

# OptiPlex 7071 Tower

## Service Manual



## 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.

© 2019 - 2020 Dell Inc. or its subsidiaries. All rights reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners.

# Contents

<b>1 Working on your computer.....</b>	<b>6</b>
Safety instructions.....	6
Before working inside your computer.....	6
Safety precautions.....	7
Electrostatic discharge—ESD protection.....	7
ESD field service kit .....	8
Transporting sensitive components.....	9
After working inside your computer.....	9
<b>2 Major components of your system.....</b>	<b>10</b>
<b>3 Disassembly and reassembly.....</b>	<b>12</b>
Recommended tools.....	12
Screw list.....	12
Left-side cover.....	13
Removing the left-side cover.....	13
Installing the left-side cover.....	14
Front cover.....	16
Removing the front cover.....	16
Installing the front cover.....	16
2.5-inch hard drive.....	17
Removing the 2.5-inch hard drive.....	17
Installing the 2.5-inch hard drive.....	18
2.5-inch hard drive bracket.....	19
Removing the 2.5-inch hard drive bracket.....	19
Installing the 2.5-inch hard drive bracket.....	20
3.5-inch hard drive.....	21
Removing the 3.5-inch hard drive.....	21
Installing the 3.5-inch hard drive.....	22
3.5-inch hard drive bracket.....	24
Removing the 3.5-inch hard drive bracket.....	24
Installing the 3.5-inch hard drive bracket.....	24
Slim optical-drive.....	25
Removing the Optical Disk Drive.....	25
Installing the Optical Disk Drive.....	26
Slim optical-drive bracket.....	27
Removing the slim ODD bracket.....	27
Installing the slim ODD bracket.....	28
Chassis fan.....	29
Removing the chassis fan.....	29
Installing the chassis fan.....	30
Memory modules.....	31
Removing the memory modules.....	31
Installing the memory modules.....	32

Wireless card.....	33
Removing the wireless card.....	33
Installing the wireless card.....	34
Solid-state drive/Intel Optane.....	35
Removing the 2230 solid-state drive/Intel Optane memory module.....	35
Installing the 2230 solid-state drive/Intel Optane memory module.....	36
Removing the 2280 solid-state drive/Intel Optane memory module.....	37
Installing the 2280 solid-state drive/Intel Optane memory module.....	37
Graphics card.....	38
Removing the graphics card.....	38
Installing the graphics card.....	39
Coin-cell battery.....	40
Removing the coin-cell battery.....	40
Installing the coin-cell battery.....	41
Power-supply unit.....	42
Removing the power-supply unit.....	42
Installing the power-supply unit.....	44
Processor fan and heat-sink assembly.....	47
Removing the processor fan and 95 W heat-sink assembly.....	47
Installing the processor fan and 95 W heat-sink assembly.....	48
Removing the processor fan and 65 W heat-sink assembly.....	49
Installing the processor fan and 65 W heat-sink assembly.....	49
Processor.....	50
Removing the processor.....	50
Installing the processor.....	51
VR heat sink.....	53
Removing the VR heat sink.....	53
Installing the VR heat sink.....	53
Speaker.....	54
Removing the speaker.....	54
Installing the speaker.....	55
Power button.....	56
Removing the power button.....	56
Installing the power button.....	57
Intrusion switch.....	58
Removing the intrusion switch.....	58
Installing the intrusion switch.....	59
System board.....	60
Removing the system board.....	60
Installing the system board.....	64
<b>4 System setup.....</b>	<b>69</b>
Entering BIOS setup program.....	69
Boot menu.....	69
Navigation keys.....	69
Boot Sequence.....	70
System setup options.....	70
General options.....	70
System information.....	71
Video screen options.....	72



Security.....	73
Secure boot options.....	74
Intel Software Guard Extensions options.....	75
Performance.....	75
Power management.....	76
Post behavior.....	76
Manageability.....	77
Virtualization support.....	77
Wireless options.....	78
Maintenance.....	78
System logs.....	78
Advanced configuration.....	78
System and setup password.....	79
Assigning a system setup password.....	79
Deleting or changing an existing system setup password.....	79
Clearing CMOS settings.....	80
Clearing BIOS (System Setup) and System passwords.....	80
Updating the BIOS in Windows .....	80
Updating BIOS on systems with BitLocker enabled.....	81
Updating your system BIOS using a USB flash drive.....	81
Updating the Dell BIOS in Linux and Ubuntu environments.....	82
Flashing the BIOS from the F12 One-Time boot menu.....	82
<b>5 Troubleshooting.....</b>	<b>88</b>
Enhanced Pre-Boot System Assessment (ePSA) diagnostics.....	88
Running the ePSA diagnostics.....	88
Diagnostics.....	88
Diagnostic error messages.....	90
System error messages.....	93
Recovering the operating system.....	93
Enabling Intel Optane memory.....	94
Disabling Intel Optane memory.....	94
Flea power release.....	94
WiFi power cycle.....	95
<b>6 Getting help.....</b>	<b>96</b>
Contacting Dell.....	96

# Working on your computer


## Safety instructions

### Prerequisites


Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that the following conditions exist:

- You have read the safety information that shipped with your computer.
- A component can be replaced or, if purchased separately, installed by performing the removal procedure in reverse order.


### About this task


 **NOTE:** Disconnect 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 to the power source.

 **WARNING:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the [Regulatory Compliance Homepage](#)

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **CAUTION:** To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface at the same time as touching a connector on the back of the computer.

 **CAUTION:** Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

 **CAUTION:** When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

 **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

 **CAUTION:** System will shut down if side covers are removed while the system is running. The system will not power on if the side cover is removed.

 **CAUTION:** System will shut down if side covers are removed while the system is running. The system will not power on if the side cover is removed.

 **CAUTION:** System will shut down if side covers are removed while the system is running. The system will not power on if the side cover is removed.

## Before working inside your computer

### About this task

To avoid damaging your computer, perform the following steps before you begin working inside the computer.

## Steps

1. Ensure that you follow the [Safety Instruction](#).
2. Ensure that your work surface is flat and clean to prevent the computer cover from being scratched.
3. Turn off your computer.
4. Disconnect all network cables from the computer.

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

5. Disconnect your computer and all attached devices from their electrical outlets.
6. Press and hold the power button while the computer is unplugged to ground the system board.

 **NOTE:** To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface at the same time as touching a connector on the back of the computer.

## Safety precautions

The safety precautions chapter details the primary steps to be taken 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 system and all attached peripherals.
- Disconnect the system and all attached peripherals from AC power.
- Disconnect all network cables, telephone, and telecommunications lines from the system.
- Use an ESD field service kit when working inside any tablet/notebook/desktop to avoid electrostatic discharge (ESD) damage.
- After removing any system component, carefully place the removed component on an anti-static mat.
- Wear shoes with non-conductive rubber soles to reduce the chance of getting electrocuted.

## Standby power

Dell products with standby power must be unplugged before you open the case. Systems that incorporate standby power are essentially powered while turned off. The internal power enables the system to be remotely turned on (wake on LAN) and suspended into a sleep mode and has other advanced power management features.

Unplugging, pressing and holding the power button for 15 seconds should discharge residual power in the system board. Remove the battery from tablets/notebooks.

## Bonding

Bonding is a method for connecting two or more grounding conductors to the same electrical potential. This is done through the use of 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 non-metal surface. The wrist strap should be secure and in full contact with your skin, and ensure that you remove all jewelry such as watches, bracelets, or rings prior to bonding 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 DIMMs, and system boards. Very slight charges 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.

Due to the increased density of semiconductors used in recent Dell products, the sensitivity to static damage is now higher than in previous Dell products. For this reason, some previously approved methods of handling parts are no longer applicable.

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 DIMM that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code 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 DIMM receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms 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, etc.

The more difficult type of damage to recognize and troubleshoot is the intermittent (also called latent or "walking wounded") failure.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. The use of wireless anti-static straps is no longer allowed; they 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, ensure that you discharge static electricity from your body.
- 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.

### 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 mat and to any bare metal on the system being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the mat. ESD-sensitive items are safe in your hand, on the ESD mat, in the system, or inside a 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 ESD mat is not required, or connected 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 ESD mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, mat, and bonding wire. Never use wireless wrist straps. Always be aware 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 of 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 call, and at a minimum, test once per week. A wrist strap tester is the best method for doing this test. If you do not have your own wrist strap tester, check with your regional office to find out if they have one. To perform the test, plug the wrist-strap's bonding-wire 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.
- **Insulator Elements** – It is critical to keep ESD sensitive devices, such as plastic heat sink casings, away from internal parts that are insulators and often highly charged.
- **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 portable environment. Servers are typically installed in a rack within a data center; desktops or portables 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 system 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 part 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 ESD mat, in the system, or inside an anti-static bag.
- **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.

### ESD protection summary


It is recommended that all field service technicians use the traditional wired ESD grounding wrist strap and protective anti-static mat at all times when servicing Dell products. In addition, it is critical that technicians keep sensitive parts separate from all insulator parts while performing service and that they use anti-static bags for transporting sensitive components.

# 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 weight 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 techniques in reverse to set the load down.

## After working inside your computer

### About this task

After you complete any replacement procedure, ensure that you connect any external devices, cards, and cables before turning on your computer.

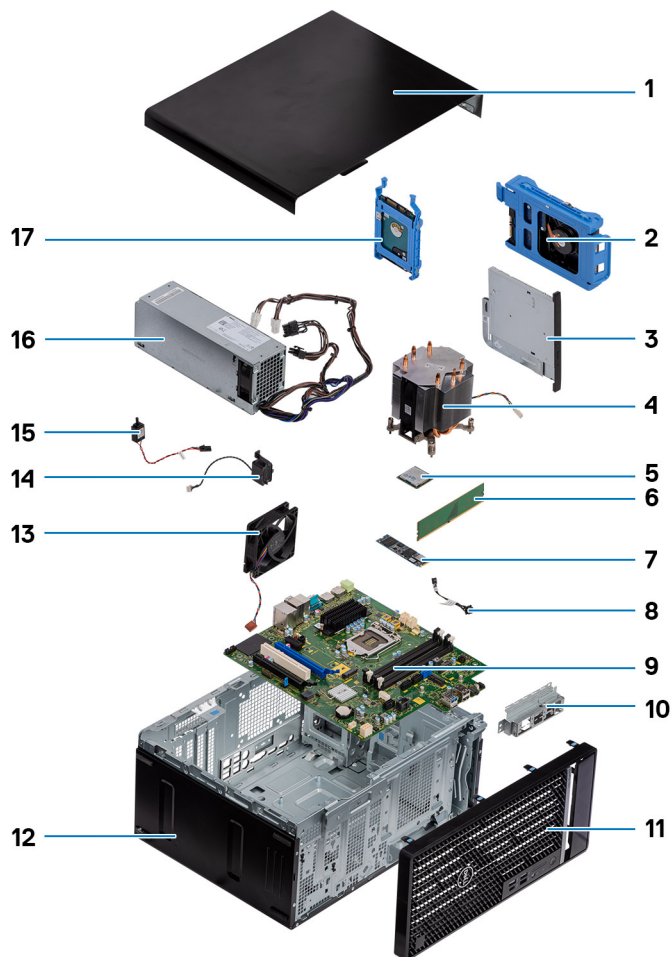
### Steps

1. Connect any telephone or network cables to your computer.


 **CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.**

2. Connect your computer and all attached devices to their electrical outlets.
3. Turn on your computer.
4. If required, verify that the computer works correctly by running **ePSA diagnostics**.

## Major components of your system



1. Left-side cover
2. 3.5-inch hard drive
3. Slim optical-drive
4. Processor fan and heat-sink assembly
5. Processor
6. Memory module
7. Solid-state drive/Intel Optane
8. Power button
9. System board
10. Front I/O port bracket
11. Front cover
12. Chassis
13. Chassis fan
14. Speaker
15. Intrusion switch
16. Power-supply unit
17. 2.5-inch hard drive

 **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.

# Disassembly and reassembly

## Recommended tools







The procedures in this document require the following tools:

- Phillips #0 screwdriver
- Phillips #1 screwdriver
- Philips #2 screwdriver
- Plastic scribe
- Hex screwdriver

## Screw list

- NOTE:** When removing screws from a component, it is recommended to note the screw type, 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 surface when replacing a component.
- NOTE:** Screw color may vary with the configuration ordered.

**Table 1. Screw list**

Component	Secured to	Screw type	Quantity	Screw image
Wireless card	System board	M2x3	1	
Solid-state drive	System board	M2x4	1	
Intel Optane memory module	System board	M2x4	1	
Power-supply unit	Chassis	#6-32	3	
Ports bezel	Chassis	#6-32	1	
System board	Chassis	#6-32	8	
Processor fan and heat-sink assembly	System board	Captive screw	4	
VR heat sink	System board	Captive screw	2	



# Left-side cover

## Removing the left-side cover

### Prerequisites

1. Follow the procedure in [Before working inside your computer.](#)

### About this task

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



**Steps**

1. Push the release latch down to unlock the side cover.
2. Using the tab on the left-side cover, slide and lift the left-side cover off the chassis.

## Installing the left-side cover

**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 left-side cover and provides a visual representation of the installation procedure.



### Steps

1. Align the tabs on the left-side cover with the slots on the chassis.
2. Slide it towards the front of the computer until the release latch locks the side cover.

### Next steps

1. Follow the procedure in [After working inside your computer.](#)

# Front cover

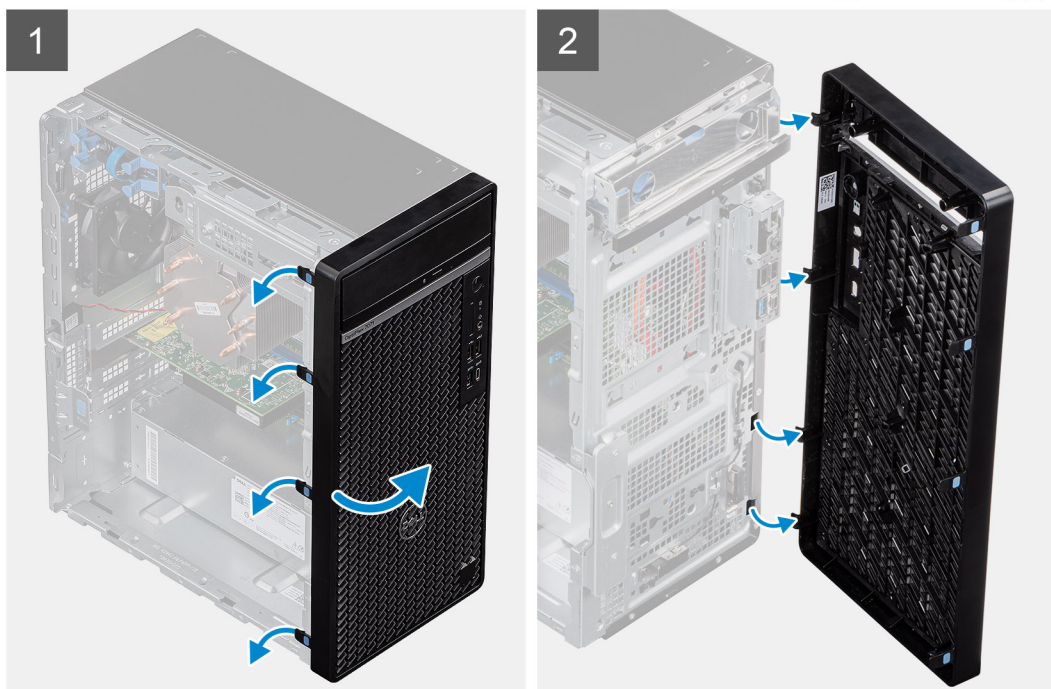
## Removing the front cover

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

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



### Steps

1. Place the computer in an upright position.
2. Gently pry and release the front-cover tabs sequentially from the top.
3. Move the front cover outward from the chassis.

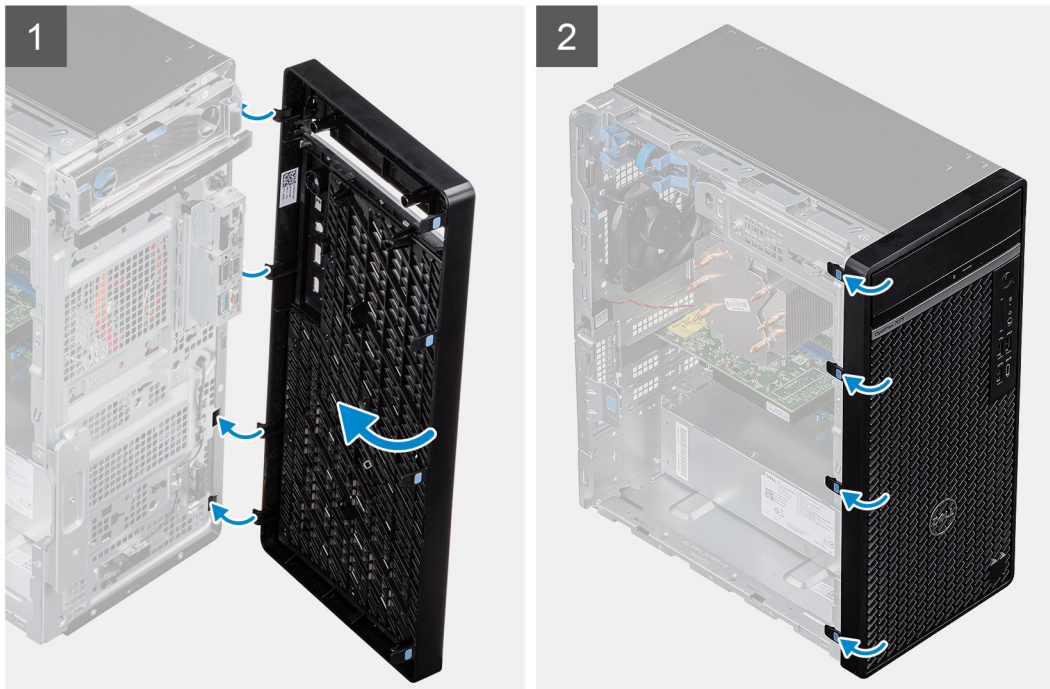
## Installing the front cover

### 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 front cover and provide a visual representation of the installation procedure.



### Steps

1. Place the computer in an upright position.
2. Align the front-cover tabs with the slots on the chassis.
3. Move the front cover towards the chassis and snap it into place.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## 2.5-inch hard drive

### Removing the 2.5-inch hard drive

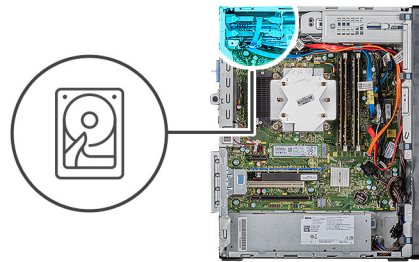
#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).



### About this task

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



### Steps

1. Disconnect the data and power cables from the hard drive.
2. Press the release tabs on the hard-drive bracket and slide the hard-drive assembly out of the hard-drive cage.

**NOTE:** Note the orientation or the SATA connector marking on the hard drive so that you can replace it correctly.

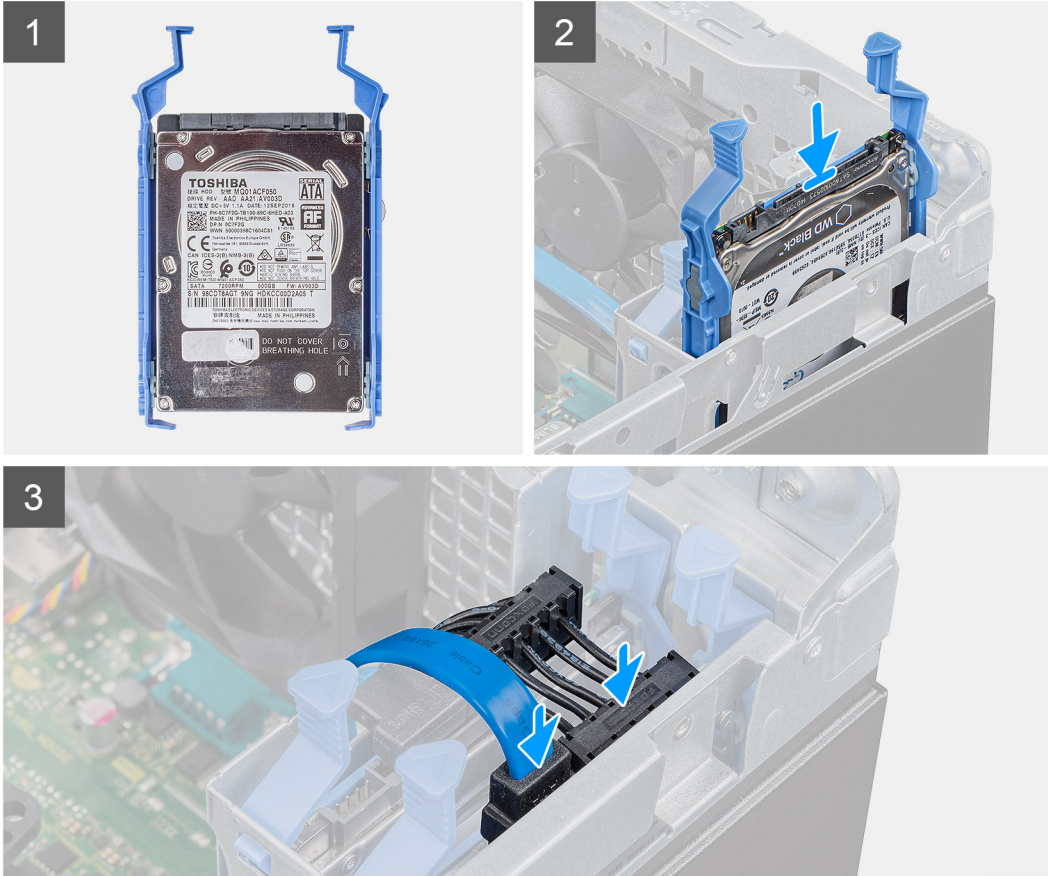
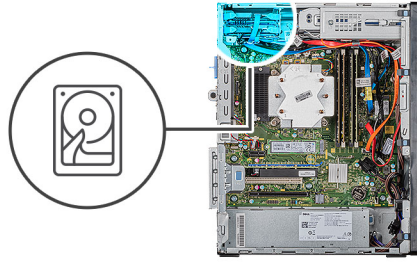
## Installing the 2.5-inch hard drive

### 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 provides a visual representation of the installation procedure.



### Steps

1.  **NOTE:** Note the orientation or the SATA connector marking on the hard drive so that you can replace it correctly.  
Slide the hard-drive assembly into the hard-drive cage until it snaps into place.
2. Connect the data cable and power cable to the hard drive.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## 2.5-inch hard drive bracket

## Removing the 2.5-inch hard drive bracket

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

3. Remove the 2.5-inch hard drive assembly.

#### About this task

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



#### Steps

1. Pry the hard-drive bracket to release the tabs on the assembly from the slots on the hard drive.
2. Lift and remove the hard drive off the hard-drive bracket.

## Installing the 2.5-inch hard drive bracket

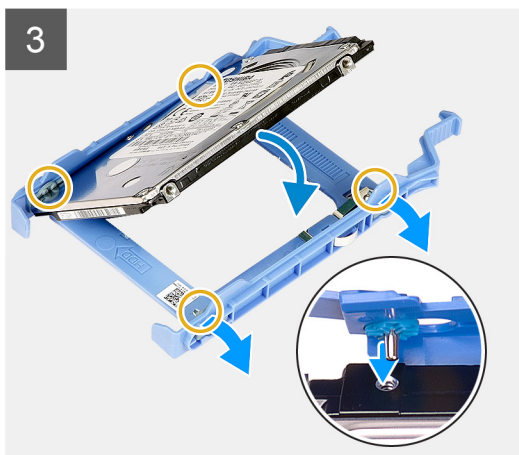
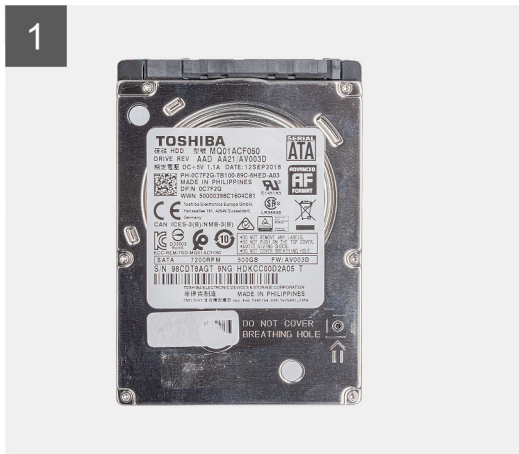
#### Prerequisites

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 2.5-inch hard drive bracket and provides a visual representation of the installation procedure.





### Steps

1. Place the hard drive into the hard-drive bracket and align the tabs on the bracket with the slots on the hard drive.
2. Snap the hard drive into the hard-drive bracket.

### Next steps

1. Install the [2.5-inch hard drive assembly](#).
2. Install the [left-side cover](#).
3. Follow the procedure in [After working inside your computer](#).

## 3.5-inch hard drive

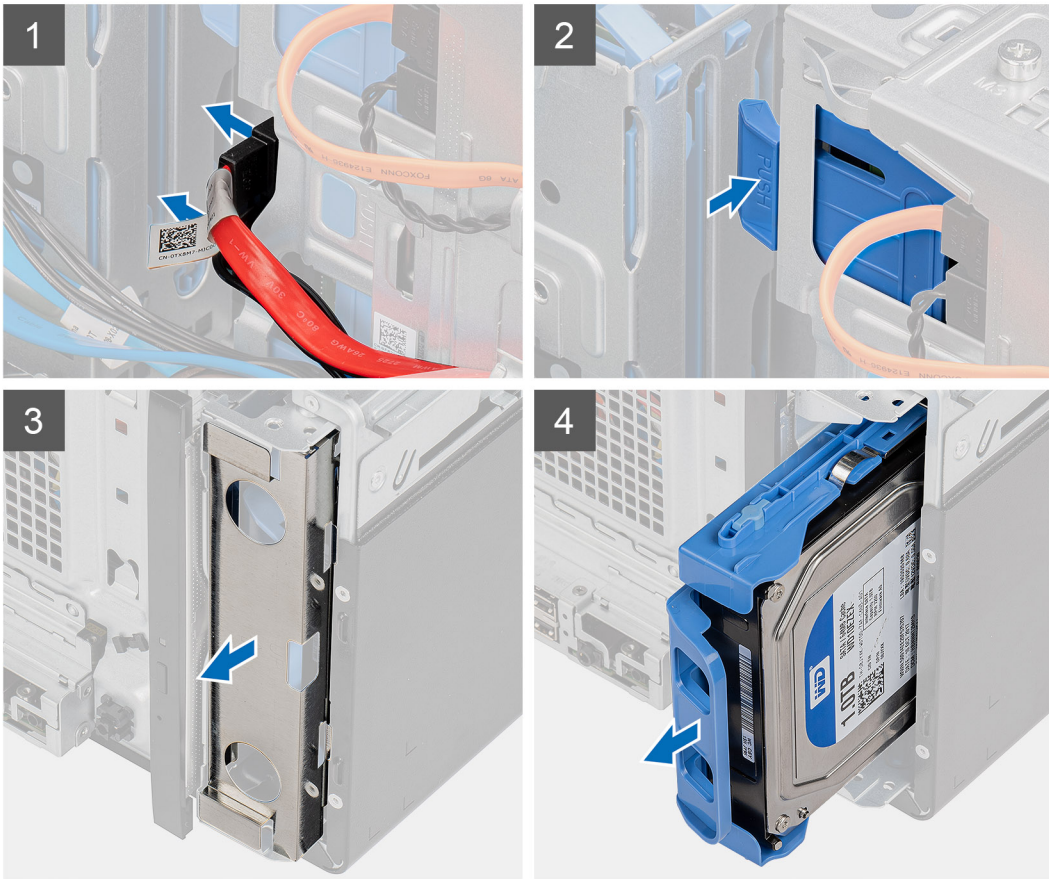
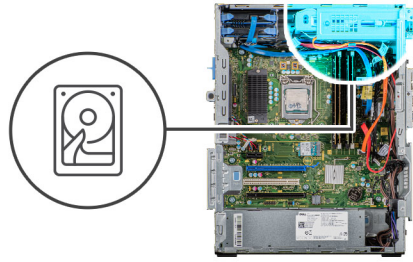
## Removing the 3.5-inch hard drive

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

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



### Steps

1. Lay the computer on the right side.
2. Disconnect the data and power cables from the hard drive.
3. Push the securing tab to release the hard drive bracket from the chassis.
4. Remove the EMI shield from the front-side of the chassis.
5. Slide the hard-drive assembly away from the chassis.

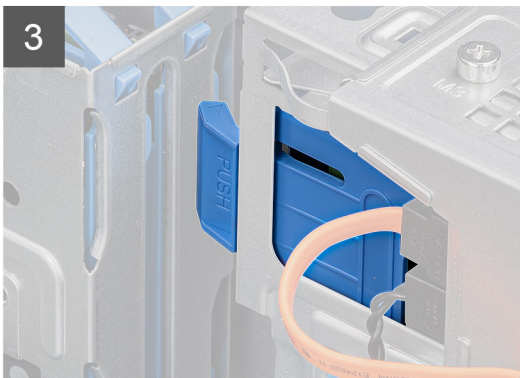
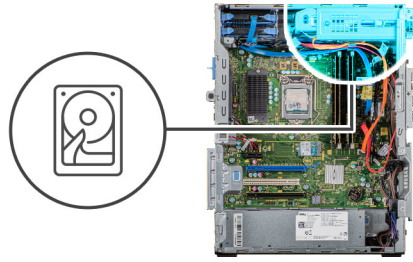
## Installing the 3.5-inch hard drive

### 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 assembly and provides a visual representation of the installation procedure.



### Steps

1. Slide and insert the hard-drive assembly into the hard drive cage.
2. Replace the EMI shield on the chassis.
3. Align the hard-drive assembly with the tabs on the chassis.
4. Route the power cable and data cable through the routing guides on the hard-drive assembly and connect the cables to the hard drive.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).



# 3.5-inch hard drive bracket

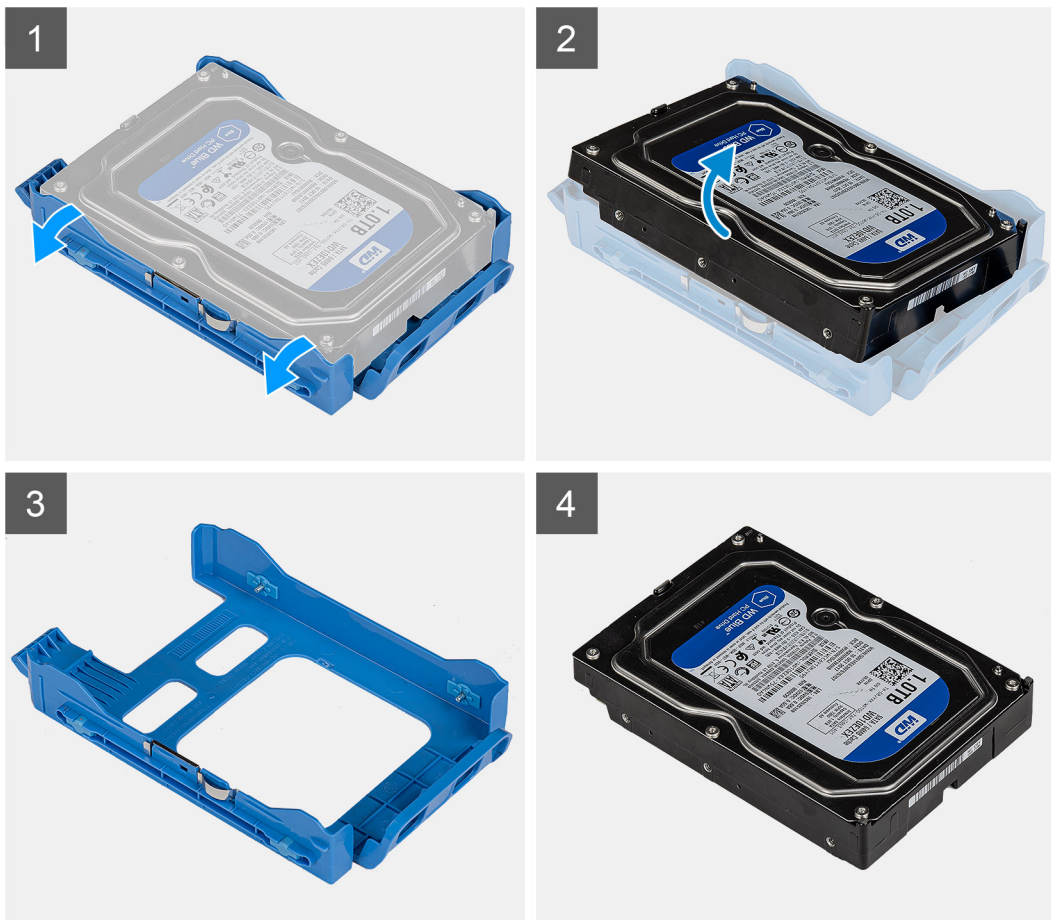
## Removing the 3.5-inch hard drive bracket

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).
3. Remove the [3.5-inch hard drive assembly](#).

### About this task

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



### Steps

1. Pry the hard-drive bracket to release the tabs on the assembly from the slots on the hard drive.
2. Lift and remove the hard drive off the hard-drive bracket.

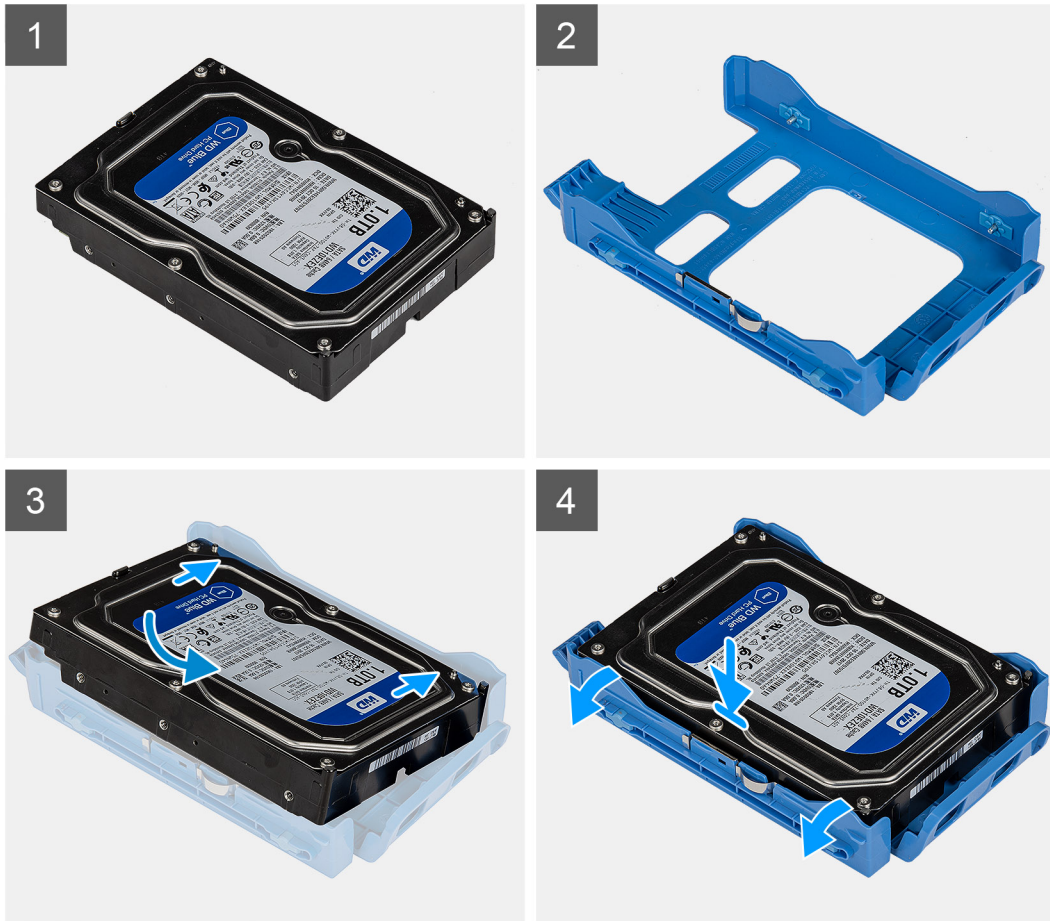
## Installing the 3.5-inch hard drive bracket

### 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 3.5-inch hard drive bracket and provides a visual representation of the installation procedure.



### Steps

1. Place the hard drive into the hard-drive bracket and align the tabs on the bracket with the slots on the hard drive.
2. Snap the hard drive into the hard-drive bracket.

### Next steps

1. Install the [3.5-inch hard drive assembly](#).
2. Install the [left-side cover](#).
3. Follow the procedure in [After working inside your computer](#).

## Slim optical-drive

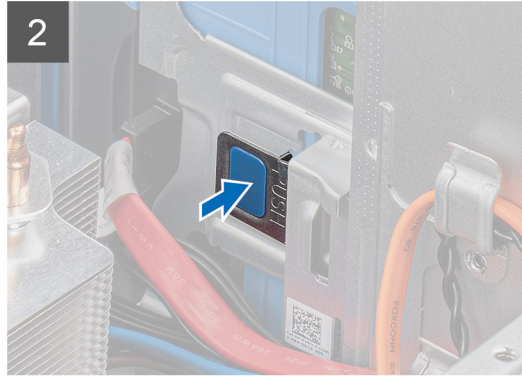
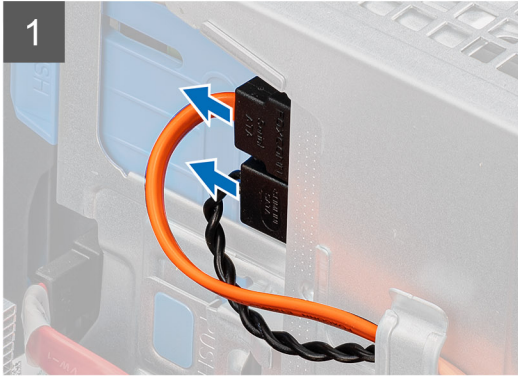
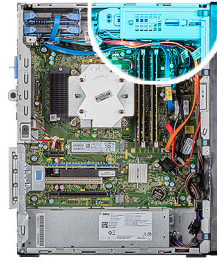
## Removing the Optical Disk Drive

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

The following images indicate the location of the ODD and provides a visual representation of the removal procedure.



### Steps

1. Lay the computer on the right side.
2. Disconnect the data and power cables from the ODD.
3. Push the securing tab to release the ODD from the chassis.
4. Slide and remove the ODD from the ODD slot.

## Installing the Optical Disk Drive

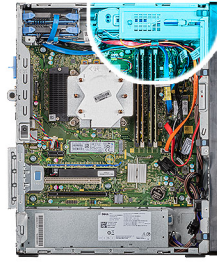
### Prerequisites

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 Optical Disk Drive and provide a visual representation of the installation procedure.





### Steps

1. Insert the ODD assembly into the ODD slot.
2. Slide the ODD assembly until it snaps into place.
3. Route the power cable and data cable through the routing guides and connect the cables to the ODD.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Slim optical-drive bracket

## Removing the slim ODD bracket

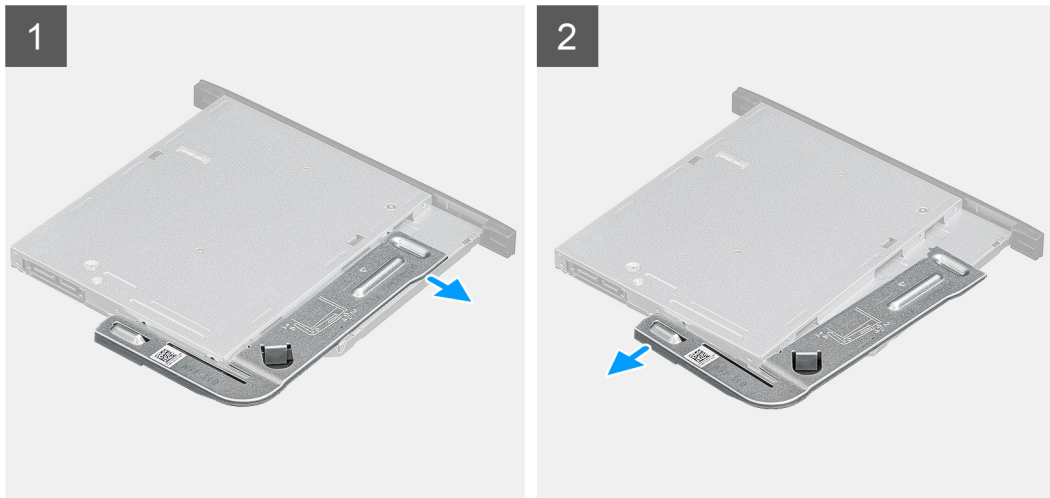
### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

3. Remove the [slim ODD assembly](#).

#### About this task

The following images indicate the location of the slim ODD bracket and provides a visual representation of the removal procedure.



#### Steps

1. Pry the ODD bracket to release from the slots on the ODD.
2. Remove the ODD bracket off the ODD

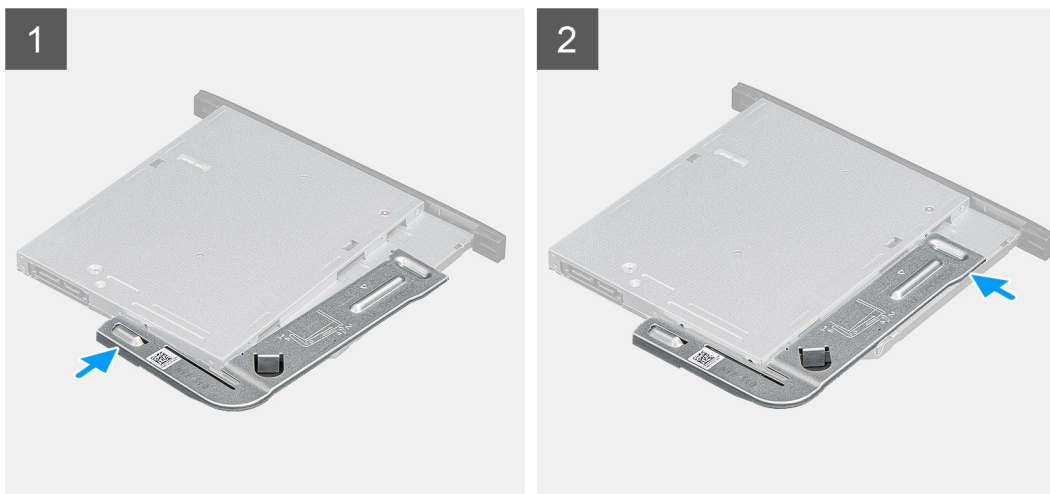
## Installing the slim ODD bracket

#### 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 slim ODD bracket and provides a visual representation of the installation procedure.



#### Steps

1. Align and place the ODD bracket on the ODD slots.
2. Snap the ODD bracket into the ODD.



### Next steps

1. Install the [slim ODD assembly](#).
2. Install the [left-side cover](#).
3. Follow the procedure in [After working inside your computer](#).

## Chassis fan

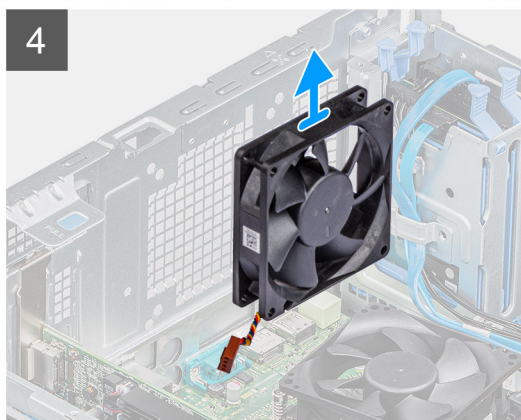
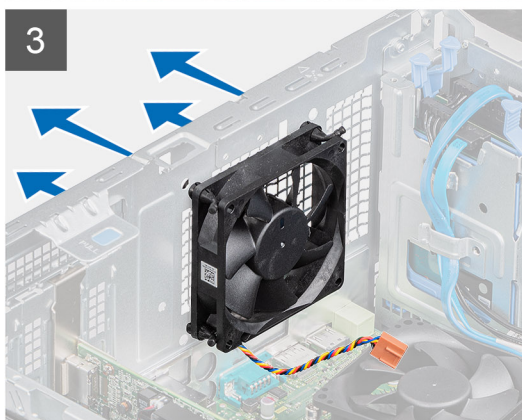
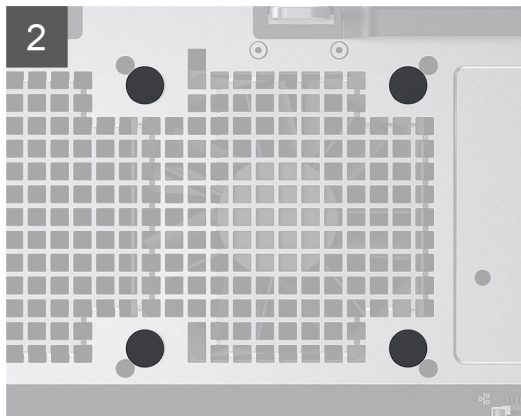
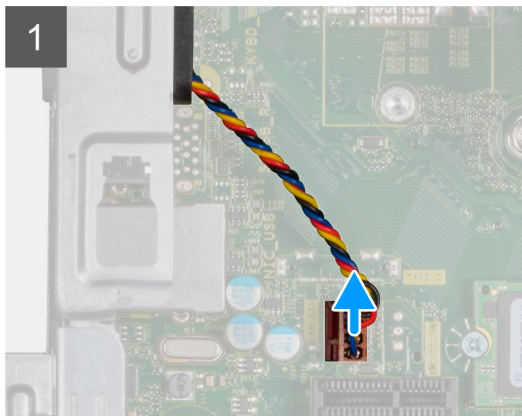
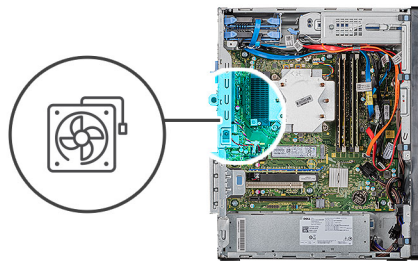
### Removing the chassis fan

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

#### About this task

The following images indicate the location of the chassis fan and provides a visual representation of the removal procedure.



#### Steps

1. Lay the computer on the right side.

2. Disconnect the fan cable from the system board.
3. Gently pull the rubber grommets to release the fan from the chassis .
4. Remove the fan off the chassis.

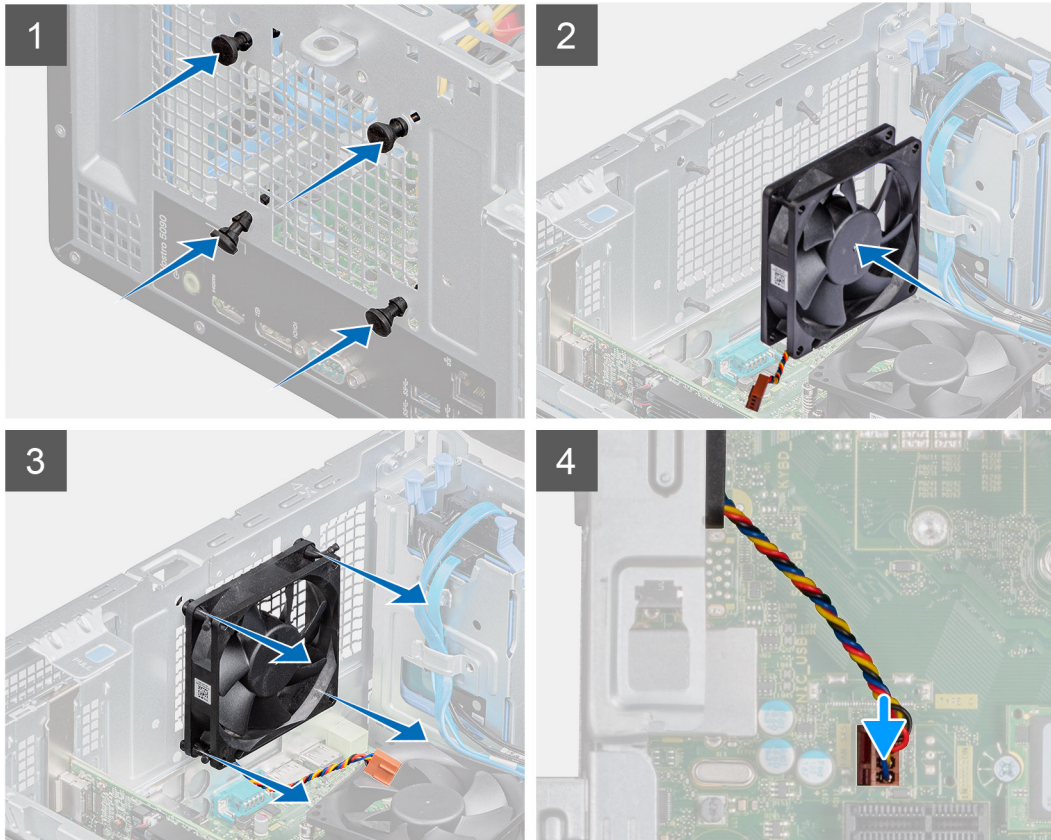
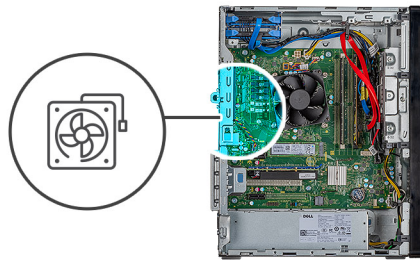
## Installing the chassis fan

### 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 chassis fan and provides a visual representation of the installation procedure.



### Steps

1. Insert the rubber grommets on the chassis.
2. Align the slots on the fan with the rubber grommets on the chassis.
3. Route the rubber grommets through the slots on fan and pull the rubber grommets until the fan snaps into position.
4. Connect the fan cable to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Memory modules

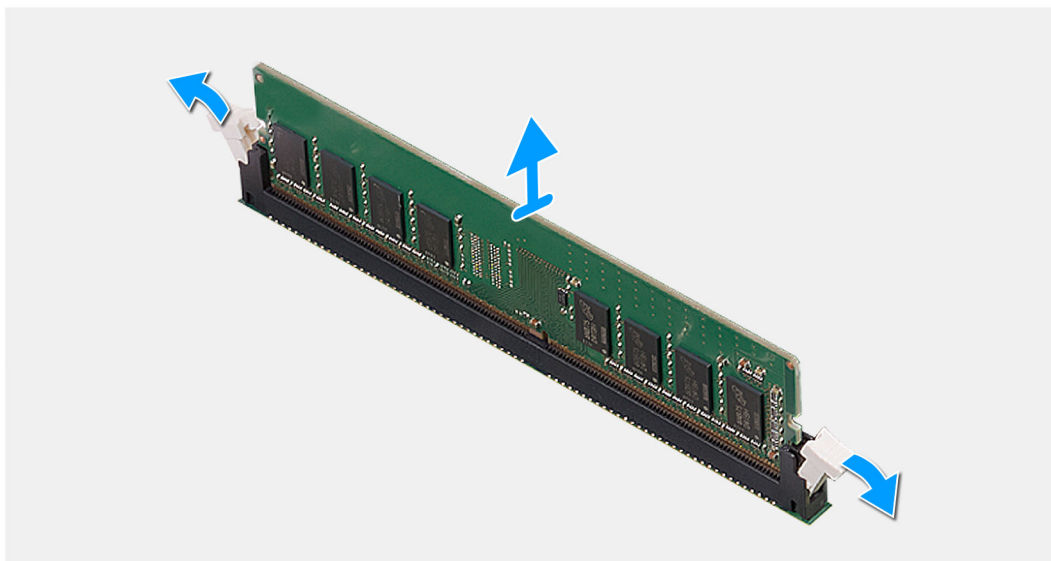
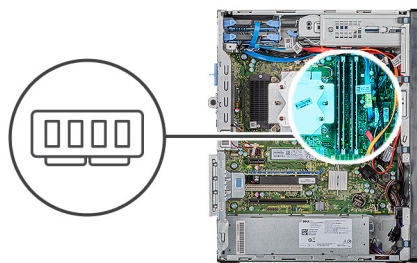
### Removing the memory modules

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

#### About this task

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



#### Steps

1. Lay the chassis on the right side.
2. Use your fingertips to carefully spread apart the securing-clips on each end of the memory-module slot.
3. Grasp the memory module near the securing clip, and then gently ease the memory module out of the memory-module slot.

**NOTE:** Repeat step 2 to step 4 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.

**NOTE:** If the memory module is difficult to remove, gently ease the memory module back and forth to remove it from the 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.

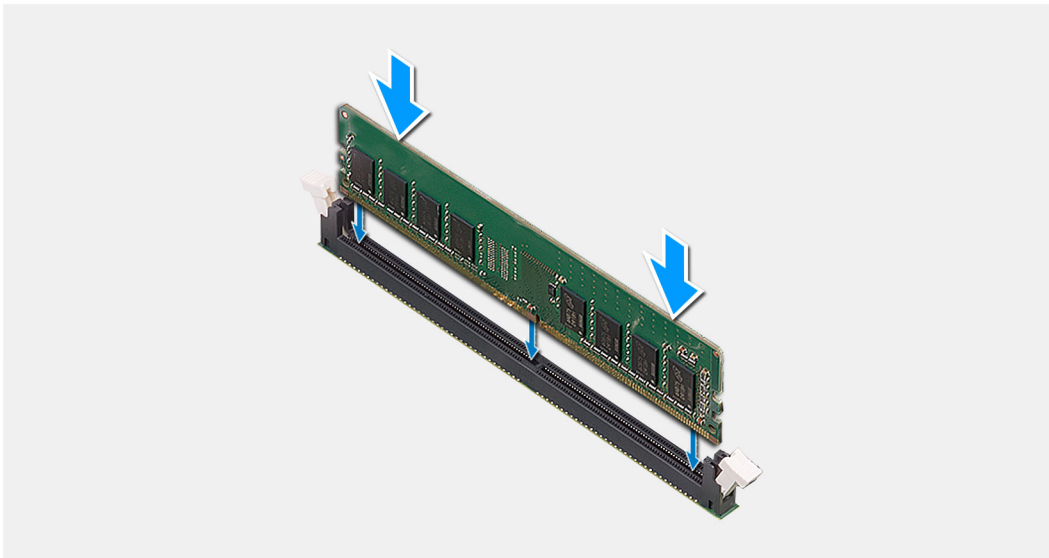
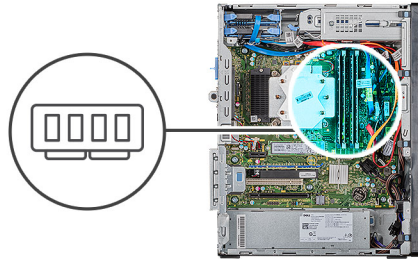
## Installing the memory modules

### 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 modules and provides a visual representation of the installation procedure.



### Steps

1. Align the notch on the memory module with the tab on the memory-module slot.
2. Insert the memory module into the memory-module connector until the memory module snaps into position and the securing clip locks in place.



**NOTE:** The securing clips return to the locked position. If you do not hear the click, remove the memory module and reinstall it.



**NOTE:** If the memory module is difficult to remove, gently ease the memory module back and forth to remove it from the slot.



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

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).



# Wireless card

## Removing the wireless card

### Prerequisites

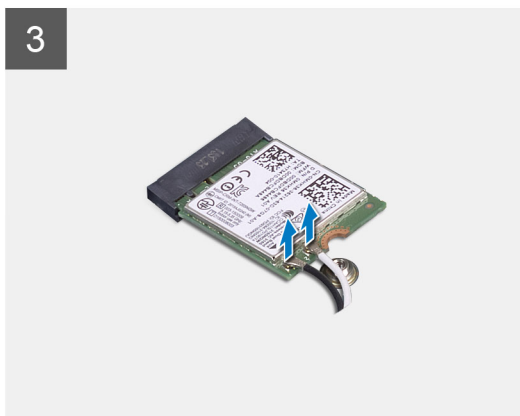
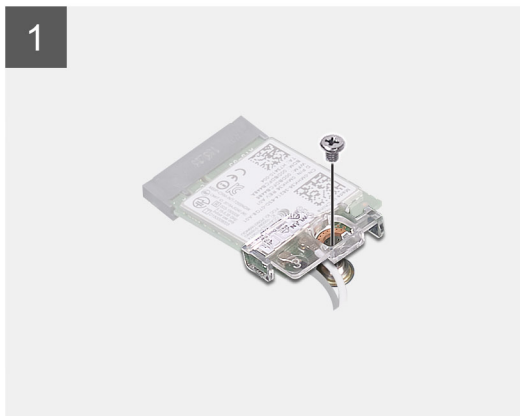
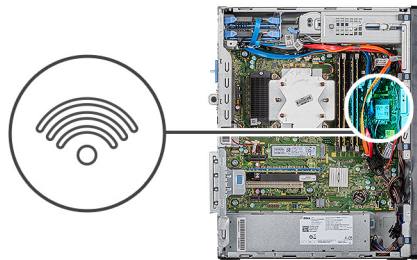
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

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



1x  
M2x3



### Steps

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

# Installing the wireless card

## Prerequisites

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

 **NOTE:** To avoid damage to the wireless card, do not place any cables under it.

## About this task

The following images indicate the location of the wireless card and provides a visual representation of the installation procedure.



## Steps

1. Align the notch on the wireless card with the tab on the wireless-card slot.
2. Slide the wireless card at an angle into the wireless-card slot.
3. Connect the antenna cables to the wireless card.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

**Table 2. Antenna-cable color scheme**

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

#### Connectors on the wireless card

Auxiliary (black triangle)

#### Antenna-cable color

Black

4. Slide and place the wireless-card bracket on the wireless card.
5. Replace the single (M2x3) screw that secures the wireless card to the system board.

#### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Solid-state drive/Intel Optane

### Removing the 2230 solid-state drive/Intel Optane memory module

#### Prerequisites

**NOTE:** You need to disable the Intel Optane memory before removing Intel Optane memory module from your computer. For more information about disabling the Intel Optane memory, see [Disabling Intel Optane memory](#).

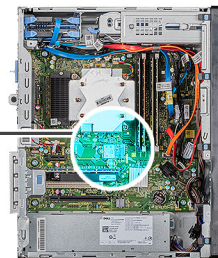
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

#### About this task

The following images indicate the location of the 2230 solid-state drive/Intel Optane and provides a visual representation of the removal procedure.



1x  
M2x3



1



2



#### Steps

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

# Installing the 2230 solid-state drive/Intel Optane memory module

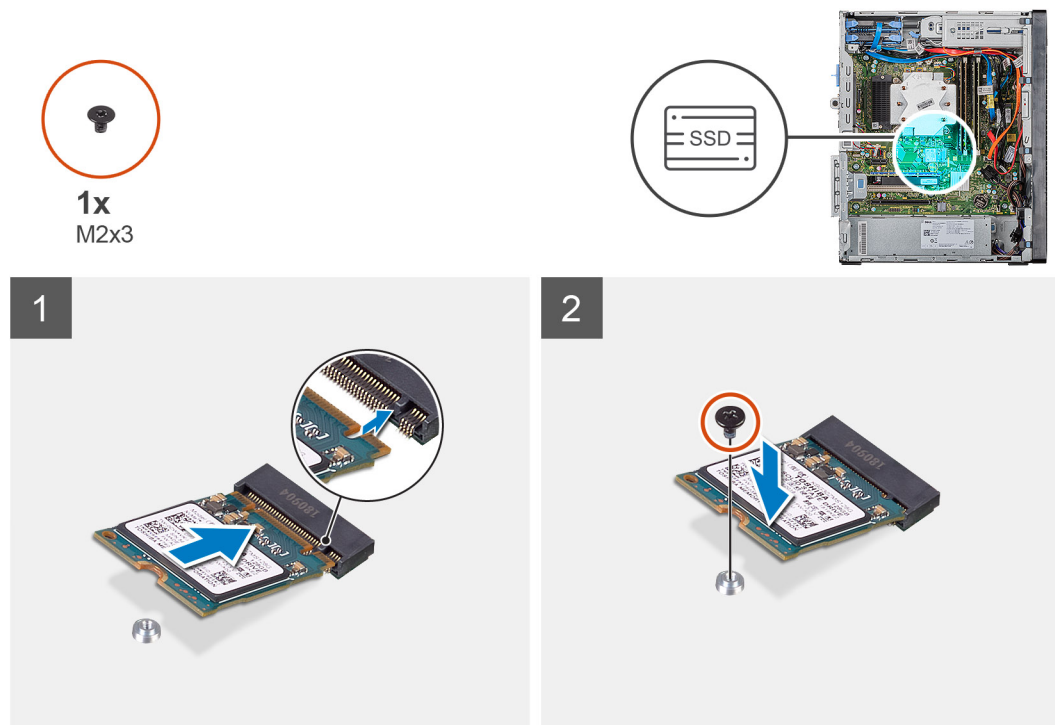
## Prerequisites

 **CAUTION:** Solid-state drives are fragile. Exercise care when handling the solid-state drive.

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 solid-state drive/Intel Optane memory and provides a visual representation of the installation procedure.



## Steps

1. Locate the notch on the 2230 solid-state drive/Intel Optane memory.
2. Align the notch on the 2230 solid-state drive/Intel Optane memory with the tab on the M.2 card slot.
3. Slide the 2230 solid-state drive/Intel Optane memory into the M.2 card slot on the system board.
4. Replace the screw (M2x3) that secures the 2230 solid-state drive/Intel Optane memory to the system board.

## Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

 **NOTE:** Enable the Intel Optane memory after you replace the Intel Optane memory module. For more information about enabling the Intel Optane memory, see [Enabling Intel Optane memory](#).



# Removing the 2280 solid-state drive/Intel Optane memory module

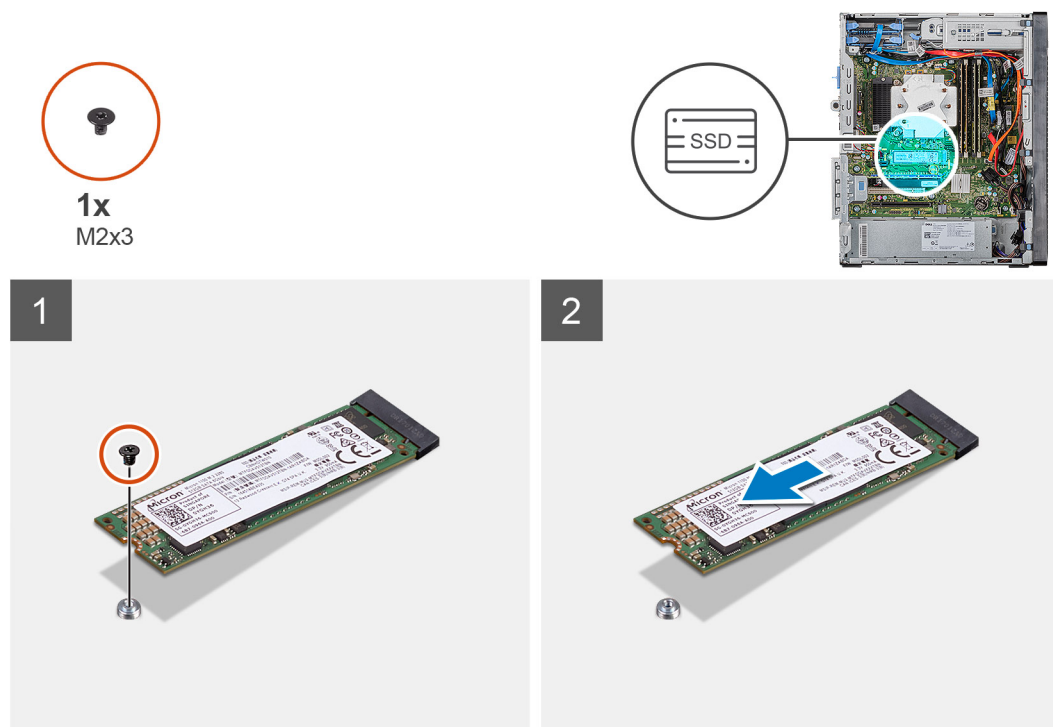
## Prerequisites

**NOTE:** You need to disable the Intel Optane memory before removing Intel Optane memory module from your computer. For more information about disabling the Intel Optane memory, see [Disabling Intel Optane memory](#).

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

## About this task

The following images indicate the location of the 2280 solid-state drive/Intel Optane memory module and provide a visual representation of the removal procedure.



## Steps

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

# Installing the 2280 solid-state drive/Intel Optane memory module

## Prerequisites

**CAUTION:** Solid-state drives are fragile. Exercise care when handling the solid-state drive.

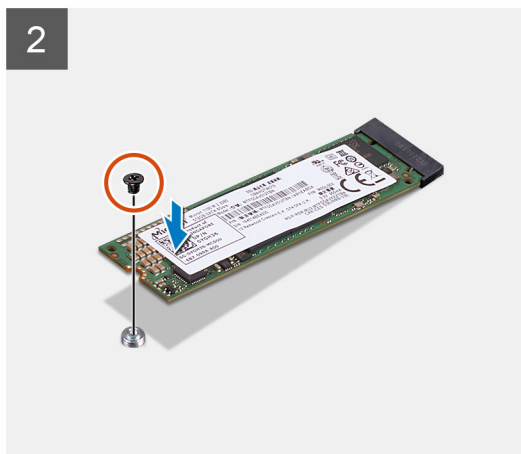
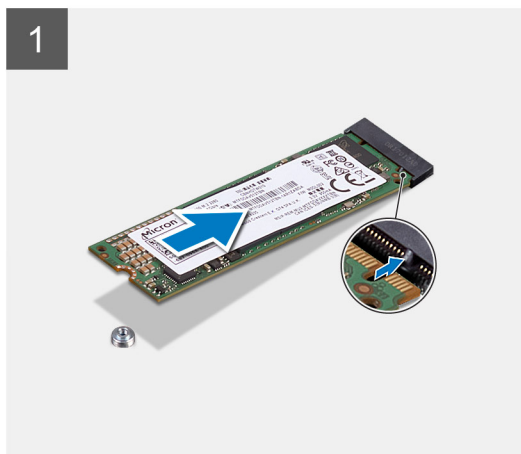
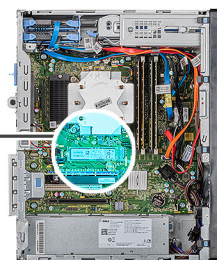
If you are replacing a component, remove the existing component before performing the installation procedure.

## About this task

The following images indicate the location of the 2280 solid-state drive/Intel Optane memory module and provides a visual representation of the installation procedure.



1x  
M2x3



### Steps

1. Locate the notch on the 2230 solid-state drive/Intel Optane memory.
2. Align the notch on the 2230 solid-state drive/Intel Optane memory with the tab on the M.2 card slot.
3. Slide the 2230 solid-state drive/Intel Optane memory into the M.2 card slot on the system board.
4. Replace the screw (M2x3) that secures the 2230 solid-state drive/Intel Optane memory to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

**NOTE:** Enable the Intel Optane memory after you replace the Intel Optane memory module. For more information about enabling the Intel Optane memory, see [Enabling Intel Optane memory](#).

## Graphics card

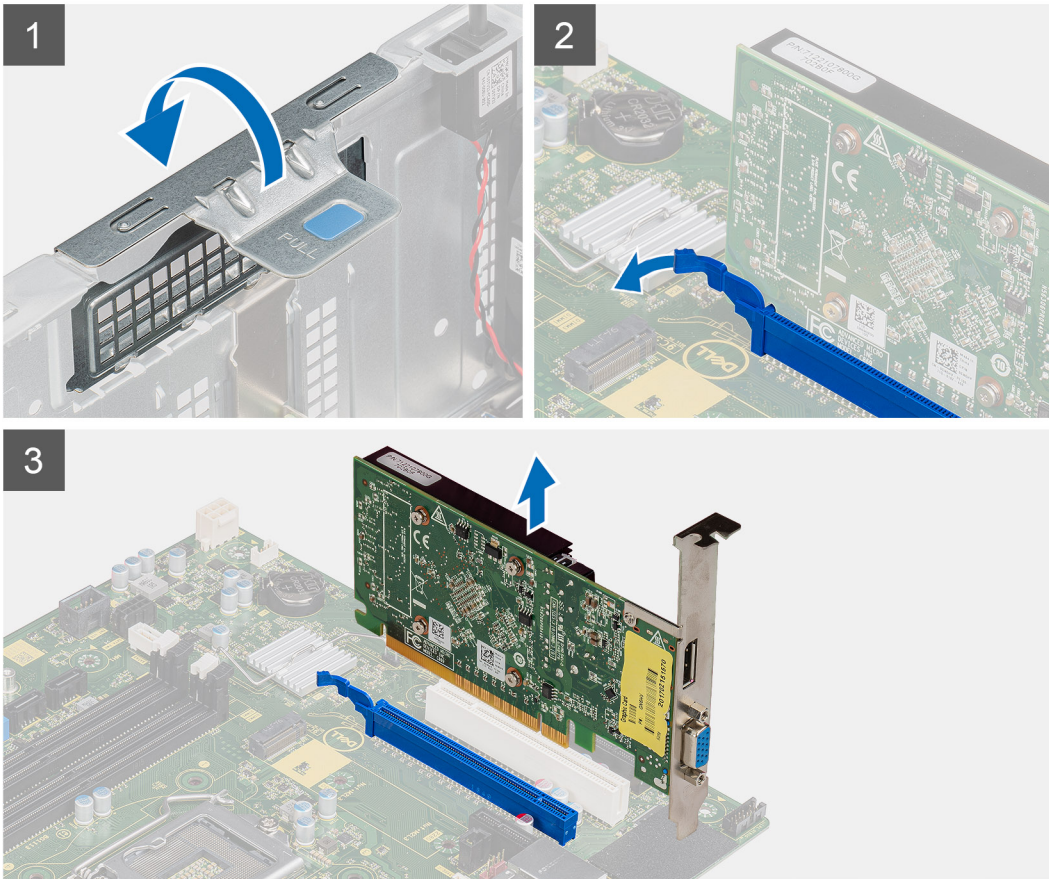
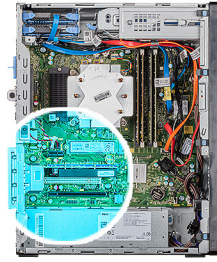
### Removing the graphics card

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

#### About this task

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



### Steps

1. Lay the computer on the right side.
2. Locate the graphics card (PCI-Express).
3. Lift the pull tab to open the PCIe door.
4. Push and hold the securing tab on the graphics-card slot and lift the graphics card from the graphics-card slot.

**NOTE:** To remove the NVIDIA GeForce RTX 2080 graphics card, lift and rotate the graphics card.

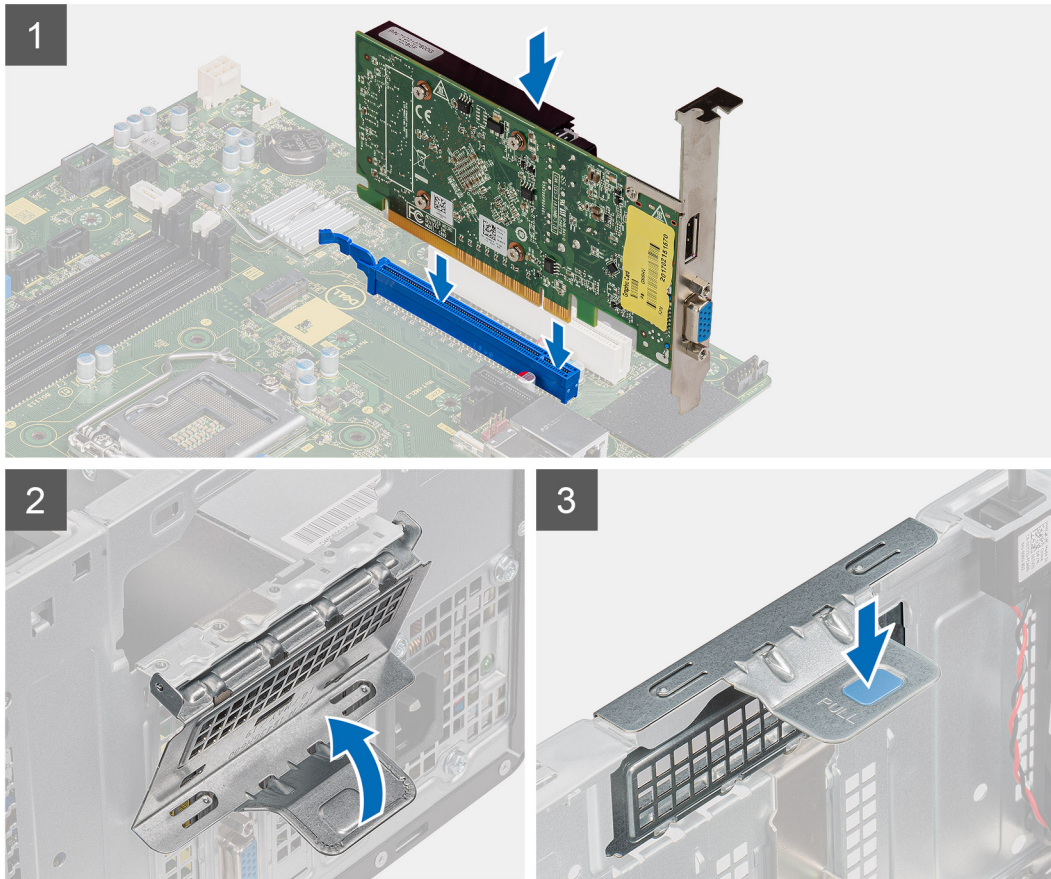
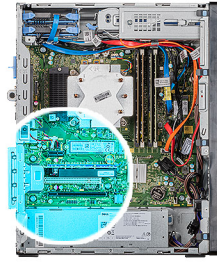
## Installing the graphics card

### Prerequisites

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

### About this task

The following images indicate the location of the graphics card and provides a visual representation of the installation procedure.



### Steps

1. Align the graphics card with the PCI-Express card connector on the system board.  
**i** **NOTE:** To install the NVIDIA GeForce RTX 2080 graphics card, rotate and install the graphics card.
2. Using the alignment post, connect the card in the connector and press down firmly. Ensure that the card is firmly seated.
3. Lift the pull tab to close the PCIe door.

### Next steps

1. Install the [left-side cover](#).
2. 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](#).

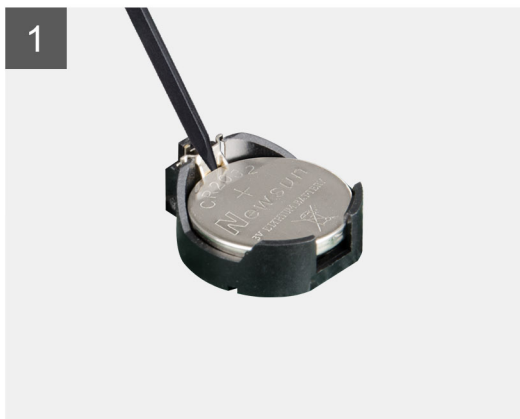
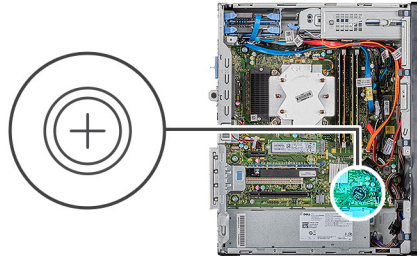


**CAUTION:** Removing the coin-cell battery resets the BIOS setup program's settings to default. It is recommended that you note the BIOS setup program's settings before removing the coin-cell battery.

2. Remove the [left-side cover](#).
3. Remove the [multiple graphics cards](#).

#### About this task

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



#### Steps

1. Lay the computer on the right side.
2. Using a plastic scribe, push the coin-cell battery-release lever on the coin-cell battery socket to release the coin-cell battery out of the socket.
3. Remove the coin-cell battery.

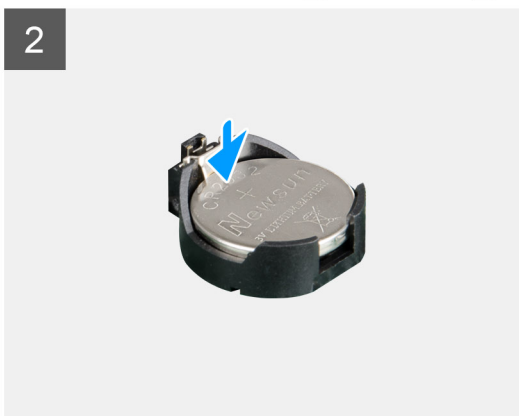
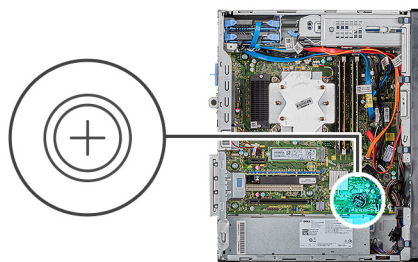
## Installing the coin-cell battery

#### Prerequisites

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

#### About this task

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



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

#### Next steps

1. Install the [multiple graphics cards](#).
2. Install the [left-side cover](#).
3. 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 [left-side cover](#).
3. Remove the [processor fan and heat-sink assembly](#).
4. Remove the [multiple graphics cards](#).

**NOTE:** Note the routing of all cables as you remove them so that you can route them correctly while you are replacing the power-supply unit.

#### About this task

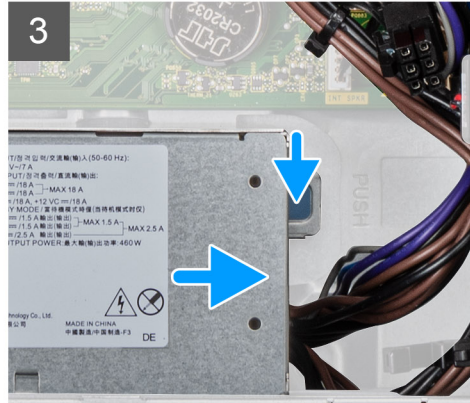
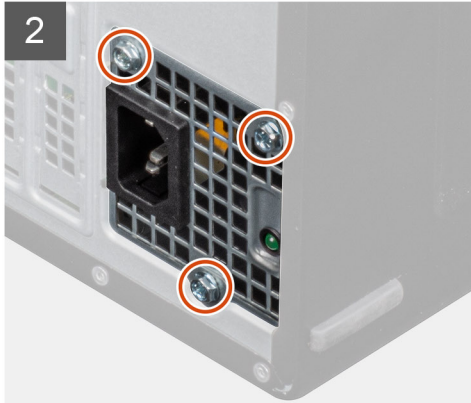
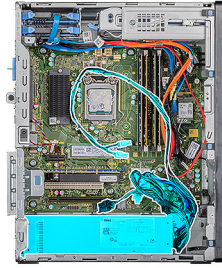
The following images indicate the location of the power-supply unit and provides a visual representation of the removal procedure.







**3x**  
6-32



## Steps

1. Lay the computer on the right side.
2. Disconnect the power cables from the system board and remove them from the routing guides on the chassis.
3. Remove the three (#6-32) screws that secure the power-supply unit to the chassis.
4. Press the securing clip and slide the power-supply unit away from the back of the chassis.
5. 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.

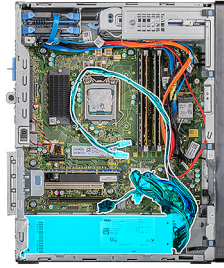
**WARNING:** The cables and ports on the back of the power-supply unit are color-coded to indicate the different power wattage. Ensure that you plug in the cable to the correct port. Failure to do so may result in damaging the power-supply unit and/or system components.

## About this task

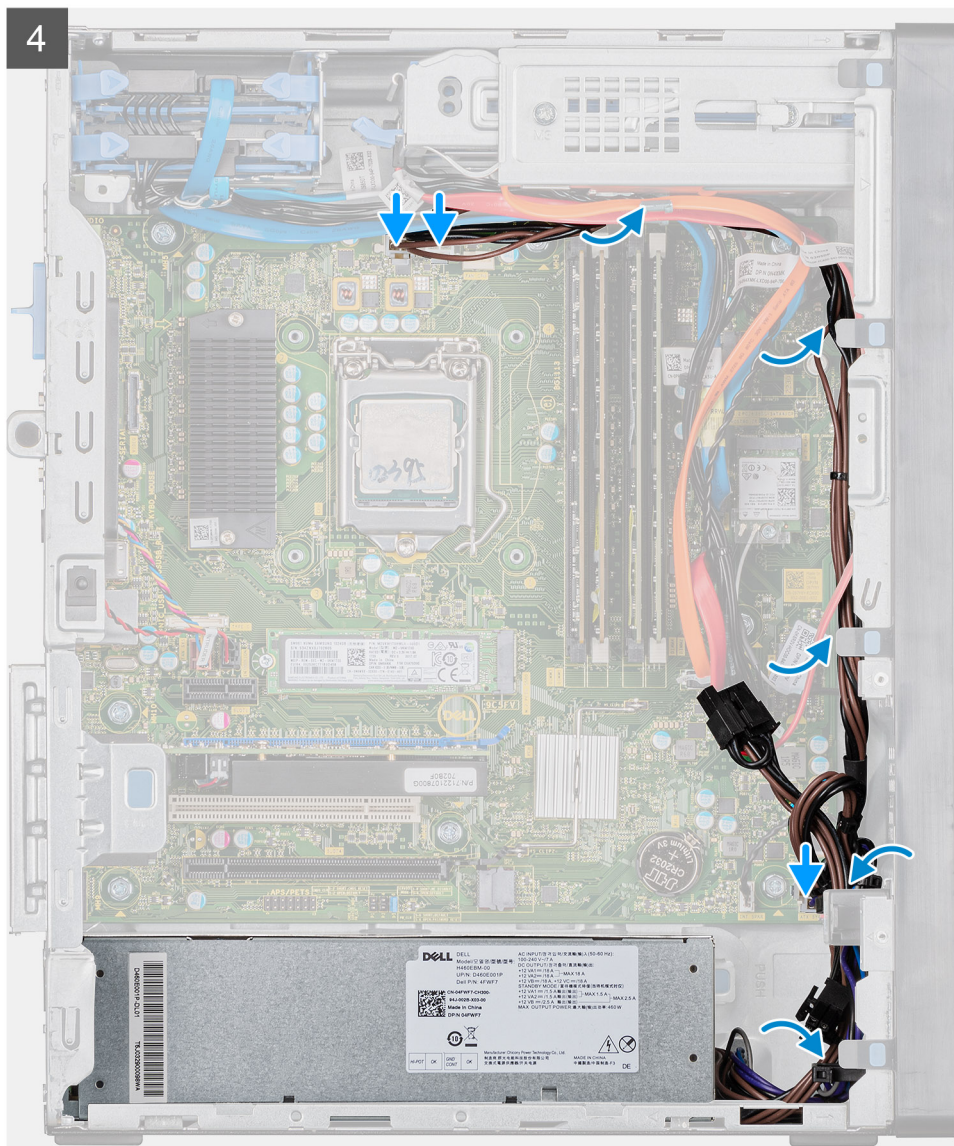
The following images indicate the location of the power-supply unit and provides a visual representation of the installation procedure.



3x  
6-32







## Steps

1. Slide the power-supply unit into the chassis until the securing tab snaps into position.
2. Replace the three screws (#6-32) that secure the power-supply unit to the chassis.
3. Route the power cable through the routing guides on the chassis and connect the power cables to their respective connectors on the system board.

## Next steps


1. Install the [processor fan and heat-sink assembly](#).
2. Install the [multiple graphics cards](#).
3. Install the [left-side cover](#).
4. Follow the procedure in [After working inside your computer](#).


# Processor fan and heat-sink assembly

## Removing the processor fan and 95 W heat-sink assembly

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

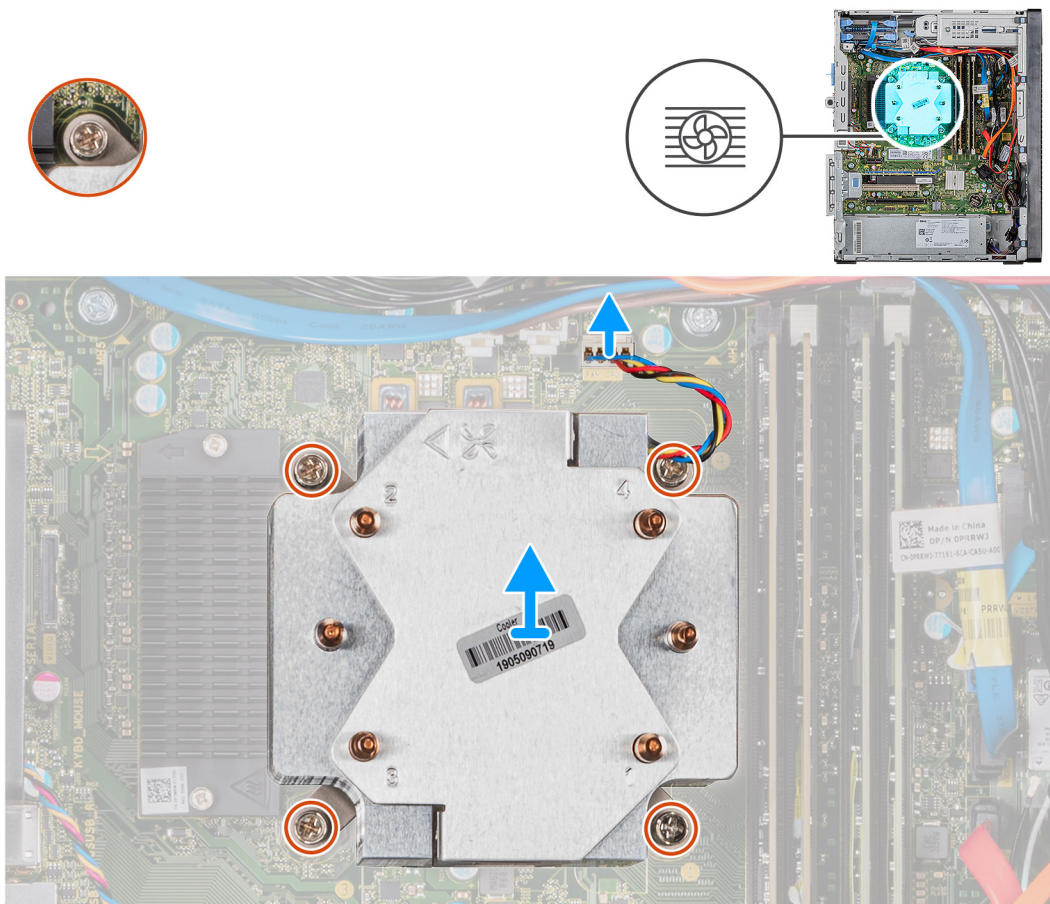
 **WARNING:** The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

 **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 [left-side cover](#).

### About this task

The following images indicate the location of the processor fan and 95 W heat-sink assembly and provides a visual representation of the removal procedure.



### Steps

1. Disconnect the processor-fan cable from the system board.
2. In the reverse sequential order (4->3->2->1), loosen the captive screws that secure the processor fan and heat-sink assembly to the system board.
3. Lift the processor fan and heat-sink assembly off the system board.

# Installing the processor fan and 95 W heat-sink assembly

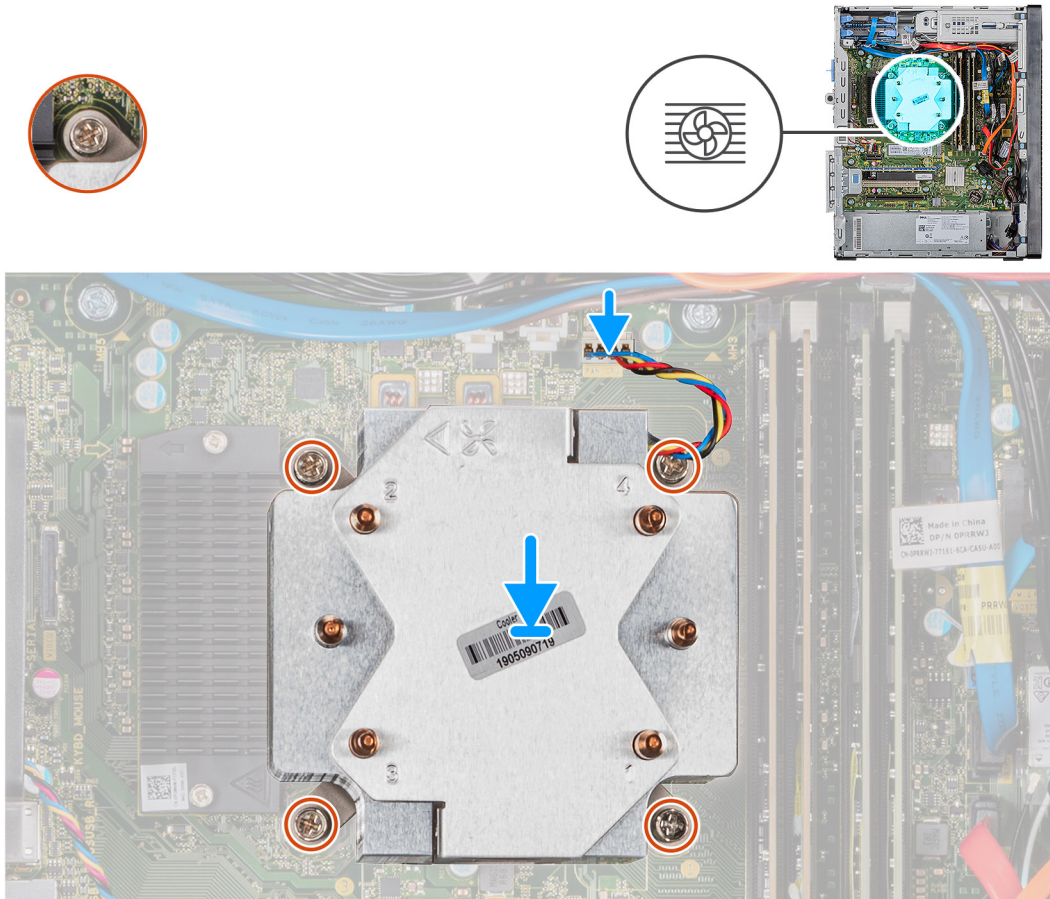
## Prerequisites

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

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

## About this task

The following images indicate the location of the processor fan and 95 W heat-sink assembly and provides a visual representation of the installation procedure.



## Steps

1. Align the screw holes on the processor fan and heat-sink assembly with the screw holes on the system board.
2. In the sequential order (1->2->3->4), tighten the captive screws that secure the processor fan and heat-sink assembly to the system board.
3. Connect the processor-fan cable to the system board.

## Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).




# Removing the processor fan and 65 W heat-sink assembly

## Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

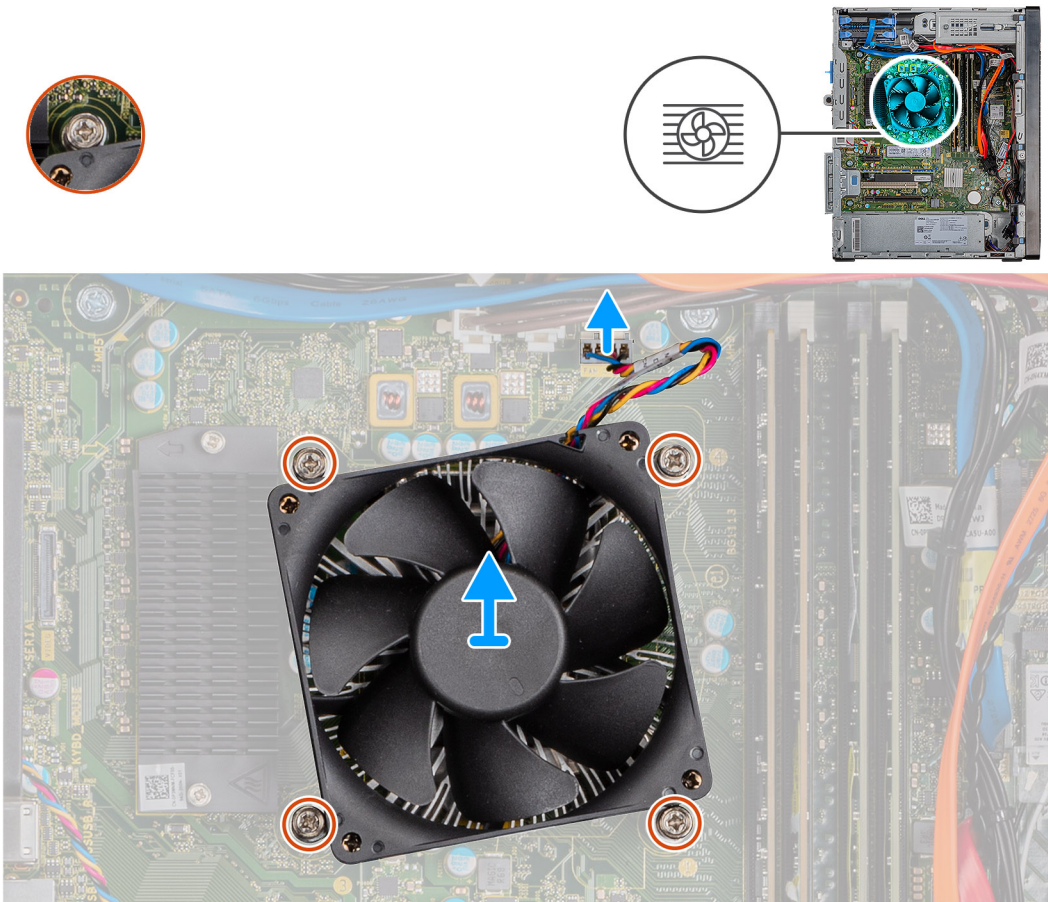
 **WARNING:** The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

 **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 [left-side cover](#).

## About this task

The following images indicate the location of the processor fan and 65 W heat-sink assembly and provides a visual representation of the removal procedure.



## Steps

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

# Installing the processor fan and 65 W heat-sink assembly

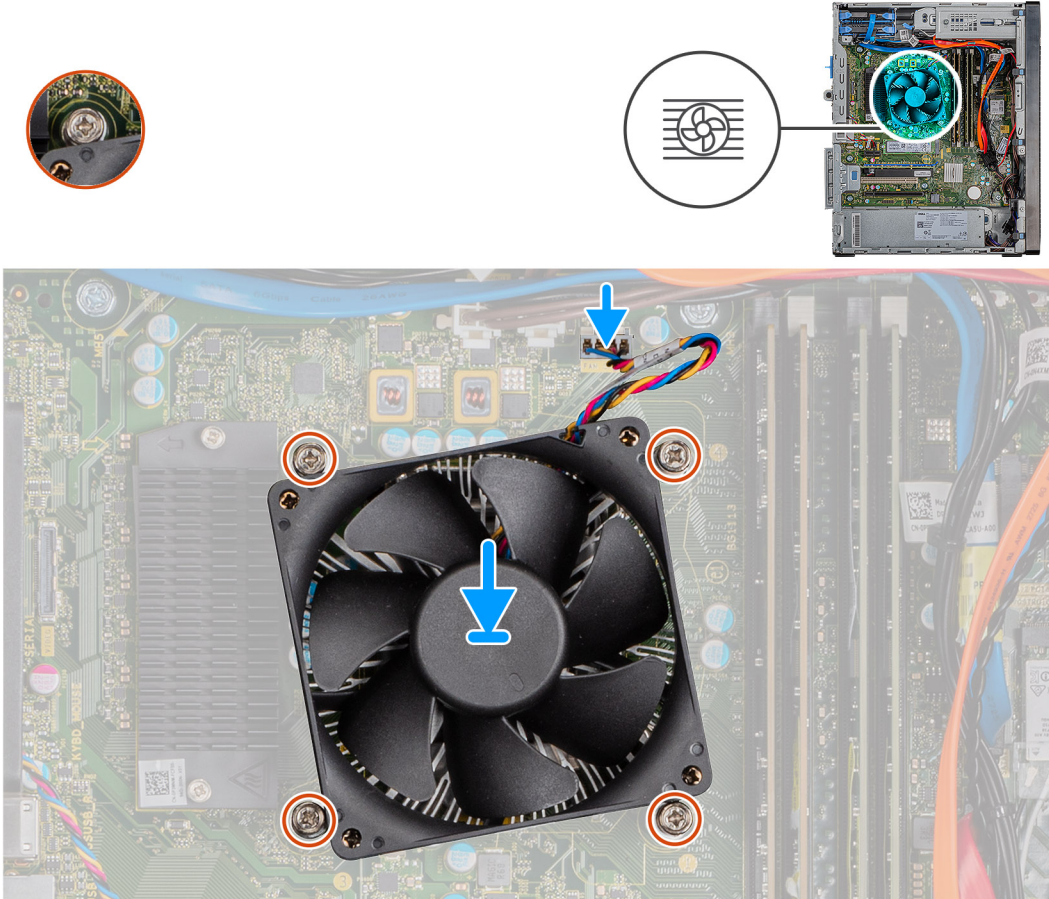
## Prerequisites

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

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

### About this task

The following images indicate the location of the processor fan and 65 W heat-sink assembly and provides a visual representation of the installation procedure.



### Steps

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

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Processor

## Removing the processor

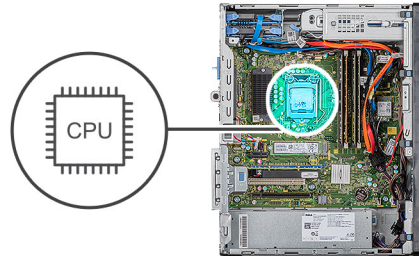
### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).
3. Remove the [processor fan and heat-sink assembly](#).

**NOTE:** The processor might still be hot after the computer is shut down. Allow the processor to cool down before removing it.

### About this task

The following images indicate the location of the processor and provides 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.

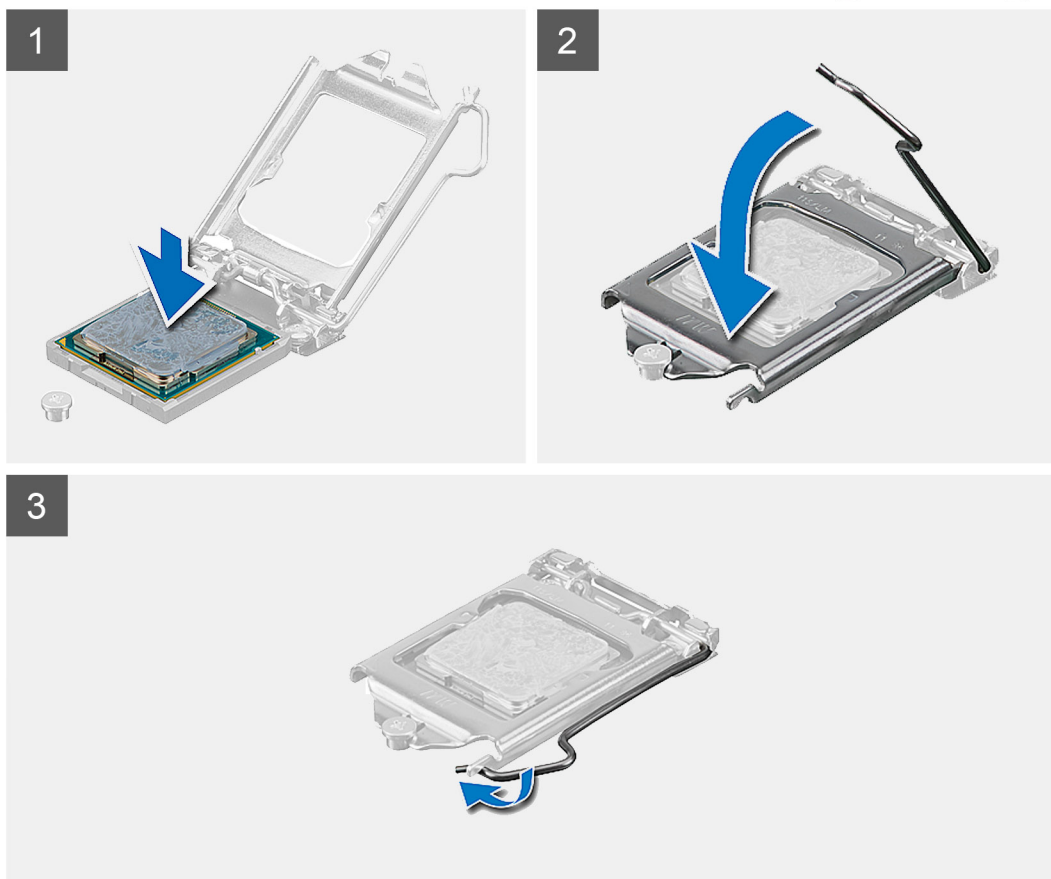
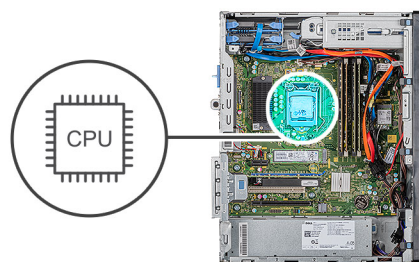
## Installing the processor

### Prerequisites

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

### About this task

The following images indicate 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.

**i** **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.

2. Align the notches on the processor with the tabs on the processor socket and place the processor in the processor socket.

**Δ** **CAUTION:** Ensure that the processor-cover notch is positioned underneath the alignment post.

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 fan and heat-sink assembly](#).
2. Install the [left-side cover](#).
3. Follow the procedure in [After working inside your computer](#).





# VR heat sink

## Removing the VR 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 [left-side cover](#).

### About this task

The following images indicate the location of the VR heat sink and provides a visual representation of the removal procedure.



### Steps

1. Loosen the two captive screws that secure the VR heat sink to the system board.
2. Lift the VR heat sink off the system board.

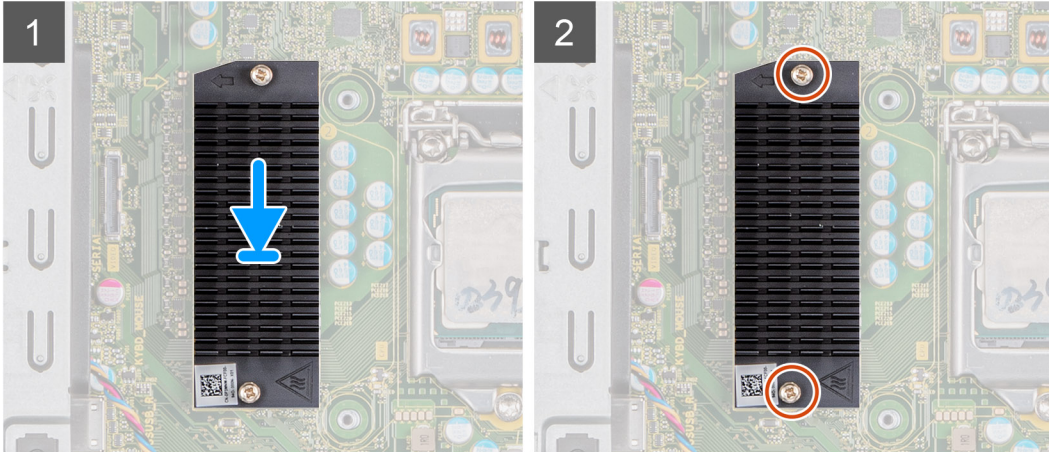
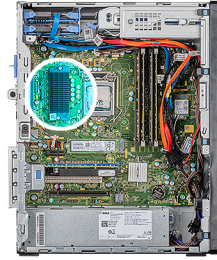
## Installing the VR heat sink

### 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 VR heat sink and provides a visual representation of the installation procedure.



### Steps

1. Align and place the VR heat sink on the system board.
2. Tighten the two captive screws that secure the VR heat sink to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Speaker

### Removing the speaker

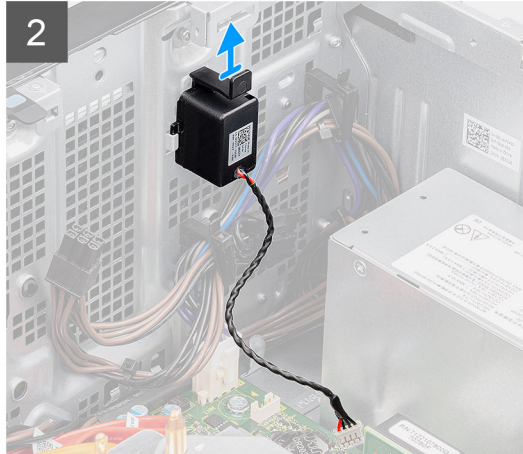
#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

#### About this task

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





### Steps

1. Lay the computer on the right side.
2. Disconnect the speaker cable from the system board.
3. Press and slide the speaker to remove from the slots on the chassis .

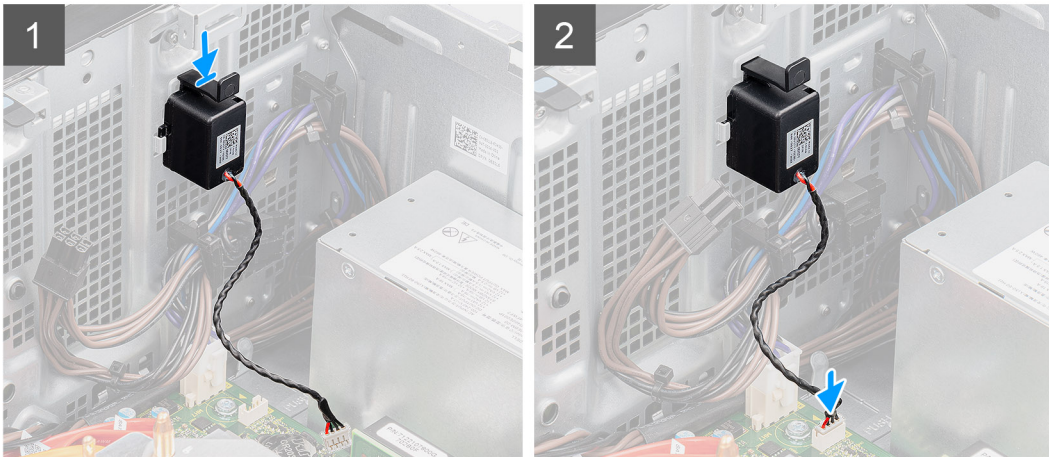
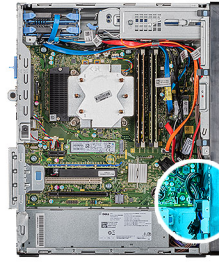
## Installing the speaker

### Prerequisites

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

### About this task

The following images indicate 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. Connect the speaker cable to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Power button

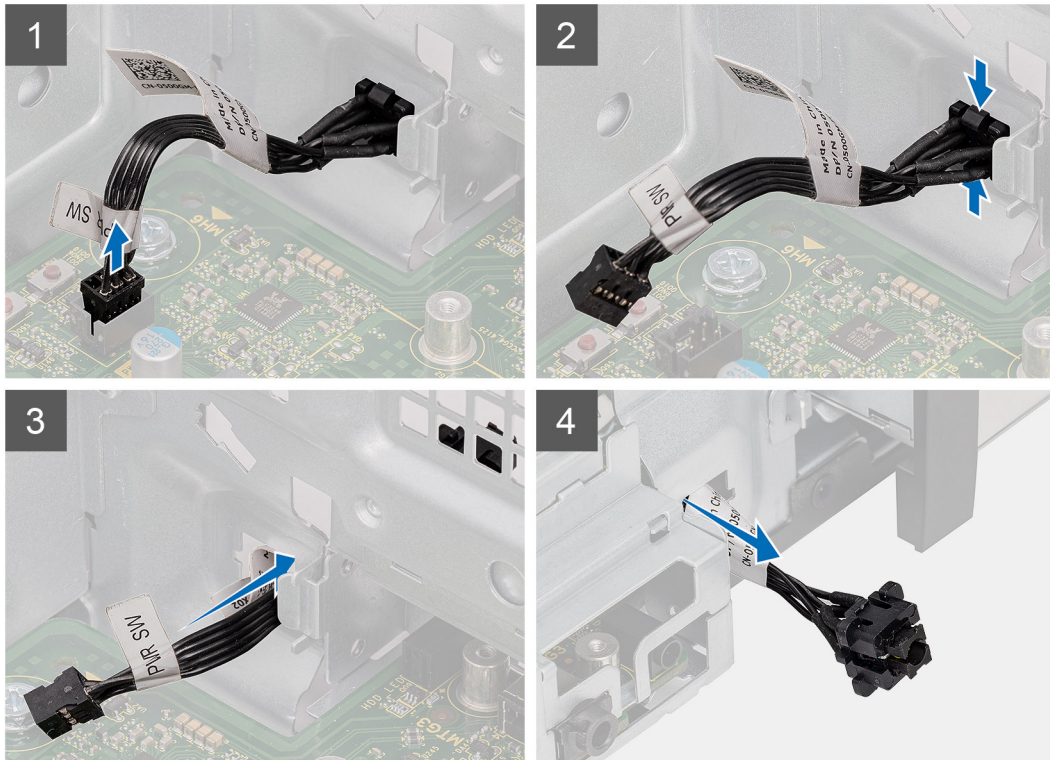
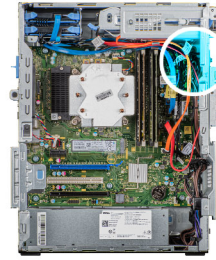
## Removing the power button

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

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



### Steps

1. Lay the computer on the right side.
2. Disconnect the power button cable from the system board.
3. Press the release tabs and slide the power button out from the front-side of the computer.
4. Pull the power button out from the computer.

## Installing the power button

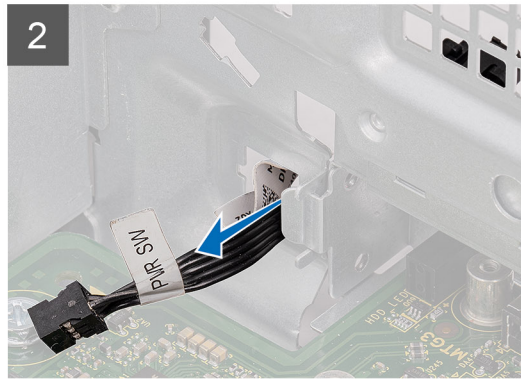
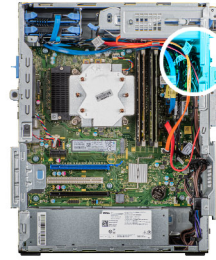
### Prerequisites

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 switch and provides a visual representation of the installation procedure.





### Steps

1. Insert the power button switch into the slot from the front-side of the computer, and press until it clicks into the place.
2. Align and connect the power button cable to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Intrusion switch

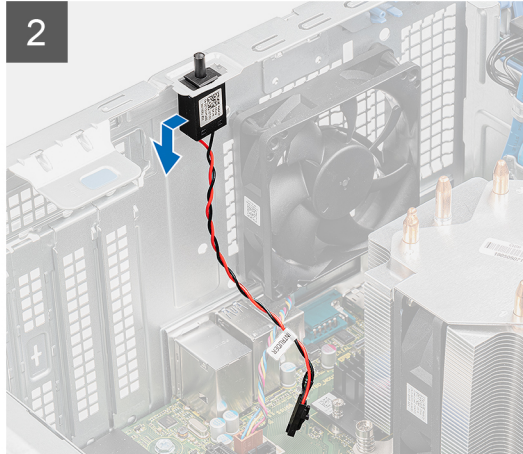
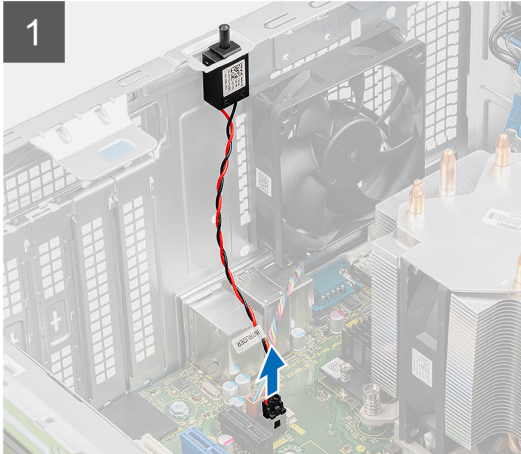
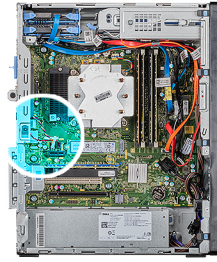
## Removing the intrusion switch

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [left-side cover](#).

### About this task

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



### Steps

1. Lay the computer on the right side.
2. Disconnect the intruder cable from the system board.
3. Slide and remove the intrusion switch from the chassis.

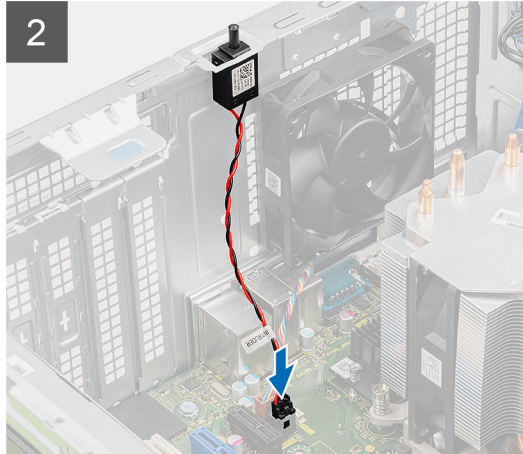
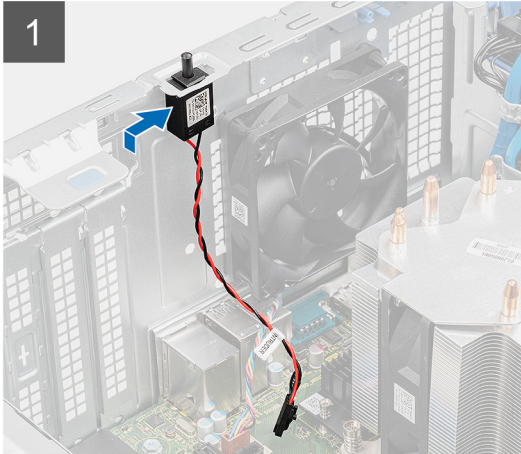
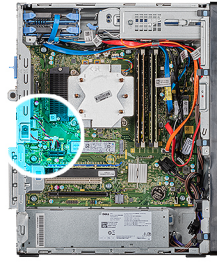
## Installing the intrusion switch

### 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 provides a visual representation of the installation procedure.



### Steps

1. Slide and place the intrusion switch in the chassis slot.
2. Connect the intruder cable to the system board.

### Next steps

1. Install the [left-side cover](#).
2. Follow the procedure in [After working inside your computer](#).

## System board

### Removing the system board

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

**NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.

**NOTE:** Replacing the system board removes any changes that you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.

**NOTE:** Before disconnecting the cables from the system board, note the location of the connectors so that you can reconnect the cables correctly after you replace the system board.

2. Remove the [left-side cover](#).
3. Remove the [front cover](#).
4. Remove the [memory modules](#).
5. Remove the [wireless card](#).
6. Remove the [solid-state drive/Intel Optane memory module](#).
7. Remove the [graphics card](#).
8. Remove the [coin-cell battery](#).
9. Remove the [processor fan and heat-sink assembly](#).



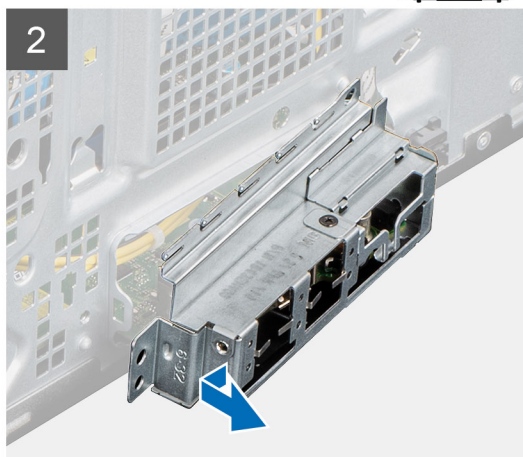
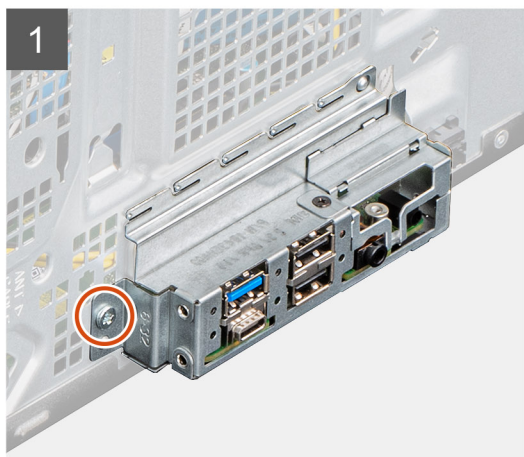
10. Remove the VR heat sink.
11. Remove the processor.

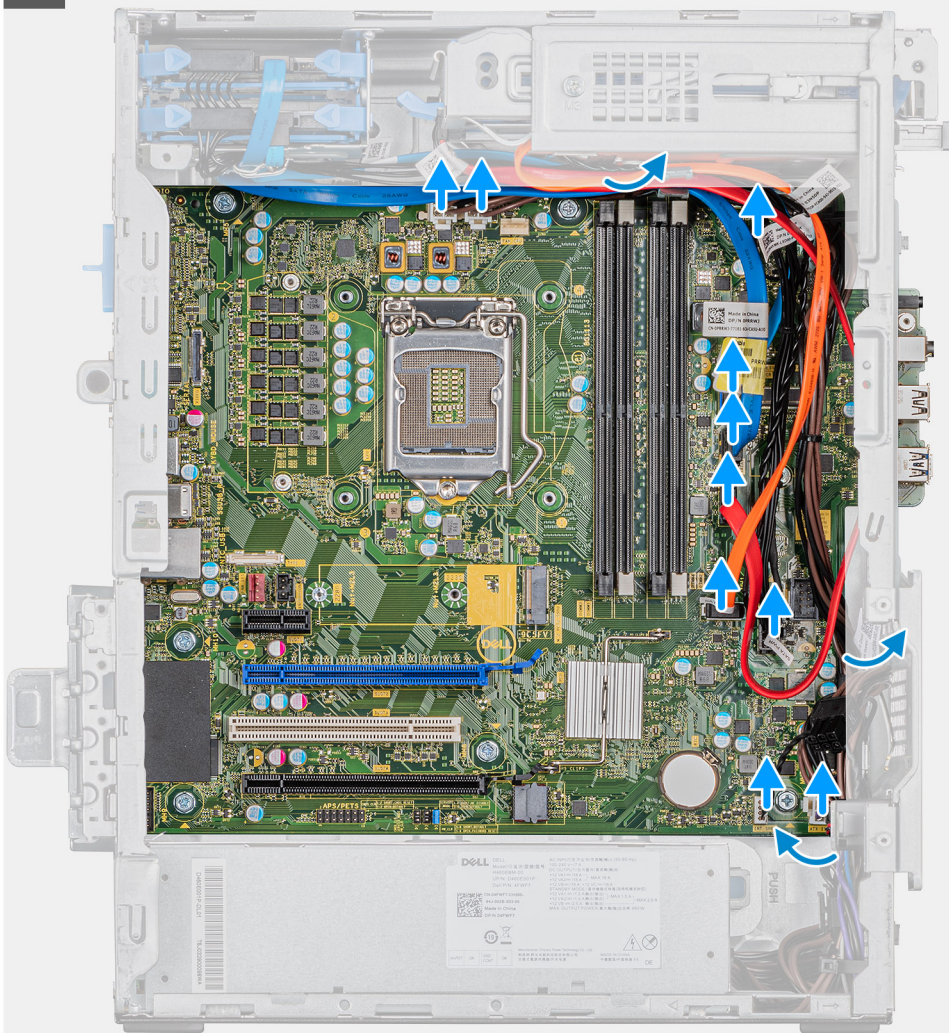
#### About this task

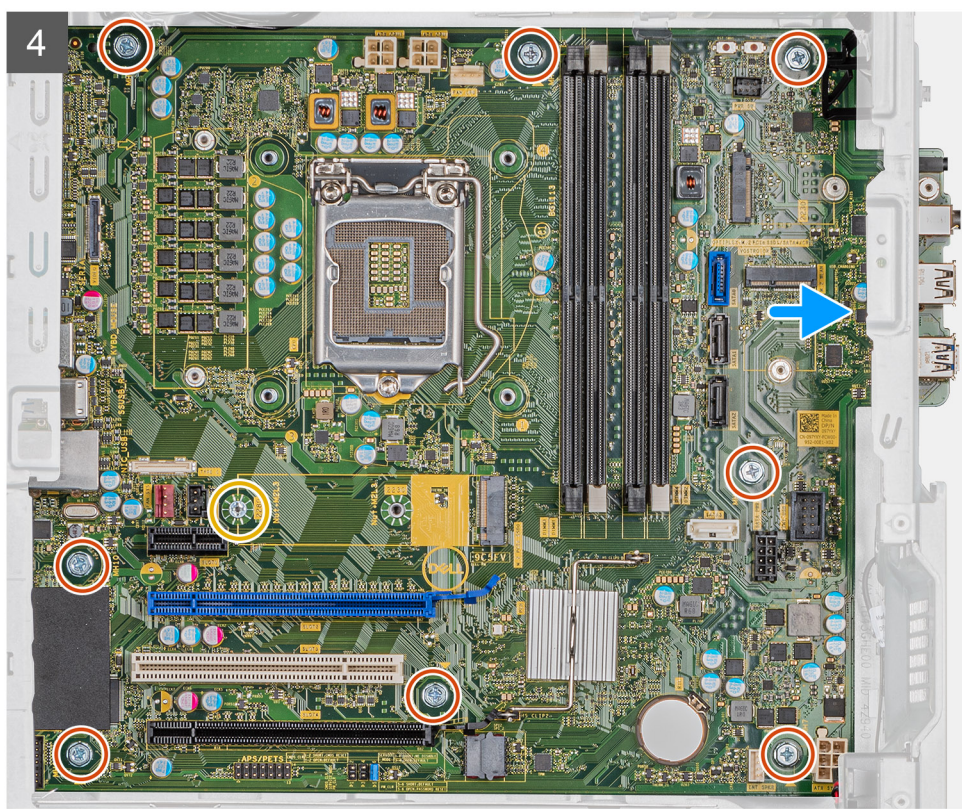
The following images indicate the location of the system board and provides a visual representation of the removal procedure.



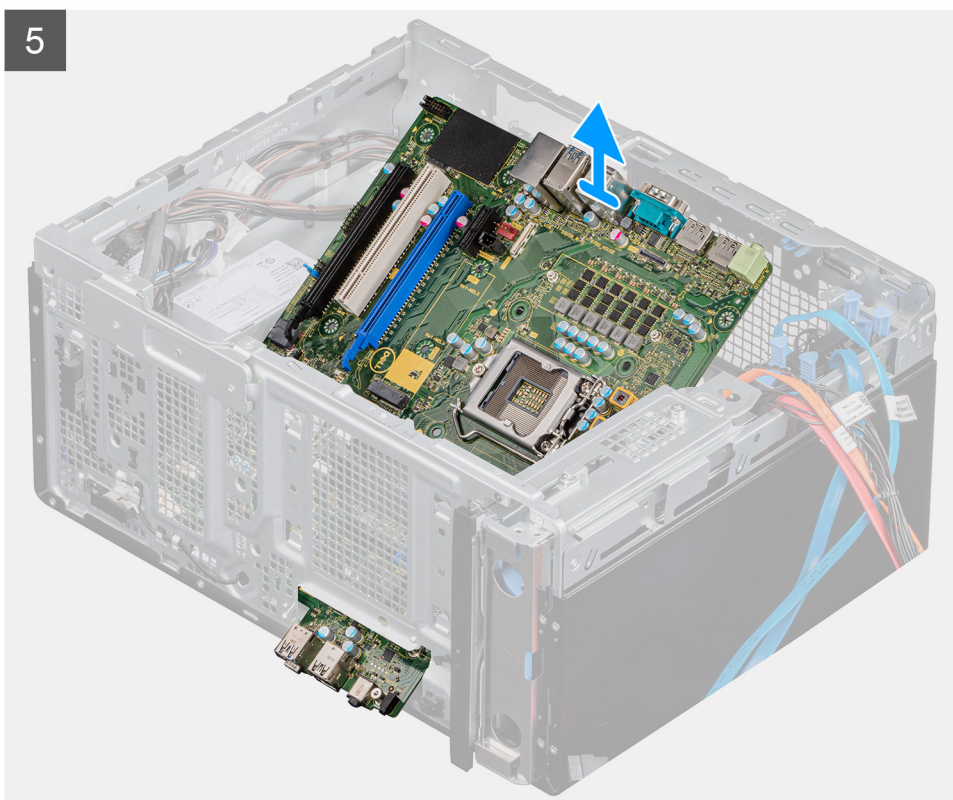
**1x**  
6-32











5

### Steps

1. Lay the computer on the right side.
2. Remove the screw (#6-32) that secures the front I/O-bracket to the chassis.
3. Slide and remove the front I/O-bracket from the chassis.
4. Disconnect all the cables that are connected to the system board.
5. Remove the eight (#6-32) screws that secure the system board to the chassis.
6. Remove the screw (M2x4) that secures the system board to the chassis.
7. Lift the system board at an angle and remove the system board off the chassis.

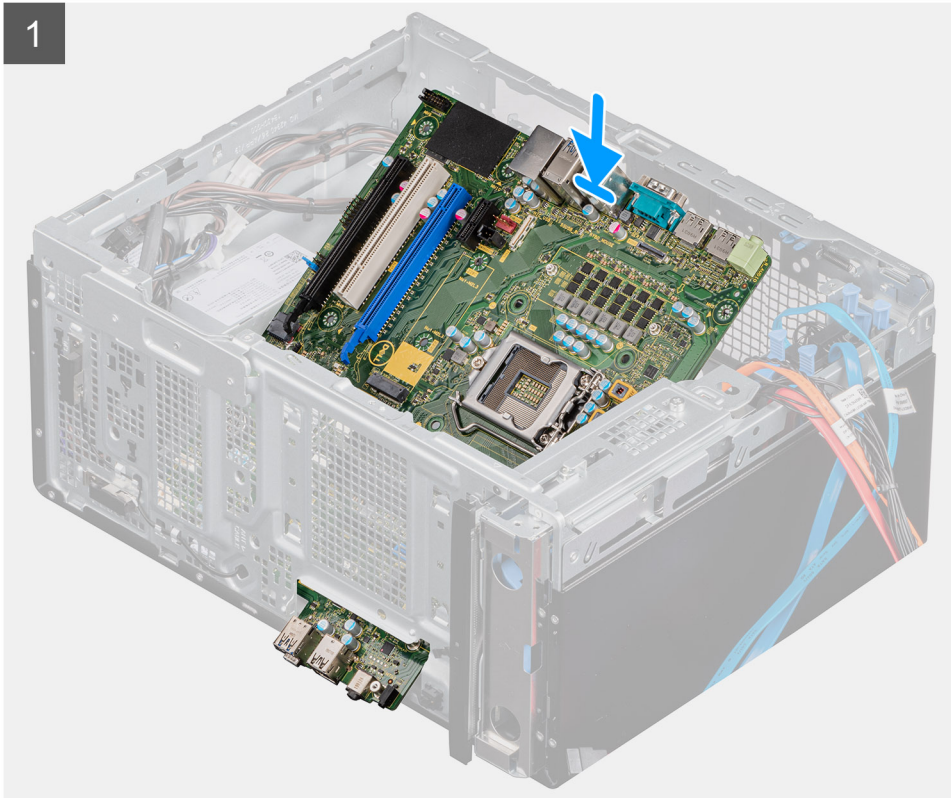
## Installing the system board

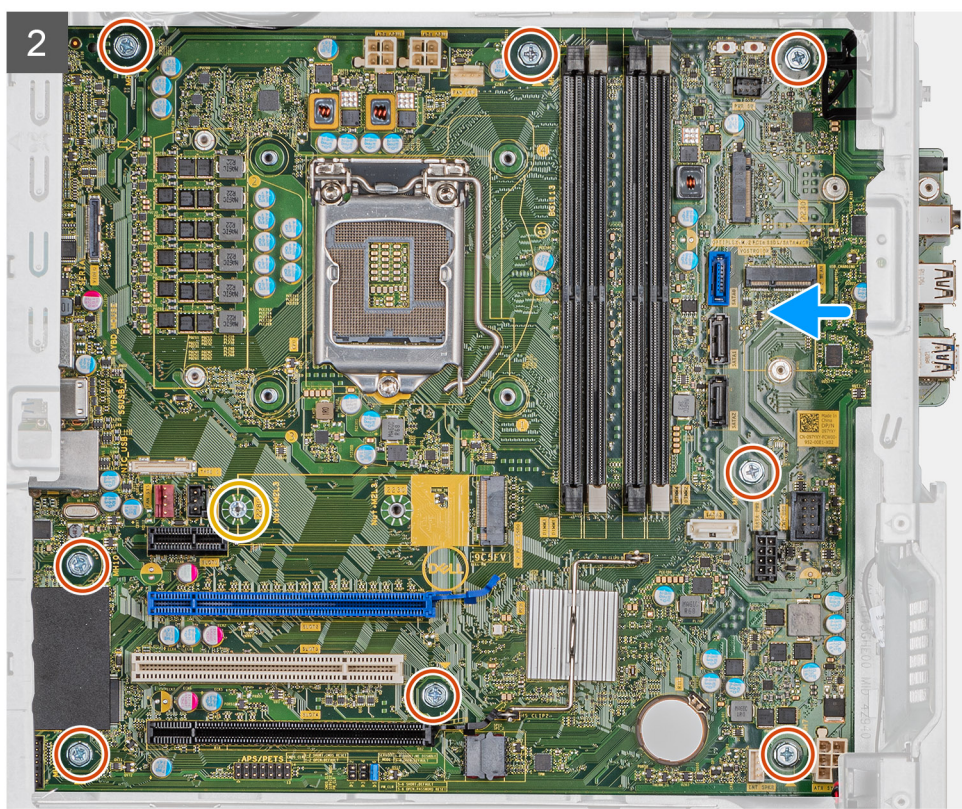
### Prerequisites

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

### About this task

The following images indicate the location of the system board and provides a visual representation of the installation procedure.



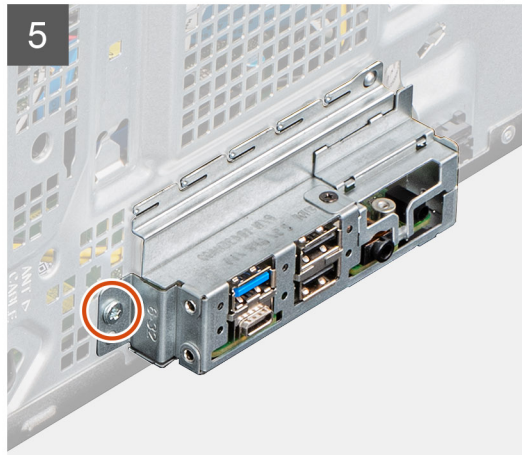
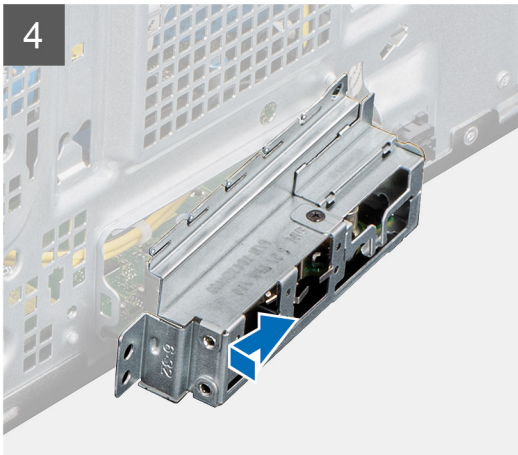








1x  
6-32



## Steps

1. Slide the front I/O-ports on the system board into the front I/O-slots on the chassis and align the screw holes on the system board with the screw holes on the chassis.
2. Replace the screw (M2x4) that secures the system board to the chassis.
3. Replace the eight screws (#6-32) that secure the system board to the chassis.
4. Route and connect all the cables that you disconnected from the system board .
5. Align the front I/O-bracket with the slots on the chassis.
6. Replace the screw (#6-32) that secures the front I/O-bracket to the chassis.

## Next steps

1. Install the [processor](#).
2. Install the [VR heat sink](#).
3. Install the [processor fan and heat-sink assembly](#).
4. Install the [coin-cell battery](#).
5. Install the [graphics card](#).
6. Install the [solid-state drive/Intel Optane memory module](#).
7. Install the [wireless card](#).
8. Install the [memory modules](#).
9. Install the [front cover](#).
10. Install the [left-side cover](#).
11. Follow the procedure in [After working inside your computer](#).

**i NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.

**i NOTE:** Replacing the system board removes any changes that you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.

# System setup

 **CAUTION:** Unless you are an expert computer user, do not change the settings in the BIOS Setup program. Certain changes can make your computer work incorrectly.

 **NOTE:** Before you change BIOS Setup program, it is recommended that you write down the BIOS Setup program screen information for future reference.

Use the BIOS Setup program for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the size of the hard drive.
- Change the system configuration information.
- Set or change a user-selectable option, such as the user password, type of hard drive installed, and enabling or disabling base devices.

## Topics:

- [Entering BIOS setup program](#)
- [Boot menu](#)
- [Navigation keys](#)
- [Boot Sequence](#)
- [System setup options](#)
- [System and setup password](#)
- [Updating the BIOS in Windows](#)

## Entering BIOS setup program

### About this task

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


## Boot menu

Press <F12> when the Dell logo appears to initiate a one-time boot menu with a list of the valid boot devices for the system. Diagnostics and BIOS Setup options are also included in this menu. The devices listed on the boot menu depend on the bootable devices in the system. This menu is useful when you are attempting to boot to a particular device or to bring up the diagnostics for the system. Using the boot menu does not make any changes to the boot order stored in the BIOS.

The options are:

- **UEFI Boot:**
  - Windows Boot Manager
- **Other Options:**
  - BIOS Setup
  - Device Configuration
  - BIOS Flash Update
  - Diagnostics
  - SupportAssist OS Recovery
  - Exit Boot Menu and Continue

## Navigation keys

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

Keys	Navigation
<b>Up arrow</b>	Moves to the previous field.
<b>Down arrow</b>	Moves to the next field.
<b>Enter</b>	Selects a value in the selected field (if applicable) or follow the link in the field.
<b>Spacebar</b>	Expands or collapses a drop-down list, if applicable.
<b>Tab</b>	Moves to the next focus area.
<b>Esc</b>	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 restarts the system.


## Boot Sequence

Boot sequence enables you to bypass the System Setup–defined boot device order and boot directly to a specific device (for example: optical drive or hard drive). During the Power-on Self-Test (POST), when the Dell logo appears, you can:

- Access System Setup by pressing F2 key
- Bring up the one-time boot menu by pressing F12 key.

The one-time boot menu displays the devices that you can boot from including the diagnostic option. The boot menu options are:

- Removable Drive (if available)
- STXXXX Drive
 

 **NOTE: XXXX denotes the SATA drive number.**

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

 **NOTE: Choosing Diagnostics, displays the ePSA diagnostics screen.**

The boot sequence screen also displays the option to access the System Setup screen.

## System setup options

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

## General options

**Table 3. General**

Option	Description
System Information	<p>Displays the following information:</p> <ul style="list-style-type: none"> <li>• <b>System Information:</b> Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Manufacture Date, Ownership Date, and Express Service Code.</li> <li>• <b>Memory Information:</b> Displays Memory Installed, Memory Available, Memory Speed, Memory Channel Mode, Memory Technology, DIMM 1 Size, DIMM 2 Size, DIMM 3 Size, and DIMM 4 Size.</li> <li>• <b>PCI Information:</b> Displays Slot1, Slot2, Slot3, Slot4, Slot5_M.2, Slot6_M.2, and Slot7_M.2.</li> <li>• <b>Processor Information:</b> Displays Processor Type, Core Count, Processor ID, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable, and 64-Bit Technology.</li> <li>• <b>Device Information:</b> Displays SATA-0, SATA 4, M.2 PCIe SSD-0, LOM MAC Address, Video Controller, Audio Controller, Wi-Fi Device, and Bluetooth Device.</li> </ul>
Boot Sequence	<p>Allows you to specify the order in which the computer attempts to find an operating system from the devices specified in this list.</p> <p><b>Boot Sequence:</b> By default, the <b>UEFI: TOSHIBA MQ01ACF050</b> option is enabled.</p>

Option	Description
	<b>Boot List Option:</b> <ul style="list-style-type: none"> <li>Legacy External Devices</li> <li>UEFI—The <b>UEFI</b> option is enabled by default.</li> </ul>
Advanced Boot Options	Allows you to select the Enable Legacy Option ROMs option, when in UEFI boot mode. <ul style="list-style-type: none"> <li>Enable Legacy Option ROMs—The <b>Enable Legacy Option ROMs</b> option is enabled by default.</li> <li>Enable Attempt Legacy Boot</li> </ul>
UEFI Boot Path Security	This option controls whether or not the system will prompt the user to enter the Admin password when booting a UEFI boot path from the F12 Boot Menu. <ul style="list-style-type: none"> <li>Always, Except Internal HDD—The <b>Always, Except Internal HDD</b> option is enabled by default.</li> <li>Always, Except Internal HDD&amp;PXE</li> <li>Always</li> <li>Never</li> </ul>
Date/Time	Allows you to set the date and time settings. Changes to the system date and time take effect immediately.

## System information

Table 4. System Configuration

Option	Description
Integrated NIC	Allows you to control the on-board LAN controller. The option <b>Enable UEFI Network Stack</b> is not selected by default. The options are: <ul style="list-style-type: none"> <li>Disabled</li> <li>Enabled</li> <li>Enabled w/PXE: The <b>Enabled w/PXE</b> option is enabled by default.</li> </ul> <p><b>NOTE:</b> Depending on the computer and its installed devices, the items that are listed in this section may or may not be display.</p>
Serial Port	This option determines how the integrated serial port operates.           The options are: <ul style="list-style-type: none"> <li>Disabled</li> <li>COM1: The <b>COM1</b> option is enabled by default.</li> <li>COM2</li> <li>COM3</li> <li>COM4</li> </ul>
SATA Operation	This option enables you to configure the operating mode of the integrated SATA hard drive controller.           The options are: <ul style="list-style-type: none"> <li>Disabled—The SATA controllers are hidden</li> <li>AHCI—SATA is configured for AHCI mode</li> <li>RAID ON—SATA is configured to support RAID mode. This option is enabled by default.</li> </ul>
Drives	Allows you to enable or disable various drives on-board: <ul style="list-style-type: none"> <li>SATA-0</li> <li>SATA-1</li> <li>SATA-2</li> <li>SATA-3</li> </ul>



Option	Description
	<ul style="list-style-type: none"> <li>• SATA-4</li> <li>• M.2 PCIe SSD-0</li> <li>• M.2 PCIe SSD-1</li> </ul>
Smart Reporting	This field controls whether hard drive errors for integrated drives are reported during system startup. The <b>Enable Smart Reporting</b> option is disabled by default.
USB Configuration	<p>Allows you to enable or disable the integrated USB controller.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>• Enable USB Boot Support—enabled by default</li> <li>• Enable Front USB Ports—enabled by default</li> <li>• Enable Rear USB Ports—enabled by default</li> </ul>
Front USB Configuration	<p>Allows you to enable or disable the front USB ports.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>• Front Port 1(Bottom Right)*—enabled by default</li> <li>• Front Port1 w/PowerShare (Top Right)—enabled by default</li> <li>• Front Port 2(Bottom Left)*—enabled by default</li> <li>• Front Port 2(Top Left)—enabled by default</li> </ul>
Rear USB Configuration	Allows you to enable or disable the rear USB ports. All the ports are enabled by default.
USB PowerShare	This option enables you to charge the external devices, such as mobile phones, music player. The <b>Enable USB PowerShare</b> option is disabled by default.
Audio	<p>Allows you to enable or disable the integrated audio controller. The option <b>Enable Audio</b> is enabled by default.</p> <ul style="list-style-type: none"> <li>• Enable Microphone—enabled by default</li> <li>• Enable Internal Speaker—enabled by default</li> </ul>
Dust Filter Maintenance	<p>Allows you to enable or disable BIOS messages for maintaining the optional dust filter that is installed on your computer. BIOS generates a preboot reminder to clean or replace the dust filter based on the interval set.</p> <ul style="list-style-type: none"> <li>• Disabled—enabled by default</li> <li>• 15 days</li> <li>• 30 days</li> <li>• 60 days</li> <li>• 90 days</li> <li>• 120 days</li> <li>• 150 days</li> <li>• 180 days</li> </ul>
Miscellaneous Devices	<p>Allows you to enable or disable various on board devices. The options are:</p> <ul style="list-style-type: none"> <li>• Enable PCI Slot—enabled by default</li> <li>• Enable Secure Digital (SD) Card—enabled by default</li> <li>• Secure Digital (SD) Card</li> <li>• Secure Digital (SD) Card Read-Only Mode</li> </ul>

## Video screen options

Table 5. Video

Option	Description
Primary Display	<p>Allows you to select the primary display when multiple controllers are available in the system.</p> <ul style="list-style-type: none"> <li>• <b>Auto</b> (default)</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>Intel HD Graphics</li> </ul> <p><b>NOTE:</b> If you do not select Auto, the on-board graphics device will be present and enabled.</p>

## Security


Table 6. Security

Option	Description
Admin Password	Allows you to set, change, and delete the admin password.
System Password	Allows you to set, change, and delete the system password.
Internal HDD-0 Password	Allows you to set, change, and delete the computer internal hard drive.
Strong Password	This option lets you enable or disable strong password for the system. The option is disabled by default.
Password Configuration	Allows you to control the minimum and maximum number of characters that are enabled for an administrative password and the system password. The range of characters is 4–32.
Password Bypass	<p>This option enables you to bypass the System (Boot) password and the internal hard drive password prompts during a system restart.</p> <ul style="list-style-type: none"> <li><b>Disabled</b>—Always prompt for the system and internal hard drive password when they are set. This option is enabled by default.</li> <li>Reboot Bypass—Bypass the password prompts on restarts (warm boots).</li> </ul> <p><b>NOTE:</b> The system always prompts for the system and internal hard drive passwords when powered on from the off state (a cold boot). Also, the system prompts for passwords on any module bay HDDs that may be present.</p>
Password Change	<p>This option lets you determine whether changes to the System and Hard Disk passwords are permitted when an administrator password is set.</p> <p><b>Allow Non-Admin Password Changes</b> - This option is enabled by default.</p>
UEFI Capsule Firmware Updates	This option controls whether this system enables BIOS updates through UEFI capsule update packages. This option is enabled by default. Disabling this option blocks BIOS updates from services such as Microsoft Windows Update and Linux Vendor Firmware Service (LVFS)
TPM 2.0 Security	<p>Allows you to control whether the Trusted Platform Module (TPM) is visible to the operating system.</p> <ul style="list-style-type: none"> <li>TPM On—enabled by default</li> <li>Clear</li> <li>PPI Bypass for Enable Commands</li> <li>PPI Bypass for Disable Commands</li> <li>PPI Bypass for Clear Commands</li> <li>Attestation Enable—enabled by default</li> <li>Key Storage Enable—enabled by default</li> <li>SHA-256—enabled by default</li> </ul> <p>The options are:</p> <ul style="list-style-type: none"> <li>Disabled</li> <li>Enabled—enabled by default</li> </ul>
Absolute	<p>This field enables you to enable, disable, or permanently disable the BIOS module interface of the optional Absolute Persistence Module service from Absolute Software.</p> <ul style="list-style-type: none"> <li>Enabled—enabled by default</li> <li>Disabled</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>Permanently Disabled</li> </ul>
Chassis Intrusion	<p>This field controls the chassis intrusion feature.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>Disabled—enabled by default</li> <li>Enabled</li> <li>On-Silent</li> </ul>
OROM Keyboard Access	<p>This option determines whether users can enter Option ROM Configuration screens through hotkeys during the system boot.</p> <ul style="list-style-type: none"> <li>Disabled</li> <li>Enabled—enabled by default</li> <li>One Time Enable</li> </ul>
Admin Setup Lockout	Allows you to prevent users from entering the setup when Admin password is set. This option is disabled by default.
Master Password Lockout	When enabled, this option disables master password support. This option is disabled by default.
SMM Security Mitigation	Allows you to enable or disable another UEFI SMM Security Mitigation protections. This option is disabled by default.

## Secure boot options

**Table 7. Secure Boot**

Option	Description
Secure Boot Enable	<p>Allows you to enable or disable Secure Boot feature</p> <ul style="list-style-type: none"> <li>Secure Boot Enable</li> </ul> <p>This option is not selected by default.</p>
Secure Boot Mode	<p>Allows you to modify the behavior of Secure Boot to allow evaluation or enforcement of UEFI driver signatures.</p> <ul style="list-style-type: none"> <li><b>Deployed Mode</b> (default)</li> <li>Audit Mode</li> </ul>
Expert key Management	<p>Allows you to manipulate the security key databases only if the system is in Custom Mode. The <b>Enable Custom Mode</b> option is disabled by default. The options are:</p> <ul style="list-style-type: none"> <li><b>PK</b> (default)</li> <li>KEK</li> <li>db</li> <li>dbx</li> </ul> <p>If you enable the <b>Custom Mode</b>, the relevant options for <b>PK, KEK, db, and dbx</b> appear. The options are:</p> <ul style="list-style-type: none"> <li><b>Save to File</b>- Saves the key to a user-selected file</li> <li><b>Replace from File</b>- Replaces the current key with a key from a user-selected file</li> <li><b>Append from File</b>- Adds a key to the current database from a user-selected file</li> <li><b>Delete</b>- Deletes the selected key</li> <li><b>Reset All Keys</b>- Resets to default setting</li> <li><b>Delete All Keys</b>- Deletes all the keys</li> </ul> <p> <b>NOTE:</b> If you disable the Custom Mode, all the changes made will be erased and the keys will restore to default settings.</p>

# Intel Software Guard Extensions options

Table 8. Intel Software Guard Extensions

Option	Description
<b>Intel SGX Enable</b>	<p>This field specifies you to provide a secured environment for running code/storing sensitive information in the context of the main OS.</p> <p>The options are:</p> <ul style="list-style-type: none"><li>• Disabled</li><li>• Enabled</li><li>• Software controlled—enabled by default</li></ul>
<b>Enclave Memory Size</b>	<p>This option sets <b>SGX Enclave Reserve Memory</b> size.</p> <p>The options are:</p> <ul style="list-style-type: none"><li>• 32 MB</li><li>• 64 MB</li><li>• 128 MB—enabled by default</li></ul>

## Performance

Table 9. Performance

Option	Description
<b>Multi Core Support</b>	<p>This field specifies whether the process has one or all cores enabled. The performance of some applications improves with the additional cores.</p> <ul style="list-style-type: none"><li>• <b>All</b>—Default</li><li>• <b>1</b></li><li>• <b>2</b></li><li>• <b>3</b></li></ul>
<b>Intel SpeedStep</b>	<p>Allows you to enable or disable the Intel SpeedStep mode of processor.</p> <ul style="list-style-type: none"><li>• <b>Enable Intel SpeedStep</b></li></ul> <p>This option is set by default.</p>
<b>C-States Control</b>	<p>Allows you to enable or disable the additional processor sleep states.</p> <ul style="list-style-type: none"><li>• <b>C states</b></li></ul> <p>This option is set by default.</p>
<b>Intel TurboBoost</b>	<p>Allows you to enable or disable the Intel TurboBoost mode of the processor.</p> <ul style="list-style-type: none"><li>• <b>Enable Intel TurboBoost</b></li></ul> <p>This option is set by default.</p>
<b>Hyper-Thread Control</b>	<p>Allows you to enable or disable the HyperThreading in the processor.</p> <ul style="list-style-type: none"><li>• Disabled</li><li>• <b>Enabled</b>—Default</li></ul>

# Power management

Table 10. Power Management

Option	Description
AC Recovery	Determines how the system responds when AC power restored after a power loss. You can set the AC Recovery to: <ul style="list-style-type: none"><li>• Power Off—enabled by default</li><li>• Power On</li><li>• Last Power State</li></ul>
Enable Intel Speed Shift Technology	Allows you to enable or disable <b>Intel Speed Shift Technology</b> option. This option is enabled by default.
Auto On Time	This option enables you to set time to automatically turn on the computer. The options are: <ul style="list-style-type: none"><li>• Disabled—enabled by default</li><li>• Every Day</li><li>• Weekdays</li><li>• Select Days</li></ul>
Deep Sleep Control	This option determines how aggressively the system conserves power while shut down (S5) or in the Hibernate (S4) mode. The options are: <ul style="list-style-type: none"><li>• Disabled</li><li>• Enabled in S5 only</li><li>• Enabled in S4 and S5—enabled by default</li></ul>
Fan Control Override	The option is not set by default
USB Wake Support	Allows you to enable the USB devices to wake the computer from standby mode. The option <b>"Enable USB Wake Support"</b> is selected by default
Wake on LAN/WLAN	This option enables the computer to power up from the off state when triggered by a special LAN signal. This feature only works when the computer is connected to AC power supply. <ul style="list-style-type: none"><li>• <b>Disabled</b> - Does not enables the system to power on by special LAN signals when it receives a wake-up signal from the LAN or wireless LAN.</li><li>• <b>LAN or WLAN</b> - Allows the system to be powered on by special LAN or wireless LAN signals.</li><li>• <b>LAN Only</b> - Allows the system to be powered on by special LAN signals.</li><li>• <b>LAN with PXE Boot</b> - A wakeup packet sent to the system in either the S4 or S5 state, that causes the system to wake up and immediately boot to PXE.</li><li>• <b>WLAN Only</b> - Allows the system to be powered on by special WLAN signals.</li></ul> The <b>Disabled</b> option is enabled by default.
Block Sleep	Allows you to block entering to sleep (S3 state) in operating system environment. This option is disabled by default.

## Post behavior

Table 11. POST Behavior

Option	Description
Numlock LED	Allows you to enable or disable the Numlock feature when your computer starts. This option is enabled by default.
Keyboard Errors	Allows you to enable or disable the keyboard error reporting when the computer starts. The option <b>Enable Keyboard Error Detection</b> is enabled by default.
Fast Boot	This option can speed up the boot process by bypassing some compatibility steps: <ul style="list-style-type: none"><li>• Minimal — The system boots quickly, unless the BIOS has been updated, memory changed, or the previous POST did not complete.</li></ul>



Option	Description
	<ul style="list-style-type: none"> <li>Thorough — The system does not skip any steps in the boot process.</li> <li>Auto — This allows the operating system to control this setting (this works only when the operating system supports Simple Boot Flag).</li> </ul> <p>This option is set to <b>Thorough</b> by default.</p>
Extend BIOS POST Time	<p>This option creates an additional pre-boot delay.</p> <ul style="list-style-type: none"> <li><b>0 seconds</b> (default)</li> <li>5 seconds</li> <li>10 seconds</li> </ul>
Full Screen Logo	<p>This option will display full screen logo if your image match screen resolution. The option Enable Full Screen Logo is not set by default.</p>
Warnings and Errors	<p>This option causes the boot process to only pause when warning or errors are detected. Choose any one of the option:</p> <ul style="list-style-type: none"> <li><b>Prompt on Warnings and Errors</b> (default)</li> <li>Continue on Warnings</li> <li>Continue on Warnings and Errors</li> </ul>

## Manageability

Table 12. Manageability

Option	Description
Intel AMT Capability	<p>This option enables you to enable or disable Intel AMT capability. The options are:</p> <ul style="list-style-type: none"> <li>Disabled</li> <li>Enabled—enabled by default</li> <li>Restrict MEBx Access</li> </ul>
USB provision	<p>This option is disabled by default.</p>
MEBx Hotkey	<p>This option is enabled by default.</p>

## Virtualization support

Table 13. Virtualization Support

Option	Description
Virtualization	<p>This option specifies whether a Virtual Machine Monitor (VMM) can use the additional hardware capabilities that are provided by the Intel Virtualization technology.</p> <p>The option <b>Enable Intel Virtualization Technology</b> is enabled by default.</p>
VT for Direct I/O	<p>Enables or disables the Virtual Machine Monitor (VMM) from using the additional hardware capabilities that are provided by the Intel Virtualization technology for direct I/O.</p> <p>The option <b>Enable VT for Direct I/O</b> is enabled by default.</p>
Trusted Execution	<p>This option specifies whether a Measured Virtual Machine Monitor (MVMM) can use the additional hardware capabilities that are provided by Intel Trusted Execution Technology.</p> <p>The option <b>Trusted Execution</b> is disabled by default.</p>

## Wireless options

Table 14. Wireless

Option	Description
Wireless Device Enable	<p>Allows you to enable or disable the internal wireless devices.</p> <p>The options are:</p> <ul style="list-style-type: none"><li>• <b>WLAN/WiGig</b></li><li>• <b>Bluetooth</b></li></ul> <p>All the options are enabled by default.</p>

## Maintenance

Table 15. Maintenance

Option	Description
Service Tag	Displays the service tag of your computer.
Asset Tag	<p>If an asset tag is not set, this option enables you to create a system asset tag.</p> <p>This option is disabled by default.</p>
SERR Messages	Controls the SERR message mechanism. This option is set by default. Some graphics cards require that the SERR message mechanism be disabled.
BIOS Downgrade	<p>Allows you to flash previous revisions of the system firmware.</p> <p>The option <b>Allow BIOS Downgrade</b> is enabled by default.</p>
Data Wipe	This option enables you to securely erase data from all the internal storage devices. The process adheres to SerialATA Security Erase and eMMC JEDEC Sanitize specifications. The option <b>Wipe on Next Boot</b> is disabled by default.
Bios Recovery	<p><b>BIOS Recovery from Hard Drive</b>—This option is set by default. Allows you to recover the corrupted BIOS from a recovery file on the hard drive or an external USB drive.</p> <p><b>BIOS Auto-Recovery</b>—Allows you to recover the BIOS automatically.</p>
First Power On Date	Allows you the set Ownership date. The option <b>Set Ownership Date</b> is not set by default.

## System logs

Table 16. System Logs

Option	Description
BIOS events	Allows you to view and clear the System Setup (BIOS) POST events.

## Advanced configuration

Table 17. Advanced configuration

Option	Description
ASPM	<p>Allows you to set the ASPM level.</p> <ul style="list-style-type: none"><li>• Auto (default) - There is handshaking between the device and PCI Express hub to determine the best ASPM mode supported by the device</li></ul>

Option	Description
	<ul style="list-style-type: none"> <li>Disabled - ASPM power management is turned off at all time</li> <li>L1 Only - ASPM power management is set to use L1</li> </ul>


## System and setup password

Table 18. System and setup password

Password type	Description
System password	Password that you must enter to log on to your system.
Setup password	Password that you must enter to access and make changes to the BIOS settings of your computer.

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

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

 **CAUTION:** Anyone can access the data stored on your computer if it is not locked and left unattended.

 **NOTE:** System and setup password feature is disabled.

## Assigning a system setup password

### Prerequisites

You can assign a new **System or Admin Password** only when the status is in **Not Set**.

### About this task

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 **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 assign the system password:
  - A password can have up to 32 characters.
  - The password can contain the numbers 0 through 9.
  - Only lower case letters are valid, upper case letters are not allowed.
  - Only the following special characters are allowed: space, ("), (+), (,), (-), (.), (/), (;), ([), (\), (]), (').
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press Esc and a message prompts you to save the changes.
5. Press Y to save the changes.  
The computer reboots.

## Deleting or changing an existing system setup password

### Prerequisites


Ensure that the **Password Status** is Unlocked (in the System Setup) before attempting to delete or change the existing System and Setup password. You cannot delete or change an existing System or Setup password, if the **Password Status** is Locked.

### About this task

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 **Password Status** is **Unlocked**.
3. Select **System Password**, alter or delete the existing system password and press **Enter** or **Tab**.
4. Select **Setup Password**, alter or delete the existing setup password and press **Enter** or **Tab**.

 **NOTE:** If you change the System and/or Setup password, re enter the new password when prompted. If you delete the System and Setup password, confirm the deletion when prompted.

5. Press **Esc** and 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 [left-side cover](#).
2. Remove the [graphics card](#).
3. Remove the jumper plug from the password jumper-pins (PSWD) and connect it to the CMOS jumper-pins.
4. Wait for 5 seconds and then replace the jumper plug to its original location.
5. Install the [graphics card](#).
6. Install the [left-side cover](#).

## Clearing BIOS (System Setup) and System passwords

### About this task

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

### Steps

1. Remove the [left-side cover](#).
2. Remove the [graphics card](#).
3. Remove the jumper plug from the password jumper-pins (PSWD).
4. Wait for 5 seconds and then replace the jumper plug to its original location.
5. Install the [graphics card](#).
6. Install the [left-side cover](#).

## Updating the BIOS in Windows

### Prerequisites


It is recommended to update your BIOS (System Setup), when you replace the system board or if an update is available. For laptops, ensure that your computer battery is fully charged and connected to a power before initiating a BIOS update.

### About this task


 **NOTE:** If BitLocker is enabled, it must be suspended prior to updating the system BIOS, and then re enabled after the BIOS update is completed.

### Steps

1. Restart the computer.
2. Go to **Dell.com/support**.
  - Enter the **Service Tag** or **Express Service Code** and click **Submit**.
  - Click **Detect Product** and follow the instructions on screen.
3. If you are unable to detect or find the Service Tag, click **Choose from all products**.
4. Choose the **Products** category from the list.

 **NOTE:** Choose the appropriate category to reach the product page
5. Select your computer model and the **Product Support** page of your computer appears.
6. Click **Get drivers** and click **Drivers and Downloads**.  
The Drivers and Downloads section opens.
7. Click **Find it myself**.
8. Click **BIOS** to view the BIOS versions.
9. Identify the latest BIOS file and click **Download**.
10. Select your preferred download method in the **Please select your download method below** window, click **Download File**.  
The **File Download** window appears.
11. Click **Save** to save the file on your computer.
12. Click **Run** to install the updated BIOS settings on your computer.  
Follow the instructions on the screen.


## Updating BIOS on systems with BitLocker enabled

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the system it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress and the system 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, see Knowledge Article: [Updating the BIOS on Dell Systems With BitLocker Enabled](#)

## Updating your system BIOS using a USB flash drive

### About this task

If the system cannot load into Windows, but there is still a need to update the BIOS, download the BIOS file using another system and save it to a bootable USB Flash Drive.

 **NOTE:** You will need to use a bootable USB flash drive. Please refer to the following article for further details [How to Create a Bootable USB Flash Drive using Dell Diagnostic Deployment Package \(DDDP\)](#)

### Steps

1. Download the BIOS update .EXE file to another system.
2. Copy the file e.g. O9010A12.EXE onto the bootable USB flash drive.
3. Insert the USB flash drive into the system that requires the BIOS update.
4. Restart the system and press F12 when the Dell splash logo appears to display the One Time Boot Menu.
5. Using arrow keys, select **USB Storage Device** and click **Enter**.
6. The system will boot to a Diag C:\> prompt.
7. Run the file by typing the full filename, for example, O9010A12.exe and press **Enter**.
8. The BIOS Update Utility will load. Follow the instructions on screen.



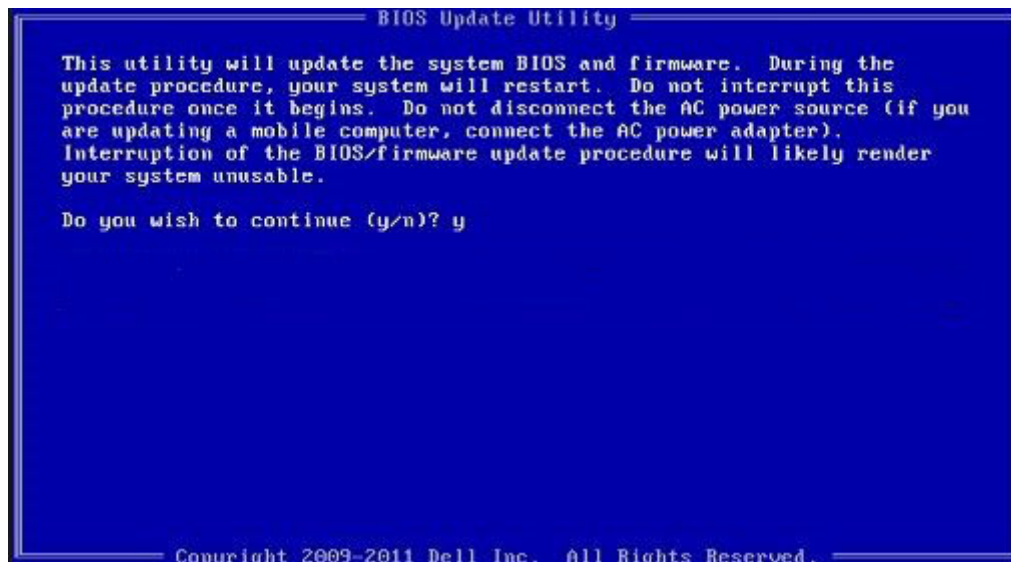


Figure 1. DOS BIOS Update Screen

## Updating the Dell BIOS in Linux and Ubuntu environments

If you want to update the system BIOS in a Linux environment, such as Ubuntu, see <https://www.dell.com/support/article/sln171755/>.

## Flashing the BIOS from the F12 One-Time boot menu

Updating your system BIOS using a BIOS update .exe file copied to a FAT32 USB key and booting from the F12 one time boot menu.

### About this task

#### BIOS Update

You can run the BIOS update file from Windows using a bootable USB key or you can also update the BIOS from the F12 One-Time boot menu on the system.

Most Dell systems built after 2012 have this capability and you can confirm by booting your system to the F12 One-Time Boot Menu to see if BIOS FLASH UPDATE is listed as a boot option for your system. If the option is listed, then the BIOS supports this BIOS update option.

**NOTE:** Only systems with BIOS Flash Update option in the F12 One-Time Boot Menu can use this function.

#### Updating from the One-Time Boot Menu

To update your BIOS from the F12 One-Time boot menu, you will need:

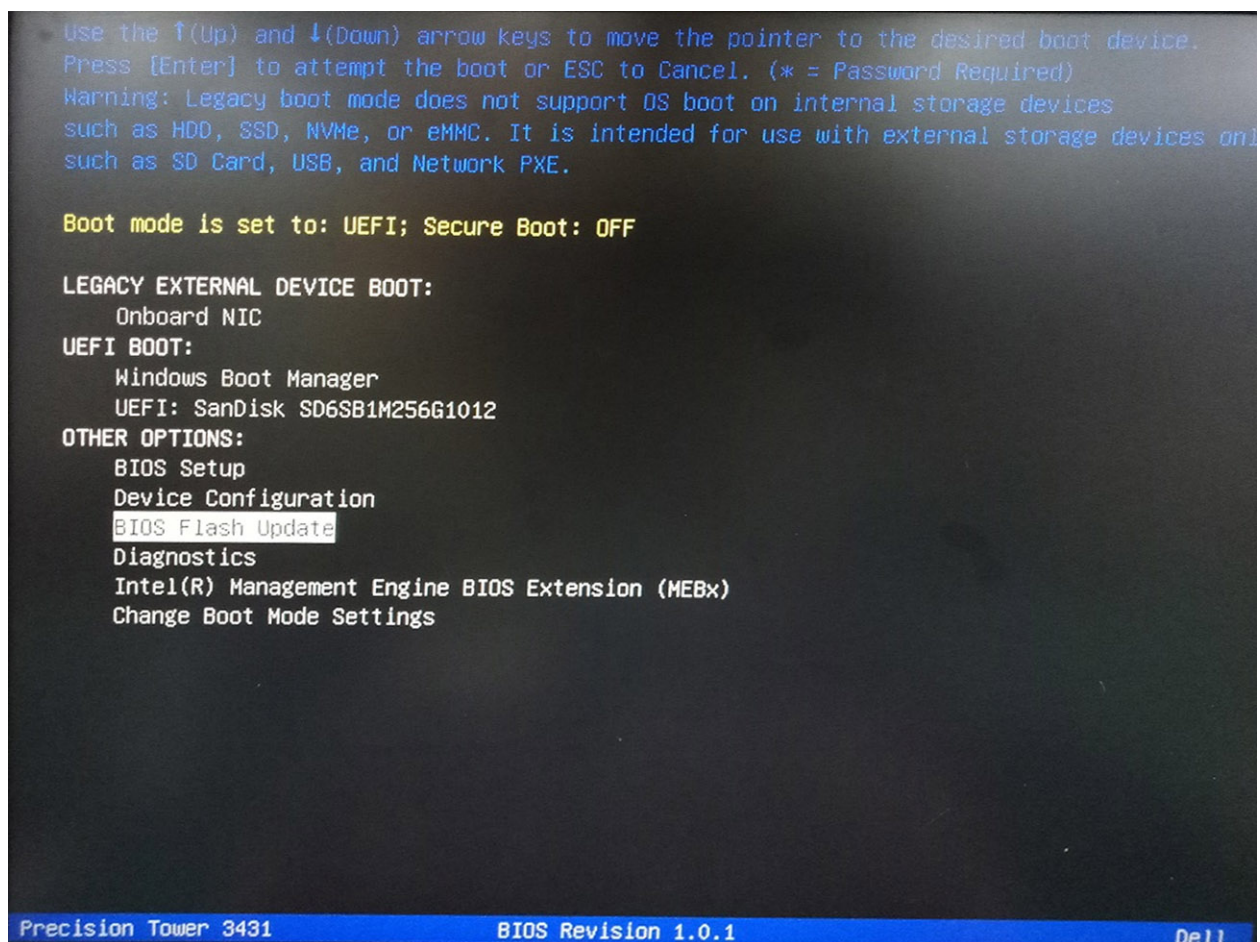
- USB key formatted to the FAT32 file system (key does not have to be bootable)
- BIOS executable file that you downloaded from the Dell Support website and copied to the root of the USB key
- AC power adapter connected to the system
- Functional system battery to flash the BIOS

Perform the following steps to execute the BIOS update flash process from the F12 menu:

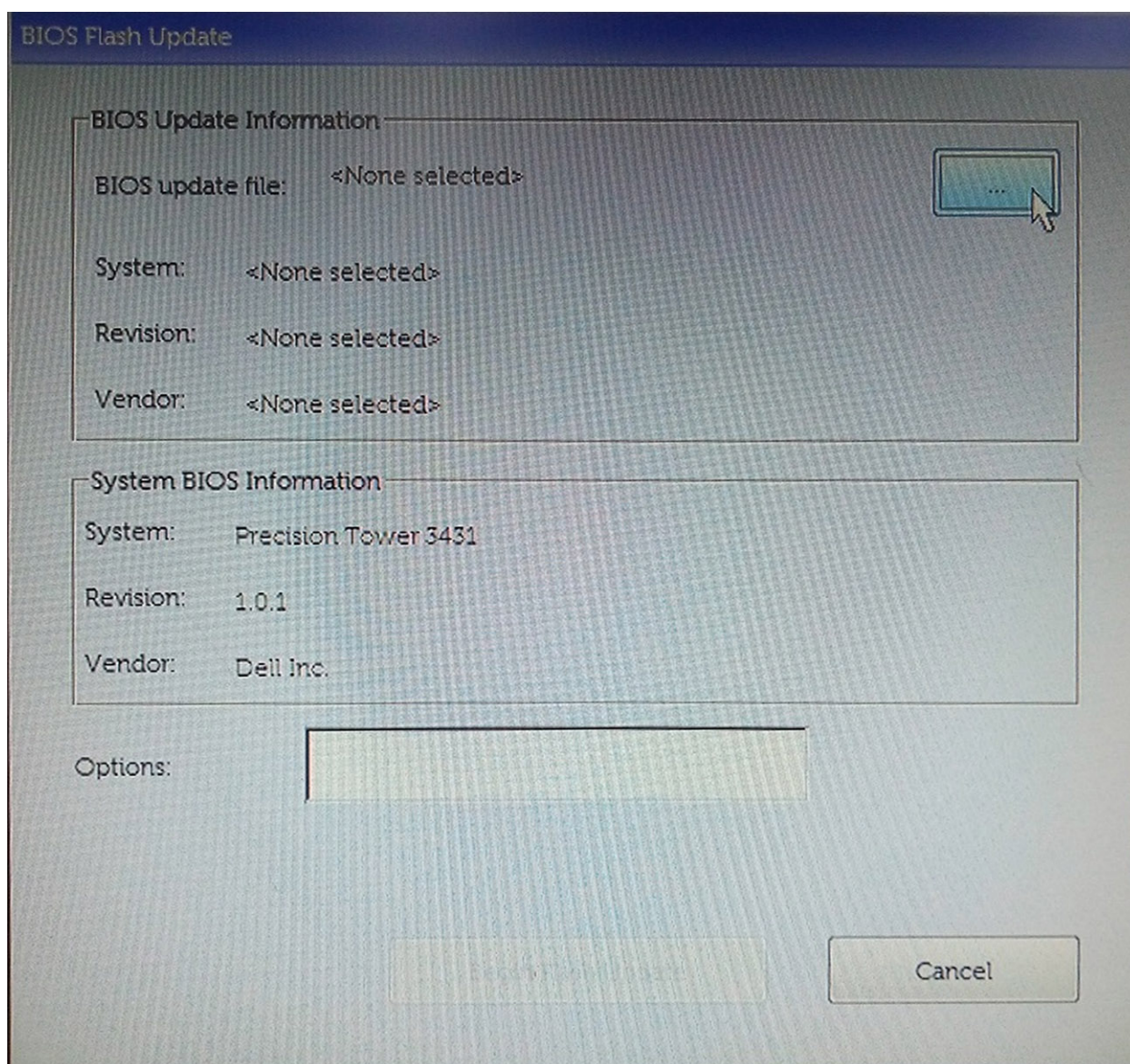
**CAUTION:** Do not power off the system during the BIOS update process. Powering off the system could make the system fail to boot.

#### Steps

1. From a power off state, insert the USB key where you copied the flash into a USB port of the system .
2. Power on the system and press the F12 key to access the One-Time Boot Menu, Highlight **BIOS Flash Update** using the arrow keys then press **Enter**.

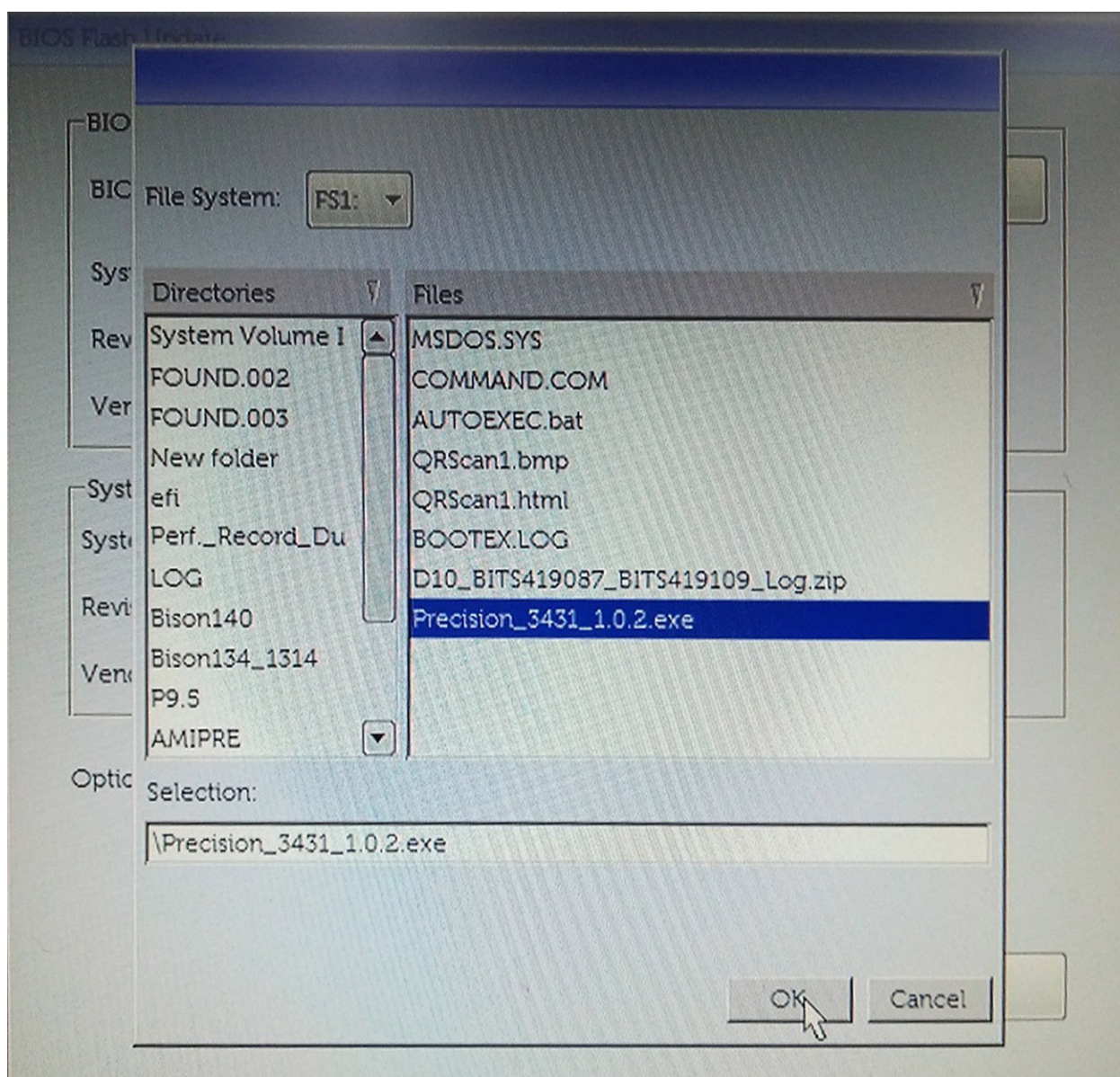


3. The Bios Flash Update dialog box menu is opened. Click **BIOS Update file** browse button to select the BIOS file.

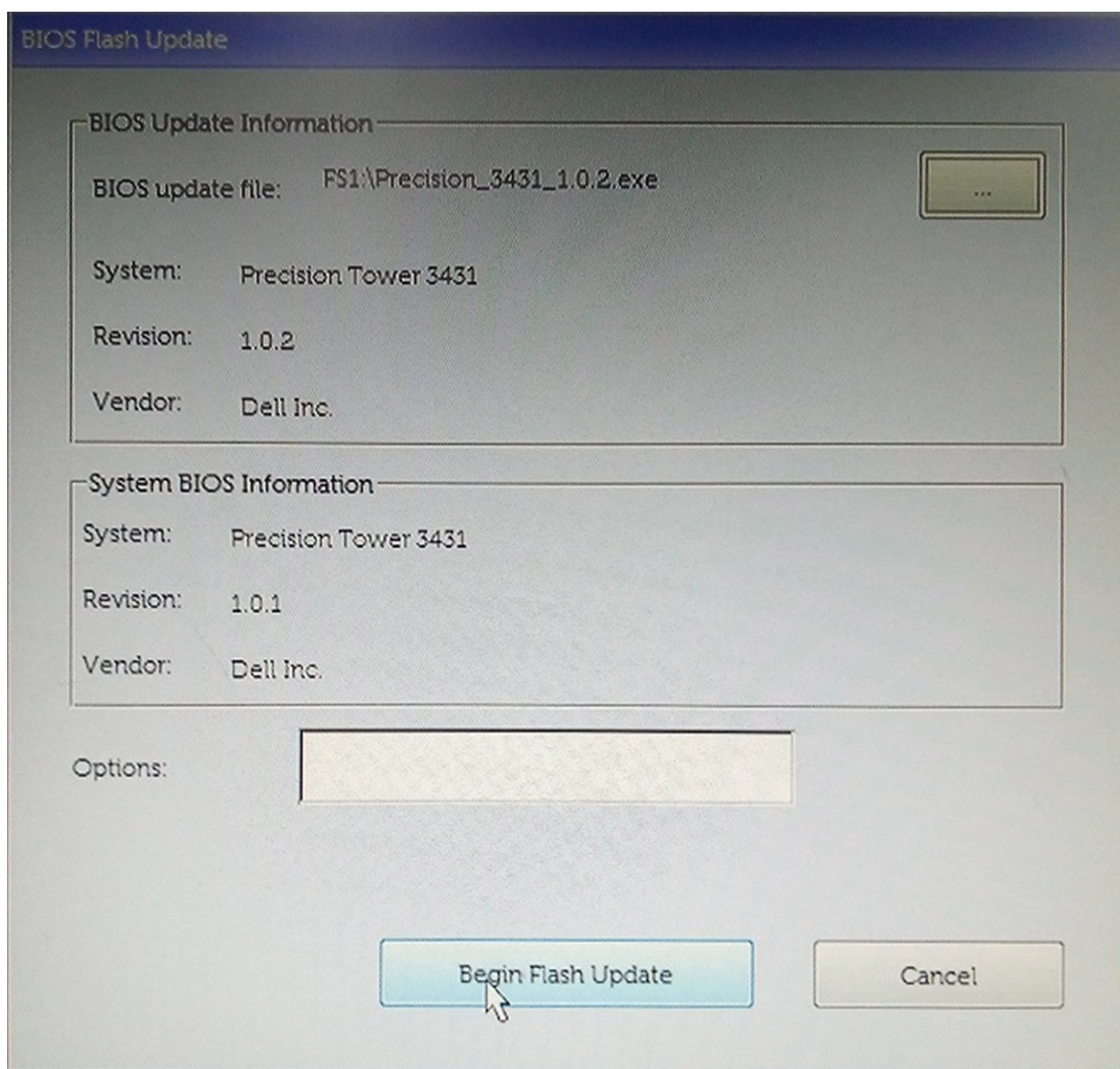


4. Select the BIOS executable file and then press **OK**. Switch to correct catalogue of your external USB device by **File system** if you do not find the BIOS executable file.



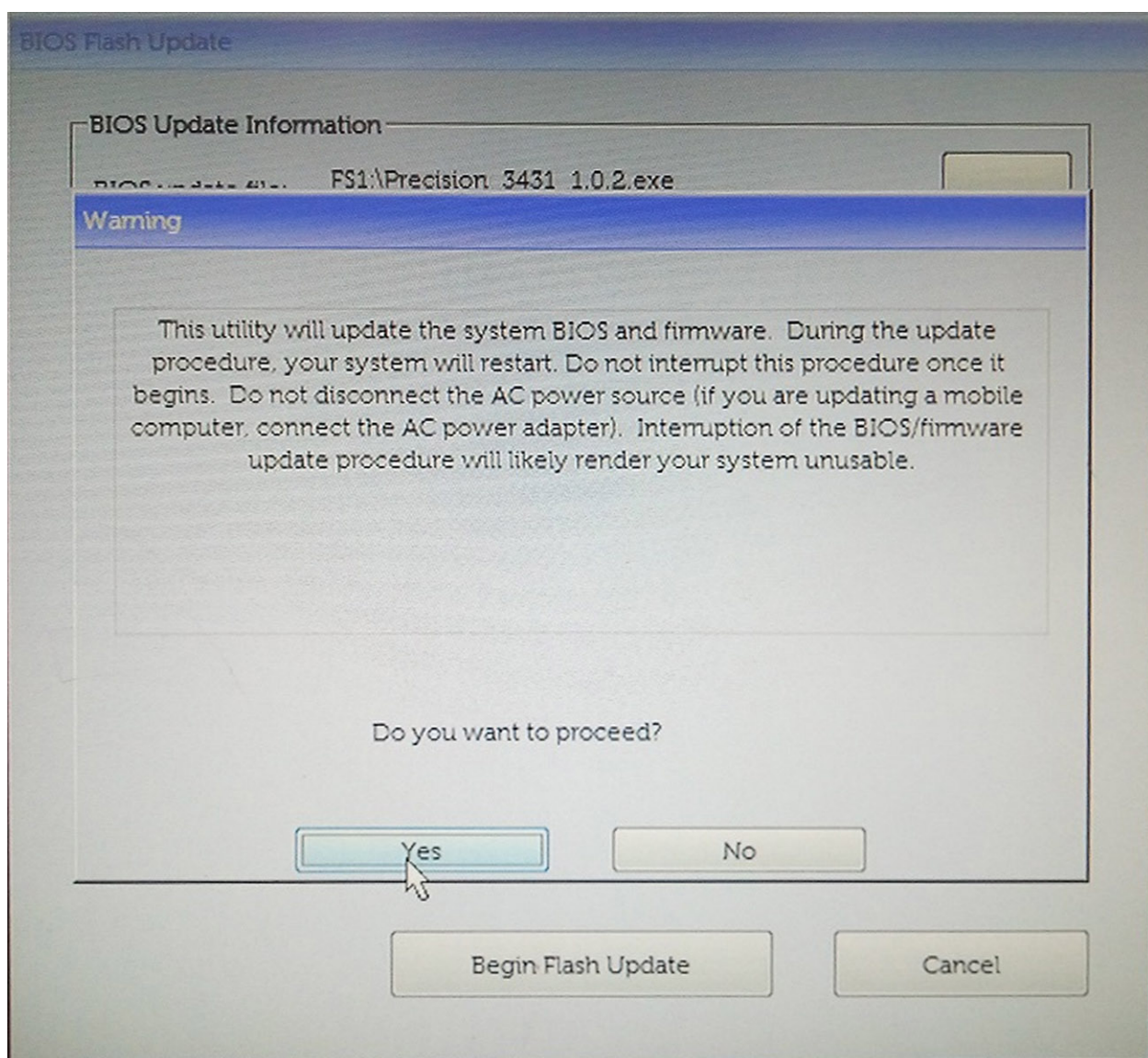


5. Click **Begin Flash Update**, and then a warning message is displayed.



6. Click **Yes**. The systems restarts automatically and starts BIOS Flash.





7. Once complete, the system will reboot and the BIOS update process is completed.

## Troubleshooting

# Enhanced Pre-Boot System Assessment (ePSA) diagnostics

### About this task

The ePSA diagnostics (also known as system diagnostics) performs a complete check of your hardware. The ePSA is embedded with the BIOS and is launched by the BIOS internally. The embedded system diagnostics provides a set of options for particular devices or device groups allowing you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if 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 terminal when the diagnostic tests are performed.

For more information, see [Dell EPSA Diagnostic 3.0](#).

## Running the ePSA diagnostics

### Steps

1. Turn on your computer.
2. As the computer boots, press the F12 key as the Dell logo appears.
3. On the boot menu screen, select the **Diagnostics** option.
4. Click the arrow at the bottom left corner.  
Diagnostics front page is displayed.
5. Click the arrow in the lower-right corner to go to the page listing.  
The items detected are listed.
6. To run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
7. Select the device from the left pane and click **Run Tests**.
8. If there are any issues, error codes are displayed.  
Note the error code and validation number and contact Dell.

## Diagnostics

The computer POST (Power On Self Test) ensures that it meets the basic computer requirements and the hardware is working appropriately before the boot process begins. If the computer passes the POST, the computer continues to start in a normal mode. However, if the computer fails the POST, the computer emits a series of LED codes during the start-up. The system LED is integrated on the Power button.

The following table shows different light patterns and what they indicate.

**Table 19. Power LED summary**

Amber LED state	White LED state	System state	Notes
Off	Off	S4, S5	<ul style="list-style-type: none"> <li>Hibernate or Suspend to Disk (S4)</li> <li>Power is off (S5)</li> </ul>
Off	Blinking	S1, S3	System is in a low power state, either S1 or S3. This does not indicate a fault condition.
Previous State	Previous State	S3, no PWRGD_PS	This entry provides for the possibility of a delay from SLP_S3# active to PWRGD_PS inactive.
Blinking	Off	S0, no PWRGD_PS	Boot Failure - The computer is receiving electrical power, and power supplied by the power supply is normal. A device might be malfunctioning or incorrectly installed. Refer to the table below for Amber Blinking Pattern diagnostics suggestion and possible failures.
Steady	Off	S0, no PWRGD_PS, Code fetch = 0	Boot Failure - This is a system fault error condition, including the power supply. Only the +5VSB rail on the power supply is working correctly.
Off	Steady	S0, no PWRGD_PS, Code fetch = 1	This indicates that the host BIOS has started to execute and the LED register is now writable.

**Table 20. Amber LED blinking failures**

Amber LED state	White LED state	System state	Notes
2	1	Bad MBD	Bad MBD - Rows A, G, H, and J from table 12.4 of SIO Spec - Pre-Post indicators [40]
2	2	Bad MB, PSU or cabling	Bad MBD, PSU or PSU cabling - Rows B, C and D of table 12.4 SIO spec [40]
2	3	Bad MBD, DIMMS, or CPU	Bad MBD, DIMMS or CPU - Rows F and K from table 12.4 of SIO spec [40]
2	4	Bad coin cell	Bad coin cell - Row M of table 12.4 in SIO spec [40]

**Table 21. States Under Host BIOS Control**

Amber LED state	White LED state	System state	Notes
2	5	BIOS state 1	BIOS Post code (Old LED pattern 0001) Corrupt BIOS.
2	6	BIOS state 2	BIOS Post code (Old LED pattern 0010) CPU config or CPU failure.
2	7	BIOS state 3	BIOS Post code (Old LED pattern 0011) MEM config in

Amber LED state	White LED state	System state	Notes
			process. Appropriate mem modules detected but failure has occurred.
3	1	BIOS state 4	BIOS Post code (Old LED pattern 0100) Combine PCI device config or failure with video sub sytem config or failure. BIOS to eliminate 0101 video code.
3	2	BIOS state 5	BIOS Post code (Old LED pattern 0110) Combine storage and USB config or failure. BIOS to eliminate 0111 USB code.
3	3	BIOS state 6	BIOS Post code (Old LED pattern 1000) MEM config, no memory detected.
3	4	BIOS state 7	BIOS Post code (Old LED pattern 1001) Fatal Motherboard error.
3	5	BIOS state 8	BIOS Post code (Old LED pattern 1010) Mem config, modules incompatible or invalid config.
3	6	BIOS state 9	BIOS Post code (Old LED pattern 1011) combine "Other pre-video activity and resource configuration codes. BIOS to eliminate 1100 code.
3	7	BIOS state 10	BIOS Post code (Old LED pattern 1110) Other pre-post activity, routine subsequent to video init.

## Diagnostic error messages

Table 22. Diagnostic error messages

Error messages	Description
AUXILIARY DEVICE FAILURE	The touchpad or external mouse may be faulty. For an external mouse, check the cable connection. Enable the <b>Pointing Device</b> option in the System Setup program.
BAD COMMAND OR FILE NAME	Ensure that you have spelled the command correctly, put spaces in the proper place, and used the correct path name.
CACHE DISABLED DUE TO FAILURE	The primary cache internal to the microprocessor has failed. <b>Contact Dell</b>
CD DRIVE CONTROLLER FAILURE	The optical drive does not respond to commands from the computer.
DATA ERROR	The hard drive cannot read the data.
DECREASING AVAILABLE MEMORY	One or more memory modules may be faulty or improperly seated. Reinstall the memory modules or, if necessary, replace them.
DISK C: FAILED INITIALIZATION	The hard drive failed initialization. Run the hard drive tests in <b>Dell Diagnostics</b> .



Error messages	Description
DRIVE NOT READY	The operation requires a hard drive in the bay before it can continue. Install a hard drive in the hard drive bay.
ERROR READING PCMCIA CARD	The computer cannot identify the ExpressCard. Reinsert the card or try another card.
EXTENDED MEMORY SIZE HAS CHANGED	The amount of memory recorded in non-volatile memory (NVRAM) does not match the memory module installed in the computer. Restart the computer. If the error appears again, <b>Contact Dell</b>
THE FILE BEING COPIED IS TOO LARGE FOR THE DESTINATION DRIVE	The file that you are trying to copy is too large to fit on the disk, or the disk is full. Try copying the file to a different disk or use a larger capacity disk.
A FILENAME CANNOT CONTAIN ANY OF THE FOLLOWING CHARACTERS: \ / : * ? " < >   -	Do not use these characters in filenames.
GATE A20 FAILURE	A memory module may be loose. Reinstall the memory module or, if necessary, replace it.
GENERAL FAILURE	The operating system is unable to carry out the command. The message is usually followed by specific information. For example, Printer out of paper. Take the appropriate action.
HARD-DISK DRIVE CONFIGURATION ERROR	The computer cannot identify the drive type. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE CONTROLLER FAILURE 0	The hard drive does not respond to commands from the computer. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE FAILURE	The hard drive does not respond to commands from the computer. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE READ FAILURE	The hard drive may be defective. Shut down the computer, remove the hard drive, and boot the computer from an optical. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
INSERT BOOTABLE MEDIA	The operating system is trying to boot to non-bootable media, such as an optical drive. Insert bootable media.
INVALID CONFIGURATION INFORMATION-PLEASE RUN SYSTEM SETUP PROGRAM	The system configuration information does not match the hardware configuration. The message is most likely to occur after a memory module is installed. Correct the appropriate options in the system setup program.
KEYBOARD CLOCK LINE FAILURE	For external keyboards, check the cable connection. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .
KEYBOARD CONTROLLER FAILURE	For external keyboards, check the cable connection. Restart the computer, and avoid touching the keyboard or the mouse during the boot routine. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .
KEYBOARD DATA LINE FAILURE	For external keyboards, check the cable connection. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .

Error messages	Description
KEYBOARD STUCK KEY FAILURE	For external keyboards or keypads, check the cable connection. Restart the computer, and avoid touching the keyboard or keys during the boot routine. Run the <b>Stuck Key</b> test in <b>Dell Diagnostics</b> .
LICENSED CONTENT IS NOT ACCESSIBLE IN MEDIADIRECT	Dell MediaDirect cannot verify the Digital Rights Management (DRM) restrictions on the file, so the file cannot be played.
MEMORY ADDRESS LINE FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY ALLOCATION ERROR	The software you are attempting to run is conflicting with the operating system, another program, or a utility. Shut down the computer, wait for 30 seconds, and then restart it. Run the program again. If the error message still appears, see the software documentation.
MEMORY DOUBLE WORD LOGIC FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY ODD/EVEN LOGIC FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY WRITE/READ FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
NO BOOT DEVICE AVAILABLE	The computer cannot find the hard drive. If the hard drive is your boot device, ensure that the drive is installed, properly seated, and partitioned as a boot device.
NO BOOT SECTOR ON HARD DRIVE	The operating system may be corrupted. <b>Contact Dell.</b>
NO TIMER TICK INTERRUPT	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> .
NOT ENOUGH MEMORY OR RESOURCES. EXIT SOME PROGRAMS AND TRY AGAIN	You have too many programs open. Close all windows and open the program that you want to use.
OPERATING SYSTEM NOT FOUND	Reinstall the operating system. If the problem persists, <b>Contact Dell.</b>
OPTIONAL ROM BAD CHECKSUM	The optional ROM has failed. <b>Contact Dell.</b>
SECTOR NOT FOUND	The operating system cannot locate a sector on the hard drive. You may have a defective sector or corrupted File Allocation Table (FAT) on the hard drive. Run the Windows error-checking utility to check the file structure on the hard drive. See <b>Windows Help and Support</b> for instructions (click <b>Start &gt; Help and Support</b> ). If a large number of sectors are defective, back up the data (if possible), and then format the hard drive.
SEEK ERROR	The operating system cannot find a specific track on the hard drive.
SHUTDOWN FAILURE	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> . If the message reappears, <b>Contact Dell.</b>
TIME-OF-DAY CLOCK LOST POWER	System configuration settings are corrupted. Connect your computer to an electrical outlet to charge the battery. If the problem persists, try to restore the data by entering the System Setup program, then immediately exit the program. If the message reappears, <b>Contact Dell.</b>
TIME-OF-DAY CLOCK STOPPED	The reserve battery that supports the system configuration settings may require recharging. Connect your computer to an electrical outlet to charge the battery. If the problem persists, <b>Contact Dell.</b>

Error messages	Description
TIME-OF-DAY NOT SET-PLEASE RUN THE SYSTEM SETUP PROGRAM	The time or date stored in the system setup program does not match the system clock. Correct the settings for the <b>Date and Time</b> options.
TIMER CHIP COUNTER 2 FAILED	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> .
UNEXPECTED INTERRUPT IN PROTECTED MODE	The keyboard controller may be malfunctioning, or a memory module may be loose. Run the <b>System Memory</b> tests and the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> or <b>Contact Dell</b> .
X:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY	Insert a disk into the drive and try again.

## System error messages

Table 23. System error messages

System message	Description
Alert! Previous attempts at booting this system have failed at checkpoint [nnnn]. For help in resolving this problem, please note this checkpoint and contact Dell Technical Support	The computer failed to complete the boot routine three consecutive times for the same error.
CMOS checksum error	RTC is reset, <b>BIOS Setup</b> default has been loaded.
CPU fan failure	CPU fan has failed.
System fan failure	System fan has failed.
Hard-disk drive failure	Possible hard disk drive failure during POST.
Keyboard failure	Keyboard failure or loose cable. If reseating the cable does not solve the problem, replace the keyboard.
No boot device available	No bootable partition on hard disk drive, the hard disk drive cable is loose, or no bootable device exists. <ul style="list-style-type: none"> <li>If the hard drive is your boot device, ensure that the cables are connected and that the drive is installed properly and partitioned as a boot device.</li> <li>Enter system setup and ensure that the boot sequence information is correct.</li> </ul>
No timer tick interrupt	A chip on the system board might be malfunctioning or motherboard failure.
NOTICE - Hard Drive SELF MONITORING SYSTEM has reported that a parameter has exceeded its normal operating range. Dell recommends that you back up your data regularly. A parameter out of range may or may not indicate a potential hard drive problem	S.M.A.R.T error, possible hard disk drive failure.

## 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 standalone tool that is preinstalled in all Dell computers installed with Windows 10 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, or 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 their 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 [www.dell.com/support](http://www.dell.com/support).

## Enabling Intel Optane memory

### Steps

1. On the taskbar, click the search box, and type "**Intel Rapid Storage Technology**".
2. Click **Intel Rapid Storage Technology**.
3. On the **Status** tab, click **Enable** to enable the Intel Optane memory.
4. On the warning screen, select a compatible fast drive, and then click **Yes** to continue enabling Intel Optane memory.
5. Click **Intel Optane memory > Reboot** to enable the Intel Optane memory.

 **NOTE:** Applications may take up to three subsequent launches after enablement to see the full performance benefits.

## Disabling Intel Optane memory

### About this task

 **CAUTION:** After disabling Intel Optane memory, do not uninstall the driver for Intel Rapid Storage Technology as it will result in a blue screen error. The Intel Rapid Storage Technology user interface can be removed without uninstalling the driver.

 **NOTE:** Disabling Intel Optane memory is required before removing the SATA storage device, accelerated by the Intel Optane memory module, from the computer.

### Steps

1. On the taskbar, click the search box, and then type "**Intel Rapid Storage Technology**".
2. Click **Intel Rapid Storage Technology**. The **Intel Rapid Storage Technology** window is displayed.
3. On the **Intel Optane memory** tab, click **Disable** to disable the Intel Optane memory.
4. Click **Yes** if you accept the warning.  
The disabling progress is displayed.
5. Click **Reboot** to complete disabling Intel Optane memory and restart your computer.

## Flea power release

### About this task

Flea power is the residual static electricity that remains on the computer even after it has been powered off and the battery has been removed. The following procedure provides the instructions on how to conduct flea power release:

### Steps

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Press and hold the power button for 15 seconds to drain the flea power.
4. Connect the power adapter to your computer.
5. Turn on your computer.

# WiFi power cycle

## About this task

If your computer is unable to access the internet due to WiFi connectivity issues a WiFi power cycle procedure may be performed. The following procedure provides the instructions on how to conduct a WiFi power cycle:

 **NOTE:** Some ISPs (Internet Service Providers) provide a modem/router combo device.

## Steps

1. Turn off your computer.
2. Turn off the modem.
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 your computer.




# Getting help

## Topics:

- [Contacting Dell](#)

## Contacting Dell

### Prerequisites

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

### About this task

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

### Steps

1. Go to **Dell.com/support**.
2. Select your support category.
3. Verify your country or region in the **Choose a Country/Region** drop-down list at the bottom of the page.
4. Select the appropriate service or support link based on your need.