

Introduction to Technology



Technology provides access to the digital world around you.

Objectives

After completing this chapter, you will be able to:

- 1 Differentiate among laptops, tablets, desktops, and servers
- 2 Describe the purpose and uses of smartphones, digital cameras, portable media players, e-book readers, and game devices
- 3 Describe the relationship between data and information
- 4 Briefly explain various input options (keyboards, pointing devices, voice and video input, and scanners), output options (printers, displays, and speakers), and storage options (hard disks, solid-state drives, USB flash drives, memory cards, optical discs, and cloud storage)
- 5 Differentiate the Internet from the web, and describe the relationship among the web, webpages, websites, and web servers
- 6 Explain the purpose of a browser, a search engine, and an online social network
- 7 Briefly describe digital security risks associated with viruses and other malware, privacy, your health, and the environment
- 8 Differentiate between an operating system and applications
- 9 Differentiate between wired and wireless network technologies, and identify reasons individuals and businesses use networks
- 10 Discuss how society uses technology in education, government, finance, retail, entertainment, health care, travel, science, publishing, and manufacturing
- 11 Describe home users, small/home office users, mobile users, power users, and enterprise users



A World of Technology

In the course of a day, you may . . . complete a homework assignment and watch a streaming video on your laptop, flip through news headlines and refill a prescription on your tablet, search for directions and the local weather forecast on your smartphone, book a flight and create a shipping label using your office computer, and listen to your favorite songs on a portable media player. These and many other technologies are an integral part of everyday life: at school, at home, and at work (Figure 1).

Technology can enable you to more efficiently and effectively access and search for information; share personal ideas, photos, and videos with friends, family, and others; communicate with and meet other people; manage finances; shop for goods and services; play games or access other sources of entertainment; keep your life and activities organized; and complete business activities.

Because technology changes, you must keep up with the changes to remain digitally literate. **Digital literacy** involves having a current knowledge and understanding of computers, mobile devices, the Internet, and related technologies. This chapter presents some of the knowledge you need to be digitally literate today. As you read this chapter, keep in mind it is an overview.



Figure 1 Technology is an integral part of life at school, home, and work.

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Computers

A **computer** is an electronic device, operating under the control of instructions stored in its own memory, that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use. Computers contain many electric, electronic, and mechanical components known as hardware.

Electronic components in computers process data using instructions, which are the steps that tell the computer how to perform a particular task. A collection of related instructions organized for a common purpose is referred to as software or a program. Using software, you can complete a variety of activities, such as search for information, type a paper, balance a budget, create a presentation, or play a game.

One popular category of computer is the personal computer. A **personal computer (PC)** is a computer that can perform all of its input, processing, output, and storage activities by itself and is intended to be used by one person at a time. Most personal computers today also can communicate with other computers and devices.

Types of personal computers include laptops, tablets, and desktops, with the first two sometimes called mobile computers. A mobile computer is a portable personal computer, designed so that a user can carry it from place to place. A **user** is anyone who interacts with a computer or mobile device, or utilizes the information it generates.

Laptops

A **laptop**, also called a notebook computer, is a thin, lightweight mobile computer with a screen in its lid and a keyboard in its base (Figure 2). Designed to fit on your lap and for easy transport, laptops weigh up to 10 pounds (varying by manufacturer and specifications). A laptop that is less than an inch thick and weighs about 3 pounds or less sometimes is referred to as an ultrathin laptop. Most laptops can operate on batteries or a power supply or both.

Tablets

Usually smaller than a laptop but larger than a phone, a **tablet** is a thin, lightweight mobile computer that has a touch screen. A popular style of tablet is the slate, which does not contain a physical keyboard (Figure 3). Like laptops, tablets run on batteries or a power supply or both; however, batteries in a tablet typically last longer than those in laptops.

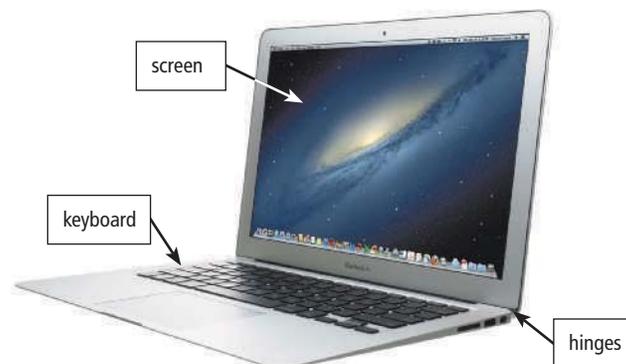


Figure 2 A typical laptop has a keyboard in the base and a screen in the lid, with the lid attaching to the base with hinges.

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Figure 3 A slate tablet.

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 **CONSIDER THIS**
If the slate tablet has no keyboard, how do you type on it?

You can use your fingers to press keys on a keyboard that appears on the screen, called an on-screen keyboard, or you can purchase a separate physical keyboard that attaches to or wirelessly communicates with the tablet.

 **MINI FEATURE 1**

Mobile Computer Buyer's Guide

If you need computing capability while traveling and during lectures or meetings, you may find a laptop or tablet to be an appropriate choice. With the abundance of mobile computer manufacturers, research each before making a purchase. The following are purchasing considerations unique to mobile computers.

1. Determine which mobile computer form factor fits your needs. Consider a tablet or netbook if you primarily will use the device to access the Internet and email. If you will use the computer to create and edit documents, work on spreadsheets, play graphic intensive games, or use other software that requires greater processing power, consider purchasing a traditional or ultrathin laptop.
2. Consider a mobile computer with a sufficiently large screen. Laptops and tablets are available with various screen sizes. For example, most traditional and ultrathin laptop screens range in size from 11 to 18 inches, while most tablet and netbook screens range in size from 7 to 10 inches.
3. Experiment with different keyboards and pointing devices. Mobile computers often vary in size, and for that reason have different keyboard layouts. Familiarize yourself with the keyboard layout of the computer you want to purchase, and make sure it is right for you. If you have large fingers, for example, you should not purchase a computer with a small, condensed keyboard. Laptops typically include a touchpad to control the pointer. Tablets have a touch screen and an on-screen keyboard.
4. Consider processor, memory, and storage upgrades at the time of purchase. As with a desktop, upgrading a mobile computer's memory and disk storage may be less expensive at the time of initial purchase. Some disk storage is custom designed for mobile computer manufacturers, meaning an upgrade might not be available in the future.
5. The availability of built-in ports and slots is important. Determine which ports and slots (discussed later in this chapter) you require on the mobile computer. If you plan to transfer photos from a digital camera using a memory card, consider a mobile computer with a built-in card slot compatible with your digital camera's memory card. If you plan to connect devices such as a printer or USB flash drive to your mobile computer, consider purchasing one with one or more USB ports. In addition, evaluate mobile computers with ports enabling you to connect an external monitor.
6. If you plan to use your mobile computer for a long time without access to an electrical outlet, or if the battery life for the mobile computer you want to purchase is not sufficient, consider purchasing a second battery. Some mobile computers, such as most tablets, have built-in batteries that can be replaced only by a qualified technician. In that case, you might look into options for external battery packs or power sources.
7. Purchase a well-padded and well-designed carrying case. An amply padded carrying case will protect your mobile computer from the bumps it will receive while traveling. A well-designed carrying case will have room for accessories such as USB flash drives, pens, and paperwork. Although a mobile computer may be small enough to fit in a handbag, make sure that the bag has sufficient padding to protect the computer.
8. If you plan to connect your mobile computer to a video projector, make sure the mobile computer is compatible with the video projector. You should check, for example, to be sure that your mobile computer will allow you to display an image on the screen and projection device at the same time. Also, ensure that the mobile computer has the ports required or that you have the necessary dongle and cables to connect to the video projector.



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 Based on your current computing needs, should you purchase a traditional laptop, ultrathin laptop, netbook, or tablet? What are the specifications of the mobile computer you would purchase?

Desktops

A **desktop**, or desktop computer, is a personal computer designed to be in a stationary location, where all of its components fit on or under a desk or table. On many desktops, the screen is housed in a device that is separate from a tower, which is a case that contains the processing circuitry (Figure 4a). Other desktops, sometimes called all-in-one desktops, do not contain a tower and instead use the same case to house the screen and the processing circuitry (Figure 4b). Some screens for desktops support touch.



Desktop

The term, desktop, also sometimes is used to refer to an on-screen work area on desktops, tablets, and laptops.



Figure 4 Some desktops have a separate tower; others do not.

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CONSIDER THIS

Which type of computer — laptop, tablet, or desktop — is best?

It depends on your needs. Because laptops can be as powerful as the average desktop, more people today choose laptops over desktops so that they have the added benefit of portability. Tablets are ideal for those not needing the power of a laptop or for searching for information, communicating with others, and taking notes in lectures, at meetings, conferences, and other forums where a laptop is not practical.

MINI FEATURE 2

Desktop Computer Buyer's Guide

Desktops are a suitable option if you work mostly in one place and have plenty of space in a work area. Today, desktop manufacturers emphasize desktop style by offering bright colors, trendy displays, and theme-based towers so that the computer looks attractive if it is in an area of high visibility. If you have decided that a desktop is most suited to your technology needs, the next step is to determine specific software, hardware, peripheral devices, and services to purchase, as well as where to buy the computer. The following considerations will help you determine the appropriate desktop to purchase.

1. Determine the specific software to use on the desktop. Decide which software contains the features necessary for the tasks you want to perform. Your hardware requirements depend on the minimum requirements of the software you plan to use on the desktop.
2. Know the system requirements of the operating system. Determine the operating system you want to use because this also dictates hardware requirements. If, however, you purchase a new desktop, chances are it will have the latest version of your preferred operating system (Windows, Mac OS, or Linux).
3. Look for bundled software. Purchasing software at the same time you purchase a desktop may be less expensive than purchasing the software at a later date. At the very least, you probably will want word processing software and an antivirus program.
4. Avoid purchasing the least powerful desktop available. Computer technology changes rapidly, which means a desktop that seems powerful enough today may not serve your computing needs in the future. Purchasing a desktop with the most memory, largest hard disk, and fastest processor you can afford will help delay obsolescence.
5. Consider upgrades to the keyboard, mouse, monitor, printer, microphone, and speakers. You use these peripheral devices to interact with the desktop, so make sure they meet your standards.

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6. Consider a touch screen monitor. A touch screen monitor will enable you to interact with the latest operating systems and apps using touch input.



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7. Evaluate all-in-one desktops. All-in-one desktops may be less expensive than purchasing a system unit and monitor separately. In addition, all-in-one desktops take up less space and often look more attractive than desktops with separate towers.

8. If you are buying a new desktop, you have several purchasing options: buy directly from a school bookstore, a local computer dealer, or a large retail store, or order from a vendor by mail, phone, or the web. Each purchasing option has its advantages. Explore each option to find the best combination of price and service.

9. Be aware of hidden costs. Along with the desktop itself, you also may need to make additional purchases. For example, you might purchase computer furniture, an uninterruptible power supply (UPS) or surge protector (discussed later in the chapter), an external hard disk, a printer, a router, a USB flash drive, or computer training classes.

10. Consider purchasing an extended warranty or service plan. If you use your computer for business or require fast resolution to major computer problems, consider purchasing an extended warranty or a service plan through a local dealer or third-party company. Most extended warranties cover the repair and replacement of computer components beyond the standard warranty.

- ☀ Shop around for a desktop that meets your current needs. Which desktop would you purchase? Why?



Online

When a computer or device connects to a network, it is online.



Figure 5 A server provides services to other computers or devices on a network.

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Servers

A **server** is a computer dedicated to providing one or more services to other computers or devices on a network. A network is a collection of computers and devices connected together, often wirelessly. Services provided by servers include storing content and controlling access to hardware, software, and other resources on a network.

A server can support from two to several thousand connected computers and devices at the same time. Servers are available in a variety of sizes and types for both small and large business applications (Figure 5). Smaller applications, such as at home, sometimes use a high-end desktop as a server. Larger corporate, government, and Internet applications use powerful, expensive servers to support their daily operations.

Mobile and Game Devices

A **mobile device** is a computing device small enough to hold in your hand. Because of their reduced size, the screens on mobile devices are small — often between 3 and 5 inches.

Some mobile devices are Internet capable, meaning that they can connect to the Internet wirelessly. You often can exchange information between the Internet and a mobile device or between a computer or network and a mobile device. Popular types of mobile devices are smartphones, digital cameras, portable media players, and e-book readers.

CONSIDER THIS

Are mobile devices computers?

The mobile devices discussed in this section can be categorized as computers because they operate under the control of instructions stored in their own memory, can accept data, process the data according to specified rules, produce or display information, and store the information for future use.

Smartphones

A **smartphone** is an Internet-capable phone that usually also includes a calendar, an appointment book, an address book, a calculator, a notepad, games, and several other apps (which are programs on a smartphone). Smartphones typically communicate wirelessly with other devices or computers. With several smartphone models, you also can listen to music and take photos.

Many smartphones have touch screens. Instead of or in addition to a touch screen, some smartphones have a built-in mini keyboard on the front of the phone or a keyboard that slides in and out from behind the phone (Figure 6). Others have keypads that contain both numbers and letters.



Figure 6 Smartphones may have a touch screen and/or a mini keyboard or slide out keyboard.

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Instead of calling someone's phone to talk, you can send messages to others by pressing images on an on-screen keyboard, keys on the mini keyboard, or buttons on the phone's keypad. Three popular types of messages that you can send with smartphones include text messages, picture messages, and video messages.

- A text message is a short note, typically fewer than 300 characters, sent to or from a smartphone or other mobile device.
- A picture message is a photo or other image, sometimes along with sound and text, sent to or from a smartphone or other mobile device. A phone that can send picture messages sometimes is called a camera phone.
- A video message is a short video clip, usually about 30 seconds, sent to or from a smartphone or other mobile device.

Read Ethics & Issues 1 on the next page to consider whether sending text messages affects writing skills.



BTW **Messaging Services**

Providers of wireless communications services may charge additional fees for sending text, picture, or video messages, depending on the service plan.

ETHICS & ISSUES 1

Do Text Messages Affect Writing Skills?

When you send text messages, the goal is to communicate the most amount of information using the fewest words and characters. This type of rapid-fire communications places a higher priority on brevity and speed than spelling, capitalization, and punctuation. Educators wonder about the effect that text messages might have on the writing habits and grammar skills of today's students. Their use of text acronyms such as LOL (laugh out loud) and text abbreviations that include numbers, such as gr8 (for great) or 2 (for to, too, or two), is working its way into their formal writing. While adults also use text acronyms and abbreviations, the concern is

that teens and young adults use them so often before developing formal writing skills. The result could be students who are less able to use formal language when needed.

Research indicates that the more text messages students send, the more likely it is that they may have difficulty with formal writing. On the positive side, by reducing a message to as few words as possible, students learn to present the most important content first, without rambling or exaggeration. The downside is this can lead to short, choppy sentences that do not connect with each other and a lack of supporting details, which are essential in formal writing. Other positives are that students are writing more than ever, and that this

type of writing can be considered a form of journaling, or recording of thoughts, activities, and opinions. Some educators argue that rather than worrying about the writing style that students use in their text messages, they should focus on helping students distinguish between formal and informal communications, and what is appropriate in each.

Does the use of text messages make students less likely to perform well in formal writing assignments? Why or why not? Should teachers allow students to use text acronyms and abbreviations in formal writing? Why or why not? Do text messages have any positive impact on communications skills? Why or why not?

Digital Cameras

A **digital camera** is a device that allows you to take photos and store the photographed images digitally (Figure 7). While many digital cameras look like a traditional camera, some are built into smartphones and other mobile devices.

Internet Research

What is a digital SLR camera?

Search for: digital slr camera introduction

Digital cameras typically allow you to review, and sometimes modify, images while they are in the camera. You also can transfer images from a digital camera to a computer, so that you can review, modify, share, organize, or print the images. Digital cameras often can connect to or communicate wirelessly with a computer, a printer, or the Internet, enabling you to access the photos on the camera without using a cable. Some also can record videos. Many digital devices, such as smartphones and tablets, include an integrated digital camera.



Figure 7 With a digital camera, you can view photographed images immediately through a small screen on the camera to see if the photo is worth keeping.

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Internet Research

What are popular portable media players?

Search for: portable media players

Portable Media Players

A **portable media player**, sometimes called a personal media player, is a mobile device on which you can store, organize, and play or view digital media (Figure 8). Digital media includes music, photos, and videos. Portable media players enable you to listen to music, view photos, and watch videos, movies, and television shows. With most, you transfer the digital media from a computer (or the Internet, if the device is Internet capable) to the portable media player.



Figure 8 Portable media players typically include a set of earbuds.

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Portable media players usually include a set of earbuds, which are small speakers that rest inside each ear canal. Some portable media player models have a touch screen, while others have a pad that you operate with a thumb or finger, so that you can navigate through digital media, adjust volume, and customize settings. Some portable media players also offer a calendar, address book, games, and other apps.

Internet Research

What are the features of the top e-book readers?

Search for: e-book reader comparison

MINI FEATURE 3

Mobile Device Buyer's Guide

Mobile devices such as smartphones, digital cameras, and portable media players are quite popular among people who are frequently on the go. Research the manufacturers and then consider the following guidelines before purchasing a mobile device.

Smartphone Purchase Guidelines

1. Choose a wireless carrier and plan that satisfies your needs and budget.
2. Decide on the size, style, and weight of the smartphone that will work best for you.
3. Determine whether you prefer an on-screen keyboard, keypad, or mini keyboard.
4. Select a smartphone that is compatible with the program you want to use for synchronizing your email messages, contacts, calendar, and other data.
5. Choose a smartphone with sufficient battery life that meets your lifestyle.
6. Make sure your smartphone has enough memory and storage for contacts, email messages, photos, videos, and apps.
7. Consider purchasing accessories such as extra batteries, earbuds, screen protectors, and carrying cases.



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Digital Camera Purchase Guidelines

1. Determine the type of digital camera that meets your needs, such as a point-and-shoot camera or SLR camera.
2. Choose a camera with an appropriate resolution.
3. Evaluate memory cards because different cameras require different memory cards.
4. Consider a camera with built-in photo editing features.

5. Make sure that you can see the screen easily.
6. If the photos you plan to take will require you to zoom, choose a camera with an appropriate optical zoom.
7. Purchase accessories such as extra batteries and battery chargers, extra memory cards, lenses, and carrying cases.



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Portable Media Player Purchase Guidelines

1. Choose a portable media player with sufficient storage capacity for your media library.
2. Consider a portable media player that can play video.
3. Read reviews about sound quality. Consider higher-quality earbuds, headphones, or external speakers.



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4. Select an appropriate size and style.
 5. Consider additional memory cards to increase the storage capacity of your portable media player.
 6. Consider rechargeable batteries instead of disposable batteries.
-  Although most smartphones also can function as portable media players and digital cameras, would you have a separate portable media player and digital camera? Why?

E-Book Readers

An **e-book reader** (short for electronic book reader), or e-reader, is a mobile device that is used primarily for reading e-books (Figure 9). An e-book, or digital book, is an electronic version of a printed book, readable on computers and other digital devices. In addition to books, you typically can purchase and read other forms of digital media such as newspapers and magazines.

Most e-book reader models have a touch screen, and some are Internet capable. These devices usually are smaller than tablets but larger than smartphones.

Game Devices

A **game console** is a mobile computing device designed for single-player or multi-player video games. Gamers often connect the game console to a television so that they can view their gameplay on the television's screen (Figure 10). Many game console models are Internet capable and also allow you to listen

to music and watch movies or view photos. Typically weighing between three and eleven pounds, the compact size of game consoles makes them easy to use at home, in the car, in a hotel, or any location that has an electrical outlet and a television screen.

A handheld game device is small enough to fit in one hand, making it more portable than the game console. Because of their reduced size, the screens are small — similar in size to some smartphone screens. Some handheld game device models are Internet capable and also can communicate wirelessly with other similar devices for multiplayer gaming.



Figure 9 An e-book reader.
© iStockphoto / Michael Bodmann



Figure 10 Game consoles often connect to a television; handheld game devices contain a built-in screen.

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CONSIDER THIS

Are digital cameras, portable media players, e-book readers, and handheld game devices becoming obsolete because more and more smartphones and tablets include their functionality?

True, many smartphones and tablets enable you to take and store photos; store, organize, and play or view your digital media; read e-books; and play games. This trend of computers and devices with technologies that overlap, called convergence, means that consumers may need fewer devices for the functionality that they require.

Still, consumers often purchase separate stand-alone devices (i.e., a separate digital camera, portable media player, etc.) for a variety of reasons. The stand-alone device (i.e., a digital camera) may have more features and functionality than the combined device offers (i.e., a smartphone). You might want to be able to use both devices at the same time, for example, send text messages on the phone while reading a book on an e-book reader. Or, you might want protection if your combined device (i.e., smartphone) breaks. For example, you still can listen to music on a portable media player if your smartphone becomes nonfunctional.

Data and Information

Computers process data (input) into information (output) and often store the data and resulting information for future use. Data is a collection of unprocessed items, which can include text, numbers, images, audio, and video. Information conveys meaning to users. Both business and home users can make well-informed decisions because they have instant access to information from anywhere in the world.

Many daily activities either involve the use of or depend on information from a computer. For example, as shown in Figure 11, computers process several data items to print information in the form of a cash register receipt.

CONSIDER THIS

Can you give another example of data and its corresponding information?

Your name, address, term, course names, course sections, course grades, and course credits all represent data that is processed to generate your semester grade report. Other information on the grade report includes results of calculations such as total semester hours, grade point average, and total credits.

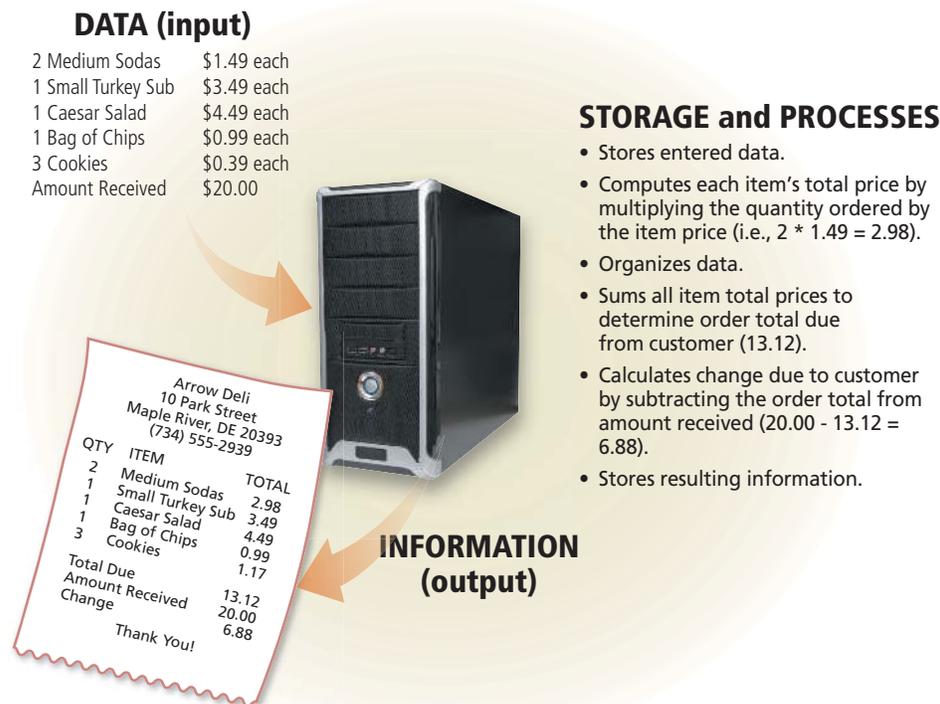


Figure 11

A computer processes data into information. In this simplified example, the item ordered, item price, quantity ordered, and amount received all represent data (input). The computer processes the data to produce the cash register receipt (information, or output).

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Input

Users have a variety of input options for entering data into a computer, many of which involve using an input device. An **input device** is any hardware component that allows you to enter data and instructions into a computer or mobile device. The following sections discuss common input methods.



Mobile Computer Input

If you prefer a desktop keyboard to a laptop's keyboard or a tablet's on-screen keyboard, you can use a desktop keyboard with your mobile computer. Likewise, if you prefer using a mouse instead of a touchpad, you can use a mouse with your mobile computer.



desktop keyboard



laptop keyboard



on-screen keyboard



mini keyboard



virtual keyboard

Figure 12 Users have a variety of keyboard options.

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Courtesy of Virtek, Inc.

Keyboards A keyboard contains keys you press to enter data and instructions into a computer or mobile device (Figure 12). All desktop keyboards have a typing area that includes letters of the alphabet, numbers, punctuation marks, and other basic keys. Some users prefer a wireless keyboard because it eliminates the clutter of a cord.

Keyboards for desktops contain more keys than keyboards for mobile computers and devices. To provide the same functionality as a desktop keyboard, many of the keys on mobile computers and devices serve two or three purposes. On a laptop, for example, you often use the same keys to type numbers and to show various areas on a screen, switching a key's purpose by pressing a separate key first.

Instead of a physical keyboard, users also can enter data via an on-screen keyboard or a virtual keyboard, which is a keyboard that projects from a device to a flat surface.



Pointing Devices A pointing device is an input device that allows a user to control a small symbol on a screen, called the pointer. Desktops typically use a mouse as their pointing device, and laptops use a touchpad (Figure 13).

A mouse is a pointing device that fits under the palm of your hand comfortably. With the mouse, you control movement of the pointer and send instructions to the computer or mobile device. Like keyboards, some users prefer working with a wireless mouse.

A touchpad is a small, flat, rectangular pointing device that is sensitive to pressure and motion. To control the pointer with a touchpad, slide your fingertip across the surface of the pad. On most touchpads, you also can tap the pad's surface to imitate mouse operations such as clicking.

Figure 13 A mouse and a touchpad.

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Voice and Video Input Some mobile devices and computers enable you to speak data instructions using voice input and to capture live full-motion images using video input. With your smartphone, for example, you may be able to use your voice to send a text message, schedule an appointment, and dial a phone number. Or, you may opt for video calling instead of a traditional phone call, so that you and the person you called can see each other as you chat on a computer or mobile device. As in this example, video input usually works in conjunction with voice input. For voice input, you use a microphone, and for video input you use a webcam (Figure 14).



Figure 14 You can speak instructions into a microphone or wireless headset and capture live video on a webcam for a video call.

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A microphone is an input device that enables you to speak into a computer or mobile device. Many computers and most mobile devices contain built-in microphones. You also can talk into a headset, which contains both a microphone and a speaker. Many headsets can communicate wirelessly with the computer or mobile device. A webcam is a digital video camera that allows you to capture video and usually audio input for your computer or mobile device.

Scanners A scanner is a light-sensing input device that converts printed text and images into a form the computer can process (Figure 15). A popular type of scanner works in a manner similar to a copy machine, except that instead of creating a paper copy of the document or photo, it stores the scanned document or photo electronically.



Figure 15 A scanner.

© iStockphoto / Edgaras Marozas

Output

Users have a variety of output options to convey text, graphics, audio, and video — many of which involve using an output device. An **output device** is any hardware component that conveys information from a computer or mobile device to one or more people. The sections on the next page discuss common output methods.

Printers A **printer** is an output device that produces text and graphics on a physical medium such as paper. Printed content sometimes is referred to as a hard copy or printout. Most printers today print text and graphics in both black-and-white and color on a variety of paper types (Figure 16). Some printer models also can print lab-quality photos. A variety of printers support wireless printing, where a computer or other device communicates wirelessly with the printer.



Figure 16 A printer can produce a variety of printed output.

Courtesy of Epson America, Inc.; © designsstock / Shutterstock.com; © iStockphoto / Henrik Jonsson; © maigi / Shutterstock.com



Displays A display is an output device that visually conveys text, graphics, and video information. Displays consist of a screen and the components that produce the information on the screen. The display for a desktop typically is a monitor, which is a separate, physical device. Mobile computers and devices typically integrate the display in their same physical case (Figure 17). Some displays have touch screens.



smartphone display



digital camera display



tablet display



laptop display



monitor display

Figure 17 Displays vary depending on the computer or mobile device.

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CONSIDER THIS

What can you do to ease eyestrain while using a computer or mobile device?

Position the display about 20 degrees below eye level. Clean the screen regularly. Blink your eyes every five seconds. Adjust the room lighting. Face into an open space beyond the screen. Use larger fonts or zoom the display. Take an eye break every 30 minutes. If you wear glasses, ask your doctor about computer glasses.

Speakers Speakers allow you to hear audio, that is, music, voice, and other sounds. Most personal computers and mobile devices have a small internal speaker. Many users attach higher-quality speakers to their computers and mobile devices, including game consoles.

So that only you can hear sound, you can listen through earbuds (shown in Figure 8 on page IT 8) or headphones, which cover or are placed outside of the ear (Figure 18). Both earbuds and headphones usually include noise-cancelling technology to reduce the interference of sounds from the surrounding environment. To eliminate the clutter of cords, users can opt for wireless speakers or wireless headphones.

Memory and Storage

Memory consists of electronic components that store instructions waiting to be executed and the data needed by those instructions. Although some forms of memory are permanent, most memory keeps data and instructions temporarily, which means its contents are erased when the computer is shut off.

Storage, by contrast, holds data, instructions, and information for future use. For example, computers can store hundreds or millions of student names and addresses permanently.

A computer keeps data, instructions, and information on **storage media**. Examples of storage media are hard disks, solid-state drives, USB flash drives, memory cards, and optical discs. The amount of storage for each type of storage media varies, but hard disks, solid-state drives, and optical discs usually hold more than USB flash drives and memory cards. Some storage media are portable, meaning you can remove the medium from one computer and carry it to another computer.

A **storage device** records (writes) and/or retrieves (reads) items to and from storage media. Storage devices often also function as a source of input and output because they transfer items from storage to memory and vice versa. Drives and readers/writers, which are types of storage devices, accept a specific kind of storage media. For example, a DVD drive (storage device) accepts a DVD (storage media).

Hard Disks A hard disk is a storage device that contains one or more inflexible, circular platters that use magnetic particles to store data, instructions, and information. The entire device is enclosed in an airtight, sealed case to protect it from contamination. Desktops and laptops often contain at least one hard disk that is mounted inside the computer's case, called a fixed disk because this hard disk is not portable (Figure 19a on the next page). External hard disks are separate, portable, freestanding hard disks that usually connect to the computer with a cable (Figure 19b on the next page).

Internet Research

What types of earbuds are available?

Search for: earbud reviews



Figure 18 In a crowded environment where speakers are not practical, users can wear headphones to hear music, voice, and other sounds.

© iStockphoto / Photo_Alto

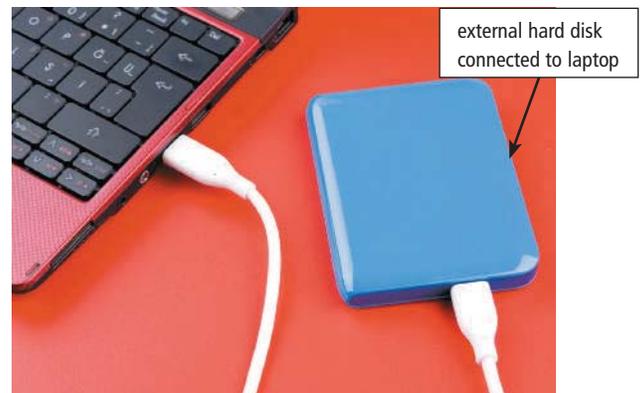
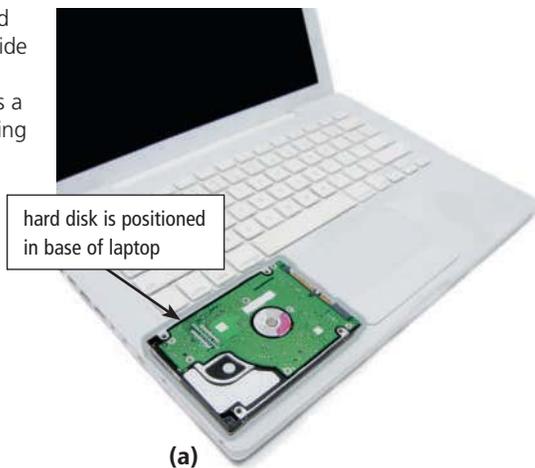
BTW

Disk vs. Disc

The spelling, disk, is used for hard disks and other magnetic media, and disc is used for CDs, DVDs, and other optical media.

Figure 19 A fixed disk is mounted inside a laptop's case; an external hard disk is a separate, freestanding device.

© iStockphoto / Brian Balster; © iStockphoto / murat sarica



(b)



Figure 20 A solid-state drive (SSD) is about the same size as a laptop hard disk.

© iStockphoto / Ludovit Repko

Solid-State Drives A solid-state drive (SSD) is a storage device that typically uses flash memory to store data, instructions, and information. Flash memory contains no moving parts, making it more durable and shock resistant than other types of media. For this reason, some manufacturers are using SSDs instead of hard disks in their desktops, laptops, and tablets (Figure 20).

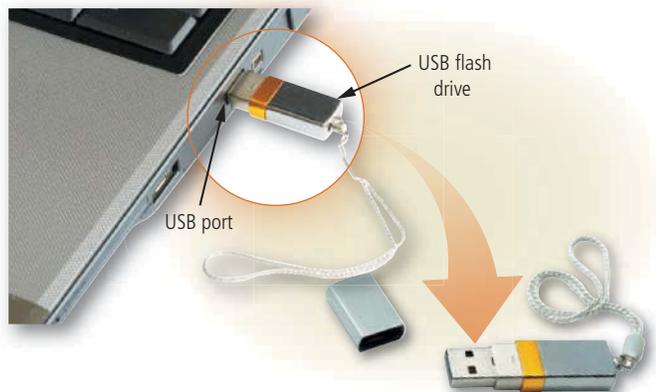


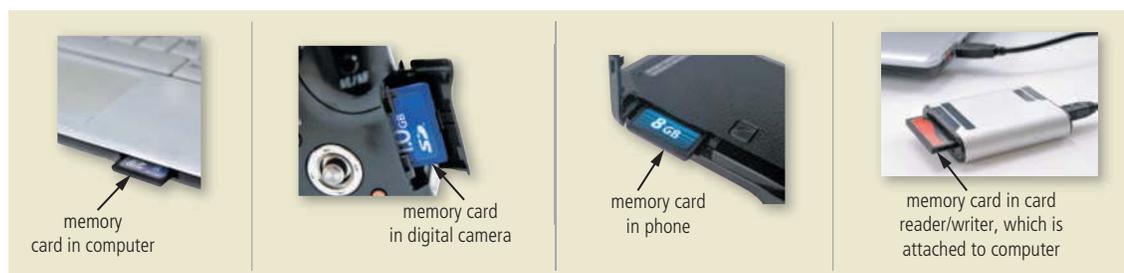
Figure 21 You insert a USB flash drive in a USB port on a computer.

© Pakhnyushcha / Shutterstock.com

USB Flash Drives A USB flash drive is a portable flash memory storage device that you plug in a USB port, which is a special, easily accessible opening on a computer or mobile device (Figure 21). USB flash drives are convenient for mobile users because they are small and lightweight enough to be transported on a keychain or in a pocket.

Figure 22 Computers and mobile devices use a variety of styles of memory cards to store documents, photos, and other items.

© Verisakeet / Fotolia;
© Sonar / Fotolia;
© Xuejun li / Fotolia;
© uwimages / Fotolia



Memory Cards A memory card is removable flash memory, usually no bigger than 1.5 inches in height or width, that you insert in and remove from a slot in a computer, mobile device, or card reader/writer (Figure 22). With a card reader/writer, you can transfer the stored items, such as digital photos, from a memory card to a computer or printer that does not have a built-in card slot.

Optical Discs An optical disc is a type of storage media that consists of a flat, round, portable metal disc made of metal, plastic, and lacquer that is written and read by a laser. CDs (compact discs) and DVDs (digital versatile discs) are two types of optical discs (Figure 23).



Figure 23 You can insert a DVD in a DVD drive on a computer.
© iStockphoto / Hanquan Chen

CONSIDER THIS

What is the general use for each type of storage media?

Hard disks and SSDs store software and all types of user files. A file is a named collection of stored data, instructions, or information and can contain text, images, audio, and video. Memory cards and USB flash drives store files you intend to transport from one location to another, such as a homework assignment or photos. Optical discs generally store software, photos, movies, and music.

Cloud Storage Instead of storing data, instructions, and information locally on a hard disk or other media, you can opt for cloud storage. Cloud storage is an Internet service that provides storage to computer users (Figure 24).

Types of services offered by cloud storage providers vary. Some provide storage for specific types of media, such as photos, whereas others store any content and provide backup services. A backup is a duplicate of content on a storage medium that you can use in case the original is lost, damaged, or destroyed. Read Secure IT 1 on the next page for suggestions for backing up your computers and mobile devices.



Figure 24 JustCloud is an example of a website that provides cloud storage solutions to home and business users.

Source: JustCloud.com

SECURE IT 1

Backing Up Computers and Mobile Devices

Many factors, including power outages and hardware failure, can cause loss of data, instructions, or information on a computer or mobile device. To protect against loss, you should back up the contents of storage media regularly. Backing up can provide peace of mind and save hours of work attempting to recover important material in the event of loss.

A backup plan for computers could include the following:

- Use a backup program, either included with your computer's operating system or one that you purchased separately, to copy the contents of your entire hard disk to a separate device.
- Regularly copy music, photos, videos, documents, and other important items to a USB flash drive, external hard disk, or DVD.
- Subscribe to a cloud storage provider.
- Schedule your files to be backed up regularly.

Backup plans for mobile devices are less specific. Apps for backing up your smartphone or tablet's content are available. You also can

back up a mobile device to your computer's hard disk using synchronization software that runs on your computer. Some mobile device manufacturers, such as Apple, provide cloud storage solutions to owners of their devices. Other services allow subscribers to use a friend's computer as a backup storage location.

Overall, the best advice is to back up often using a variety of methods.

☀ Do you back up files regularly? If not, why not? What would you do if you had no backup and then discovered that your computer or mobile device had failed?



Courtesy of Western Digital Corporation; © iStockphoto / Stephen Krow; © Cengage Learning

NOW YOU KNOW

Be sure you understand the material presented in the sections titled Computers, Mobile and Game Devices, and Data and Information, as it relates to the chapter objectives.

You now should know . . .

- Which type of computer might be suited to your needs (Objective 1)
- Why you would use a smartphone, digital camera, portable media player, and an e-book reader, and which game software/apps you find interesting (Objective 2)
- How to recognize the difference between data and information (Objective 3)
- When you might use the various methods of input, output, and storage (Objective 4)

The Internet

The **Internet** is a worldwide collection of computer networks that connects millions of businesses, government agencies, educational institutions, and individuals (Figure 25). The Internet provides society with access to global information and instant communications.

Businesses, called Internet service providers (ISPs), offer users and organizations access to the Internet free or for a fee. By subscribing to an ISP, you can connect to the Internet through your computers and mobile devices.

Today, more than two billion home and business users around the world access a variety of services on the Internet. The World Wide Web is one of the more widely used Internet services. Other popular services include email, instant messaging, VoIP, and FTP (all discussed later in this chapter).



Web vs. Internet

The terms, web and Internet, should not be used interchangeably. The web is a service of the Internet.



Figure 25 The Internet is the largest computer network, connecting millions of computers and devices around the world.

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The World Wide Web

The World Wide Web (or web, for short) is a global library of information available to anyone connected to the Internet. People around the world access the web to accomplish a variety of online tasks, including:

- Search for information
- Conduct research
- Communicate with and meet other people
- Share information, photos, and videos with others
- Access news, weather, and sports
- Participate in online training
- Shop for goods and services
- Play games with others
- Download or listen to music
- Watch videos
- Download or read books

The **web** consists of a worldwide collection of electronic documents. Each electronic document on the web is called a **webpage**, which can contain text, graphics, audio, and video (Figure 26).



Downloading

Downloading is the process of transferring content from a server on the Internet to a computer or mobile device.

Figure 26 Webpages, such as the one shown here, can display text, graphics, audio, and video on a computer or mobile device. Pointing to a link on the screen typically changes the shape of the pointer to a small hand with a pointing index finger.

Source: WTMJ



Webpages often contain links. A link, short for hyperlink, is a built-in connection to other documents, graphics, audio files, videos, webpages, or websites. To activate an item associated with a link, you tap or click the link. In Figure 26 on the previous page, for example, tapping or clicking the audio link connects to a live radio show so that you can hear the broadcast. A text link often changes color after you tap or click it to remind you visually that you previously have visited the webpage or downloaded the content associated with the link.

Links allow you to obtain information in a nonlinear way. That is, instead of accessing topics in a specified order, you move directly to a topic of interest. Some people use the phrase surfing the web to refer to the activity of using links to explore the web.

A **website** is a collection of related webpages, which are stored on a web server. A **web server** is a computer that delivers requested webpages to your computer or mobile device.

Web Browsing

A **browser** is software that enables users with an Internet connection to access and view webpages on a computer or mobile device. Some widely used browsers include Internet Explorer, Firefox, Safari, and Google Chrome. Read How To 1 for instructions about using a browser to display a webpage on a computer or mobile device.

HOW TO 1

Use a Browser to Display a Webpage

The following steps describe how to use a browser to display a webpage on a computer or mobile device:

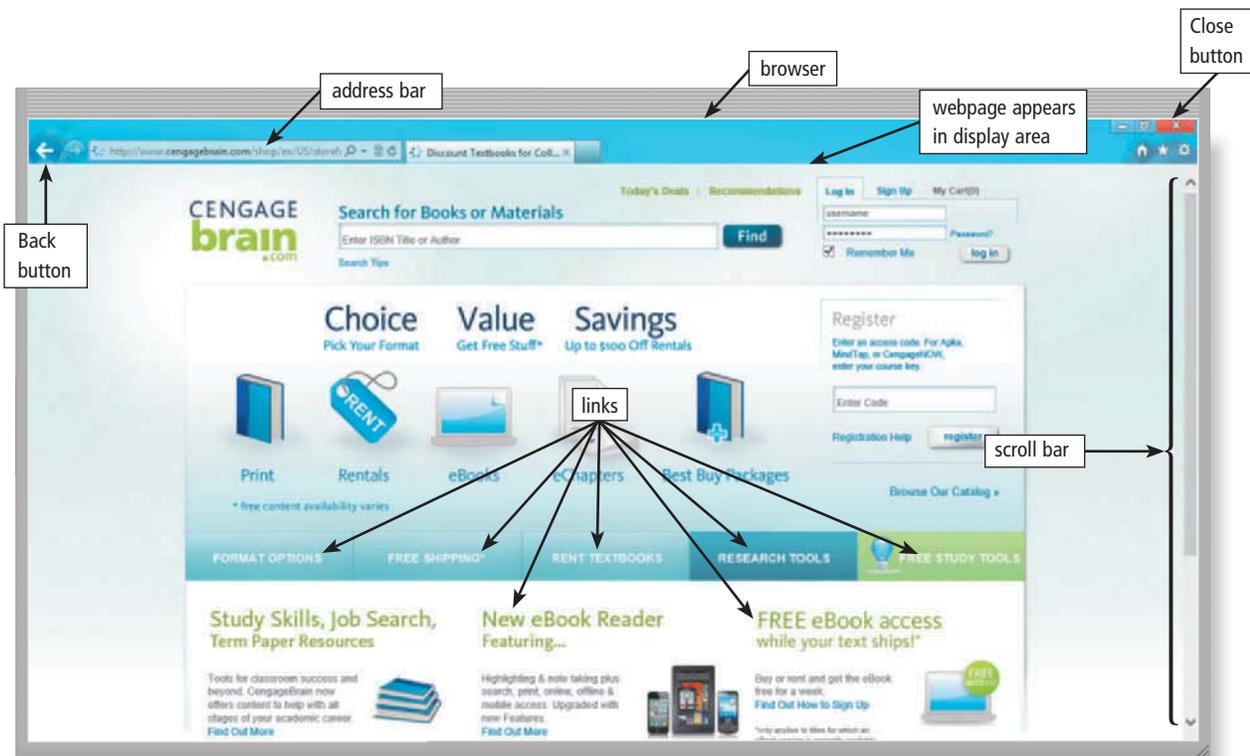
1. Run the browser. (For instructions on running programs and apps, see How To 3 and How To 4 on page IT 27.)
2. If necessary, tap or click the address bar to select it and any previously displayed web address it may contain. (A web

address is a unique address that identifies a webpage.)

3. In the address bar, type the web address of the webpage you want to visit and then press the ENTER key or tap or click the Go (or similar) button to display the webpage. For example, www.cengagebrain.com is a valid web address, which displays the CengageBrain webpage shown in the figure below.

4. If necessary, scroll to view the entire webpage. You can scroll either by sliding your finger across a touch screen or by using a pointing device, such as a mouse, to drag the scroll bar.
5. Tap or click links on the webpage to navigate to the link's destination.

 What should you do if the web address you enter does not display a webpage or you receive an error message?



Source: Cengage Learning

Web Searching

A primary reason that people use the web is to search for specific information, including text, photos, music, and videos. The first step in successful searching is to identify the main idea or concept in the topic about which you are seeking information. Determine any synonyms, alternate spellings, or variant word forms for the topic. Then, use a search engine, such as Google, to help you locate the information. A **search engine** is software that finds websites, webpages, images, videos, news, maps, and other information related to a specific topic. Read How To 2 for instructions about how to perform a basic web search using a search engine on a computer or mobile device.

HOW TO 2

Perform a Basic Web Search

The following steps describe how to use a search engine on a computer or mobile device to perform a basic web search:

1. Run a browser. (For instructions on running programs and apps, see How To 3 and How To 4 on page IT 27.)
2. If the browser does not contain a separate Search box near the address bar, display the search engine's webpage on the screen by entering its web address in the address bar. For example, you could type `google.com` to display the Google

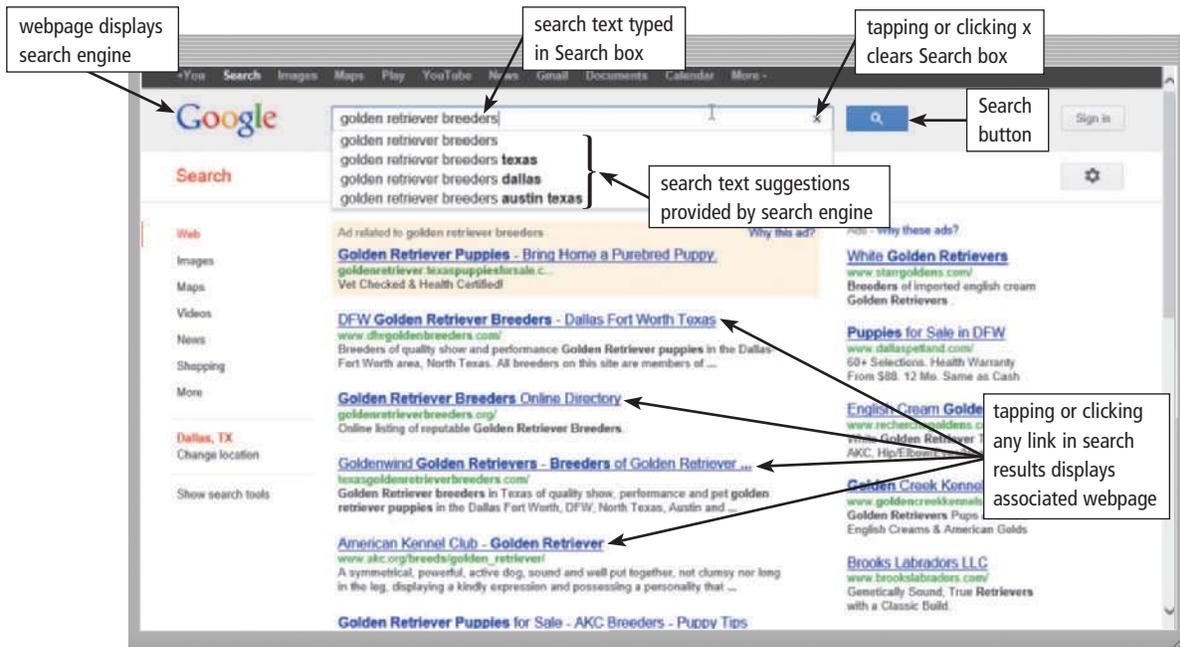
search engine, `bing.com` to display the Bing search engine, or `yahoo.com` to display the Yahoo! search engine.

3. Tap or click the Search box and then type the desired search text in the Search box. The more descriptive the search text, the easier it will be to locate the desired search results. As the figure shows, the search engine may provide search text suggestions as you type search text in the Search box.
4. To display search results based on your typed search text, press the ENTER key or tap or click the Search button.

To display search results based on one of the suggestions provided by the search engine, tap or click the desired search text suggestion.

5. Scroll through the search results and then tap or click a search result to display the corresponding webpage.
6. To return to the search results, tap or click the Back button in your browser, which typically looks like a left-pointing arrow.

 What search text would you enter to locate the admission criteria for your school?



Source: Google Inc.

Online Social Networks

An **online social network**, also called a **social networking site**, is a website that encourages members in its online community to share their interests, ideas, stories, photos, music, and videos with other registered users (Figure 27 on the next page). Popular social networking sites include Facebook, Twitter, and LinkedIn.

Some social networking sites have no specialized audience; others are more focused. A photo sharing site, for example, is a specific type of social networking site that allows users to create an online photo album and store and share their digital photos. Similarly, a video sharing site is a type of social networking site that enables users to store and share their personal videos.

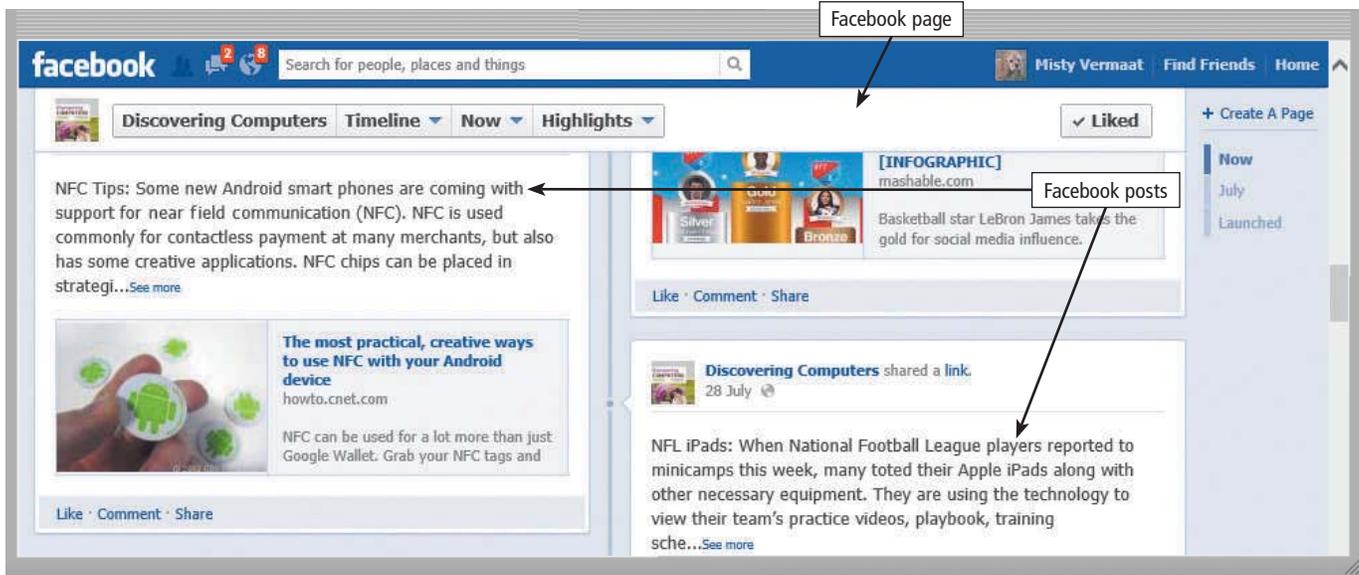


Figure 27 When Facebook users ‘like’ this Facebook page, the posts shown here appear on their own personal pages.
 Source: Facebook

CONSIDER THIS

BTW
Blogs

Posts on Twitter also form a blog, because of its journal format with the most recent entry at the top.

How do Facebook, Twitter, and LinkedIn differ?

With Facebook, you share messages, interests, activities, events, photos, and other personal information — called posts — with family and friends. You also can ‘like’ pages of celebrities, companies, products, etc., so that posts on these pages appear on your Facebook page. With Twitter, you ‘follow’ people, companies, and organizations in which you have an interest. Twitter enables you to stay current with the daily activities of those you are following via their Tweets, which are short posts (messages) that Tweepsters broadcast for all their followers.

On LinkedIn, you share professional interests, education, and employment history, and add colleagues or coworkers to your list of contacts. You can include recommendations from people who know you professionally. Many employers post jobs using LinkedIn and consider information in your profile as your online resume.

Read Ethics & Issues 2 to consider whether employees should be held accountable for their social networking posts.

ETHICS & ISSUES 2

Should Employees Be Held Accountable for Their Social Networking Posts?

Companies no longer solely rely on a resume and interview to consider you as a potential employee. At a minimum, the hiring manager may search the web to find out any information readily available about you. This includes your use of social networking or blogging sites, such as Facebook or Twitter. Once employed, your manager still may track and review your online presence. You might believe your posts and photos should be your own business. Some companies, however, feel that what you say and do online, as well as what others say about you, could reflect poorly on them and, thus, should affect your employment. These companies are worried not only about their reputations but also

potential red flags. For example, companies may be on the lookout for employees who discuss company sales activity on their blogs, gripe about their managers on Twitter, or have Facebook photos that show them taking part in unethical, illegal, or unsavory activities.

Social network-related firings have made headlines. Two examples include a CFO (chief financial officer) fired for blogging details about his publicly traded company and a teacher fired for making disparaging remarks on her Facebook page about students and their parents. Accessing an employee’s or a potential employee’s social networking profile also could have consequences for the company. For example, if a company realizes that a person is a member of a minority group or has a disability, the company could face

discrimination charges if it does not hire or later fires the employee. Debate regarding what falls under free speech is ongoing. Remember that what you post online is not deleted easily. Whether or not you currently are searching for a job, online posts you make now can damage your future employment opportunities.

What are the results when you search for yourself online? What steps can you take to clean up and protect your online reputation? Would you share social networking accounts or passwords with an employer or potential employer? Why or why not? Should companies be allowed to view and monitor employees’ accounts? Why or why not?

Internet Communications

The web is only one of the services on the Internet. Some of the other services on the Internet facilitate communications among users:

- Email allows you to send messages to and receive messages and files from other users via a computer network.
- With instant messaging (IM), you can have a real-time typed conversation with another connected user (real-time means that both of you are online at the same time).
- VoIP enables users to speak to other users over the Internet.
- With FTP, users can transfer items to and from other computers on the Internet.

Digital Security and Safety

People rely on computers to create, store, and manage their information. To safeguard this information, it is important that users protect their computers and mobile devices. Users also should be aware of health risks and environmental issues associated with using computers and mobile devices.

Viruses and Other Malware

Malware, short for malicious software, is software that acts without a user's knowledge and deliberately alters the computer's and mobile device's operations. Examples of malware include viruses, worms, trojan horses, rootkits, spyware, adware, and zombies. Each of these types of malware attacks your computer or mobile device differently. Some are harmless pranks that temporarily freeze, play sounds, or display messages on your computer or mobile device. Others destroy or corrupt data, instructions, and information stored on the infected computer or mobile device. If you notice any unusual changes in the performance of your computer or mobile device, it may be infected with malware. Read Secure IT 2 for ways to protect computers from viruses and other malware.



Malware

A leading maker of security software claims its software blocked more than five billion malware attacks in a single year.

SECURE IT 2

Protection from Viruses and Other Malware

Although it is impossible to ensure a virus or malware never will attack a computer, you can take steps to protect your computer by following these practices:

- **Use virus protection software.** Install a reputable antivirus program and then scan the entire computer to be certain it is free of viruses and other malware. Update the antivirus program and the virus signatures (known specific patterns of viruses) regularly.
- **Use a firewall.** Set up a hardware firewall or install a software firewall that protects your network's resources from outside intrusions.
- **Be suspicious of all unsolicited email attachments.** Never open an email attachment unless you are expecting it *and* it is from a trusted source.

When in doubt, ask the sender to confirm the attachment is legitimate before you open it. Delete or quarantine flagged attachments immediately.

- **Disconnect your computer from the Internet.** If you do not need Internet access, disconnect the computer from the Internet. Some security experts recommend disconnecting from the computer network before opening email attachments.
- **Download software with caution.** Download programs or apps only from websites you trust, especially those with music and movie sharing software.
- **Close spyware windows.** If you suspect a pop-up window (rectangular area that suddenly appears on your screen) may be spyware, close the window. Never click an Agree or OK button in a suspicious window.

- **Before using any removable media, scan it for malware.** Follow this procedure even for shrink-wrapped software from major developers. Some commercial software has been infected and distributed to unsuspecting users. Never start a computer with removable media inserted in the computer unless you are certain the media are uninfected.
- **Keep current.** Install the latest updates for your computer software. Stay informed about new virus alerts and virus hoaxes.
- **Back up regularly.** In the event your computer becomes unusable due to a virus attack or other malware, you will be able to restore operations if you have a clean (uninfected) backup.

-  What precautions do you take to prevent viruses and other malware from infecting your computer? What new steps will you take to attempt to protect your computer?

Privacy

Nearly every life event is stored in a computer somewhere . . . in medical records, credit reports, tax records, etc. In many instances, where personal and confidential records were not protected properly, individuals have found their privacy violated and identities stolen. Some techniques you can use to protect yourself from identity theft include shredding financial documents before discarding them, never tapping or clicking links in unsolicited email messages, and enrolling in a credit monitoring service.

Adults, teens, and children around the world are using online social networks to share their photos, videos, journals, music, and other personal information publicly. Some of these unsuspecting, innocent computer users have fallen victim to crimes committed by dangerous strangers. Protect yourself and your dependents from these criminals by being cautious in email messages and on websites. For example, do not share information that would allow others to identify or locate you and do not disclose identification numbers, user names, passwords, or other personal security details. A user name is a unique combination of characters, such as letters of the alphabet or numbers, that identifies one specific user. A password is a private combination of characters associated with a user name. Read Secure IT 3 for tips on creating strong passwords.

Internet Research

What are other techniques that deter identity theft?

Search for: prevent identity theft

SECURE IT 3

Creating Strong Passwords

A good password is easy for you to remember but difficult for criminals and password-breaking software to guess. Use these guidelines to create effective, strong passwords:

- **Personal information:** Avoid using any part of your first or last name, your family members' names, phone number, street address, license plate number, Social Security number, or birth date.
- **Length:** Use at least eight characters.
- **Difficulty:** Use a variety of uppercase and lowercase letters, numbers, punctuation, and symbols. Select characters located on different parts of the keyboard, not the ones you commonly use or that are adjacent

to each other. Criminals use software that converts common words to symbols, so changing the word, two, to the numeral, 2, or the word, and, to the ampersand symbol, &, is not likely to foil a thief.

- **Modify:** Change the password frequently, at least every three months.
- **Variation:** Do not use the same password for all accounts. Once criminals have stolen a password, they attempt to use that password for other accounts they find on your computer or mobile device, especially banking websites.
- **Passphrase:** A passphrase, which is similar to a password, consists of several words separated by spaces. Security

experts recommend misspelling a few of the words and adding several numerals. For example, the phrase, "Create a strong password," could become the passphrase, "Creaet a strang pasword42."

- **Common sequences:** Avoid numbers or letters in easily recognized patterns, such as "asdfjkl," "12345678," "09870987," or "abcdefg." Also, do not spell words backwards or use common abbreviations.
- **Test:** Use online tools to evaluate password strength.

 How strong are your passwords? How will you modify your passwords using some of these guidelines?

Health Concerns

Prolonged or improper computer use can lead to injuries or disorders of the hands, wrists, elbows, eyes, neck, and back. Computer users can protect themselves from these health risks through proper workplace design, good posture while at the computer, and appropriately spaced work breaks.

Two behavioral health risks are technology addiction and technology overload. Technology addiction occurs when someone becomes obsessed with using technology. Individuals suffering from technology overload feel distressed when deprived of computers and mobile devices. Once recognized, both technology addiction and technology overload are treatable disorders.

Environmental Issues

Manufacturing processes for computers and mobile devices along with e-waste, or discarded computers and mobile devices, are depleting natural resources and polluting the environment. When computers and mobile devices are stored in basements or other locations, disposed in landfills, or burned in incinerators, they can release toxic materials and potentially dangerous levels of lead, mercury, and flame retardants.

Green computing involves reducing the electricity consumed and environmental waste generated when using a computer. Strategies that support green computing include recycling, using energy efficient hardware and energy saving features, regulating manufacturing processes, extending the life of computers, and immediately donating or properly disposing of replaced computers. When you purchase a new computer, some retailers offer to dispose of your old computer properly.

CONSIDER THIS

How can you contribute to green computing?

Some habits you can alter that will help reduce the environmental impact of computing include the following:

1. Do not leave a computer or device running overnight.
2. Turn off your monitor, printer, and other devices when you are not using them.
3. Use energy efficient hardware.
4. Use paperless methods to communicate.
5. Recycle paper and buy recycled paper.
6. Recycle toner, computers, mobile devices, printers, and other devices.
7. Telecommute.
8. Use videoconferencing and VoIP for meetings.

Programs and Apps

Software, also called a **program**, consists of a series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them.

Two categories of software are system software and application software. System software consists of the programs that control or maintain the operations of the computer and its devices. Operating systems are a widely recognized example of system software. Other types of system software, sometimes called tools, enable you to perform maintenance-type tasks usually related to managing devices, media, and programs used by computers and mobile devices. The next sections discuss operating systems and application software.

Operating Systems

An operating system is a set of programs that coordinates all the activities among computer or mobile device hardware. It provides a means for users to communicate with the computer or mobile device and other software. Many of today's computers and mobile devices use a version of Microsoft's Windows, Apple's Mac OS, Apple's iOS, or Google's Android (Figure 28).

To use application software, your computer or mobile device must be running an operating system.



Figure 28 Shown here are the Mac OS and Windows operating systems for personal computers and the Android and iOS operating systems for smartphones and tablets. You interact with these operating system interfaces by tapping or clicking their icons or tiles.

Source: Apple Inc.; Apple Inc.; Google Inc.; Microsoft.

Applications

Application software, usually simply called an **application** (or **app** for short), consists of programs designed to make users more productive and/or assist them with personal tasks. Browsers, discussed in an earlier section, are an example of an application that enables users with an Internet connection to access and view webpages. Table 1 identifies the categories of applications with samples of ones commonly used in each category.

Applications include programs stored on a computer, as well as those on a mobile device or delivered to your device over the Internet. The term, desktop app, often is used to describe applications stored on a computer. The term, web app is an application stored on a web server that you access through a browser. A mobile app is an application you download from a mobile device's application store or other location on the Internet to a smartphone or other mobile device. Some applications are available as both a web app and a mobile app.

Table 1 Categories of Applications

Category	Sample Applications	Sample Uses
Productivity 	Word Processing Presentation Calendar and Contact Management Personal Finance	Create letters, reports, and other documents. Create visual aids for presentations. Organize appointments and contact lists. Balance checkbook, pay bills, and track income and expenses.
Graphics and Media 	Photo Editing Video and Audio Editing Media Player	Modify digital photos, i.e., crop, remove red-eye, etc. Modify recorded movie clips, add music, etc. View images, listen to audio/music, watch videos.
Personal Interest 	Travel, Mapping, and Navigation Reference Educational Entertainment	View maps, obtain route directions, locate points of interest. Look up material in dictionaries, encyclopedias, etc. Learn through tutors and prepare for tests. Receive entertainment news alerts, check movie times and reviews, play games.
Communications 	Browser Email VoIP FTP	Access and view webpages. Send and receive messages. Speak to other users over the Internet. Transfer items to and from other computers on the Internet.
Security 	Antivirus Personal Firewall Spyware, Adware, and other Malware Removers	Protect a computer against viruses. Detect and protect against unauthorized intrusions. Detect and delete spyware, adware, and other malware.

Installing and Running Applications

Installing software is the process of setting up software to work with a computer, printer, and other hardware. When you buy a computer, it usually has some software such as an operating system preinstalled on its hard disk so that you can use the computer the first time you turn it on. Installed operating systems often include other programs such as a browser, media player, and calculator. To use additional desktop apps on a computer, you usually need to install the software. Mobile apps typically install automatically after you transfer the app's files to your device from its website. You usually do not need to install web apps before you can run them.

Once installed, you can run an application so that you can interact with it. When you instruct a computer or mobile device to run an application, the computer or mobile device loads its software, which means the application is copied from storage to memory. Once in memory, the computer or mobile device can carry out, or execute, the instructions in the application so that you can use it.

You interact with a program or application through its user interface. The user interface controls how you enter data and instructions and how information is displayed on the screen. Often, you work with icons or tiles (shown in Figure 28 on page IT 25), which are miniature images that link to programs, media, documents, or other objects. Read How To 3 for instructions about locating, downloading, and installing applications; and read How To 4 for instructions about locating, installing, and running mobile apps.



HOW TO 3

Install, Run, and Exit an Application

The following steps describe how to install, run, and exit an application on a computer.

Locate the Application

- Locate the application to install. Applications are available from retail stores, websites, and from other services such as Apple's App Store or Google Play.

Download and/or Install the Application

- If you are installing an application from physical media such as a CD or DVD, insert the media in your computer. If the installation does not start automatically, locate the installation program on the media and then double-tap or double-click the installation program.

- If the application is available from a website or online store, download the application to your computer. Once the download is complete, if the installation does not start automatically, locate and then double-tap or double-click the downloaded file to begin the installation.

Run the Application

- You have various options for running an application:
 - Tap or click the application's tile or double-tap or double-click the application's icon in the desktop.
 - Display a list of all applications on your computer and then tap or click the icon representing the application to run (some computers may require

you to double-tap or double-click the icon).

- Use the search feature in the operating system to locate the newly installed application and then tap or click the search result to run the application.

Exit the Application

- Locate and tap or click an Exit or Close button or an Exit or Close command, which often can be found on an application's File menu.
- Locate and tap or click the Close button on the application's title bar (horizontal space at top of window).

If you run a second application without first exiting the one you are using, how can you return to the first application?



HOW TO 4

Locate, Install, and Run a Mobile App

The following steps describe how to locate, install, and run an app on a mobile device:

1. Navigate to the online store for your device. Common stores used to obtain apps include Apple's App Store and Google Play.
2. Use the search feature to browse for the type of app you would like to download

and install. If the app is not free, follow the payment instructions.

3. Tap or click the appropriate button to download the desired app. Depending on your device, you may need to enter additional information, such as a password, to download the app. Once the app downloads, it should install automatically.

4. Locate the app's icon on your device and then tap or click the icon to run the app. Depending on the app, you may have to create a profile, which contains personal data about a user, or enter your email address.

After installing an app on your device, what are some locations you might look to find the new app's icon or tile?

CONSIDER THIS

How do you know if a program will run on your computer?

When you buy a computer, the box, the manufacturer's website, or the order summary will list the computer's specifications. Similarly, when you buy software, the software box or the product's website will list specifications and minimum requirements for memory, speed, and more. Your computer's specifications should be the same as or greater than the software specifications. Ensure the software will run on your computer before making a purchase, because many retailers will not allow you to return software.

Developing Programs and Apps

A software developer, sometimes called an application developer or computer programmer, is someone who develops programs and apps or writes the instructions that direct the computer or mobile device to process data into information. When writing instructions, a developer must be sure the program or app works properly so that the computer or mobile device generates the desired results. Complex programs can require thousands to millions of instructions.

Software developers use a programming language or program development tool to create computer programs and apps. Popular programming languages include C++, Java, JavaScript, Visual C#, and Visual Basic. Figure 29 shows some of the Visual Basic instructions a programmer may write to create a simple payroll program.

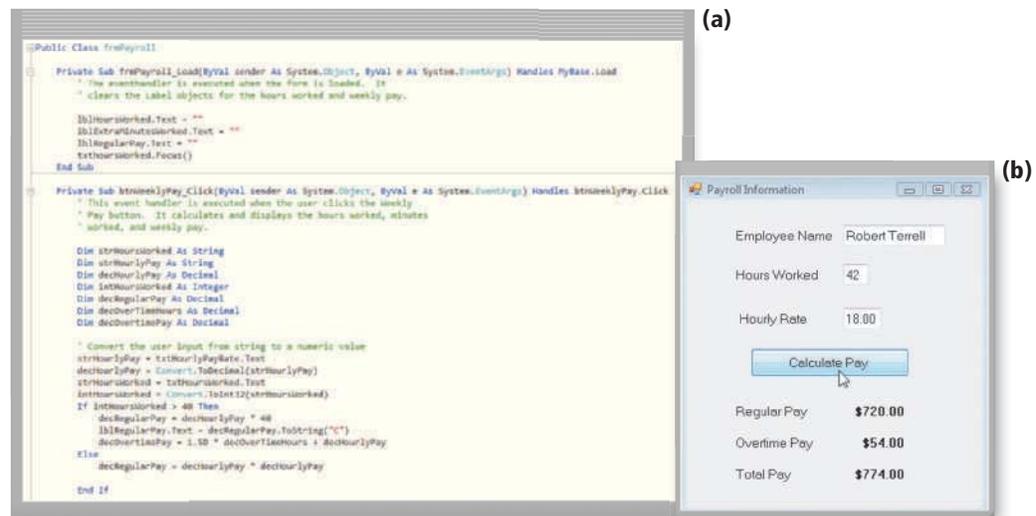


Figure 29

A developer writes instructions using Visual Basic (a) to create the Payroll Information window shown here (b).

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NOW YOU KNOW

Be sure you understand the material presented in the sections titled The Internet, Digital Security and Safety, and Programs and Apps, as it relates to the chapter objectives.

You now should know . . .

- Why webpages use links (Objective 5)
- How you could use a browser to display a webpage and how to perform a basic web search (Objective 6)
- What risks you are exposed to as a result of your technology use and how you can minimize those risks (Objective 7)
- How to recognize an operating system and which programs and apps you might find useful (Objective 8)

Communications and Networks

Communications technologies are everywhere. Many require that you subscribe to an Internet service provider. With others, an organization such as a business or school provides communications services to employees, students, or customers.

In the course of a day, it is likely you use, or use information generated by, one or more of the communications technologies in Table 2.

Table 2 Uses of Communications Technologies

Type	Brief Description
Chat rooms	Real-time typed conversation among two or more people on a computers or mobile devices connected to a network
Email	Transmission of messages and files via a computer network
Fax	Transmission and receipt of documents over telephone lines
FTP	Permits users to transfer files to and from servers on the Internet
GPS	Navigation system that assists users with determining their location, ascertaining directions, and more
Instant messaging	Real-time typed conversation with another connected user where you also can exchange photos, videos, and other content
Internet	Worldwide collection of networks that links millions of businesses, government agencies, educational institutions, and individuals
Newsgroups	Online areas in which users have written discussions about a particular subject
RSS	Specification that enables web content to be distributed to subscribers
Videoconference	Real-time meeting between two or more geographically separated people who use a network to transmit audio and video
Voice mail	Allows users to leave a voice message for one or more people
VoIP	Conversation that takes place over the Internet using a phone connected to a computer, mobile device, or other device
Wireless Internet access points	Enables users with computers and mobile devices to connect to the Internet wirelessly
Wireless messaging services	Send and receive wireless messages to and from smartphones, mobile phones, handheld game devices, and other mobile devices using text messaging and picture/video messaging

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Wired and Wireless Communications

Computer communications describes a process in which two or more computers or devices transfer (send and receive) data, instructions, and information over transmission media via a communications device(s). A **communications device** is hardware capable of transferring items from computers and devices to transmission media and vice versa. Examples of communications devices are modems, wireless access points, and routers. As shown in Figure 30, some communications involve cables and wires; others are sent wirelessly through the air.

Wired communications often use some form of telephone wiring, coaxial cable, or fiber-optic cables to send communications signals. The wiring or cables typically are used within buildings or underground between buildings.

Because it is more convenient than installing wires and cables, many users opt for wireless communications, which sends signals through the air or space. Examples of wireless communications technologies include Wi-Fi, Bluetooth, and cellular radio:

- Wi-Fi uses radio signals to provide high-speed Internet and network connections to computers and devices capable of communicating via Wi-Fi. Most computers and many mobile devices, such as smartphones and portable media players, can connect to a Wi-Fi network.
- Bluetooth uses short-range radio signals to enable Bluetooth-enabled computers and devices to communicate with each other. For example, Bluetooth headsets allow you to connect a Bluetooth-enabled phone to a headset wirelessly.



Figure 30 Modems, wireless access points, and routers are examples of communications devices that enable communications between computers/mobile devices and the Internet. Notice that some computers and devices communicate via wires and others communicate wirelessly.

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- Cellular radio uses the cellular network to enable high-speed Internet connections to devices with built-in compatible technology, such as smartphones. Cellular network providers use the categories 3G, 4G, and 5G to denote cellular transmission speeds, with 5G being the fastest.

Wi-Fi and Bluetooth are both hot spot technologies. A hot spot is a wireless network that provides Internet connections to mobile computers and devices. Wi-Fi hot spots provide wireless network connections to users in public locations such as airports and airplanes, train stations, hotels, convention centers, schools, campgrounds, marinas, shopping malls, bookstores, libraries, restaurants, coffee shops, and more. Bluetooth hot spots provide location-based services, such as sending coupons or menus, to users whose Bluetooth-enabled devices enter the coverage range. Read Secure IT 4 for tips on protecting your personal data while using a public hot spot.

SECURE IT 4

Using Public Wi-Fi Hot Spots Safely

Connecting wirelessly to a public hot spot at your local coffee shop or at the airport can be convenient and practical. Using this free service can be risky, however, because cybercriminals lurk in these areas hoping to gain access to confidential information on your computer or mobile device. Follow these guidelines for a safer browsing experience:

- **Avoid typing passwords and financial information.** Identity thieves are on the lookout for people who sign in to accounts, enter their credit card account numbers in shopping websites, or conduct online banking transactions. If you must type this personal information, be certain the web address begins with "https," not "http." If the web address

changes to "http," sign out of (end your Internet session) immediately.

- **Sign out of websites.** When finished using an account, sign out of it and close the window.
- **Disable your wireless connection.** If you have finished working online but still need to use the computer, disconnect from the wireless connection.
- **Do not leave the computer unattended.** It may seem obvious, but always stay with your computer or mobile device. Turning your back to talk with a friend or to refill your coffee gives thieves a few seconds to steal sensitive information that may be displayed on the screen.
- **Beware of over-the-shoulder snoopers.** The person sitting behind you

may be watching or using a camera phone to record your keystrokes, read your email messages and social networking posts, and view your photos and videos.

- ☀ How will you apply these precautions the next time you use a public Wi-Fi hot spot? Should businesses post signs alerting customers about Wi-Fi security issues?



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Figure 31 A server manages the resources on a network, and clients access the resources on the server. This network enables three separate computers to share the same printer, one wirelessly.

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Networks

A **network** is a collection of computers and devices connected together, often wirelessly, via communications devices and transmission media. Networks allow computers to share resources, such as hardware, software, data, and information. Sharing resources saves time and money. In many networks, one or more computers act as a server. The server controls access to the resources on a network. The other computers on the network, each called a client, request resources from the server (Figure 31). The major differences between the server and client computers are that the server typically has more power, more storage space, and expanded communications capabilities.

Many homes and most businesses and schools network their computers and devices. Most allow users to connect their computers wirelessly to the network.

Users often are required to sign in to, or log on, a network, which means they enter a user name and password (or other credentials) to access the network and its resources.

Home Networks Home networks save the home user money and provide many conveniences. Each networked computer or mobile device on a home network has the following capabilities:

- Connect to the Internet at the same time
- Share a single high-speed Internet connection
- Access photos, music, videos, and other content on computers and devices throughout the house
- Share devices such as a printer, scanner, or external hard disk
- Play multiplayer games with players on other computers and mobile devices in the house
- Connect game consoles to the Internet
- Subscribe to and use VoIP

Home networks usually are small, existing within a single structure, and use wireless technologies such as those shown in Figure 30 on page IT 29. You do not need extensive knowledge of networks to set up a home network. You will need a communications device, such as a router, which usually includes setup instructions. Most operating systems also provide tools enabling you easily to connect all the computers and devices in your house.

Business Networks Business and school networks can be small, such as in a room or building, or widespread, connecting computers and devices across a city, country, or the globe. Some reasons that businesses network their computers and devices together include the following:

- **Facilitate communications.** Using a network, employees and customers communicate efficiently and easily via email, instant messaging, blogs, online social networks, video calls, online meetings, video conferencing, VoIP, wireless messaging services, and more.
- **Share hardware.** In a networked environment, each computer on the network can access the hardware on the network, instead of providing each user with the same piece of hardware. For example, computer and mobile device users can access the laser printer on the network, as they need it.
- **Share data, information, and software.** In a networked environment, any authorized computer user can access data, information, and software stored on other computers on the network. A large company, for example, might have a database of customer information that any authorized user can access.

Uses of Technology in Society

Technology has changed society today as much as the industrial revolution changed society in the eighteenth and nineteenth centuries. People interact directly with technology in fields such as education, government, finance, retail, entertainment, health care, travel, science, publishing, and manufacturing.

Education

Educators and teaching institutions use technology to assist with education. Most equip labs and classrooms with computers. Some even provide computers to students. Many require students to have a mobile computer or mobile device to access the school's network or Internet wirelessly, or to access digital-only content provided by a textbook publisher. To promote education by computer, vendors often offer substantial student discounts on hardware and software.

Educators may use an interactive whiteboard, which is a touch-sensitive device resembling a dry-erase board, that displays images on a connected computer screen. They also may use a course management system, sometimes called a learning management system, which is software that contains tools for class preparation, distribution, and management. Read Ethics & Issues 3 on the next page to consider issues related to schools integrating technology into the classroom.

Many schools offer distance learning classes, where the delivery of education occurs at one place while the learning occurs at other locations.



The Internet

The world's largest computer network is the Internet.



How do educators use iTunes U?

Search for: itunes u

ETHICS & ISSUES 3

Does Technology Create a Divide between the More and Less Fortunate?

A teacher assigns a research paper that requires students to read several articles on the web. A school requires that all students type papers on a computer and submit the papers using email. While these may be valid ways to integrate technology in a curriculum or to help instructors manage their classroom, they assume all students have ample access to technology outside of school. School districts that assume all students have computers at home place less fortunate students at a further disadvantage. These students may have to stay after school to use a computer or study at the local library to access the Internet. Students at

school districts in disadvantaged areas may fall further behind if the school is unable to provide access to the technology taken for granted at other schools, including interactive whiteboards and dedicated technology specialists. These discrepancies are known collectively as the digital divide, a term used to illustrate the gap between those with and without access to technology.

With the recent widespread growth of mobile device users, some aspects of the digital divide are closing. Students can email and do research on Internet-capable mobile devices, as well as access education-related apps. Mobile device capabilities, however, are limited. You cannot use a mobile device to write a research paper, prepare a resume, or submit a college application. Some

companies and organizations are trying to provide better access. One cable company provides low-cost Internet access to families who receive free or reduced school lunches. Schools can apply for technology grants to purchase classroom computers. These grants may be able to provide access to students, but if no one can teach the students or their teachers how to use the technology, it may not solve the problem.

Is it the school's responsibility to provide an even playing field regarding technology access? Why or why not? Should schools be allowed to require students to use technology? Why or why not? What steps can society take to narrow the digital divide?

Government

Most government offices have websites to provide citizens with up-to-date information. People in the United States access government websites to view census data, file taxes, apply for permits and licenses, pay parking tickets, buy stamps, report crimes, apply for financial aid, and renew vehicle registrations and driver's licenses.

Employees of government agencies use computers as part of their daily routine. North American 911 call centers use computers to dispatch calls for fire, police, and medical assistance. Military and other agency officials use the U.S. Department of Homeland Security's network of information about domestic security threats to help protect against terrorist attacks. Law enforcement officers have online access to the FBI's National Crime Information Center (NCIC) through in-vehicle laptops, fingerprint readers, and mobile devices.

Finance

Many people and companies use online banking or finance software to pay bills, track personal income and expenses, manage investments, and evaluate financial plans. The difference between using a financial institutions' website versus finance software on your computer is that all your account information is stored on the bank's computer instead of your computer. The advantage is you can access your financial records from anywhere in the world.

Investors often use online investing to buy and sell stocks and bonds — without using a broker. With online investing, the transaction fee for each trade usually is much less than when trading through a broker.

Retail

You can purchase just about any product or service on the web, including groceries, flowers, books, computers and mobile devices, music, movies, airline tickets, and concert tickets. To purchase from an online retailer, a customer visits the business's storefront, which contains product descriptions, images, and a shopping cart. The shopping cart allows the customer to collect purchases. When ready to complete the sale, the customer enters personal data and the method of payment, which should be through a secure Internet connection. Figure 32 illustrates the steps involved when a customer purchases from an online retailer.

Purchasing from an Online Retailer

Step 1

The customer displays the online retailer's storefront.



Step 2

The customer collects purchases in a shopping cart.



Step 3

The customer enters payment information on a secure website. The online retailer sends financial information to a bank.



Step 5

The online retailer's web server sends confirmation to the customer, processes the order, and then sends it to the fulfillment center.



Step 4

The bank performs security checks and sends authorization back to the online retailer.



Step 6

The fulfillment center packages the order, prepares it for shipment, and then sends a report to the server where records are updated.



Step 7

While the order travels to the customer, shipping information is posted on the web.



Step 8

The order is delivered to the customer, who may be required to sign a handheld computer or document to acknowledge receipt.

Figure 32 This figure shows the steps involved when a customer purchases from an online retailer.

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Many mobile apps make your shopping experience more convenient. Some enable you to manage rewards, use coupons, locate stores, or pay for goods and services directly from your phone or other mobile device. Other mobile apps will check a product's price and availability at stores in your local area or online.

Entertainment

You can use computers and mobile devices to listen to audio clips or live audio; watch video clips, television shows, or live performances and events; read a book, magazine, or newspaper; and play a myriad of games individually or with others. In some cases, you download the media from the web to a computer or mobile device so that you can watch, listen to, view, or play later. Some websites support streaming, where you access the media content while it downloads. For example, radio and television broadcasts often use streaming media to broadcast music, interviews, talk shows, sporting events, news, and other segments so that you can listen to the audio or view the video as it downloads to your computer. You also can create videos, take photos, or record audio and upload (transfer) your media content to the web to share with others, such as on an online social network.



CONSIDER THIS

Can I make copies of songs or other media that I have purchased and downloaded from a legitimate website, such as iTunes?

You typically can make a copy as a personal backup, but you cannot share the copy with others in any format unless you have legal permission from the copyright owner to do so. That is, you cannot give someone a CD copy, nor can you share a digital file by posting it on the web or sending it in an email attachment.

**Technology @ Work**

For more information about how technology is used in the health care fields, read the Technology @ Work feature at the end of this chapter.

Health Care

Nearly every area of health care today uses computers. Whether you are visiting a family doctor for a regular checkup, having lab work or an outpatient test, filling a prescription, or being rushed in for emergency surgery, the medical staff around you will be using computers for various purposes:

- Maintain and access patient records.
- Monitor patients' vital signs and manage health conditions, such as diabetes.
- Deliver medication to nurses' stations in hospitals.
- Assist doctors, nurses, and technicians with medical tests.
- Assist with researching and diagnosing health conditions.
- Communications services to correspond with patients.
- Refill and file insurance claims.
- Implanted computerized devices, such as pacemakers, allow patients to live longer.
- Computer-controlled devices to provide surgeons with greater precision during operations.

Travel

Whether traveling by car or plane, your goal is to arrive safely at your destination. As you make the journey, you may interact with a navigation system or GPS, which uses satellite signals to determine a geographic location. GPS technology also assists people with creating maps, determining the best route between two points, locating a lost person or stolen object, monitoring a person's or object's movement, determining altitude, calculating speed, and finding points of interest.

In preparing for a trip, you may need to reserve a car, hotel, or flight. Many websites offer these services to the public where you can search for and compare flights and prices, order airline tickets, or reserve a rental car. You also can print driving directions and maps from the web.

Science

All branches of science, from biology to astronomy to meteorology, use computers to assist them with collecting, analyzing, and modeling data. Scientists also use the Internet to communicate with colleagues around the world. Breakthroughs in surgery, medicine, and treatments often result from scientists' use of computers. Tiny computers now imitate functions of the central nervous system, retina of the eye, and cochlea of the ear. A cochlear implant allows a deaf person to listen. Electrodes implanted in the brain stop tremors associated with Parkinson's disease.

Publishing

Many publishers of books, magazines, newspapers, music, film, and video make their works available online. Organizations and individuals publish their thoughts and ideas using a blog, podcast, or wiki.

- A blog is an informal website consisting of time-stamped articles (posts) in a diary or journal format, usually listed in reverse chronological order.
- A podcast is recorded media that users can download or stream to a computer or portable media player.
- A wiki is a collaborative website that allows users to create, add to, modify, or delete the content via their browser. Read Ethics & Issues 4 for an issue related to using wikis as a source for research.

**Internet Research**

How can you create a blog?

Search for: create a blog

ETHICS & ISSUES 4

Should Wikis Be Allowed as Valid Sources for Academic Research?

As wikis have grown in number, size, and popularity, many educators and librarians have shunned the sites as valid sources of research. While some wikis are tightly controlled with a limited number of contributors and expert editors, these usually focus on narrowly defined, specialized topics. Most large online wikis, such as Wikipedia, often involve thousands of editors, many of whom remain anonymous.

Critics of wikis cite the lack of certified academic credentials by the editors, as well as political or gender bias by contributors. Wikis also are subject to vandalism. Vandals'

motives vary; some enter false information to discredit the wiki, and others for humorous results. On occasion, rival political factions have falsified or embellished wiki entries in an attempt to give their candidate an advantage. Some wiki supporters argue that most wikis provide adequate controls to correct false or misleading content quickly and to punish those who submit it. One popular wiki now requires an experienced editor to verify changes made to certain types of articles. Other wiki protection methods include locking articles from editing, creating a list of recently edited articles, enabling readers to report vandalism, and allowing people to be notified about changes to a wiki page that

they have edited or that is about them. Some proponents propose that people should use wikis as a starting point for researching a fact, but that they should verify the fact using traditional sources.

Should instructors allow wikis as valid sources for academic research? Why or why not? Would you submit a paper to your instructor that cites a wiki as a source? Why or why not? What policies might wikis enforce that could garner more confidence from the public? If a wiki provided verification of the credentials of the author, would you trust the wiki more? Why or why not?

Manufacturing

Computer-aided manufacturing (CAM) refers to the use of computers to assist with manufacturing processes such as fabrication and assembly. Industries use CAM to reduce product development costs, shorten a product's time to market, and stay ahead of the competition. Often, robots carry out processes in a CAM environment. CAM is used by a variety of industries, including oil drilling, power generation, food production, and automobile manufacturing. Automobile plants, for example, have an entire line of industrial robots that assemble a car.

Technology Users

Every day, people around the world use various technologies at home, at work, and at school. Depending on the hardware, software, and communications requirements, these users generally can be classified in one of five categories. Keep in mind that a single user may fall into more than one category.

- A home user is any person who spends time using technology at home. Parents, children, teenagers, grandparents, singles, couples, etc., are all examples of home users.
- A small/home office user includes employees of companies with fewer than 50 employees, as well as the self-employed who work from home. Small offices include local law practices, accounting offices, travel agencies, and florists.
- A mobile user includes any person who works with computers or mobile devices while away from a main office, home, or school. Examples of mobile users are sales representatives, real estate agents, insurance agents, meter readers, package delivery people, journalists, consultants, and students.
- A power user is a user who requires the capabilities of a powerful computer. Examples of power users include engineers, scientists, architects, desktop publishers, and graphic artists.
- An enterprise has hundreds or thousands of employees or customers who work in or do business with offices across a region, the country, or the world. Each employee or customer who uses computers, mobile devices, and other technology in the enterprise is an enterprise user.

NOW YOU KNOW

Be sure you understand the material presented in the sections titled Communications and Networks, Uses of Technology in Society, and Technology Users, as it relates to the chapter objectives.

You now should know...

- When you might use wired and wireless communications, and why you would use a network (Objective 9)
- How you would use technology in education, government, finance, retail, entertainment, health care, travel, science, publishing, and manufacturing (Objective 10)
- What types of hardware, software, and communications you could use at home, school, and work (Objective 11)

Chapter Summary

This chapter introduced you to basic computer concepts. You learned about laptops, tablets, desktops, servers, smartphones, digital cameras, portable media players, e-book readers, and game devices. The chapter introduced various methods for input, output, memory, and storage. It discussed the Internet, browsing and searching the web, and online social networks. Next, the chapter introduced digital security and safety risks and precautions, along with various types of programs, applications, communications, and networks. The many different uses of technology applications in society also were presented, along with types of users.

TECHNOLOGY @ WORK

Health Care

During an intramural volleyball game, you suffer an injury that requires a trip to an emergency room, which is extremely crowded. Upon check-in, the employee at the front desk uses a computer to record your personal data and symptoms. She also uses the computer to verify that your insurance coverage is current and informs you of your co-payment amount. After waiting several minutes, a triage nurse takes your temperature and blood pressure and then asks a series of questions about your symptoms. The nurse also records this data in a tablet and asks you to remain in the waiting room until someone from the radiology department is available to perform a CT scan. The radiology department is located in a different area of the hospital, so the technicians watch a computer screen that displays a list of patients who currently are waiting for their services.

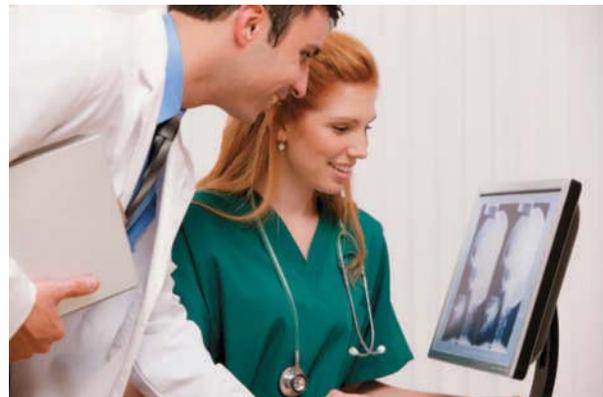
About 30 minutes later, a technician calls your name and escorts you to the radiology department for your CT scan. As she is performing the scan, a computer records the images that later will be reviewed by a physician. When the CT scan is complete, you

return to the waiting room until a physician reviews the results. Once he receives the results and reviews them, a hospital employee takes you to a consultation room.

The physician informs you that other than a few bumps and bruises, he believes that you have sustained no permanent damage and prescribes medication to help ease the pain. He then returns to a computer at the nurses' station and adds his diagnosis to the database that stores your medical records. He also sends your prescription electronically to the hospital's pharmacy. Once discharged, you visit the cashier to pay the bill. You then use a tablet to sign an electronic version of your discharge paperwork so that the hospital can store it electronically. The hospital bills your insurance company electronically. If you owe a balance after the insurance company pays its portion, a computer at the hospital will generate a bill that will be mailed

to you. After purchasing your medication and leaving the hospital, you realize that despite the hospital being busy, computers decreased the time of your visit by automating processes that otherwise would have been performed manually and reduced possible errors by storing all of your personal information centrally.

 How else might computers and technology be used in the health care industry?



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You should be able to define the Key Terms listed below.

Key Terms

Key Terms (shown in **bold-black** characters in the chapter)

app (26)	green computing (25)	portable media player (8)	tablet (3)
application (26)	input device (12)	printer (14)	user (3)
browser (20)	Internet (18)	program (25)	web (19)
communications device (29)	laptop (3)	search engine (21)	web server (20)
computer (3)	malware (23)	server (6)	webpage (19)
desktop (5)	mobile device (6)	smartphone (7)	website (20)
digital camera (8)	network (30)	social networking site (21)	
digital literacy (3)	online social network (21)	software (25)	
e-book reader (10)	output device (13)	storage device (15)	
game console (10)	personal computer (3)	storage media (15)	

Checkpoint

The Checkpoint exercises test your knowledge of the chapter concepts. The page number containing the answer appears in parentheses after each exercise. The Consider This exercises challenge your understanding of chapter concepts.

True/False Mark T for True and F for False.

- _____ 1. Electronic components in computers process data using instructions, which are the steps that tell the computer how to perform a particular task. (3)
- _____ 2. Screens for desktops cannot yet support touch. (5)
- _____ 3. Smaller applications, such as at home, typically use a powerful, expensive server to support their daily operations. (6)
- _____ 4. Smartphones typically communicate wirelessly with other devices or computers. (7)
- _____ 5. Data conveys meaning to users, and information is a collection of unprocessed items, which can include text, numbers, images, audio, and video. (11)
- _____ 6. As widespread as computers appear to be, most daily activities do not involve the use of or depend on information from them. (11)
- _____ 7. A scanner is a light-sensing output device. (13)
- _____ 8. Because it contains moving parts, flash memory is less durable and shock resistant than other types of media. (16)
- _____ 9. The terms, web and Internet, are interchangeable. (18)
- _____ 10. One way to protect your computer from malware is to scan any removable media before using it. (23)
- _____ 11. Operating systems are a widely recognized example of system software. (25)
- _____ 12. You usually do not need to install web apps before you can run them. (27)

Multiple Choice Select the best answer.

1. A(n) _____ is any hardware component that allows you to enter data and instructions into a computer or mobile device. (12)
 - a. output device
 - b. communications device
 - c. input device
 - d. display
2. Which of the following is *not* an example of an output device? (13)
 - a. scanner
 - b. printer
 - c. display
 - d. speaker

3. _____ consists of electronic components that store instructions waiting to be executed and the data needed by those instructions. (15)
 - a. Storage
 - b. Cloud storage
 - c. Solid-state drives
 - d. Memory
4. A(n) _____ is removable flash memory, usually no bigger than 1.5 inches in height or width, that you insert in and remove from a slot in a computer, mobile device, or card reader/writer. (16)
 - a. memory card
 - b. USB flash drive
 - c. solid-state drive (SSD)
 - d. optical disc
5. A computer that delivers requested webpages to your computer or mobile device is a(n) _____. (20)
 - a. VoIP computer
 - b. web server
 - c. FTP device
 - d. hard disk
6. _____ software consists of programs designed to make users more productive and/or assist them with personal tasks. (26)
 - a. System
 - b. Application
 - c. Operating system
 - d. Gaming
7. _____ uses the cellular network to enable high-speed Internet connections to devices with built-in compatible technology, such as smart phones. (30)
 - a. Cellular radio
 - b. Bluetooth
 - c. Wi-Fi
 - d. Hot spot
8. A(n) _____ is a collaborative website that allows users to create, add to, modify, or delete the content via their browser. (34)
 - a. podcast
 - b. blog
 - c. online social network
 - d. wiki

Short Answer

Write a brief answer to each of the following questions.

1. Define an online social network. (21) Differentiate among Facebook, Twitter, and LinkedIn. (22)
2. Name several different types of malware. (23) List steps you can take to protect your computer from malware and viruses. (23)
3. What is a passphrase? (24) List the guidelines you should use when creating strong passwords. (24)
4. Define green computing. (25) List steps you can take to contribute to green computing. (25)
5. Define application software. (26) Differentiate among desktop apps, web apps, and mobile apps. (26)



Consider This

Answer the following questions in the format specified by your instructor.

1. Answer the critical thinking questions posed at the end of these elements in this chapter: Ethics & Issues (8, 22, 32, 35), How To (20, 21, 27), Mini Features (4, 5, 9), Secure IT (18, 23, 24, 30), and Technology @ Work (36).
2. What does it mean to be digitally literate, and why is it important? (3)
3. What should you purchase to help protect your laptop or tablet from damage while traveling? (4)
4. What types of keyboards are available for smartphones? (7)
5. In what circumstances is it appropriate or inappropriate to use text acronyms and abbreviations? (8)
6. What is the difference between a disk and a disc? (15)
7. In what circumstances might you use a card reader/writer? (16)
8. Besides the web, what are some other services on the Internet? (23)
9. How do you know if you are addicted to computers or suffer from technology overload? (24)
10. Why is green computing important? (25)
11. What is the difference between system and application software? (25)
12. What is the difference between instant messaging and a chat room? (29)
13. In what ways might you benefit from creating a home network? (31)

☀ How To: Your Turn

The **How To: Your Turn** exercise presents general guidelines for fundamental skills when using a computer or mobile device and then requires that you determine how to apply these general guidelines to a specific program or situation.

Instructions: You often can complete tasks using technology in multiple ways. Figure out how to perform the tasks described in the following exercise by using one or more resources available to you (such as a computer or mobile device, articles on the web or in print, online or program help, user guides, blogs, podcasts, videos, other individuals, trial and error, etc.). Summarize your 'how to' steps, along with the resource(s) used, in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

Sign Up for a Microsoft Account

A Microsoft account provides access to resources on several Microsoft websites. These websites include access to resources such as a free email account, cloud storage, a location to store information about your contacts, and an online calendar. You will need a Microsoft account to complete some of the exercises in this book. The following steps guide you through the process of signing up for a Microsoft account.

- Run a browser and navigate to www.outlook.com.
- Click the link and follow the on-screen instructions to sign up for a free Microsoft account.
- Browse the resources available to you in your Microsoft account.
- If approved by your instructor, compose and send a new email message to your instructor stating that you have signed up for a Microsoft account successfully.
- Add your instructor's contact information. Next, add contact information for at least three additional people.
- Add your birthday to the calendar.
- Edit your Microsoft account profile to add additional contact and work information.

Exercises

- If necessary, navigate to and view your new outlook.com email account. What are some ways to prevent junk email using the mail settings? What is junk email?
- What is SkyDrive? How much space do you have available on SkyDrive to post files?
- How can you see yourself using the various features in your newly created Microsoft account?

☀ Internet Research

The **Internet Research** exercise broadens your understanding of chapter concepts by requiring that you search for information on the web.

Instructions: Use a search engine or another search tool to locate the information requested or answers to questions presented in the following exercise. Describe your findings, along with the search term(s) you used and your web source(s), in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

Security

Secure IT 1 on page 18 discusses the benefits of creating a backup plan for computers and mobile devices. One backup method is subscribing to a cloud storage provider. Consumer subscriptions to cloud storage services are experiencing double-digit growth each year, with an estimated 1.3 billion users predicted by 2017. Amazon, Google, Microsoft, and Apple are among the many companies offering cloud storage services.

Locate information about two of these services and review the features. Then, locate at least two independent cloud service providers, such as JustCloud, and read about accounts. How much free storage is available? What is the charge for additional storage? Are both limited and unlimited storage plans available? What is the maximum individual file size allowed? What methods do these companies take to secure the files? For example, how do they check the authenticity of the person signing in to the account? How do they monitor suspicious activity? Do they allow users to review all the sign-ins within a set period of time? Do they require account holders to modify their passwords occasionally? Is live customer support available 24 hours each day at no charge? In which country is the company and server located?



Problem Solving

The Problem Solving exercises extend your knowledge of chapter concepts by seeking solutions to practical problems with technology that you may encounter at home, school, or work.

Instructions: You often can solve problems with technology in multiple ways. Determine a solution to the problems in these exercises by using one or more resources available to you (such as a computer or mobile device, articles on the web or in print, blogs, podcasts, videos, television, user guides, other individuals, electronics or computer stores, etc.). Describe your solution, along with the resource(s) used, in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

- 1. Shopping for Software** You are shopping for software that will assist you with your home's interior design. The package for the program you would like to purchase states that it was designed for the most recent version of Windows, but an older version is installed on your computer. How can you determine whether the program will run on your computer?



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- 2. Bad Directions** You are driving to your friend's house and are using your smartphone for directions. While approaching your destination, you realize that your smartphone app instructed you to turn the wrong way on your friend's street. How could this have happened?

- 3. Problematic Camera** After charging your digital camera battery overnight, you insert the battery and turn on the camera only to find that it is reporting

a low battery. Seconds later, the camera shuts off automatically. What might be wrong?

- 4. Discarding Old Computer Equipment** Your company has given you a new laptop to replace your current, outdated desktop. Because of the negative environmental impact of discarding the old computer in the trash, your supervisor asked you to suggest options for its disposal. How will you respond?
- 5. Dead Battery** While traveling for business, you realize that you forgot to bring the battery charger for your laptop. Knowing that you need to use the laptop to give a presentation tomorrow, what steps will you take tonight to make sure you have enough battery power?

Critical Thinking

The Critical Thinking exercises challenge your assessment and decision-making skills by presenting real-world situations associated with chapter concepts.

Instructions: Evaluate the situations below, using personal experiences and one or more resources available to you (such as articles on the web or in print, blogs, podcasts, videos, television, user guides, other individuals, electronics or computer stores, etc.). Perform the tasks requested in each exercise and share your deliverables in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

1. Research and Share

Energy Efficiency Increases in energy prices lead many individuals to look at purchasing energy-efficient computers. Energy-efficient computers often look and perform similarly to equivalent computers that use more energy. Find two computers of identical configuration, where the only difference is energy consumption. How much energy does the energy-efficient computer save? Are energy-efficient computers more or less expensive? Will the difference in cost (if any) affect your purchasing decision? How else might you be able to change your computer to save energy? Use the web to locate articles that recommend energy efficient products and that provide tips about additional ways to save energy. Compile your findings and then share them with the class.

2. Case Study

Farmers' Market You are the new manager for a group of organic farmers who have a weekly market in season. The previous manager tracked all of the data on paper. You realize that using technology will increase your efficiency and enable you to communicate better with the board of directors, vendors, and customers. At the board's next meeting, you will share ideas of how you will use technology. Before the meeting, you compile the following: differences between input and output, a list of the types of data you can use as input, and a list of the types of information you can produce as output. You include the types of computers, mobile devices, and other technologies you will use to enter data and produce the information. Incorporate your own experiences and user reviews of the devices. Compile your findings.

