جامعة البلقاء التطبيقية
AL-BALQA APPLIED UNIVERSITY

Computer Skills 1

مـــهـــارات الحـــاســـوب 1

Networking
CISCO Academy

**Based on the online material provided by
Cisco Networking Academy**

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0.0.1.1.Welcome

Welcome to the Information Technology (IT) Essentials course. The goal of this course is to introduce you to computer hardware and software, as well as operating systems, networking concepts, mobile devices, IT security, and troubleshooting.

0.0.1.4: Mind Wide Open

Our goal at the Cisco Networking Academy is to enrich you, the student, by expanding what you know and can do. It is important to realize, however, that the instructional materials and the instructor can only facilitate the process. You must make the commitment yourself to learn new skills.

0.0.2: The IT Industry

0.0.2.1: Education and Certifications

In this course, you will gain the specialized technical skills needed to install, maintain, secure, and repair computers. Earning an industry-standard certification provides confidence and increases your opportunities in IT. This course will prepare you to take the CompTIA A+ Certification exams.

This course is only an introduction into the world of IT.

0.0.2.2: CompTIA A+ Certification

The Computing Technology Industry Association(CompTIA) developed the A+ certification program. A CompTIA A+ certification signifies that a candidate is a qualified PC hardware and software technician. CompTIA certifications are known throughout the IT community as one of the best ways to enter the IT field and build a solid career.

Figure below shows the reasons to get CompTIA certified. Figure 2 shows how you can learn, certify, and work toward your IT goals.

0.0.2.4: Cisco Networking Academy and NetAcad Advantage

When you participate in the Networking Academy, you are joining a global community linked by common goals and technologies. Schools, colleges, universities, and other entities in over 160 countries participate in the program.

NetAcad Advantage is designed especially for Cisco Networking Academy students and alumni. It can help you prepare to enter the IT industry or advance your career. The NetAcad Advantage site includes tips on how to create a resume, apply for a job, and make a great first impression at job interviews. As a Cisco Networking Academy student or alumnus, you have exclusive access to an online job searchthat has thousands of IT job opportunities around the world with Cisco and Cisco partners. Check out NetAcad Advantage for all this and more!

Chapter 1: Introduction to the Personal Computer

1.0: Introduction

1.0.1: Welcome

1.0.1.1: Introduction to the Personal Computer System

A computer is an electronic machine that performs calculations based on a set of instructions.

A computer system consists of hardware and software components.

Hardware is the physical equipment. It includes the case, keyboard, monitor, cables, storage drives, speakers, and printers.

Software includes the operating system and programs. The operating system manages computer operations such as identifying, accessing, and processing information. Programs or applications perform different functions. Programs vary widely depending on the type of information that is accessed or generated. For example, instructions for balancing a check book are different from instructions for simulating a virtual reality world on the Internet.

1.1: Personal Computer Systems

1.1.1: Cases and Power Supplies

1.1.1.1: Cases

The case of a desktop computer houses the internal components such as the power supply, motherboard, central processing unit (CPU), memory, disk drives, and assorted adapter cards.

Cases are typically made of plastic, steel, or aluminum and provide the framework to support, protect, and cool the internal components.

A device form factor refers to its physical design and look. Desktop computers are available in a variety of form factors including:

- **Horizontal case** – These were popular with early computer systems. The computer case was horizontally oriented on the user desk with the monitor positioned on top. This form factor is no longer popular.

- **Full-Size Tower** –This is a computer case which is oriented vertically. It is typically located on the floor under, or beside, a desk or table. It provides room for expansion to accommodate additional components such as disk drives, adapter cards, and more. It requires an external keyboard, mouse, and monitor.

- **Compact Tower** –This is a smaller version of the full-size tower and is commonly found in the corporate environment. It may also be called a mini-tower or small form factor (SFF) model. It can be located on the user desk or on the floor. It provides limited room for expansion. It requires an external keyboard, mouse, and monitor.

- **All-in-one** - All of the computer system components are integrated into the display. They often include touch-screen input and built-in microphone and speakers. Depending on the model, all-in-one computers offer little to no expansion capabilities. It requires an external keyboard, mouse, and power supply.

Computer components tend to generate a lot of heat; therefore, computer cases contain fans that move air through the case. As the air passes warm components, it absorbs heat and then exits the case. This process keeps the computer components from overheating. Cases are also designed to protect against static electricity damage. The computer's internal components are grounded via attachment to the case.

1.1.1.2: Power Supplies

Electricity from wall outlets is provided in alternating current (AC). However, all components inside a computer require direct current (DC) power. To obtain DC power, computers use a power supply, to convert AC power into a lower voltage DC power.

A computer can tolerate slight fluctuations in power, but a

significant deviation can cause the power supply to fail.

1.1.2: Internal PC Components

1.1.2.1: Motherboards

The motherboard, also known as the system board or the main board, is the backbone of the computer.

Motherboard Printed Circuit Board →
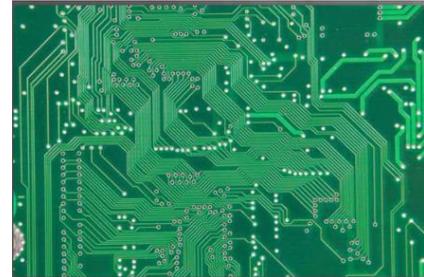
A motherboard is a circuit that contains buses that interconnect electronic components. These components may be soldered directly to the motherboard, or added using sockets, expansion slots, and ports.

Motherboard Connections →
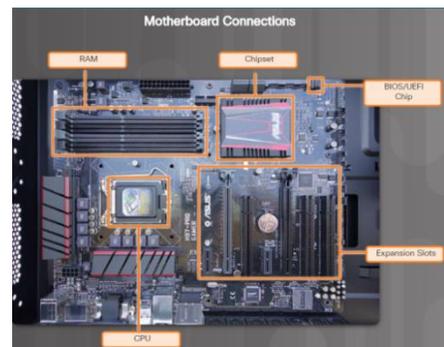
These are some connections on the motherboard where computer components can be added.

- **Central Processing Unit (CPU)** - This is considered the brain of the computer.

- **Random Access Memory (RAM)** - This is a temporary location to store data and applications.

- **Expansion slots** - These provide locations to connect additional components.

- **Chipset** - This consists circuits that control how system hardware interacts with the CPU and motherboard. It also establishes how much memory can be added to a motherboard.

- **Basic input/output system (BIOS)** chip - BIOS is used to help boot the computer and manage the flow of data between the hard drive, video card, keyboard, mouse, and more.

A motherboard with some additional components installed. →

1.1.2.2: CPU Architectures

While the motherboard is considered to be the backbone of the computer, the central processing unit (CPU) is considered to be the brain. In terms of computing power, the CPU, sometimes referred to as the processor, is the most important element of a computer system. Most calculations take place in the CPU.

A program is a sequence of stored instructions. A CPU executes these instructions by following a specific instruction set.
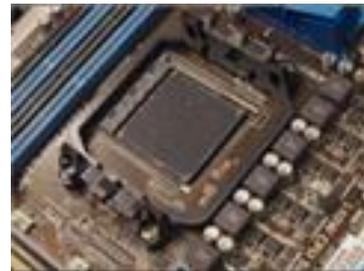
While the CPU is executing one step of the program, the remaining instructions and the data are stored nearby in a special, high-speed memory, called cache.
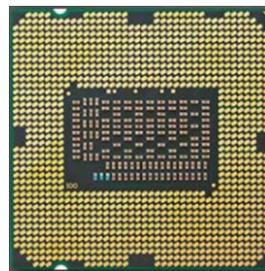
1.1.2.3: Enhancing CPU Operation

Various CPU manufacturers complement their CPU with performance enhancing features.

The power of a CPU is measured by the speed and the amount of data that it can process. The speed of a CPU is rated in cycles per second, such as millions of cycles per second, called megahertz (MHz), or billions of cycles per second, called gigahertz (GHz).

The amount of data that a CPU can process at one time is measured in bits. A bit is the smallest unit of data in a computer.

1.1.2.4: Cooling Systems

The flow of current between electronic components generates heat. Computer components perform better when kept cool. If the heat is not removed, the computer may run more slowly. If too much heat builds up, the computer could crash, or components can be damaged. Therefore, it is imperative that computers be kept cool. Case fan→

Note: Computers are kept cool using active and passive cooling solutions. Active solutions require power while passive solutions do not.

Increasing the air flow in the computer case allows more heat to be removed. An active cooling solution uses fans inside of a computer case to blow out hot air. For increased air flow, some cases have multiple fans with cool air being brought in while another fan is blowing out hot air.

Other components are also susceptible to heat damage and are often equipped with fans. Many video adapter cards have their own processor called a graphics-processing unit (GPU) which generates excessive heat. Some video adapter cards come equipped with one or more fans.

Graphics card cooling system →

1.1.2.5: ROM

A computer has different types of memory chips. However, all memory chips store data in the form of bytes. A byte is a grouping of digital information and represents information such as letters, numbers, and symbols. Specifically, a byte is a block of eight bits stored as either 0 or 1 in the memory chip.

An essential computer chip is the read-only memory (ROM) chip. ROM chips are located on the motherboard and other circuit boards and contain instructions that can be directly accessed by a CPU. The instructions stored in ROM include basic operation instructions such as booting the computer and loading the operating system.

ROM

Read-only memory chips. Information is written to a ROM chip when it is manufactured. A ROM chip cannot be erased or re-written and is obsolete.

It is important to note that ROM chips retain their contents even when the computer is powered down. The contents cannot be erased or changed easily.

1.1.2.6: RAM

RAM is the temporary working storage for data and programs that are being accessed by the CPU.

Unlike ROM, RAM is volatile memory, which means that the contents are erased every time the computer is powered off.

Note: ROM is nonvolatile which means that the contents are not erased when the computer is powered off.

Adding more RAM in a computer enhances the system performance. For instance, more RAM increases the memory capacity of the computer to hold and process programs and files. With less RAM, a computer must swap data between RAM and the much slower hard drive. The maximum amount of RAM that can be installed is limited by the motherboard.

1.1.2.9: Storage Devices

Storage drives, as shown in Figure 1, read information from or write information to magnetic, or optical storage media. The drive can be used to store data permanently or to retrieve information from a media disk.

The following are common types of storage drives:

- **Hard Disk Drive (HDD)** - HDDs are the traditional magnetic disk devices that have been used for years. Their storage capacity ranges from gigabytes (GBs) to terabytes (TBs).

- **Optical Drive** - An optical drive uses lasers to read data on optical media. There are three types of optical drives including compact disc (CD), digital versatile disc (DVD), and Blu-ray disc (BD). CD, DVD, and BD media can be pre-recorded (read only), recordable (write once), or rewriteable (read and write multiple times).

- **Tape Drive** - Magnetic tapes are most often used for archiving data. Common tape storage capacities vary between a few GBs to TBs.

- **External Flash Drive** - An external flash drive, such as a USB thumb drive that connects to a USB port. uses the nonvolatile memory chips. It does not require power to maintain its data. Their storage capacity ranges from MBs to GBs.

1.1.3: External Ports and Cables

1.1.3.1: Video Ports and Cables

A video port connects a monitor to a computer using a cable. Video ports and monitor cables transfer analog signals, digital signals, or both. Computers are digital devices that create digital signals. The digital signals are sent to the graphics card where they are transmitted through a cable to a digital display. Digital signals can also be converted to analog signals by the graphics card and transferred to an analog display. Lower image quality is a result of converting a digital signal to an

analog signal. A display and a monitor cable that support digital signals will provide higher image quality than those supporting only analog signals.

There are several video ports and connector types, such as:

- **HDMI** - High Definition Multimedia Interface was developed specifically for high-definition televisions. However, its digital features also make it a good candidate for computers.

Mini HDMI →

- **VGA connector** – (Figure 5) This is a connector for analog video. It has 3 rows and 15 pins. It is also sometimes referred to as the DE-15 or HD-15 connector.

VGA →

- **RCA connectors** – (Figure 6) RCA connectors have a central plug with a ring around it and are used to carry audio or video. RCA connectors are often found in groups of three, where a yellow connector carries video and a pair of red and white connectors carries left and right audio channels.

RCA →

1.1.3.2: Other Ports and Cables

Input/output (I/O) ports on a computer connect peripheral devices, such as printers, scanners, and portable drives. In addition to the ports and interfaces previously discussed, a computer may also have other ports:

- **PS/2 Ports** – (Figure 1) A PS/2 port connects a keyboard or a mouse to a computer. The connectors for the keyboard and mouse are often colored differently. If the ports are not color-coded, look for a small figure of a mouse or keyboard next to each port.

PS/2 Cable and connector →

- **Audio Ports** – Audio ports connect audio devices to the computer.

- **Ethernet Network port** – A network port connects devices to a network.
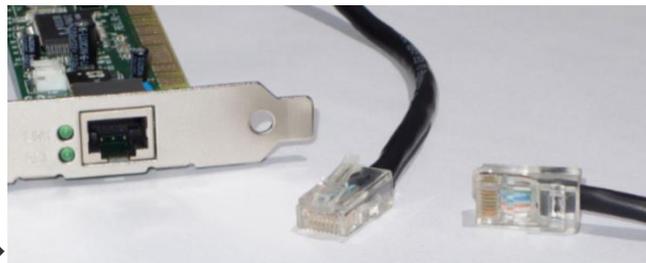
Network Cable and connector →

- **USB Ports and Cables** - The Universal Serial Bus (USB) is a standard interface that connects peripheral devices to a computer. USB devices are hot-swappable, which means that users can connect and disconnect the devices while the computer is powered on. USB connections can be found on computers, cameras, printers, scanners, storage devices, and many other electronic devices.

1.1.4: Input and Output Devices

1.1.4.1: Input Devices

An input device enters data or instructions into a computer.

The following are examples of input devices:

- **Mice and Keyboards** –These are the two most commonly used input devices. The keyboard is used to enter text while the mouse is used to navigate the graphical user interface (GUI). Laptops also have touchpads to provide built-in mouse features.

- **Touch Screens** –These input devices have touch or pressure sensitive screens. The computer receives instructions specific to the place on the screen that the user touches.

- **Joysticks and Gamepads** –These are input devices for playing games.

- **Digital Cameras and Digital Video Cameras**– These input devices capture images that can be stored, displayed, or printed.

- **Scanners** – (Figure 5) These devices digitize an image or document. The digitization of the image is stored as a file that can be displayed, or printed. A bar code reader is a type of scanner that reads Universal

Product Code (UPC) bar codes. It is widely used for pricing and inventory information.

- **Digitizers** –This device allows a designer or artist to create blueprints, images, or other artwork.

- **Biometric Identification Devices** –These input devices identify a user based on a unique physical feature such as their fingerprints or voice. Many laptops now have fingerprint readers to automate logging in to the device.

1.1.4.2: Output Devices

An output device presents information to the user from a computer.

Monitors and projectors are primary output devices for a computer.

Printers are output devices that create hard copies of computer files. All-in-one printers are designed to provide multiple services, such as printing, scanning, faxing, and copying.

Speakers and headphones are output devices for audio signals.

1.1.4.3: Monitor Characteristics

Monitor resolution refers to the level of image detail that can be reproduced. Higher resolution settings produce better image quality.

Several factors are involved in monitor resolution, such as:

- **Pixel** - Pixels are the tiny dots that comprise a screen. Each pixel consists of red, green, and blue (RGB).

- **Dot pitch** - Dot pitch is the distance between pixels on the screen. A lower dot pitch number produces a better image.

1.2.1: Select PC Components

Refer to the online material (Netacad.com).

1.4: Summary

This chapter introduced the components that comprise a personal computer system and how to consider upgrade components. Much of the content in this chapter will help you throughout this course.

- Information technology encompasses the use of computers, network hardware, and software to process, store, transmit, and retrieve information.

- A personal computer system consists of hardware components and software applications.

- The computer case and power supply must be chosen carefully to support the hardware inside the case and allow for the addition of components.

- The internal components of a computer are selected for specific features and functions. All internal components must be compatible with the motherboard.

- Use the correct type of ports and cables when connecting devices.

- Typical input devices include the keyboard, mouse, touch screen, and digital cameras.
- Typical output devices include monitors, printers, and speakers.

- Cases, power supplies, the CPU and cooling system, RAM, hard drives, and adapter cards, must be upgraded when devices fail or no longer meet customer needs.
- Specialized computers require hardware specific to their function. The type of hardware used in specialized computers is determined by how a customer works and what a customer wants to accomplish.

Chapter 6: Windows Configuration and Management

6.0: Introduction

6.0.1: Welcome

6.0.1.1: Windows Configuration and Management

In this chapter, you will learn how to navigate the Windows GUI. You will also learn how to use the Control Panel and other tools to keep Windows operating systems running smoothly.

6.1.1: Windows Desktop, Tools and Applications

6.1.1.1: Windows Desktop

After the OS has been installed, you can customize the computer desktop to suit individual needs. A computer desktop is a graphical representation of the workspace and is commonly called a graphical user interface, or GUI. The desktop has icons, toolbars, and menus to manipulate files. You can add or change images, sounds, and colors to provide a more personalized look and feel. Together, these customizable items make up a theme.

Windows 8 desktop environment→
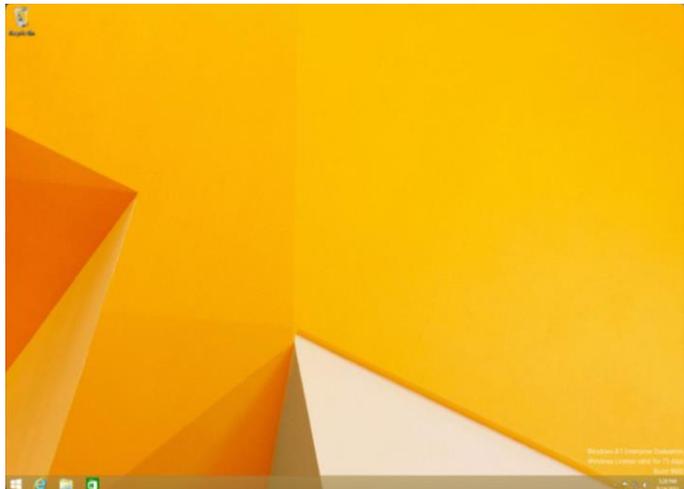
Windows 8 introduced a new desktop that uses tiles on the Start screen, as shown in figure beside.

Windows 8 app environment→
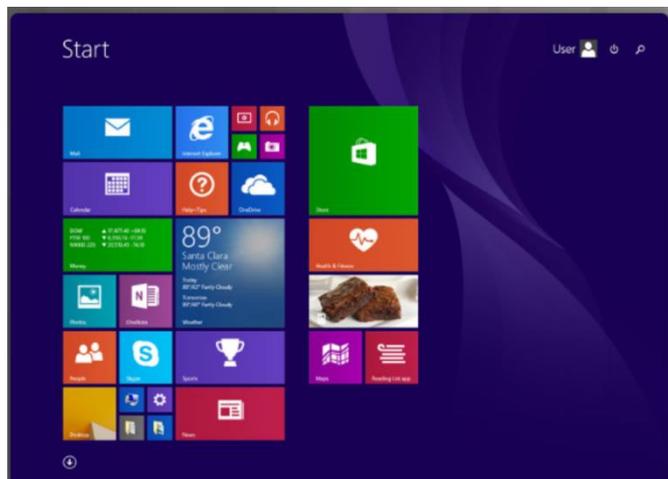
Chapter 6: Windows Configuration and Management

This environment is used on desktops and laptops and it is optimized for mobile devices. The Start screen displays a customizable array of tiles designed to access apps and other information, such as social media updates and calendar notifications. These tiles represent notifications, applications or desktop programs. The tiles that can display dynamic content are called live tiles. Another new GUI element is a vertical bar known as charms. Charms can be accessed by swiping in with your finger from the right edge of the screen, or by placing the mouse cursor in the upper-right corner of the screen.

Windows 7 and Vista have a default theme called Aero. Aero has translucent window borders, numerous animations, and icons that are thumbnail images of the contents of a file. Because of the advanced graphics required to support the theme.

Windows 8.1, 8.0, and 7 include the following desktop features:

- Shake - Minimize all windows that are not being used by clicking and holding the title bar of one window and shaking it with the mouse. Repeat the action to maximize all of the windows.
- Peek - View the desktop icons that are behind open windows by placing your cursor over the Show desktop button found at the right edge of the taskbar. This makes the open windows transparent. Click the button to minimize all windows.
- Snap - Resize a window by dragging it to one of the edges of the screen. Dragging the window to the left edge of the desktop fits the window to the left half of the screen. Dragging the window to the right edge of the desktop fits the window to the right half of the screen. Dragging the window to the top of the screen will maximize the window.

In Windows 7 and Vista, users can place Gadgets on the desktop. Gadgets are small applications, such as games, sticky notes, a calendar or a clock. You can snap or position gadgets to the sides and corners of the desktop, as well as align them to other gadgets.

Windows7 desktop with gadgets→.
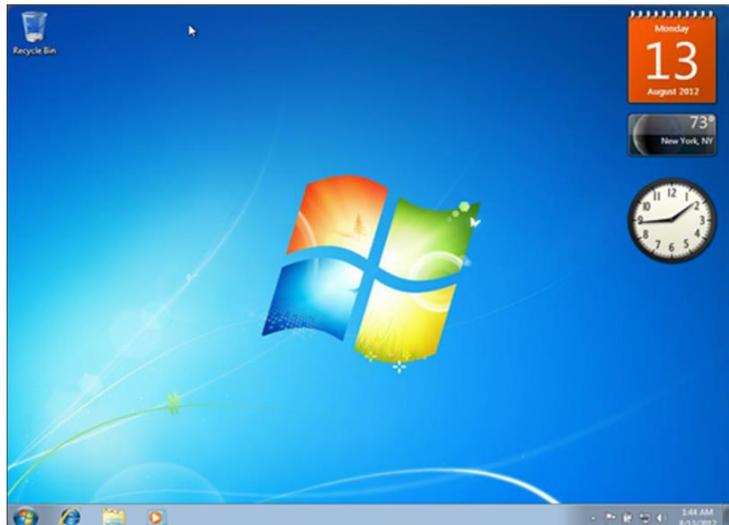
To add gadgets to the Windows 7 or Vista desktop, follow these steps:

Step 1. Right-click anywhere on the desktop and choose Gadgets.

Step 2. Drag and drop the gadget from the menu to the desktop, or double-click the gadget to add it to the desktop, or right-click the gadget and choose Add.

Step 3. To snap a gadget, drag it to the desired desktop location. The gadget aligns itself with the screen edges and other gadgets.

6.1.1.2: Desktop Properties

The Windows 8 Apps environment is highly customizable:

- To re-arrange the tiles, click and drag the tiles.

- To rename a tile group, right-click on any empty area of the screen and select Name groups.

- To add tiles to the main screen, right-click the desired Windows app after searching for it and select Pin to Start.

- To search for an app, click Search from the Charms bar. Alternatively, you can start typing the name of the app from the Windows Apps environment. Search will start automatically.

Windows 8 Apps environment and the Charms bar→
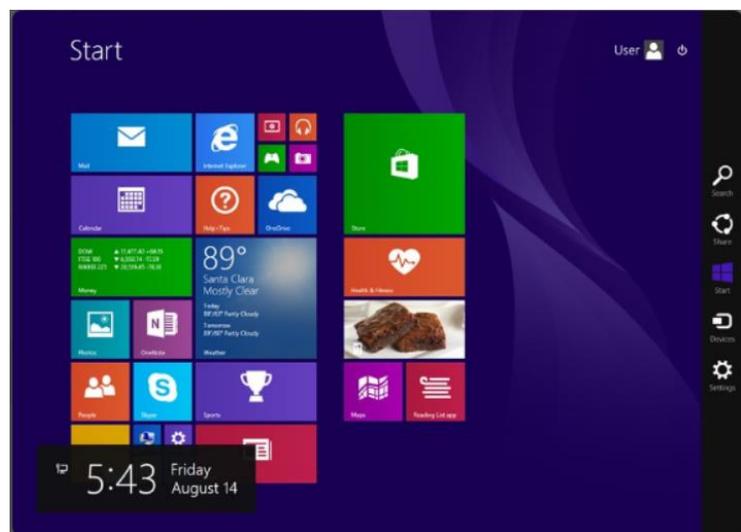
To customize the desktop, right-click anywhere on the desktop and choose Personalize.

Note: In Windows 8, click the Desktop tile to leave the Apps environment and show the desktop.

In the Personalization window, you can change the desktop appearance, display setting, and sound settings.

Windows 8 Personalization window→
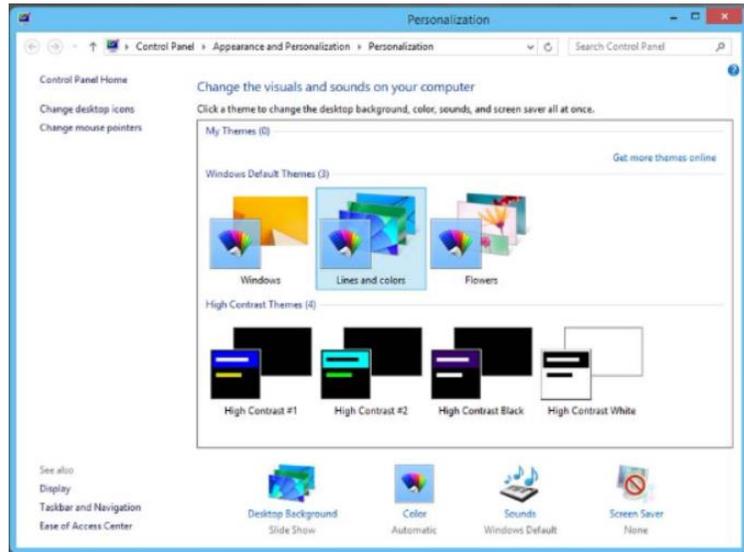
Windows 7 Personalization window→
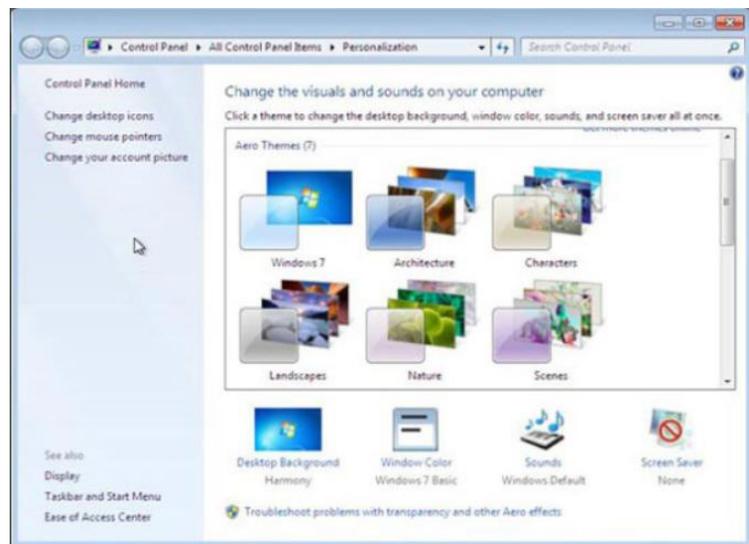
6.1.1.3: Start Menu

Start Menu

In Windows 8.0, with the introduction of Windows Apps environment, Microsoft chooses to remove the Start Button and Start Menu. The Start Menu was replaced by the Start Screen, the main screen where the tiles are located.

Chapter 6: Windows Configuration and Management

After many requests, Microsoft brought back the Start Button in Windows 8.1. The Start Screen still plays the role of the Start Menu but Windows 8.1 users now have a button to access the Start Screen. Other ways to access the Start Screen include pressing the Windows key on the keyboard or clicking the Start Button located on the Charms bar.

Windows 8.0 desktop
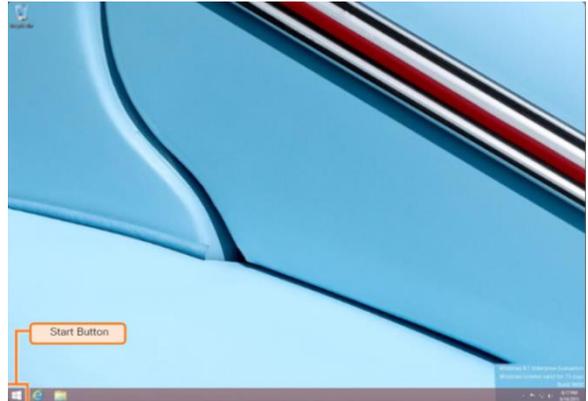
Windows 8.1 desktop

The Start Menu and Taskbar allow users to manage programs, search the computer, and manipulate running applications. To customize the Start Menu or the Taskbar, right-click it and choose Properties.

Windows 8.1 Limited Start Menu →
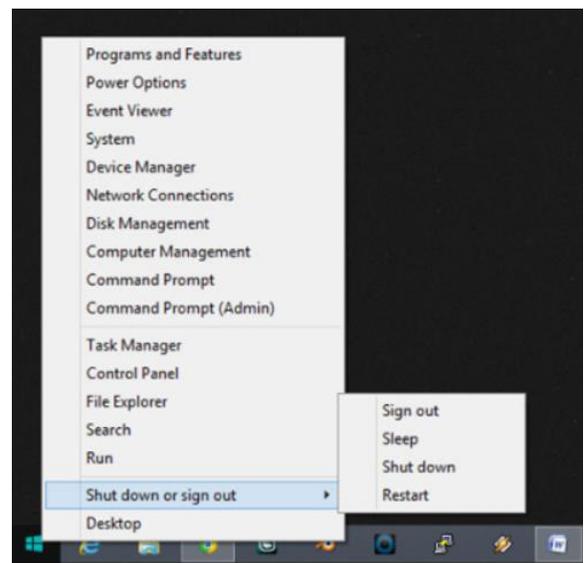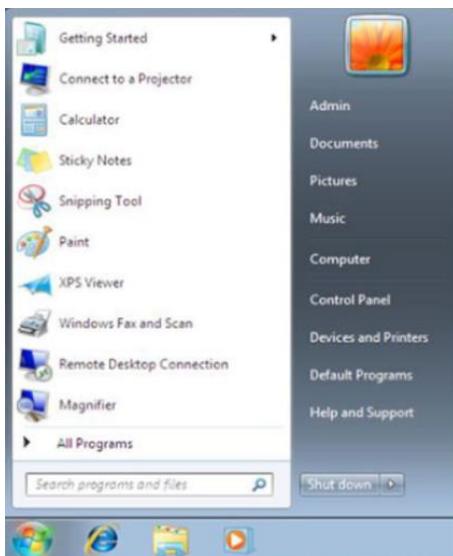
← Start Menu in Windows 7 and Vista

The Start Menu is accessed by clicking the Windows icon at the bottom-left of the desktop. The Start Menu, displays all the applications installed on the computer, a list of recently opened documents, and a list of other elements, such as

the search feature, help and support, and control panel.

To customize Start Menu settings in Windows 7 or Vista, use the following path:

Right-click an empty section of the taskbar and choose Properties > Start Menu > Customize.

Taskbar

In Windows 8 and 7, the following new features have been added to the taskbar to make navigating, organizing, and accessing windows and notifications easier:

- Jump list - To display a list of tasks that are unique to the application, right-click the application's icon in the taskbar.

- Pinned applications - To add an application to the taskbar for easy access, right-click the icon of an application and select Pin to taskbar.

- Thumbnail previews - To view a thumbnail image of a running program, hover the mouse over the program icon on the taskbar.

Windows 8.1 Taskbar and Navigation Properties→
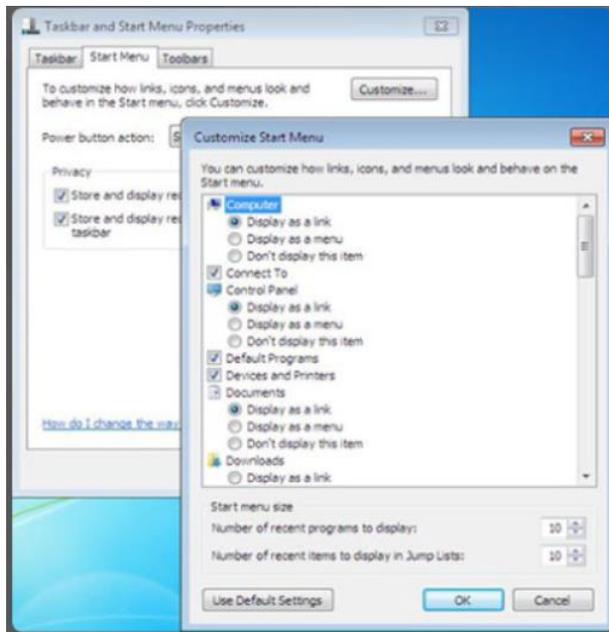
← Windows 7 Taskbar and Navigation Properties.

6.1.1.4: Task Manager

The Task Manager allows you to view all applications that are running and to close any application.

Windows 8 Task Manager→
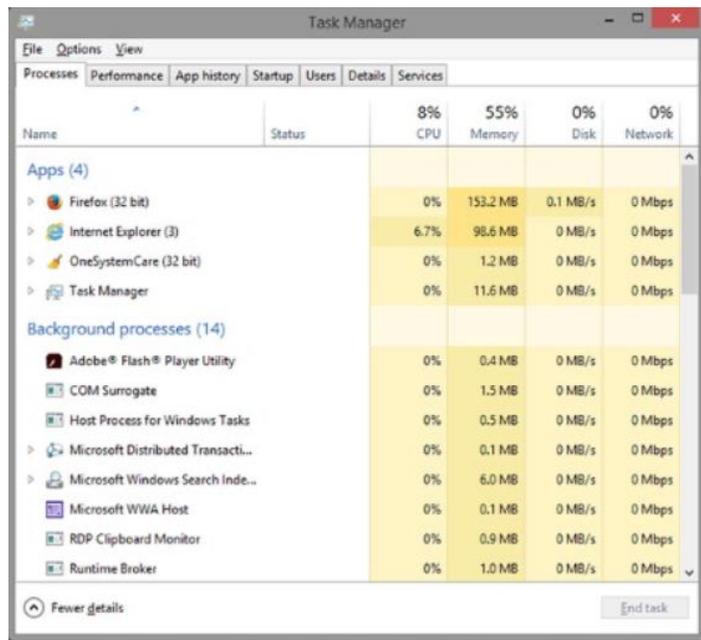
After clicking More details, the Windows 8 Task Manager has the following tabs:

- **Processes** - This tab shows a list of processes currently running on the computer. A process is a set of instructions started by the user, a program, or the OS. Running processes are categorized as apps, background processes, or Windows system processes.

- **Performance** - This tab contains system performance graphs. You can select any of the options, CPU, Memory, Disk, or Ethernet, to see a performance graph in the right column.

- **App History** - While the Processes tab shows live process information, this tab contains historical information, such as CPU time and network bandwidth. It is very useful when analyzing which apps consume the most resources.

- **Startup** - This tab shows what processes will be automatically started during Windows 8 startup.

- **Users** - This tab shows how much of the system resources each user is consuming.

- **Details** – This tab allows you to tweak the level of CPU priority for a given process.

- **Services** - This tab displays all services currently running on the system and allows for stopping, starting and restarting them.

The Windows 7 and Vista Task Manager, have the following tabs:

- **Applications** - This tab shows all running applications. From this tab you can create, switch to, or close an application that has stopped responding.
- **Processes** - This tab shows all running processes. From this tab, you can end processes or set process priorities.
- **Services** - This tab shows the available services, including their operational status.
- **Performance** - This tab shows the CPU and page file usage.
- **Networking** - This tab shows the usage of all network adapters.
- **Users** - This tab shows all users that are logged on the computer. From this tab, you can disconnect remote users or log off local users.
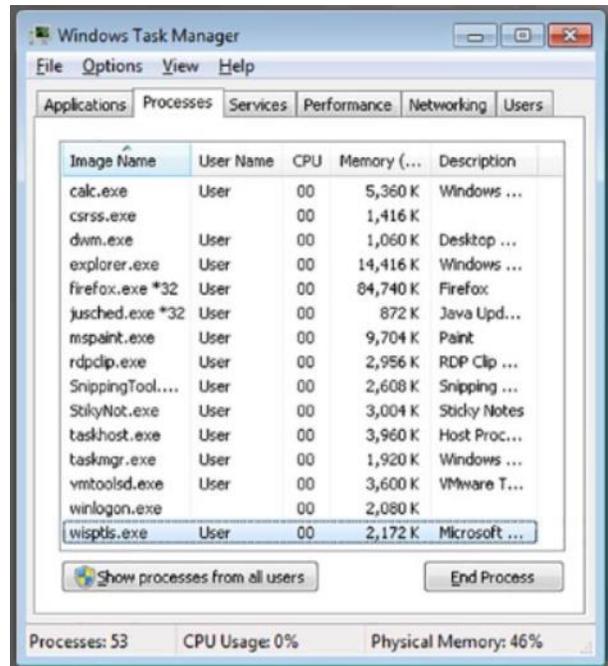
Windows 8 Task Manager→

To open the Task Manager, press **CTRL-ALT-DEL** and select Start Task Manager.

Alternatively, you can open the Task Manager by right-clicking the taskbar and selecting Task Manager in Windows 8 and Start Task Manager in Windows 7 and Vista.

Be careful when ending a process or changing the priority of processes. Ending a process causes the program to end immediately without saving any information. Ending a process might prevent the system from running correctly. Also, changing the priority of a process might adversely affect the performance of the computer.

6.1.1.6: Computer and Windows Explorer

File Explorer and Windows Explorer

File Explorer is a file management application in Window 8. It allows you to navigate the file system and manage the folders, subfolders, and applications on your storage media. File Explorer is launched automatically when a folder or drive is opened. In File Explorer, common tasks, such as copying and moving files, and creating new folders, can be done using the Ribbon. The tabs at the top of the window change as different types of items are selected in the File Explorer. the Ribbon for the Home tab is displayed. If the Ribbon is not displaying, click the Expand the Ribbon, represented by a down arrow, at the upper-right corner of the window.

Windows 8 Explorer Ribbon→

The Ribbon combines the functionality of the menu and former toolbar
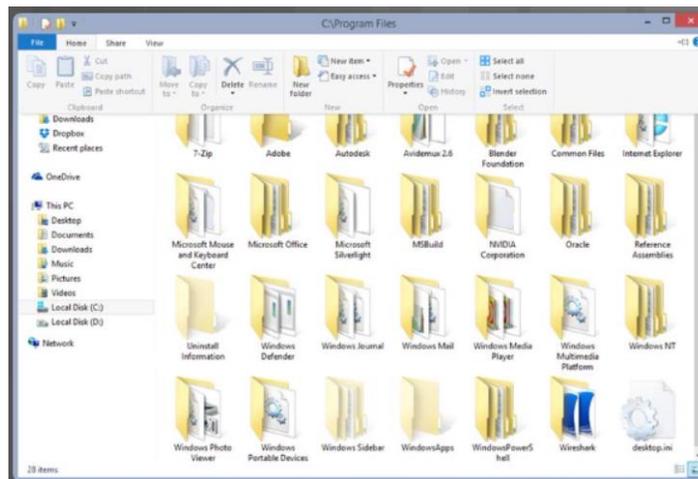
Windows Explorer is the name of the file management application in Windows 7 and earlier. Windows Explorer performs similar functions as File Explorer without the use of the Ribbon.

This PC and Computer

In Windows 8.1, the This PC feature allows you to access the various drives installed in the computer. In Windows 7 and Vista, this same feature is called Computer.

In Windows 8.1, the This PC feature can be accessed either through File Explorer or from the Start Screen. To open This PC via File Explorer, simply open File Explorer, and it should display This PC by default. To reach This PC via the Start

Screen, start typing This PC. Click This PC when it appears among the search results in the right side of the screen.
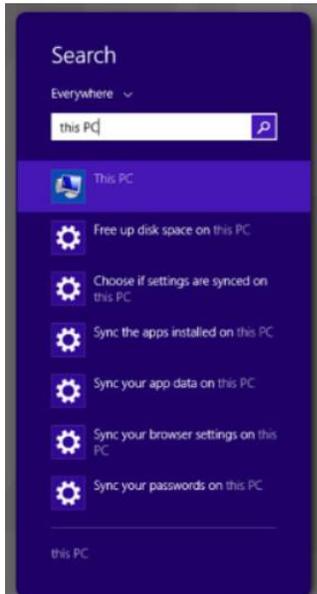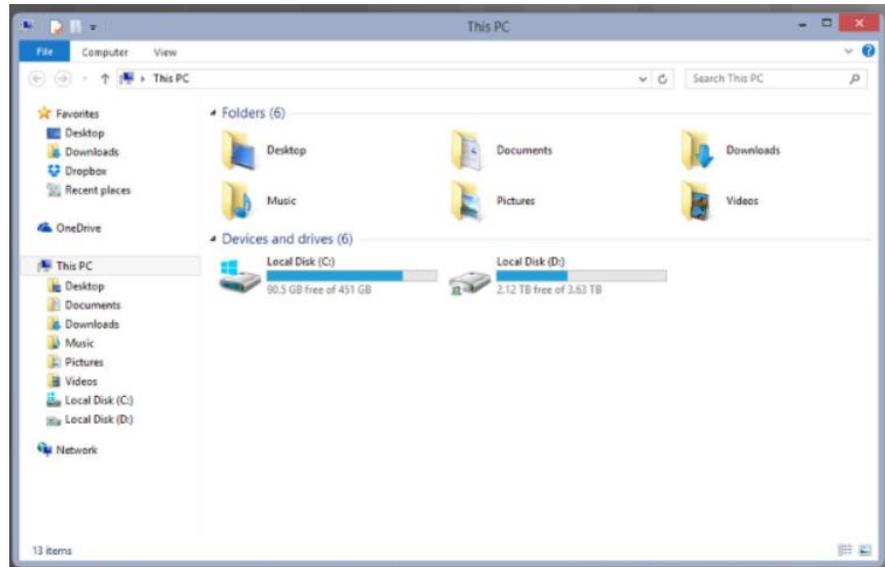
The search result   This PC

In Windows 8.0, 7, or Vista, click Start and select Computer.

Computer feature→
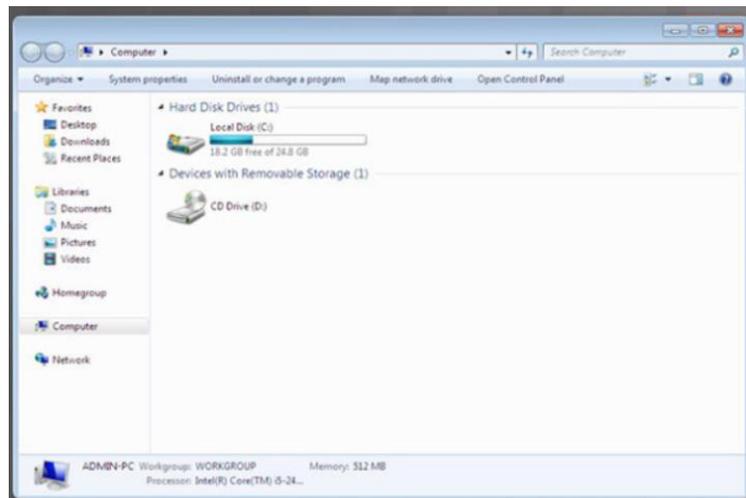
Opening Files

You can open files in the same manner as applications. When opening a file, Windows determines which application is associated with the file type. For example, if you open a document, Windows will open the file with the associated program. This may be Microsoft Word, WordPad, Notepad, or another document-editing program.

Run as Administrator

Modern operating systems use a number of methods to improve security. One of these methods is file permissions. Depending on the file permission, only users with enough permission can access the file. System files, other user files, or files with elevated permissions are examples of files that could deny a user access. To override this behavior and gain access to those files, you must open or execute them as the system administrator.

To open or execute a file using elevated permission, right-click the file and choose Run as Administrator. You will need to provide the password for the Administrator account.

6.1.1.7: Windows Libraries

Windows Libraries allow you to easily organize content from various storage devices on your computer and network locations, including removable media, without moving the files. A library presents content from different locations in the same folder. You can search a library, and you can filter the content using criteria such as filename, file type, or date modified.
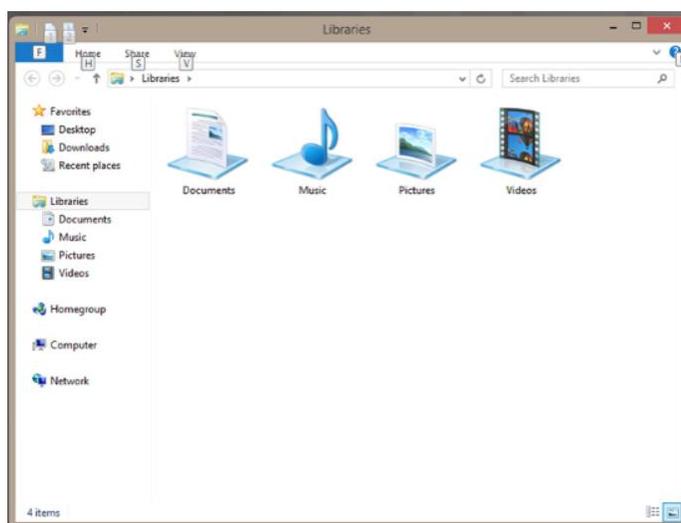
When Windows is installed, each user has four default libraries: Documents, Music, Pictures, and Videos.

To access a library, open Windows Explorer and click Libraries in the left column.

To add a file or folder to a library, right-click it, select Include in library, and choose the library to which you wish to add the item. The file or folder will be available when you open that library.

To create a new library, open a folder and select Libraries > New library.

To customize a library, right-click the library and click Properties. The Properties window allows you to add folders to the library by clicking Include a folder. You can also change the icon for the library and customize how items are arranged.

The Libraries feature in Windows 8.1 is hidden by default. To show a link to Libraries, follow these steps:

Step 1. Open File Explorer and expand the View tab.

Step 2. Go to Options > Folder Options on the right side of the ribbon and click Change folder and search options.

Step 3. Go to the General tab and check the Show Libraries checkbox at the bottom of the window. Click OK.

6.1.1.8: Install and Uninstall Applications

As a technician, you will be responsible for adding and removing software from your customers' computers. Most applications use an automatic installation process when the application disc is inserted in the optical drive. The user is required to click through the installation wizard and provide information when requested.

Installing an Application

Insert the CD or DVD into the optical drive, or open the downloaded program file. The program installer should start. If it does not start, run the setup or install file on the disc to begin installation, or download the program again.

After the application is installed, you can run the application from the Start Menu or the shortcut icon that the application installs on the desktop. Check the application to ensure that it is functioning properly. If there are problems, repair or uninstall the application. In addition to the process described above, Windows 8 provides access to the Windows Store.

Windows 8 Store App→
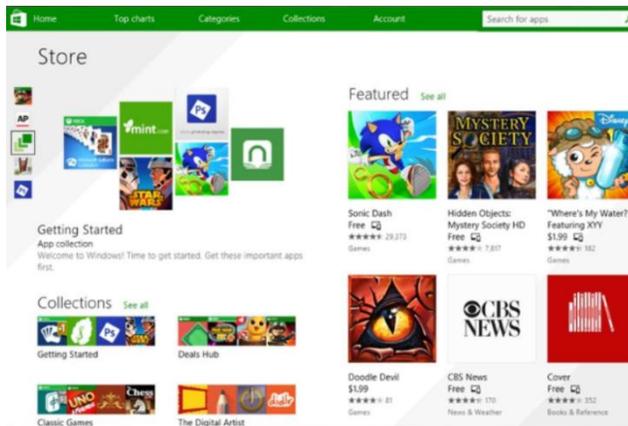
Chapter 6: Windows Configuration and Management

Windows Store allows a user to search and install apps on a Windows 8 computer (or other Windows 8 device). To open the Windows Store app:

From the Start Screen, type Store and click the Store icon when it appears in the search results.

Uninstalling or Changing a Program

If an application is uninstalled incorrectly, you might be leaving files on the hard drive and unnecessary settings in the registry, which depletes the hard drive space and system resources. Unnecessary files might also reduce the speed at which the registry is read. Microsoft recommends that you always use the Programs and Features utility when removing, changing, or repairing applications. The utility guides you through the software removal process and removes every file that was installed.
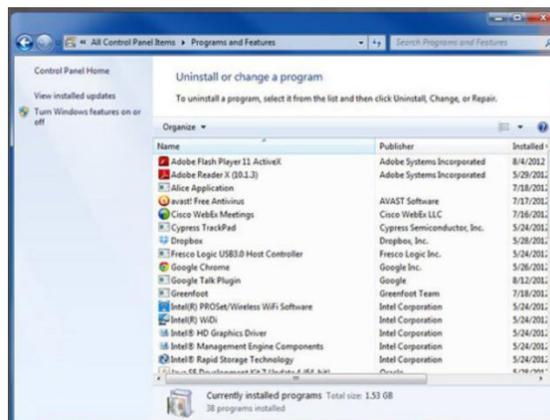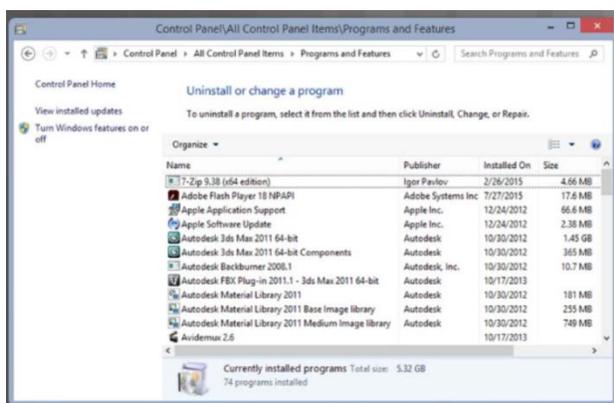
Programs and Features in Windows 8   Programs and Features in Windows 7

In some instances, you can install or uninstall optional features of a program using the Programs and Features utility. Not all programs offer this option.

To open the Programs and Features utility, use the following path:

Control Panel > Programs and Features

To uninstall or change a program:

Step 1. Click Control Panel > Programs and Features.

Step 2. Select a program, and then click Uninstall. To change a program, click Change or Repair. Administrator permission may be required. If you are

prompted for an administrator password or confirmation, type the password or provide confirmation.

6.1.2: Control Panel Utilities

6.1.2.1: Introduction to Control Panel Utilities

Windows centralizes the settings for many features that control the behavior and appearance of the computer. These settings are categorized in utilities, or small programs, found in the Control Panel.

←Windows 8 Control |Panel in category view

The names of various categories in the Control Panel differ slightly depending on the version of Windows installed. By default, icons are grouped into the following eight categories:

- **System and Security** - Configure system and security settings

- **Network and Internet** **- Configure network connection types**

- **Hardware and Sound** **- Configure devices connected to the computer** and settings for sound

- **Programs** **- Install, uninstall, change, and repair applications**

- **User Accounts and Family Safety** - **Create and remove user accounts** and set up parental controls

- **Appearance and Personalization** - Control the look and feel of the **Windows GUI**

- **Clock, Language, and Region** - Configure location and language

- **Ease of Access** - Configure Windows for vision, hearing, and mobility needs

You can change how the Control Panel is displayed. The selected view determines which utilities are immediately accessible in the Control Panel. The view options include:

- **Category** - Groups the Control Panel utilities into easy-to-navigate groups.
- **Large Icons** - Displays the utilities in alphabetical order using large icons.
- **Small icons** - Displays the utilities in alphabetical order using small icons.

Windows 8 Control Panel with small icon →
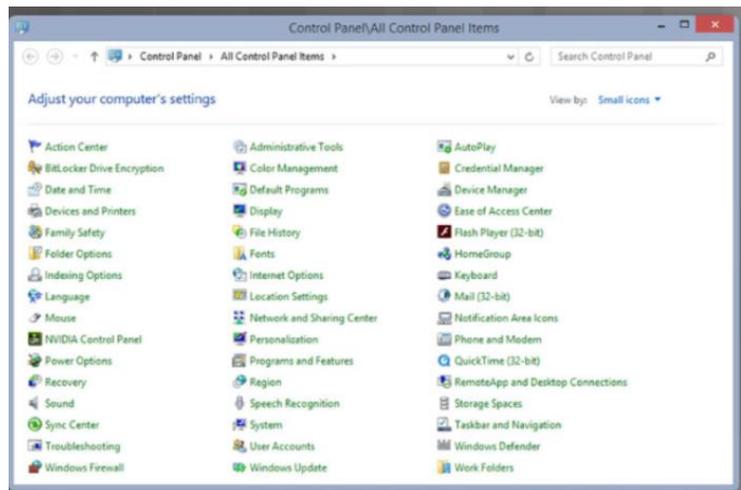
In Windows Vista, there are two view options:

- Control Panel Home – Groups the Control Panel utilities into easy-to-navigate groups.
- Classic View – Displays all of the Control Panel utilities individually.

6.1.2.2: User Accounts
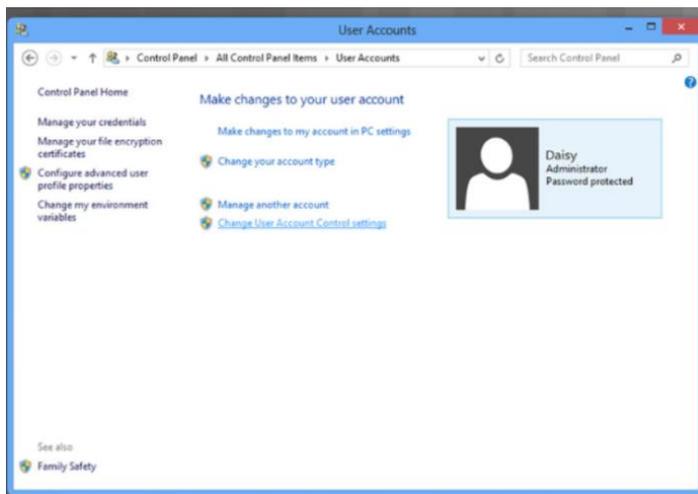
An administrative account is created when Windows is installed. To create a user account afterwards, open the User Accounts utility by using the following path:

Control Panel > User Accounts.

←Windows 8 User Accounts

The User Accounts utility provides options to help you manage passwords, change account pictures, change account names and types, and change User Account Control (UAC) settings.

Note: Some features of the User Accounts utility require administrative privileges and might not be accessible with a standard user account.

User Account Control Settings

The UAC monitors programs on a computer and warns users when an action might present a threat to the computer. In Windows 8 or 7, you can adjust the level of monitoring that the UAC performs. When Windows 8 or 7 is installed, the UAC for the primary account defaults to the setting Notify me only when programs try to make changes to my computer, as shown in Figure 2. You are not notified when you make changes to these settings.

To adjust the level of UAC monitoring, use the following path:

Control Panel > User Accounts > Change User Account Control settings

      User Account Control Setting→
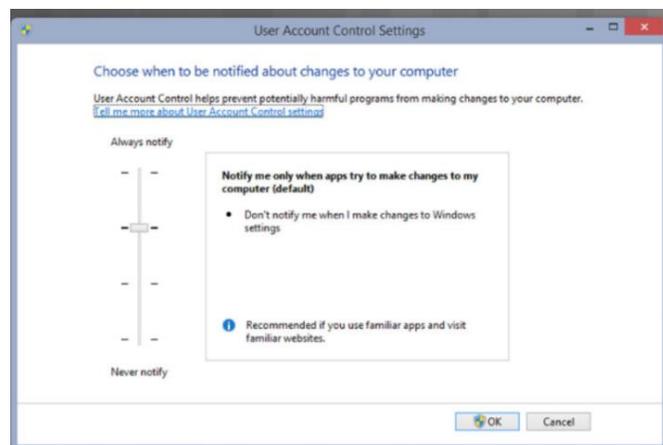
6.1.2.4: Internet Options

Internet Options, shown in the figure, has the following tabs:

- **General** - Configure basic Internet settings, such as selecting the Internet Explorer (IE) home page, viewing and deleting browsing history, adjusting search settings, and customizing the browser appearance.

- **Security** - Adjust the security settings for the Internet, local intranet, trusted sites, and restricted sites. Security levels for each zone can range from low (minimal security) to high (maximum security).

- **Privacy** - Configure privacy settings for the Internet zone, manage location services, and enable the Pop-up Blocker.

- **Content** - Access Parental Controls, control content viewed on the computer, adjust AutoComplete settings, and configure the feeds and web slices that can be viewed in IE. Web slices are specific content from websites that allow the users to subscribe and view the updated content, such as current temperature and stock quotes.

- **Connections** - Set up an Internet connection and adjust network settings.

- **Programs** - Choose the default web browser, enable browser add-ons, select the HTML editor for IE, and select programs used for Internet services. Hypertext Markup Language (HTML) is a system that tags text files to affect the appearance of web pages. An HTML editor is a computer program that can edit web pages.

- **Advanced** - Adjust advanced settings, and reset IE's settings to the default state.
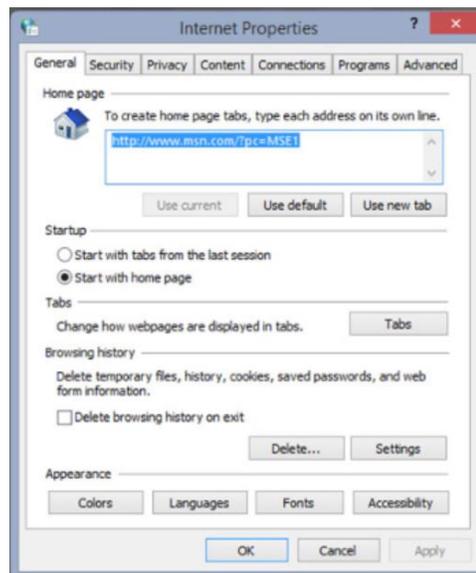
To access the Internet Options utility, use the following path:

Control Panel > Internet Options

6.1.2.6: Display Settings

You can change the appearance of the desktop by modifying the resolution and color quality with the Display Settings utility. If the screen resolution is not set properly, you might get unexpected display results from different video cards and monitors. You can also change more advanced display settings, such as the wallpaper, screensaver, power settings, and other options.
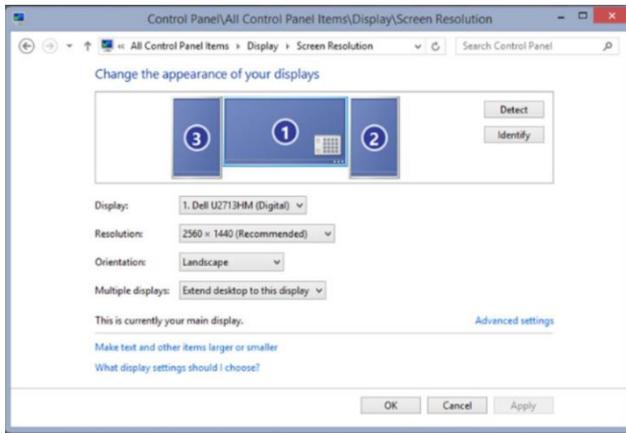
When using an LCD screen, set the resolution to native resolution. Native resolution sets the video output to the same number of pixels that the monitor has. If you do not use native resolution, the monitor does not produce the best picture.

To change the display settings in Windows 8 and 7, use the following path:

Control Panel > Display > Change display settings

You can adjust the following features in Windows 8 and 7:

- **Screen resolution** - Specifies the number of pixels. A higher number of pixels provide better resolution.

- **Orientation** - Determines whether the display appears in Landscape, Portrait, flipped Landscape, or flipped Portrait orientations.

- **Refresh rate** - Sets how often the image in the screen is redrawn. The refresh rate is in Hertz (Hz). The higher the refresh rate, the more steady the screen image.

- **Display colors** - Specifies the number of colors visible on the screen at one time. The more bits, the greater the number of colors. The 8-bit color palette contains 256 colors. The 16-bit color (High Color) palette contains 65,536 colors. The 24-bit color (True Color) palette contains 16 million colors. The 32-bit color palette contains 24-bit color and 8 bits for other data such as transparency.

6.1.2.7: Folder Options

Ensuring proper access to files requires managing the directory and folder settings.
To configure settings for folders, use the Folder Options utility.
Folder Options, has three tabs.
The General tab is used to adjust the following settings:

- Browse folders - Configures how a folder is displayed when it is opened.

- Click items as follows - Specifies the number of clicks required to open a file.

- Navigation pane - Determines whether all folders are displayed and whether a
  folder is automatically expanded when it is selected in the navigation pane.
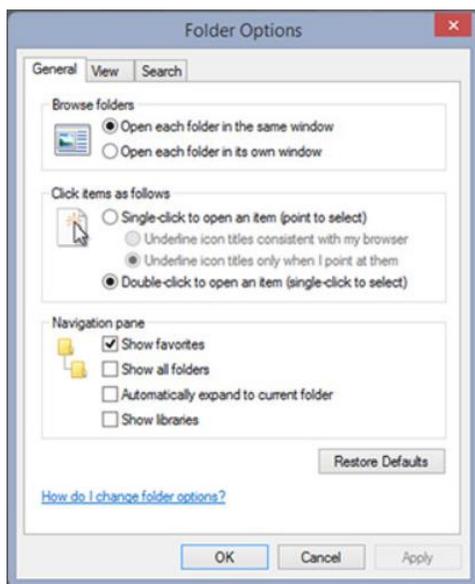
| Windows 8.1 Folder options | Windows 7 Folder options |
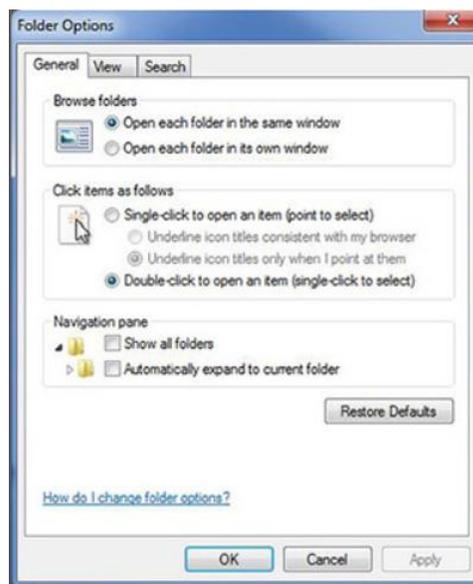
The View tab is used to adjust the following settings:

- Folder views - Applies the view settings for a folder being viewed to all
  folders of the same type.

- Advanced settings - Customizes the viewing experience.

The Search tab is used to adjust the following settings:

- What to search (Windows 7 and Vista only) - Configures search settings based on indexed and non-indexed locations to make files and folders easier to find.

- How to search - Determines which options to consider during a search.

- When searching non-indexed locations - Determines whether system directories and compressed files are included when searching non-indexed locations.

To access the Folder Options utility, use the following path:

Control Panel > Folder Options

6.1.2.10: Power Options

The Power Options utility in Windows allows you to change the power consumption of certain devices or the entire computer. Use Power Options to maximize performance or conserve energy by configuring a power plan. Power plans are a collection of hardware and system settings that manage the power usage of the computer.

Windows have preset power plans. These are the default settings and were created when Windows was installed. You can use the default settings or the customized plans that are based on specific work requirements.

Note: Power Options automatically detect some devices that are connected to the computer. Therefore, the Power Options windows will vary based on the hardware that is detected.
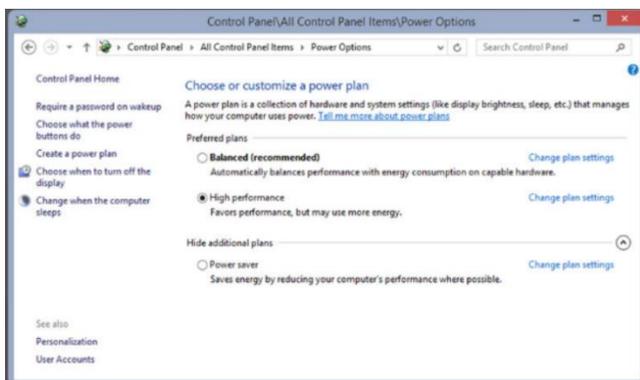
Power Options in Windows 8   Power Options in Windows 7
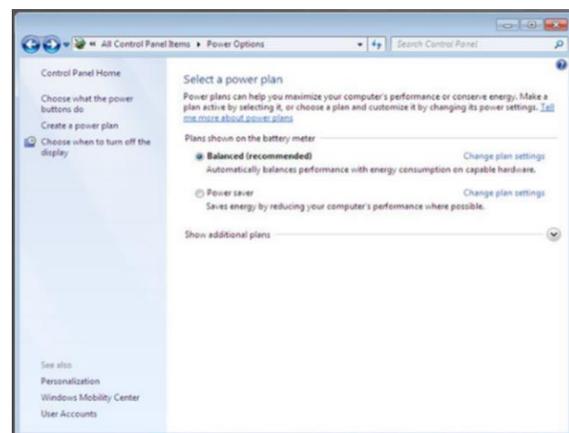
Chapter 6: Windows Configuration and Management

To access the Power Options, use the following path:

Control Panel > Power Options

You can choose from the following options:

- Require a password on wakeup

- Choose what the power buttons do

- Choose what closing the lid does (for laptops only)

- Create a power plan

- Choose when to turn off the display

- Change when the computer sleeps

Selecting Choose what the power buttons do, or Choose what closing the lid does, configures how a computer acts when power or sleep buttons are pressed, or the lid is closed. If users do not want to completely shut down a computer, the following options are available:

- Do nothing - The computer continues to run at full power.

- Sleep – Documents, applications, and the state of the operating system are saved in RAM. This allows the computer to power on quickly, but uses power to retain the information in RAM.

- Hibernate – Documents, applications, and the state of the operating system are saved to a temporary file on the hard drive. With this option, the computer takes a little longer to power on than the Sleep state, but does not use any power to retain the information on the hard drive.

- Shut Down - Shuts down the computer.

6.1.2.15: Region, Programs and Features

Region

Windows 8 allows you to change the format of numbers, currencies, dates, and time by using the Region tool. You can also change the primary language or install an additional language by using Language tool.
To access the Region tool in Windows 8, use the following path:
Control Panel > Region

Region tool in Windows 8 →
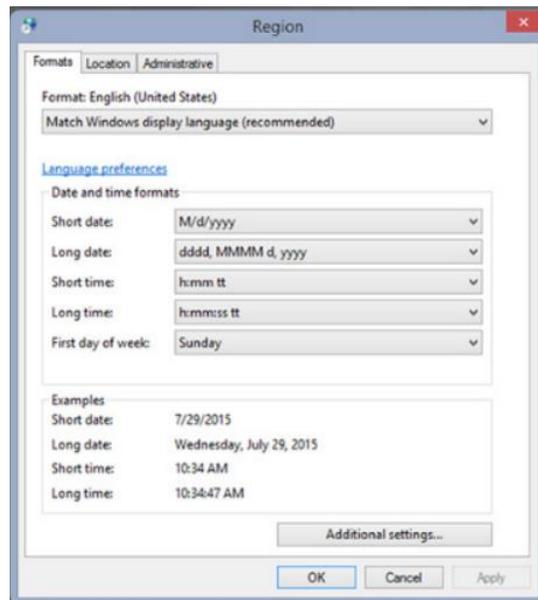
To access the Language tool in Windows 8, use the following path:
Control Panel > Language

Language tool in Windows 8→
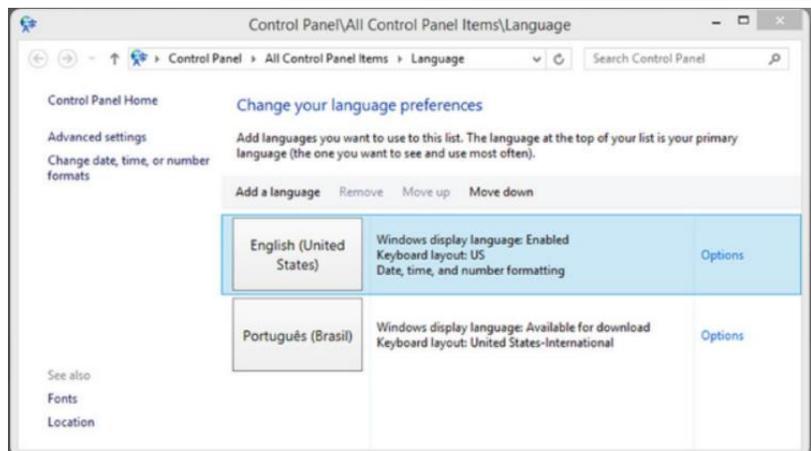
Region and Language Options

In Windows 7 and Vista, the two tools are combined into one tool called Regional and Language.
To access the Region and Language tool, use the following path:
Control Panel > Region and Language

Region and Language tool in Windows' 7→
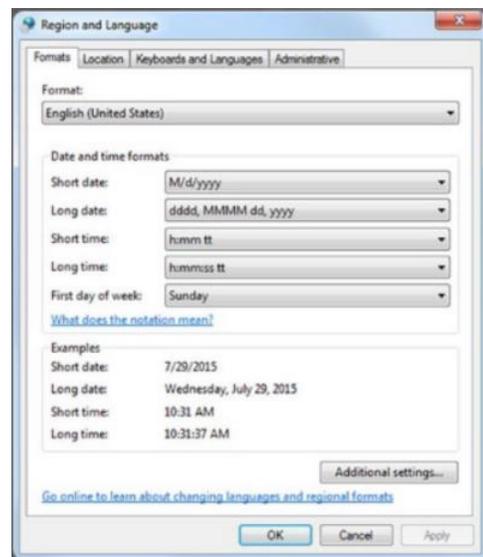
Programs and Features

Use the Program and Features tool to uninstall a program from your computer if you no longer use it or if you want to free up space on your hard disk. You can use Programs and Features to uninstall programs or to change a program's configuration by adding or removing certain options.
To access Programs and Features, use the following path:
Control Panel > Programs and Features

Troubleshooting

The Troubleshooting tool has a number of built-in scripts to identify and solve problems.

To access the Troubleshooting tool in Windows 8 and 7, use the following path:

Control Panel > Troubleshooting

To display a list of all available troubleshooting scripts, click the View All link located in the pane on the left side of the Troubleshooting window.
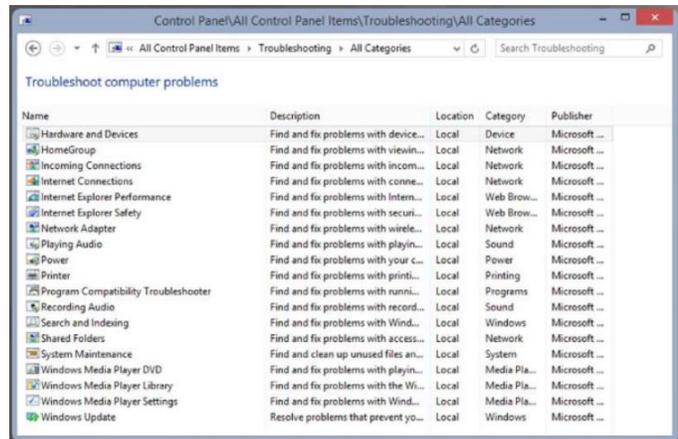
Troubleshooting for Windows 8→
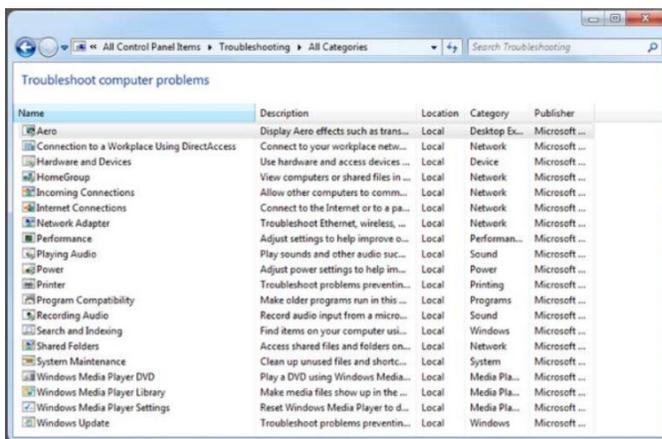
←Troubleshooting for Windows 7

6.5: Summary

This chapter covered Windows configuration and management. You should be skilled at installing an operating system. The following concepts from this chapter are important to remember:

Several different operating systems are available, and you must consider the customer's needs and environment when choosing an OS.

The main steps in setting up a customer's computer include preparing the hard drive, installing the OS, creating user accounts, and configuring installation options.

A GUI shows icons of all files, folders, and applications on the computer. A pointing device, such as a mouse, is used to navigate in a GUI desktop.

A CLI uses commands to complete tasks and navigate the file system.

Preventive maintenance techniques help to ensure optimal performance of the OS. You should establish a backup strategy that allows for the recovery of data.

Chapter 7: Networking Concepts

7.0: Introduction

7.0.1: Welcome

7.0.1.1: Networking Concepts

This chapter provides an overview of network principles, standards, and purposes. To meet the expectations and needs of your customers and network users, you must be familiar with networking concepts. You will learn the basics of network design and how some components affect the flow of data on a network. This knowledge will help you successfully design, implement, and troubleshoot networks.

7.1.1.1: Network Definition

Networks are systems that are formed by links. For example, roads that connect groups of people together create a physical network. Connections with your friends create your personal network. Websites that allow individuals to link to each other's pages are called social networking sites.

People use the following networks every day:

- Mail delivery system

- Telephone system

- Public transportation system

- Corporate computer network

- The Internet

The public transportation system shown in the figure is similar to a computer network. The cars, trucks, and other vehicles are like the messages that travel within the network. Each driver defines a starting point (source computer) and

an ending point (destination computer). Within this system there are rules, similar to stop signs and traffic lights, which control the flow from the source to the destination.

7.1.1.2: Host Devices

Computer networks consist of a variety of devices. Some devices can serve either as hosts or peripherals. A host is any device that sends and receives information on the network. A printer connected to your laptop is a peripheral. If the printer is connected directly to a network, it is acting as a host.

Many different types of host devices can connect to a network. Some of the more common ones are shown in Figure 1.

Note: An Internet Protocol phone, which is known as an IP phone, connects to a computer network instead of the traditional telephone network.

Computer networks are used in businesses, homes, schools, and government agencies. Many networks are connected to each other through the Internet. A network can share many different types of resources, as shown in Figure 2.

Desktop Computer Laptop Computer Server Tablet Smartphone

Camera IP Phone Printer Scanner

- Services, such as printing or scanning
- Storage space on devices, such as hard drives or optical drives
- Applications, such as databases
- Information stored on other computers, such as documents and photos
- Calendars, synchronizing between a computer and a smartphone

7.1.1.3: Intermediary Devices

Computer networks contain many devices that exist in between the host devices. These intermediary devices ensure that data flows from one host device to another host device. The most common intermediary devices are shown in the figure.

A switch is used to connect multiple devices to the network. A router is used to forward traffic between networks. A wireless router connects multiple wireless devices to the network. In addition, a wireless router often includes a switch so that multiple wired devices can connect to the network. An access point (AP) provides wireless connectivity, but has fewer features than a wireless router. A modem is used to connect a home or small office to the Internet.
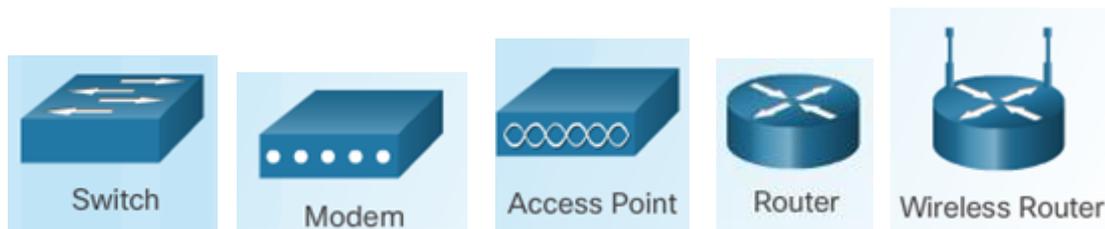
7.1.1.4: Network Media

Communication across a network is carried on a medium. The medium provides the channel over which the message travels from source to destination. The plural for medium is media.

Network devices are linked together using a variety of media, these media are:

- **Copper cabling** - Uses electrical signals to transmit data between devices
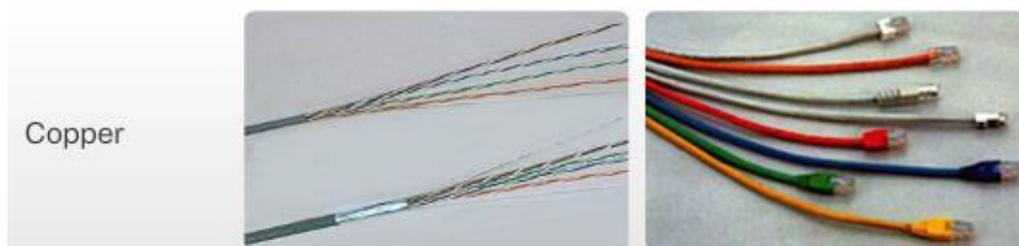
- **Fiber-optic cabling** - Uses glass or plastic fiber to carry information as light pulses
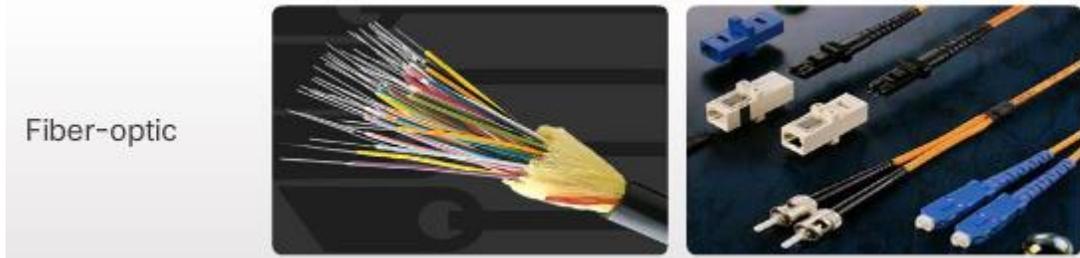
- **Wireless connection** - Uses radio signals, infrared technology, or satellite transmissions
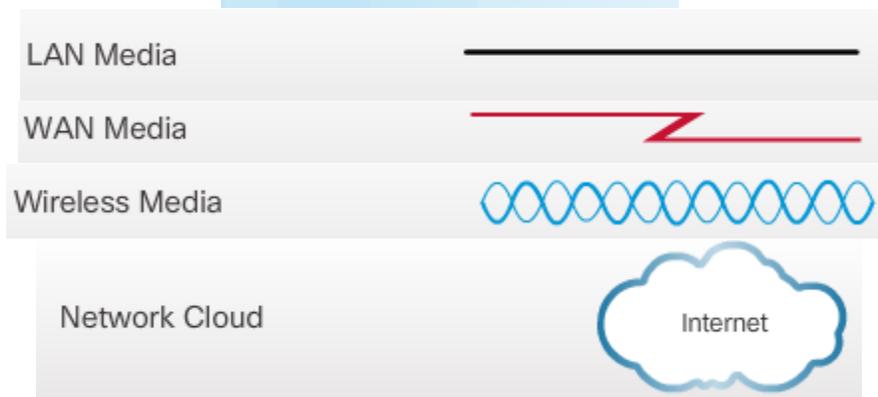
The icons shown in Figure 2 are used throughout this course to represent the different types of network media. Local area network (LANs), wide area networks (WANs), and wireless networks are discussed in the next topic. The Cloud will be used throughout this course to represent connections to the Internet. The Internet is often the medium for communications between one network and another network.

7.1.1.5: Activity - Identify Network Devices & Media Representations

7.1.2: Types of Networks

7.1.2.1: LANs

A computer network is identified by the following specific characteristics:

- Size of the area covered

- Number of users connected

- Number and types of services available

- Area of responsibility

Traditionally, a LAN is defined as a network that encompasses a small geographical area. However, the distinguishing characteristic for LANs today is that they are typically owned by an individual, such as in a home or small business, or wholly managed by an IT department, such as in a school or corporation. This individual or group enforces the security and access control policies of the network.
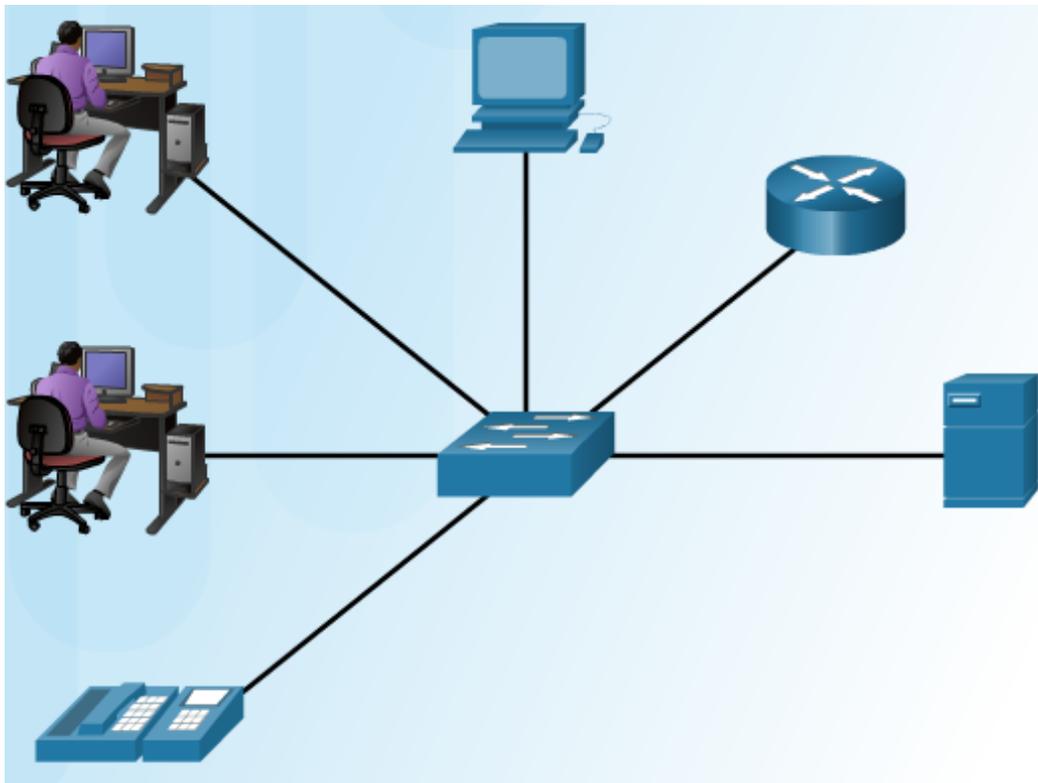
7.1.2.2: WLANs

A Wireless LAN (WLAN) is a LAN that uses radio waves to transmit data between wireless devices. In a traditional LAN, devices are connected together using copper cabling. In some environments, installing copper cabling might not be practical, desirable, or even possible. In these situations, wireless devices are used to transmit and receive data using radio waves. As with LANs, on a WLAN, you can share resources, such as files, printers, and Internet access.

WLANs can operate in two modes. In infrastructure mode, wireless clients connect to a wireless router or access point (AP). The AP in Figure 1 is connected to a switch, which provides access to the rest of the network and to the Internet. Access points are typically connected to the network using copper cabling. Instead of providing copper cabling to every network host, only the wireless access point is connected to the network with copper cabling. The range (radius of coverage) for typical WLAN systems varies from under 98.4 ft. (30 m) indoors to much greater distances outdoors, depending on the technology used.

Devices interconnect using the services of an AP or wireless router.
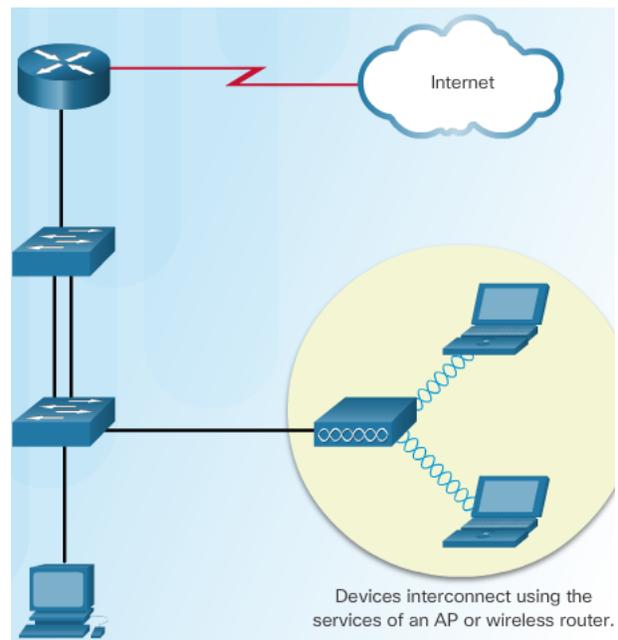
Ad hoc means the WLAN is created when it is needed. Ad hoc is usually temporary. Figure 2 shows an example ad hoc mode. The laptop is wirelessly connected to the smartphone, which has access to the Internet through cellular service provider.

7.1.2.3: PANs

A personal area network (PAN) is a network that connects devices, such as mice, keyboards, printers, smartphone, and tablets within the range of an individual person. All of these devices are dedicated to a single host and are most often connected with Bluetooth technology.

Bluetooth is a wireless technology that enables devices to communicate over short distances. A Bluetooth device can connect up to seven other Bluetooth devices. Described in the IEEE standard 802.15.1, Bluetooth devices are capable of handling voice and data. Bluetooth devices operate in the 2.4 to 2.485 GHz radio frequency range, which is in the Industrial, Scientific, and Medical (ISM) band. The Bluetooth standard incorporates Adaptive Frequency Hopping (AFH). AFH allows signals to "hop" around using different frequencies within the Bluetooth range, thereby reducing the chance of interference when multiple Bluetooth devices are present

7.1.2.4: MANs

A metropolitan area network (MAN) is a network that spans across a large campus or a city. The network consists of various buildings interconnected through wireless or fiber optic backbones. The communication links and equipment are typically owned by a consortium of users, or by a network service provider who sells the service to the users. A MAN can act as a high-speed network to enable sharing of regional resources
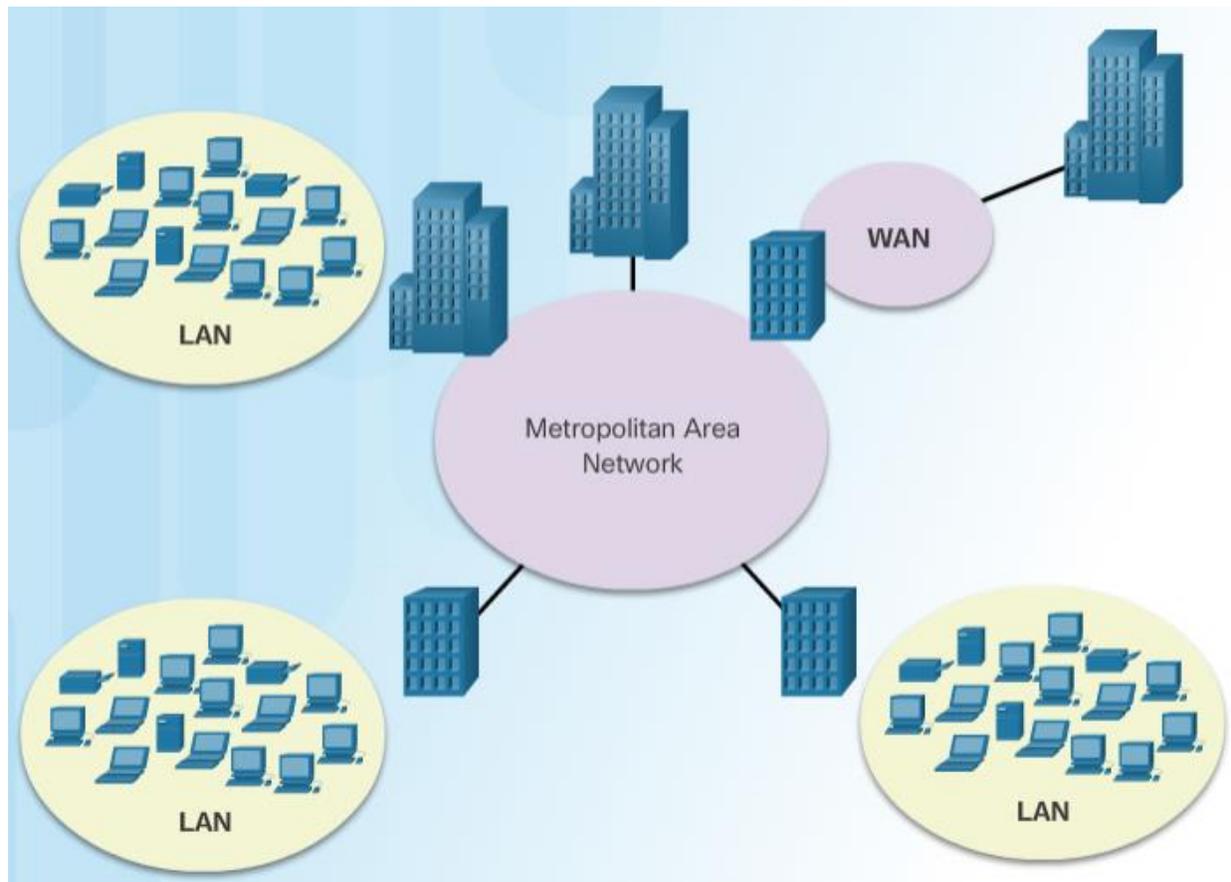
7.1.2.5: WANs

A WAN connects multiple networks that are in geographically separated locations. The distinguishing characteristic of a WAN is that it is owned by a service provider. Individuals and organizations contract for WAN services. The most common example of a WAN is the Internet. The Internet is a large WAN that is composed of millions of interconnected networks. In the figure, the Tokyo and Moscow networks are connected through the Internet.
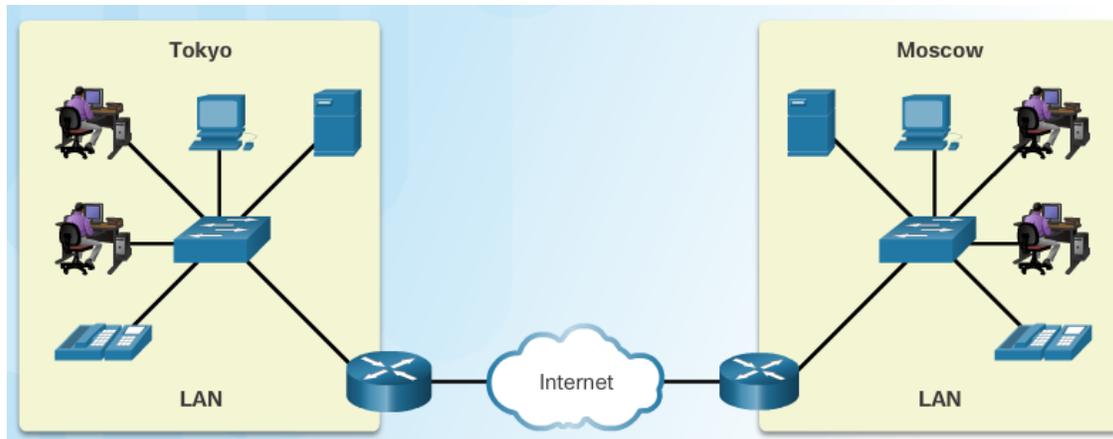
7.1.2.8: Activity – Matching Network Types

7.4: Basic Networking Concepts and Technologies

7.4.1: Networked Equipment Addressing

7.4.1.1: Network Addressing

The fingerprint and addressed letters in Figure 1 are two ways of identifying a person. A person's fingerprints usually do not change. They provide a way to physically identify people. The mailing address of a person can change, as it relates to where the person lives or picks up mail.

A fingerprint is like a MAC addr5ess   A mailing address is like an IP address

Devices that are attached to a network have two addresses that are similar to a person's fingerprints and a person's mailing address. These two types of addresses are the Media Access Control (MAC) address and the IP address. The MAC address is hard coded onto the network interface card (NIC) by the manufacturer. The address stays with the device regardless of what network the device is connected. A MAC address is 48 bits and can be represented in one of the three hexadecimal formats shown in Figure below.

Address Format	Description
00-50-56-BE-D7-87	Two hexadecimal digits separated by hyphens
00:50:56:BE:D7:87	Two hexadecimal digits separated by colons
0050.56BE.D787	Four hexadecimal digits separated by periods

7.4.1.2: IP Addresses

Today, it is common for a computer to have two versions of IP addresses. In the early 1990s there was a concern about running out of IPv4 network addresses. The Internet Engineering Task Force (IETF) began to look for a replacement. This led to the development of what is now known as IP version 6 (IPv6). Currently IPv6 is operating alongside and is beginning to replace IPv4. An IPv4 address is 32 bits long and is represented in dotted decimal. An IPv6 address is 128 bits long and is represented in hexadecimal. Figure 1 shows examples of IPv4 and IPv6 addresses.

IPv4 Address Format

32 bits in dotted decimal notation
192.168.200.8

IPv6 Address Format

128 bits in hexadecimal format
2001:0DB8:CAFE:0200:0000:0000:0000:0008

128 bits in compressed format
2001:DB8:CAFE:200::8

IP addressing is assigned by network administrators based on the location within the network. When a device moves from one network to another, its IP address will most likely change. Figure 2 shows a topology with two LANs. This topology demonstrates that MAC addresses do not change when a device is moved. But IP addresses do change. Laptop was moved to LAN 2. Notice that Laptop's MAC address did not change, but its IP addresses did change.
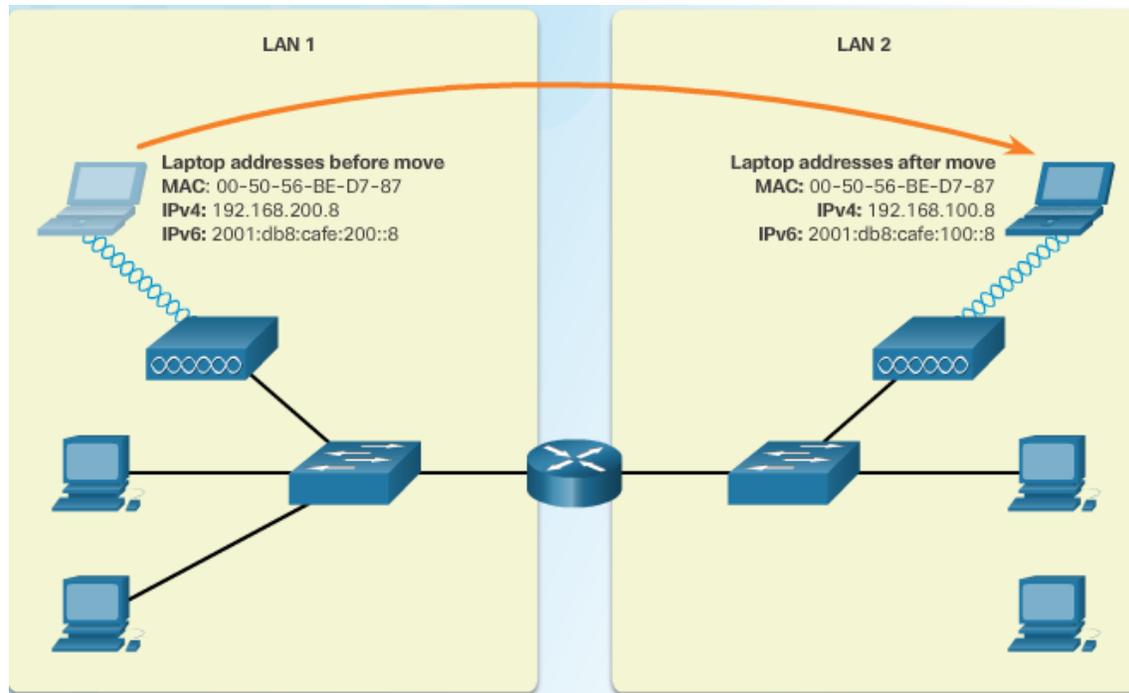
7.5: Summary

Many different devices can connect to today's networks including computers, laptops, tablets, smartphones, TVs, watches, and home appliances. These devices use a variety of media to connect to the network including copper, fiber, and wireless. Intermediary devices, such as switches and routers, ensure that data flows between source and destination. The type of networks these devices connect to include LANs, WLANs, PANs, MANs, and WANs.

Devices must agree on a set of rules before they can effectively communicate with each other. These rules are called standards and protocols. The OSI reference model and the TCP/IP protocol suite help network administrators and technicians understand the interaction of these various standards and protocols.

Ethernet standards come in wired and wireless varieties. The wired standard is IEEE 802.3 and the wireless standard is IEEE 802.11.

Data requires several different types of addresses and numbering to make sure it is received by the correct destination. MAC addresses are used by switches to forward traffic within a LAN. IP addresses are used by routers to determine the best path to a destination network. Port numbers are used by computers to determine which application should receive the data.

Chapter 9: Laptops and Mobile Devices

9.0: Introduction

9.0.1: Welcome

9.0.1.1: Laptops and Mobile Devices

Improvements in technology have allowed the laptop to become lightweight, powerful, and much more affordable. Because of this, laptops are found in just about every setting today.

Laptops run the same operating systems as desktop computers and most come with built in Wi-Fi, webcam, microphone, speakers, and ports to attach external components.

A mobile device is any device that is hand-held, lightweight, and typically has a touchscreen for input. Like a desktop or laptop computer, mobile devices use an operating system to run applications (apps), games, and play movies and music. Mobile device also have different CPU architecture, designed to have a reduced instruction set when compared to laptop and desktop processors.

With the increase in demand for mobility, the popularity of laptops and other mobile devices continues to grow. This chapter focuses on many features of laptops, mobile devices, and their capabilities.

9.1: Laptop Components

9.1.1: Features of Laptop Components

9.1.1.1: External Features Unique to Laptops

Laptop and desktop computers use many of the same hardware features so that peripherals can be interchangeable. The placement of ports, connections, and drives is unique because of the compact design of a laptop.

Top view of a laptop shows three LEDs on the top of the laptop →

Rear view of a laptop   Front view of a laptop

Laptops require a port for external power and can operate using either a battery or an AC power adapter. You can use this port to power the computer or to charge the battery.

Right side view of a laptop   Left side view of a laptop

9.1.1.2: Common Input Devices and LEDs in Laptops

Laptops are designed to be compact and portable, while maintaining much of the same functionality provided by desktop computers. As a result, essential input devices are built into laptops. When a laptop lid is lifted, the following input devices may be present:

- Touchpad
- Pointing stick
- Keyboard
- Fingerprint readers
- Microphone
- Web camera

Laptops may feature LEDs that show the status of specific devices or components. LEDs are commonly found below the display screen or directly above the keyboard. LEDs vary by laptop model.

Laptop icons→
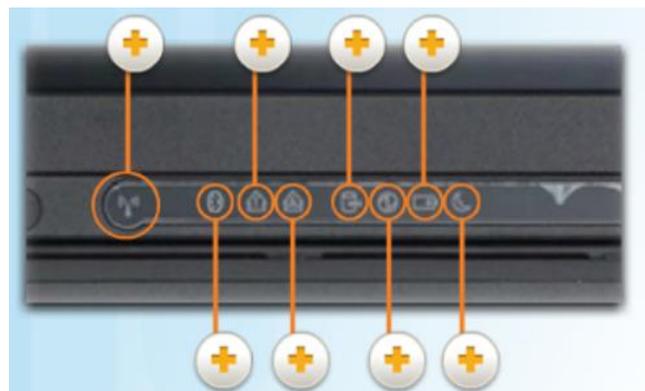
9.1.2: Laptop Displays

9.1.2.1: LCD, LED, and OLED Displays

There are three types of laptop displays:

- Liquid-crystal display (LCD)

- Light-emitting diode (LED)

- Organic light-emitting diode (OLED)

LED displays use less power and have a longer lifespan than LCD displays, making them the display choice for many laptop manufactures.

Organic LED (OLED) technology is commonly used for mobile devices and digital cameras, but can also be found in some laptops. With OLED displays, every pixel is individually lit.

Some laptops now come with detachable touch screens that can be used like a tablet when the display is detached. Other laptops permit the keyboard to fold back behind the display to allow the laptop to function like a tablet. To accommodate these types of laptops, Windows will rotate the display 90, 180, or 270 degrees automatically or by pressing the Control + Alt keys simultaneously with the arrow key for which way you want the laptop to face.

9.1.2.4: Webcam and Microphone

Most laptops today have a webcam and microphone built in. The webcam is normally positioned at the top, center of the display. The internal microphone can often be found next to the webcam. Some manufactures may place the microphone next to the keyboard, or on the side of the laptop.
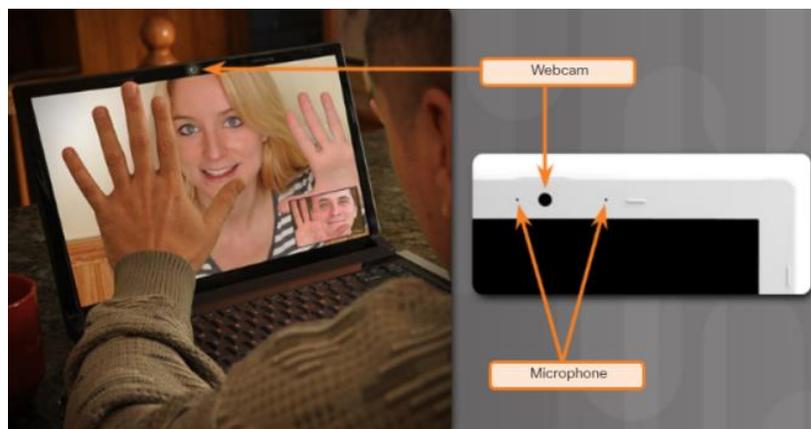
9.2.2: Wireless Configuration

9.2.2.1: Bluetooth

The Bluetooth technical specification is described by the Institute of Electrical and Electronics Engineers (IEEE) 802.15.1 standard. Bluetooth devices are capable of handling voice, music, videos, and data.

Bluetooth Characteristics

- A short-range wireless technology designed to eliminate the need for cables between portable or fixed-configuration devices
- Operates at 2.4 to 2.485 GHz in the unlicensed Industrial, Scientific, and Medical band
- Low power, low cost, and small size
- Uses adaptive frequency hopping

Bluetooth Installation and Configuration

Windows activates connections to Bluetooth devices by default. If the connection is not active, look for a switch on the front face or on the side of the laptop to enable the connection. If a laptop does not feature Bluetooth technology, you can purchase a Bluetooth adapter that plugs into a USB port.

9.2.2.3: Wi-Fi

Laptops usually access the internet by using wireless adapters. Wireless adapters can be built in to the laptop or attached to the laptop through an expansion port.

9.4: Mobile Device Hardware Overview

9.4.1: Mobile Device Hardware

9.4.1.1: Mobile Device Parts

Unlike laptops, mobile devices, such as smartphone and tablets, are typically small enough to be handheld. A smartphone can be carried in a pocket. A tablet can be carried in a purse or small backpack.

There are parts and instructions available from many websites for replacing broken mobile device parts, including touchscreens, front or back glass, and batteries. Installing parts from sources other than the manufacturer voids the manufacturer's warranty and might harm the device.

Some mobile devices might have one or more of the following field-replaceable parts:

- **Battery -** Some mobile device batteries can be replaced.

Mobile phone battery→

- **Memory card -** Many mobile devices use memory cards to add storage.

Micro SD Card→

- **Subscriber Identity Module (SIM) card -** This small card contains information used to authenticate a device to mobile telephone and data providers, SIM cards can also hold user data such as contacts and text messages.   SIM Card→

9.4.1.3: Touchscreens

Most mobile devices do not have a keyboard or a pointing device. They use touchscreens to allow users to physically interact with what is shown on the screen and type on a virtual keyboard. Icons, like those found on desktops and laptops, are clicked with a touch rather than a mouse button. Mobile device manufacturers use the word tap or touch when describing operations and steps when using a mobile device.

In addition to a single touch, there are some common finger movements, called gestures, used to perform functions:

- **Slide or swipe -** Move between screens horizontally or vertically. Touch the screen, slide your finger quickly in the direction you want to move the screen and let go.

- **Double touch -** Zoom items such as photographs, maps, and text. Touch the screen twice quickly to zoom in. Touch the screen twice quickly again to zoom out.

- **Long touch -** Select items, such as text, icons, or photos. Touch and hold the screen until options become available for the item you are touching.

- **Scroll -** Scroll items that are too large for the screen, such as photos or web pages. Touch and hold the screen, moving your finger in the direction you want to move the item. Lift your finger when you reach the area of the screen you want to see.

- **Pinch -** Zoom out from objects, such as photographs, maps, and text. Touch the screen with two fingers and pinch them together to zoom out from the object.

- **Spread -** Zoom in on objects, such as photographs, maps, and text. Touch the screen with two fingers and spread them apart to zoom in on the object.

Some smartphones have a proximity sensor that turns off the touchscreen when the phone is up to your ear and turns it on when you pull the device away from your ear. This prevents functions from being activated by contact with your face or ear, and also saves power.

9.4.1.7: Accessories

Mobile device accessories are not necessary for the functions of the devices as intended by the manufacturer. However, accessories can enhance the user's experience. The accessories, except for protective covers, can be connected to the laptops and mobile devices via wired or wireless technologies.

Protective covers:

Chapter 9: Laptops and Mobile Devices

Mobile devices are portable electronic devices. Cases and protective covers can protect these devices from physical damage during travel or use. Furthermore, some protective covers also provide protection from water damage.

Power sources:

- **External batteries / portable chargers** – While on the go, the external batteries can provide the extra power for mobile devices. Portable chargers, such as solar chargers and car chargers, can replenish power.

External Battery→

←Portable chargers

- **Docking stations** – These allow mobile devices to easily connect to other devices. Most docking stations will also act as a charger while the mobile device is connected. Some docking stations also have speakers or keyboards.

Audio Accessories

- **Headsets / ear buds -** These allow a user to listen to audio output privately. If the headset or ear buds have a microphone, the user can have phone conversation while keeping their hands free. Both wireless and wired connections are available.

Headsets   Ear buds

- **Speakers** - These speakers can come in different colors, shapes and sizes. Speakers can also be wireless or wired.

Other:

- **Credit card readers -** People can use their smartphones with credit card readers to accept credit card payments from anyone.

- **Game pad -** These are peripheral devices used for playing video games.

- **Memory/MicroSD -** Like a laptop, built-in memory card readers increase storage capacity.

9.4.2: Other Mobile Devices

9.4.2.1: Wearable Devices

Wearable devices are clothing or accessories that have miniature computing devices. Smart watches, fitness monitors, and smart headsets are some examples.

Chapter 9: Laptops and Mobile Devices

Smart Watches

Smart watches are watches that combine the functions of a watch and some functions of mobile devices. Some smartwatches also include sensors to measure body and environmental metrics such as heart rate, body temperature, elevation, or air temperature. They have touchscreen displays, and they can function on their own or paired with smartphones. These watches can display notifications of incoming messages, incoming phone calls, and social media updates. Smartwatches can run apps on the watch or via a smartphone. They may also allow the users to control some functions, such as music and camera, on a smartphone.

Fitness Monitors

Fitness monitors are designed to clip onto clothing or be worn on the wrist. They are used for tracking a person's daily activity and body metrics as they work toward their fitness goals. These devices measure and collect activity data. They can also connect with other Internet-connected devices to upload the data for later review. Some fitness monitors may also have basic smartwatch capabilities, such as displaying caller ID and text messages.

Smart Headsets

Smart headsets are designed to be worn like a pair of eyeglasses. The headset has a small screen built into the frame or projected onto glass. The headset is often connected to a smartphone for network connectivity. Functions might be controlled by a touchpad on the side or voice commands. These devices have many of the same functions as smartphones. A user can see notifications, read emails, get directions, or take calls via the headset rather than on a smartphone. The display is always visible to the wearer; all they have to do is focus on it.

9.7: Summary

This chapter discussed the features and functionality of laptops and mobile devices. The following concepts from this chapter are important to remember:

- Laptops and mobile devices are lightweight and can operate on battery power.

- Laptops use the same types of ports as desktop computers so that peripheral devices can be interchangeable. Mobile devices can also use some of the same peripheral devices.

- Essential input devices, such as a keyboard and track pad, are built into laptops to provide similar functionality as desktop computers. Some laptops and mobile devices use touchscreens as input devices.

- The internal components of laptops are typically smaller than desktop components because they are designed to fit into compact spaces and conserve energy. The internal components of mobile devices are usually connected to the circuit board to keep the device compact and light weight.

- Docking stations and port replicators can increase the functionality of laptops by providing the same types of ports that are featured on desktop computers. Some mobile devices use docking station to charge or use peripheral devices.

- Laptops and mobile devices most commonly feature LCD or LED screens, many of which are touchscreen.

- Backlights illuminate LCD and LED laptop displays. OLED displays have no backlight.

- The power settings of laptop batteries can be configured to ensure that power is used efficiently.

- Laptops and mobile devices can feature a number of wireless technologies, including Bluetooth, Infrared, Wi-Fi and the ability to access Cellular WANs.

- Laptop components should be cleaned regularly in order to extend the life of the laptop.

Chapter 12: Security

12.0: Introduction

12.0.1: Welcome

12.0.1.1: Security

This chapter reviews the types of attacks that threaten the security of computers and the data contained on them. A technician is responsible for the security of data and computer equipment in an organization. You will learn how to work with customers to ensure that the best possible protection is in place.

To successfully protect computers and the network, a technician must understand both types of threats to computer security:

Physical - Events or attacks that steal, damage, or destroy equipment, such as servers, switches, and wiring

Data - Events or attacks that remove, corrupt, deny access to authorized users, allow access to unauthorized users, or steal information

12.1: Security Threats

12.1.1: Types of Security Threats

12.1.1.1: Malware

Computers and the data contained on them must be secured against malware:

- Malware is any software created to perform malicious acts. The word malware is an abbreviation of malicious software.

- It is usually installed on a computer without the knowledge of the user. These programs open extra windows on the computer or change the computer configuration.

- Malware is capable of modifying web browsers to open specific web pages that are not the desired web page. This is known as browser redirection.

It is also capable of collecting information stored on the computer without the user's consent. The first and most common type of malware is a computer virus. A virus is transferred to another computer through email, USB drives, file transfers, and even instant messaging. The virus hides by attaching itself to computer code, software, or documents on the computer. When the file is

accessed, the virus executes and infects the computer. Examples of what a virus can do are listed below:
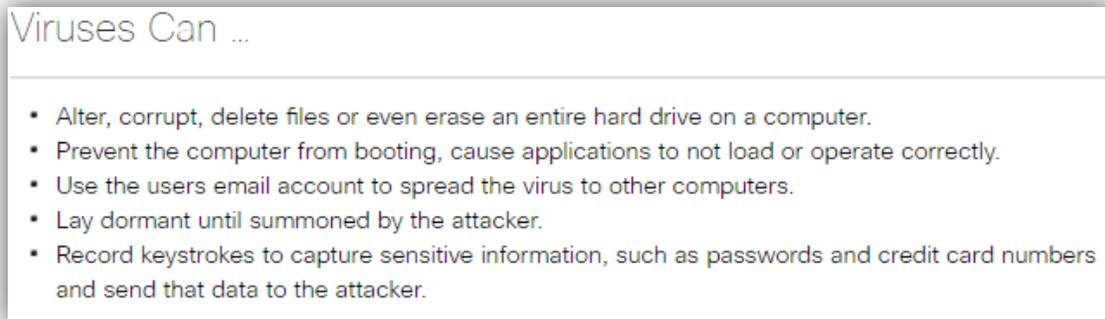
Another type of malware is a Trojan horse. A Trojan horse usually looks like a useful program but it carries malicious code. For example, Trojan horses are often provided with free online games. While playing the game, the Trojan horse is installed on the user's system and continues operating even after the game has been closed. Over the years, malware has continued to evolve.

A **worm** (one of malware types) is a self-replicating program that is harmful to networks with the intent to slow or disrupt network operations. Worms typically spread automatically by exploiting known vulnerabilities in legitimate software.

To detect, disable, and remove malware before it infects a computer, always use antivirus software, antispyware, and adware removal tools. It is important to know that these software programs become outdated quickly. Therefore, it is the responsibility of the technician to apply the most recent updates, patches, and virus definitions as part of a regular maintenance schedule. Many organizations establish a written security policy stating that employees are not permitted to install any software that is not provided by the company.

12.1.1.3: Phishing

Phishing is when a malicious party sends an email, calls on the phone, or places a text with the intent to trick the recipient into providing personal or financial information. Phishing attacks are also used to persuade users to unknowingly install malware on their devices.

For example, a user has received an email which looks like it originated from a legitimate outside organization, such as a bank. The attacker might ask for

verification of information, such as a username, password, or PIN number, to possibly prevent some terrible consequence from occurring. If the user provides the requested information, the phishing attack is successful.

A form of phishing attack is called spear phishing. This is when a phishing attack is targeted at a specific individual or organization.

Organizations must educate their users regarding phishing attacks. There is rarely a need to provide sensitive personal or financial information online. Legitimate businesses will not ask for sensitive information through email. Be suspicious. When in doubt, make contact by mail or phone to ensure the validity of the request.

12.1.1.4: Spam

Spam, also known as junk mail, is unsolicited email. In most cases, spam is used as a method of advertising. However, spam can be used to send harmful links, malware, or deceptive content. The goal is to obtain sensitive information such as a social security number or bank account information. Most spam is sent out by multiple computers on networks that have been infected by a virus or worm. These compromised computers send out as much bulk email as possible.

Spam cannot be stopped, but its effects can be diminished. For example, most ISPs filter spam before it reaches the user's inbox. Many antivirus and email software programs automatically perform email filtering. This means that they detect and remove spam from an email inbox.

Organizations must also make employees aware of the dangers of opening email attachments that may contain a virus or a worm. Do not assume that email attachments are safe, even when they are sent from a trusted contact. The sender's computer may be infected by a virus that is trying to spread itself. Always scan email attachments before opening them.

12.1.1.8: Social Engineering

Social engineering occurs when an attacker tries to gain access to equipment or a network by tricking people into providing the necessary access information. For

example, in the figure below, the social engineer gains the confidence of an employee and convinces the employee to divulge their username and password information.

Social Engineering Attack Example

Here are some basic precautions to help protect against social engineering:

- Never give out your login credentials (e.g., username, password, PIN).
- Never post credential information in your work area.
- Lock your computer when you leave your desk.

To secure a physical location, the business should:

- Implement an access or entry control roster listing who is permitted in.
- Do not let anyone follow you through a door that requires an access card.
- Always ask for the ID of unknown persons.
- Restrict access to visitors.
- Escort all visitors.

12.2: Security Procedures

12.2.1: Windows Local Security Policy

12.2.1.1: What is a Security Policy?

A security policy is a set of security objectives that ensure the security of a network, the data, and the computer systems in an organization. The security policy is a constantly evolving document based on changes in technology, business, and employee requirements.

The security policy is usually created and managed by the organization management and the IT staff as illustrated in the figure below.

12.2.1.3: Usernames and Passwords

The system administrator usually defines a naming convention for usernames when creating network logins. A common example of a username is the first letter of the person's first name and then the entire last name. Keep the naming convention simple so that people do not have a hard time remembering it. Usernames, like passwords, are an important piece of information and should not be revealed.

Password guidelines are an important component of a security policy. Any user that must log on to a computer or connect to a network resource should be required to have a password. Passwords help prevent theft of data and malicious acts. Passwords also help to confirm that the logging of events is valid by ensuring that the user is the correct person.

Three levels of password protection are recommended:

- BIOS – Prevents the operating system from booting and the BIOS settings from being changed without the appropriate password.

- Login – Prevents unauthorized access to the local computer.

- Network – Prevents access to network resources by unauthorized personnel.

# 12.2.4: Protection Against Malicious Software

12.2.4.1: Malicious Software Protection Programs

Malware includes viruses, worms, Trojan horses, keyloggers, spyware, and adware. These are designed to invade privacy, steal information, damage the system, or delete corrupt data.

It is important that you protect computers and mobile devices using reputable antimalware software. The following types of antimalware programs are available:

- Antivirus protection - Program continuously monitors for viruses. When a virus is detected, the user is warned, and the program attempts to quarantine or delete the virus, as shown:

Chapter 12: Security
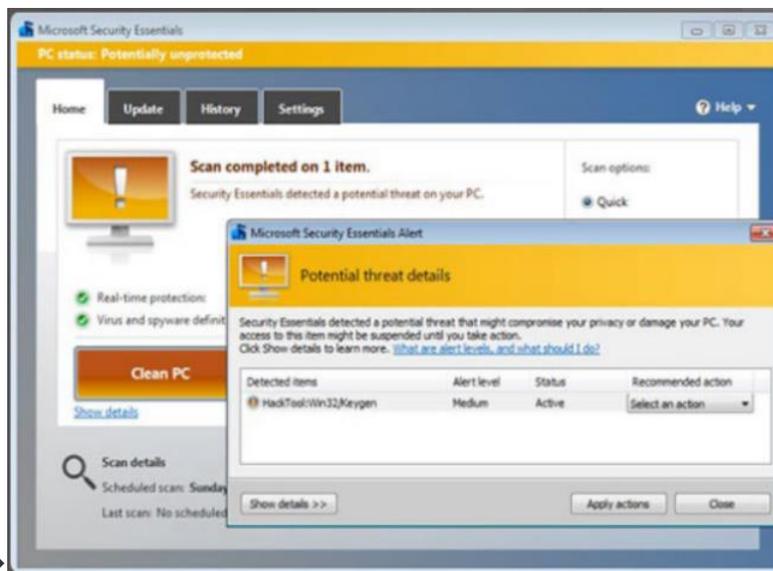
Virus Detection➔

- Adware protection – Program continuously looks for programs that display advertising on your computer.

- Phishing protection – Program blocks the IP addresses of known phishing websites and warns the user about suspicious sites.

- Spyware protection – Program scans for keyloggers and other spyware.

- Trusted / untrusted sources – Program warns you about unsafe programs about to be installed or unsafe websites before they are visited.

It may take several different programs and multiple scans to completely remove all malicious software. Run only one malware protection program at a time.

Several reputable security organizations such as McAfee, Symantec, Kaspersky, offer all-inclusive malware protection for computers and mobile devices.

Be cautious of malicious rogue antivirus products that may appear while browsing the Internet. Most of these rogue antivirus products display an ad or pop-up that looks like an actual Windows warning window. They usually state that the computer is infected and must be cleaned. Clicking anywhere inside the window may begin the download and installation of the malware.

Example of Rogue Antivirus →

When faced with a warning window that is suspect, never click inside the warning window. Close the tab or the browser to see if the warning window goes away. If the tab or browser does not close, press ALT+F4 to close the window or use the task manager to end the program. If the warning window does not goes away, scan the computer using a known, good antivirus or adware protection program to ensure that the computer is not infected.

12.5: Summary

This chapter discussed computer security and why it is important to protect computer equipment, networks, and data. Threats, procedures, and preventive maintenance relating to data and physical security were described to help you keep computer equipment and data safe. Some of the important concepts to remember from this chapter are:

- Security threats can come from inside or outside of an organization.

- Viruses and worms are common threats that attack data.

- Develop and maintain a security plan to protect both data and physical equipment from loss.

- Keep operating systems and applications up to date and secure with patches and service packs.