ThinkSystem SR850
Setup Guide

Machine Types: 7X18 and 7X19

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html

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

Contents

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.

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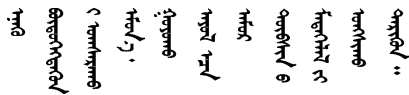
Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྟེར་བསྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنتشتىن بۇرۇن بخەتەرلىك 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:

    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.

Chapter 1. Introduction

The ThinkSystem SR850 server is a 2U 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.
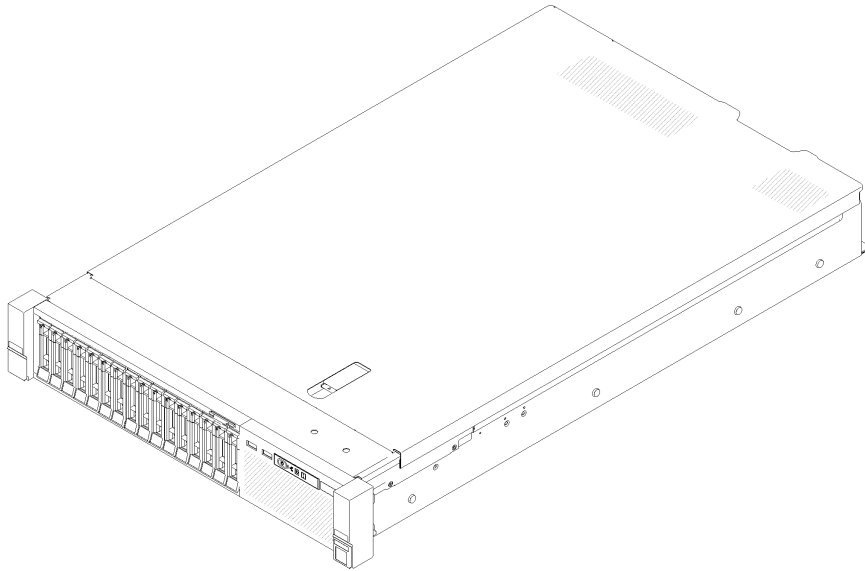
Figure 1. ThinkSystem SR850

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/sr850

Figure 2. QR code

Server package contents

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

The server package includes the following items:

Note: Some of the items listed are available on select models only.

- Server

- Rail installation kit (optional). Detailed instructions for installing the rail installation kit are provided in the package with the rail installation kit.

- Cable management arm or cable management bar.

- Material box, including items such as rack installation guide and accessory kit.

Features

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

Your server implements the following features and technologies:

- **Features on Demand**

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

  https://fod.lenovo.com/lkms

- **Lenovo XClarity Controller (XCC)**

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

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

  https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

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

- **UEFI-compliant server firmware**

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

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

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

- **Active Memory**

  The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs.

- **Large system-memory capacity**

The server supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) with error correcting code (ECC). For more information about the specific types and maximum amount of memory, see "Specifications" on page 4.

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

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

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

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

  The hot-swap server models support a maximum of fourteen 3.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives or hot-swap Serial ATA (SATA) hard disk drives. The simple-swap server models support a maximum of eight 3.5-inch simple-swap SATA hard disk drives.

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

- **Light path diagnostics**

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

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

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

- **Active Energy Manager**

  Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, and ThinkServer servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant networking connection**

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

- **Redundant cooling and optional power capabilities**

  The server supports a maximum of two 550-watt or 750-watt hot-swap power supplies and three dual-motor non hot-swap fans, which provide redundancy for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails. The server comes with one 550-watt or 750-watt hot-swap power supply and three non hot-swap fans.

  Note: You cannot mix 550-watt and 750-watt power supplies in the server.

- **ThinkSystem RAID support**

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

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 7X18 and 7X19

Specification	Description

Dimension	2U server
	• Height: 86.5 mm (3.4 inches)
	• Width:
	  – With rack handles: 482 mm (19.0 inches)
	  – Without rack handles: 444.6 mm (17.5 inches)
	• Depth: 763.7 mm (30.1 inches)
	Note: The depth is measured with rack handles installed, but without the security bezel installed.

Weight (depending on the configuration)	27.0 kg (59.6 lb) in maximum.
Processor (depending on model)	Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Ultra Path Interconnect (UPI) architecture. • Two processor sockets (expandable up to four) with minimal requirement of two installed on the system board. • Designed for LGA 3647 sockets • Scalable up to 28 cores • Supports Intel Extended Memory 32/64 Technology (EM32/64T)

Memory	See "Memory module installation rules and order" on page 52 for detailed information about memory configuration and setup.
	• Minimum: 16 GB
	• Maximum:
	  – RDIMM: 1.5 TB
	  – LRDIMM: 3 TB
	  – 3DS-RDIMM: 6 TB
	  – DC Persistent Memory (DCPMM): 12 TB in Memory Mode
	• Memory module types:
	  – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 2666/2933 MT/s registered DIMM (RDIMM) or load reduced DIMM (LRDIMM)
	  – DC Persistent Memory (DCPMM)
	• Capacity (depending on the model):
	  – 8 GB, 16 GB, 32 GB, and 64 GB RDIMM
	  – 64 GB LRDIMM
	  – 64 GB and 128 GB 3DS-RDIMM
	  – 128 GB, 256 GB, and 512 GB DCPMM
	
	    Note: DCPMM can be mixed with DRAM DIMMs with capacity of more than 16 GB. See "DC Persistent Memory Module (DCPMM) setup" on page 74 for more information.
	• Slots: 24 two-way interleaved slots (expandable to 48)
	
	For a list of supported memory modules, see https://static.lenovo.com/us/en/serverproven/index.shtml.

Drive expansion	Sixteen 2.5-inch drive bays: • Eight 2.5-inch hot-swap SATA/SAS drive bays (bay 0-3, 8-11) • Eight 2.5-inch hot-swap SATA/SAS/NVMe drive bays (bay 4-7, 12-15)

Table 1. Specifications, Type 7X18 and 7X19 (continued)

Expansion slots	Eleven expansion slots:
	• Slot 1: PCI Express 3.0 x16 (supports PCIe switch card)
	• Slot 2: PCI Express 3.0 x8 (supports RAID adapters for SATA/SAS drives)
	• Slot 3 - 5: PCI Express 3.0 for PCIe riser-card with the following slots available depending on the riser-card installed:
	  – x8/x8/x8 PCIe full-height riser assembly provides:
	    – Slot 3: PCI Express 3.0 x8
	    – Slot 4: PCI Express 3.0 x8
	    – Slot 5: PCI Express 3.0 x8
	  – x8/x8/x8ML2 PCIe full-height riser assembly provides:
	    – Slot 3: PCI Express 3.0 x8
	    – Slot 4: PCI Express 3.0 x8
	    – Slot 5: Customized slot for x8 ML2 adapter
	  – x8/x16ML2 PCIe full-height riser assembly provides:
	    – Slot 3: PCI Express 3.0 x8
	    – Slot 4: Not available
	    – Slot 5: Customized slot for x16 ML2 adapter
	• Slot 6: Customized slot for dual M.2 backplane that supports M.2 drives in three different physical sizes:
	  – 42 mm (2242)
	  – 60 mm (2260)
	  – 80 mm (2280)
	• Slot 7: Customized slot for LOM adapter
	• Slot 8: PCI Express 3.0 x8
	• Slot 9: PCI Express 3.0 x8
	• Slot 10: PCI Express 3.0 x8 (supports RAID adapters for SATA/SAS drives)
	• Slot 11: PCI Express 3.0 x16 (supports PCIe switch card)

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.
	• Light-path diagnostics
	• Four universal serial bus (USB) ports:
	  – Two on the front of the server
	    – One USB 2.0 with Lenovo XClarity Controller management
	    – One USB 2.0 or 3.0 (depending on the model)
	  – Two USB 3.0 on the rear of the server
	• One serial port

Network	This server supports 1GbE and 10 GbE LOM adapters with the following requirements: • 1GbE LOM adapter: maximal bandwidth of network environment is 1GB. • 10GbE LOM adapter: minimal bandwidth of network environment is 1GB.
RAID adapter (depending on model)	The following options with support for RAID levels 0, 1, and 10 are available for this server: • ThinkSystem RAID 530-8i PCIe 12 GB Adapter • ThinkSystem RAID 730-8i 1 GB Cache PCIe 12 GB Adapter • ThinkSystem RAID 730-8i 2 GB Cache PCIe 12 GB Adapter • ThinkSystem RAID 930-8i 2 GB Flash PCIe 12 GB Adapter • ThinkSystem RAID 930-16i 4 GB Flash PCIe 12 GB Adapter • ThinkSystem RAID 930-8e 4 GB Flash PCIe 12 GB Adapter
Fans	Six (60 mm x 38 mm) internal system fans (N+1 redundancy)

Table 1. Specifications, Type 7X18 and 7X19 (continued)

Electrical input	This server comes with three types of power supply units:
	• 750-watt platinum power supply
	   – Input power 115V or 220V ac
	• 1100-watt platinum power supply
	   – Input power 115V or 220V ac
	• 1600-watt platinum power supply
	   – Input power 220V ac
	Two power supplies provide N+1 redundancy support.
	CAUTION:
	
	1. **240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.**
	
	2. **Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.**
	
	3. **In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.**

Minimal configuration for debugging	• Two processors in processor socket 1 and 2 • Two DIMMs in slot 8 and 20 • One power supply • One drive with RAID adapter and backplane (If OS is needed for debugging) • Six system fans (fan 1 to fan 6)

Acoustical noise emissions	• Sound power, idling
	   – 5.2 bels, minimum
	   – 5.8 bels, typical
	   – 6.4 bels, maximum
	• Sound power, operating
	   – 5.8 bels, minimum
	   – 6.8 bels, typical
	   – 7.0 bels, maximum

Heat output	Approximate heat output: • Minimum configuration: 447 BTU, 131 W (in BTU per hour and watts) • Maximum configuration: 5265 BTU, 1543 W (in BTU per hour and watts)

Table 1. Specifications, Type 7X18 and 7X19 (continued)

Environment	ThinkSystem SR850 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 ASHRAE A2 specification.
	• Air temperature:
	  – Operating
	    – ASHRAE 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).
	    – ASHRAE 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).
	    – ASHRAE 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" in *ThinkSystem SR850 Maintenance Manual*.

Operating systems	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.com/osig. • OS deployment instructions: "Deploy the operating system" on page 124.

Note: To maintain component reliability, system performance might vary at ambient temperature higher than 35°C while all the fans are functioning. With one fan failing, system performance might vary at ambient temperature higher than 27°C.

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 300 Angstroms per month (Å/month ≈ 0.0039 μg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Å/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.

Management options

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

Overview

Options	Description
Lenovo XClarity Controller	Baseboard management controller. (BMC) Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board. **Interface** • CLI application • Web GUI interface • Mobile application • REST API **Usage and downloads** https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html
Lenovo XClarity Essentials toolset	Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts. **Interface** • **OneCLI**: CLI application • **Bootable Media Creator**: CLI application, GUI application • **UpdateXpress**: GUI application **Usage and downloads** http://sysmgt.lenovofiles.com/help/topic/xclarity_essentials/overview.html

Options	Description
Lenovo XClarity Provisioning Manager	UEFI-based embedded GUI tool on a single server that can simplify management tasks. **Interface** • Web interface (BMC remote access) • GUI application **Usage and downloads** https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html **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://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.
Lenovo XClarity Integrator	Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency. **Interface** GUI application **Usage and downloads** https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html
Lenovo XClarity Energy Manager	Application that can manage and monitor server power and temperature. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lxem
Lenovo Capacity Planner	Application that supports power consumption planning for a server or rack. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lcp

Functions

Options		Functions							
		Multi-system mgmt	OS deploy-ment	System configu-ration	Firm-ware up-dates[1]	Event-s/alert moni-toring	Inven-tory/logs	Pow-er mgmt	Power planning
Lenovo XClarity Controller				√	√[2]	√	√[4]		
Lenovo XClarity Administrator		√	√	√	√[2]	√	√[4]		
Lenovo XClarity Essen-tials toolset	OneCLI	√		√	√[2]	√	√[4]		
	Bootable Media Creator			√	√[2]		√[4]		
	UpdateXpress			√	√[2]				
Lenovo XClarity Provisioning Manager			√	√	√[3]		√[5]		
Lenovo XClarity Integrator		√	√[6]	√	√	√	√	√[7]	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√[8]

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.

2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.

3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.

4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.

5. Limited inventory.

6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.

7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.

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

Chapter 2. Server components

Use the information in this section to learn about each of the components associated with your 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.
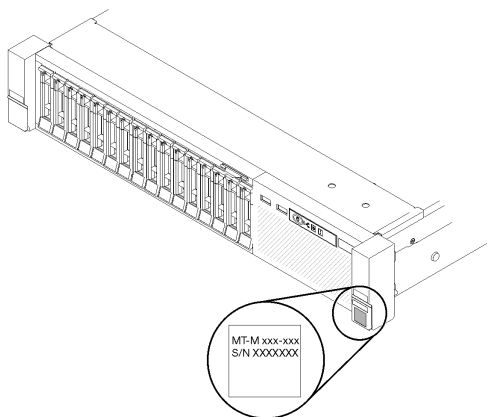
Figure 3. Location of the machine type, model, and serial number

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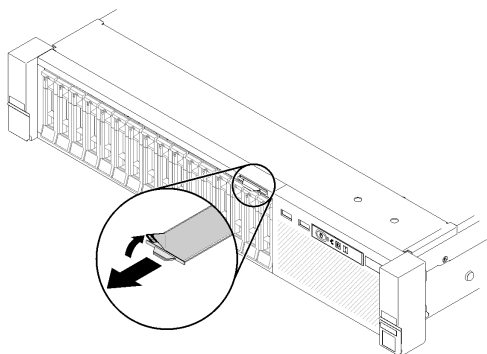
Figure 4. XClarity Controller network access label on the pull-out information tab

Front view

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

The following illustration shows the controls, LEDs, and connectors on the front of the server.
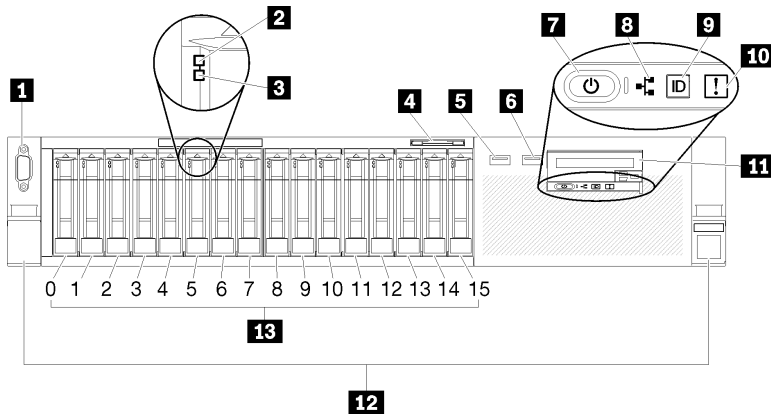
Figure 5. Front view

Table 3. Components on the server front view

1 VGA connector (optional)	**8** Network activity LED (green)
2 Drive activity LED (green)	**9** Identification button/LED (blue)
3 Drive status LED (yellow)	**10** System error LED (yellow)
4 Pull-out information tab	**11** Front operator panel with optional pull-out LCD display
5 USB 1 (USB 2.0 with Lenovo XClarity Controller management)	**12** Rack release latches
6 USB 2	**13** 2.5-inch drive bays
7 Power button/LED (green)	

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 Drive activity LED (green):

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

3 Drive status LED (yellow):

These LEDs are on SAS or SATA hard disk drives and solid-state drives. When one of these LEDs is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

4 Pull-out information tab:

This tag contains network information such as MAC address, which is available with a pull on the tab.

5 6 USB connectors:

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

• **5** 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 USB 2.0 with Lenovo XClarity Controller management 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.

• **6** USB 2: USB 2.0 or 3.0 (depending on the model).

7 Power button/LED (green):

Press the power button to turn the server on and off manually. This LED indicates power status of the server. See "Front operator panel" on page 16 for more details.

8 Network activity LED (green):

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

9 Identification button/LED (blue):

Press this button to visually locate the server among other servers. Use this LED to visually locate the server among other servers. XCC can also be used to turn this LED on and off.

10 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 front operator panel could also help isolate an error.

11 Front operator panel with optional pull-out LCD display:

This panel contains controls and LEDs that provide information about the status of the server. For information about the controls and LEDs on the front operator panel, see "Front operator panel" on page 16.

12 Rack release latches:

Press the latch on both sides in the front of the server to slide the server out of the rack.

13 2.5-inch drive bays:

Install 2.5-inch drives to these bays. See "Install a 2.5-inch hot-swap drive" on page 96 for more details.

Front operator panel

The following illustration shows the controls and LEDs on the front operator panel.
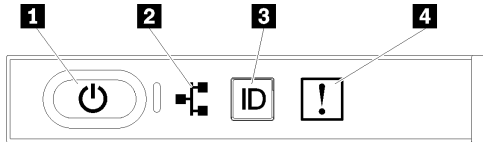
Figure 6. Front operator panel

Table 4. Buttons and LEDs on the front operator panel

1 Power button/LED (green)	**3** Identification button/LED (blue)
2 Network activity LED (green)	**4** System error LED (yellow)

1 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 is properly installed, or the LED itself has failed.

Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 5 to 10 seconds.

Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

Lit: The server is turned on.

2 Network activity LED (green)

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

3 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.

4 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 front operator panel could also help isolate an error.

Front operator panel with LCD display

The following section includes an overview of the LCD system information display panel of front operator panel, which displays various types of information about the server.

Your front operator panel may come with a LCD display, which is accessible with a pull on the latch on the right of the front operator panel.
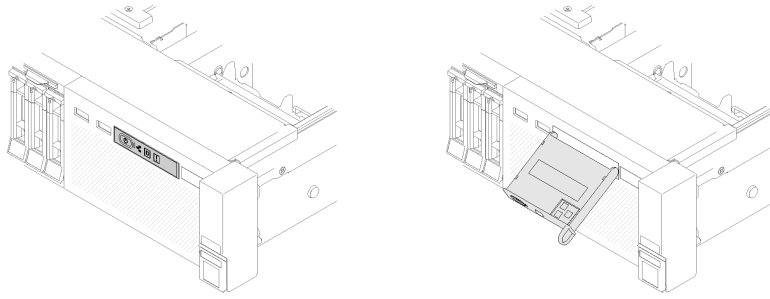
Figure 7. Front operator panel and LCD display

The LCD system information display panel attached to the front of the server allows quick access to system status, firmware, network, and health information.
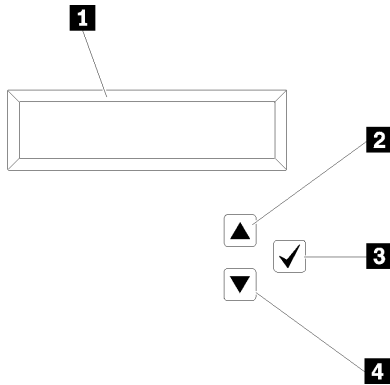
Figure 8. System information and control of the front operator panel

Table 5. System information and control of the front operator panel

1 System information: System information, including system name, system status, temperature, power consumption and UEFI/POST code, is displayed here.	**3 Select button:** Press this button to make your selection from the menu options.
2 Scroll up button: Press this button to scroll up or scroll to the left in the main menu to locate and select the system information that you want displayed.	**4 Scroll down button:** Press this button to scroll down or scroll to the right in the main menu to location and select the system information that you want displayed.

Following is an example of the information on the display panel.
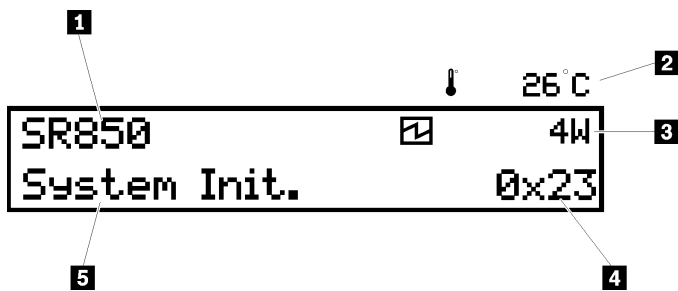
Figure 9. System information on LCD display panel

Table 6. System information display panel of front operator panel

1 System name (SR850)	**4** Checkpoint code
2 Temperature (blinking in turns with **3**)	**5** System status
3 Power consumption (blinking in turns with **2**)	

The option menu UI flow on the LCD display is illustrated as following.
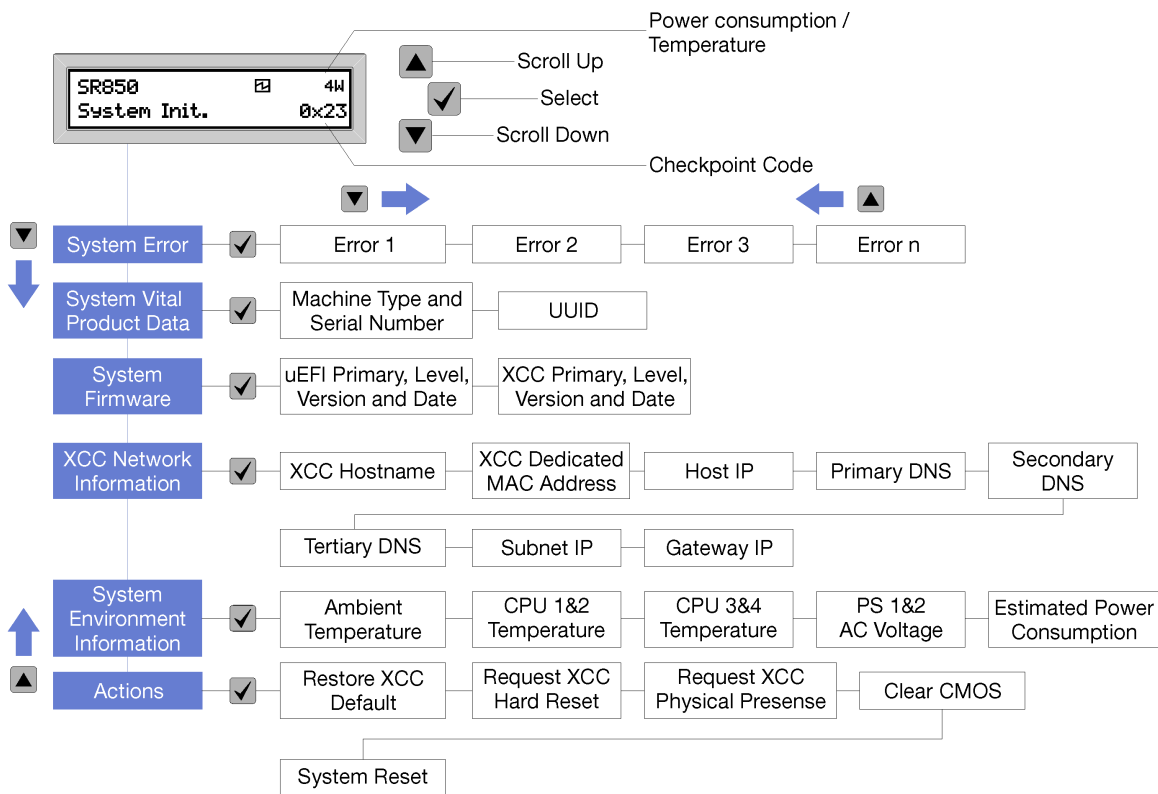
Figure 10. Front operator panel option menu UI flow

Following is the list of options available on the front operator panel. Switch between an option and the subordinate information entries with **Select** (√) button, and switch among options or information entries with **Scroll up** (▾) and **Scroll down** (▴) buttons.

Table 7. Options available on the front operator panel

Option	Description
System error	**System error** provides the total number of errors the system encountered, and the description of these errors. The information is displayed as following: `System Has Encountered X Errors` Whereas X is the total number of system errors encountered. Access error descriptions with select button, and switch among the descriptions with scroll up and down buttons. **Note:** When only one error occurs, the LCD display panel displays error description instead of number of errors encountered.

System vital product data	**System vital product data** provides the following information:
	
	• **Machine type and serial number** are displayed as following:
	
	`Machine Type: XXXXXXXX Serial Num: YYYYYY`
	
	• **UUID (universally unique identifier)** is displayed as following:
	
	`UUID: ZZZZZZZZZZZZZZZZZZZZZZZZZZZZ`
	
	Whereas
	• XXXXXXXX is the machine type.
	• YYYYYY is the serial number.
	• ZZZZZZZZZZZZZZZZZZZZZZZZZZZZ is the UUID

System firmware level	**System firmware level** provides information about the following firmware:
	
	• **UEFI primary level** is displayed as following:
	
	`UEFI Pri: TEEXXXX vN.NN Date:YYYY-MM-DD`
	
	• **XCC primary level** is displayed as following:
	
	`XCC Pri: TEEXXXX vN.NN Date:YYYY-MM-DD`
	
	Whereas
	• XXXX is the level information.
	• N.NN is the version number.
	• YYYY is the year.
	• MM is the month.
	• DD is the date.

Table 7. Options available on the front operator panel (continued)

XCC network information	**XCC Network information** provides the following XCC related network information:
	
	• **XCC hostname** is displayed as following:
	
	`XCC Hostname: XCC-NNNN`
	
	• **XCC shared or extension MAC address** is displayed as following:
	
	`XCC Dedicated MAC: XX:XX:XX:XX:XX:XX`
	
	• **IP Address** is displayed as following:
	
	`IP Host IP: Y.Y.Y.Y`
	
	• **Primary DNS** is displayed as following:
	
	`IP Primary DNS: Y.Y.Y.Y`
	
	• **Secondary DNS** is displayed as following:
	
	`IP Secondary DNS: Y.Y.Y.Y`
	
	• **Tertiary DNS** is displayed as following:
	
	`IP Tertiary DNS: Y.Y.Y.Y`
	
	• **Subnet IP** is displayed as following:
	
	`IP Subnet IP: Y.Y.Y.Y`
	
	• **Gateway IP** is displayed as following:
	
	`IP Gateway IP: Y.Y.Y.Y`
	
	Whereas
	
	• NNNN is the machine type.
	• XX.XX:XX:XX:XX:XX is a MAC address.
	• Y.Y.Y.Y is an IPv4 or IPv6 address.

System environmental information	**System environmental information** provides the following information:
	
	• **Ambient temperature** is displayed as following:
	
	`Ambient Temperature: XX C`
	
	• **Processor temperature** is displayed as following:
	
	`CPU1 Temperature: XX C CPU2 Temperature: XX C CPU3 Temperature: XX C CPU4 Temperature: XX C`
	
	Switch between CPU1/2 and CPU3/4 with scroll up and down buttons.
	
	• **AC input voltage** is displayed as following:
	
	`PS1 AC Voltage: YYY V PS2 AC Voltage: YYY V`
	
	• **Estimated power consumption** is displayed as following:
	
	`Sytem Power: ZZ W`
	
	Whereas
	
	• XX is the temperature.
	• YYY is the AC voltage.
	• ZZ is the wattage.

Actions	**Actions** provides the following available actions, which come in effect by pressing and holding on the select button for three seconds: • **Restore XCC default settings** is displayed as following: `RESTORE XCC DEFAULTS? HOLD v FOR 3s`

Table 7. Options available on the front operator panel (continued)

	• **Restart XCC** is displayed as following: REQUEST XCC HARD RESET? HOLD v FOR 3s • **Request XCC physical presence** is displayed as following: REQUEST XCC PHY. PRES.? HOLD v FOR 3s • **Clear CMOS** is displayed as following: CLEAR CMOS? HOLD v FOR 3s **Note:** This action is only available when the system power is off. • **System reboot** is displayed as following: SYSTEM RESET BUTTOM? HOLD v FOR 3s

Rear view

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

The following illustrations show the connectors and LEDs on the rear of the server.
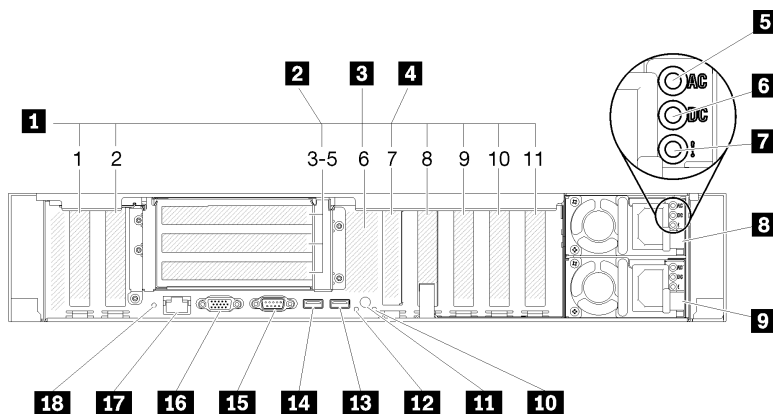
Figure 11. Rear view

Table 8. Components on the server rear view

1 PCIe slots (slot 1-2, 8-11)	**10** System error LED (yellow)
2 PCIe riser-card (slot 3-5)	**11** Identification button
3 M.2 backplane (slot 6, internal)	**12** Identification LED (blue)
4 LOM adapter (slot 7)	**13** USB 4 (USB 3.0)
5 AC power LED (green)	**14** USB 3 (USB 3.0)
6 DC power LED (green)	**15** Serial connector
7 Power supply error LED (yellow)	**16** VGA connector
8 Power supply unit 2	**17** XClarity Controller network connector
9 Power supply unit 1	**18** NMI button

1 PCIe slots (slot 1-2, 8-11):

Install PCIe adapters into these slots. Following are detailed descriptions of each slot:

- Slot 1: PCI Express 3.0 x16 (supports PCIe switch card)
- Slot 2: PCI Express 3.0 x8 (supports RAID adapters for SATA/SAS drives)
- Slot 8: PCI Express 3.0 x8
- Slot 9: PCI Express 3.0 x8
- Slot 10: PCI Express 3.0 x8 (supports RAID adapters for SATA/SAS drives)
- Slot 11: PCI Express 3.0 x16 (supports PCIe switch card)

For more information, see "System-board connectors" in *ThinkSystem SR850 Maintenance Manual* for the location of the slots, and "PCIe riser-card and adapter replacement" in *ThinkSystem SR850 Maintenance Manual* for information about installation and removal.

2 PCIe riser-card (slot 3-5):

Install a full-height PCIe riser-card into this slot. Following are the PCIe riser-cards supported by this server.

- x8/x8/x8 PCIe full-height riser assembly provides:
  - Slot 3: PCI Express 3.0 x8
  - Slot 4: PCI Express 3.0 x8
  - Slot 5: PCI Express 3.0 x8
- x8/x8/x8ML2 PCIe full-height riser assembly provides:
  - Slot 3: PCI Express 3.0 x8
  - Slot 4: PCI Express 3.0 x8
  - Slot 5: Customized slot for x8 ML2 adapter
- x8/x16ML2 PCIe full-height riser assembly provides:
  - Slot 3: PCI Express 3.0 x8
  - Slot 4: Not available
  - Slot 5: Customized slot for x16 ML2 adapter

3 M.2 backplane (slot 6):

Install M.2 backplane to this slot. See "Install the M.2 backplane" on page 102 and "Install an M.2 drive in the M.2 backplane" on page 101 for more details.

4 LOM adapter (slot 7):

Insert LOM adapter into this slot (see "System-board connectors" in *ThinkSystem SR850 Maintenance Manual* for the location of the LOM adapter slot on the system board and "LOM adapter replacement" in *ThinkSystem SR850 Maintenance Manual* for information about the installation of the LOM adapter).

5 AC power LED:

Each hot-swap power supply comes with an ac power LED and a 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. For more information, see "Lightpath Diagnostics" in ThinkSystem SR850 Maintenance Manual.

6 DC power LED:

Each hot-swap power supply comes with a dc power LED and an ac 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. For more information, see "Lightpath Diagnostics" in ThinkSystem SR850 Maintenance Manual.

▐▌ Power-supply error LED:

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

▐▌ ▐▌ 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 power supply
  - Input power 115V or 230V ac
- 1100-watt platinum power supply
  - Input power 115V or 230V ac
- 1600-watt platinum power supply
  - Input power 230V ac

▐▌ 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 front operator panel could also help isolate an error.

▐▌ Identification button:

Press this button to visually locate the server among other servers. This button is functionally equivalent to the identification button on the front of the server.

▐▌ Identification LED (blue):

Use this LED to visually locate the server among other servers. XCC can also be used to turn this LED on and off. This LED is functionally equivalent to the identification LED on the front of the server.

▐▌ ▐▌ USB connectors (USB 3.0):

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

▐▌ Serial connector:

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

▐▌ 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.

▐▌ 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.

18 **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.

Optional processor and memory expansion tray

Use this information to locate the connectors and LEDs on the optional processor and memory expansion tray.

The following illustrations show the connectors and LEDs on the processor and memory expansion tray.
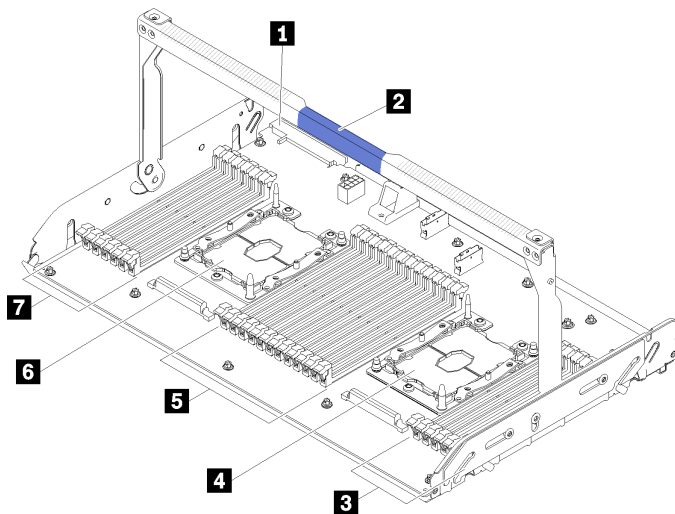
Figure 12. Optional processor and memory expansion tray

Table 9. Components on the optional processor and memory expansion tray

1 Power supply 2 connector	**5** DIMM slot 31-42
2 Tray handle	**6** Processor 3
3 DIMM slot 43-48	**7** DIMM slot 25-30
4 Processor 4	
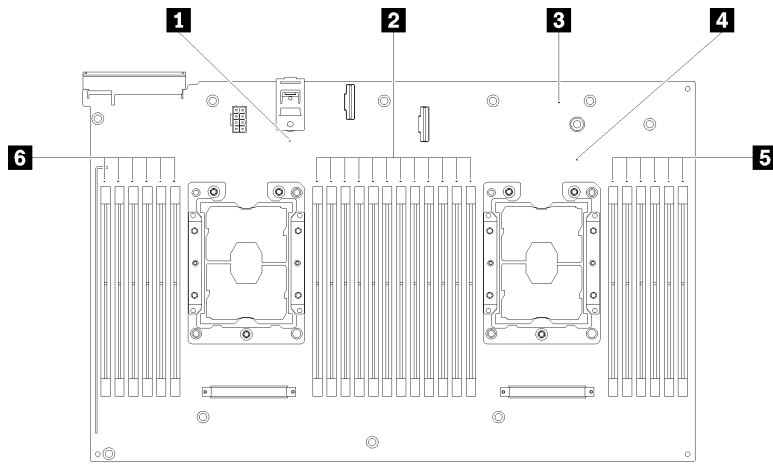
Figure 13. LEDs on the optional processor and memory expansion tray

Table 10. LEDs on the optional processor and memory expansion tray

1 Processor 3 error LED	**4** Processor 4 error LED
2 DIMM slot 31-42 error LEDs	**5** DIMM slot 43-48 error LEDs
3 Expansion board error LED	**6** DIMM slot 25-30 error LEDs
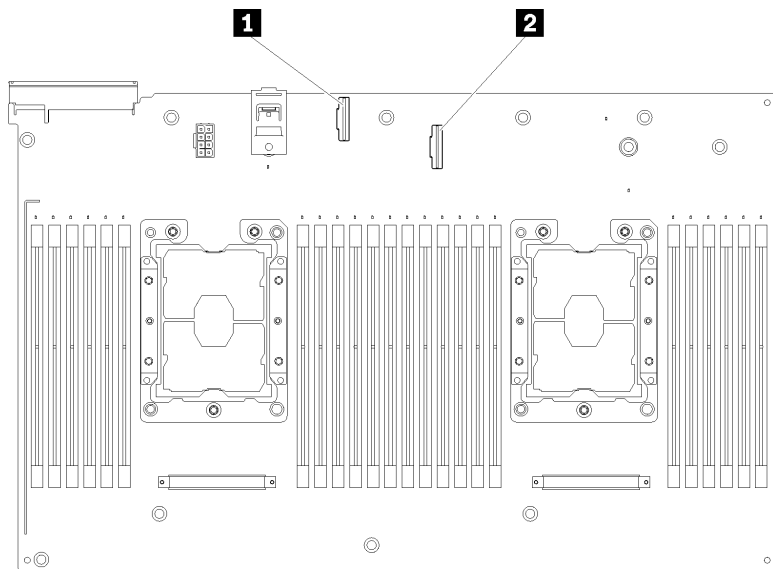
Figure 14. Connectors on the optional processor and memory expansion tray

Table 11. Connectors on the optional processor and memory expansion tray

1 NVMe signal cable connector 0-1	**2** NVMe signal cable connector 2-3

PCIe riser-cards

Use this information to locate the connectors on the optional PCIe riser-cards.

x8/x8/x8 PCIe FH Riser Assembly
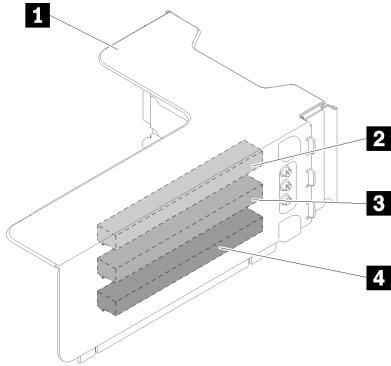
Figure 15. x8/x8/x8 PCIe FH Riser Assembly

Table 12. Components of x8/x8/x8 PCIe FH Riser Assembly

1 PCIe full-height riser cage	**3** PCI Express 3.0 x8 (slot 4)
2 PCI Express 3.0 x8 (slot 3)	**4** PCI Express 3.0 x8 (slot 5)

x8/x8/x8ML2 PCIe FH Riser Assembly
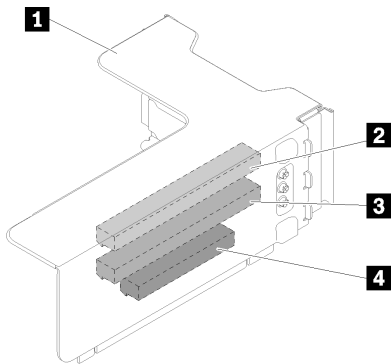
Figure 16. x8/x8/x8ML2 PCIe FH Riser Assembly

Table 13. Components of x8/x8/x8ML2 PCIe FH Riser Assembly

1 PCIe full-height riser cage	**3** PCI Express 3.0 x8 (slot 4)
2 PCI Express 3.0 x8 (slot 3)	**4** Customized slot for ML2 adapter (slot 5)

x8/x16ML2 PCIe FH Riser Assembly
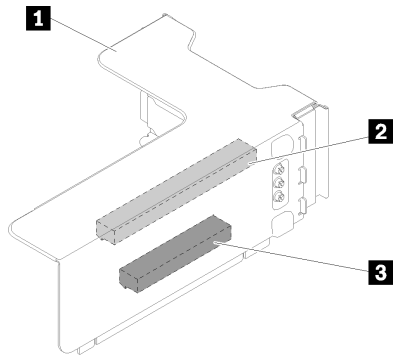
Figure 17. x8/x16ML2 PCIe FH Riser Assembly

Table 14. Components of x8/x16ML2 PCIe FH Riser Assembly

1 PCIe full-height riser cage	**3** Customized slot for ML2 adapter (slot 5)
2 PCI Express 3.0 x8 (slot 3)	

2.5-inch drive backplanes

Use this information to locate the connectors on the optional 2.5-inch drive backplanes.

2.5-inch SATA/SAS 8-bay backplane
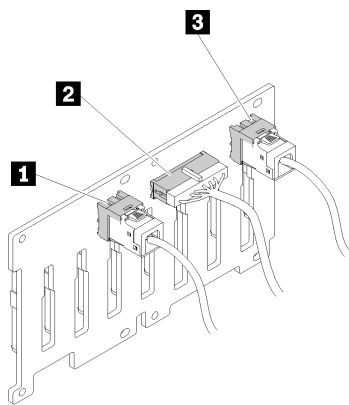
Figure 18. 2.5-inch SATA/SAS 8-bay backplane

Table 15. Connectors on 2.5-inch SATA/SAS 8-bay backplane

1 SATA/SAS connector 1	**3** SATA/SAS connector 0
2 Power/configuration cable connector	

2.5-inch SATA/SAS 8-bay backplane comes with:

- Eight SATA/SAS drive connectors with bay numbers of 0-7 or 8-15, depending on the location installed.
- One power/configuration connector
- Two SATA/SAS connectors (0, 1)

2.5-inch AnyBay (SATA/SAS/NVMe) 8-bay backplane
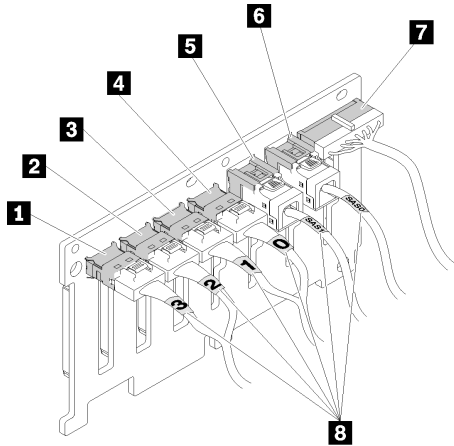
Figure 19. 2.5-inch AnyBay (SATA/SAS/NVMe) 8-bay backplane

Table 16. Connectors on 2.5-inch AnyBay (SATA/SAS/NVMe) 8-bay backplane

1 NVMe connector 3	**5** SATA/SAS connector 1
2 NVMe connector 2	**6** SATA/SAS connector 0
3 NVMe connector 1	**7** Power/configuration cable connector
4 NVMe connector 0	**8** Cable numbering labels

2.5-inch AnyBay (SATA/SAS/NVMe) 8-bay backplane comes with:

- Four SATA/SAS drive connectors with bay numbers of 0-3 or 8-11, depending on the location installed.
- Four NVMe drive connectors with bay numbers of 4-7 or 12-15, depending on the location installed.
- One power/configuration cable connector
- Two SATA/SAS connectors (0, 1)
- Four NVMe connectors (0, 1, 2, 3)

RAID adapters

Use this information to locate the connectors on the optional RAID adapters.
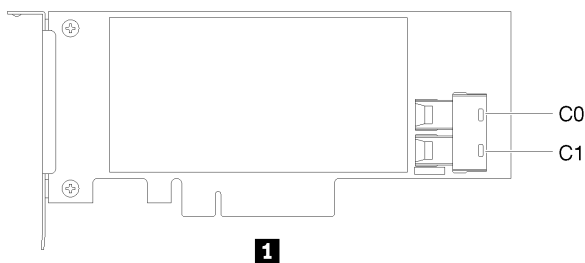
Figure 20. Connectors on SATA/SAS RAID adapter (8i)

Table 17. SATA/SAS RAID adapter (8i)

1 SATA/SAS RAID adapter (8i) with two SATA/SAS connectors (C0, C1)
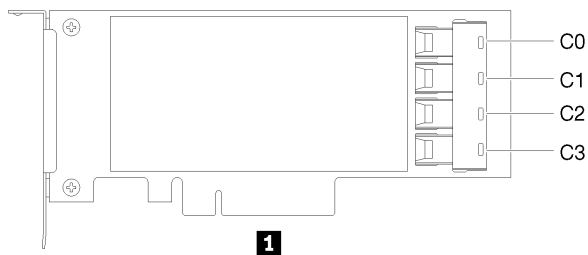
Figure 21. Connectors on SATA/SAS RAID adapter (16i)

Table 18. SATA/SAS RAID adapter (16i)

1 SATA/SAS RAID adapter (16i) with four SATA/SAS connectors (C0, C1, C2, C3)
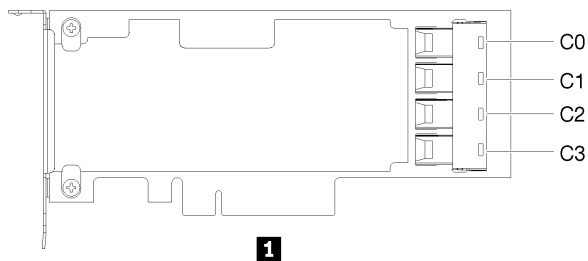
Figure 22. Connectors on PCIe switch card

Table 19. PCIe switch card

1 PCIe switch card with four SATA/SAS connectors (C0, C1, C2, C3)

Internal cable routing

Use this information to do cable routing to complete installation of certain components.

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

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

Cable routing for 2.5-inch drives

Use this section to understand how to route cables for 2.5-inch drives.

Following is the list of combinations of cable routing for 2.5-inch drives.

-
  -
  -
    - Two processors installed
    - Four processors installed
-

Important:

1. Make sure all the signal cables go through the cable guides.
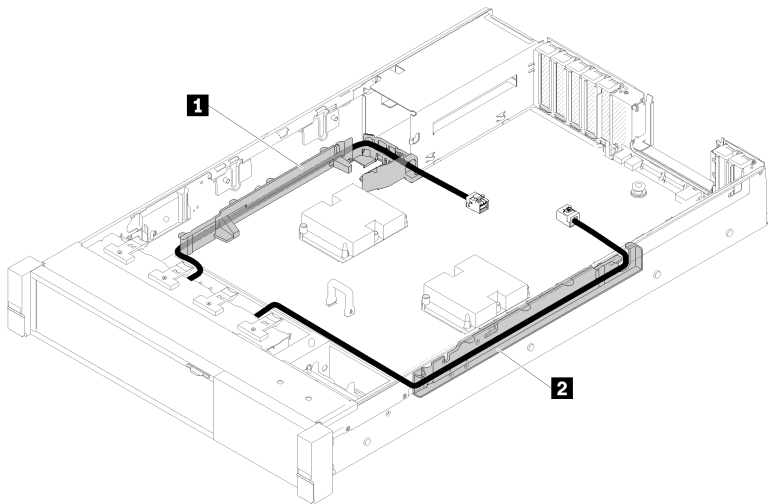
Figure 23. Cable guide locations

2. Connect the direct NVMe signal cables to the NVMe connectors on the processor and memory expansion tray.
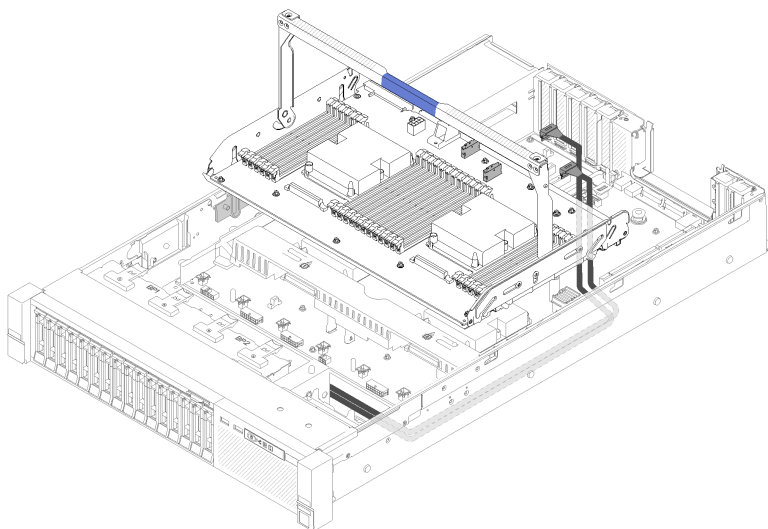
Figure 24. Connecting NVMe cables to the processor and memory expansion tray

Before starting cable routing for 2.5-inch drives:

1. Remove the fan cage assembly (see "Remove the fan cage assembly" on page 88).
2. Remove the system board air baffle (see "Remove the system board air baffle and the power interposer" on page 86) or the processor and memory expansion tray and the expansion tray air baffle (see "Remove the processor and memory expansion tray" on page 87).

Connecting power cable

Connect power cables for drive backplanes as in the following illustration.
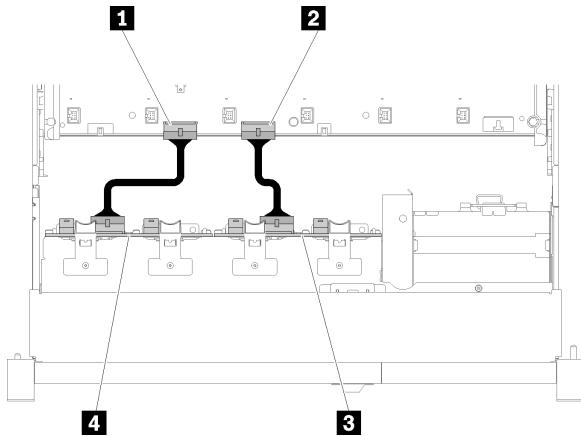
Figure 25. Location of power cable connectors on the system board

Table 20. Power cable connectors on the system board and the drive backplanes

1 Power cable connector on the system board	**3** Power cable connector on the drive backplane
2 Power cable connector on the system board	**4** Power cable connector on the drive backplane

Two types of drive backplanes are supported by this system:

- 2.5-inch SATA/SAS 8-bay backplane (referred to as "8-bay backplane")
- 2.5-inch AnyBay 8-bay backplane (referred to as "AnyBay backplane")

Connecting signal cables to one backplane

When one backplane is installed, see the following illustrations for cable routing.

One 8-bay backplane
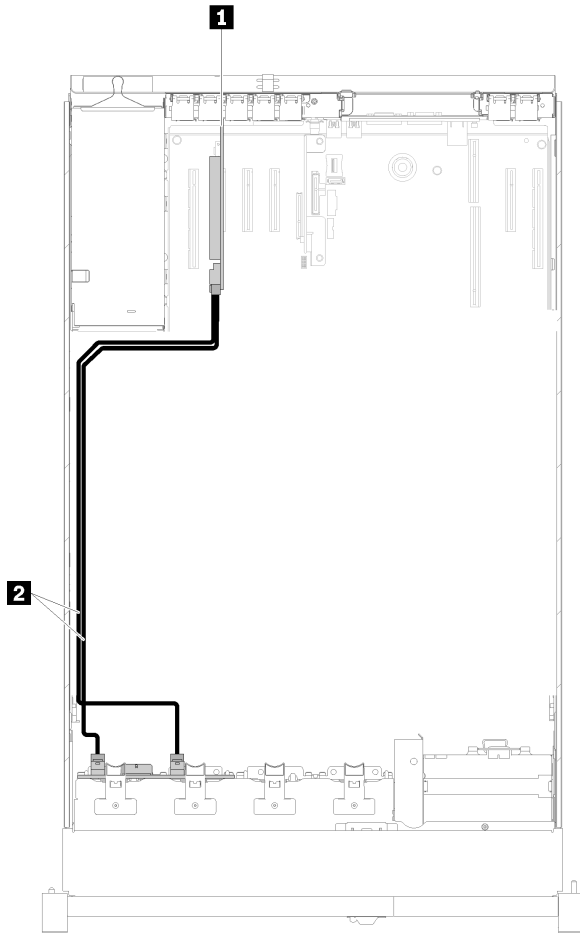
Figure 26. Cable routing, 8-bay backplane

Table 21. Cables and adapters for routing

1 SATA/SAS RAID adapter (8i)	**2** SATA/SAS signal cables (720 mm)

One AnyBay backplane

Two processors installed
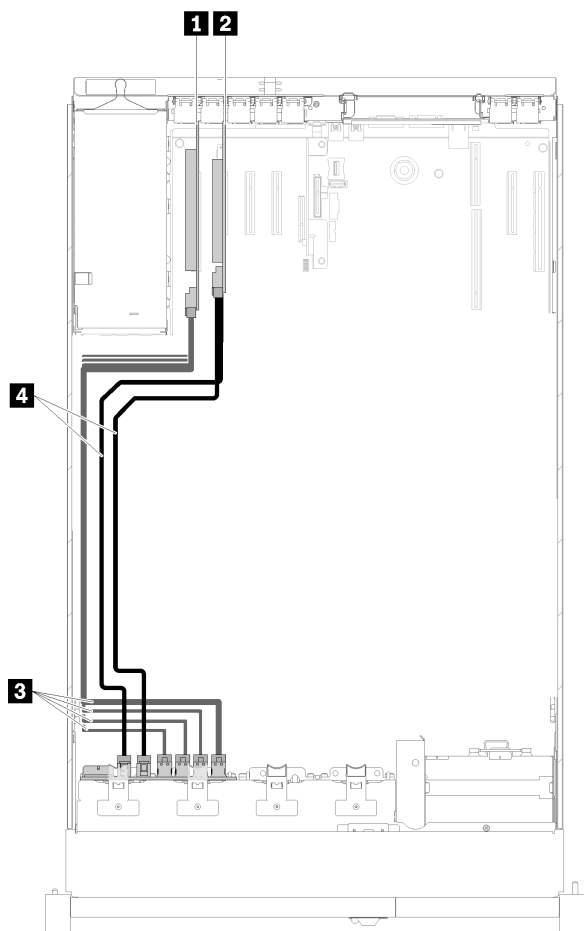
Figure 27. Cable routing, AnyBay backplane with two processors installed

Table 22. Cables and adapters for routing

1 PCIe switch card	**3** NVMe signal cables for PCIe switch card
2 SATA/SAS RAID adapter (8i)	**4** SATA/SAS signal cables (720 mm)

Four processors installed

Note: Install the processor and memory expansion tray before connecting the signal cables to NVMe connectors on the expansion tray (see "Install the processor and memory expansion tray" on page 105).
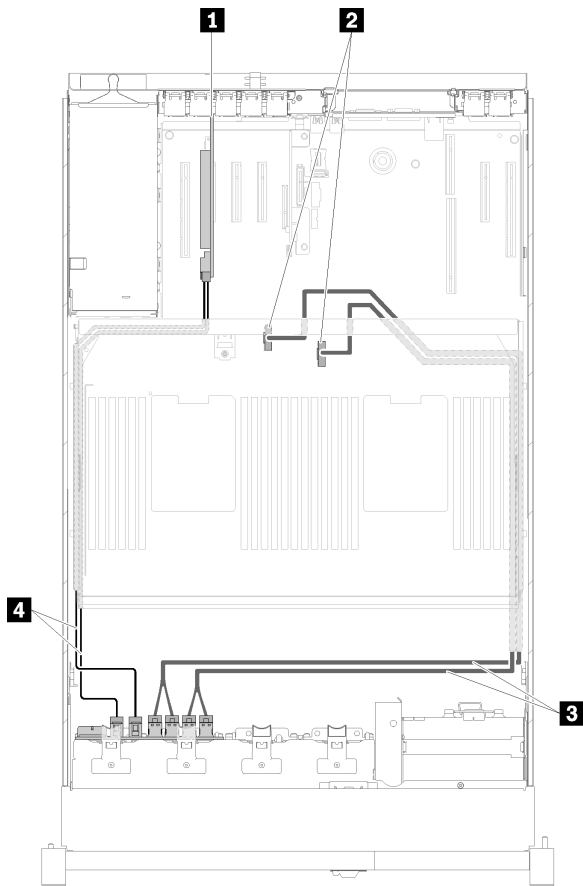
Figure 28. Cable routing, AnyBay backplane

Table 23. Cables and adapters for routing

1 SATA/SAS RAID adapter (8i)	**3** Direct NVMe signal cables for processor and memory expansion tray
2 NVMe connectors on the processor and memory expansion tray	**4** SATA/SAS signal cables (720 mm)

Connecting signal cables to two backplanes

When two backplanes are installed, see the following illustrations for cable routing.

8-bay backplane + 8-bay backplane

Two options are available for this combination:

1. With SATA/SAS RAID adapter (16i)
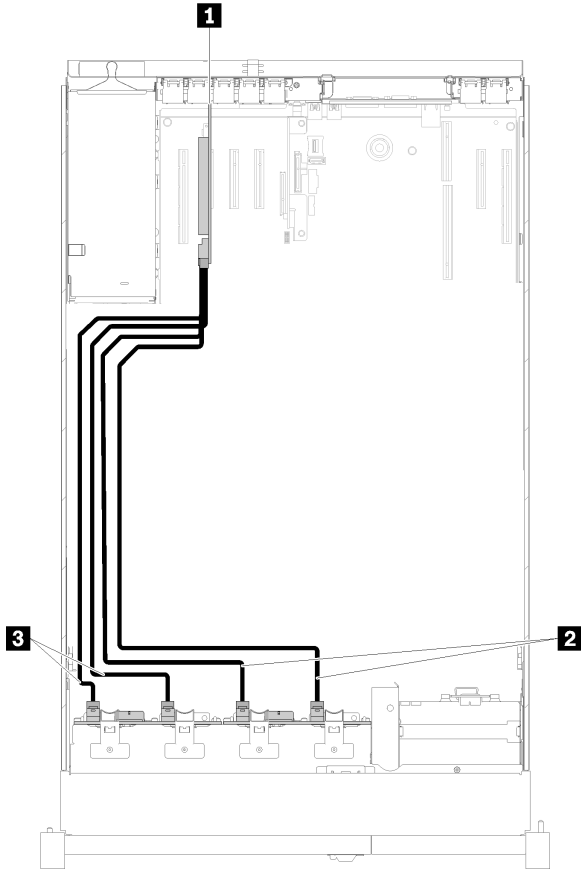
Figure 29. Cable routing, 8-bay backplane + 8-bay backplane

Table 24. Cables and adapters for routing

1 SATA/SAS RAID adapter (16i)	**3** SATA/SAS signal cables (720 mm)
2 SATA/SAS signal cables (900 mm)	

2. With SATA/SAS RAID adapter (8i)
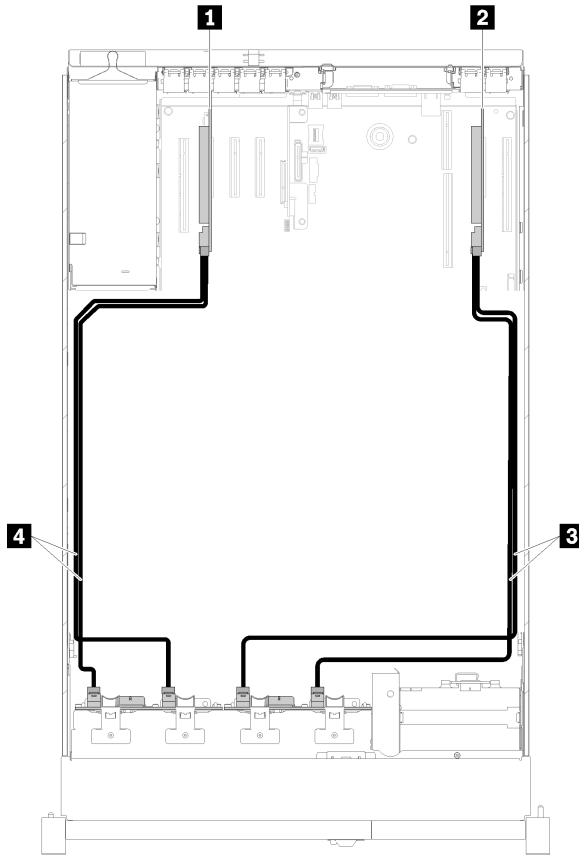
Figure 30. Cable routing, 8-bay backplane + 8-bay backplane

Table 25. Cables and adapters for routing

1 SATA/SAS RAID adapter (8i)	**3** SATA/SAS signal cables (720 mm)
2 SATA/SAS RAID adapter (8i)	**4** SATA/SAS signal cables (720 mm)

8-bay backplane + AnyBay backplane

Notes:

- When installing a 8-bay backplane and a AnyBay backplane, always install the 8-bay backplane to drive bay 0-7, and the AnyBay backplane to drive bay 8-15.

- Install the processor and memory expansion tray before connecting the signal cables to NVMe connectors on the expansion tray (see "Install the processor and memory expansion tray" on page 105).

Two processors installed

Two options are available for this combination:

1. With one SATA/SAS RAID adapter (16i)
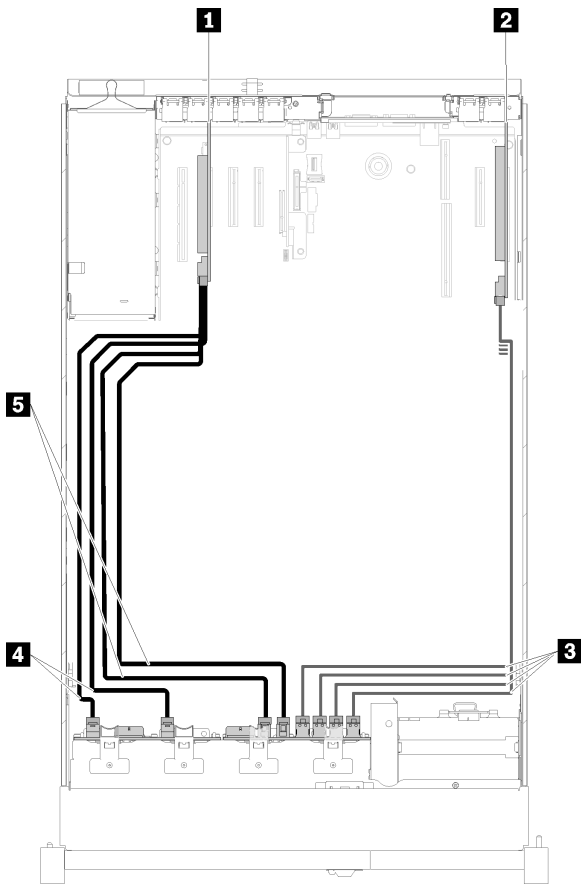
Figure 31. Cable routing, 8-bay backplane + AnyBay backplane

Table 26. Cables and adapters for routing

1 SATA/SAS RAID adapter (16i)	**4** SATA/SAS signal cables (720 mm)
2 PCIe switch card	**5** SATA/SAS signal cables (900 mm)
3 NVMe signal cables for PCIe switch card	

2. With two SATA/SAS RAID adapters (8i)
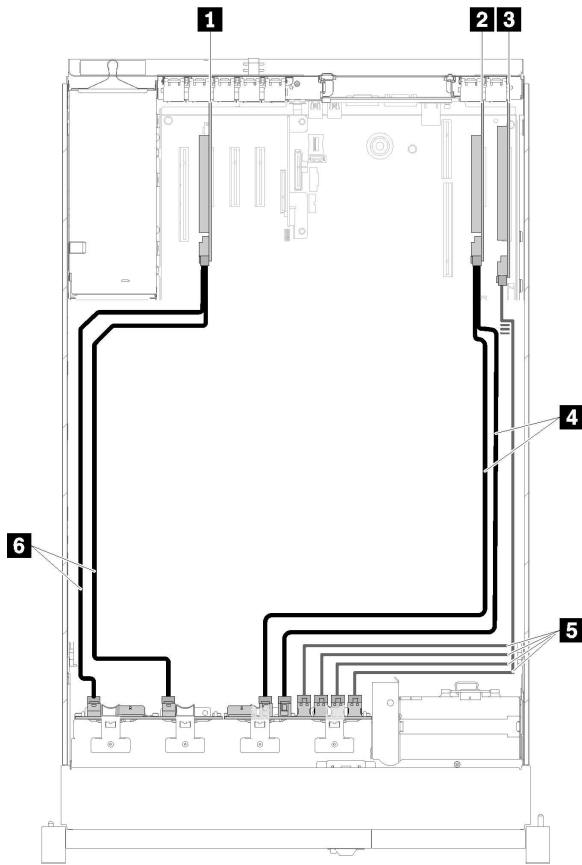
Figure 32. Cable routing, 8-bay backplane + AnyBay backplane

Table 27. Cables and adapters for routing

1 SATA/SAS RAID adapter (8i)	**4** SATA/SAS signal cables (720 mm)
2 SATA/SAS RAID adapter (8i)	**5** NVMe signal cables for PCIe switch card
3 PCIe switch card	**6** SATA/SAS signal cables (720 mm)

Four processors installed

Two options are available for this combination:

1. With SATA/SAS RAID adapter (16i)
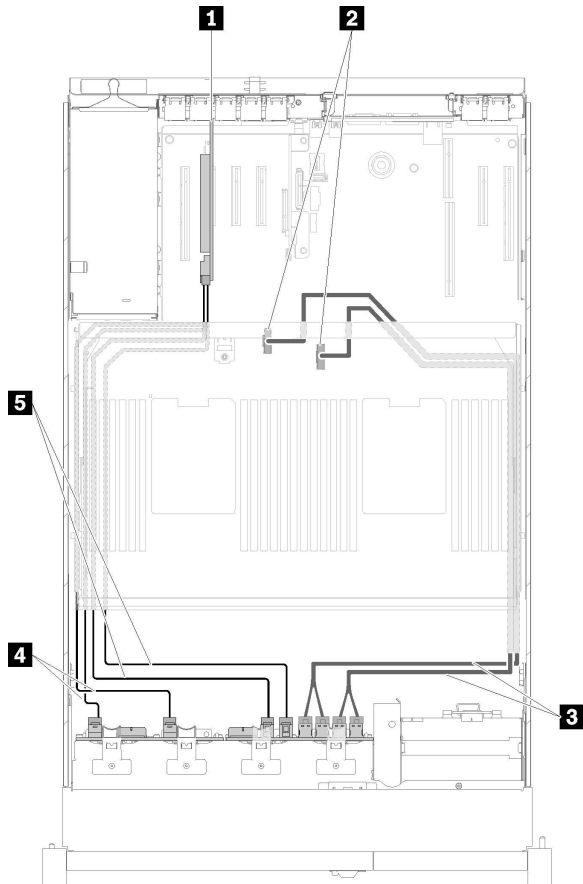
Figure 33. Cable routing, 8-bay backplane + AnyBay backplane

Table 28. Cables and adapters for routing

1 SATA/SAS RAID adapter (16i)	**4** SATA/SAS signal cables (720 mm)
2 NVMe connectors on the processor and memory expansion tray	**5** SATA/SAS signal cables (900 mm)
3 Direct NVMe signal cables for processor and memory expansion tray	

2. With SATA/SAS RAID adapter (8i)
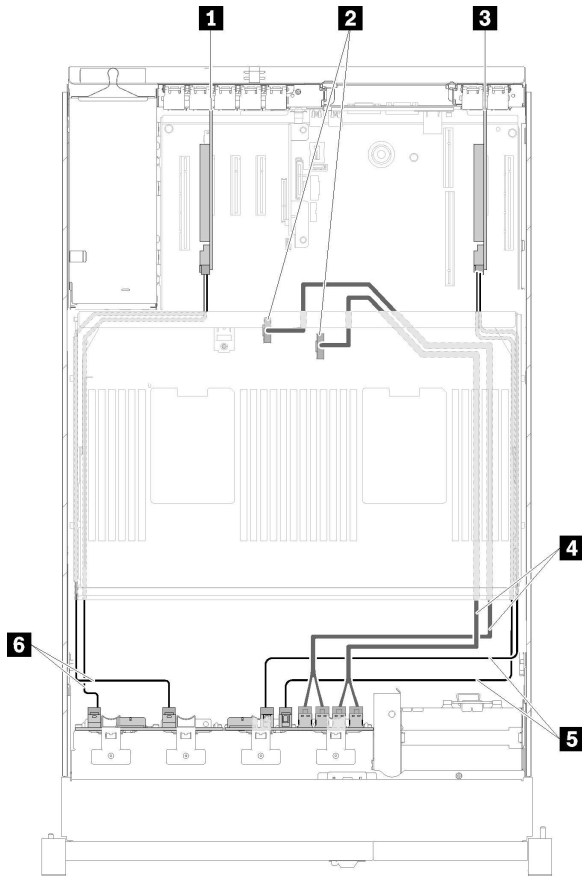
Figure 34. Cable routing, 8-bay backplane + AnyBay backplane

Table 29. Cables and adapters for routing

1 SATA/SAS RAID adapter (8i)	**4** Direct NVMe signal cables for processor and memory expansion tray
2 NVMe connectors on the processor and memory expansion tray	**5** SATA/SAS signal cables (720 mm)
3 SATA/SAS RAID adapter (8i)	**6** SATA/SAS signal cables (720 mm)

AnyBay backplane + AnyBay backplane

Two processors installed

Two options are available for this combination:

1. With one SATA/SAS RAID adapter (16i)
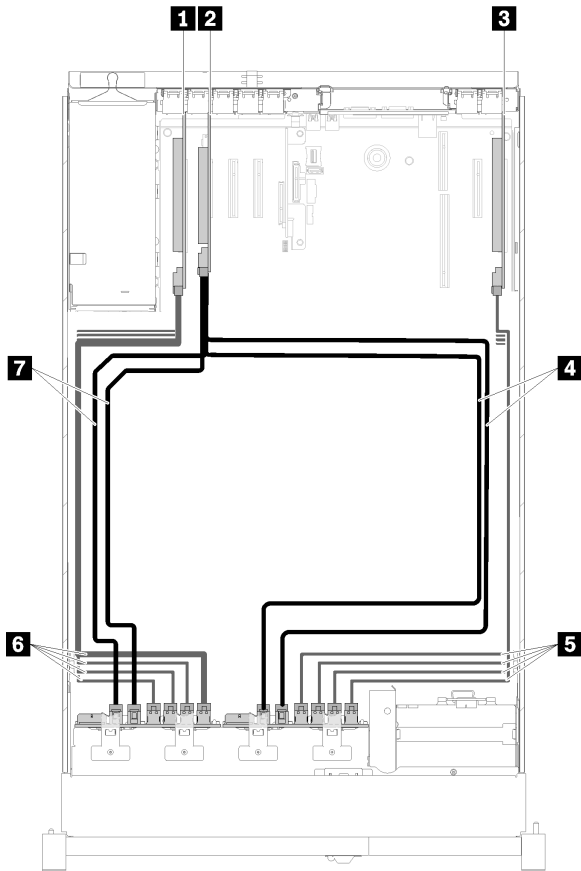
Figure 35. Cable routing, AnyBay backplane + AnyBay backplane

Table 30. Cables and adapters for routing

1 PCIe switch card	**5** NVMe signal cables for PCIe switch card
2 SATA/SAS RAID adapter (16i)	**6** NVMe signal cables for PCIe switch card
3 PCIe switch card	**7** SATA/SAS signal cables (720 mm)
4 SATA/SAS signal cables (900 mm)	

2. With two SATA/SAS RAID adapters (8i)
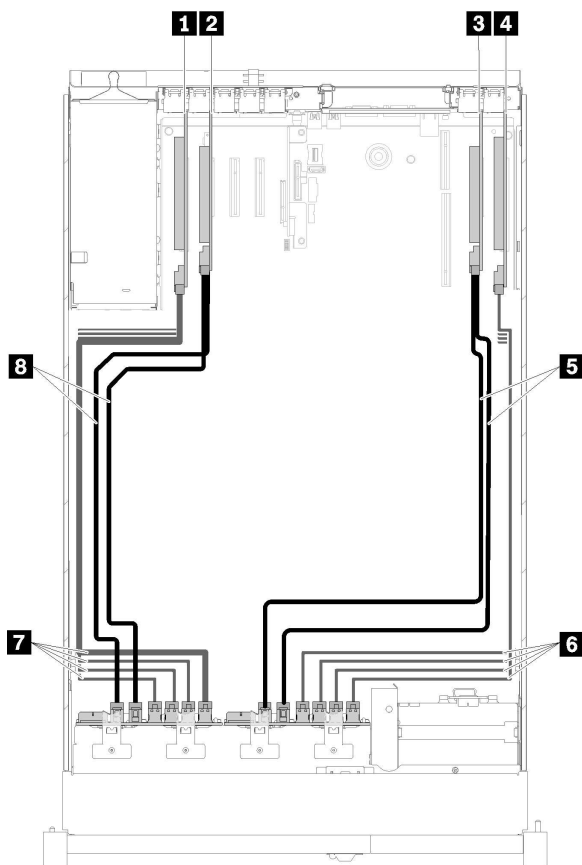
Figure 36. Cable routing, AnyBay backplane + AnyBay backplane

Table 31. Cables and adapters for routing

1 PCIe switch card	**5** SATA/SAS signal cables (720 mm)
2 SATA/SAS RAID adapter (8i)	**6** NVMe signal cables for PCIe switch card
3 SATA/SAS RAID adapter (8i)	**7** NVMe signal cables for PCIe switch card
4 PCIe switch card	**8** SATA/SAS signal cables (720 mm)

Four processors installed

Two options are available for this combination:

Note: Install the processor and memory expansion tray before connecting the signal cables to NVMe connectors on the expansion tray (see "Install the processor and memory expansion tray" on page 105).

1. With one SATA/SAS RAID adapter (16i)
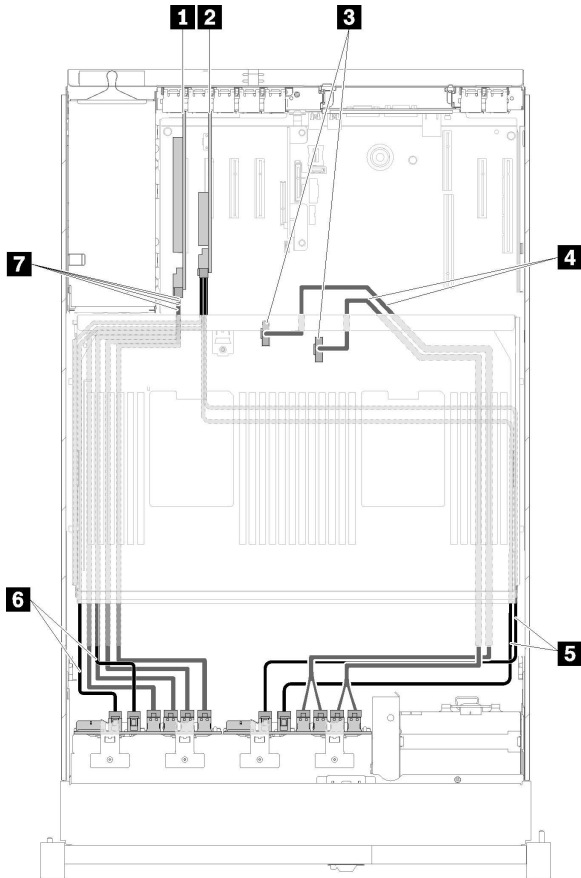
Figure 37. Cable routing, AnyBay backplane + AnyBay backplane

Table 32. Cables and adapters for routing

1 PCIe switch card	**5** SATA/SAS signal cables (900 mm)
2 SATA/SAS RAID adapter (16i)	**6** SATA/SAS signal cables (720 mm)
3 NVMe connectors on the processor and memory expansion tray	**7** NVMe signal cables for PCIe switch card
4 Direct NVMe signal cables for processor and memory expansion tray	

2. With two SATA/SAS RAID adapters (8i)
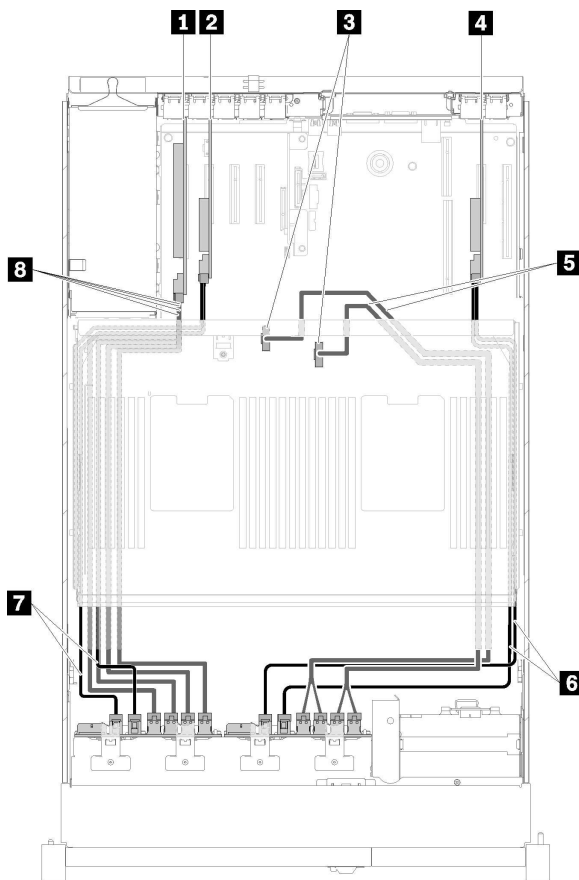
Figure 38. Cable routing, AnyBay backplane + AnyBay backplane

Table 33. Cables and adapters for routing

1 PCIe switch card	**5** Direct NVMe signal cables for processor and memory expansion tray
2 SATA/SAS RAID adapter (8i)	**6** SATA/SAS signal cables (720 mm)
3 NVMe connectors on the processor and memory expansion tray	**7** SATA/SAS signal cables (720 mm)
4 SATA/SAS RAID adapter (8i)	**8** NVMe signal cables for PCIe switch card

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 39 "Server components" on page 45:

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.
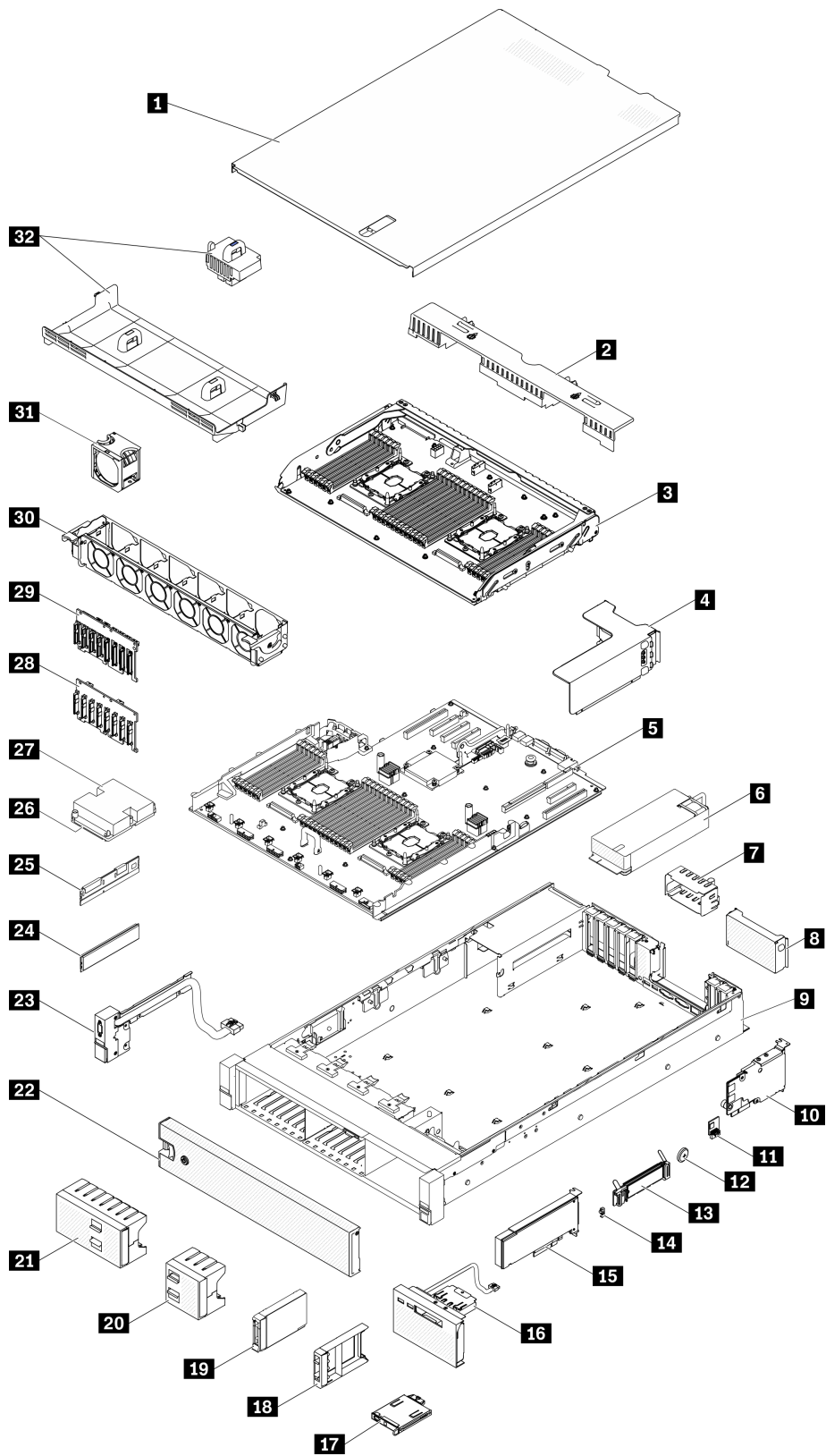
Figure 39. Server components

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 34. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 39 "server components" on page 45: http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr850/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	Expansion tray air baffle	√			
3	Processor and memory expansion tray			√	
4	PCIe riser-card assembly	√			
5	System board			√	
6	Power supply unit	√			
7	Power supply filler	√			
8	PCIe riser-card filler				√
9	Chassis			√	
10	LOM adapter	√			
11	Trusted Cryptographic Module			√	
12	CMOS battery (CR2032)				√
13	M.2 backplane	√			
14	M.2 retainer clip	√			
15	PCIe adapter	√			
16	Operator panel tray assembly		√		
17	Front operator panel		√		
18	2.5-inch drive filler	√			
19	2.5-inch drive	√			
20	2.5-inch drive 4-bay filler	√			
21	2.5-inch drive 8-bay filler	√			

Table 34. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
22	Security bezel	√			
23	Front VGA assembly	√			
24	Memory module	√			
25	DC Persistent Memory (DCPMM)	√			
26	Processor			√	
27	Heatsink			√	
28	2.5-inch SATA/SAS 8-bay backplane	√			
29	2.5-inch AnyBay (SATA/SAS/NVMe) 8-bay backplane	√			
30	Fan cage	√			
31	Hot-swap fan	√			
32	System board air baffle and power interposer	√			

Power cords

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

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

1. Go to:

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

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

Notes:

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

Chapter 3. Server hardware setup

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

Server setup checklist

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

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

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

1. Unpack the server package. See "Server package contents" on page 1.
2. Set up the server hardware.
   a. Install any required hardware or server options. See the related topics in "Install server hardware options" on page 83.
   b. If necessary, install the server into a standard rack cabinet by using the rail kit shipped with the server. See the *Rack Installation Instructions* that comes with optional rail kit.
   c. Connect the Ethernet cables and power cords to the server. See "Rear view" on page 21 to locate the connectors. See "Cable the server" on page 110 for cabling best practices.
   d. Power on the server. See "Power on the server" on page 111.

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

      "Opening and Using the XClarity Controller Web Interface" section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.
   e. Validate that the server hardware was set up successfully. See "Validate server setup" on page 111.
3. Configure the system.
   a. Connect the Lenovo XClarity Controller to the management network. See "Set the network connection for the Lenovo XClarity Controller" on page 113.
   b. Update the firmware for the server, if necessary. See "Update the firmware" on page 115.
   c. Configure the firmware for the server. See "Configure the firmware" on page 118.

      The following information is available for RAID configuration:

      - https://lenovopress.com/lp0578-lenovo-raid-introduction
      - https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources
   d. Install the operating system. See "Deploy the operating system" on page 124.
   e. Back up the server configuration. See "Back up the server configuration" on page 125.
   f. Install the applications and programs for which the server is intended to be used.

Installation Guidelines

Use the installation guidelines to install components in your server.

Before installing optional devices, read the following notices carefully:

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

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

    http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - The following guidelines are available as well: "Handling static-sensitive devices" on page 52 and "Working inside the server with the power on" on page 51.
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see https://static.lenovo.com/us/en/serverproven/index.shtml.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to ThinkSystem SR850 Drivers and Software to download firmware updates for your server.

  Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- 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 an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch

points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

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

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

System reliability guidelines

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

Make sure the following requirements are met:

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

Working inside the server with the power on

Guidelines to work inside the server with the power on.

<u>S033</u>

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

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

Handling static-sensitive devices

Use this information to handle static-sensitive devices.

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

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

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement and the number of processors and memory modules installed in the server.

The following memory configurations and population sequences are supported for the ThinkSystem SR850 server:

- "Memory sparing mode" on page 68
  - "Installation order: memory sparing with two processors" on page 71
  - "Installation order: memory sparing with four processors" on page 72

The following memory configurations and population sequences are supported with DC Persistent Memory Modules (DCPMMs).

- "App Direct Mode" on page 76
  - "Installation order: App Direct Mode with two processors" on page 76
  - "Installation order: App Direct Mode with four processors" on page 78
- "Memory Mode" on page 80
  - "Installation order: Memory Mode with two processors" on page 80
  - "Installation order: Memory Mode with four processors" on page 81
- "Mixed Memory Mode" on page 82
  - "Installation order: Mixed Memory Mode with two processors" on page 82
  - "Installation order: Mixed Memory Mode with four processors" on page 83

Memory module installation guideline

There are a number of criteria that must be followed when selecting and installing memory modules in your server.

Memory installation requirements:

- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx *n*Rxxx PC4-xxxxx-xx-xx-xxx**. Where *n* indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).
- At least one DIMM is required for each processor. Install at least six DIMMs per processor for good performance.
- The following table includes all the feasible combinations of different types of DIMMs:

Table 35. DIMM compatibility

DIMM Types	RDIMM	LRDIMM	3DS-RDIMM
RDIMM	V	X	X
LRDIMM	X	V	X
3DS-RDIMM	X	X	V

- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup utility to enable the new DIMM manually.

Attention:

- Mixing x4 and x8 DIMMs in the same channel is allowed.
- Install DIMMs of the same speed for optimal performance. Otherwise, the BIOS will find and run the lowest speed among all channels.
- Always populate DIMMs with the maximum number of ranks in the farthest DIMM slot, followed by the nearest DIMM slot.

DRAM DIMM installation order

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

Independent memory mode

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation order for independent memory mode varies based on the number of processors and memory modules installed in the server.
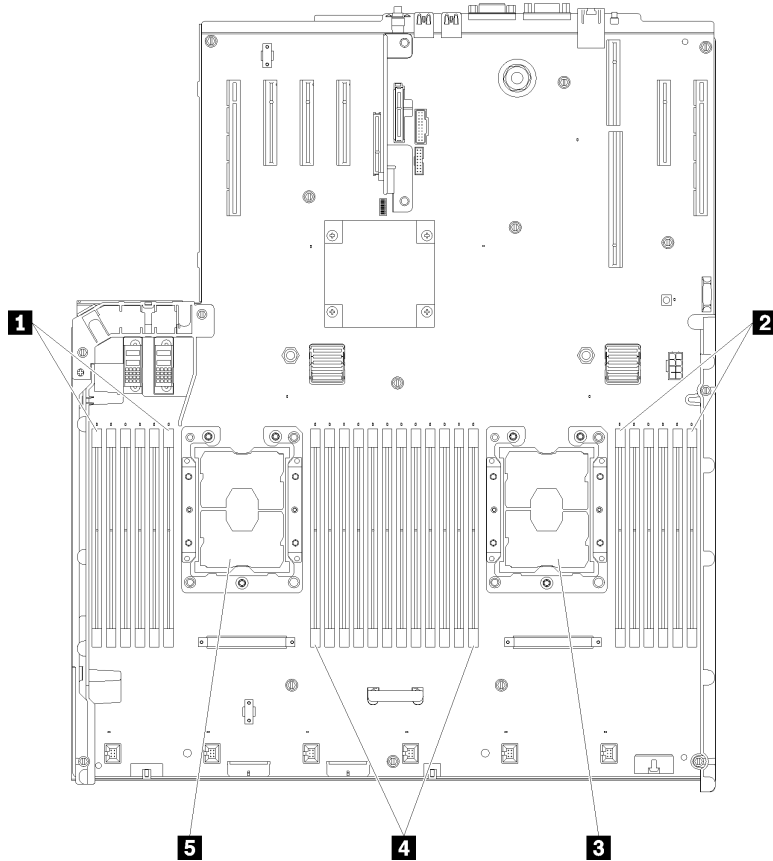
Figure 40. Processor and memory module layout: processor 1 and 2

Table 36. Processor and memory module layout: processor 1 and 2

1 DIMM 1-6	**4** DIMM 7-18
2 DIMM 19-24	**5** Processor 1
3 Processor 2	
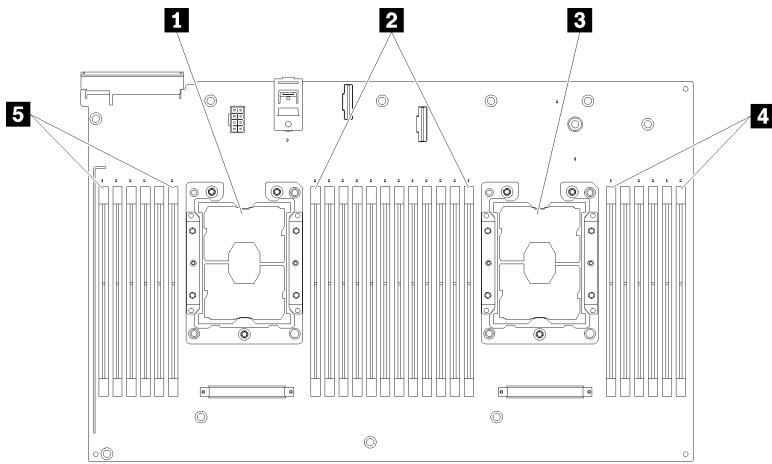
Figure 41. Processor and memory module layout: processor 3 and 4

Table 37. Processor and memory module layout: processor 3 and 4

1 Processor 3	**4** DIMM 43-48
2 DIMM 31-42	**5** DIMM 25-30
3 Processor 4	

Table 38. Channel and slot information of DIMMs around a processor

Slot	0	1	0	1	0	1		1	0	1	0	1	0
Channel	Channel 2		Channel 1		Channel 0			Channel 0		Channel 1		Channel 2	
DIMM number (Processor 1)	1	2	3	4	5	6		7	8	9	10	11	12
DIMM number (Processor 2)	13	14	15	16	17	18	Processor	19	20	21	22	23	24
DIMM number (Processor 3)	25	26	27	28	29	30		31	32	33	34	35	36
DIMM number (Processor 4)	37	38	39	40	41	42		43	44	45	46	47	48

Independent memory mode guidelines:

- Individual memory channels can run at different DIMM timings, but all channels must run at the same interface frequency.
- Populate memory channel 0 first.
- Memory channel 1 is empty or identically populated as memory channel 0.
- Memory channel 2 is empty or identically populated as memory channel 1.
- In each memory channel, populate slot 0 first.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0.

The independent memory mode DIMM population sequences for each supported processor configuration are:

-
-

Installation order: independent memory mode with two processors

Memory module installation order for independent (non-mirroring) memory mode with two processors installed in the server.

The following table shows the DIMM population sequence for independent memory mode when two processors are installed.
- Processors 1 and 2 are installed on the system board.

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

Table 39. Independent mode with two processors

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

Installation order: independent memory mode with four processors

Memory module installation order for independent (non-mirroring) memory mode with four processors installed in the server.

The following tables show the DIMM population sequence for independent memory mode when four processors are installed.
- Processors 1 and 2 are installed on the system board.
- Processors 3 and 4 are installed in the processor and memory expansion tray.

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

Table 40. Independent mode with four processors (Processor 1 and 2, 4 to 24 total DIMMs installed in server)

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

Related DIMM population sequences for four processor systems:
- Processor 1 and 2 DIMM population sequence for 25 to 48 DIMMs, see Table 41 "Independent mode with four processors (Processor 1 and 2, 25 to 48 total DIMMs installed in server)" on page 60.
- To continue populating processor 3 and 4 DIMMs for a system with 4 to 24 DIMMs, see Table 42 "Independent mode with four processors (Processor 3 and 4, 4 to 24 total DIMMs installed in server)" on page 61.

Table 41. *Independent mode with four processors (Processor 1 and 2, 25 to 48 total DIMMs installed in server)*

Total DIMMs	Processor 1												Processor 2												Total DIMMs
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
25	1		3		5		7	8	9	10			13		15		17			20		22		24	25
26	1		3		5		7	8	9	10			13		15		17		19	20	21	22			26
27	1		3		5		7	8	9	10			13		15		17		19	20	21	22			27
28	1		3		5		7	8	9	10			13		15		17		19	20	21	22			28
29			3	4	5	6	7	8	9	10			13		15		17		19	20	21	22			29
30			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			30
31			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			31
32			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			32
33	1		3		5		7	8	9	10	11	12			15	16	17	18	19	20	21	22			33
34	1		3		5		7	8	9	10	11	12	13		15		17		19	20	21	22	23	24	34
35	1		3		5		7	8	9	10	11	12	13		15		17		19	20	21	22	23	24	35
36	1		3		5		7	8	9	10	11	12	13		15		17		19	20	21	22	23	24	36
37			3	4	5	6	7	8	9	10	11	12	13		15		17		19	20	21	22	23	24	37
38			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	38
39			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	39
40			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	40
41	1	2	3	4	5	6	7	8	9	10	11	12	13		15		17		19	20	21	22	23	24	41
42	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	42
43	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	43
44	1		3	4	5	6	7	8	9	10	11	12	13		15	16	17	18	19	20	21	22	23	24	44
45	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	45
46	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	46
47	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	47
48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	48

Related DIMM population sequences for four processor systems:
- Processor 1 and 2 DIMM population sequence for 4 to 24 DIMMs, see Table 40 "Independent mode with four processors (Processor 1 and 2, 4 to 24 total DIMMs installed in server)" on page 59.
- To continue populating processor 3 and 4 DIMMs for a system with 25 to 48 DIMMs, see Table 43 "Independent mode with four processors (Processor 3 and 4, 25 to 48 total DIMMs installed in server)" on page 62.

Table 42. Independent mode with four processors (Processor 3 and 4, 4 to 24 total DIMMs installed in server)

Total DIMMs	Processor 3												Processor 4												Total DIMMs
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
4								32												44					4
5								32												44					5
6								32												44					6
7					29			32												44					7
8					29			32									41			44					8
9					29			32									41			44					9
10					29			32									41			44					10
11					29			32		34							41			44					11
12					29			32		34							41			44		46			12
13					29			32		34							41			44		46			13
14					29			32		34							41			44		46			14
15			27		29			32		34							41			44		46			15
16			27		29			32		34					39		41			44		46			16
17			27		29			32		34					39		41			44		46			17
18			27		29			32		34					39		41			44		46			18
19			27		29			32		34		36			39		41			44		46			19
20			27		29			32		34		36			39		41			44		46		48	20
21			27		29			32		34		36			39		41			44		46		48	21
22			27		29			32		34		36			39		41			44		46		48	22
23	25		27		29			32		34		36			39		41			44		46		48	23
24	25		27		29			32		34		36	37		39		41			44		46		48	24

Related DIMM population sequences for four processor systems:
- Processor 3 and 4 DIMM population sequence for 25 to 48 DIMMs, see Table 43 "Independent mode with four processors (Processor 3 and 4, 25 to 48 total DIMMs installed in server)" on page 62.
- To continue populating processor 1 and 2 DIMMs for a system with 4 to 24 DIMMs, see Table 40 "Independent mode with four processors (Processor 1 and 2, 4 to 24 total DIMMs installed in server)" on page 59.

Table 43. Independent mode with four processors (processor 3 and 4, 25 to 48 total DIMMs installed in server)

Total DIMMs	Processor 3												Processor 4												Total DIMMs
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
25	25		27		29			32		34		36	37		39		41			44		46		48	25
26	25		27		29			32		34		36	37		39		41			44		46		48	26
27	25		27		29		31	32	33	34			37		39		41			44		46		48	27
28	25		27		29		31	32	33	34			37		39		41		43	44	45	46			28
29	25		27		29		31	32	33	34			37		39		41		43	44	45	46			29
30	25		27		29		31	32	33	34			37		39		41		43	44	45	46			30
31			27	28	29	30	31	32	33	34			37		39		41		43	44	45	46			31
32			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			32
33			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			33
34			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			34
35	25		27		29		31	32	33	34	35	36			39	40	41	42	43	44	45	46			35
36	25		27		29		31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	36
37	25		27		29		31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	37
38	25		27		29		31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	38
39			27	28	29	30	31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	39
40			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	40
41			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	41
42	25		27		29		31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	42
43			27	28	29	30	31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	43
44	25		27	28	29	30	31	32	33	34	35	36	37		39	40	41	42	43	44	45	46	47	48	44
45	25	26	27	28	29	30	31	32	33	34	35	36	37		39		41		43	44	45	46	47	48	45
46	25	26	27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	46
47	25	26	27	28	29	30	31	32	33	34	35	36	37		39	40	41	42	43	44	45	46	47	48	47
48	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	48

Related DIMM population sequences for four processor systems:
- Processor 3 and 4 DIMM population sequence for 4 to 24 DIMMs, see Table 42 "Independent mode with four processors (Processor 3 and 4, 4 to 24 total DIMMs installed in server)" on page 61.
- To continue populating processor 1 and 2 DIMMs for a system with 25 to 48 DIMMs, see Table 41 "Independent mode with four processors (Processor 1 and 2, 25 to 48 total DIMMs installed in server)" on page 60.

Memory mirroring mode

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

Memory mirroring guidelines:

- Memory mirroring reduces the maximum available memory by half of the installed memory. For example, if the server has 64 GB of installed memory, only 32 GB of addressable memory is available when memory mirroring is enabled.
- Each DIMM must be identical in size and architecture.
- DIMMs on each memory channel must be of equal density.
- If two memory channels have DIMMs, mirroring occurs across two DIMMs (channels 0/1 will both contain the primary/secondary memory caches).
- If three memory channels have DIMMs, mirroring occurs across all three DIMMs (channels 0/1, channels 1/2, and channels 2/0 will all contain primary/secondary memory caches).
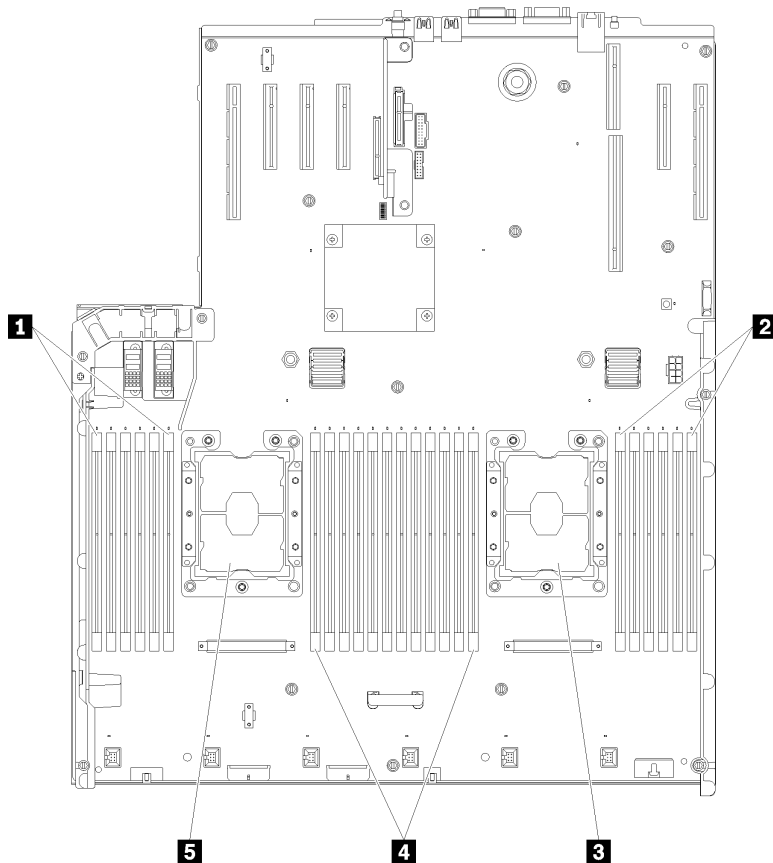

Figure 42. Processor and memory module layout: processor 1 and 2

Table 44. Processor and memory module layout: processor 1 and 2

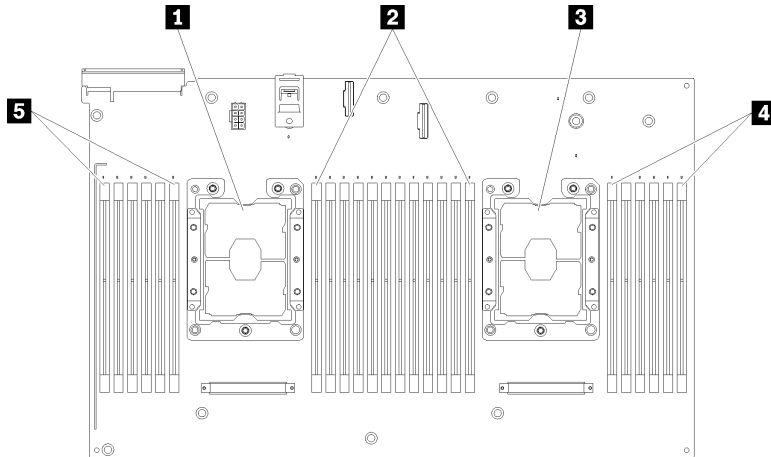| **1** DIMM 1-6	**4** DIMM 7-18
2 DIMM 19-24	**5** Processor 1
3 Processor 2	

Figure 43. Processor and memory module layout: processor 3 and 4

Table 45. Processor and memory module layout: processor 3 and 4

1 Processor 3	**4** DIMM 43-48
2 DIMM 31-42	**5** DIMM 25-30
3 Processor 4	

Table 46. Channel and slot information of DIMMs around a processor

Slot	0	1	0	1	0	1		1	0	1	0	1	0
Channel	Channel 2		Channel 1		Channel 0			Channel 0		Channel 1		Channel 2	
DIMM number (Processor 1)	1	2	3	4	5	6	Processor	7	8	9	10	11	12
DIMM number (Processor 2)	13	14	15	16	17	18		19	20	21	22	23	24
DIMM number (Processor 3)	25	26	27	28	29	30		31	32	33	34	35	36
DIMM number (Processor 4)	37	38	39	40	41	42		43	44	45	46	47	48

Memory mirroring DIMM population sequences for each of the supported processor configurations is shown by one of the following topics:

- "Installation order: memory mirroring with two processors" on page 65
- "Installation order: memory mirroring with four processors" on page 66

Installation order: memory mirroring with two processors

Memory module installation order for memory mirroring with two processors installed in the server.

The following table shows the DIMM population sequence for memory mirroring when two processors are installed.
- Processors 1 and 2 are installed on the system board.

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

Table 47. Memory mirroring with two processors

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

Installation order: memory mirroring with four processors

Memory module installation order for memory mirroring with four processors installed in the server.

The following tables show the DIMM population sequence for memory mirroring when four processors are installed.
- Processors 1 and 2 are installed on the system board.
- Processors 3 and 4 are installed in the processor and memory expansion tray.

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

Table 48. Memory mirroring with four processors (Processors 1 and 2)

Total DIMMs	Processor 1												Processor 2												Total DIMMs
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
8								8		10										20		22			8
10								8		10		12								20		22			10
12			3		5			8		10										20		22			12
14			3		5			8		10										20		22		24	14
16			3		5			8		10					15		17			20		22			16
18	1		3		5			8		10		12			15		17			20		22			18
20	1		3		5			8		10		12			15		17			20		22			20
22	1		3		5			8		10		12	13		15		17			20		22		24	22
24	1		3		5			8		10		12	13		15		17			20		22		24	24
26			3	4	5	6	7	8	9	10			13		15		17			20		22		24	26
28			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			28
30			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			30
32			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			32
34	1	2	3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22			34
36	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	36
38	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	38
40	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	40
42	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	42
44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	44
48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	48

Related DIMM population sequences for four processor systems:

Table 49. Memory mirroring with four processors (processor 3 and 4)

Total DIMMs	Processor 3												Processor 4												Total DIMMs
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
8								32		34										44		46			8
10								32		34		36								44		46			10
12			27		29			32		34										44		46			12
14			27		29			32		34										44		46		48	14
16			27		29			32		34					39		41			44		46			16
18			27		29			32		34					39		41			44		46			18
20	25		27		29			32		34		36			39		41			44		46			20
22	25		27		29			32		34		36			39		41			44		46			22
24	25		27		29			32		34		36	37		39		41			44		46		48	24
26	25		27		29			32		34		36	37		39		41			44		46		48	26
28	25		27		29			32		34		36	37		39		41			44		46		48	28
30			27	28	29	30	31	32	33	34			37		39		41			44		46		48	30
32			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			32
34			27	28	29	30	31	32	33	34			37		39		41			44		46		48	34
36	25		27		29			32		34		36	37		39		41			44		46		48	36
38			27	28	29	30	31	32	33	34			37		39		41			44		46		48	38
40			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			40
42	25	26	27	28	29	30	31	32	33	34	35	36	37		39		41			44		46		48	42
44	25	26	27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	44
48	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	10	41	42	43	44	45	46	47	48	48

Related DIMM population sequences for four processor systems:
- To continue populating processor 1 and 2 DIMMs, see Table 48 "Memory mirroring with four processors (Processor 1 and 2)" on page 66.

Memory sparing mode

In memory-sparing mode, one memory rank serves as a spare for other ranks on the same channel in case they fail. The spare rank is held in reserve and not used as active memory until a failure is indicated, with reserved capacity subtracted from the total available memory in the system.The DIMM installation order for memory sparing varies based on the number of processors and memory modules installed in the server.

After an error threshold is surpassed in a system protected by memory sparing, the content of a failing rank of DIMMs is copied to the spare rank. The failing rank is then taken offline and the spare rank placed online for use as active memory in place of the failed rank. Since the failover process involves copying of memory content, the level of memory redundancy provided by memory sparing is less than that provided by memory mirroring: memory mirroring is the preferred failure-protection choice for critical applications.
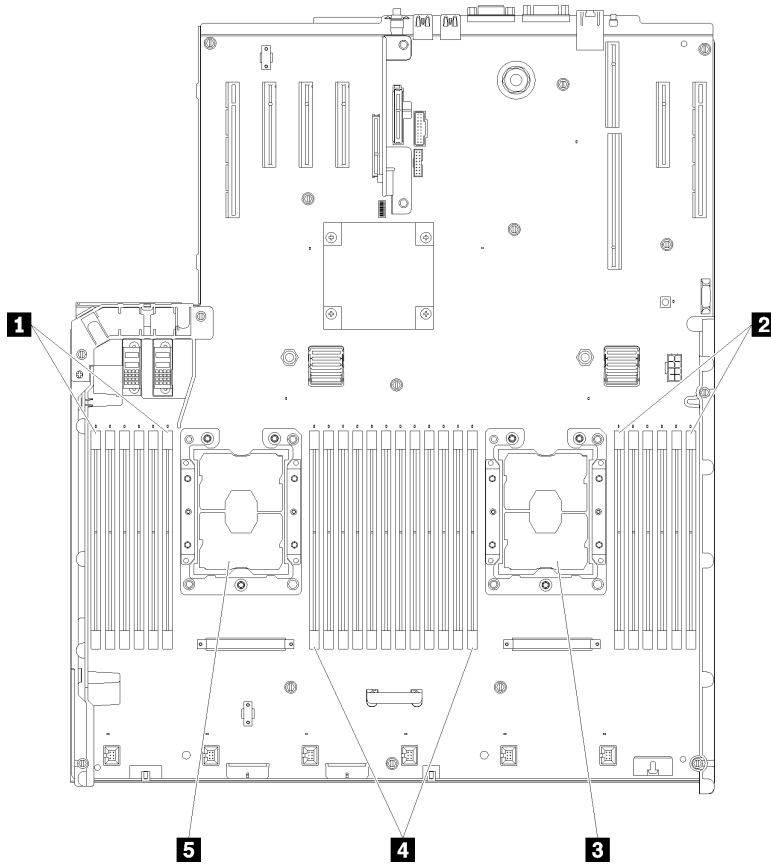
Figure 44. Processor and memory module layout: processor 1 and 2

Table 50. Processor and memory module layout: processor 1 and 2

1 DIMM 1-6	**4** DIMM 7-18
2 DIMM 19-24	**5** Processor 1
3 Processor 2	
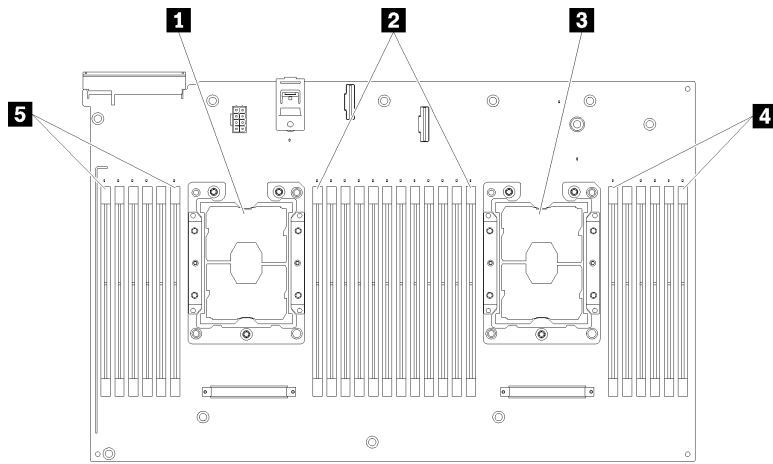
Figure 45. Processor and memory module layout: processor 3 and 4

Table 51. Processor and memory module layout: processor 3 and 4

1 Processor 3	**4** DIMM 43-48
2 DIMM 31-42	**5** DIMM 25-30
3 Processor 4	

Table 52. Channel and slot information of DIMMs around a processor

Slot	0	1	0	1	0	1		1	0	1	0	1	0
Channel	Channel 2		Channel 1		Channel 0			Channel 0		Channel 1		Channel 2	
DIMM number (Processor 1)	1	2	3	4	5	6		7	8	9	10	11	12
DIMM number (Processor 2)	13	14	15	16	17	18	Processor	19	20	21	22	23	24
DIMM number (Processor 3)	25	26	27	28	29	30		31	32	33	34	35	36
DIMM number (Processor 4)	37	38	39	40	41	42		43	44	45	46	47	48

Memory sparing guidelines:

- The spare rank must have identical or larger memory capacity than all of the other active memory ranks on the same channel.
- If installing DIMMs that are one rank, follow the population sequences listed below.
- If installing DIMMs with more than one rank, follow population sequences specified for independent memory mode. See "Independent memory mode" on page 55.

The memory sparing DIMM population sequences for each supported processor configuration are:

- "Installation order: memory sparing with two processors" on page 71
- "Installation order: memory sparing with four processors" on page 72

Note: This mode only applies to single-rank memory modules. When installing DIMMs consisting of more than two ranks, including dual-rank, quad-rank or octal-rank memory modules, refer to "Independent memory mode" on page 55 instead.

Installation order: memory sparing with two processors

Memory module installation order for memory sparing with two processors installed in the server.

The following table shows the DIMM population sequence for memory sparing when two processors are installed.
- Processors 1 and 2 are installed on the system board.

Notes:

1. An even number of DIMMs is required for memory sparing.

2. This mode only applies to single-rank memory modules. When installing DIMMs consisting of more than two ranks, including dual-rank, quad-rank or octal-rank memory modules, refer to "Independent memory mode" on page 55 instead.

Table 53. Memory sparing with two processors

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

Memory module installation order for memory sparing with four processors installed in the server.

The following tables show the DIMM population sequence for memory sparing when four processors are installed.
- Processors 1 and 2 are installed on the system board.
- Processors 3 and 4 are installed in the processor and memory expansion tray.

Notes:

1. When adding one or more DIMMs during a memory upgrade, you might need to remove some DIMMs that are already installed to new locations.

2. An even number of DIMMs is required for memory sparing.

3. This mode only applies to single-rank memory modules. When installing DIMMs consisting of more than two ranks, including dual-rank, quad-rank or octal-rank memory modules, refer to "Independent memory mode" on page 55 instead.

Table 54. Memory sparing with four processors (processor 1 and 2)

Total DIMMs	Processor 1												Processor 2												Total DIMMs
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
8							7	8											19	20					8
10					5	6	7	8											19	20					10
12					5	6	7	8									17	18	19	20					12
14					5	6	7	8									17	18	19	20					14
16					5	6	7	8									17	18	19	20					16
18					5	6	7	8	9	10							17	18	19	20					18
20					5	6	7	8	9	10							17	18	19	20	21	22			20
22					5	6	7	8	9	10							17	18	19	20	21	22			22
24					5	6	7	8	9	10							17	18	19	20	21	22			24
26			3	4	5	6	7	8	9	10							17	18	19	20	21	22			26
28			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			28
30			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			30
32			3	4	5	6	7	8	9	10					15	16	17	18	19	20	21	22			32
34			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22			34
36			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	36
38			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	38
40			3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	40
42	1	2	3	4	5	6	7	8	9	10	11	12			15	16	17	18	19	20	21	22	23	24	42
44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	44
46	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	46
48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	48

Related DIMM population sequences for four processor systems:
- To continue populating processor 3 and 4 DIMMs, see Table 55 "Memory sparing with four processors (processor 3 and 4)" on page 73.

Table 55. Memory mirroring with four processors (processor 3 and 4)

Total DIMMs	Processor 3												Processor 4												Total DIMMs
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
8							31	32											43	44					8
10							31	32											43	44					10
12							31	32											43	44					12
14					29	30	31	32											43	44					14
16					29	30	31	32									41	42	43	44					16
18					29	30	31	32									41	42	43	44					18
20					29	30	31	32									41	42	43	44					20
22					29	30	31	32	33	34							41	42	43	44					22
24					29	30	31	32	33	34							41	42	43	44	45	46			24
26					29	30	31	32	33	34							41	42	43	44	45	46			26
28					29	30	31	32	33	34							41	42	43	44	45	46			28
30			27	28	29	30	31	32	33	34							41	42	43	44	45	46			30
32			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			32
34			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			34
36			27	28	29	30	31	32	33	34					39	40	41	42	43	44	45	46			36
38			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46			38
40			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	40
42			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	42
44			27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	44
46	25	26	27	28	29	30	31	32	33	34	35	36			39	40	41	42	43	44	45	46	47	48	46
48	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	48

Related DIMM population sequences for four processor systems:
- To continue populating processor 1 and 2 DIMMs, see .

DCPMM and DRAM DIMM installation order

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

Notes:

- Before installing DCPMMs and DRAM DIMMs, refer to "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* and make sure to meet all the requirements.
- To verify if the presently installed processors support DCPMMs, examine the four digits in the processor description. Only the processor with description meeting *both* of the following requirements support DCPMMs.

  – The first digit is **5** or a larger number.

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

  – The second digit is **2**.

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

If the presently installed processors do not support DCPMMs, replace them with those that do.

- Supported memory capacity range varies with the following types of DCPMMs.

  – **Large memory tier (L):** The processors with **L** after the four digits (for example: *Intel Xeon 52*15L)

  – **Medium memory tier (M):** The processors with **M** after the four digits (for example: *Xeon Platinum 82*80M)

  – **Other:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 5222*)

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

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

DC Persistent Memory Module (DCPMM) setup

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

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

1. Update the system firmware to the latest version that supports DCPMMs (see "Update the firmware" on page 115).

2. Make sure to meet all the following requirements before installing DCPMMs.

   - All the DCPMMs that are installed must be of the same part number.

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

   - 64 GB 3DS LRDIMMs are not supported to be mixed with DCPMMs.

3. Refer to "DCPMM and DRAM DIMM installation order" in *Memory Population Reference* to determine the most suitable combination and the following:

   - Number and capacity of the DCPMMs and DRAM DIMMs to install.

   - Check if the presently installed processors support the combination. If not, replace the processors with ones that support the combination.

4. Based on the determined DCPMM combination, acquire the DCPMMs, DRAM DIMMs and processors if necessary.

5. Replace the processors if necessary (see "Processor and heat sink replacement" in *Maintenance Manual*).

6. Remove all the memory modules that are installed (see "Remove a memory module" in *Maintenance Manual*).

7. Follow the slot combination in "DCPMM and DRAM DIMM installation order" in *Memory Population Reference* to install all the DCPMMs and DRAM DIMMs (see "Install a memory module" on page 93).

8. Disable security on all the installed DCPMMs (see "Configure DC Persistent Memory Module (DCPMM)" on page 119).

9. Make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).

10. Configure DCPMMs so that the capacity is available for use (see "Configure DC Persistent Memory Module (DCPMM)" on page 119).

Adding memory modules with DCPMMs

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

If DCPMMs are already installed and configured in the system, complete the following steps to add new memory modules.

1. Update the system firmware to the latest version (see "Update the firmware" on page 115).

2. Consider the following DCPMM requirements before acquiring new DCPMM units.

   - All the DCPMMs that are installed must be of the same part number.

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

3. See "DCPMM and DRAM DIMM installation order" in *Memory Population Reference* to determine the new configuration, and acquire memory modules accordingly.

4. If the DCPMMs are in Memory Mode and will stay in Memory Mode after new units are installed, follow the combination in "DCPMM installation: Memory Mode" in *Memory Population Reference* to install the new modules in the correct slots. Otherwise, go to the next step.

5. Make sure to back up the stored data.

6. If the App Direct capacity is interleaved:

   a. Delete all the created namspaces and filesystems in the operating system.

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

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

7. Follow the slot combination in "DCPMM and DRAM DIMM installation order" in *Memory Population Reference* to install all the DCPMMs and DRAM DIMMs (see "Install a memory module" on page 93).

8. Disable security on all the installed DCPMMs (see "Configure DC Persistent Memory Module (DCPMM)" on page 119).

9. Make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).

10. Configure DCPMMs so that the capacity is available for use (see "Configure DC Persistent Memory Module (DCPMM)" on page 119).

11. Restore the data that have been backed up.

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

Installation order: App Direct Mode with two processors

Memory module installation order for DCPMM App Direct Mode with two installed processors.

Table 56. Memory population in App Direct Mode with two processors

• D: DRAM DIMMs with 16 GB or larger capacity																								
• P: DC Persistent Memory Module (DCPMM)

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

Table 57. Supported DCPMM capacity in App Direct Mode with two processors

Total PMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	8	L	√	√	√
		M	√	√	√
		Other	√	√	
4	16	L	√	√	√
		M	√	√	√
		Other	√	√	
4	12	L	√	√	√
		M	√	√	√
		Other	√	√	
8	12	L	√	√	√
		M	√	√	
		Other	√		
12	12	L	√	√	√
		M	√	√	
		Other	√		

Table 58. Memory population in App Direct Mode with two processors (not interleaved only)

- **D: DRAM DIMMs with 16 GB or larger capacity**
- **P: DC Persistent Memory Module (DCPMM)**

Configuration	Processor 1												Processor 2											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
1 DCPMM and 12 DIMMs	D		D		D		**P**	D		D		D	D		D		D			D		D		D
2 DCPMMs and 12 DIMMs	D		D		D		**P**	D		D		D	D		D		D		**P**	D		D		D

Table 59. Supported DCPMM capacity in App Direct Mode with two processors (not interleaved only)

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

Installation order: App Direct Mode with four processors

Memory module installation order for DCPMM App Direct Mode with four installed processors.

Table 60. Memory population in App Direct Mode with four processors

- **D: DRAM DIMMs with 16 GB or larger capacity**
- **P: DC Persistent Memory Module (DCPMM)**

Configuration	\	Processor 1 / Processor 3											Processor 2 / Processor 4										
	1 (25)	2 (26)	3 (27)	4 (28)	5 (29)	6 (30)	7 (31)	8 (32)	9 (33)	10 (34)	11 (35)	12 (36)	13 (37)	14 (38)	15 (39)	16 (40)	17 (41)	18 (42)	19 (43)	20 (44)	21 (45)	22 (46)	23 (47)	24 (48)
8 DCPMMs and 16 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
8 DCPMMs and 32 DIMMs	P		D	D	D	D	D	D	D	D		P	P		D	D	D	D	D	D	D	D		P
8 DCPMMs and 24 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
16 DCPMMs and 24 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
24 DCPMMs and 24 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 61. Supported DCPMM capacity in App Direct Mode with four processors

Total PMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
8	16	L	√	√	√
		M	√	√	√
		Other	√	√	X
8	32	L	√	√	√
		M	√	√	√
		Other	√	√	
8	24	L	√	√	√
		M	√	√	√
		Other	√	√	
16	24	L	√	√	√
		M	√	√	
		Other	√		
24	24	L	√	√	√
		M	√	√	
		Other	√		

Table 62. Memory population in App Direct Mode with four processors (not interleaved only)

- **D: DRAM DIMMs with 16 GB or larger capacity**
- **P: DC Persistent Memory Module (DCPMM)**

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

Configuration	Processor 3												Processor 4											
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1 DCPMM and 24 DIMMs	D		D		D			D		D		D	D		D		D			D		D		D
4 DCPMM and 24 DIMMs	D		D		D		P	D		D		D	D		D		D		P	D		D		D

Table 63. Supported DIMM capacity in App Direct Mode with four processors (not interleaved only)

Total PMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	24	L	√	√	√
		M	√	√	√
		Other	√	√	√
4	24	L	√	√	√
		M	√	√	√
		Other	√	√	

Memory Mode

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache.

Installation order: Memory Mode with two processors

Memory module installation order for DCPMM Memory Mode with two installed processors.

Table 64. Memory population in Memory Mode with two processors

- **D1: DRAM DIMMs of 16 or 32 GB**
- **D2: DRAM DIMMs of 32 GB or larger capacity**
- **P: DC Persistent Memory Module (DCPMM)**

Configuration	Processor 1												Processor 2											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4 DCPMMs and 8 DIMMs	P		D2		D2			D2		D2		P	P		D2		D2			D2		D2		P
4 DCPMMs and 12 DIMMs	D1		D1		D1	P	P	D1		D1		D1	D1		D1		D1	P	P	D1		D1		D1
8 DCPMMs and 12 DIMMs	D2		D2	P	D2	P	P	D2	P	D2		D2	D2		D2	P	D2	P	P	D2	P	D2		D2
12 DCPMMs and 12 DIMMs	D2	P	D2	P	D2	P	P	D2	P	D2	P	D2	D2	P	D2	P	D2	P	P	D2	P	D2	P	D2

Table 65. Supported DCPMM capacity in Memory Mode with two processors

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

Installation order: Memory Mode with four processors

Memory module installation order for DCPMM Memory Mode with four installed processors.

Table 66. Memory population in Memory Mode with four processors

- **D1: DRAM DIMMs of 16 or 32 GB**
- **D2: DRAM DIMMs of 32 GB or larger capacity**
- **P: DC Persistent Memory Module (DCPMM)**

Configuration	Processor 1												Processor 2											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Processor 3												Processor 4											
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
8 DCPMMs and 16 DIMMs	P		D2		D2			D2		D2		P	P		D2		D2			D2		D2		P
8 DCPMMs and 24 DIMMs	D1		D1		D1	P	P	D1		D1		D1	D1		D1		D1	P	P	D1		D1		D1
16 DCPMMs and 24 DIMMs	D2		D2	P	D2	P	P	D2	P	D2		D2	D2		D2	P	D2	P	P	D2	P	D2		D2
24 DCPMMs and 24 DIMMs	D2	P	D2	P	D2	P	P	D2	P	D2	P	D2	D2	P	D2	P	D2	P	P	D2	P	D2	P	D2

Table 67. Supported DCPMM capacity in Memory Mode with four processors

Total PMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
8	16	L	√	√	√
		M	√	√	√
		Other	√	√	
8	24	L	√	√	√
		M	√	√	√
		Other	√	√	
16	24	L	√	√	√
		M	√	√	
		Other	√		√
24	24	L	√	√	√
		M	√	√	
		Other	√		√

Mixed Memory Mode

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

Installation order: Mixed Memory Mode with two processors

Memory module installation order for DCPMM Mixed Memory mode with two installed processors.

Table 68. Memory population in Mixed Memory Mode with two processors

• **D: DRAM DIMMs of 16 GB or larger capacity**																								
Note: **3DS LRDIMMs are not supported in this mode.**																								
• **P: DC Persistent Memory Module (DCPMM)**																								
	Processor 1												**Processor 2**												
Configuration	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
4 DCPMMs with 8 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
4 DCPMMs with 12 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
8 DCPMMs with 12 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
12 DCPMMs with 12 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 69. Supported DCPMM capacity in Mixed Memory Mode with two processors

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

Installation order: Mixed Memory Mode with four processors

Memory module installation order for DCPMM Mixed Memory mode with four installed processors.

Table 70. Memory population in Mixed Memory Mode with four processors

- **D: DRAM DIMMs of 16 GB or larger capacity**

  Note: 3DS LRDIMMs are not supported in this mode.
- **P: DC Persistent Memory Module (DCPMM)**

Configuration	Processor 1 / Processor 3												Processor 2 / Processor 4											
	1 (25)	2 (26)	3 (27)	4 (28)	5 (29)	6 (30)	7 (31)	8 (32)	9 (33)	10 (34)	11 (35)	12 (36)	13 (37)	14 (38)	15 (39)	16 (40)	17 (41)	18 (42)	19 (43)	20 (44)	21 (45)	22 (46)	23 (47)	24 (48)
8 DCPMMs and 16 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
8 DCPMMs and 24 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
16 DCPMMs and 24 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
24 DCPMMs and 24 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 71. Supported DCPMM capacity in Mixed Memory Mode with two processors

Total PMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
8	16	L	√	√	√
		M	√	√	√
		Other	√	√	
8	24	L	√	√	√
		M	√	√	√
		Other	√	√	
16	24	L	√	√	√
		M	√	√	
		Other	√		√
24	24	L	√	√	√
		M	√	√	
		Other	√		√

Install server hardware options

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

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

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

- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see https://static.lenovo.com/us/en/serverproven/index.shtml.
- Always download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to ThinkSystem SR850 Drivers and Software to download firmware updates for your server.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

Remove the security bezel

Follow the instructions in this section to remove the security bezel.

Before removing the security bezel:

1. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
2. If the server is installed in a rack, slightly slide out or remove the server from the rack.
3. **Watch the procedure**

   A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list= PLYV5R7hVcs-B2y7oAb54mfyuLrIusa_qE.

To remove the security bezel, complete the following steps:

Watch the procedure. A video of the removal process is available:
- Youtube: Removing the security bezel
- Youku: Removing the security bezel

Step 1. Insert the key that comes with the server and rotate it clockwise to unlock the security bezel to the open position.
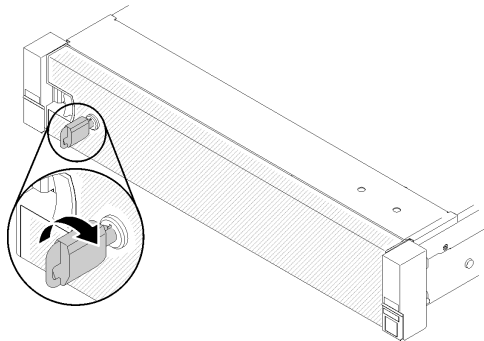
Figure 46. Unlocking the security bezel

Step 2. Press on the release latch and pivot the security bezel outward to remove it from the chassis.
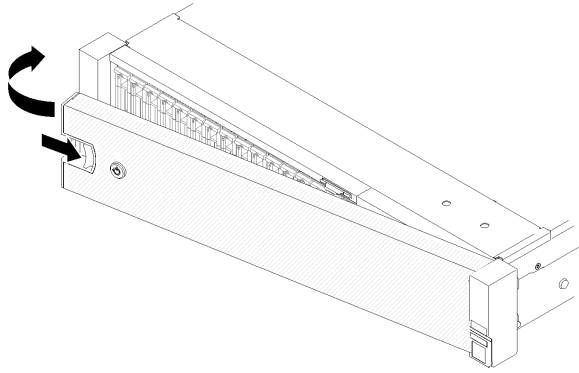
Figure 47. Security bezel removal

Remove the top cover

Follow the instructions in this section to remove the top cover.

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.

To remove the top cover, complete the following steps:

Step 1. Unlock the cover release latch with a flat-end screwdriver.
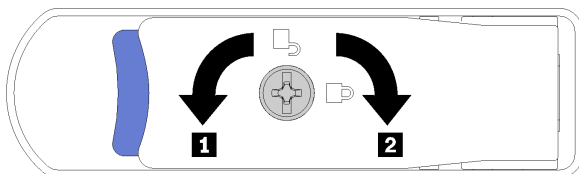
Figure 48. Lock on the top cover latch

Table 72. Lock/unlock directions on the top cover latch

1 Unlock	**2** Lock

Step 2.   Press and hold on the blue tab of cover release latch; then, rotate the tip of the latch up.

Step 3.   Push the latch forward to slide the top cover away from the server.
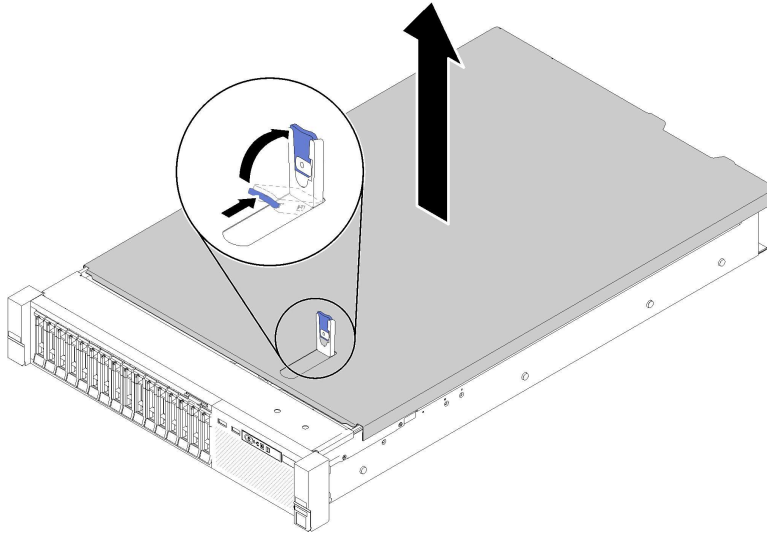
Figure 49. Top cover removal

Step 4.   Lift the cover, remove it from the server, and set it aside.

Remove the processor and memory expansion tray or the system air baffle

Follow the instructions in this section to remove the processor and memory expansion tray or the system air baffle.

Depending on the configuration, one of the following need to be removed before some optional components are installed.

- Processor and memory expansion tray (see "Remove the processor and memory expansion tray" on page 87).
- System air baffle and power interposer (see "Remove the system board air baffle and the power interposer" on page 86).

Remove the system board air baffle and the power interposer

Use this procedure to remove the system board air baffle and the power interposer.

To remove the system board air baffle, complete the following steps:

Step 1.   Slightly slide power supply 2 out from the power supply bay (see "Remove a hot-swap power supply unit" in *ThinkSystem SR850 Maintenance Manual*).

Step 2.   Lift the power interposer from the server, and set it aside.
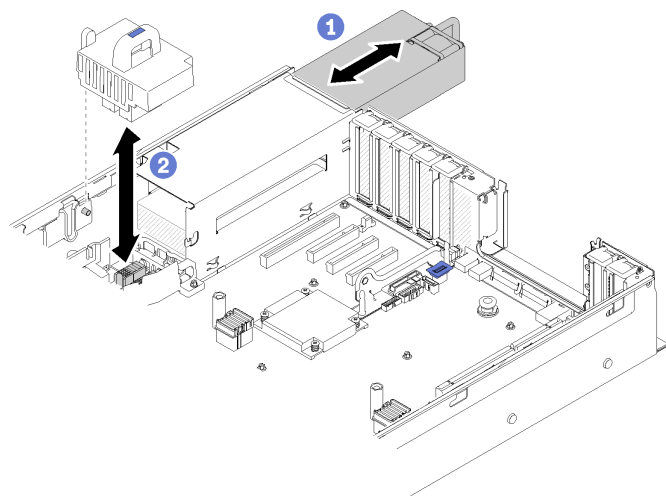
Figure 50. Power interposer removal

Step 3. Lift the system board air baffle from the server, and set it aside.

Attention: Air baffle is required for airflow that creates proper cooling. Make sure proper air baffles for system configuration is installed before the power is turned on.
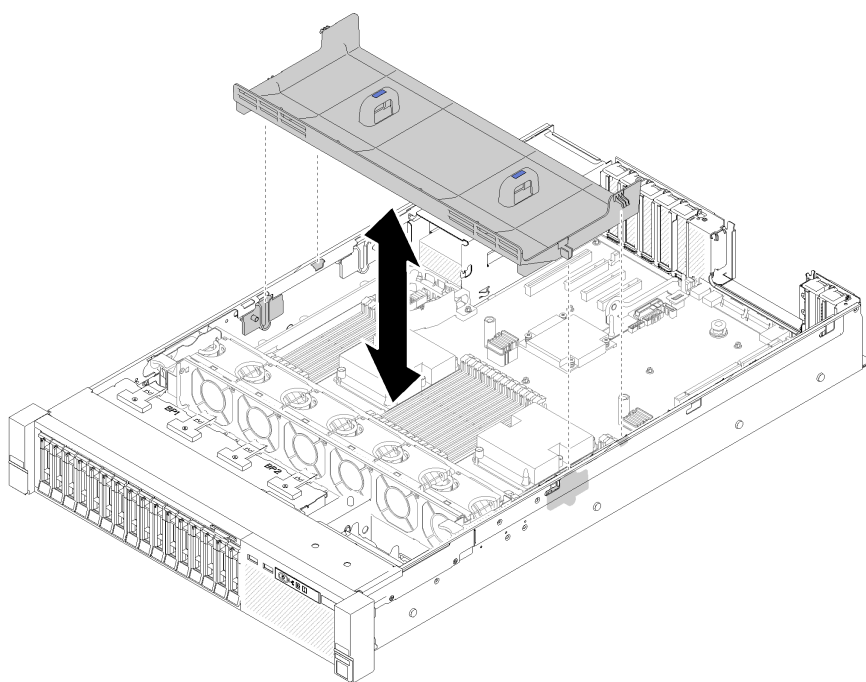
Figure 51. System board air baffle removal

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.

Remove the processor and memory expansion tray

Use this procedure to remove the processor and memory expansion tray.

To remove the processor and memory expansion tray, complete the following steps:

Step 1. Slightly pull out power supply 2.

> **Attention:** Do not remove the processor and memory expansion tray without physically disconnecting power supply 2.

Step 2. Grasp the handle of the processor and memory expansion tray; then, pull and rotate it all the way up until it is in the vertical position. This disengages the expansion tray from the system board.
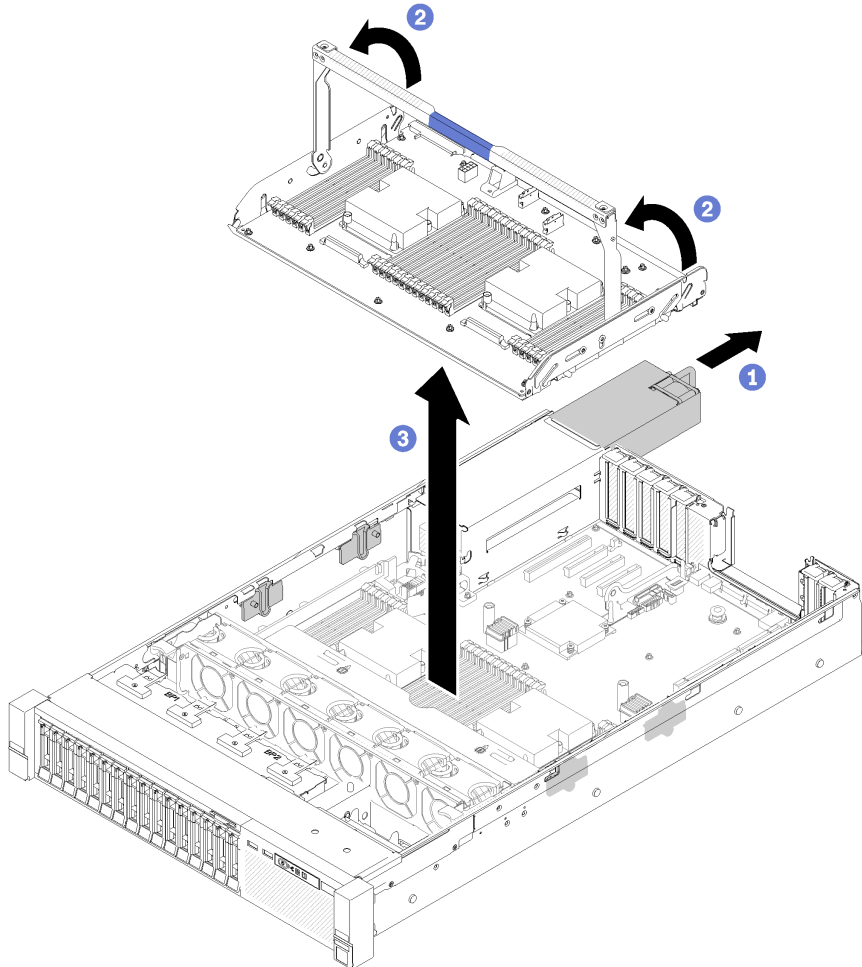
Figure 52. Processor and memory expansion tray removal

Step 3. Loosen the two screws that secure the expansion tray to the chassis.

Step 4. Grasp the handle and slowly lift the expansion tray from the server; then, set it on a flat surface.

Remove the fan cage assembly

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

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.

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

Step 1.   Lift and rotate the fan cage release latches to disengage the fan cage assembly from the server.
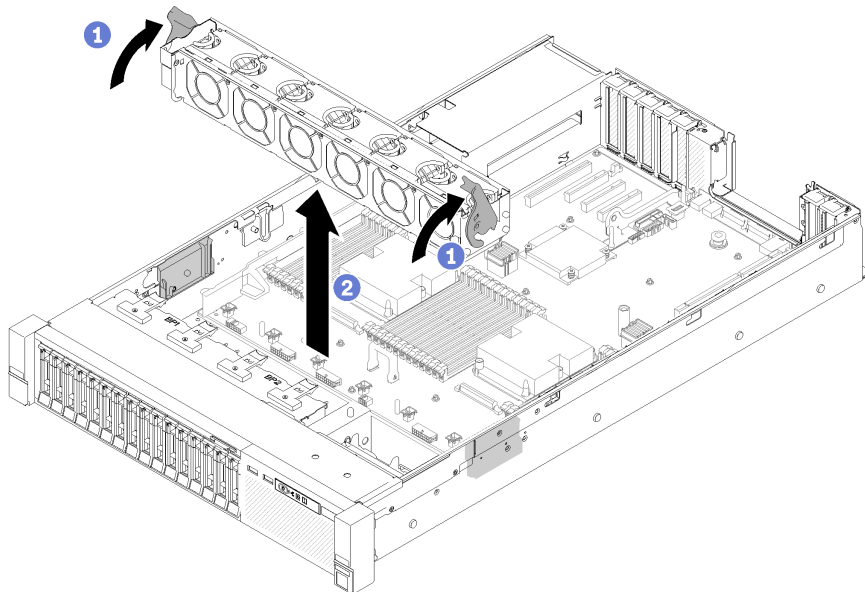
Figure 53. Fan cage assembly removal

Step 2.   Lift the fan cage assembly from the server.

Install a processor-heat-sink module

Processors are in the compute system boards that are accessed from the front of the server. The processor and heat sink are removed together as part of a processor-heat-sink-module (PHM) assembly. PHM installation requires a Torx T30 driver.

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

"**Read** the installation Guidelines" on page 50	"**Power off** the server for this task" on page 111	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 52
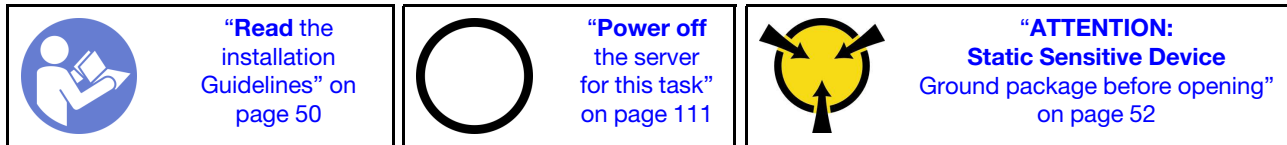
Attention:

- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

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

- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.

- Thermal grease can stay functional on the heat sink for two years. When installing a new heat sink, make sure to check the manufacturing date to ensure the thermal grease is still functioning. If the date is over two years ago, replace the thermal grease to avoid seating issues.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.

- See https://static.lenovo.com/us/en/serverproven/index.shtml for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.

- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See "Update the firmware" on page 115.

- Installing an additional PHM can change the memory requirements for your system. See *ThinkSystem SR850 Memory Population Reference* for a list of processor-to-memory relationships.

- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.
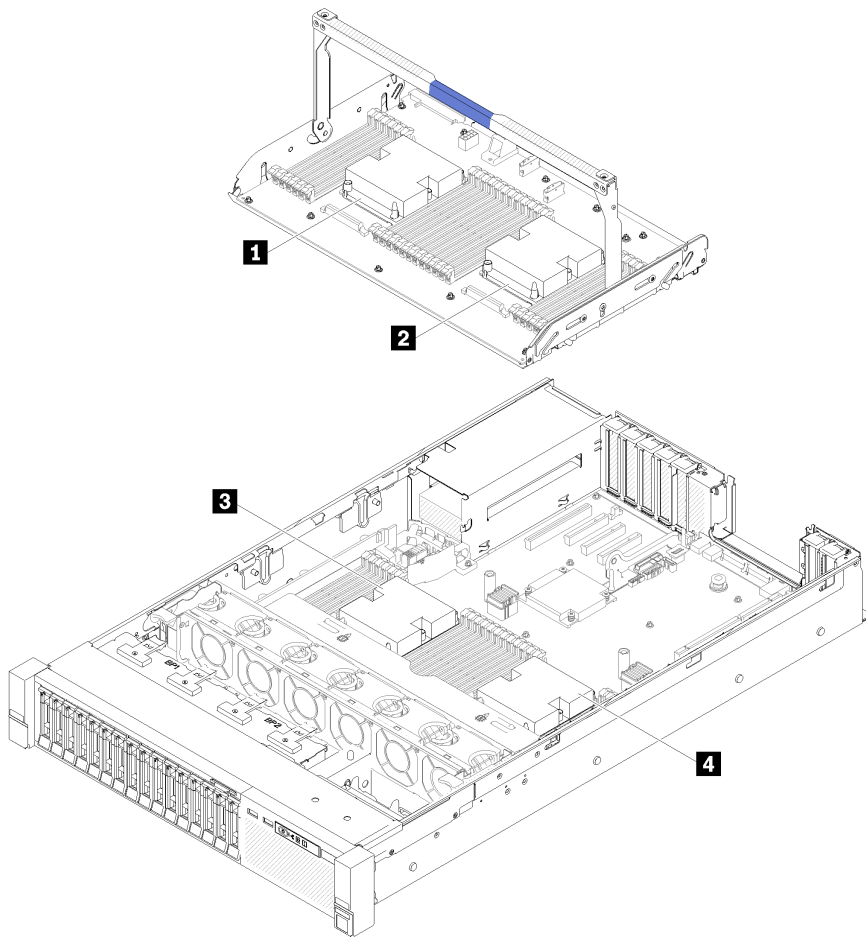
Figure 54. Processor locations

Table 73. Processor locations

1 Processor 3	**2** Processor 4
3 Processor 1	**4** Processor 2

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

Step 2.   Install the processor-heat-sink module on the system board.
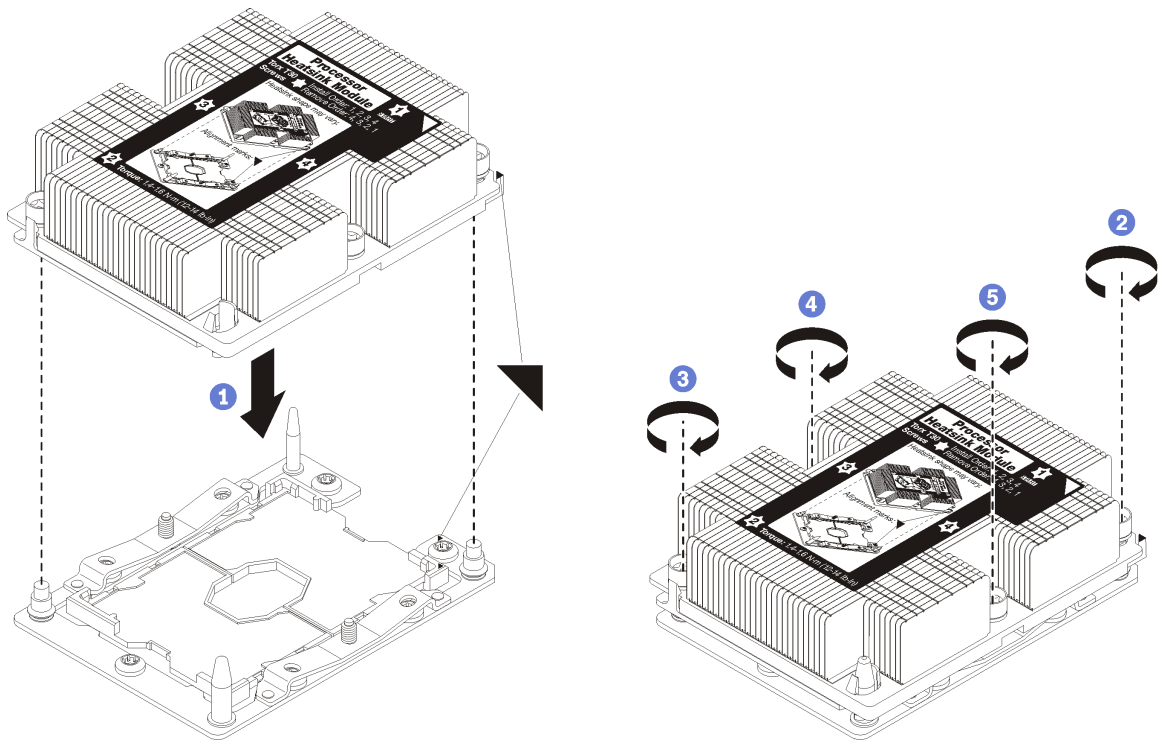
Figure 55. Installing a PHM

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

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

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

After installing the PHM option:

1. If there are memory modules to install, install them. See "Install a memory module" on page 93.

2. Reinstall the system board air baffle (see "Install the system board air baffle and the power interposer" on page 104) or processor and memory expansion tray and expansion tray air baffle (see "Install the processor and memory expansion tray" on page 105).

3. Reinstall the top cover (see "Install the top cover" on page 108).

4. Reconnect the power cords and any cables that you removed.

5. Power on the server and any peripheral devices.

Install a memory module

Memory modules are installed in the compute system boards that are accessed from the front of the server.
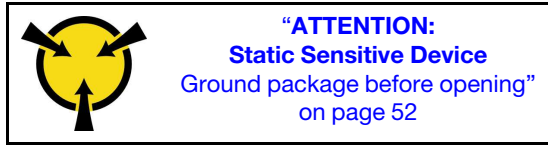
> "**ATTENTION:**
> **Static Sensitive Device**
> Ground package before opening"
> on page 52

See "Memory module installation rules and order" on page 52 for detailed information about memory configuration and setup.

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 52:

- 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.

Before installing a memory module, make sure that you understand the required installation order, depending on whether you are implementing memory mirroring, memory rank sparing, or independent Memory Mode. See *ThinkSystem SR850 Memory Population Reference* for the required installation order.

If you are installing an optional processor, install it before installing memory modules. See "Install a processor-heat-sink module" on page 90

Before installing a memory module:

1. If you are installing Intel Optane DC Persistent Memory modules (DCPMM) for the first time, follow the instructions in "Intel Optane DC Persistent Memory (DCPMM)" in *Setup Guide* "DC Persistent Memory Module (DCPMM) setup" on page 74.
2. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
3. 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.
4. **Watch the procedure**

   A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-B2y7oAb54mfyuLrIusa_qE.

Complete the following steps to install a memory module:

Watch the procedure

   A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-B2y7oAb54mfyuLrIusa_qE.

Step 1.   Open the memory module connector retaining clips. If a memory module is already installed in the connector, remove it.

Step 2.   Align the keys on the memory module that you are installing with the connector; then, insert the memory module.

Step 3.	Firmly press both ends of the memory module straight down into the connector until the retaining clips snap into the locked position.
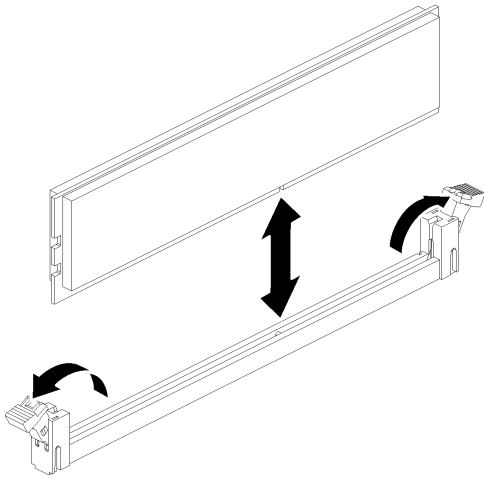
Figure 56. Memory module installation

Step 4.	If you are installing additional memory modules, do so now.

After installing a memory module option:

1.	Reinstall the system board air baffle (see "Install the system board air baffle and the power interposer" on page 104) or processor and memory expansion tray and expansion tray air baffle (see "Install the processor and memory expansion tray" on page 105).

2.	Reinstall the top cover (see "Install the top cover" on page 108).

3.	Reconnect the power cords and any cables that you removed.

4.	Install the server in the rack.

5.	Power on the server and any peripheral devices.

6.	If you have installed a DCPMM, make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).

7.	Configure DCPMMs and DRAM DIMMs (see "Configuring Intel Optane DC Persistent Memory (DCPMM)" in *Setup Guide* "Configure DC Persistent Memory Module (DCPMM)" on page 119).

Install a drive backplane

Use this procedure to install a drive backplane.

To install a drive backplane, complete the following steps:

Step 1.	Determine the location of the backplane to be installed accordingly to the following combinations. For more details about drive bay numbering, see "Front view" on page 13.

- One drive backplane:

	Always install the drive backplane to the drive bay 0-7 when there is only one backplane.

- Two drive backplanes:

	Two types of drive backplanes are supported by this system:

	– 2.5-inch SATA/SAS 8-bay backplane (referred to as "8-bay backplane")

	– 2.5-inch AnyBay 8-bay backplane (referred to as "AnyBay backplane")

When installing a 8-bay backplane and a AnyBay backplane, always install the 8-bay backplane to drive bay 0-7, and the AnyBay backplane to drive bay 8-15.

Step 2. Align the tabs on the bottom of the drive backplane with the slots on the system board, and insert them into the slots.

Step 3. Push the top of the drive backplane toward the front of the server until it clicks in place.
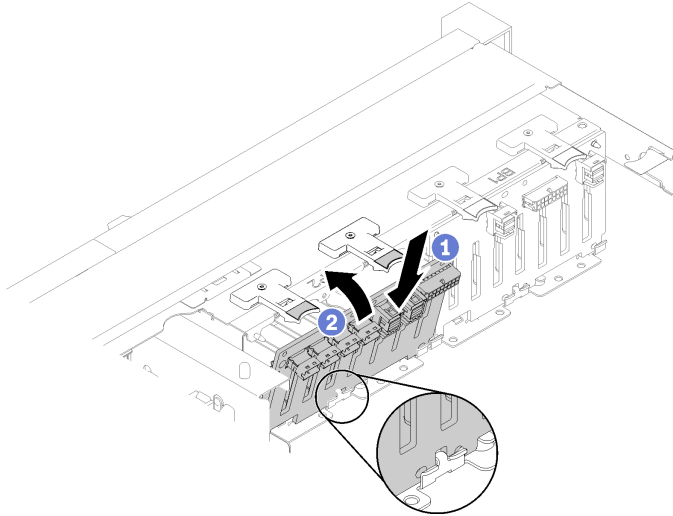
Figure 57. Drive backplane installation

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

- 8-bay backplane

  - **12-15 (NVMe)**

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

  - **12-15**

    Apply this label to drive bay 12-15 if an 8-bay backplane is installed to drive bay 8-15

  - **4-7**

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

- AnyBay backplane

  - **4-7 (NVMe)**

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

  - **12-15 (NVMe)**

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

Note: Only drive bay 4-7 and 12-15 may support NVMe solid-state drives when AnyBay backplane is installed. Drive bay 0-3 and 8-11 always support SATA/SAS drives only.
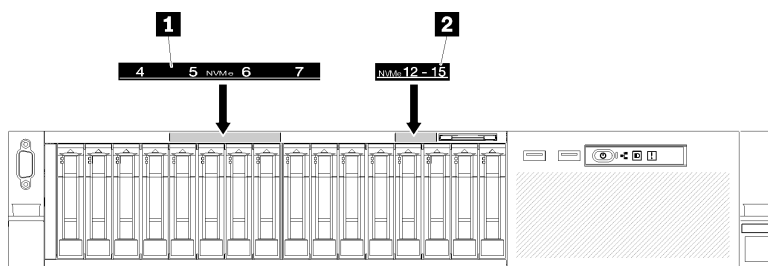
Figure 58. Drive bay labels of NVMe solid-state drives

Table 74. Drive bay labels of NVMe solid-state drives

1 Drive bay 4-7 label of NVMe solid-state drives	**2** Drive bay 12-15 label of NVMe solid-state drives

Install a 2.5-inch hot-swap drive

Use this procedure to install a 2.5-inch drive.

Following are the types of drives supported by this server:

- NVMe solid-state drive
- SATA/SAS solid-state drive
- SATA/SAS hard-disk drive

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

Before installing a 2.5-inch hot-swap drive:

1. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
2. 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.
3. **Watch the procedure**

   A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-B2y7oAb54mfyuLrIusa_qE.

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

Step 1.   Determine the available drive bays based on the drive bay labels applied. The following NVMe labels indicate that these drive bays support both NVMe and SATA/SAS drives. Otherwise, only SATA/SAS drives are supported.
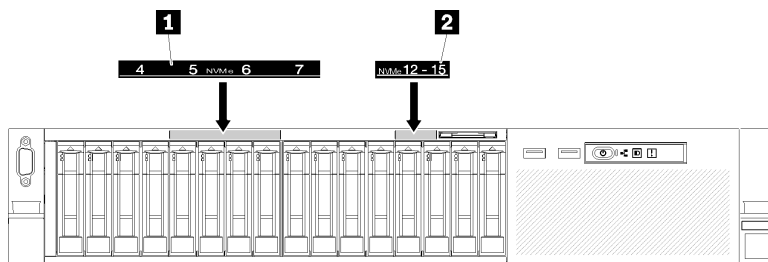
Figure 59. Drive bay labels of NVMe solid-state drives

Table 75. Drive bay labels of NVMe solid-state drives

1 Drive bay 4-7 label of NVMe solid-state drives	**2** Drive bay 12-15 label of NVMe solid-state drives

Notes:

1. Make sure to install every drive into the drive bay that supports the type of the specific drive. Drive type information is available on the drive.

2. When there are both SATA/SAS and NVMe drives to install, first install NVMe drives in reverse numeral order based on the bay number, and then install the SATA/SAS ones in numeral order.

Step 2.   Remove the drive bay filler if it has been installed in the drive bay.

Step 3.   Gently rotate the release latch away to unlock the drive handle.

Step 4.   Slide the drive into the drive bay, and push it until it stops.
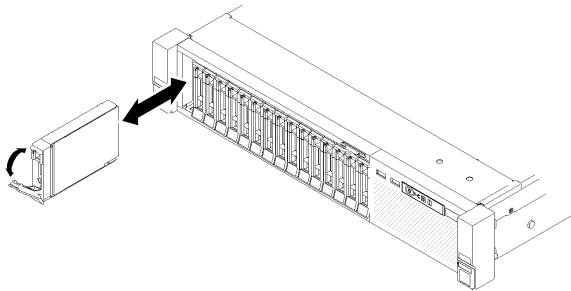
Figure 60. Drive installation

Step 5.   Rotate the drive-tray handle back to the locked position.

After installing the 2.5-inch hot-swap drive, 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 adapters.

Install the PCIe riser-card assembly

Use this procedure to install the PCIe riser-card assembly.

Before installing the PCIe riser-card assembly:

1. Disconnect the USB 3.0 cable of operator panel tray assembly, and remove it vertically from the system board.
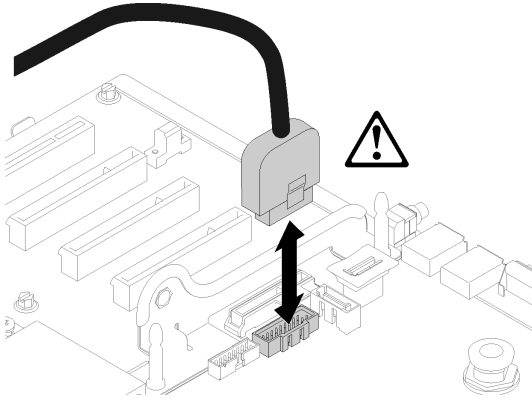
Figure 61. Removing USB 3.0 connector vertically

To install the PCIe riser-card assembly, complete the following steps:

Step 1. Assemble the PCIe riser-card assembly:

a. Align the bottom of the PCIe riser-card to the slot, and rotate the top to fit it into the slot on the riser-cage; then, move the PCIe riser-card slightly to fit the holes into the pins.
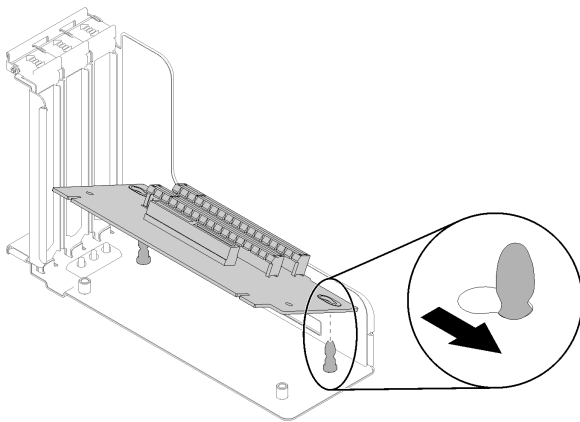
Figure 62. PCIe riser-card assembly

b. Install the PCIe riser-card to the riser-cage with screws.
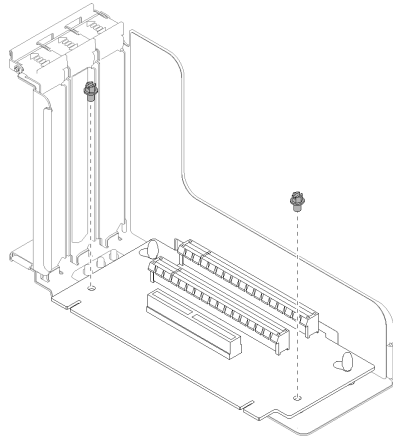
Figure 63. PCIe riser-card assembly

Step 2. Align the PCIe riser-card assembly with the connector on the system board; then, push it in until it clicks in place.
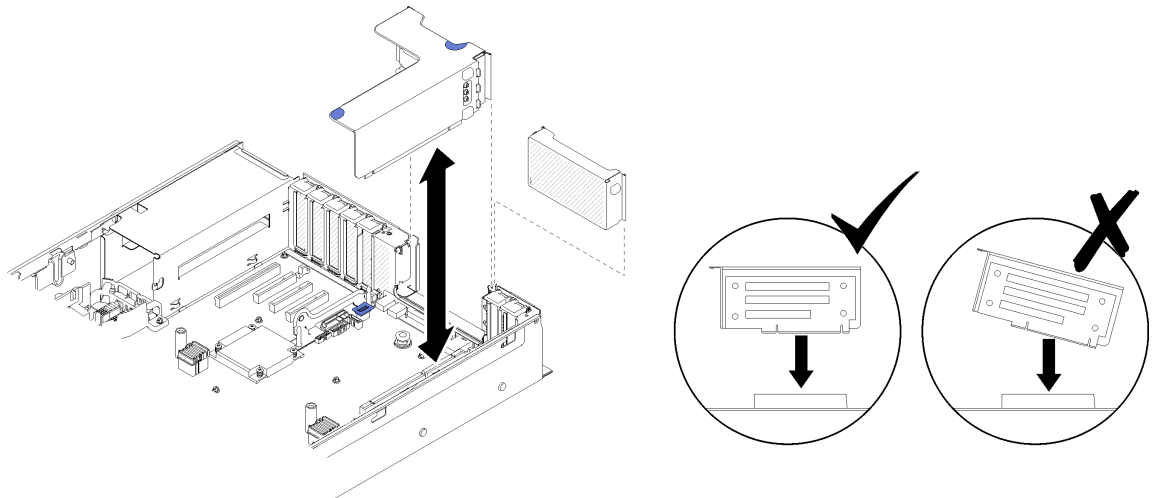
Figure 64. PCIe riser-card assembly installation

Step 3. Reconnect all the cables disconnected previously.

Install the LOM adapter

Follow the instructions in this section to install the LOM adapter.

Note: When both LOM adapter and ML2 adapter are installed to the server, the system can support up to two additional network adapters.

To install the LOM adapter, complete the following steps:

Step 1. Open the retention latch.

Step 2. Align the LOM adapter to the connector, and push it in.

Step 3. Tighten the captive thumbscrew to lock it to the system board.
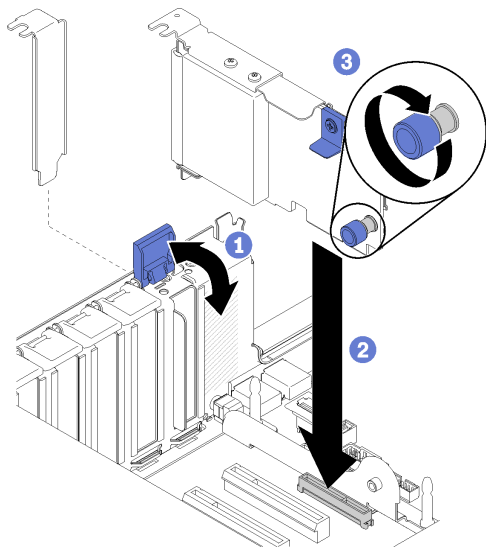
Figure 65. LOM adapter installation

Step 4.   Close the retention latch.

How to adjust the position of the retainer on the M.2 backplane

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

Before you adjust the position of the retainer on the M.2 backplane, complete the following steps:

1. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
2. 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.

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

Step 1.   Locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.

Step 2.   Press both sides of the retainer and move it forward until it is in the large opening of the keyhole; then, remove it from the backplane.

Step 3.   Insert the retainer into the correct keyhole and slide it backwards until the nubs are in the holes.
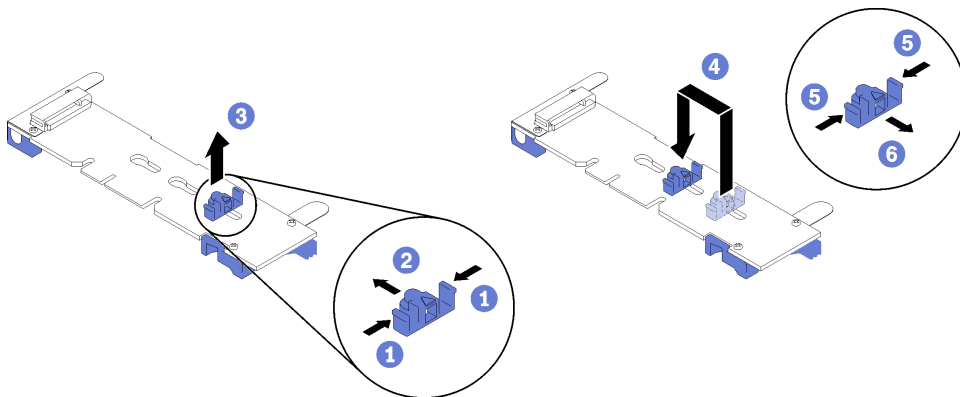
Figure 66. M.2 retainer adjustment

Install an M.2 drive in the M.2 backplane

Use this procedure to install an M.2 drive in the M.2 backplane.

Before installing an M.2 drive in the M.2 backplane:

1. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
2. 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.

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

Step 1. Locate the connector on each side of the M.2 backplane.

> **Notes:**
>
> - Some M.2 backplanes support two M.2 drives. When two drives are installed, align and support both drives when sliding the retainer forward to secure the drives.
> - Install the M.2 drive in slot 0 first.
> - Make sure to install a 480 GB M.2 drive into the M.2 backplane that supports two M.2 drives.
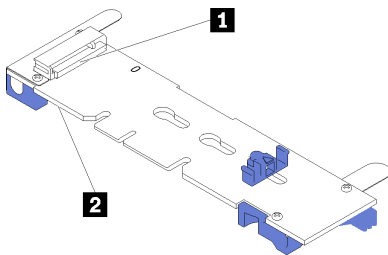
Figure 67. M.2 drive slots

Table 76. M.2 drive slots

1 Slot 0	**2** Slot 1

Step 2. Insert the M.2 drive at an angle (approximately 30 degrees) into the connector and rotate it until the notch catches on the lip of the retainer; then, slide the retainer forward (toward the connector) to secure the M.2 drive in the M.2 backplane.
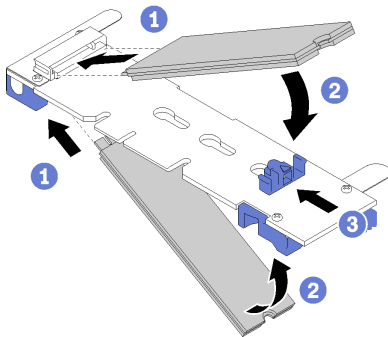
Figure 68. M.2 drive installation

Attention: When sliding the retainer forward, make sure the two nubs on the retainer enter the small holes on the M.2 backplane. Once they enter the holes, you will hear a soft "click" sound.
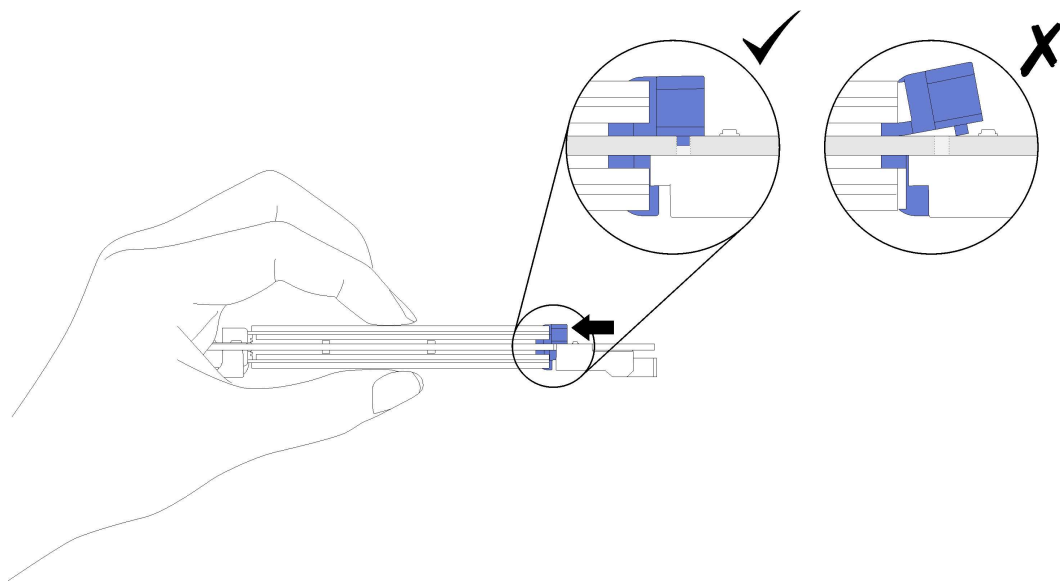
Figure 69. M.2 drive installation with the retainers in place

Install the M.2 backplane

Use this procedure to install the M.2 backplane.

Before installing the M.2 backplane:

1. Read the safety information and installation guidelines (see "Safety" on page iii and "Installation Guidelines" on page 50).
2. Install an M.2 drive to every available connector on the M.2 backplane (see "Install an M.2 drive in the M.2 backplane" on page 101).
3. 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.
4. Disconnect the USB 3.0 cable of operator panel tray assembly, and remove it vertically from the system board.
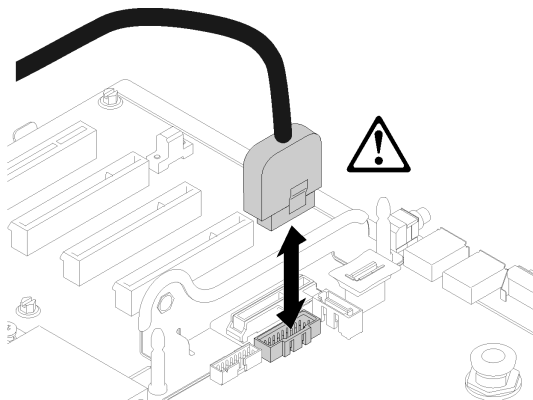
Figure 70. Removing USB 3.0 connector vertically

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

Note: Before installing the M.2 backplane, make sure an M.2 drive is installed to every available connector on the M.2 backplane.

Step 1. Align the openings located at the bottom of the blue plastic supports at each end of the M.2 backplane with the guide pin on the system board and T-head pins on the hard drive cage; then, insert the backplane in the system board connector. Press down on the M.2 backplane to fully seat it.
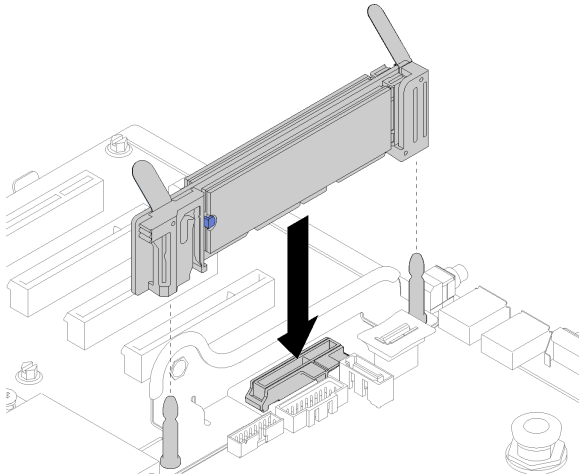
Figure 71. M.2 backplane installation

Install the fan cage assembly

Use this procedure to install the fan cage assembly.

To install the fan cage assembly, complete the following steps:

Step 1. Align the fan cage assembly to the slots on both sides of the server, and lower it into the server.
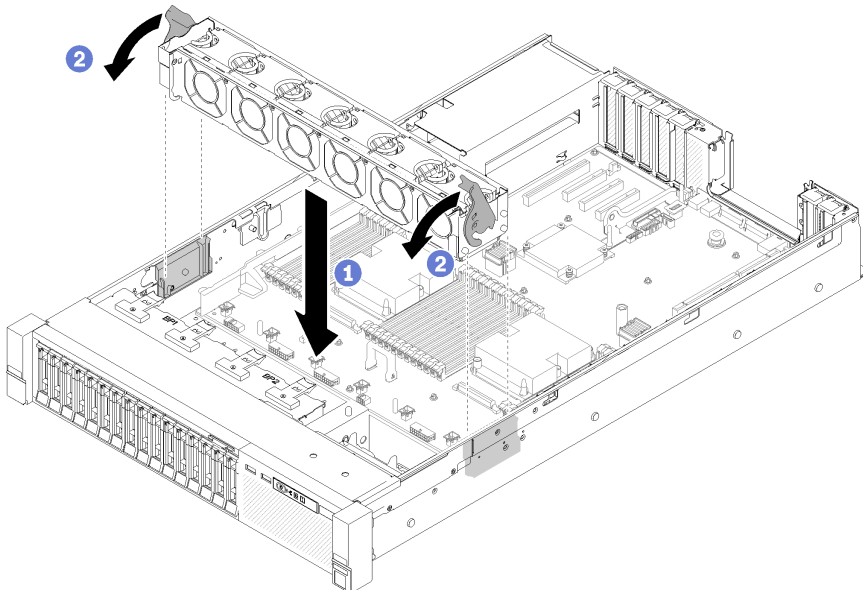
Figure 72. Fan cage assembly installation

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

Install the processor and memory expansion tray or the system air baffle

Follow the instructions in this section to install the processor and memory expansion tray or the system air baffle.

Depending on the configuration, one of the following need to be install before installation of some optional components is completed.

- Processor and memory expansion tray (see "Remove the processor and memory expansion tray" on page 87).
- System air baffle and power interposer (see "Remove the system board air baffle and the power interposer" on page 86).

Install the system board air baffle and the power interposer

Use this procedure to install the system board air baffle and the power interposer.

To install the system board air baffle and the power interposer, complete the following steps:

Step 1. Slightly slide power supply 2 out from the power supply bay (see "Remove a hot-swap power supply unit" in *ThinkSystem SR850 Maintenance Manual*).

Step 2. Align the power interposer to the server, and lower it until it sits firmly in place.
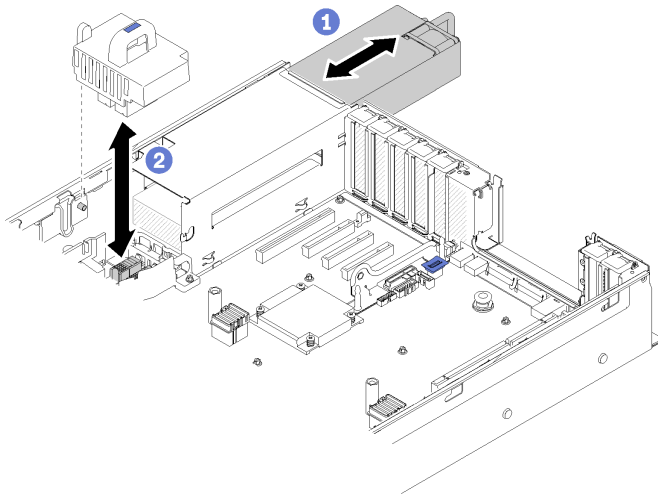
Figure 73. Power interposer installation

Step 3. Align the two pairs of nailheads of the system board air baffle to slots, and lower it into the server.

Attention: Air baffle is required for airflow that creates proper cooling. Make sure proper air baffles for system configuration is installed before the power is turned on.
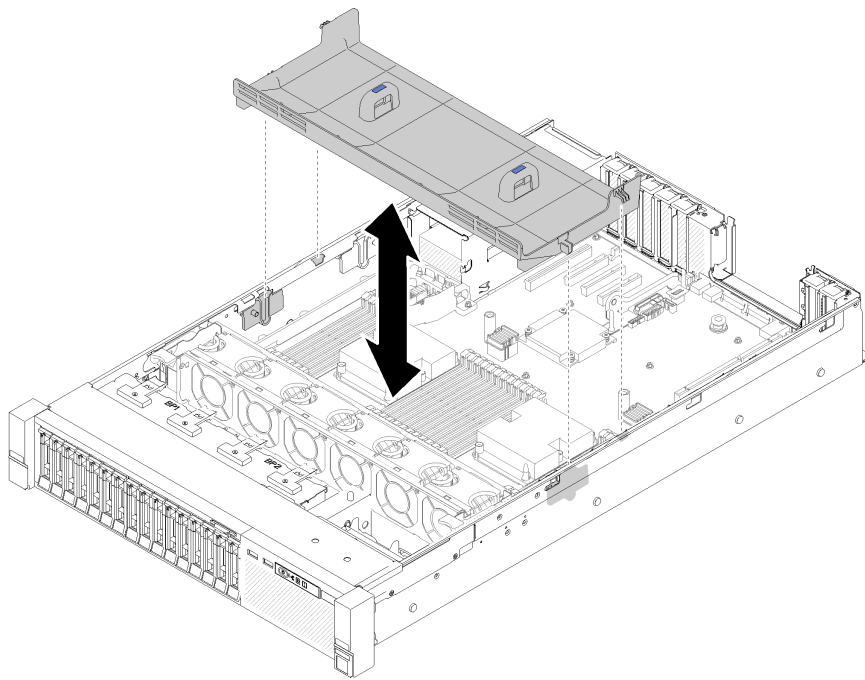
Figure 74. System board air baffle installation

Install the processor and memory expansion tray

Use this procedure to install the processor and memory expansion tray.

To install the processor and memory expansion tray, complete the following steps:

Step 1. If the power interposer and system board air baffle are installed, remove them (see "Remove the system board air baffle and the power interposer" on page 86).

Step 2. Install an expansion tray air baffle on the system board. Make sure it is properly installed before installing the processor and memory expansion tray.
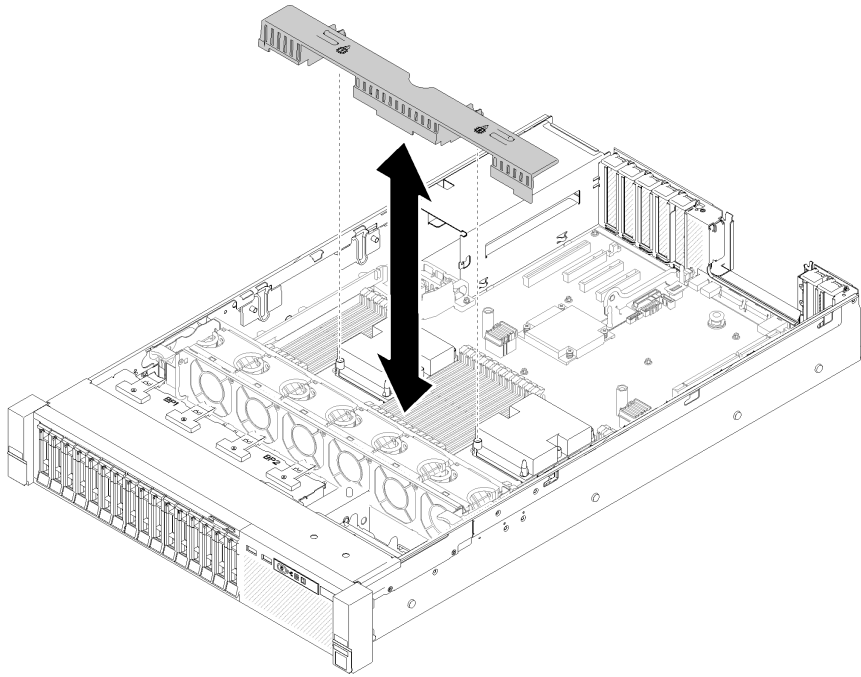
Figure 75. Expansion tray air baffle installation

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

Step 3. Slightly slide power supply 2 out from the power supply bay (see "Remove a hot-swap power supply unit" in *ThinkSystem SR850 Maintenance Manual*).

Step 4. Grip on the blue touch point on the handle of the expansion tray, and lift it up; then, lower the tray vertically into the server with nailheads aligned to the slots on both sides.

Step 5. Rotate the handle all the way down. This connects and fix the expansion tray to the system board.
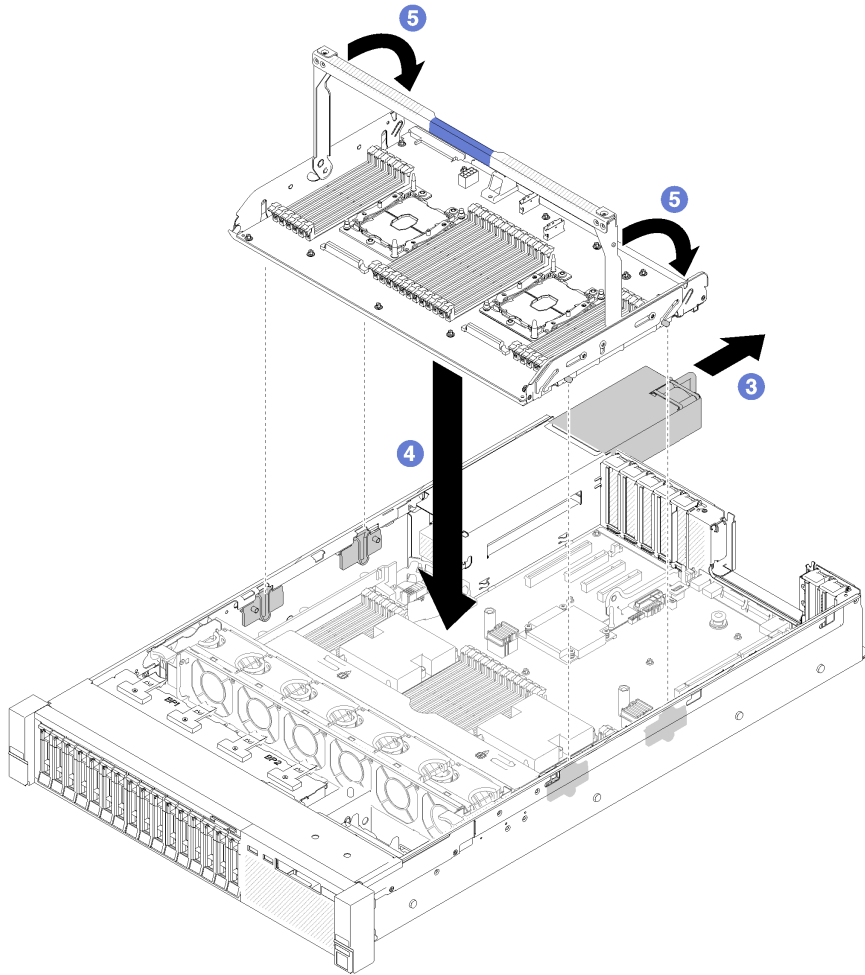
Figure 76. Processor and memory expansion tray installation

Step 6.   Slide the power supply 2 back into the chassis.

Step 7.   Install DIMMs (see "Install a memory module" on page 93), PHMs (see "Install a processor-heat-sink module" on page 90), and the expansion tray air baffle on the expansion tray.
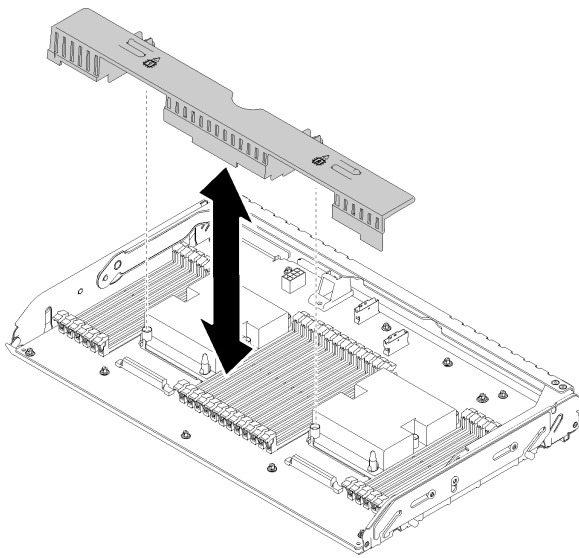
Figure 77. Expansion tray air baffle installation

Attention:

1. For the optimal performance, make sure both PHMs and corresponding DIMMs are installed to the processor and memory expansion tray.

2. Air baffle is required for airflow that creates proper cooling. Make sure proper air baffles for system configuration is installed before the power is turned on.

Install the top cover

Use this procedure to install the server top cover.

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.

Before installing the top cover:

1. Read the safety information and installation guidelines (see and).

2. **Watch the procedure**

    A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-B2y7oAb54mfyuLrlusa_qE.

3. Make sure all the removed components are installed, and all the disconnected cables are reconnected.

To install the top cover, complete the following steps:

Step 1.   Press and hold on the blue tab of cover release latch; then, rotate the tip of the latch up.

Step 2.   Place the top cover on top of the server with both sides aligned.

Step 3.   Push the latch down until it clicks in place.
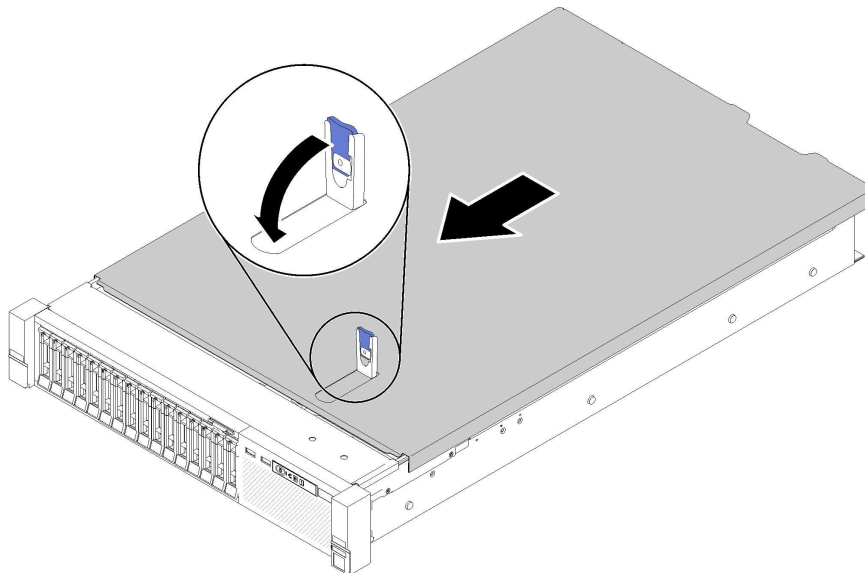
Figure 78. Top cover installation

Install the security bezel

Install the security bezel by pivoting the security bezel inward until the other side clicks into place, and then locking the security bezel.

Before installing the security bezel:

1. Read the safety information and installation guidelines (see and).

2. **Watch the procedure**

    A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-B2y7oAb54mfyuLrlusa_qE.

3. If you have removed the rack handles, reinstall it (see *ThinkSystem SR850 Rack Installation Guide*).

Step 1.   Carefully insert the tabs on the security bezel into the slots on the right rack handle. Then, press and hold the release latch, and pivot the security bezel inward until the other side clicks into place.
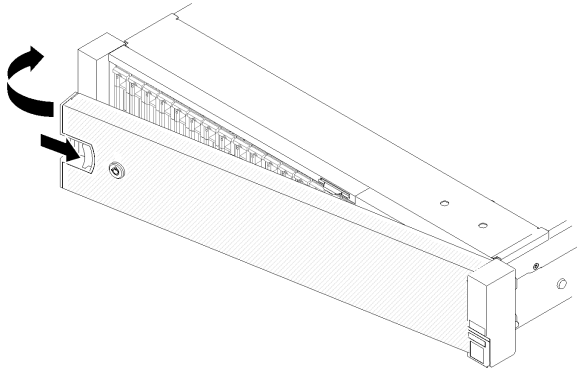
Figure 79. Security bezel installation

Step 2.   Use the key to lock the security bezel to the closed position.
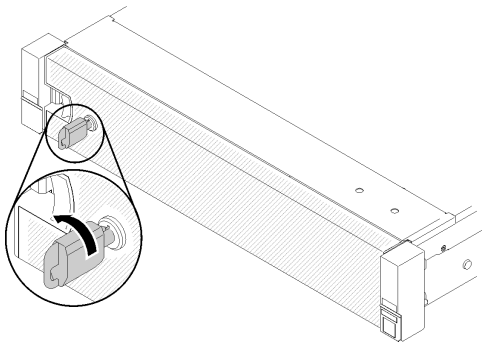
Figure 80. Locking the security bezel

After installing the security bezel, push or install the server into the rack if necessary. See ThinkSystem SR850 Rack Installation Guide that comes with the rail kit.

Install the server in a rack

To install the server in a rack, follow the instructions that are provided below.

- Rack servers
  - To install the server in a rack, follow the instructions that are provided in the Rail Installation Kit for the rails on which the server will be installed.
- Blade servers
  - To install the server in a chassis, follow the instructions that are provided in the documentation for the chassis in which you are installing the server.
  - For instructions related to the Flex System Enterprise chassis, see http://flexsystem.lenovofiles.com/ help/topic/com.lenovo.acc.8721.doc/installing_components.html.
  - For instructions related to the Flex System Carrier-Grade chassis, see http://flexsystem.lenovofiles.com/ help/topic/com.lenovo.acc.7385.doc/installing_components.html.

Cable the server

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

Connect to power

Connect the server to power.

Connect to the network

Connect the server to the network.

Connect to storage

Connect the server to any storage devices.

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 .

Validate server setup

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

Power off the server

The server remains in a standby state when it is connected to a power source, allowing the 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 .

Chapter 4. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

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

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

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

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

  1. Start the server.

  2. 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://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.)

  3. Go to **LXPM ➙ UEFI Setup ➙ BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.

     - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
     - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.

  4. Click **OK** to apply the setting and wait for two to three minutes.

  5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

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

- If no monitor attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see "Rear view" on page 21.

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

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

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see "Front view" on page 13.

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

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.

2. On your mobile device, enable USB tethering.

3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.

4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

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

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

Set front USB port for Lenovo XClarity Controller connection

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

Server support

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

- Refer to Chapter 2 "Server components" on page 13.

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

Setting the USB port for Lenovo XClarity Controller connection

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

- Hold the ID button for at least 3 second until its LED flashes slowly (once every couple of seconds). See Chapter 2 "Server components" on page 13 for ID button location.

- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the "Command-line interface" section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration ➙ Network ➙ Front Panel USB Port Manager**. For information about Lenovo XClarity Controller web interface functions, see the "Description of XClarity Controller functions on web interface" section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration ➙ Network ➙ Front Panel USB Port Manager**). See the "Command-line interface"

and "Description of XClarity Controller functions on web interface" sections in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

Update the firmware

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

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

- Best practices related to updating firmware is available at the following site:
  - http://lenovopress.com/LP0656
- The latest firmware can be found at the following site:
  - http://datacentersupport.lenovo.com/products/servers/thinksystem/sr850/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 Operating System executing on the server's operating system.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs)**. UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
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://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

  Notes:

  – To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

    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://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

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

  For 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://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

- **Lenovo XClarity Essentials OneCLI**

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

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

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_update.html

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

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

- **Lenovo XClarity Administrator**

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

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

Configure the firmware

Several options are available to install and set up the firmware for the server.

Important: Do not configure option ROMs to be set to **Legacy** unless directed to do so by Lenovo Support. This setting prevents UEFI drivers for the slot devices from loading, which can cause negative side effects for Lenovo software, such as Lenovo XClarity Administrator and Lenovo XClarity Essentials OneCLI, and to the Lenovo XClarity Controller. The side effects include the inability to determine adapter card details, such as model name and firmware levels. When adapter card information is not available, generic information for the model name, such as "Adapter 06:00:00" instead of the actually model name, such as "ThinkSystem RAID 930-16i 4GB Flash." In some cases, the UEFI boot process might also hang.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

  Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager ➙ UEFI Setup ➙ System Settings ➙ <F1>Start Control ➙ Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

  See the following documentations for more information:

  - *Lenovo XClarity Provisioning Manager User Guide*

    - Search for the LXPM documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html

  - *UEFI User Guide*

    - https://thinksystem.lenovofiles.com/help/topic/dcg_uefi/overview_dcg_uefi.html

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_settings_info_commands.html

- **Lenovo XClarity Administrator**

  You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

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

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

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface or through the command-line interface.

  For information about configuring the server using Lenovo XClarity Controller, see:

  "Configuring the Server" section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

Memory configuration

Memory performance depends on several variables, such as Memory Mode, memory speed, memory ranks, memory population and processor.

More information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.com/servers/options/memory

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

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

Configure DC Persistent Memory Module (DCPMM)

Follow the instructions in this section to configure DCPMMs and DRAM DIMMs.

DCPMM capacity could act as accessible persistent memory for applications or volatile system memory. Based on the approximate percentage of DCPMM capacity invested in volatile system memory, the following three operating modes are available for choice:

- **App Direct Mode** (0% of DCPMM capacity acts as system memory):

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

  The total displayed volatile system memory in this mode is the sum of DRAM DIMM capacity.

  Notes:

– In App Direct Mode, the DRAM DIMMs that are installed can be configured to mirror mode.

– When only one DCPMM is installed for each processor, only not-interleaved App Direct Mode is supported.

- **Mixed Memory Mode** (1-99% of DCPMM capacity acts as system memory):

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

The total displayed volatile system memory in this mode is the DCPMM capacity that is invested in volatile system memory.

- **Memory Mode** (100% of DCPMM capacity acts as system memory):

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache.

The total displayed volatile system memory in this mode is the sum of DCPMM capacity.

DCPMM Management options

DCPMMs can be managed with the following tools:

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

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

Go to **UEFI Setup ➙ System Settings ➙ Intel Optane DCPMMs** to configure and manage DCPMMs.

For more details, see the "UEFI Setup" section in the Lenovo XClarity Provisioning Manager documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.

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

- **Setup Utility**

To enter Setup Utility:

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

Go to **System Configuration and Boot Management ➙ System Settings ➙ Intel Optane DCPMMs** to configure and manage DCPMMs.

- **Lenovo XClarity Essentials OneCLI**

Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See https://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_t_download_use_tcscli.html to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane DCPMM details**

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

- Firmware version
- Configuration status
- Raw capacity
- Memory capacity
- App Direct capacity
- Unconfigured capacity
- Inaccessible capacity
- Reserved capacity
- Percentage remaining
- Security state

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

```
onecli.exe config show IntelOptaneDCPMM --imm USERID:PASSWORD@10.104.195.86
```

Notes:
- *USERID* stands for XCC user ID.
- *PASSW0RD* stands for XCC user password.
- *10.104.195.86* stands for IP address.

- **Goals**

  - **Memory Mode [%]**

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

    - **0%:** App Direct Mode

    - **1-99%:** Mixed Memory Mode

    - **100%:** Memory Mode

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

    Notes:
    - Before changing from one mode to another:

      1. Back up all the data and delete all the created namespaces. Go to **Namespaces ➙ View/Modify/Delete Namespaces** to delete the created namespaces.

      2. Perform secure erase on all the installed DCPMMs. Go to **Security ➙ Press to Secure Erase** to perform secure erase.

    - Make sure the capacity of installed DCPMMs and DRAM DIMMs meets system requirements for the new mode (see "DCPMM and DRAM DIMM installation order" in *Memory Population Reference*).

    - After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management ➙ Intel Optane DCPMMs ➙ Goals** will go back to the following default selectable options:

      - **Scope:** [Platform]
      - **Memory Mode [%]:** 0
      - **Persistent Memory Type:** [App Direct]
      These values are selectable options for DCPMM settings, and do not represent the current DCPMM status.

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

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

    1. Set create goal status.

```
onecli.exe config set IntelOptaneDCPMM.CreateGoal Yes --imm USERID:PASSWORD@10.104.195.86
```

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

```
onecli.exe config set IntelOptaneDCPMM.MemoryModePercentage 20 --imm USERID:PASSWORD@10.104.195.86
```

Where *20* stands for the percentage of capacity that is invested in system volatile memory.

3. Set the DCPMM mode.

```
onecli.exe config set IntelOptaneDCPMM.PersistentMemoryType "App Direct" --imm
USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the DCPMM mode.

– **Persistent Memory Type**

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

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

- **Regions**

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

- **Namespaces**

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

1. Namespaces must be created for region capacity allocation.

2. Filesystem must be created and formatted for the namespaces in the operating system.

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

– Windows: Use *Pmem* command.

– Linux: Use *ndctl* command.

– VMware: Reboot the system, and VMware will create namespaces automatically.

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

- **Security**

– Enable Security

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

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

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

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

• Enable security:

1. Enable security.

```
onecli.exe config set IntelOptaneDCPMM.SecurityOperation "Enable Security" --imm
USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456" --imm
USERID:PASSWORD@10.104.195.86
```

Where *123456* stands for the passphrase.

3. Reboot the system.

- Disable security:

1. Disable security.

```
onecli.exe config set IntelOptaneDCPMM.SecurityOperation "Disable Security" --imm
USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456" --imm
USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

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

Notes:

- Single DCPMM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.

- Always make sure to keep records of the slot number of locked DCPMMs and corresponding passphrases. In the case the passphrases are lost or forgotten, the stored data cannot be backed up or restored, but you can contact Lenovo service for administrative secure erase.

- After three failed unlocking attempts, the corresponding DCPMMs enter "exceeded" state with a system warning message, and the DCPMM unit can only be unlocked after the system is rebooted.

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

– Secure Erase

Notes:

– Password is required to perform Secure Erase when security enabled.

– Before executing secure erase, make sure ARS (Address Range Scrub) is done on all PMEMs or on the specific PMEMs selected. Otherwise, secure erase cannot be started on all PMEMs or the specific PMEM selected, and the following text message will pop out:

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

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

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

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

- **DCPMM Configuration**

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

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run DCPMM diagnostics (see the "Running diagnostics" section in the Lenovo XClarity Provisioning Manager documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html). To adjust the selectable percentage that the warning message requires, go to **Intel Optane DCPMMs ➔ DCPMM Configuration**, and input the percentage.

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

```
onecli.exe config set IntelOptaneDCPMM.PercentageRemainingThresholds 20 --imm USERID:PASSWORD@10.104.195.86
```

Where *20* is the selectable percentage.

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

https://lenovopress.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: https://lenovopress.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

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

  – Lenovo XClarity Essentials OneCLI

    http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html

  – Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

    https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.html

- **Single-server**

  Available tools:

  – Lenovo XClarity Provisioning Manager

    "OS Installation" section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html

  – Lenovo XClarity Essentials OneCLI

    http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html

  – Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

    https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.html

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding *OS Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to https://datacentersupport.lenovo.com/solutions/server-os.

2. Select an operating system from the navigation pane and click **Resources**.

3. Locate the "OS Install Guides" area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

  "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

  Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_save_command.html

- **Operating system**

  Use your backup methods to back up the operating system and user data for the server.

Update the Vital Product Data (VPD)

After initial setup of the system, you can update some Vital Product Data (VPD), such as asset tag and Universal Unique Identifier (UUID).

Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

  To update the UUID from Lenovo XClarity Provisioning Manager:

  1. Start the server and press the key according to the on-screen instructions. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) The Lenovo XClarity Provisioning Manager interface is displayed by default.
  2. If the power-on Administrator password is required, enter the password.
  3. From the System Summary page, click **Update VPD**.
  4. Update the UUID.
- From Lenovo XClarity Essentials OneCLI

  Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

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

  To update the UUID from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

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

     `onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]`

     Where:

     <uuid_value>
         Up to 16-byte hexadecimal value assigned by you.

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

         – Online authenticated LAN access, type the command:

            `[--bmc-username xcc_user_id --bmc-password xcc_password]`

Where:

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

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

Example command is as follows: `onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>`
`--bmc-username xcc_user_id`
`--bmc-password xcc_password`

– Online KCS access (unauthenticated and user restricted):

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

Example command is as follows:`onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>`

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

– Remote LAN access, type the command:

`[--bmc xcc_user_id:xcc_password@xcc_external_ip]`

Where:

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

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

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

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

Example command is as follows:`onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>`
`--bmc xcc_user_id:xcc_password@xcc_external_ip`

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

Update the asset tag

Optionally, you can update the asset tag.

There are two methods available to update the asset tag:

• From Lenovo XClarity Provisioning Manager

To update the asset tag from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the asset tag information.

• From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the asset tag in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the asset tag:

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

To update the asset tag from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.

3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the DMI:

   `onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]`

   Where:

   <asset_tag>
   The server asset tag number. Type `asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

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

   – Online authenticated LAN access, type the command:

     [**--bmc**`-username xcc_user_id `**--bmc**`-password xcc_password`]

     Where:

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

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

     Example command is as follows: `onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> `**--bmc**`-username xcc_user_id`
     --bmc`-password xcc_password`

   – Online KCS access (unauthenticated and user restricted):

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

     Example command is as follows:`onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>`

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

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

     Where:

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

     xcc_user_id

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

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

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

Example command is as follows: `onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>`
--bmc `xcc_user_id:xcc_password@xcc_external_ip`

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

Chapter 5. Resolving installation issues

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your server.

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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" in *ThinkSystem SR850 Maintenance Manual*.

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

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the light path diagnostics LEDs.

2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

    You can view processor details from system setup.

    To determine if the processor is supported for the server, see https://static.lenovo.com/us/en/serverproven/index.shtml.

3. (Trained technician only) Make sure that processor 1 is seated correctly

4. (Trained technician only) Remove processor 2 and restart the server.

5. Replace the following components one at a time, in the order shown, restarting the server each time:
    a. (Trained technician only) Processor
    b. (Trained technician only) System board

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is 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 cannot recognize a drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow drive status LED. If the LED is lit, it indicates a drive fault.

2. If the LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the drive backplane.

3. Observe the associated green drive activity LED and the yellow status LED:
    - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press 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://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.)You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD test**.
    - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.

- If neither LED is lit or flashing, check the drive backplane (go to step drive problems).
- 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 drive problems. If the activity of the LEDs changes, return to step 1.

4. Make sure that the 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://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ 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.

Displayed system memory is less than installed physical memory

Complete the following steps until the problem is solved:

Note: Each time you install or remove a memory module, you must disconnect the 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 "Specifications" on page 4 or "Intel Optane DC Persistent Memory (DCPMM) setup" in *Setup Guide* "DC Persistent Memory Module (DCPMM) setup" on page 74 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 DCPMMs are installed:
     a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.

b. Refer to "Intel Optane DC Persistent Memory (DCPMM) setup" in *Setup Guide* "DC Persistent Memory Module (DCPMM) setup" on page 74 and see if the displayed memory fits the mode description.

   c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see "Intel Optane DC Persistent Memory (DCPMM) setup" in *Setup Guide* "DC Persistent Memory Module (DCPMM) setup" on page 74).

   d. Go to the Setup Utility, select **System Configuration and Boot Management ➙ Intel Optane DCPMMs ➙ Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the server.

3. Check the POST error log:

   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.

   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.

4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic ➙ Memory test** or **DCPMM test**.

   Notes: When DCPMMs are installed, run diagnostics based on the mode that is set presently:

   - App Direct Mode:

     – Run Memory Test for DRAM memory modules.

     – Run DCPMM Test for DCPMMs.

   - Memory and Mixed Memory Mode:

     Run both Memory Test and DCPMM Test for DCPMMs.

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 DCPMMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup utility, and then restart the server.

7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.

8. (Trained technician only) Replace the system board.

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

1. Check the XCC event log for any events associated with the device.

2. Make sure that the following conditions are met:

   - The device is installed in the correct port.

   - The device is designed for the server (see https://static.lenovo.com/us/en/serverproven/index.shtml).

   - You followed the installation instructions that came with the device, and the device is installed correctly.

   - You have not loosened any other installed devices or cables.

   - You updated the configuration information in system setup. When you start a server and press 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://

sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) Whenever memory or any other device is changed, you must update the configuration.

3. Reseat the device that you just installed.

4. Replace the device that you just installed.

Appendix A. Getting help and technical assistance

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

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

http://datacentersupport.lenovo.com

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

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

Attempt to resolve the problem yourself

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

You can find the product documentation for your ThinkSystem products at the following location:

http://thinksystem.lenovofiles.com/help/index.jsp

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check https://static.lenovo.com/us/en/serverproven/index.shtml to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
  - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

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.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

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

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

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

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

  – For more information about using the web interface to collect service data, see the "Downloading service data" section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

  – For more information about using the CLI to collect service data, see the "ffdc command" section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another

service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

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Lenovo

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