



User Guide

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First Edition: July 2018

Part number: L30689-001

Product notice

This guide describes features that are common to most products. Some features may not be available on your computer.

Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. See <http://www.microsoft.com>.

To access the latest user guides, go to <http://www.hp.com/support>, and follow the instructions to find your product. Then select **User Guides**.

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a full refund subject to the refund policy of your seller.

For any further information or to request a full refund of the price of the computer, please contact your seller.

About this guide

This guide provides information about computer features, setting up the computer, using the software, and technical specifications.

The following types of alerts may appear in this guide.

-
-  **WARNING!** Indicates a hazardous situation that, if not avoided, **could** result in death or serious injury.
 -  **CAUTION:** Indicates a hazardous situation that, if not avoided, **could** result in minor or moderate injury.
 -  **IMPORTANT:** Indicates information considered important but not hazard-related (for example, messages related to property damage). An important alert warns the user that failure to follow a procedure exactly as described could result in loss of data or in damage to hardware or software. Also contains essential information to explain a concept or to complete a task.
 -  **NOTE:** Contains additional information to emphasize or supplement important points of the main text.
 -  **TIP:** Provides helpful hints for completing a task.
-

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1 Locating HP resources

Read this chapter to learn about where to find additional HP resources.

Product information

Topic	Location
Technical specifications	To find the QuickSpecs for your product, go to http://www.hp.com/go/quickspecs . Click the link for the Hewlett Packard Enterprise QuickSpecs experience. Click Search all QuickSpecs , type your model name in the search box, and then click Go .
<i>Regulatory, Safety and Environmental Notices</i>	See the <i>Regulatory, Safety and Environmental Notices</i> for product regulatory information. You can also see the Agency/Environmental label. To access this guide: <ul style="list-style-type: none">▲ Select the Start button, select your product, select HP Help and Support, and then select HP Documentation.
Accessories	For complete and current information about supported accessories and components, go to http://www.hp.com/go/workstations and select Displays & accessories .
System board	A diagram of the system board is located on the inside of the chassis. Additional information is located in the computer <i>Maintenance and Service Guide</i> on the Web at http://www.hp.com/support . To access this guide: <ul style="list-style-type: none">▲ Select the Start button, Select your product, select HP Help and Support, and then select Product Information.
Serial number, Agency/Environmental, and operating system labels	The serial number, Agency/Environmental, and operating system labels might be on the bottom of the computer, on the rear panel of the computer, or under the service door.

Support

Topic	Location
Product support	For HP support, go to http://www.hp.com/support . Here you can access the following types of support: <ul style="list-style-type: none">• Online chat with an HP technician• Support telephone numbers• HP service center locations
Warranty information	To access this document: <ul style="list-style-type: none">▲ Select the Start button, select HP Help and Support, and then select HP Documentation. <p>– or –</p> <ul style="list-style-type: none">▲ Go to http://www.hp.com/go/orderdocuments.

Topic	Location
	<p>IMPORTANT: You must be connected to the Internet to access the latest version of the warranty.</p> <p>You can find your HP Limited Warranty located with the user guides on your product. The warranty may also be provided on a CD or DVD provided in the box. In some countries or regions, HP may provide a printed warranty in the box. For countries or regions where the warranty is not provided in printed format, you can request a copy from http://www.hp.com/go/orderdocuments. For products purchased in Asia Pacific, you can write to HP at POD, PO Box 161, Kitchener Road Post Office, Singapore 912006. Include your product name, and your name, phone number, and postal address.</p>

Product documentation

Topic	Location
HP user documentation, white papers, and third-party documentation	User documentation is located on your hard drive. Select the Start button, select HP Help and Support , and then select HP Documentation . For the latest online documentation, go to http://www.hp.com/support . The documentation includes this user guide and the <i>Maintenance and Service Guide</i> .
Removal and replacement videos	To learn how to remove and replace computer components, go to http://www.hp.com/go/sml .
Product notifications	Subscriber's Choice is an HP program that allows you to sign up to receive driver and software alerts, proactive change notifications (PCNs), the HP newsletter, customer advisories, and more. Sign up at https://h41369.www4.hp.com/alerts-signup.php .
Technical specifications	The Product Bulletin contains QuickSpecs for HP computers. QuickSpecs include information about the operating system, power supply, memory, processor, and many other system components. To access the QuickSpecs, go to http://www.hp.com/go/quickspecs/ .
Bulletins and Notices	To find advisories, bulletins, and notices: <ol style="list-style-type: none"> 1. Go to http://www.hp.com/support. 2. Select your product. 3. Select Advisories or Bulletins and Notices.

Product diagnostics

Topic	Location
Windows® diagnostics tools	The HP PC Hardware Diagnostics Windows utility and HP PC Hardware Diagnostics UEFI utility are preinstalled on select Windows computers. See Using HP PC Hardware Diagnostics UEFI on page 26 . For additional information, see the computer <i>Maintenance and Service Guide</i> at http://www.hp.com/support .
Audible beep and light code definitions	See the computer <i>Maintenance and Service Guide</i> at http://www.hp.com/support .
POST error codes	See the computer <i>Maintenance and Service Guide</i> at http://www.hp.com/support .

Product updates

Topic	Location
Driver and BIOS updates	Go to http://www.hp.com/support and select Get software and drivers to verify that you have the latest drivers for the computer. For more information about updating the drivers and BIOS, see Updating the computer on page 19 .
Operating systems	For information, go to the following locations: <ul style="list-style-type: none"><li data-bbox="671 495 1342 516">• Windows operating systems, go to http://www.support.microsoft.com.<li data-bbox="671 537 1198 558">• Linux® operating systems, go to http://www.linux.com.

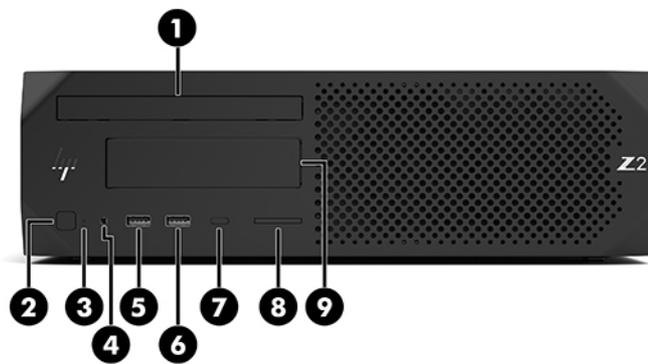
2 Computer features

For complete and current information about supported accessories and components for the computer, go to <http://partsurfer.hp.com>.

Desktop components

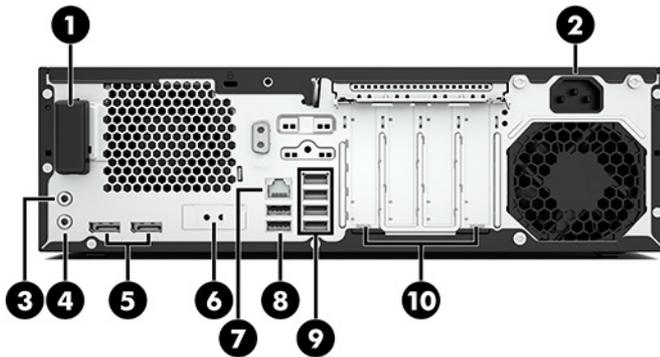
For complete and current information about supported accessories and components for the computer, see <http://partsurfer.hp.com>.

Front



Item	Icon	Component	Item	Icon	Component
1		Optical drive (optional)	6		USB Type-C SuperSpeedPlus port with HP Sleep and Charge (optional)
2		Power button	7		USB Type-C SuperSpeedPlus port with HP Sleep and Charge (optional)
3		HDD activity	8		Memory card reader (optional)
4		Audio-out (headphone)/Audio-in (microphone) combo jack	9		3.5" drive bay (optional)
5		USB SuperSpeed port			

Rear



Item	Icon	Component	Item	Icon	Component
1		Antenna cover	6		Flex IO port
2		Power connector	7		RJ-45 (network) jack
3		Audio line-in connector (blue)	8		USB ports (2)
4		Audio line-out connector (green)	9		USB Type-C SuperSpeedPlus port with HP Sleep and Charge (optional) (4)
5		DisplayPort (DP) ports (2)	10		Expansion slot covers (4)

NOTE: The labels for the rear panel connectors use industry-standard icons and colors.

NOTE: The DP ports are not supported when the system is configured with Intel® Xeon® E3-12x0 v5 processors. For all other processors, these DP ports are disabled by default when a discrete graphics card is installed.

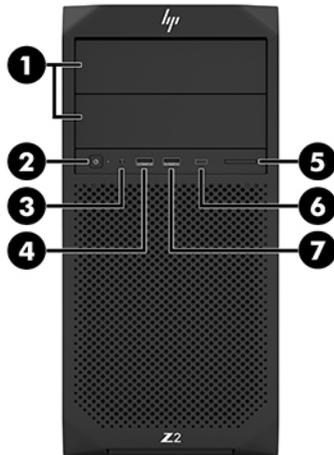
NOTE: Simultaneous use of integrated Intel HD graphics and discrete graphics cards (in order to drive more than two displays) can be enabled using Computer Setup. However, HP recommends using only discrete graphics cards when attaching three or more displays.

Tower components

This section describes the tower components.

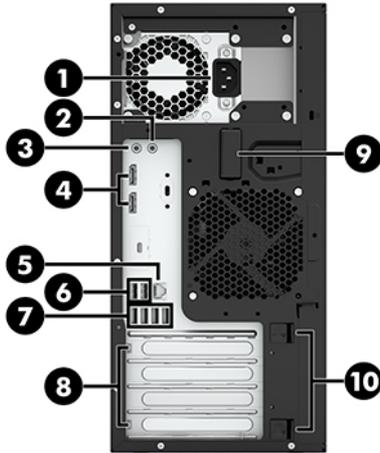
For complete and current information about supported accessories and components for the computer, see <http://partsurfer.hp.com>.

Front



Item	Icon	Component	Item	Icon	Component
1		5.25-inch hard drive/optical drive bays (2, optional)	5		MicroSD memory card reader (optional)
2		Power button	6		USB Type-C SuperSpeedPlus port with HP Sleep and Charge (optional)
3		Audio-out (headphone)/Audio-in (microphone) combo jack	7		USB Type-C SuperSpeedPlus port with HP Sleep and Charge (optional)
4		USB SuperSpeed port			

Rear



Item	Icon	Component	Item	Icon	Component
1		Power connector	6		USB ports (2)
2		Audio line-in connector (blue)	7		USB SuperSpeed ports (4)
3		Audio line-out connector (green)	8		Expansion slot covers (4)
4		Display Port (DP) connectors (2)	9		Antenna cover
5		RJ-45 (network) jack/status lights	10		Latches

NOTE: The labels for the rear panel connectors use industry-standard icons and colors.

NOTE: The DP and DVI-D ports are not supported when the system is configured with Intel Xeon E3-12x0 v5 processors. Also, if a discrete graphics card is installed these ports are disabled by default.

NOTE: Simultaneous usage of integrated Intel HD graphics and discrete graphics cards (in order to drive more than two displays) can be enabled using the Computer (F10) Setup Utility. However, HP recommends using only discrete graphics cards when attaching three or more displays.

Product specifications

To find the QuickSpecs for your product, go to <http://www.hp.com/go/quickspecs>. Click the link for the HP Inc. QuickSpecs experience. Click **Search all QuickSpecs**, type your model name in the search field, and then click **Go**.

– or –

Go to <http://www.hp.com/support>, and follow the instructions to find your product. Select **Product Information**, and then select your computer specifications.

3 Setting up the computer

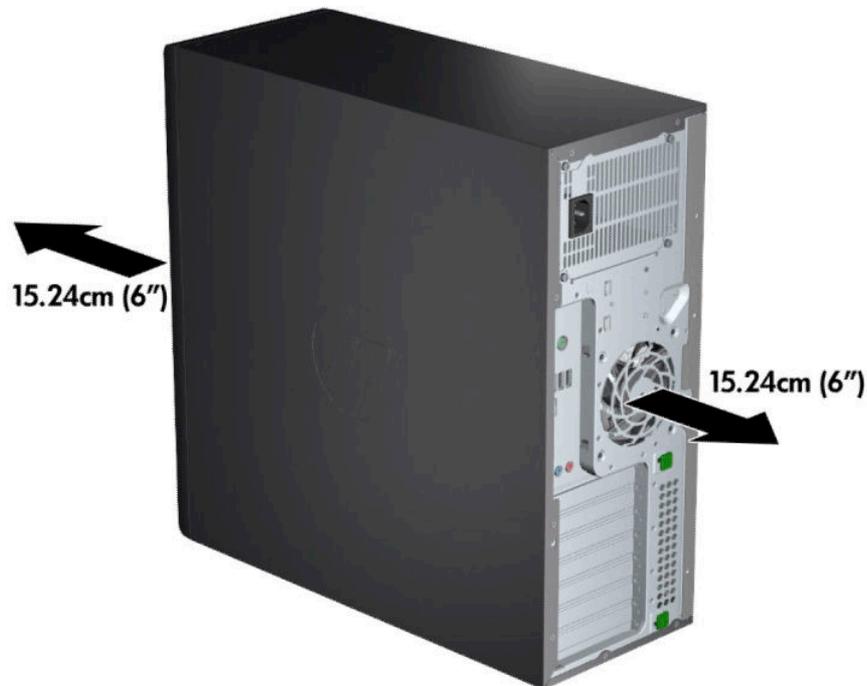
This chapter describes how to set up your computer.

Ensuring proper ventilation

Proper ventilation for the system is important for computer operation. Follow these guidelines:

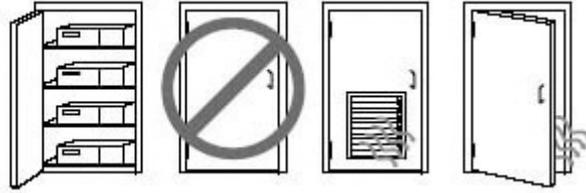
- Operate the computer on a sturdy, level surface.
- Provide at least 15.24 cm (6.00 in) of clearance at the front and back of the computer. (This is the *minimum* distance for all computer models.)

 **NOTE:** Your computer may look slightly different from the illustration in this section.



- Ensure that the ambient air temperature is within specified limits. To locate specifications for your computer, see [Product specifications on page 7](#).

- For cabinet installation, ensure adequate cabinet ventilation and ensure that the ambient temperature within the cabinet does not exceed specified limits.



- Never restrict the incoming or outgoing airflow of the computer by blocking any vents or air intakes.

Setup procedures

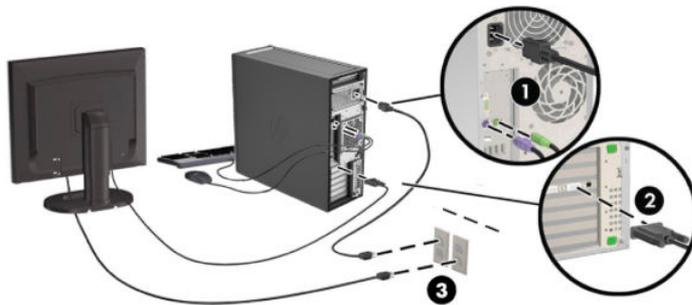
⚠ WARNING! To reduce the risk of electric shock or damage to your equipment, observe these practices:

- Plug the power cord into an AC outlet that is easily accessible at all times.
- Disconnect power from the computer by unplugging the power cord from the AC outlet (not by unplugging the power cord from the computer).
- Plug the cord into a grounded (earthed) three-pin outlet. Do not disable the power cord grounding pin (for example, by attaching a two-pin adapter). The grounding pin is an important safety feature.

📝 NOTE: If your computer has a 1125 W power supply, it might require more power than the typical office environment can supply. For details, see the *Site Preparation Guide* for the computer at <http://www.hp.com/support>.

To set up the computer:

1. Connect the mouse, keyboard, and power cord to the computer (1).
2. Connect the monitor to the computer (2).
3. Connect other peripheral components (such as a printer) according to the instructions included with the device.
4. Connect a network cable to the computer and to a network router or LAN device.
5. Plug the computer power cord and monitor power cord into an AC outlet (3).



Adding monitors

Planning for additional monitors

All graphics cards provided with HP Z-series computers support two simultaneous-display monitors (see [Connecting and configuring monitors on page 13](#)). Cards that support more than two monitors are available. The process for adding monitors depends on your graphics card(s) and the type and number of monitors you add.

Use this process to plan for adding more monitors.

1. Assess your monitor needs.

- Determine how many monitors you require.
- Determine the kind of graphics performance you want.
- Note the type of graphics connector used by each monitor. HP provides graphics cards with DisplayPort (DP) and DVI interfaces, but you can use adapters and third-party cards to interface to other graphics formats, including DVI-I, HDMI, or VGA.

 **TIP:** Some adapters for older legacy hardware may cost more than others. You may want to compare the cost of acquiring adapters with the cost of getting a newer monitor that doesn't need adapters.

2. Determine whether you need additional graphics cards.

- Consult the graphics card documentation to determine how many monitors you can connect to the card.

You may need to acquire adapters to match the card output to the monitor connector. See [Matching graphics cards to monitor connectors on page 12](#).

- If necessary, plan to acquire a new graphics card to support additional monitors.
- The maximum number of monitors that a graphics card supports depends on the card. Most cards provide outputs for two monitors. Some provide three or four outputs.

 **NOTE:** Monitors with resolutions above 1920 × 1200 pixels at 60 Hz require a graphics card with either Dual Link DVI (DL-DVI) or DisplayPort output. To get native resolution with DVI, you must use a DL-DVI cable, not standard DVI-I or DVI-D cables.

HP computers do not support all graphics cards. Be sure that a new graphics card is supported before purchasing it. See [Finding supported graphics cards on page 11](#).

Many graphics cards provide more than two monitor outputs but limit you to using only two at a time. Consult the graphics card documentation or look up information about the card according to the procedure in [Finding supported graphics cards on page 11](#).

Some graphics cards support multiple monitors by multiplexing the monitor signal across multiple outputs. This might reduce graphics performance. Consult the graphics card documentation or look up information about the card according to the procedure in [Finding supported graphics cards on page 11](#).

Make sure the card outputs match the input required by the monitors. (See [Identifying monitor connection requirements on page 12](#).)

The different models of HP Z-series computers have different limits on the mechanical size, data speed, and power available for additional graphics cards. Note that the usual practical limit for graphics cards is two per computer. See the *Maintenance and Service Guide* for expansion card slot identification to make sure a new graphics card will work for your computer.

3. If you want to add a new graphics card or cards:

- a. Determine which supported graphics card best fits your needs in terms of number of monitors, compatibility with the monitors you plan to use, and performance.
- b. Make sure you have the correct drivers for the card. See <http://www.hp.com/support> for HP-qualified drivers.
- c. Install the graphics card according to the video instructions for your computer at <http://www.hp.com/go/sml>.
- d. Configure the monitor. For details, see Windows Help or go to <http://www.microsoft.com>.

For monitor setup in Linux, you can often use the settings tool for the graphics cards (e.g., NVIDIA® nvidia-settings or AMD™ Catalyst Control Center). In some recent Linux releases, the window manager system (e.g., Gnome 3) preferences must also be modified.

 **TIP:** To simplify troubleshooting of possible problems, enable the first monitor and make sure it works properly before enabling the next monitor.

Finding supported graphics cards

To find information about graphics cards supported for your computer:

1. Go to <http://www.hp.com/go/quickspecs>.
2. Select **Search active QuickSpecs**, and then select **Desktops & Workstations**.
3. Choose your model to view the specifications.
4. Click the link for **Technical Specifications-Graphics** to display expanded technical information for supported graphics cards, including how many monitors the card supports, connectors, power consumption, drivers, and other details.

 **NOTE:** Not all graphics cards are compatible with all video transceivers and adapters. See the graphics card documentation for specific details.

Matching graphics cards to monitor connectors

The following table describes monitor configuration scenarios.

 **NOTE:** See the illustration that most closely matches your computer.

Graphics card interface connector	Monitor connector				
	VGA	DVI	Dual Link DVI	DisplayPort (DP)	HDMI
DISPLAYPORT 	DisplayPort-to-VGA adapter (sold separately)	DP-to-DVI adapter	DP-to-DL DVI adapter	DP cable	DP-to-HDMI adapter
DVI-I (white) 	DVI-to-VGA adapter	DVI cable	DL DVI cable	N/A	N/A
DMS-59* 	DMS-59-to-VGA adapter	DMS-59-to-DVI adapter	N/A	DMS-59-to-DP adapter	N/A

* This interface is a dual-monitor graphics interface card that supports two VGA, two DVI, or two DP monitors.

 **NOTE:** HP graphics cards include monitor cable adapters unless otherwise indicated.

DisplayPort connections have the highest performance; VGA connections have the lowest.

Identifying monitor connection requirements

The following are various scenarios for connecting monitors. See [Matching graphics cards to monitor connectors on page 12](#) for more information about the different graphics cards.

- Graphics card with DisplayPort output—If the graphics card has four DisplayPort connectors, you can connect a monitor to each connector. Use the proper adapters if required.
- Graphics card with DVI output—If you have a graphics card with two DVI connectors, you can connect a monitor to each connector. Use the proper adapters if required.

 **NOTE:** Models that have only one DVI port always have a second graphics output option (DisplayPort or VGA).

Many graphics cards provide more than two monitor outputs but limit you to using only two at a time. Consult the graphics card documentation or look up information about the card according to the procedure in See [Matching graphics cards to monitor connectors on page 12](#).

On a system with two DVI connections, port number 1 provides the primary display, which is where the BIOS POST screen appears after a system boot. (Only one card is used during BIOS POST unless you change the BIOS setting.)

- Graphics card with VGA and DL-DVI output—If the computer does not have a PCIe graphics card, but has one or more SVGA and/or DL-DVI connectors, you can connect a monitor to each output.
- Graphics card with DMS-59 output—If the computer has a PCIe graphics card with a DMS-59 connector, use the appropriate adapter to connect your monitor.

Adapters are available to connect the DMS-59 output to two DVI or two VGA monitors.

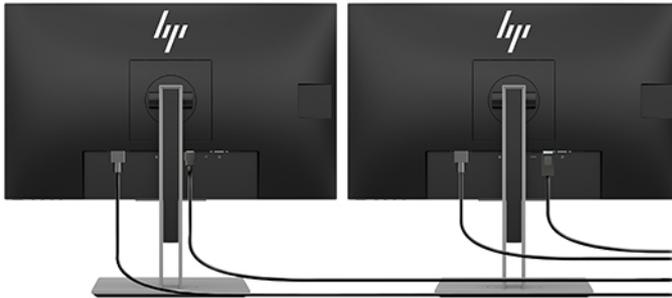
Connecting and configuring monitors

 **NOTE:** The supported graphics cards typically allow at least two monitors, as shown in this section; some supported cards allow more monitors. See the graphics card documentation for details.

1. Connect the monitor cable adapters (if required) to the computer, and then connect the appropriate monitor cables to the adapters or directly to the graphics card.



2. Connect the other ends of the monitor cables to the monitors.



3. Connect one end of the monitor power cord to the monitor and the other end to an AC outlet.
4. Configure the monitor. For details, see Windows Help or go to <http://www.microsoft.com>.

For monitor setup in Linux, you can often use the settings tool for the graphics cards (e.g., NVIDIA nvidia-settings or AMD Catalyst Control Center). In some recent Linux releases, the window manager system (e.g., Gnome 3) preferences must also be modified.

Using a third-party graphics configuration utility

Third-party graphics cards may include a monitor configuration utility. Upon installation, this utility is integrated into Windows. You can select the utility and use it to configure multiple monitors with your computer.

See your graphics card documentation for details.

 **NOTE:** Some third-party configuration utilities require that you enable the monitors in Windows before using the configuration tool. See your graphics card documentation for more information.



NOTE: Monitor configuration utilities are also often available on the HP support website.

Customizing the monitor (Windows)

You can manually select or change the monitor model, refresh rates, screen resolution, color settings, font sizes, and power management settings.

To change settings:

▲ Press the **Start** button, select **Settings**, select **System**, and then select **Display**.

– or –

▲ Right-click anywhere on the desktop, and then select **Display settings**.

For more information about customizing your monitor display, see the following resources:

- Online documentation provided with the graphics controller utility
- Documentation included with your monitor

Installing optional components

Depending on the computer model, additional components (such as memory, hard drives, optical drives, PCIe cards, or a second processor) can be installed on your computer.

- To view component installation videos, go to <http://www.hp.com/go/sml>.
- For installation guidelines and technical information, see the *Maintenance and Service Guide* for your computer at <http://www.hp.com/support>.

Security

Some HP computers have a lock on the side access panel. The key for this lock is shipped attached to the back panel of the computer chassis.

Additional security features reduce the risk of theft and alert you when there has been a chassis intrusion. For information about additional hardware and software security features available for your system, see *Maintenance and Service Guide* for your computer at <http://www.hp.com/support>.

Product recycling

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries.

For information about recycling HP components or products, go to <http://www.hp.com/go/recycle>.

4 Backing up, restoring, and recovering

This chapter provides information about the following processes, which are standard procedure for most products:

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see [Using Windows tools on page 15](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 15](#)).
- **Restoring and recovery**—Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state (see [Using Windows tools on page 15](#)).

Using Windows tools

 **IMPORTANT:** Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

You can use Windows tools to back up personal information and create system restore points and recovery media, allowing you to restore from backup, refresh the computer, and reset the computer to its original state.

 **NOTE:** If computer storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see the Get Help app.

- ▲ Select the **Start** button, and then select the **Get Help** app.

 **NOTE:** You must be connected to the Internet to access the Get Help app.

Using the HP Cloud Recovery Download Tool to create recovery media

To create HP Recovery media using the HP Cloud Recovery Download Tool:

1. Go to <http://www.hp.com/support>.
2. Select **Software and Drivers**, and then follow the on-screen instructions.

Restoring and recovery

Restoring and recovery can be performed using Windows tools.

 **IMPORTANT:** This method may not be available on all products.

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see [Using Windows tools on page 15](#).

5 Setting up Linux

This chapter describes how to set up and restore the Linux operating system.

 **CAUTION:** Do not add optional hardware or third-party devices to the computer until the operating system is successfully installed. Adding hardware might cause errors and prevent the operating system from installing correctly.

 **NOTE:** After you set up the operating system, be sure that the latest BIOS, drivers, and software updates are installed. See [Updating the computer on page 19](#).

 **NOTE:** To create recovery media, you must have either a high-quality blank USB flash drive or an external optical drive with DVD writer capability. If you use an optical drive, you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. A compatible external optical drive may be purchased from HP.

Linux-ready systems

The Linux-ready option provides a system with a minimally functional OS preload (for example, FreeDOS). It is intended for situations where the customer is going to install an OS when the system arrives. The option does not include a license for any operating system.

The Linux-ready option does not include the Linux operating system, which the user must supply. Commercial Linux distributions are available for purchase from vendors such as Red Hat and SUSE. A variety of other Linux distributions are available for free (e.g., Ubuntu). To view supported configurations and operating systems, go to http://www.hp.com/support/linux_hardware_matrix.

HP Linux driver discs

Driver ISO images that support proper use and behavior of some Linux OSes on HP computers may be available on the HP website. Such images include tested drivers that augment and/or replace those found in RHEL, SLED, Ubuntu, or other OSes. Each image is specific to a particular Linux OS release.

These images also can be downloaded using the following steps:

1. Go to <http://www.hp.com/support>.
2. Enter your product name or serial number or select **Find your product**.
3. Select the desired operating system.
4. Select the download link for the appropriate package (typically the most recent revision).
5. Download the software ISO image and burn it to a high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL disc using an external optical drive with DVD writer capability. This disc is your *HP driver disc*.

 **NOTE:** A compatible external optical drive may be purchased from HP.

Setting up Red Hat Enterprise Linux (RHEL)

For details of RHEL support for a particular platform, see the *Linux Hardware Matrix for HP Workstations* at http://www.hp.com/support/linux_hardware_matrix.

For information about Red Hat certifications on HP computers, go to <https://access.redhat.com/ecosystem>, select **Certified Hardware**, and then follow the on-screen instructions.

HP driver disc

Recent versions of Red Hat Linux typically require only driver updates with minor fixes to support HP computers. These releases can usually be supported with the appropriate driver USB flash drive or optical disc from the HP website, which can be used as a post-installation utility for the standard Red Hat Linux install. For more information, see [HP Linux driver discs on page 16](#).

After you complete the standard Red Hat install and restart the system, a Red Hat first-boot utility runs. After you specify a number of settings (such as the security level, time and date, 'root' password, and user accounts), the utility lets you load an additional USB flash drive or optical disc.

The driver media is used during this phase. All content added by HP is in the /HP directory on the media. You can use it to build your own image or to browse the HP content.

Please see the /HP directory on the media for any last-minute README pointers for elements on the disc.

Installing with the HP Red Hat Linux driver media

1. If you do not have the appropriate HP driver media for a supported stream, create one (see [HP Linux driver discs on page 16](#)).
2. Install the operating system using the media included in the Red Hat Linux box set.
3. If you have a Red Hat driver USB flash drive or optical disc for the OS version you are installing, type `linux dd` when the initial install splash screen appears, and then press **Enter**.
4. When asked if you have a driver disc, select **Yes**. Place the Red Hat driver USB flash drive or optical disc in the drive, and select the appropriate `drive:hd[abcd]`. Continue the normal installation.
5. After successfully installing the operating system, reboot the computer.
 - RHEL 6 or RHEL 7: Insert your HP driver USB flash drive or optical disc. The driver installation software automatically starts. Follow the on-screen instructions to install the contents.

Setting up SUSE Linux Enterprise Desktop (SLED)

Various versions of SLED are certified and supported by SUSE on HP computers. For more information, go to the SUSE certification bulletin search page at <https://www.suse.com/yessearch/Search.jsp>.

Installing SLED with the HP driver disc

1. If an HP driver disc did not come with your computer, create one (see [HP Linux driver discs on page 16](#)).
2. Install the operating system using the discs included in the SUSE box set.
3. After successfully installing the operating system, reboot the computer.
4. Insert your HP driver disc. The driver installation software automatically starts. Follow the on-screen instructions to install the contents.

Setting up Ubuntu

Various versions of Ubuntu are certified and supported by Canonical on HP computers. For more information, go to the Ubuntu Desktop certified hardware search page at <http://www.ubuntu.com/certification/desktop> and search for your computer product. Ubuntu is available at no cost from <http://www.ubuntu.com>.

Using the HP driver disc

Ubuntu does not require registration to obtain software package updates. Updates can be obtained from various repositories on the web using a variety of tools built into the OS. An Internet connection and proxy may be all that are required.

The HP-provided Linux driver disc for Ubuntu relies on the same mechanisms in order to satisfy dependencies during installation. So the same Internet access is needed, as well as capability to elevate from the current user session to administrator privileges.

In some cases, HP-tested proprietary graphics drivers may be the only “payload” delivered by the driver disc.

1. Install the operating system from your own installation media.
Ubuntu is available at no cost from <http://www.ubuntu.com>.
2. Restart the computer.
3. Insert your HP driver disc. The driver installation software automatically starts.
4. When prompted for the administrator password, type the password in the field.
5. Follow the on-screen instructions to install the drivers appropriate to your hardware configuration.

Proprietary graphics drivers

Most HP computers can be ordered with graphics cards that have been through extensive verification by HP. For a list of supported cards, see *Linux Hardware Matrix for HP Workstations* at http://www.hp.com/support/linux_hardware_matrix.



NOTE: Not all graphics cards are supported on every computer. Limitations generally occur for cards that consume large amounts of power in lower-power computers.

Third-party proprietary graphics drivers are supported by HP. The list of graphics vendors is available with the SLED 11 and Ubuntu preloads and from HP support. Go to www.hp.com/support and enter your product name or serial number or select **Find your product**, and then follow the on-screen instructions.

These proprietary drivers are not a standard part of the RHEL, SLED, or Ubuntu distributions because they are not open source. Driver revisions more recent than those at the HP support website are supported directly by the vendor.

6 Updating the computer

HP is constantly working to improve your total computer experience. To ensure that the computer leverages the latest enhancements, HP recommends that you install the latest BIOS, driver, and software updates on a regular basis.

Updating the computer after first boot

After successfully booting the computer for the first time, follow these guidelines to be sure that the computer is up to date:

- Be sure that you have the latest system BIOS version loaded. See [Updating the BIOS on page 19](#).
- Be sure that you have the latest drivers for your system. See [Upgrading device drivers on page 20](#).
- Become familiar with your available HP resources. See [Online support on page 23](#).
- Consider a subscription to Driver Alerts at <https://h41369.www4.hp.com/alerts-signup.php>.

Updating the BIOS

For optimum performance, determine the BIOS version on the computer, and upgrade it if necessary.

Determining the current BIOS version

1. Press **Esc** during startup (boot).
2. Press **F10** to enter Computer Setup (F10).
3. Select **Main**, and then select **System Information**. Note the Computer System BIOS version.

 **NOTE:** For procedures for upgrading the BIOS as well as the Computer Setup (F10) BIOS Menu settings, see the Maintenance and Service Guide at <http://www.hp.com/support>. Enter your product name or serial number or select **Find your product**, and then follow the on-screen instructions.

Upgrading BIOS

To find and download the latest available BIOS version, which includes the latest enhancements:

1. Go to <http://www.hp.com/support> and select your product.
2. Select **Software and Drivers** and follow the instructions to locate the latest BIOS version available for the computer.
3. Compare the BIOS version on your computer to the BIOS versions on the website (see [Determining the current BIOS version on page 19](#)). If the BIOS version on the website is the same as the version on your system, no further action is required.
4. If the BIOS version on the website is a version later than the one on your system, download the appropriate version for the computer. Follow the instructions in the release notes to complete the installation.

Upgrading device drivers

If you install a peripheral device (such as a printer, display adapter, or network adapter), confirm that you have the latest device drivers loaded. If you purchased your device through HP, go to the HP website to download the latest drivers for your device. These drivers have been tested to ensure the best compatibility between your device and your HP computer.

If you did not purchase your device from HP, HP recommends that you go to the HP website first to see if your device and its drivers have been tested for HP computer compatibility. If no driver is available, go to the device manufacturer's website to download the latest drivers.

To upgrade device drivers:

1. Go to <http://www.hp.com/support> and select your product.
2. Follow the instructions to find the latest drivers available for the computer.

If a required driver is not found, see the website of the manufacturer of the peripheral device.

7 Maintenance, diagnostics, and minor troubleshooting

Turning off the computer

To properly turn off the computer, shut down the operating system software.

⚠ CAUTION: HP does not recommend holding down the power button to shut off the system. Doing so can cause loss of user data and may damage the storage device. If the system becomes unstable and no other alternative is available, please give the system sufficient time to wake up completely after you reboot the computer. This may take several minutes, especially on larger-capacity or solid-state devices.

▲ Click the **Start** icon, click the **Power** icon, and then select **Shut down**.

If you encounter issues

To diagnose and resolve issues, HP recommends a sequential troubleshooting approach:

- Visual inspection
- Blink or beep codes
- Basic troubleshooting, including HP PC Hardware Diagnostics
- HP support
- System restore and recovery

These troubleshooting strategies are explained in the following sections.

For more information

You can find more troubleshooting information in the comprehensive *Maintenance and Service Guide* (English only) available at <http://www.hp.com/support>.

Visual inspection

If you encounter a problem with the computer, monitor, or software, the following general suggestions might help you isolate and focus on the problem before taking further action.

At startup

- Verify that the computer is plugged into a functional AC outlet.
- Remove all optical discs and USB flash drives before starting the computer.
- Verify that the computer is on and the power light is on.
- If you have installed an operating system other than the factory-installed operating system, confirm that it is supported on your system by going to <http://www.hp.com/go/quickspecs>.

- Verify that the display panel is lit.
- If you have an optional external monitor:
 - Verify that the monitor is plugged into a functional AC outlet.
 - Verify that the monitor is on and the green monitor light is on.
 - If the monitor is dim, turn up the brightness and contrast controls.

During operation

- Beeps and blinking lights on the computer are error codes that can help you diagnose problems. For more information about interpreting these codes, see the *Diagnostic LED and audible (beep) codes* section in the *Maintenance and Service Guide* for your computer.
- Press and hold any key. If the system beeps, your keyboard is operating correctly.
- Check all cables for loose or incorrect connections.
- Wake the computer by pressing the power button or any key on the keyboard. If the system remains in standby, shut down the system by pressing and holding the power button for at least four seconds. Then press the power button again to restart the system.

If the system does not shut down, unplug the power cord, wait a few seconds, and then plug it in again. If the system does not restart, press the power button.

- Be sure that all required device drivers have been installed. For example, if you have connected a printer, you must install a printer driver.
- If you are working on a network, use another cable to plug your computer into the network connection. If you still cannot connect, there might be a problem with the network plug.
- If you recently added new hardware, remove the hardware to see whether the computer functions properly.
- If you recently installed new software, uninstall the software to see whether the computer functions properly.
- If the display panel on an all-in-one computer is blank, open the computer and be sure that both ends of the cable between the system board and the display panel are connected. If you are using a graphics card, verify that the card is properly installed.
- Upgrade the BIOS. A new release of the BIOS might have been released that supports new features or fixes your problem.
- For more detailed information, see the troubleshooting chapter in the *Maintenance and Service Guide* at <http://www.hp.com/support>.

Customer Self Repair

Under the Customer Self Repair program, you can order a replacement part and install the part without on-site HP technical assistance. Customer Self Repair might be required for some components. For more information, go to <http://www.hp.com/go/selfrepair> and select your product.



NOTE: Some components are not eligible for Customer Self Repair and must be returned to HP for service. Call support for further instructions before attempting to remove or repair these components.

Blink or beep codes: interpreting POST diagnostic LEDs and audible codes

If the power LED on the computer is flashing or if you hear beeps, see the *Maintenance and Service Guide* (English only) for interpretation and recommended action.

Basic troubleshooting

 **WARNING!** When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before you touch them.

If you are having problems with the computer, try the appropriate solutions as described in the previous sections and summarized below to try to isolate the exact problem before calling for technical support.

- If the screen is blank, plug the monitor into a different video port on the computer if one is available. Or, replace the monitor with a monitor that you know is functioning properly.
- If you are working on a network:
 - Use a different network cable to connect your computer to the network.
 - Connect a different computer with a different cable to the network.

If your problem is not resolved, the network jack on your computer or the network wall jack might be faulty.

- If you recently added new hardware, remove the hardware.
- If you recently installed new software, uninstall the software.
- If the computer will turn on but will not boot into the operating system, run the preboot diagnostics utility, HP PC Hardware Diagnostics. See [Using HP PC Hardware Diagnostics on page 25](#).

HP Support

Online support

Online support resources include web-based troubleshooting tools, technical knowledge databases, driver and patch downloads, online communities, and product change notification services.

The following websites are also available to you:

- <http://www.hp.com>—Provides useful product information.
- <http://www.hp.com/support>—Provides the latest online documentation and worldwide technical support.
- <http://support.hp.com>—Provides technical support information for computers.
- <http://support.hp.com>—Provides access to software and drivers for computers.

Customer support for computers

1. Go to <http://support.hp.com>.
2. Search for your product.
3. Select **Troubleshooting**.
4. Select the problem that you are troubleshooting.

Advisories and Bulletins and Notices

To find advisories and bulletins and notices:

1. Go to <http://support.hp.com>.
2. Select your product.
3. Select **Advisories** or **Bulletins and Notices**.
4. Select an item for viewing.

Product Change Notifications

Product Change Notifications (PCNs) are proactive notifications for product changes occurring within a 30- to 60-day window of the effective date of the change in the manufacturing process. PCNs give you advance notice of changes to your product, such as an updated BIOS version that you might decide to download before the product change is required. To view a list of PCNs, go to the **Bulletins and Notices** page for your product.

Calling support

At times you might encounter an issue that requires support. Before you call support:

- Have the computer readily accessible.
- Write down the computer serial number, product number, model name, and model number and have them in front of you. This information is provided on labels. This information might be on the bottom of the computer, on the rear panel of the computer, or under the service door.
- Note any applicable error messages.
- Note any add-on options.
- Note the operating system.
- Note any third-party hardware or software.
- Note the details of any blinking lights on the front of the computer (tower and desktop configurations) or on the side of the computer (all-in-one configurations).
- Note the applications you were using when you encountered the problem.



NOTE: When calling in for service or support, you might be asked for the product number (example: PS988AV) of the computer. If the computer has a product number, it is generally located next to the 10- or 12-digit serial number of the computer.



NOTE: The serial number and product number labels can be found on the rear panel of the computer.

For a support phone number, go to <http://www.hp.com/support>, select your region, and then, under **Customer Support**, select **Contact Support**.

Locating warranty information

To locate warranty information, go to <http://www.hp.com/support>. HP Care Pack Services offer upgraded service levels to extend and expand a standard product warranty.



NOTE: For sales information and warranty upgrades (HP Care Packs), call your local authorized service provider or dealer.

8 Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows

HP PC Hardware Diagnostics Windows is a Windows-based utility that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs within the Windows operating system in order to diagnose hardware failures.

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see [Downloading HP PC Hardware Diagnostics Windows on page 25](#).

After HP PC Hardware Diagnostics Windows is installed, follow these steps to access it from HP Help and Support.

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:
 - a. Select the **Start** button, and then select **HP Help and Support**.
 - b. Right-click **HP PC Hardware Diagnostics Windows**, select **More**, and then select **Run as administrator**.
2. When the tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.



NOTE: If you need to stop a diagnostic test at any time, select **Cancel**.

3. When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in correcting the problem, contact support, and then provide the Failure ID code.

Downloading HP PC Hardware Diagnostics Windows

- The HP PC Hardware Diagnostics Windows download instructions are provided in English only.
- You must use a Windows computer to download this tool because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics Windows version

To download HP PC Hardware Diagnostics Windows, follow these steps:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select the installation location:
To run the tool on your computer, download it to the computer desktop.
– or –
To run the tool from a USB flash drive, download it to a USB flash drive.
3. Select **Run**.

Downloading HP Hardware Diagnostics Windows by product name or number (select products only)

 **NOTE:** For some products, it may be necessary to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics Windows by product name or number (select products only), follow these steps:

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**, and then enter the product name or number.
3. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select the installation location:
To run the tool on your computer, download it to the computer desktop.
– or –
To run the tool from a USB flash drive, download it to a USB flash drive.
4. Select **Run**.

Installing HP PC Hardware Diagnostics Windows

- ▲ To install HP PC Hardware Diagnostics Windows, navigate to the folder on your computer or the USB flash drive where the .exe file was downloaded, double-click the .exe file, and then follow the on-screen instructions.

Using HP PC Hardware Diagnostics UEFI

HP PC Hardware Diagnostics UEFI (Unified Extensible Firmware Interface) allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

If your PC will not boot into Windows, you can use HP PC Hardware Diagnostics UEFI to diagnose hardware issues.

When HP PC Hardware Diagnostics UEFI detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in correcting the problem, contact support, and provide the Failure ID code.

 **NOTE:** To start diagnostics on a convertible computer, your computer must be in notebook mode, and you must use the attached keyboard.

 **NOTE:** If you need to stop a diagnostic test, press *esc*.

Starting HP PC Hardware Diagnostics UEFI

To start HP PC Hardware Diagnostics UEFI, follow these steps:

1. Turn on or restart the computer, and quickly press *esc*.
2. Press *f2*.

The BIOS searches three places for the diagnostic tools, in the following order:

- a. Connected USB flash drive



NOTE: To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see [Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive on page 27](#).

- b. Hard drive
 - c. BIOS
3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive can be useful in the following situations:

- HP PC Hardware Diagnostics UEFI is not included in the preinstall image.
- HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.
- The hard drive is damaged.



NOTE: The HP PC Hardware Diagnostics UEFI download instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics (UEFI) version

To download the latest HP PC Hardware Diagnostics (UEFI) version to a USB flash drive:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. Select **Download HP Diagnostics UEFI**, and then select **Run**.

Downloading HP PC Hardware Diagnostics (UEFI) by product name or number (select products only)



NOTE: For some products, it may be necessary to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics (UEFI) by product name or number (select products only) to a USB flash drive:

1. Go to <http://www.hp.com/support>.
2. Enter the product name or number, select your computer, and then select your operating system.
3. In the **Diagnostics** section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.

Using HP Remote PC Hardware Diagnostics UEFI settings (select products only)

HP Remote PC Hardware Diagnostics UEFI is a firmware (BIOS) feature that downloads HP PC Hardware Diagnostics UEFI to your computer. It can then execute the diagnostics on your computer, and it may upload results to a preconfigured server. For more information about HP Remote PC Hardware Diagnostics UEFI, go to <http://www.hp.com/go/techcenter/pcdiags>, and then select **Find out more** under **Remote Diagnostics**.

Downloading HP Remote PC Hardware Diagnostics UEFI

 **NOTE:** HP Remote PC Hardware Diagnostics UEFI is also available as a Softpaq that can be downloaded to a server.

Downloading the latest HP Remote PC Hardware Diagnostics UEFI version

To download the latest HP Remote PC Hardware Diagnostics UEFI version, follow these steps:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. In the **Remote Diagnostics** section, select **Remote Diagnostics**, and then select **Run**.

Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number

 **NOTE:** For some products, it may be necessary to download the software by using the product name or number.

To download HP Remote PC Hardware Diagnostics UEFI by product name or number, follow these steps:

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**, enter the product name or number, select your computer, and then select your operating system.
3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

Customizing HP Remote PC Hardware Diagnostics UEFI settings

Using the HP Remote PC Hardware Diagnostics setting in Computer Setup (BIOS), you can perform the following customizations:

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.
- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a hard drive or USB flash drive) to run remote diagnostics.
- Set a location for storing the test results. You can also set the user name and password settings used for uploads.
- Display status information about the diagnostics run previously.

To customize HP Remote PC Hardware Diagnostics UEFI settings, follow these steps:

1. Turn on or restart the computer, and when the HP logo appears, press **f10** to enter Computer Setup.
2. Select **Advanced**, and then select **Settings**.
3. Make your customization selections.
4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

9 Routine care

General cleaning safety precautions

- Never use solvents or flammable solutions to clean the computer.
- Never immerse any component in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
- Always unplug the computer before cleaning the keyboard, mouse, or air vents.
- Always disconnect the keyboard before cleaning it.
- Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the chassis

- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the computer.
- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping the computer with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is required because the alcohol evaporates quickly and does not leave a residue.
- After cleaning, always wipe the computer with a clean, lint-free cloth.
- Occasionally, clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

Cleaning the keyboard

 **CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- If the keyboard has an on/off switch, turn it off.
- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the computer.
- Visible debris underneath or between the keys can be removed by vacuuming or shaking.
- Canned, pressurized air can be used to clean debris from under the keys. Use caution because too much air pressure can dislodge lubricants applied under the wide keys.
- To remove a key, use a specially designed key remover to prevent damage to the keys. This tool is available from many electronics supply outlets.

 **CAUTION:** Never remove a wide key (like the space bar key) from the keyboard. If these keys are improperly removed or installed, the keyboard might not function properly.

- Clean under a key with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Allow the parts to air dry before reassembly.
- Use tweezers to remove any fibers or dirt in confined areas.

Cleaning the monitor

- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the monitor.
- To clean the monitor, wipe the monitor screen with a towelette designed for cleaning monitors or a clean cloth moistened with water.

 **CAUTION:** Do not use sprays or aerosols directly on the screen—the liquid might seep into the housing and damage a component.

Never use solvents or flammable liquids on the monitor because display or housing damage may result.

Cleaning the mouse

1. Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the mouse.
2. If the mouse has an on/off switch, turn it off.
3. Wipe the body of the mouse with a damp cloth.
4. Clean the following components as directed:
 - Laser or LED—Use a cotton swab dampened with cleaning solution to gently brush out any dust around the laser or LED, and then wipe again with a dry swab. Do not wipe the laser or LED directly with the swab.
 - Scroll wheel—Spray canned, pressurized air into the gap between the scroll wheel and the click buttons. Do not blow air directly on one spot for very long or condensation can form.
 - Roller ball—Remove and clean the roller ball, remove any debris from the ball socket, wipe out the socket with a dry cloth, and reassemble the mouse.

10 Accessibility

Accessibility

HP is working to weave diversity, inclusion and work/life into the fabric of our company, so it is reflected in everything we do. Here are some examples of how we are putting differences to work to create an inclusive environment focused on connecting people to the power of technology throughout the world.

Finding the technology tools you need

Technology can unleash your human potential. Assistive technology removes barriers and helps you create independence at home, at work, and in the community. Assistive technology helps increase, maintain, and improve the functional capabilities of electronic and information technology. For more information, see [Finding the best assistive technology on page 32](#).

Our commitment

HP is committed to providing products and services that are accessible for people with disabilities. This commitment supports our company's diversity objectives and helps us ensure that the benefits of technology are available to all.

Our accessibility goal is to design, produce, and market products and services that can be effectively used by everyone, including people with disabilities, either on a stand-alone basis or with appropriate assistive devices.

To achieve our goal, this Accessibility Policy establishes seven key objectives to guide our actions as a company. All HP managers and employees are expected to support these objectives and their implementation in accordance with their roles and responsibilities:

- Raise the level of awareness of accessibility issues within our company, and provide our employees with the training they need to design, produce, market, and deliver accessible products and services.
- Develop accessibility guidelines for products and services, and hold product development groups accountable for implementing these guidelines where competitively, technically, and economically feasible.
- Involve people with disabilities in the development of accessibility guidelines, and in the design and testing of products and services.
- Document accessibility features and make information about our products and services publicly available in an accessible form.
- Establish relationships with leading assistive technology and solution providers.
- Support internal and external research and development that will improve assistive technology relevant to our products and services.
- Support and contribute to industry standards and guidelines for accessibility.

International Association of Accessibility Professionals (IAAP)

IAAP is a not-for-profit association focused on advancing the accessibility profession through networking, education, and certification. The objective is to help accessibility professionals develop and advance their careers and to better enable organizations to integrate accessibility into their products and infrastructure.

HP is a founding member, and we joined to participate with other organizations to advance the field of accessibility. This commitment supports our company's accessibility goal of designing, producing, and marketing products and services that can be effectively used by people with disabilities.

IAAP will make our profession strong by globally connecting individuals, students, and organizations to learn from one another. If you are interested in learning more, go to <http://www.accessibilityassociation.org> to join the online community, sign up for newsletters, and learn about membership options.

Finding the best assistive technology

Everyone, including people with disabilities or age-related limitations, should be able to communicate, express themselves, and connect with the world using technology. HP is committed to increasing accessibility awareness within HP and with our customers and partners. Whether it's large fonts that are easy on the eyes, voice recognition that lets you give your hands a rest, or any other assistive technology to help with your specific situation—a variety of assistive technologies make HP products easier to use. How do you choose?

Assessing your needs

Technology can unleash your potential. Assistive technology removes barriers and helps you create independence at home, at work, and in the community. Assistive technology (AT) helps increase, maintain, and improve the functional capabilities of electronic and information technology.

You may choose from many AT products. Your AT assessment should allow you to evaluate several products, answer your questions, and facilitate your selection of the best solution for your situation. You will find that professionals qualified to do AT assessments come from many fields, including those licensed or certified in physical therapy, occupational therapy, speech/language pathology, and other areas of expertise. Others, while not certified or licensed, may also provide evaluation information. You will want to ask about the individual's experience, expertise, and fees to determine if they are appropriate for your needs.

Accessibility for HP products

The following links provide information on accessibility features and assistive technology, if applicable, included in various HP products. These resources will help you select the specific assistive technology features and product(s) most appropriate for your situation.

- [HP Elite x3—Accessibility Options \(Windows 10 Mobile\)](#)
- [HP PCs—Windows 7 Accessibility Options](#)
- [HP PCs—Windows 8 Accessibility Options](#)
- [HP PC's—Windows 10 Accessibility Options](#)
- [HP Slate 7 Tablets—Enabling Accessibility Features on Your HP Tablet \(Android 4.1/Jelly Bean\)](#)
- [HP SlateBook PCs—Enabling Accessibility Features \(Android 4.3, 4.2/Jelly Bean\)](#)
- [HP Chromebook PCs—Enabling Accessibility Features on Your HP Chromebook or Chromebox \(Chrome OS\)](#)
- [HP Shopping—peripherals for HP products](#)

If you need additional support with the accessibility features on your HP product, see [Contacting support on page 37](#).

Additional links to external partners and suppliers that may provide additional assistance:

- [Microsoft Accessibility information \(Windows 7, Windows 8, Windows 10, Microsoft Office\)](#)
- [Google Products accessibility information \(Android, Chrome, Google Apps\)](#)

- [Assistive Technologies sorted by impairment type](#)
- [Assistive Technologies sorted by product type](#)
- [Assistive Technology vendors with product descriptions](#)
- [Assistive Technology Industry Association \(ATIA\)](#)

Standards and legislation

Standards

Section 508 of the Federal Acquisition Regulation (FAR) standards was created by the US Access Board to address access to information and communication technology (ICT) for people with physical, sensory, or cognitive disabilities. The standards contain technical criteria specific to various types of technologies, as well as performance-based requirements which focus on functional capabilities of covered products. Specific criteria cover software applications and operating systems, web-based information and applications, computers, telecommunications products, video and multi-media, and self-contained closed products.

Mandate 376 – EN 301 549

The EN 301 549 standard was created by the European Union within Mandate 376 as the basis for an online toolkit for public procurement of ICT products. The standard specifies the functional accessibility requirements applicable to ICT products and services, together with a description of the test procedures and evaluation methodology for each accessibility requirement.

Web Content Accessibility Guidelines (WCAG)

Web Content Accessibility Guidelines (WCAG) from the W3C's Web Accessibility Initiative (WAI) helps web designers and developers create sites that better meet the needs of people with disabilities or age-related limitations. WCAG advances accessibility across the full range of web content (text, images, audio, and video) and web applications. WCAG can be precisely tested, is easy to understand and use, and allows web developers flexibility for innovation. WCAG 2.0 has also been approved as [ISO/IEC 40500:2012](#).

WCAG specifically addresses barriers to accessing the web experienced by people with visual, auditory, physical, cognitive, and neurological disabilities, and by older web users with accessibility needs. WCAG 2.0 provides characteristics of accessible content:

- **Perceivable** (for instance, by addressing text alternatives for images, captions for audio, adaptability of presentation, and color contrast)
- **Operable** (by addressing keyboard access, color contrast, timing of input, seizure avoidance, and navigability)
- **Understandable** (by addressing readability, predictability, and input assistance)
- **Robust** (for instance, by addressing compatibility with assistive technologies)

Legislation and regulations

Accessibility of IT and information has become an area of increasing legislative importance. This section provides links to information on key legislation, regulations, and standards.

- [United States](#)
- [Canada](#)
- [Europe](#)

- [United Kingdom](#)
- [Australia](#)
- [Worldwide](#)

United States

Section 508 of the Rehabilitation Act specifies that agencies must identify which standards apply to the procurement of ICT, perform market research to determine the availability of accessible products and services, and document the results of their market research. The following resources provide assistance in meeting Section 508 requirements:

- www.section508.gov
- [Buy Accessible](#)

The U.S. Access Board is currently updating the Section 508 standards. This effort will address new technologies and other areas where the standards need to be modified. For more information, go to [Section 508 Refresh](#).

Section 255 of the Telecommunications Act requires telecommunications products and services to be accessible to people with disabilities. FCC rules cover all hardware and software telephone network equipment and telecommunications equipment used in the home or office. Such equipment includes telephones, wireless handsets, fax machines, answering machines, and pagers. FCC rules also cover basic and special telecommunications services, including regular telephone calls, call waiting, speed dialing, call forwarding, computer-provided directory assistance, call monitoring, caller identification, call tracing, and repeat dialing, as well as voice mail and interactive voice response systems that provide callers with menus of choices. For more information, go to [Federal Communication Commission Section 255 information](#).

21st Century Communications and Video Accessibility Act (CVAA)

The CVAA updates federal communications law to increase the access of persons with disabilities to modern communications, updating accessibility laws enacted in the 1980s and 1990s to include new digital, broadband, and mobile innovations. Regulations are enforced by the FCC and documented as 47 CFR Part 14 and Part 79.

- [FCC Guide on the CVAA](#)

Other U.S. legislation and initiatives

- [Americans with Disabilities Act \(ADA\), Telecommunications Act, the Rehabilitation Act and others](#)

Canada

The Accessibility for Ontarians with Disabilities Act was established to develop and implement accessibility standards to make goods, services, and facilities accessible to Ontarians with disabilities and to provide for the involvement of persons with disabilities in the development of the accessibility standards. The first standard of the AODA is the customer service standard; however, standards for transportation, employment, and information and communication are also being developed. The AODA applies to the Government of Ontario, the Legislative Assembly, every designated public sector organization, and to every other person or organization that provides goods, services, or facilities to the public or other third parties and that has at least one employee in Ontario; and accessibility measures must be implemented on or before January 1, 2025. For more information, go to [Accessibility for Ontarians with Disability Act \(AODA\)](#).

Europe

EU Mandate 376 ETSI Technical Report ETSI DTR 102 612: "Human Factors (HF); European accessibility requirements for public procurement of products and services in the ICT domain (European Commission Mandate M 376, Phase 1)" has been released.

Background: The three European Standardization Organizations have set up two parallel project teams to carry out the work specified in the European Commission "Mandate 376 to CEN, CENELEC and ETSI, in Support of Accessibility Requirements for Public Procurement of Products and Services in the ICT Domain."

ETSI TC Human Factors Specialist Task Force 333 has developed ETSI DTR 102 612. Further details about the work performed by STF333 (e.g., Terms of Reference, specification of the detailed work tasks, time plan for the work, previous drafts, listing of comments received and means to contact the task force) can be found at the [Special Task Force 333](#).

The parts relating to the assessment of suitable testing and conformity schemes were carried out by a parallel project, detailed in CEN BT/WG185/PT. For further information, go to the CEN project team website. The two projects are closely coordinated.

- [CEN project team](#)
- [European Commission mandate for e-accessibility \(PDF 46KB\)](#)
- [Commission takes low profile on e-accessibility](#)

United Kingdom

The Disability Discrimination Act of 1995 (DDA) was enacted to ensure that websites are accessible to blind and disabled users in the United Kingdom.

- [W3C UK Policies](#)

Australia

The Australian government has announced their plan to implement [Web Content Accessibility Guidelines 2.0](#).

All Australian government websites will require Level A compliance by 2012, and Double A by 2015. The new standard replaces WCAG 1.0, which was introduced as a mandated requirement for agencies in 2000.

Worldwide

- [JTC1 Special Working Group on Accessibility \(SWG-A\)](#)
- [G3ict: The Global Initiative for Inclusive ICT](#)
- [Italian accessibility legislation](#)
- [W3C Web Accessibility Initiative \(WAI\)](#)

Useful accessibility resources and links

The following organizations may be good resources for information about disabilities and age-related limitations.



NOTE: This is not an exhaustive list. These organizations are provided for informational purposes only. HP assumes no responsibility for information or contacts you may encounter on the Internet. Listing on this page does not imply endorsement by HP.

Organizations

- American Association of People with Disabilities (AAPD)
- The Association of Assistive Technology Act Programs (ATAP)
- Hearing Loss Association of America (HLAA)
- Information Technology Technical Assistance and Training Center (ITTATC)
- Lighthouse International
- National Association of the Deaf
- National Federation of the Blind
- Rehabilitation Engineering & Assistive Technology Society of North America (RESNA)
- Telecommunications for the Deaf and Hard of Hearing, Inc. (TDI)
- W3C Web Accessibility Initiative (WAI)

Educational institutions

- California State University, Northridge, Center on Disabilities (CSUN)
- University of Wisconsin - Madison, Trace Center
- University of Minnesota computer accommodations program

Other disability resources

- ADA (Americans with Disabilities Act) Technical Assistance Program
- Business & Disability network
- EnableMart
- European Disability Forum
- Job Accommodation Network
- Microsoft Enable
- U.S. Department of Justice - A Guide to disability rights Laws

HP links

[Our contact webform](#)

[HP comfort and safety guide](#)

[HP public sector sales](#)

Contacting support



NOTE: Support is in English only.

- Customers who are deaf or hard of hearing that have questions about technical support or accessibility of HP products:
 - Use TRS/VRS/WebCapTel to call (877) 656-7058 Monday through Friday, 6 a.m. to 9 p.m. Mountain Time.
- Customers with other disabilities or age-related limitations who have questions about technical support or accessibility of HP products, choose one of the following options:
 - Call (888) 259-5707 Monday through Friday, 6 a.m. to 9 p.m. Mountain Time.
 - Complete the [Contact form for people with disabilities or age-related limitations](#).

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