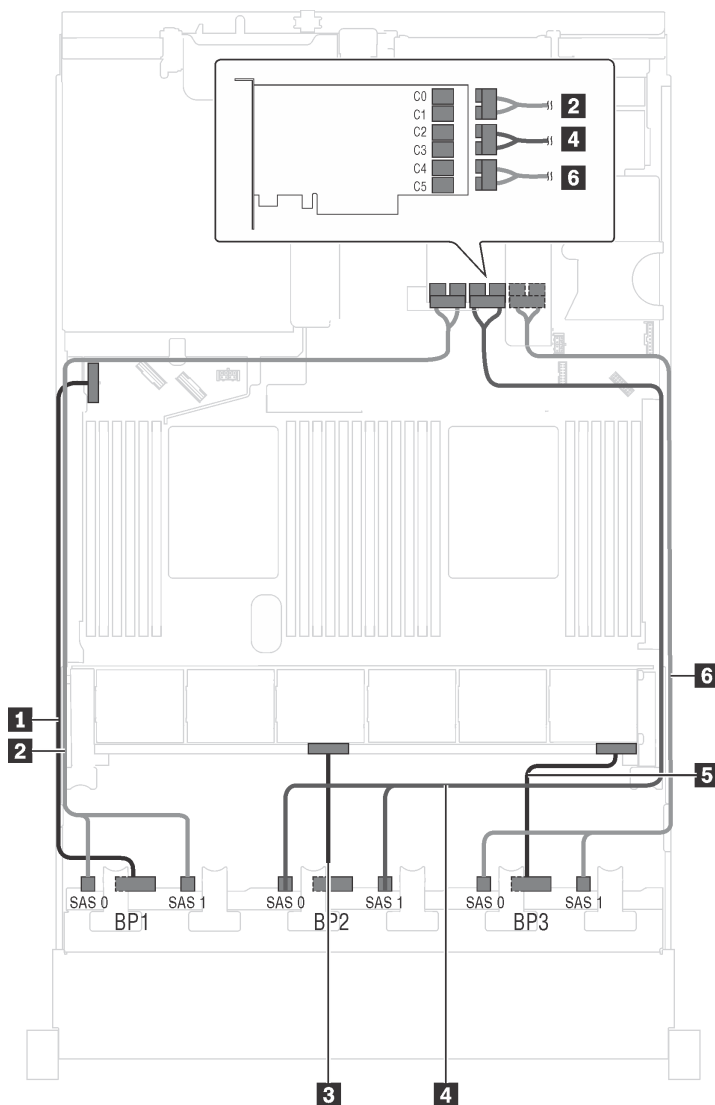


Figure 54. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter on riser 1 assembly
3 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
4 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter on riser 1 assembly
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter on riser 1 assembly

Server model: twenty-four 2.5-inch SAS/SATA drives, one 32i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

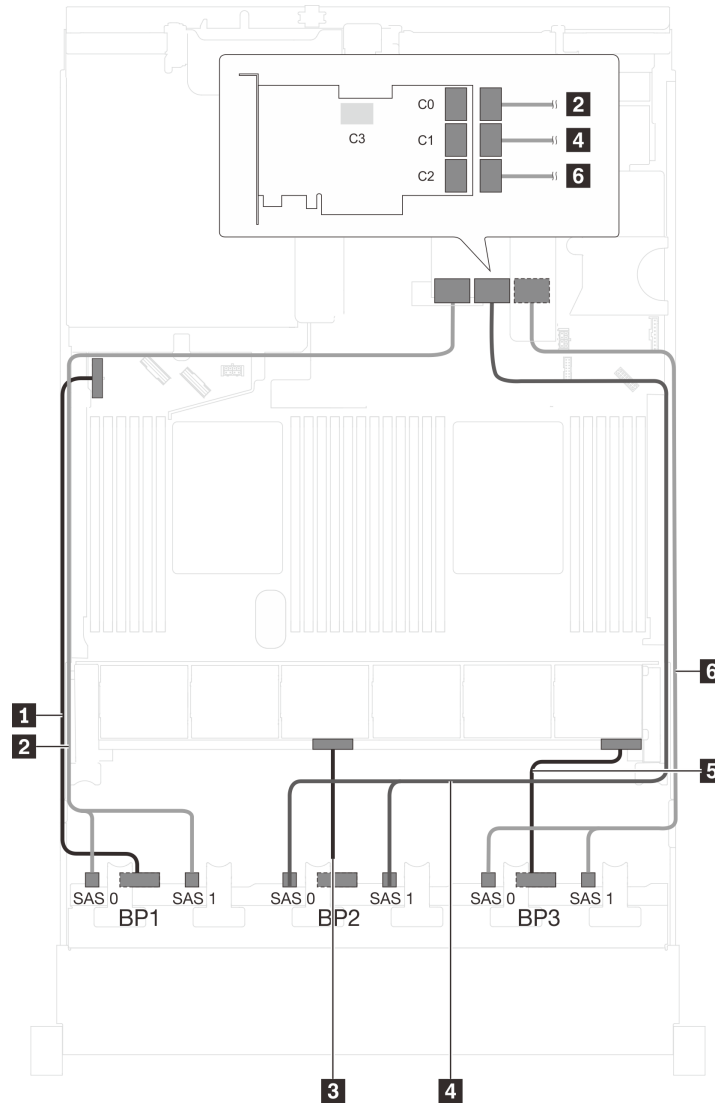


Figure 55. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on riser 1 assembly
3 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connectors on the 32i RAID adapter on riser 1 assembly
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on riser 1 assembly

Server model: twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, four 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 6 might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **6**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

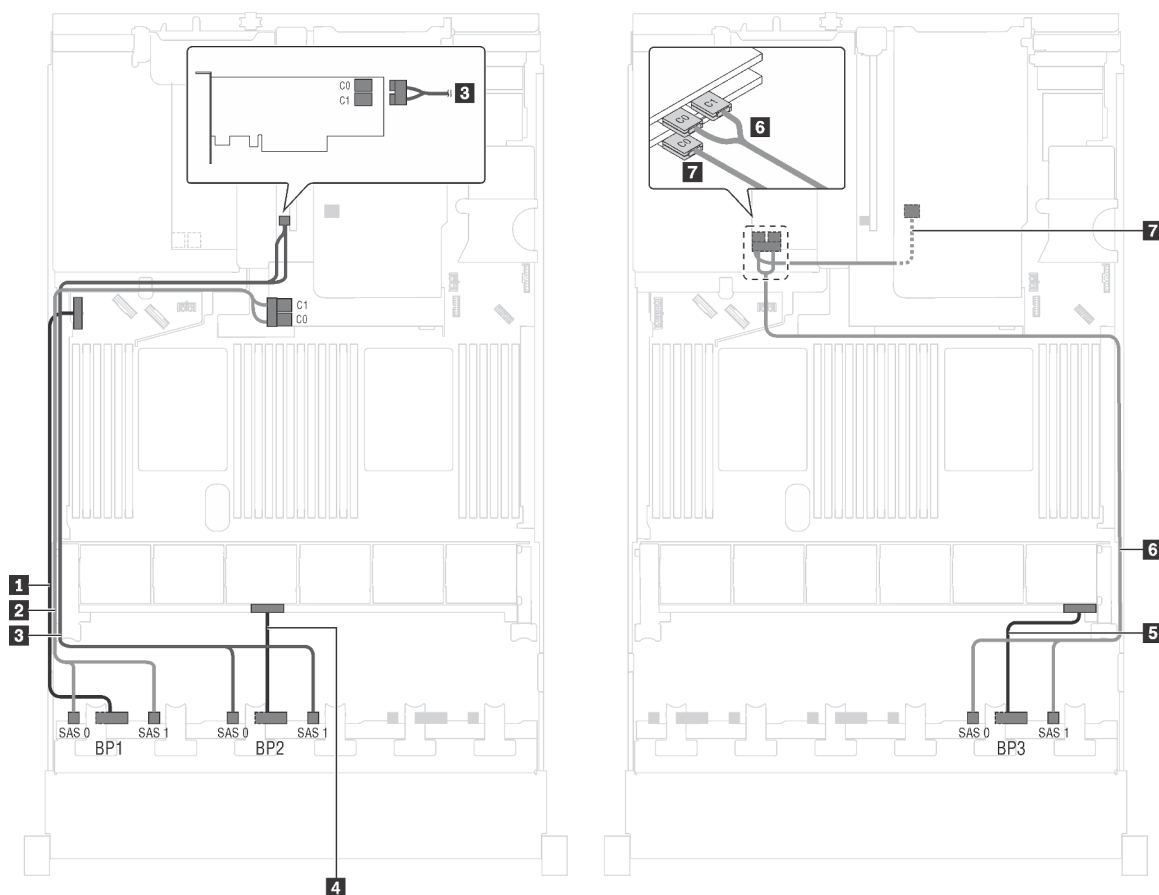


Figure 56. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and four 8i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	8i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter installed in PCIe slot 6 <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/3/6**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

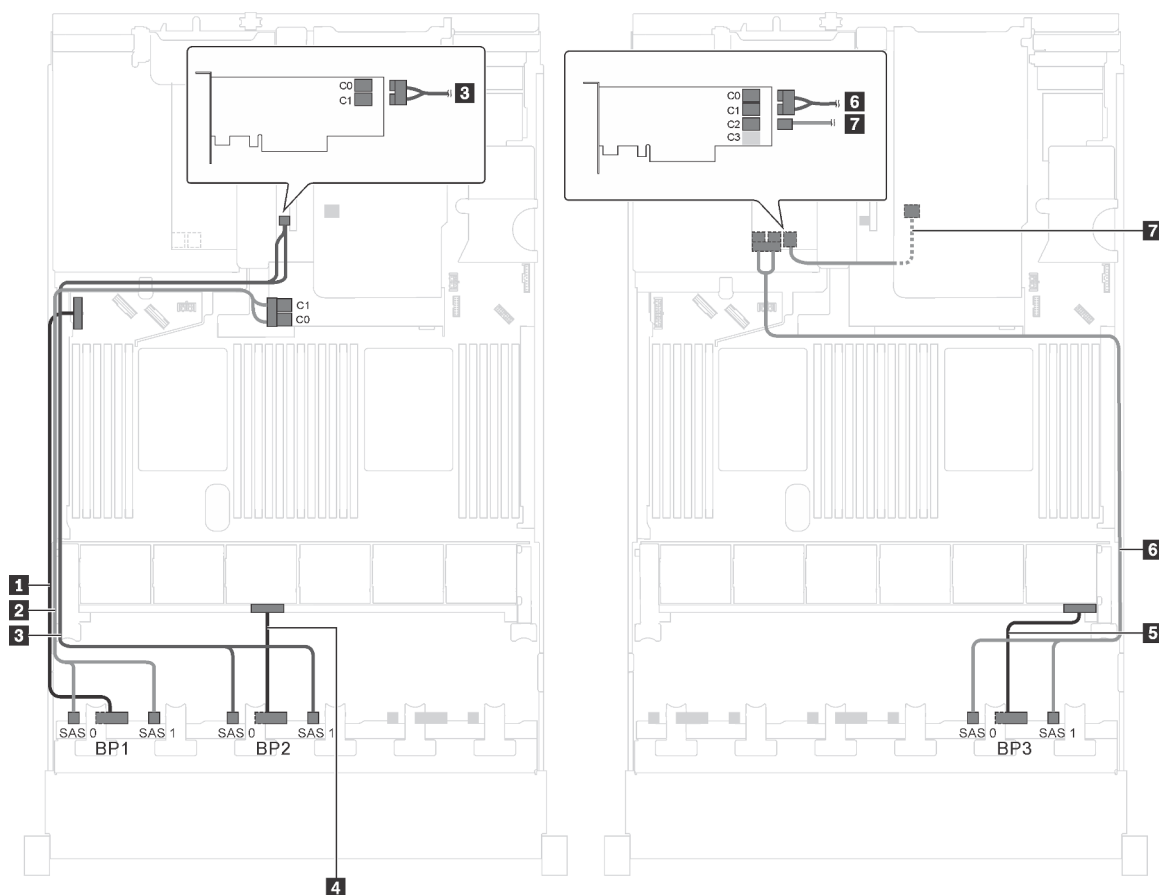


Figure 57. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> Gen 3: C2 Gen 4: C1

Server model: twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 24i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit).

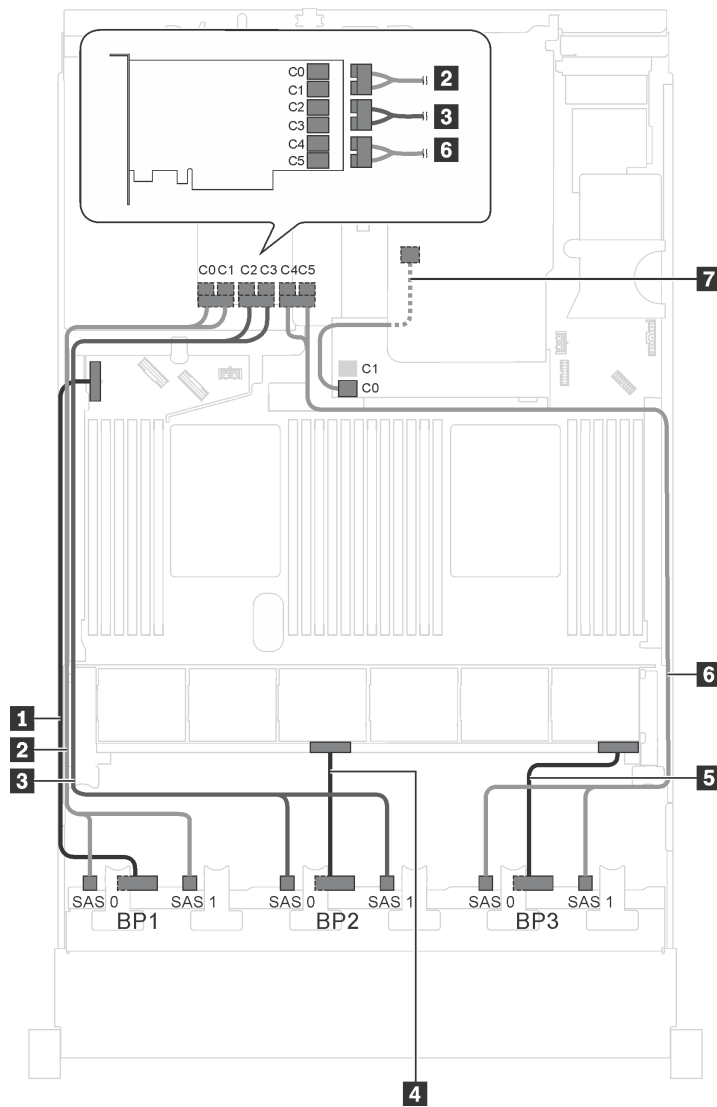


Figure 58. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 5
3 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
6 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter installed in PCIe slot 5
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 32i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/3/6**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

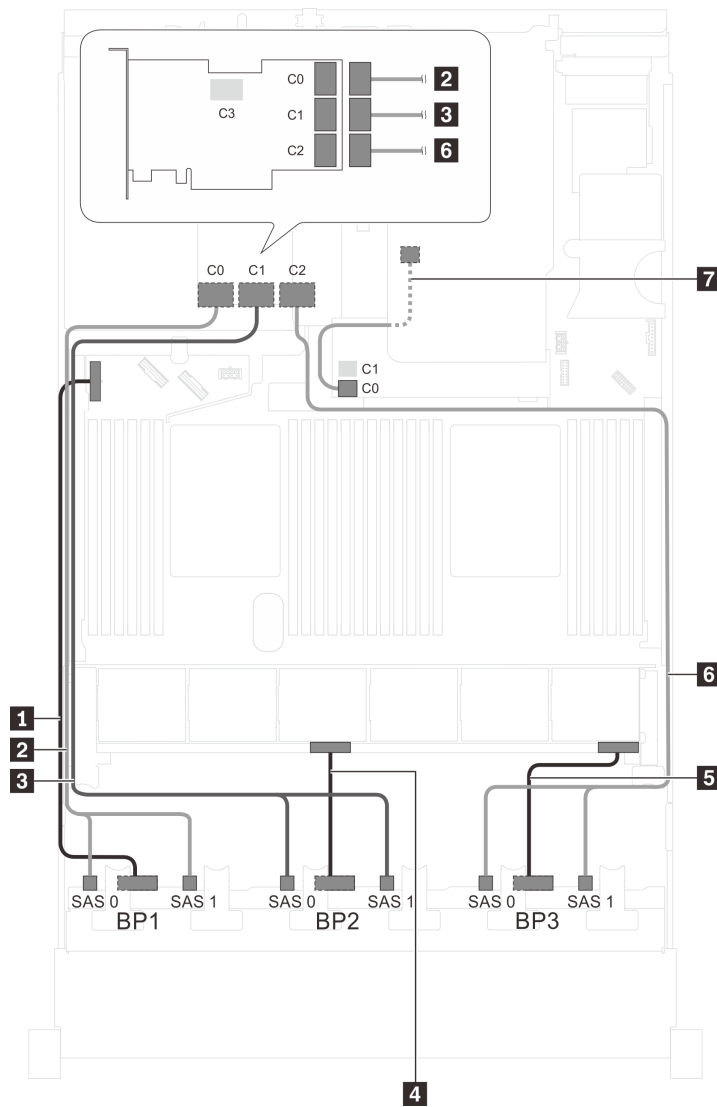


Figure 59. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 5
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on PCIe slot 5
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, two 16i HBA/RAID adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/3/6**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **7**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

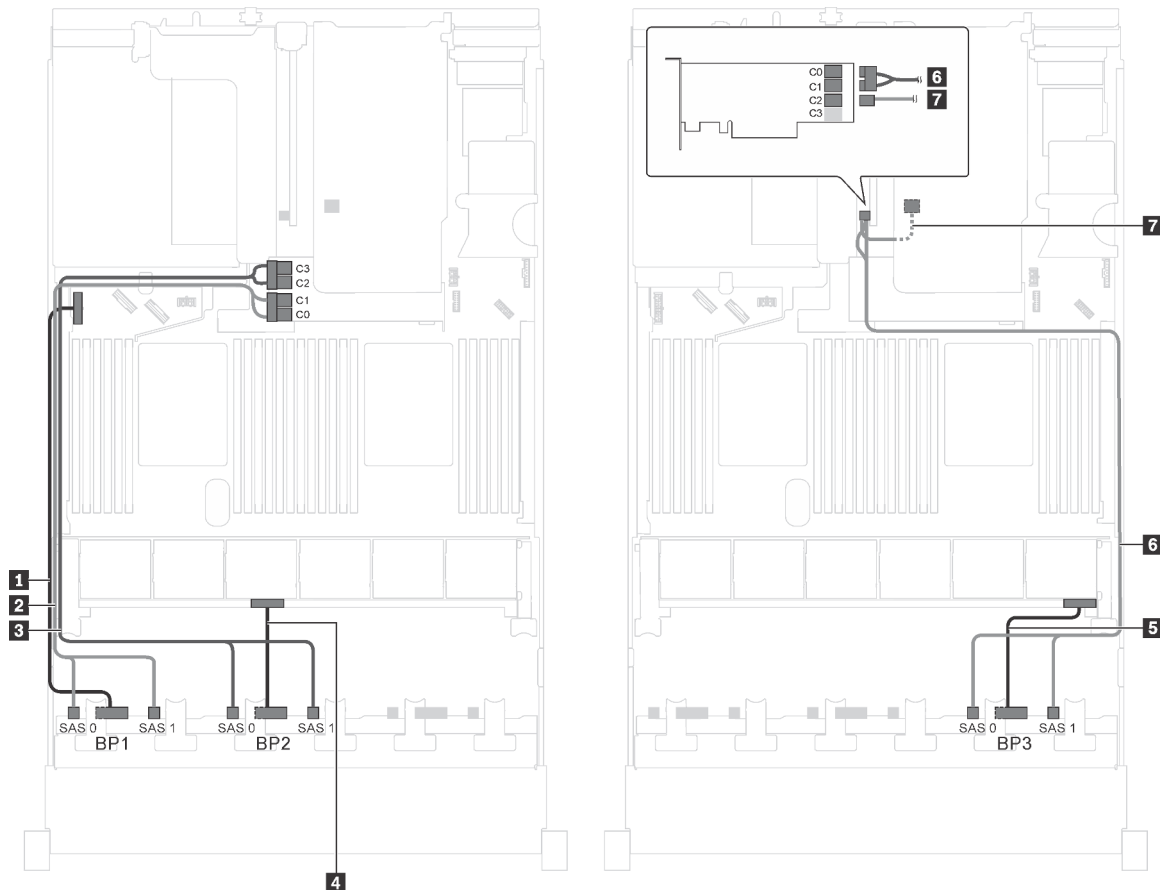


Figure 60. Cable routing for server models with twenty-four 2.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and two 16i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
7 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C2 Gen 4: C1

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

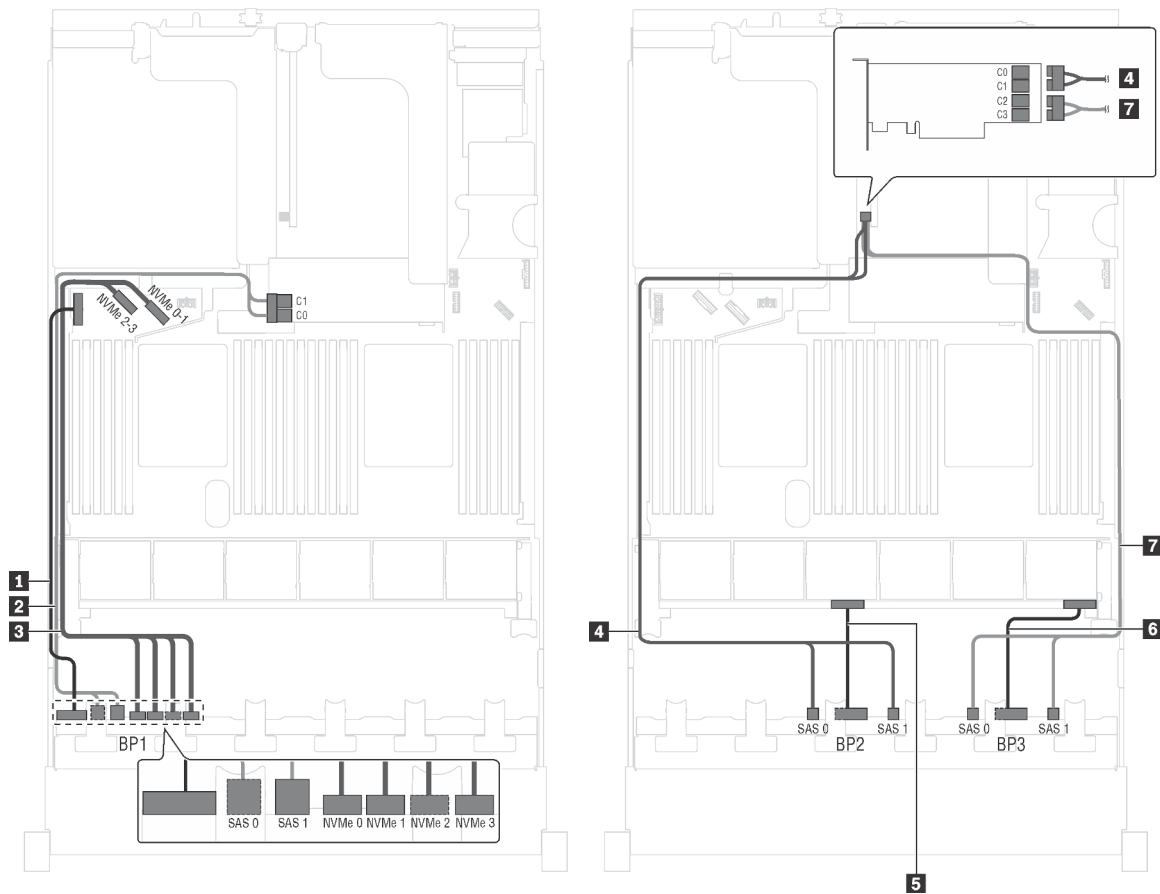


Figure 61. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter

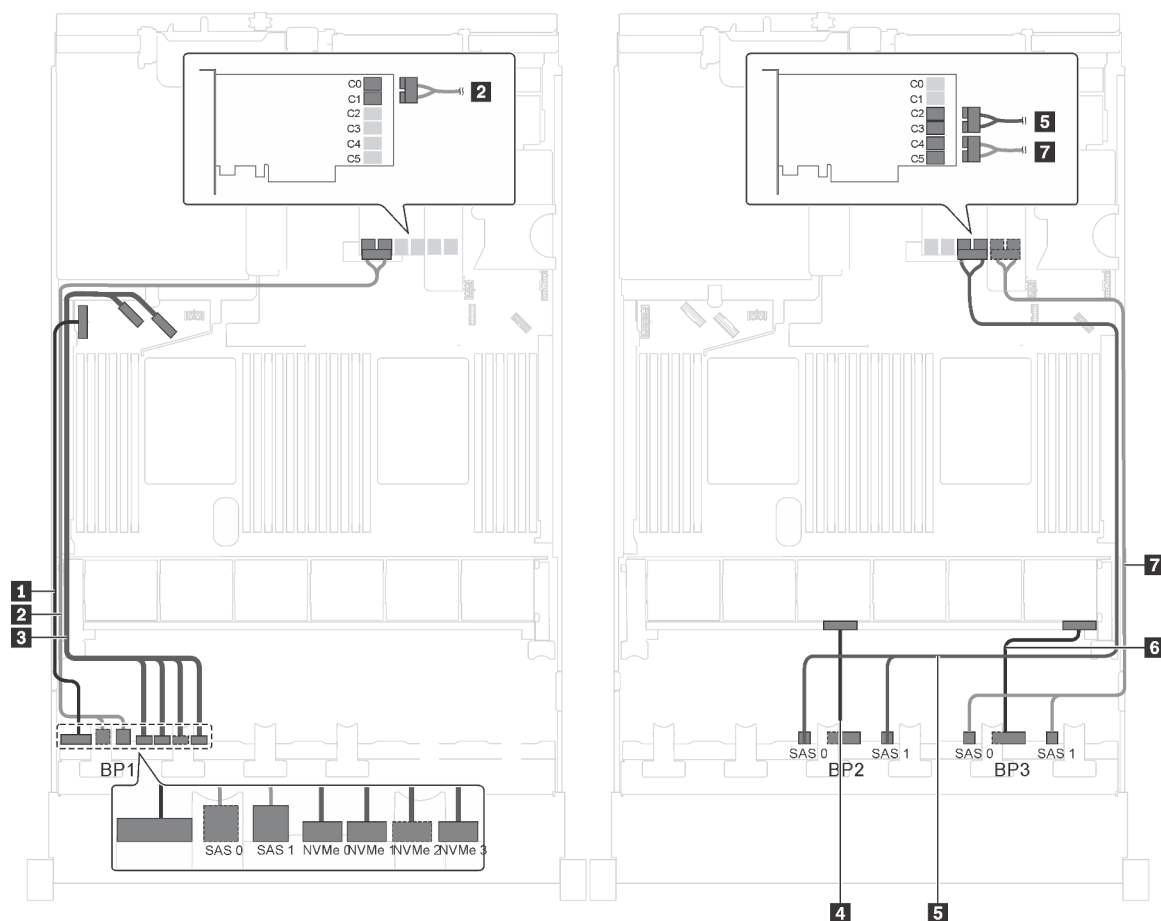


Figure 62. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter on riser 1 assembly
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board

Cable	From	To
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter on riser 1 assembly
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter on riser 1 assembly

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

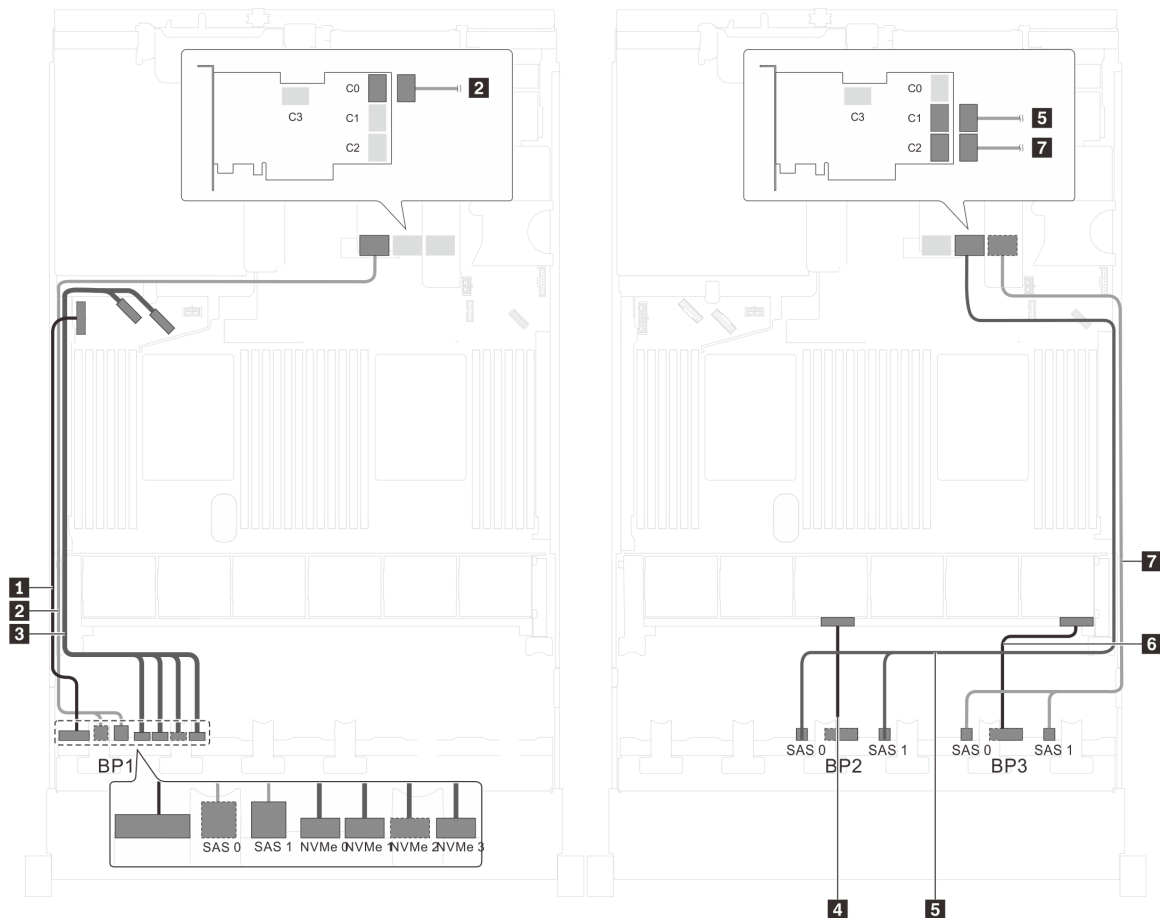


Figure 63. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on riser 1 assembly
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on riser 1 assembly
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on riser 1 assembly

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, four 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 6 might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).
 - Cable **2** / Cable **4** / Cable **7**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **8**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

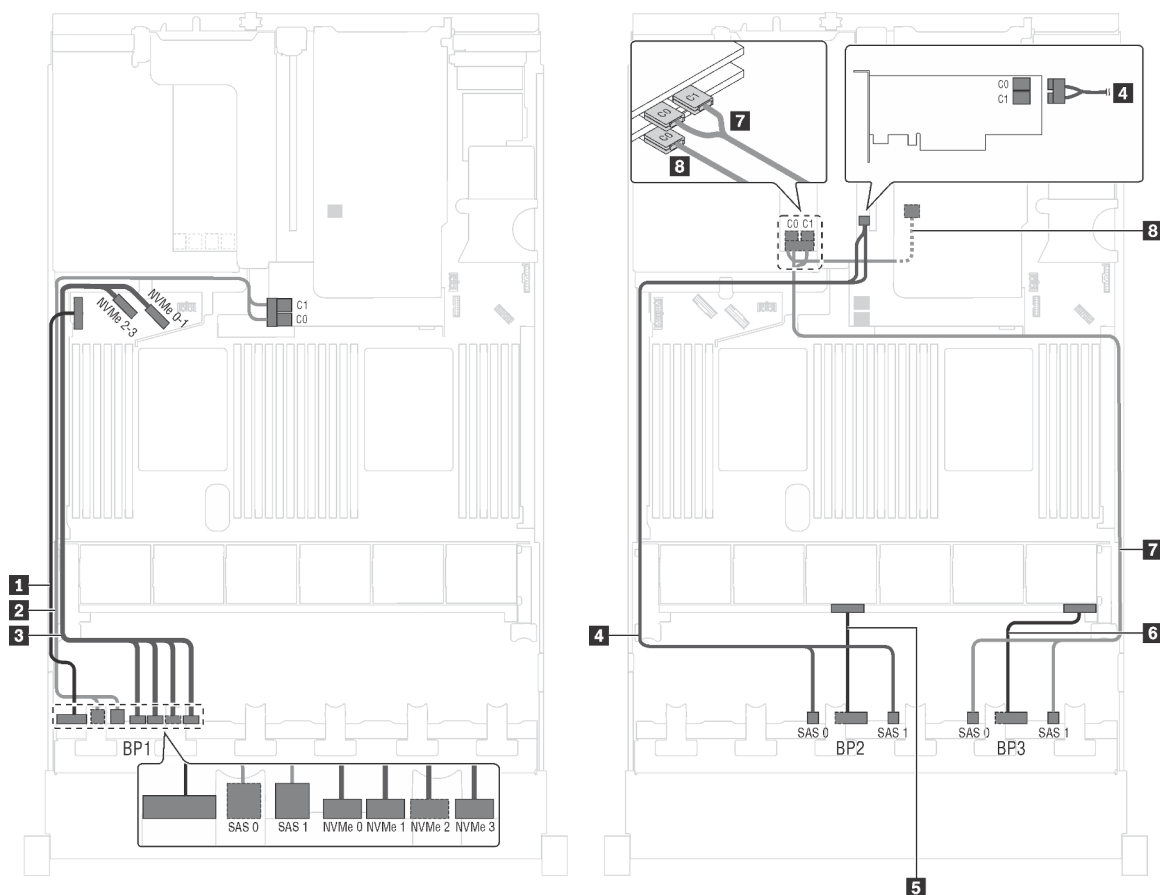


Figure 64. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and four 8i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	8i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
8 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter installed in PCIe slot 6 <ul style="list-style-type: none"> Gen 3: C0 Gen 4: C0

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, one 16i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/4/7**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **8**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

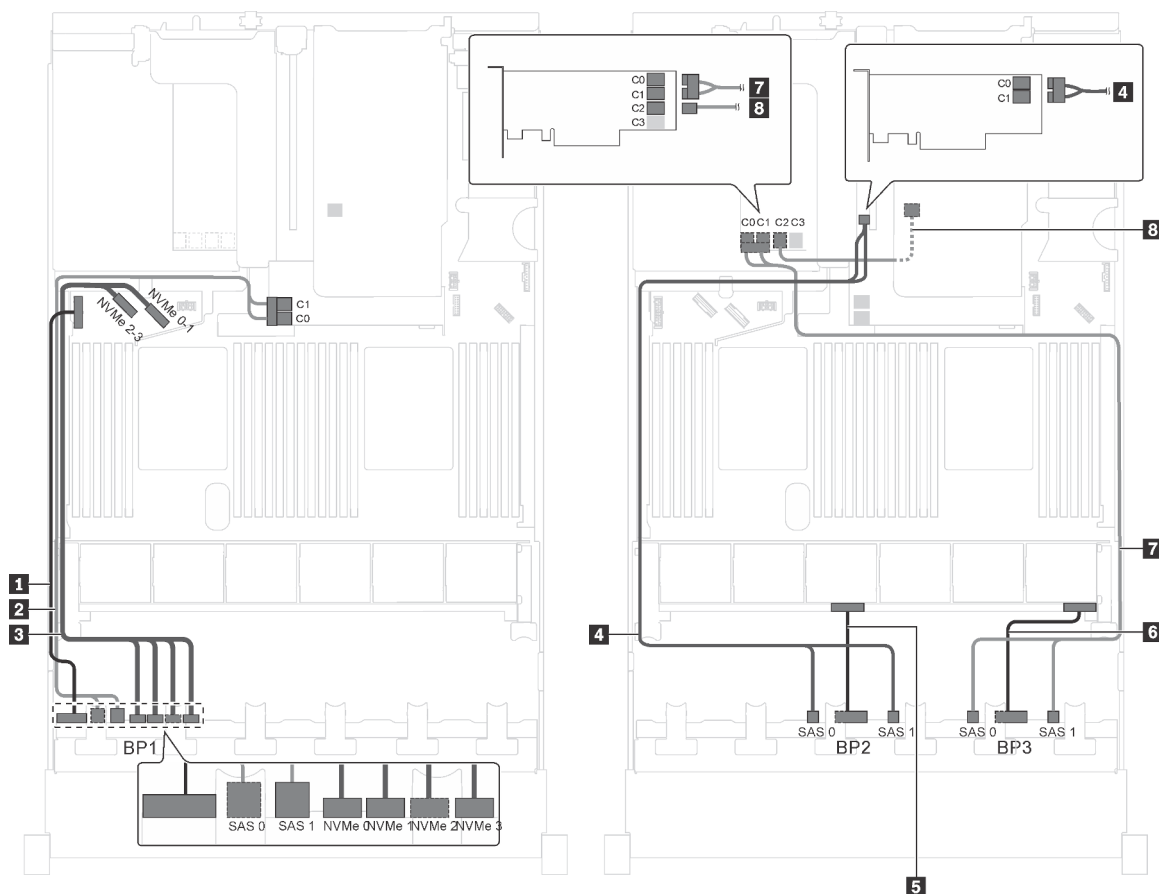


Figure 65. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
8 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 5 <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 24i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit).

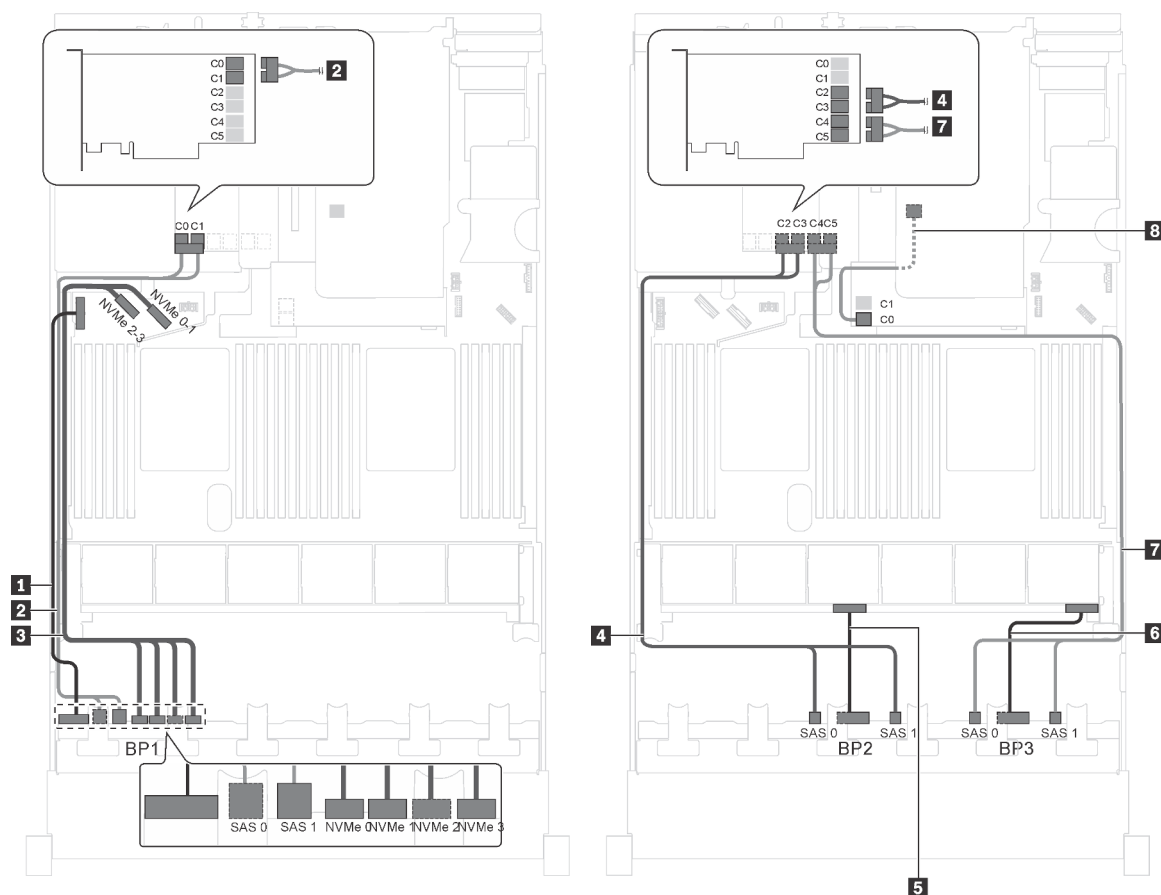


Figure 66. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 24i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 5
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 5
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
7 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter installed in PCIe slot 5
8 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 32i RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/4/7**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **8**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

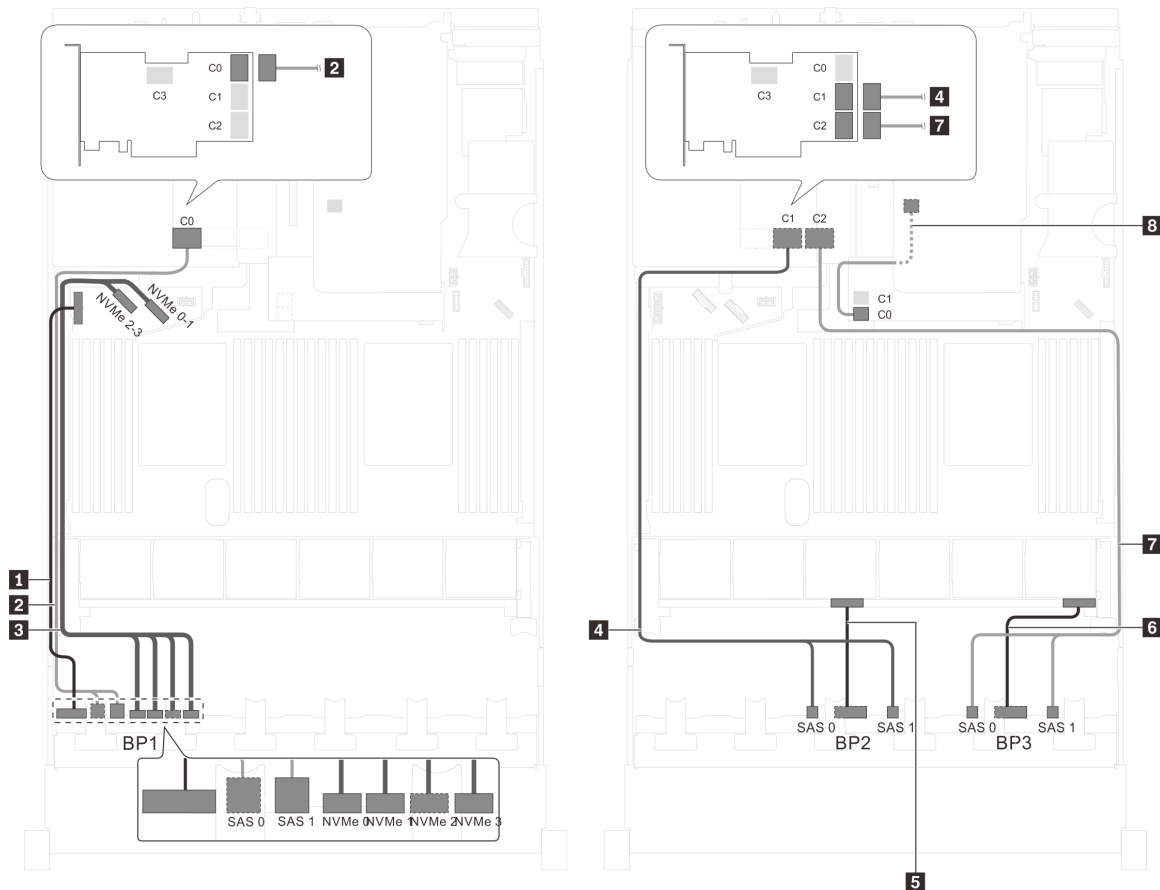


Figure 67. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 32i RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 5
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connectors on the 32i RAID adapter on PCIe slot 5
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connectors on the 32i RAID adapter on PCIe slot 5
8 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0 Gen 4: C0

Server model: twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 16i HBA/RAID adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/4/7**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable 8: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

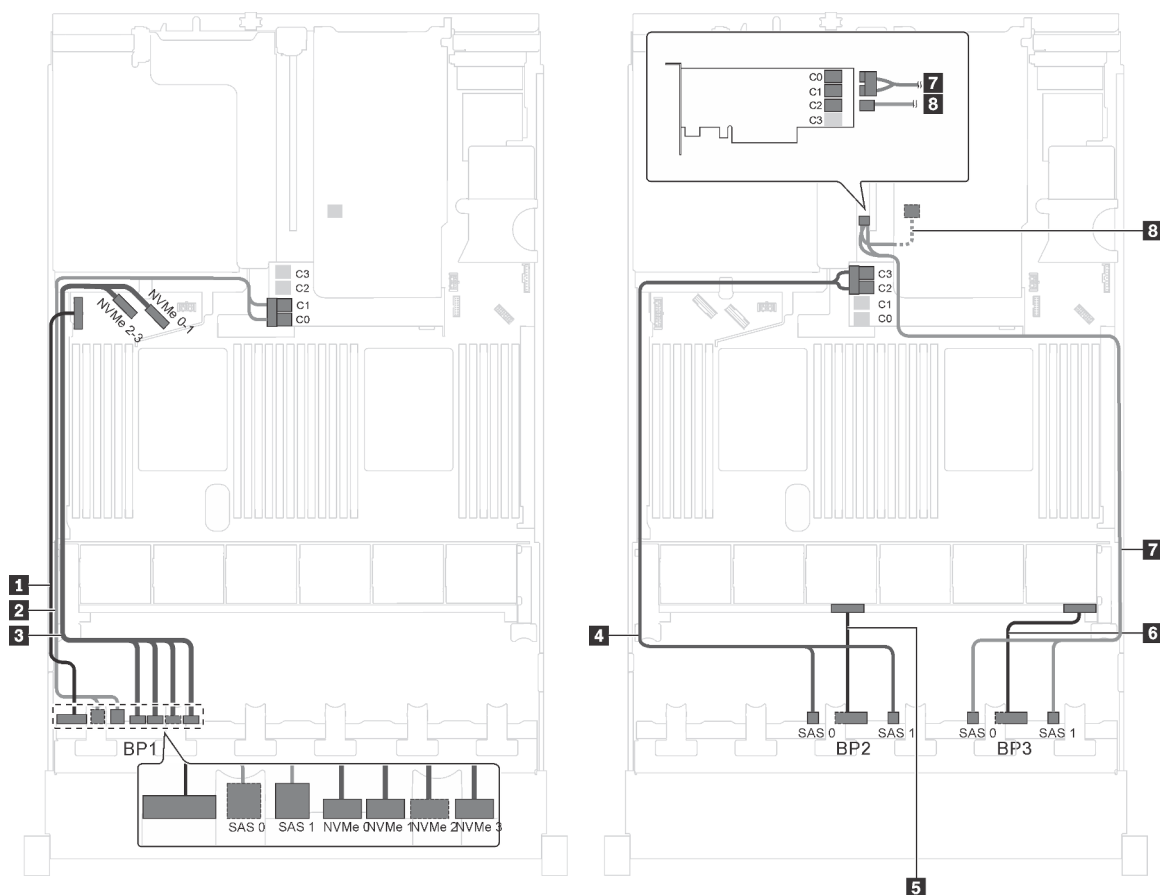


Figure 68. Cable routing for server models with twenty 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and two 16i HBA/RAID adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Cable	From	To
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
8 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C2 Gen 4: C1

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter, one NVMe switch adapter

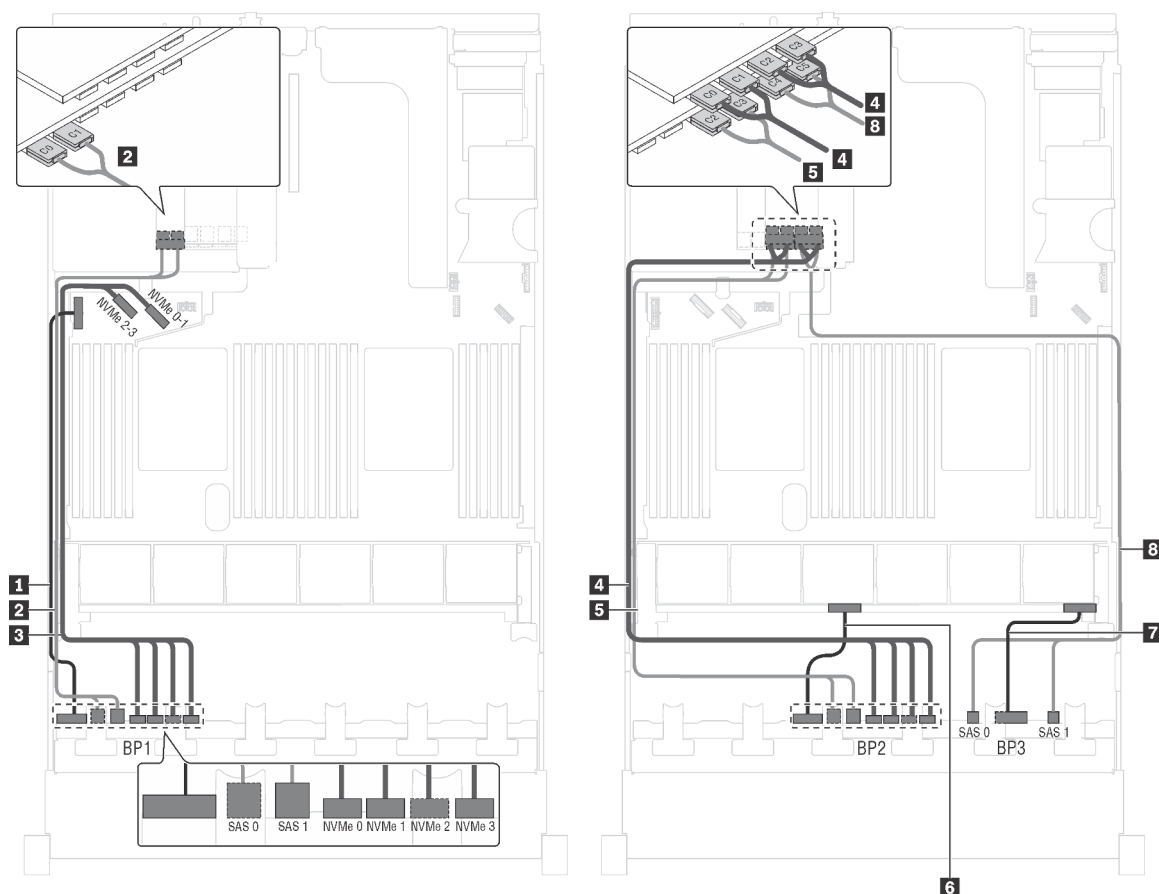


Figure 69. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter on an available PCIe slot
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board

Cable	From	To
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter on an available PCIe slot
5 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter on an available PCIe slot
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter on an available PCIe slot

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter, one NVMe switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

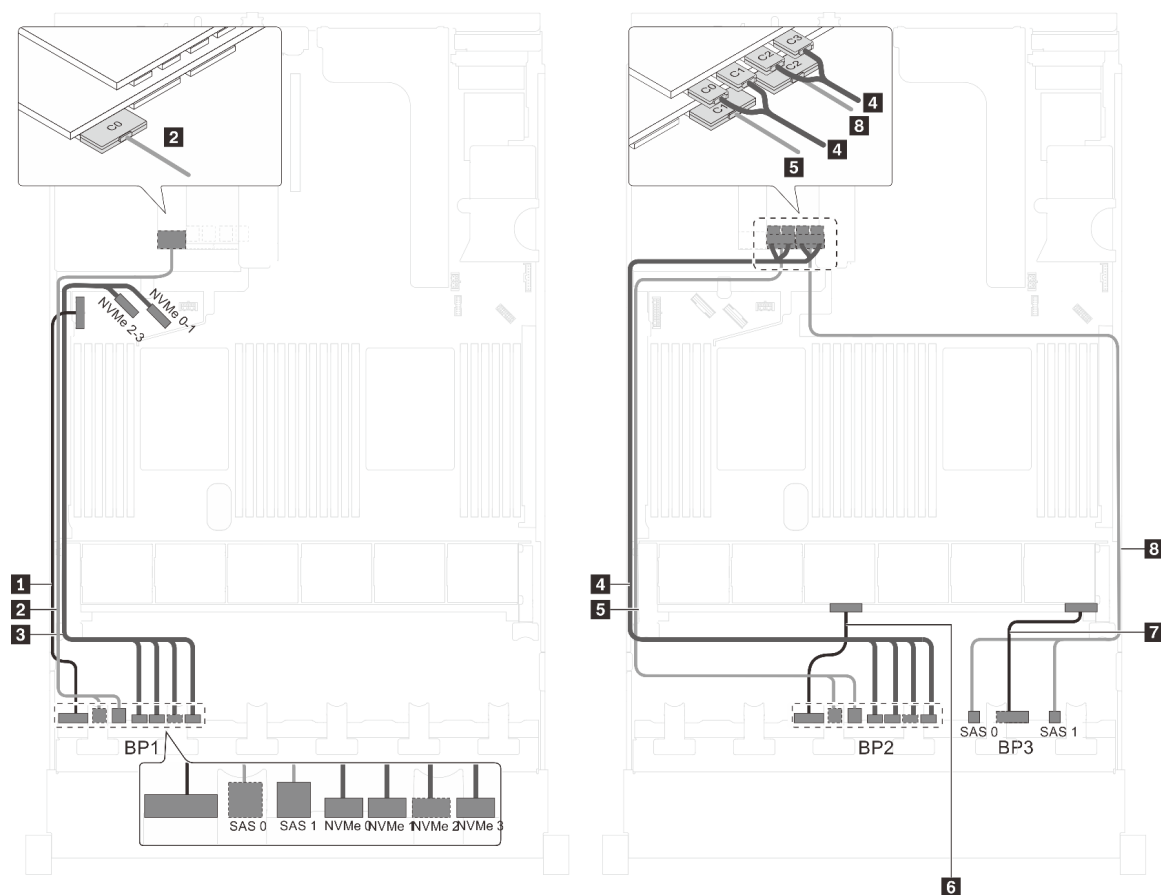


Figure 70. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on an available PCIe slot
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter on an available PCIe slot
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on an available PCIe slot
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on an available PCIe slot

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 32i HBA/RAID adapter, one NVMe 1611-8P switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

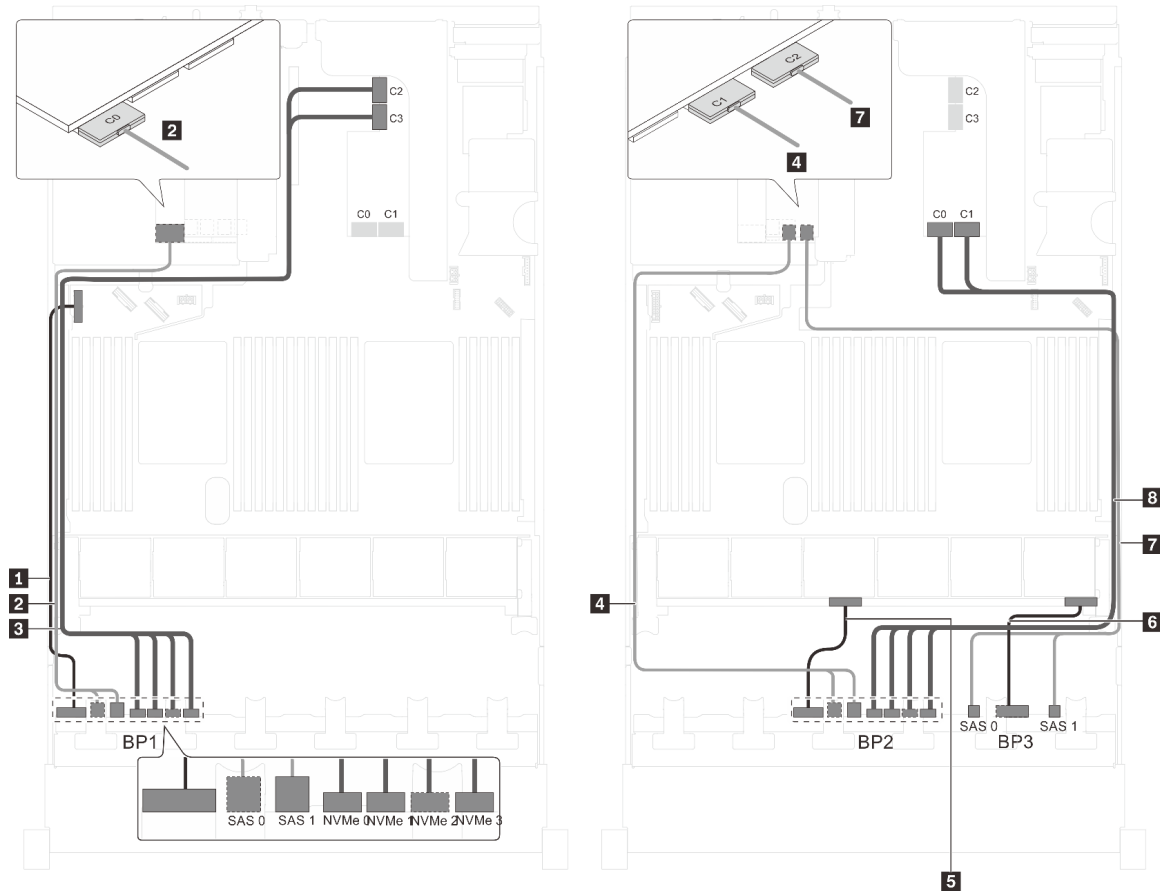


Figure 71. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 32i HBA/RAID adapter, and one NVMe 1611-8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on an available PCIe slot
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	C2 and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on an available PCIe slot
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on an available PCIe slot
8 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0 and C1 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 24i RAID adapter, one NVMe switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit).

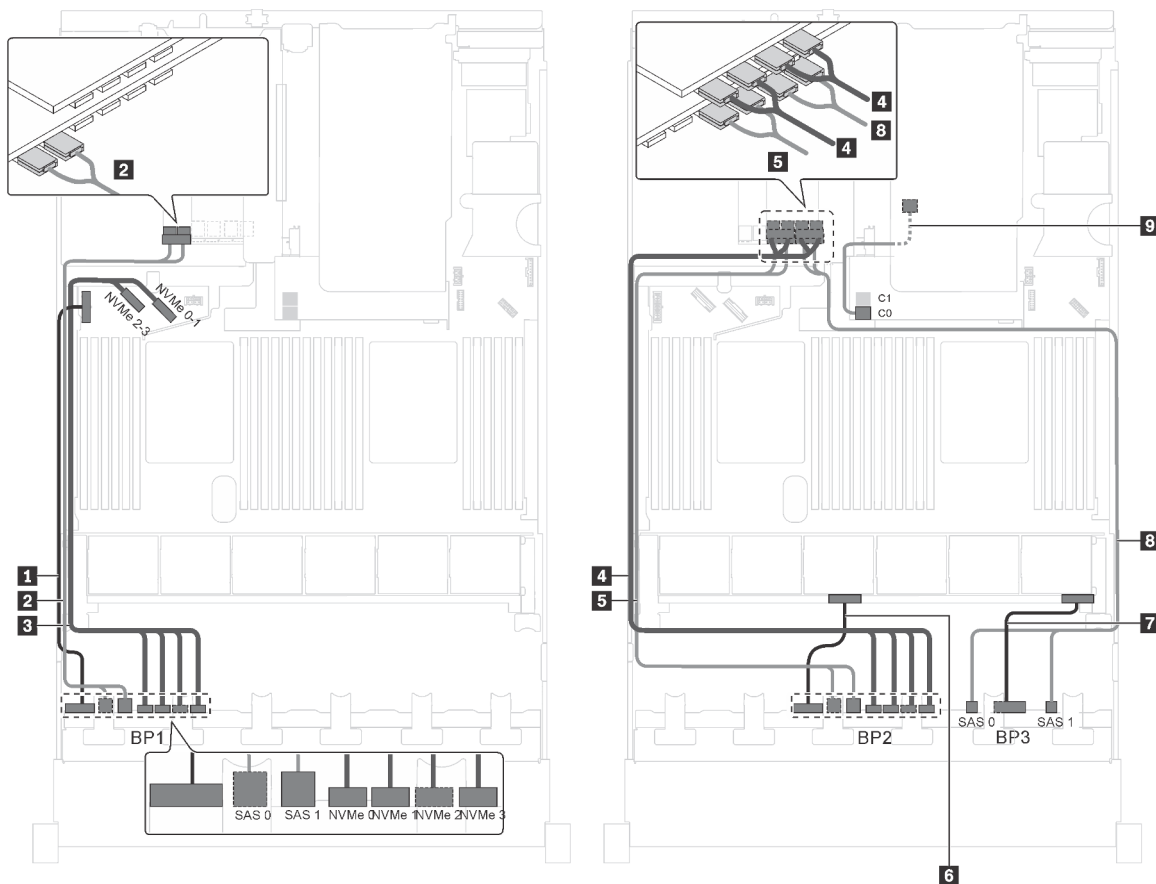


Figure 72. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 24i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 6
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter installed in PCIe slot 6
9 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, one NVMe 1611-8P switch adapter

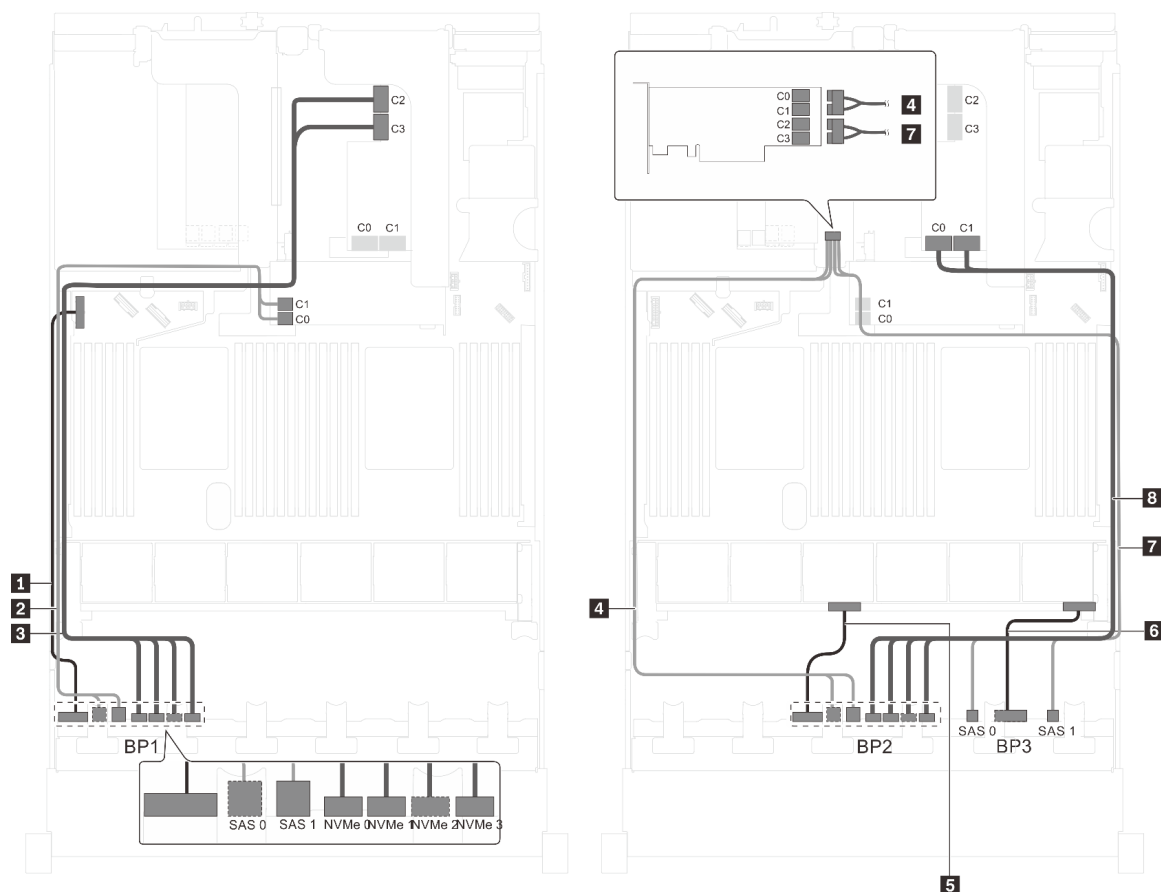


Figure 73. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, and one NVMe 1611-8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	C2 and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1
4 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter installed in PCIe slot 1 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
7 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter installed in PCIe slot 1 <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1
8 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0 and C1 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 32i RAID adapter, one NVMe switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/5/8**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **9**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

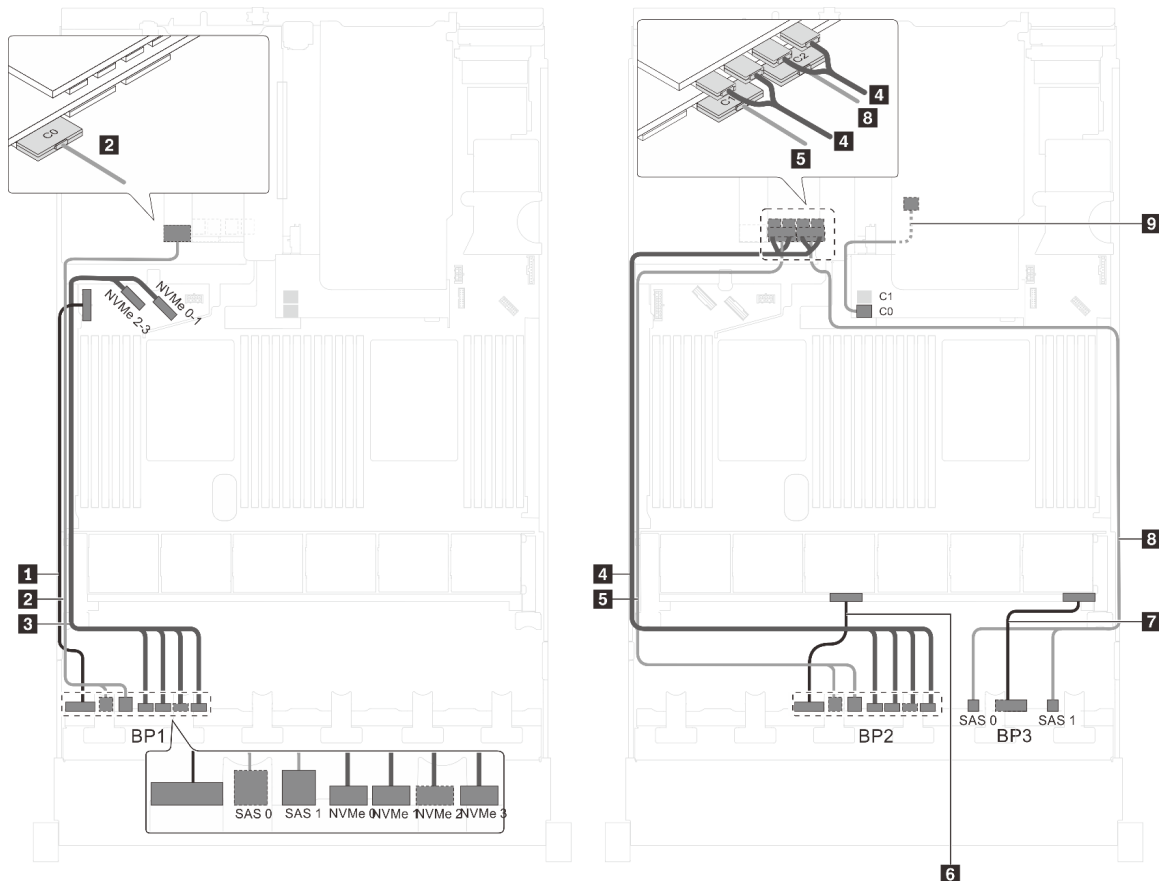


Figure 74. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 32i RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 6
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on PCIe slot 6
9 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 16i HBA/RAID adapters, one NVMe switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/5/8**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **9**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

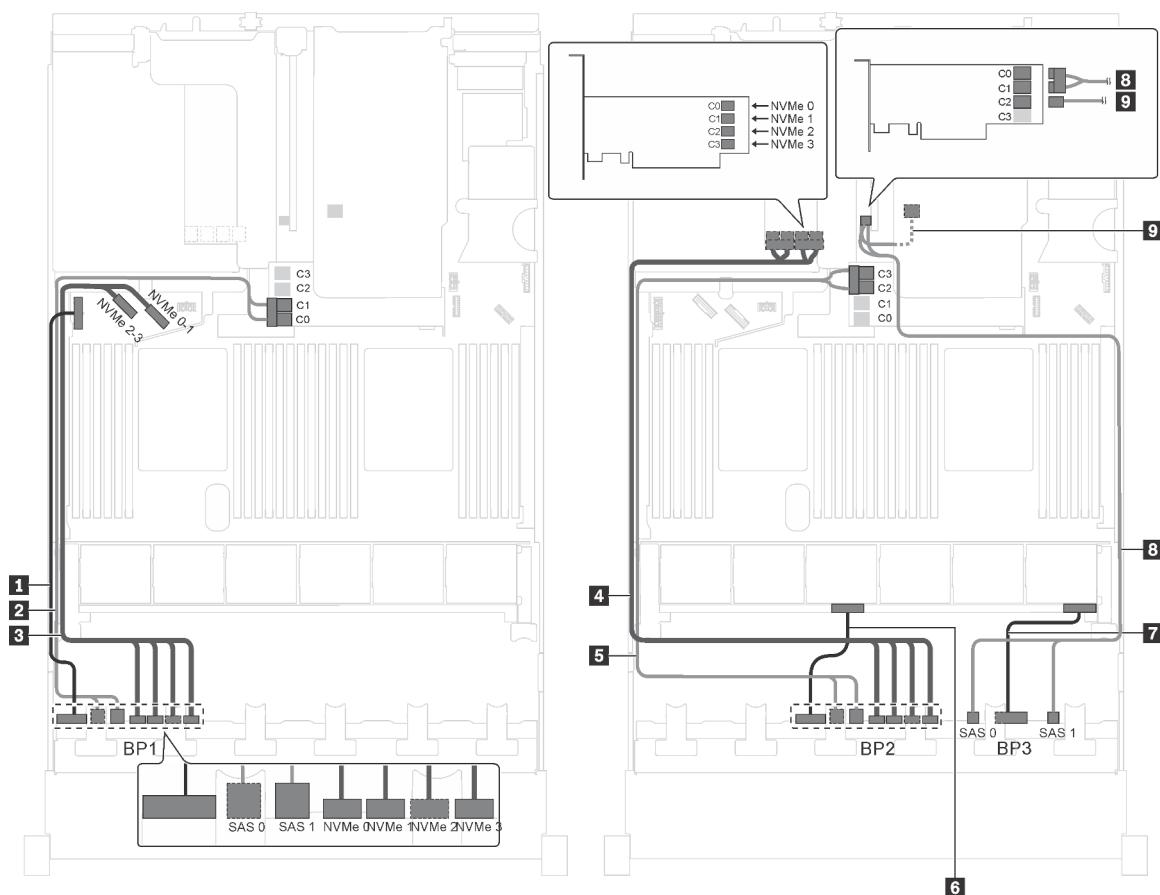


Figure 75. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 16i RAID adapters, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
9 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C2 Gen 4: C1

Server model: sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, one 16i HBA/RAID adapter, one NVMe switch adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the cable **6** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2/5/7**: ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit
 - Cable **6**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

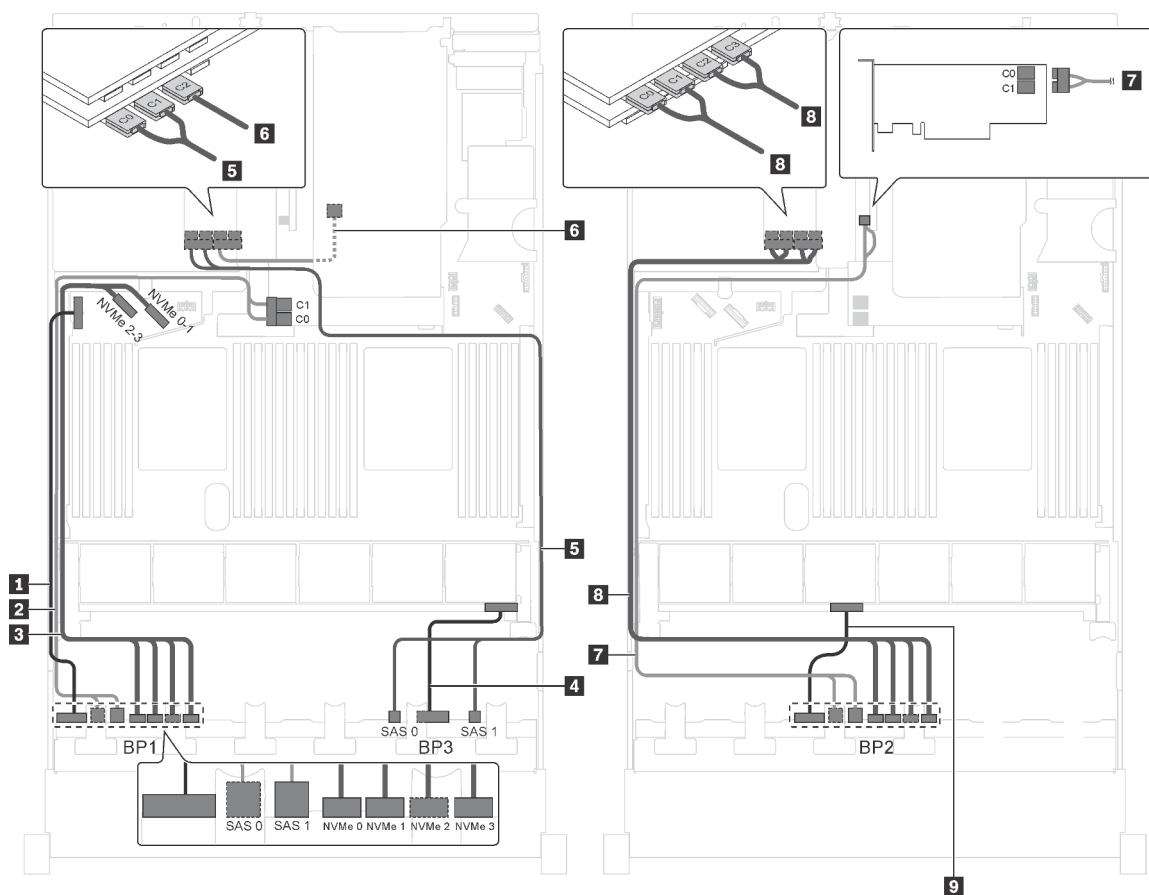


Figure 76. Cable routing for server models with sixteen 2.5-inch SAS/SATA drives, eight 2.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters, one 16i HBA/RAID adapter, and one NVMe switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
5 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 6 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
6 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on PCIe slot 6 <ul style="list-style-type: none"> Gen 3: C2 Gen 4: C1

Cable	From	To
7 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
8 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
9 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter, two NVMe switch adapters

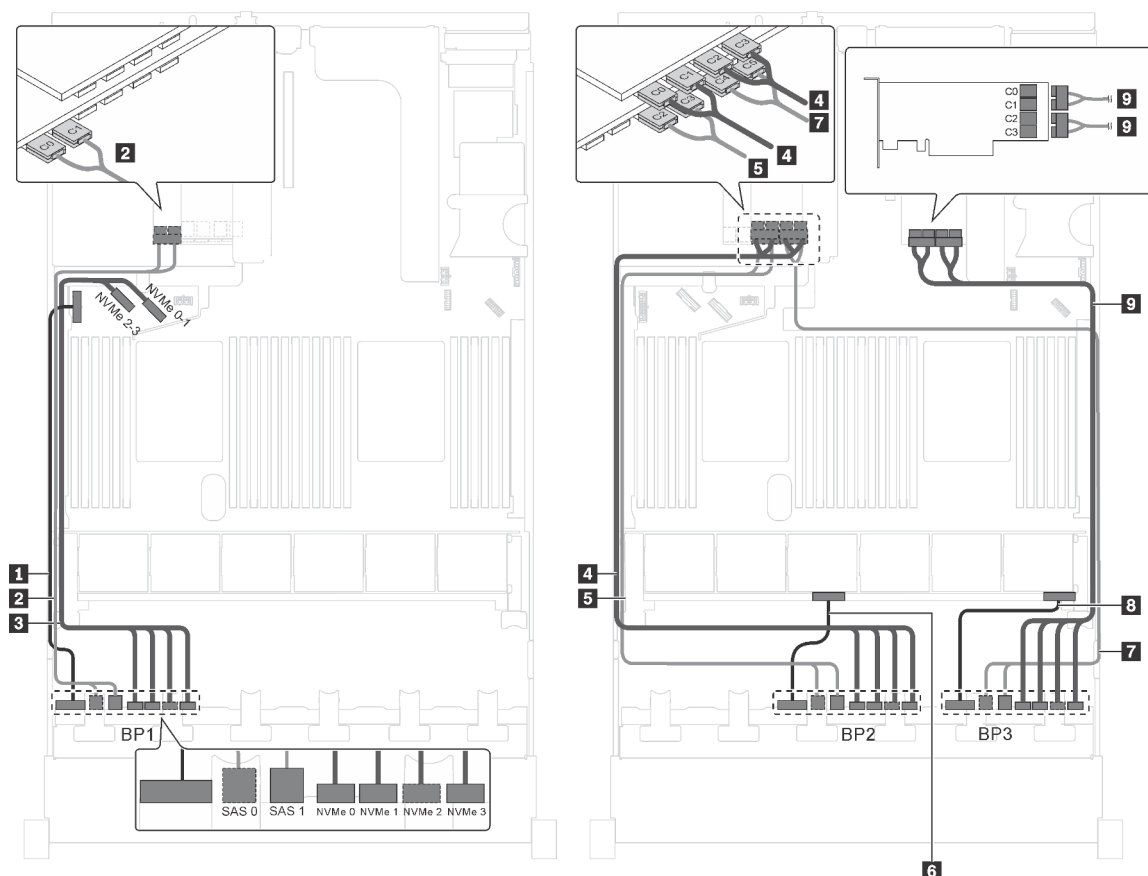


Figure 77. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 24i RAID adapter, and two NVMe switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1	SAS 0 and SAS 1 connectors on front backplane 1	C0 and C1 connectors on the 24i RAID adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0-1 and NVMe 2-3 connectors on the system board

Cable	From	To
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2	SAS 0 and SAS 1 connectors on front backplane 2	C2 and C3 connectors on the 24i RAID adapter installed in PCIe slot 6
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for front backplane 3	SAS 0 and SAS 1 connectors on front backplane 3	C4 and C5 connectors on the 24i RAID adapter installed in PCIe slot 6
8 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
9 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter, two NVMe switch adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

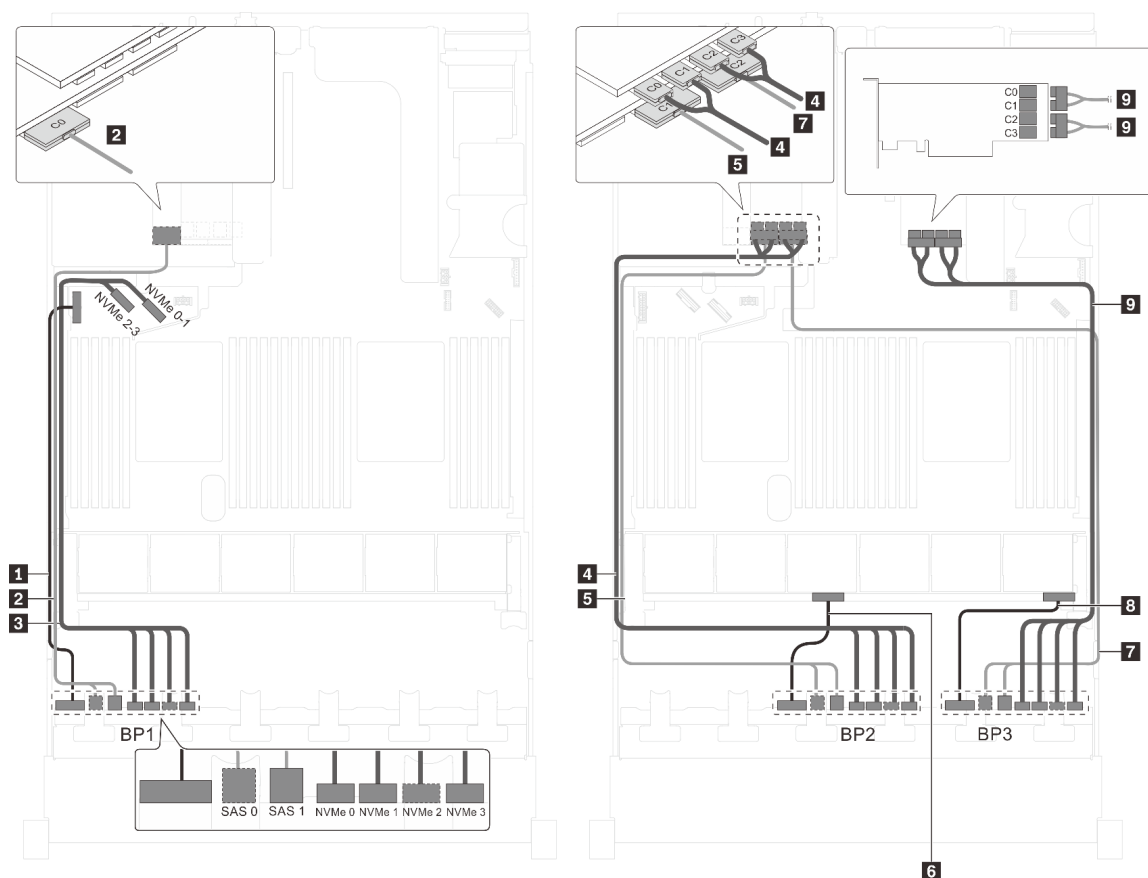


Figure 78. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 32i RAID adapter, and two NVMe switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 6
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
7 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on PCIe slot 6

Cable	From	To
8 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
9 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 32i HBA/RAID adapter, one NVMe 1611-8P switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

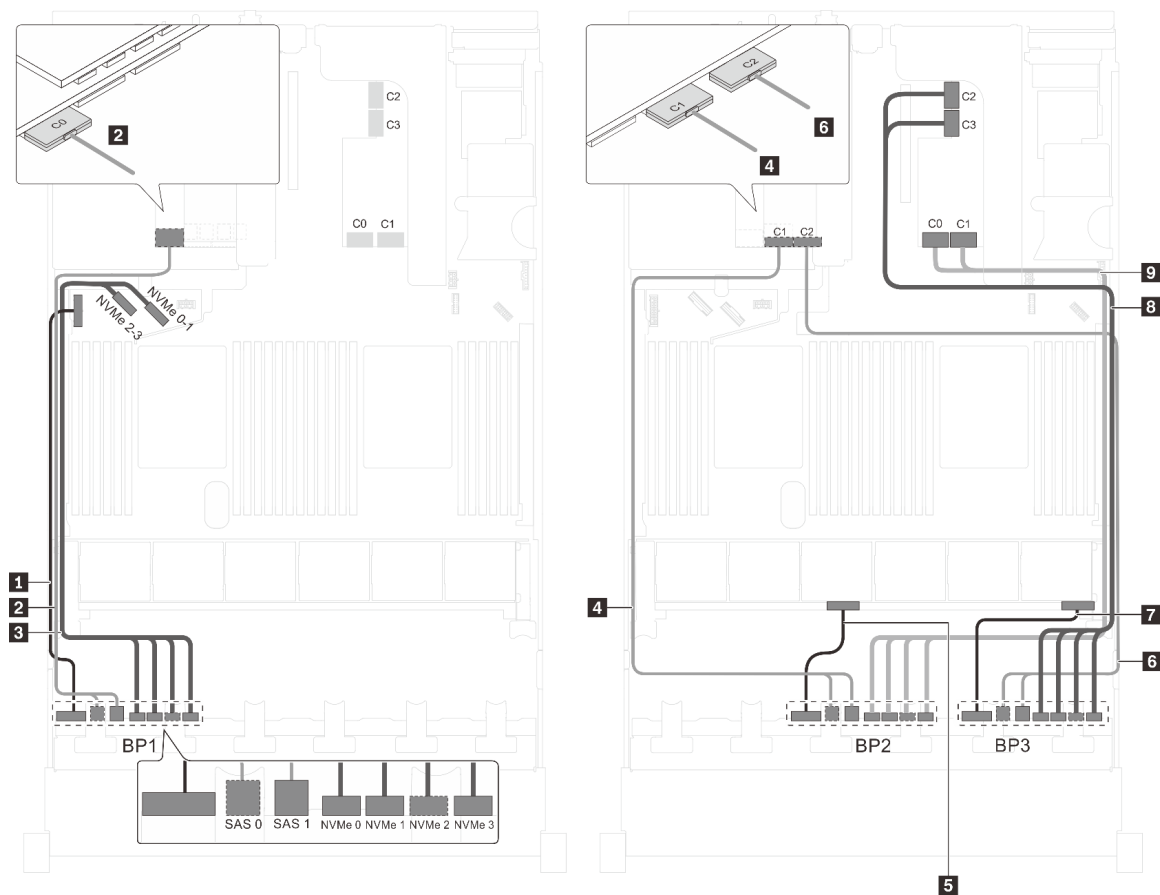


Figure 79. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 32i HBA/RAID adapter, and one NVMe 1611-8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	C0 connector on the 32i RAID adapter on PCIe slot 6

Cable	From	To
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	C1 connector on the 32i RAID adapter on PCIe slot 6
5 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
6 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	C2 connector on the 32i RAID adapter on PCIe slot 6
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C2 and C3 connectors on the NVMe 1611–8P installed in PCIe slot 1
9 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0 and C1 connectors on the NVMe 1611–8P installed in PCIe slot 1

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, three 8i HBA/RAID adapters, two NVMe switch adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

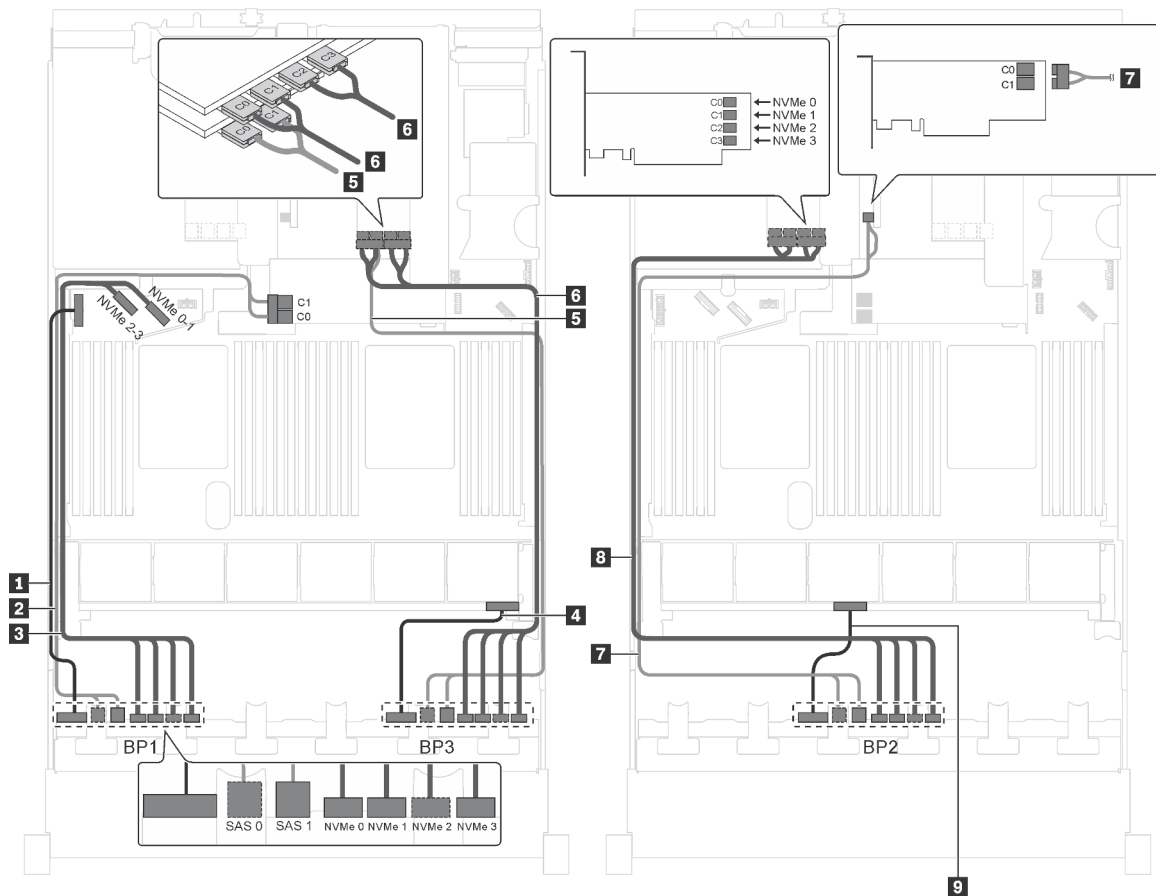


Figure 80. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, three 8i HBA/RAID adapters, and two NVMe switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
5 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	8i HBA/RAID adapter on PCIe slot 2 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
6 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1

Cable	From	To
7 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
8 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
9 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapters, two NVMe switch adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

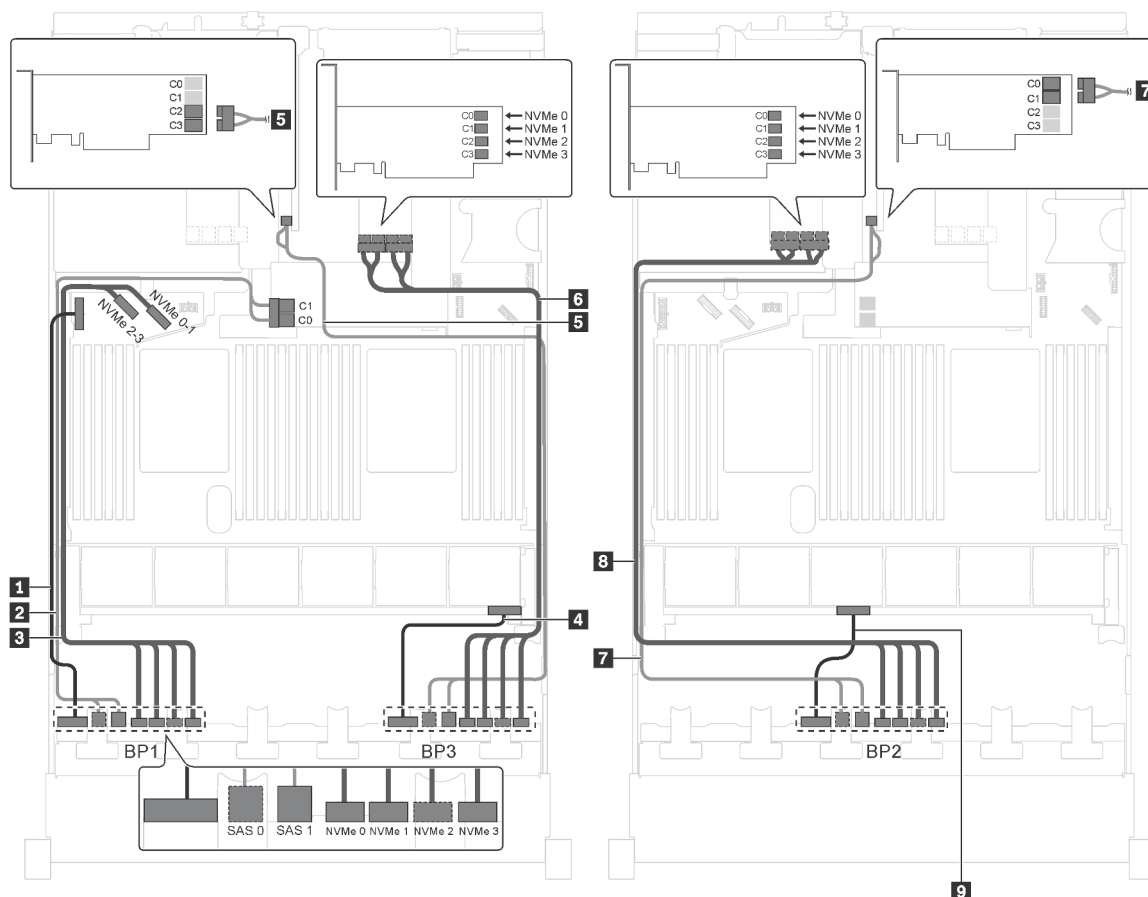


Figure 81. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapters, and two NVMe switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
5 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C2C3 • Gen 4: C1
6 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1
7 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
8 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 5
9 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Server model: twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, one NVMe 1611-8P switch adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

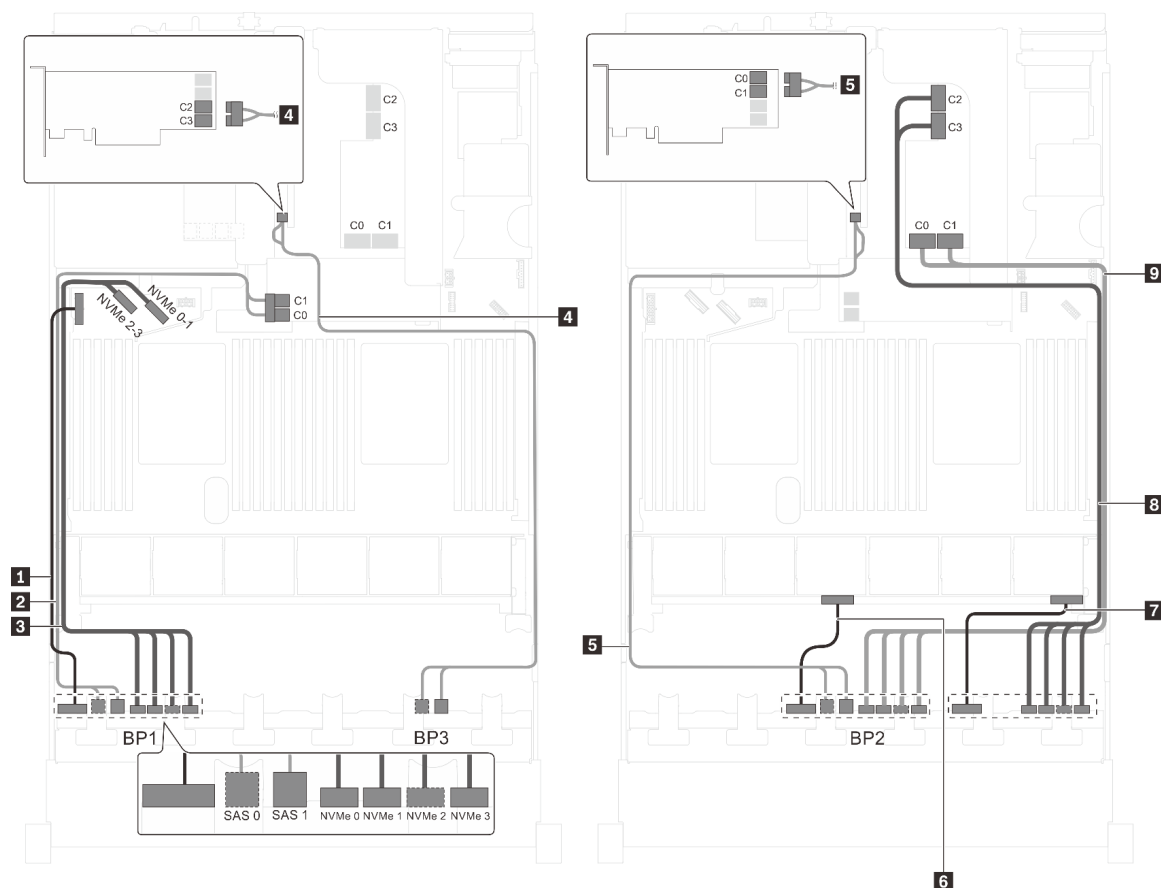


Figure 82. Cable routing for server models with twelve 2.5-inch SAS/SATA drives, twelve 2.5-inch SAS/SATA/NVMe drives, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter, and one NVMe 1611-8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 SAS signal cable for front backplane 1*	SAS 0 and SAS 1 connectors on front backplane 1	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
3 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	NVMe 0–1 and NVMe 2–3 connectors on the system board
4 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C2C3 Gen 4: C1
5 SAS signal cable for front backplane 2*	SAS 0 and SAS 1 connectors on front backplane 2	16i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0C1 Gen 4: C0
6 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board

Cable	From	To
7 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
8 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C2 and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1
9 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0 and C1 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1

Server model: sixteen 2.5-inch NVMe drives, eight SAS/SATA drives, two NVMe 810-4P switch adapters, two NVMe 1610-4P switch adapters, one 8i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

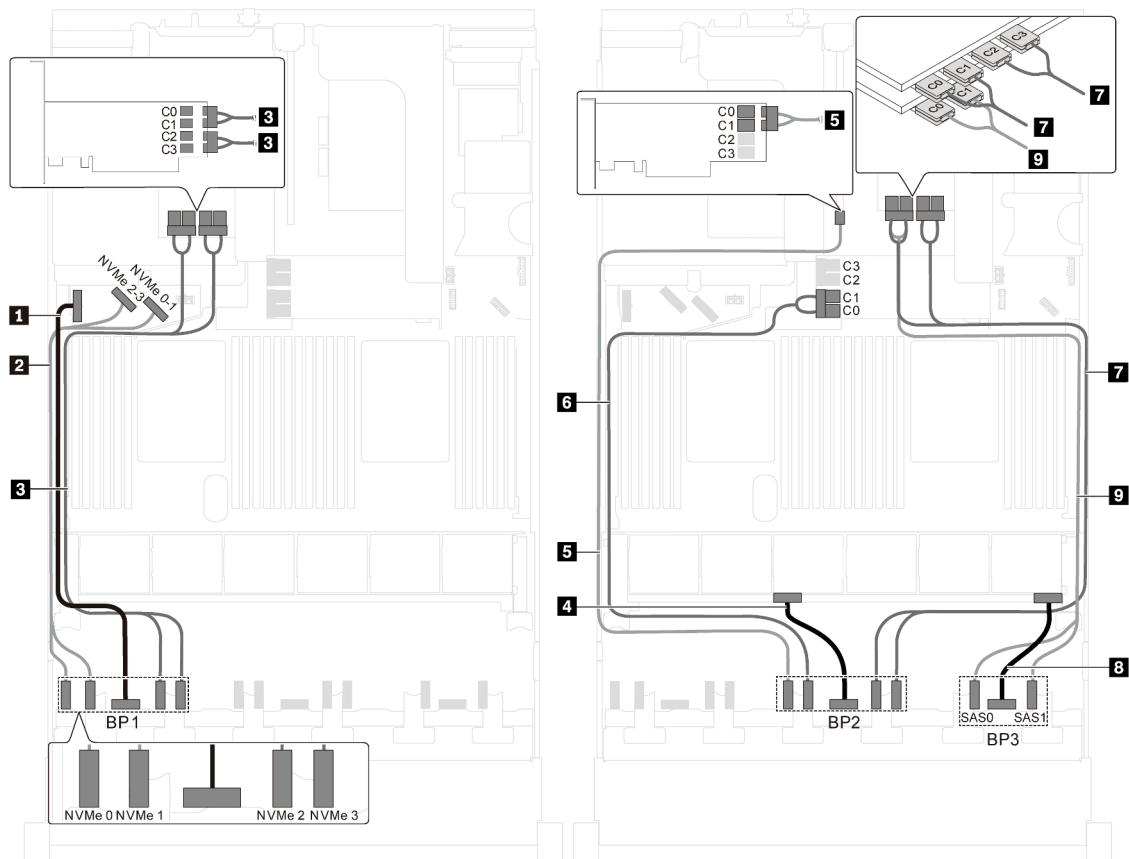


Figure 83. Cable routing for server models with sixteen 2.5-inch NVMe drives, eight SAS/SATA drives, two NVMe 810-4P switch adapters, two NVMe 1610-4P switch adapters and one 8i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0 and NVMe 1 connectors on front backplane 1	NVMe 2–3 and NVMe 0–1 connectors on the system board
3 NVMe signal cable for front backplane 1	NVMe 2 and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 6
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 NVMe signal cable for front backplane 2	NVMe 0 connector on front backplane 2	C0 and C1 connector on the NVMe 810-4P switch adapter installed in PCIe slot 4
6 NVMe signal cable for front backplane 2	NVMe 1 connector on front backplane 2	C0 and C1 connector on the NVMe 810-4P switch adapter installed in RAID adapter slot on the system board
7 NVMe signal cable for front backplane 2	NVMe 2 and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1610-4P switch adapter installed in PCIe slot 1
8 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
9 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	8i HBA/RAID adapter on PCIe slot 3 <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0

Server model: sixteen 2.5-inch NVMe drives, eight 2.5-inch SAS/SATA drives, one 8i HBA/RAID adapter, two NVMe 1611-8P switch adapters

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 2.5" SAS/SATA/AnyBay 8-Bay X40 RAID Cable Kit).

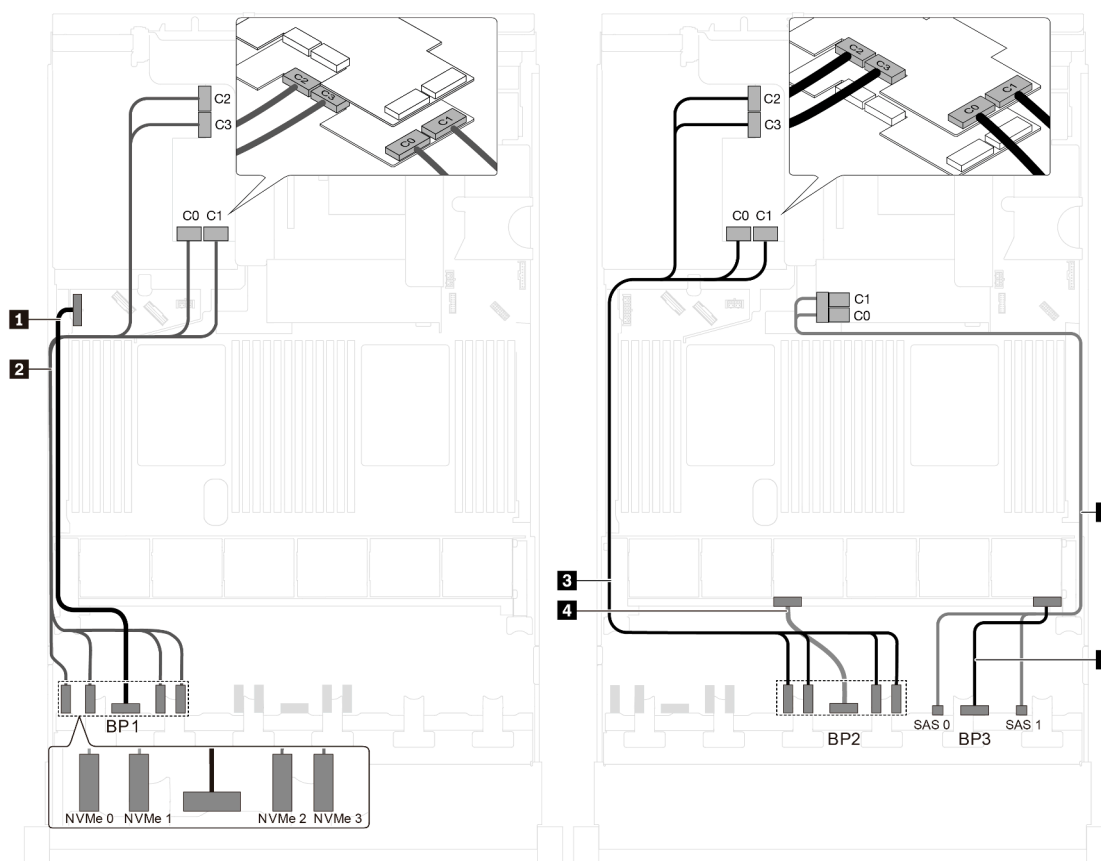


Figure 84. Cable routing for server models with sixteen 2.5-inch NVMe drives, eight 2.5-inch SAS/SATA drives, one 8i HBA/RAID adapter, and two NVMe 1611-8P switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 5
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 SAS signal cable for front backplane 3*	SAS 0 and SAS 1 connectors on front backplane 3	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
6 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board

Server model: twenty-four 2.5-inch NVMe drives, four NVMe 810-4P switch adapters, one NVMe 1610-8P switch adapter

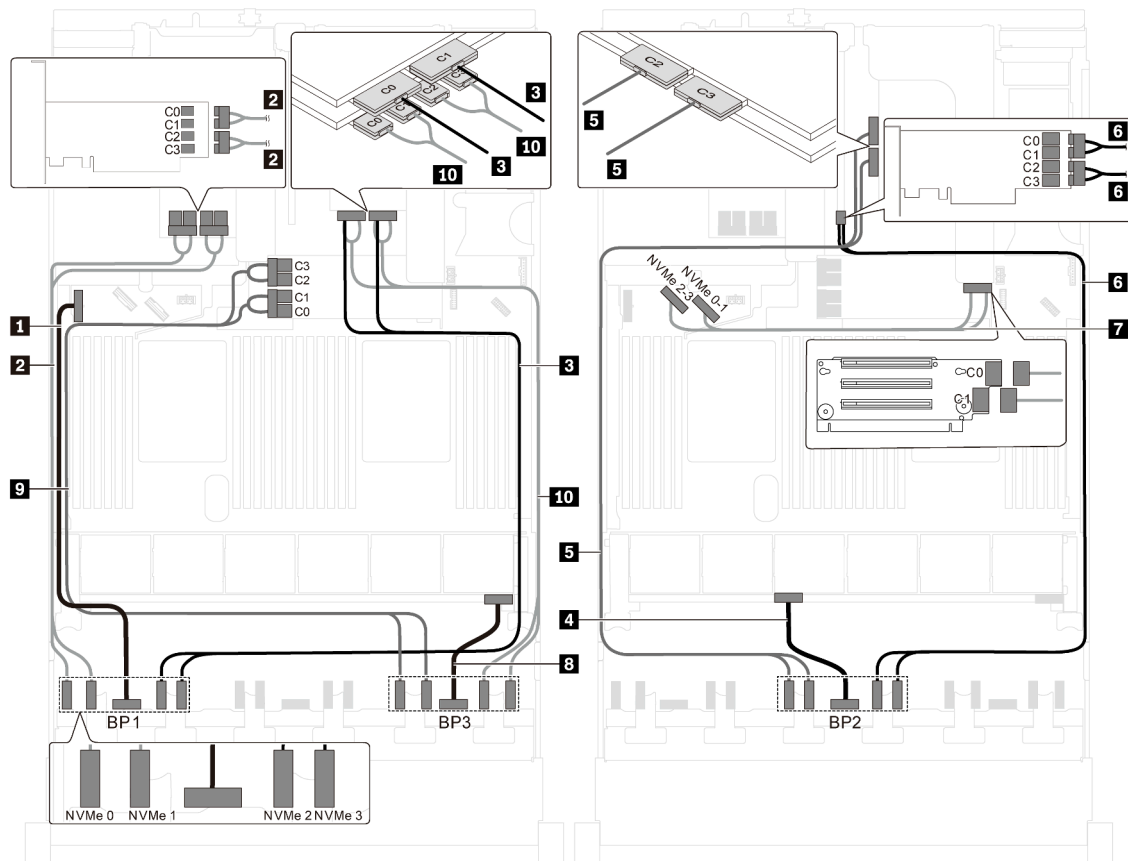


Figure 85. Cable routing for server models with twenty-four 2.5-inch NVMe drives, four NVMe 810-4P switch adapters, and one NVMe 1610-8P switch adapter

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0 and NVMe 1 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 810-4P switch adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 1	NVMe 2 and NVMe 3 connectors on front backplane 1	C0 and C1 connectors on the NVMe 1610-8P switch adapter installed in PCIe slot 1
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 NVMe signal cable for front backplane 2	NVMe 0 and NVMe 1 connectors on front backplane 2	C2 and C3 connectors on the NVMe 1610-8P switch adapter installed in PCIe slot 1
6 NVMe signal cable for front backplane 2	NVMe 2 and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 810-4P switch adapter installed in PCIe slot 4
7 NVMe signal cable for onboard NVMe connectors	NVMe 0–1 and NVMe 2–3 connectors on the system board	C0 and C1 connectors on the riser card 1

Cable	From	To
8 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
9 NVMe signal cable for front backplane 3	NVMe 0 and NVMe 1 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe 810-4P switch adapter installed in RAID adapter slot on the system board
10 NVMe signal cable for front backplane 3	NVMe 2 and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe 810-4P switch adapter installed in PCIe slot 2

Server model: twenty-four 2.5-inch NVMe drives, three NVMe 1611-8P switch adapters

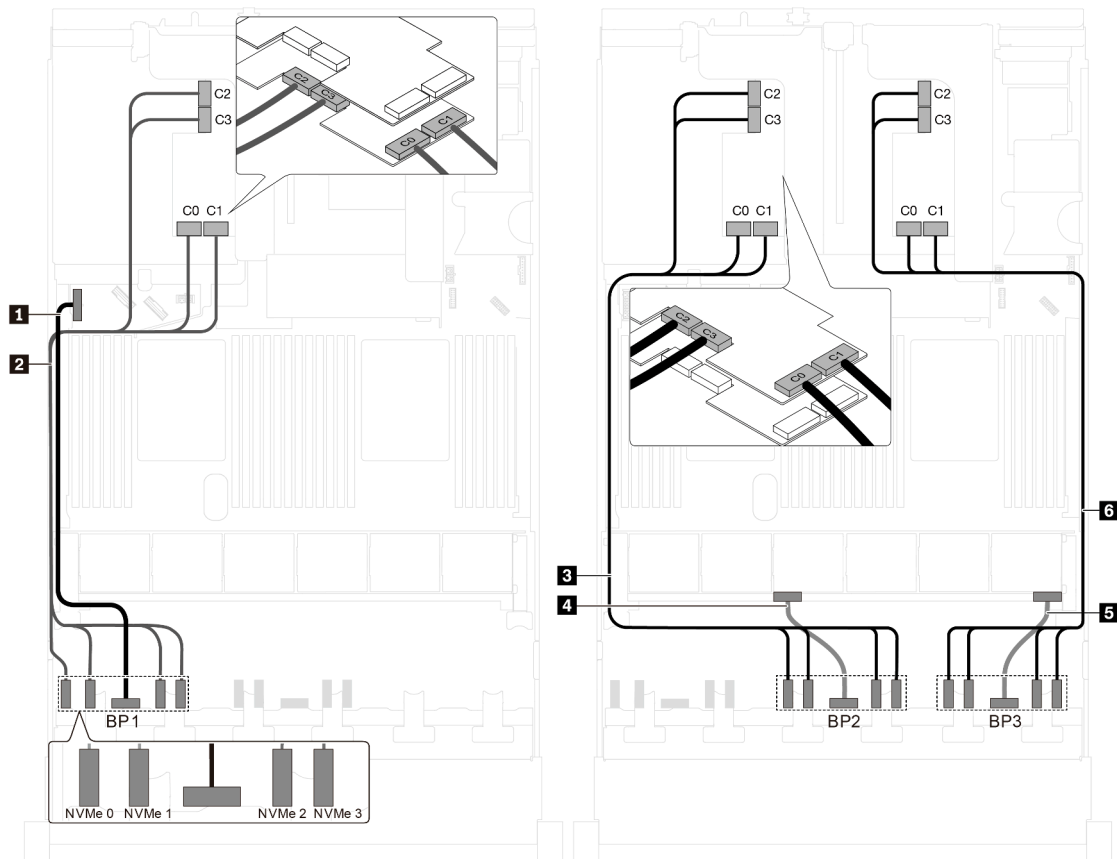


Figure 86. Cable routing for server models with twenty-four 2.5-inch NVMe drives and three NVMe 1611-8P switch adapters

Cable	From	To
1 Power cable for front backplane 1	Power connector on front backplane 1	Backplane power connector 1 on the system board
2 NVMe signal cable for front backplane 1	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 1	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 6
3 NVMe signal cable for front backplane 2	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 2	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 5

Cable	From	To
4 Power cable for front backplane 2	Power connector on front backplane 2	Backplane power connector 2 on the system board
5 Power cable for front backplane 3	Power connector on front backplane 3	Backplane power connector 3 on the system board
6 NVMe signal cable for front backplane 3	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on front backplane 3	C0, C1, C2, and C3 connectors on the NVMe 1611-8P switch adapter installed in PCIe slot 1

Server models with eight 3.5-inch drives

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

Server model: eight 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, two 8i HBA/RAID adapters

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter in PCIe slot 4 might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

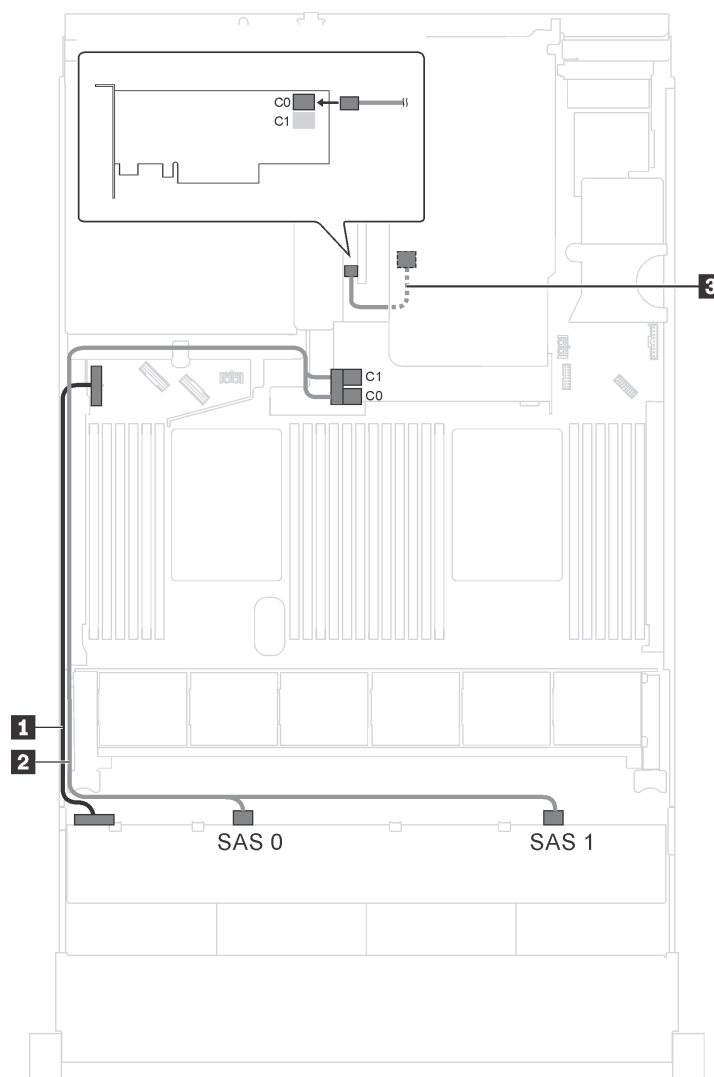


Figure 87. Cable routing for server models with eight 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and two 8i HBA/RAID adapters

Cable	From	To
1 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> • Gen 3: C0 • Gen 4: C0

Server model: eight 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 16i HBA/RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and cable **3** might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit
 - Cable **3**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

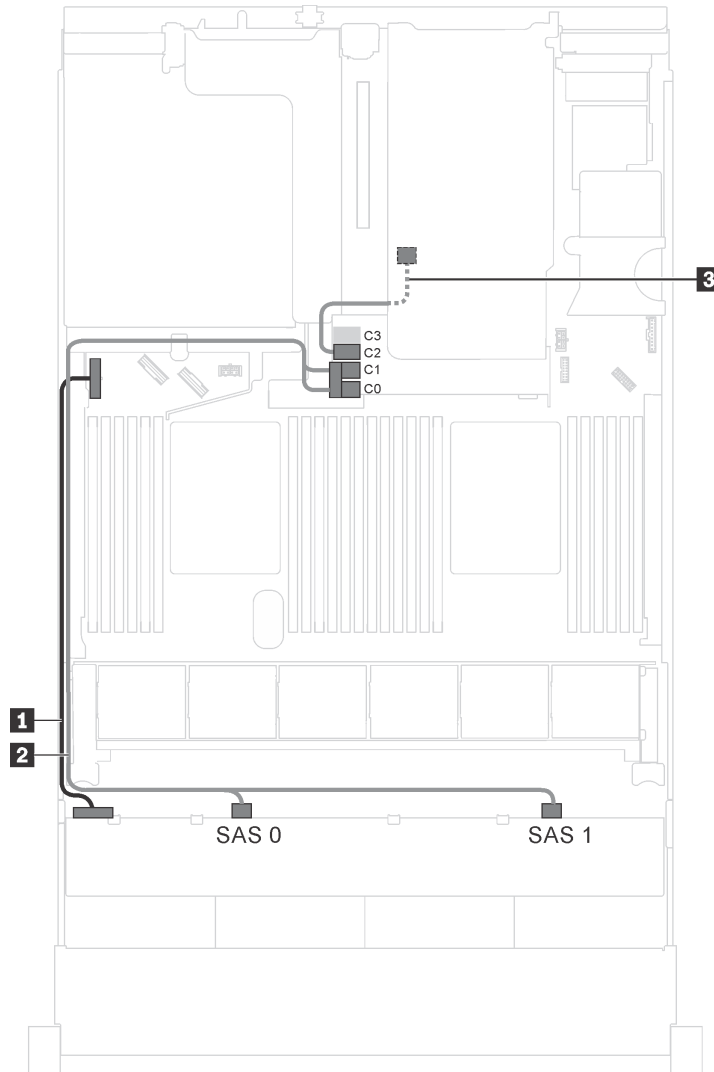


Figure 88. Cable routing for server models with eight 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable	Power connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C2 • Gen 4: C1

Server models with twelve 3.5-inch drives

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

Server model: twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 3 16i HBA/RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.

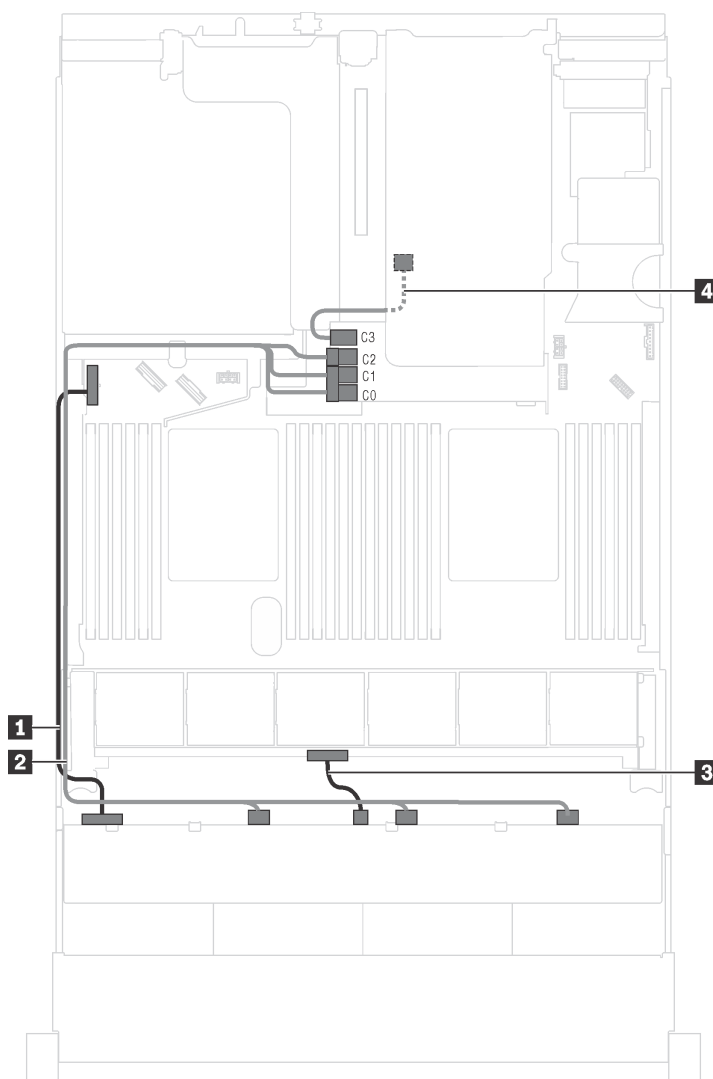


Figure 89. Cable routing for server models with twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one Gen 3 16i HBA/RAID adapter

Cable	From	To
1 Power cable	Power 1 connector on the front backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0, SAS 1, and SAS 2 connectors on the backplane	C0, C1, and C2 connectors on the 16i HBA/RAID adapter on the RAID adapter slot
3 Power cable	Power 2 connector on the front backplane	Backplane power connector 2 on the system board
4 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C3 connector on the 16i HBA/RAID adapter on the RAID adapter slot

Server model: twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one Gen 4 16i HBA/RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

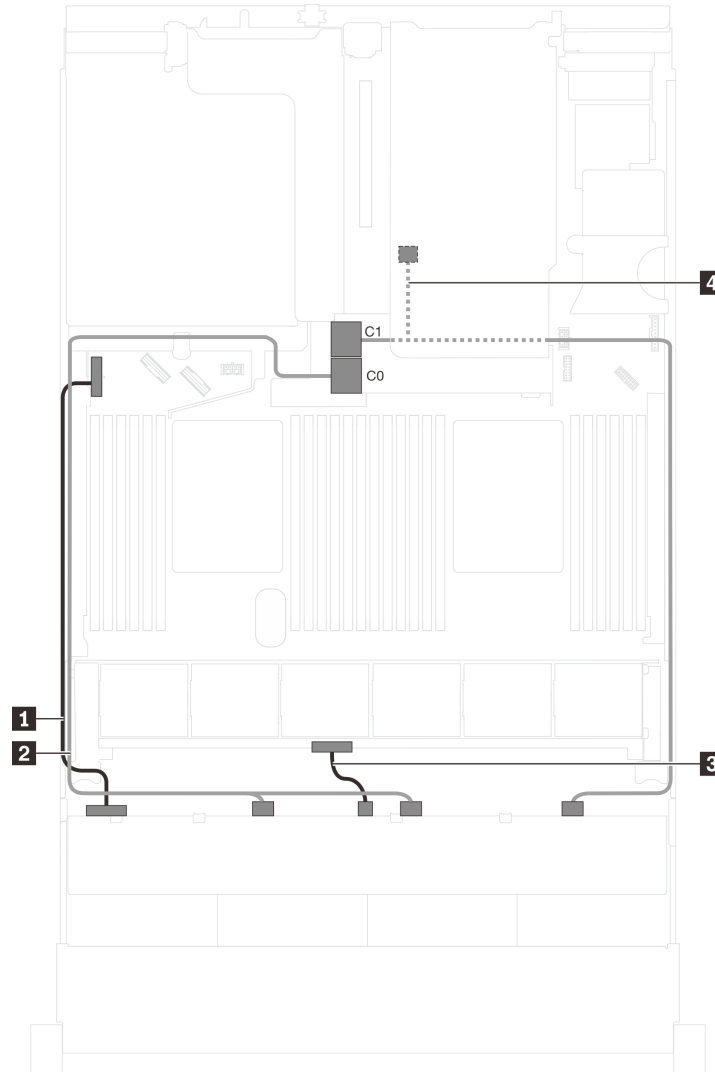


Figure 90. Cable routing for server models with twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, and one Gen 4 16i HBA/RAID adapter

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

Cable	From	To
3 Power cable	Power 2 connector on the front backplane	Backplane power connector 2 on the system board
4 SAS signal cable for the rear hot-swap drive assembly	SAS 2 connector on the backplane and signal connector on the rear hot-swap drive assembly	C1 connector on the 16i HBA/RAID adapter on the RAID adapter slot

Server model: twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, one 16i HBA/RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly and the 8i HBA/RAID adapter might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable:
 - Cable **2**: ThinkSystem SR590/SR650 3.5" SAS/SATA/AnyBay 12-Bay X40 RAID Cable Kit
 - Cable **4**: ThinkSystem SR590/SR650 3.5" SAS/SATA 2-Bay Rear BP X40 RAID Cable Kit

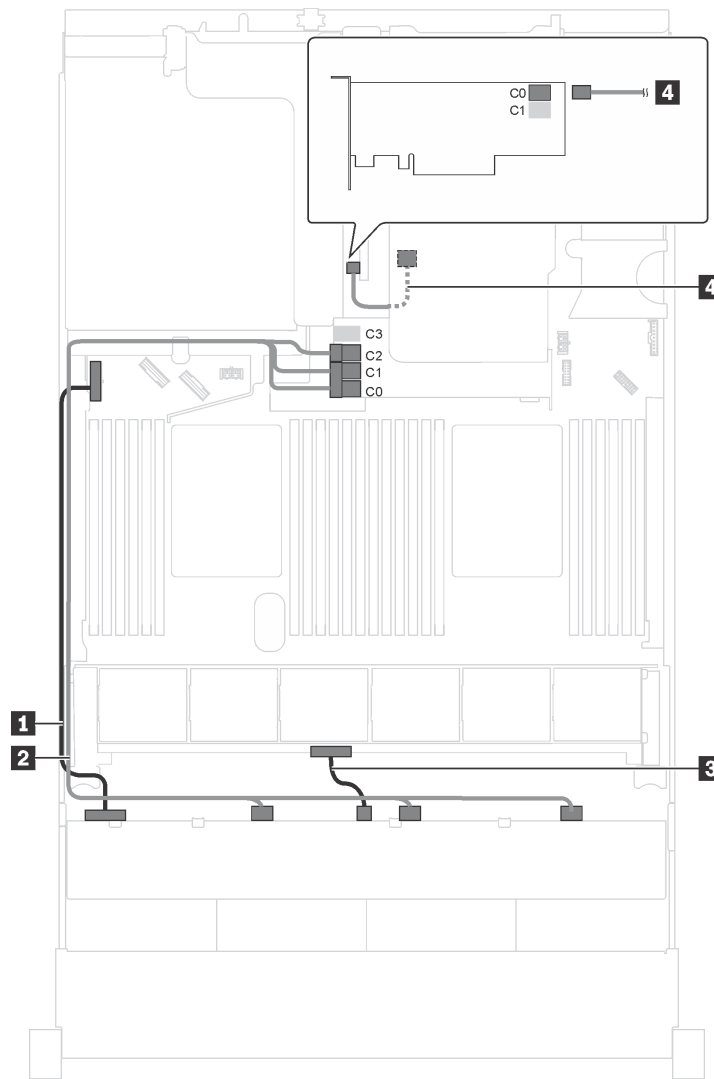


Figure 91. Cable routing for server models with twelve 3.5-inch SAS/SATA drives, the rear hot-swap drive assembly, one 8i HBA/RAID adapter, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable	Power 1 connector on the front backplane	Backplane power connector 1 on the system board
2 SAS signal cable*	SAS 0, SAS 1, and SAS 2 connectors on the backplane	16i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> Gen 3: C0C1C2 Gen 4: C0C1
3 Power cable	Power 2 connector on the front backplane	Backplane power connector 2 on the system board
4 SAS signal cable for the rear hot-swap drive assembly*	Signal connector on the rear hot-swap drive assembly	8i HBA/RAID adapter on PCIe slot 4 <ul style="list-style-type: none"> Gen 3: C0 Gen 4: C0

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one Gen 3 16i HBA/RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.

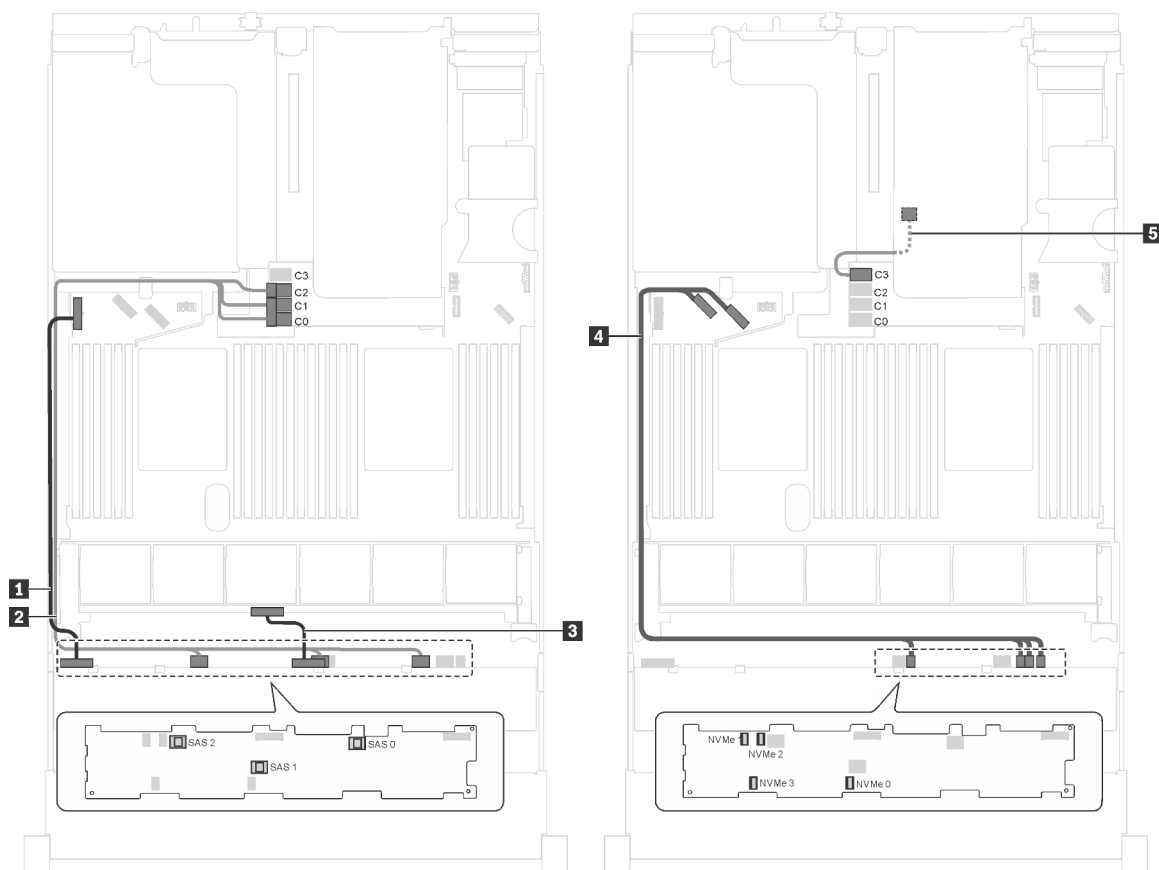


Figure 92. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one Gen 3 16i HBA/RAID adapter

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

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, one Gen 4 16i HBA/RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner RAID adapter slot.
- Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

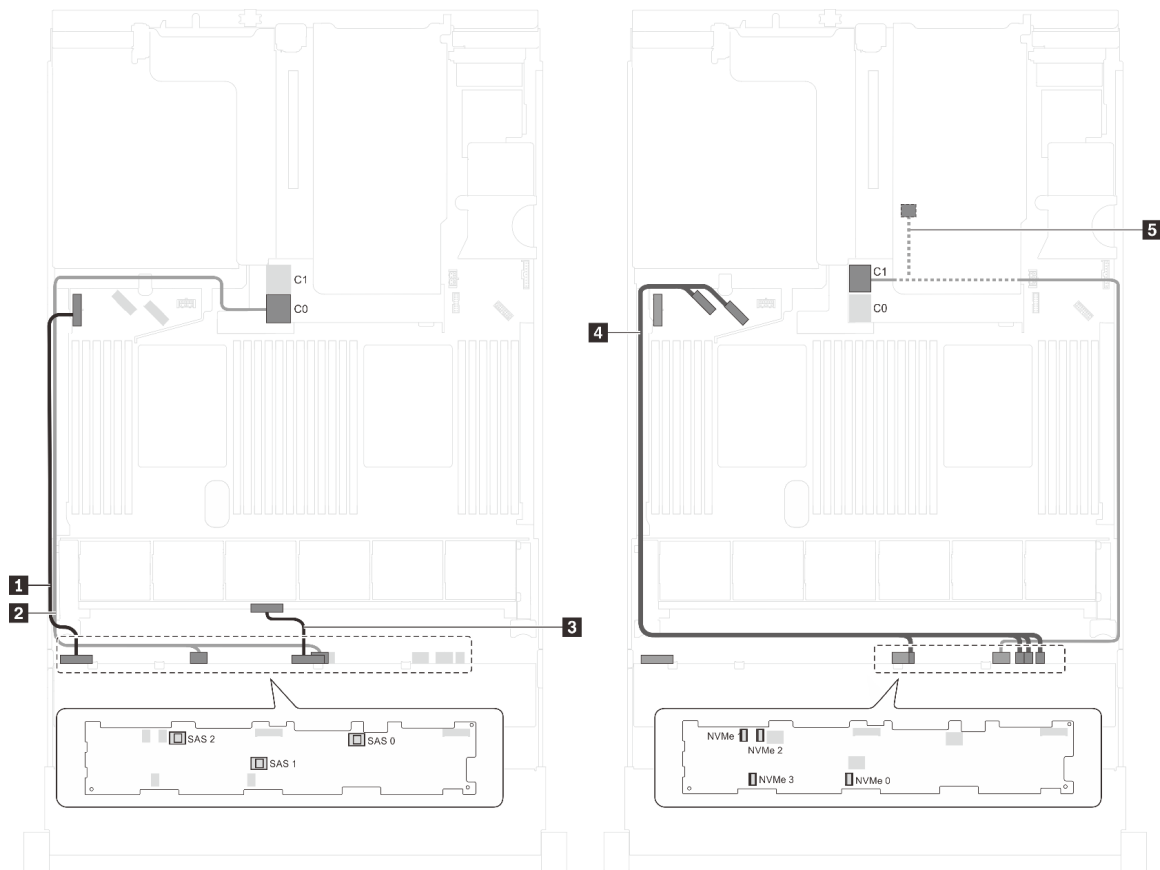


Figure 93. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, the rear hot-swap drive assembly, and one Gen 4 16i HBA/RAID adapter

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

Cable	From	To
4 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board
5 SAS signal cable for the rear hot-swap drive assembly	SAS 2 connector on the backplane and signal connector on the rear hot-swap drive assembly	C1 connector on the 16i HBA/RAID adapter on the RAID adapter slot

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

Notes:

- Depending on the backplane type, the connector location of the backplanes may vary slightly.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

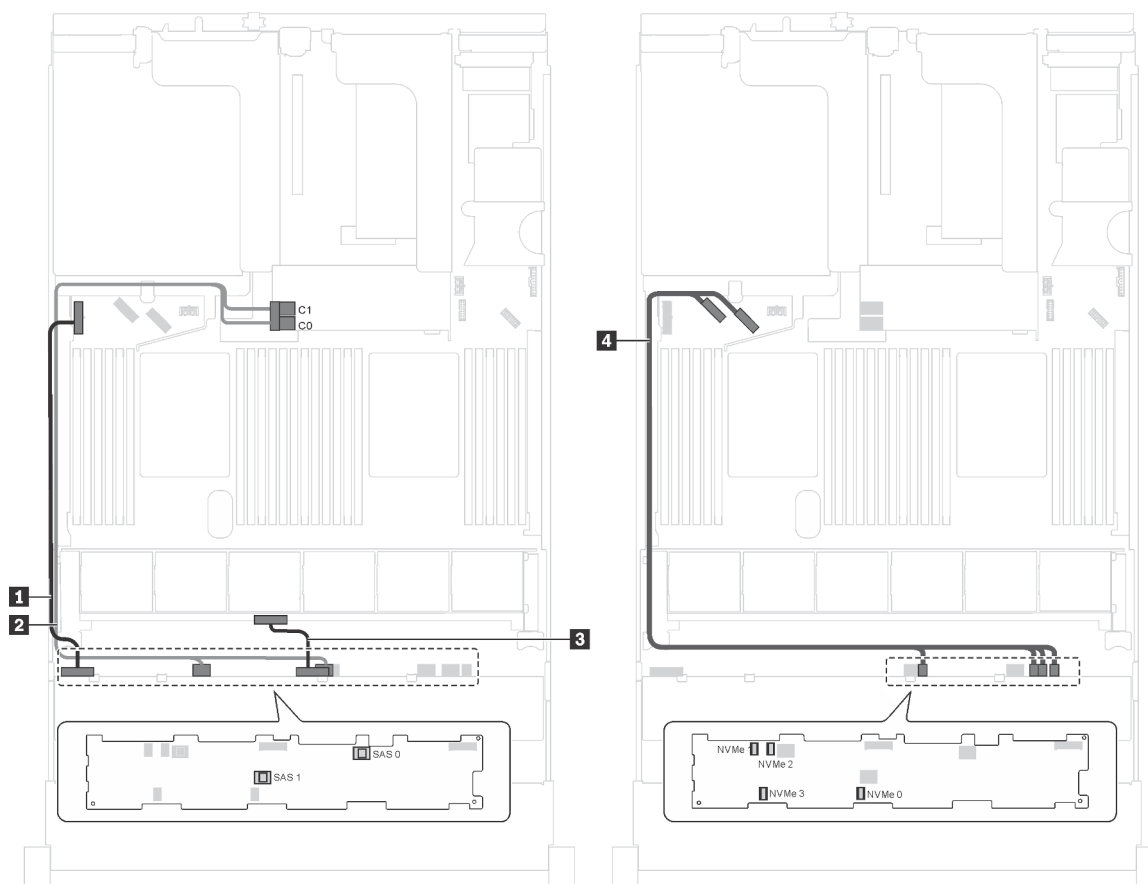


Figure 94. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, and one 8i HBA/RAID adapter

Cable	From	To
1 Power cable	Power 1 connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable*	SAS 0 and SAS 1 connectors on the backplane	8i HBA/RAID adapter on the RAID adapter slot <ul style="list-style-type: none"> • Gen 3: C0C1 • Gen 4: C0
3 Power cable	Power 2 connector on the backplane	Backplane power connector 2 on the system board
4 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, the rear hot-swap drive assembly, one Gen 3 8i HBA/RAID adapter

Note: This server model is supported in Chinese Mainland only.

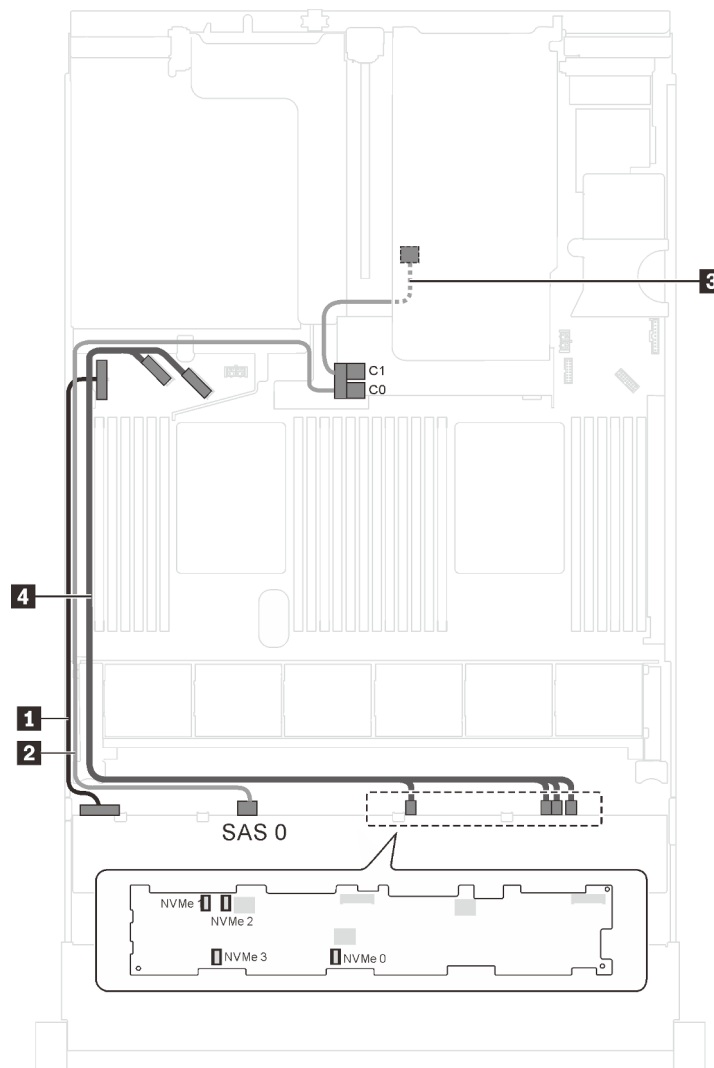


Figure 95. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, the rear hot-swap drive assembly, and one Gen 3 8i HBA/RAID adapter

Cable	From	To
1 Power cable	Power 1 connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0 connector on the backplane	C0 connector on the 8i HBA/RAID adapter on the RAID adapter slot
3 SAS signal cable for the rear hot-swap drive assembly	Signal connector on the rear hot-swap drive assembly	C1 connector on the 8i HBA/RAID adapter on the RAID adapter slot
4 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board

Server model: eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, the rear hot-swap drive assembly, one Gen 4 8i HBA/RAID adapter

Notes:

- This server model is supported in Chinese Mainland only.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- Ensure you use Gen 4 SAS signal cable (ThinkSystem SR550/SR590/SR650 3.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

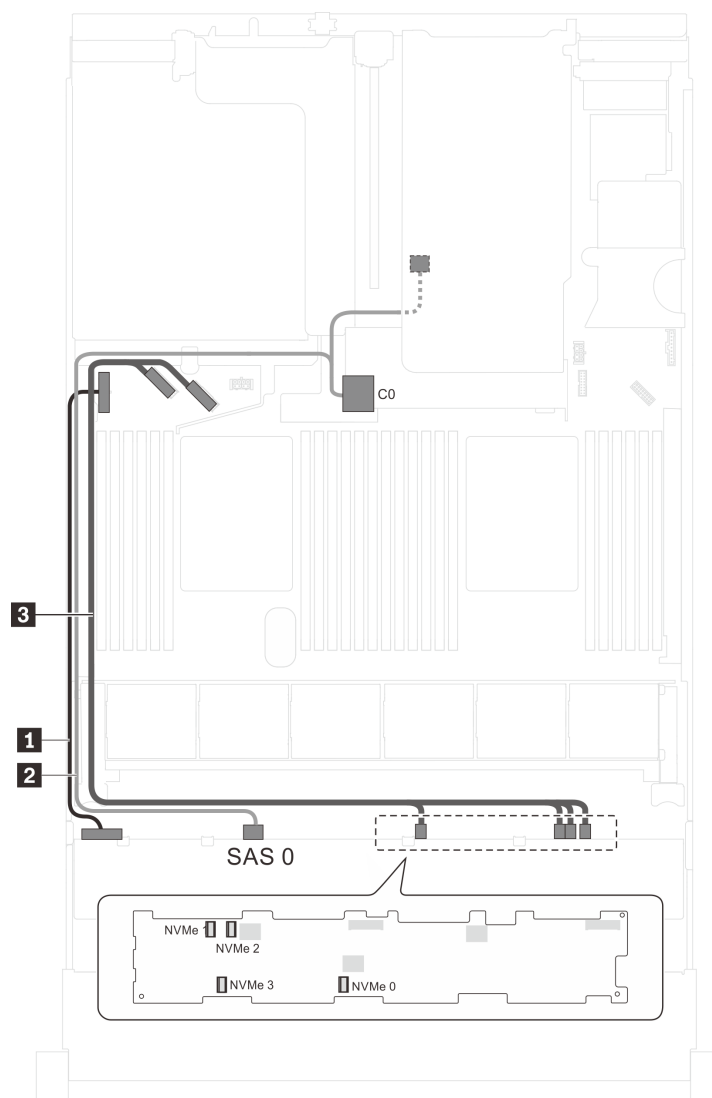


Figure 96. Cable routing for server models with eight 3.5-inch SAS/SATA drives, four 3.5-inch NVMe drives, the rear hot-swap drive assembly, and one Gen 4 8i HBA/RAID adapter

Cable	From	To
1 Power cable	Power 1 connector on the backplane	Backplane power connector 1 on the system board
2 SAS signal cable	SAS 0 connector on the backplane and signal connector on the rear hot-swap drive assembly	C0 connector on the 8i HBA/RAID adapter on the RAID adapter slot
3 NVMe signal cable	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the backplane	NVMe 0–1 and NVMe 2–3 connectors on the system board

Parts list

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

For more information about ordering the parts shown in [Figure 97 “Server components” on page 146](#):

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

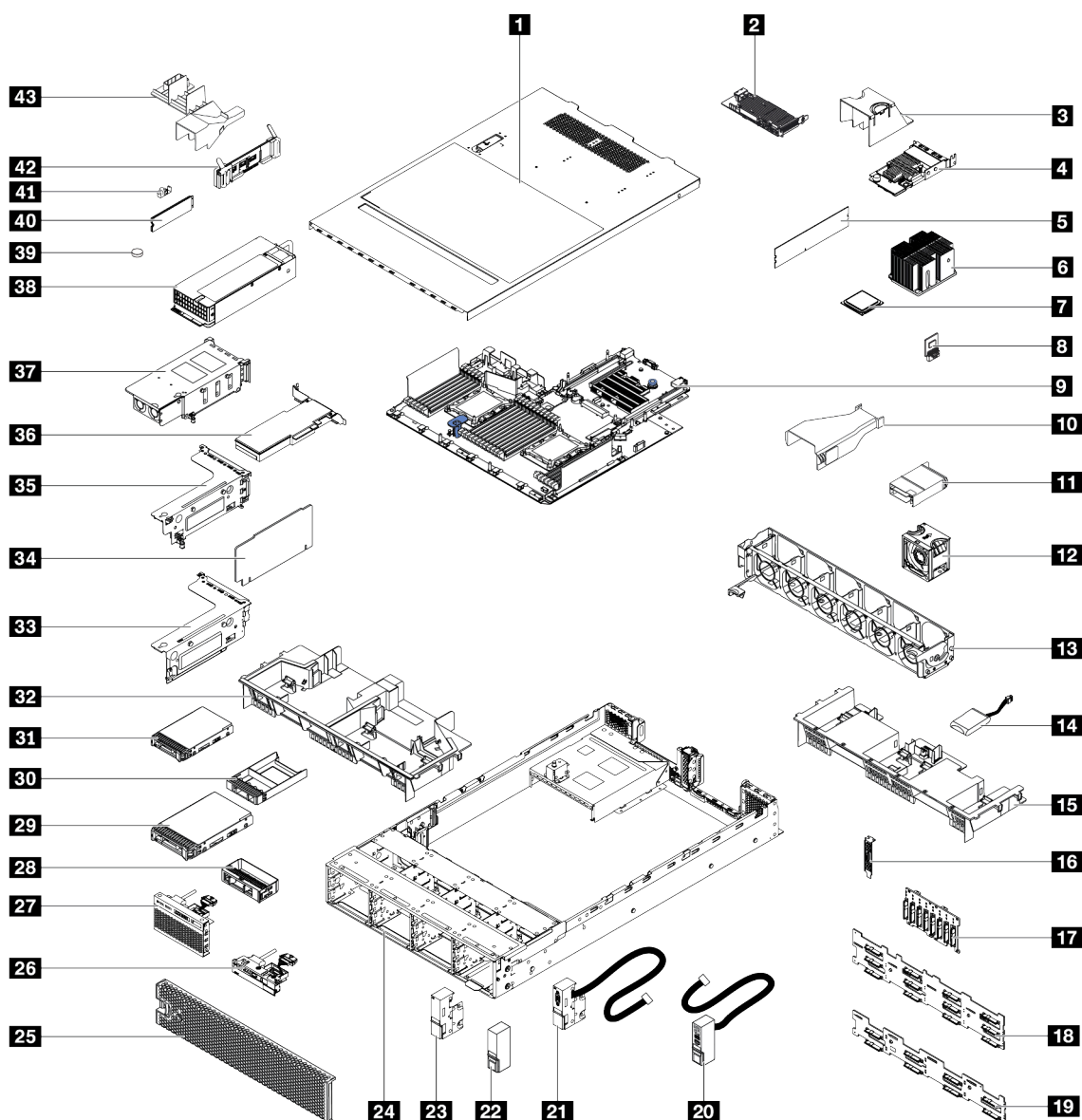


Figure 97. Server components

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.

Table 9. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
<p>For more information about ordering the parts shown in Figure 97 “Server components” on page 146:</p> <p>http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr650/7x05/parts</p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
1	Top cover	✓			
2	RAID adapter	✓			
3	LOM-adapter air baffle				✓
4	LOM adapter	✓			
5	Memory module (DCPMM might look slightly different from the illustration)	✓			
6	Heat sink			✓	
7	Processor			✓	
8	TCM/TPM adapter (for Chinese Mainland only)			✓	
9	System board			✓	
10	P4 GPU air baffle	✓			
11	FHHL V100 GPU air baffle	✓			
12	Fan	✓			
13	Fan cage				✓
14	RAID super capacitor module	✓			
15	Standard air baffle				✓
16	Serial port module	✓			
17	Backplane, eight 2.5-inch hot-swap drives	✓			
18	Backplane, twelve 3.5-inch hot-swap drives	✓			
19	Backplane, eight 3.5-inch hot-swap drives	✓			
20	Right rack latch, with front I/O assembly	✓			
21	Left rack latch, with VGA connector	✓			
22	Right rack latch, without front I/O assembly				✓

Table 9. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
23	Left rack latch, without VGA connector				✓
24	Chassis			✓	
25	Security bezel	✓			
26	Front I/O assembly, server models with eight 3.5-inch drive bays	✓			
27	Front I/O assembly, server models with eight or sixteen 2.5-inch drive bays	✓			
28	Filler, 3.5-inch drive				✓
29	Storage drive, 3.5-inch, hot-swap	✓			
30	Filler, 2.5-inch drive				✓
31	Storage drive, 2.5-inch, hot-swap	✓			
32	Large-size air baffle				✓
33	Riser 2 bracket	✓			
34	Riser card	✓			
35	Riser 1 bracket	✓			
36	PCIe adapter	✓			
37	Rear hot-swap drive assembly	✓			
38	Power supply	✓			
39	CMOS battery (CR2032)				✓
40	M.2 drive	✓			
41	M.2 retainer	✓			
42	M.2 backplane	✓			
43	480 GB M.2 drive air baffle	✓			

Power cords

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

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

1. Go to:
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power → Power Cables** to see all line cords.

Notes:

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

Chapter 3. 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.

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 3](#).
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 155](#).
 - 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 26](#) to locate the connectors. See [“Cable the server” on page 220](#) for cabling best practices.
 - d. Power on the server. See [“Turn on the server” on page 220](#).

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:

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

- e. Validate that the server hardware was set up successfully. See [“Validate server setup” on page 220](#).
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 223](#).
 - b. Update the firmware for the server, if necessary. See [“Update the firmware” on page 224](#).
 - c. Configure the firmware for the server. See [“Configure the firmware” on page 227](#).

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 [“Deploy the operating system” on page 234](#).
 - e. Back up the server configuration. See [“Back up the server configuration” on page 235](#).
 - f. Install the applications and programs for which the server is intended to be used.

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 that you work safely.
 - A complete list of safety information for all products is available at:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - The following guidelines are available as well: “Handling static-sensitive devices” on page 154 and “Working inside the server with the power on” on page 154.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <https://static.lenovo.com/us/en/serverproven/index.shtml>.
- 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 SR650 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.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

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

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

Safety inspection checklist

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

Notes:

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

CAUTION:

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

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

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

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

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

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

System reliability guidelines

The system reliability guidelines to ensure proper system cooling.

Make sure the following requirements are met:

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

Working inside the server with the power on

Guidelines to work inside the server with the power on.

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

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

Handling static-sensitive devices

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.

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.

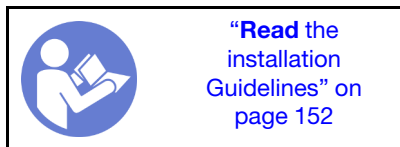
Installation procedures are presented in the optimum sequence to minimize work.

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

- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <https://static.lenovo.com/us/en/serverproven/index.shtml>.
- 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 SR650 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.



To remove the security bezel, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

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

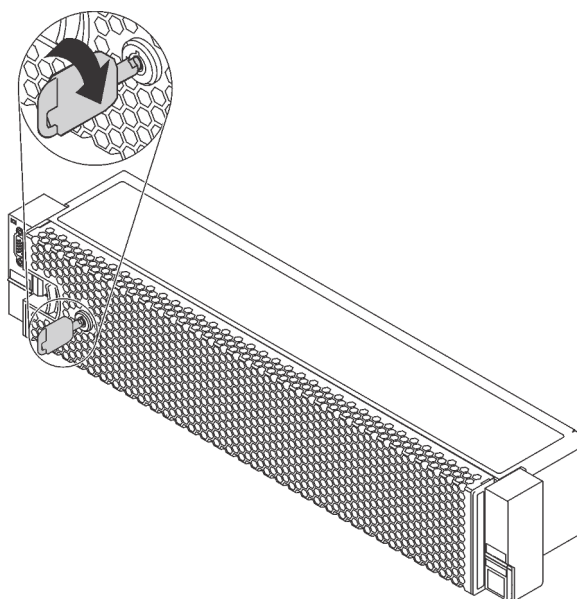


Figure 98. Unlocking the security bezel

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

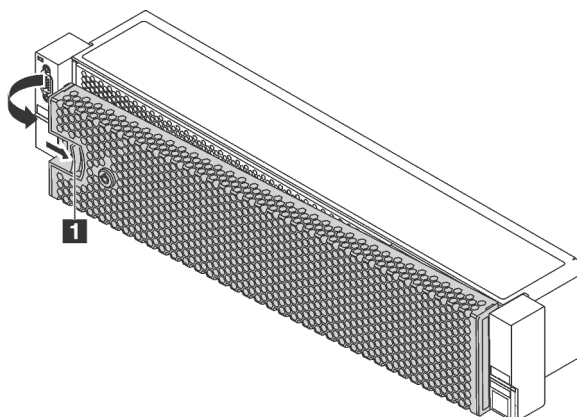

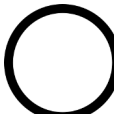



Figure 99. Security bezel removal

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.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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S033



CAUTION:

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

S014



CAUTION:

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

To remove the top cover, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

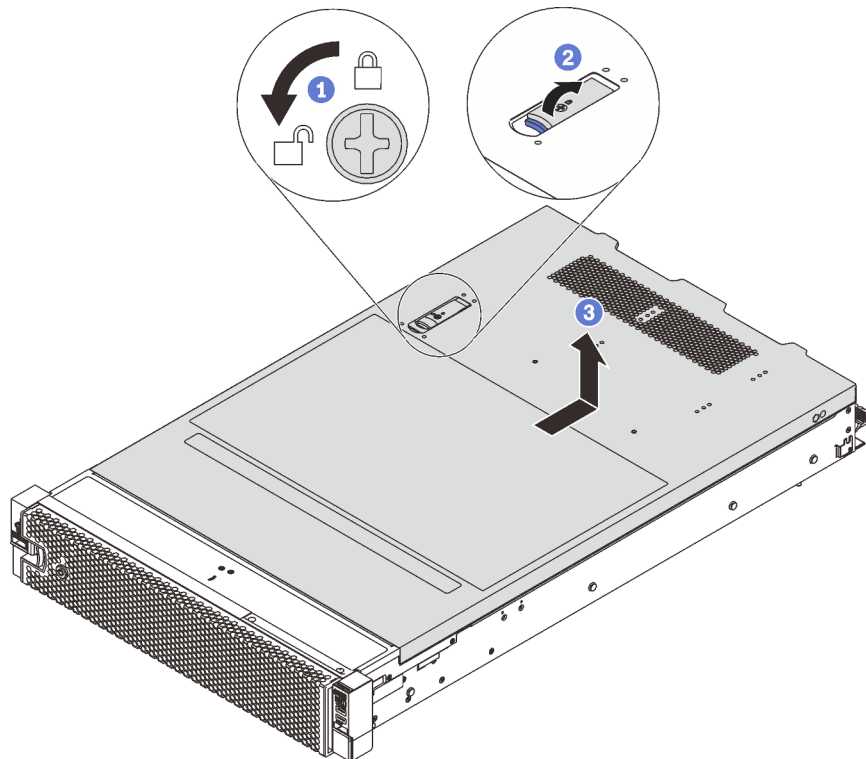


Figure 100. Top cover removal

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

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

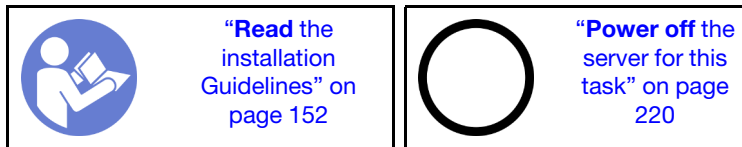
Step 3. Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

Attention:

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

Remove the air baffle

If you intend to install hardware options in the server, you must first remove the air baffle from the server.



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.

Before removing the air baffle, if there is a RAID super capacitor module installed on top of the air baffle, remove the RAID super capacitor module first.

To remove the air baffle, complete the following step:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

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

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

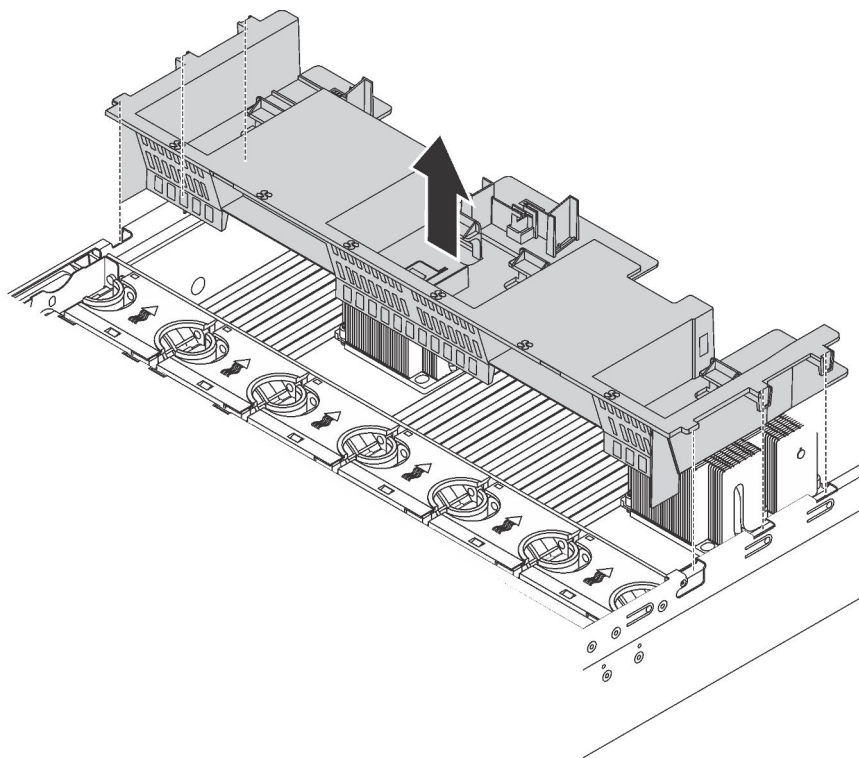


Figure 101. Removal of the standard air baffle

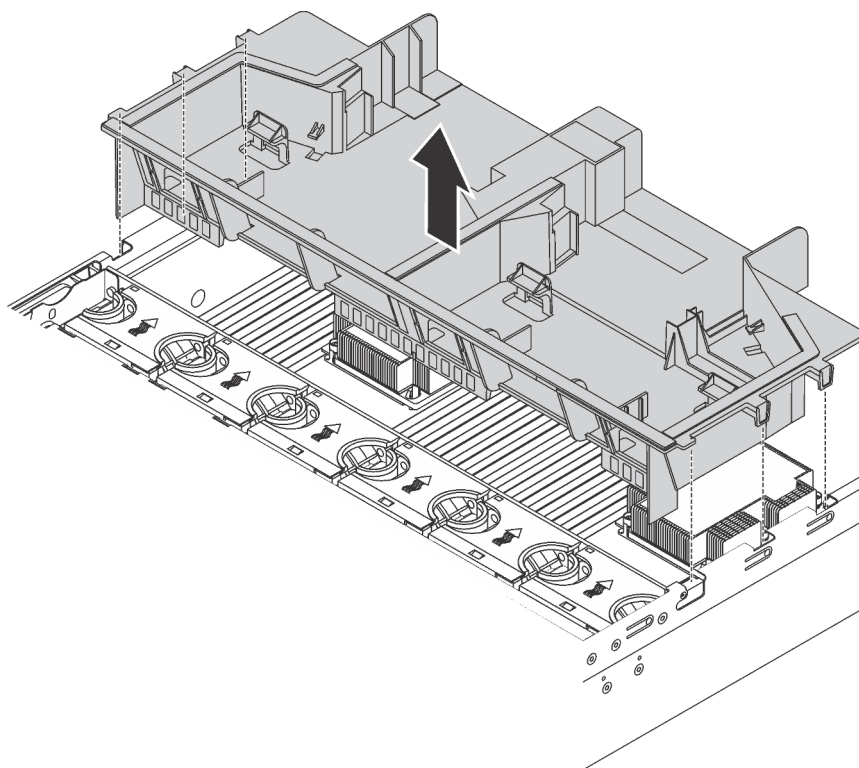
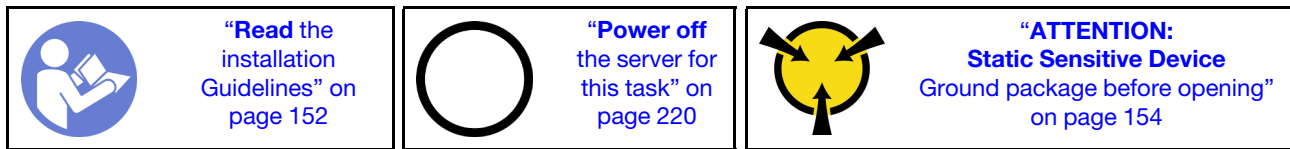


Figure 102. Removal of the large-size air baffle

Remove the system fan cage

The system fan cage might impede your access to some connectors. You must remove the system fan cage before you route cables.



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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

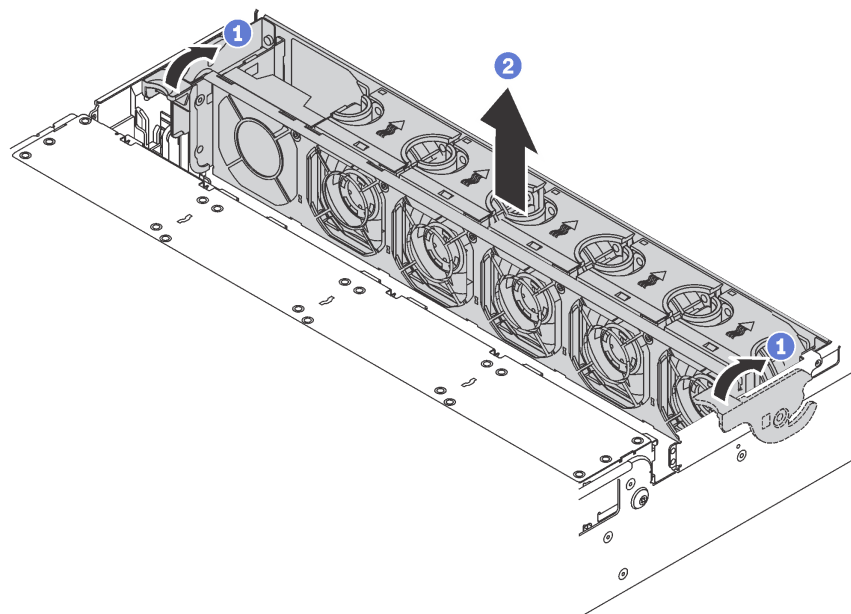


Figure 103. System fan cage removal

Step 1. Rotate the levers of the system fan cage to the rear of the server.

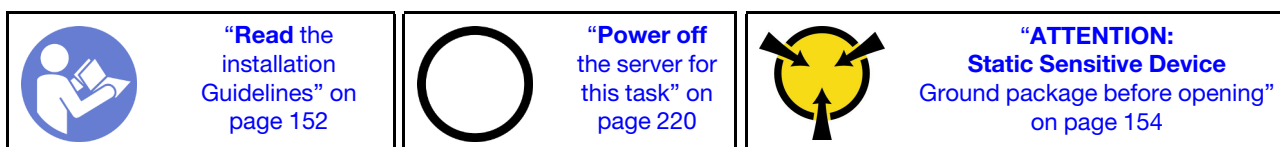
Step 2. Lift the system fan cage straight up and out of the chassis.

After removing the system fan cage, begin installing any options that you have purchased.

Install a processor-heat-sink module

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

Note: If you are installing multiple options relating to the system board, the PHM installation should be performed first.



Attention:

- Intel Xeon SP Gen 2 is supported on the system board with part number 01PE847. If you use the system board with part number 01GV275, 01PE247, or 01PE934, update your system firmware to the latest level before installing a Intel Xeon SP Gen 2. Otherwise, the system cannot be powered on.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://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 224](#).
- Installing an additional PHM can change the memory requirements for your system. See [“Memory module installation rules” on page 166](#) for a list of microprocessor-to-memory relationships.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.
- The PHM for your system might be different than the PHM shown in the illustrations.
- Intel Xeon 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R processor is supported only when the following requirements are met:
 - The server chassis is the twenty-four 2.5-inch-bay chassis.
 - The operating temperature is equal to or less than 30°C.
 - Up to eight drives are installed in the drive bays 8–15.
- Intel Xeon 6144, 6146, 8160T, 6126T, 6244, and 6240Y processor, or processors with TDP equal to 200 watts or 205 watts (excluding 6137, 6242R, 6246R, 6248R, 6250, 6256, or 6258R) are supported only when the following requirements are met:
 - The server chassis is the twenty-four 2.5-inch-bay chassis.
 - Up to eight drives are installed in the drive bays 8–15 if the operating temperature is equal to or less than 35°C, or up to sixteen drives are installed in the drive bays 0–15 if the operating temperature is equal to or less than 30°C.

To install a PHM, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

- Step 1. Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.
- Step 2. Install the processor-heat-sink module on the system board.

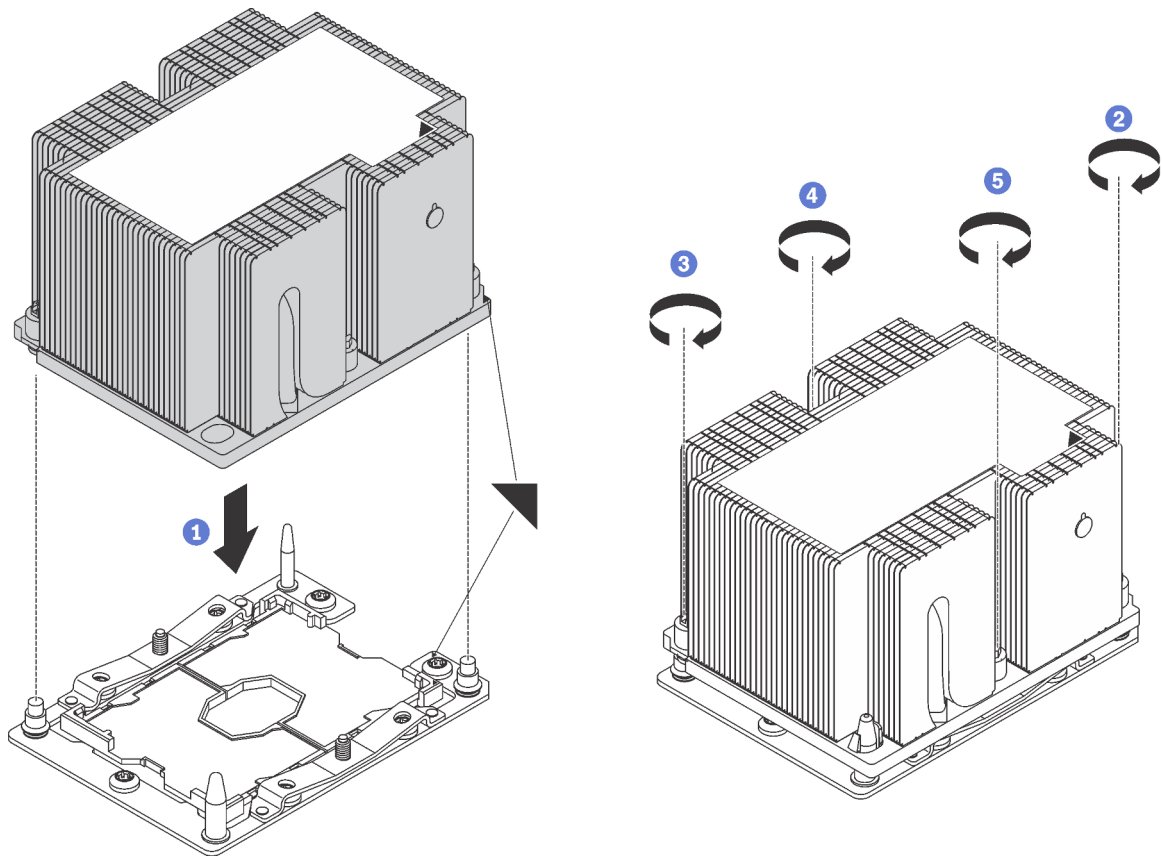


Figure 104. Installing a PHM

- a. Align the triangular marks and guide pins on the processor socket with the PHM; then, insert the PHM into the processor socket.

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

- b. Fully tighten the Torx T30 captive fasteners *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the microprocessor socket. (For reference, the torque required for the nuts to fully tighten is 1.4 — 1.6 newton-meters, 12 — 14 inch-pounds).

After installing the PHM:

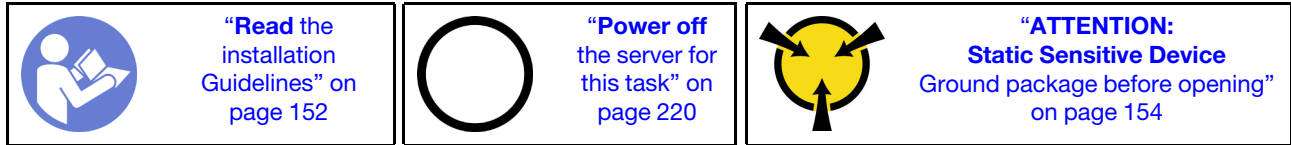
1. If you are installing the second PHM, remove the fan filler and install the new system fan that comes with the processor option kit. See [“Install a system fan” on page 204](#).

Note: The Intel Xeon SP Gen 2 does not come with a system fan. If you are installing a Intel Xeon SP Gen 2, ensure that you have ordered the ThinkSystem SR650 FAN Option Kit and install it.

2. If there are memory modules to install, install them. See [“Install a memory module” on page 163](#).

Install a memory module

Use this information to install a memory module.



Attention:

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

Before installing a memory module:

1. Touch the static-protective package that contains the new memory module to any unpainted surface on the outside of the server. Then, take the new memory module out of the package and place it on a static-protective surface.
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” on page 166](#).

3. If you are going to install a DCPMM for the first time, refer to [“DC Persistent Memory Module \(DCPMM\) setup” on page 164](#).

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

To install a memory module, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

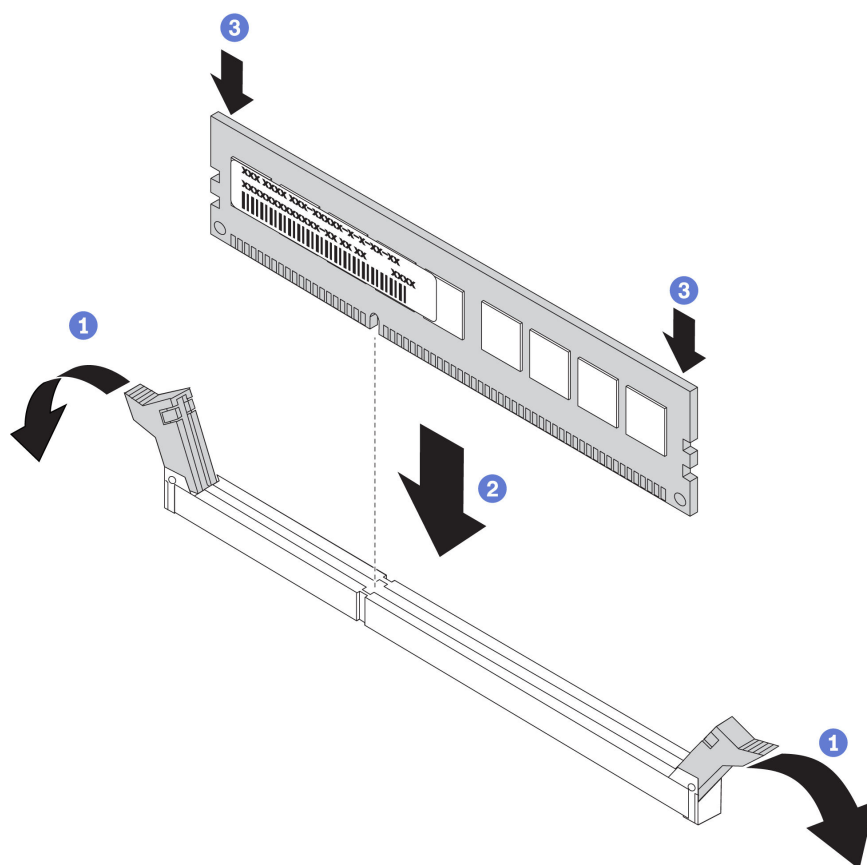


Figure 105. memory module installation

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

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

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

Step 3. Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

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

DC Persistent Memory Module (DCPMM) setup

Follow the instructions in this section to complete required setup before installing DCPMMs for the first time, determine the most suitable configuration, and install memory modules accordingly.

Complete the following steps to finish system setup to support DCPMM, and install the memory modules according to the designated combination.

1. Update the system firmware to the latest version that supports DCPMM (see [“Update the firmware” on page 224](#)).
2. Make sure to meet all the following requirements before installing DCPMMs.
 - All the DCPMMs 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 of the same part number.
3. Refer to [“DCPMM and DRAM DIMM installation order” on page 171](#) to determine the most suitable combination and the following:
 - Number and capacity of the DCPMMs and DRAM DIMMs to install
 - Check if the presently installed processors support the combination. If not, replace the processors with ones that support the combination.
 4. Based on the determined DCPMM combination, acquire the DCPMMs, DRAM DIMMs and processors if necessary.
 5. Replace the processors if necessary (see “Processor and heat sink replacement” in *Maintenance Manual*).
 6. Remove all the memory modules that are installed (see “Remove a memory module” in *Maintenance Manual*).
 7. Follow the slot combination in [“DCPMM and DRAM DIMM installation order” on page 171](#) to install all the DCPMMs and DRAM DIMMs (see [“Install a memory module” on page 163](#)).
 8. Disable security on all the installed DCPMMs (see [“Configure DC Persistent Memory Module \(DCPMM\)” on page 229](#)).
 9. Make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
 10. Configure DCPMMs so that the capacity is available for use. Refer to [“Configure DC Persistent Memory Module \(DCPMM\)” on page 229](#).

Adding memory modules to configuration with DCPMMs

Follow the instructions in this section to add memory modules to the existing configuration with DCPMMs.

Complete the following steps to finish system setup to support DCPMM, and install the memory modules according to the designated combination.

1. Update the system firmware to the latest version that supports DCPMM (see [“Update the firmware” on page 224](#)).
2. Consider the following DCPMM requirements before acquiring new DCPMM units.
 - All the DCPMMs 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 of the same part number.
3. Refer to [“DCPMM and DRAM DIMM installation order” on page 171](#) to determine the new configuration, and acquire memory modules accordingly.
4. If the DCPMMs are in Memory Mode and will stay in Memory Mode after new units are installed, follow the combination in [“Memory Mode” on page 175](#) to install the new modules in the correct slots. Otherwise, go to the next step.
5. Make sure to back up the stored data.
6. If the App Direct capacity is interleaved:
 - a. Delete all the created namespaces and filesystems in the operating system.
 - b. Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

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

7. Follow the slot combination in “[DCPMM and DRAM DIMM installation order](#)” on page 171 to install all the DCPMMs and DRAM DIMMs (see “[Install a memory module](#)” on page 163).
8. Disable security on all the installed DCPMMs (see “[Configure DC Persistent Memory Module \(DCPMM\)](#)” on page 229).
9. Make sure the DCPMM 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).
10. Configure DCPMMs so that the capacity is available for use (refer to “[Configure DC Persistent Memory Module \(DCPMM\)](#)” on page 229).
11. Restore the data that have been backed up.

Memory module installation rules

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

Your server has 24 memory module slots. It supports up to 12 memory modules when one processor is installed, and up to 24 memory modules when two processors are installed. It has the following features:

For Intel Xeon SP Gen 1:

- Supporting memory module type is as follows:
 - TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMM
 - TruDDR4 2666, quad-rank, 64 GB LRDIMM
 - TruDDR4 2666, octa-rank, 128 GB 3DS RDIMM
- The minimum system memory is 8 GB.
- The maximum system memory is as follows:
 - 768 GB using RDIMMs
 - 1.5 TB using LRDIMMs
 - 3 TB using 3DS RDIMMs

For Intel Xeon SP Gen 2:

- Supporting memory module type is as follows:
 - TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMM
 - TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM
 - TruDDR4 2933, single-rank or dual-rank, 16 GB/32 GB/64 GB Performance+ RDIMM
 - TruDDR4 2666, quad-rank, 64 GB 3DS RDIMM
 - TruDDR4 2933, quad-rank, 128 GB 3DS RDIMM
 - TruDDR4 2933, quad-rank, 128 GB Performance+ 3DS RDIMM
 - 128 GB/256 GB/512 GB DCPMM
- The minimum system memory is 8 GB.
- The maximum system memory is as follows:
 - 1.5 TB using RDIMMs
 - 3 TB using 3DS RDIMMs
 - 6 TB using DCPMM and RDIMMs/3DS RDIMMs in Memory Mode

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

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

- [“DRAM DIMM installation rules” on page 167](#)
- [“DCPMM and DRAM DIMM installation order” on page 171](#)

DRAM DIMM installation rules

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

- [“Independent mode” on page 167](#)
- [“Mirroring mode” on page 169](#)
- [“Rank sparing mode” on page 170](#)

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.

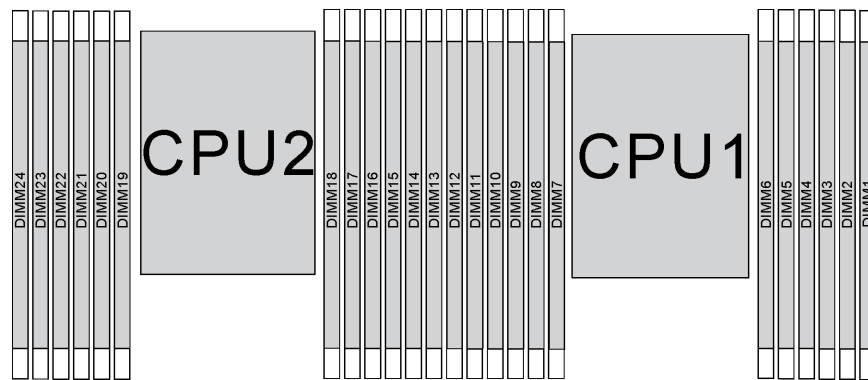


Figure 106. memory module slots on the system board

Independent mode

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

Notes:

- All memory modules to be installed must be the same type.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.
- When you install memory modules with same rank and different capacity, install the memory module that has the highest capacity first.

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

Notes:

- If there are three identical memory modules to be installed for Processor 1, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 8 to slot 1.
- If there are ten identical memory modules to be installed for Processor 1, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 6 to slot 12.

Table 10. Independent mode with one processor

Total DIMMs	Processor 1												Total DIMMs
	12	11	10	9	8	7	6	5	4	3	2	1	
1								5					1
2					8			5					2
3					8			5		3			3
4			10		8			5		3			4
5			10		8			5		3		1	5
6	12		10		8			5		3		1	6
7	12		10		8		6	5	4	3			7
8			10	9	8	7	6	5	4	3			8
9	12		10		8		6	5	4	3	2	1	9
10			10	9	8	7	6	5	4	3	2	1	10
11	12		10	9	8	7	6	5	4	3	2	1	11
12	12	11	10	9	8	7	6	5	4	3	2	1	12

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

Notes:

- If there are three identical memory modules to be installed for Processor 1, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 8 to slot 1.
- If there are three identical memory modules to be installed for Processor 2, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 20 to slot 13.
- If there are ten identical memory modules to be installed for Processor 1, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 2 to slot 12.
- If there are ten identical memory modules to be installed for Processor 2, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 14 to slot 24.

Table 11. Independent mode with two processors

Total DIMMs	Processor 2												Processor 1												Total DIMMs
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
2								17												5					2
3								17								8				5					3
4					20			17								8				5					4
5					20			17								8				5		3			5
6					20			17		15						8				5		3			6
7					20			17		15					10		8			5		3			7
8			22		20			17		15					10		8			5		3			8
9			22		20			17		15					10		8			5		3		1	9
10			22		20			17		15		13			10		8			5		3		1	10

Table 11. Independent mode with two processors (continued)

Total	Processor 2												Processor 1												Total
DIMMs	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
11			22		20			17		15		13	12		10		8			5		3		1	11
12	24		22		20			17		15		13	12		10		8			5		3		1	12
13	24		22		20			17		15		13	12		10		8		6	5	4	3			13
14	24		22		20		18	17	16	15			12		10		8		6	5	4	3			14
15	24		22		20		18	17	16	15					10	9	8	7	6	5	4	3			15
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			16
17			22	21	20	19	18	17	16	15			12		10		8		6	5	4	3	2	1	17
18	24		22		20		18	17	16	15	14	13	12		10		8		6	5	4	3	2	1	18
19	24		22		20		18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	19
20			22	21	20	19	18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	20
21	24		22		20		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	21
22	24		22	21	20	19	18	17	16	15	14	13	12		10	9	8	7	6	5	4	3	2	1	22
23	24		22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	23
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	24

Mirroring mode

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

Notes:

- Partial memory mirroring is a sub-function of memory mirroring, which requires to follow the installation rules of mirroring mode.
- All memory modules to be installed must be the same type with the same capacity, frequency, voltage, and ranks.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.

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

Table 12. Mirroring mode with one processor

Total	Processor 1												Total
DIMMs	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
2								5		3			2
3								5		3		1	3
4			10		8			5		3			4
6	12		10		8			5		3		1	6
8			10	9	8	7	6	5	4	3			8

Table 12. Mirroring mode with one processor (continued)

Total DIMMs	Processor 1												Total DIMMs
	12	11	10	9	8	7	6	5	4	3	2	1	
9	12		10		8		6	5	4	3	2	1	9
12	12	11	10	9	8	7	6	5	4	3	2	1	12

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

Table 13. Mirroring mode with two processors

Total DIMMs	Processor 2												Processor 1												Total DIMMs
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
4								17		15										5		3			4
5								17		15										5		3		1	5
6								17		15		13								5		3		1	6
7								17		15		13			10		8			5		3			7
8			22		20			17		15					10		8			5		3			8
9								17		15		13	12		10		8			5		3		1	9
10			22		20			17		15			12		10		8			5		3		1	10
12	24		22		20			17		15		13	12		10		8			5		3		1	12
13			22		20			17		15			12		10		8		6	5	4	3	2	1	13
14			22	21	20	19	18	17	16	15			12		10		8			5		3		1	14
15	24		22		20			17		15		13	12		10		8		6	5	4	3	2	1	15
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			16
17			22	21	20	19	18	17	16	15			12		10		8		6	5	4	3	2	1	17
18	24		22		20		18	17	16	15	14	13	12		10		8		6	5	4	3	2	1	18
20			22	21	20	19	18	17	16	15			12	11	10	9	8	7	6	5	4	3	2	1	20
21	24		22		20		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	21
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	24

Rank sparing mode

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

Notes:

- All memory modules to be installed must be the same type with the same capacity, frequency, voltage, and ranks.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.
- If the rank of installed memory modules is one rank, follow the installation rules listed in the following tables. If the rank of installed memory modules is more than one rank, follow the installation rules of independent mode.

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

Table 14. Rank sparing mode with one processor

Total	Processor 1												Total
DIMMs	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
2							6	5					2
4					8	7	6	5					4
6					8	7	6	5	4	3			6
8			10	9	8	7	6	5	4	3			8
10			10	9	8	7	6	5	4	3	2	1	10
12	12	11	10	9	8	7	6	5	4	3	2	1	12

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

Table 15. Rank sparing mode with two processors

Total	Processor 2												Processor 1												Total
DIMMs	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
4							18	17										6	5						4
6							18	17								8	7	6	5						6
8					20	19	18	17								8	7	6	5						8
10					20	19	18	17								8	7	6	5	4	3				10
12					20	19	18	17	16	15						8	7	6	5	4	3				12
14					20	19	18	17	16	15					10	9	8	7	6	5	4	3			14
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			16
18			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3	2	1	18
20			22	21	20	19	18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	20
22			22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	22
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	24

DCPMM and DRAM DIMM installation order

For DCPMM, the following memory modes are available:

- [“App Direct Mode” on page 172](#)
- [“Memory Mode” on page 175](#)
- [“Mixed Memory Mode” on page 177](#)

Notes:

- Before installing DCPMMs and DRAM DIMMs, refer to [“DC Persistent Memory Module \(DCPMM\) setup” on page 164](#) and make sure to meet all the requirements.
- To verify if the presently installed processors support DCPMMs, examine the four digits in the processor description. Only the processor with description meeting *both* of the following requirements support DCPMMs.

- The first digit is **5** or a larger number.
- The second digit is **2**.

Example: *Intel Xeon 5215L* and *Intel Xeon Platinum 8280M*

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

- DCPMMs are supported only by Intel Xeon SP Gen 2. For a list of supported processors and memory modules, see <http://www.lenovo.com/us/en/serverproven/>
- When you install two or more DCPMMs, all DCPMMs must have the same Lenovo part number.
- All DRAM memory modules installed must have the same Lenovo part number.
- 16 GB RDIMM has two different types: 16 GB 1Rx4 and 16 GB 2Rx8. The part number of the two types are different.
- Supported memory capacity range varies with the following types of DCPMMs.
 - **Large memory tier (L):** The processors with **L** after the four digits (for example: *Intel Xeon 5215 L*)
 - **Medium memory tier (M):** The processors with **M** after the four digits (for example: *Intel Xeon Platinum 8280 M*)
 - **Other:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 5222*)

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

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

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

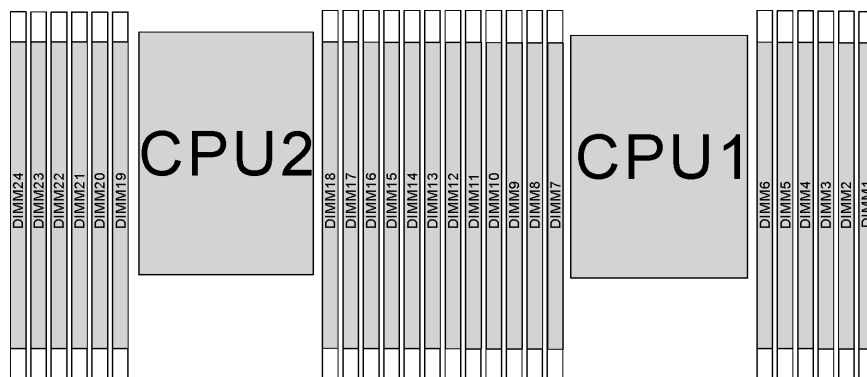


Figure 107. memory module slots on the system board

App Direct Mode

In this mode, DCPMMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory.

Note: Before installing DCPMM, refer to “[Memory configuration](#)” on page 228 and “[Configure DC Persistent Memory Module \(DCPMM\)](#)” on page 229 for the requirements.

App Direct Mode with one processor

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DIMMs that are already installed to new locations.

Table 16. App Direct Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM												
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.												
Configuration	Processor 1											
	12	11	10	9	8	7	6	5	4	3	2	1
1 DCPMM and 6 DIMMs	D		D		D	P		D		D		D
2 DCPMMs and 4 DIMMs	P		D		D			D		D		P
2 DCPMMs and 6 DIMMs	D		D		D	P	P	D		D		D
2 DCPMMs and 8 DIMMs	P		D	D	D	D	D	D	D	D		P
4 DCPMMs and 6 DIMMs	D		D	P	D	P	P	D	P	D		D
6 DCPMMs and 6 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D

Table 17. Supported DCPMM capacity in App Direct Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	6	L	√	√	√
		M	√	√	√
		Other	√	√	√ ²
2	4	L	√	√	√
		M	√	√	√
		Other	√	√	
2	6	L	√	√	√
		M	√	√	√
		Other	√	√ ²	
2	8	L	√	√	√
		M	√	√	√
		Other	√ ²	√ ²	
4	6	L	√	√	√
		M	√	√	
		Other	√ ²		
6	6	L	√	√	√
		M	√	√ ²	
		Other	√ ¹		

Notes:

1. Supported DIMM capacity is up to 32 GB.
2. Supported DIMM capacity is up to 64 GB.

App Direct Mode with two processors

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DCPMMs and DIMMs that are already installed to new locations.

Table 18. App Direct Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM																								
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																								
Configuration	Processor 2												Processor 1											
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1 DCPMM and 12 DIMMs	D		D		D			D		D		D	D		D		D		P	D		D		D
2 DCPMMs and 12 DIMMs	D		D		D		P	D		D		D	D		D		D		P	D		D		D
4 DCPMMs and 8 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
4 DCPMMs and 12 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
4 DCPMMs and 16 DIMMs	P		D	D	D	D	D	D	D	D		P	P		D	D	D	D	D	D	D	D		P
8 DCPMMs and 12 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
12 DCPMMs and 12 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 19. Supported DCPMM capacity in App Direct Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	12	L	√	√	√
		M	√	√	√
		Other	√	√	√ ²
2	12	L	√	√	√
		M	√	√	√
		Other	√	√	√ ²
4	8	L	√	√	√
		M	√	√	√
		Other	√	√	
4	12	L	√	√	√
		M	√	√	√

Table 19. Supported DCPMM capacity in App Direct Mode with two processors (continued)

		Other	√	√ ²	
4	16	L	√	√	√
		M	√	√	√
		Other	√ ²	√ ²	
8	12	L	√	√	√
		M	√	√	
		Other	√ ²		
12	12	L	√	√	√
		M	√	√ ²	
		Other	√ ¹		

Notes:

1. Supported DIMM capacity is up to 32 GB.
2. Supported DIMM capacity is up to 64 GB.

Memory Mode

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache. Ensure that the ratio of DRAM DIMM capacity to DCPMM capacity is between 1:2 and 1:16.

Note: Before installing DCPMM, refer to [“Memory configuration” on page 228](#) and [“Configure DC Persistent Memory Module \(DCPMM\)” on page 229](#) for the requirements.

Memory Mode with one processor

Table 20. Memory Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM												
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.												
Configuration	Processor 1											
	12	11	10	9	8	7	6	5	4	3	2	1
2 DCPMMs and 4 DIMMs	P		D		D			D		D		P
2 DCPMMs and 6 DIMMs	D		D		D	P	P	D		D		D
4 DCPMMs and 6 DIMMs	D		D	P	D	P	P	D	P	D		D
6 DCPMMs and 6 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D

Table 21. Supported DCPMM capacity in Memory Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
2	4	L	√ ¹	√ ²	√ ³

Table 21. Supported DCPMM capacity in Memory Mode with one processor (continued)

		M	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{3}$
		Other	$\sqrt{1}$	$\sqrt{2}$	
2	6	L		$\sqrt{1}$	$\sqrt{2}$
		M		$\sqrt{1}$	$\sqrt{2}$
		Other		$\sqrt{1}$	
4	6	L	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{4}$
		M	$\sqrt{1}$	$\sqrt{2}$	
		Other	$\sqrt{1}$		
6	6	L	$\sqrt{2}$	$\sqrt{3}$	$\sqrt{5}$
		M	$\sqrt{2}$	$\sqrt{3}$	
		Other	$\sqrt{2}$		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 GB to 64 GB.
4. Supported DIMM capacity is 32 GB to 64 GB.
5. Supported DIMM capacity is 32 GB to 128 GB.

Memory Mode with two processors

Table 22. Memory Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM																								
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																								
Configuration	Processor 2												Processor 1											
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4 DCPMMs and 8 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
4 DCPMMs and 12 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
8 DCPMMs and 12 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
12 DCPMMs and 12 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 23. Supported DCPMM capacity in Memory Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	8	L	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{3}$
		M	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{3}$

Table 23. Supported DCPMM capacity in Memory Mode with two processors (continued)

		Other	$\sqrt{1}$	$\sqrt{2}$	
4	12	L		$\sqrt{1}$	$\sqrt{2}$
		M		$\sqrt{1}$	$\sqrt{2}$
		Other		$\sqrt{1}$	
8	12	L	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{4}$
		M	$\sqrt{1}$	$\sqrt{2}$	
		Other	$\sqrt{1}$		
12	12	L	$\sqrt{2}$	$\sqrt{3}$	$\sqrt{5}$
		M	$\sqrt{2}$	$\sqrt{3}$	
		Other	$\sqrt{2}$		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 GB to 64 GB.
4. Supported DIMM capacity is 32 GB to 64 GB.
5. Supported DIMM capacity is 32 GB to 128 GB.

Mixed Memory Mode

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

Note: Before installing DCPMM, refer to [“Memory configuration” on page 228](#) and [“Configure DC Persistent Memory Module \(DCPMM\)” on page 229](#) to define the percentage of DCPMM capacity.

Mixed Memory Mode with one processor

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DIMMs that are already installed to new locations.

Table 24. Mixed Memory Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM												
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.												
Configuration	Processor 1											
	12	11	10	9	8	7	6	5	4	3	2	1
2 DCPMMs and 4 DIMMs	P		D		D			D		D		P
2 DCPMMs and 6 DIMMs	D		D		D	P	P	D		D		D

Table 24. Mixed Memory Mode with one processor (continued)

4 DCPMMs and 6 DIMMs	D		D	P	D	P	P	D	P	D		D
6 DCPMMs and 6 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D

Table 25. Supported DCPMM capacity in Mixed Memory Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
2	4	L		√ ¹	√ ²
		M		√ ¹	√ ²
		Other		√ ¹	
2	6	L		√ ¹	√ ²
		M		√ ¹	√ ²
		Other		√ ¹	
4	6	L	√ ¹	√ ²	√ ³
		M	√ ¹	√ ²	
		Other	√ ¹		
6	6	L	√ ¹	√ ²	√ ³
		M	√ ¹	√ ²	
		Other	√ ¹		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 to 64 GB.

Mixed Memory Mode with two processors

Table 26. Mixed Memory Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM																								
P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																								
Configuration	Processor 2												Processor 1											
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4 DCPMMs and 8 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
4 DCPMMs and 12 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
8 DCPMMs and 12 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
12 DCPMMs and 12 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 27. Supported DCPMM capacity in Mixed Memory Mode with two processors




Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	8	L		√ ¹	√ ²
		M		√ ¹	√ ²
		Other		√ ¹	
4	12	L		√ ¹	√ ²
		M		√ ¹	√ ²
		Other		√ ¹	
8	12	L	√ ¹	√ ²	√ ³
		M	√ ¹	√ ²	
		Other	√ ¹		
12	12	L	√ ¹	√ ²	√ ³
		M	√ ¹	√ ²	
		Other	√ ¹		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 to 64 GB.

Install the 2.5-inch-drive backplane

Use this information to install the 2.5-inch-drive backplane. This topic applies only to server models that support 2.5-inch-drive backplanes.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Note:

Your server supports three types of 2.5-inch-drive backplanes: SATA/SAS 8-bay backplane (eight SATA/SAS drive bays), AnyBay 8-bay backplane (four SATA/SAS drive bays and four NVMe drive bays), and NVMe 8-bay backplane. Depending on the backplane type and quantity, the installation location of the backplanes varies.

- One backplane

Always install either the SATA/SAS 8-bay backplane or the AnyBay 8-bay backplane to drive bays 0–7.

- Two backplanes

- Two SATA/SAS 8-bay backplanes, two AnyBay 8-bay backplanes, or two NVMe 8-bay backplanes: install the two backplanes to drive bays 0–7 and drive bays 8–15
- One SATA/SAS 8-bay backplane and one AnyBay 8-bay backplane: install the AnyBay 8-bay backplane to drive bays 0–7; install the SATA/SAS 8-bay backplane to drive bays 8–15

- Three backplanes
 - Three SATA/SAS 8-bay backplanes, three AnyBay 8-bay backplanes, or three NVMe 8-bay backplanes: install the three backplanes to drive bays 0–7, drive bays 8–15, and drive bays 16–23
 - Two SATA/SAS 8-bay backplanes and one AnyBay 8-bay backplane: install the AnyBay 8-bay backplane to drive bays 0–7; install the two SATA/SAS 8-bay backplanes to drive bays 8–15 and drive bays 16–23
 - Two AnyBay 8-bay backplanes and one SATA/SAS 8-bay backplane: install the two AnyBay 8-bay backplanes to drive bays 0–7 and drive bays 8–15; install the SATA/SAS 8-bay backplanes to drive bays 16–23
 - Two NVMe 8-bay backplanes and one SATA/SAS 8-bay backplane: install the two NVMe 8-bay backplanes to drive bays 0–7 and drive bays 8–15; install the SATA/SAS 8-bay backplanes to drive bays 16–23

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

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

Note: Depending on the specific type, the connectors on your backplane might look different from the illustration in this topic.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

Step 1. Determine the location of the backplanes to be installed.

Step 2. Connect the cables to the backplane.

Step 3. Insert the bottom of the backplane into the slots on the bottom of the chassis. Then, rotate the backplane to vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

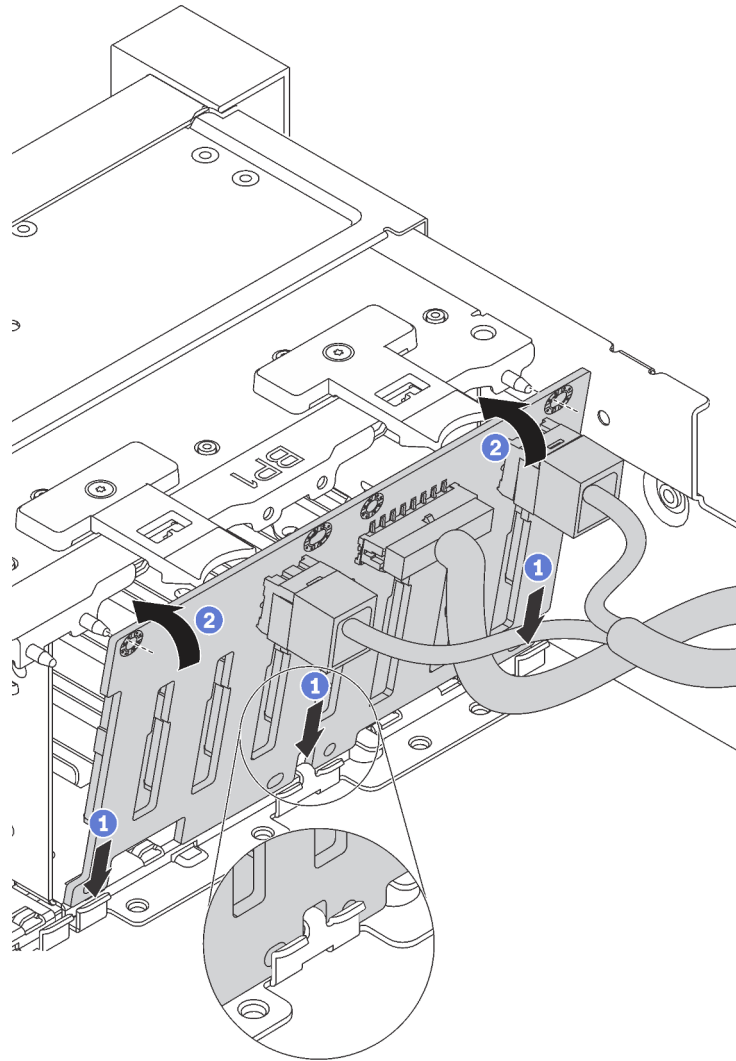


Figure 108. 2.5-inch-drive backplane installation

Step 4. Apply drive bay labels based on the type of the installed backplanes. Several drive bay labels come with each type of the supported drive backplane:

- **4–7**

Apply this label to drive bays 4–7 if a SATA/SAS 8-bay backplane is installed to drive bays 0–7.

- **12–15**

Apply this label to drive bays 12–15 if a SATA/SAS 8-bay backplane is installed to drive bays 8–15.

- **4–7 (NVMe)**

Apply this label to drive bays 4–7 if an AnyBay 8-bay backplane is installed to drive bays 0–7.

- **12–15 (NVMe)**

Apply this label to drive bays 12–15 if an AnyBay 8-bay backplane is installed to drive bays 8–15.

- **0-15 (NVMe)**

Apply this label to drive bays 0–15 if two NVMe 8-bay backplanes are installed to drive bays 0–15.

- **16-19 (NVMe)**

Apply this label to drive bays 16–19 if a NVMe 8-bay backplane is installed to drive bays 16–19.

- **16-23 (NVMe)**

Apply this label to drive bays 16–23 if a NVMe 8-bay backplane is installed to drive bays 16–23.

The following illustration shows the location for applying the drive bay labels to the server models with AnyBay 8-bay backplanes installed. The location is the same for applying the drive bay labels to server models with SATA/SAS 8-bay backplanes installed. Ensure that the drive bay labels are stuck in the correct location. The labels help you to locate the correct drive during problem determination.

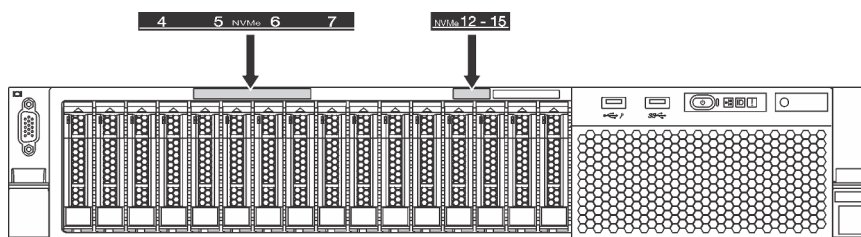

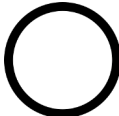



Figure 109. Drive bay labels for server models with AnyBay 8-bay backplanes installed

After installing the 2.5-inch-drive backplane, connect the cables to the system board. For information about the cable routing, see [“Internal cable routing” on page 35](#).

Install the 3.5-inch-drive backplane

Use this information to install the 3.5-inch-drive backplane. This topic applies only to server models that support 3.5-inch-drive backplanes.

	“Read the installation Guidelines” on page 152		“Power off the server for this task” on page 220		“ATTENTION: Static Sensitive Device Ground package before opening” on page 154
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Notes:

- The procedure is based on the scenario that you want to install the backplane for up to twelve 3.5-inch drives. The procedure is similar for the backplane for up to eight 3.5-inch drives.
- If you are installing the 3.5-inch-drive backplane with expander and the 8i HBA/RAID adapter for the server models with twelve 3.5-inch-drive bays, GPU is not supported, the maximum supported processor TDP is 165 watts, and you need to create the RAID volume to avoid the disorder of the HDD sequence. Besides, if the rear hot-swap drive is installed, the server performance might be degraded.

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

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

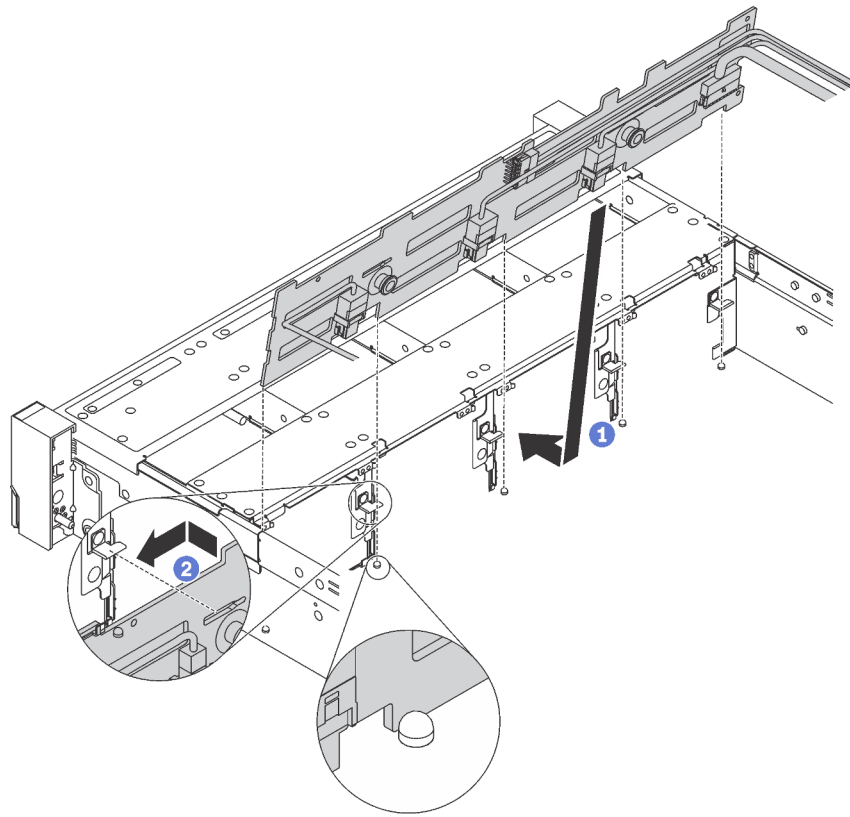


Figure 110. 3.5-inch-drive backplane installation

- Step 1. Connect the cables to the backplane.
- Step 2. Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.
- Step 3. Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.
- Step 4. Apply the drive bay label based on the type of the installed backplanes. The drive bay label comes with each type of the supported drive backplane:
 - **0–7**
Apply this label to the chassis if an 8-bay backplane is installed.
 - **0–11**
Apply this label to the chassis if a 12-bay backplane is installed.
 - **0–11 (NVMe)**
Apply this label to the chassis if an AnyBay 12-bay backplane is installed.

Note: NVMe drives are supported in drive bays 8–11.

The following illustration shows the location for applying the drive bay label to the server models with a 12-bay backplane installed. The location is the same for applying the drive bay label to server models with an 8-bay backplane or an AnyBay 12-bay backplane installed. Ensure that the drive bay label is stuck in the correct location. The label helps you to locate the correct drive during problem determination.

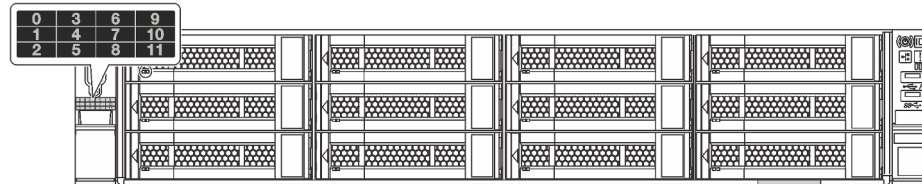


Figure 111. Drive bay label for server models with a 12-bay backplane installed

After installing the 3.5-inch-drive backplane, connect the cables to the system board. For information about the cable routing, see [“Internal cable routing” on page 35](#).

Install the rear hot-swap drive assembly

Use this information to install the rear hot-swap drive assembly. This topic applies only to server models that support the rear hot-swap drive assembly.

	<p>“Read the installation Guidelines” on page 152</p>		<p>“Power off the server for this task” on page 220</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Before installing the rear hot-swap drive assembly, touch the static-protective package that contains the new rear hot-swap drive assembly to any unpainted surface on the outside of the server. Then, take the new rear hot-swap drive assembly out of the package and place it on a static-protective surface.

Note: If you are installing the ThinkSystem SR650 Rear 3.5 HDD kit Without Fan (provided for Chinese Mainland only), the maximum supported processor TDP is 125 watts.

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

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

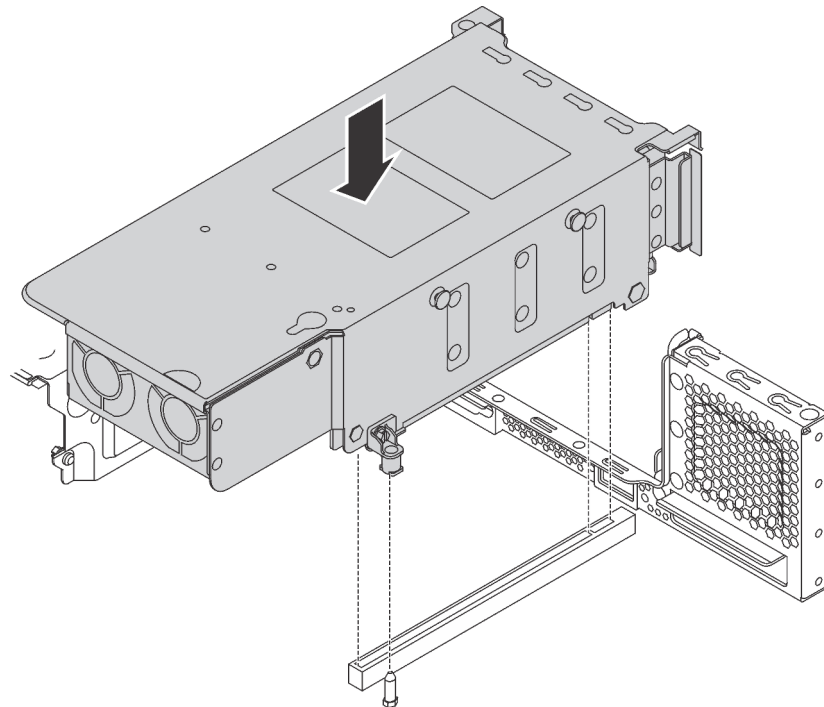





Figure 112. Rear hot-swap drive assembly installation

Step 2. Connect the signal cable to the rear hot-swap drive assembly and the RAID adapter. See [“Internal cable routing” on page 35](#).

After installing the rear hot-swap drive assembly, you can install hot-swap drives to the assembly. See [“Install a hot-swap drive” on page 216](#).

Install the RAID adapter

Use this information to install the RAID adapter in the RAID adapter slot on the system board.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Ensure that you follow the installation order if you install more than one RAID adapter:

- The RAID adapter slot on the system board
- The PCIe slot 4 on the system board if the serial port module is not installed
- A PCIe slot on the riser card

Notes:

- The following procedure is based on the scenario that the RAID adapter will be installed in the RAID adapter slot on the system board. For the procedure about installing the RAID adapter in PCIe slot 4 or a PCIe slot on the riser assembly, see [“Install a PCIe adapter” on page 194](#)
- Depending on the specific server model, a NVMe switch adapter might be installed in the RAID adapter slot. The NVMe switch adapter might be different from the RAID adapter illustration in this topic, but the installation and removal procedures are the same.

Before installing the RAID adapter:

1. Touch the static-protective package that contains the new RAID adapter to any unpainted surface on the outside of the server. Then, take the new RAID adapter out of the package and place it on a static-protective surface.
2. If the RAID adapter is installed with a bracket, remove the bracket.

To install the RAID adapter in the RAID adapter slot on the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

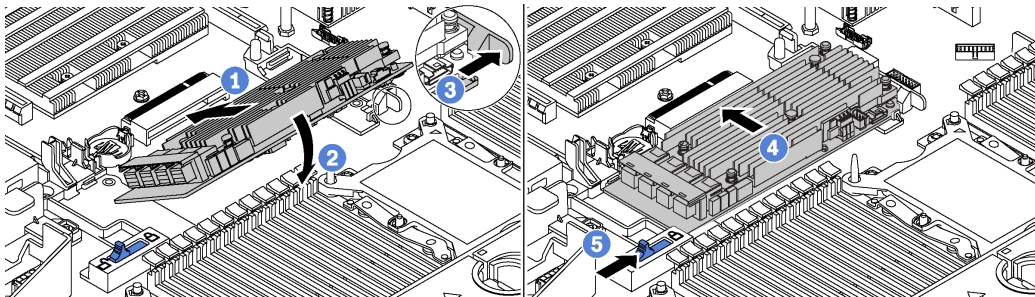





Figure 113. RAID adapter installation

- Step 1. Place the RAID adapter into the slot at an angle.
- Step 2. Rotate the RAID adapter down.
- Step 3. Push the right-side latch open.
- Step 4. Push the RAID adapter to the fully horizontal position and insert it into the RAID adapter slot.
- Step 5. Slide the left-side latch to the locked position.

After installing the RAID adapter, connect cables to the RAID adapter. See [“Internal cable routing” on page 35](#).

Install the M.2 backplane and M.2 drive

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

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Before installing the M.2 backplane and M.2 drive:

1. Touch the static-protective package that contains the new M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the new M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.
2. Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See [“Adjust the retainer on the M.2 backplane ” on page 190](#).
3. Locate the connector on each side of the M.2 backplane.

Notes:

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

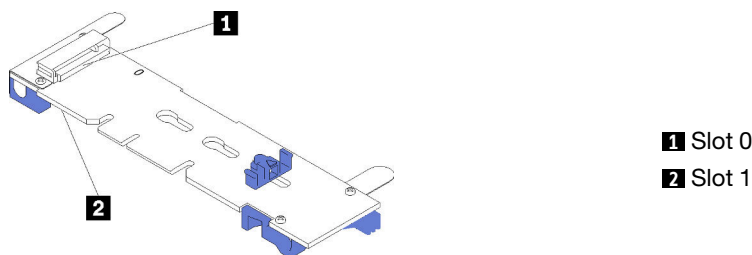


Figure 114. M.2 drive slot

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

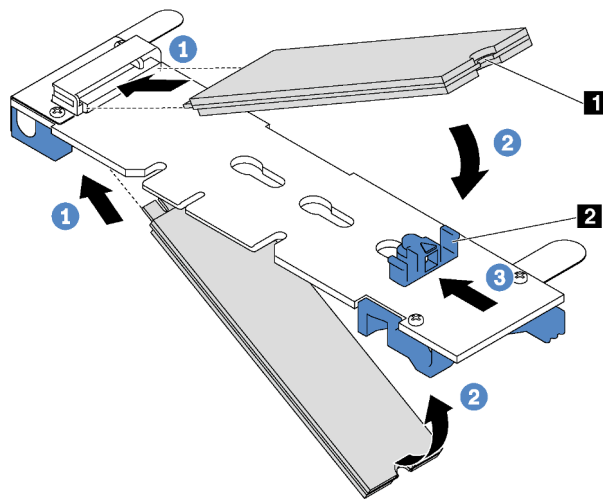


Figure 115. M.2 drive installation

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

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

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

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

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

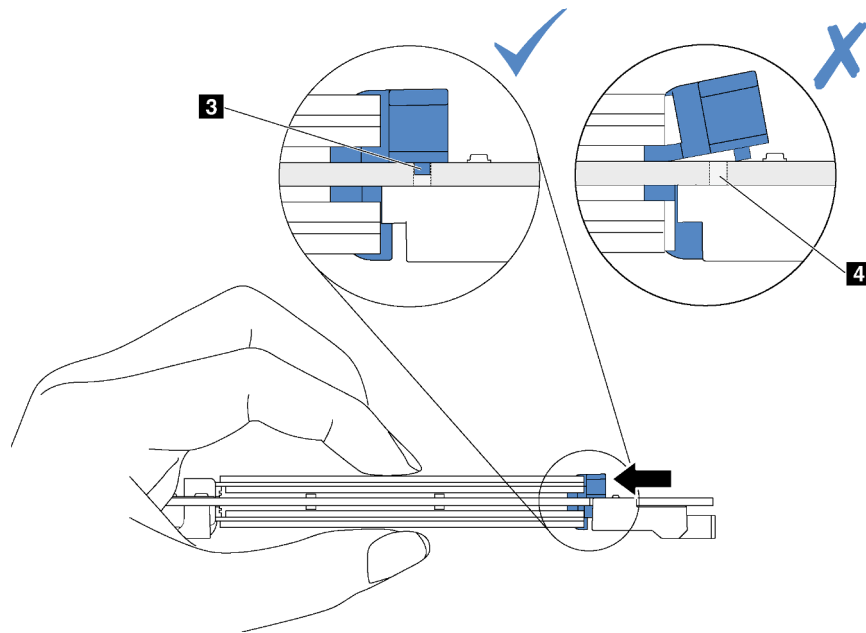


Figure 116. Instruction for sliding the retainer

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

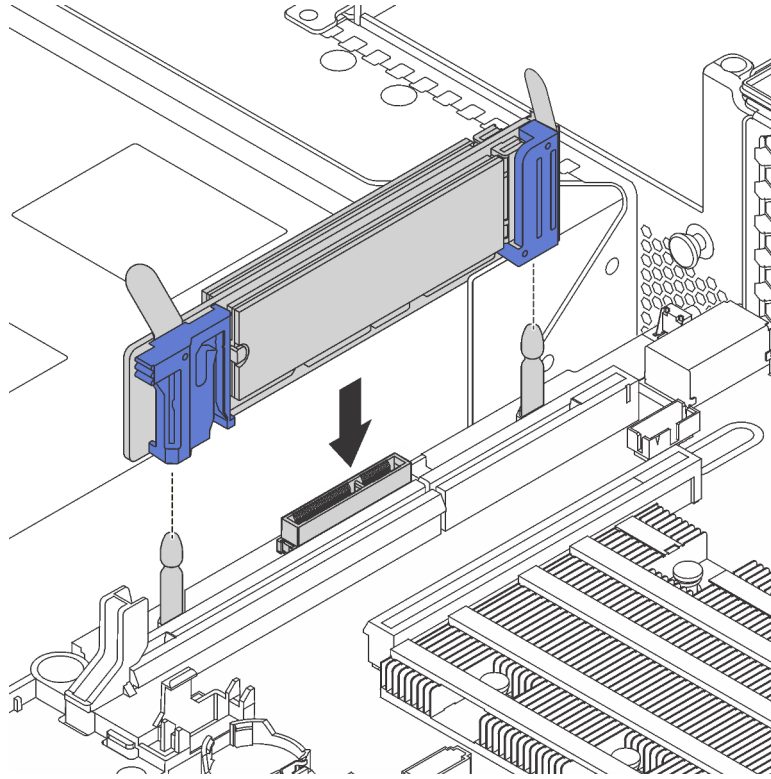


Figure 117. M.2 backplane installation

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

1. If you are installing the 480 GB M.2 drives and there is no PCIe adapter installed on PCIe slot 6, install the M.2 drive air baffle for proper airflow.

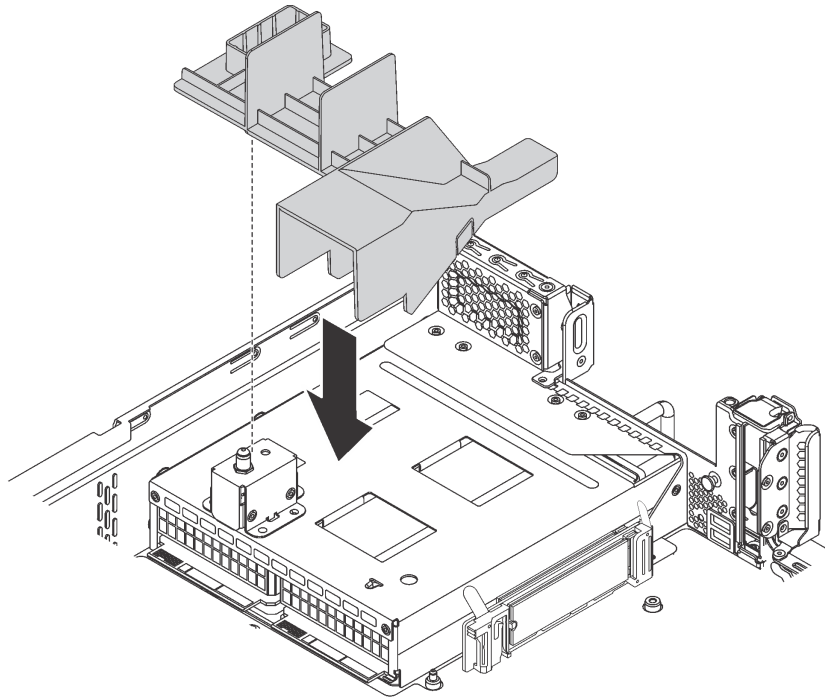

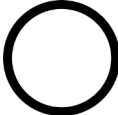



Figure 118. M.2 drive air baffle installation

2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

Adjust the retainer on the M.2 backplane

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

	“Read the installation Guidelines” on page 152		“Power off the server for this task” on page 220		“ATTENTION: Static Sensitive Device Ground package before opening” on page 154
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Before adjusting the retainer on the M.2 backplane, locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.

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

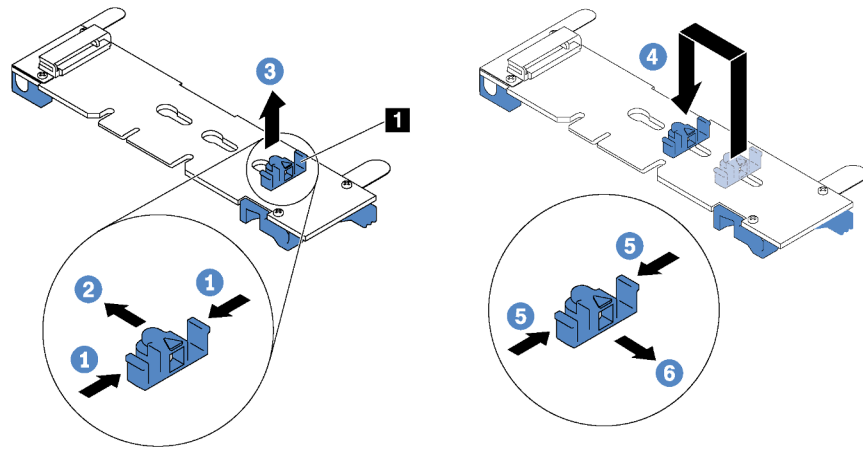





Figure 119. M.2 retainer adjustment

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

Install a GPU with the GPU thermal kit

Use this information to install a full-height GPU or the NVIDIA P4 GPU with the GPU thermal kit.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Notes:

- To install a full-height GPU or the NVIDIA P4 GPU, you need to use the GPU thermal kit. The GPU thermal kit contains the following items:
 - The large-size air baffle
 - Two 1U heat sinks
 - Three GPU holders
- To install the other supported low-profile GPUs, refer to [“Install a PCIe adapter on the riser assembly” on page 195](#).
- For information about the form factor of GPUs, refer to GPU specifications. See [“Specifications” on page 5](#).
- Depending on the specific type, your GPU might look different from the illustrations in this topic.

Before installing the GPU thermal kit and a GPU, touch the static-protective package that contains the GPU thermal kit and the GPU to any unpainted surface on the outside of the server. Then, take the components out of the packages and place them on a static-protective surface.

To install a GPU with the GPU thermal kit, complete the following steps:

- Step 1. If your server is installed with 2U heat sinks, replace the 2U heat sinks with the 1U heat sinks that came with the GPU thermal kit. For detailed instructions on how to replace the heat sink, see http://thinksystem.lenovofiles.com/help/topic/7X05/microprocessor_replacement.html.
- Step 2. Install the large-size air baffle that came with the GPU thermal kit. For more information about the air baffle, refer to “Important information for the air baffle” on page 5.

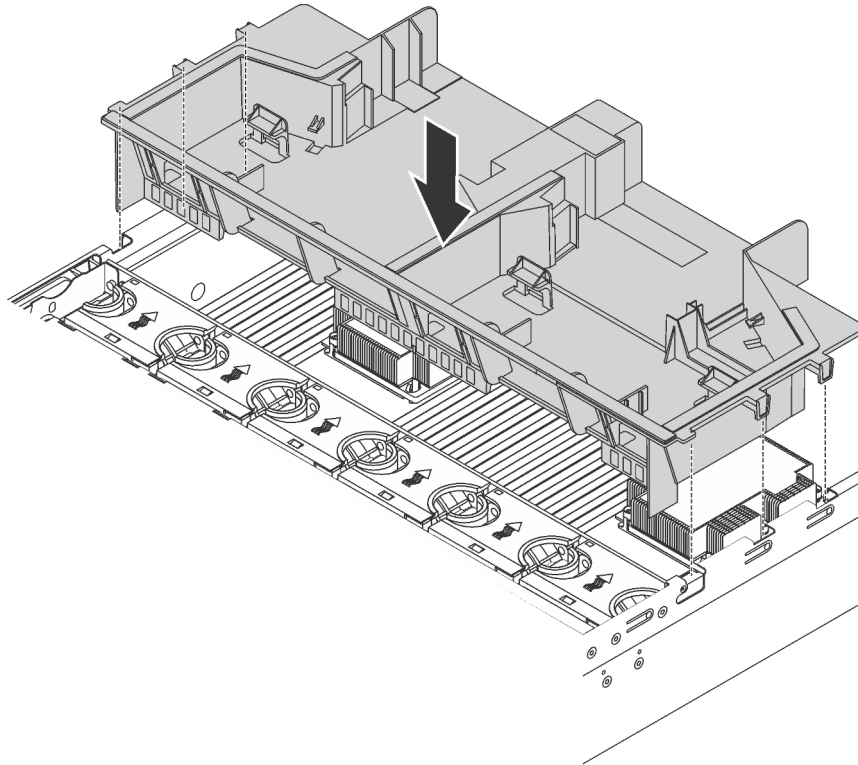


Figure 120. Installation of the large-size air baffle

- Step 3. Depending on the GPU type, do one of the following:
- For full-height full-length GPUs, if the GPU does not have a bracket installed on it, install the screws to secure the GPU bracket **1** to the GPU. Then, install the GPU holder **2** to the GPU.

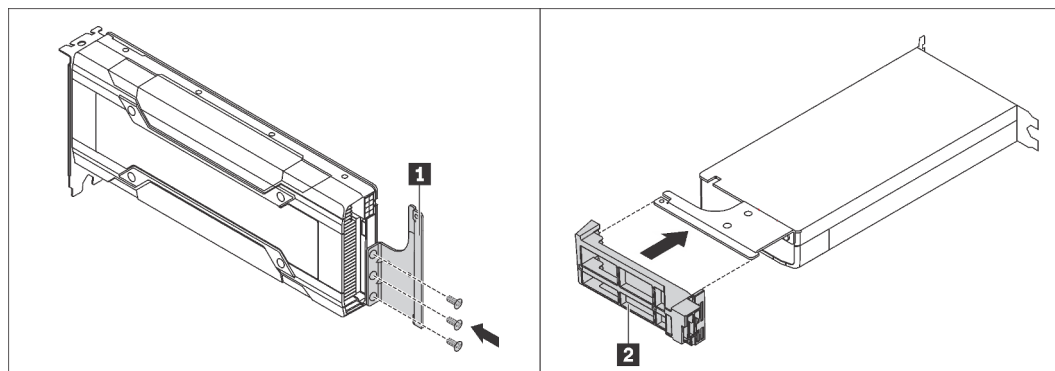


Figure 121. GPU bracket and holder installation

- For NVIDIA P4 GPU, install the P4 GPU air baffle (also called the P4 GPU air duct).

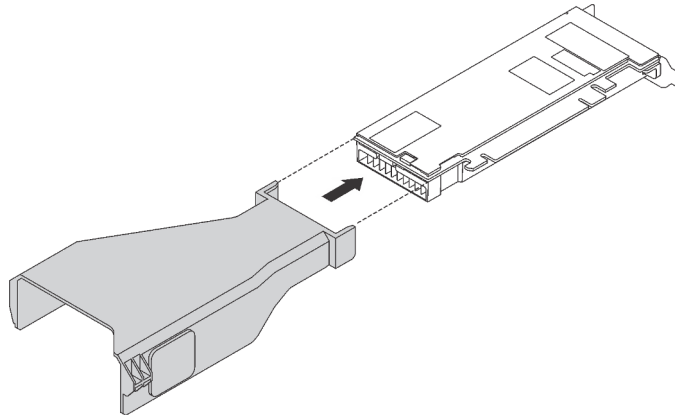


Figure 122. P4 GPU air baffle installation

- For NVIDIA A10 GPU, if you are installing one NVIDIA A10 on the one riser assembly, install a A10 GPU air baffle on the large-size air baffle first.

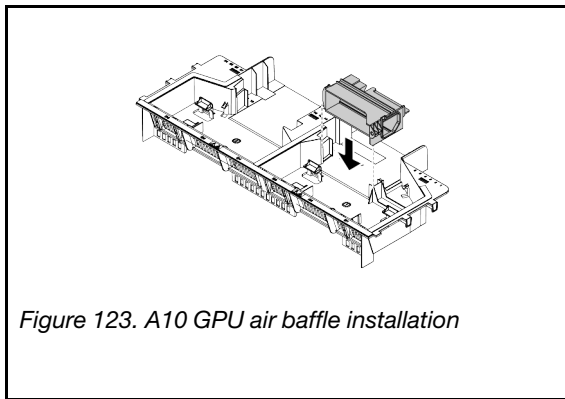


Figure 123. A10 GPU air baffle installation

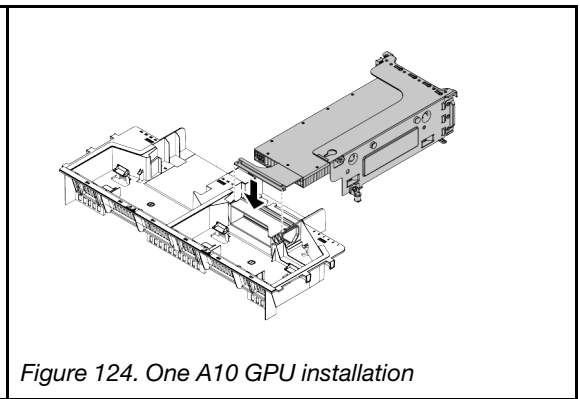


Figure 124. One A10 GPU installation

- If you are installing two NVIDIA A10 GPUs on one riser assembly, install the FHFL GPU holder on the riser assembly first.

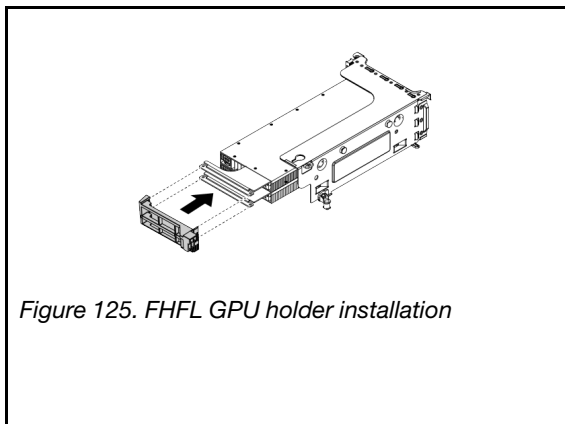


Figure 125. FHFL GPU holder installation

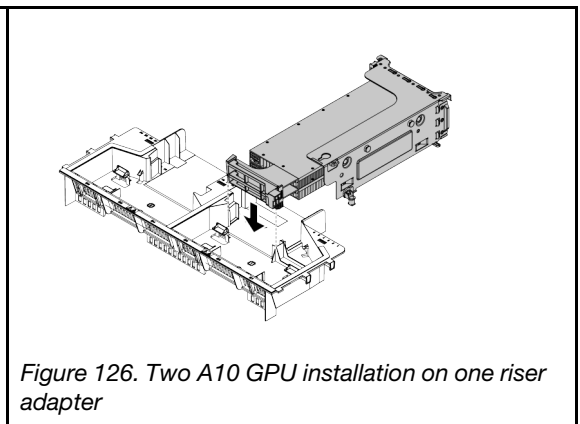


Figure 126. Two A10 GPU installation on one riser adapter

Step 4. Locate the appropriate PCIe slot for the GPU.

Note: For server models with one processor, you can install one GPU in PCIe slot 1. For server models with two processors, you can install up to two GPUs in PCIe slot 1 and PCIe slot 5, or up to three GPUs in PCIe slots 1, 5 and 6. For more information, see [“Specifications” on page 5](#).

- Step 5. Align the GPU with the PCIe slot on the riser card. Then, carefully press the GPU straight into the slot until it is securely seated. See [“Install a PCIe adapter on the riser assembly” on page 195](#).
- Step 6. If a GPU power cable is required, do the following:
- Connect one end of the power cable to the GPU power connector on the system board.
 - Connect the other end of the power cable to the GPU.
 - Route the GPU power cable properly. See [“GPU cabling routing” on page 35](#).
- Step 7. Install the riser assembly with the GPU into the chassis.
- Step 8. If you are installing a NVIDIA FHHL V100 GPU, do the following:
- One V100 GPU air baffle supports up to two FHHL V100 GPUs installed. If you are installing two FHHL V100 GPUs, remove the middle plate from the V100 GPU air baffle. If you are installing one FHHL V100 GPU, go to the next step.

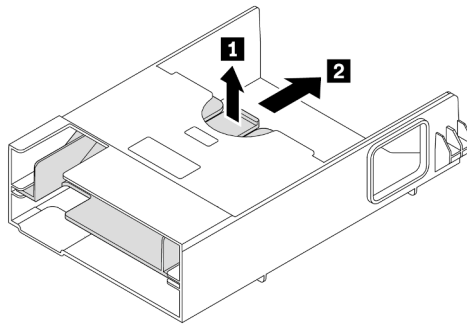


Figure 127. Middle plate removal

- Install the V100 GPU air baffle.

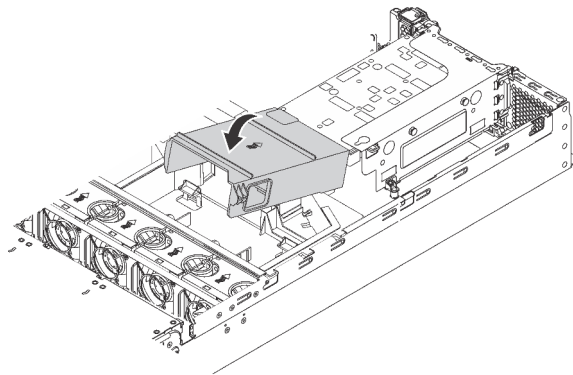


Figure 128. V100 GPU air baffle installation

After installing a GPU with the GPU thermal kit, continue to install other PCIe adapter if necessary. See [“Install a PCIe adapter on the riser assembly” on page 195](#).

Install a PCIe adapter




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

This topic contains the following information:

- [“Install a PCIe adapter on the riser assembly” on page 195](#)
- [“Install a PCIe adapter on the system board” on page 200](#)

Install a PCIe adapter on the riser assembly

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

 “Read the installation Guidelines” on page 152	 “Power off the server for this task” on page 220	 “ATTENTION: Static Sensitive Device Ground package before opening” on page 154
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Observe the following PCIe slot selection priority when installing a PCIe adapter:

- For NVMe switch adapter:

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

- For server models with sixteen/twenty/twenty-four NVMe drives (with two processors installed):

Server models	PCIe slot selection
Sixteen NVMe drives	1, 4, 6, 7
Twenty NVMe drives	1, 4, 5, 6, 7
Twenty-four NVMe drives	1, 2, 4, 6, 7

- For 24i RAID adapter:

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

- For 8i or 16i HBA/RAID adapter:

Number of installed processors	PCIe slot selection priority
One processor	7, 4, 2, 3, 1
Two processors	7, 4, 2, 3, 1, 5, 6

- For 440-8e or 440-16e HBA/RAID adapter:

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

- For an Ethernet card or a converged network adapter:

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

Notes:

- Depending on the specific type, your PCIe adapter and riser card for the riser assembly might look different from the illustration in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.
- Do not install PCIe adapters with small form factor (SFF) connectors in PCIe slot 6.
- ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter is supported only when the following requirement are met:
 - For server models installed with one CPU, only one adapter is supported and must be installed in PCIe slot 1.
 - For server models installed with two CPUs, up to two adapters are supported and must be installed in PCIe slot 1 and slot 5.
 - The maximum supported processor TDP is 165 watts and the ThinkSystem SR630/530/650(GPU) CPU Performance Heatsink must be installed.
 - The maximum operating temperature is 35°C.
 - No fan fails.
 - The P4 GPU air baffle and the large-size air baffle must be installed.
 - No VMware and Windows preload.
- ThinkSystem Mellanox ConnectX-6 HDR100 QSFP56 1-port PCIe InfiniBand adapter or ThinkSystem Mellanox ConnectX-6 HDR100 QSFP56 2-port PCIe InfiniBand adapter is supported only when the following requirements are met:
 - The server chassis is the eight 3.5-inch-drive bays chassis, eight 2.5-inch-drive bays chassis, sixteen 2.5- inch- drive bays chassis, or twenty 2.5- inch-drive bays chassis.
 - The operating temperature is equal to or less than 35°C.
- ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe adapter is supported only when the following requirements are met:
 - The server chassis is the eight 3.5-inch-drive bays chassis, eight 2.5-inch-drive bays chassis, sixteen 2.5- inch- drive bays chassis, or twenty 2.5- inch-drive bays chassis.
 - The operating temperature is equal to or less than 35°C.
 - Two processors installed.
 - The PCIe adapter can only be installed in PCIe slot 1, and the auxiliary connection card can only be installed in PCIe slot 5 or PCIe slot 6.
- For information about installing a Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe adapter with the ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit on the riser assembly, refer to the most up-to-date documentation at https://thinksystem.lenovofiles.com/help/index.jsp?topic=%2Fthinksystem_mellanox_hdr_200gbe_2x_pcie_aux_kit%2FThinkSystem_Mellanox_HDR200GbE_2xPCIe_Aux_Kit.html&cp=7_9_4.

Before installing a PCIe adapter on the riser assembly:

1. Touch the static-protective package that contains the new PCIe adapter to any unpainted surface on the outside of the server. Then, take the new PCIe adapter out of the package and place it on a static-protective surface.
2. Locate an appropriate PCIe slot. See “Rear view” on page 26 to identify the PCIe slots of your server.

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

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

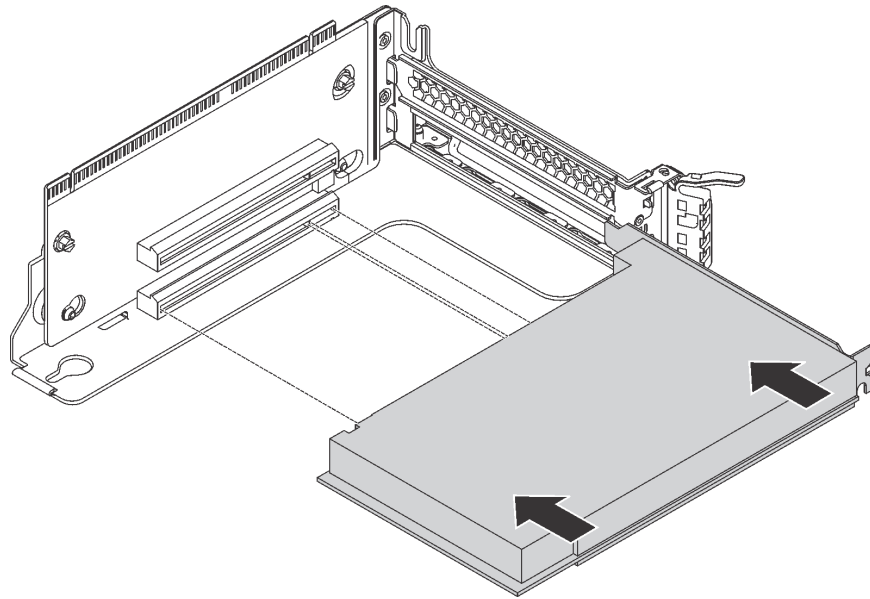


Figure 129. PCIe adapter installation

Note: Carefully handle the PCIe adapter by its edges.

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

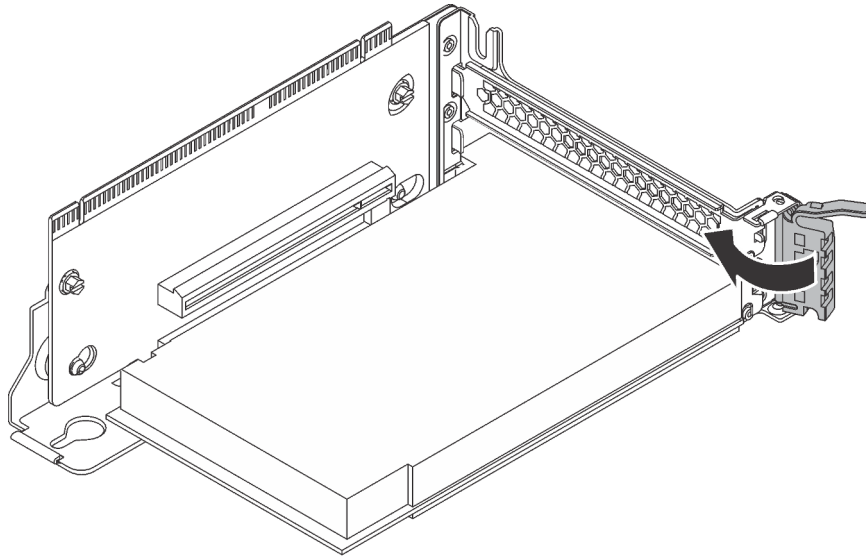


Figure 130. Closing the PCIe adapter retention latch

After installing the PCIe adapter on the riser assembly:

1. Connect cables to the PCIe adapter. See [“Internal cable routing” on page 35](#).
2. Install the riser assembly to the chassis by doing the following:

- To install the riser 1 assembly, align the mounting stud on the system board with the corresponding hole in the riser bracket. Meanwhile, align the rear of the riser 1 assembly with the corresponding rail guides in the rear of the chassis. Then, carefully press the riser 1 assembly straight down into the chassis until it is fully seated.

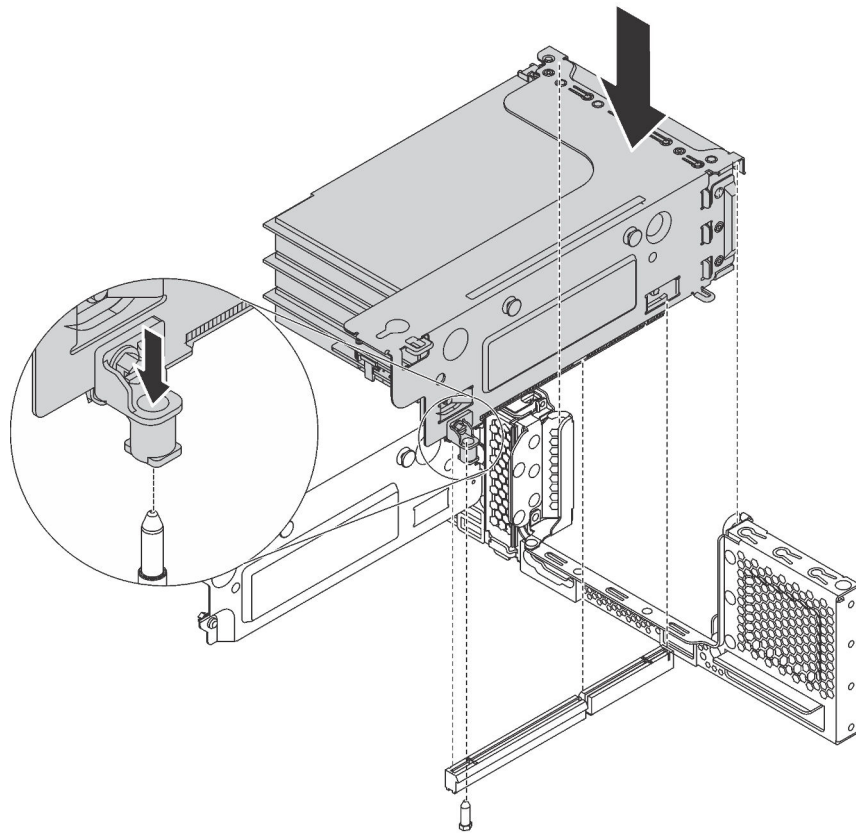


Figure 131. Riser 1 assembly installation

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

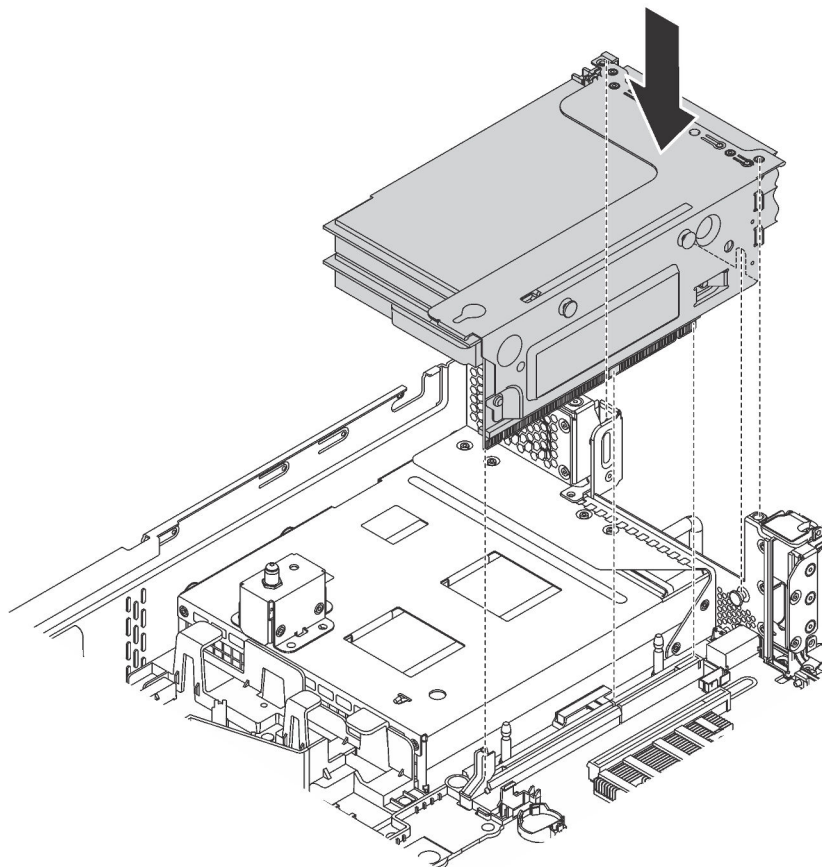

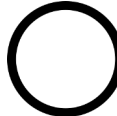



Figure 132. Riser 2 assembly installation

Install a PCIe adapter on the system board

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

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Notes:

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

Before installing the PCIe adapter on the system board:

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

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

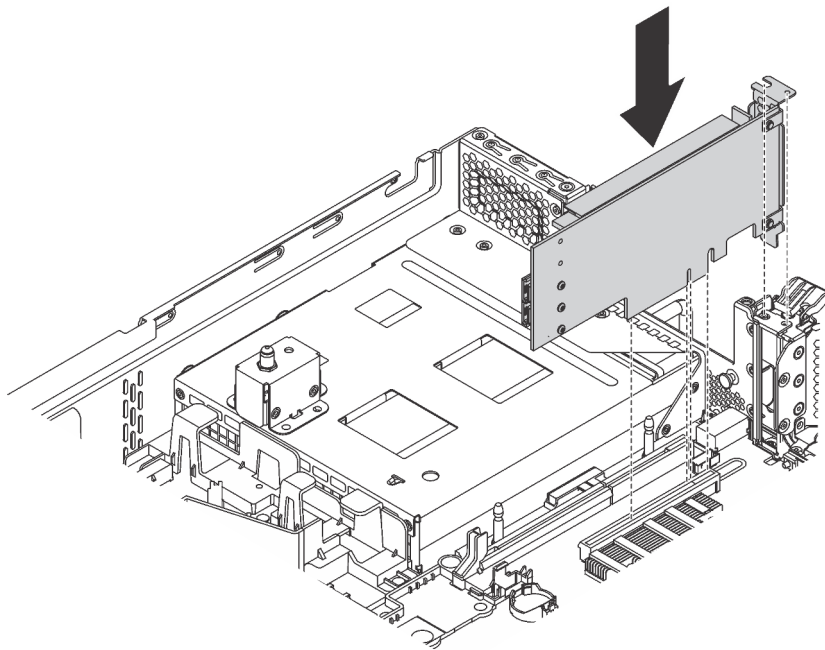


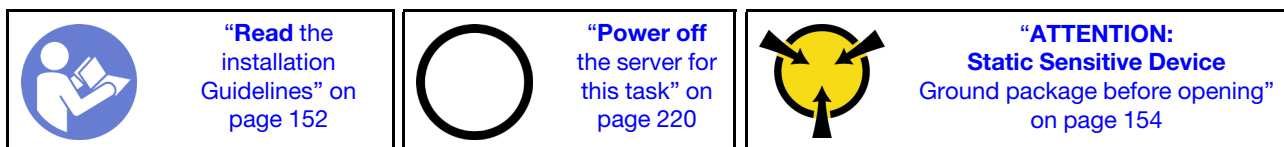
Figure 133. Installing a PCIe adapter on the system board

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

After installing the PCIe adapter on the system board, connect cables to the PCIe adapter.

Install the LOM adapter

Use this information to install the LOM adapter.



Before installing the LOM adapter:

1. If the server comes with a LOM adapter slot bracket, remove it with a tool first. Store the bracket in case that you later remove the LOM adapter and need the bracket to cover the place.

CAUTION:

Use a tool to remove the LOM adapter slot bracket to avoid injury.

2. Lift the LOM-adapter air baffle out of the chassis.
3. Touch the static-protective package that contains the new LOM adapter to any unpainted surface on the outside of the server. Then, take the new LOM adapter out of the package and place it on a static-protective surface.

To install the LOM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

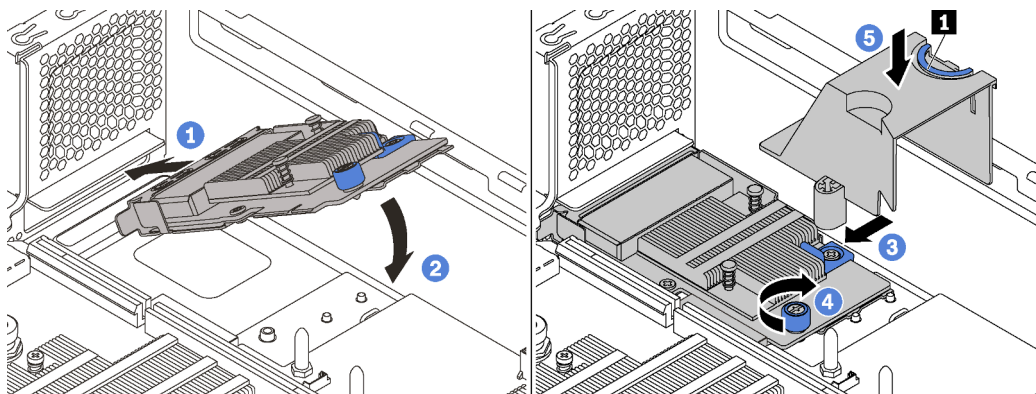
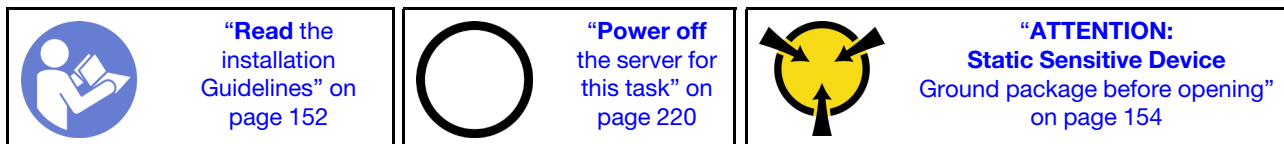


Figure 134. LOM adapter installation

- Step 1. Place the LOM adapter into the connector at an angle.
- Step 2. Rotate the LOM adapter down.
- Step 3. Push the LOM adapter as shown to insert it into the connector on the system board.
- Step 4. Tighten the thumbscrew to secure the LOM adapter.
- Step 5. Align the mounting stud on the chassis with the hole in the LOM-adapter air baffle. Then, pinch the tab **1** and lower the LOM-adapter air baffle onto the LOM adapter.

Install the serial port module

Use this information to install the serial port module.



Before installing the serial port module:

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

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

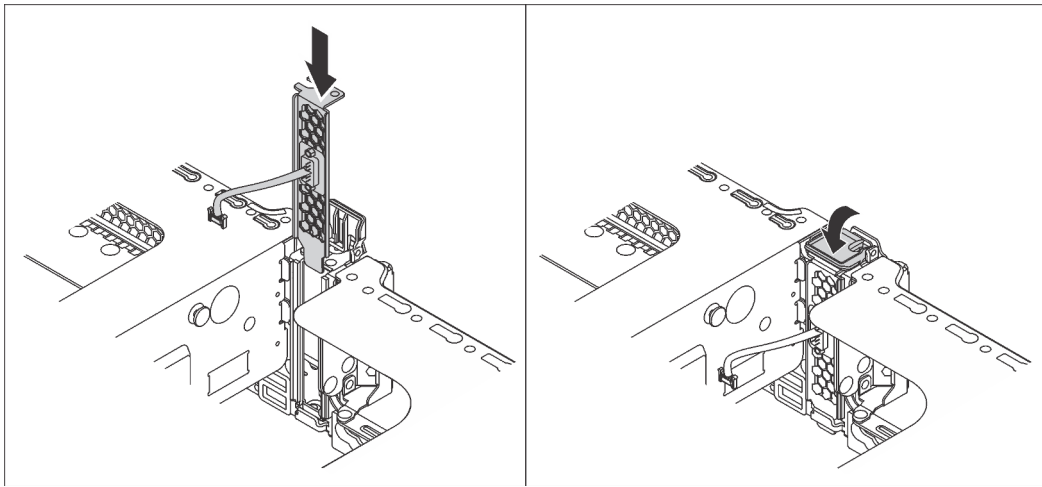


Figure 135. Serial port module installation

Step 2. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module connector, refer to “[System board components](#)” on page 32.

After installing the serial port module, do one of the following to enable it 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
```


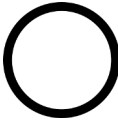

2. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

```
Bcdedit /ems no
```

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

Install the system fan cage

Use this information to install the system fan cage.

	"Read the installation Guidelines" on page 152		"Power off the server for this task" on page 220		"ATTENTION: Static Sensitive Device" Ground package before opening" on page 154
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To install the system fan cage, complete the following steps:

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

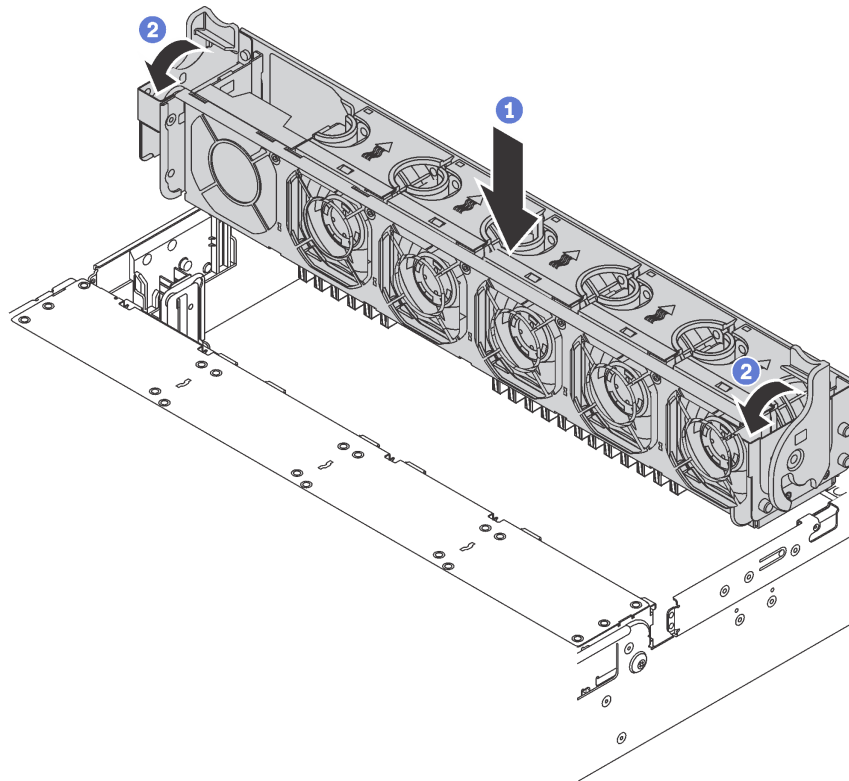




Figure 136. System fan cage installation

- Step 1. Align both sides of the system fan cage with the corresponding mounting posts in the chassis. Then, press the system fan cage straight down into the chassis.
- Step 2. Rotate the levers of the system fan cage to the front of the server to secure the system fan cage.

Install a system fan

Use this information to install a system fan.

	"Read the installation Guidelines" on page 152		"ATTENTION: Static Sensitive Device" Ground package before opening" on page 154
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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.

To install a system fan, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

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

- Step 2. Position the system fan above the system fan cage. The system fan connector on the bottom of the system fan should face the rear of the chassis. Press the system fan straight down until it is seated into place.

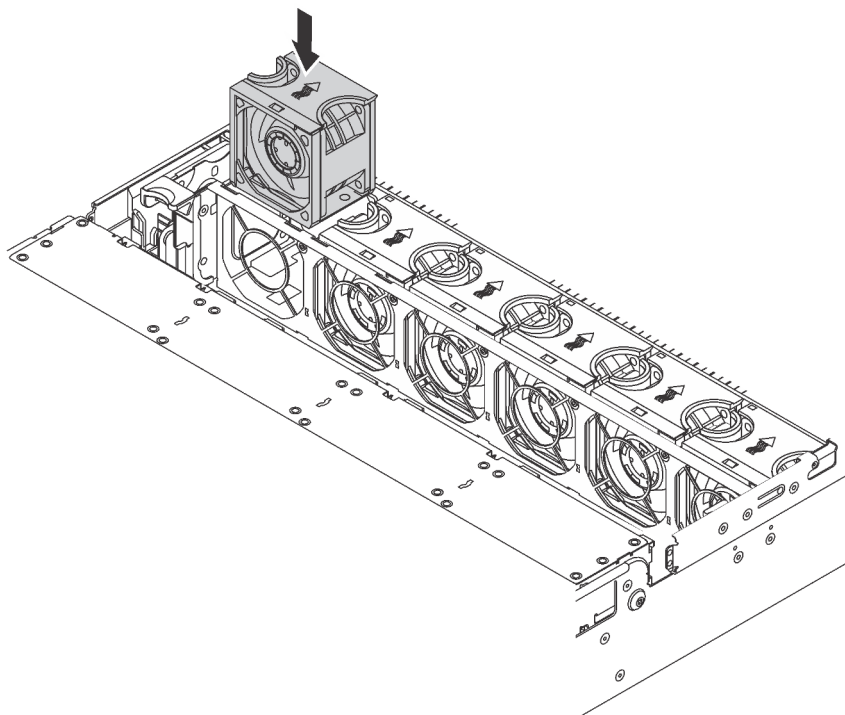


Figure 137. System fan installation

Install the U.2 24-Bay/20-Bay upgrade kit

Use the section to understand the procedures to install the U.2 24-Bay/20-Bay upgrade kit.

This topic contains the following information:


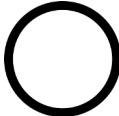

- “Install the U.2 20-Bay upgrade kit” on page 206
- “Install the U.2 24-Bay upgrade kit” on page 207

Watch the procedure. A video of the installation process for U.2 24-Bay/20-Bay upgrade kit is available:

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

Install the U.2 20-Bay upgrade kit

Use this information to install the U.2 20-Bay upgrade kit.

	“Read the installation Guidelines” on page 152		“Power off the server for this task” on page 220		“ATTENTION: Static Sensitive Device Ground package before opening” on page 154
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The following information is a summary of the PCIe switch adapters and the corresponding PCIe slots. For information about PCIe slot location, refer to “Rear view” on page 26.

Table 28. PCIe switch adapters and the corresponding PCIe slots

Type of PCIe switch adapter	PCIe slot selection
810-4P NVMe switch adapter (with the 2U bracket installed)	Slot 4 on the system board
810-4P NVMe switch adapter	RAID adapter slot on the system board
1610-4P NVMe switch adapter	Slot 1 on riser card 1
1610-4P NVMe switch adapter	Slot 5 on riser card 2
1610-4P NVMe switch adapter	Slot 6 on riser card 2


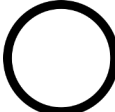

Watch the procedure. A video of the installation process is available:

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

- Step 1. Install the three 2.5-inch NVMe 8-Bay backplanes. See [Install the 2.5-inch-drive backplane](#). Then, apply drive bay sequence labels above the drive bays on your server.
- Step 2. Install the bracket on one 810-4P NVMe switch adapter. To install the bracket, align the screw holes in the bracket with the corresponding holes in the switch adapter, and then install the screws to secure the bracket to the switch adapter.
- Step 3. Install the 810-4P NVMe switch adapter in the RAID adapter slot on the system board. See [Install the RAID adapter](#).
- Step 4. Install the 810-4P NVMe switch adapter with 2U bracket in PCIe slot 4 on the system board. See [Install a PCIe adapter on the system board](#).
- Step 5. Install the riser card 1 on riser 1 bracket. See [Install a riser card](#).
- Step 6. Install the 1610-4P NVMe switch adapter in PCIe slot 1 on riser card 1. See [Install a PCIe adapter on the riser assembly](#).
- Step 7. Install the riser 1 assembly to the chassis. See [Install a riser card](#).
- Step 8. Install the riser card 2 on riser 2 bracket. See [Install a riser card](#).
- Step 9. Install one 1610-4P NVMe switch adapter in PCIe slot 5 on riser card 2. Then, install the other 1610-4P NVMe switch adapter in PCIe slot 6 on riser card 2. See [Install a PCIe adapter on the riser assembly](#).
- Step 10. Install the riser 2 assembly to the chassis. See [Install a riser card](#).
- Step 11. Install any required hardware or server options, and then cable the server. For information about how to connect cables for server models with twenty NVMe drives, see “Server model: twenty 2.5-inch NVMe drives, two NVMe 810-4P switch adapters, three NVMe 1610-4P switch adapters” in the topic [Server models with twenty 2.5-inch drives](#).

Install the U.2 24-Bay upgrade kit

Use this information to install the U.2 24-Bay upgrade kit.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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The following information is a summary of the PCIe switch adapters and the corresponding PCIe slots. For information about PCIe slot location, refer to [“Rear view”](#) on page 26.

Table 29. PCIe switch adapters and the corresponding PCIe slots

Type of PCIe switch adapter	PCIe slot selection
810-4P NVMe switch adapter (with the 3U bracket installed)	Slot 2 on riser card 1
810-4P NVMe switch adapter (with the 2U bracket installed)	Slot 4 on the system board
810-4P NVMe switch adapter (with the 3U bracket installed)	Slot 6 on riser card 2
810-4P NVMe switch adapter	RAID adapter slot on the system board
1610-8P NVMe switch adapter	Slot 1 on riser card 1

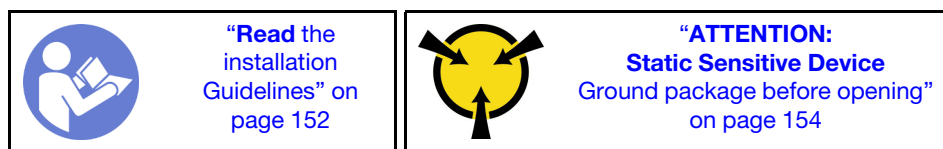
Watch the procedure. A video of the installation process is available:

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

- Step 1. Install the three 2.5-inch NVMe 8-Bay backplanes. See [Install the 2.5-inch-drive backplane](#). Then, apply drive bay sequence labels above the drive bays on your server.
- Step 2. Install three brackets on three 810-4P NVMe switch adapters. To install the bracket, align the screw holes in the bracket with the corresponding holes in the switch adapter, and then, install the screws to secure the bracket to the switch adapter.
- Step 3. Install the 810-4P NVMe switch adapter in the RAID adapter slot on the system board. See [Install the RAID adapter](#).
- Step 4. Install the 810-4P NVMe switch adapter with 2U bracket in PCIe slot 4 on the system board. See [Install a PCIe adapter on the system board](#).
- Step 5. Install the riser card 1 on riser 1 bracket. See [Install a riser card](#).
- Step 6. Install the 1610-8P NVMe switch adapter in PCIe slot 1 on riser card 1. Then, install the 810-4P NVMe switch adapter with 3U bracket in PCIe slot 2 on riser card 1. See [Install a PCIe adapter on the riser assembly](#).
- Step 7. Install the riser 1 assembly to the chassis. See [Install a riser card](#).
- Step 8. Install the riser card 2 on riser 2 bracket. See [Install a riser card](#).
- Step 9. Install the 810-4P NVMe switch adapter with 3U bracket in PCIe slot 6 on riser card 2. See [Install a PCIe adapter on the riser assembly](#).
- Step 10. Install the riser 2 assembly to the chassis. See [Install a riser card](#).
- Step 11. Install any required hardware or server options, and then cable the server. To connect the cable for server models with twenty-four NVMe drives, see “Server model: twenty-four 2.5-inch NVMe drives, four NVMe 810-4P switch adapters, one NVMe 1610-8P switch adapter” in the topic [Server models with twenty-four 2.5-inch drives](#).

Install a hot-swap power supply

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



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

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

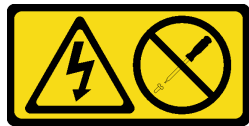
Notes:

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



Figure 138. Hot-swap power supply label on the cover

S035



CAUTION:

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

S002



CAUTION:

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

S001





DANGER

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

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

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

CAUTION:

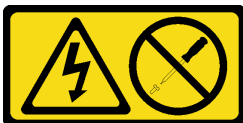
- 240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.
- In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.



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

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

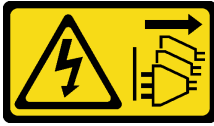
S035



CAUTION:

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

S019



CAUTION:

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

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

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

Step 1. If there is a power-supply filler installed, remove it.

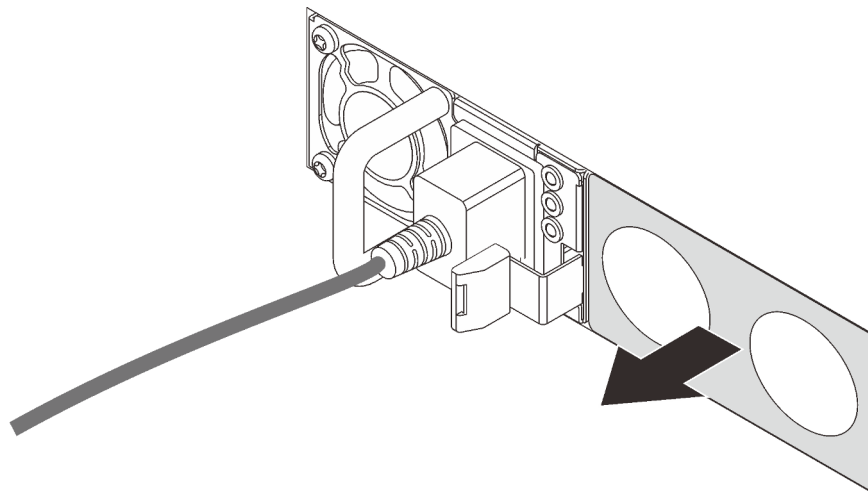


Figure 139. Hot-swap power supply filler removal

Step 2. Slide the new hot-swap power supply into the bay until it snaps into position.

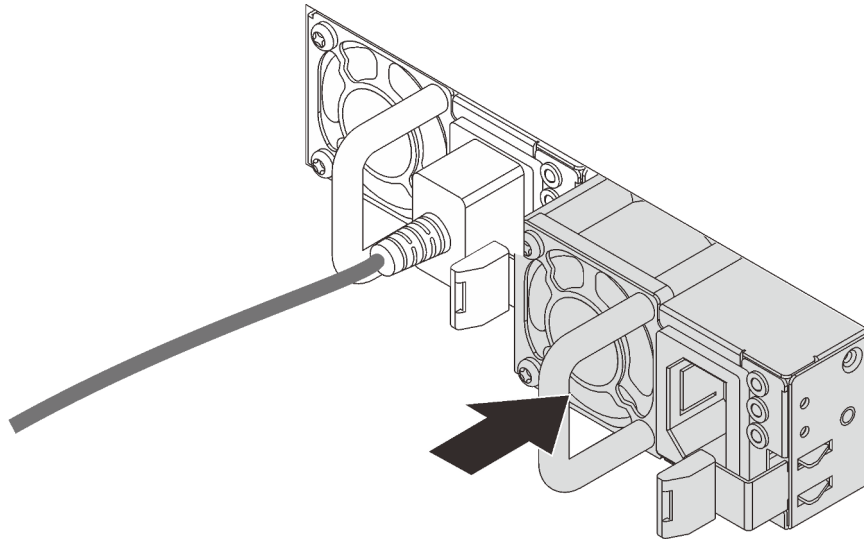




Figure 140. Hot-swap power supply installation

Install the air baffle

Use this information to install the air baffle.

	“Read the installation Guidelines” on page 152		“Power off the server for this task” on page 220
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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.

Before installing the air baffle:

1. Ensure that no tools or loose screws are left inside your server.
2. Ensure that all components have been reassembled correctly.
3. Ensure that all cables inside the server have been properly routed and they will not interfere with installing the air baffle.

To install the air baffle, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

Step 1. Note the orientation of the air baffle.

Step 2. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis. Then, lower the air baffle into the chassis and press the air baffle down until it is securely seated.

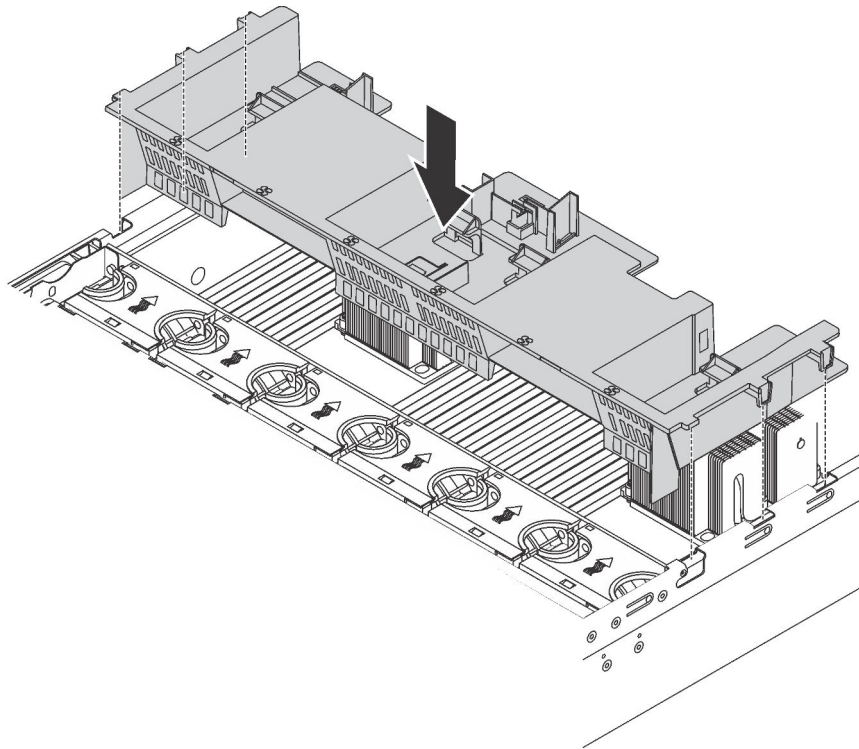


Figure 141. Installation of the standard air baffle

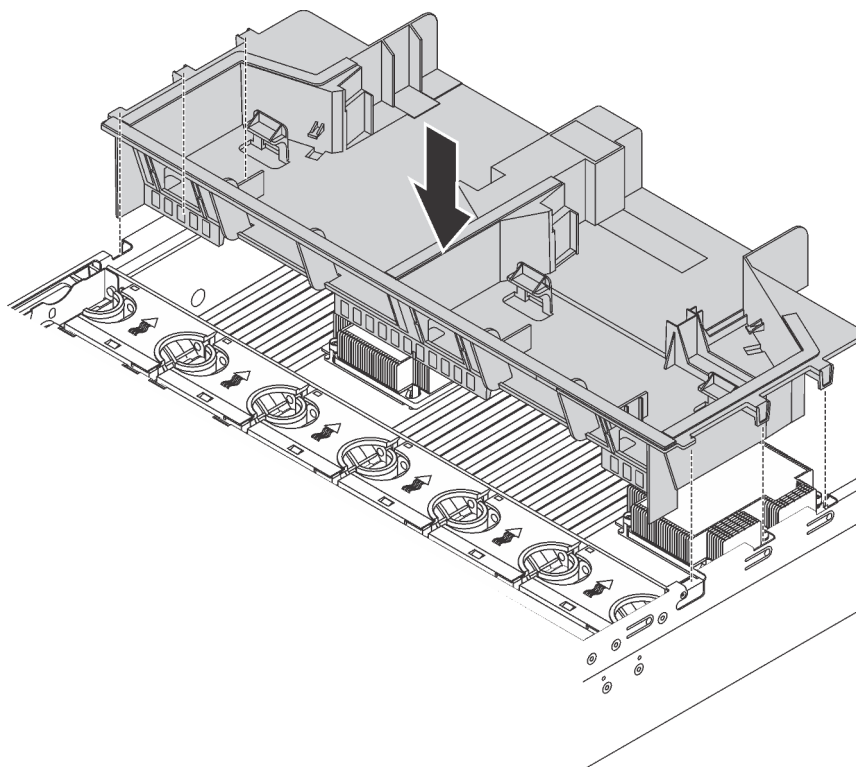

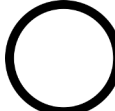



Figure 142. Installation of the large-size air baffle

After installing the air baffle, install any RAID super capacitor modules that you removed.

Install the RAID super capacitor module

Use this information to install the RAID super capacitor module.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Before installing a RAID super capacitor module:

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

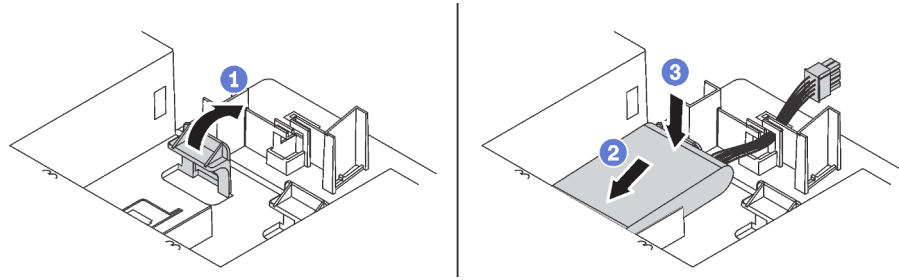





Figure 143. RAID super capacitor module installation

- Step 1. Gently press and hold the tab on the air baffle as shown.
- Step 2. Insert the RAID super capacitor module into the holder on the air baffle.
- Step 3. Press down the RAID super capacitor module to install it into the holder.

After installing the RAID super capacitor module, connect the RAID super capacitor module to a RAID adapter with the extension cable that comes with the RAID super capacitor module.

Install the top cover

Use this information to install the top cover.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“Power off the server for this task” on page 220</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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Before you install the top cover:

1. Ensure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Ensure that all internal cables are connected and routed correctly. See [“Internal cable routing”](#) on page 35.

To install the top cover, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_.

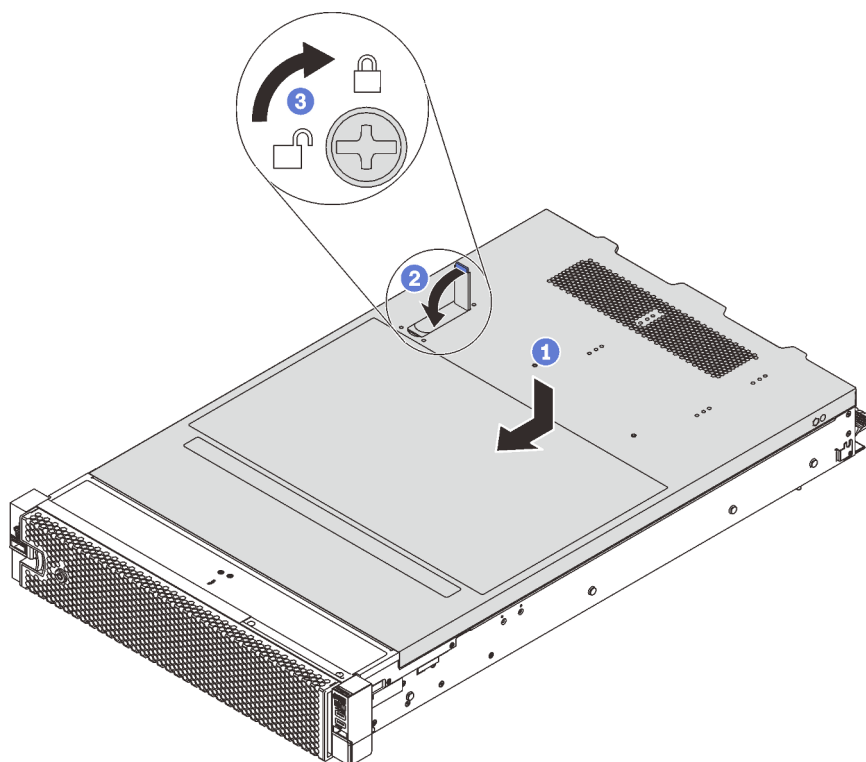




Figure 144. Top cover installation

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

- Step 1. Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage the guides on both sides of the chassis.
- Step 2. Pivot the cover latch and slide the top cover to the front of the chassis at the same time until the top cover snaps into position. Ensure that the cover latch is closed.
- Step 3. Use a screwdriver to turn the cover lock to the locked position.

Install a hot-swap drive

Install a hot-swap drive by sliding it into the drive bay and closing the drive bay handle.

 <p>“Read the installation Guidelines” on page 152</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 154</p>
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The following notes describe the type of drives that your server supports and other information that you must consider when you install a drive and place it on a static-protective surface.

- Depending on your server models, your server supports the following drive types:
 - NVMe SSD
 - SAS/SATA SSD
 - SAS/SATA HDD

For a list of supported drives, see:

<https://static.lenovo.com/us/en/serverproven/index.shtml>

- 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 21.
- You can mix drives of different types, different sizes, and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
 - Drive type priority: NVMe SSD, SAS SSD, SATA SSD, SAS HDD, SATA HDD
 - Drive size priority: 2.5 inch, 3.5 inch
 - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and with the same capacity.
- Some server models support NVMe drives and the bays for installing NVMe drives vary by model:

Server models	Bays for installing NVMe drives
Server models with a 2.5-inch AnyBay backplane installed	Up to four NVMe drives in the bays 4–7
Server models with two 2.5-inch AnyBay backplanes installed	Up to eight NVMe drives in the bays 4–7 and bays 12–15
Server models with two 2.5-inch NVMe backplanes installed	Up to 16 NVMe drives in the bays 0–15
Server models with three 2.5-inch AnyBay backplanes installed	Up to twelve NVMe drives in the bays 4–7, bays 12–15, and bays 20–23
Server models with three 2.5-inch NVMe backplanes installed	Up to 24 NVMe drives in the bays 0–23
Server models with a 3.5-inch AnyBay backplane installed	Up to four NVMe drives in the bays 8–11

Before installing a hot-swap drive:

1. Determine the available drive bays based on the drive bay labels.

Important: Ensure that you install the correct type of drives into corresponding drive bays. Drive type information is available on the bottom of the front side of a drive.

2. Pinch the two tabs to remove the drive filler. Keep the drive filler in a safe place for future use.

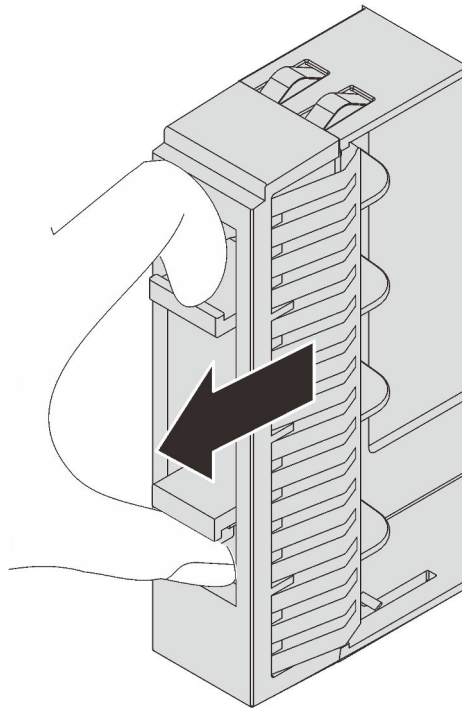


Figure 145. 2.5-inch drive filler removal

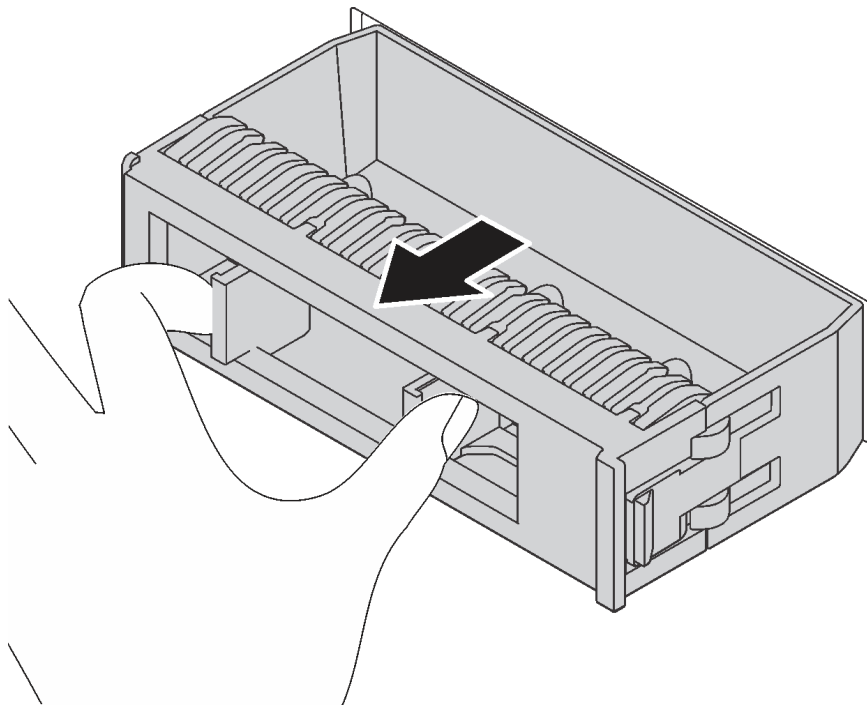


Figure 146. 3.5-inch drive filler removal

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

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
- Youku: http://list.youku.com/albumlist/show/id_50483444

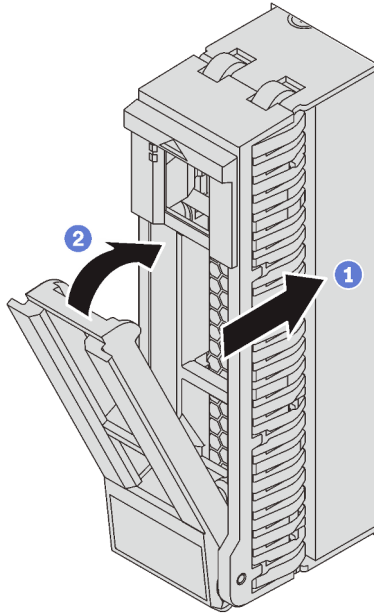


Figure 147. 2.5-inch hot-swap drive installation

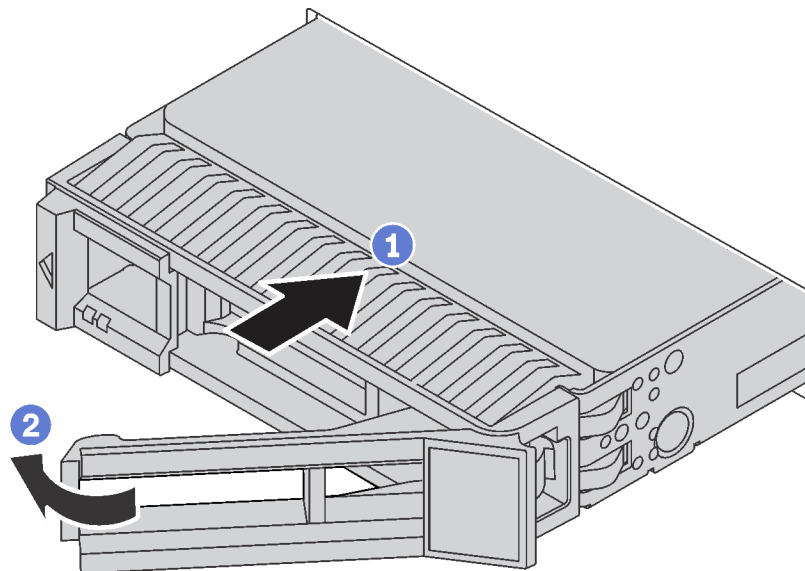


Figure 148. 3.5-inch hot-swap drive installation

- Step 1. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- Step 2. Close the drive tray handle to lock the drive in place.
- Step 3. Continue to install additional hot-swap drives if necessary.

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 to power

Connect the server to power.

Connect to the network

Connect the server to the network.

Connect to storage

Connect the server to any storage devices.

Turn on the server

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

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

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

For information about powering off the server, see [“Turn off the server” on page 220](#).

Validate server setup

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

Turn off the server

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

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

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

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

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see [“Turn on the server” on page 220](#).

Chapter 4. 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 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 26](#).

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 21](#).

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

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:

<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr650/7X05/downloads>

UpdateXpress System Packs (UXSPs)

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

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an Operating System executing on the server's operating system.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager (LXPM)	In-band ² On-Target	√		√		
Lenovo XClarity Controller (XCC)	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Essentials Bootable Media Creator³ (BOMC)	In-band On-Target	√	All I/O devices	√ (BOMC application)	√ (BOMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	√	All I/O devices	√		√
Notes: <ol style="list-style-type: none"> 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates. 						

• **Lenovo XClarity Provisioning Manager**

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

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you press F1. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

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

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

• **Lenovo XClarity Controller**

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

Notes:

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

Additional information about configuring Ethernet over USB is available at:

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

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

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

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

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

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

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

- **Lenovo XClarity Essentials UpdateXpress**

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

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

<https://datacentersupport.lenovo.com/solutions/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

- **Lenovo XClarity Administrator**

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

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

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

- **Lenovo XClarity Integrator offerings**

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

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

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

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.

Note: 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.

- **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/toolctr_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

- **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:

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

Memory configuration

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 website:

<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

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 [“DIMM installation rules” on page 166](#).

Table 30. Channel and slot information of DIMMs around processor 1 and 2

The memory-channel configuration table is a three-column table that shows the relationship between the processors, memory controllers, memory channels, slot number and the DIMM connectors.

Integrated Memory Controller (iMC)	Controller 0						Controller 1					
Channel	Channel 2		Channel 1		Channel 0		Channel 0		Channel 1		Channel 2	
Slot	0	1	0	1	0	1	1	0	1	0	1	0
DIMM connector (processor 1)	1	2	3	4	5	6	7	8	9	10	11	12
DIMM connector (processor 2)	13	14	15	16	17	18	19	20	21	22	23	24

Configure DC Persistent Memory Module (DCPMM)

DCPMM capacity could act as accessible persistent memory for applications or volatile system memory. Based on the approximate percentage of DCPMM capacity invested in volatile system memory, the following three operating modes are available for choice:

- **App Direct Mode** (0% of DCPMM capacity acts as system memory):

In this mode, DCPMMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory.

The total volatile displayed system memory in this mode is the sum of DRAM DIMM capacity.

Notes:

- In App Direct Mode, the DRAM DIMMs that are installed can be configured to mirror mode.
- When only one DCPMM is installed for each processor, only not-interleaved App Direct Mode is supported.

- **Mixed Memory Mode** (1-99% of DCPMM capacity acts as system memory):

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

The total displayed volatile system memory in this mode is the DCPMM capacity that is invested in system memory.

- **Memory Mode** (100% of DCPMM capacity acts as system memory):

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache.

The total displayed volatile system memory in this mode is the sum of DCPMM capacity.

DCPMM Management options

DCPMMs 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 DCPMMs** to configure and manage DCPMMs.

For more details, see https://sysmgt.lenovofiles.com/help/topic/LXPM/UEFI_setup.html.

Note: If the text-based interface of Setup Utility opens instead of Lenovo XClarity Provisioning Manager, 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 Lenovo XClarity Provisioning Manager.

- **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 DCPMMs** to configure and manage DCPMMs.

- **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/toolctr_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 DCPMM details**

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

- Firmware version
- Configuration status
- Raw capacity
- Memory capacity
- App Direct capacity
- Unconfigured capacity
- Inaccessible capacity
- Reserved capacity
- Percentage remaining
- Security state

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

```
onecli.exe config show IntelOptaneDCPMM
--imm 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 DCPMM capacity that is invested in system memory, and hence decide the DCPMM mode:

- **0%:** App Direct Mode

- **1-99%:** Mixed Memory 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 DCPMMs. Go to **Security → Press to Secure Erase** to perform secure erase.
- Make sure the capacity of installed DCPMMs and DRAM DIMMs meets system requirements for the new mode (see “[DCPMM and DRAM DIMM installation order](#)” on page 171).
- After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management → Intel Optane DCPMMs → 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 DCPMM settings, and do not represent the current DCPMM status.

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

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

1. Set create goal status.

```
onecli.exe config set IntelOptaneDCPMM.CreateGoal Yes
--imm USERID:PASSWORD@10.104.195.86
```

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

```
onecli.exe config set IntelOptaneDCPMM.MemoryModePercentage 20
--imm USERID:PASSWORD@10.104.195.86
```

Where *20* stands for the percentage of capacity that is invested in system volatile memory.

3. Set the DCPMM mode.

```
onecli.exe config set IntelOptaneDCPMM.PersistentMemoryType "App Direct"
--imm USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the DCPMM mode.

- **Persistent Memory Type**

In App Direct Mode and Mixed Memory Mode, the DCPMMs 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 DCPMMs → Goals → Persistent Memory Type [(DCPMM mode)]**, select **App Direct Not Interleaved** and reboot the system.

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

- **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.

- **Namespaces**

App Direct capacity of DCPMMs 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 *Pmem* command.
- 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, DCPMM 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.

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

- **Platform:** Choose this option to run security operation on all the installed DCPMM units at once. A platform passphrase is stored and automatically applied to unlock DCPMMs 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 IntelOptaneDCPMM.SecurityOperation "Enable Security"  
--imm USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456"  
--imm 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 IntelOptaneDCPMM.SecurityOperation "Disable Security"  
--imm USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456"  
--imm USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

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

Notes:

- Single DCPMM 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 DCPMMs 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 DCPMMs enter “exceeded” state with a system warning message, and the DCPMM unit can only be unlocked after the system is rebooted.

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

– Secure Erase

Note: If the DCPMMs to be secure erased are protected with a passphrase, make sure to disable security and reboot the system before performing secure erase.

Secure erase cleanses all the data that is stored in the DCPMM unit, including encrypted data. This data deletion method is recommended before returning or disposing a malfunctioning unit, or changing DCPMM 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 IntelOptaneDCPMM.SecurityOperation "Secure Erase Without Passphrase"  
--imm USERID:PASSWORD@10.104.195.86
```

• DCPMM Configuration

DCPMM 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 DCPMM diagnostics (see https://sysmgmt.lenovofiles.com/help/topic/LXPM/running_diagnostics.html). To adjust the selectable percentage that the warning message requires, go to **Intel Optane DCPMMs → DCPMM Configuration**, and input the percentage.

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

```
onecli.exe config set IntelOptaneDCPMM.PercentageRemainingThresholds 20  
--imm USERID:PASSWORD@10.104.195.86
```

Where 20 is the selectable percentage.

RAID configuration

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 website:

<https://lenovopress.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.com/osig>.

Tool-based deployment

- **Multi-server**

Available tools:

- Lenovo XClarity Administrator
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/toolctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.html

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager
https://sysmgt.lenovofiles.com/help/topic/LXPM/os_installation.html
- Lenovo XClarity Essentials OneCLI
http://sysmgt.lenovofiles.com/help/topic/toolctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.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:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_backupthexcc.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

- **Operating system**

Use your own operating-system and user-data 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>

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 UUID:

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]
```

Where:

[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 createuuid SYSTEM_PROD_DATA.SysInfoUUID --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 createuuid SYSTEM_PROD_DATA.SysInfoUUID
```

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 createuuid SYSTEM_PROD_DATA.SysInfoUUID
--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 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. Go to https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_resettingthexcc.html for more information.

Chapter 5. 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” on page 239](#)
- [“The server immediately displays the POST Event Viewer when it is turned on” on page 239](#)
- [“Embedded hypervisor is not in the boot list” on page 239](#)
- [“Server cannot recognize a hard disk drive” on page 240](#)
- [“Displayed system memory less than installed physical memory” on page 241](#)
- [“A Lenovo optional device that was just installed does not work.” on page 242](#)
- [“Voltage system board fault is displayed in the event log” on page 242](#)

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Reseat the power supply.
5. Replace the power supply.

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 the XClarity Controller product documentation:

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

5. Check <http://datacentersupport.lenovo.com> for any tech tips (service bulletins) related to the embedded hypervisor and the server.
6. Make sure that other software works on the server to ensure that it is working properly.

Server cannot recognize a hard disk drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED:
 - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
 - If neither LED is lit or flashing, check the hard disk drive backplane.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.
 - Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

Based on those tests:

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

- If the adapter fails the test, replace the adapter.

Displayed system memory less than installed physical memory

Complete the following steps until the problem is resolved:

Note: Each time you install or remove a 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.
- Memory mirrored channel does not account for the discrepancy.
- The memory modules are seated correctly.
- You have installed the correct type of memory.
- If you changed the memory, you updated the memory configuration in the 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 DCPMMs are installed:
 - a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
 - b. Refer to [“DC Persistent Memory Module \(DCPMM\) setup” on page 164](#) and see if the displayed memory fits the mode description.
 - c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see [“DC Persistent Memory Module \(DCPMM\) setup” on page 164](#)).
 - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the 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. Power on the system and press **F1** when the logo screen appears, the Lenovo XClarity Provisioning Manager interface will start. Perform memory diagnostics with this interface. Go to **Diagnostics → Run Diagnostic → Memory test or DCPMM test**.

When DCPMMs are installed, run diagnostics based on the current DCPMM mode:

- App Direct Mode
 - Run **DCPMM Test** for DCPMMs.
 - Run **Memory Test** for DRAM DIMMs.
- Memory Mode and Mixed Memory Mode
 - Run **DCPMM Test** for App Direct capacity of DCPMMs.
 - Run **Memory Test** for memory capacity of DCPMMs.

Note: DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.

- 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 DCPMMs are installed, only adopt this method in Memory Mode.

- Re-enable all memory modules using the Setup Utility, and restart the system.
- (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.

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

- 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 system setup interface. Whenever memory or any other device is changed, you must update the configuration.
- Reseat the device that you just installed.
- Replace the device that you just installed.

Voltage system board fault is displayed in the event log

Complete the following steps until the problem is solved.

- Revert the system to the minimum configuration. See “Specifications” on page 5 for the minimally required number of processors and memory modules.
- Restart the system.
 - If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

Appendix A. Getting help and technical assistance

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

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

<http://datacentersupport.lenovo.com>

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

Before you call

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

Attempt to resolve the problem yourself

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

You can find the product documentation for your ThinkSystem products at the following location:

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

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://static.lenovo.com/us/en/serverproven/index.shtml> to make sure that the hardware and software is supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
 - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

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

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

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

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

- For more information about using the web interface to collect service data, see http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_servicesandsupport.html.
- For more information about using the CLI to collect service data, see http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/nn1ia_r_ffdccommand.html.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI can be run in-band from the operating system. In addition to the hardware service data, Lenovo XClarity Essentials OneCLI can collect information about the operating system, such as the operating system event log.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see http://sysmgmt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

Appendix B. Trademarks

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