OptiPlex 5000 Small Form Factor

Service Manual

Regulatory Model: D17S
Regulatory Type: D17S002
November 2024
Rev. A03

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

Working inside your computer

Safety instructions

Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure in this document assumes that you have read the safety information that shipped with your computer.

WARNING: Before working inside your computer, read the safety information that is shipped with your computer. For more safety best practices, see Dell Regulatory Compliance Home Page.

WARNING: Disconnect your computer from all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting your computer to an electrical outlet.

CAUTION: To avoid damaging the computer, ensure that the work surface is flat, dry, and clean.

CAUTION: You should only perform troubleshooting and repairs as authorized or directed by the Dell technical support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. See the safety instructions that are shipped with the product or at Dell Regulatory Compliance Home Page.

CAUTION: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity which could harm internal components.

CAUTION: To avoid damaging the components and cards, handle them by their edges, and avoid touching the pins and the contacts.

CAUTION: When you disconnect a cable, pull it by its connector or its pull tab, not the cable itself. Some cables have connectors with locking tabs or thumbscrews that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending the connector pins. When connecting cables, ensure that the connector on the cable is correctly oriented and aligned with the port.

CAUTION: Press and eject any installed card from the media-card reader.

CAUTION: Exercise caution when handling rechargeable Li-ion batteries in laptops. Swollen batteries should not be used and should be replaced and disposed properly.

Before working inside your computer

About this task

NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Steps

1. Save and close all open files and exit all open applications.
2. Shut down your computer. Click **Start** > **Power** > **Shut down**.

   NOTE: If you are using a different operating system, see the documentation of your operating system for shut-down instructions.
3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.

CAUTION: To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

5. Remove any media card and optical disc from your computer, if applicable.

Safety precautions

This section details the primary steps to be followed before performing any disassembly instructions.

Observe the following safety precautions before you perform any installation or break-fix procedures involving disassembly or reassembly:

- Turn off the computer and all attached peripherals.
- Disconnect the computer from AC power.
- Disconnect all network cables and peripherals from the computer.
- Use an ESD field service kit when working inside any desktop to avoid electrostatic discharge (ESD) damage.
- Place the removed component on an anti-static mat after removing it from the computer.
- Wear shoes with nonconductive rubber soles to reduce the chance of getting electrocuted.
- Unplugging, pressing, and holding the power button for 15 seconds should discharge residual power in the system board.

Standby power

Dell products with standby power must be unplugged before you open the back cover. Systems that are equipped with standby power are powered while turned off. The internal power enables the computer to be remotely turned on (Wake-on-LAN) and suspended into a sleep mode and has other advanced power management features.

Bonding

Bonding is a method for connecting two or more grounding conductors to the same electrical potential. This is done by using a field service electrostatic discharge (ESD) kit. When connecting a bonding wire, ensure that it is connected to bare metal and never to a painted or nonmetal surface. Ensure that the wrist strap is secure and in full contact with your skin. Remove all jewelry, watches, bracelets, or rings before grounding yourself and the equipment.

Electrostatic discharge—ESD protection

ESD is a major concern when you handle electronic components, especially sensitive components such as expansion cards, processors, memory modules, and system boards. A slight charge can damage circuits in ways that may not be obvious, such as intermittent problems or a shortened product life span. As the industry pushes for lower power requirements and increased density, ESD protection is an increasing concern.

Two recognized types of ESD damage are catastrophic and intermittent failures.

- **Catastrophic** – Catastrophic failures represent approximately 20 percent of ESD-related failures. The damage causes an immediate and complete loss of device functionality. An example of catastrophic failure is a memory module that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code that is emitted for missing or nonfunctional memory.
- **Intermittent** – Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable. The memory module receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms that are related to the damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity, intermittent memory errors, and so on.

Intermittent failures that are also called latent or "walking wounded" are difficult to detect and troubleshoot.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. Wireless anti-static straps do not provide adequate protection. Touching the chassis before handling parts does not ensure adequate ESD protection on parts with increased sensitivity to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, use the anti-

static wrist strap to discharge the static electricity from your body. For more information about the wrist strap and ESD wrist strap tester, see Components of an ESD Field Service Kit.

- Before transporting a static-sensitive component, place it in an anti-static container or packaging.

ESD Field Service kit

The unmonitored field service kit is the most commonly used service kit. Each Field Service kit includes three main components: anti-static mat, wrist strap, and bonding wire.

CAUTION: It is critical to keep ESD-sensitive devices away from internal parts that are insulated and often highly charged, such as plastic heat sink casings.

Working Environment

Before deploying the ESD Field Service kit, assess the situation at the customer location. For example, deploying the kit for a server environment is different than for a desktop or laptop environment. Servers are typically installed in a rack within a data center; desktops or laptops are typically placed on office desks or cubicles. Always look for a large open flat work area that is free of clutter and large enough to deploy the ESD kit with additional space to accommodate the type of computer that is being repaired. The workspace should also be free of insulators that can cause an ESD event. On the work area, insulators such as styrofoam and other plastics should always be moved at least 12 inches or 30 centimeters away from sensitive parts before physically handling any hardware components.

ESD Packaging

All ESD-sensitive devices must be shipped and received in static-safe packaging. Metal, static-shielded bags are preferred. However, you should always return the damaged component using the same ESD bag and packaging that the new part arrived in. The ESD bag should be folded over and taped shut and all the same foam packing material should be used in the original box that the new part arrived in. ESD-sensitive devices should be removed from packaging only at an ESD-protected work surface, and parts should never be placed on top of the ESD bag because only the inside of the bag is shielded. Always place parts in your hand, on the anti-static mat, in the computer, or inside an ESD bag.

Components of an ESD Field Service kit

The components of an ESD Field Service kit are:

- **Anti-Static Mat** – The anti-static mat is dissipative and parts can be placed on it during service procedures. When using an anti-static mat, your wrist strap should be snug and the bonding wire should be connected to the anti-static mat and to any bare metal on the computer being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the anti-static mat. ESD-sensitive items are safe in your hand, on the anti-static mat, in the computer, or inside an ESD bag.
- **Wrist Strap and Bonding Wire** – The wrist strap and bonding wire can be either directly connected between your wrist and bare metal on the hardware if the anti-static mat is not required, or connect to the anti-static mat to protect hardware that is temporarily placed on the mat. The physical connection of the wrist strap and bonding wire between your skin, the anti-static mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, anti-static mat, and bonding wire. Never use wireless wrist straps. Always be cautious that the internal wires of a wrist strap are prone to damage from normal wear and tear, and must be checked regularly with a wrist strap tester in order to avoid accidental ESD hardware damage. It is recommended to test the wrist strap and bonding wire at least once per week.
- **ESD Wrist Strap Tester** – The wires inside an ESD strap are prone to damage over time. When using an unmonitored kit, it is a best practice to regularly test the strap prior to each service, and at a minimum, test once per week. A wrist strap tester is the best method for doing this test. To perform the test, plug the bonding-wire of the wrist-strap into the tester while it is strapped to your wrist and push the button to test. A green LED is lit if the test is successful; a red LED is lit and an alarm sounds if the test fails.

NOTE: It is recommended to always use the traditional wired ESD grounding wrist strap and protective anti-static mat when servicing Dell products. In addition, it is critical to keep sensitive parts separate from all insulator parts while servicing the computer.

Transporting sensitive components

When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

Lifting equipment

Adhere to the following guidelines when lifting heavy equipment:

CAUTION: Do not lift greater than 50 pounds. Always obtain additional resources or use a mechanical lifting device.

1. Get a firm balanced footing. Keep your feet apart for a stable base, and point your toes out.
2. Tighten stomach muscles. Abdominal muscles support your spine when you lift, offsetting the force of the load.
3. Lift with your legs, not your back.
4. Keep the load close. The closer it is to your spine, the less force it exerts on your back.
5. Keep your back upright, whether lifting or setting down the load. Do not add the weight of your body to the load. Avoid twisting your body and back.
6. Follow the same technique in reverse to set the load down.

After working inside your computer

About this task

CAUTION: Leaving stray or loose screws inside your computer may severely damage your computer.

Steps

1. Replace all screws and ensure that no stray screws remain inside your computer.
2. Connect any external devices, peripherals, or cables you removed before working on your computer.
3. Replace any media cards, discs, or any other parts that you removed before working on your computer.
4. Connect your computer and all attached devices to their electrical outlets.
5. Turn on your computer.

2

Removing and installing components

NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Recommended tools

The procedures in this document may require the following tools:

- Phillips screwdriver #0
- Phillips screwdriver #1
- Torx #5 (T5) screwdriver
- Plastic scribe
- M8 slim-type wrench

Screw list

NOTE: When removing screws from a component, it is recommended to note the screw type and the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.

NOTE: Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surfaces when replacing a component.

NOTE: Screw color may vary depending on the configuration ordered.

Table 1. Screw list

Component	Screw type	Quantity	Screw image
Solid-state drive	M2x3	1	
Hard-drive and optical-drive supporting bracket	#6-32	2	
SD-card reader	M3x5	1	
WLAN card	M2x3	1	
WLAN antenna	M3x3	2	
Fan assembly	M3	3	
Processor heat-sink assembly	Captive	4	

Table 1. Screw list (continued)

Component	Screw type	Quantity	Screw image
Voltage-regulator heat-sink	Captive	4	
Power-supply unit	#6-32	3	
Optional I/O module (VGA/ HDMI/DP/USB Type-C)	M3x3	2	
Front I/O bracket	#6-32	1	
System board	#6-32	4	

Customer Replaceable Units (CRUs) and Field Replaceable Units (FRUs) list

Table 2. CRU/FRU list

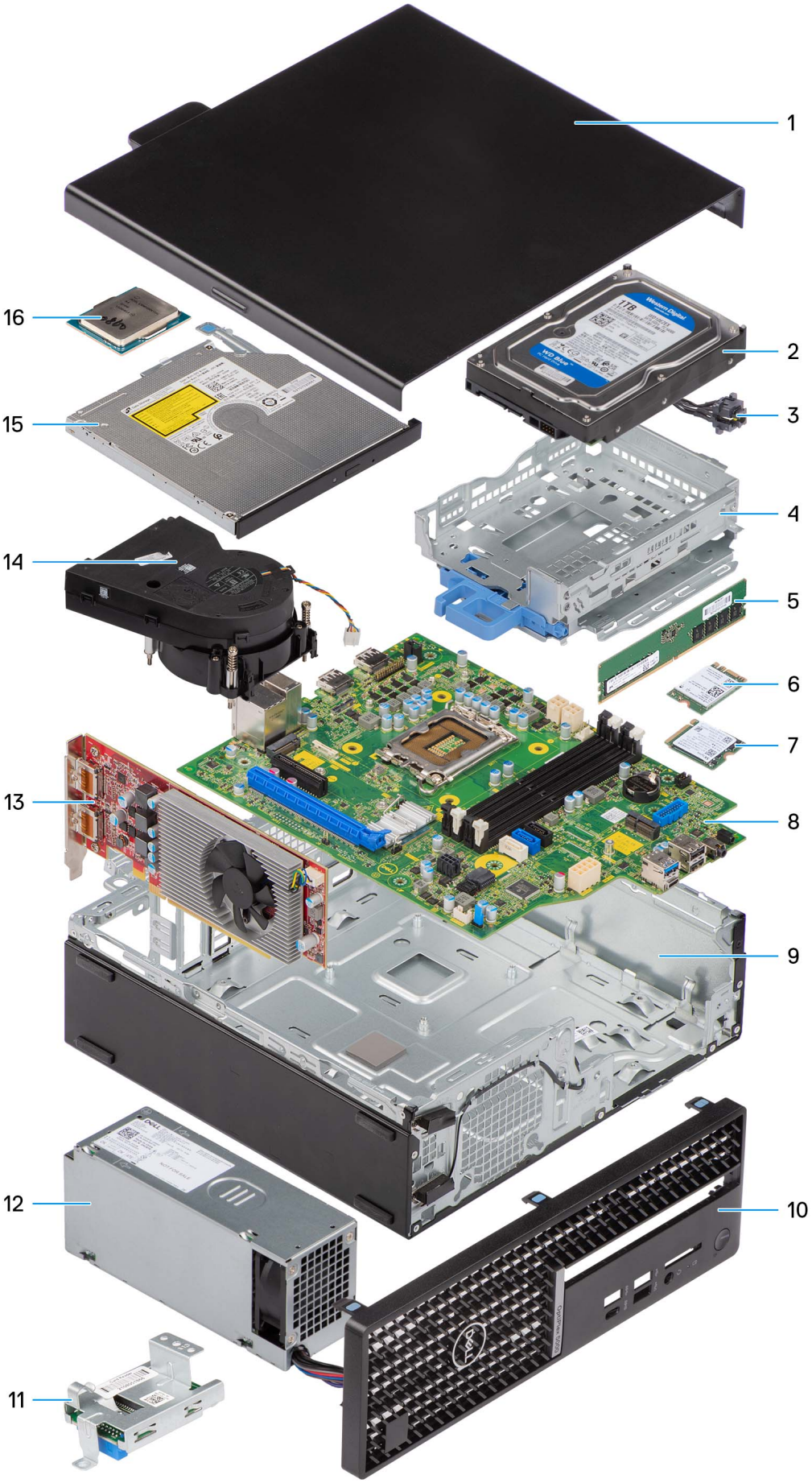
OptiPlex 5000 Small Form Factor	CRU component	FRU component
Side cover	✓	✗
Front bezel	✓	✗
Intrusion switch	✓	✗
2.5-inch hard drive	✓	✗
3.5-inch hard drive	✓	✗
Optical drive	✓	✗
Hard-drive and optical-drive bracket	✓	✗
Supporting bracket	✓	✗
M.2 Solid-state drive	✓	✗

Table 2. CRU/FRU list (continued)

OptiPlex 5000 Small Form Factor	CRU component	FRU component
WLAN card	✓	✗
Memory module	✓	✗
Expansion card	✓	✗
Fan assembly	✓	✗
Processor heat-sink assembly	✗	✓
SD-card reader	✗	✓
Optional I/O module (PS2/Serial)	✗	✓
Coin-cell battery	✗	✓
Chassis fan	✗	✓
Speaker	✗	✓
VR heat-sink	✗	✓
Power button	✗	✓
Power supply unit	✗	✓
Processor	✗	✓
System board	✗	✓

Major components of OptiPlex 5000 Small Form Factor

The following image shows the major components of OptiPlex 5000 Small Form Factor.


1
2
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16

1. Side cover
2. Hard-drive assembly
3. Power button
4. Hard-drive and optical-drive bracket
5. Memory module
6. WLAN card
7. M.2 Solid-state drive
8. System board
9. Chassis
10. Front bezel
11. SD-card reader
12. Power supply unit
13. Expansion card
14. Processor heat-sink assembly
15. Optical drive
16. Processor

NOTE: Dell provides a list of components and their part numbers for the original system configuration purchased. These parts are available according to warranty coverages purchased by the customer. Contact your Dell sales representative for purchase options.

Side cover

Removing the side cover

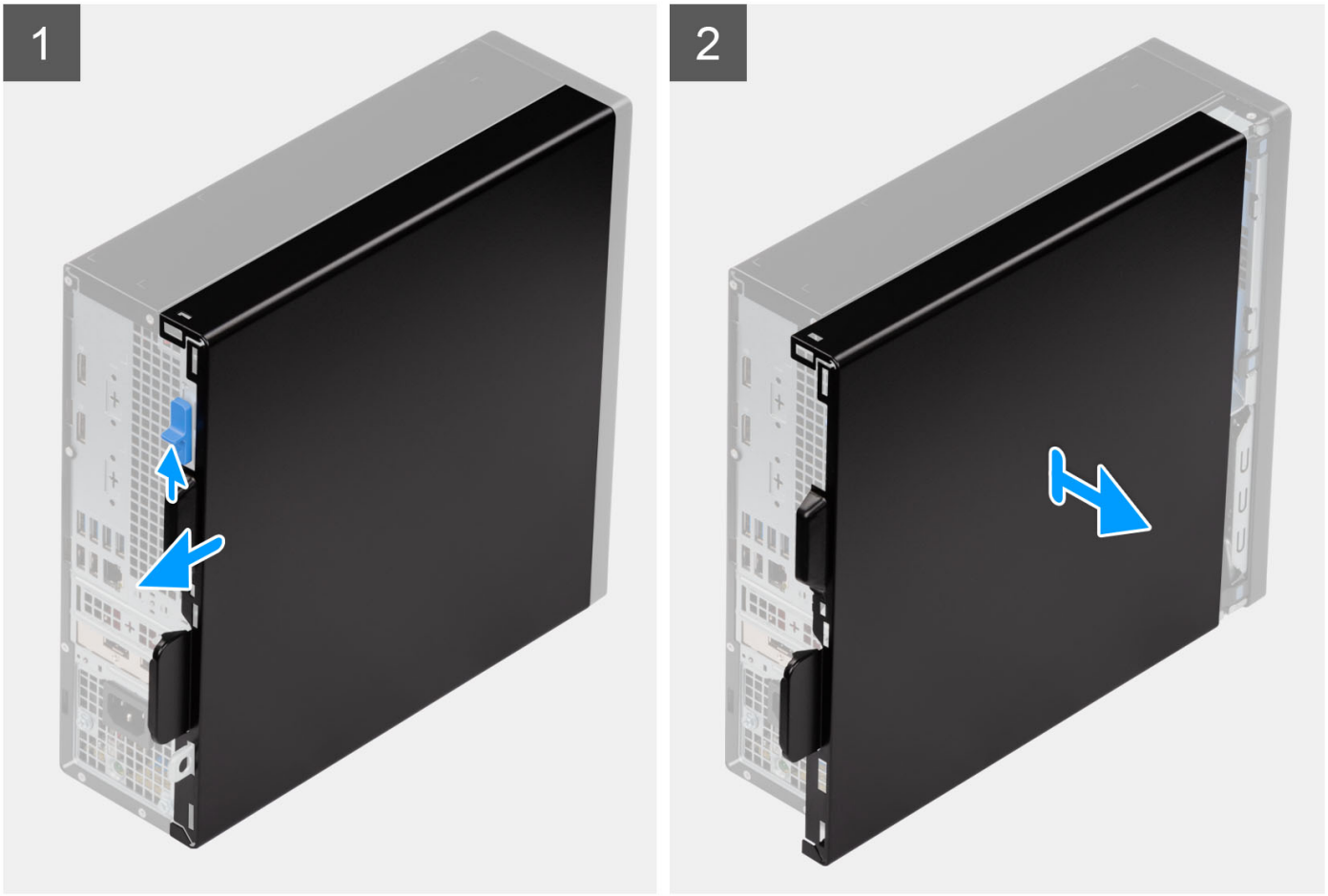
Prerequisites

1. Follow the procedure in before working inside your computer.

NOTE: Ensure that you remove the security cable from the security-cable slot (if applicable).

About this task

The following images indicate the location of the side cover and provide a visual representation of the removal procedure.



Steps

1. Slide the release latch until your hear a click and slide the side cover towards the back of the computer.
2. Lift the side cover from the chassis.

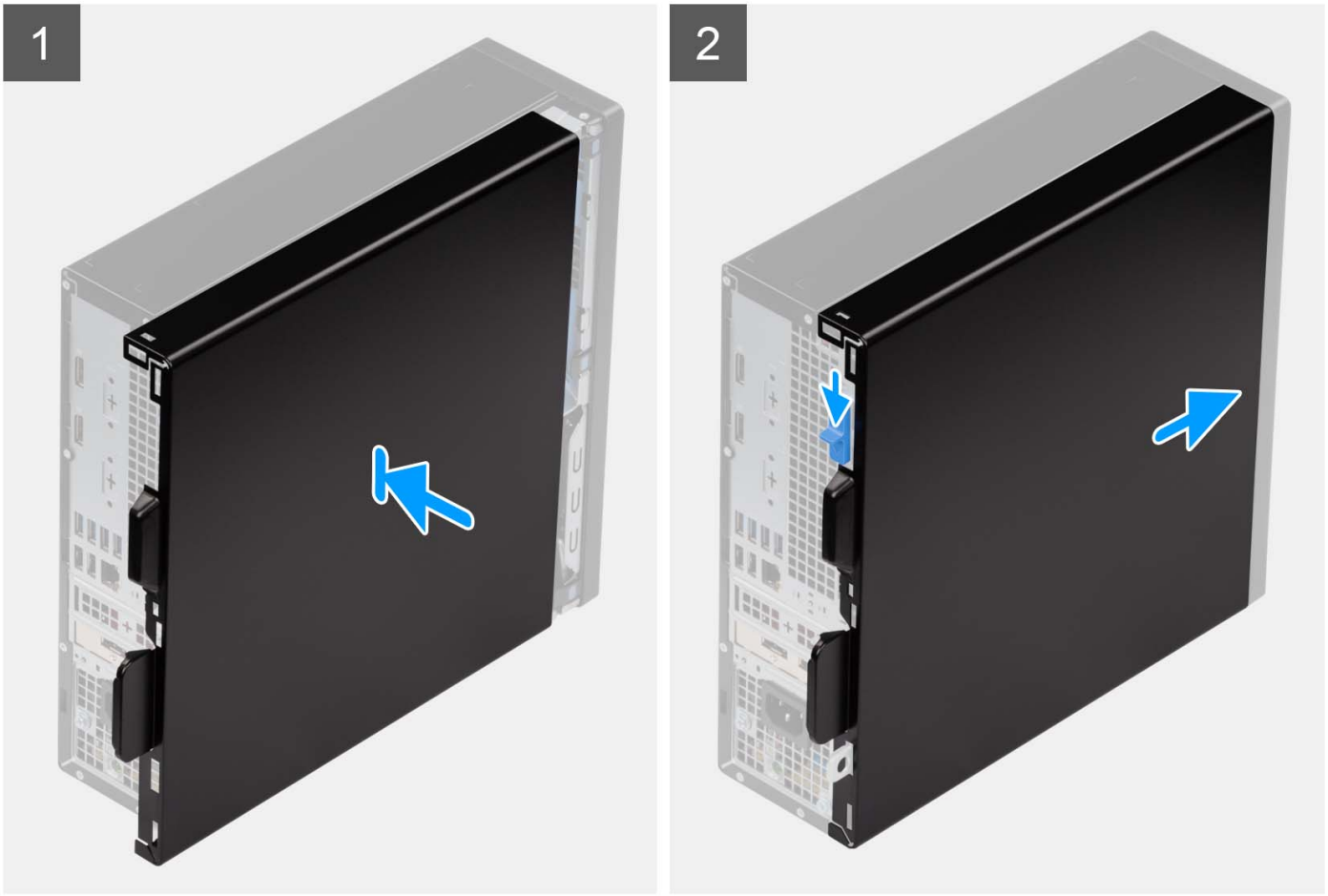
Installing the side cover

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicates the location of the side cover and provide a visual representation of the installation procedure.



Steps

1. Align the tabs on the side cover with the slots on the chassis.
2. Slide the side cover towards the front of the computer until you hear the release latch click.

Next steps

1. Follow the procedure in after working inside your computer.

Front bezel

Removing the front bezel

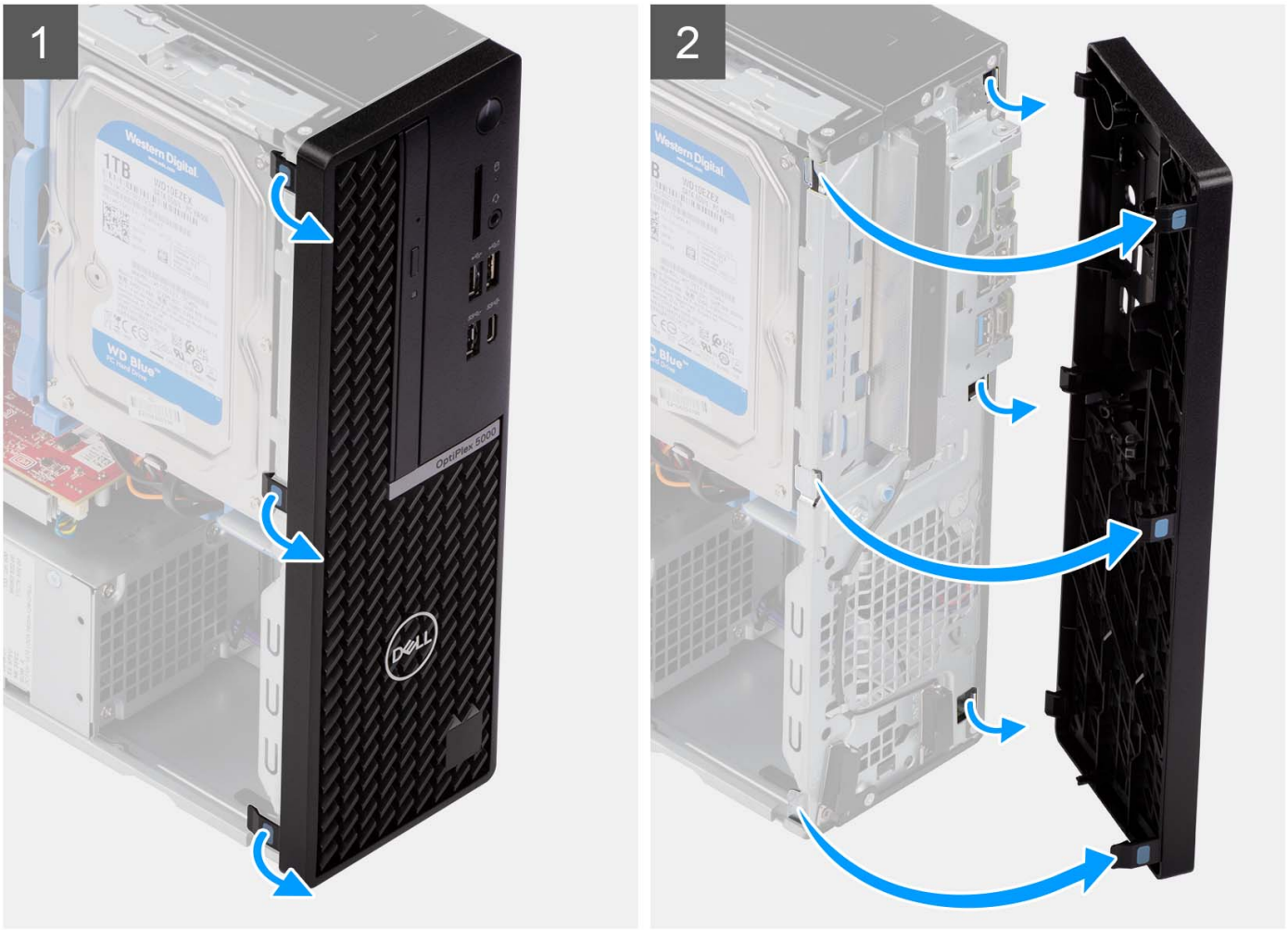
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

About this task

The following images indicate the location of the front bezel and provide a visual representation of the removal procedure.





Steps

1. Gently pry and release the front-bezel tabs sequentially from the top.
2. Rotate the front bezel outwards, away from the chassis, and remove the front bezel.

Installing the front bezel

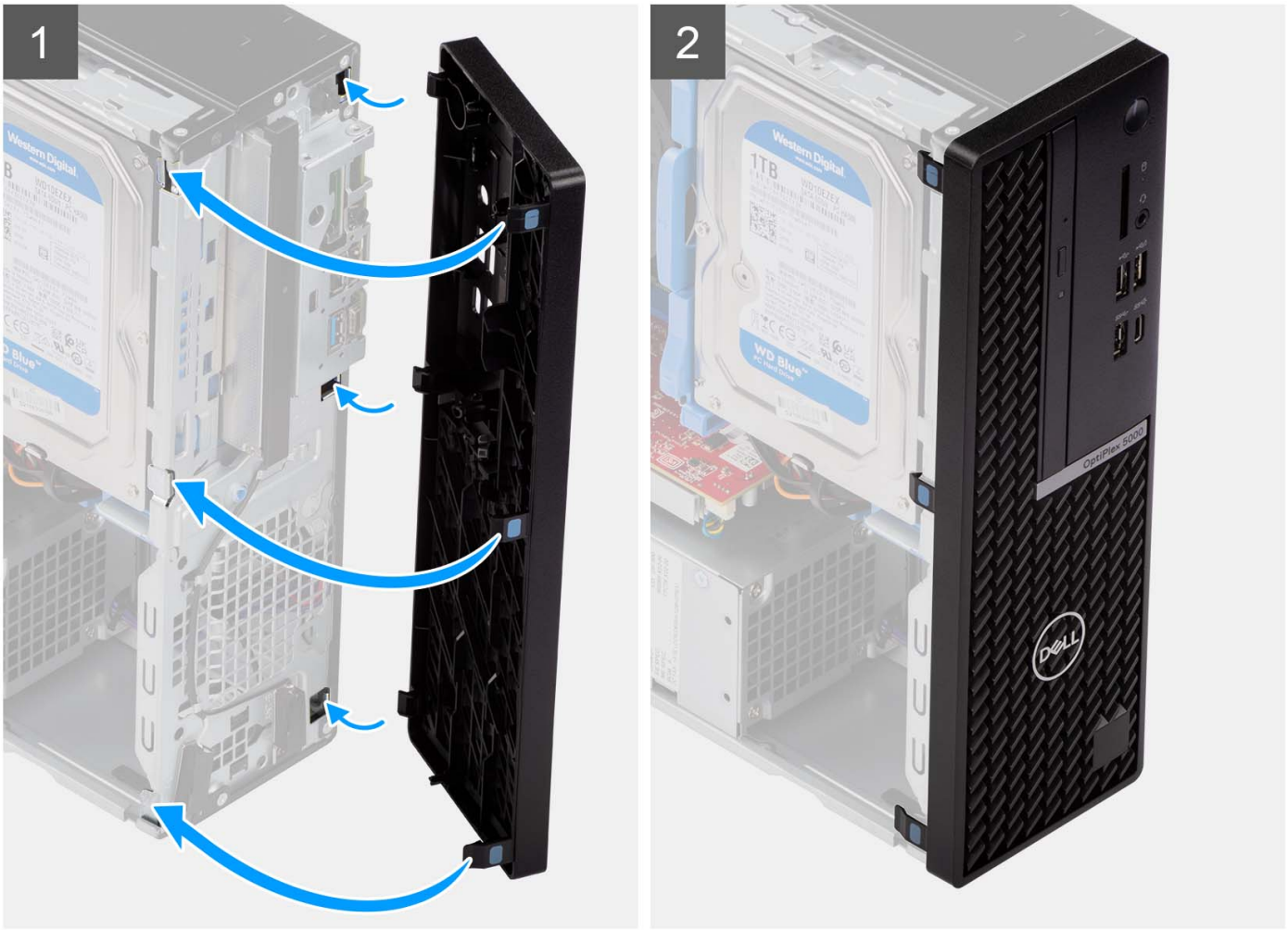
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicates the location of the front bezel and provide a visual representation of the installation procedure.





Steps

1. Align and insert the front-bezel tabs with the slots on the chassis.
2. Rotate the front bezel towards the chassis and snap it into place.

Next steps

1. Install the side cover.
2. Follow the procedure in after working inside your computer.

Intrusion switch

Removing the intrusion switch

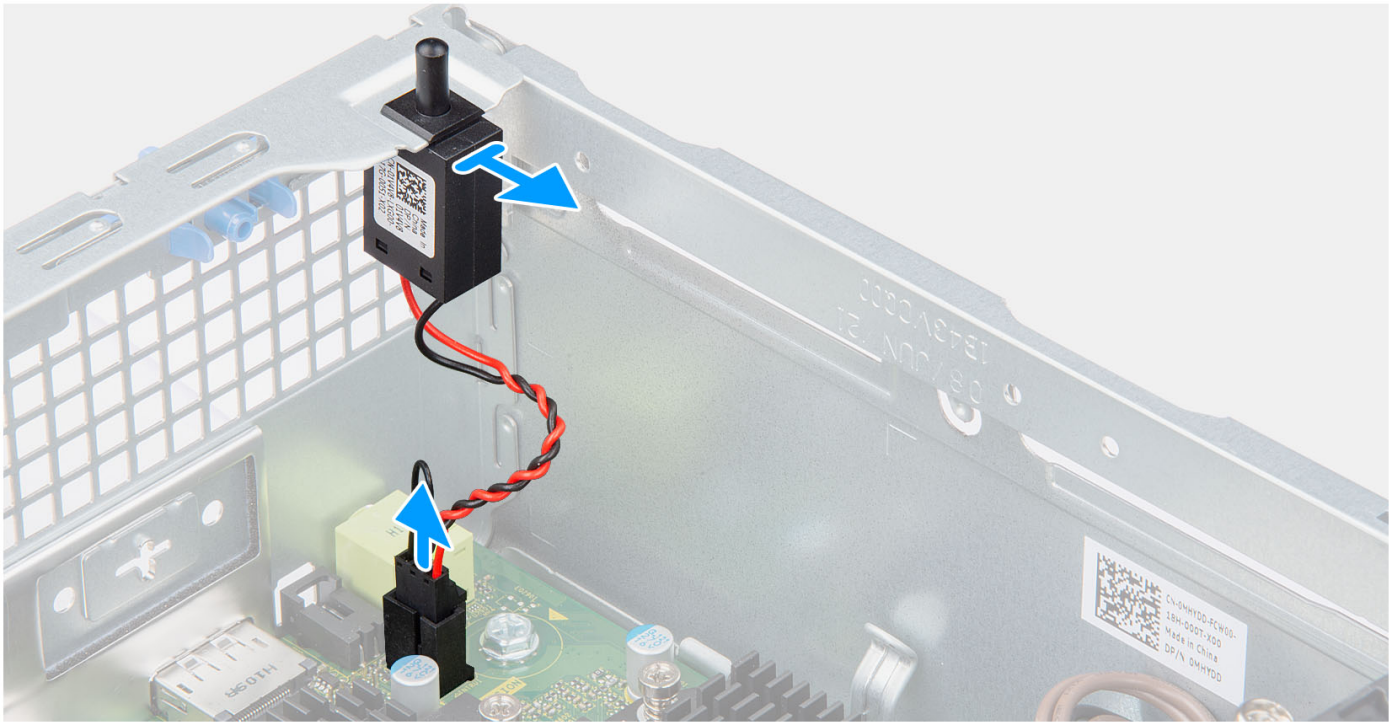
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

About this task

The following images indicate the location of the intrusion switch and provide a visual representation of the removal procedure.





Steps

1. Disconnect the intrusion-switch cable from the connector on the system board.
2. Slide the intrusion switch and lift it away from the computer.

Installing the intrusion switch

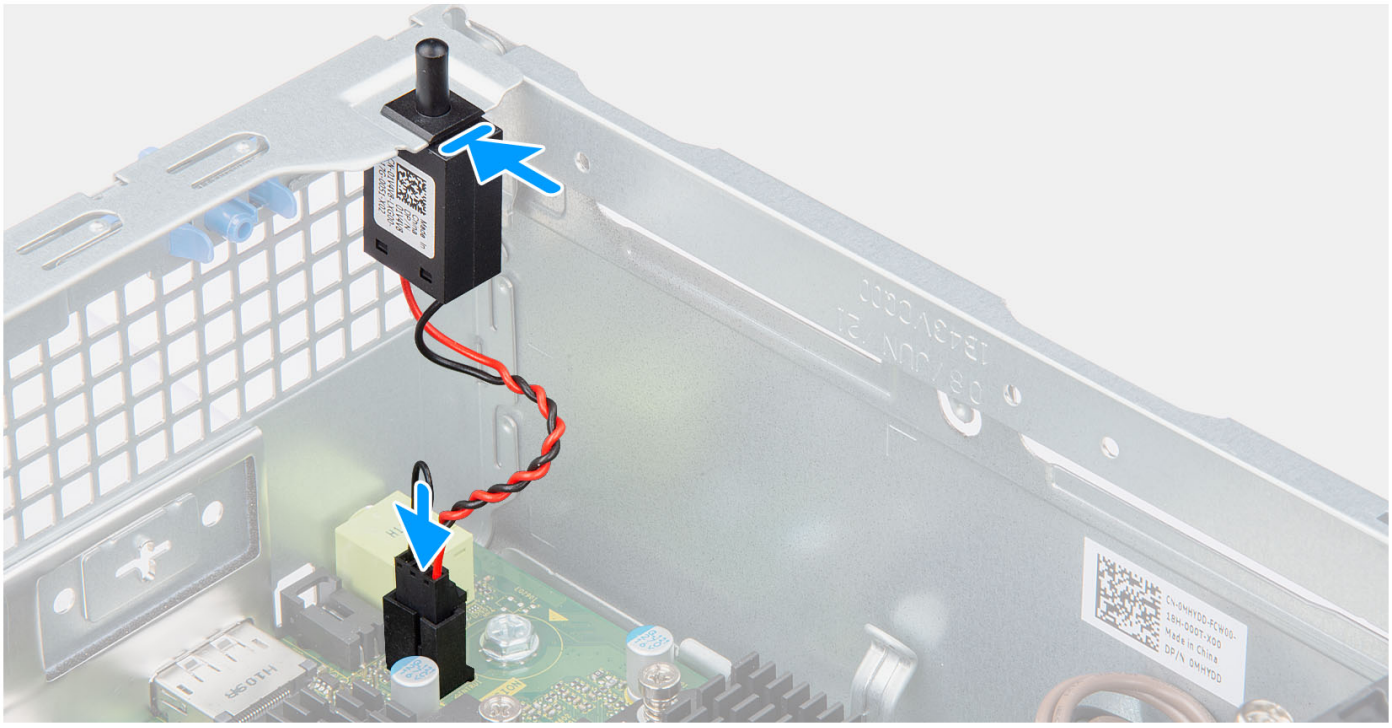
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the intrusion switch and provide a visual representation of the installation procedure.





Steps

1. Slide the intrusion switch into the slot on the chassis.
2. Insert the connector from the intrusion switch cable into the connector on the system board.

Next steps

1. Install the side cover.
2. Follow the procedure in after working inside your computer.

Hard drive

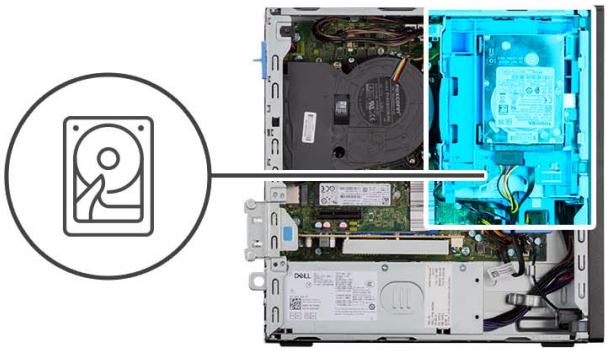
Removing the 2.5-inch hard drive

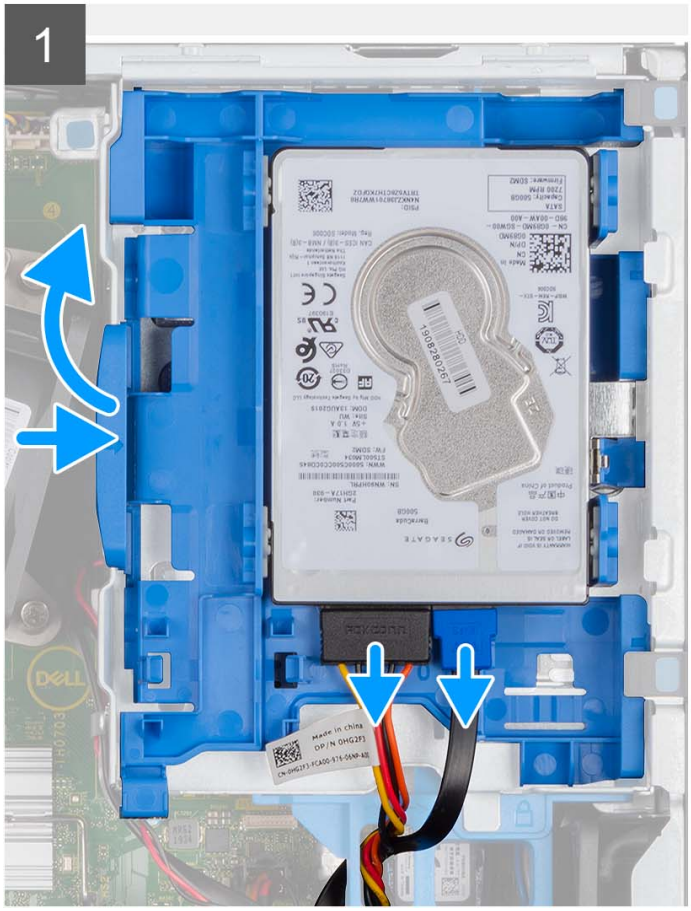
Prerequisites

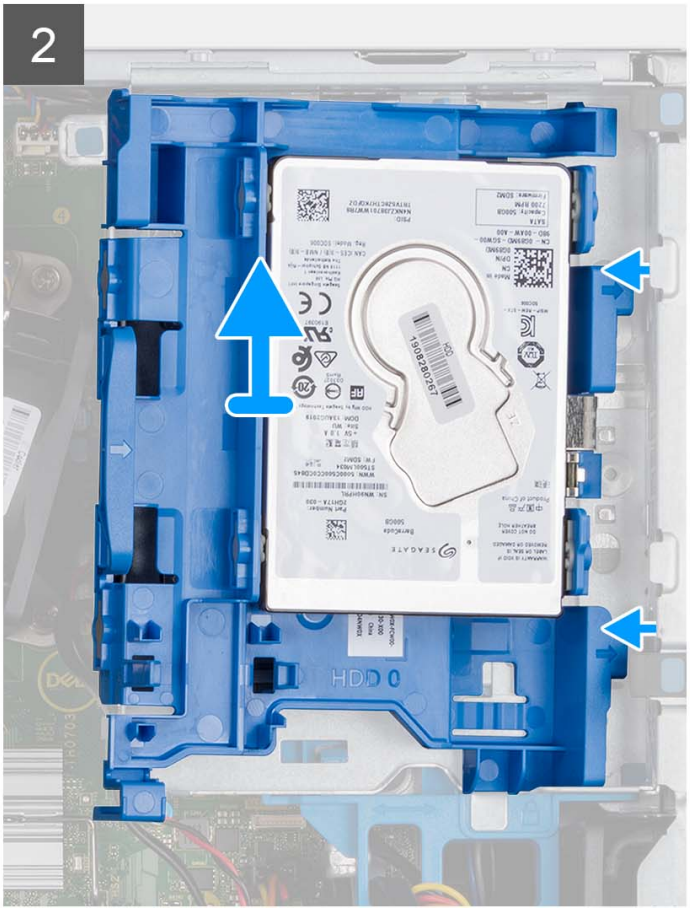
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.

About this task

The following images indicate the location of the 2.5-inch hard drive and provide a visual representation of the removal procedure.







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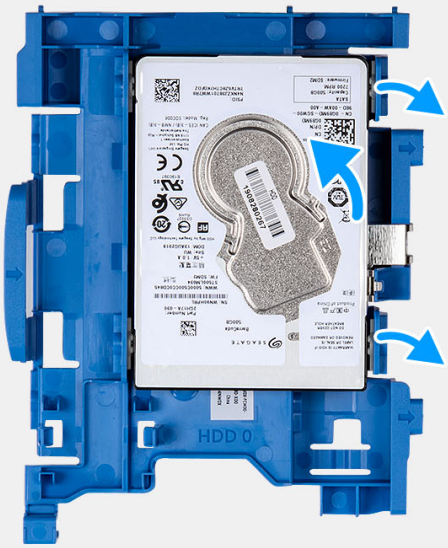

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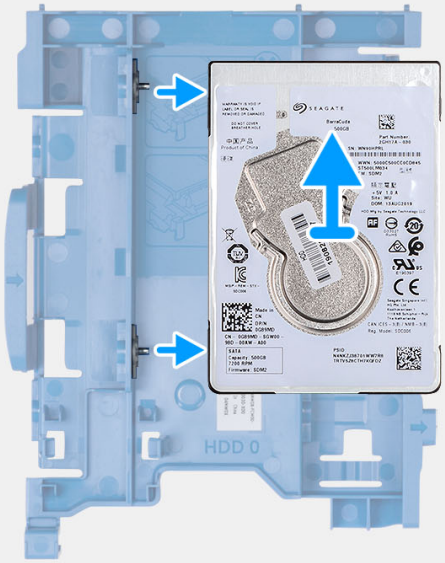
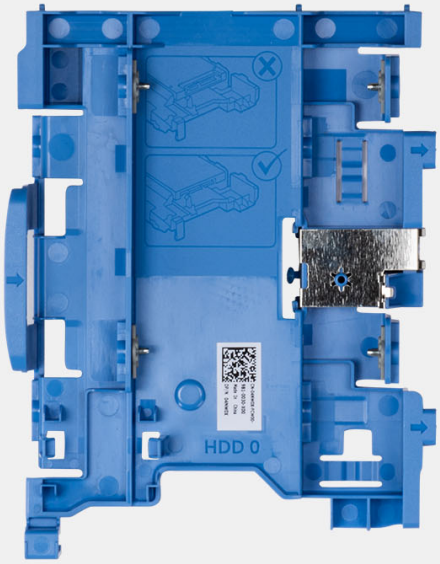


5

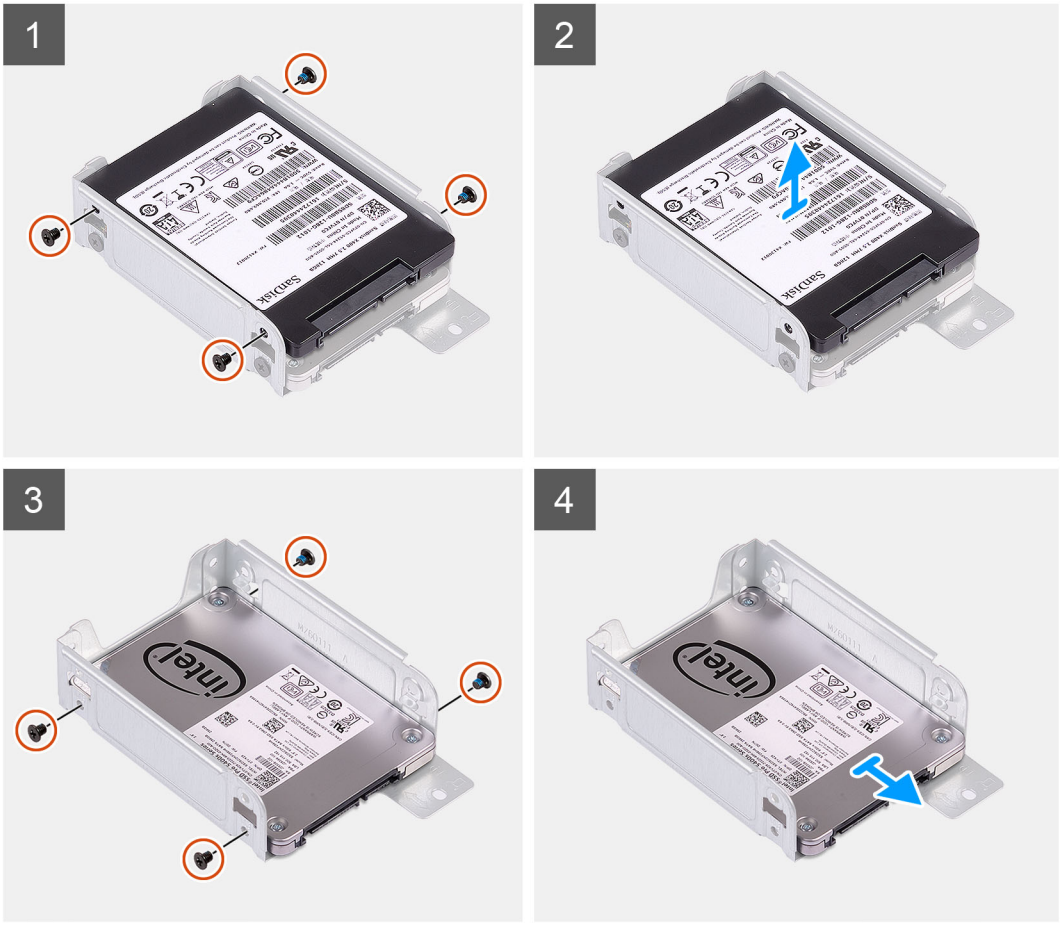


6





8x
M3x3



Steps

1. Disconnect the hard-drive data and power cables from the connectors on the 2.5-inch hard drive.
2. Press the tab on the hard-drive carrier and lift the hard-drive carrier to release the hard-drive carrier from the chassis.

   NOTE: The hard-drive's power and data cables can only connected from the bottom side of the caddy. Make a note of the orientation of the hard drive to avoid errors during installation.

3. Slide the hard-drive carrier away from the chassis and lift the hard-drive carrier out of the hard-drive and optical-drive bracket.
4. Pry the hard-drive carrier to release the 2.5-inch hard-drive from the mounting points on the hard-drive carrier.
5. Slide and lift the 2.5-inch hard drive off the hard-drive carrier.

Installing the 2.5-inch hard drive

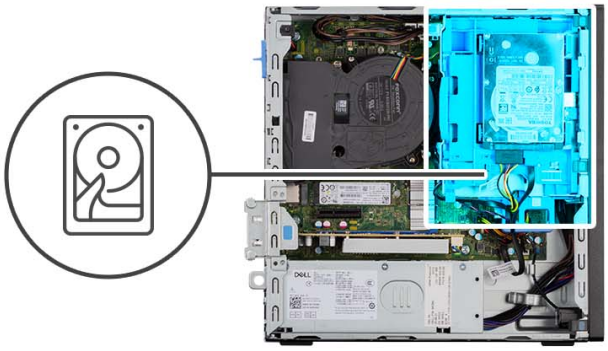
Prerequisites

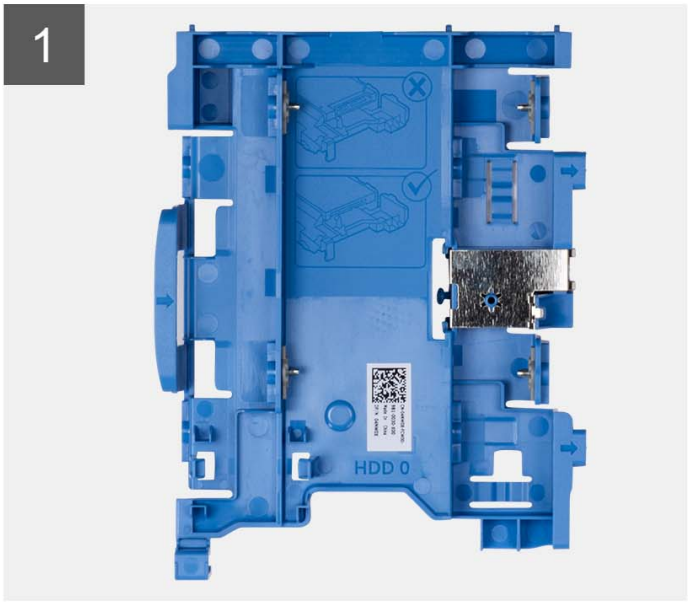
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

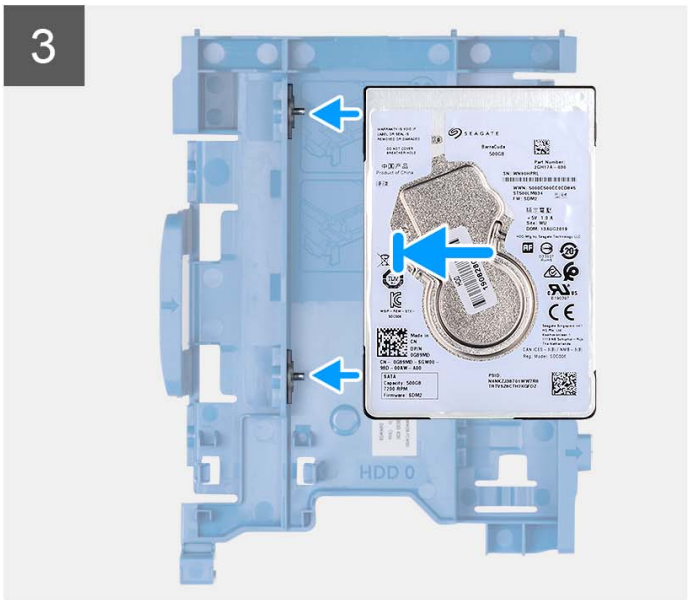
The following images indicate the location of the 2.5-inch hard drive and provide a visual representation of the installation procedure.

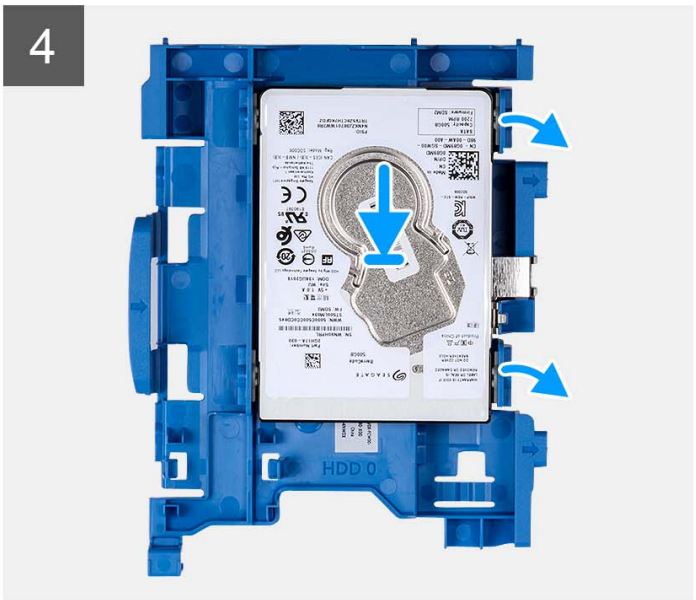
NOTE: For systems that support dual 2.5-inch hard drives, the second 2.5-inch hard drive can be mounted to the back of the hard-driver carrier. The installation steps remain the same for both hard-drives.

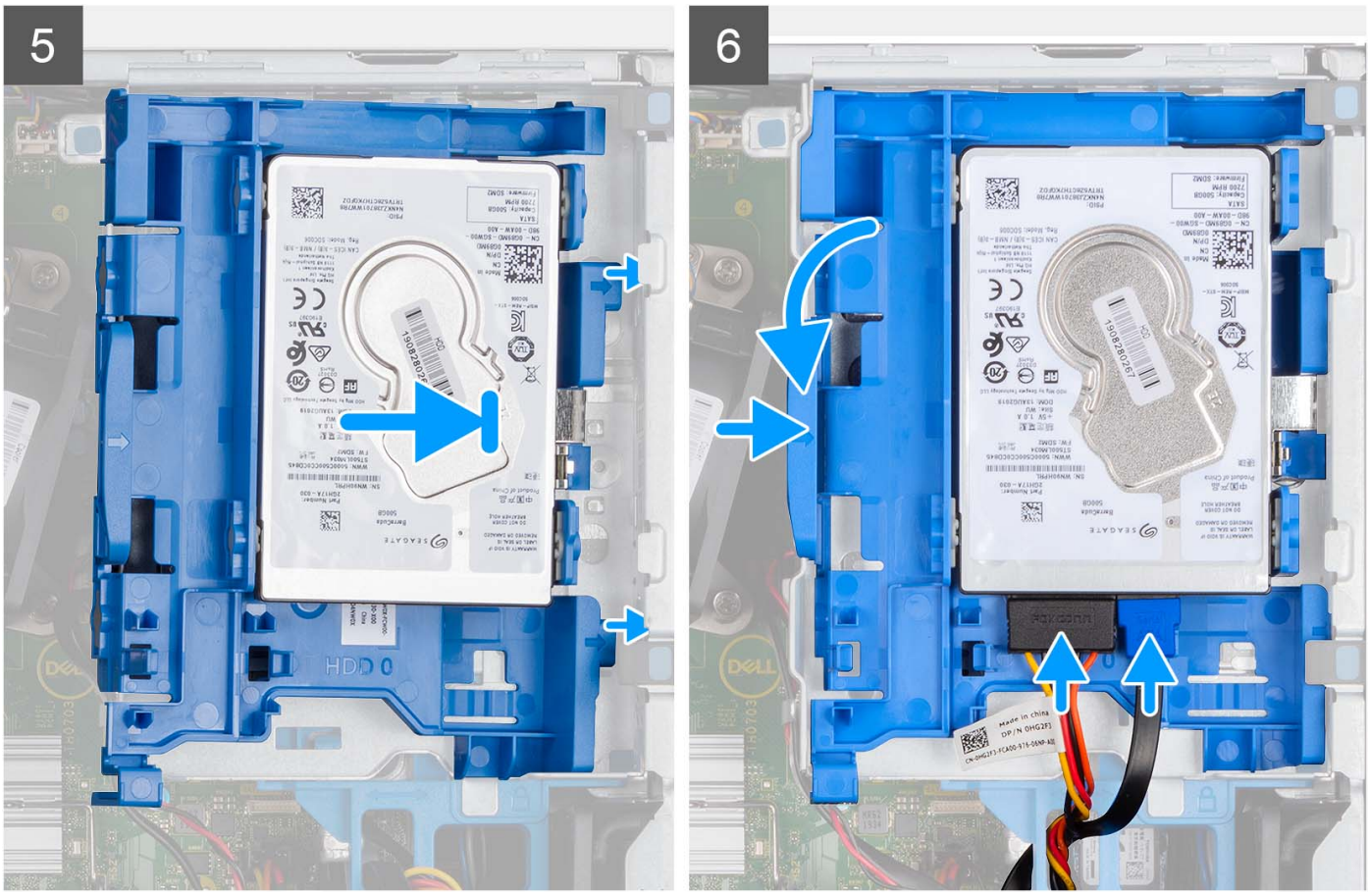












Steps

1. Align the slots on the 2.5-inch hard drive with the mounting points on the hard-drive carrier.
2. Pry the hard-drive carrier to align the mounting points on the hard-drive carrier with the slots on the 2.5-inch hard drive.
3. Snap the 2.5-inch hard drive onto the hard-drive carrier.
4. Align the tabs on the hard-drive carrier with the slots on the chassis and snap the hard-drive carrier onto the disk-drive cage.

   NOTE: Use the arrows seen on the caddy as guides to identify the tabs on the tray.

5. Connect the hard-drive data and power cables to the connectors on the hard drive.

Next steps

1. Install the front bezel.
2. Install the side cover.
3. Follow the procedure in after working inside your computer.

Removing the 3.5-inch hard drive

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.

About this task

The following images indicate the location of the 3.5-inch hard drive and provide a visual representation of the removal procedure.



Steps

1. Disconnect the hard-drive data and power cables from the connectors on the 3.5-inch hard drive.
2. Press the tab on the hard-drive carrier and lift the hard-drive carrier.
3. Slide the hard-drive carrier away from the chassis and lift hard-drive carrier out of the disk-drive cage.
4. Pry the hard-drive carrier to release the mounting points on the carrier from the slots on the 3.5-inch hard drive.
5. Lift the 3.5-inch hard drive off the hard-drive carrier.

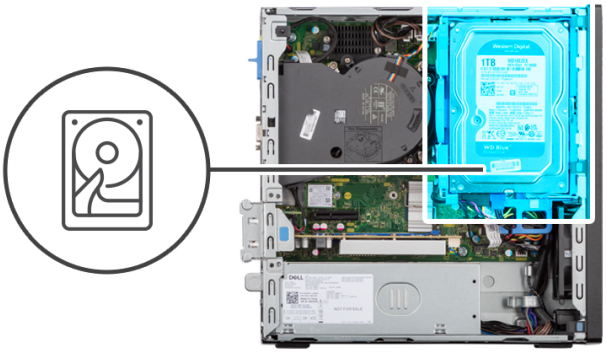
Installing the 3.5-inch hard drive

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

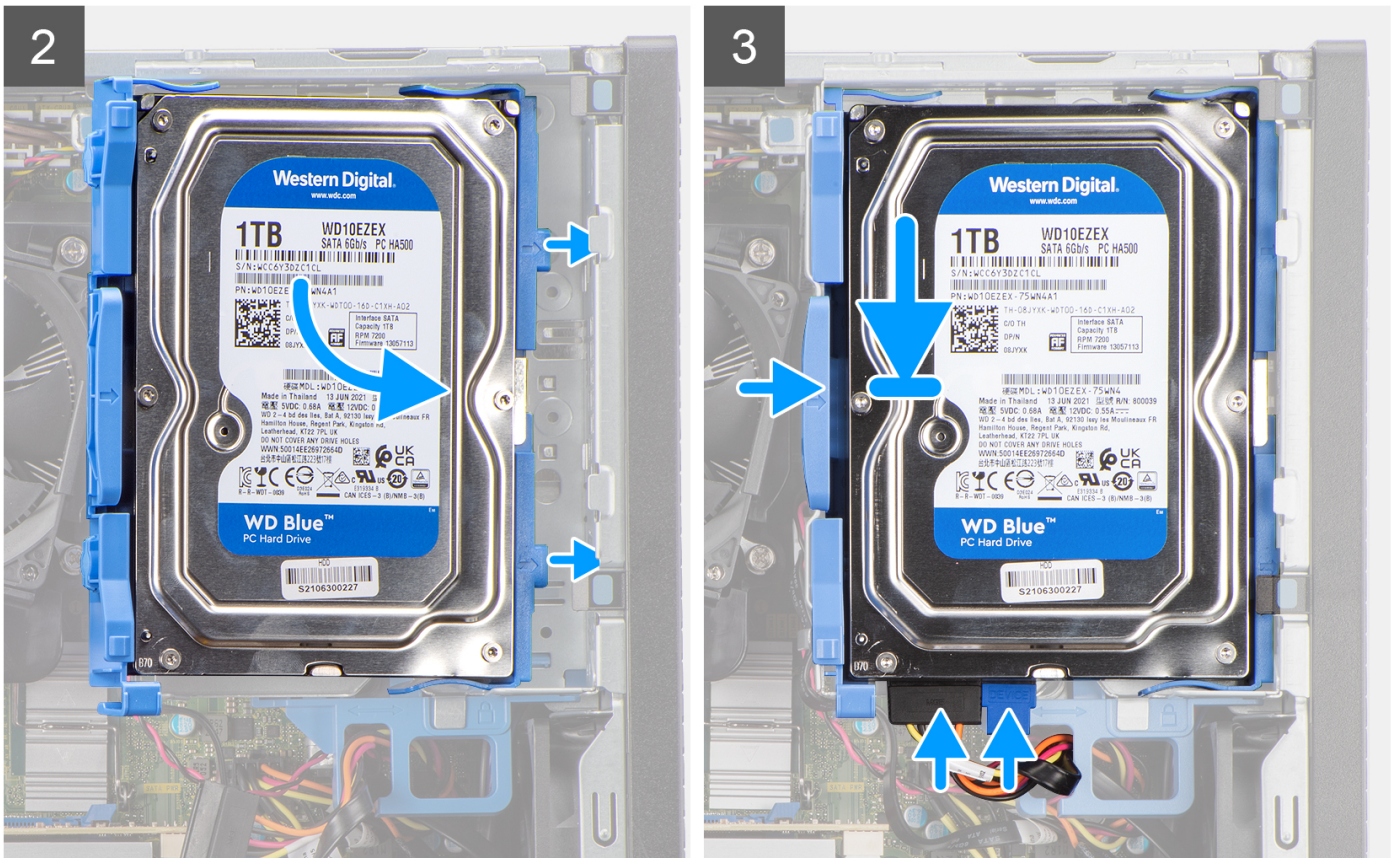
About this task

The following images indicate the location of the 3.5-inch hard drive and provide a visual representation of the installation procedure.



1





Steps

1. Align the mounting points on the carrier with the slots on the hard drive.
2. Snap the 3.5-inch hard-drive onto the hard-drive carrier.
3. Align the tabs on the hard-drive carrier with the slots on the chassis and snap the hard-drive carrier onto the disk-drive cage.

   NOTE: Use the arrows seen on the caddy as guides to identify the tabs on the tray.

4. Connect the hard-drive data and power cables to the connectors on the hard drive.

Next steps

1. Install the front bezel.
2. Install the side cover.
3. Follow the procedure in after working inside your computer.

Disk-drive cage

Removing the disk-drive cage

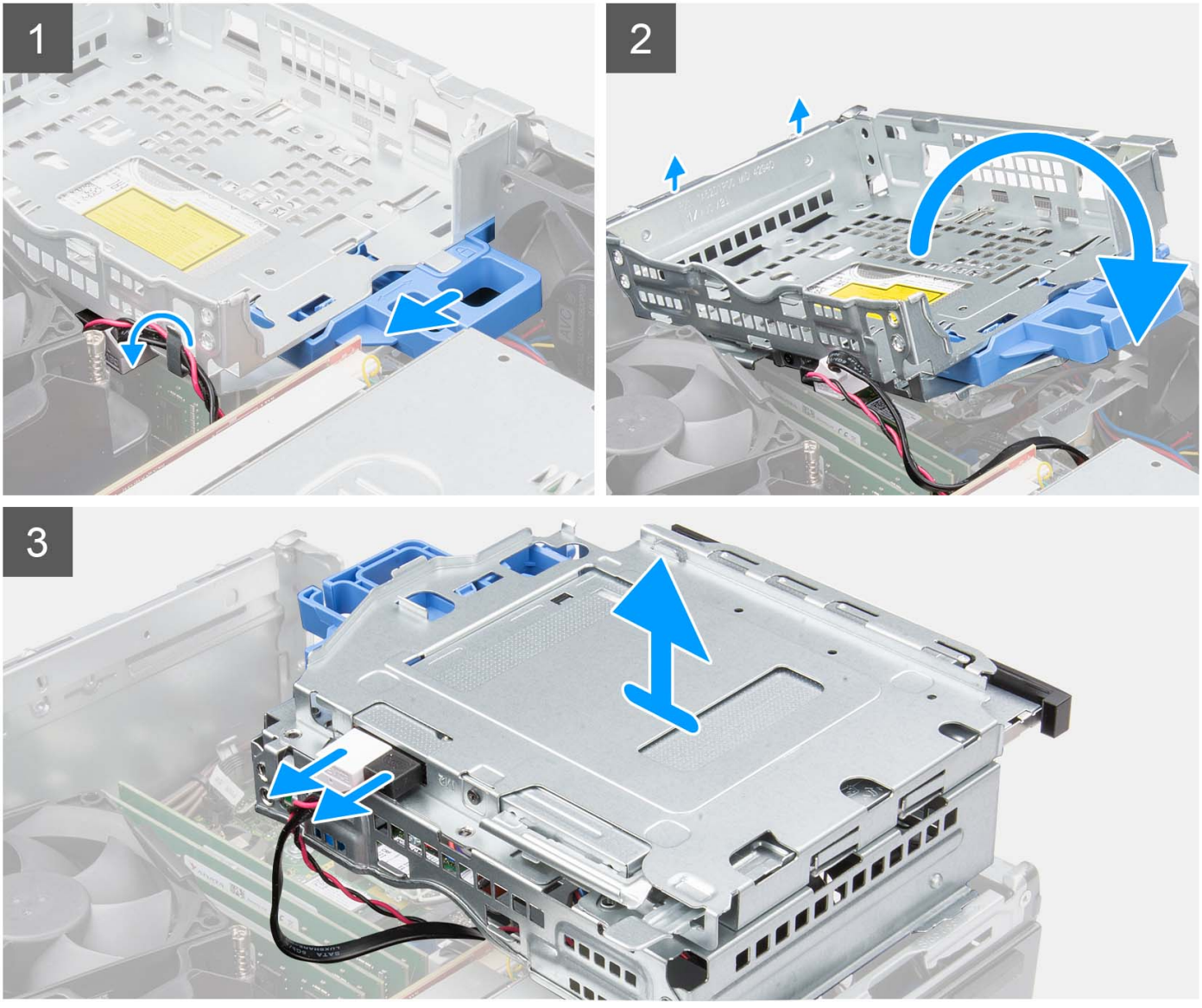
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.

About this task

The following images indicate the location of the disk-drive cage and provide a visual representation of the removal procedure.





Steps

1. Remove the hard-drive power and data cables that are routed via the locking mechanism.
2. Remove the cables from the routing points on the bracket.
3. Move the lock handle from the locking mechanism towards the left to unlock the disk-drive cage and detach it from the chassis.

4. Hold the lock handle to lift the bracket.
5. Lift the disk-drive cage upwards and detach it from the mounting points on the top portion of the chassis.
6. Disconnect the power and SATA cables from the optical drive and lift the disk-drive cage away from the computer.

Installing the disk-drive cage

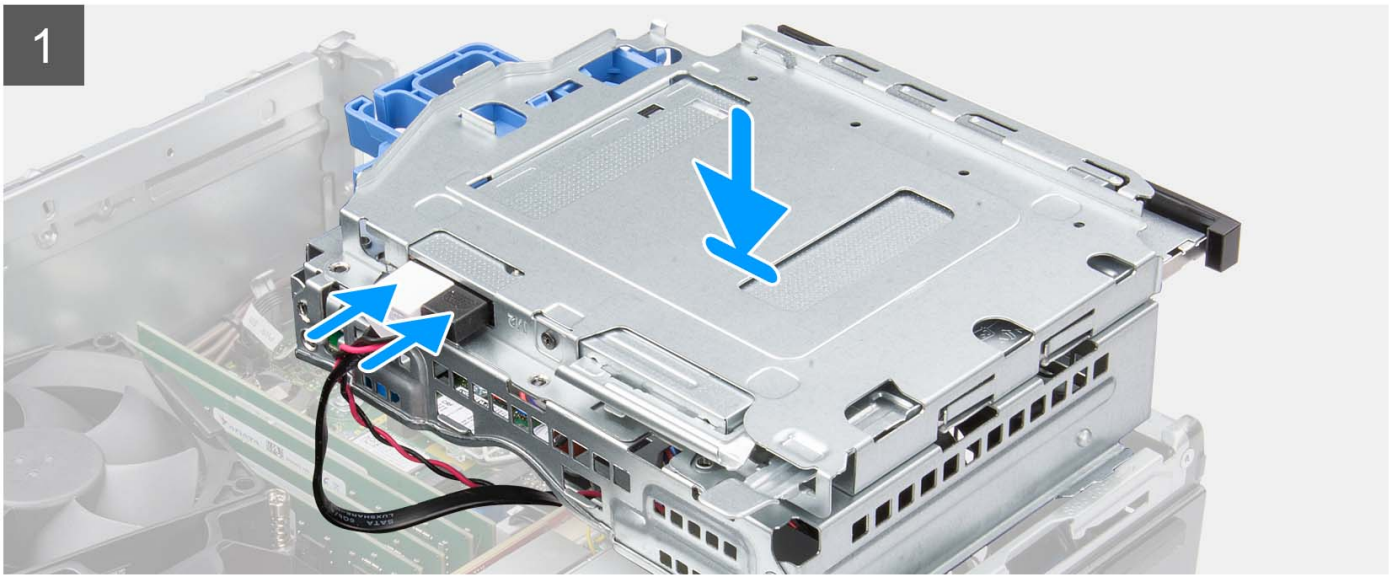
Prerequisites

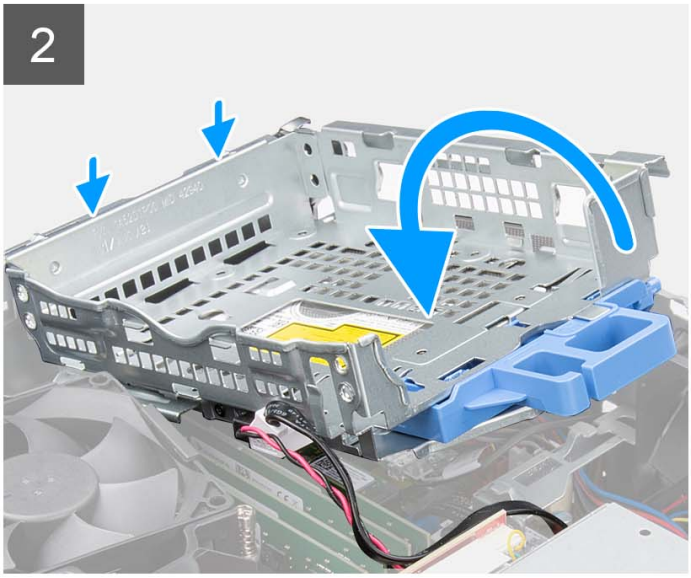
If you are replacing a component, remove the existing component before performing the installation procedure.

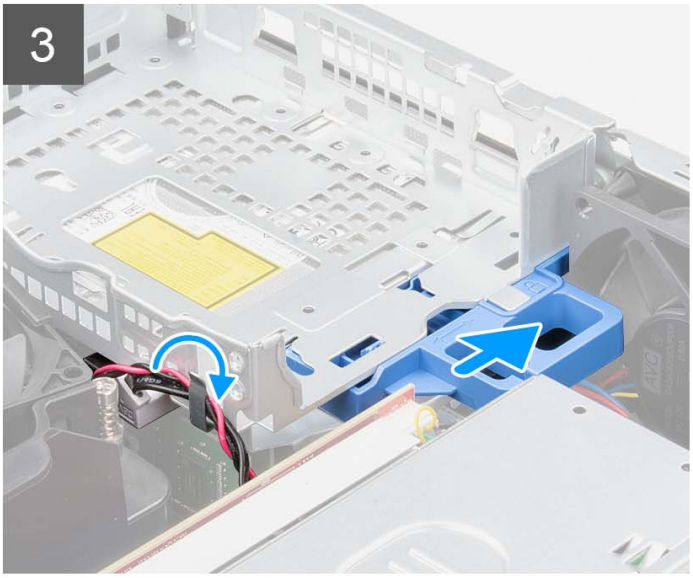
About this task

The following image indicates the location of the disk-drive cage and provides a visual representation of the installation procedure.









Steps

1. Connect the power and SATA cables to the optical drive while holding the disk-drive cage upside down.
2. Hold the disk-drive cage upright and align the mounting points with the ones on the chassis.
3. Push the disk-drive cage until the assembly is secured onto the chassis.
4. Move the lock handle from the locking mechanism towards the right to lock the disk-drive cage in place.
5. Route the optical drive's power and data cables through the routing guide on the disk-drive cage.
6. Route the hard-drive power and SATA cables through the routing guide on the lock.

Next steps

1. Install the 3.5-inch hard-drive.
2. Install the 2.5-inch hard-drive.
3. Install the front bezel.
4. Install the side cover.
5. Follow the procedure in after working inside your computer.

Optical drive

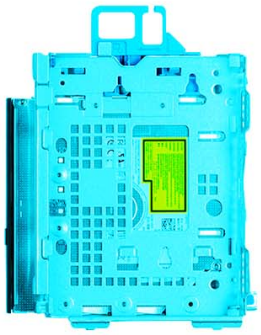
Removing the optical drive

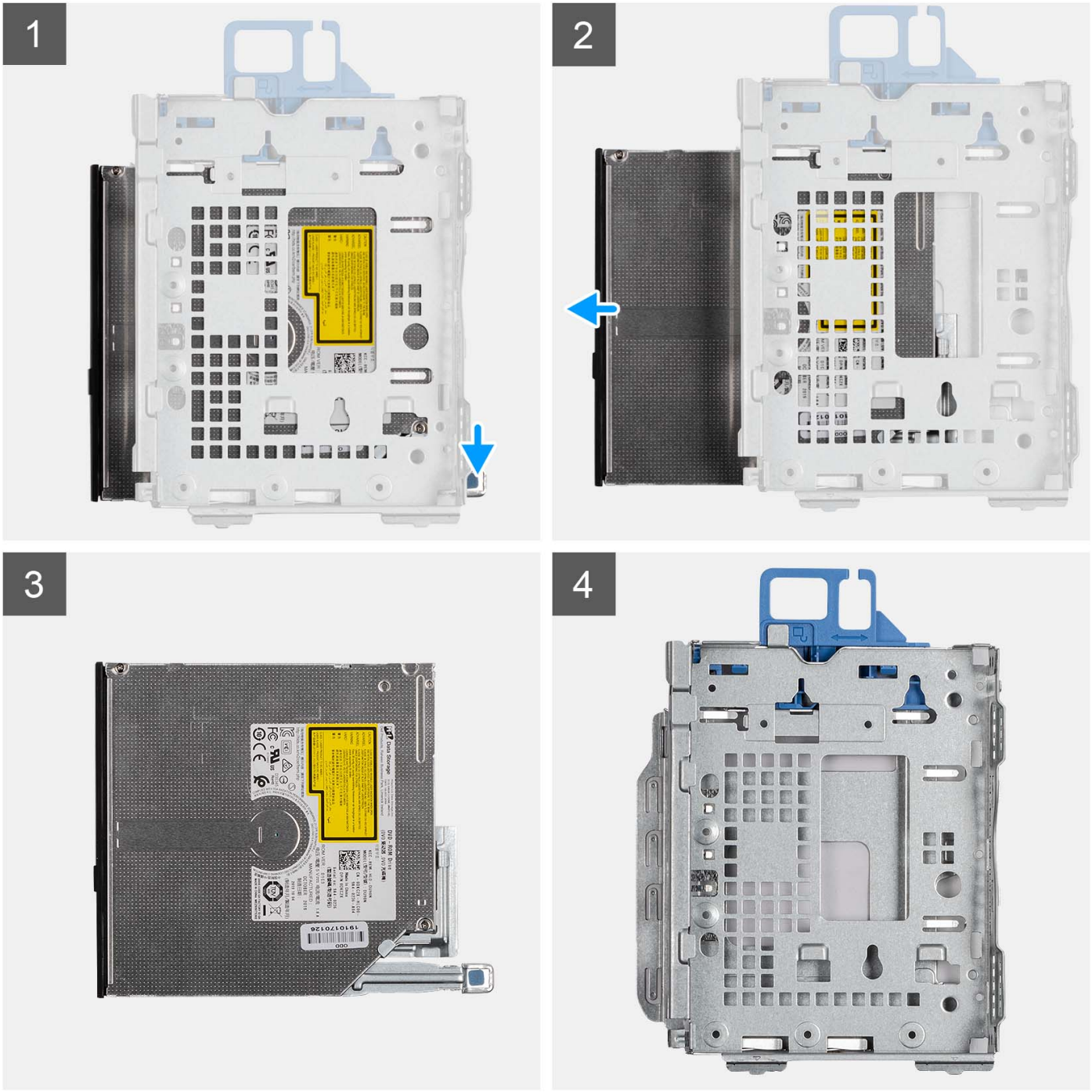
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

About this task

The following images show the slim optical-drive and provide a visual representation of the removal procedure.





Steps

1. Release the tab on the optical drive to release the optical drive from the disk-drive cage.

2. Slide the optical drive out of the disk-drive cage.

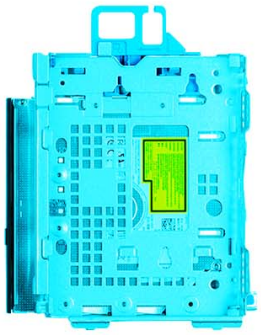
Installing the optical-drive

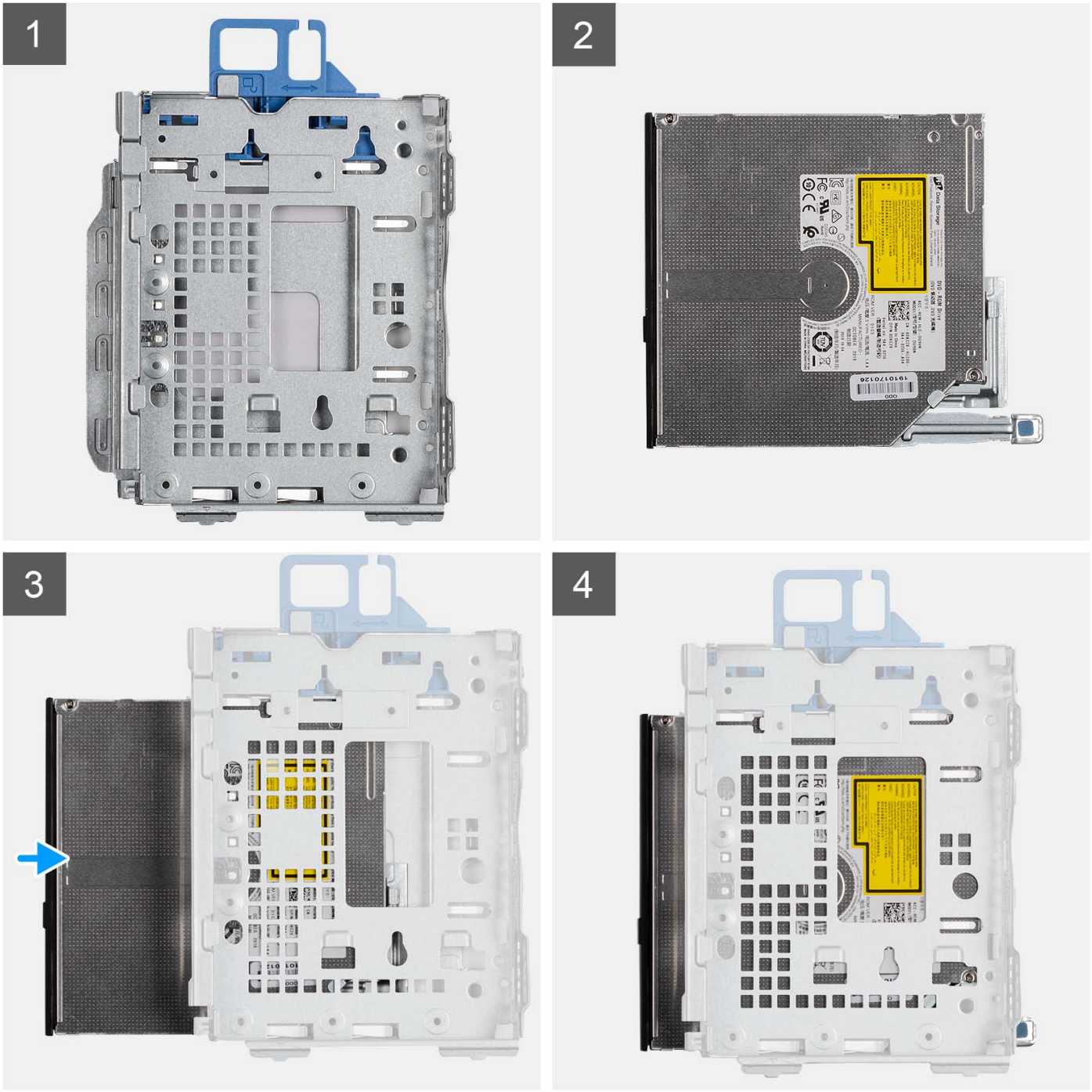
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images show the optical-drive and provide a visual representation of the installation procedure.





Steps

Slide the optical drive into the disk-drive cage until it snaps into place.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

Solid-state drive

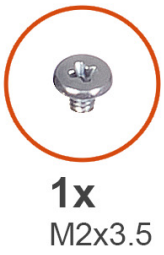
Removing the M.2 2230 PCIe solid-state drive

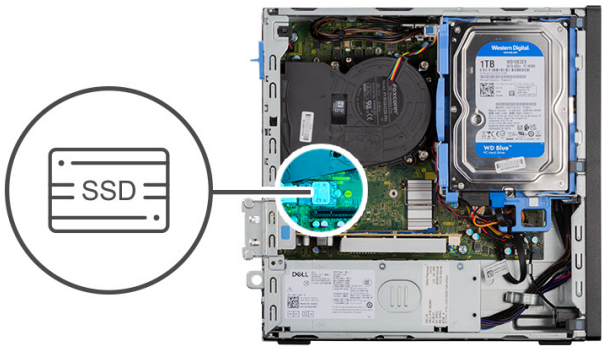
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

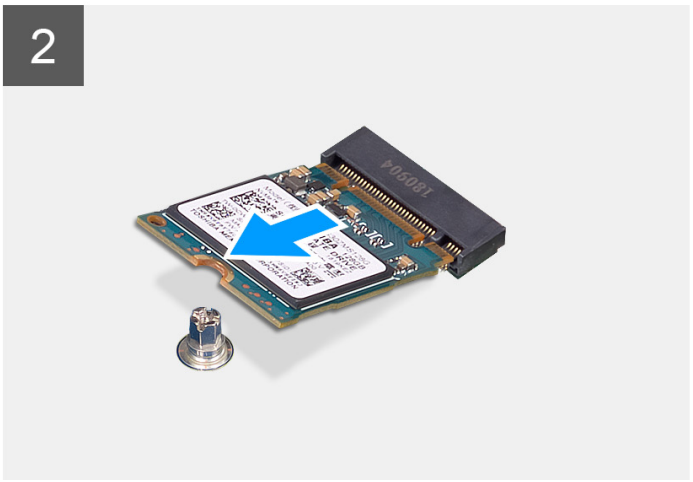
About this task

The following images indicate the location of the M.2 2230 PCIe solid-state drive and provide a visual representation of the removal procedure.









Steps

1. Remove the single (M2x3.5) screw that secures the solid-state drive to the system board.
2. Slide and lift the 2230 solid-state drive from the M.2 card slot on the system board.

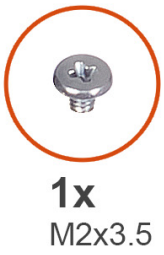
Installing the M.2 2230 PCIe solid-state drive

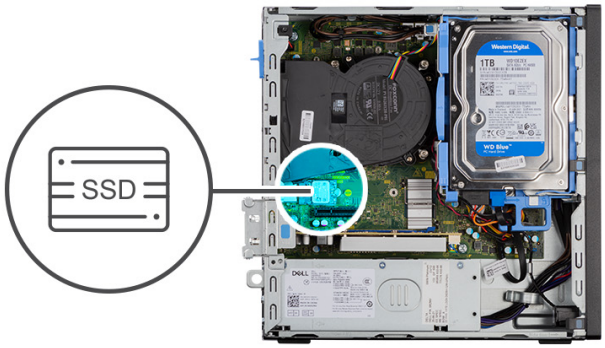
Prerequisites

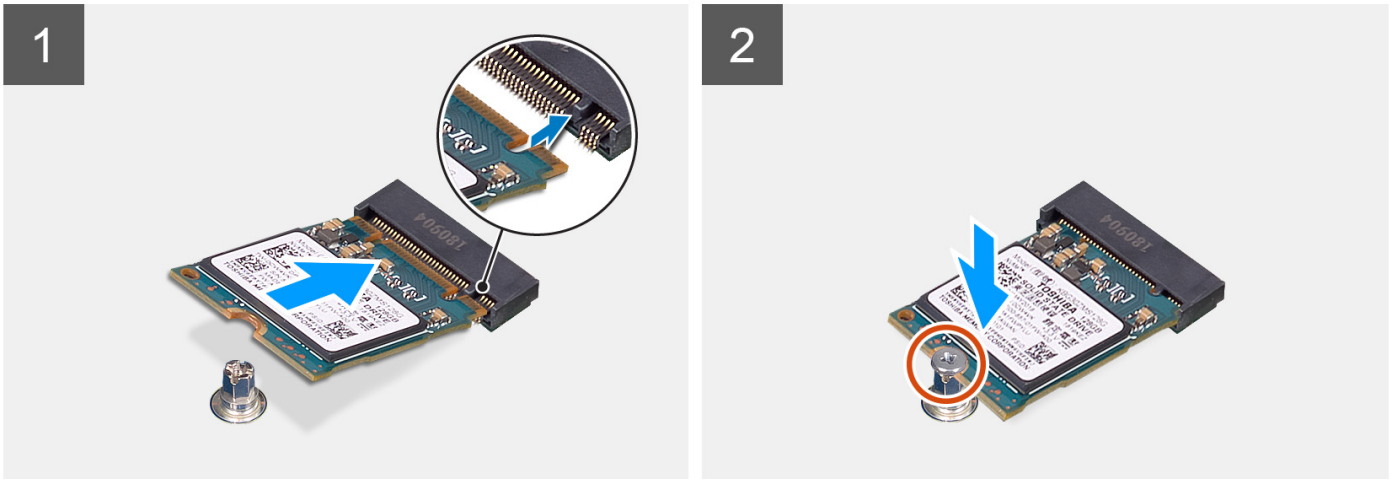
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the M.2 2230 PCIe solid-state drive and provide a visual representation of the installation procedure.







Steps

1. Align the notch on the 2230 solid-state drive with the tab on the M.2 card slot on the system board.
2. Slide the 2230 solid-state drive into the M.2 card slot on the system board. Replace the screw (M2x3.5) that secures the 2230 solid-state drive to the system board.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

Removing the M.2 2280 PCIe solid-state drive

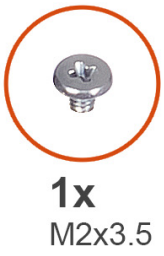
Prerequisites

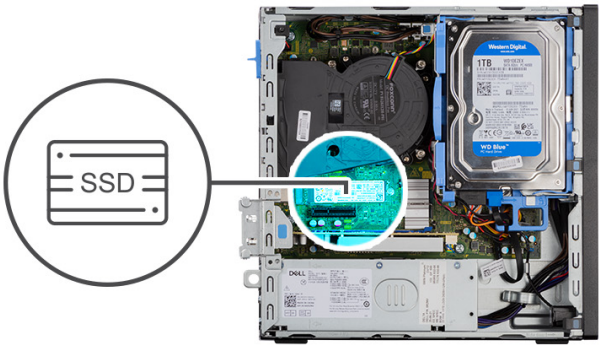
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

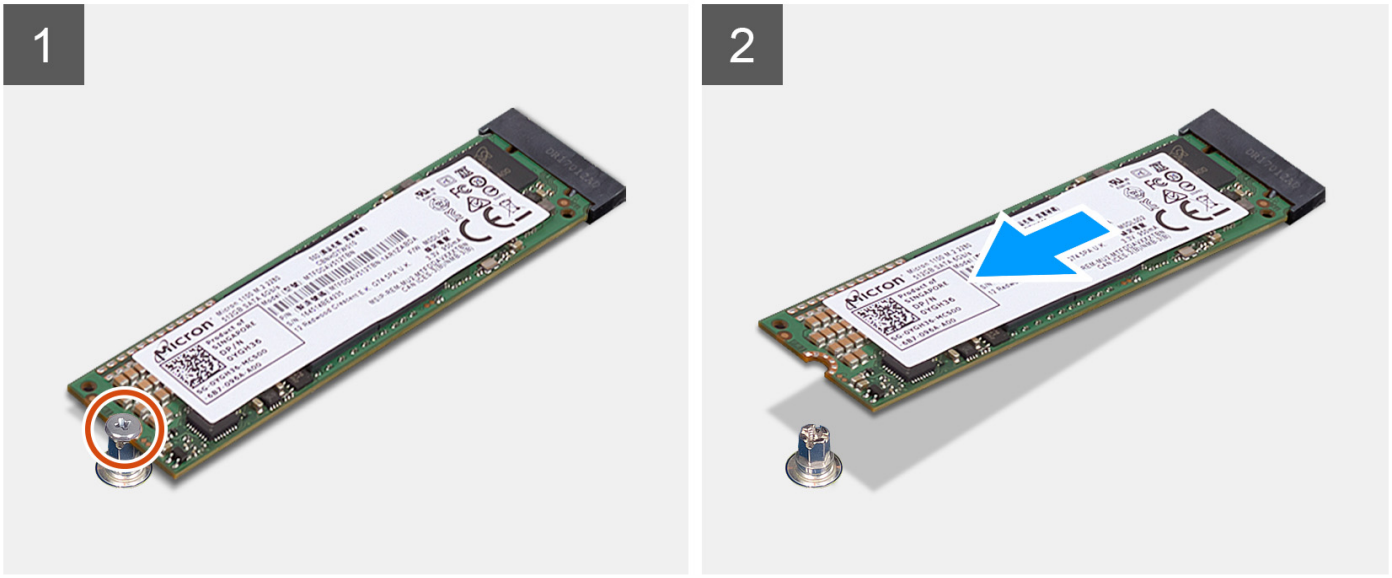
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

About this task

The following images indicate the location of the M.2 2280 PCIe solid-state drive and provide a visual representation of the removal procedure.







Steps

1. Remove the (M2x3.5) screw that secures the 2280 solid-state drive to the system board.
2. Slide and lift the 2280 solid-state drive from the M.2 card slot on the system board.

Installing the M.2 2280 PCIe solid-state drive

Prerequisites

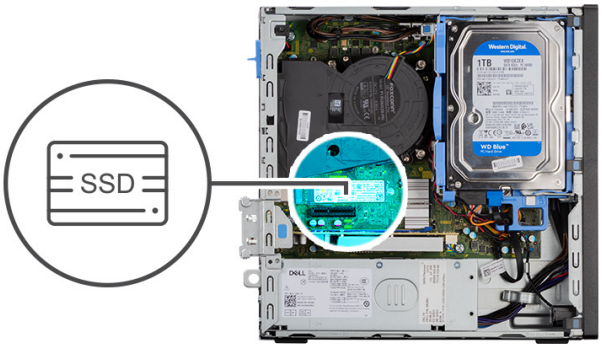
If you are replacing a component, remove the existing component before performing the installation procedure.

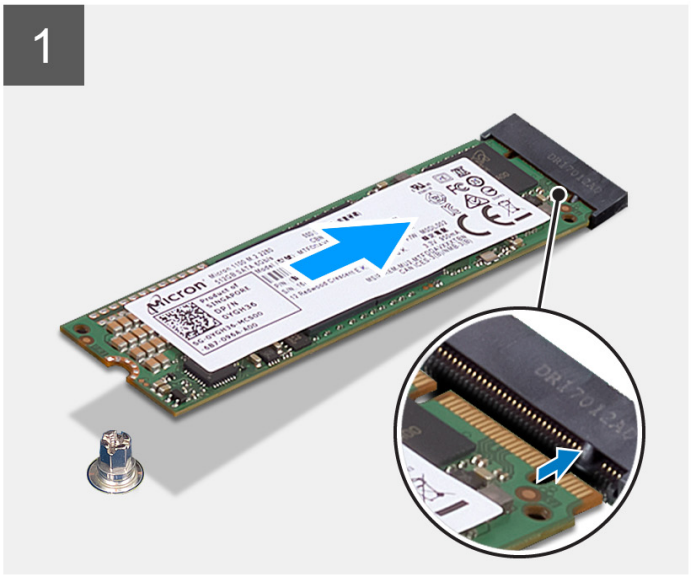
About this task

The following images indicates the location of the M.2 2280 PCIe solid-state drive and provide a visual representation of the installation procedure.



1x
M2x3.5







Steps

1. Align the notch on the 2280 solid-state drive with the tab on the M.2 card slot on the system board.
2. Slide the 2280 solid-state drive into the M.2 card slot on the system board.
3. Replace the screw (M2x3.5) that secures the 2280 solid-state drive to the system board.

Next steps

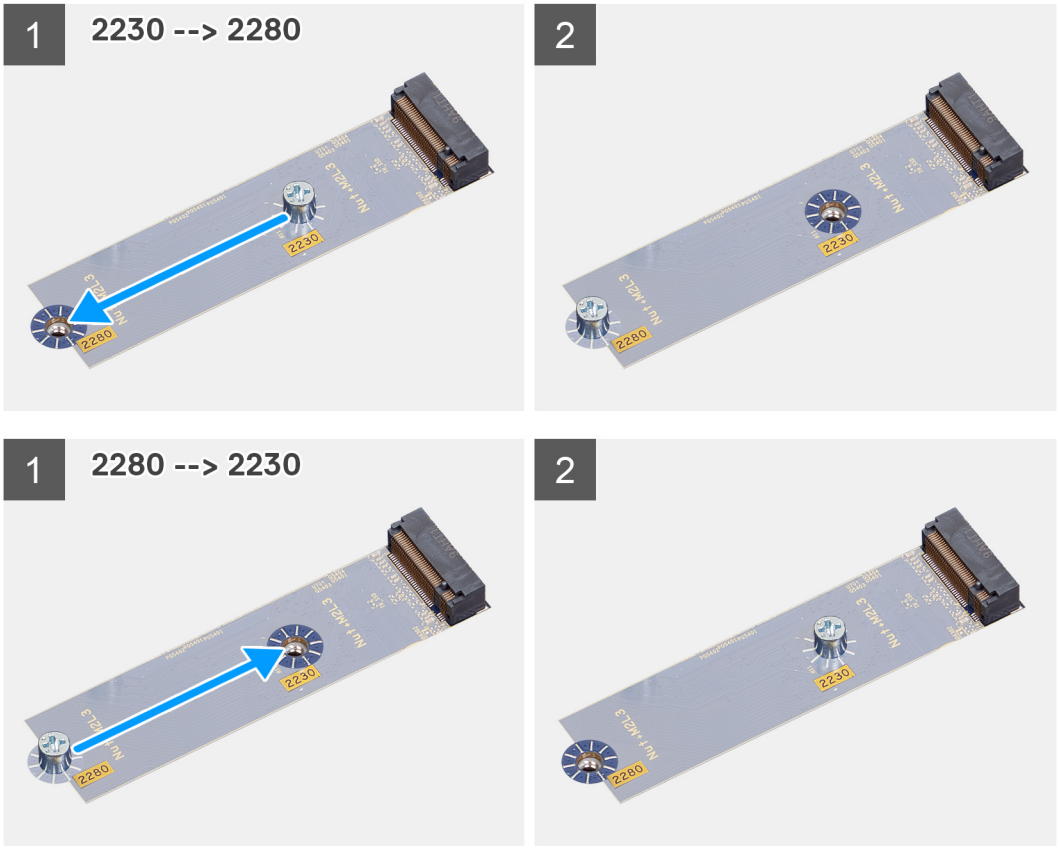
1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

Removing and installing the M.2 screw mount

About this task

The following image provides a visual representation of the procedure to remove and install the M.2 screw mount on the system board.

NOTE: Moving the M.2 screw mount would accommodate the installation of an M.2 2230 or 2280 solid-state drive in the same slot.



Bay-support bracket

Removing the bay-support bracket

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

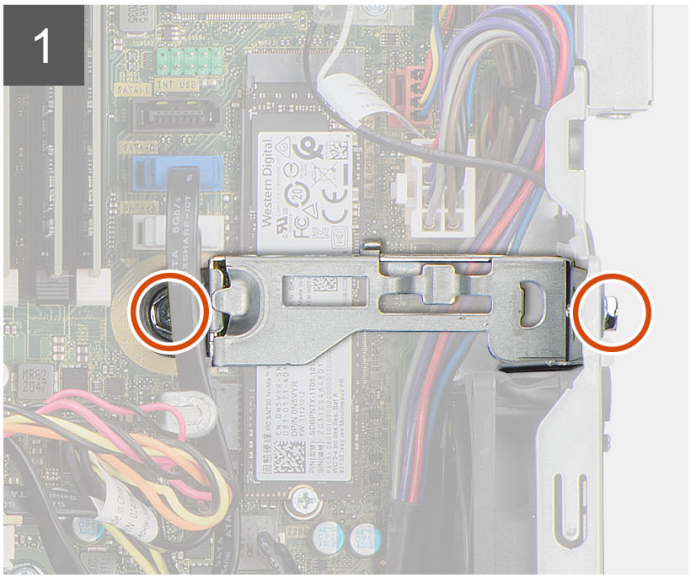
About this task

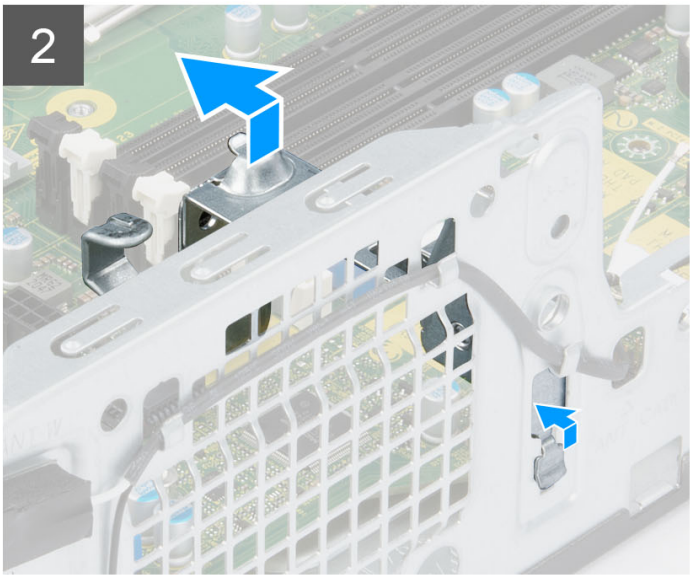
The following images indicate the location of the bay-support bracket and provide a visual representation of the removal procedure.



2x
#6-32







Steps

1. Remove the two (#6-32) screws that secures the bay-support bracket to the chassis.
2. Push the bay-support bracket to free it from the front side of the chassis.
3. Lift and remove the bay-support bracket from the system.

Installing the bay-support bracket

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

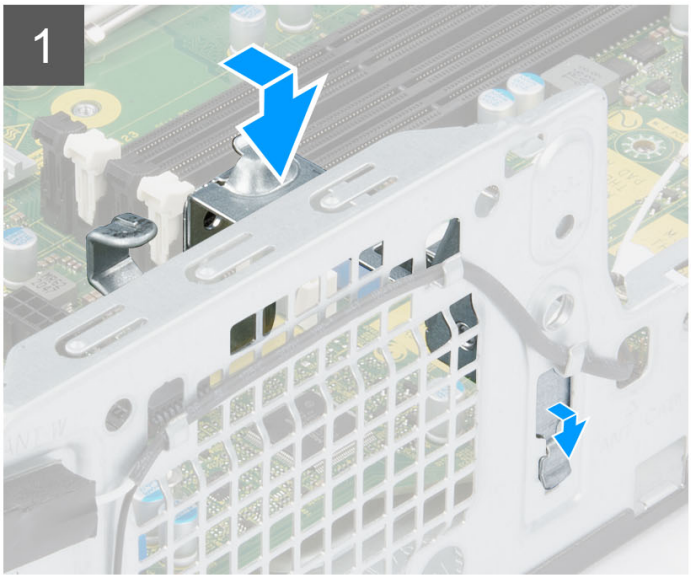
About this task

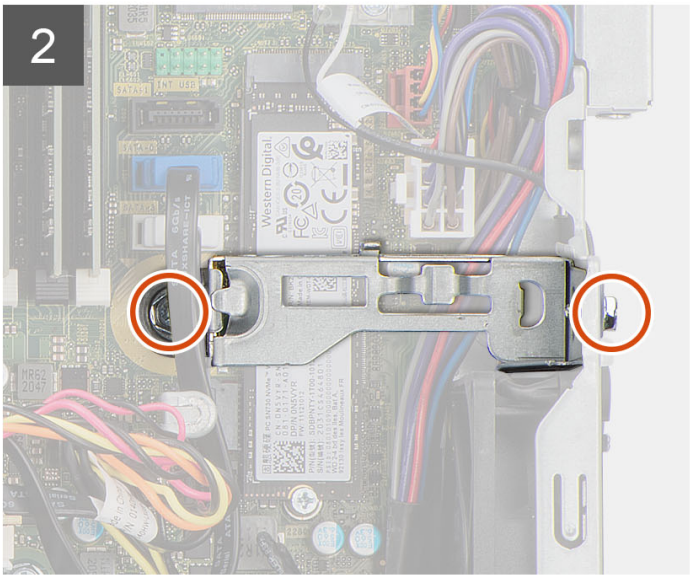
The following images indicate the location of the bay-support bracket and provides a visual representation of the installation procedure.



2x
#6-32







Steps

1. Align and place the bay-support bracket on the slot on the chassis.
2. Replace the two (#6-32) screws that secures the bay-support bracket to the chassis.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

SD-card reader

Removing the SD-card reader

Prerequisites

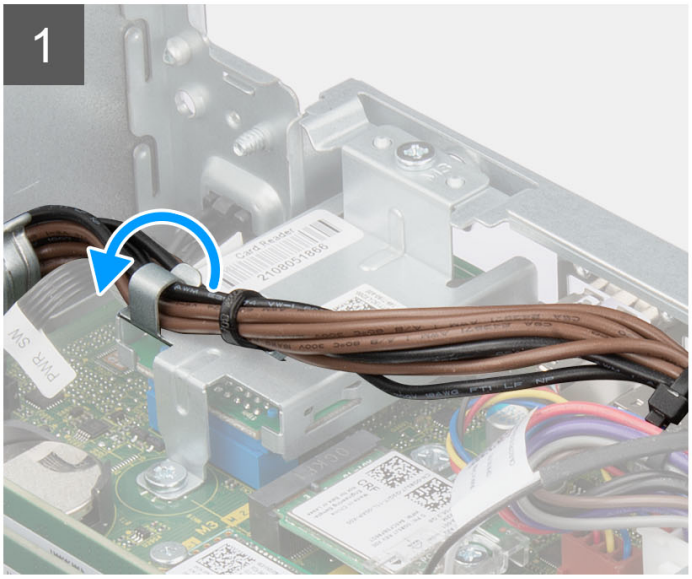
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the hard-drive and optical-drive cage.

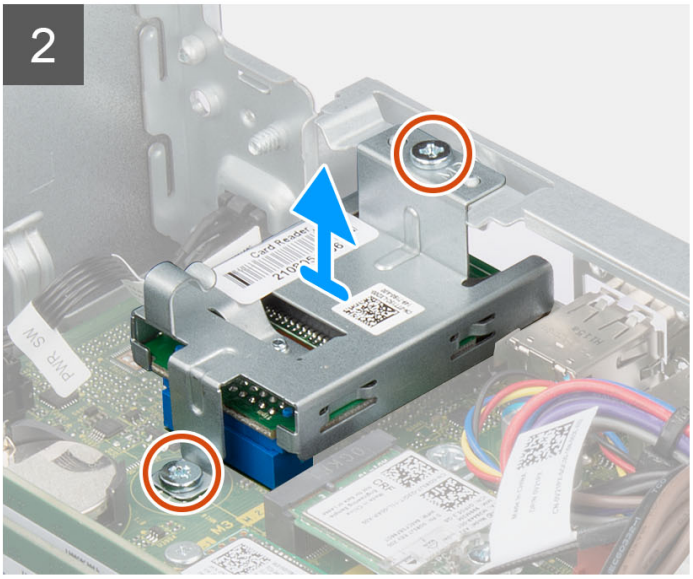
About this task

The following images indicate the location of the SD-card reader and provide a visual representation of the removal procedure.









Steps

1. Remove the power-supply cables from the routing guides on the SD-card reader bracket.
2. Remove the two screws (M3x5) that secure the SD-card bracket to the system board and the chassis.
3. Disconnect the SD-card reader from the connector on the system board.
4. Lift and remove the SD-card reader from the system.

Installing the SD-card reader

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

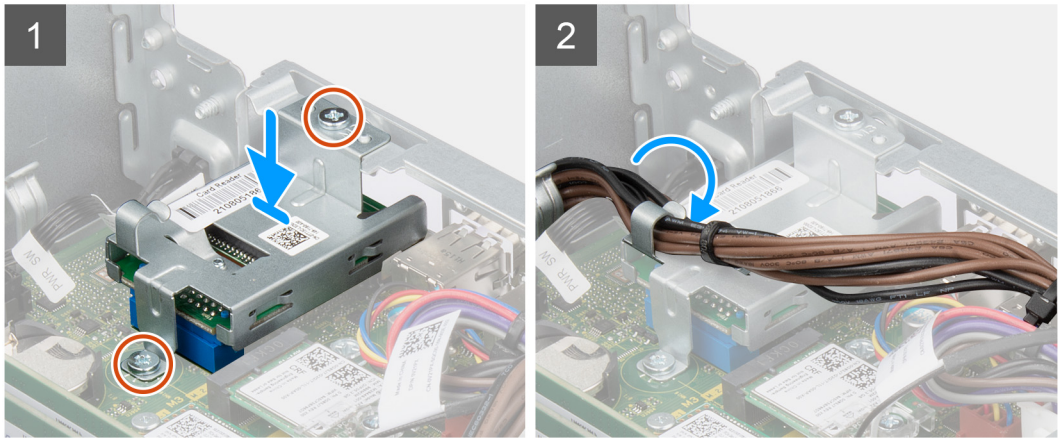
About this task

The following images indicate the location of the SD-card reader and provide a visual representation of the installation procedure.



2x
M3x5





Steps

1. Place and align the screw holes on the SD-card reader to the screw holes on the chassis.
2. Connect the SD-card reader to the connector on the system board.
3. Replace the two screws (M3x5) that secure the SD-card bracket to the system board and the chassis.
4. Route the power-supply cables through the routing guides on the SD-card reader bracket.

Next steps

1. Install the hard-drive and optical-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

Coin-cell battery

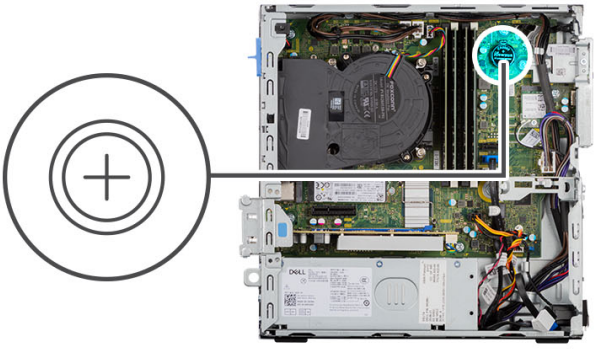
Removing the coin-cell battery

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.

About this task

The following images indicate the location of the coin-cell battery and provide a visual representation of the removal procedure.





Steps

1. Push the coin-cell battery-release lever on the coin-cell battery socket to release the coin-cell battery out of the socket.
2. Remove the coin-cell battery.

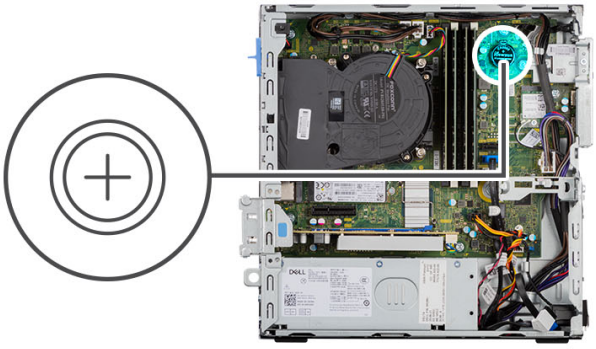
Installing the coin-cell battery

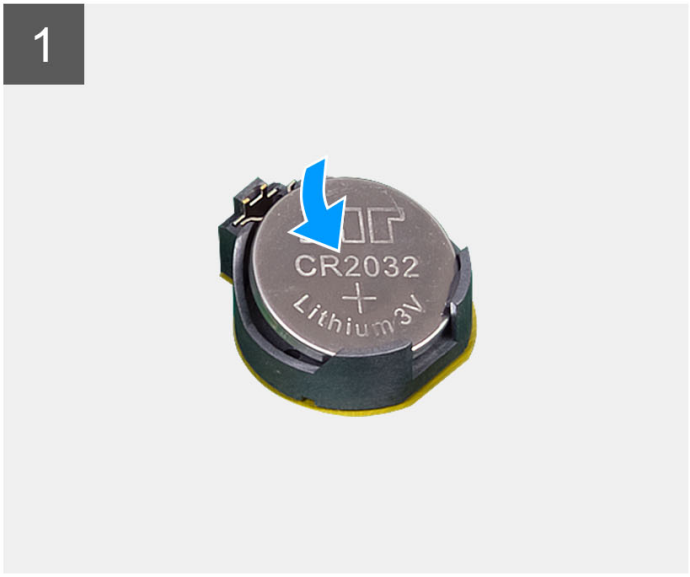
Prerequisites

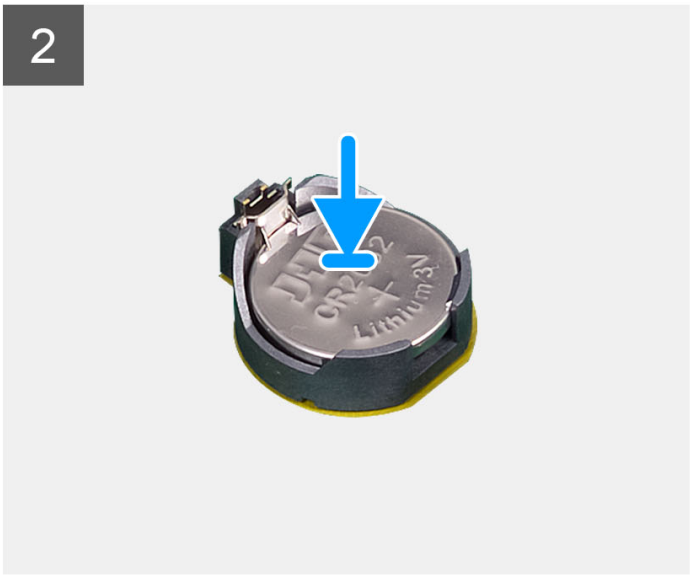
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the installation procedure.







Steps

Insert the coin-cell battery into the socket with the positive side (+) label facing up and snap the battery in the socket.

Next steps

1. Install the front bezel.
2. Install the side cover.
3. Follow the procedure in after working inside your computer.

Power button

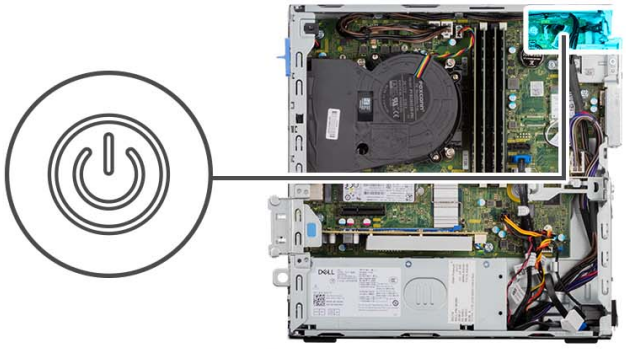
Removing the power button

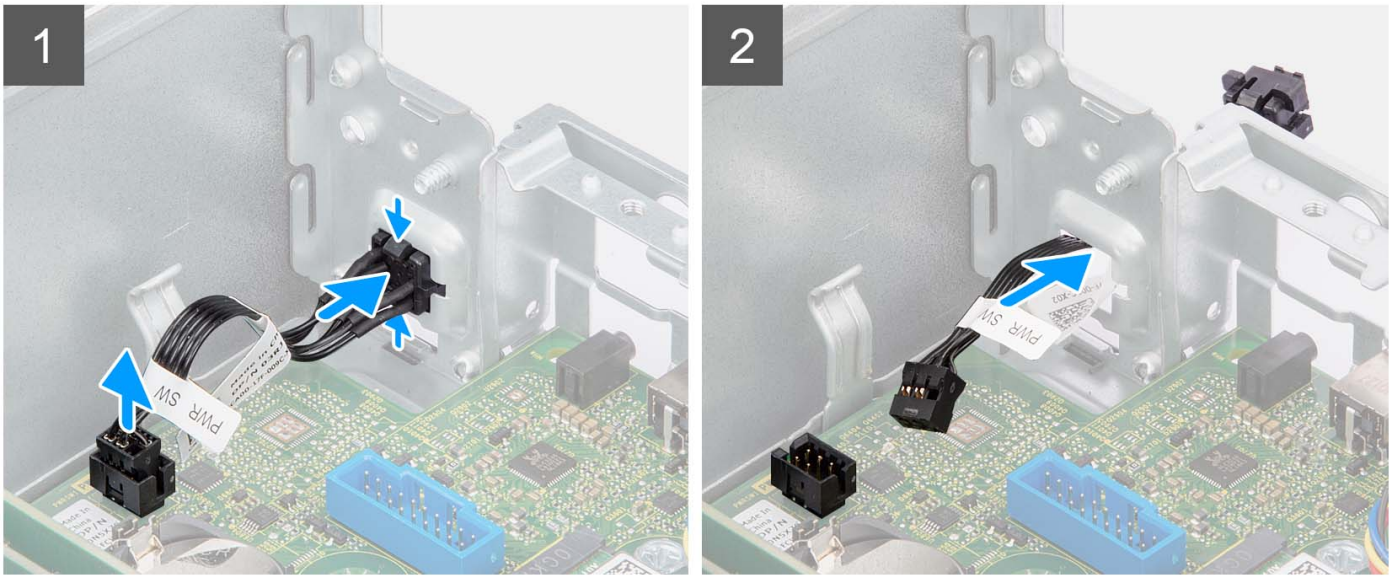
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

About this task

The following images indicate the location of the power button and provide a visual representation of the removal procedure.





Steps

1. Disconnect the power-button cable from the connector on the system board.
2. Press the release tabs on the power-button head and push the power button through the slot on the chassis.
3. Remove the power button and its cable from the from the slot on the chassis.

Installing the power button

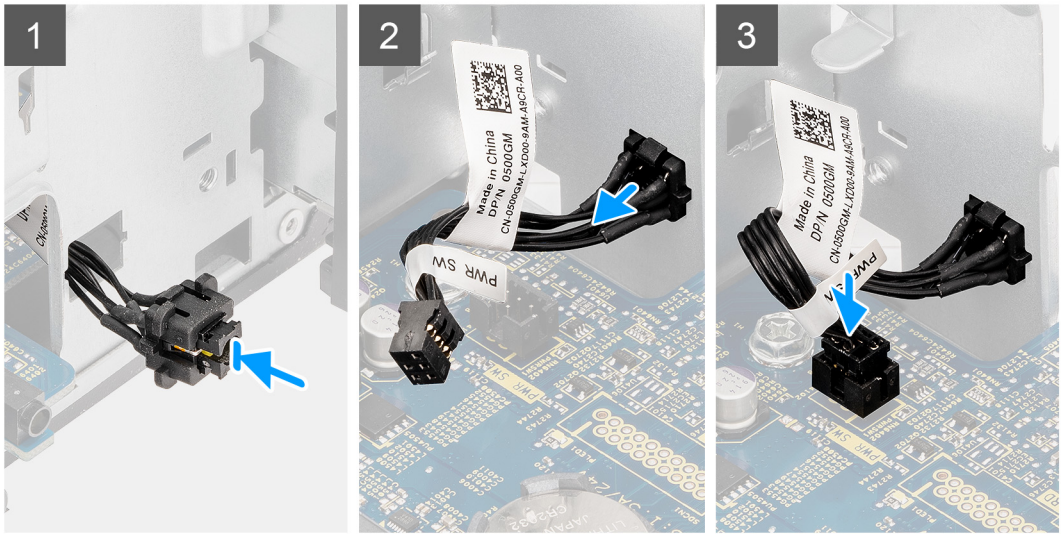
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the power button and provide a visual representation of the installation procedure.





Steps

1. Insert the power button and its cable into the slot on the chassis.
2. Press the power button until it is seated on the slot on the chassis.
3. Connect the power-button cable to the connector on the system board.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

WLAN card

Removing the WLAN card

Prerequisites

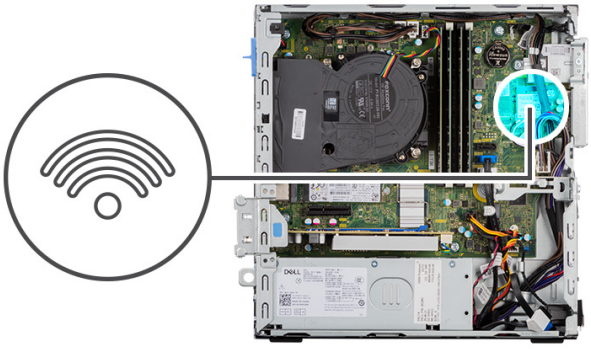
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

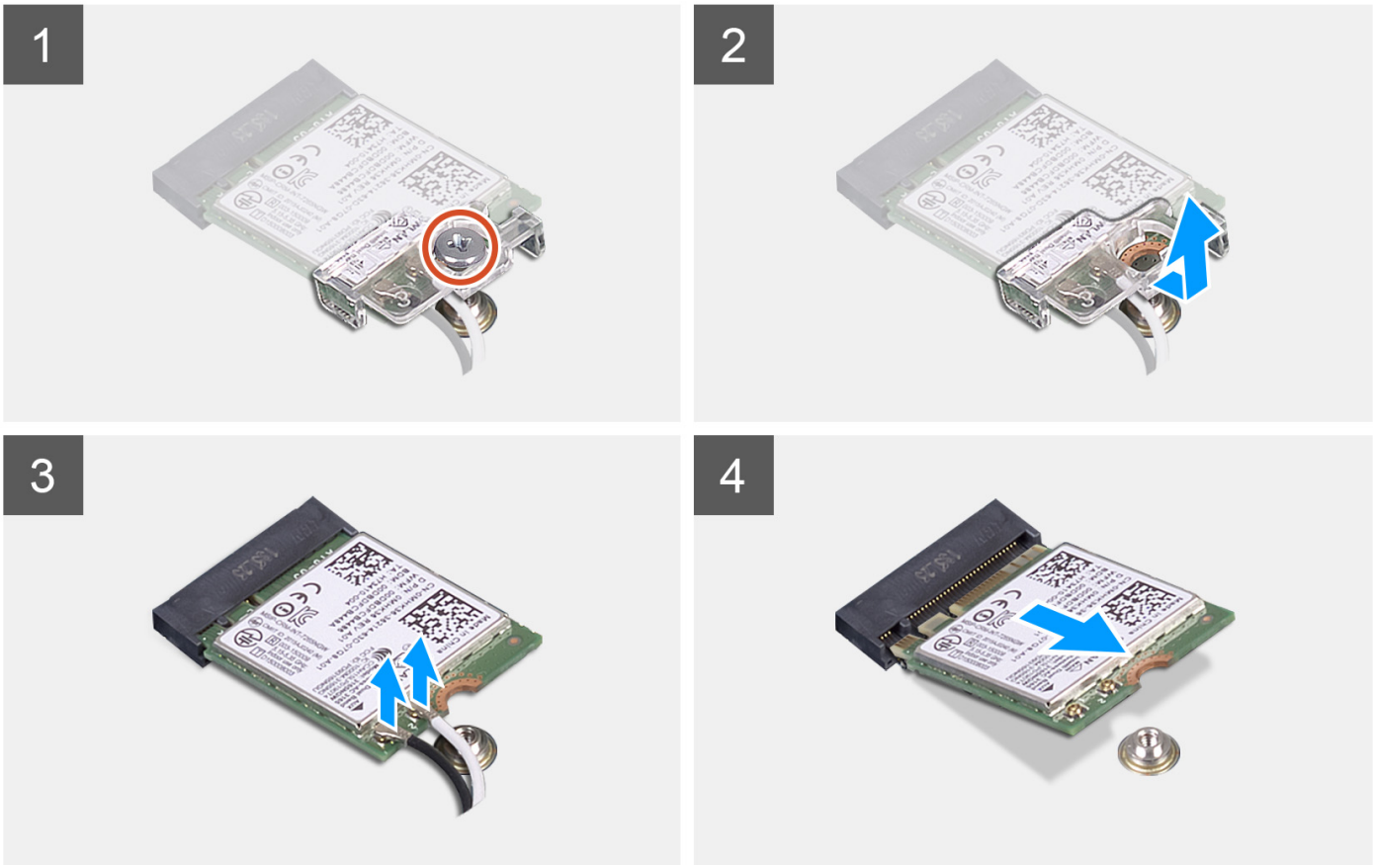
About this task

The following images indicate the location of the wireless card and provide a visual representation of the removal procedure.



1x
M2x3.5





Steps

1. Remove the screw (M2x3) that secures the wireless card to the system board.
2. Slide and lift the wireless-card bracket off the wireless card.
3. Disconnect the antenna cables from the wireless card.
4. Slide and remove the wireless card at an angle from the wireless-card slot.

Installing the WLAN card

Prerequisites

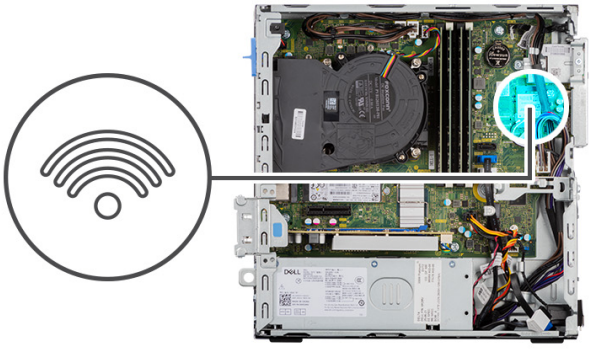
If you are replacing a component, remove the existing component before performing the installation procedure.

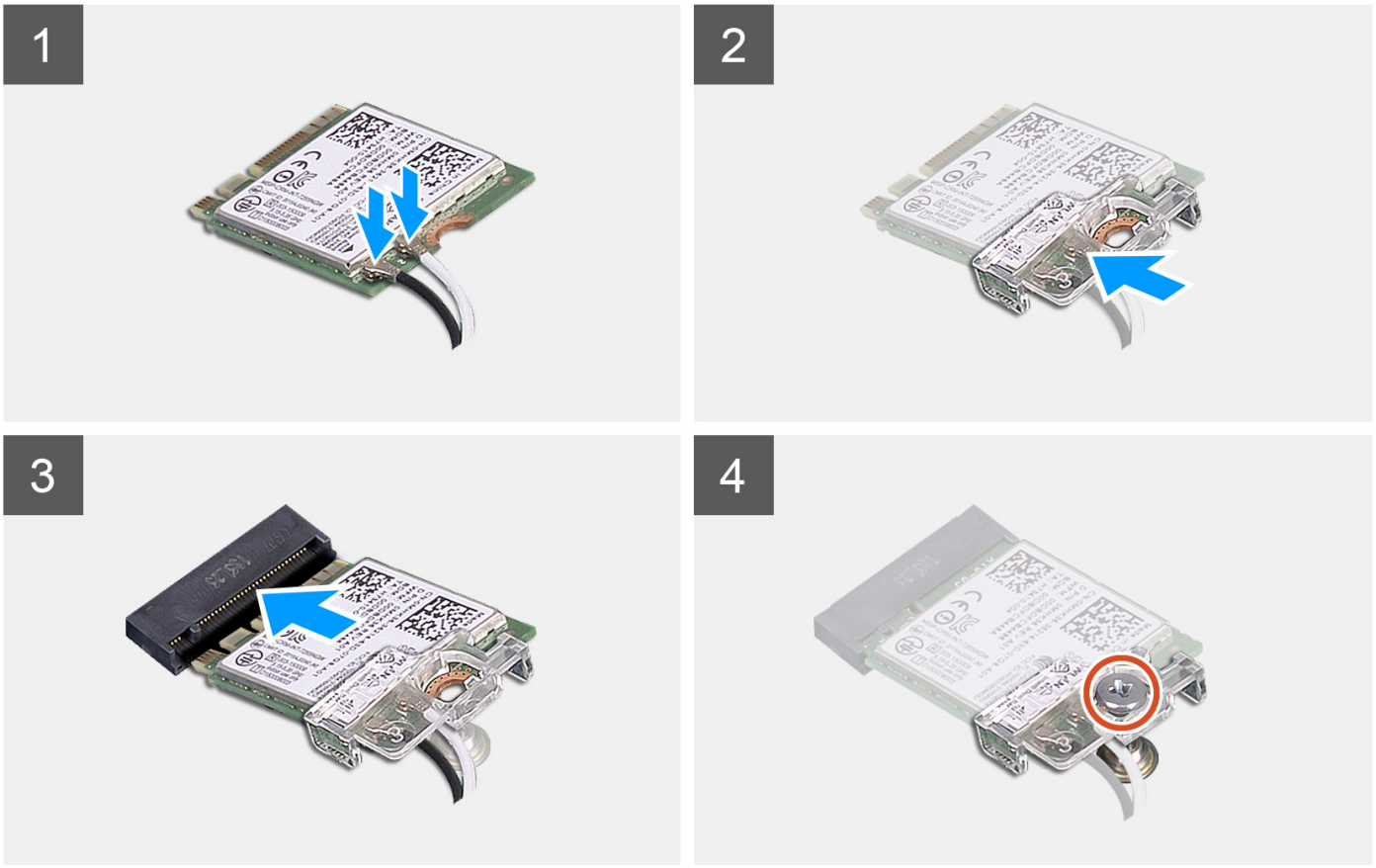
About this task

The following image indicates the location of the wireless card and provides a visual representation of the installation procedure.



1x
M2x3.5





Steps

1. Connect the antenna cables to the WLAN card.
   The following table provides the antenna-cable color scheme for the WLAN card of your computer.

Table 3. Antenna-cable color scheme

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

2. Slide and place the wireless-card bracket on the wireless card.
3. Align the notch on the wireless card with the tab on the wireless-card slot.
4. Slide the wireless card at an angle into the wireless-card slot.
5. Replace the screw (M2x3) that secures the wireless card to the system board.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

WLAN antenna

Removing the internal WLAN antenna

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.
7. Remove the WLAN card.

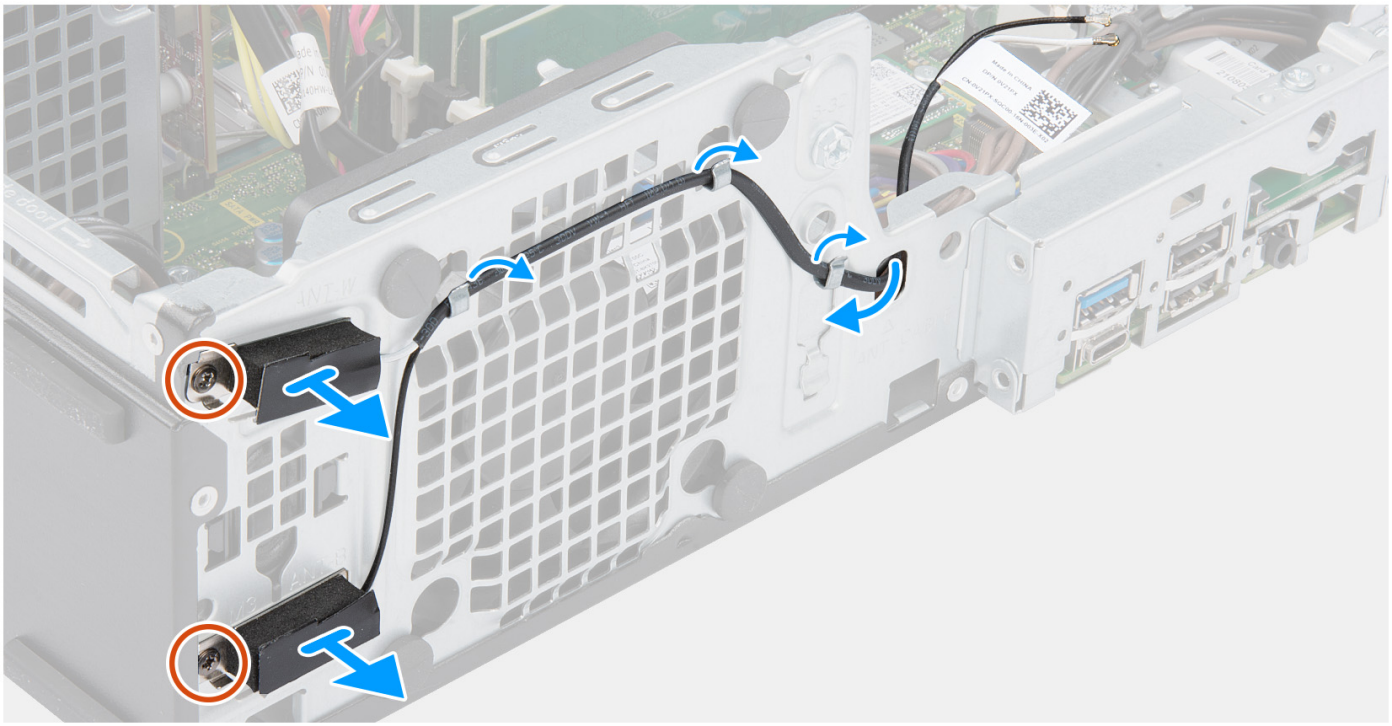
About this task

The following images indicate the location of the internal WLAN antenna and provide a visual representation of the removal procedure.



2x
M3x3





Steps

1. Remove the antenna cables from the routing guides on the chassis.
2. Remove the two (M3x3) screws that secures the WLAN antenna to the chassis.
3. Lift and remove the WLAN antenna from the chassis.

Installing the WLAN antenna

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

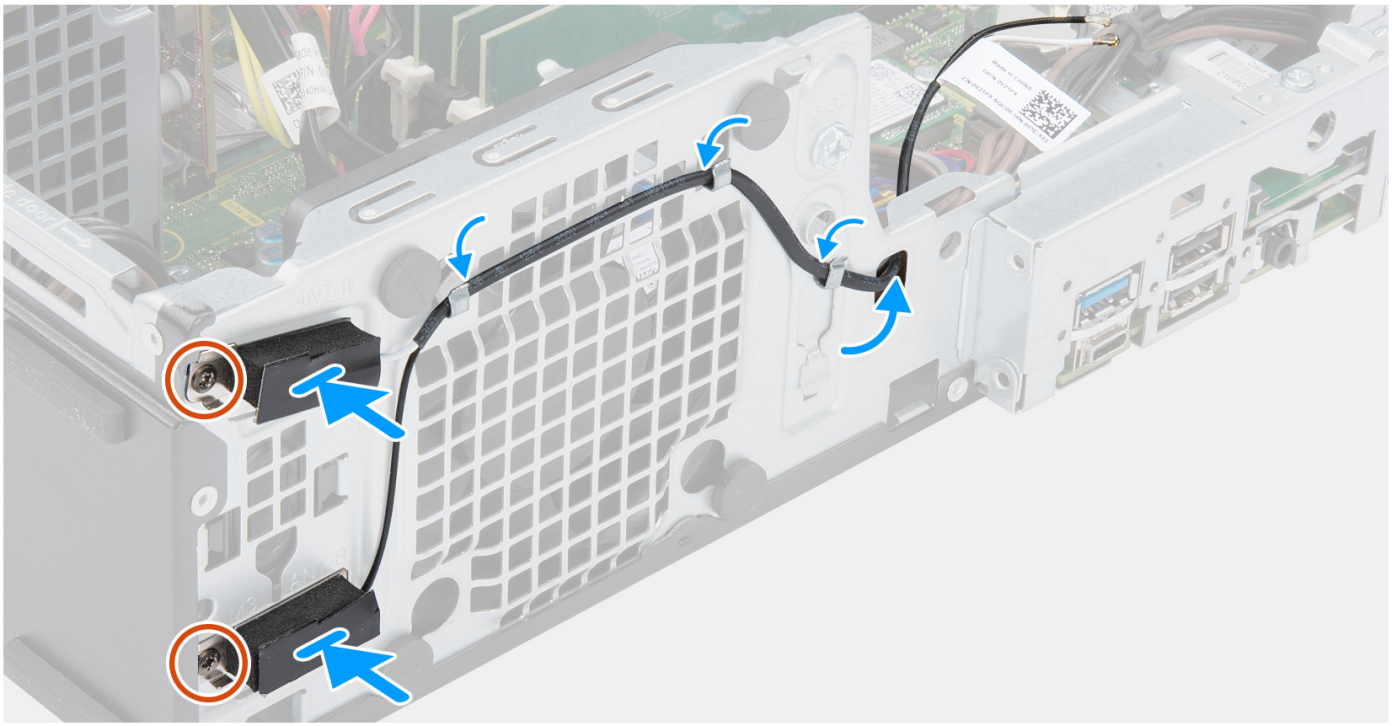
About this task

The following image indicates the location of the WLAN antenna and provides a visual representation of the installation procedure.



2x
M3x3





Steps

1. Route the WLAN antenna cables through the routing guides on the chassis.
2. Place and align the screw holes on the WLAN antenna with the screw holes on the chassis
3. Replace the two (M3x3) screws to secure the WLAN antenna to the chassis.

Next steps

1. Install the disk-drive cage.
2. Install the WLAN card.
3. Install the 3.5-inch hard-drive.
4. Install the 2.5-inch hard-drive.
5. Install the front bezel.
6. Install the side cover.
7. Follow the procedure in after working inside your computer.

WLAN antennas (External)

Removing the external WLAN antenna

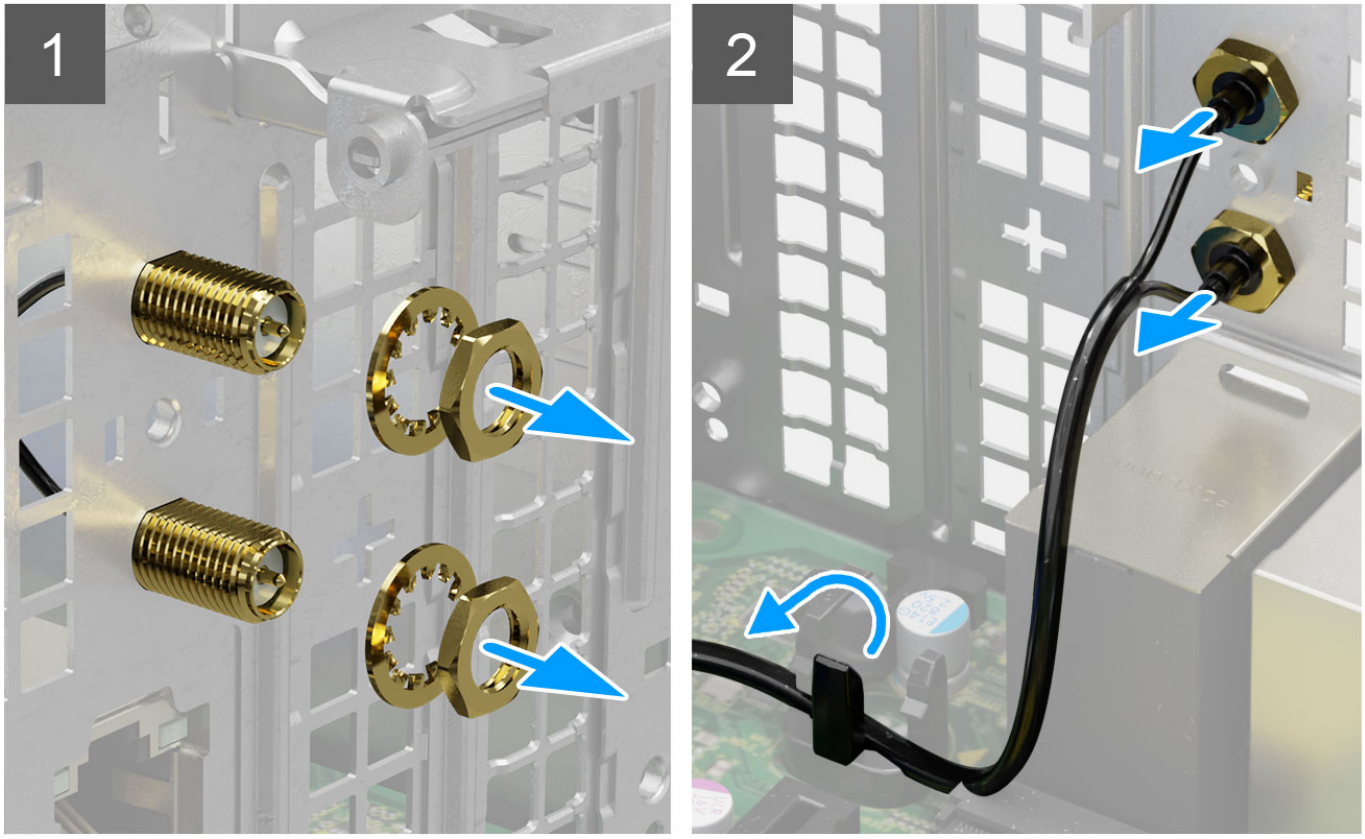
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.
7. Remove the WLAN card.

About this task

The following images indicate the location of the external WLAN antennas and provide a visual representation of the removal procedure.





Steps

1. Remove the nut and washer from the two antenna heads.
2. Gently pry and remove the antenna heads from the chassis.
3. Remove the antenna cables from routing point on the system board.
4. Lift and remove the antenna-module from the system.

Installing the external WLAN antenna

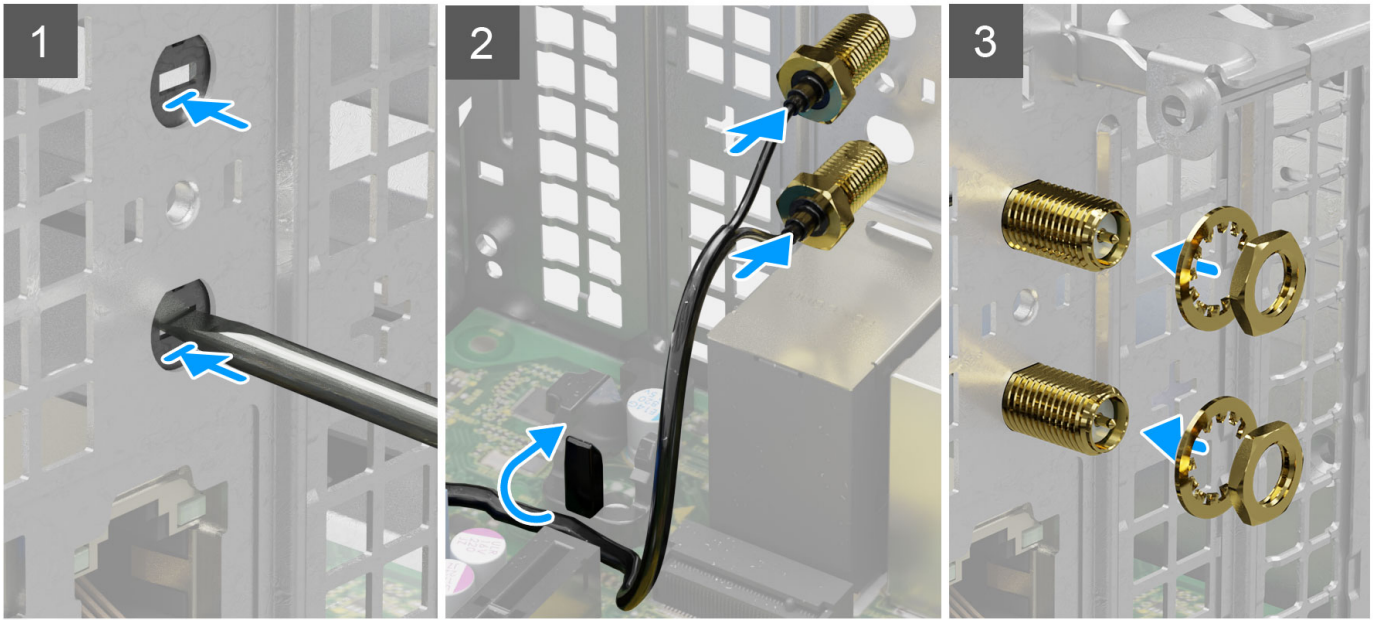
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the WLAN antennas and provide a visual representation of the installation procedure.





Steps

1. Push and remove the antenna cover from the chassis using a screwdriver.

   NOTE: This step is only applicable when the system is being upgraded to have an external WLAN antenna.

2. Route the antenna cables through the routing guides on the system board.
3. Push the antenna-modules in to the slot on the back panel of the chassis.
4. Install the nut and washer to secure the antenna-modules to the chassis.

Next steps

1. Install the disk-drive cage.
2. Install the WLAN card.
3. Install the 3.5-inch hard-drive.
4. Install the 2.5-inch hard-drive.
5. Install the front bezel.
6. Install the side cover.
7. Follow the procedure in after working inside your computer.

Memory

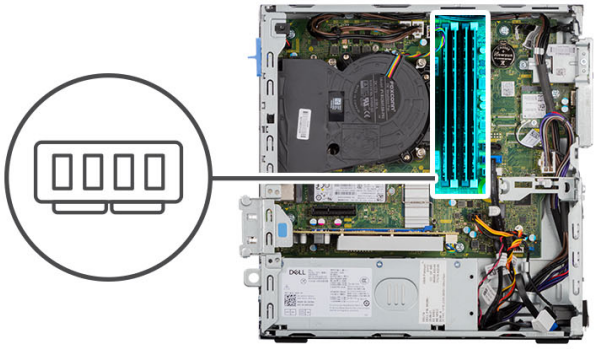
Removing the memory

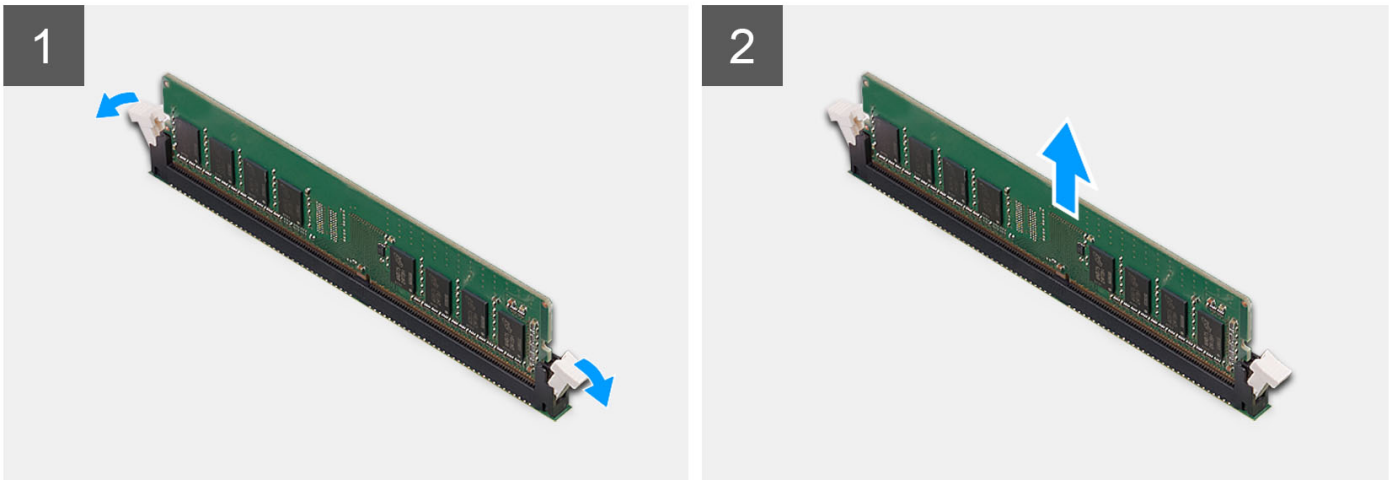
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the 2.5-inch hard-drive.
4. Remove the 3.5-inch hard-drive.
5. Remove the disk-drive cage.

About this task

The following images indicate the location of the memory modules and provide a visual representation of the removal procedure.





Steps

1. Carefully spread apart the securing-clips on each end of the memory-module slot.
2. Grasp the memory module near the securing clip, and then gently ease the memory module out of the memory-module slot.

CAUTION: To prevent damage to the memory module, hold the memory module by the edges. Do not touch the components on the memory module

NOTE: Repeat step 1 to step 2 to remove any other memory modules installed in your computer.

NOTE: Note the slot and the orientation of the memory module in order to replace it in the correct slot.

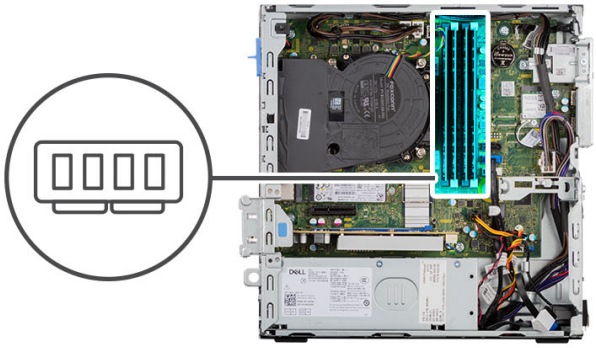
Installing the memory

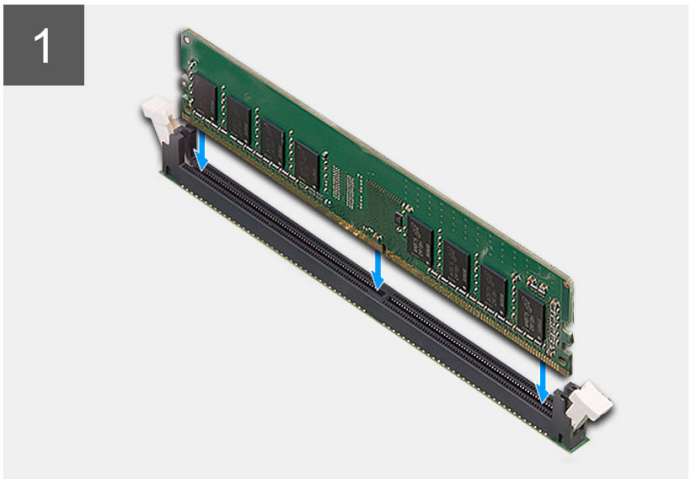
Prerequisites

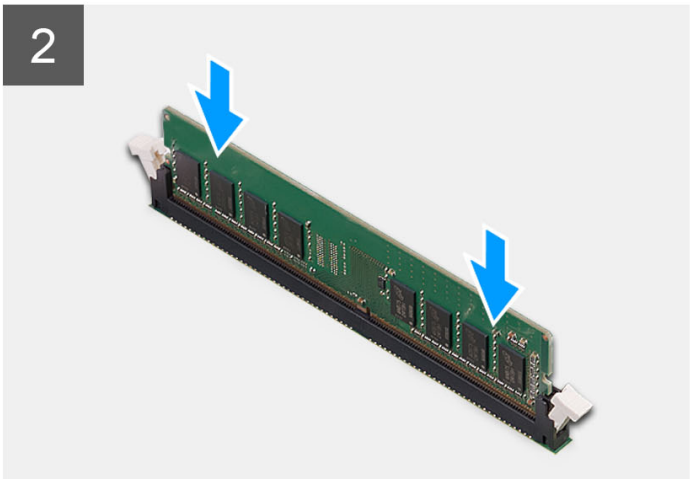
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the memory and provide a visual representation of the installation procedure.







Steps

1. Ensure that the securing clips are in an open position.
2. Align the notch on the memory module with the tab on the memory-module slot.
3. Press down on the memory module until the memory module snaps into position and the securing clip locks in place.

CAUTION: To prevent damage to the memory module, hold the memory module by the edges. Do not touch the components on the memory module.

NOTE: Repeat step 1 to step 3 when installing more than one memory module in your computer.

Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the side cover.
5. Follow the procedure in after working inside your computer.

Fan assembly

Removing the fan assembly

Prerequisites

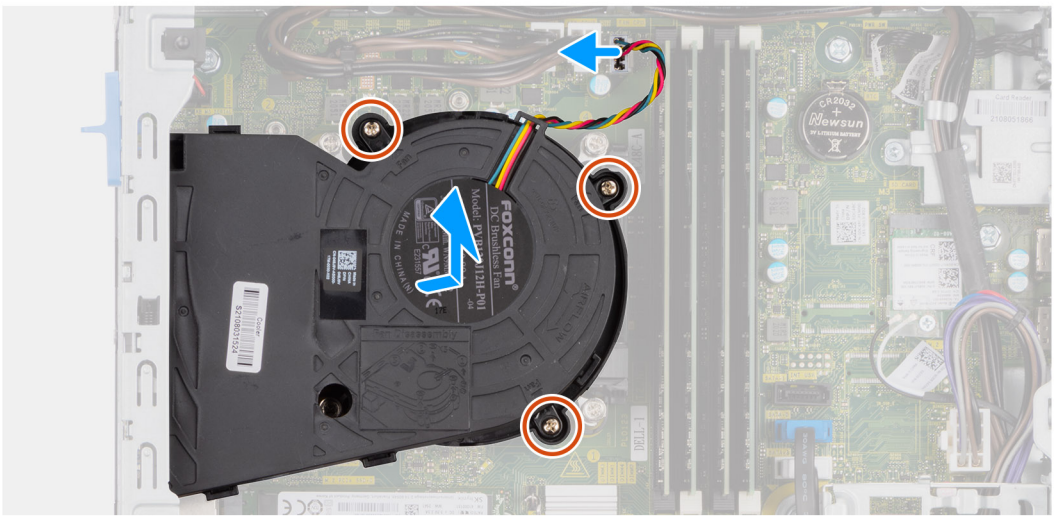
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the disk-drive cage.

About this task

The following images indicate the location of the fan assembly and provide a visual representation of the removal procedure.







Steps

1. Disconnect the processor-fan cable from the connector on the system board.
2. Loosen the three (M3) captive screws that secure the fan assembly to the heat sink assembly.
3. Lift the fan assembly from the heat sink assembly.

Installing the fan assembly

Prerequisites

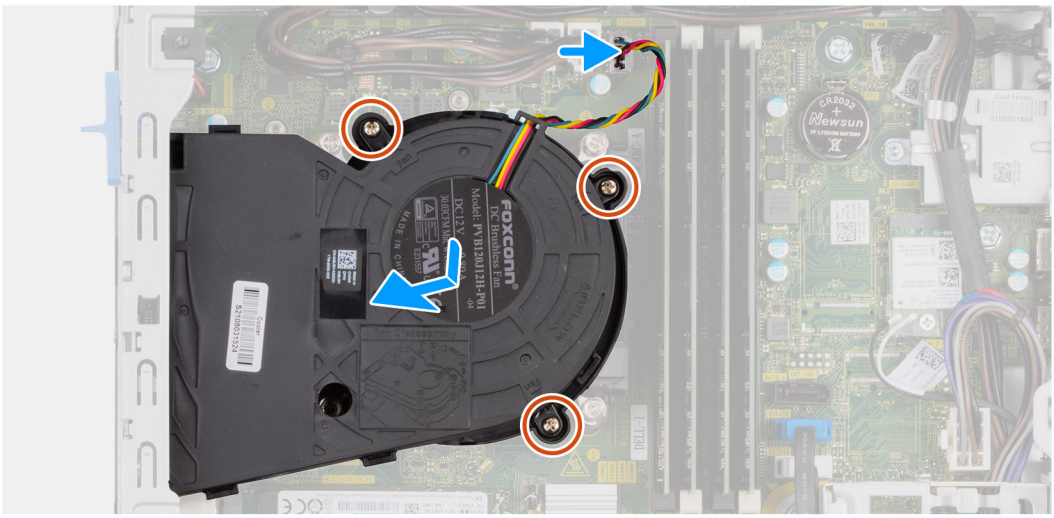
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the fan assembly and provides a visual representation of the installation procedure.







Steps

1. Place the fan assembly on the heat sink assembly and align the screw holes.
2. Tighten the three (M3) captive screws that secure the fan assembly to the heat sink assembly.
3. Connect the processor-fan cable to the system board.

Next steps

1. Install the disk-drive cage.
2. Install the front bezel.
3. Install the side cover.
4. Follow the procedure in after working inside your computer.

Processor heat-sink assembly

Removing the processor heat-sink assembly

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the disk-drive cage.

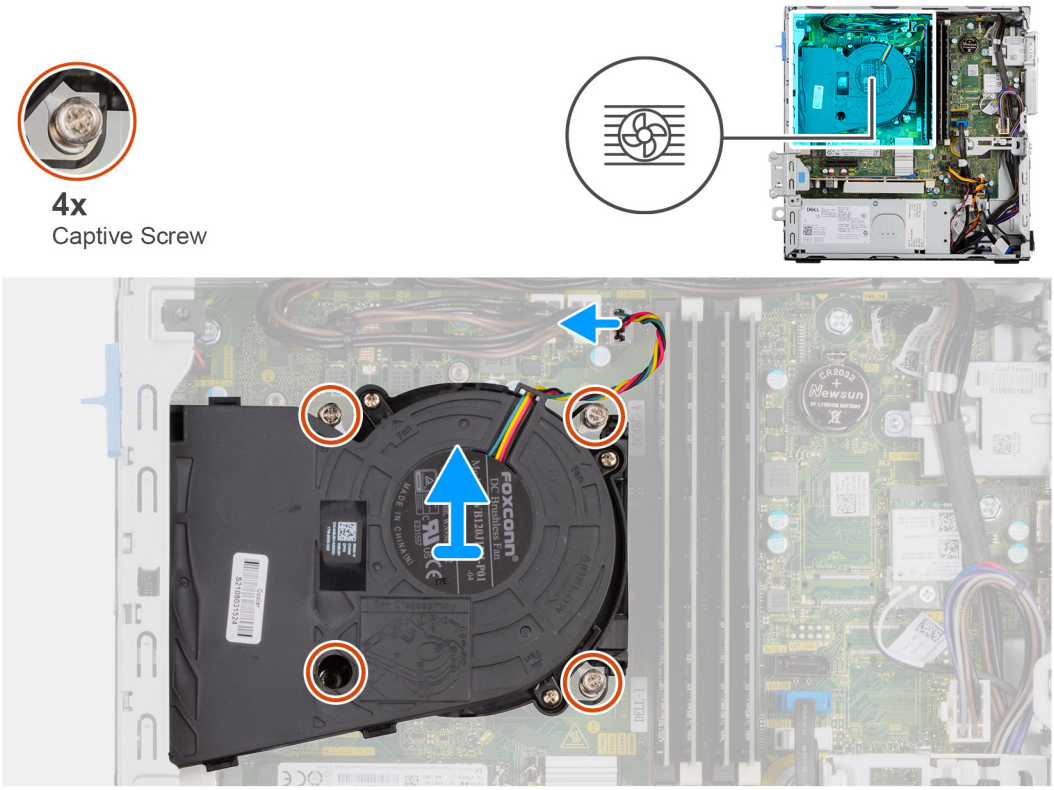
About this task

The following images indicate the location of the processor heat-sink assembly and provide a visual representation of the removal procedure.

NOTE: The processor heat-sink assembly consists of the fan assembly and the processor-heat sink. When the processor-heat sink needs to be replaced, remove the entire processor heat-sink assembly and install a new processor heat-sink assembly.

NOTE: The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

NOTE: For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.



Steps

1. Disconnect the processor-fan cable from the connector on the system board.
2. Loosen the four captive screws that secure the processor and heat-sink assembly to the system board.
3. Lift the processor heat-sink assembly from the chassis.

Installing the processor heat-sink assembly

Prerequisites

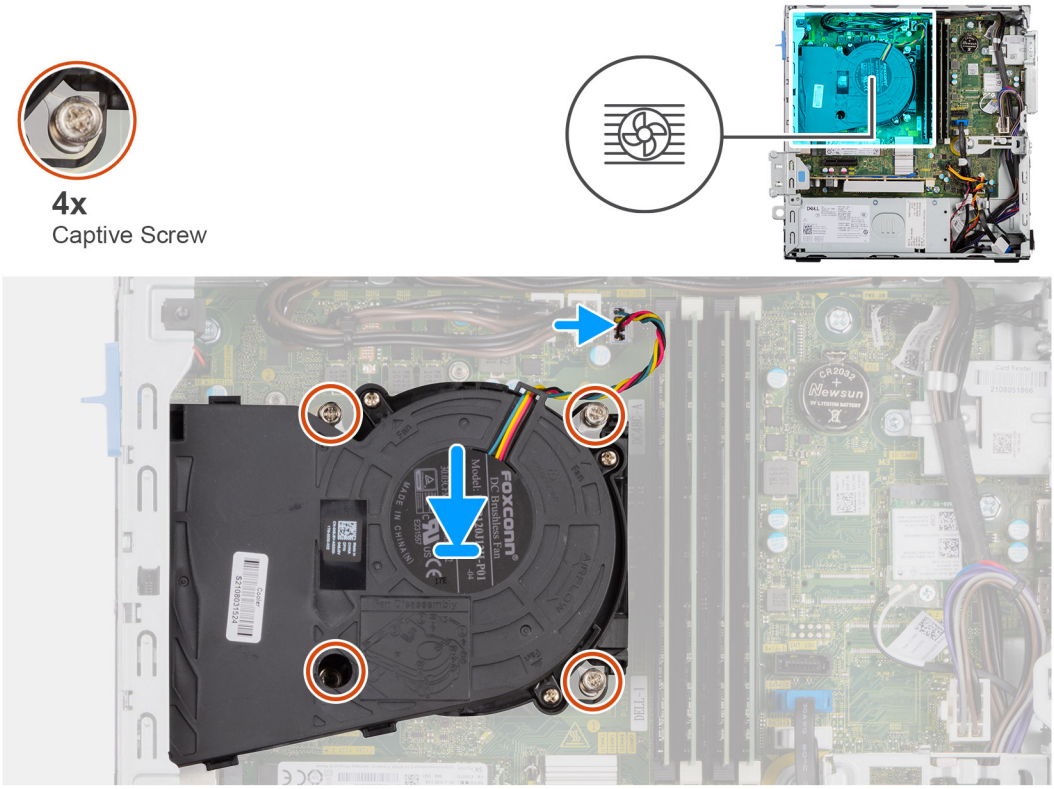
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the processor heat-sink assembly and provides a visual representation of the installation procedure.

NOTE: The processor heat-sink assembly consists of the fan assembly and the processor-heat sink.

NOTE: If either the processor or the heat-sink assembly is replaced, use the thermal grease that is provided in the kit to ensure that thermal conductivity is achieved.



Steps

1. Place the processor heat-sink assembly on the system board and align the captive screws to the screw holes on the system board.
2. Tighten the four captive screws that secure the heat sink to the system board.
3. Connect the processor-fan cable to the system board.

Next steps

1. Install the disk-drive cage.
2. Install the front bezel.
3. Install the side cover.
4. Follow the procedure in after working inside your computer.

Voltage-regulator heat sink

Removing the voltage-regulator heat sink

Prerequisites

1. Follow the procedure in before working inside your computer.

WARNING: The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

CAUTION: For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

2. Remove the side cover.
3. Remove the front bezel.
4. Remove the disk-drive cage.

5. Remove the fan assembly.

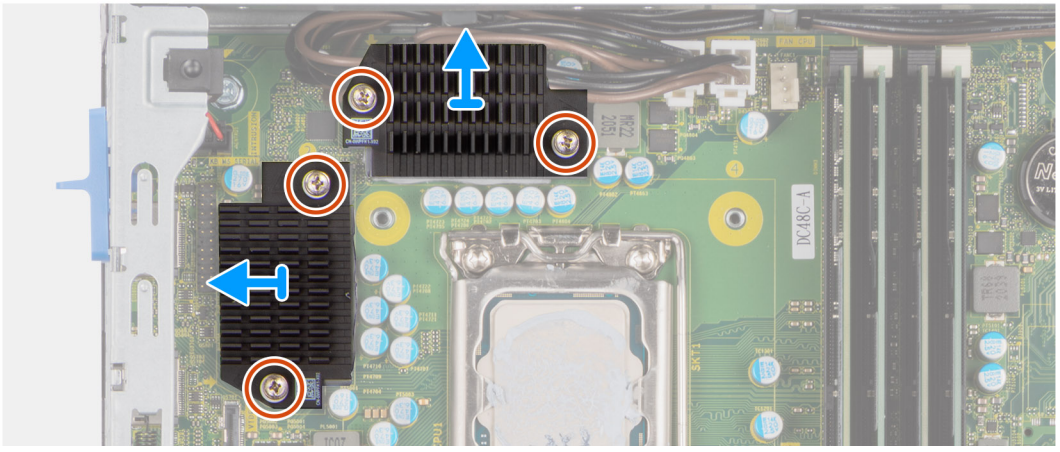
About this task

The following image indicates the location of the voltage-regulator heat sink and provide a visual representation of the removal procedure.



4x
Captive Screw





Steps

1. Loosen the four captive screws that secure the voltage-regulator heat sink to the system board.
2. Lift the voltage-regulator heat sink off the system board.

Installing the voltage-regulator heat sink

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

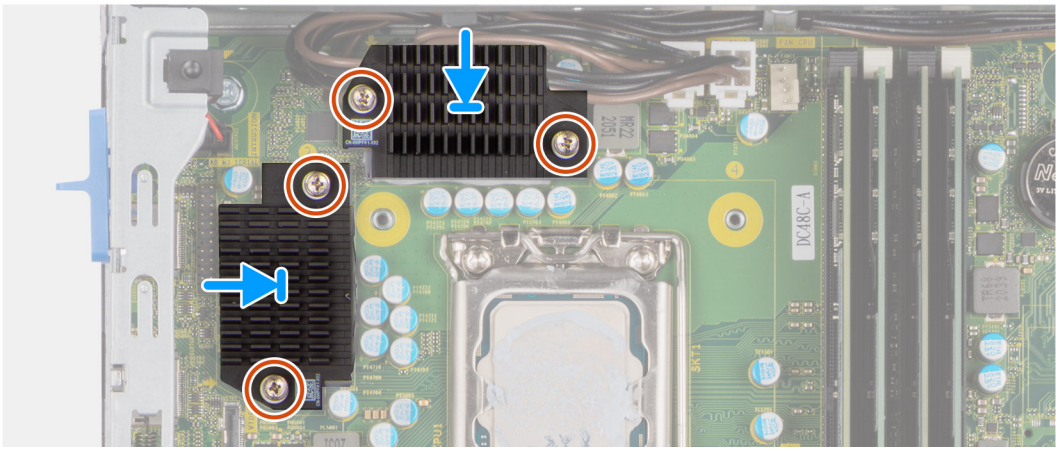
About this task

The following image indicates the location of the voltage-regulator heat sink and provide a visual representation of the installation procedure.



4x
Captive Screw





Steps

1. Place the voltage-regulator heat sink on the system board.
2. Align the captive screws on the voltage-regulator heat sink to the screw holes on the system board.
3. Tighten the four captive screws that secure the voltage-regulator heat stink to the system board.

Next steps

1. Install the fan assembly.
2. Install the disk-drive cage.
3. Install the front bezel.
4. Install the side cover.
5. Follow the procedure in after working inside your computer.

Processor

Removing the processor

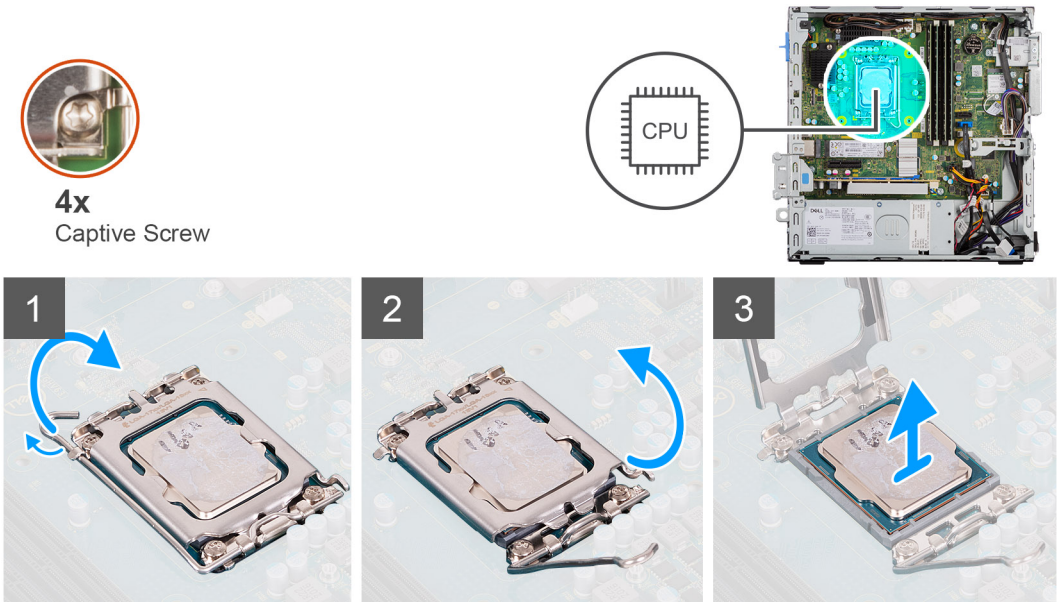
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the 2.5-inch hard-drive.
4. Remove the 3.5-inch hard-drive.
5. Remove the disk-drive cage.
6. Remove the processor heat-sink assembly.

NOTE: The processor may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

About this task

The following images indicate the location of the processor and provide a visual representation of the removal procedure.



Steps

1. Press the release lever down and then push it away from the processor to release it from the securing tab.
2. Extend the release lever completely and open the processor cover.

   CAUTION: When removing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

3. Gently lift the processor from the processor socket.

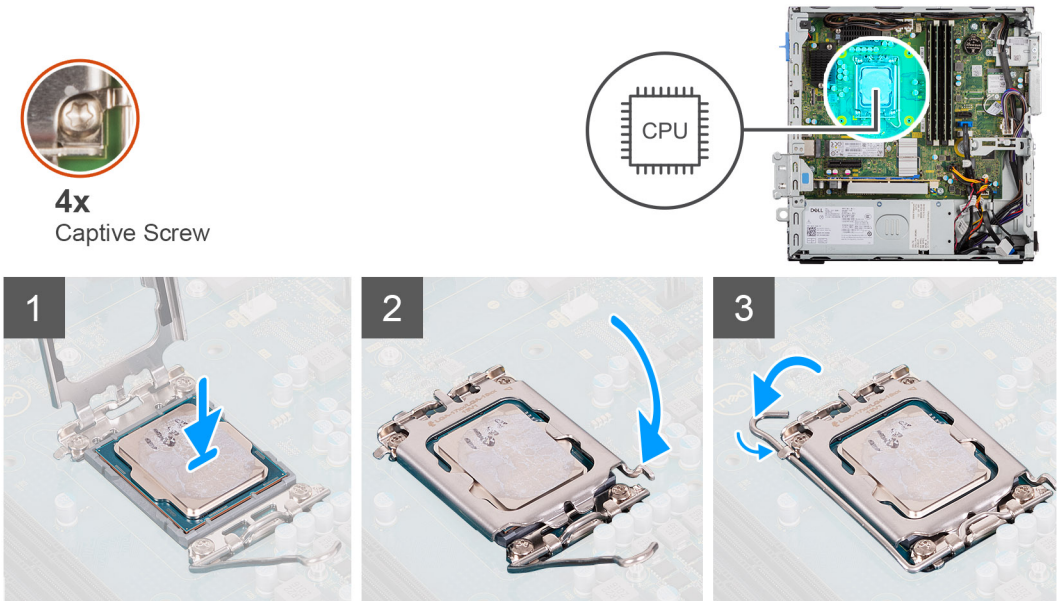
Installing the processor

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the processor and provides a visual representation of the installation procedure.



Steps

1. Ensure that the release lever on the processor socket is fully extended in the open position.
2. Align the notches on the processor with the tabs on the processor socket and place the processor in the processor socket.

   NOTE: Ensure that the processor-cover notch is positioned underneath the alignment post.

   NOTE: The pin-1 corner of the processor has a triangle that aligns with the triangle on the pin-1 corner on the processor socket. When the processor is properly seated, all four corners are aligned at the same height. If one or more corners of the processor are higher than the others, the processor is not seated properly.

3. When the processor is fully seated in the socket, pivot the release-lever down and place it under the tab on the processor cover.

Next steps

1. Install the processor heat-sink assembly.
2. Install the disk-drive cage.
3. Install the 3.5-inch hard-drive.
4. Install the 2.5-inch hard-drive.
5. Install the front bezel.
6. Install the side cover.
7. Follow the procedure in after working inside your computer.

Expansion card

Removing the graphics card

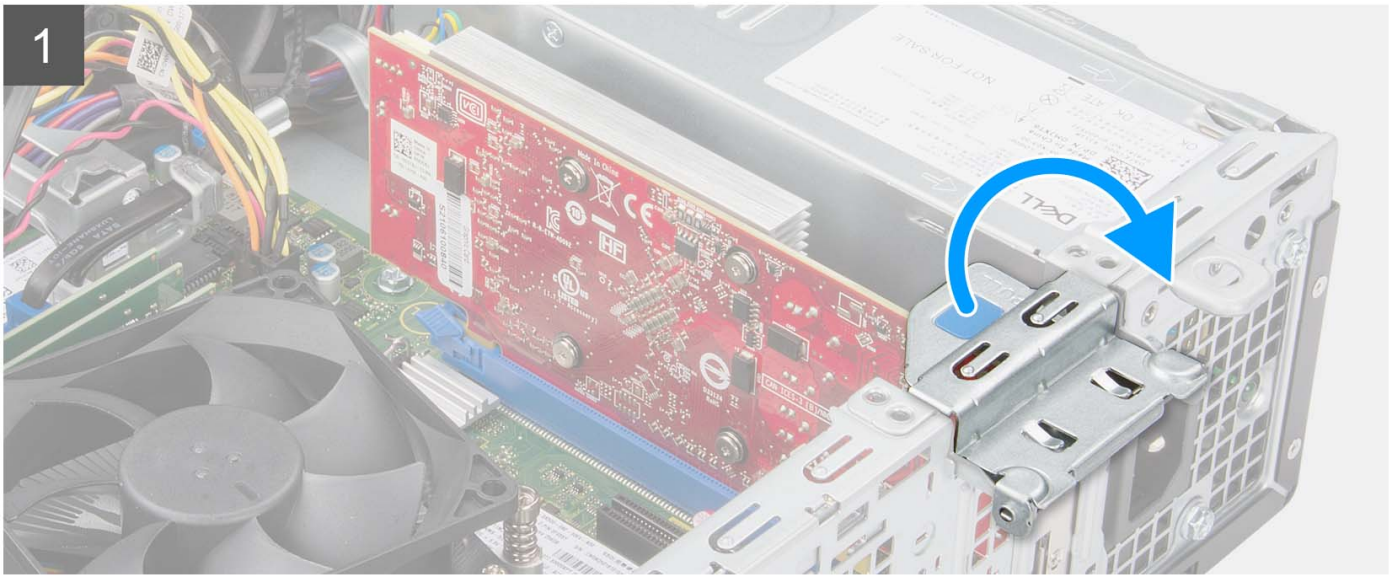
Prerequisites

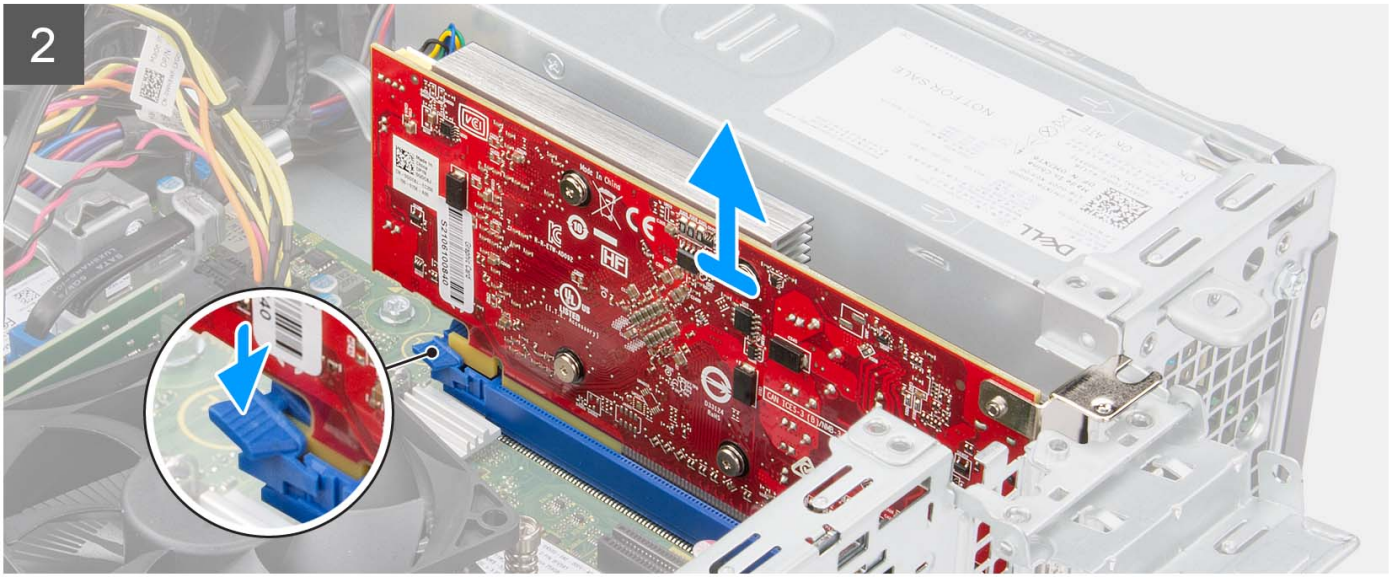
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

About this task

The following images indicate the location of the graphics card and provide a visual representation of the removal procedure.







Steps

1. Using the tab, lift and open the PCIe door.
2. Push and hold the securing tab on the graphics-card slot and lift the graphics card from the PCIe x16 card slot.
3. Lift the graphics card off the system board.

Installing the graphics card

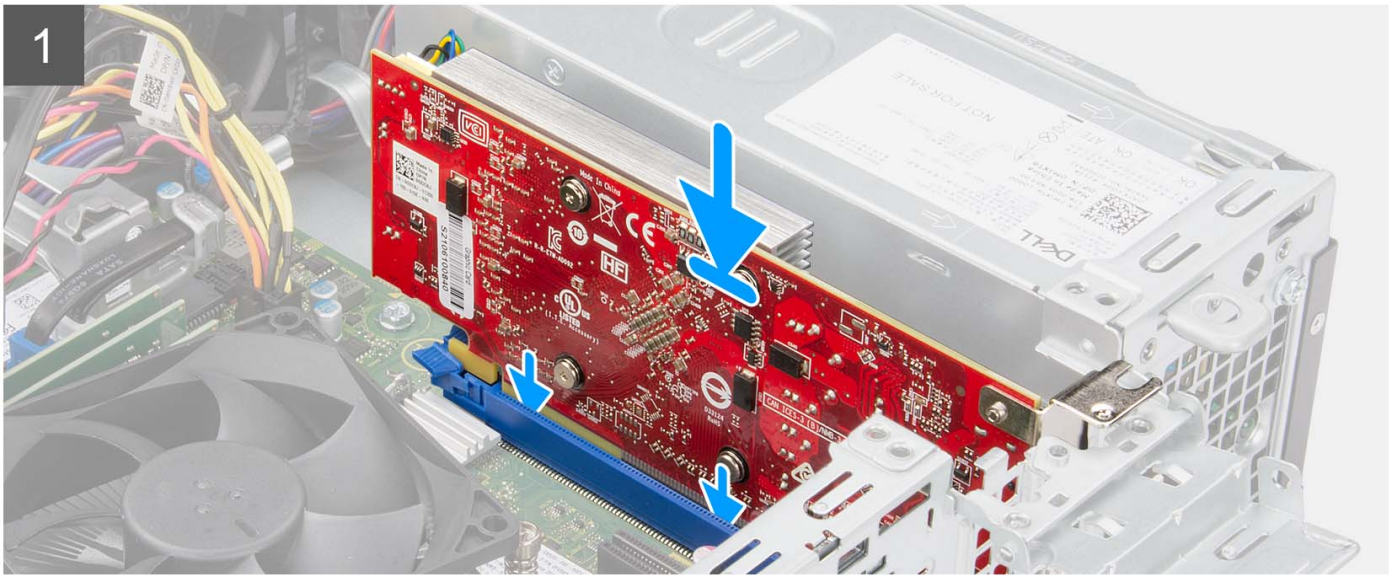
Prerequisites

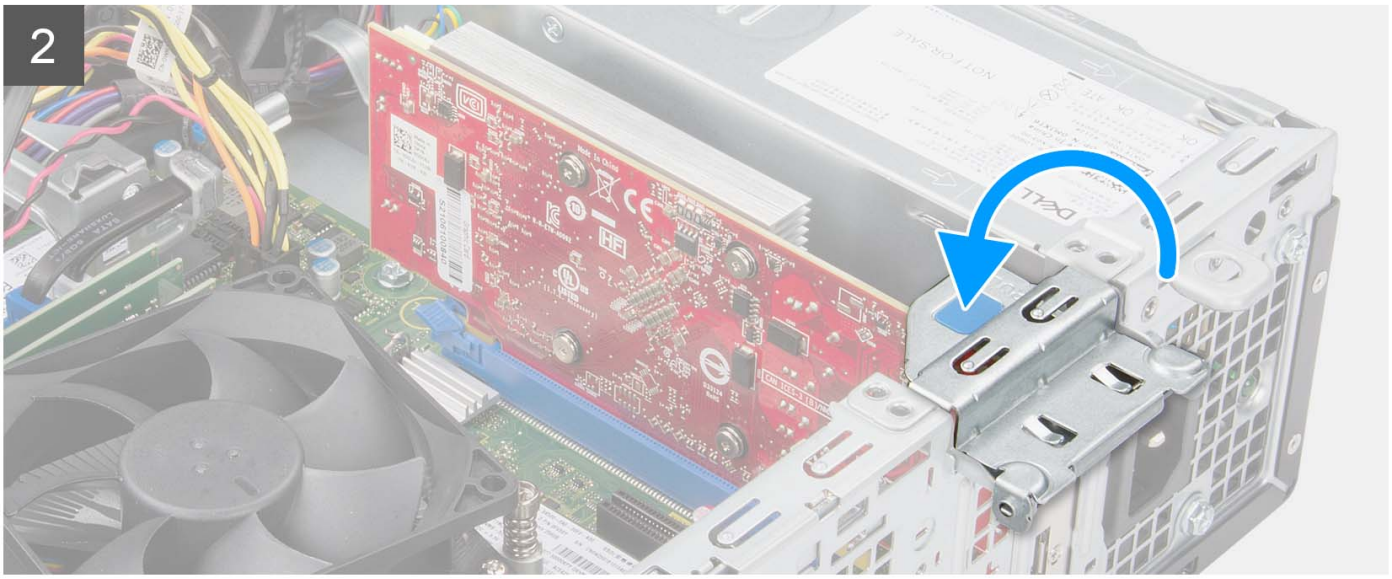
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the graphics card and provides a visual representation of the installation procedure.







Steps

1. Align the graphics card with the PCIe x16 card slot on the system board.
2. Using the alignment post on the PCIe slot, connect the card in the connector and press down firmly. Ensure that the card is firmly seated.
3. Close the PCIe door.

Next steps

1. Install the side cover.
2. Follow the procedure in after working inside your computer.

Removing the Dell Ultra Speed Drive Gen 4 card

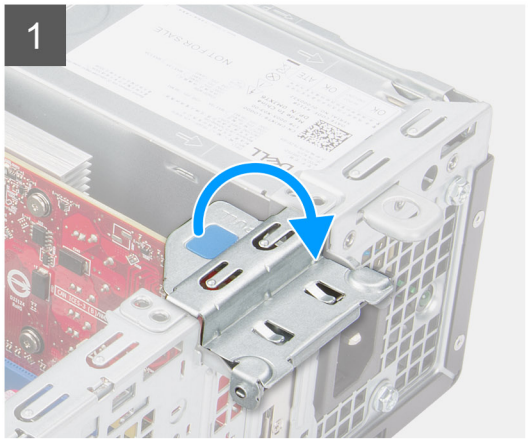
Prerequisites

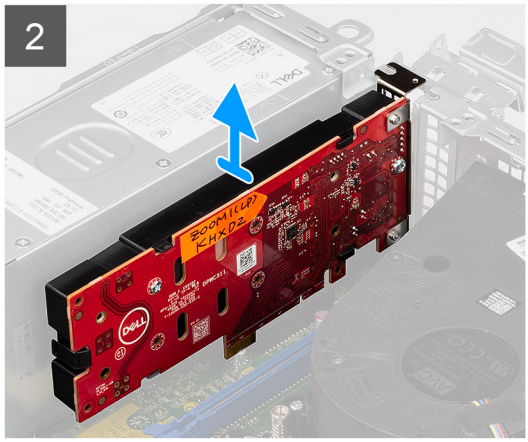
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

About this task

The following images indicate the location of the Dell Ultra Speed Drive Gen 4 card and provide a visual representation of the removal procedure.







Steps

1. Lift the pull tab and open the expansion-card door.
2. Push and hold the securing tab on the PCIe slot and lift the Dell Ultra Speed Drive Gen 4 card from the PCIe x4 card slot.

Installing the Dell Ultra Speed Drive Gen 4 card

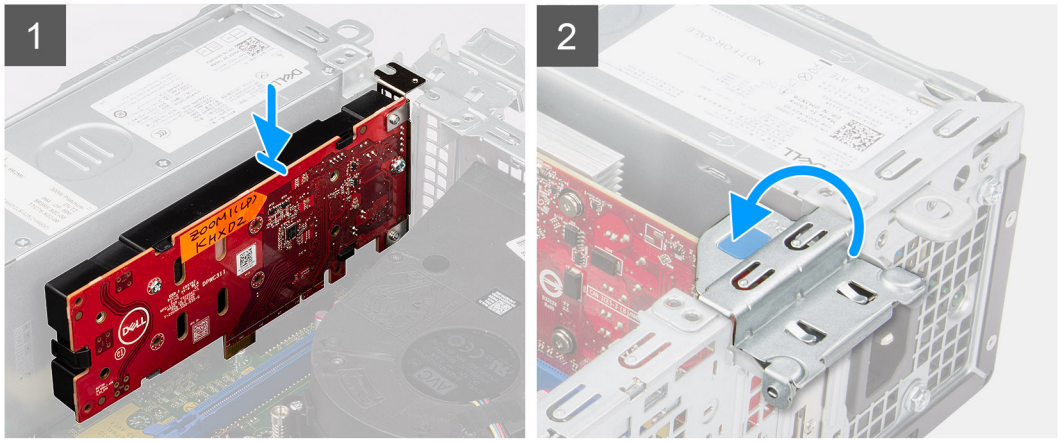
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the Dell Ultra Speed Drive Gen 4 card and provides a visual representation of the installation procedure.





Steps

1. **NOTE:** The Dell Ultra Speed Drive Gen4 card must be installed in the PCIe x4 slot.

   Align the Dell Ultra Speed Drive Gen 4 card with the PCIe x4 card slot on the system board.
2. Using the alignment post, connect the card in the connector and press down firmly.
3. Ensure that the card is firmly seated.
4. Close the expansion-card door, and press until it clicks into place.

Next steps

1. Install the side cover.
2. Follow the procedure in after working inside your computer.

Optional I/O modules (PS2/Serial)

Removing PS2 module

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the fan assembly.

About this task

The following images indicate the location of the PS2 module and provide a visual representation of the removal procedure.

Steps

1. Lift the pull tab and open the expansion-card door.
2. Disconnect the PS2 module cable from the connector on the system board.
3. Lift the PS2 module off the system board.

Installing PS2 module

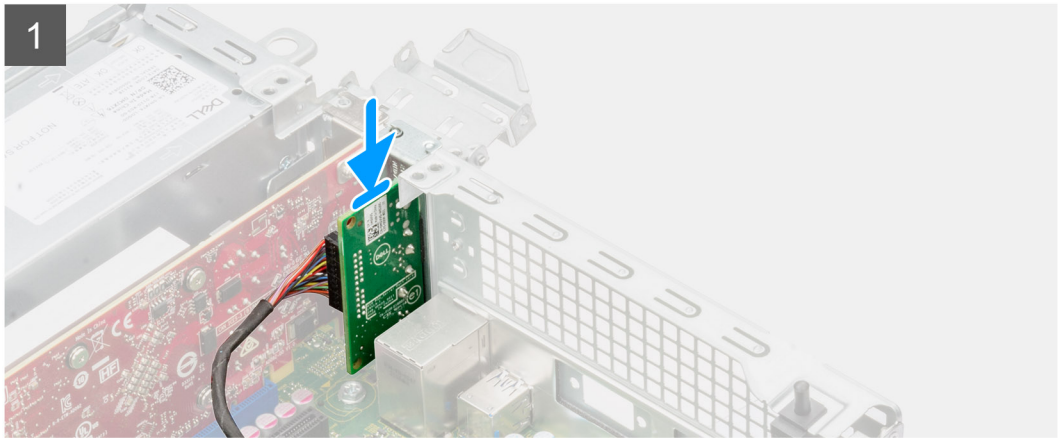
Prerequisites

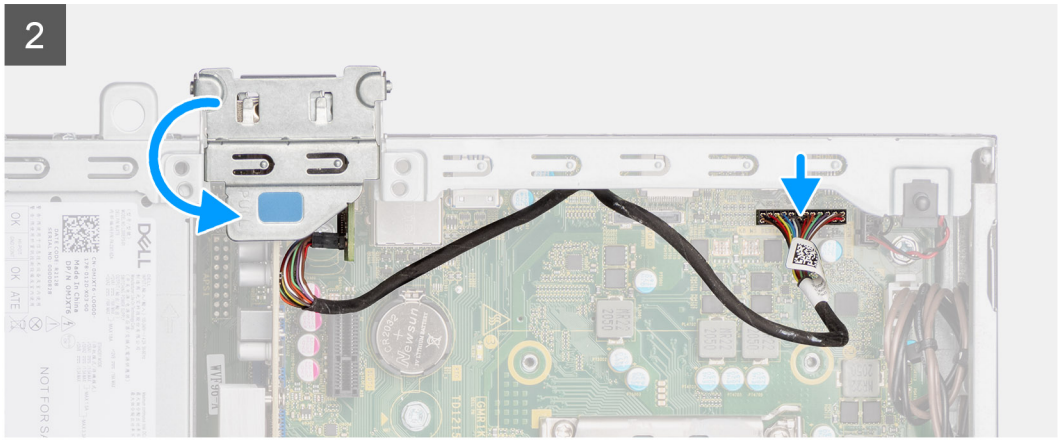
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the PS2 module and provide a visual representation of the installation procedure.







Steps

1. Insert the PS2 module into its slot on the chassis.
2. Connect the PS2-module cable to the connector on the system board.
3. Close the expansion-card door, and press until it clicks into place.

Next steps

1. Install the fan assembly.
2. Install the side cover.
3. Follow the procedure in after working inside your computer.

Optional I/O modules (VGA/HDMI/DP/USB Type-C)

Removing optional I/O module

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the fan assembly.

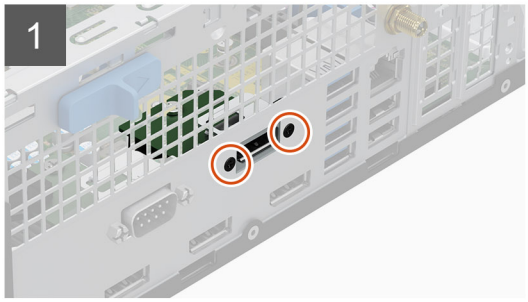
About this task

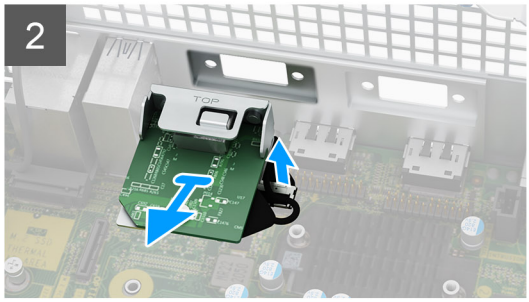
The following images indicate the location of the optional I/O module and provide a visual representation of the removal procedure.

NOTE: The removal procedure for the DP/HDMI/USB Type-C/VGA optional modules are the same.





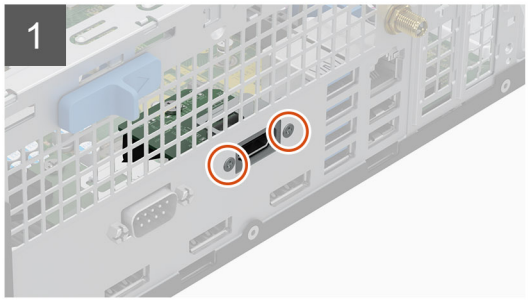


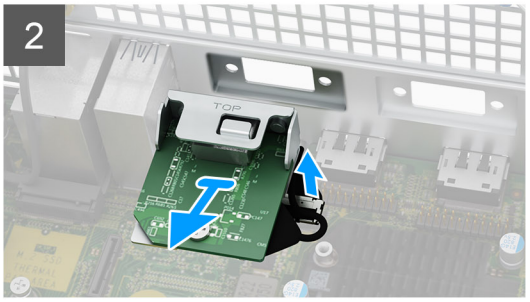




2x
M3x3



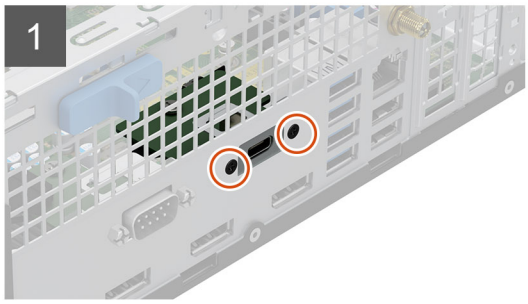


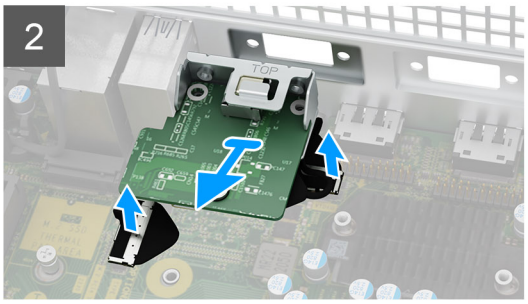




2x
M3x3



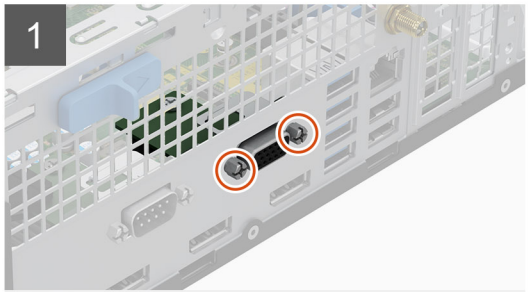


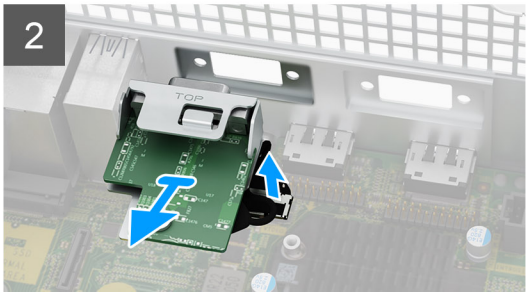




2x







Steps

1. Remove the two (M3x3) screws that secure the I/O module to the chassis.

NOTE: For a VGA module, the screws are attached to the connector.

2. Disconnect the I/O-module cable from the connector on the system board.
3. Remove the I/O module from the computer.

Installing optional I/O module

Prerequisites

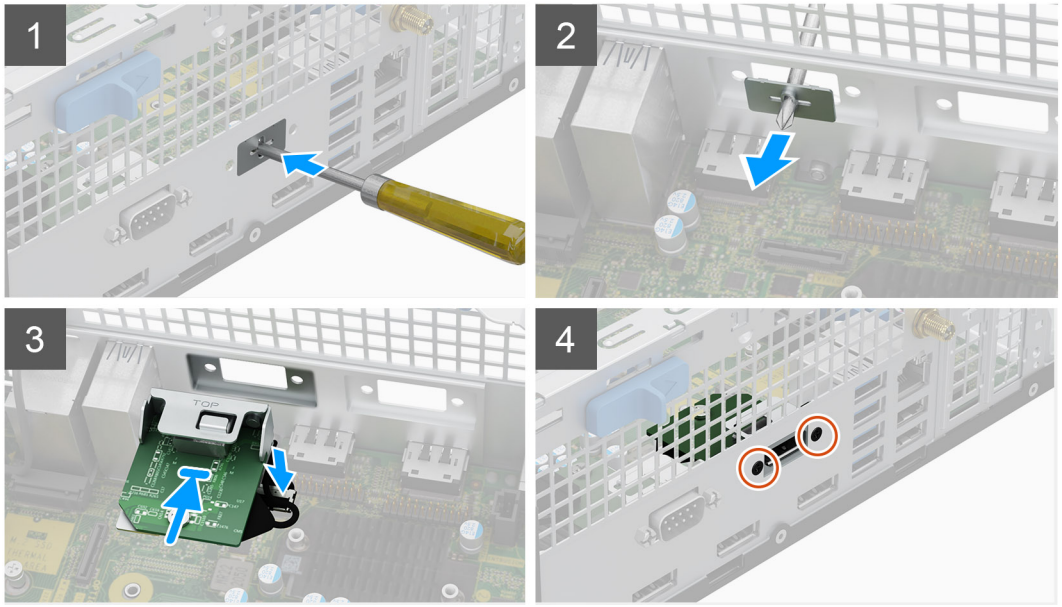
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the optional I/O module and provide a visual representation of the installation procedure.



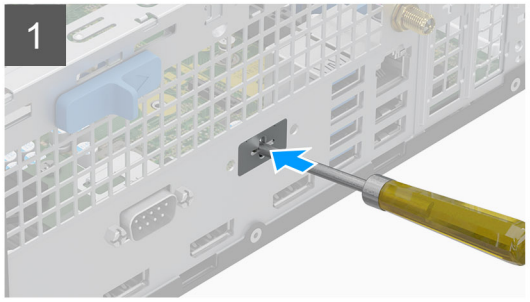


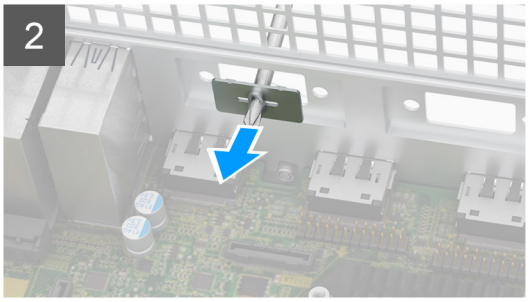


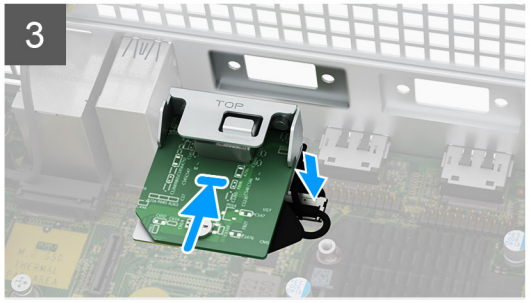


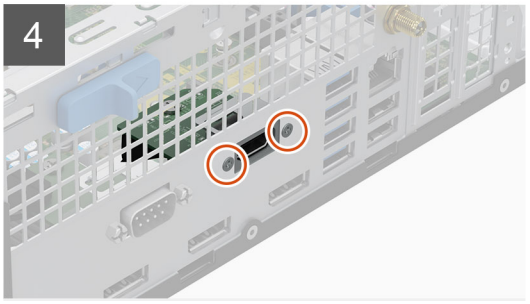
2x
M3x3







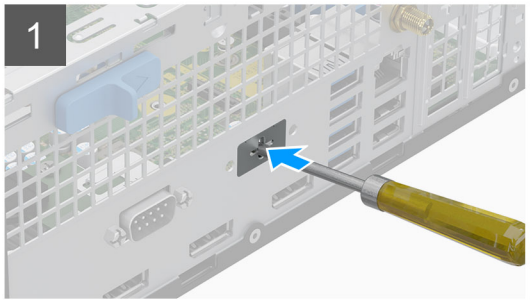


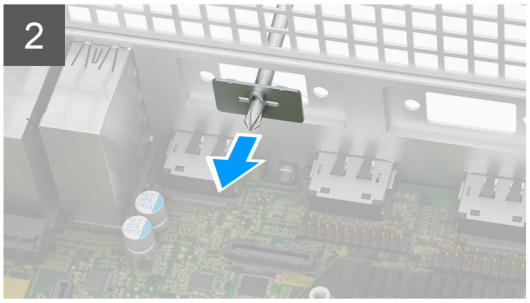


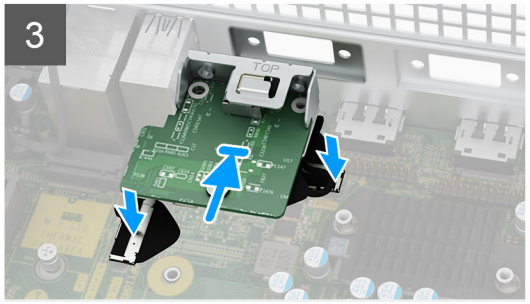


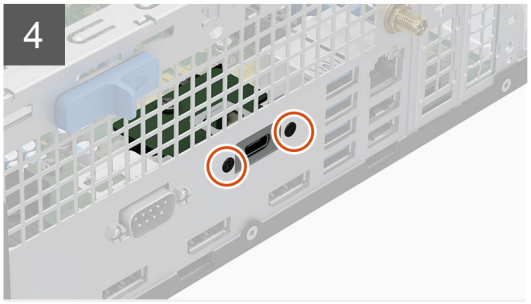
2x
M3x3





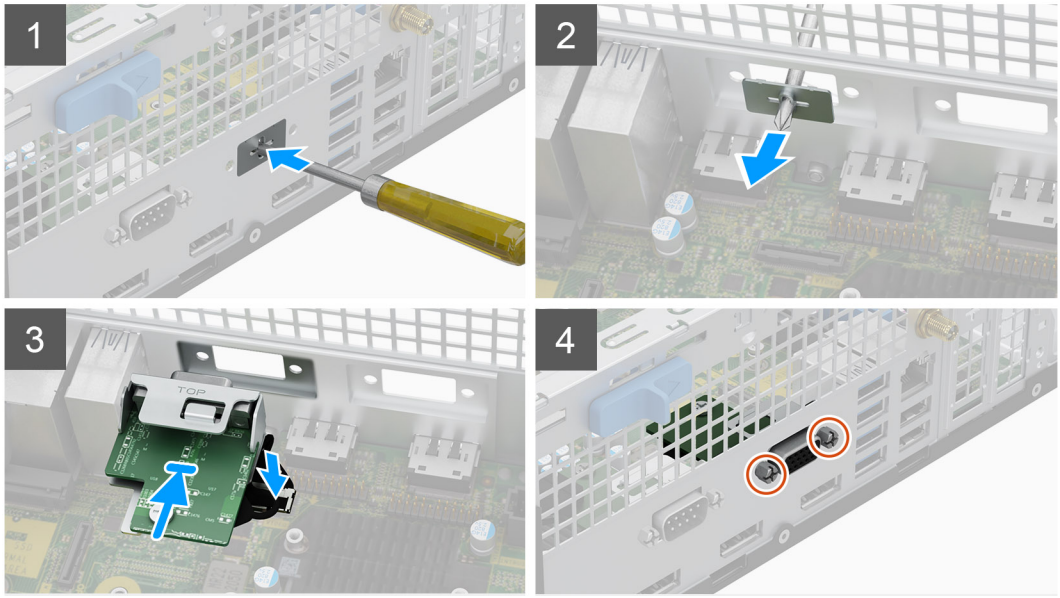












Steps

1. Using a screwdriver, remove the bracket covering the I/O module slot.

   NOTE: This step is only for systems that are being upgraded with the I/O module for the first time.

2. Connect the I/O-module cable to the connector on the system board.
3. Insert the optional I/O module into its slot on the chassis.
4. Secure the two (M3x3) screws to secure the I/O module to the chassis.

   NOTE: For a VGA module, the screws are attached to the connector.

Next steps

1. Install the fan assembly.
2. Install the side cover.
3. Follow the procedure in after working inside your computer.

Speakers

Removing the speaker

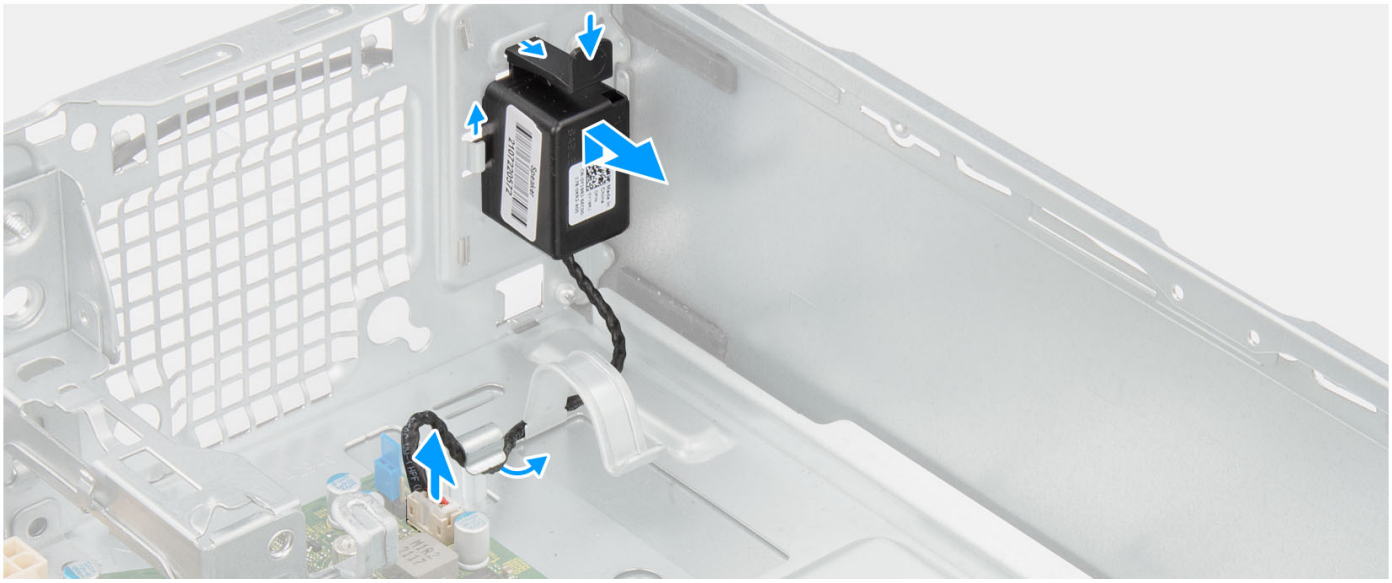
Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.

About this task

The following images indicate the location of the speaker and provide a visual representation of the removal procedure.





Steps

1. Disconnect the speaker cable from the connector on the system board.
2. Remove the speaker cable from the routing guides on the chassis.
3. Press the tab and slide the speaker along with the cable from the slot on the chassis.

Installing the speaker

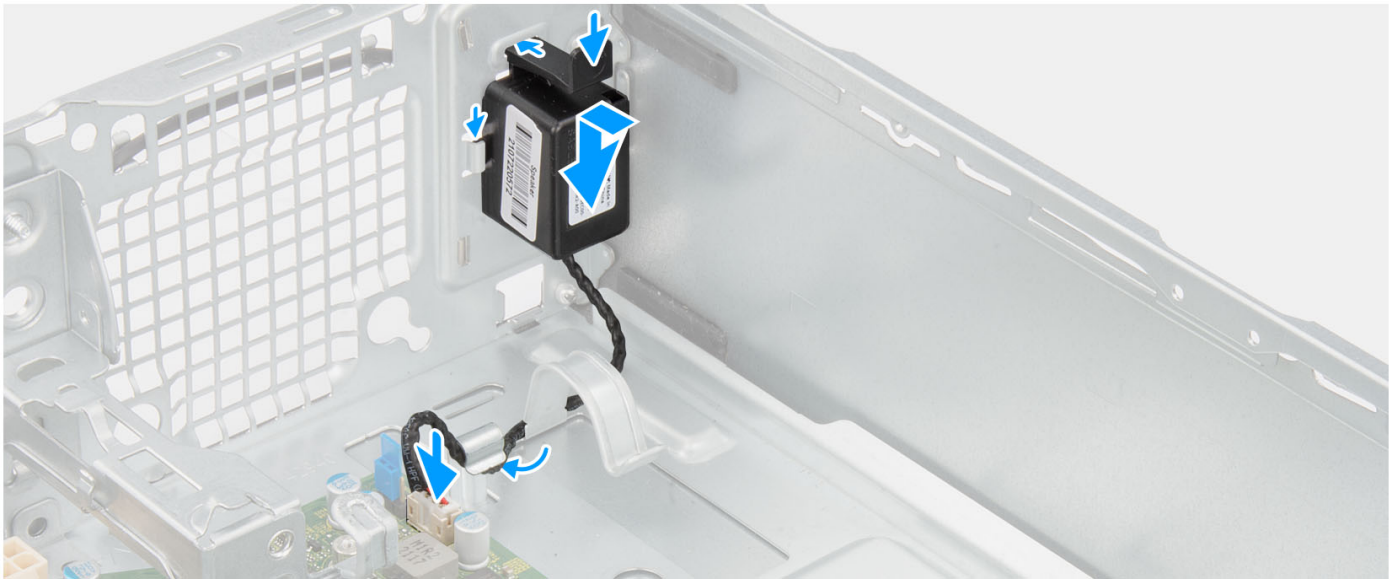
Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the speaker and provides a visual representation of the installation procedure.





Steps

1. Press and slide the speaker in the slot on the chassis until it snaps into place.
2. Route the speaker cable through the routing guide on the chassis.
3. Connect the speaker cable to the connector on the system board.

Next steps

1. Install the side cover.
2. Follow the procedure in after working inside your computer.

Power-supply unit

Removing the power-supply unit

Prerequisites

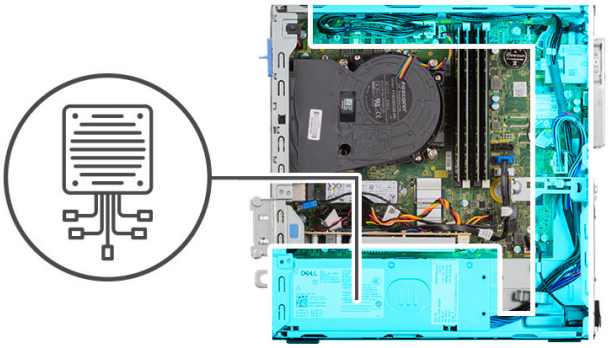
1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.

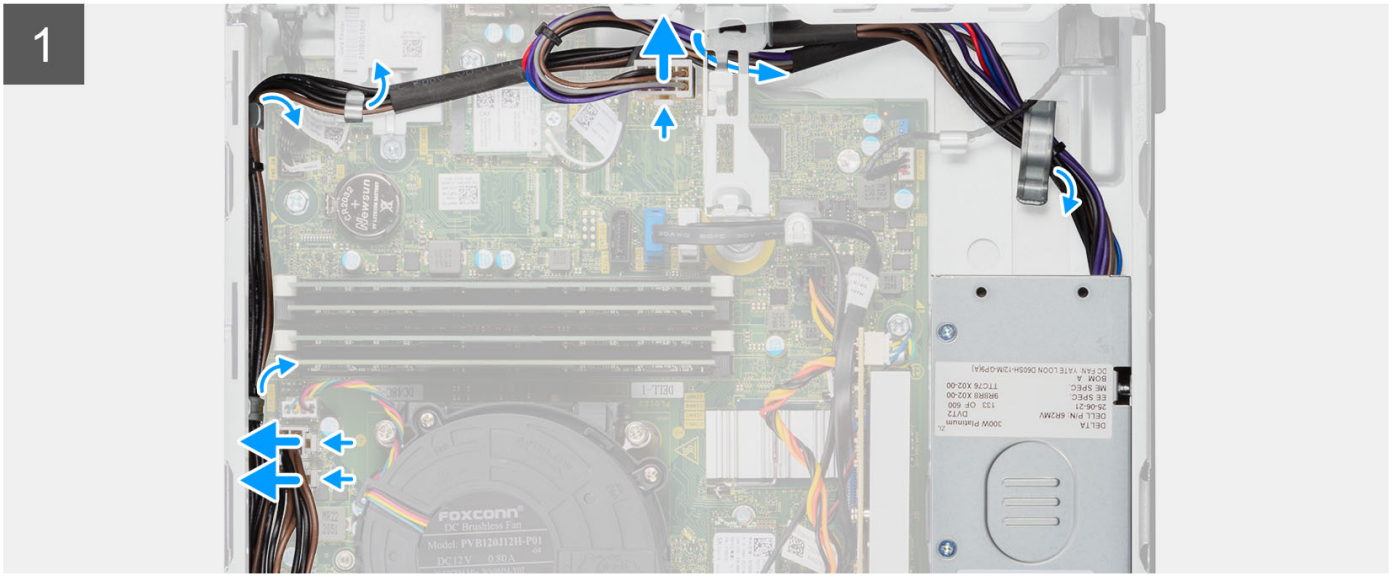
About this task

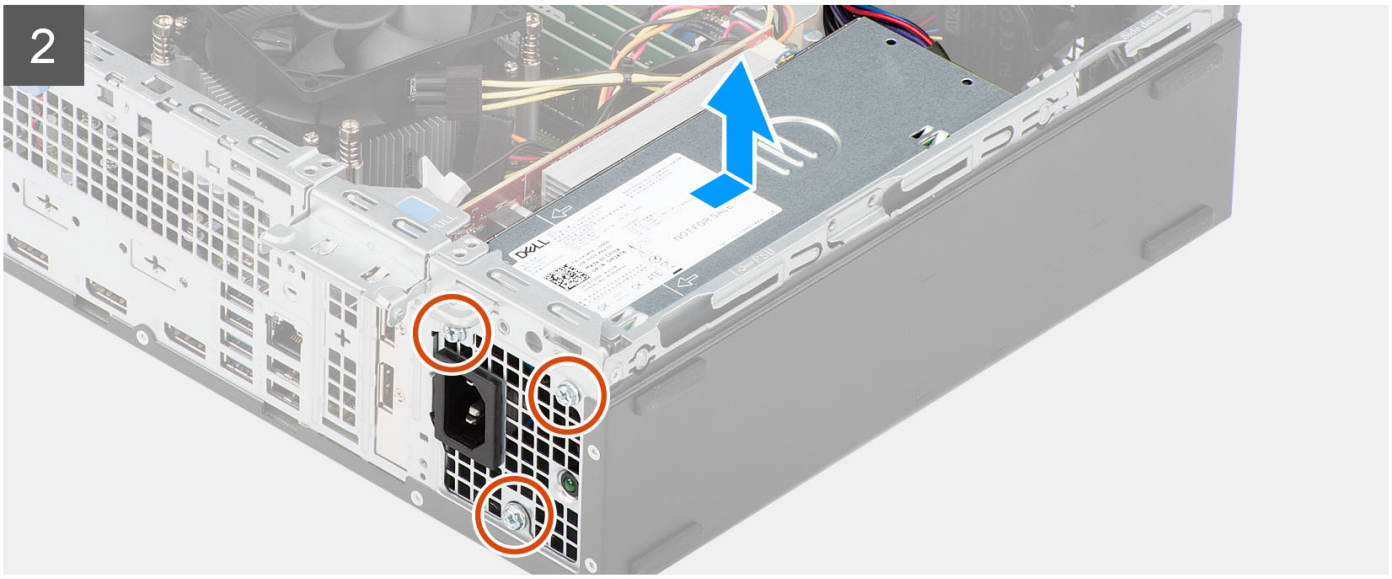
The following images indicate the location of the power-supply unit and provide a visual representation of the removal procedure.



3x
#6-32







Steps

1. Disconnect the power-supply cables from the connectors on the system board.
2. Remove the power-supply cables from the routing guides on the chassis.
3. Remove the three screws (M6-32) that secure the power-supply unit to the chassis.
4. Slide and lift the power-supply unit off the chassis.

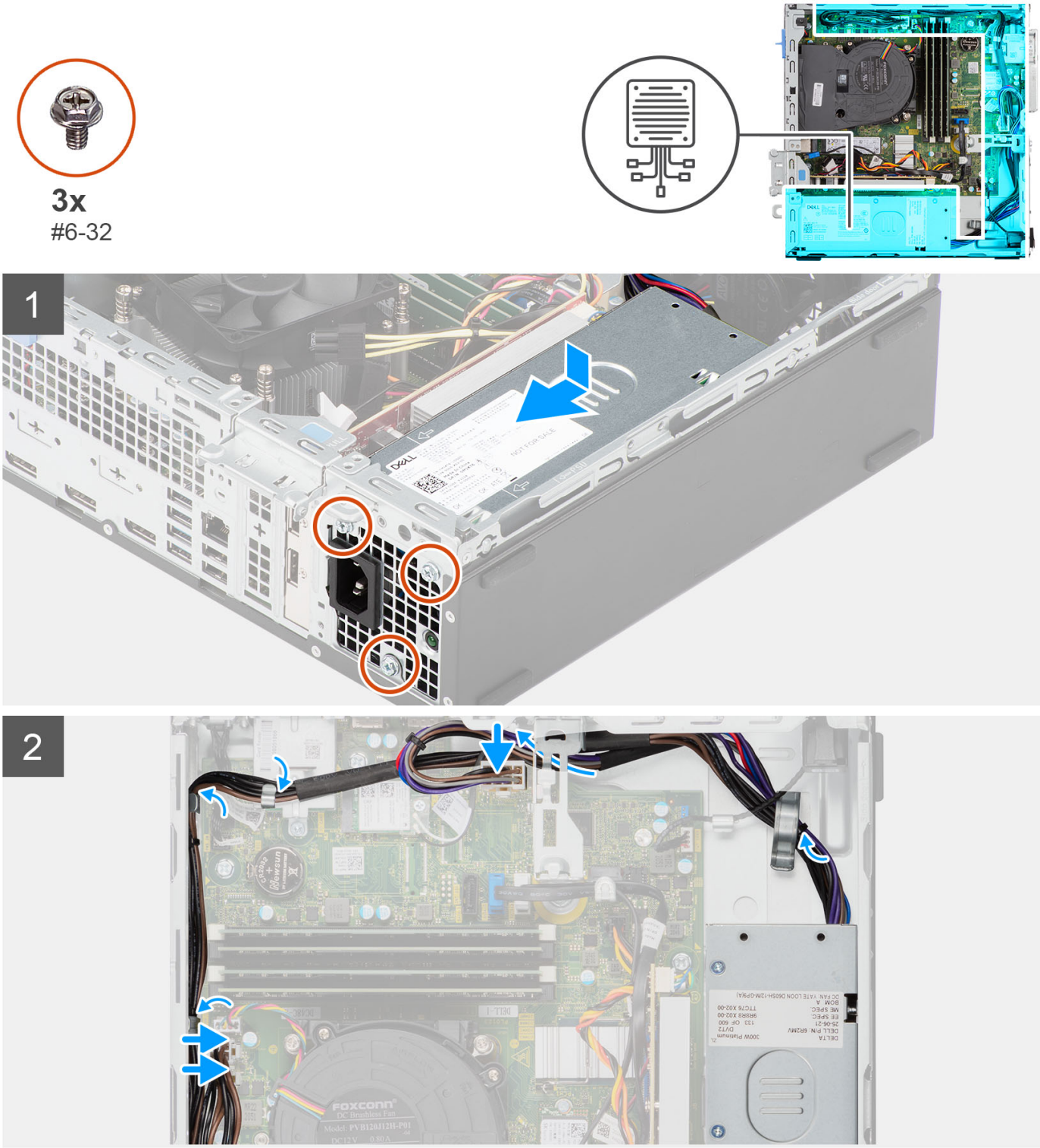
Installing the power-supply unit

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the power-supply unit and provides a visual representation of the installation procedure.



Steps

1. Place and align the screw holes on the power-supply unit to the screw holes on the chassis.
2. Replace the three (M6-32) screws to secure the power-supply unit to the chassis.
3. Route the power-supply cables through the routing guides on the chassis.
4. Connect the power-supply cables to the connectors on the system board.

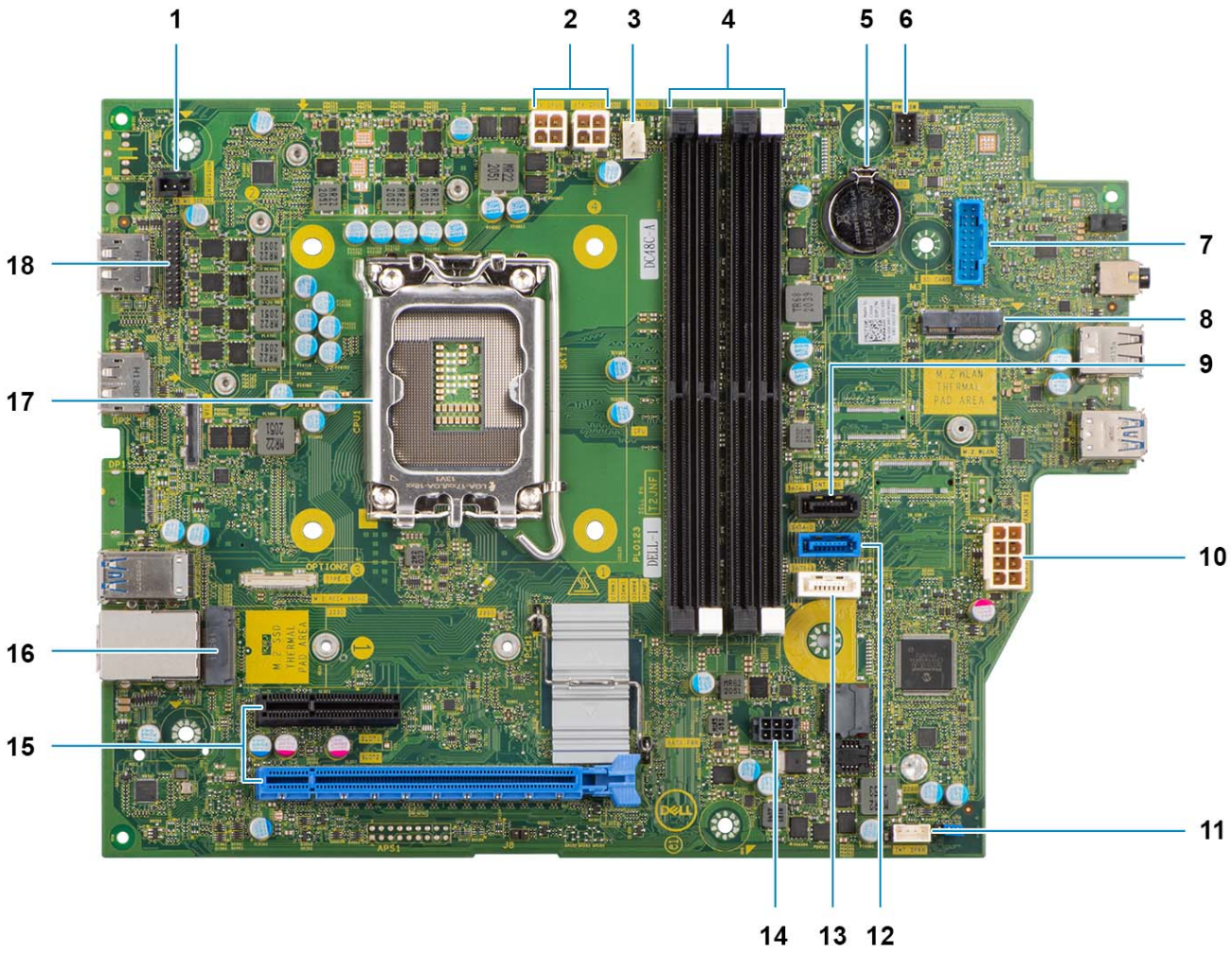
Next steps

1. Install the disk-drive cage.
2. Install the 3.5-inch hard-drive.
3. Install the 2.5-inch hard-drive.
4. Install the front bezel.
5. Install the side cover.
6. Follow the procedure in after working inside your computer.

System board

System board

The following image indicates the slots and connectors on your system board:



1. Intrusion-switch cable

2. Processor-power cable
3. Processor fan connector
4. UDIMM slots

   From the left (a>b>c>d):

   DIMM 3

   DIMM 1

   DIMM 4

   DIMM 2
5. Coin-cell battery socket
6. Power-button cable
7. SD-card reader slot
8. M.2 WLAN slot
9. Hard-drive data cable (SATA 0)
10. System-power cable
11. Internal-speaker cable
12. Hard-drive data cable (SATA 1)
13. Optical-drive/hard-drive data cable (SATA 2)
14. SATA power cable
15. a. PCIe x16 slot (SLOT 2)
    b. PCIe x4 slot (SLOT 4)
16. M.2 2230/2280 solid-state drive slot
17. Processor socket
18. I/O cable

Removing the system board

Prerequisites

1. Follow the procedure in before working inside your computer.
2. Remove the side cover.
3. Remove the front bezel.
4. Remove the 2.5-inch hard-drive.
5. Remove the 3.5-inch hard-drive.
6. Remove the disk-drive cage.
7. Remove the expansion card.
8. Remove the optional I/O modules.
9. Remove the solid-state drive.
10. Remove the WLAN card.
11. Remove the processor heat-sink assembly.
12. Remove the memory modules.
13. Remove the processor.

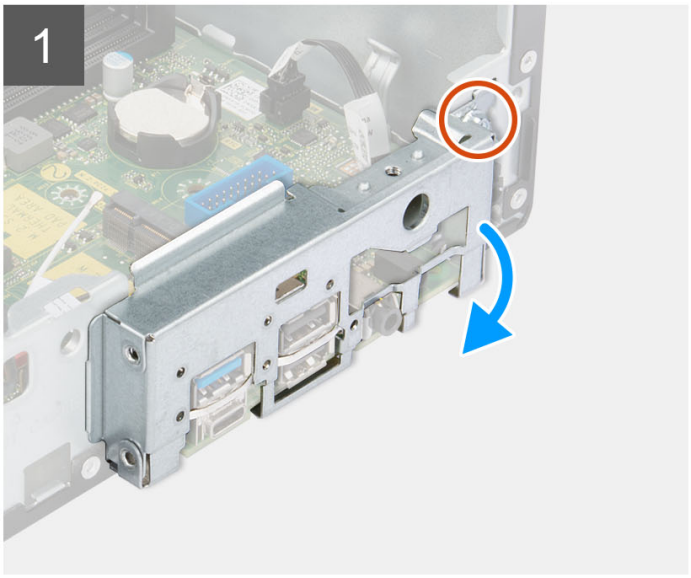
About this task

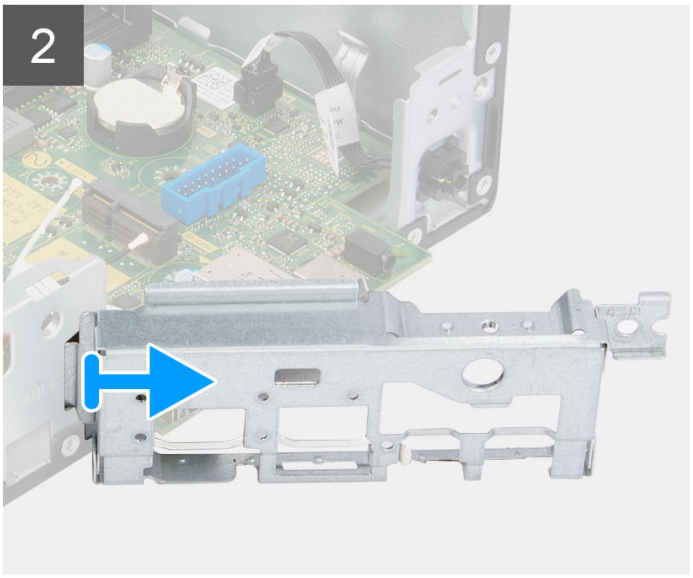
The following images indicate the location of the system board and provide a visual representation of the removal procedure.



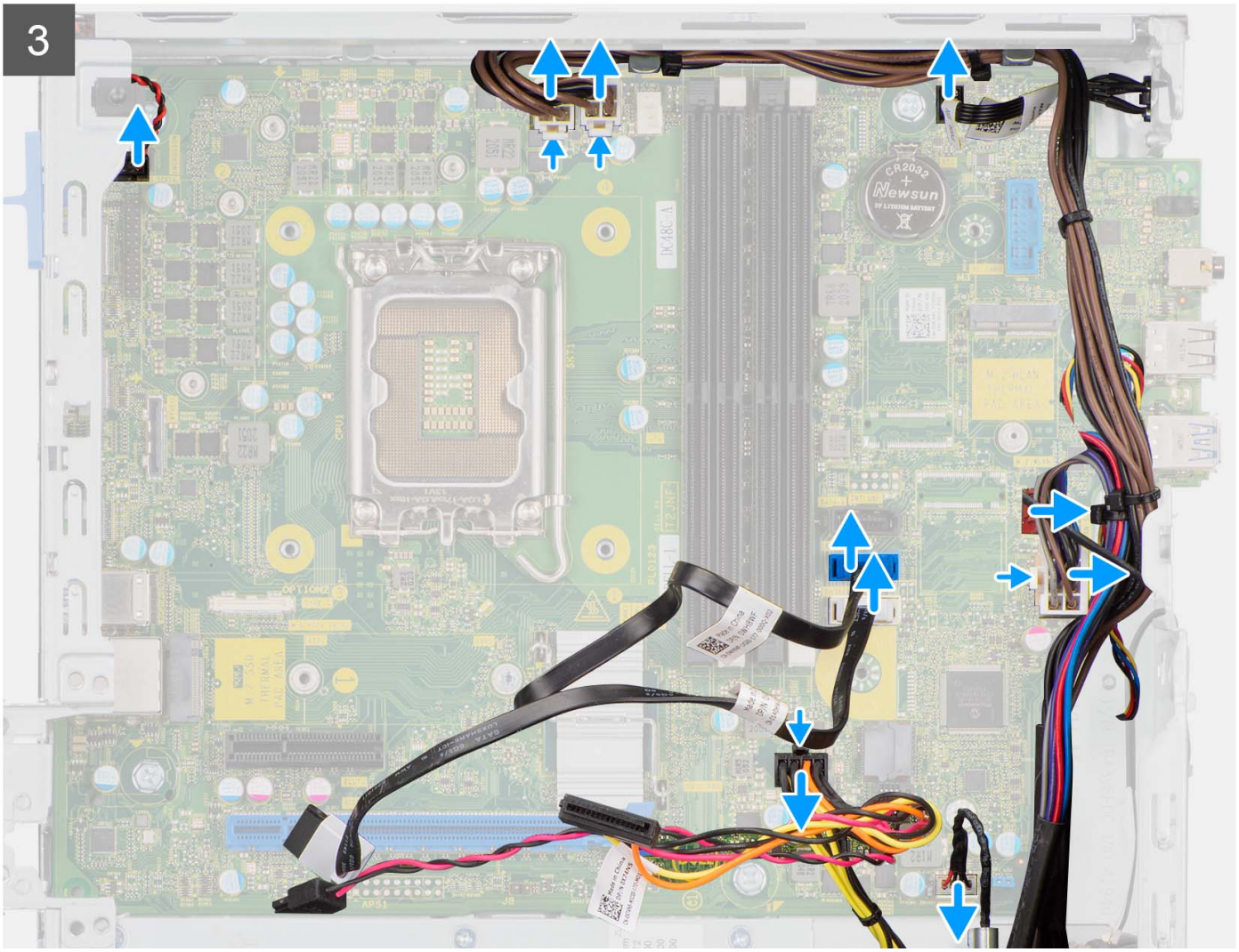
5x
#6-32

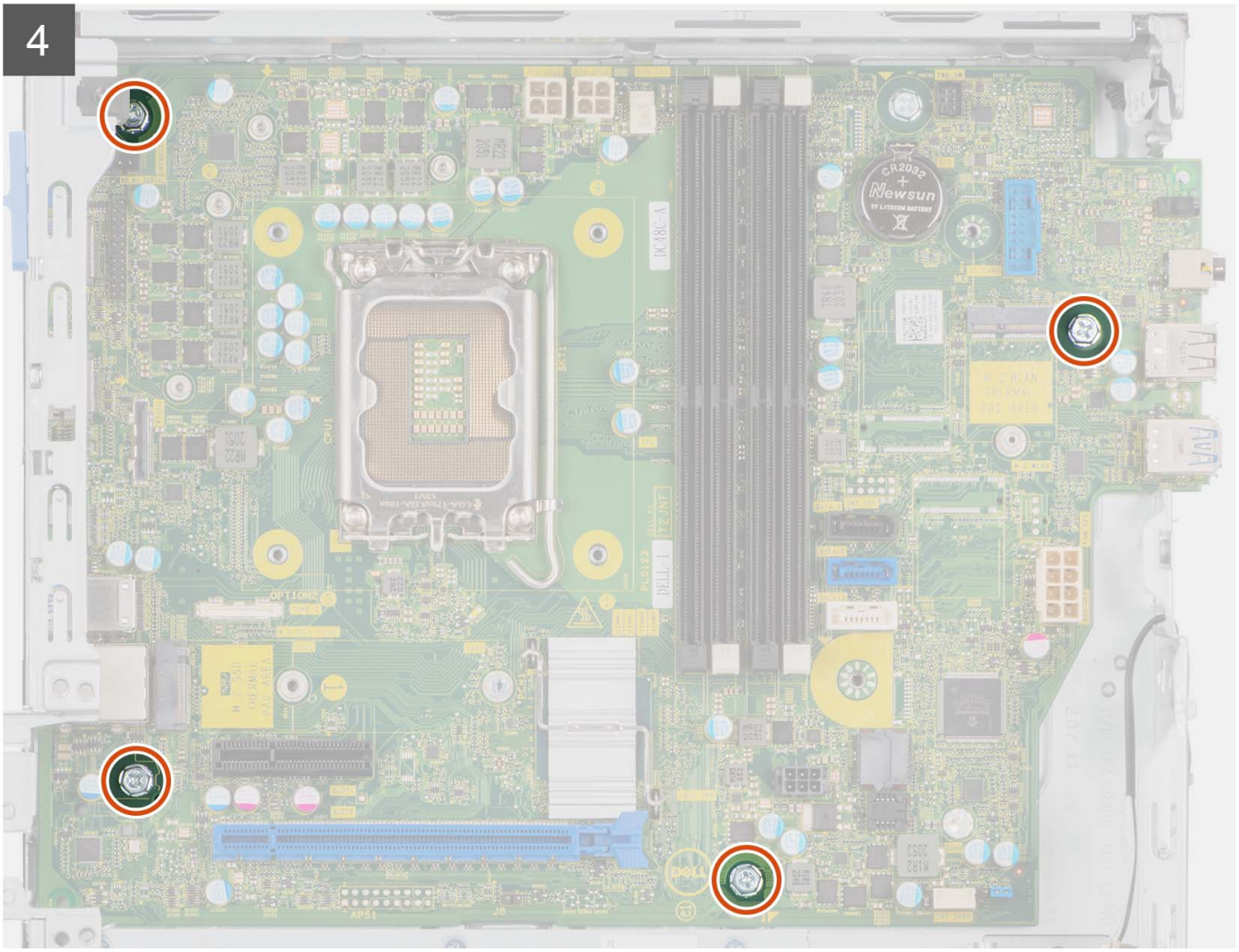


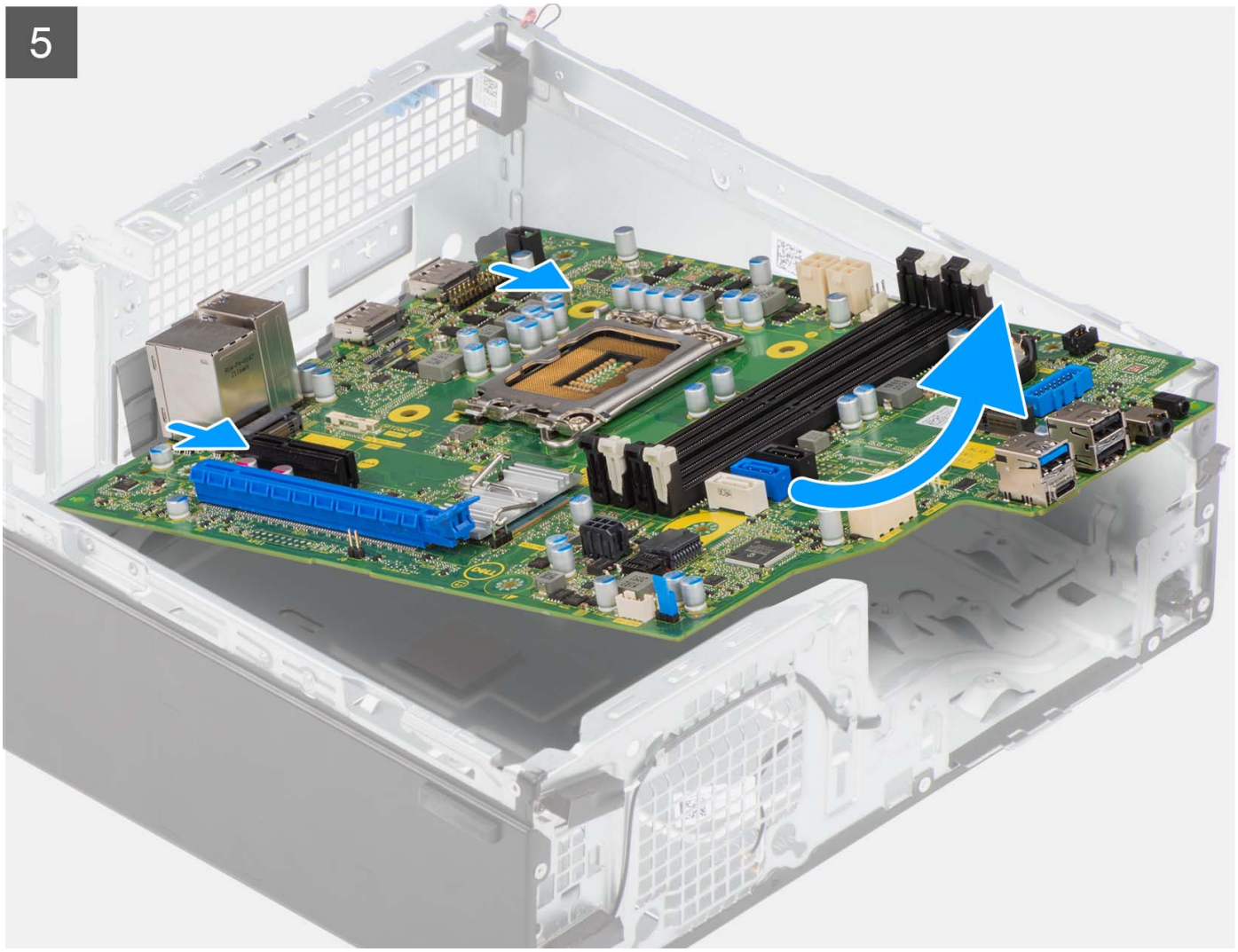




3




4



Steps

1. Remove the screw (6-32) that secures the front I/O bracket to the chassis.
2. Rotate and remove the front I/O-bracket from the chassis.
3. Disconnect all the cables that are connected to the system board.
4. Remove the four screws (#6-32) that secure the system board to the chassis.
5. Free the system board from the back I/O panel by sliding it towards the right and lift the system board out of the chassis.

Installing the system board

Prerequisites

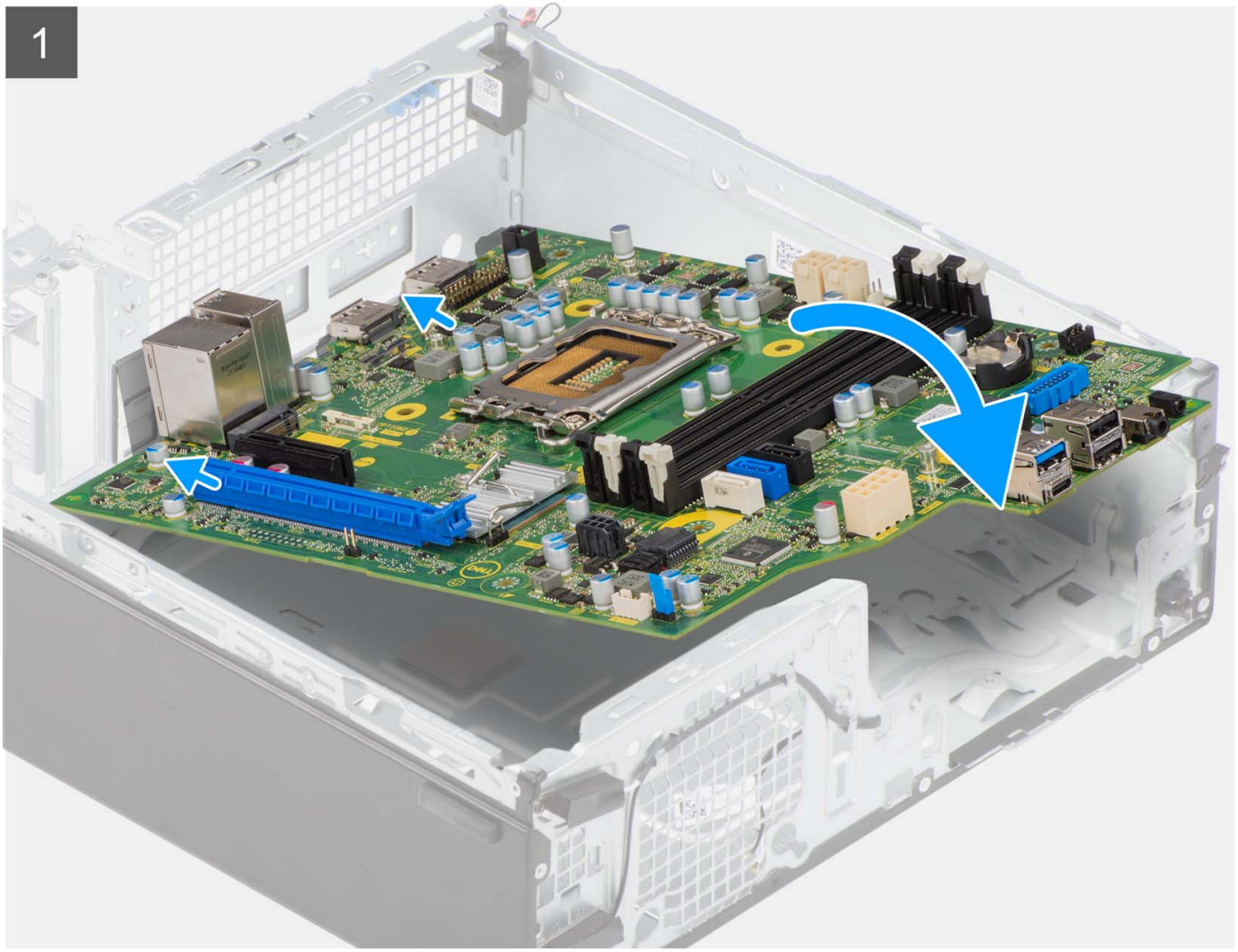
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

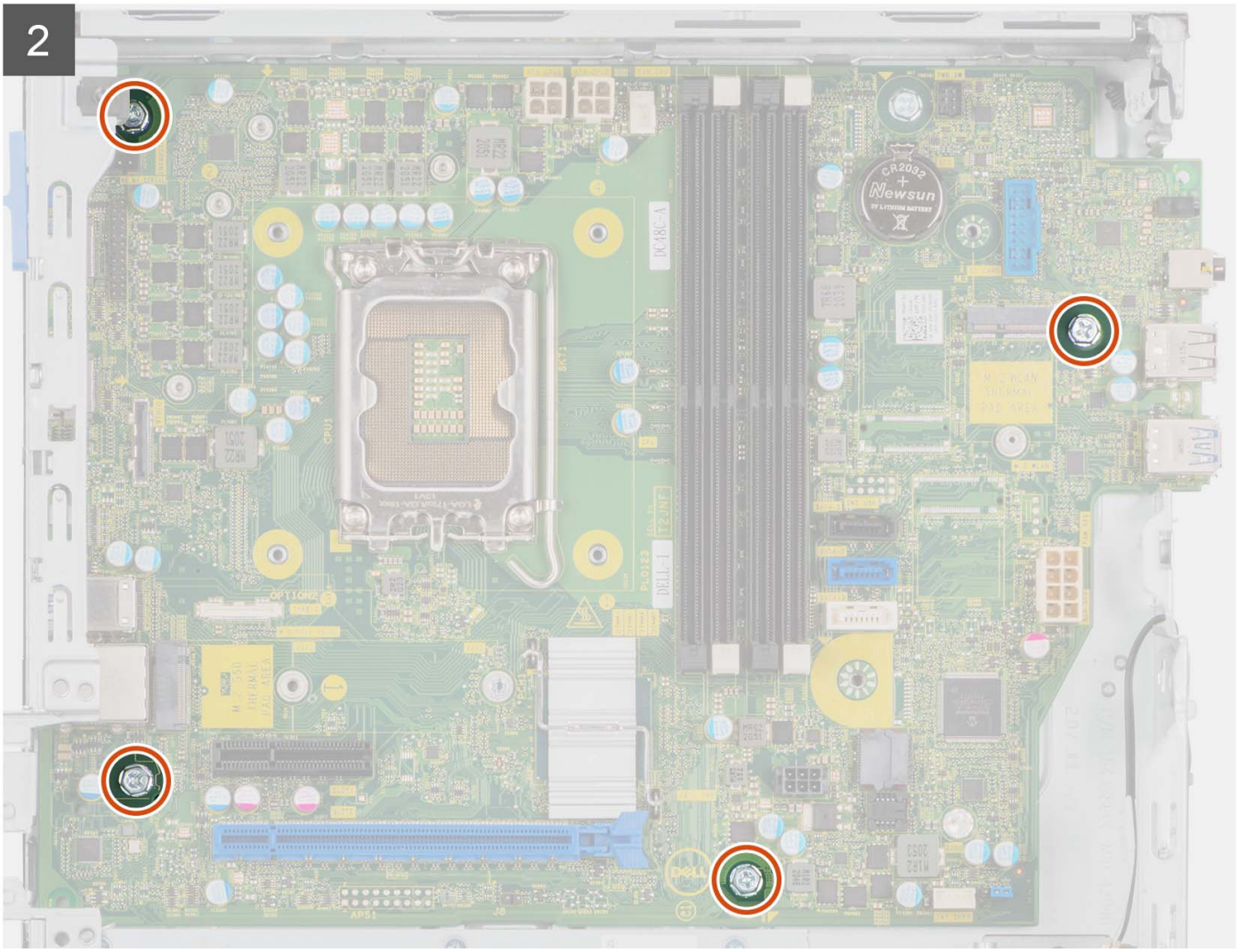
The following image indicates the location of the system board and provides a visual representation of the installation procedure.

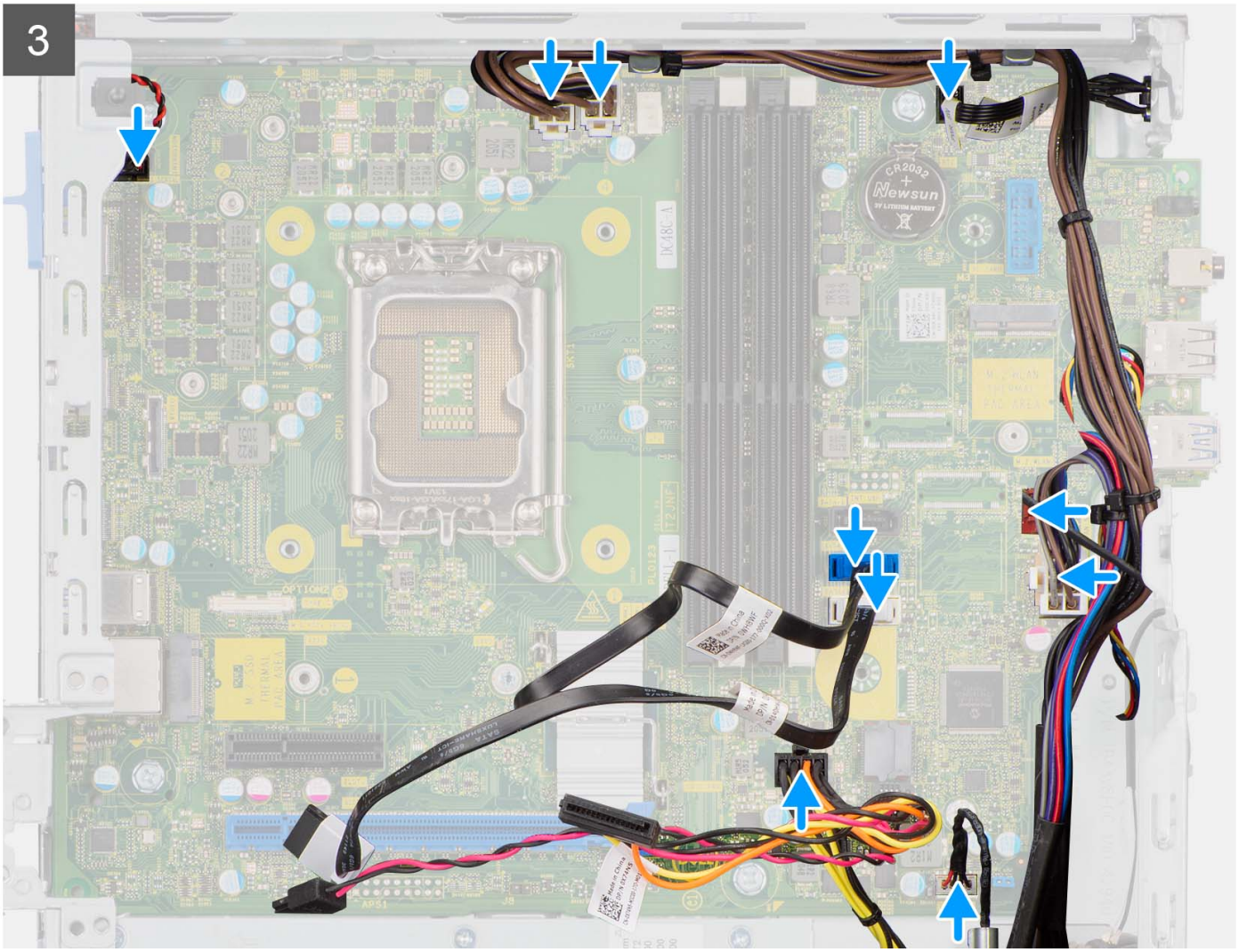


5x
#6-32

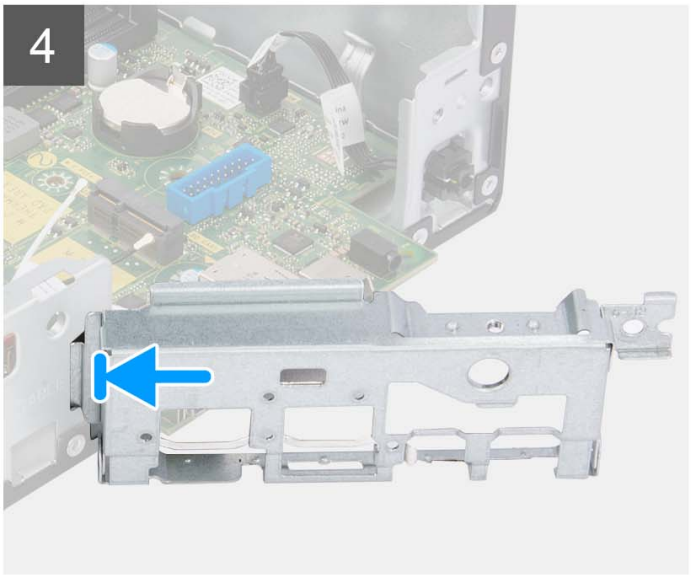


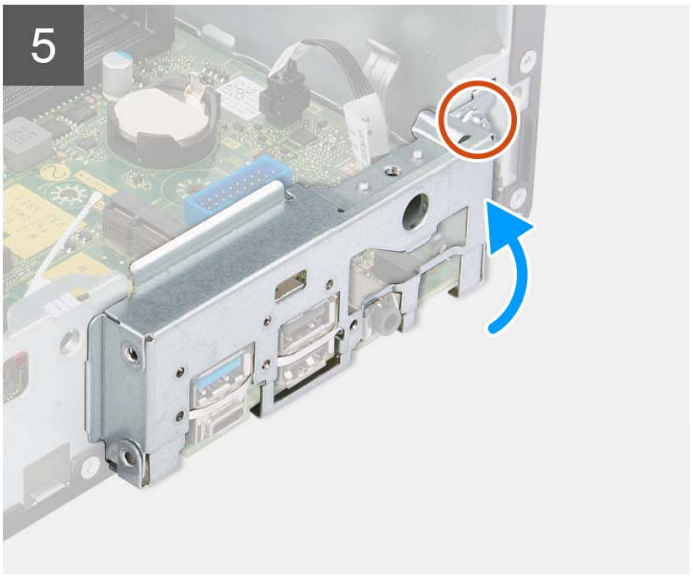
2




3







Steps

1. Align and lower the system board into the system until the stand-off points at the back of the system board align with those on the chassis.
2. Replace the four (#6-32) screws to secure the system board to the chassis.
3. Route and connect all the cables that you disconnected from the system board.
4. Place and align the front I/O-bracket with the I/O slot on the chassis.
5. Replace the screw (#6-32) that secures the front I/O-bracket to the chassis.

Next steps

1. Install the processor.
2. Install the memory modules.
3. Install the processor heat-sink assembly.
4. Install the WLAN card.
5. Install the solid-state drive.
6. Install the optional I/O modules.
7. Install the expansion card.
8. Install the disk-drive cage.
9. Install the 3.5-inch hard-drive.
10. Install the 2.5-inch hard-drive.
11. Install the front bezel.
12. Install the side cover.
13. Follow the procedure in after working inside your computer.

3

Drivers and downloads

When troubleshooting, downloading, or installing drivers, it is recommended that you read the Dell Knowledge Base article Drivers and Downloads FAQs 000123347.

4

BIOS Setup

NOTE: Depending on the computer and the installed devices, the options that are listed in this section may or may not be displayed.

CAUTION: Certain changes can make your computer work incorrectly. Before you change the settings in BIOS Setup, it is recommended that you note down the original settings for future reference.

Use BIOS Setup for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the capacity of the storage device.
- Change the system configuration information.
- Set or change a user-selectable option, such as the user password, type of storage device installed, and enable or disable base devices.

Entering BIOS Setup program

About this task

Turn on (or restart) your computer and press F2 immediately.

Navigation keys

NOTE: For most of the BIOS Setup options, changes that you make are recorded but do not take effect until you restart the computer.

Table 4. Navigation keys

Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Selects a value in the selected field (if applicable) or follows the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
Tab	Moves to the next focus area.
Esc	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restart the computer.

F12 One Time Boot menu

To enter the One Time Boot menu, turn on or restart your computer, and then press F12 immediately.

NOTE: If you are unable to enter the One Time Boot menu, repeat the above action.

The One Time Boot menu displays the devices that you can boot from and also display the options to start diagnostics. The boot menu options are:

- Removable Drive (if available)

- STXXXX Drive (if available)

  NOTE: XXX denotes the SATA drive number.

- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics

The One Time Boot menu screen also displays the option to access BIOS Setup.

System setup options

NOTE: Depending on this computer and its installed devices, the items listed in this section may or may not appear.

Table 5. System setup options—System information menu

General-System Information	
System Information	
BIOS Version	Displays the BIOS version number.
Service Tag	Displays the Service Tag of the computer.
Asset Tag	Displays the Asset Tag of the computer.
Ownership Tag	Displays the ownership tag of the computer.
Manufacture Date	Displays the manufacture date of the computer.
Ownership Date	Displays the ownership date of the computer.
Express Service Code	Displays the express service code of the computer.
Memory Information	
Memory Installed	Displays the total computer memory installed.
Memory Available	Displays the total computer memory available.
Memory Speed	Displays the memory speed.
Memory Channel Mode	Displays single or dual channel mode.
Memory Technology	Displays the technology used for the memory.
DIMM 1 Size	Displays the DIMM 1 memory size.
DIMM 2 Size	Displays the DIMM 2 memory size.
PCI Information	
SLOT2	Displays the PCI information of the computer.
SLOT3	Displays the PCI information of the computer.
SLOT5_M.2	Displays the PCI information of the computer.
Processor Information	
Processor Type	Displays the processor type.
Core Count	Displays the number of cores on the processor.
Processor ID	Displays the processor identification code.
Current Clock Speed	Displays the current processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.
Maximum Clock Speed	Displays the maximum processor clock speed.
Processor L2 Cache	Displays the Processor L2 Cache size.
Processor L3 Cache	Displays the Processor L2 Cache size.

Table 5. System setup options—System information menu (continued)

General-System Information	
HT Capable	Displays whether the processor is HyperThreading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.
Device Information	
SATA-0	Displays the SATA device information of the computer.
SATA-1	Displays the SATA device information of the computer.
M.2 PCIe SSD-2	Displays the M.2 PCIe SSD information of the computer.
LOM MAC Address	Displays the LOM MAC address of the computer.
Video Controller	Displays the video controller type of the computer.
Audio Controller	Displays the audio controller information of the computer.
Wi-Fi Device	Displays the wireless device information of the computer.
Bluetooth Device	Displays the Bluetooth device information of the computer.
Boot Sequence	
Boot Sequence	Displays the boot sequence.
Boot List Option	Displays the available boot options.
UEFI Boot Path Security	
Always,Except Internal HDD	Enable or disable the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu. Default: Enabled
Always	Enable or disable the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu. Default: Disabled
Never	Enable or disable the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu. Default: Disabled
Date/Time	Displays the current date in MM/DD/YY format and current time in HH:MM:SS AM/PM format.

Table 6. System setup options—System Configuration menu

System Configuration	
Integrated NIC	Controls the on-board LAN controller.
Enable UEFI Network Stack	Enable or disable UEFI Network Stack.
SATA Operation	Configure operating mode of the integrated SATA hard drive controller.
Drives	Enable or disable various drives on board.
SATA-0	Displays the SATA device information of the computer.
SATA-1	Displays the SATA device information of the computer.
M.2 PCIe SSD-2	Displays the M.2 PCIe SSD information of the computer.
SMART Reporting	Enable or disable SMART Reporting during system startup.
USB Configuration	
Enable USB Boot Support	Enable or disable booting from USB mass storage devices such as external hard drive, optical drive, and USB drive.
Enable front USB Port	Enable or disable the front USB ports.
Enable rear USB Port	Enable or disable the rear USB ports.
Front USB Configuration	Enable or disable the front USB ports.
Rear USB Configuration	Enable or disable the rear USB ports.
Audio	Enable or disable the integrated audio controller.

Table 6. System setup options—System Configuration menu (continued)

System Configuration	
Miscellaneous Devices	Enable or disable various onboard devices.

Table 7. System setup options—Video menu

Video	
Multi-Display	Enable or disable multiple displays.
Primary Display	Set or change the primary display.

Table 8. System setup options—Security menu

Security	
Admin Password	Set, change, or delete the administrator password.
System Password	Set, change, or delete the system password.
Internal HDD-0 Password	Set, change, or delete the internal hard-disk drive password.
Password Configuration	Control the minimum and maximum number of characters allowed for Admin and System passwords.
Password Change	Enable or disable changes to the System and Hard Disk passwords when an administrator password is set.
UEFI Capsule Firmware Updates	Enable or disable BIOS updates through UEFI capsule update packages.
PTT Security	
PTT On	Enable or disable Platform Trust Technology (PTT) visibility to the operating system.
Clear	Default: Disabled
PPI ByPass for Clear Command	Enable or disable the TPM Physical Presence Interface (PPI). When enabled, this setting will allow the OS to skip BIOS PPI user prompts when issuing the Clear command. Changes to this setting take effect immediately.Default: Disabled
Absolute(R)	Enable or disable the BIOS module interface of the optional Computrace(R) Service from Absolute Software.
Admin Setup Lockout	Enable to prevent users from entering Setup when an Admin Password is set.
Master Password Lockout	Disables the master password support. Hard Disk passwords need to be cleared before changing the setting.
SMM Security Mitigation	Enable or disable SMM Security Mitigation

Table 9. System setup options—Secure Boot menu

Secure Boot	
Secure Boot Enable	Enable or disable the secure boot feature.
Secure Boot Mode	Modifies the behavior of Secure Boot to allow evaluation or enforcement of UEFI driver signatures. • Deployed Mode-Default: Enabled • Audit Mode-Default: Disabled
Deployed Mode	Enable or disable the deployed mode.
Audit Mode	Enable or disable the audit mode.
Expert Key Management	
Expert Key Management	Enable or disable Expert Key Management.
Custom Mode Key Management	Select the custom values for expert key management.

Table 10. System setup options—Intel Software Guard Extensions menu

Intel Software Guard Extensions	
Intel SGX Enable	Enable or disable Intel Software Guard Extensions.
Enclave Memory Size	Set the Intel Software Guard Extensions Enclave Reserve Memory Size.
Performance	
Multi Core Support	Enable multiple cores. Default: Enabled.
Intel SpeedStep	Enable or disable Intel Speedstep Technology. Default: Enabled. **NOTE:** If enabled, the processor clock speed and core voltage are adjusted dynamically based on the processor load.
C-States Control	Enable or disable additional processor sleep states. Default: Enabled.
Intel TurboBoost	Enable or disable Intel TurboBoost mode of the processor. Default: Enabled.
HyperThread control	Enable or disable HyperThreading in the processor. Default: Enabled.
Power Management	
AC Recovery	Sets what action the computer takes when power is restored.
Enable Intel Speed Shift Technology	Enable or disable Intel Speed Shift Technology.
Auto On Time	Enable to set the computer to turn on automatically every day or on a preselected date and time. This option can be configured only if the Auto On Time is set to Everyday, Weekdays or Selected Days. Default: Disabled.
USB Wake Support	Enable the USB devices to wake the computer from Standby.
Deep Sleep Control	Enables you to control the Deep Sleep mode support.
Wake on LAN/WLAN	Enables the computer to be powered on by special LAN signals.
Block sleep	Enables you to block entering to sleep mode in OS environment.
POST Behavior	
Numlock LED	Enables the NumLock function when computer boots.
Keyboard Errors	Enables the keyboard error detection.
Fastboot	Enable to set the speed of the boot process. Default: Thorough.
Extend BIOS POST Time	Configure additional pre-boot delay.
Full Screen Logo	Enable or disable to display full screen logo.
Warnings and Errors	Sets the boot process to pause when Warnings or Errors are detected.

Table 11. System setup options—Virtualization Support menu

Virtualization Support	
Virtualization	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
VT for Direct I/O	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology for Direct I/O.

Table 12. System setup options—Wireless menu

Wireless	
Wireless Device Enable	Enable or disable internal wireless devices.

Table 13. System setup options—Maintenance menu

Maintenance	
Service Tag	Display the system's Service Tag.
Asset Tag	Create a system Asset Tag.
SERR Messages	Enable or disable SERR messages.
BIOS Downgrade	Control flashing of the system firmware to previous revisions.
Data Wipe	Enable to securely erase data from all internal storage devices.
BIOS Recovery	Enable the user to recover from certain corrupted BIOS conditions from a recovery file on the user primary hard drive or an external USB key.

Table 14. System setup options—System Logs menu

System Logs	
BIOS Events	Display BIOS events.

Table 15. System setup options—SupportAssist System Resolution menu

SupportAssist System Resolution	
Auto OS Recovery Threshold	Control the automatic boot flow for SupportAssist System Resolution Console and for Dell OS Recovery tool.

Overview

This section provides hardware specification for the system and contains no modifiable settings.

Table 16. BIOS Overview Page

Options	Description
Series and system model number	This field shows the following information: ● BIOS Version - The version of the BIOS installed on the computer. ● Service tag - The unique 7 digit hexadecimal identification number for the computer. ● Asset tag ● Manufacture Date - The date for when the unit was manufactured. ● Ownership Date - The date for when the unit's ownership was transferred to the end user. ● Express Service Code - An alternative to Service Tag, 11-digit numerical identification number for the computer. ● Ownership Tag ● Signed Firmware Update - This helps to verify that only Dell Signed and released BIOS can be installed on the computer.
Processor	The Processor field provides information related to the CPU on the computer: ● Processor Type - This field mentions the CPU model and generation information.

Table 16. BIOS Overview Page (continued)

Options	Description
	• Maximum Clock Speed - This field mentions the maximum clock speed that the CPU is capable of reaching. • Minimum Clock Speed - This field mentions the minimum clock speed that the CPU is capable of reaching. • Current Clock Speed - This field mentions the clock speed that the CPU is running at currently. • Core Count - This field gives the count of the physical cores on the CPU. • Processor ID • Processor L3 Cache - This field shows the amount of cache storage available on the CPU. • Microcode Version • Intel Hyper-Threading Capable - This field helps identify if the CPU is capable of Hyper-Threading. • 64-bit Technology - This field helps identify the CPU architecture.
Memory	The Memory field provides information related to the memory on the computer: • Memory Installed - This field gives the amount of memory installed on the computer. • Memory Available - This field gives the amount of memory available for use on the computer. • Memory Speed - This field mentions the speed at which the memory runs on the computer. • Memory Channel Mode - This field helps us identify if the computer has Dual-Channel memory utilization capability. • DIMM_SLOT 1 - This field shows the capacity of the memory installed in the first DIMM slot. • DIMM_SLOT 2 - This field shows the capacity of the memory installed in the second DIMM slot.
Devices	The Devices field provides information related to the memory on the computer: • Panel Type - This field mentions the type of display panel used on the computer. • Video controller - This field mentions the type of video controller used on the computer. • Video Memory - This field gives the capacity of the video memory available for use on the computer. • Wi-Fi Device - This field mentions the type of wireless device available for use on the computer. • Native Resolution - This field mentions the native video resolution supported on the computer. • Video BIOS Version - The version of the BIOS installed on the computer. • Audio Controller - This field mentions the type of audio controller used on the computer. • Bluetooth Device - This field mentions the type of Bluetooth device available for use on the computer. • LOM MAC Address - This field provides the unique MAC address for the computer.

Boot Configuration

This section provides Boot Configuration related details and settings.

Table 17. Boot Configuration:

Options	Description
Boot Sequence	
Boot Mode: UEFI only	This section allows the user to choose the first bootable device that the computer should use to boot the system. It lists all potential bootable devices. ● Windows Boot Manager (Enabled by default) ● UEFI Boot Drive (Enabled by default) ● Add Boot option - Allows the user to manually add a Boot path.
Secure Digital(SD) Card Boot	This section contains a toggle switch that allows the user to enable or disable the option to allow the computer to boot from an SD Card.
Secure Boot	
Enable Secure Boot	This section contains a toggle switch that allows the user to enable or disable Secure Boot. (OFF by default)
Secure Boot Mode	This section allows the user to select one of the two Secure Boot options available on the computer: ● Deployed Mode - This mode checks the integrity of UEFI drivers and bootloaders before allowing execution. This option allows for full Secure Boot protections (Enabled by default.) ● Audit Mode - This mode performs a signature check but never does a block execution of all UEFI drivers and bootloaders. This mode is only used when making changes to Secure Boot Keys.
Expert Key Management	
Enable Custom Mode	This section contains a toggle switch that allows the user to enable or disable Custom Mode. This mode allows the PK, KEK, db and dbx security key databases to be manipulated. (OFF by default)
Custom Mode Key Management	This section helps the user to select the Key Database to allow modification. The options available are as below: ● PK (Selected by default) ● KEK ● db ● dbx

Integrated Devices

This section provides Integrated Devices details and settings.

Table 18. Integrated Devices

Options	Description
Date/Time	
Date	This section allows the user to change the date which takes effect immediately. The format used is MM/DD/YYYY.

Table 18. Integrated Devices (continued)

Options	Description
Time	This section allows the user to change the time which takes effect immediately. The format used is HH/MM/SS in 24 hour format. The user also has an option to switch between 12-hours or 24-hours clock.
Audio	
Enable Audio	This section contains a toggle switch that allows the user to enable or disable the audio on the computer. It also allows the user to: ● Enable Microphone (Enabled by default.)
Serial Port	This section allows the user to set the Serial Port Configuration: ● Disabled ● COM1: Port is configured at 3F8h with IRQ4 (Selected by default) ● COM2: Port is configured at F28h with IRQ3 ● COM3: Port is configured with 2E8h with IRQ4
USB Configuration	This section helps the user to make changes to the USB settings on the computer. The options available are as follows(All options are enabled by default): ● Enable Front USB Ports ● Enable Rear USB Ports ● Enable USB Boot Support
Front USB Configuration	This section allows the user to manually enable the 4 USB ports on the front bezel (All USB ports are enabled by default.). The options are: ● Front Port 1 (Bottom Left) ● Front Port 2 (Bottom Right) ● Front Port 3 (Top Left) ● Front Port 4 (Top Right)
Rear USB Configuration	This section allows the user to manually enable the 4 USB ports on the back (All USB ports are enabled by default.). The options are: ● Rear Port 1 (Top Left) ● Rear Port 2 (Left Middle) ● Rear Port 3 (Bottom Left) ● Rear Port 4 (Bottom Right) ● Rear Port 4 (Middle Right) ● Rear Port 4 (Top Right)
Dust Filter Maintenance	This field enabled or disabled BIOS messages for maintaining the optional dust filter. BIOS will generate a pre-boot reminder to clean or replace the dust filter based on the following time intervals: ● Disabled (selected by default) ● 15 days ● 30 days ● 60 days ● 90 days ● 120 days ● 150 days ● 180 days

Storage

This section provides storage details and settings.

Table 19. Storage

Options	Description
SATA Operation	
SATA Operation	This section allows the user to select the operating mode of the integrated SATA hard drive controller. The following options are available: ● Disabled - SATA controllers are disabled. ● AHCI - SATA is configured in AHCI mode. ● RAID On - SATA is setup to support RAID (Intel Rapid Storage Technology). (Selected by default) **NOTE:** Although the default operating mode of the integrated SATA hard drive controller is set to RAID ON, this computer does not support RAID functionality.
Storage Interface	
Port Enablement	This section allows the user to enable or disable the onboard drives on the computer. The following options is available (ON by default). ● SATA-0 ● SATA-1 ● SATA-3 ● M.2 PCIe SSD-0 ● M.2 PCIe SSD-1
SMART Reporting	
Enable SMART Reporting	This section contains a toggle switch that allows the user to enable or disable the S.M.A.R.T(Self-Monitoring, Analysis, and Reporting Technology) option on the system (OFF by default).
Drive Information	This section provides information about the connected and active drives on the computer. The following options are available: ● M.2 PCIe SSD-0 ○ Type ○ Device
Enable MediaCard	This section allows setting the media cards ON/OFF or enable/disable media card in read-only state. The following options are available: ● Secure Digital (SD) Card (Enabled by default) ● Secure Digital (SD) Card Read-Only Mode

Display

This section provides display details and settings.

Table 20. Display

Options	Description
Multi-Display	This section contains a toggle switch which allows the user to enable/disable Multi-Display. (disabled by default). This feature is only supported on Windows 7 and above.
Primary Display	
Video Primary Display	This section allows the user to select the video controller for the primary display when multiple video controllers are detected. The options are: ● Auto (Selected by default) ● Onboard Video
Full Screen Logo	
Full Screen Logo	This section contains a toggle switch which allows the user to enable/disable the option to view a full screen logo (disabled by default).

Connection

This section provides connection details and settings.

Table 21. Connection

Options	Description
Network Controller Configuration	
Integrated NIC	This section allows the user to change the on-board LAN controller options. The options are as follows: ● Disabled - The internal LAN is off and not visible to the operating system. ● Enabled - The internal LAN is enabled. ● Enabled with PXE (Selected by defauly) - The internal LAN is enabled with PXE boot capabilities.
Wireless Device Enable	This section contains a toggle switch that allows the user to enable or disable WLAN and Bluetooth on the computer. The options are as follows: ● WLAN (Enabled by default). ● Bluetooth (Enabled by default).
Enable UEFI Network Stack	This section contains a toggle switch that allows the user to enable or disable installation of UEFI networking protocols. (ON by default)
Wireless Radio Control	This section contains a toggle switch that allows the user to enable or disable a feature where the system will sense a connection to a wired network and disable the WLAN or WWAN connection (OFF by default).
HTTP(s) Boot Feature	
HTTP(s) Boot Feature	This section contains a toggle switch that allows the user to enable or disable HTTP(s) Boot capabilities (ON by default).
HTTP(s) Boot Modes	● Auto Mode - HTTP(s) Boot automatically extracts Boot URL from DHCP(Dynamic Host Configuration Protocol) - Selected by default.

Table 21. Connection (continued)

Options	Description
	• Manual Mode - HTTP(s) Boot reads Boot URL provided by the user. This section also contains an "Upload" and "Delete" option for provisioning of the certificates required to connect to HTTPs Boot server.

Power

This section provides power details and settings.

Table 22. Power

Options	Description
USB Wake Support	
Enable USB Wake Support	This section contains a toggle switch to allow the user to enable or disable USB Wake Support. It allows the system to use USB devices like a mouse and keyboard to wake the system from standby mode (OFF by default). **NOTE:** This feature only works if the power adapter is connected to the system.
AC Behavior	This section allows the user to control the behavior of the system when power is restored after an unexpected loss of power. The options here are: • Power Off - System stays off after AC power is restored (Selected by default) • Power On - System powers on after AC power is restored • Last Power State - System returns to the previous state after AC power recovery
Active State Power Management (ASPM)	This section allows the user to set the ASPM level. The options here are: • Auto - There is handshaking between the device and PCI Express hub (Selected by default) • Disabled - ASPM power management is turned off at all times • L1 Only - ASPM power management is set to level 1
Block Sleep	This section determines how aggressively the system is conserving power while in Shutdown (S5) or Hiernate (S4) mode. The options are: • Disabled • Enabled in S5 only • Enabled in S4 and S5 (Selected by default)
Intel Speed Shift Technology	
Intel Speed Shift Technology	This section contains a toggle switch to allow the user to enable or disable Intel Speed Shift Technology support. This feature enables the operating system to select appropriate processor performance automatically (ON by default).

Security

This section provides security details and settings.

Table 23. Security

Options	Description
TPM 2.0 Security	
TPM 2.0 Security On	This section contains a toggle switch to select whether Trusted Platform Module(TPM) is visible to the Operating System(OS). (ON by default)
Attestation Enable	This section contains a toggle switch which lets the user control whether the TPM Endorsement Hierarchy is available to the operating system (OFF by default).
Key Storage Enable	This section contains a toggle switch that allows the user to control whether TPM Storage Hierarchy is available to the operating system (ON by default).
SHA-256	This section contains a toggle switch that when enabled, allows the BIOS and the TPM to use the SHA-256 hash algorithm to extend measurements into the TPM PCRs during BIOS boot (ON by default).
Clear	This section contains a toggle switch which clears the TPM owner information, and returns the TPM to the default state (OFF by default).
PPI Bypass for Clear Commands	This section contains a toggle switch which controls the TPM Physical Presence Interface(PPI). When enabled, this setting will allow the OS to skip BIOS PPI user prompts when issuing the clear command (OFF by default).
TPM State	This section allows the user to enable or disable the TPM. This is the default operating state for the TPM when you want to use its complete arrays of capabilities (enabled by default).
Intel Total Memory Encryption	
Total Memory Encryption(TME)	This section allows the user to enable/disable TME to protect memory from physical attachs including freeze spray, probing DDR to read the cycles etc. All of the system memory is encrypted by the TME block attached to the memory controller
Chassis Intrusion	
Chassis Intrusion	This field controls the chassis intrusion feature • Disabled - Will not report intrusions during POST • Enabled - Will report intrusions during POST • On-silent - Detects intrusions but does not display any detected intrusions during POST (Selected by default)
Clear Intrusion Warning	This section contains a toggle switch to enable/disable warnings on intrusion (OFF by default).
SMM Security Mitigation	This section allows the user to enable or disable UEFI SMM security Mitigation protections (ON by default).
Data Wipe on Next Boot	

Table 23. Security (continued)

Options	Description
Start Data Wipe	This section contains toggle switch which when enabled ensures that the BIOS will queue up a data wipe cycle for storage device(s) connected to the system board on the next reboot (OFF by default).
Absolute	
Absolute	This section lets the user enable, disable or permanently disable the BIOS module interface of the optional Absolute Persistence Module service from Absolute Software. The options available are as follows: ● Enable Absolute - Enables Absolute Persistence and load the firmware Persistence Module (Selected by default) ● Disable Absolute - Disables Absolute Persistence. The firmware Persistence Module is not installed. ● Permanently Disable Absolute - Permanently disables Absolute Persistence module interface from further use.
UEFI Boot Path Security	
UEFI Boot Path Security	This section lets the user control whether the system will prompt the user to enter the admin password(if set) when booting to a UEFI booth path device from F12 boot menu. The options available are as below: ● Never ● Always ● Always Except Internal HDD (Selected by default) ● Always Except Internal HDD&PXE
SafeShutter	
SafeShutter	This section allows the user to choose between dynamic and manual shutter control: ● Dynamic Shutter - Camera shutter will automatically open when user grants application permission and close when permission ends. Can be disabled by using the F9 camera mute key(LED on). This is the default selected option. ● Manual Shutter Control - Shutter opens when F9 key is pressed(LED off) and closes when F9 key is pressed(LED on)

Passwords

This section provides details on password settings.

Table 24. Passwords

Options	Description
Admin Password	This field allows the user to set, change, or delete the administrator password.
System Password	This field allows the user to set, change, or delete the system password.
Internal HDD-0 Password	This field allows the user to set, change, or delete the HDD-0's password.

Table 24. Passwords (continued)

Options	Description
NVMe SSD0	This field allows the user to set, change, or delete the NVMe SSD-0's password.
Password Configurator	
Upper Case Letter	Enable or disable reinforced use of upper case letters (OFF by default).
Lower Case Letter	Enable or disable reinforced use of lower case letters (OFF by default).
Digit	Enable or disable reinforced use of at least one digit (OFF by default).
Special Character	Enable or disable reinforced use of at least one special character (OFF by default).
Minimum Character	Allows the user to select the number of characters allowed for a password (4 is the default value).
Password Bypass	This section allows the user to enable/disable the feature where the user must enter the system and internal hard drive password when the system is powered on from OFF state. The options are: • Disabled (Selected by default) • Reboot Bypass
Password Changes	
Enable Non-Admin Password Changes	This section contains a toggle switch which when on, user can change system and hard drive password without the need for admin password (OFF by default).
Admin Setup Lockout	
Enable Admin Setup Lockout	This section contains a toggle switch which allows the administrator to control how users can or cannot access BIOS setup (OFF by default).
Master Password Lockout	
Enable Active Password Lockout	This section contains a toggle switch which allows the user to disable active password support (OFF by default).

Update Recovery

This section provides details on Update Recovery settings.

Table 25. Update Recovery

Options	Description
UEFI capsule Firmware Updates	
Enable UEFI Capsule Firmware Updates	This field contains a toggle switch which allows the user to enable or disable BIOS updates through UEFI capsule update packages (ON by default).
BIOS Recovery from Hard Drive	

Table 25. Update Recovery (continued)

Options	Description
BIOS Recovery from Hard Drive	This field contains a toggle switch which allows the user to enable or disable recovery from certain corrupted BIOS conditions from a recovery file on the user's primary hard drive or an external USB key (ON by default).
BIOS Downgrade	
Allow BIOS Downgrade	This field contains a toggle switch which allows the user to enable or disable flashing of the system firmware to previous revisions.
SupportAssist OS Recovery	
SupportAssist OS Recovery	This field contains a toggle switch which allows the user to enable or disable the boot flow for SupportAssist OS Recovery tool in the events of certain system errors (ON by default).
BIOSConnect	
BIOSConnect	This field contains a toggle switch which allows the user to enable or disable BIOSConnect setup to attempt cloud Service OS recovery if the main operating system fails to boot with a set number of failures (ON by default).
Dell Auto OS Recovery Threshold	
Dell Auto OS Recovery Threshold	This field allows the user to select the number of failed boot attempts by the system before SupportAssist OS Recovery is triggered. The options here are as below: • Off • 1 • 2 (selected by default) • 3

System Management

This section provides System Management settings.

Table 26. System Management

Options	Description
Service Tag	
Service Tag	This field provides the unique Service Tag of the computer.
Asset Tag	
Asset Tag	This field provides the asset tag which is a unique and up to 64-character identification that can be set by the IT administrator.
Wake on LAN	
Wake on LAN	This field allows the user to select if and how the system should boot when connected to LAN. The options here are as follows: • Disabled - The system will not boot with any special LAN signals (selected by default).

Table 26. System Management (continued)

Options	Description
	• LAN only - Allows the system to be powered on by a special LAN signal from a network computer. • WLAN only - Allows the system to power on by special WLAN signals. • LAN or WLAN - Allows the system to power on by special LAN or wireless LAN signals. • LAN with PXE Boot - Allows the system to wake-up from S4 or S5 state and boot to PXE.
Auto On Time	
Auto On Time	This field allows the user to set defined days/time when the sytem can automatically power on. The options here are as follows: • Disabled (selected by default) • Everyday • Weekdays • Select Days
SERR Messages	This section allows the user to enable or disable(ON/OFF) the SERR message mechanism (ON by default). **NOTE:** Some graphics cards require SERR message mechanism to be disbaled.
First Power On Date	This option if enabled lets the user see the ownership date (disabled by default).

Keyboard

This section provides keyboard settings.

Table 27. Keyboard

Options	Description
Enable keyboard Error Detection	This field contains a toggle switch(ON/OFF) to allow the keyboard-related errors to be reported when the system boots.
Numlock LED	This field contains a toggle switch(ON/OFF) to allow the user to decide if the Numlock LED should be on when the system boots.

Virtualization

This section provides details on Virtualization settings.

Table 28. Virtualization

Options	Description
Intel Virtualization Technology	
Enable Intel Virtualization Technology(VT)	This field contains a toggle switch to enable or disable Virtualization to run Virtual machine monitor(VMM) (enabled by default).

Table 28. Virtualization (continued)

Options	Description
VT for Direct I/O	
Enable Intel VT for Direct I/O	This field allows the user to enable or disable the system from being able to perform VT for Direct I/O (enabled by default).

Performance

This section provides Performance settings.

Table 29. Performance

Options	Description
Multi-Core Support	
Active Cores	This field allows the user to configure the number of active cores on the computer. The options are as follows: • All Cores (selected by default) • 1 • 2 • 3
Intel SpeedStep	
Enable Intel SpeedStep Technology	This field contains a toggle switch to enable or disable Intel SpeedStep Technology which allows the computer to dynamically adjust processor voltage and core frequency, decreasing average power consumption and heat production (enabled by default).
C-States Control	
Enable C-States Control	This field contains a toggle switch to enable or disable C-States Control that configures the CPU's ability to enter and exit low power states. When off, it disables all C-States (enabled by default).
Intel Turbo Boost Technology	
Enable Intel Turbo Boost Technology	This field allows the user to enable or disable Intel Turbo Boost Technology (enabled by default). • Disabled - Does not allow the Intel Turbo Boost Technology driver to increase the performance state of the processor above the standard performance. • Enabled - Allows the Intel Turbo Boost Technology to increase the performance of the CPU or graphics processor.
Intel Hyper-Threading Technology	
Enable Intel Hyper-Threading Technology	This field allows the user to configure this feature where the processor resources are used more effectively, enabling multiple threads to run on each core (enabled by default).
Dynamic Tuning: Machine Learning	
Enable Dynamic Tuning: Machine Learning	This field allows the user to configure the OS' capability to enhance dynamic power tuning capabilities based on detected workloads (disabled by default)

System Logs

This section contains BIOS, Thermal and Power event logs.

Table 30. System Logs

Options	Description
BIOS Event Log	
Clear BIOS Event log	This field contains a toggle switch to Keep or Clear BIOS Event logs. It also lists all saved events(Date, Time, Message) - ("Keep" selected by default).

Updating the BIOS

Updating the BIOS in Windows

About this task

CAUTION: If BitLocker is not suspended before updating the BIOS, the BitLocker key is not recognized the next time you reboot the computer. You will then be prompted to enter the recovery key to proceed, and the computer displays a prompt for the recovery key on each reboot. Failure to provide the recovery key can result in data loss or an operating system reinstall. For more information, see the Knowledge Base Resource updating the BIOS on Dell systems with BitLocker enabled.

Steps

1. Go to Dell Support Site.
2. Go to **Identify your product or search support**. In the box, enter the product identifier, model, service request or describe what you are looking for, and then click **Search**.

   NOTE: If you do not have the Service Tag, use the SupportAssist to automatically identify your computer. You can also use the product ID or manually browse for your computer model.

3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.
6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. After the download is complete, browse the folder where you saved the BIOS update file.
8. Double-click the BIOS update file icon and follow the on-screen instructions.

   For more information, search in the Knowledge Base Resource at Dell Support Site.

Updating the BIOS in Linux and Ubuntu

To update the system BIOS on a computer that is installed with Linux or Ubuntu, see the knowledge base article 000131486 at Dell Support Site.

Updating the BIOS using the USB drive in Windows

About this task

CAUTION: If BitLocker is not suspended before updating the BIOS, the BitLocker key is not recognized the next time you reboot the computer. You will then be prompted to enter the recovery key to proceed, and the computer displays a prompt for the recovery key on each reboot. Failure to provide the recovery key can result

in data loss or an operating system reinstall. For more information, see the Knowledge Base Resource updating the BIOS on Dell systems with BitLocker enabled.

Steps

1. Go to Dell Support Site.
2. Go to **Identify your product or search support**. In the box, enter the product identifier, model, service request or describe what you are looking for, and then click **Search**.

   NOTE: If you do not have the Service Tag, use the SupportAssist to automatically identify your computer. You can also use the product ID or manually browse for your computer model.

3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.
6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. Create a bootable USB drive. For more information, search in the Knowledge Base Resource at Dell Support Site.
8. Copy the BIOS setup program file to the bootable USB drive.
9. Connect the bootable USB drive to the computer that needs the BIOS update.
10. Restart the computer and press **F12**.
11. Select the USB drive from the **One Time Boot Menu**.
12. Type the BIOS setup program filename and press **Enter**.
    The **BIOS Update Utility** appears.
13. Follow the on-screen instructions to complete the BIOS update.

Updating the BIOS from the One-Time boot menu

You can run the BIOS flash update file from Windows using a bootable USB drive or you can also update the BIOS from the One-Time boot menu on the computer. To update your computers BIOS, copy the BIOS XXXX.exe file onto a USB drive formatted with the FAT32 file system. Then, restart your computer and boot from the USB drive using the One-Time Boot Menu.

About this task

CAUTION: If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at Dell Support Site.

BIOS Update

To confirm if the BIOS Flash Update is listed as a boot option you can boot your computer to the **One Time Boot** Menu. If the option is listed, then the BIOS can be updated using this method.

To update your BIOS from the One-Time boot menu, you need the following:

- USB drive formatted to the FAT32 file system (the drive does not have to be bootable)
- BIOS executable file that you downloaded from the Dell Support website and copied to the root of the USB drive
- AC power adapter must be connected to the computer
- A functional computer battery to flash the BIOS

Perform the following steps to update the BIOS from the One-Time boot menu:

CAUTION: Do not turn off the computer during the BIOS flash update process. The computer may not boot if you turn off your computer.

Steps

1. Turn off the computer, insert the USB drive that contains the BIOS flash update file.

2. Turn on the computer and press **F12** to access the **One Time Boot** Menu. Select **BIOS Update** using the mouse or arrow keys then press Enter.
   The flash BIOS menu is displayed.
3. Click **Flash from file**.
4. Select the external USB device.
5. Select the file and double-click the flash target file, and then click **Submit**.
6. Click **Update BIOS**. The computer restarts to flash the BIOS.
7. The computer will restart after the BIOS flash update is completed.

System and setup password

CAUTION: The password features provide a basic level of security for the data on your computer.

CAUTION: Ensure that your computer is locked when it is not in use. Anyone can access the data that is stored on your computer, when left unattended.

Table 31. System and setup password

Password type	Description
System password	Password that you must enter to boot to your operating system.
Setup password	Password that you must enter to access and change the BIOS settings of your computer.

You can create a system password and a setup password to secure your computer.

NOTE: The System and setup password feature is disabled by default.

Assigning a System Setup password

Prerequisites

You can assign a new System or Admin Password only when the status is set to **Not Set**. To enter BIOS System Setup, press F2 immediately after a power-on or reboot.

Steps

1. In the **System BIOS** or **System Setup** screen, select **Security** and press Enter.
   The **Security** screen is displayed.
2. Select **System/Admin Password** and create a password in the **Enter the new password** field.
   Use the following guidelines to create the system password:
   - A password can have up to 32 characters.
   - A password can at least have one special character: "(! " # $ % & ' * + , - . / : ; < = > ? @ [\ ] ^ _ ` { | })"
   - A password can have numbers 0 to 9.
   - A password can have an upper case letters from A to Z.
   - A password can have a lower case letters from a to z.
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press Y to save the changes.
   The computer restarts.

Deleting or changing an existing system password or setup password

Prerequisites

Ensure that the **Password Status** is Unlocked in the System Setup before attempting to delete or change the existing system password and/or setup password. You cannot delete or change an existing system password or setup password if the **Password Status** is Locked. To enter the System Setup, press F2 immediately after a power-on or reboot.

Steps

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.
   The **System Security** screen is displayed.
2. In the **System Security** screen, verify that the **Password Status** is Unlocked.
3. Select **System Password**. Update or delete the existing system password, and press Enter or Tab.
4. Select **Setup Password**. Update or delete the existing setup password, and press Enter or Tab.

   NOTE: If you change the system password and/or setup password, reenter the new password when prompted. If you delete the system password and/or setup password, confirm the deletion when prompted.
5. Press Esc. A message prompts you to save the changes.
6. Press Y to save the changes and exit from **System Setup**.
   The computer restarts.

Clearing CMOS settings

About this task

CAUTION: Clearing CMOS settings will reset the BIOS settings on your computer.

Steps

1. Remove the side cover.
2. Remove the coin-cell battery.
3. Wait for one minute.
4. Replace the coin-cell battery.
5. Replace the side cover.

Clearing system and setup passwords

About this task

To clear the system or setup passwords, contact Dell technical support as described at Contact Support.

NOTE: For information about how to reset Windows or application passwords, see the documentation accompanying Windows or your application.

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Troubleshooting

Dell SupportAssist Pre-boot System Performance Check diagnostics

About this task

SupportAssist diagnostics (also known as system diagnostics) performs a complete check of your hardware. The Dell SupportAssist Pre-boot System Performance Check diagnostics is embedded within the BIOS and launched by the BIOS internally. The embedded system diagnostics provides options for particular devices or device groups allowing you to:

- Run tests automatically or in an interactive mode.
- Repeat the tests.
- Display or save test results.
- Run thorough tests to add more options and obtain details about any failed devices.
- View status messages that inform you when the tests are completed successfully.
- View error messages that inform you of problems encountered during testing.

NOTE: Some tests for specific devices require user interaction. Always ensure that you are present at the computer when the diagnostic tests are performed.

For more information, see the knowledge base article 000181163.

Running the SupportAssist Pre-Boot System Performance Check

Steps

1. Turn on your computer.
2. As the computer boots, press the F12 key.
3. On the boot menu screen, select **Diagnostics**.
   The diagnostic quick test begins.
   NOTE: For more information about running the SupportAssist Pre-Boot System Performance Check on a specific device, see Dell Support Site,
4. If there are any issues, error codes are displayed.
   Note the error code and validation number and contact Dell.

Power-Supply Unit Built-in Self-Test

Built-in Self-Test (BIST) helps determine if the power-supply unit is working. To run self-test diagnostics on the power-supply unit of a desktop or all-in-one computer, search in the Knowledge Base Resource at Dell Support Site.

System-diagnostic lights

Table 32. Diagnostic LED behavior

Blinking pattern		Problem description
Amber	**White**	
1	2	Unrecoverable SPI Flash Failure
2	1	CPU failure

Table 32. Diagnostic LED behavior (continued)

Blinking pattern		Problem description
Amber	**White**	
2	2	System board failure (included BIOS corruption or ROM error)
2	3	No memory/RAM detected
2	4	Memory/RAM failure
2	5	Invalid memory installed
2	6	System board / Chipset Error / Clock failure / Gate A20 failure / Super I/O failure / Keyboard controller failure
3	1	CMOS battery failure
3	2	PCI or Video card/chip failure
3	3	BIOS Recovery image not found
3	4	BIOS Recovery image found but invalid
3	5	Power rail failure
3	6	SBIOS Flash corruption
3	7	Intel ME (Management Engine) Error
4	1	Memory DIMM power rail failure
4	2	CPU Power Cable Connection Issue

Recovering the operating system

When your computer is unable to boot to the operating system even after repeated attempts, it automatically starts Dell SupportAssist OS Recovery.

Dell SupportAssist OS Recovery is a stand-alone tool that is preinstalled in Dell computers running the Windows operating system. It consists of tools to diagnose and troubleshoot issues that may occur before your computer boots to the operating system. It enables you to diagnose hardware issues, repair your computer, back up your files, and restore your computer to its factory state.

You can also download it from the Dell Support website to troubleshoot and fix your computer when it fails to boot into the primary operating system due to software or hardware failures.

For more information about the Dell SupportAssist OS Recovery, see *Dell SupportAssist OS Recovery User's Guide* at Serviceability Tools at the Dell Support Site. Click **SupportAssist** and then click **SupportAssist OS Recovery**.

Real Time Clock—RTC reset

The Real Time Clock (RTC) reset function allows you or the service technician to recover the recently launched model Dell Latitude and Precision systems from **No POST/No Boot/No Power** situations. You can initiate the RTC reset on the system from a power-off state only if it is connected to AC power. Press and hold the power button for 25 seconds. The system RTC reset occurs after you release the power button.

NOTE: If AC power is disconnected from the system during the process or the power button is held longer than 40 seconds, the RTC reset process gets aborted.

The RTC reset will reset the BIOS to Defaults, un-provision Intel vPro and reset the system date and time. The following items are unaffected by the RTC reset:

- Service Tag
- Asset Tag
- Ownership Tag

- Admin Password
- System Password
- HDD Password
- Key Databases
- System Logs

NOTE: The IT administrator's vPro account and password on the system will be un-provisioned. The system needs to go through the setup and configuration process again to reconnect it to the vPro server.

The below items may or may not reset based on your custom BIOS setting selections:

- Boot List
- Enable Legacy Option ROMs
- Secure Boot Enable
- Allow BIOS Downgrade

Backup media and recovery options

It is recommended to create a recovery drive to troubleshoot and fix problems that may occur with Windows. Dell provides multiple options for recovering the Windows operating system on your Dell computer. For more information, see Dell Windows Backup Media and Recovery Options.

Network power cycle

About this task

If your computer is unable to access the Internet due to network connectivity issues, reset your network devices by performing the following steps:

Steps

1. Turn off the computer.
2. Turn off the modem.
   NOTE: Some Internet service providers (ISPs) provide a modem and router combo device.
3. Turn off the wireless router.
4. Wait for 30 seconds.
5. Turn on the wireless router.
6. Turn on the modem.
7. Turn on the computer.

6

Getting help and contacting Dell

Self-help resources

You can get information and help on Dell products and services using these self-help resources:

Table 33. Self-help resources

Self-help resources	Resource location
Information about Dell products and services	Dell Site
My Dell app	
Tips	
Contact Support	In Windows search, type `Contact Support`, and press Enter.
Online help for operating system	Windows Support Site Linux Support Site
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals, and documents.	Your Dell computer is uniquely identified using a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, enter the Service Tag or Express Service Code at Dell Support Site. For more information about how to find the Service Tag for your computer, see Locate the Service Tag on your computer.
Dell knowledge base articles	1. Go to Dell Support Site. 2. On the menu bar at the top of the Support page, select **Support** > **Support Library**. 3. In the Search field on the Support Library page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.

Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see Contact Support at Dell Support Site.

NOTE: Availability of the services may vary depending on the country or region, and product.

NOTE: If you do not have an active Internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell product catalog.