Lenovo

ThinkSystem SR860 V2
Maintenance Manual

Machine Types: 7Z59 and 7Z60

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:
https://pubs.lenovo.com/safety_documentation/

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

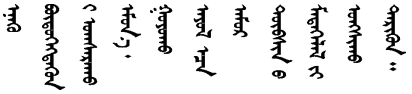
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྒྲུབ་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

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.

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Chapter 1. Introduction

The ThinkSystem SR860 V2 is a 4U rack server designed for high-volume network transaction processing. This high-performance, multi-core server is ideally suited for networking environments that require superior processor performance, input/output (I/O) flexibility, and high manageability.

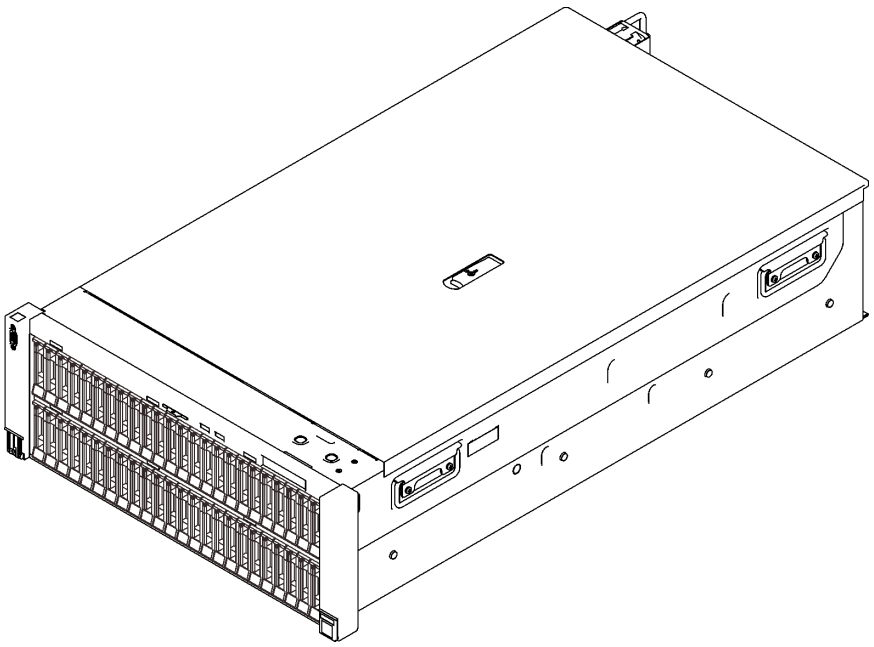

Figure 1. ThinkSystem SR860 V2

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

In addition, the system service label on the top cover of the server provides a QR code for mobile access to service information. You can scan the QR code with a mobile device for quick access to additional information including parts installation, replacement, and error codes.

Following illustration is the QR code: https://support.lenovo.com/p/servers/sr860v2

Figure 2. QR code

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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. Specifications, Type 7Z59 and 7Z60

Specification	Description
Dimension	4U server • Height: 175 mm (6.9 inches) • Width: – With rack handles: 482 mm (19.0 inches) – Without rack handles: 434.4 mm (17.1 inches) • Depth: 835.9 mm (32.9 inches) **Note:** The depth is measured with rack handles installed.
Weight (depending on the configuration)	62 kg (136.7 lb) in maximum
Processor (depending on model)	Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. • Two processor sockets (expandable up to four) with minimal requirement of two installed on the system board. • Designed for LGA 4189 sockets • Scalable up to 28 cores • Supports 6 UPI links at 10.4 GT/s
Memory	See “Memory module installation rules and order” in *Setup Guide* for detailed information about memory configuration and setup. • Capacity – Minimum: 16 GB – Maximum: – RDIMM: 3 TB – 3DS-RDIMM: 6 TB • Memory module types: – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 3200 MT/s registered DIMM (RDIMM) or 3DS RDIMM – Persistent Memory (PMEM) • Capacity (depending on the model): – RDIMM: 16 GB, 32 GB, and 64 GB – 3DS-RDIMM: 128 GB, 256 GB – PMEM: 128 GB, 256 GB, and 512 GB **Note:** PMEMs can be mixed with DRAM DIMMs. See “PMEM rules” in *Setup Guide* for more information. • Slots: 24 two-way interleaved slots (expandable to 48) For a list of supported memory modules, see https://serverproven.lenovo.com/.
Storage expansion	• Forty-eight 2.5-inch drive bays: – Bay 0 to 23 support SAS/SATA/NVMe drives. – Bay 24 to 47 support SAS/SATA drives. **Notes:** When the following components are installed in the system, bay 24 to 47 are disabled, and the maximal supported drive quantity is 24. – PMEMs – DRAM DIMMs with 64 GB or larger capacity – Processors with 250 or more watts • Two 7mm/M.2 drive bays support SAS/SATA/NVMe drives.

Table 1. Specifications, Type 7Z59 and 7Z60 (continued)

Expansion slots	Up to seventeen slots: • Slot 1 to 4 (4U PCIe riser cage): – PCI Express 3.0 x8 (Slot 1, 2, 3, 4) or – PCI Express 3.0 x16 (Slot 2, 4) • Slot 5 to 7 (PCIe riser card): – PCI Express 3.0 x16 (Slot 5, 6, 7) or – PCI Express 3.0 x8 (Slot 5, 6) • Slot 8 (OCP 3.0 Ethernet adapter) • Slot 9 to 12 (4U PCIe riser cage): – PCI Express 3.0 x8 (Slot 9, 10, 11, 12) or – PCI Express 3.0 x16 (Slot 10, 12) • Slot 13: PCI Express 3.0 x16 • Slot 14: PCI Express 3.0 x8 • Slot 15: PCI Express 3.0 x8 • Slot 16 to 17: 7mm/M.2 drive bays
Integrated functions	• Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities. • One system-management RJ-45 connector on the rear to connect to a systems-management network. This connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed. • Four universal serial bus (USB) ports: – Two on the front of the server: – One USB 2.0 with Lenovo XClarity Controller management – One USB 3.1 – Two USB 3.1 on the rear of the server • One serial port
RAID adapter (depending on model)	The following options with support for RAID levels 0, 1, and 10 are available for this server with up to four flash power modules: • ThinkSystem 430-8i SAS/SATA 12Gb HBA • ThinkSystem 430-16i SAS/SATA 12Gb HBA • ThinkSystem 430-8e SAS/SATA 12Gb HBA • ThinkSystem 430-16e SAS/SATA 12Gb HBA • ThinkSystem RAID 530-8i PCIe 12Gb Adapter • ThinkSystem RAID 530-16i PCIe 12Gb Adapter • ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem RAID 940-16i 4GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 940-16i 8GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 940-32i 8GB Flash PCIe 12Gb Adapter • x16 PCIe 1610-8P adapter • ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 5350-8i Flash PCIe 12Gb Adapter • ThinkSystem 4350-16i SAS/SATA 12Gb HBA • ThinkSystem 4350-8i SAS/SATA 12Gb HBA
Network	OCP Ethernet adapter with 1G/10G base-T and 10G/25G/50G SPF+
Fans	• Eight (60 mm x 38 mm / 60 mm x 56 mm) internal single/dual rotor system fans (N+1 redundancy) : – Slot 1, 3, 4, 6: single-fan single/dual-rotor module – Slot 2, 5: dual-fan single/dual-rotor module • Four fans for 4U PCIe riser cages (Two fans for each unit)

Table 1. Specifications, Type 7Z59 and 7Z60 (continued)

Operating System	Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: See “Deploy the operating system” in *Setup Guide*..
Electrical input	This server supports up to four units of CFF V4 power supplies. Following is the list of supported types: • 750-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC • 750-watt Titanium, input power 230 Vac / 240 VDC **Note:** When only two units of 750-watt Titanium power supply are installed, 240 VDC is not supported. • 1100-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC • 1100-watt Titanium, input power 230 Vac / 240 VDC • 1800-watt Platinum, input power 230 Vac / 240 VDC • 1800-watt Titanium, input power 230 Vac / 240 VDC • 2600-watt Titanium, input power 230 Vac / 240 VDC **CAUTION:** • **240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.** • **Power supply with 240 V dc input cannot support hot-plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**
Minimal configuration for debugging	• Two processors in processor socket 1 and 2 • Two DRAM DIMMs in slot 8 and 20 • One power supply • One drive with RAID adapter and backplane (If OS is needed for debugging) • Eight system fans: – Upper row: fan 2 and fan 5 – Lower row: fan 1 to 6

Table 1. Specifications, Type 7Z59 and 7Z60 (continued)

Acoustical noise emissions	The server has the following acoustic noise emissions declaration: • Sound power level (L_{WAd}) – Idling: – Typical: 6.1 Bel – Storage rich: 6.8 Bel – GPU: 7.4 Bel – Operating: – Typical: 7.0 Bel – Storage rich: 7.5 Bel – GPU: 8.2 Bel • Sound pressure level (L_{pAm}): – Idling: – Typical: 47 dBA – Storage rich: 53 dBA – GPU: 60 dBA – Operating: – Typical: 55 dBA – Storage: 61 dBA – GPU: 67 dBA **Notes:** • These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296. • The declared acoustic sound levels are based on the specified configurations, which may change slightly depending on configuration/conditions. – Typical configuration: four 165W processors, twenty-four 64 GB DIMMs, twenty-four SAS hard disk drives, 930-8i, Intel X710 10 GB 2 port, four 1100-watt power supply units – Storage rich configuration: four 205W processors, forty-eight 64 GB DIMMs, forty-eight SAS hard disk drives, 940-16i, Intel X710 10 GB 2 port, four 1100-watt power supply units – GPU configuration: four 205W processors, forty-eight 64 GB DIMMs, forty-eight SAS hard disk drives, 940-16i, Intel X710 10 GB 2 port, eight Nvidia Tesla T4, four 1800-watt power supply units • The declared acoustic noise levels may increase greatly, if high-power components are installed such as high-power NICs, high-power processors and GPUs. • Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Table 1. Specifications, Type 7Z59 and 7Z60 (continued)

Ambient temperature management	Adjust ambient temperature when specific components are installed: • Keep ambient temperature to 35°C or lower when one or more of the following components are installed. – Processors with 165 to 205 watts – DRAM DIMMs with capacity larger than 64 GB • Keep ambient temperature to 35°C or lower when the following components are installed in the same unit. – Processors with 205 to 250 watts – 24 drives • Keep room temperature to 30°C or lower when one or more of the following components are installed. – Processors with 205 or more watts – Nvidia V100S – Nvidia T4 – PMEMs **Important:** To avoid throttling, follow the instructions below: – – Make sure to adopt passive Direct Attach cables when ThinkSystem NVIDIA ConnectX-7 adapter is installed.
Environment	ThinkSystem SR860 V2 complies with ASHRAE Class A2 specifications. Depending on the hardware configuration, some models comply with ASHRAE Class A3 and Class A4 specifications. System performance may be impacted when operating temperature is outside AHSARE A2 specification. • Air temperature: – Operating – ASHARE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). – ASHARE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft). – ASHARE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft). – Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative Humidity (non-condensing): – Operating – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F) – ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F) – ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F) – Shipment/storage: 8% to 90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 7. **Note:** The server is designed for standard data center environment and recommended to be placed in industrial data center.

Particulate contamination

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

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

Table 2. Limits for particulates and gases

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

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

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

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

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

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

Firmware updates

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

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

- 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/sr860v2/downloads
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/tw/en/solutions/ht509500

UpdateXpress System Packs (UXSPs)

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

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 installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs)**. UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
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 Creator (BoMC)	In-band Out-of-band Off-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	√		
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:

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 start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

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

  "Firmware Update" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

  Important: Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.

- **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.

    For additional information about configuring Ethernet over USB, see:

    "Configuring Ethernet over USB" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  – If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

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

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  Important: Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go to https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

  For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update

packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

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

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

- **Lenovo XClarity Administrator**

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

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

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

- **Lenovo XClarity Integrator offerings**

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

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

  https://pubs.lenovo.com/lxci-overview/

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

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

Security advisories

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

The list of current advisories is available at the following site:

https://datacentersupport.lenovo.com/product_security/home

Power on the server

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

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

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

For information about powering off the server, see “Power off the server” on page 12.

Power off the server

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

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

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

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

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see “Power on the server” on page 12.

Chapter 2. Server components

This section contains information about each of the components associated with the server.

Identifying your server

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

Figure 3 “Location of the machine type, model, and serial number” on page 13 shows the location of the label containing the machine type, model, and serial number.

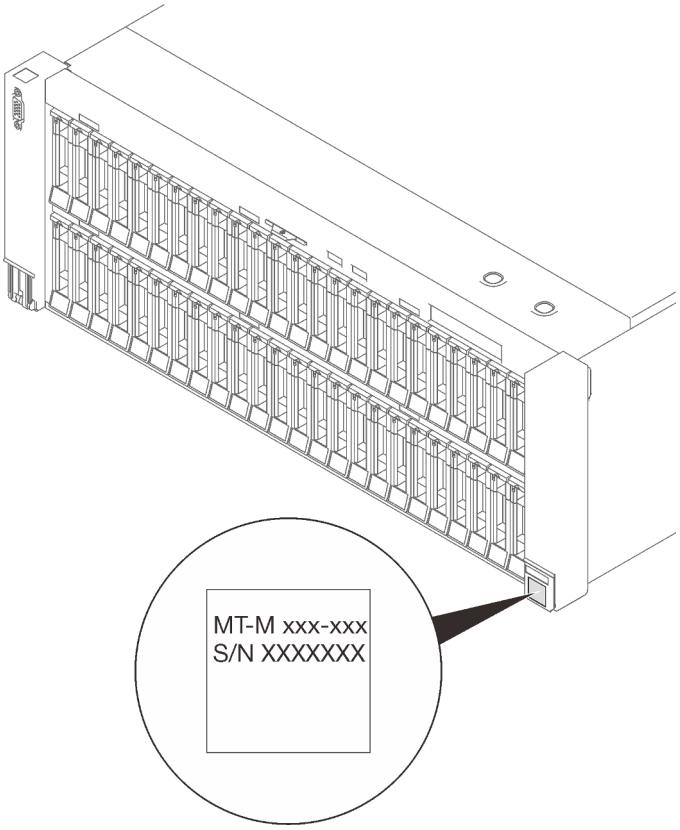

Figure 3. Location of the machine type, model, and serial number

The model number and serial number are on the ID label on the front of the server, as shown in the following illustrations. You can also add other system information labels to the front of the server in the customer label spaces.

XClarity Controller network access label

In addition, the XClarity Controller network access label is attached to the pull-out information tab located near the top of the center of the front view, with MAC address accessible with a pull.

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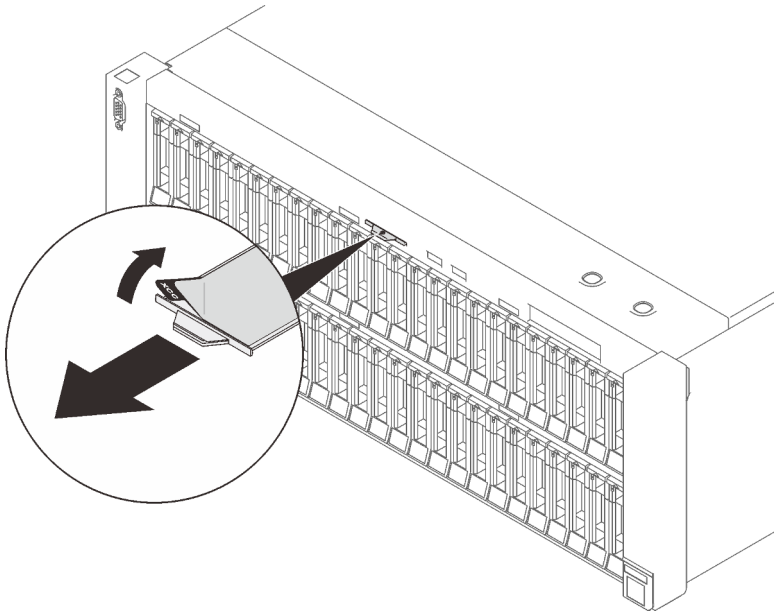


Figure 4. XClarity Controller network access label on the pull-out information tab

Front view

This section contains information about the controls, LEDs, and connectors on the front of the server.

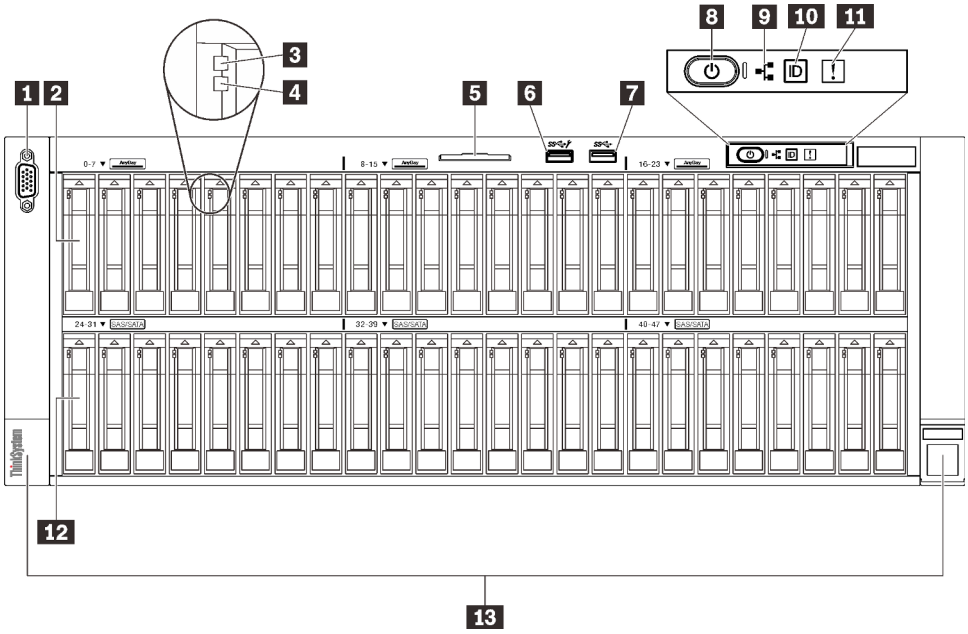


Figure 5. Front view

Table 3. Components on the front view

1	“VGA connector (optional)” on page 15	8	“Power button/LED (green)” on page 16
2	“2.5-inch drive bays” on page 15 (bay 0 to 23)	9	“Network activity LED (green)” on page 17
3	“Drive activity LED (green)” on page 16	10	“Identification button/LED (blue)” on page 17
4	“Drive status LED (yellow)” on page 16	11	“System error LED (yellow)” on page 17
5	“Pull-out information tab” on page 16	12	“2.5-inch drive bays” on page 15 (bay 24 to 47)
6	“USB” on page 16 1 (USB 2.0 with Lenovo XClarity Controller management)	13	“Rack release latches” on page 17
7	“USB” on page 16 2 (USB 3.1)		

1 VGA connector (optional)

Connect a monitor to this connector.

Notes:

- When the optional front VGA connector is in use, the rear one will be disabled.
- The maximum video resolution is 1920 x 1200 at 60 Hz.

2/12 2.5-inch drive bays

Install 2.5-inch drives to these bays. See “Install a 2.5-inch hot-swap drive” on page 146 for more details.

3 Drive activity LED (green)

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

4 Drive status LED (yellow)

These LEDs indicate the following status:

- The LED is lit: the drive has failed.
- The LED is flashing slowly (once per second): the drive is being rebuilt.
- The LED is flashing rapidly (three times per second): the drive is being identified.

5 Pull-out information tab

This tab contains network information such as MAC address and XCC network access label.

6/7 USB connectors

Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors. Following are detailed descriptions of each connector:

- USB 1: USB 2.0 with Lenovo XClarity Controller management.

  Connection to XClarity Controller is primarily intended for users with a mobile device running the XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the XClarity Controller.

  Select **Network** in **BMC Configuration** to view or modify settings.

  Four types of settings are available:

  - **Host only mode**

    In this mode, the USB port is always solely connected to the server.
  - **BMC only mode**

    In this mode, the USB port is always solely connected to XClarity Controller.
  - **Shared mode: owned by BMC**

    In this mode, connection to the USB port is shared by the server and XClarity Controller, while the port is switched to XClarity Controller.
  - **Shared mode: owned by host**

    In this mode, connection to the USB port is shared by the server and XClarity Controller, while the port is switched to the server.
- USB 2: USB 3.1.

8 Power button/LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

- **Off:** No power supply unit is properly installed or connected, or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and not ready to be turned on yet. The power button is disabled. This will last approximately five to ten seconds after power supply units are properly installed and connected.
- **Flashing slowly (once per second):** The server is power off but ready to be turned on. Press the power button to turn on the server.
- **Lit:** The server is turned on.

9 Network activity LED (green)

When this LED is lit, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

10 Identification button/LED (blue)

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely.

11 System error LED (yellow)

When this yellow LED is lit, it indicates that a system error has occurred. This LED can be controlled by the XCC. Information provided from the LCD display of the LCD diagnostics panel could also help isolate an error.

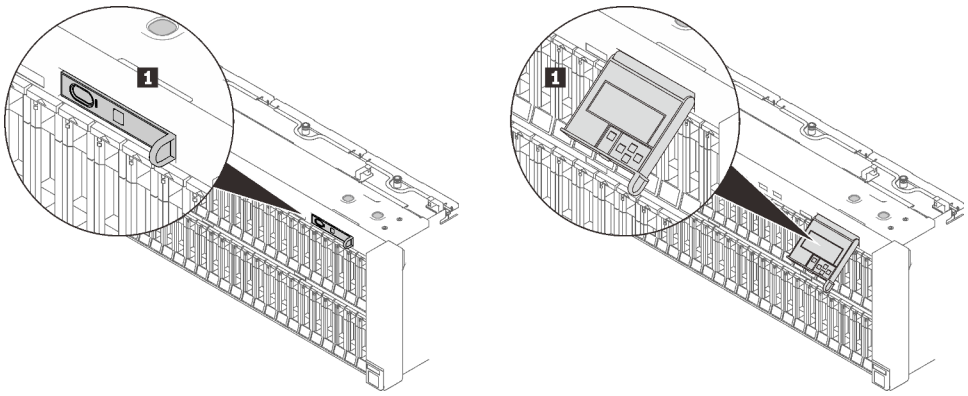
13 Rack release latches

Press on the latch on both sides to disengage the server from the rack and slide it out.

LCD diagnostics panel

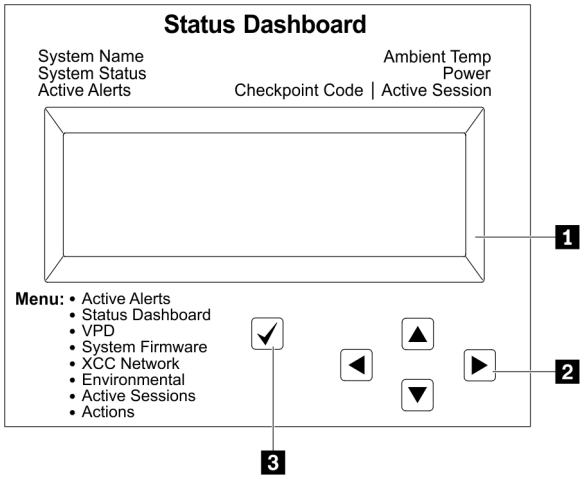
The LCD diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the LCD diagnostics panel

Location	The LCD diagnostics panel is attached to the front of the server. 
Callout	1 The handle with which the panel can be pulled out from the server. **Notes:** • The panel can be pushed in or pulled out regardless of the system power status. • When pulling it out, do it gently to avoid damage.

Display panel overview

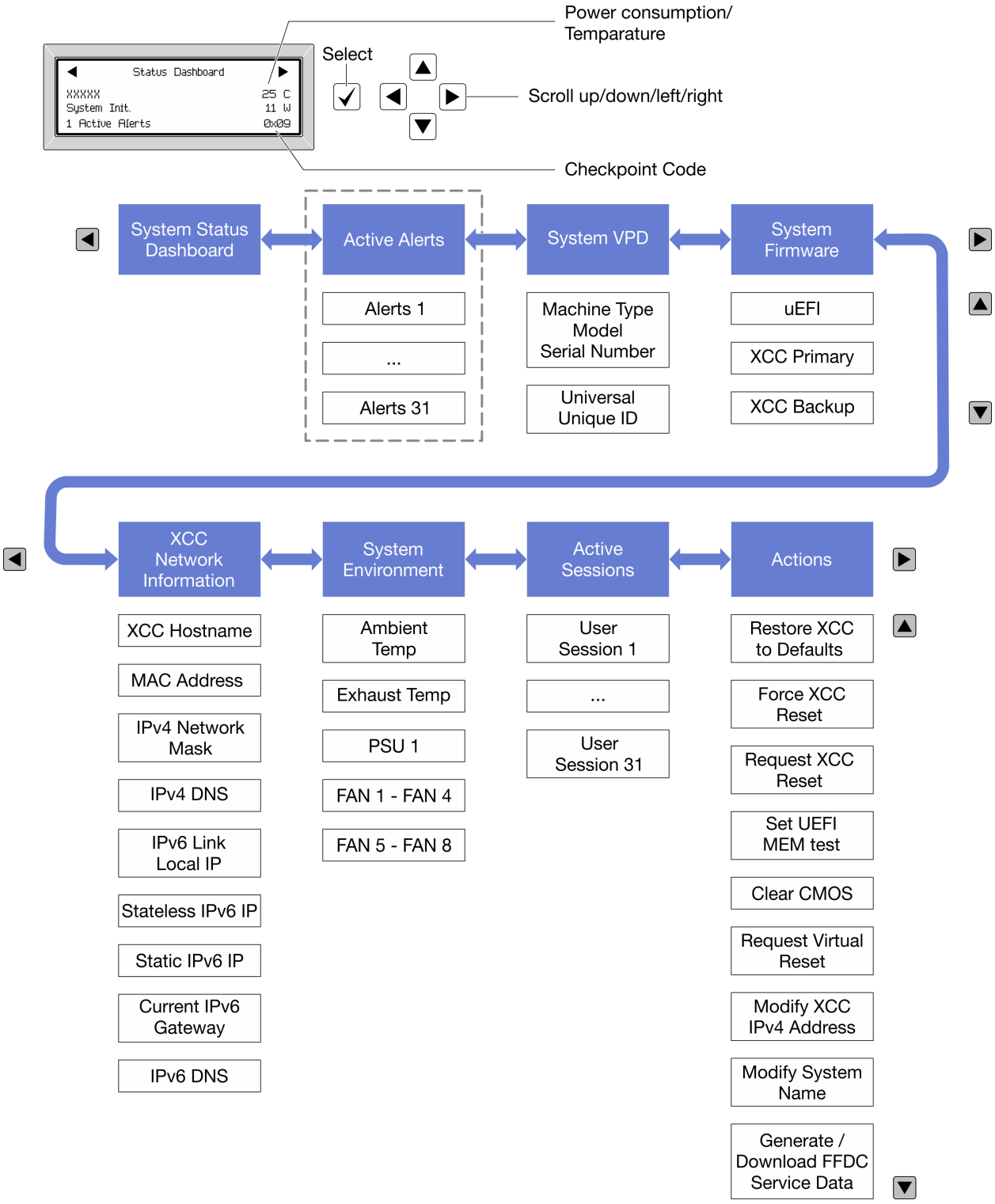
The diagnostics device consists of an LCD display and 5 navigation buttons.



1 LCD display
2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.
3 Select button Press the select button to select from the options in the menu.

Option flow diagram

Depending on the model, the options and entries on the LCD display might be different.

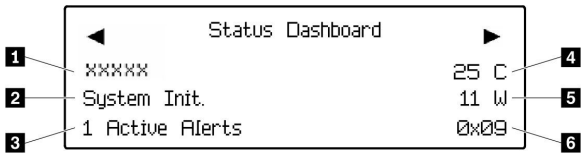


Full menu list

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

Depending on the model, the options and entries on the LCD display might be different.

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	

Active Alerts

Sub Menu	Example
Home screen: Active error quantity **Note:** The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
• Machine type and serial number • Universal Unique ID (UUID)	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary • Firmware level (status) • Build ID • Version number • Release date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup • Firmware level (status) • Build ID • Version number • Release date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
• XCC hostname • MAC address • IPv4 Network Mask • IPv4 DNS • IPv6 Link Local IP • Stateless IPv6 IP • Static IPv6 IP • Current IPv6 Gateway • IPv6 DNS **Note:** Only the MAC address that is currently in use is displayed (extension or shared).	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x

System Environmental Information

Sub Menu	Example
• Ambient temperature • Exhaust temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

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

Actions

Sub Menu	Example
Several quick actions are available: • Restore XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Clear CMOS • Request Virtual Reseat • Modify XCC Static IPv4 Address/Net mask/Gateway • Modify System Name • Generate/Download FFDC Service Data	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

Rear view

This section contains information about the LEDs and connectors on the rear of the server.

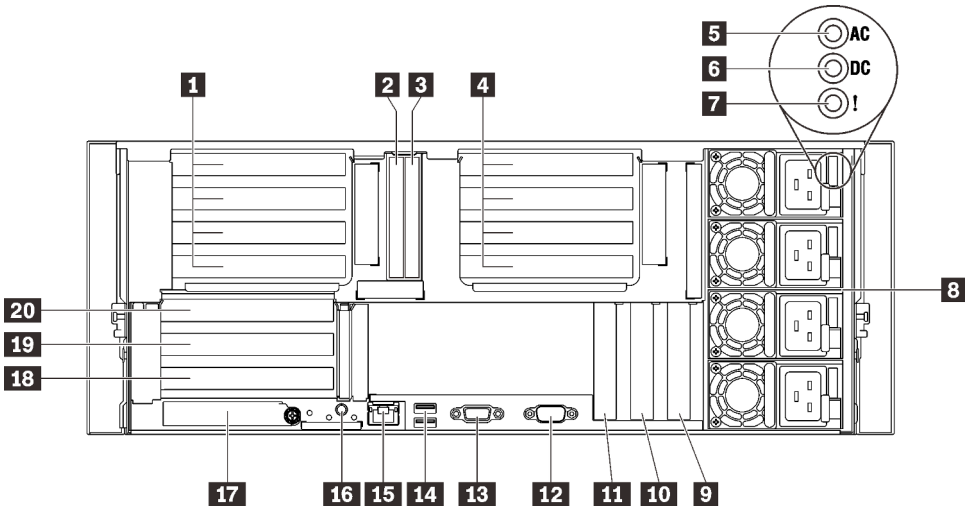


Figure 6. Rear view

Table 4. Components on the rear view

1	“4U PCIe Riser Cage” on page 23 (Riser cage 1, PCIe slot 1-4)	11	“PCI Express 3.0 x16” on page 24 (PCIe slot 13)
2	“7mm/M.2 drive bay” on page 24 (drive bay 0)	12	“Serial connector” on page 24
3	“7mm/M.2 drive bay” on page 24 (drive bay 1)	13	“VGA connector” on page 24
4	“4U PCIe Riser Cage” on page 23 (Riser cage 2, PCIe Slot 9-12)	14	“USB 3.1 connectors” on page 25
5	“AC power LED (green)” on page 24	15	“XClarity Clarity Controller network connector” on page 25
6	“DC power LED (green)” on page 24	16	“NMI button” on page 25
7	“Power supply error LED (yellow)” on page 24	17	“OCP 3.0 Ethernet adapter” on page 25
8	“Power supply units” on page 24	18	“PCIe riser” on page 25 (PCIe slot 7)
9	“PCI Express 3.0 x8” on page 24 (PCIe slot 15)	19	“PCIe riser” on page 25 (PCIe slot 6)
10	“PCI Express 3.0 x8” on page 24 (PCIe slot 14)	20	“PCIe riser” on page 25 (PCIe slot 5)

1/4 4U PCIe Riser Cage

Install PCIe adapters into these riser cages. See the following table for PCIe slots corresponding to the riser cages.

Table 5. 4U PCIe Riser Cages and corresponding PCIe slots

Riser cage type	**x8/x8/x8/x8 riser cage**	**x16/x16 riser cage**
1 Riser cage 1	Slot 1	NA
	Slot 2	Slot 2
	Slot 3	NA
	Slot 4	Slot 4

Table 5. 4U PCIe Riser Cages and corresponding PCIe slots (continued)

4 Riser cage 2	Slot 9	NA
	Slot 10	Slot 10
	Slot 11	NA
	Slot 12	Slot 12

2/3 7mm drive bays

Install 7mm drives to these bays. See “Install a 7mm drive” on page 269 for more details.

5 AC power LED (green)

Each hot-swap power supply unit comes with one AC and one DC power LED. When the AC power LED is lit, it indicates that sufficient power is being supplied to the power supply through the power cord. During normal operation, both the AC and DC power LEDs are lit.

6 DC power LED (green)

Each hot-swap power supply unit comes with one AC and one DC power LED. When the DC power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During normal operation, both the AC and dc power LEDs are lit.

7 Power supply error LED (yellow)

When the power supply error LED is lit, it indicates that the power supply has failed.

8 Power supply units

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. Following are the power supplies supported by this system:

- 750-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC
- 750-watt Titanium, input power 230 Vac / 240 VDC

  Note: When only two units of 750-watt Titanium power supply are installed, 240 VDC is not supported.
- 1100-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC
- 1100-watt Titanium, input power 230 Vac / 240 VDC
- 1800-watt Platinum, input power 230 Vac / 240 VDC
- 1800-watt Titanium, input power 230 Vac / 240 VDC
- 2600-watt Titanium, input power 230 Vac / 240 VDC

9/10/11 PCI Express 3.0

Install adapters, particularly RAID adapters, to these slots.

12 Serial connector

Connect a 9-pin serial device to this connector. The serial port is shared with XCC. XCC can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

13 VGA connector

Connect a monitor to this connector.

Notes:

- When the optional front VGA connector is in use, the rear one will be disabled.
- The maximum video resolution is 1920 x 1200 at 60 Hz.

14 USB 3.1 connectors

Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors.

15 XClarity Controller network connector

Use this connector to manage the server, by using a dedicated management network. If you use this connector, the Lenovo XClarity Controller cannot be accessed directly from the production network. A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the Setup utility to configure the server to use a dedicated systems-management network or a shared network.

16 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

17 OCP 3.0 Ethernet adapter

The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections. One of the Ethernet connectors on the OCP 3.0 Ethernet adapter can also function as a management connector with shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.

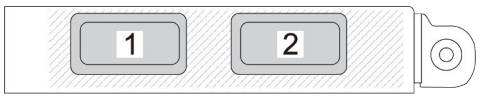


Figure 7. Port numbering — 2-port OCP module

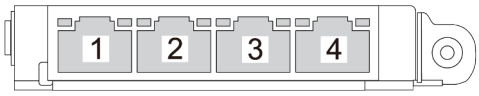


Figure 8. Port numbering — 4-port OCP 3.0 module

18/19/20 PCIe riser

Install a PCIe riser card into these slots. See the following table for PCIe slots corresponding to the riser cards.

Table 6. PCIe riser cards and corresponding PCIe slots

Riser card type	**x16/x16 (x8 lanes) riser card**	**x16/x16/x16 riser card**
20	Slot 5 (x16, x8 lane)	Slot 5 (x16)
19	Slot 6 (x16, x8 lane)	Slot 6 (x16)
18	NA	Slot 7 (x16)

7 DC power LED (green)

Each hot-swap power supply unit comes with one AC and one DC power LED. When the DC power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During normal operation, both the AC and dc power LEDs are lit.

8 Power supply error LED (yellow)

When the power supply error LED is lit, it indicates that the power supply has failed.

Identifying connectors

See this section to locate and identify the connectors on the electric boards.

System board connectors

See this section to identify the connectors on the system board.

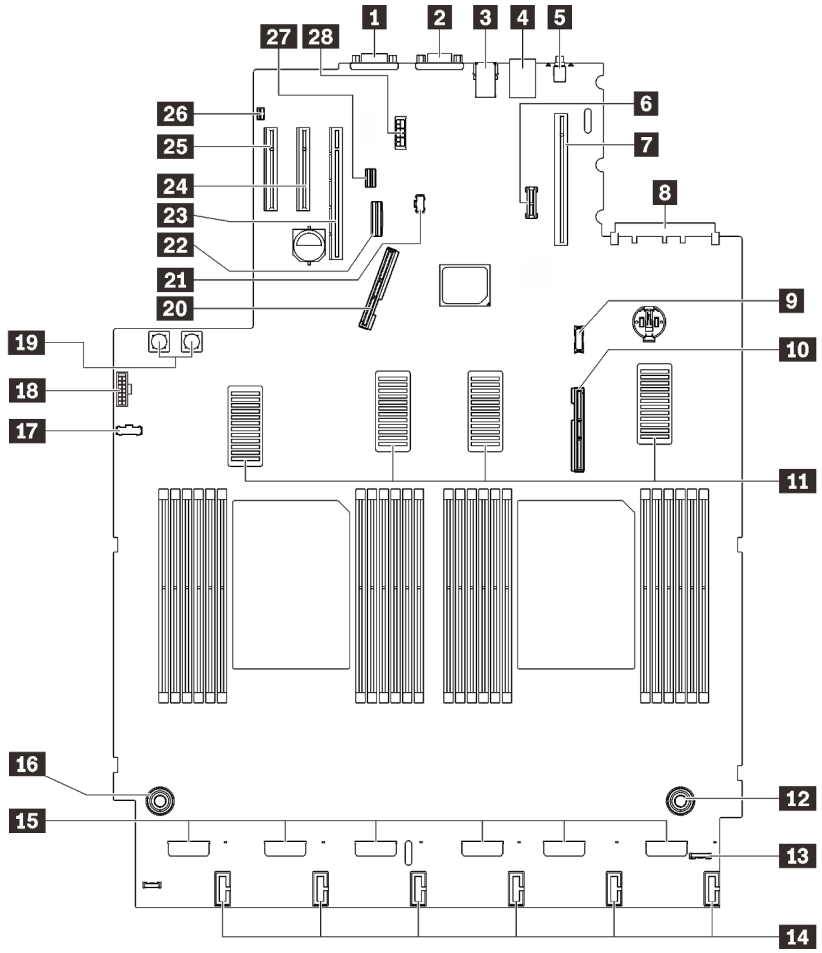


Figure 9. System board connectors

Table 7. System board connectors

1 Serial connector	15 Fan connectors
2 VGA connector	16 Processor and memory expansion tray power connector
3 Two USB 3.1	17 Power backplane sideband connector
4 XClarity Controllernetwork connector	18 Front VGA connector
5 NMI button	19 Power backplane power connector
6 TCM/TPM module	20 PCIe signal connector 1
7 PCIe riser connector (PCIe slot 5 to 7)	21 M.2 backplane power connector
8 PCIe slot 8 (OCP connector)	22 On-board SATA connector
9 USB front panel module connector	23 PCIe slot 13 (x16)
10 PCIe signal connector 2	24 PCIe slot 14 (x8)
11 UPI connectors	25 PCIe slot 15 (x8)

Table 7. System board connectors (continued)

12 Processor and memory expansion tray power connector	26 Intrusion switch connector
13 LCD diagnostics panel connector	27 7mm drive/M.2 signal connector
14 Drive backplane power connectors	28 7mm drive power connector

Processor and memory expansion tray connectors

See this section to locate the connectors on the processor and memory expansion tray.

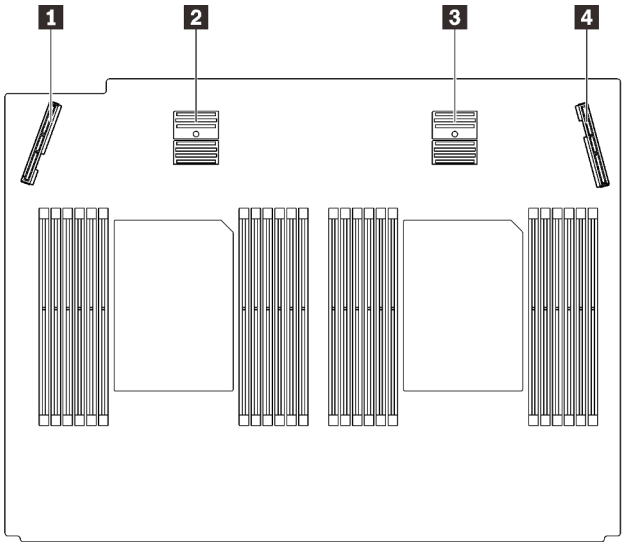


Figure 10. Processor and memory expansion tray connectors

Table 8. Processor and memory expansion tray connectors

1 PCIe signal connector 3	3 PCIe signal connector 5
2 PCIe signal connector 4	4 PCIe signal connector 6

Power backplane connectors

See this section to locate the connectors on the power backplane.

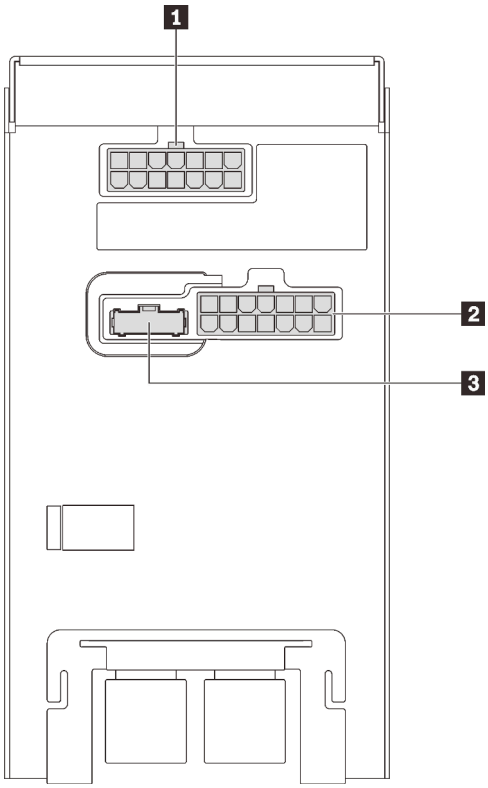


Figure 11. Power backplane connectors

Table 9. Power backplane connectors

1 4U PCIe riser cage 2 power cable connector	3 Power backplane sideband connector
2 4U PCIe riser cage 1 power cable connector	

Note: Make sure to connect corresponding power cables to the power connectors.

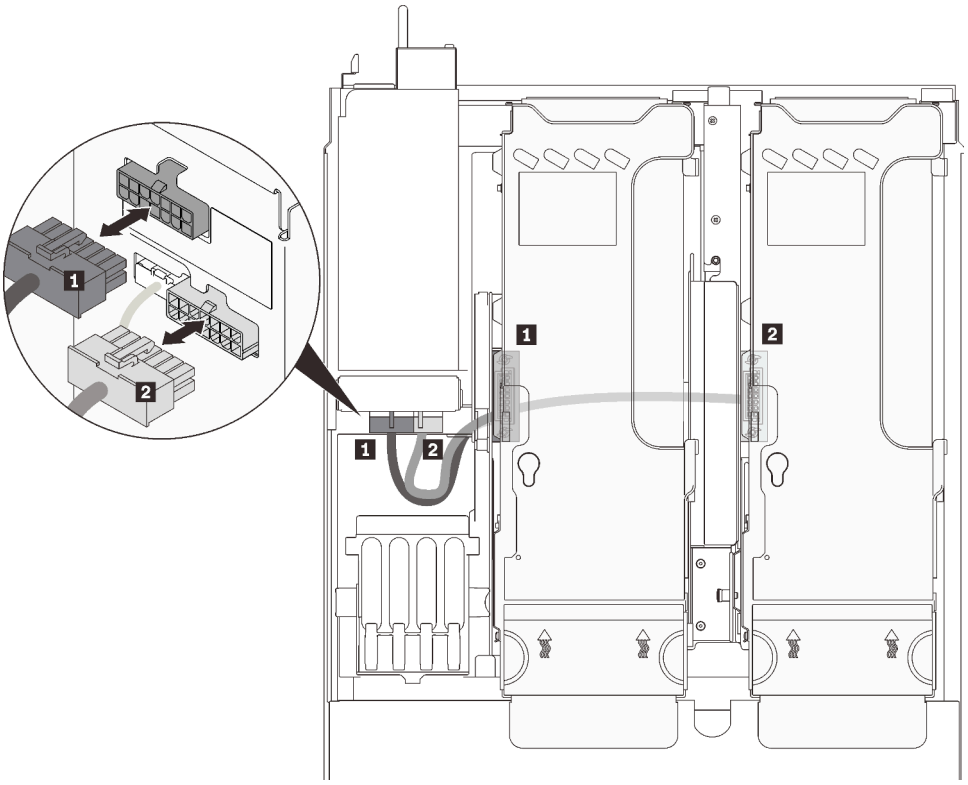


Figure 12. 4U PCIe riser power cables

Table 10. 4U PCIe riser power cables

Length	From	To
1 230 mm (shorter)	PCIe riser cage 2	upper power connector
2 320 mm (longer)	PCIe riser cage 1	lower power connector

2.5-inch 8-bay drive backplane connectors

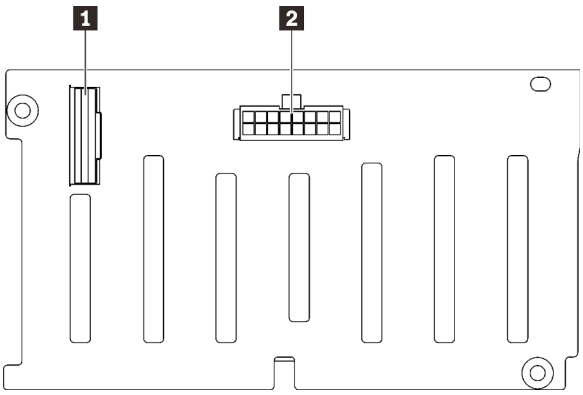
See this section to locate the connectors in the 2.5-inch 8-bay drive backplanes.

Two types of 2.5-inch 8-bay drive backplanes are supported in this system:

- “SAS/SATA drive backplane” on page 33
- “AnyBay/NVMe drive backplane” on page 34

SAS/SATA drive backplane

See this section to locate the connectors on the SAS/SATA drive backplanes.

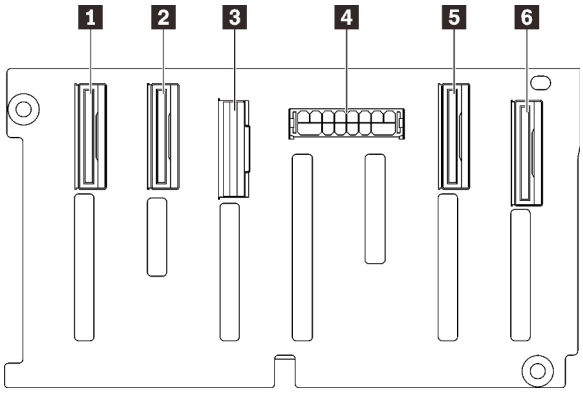


1 SAS/SATA signal connector
2 Backplane power/configuration connector

Figure 13. SAS/SATA drive backplane connectors

AnyBay/NVMe drive backplane

See this section to locate the connectors on the AnyBay/NVMe drive backplanes.



1 NVMe signal connector (6-7)
2 NVMe signal connector (4-5)
3 SAS/SATA signal connector
4 Backplane power/configuration connector
5 NVMe signal connector (2-3)
6 NVMe signal connector (0-1)

Figure 14. AnyBay/NVMe drive backplane connectors

PCIe riser card connectors

See this section to locate the connectors on the PCIe riser cards.

Two types of riser cards are supported:

- "x16/x16 (x8 lanes) PCIe riser card" on page 35
- "x16/x16/x16 PCIe riser card" on page 36

x16/x16 (x8 lanes) PCIe riser card

See this section to locate the connectors on the x16/x16 (x8 lanes) PCIe riser card.

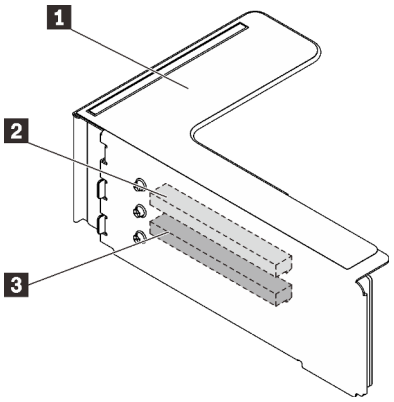


Figure 15. x16/x16 (x8 lanes) PCIe riser card connectors

Table 11. x16/x16 (x8 lanes) PCIe riser card connectors

1 PCIe full-height riser	3 PCI Express 3.0 x16 (x8 lane) (Slot 2)
2 PCI Express 3.0 x16 (x8 lane) (Slot 1)	

x16/x16/x16 PCIe riser card

See this section to locate the connectors on the x16/x16/x16 PCIe riser card.

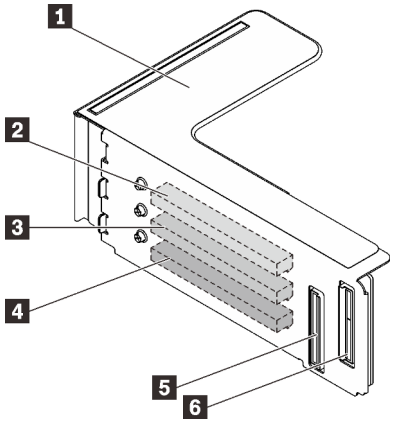


Figure 16. x16/x16/x16 PCIe riser card connectors

1 PCIe full-height riser	4 PCI Express 3.0 x16 (Slot 7)
2 PCI Express 3.0 x16 (Slot 5)	5 PCIe cable connector (to PCIe connector 1)
3 PCI Express 3.0 x16 (Slot 6)	6 PCIe cable connector (to PCIe connector 2)

4U PCIe riser cage connectors

See this section to locate the connectors in the 4U PCIe riser cages.

Two zones (Slot 1 to 4 and Slot 9 to 12) are available the following 4U PCIe riser cages:

- “x16/x16 PCIe FH riser cage” on page 37
- “x8/x8/x8/x8 PCIe FH riser cage” on page 38

x16/x16 PCIe FH riser cage

See this section to locate the connectors in the x16/x16 4U PCIe riser cage.

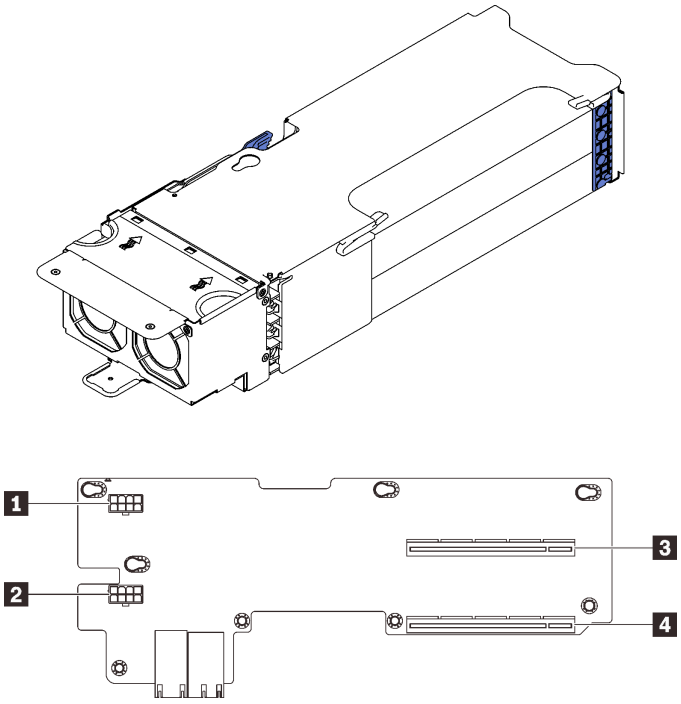


Figure 17. x16/x16 PCIe FH Riser Cage

Table 12. Connectors on x16/x16 PCIe FH Riser Cage

1 Auxiliary power connector	3 PCI Express 3.0 x16 (slot 2/10)
2 Auxiliary power connector	4 PCI Express 3.0 x16 (slot 4/12)

x8/x8/x8/x8 PCIe FH riser cage

See this section to locate the connectors in the x8/x8/x8/x8 4U PCIe riser cage.

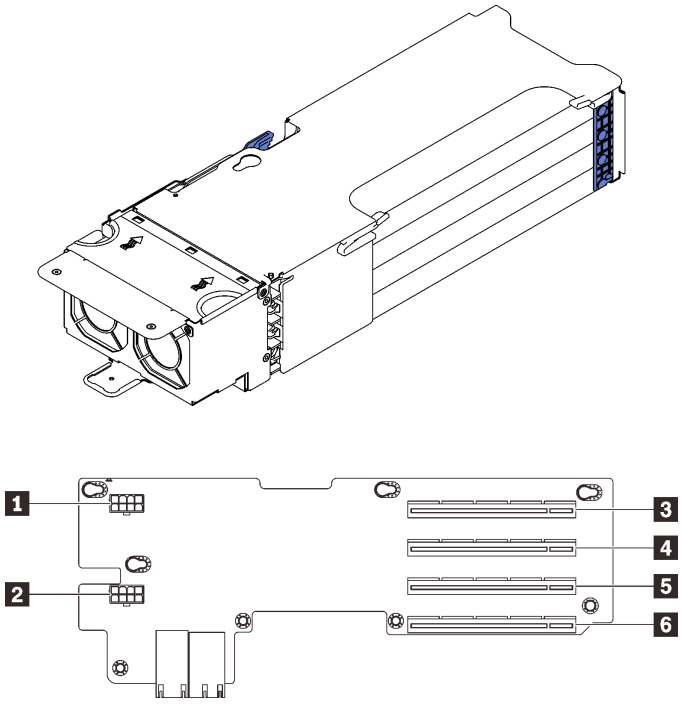


Figure 18. x8/x8/x8/x8 PCIe FH Riser Cage

Table 13. Connectors on x8/x8/x8/x8 PCIe FH Riser Cage

1 Auxiliary power connector	4 PCI Express 3.0 x8 (slot 2/10)
2 Auxiliary power connector	5 PCI Express 3.0 x8 (slot 3/11)
3 PCI Express 3.0 x8 (slot 1/9)	6 PCI Express 3.0 x8 (slot 4/12)

Switches, jumpers, and buttons

The following illustration shows the location of the switches, jumpers, and buttons on the server.

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

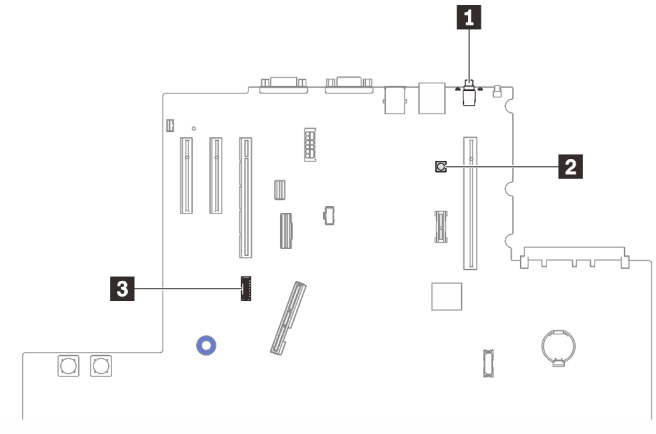


Figure 19. Switches, jumpers and buttons

1 “NMI button” on page 39	3 “SW4” on page 39
2 “Light path button” on page 39	

NMI button

Table 14. NMI button

Button name	Function
Force NMI button	This button is on the rear of the server. Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue screen memory dump (use this button only when you are directed to do so by Lenovo Support).

Light path button

Table 15. Light path button

Button name	Function
Light path button	Press this button to light the LEDs on the system board when the power source has been removed from the server.

SW4

See the following table for SW4 switch block functions.

Table 16. System board SW4 switch block descriptions

Switch number	Default position	Off	On
1, 16	Off	Host TPM Physical Presence disabled	Host TPM Physical Presence enable
2, 15	Off	PASSWORD_OVERRIDE function disabled	PASSWORD_OVERRIDE function enabled
3, 14	Off	Serial port message from uEFI	Serial port message from Lenovo XClarity Controller
4, 13	Off	XCC TPM Physical Presence disabled	XCC TPM Physical Presence enabled
5, 12	Off	Managing Engine recovery mode disabled	Managing Engine set to recovery mode

Table 16. System board SW4 switch block descriptions (continued)

Switch number	Default position	Off	On
6, 11	Off	Managing Engine security override disabled	Managing Engine security override enabled
7, 10	Off	Reserved	
8, 9	Off		Real time clock reset

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in https://pubs.lenovo.com/safety_documentation/, “Installation Guidelines” on page 137, “Handling static-sensitive devices” on page 140, and “Power off the server” on page 12.
2. Any system board switch or jumper block that is not shown in the illustrations in this document are reserved.

System board LEDs

See this section to locate the LEDs on the system board.

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

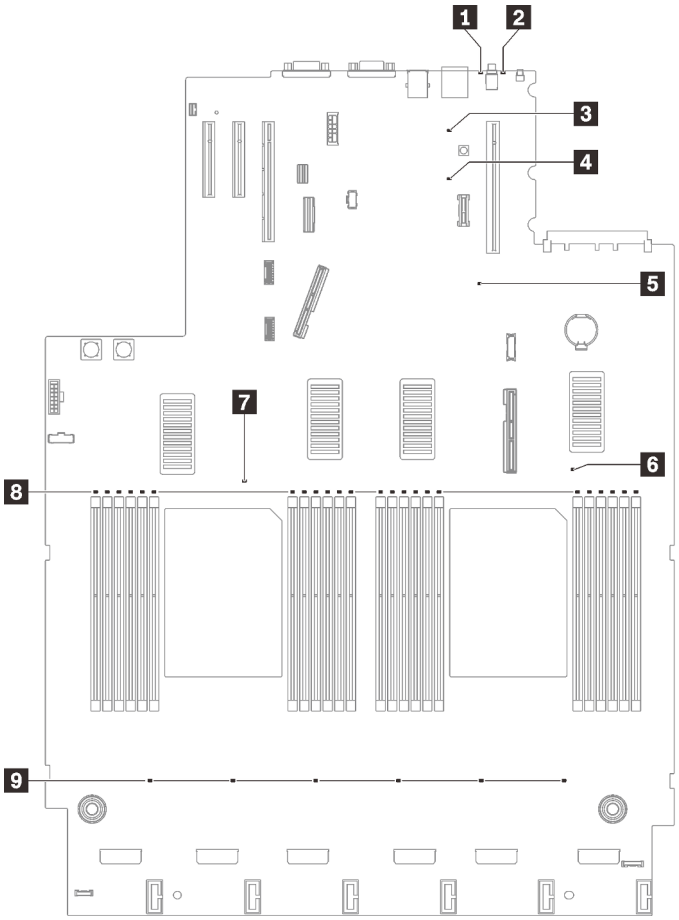


Figure 20. System-board LEDs

Table 17. System board LEDs

1 System error LED (yellow)	6 Processor 2 error LED
2 Identification LED (blue)	7 Processor 1 error LED
3 Light path power LED	8 DIMM 1-24 error LEDs
4 XCC heartbeat LED (Green)	9 Fan error LEDs
5 FPGA heartbeat LED (Green)	

Processor and memory expansion tray LEDs

See this section to locate the LEDs on the processor and memory expansion tray.

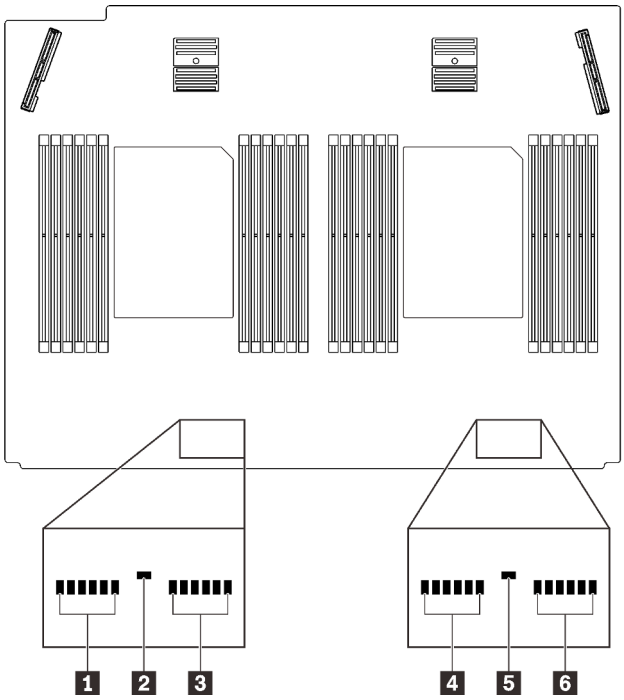


Figure 21. Processor and memory expansion tray LEDs

Table 18. Processor and memory expansion tray LEDs

1 DIMM 25-30 error LEDs	4 DIMM 37-42 error LEDs
2 Processor 3 error LED	5 Processor 4 error LED
3 DIMM 31-36 error LEDs	6 DIMM 43-48 error LEDs

Parts list

Identify each of the components that is available for your server with the parts list.

For more information about ordering the parts shown in Figure 22 “Server components” on page 43:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
2. Click **Parts & Accessories → Parts Lookup**.
3. Enter either the serial number or the machine type model for your server to see the parts for your server.

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

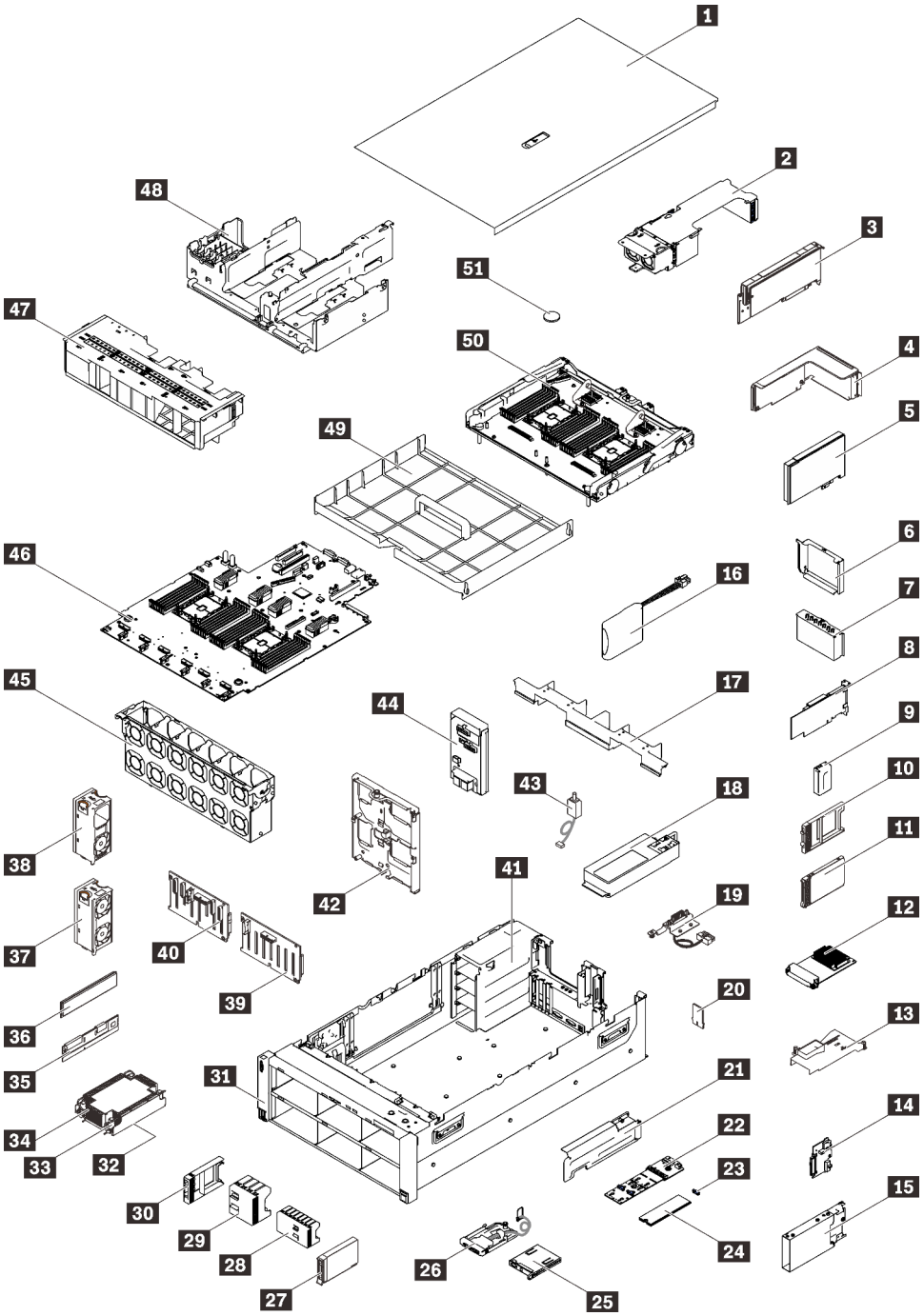


Figure 22. Server components

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

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

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 19. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 22 “Server components” on page 43: http://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v2/parts It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover	√			
2	4U PCIe riser cage		√		
3	4U PCIe adapter	√			
4	PCIe riser card assembly		√		
5	Adapter	√			
6	PCIe riser cage filler	√			
7	PCIe riser filler	√			
8	RAID adapter	√			
9	7mm drive cage filler	√			
10	7mm drive filler	√			
11	7mm drive	√			
12	OCP 3.0 Ethernet adapter	√			
13	OCP Ethernet adapter air baffle	√			
14	7mm drive backplane	√			
15	7mm drive cage	√			
16	Flash power module	√			
17	Expansion tray air baffle	√			
18	Power supply unit	√			
19	4U PCIe riser power cable assembly	√			
20	TPM card (for Chinese Mainland only)			√	
21	M.2 bracket		√		
22	M.2 backplane	√			
23	M.2 retainer clip	√			
24	M.2 drive	√			
25	LCD diagnostics panel	√			

Table 19. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
26	USB front panel module		√		
27	2.5-inch drive	√			
28	8-bay 2.5-inch drive filler	√			
29	4-bay 2.5-inch drive filler	√			
30	2.5-inch drive filler	√			
31	Front VGA assembly		√		
32	Processor			√	
33	Heat sink Torx T30		√		
34	Heat sink			√	
35	Persistent Memory Module (PMEM)		√		
36	DRAM DIMM		√		
37	Dual-fan module	√			
38	Single-fan module	√			
39	2.5-inch 8-bay SAS/SATA backplane	√			
40	2.5-inch 8-bay AnyBay/NVMe backplane	√			
41	Chassis			√	
42	Drive backplane carrier	√			
43	Intrusion switch	√			
44	Power backplane	√			
45	Fan cage	√			
46	System board			√	
47	Chassis air baffle	√			
48	PCIe expansion tray	√			
49	System air baffle	√			
50	Processor and memory expansion tray			√	
51	CMOS battery (CR2032)				√

Power cords

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

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

1. Go to:

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

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

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 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.

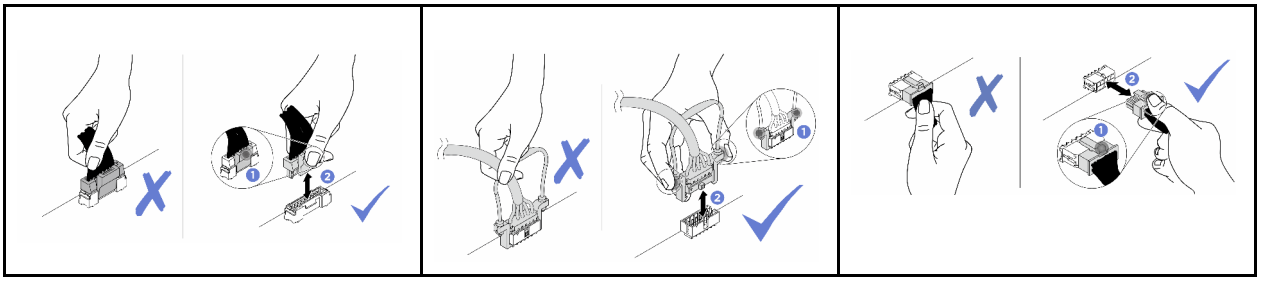
Chapter 3. Internal cable routing

See this section to do cable routing for specific components.

Attention: 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. Strictly observe the following instructions to avoid damaging cable sockets on the system board. Any damage to the cable sockets might require replacing the system board.

- Connect cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.
- To disconnect cables from the system board, do as follows:
  1. Press and hold all latches, release tabs, or locks on cable connectors to release the cable connectors.
  2. Remove the cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

     Note: The cable connectors might look different from those in the illustration, but the removal procedure is the same.



Cable routing for 2.5-inch drives

Follow the instructions in this section to learn how to do cable routing for 2.5-inch drives.

Go through the following list to acquire necessary information before starting cable routing for 2.5-inch drives.

Preliminary parts removal and installation

1. Make sure the following components are removed beforehand:
   - Top cover (see “Remove the top cover” on page 241)
   - Both 4U PCIe riser cages (see “Remove a 4U PCIe riser cage” on page 256)
   - Chassis air baffle (see “Remove the chassis air baffle” on page 271)
   - 4U PCIe expansion tray (see “Remove the 4U PCIe expansion tray” on page 250)
   - Processor and memory expansion tray (see “Remove the processor and memory expansion tray” on page 220)
   - Fan cage (see “Remove the fan cage assembly” on page 153)
2. Make sure to install all the drive backplanes that you plan to installed (see “Install a drive backplane carrier assembly” on page 144).

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Power cables

Connect power cables to drive backplanes as illustrated.

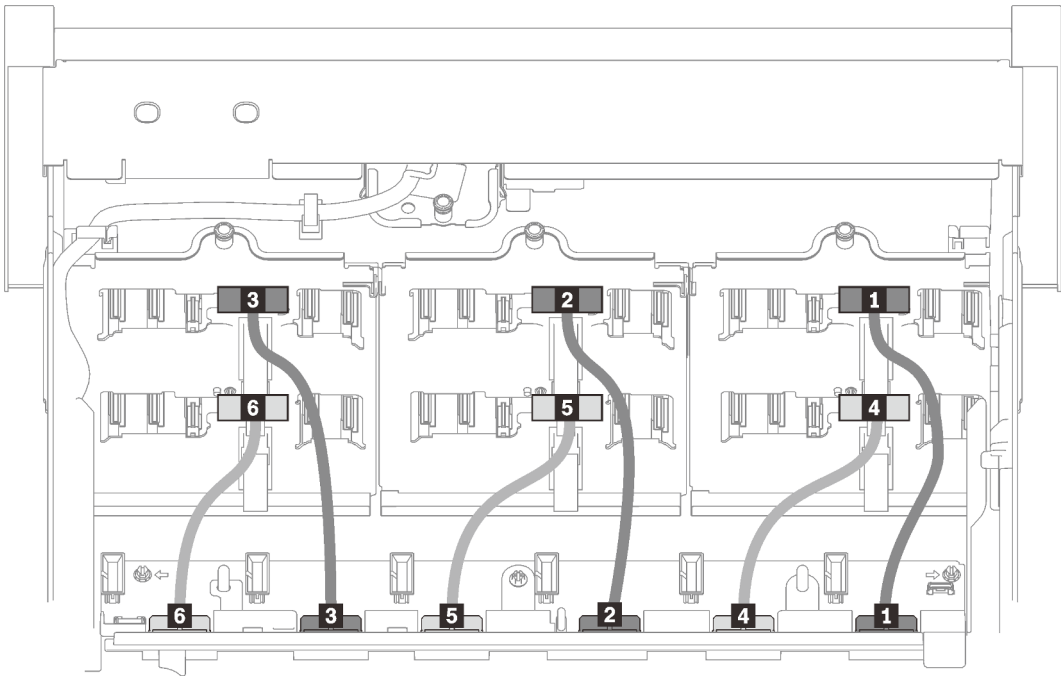


Figure 23. Drive backplane power cables

Table 20. Drive backplane power cables

1 Drive backplane 1 to connector 1	4 Drive backplane 4 to connector 4
2 Drive backplane 2 to connector 2	5 Drive backplane 5 to connector 5
3 Drive backplane 3 to connector 3	6 Drive backplane 6 to connector 6

Cable guides

Make sure all the signal cables go through the cable guides on the system board and the memory expansion tray.

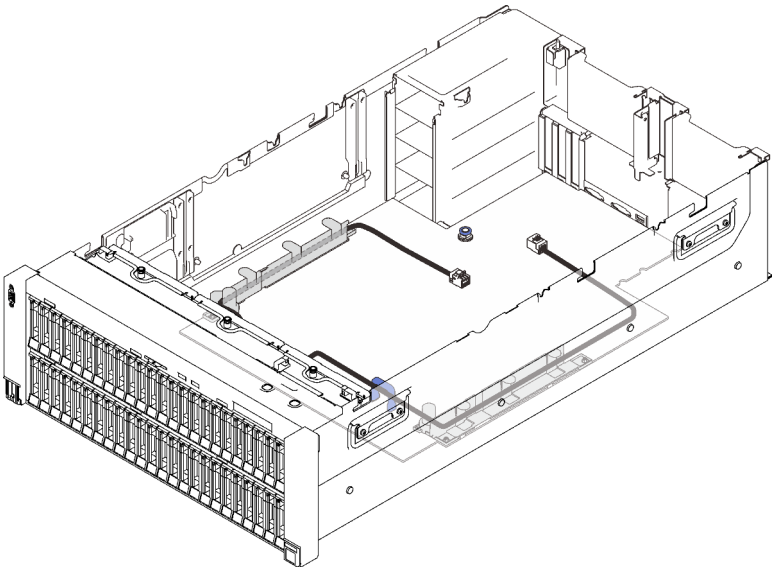


Figure 24. Cable guides on the system board

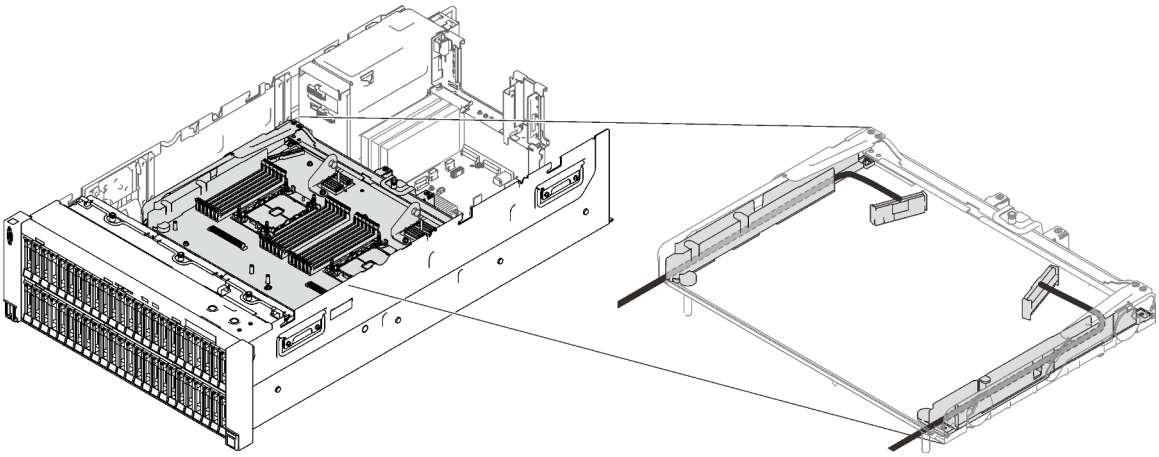


Figure 25. Cable guides on the processor and memory expansion tray

SAS/SATA cables for Gen3 and Gen4 RAID adapters

When picking cables for 8i and 16i RAID adapters from SAS/SATA cable kits, make sure to choose the cables based on the generation of RAID adapters that you plan to install:

- **Gen3 RAID adapters** (430-8i, 930-8i, 430-16i, 530-16i, 930-16i): MiniSAS to Slimline cable
- **Gen4 RAID adapters** (940-8i, 940-16i): Slimline cable

Backplane and PCIe slot reference

See the engraving on the cable connector for reference of PCIe slots to installed RAID adapters or PCIe switch cards in. For example, “BP 1/4” and “Slot 15/14 means the cable could be applied to the following scenarios:

- Connecting backplane 1 to RAID adapter that is installed in slot 15
- Connecting backplane 4 to RAID adapter that is installed in slot 14

Connecting cables to the processor and memory expansion tray

Follow the instructions in this section to learn how to connect cables to the processor and memory expansion tray.

When working on cable routing plans that involve the processor and memory expansion tray, perform the procedure in the following order.

1. Connect the following:
   - Connect all the cables in the plan to corresponding drive backplanes.
   - Connect all the SAS/SATA cables to the adapters or the on-board SAS/SATA connector.
   - If applicable, connect the two PCIe cables to the connectors on the system board.
2. Install the expansion tray air baffle.

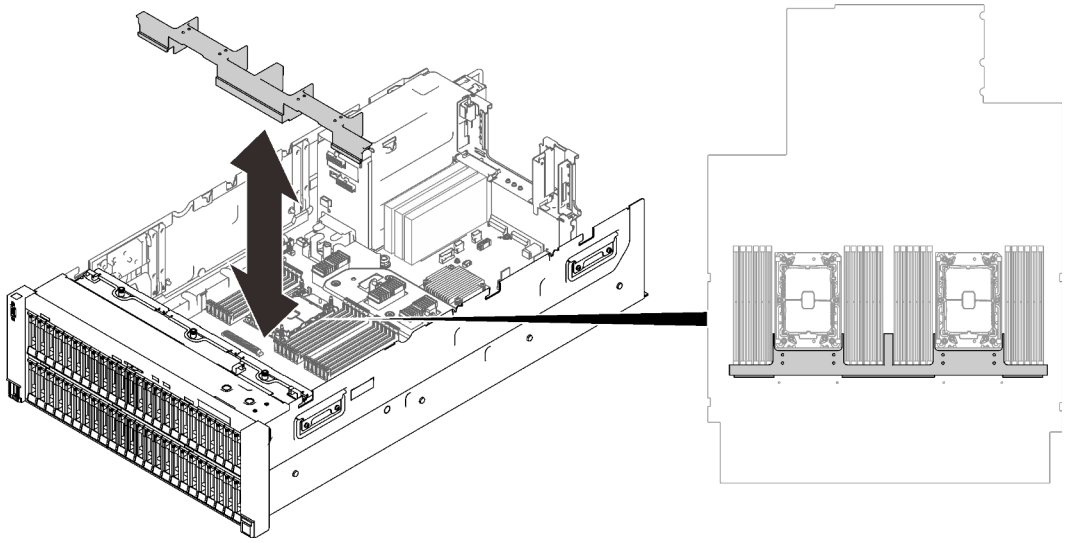


Figure 26. Installing the expansion tray air baffle

3. Align the processor and memory expansion tray with the two pairs of guides on the sides, and lower it into the chassis.

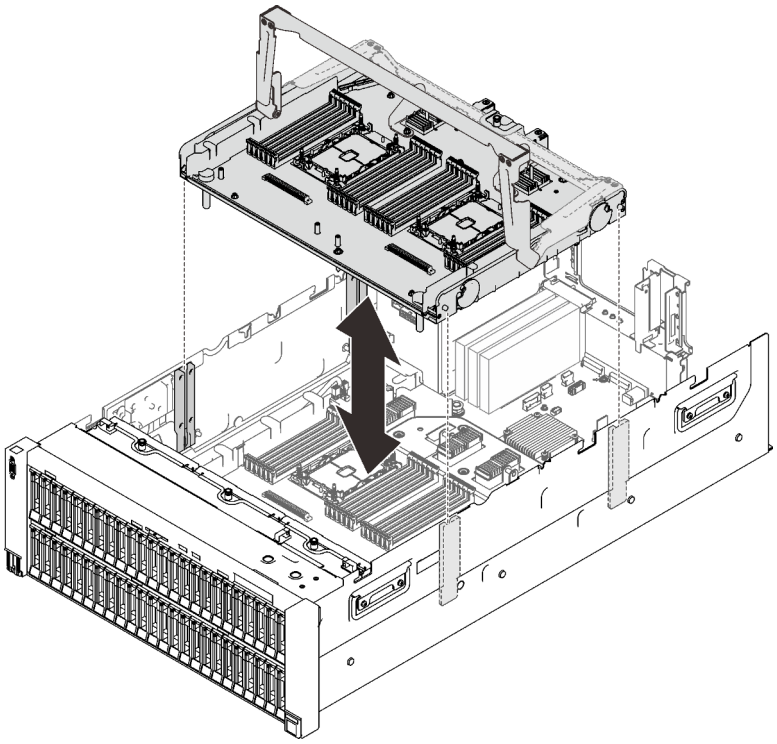


Figure 27. Installing the processor and memory expansion tray

4. Route the two PCIe cables through the side cable guides, and connect them to the processor and memory expansion tray.

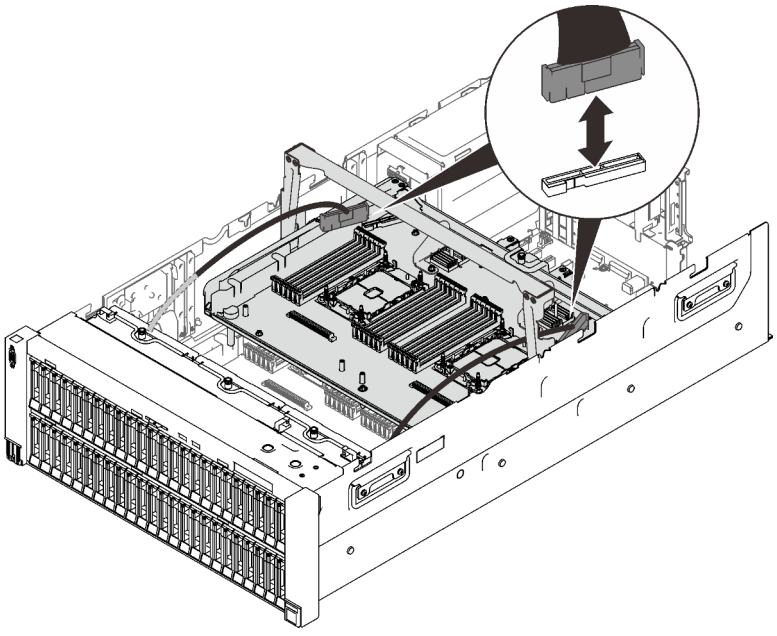


Figure 28. Connecting cables to the expansion tray

5. Secure the processor and memory expansion tray.

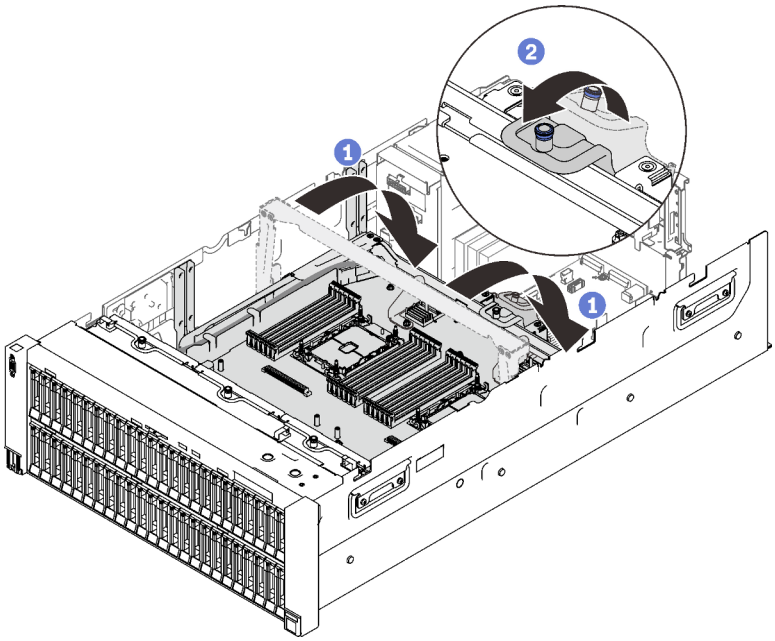


Figure 29. Securing the processor and memory expansion tray

1 Rotate the handle all the way down. This connects and fixes the expansion tray to the system board.

2 Pull the retaining tab back to secure the handle.

Connecting cables to the NVMe switch cards

Follow the instructions in this section to learn how to connect cables to the NVMe switch cards.

When working on cable routing plans that involve NVMe switch cards, perform the procedure in the following order.

Step 1. Complete the procedure in "Connecting cables to the processor and memory expansion tray" on page 51.

Step 2. Install the 4U PCIe expansion tray (see "Install the 4U PCIe expansion tray" on page 253).

Step 3. Rout the four PCIe cables in the following order:

1. through the side cable guide in the chassis
2. through the cable clips on the processor and memory expansion tray
3. through the spine of the 4U PCIe expansion tray

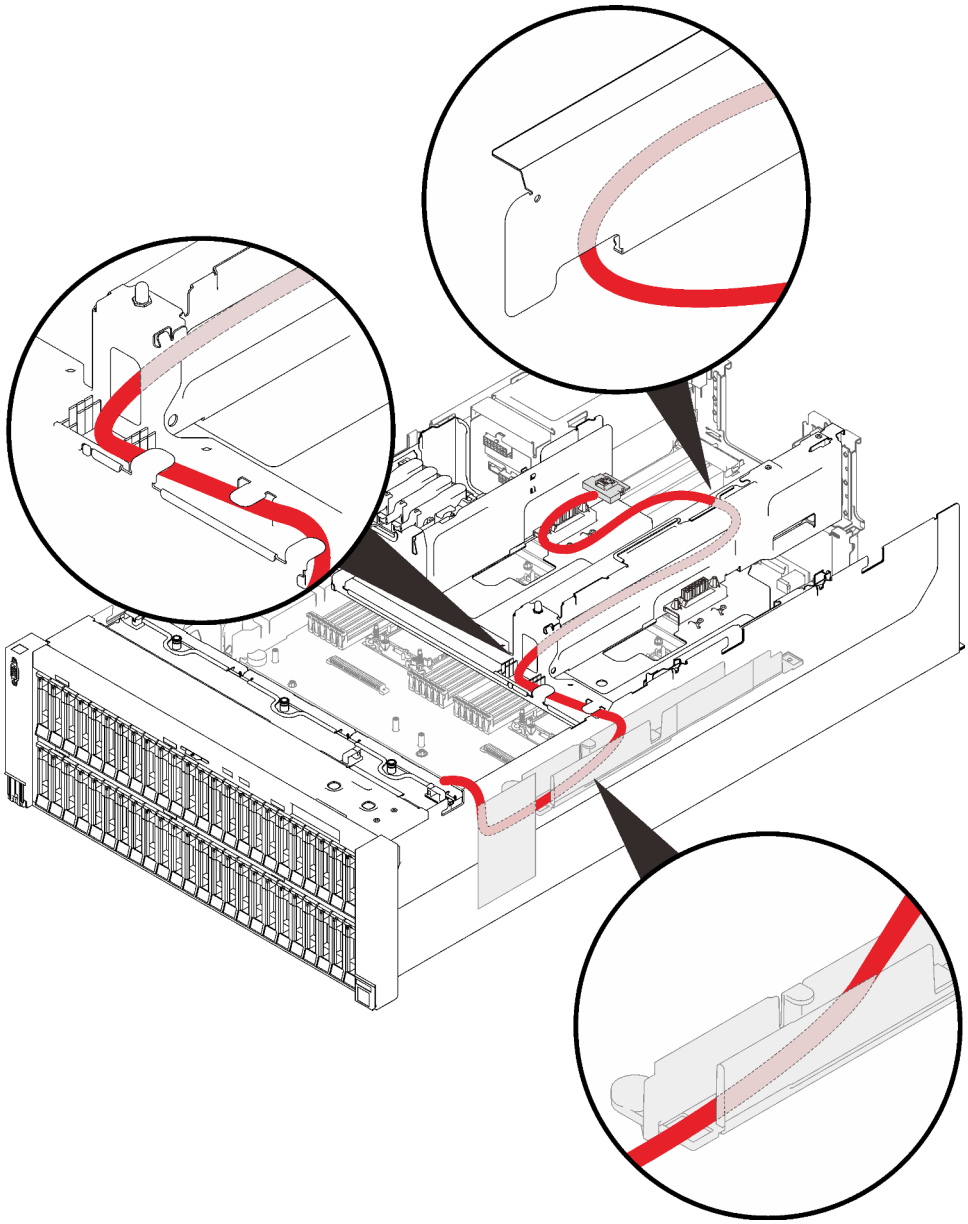
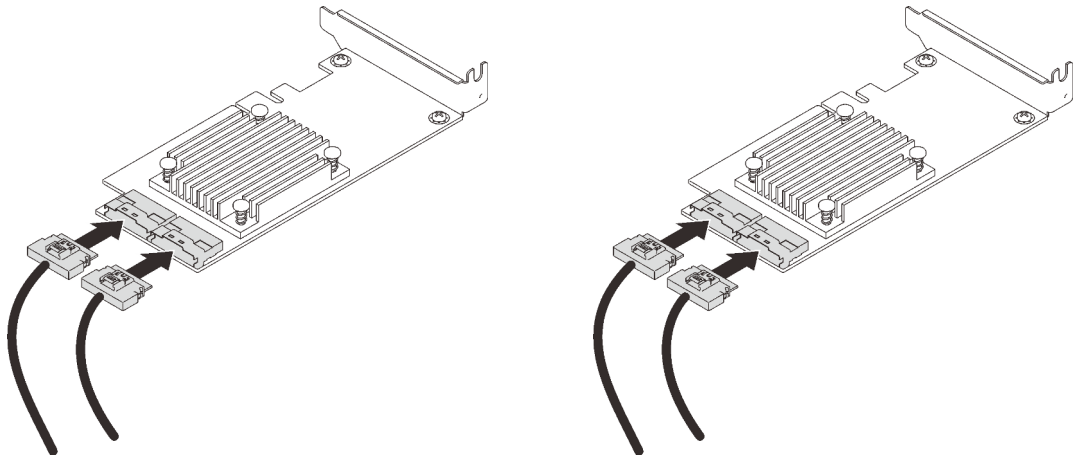


Figure 30. Routing cables for the NVMe switch cards

Step 4. Connect the four PCIe cables to the two NVMe switch cards.



Note: Make sure to match the drive backplane and NVMe switch card connectors as following:

Table 21. Drive backplane and NVMe switch card connectors

AnyBay/NVMe drive backplane connector	Switch card connector
0-1	**C0**
2-3	**C1**
4-5	**C0**
6-7	**C1**

Figure 31. Connecting cables to the NVMe switch cards

Step 5. Open the retainers of x16/x16 4U PCIe riser cage, and install the two NVMe switch cards to corresponding slots:

Table 22. NVMe switch cards and corresponding PCIe slot numbers

	AnyBay/NVMe drive backplane connectors	PCIe slot number
1	0-1, 2-3	Slot 10
2	4-5, 6-7	Slot 12

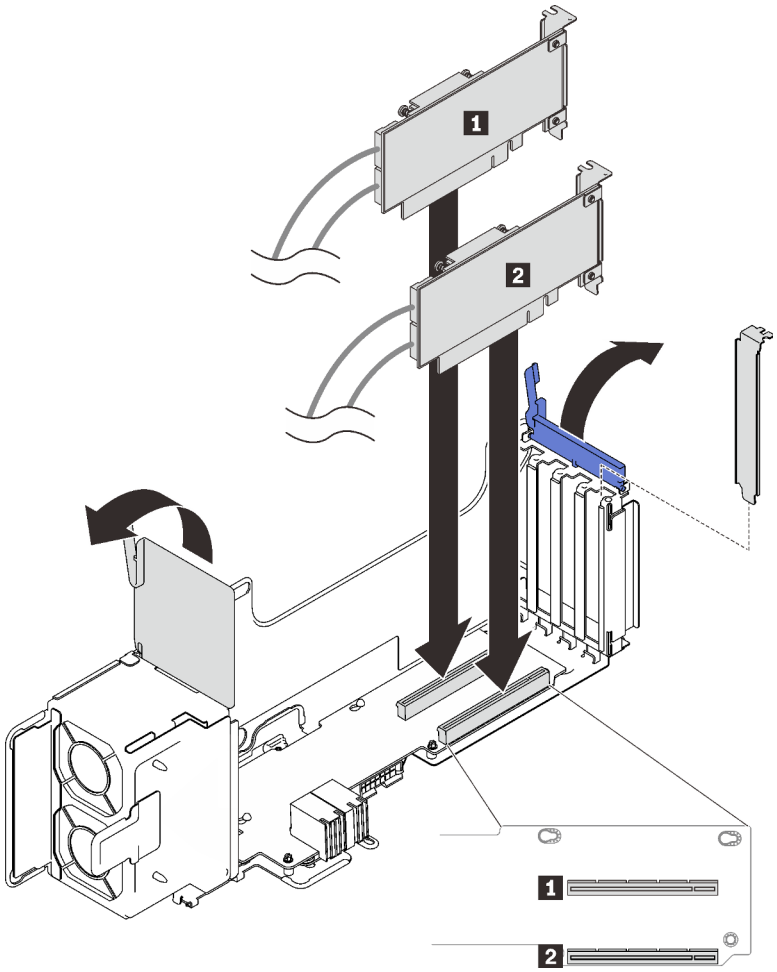


Figure 32. Connecting cables to the NVMe switch cards

Then, close the retainers to secure the adapters.

SAS/SATA backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with SAS/SATA backplanes.

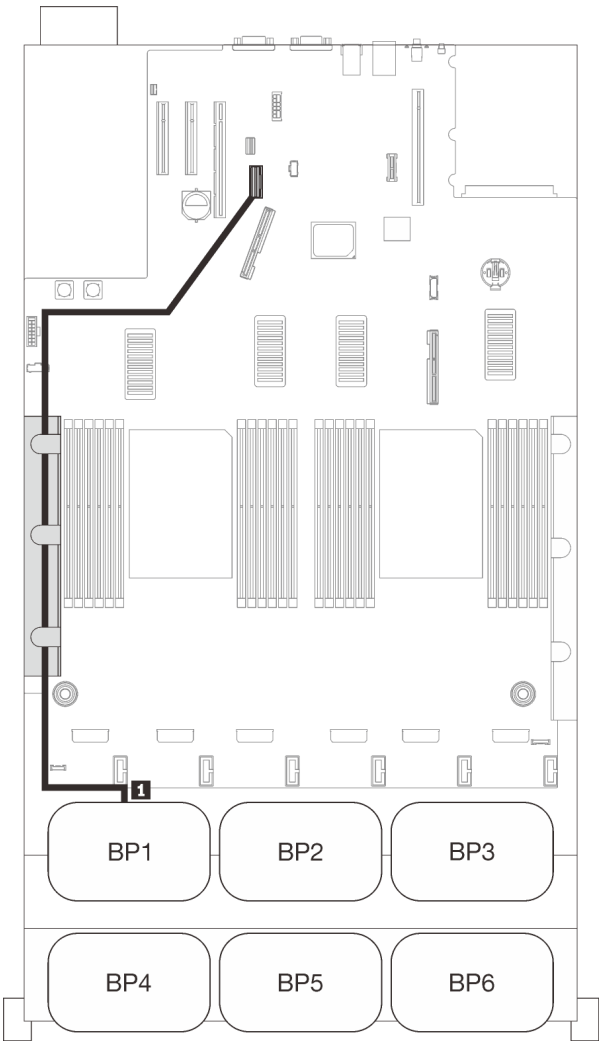
See the following sections for cable routing combinations with only SAS/SATA drive backplanes.

- “One backplane” on page 57
- “Two backplanes” on page 60
- “Three backplanes” on page 61
- “Four backplanes” on page 63
- “Six backplanes” on page 65

One backplane

One SAS/SATA backplane

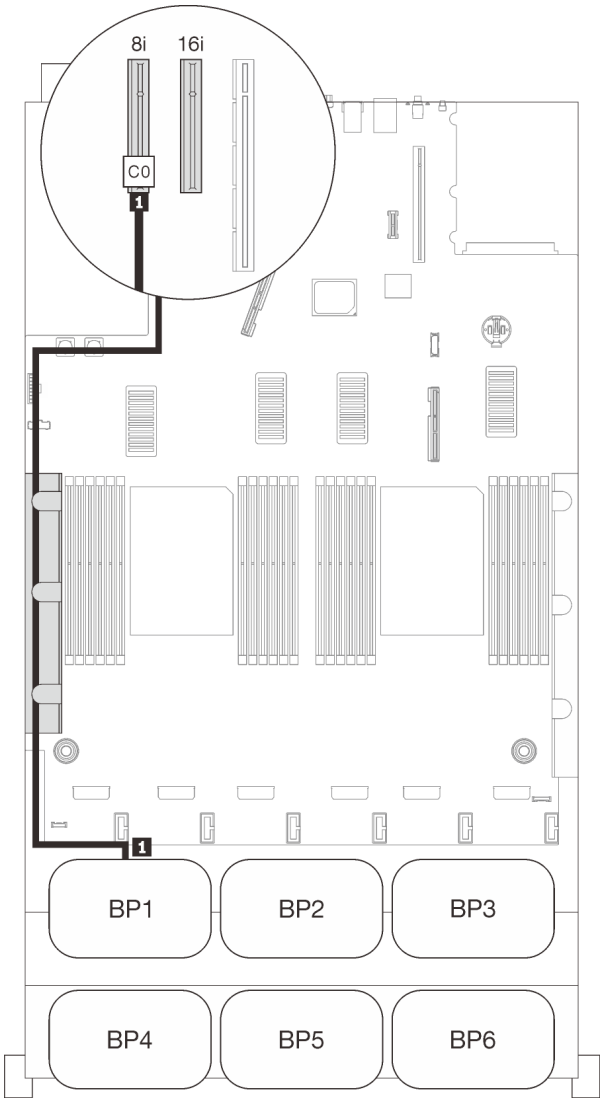
On-board connector



SAS/SATA cable routing

	Length	To
1	845 mm	On-board

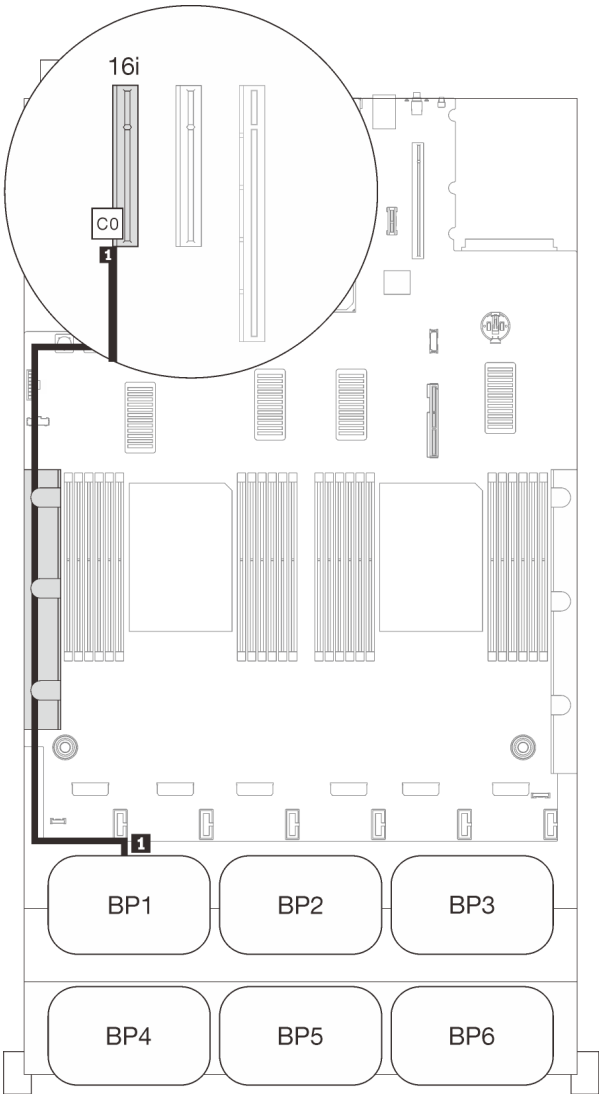
8i RAID adapter



SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (8i)

16i RAID adapter



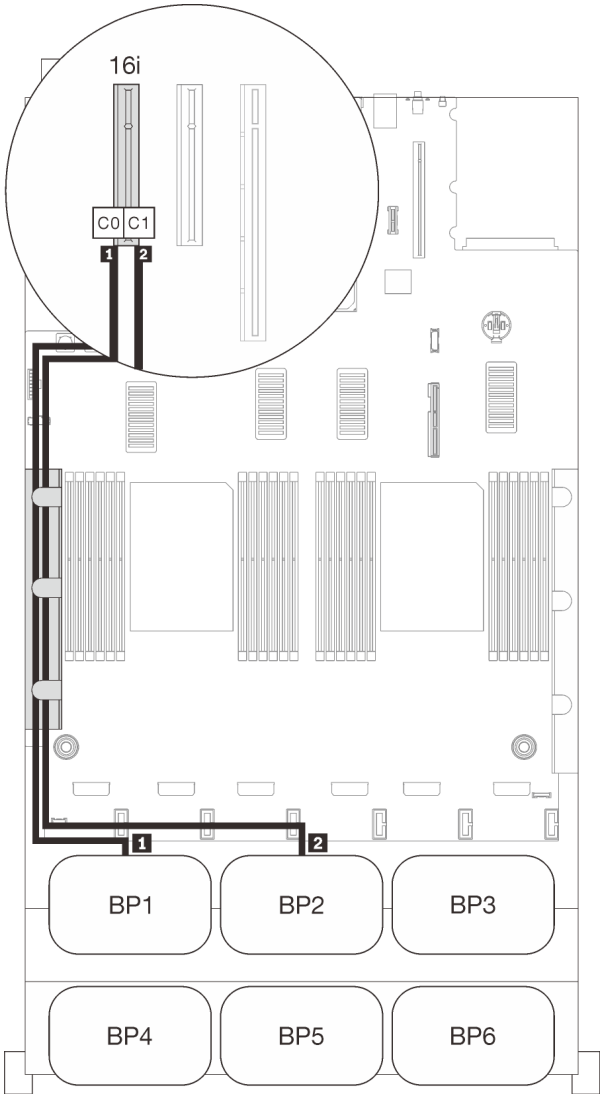
SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)

Two backplanes

Two SAS/SATA backplanes

16i RAID adapter



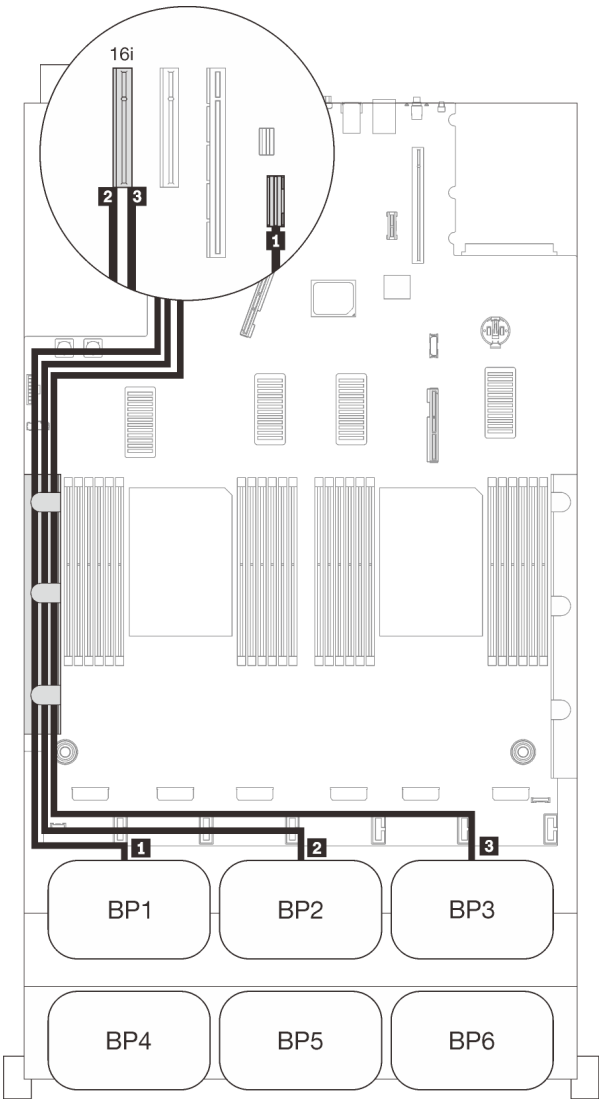
SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)
2	860 mm	C1 (16i)

Three backplanes

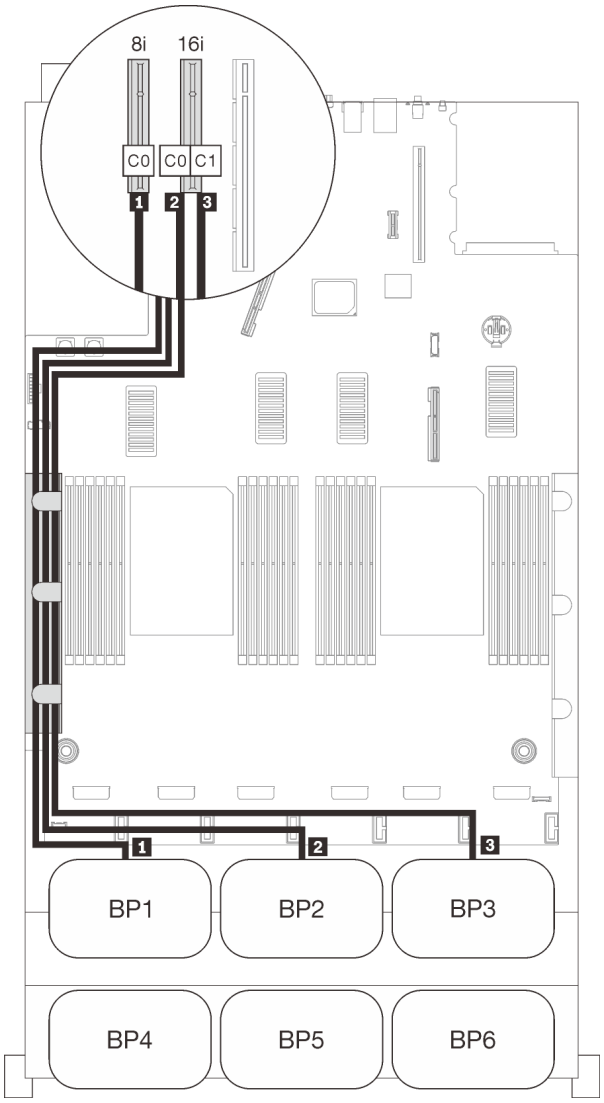
Three SAS/SATA backplanes

On-board connector + 16i RAID adapter



SAS/SATA cable routing		
	Length	To
1	845 mm	On-board
2	860 mm	C0 (16i)
3	1000 mm	C1 (16i)

8i + 16i RAID adapter



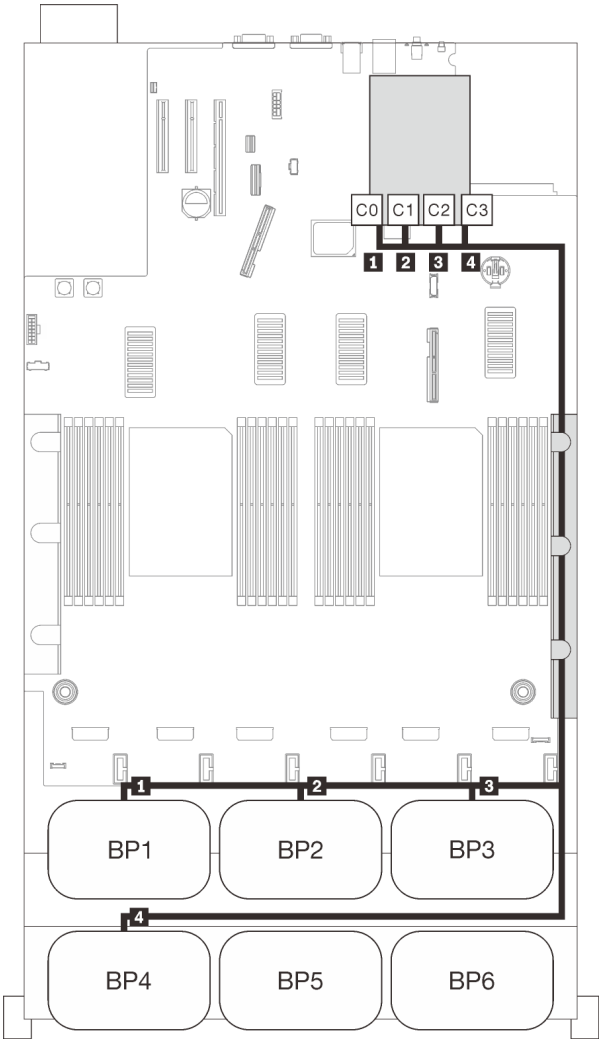
SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (8i)
2	860 mm	C0 (16i)
3	1000 mm	C1 (16i)

Four backplanes

Four SAS/SATA backplanes

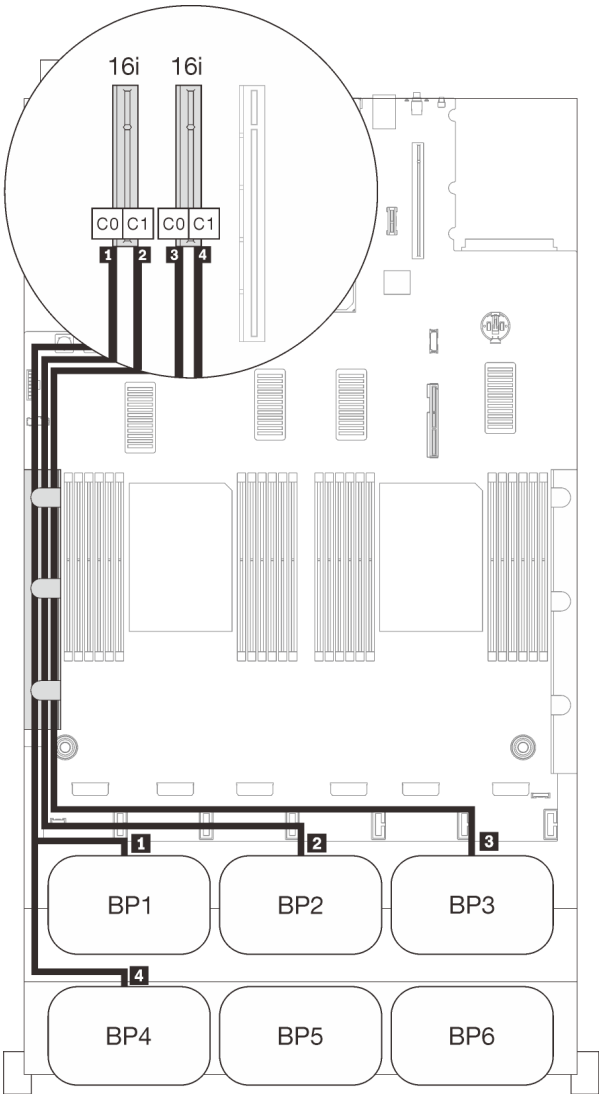
32i RAID adapter



SAS/SATA cable routing

	Length	To
1	945 mm	C0 (32i)
2	820 mm	C1 (32i)
3	690 mm	C2 (32i)
4	830 mm	C3 (32i)

16i + 16i RAID adapters



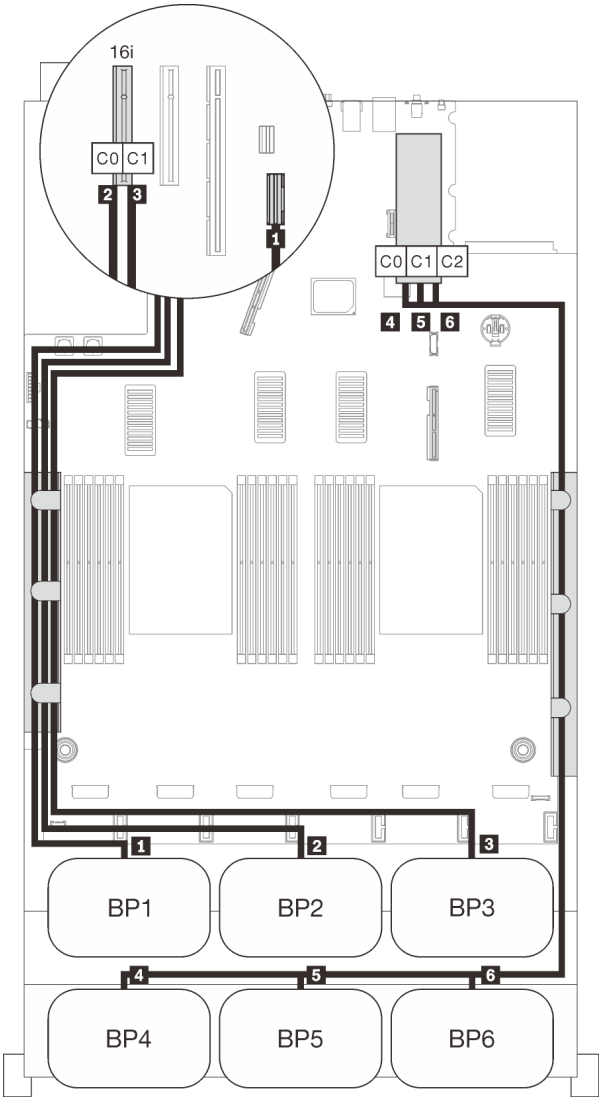
SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)
2	860 mm	C1 (16i)
3	1000 mm	C0 (16i)
4	665 mm	C1 (16i)

Six backplanes

Six SAS/SATA backplanes

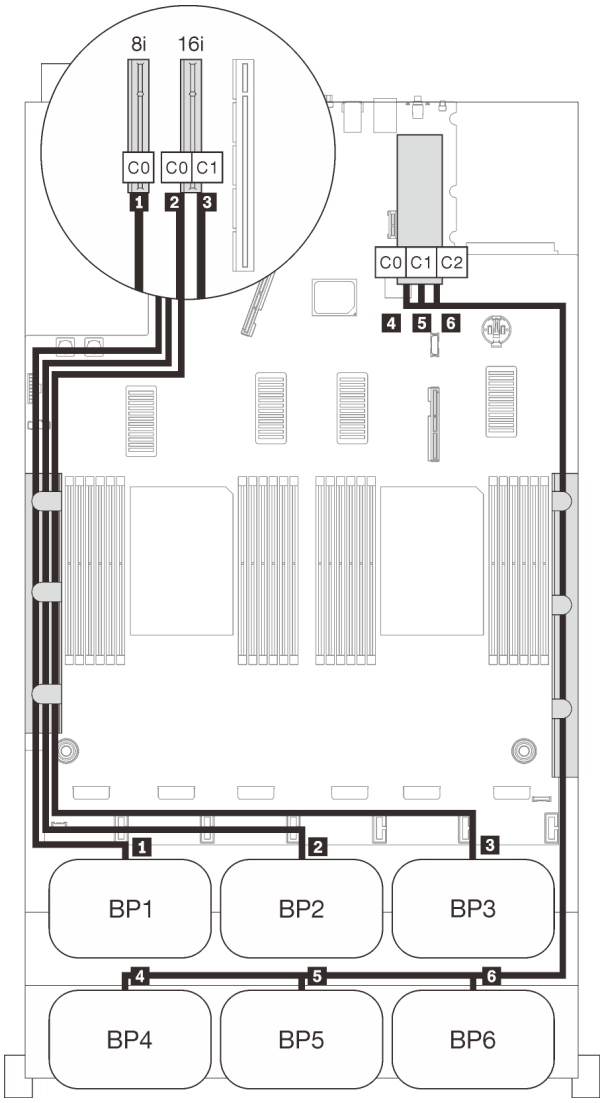
on-board connector +16i + 32i RAID adapters



SAS/SATA cable routing

	Length	To
1	845 mm	On-board
2	860 mm	C0 (16i)
3	1000 mm	C1 (16i)
4	820 mm	C0 (32i)
5	690 mm	C1 (32i)
6	665 mm	C2 (32i)

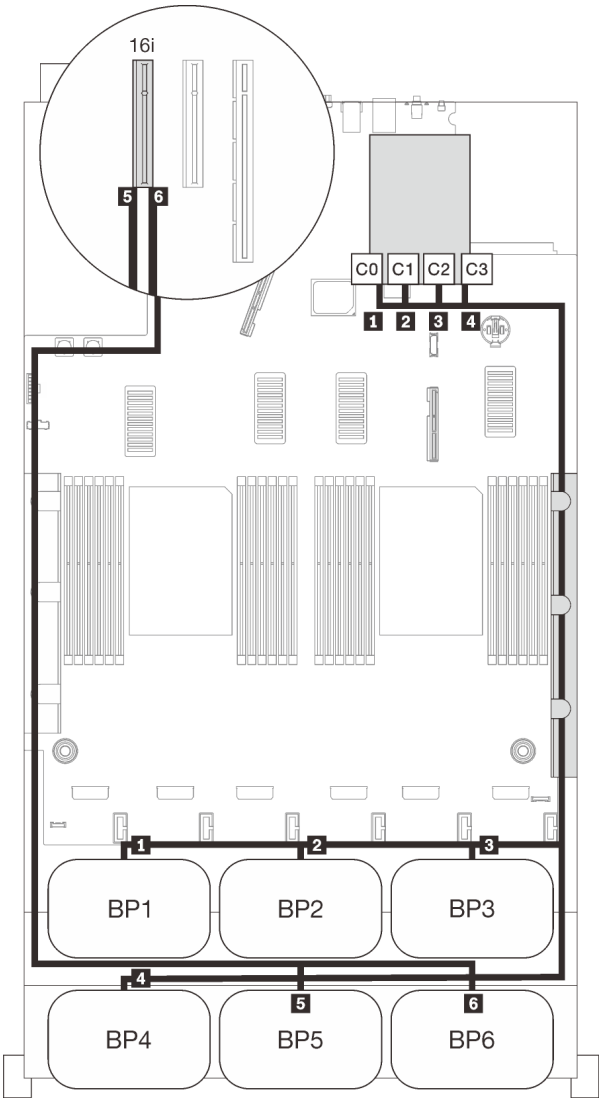
8i +16i + 32i RAID adapters



SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (8i)
2	860 mm	C0 (16i)
3	1000 mm	C1 (16i)
4	820 mm	C0 (32i)
5	690 mm	C1 (32i)
6	665 mm	C2 (32i)

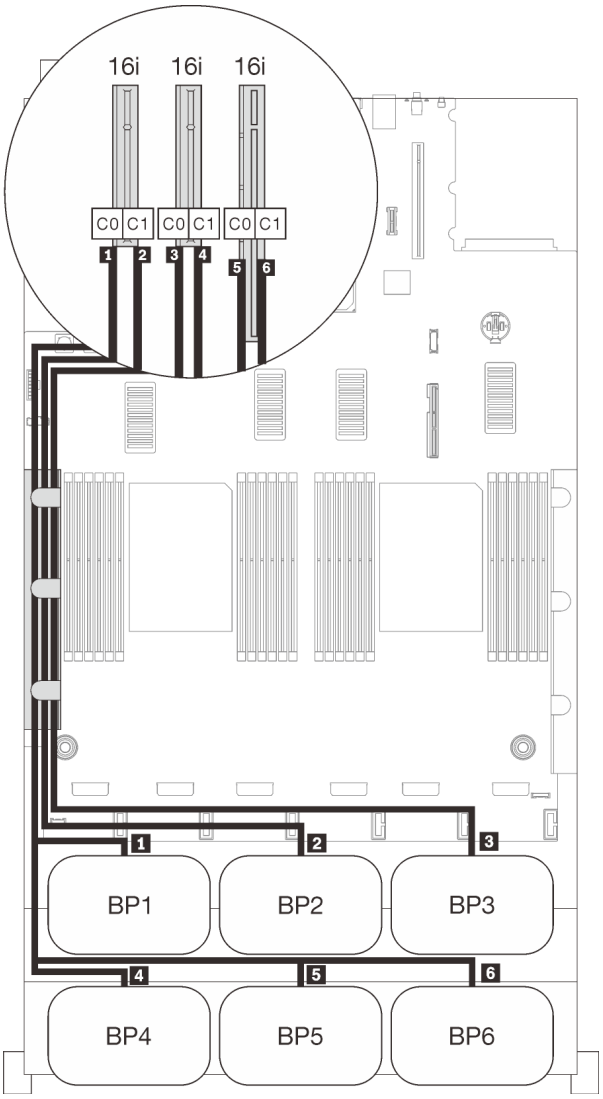
32i + 16i RAID adapters



SAS/SATA cable routing

	Length	To
1	945 mm	C0 (32i)
2	820 mm	C1 (32i)
3	690 mm	C2 (32i)
4	830 mm	C3 (32i)
5	820 mm	C0 (16i)
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)

16i + 16i + 16i RAID adapters



SAS/SATA cable routing

	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)
2	860 mm	C1 (16i)
3	1000 mm	C0 (16i)
4	665 mm	C1 (16i)
5	820 mm	C0 (16i)
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)

One-NVMe-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with one NVMe backplane.

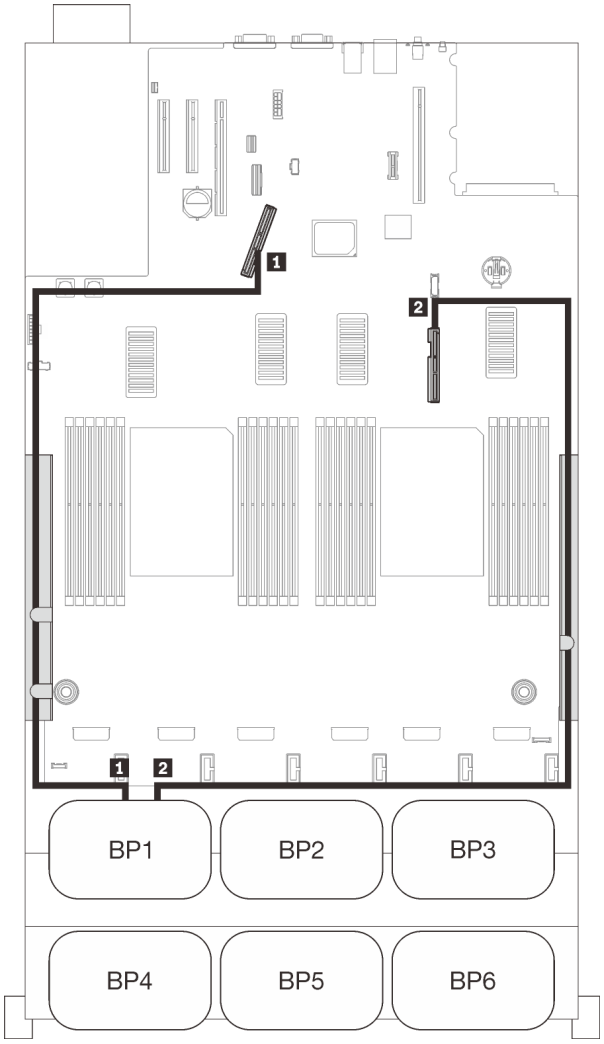
Notes:

- See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.
- See “Connecting cables to the NVMe switch cards” on page 53 to perform the procedure properly while connecting PCIe cables to the PCIe switch cards.

One backplane

One NVMe backplane

System board



PCIe cable routing

NVMe connector	Length	To
1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2 4-5, 6-7	910 mm	PCIe 2 (on-board)

Two-NVMe-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with two NVMe backplanes.

Notes:

- See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.
- See “Connecting cables to the NVMe switch cards” on page 53 to perform the procedure properly while connecting PCIe cables to the PCIe switch cards.

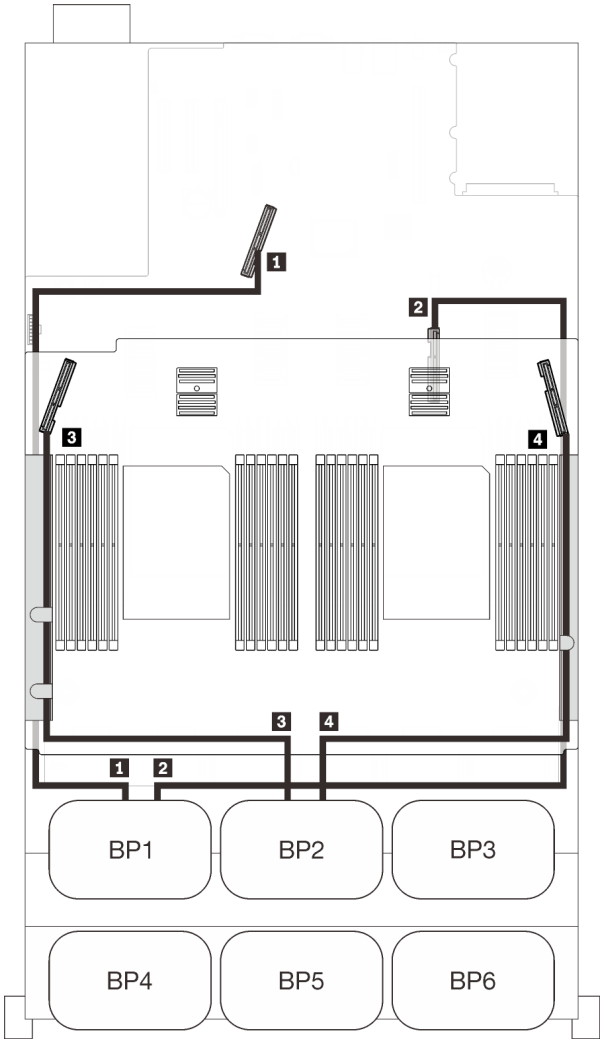
See the following sections for cable routing combinations with three AnyBay drive backplanes.

- “Two backplanes” on page 72
- “Three backplanes” on page 73

Two backplanes

Two NVMe backplanes

System board + processor and memory expansion tray



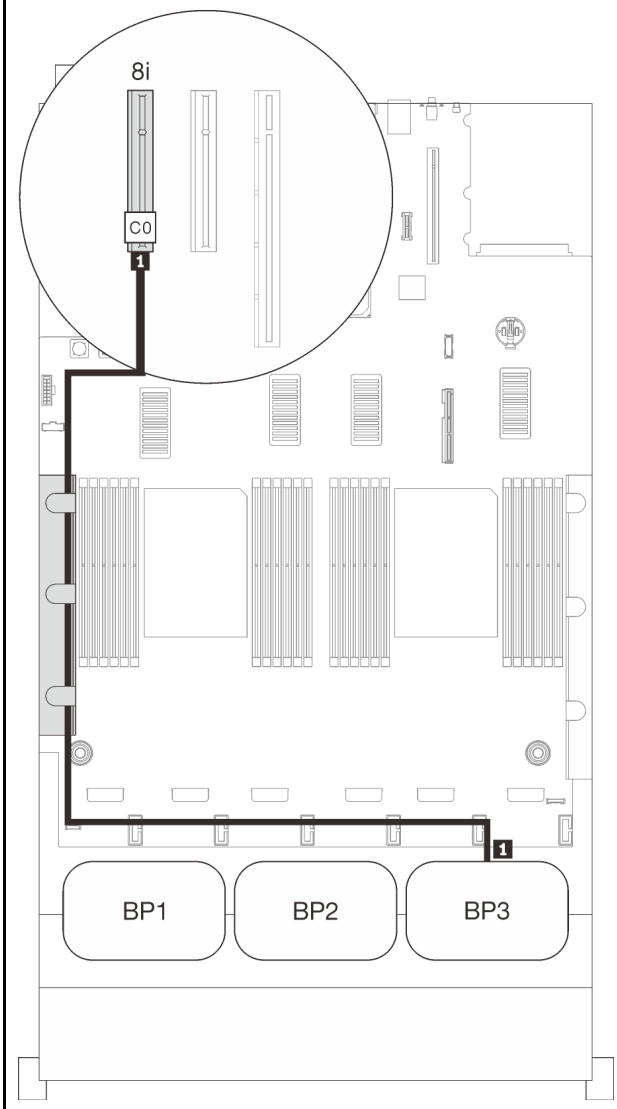
PCIe cable routing

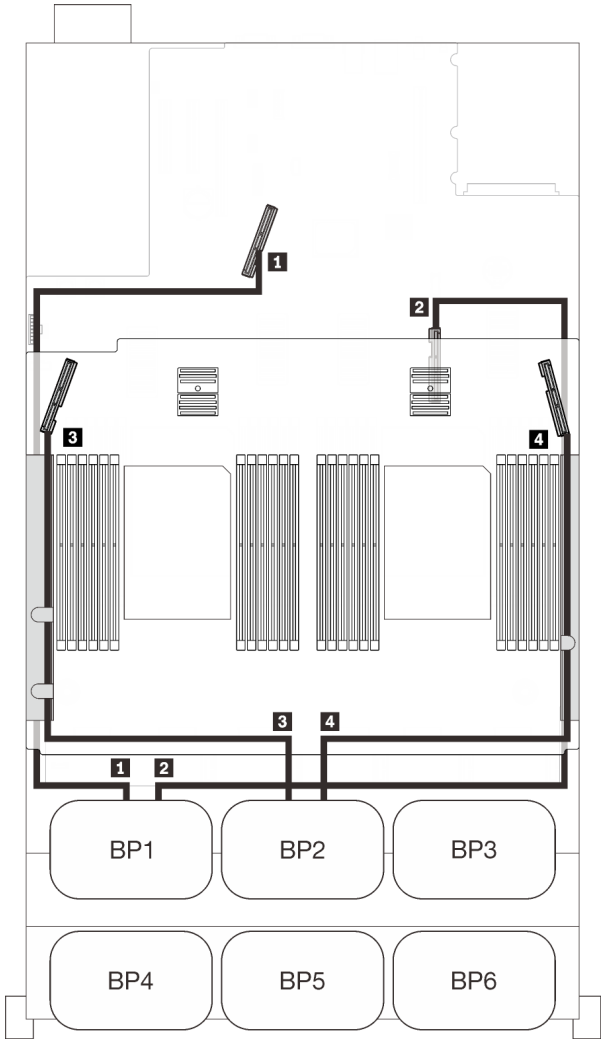
NVMe connector	Length	To
1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3 0-1, 2-3	530 mm	PCIe 3 (tray)
4 4-5, 6-7	670 mm	PCIe 6 (tray)

Three backplanes

Two NVMe backplanes and one SAS/SATA backplane

System board + processor and memory expansion tray + 8i RAID adapter





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	1000 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)
			3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)

Three-NVMe-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with three NVMe backplanes.

Notes:

- See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.
- See “Connecting cables to the NVMe switch cards” on page 53 to perform the procedure properly while connecting PCIe cables to the PCIe switch cards.

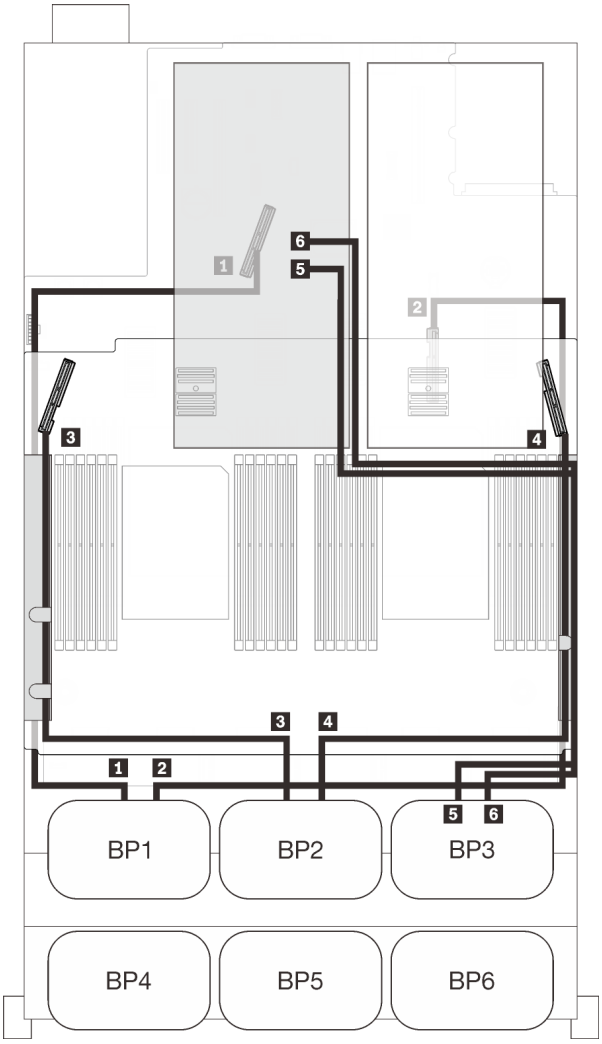
See the following sections for cable routing combinations with three AnyBay drive backplanes.

- “Three backplanes” on page 75
- “Four backplanes” on page 76
- “Five backplanes” on page 77
- “Six backplanes” on page 78

Three backplanes

Three NVMe backplanes

System board + processor and memory expansion tray + PCIe switch cards



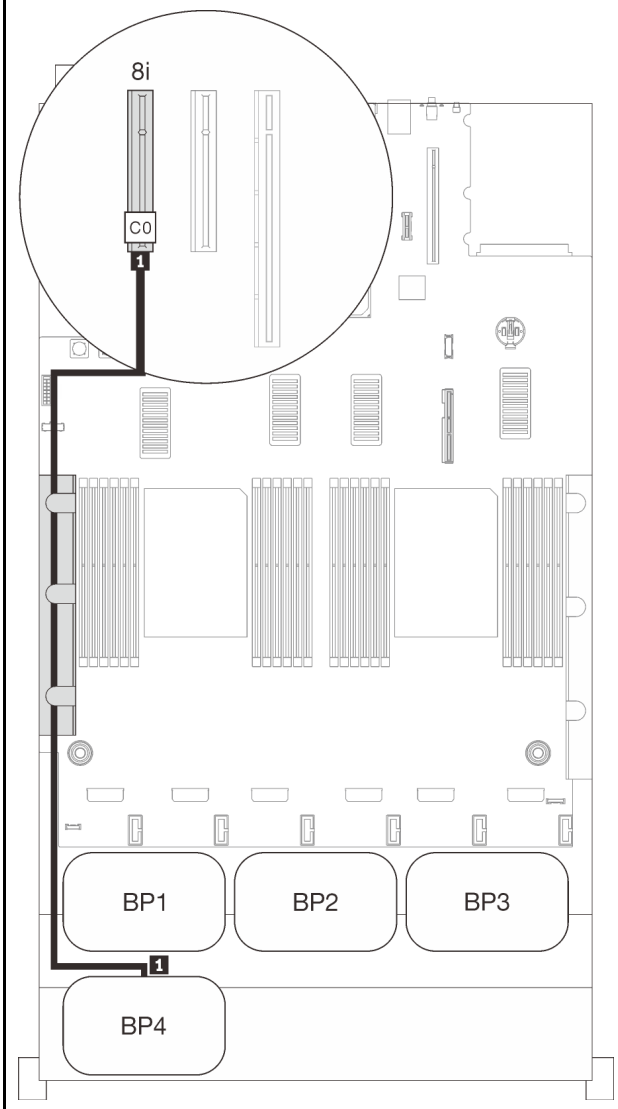
PCIe cable routing

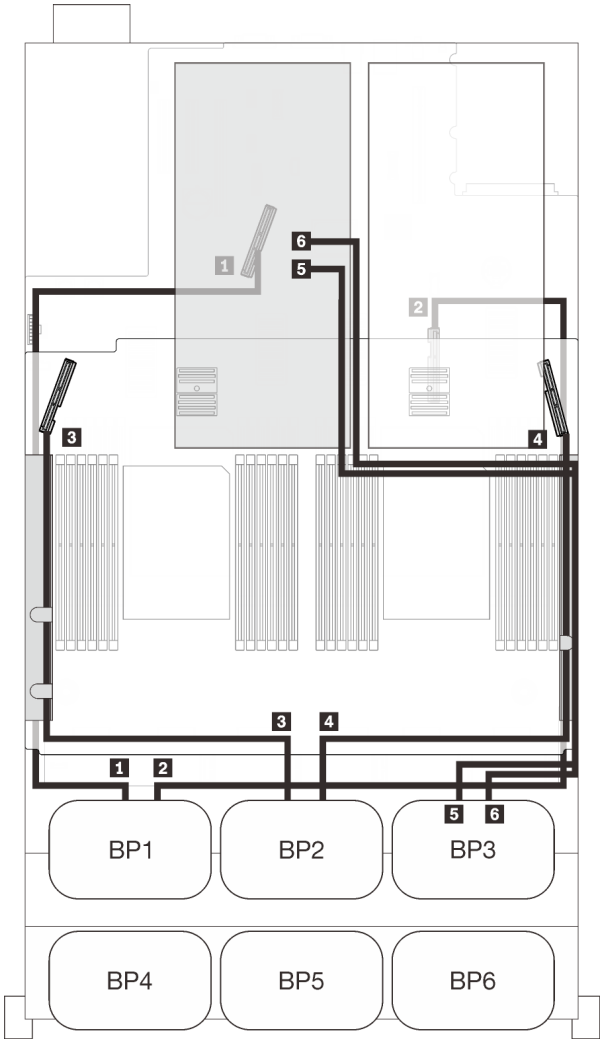
NVMe connector	Length	To
1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3 0-1, 2-3	530 mm	PCIe 3 (tray)
4 4-5, 6-7	670 mm	PCIe 6 (tray)
5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Four backplanes

Three NVMe backplanes and one SAS/SATA backplane

System board + processor and memory expansion tray + PCIe switch cards + 8i RAID adapter



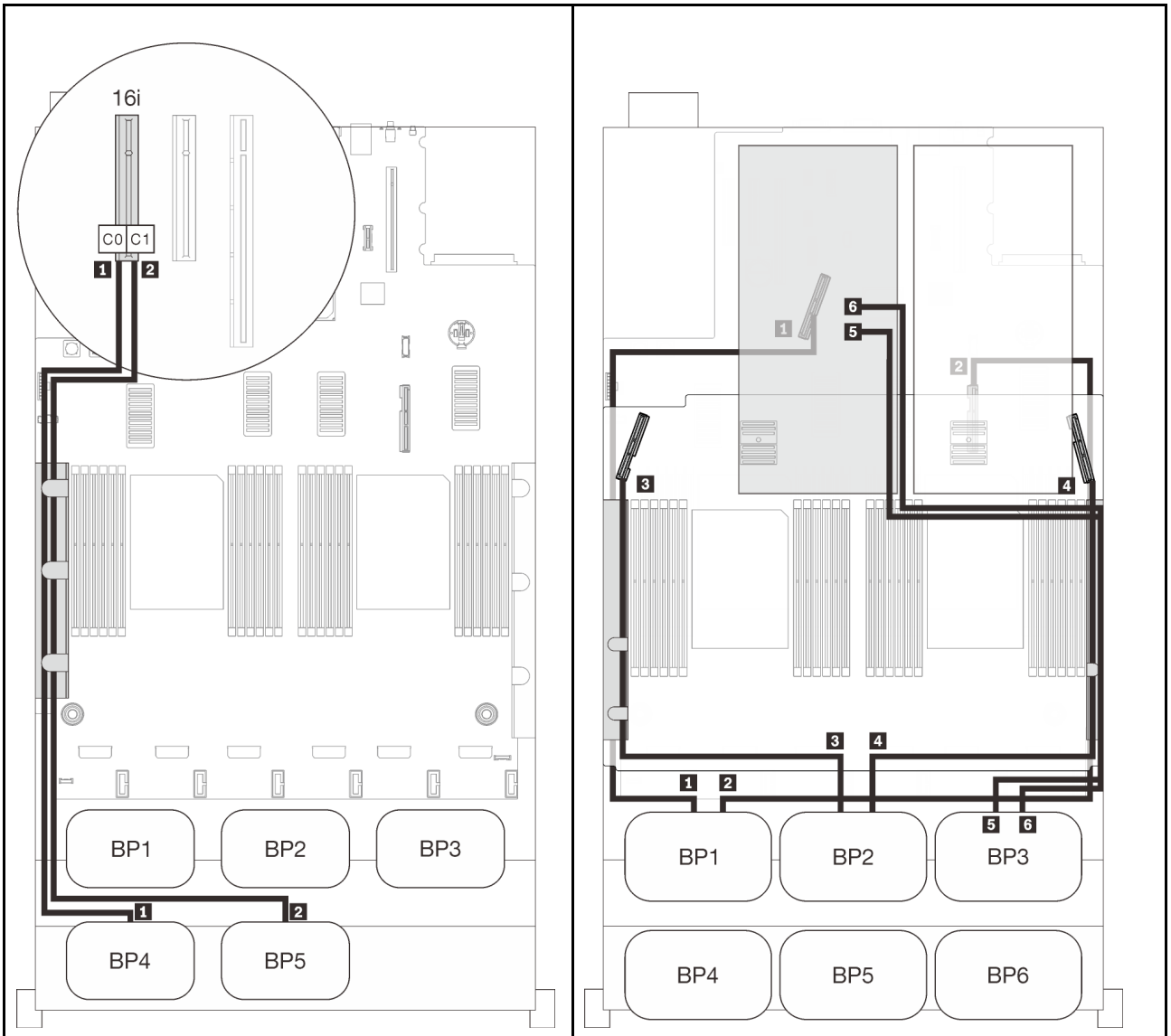


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	820 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)
			3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Five backplanes

Three NVMe backplanes and two SAS/SATA backplanes

System board + processor and memory expansion tray + PCIe switch cards + 16i RAID adapter

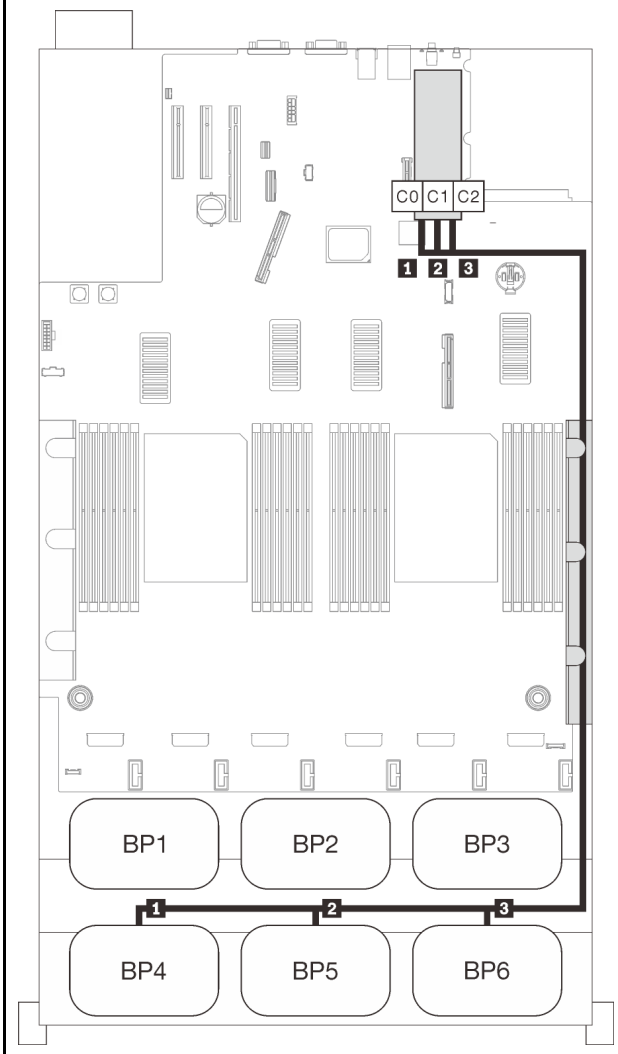


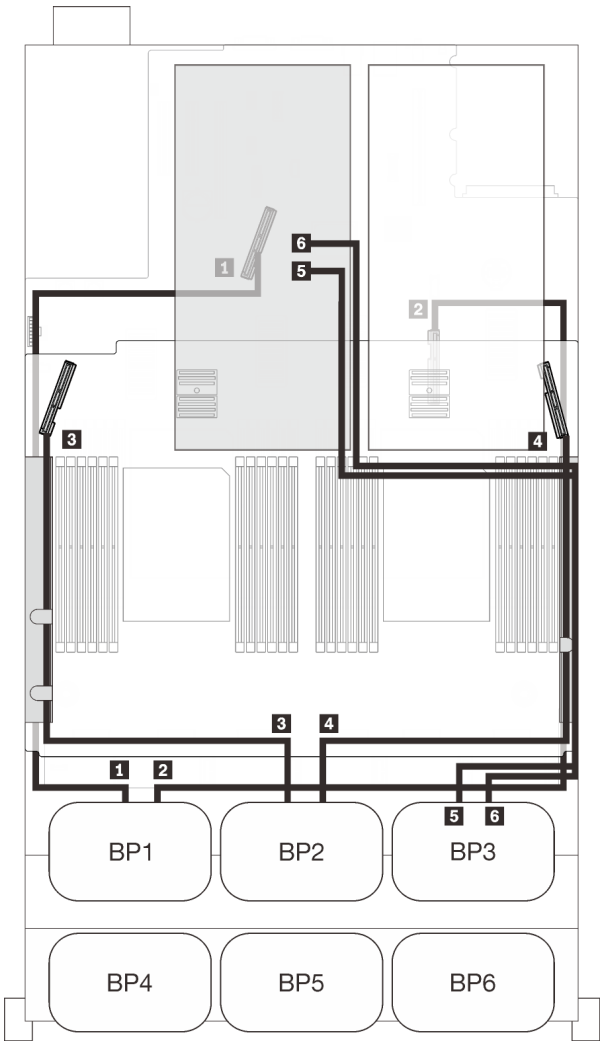
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	820 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
			3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Six backplanes

Three NVMe backplanes and three SAS/SATA backplanes

System board + processor and memory expansion tray + PCIe switch cards + 32i RAID adapter





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	820 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	690 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	665 mm	C2 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

One-AnyBay-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with one AnyBay backplane.

See the following sections for cable routing combinations with one AnyBay drive backplane.

- "With two processors" on page 80
  - "One backplane" on page 80
  - "Two backplanes" on page 83
  - "Three backplanes" on page 84
  - "Four backplanes" on page 86
  - "Six backplanes" on page 88
- "With four processors" on page 92
  - "One backplane" on page 92
  - "Two backplanes" on page 95
  - "Three backplanes" on page 96
  - "Four backplanes" on page 98
  - "Six backplanes" on page 100

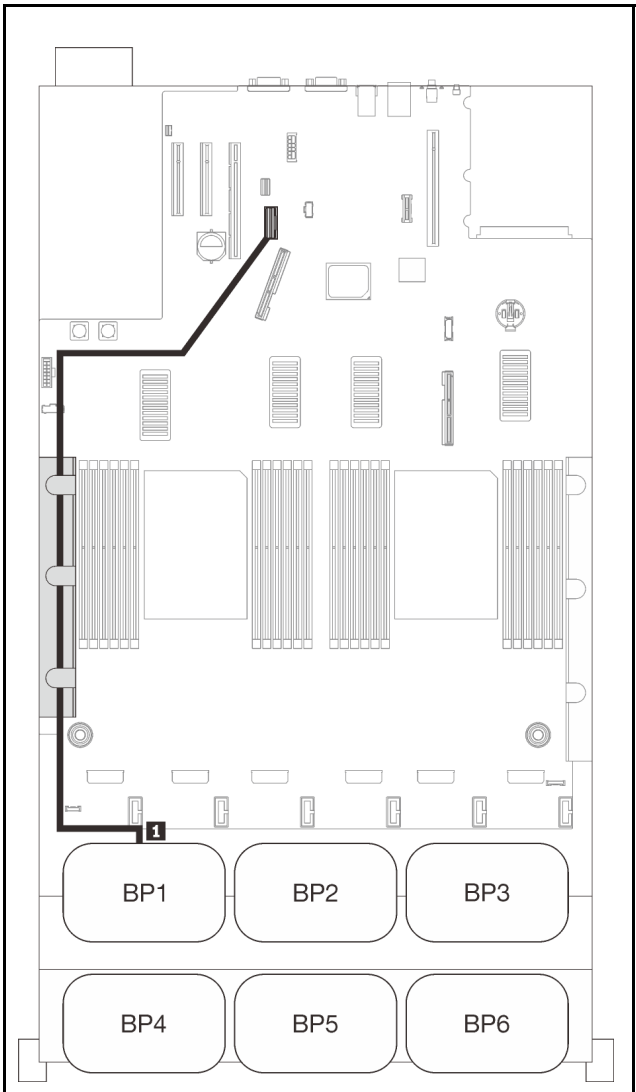
With two processors

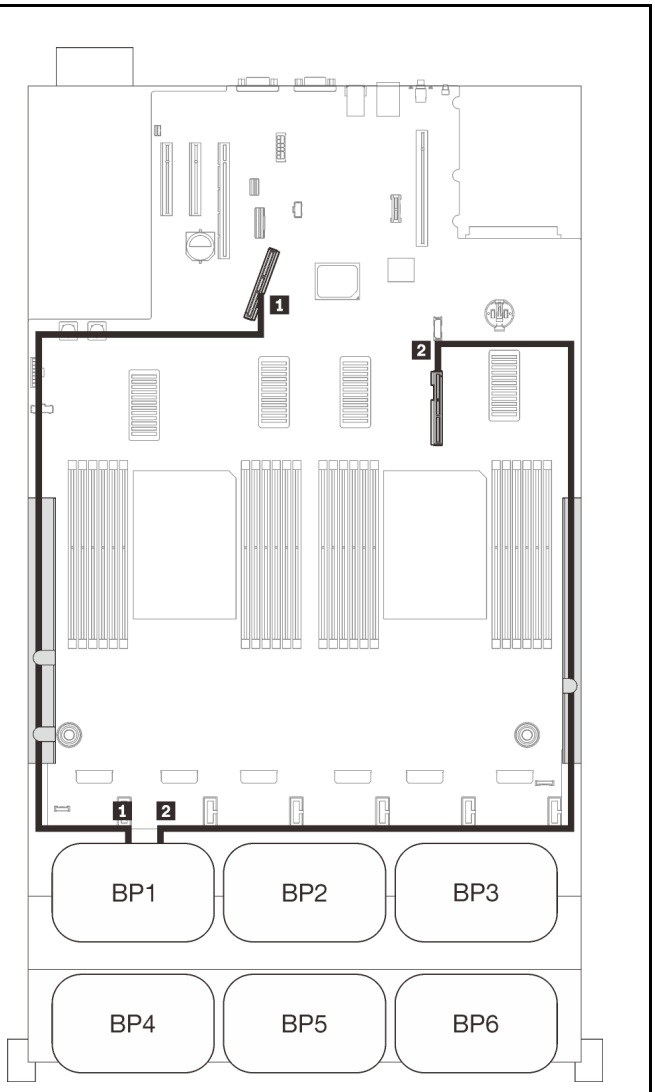
Follow the instructions in this section to learn how do cable routing for combinations with one AnyBay backplane and two processors.

One backplane

One AnyBay backplane

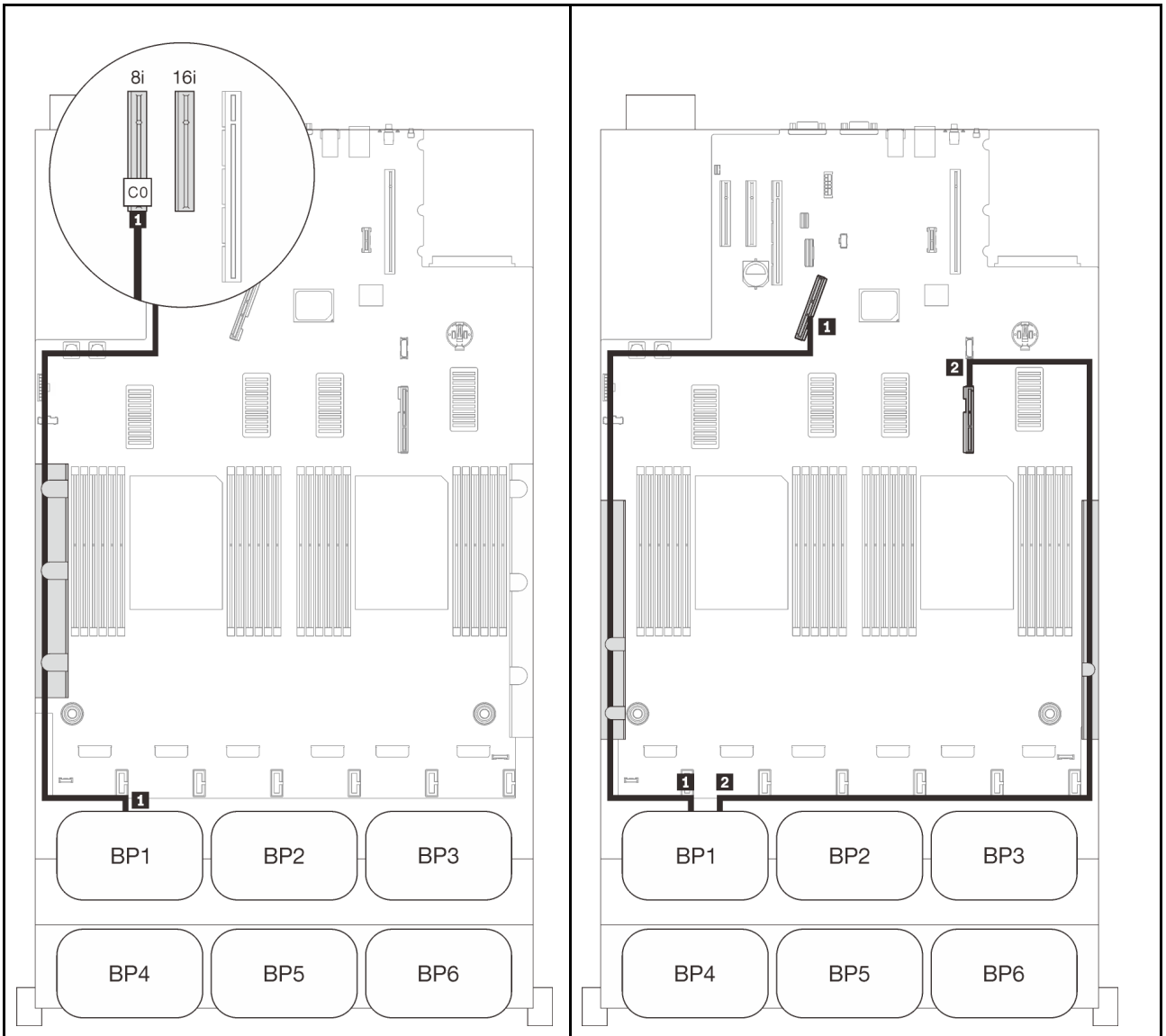
On-board connector





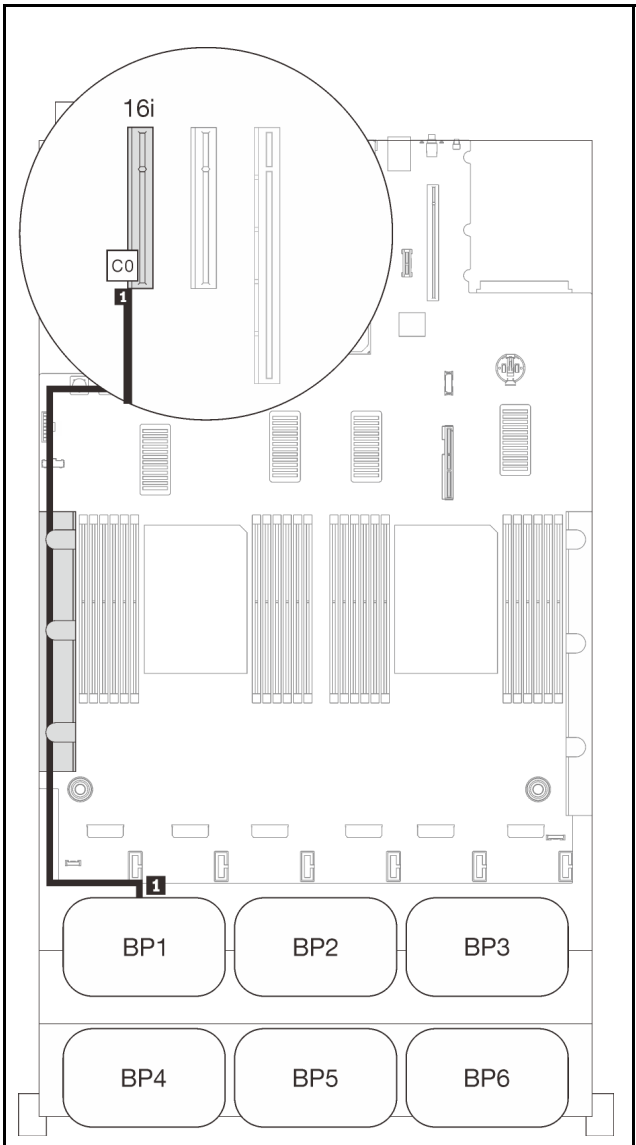
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)

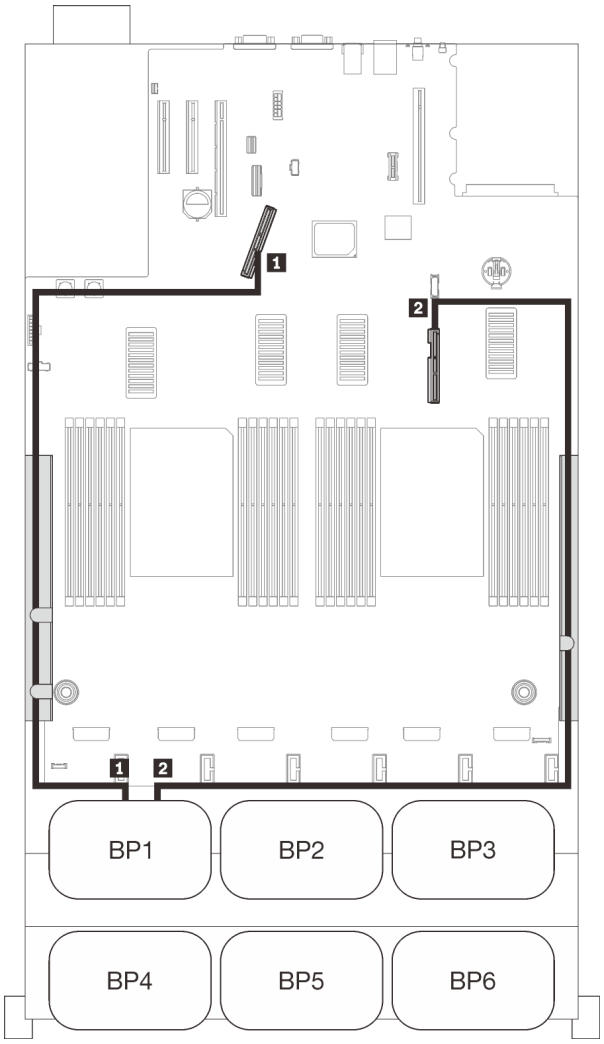
8i RAID adapter



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)

16i RAID adapter



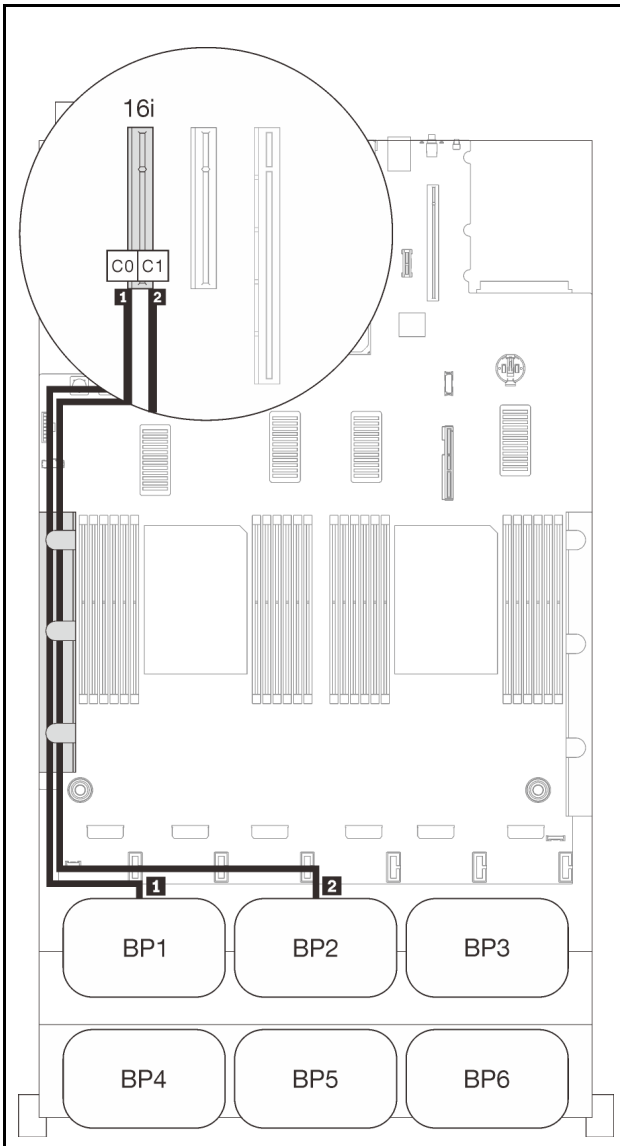


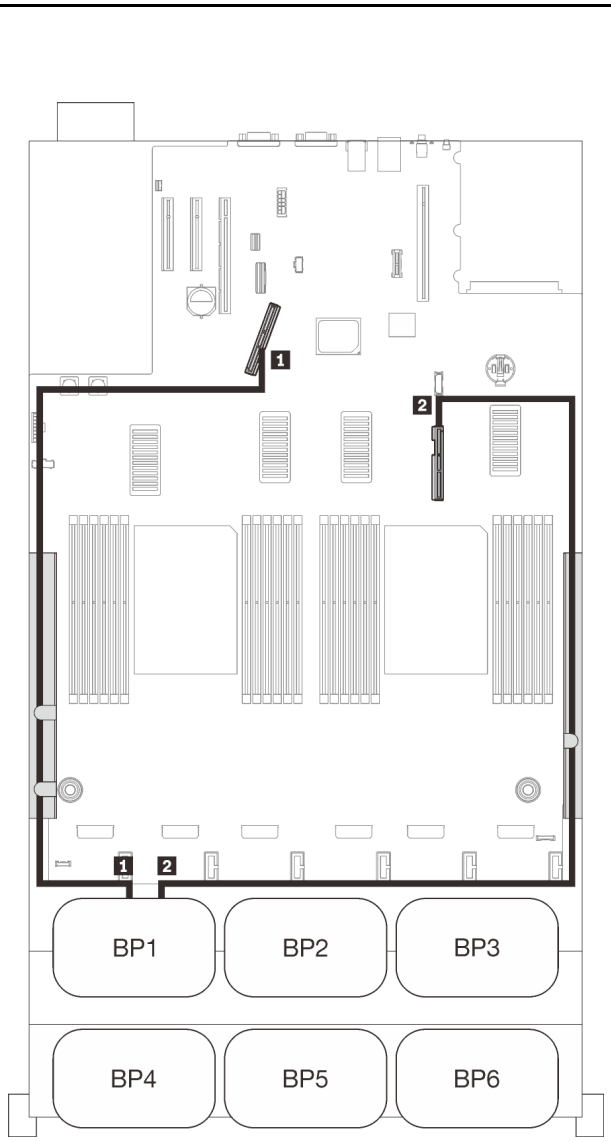
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)

Two backplanes

One AnyBay and one SAS/SATA backplane

16i RAID adapter



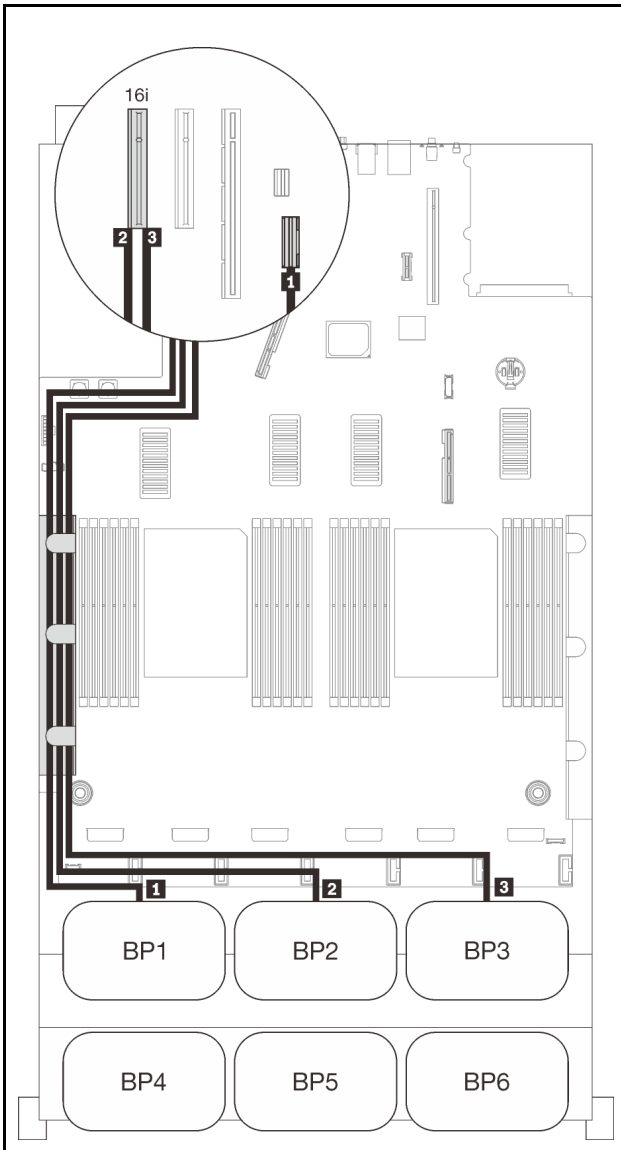


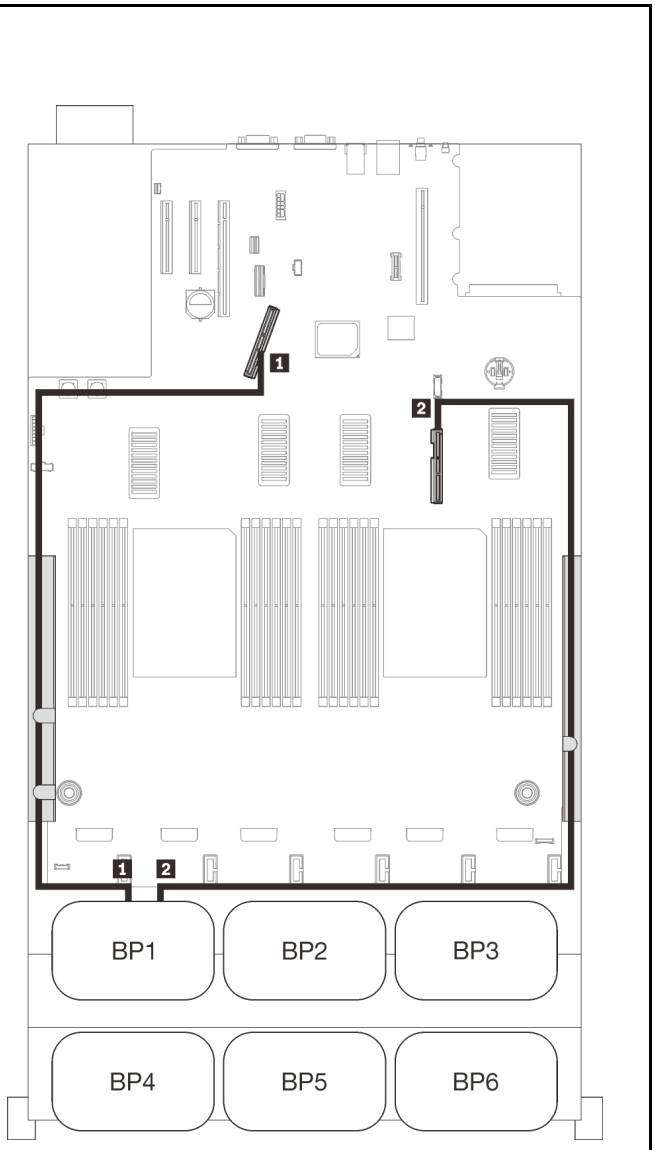
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)

Three backplanes

One AnyBay and two SAS/SATA backplanes

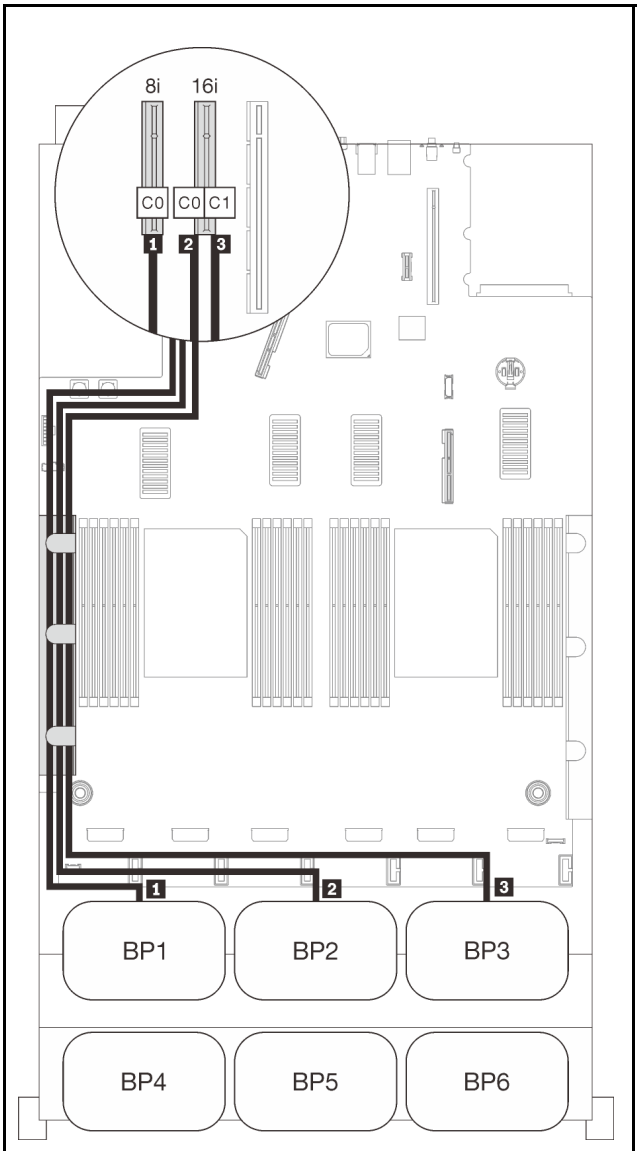
On-board connector + 16i RAID adapter

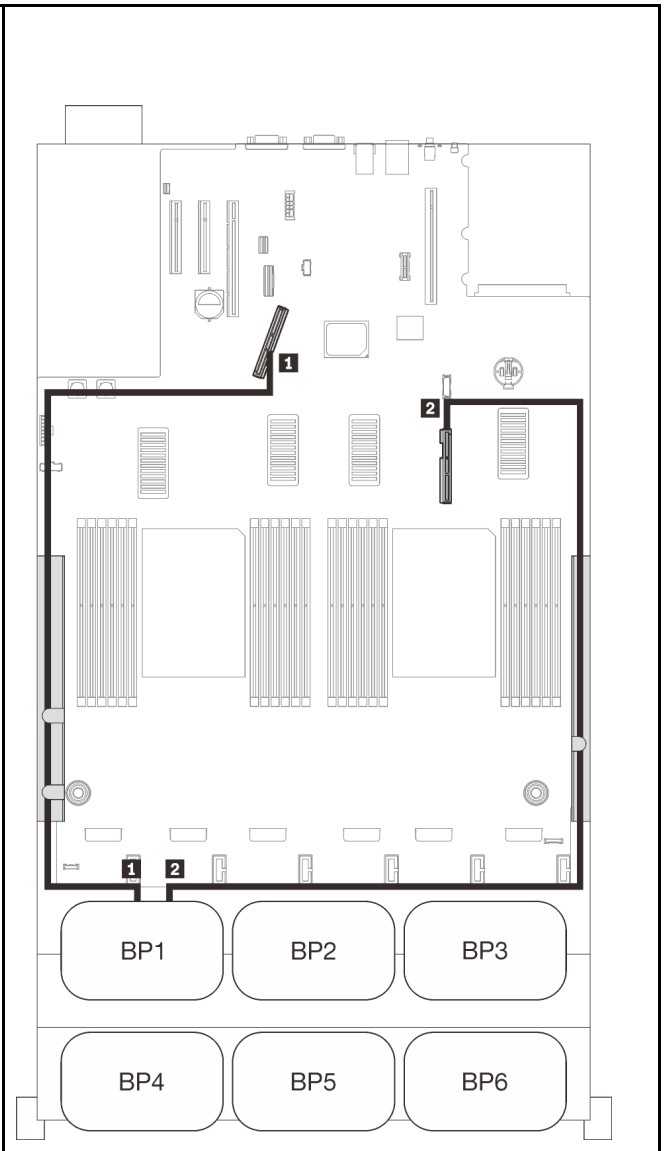




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)			

8i + 16i RAID adapters



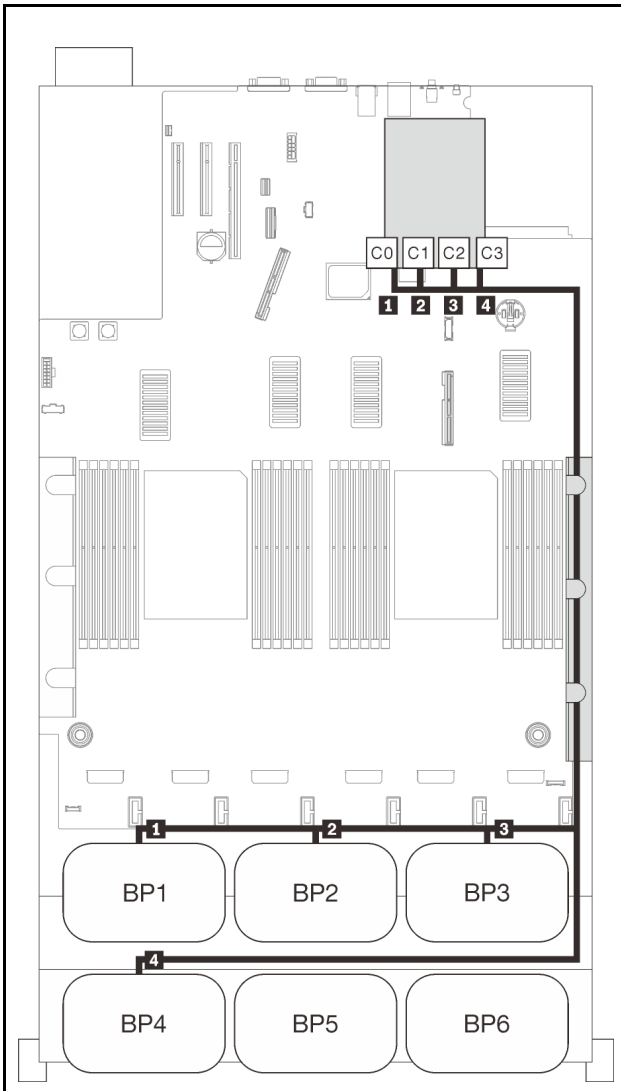


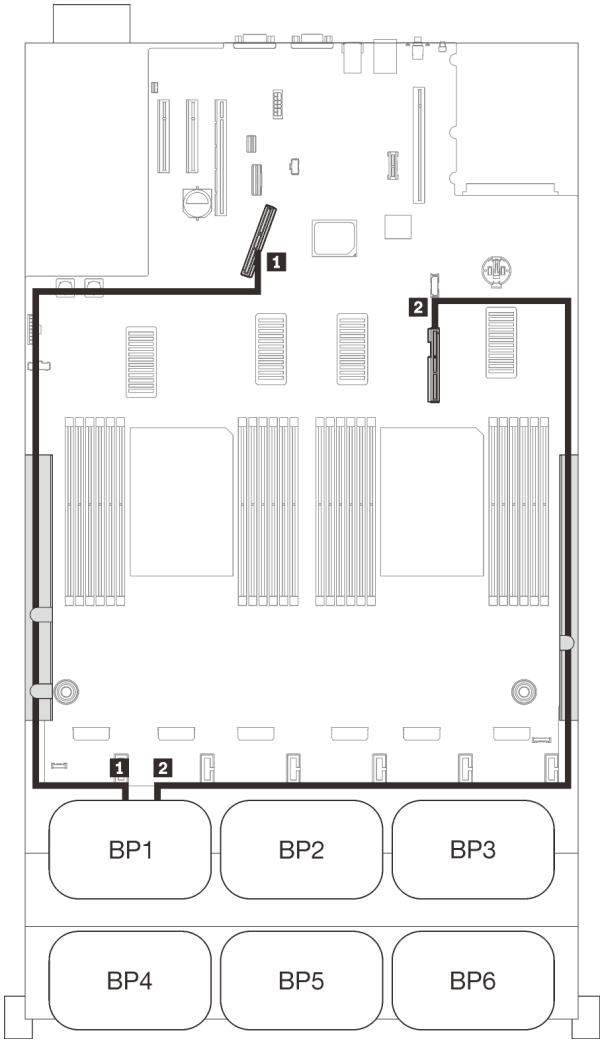
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)			

Four backplanes

One AnyBay and three SAS/SATA backplanes

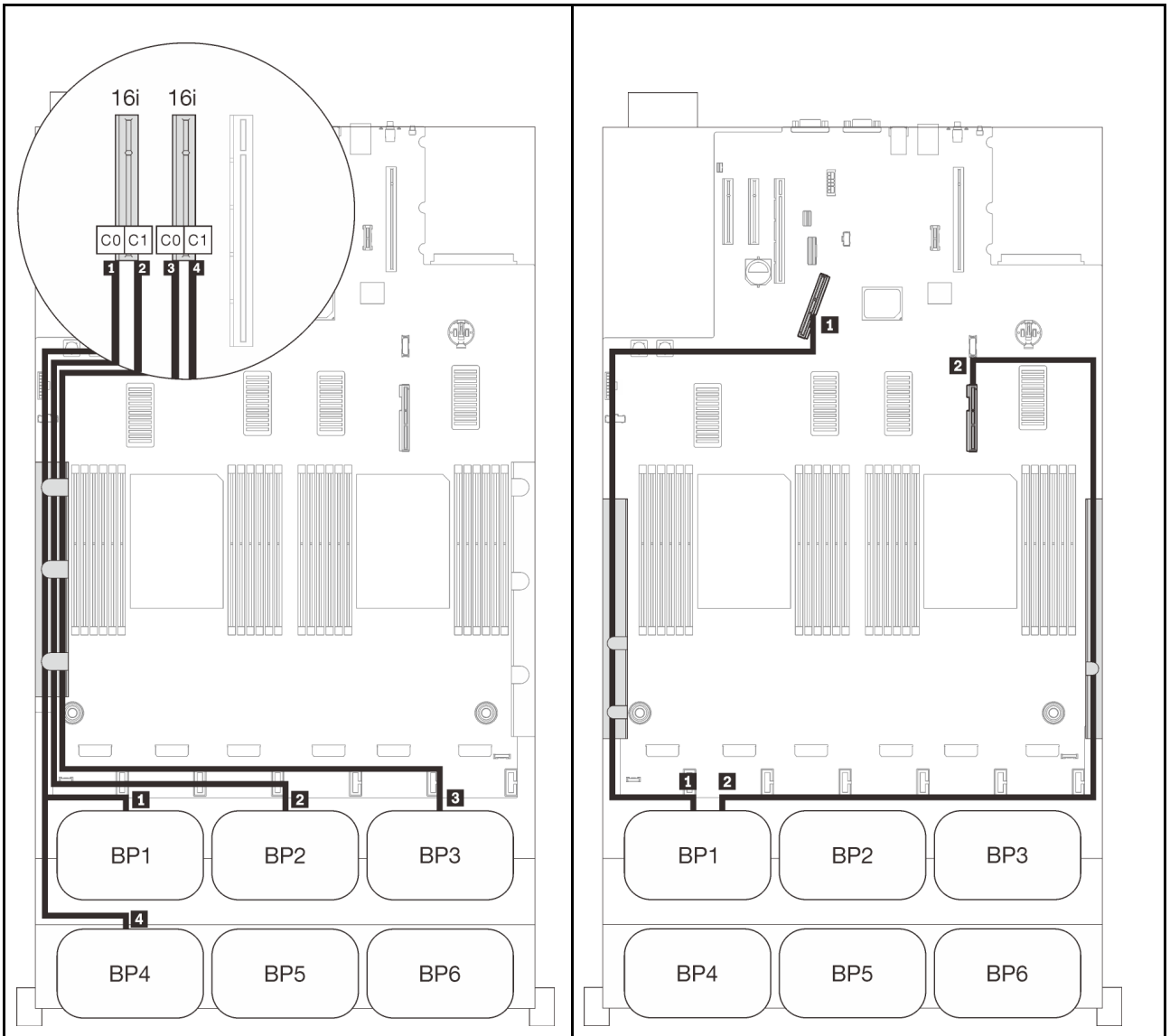
32i RAID adapter





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)			
4	830 mm	C3 (32i)			

16i + 16i RAID adapter

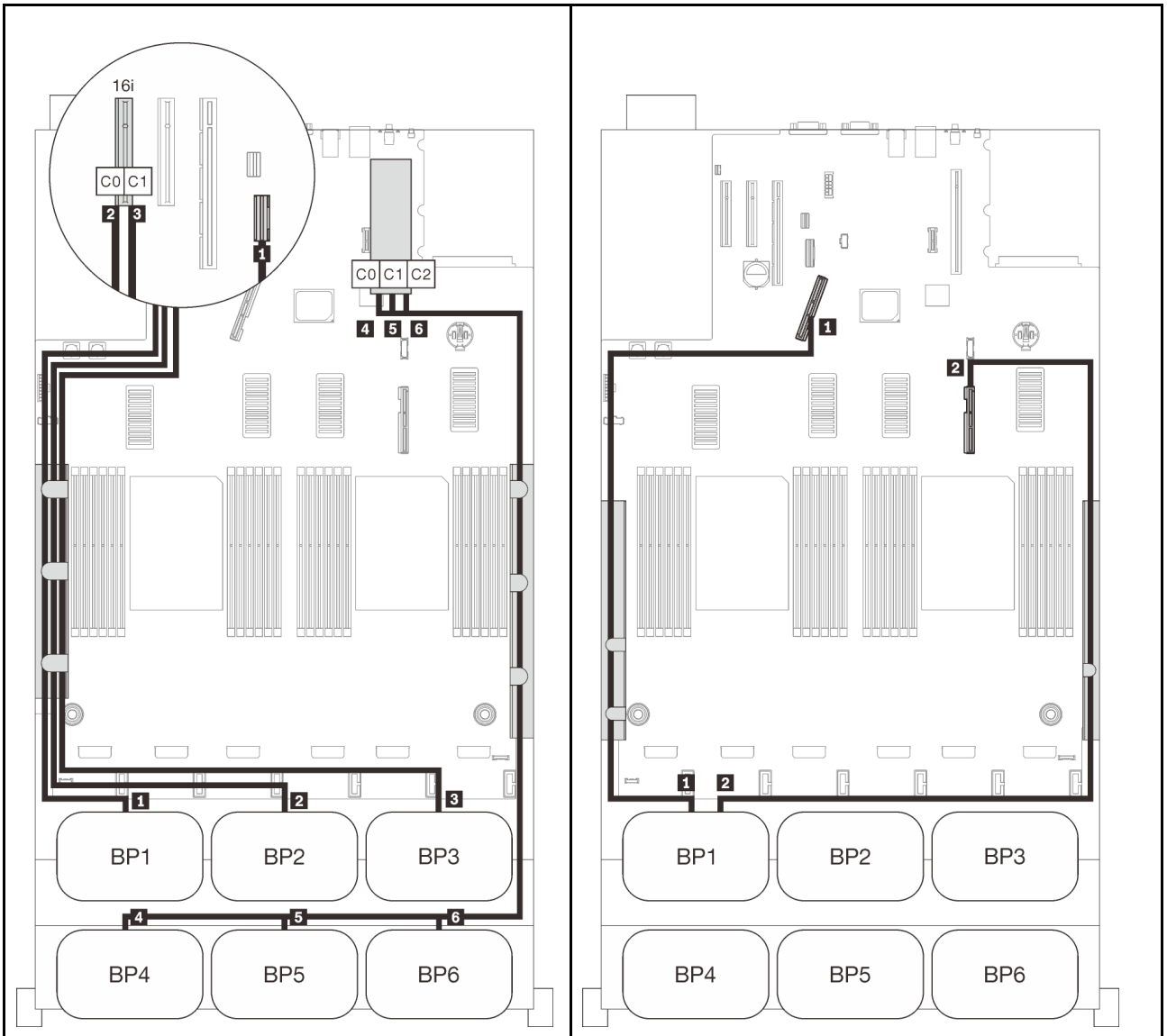


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C0 (16i)			
4	665 mm	C1 (16i)			

Six backplanes

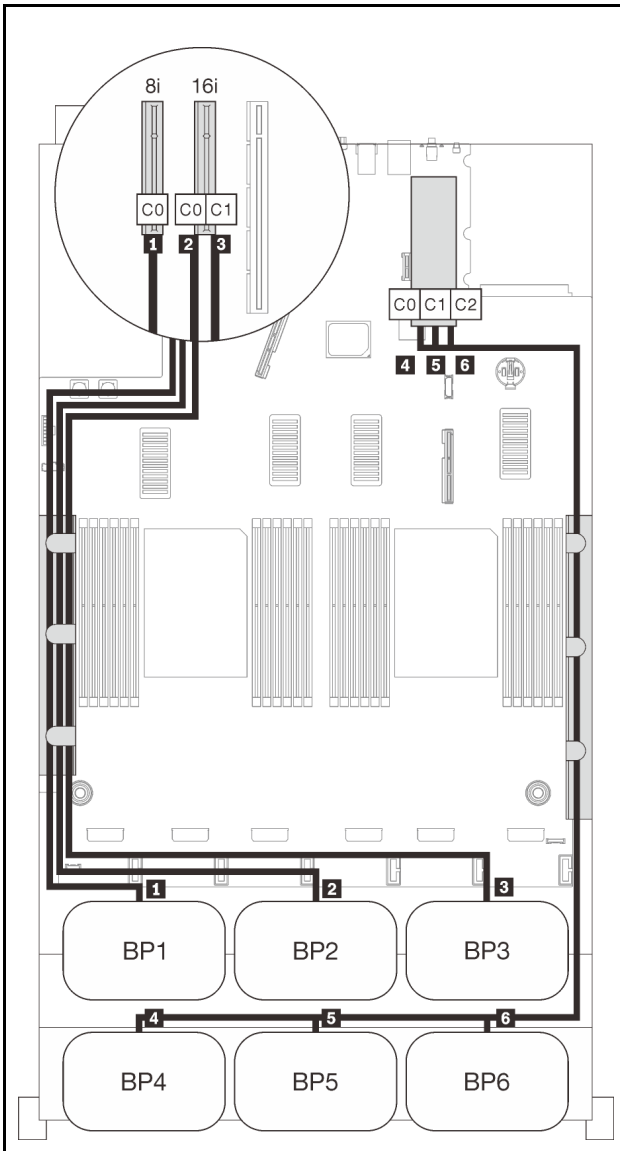
One AnyBay and five SAS/SATA backplanes

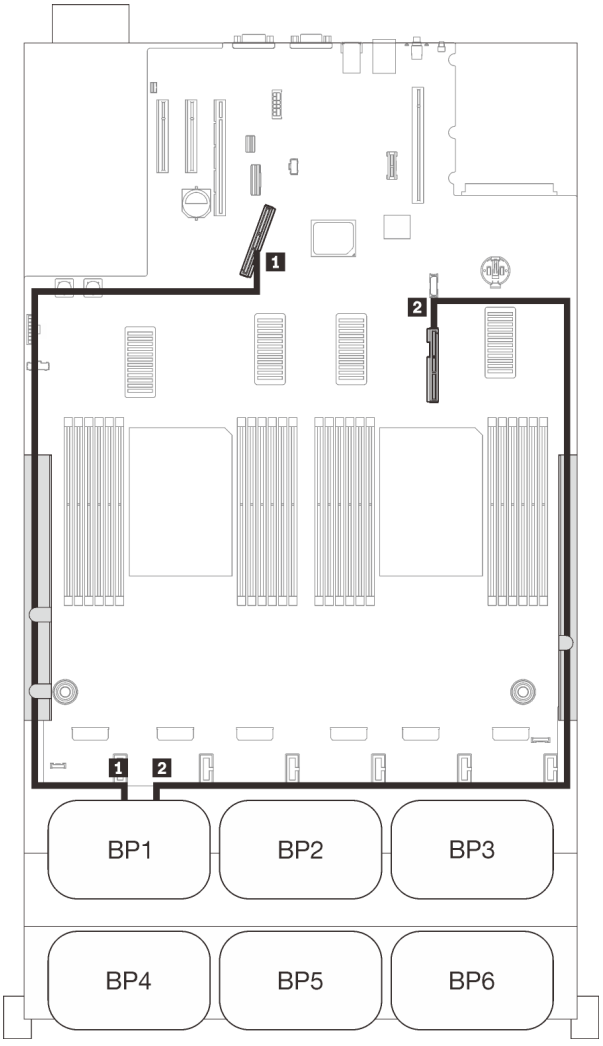
On-board SATA + 16i + 32i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)			
4	820 mm	C0 (32i)			
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

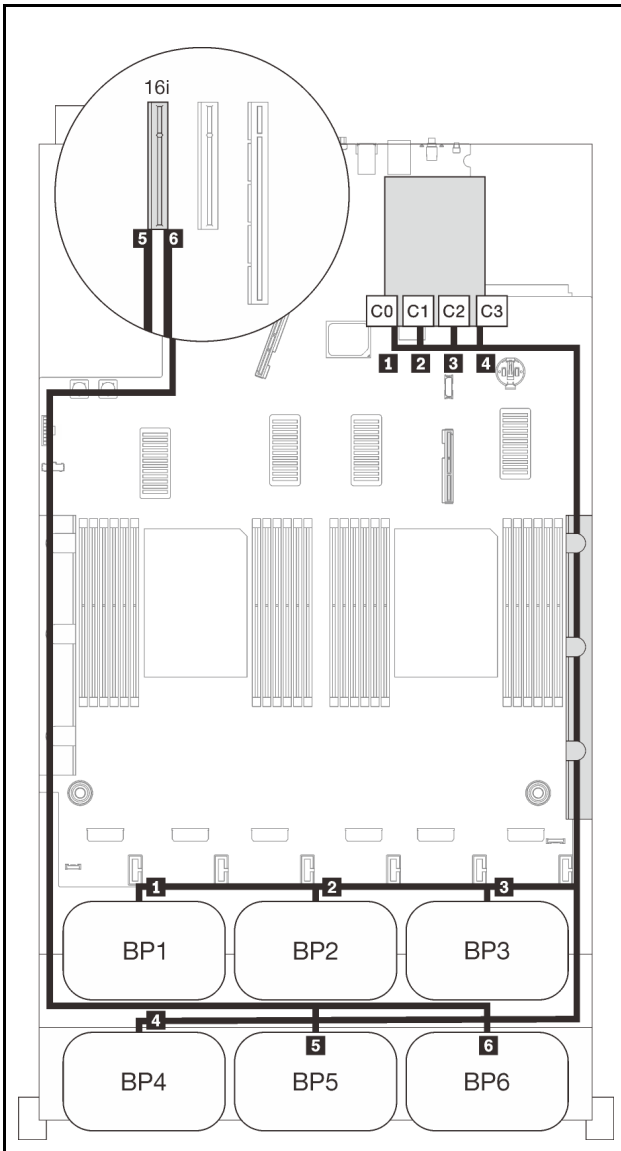
8i + 16i + 32i RAID adapters

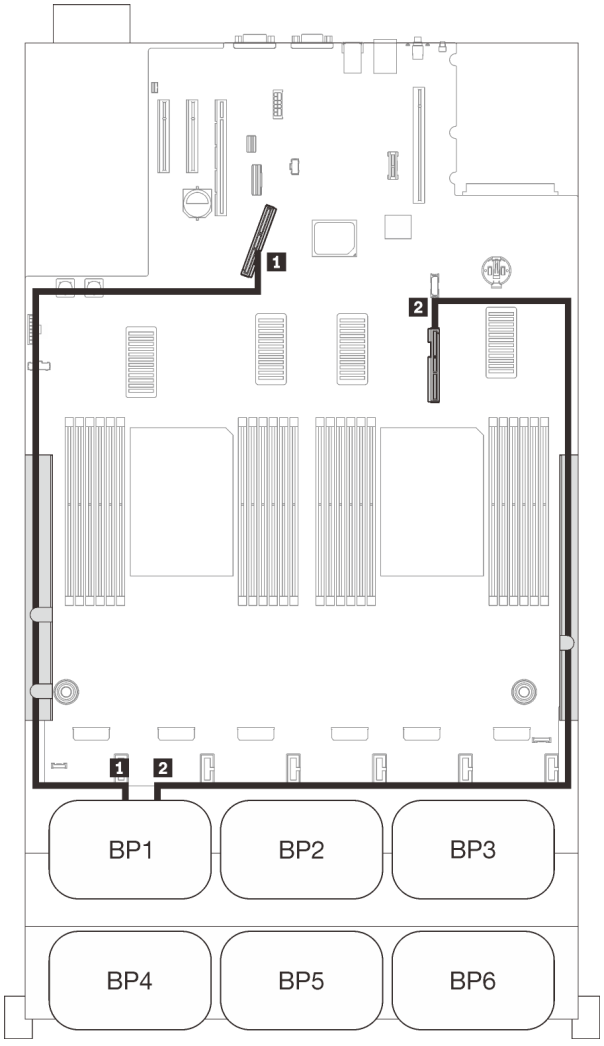




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)			
4	820 mm	C0 (32i)			
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

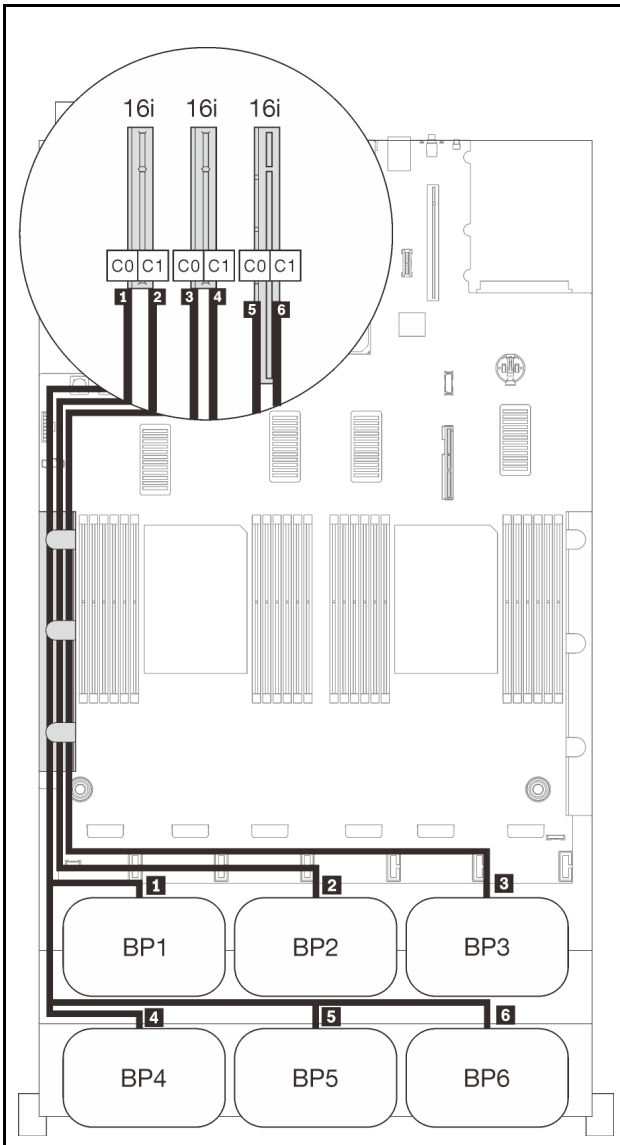
32i + 16i RAID adapters

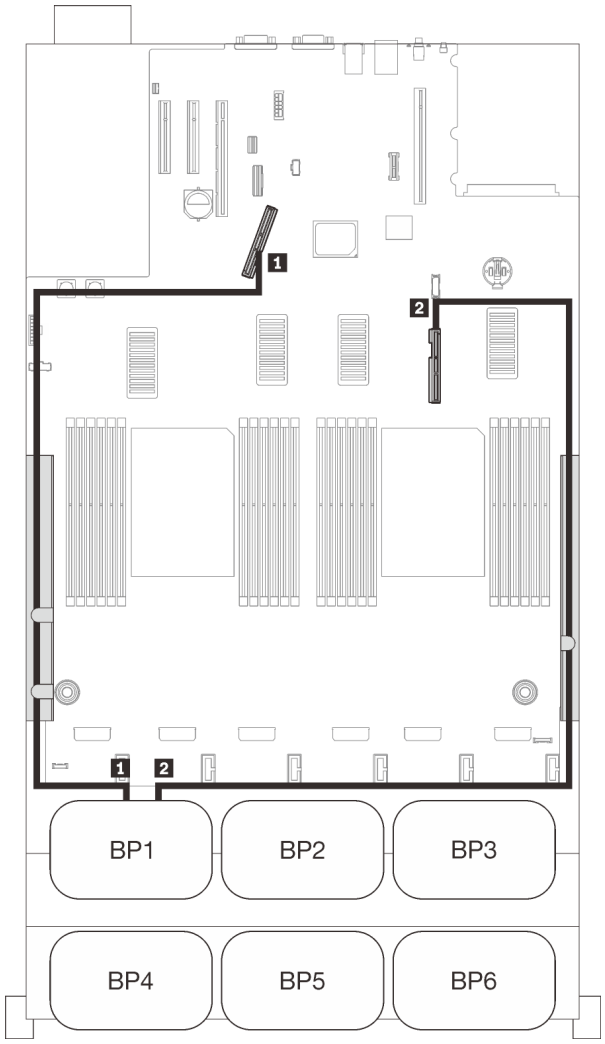




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)			
4	830 mm	C3 (32i)			
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

16i + 16i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C0 (16i)			
4	665 mm	C1 (16i)			
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

With four processors

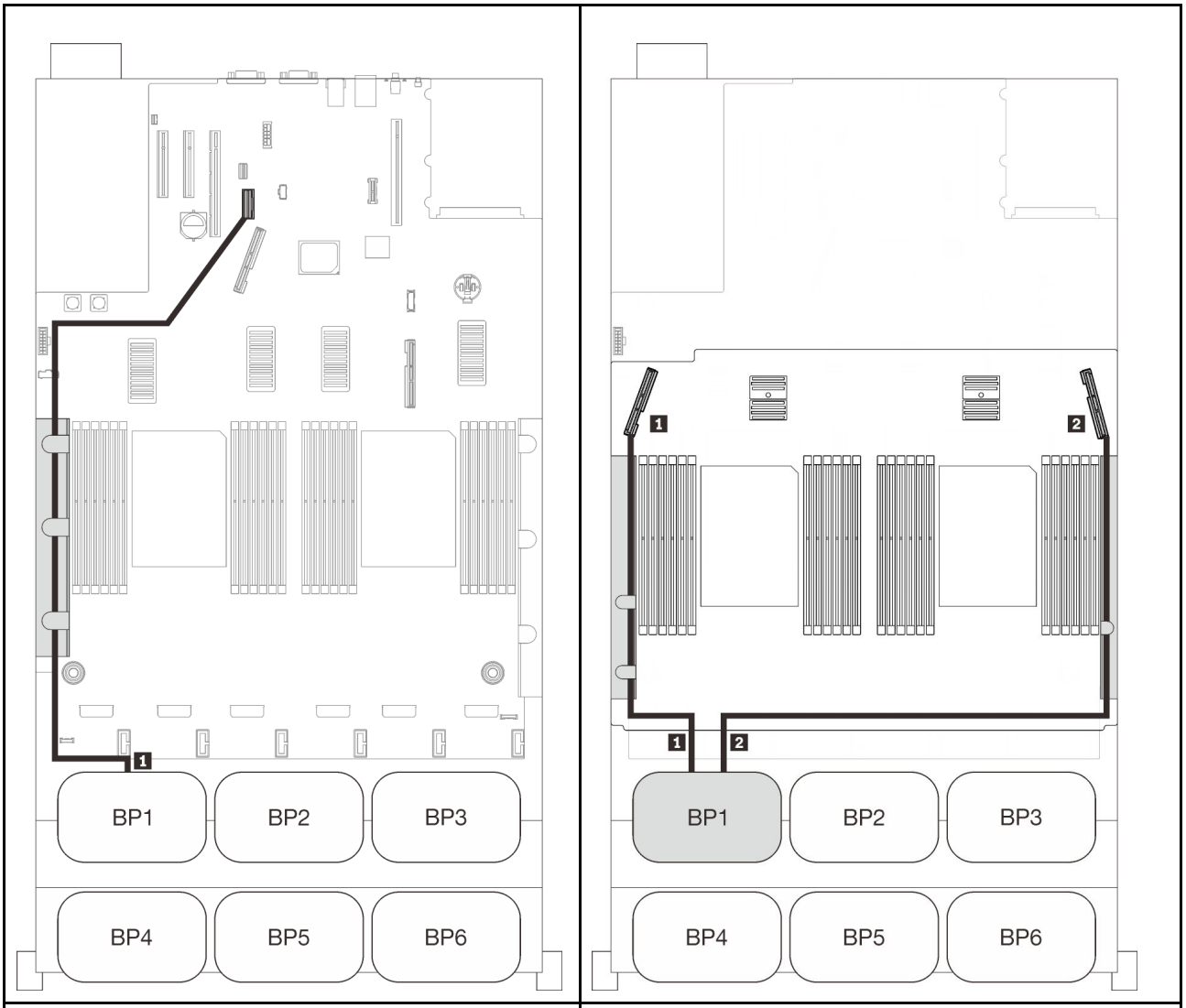
with four processors installed, the two PCIe connectors on the expansion tray are also available. Follow the instructions in this section to learn how do cable routing for combinations with one AnyBay backplane and these two connectors.

Note: See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.

One backplane

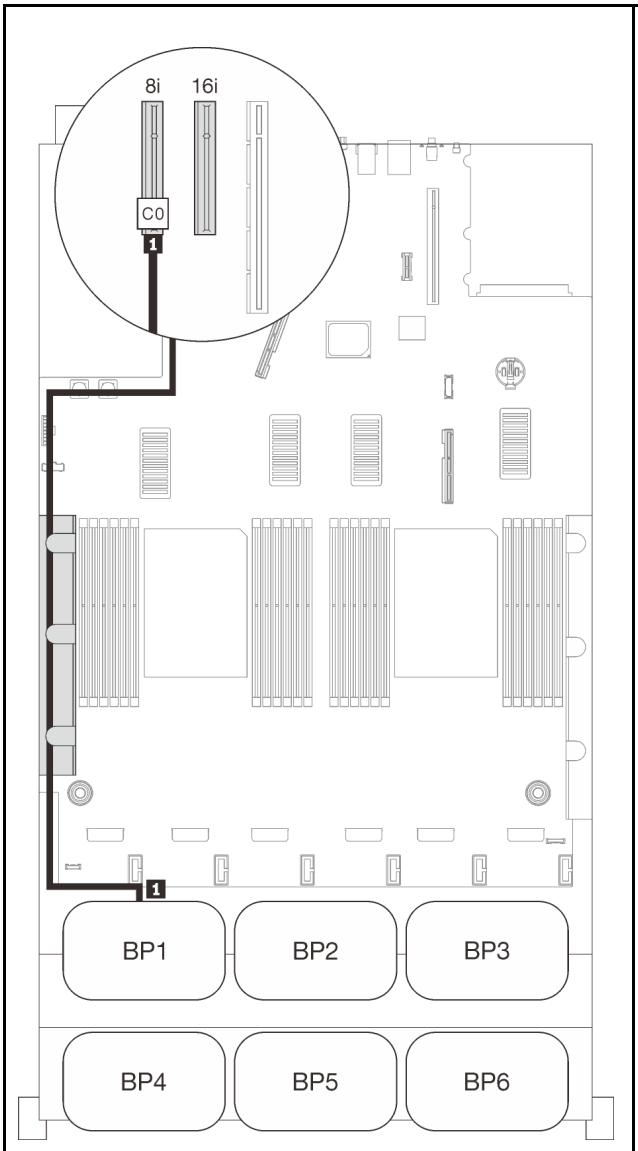
One AnyBay backplane

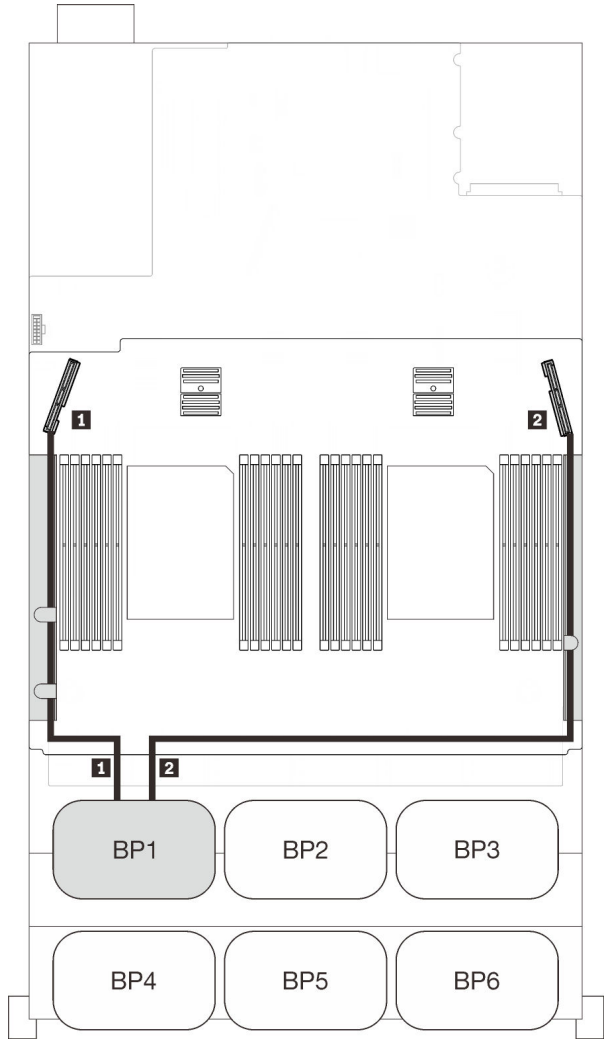
On-board connector



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
			2 4-5, 6-7	670 mm	PCIe 6 (tray)

8i RAID adapter

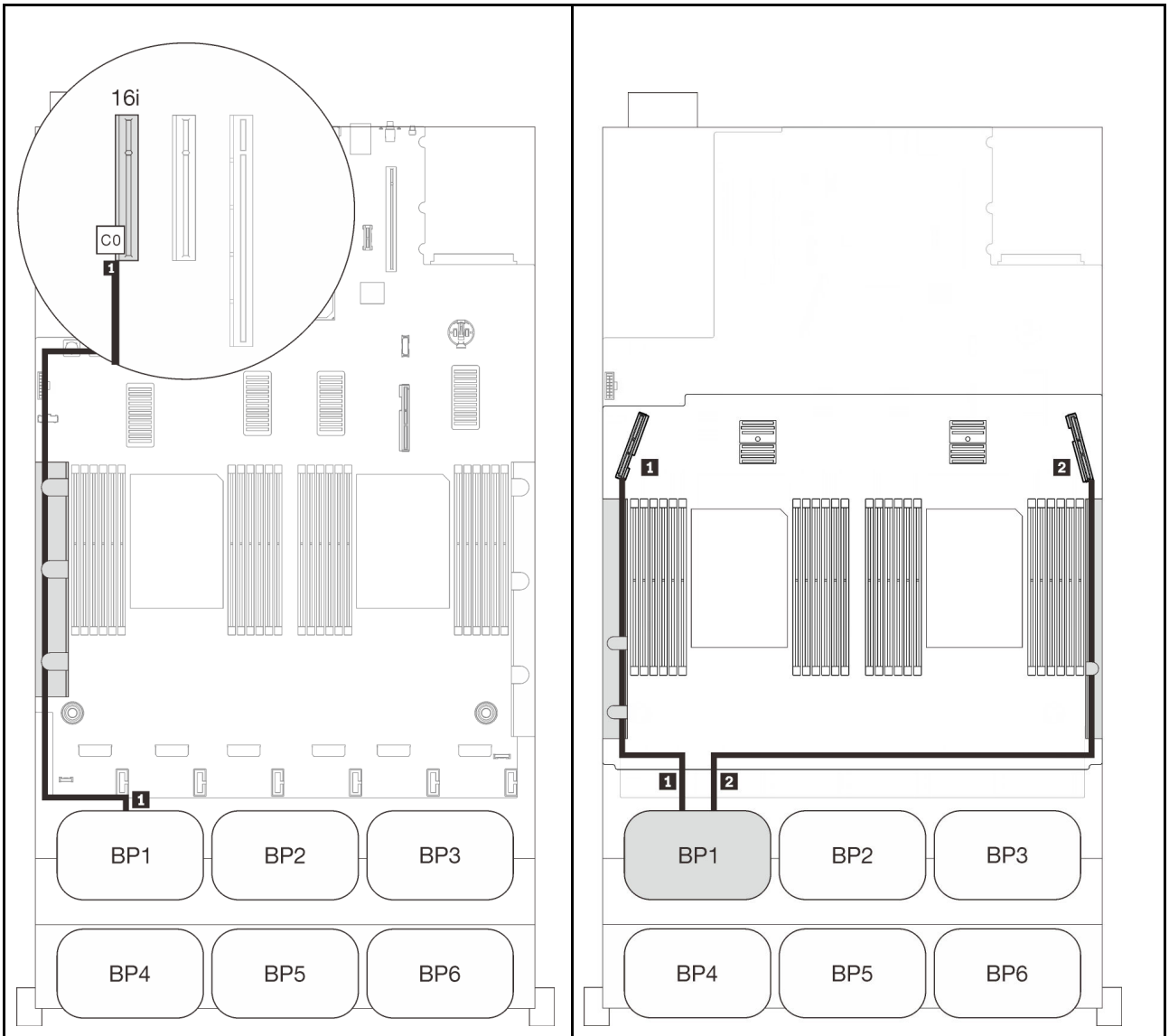




SAS/SATA cable routing		
	Length	To
1	665 mm	C0 (8i)

PCIe cable routing		
NVMe connector	Length	To
1 0-1, 2-3	530 mm	PCIe 3 (tray)
2 4-5, 6-7	670 mm	PCIe 6 (tray)

16i RAID adapter

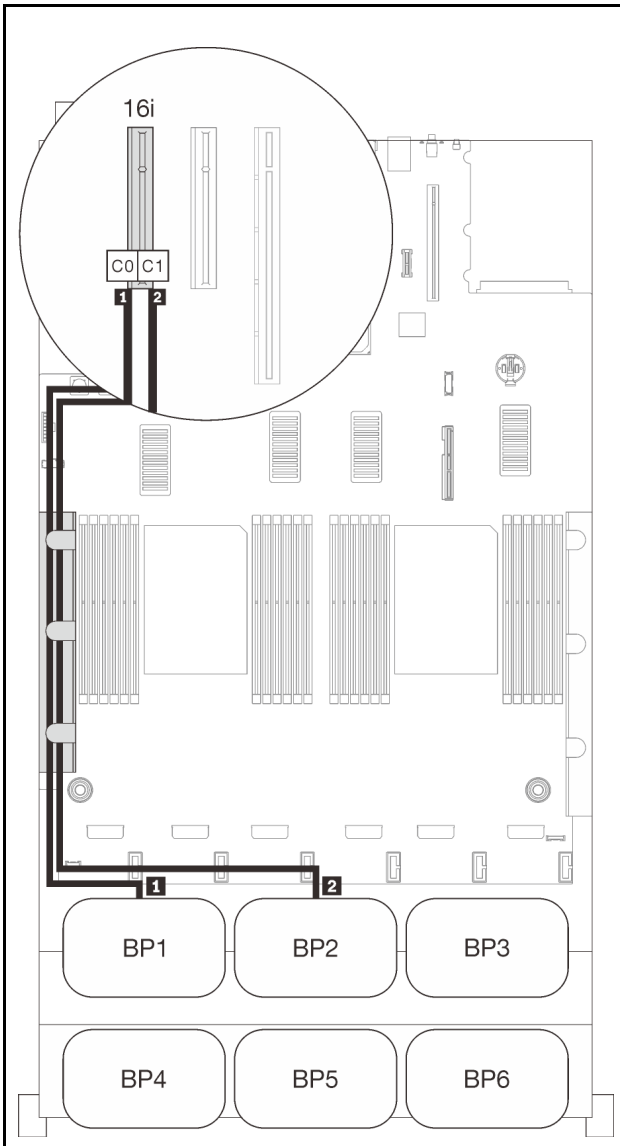


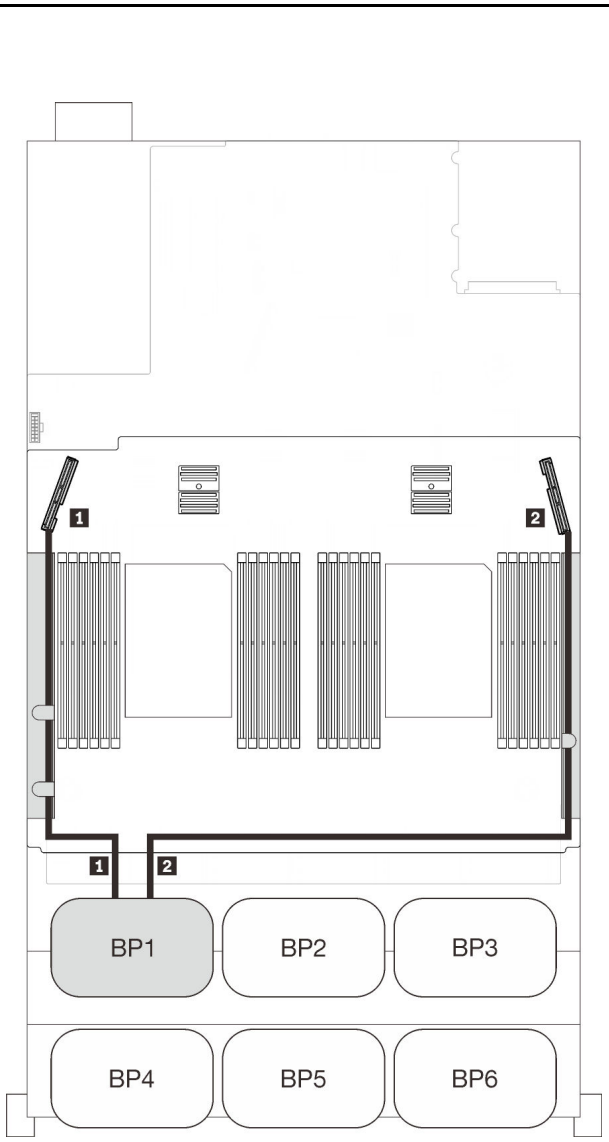
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	• Gen3: 665 mm • Gen4: 690 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
			2 4-5, 6-7	670 mm	PCIe 6 (tray)

Two backplanes

One AnyBay and one SAS/SATA backplane

16i RAID adapter



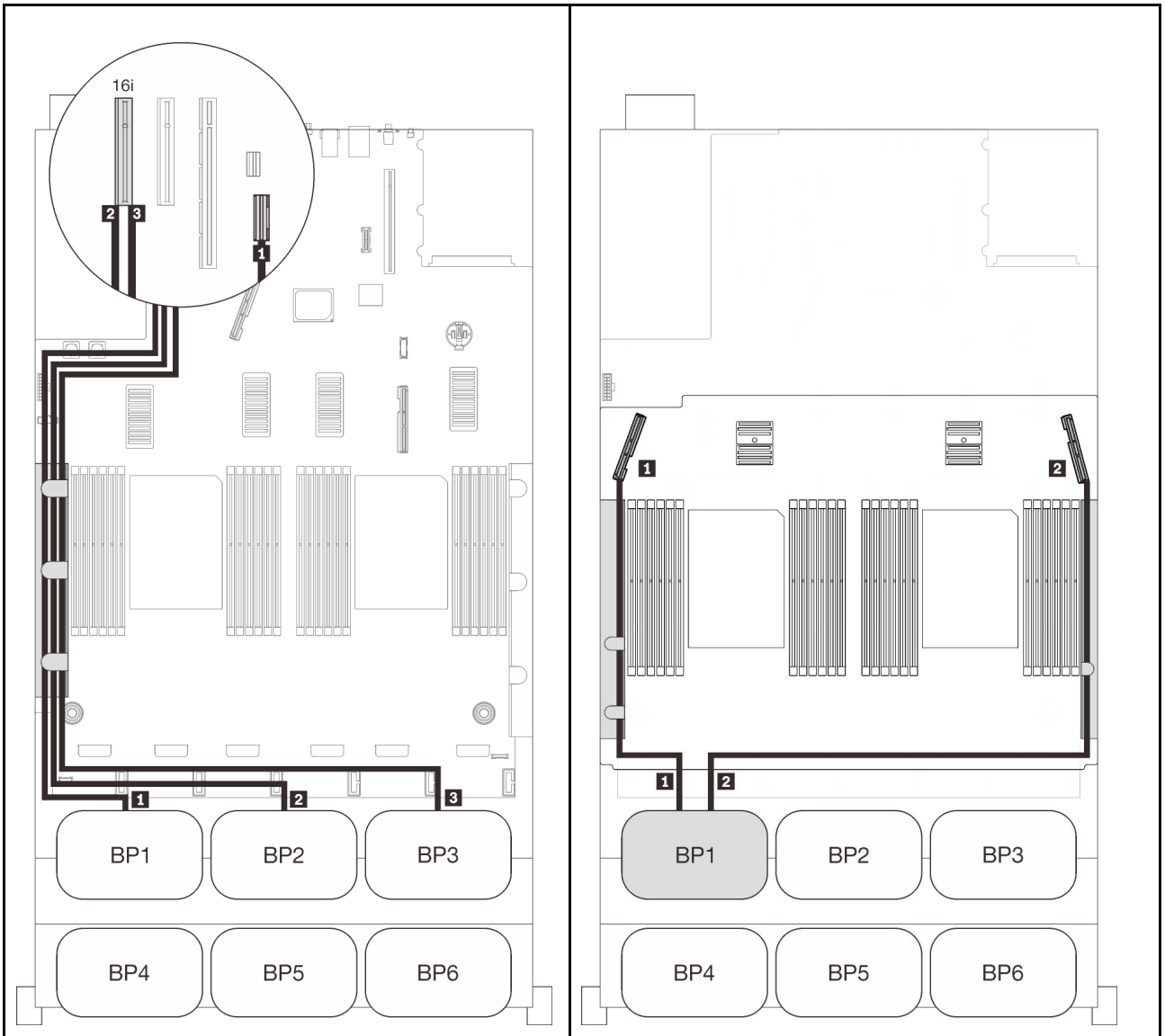


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)

Three backplanes

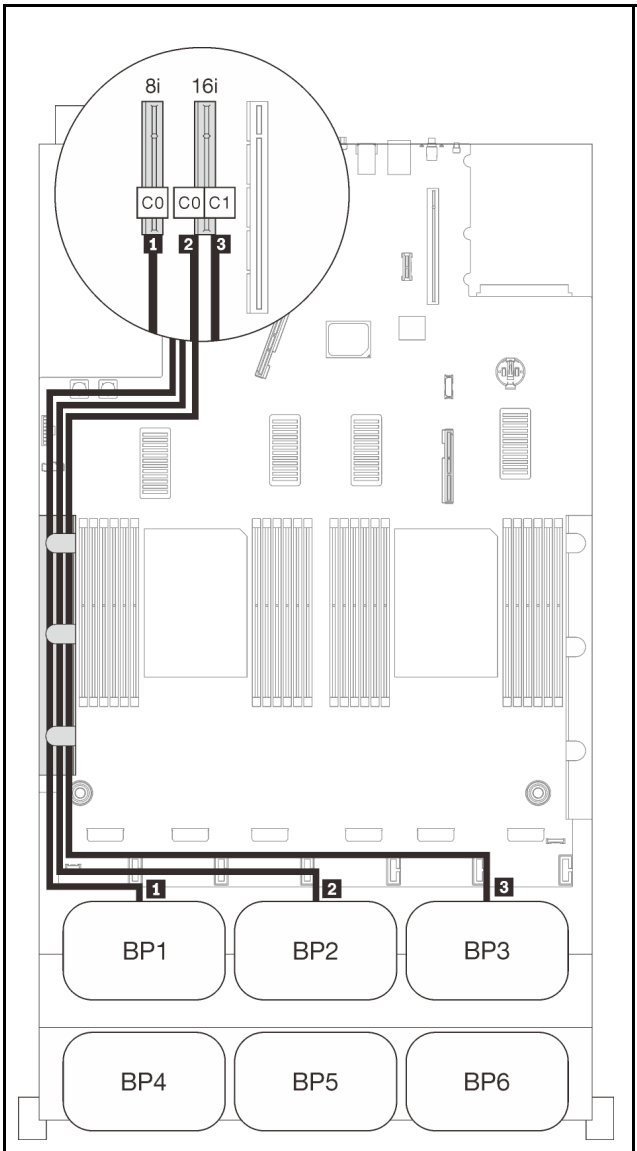
One AnyBay and two SAS/SATA backplanes

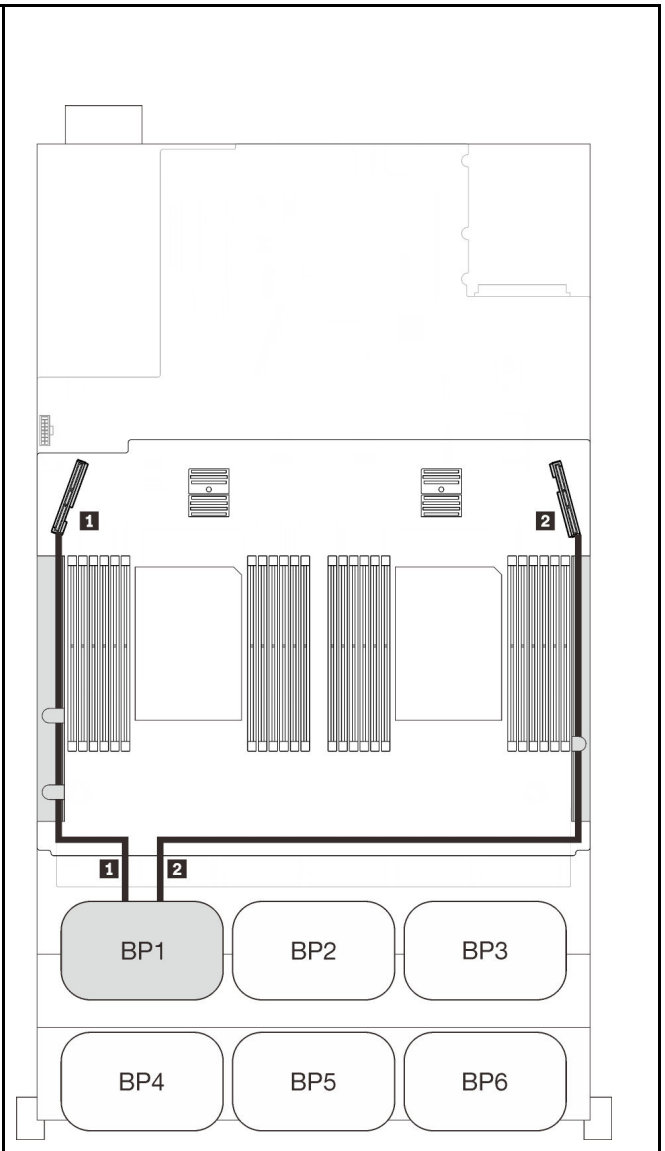
On-board connector + 16i RAID adapter



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)			

8i + 16i RAID adapters



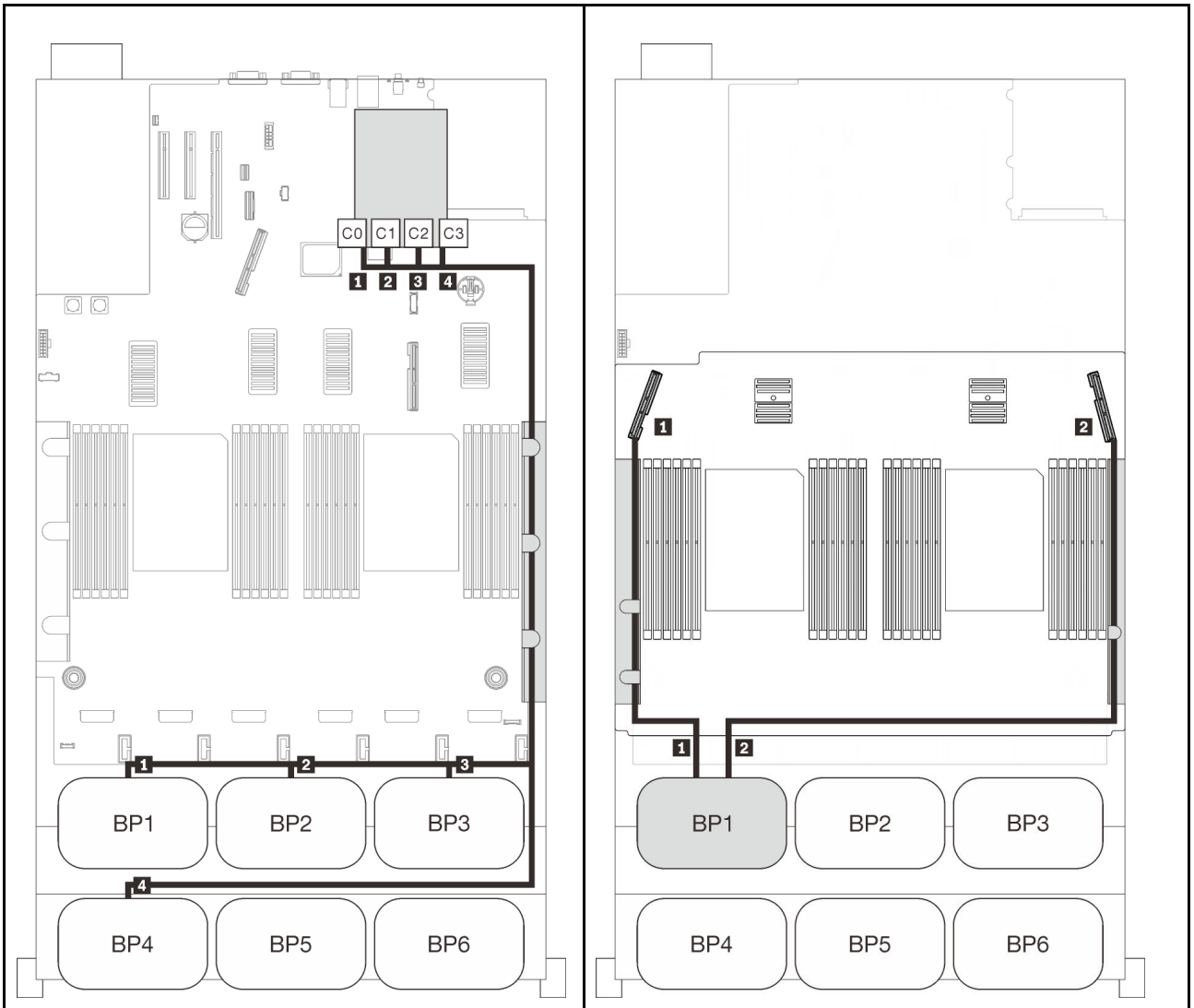


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)			

Four backplanes

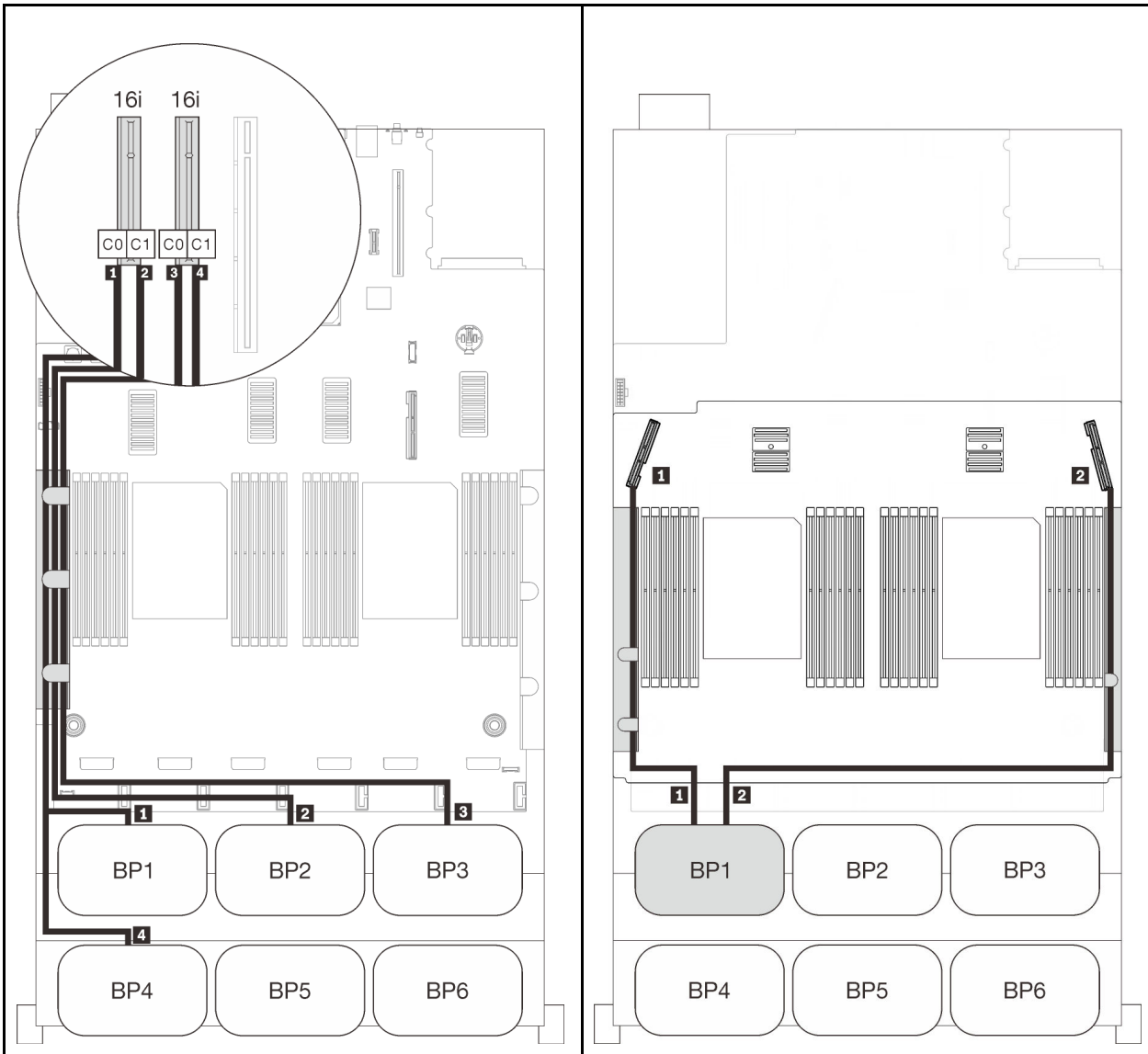
One AnyBay and three SAS/SATA backplanes

32i RAID adapter



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	820 mm	C1 (32i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	690 mm	C2 (32i)			
4	830 mm	C3 (32i)			

16i + 16i RAID adapter

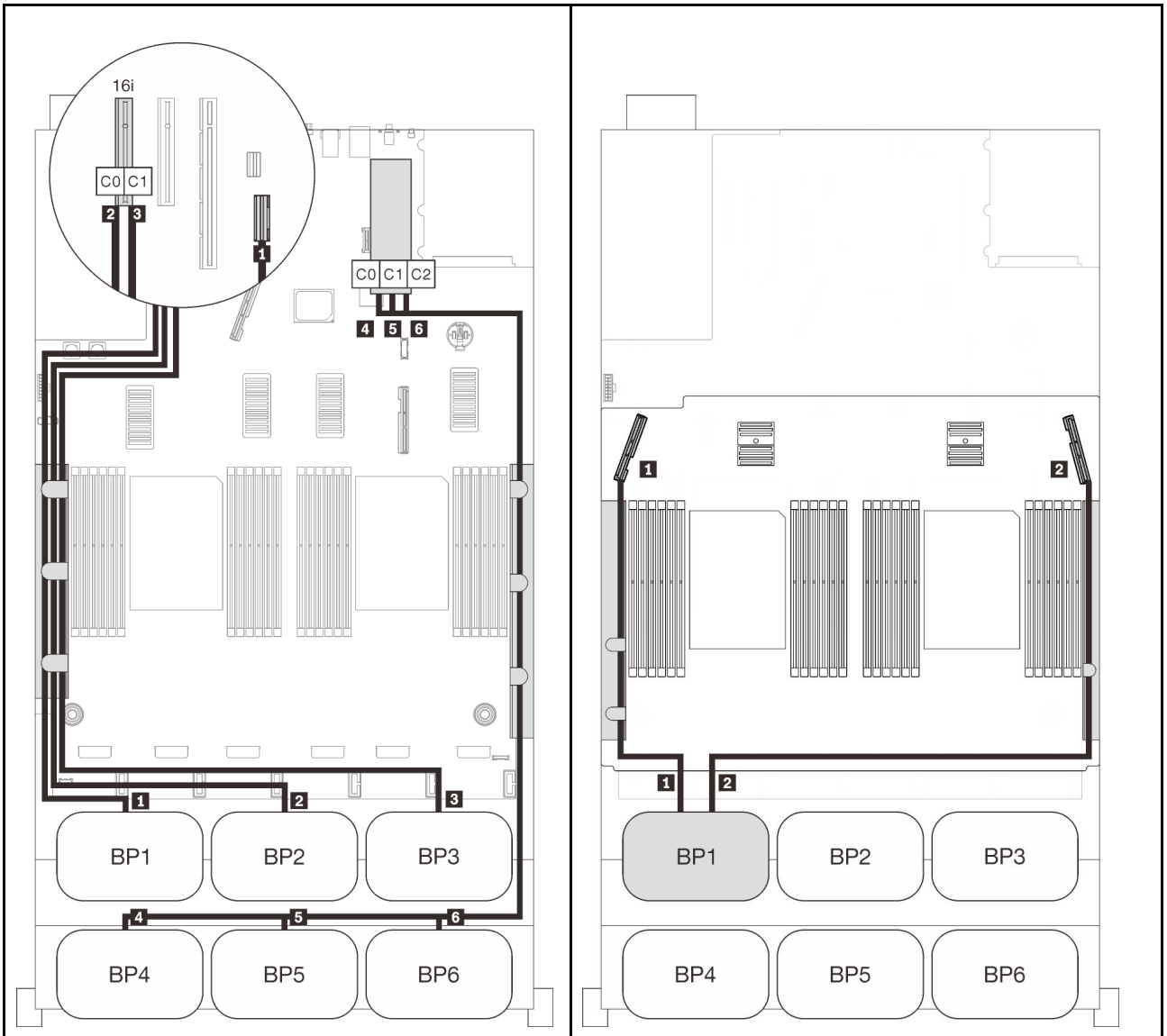


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C0 (16i)			
4	665 mm	C1 (16i)			

Six backplanes

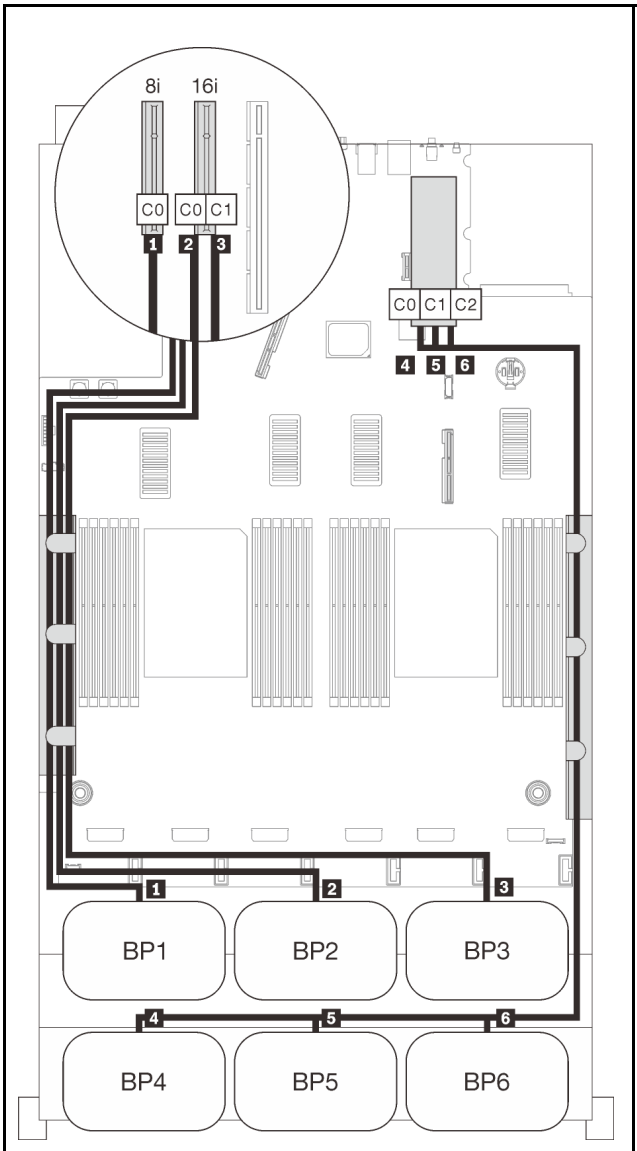
One AnyBay and five SAS/SATA backplanes

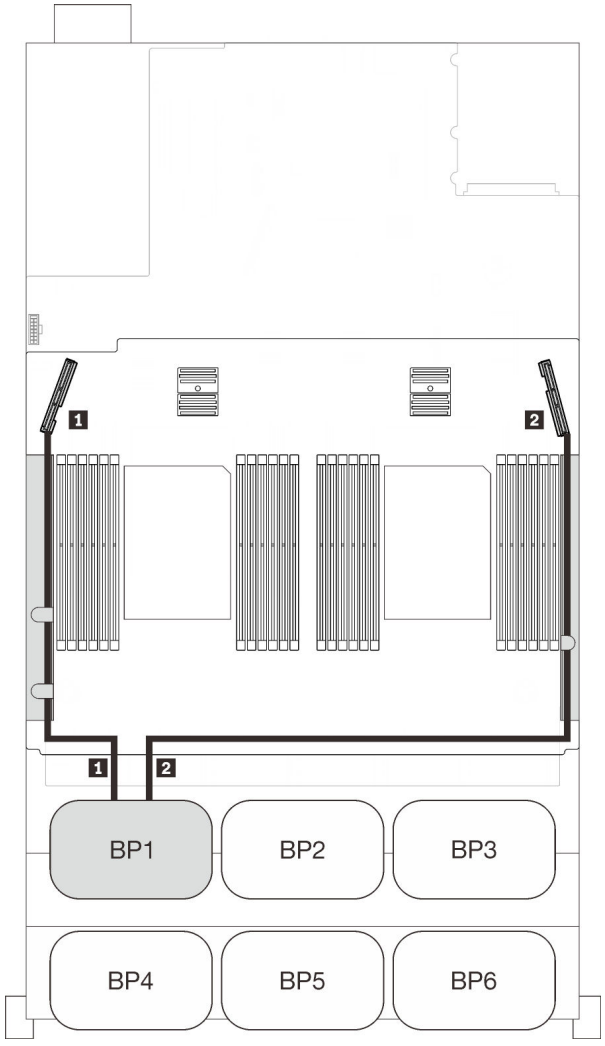
On-board SATA + 16i + 32i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)			
4	820 mm	C0 (32i)			
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

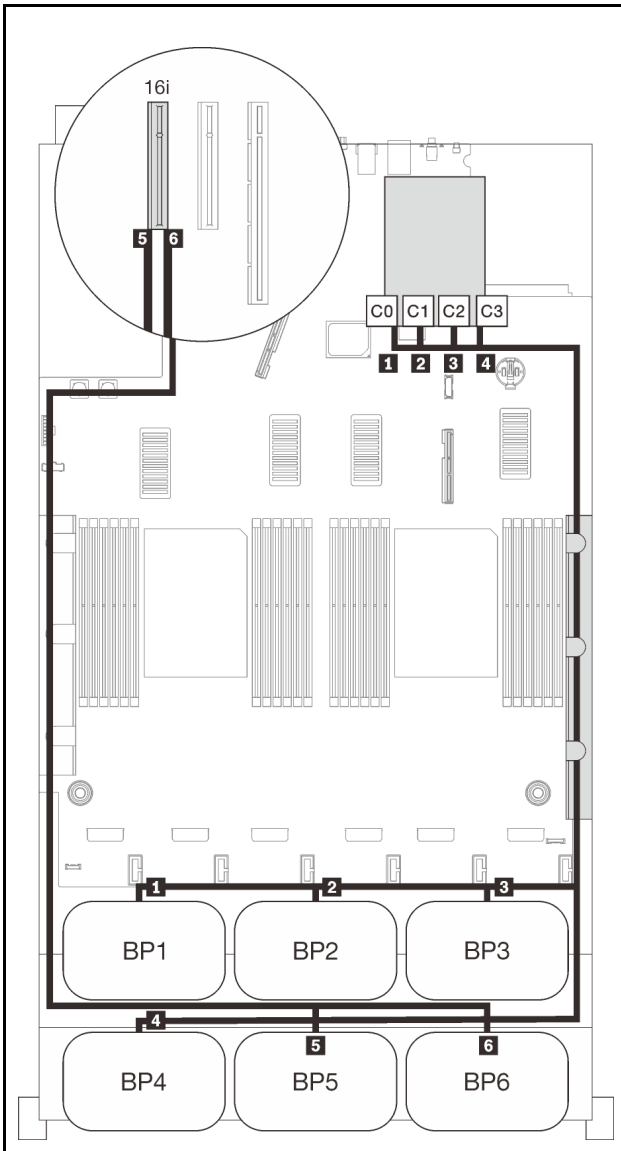
8i + 16i + 32i RAID adapters

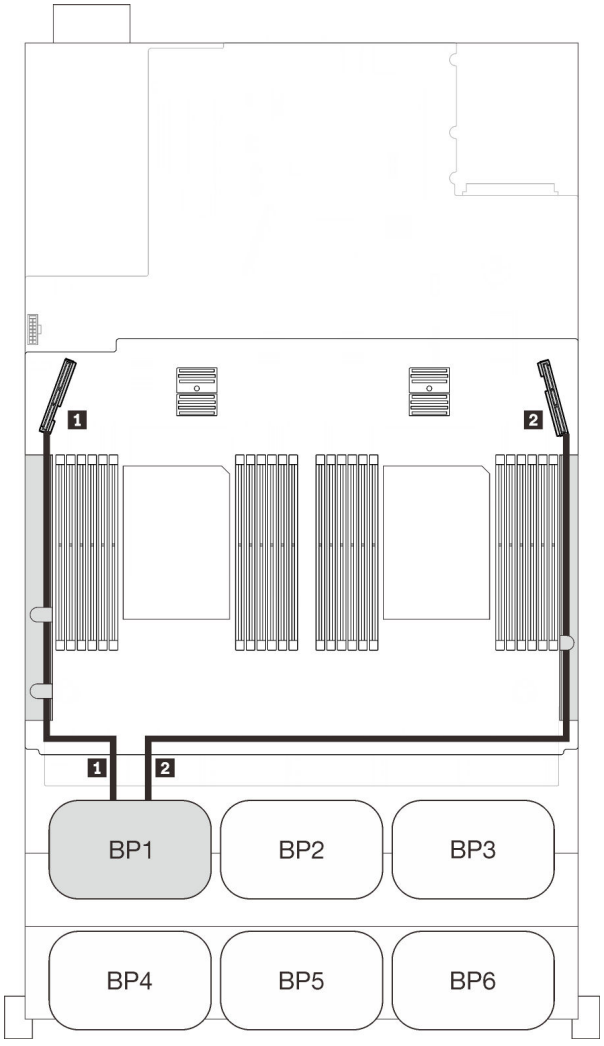




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)			
4	820 mm	C0 (32i)			
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

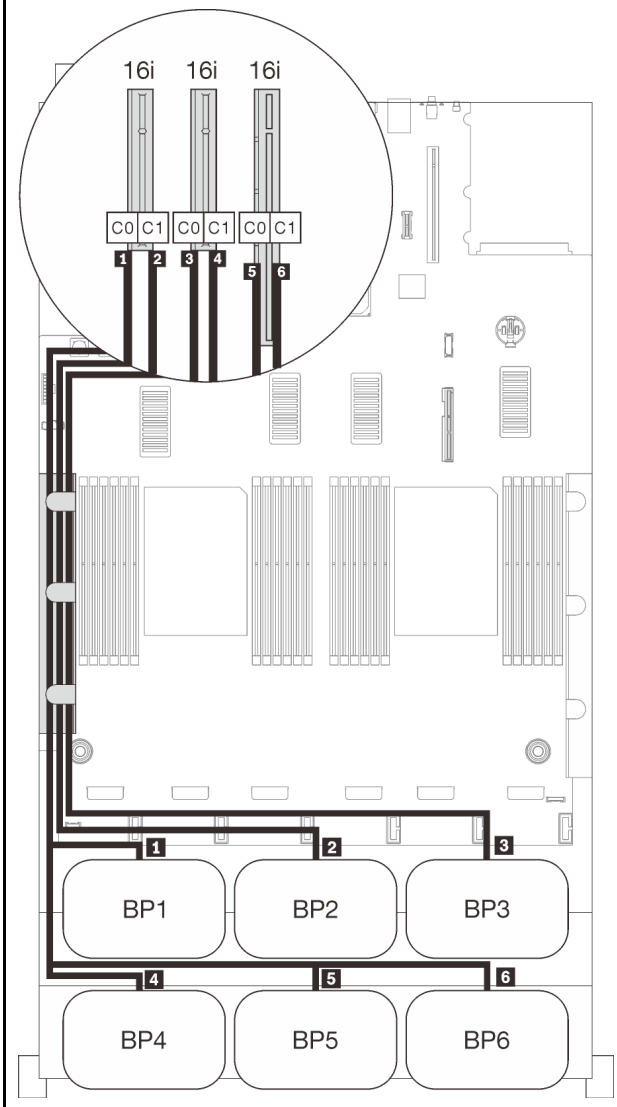
32i + 16i RAID adapters

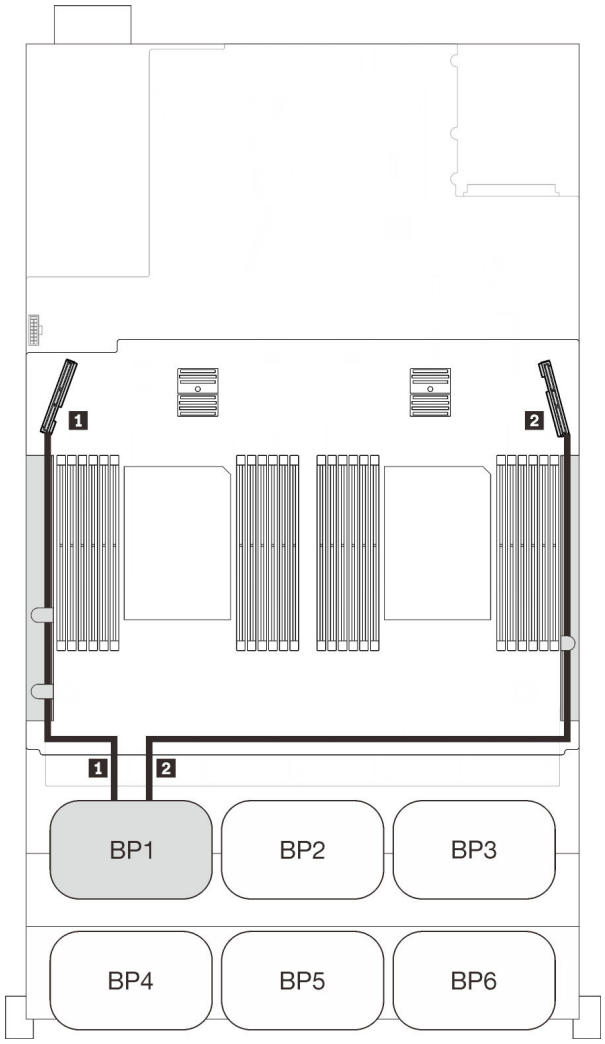




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	820 mm	C1 (32i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	690 mm	C2 (32i)			
4	830 mm	C3 (32i)			
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

16i + 16i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C0 (16i)			
4	665 mm	C1 (16i)			
5	820 mm				
6	• Gen3: 930 mm • Gen4: 945 mm				

Two-AnyBay-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with two AnyBay backplanes.

Note: These combinations require four installed processors.

See the following sections for cable routing combinations with two AnyBay drive backplanes.

- "Without PCIe switch card" on page 104
  - "Two backplanes" on page 104
  - "Three backplanes" on page 106
  - "Four backplanes" on page 109
  - "Six backplanes" on page 111
- "With PCIe switch card" on page 116
  - "Two backplanes" on page 117
  - "Three backplanes" on page 118
  - "Four backplanes" on page 120
  - "Six backplanes" on page 122

Without PCIe switch card

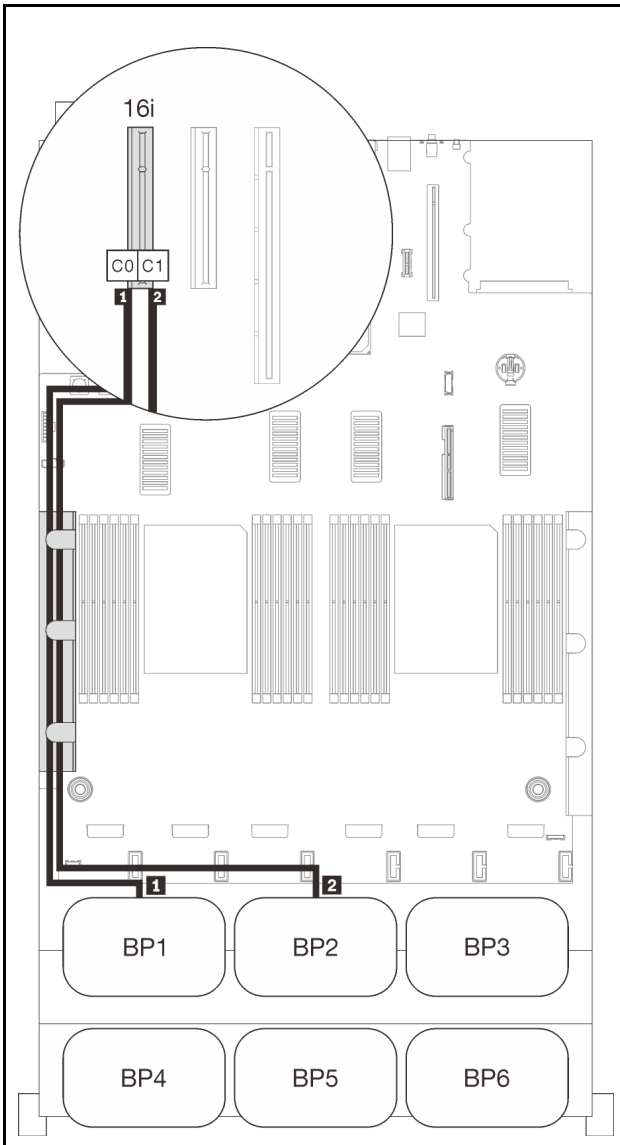
Follow the instructions in this section to learn how do cable routing for combinations with two AnyBay backplanes and not PCIe switch card.

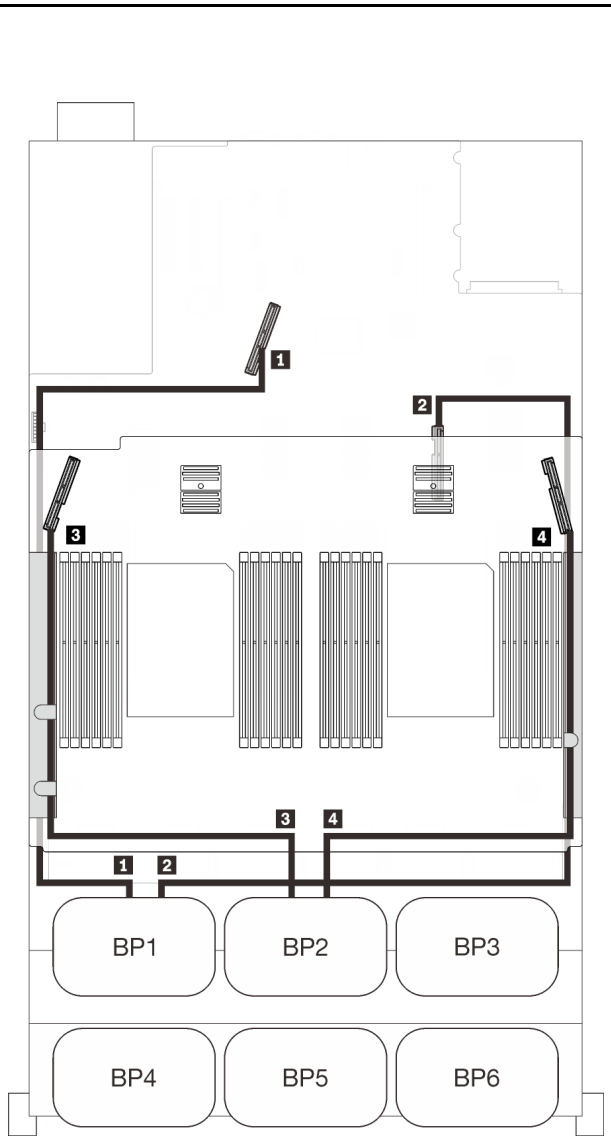
Note: See "Connecting cables to the processor and memory expansion tray" on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.

Two backplanes

Two AnyBay backplanes

16i RAID adapter





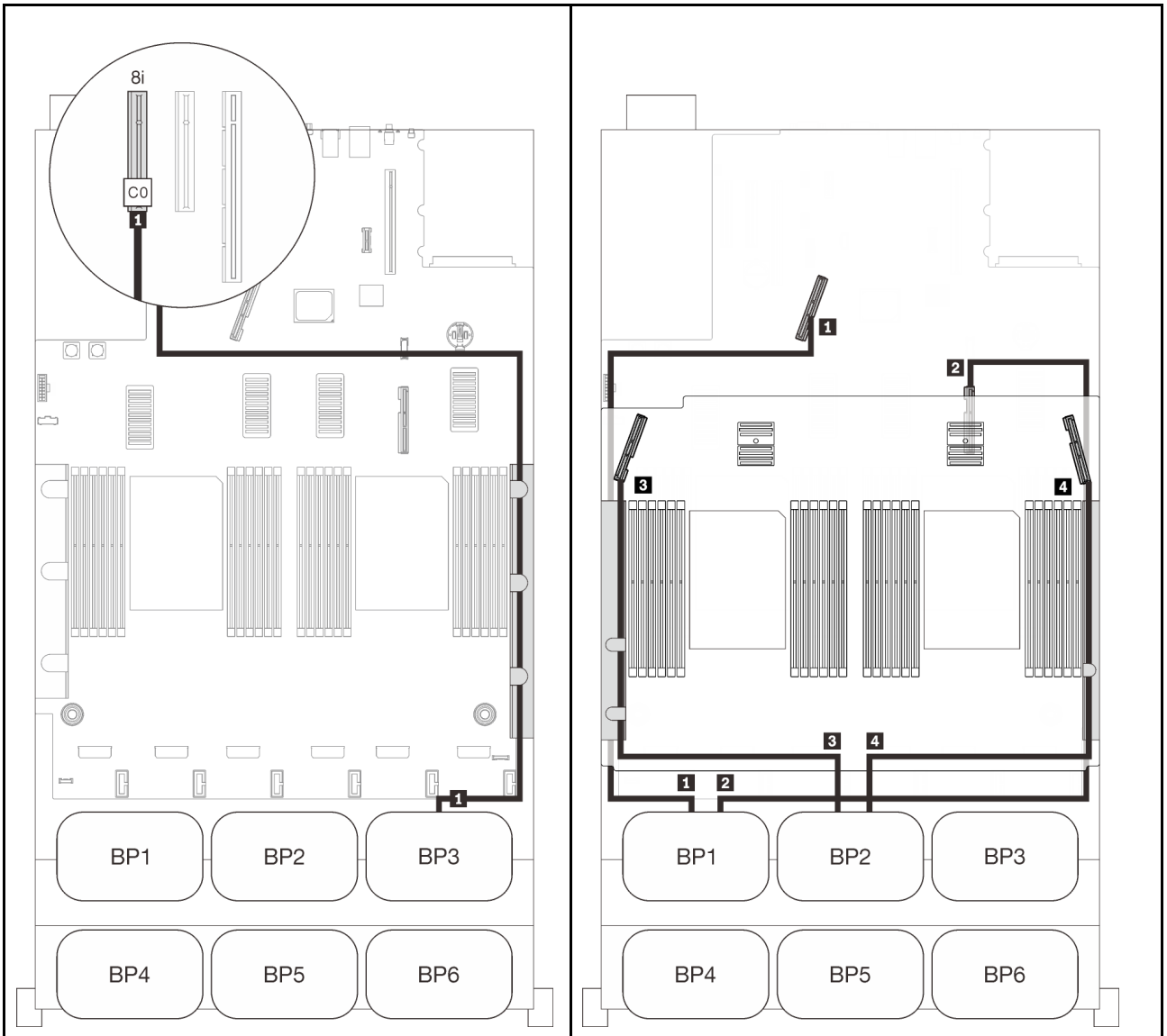
SAS/SATA cable routing		
	Length	To
1	665 mm	C0 (16i)
2	860 mm	C1 (16i)

PCIe cable routing		
NVMe connector	Length	To
1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3 0-1, 2-3	530 mm	PCIe 3 (tray)
4 4-5, 6-7	670 mm	PCIe 6 (tray)

Three backplanes

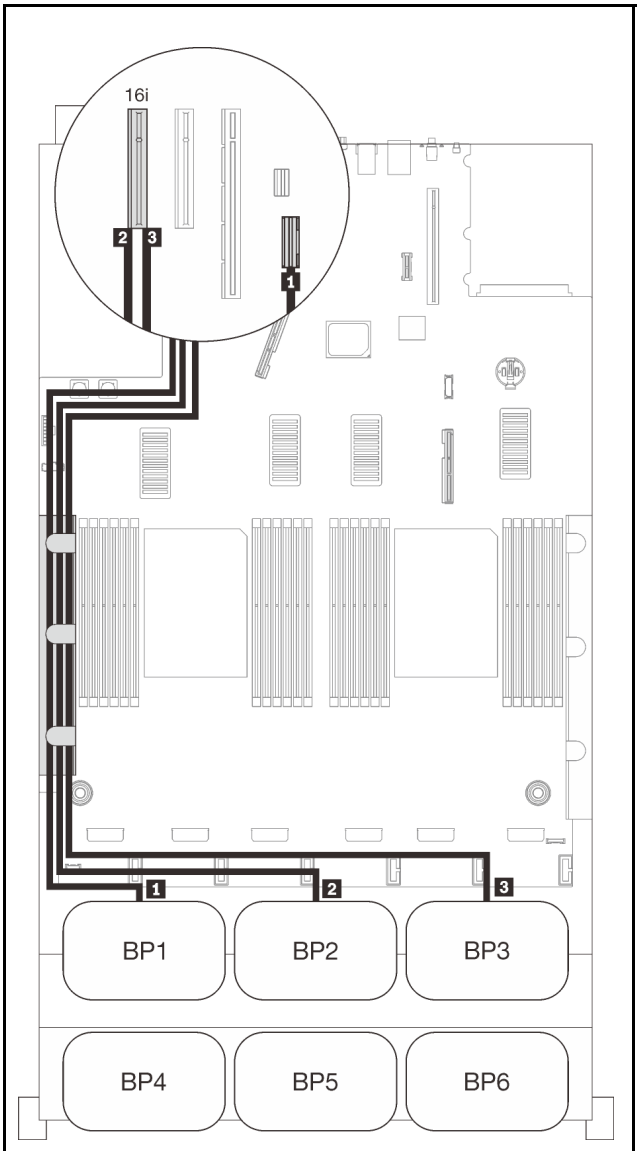
Two AnyBay and one SAS/SATA backplane

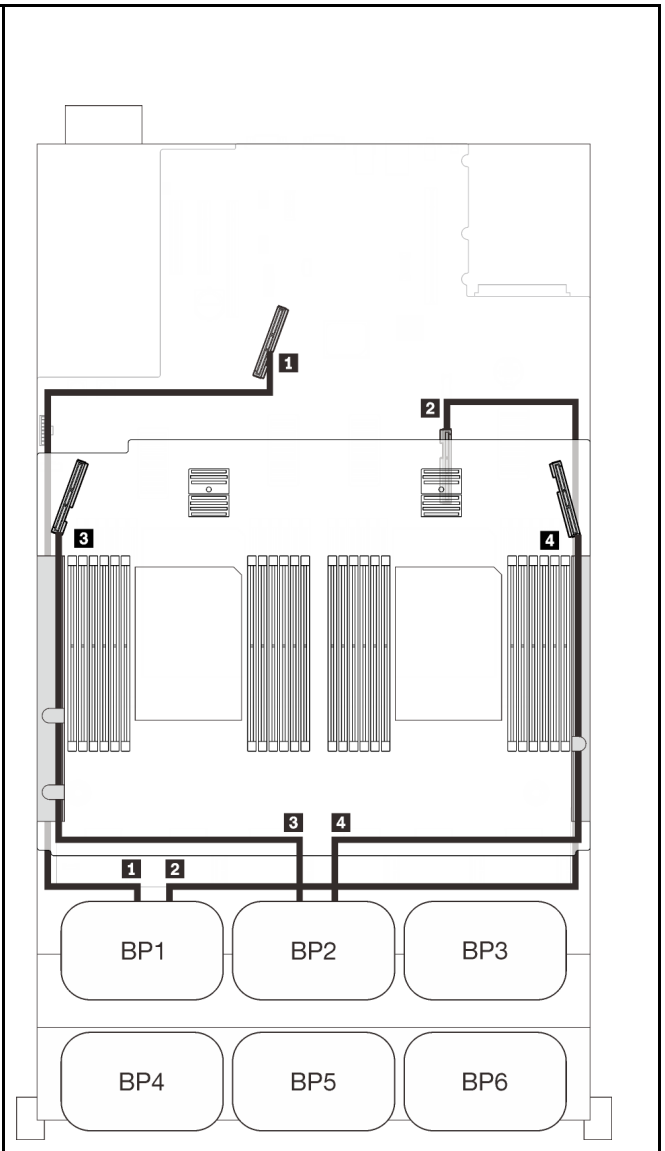
8i RAID adapter



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	1000 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
			2 4-5, 6-7	910 mm	PCIe 2 (on-board)
			3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)

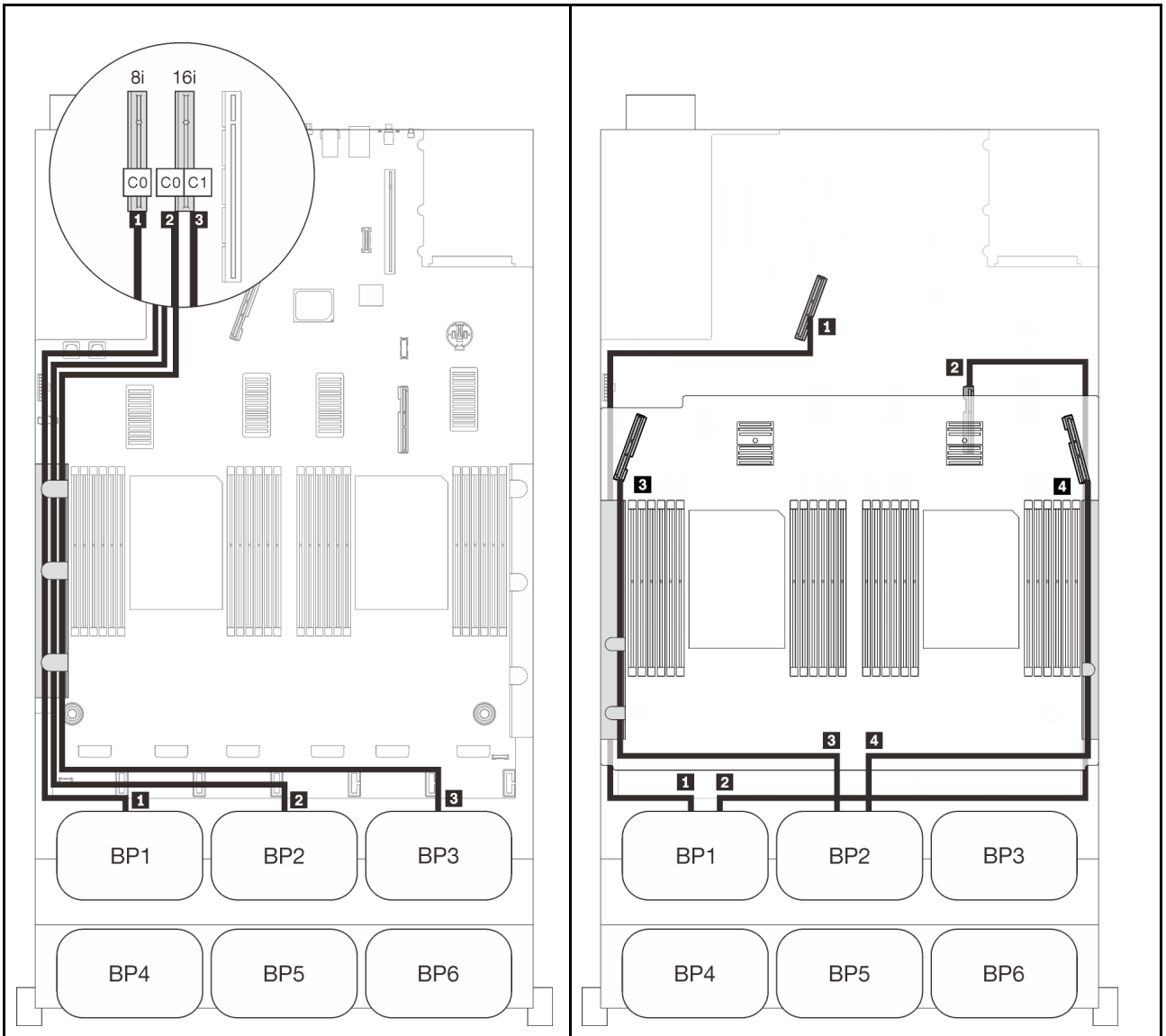
On-board connector + 16i RAID adapter





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)

8i + 16i RAID adapters

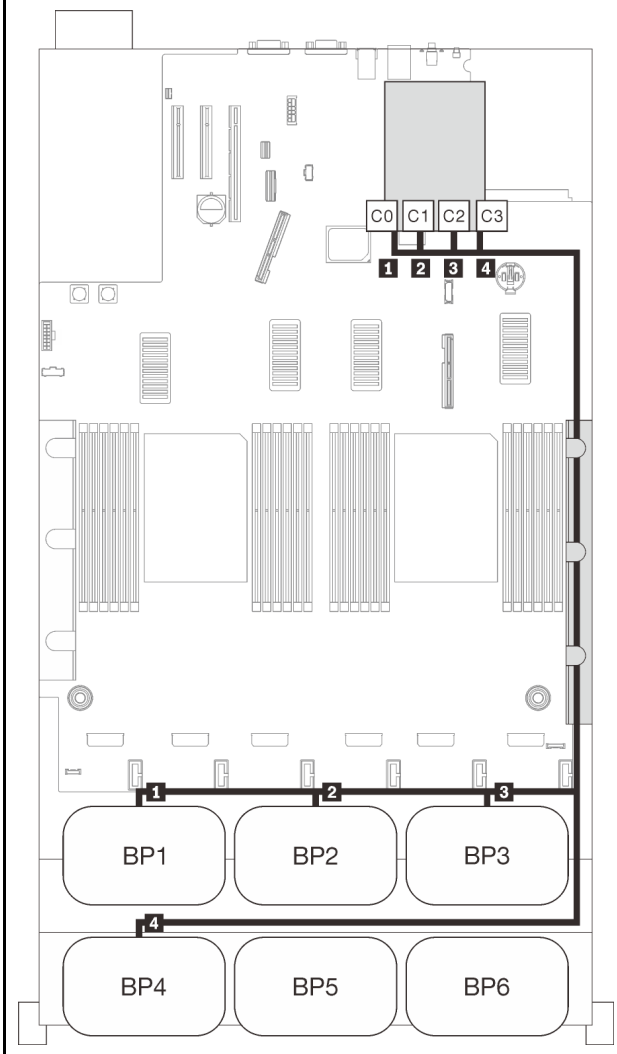


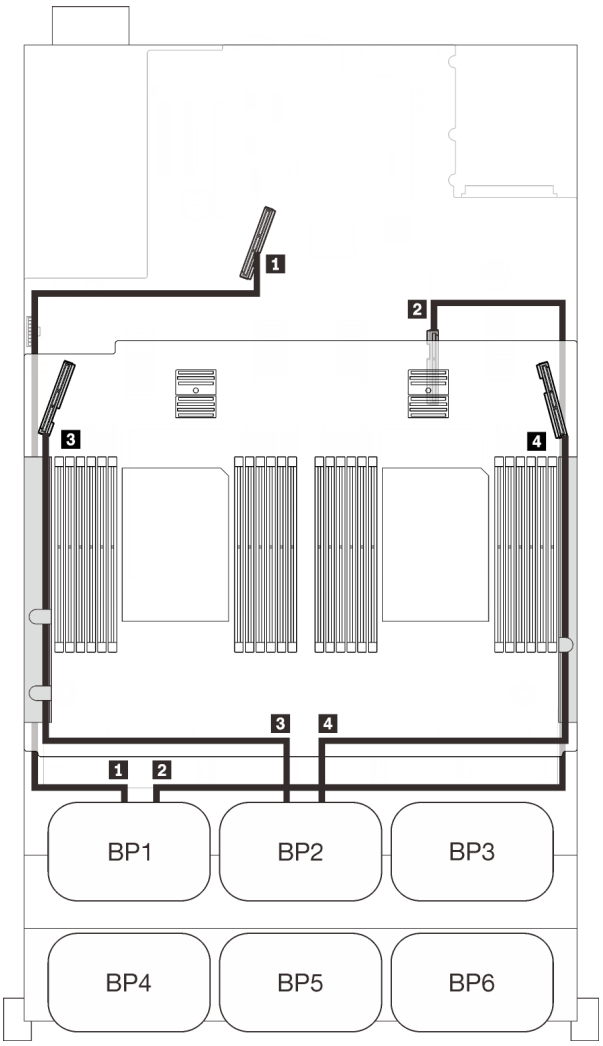
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)

Four backplanes

Two AnyBay and two SAS/SATA backplanes

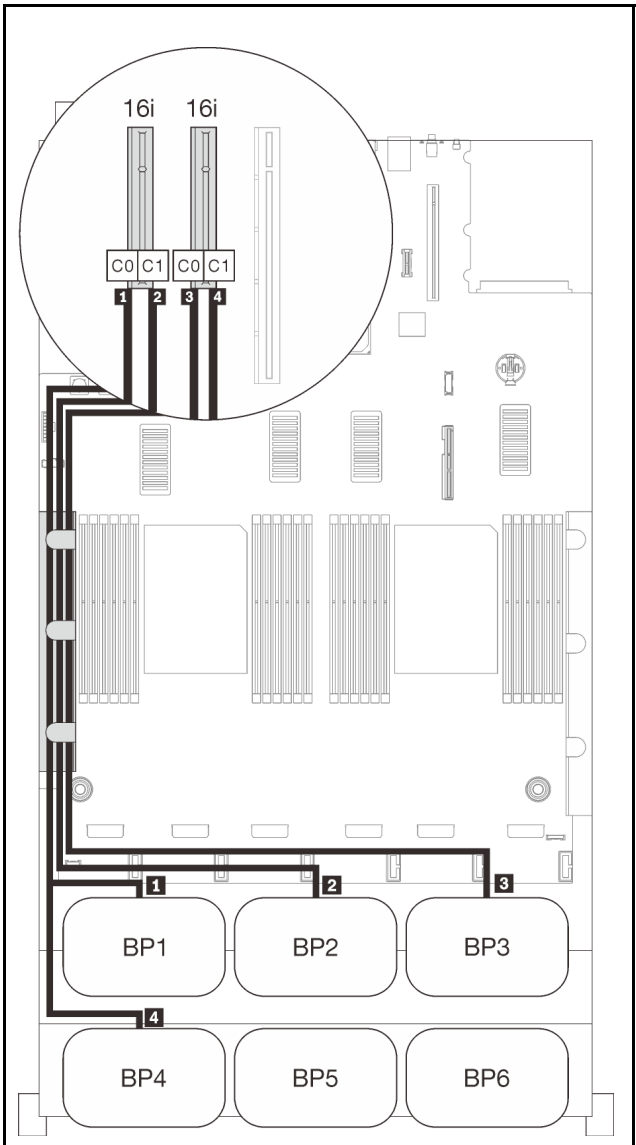
32i RAID adapter

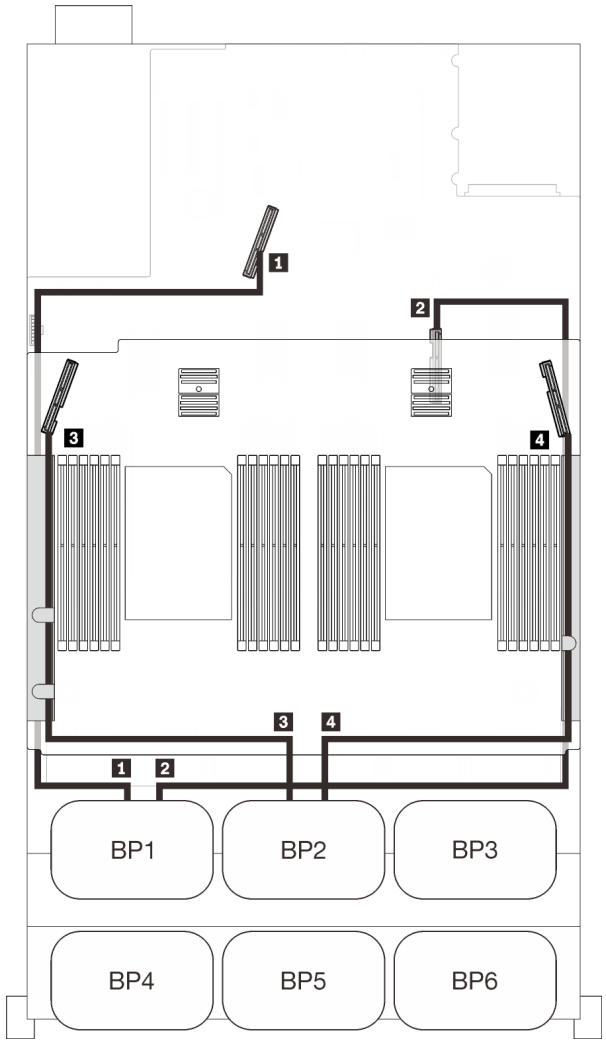




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	830 mm	C3 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)

16i + 16i RAID adapters



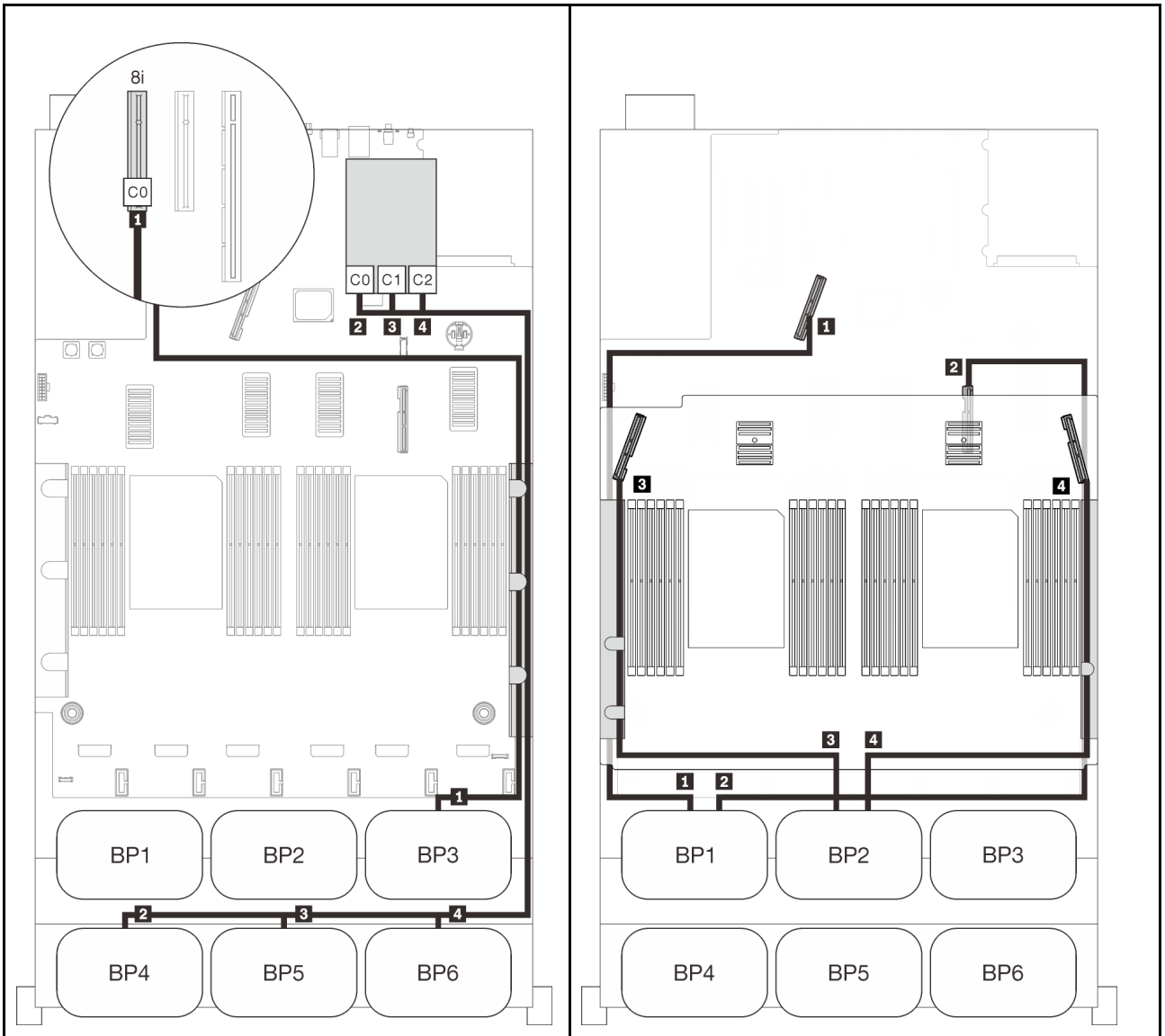


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm		3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	665 mm		4 4-5, 6-7	670 mm	PCIe 6 (tray)

Six backplanes

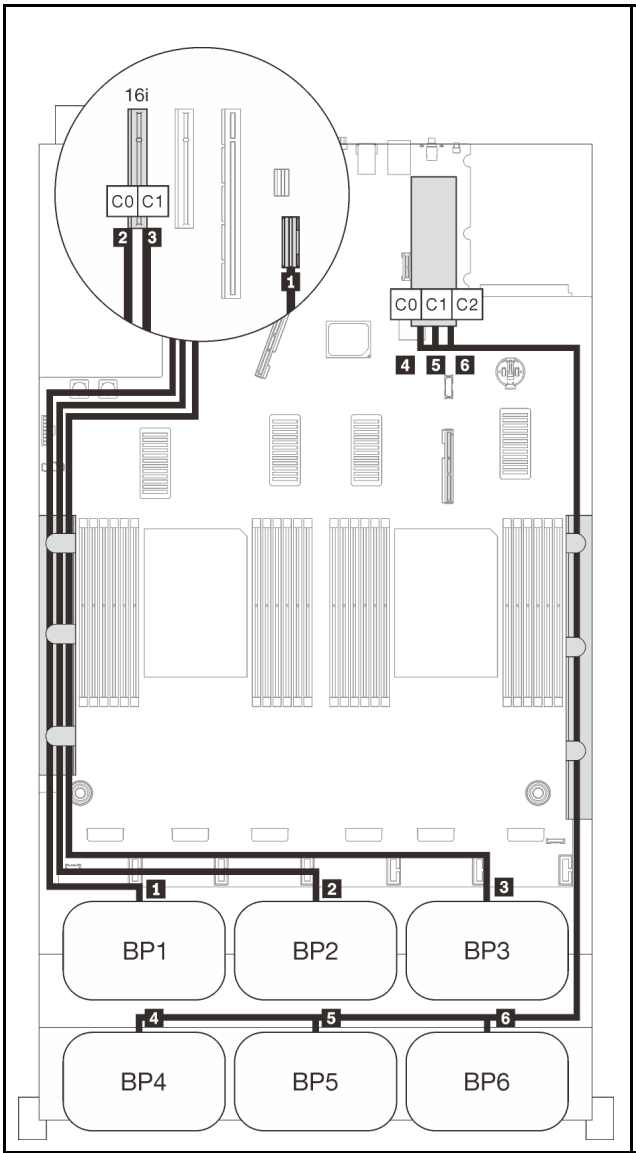
Two AnyBay and four SAS/SATA backplanes

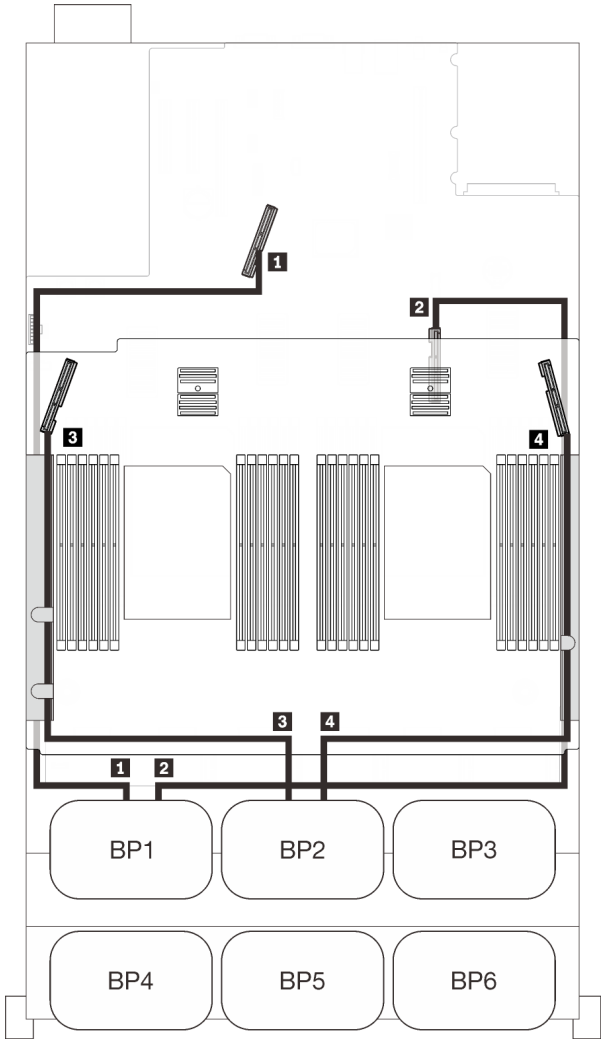
8i + 32i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	1000 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C0 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C1 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	665 mm	C2 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)

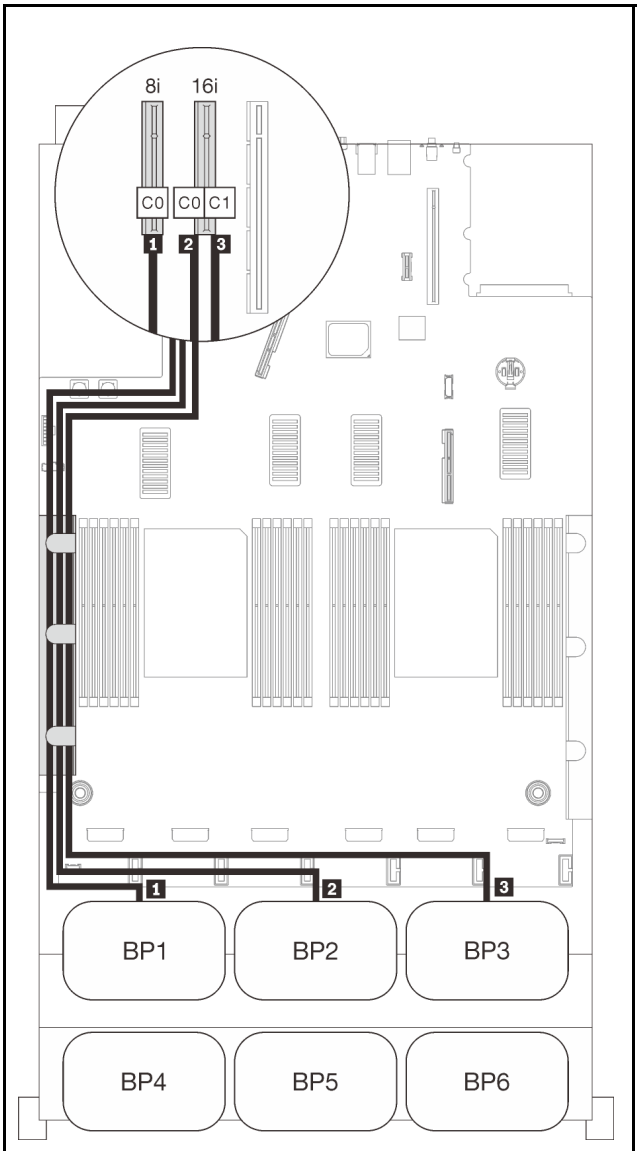
On-board SATA + 16i + 32i RAID adapters

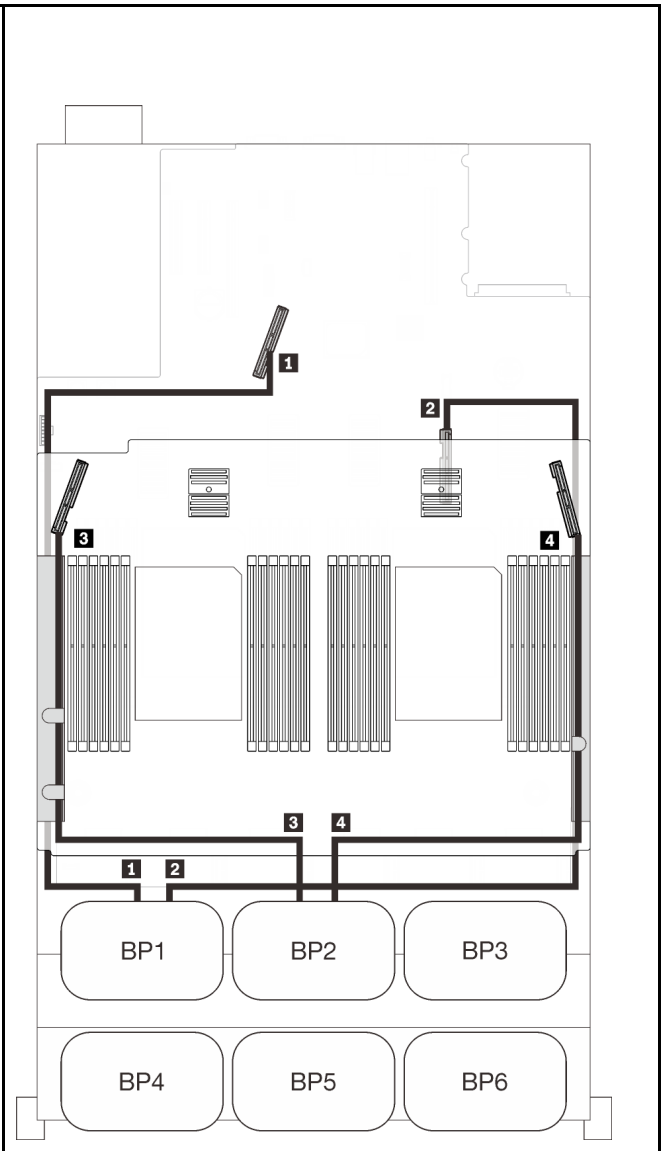




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C0 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	820 mm	C1 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	690 mm	C2 (32i)			
6	665 mm	C3 (32i)			

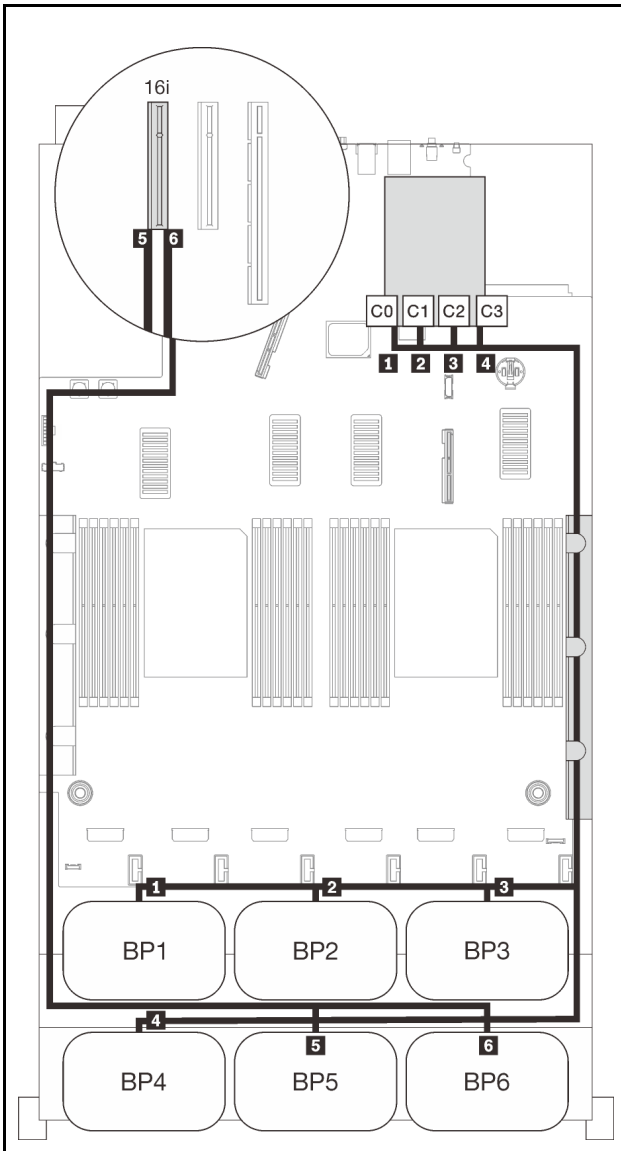
8i + 16i + 32i RAID adapters

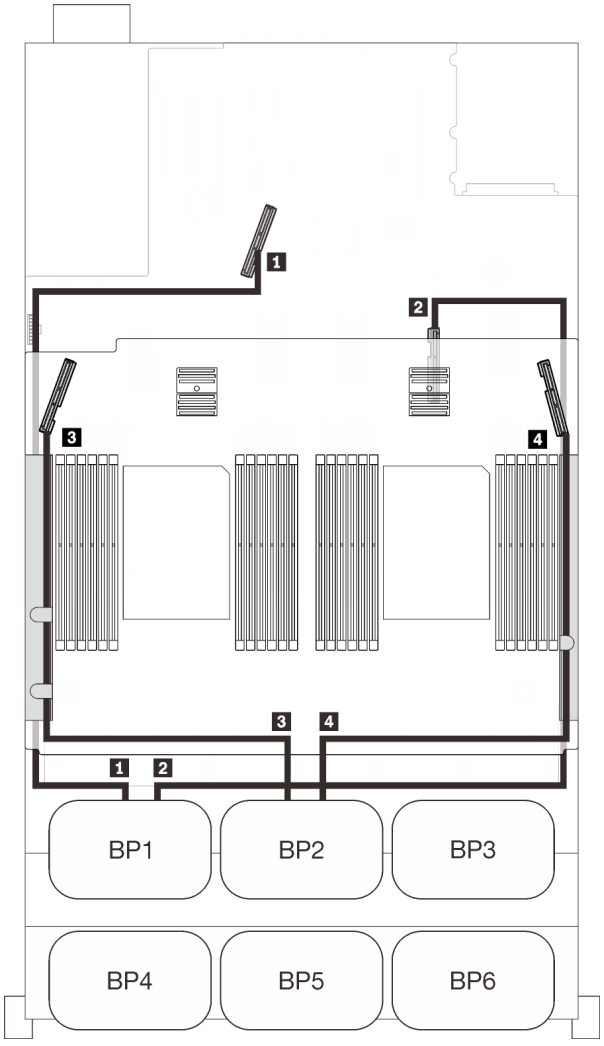




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	820 mm	C0 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

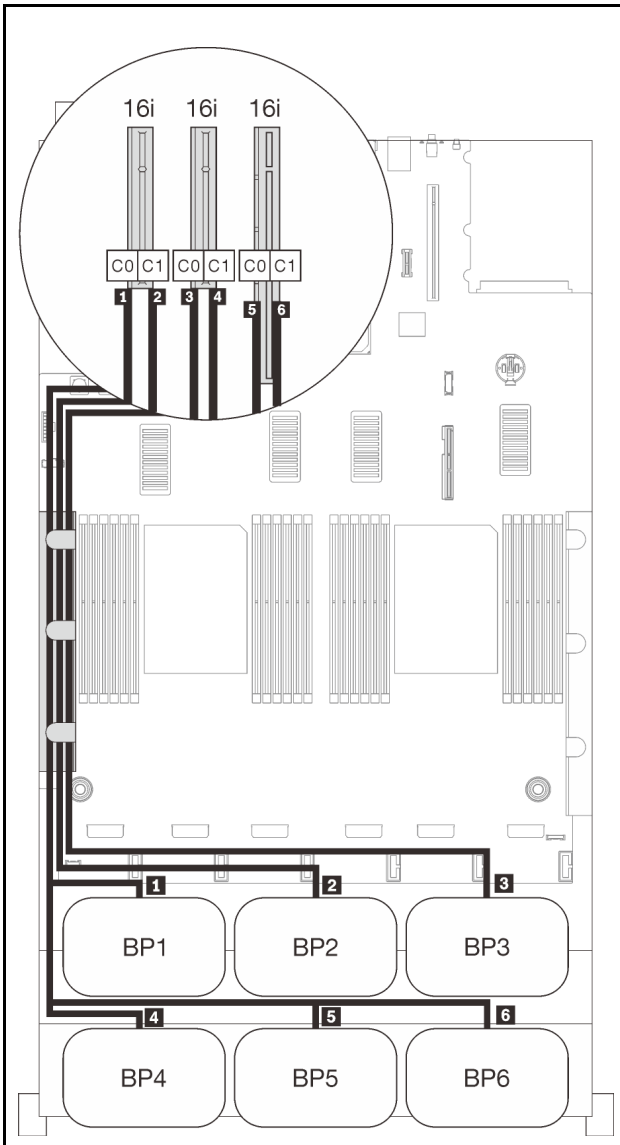
32i + 16i RAID adapters

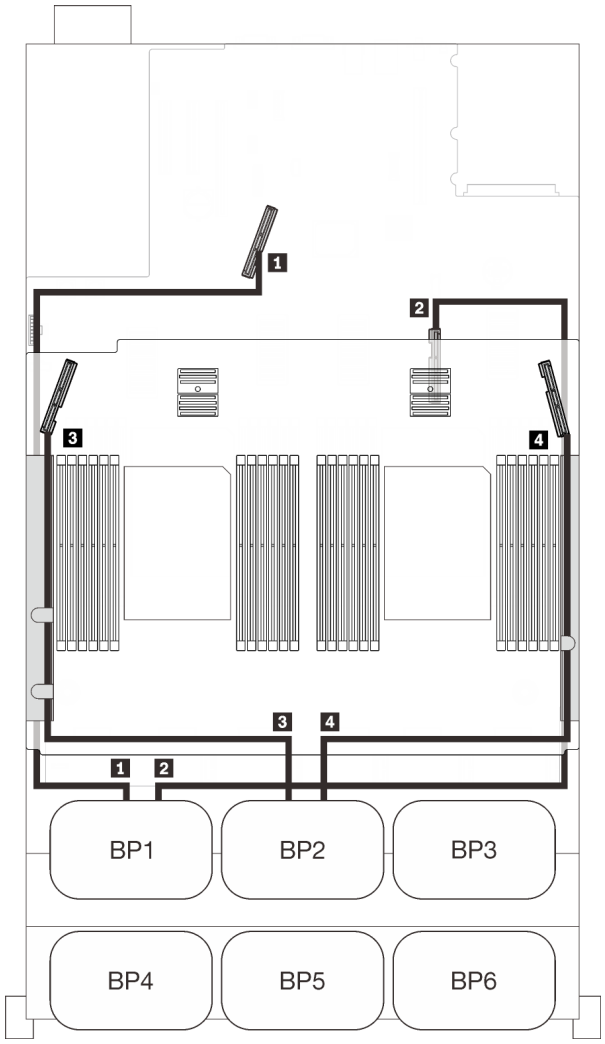




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	830 mm	C3 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

16i + 16i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C0 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	665 mm	C1 (16i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

With PCIe switch card

With one PCIe switch card installed, there is one more option for NVMe cable connection. Follow the instructions in this section to learn how do cable routing for combinations with two AnyBay backplanes and a PCIe switch card.

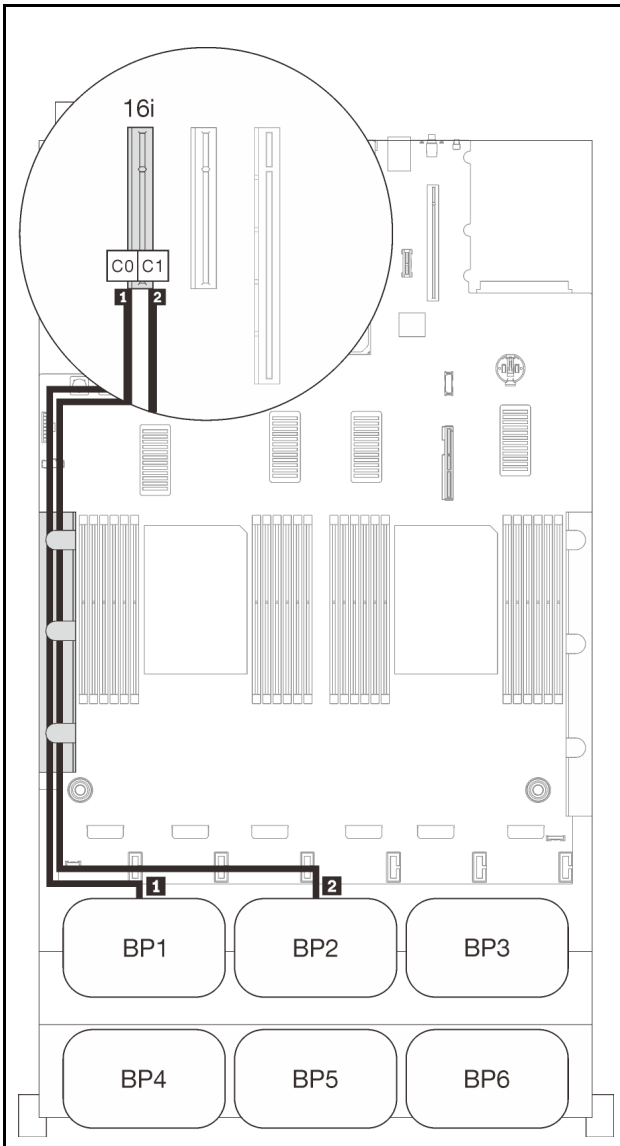
Notes:

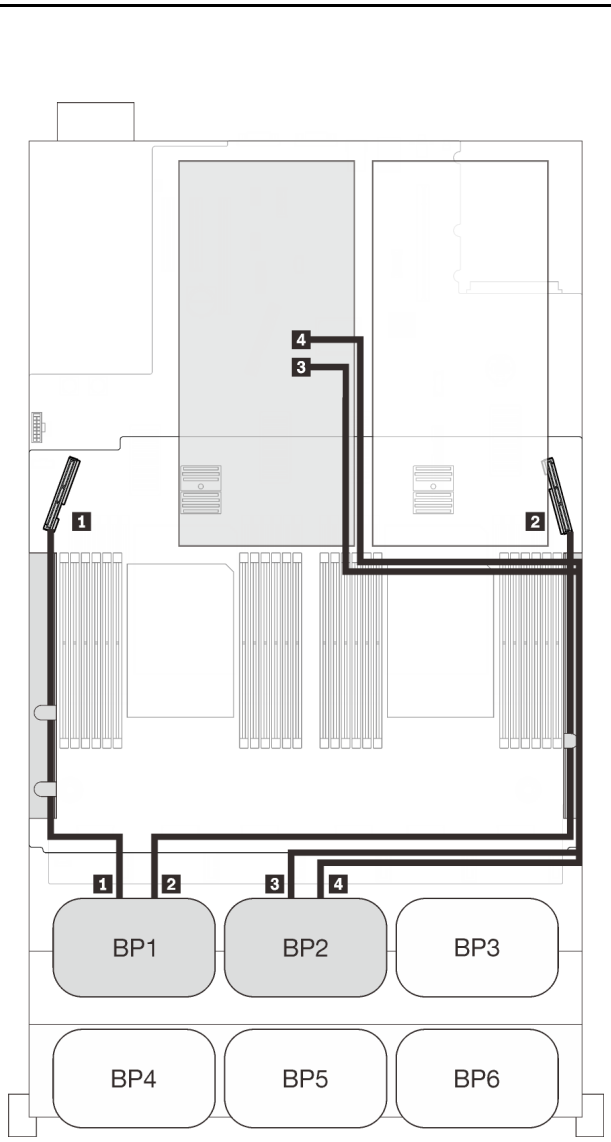
- See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.
- See “Connecting cables to the NVMe switch cards” on page 53 to perform the procedure properly while connecting PCIe cables to the PCIe switch cards.

Two backplanes

Two AnyBay backplanes

16i RAID adapter



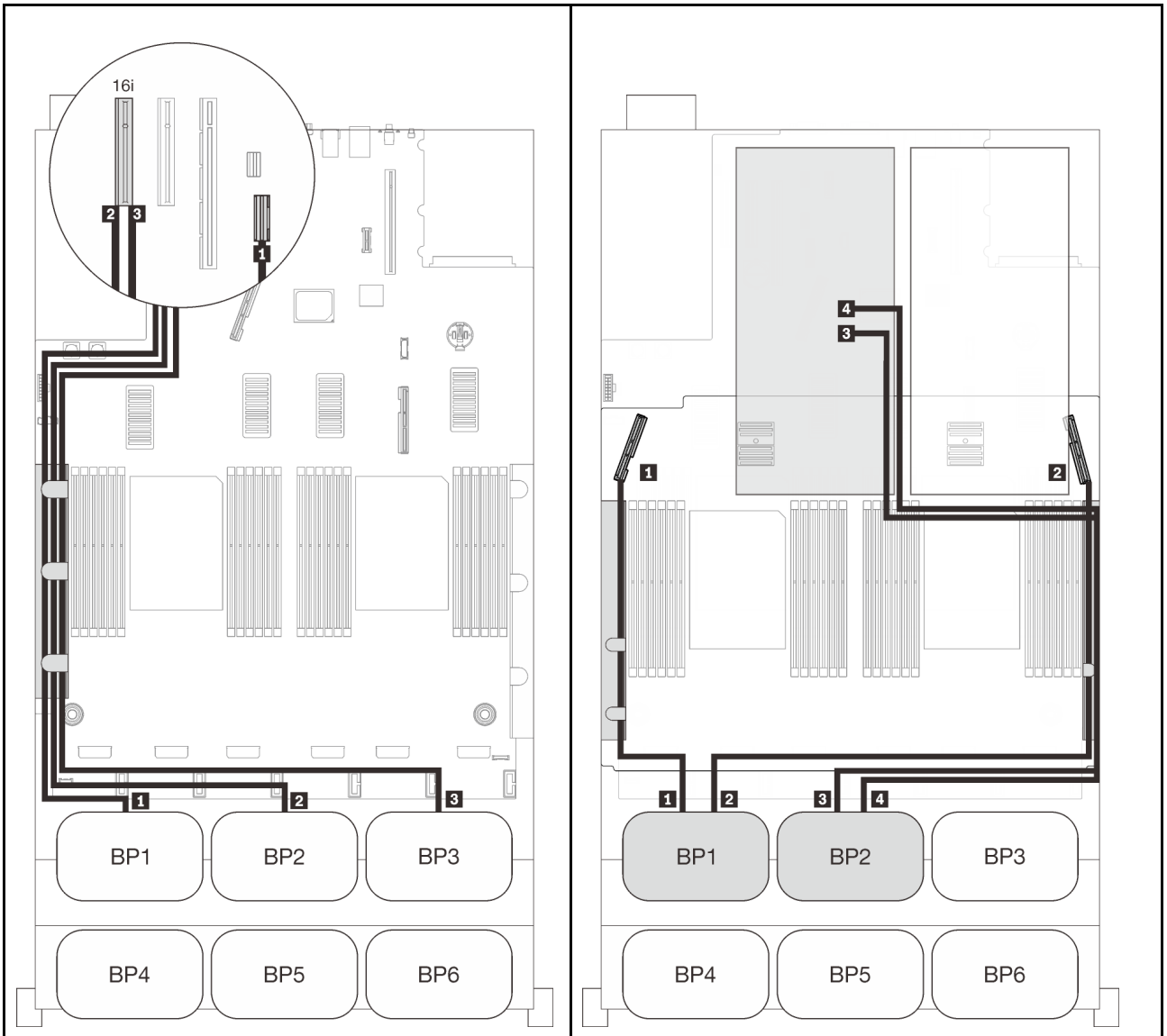


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
			3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Three backplanes

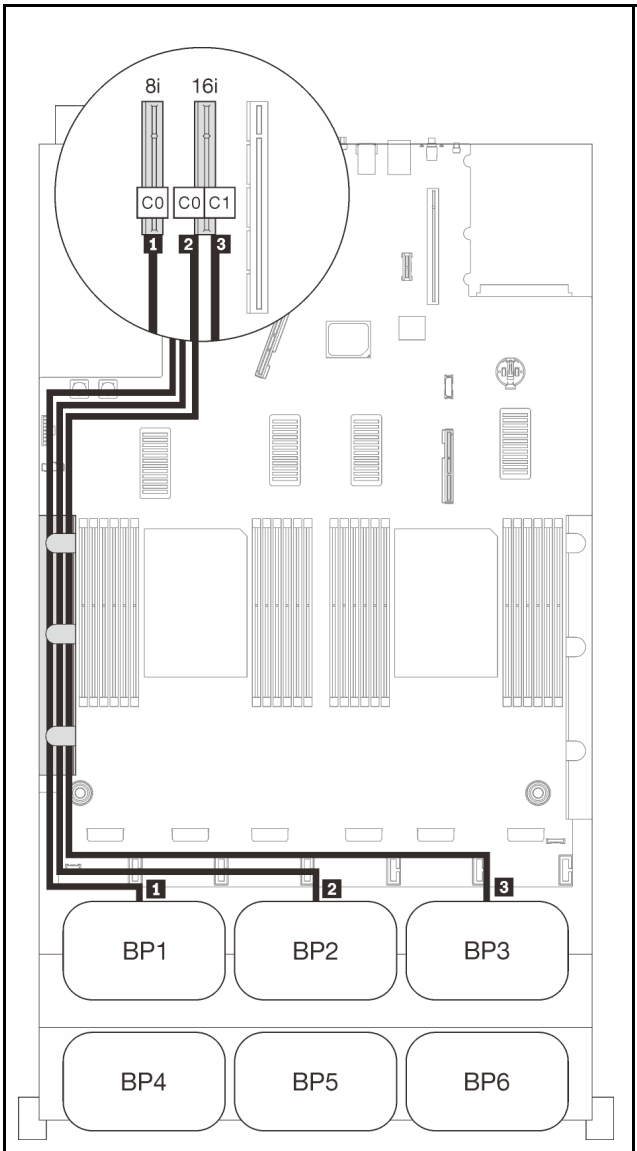
Two AnyBay and one SAS/SATA backplane

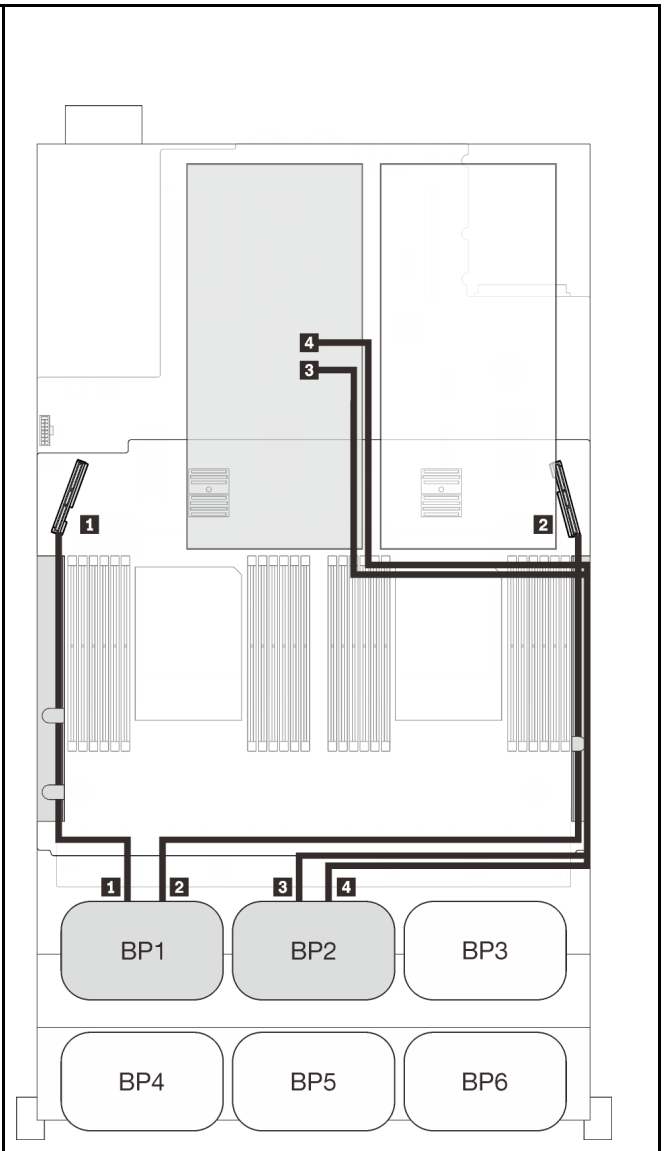
On-board connector + 16i RAID adapter



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

8i + 16i RAID adapters



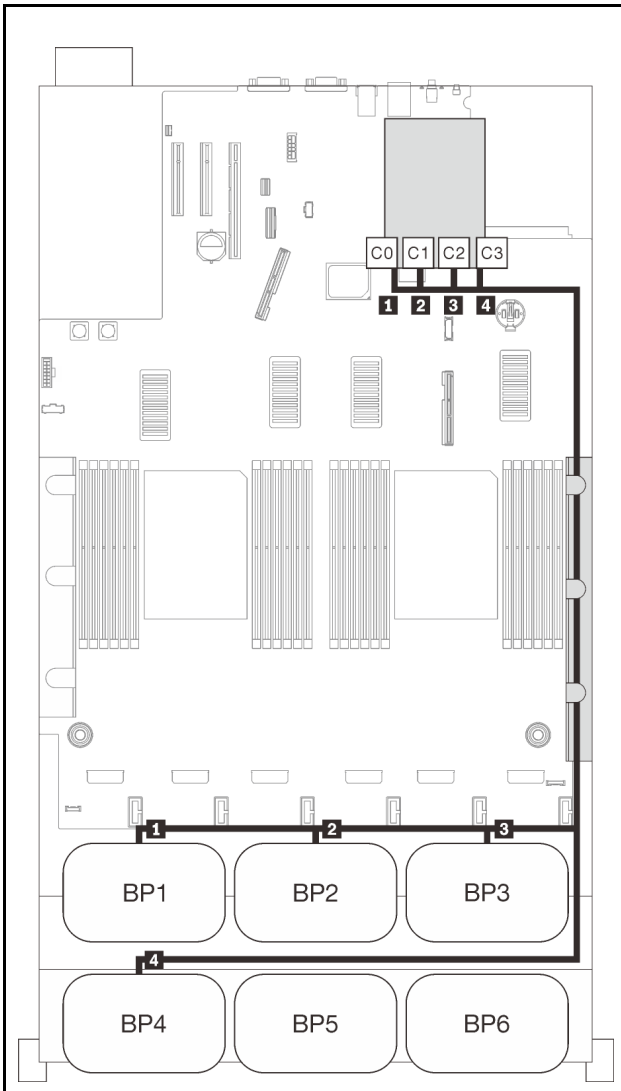


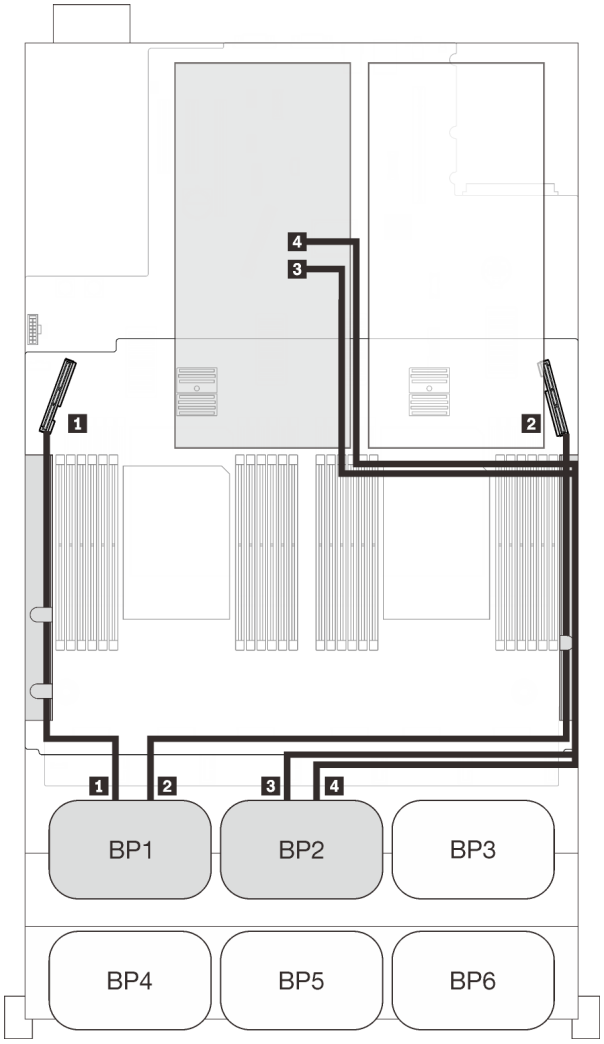
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Four backplanes

Two AnyBay and two SAS/SATA backplanes

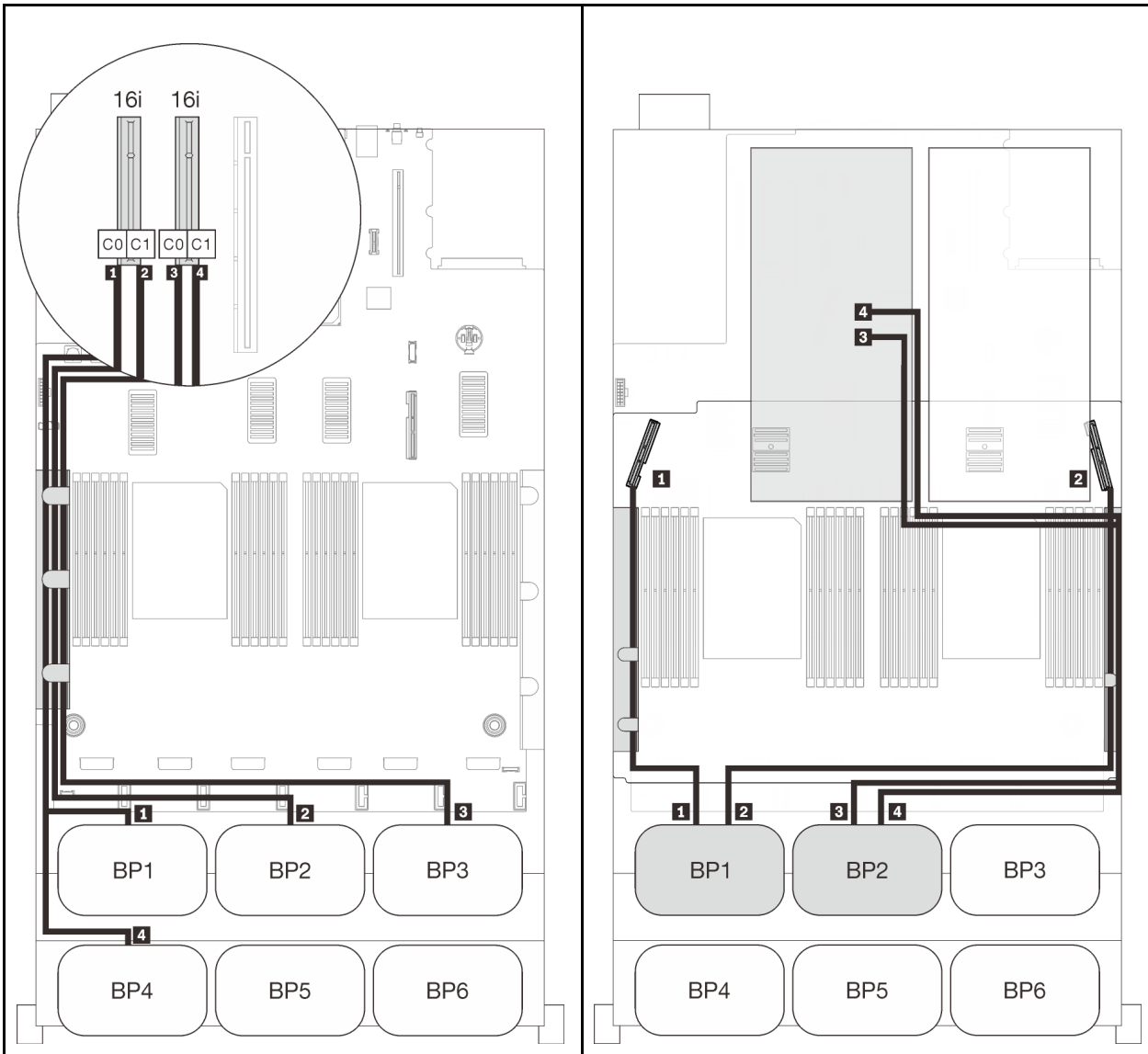
32i RAID adapter





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	820 mm	C1 (32i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	690 mm	C2 (32i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	830 mm	C3 (32i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

16i + 16i RAID adapters

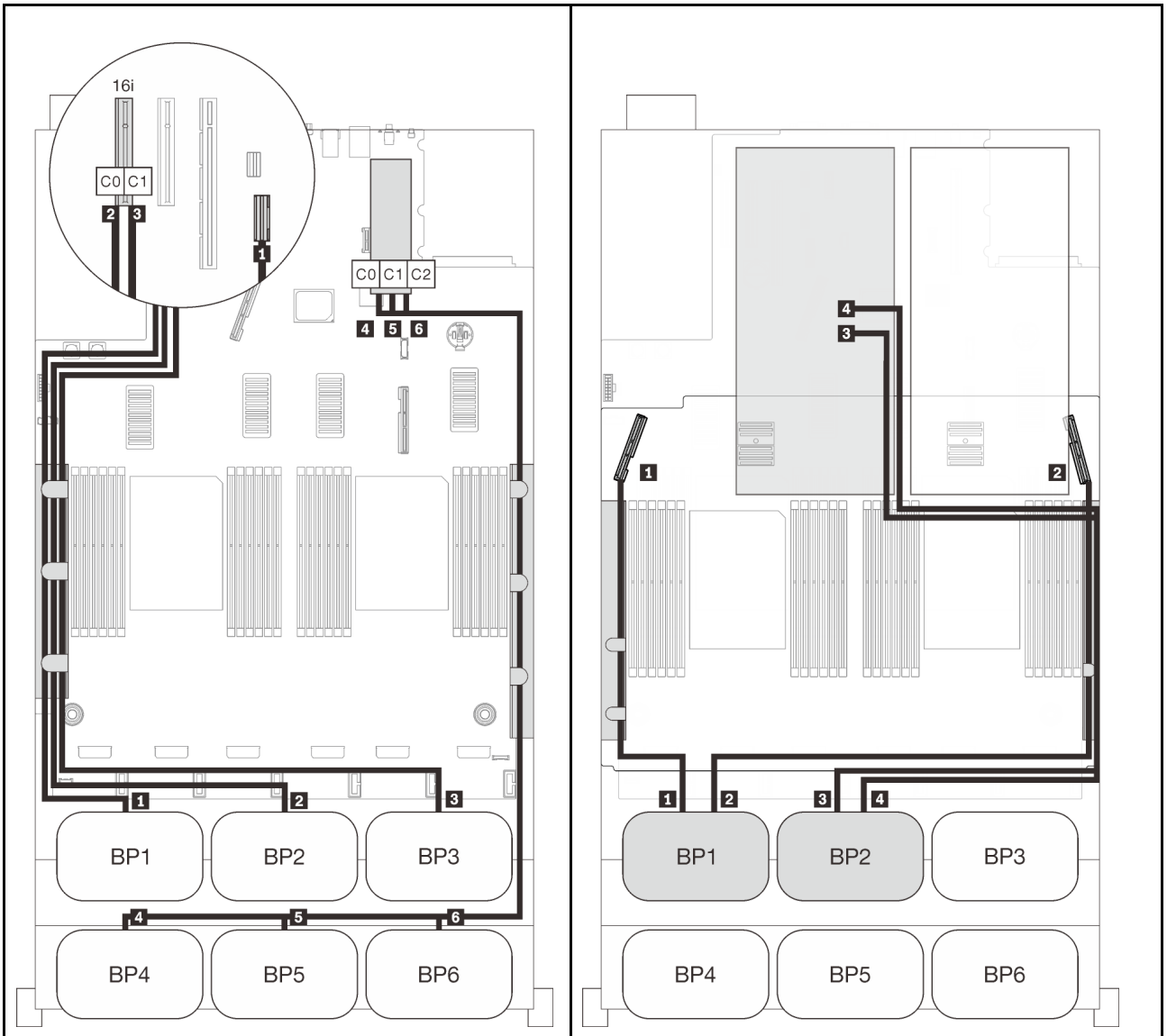


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C0 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	665 mm	C1 (16i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Six backplanes

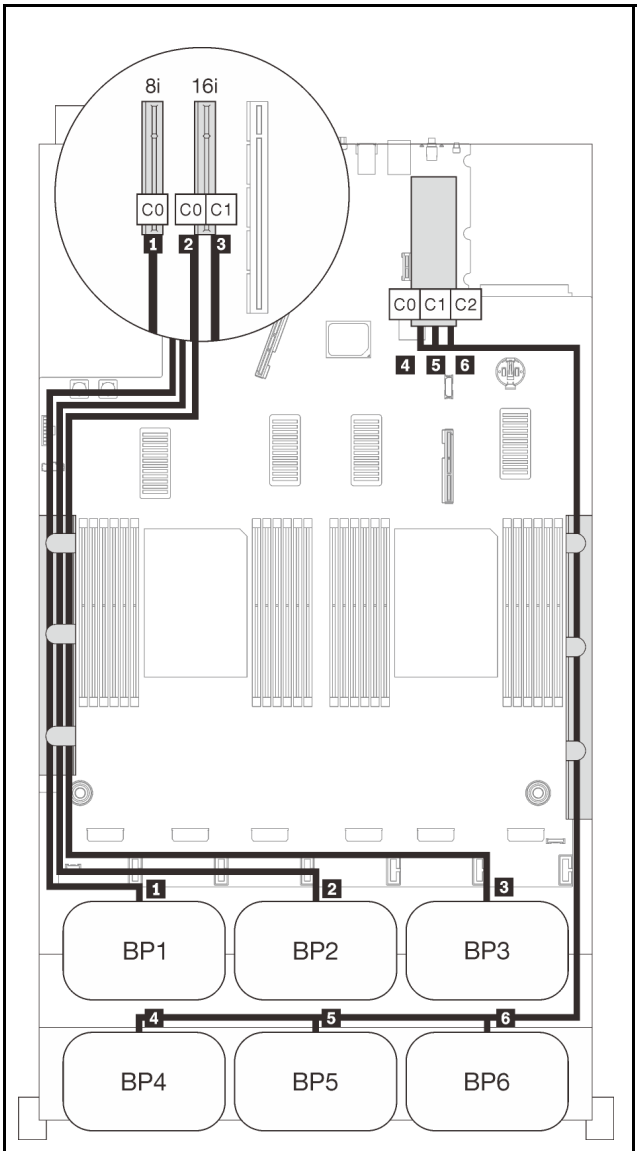
Two AnyBay and four SAS/SATA backplanes

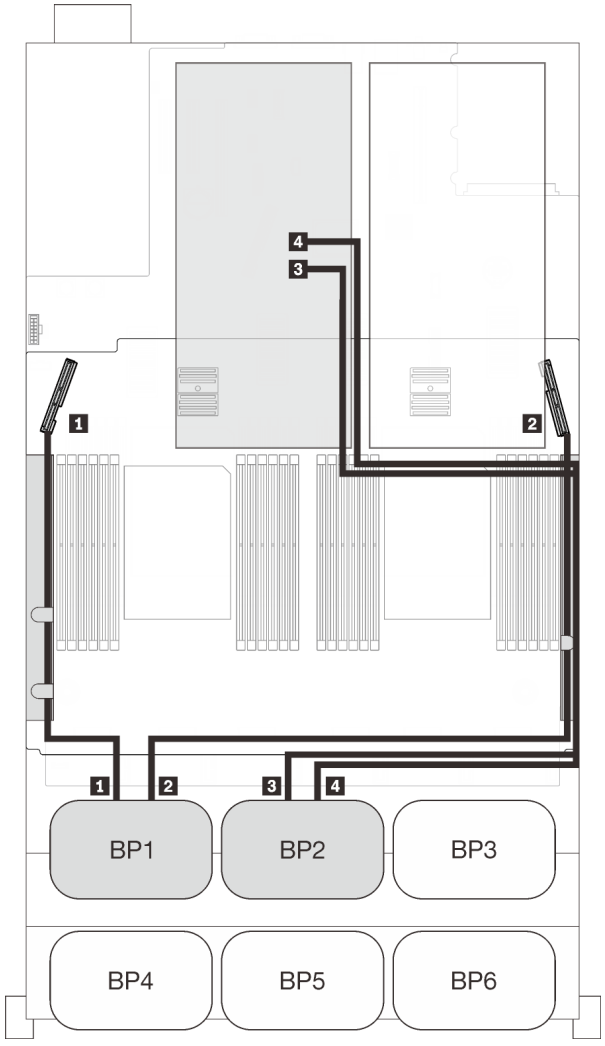
On-board SATA + 16i + 32i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	820 mm	C0 (32i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

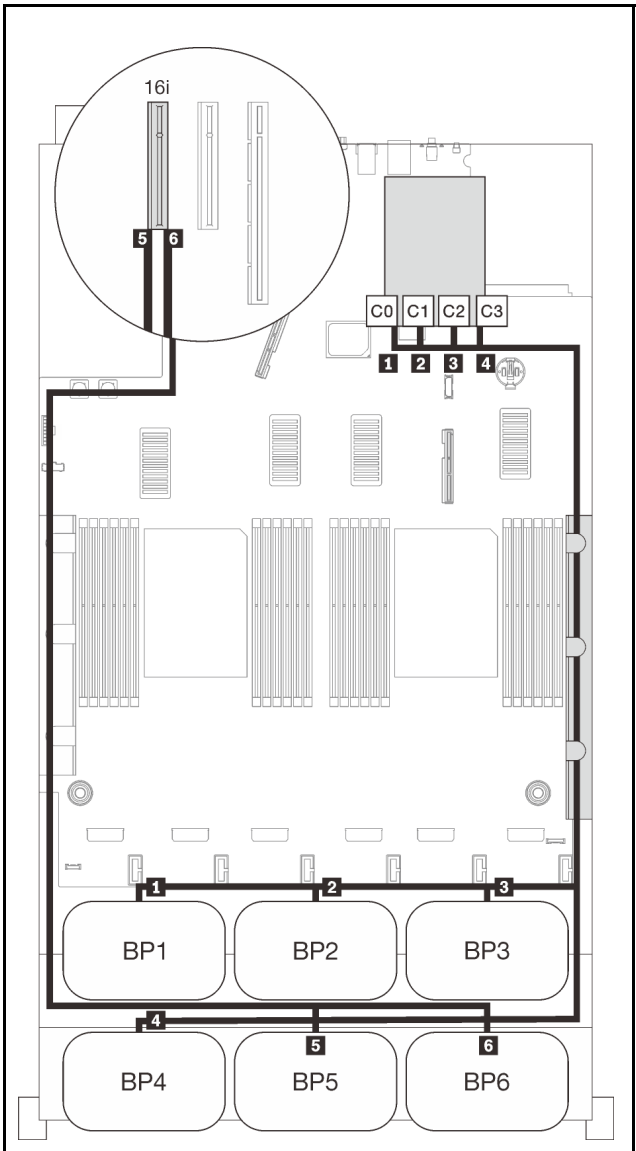
8i + 16i + 32i RAID adapters

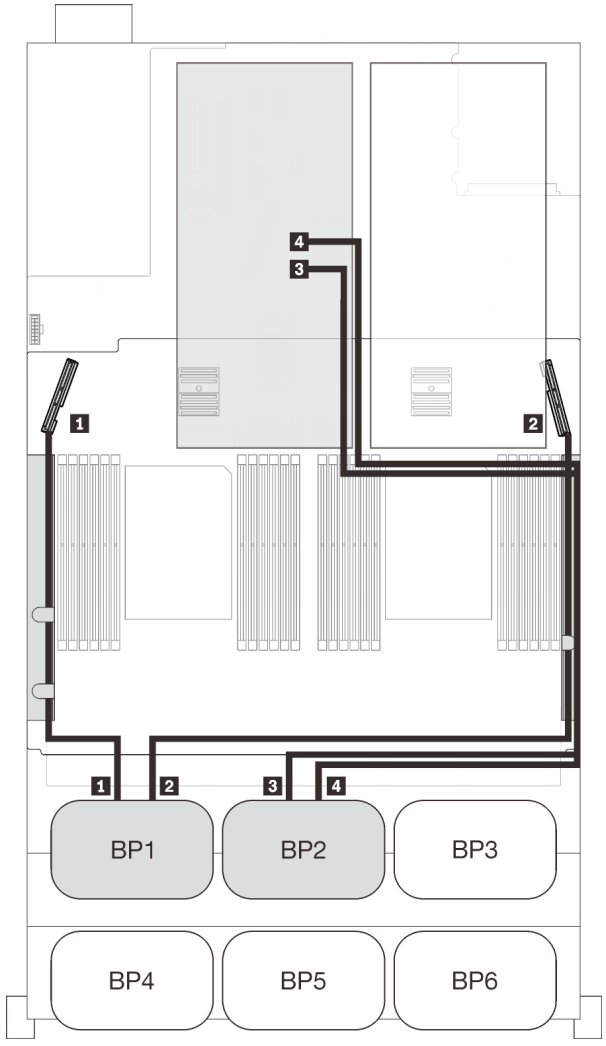




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C0 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C1 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	820 mm	C0 (32i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)
5	690 mm	C1 (32i)			
6	665 mm	C2 (32i)			

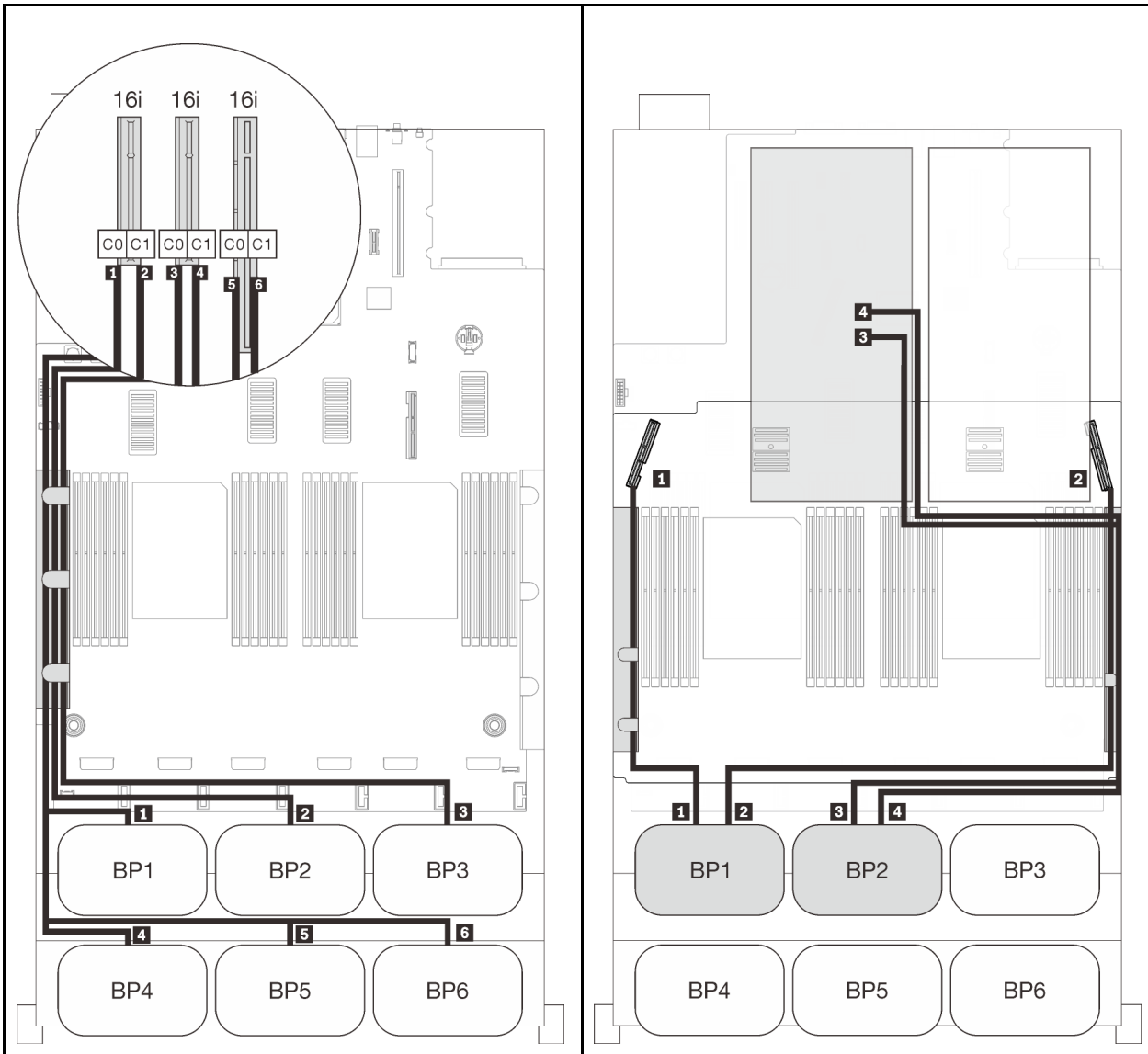
32i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	820 mm	C1 (32i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	690 mm	C2 (32i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	830 mm	C3 (32i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

16i + 16i + 16i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	530 mm	PCIe 3 (tray)
2	860 mm	C1 (16i)	2 4-5, 6-7	670 mm	PCIe 6 (tray)
3	1000 mm	C0 (16i)	3 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
4	665 mm	C1 (16i)	4 4-5, 6-7	1100 mm	C0, C1 (Slot 12)
5	820 mm	C0 (16i)			
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)			

Three-AnyBay-backplane combinations

Follow the instructions in this section to learn how do cable routing for combinations with three AnyBay backplanes.

Notes:

- These combinations require four installed processors.
- See “Connecting cables to the processor and memory expansion tray” on page 51 to perform the procedure properly while connecting PCIe cables to the processor and memory expansion tray.
- See “Connecting cables to the NVMe switch cards” on page 53 to perform the procedure properly while connecting PCIe cables to the PCIe switch cards.

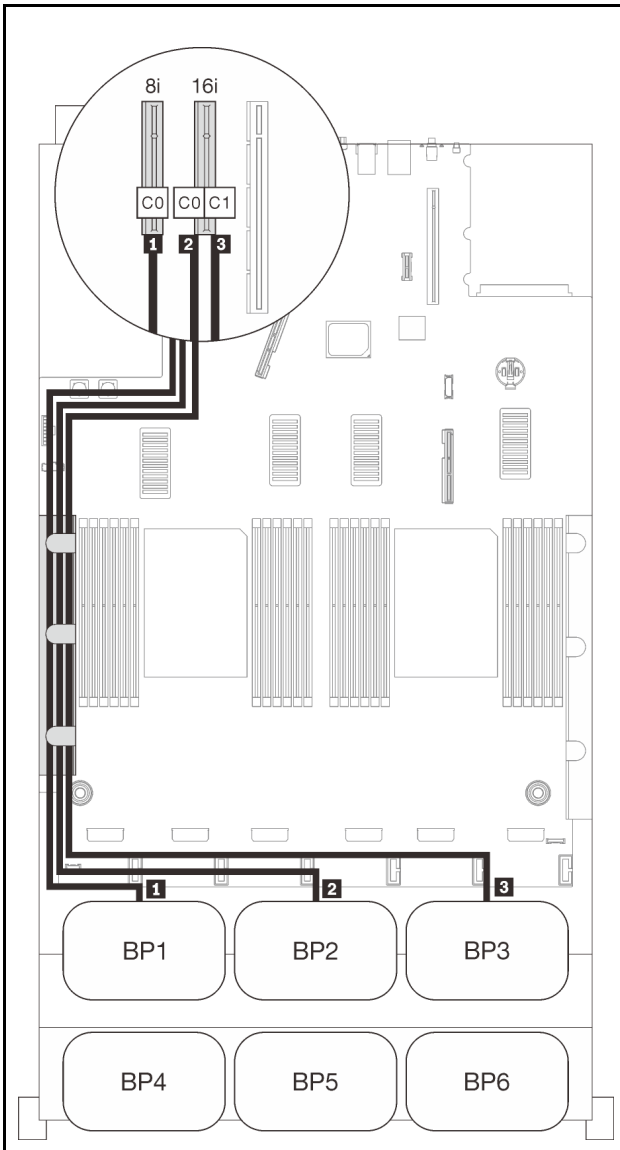
See the following sections for cable routing combinations with three AnyBay drive backplanes.

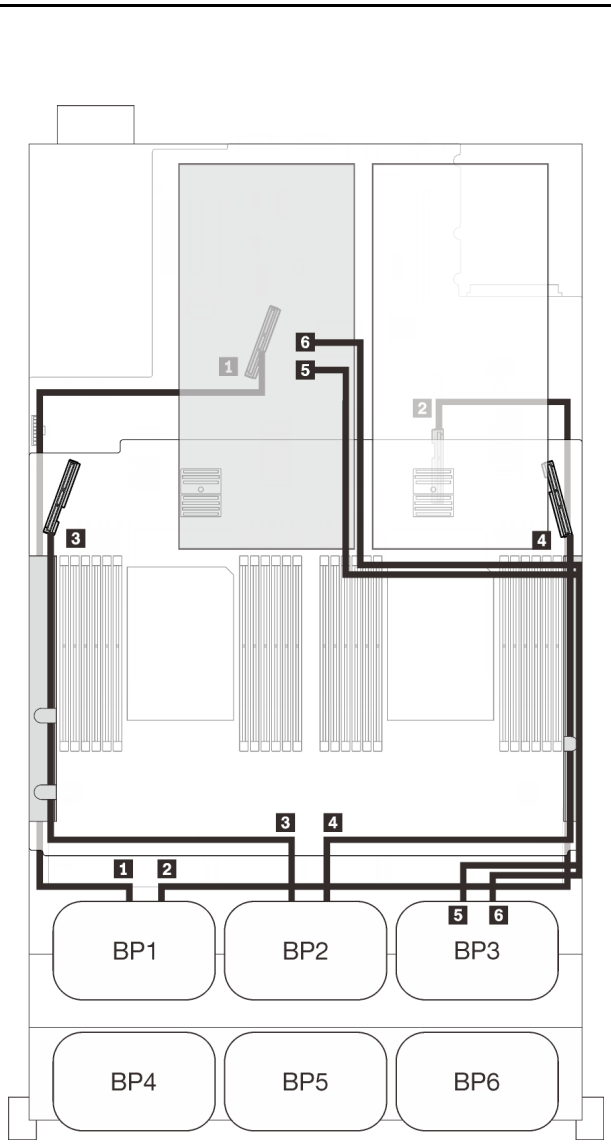
- “Three backplanes” on page 127
- “Four backplanes” on page 129
- “Five backplanes” on page 131
- “Six backplanes” on page 133

Three backplanes

Three AnyBay backplanes

8i + 16i RAID adapters



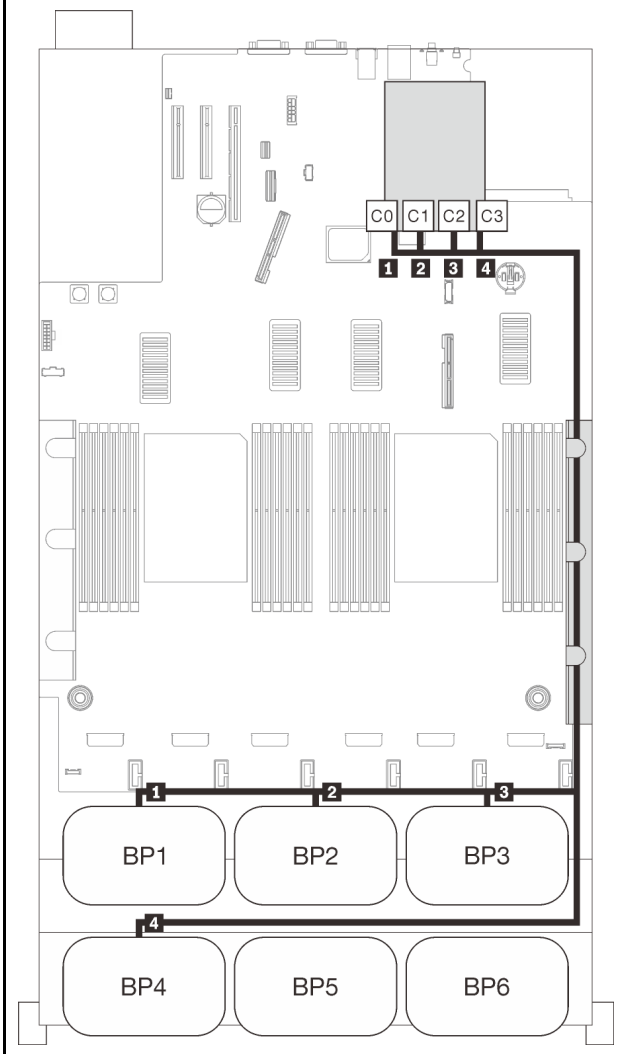


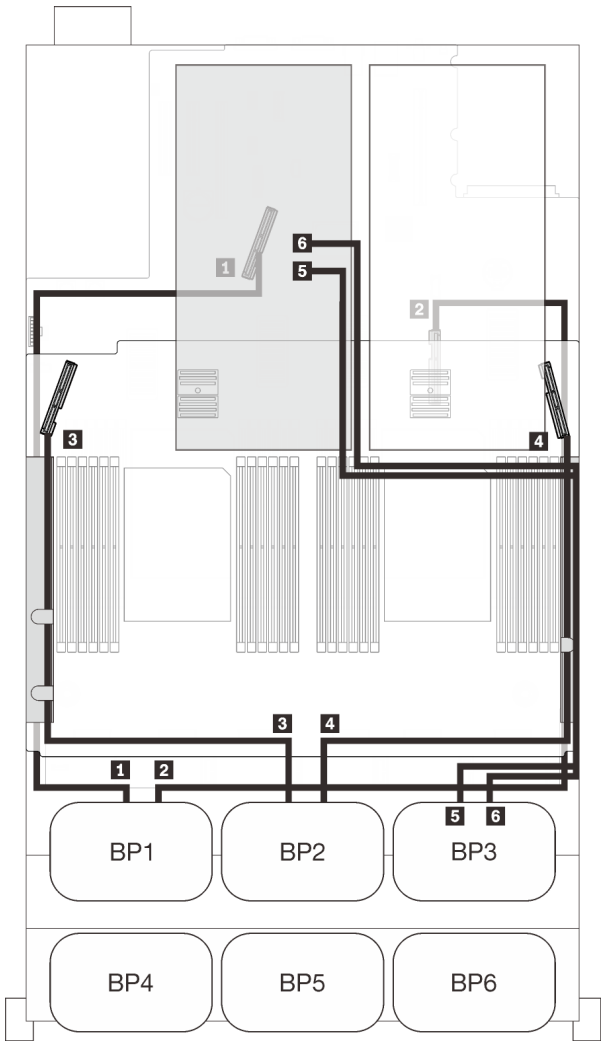
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
			4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Four backplanes

Three AnyBay and one SAS/SATA backplane

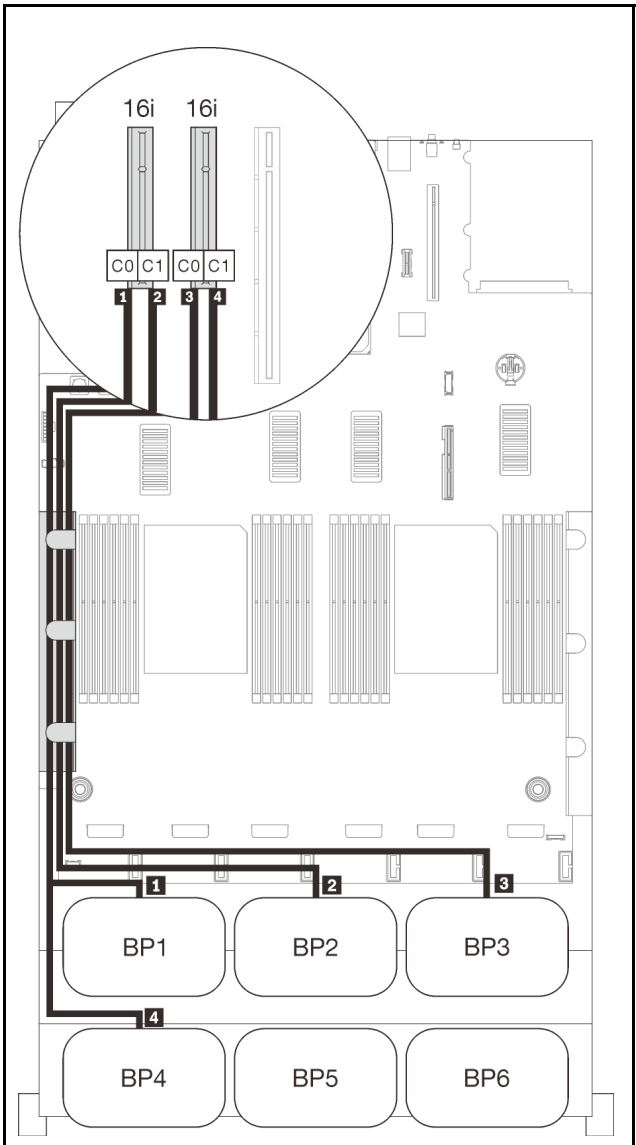
32i RAID adapter

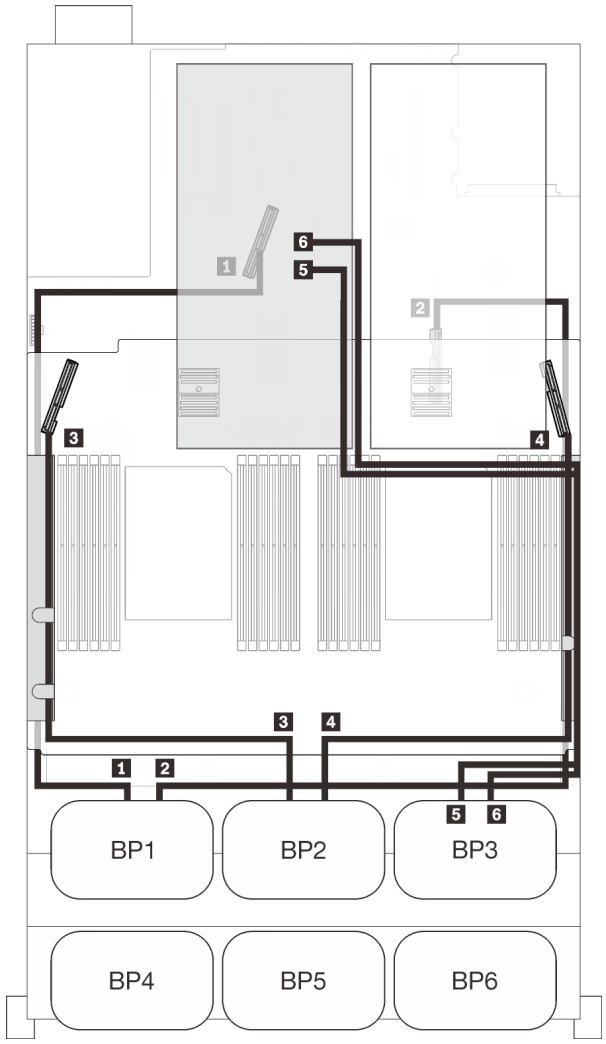




SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	830 mm	C3 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

16i + 16i RAID adapter



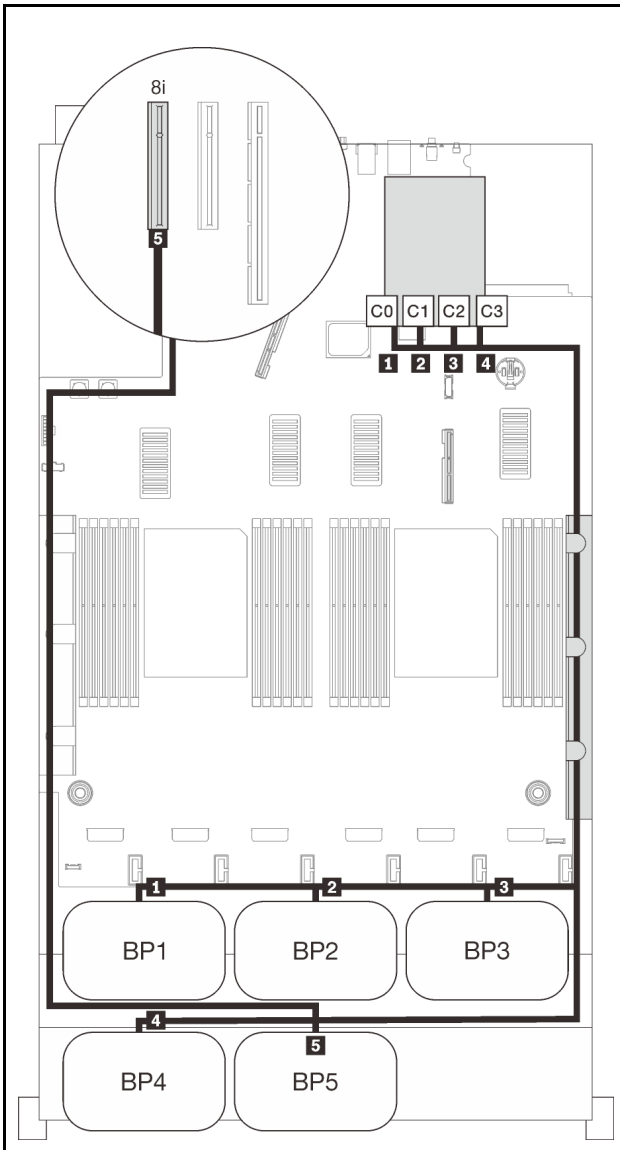


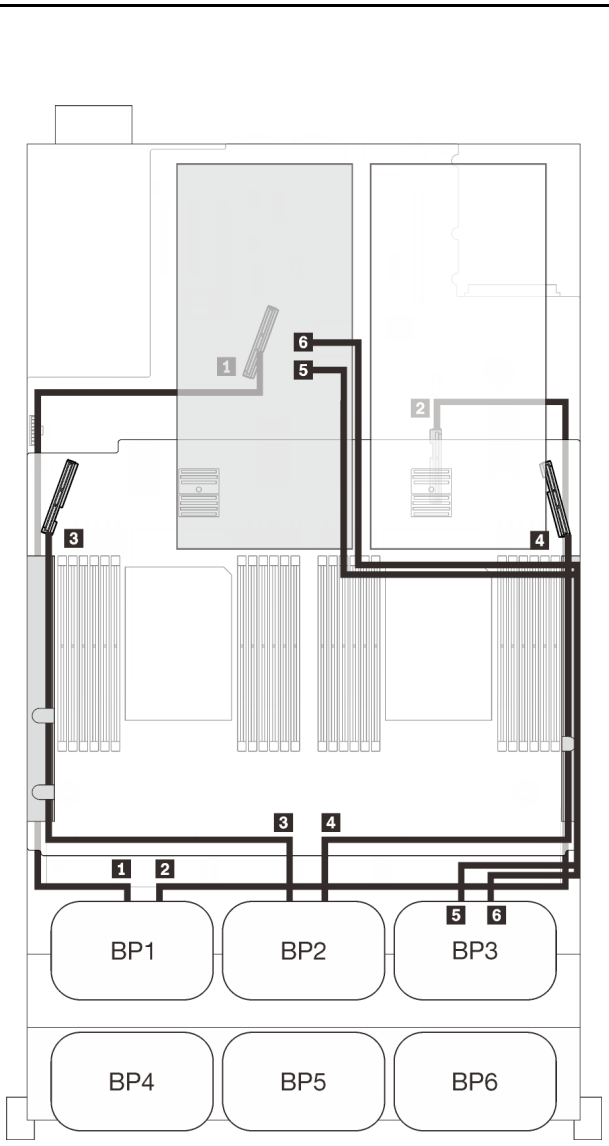
SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C0 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	665 mm	C1 (16i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
			5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Five backplanes

Three AnyBay and two SAS/SATA backplanes

8i + 32i RAID adapters



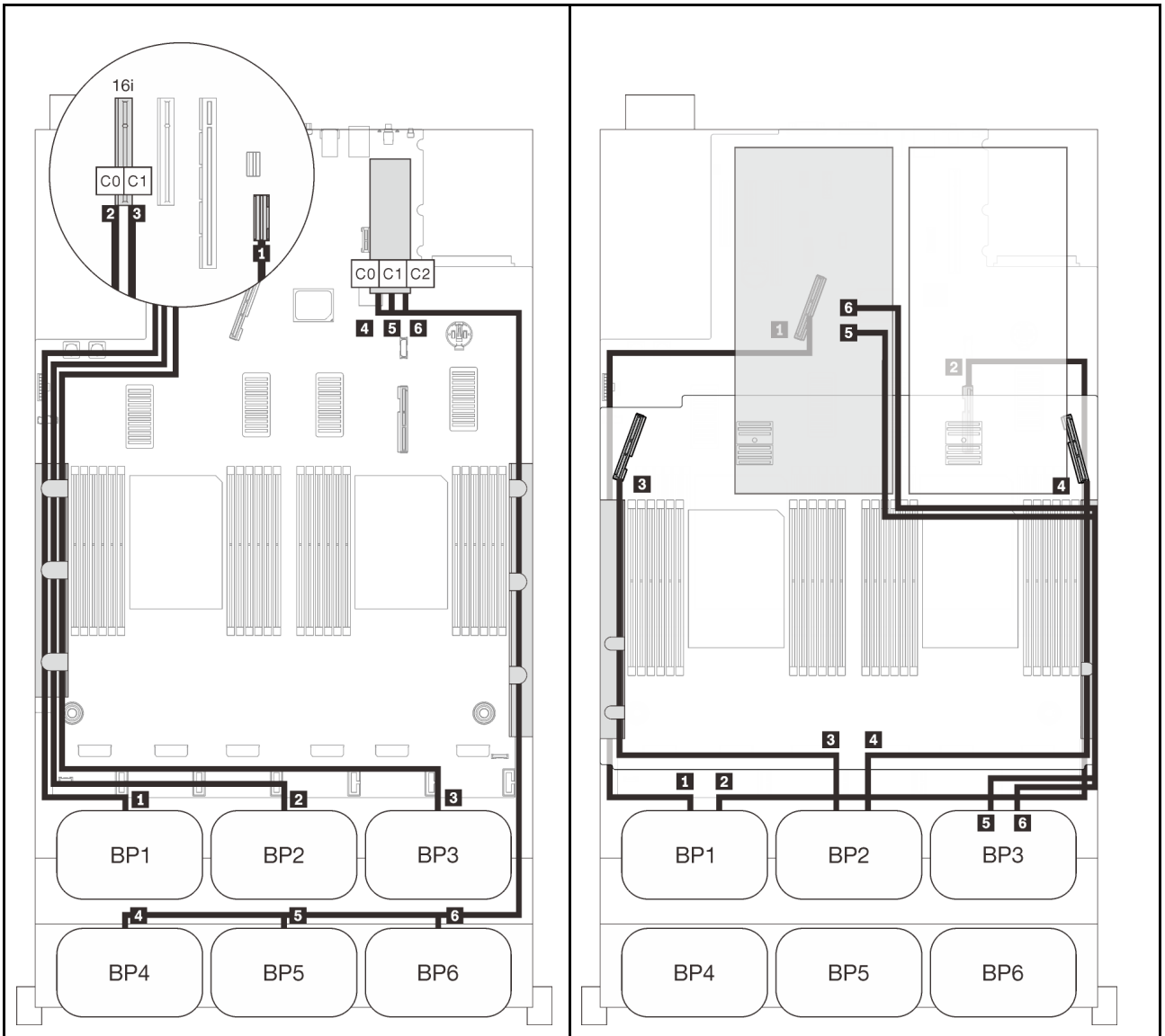


SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	820 mm	C1 (32i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	690 mm	C2 (32i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	830 mm	C3 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	820 mm	C0 (8i)	5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
			6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Six backplanes

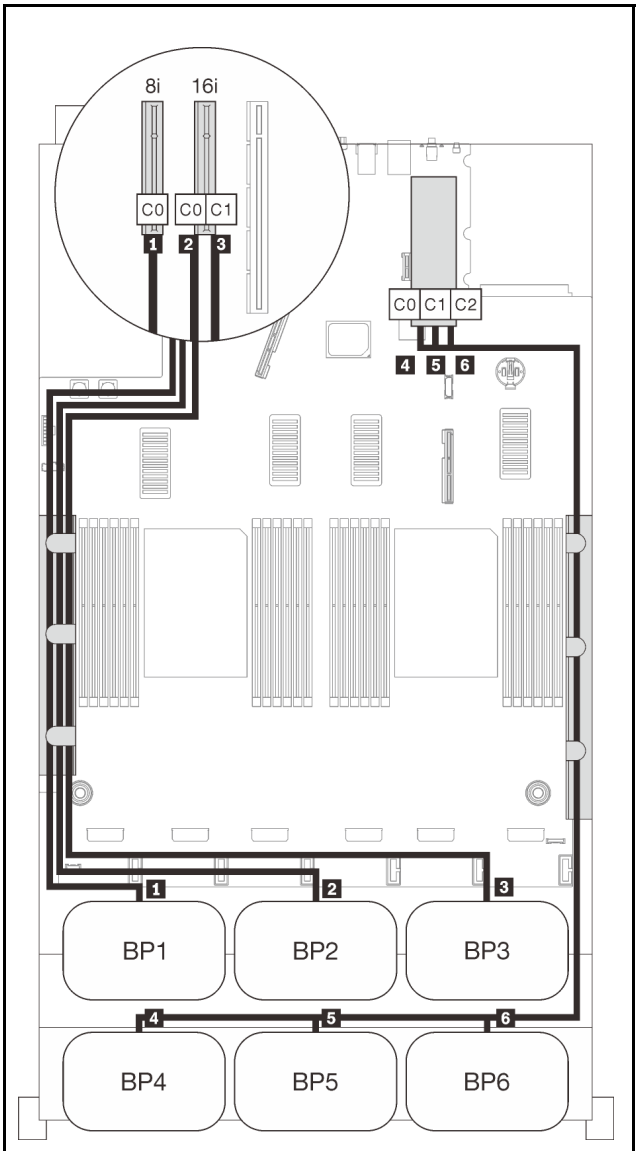
Three AnyBay and three SAS/SATA backplanes

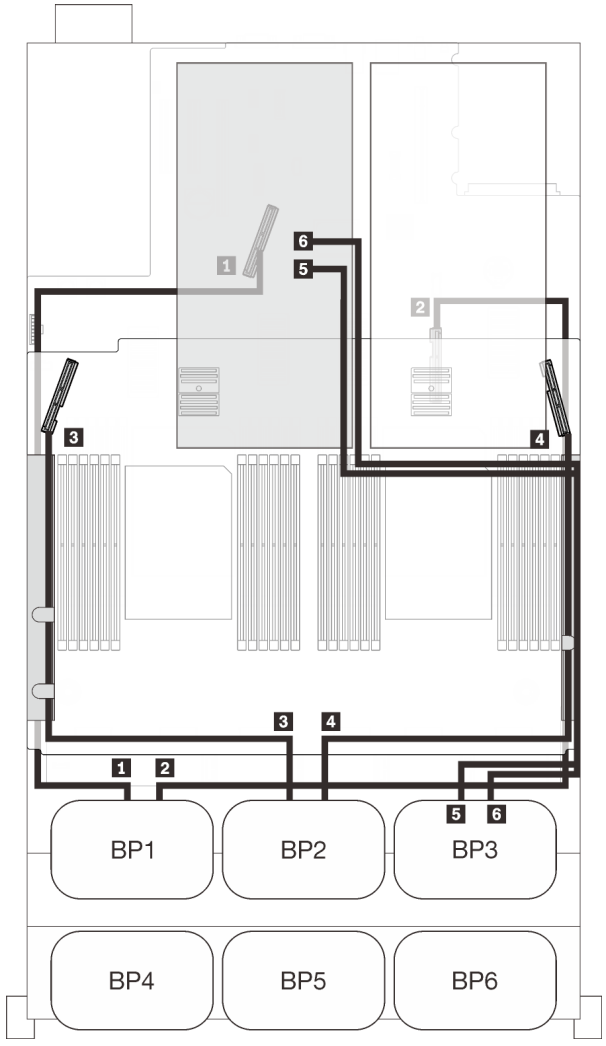
On-board SATA + 16i + 32i RAID adapters



SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	845 mm	On-board	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C0 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	820 mm	C0 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	690 mm	C1 (32i)	5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
6	665 mm	C2 (32i)	6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

8i + 16i + 32i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (8i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
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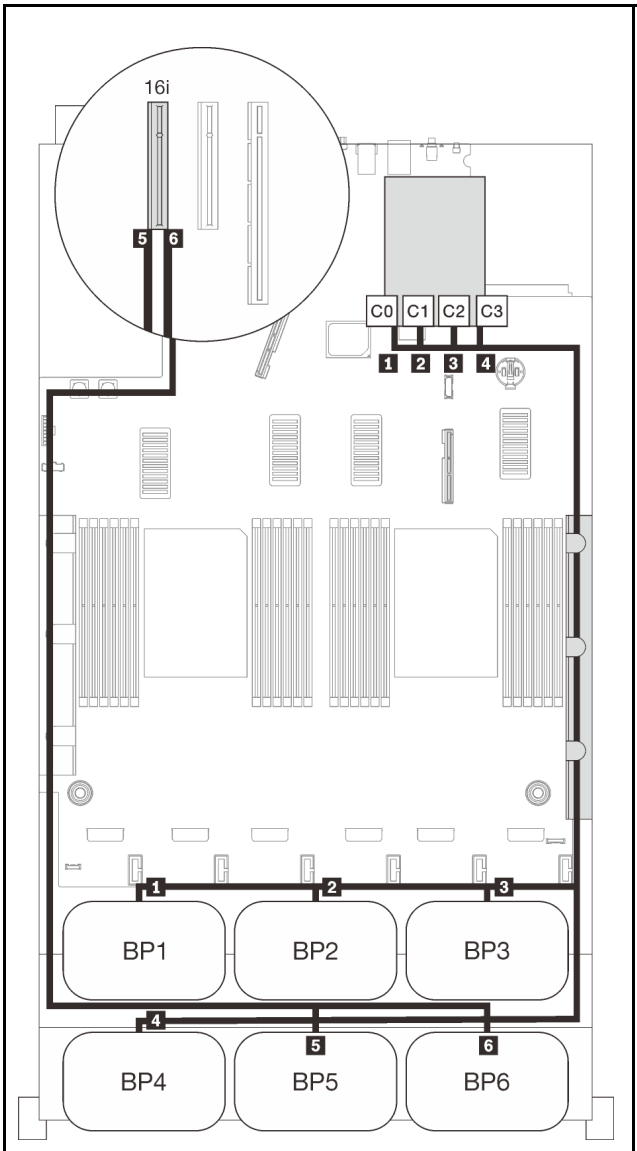
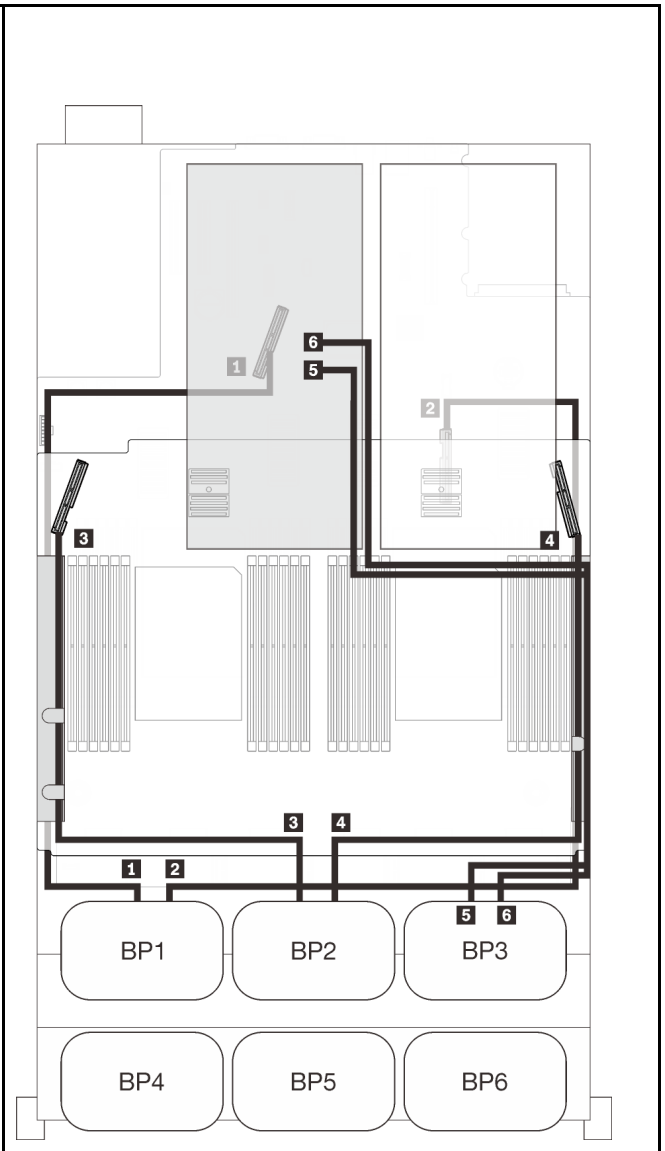
3	1000 mm	C1 (16i)	3 0-1, 2-3	530 mm	PCIe 3 (tray)
4	820 mm	C0 (32i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	690 mm	C1 (32i)	5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
6	665 mm	C2 (32i)	6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

32i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	945 mm	C0 (32i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
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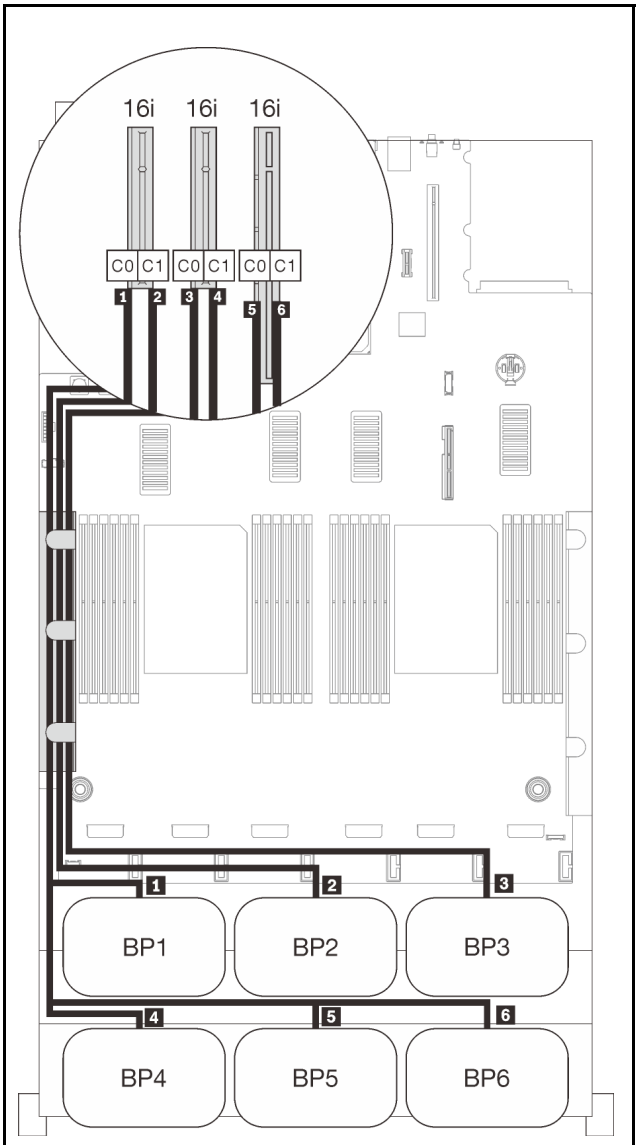
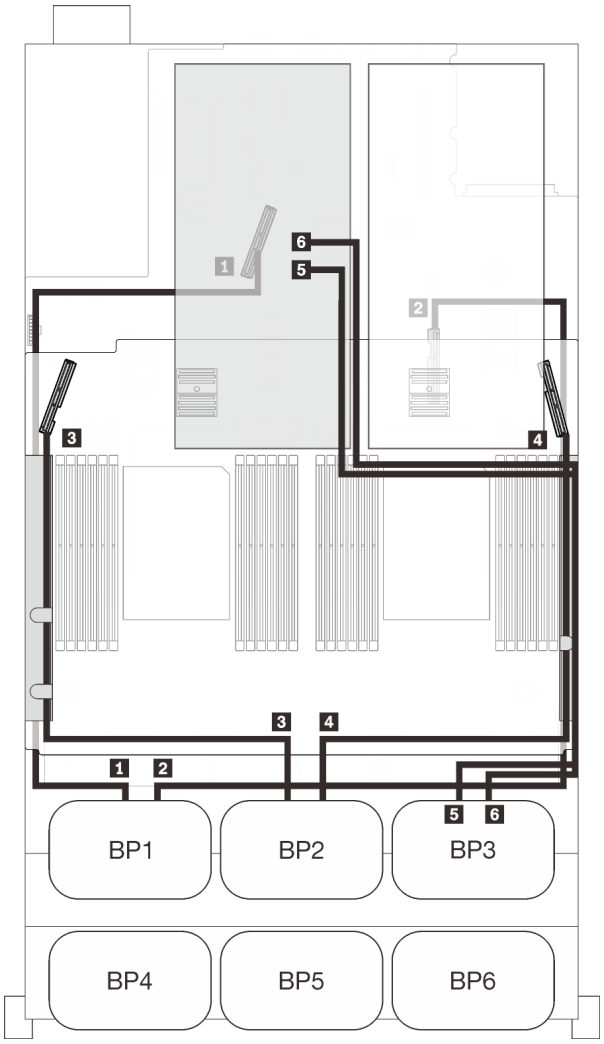
5	820 mm	C0 (16i)	5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)	6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

16i + 16i + 16i RAID adapters





SAS/SATA cable routing			PCIe cable routing		
	Length	To	NVMe connector	Length	To
1	665 mm	C0 (16i)	1 0-1, 2-3	670 mm	PCIe 1 (on-board)
2	860 mm	C1 (16i)	2 4-5, 6-7	910 mm	PCIe 2 (on-board)
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4	665 mm	C1 (16i)	4 4-5, 6-7	670 mm	PCIe 6 (tray)
5	820 mm	C0 (16i)	5 0-1, 2-3	1100 mm	C0, C1 (Slot 10)
6	• Gen3: 930 mm • Gen4: 945 mm	C1 (16i)	6 4-5, 6-7	1100 mm	C0, C1 (Slot 12)

Chapter 4. Hardware replacement procedures

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

For more information about ordering parts:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
2. Click **Service Parts**.
3. Enter the serial number to view a listing of parts for your server.

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Firmware updates” on page 8.

Installation Guidelines

Before installing components in your server, read the installation guidelines.

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure your safety at work:
  - A complete list of safety information for all products is available at:

    https://pubs.lenovo.com/safety_documentation/
  - The following guidelines are available as well: “Handling static-sensitive devices” on page 140 and “Working inside the server with the power on” on page 139.
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see https://serverproven.lenovo.com/.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to http://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v2/downloads 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 the latest Best Recipe code level menu for cluster supported firmware and driver 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.

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  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- 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.
- Terra-cotta on a component or a terra-cotta label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

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

Safety inspection checklist

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

Notes:

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

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

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

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

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

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

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

     a. Go to:

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

     b. Click **Preconfigured Model** or **Configure to order**.

     c. Enter the machine type and model for your server to display the configurator page.

     d. Click **Power → Power Cables** to see all line cords.
   - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

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

Make sure the following requirements are met:

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

Working inside the server with the power on

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

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

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

Handling static-sensitive devices

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

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

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

Replace components in the server

Follow instructions in this section to remove or install components in the server.

2.5-inch hot-swap drive and backplane replacement

Follow instructions in this section to install or remove 2.5-inch hot-swap drives and backplanes.

Remove a 2.5-inch hot-swap drive

Follow instructions in this section to remove a 2.5-inch hot-swap drive.

About this task

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.

Procedure

Step 1. Gently rotate the release latch away to unlock the drive handle.

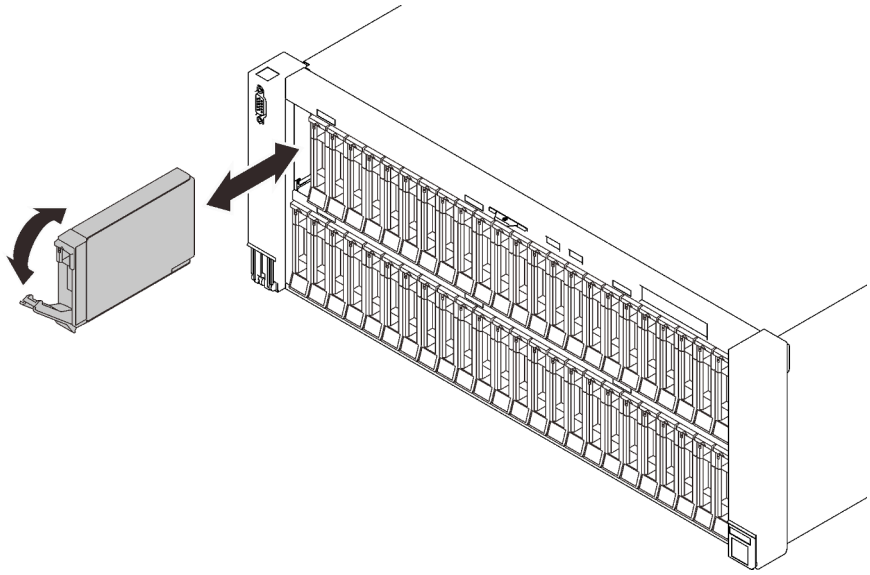


Figure 33. Removing a 2.5-inch drive

Step 2. Grasp and pull the handle to remove the drive from the drive bay.

After this task is completed

1. Install a replacement unit or filler (see “Install a 2.5-inch hot-swap drive” on page 146).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove a drive backplane carrier assembly

Follow instructions in this section to remove a drive backplane carrier assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

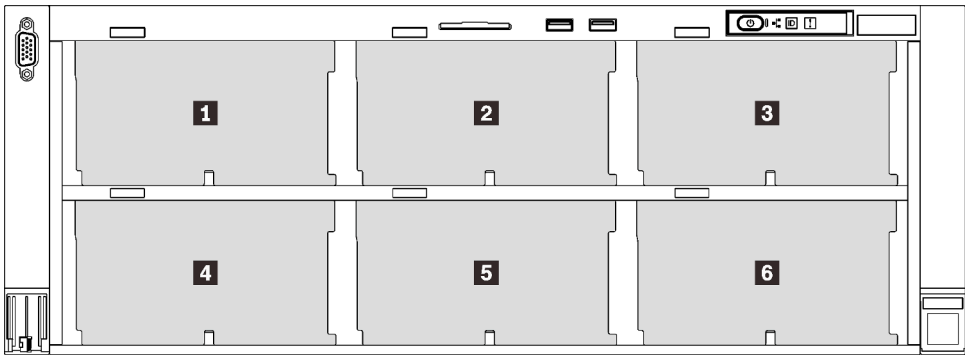
b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see "Remove a 4U PCIe riser cage" on page 256, "Remove the chassis air baffle" on page 271, and "Remove the 4U PCIe expansion tray" on page 250).

c. Remove the fan cage assembly (see "Remove the fan cage assembly" on page 153).

d. Disengage all the drives or fillers from the two backplanes on the carrier to be removed (see "Remove a 2.5-inch hot-swap drive" on page 140), and disconnect the signal cables that are connected to the two backplanes.

Notes: Following are the backplanes that are installed to the same carrier. Make sure to disengage drives and disconnect cables from both backplanes before removing the carrier assembly.

- 1 4 Backplane 1 and 4
- 2 5 Backplane 2 and 5
- 3 6 Backplane 3 and 6



Step 2. Remove the drive backplane carrier assembly.

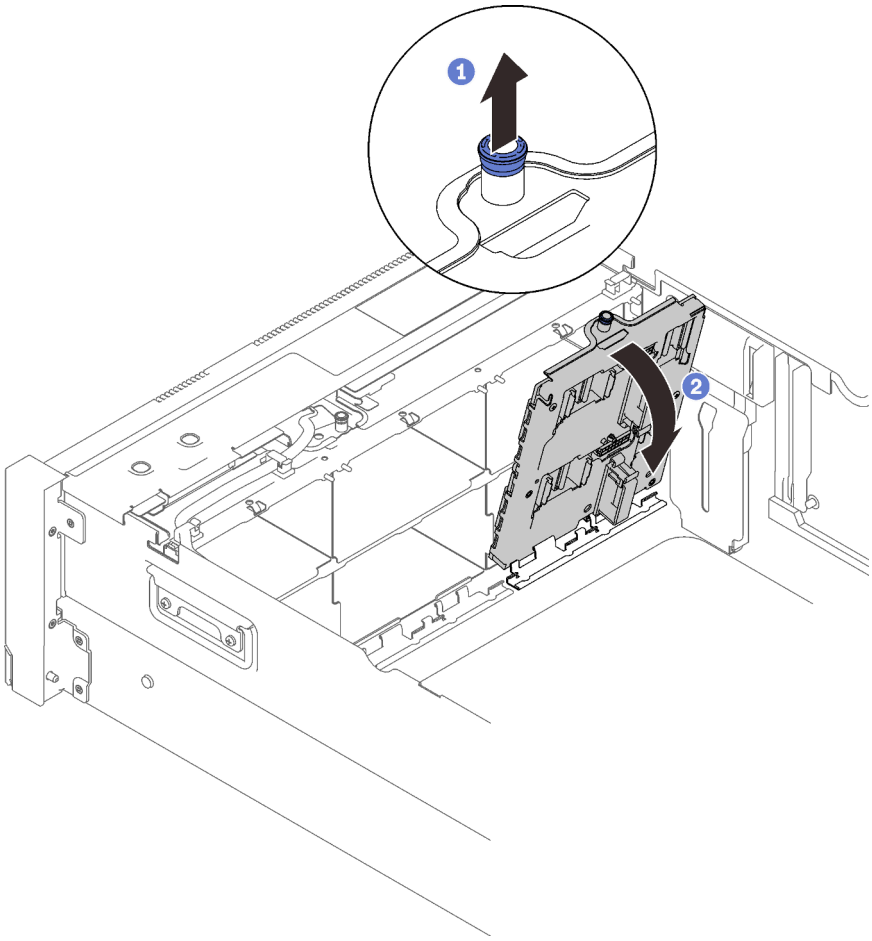


Figure 34. Removing the drive backplane carrier assembly

1. Pull the captive screw up to disengage the backplane carrier.
2. Pivot the top of the backplane carrier away to remove it from the server.

Step 3. To remove the drive backplanes from the backplane carrier, remove the two screws that secure each of the backplane.

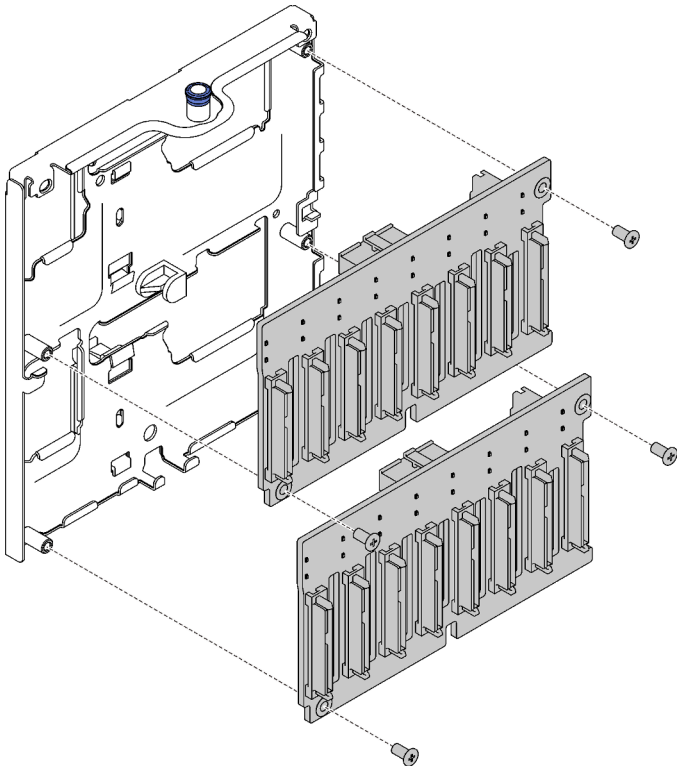


Figure 35. Removing drive backplanes from the carrier

After this task is completed

1. Install a replacement unit (see “Install a drive backplane carrier assembly” on page 144), or fill the corresponding drive bays with drive fillers.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a drive backplane carrier assembly

Follow instruction in this section to install a drive backplane carrier assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. If necessary, install each backplane to the carrier with two screws.

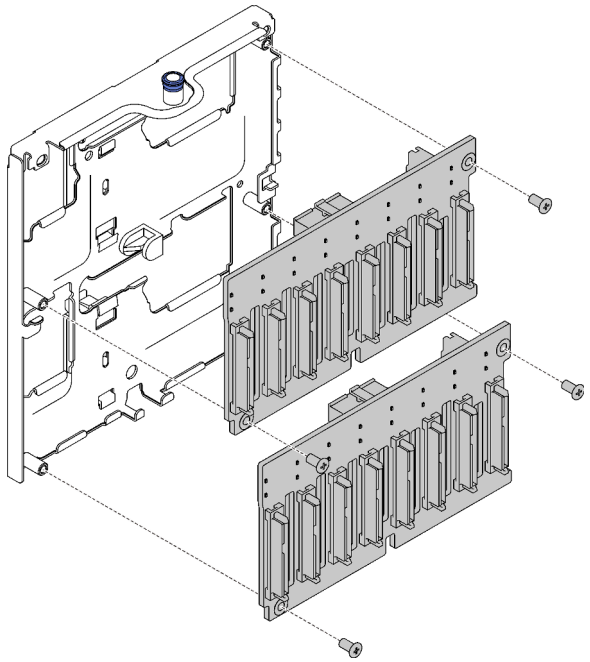


Figure 36. Installing drive backplanes to the carrier

Note: Two spared screws that come with the empty carrier are available for backplane installation.

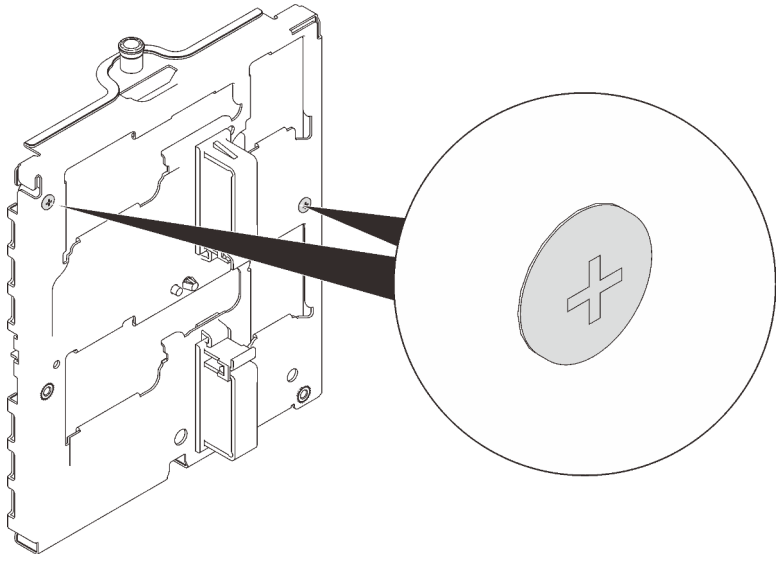


Figure 37. Spared screws on the carrier

Step 2. Install the drive backplane carrier assembly.

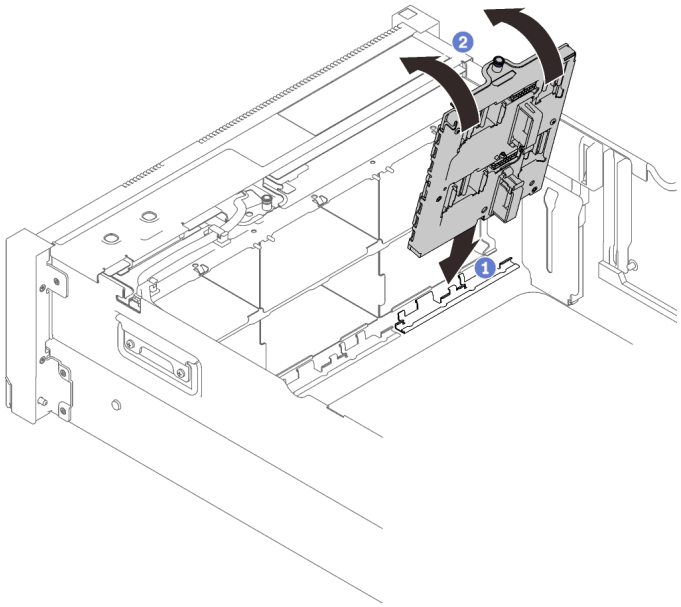


Figure 38. Installing the drive backplane carrier assembly

1 Align the bottom of the carrier to the slot in the server.

2 Pivot the top of the carrier until it clicks into place.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Install a 2.5-inch hot-swap drive

Follow instructions in this section to install a 2.5-inch hot-swap drive.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

Notes: The server supports up to six drive backplanes with the following corresponding drive bay numbers.

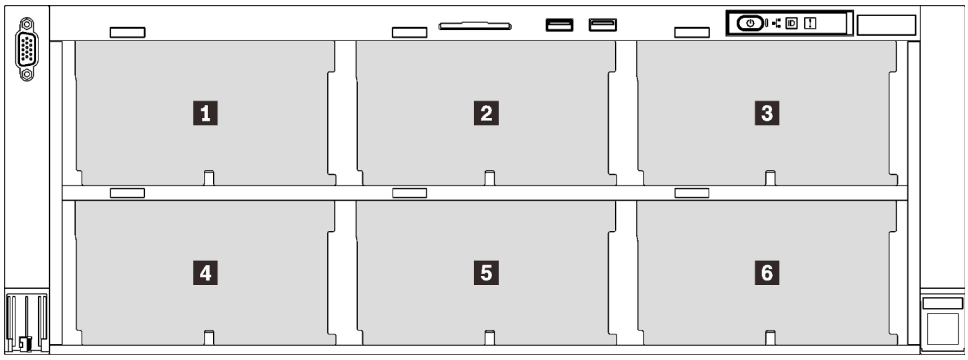


Figure 39. Drive backplane numbering

Table 23. Drive backplanes and corresponding drive bays

	Drive backplane	Drive bay	Supported drive backplane	Supported drive
1	1	0 to 7	• 2.5-inch SAS/SATA 8-bay drive backplane • 2.5-inch AnyBay/NVMe 8-bay drive backplane	• 2.5-inch SAS/SATA drives • 2.5-inch NVMe drives
2	2	8 to 15		
3	3	16 to 23		
4	4	24 to 31	• 2.5-inch SAS/SATA 8-bay drive backplane	• 2.5-inch SAS/SATA drives
5	5	32 to 39		
6	6	40 to 47		

Notes: When the following components are installed in the system, bay 24 to 47 are disabled, and the maximal supported drive quantity is 24.

- PMEMs
- DRAM DIMMs with 64 GB or larger capacity
- Processors with 250 or more watts

For a complete list of supported optional device for this server, see https://serverproven.lenovo.com/.

Procedure

Step 1. If a drive filler has been installed in the drive bay, remove it.

Step 2. Gently rotate the release latch away to unlock the drive handle.

Step 3. Slide the drive into the drive bay, and push it until it stops.

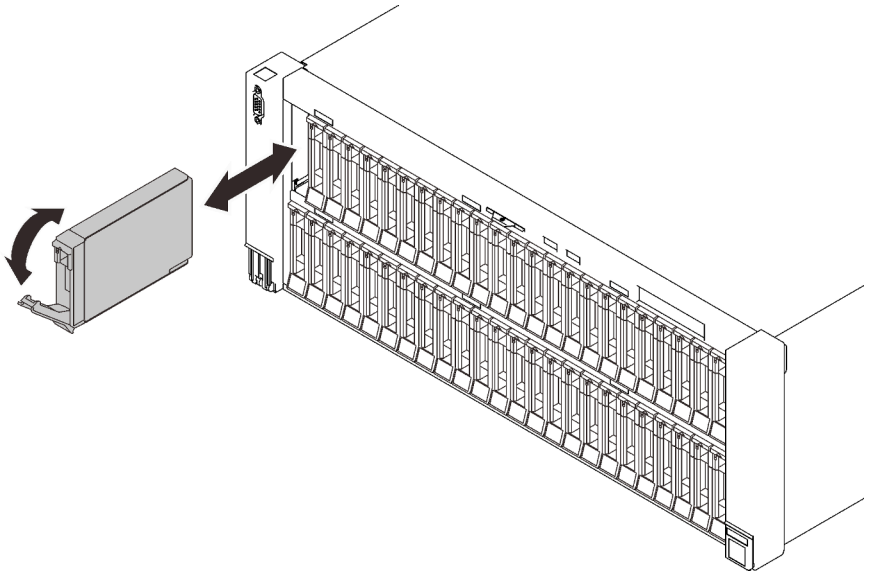


Figure 40. Installing a 2.5-inch drive

Step 4. Rotate the handle back to the locked position.

After this task is completed

1. Check the drive status LED to verify if the drive is operating correctly:
   - If the yellow LED is lit continuously, it is malfunctioning and must be replaced.
   - If the green LED is flashing, the drive is functioning.

   Note: If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.
2. If any of the drive bays are left empty, fill them with drive bay fillers.

Demo video

Watch the procedure on YouTube

CMOS battery (CR2032) replacement

Follow instructions in this section to remove or install the CMOS battery (CR2032).

Remove the CMOS battery (CR2032)

Follow instructions in this section to remove the CMOS battery.

About this task

The following notes describe information that you must consider when replacing the battery:

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that

contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

- After you replace the battery, you must reconfigure the server and reset the system date and time.

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.

S004

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

Do not:

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

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

S005

CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).

- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

d. Remove the PCIe riser assembly (see “Remove the PCIe riser assembly” on page 187).

e. If OCP adapter air baffle has been installed, remove it.

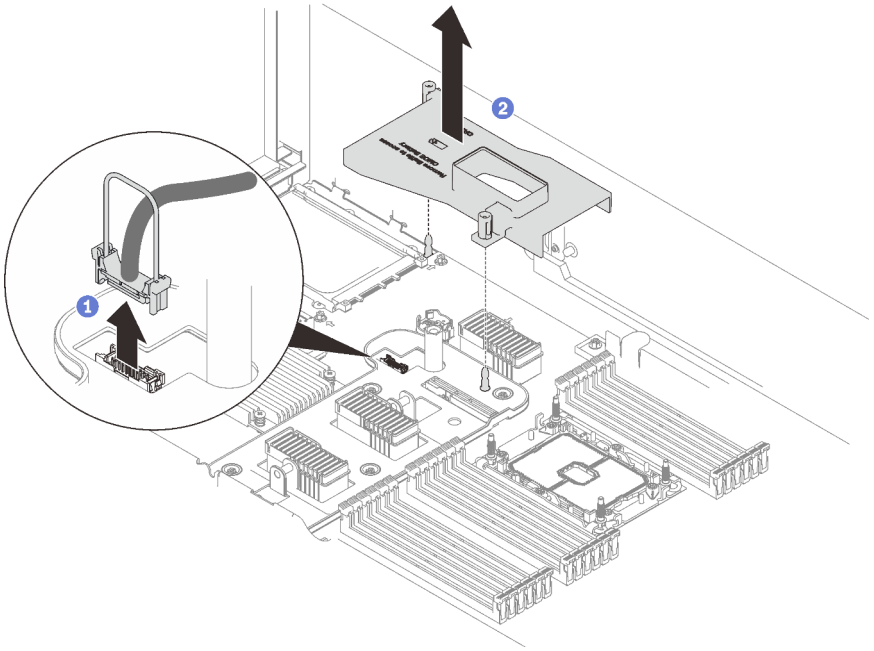


Figure 41. Remove the OCP adapter air baffle

1 Grasp and lift the handle to disconnect the USB cable from the system board.

2 Lift the air baffle to remove it.

f. Locate the CMOS battery on the system board.

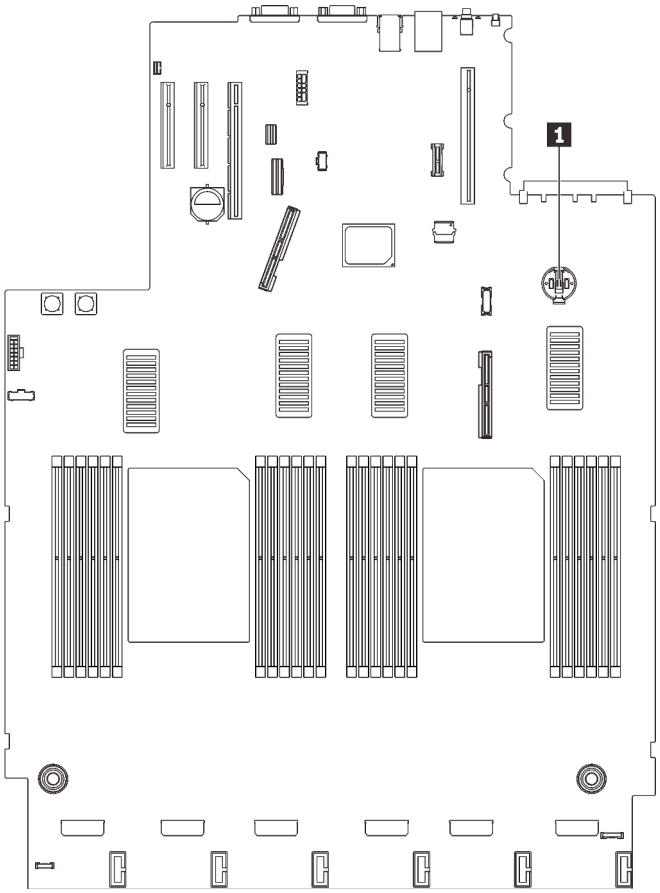


Figure 42. CMOS battery location on the system board

Table 24. CMOS battery location

1 CMOS battery

Step 2. Gently press on the nub on the side of the CMOS battery as illustrated; then, pivot the battery away from the seat to remove it.

Attention: Avoid excessive force on the CMOS battery, as it might damage the socket on the system board and result in system board replacement.

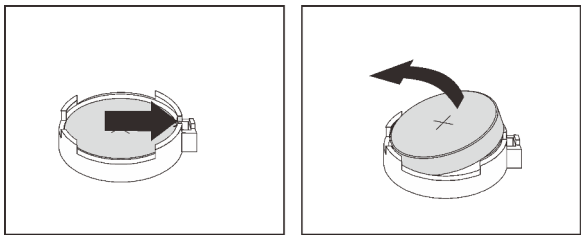


Figure 43. Removing the CMOS battery

Step 3. Pick up the battery with finger tips.

After this task is completed

- Install a replacement unit (see "Install the CMOS battery (CR2032)" on page 152).

- Dispose the component with compliance to local regulations.

Demo video

Watch the procedure on YouTube

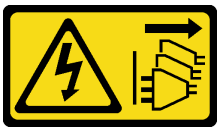
Install the CMOS battery (CR2032)

Follow instructions in this section to install the CMOS battery.

About this task

- When replacing the CMOS battery, you must replace it with another CMOS battery of the same type from the same manufacturer.
- After you replace the CMOS battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

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.

S004

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

Do not:

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

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

S005

CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: Follow any special handling and installation instructions that come with the replacement battery.

Procedure

Step 1. Place the CMOS battery on top of the socket with the positive (+) symbol facing up, and press the battery into the seat until it clicks in place.

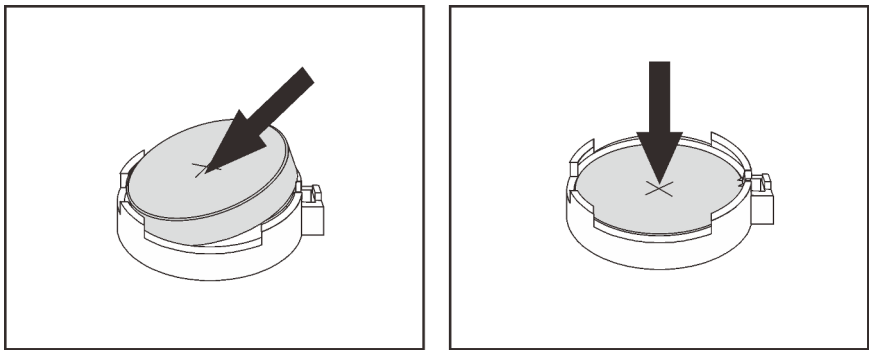


Figure 44. Installing the CMOS battery

After this task is completed

1. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).
2. Reset date, time, and all the passwords.

Demo video

Watch the procedure on YouTube

Fan and fan cage replacement

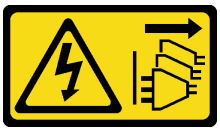
Follow instructions in this section to remove or install the fans and the fan cage assembly.

Remove the fan cage assembly

Follow instructions in this section to remove the fan cage assembly.

About this task

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.

S017

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

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

Step 2. Lift and rotate the fan cage release latches to disengage the fan cage assembly from the server.

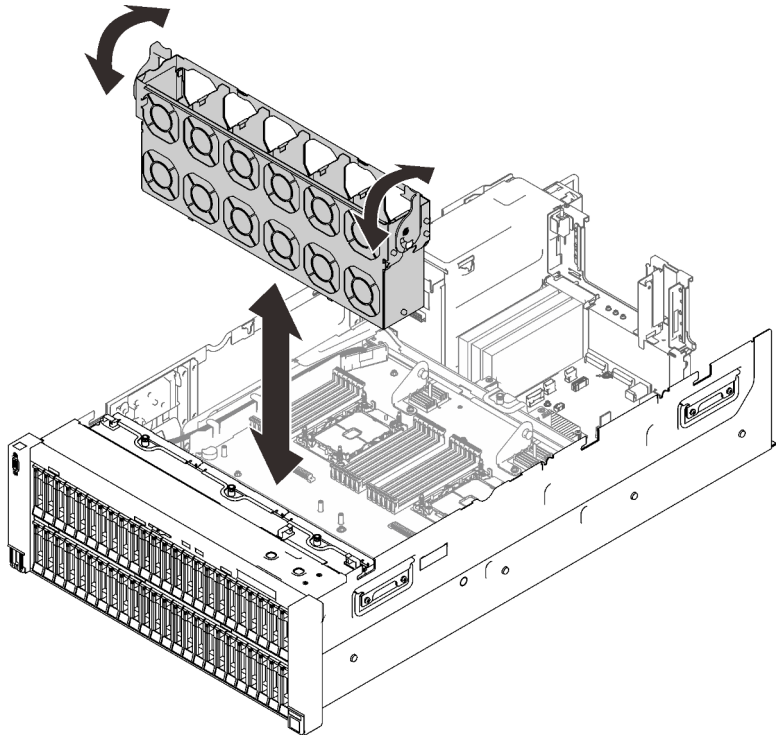


Figure 45. Removing the fan cage assembly

Step 3. Lift the fan cage assembly to remove it.

After this task is completed

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

Demo video

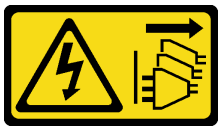
Watch the procedure on YouTube

Install the fan cage assembly

Follow instructions in this section to install the fan cage assembly.

About this task

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.

S017

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

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the fan cage assembly to the guides on both sides of the server, and lower it into the server.

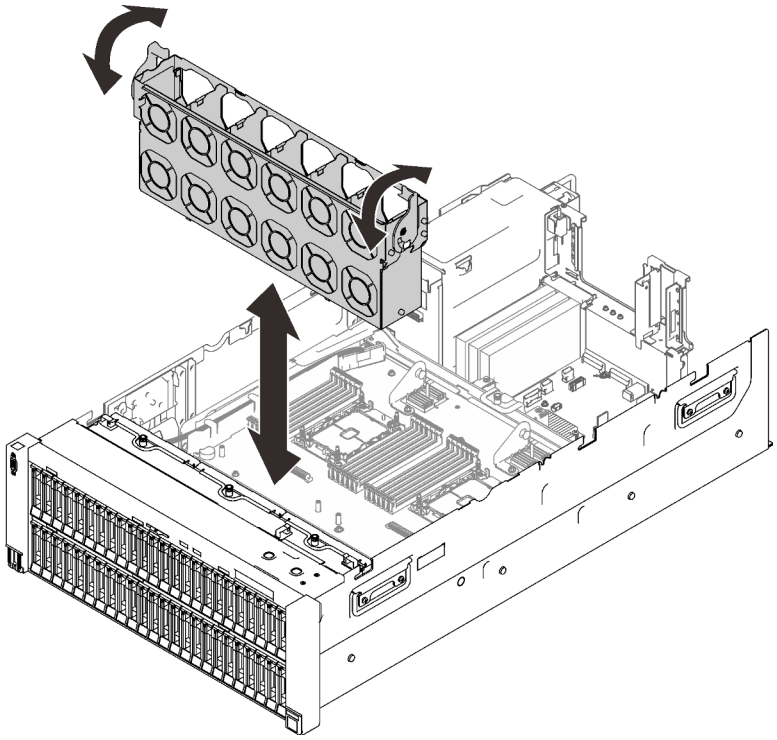


Figure 46. Installing the fan cage assembly

Step 2. Rotate the fan cage release latches down until they stop.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Remove a fan module

Follow instructions in this section to remove a fan module.

About this task

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.

S017

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

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.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

Step 2. Remove the fan module.

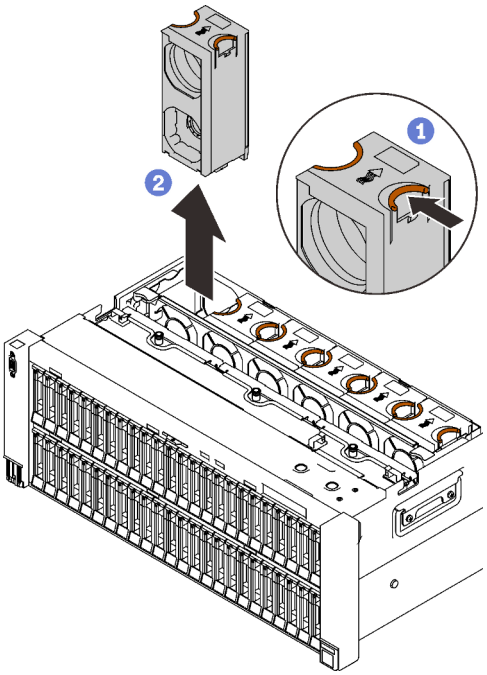


Figure 47. Removing a fan module

1 Pinch and hold on the orange touch points on the top of the fan module.

2 Lift the fan module to remove it.

After this task is completed

- Install a replacement unit (see “Install a fan module” on page 158). Make sure the replacement unit is of the exact same type as the removed one.

  Attention: With power on, complete the replacement within 30 seconds to ensure proper operation.
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a fan module

Follow instructions in this section to install a hot-swap fan.

About this task

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.

S017

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

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.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Following are the types of fans that are supported by this server.

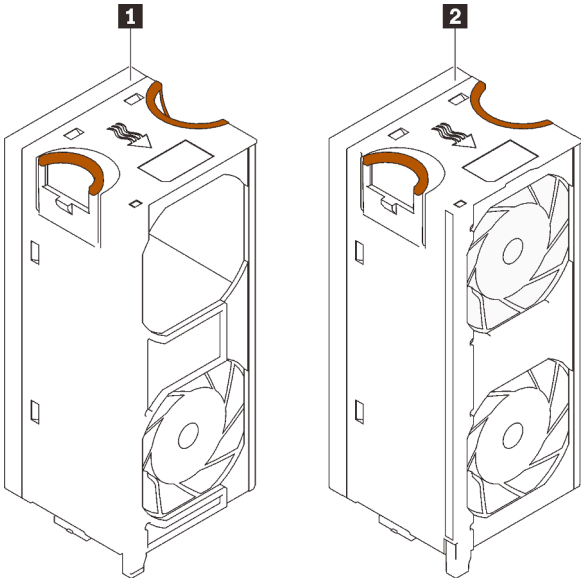


Figure 48. Fan modules

Table 25. Fan module

1	2
• Single Fan/Single Rotor Module • Single Fan/Dual Rotor Module	• Dual Fan/Single Rotor Module • Dual Fan/Dual Rotor Module

Notes:

- Make sure to replace a defective fan module with another unit of the exact same type.
- Do not mix single and dual rotor fan modules in the same unit of server.

Procedure

Step 1. Align the fan module over the fan slot in the fan cage assembly, and insert the fan module into the fan cage assembly until it clicks into place.

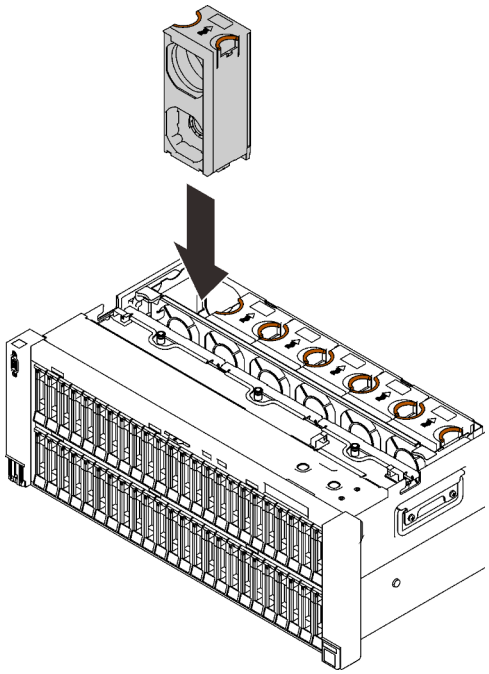


Figure 49. Installing a fan module

Attention: With power on, complete the replacement within 30 seconds to ensure proper operation.

After this task is completed

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

Demo video

Watch the procedure on YouTube

Front VGA assembly replacement

Follow instructions in this section to remove or install the front VGA assembly.

Remove the front VGA assembly

Follow instructions in this section to remove the front VGA assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

d. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

e. Disconnect the VGA cable from the system board.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 3 “Internal cable routing” on page 47 when disconnecting cables from the system board.

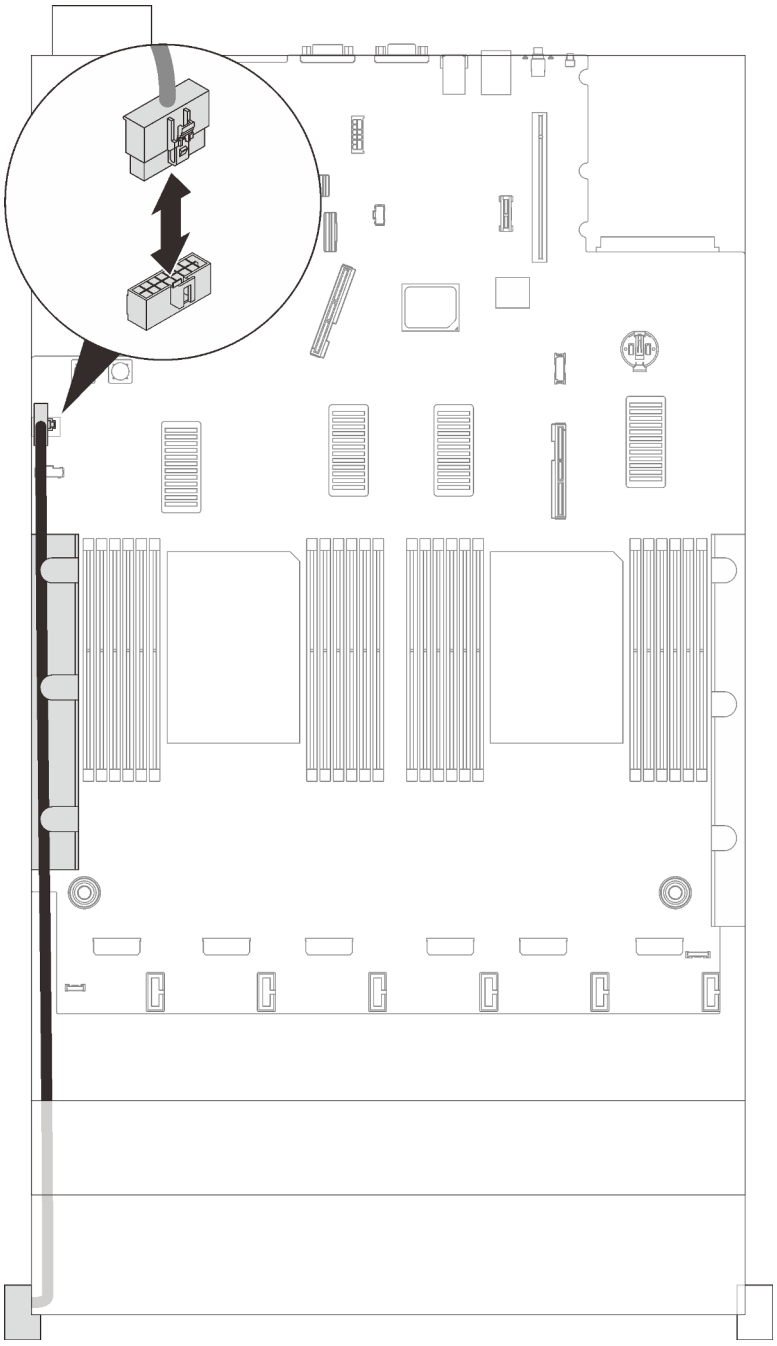


Figure 50. Disconnecting the front VGA cable

Step 2. Remove the four screws that secure the Front VGA assembly.

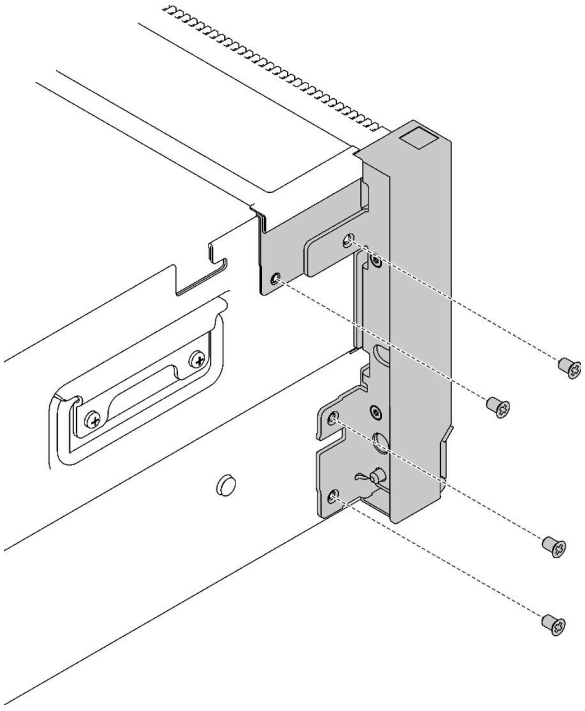


Figure 51. Removing the front VGA assembly

Step 3. Grasp the Front VGA assembly and disengage it from the server.

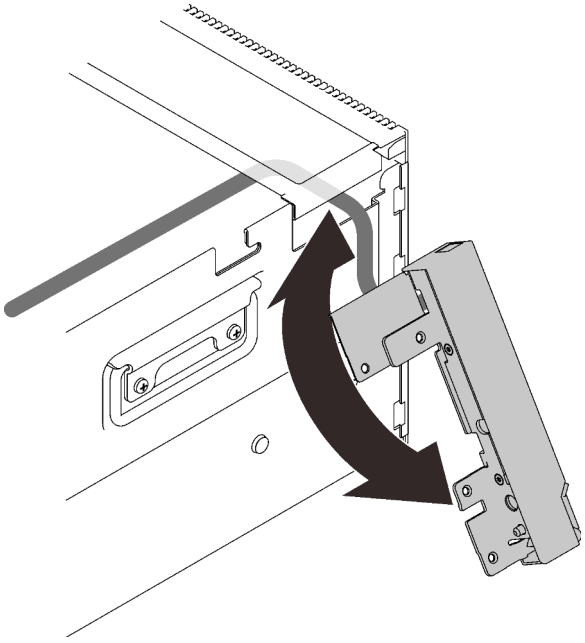


Figure 52. Removing the front VGA assembly

Step 4. Remove the front VGA cable from the server.

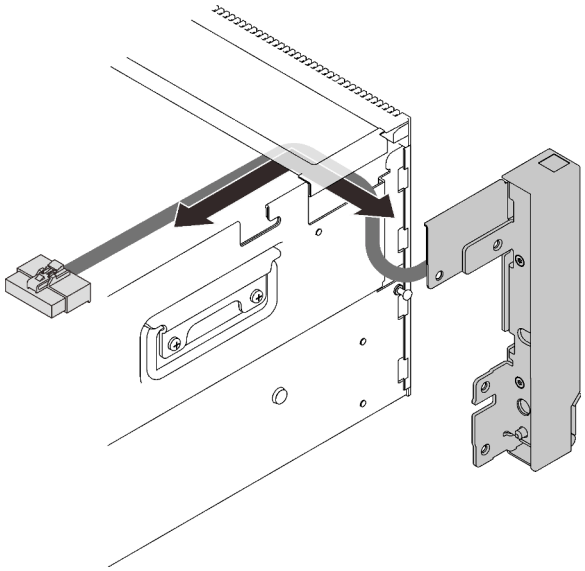


Figure 53. Removing the front VGA cable

After this task is completed

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

Demo video

Watch the procedure on YouTube

Install the front VGA assembly

Follow instructions in this section to install the front VGA assembly.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Route the cable into the slot on the side of the server.

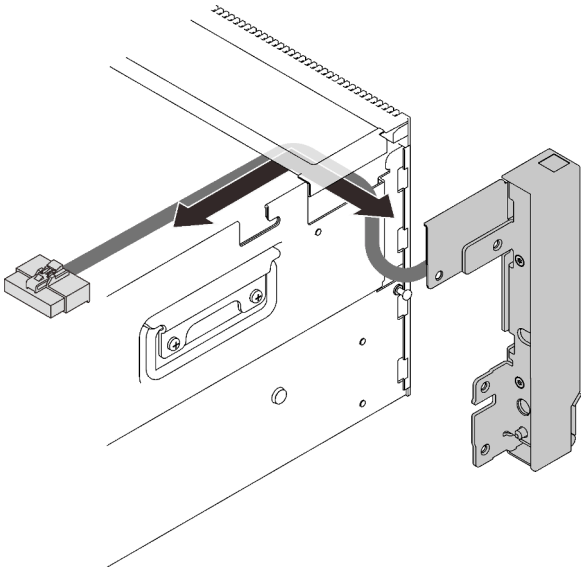


Figure 54. Installing the front VGA assembly

Step 2. Align the top side of the VGA assembly with the top of the server.

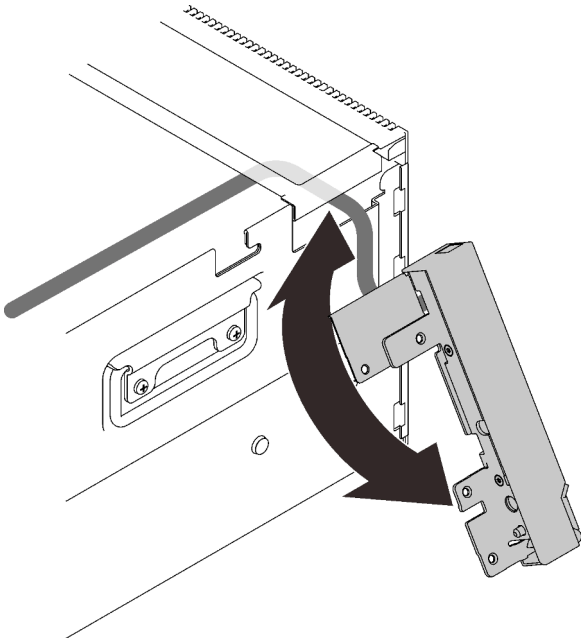


Figure 55. Installing the front VGA assembly

Step 3. Secure the front VGA assembly to the server with four screws.

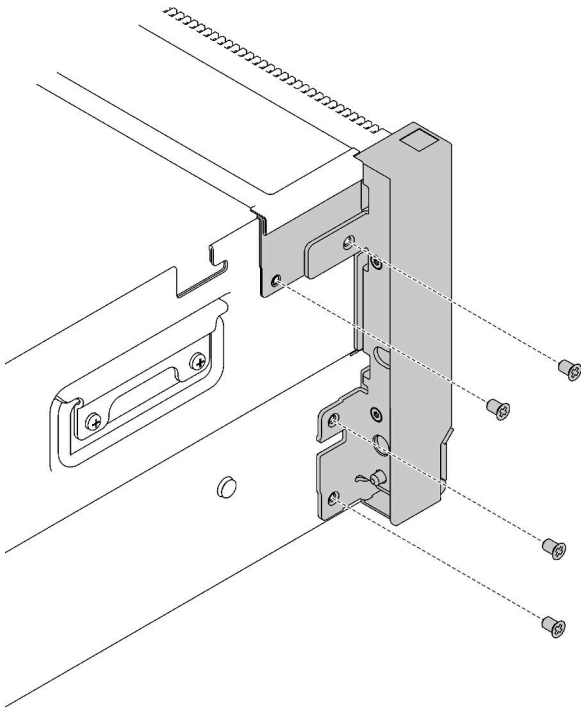


Figure 56. Installing the front VGA assembly

Step 4. Route the front VGA cable through the cable guide, and connect it to the system board.

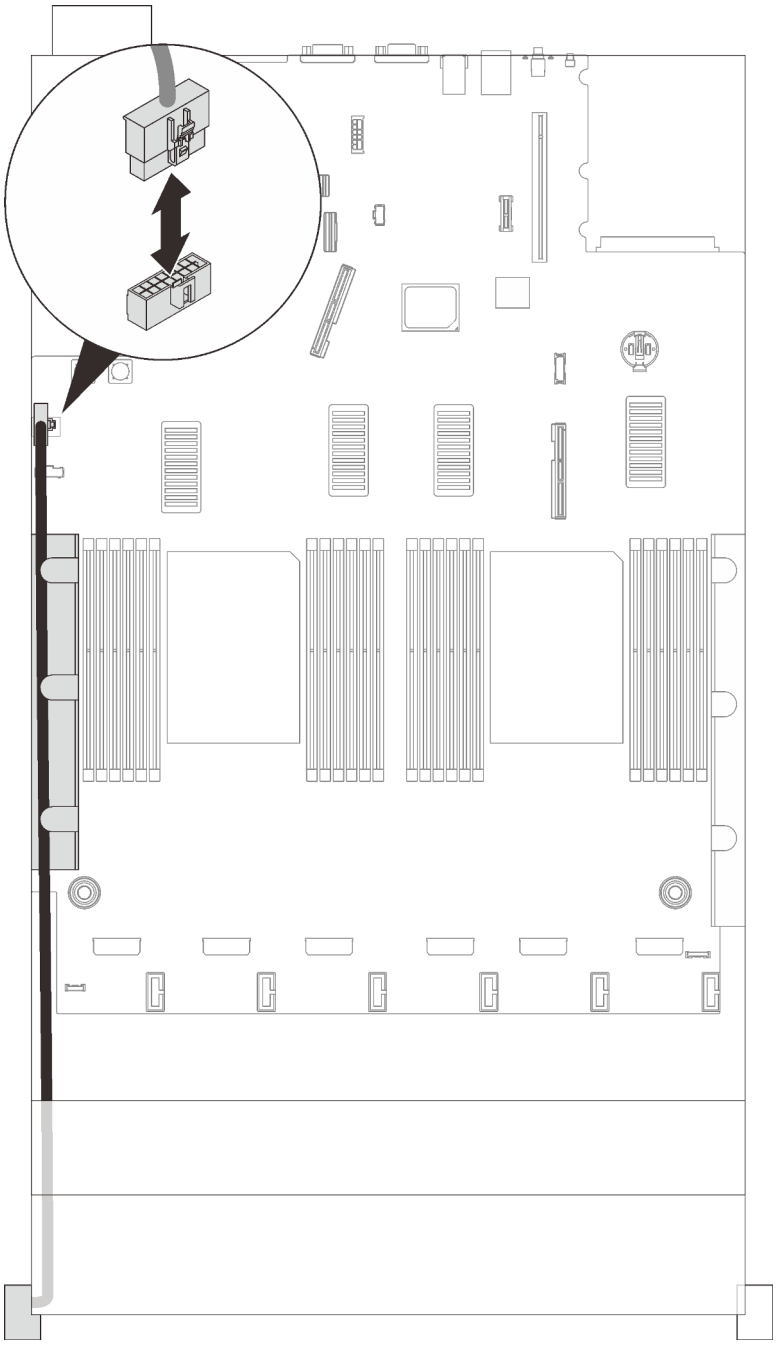


Figure 57. Connecting the front VGA cable

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Heat sink Torx T30 nut replacement

Follow the instructions in this section to remove and install a heat sink Torx T30 nut.

Remove a heat sink Torx T30 nut

Follow the instructions in this section to remove a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the following components depending on the location of the processor that is to be removed:

- If the processor is located on the processor and memory expansion tray, **do not** remove the expansion tray.

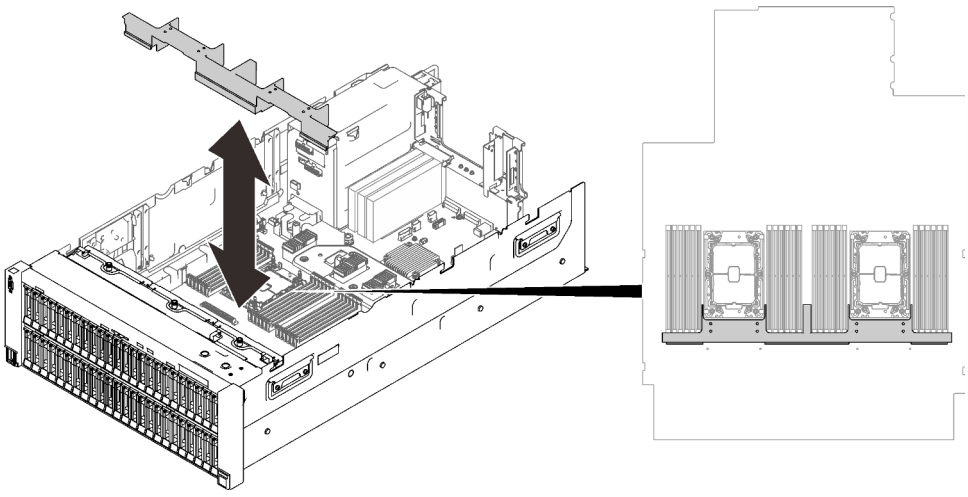


Figure 58. Removing the air baffle from the expansion tray

- If the processor is located on the system board:
  1. Remove one of the following components.
     - System air baffle (see “Remove the system board air baffle” on page 227)
     - Processor and memory expansion tray and expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220)
  2. Remove the expansion tray air baffle.

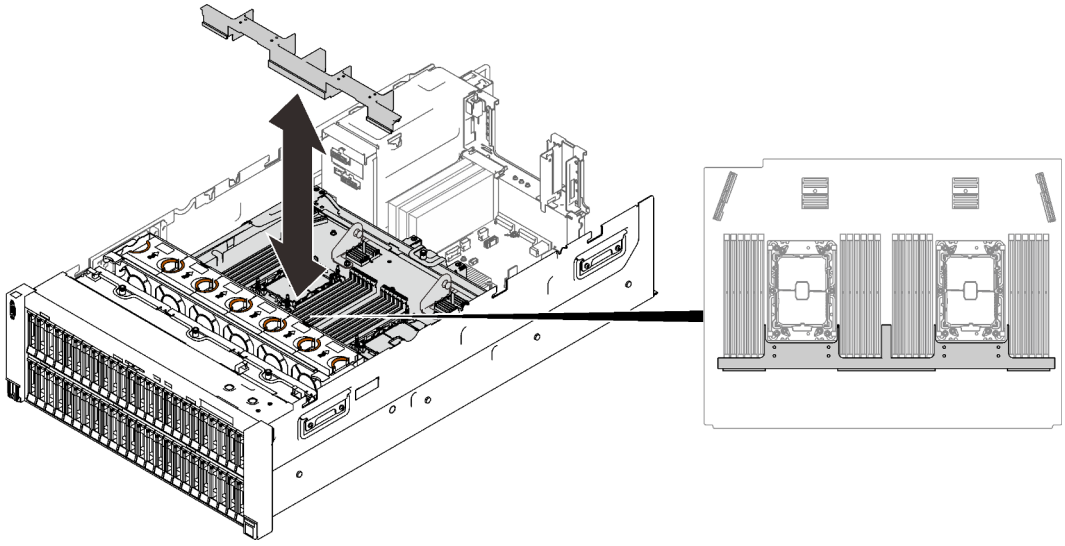


Figure 59. Removing the expansion tray air baffle

d. Remove the PHM. See “Remove a processor and heat sink” on page 207.

Step 2. Remove the Torx T30 nut.

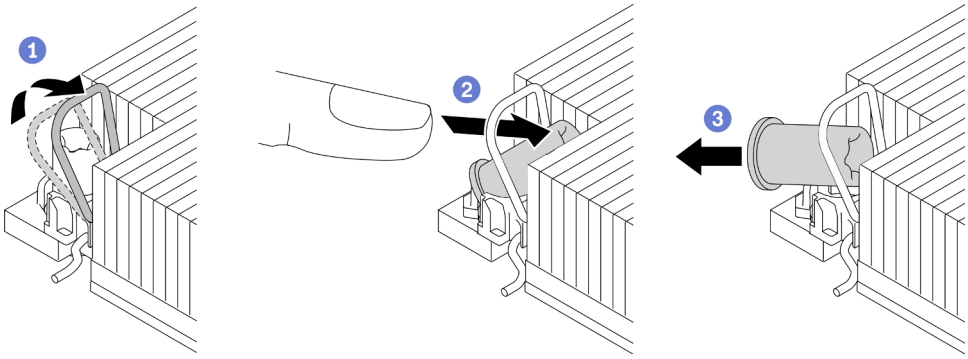


Figure 60. Removing a Torx T30 nut from the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Push the upper edge of the Torx T30 nut towards the center of the heat sink until it disengages.

c. 3 Remove the Torx T30 nut.

Attention: Visually inspect the removed Torx T30 nut, if the nut is cracked or damaged, make sure no debris or broken pieces are left inside the server.

After you finish

1. Install a new Torx T30 nut. See “Install a heat sink Torx T30 nut” on page 170.
2. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Install a heat sink Torx T30 nut

Follow the instructions in this section to install a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.

Procedure

Step 1. Install the Torx T30 nut.

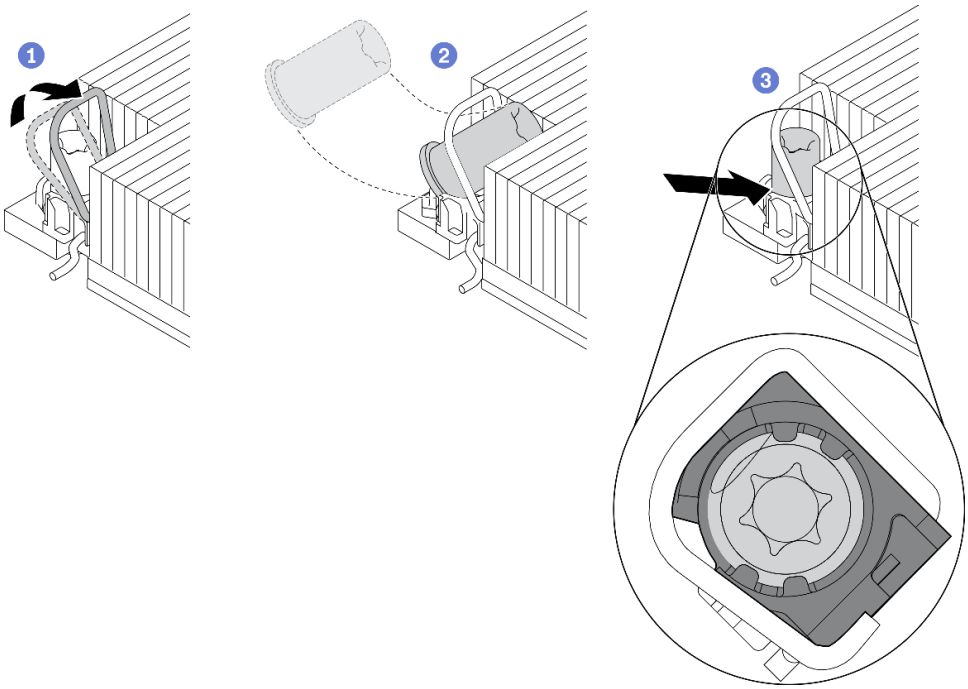


Figure 61. Installing a Torx T30 nut into the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Orient the Torx T30 nut under the anti-tilt wire bail; then, align the Torx T30 nut with the socket at an angle as shown.

c. 3 Push the lower edge of the Torx T30 nut into the socket until it clicks into place. Make sure the Torx T30 nut is secured under the four clips in the socket.

After you finish

1. Make sure all four nuts are installed to the PHM, and install the PHM. See “Install a processor and heat sink” on page 214.
2. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Intrusion switch replacement

Follow instructions in this section to remove or install the intrusion switch.

Remove the intrusion switch

Follow instructions in this section to remove the intrusion switch.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove the PCIe bracket cage from Zone 2 next to the power supplies (see “Remove a 4U PCIe riser cage” on page 256).

Step 2. Disconnect the cable from the system board.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 3 “Internal cable routing” on page 47 when disconnecting cables from the system board.

Step 3. Grasp the switch, and pull to remove it from the seat.

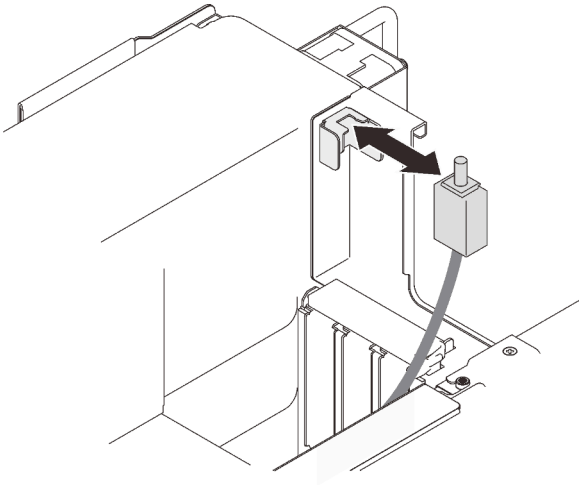


Figure 62. Removing the intrusion switch

After this task is completed

- Install a replacement unit (see “Install the intrusion switch” on page 172).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the intrusion switch

Follow instructions in this section to install the intrusion switch.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the intrusion switch with the slot next to the power supply bays, and push it in.

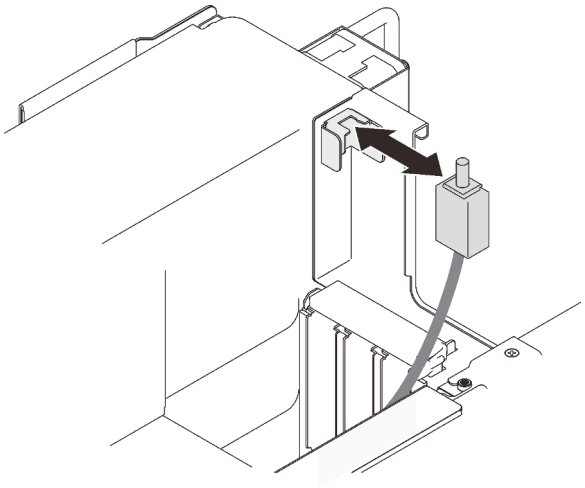


Figure 63. Installing the intrusion switch

Step 2. Connect the cable to the system board. See "System board connectors" on page 28 to locate the connector on the system board.

After this task is completed

Proceed to complete the parts replacement (see "Complete the parts replacement" on page 284).

Demo video

Watch the procedure on YouTube

LCD diagnostics panel replacement

Follow instructions in this section to remove or install the LCD diagnostics panel.

Remove the LCD diagnostics panel

Follow instructions in this section to remove the LCD diagnostics panel.

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the server" on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

d. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

Step 2. Disconnect the LCD diagnostics panel cable.

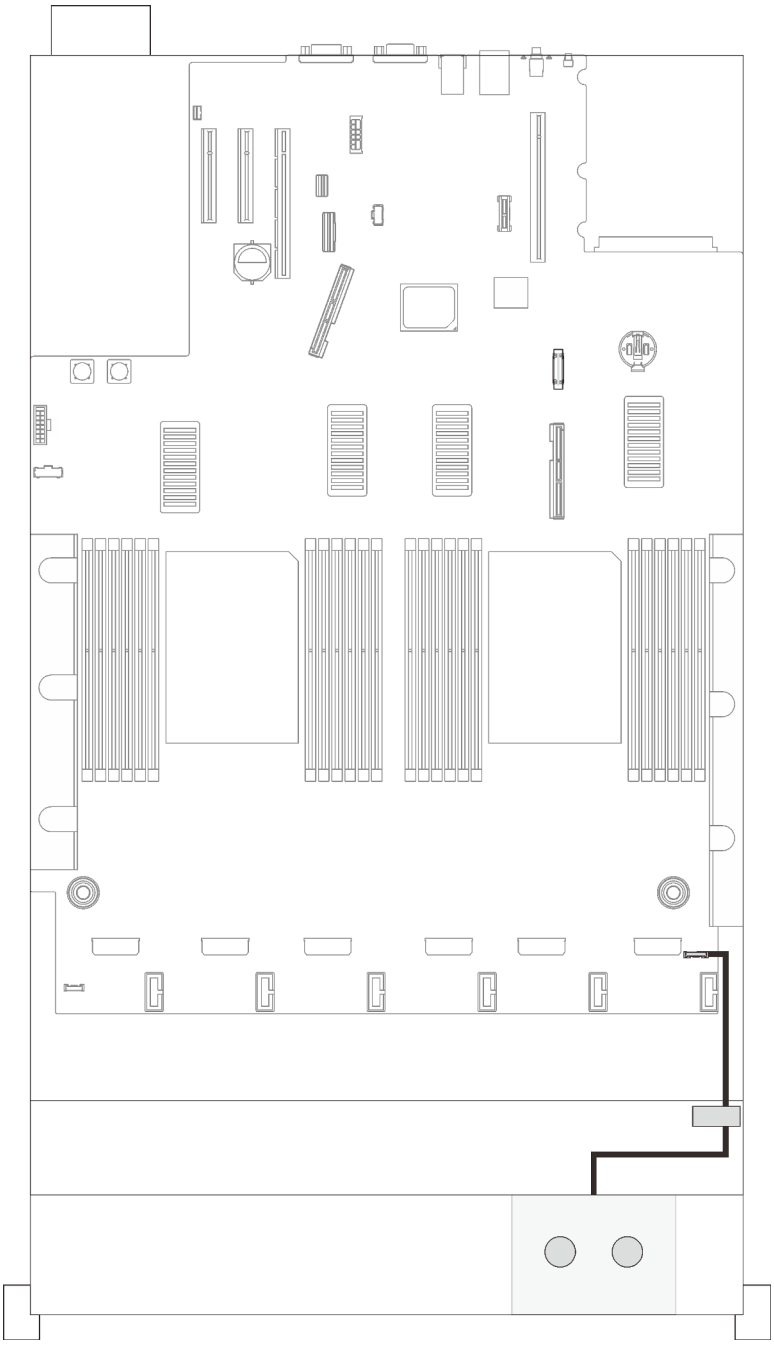


Figure 64. Disconnecting the LCD diagnostics panel cable

Step 3. Remove the LCD diagnostics panel.

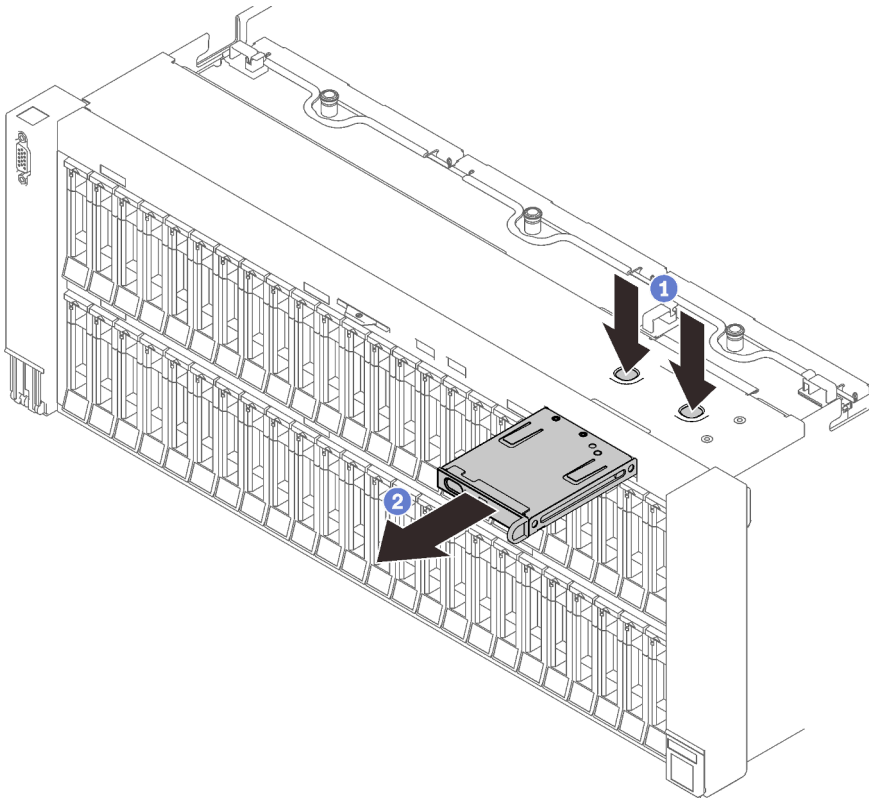


Figure 65. Removing the LCD diagnostics panel

1 Press and hold on the two release tabs on the top of the server.

2 Grasp and pull the assembly to remove it from the server.

After this task is completed

1. Install a replacement unit (see “Install the LCD diagnostics panel” on page 175).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the LCD diagnostics panel

Follow instructions in this section to install the LCD diagnostics panel.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the LCD diagnostics panel to the slot on the front end of the server, and slide it in.

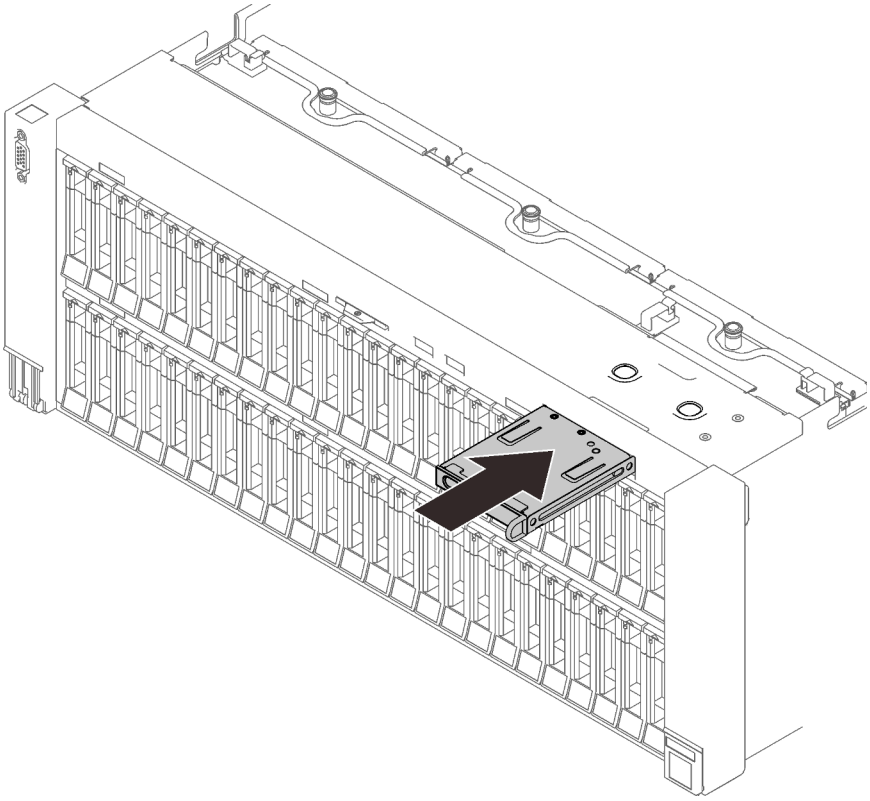


Figure 66. Installing the LCD diagnostics panel

Step 2. Connect the LCD diagnostics panel cable.

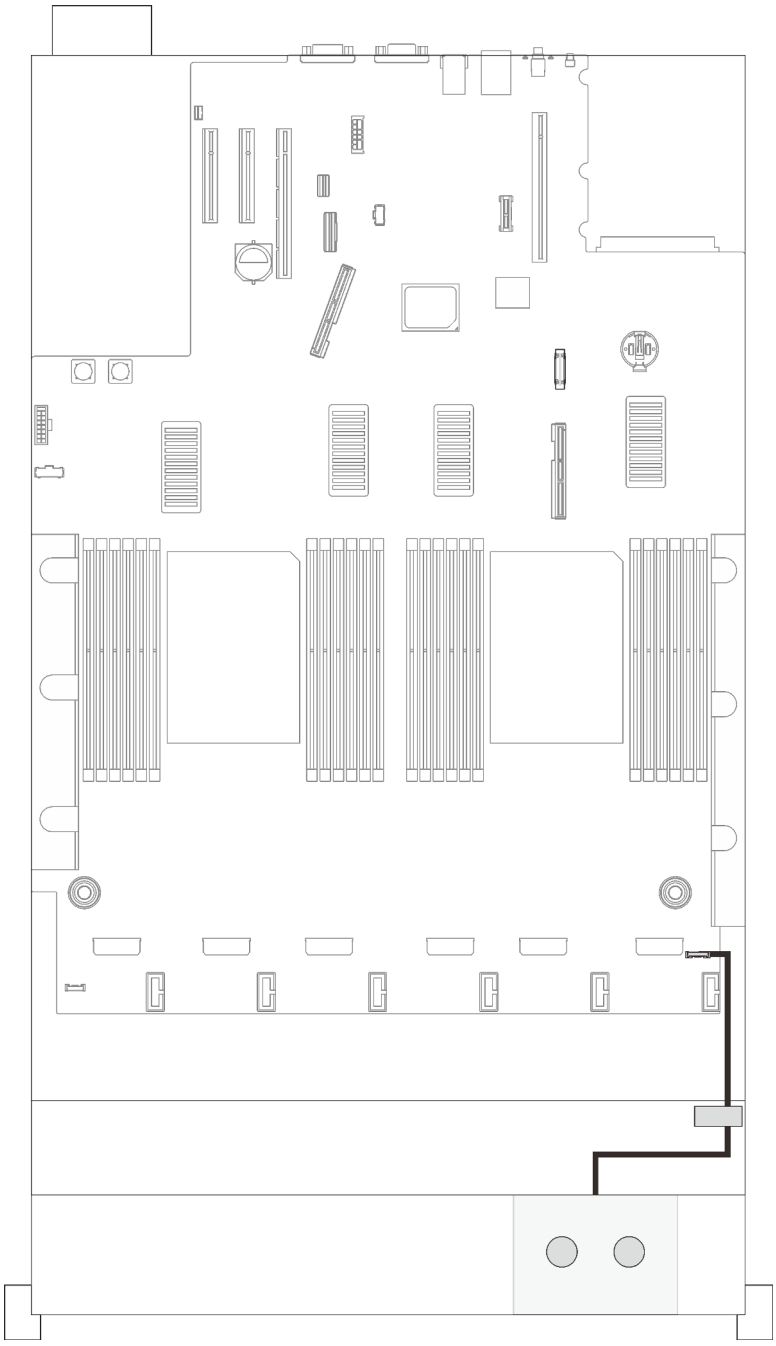


Figure 67. Connecting the LCD diagnostics panel cable

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Memory module replacement

Follow instructions in this section to remove or install a memory module.

Memory module slot location

Locate the memory module to replace based on the following figures.

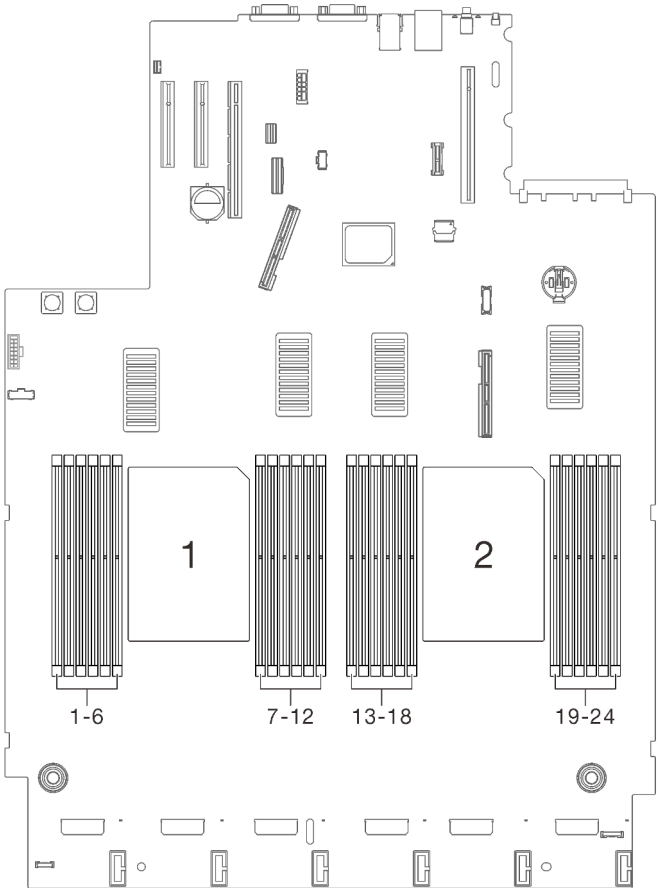


Figure 68. Memory module slot 1-24 on the system board

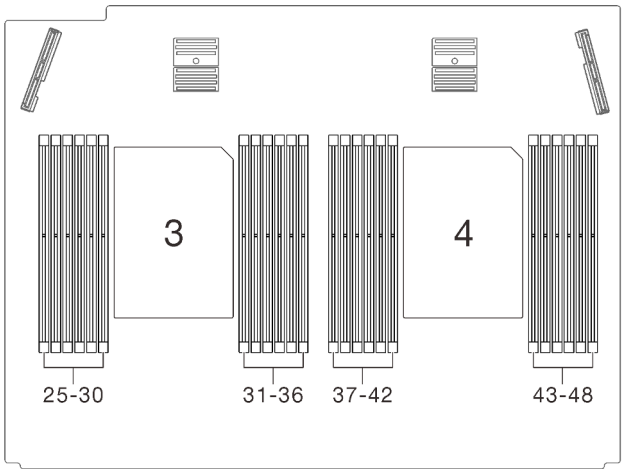


Figure 69. Memory module slot 25-48 on the expansion tray

Remove a memory module

Follow instructions in this section to remove a memory module.

About this task

"**ATTENTION:**
Static Sensitive Device
Ground package before opening"
on page 140

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for "Handling static-sensitive devices" on page 140:

- Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the 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.
- Go over "Installation Guidelines" on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the server" on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. If any of the modules to be removed is PMEM:

- In the case of pure system board or expansion tray replacement, keep records of the slots in which the modules are installed, and make sure to install them back to the exact same slots after system board or expansion tray replacement.
- If the removed PMEM is to be replaced or reused in a different configuration, make sure to complete the following procedure before physically removing the module.

  Attention: Without the following steps being completed, the removed PMEM will not be usable in another system or configuration.

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

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

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

3. Delete namespaces with command corresponding to the operating system that is installed:
   - **Linux** command:
     ```
     ndctl destroy-namespace all -f
     ndctl destroy-namespace all -f
     ```
   - **Windows** Powershell command
     ```
     Get-PmemDisk | Remove-PmemDisk
     ```
4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).
   ```
   ipmctl delete -pcd
   ```

   Notes: See the following links to learn how to download and use impctl in different operating systems:
   - Windows: https://datacentersupport.lenovo.com/us/en/videos/YTV101407
   - Linux: https://datacentersupport.lenovo.com/us/en/solutions/HT508642
5. Reboot the system.

b. Remove the top cover (see "Remove the top cover" on page 241).

c. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see "Remove a 4U PCIe riser cage" on page 256, "Remove the chassis air baffle" on page 271, and "Remove the 4U PCIe expansion tray" on page 250).

d. Remove the following components depending on the location of the processor that is to be removed:

- If the processor is located on the processor and memory expansion tray, **do not** remove the expansion tray.

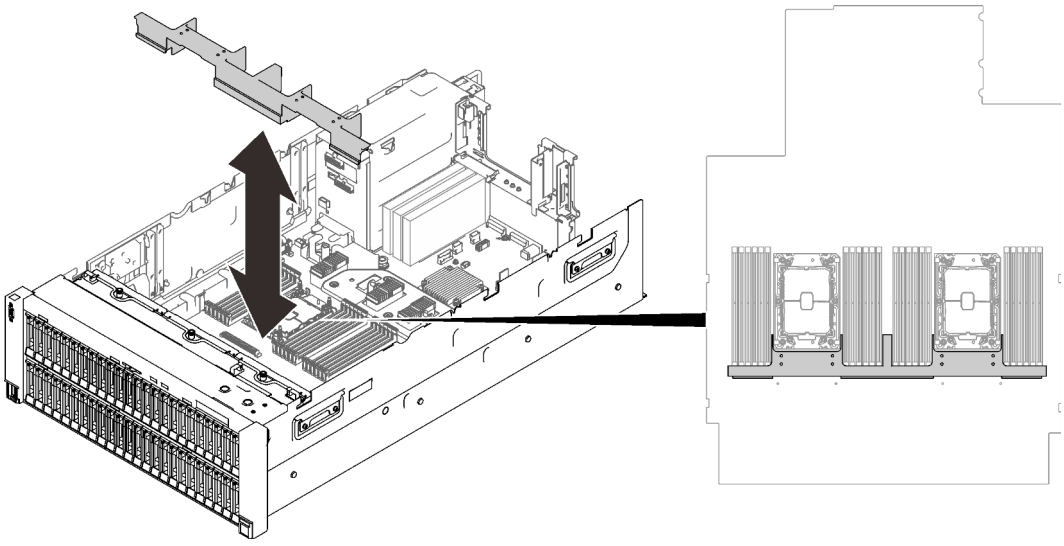


Figure 70. Removing the air baffle from the expansion tray

- If the processor is located on the system board:
  1. Remove one of the following components.

- System air baffle (see “Remove the system board air baffle” on page 227)
- Processor and memory expansion tray and expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220)

2. Remove the expansion tray air baffle.

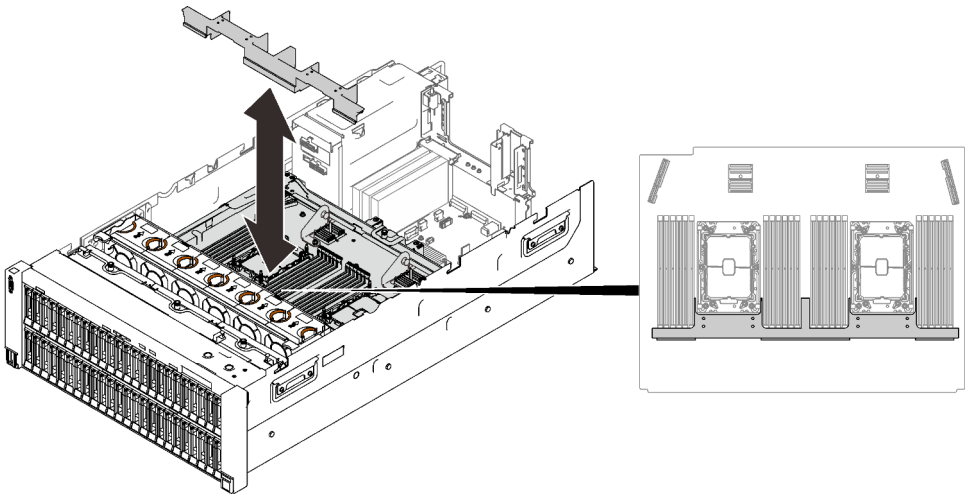


Figure 71. Removing the expansion tray air baffle

Step 2. Remove the memory module from the slot.

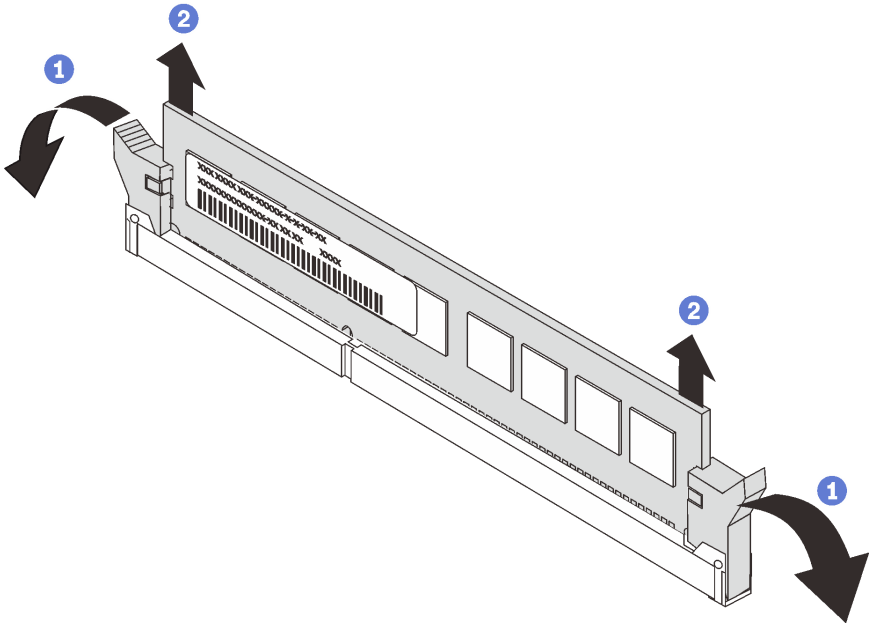


Figure 72. Removing a memory module

1. Open the retaining clip on each end of the memory module slot.
2. Grasp the memory module at both ends, and gently lift and remove it from the slot.

After this task is completed

1. Install a replacement unit (see “Install a memory module” on page 182).

2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a memory module

Follow instructions in this section to install a memory module.

About this task

See “Memory module installation rules and order” in *Setup Guide* for detailed information about memory configuration and setup.

“**ATTENTION:**
Static Sensitive Device
Ground package before opening”
on page 140

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for “Handling static-sensitive devices” on page 140:

- Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the 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.
- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Important:

- If you are installing memory modules on the processor and memory expansion tray, **do not** remove the expansion tray. Install the modules while the expansion tray is installed in the chassis to avoid accidental damages to components.
- Ensure that you have observed the installation rules and sequence in “Memory module installation rules and order” in *Setup Guide*.
- Before installing 3DS RDIMMs or PMEMs, make sure dual-rotor fan modules are installed in the system. If not, follow the instructions in "Install the dual-rotor fan module upgrade kit" in *Setup Guide* to install the dual-rotor fan upgrade kit.

Procedure

Step 1. If any of the modules to be installed is PMEM, make sure to complete the following procedure before physically installing the module:

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

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

     Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
3. Delete namespaces with command corresponding to the operating system that is installed:
   - **Linux** command:
     ```
     ndctl destroy-namespace all -f
     ndctl destroy-namespace all -f
     ```
   - **Windows** Powershell command
     ```
     Get-PmemDisk | Remove-PmemDisk
     ```
4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).
   ```
   ipmctl delete -pcd
   ```

   Notes: See the following links to learn how to download and use impctl in different operating systems:
   - Windows: https://datacentersupport.lenovo.com/us/en/videos/YTV101407
   - Linux: https://datacentersupport.lenovo.com/us/en/solutions/HT508642
5. Reboot the system.

Step 2. Install the memory module into the slot.

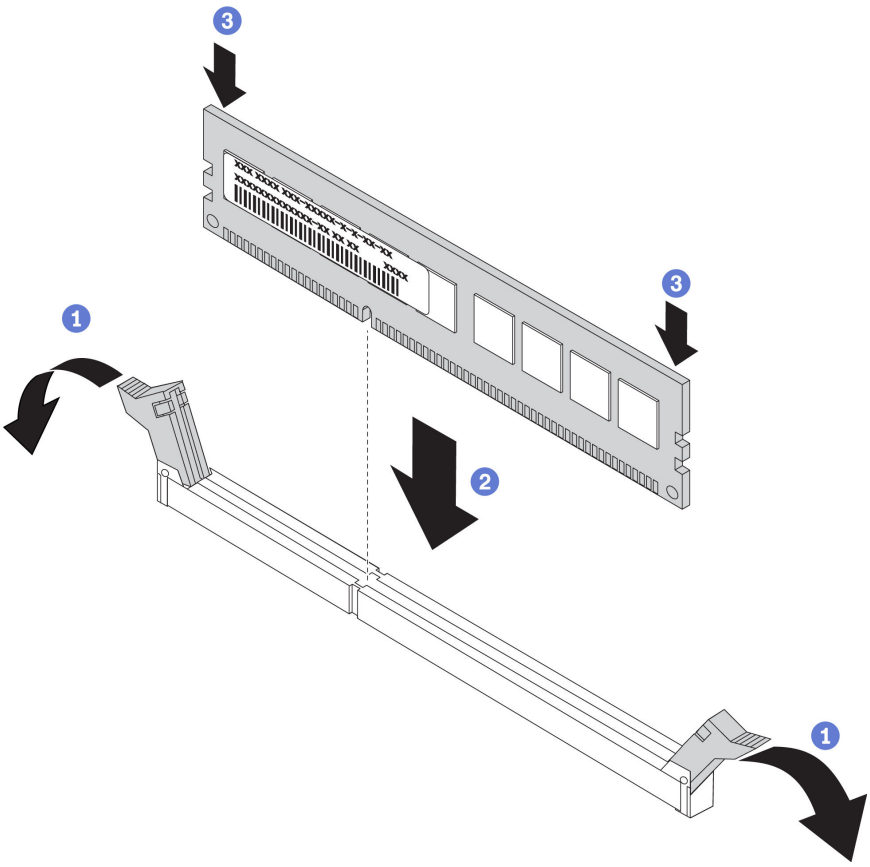


Figure 73. Installing a memory module

1 Gently open the retaining clip on each end of the memory module slot.

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

3 Firmly press both ends of the memory module straight down 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.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

OCP Ethernet adapter replacement

Follow instructions in this section to install or remove the OCP Ethernet adapter .

Remove the OCP Ethernet adapter

Follow instructions in this section to remove the OCP Ethernet adapter.

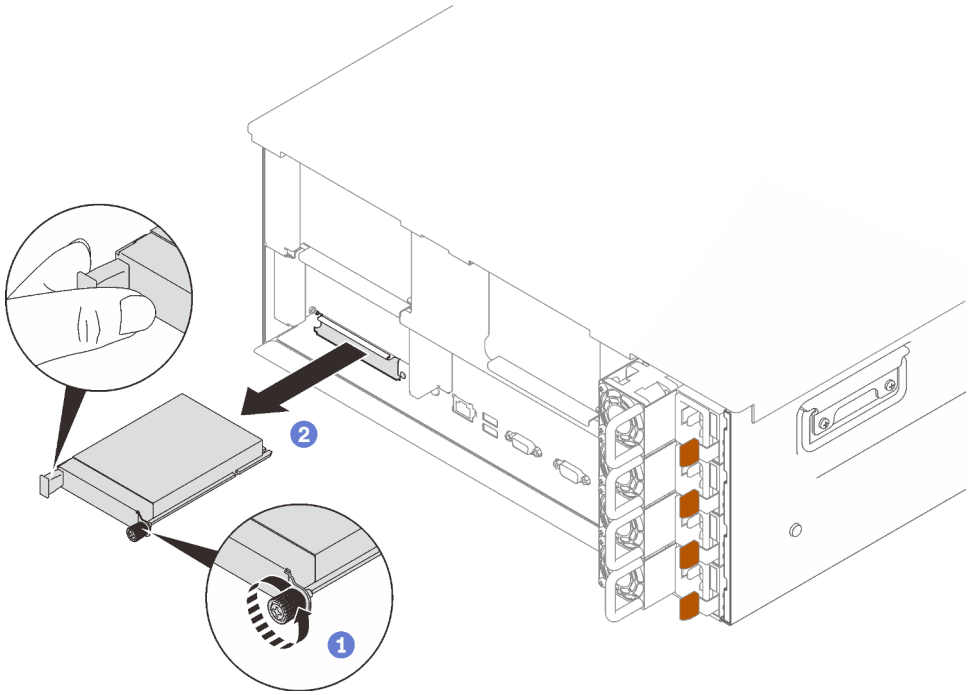
About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Remove the OCP Ethernet adapter.



1 Loosen the captive screw.

2 Grasp the handle, and slide the adapter out.

Figure 74. Removing the OCP Ethernet adapter

After this task is completed

1. Install a replacement unit or a filler (see “Install the OCP Ethernet adapter” on page 185).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the OCP Ethernet adapter

Follow instructions in this section to install the OCP Ethernet adapter.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the OCP Ethernet adapter.

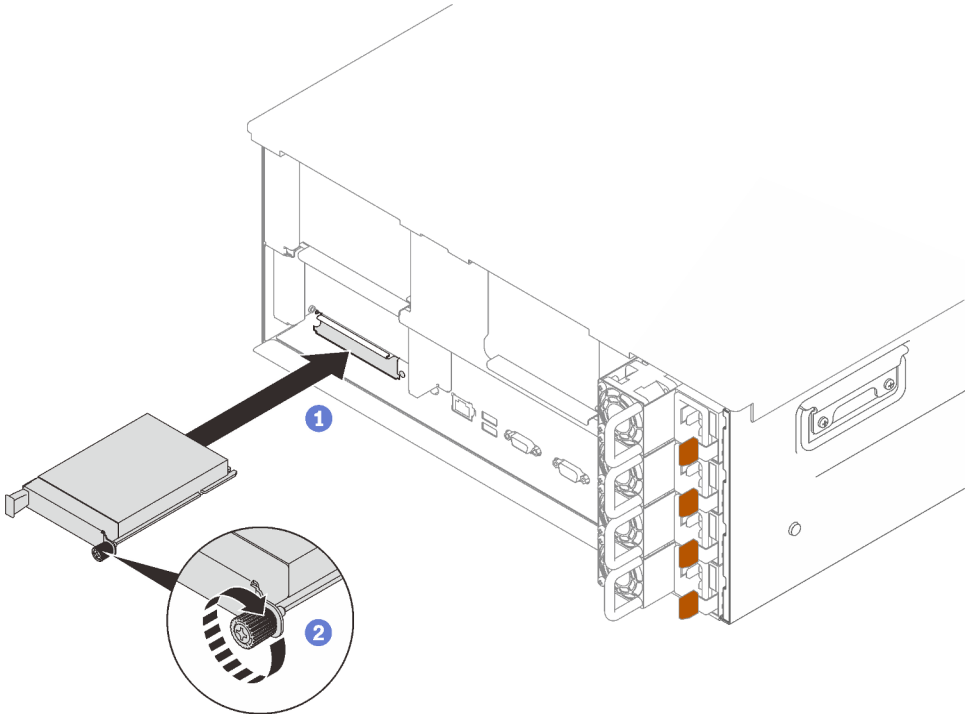


Figure 75. Installing the OCP Ethernet adapter

1 Slide the adapter into the PCIe slot.

2 Tighten the captive screw to secure the adapter.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

PCIe riser assembly and adapter replacement

Follow instructions in this section to remove or install the PCIe riser assembly and the adapters.

Notes: To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:

- The server is equipped with a GPU adapter.
- The UEFI firmware version is M5E128A or later.

For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.

Remove the PCIe riser assembly

Follow instructions in this section to remove the PCIe riser assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Disconnect cables that are connected to the adapters.

Step 2. Grasp and lift the PCIe riser assembly to remove it from the system board.

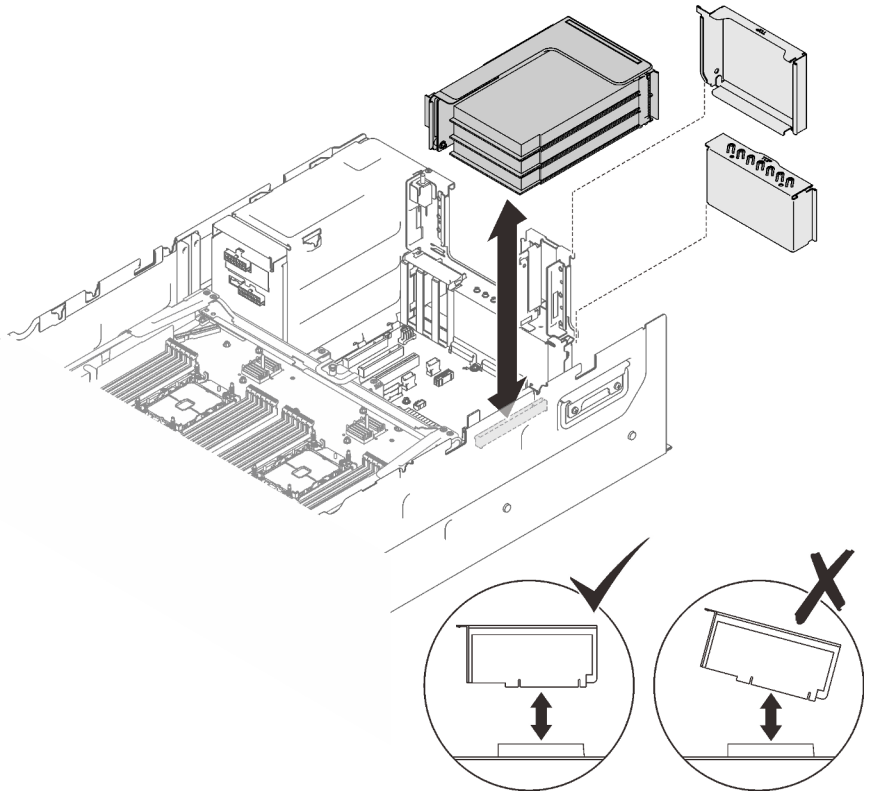


Figure 76. Removing the PCIe riser assembly

After this task is completed

- Fill the riser slot with a replacement unit or a filler (see “Install the PCIe riser assembly” on page 193).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the component:
  1. Remove the three screws that secure the riser assembly to the bracket, and slide the riser assembly slightly away to disengage and remove it from the bracket.

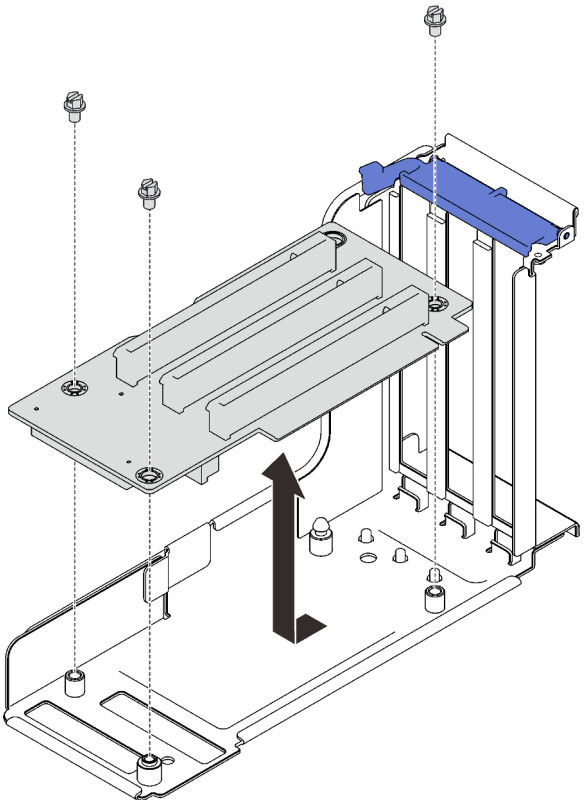


Figure 77. Disassembling the PCIe riser card

2. Recycle the component in compliance with local regulations.

Demo video

Watch the procedure on YouTube

Remove an adapter

Follow the instructions in this section to remove an adapter.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Remove an adapter from the system board

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see "Remove a 4U PCIe riser cage" on page 256, "Remove the chassis air baffle" on page 271, and "Remove the 4U PCIe expansion tray" on page 250).

c. Disconnect all the cables (including external ones) from the adapter.

Step 2. Open the retaining latch.

Step 3. Remove the screw that secures the adapter.

Step 4. Grasp the adapter by upper corners, and remove it from the system board.

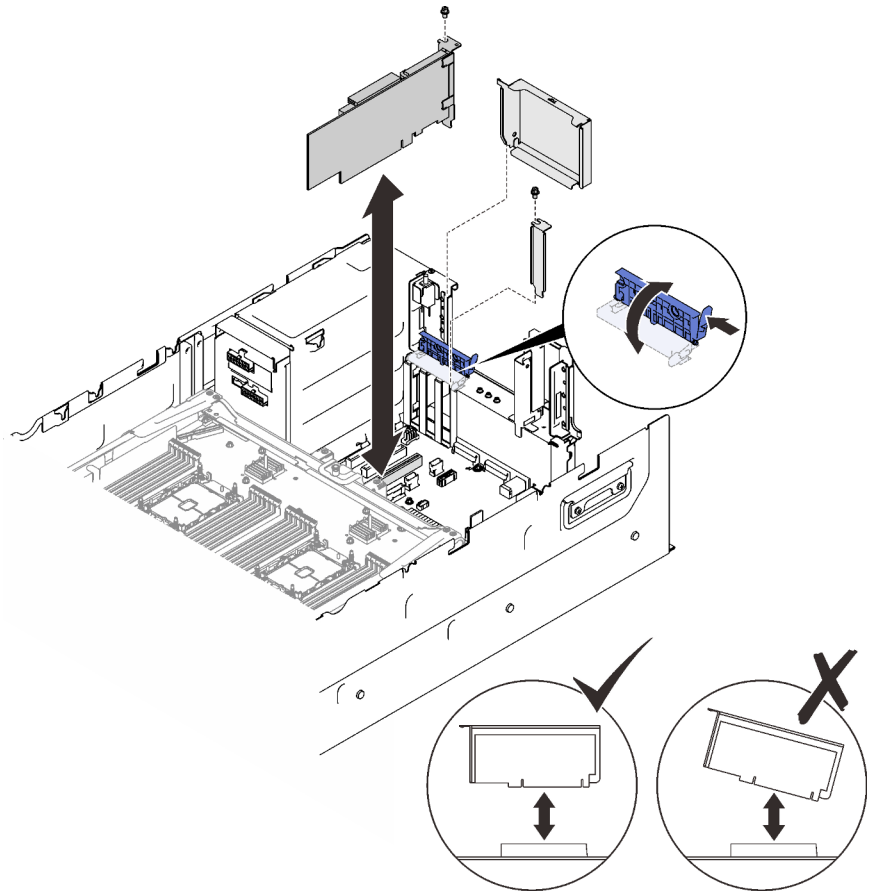


Figure 78. Removing an adapter from the system board

Remove an adapter from the PCIe riser card assembly

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see "Remove the top cover" on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see "Remove a 4U PCIe riser cage" on page 256, "Remove the chassis air baffle" on page 271, and "Remove the 4U PCIe expansion tray" on page 250).

c. Disconnect all the cables (including external ones) from the adapters that are installed in the PCIe riser card assembly.

d. Remove the PCIe riser assembly (see "Remove the PCIe riser assembly" on page 187).

Step 2. Open the retaining latch on the PCIe riser card assembly.

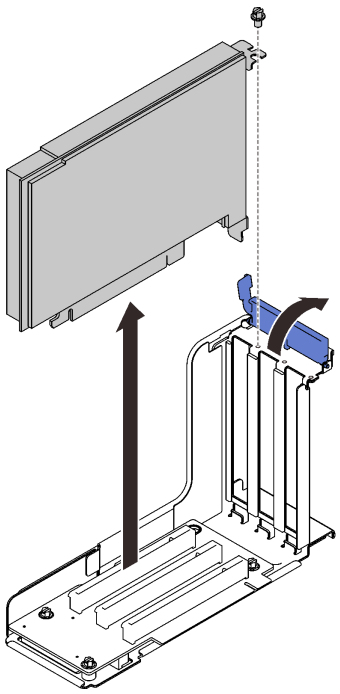


Figure 79. Removing an adapter from the PCIe riser card assembly

Step 3. Remove the screw that secures the adapter to the riser assembly.

Step 4. Remove the adapter from the PCIe riser card assembly.

After this task is completed

1. Install a replacement unit or a filler (see “Install an adapter” on page 191).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install an adapter

Follow the instructions in this section to install an adapter.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Notes:

- The following adapters must be installed in 4U PCIe riser cages. See “Install an adapter into a 4U PCIe riser cage” on page 258 for installation instructions.
  - Nvidia Tesla V100s
  - Nvidia Tesla T4

- 1610-8p NVMe switch adapter

- The following adapters must be installed in the PCIe riser assembly or 4U PCIe riser cages. See “Install an adapter in the PCIe riser assembly” on page 192 or “Install an adapter into a 4U PCIe riser cage” on page 258 for installation instructions.
  - ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter
  - ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter V2
  - ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter

Install an adapter on the system board

Procedure

Step 1. Open the retention latch.

Step 2. If a filler has been installed in the PCIe slot, remove the screw that secures it, and remove the filler.

Step 3. Align the adapter with the connector on the system board, and push it in.

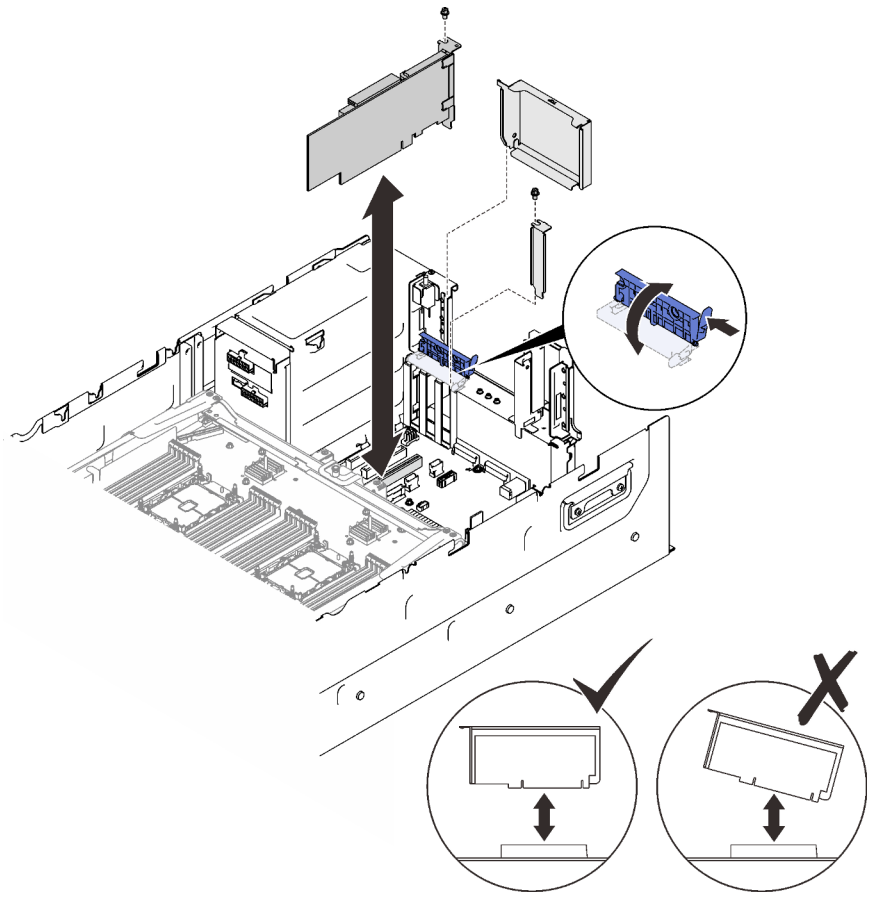


Figure 80. Installing an adapter to the system board

Step 4. Secure the adapter with a screw.

Step 5. Close the retention latch.

Install an adapter in the PCIe riser assembly

Procedure

Step 1. Open the retaining bracket on the PCIe riser assembly.

Step 2. If a filler has been installed to the slot on the riser, remove the screw that secures it and remove the filler.

Step 3. Align the adapter with the connector on the PCIe riser assembly, and push it in.

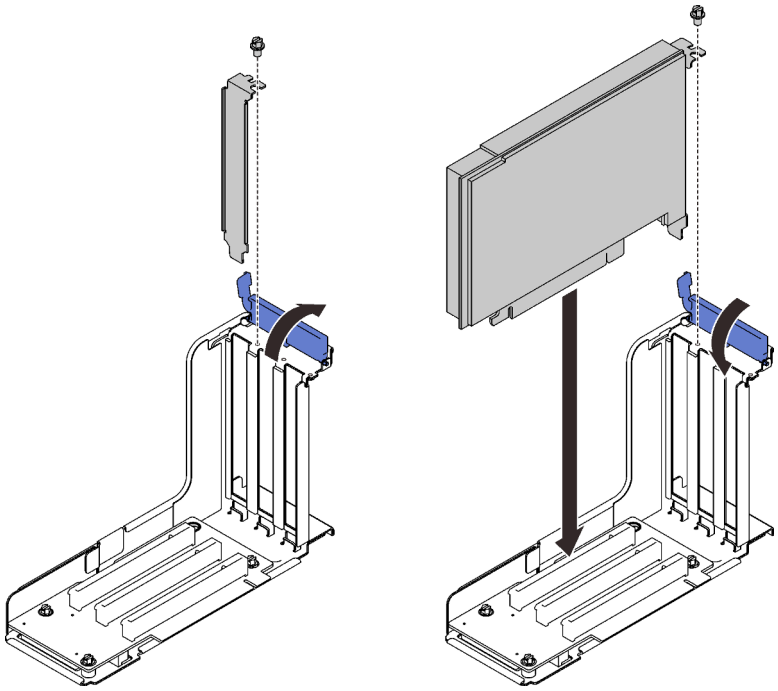


Figure 81. Installing an adapter into the PCIe riser assembly

Step 4. Secure the adapter with a screw.

Step 5. Close the retention latch.

After this task is completed

- If one of the following adapters has been installed, install a flash power module (see "Install a flash power module" on page 275).
  - ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapte
  - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 940-32i 8GB Flash PCIe 12Gb Adapter
- Proceed to complete the parts replacement (see "Complete the parts replacement" on page 284).

Demo video

Watch the procedure on YouTube

Install the PCIe riser assembly

Follow instructions in this section to install the PCIe riser assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the PCIe riser assembly with the connector on the system board, and push it in.

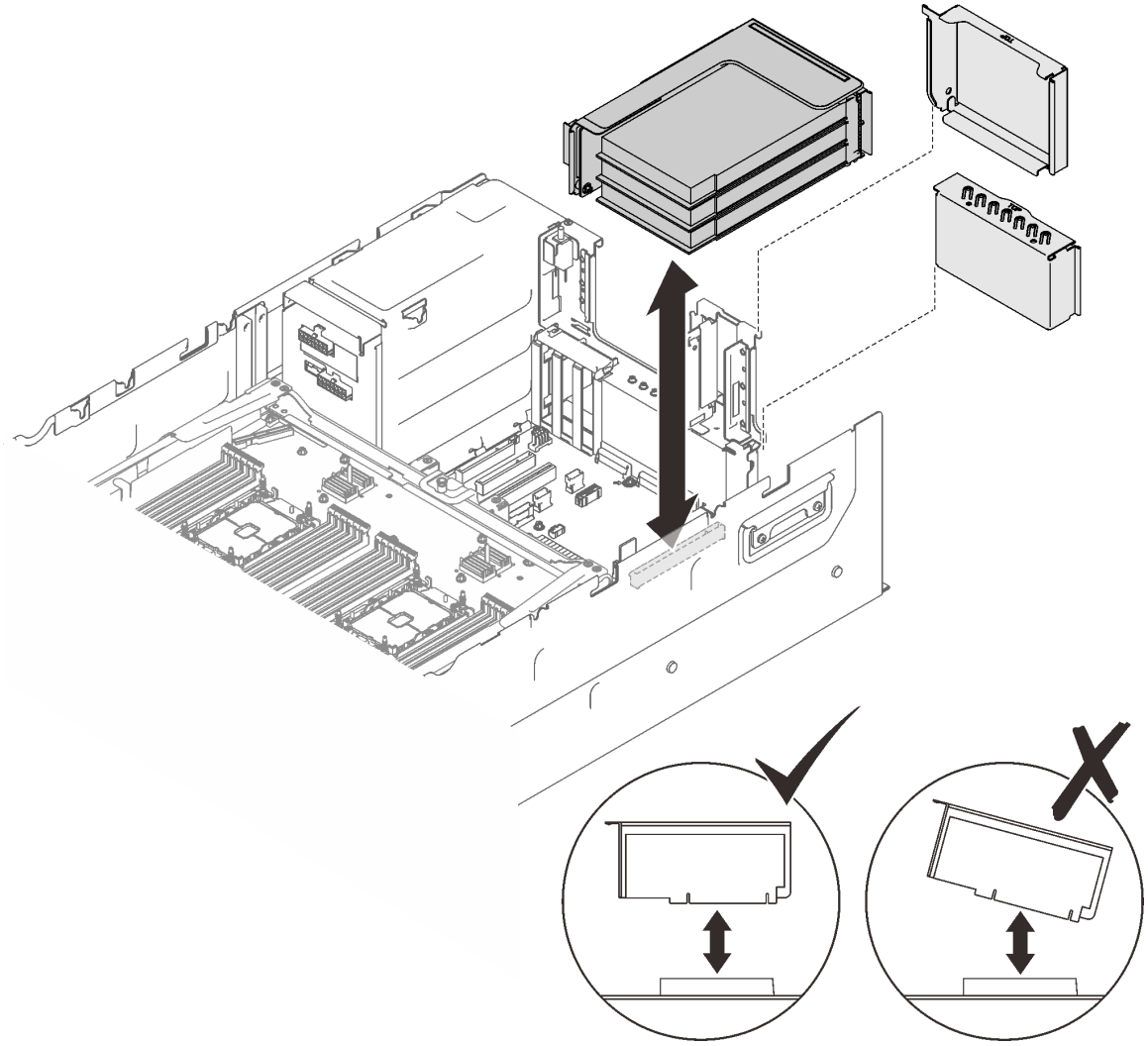


Figure 82. Installing the PCIe riser assembly

Step 2. If you are installing x16/x16/x16 riser assembly, connect the two PCIe cables to the system board.

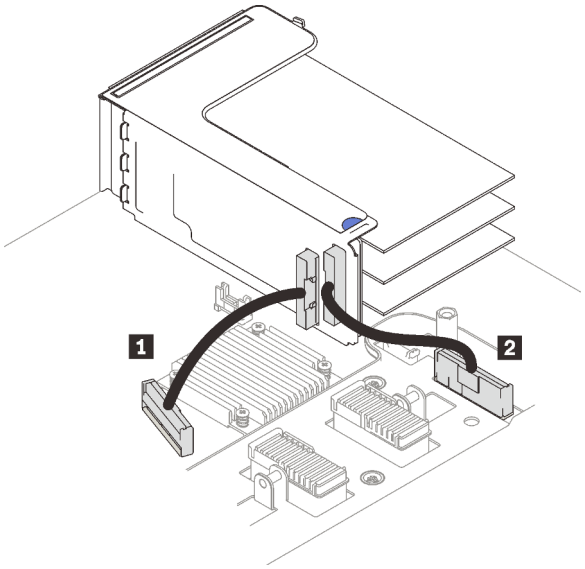


Figure 83. Connecting PCIe cables from x16/x16/x16 riser to the system board

1 PCIe connector 1	2 PCIe connector 2

After this task is completed

1. Reconnect all the required cables.
2. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Power backplane replacement

Follow instructions in this section to remove or install the power backplane .

Remove the power backplane

Follow instructions in this section to remove the power backplane.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

d. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

a. Gently pull and disengage every installed power supply unit.

Step 2. Disconnect the power backplane cable and remove if from the cable clip.

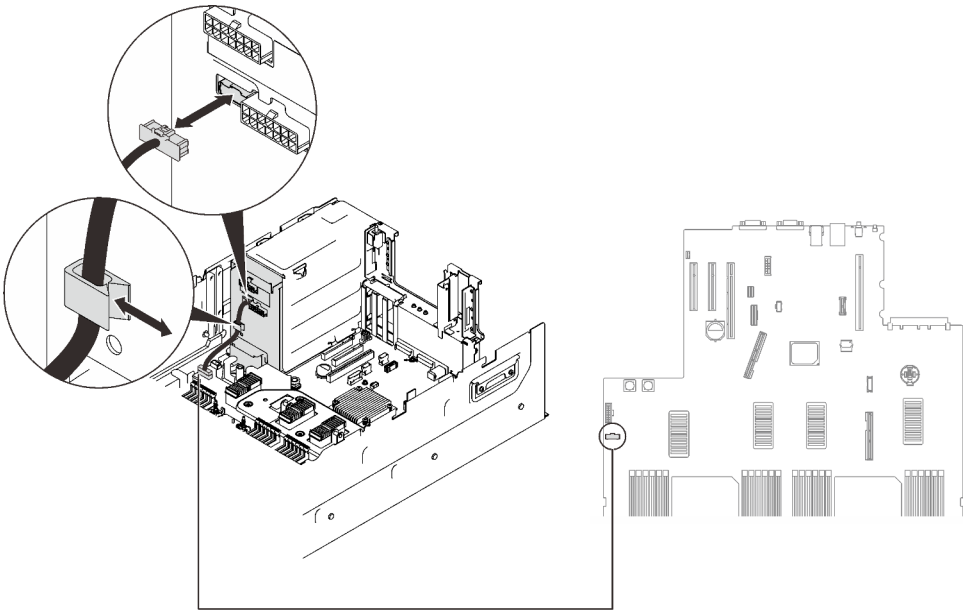


Figure 84. Disconnecting the power backplane cable

Step 3. Grasp and lift the power backplane to remove it.

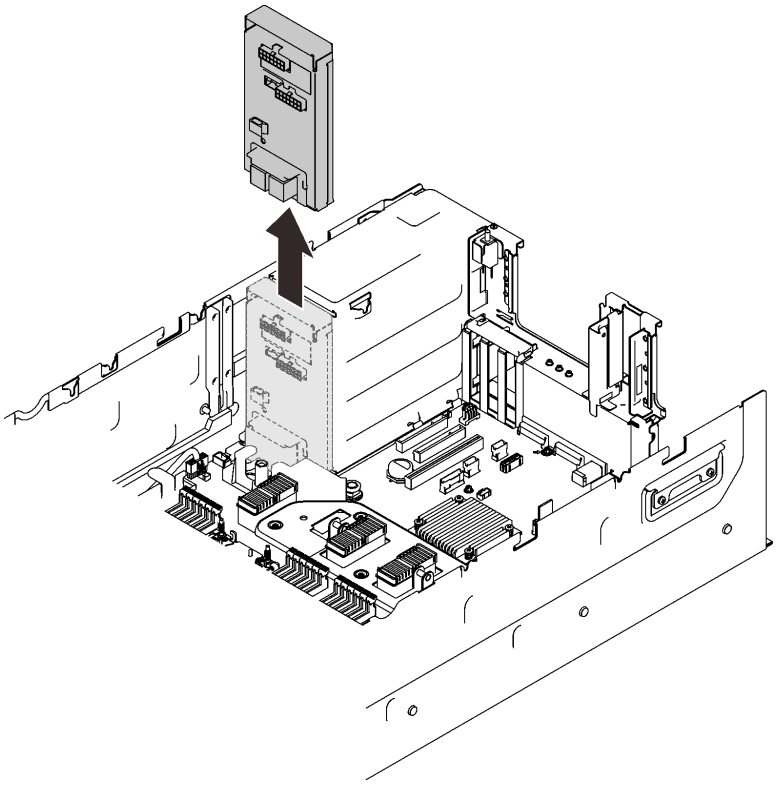


Figure 85. Removing the power backplane

After this task is completed

- Install a replacement unit (see “Install the power backplane” on page 198).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the component:
  1. Remove the six screws, and separate the backplane from the bracket.

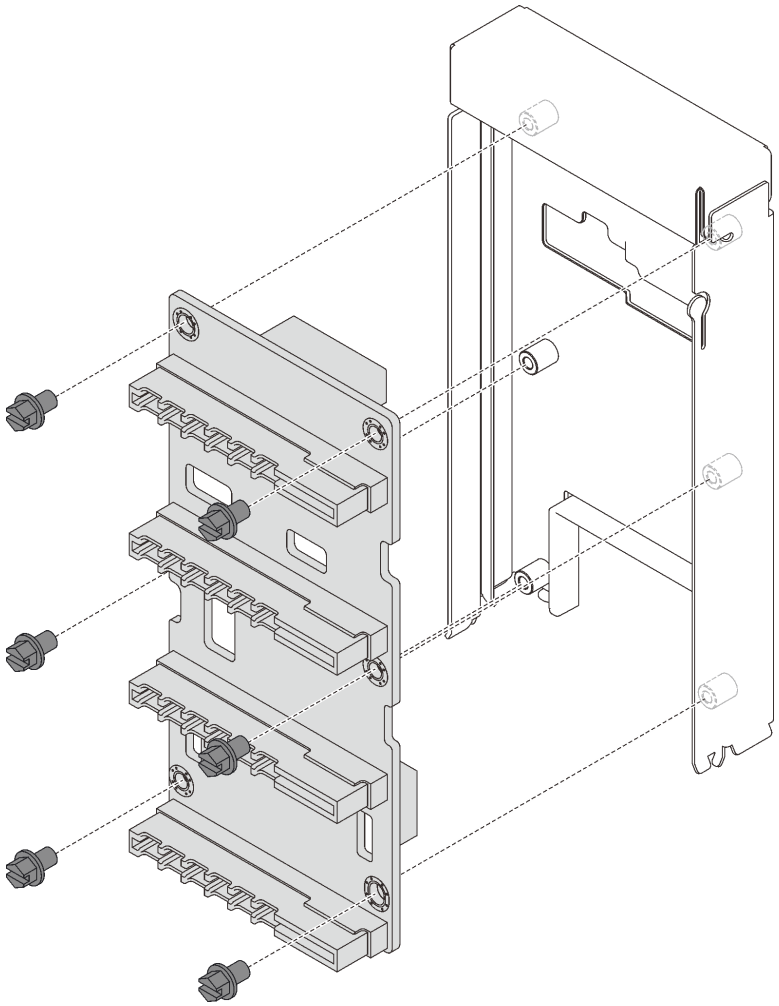


Figure 86. Disassembling the power backplane

2. Recycle the component in compliance with local regulations.

Demo video

Watch the procedure on YouTube

Install the power backplane

Follow instructions in this section to install the power backplane.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the bottom connector on the backplane to the corresponding connector on the system board, and push the backplane in.

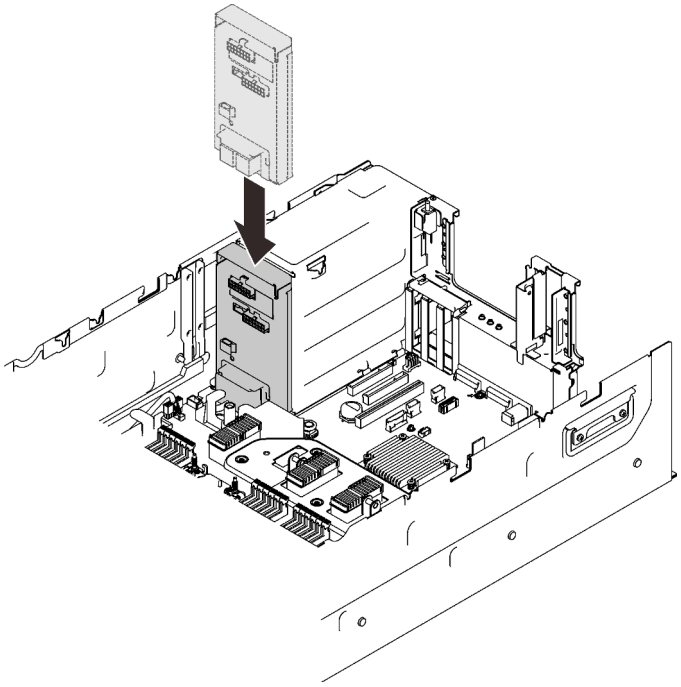


Figure 87. Installing the power backplane

Step 2. Route the power backplane cable through the cable clip, and connect it to the power backplane.

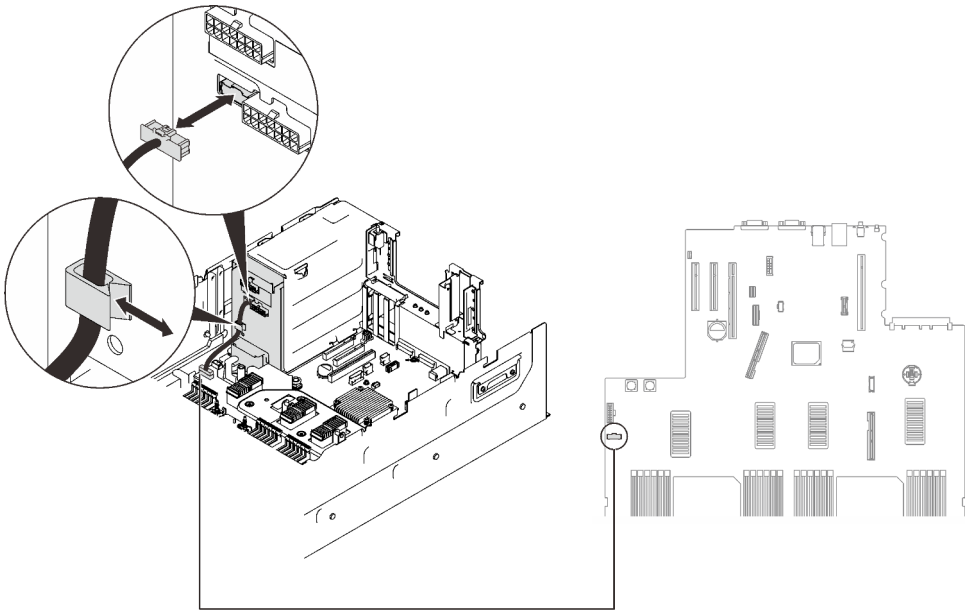


Figure 88. Connecting the power backplane cable

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Power supply unit replacement

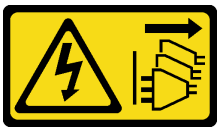
Follow instructions in this section to install or remove power supply units.

Remove a hot-swap power supply unit

Follow instructions in this section to remove a hot-swap power supply unit.

About this task

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.

S029

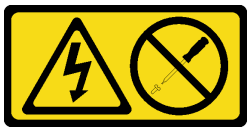
DANGER

For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:

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

To Connect:	To Disconnect:
1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product. 2. Install the power supply unit(s) into the system housing. 3. Attach dc power cord(s) to the product. • Ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should be connected very well. 4. Connect dc power cord(s) to subject power source (s). 5. Turn ON all the power source(s).	1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s). 2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated. 3. Unplug the subject power supply unit(s) from the system housing.

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.

Attention: Go over “Installation Guidelines” on page 137 to ensure that you work safely.

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.**

Procedure

Step 1. Make preparations for this task.

a. If CMA has been installed, do the following:

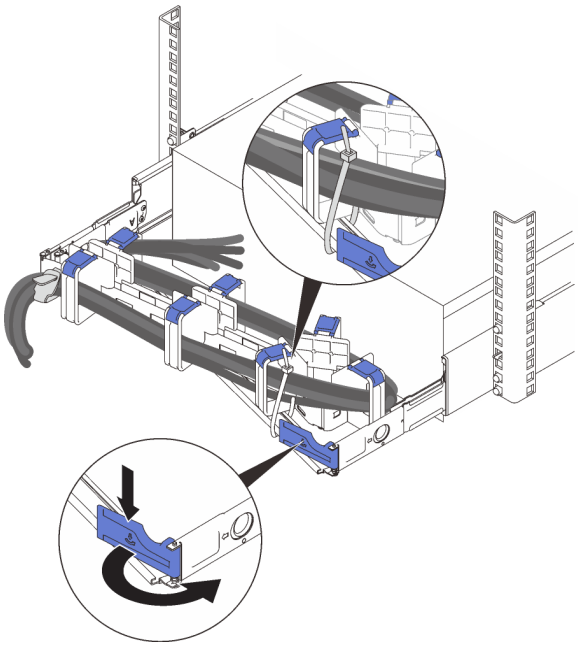


Figure 89. Adjusting CMA

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

Note: Make sure the cables are secured to the CMA with cable straps.

Step 2. Remove the power supply.

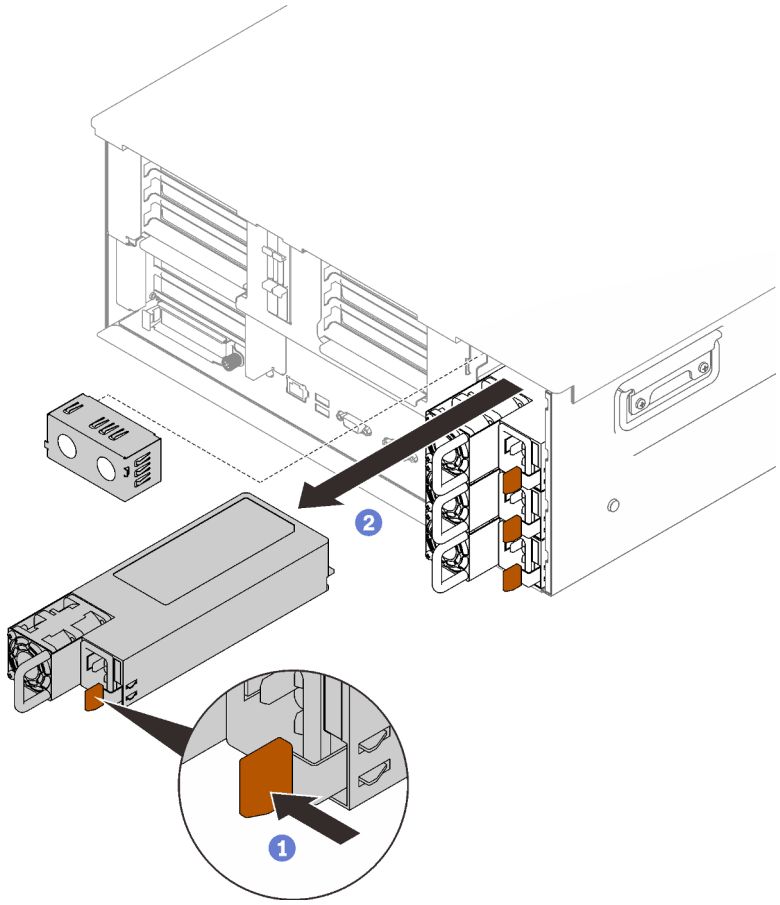


Figure 90. Removing the power supply

1. Press and hold on the orange release tab.
2. Grasp the handle and slide the power supply unit out from the server.

After this task is completed

1. Fill the power supply bay with a replacement unit or a filler (see “Install a hot-swap power supply unit” on page 203).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

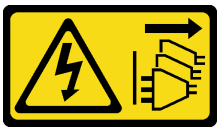
Watch the procedure on YouTube

Install a hot-swap power supply unit

Follow instructions in this section to install a hot-swap power supply unit.

About this task

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.

S029

DANGER

For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:

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

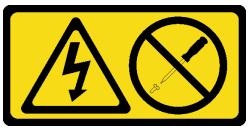
To Connect:

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

To Disconnect:

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

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.

Following are the types of power supply units compatible to this server and notices to take during installation. The server supports a maximum of four power supply units.

- 750-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC
- 750-watt Titanium, input power 230 Vac / 240 VDC

  Note: When only two units of 750-watt Titanium power supply are installed, 240 VDC is not supported.
- 1100-watt Platinum, input power 115 Vac / 230 Vac / 240 VDC
- 1100-watt Titanium, input power 230 Vac / 240 VDC
- 1800-watt Platinum, input power 230 Vac / 240 VDC
- 1800-watt Titanium, input power 230 Vac / 240 VDC
- 2600-watt Titanium, input power 230 Vac / 240 VDC

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.**

Procedure

Step 1. Make preparations for this task.

a. Make sure the power supply unit to be installed is of the same wattage as the installed ones. Otherwise, complete the following steps:

1. Turn off the server and peripheral devices.
2. Disconnect the power cords and all external cables.
3. Remove all the installed power supply units.
4. Make sure all the power supply units to be installed are of the same wattage. Do not mix power supply units of different wattages in the same unit of server.

b. If CMA has been installed, do the following:

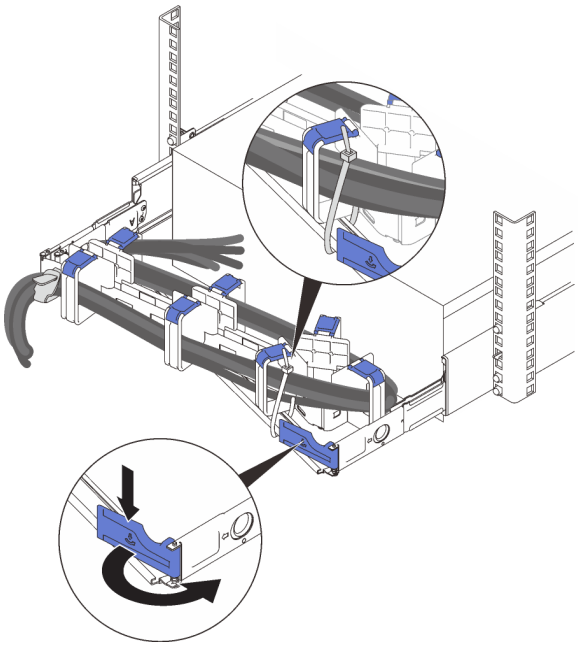


Figure 91. Adjusting CMA

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

Note: Make sure the cables are secured to the CMA with cable straps.

c. If you are installing the power supply into an empty bay, remove the power supply filler panel from the power supply bay.

d. If more than one units are to be installed, start with the lowest available power supply bay.

Step 2. Grasp the handle on the rear of the power supply, and slide it into the power-supply bay until it clicks into place.

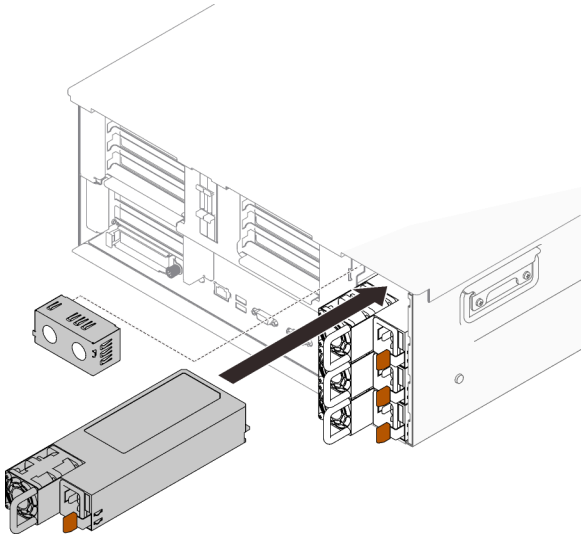


Figure 92. Installing a power supply unit

After this task is completed

1. Connect the power cord to the power supply unit, and make sure it's properly connected to the power.
2. Pull the handle to try if the power supply unit is properly installed. If it slides out, reinstall it.

Demo video

Watch the procedure on YouTube

Processor and heat sink replacement

Follow instructions in this section to remove and install a processor and heat sink.

Attention: Before you begin replacing a processor, make sure that you have an alcohol cleaning pad and thermal grease.

Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

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.

Attention:

- Read “Installation Guidelines” on page 137 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- If the server is in a rack, remove it from the rack.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

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

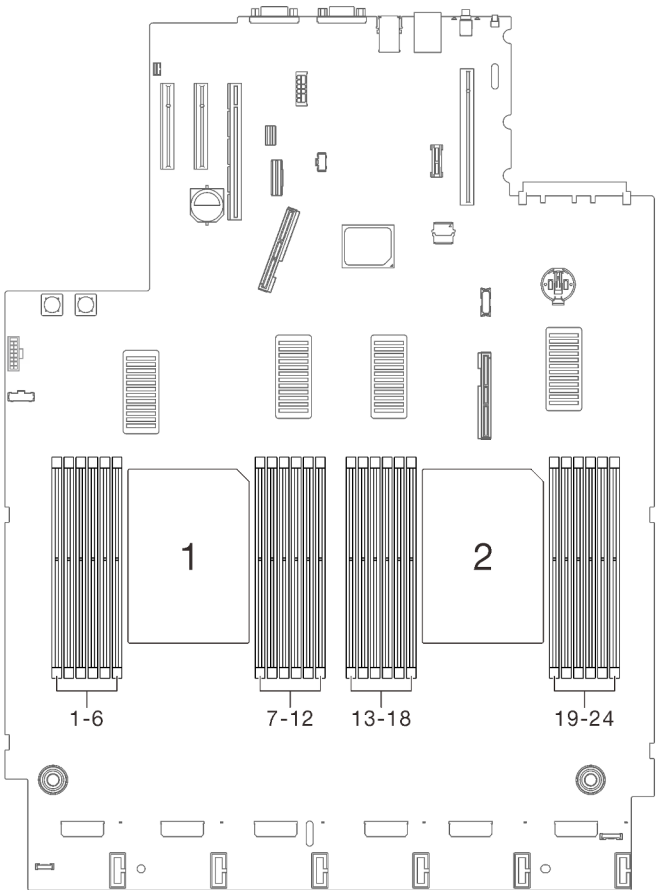


Figure 93. Processor 1 and 2 location on the system board

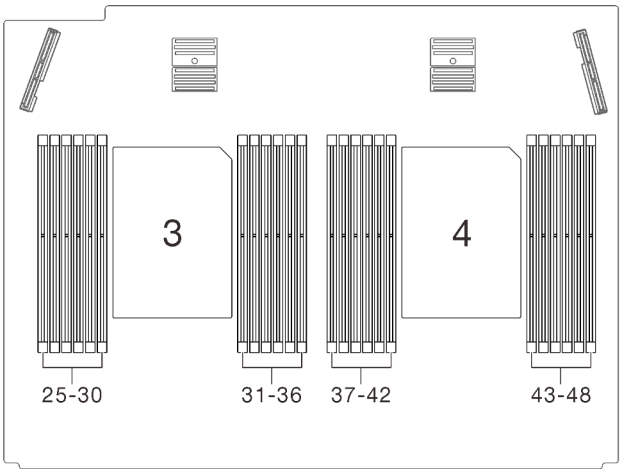


Figure 94. Processor 3 and 4 location on the processor and memory expansion tray

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

The following illustration shows the components of the PHM.

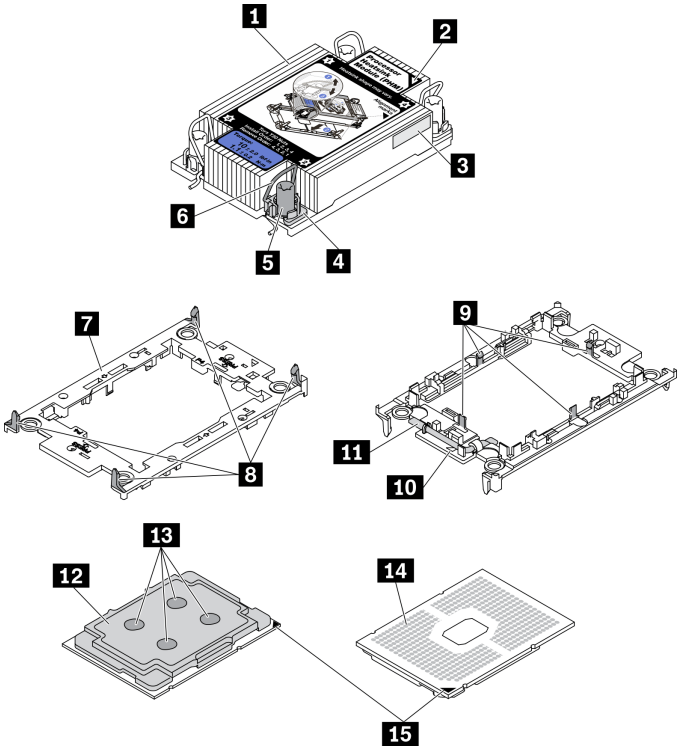


Figure 95. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover. See “Remove the top cover” on page 241.

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the following components depending on the location of the processor that is to be removed:

- If the processor is located on the processor and memory expansion tray, **do not** remove the expansion tray.

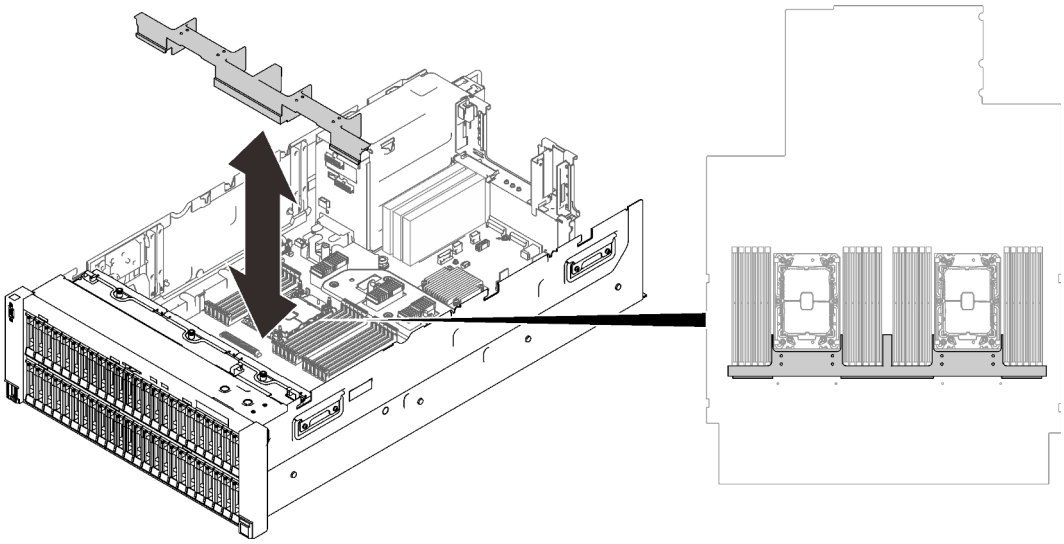


Figure 96. Removing the air baffle from the expansion tray

- If the processor is located on the system board:
  1. Remove one of the following components.
     - System air baffle (see "Remove the system board air baffle" on page 227)
     - Processor and memory expansion tray and expansion tray air baffle (see "Remove the processor and memory expansion tray" on page 220)
  2. Remove the expansion tray air baffle.

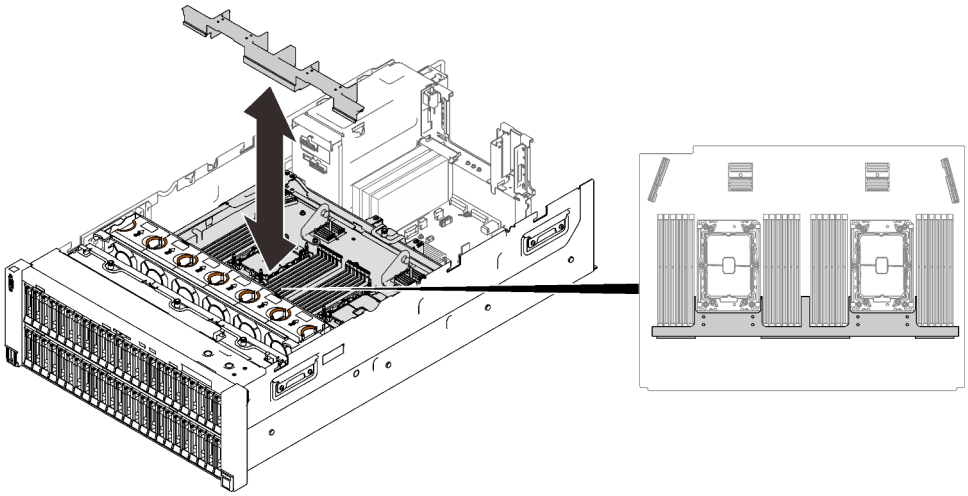


Figure 97. Removing the expansion tray air baffle

Step 2. If the processor comes with a T-shaped heat sink, fully loosen the two heat sink screws as shown.

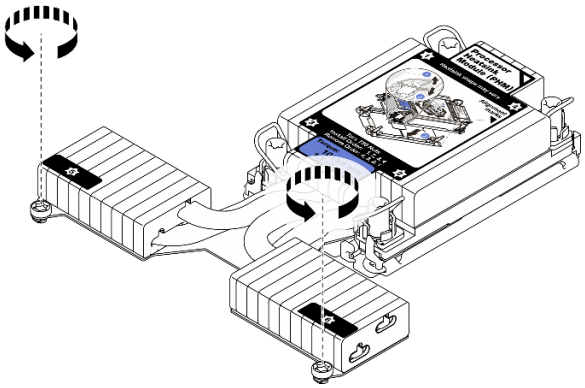


Figure 98. Loosening T-shaped heat sink screws

Step 3. Remove the PHM from the system board.

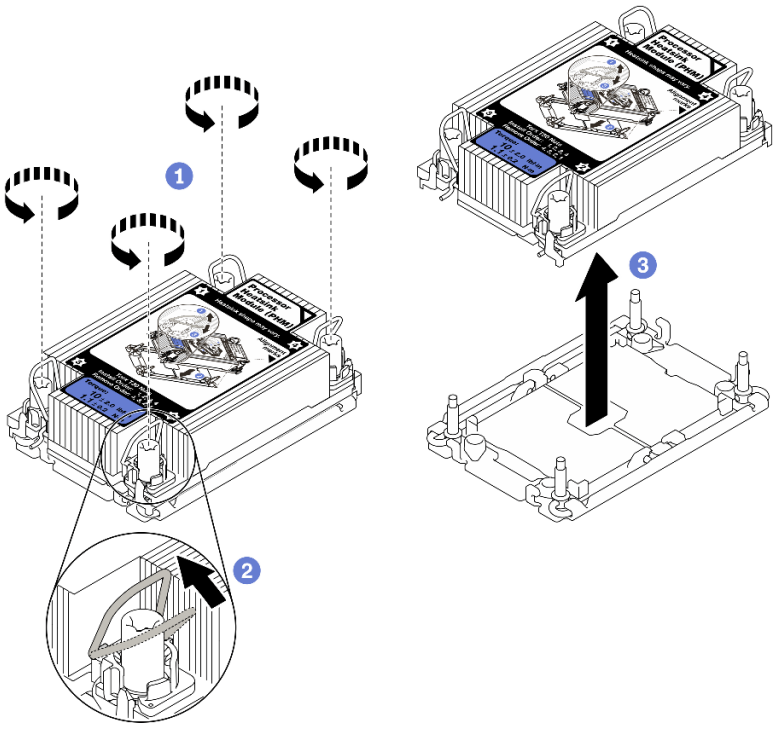


Figure 99. Removing a PHM

1 Fully loosen the Torx T30 nuts on the PHM *in the removal sequence shown* on the heat-sink label.

2 Rotate the anti-tilt wire bails inward.

3 Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

After you finish

- Each processor socket must always contain a cover or a PHM. Protect empty processor sockets with a cover or install a new PHM.
- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are reusing the processor or heat sink, separate the processor from its retainer. See “Separate the processor from carrier and heat sink” on page 212
- If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Demo video

Watch the procedure on YouTube

Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.
- 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.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

Note: The heat sink, processor, and processor carrier for your system might be different than those shown in the illustrations.

Procedure

Step 1. Separate the processor from the heat sink and carrier.

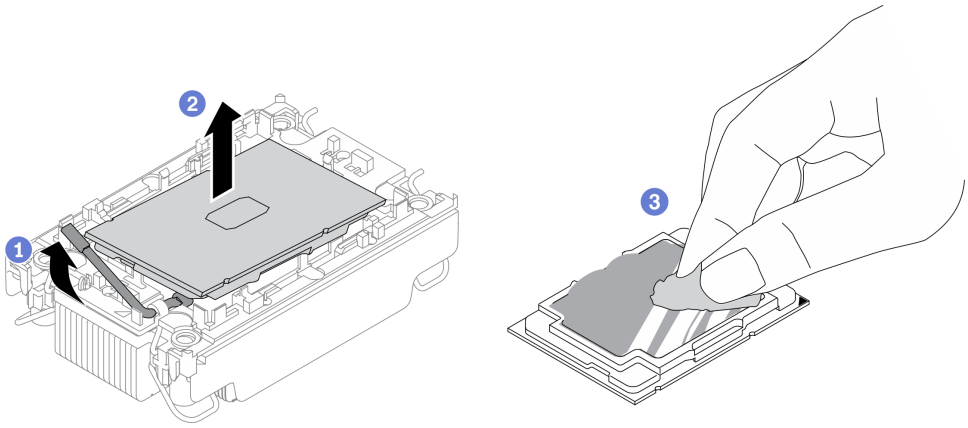


Figure 100. Separating a processor from the heat sink and carrier

Note: Do not touch the contacts on the processor.

a. Lift the handle to release the processor from the carrier.

b. Hold the processor by its edges; then, lift the processor from the heat sink and carrier.

c. Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 2. Separate the processor carrier from the heat sink.

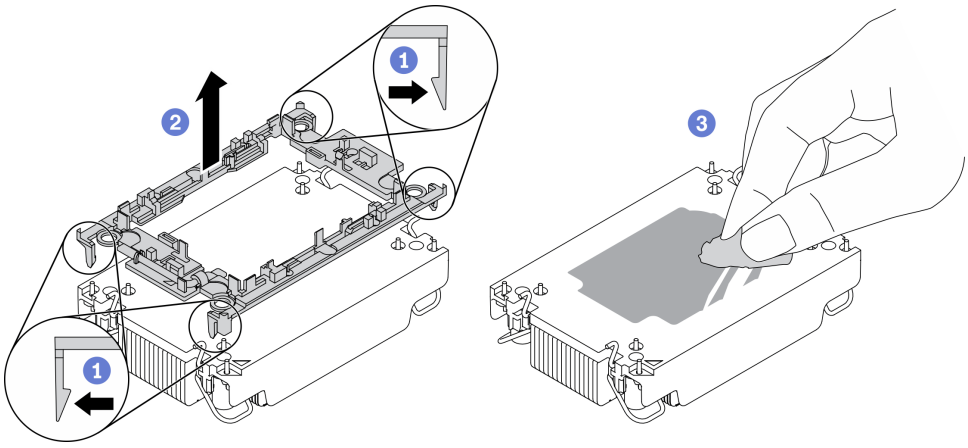


Figure 101. Separating a processor carrier the from heat sink

Note: The processor carrier will be discarded and replaced with a new one.

a. Release the retaining clips from the heat sink.

b. Lift the carrier from the heat sink.

c. Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Demo video

Watch the procedure on YouTube

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.

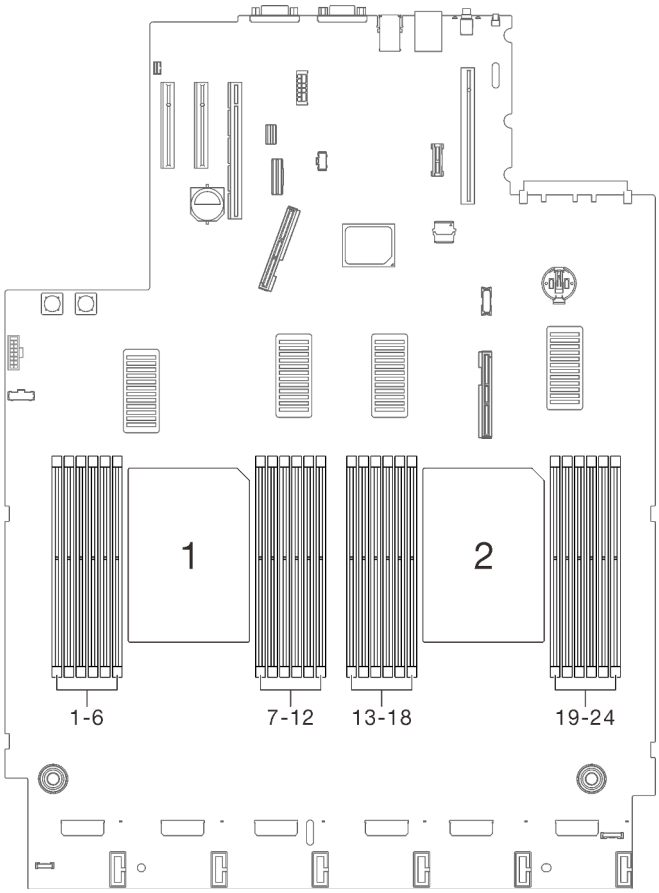


Figure 102. Processor 1 and 2 location on the system board

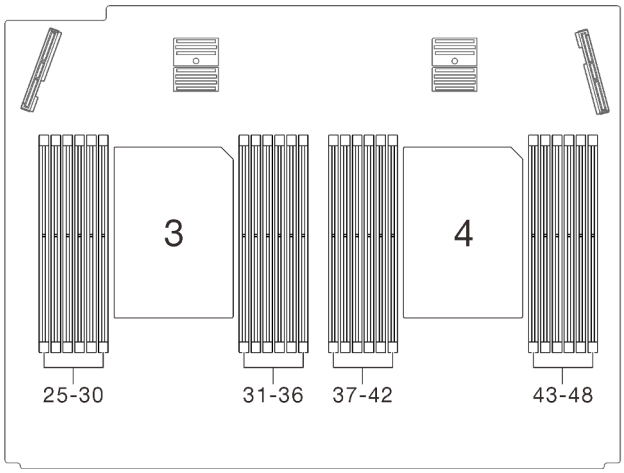


Figure 103. Processor 3 and 4 location on the processor and memory expansion tray

Notes:

- The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.

- See https://serverproven.lenovo.com/ for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “Update the firmware” in the *ThinkSystem SR860 V2 Setup Guide*.

The following illustration shows the components of the PHM.

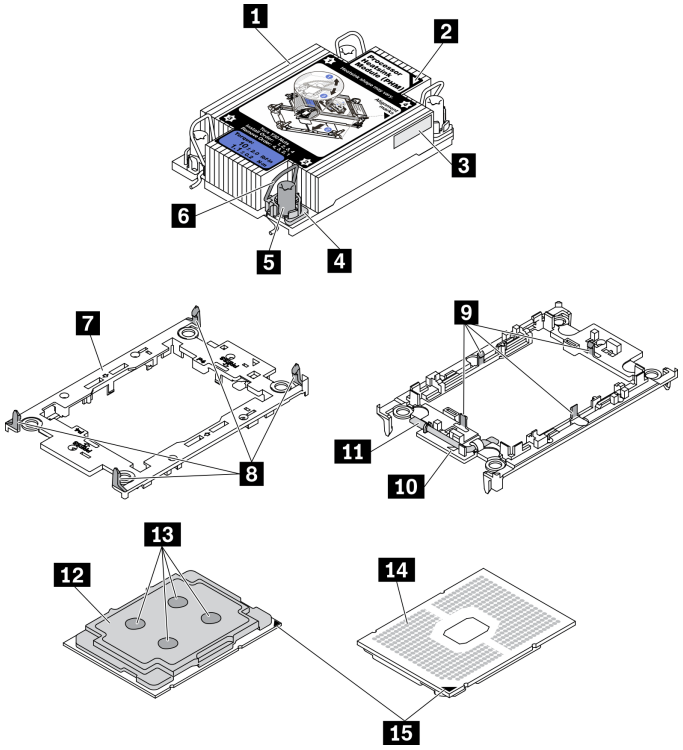


Figure 104. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

Procedure

Step 1. If you are replacing a processor and reusing the heat sink.

a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.

b. If there is any old thermal grease on the heat sink, wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

Step 2. If you are replacing a heat sink and reusing the processor.

a. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

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

b. Install the processor into a new carrier.

Note: Replacement heat sinks come with both gray and black processor carriers. Make sure to use the carrier with the same color as the one you discarded earlier.

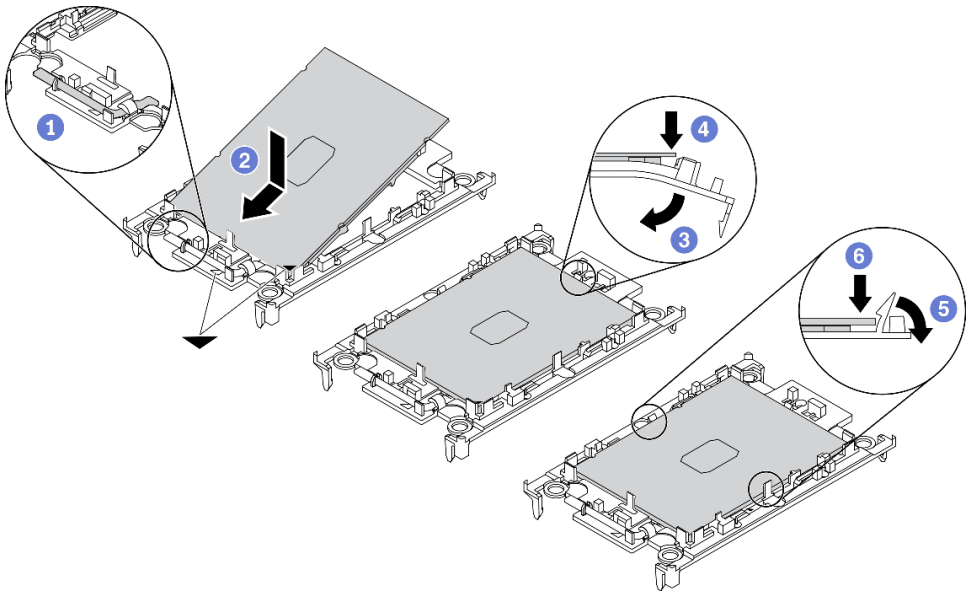


Figure 105. Installing a processor carrier

1 Make sure the handle on the carrier is in the closed position.

2 Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.

3 Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.

4 Press the processor and secure the unmarked end under the clip on the carrier.

5 Carefully pivot the sides of the carrier down and away from the processor.

6 Press the processor and secure the sides under the clips on the carrier.

Note: To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

Step 3. Apply the thermal grease.

a. Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is aligned with the triangular mark in the shipping tray.

b. If there is any old thermal grease on the processor, gently wipe the top of the processor with an alcohol cleaning pad.

Note: Make sure the alcohol has fully evaporated before applying new thermal grease.

c. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

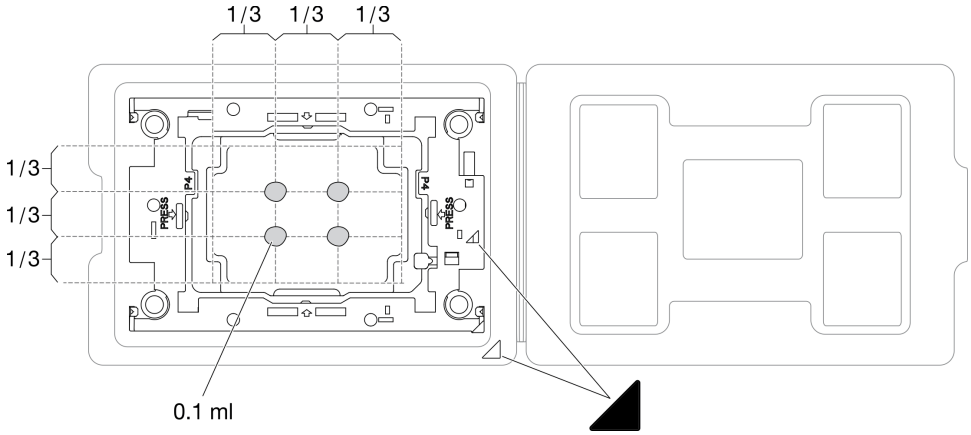


Figure 106. Thermal grease application with processor in the shipping tray

Step 4. Assemble the processor and heat sink.

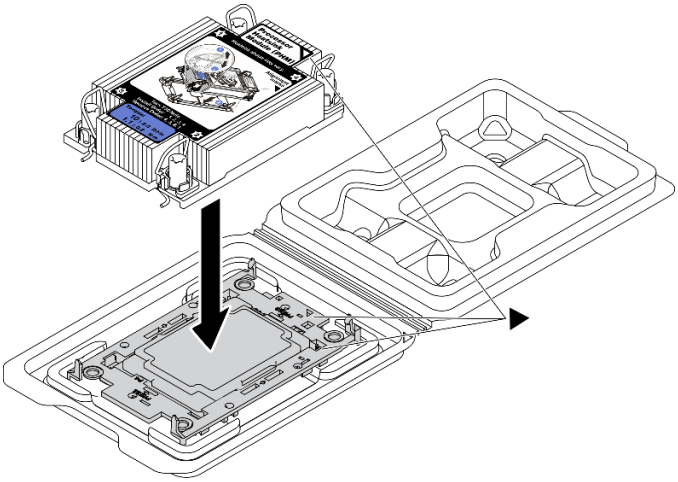


Figure 107. Assembling the PHM with processor in shipping tray

a. Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.

b. Install the heat sink onto the processor-carrier.

c. Press the carrier into place until the clips at all four corners engage.

Step 5. Install the processor-heat-sink module into the system board socket.

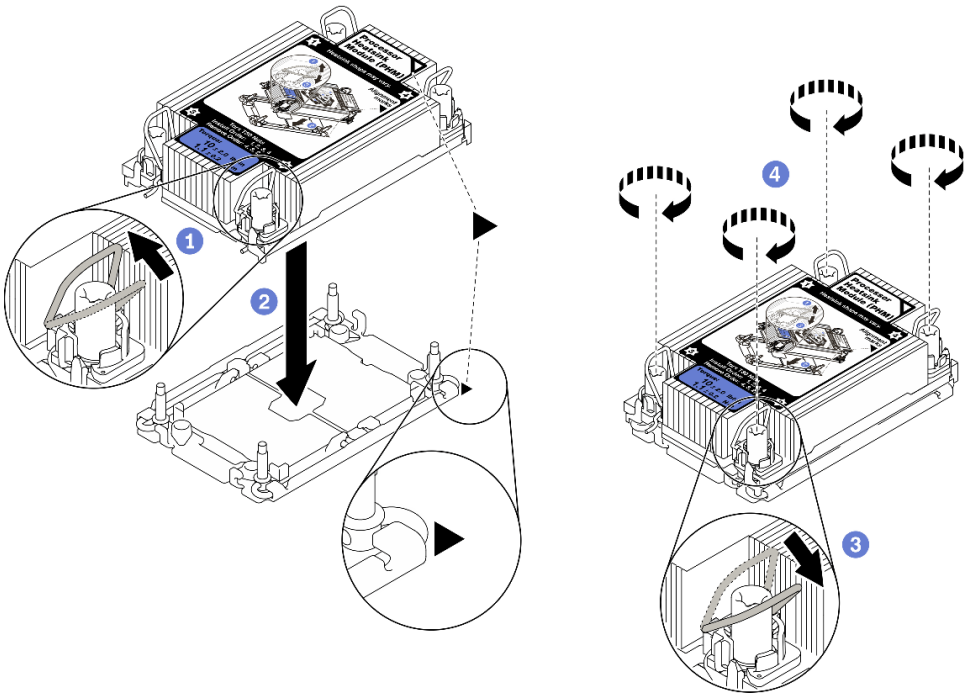


Figure 108. Installing a PHM

1 Rotate the anti-tilt wire bails inward.

2 Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.

3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.

4 Fully tighten the Torx T30 nuts *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 1.1 newton-meters, 10 inch-pounds).

Step 6. If the processor comes with a T-shaped heat sink, fully tighten the two heat sink screws as shown. (For reference, the torque required for the fasteners to fully tighten is 1.1 newton-meters, 10 inch-pounds).

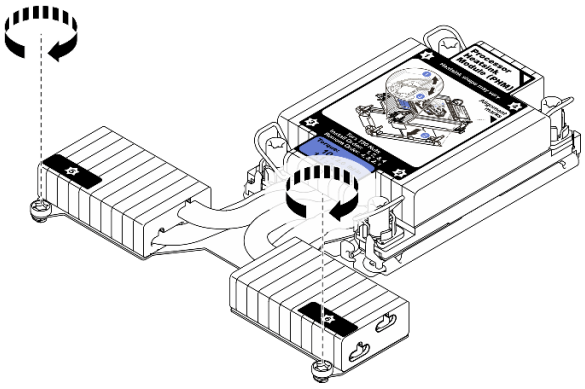


Figure 109. Tightening T-shaped heat sink screws

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Processor and memory expansion tray replacement

Follow instructions in this section to remove or install the processor and memory expansion tray and corresponding air baffles.

Remove the processor and memory expansion tray

Follow instructions in this section to remove the processor and memory expansion tray.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

d. If you are replacing the processor and memory expansion tray, remove the memory modules (see “Remove a memory module” on page 179), and PHMs (see “Remove a processor and heat sink” on page 207) from the expansion tray.

Important: To avoid component damage, **DO NOT** remove or install memory modules or PHMs when the tray is removed from the server.

Step 2. Disengage the processor and memory expansion tray.

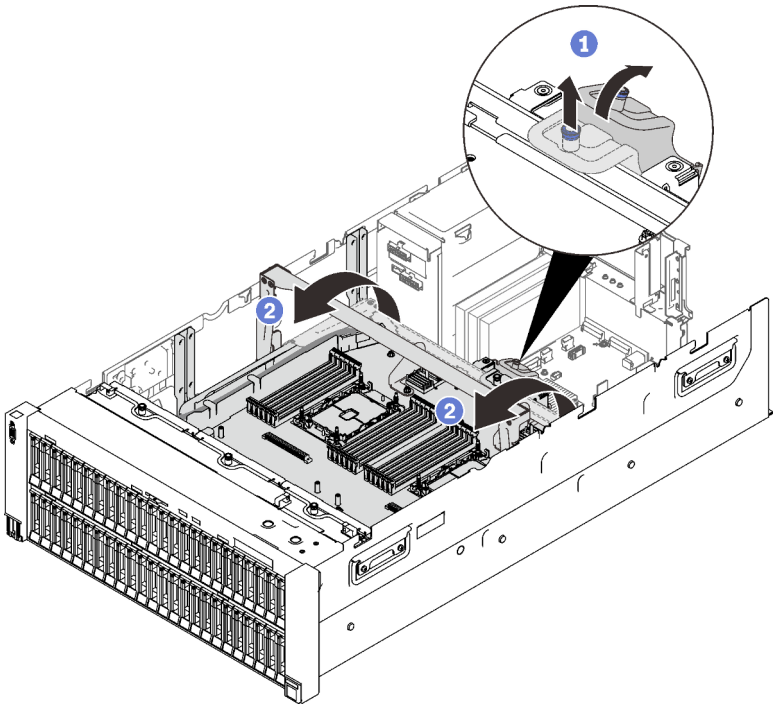


Figure 110. Disengaging the processor and memory expansion tray

1 Grasp and pull the captive screw up; then, push it forward to disengage the handle.

2 Rotate the handle all the way up until it is in the vertical position.

Step 3. If the two PCIe cables are connected, disconnect them.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 3 "Internal cable routing" on page 47 when disconnecting cables from the system board.

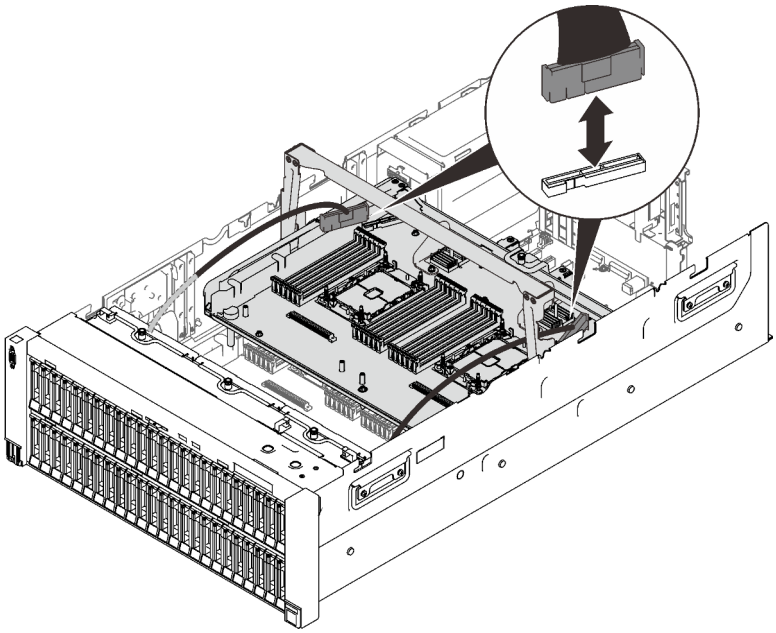


Figure 111. Disconnecting PCIe cables

Step 4. Lift the expansion tray and remove it.

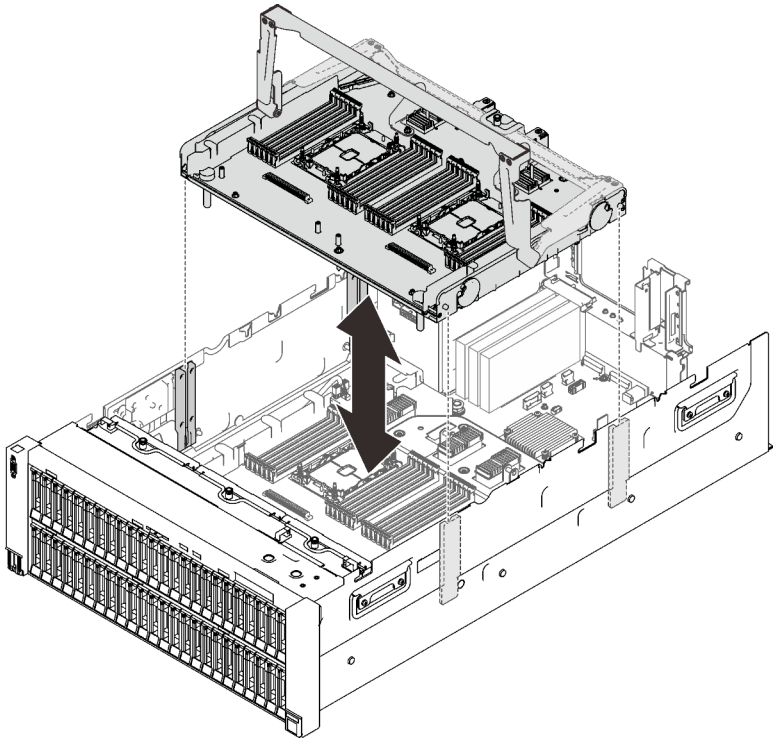


Figure 112. Removing the processor and memory expansion tray

After this task is completed

- Install a replacement unit (see “Install the processor and memory expansion tray” on page 224) or the system board air baffle (see “Install the system board air baffle” on page 228).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the system board, follow the instructions in “Disassemble the processor and memory expansion tray for recycle” on page 222 for compliance with local regulations.

Demo video

Watch the procedure on YouTube

Disassemble the processor and memory expansion tray for recycle

Follow the instructions in this section to disassemble the processor and memory expansion tray before recycle.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the processor and memory expansion tray from the server (see “Remove the processor and memory expansion tray” on page 220).

b. Remove the two brackets from the expansion tray.

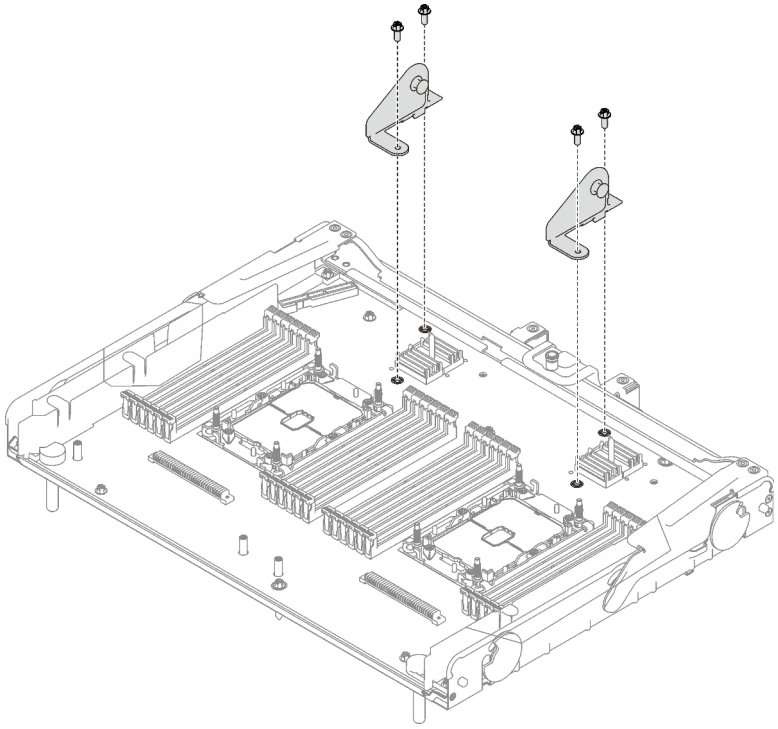


Figure 113. Removing brackets from the expansion tray

c. Refer to local environmental, waste or disposal regulations to ensure compliance.

Step 2. Remove the following components as illustrated:

- Nine slotted screws
- Two standoffs (with 12 mm wrench)

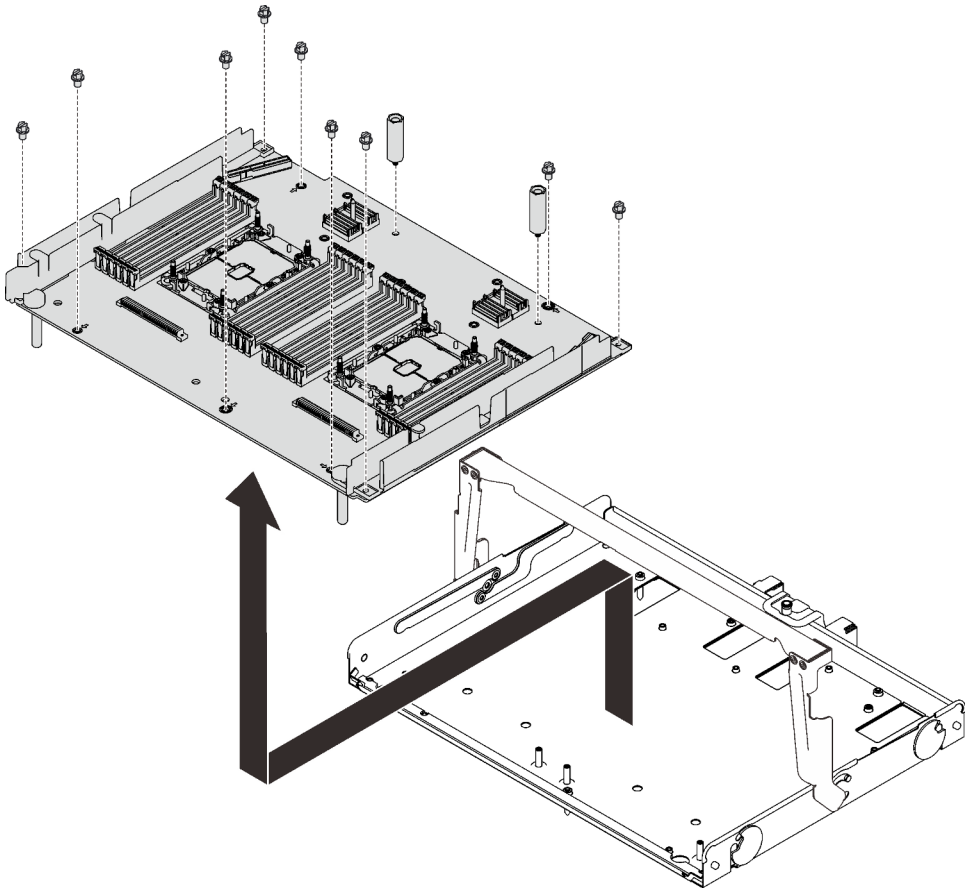


Figure 114. Disassembling the expansion tray

Step 3. Separate the expansion board from the supporting tray.

After this task is completed

Recycle the unit in compliance with local regulations.

Install the processor and memory expansion tray

Follow instructions in this section to install the processor and memory expansion tray.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Important: To avoid component damage, **DO NOT** remove or install memory modules or PHMs when the tray is removed from the server.

Procedure

Step 1. Remove the four screws from the expansion tray, and secure the two brackets to the expansion tray with these screws.

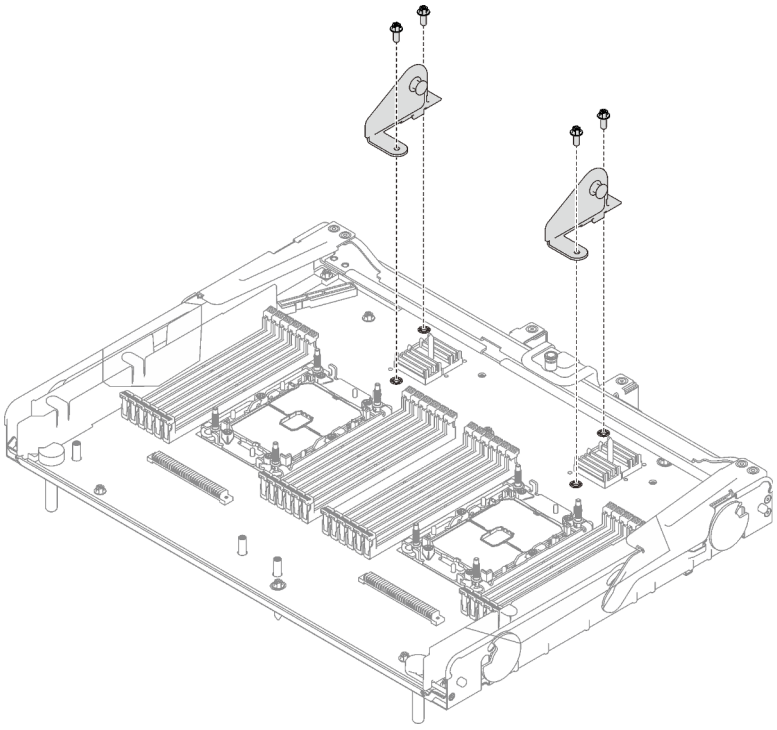


Figure 115. Securing brackets to the expansion tray

Step 2. Make sure the expansion tray air baffle is installed on the system board. If not, install it.

Attention: Air baffle is required for airflow that creates proper cooling. Make sure to install proper air baffles for system configuration before the power is turned on.

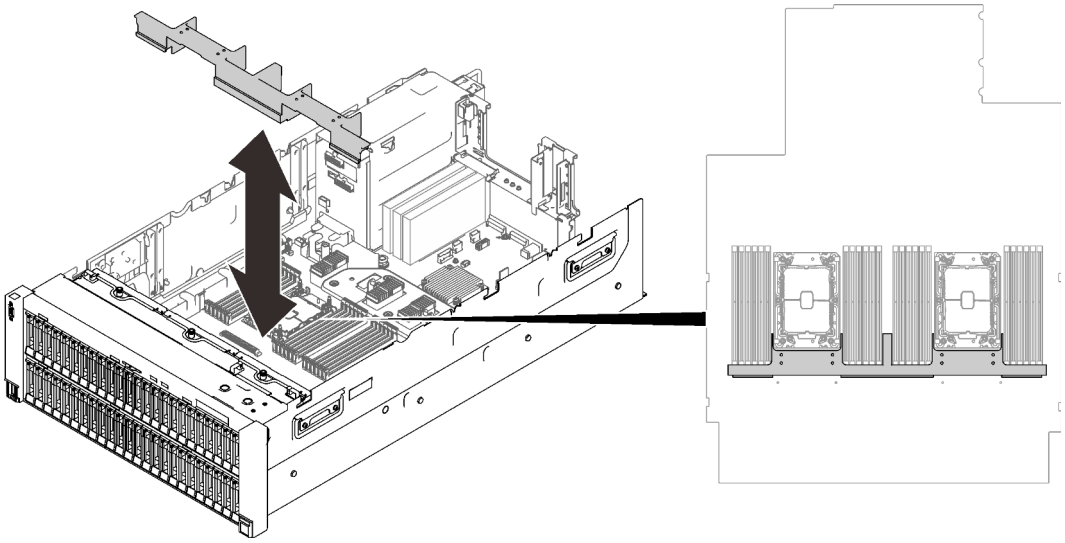


Figure 116. Installing the expansion tray air baffle

Step 3. Align the processor and memory expansion tray with the two pairs of guides on the sides, and lower it into the chassis.

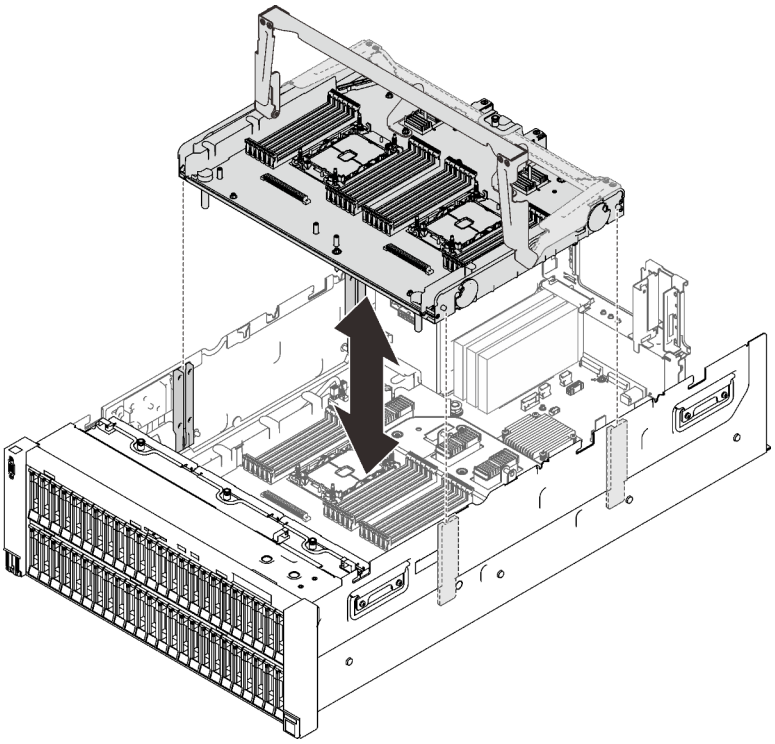


Figure 117. Installing the processor and memory expansion tray

Step 4. If you plan to install memory modules and PHMs, do it now (see “Install a memory module” on page 182 and “Install a processor and heat sink” on page 214).

Step 5. If applicable, route the two PCIe cables through the cable guides, and connect them to the expansion tray.

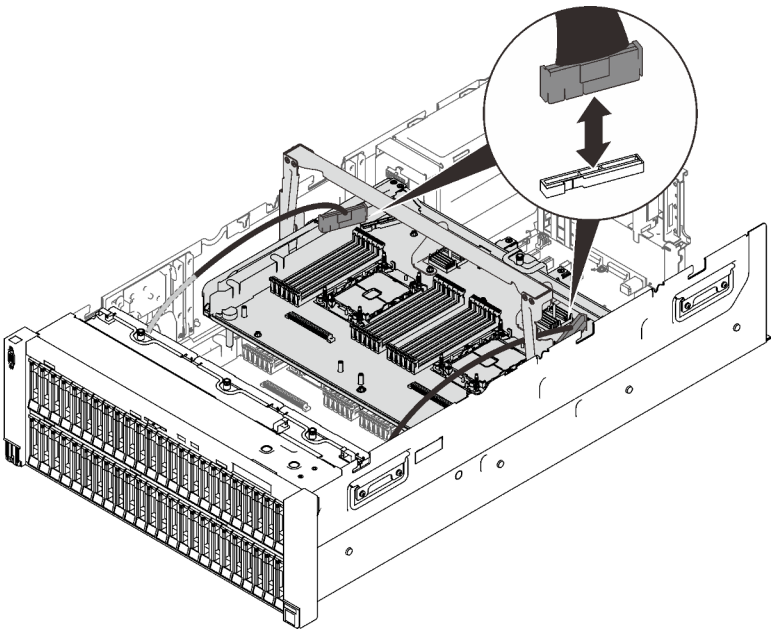


Figure 118. Connecting cables to the expansion tray

Step 6. Secure the processor and memory expansion tray.

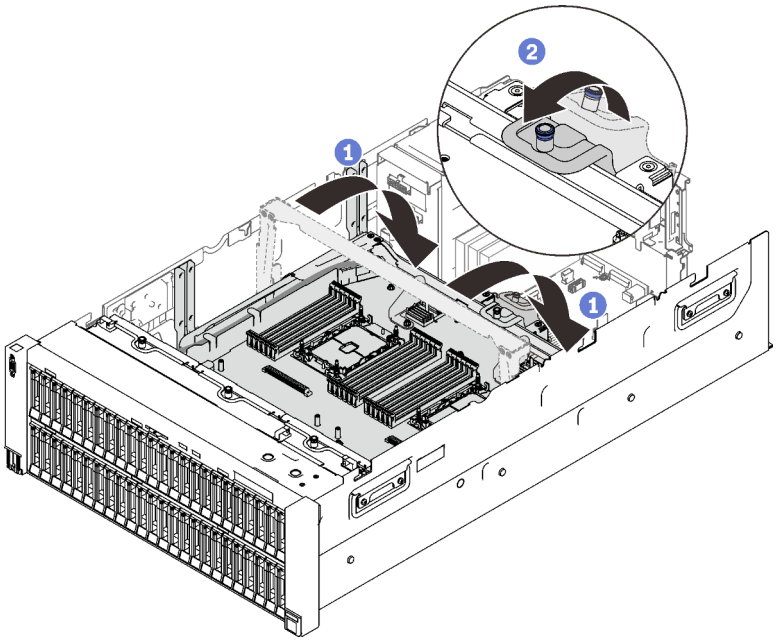


Figure 119. Securing the processor and memory expansion tray

1 Rotate the handle all the way down. This connects and fixes the expansion tray to the system board.

2 Pull the retaining tab back to secure the handle.

After this task is completed

Proceed to complete the parts replacement (see "Complete the parts replacement" on page 284).

Demo video

Watch the procedure on YouTube

System board air baffle replacement

Follow instructions in this section to install or remove the system board air baffle.

About this task

Note: If the server comes with four processors, it does not come with this component.

Remove the system board air baffle

Follow instructions in this section to remove the system board air baffle.

About this task

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the server" on page 12).

- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

Step 2. Lift the system air baffle to remove it from the server.

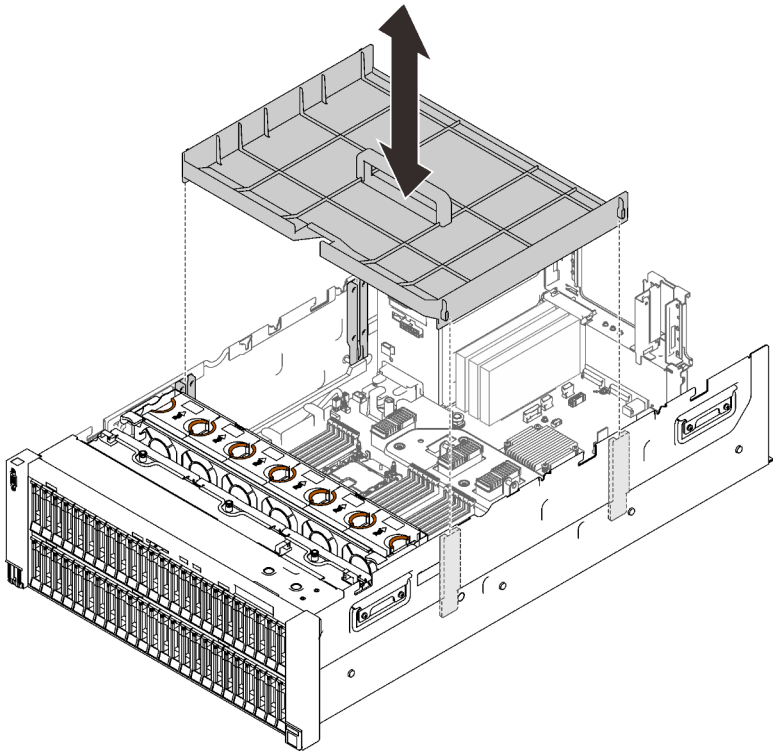


Figure 120. Removing the system board air baffle

After this task is completed

- Install the processor and memory expansion tray (see “Install the processor and memory expansion tray” on page 224).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the system board air baffle

Follow instructions in this section to install the system board air baffle.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the system board air baffle with the two pairs of guides on the sides, and lower it into the server.

Attention: Air baffle is required for airflow that creates proper cooling. Make sure to install proper air baffles for system configuration before the power is turned on.

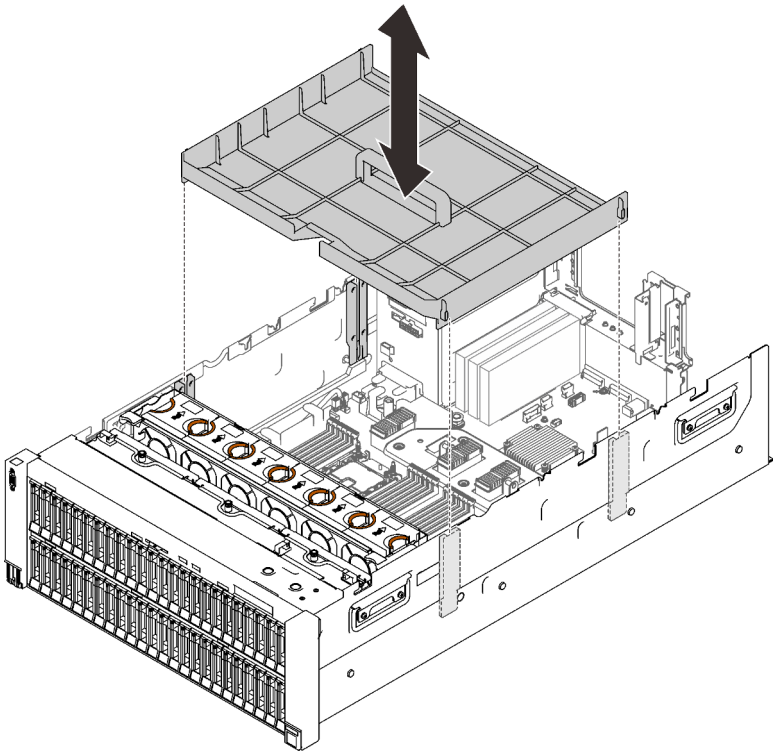


Figure 121. Installing the system board air baffle

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

System board replacement (trained technician only)

Follow instructions in this section to remove or install the system board.

About this task

Note: This task must be operated by trained technicians.

Remove the system board

Follow instructions in this section to remove the system board.

Attention:

- Removing and installing this component requires trained technicians. **Do not** attempt to remove or install it without proper training.
- When replacing the system board, always update the server with the latest firmware or restore the pre-existing firmware. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.
- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Record all system configuration information, such as Lenovo XClarity Controller (XCC) IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.

b. Save the system configuration to an external device with Lenovo XClarity Essentials.

c. Save the system event log to external media.

d. Remove the top cover (see “Remove the top cover” on page 241).

e. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

f. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

g. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

h. Disconnect all the cables from the system board. Make a list of each cable as you disconnect it and use it as a checklist after installing the new system board.

i. Remove the PCIe riser assembly (see “Remove the PCIe riser assembly” on page 187).

j. Remove all the adapters from the system board (see “Remove an adapter” on page 189 and “Remove the OCP Ethernet adapter” on page 184).

k. Label the slot number on each memory module, remove all the memory modules from the system board, and set them aside on a static-protective surface for reinstallation (see “Remove a memory module” on page 179).

Important: It is advised to print out the layout of memory module slots for reference.

l. Remove the power backplane (see “Remove the power backplane” on page 195).

m. Remove both the PHMs that are installed on the system board (see “Install a processor and heat sink” on page 214).

Step 2. Disengage the system board.

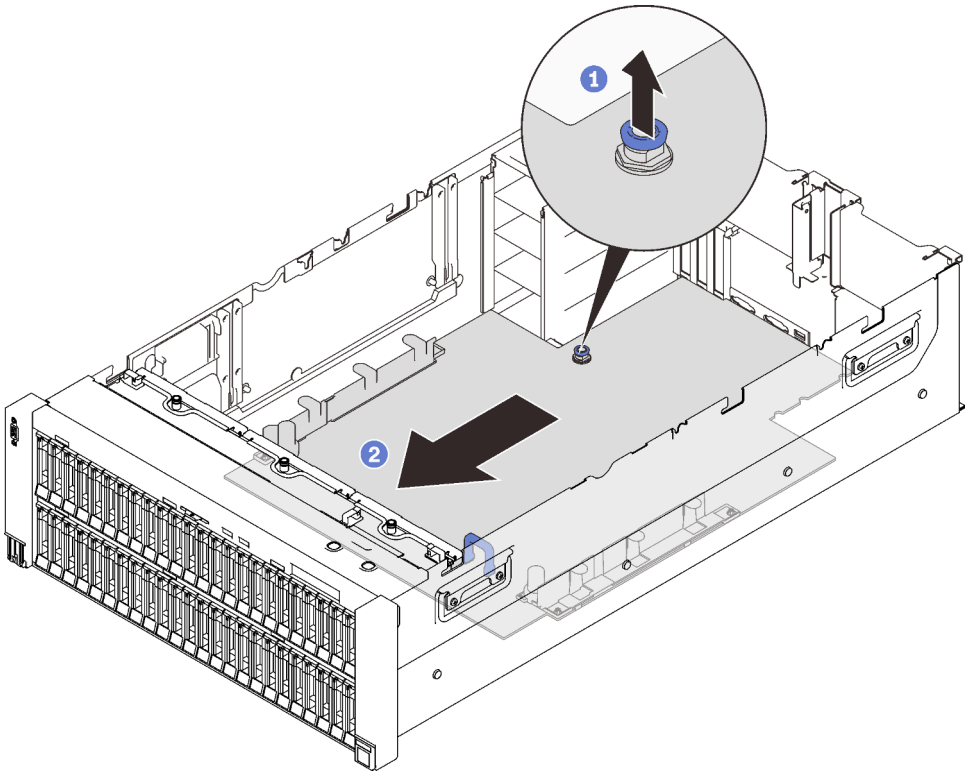


Figure 122. Disengaging the system board

1 Pull the captive screw up to release the system board.

2 Grasp the blue handle, and slide the system board back slightly to disengage it from the chassis.

Note: This handle only serves the purpose of removing system board. Do not attempt to lift the whole server with it.

Step 3. Rotate the longer side of the system board up, and remove the board from the server.

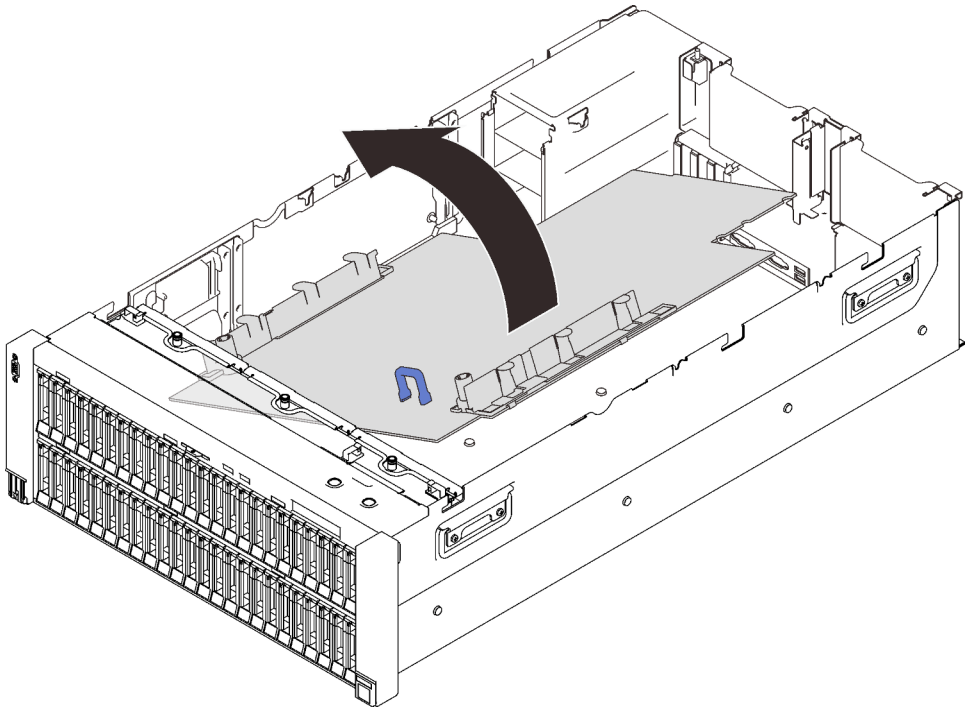


Figure 123. Removing the system board

After this task is completed

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

  Important: Before returning the system board, make sure that you install the processor socket dust covers from the new system board. To replace a processor socket dust cover:

  1. Take a dust cover from the processor socket assembly on the new system board, and orient it correctly above the processor socket assembly on the removed system board.
  2. Gently press down the dust cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
  3. **Make sure** that the dust cover is securely attached to the processor socket assembly.
- If you are planning to recycle the system board, follow the instructions in "Disassemble the system board for recycle" on page 232 for compliance with local regulations.

Demo video

Watch the procedure on YouTube

Disassemble the system board for recycle

Follow the instructions in this section to disassemble the processor and memory expansion tray before recycle.

About this task

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.

- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Step 1. Make preparations for this task.

a. Remove the system board from the server (see “Remove the system board” on page 230).

b. Refer to local environmental, waste or disposal regulations to ensure compliance.

Step 2. Remove the following components as illustrated:

- 22 slotted screws
- Two standoffs (with 12 mm wrench)
- One plunger (with 11 mm and 16 mm wrench)

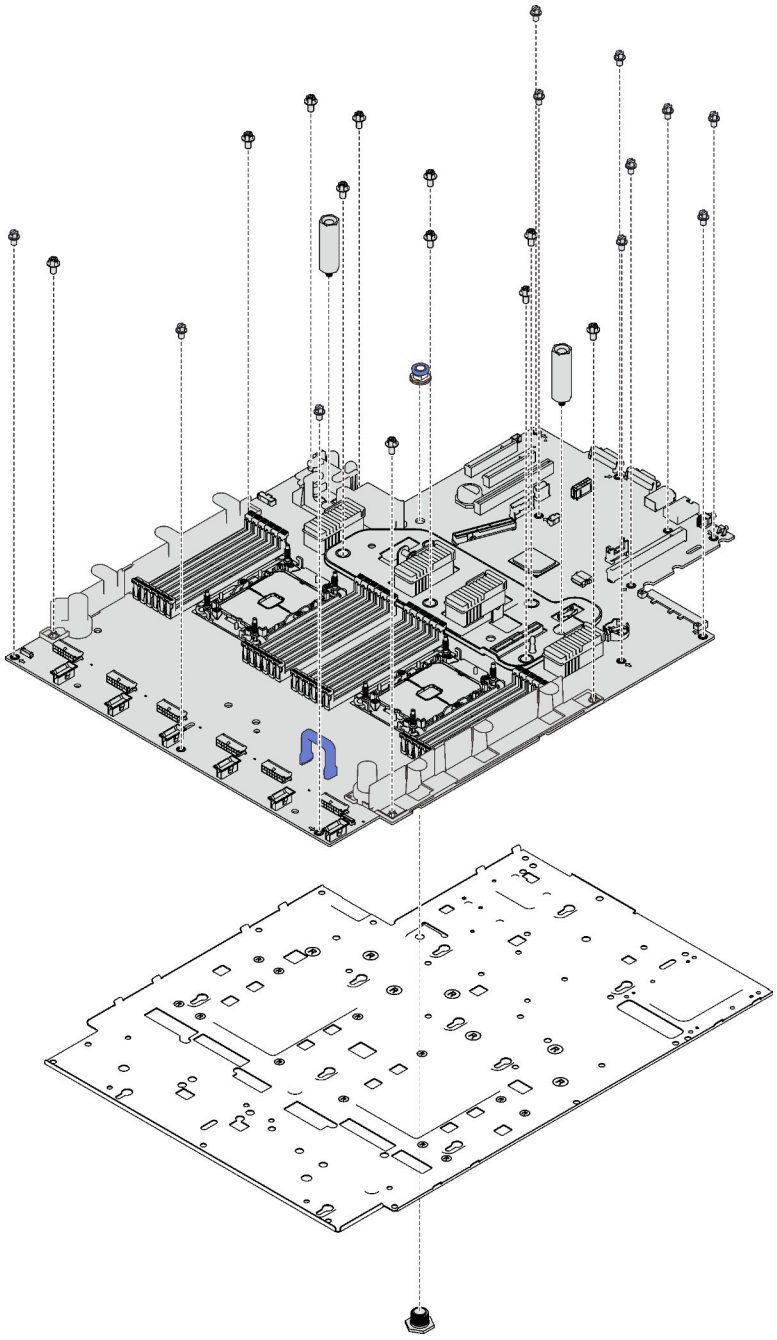


Figure 124. Disassembling the system board

Step 3. Separate the system board from the supporting sheet metal.

After this task is completed

Recycle the unit in compliance with local regulations.

Install the system board

Follow instructions in this section to install the system board.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Place the system board in the chassis.

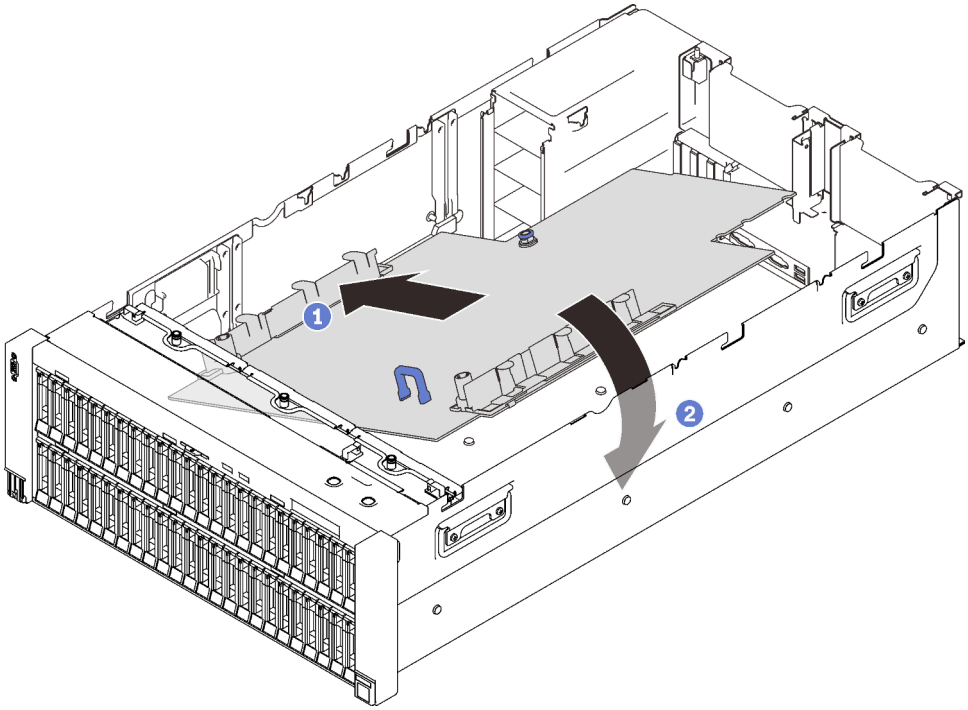


Figure 125. Installing the system board

1. Align the shorter side of the system board with the slots in the server.
2. Lower the longer side down until it stops.

Step 2. Slide the system board forward until it stops.

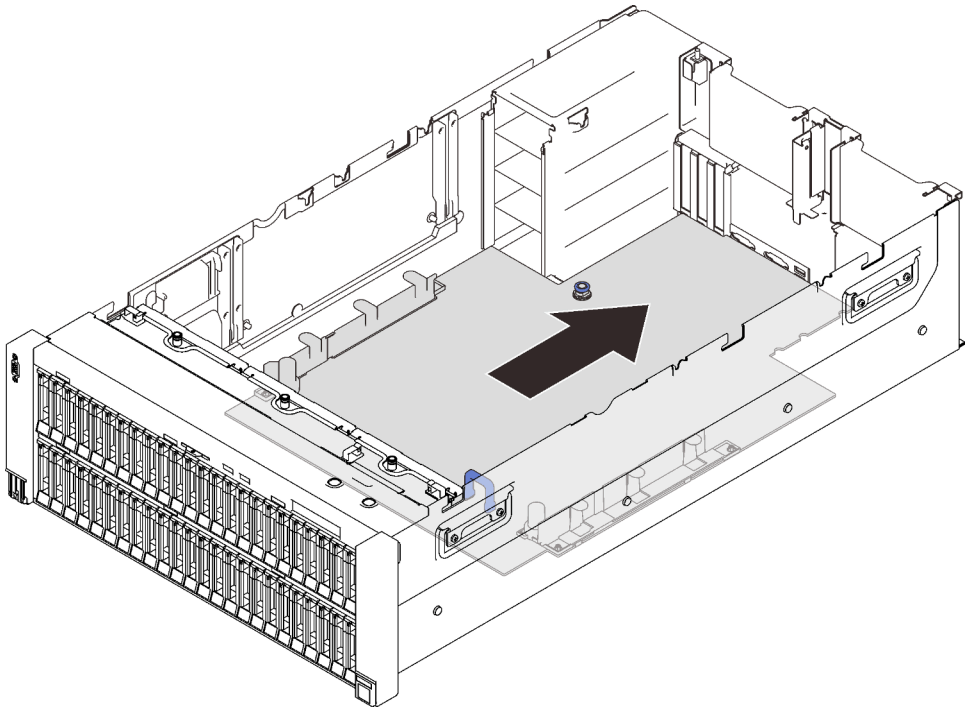


Figure 126. Installing the system board

After this task is completed

1. Install the power backplane (see “Install the power backplane” on page 198).
2. Install both PHMs (see “Install a processor and heat sink” on page 214).
3. Install each memory module to the same slot on the new system board as on the defective system board (see “Install a memory module” on page 182) until all the memory modules are installed.
4. Reinstall the drive backplanes (see “Install a drive backplane carrier assembly” on page 144).
5. Install the power supplies (see “Install a hot-swap power supply unit” on page 203).
6. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).
7. Reconnect all the required cables, and boot the server.
8. Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See “Update the machine type and serial number” on page 236.
9. Enable TPM/TCM. See “Enable TPM” on page 238
10. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 241.

Demo video

Watch the procedure on YouTube

Update the machine type and serial number

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

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

- From Lenovo XClarity Provisioning Manager

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

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

- From Lenovo XClarity Essentials OneCLI

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

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

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

  1. Download and install Lenovo XClarity Essentials OneCLI.

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

     https://datacentersupport.lenovo.com/solutions/HT116433
  2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
  3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:
     ```
     onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]
     ```

     Where:

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

     <s/n>
     The serial number on the server. Type `zzzzzzzz` (length 8-10 characters), where *zzzzzzz* is the serial number.

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

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

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

       Where:

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

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

       Example commands are as follows:

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

– Online KCS access (unauthenticated and user restricted):

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

  Example commands are as follows:

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

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

– Remote LAN access, type the command:

```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

  Where:

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

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

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

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

  Example commands are as follows:

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

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

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Enable TPM

The server supports Trusted Platform Module (TPM).

Note: For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a TPM adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM 2.0 firmware is updated to the latest version and the TPM policy is set correctly.

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

Update the TPM 2.0 firmware

When a system board is replaced, you must make sure that the TPM 2.0 firmware is updated to the latest version.

To update the TPM version:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click **Drivers & Software** and download the latest version of BIOS/UEFI firmware.
3. Update the firmware. See "Firmware updates" on page 8.
4. Power on the system and press F1.
5. If you have set the power on password, enter the correct password.
6. Wait for about 90 seconds, the setup utilities window is displayed.
7. Navigate to **System Settings → Security → Trusted Platform Module** and update the TPM.
8. Reboot the system once the update is complete.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

  To set the TPM policy from Lenovo XClarity Provisioning Manager:

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

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

- From Lenovo XClarity Essentials OneCLI

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

  To set the TPM policy from Lenovo XClarity Essentials OneCLI:

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

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

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

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

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

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

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

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

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

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

imm.TpmTcmPolicyLock is defined as below:

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

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

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

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

  2. Run the following command to enable Secure Boot:
     `OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_address>`

     where:

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

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

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

     https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

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

Top cover replacement

Follow instructions in this section to install or remove the top cover.

Remove the top cover

Follow the instructions in this section to remove the top cover.

About this task

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.

S033

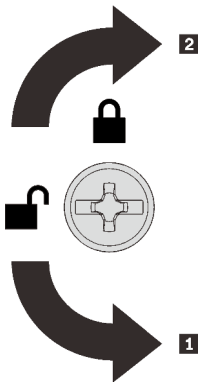
CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the server" on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. If the top cover is locked, unlock it with a screwdriver (direction 1).



1 Unlocking direction
2 Locking direction

Figure 127. Top cover locking/unlocking direction

Step 2. Remove the top cover from the server.

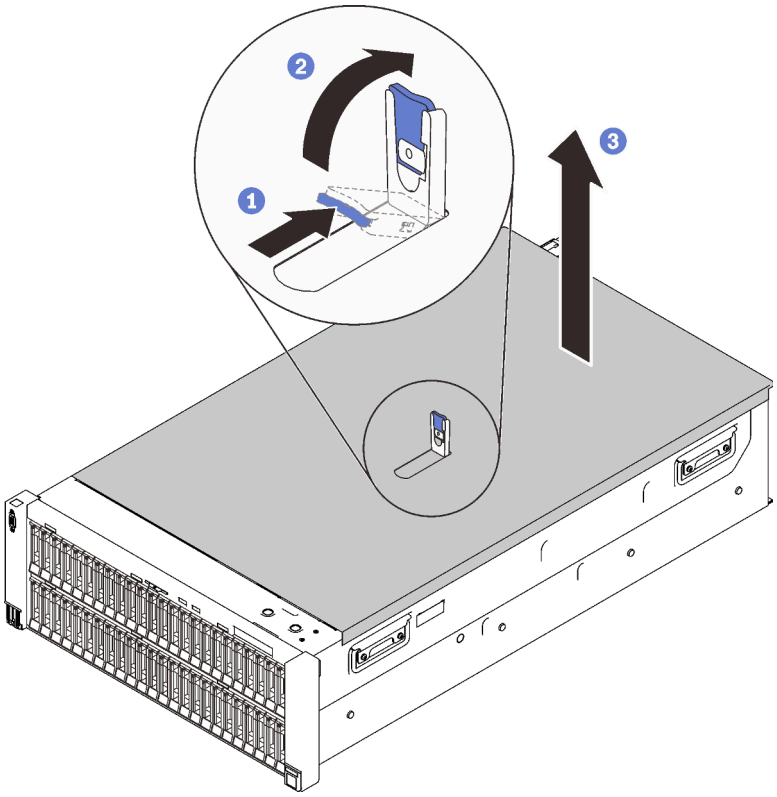


Figure 128. Removing the top cover

1. Press and hold on the blue tab on the cover release latch.
2. Rotate the end of the latch up until it is in vertical position.
3. Lift the top cover to remove it.

After this task is completed

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

Demo video

Watch the procedure on YouTube

Install the top cover

Follow instructions in this section to install the server top cover.

About this task

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.

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.

Attention:

- Go over "Installation Guidelines" on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the top cover.

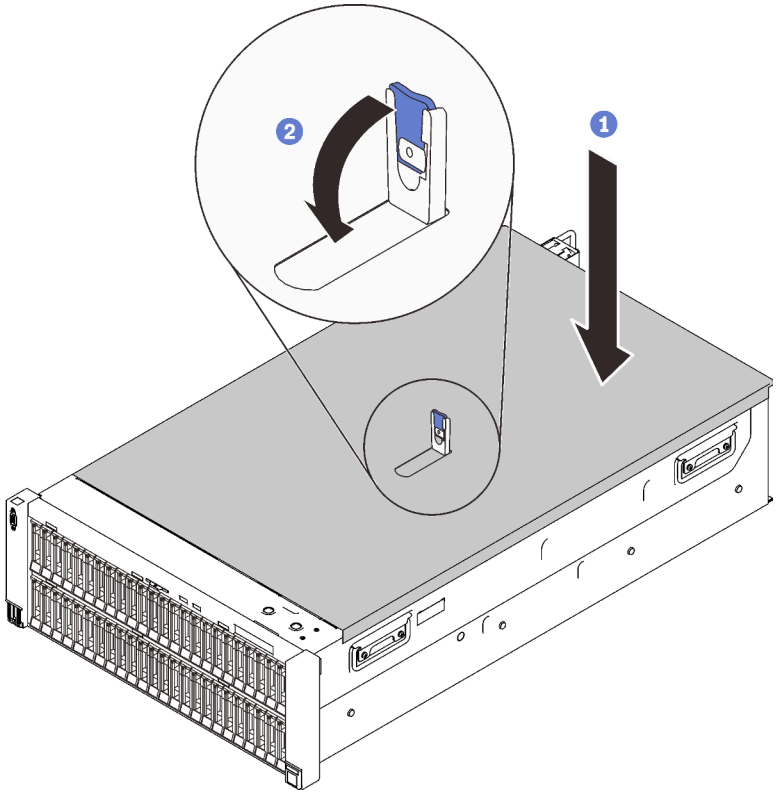
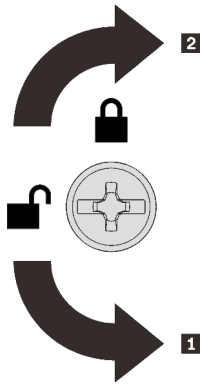


Figure 129. Installing the top cover

1 Place the top cover over top of the server with both sides aligned.

2 Rotate the latch down until it stops.

Step 2. (Optional) Lock the top cover with a screw driver (direction 2).



1 Unlocking direction
2 Locking direction

Figure 130. Top cover locking/unlocking direction

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

USB front panel module replacement

Follow instructions in this section to remove or install the USB front panel module.

Remove the USB front panel module

Follow instructions in this section to remove the USB front panel module.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

c. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

d. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

Step 2. Disconnect the USB front panel cable from the system board.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 3 “Internal cable routing” on page 47 when disconnecting cables from the system board.

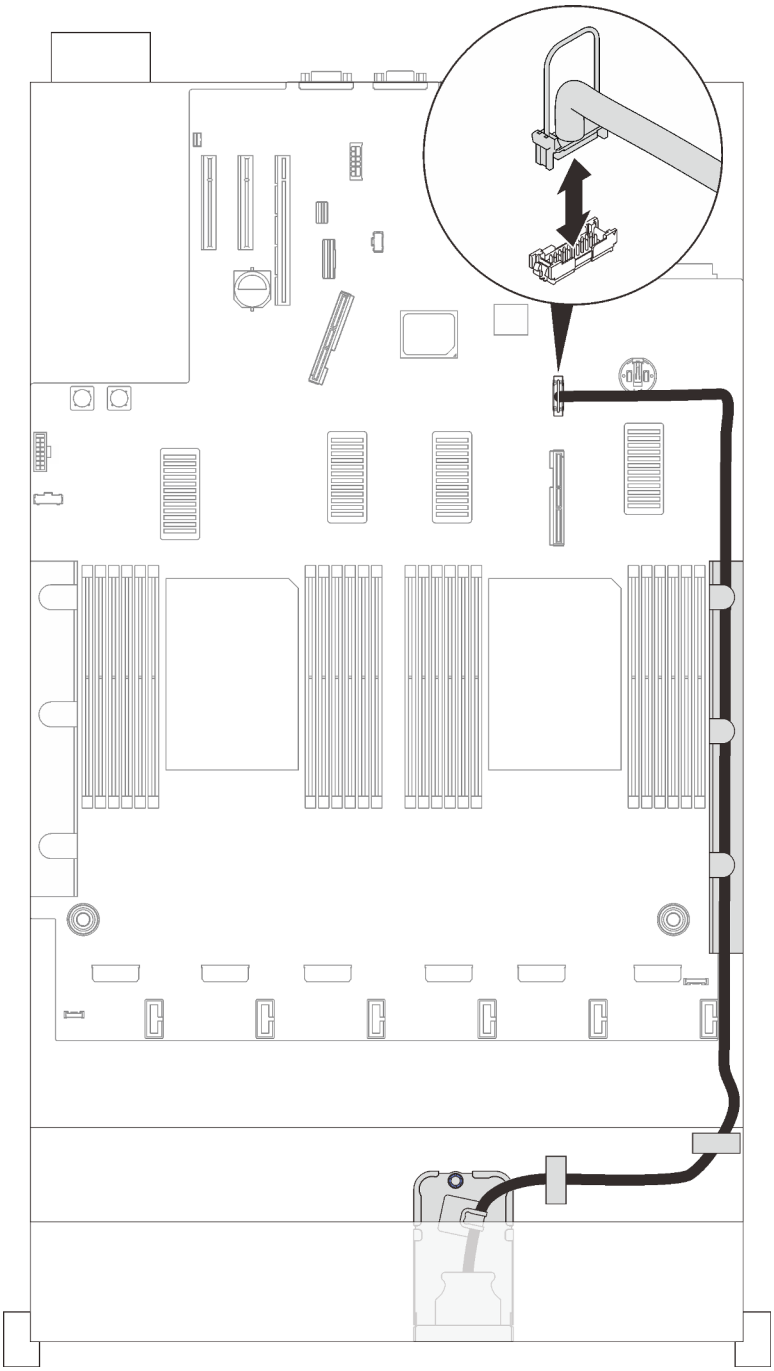


Figure 131. Disconnecting the USB front panel cable

Step 3. Pull the captive screw up to disengage the module, and remove it from the server.

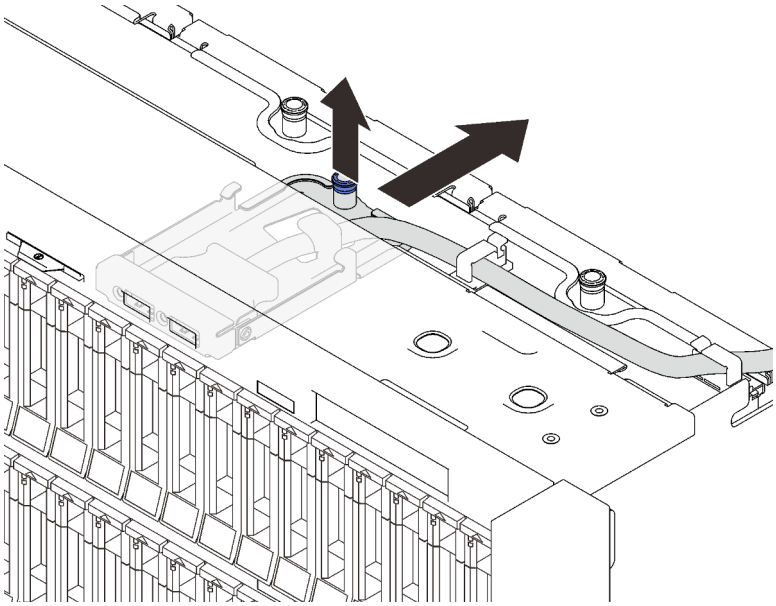


Figure 132. Removing the USB front panel assembly

After this task is completed

- Install a replacement unit (see “Install the USB front panel module” on page 247).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the USB front panel module

Follow instructions in this section to install the USB front panel module.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the USB front panel module with the bay on the front of the server, and slide it towards the front of the server until it clicks in place.

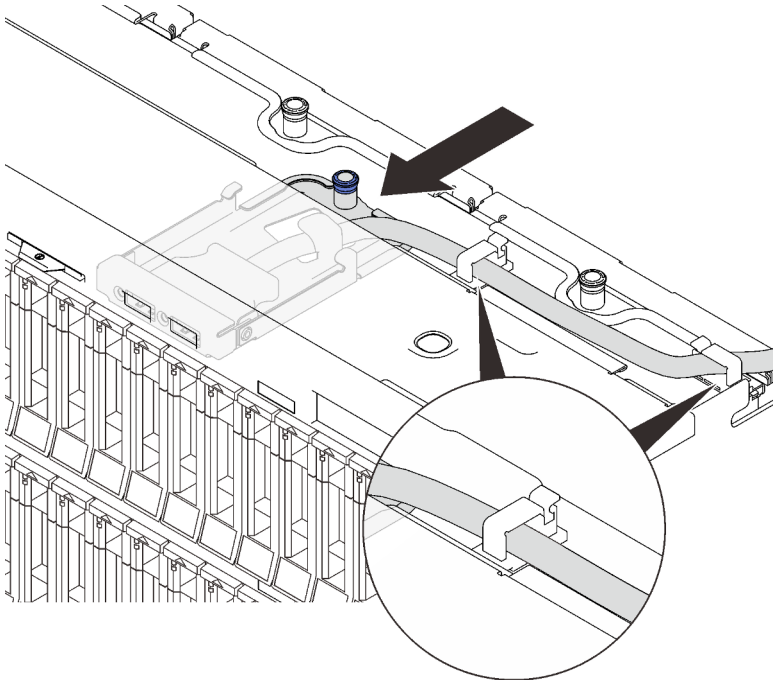


Figure 133. Installing the USB front panel module

Note: Make sure to route the cable through the cable clips as illustrated.

Step 2. Route the USB front panel cable through the side cable guide, and connect it to the system board.

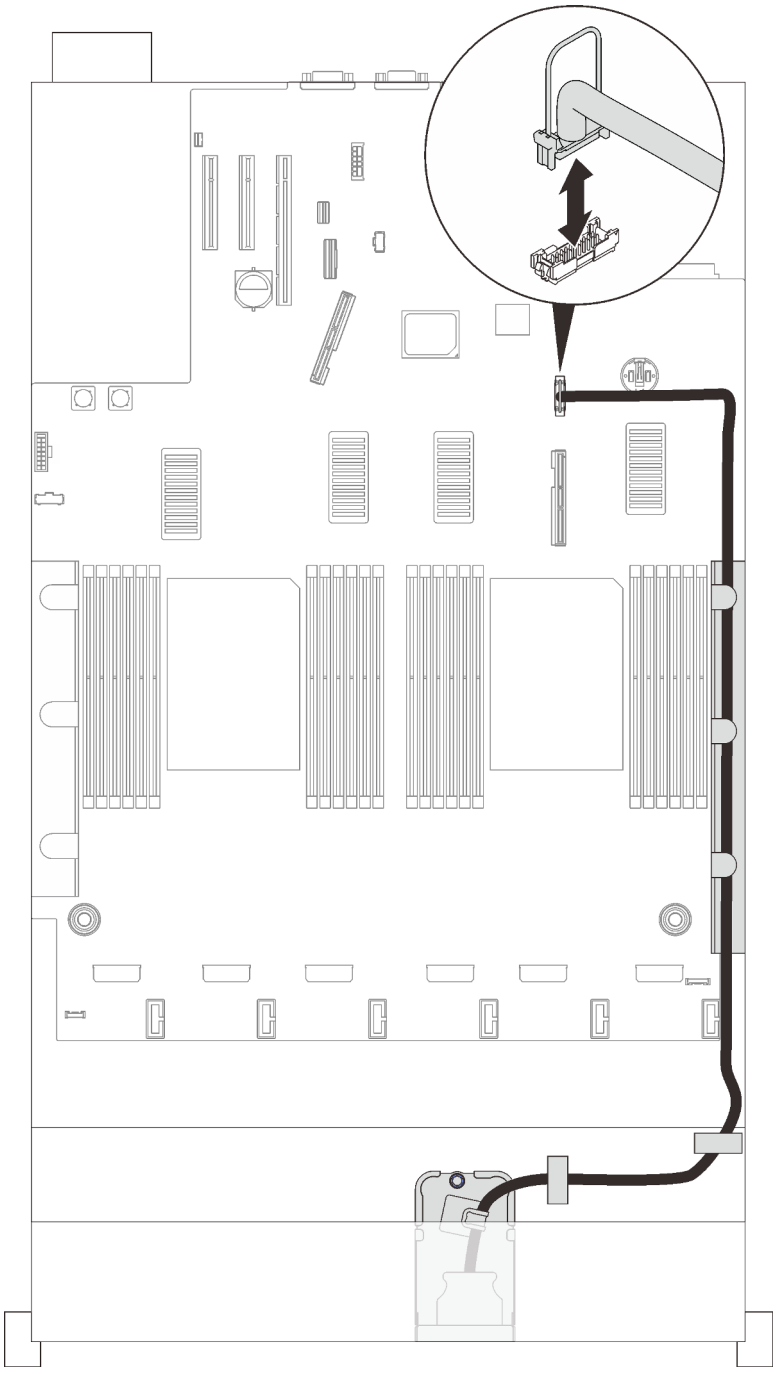


Figure 134. Connecting the USB front panel cable

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Replace components in the PCIe expansion tray

Follow instructions in this section to remove or install components in the PCIe expansion tray.

4U PCIe expansion tray replacement

See the instructions in this section to learn how to remove and install the 4U PCIe expansion tray.

Remove the 4U PCIe expansion tray

Follow instructions in this section to remove the 4U PCIe expansion tray.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages and the chassis air baffle (see “Remove a 4U PCIe riser cage” on page 256 and “Remove the chassis air baffle” on page 271).

c. Disconnect the following cables.

1. Disconnect both 4U PCIe riser power cables from the power backplane.

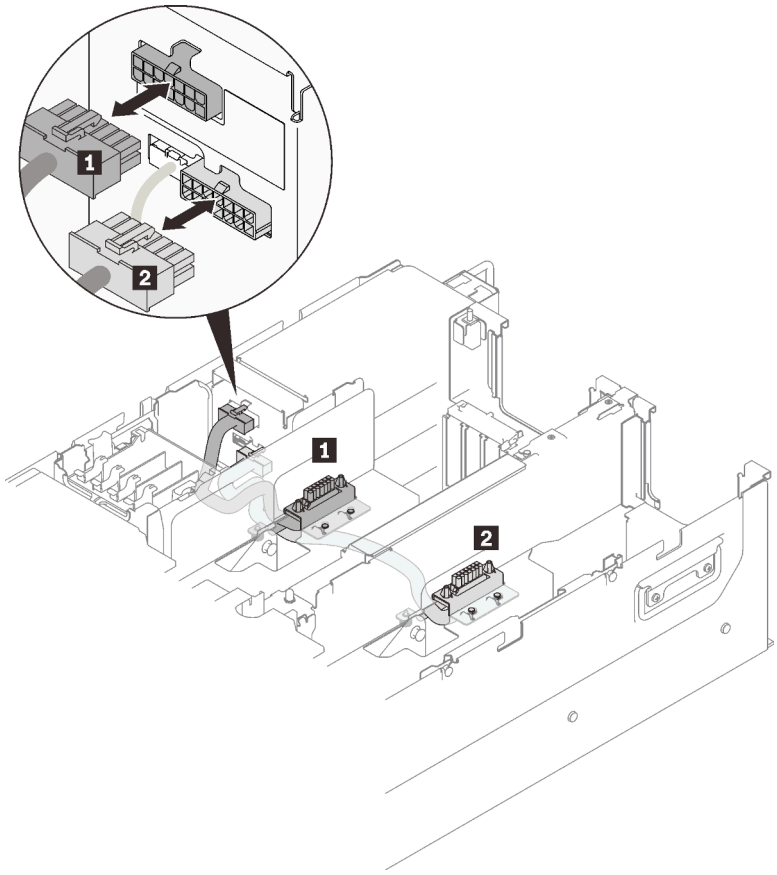


Figure 135. Disconnecting 4U PCIe riser power cables

Table 26. 4U PCIe riser power cables

Length	From	To
1 230 mm (shorter)	PCIe riser cage 2	upper power connector
2 320 mm (longer)	PCIe riser cage 1	lower power connector

2. If applicable, disconnect M.2 and 7mm drive cables from the system board.
3. If applicable, disconnect all the flash power module cables.

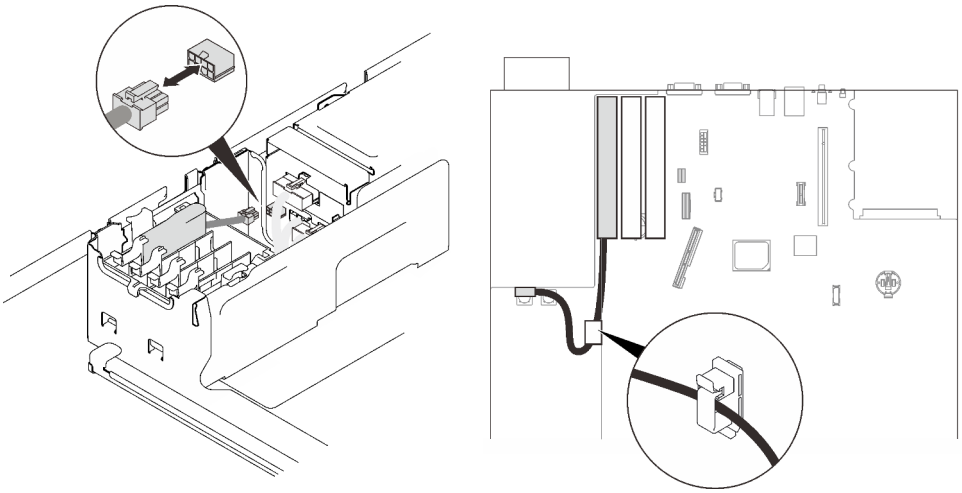


Figure 136. Disconnecting flash power module cables

Step 2. Lift the 4U PCIe expansion tray to remove it from the server.

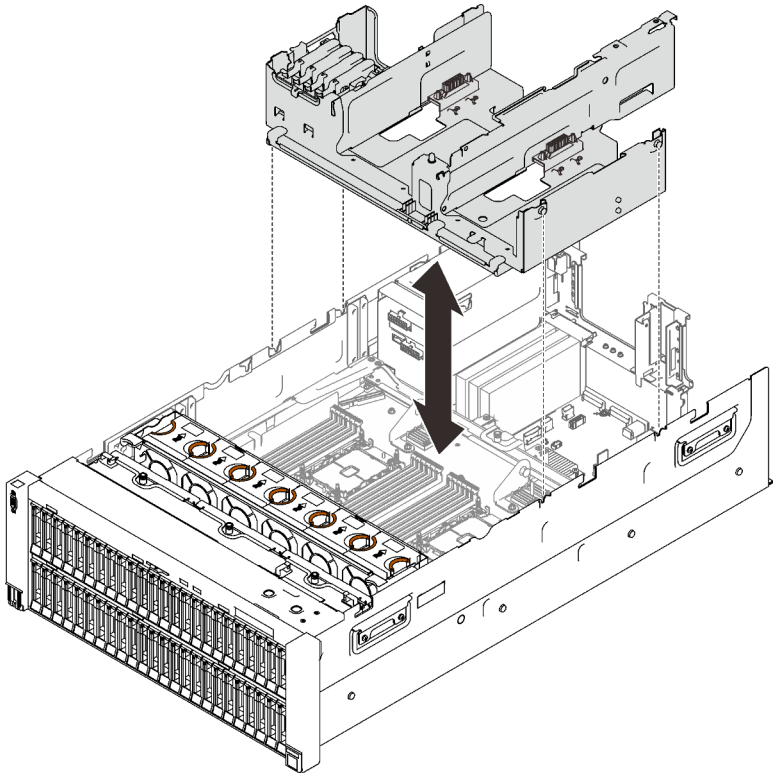


Figure 137. Removing the 4U PCIe expansion tray

After this task is completed

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

Demo video

Watch the procedure on YouTube

Install the 4U PCIe expansion tray

Follow instructions in this section to install the 4U PCIe expansion tray.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make sure both 4U PCIe riser power cable modules are installed to the expansion tray. If not, install both of them (see “Install the 4U PCIe riser power cable assembly” on page 263).

Step 2. Aligned the nailheads with the slots on both sides of the server, and lower the tray into the server.

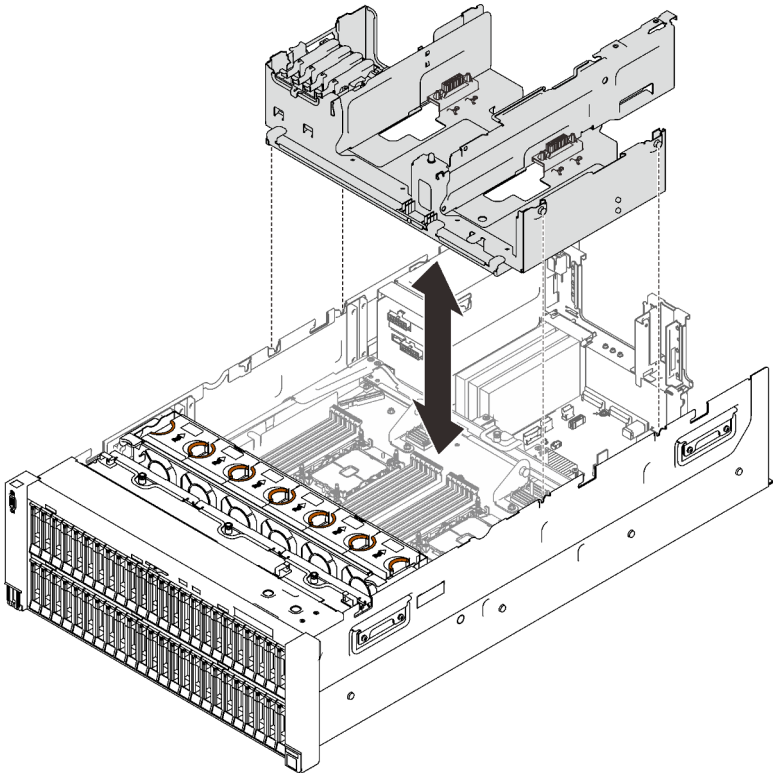


Figure 138. Installing the 4U PCIe expansion tray

Step 3. Connect both 4U PCIe riser power cables to the power backplane.

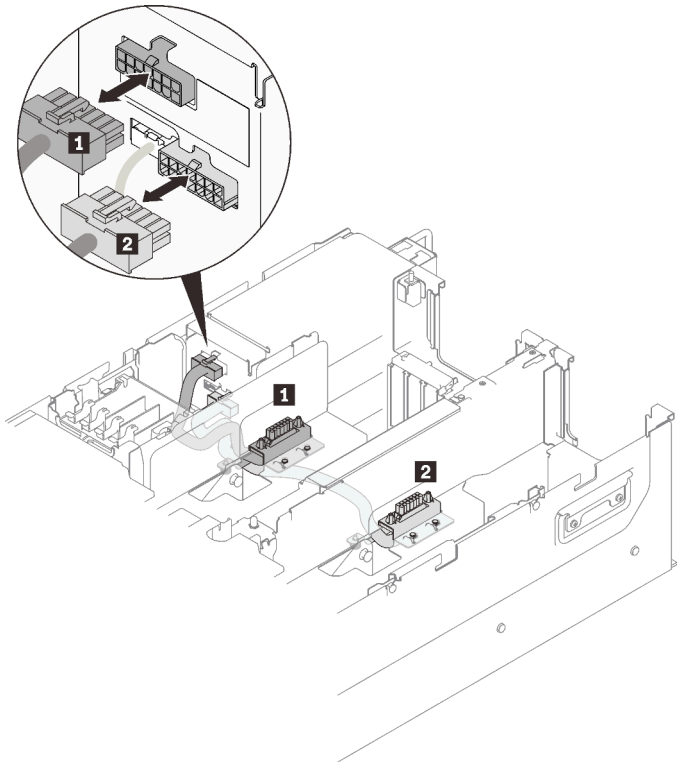


Figure 139. Connecting 4U PCIe riser power cables

Table 27. 4U PCIe riser power cables

Length	From	To
1 230 mm (shorter)	PCIe riser cage 2	upper power connector
2 320 mm (longer)	PCIe riser cage 1	lower power connector

After this task is completed

- If applicable, connect M.2 or 7mm drive cables to the system board.

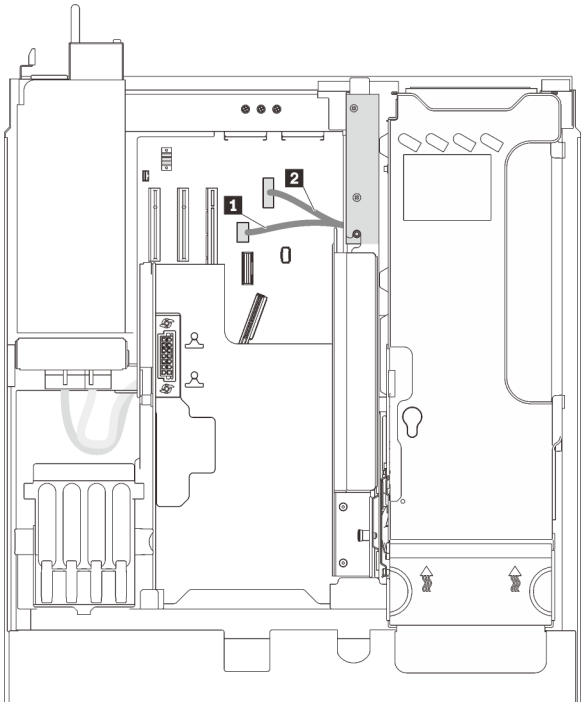


Figure 140. 7mm drive cage cable routing

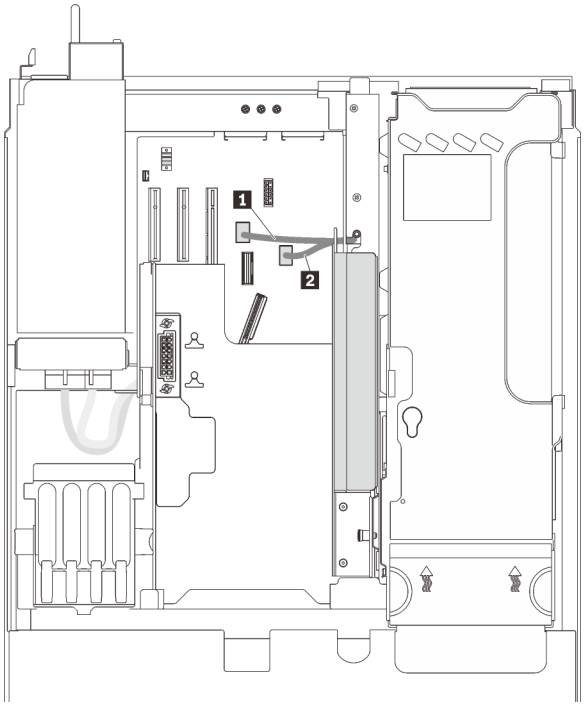


Figure 141. M.2 cable routing

1 7mm drive signal connector	1 M.2 drive signal connector
2 7mm drive power connector	2 M.2 backplane power connector

- If applicable, connect all the flash power module cables.

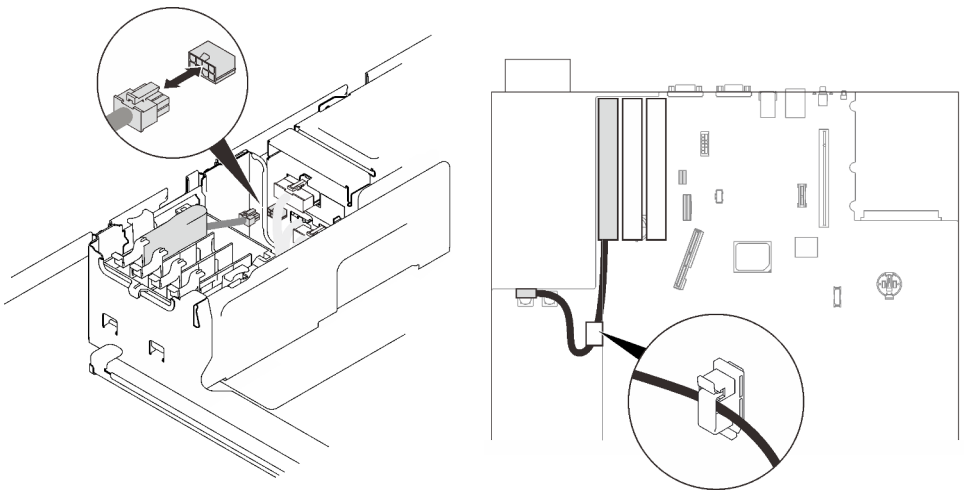


Figure 142. Connecting flash power module cables

- Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

4U PCIe riser cage replacement

See the instructions in this section to learn how to remove and install a 4U PCIe riser cage.

Remove a 4U PCIe riser cage

Follow instructions in this section to remove a 4U PCIe riser cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

Step 2. Remove the 4U PCIe riser cage.

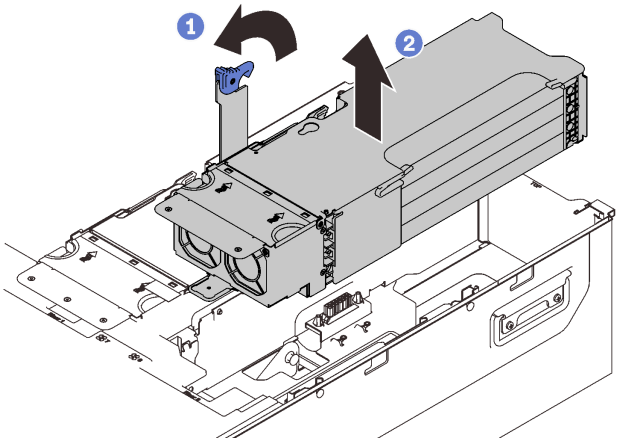


Figure 143. Removing the 4U PCIe riser cage

1 Grip on the handle and rotate it all the way up until it is in the vertical position.

2 Lift the riser cage to remove it from the server.

After this task is completed

- Install one of the following to the zone:
  - A filler
  - Install PCIe adapters into the riser cage if necessary (see “Install an adapter into a 4U PCIe riser cage” on page 258), and install the unit back (see “Install a 4U PCIe riser cage” on page 261).
  - Migrate the PCIe adapters into a replacement unit of riser cage (see “Install an adapter into a 4U PCIe riser cage” on page 258), and install the replacement unit (see “Install a 4U PCIe riser cage” on page 261).

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the component:
  1. Remove the four screws that secure the riser card to the cage, and slide the riser card forward slightly to remove it from the cage.

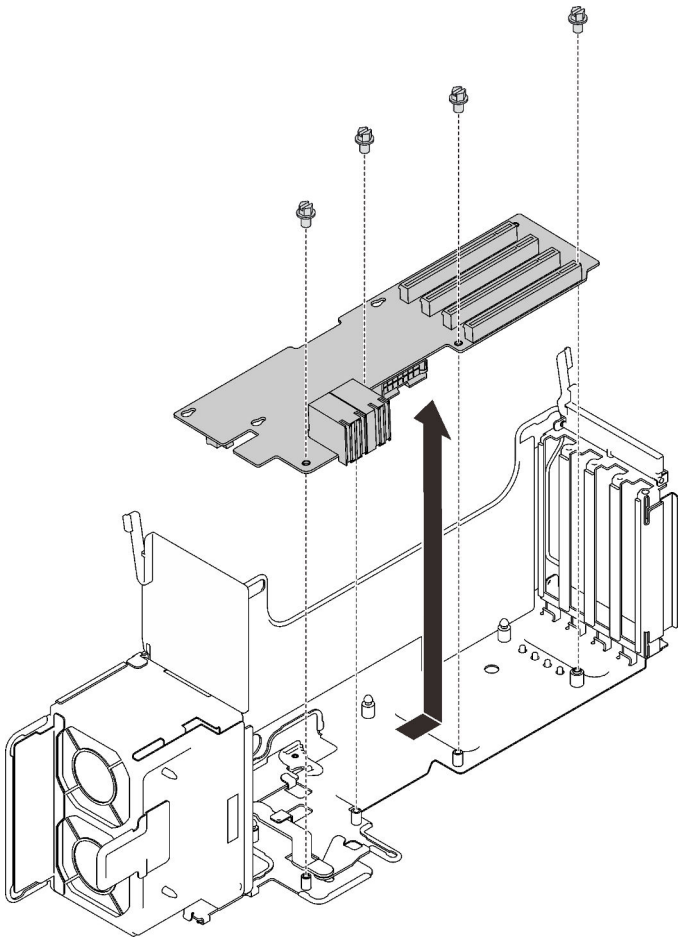


Figure 144. Disassembling the 4U PCIe riser cage

  2. Recycle the component in compliance with local regulations.

Demo video

Watch the procedure on YouTube

Remove an adapter from a 4U PCIe riser cage

Follow instructions in this section to remove an adapter from a 4U PCIe riser cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove the PCIe riser cage with the adapter to be removed (see “Remove a 4U PCIe riser cage” on page 256).

Step 2. Remove the adapter from the 4U PCIe riser cage.

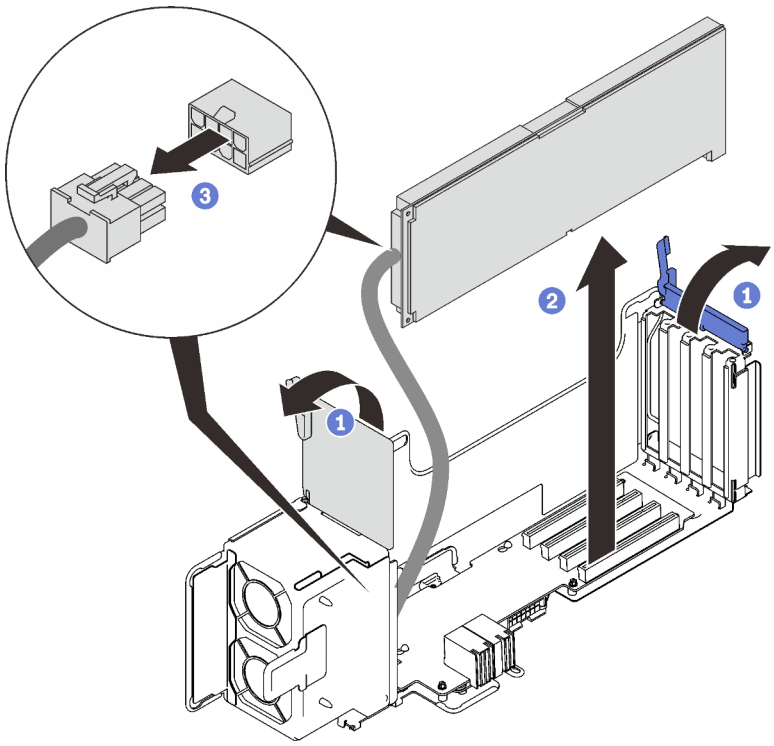


Figure 145. Removing the adapter from the 4U PCIe riser cage

1 Open both the retaining latches.

2 Grasp the adapter and remove it from the connector.

3 Disconnect the auxiliary power cable.

After this task is completed

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

Install an adapter into a 4U PCIe riser cage

Follow instructions in this section to install an adapter into a 4U PCIe riser cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Notes: To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:

- The server is equipped with a GPU adapter.
- The UEFI firmware version is M5E128A or later.

For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.

Procedure

Step 1. See the following table to determine the proper slot and riser cage for the adapter to be installed.

Table 28. Supported PCIe adapters and corresponding riser cage and slots

	x16/x16 riser cage				**x8/x8/x8/x8 riser cage**			
PCIe Slot	2	4	10	12	1/9	2/10	3/11	4/12
Nvidia Tesla V100s	√	√	√	√				
Nvidia Tesla T4	√	√	√	√	√	√	√	√
1610-8p NVMe switch adapter			√	√				
Broadcom 57504 Ethernet adapter	√	√	√	√	√	√	√	√

Attention: When one unit of Nvidia Tesla V100s is installed in a x16/x16 Riser cage, do no installed any adapter in the other slot.

Step 2. Install the adapter into the 4U PCIe riser cage.

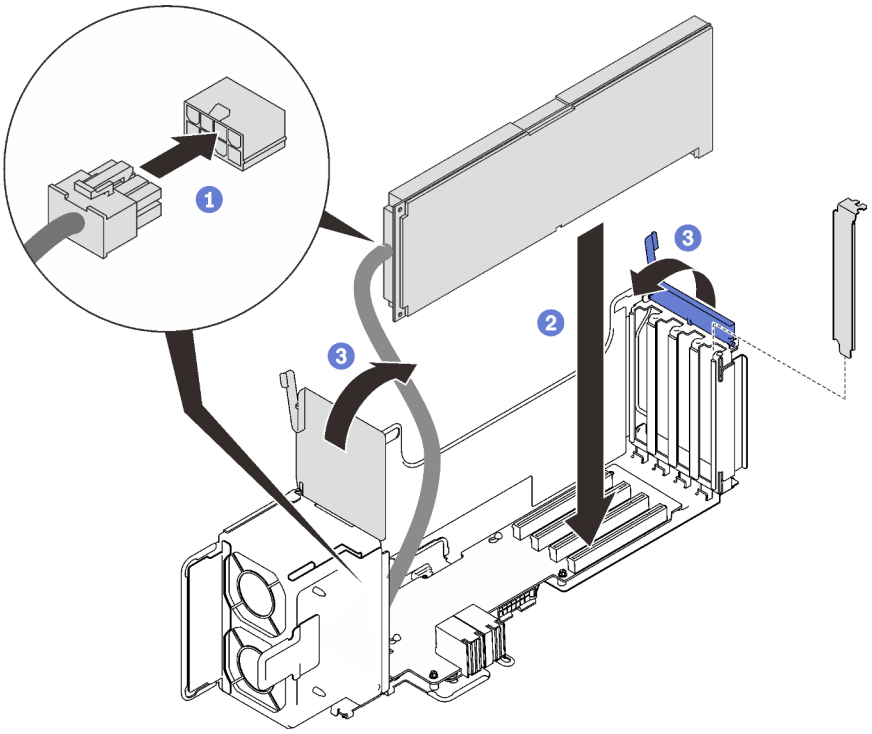


Figure 146. Installing the adapter into the 4U PCIe riser cage

1. Connect the power auxiliary cable.
2. Insert the adapter into the connector in the riser cage.
3. Close both the retaining latches to secure the adapter.

Step 3. (Optional) Secure the adapter with one of the four spare screws that come with the 4U PCIe riser cage.

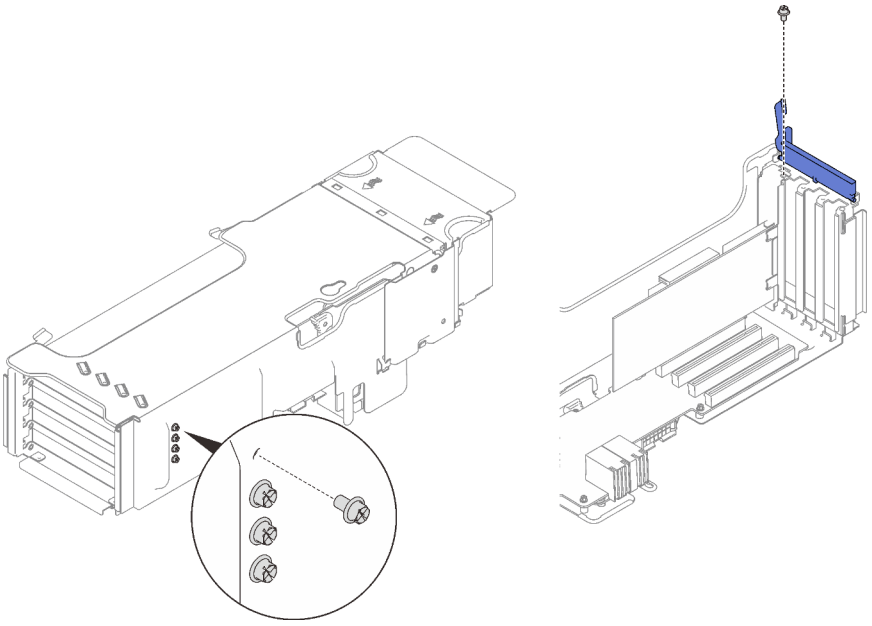


Figure 147. Securing the adapter to the 4U PCIe riser cage

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Install a 4U PCIe riser cage

Follow instructions in this section to install a 4U PCIe riser cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the riser cage with the slot on the 4U PCIe expansion tray.

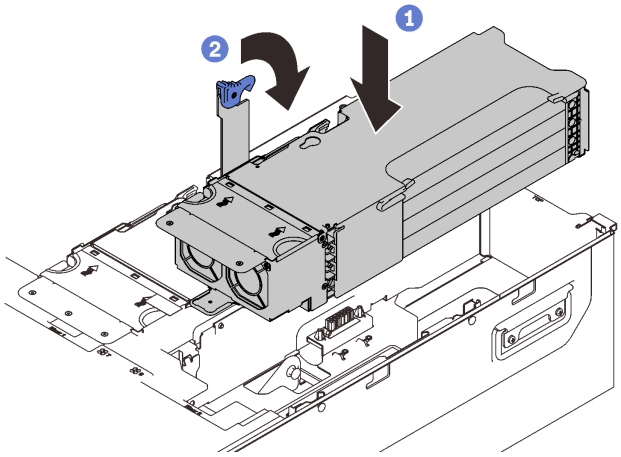


Figure 148. Installing the PCIe riser cage

Step 2. Rotate the handle all the way down to secure the cage to the server.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

4U PCIe riser power cable assembly replacement

Follow instructions in this section to remove or install the 4U PCIe riser power cable assembly.

Remove 4U PCIe riser power cable assembly

Follow instructions in this section to remove 4U PCIe riser power cable assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

Step 2. Flip the 4U PCIe expansion tray upside down.

Step 3. Loosen the captive screws to disengage the modules.

Step 4. Slide the power cable assembly forward slightly to remove it from the tray.

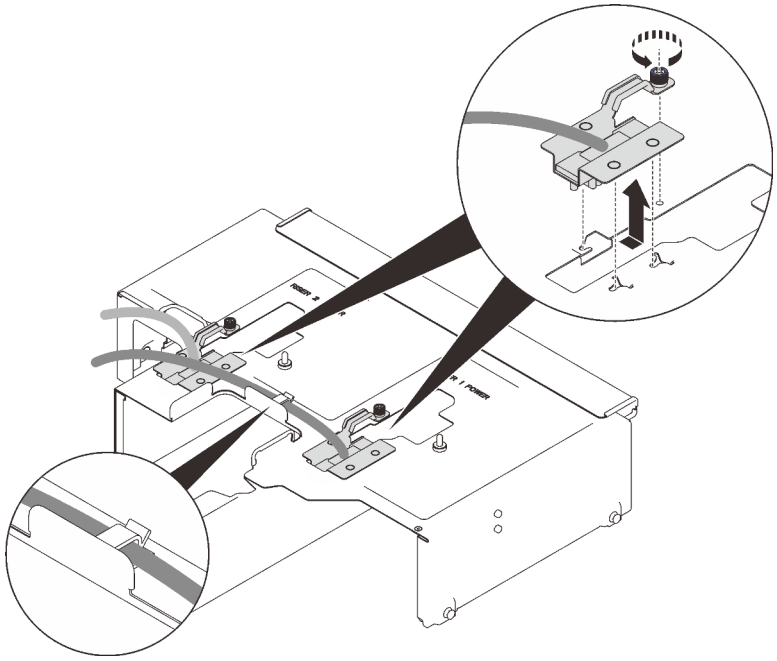


Figure 149. Removing the power cable assembly

After this task is completed

- If necessary, install a replacement unit (see “Install the 4U PCIe riser power cable assembly” on page 263).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the 4U PCIe riser power cable assembly

Follow instructions in this section to install the 4U PCIe riser power cable assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make sure the power cable is of the appropriate length for the slot.

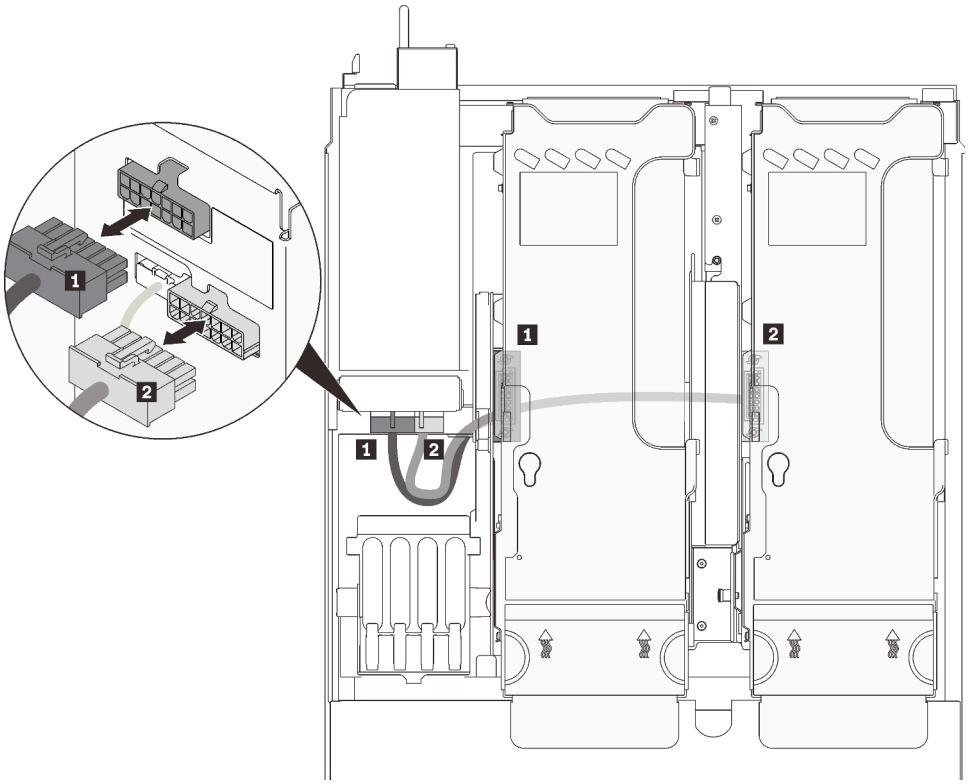


Figure 150. 4U PCIe riser power cables

Table 29. 4U PCIe riser power cables

Length	From	To
1 230 mm (shorter)	PCIe riser cage 2	upper power connector
2 320 mm (longer)	PCIe riser cage 1	lower power connector

Step 2. Flip the 4U PCIe expansion tray upside down.

Step 3. Align the power cable assembly with the key-shaped slots on the bottom of the 4U PCIe expansion tray, and slide it backward to secure it.

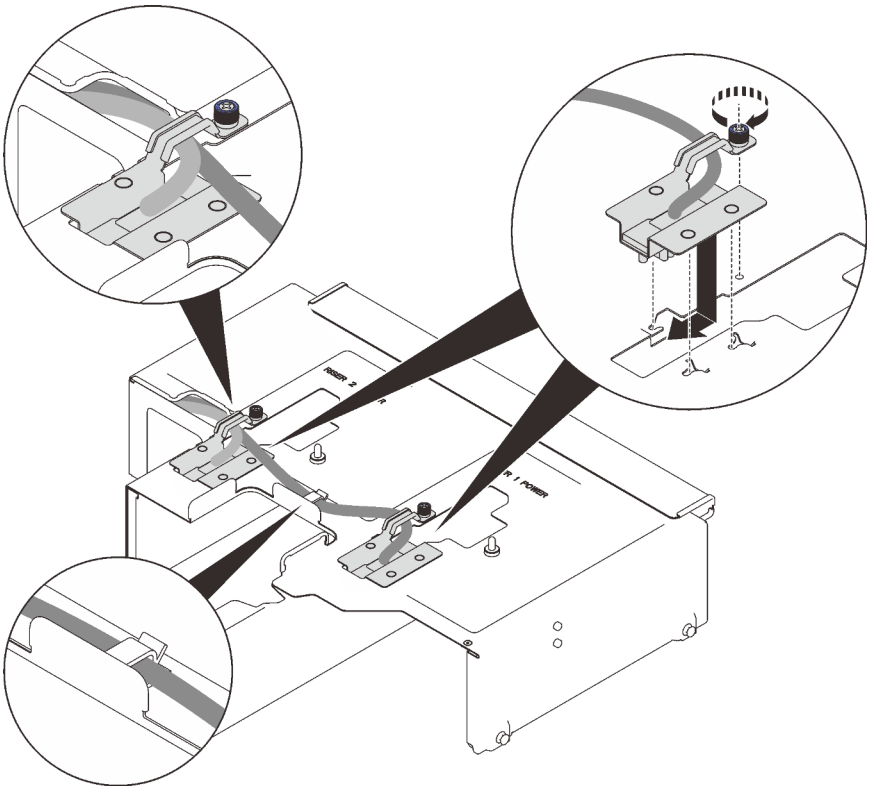


Figure 151. Installing the 4U PCIe riser power cable assemblies

Step 4. Fasten the captive screw on the module to secure it to the expansion tray.

Notes:

- Make sure the longer (320 mm) cable is routed through the middle cable clip.
- Make sure both cable are routed through the side cable clip and the side opening as illustrated.

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

7mm drive and drive cage replacement

Follow instructions in this section to remove or install the 7mm drive and drive cage.

Remove a 7mm drive

Follow instructions in this section to remove a 7mm drive.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

Procedure

Step 1. Gently rotate the release latch away to unlock the drive handle.

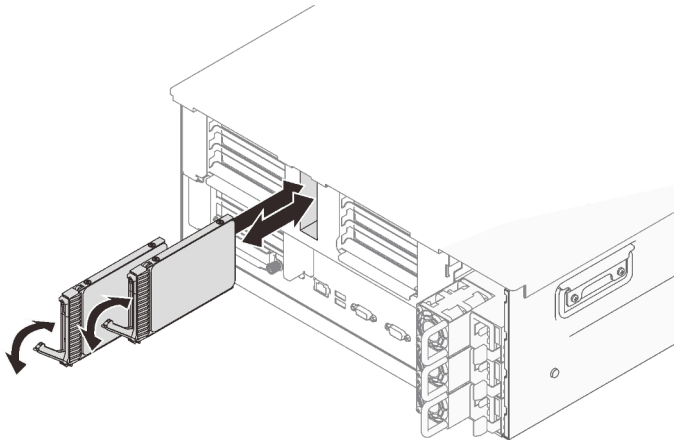


Figure 152. Removing 7mm drives

Step 2. Grasp and pull the handle to remove the drive from the drive bay.

After this task is completed

- Install a replacement unit or a filler (see “Install a 7mm drive” on page 269).

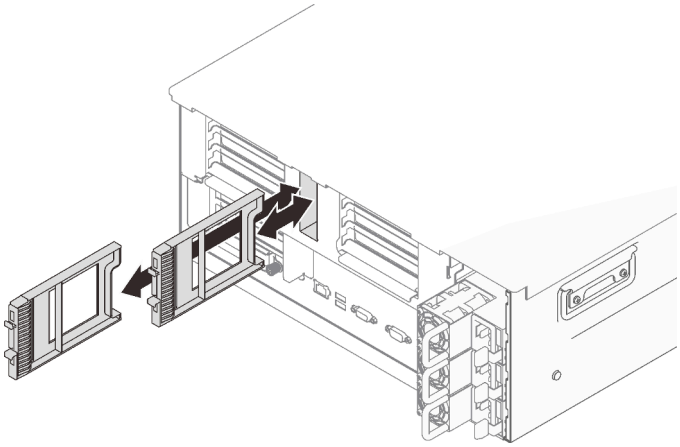


Figure 153. Installing 7mm drive fillers

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the 7mm drive cage

Follow instructions in this section to remove the 7mm drive cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. If drives or fillers have been installed, remove them (see “Remove a 7mm drive” on page 264).

b. Remove the top cover (see “Remove the top cover” on page 241).

c. Remove the PCIe bracket cage from Zone 2 next to the power supplies (see “Remove a 4U PCIe riser cage” on page 256).

d. Disconnect the cables from the 7mm drive cage.

Step 2. Remove the 7mm drive cage.

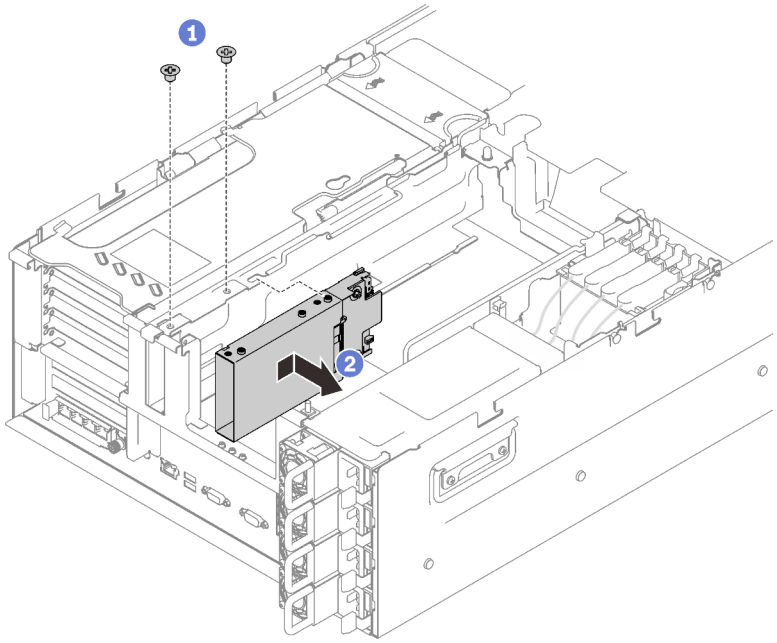


Figure 154. Removing the 7mm drive cage

1 Remove the two screws that secure the drive cage.

2 Slide the drive cage forward to remove it.

After this task is completed

- Install a replacement unit or a filler (“Install the 7mm drive cage” on page 267).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the component:
  1. Remove the three screws that secure the two drive backplanes to the drive cage.

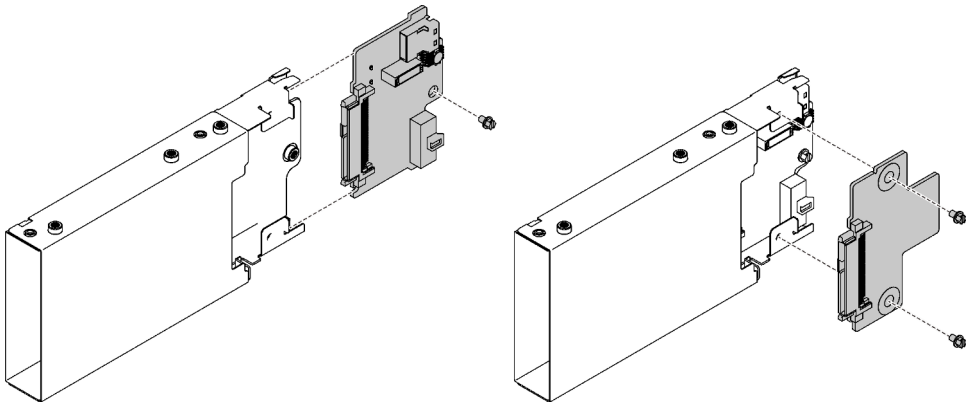


Figure 155. Disassembling the 7mm drive cage

2. Recycle the component in compliance with local regulations.

Demo video

Watch the procedure on YouTube

Install the 7mm drive cage

Follow instructions in this section to install the 7mm drive cage.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make preparations for this task.

a. If necessary, secure the two drive backplanes to the drive cage with three screws.

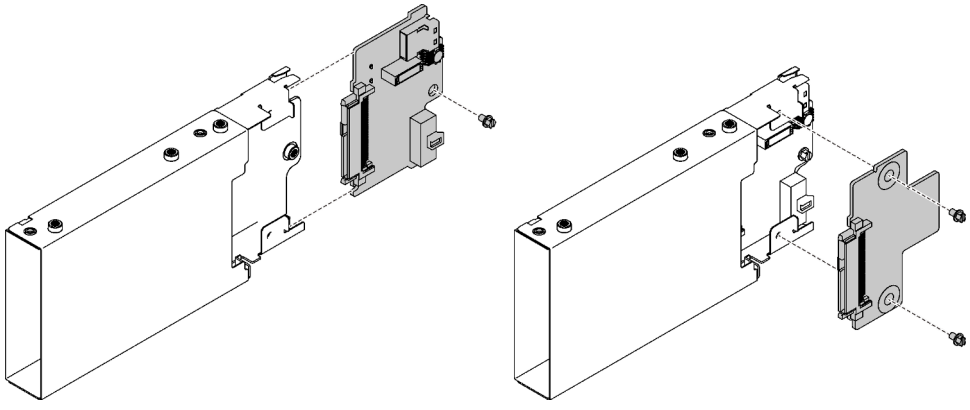


Figure 156. Installing the 7mm drive backplanes

Step 2. Install the 7mm drive cage.

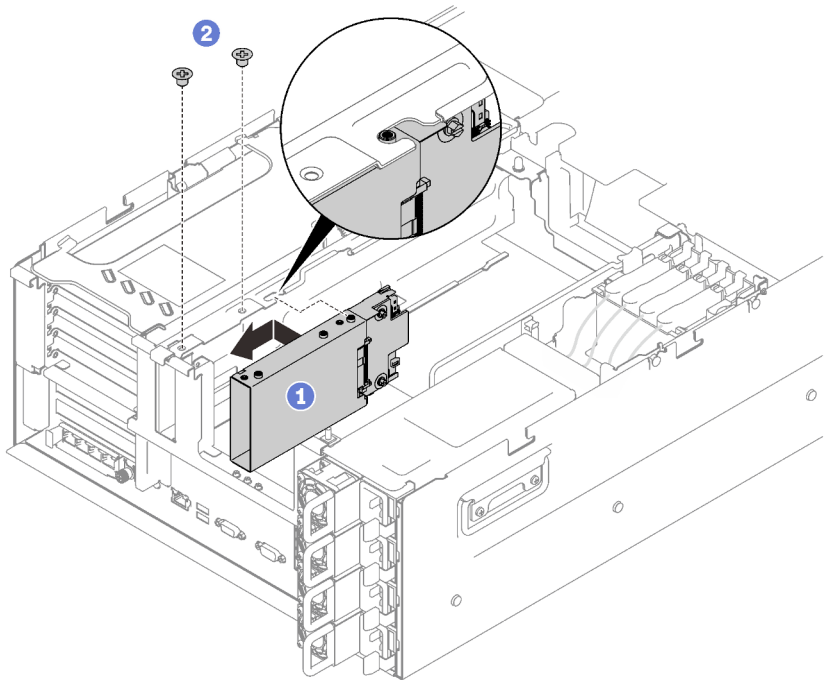


Figure 157. Installing the 7mm drive cage

1 Slide the drive cage into the slot in the PCIe expansion tray, and align the screw holes on the drive cage with those on the tray.

2 Secure the drive cage with two screws.

Step 3. Connect the cable to the system board.

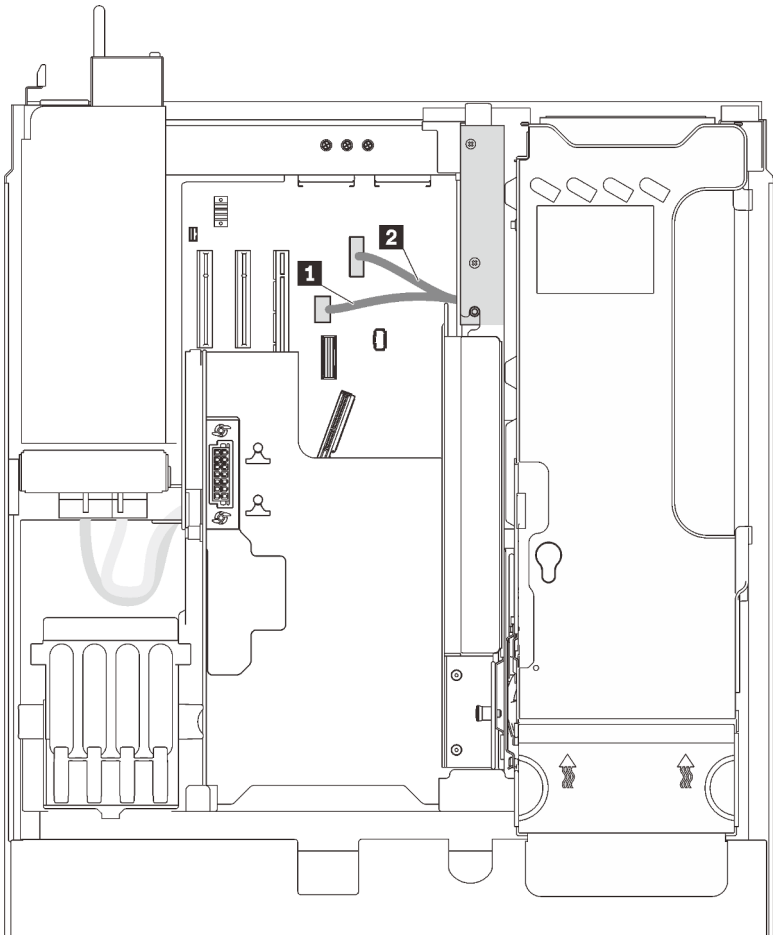


Figure 158. 7mm drive cage cable routing

Table 30. 7mm drive cage cables

1 7mm drive PCIe connector	2 7mm drive power connector

After this task is completed

1. Fill the drive bays with 7mm drives or fillers (see “Install a 7mm drive” on page 269).
2. Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Install a 7mm drive

Follow the instructions in this section to install a 7mm drive.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.

- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the server" on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. If a drive filler has been installed in the drive bay, remove it.

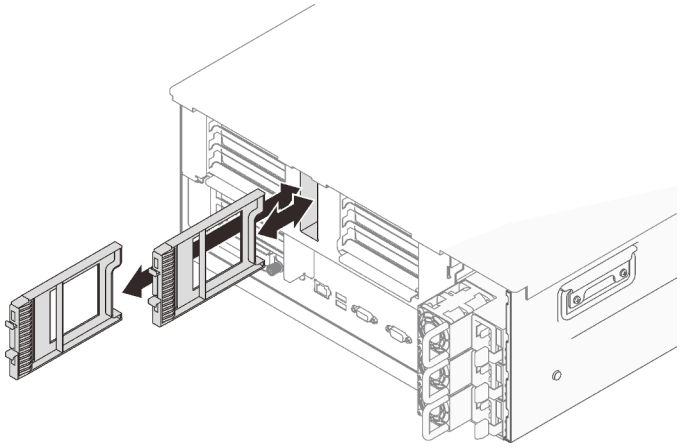


Figure 159. Removing 7mm drive fillers

Step 2. Gently rotate the release latch away to unlock the drive handle.

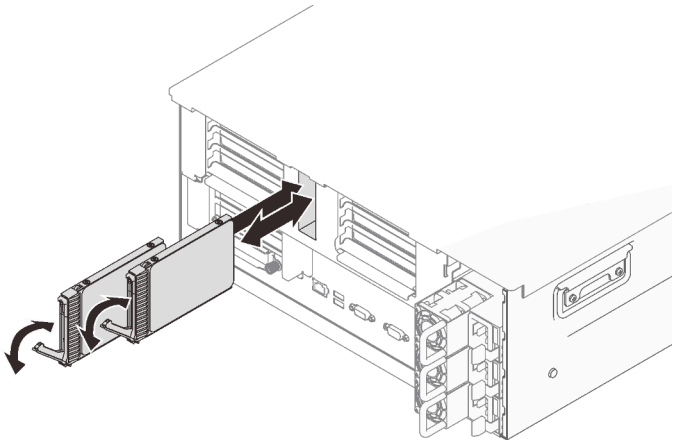


Figure 160. Installing 7mm drives

Step 3. Slide the drive into the drive bay, and push it until it stops.

Step 4. Rotate the handle back to the locked position.

After this task is completed

Check the drive status LED to verify if the drive is operating correctly:

- If the yellow LED is lit continuously, it is malfunctioning and must be replaced.
- If the green LED is flashing, the drive is functioning.

Note: If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Watch the procedure on YouTube

Chassis air baffle replacement

Follow instructions in this section to remove or install the chassis air baffle.

Remove the chassis air baffle

Follow instructions in this section to remove the chassis air baffle.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove both PCIe riser cages (see “Remove a 4U PCIe riser cage” on page 256).

Step 2. Lift the chassis air baffle to remove it from the server.

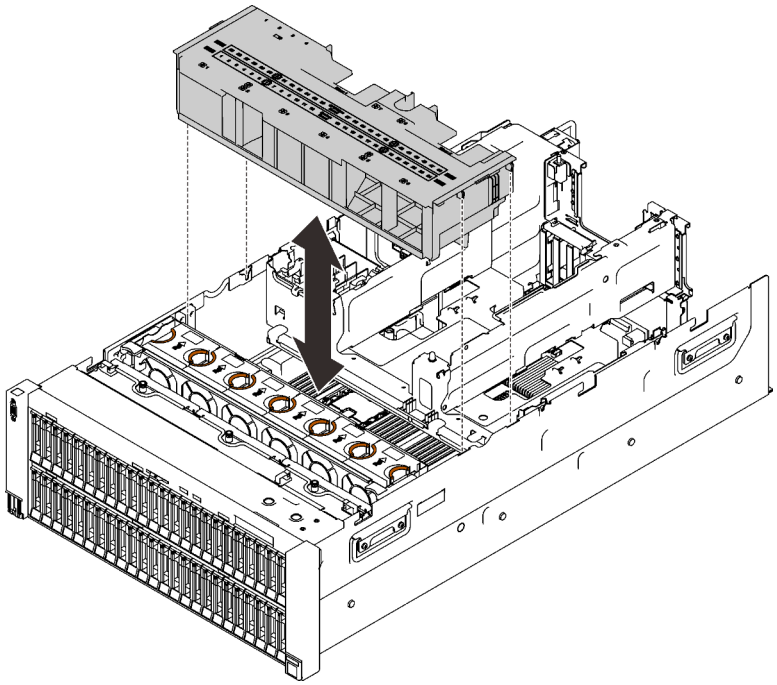


Figure 161. Removing the chassis air baffle

After this task is completed

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

Demo video

Watch the procedure on YouTube

Install the chassis air baffle

Follow instructions in this section to install the chassis air baffle.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the chassis air baffle with the guides on both sides of the server, and lower it until it stops.

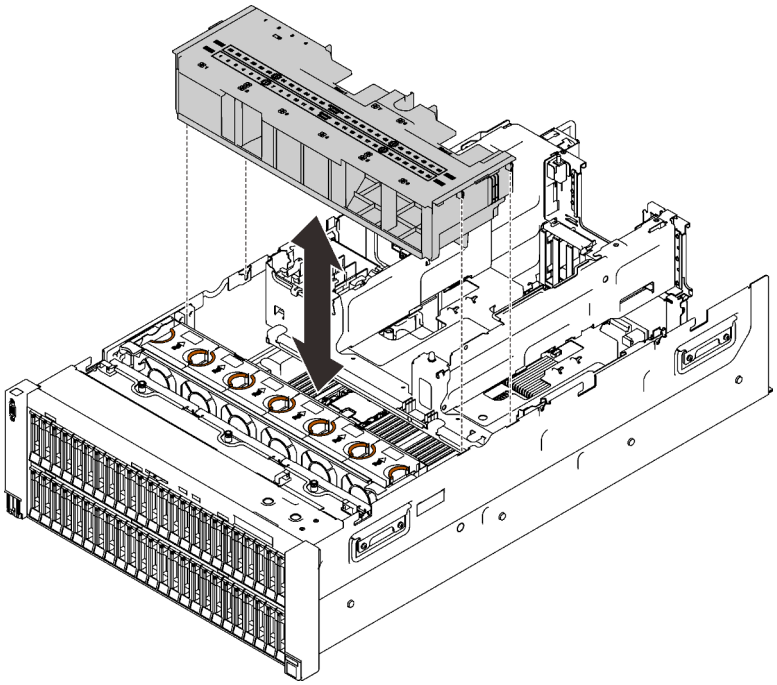


Figure 162. Installing the chassis air baffle

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Flash power module replacement

Follow instructions in this section to remove or install the flash power module.

Remove the flash power module

Follow instructions in this section to remove the flash power module.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Disconnect the cable from the flash power module to be removed.

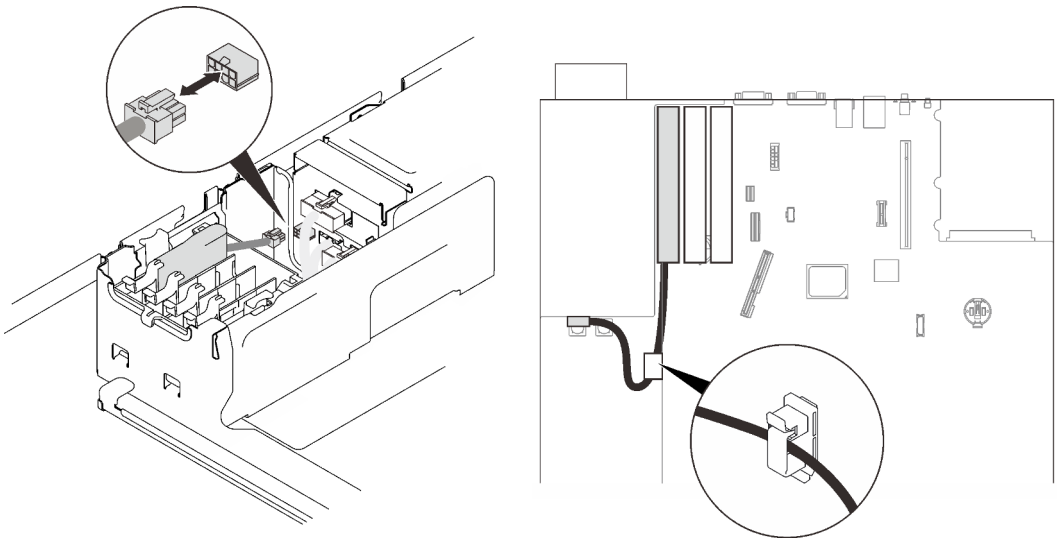


Figure 163. Disconnecting the cable from the flash power module

Step 2. Press on the retaining latch to disengage the flash power module; then, remove the module.

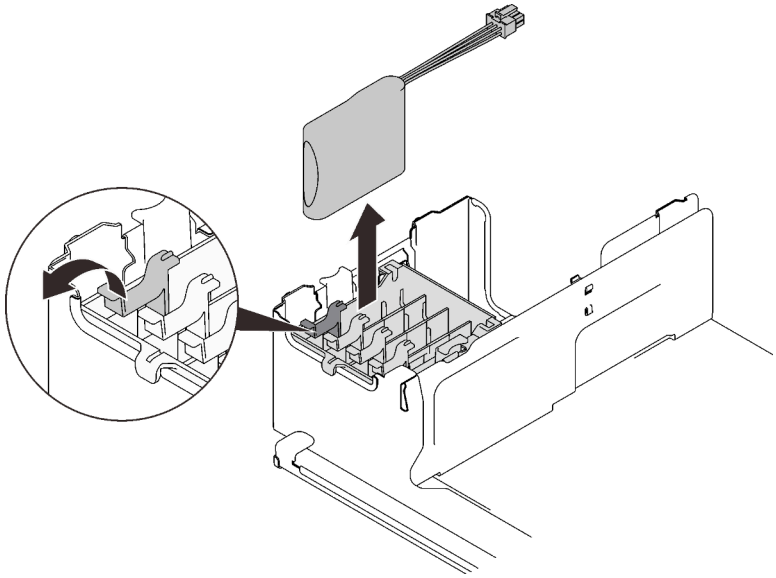


Figure 164. Removing the flash power module

After this task is completed

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

Demo video

Watch the procedure on YouTube

Install a flash power module

Follow instructions in this section to install a flash power module.

About this task

Note:

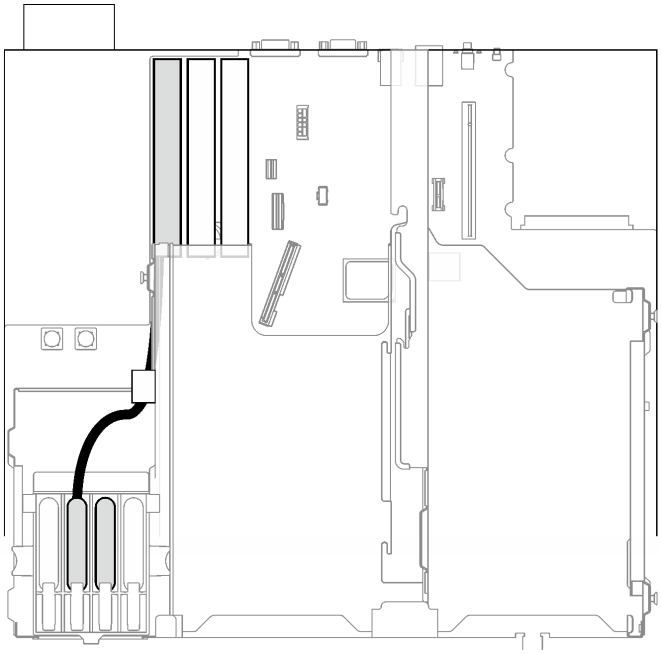


Figure 165. Available flash power module slots for 9350-8i and 9350-16i RAID adapters

When 9350-8i or 9350-16i RAID adapter is installed, only the middle two slots are available for flash power module. Make sure to install the flash power module into these two slots.

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Press on the retaining latch; then, align the flash power module with the slot in the PCIe expansion tray, and push it in.

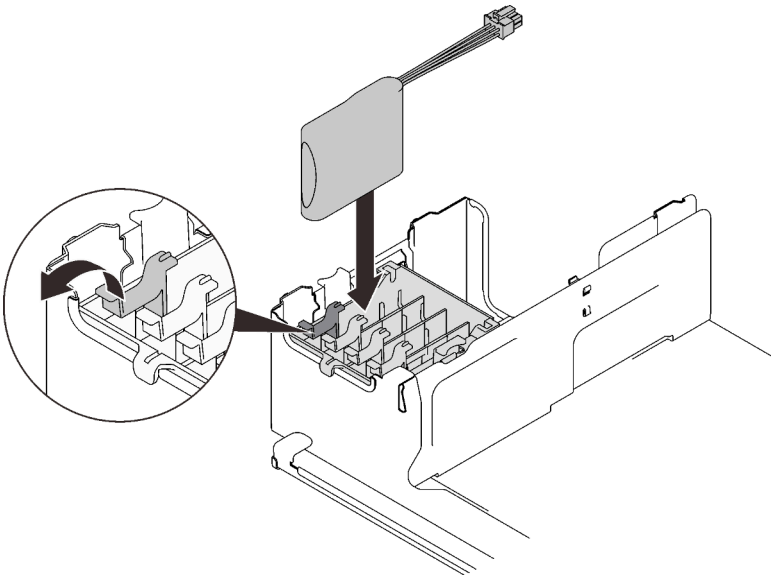


Figure 166. Installing the flash power module

Step 2. Connect the cable to the RAID adapter. Make sure to route the cable through the cable clips on the PCIe expansion tray.

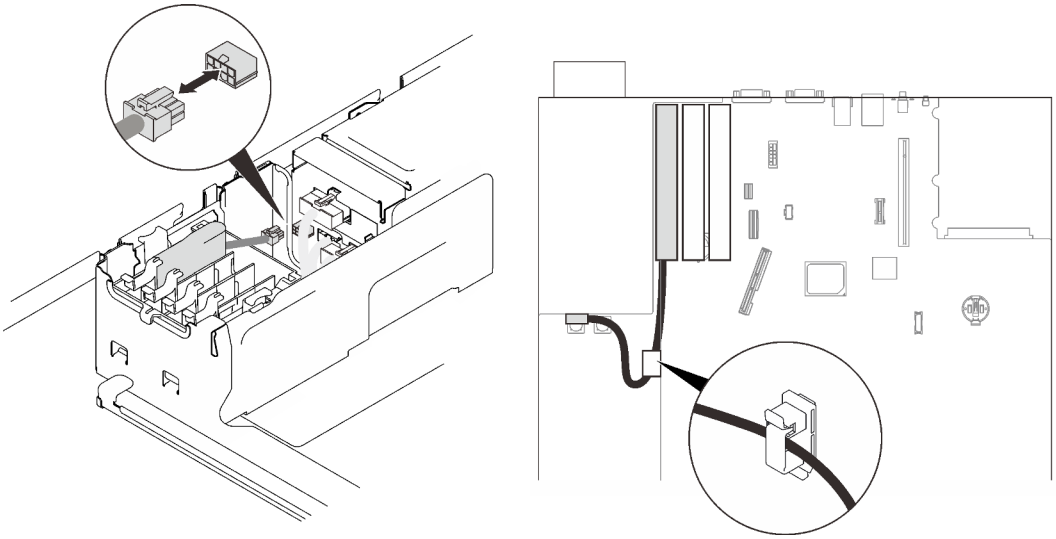


Figure 167. Connecting the cable to the RAID adapter

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

M.2 drive and backplane replacement

Follow instructions in this section to remove or install M.2 drives and backplane.

Remove the M.2 backplane bracket assembly and drives

Follow instructions in this section to remove the M.2 drive backplane bracket assembly and drives.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover (see “Remove the top cover” on page 241).

b. Remove the PCIe bracket cage from Zone 2 next to the power supplies (see “Remove a 4U PCIe riser cage” on page 256).

Step 2. Disconnect the M.2 cables from the system board.

Step 3. Remove the M.2 bracket assembly.

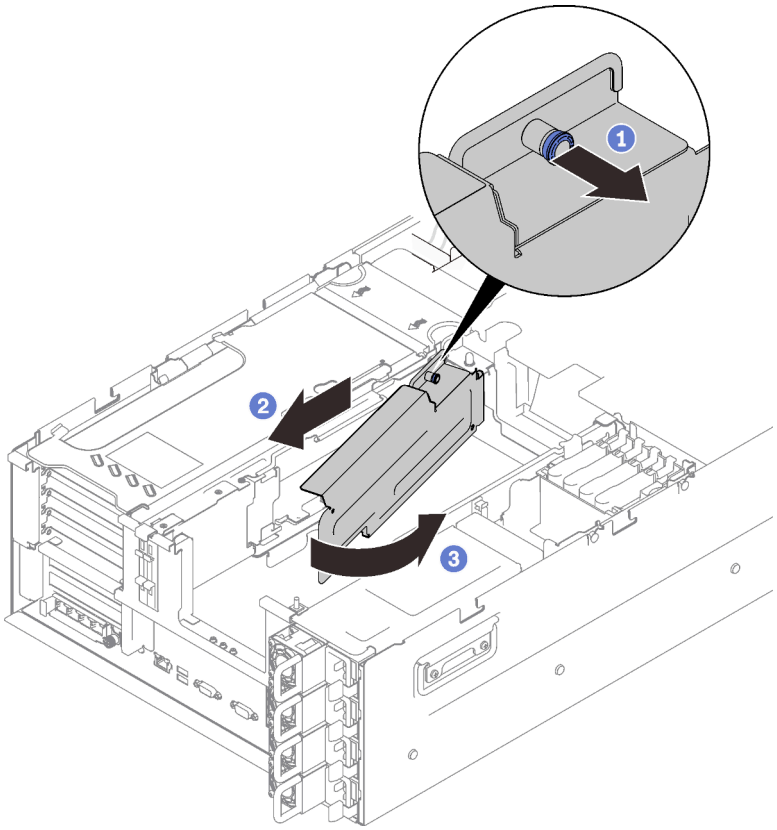


Figure 168. Removing the M.2 bracket assembly

1 Grasp and pull the captive screw to disengage the backplane bracket.

2 Slightly slide the backplane bracket backward.

3 Pivot the rear end of the backplane bracket assembly away from the expansion tray to remove it.

Step 4. Remove the drives.

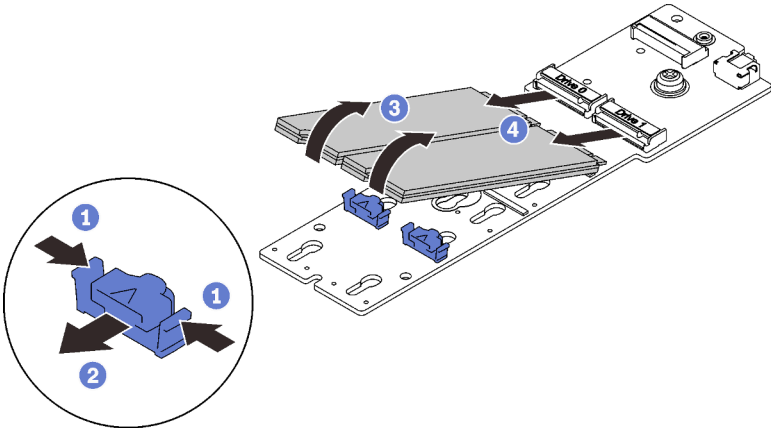


Figure 169. Removing M.2 drives from the backplane

1 Pinch and hold on the retainer clip.

2 Remove the retainer clip.

3 Pivot the rear side of the M.2 drives away from the backplane.

4 Remove the M.2 drives.

After this task is completed

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- If you plan to recycle the component:
  1. Remove the M.2 backplane from the bracket.

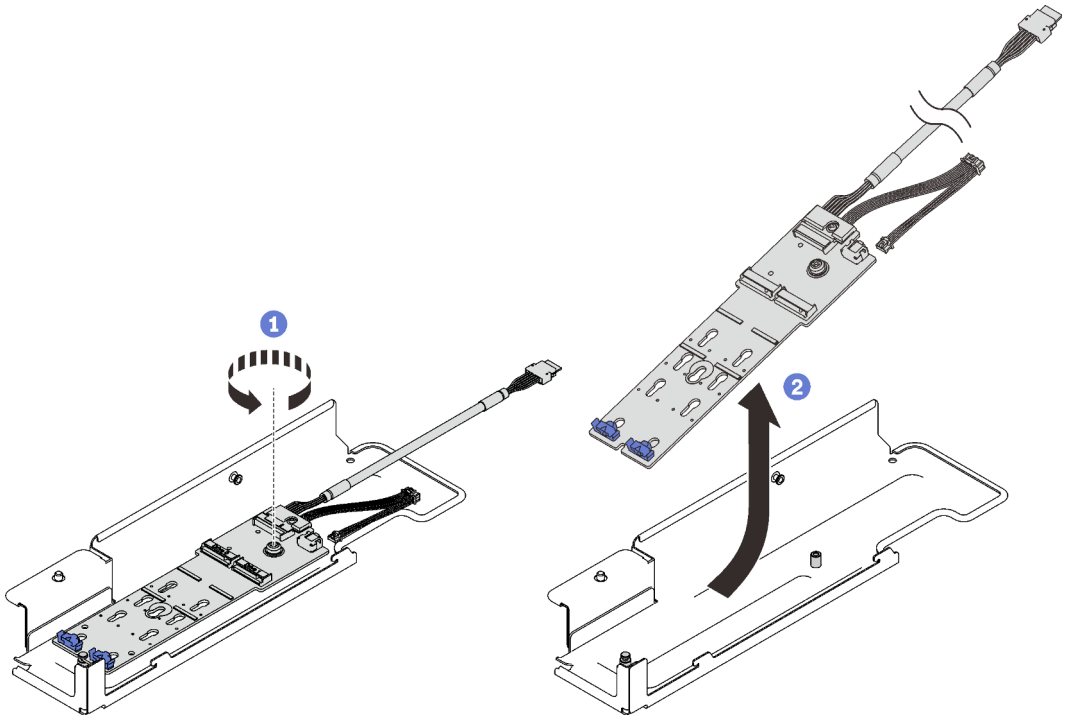


Figure 170. Removing the M.2 backplane from the bracket

1. Loosen the captive screw with a screwdriver to disengage the M.2 backplane from the bracket.
2. Slightly slide the backplane forward, and remove it from the bracket.

2. Disconnecting the cables from the M.2 backplane.

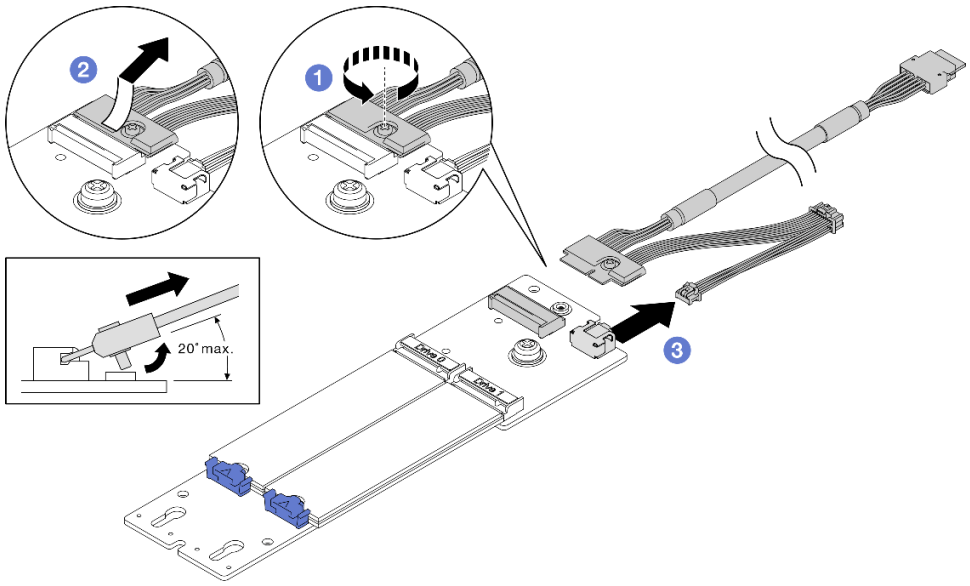


Figure 171. Disconnecting the cable from the M.2 backplane

1. Loosen the screw on the signal cable.
2. Tilt the connector and remove it.

3 Remove the power cable.

3. Recycle the component in compliance with local regulations.

Demo video

Watch the procedure on YouTube

Install the M.2 drive and backplane bracket assembly

Follow instructions in this section to install the M.2 drive and backplane bracket assembly.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. If a 7mm drive cage has been installed, remove it first (see “Remove the 7mm drive cage” on page 265).

Step 2. Install the M.2 drives into the backplane if necessary.

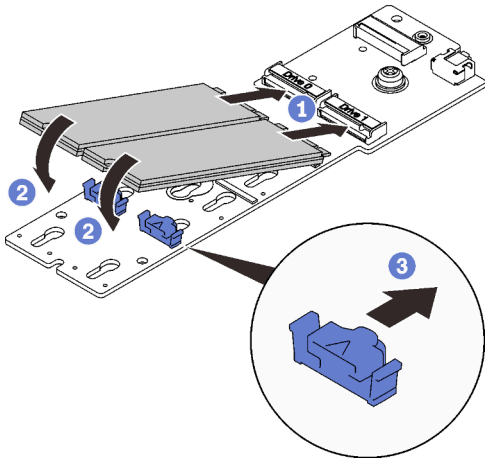


Figure 172. Install the M.2 drives

1 Align the M.2 drives with the connectors.

2 Pivot the other end of the M.2 drives toward the backplane.

3 Slide the retaining clips forward to secure the drives to the backplane.

Step 3. If applicable, connect the cables to the M.2 backplane.

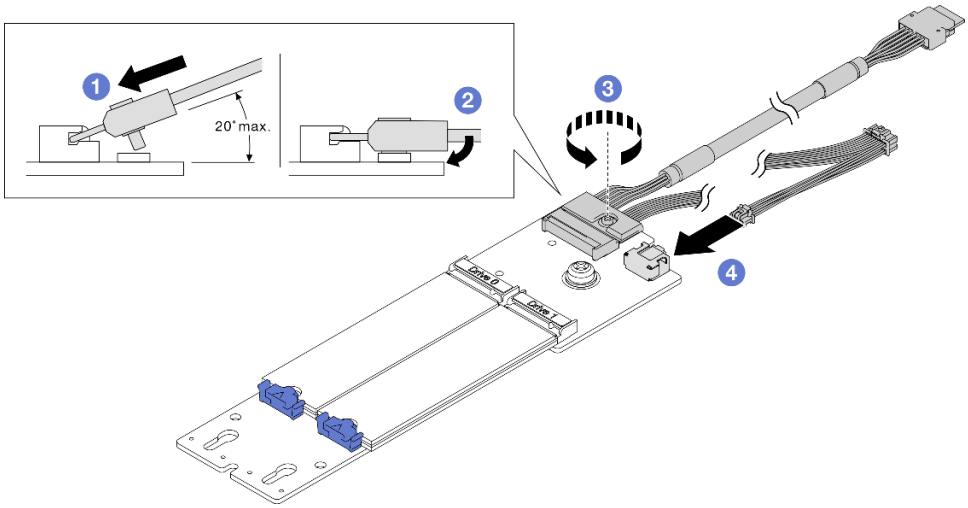


Figure 173. Connecting the cable to the M.2 backplane

1. Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp.
2. Press the connector down flat.
3. Tighten the screw on the signal cable.
4. Connect the power cable.

Step 4. If applicable, install the M.2 backplane to the bracket.

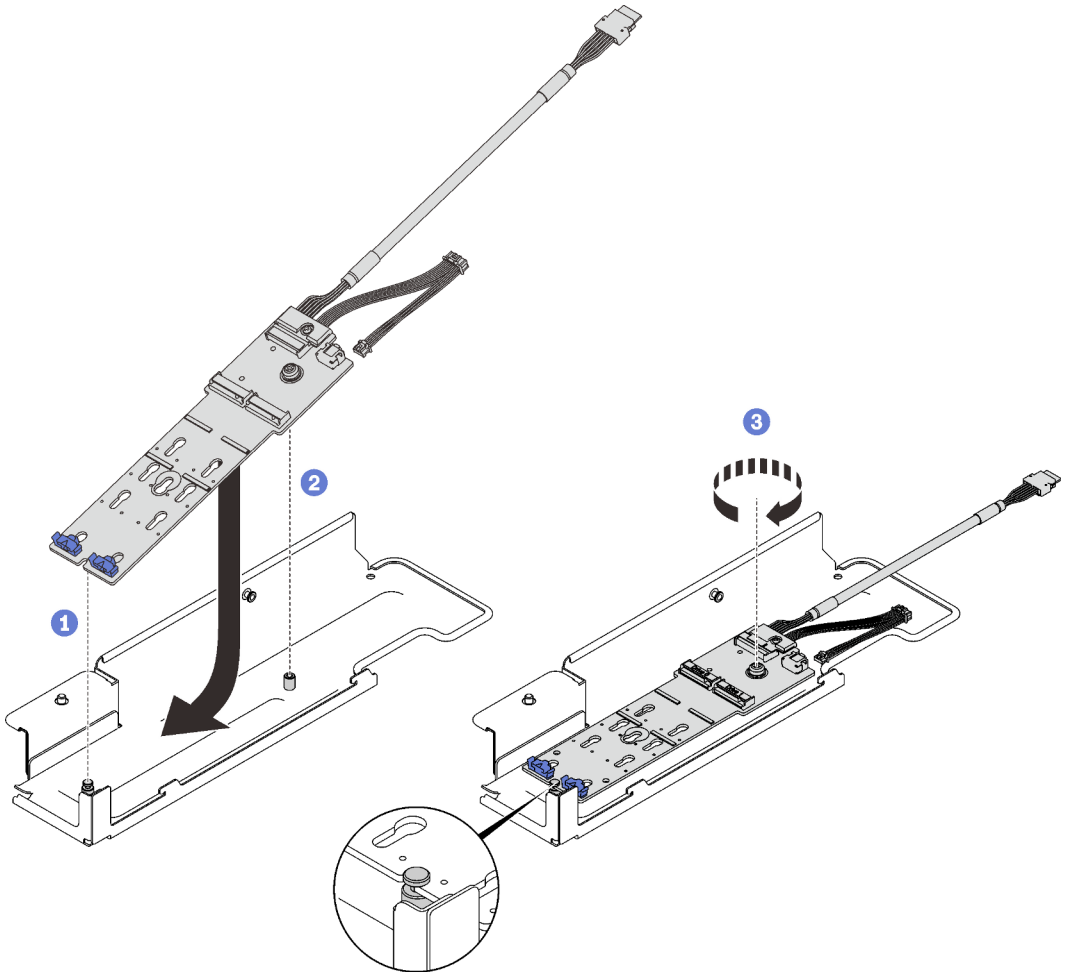


Figure 174. Installing the M.2 backplane to the bracket

1 Align the slot on the rear of the backplane with the rear pin on the bracket, and lower the other side of the backplane.

2 Align the captive screw on the backplane to the front pin on the bracket.

3 Tighten the captive screw with a screw driver to secure the backplane to the bracket.

Step 5. Align the end of the M.2 backplane to the slot on the PCIe expansion tray, and pivot the other end towards the tray until the bracket clicks in place.

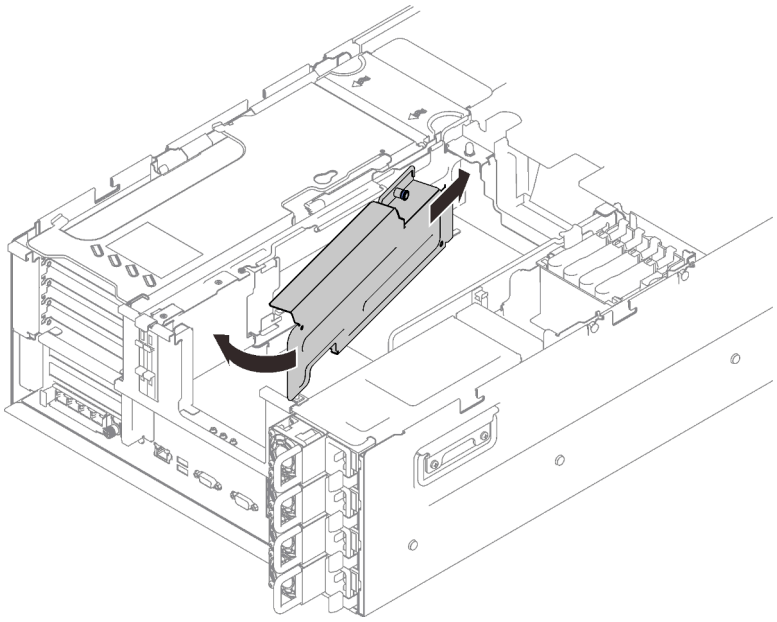


Figure 175. Installing the M.2 backplane bracket assembly

Step 6. Connect the M.2 signal and power cable to the system board.

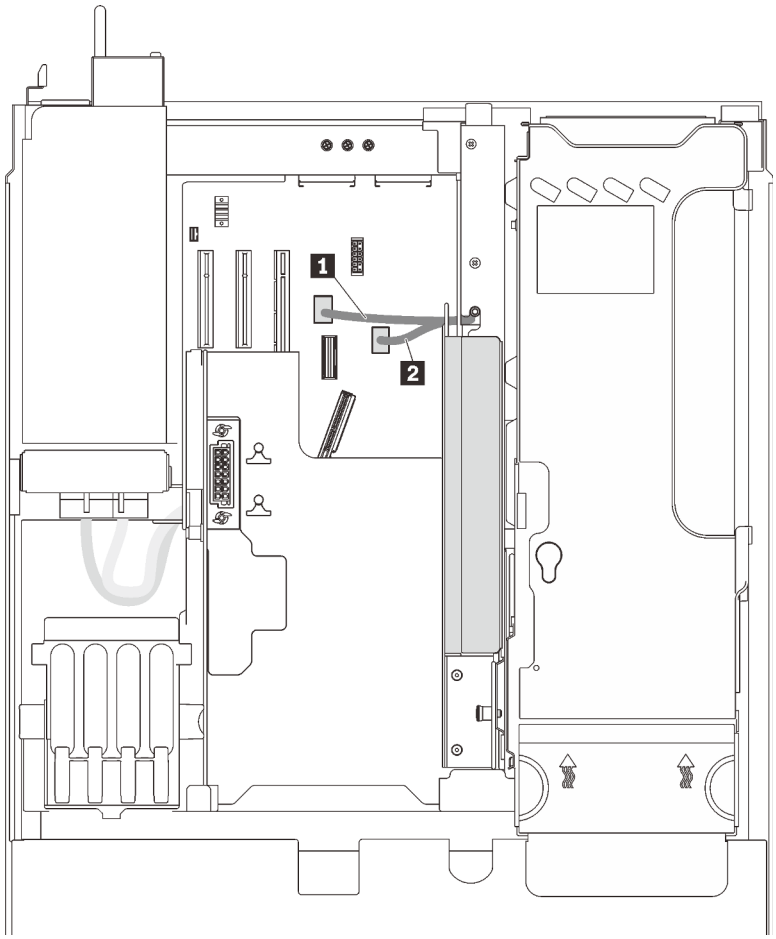


Figure 176. M.2 drive cable routing

1 M.2 PCIe connector	2 M.2 backplane power connector

After this task is completed

Proceed to complete the parts replacement (see “Complete the parts replacement” on page 284).

Demo video

Watch the procedure on YouTube

Complete the parts replacement

Go through this checklist before completing parts replacement.

To complete parts replacement, go through the following list:

1. Ensure that all the removed components have been properly reinstalled and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. Make sure to install one of the following:

- With two installed processors: system air baffle.
- With four installed processors:
  - Processor and memory expansion tray
  - **Two** expansion tray air baffles, one under the tray and the other on the tray

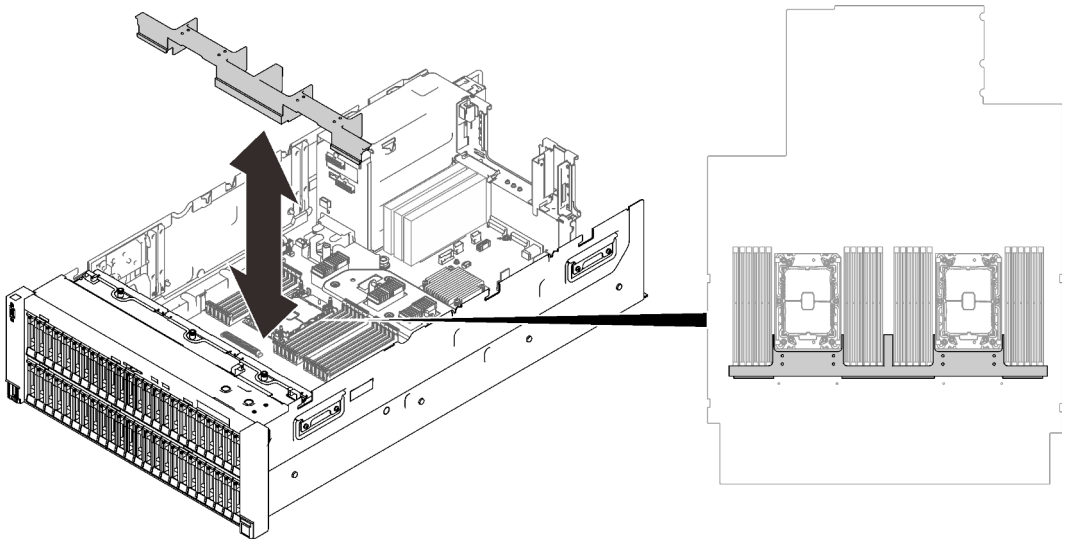


Figure 177. Installing the air baffle to the system board

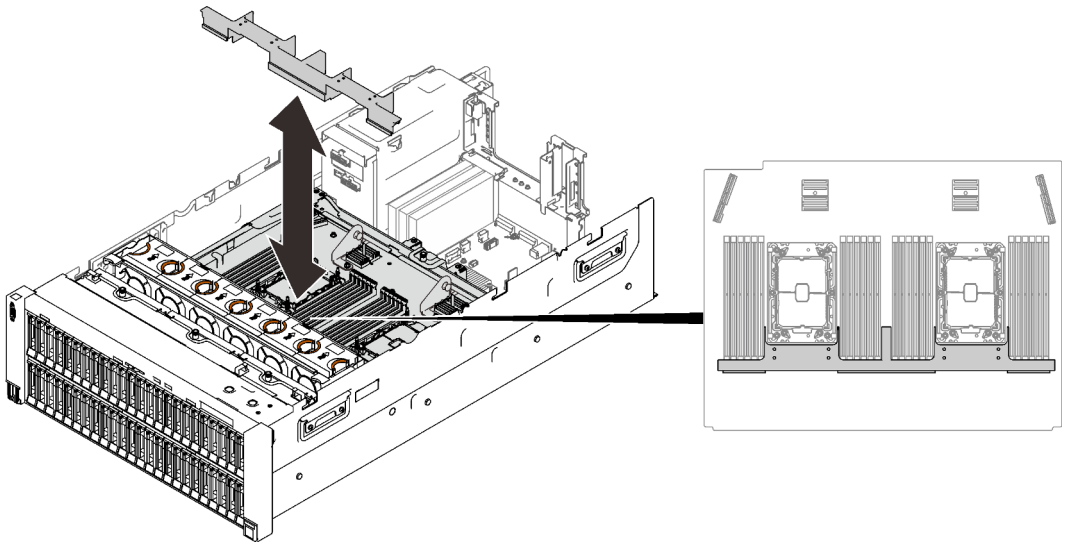


Figure 178. Installing air baffle to the expansion tray

Attention: Air baffle is required for airflow that creates proper cooling. Make sure to install proper air baffles for system configuration before the power is turned on.

4. If the top cover has been removed, reinstall it. See "Install the top cover" on page 243.
5. Reconnect external cables and power cords to the server.

   Attention: To avoid component damage, connect the power cords last.
6. Update the server configuration.

- Download and install the latest device drivers: http://datacentersupport.lenovo.com.
- Update the system firmware. See “Firmware updates” on page 8.
- Update the UEFI configuration.
- Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: http://datacentersupport.lenovo.com.

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

Chapter 5. Problem determination

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

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

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

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

Event logs

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

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at:https://pubs.lenovo.com/sr860-v2/pdf_files

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

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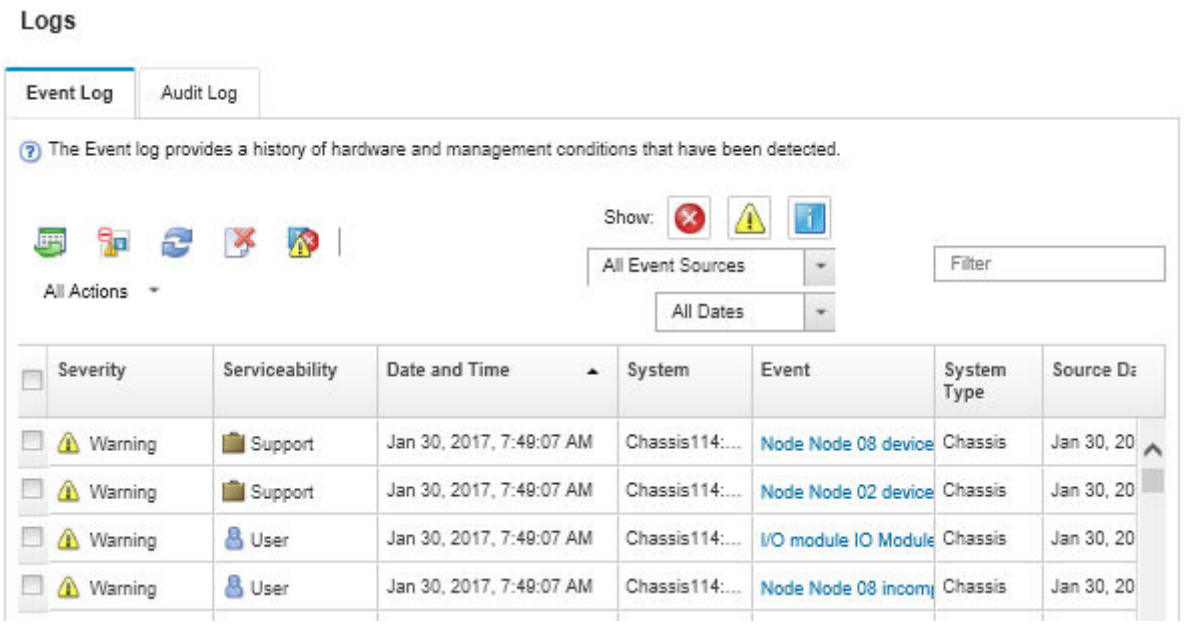


Figure 179. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

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

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

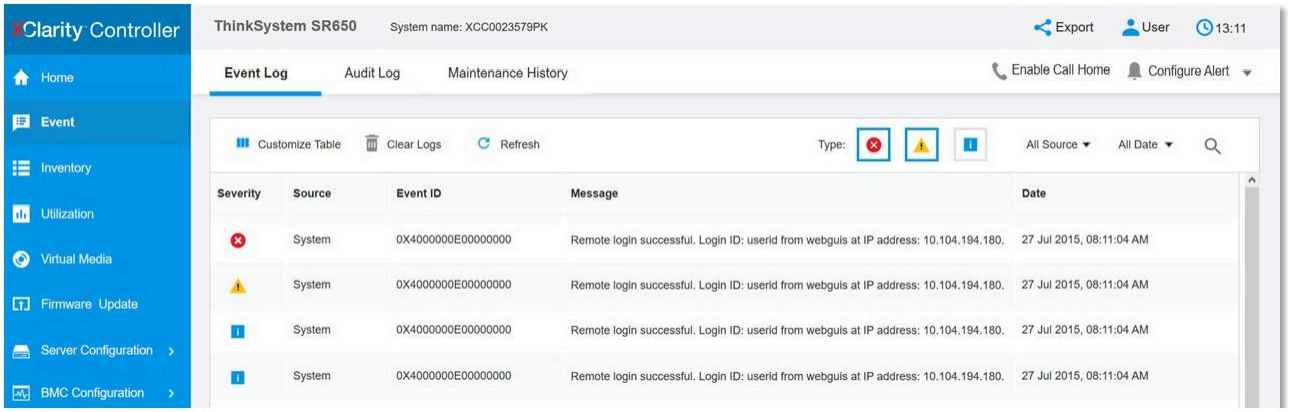


Figure 180. Lenovo XClarity Controller event log

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

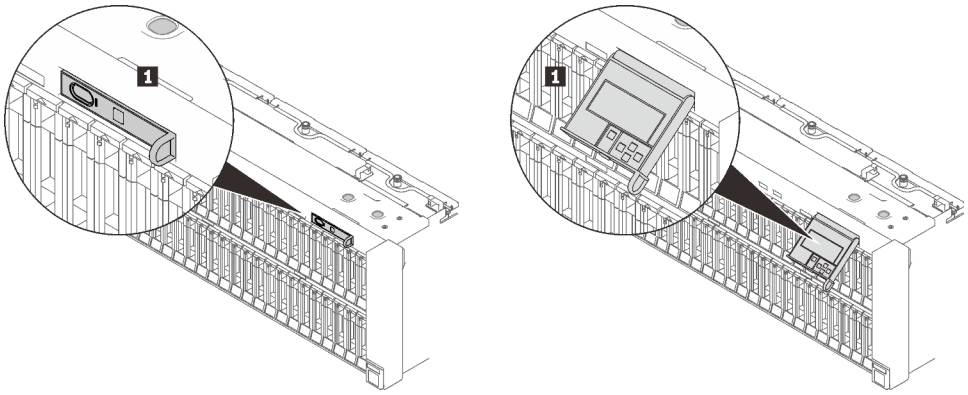
“Viewing Event Logs” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server that leads you to the failed component. By viewing the LEDs in a particular order, you can often identify the source of the error.

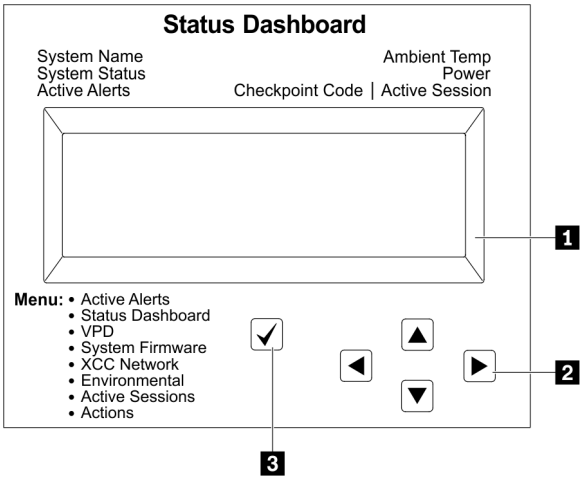
Information of failed components is often available on the LCD diagnostics panel.

Location of the LCD diagnostics panel

Location	The LCD diagnostics panel is attached to the front of the server. 
Callout	1 The handle with which the panel can be pulled out from the server. **Notes:** • The panel can be pushed in or pulled out regardless of the system power status. • When pulling it out, do it gently to avoid damage.

Display panel overview

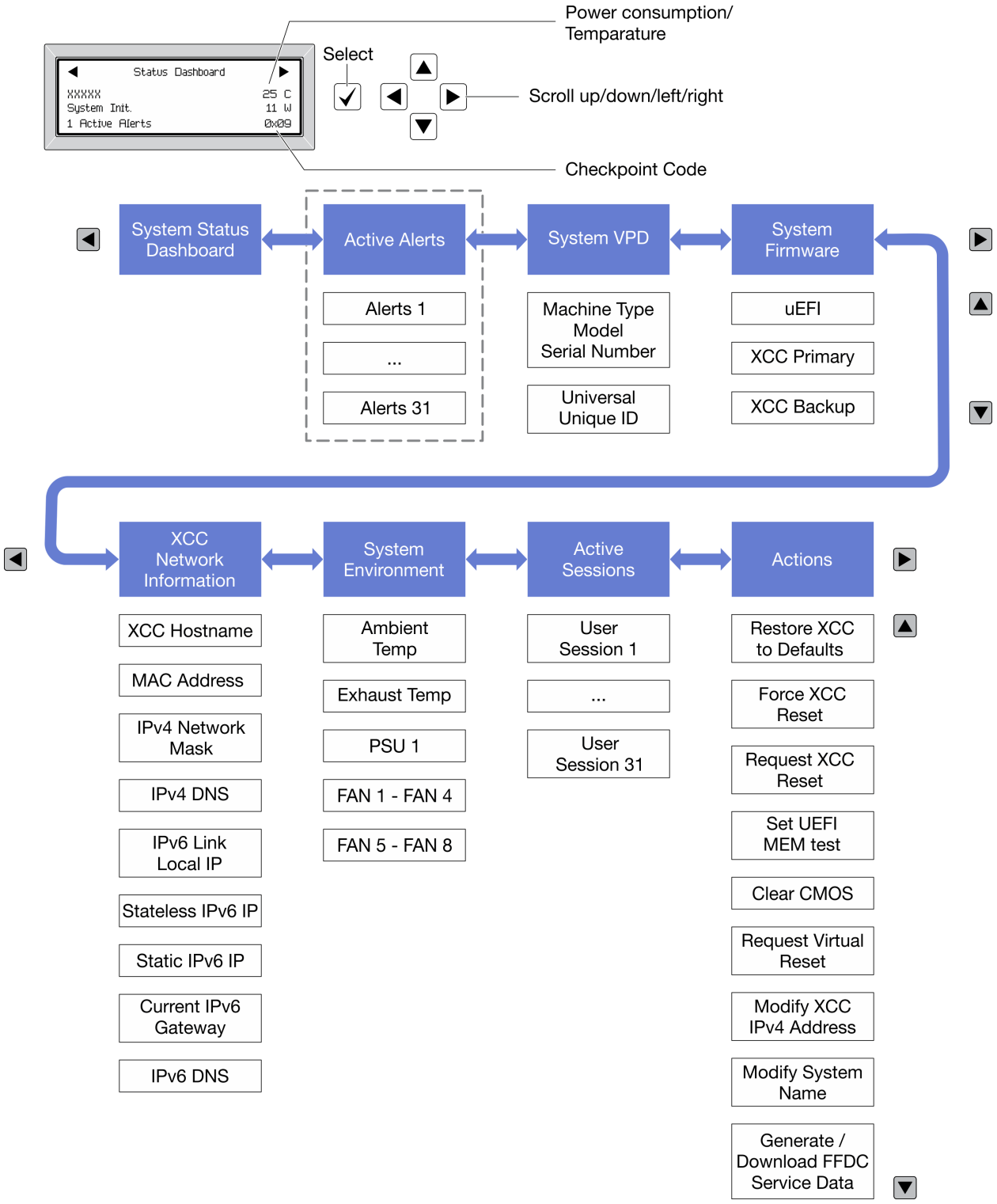
The diagnostics device consists of an LCD display and 5 navigation buttons.



1 LCD display
2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.
3 Select button Press the select button to select from the options in the menu.

Option flow diagram

Depending on the model, the options and entries on the LCD display might be different.



Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimum configuration is required for the ac power LED on the power supply to be lit:

- Power supply
- Power cord
- Appropriate input power from the power source

The following minimum configuration is required for the server to start:

- 16 GB DIMM
- Two processors installed
- At least one 2.5-inch drive installed
- One power supply
- Power cord

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED on the front operator panel and suggested actions to correct the detected problems.

Power supply LEDs			Description	Action	Note
AC	DC	Error			
On	On	Off	Normal operation		The server is functioning correctly.
Off	Off	Off	No ac power to the server, a problem with the ac power source, or a power supply has failed.	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Restart the server. If the error remains, check the power-supply LEDs. 4. Replace the power supply.	
Off	Off	On	No input power to the power supply or the power supply has detected an internal problem.	1. Make sure that the power cord is connected to a functioning power source. 2. Replace the power supply.	This happens only when a second power supply is providing power to the server.
Off	On	Off	The power supply has failed.	Replace the power supply.	

On	Blinking	Off	The power supply is in zero output mode (standby). When the total power consumption is low, only one of the power supplies delivers the entire power, while the other is put into this mode.	Zero output advanced mode is on by default, and the standby power supply unit will function normally when power consumption increases. To disable zero output mode, choose **F1 -> System Settings -> Power -> Zero Output -> Disable**.	
Off	On	On	Faulty power supply.	Replace the power supply.	
On	Off	Off	The system is off: The system is connected to power.	1. Reseat the power supply unit. 2. Replace the power supply unit.	PSU should be ON initially when AC input is ready.
			The system is on: Power supply not fully seated, faulty standard I/O book, or faulty power supply.	1. Reseat the power supply unit. 2. Replace the power supply unit. 3. Replace the standard I/O book.	It usually indicates the power supply is not fully seated.
On	Off	On	Faulty power supply.	Replace the power supply.	
On	On	On	Faulty power supply.	Replace the power supply.	

System board LEDs

The following illustrations show the light emitting diodes (LEDs) on the system board.

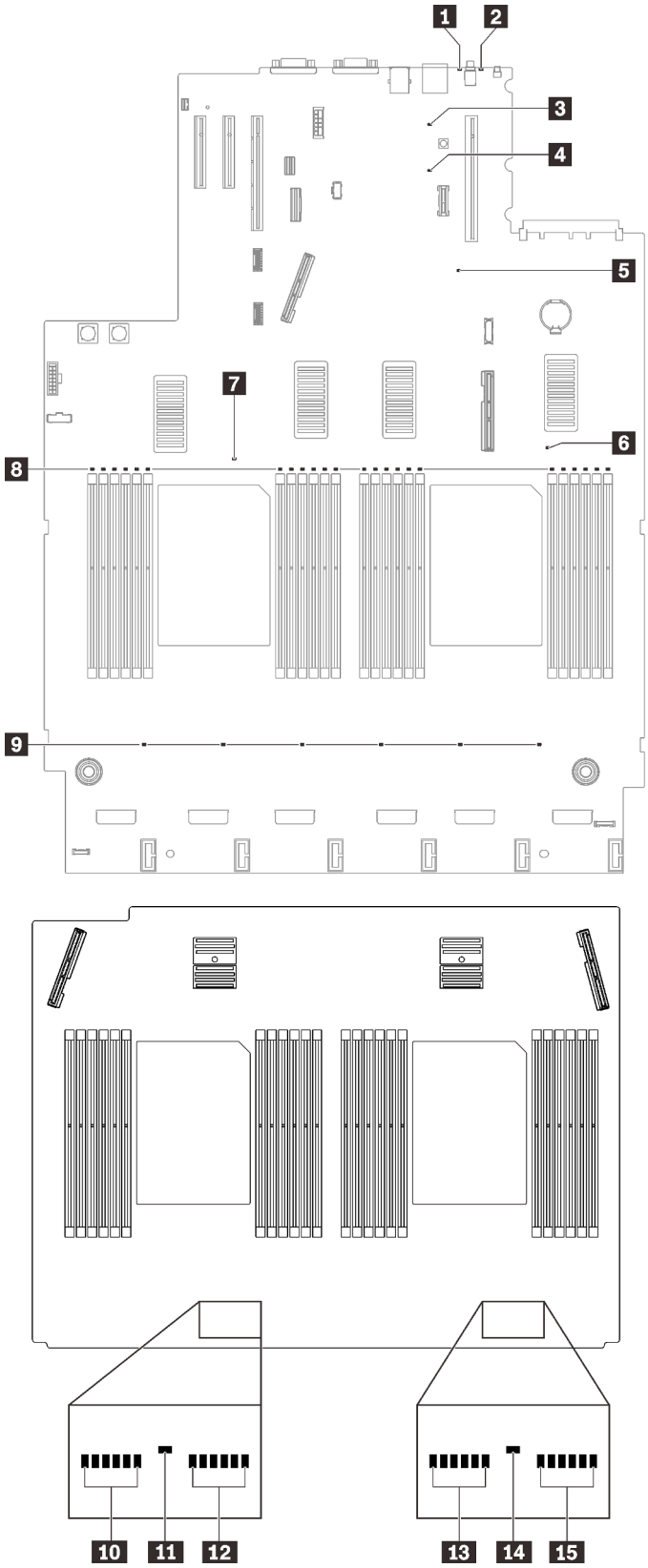


Figure 181. System board and expansion board LEDs

Table 31. System board LEDs descriptions and actions

LED	Descriptions and actions
1 System error LED (yellow)	LED on: An error has occurred. Complete the following steps: 1. Check the identification LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 3. Save the log if necessary, and clear the log afterward.
2 Identification LED (blue)	This LED is used as a presence detection LED. You can use Lenovo XClarity Controller to light this LED remotely. Use this LED to locate the server among other servers visually.
3 Light path power LED	This LED indicates if there is sufficient power to lit the LEDs when light path button is pressed while the system is not connected to the power.
4 XCC heartbeat LED (green)	This LED indicates XCC heartbeat and boot process: • LED blinking fast: XCC code is in the loading process. • LED going off momentarily: XCC code has loaded completely. • LED going off momentarily and then starts blinking slowing: XCC is fully operational. You can now press the power-control button to power on the server.
5 FPGA heartbeat LED (green)	This LED indicates power-on and power-off sequencing. • LED blinking: the system is functioning properly, and no action is necessary. • LED not blinking: (trained technician only) replace the system board (see “System board replacement (trained technician only)” on page 229).
6 7 11 14 Processor error LEDs	LED on: An error has occurred to the processor the LED represents. See “Processor problems” on page 314 for more information.
8 10 12 13 15 DIMM error LEDs	LED on: An error has occurred to the DIMM which the LED represents. See “Memory problems” on page 302 for more information.
9 Fan error LEDs	LED on: An error has occurred to the fan the LED represents. See “Fan problems” on page 299 for more information.

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Printer, mouse, and non-Lenovo devices.
   - Each adapter.
   - Hard disk drives.

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

  See “Specifications” on page 2 to determine the minimum configuration for your server.

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 287

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See “Specifications” on page 2 to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, see “Power supply LEDs” on page 291 to replace the components in the minimum configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.

Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.

Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.

- The Ethernet link status LED is lit when the Ethernet controller receives a link indication from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the rear of the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

See this section to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
   - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
   - If you are managing the server from the Chassis Management Module 2, begin with the Chassis Management Module 2 event log.
   - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

   For more information about event logs, see “Event logs” on page 287)
2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see “Contacting Support” on page 321).

Hard disk drive problems

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

- “Server cannot recognize a hard drive” on page 298
- “Multiple hard drives fail” on page 298
- “Multiple hard drives are offline” on page 299
- “A replacement hard disk drive does not rebuild” on page 299
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 299

- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 299

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

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

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

Multiple hard drives fail

Complete the following steps until the problem is solved:

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

- Make sure that the device drivers and firmware for the hard disk drive and server are at the latest level

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

Multiple hard drives are offline

Complete the following steps until the problem is solved:

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

A replacement hard disk drive does not rebuild

Complete the following steps until the problem is solved:

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

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

Complete the following steps until the problem is solved:

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

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

Complete the following steps until the problem is solved:

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

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

Fan problems

See this section to resolve issues related the to fans.

- “Abnormally high RPM (revolutions per minute)” on page 299

Abnormally high RPM (revolutions per minute)

Complete the following procedure to solve the problem.

1. Check to see if the system inlet perforation or heat sinks are clogged.
2. Make sure that all air baffles are correctly installed in the server.
3. Check the thermal grease on the processor , and make sure it's not contaminated.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 300
- “Intermittent KVM problems” on page 300
- “Intermittent unexpected reboots” on page 300

Intermittent external device problems

Complete the following steps until the problem is solved.

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

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

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

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

To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **BMC Settings → POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, do one of the followings:
   - Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
     `OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
   - Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
3. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 287 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

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

- “All or some keys on the keyboard do not work” on page 301
- “Mouse does not work” on page 301
- “KVM switch problems” on page 301
- “USB-device does not work” on page 302

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
   - The correct USB device driver is installed.
   - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

   Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

- “Displayed system memory is less than installed physical memory” on page 302
- “Multiple memory modules in a channel identified as failing” on page 303
- “Attempt to change to another PMEM mode fails” on page 304
- “Extra namespace appears in an interleaved region” on page 304
- “Migrated PMEMs are not supported” on page 304
- “Invalid memory population detected” on page 305
- “PMEMs installed in wrong slots after system board replacement” on page 305
- “After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots” on page 305
- “Cannot create goal successfully when installing PMEMs to the system for the first time” on page 305

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

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

1. Make sure that:
   - No error LEDs are lit on the operator information panel.
   - No memory module error LEDs are lit on the system board.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see “PMEM rules” in *Setup Guide* for requirements).
   - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
   - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
   - There is no memory mismatch when the server is at the minimum memory configuration.
   - When PMEMs are installed:

a. If the memory is set in App Direct Mode, all the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
b. Refer to “PMEM rules” in *Setup Guide* and see if the displayed memory fits the mode description.
c. If PMEMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted.
d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.

2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.
4. Run memory diagnostics. When you start a solution and press F1, the LXPM interface is displayed by default. You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

   Notes: When PMEMs are installed, run diagnostics based on the mode that is set presently:

   - App Direct Mode:
     – Run Memory Test for DRAM memory modules.
     – Run PMEM Test for PMEMs.
   - Memory Mode:

     Run both Memory Test and PMEM Test for PMEMs.
5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.

   Note: When PMEMs are installed, only adopt this method in Memory Mode.
6. Re-enable all memory modules using the Setup utility, and then restart the server.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the system board.

Multiple memory modules in a channel identified as failing

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.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.

5. Reverse the memory 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.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board.

Attempt to change to another PMEM mode fails

After the PMEM mode is changed and the system is successfully restarted, if the PMEM mode stays the same instead of being changed, check the DRAM DIMMs and PMEM capacity to see if it meets the requirement of the new mode (see “PMEM rules” in *Setup Guide*).

Extra namespace appears in an interleaved region

If there are two created namespaces in one interleaved region, VMware ESXi ignores the created namespaces and creates an extra new namespace during system booting. Delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

Migrated PMEMs are not supported

Intel Optane PMEM interleave set (DIMM X) is migrated from another system (Platform ID: 0x00), these migrated PMEMs are not supported nor warranted in this system.

If this warning message appears, complete the following steps:

1. Move the modules back to the original system with the exact same configuration as the previous one.
2. Back up stored data in PMEM namespaces.
3. Disable PMEM security with one of the following options:
   - **LXPM**

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

     Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
4. Delete namespaces with command corresponding to the operating system that is installed:
   - **Linux** command:
     ```
     ndctl destroy-namespace all -f
     ndctl destroy-namespace all -f
     ```
   - **Windows** Powershell command
     ```
     Get-PmemDisk | Remove-PmemDisk
     ```
5. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).
   ```
   ipmctl delete -pcd
   ```

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

   - Windows: https://datacentersupport.lenovo.com/us/en/videos/YTV101407
   - Linux: https://datacentersupport.lenovo.com/us/en/solutions/HT508642
6. Reboot the system, and press F1 to enter Setup Utility.
7. Power off the system.
8. Remove the modules to be reused for a new system or configuration.

Invalid memory population detected

Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.

If this warning message appears, complete the following steps:

1. See “Memory module installation rules and order” in *Setup Guide* to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

PMEMs installed in wrong slots after system board replacement

DIMM **X** of Intel Optane PMEM persistent interleave set should be moved to DIMM **Y**.

If this warning message appears, complete the following steps:

1. Record each of the instructions of changing PMEM slot from XCC events.
2. Power off the system, and remove the PMEMs that are mentioned in the warning messages. It is suggested to label these PMEMs to avoid confusion.
3. Install the PMEMs in the correct slot number indicated in the warning messages. Remove the labels to avoid blocking airflow and cooling.
4. Complete replacement and power on the system. Make sure there is no similar warning messages in XCC.

Note: Do not perform any provisioning on PMEM to avoid data lost when the messages are still present in XCC events.

After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots

AC the system or restart XCC to solve this problem.

Cannot create goal successfully when installing PMEMs to the system for the first time

When seeing ones of the following messages:

- ERROR: Cannot retrieve memory resources info
- ERROR: One or more PMEM modules do not have PCD data. A platform reboot is recommended to restore valid PCD data.

Complete the following steps to solve the problem.

1. If the PMEMs have been installed in another system with stored data, perform the following steps to erase the data.
   a. Based on the original population order, install the PMEMs to the original system where they were installed previously, and back up the data from the PMEMs to other storage devices.
   b. Disable PMEM security with one of the following options:
      - **LXPM**

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

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

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

- **Linux** command:
  ```
  ndctl destroy-namespace all -f
  ndctl destroy-namespace all -f
  ```
- **Windows** Powershell command
  ```
  Get-PmemDisk | Remove-PmemDisk
  ```

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

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

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

2. Install the PMEMs back to the target system, and upgrade system firmware to the latest version without entering Setup Utility.
3. If the problem persists, overwrite PMEMs with the following ndctl command.
   ```
   ndctl sanitize-dimm --overwrite all
   ```
4. Monitor the overwrite status with the following command.
   ```
   watch -n 1 "ipmctl show -d OverwriteStatus -dimm"
   ```
5. When seeing all PMEM `OverwriteStatus=Completed`, reboot the system and see if the problem persists.

Monitor and video problems

See this section to solve problems related to a monitor or video.

- "Incorrect characters are displayed" on page 306
- "Screen is blank" on page 306
- "Screen goes blank when you start some application programs" on page 307
- "The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted." on page 307
- "The wrong characters appear on the screen" on page 307
- "Management controller remote presence cannot work" on page 307

Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See "Firmware updates" on page 8.

Screen is blank

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. If the server installed with the graphical adapters while turning on the server, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
3. Make sure that:
   - The server is turned on and there is power supplied to the server.

- The monitor cables are connected correctly.
- The monitor is turned on and the brightness and contrast controls are adjusted correctly.

4. Make sure that the correct server is controlling the monitor, if applicable.
5. Make sure that the video output is not affected by corrupted server firmware; see "Firmware updates" on page 8.
6. If the problem remains, contact Lenovo Support.

Screen goes blank when you start some application programs

1. Make sure that:
   - The application program is not setting a display mode that is higher than the capability of the monitor.
   - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

   Attention: Moving a color monitor while it is turned on might cause screen discoloration.

   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

   Notes:

   a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).

   b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor
   d. (Trained technician only) System board.

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See "Firmware updates" on page 8.

Management controller remote presence cannot work

The management controller remote presence function is unable to display the system screen when an optional video adapter is present. To use the management controller remote presence function, remove the optional video adapter or use the onboard VGA as the display device.

Network problems

See this section to resolve issues related to networking.

- “Could not log in using LDAP account with SSL enabled” on page 308
- “Network connection is lost or with degraded performance” on page 308
- “Network settings can not be changed” on page 308

Could not log in using LDAP account with SSL enabled

Complete the following procedure to solve the problem:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Network connection is lost or with degraded performance

Complete the following procedure to solve the problem:

1. Network connection may be lost or with degraded performance with exposure to conducted and/or radiated frequency. Take appropriate actions in this case.

Network settings can not be changed

Complete the following procedure to solve the problem:

1. Go to **Setup Utility → BMC Settings → Network Settings**, and check if the system is configured as following:
   - In **Network Interface Port**, **Dedicated** is set.
   - In **Fail-over Rule**, **Failover to Shared NIC** is set.
   - In **Failed over to Shared NIC → Network Settings**, **Independence** is set.
2. If the system is indeed configured so, go to **Setup Utility → BMC Settings → Network Settings → Network Interface Port**, and select **Shared NIC**.
3. Change network settings as you plan, and save the settings.
4. Go to **Setup Utility → BMC Settings → Network Settings → Network Interface Port**, and select **Dedicated**.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 308
- “The server immediately displays the POST Event Viewer when it is turned on” on page 309
- “Server is unresponsive (POST is complete and operating system is running)” on page 309
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 310
- “Voltage planar fault is displayed in the event log” on page 310
- “Unusual smell” on page 310
- “Server seems to be running hot” on page 310
- “Cannot enter legacy mode after installing a new adapter” on page 311
- “Cracked parts or cracked chassis” on page 311

Server hangs during the UEFI boot process

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

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

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

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

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

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

Complete the following steps until the problem is solved.

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

   You can view processor details from system setup.

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

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

Complete the following steps until the problem is solved.

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

6. Contact your place of purchase of the software or your software provider.

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

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

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

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

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

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

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

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

Unusual smell

Complete the following steps until the problem is solved.

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

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

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

   Note: The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

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

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- "External USB device is not recognized" on page 311
- "PCIe adapter is not recognized or is not functioning" on page 311
- "Insufficient PCIe resources are detected." on page 312
- "A Lenovo optional device that was just installed does not work." on page 312
- "A Lenovo optional device that worked previously does not work now" on page 312

External USB device is not recognized

Complete the following steps until the problem is resolved:

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

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

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

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.

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

Insufficient PCIe resources are detected.

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

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

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

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

A Lenovo optional device that worked previously does not work now

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

6. Replace the failing device.

Power on and power off problems

See this section to resolve issues when powering on or powering off the server.

- "Embedded hypervisor is not in the boot list" on page 313
- "Server does not power on" on page 313
- "Server does not power off" on page 314
- "Unexpected shutdown with LED not lit" on page 314

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is resolved:

1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager `<F12> Select Boot Device` at startup.
2. Make sure that the embedded hypervisor flash device is seated in the connector correctly.
3. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
4. Make sure that other software works on the server.

Server does not power on

Complete the following steps until the problem is resolved:

Note: The power-control button will not function until approximately 5 to 10 seconds after the server has been connected to power.

1. Make sure that the power-control button is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the power cords.
   c. (Trained technician only) Reseat the operator information panel cable, and then repeat steps 1a and 1b.
      - (Trained technician only) If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
      - If the server does not start, bypass the power-control button by using the force power-on jumper. If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
2. Make sure that the reset button is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the power cords.
   c. (Trained technician only) Reseat the operator information panel cable, and then repeat steps 2a and 2b.
      - (Trained technician only) If the server starts, replace the operator information panel.
      - If the server does not start, go to step 3.
3. Make sure that both power supplies installed in the server are of the same type. Mixing different power supplies in the server will cause a system error (the system-error LED on the front panel turns on).
4. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The type of memory that is installed is correct.

- The DIMMs are fully seated.
- The LEDs on the power supply do not indicate a problem.
- The processors are installed in the correct sequence.

5. Reseat the following components:
   a. Operator information panel connector
   b. Power supplies
6. Replace the following components. restarting the server each time:
   a. Operator information panel connector
   b. Power supplies
7. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
8. See “Power supply LEDs” on page 291.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
   a. Press `Ctrl+Alt+Delete`.
   b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
   c. Restart the server.
   d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Unexpected shutdown with LED not lit

Complete the following steps until the problem is resolved:

1. Check the XCC event log, and resolve related errors if found any.
2. Reseat power supply.
3. If the error recurs, replace power supply.

Processor problems

See this section to solve problems related to a monitor or video.

- “The server goes directly to the POST event viewer when it is turned on.” on page 314

The server goes directly to the POST event viewer when it is turned on.

1. Check the light path diagnostics LEDs and the XCC event log, and resolve any errors that have occurred.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size. You can view processor details from system setup. To determine if the processor is supported for the server, see https://serverproven.lenovo.com/
3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server. (3 and 4)
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

Serial-device problems

See this section to solve problems with serial ports or devices.

- "Number of displayed serial ports is less than the number of installed serial ports" on page 315
- "Serial device does not work" on page 315

Number of displayed serial ports is less than the number of installed serial ports

Complete the following procedure to solve the problem.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

Complete the following procedure to solve the problem.

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector.
2. Reseat the following components::
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. (Trained technician only) Replace the system board.

Software problems

See this section to solve software problems.

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

     Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.
   - The operating system is on the ServerProven list (see https://serverproven.lenovo.com/) and supported by your hardware.
   - The software is designed to operate on the server.
   - Other software works on the server.
   - The software works on another server.

2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Check the operating system logs for any events related to your software and attempt to resolve them.
4. Contact your place of purchase of the software.

Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

Disassemble the server for chassis recycle

Follow the instructions in this section to disassemble the server before recycling the chassis.

About this task

Attention:

- Go over “Installation Guidelines” on page 137 to ensure that you work safely.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see “Power off the server” on page 12).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack.

Step 1. Remove all the installed drives and fillers (see “Remove a 2.5-inch hot-swap drive” on page 140 and “Remove a 7mm drive” on page 264).

Step 2. Remove all the installed power supply units and fillers (see “Remove a hot-swap power supply unit” on page 200).

Step 3. Remove the top cover (see “Remove the top cover” on page 241).

Step 4. Remove both PCIe riser cages or fillers, the chassis air baffle, and the PCIe expansion tray (see “Remove a 4U PCIe riser cage” on page 256, “Remove the chassis air baffle” on page 271, and “Remove the 4U PCIe expansion tray” on page 250).

Step 5. Remove the system board air baffle (see “Remove the system board air baffle” on page 227) or the processor and memory expansion tray and the expansion tray air baffle (see “Remove the processor and memory expansion tray” on page 220).

Step 6. Remove the fan cage assembly (see “Remove the fan cage assembly” on page 153).

Step 7. Remove the LCD diagnostics panel (see “Remove the LCD diagnostics panel” on page 173).

Step 8. Remove the USB front panel module (see “Remove the USB front panel module” on page 245).

Step 9. Remove the front VGA assembly (see “Remove the front VGA assembly” on page 161).

Step 10. Remove the PCIe riser card assembly (see “Remove the PCIe riser assembly” on page 187).

Step 11. Remove all the adapters that are installed on the system board (see “Remove an adapter” on page 189 and “Remove the OCP Ethernet adapter” on page 184).

Step 12. Remove the memory modules that are installed on the system board (see “Remove a memory module” on page 179).

Step 13. Remove both PHMs that are installed on the system board (see “Remove a processor and heat sink” on page 207).

Step 14. Remove the power backplane from the system board (see “Remove the power backplane” on page 195).

Step 15. Remove the system board (see “Remove the system board” on page 230).

After disassembling the server, recycle the unit in compliance with local regulations.

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Appendix B. Getting help and technical assistance

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

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

http://datacentersupport.lenovo.com

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

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

Attempt to resolve the problem yourself

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

You can find the product documentation for your ThinkSystem products at the following location:

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

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com/ to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
  - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

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

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

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

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

  - For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
  - For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Appendix C. Notices

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Lenovo (United States), Inc.
1009 Think Place
Morrisville, NC 27560
U.S.A.
Attention: Lenovo VP of Intellectual Property

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Important notes

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

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

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

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

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

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

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

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Taiwan Region BSMI RoHS declaration

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

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

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

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

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

備考3. 〝-〞係指該項限用物質為排除項目。

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

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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

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