ThinkStation PX
User Guide

Read this first

Before using this documentation and the product it supports, ensure that you read and understand the following:

- *Safety and Warranty Guide*
- *Generic Safety and Compliance Notices*
- *Setup Guide*

Sixth Edition (March 2025)

Contents

Discover your Lenovo computer

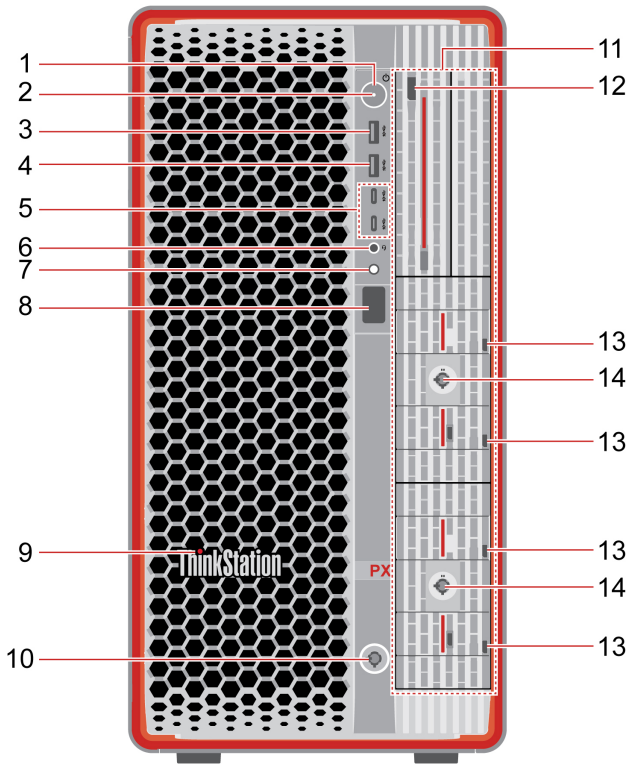
Thank you for choosing a Lenovo® computer! We are dedicated to delivering the best solution to you.

Before starting your tour, please read the following information:

- Illustrations in this documentation might look different from your product.
- Depending on the model, some optional accessories, features, software programs, and user interface instructions might not be applicable to your computer.
- Documentation content is subject to change without notice. To get the latest documentation, go to https://pcsupport.lenovo.com.

Chapter 1. Overview

Front



Item	Description	Item	Description
1.	Power button	2.	Power indicator
3.	USB-A 3.2 Gen 2 connector*	4.	Always On USB-A 3.2 Gen 2 connector*
5.	USB-C® (3.2 Gen 2) connectors*	6.	Headset connector
7.	Diagnostic LCD switch	8.	Diagnostic LCD
9.	ThinkStation®LED	10.	Front access bay lock
11.	Front access bays (1 to 6)	12.	HDD (hard disk drive) LED label*
13.	M.2 SSD (solid-state drive) LED labels*	14.	Dual M.2 SSD enclosure locks*

* for selected models

Statement on USB transfer rate

Depending on many factors such as the processing capability of the host and peripheral devices, file attributes, and other factors related to system configuration and operating environments, the actual transfer rate using the various USB connectors on this device will vary and will be slower than the data rate listed below for each corresponding device.

USB device	Data rate (Gbit/s)
3.2 Gen 1	5
3.2 Gen 2	10
3.2 Gen 2 × 2	20
Thunderbolt 3	40
Thunderbolt 4	40

Power indicator

Show the system status of your computer.

- **On:** The computer is starting up or working.
- **Off:** The computer is off or in hibernation mode.
- **Blinking slowly:** The computer is in sleep mode.

Always On USB-A 3.2 Gen 2 connector

With the Always On USB feature enabled, the Always On USB-A 3.2 Gen 2 connector can charge a USB-A compatible device when the computer is on, off, in sleep mode, or in hibernation mode.

To enable the Always On USB feature, do the following:

1. Enter the UEFI BIOS menu. See “Enter the BIOS menu” on page 22.
2. Click **Devices → USB Setup → Front USB Ports → USB Port 2** to enable the Always On USB feature.

Diagnostic LCD switch

Use the diagnostic LCD switch to turn on or turn off the diagnostic LCD, and handle occurred events.

Status	Behavior and function
No event	**Short press:** Turn on or turn off the diagnostic LCD. Date and time will be displayed on the LCD when it is turned on. The LCD will turn off automatically if idle for three minutes.
Error events occur	The diagnostic LCD will turn on automatically when an error event occurs. • **Short press (when multiple events occur):** Switch among error events and display the corresponding QR code of the selected event. • **Long press (about 3 seconds):** Clear the selected event.

Diagnostic LCD

Display the diagnostic information when an issue or error is detected. You can decode the error code at https://www.thinkworkstationsoftware.com/codes.

HDD or M.2 SSD LED label

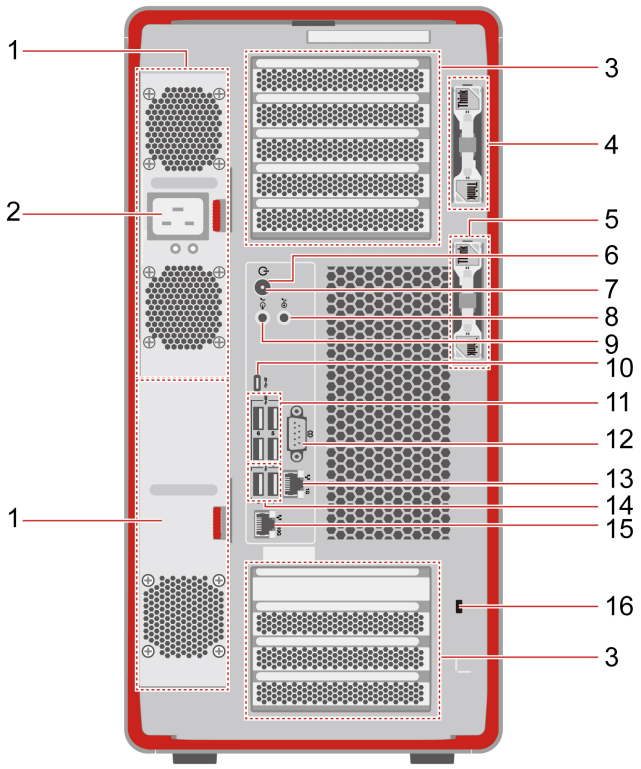
The storage drives have the following two types of LEDs:

LED	Status and indication
Status LED	• **Solid on:** The storage drive status is failure. • **4 Hz blinking (four times per second):** Locating the storage drive. • **1 Hz blinking (once a second):** Rebuilding RAID. • **Off (when the computer is powered on):** The storage drive status is normal.
Activity LED	• **Solid on:** The storage drive is online, installed, or powered on (no activity). • **Variable blinking:** Accessing the storage drive. • **Off (when the computer is powered on):** The storage drive is not installed or powered.

Related topics

- “Expand your computer” on page 19.
- “USB specifications” on page 9.
- “Transfer data” on page 19.
- “Lock the computer” on page 13.
- “Diagnostics” on page 30.

Rear



Item	Description	Item	Description
1.	PSU (power supply unit) bays (2)	2.	Power cord connector
3.	PCIe card areas	4.	Key-nest for the left side cover and front access bays

Item	Description	Item	Description
5.	Key-nest for the dual M.2 SSD enclosure	6.	Power button
7.	Power indicator	8.	Audio line-in connector
9.	Audio line-out connector	10.	USB-C (3.2 Gen 2x2) connector
11.	USB-A 3.2 Gen 1 connectors	12.	Serial connector*
13.	Ethernet connector (1 G)	14.	USB-A 2.0 connectors
15.	Ethernet connector (10 G)	16.	Security-lock slot

* for selected models

Power indicator

Show the system status of your computer.

- **On:** The computer is starting up or working.
- **Off:** The computer is off or in hibernation mode.
- **Blinking slowly:** The computer is in sleep mode.

Serial connector*

Connect an external modem, a serial printer, or other devices that use a serial connector.

PCIe card areas

Install PCIe cards into these areas to improve the operating performance of the computer. Depending on the computer model, the video output connectors in these areas might be DisplayPort™ connectors or Mini DisplayPort™ connectors.

Related topics

- “Expand your computer” on page 19.
- “Lock the computer” on page 13.
- “Connect an external display” on page 11.
- “USB specifications” on page 9.

Notices for side ventilation and workplace power

Side ventilation notice

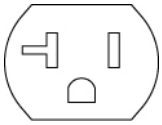
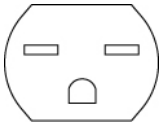
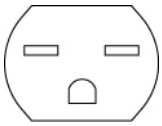
Side ventilation design is available on some models. Pay attention to the ventilation distance requirements for models with different configurations:

- Systems configured with rear-exhausting graphics cards (such as NVIDIA RTX 6000 Ada) do not require side ventilation.
- Systems configured with internal-exhausting graphics cards (such as GeForce RTX 4070 and GeForce RTX 4080) require side ventilation. Do not block air vents on the left side cover. To ensure heat dissipation, do not place any objects within 4.5 cm (1.8 inches) or 1 rack unit from the left side cover.
- For rack-mounted systems, a rack spacer is recommended in the gap above the system.

Note: Do not install internal-exhausting graphics cards (such as GeForce RTX 4070 and GeForce RTX 4080) on systems without side ventilation on the left side cover.

Workplace power and system configuration requirements

- Only use the power cord shipped with your computer.
- General power supply requirements:
  - Ensure that your workplace is able to support the AC outlet and AC current requirements.
  - Low AC voltage countries require up to 20 amps of AC power.
  - Japan and Taiwan region require a high AC voltage outlet.
  - See details in the table below for North America, Japan, and Taiwan region.

Low / High AC voltage	Countries or regions	Requirements
Low AC voltage	North America (110-127V AC typical)	– Require 110-127V / 20A AC receptacle. – Lenovo power cord part number: SL60P41047  125V / 20A
Low AC voltage	Japan (100V AC typical)	– Require 200V / 12A AC receptacle. – Lenovo power cord part number: SL60P41056  250V / 15A
Low AC voltage	Taiwan region (110V AC typical)	– Require 220V / 12A AC receptacle. – Lenovo power cord part number: SL60P41049  250V / 15A
High AC voltage	Countries or regions except North America, Japan, and Taiwan region	– Require 220-240V / 12A AC various receptacle. – Minimum 12A circuit per power supply

- Redundant mode hot-plug power supply requirements:
  - A dedicated circuit is recommended for each power supply to maximize redundancy.
  - System must be configured to the maximum output of single power supply. Upgrading system components may compromise redundancy.

- Teamed mode power supply requirements:
  - A dedicated circuit is required for each power supply for low AC voltage workplace and is recommended for high AC voltage workplace.
  - Teaming allows system power output up to 2350 W. Total output power is 100-240V / 27-12A AC.
  - Do not hot plug in teamed mode with system power consumption above single PSU maximum output power. This might result in immediate power off.

Specifications

Specification	Description
Dimensions	• Width: 220 mm (8.7 inches) • Height: 440.4 mm (17.3 inches, with feet) • Depth: 575 mm (22.6 inches)
Weight (without packaging)	Maximum configuration as shipped: 35.6 kg (78.5 lb)
Hardware configuration	Type `Device Manager` in the Windows search box and then press Enter. Type the administrator password or provide confirmation, if prompted.
Power supply	1850-watt 92% hot-swappable power supply, downgrade to 1400-watt (supported by firmware in some regions) **Notes:** • Only use the power cord shipped with the system and ensure that your workplace is able to support the AC outlet and AC current requirements. • A dedicated circuit is recommended for each power supply. • Pay attention to the hot swap using scenarios in case system power consumption above single PSU maximum output power. This might result in immediate power off.
Electrical input	• Input voltage: From 100 V ac to 240 V ac • Input frequency: 50/60 Hz
Memory	• Quantity: – 1 CPU: 1, 2, 4, 6, or 8 memory modules – 2 CPUs: 2, 4, 8, 12, or 16 memory modules • Type: – DDR5-4800 (double data rate 5 at 4800 MT/s) ECC (error correction code) RDIMM (registered dual inline memory modules) – DDR5-5600 ECC RDIMM **Note:** See “System memory speed” on page 8 for memory speed statements. • Capacity: 16 GB, 32 GB, 64 GB, or 128 GB
Storage device	• 3.5-inch HDD* (hot-swappable in the front access bay) • 3.5-inch HDD* (in the PSU bay 2) • 2280 Gen 4 or Gen 5 M.2 SSD* (Onboard) • 2280 Gen 4 M.2 SSD* (hot-swappable in the front access bay) • 2280 Gen 4 or Gen 5 M.2 SSD* on an M.2 SSD PCIe adapter* **Note:** To view the storage drive capacity of your computer, type `Disk Management` in the Windows search box and then press Enter. The storage drive capacity indicated by the system is less than the nominal capacity.
Video features	• PCIe x16 card slots on the system board for a discrete graphics card • Video connectors on a discrete graphics card: – DisplayPort connector – Mini DisplayPort connector

Specification	Description
Expansion	• Front access bay • Memory slots • M.2 SSD slots • PCIe slots • PSU bay
Network features	• Bluetooth* • Ethernet LAN • Wireless LAN*

* for selected models

Note: You can enhance your computer capacity and performance by adding various devices according to the rules listed in “Expand your computer” on page 19

System memory speed

Your computer can come with the following types of memory modules and will run up to the following speed:

Memory module type	Memory module speed
DDR5–4800 ECC RDIMM	4800 MT/s
DDR5–5600 ECC RDIMM	5600 MT/s

To avoid unexpected frequency reduction, ensure that you install memory modules in a right way:

- Installed memory module quantity:
  - 1 CPU: 1, 2, 4, 6, or 8 memory modules
  - 2 CPUs: 2, 4, 8, 12, or 16 memory modules
- Install memory modules of the same type, the same capacity, and the same DRAM densities.
- Install memory modules in the correct order. See “Memory module” on page 90.

Notes:

- The actual system memory speed of the memory modules depends on the microprocessor model. For example, your computer comes with 4800 MT/s memory modules, but the microprocessor only supports up to 4400 MT/s memory modules. Then the system memory speed will be no faster than 4400 MT/s. For microprocessor models supported in your computer, contact the Lenovo Customer Support Center.
- If you install memory modules of different speed, the actual system memory speed will be set to the lowest speed of all the memory modules.

Operating environment

Maximum altitude (without pressurization)

- Operating: From 0 m (0 ft) to 3048 m (10 000 ft)
- Storage: From 0 m (0 ft) to 12192 m (40 000 ft)

Temperature

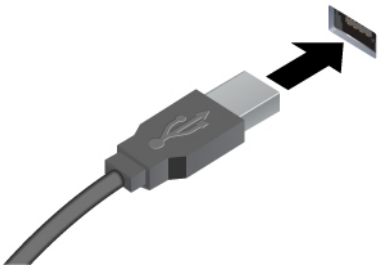
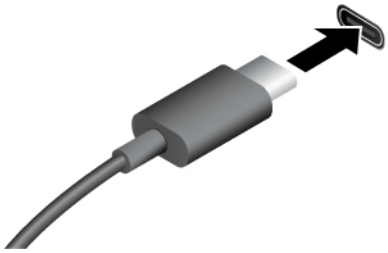
- Operating: From 10°C (50°F) to 35°C (95°F)
- Storage: From -40°C (-40°F) to 60°C (140°F)

Relative humidity

- Operating: 20%-80% (non-condensing)
- Storage: 10%–90% (non-condensing)

USB specifications

Note: Depending on the model, some USB connectors might not be available on your computer.

Connector name	Description
 • USB-A 2.0 connector • SS USB-A 3.2 Gen 1 connector • 10 USB-A 3.2 Gen 2 connector	Connect USB-A compatible devices, such as a USB-A keyboard, USB-A mouse, USB-A storage device, or USB-A printer.
 • 10 USB-C (3.2 Gen 2) connector • 20 USB-C (3.2 Gen 2x2) connector	• Charge USB-C compatible devices with the output voltage and current of 5 V and 3 A. • Connect to USB-C accessories to help expand your computer functionality. To purchase USB-C accessories, go to https://www.lenovo.com/accessories.

Chapter 2. Get started

Connect an external display

Connect a projector or a monitor to your computer to give presentations or expand your workspace.

Connect a wireless display

Ensure that both your computer and the wireless display support Miracast®.

Press Windows logo key + K and then select a wireless display to connect.

Change display settings

1. Right-click a blank area on the desktop and select display settings.
2. Select the display that you want to configure and change display settings of your preference.

Access networks

This section helps you access networks through connecting to a wired or wireless network.

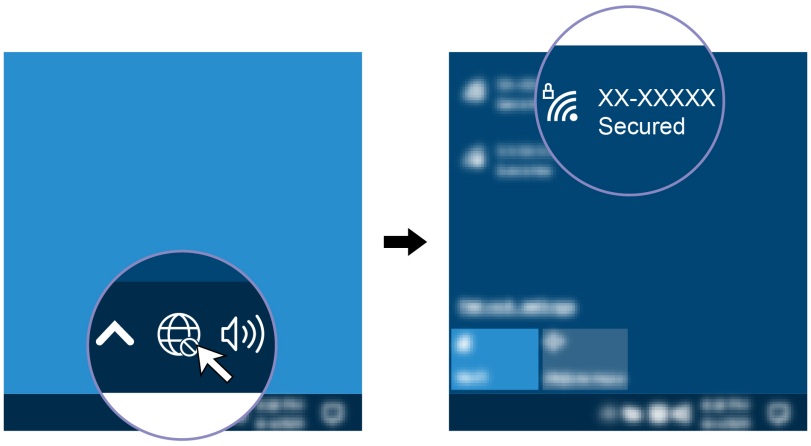
Connect to the wired Ethernet

Connect your computer to a local network through the Ethernet connector on your computer with an Ethernet cable.

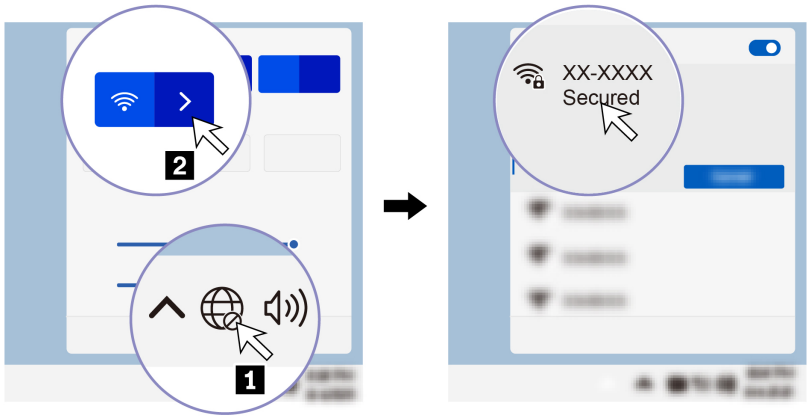
Connect to Wi-Fi networks (for selected models)

Click the network icon in the Windows® notification area, and then select a network for connection. Provide required information, if needed.

- For models with Windows 10:



- For models with Windows 11:

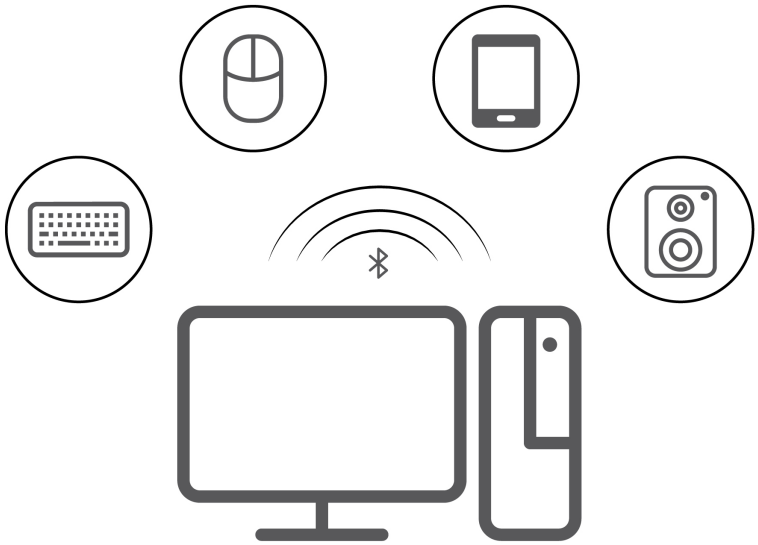


Transfer data

Quickly share your files using the built-in Bluetooth technology among devices with the same features.

Connect to a Bluetooth-enabled device (for selected models)

You can connect all types of Bluetooth-enabled devices to your computer, such as a keyboard, a mouse, a smartphone, or speakers. Place the device that you are attempting to connect to less than 10 meters (33 feet) from the computer.



1. Type `Bluetooth` in the Windows search box and then press Enter.
2. Turn on Bluetooth, if it is off.
3. Select a Bluetooth device, and then follow the on-screen instructions.

Set the power plan

For ENERGY STAR® compliant computers, the following power plan takes effect when your computers have been idle for a specified duration:

- Turn off the display: After 10 minutes
- Put the computer to sleep: After 25 minutes

To awaken the computer from Sleep mode, press any key on your keyboard.

To set the power plan:

1. Type **Power Options** in the Windows search box and then press Enter.
2. Choose or customize a power plan of your preference.

The Vantage app

The preinstalled Vantage app is a customized one-stop solution to help you maintain your computer with automated updates and fixes, configure hardware settings, and get personalized support.

To access the Vantage app, type `Vantage` in the Windows search box.

Key features

The Vantage app enables you to:

- Know the device status easily and customize device settings.
- Download and install UEFI BIOS, firmware and driver updates to keep your computer up-to-date.
- Monitor your computer health, and secure your computer against outside threats.
- Scan your computer hardware and diagnose hardware problems.
- Look up warranty status (online).
- Access *User Guide* and helpful articles.

Notes:

- The available features vary depending on the computer model.
- The Vantage app makes periodic updates of the features to keep improving your experience with your computer. The description of features might be different from that on your actual user interface.

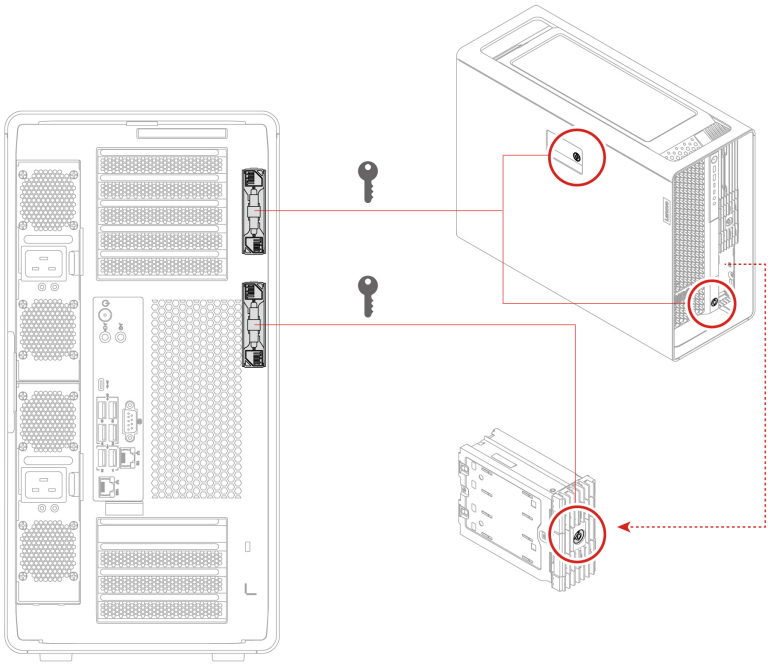
Security solutions

Lenovo values your information security. Your computer can be secured by physical locks, software solutions, and BIOS solutions. They can protect your computer from harm, theft, or unauthorized use.

Lock the computer

Note: Lenovo makes no comments, judgments, or warranties about the function, quality, or performance of the locking device and security feature. You can purchase computer locks from Lenovo.

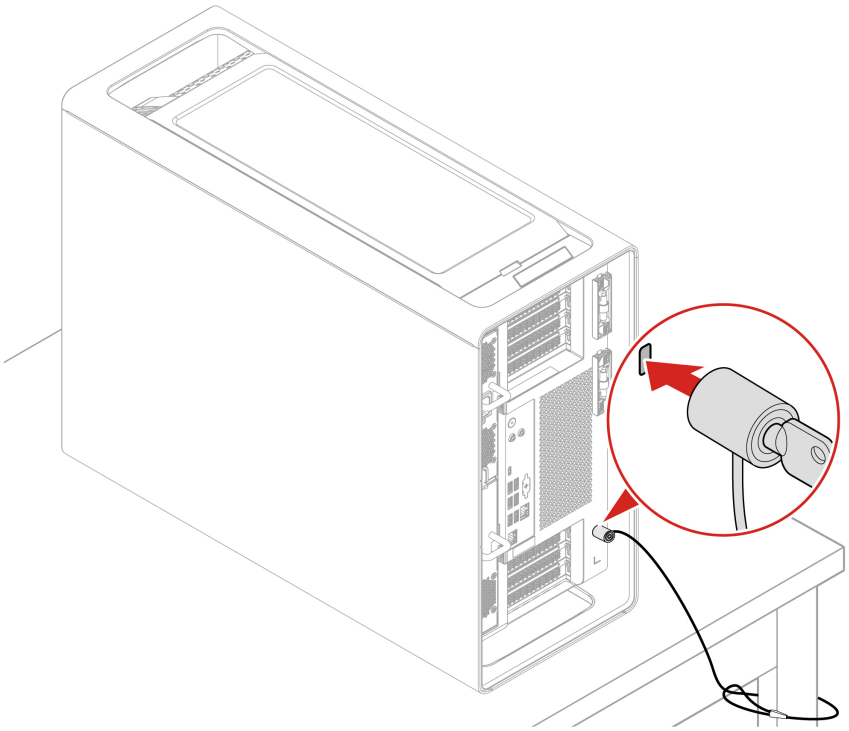
Key lock



- Locks
  - Locks for side cover, front access bay, and dual M.2 SSD enclosure prevent unauthorized access to the inside of your computer chassis or storage drives.
  - The storage drive in the front access bay can be hot-swappable, which means that you can install or replace the drive without even turning off your computer. Therefore, lock the front access bay to prevent unexpected removal.
- Keys
  - The keys are attached to the rear of the machine. For security, store the keys in a secure place when you are not using them.
  - The keys can be carved with numbers, for example, **00**, **01**, **02**, and **03**. The key can unlock locks that are carved with the same number on the same computer or on other computers.

Security lock

Lock your computer to a desk, table, or other fixtures through a security lock.



Use software security solutions

The following software solutions help secure your computer and information.

- **Windows Security**

  Windows Security is a software built-in to the operating system. It continually scans for malicious software, viruses, and other security threats. Besides, Windows updates are downloaded automatically to help keep your computer safe. Windows Security also enables you to manage tools including firewall, account protection, application and browser control, and so on.

- **Antivirus programs**

  Lenovo preinstalls a full-version antivirus software on selected models of computer. It helps defend the computer against viruses, safeguard your identity, and keep your personal information secured.

Note: For more information about how to use these software solutions, refer to their help systems respectively.

Use BIOS security solutions

This section provides BIOS solutions to secure your computer and information.

Wipe the storage drive data

It is recommended that you wipe the storage drive data before recycling the storage drive or the computer.

To wipe the storage drive data:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security → secure wipe → Enabled**.
3. Press F10 or Fn+F10 to save the changes and exit.
4. Restart the computer. When the logo screen is displayed, press F12 or Fn+F12.

5. Select **App Menu → secure wipe** and press Enter.
6. Select the storage drive you will wipe and click **NEXT**.
7. Select the entire storage drive or partition to wipe as desired.
8. Select the method as desired and click **NEXT**.
9. Click **Yes** to confirm your option when the prompting window is displayed.
10. If you have set a hard disk password for the storage drive, enter the password. Otherwise, set a temporary password following the on-screen instructions. Then, click **NEXT**. The wiping process begins.

    Note: Duration of the wiping process varies depending on the storage drive capacity.
11. Click **Reboot** when you are prompted to reset the system, and then one of the following will happen:
    - If the system storage drive data is wiped, you will be prompted that no operating system is found.
    - If the non-system storage drive data is wiped, the computer restarts automatically.

Cover presence switch

The cover presence switch prevents the computer from logging in to the operating system when the computer cover is not properly installed or closed.

To enable the cover presence switch connector on the system board:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security → Cover Tamper Detected** and press Enter.
3. Select **Enabled** and press Enter.
4. Press F10 or Fn+F10 to save the changes and exit.

If the cover presence switch is enabled and the computer cover is not correctly installed or closed, an error message will be displayed when you turn on the computer. To bypass the error message and log in to the operating system:

1. Properly install or close the computer cover.
2. Enter the BIOS menu, save and then exit.

Intel BIOS guard

The Intel® BIOS Guard module cryptographically verifies all BIOS updates. This hardware-based security helps prevent software and malware attacks on the computers BIOS.

Smart USB Protection

The Smart USB Protection function is a security function that helps prevent data from being copied from the computer to USB storage devices connected to the computer. You can set the Smart USB Protection function to one of the following modes:

- **Disabled** (default setting): You can use the USB storage devices without limitation.
- **Read Only**: You cannot copy data from the computer to the USB storage devices. However, you can access data on the USB storage devices.
- **No Access**: You cannot access the USB storage devices from the computer.

To configure the Smart USB Protection function:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security → Smart USB Protection** and press Enter.
3. Select the desired setting and press Enter.

4. Press F10 or Fn+F10 to save the changes and exit.

UEFI BIOS passwords

You can set passwords in UEFI (Unified Extensible Firmware Interface) BIOS (Basic Input/Output System) to strengthen the security of your computer.

Password types

You can set a power-on password, supervisor password, system management password, or hard disk password in UEFI BIOS to prevent unauthorized access to your computer. However, you are not prompted to enter any UEFI BIOS password when your computer resumes from sleep mode.

- Power-on password

  When a power-on password is set, you are prompted to enter a valid password each time the computer is turned on.

- Supervisor password

  Setting a supervisor password deters unauthorized users from changing configuration settings. If you are responsible for maintaining the configuration settings of several computers, you might want to set a supervisor password.

  When a supervisor password is set, you are prompted to enter a valid password each time you try to enter the BIOS menu.

  If both the power-on password and supervisor password are set, you can enter either password. However, you must use your supervisor password to change any configuration settings.

- Hard disk password

  Setting a hard disk password prevents unauthorized access to the data on the storage drive. When a hard disk password is set, you are prompted to enter a valid password each time you try to access the storage drive.

  Note: After you set a hard disk password, your data on the storage drive is protected even if the storage drive is removed from one computer and installed in another.

- System management password (for selected models)

  You can enable the system management password to have the same authority as the supervisor password to control security related features. To customize the authority of the system management password through the UEFI BIOS menu:

  1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
  2. Select **Security → System Management Password Access Control**.
  3. Follow the on-screen instructions.

  If you have set both the supervisor password and the system management password, the supervisor password overrides the system management password.

Set, change, and remove a password

Before you start, print these instructions.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security**.
3. Depending on the password type, select **Set Supervisor Password**, **Set Power-On Password**, **Set System Management Password**, or **Hard Disk Password** and press Enter.
4. Follow the on-screen instructions to set, change, or remove a password.
5. Press F10 or Fn+F10 to save the changes and exit.

You should record your passwords and store them in a safe place. If you forget the passwords, contact a Lenovo-authorized service provider.

Note: If the hard disk password is forgotten, Lenovo cannot remove the password or recover data from the storage drive.

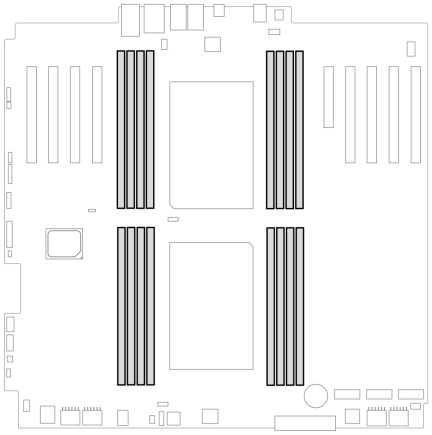
Chapter 3. Explore your computer

Expand your computer

You can enhance your computer capacity and performance by adding various devices into the following slots or bays. To add or replace a device, see Chapter 5 “CRU replacement” on page 39 for replacement instructions.

Memory slots

Your computer has sixteen memory slots. You can expand the configurations according to the rules listed in the following table.



Items	Rules
Quantity	• 1 CPU: 1, 2, 4, 6, or 8 memory modules • 2 CPUs: 2, 4, 8, 12, or 16 memory modules
Type	• DDR5-4800 ECC RDIMM • DDR5-5600 ECC RDIMM **Note:** See “System memory speed” on page 8 for memory speed statements.
Capacity	16 GB, 32 GB, 64 GB, 128 GB, or 256 GB
Others	• Install memory modules of the same type, the same capacity, and the same DRAM densities. • Install memory modules in the correct order. See “Memory module” on page 90.

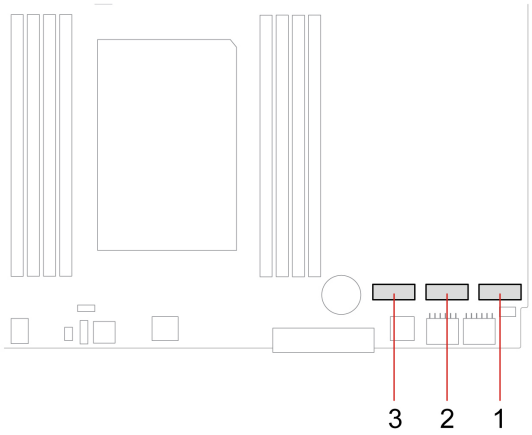
Memory fan

Your computer has at least one memory fan. If you install any of the following memory modules, two memory fans are required.

- 128 GB or 256 GB DDR5-4800 ECC RDIMM
- 64 GB, 128 GB, or 256 GB DDR5-5600 ECC RDIMM

On-board M.2 SSD slots

Your computer has three on-board M.2 SSD slots. You can expand the configurations according to the following rules.



Installation order

Installation order	Slot
1	slot 1
2	slot 2
3	slot 3

Supported M.2 SSD type

Slot	Supported M.2 SSD type
Slot 1, slot 2	• 2280 or 22110 Gen 4 M.2 SSD • 2280 or 22110 Gen 5 M.2 SSD
Slot 3	• 2280 Gen 4 M.2 SSD • 2280 Gen 5 M.2 SSD

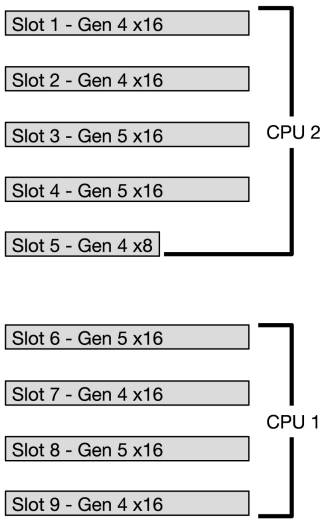
Note: For better performance, it's recommended that you install on-board M.2 SSD of the same generation.

Power of Gen 5 M.2 SSD

Slot	Power of Gen 5 M.2 SSD
Slot 1, slot 2	• 10 W (when slot 3 is empty) • 8 W (when slot 3 is installed with Gen 5 M.2 SSD)
Slot 3	8 W

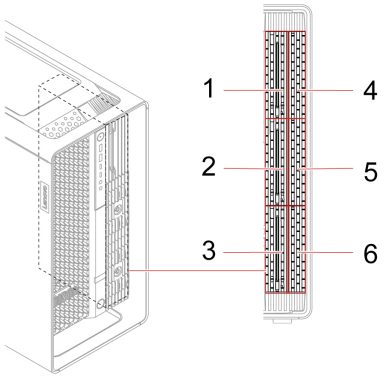
PCIe slots

Your computer has nine PCIe slots to install PCIe cards such as graphics card, BMC card, and different kinds of PCIe adapter card. For PCIe card installation order and special installation rules for certain PCIe cards, see “PCIe card installation rule” on page 83.



Front-access bays

Your computer has six front-access bays. The configuration of storage drive devices in the bays should follow the rules as shown below.

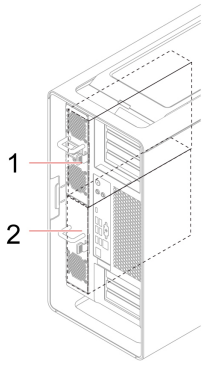


Option	Dual M.2 SSD enclosure	3.5-inch HDD (hot-swappable) in HDD bracket
1	Zero	Up to three (in bay 1 to 3)
2	One (in bay 2+5)	Up to two (in bay 1 and 3)
3	Two (in bay 2+5 and 3+6)	Up to one (in bay 1)

Note: Each dual M.2 SSD enclosure supports up to two Gen 4 M.2 SSDs (hot-swappable).

PSU bays

Your computer has two PSU bays. The configuration of devices in the bays should follow the rules as shown below.



Option	Bay 1	Bay 2
1	Empty	One PSU
2	One PSU	One PSU
3	One PSU	One 3.5-inch HDD in a PSU bay storage enclosure

UEFI BIOS

UEFI BIOS is the first program that the computer runs. When the computer turns on, the UEFI BIOS performs a self test to make sure that various devices in the computer are functioning properly.

What is UEFI BIOS

Note: The operating system settings might override any similar settings in UEFI BIOS.

UEFI BIOS is the first program that the computer runs when the computer is turned on. UEFI BIOS initializes the hardware components and loads the operating system and other programs. Your computer comes with a setup program with which you can change UEFI BIOS settings.

Enter the BIOS menu

Restart the computer. When the logo screen is displayed, press F1 or Fn+F1 to enter the BIOS menu.

Note: If you have set BIOS passwords, enter the correct passwords when prompted. You also can select **No** or press Esc to skip the password prompt and enter the BIOS menu. However, you cannot change the system configurations that are protected by passwords.

Navigate in the BIOS interface

Attention: The default configurations are already optimized for you in **boldface**. Improper change of the configurations might cause unexpected results.

Depending on your keyboard, you can navigate in the BIOS interface by pressing the following keys, or combinations of Fn and the following keys:

Key	Function
F1 or Fn+F1	General Help
Esc or Fn+Esc	Exit the submenu

Key	Function
↑ ↓ or Fn+↑ ↓	Locate an item
← → or Fn+← →	Move keyboard focus
+/– or Fn++/–	Change value
Enter	Enter the submenu
F9 or Fn+F9	Setup Defaults
F10 or Fn+F10	Save and exit

Change the display language of UEFI BIOS

UEFI BIOS supports three or four display languages: English, French, simplified Chinese, and Russian (for selected models).

To change the display language of UEFI BIOS:

1. Select **Main → Language** and press Enter.
2. Set the display language as desired.

Change the display mode of UEFI BIOS (for selected models)

You can use UEFI BIOS in the graphic mode or the text mode according to your needs.

The keys on the keyboard used to perform various tasks are displayed at the bottom of the screen. In addition to the keyboard, you also can use the mouse to make selections.

To change the display mode of UEFI BIOS:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Main → Setup Mode Select** and press Enter.
3. Set the display mode as desired.

Set the system date and time

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Main → System Time & Date** and press Enter.
3. Set the system date and time as desired.
4. Press F10 or Fn+F10 to save the changes and exit.

Change the priority boot order

If the computer does not boot from a device as expected, you can change the boot priority order permanently or select a temporary boot device.

Change the priority boot order permanently

1. Depending on the type of the storage device, do one of the following:
   - If the storage device is internal, go to step 2.
   - If the storage device is a disc, ensure that the computer is on or turn on the computer. Then, insert the disc into the optical drive.
   - If the storage device is an external device other than a disc, connect the storage device to the computer.

2. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
3. Select **Startup → Priority Boot Order**, and then follow the on-screen instructions to change the boot priority order.
4. You can also select the first priority device group by selecting **Startup → First Boot Device**, and then follow the on-screen instructions to select the first boot device within this group. Your computer will boot from the first boot device before trying the boot priority order you set in the previous step.
5. Press F10 or Fn+F10 to save the changes and exit.

Select a temporary boot device

Note: Not all discs and storage drives are bootable.

1. Depending on the type of the storage device, do one of the following:
   - If the storage device is internal, go to step 2.
   - If the storage device is a disc, ensure that the computer is on or turn on the computer. Then, insert the disc into the optical drive.
   - If the storage device is an external device other than a disc, connect the storage device to the computer.
2. Restart the computer. When the logo screen is displayed, press F12 or Fn+F12.
3. Select the storage device as desired and press Enter.

If you want to change the boot priority order permanently, select **Enter Setup** on Startup Device Menu and press Enter to enter the BIOS menu.

Enable or disable the configuration change detection feature

If you enable configuration change detection, when the POST detects configuration changes of some hardware devices (such as storage drives or memory modules), an error message will be displayed when you turn on the computer.

To enable or disable the configuration change detection feature:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security → Configuration Change Detection** and press Enter.
3. Enable or disable the feature as desired.
4. Press F10 or Fn+F10 to save the changes and exit.

To bypass the error message and log in to the operating system, press F2 or Fn+F2. To clear the error message, enter the BIOS menu, save and then exit.

Enable or disable the automatic power-on feature

The Automatic Power On item in UEFI BIOS provides various options for you to make your computer start up automatically.

To enable or disable the automatic power-on feature:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Power → Automatic Power On** and press Enter.
3. Select the feature as desired and press Enter.
4. Enable or disable the feature as desired.
5. Press F10 or Fn+F10 to save the changes and exit.

Enable or disable the ErP LPS compliance mode

Lenovo computers meet the eco-design requirements of the ErP Lot 3 regulation. For more information, go to:
https://www.lenovo.com/us/en/compliance/eco-declaration

You can enable the ErP LPS compliance mode to reduce the consumption of electricity when the computer is off or in sleep mode.

To enable or disable the ErP LPS compliance mode:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Power → Enhanced Power Saving Mode** and press Enter.
3. Depending on whether you select **Enabled** or **Disabled**, do one of the following:
   - If you select **Enabled**, press Enter. Then, select **Power → Automatic Power On** and press Enter. Check whether the Wake on LAN feature is disabled automatically. If no, disable it.
   - If you select **Disabled**, press Enter. Then, go to the next step.
4. Press F10 or Fn+F10 to save the changes and exit.

When the ErP LPS compliance mode is enabled, you can wake up the computer by doing one of the following:

- Press the power button.
- Enable the Wake Up on Alarm feature to make the computer wake up at a set time.

To meet the off mode requirement of ErP compliance, you need to disable the Fast Startup function.

1. Go to **Control Panel** and view by large icons or small icons.
2. Click **Power Options → Choose what the power buttons do → Change settings that are currently unavailable**.
3. Clear the **Turn on fast startup (recommended)** option from the **Shutdown settings** list.

Change BIOS settings before installing a new operating system

BIOS settings vary by operating system. Change the BIOS settings before installing a new operating system.

Microsoft constantly makes updates to the Windows operating system. Before installing a particular Windows version, check the compatibility list for the Windows version. For details, go to:
https://support.lenovo.com/us/en/solutions/windows-support

To change the BIOS settings:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. From the main interface, select **Security → Secure Boot** and press Enter.
3. Depending on the operating system to be installed, do one of the following:
   - To install a Windows operating system that supports secure boot, select **Enabled** for **Secure Boot**.
   - To install an operating system that does not support secure boot, such as some Linux operating systems, select **Disabled** for **Secure Boot**.
4. Press F10 or Fn+F10 to save the changes and exit.

Update UEFI BIOS

When you install a new program, device driver, or hardware component, you might need to update UEFI BIOS. You can update the BIOS from your operating system or a flash update disc (supported only on selected models).

Download and install the latest UEFI BIOS update package by one of the following methods:

- From the Vantage app:

  Open the Vantage app to check the available update packages. If the latest UEFI BIOS update package is available, follow the on-screen instructions to download and install the package.
- From the Lenovo Support Web site:
  1. Go to https://pcsupport.lenovo.com.
  2. Download the flash BIOS update driver for the operating system version or the ISO image version (used to create a flash update disc). Then, download the installation instructions for the flash BIOS update driver you have downloaded.
  3. Print the installation instructions and follow the instructions to update the BIOS.

Reset system to factory default

This feature allows you to reset the UEFI BIOS to the factory default settings, including all UEFI BIOS settings and internal data. It helps you wipe user data in case that you want to dispose of or reuse your computer.

1. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
2. Select **Security → Reset system to Factory Default** and press Enter.
3. Several warning windows might be displayed. Do the following before resetting the system to the factory default settings:
   a. Deactivate the Absolute Persistence Module.
   b. Remove the NVMe password if your have set one.
4. For computer models with RAID settings, a window is displayed to remind you of data damage. Select **Yes** to proceed.
5. A window is displayed to confirm all UEFI BIOS settings will be reset. Select **Yes** to proceed.

   Note: If the **Intel AMT control** and **Absolute Persistence(R) Module** are permanently disabled, these settings cannot be reset successfully.
6. Enter the supervisor password, system management password or power-on password in the window prompted.

Your computer will restart immediately. It takes a few minutes to complete the initialization process. Your computer screen might be blank during this process. This is normal and you should not interrupt it.

View UEFI BIOS Event logs

The UEFI BIOS Event log viewer provides the brief information about UEFI BIOS events. Do the following to view the logs:

1. Restart the computer. When the logo screen is displayed, press F1.
2. Select **Main → BIOS Event log**. Then, press Enter. The UEFI BIOS Event log interface is displayed.
3. Navigate the interface by pressing the following keys, and then check details by selecting each item.
   - ↑ ↓: Move keyboard focus
   - PgUp / PgDn: Scroll page

- Enter: Select
- F3: Exit

The following UEFI BIOS event logs might be listed on your screen depending on UEFI BIOS activities. Each log consists of a date, a time, and a description of the event.

- **Power On** event: This log shows the Power On Self Test (POST) routine has started with the power-on process. It includes the power-on reason, the boot mode, and the shutdown reason.
- **Subcomponent Code Measurement** event: This log shows the subcomponent code measurement has worked. It includes the validation result of each component.
- **System Preboot Authentication** event: This log shows what credential is provided to gain preboot authentication. It includes the installed password, the password type, the input device, and the authentication result.
- **BIOS Password Change** event: This log shows the change history of the UEFI BIOS passwords. It includes the password type, the type and result of the event.
- **Subcomponent Self-healing** event: This log shows the information about the subcomponent where the recovery event occurred. It includes the cause and result of the event, and the recovered firmware version.
- **BIOS Setup Configuration Change** event: This log shows the change history of the UEFI BIOS Setup configuration. It includes the item name and value.
- **Device Change** event: This log shows the change history of devices. It includes the cause and type of the event.
- **System Boot** event: This log shows which device was utilized to boot the system. It includes the boot option, the description, and the file path list.
- **System Tamper** event: This log shows the occurrence of system tamper events. It includes the cause and type of the event.
- **POST Error** event: This log shows the occurrence of errors during the POST routine. It includes the error code.
- **Flash Update** event: This log shows the occurrence of flash update. It includes the cause and result of the event, and the updated firmware version.
- **Capsule Update** event: This log shows the occurrence of UEFI capsule firmware update. It includes the cause and result of the event, and the updated firmware version.
- **Log Cleared** event: This log shows UEFI BIOS event logs are cleared. It includes the cause and result of the event.
- **Shutdown / Reboot** event: This log shows the UEFI BIOS is successfully shut down or the system is rebooted. It includes the cause and type of the event.

BMC card (for selected models)

This section provides information of the Baseboard Management Controller (BMC) card, including its functions, overview, setup, password management, and firmware update.

Functions of the BMC card

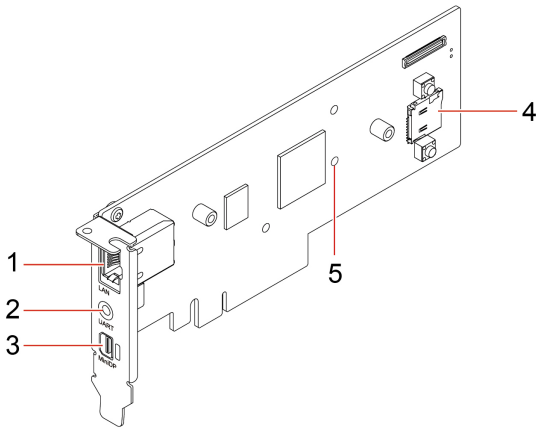
You can use the BMC card to manage your workstation through ThinkStation BMC remote management console, for example:

- View and monitor the following information:
  - Overall status
  - Relevant information of sensors
  - System inventory

- Access the following basic configurations:
  - Logs and reports
  - Configuration settings
- Access the following advanced configurations:
  - Video recording
  - Remote control
  - Virtual media configuration
  - Maintenance tasks, including backing up configuration items, restoring configuration files, updating firmware, and so on.

For details of ThinkStation BMC remote management console, access the following Web site: https://support.lenovo.com/docs/bmc_web_guide.

Overview of the BMC card

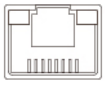
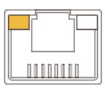


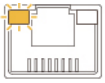
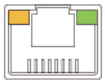
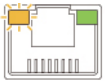
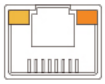
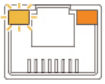
Item	Description	Item	Description
1	Ethernet connector	2	UART connector
3	Mini DisplayPort out connector	4	MicroSD slot
5	Firmware LED indicator		

Note: UART connector is disabled and reserved for future use.

Ethernet connector

Equipped with Ethernet controllers, the Ethernet connector (RJ-45) can transfer data at a speed of 10, 100, or 1000 Mbps.

LED status	Indication
	The Ethernet is not connected yet.
	The 10-Mbps Ethernet is connected, ready for transferring data.

LED status	Indication
	The 10-Mbps Ethernet is transferring data.
	The 100-Mbps Ethernet is connected, ready for transferring data.
	The 100-Mbps Ethernet is transferring data.
	The 1000-Mbps Ethernet is connected, ready for transferring data.
	The 1000-Mbps Ethernet is transferring data.

MicroSD slot

You can install a microSD card (capacity up to 2 TB) in the microSD slot as local media of BMC.

Firmware LED

When the LED status indicates ✳, it means the firmware works well.

When the LED is off, it means the firmware does not work. To solve the problem, do the following:

1. Ensure that the cable is correctly connected to the BMC card and to the system board.
2. Ensure that the BMC card is correctly installed.
3. If the LED is still off, replace the BMC card with a new one.

Set up the BMC card

Do the following to set up the BMC card.

Step 1. Connect your computer to a local network with an Ethernet cable through the Ethernet connector on the BMC card.

Note: Ensure that the host computer and client computers are in the same local area network.

Step 2. Connect power cables and turn on your computer. Wait at least 3 minutes for initial startup. You can view the startup process on the diagnostic LCD.

Step 3. Obtain the dynamic IP address (for example: `10.176.7.xxx`) from either client BIOS or router port management interface, and then log in to the BMC remote management console through a web browser (for example: `https://10.176.7.xxx/#login`).
For initial access, input your username (default: `admin`) and password (default: `admin`). It is mandatory to change your password once you log in.

Manage the BMC password

You can manage BMC passwords in the following methods to prevent unauthorized access to your computer.

- UEFI BIOS
- The BMC remote management console

- IPMI command

Update the BMC firmware

You can update the BMC firmware to the latest depending on your needs.

Step 1. Go to https://support.lenovo.com/docs/bmc_fw_ts_x576 and follow the on-screen instructions to select and download the corresponding firmware installation package.

Step 2. Log in to the BMC remote management console on the host computer.

Step 3. Click **Maintenance → Firmware Update** and select the latest firmware installation package you prepared.
The firmware will be updated automatically. Your BMC card will automatically restart when the firmware update is completed.

Lenovo diagnostic tools

Use diagnostic solutions to test hardware components and report operating-system-controlled settings that interfere with the correct operation of your computer.

When an error message pops up in the Windows notification area, a four-digit error code is displayed on the diagnostic LCD (for selected models) on the front panel, or the diagnostic indicator on the front panel turns on, do one of the following:

- If ThinkStation Diagnostics can be launched properly:
  1. Click the error message or the ThinkStation Diagnostics icon to launch the program.
  2. All events are logged locally in the program. Locate the related event and view the event log to find possible solutions.
  3. Record the four-digit error code displayed on the diagnostic LCD (for selected models) or in ThinkStation Diagnostics, and then decode the error at https://www.thinkworkstationsoftware.com/codes.

  Note: You can download ThinkStation Diagnostics at https://pcsupport.lenovo.com/lenovodiagnosticsolutions/downloads.
- If your computer does not function:
  1. Use your smartphone to scan the QR code displayed on the diagnostic LCD to open https://www.thinkworkstationsoftware.com/codes.
  2. Decode the error according to the four-digit error code displayed on the diagnostic LCD.

For more information, go to https://www.thinkworkstationsoftware.com/diags.

The Vantage app

The Vantage app is preinstalled on your computer. To diagnose problems with the Vantage app:

1. Type `Vantage` in the Windows search box and press Enter.
2. Follow the on-screen instructions and run a hardware scan.

If you are unable to isolate and resolve the problem after running the Vantage app, save and print the log files created by the program. You might need the log files when you speak to a Lenovo technical support representative.

Troubleshooting and FAQs

This section lists online access to troubleshoot your computer and to frequently asked questions in Lenovo forums. For more information, go to: https://www.lenovo.com/tips, or https://forums.lenovo.com.

Recovery

Use the following recovery options to reset or restore your computer when your computer comes with issues.

- Use Lenovo recovery options.
  1. Go to https://support.lenovo.com/HowToCreateLenovoRecovery.
  2. Follow the on-screen instructions.
- Use Windows recovery options.
  1. Go to https://pcsupport.lenovo.com.
  2. Detect your computer or manually select your computer model.
  3. Navigate to the troubleshooting menu to diagnose the operating system for recovery instructions.

Chapter 4. RAID

What is RAID

Redundant Array of Independent Disks (RAID) is a technology that provides increased storage functions and reliability through redundancy. It also can improve data storage reliability and fault tolerance compared with single-drive storage systems. Data loss resulting from a drive failure can be prevented by reconstructing missing data from the remaining drives.

When a group of independent physical storage drives is set up to use RAID technology, they are in a RAID array. This array distributes data across multiple storage drives, but the array appears to the host computer as one single storage unit. Creating and using RAID arrays provides high performance, such as the expedited I/O performance, because several drives can be accessed simultaneously.

Configure RAID with Intel RSTe

If your computer comes with the Intel RSTe configuration utility, you can follow the sections below to configure RAID with Intel RSTe.

Storage drive requirements for RAID levels

Your computer supports the following RAID levels:

- RAID 0: striped disk array
  - Consists of at least two SATA storage drives
  - Supported strip size: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB
  - Better performance without fault tolerance
- RAID 1: mirrored disk array
  - Consists of two SATA storage drives
  - Improved reading performance and 100% redundancy
- RAID 10: striped and mirrored disk array (a combination of RAID 0 and RAID 1)
  - Consists of four SATA storage drives
  - Supported strip size: 4 KB, 8 KB, 16 KB, 32 KB, or 64 KB
- RAID 5: block-level striped disk array with distributed parity
  - Consists of at least three SATA storage drives
  - Supported strip size: 16 KB, 32 KB, 64 KB, or 128 KB
  - Better performance and fault tolerance

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

To create a RAID volume:

1. Enable **RAID** by doing the following:
   a. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
   b. Select **Devices → PCH SATA Configuration** and press Enter.

c. Select **Configure SATA as** and press Enter. Then, select **RAID** and press Enter.
d. Press F10 or Fn+F10 to save the changes and exit.

2. Enter the BIOS menu again.
3. Select **Advanced → Intel RSTe SATA Controller** and press Enter.
4. Select **Create RAID Volume** and press Enter. The Create RAID Volume window is displayed.
5. Select and configure the options one by one.
   a. **Name**: You can use the default name **Volume0** or type a preferred name for the RAID volume.
   b. **RAID Level**: You can set the RAID level to one of the following:
      - **RAID0**
      - **RAID1**
      - **RAID10**
      - **RAID5**

      Note: Some of the RAID levels might not be displayed because the number of installed SATA storage drives varies.
   c. **Select Disks**: Select a storage drive and press Enter. Then, select **X** and press Enter to add it to a group.
   d. **Strip Size** (if applicable): Select a strip size and press Enter.
   e. **Capacity**: Customize the capacity of the RAID volume. The default RAID volume is the largest value.
6. Select **Create Volume** and press Enter to create a RAID volume.
7. Exit the BIOS menu.

View the information about a RAID volume

To view the information about a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel RSTe SATA Controller** and press Enter.
3. Select **RAID Volumes** and press Enter.
4. Select a RAID volume and press Enter to view the detailed information.
5. Press F10 or Fn+F10 to save the changes and exit.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

To delete a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel RSTe SATA Controller** and press Enter.
3. Under **RAID Volumes**, select the RAID volume that you want to delete and press Enter. The RAID VOLUME INFO window is displayed.
4. Select **Delete** under **Volume Actions** and press Enter. When prompted, select **Yes** and press Enter to confirm the deletion of the selected RAID volume.
5. Press F10 or Fn+F10 to save the changes and exit.

Configure RAID with AVAGO MegaRAID Configuration Utility

To configure RAID with AVAGO MegaRAID Configuration Utility, ensure that:

- An AVAGO MegaRAID adapter is installed in your computer.
- The storage drives used for RAID configuration are connected to the installed AVAGO MegaRAID adapter instead of the system board.

Storage drive requirements for RAID levels

Your computer supports the following RAID levels:

- RAID 0: striped disk array
  - Consists of at least two NVMe storage drives
  - Supported strip size: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB
  - Better performance without fault tolerance
- RAID 1: mirrored disk array
  - Consists of two or four NVMe storage drives
  - Improved read performance and 100% redundancy
- RAID 10: striped and mirrored disk array (a combination of RAID 0 and RAID 1)
  - Consists of four NVMe storage drives
  - Data being striped across storage drive groups
  - Provides both high data transfer rates and complete data redundancy
- RAID 5: block-level striped disk array with distributed parity
  - Consists of at least three NVMe storage drives
  - Supported strip size: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB
  - Better performance and fault tolerance
  - Available only on selected models of AVAGO MegaRAID adapters
- RAID 6: block-level striped disk array with dual distributed parity
  - Consists of at least four NVMe storage drives
  - Supported strip size: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB
  - Better performance and fault tolerance that can stand up to loss of two storage drives
  - Available only on selected models of AVAGO MegaRAID adapters

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

To create a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → AVAGO MegaRAID Configuration Utility** and press Enter.
3. Select **Main Menu** and press Enter.
4. Select **Configuration Management** and press Enter.
5. Select **Create Virtual Drive** and press Enter.
6. Select and configure the options one by one.
   a. **Select RAID Level**: You can set the RAID level to one of the following:
      - **RAID0**
      - **RAID1**

- **RAID5**
- **RAID6**
- **RAID10**

Note: Some of the RAID levels might not be displayed because the number of installed storage drives and the model of the AVAGO MegaRAID adapter vary.

b. **Select Drives From**: Select **Unconfigured capacity** or **Free capacity** depending on your needs and press Enter.

c. **Select Drives**: Select a storage drive and press Enter. After selecting all storage drives for creating the RAID volume, select **Apply Changes** and press Enter. When promoted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to save the storage drive selection. Finally, select **OK** and press Enter.

d. **Virtual Drive Name**: You can type a preferred name for the volume name.

e. **Strip Size** (if applicable): Select a strip size and press Enter.

7. Select **Save Configuration** and press Enter. When promoted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to confirm the creation of the RAID volume.
8. Press F10 or Fn+F10 to save the changes and exit.

View the information about a RAID volume

To view the information about a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → AVAGO MegaRAID Configuration Utility** and press Enter.
3. Select **Main Menu** and press Enter.
4. Select **Virtual Drive Management** and press Enter.
5. Select a RAID volume and press Enter to view the detailed information.
6. Press F10 or Fn+F10 to save the changes and exit.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

To delete a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → AVAGO MegaRAID Configuration Utility**.
3. Select **Main Menu** and press Enter.
4. Select **Virtual Drive Management** and press Enter.
5. Select the RAID volume that is not needed and press Enter.
6. Under **Operation**, select **Delete Virtual Drive** and press Enter.
7. Select **Go** and press Enter. When prompted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to delete the RAID volume.
8. Press F10 or Fn+F10 to save the changes and exit.

Configure RAID with Intel Virtual RAID on CPU

To configure RAID with the Intel Virtual RAID on CPU configuration utility, ensure that:

- An upgrade key module is connected to the Virtual RAID on CPU (VROC) connector on the system board.

- M.2 solid-state drives are installed in your computer.

Storage drive requirements for RAID levels

Your computer supports the following RAID levels:

- RAID 0: striped disk array
  - Consists of at least two M.2 solid-state drives
  - Supported strip size: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB
  - Better performance without fault tolerance
- RAID 1: mirrored disk array
  - Consists of two M.2 solid-state drives
  - Improved reading performance and 100% redundancy
- RAID 10: striped and mirrored disk array (a combination of RAID 0 and RAID 1)
  - Consists of four M.2 solid-state drives
  - Supported strip size: 4 KB, 8 KB, 16 KB, 32 KB, or 64 KB
- RAID 5: block-level striped disk array with distributed parity
  - Consists of at least three M.2 solid-state drives
  - Supported strip size: 16 KB, 32 KB, 64 KB, or 128 KB
  - Better performance and fault tolerance
  - Available only on selected models of upgrade key modules

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

To create a RAID volume:

1. Enable **VMD** for the selected M.2 solid-state drives by doing the following:
   a. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
   b. Select **Devices → Storage Setup → Intel(R) VMD technology** and press Enter.
   c. Select each menu item and press Enter. Then, select **Enabled** and press Enter.
   d. Select an occupied M.2 solid-state drive slot as you need and press Enter. Then, select **VMD** and press Enter.
   e. Press F10 or Fn+F10 to save the changes and exit.
2. Enter the BIOS menu again.
3. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
4. Select **All Intel VMD Controllers** and press Enter.
5. Select **Create Volumes** and press Enter.
6. Select and configure the options one by one.
   a. **Name**: You can use the default name **Volume0** or type a preferred name for the RAID volume.
   b. **RAID Level**: You can set the RAID level to one of the following:
      - **RAID0**
      - **RAID1**
      - **RAID10**

- **RAID5**

Note: Some of the RAID levels might not be displayed because the number of installed M.2 solid-state drives and the model of the upgrade key module vary.

c. **Select Disks**: Select an M.2 solid-state drive and press Enter. Then, select **X** and press Enter to add it to a group.

d. **Stripe Size** (if applicable): Select a stripe size and press Enter.

e. **Capacity**: Customize the capacity of the RAID volume. The default RAID volume is the largest value.

7. Select **Create Volume** and press Enter to create a RAID volume.
8. Exit the BIOS menu.

View the information about a RAID volume

To view the information about a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
3. Select **RAID Volumes** and press Enter.
4. Select a RAID volume and press Enter to view the detailed information.
5. Press F10 or Fn+F10 to save the changes and exit.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

To delete a RAID volume:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
3. Select **Intel VROC Mananged Volumes** and press Enter.
4. Under **Volume Actions**, select **Delete** and press Enter.
5. When prompted, select **Yes** and press Enter to confirm the deletion of the selected RAID volume.
6. Press F10 or Fn+F10 to save the changes and exit.

Chapter 5. CRU replacement

Before CRU replacement

Before replacing hardware of your computer, read this section first. You will get to know what is CRU, the CRU list, system board connectors, and prerequisites for CRU replacement.

What is CRU

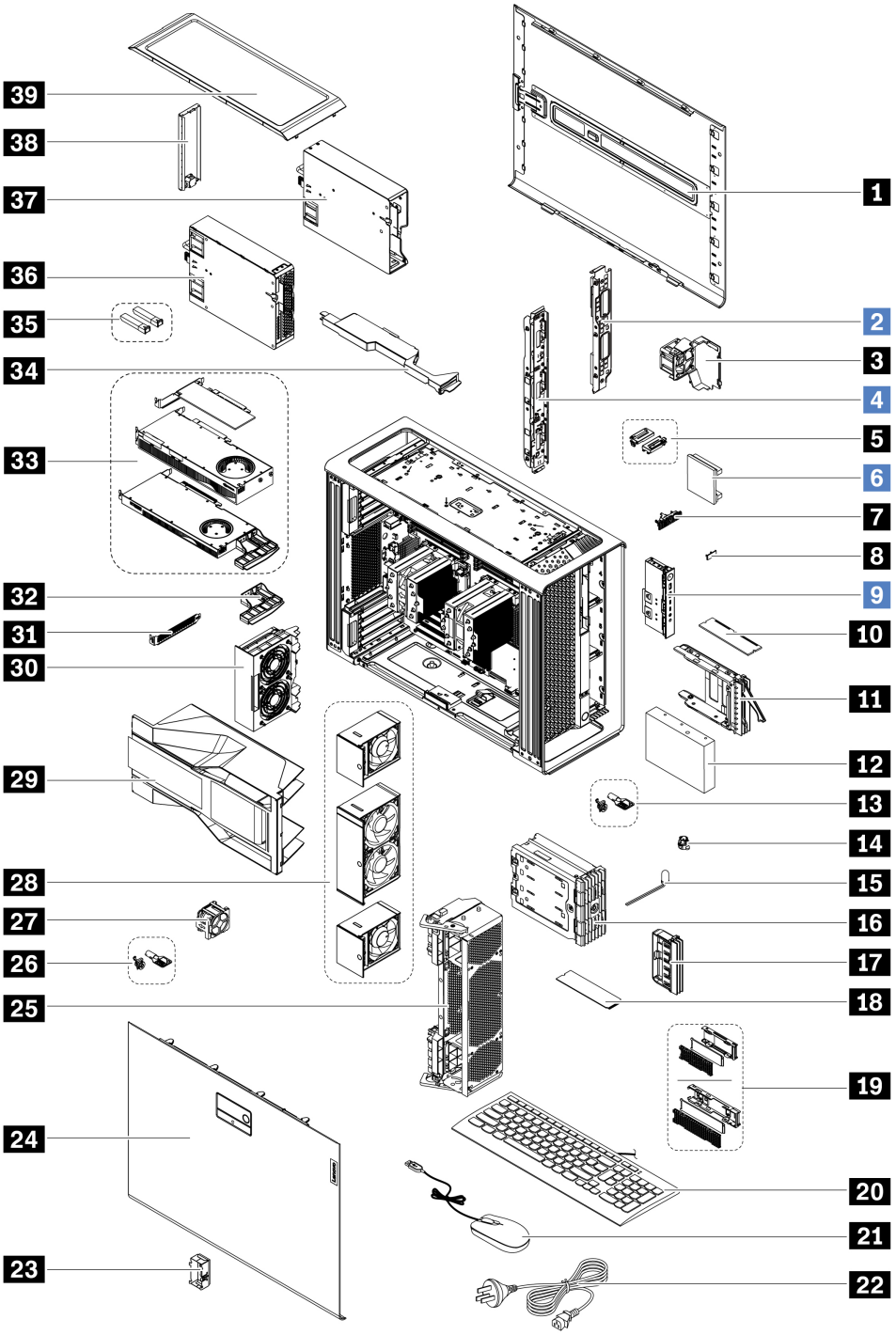
Customer Replaceable Units (CRUs) are parts that can be replaced by the customer. Lenovo computers contain the following types of CRUs:

- **Self-service CRUs:** Refer to parts that can be replaced easily by customer themselves or by trained service technicians at an additional cost.
- **Optional-service CRUs:** Refer to parts that can be replaced by customers with a greater skill level. Trained service technicians can also provide service to replace the parts under the type of warranty designated for the customer's machine.

If you intend on installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You might be required to return the defective part that is replaced by the CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. For full details, see the Lenovo Limited Warranty documentation at:
https://www.lenovo.com/warranty/llw_02

CRU list

The following is the CRU list of your computer.



Number	Description	Self-service CRU	Optional-service CRU
1	Right side cover	Yes	No
2	Power distribution board and bracket	No	Yes
3	Storage fan assembly	Yes	No
4	BCB board and bracket	No	Yes
5	Wi-Fi antenna cover	Yes	No

Number	Description	Self-service CRU	Optional-service CRU
6	NVLINK bridge*	No	Yes
7	ThinkStation logo badge	Yes	No
8	ID badge	Yes	No
9	Front panel IO assembly	No	Yes
10	Memory module	Yes	No
11	HDD bracket*	Yes	No
12	HDD*	Yes	No
13	Lock kit for the front access bay*	Yes	No
14	Think LED holder	Yes	No
15	Think LED cable	Yes	No
16	Dual M.2 SSD enclosure*	Yes	No
17	Blank bezel	Yes	No
18	M.2 SSD*	Yes	No
19	On board M.2 SSD heatsink kit	Yes	No
20	Keyboard	Yes	No
21	Mouse	Yes	No
22	Power cord	Yes	No
23	NVLINK retainer*	Yes	No
24	Left side cover	Yes	No
25	Front fan bracket	Yes	No
26	Lock kit for the left side cover*	Yes	No
27	Memory fan	Yes	No
28	Front fan assembly	Yes	No
29	CPU duct	Yes	No
30	Rear fan assembly	Yes	No
31	PCIe bracket	Yes	No
32	Customized PCIe extender*	Yes	No
33	PCIe card	Yes	No
34	Super capacitor module*	Yes	No
35	Ethernet-adapter-card fiber modules	Yes	No
36	Power supply assembly	Yes	No
37	PSU bay storage enclosure	Yes	No
38	Dummy cover for the upper PSU bay	Yes	No
39	Top cover	Yes	No

* for selected models

System board

Note: The system board might look slightly different from the illustration.

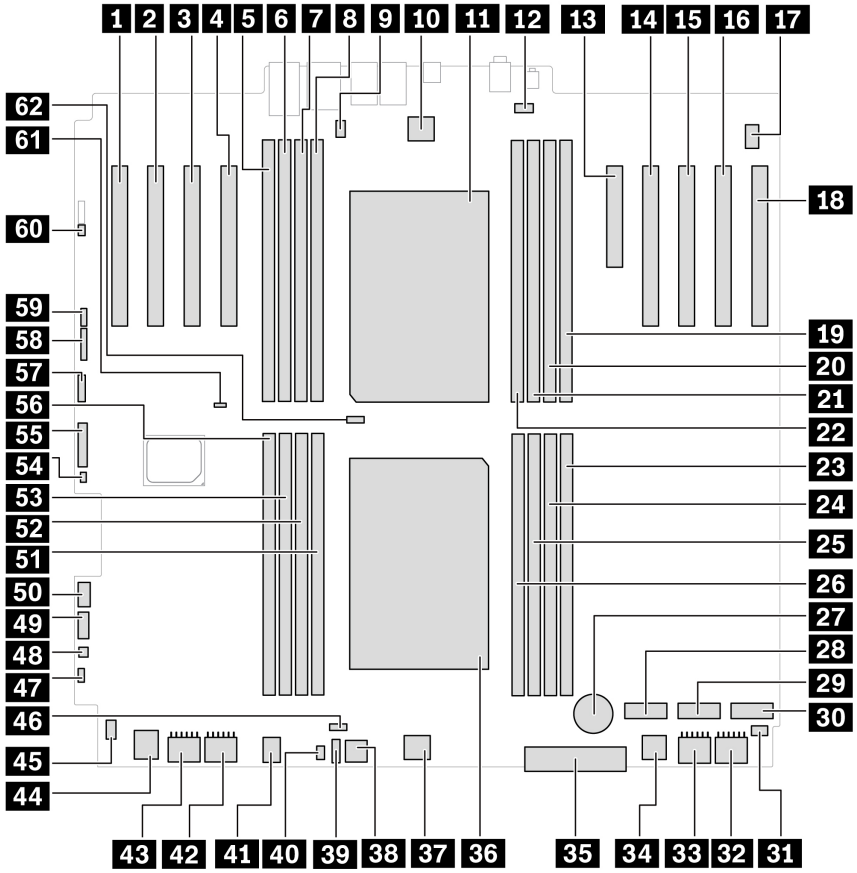


Figure 1. System board (front) part locations

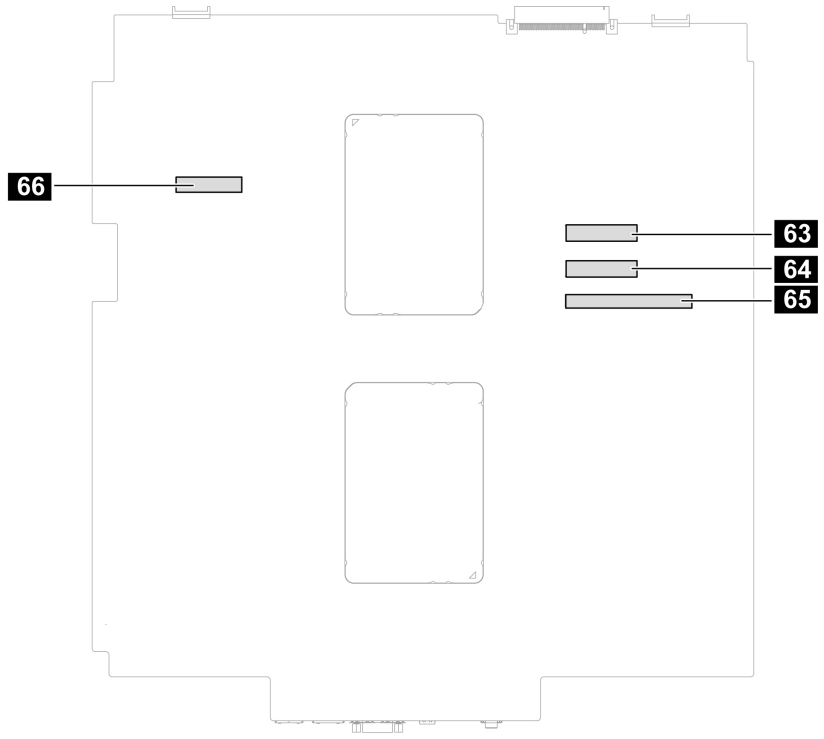


Figure 2. System board (back) part locations

Item	Item
1 PCIe card slot 9 (x 16, Gen4, Microprocessor 1)	2 PCIe card slot 8 (x 16, Gen5, Microprocessor 1)
3 PCIe card slot 7 (x 16, Gen4, Microprocessor 1)	4 PCIe card slot 6 (x 16, Gen5, Microprocessor 1)
5 Memory slot 9	6 Memory slot 10
7 Memory slot 11	8 Memory slot 12
9 Serial port (COM) connector	10 Rear-fan-assembly connector
11 Microprocessor 2*	12 Top memory-fan connector
13 PCIe card slot 5 (x 8, Gen4, Microprocessor 2)	14 PCIe card slot 4 (x 16, Gen5, Microprocessor 2)
15 PCIe card slot 3 (x 16, Gen5, Microprocessor 2)	16 PCIe card slot 2 (x 16, Gen4, Microprocessor 2)
17 Internal-speaker connector	18 PCIe card slot 1 (x 16, Gen4, Microprocessor 2)
19 Memory slot 16	20 Memory slot 15
21 Memory slot 14	22 Memory slot 13
23 Memory slot 1	24 Memory slot 2
25 Memory slot 3	26 Memory slot 4
27 Coin-cell battery	28 M.2 SSD slot 3
29 M.2 SSD slot 2	30 M.2 SSD slot 1
31 Right cover presence switch connector (intrusion switch connector)	32 Graphics card power connector 4

Item	Item
33 Graphics card power connector 3	34 Front fan assembly connector 2
35 Front panel connector	36 Microprocessor 1
37 Front fan assembly connector 1	38 Misc power connector
39 Thermal sensor connector	40 Logo LED connector
41 Bottom memory-fan connector	42 Graphics card power connector 1
43 Graphics card power connector 2	44 Front fan assembly connector 3
45 Left cover presence switch connector (intrusion switch connector)	46 Microprocessor 1 fan connector
47 Power button header	48 Thunderbolt™ power connector
49 Thunderbolt control connector	50 USB 3.2 Gen1
51 Memory slot 5	52 Memory slot 6
53 Memory slot 7	54 Drive_ACT
55 Alternative Trusted Platform Module (TPM) header	56 Memory slot 8
57 USB 2.0	58 BMC
59 VROC	60 Reset header
61 Clear CMOS jumper	62 Microprocessor 2 fan connector
63 MCIO connector 2	64 MCIO connector 1
65 Power distribution board connector	66 Drive_backplane

Prerequisites for hardware replacement

General prerequisites

Read *Generic Safety and Compliance Notices*.

Prerequisites for opening computer cover

- 

  During operation, some components become hot enough to burn the skin. Before you open the computer cover, remove any media from the drives, turn off the computer and connected devices, disconnect power, remove all cables and locking devices, and wait approximately 10 minutes until the computer is cool.

- Before reaching parts with cables, record the cable routing for future reference and then disconnect its cable from the system board.

Prerequisites for storage drive replacement

Attention: The internal storage drive is sensitive. Inappropriate handling might cause damage and loss of data. When handling the internal storage drive, observe the following guidelines:

- Replace the internal storage drive only for repair. The internal storage drive is not designed for frequent changes or replacement.

- Before replacing the internal storage drive, make backup copy of all the data that you want to keep.
- Do not touch the contact edge of the internal storage drive. Otherwise, the internal storage drive might get damaged.
- Do not apply pressure to the internal storage drive.
- Do not make the internal storage drive subject to physical shocks or vibration. Put the internal storage drive on soft material, such as a cloth, to absorb physical shocks.

Prerequisites for hot-swappable storage drives

You can install or replace a storage drive in the front access bay. The storage drive also can be hot-swappable, which means that you can install or replace the drive without even turning off your computer. Therefore, lock the storage drive to prevent the unexpected removal. The keys are attached at the rear of the computer. Store the keys in a secure place.

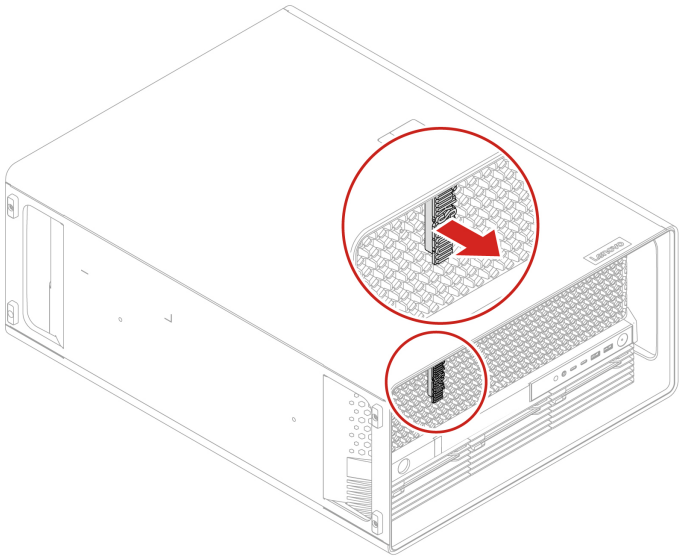
Attention: To avoid damage and loss of data, ensure that the operating system of your computer does not reside on the storage drive installed in the front access bay. If the requirement is not met, do not remove or install the storage drive when the computer is turned on.

ThinkStation logo badge

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

Remove the ThinkStation logo badge.

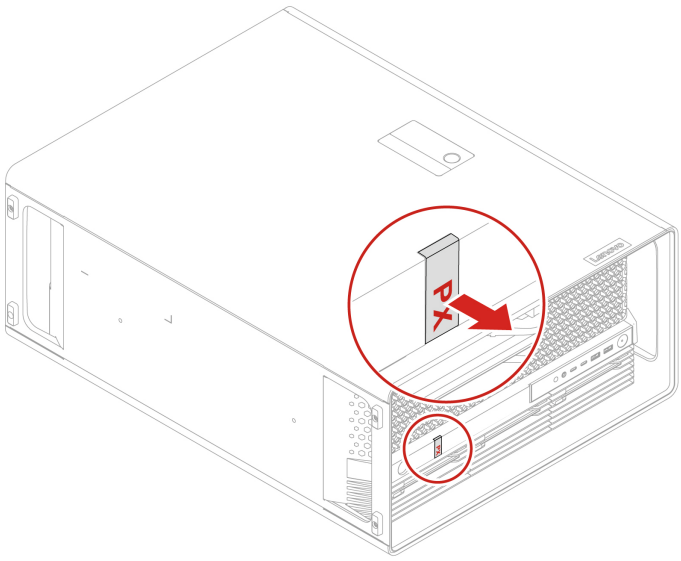


ID badge

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

Remove the ID badge.

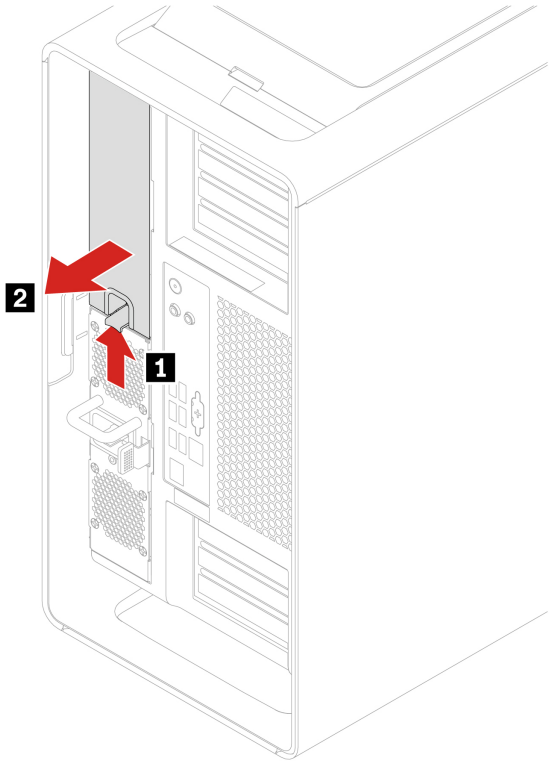


Dummy cover for the upper PSU bay

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

Remove the dummy cover for the upper PSU bay.

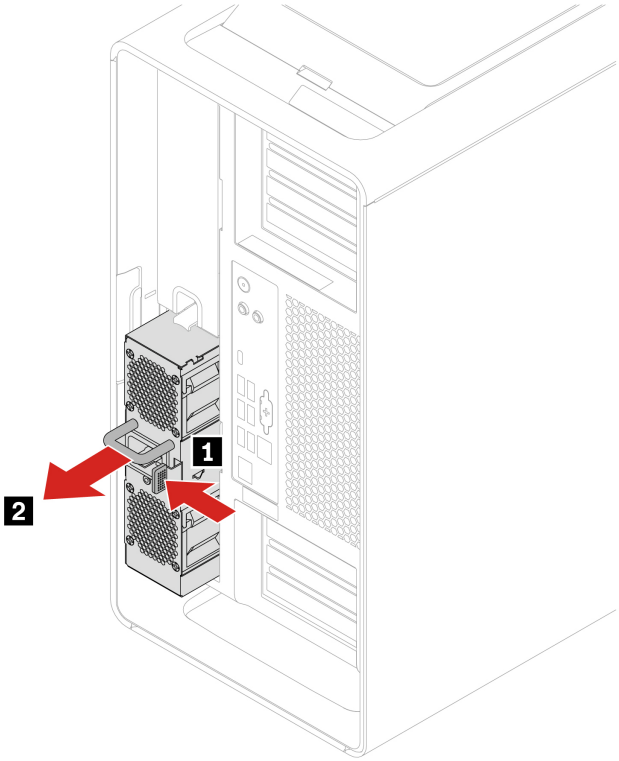


Power supply assembly

- Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.
- The power supply assembly is hot-swappable.

Removal steps

Remove the power supply assembly.

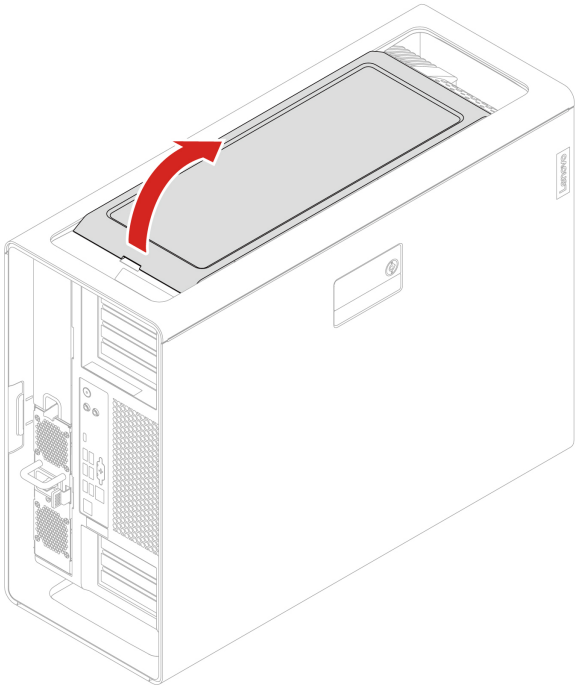


Top cover

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

Remove the top cover.

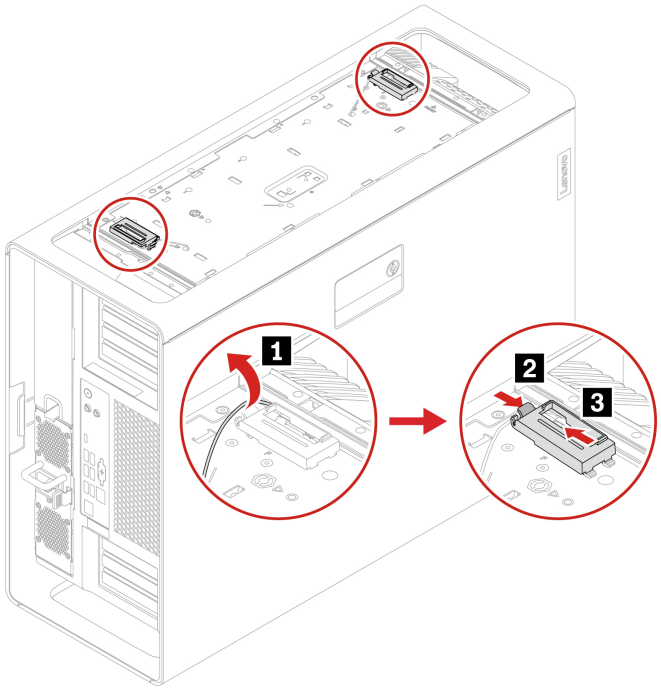


Wi-Fi antenna cover

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the “Top cover” on page 47.
2. Remove the Wi-Fi antenna cover.

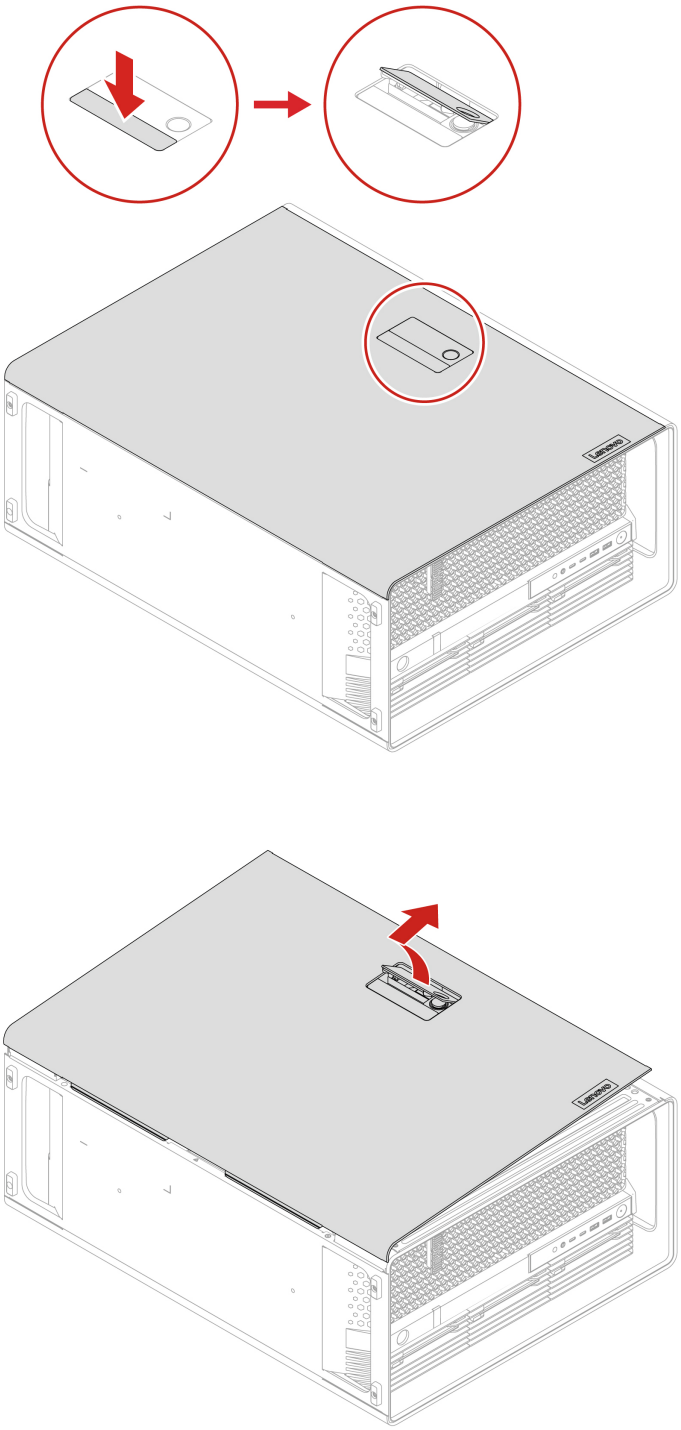


Left side cover

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

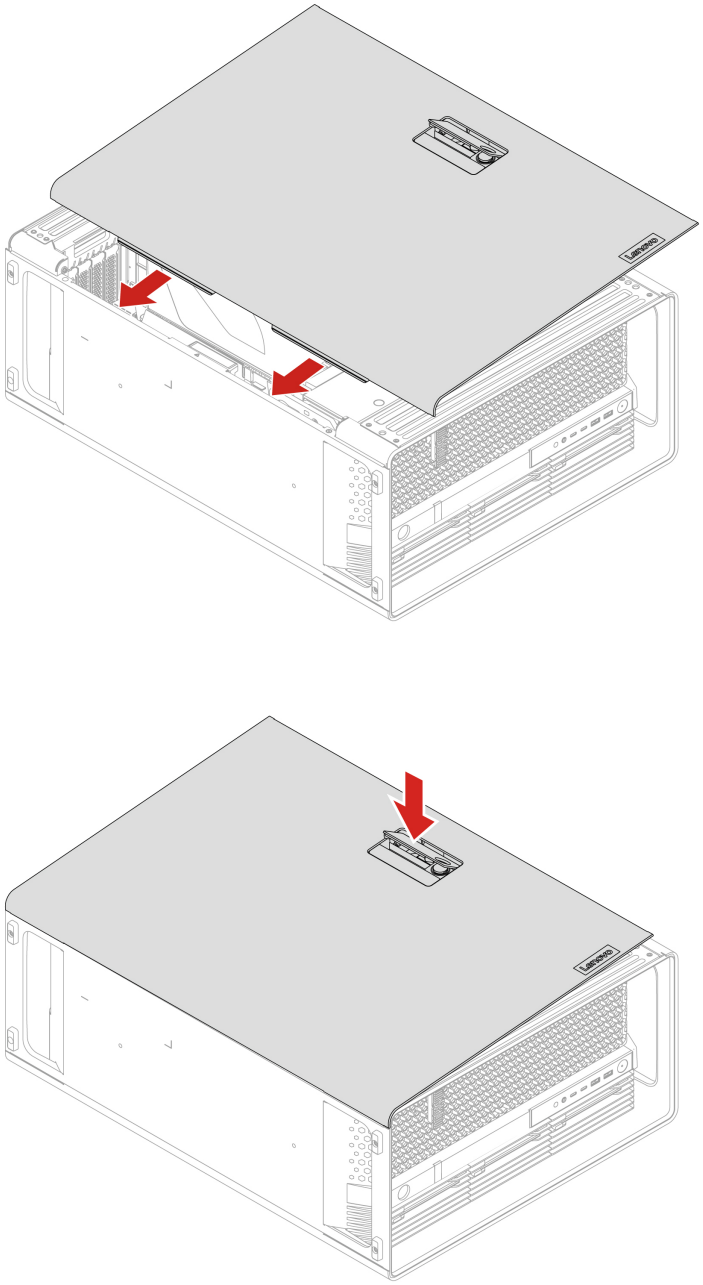
Removal steps

1. Lay the computer on its side for easier access to the left side cover.
2. Remove the left side cover.



Installation steps

Install the left side cover.



Note: If a locking device is available, use it to lock the computer after installing the computer cover.

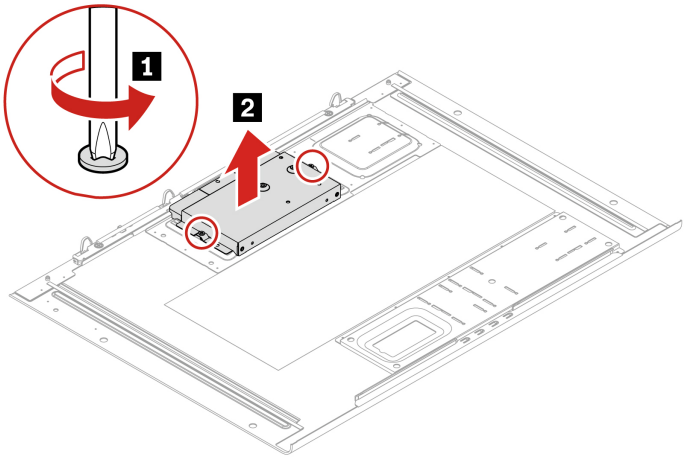
Lock kit for the left side cover

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

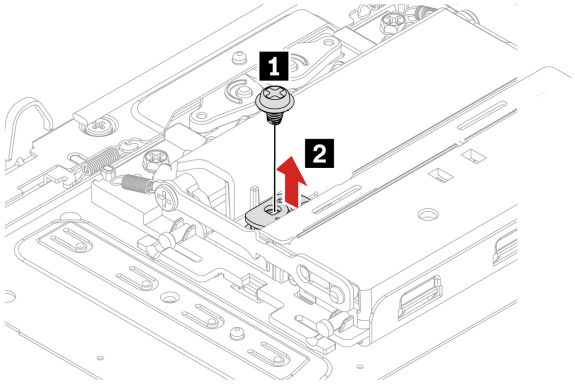
Removal steps

1. Remove the “Left side cover” on page 49.
2. Remove the left side cover lock.

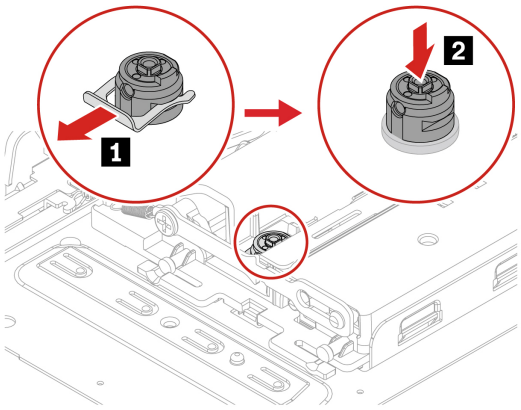
Note: Loosen the two screws that secure the lock handle cover. The two screws cannot be removed from the lock handle cover.



Screw (quantity)	Color	Torque
6-32*3.8 mm, Zn coated (2)	Blue	3.0 ± 0.5 lb/in

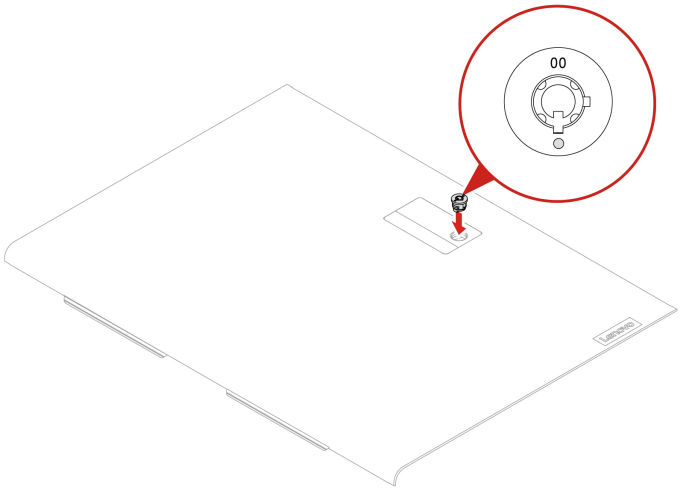


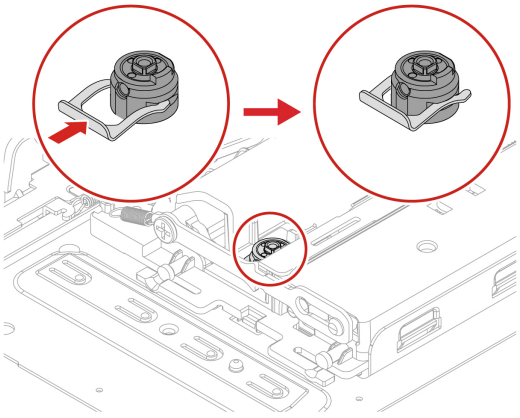
Screw (quantity)	Color	Torque
M3 x 4.2 mm, Zn coated (1)	Blue	5.0 ± 0.5 lb/in

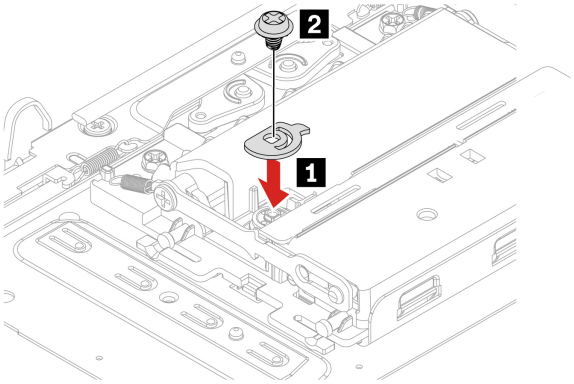


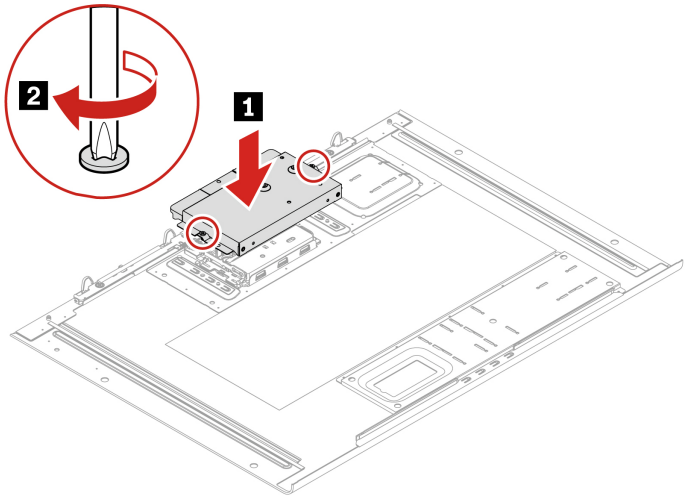
Installation steps

Install the left side cover lock.







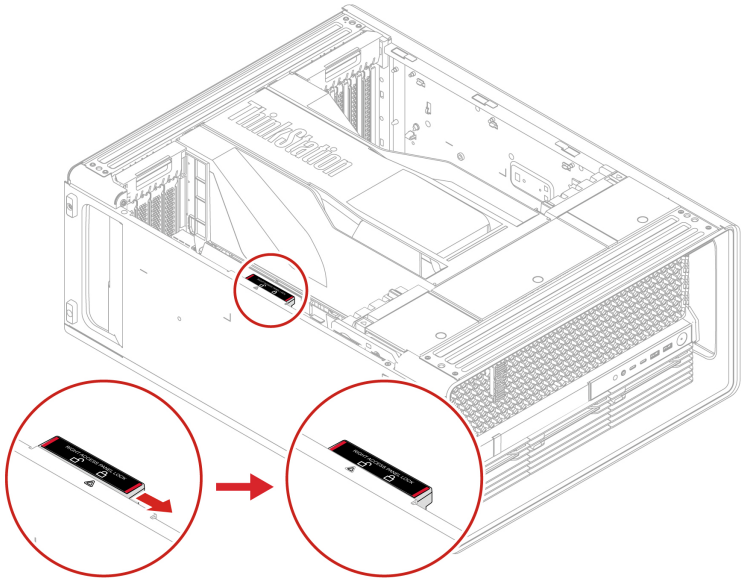


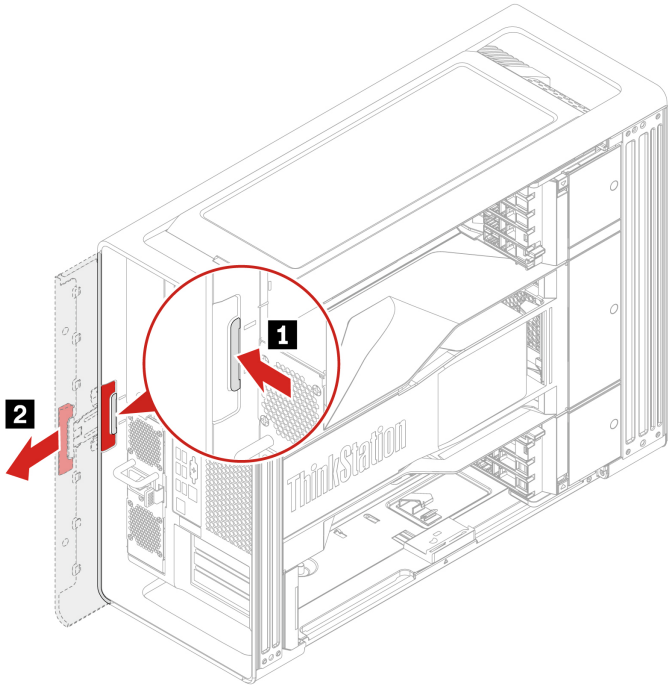
Right side cover

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

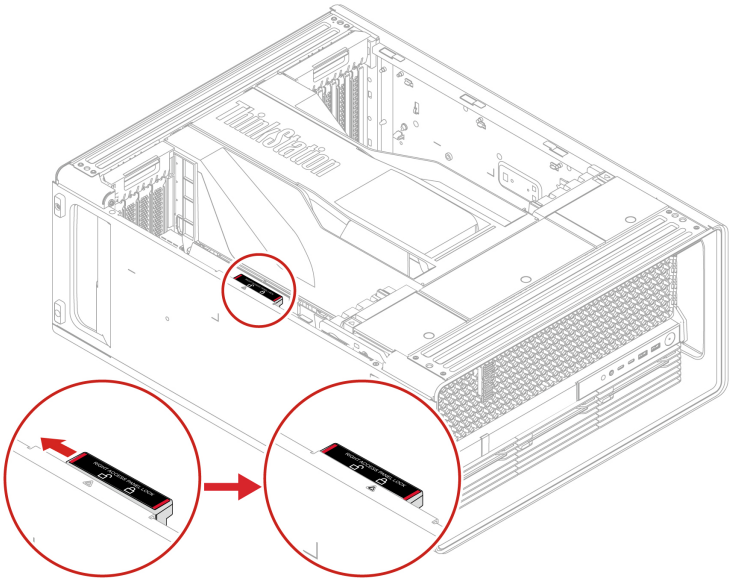
1. Remove the “Left side cover” on page 49.
2. Remove the right side cover.

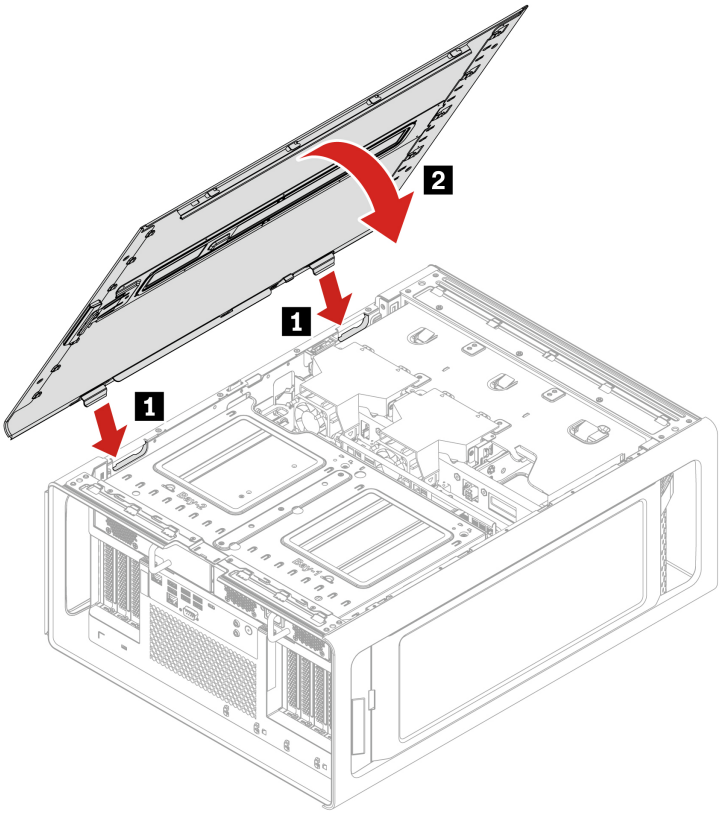


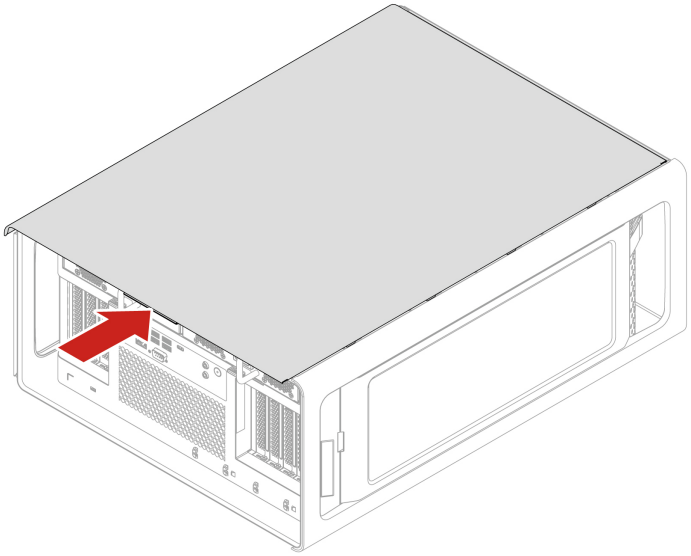


Installation steps

Install the right side cover.




2
1
1

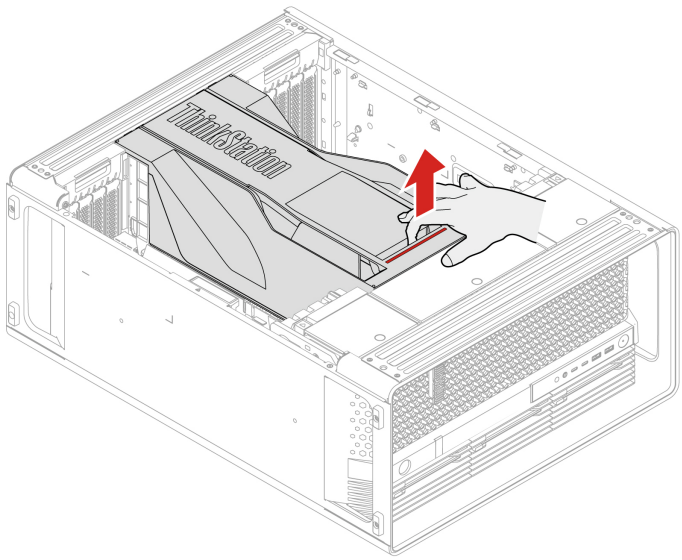


CPU duct

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the “Left side cover” on page 49.
2. Remove the CPU duct.

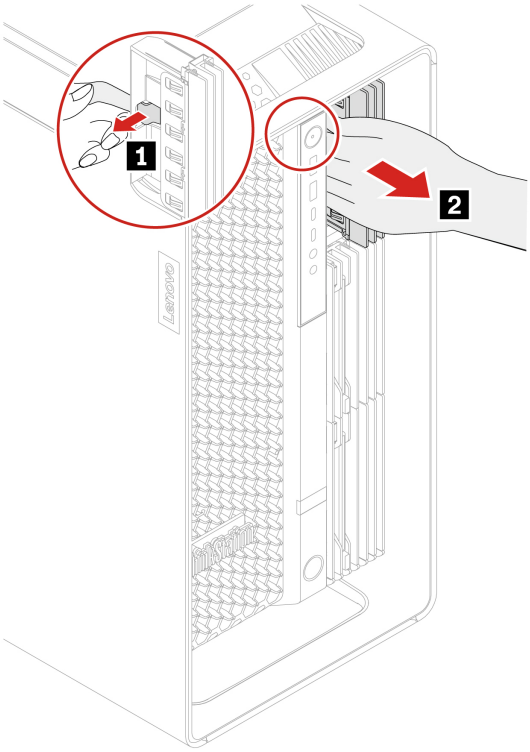


Blank bezel

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the HDD bracket beside the blank bezel. See “HDD in the front access bay” on page 62.
2. Remove the blank bezel.



Fans

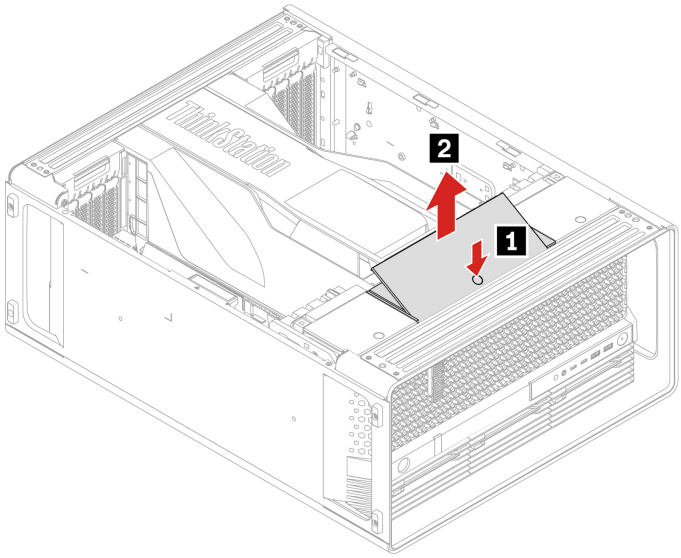
By reading this section, you will learn to replace the fans in your computer.

Front fan assembly

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the “Left side cover” on page 49.
2. Remove the front fan assembly.

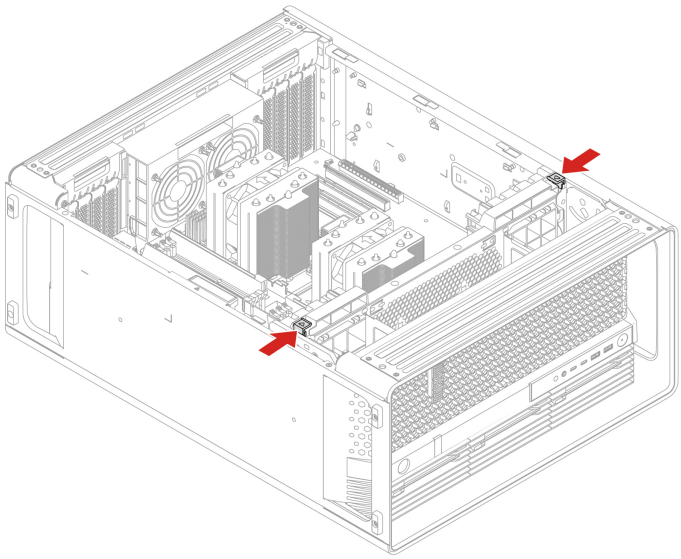


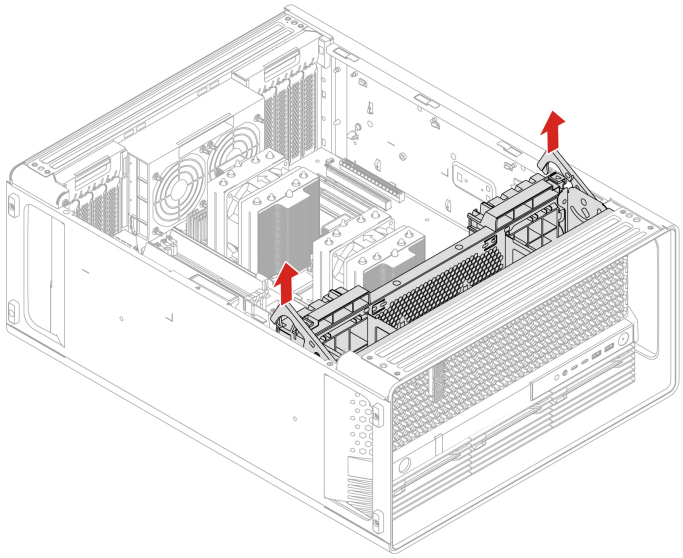
Front fan bracket

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
2. Remove the front fan bracket.



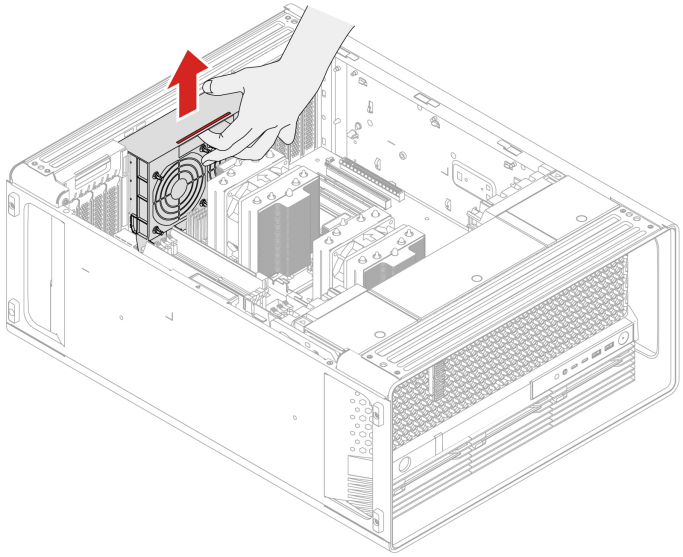


Rear fan assembly

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the rear fan assembly.

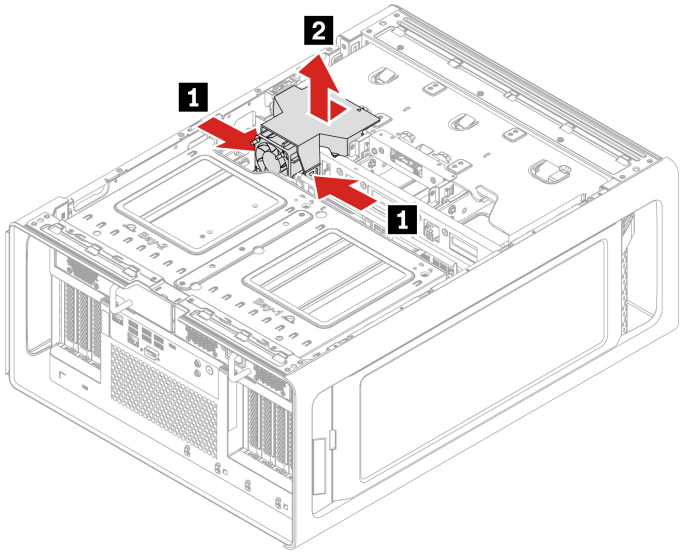


Storage fan assembly

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “Right side cover” on page 54.
2. Remove the storage fan assembly.

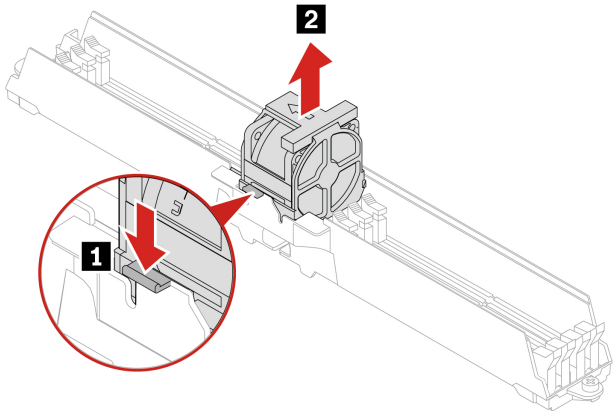


Memory fan

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
   e. “Rear fan assembly” on page 60.
2. Remove the memory fan.



Storage drives

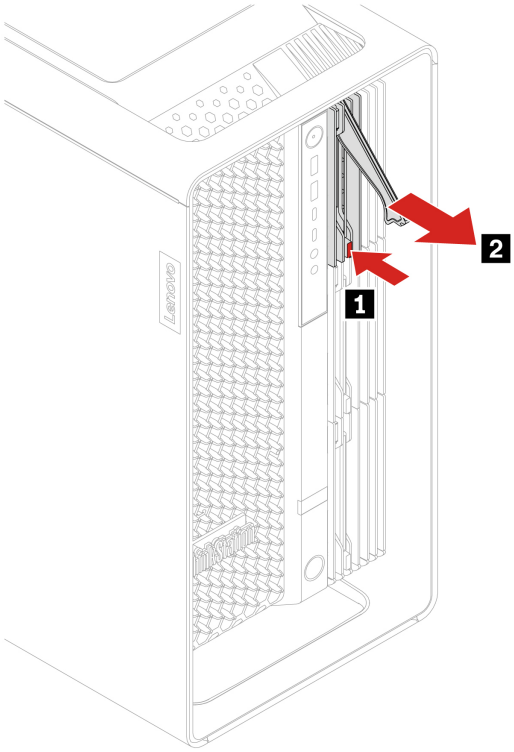
By reading this section, you will learn to replace storage drives in your computer.

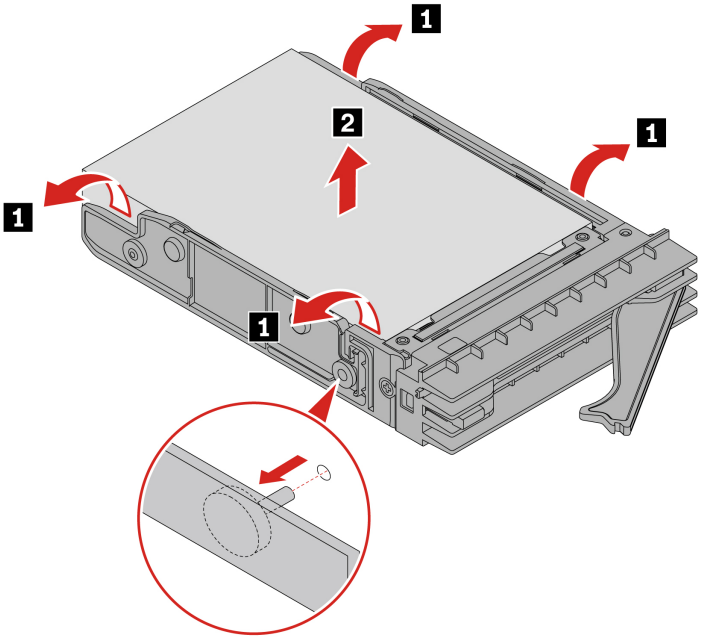
HDD in the front access bay

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

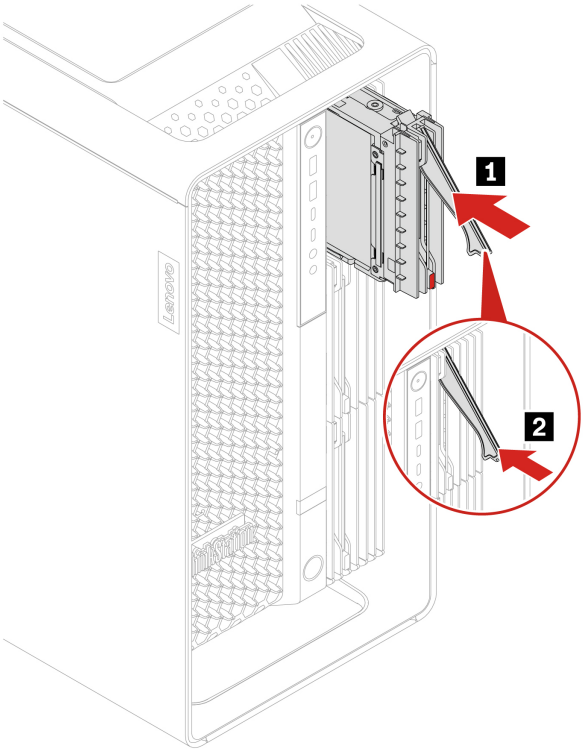
You might need to use the key attached at the rear of the computer to unlock the front access bay and then remove the HDD.





Installation steps

Install the HDD.

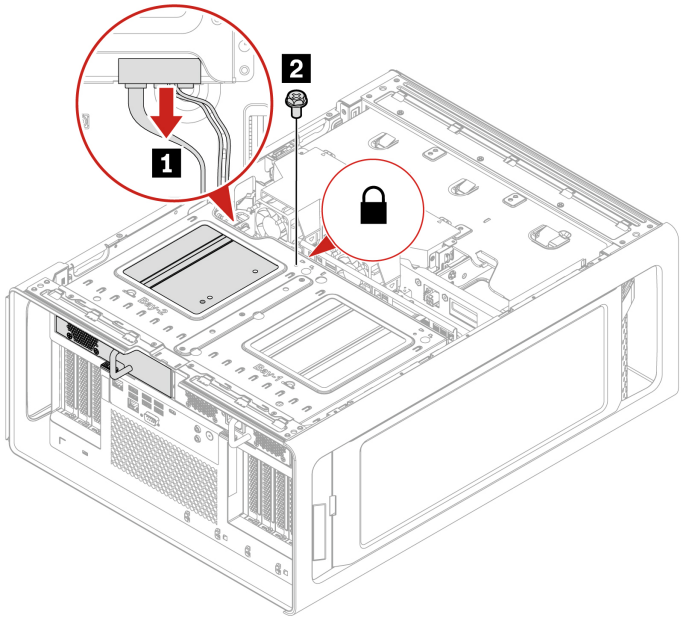


HDD in the PSU bay storage enclosure

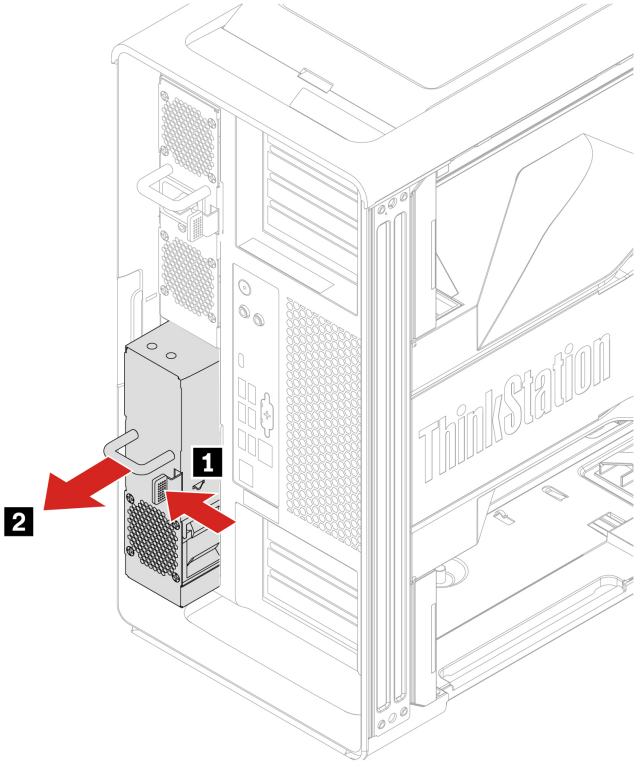
Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

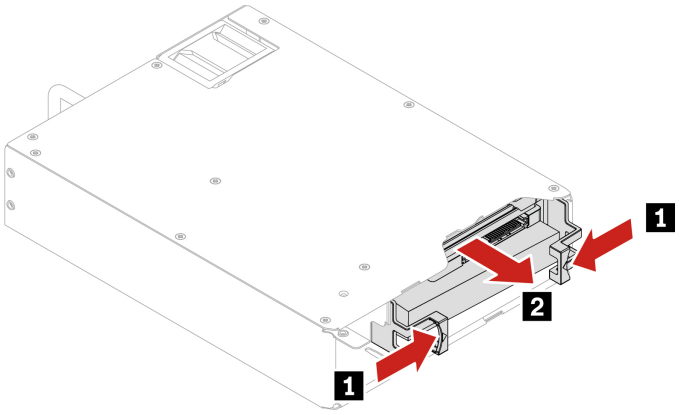
Removal steps

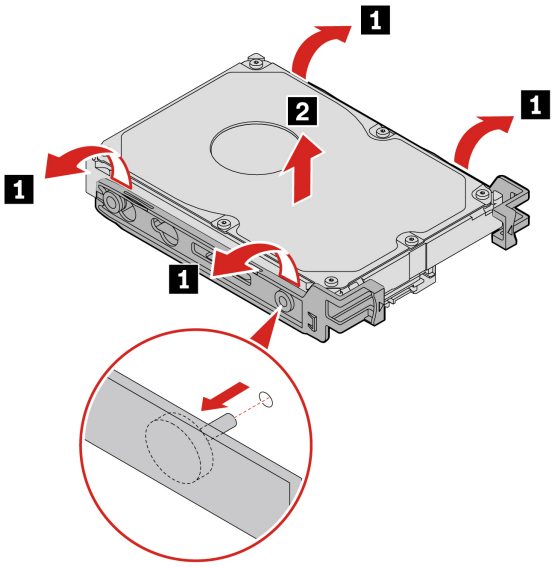
1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “Right side cover” on page 54.
2. Remove the HDD in the PSU bay storage enclosure.



Screw (quantity)	Color	Torque
M3 x 5 mm, Nickel coated (1)	Black	5.0 ± 0.5 lb/in





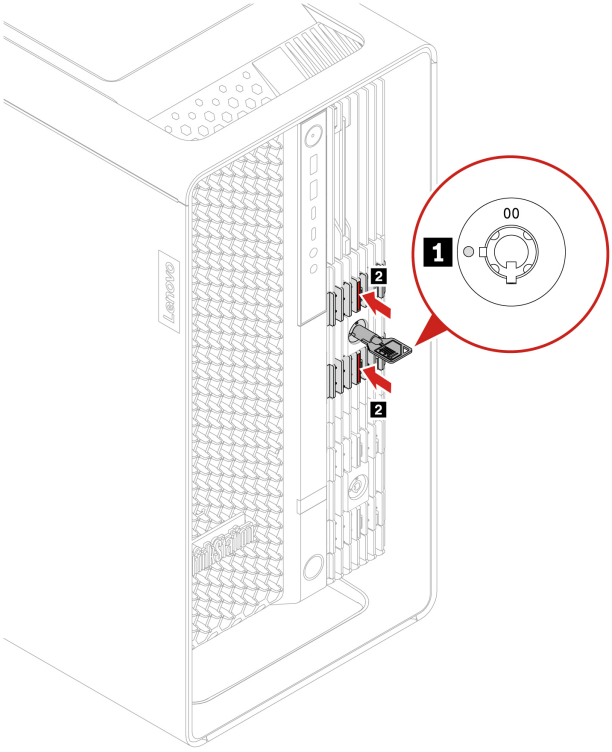


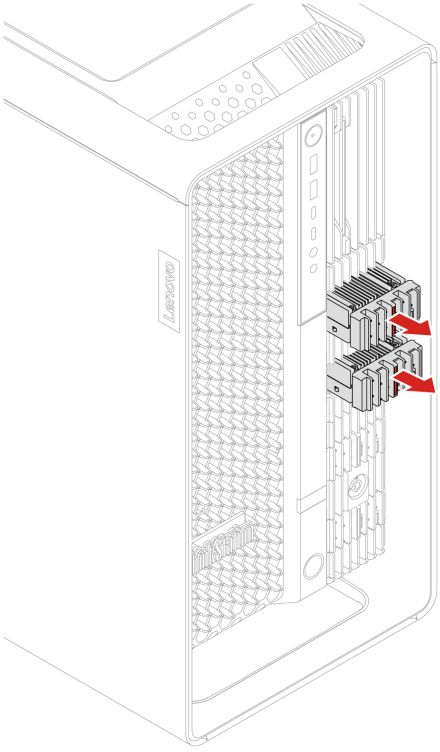
M.2 SSD in the front access bay

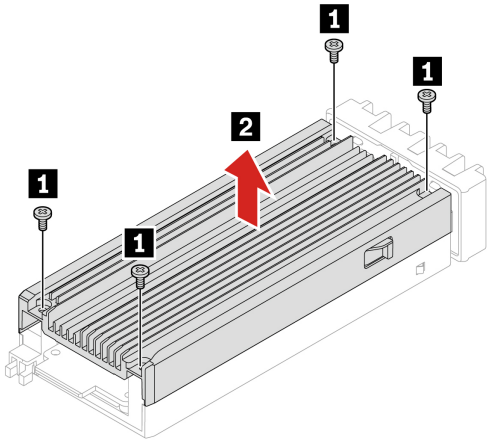
Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

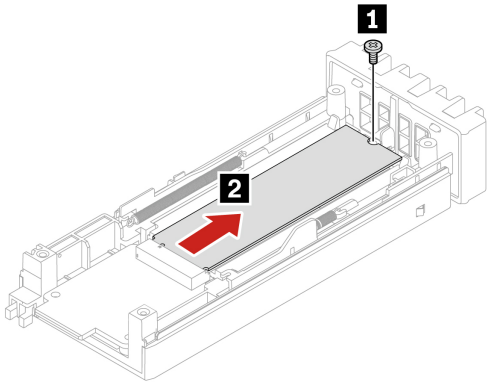
Remove the M.2 SSD.


00
1
2
2





Screw (quantity)	Color	Torque
M2 x 4.5 mm, Zn coated (4)	Black	1.5 ± 0.2 lb/in



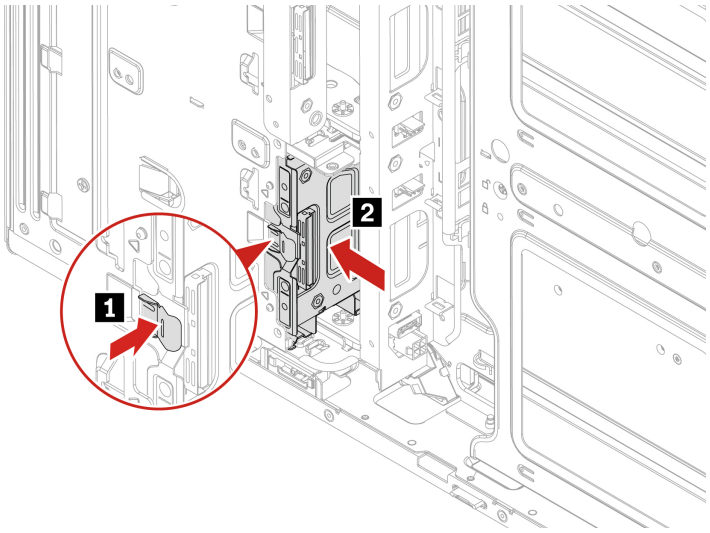
Screw (quantity)	Color	Torque
M2 x 4.5 mm, Zn coated (1)	Black	1.5 ± 0.2 lb/in

Dual M.2 SSD enclosure

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “M.2 SSD in the front access bay” on page 66.
   b. “Left side cover” on page 49.
   c. “Right side cover” on page 54.
   d. “Storage fan assembly” on page 61.
2. Remove the dual M.2 SSD enclosure.

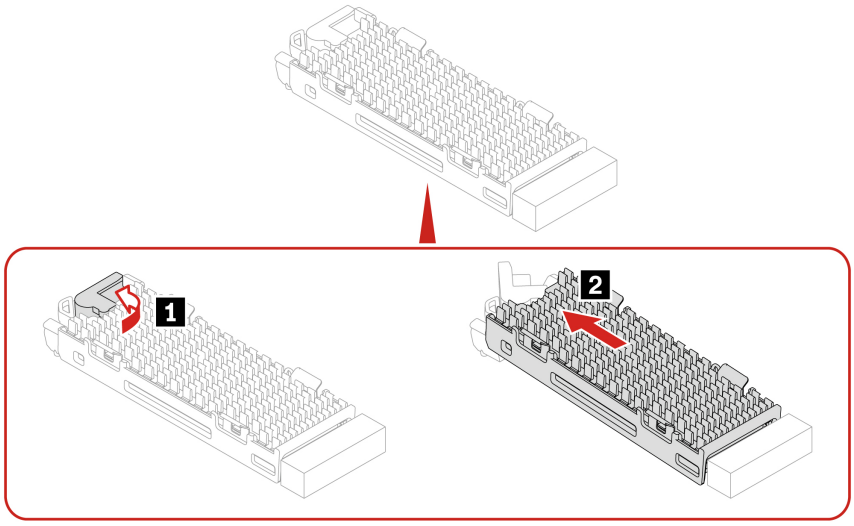


Onboard M.2 SSD and its heatsink kit

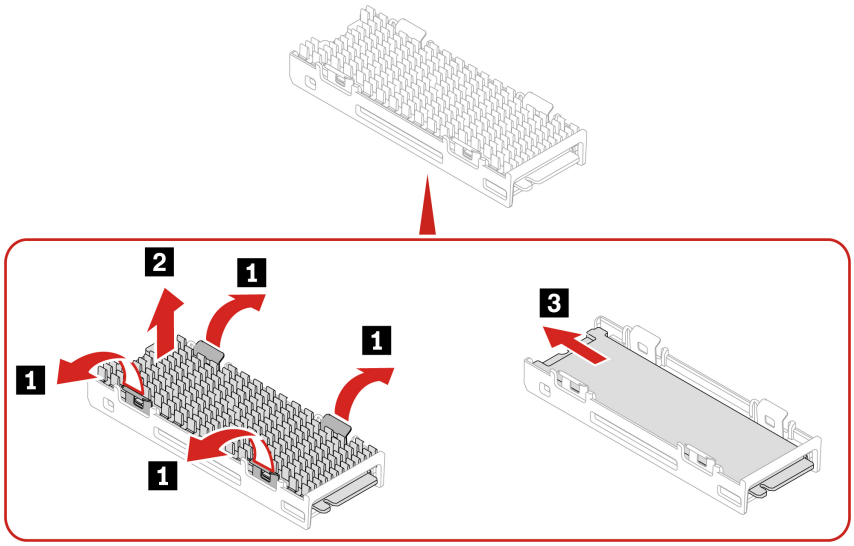
Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

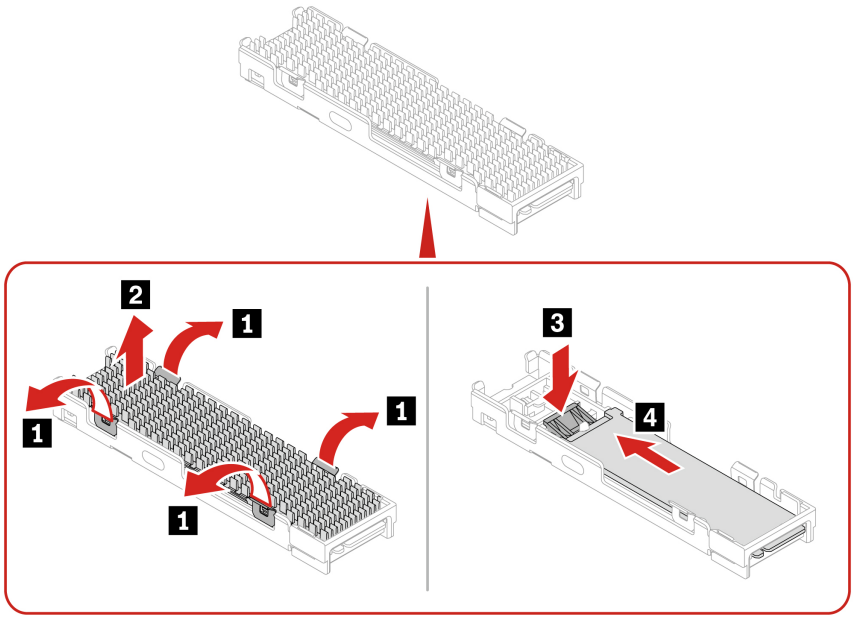
1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
2. Remove the onboard M.2 SSD with its heatsink kit.



3. Remove the M.2 SSD from its heatsink kit.
   - Gen 4 M.2 SSD

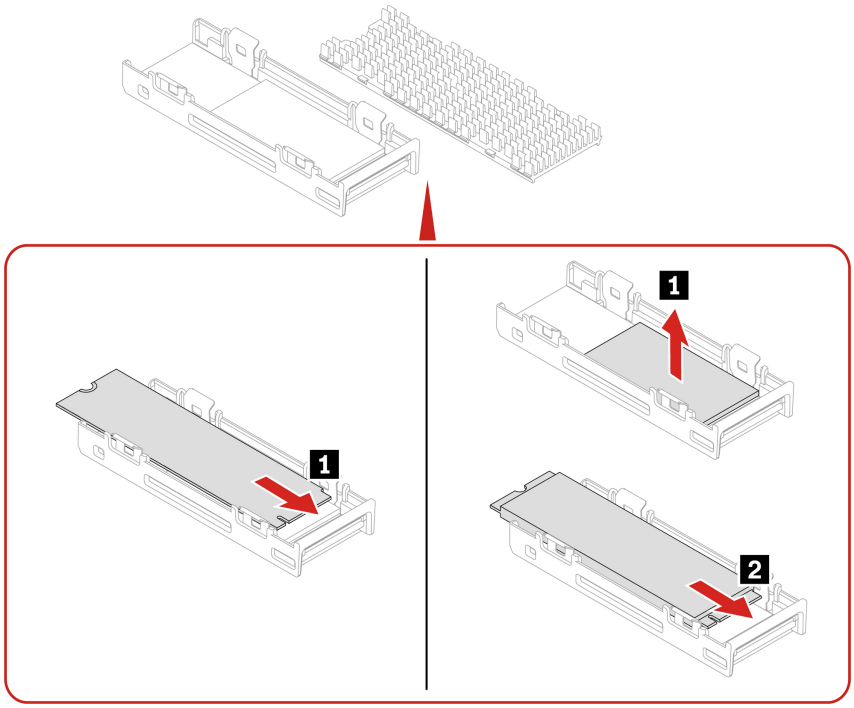


- Gen 5 M.2 SSD



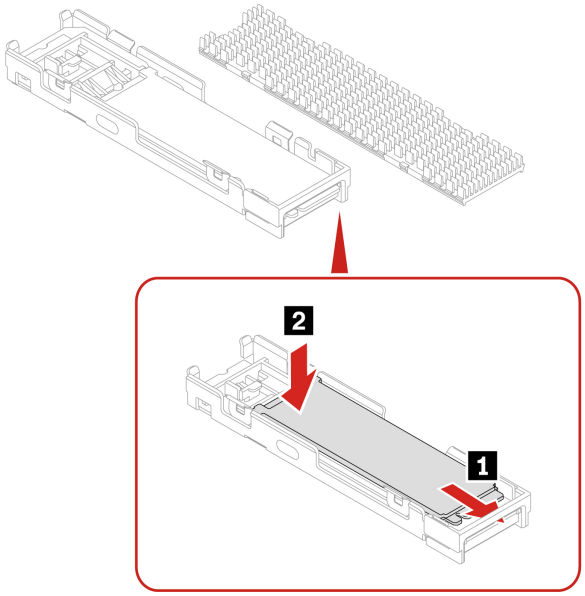
Installation steps

1. Remove the protective film from both heatsink and thermal pad before installing the onboard M.2 SSD.
2. Install the M.2 SSD into its heatsink kit.
   - Gen 4 M.2 SSD

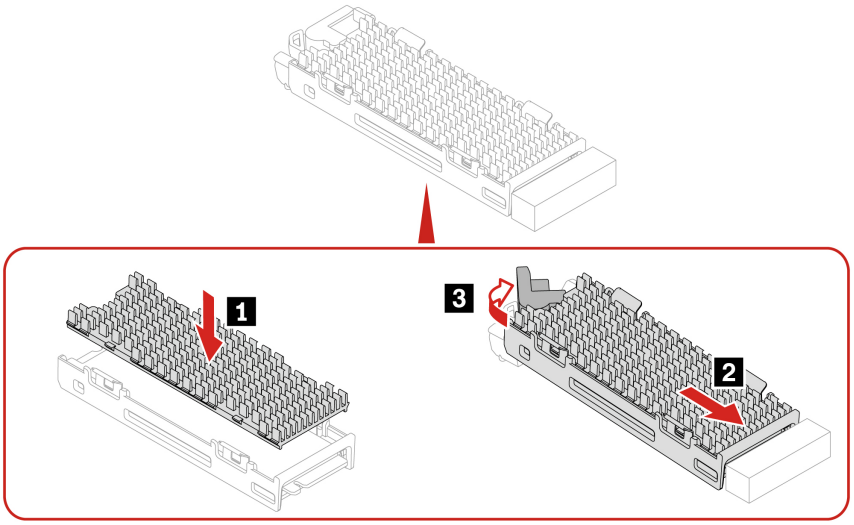


Note: If the new Gen 4 M.2 SSD is double-sided, remove the 1.5-mm thick thermal pad upward first.

- Gen 5 M.2 SSD

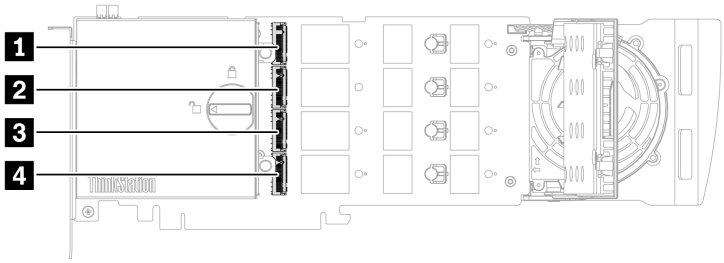


3. Install the M.2 SSD heatsink.



M.2 SSD on an M.2 SSD PCIe adapter

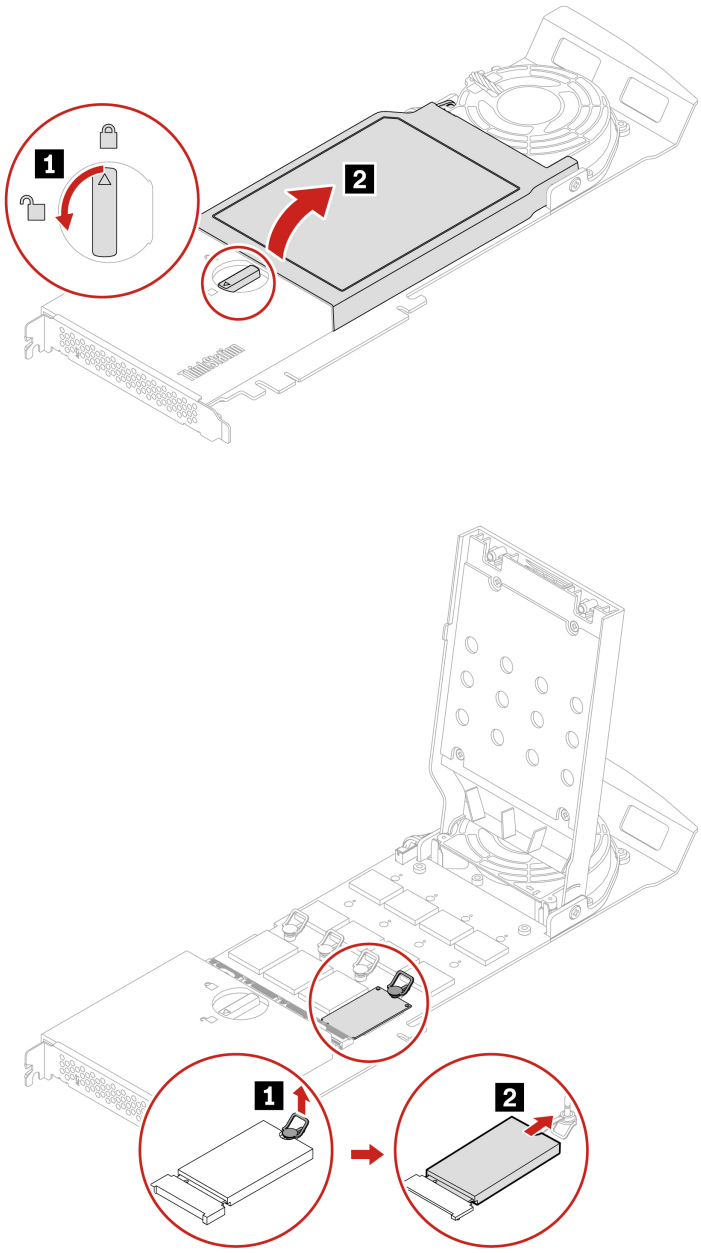
- Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.
- Install M.2 SSDs in the following order as shown:



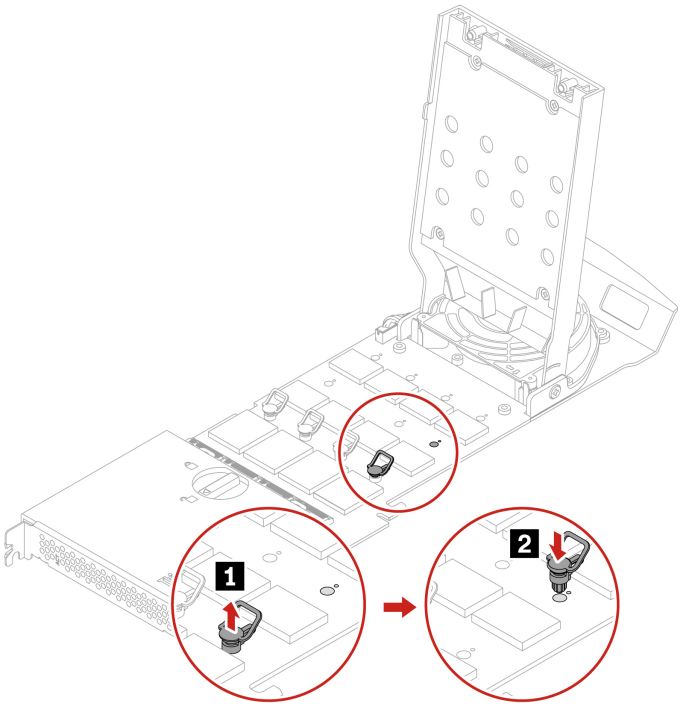
- For better performance, it's recommended that the generation of M.2 SSD match with the generation of M.2 SSD PCIe adapter. For example, install Gen 4 M.2 SSD on Gen 4 M.2 SSD PCIe adapter and install Gen 5 M.2 SSD on Gen 5 M.2 SSD PCIe adapter.

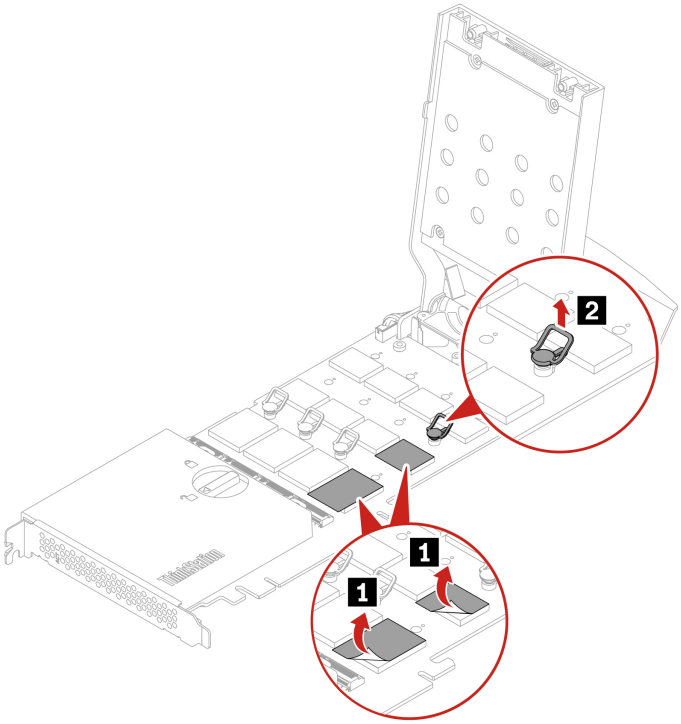
Replacement steps

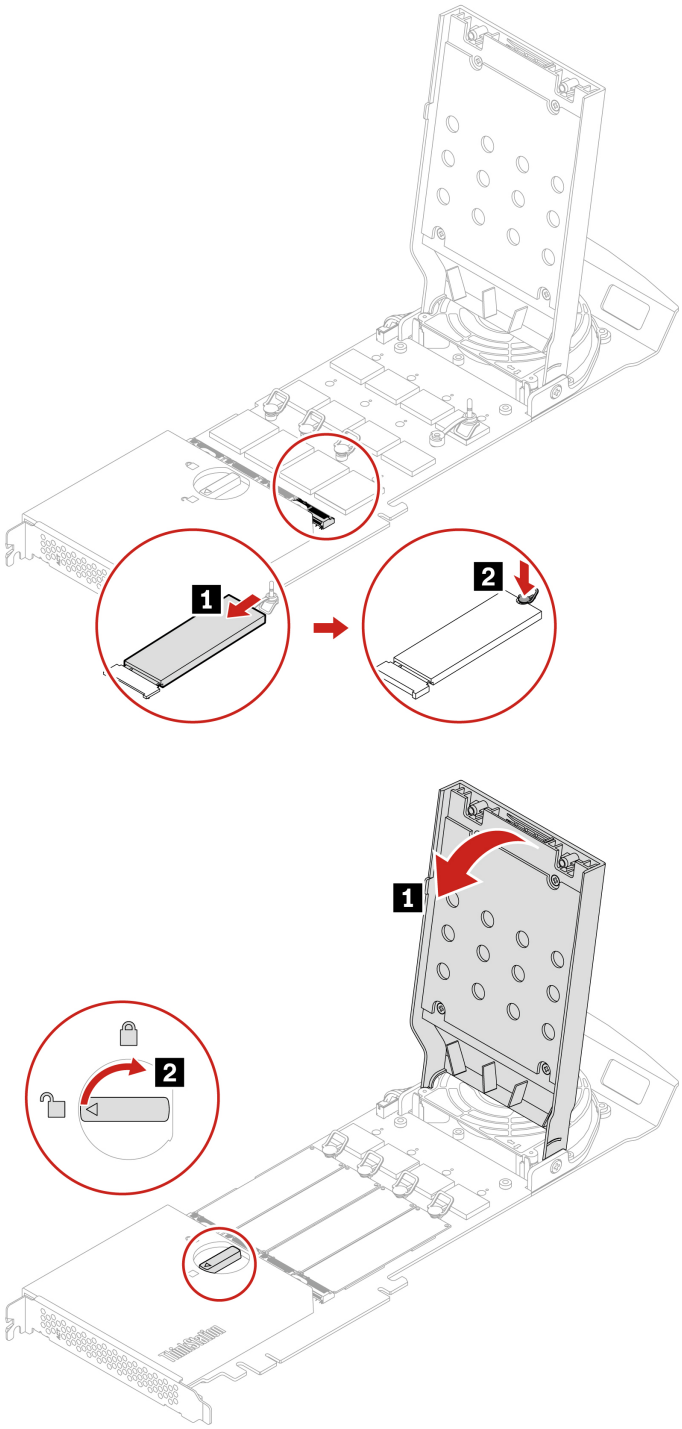
1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the M.2 SSD PCIe adapter from the PCIe card slot. See “Full-length PCIe card” on page 81.
3. Replace the M.2 SSD on the M.2 SSD PCIe adapter.



If necessary, move the retention latch to an appropriate location to suit the length of the new M.2 SSD.


1
2


2
1
1



Note: Install the M.2 SSD PCIe adapter in a PCIe x16 card slot on the system board. See “System board” on page 42.

PCIe cards

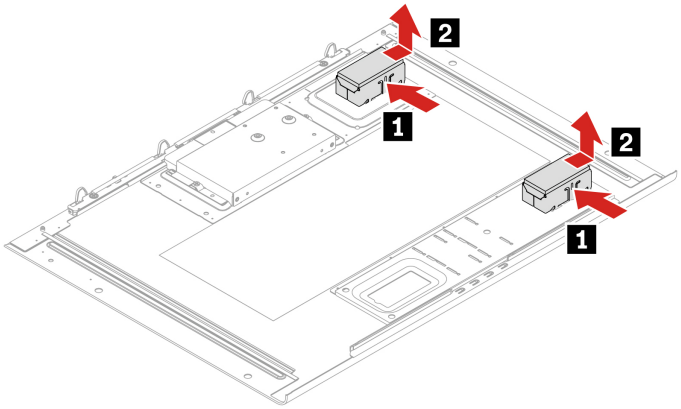
By reading this section, you will learn to replace PCIe cards, including graphics cards, in your computer.

NVLINK retainer

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the “Left side cover” on page 49.
2. Remove the NVLINK retainer.

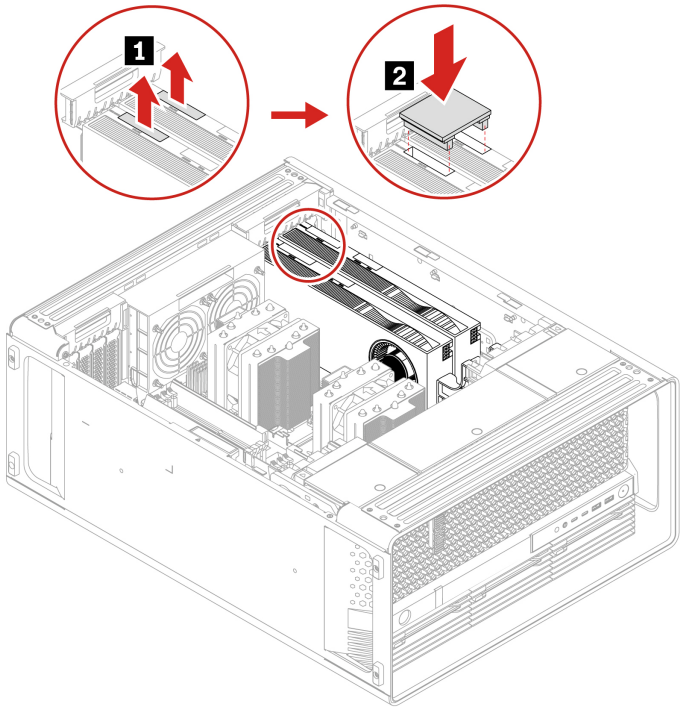


NVLINK bridge

- Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.
- The NVLINK bridge is shipped in an accessary box within the computer carton box. You need to take it out from the packaging and install it by yourself.

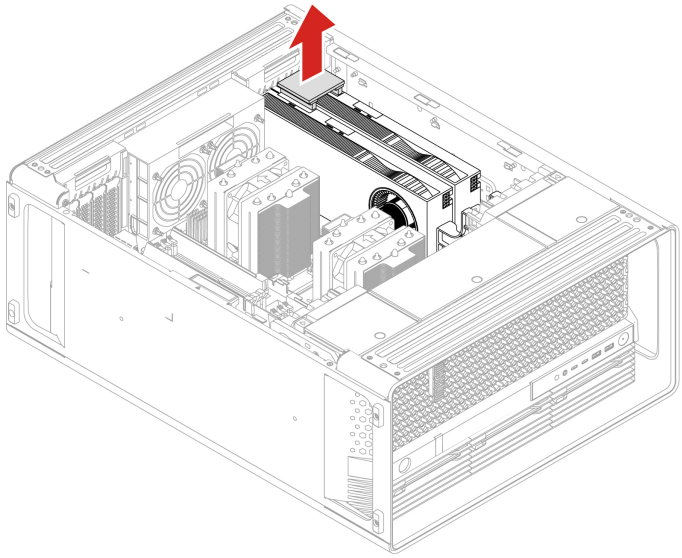
Installation steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Install the NVLINK bridge.



Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the NVLINK bridge.

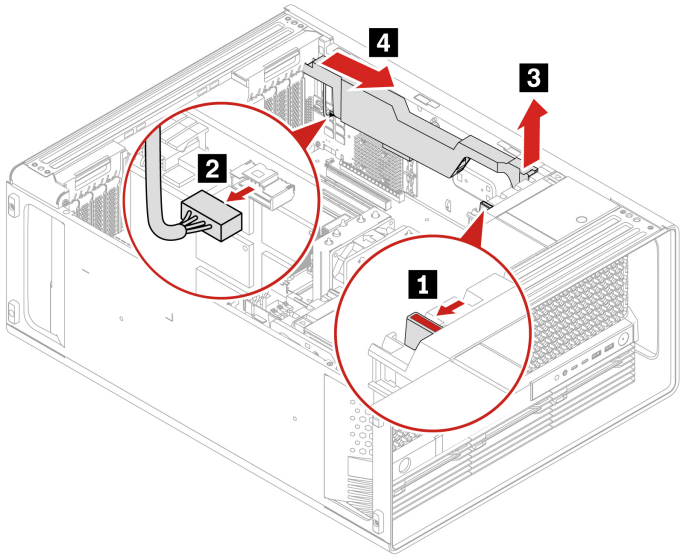


Super capacitor module

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the super capacitor module.



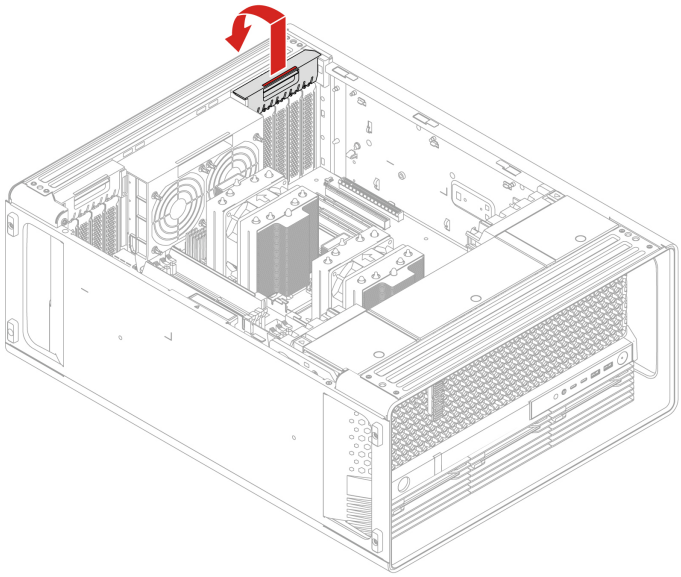
Note: When installing a new super capacitor module, connect the super capacitor module cable to the super capacitor module connector (J14) on the RAID card.

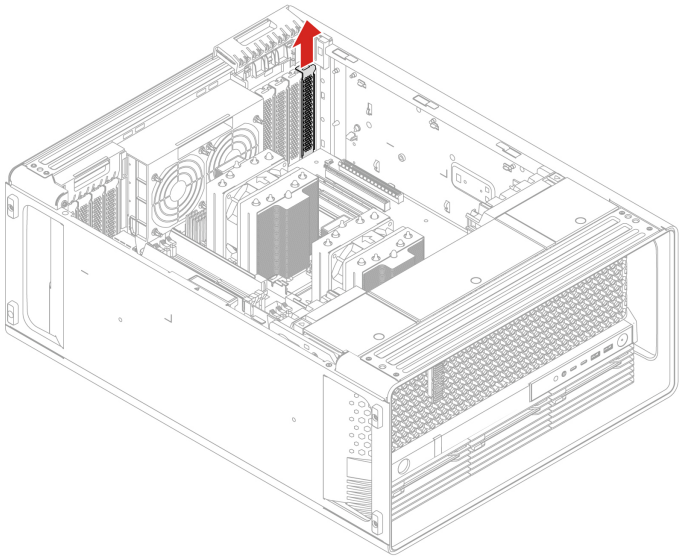
PCIe bracket

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the PCIe bracket.



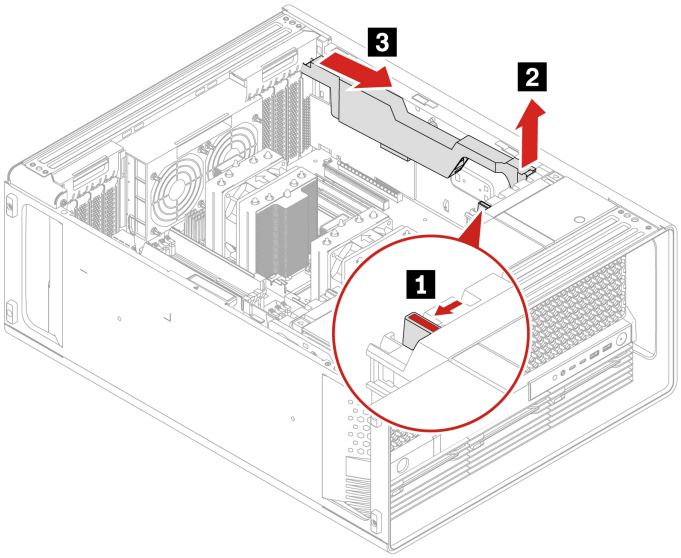


Half-length PCIe card

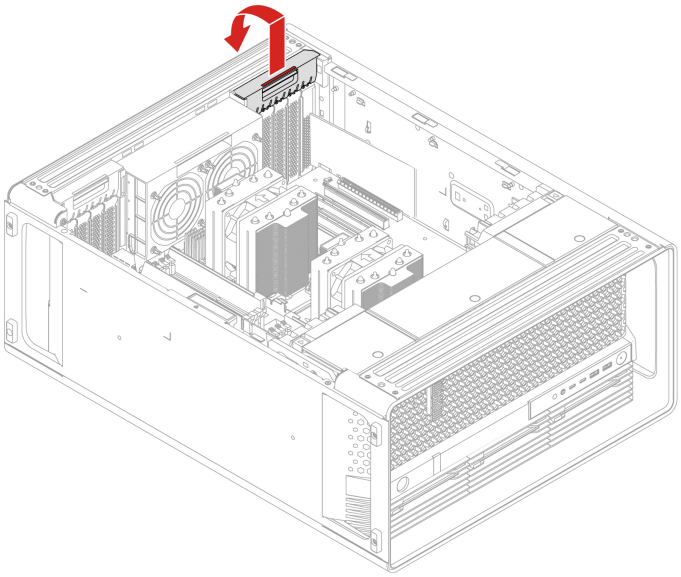
Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

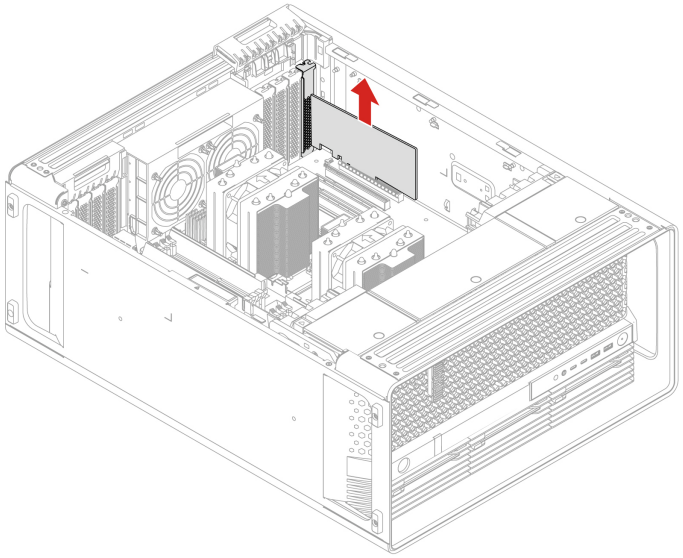
Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the PCIe card.
   a. Remove the PCIe card retainer. The PCIe card retainer is only available on some graphics cards.

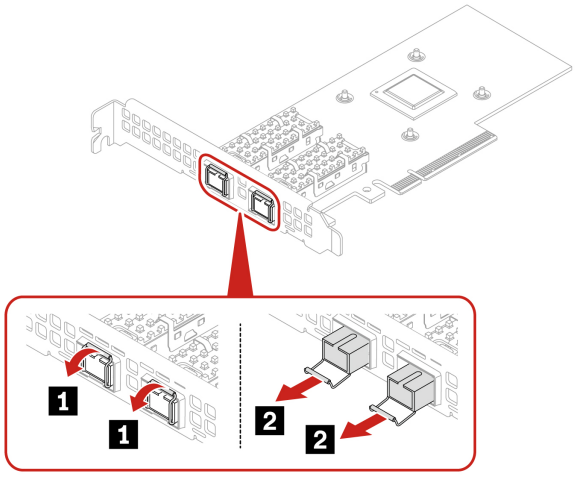


b. Open the handle and remove the PCIe card. The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.





c. For some Ethernet adapter cards, the following fiber modules can be removed.

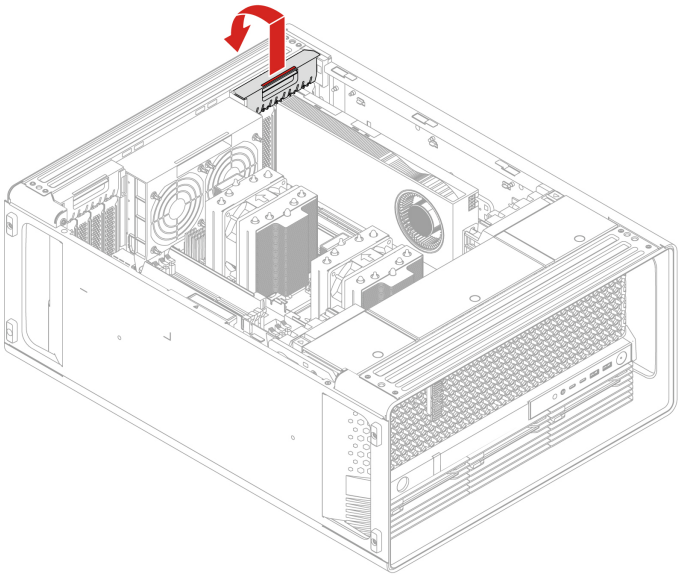


Full-length PCIe card

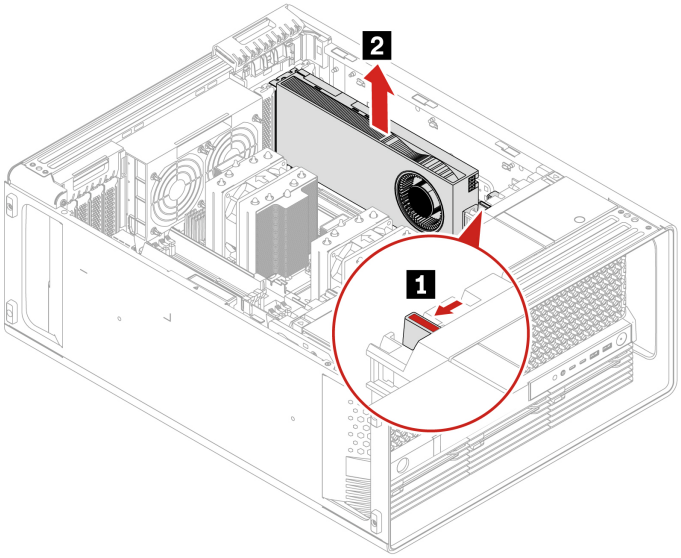
Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
2. Remove the full-length PCIe card.
   a. Open the handle.



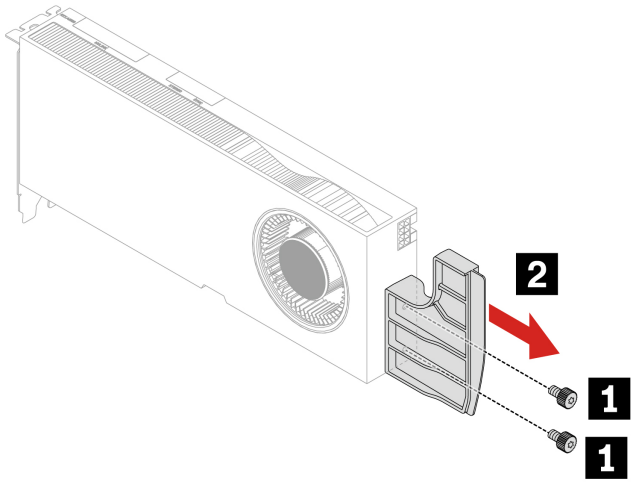
b. Remove the PCIe card. The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.



c. Remove the PCIe card extender if needed.

Notes:

- For computer models with GFX RTX 4000 Ada, the graphics card and the PCIe card extender work as a CRU assembly. Do not try to remove the extender.
- For computer models with double-width or wider graphics cards (such as NVIDIA RTX 6000 Ada and GeForce RTX 4080), the PCIe card extender is a customized CRU part. You can remove it according to the following illustration.
- If you want to install a double-width or wider graphics card, install the customized PCIe card extender first.



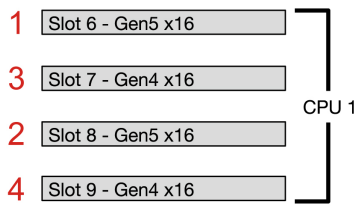
Screw (quantity)	Color	Torque
M3 x 5.5 mm, Nickel coated (2)	Black	5.5 ± 0.5 lb/in

PCIe card installation rule

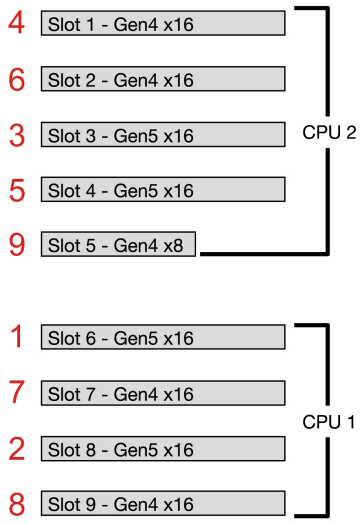
Before installing PCIe card, you need to remove “PCIe card bracket” on page 78.

Install PCIe cards according to the following order and special rules for certain PCIe cards.

- **Installation order**
  - **1 CPU**



  - **2 CPUs**



- **Special installation rules for certain PCIe cards**

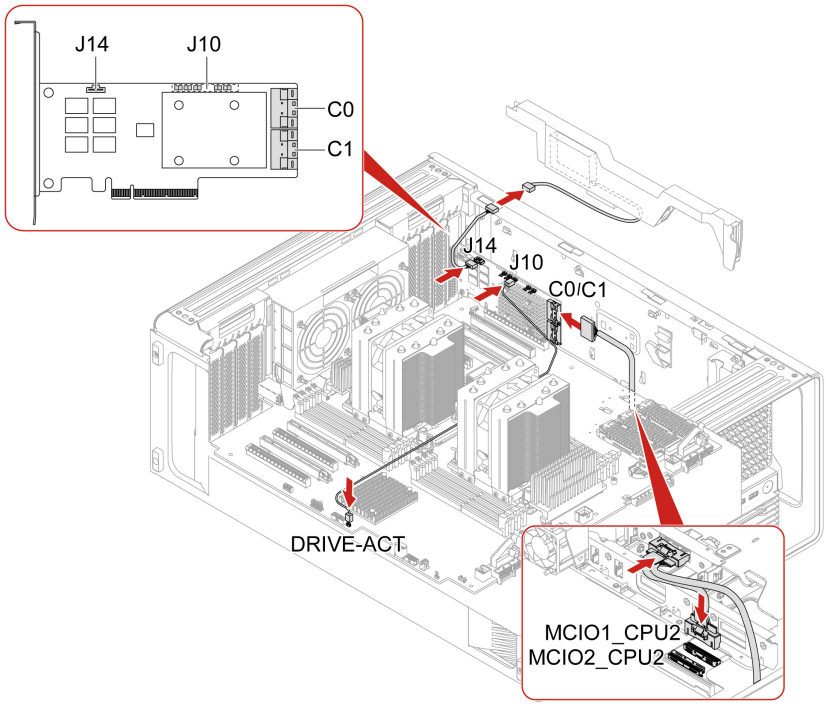
PCIe card	Installation rules
Intel AX210 Wi-Fi card	Install in slot 1.
Thunderbolt card	Install in slot 9.
Gen 5 M.2 SSD PCIe adapter	Install in slot 8, slot 3, and slot 4.
NVIDIA ConnectX-6 Ethernet Adapter card	Do not install in slot 5.
Intel X710-DA2 Ethernet Adapter card	Do not install in slot 5.
Geforce RTX 40X0 graphics card	Do not change its original installation slot.

NVIDIA A800 graphics card	– Ensure that one of the following graphics cards for display is installed.
	  – NVIDIA RTX 4000 Ada
	  – NVIDIA RTX A1000
	  – NVIDIA RTX T1000
	– If the quantity of NVIDIA A800 graphics card is 4, install them in slot 6, slot 8, slot 2, and slot 4.

Graphics card for display – NVIDIA RTX 4000 Ada – NVIDIA RTX A1000 – NVIDIA RTX T1000	– Ensure that at least one NVIDIA A800 graphics card is installed. – If the quantity of NVIDIA A800 graphics card is 1, 2, or 3, install the graphics card for display in slot 6. – If the quantity of NVIDIA A800 graphics card is 4, install the graphics card for display in slot 1.
BMC card (for selected models)	– Install in slot 8. – Ensure that at least one graphics card is installed.

Cable connection

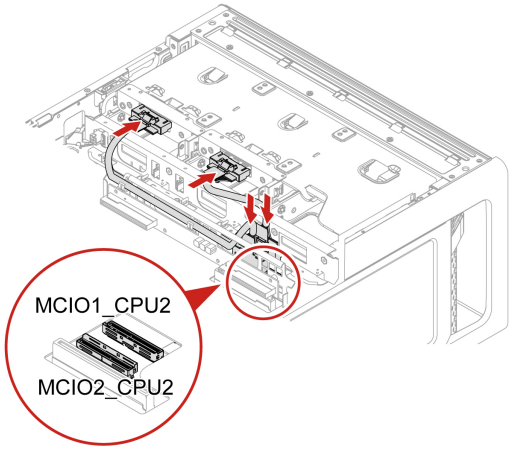
Note: The connectors on the cards or system board might look slightly different from the illustrations.



Notes:

- C0 connector priority is higher than C1 connector.
- MCIO connector 1 priority is higher than MCIO connector 2.
- Front access bay 2+5 priority is higher than front access bay 3+6 .

Figure 3. Cable connection for BCM9560 RAID AIC



Notes:

- MCIO connector 1 priority is higher than MCIO connector 2.
- Front access bay 2+5 priority is higher than front access bay 3+6.

Figure 4. Cable connection for M.2 SSD enclosure

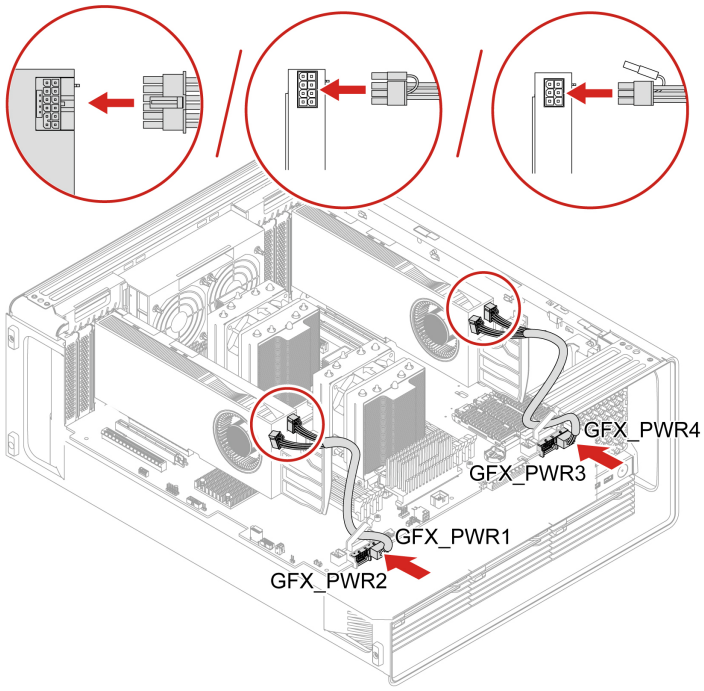


Figure 5. GFX GV100/RTX A5500/RTX A4500/RTX 5000 Ada/RTX 4500 Ada/RTX 4000 Ada Aux power connection

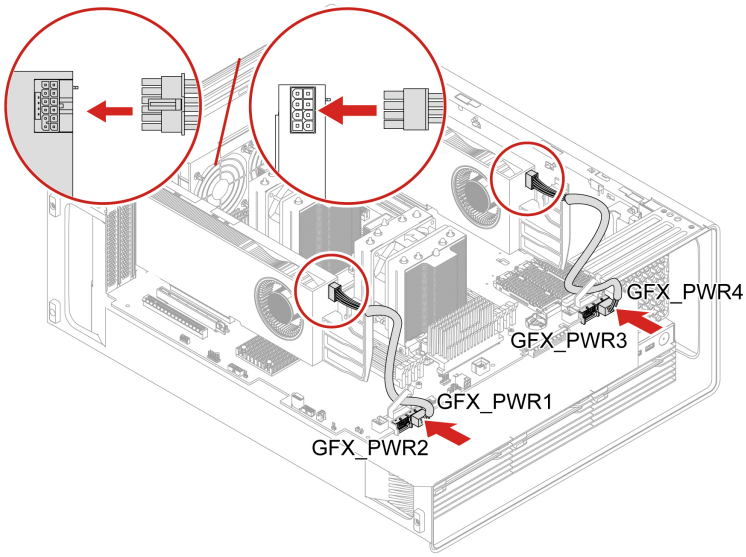
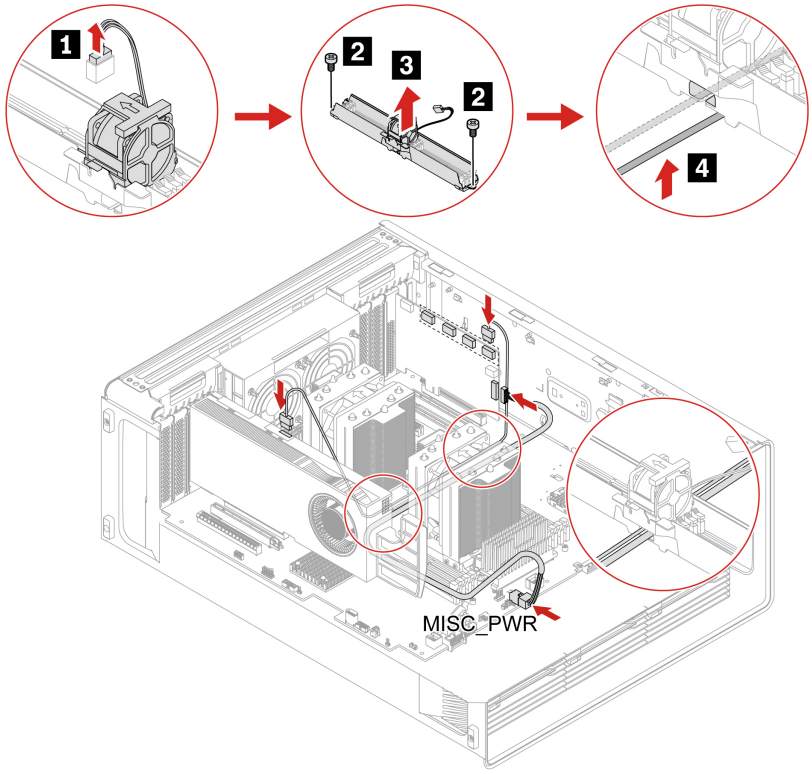


Figure 6. GFX RTX A6000/RTX 6000 Ada Aux power connection



Note: When the NVIDIA Quadro SYNC II card and the graphics card are located in the upper PCIe card area and lower PCIe card area respectively, ensure that you remove the memory fan duct to route the SYNC II card cable and power cable through the cable slot of the memory fan duct as illustrated above.

Figure 7. Cable connection for NVIDIA Quadro SYNC II card

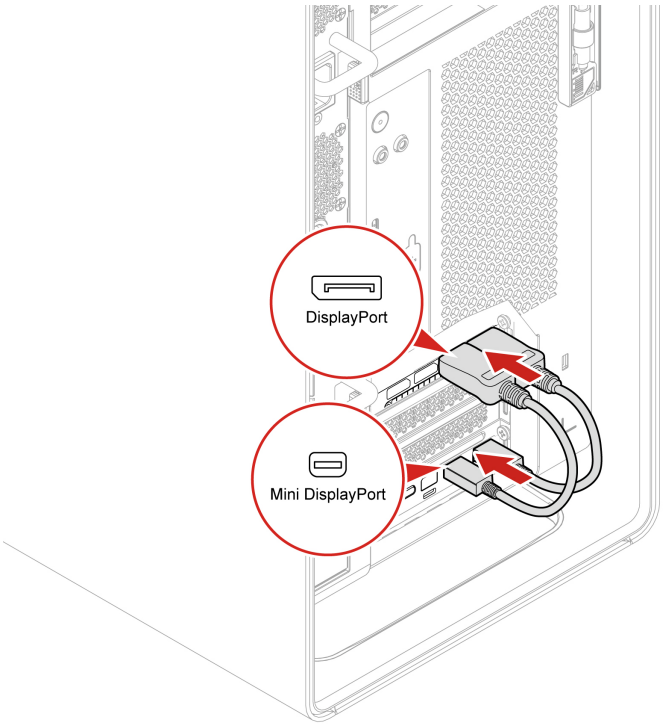


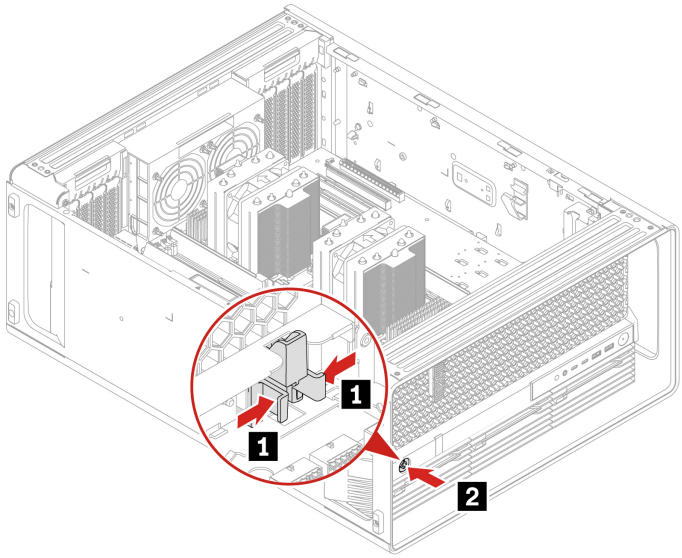
Figure 8. Cable connection for Thunderbolt card

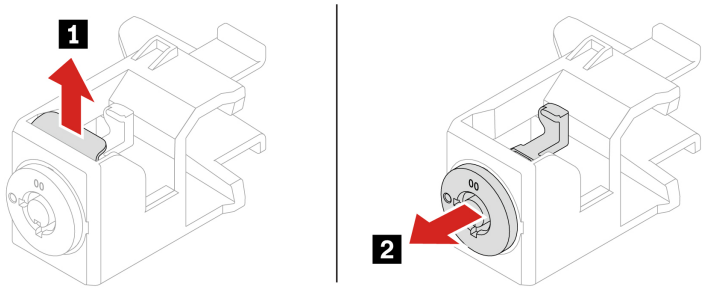
Lock kit for the front access bay

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

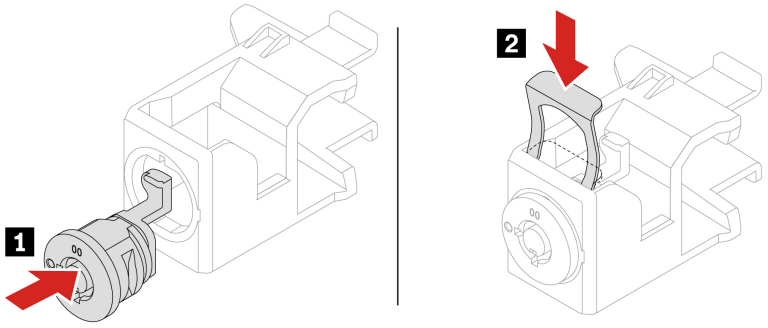
1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
2. Remove the front access bay lock.

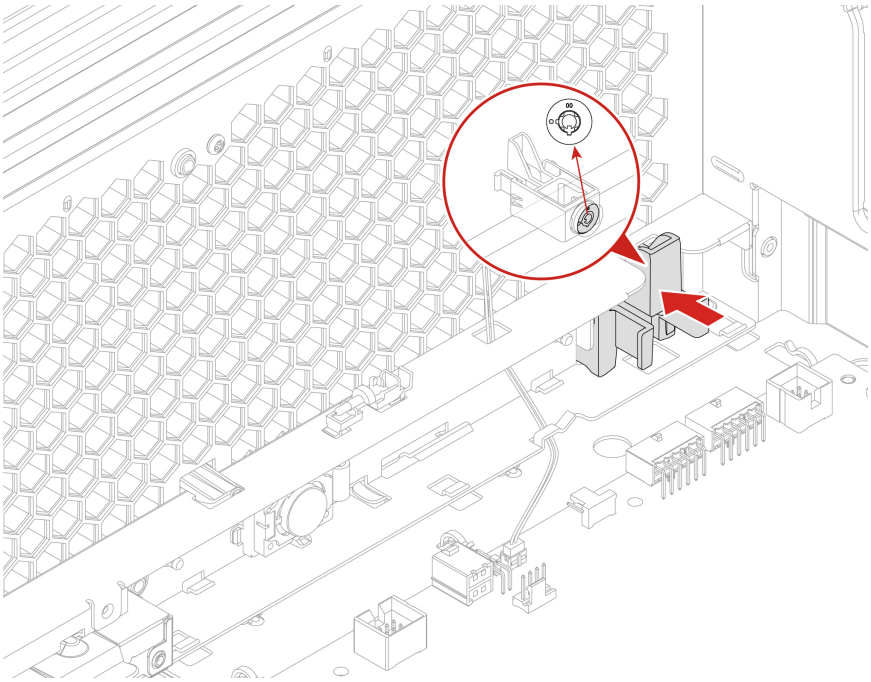




Installation steps

Install the front access bay lock.



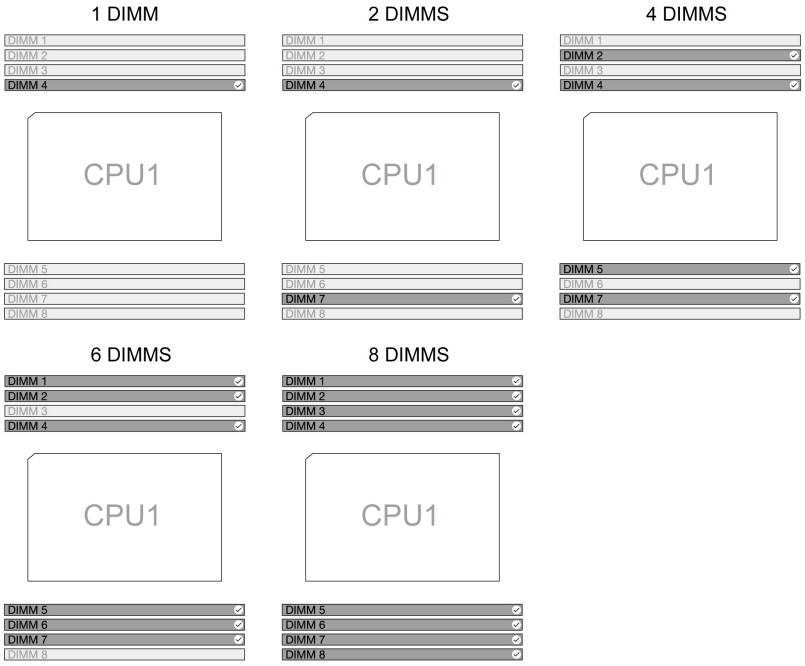


Memory module

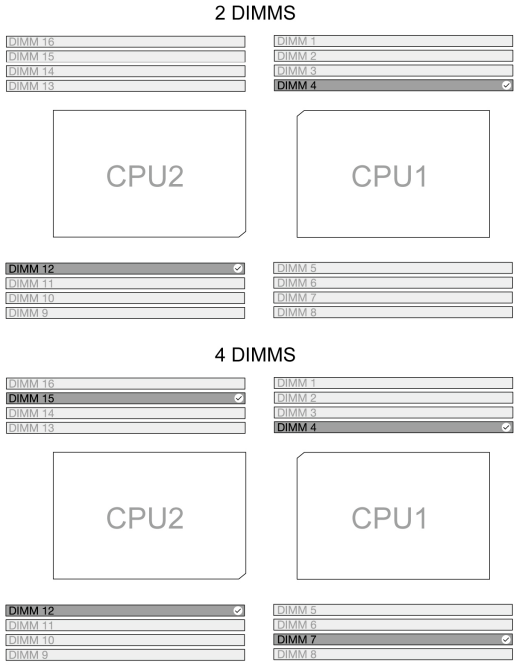
- Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.
- To remove or install the memory module, wait for several seconds after disconnecting power cords from the system according to the following table. It allows the system to be completely discharged of electricity.

Power supply assembly status	Waiting time
Removed	15 seconds
Installed	30 seconds

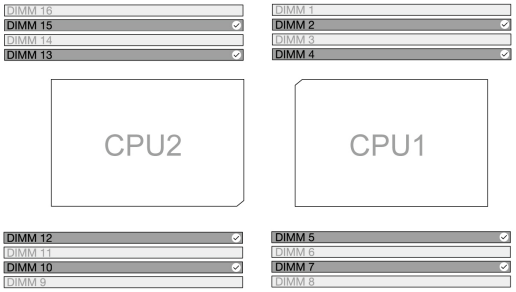
- Ensure that you follow the installation order for memory modules shown in the following illustration.
  - **1 CPU**


1 DIMM
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU1
DIMM 5
DIMM 6
DIMM 7
DIMM 8
2 DIMMS
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU1
DIMM 5
DIMM 6
DIMM 7
DIMM 8
4 DIMMS
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU1
DIMM 5
DIMM 6
DIMM 7
DIMM 8
6 DIMMS
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU1
DIMM 5
DIMM 6
DIMM 7
DIMM 8
8 DIMMS
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU1
DIMM 5
DIMM 6
DIMM 7
DIMM 8

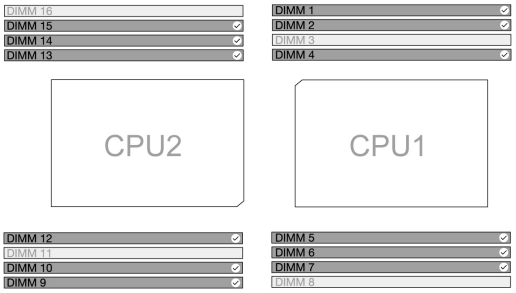
– **2 CPUs**


2 DIMMS
DIMM 16
DIMM 15
DIMM 14
DIMM 13
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU2
CPU1
DIMM 12
DIMM 11
DIMM 10
DIMM 9
DIMM 5
DIMM 6
DIMM 7
DIMM 8
4 DIMMS
DIMM 16
DIMM 15
DIMM 14
DIMM 13
DIMM 1
DIMM 2
DIMM 3
DIMM 4
CPU2
CPU1
DIMM 12
DIMM 11
DIMM 10
DIMM 9
DIMM 5
DIMM 6
DIMM 7
DIMM 8

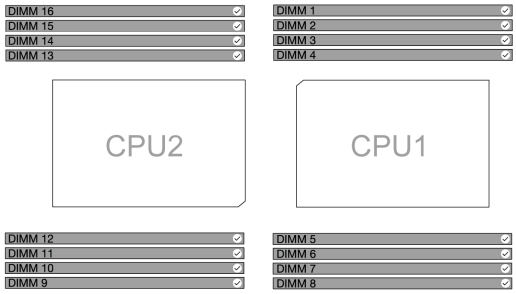
8 DIMMS



12 DIMMS

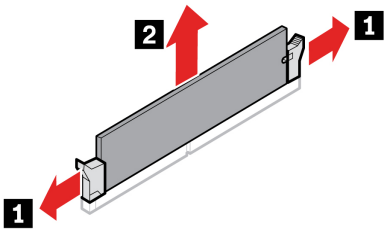


16 DIMMS



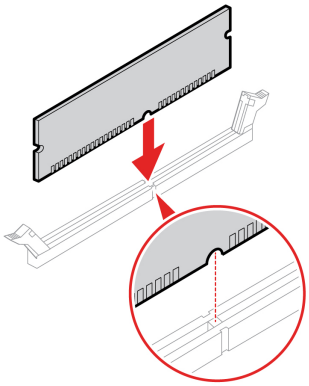
Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
   e. “Rear fan assembly” on page 60.
   f. “Memory fan” on page 61.
2. Remove the memory module.



Installation steps

Install the memory module.

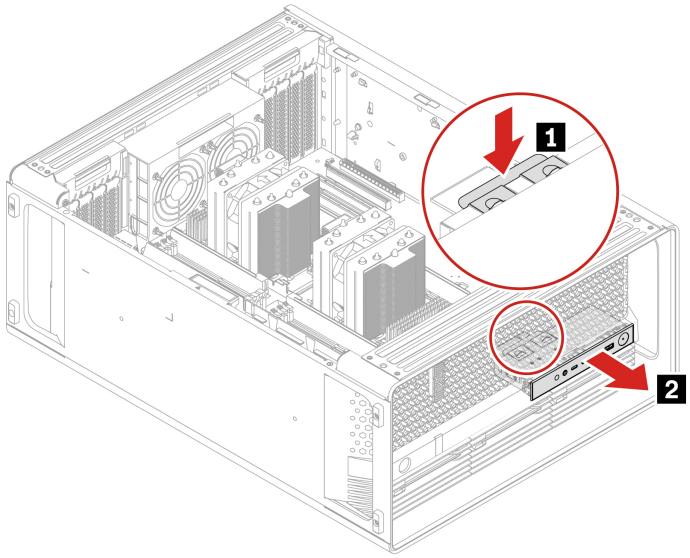


Front panel IO assembly

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
2. Remove the front panel IO assembly.

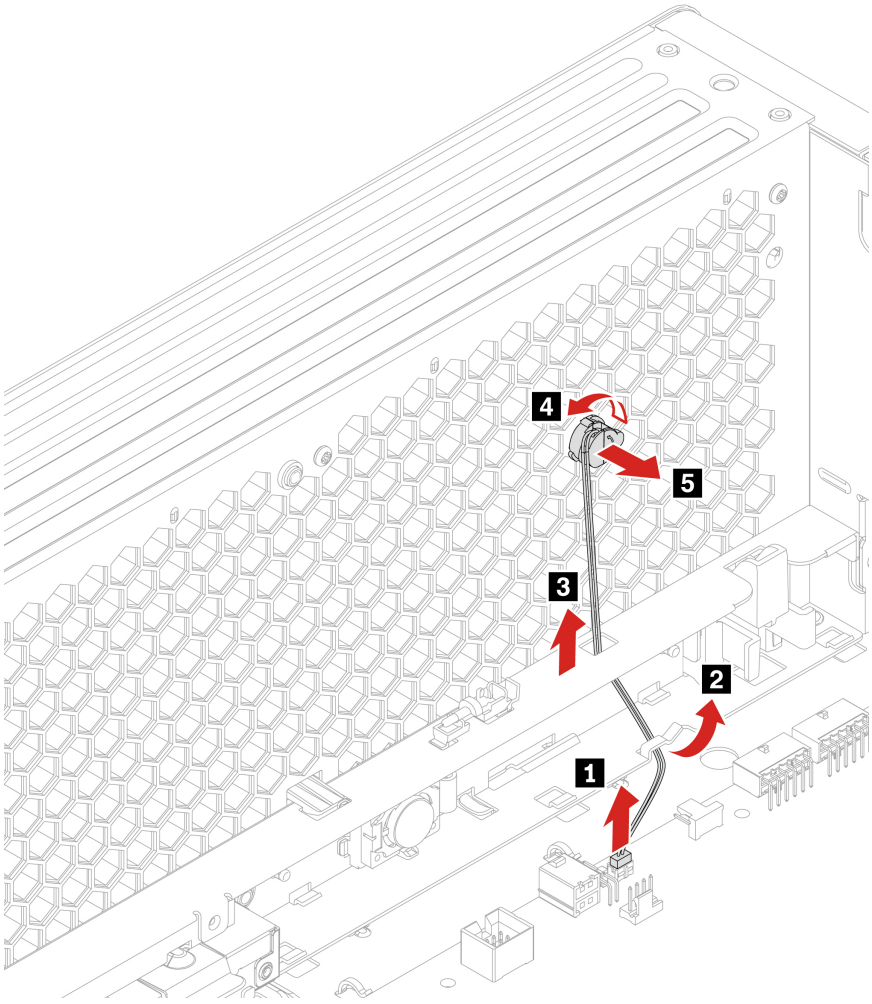


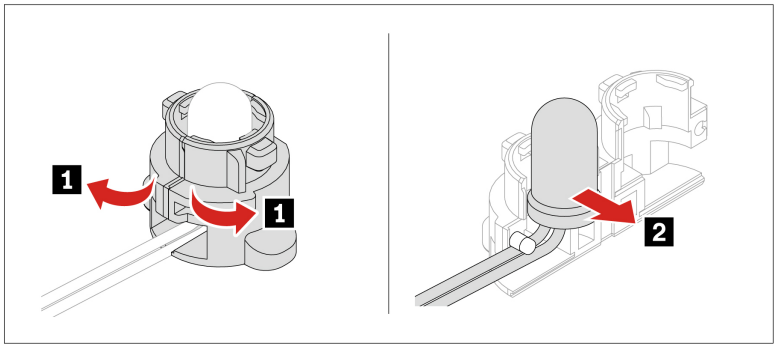
Think LED holder and cable

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “Left side cover” on page 49.
   b. “CPU duct” on page 57.
   c. “Front fan assembly” on page 58.
   d. “Front fan bracket” on page 59.
2. Remove the Think LED holder and cable.





Power distribution board and bracket

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

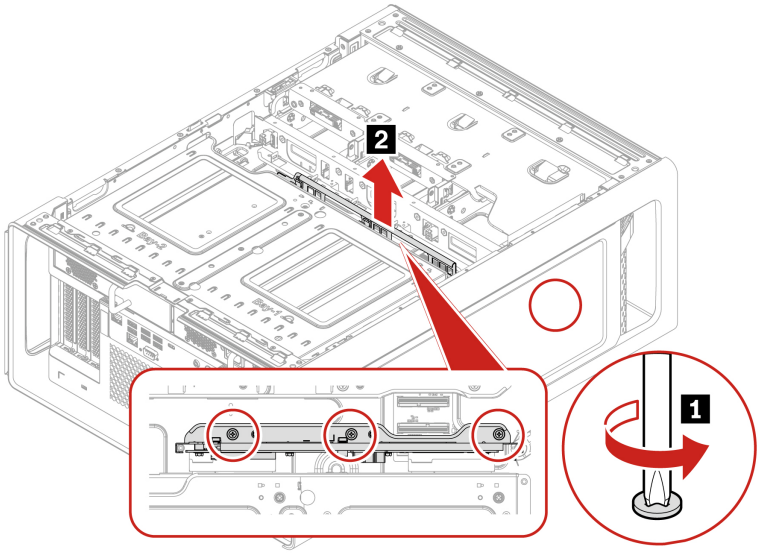
Removal steps

1. Remove the following parts, if any:
   a. “Power supply assembly” on page 47.

b. “Left side cover” on page 49.
c. “Right side cover” on page 54.
d. “HDD in the PSU bay storage enclosure” on page 64.

2. Loosen the three screws to remove the power distribution board and bracket.

Note: The three screws cannot be removed from the power distribution board bracket.



Screw (quantity)	Color	Torque
6-32*3.8 mm, Zn coated (3)	Blue	3.0 ± 0.5 lb/in

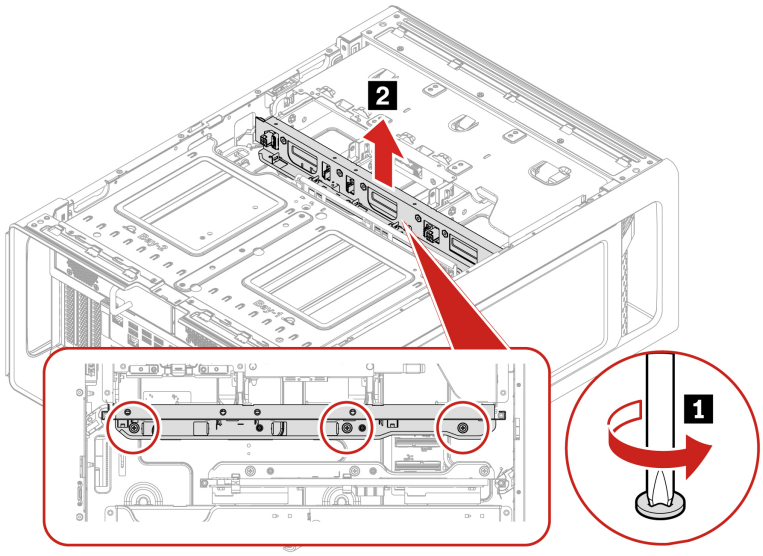
BCB board and bracket

Before you start, ensure that you have read “Prerequisites for hardware replacement” on page 44.

Removal steps

1. Remove the following parts, if any:
   a. “HDD in the front access bay” on page 62 and “M.2 SSD in the front access bay” on page 66.
   b. “Left side cover” on page 49.
   c. “Right side cover” on page 54.
   d. “Storage fan assembly” on page 61.
2. Loosen the three screws to remove the BCB board and bracket.

Note: The three screws cannot be removed from the BCB board bracket.



Screw (quantity)	Color	Torque
6-32*3.8 mm, Zn coated (3)	Blue	3.0 ± 0.5 lb/in

Chapter 6. Help and support

Self-help resources

Use the following self-help resources to learn more about the computer and troubleshoot problems.

Resources	How to access?
Troubleshooting and frequently asked questions	• https://www.lenovo.com/tips • https://forums.lenovo.com
Accessibility information	https://www.lenovo.com/accessibility
Reset or restore Windows	• Use Lenovo recovery options. 1. Go to https://support.lenovo.com/HowToCreateLenovoRecovery. 2. Follow the on-screen instructions. • Use Windows recovery options. 1. Go to https://pcsupport.lenovo.com. 2. Detect your computer or manually select your computer model. 3. Navigate to the troubleshooting menu to diagnose the operating system for recovery instructions.
Use the Vantage app to: • Configure device settings. • Download and install UEFI BIOS, drivers and firmware updates. • Secure you computer from outside threats. • Diagnose hardware problems. • Check the computer warranty status. • Access *User Guide* and helpful articles. **Note:** The available features vary depending on the computer model.	Type `Vantage` in the Windows search box.
Product documentation: • *Safety and Warranty Guide* • *Generic Safety and Compliance Notices* • *Setup Guide* • This *User Guide* • *Regulatory Notice*	Go to https://pcsupport.lenovo.com. Then, follow the on-screen instructions to filter out the documentation you want.

Resources	How to access?
Lenovo Support Web site with the latest support information of the following: • Drivers and software • Diagnostic solutions • Product and service warranty • Product and parts details • Knowledge base and frequently asked questions	https://pcsupport.lenovo.com
Windows help information	• Type `Get Help` or `Tips` in the Windows search box. • Use Windows Search. • Microsoft support Web site: https://support.microsoft.com

Call Lenovo

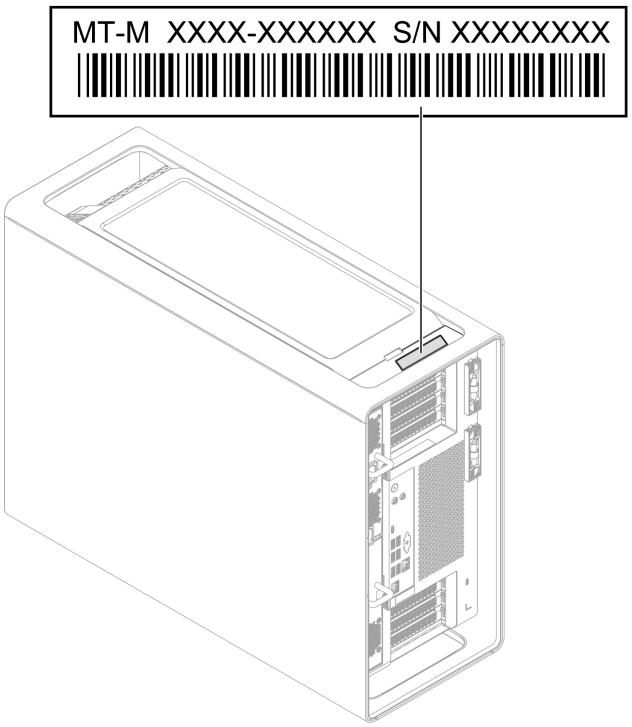
If you have tried to correct the problem yourself and still need help, you can call Lenovo Customer Support Center.

Before you contact Lenovo

Prepare the following before you contact Lenovo:

1. Record the problem symptoms and details:
   - What is the problem? Is it continuous or intermittent?
   - Any error message or error code?
   - What operating system are you using? Which version?
   - Which software applications were running at the time of the problem?
   - Can the problem be reproduced? If so, how?
2. Record the system information:
   - Product name
   - Machine type and serial number

The following illustration shows where to find the machine type and serial number of your computer.



Lenovo Customer Support Center

During the warranty period, you can call Lenovo Customer Support Center for help.

Telephone numbers

For a list of the Lenovo Support phone numbers for your country or region, go to: https://pcsupport.lenovo.com/supportphonelist

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

Certification-related information

Product name: ThinkStation PX

Machine types: 30EU, 30EV, and 30EY

Further compliance information related to your product is available at https://www.lenovo.com/compliance.

Compliance information

For more compliance information, refer to *Regulatory Notice* at https://pcsupport.lenovo.com and *Generic Safety and Compliance Notices* at https://pcsupport.lenovo.com/docs/generic_notices.

Purchase accessories

Lenovo has a number of hardware accessories and upgrades to help expand the capabilities of your computer. Options include memory modules, storage devices, network cards, power adapters, keyboards, mice, and more.

To shop at Lenovo, go to https://www.lenovo.com/accessories.

Purchase additional services

During and after the warranty period, you can purchase additional services from Lenovo at: https://pcsupport.lenovo.com/warrantyupgrade

Service availability and service name might vary by country or region.

Appendix A. Notices and trademarks

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https://pcsupport.lenovo.com

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