Chapter One

Introduction to Computers

Objectives

After completing this chapter, you will be able to:

1. Explain why computer literacy is vital to success in today's world
2. Define the term, computer, and describe the relationship between data and information
3. Describe the five components of a computer: input devices, output devices, system unit, storage devices, and communications devices
4. Discuss the advantages and disadvantages that users experience when working with computers
5. Define the term, network, and identify benefits of sharing resources on a network
6. Discuss the uses of the Internet and World Wide Web
7. Distinguish between system software and application software
8. Differentiate among types, sizes, and functions of computers in each of these categories: personal computers (desktop), mobile computers and mobile devices, game consoles, servers, mainframes, supercomputers, and embedded computers
9. Describe the role of each element in an information system
10. Explain how home users, small office/home office users, mobile users, power users, and enterprise users each interact with computers
11. Discuss how society uses computers in education, finance, government, health care, science, publishing, travel, and manufacturing

A World of Computers

Computers are everywhere: at work, at school, and at home. As shown in Figure 1-1, people use all types and sizes of computers for a variety of reasons and in a range of places. While some computers sit on top of a desk or on the floor, mobile computers and mobile devices are small enough to carry. Mobile devices, such as many cell phones, often are classified as computers.

Computers are a primary means of local and global communication for billions of people. Consumers use computers to correspond with businesses, employees with other employees and customers, students with classmates and teachers, and family members and military personnel with friends and other family members. In addition to sending simple notes, people use computers to share photos, drawings, documents, calendars, journals, music, and videos.

Through computers, society has instant access to information from around the globe. Local and national news, weather reports, sports scores, airline schedules, telephone directories, maps and directions, job listings, credit reports, and countless forms of educational material always are accessible. From the computer, you can make a telephone call, meet new friends, share opinions or life stories, book flights, shop, fill prescriptions, file taxes, take a course, receive alerts, and automate your home.

At home or while on the road, people use computers to manage schedules and contacts, listen to voice mail messages, balance checkbooks, pay bills, transfer funds, and buy or sell stocks. Banks place ATMs (automated teller machines) all over the world, so that customers can deposit

Figure 1-1 People use all types and sizes of computers in their daily activities.

and withdraw funds anywhere at anytime. At the grocery store, a computer tracks purchases, calculates the amount of money due, and often generates coupons customized to buying patterns. Vehicles include onboard navigation systems that provide directions, call for emergency services, and track the vehicle if it is stolen.

In the workplace, employees use computers to create correspondence such as e-mail messages, memos, and letters; manage calendars; calculate payroll; track inventory; and generate invoices. At school, teachers use computers to assist with classroom instruction. Students complete assignments and conduct research on computers in lab rooms, at home, or elsewhere. Instead of attending class on campus, some students take entire classes directly from their computer.

People also spend hours of leisure time using a computer. They play games, listen to music or radio broadcasts, watch or compose videos and movies, read books and magazines, share stories, research genealogy, retouch photos, and plan vacations.

As technology continues to advance, computers have become a part of everyday life. Thus, many people believe that computer literacy is vital to success in today's world. **Computer literacy**, also known as *digital literacy*, involves having a current knowledge and understanding of computers and their uses. Because the requirements that determine computer literacy change as technology changes, you must keep up with these changes to remain computer literate.

This book presents the knowledge you need to be computer literate today. As you read this first chapter, keep in mind it is an overview. Many of the terms and concepts introduced in this chapter will be discussed in more depth later in the book.

What Is a Computer?

A **computer** is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data according to specified rules, produce results, and store the results for future use.

Data and Information

Computers process data into information. **Data** is a collection of unprocessed items, which can include text, numbers, images, audio, and video. **Information** conveys meaning and is useful to people.

Many daily activities either involve the use of or depend on information from a computer. As shown in Figure 1-2, for example, computers process several data items to print information in the form of a cash register receipt.

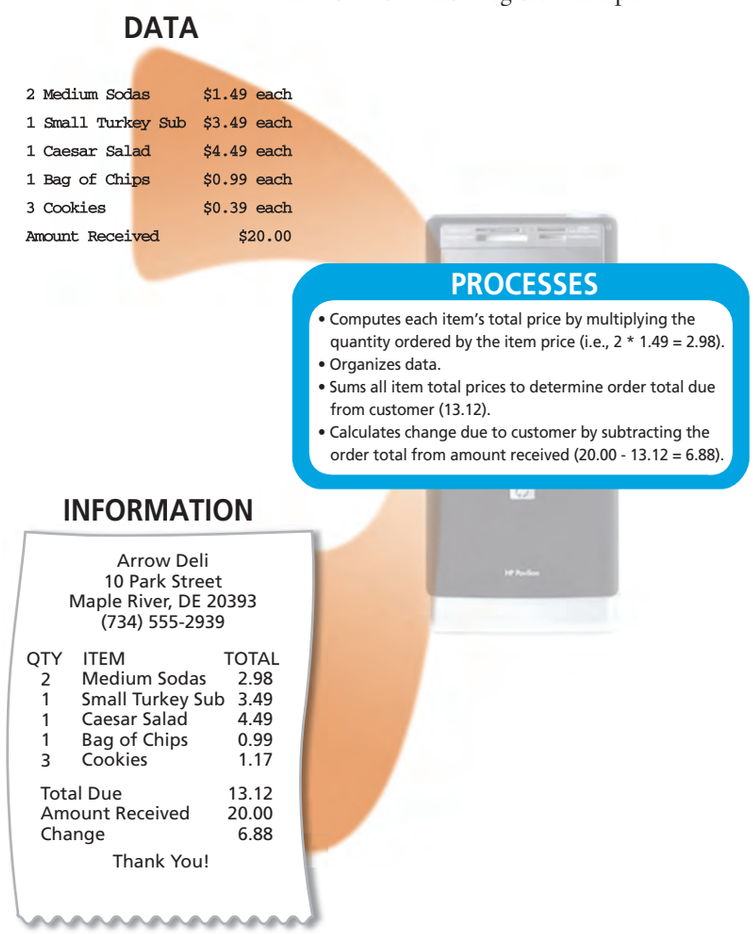


Figure 1-2 A computer processes data into information. In this simplified example, the item ordered, item price, quantity ordered, and amount received all represent data. The computer processes the data to produce the cash register receipt (information).

Information Processing Cycle

Computers process data (input) into information (output). Computers carry out processes 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. A computer often holds data, information, and instructions in storage for future use. Some people refer to the series of input, process, output, and storage activities as the *information processing cycle*.

Most computers today communicate with other computers. As a result, communications also has become an essential element of the information processing cycle.

The Components of a Computer

A computer contains many electric, electronic, and mechanical components known as **hardware**. These components include input devices, output devices, a system unit, storage devices, and communications devices. Figure 1-3 shows some common computer hardware components.

Input Devices

An **input device** is any hardware component that allows you to enter data and instructions into a computer. Five widely used input devices are the keyboard, mouse, microphone, scanner, and Web cam (Figure 1-3).

A computer keyboard contains keys you press to enter data into the computer. For security purposes, some keyboards include a fingerprint reader, which allows you to work with the computer only if your fingerprint is recognized.

A mouse is a small handheld device. With the mouse, you control movement of a small symbol on the screen, called the pointer, and you make selections from the screen.

A microphone allows you to speak into the computer. A scanner converts printed material (such as text and pictures) into a form the computer can use.

A Web cam is a digital video camera that allows you to create movies or take pictures and store them on the computer instead of on tape or film.

Output Devices

An **output device** is any hardware component that conveys information to one or more people. Three commonly used output devices are a printer, a monitor, and speakers (Figure 1-3).

A printer produces text and graphics on a physical medium such as paper. A monitor displays text, graphics, and videos on a screen. Speakers allow you to hear music, voice, and other audio (sounds).

System Unit

The **system unit** is a case that contains the electronic components of the computer that are used to process data (Figure 1-3). The circuitry of the system unit usually is part of or is connected to a circuit board called the motherboard.

Two main components on the motherboard are the processor and memory. The *processor*, also called a *CPU* (*central processing unit*), is the electronic component that interprets and carries out the basic instructions that operate the computer. *Memory* consists of electronic components that store instructions waiting to be executed and 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.

Figure 1-3 Common computer hardware components include a keyboard, mouse, microphone, scanner, Web cam, printer, monitor, speakers, system unit, hard disk drive, external hard disk, optical disc drive(s), USB flash drive, card reader/writer, memory cards, and modem.

Storage Devices

Storage holds data, instructions, and information for future use. For example, computers can store hundreds or millions of customer names and addresses. Storage holds these items permanently.

A computer keeps data, instructions, and information on **storage media**. Examples of storage media are USB flash drives, hard disks, optical discs, and memory cards. A **storage device** records (writes) and/or retrieves (reads) items to and from storage media. Drives and readers/writers, which are types of storage devices (Figure 1-3 on the previous page), accept a specific kind of storage media. For example, a DVD drive (storage device) accepts a DVD (storage media). Storage devices often function as a source of input because they transfer items from storage to memory.

A USB flash drive is a portable storage device that is small and lightweight enough to be transported on a keychain or in a pocket (Figure 1-3). The average USB flash drive can hold about 4 billion characters. You plug a USB flash drive in a special, easily accessible opening on the computer.

A hard disk provides much greater storage capacity than a USB flash drive. The average hard disk can hold more than 320 billion characters. Hard disks are enclosed in an airtight, sealed case. Although some are portable, most are housed inside the system unit (Figure 1-4). Portable hard disks are either external or removable. An external hard disk is a separate, freestanding unit, whereas you insert and remove a removable hard disk from the computer or a device connected to the computer.

An optical disc is a flat, round, portable metal disc with a plastic coating. CDs, DVDs, and Blu-ray Discs are three types of optical discs. A CD can hold from 650 million to 1 billion characters. Some DVDs can store two full-length movies or 17 billion characters (Figure 1-5). Blu-ray Discs can store about 46 hours of standard video, or 100 billion characters.

Some mobile devices, such as digital cameras, use memory cards as the storage media. You can use a card reader/writer (Figure 1-3) to transfer the stored items, such as digital photos, from the memory card to a computer or printer.

Figure 1-4 Hard disks are self-contained devices. The hard disk shown here must be installed in the system unit before it can be used.

Figure 1-5 A DVD in a DVD drive.

Communications Devices

A **communications device** is a hardware component that enables a computer to send (transmit) and receive data, instructions, and information to and from one or more computers or mobile devices. A widely used communications device is a modem (Figure 1-3).

Communications occur over cables, telephone lines, cellular radio networks, satellites, and other transmission media. Some transmission media, such as satellites and cellular radio networks, are wireless, which means they have no physical lines or wires.

Advantages and Disadvantages of Using Computers

Society has reaped many benefits from using computers. A **user** is anyone who communicates with a computer or utilizes the information it generates. Both business and home users can make well-informed decisions because they have instant access to information from anywhere in the world. Students, another type of user, have more tools to assist them in the learning process.

Advantages of Using Computers

Benefits from using computers are possible because computers have the advantages of speed, reliability, consistency, storage, and communications.

- **Speed:** When data, instructions, and information flow along electronic circuits in a computer, they travel at incredibly fast speeds. Many computers process billions or trillions of operations in a single second. Processing involves computing (e.g., adding, subtracting), sorting (e.g., alphabetizing), organizing, displaying images, recording audio, playing music, and showing a movie or video.
- **Reliability:** The electronic components in modern computers are dependable and reliable because they rarely break or fail.
- **Consistency:** Given the same input and processes, a computer will produce the same results — consistently. A computing phrase — known as *garbage in*, *garbage out* — points out that the accuracy of a computer's output depends on the accuracy of the input. For example, if you do not use the flash on a digital camera when indoors, the resulting pictures that are displayed on the computer screen may be unusable because they are too dark.
- **Storage:** A computer can transfer data quickly from storage to memory, process it, and then store it again for future use. Many computers store enormous amounts of data and make this data available for processing anytime it is needed.
- **Communications:** Most computers today can communicate with other computers, often wirelessly. Computers with this capability can share any of the four information processing cycle operations — input, process, output, and storage — with another computer or a user.

Disadvantages of Using Computers

Some disadvantages of computers relate to health risks, the violation of privacy, public safety, the impact on the labor force, and the impact on the environment.

- **Health Risks:** 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 computer addiction and technology overload. Computer addiction occurs when someone becomes obsessed with using a computer. Individuals suffering from technology overload feel distressed when deprived of computers and mobile devices. Once recognized, both computer addiction and technology overload are treatable disorders. Read Ethics & Issues 1-1 for a related discussion.

ETHICS & ISSUES 1-1

How Can People Best Cope with Technology Overload?

Most people enjoy the benefits that technology brings to their lives, such as increased productivity. A growing problem, however, is observed among those suffering the effects of technology overload. People overloaded with technology often feel uncomfortable or nervous when they cannot use the Internet or a cell phone for even a short length of time. Some mental health experts believe that technology overload is a health problem that can be treated just as other compulsions are treated. While some disagreement exists over the specific definition, the general consensus is that a person has a problem with technology overload when the overuse of technology negatively impacts health, personal life, and professional life. For some, technology overload often leads to less time spent with family and has proven to be as potent a cause for divorce as gambling or substance abuse. Experts suggest balancing the use of technology in one's life and listening to others if they suggest that the overuse of technology is causing personal problems.

What steps can people or society take to cope with technology overload? How might one determine if he or she suffers from technology overload? How can technology companies help to alleviate the problem of technology overload? Should those identified as technology addicts be able to receive health insurance benefits for counseling services? Why or why not?

Ethics & Issues

For the complete text of the Ethics & Issues boxes found in this chapter, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Ethics & Issues resource for this book.

- **Violation of 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.
- **Public Safety:** Adults, teens, and children around the world are using computers to share publicly their photos, videos, journals, music, and other personal information. 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 e-mail messages and on Web sites. For example, do not share information that would allow others to identify or locate you and do not disclose identification numbers, passwords, or other personal security details.
- **Impact on Labor Force:** Although computers have improved productivity in many ways and created an entire industry with hundreds of thousands of new jobs, the skills of millions of employees have been replaced by computers. Thus, it is crucial that workers keep their education up-to-date. A separate impact on the labor force is that some companies are outsourcing jobs to foreign countries instead of keeping their homeland labor force employed.
- **Impact on Environment:** Computer manufacturing processes and computer waste are depleting natural resources and polluting the environment. When computers are discarded in landfills, 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, 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.

Green Computing

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Green Computing.

QUIZ YOURSELF 1-1

Instructions: Find the true statement below. Then, rewrite the remaining false statements so that they are true.

1. A computer is a motorized device that processes output into input.
2. A storage device records (reads) and/or retrieves (writes) items to and from storage media.
3. An output device is any hardware component that allows you to enter data and instructions into a computer.
4. Computer literacy involves having a current knowledge and understanding of computers and their uses.
5. Computers have the disadvantages of fast speeds, high failure rates, producing consistent results, storing small amounts of data, and communicating with others.
6. Three commonly used input devices are a printer, a monitor, and speakers.

Quiz Yourself Online: To further check your knowledge of pages 4 through 10, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 1 – 4.

Networks and the Internet

A **network** is a collection of computers and devices connected together, often wirelessly, via communications devices and transmission media. When a computer connects to a network, it is **online**.

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* or workstation, request resources from the server (Figure 1-6). The major differences between the server and client computers are that the server ordinarily 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. Home networks usually are small, existing within a single

structure. 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. The world's largest computer network is the Internet.

Figure 1-6 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.

The Internet

The **Internet** is a worldwide collection of networks that connects millions of businesses, government agencies, educational institutions, and individuals (Figure 1-7).

Figure 1-7 The Internet is the largest computer network, connecting millions of computers and devices around the world.

More than one billion people around the world use the Internet daily for a variety of reasons, some of which are listed below and shown in Figure 1-8:

- Communicate with and meet other people
- Conduct research and access a wealth of information and news
- Shop for goods and services
- Bank and invest
- Participate in online training
- Engage in entertaining activities, such as planning vacations, playing online games, listening to music, watching or editing videos, and reading books and magazines
- Download music and videos
- Share information, photos, and videos
- Access and interact with Web applications

The Internet

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click The Internet.

People connect to the Internet to share information with others around the world. E-mail allows you to send and receive messages to and from other users (read Ethics & Issues 1-2 for a related discussion). With instant messaging, you can have a live conversation with another connected user. In a chat room, you can communicate with multiple users at the same time — much like a group discussion. You also can use the Internet to make a telephone call.

Businesses, called access providers, offer users and organizations access to the Internet free or for a fee. By subscribing to an access provider, you can use your computer and a communications device, such as a modem, to connect to the many services of the Internet.

The Web, short for World Wide Web, is one of the more popular services on the Internet. Think of the Web as a global library of information available to anyone connected

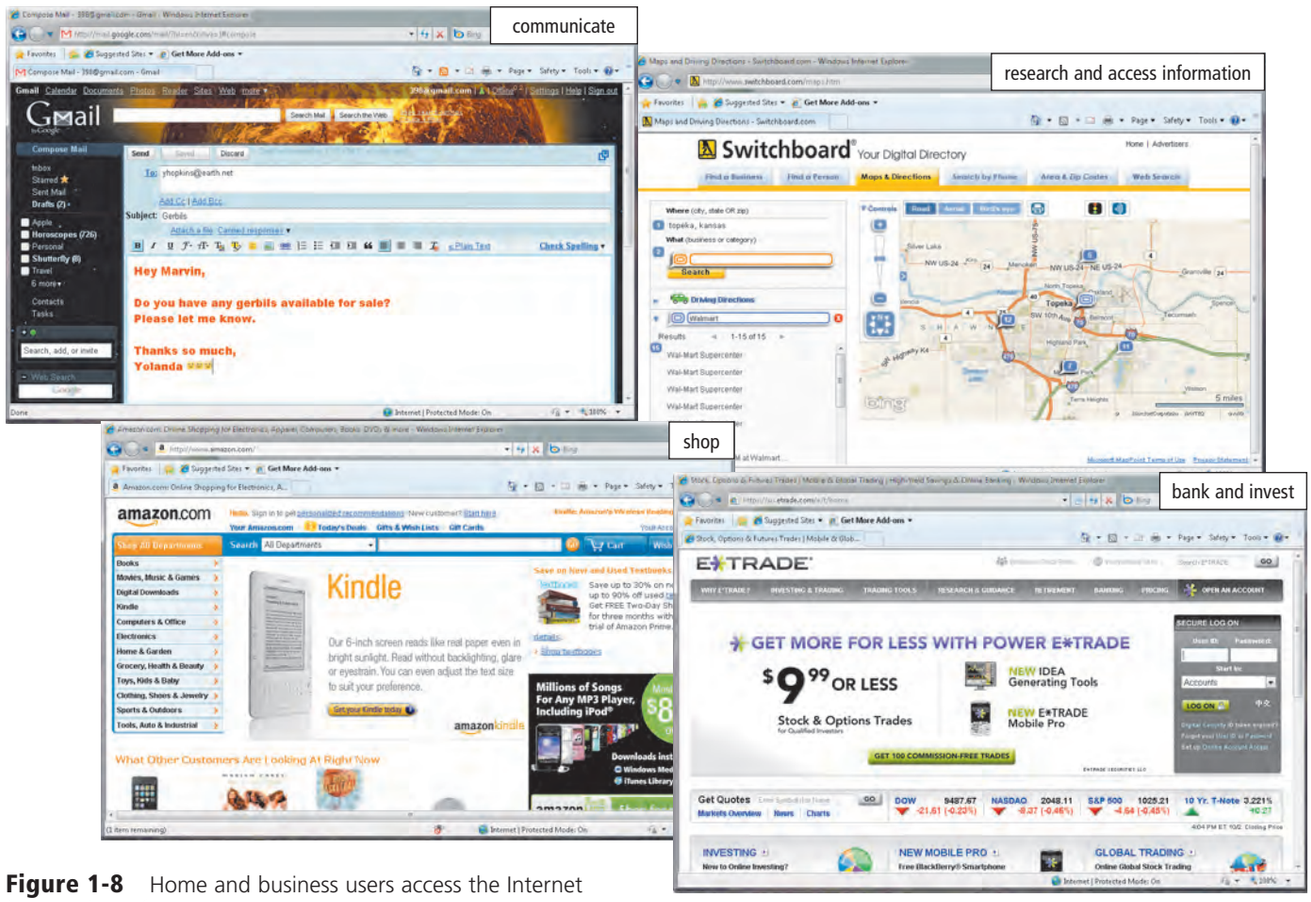


Figure 1-8 Home and business users access the Internet for a variety of reasons.

to the Internet. The **Web** contains billions of documents called Web pages. A **Web page** can contain text, graphics, animation, audio, and video. The nine screens shown in Figure 1-8 are examples of Web pages. Web pages often have built-in connections, or links, to other documents, graphics, other Web pages, or Web sites. A **Web site** is a collection of related Web pages. Some Web sites allow users to access music and videos that can be downloaded, or transferred to storage media in a computer or portable media player. Once downloaded, you can listen to the music through speakers, headphones, or earbuds, or view the videos on a display device.

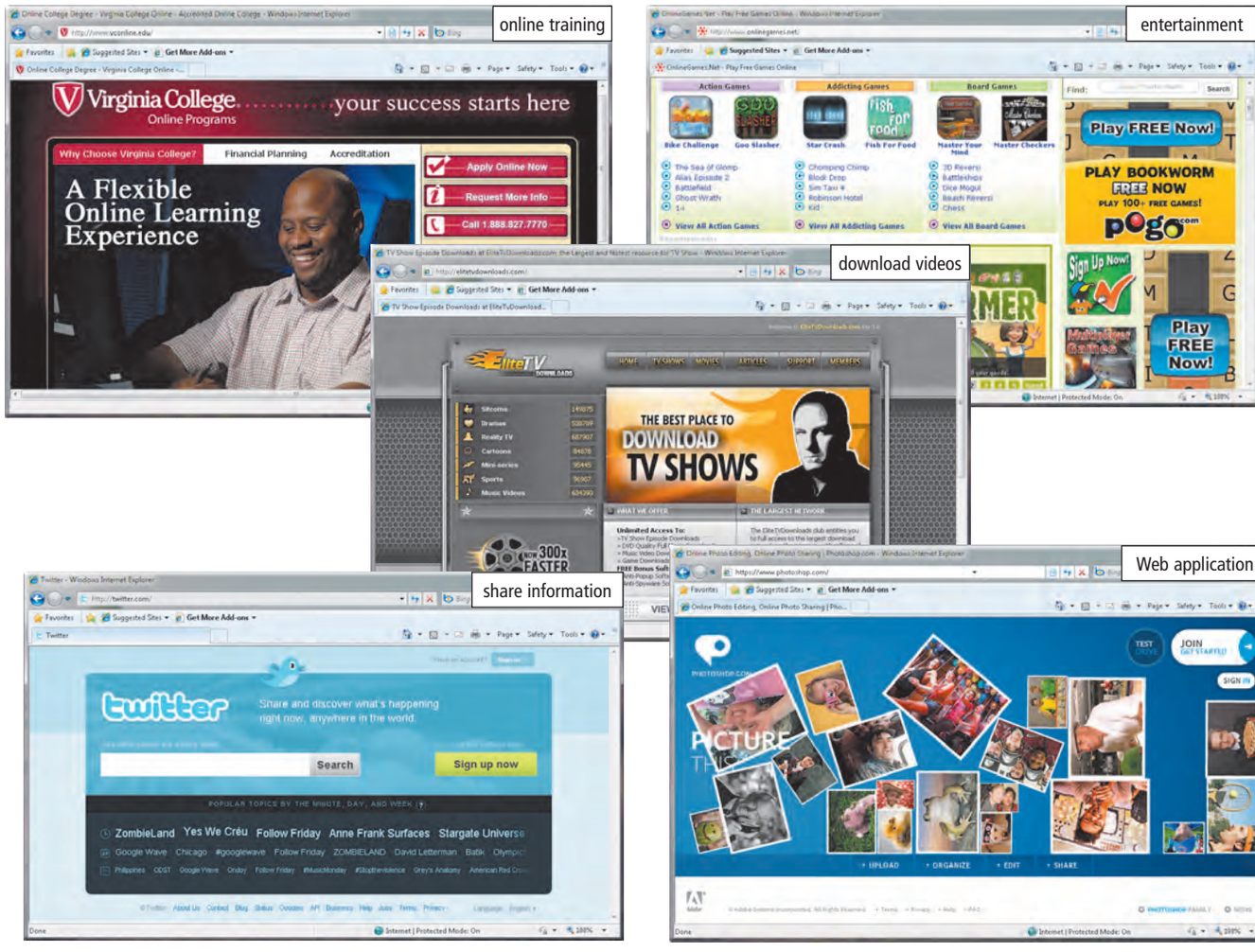
Many people use the Web as a means to share personal information, photos, and videos with the world. For example, you can create a Web page and then make it available, or *publish* it, on the Internet for others to see.

ETHICS & ISSUES 1-2

What Should Be Done about Identity Theft?

Using e-mail and other techniques on the Internet, scam artists are employing a technique known as *phishing* to try to steal your personal information, such as credit card numbers, banking information, and passwords. For example, an e-mail message may appear to be a request from your bank to verify your Social Security number and online banking password. Instead, the information you submit ends up in the hands of the scammer, who then uses the information for a variety of unethical and illegal acts. Sadly, the result often is identity theft. You can help to deter identity theft in several ways: 1) shred your financial documents before discarding them, 2) do not click links in unsolicited e-mail messages, and 3) enroll in a credit monitoring service. Consumer advocates often blame credit card companies and credit bureaus for lax security standards. Meanwhile, the companies blame consumers for being too gullible and forthcoming with private information. Both sides blame the government for poor privacy laws and light punishments for identity thieves. But while the arguments go on, law enforcement agencies bear the brunt of the problem by spending hundreds of millions of dollars responding to complaints and finding and processing the criminals.

Who should be responsible for protecting the public from online identity theft? Why? Should laws be changed to stop it, or should consumers change behavior? What is an appropriate punishment for identity thieves? Given the international nature of the Internet, how should foreign identity thieves be handled? Why?



You also can join millions of people worldwide in an online community, called a **social networking Web site** or an *online social network*, that encourages members to share their interests, ideas, stories, photos, music, and videos with other registered users (Figure 1-9). Some social networking Web sites are college oriented, some business oriented, and others are more focused. A **photo sharing community,** for example, is a specific type of social networking Web site that allows users to create an online photo album and store and share their digital photos. Similarly, a **video sharing community** is a type of social networking Web site that allows users to store and share their personal videos.

Hundreds of thousands of people today also use blogs to publish their thoughts on the Web. A *blog* is an informal Web site consisting of time-stamped articles in a diary or journal format, usually listed in reverse chronological order. As others read the articles in a blog, they reply with their own thoughts. A blog that contains video clips is called a *video blog*. A *microblog*, such as Twitter, allows users to publish short messages, usually between 100 and 200 characters, for others to read. To learn more about creating and using blogs, complete the Learn How To 2 activity on pages 50 and 51.

Podcasts are a popular way people verbally share information on the Web. A *podcast* is recorded audio stored on a Web site that can be downloaded to a computer or a portable media player such as an iPod. A video podcast is a podcast that contains video and usually audio. At a convenient time and location, the user listens to or watches the downloaded podcast.

A **Web application** is a Web site that allows users to access and interact with software from any computer or device that is connected to the Internet. Examples of software available as Web applications include those that allow you to send and receive e-mail messages, prepare your taxes, organize digital photos, create documents, and play games.

Web sites such as social networking Web sites, blogs, and Web applications are categorized as Web 2.0 sites. The term **Web 2.0** refers to Web sites that provide a means for users to share personal information (such as social networking Web sites), allow users to modify the Web site contents (such as some blogs), and/or have software built into the site for users to access (such as Web applications).

Facebook

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Facebook.

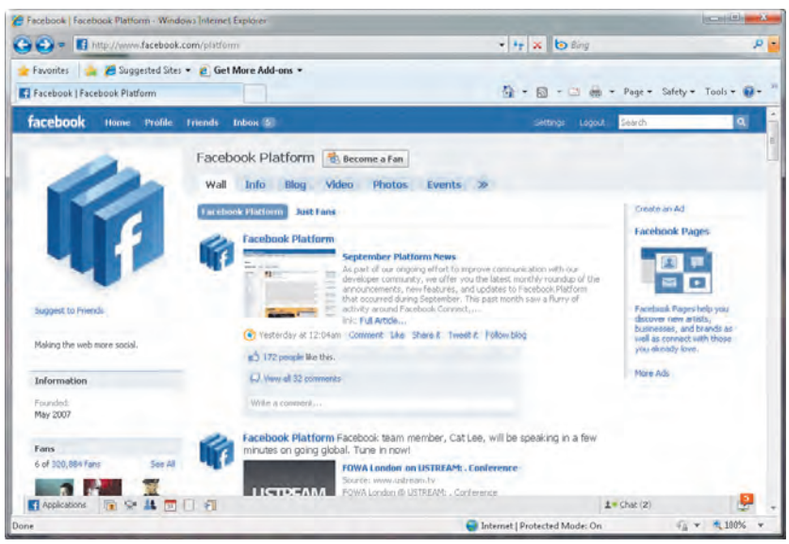
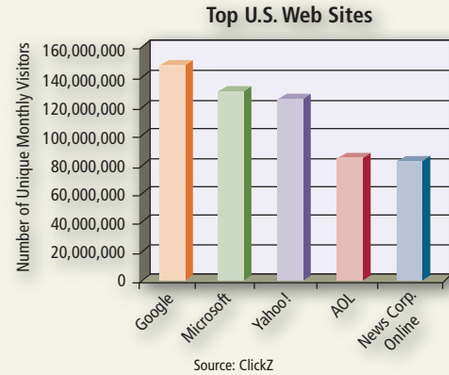


Figure 1-9 Facebook is a popular social networking Web site.

FAQ 1-1

What U.S. Web sites are visited most frequently?

A recent survey found that Google's Web site is visited most frequently, with Microsoft and Yahoo! not far behind. The chart below shows the five most frequently visited Web sites, as well as the approximate number of unique visitors per month.



Source: ClickZ

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Top Web Sites.

An *FAQ* (frequently asked question) helps you find answers to commonly asked questions. Web sites often post an FAQ section, and each chapter in this book includes FAQ boxes related to topics in the text.

Computer Software

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.

You interact with a program through its user interface. The user interface controls how you enter data and instructions and how information is displayed on the screen. Software today often has a graphical user interface. With a **graphical user interface** (**GUI** pronounced gooey), you interact with the software using text, graphics, and visual images such as icons. An *icon* is a miniature image that represents a program, an instruction, or some other object. You can use the mouse to select icons that perform operations such as starting a program.

The two categories of software are system software and application software. Figure 1-10 shows an example of each of these categories of software, which are explained in the following sections.

System Software

System software consists of the programs that control or maintain the operations of the computer and its devices. System software serves as the interface between the user, the application software, and the computer's hardware. Two types of system software are the operating system and utility programs.

Operating System An *operating system* is a set of programs that coordinates all the activities among computer hardware devices. It provides a means for users to communicate with the computer and other software. Many of today's computers use Microsoft's Windows, the latest version of which is shown in Figure 1-10, or Mac OS, Apple's operating system.

When a user starts a computer, portions of the operating system are copied into memory from the computer's hard disk. These parts of the operating system remain in memory while the computer is on.

Windows

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Windows.

Figure 1-10 Today's system software and application software usually have a graphical user interface.

Utility Program A *utility program* allows a user to perform maintenance-type tasks usually related to managing a computer, its devices, or its programs. For example, you can use a utility program to transfer digital photos to an optical disc. Most operating systems include several utility programs for managing disk drives, printers, and other devices and media. You also can buy utility programs that allow you to perform additional computer management functions.

Application Software

Application software consists of programs designed to make users more productive and/or assist them with personal tasks. A widely used type of application software related to communications is a Web browser, which allows users with an Internet connection to access and view Web pages or access programs. Other popular application software includes word processing software, spreadsheet software, database software, and presentation software.

Many other types of application software exist that enable users to perform a variety of tasks. These include personal information management, note taking, project management, accounting, document management, computer-aided design, desktop publishing, paint/image editing, photo editing, audio and video editing, multimedia authoring, Web page authoring, personal finance, legal, tax preparation, home design/landscaping, travel and mapping, education, reference, and entertainment (e.g., games or simulations, etc.).

Software is available at stores that sell computer products (Figure 1-11) and also online at many Web sites.

FAQ 1-2

Who plays video games?

The introduction of computer and video games that cater to a broader audience has greatly increased the number of people who play them. According to the Entertainment Software Association, approximately 68 percent of the U.S. population plays video games. Of these, 40 percent are women. Further, 25 percent of Americans over 50 play video games, and the average game player is 35 years old.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Game Demographics.

Installing and Running Programs

When purchasing software from a retailer, you typically receive a box that includes an optical disc(s) that contains the program. If you acquire software from a Web site on the Internet, you may be able to download the program; that is, the program transfers from the Web site to the hard disk in your computer.

The instructions in software are placed on storage media, either locally or online. To use software that is stored locally, such as on a hard disk or optical disc, you usually need to install the software. Web applications that are stored online, by contrast, usually do not need to be installed.

Installing is the process of setting up software to work with the computer, printer, and other hardware. When you buy a computer, it usually has some software preinstalled on its hard disk. This enables you to use the computer the first time you turn it on. To begin installing additional software from an optical disc, insert the program disc in an optical disc drive and follow the instructions to begin installation. To install downloaded software, the Web site typically provides instructions for how to install the program on your hard disk.

Figure 1-11
Stores that sell computer products have shelves stocked with software for sale.

Once installed, you can run the program. When you instruct the computer to **run** an installed program, the computer *loads* it, which means the program is copied from storage to memory. Once in memory, the computer can carry out, or *execute*, the instructions in the program so that you can use the program. Figure 1-12 illustrates the steps that occur when a user installs and runs a program. To learn more about starting and closing programs, complete the Learn How To 1 activity on page 50.

FAQ 1-3

How do I know if computer software will run on my computer?

When you buy a computer, the box, the manufacturer's Web site, or the order summary will list the computer's specifications. Similarly, when you buy software, the software box or the product's Web site lists specifications. Your computer's specifications should be the same as or greater than the software specifications.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Computer Software.

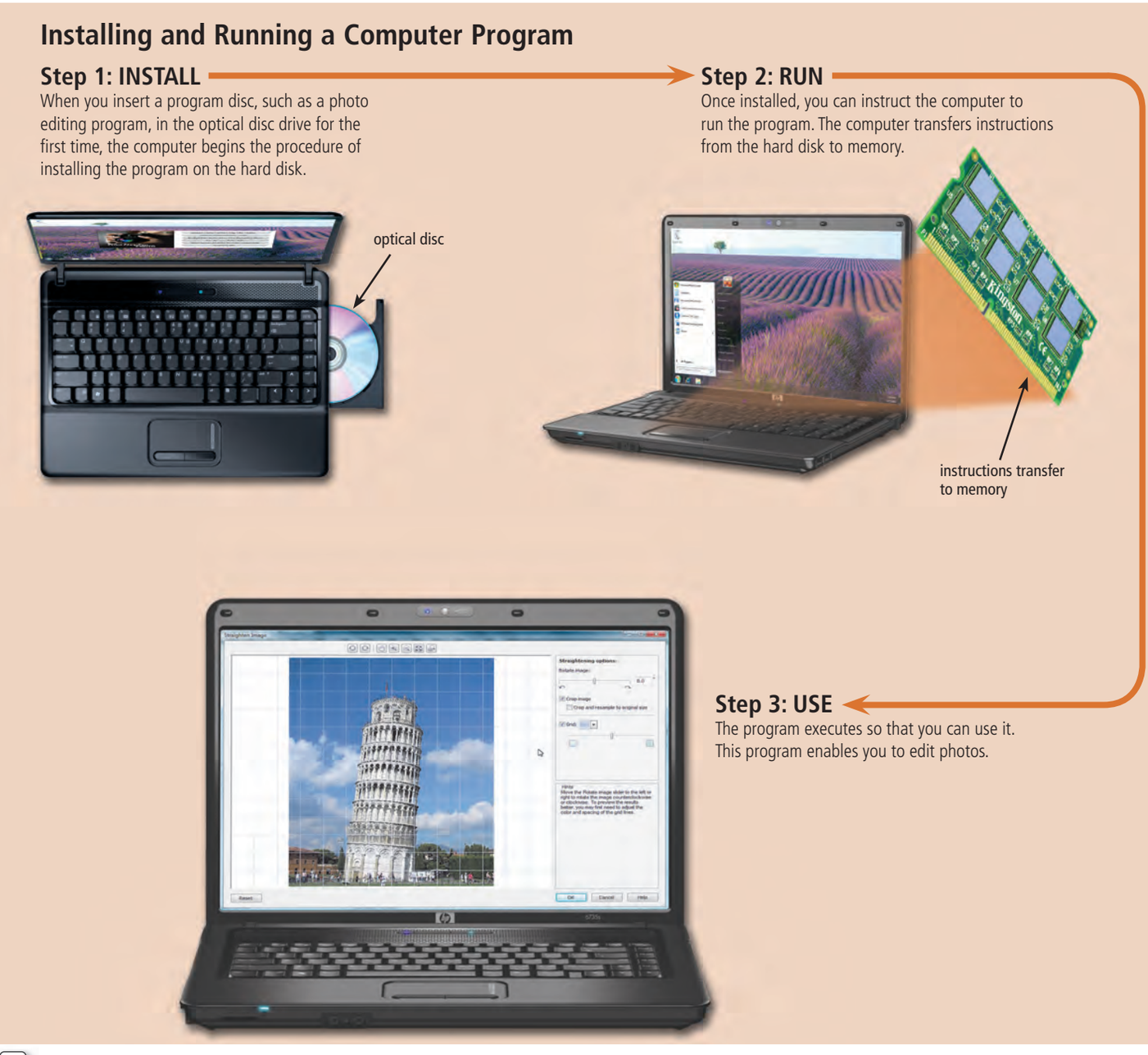


Figure 1-12 This figure shows how to install and run a computer program.

Software Development

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

Programmers use a programming language or program development tool to create computer programs. Popular programming languages include C++, Java, JavaScript, Visual C#, and Visual Basic. Figure 1-13 shows some of the Visual Basic instructions a programmer may write to create a simple payroll program.

Figure 1-13a (Visual Basic program instructions)

```
Public Class frmPayrollInformation

    Private Sub btnCalculatePay_Click(ByVal sender As System.Object, ByVal e As System.
    EventArgs) Handles btnCalculatePay.Click
        'This procedure executes when the user clicks the
        'Calculate Pay button. It calculates regular
        'and overtime pay and displays it in the window.

        ' Declare variables
        Dim strHoursWorked As String
        Dim strHourlyRate As String
        Dim decHoursWorked As Decimal
        Dim decHourlyRate As Decimal
        Dim decRegularPay As Decimal
        Dim decOvertimeHours As Decimal
        Dim decOvertimePay As Decimal
        Dim decTotalPay As Decimal

        ' Calculate and display payroll information
        strHoursWorked = Me.txtHoursWorked.Text
        strHourlyRate = Me.txtHourlyRate.Text
        decHoursWorked = Convert.ToDecimal(strHoursWorked)
        decHourlyRate = Convert.ToDecimal(strHourlyRate)

        If decHoursWorked > 40 Then
            decRegularPay = 40 * decHourlyRate
            Me.txtRegularPay.Text = decRegularPay.ToString("C")
            decOvertimeHours = decHoursWorked - 40
            decOvertimePay = (1.5 * decOvertimeHours) * decHourlyRate
            Me.txtOvertimePay.Text = decOvertimePay.ToString("C")
            decTotalPay = decRegularPay + decOvertimePay
            Me.txtTotalPay.Text = decTotalPay.ToString("C")
        Else
            decRegularPay = decHoursWorked * decHourlyRate
            Me.txtRegularPay.Text = decRegularPay.ToString("C")
            Me.txtOvertimePay.Text = "$0.00"
            Me.txtTotalPay.Text = decRegularPay.ToString("C")
        End If
    End Sub
End Class
```

Figure 1-13b (window appears when user runs program)

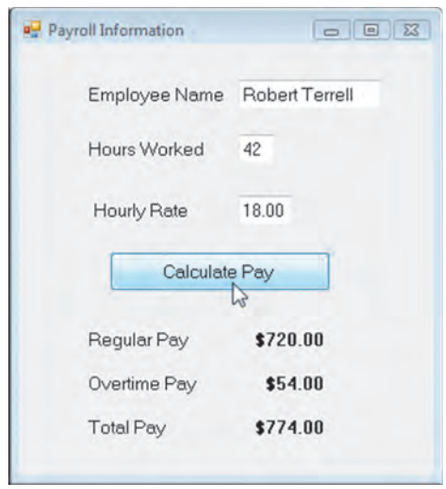


Figure 1-13 A programmer writes Visual Basic instructions to create the Payroll Information window.

QUIZ YOURSELF 1-2

Instructions: Find the true statement below. Then, rewrite the remaining false statements so that they are true.

1. A resource is a collection of computers and devices connected together via communications devices and transmission media.
2. Installing is the process of setting up software to work with the computer, printer, and other hardware.
3. Popular system software includes Web browsers, word processing software, spreadsheet software, database software, and presentation software.
4. The Internet is one of the more popular services on the Web.
5. Two types of application software are the operating system and utility programs.

Quiz Yourself Online: To further check your knowledge of pages 10 through 18, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 5 – 7.

Categories of Computers

Industry experts typically classify computers in seven categories: personal computers (desktop), mobile computers and mobile devices, game consoles, servers, mainframes, supercomputers, and embedded computers. A computer's size, speed, processing power, and price determine the category it best fits. Due to rapidly changing technology, however, the distinction among categories is not always clear-cut. This trend of computers and devices with technologies that overlap, called *convergence*, leads to computer manufacturers continually releasing newer models that include similar functionality and features. For example, newer cell phones often include media player, camera, and Web browsing capabilities. As devices converge, users need fewer devices for the functionality that they require. When consumers replace outdated computers and devices, they should dispose of them properly.

Figure 1-14 summarizes the seven categories of computers. The following pages discuss computers and devices that fall in each category.

Categories of Computers

Category	Physical Size	Number of Simultaneously Connected Users	General Price Range
Personal computers (desktop)	Fits on a desk	Usually one (can be more if networked)	Several hundred to several thousand dollars
Mobile computers and mobile devices	Fits on your lap or in your hand	Usually one	Less than a hundred dollars to several thousand dollars
Game consoles	Small box or handheld device	One to several	Several hundred dollars or less
Servers	Small cabinet	Two to thousands	Several hundred to a million dollars
Mainframes	Partial room to a full room of equipment	Hundreds to thousands	$300,000 to several million dollars
Supercomputers	Full room of equipment	Hundreds to thousands	$500,000 to several billion dollars
Embedded computers	Miniature	Usually one	Embedded in the price of the product

Figure 1-14 This table summarizes some of the differences among the categories of computers. These should be considered general guidelines only because of rapid changes in technology.

Personal Computers

A **personal computer** is a computer that can perform all of its input, processing, output, and storage activities by itself. A personal computer contains a processor, memory, and one or more input, output, and storage devices. Personal computers also often contain a communications device.

Two popular architectures of personal computers are the PC (Figure 1-15) and the Apple (Figure 1-16). The term, *PC-compatible*, refers to any personal computer based on the original IBM personal computer design. Companies such as Dell, HP, and Toshiba sell PC-compatible computers. PC and PC-compatible computers usually use a Windows operating system. Apple computers usually use a Macintosh operating system (Mac OS).

Two types of personal computers are desktop computers and notebook computers.

Figure 1-15 PC and PC-compatible computers usually use a Windows operating system.

Figure 1-16 Apple computers, such as the iMac, usually use a Macintosh operating system.

FAQ 1-4

Are PCs or Apple computers more popular?

While PCs still are more popular than Apple computers, Apple computer sales have been rising consistently during the past few years. In fact, Apple computer sales now account for more than 20 percent of all computer sales in the United States, with that number estimated to grow for the foreseeable future.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Personal Computer Sales.

Desktop Computers

A **desktop computer** is designed so that the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table (Figures 1-15 and 1-16 on the previous page). In many models, the system unit is a tall and narrow *tower*, which can sit on the floor vertically — if desktop space is limited.

Some desktop computers function as a server on a network. Others, such as a gaming desktop computer and home theater PC, target a specific audience. The *gaming desktop computer* offers high-quality audio, video, and graphics with optimal performance for sophisticated single-user and networked or Internet multiplayer games. A *home theater PC* (*HTPC*) combines the features of a high-definition video/audio entertainment system with a desktop computer that is designed to be connected to a television and includes a Blu-ray Disc, digital video recorder, and digital cable television connectivity. These high-end computers cost more than the basic desktop computer.

Another expensive, powerful desktop computer is the workstation, which is geared for work that requires intense calculations and graphics capabilities. An architect uses a workstation to design buildings and homes. A graphic artist uses a workstation to create computer-animated special effects for full-length motion pictures and video games.

FAQ 1-5

Does the term, workstation, have multiple meanings?

Yes. In the computer industry, a *workstation* can be a high-powered computer or a client computer on a network. In an office environment, a workstation can refer to a work area assigned to an employee.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Workstation.

Mobile Computers and Mobile Devices

A **mobile computer** is a personal computer you can carry from place to place. Similarly, a **mobile device** is a computing device small enough to hold in your hand.

The most popular type of mobile computer is the notebook computer. The following sections discuss the notebook computer and widely used mobile devices.

Notebook Computers

A **notebook computer**, also called a **laptop computer**, is a portable, personal computer often designed to fit on your lap. Notebook computers are thin and lightweight, yet they can be as powerful as the average desktop computer. A *netbook*, which is a type of notebook computer, is smaller, lighter, and often not as powerful as a traditional notebook computer. Most netbooks cost less than traditional notebook computers, usually only a few hundred dollars. An ultra-thin is another type of notebook computer that is lightweight and usually less than one-inch thick. Some notebook computers have touch screens, allowing you to interact with the device by touching the screen, usually with the tip of a finger.

On a typical notebook computer, the keyboard is on top of the system unit, and the monitor attaches to the system unit with hinges (Figure 1-17). These computers weigh on average from 2.5 to more than 10 pounds (depending on configuration), which allows users to transport the computers from place to place. Most notebook computers can operate on batteries or a power supply or both.

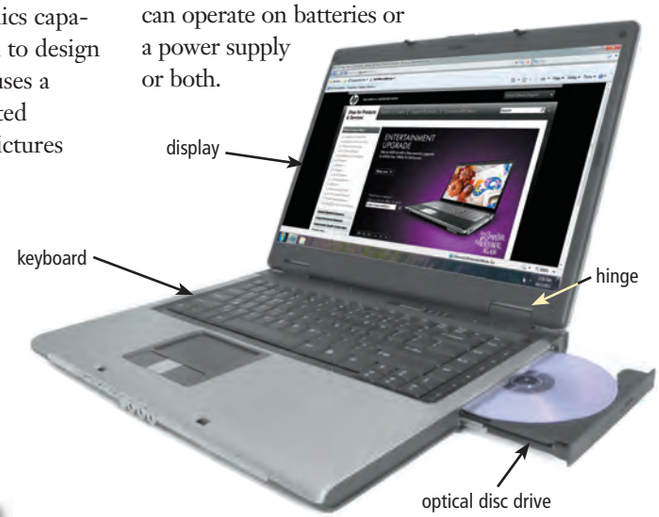


Figure 1-17 On a typical notebook computer, the keyboard is on top of the system unit, and the display attaches to the system unit with hinges.

Tablet PCs Resembling a letter-sized slate, the **Tablet PC**, or tablet computer, is a special type of notebook computer that you can interact with by touching the screen with your finger or a digital pen. A *digital pen* looks like a small ink pen but uses pressure instead of ink. Users write or draw on a Tablet PC by pressing a finger or digital pen on the screen, and issue instructions by tapping on the screen. One design of Tablet PC, called a *convertible tablet*, has an attached keyboard. Another design, which does not include a keyboard, is called a *slate tablet* (Figure 1-18) and provides other means for typing. Some Tablet PCs also support voice input so that users can speak into the computer.

Tablet PCs are useful especially for taking notes in lectures, at meetings, conferences, and other forums where the standard notebook computer is not practical.

Figure 1-18 The iPad is a widely used slate tablet.

Mobile Devices

Mobile devices, which are small enough to carry in a pocket, usually do not have disk drives. Instead, these devices store programs and data permanently on special memory inside the system unit or on small storage media such as memory cards. You often can connect a mobile device to a personal computer to exchange information between the computer and the mobile device.

Some mobile devices are **Internet-enabled**, meaning they can connect to the Internet wirelessly. With an Internet-enabled device, users can chat, send e-mail and instant messages, and access the Web. Because of their reduced size, the screens on mobile devices are small, but usually are in color.

Popular types of mobile devices are smart phones and PDAs, e-book readers, handheld computers, portable media players, and digital cameras.

Smart Phones and PDAs Offering the convenience of one-handed operation, a **smart phone** (Figure 1-19) is an Internet-enabled phone that usually also provides personal information management functions such as a calendar, an appointment book, an address book, a calculator, and a notepad. In addition to basic phone capabilities, a smart phone allows you to send and receive e-mail messages and access the Web — usually for an additional fee. Some smart phones communicate wirelessly with other devices or computers. Many also function as a portable media player and include built-in digital cameras so that you can share photos or videos with others as soon as you capture the image. Many smart phones also offer a variety of application software such as word processing, spreadsheet, and games, and the capability of conducting live video conferences.

Many smart phones have keypads that contain both numbers and letters so that you can use the same keypad to dial phone numbers

Figure 1-19 Some smart phones have touch screens; others have mini keyboards.

and enter messages. Others have a built-in mini keyboard on the front of the phone or a keyboard that slides in and out from behind the phone. Some have touch screens, where you press objects on the screen to make selections and enter text through an on-screen keyboard. Others include a stylus, which is similar to a digital pen but smaller and has less functionality.

Instead of calling someone's smart phone or cell phone, users often send messages to others by pressing buttons on their phone's keypad, keys on the mini keyboard, or images on an on-screen keyboard. Types of messages users send with smart phones include text messages, instant messages, picture messages, and video messages.

- A *text message* is a short note, typically fewer than 300 characters, sent to or from a smart phone or other mobile device.
- An *instant message* is a real-time Internet communication, where you exchange messages with other connected users.
- A *picture message* is a photo or other image, sometimes along with sound and text, sent to or from a smart phone or other mobile device. A phone that can send picture messages often is called a *camera phone*.
- A *video message* is a short video clip, usually about 30 seconds, sent to or from a smart phone or other mobile device. A phone that can send video messages often is called a *video phone*.

A **PDA** (*personal digital assistant*), which often looks like a smart phone, provides personal information management functions such as a calendar, an appointment book, an address book, a calculator, and a notepad. A PDA differs from a smart phone in that it usually does not provide phone capabilities and may not be Internet-enabled, support voice input, have a built-in camera, or function as a portable media player.

As smart phones and PDAs continue a trend of convergence, it is becoming increasingly difficult to differentiate between the two devices. This has led some manufacturers to refer to PDAs and smart phones simply as *handhelds*.

Camera Phone

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Camera Phone.

E-Book Readers An **e-book reader** (short for electronic book reader), or *e-reader*, is a handheld device that is used primarily for reading e-books (Figure 1-20). 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, users typically can purchase and read other forms of digital media such as newspapers and magazines.

Most e-book readers have a touch screen and are Internet-enabled. These devices usually are smaller than tablet computers but larger than smart phones.

Figure 1-20 An e-book reader.

Handheld Computers A **handheld computer**, sometimes referred to as an *Ultra-Mobile PC* (*UMPC*), is a computer small enough to fit in one hand. Many handheld computers communicate wirelessly with other devices or computers and also include a digital pen or stylus for input.

Some handheld computers have miniature or specialized keyboards. Many handheld computers are industry-specific and serve the needs of mobile employees, such as meter readers and parcel delivery people (Figure 1-21), whose jobs require them to move from place to place.

FAQ 1-6

How popular is text messaging?

A recent study indicates that people are using their smart phones and cell phones for voice communications and text messaging more frequently than in previous years. Because of the increase in smart phone sales and the ease with which individuals can send text messages, approximately two billion text messages are sent each day.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Text Messaging.

Figure 1-21 This handheld computer is a lightweight computer that enables delivery people to obtain and record information about their deliveries.

Portable Media Players A **portable media player** is a mobile device on which you can store, organize, and play digital media (Figure 1-22). For example, you can listen to music; watch videos, movies, and television shows; and view photos on the device's screen. With most, you download the digital media from a computer to the portable media player or to media that you insert in the device.

Figure 1-22 The iPod, shown here, is a popular portable media player.

Some portable media players are Internet-enabled so that you can access Web sites and send e-mail messages directly from the device. Many offer personal information management functions such as a calendar and address book, and include a variety of games and other application software.

Portable media players usually include a set of earbuds, which are small speakers that rest inside each ear canal. Some portable media players have a touch screen, while others have a touch-sensitive pad that you operate with a thumb or finger, to navigate through digital media, adjust volume, and customize settings.

Digital Cameras A **digital camera** is a device that allows users to take pictures and store the photographed images digitally, instead of on traditional film (Figure 1-23). While many digital cameras look like a traditional camera, some are built into smart phones and other mobile devices.

Although digital cameras usually have some amount of internal storage to hold images, most users store images on small storage media such as memory cards. Digital cameras typically allow users to review, and sometimes modify, images while they are in the camera. Some digital cameras connect to or communicate wirelessly with a computer or printer, allowing users to print or view images directly from the printer. Some memory cards can connect to a network wirelessly, so that you can transfer photos directly from the memory card in the camera to the Internet without requiring a computer.

Often users prefer to download images from the digital camera to the computer. Or, you can remove the storage media such as a memory card from the digital camera and insert it in a card reader in or attached to the computer.

Digital Cameras

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Digital Cameras.

Figure 1-23 With a digital camera, users can view photographed images immediately through a small screen on the camera to see if the picture is worth keeping.

Game Consoles

A **game console** is a mobile computing device designed for single-player or multiplayer video games (Figure 1-24). Standard game consoles use a handheld controller(s) as an input device(s); a television screen as an output device; and hard disks, optical discs, and/or memory cards for storage. Weighing on average between two and nine 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. Three popular models are Microsoft's Xbox 360, Nintendo's Wii (pronounced wee), and Sony's PlayStation 3. Read Innovative Computing 1-1 to find out how the medical field uses the Nintendo Wii.

A handheld game console is small enough to fit in one hand, making it more portable than the standard game console. With the handheld game console, the controls, screen, and speakers are built into the device. Because of their reduced size, the screens are small — three to four inches. Some models use cartridges to store games; others use a memory card or a miniature optical disc. Many handheld game consoles can communicate wirelessly with other similar consoles for multiplayer gaming. Two popular models are Nintendo DS Lite and Sony's PlayStation Portable (PSP).

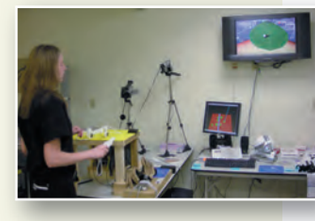
In addition to gaming, many game console models allow users to listen to music, watch movies, keep fit, and connect to the Internet. Game consoles can cost from a couple hundred dollars to more than $500.

Figure 1-24 Game consoles provide hours of video game entertainment.

INNOVATIVE COMPUTING 1-1

Wii a Welcome Medical Skill Builder

A patient awaiting laparoscopic procedures may be less tense knowing that the surgeons have honed their dexterity and coordination using a Nintendo Wii. Preliminary studies have found that doctors can improve their fine motor control by playing video games that emphasize subtle hand movements used in minimally invasive surgeries. Researchers are developing Wii surgery simulators that will allow doctors to practice their skills at home or in break rooms at hospitals.



The Wii game system is finding a medical home in other nontraditional places. Physical therapists urge arthritic patients to use *Wiihabilitation* to build endurance and increase their range of motion. Therapeutic recreation with the Wii's sports games may help patients recovering from strokes, fractures, and combat injuries.

Researchers in a testing lab in California are experimenting with using the Wii's motion-activated controls in non-gaming applications, such as allowing doctors to explain X-ray images to patients.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Innovative Computing resource for this book, and then click Medical Wii.

Servers

A **server** controls access to the hardware, software, and other resources on a network and provides a centralized storage area for programs, data, and information (Figure 1-25). Servers can support from two to several thousand connected computers at the same time.

In many cases, one server accesses data, information, and programs on another server. In other cases, people use personal computers or terminals to access data, information, and programs on a server. A terminal is a device with a monitor, keyboard, and memory.

Figure 1-25 A server controls access to resources on a network.

Mainframes

A **mainframe** is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously (Figure 1-26). Mainframes store tremendous amounts of data, instructions, and information. Most major corporations use mainframes for business activities. With mainframes, enterprises are able to bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory. One study reported that mainframes process more than 83 percent of transactions around the world.

Mainframes also can act as servers in a network environment. Servers and other mainframes can access data and information from a mainframe. People also can access programs on the mainframe using terminals or personal computers.

Figure 1-26 Mainframe computers can handle thousands of connected computers and process millions of instructions per second.

Supercomputers

A **supercomputer** is the fastest, most powerful computer — and the most expensive (Figure 1-27). The fastest supercomputers are capable of processing more than one quadrillion instructions in a single second. With weights that exceed 100 tons, these computers can store more than 20,000 times the data and information of an average desktop computer.

Applications requiring complex, sophisticated mathematical calculations use supercomputers. Large-scale simulations and applications in medicine, aerospace, automotive design, online banking, weather forecasting, nuclear energy research, and petroleum exploration use a supercomputer.

Figure 1-27 This supercomputer, IBM's Roadrunner, can process more than one quadrillion instructions in a single second.

Embedded Computers

An **embedded computer** is a special-purpose computer that functions as a component in a larger product. Embedded computers are everywhere — at home, in your car, and at work. The following list identifies a variety of everyday products that contain embedded computers.

- Consumer Electronics: mobile and digital telephones, digital televisions, cameras, video recorders, DVD players and recorders, answering machines
- Home Automation Devices: thermostats, sprinkling systems, security monitoring systems, appliances, lights
- Automobiles: antilock brakes, engine control modules, airbag controller, cruise control
- Process Controllers and Robotics: remote monitoring systems, power monitors, machine controllers, medical devices
- Computer Devices and Office Machines: keyboards, printers, fax and copy machines

Because embedded computers are components in larger products, they usually are small and have limited hardware. These computers perform various functions, depending on the requirements of the product in which they reside. Embedded computers in printers, for example, monitor the amount of paper in the tray, check the ink or toner level, signal if a paper jam has occurred, and so on. Figure 1-28 shows some of the many embedded computers in cars.

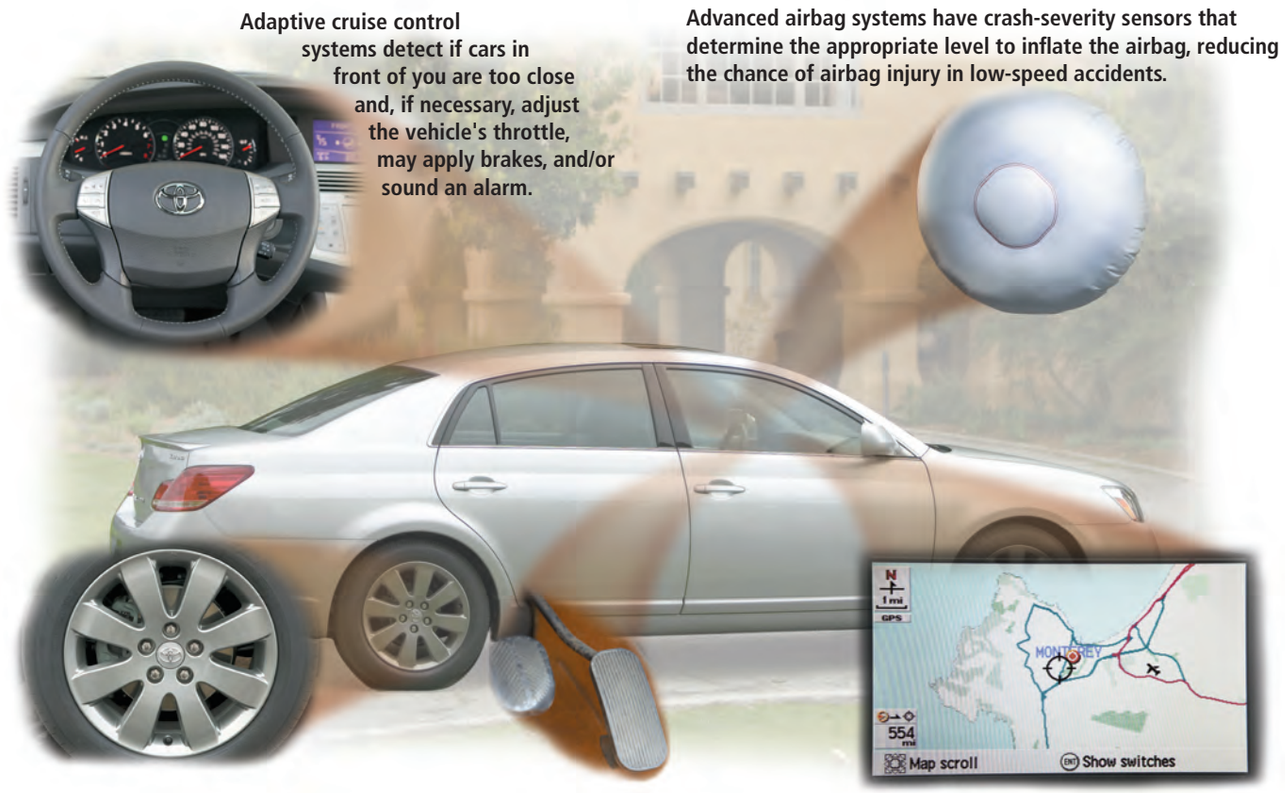


Figure 1-28 Some of the embedded computers designed to improve your safety, security, and performance in today's automobiles.

Elements of an Information System

To be valuable, information must be accurate, organized, timely, accessible, useful, and cost-effective to produce. Generating information from a computer requires the following five elements:

- Hardware
- Software
- Data
- People
- Procedures

Together, these elements (hardware, software, data, people, and procedures) comprise an *information system*. Figure 1-29 shows how each of the elements of an information system in an enterprise might interact.

The hardware must be reliable and capable of handling the expected workload. The software must be developed carefully and tested thoroughly. The data entered into the computer must be accurate.

Most companies with mid-sized and large computers have an IT (information technology) department. Staff in the IT department should be skilled and up-to-date on the latest technology. IT staff also should train users so that they understand how to use the computer properly. Today's users also work closely with IT staff in the development of computer applications that relate to their areas of work.

Finally, all the IT applications should have readily available documented procedures that address operating the computer and using its programs.

Women in Technology

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Women in Technology.

How the Elements of an Information System in an Enterprise Might Interact

Step 1
IT staff (people) develop processes (procedures) for recording checks (data) received from customers.

Step 2
Employees (people) in the accounts receivable department use a program (software) to enter the checks (data) in the computer.

Step 3
The computer (hardware) performs calculations required to process the accounts receivable data and stores the results on storage media such as a hard disk (hardware).

Step 4
Customer statements, the information, print on a corporate printer (hardware).

Figure 1-29 This figure shows how the elements of an information system in an enterprise might interact.

Examples of Computer Usage

Minorities in Technology

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Minorities in Technology.

Every day, people around the world rely on different types of computers for a variety of applications. To illustrate the range of uses for computers, this section takes you on a visual and narrative tour of five categories of users:

- Home user
- Small office/home office (SOHO) user
- Mobile user
- Power user
- Enterprise user

Home User

In an increasing number of homes, the computer no longer is a convenience. Instead, it is a basic necessity. Each family member, or **home user**, spends time on the computer for different reasons that include personal financial management, Web access, communications, and entertainment (Figure 1-30).

On the Internet, home users access a huge amount of information, conduct research, take college classes, pay bills, manage investments, shop, listen to the radio, watch movies, read books, file taxes, book airline reservations, make telephone calls, and play games (read Innovative Computing 1-2 to find out how some retailers use the Internet to help the environment). They also communicate with others around the world through e-mail, blogs, instant messages, and chat rooms using personal computers, smart phones, and other mobile devices. Home users share ideas, interests, photos, music, and videos on social networking Web sites (read Ethics & Issues 1-3 for a related discussion). With a digital camera, home users take photos and then send the electronic images to others. Using a Web cam, home users easily have live video calls with friends, family members, and others.

Many home users have a portable media player, so that they can download music or podcasts, and listen to the music and/or audio at a later time

Figure 1-30 The home user spends time on a computer for a variety of reasons.

through earbuds attached to the player. They also usually have one or more game consoles to play video games individually or with friends and family members.

Today's homes also typically have one or more desktop computers. Many home users network multiple desktop computers throughout the house, often wirelessly. These small networks allow family members to share an Internet connection and a printer.

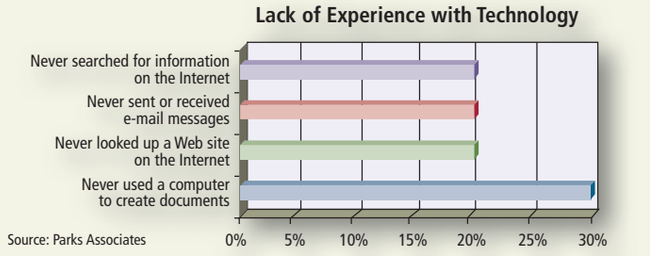
Home users have a variety of software. They type letters, homework assignments, and other documents with word processing software. Personal finance software helps the home user with personal finances, investments, and family budgets. Other software assists with preparing taxes, keeping a household inventory, setting up maintenance schedules, and protecting home computers against threats and unauthorized intrusions.

Reference software, such as encyclopedias, medical dictionaries, or a road atlas, provides valuable information for everyone in the family. With entertainment software, the home user can play games, compose music, research genealogy, or create greeting cards. Educational software helps adults learn to speak a foreign language and youngsters to read, write, count, and spell.

FAQ 1-7

How many households do not use the Internet or related technologies?

A recent survey estimates that 18 percent of U.S. households have no Internet access. Furthermore, about 20 percent of U.S. heads of households have never sent an e-mail message. The chart below illustrates the lack of experience with computer and Internet technology.



For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 FAQ resource for this book, and then click Experience with Technology.

INNOVATIVE COMPUTING 1-2

E-Receipts Save Paper, Organize Life

You may need to find a new use for the old shoeboxes that are storing your receipts. Some environmentally conscious retailers are providing a service that issues receipts electronically so that consumers never will need to hunt for a little white slip of paper when returning an item or declaring an expense for income taxes.

Digital receipts, also called *e-receipts*, are sent automatically to an e-mail account or Web site where they can be sorted or deleted. One service links a consumer's credit cards to a receipt account on a specific Web site, so that every time the cards are swiped for a purchase, a receipt is sent to the consumer's account.

More than 70 percent of consumers say they would prefer having an e-receipt rather than a paper receipt. According to one estimate, nine million trees would be saved if no paper receipts were issued for one year.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Innovative Computing resource for this book, and then click Digital Receipts.

ETHICS & ISSUES 1-3

Who Should Look Out for the Safety of Social Networking Web Site Users?

In recent years, social networking Web site usage by children and adults exploded as a new means of communicating and socializing. Not surprisingly, the problems associated with this exciting way to interact with others mirror some problems in society in general. Problems include bullying, smear campaigns against individuals, and inappropriate contact between adults and minors. Recently, a high-school-aged girl secretly left the country with the intent of marrying an adult in a foreign country whom she met on a social networking Web site. Fortunately, authorities in the foreign country intercepted her at the airport and sent her home. Some parents claim that the government should intervene to ensure better monitoring of inappropriate behavior. While some social networking Web site companies have stepped up monitoring, they often claim that they are not responsible for the behavior of individuals, and parents and individuals should be responsible for inappropriate actions. Many individuals feel that the problems are simply a matter of personal responsibility and following some simple guidelines, such as the "golden rule."

Should social networking Web sites do a better job of telling their users what is safe or unsafe information to share? Why or why not? What role should parents play in overseeing their child's involvement in social networking Web sites? Why? Should police or other government authorities be responsible for maintaining order on social networking Web sites in the same way they are charged with maintaining order in society in general? Why or why not?

Small Office/Home Office User

Computers assist small business and home office users in managing their resources effectively. A **small office/home office** (*SOHO*) includes any company with fewer than 50 employees, as well as the self-employed who work from home. Small offices include local law practices, accounting firms, travel agencies, and florists. SOHO users typically have a desktop computer to perform some or all of their duties. Many also have smart phones or other mobile devices to manage appointments and contact information.

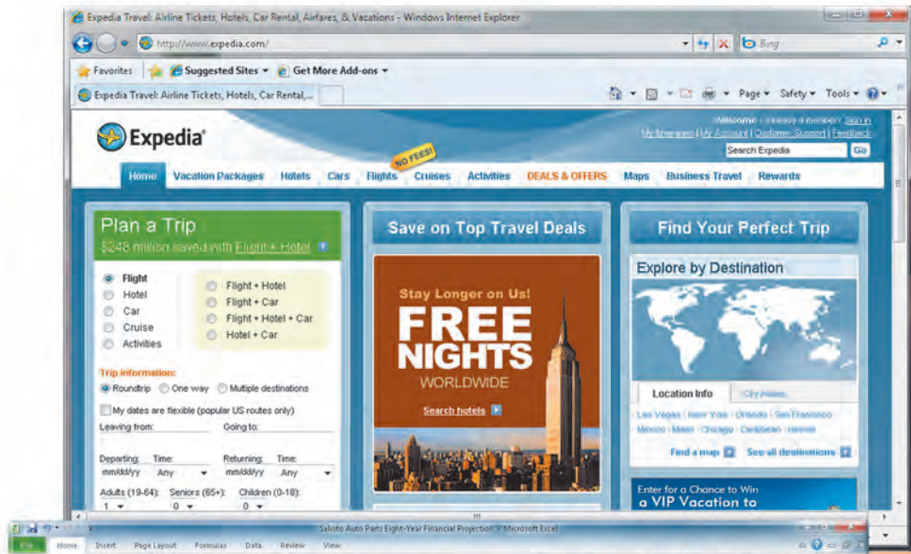
SOHO users access the Internet — often wirelessly — to look up information such as addresses, directions, postal codes, flights (Figure 1-31a), and package shipping rates or to send and receive e-mail messages or make telephone calls.

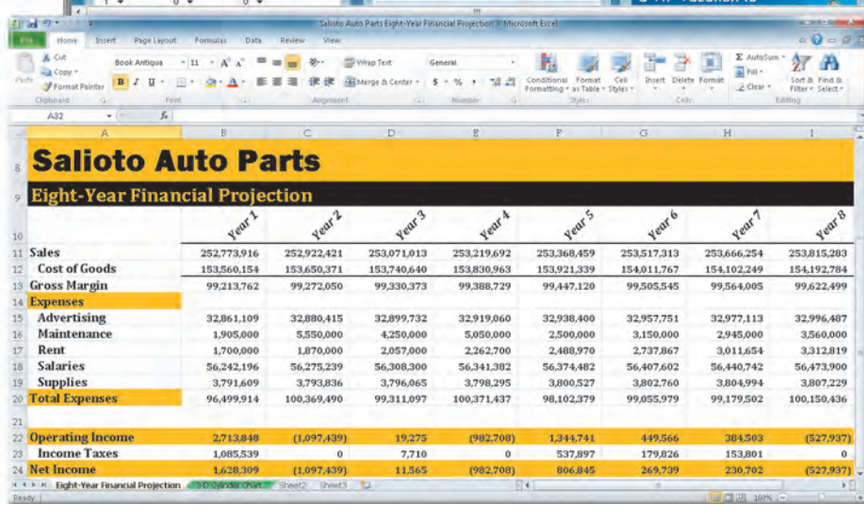
Many have entered the *e-commerce* arena and conduct business on the Web. Their Web sites advertise products and services and may provide a means for taking orders. Small business Web sites sometimes use a *Web cam* to show the world a live view of some aspect of their business.

To save money on hardware and software, small offices often network their computers. For example, the small office connects one printer to a network for all employees to share.

SOHO users often work with basic business software such as word processing and spreadsheet programs that assist with document preparation and finances (Figure 1-31b). They are likely to use other industry-specific types of software. An auto parts store, for example, will have software that allows for looking up parts, taking orders and payments, and updating inventory.

Figure 1-31a (Web access)





Salioto Auto Parts

Eight-Year Financial Projection

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Sales	252,773,916	252,922,421	253,071,013	253,219,692	253,368,459	253,517,313	253,666,254	253,815,283
Cost of Goods	153,560,154	153,650,371	153,740,640	153,830,963	153,921,339	154,011,767	154,102,249	154,192,784
Gross Margin	99,213,762	99,272,050	99,330,373	99,388,729	99,447,120	99,505,545	99,564,005	99,622,499
Expenses								
Advertising	32,861,109	32,880,415	32,899,732	32,919,060	32,938,400	32,957,751	32,977,113	32,996,487
Maintenance	1,905,000	5,550,000	4,250,000	5,050,000	2,500,000	3,150,000	2,945,000	3,560,000
Rent	1,700,000	1,870,000	2,057,000	2,262,700	2,488,970	2,737,867	3,011,654	3,312,819
Salaries	56,242,196	56,275,239	56,308,300	56,341,382	56,374,482	56,407,602	56,440,742	56,473,900
Supplies	3,791,609	3,793,836	3,796,065	3,798,295	3,800,527	3,802,760	3,804,994	3,807,229
Total Expenses	96,499,914	100,369,490	99,311,097	100,371,437	98,102,379	99,055,979	99,179,502	100,150,436
Operating Income	2,713,848	(1,097,439)	19,275	(982,708)	1,344,741	449,566	384,503	(527,937)
Income Taxes	1,085,539	0	7,710	0	537,897	179,826	153,801	0
Net Income	1,628,309	(1,097,439)	11,565	(982,708)	806,845	269,739	230,702	(527,937)

Figure 1-31b (spreadsheet program)

Figure 1-31 People with a home office and employees in small offices typically use a personal computer for some or all of their duties.

Mobile User

Today, businesses and schools are expanding to serve people across the country and around the world. Thus, increasingly more employees and students are **mobile users**, who work on a computer or mobile device while away from a main office, home office, or school (Figure 1-32). Examples of mobile users are sales representatives, real estate agents, insurance agents, meter readers, package delivery people, journalists, consultants, and students.

Mobile users often have mobile computers and/or mobile devices. With these computers and devices, the mobile user connects to other computers on a network or the Internet, often wirelessly accessing services such as e-mail and the Web. Mobile users can transfer information between their mobile device and another computer, such as one at the main office or school. For entertainment, the mobile user plays video games on a handheld game console and listens to music or watches movies on a portable media player.

The mobile user works with basic business software such as word processing. With presentation software, the mobile user can create and deliver presentations to a large audience by connecting a mobile computer or device to a video projector that displays the presentation on a full screen. Many scaled-down programs are available for mobile devices such as smart phones.

Figure 1-32 Mobile users have a variety of mobile computers and devices so that they can work, do homework, send messages, connect to the Internet, or play games while away from a wired connection.

Power User

Another category of user, called a **power user**, requires the capabilities of a workstation or other type of powerful computer. Examples of power users include engineers, scientists, architects, desktop publishers, and graphic artists (Figure 1-33). Power users often work with *multimedia*, combining text, graphics, audio, and video into one application. These users need computers with extremely fast processors because of the nature of their work.

The power user's workstation often contains industry-specific software. For example, engineers and architects use software to draft and design floor plans, mechanical assemblies, or vehicles. A desktop publisher uses software to prepare marketing literature. A graphic artist uses software to create sophisticated drawings. This software usually is expensive because of its specialized design.

Power users exist in all types of businesses. Some work at home. Their computers typically have network connections and Internet access.

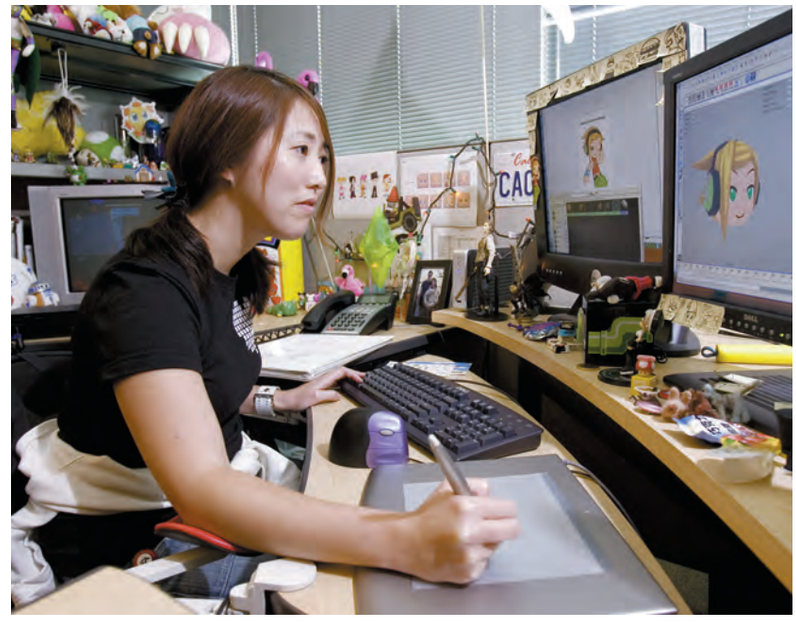


Figure 1-33 This graphic artist uses a powerful computer to develop computer games.

Enterprise User

An enterprise has hundreds or thousands of employees or customers that work in or do business with offices across a region, the country, or the world. Each employee or customer who uses a computer in the enterprise is an **enterprise user** (Figure 1-34).

Many large companies use the words, *enterprise computing*, to refer to the huge network of computers that meets their diverse computing needs. The network facilitates communications among employees at all locations. Users access the network of servers or mainframes through desktop computers, mobile computers, and mobile devices.

Enterprises use computers and the computer network to process high volumes of transactions in a single day. Although they may differ in size and in the products or services offered, all generally use computers for basic business activities. For example, they bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory. Some enterprises use blogs to open communications among employees, customers, and/or vendors.

Enterprises typically have e-commerce Web sites, allowing customers and vendors to conduct business online. The Web site also showcases products, services, and other company information.

The marketing department in an enterprise uses desktop publishing software to prepare marketing literature. The accounting department uses software for accounts receivable, accounts payable, billing, general ledger, and payroll activities.

The employees in the *information technology (IT) department* keep the computers and the network running. They determine when the company requires new hardware or software.

Enterprise users work with word processing, spreadsheet, database, and presentation software. They also may use calendar programs to post their schedules on the network. And, they might use smart phones or mobile devices to maintain contact information. E-mail programs and Web browsers enable communications among employees, vendors, and customers.

Many employees of enterprises telecommute. **Telecommuting** is a work arrangement in which employees work away from a company's standard workplace and often communicate with the office through the computer. Employees who telecommute have flexible work schedules so that they can combine work and personal responsibilities, such as child care.

Enterprise Computing

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click Enterprise Computing.

Putting It All Together

The previous pages discussed the hardware and software requirements for the home user, small office/home office user, mobile user, power user, and enterprise user. The table in Figure 1-35 summarizes these requirements.

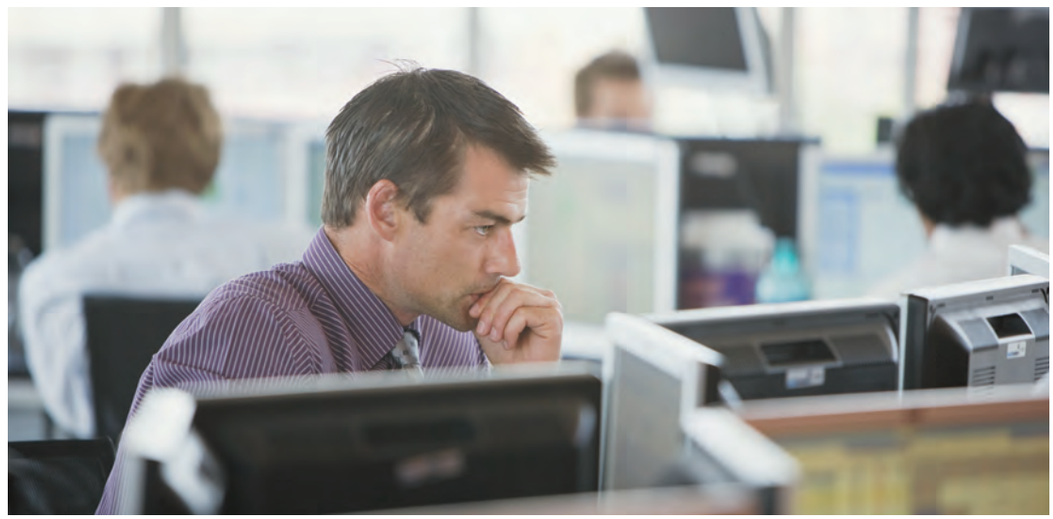


Figure 1-34 An enterprise can have hundreds or thousands of users in offices across a region, the country, or the world.

Categories of Users

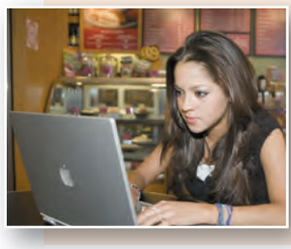
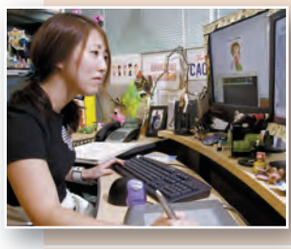
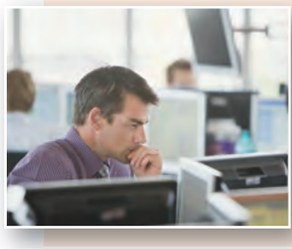
User	Hardware	Software
Home 	• Desktop or notebook computer • Smart phone or other mobile device • Game consoles	• Business (e.g., word processing) • Personal information manager • Personal finance, online banking, tax preparation • Web browser • E-mail, blogging, instant messaging, chat rooms, and online social networking • Internet telephone calls • Photo and video editing • Reference (e.g., encyclopedias, medical dictionaries, road atlas) • Entertainment (e.g., games, music composition, greeting cards) • Education (e.g., tutorials, children's math and reading software)
Small Office/Home Office 	• Desktop or notebook computer • Smart phone or other mobile device • Shared network printer	• Business (e.g., word processing, spreadsheet, database) • Personal information manager • Company specific (e.g., accounting, legal reference) • Network management • Web browser • E-mail • Internet telephone calls
Mobile 	• Notebook computer equipped with a wireless modem, or a netbook or Tablet PC • Video projector • Smart phone or other mobile device • Handheld game consoles	• Business (e.g., word processing, note taking, presentation) • Personal information manager • Web browser • E-mail
Power 	• Workstation or other powerful computer with multimedia capabilities • Smart phone or other mobile device	• Desktop publishing • Multimedia authoring • Computer-aided design • Photo, audio, and video editing • Personal information manager • Web browser • E-mail
Enterprise 	• Server or mainframe • Desktop or notebook computer • Industry-specific handheld computer • Smart phone or other mobile device	• Business (e.g., word processing, spreadsheet, database) • Personal information manager • Accounting • Network management • Web browser • E-mail • Blogging

Figure 1-35 Today, computers are used by millions of people for work tasks, school assignments, and leisure activities. Different computer users require different kinds of hardware and software to meet their needs effectively.

Computer Applications in Society

The computer has changed society today as much as the industrial revolution changed society in the eighteenth and nineteenth centuries.

People interact directly with computers in fields such as education, finance, government, health care, science, publishing, travel, and manufacturing. In addition, they can reap the benefits from breakthroughs and advances in these fields. The following pages describe how computers have made a difference in people's interactions with these disciplines. Read Looking Ahead 1-1 for a look at how embedded computers may improve the quality of life.

LOOKING AHEAD 1-1

Embedded Computers May Improve Quality of Life

The weather forecast may be as close as your fingertips if plans to integrate embedded computers in everyday objects become a reality. Researchers are envisioning an umbrella with an embedded cell phone in the handle that will dial and then download the local forecast. The handle will glow green for good weather and flash red for imminent storms.

Dancers can pin a small flower with an embedded motion-detecting computer to their clothes. When they move, the embedded computer senses action and then synchronizes the tempo of music to this movement. Other embedded computers woven into clothing can monitor heart and breathing rates.

Wearing hidden embedded computers can help the elderly and people recovering from accidents and surgeries monitor their walking stride and pace. When their steps are uneven, the embedded computer can sound a warning and perhaps prevent a fall. Other embedded computers can give subtle feedback on the quality of physical activity.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Looking Ahead resource for this book, and then click Embedded Computers.

Education

Education is the process of acquiring knowledge. In the traditional model, people learn from other people such as parents, teachers, and employers. Many forms of printed material such as books and manuals are used as learning tools. Today, educators also are turning to computers to assist with education (Figure 1-36).

Many schools and companies equip labs and classrooms with computers. Some schools require students to have a mobile computer or mobile device to access the school's network or Internet wirelessly. To promote education by computer, many vendors offer substantial student discounts on software.

Sometimes, the delivery of education occurs at one place while the learning occurs at other locations. For example, students can take a class on the Web. Some classes are blended; that is, part of the learning occurs in a classroom and the other part occurs on the Web. More than 70 percent of colleges offer distance learning classes. A few even offer entire degrees online.

Figure 1-36 In some schools, students have mobile computers on their desks during classroom lectures.

Finance

Many people and companies use computers to help manage their finances. Some use finance software to balance checkbooks, pay bills, track personal income and expenses, manage investments, and evaluate financial plans. This software usually includes a variety of online services. For example, computer users can track investments and do online banking. With **online banking**, users access account balances, pay bills, and copy monthly transactions from the bank's computer right into their personal computers.

Many financial institutions' Web sites also offer online banking. When using a Web site instead of finance software on your computer, all your account information is stored on the bank's computer. The advantage is you

can access your financial records from anywhere in the world (Figure 1-37).

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.

Government

A government provides society with direction by making and administering policies. To provide citizens with up-to-date information, most government offices have Web sites. People in the United States access government Web sites to 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. To provide these services, some Web sites require users provide personal information (read Ethics & Issues 1-4 for a related discussion).

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 notebook computers, fingerprint readers, and mobile devices (Figure 1-38). The NCIC contains more than 52 million missing persons and criminal records, including names, fingerprints, parole/probation records, mug shots, and other information.

Figure 1-37 An online banking Web site.

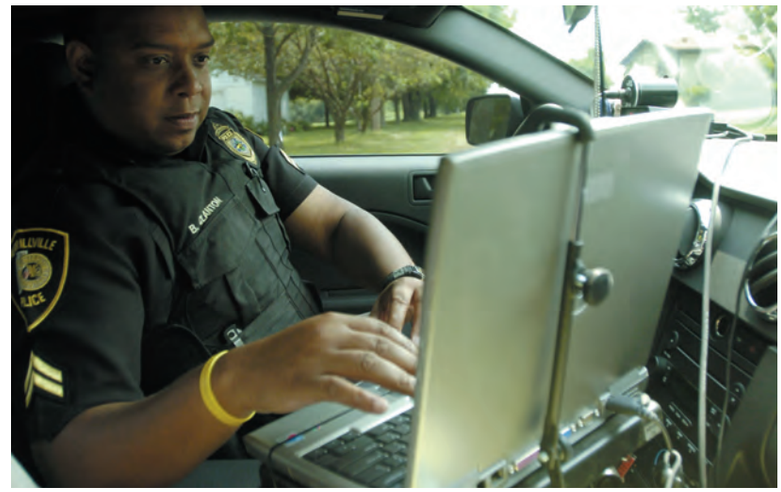


Figure 1-38 Law enforcement officials have in-vehicle computers and mobile devices to access emergency, missing person, and criminal records in computer networks in local, state, and federal agencies.

ETHICS & ISSUES 1-4

Should You Surrender Privacy for Convenience, Security, Money, or Social Connections?

The chief executive officer of a large computer software company once declared, "Privacy is dead, deal with it." While a vast majority of people demand increased privacy, many of those same people do not hesitate to surrender personal information in exchange for some short-term benefit. In a recent study, one-third of Internet users admitted to making detailed personal information available on the Internet. Personal information has become similar to a currency that people give up in order to obtain a benefit. Benefits might be in the form of increased convenience, increased security, money savings, or social connections online. For example, increased convenience may be in the form of an automated toll collection device that also can track the user's location and speed, and allow the government to maintain a record of the user's whereabouts. Insistence on safety or security may mean tolerating video cameras in many public and private places. The use of a grocery store affinity card saves a few dollars but also allows the store to track an individual buyer's every purchase. Signing up for an online social network often requires the divulgence of personal information so that the service better can locate other members with similar interests. In each of these examples, some measure of privacy is sacrificed.

Should people limit the amount of personal information they exchange? Why or why not? What are the dangers and disadvantages of giving up some amount of privacy in exchange for a short-term benefit? What are some possible alternatives to exchanging privacy for a perceived benefit? Should companies or government organizations be required to purge your personal information if you request so? Why or why not?

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, or being rushed in for emergency surgery, the medical staff around you will be using computers for various purposes:

- Hospitals and doctors use computers and mobile devices to maintain and access patient records.
- Computers monitor patients' vital signs in hospital rooms and at home.
- Robots deliver medication to nurse stations in hospitals.
- Computers and computerized devices assist doctors, nurses, and technicians with medical tests (Figure 1-39).
- Doctors use the Web and medical software to assist with researching and diagnosing health conditions.
- Doctors use e-mail to correspond with patients.
- Pharmacists use computers to file insurance claims.
- Surgeons implant computerized devices, such as pacemakers, that allow patients to live longer.
- Surgeons use computer-controlled devices to provide them with greater precision during operations, such as for laser eye surgery and robot-assisted heart surgery.

Figure 1-39 Doctors, nurses, technicians, and other medical staff use computers and computerized devices to assist with medical tests.

Many Web sites provide up-to-date medical, fitness, nutrition, or exercise information. These Web sites also maintain lists of doctors and dentists to help you find the one that suits your needs. They have chat rooms, so that you can talk to others diagnosed with similar conditions. Some Web sites even allow you to order prescriptions online.

Two forms of long-distance health care are telemedicine and telesurgery. Through *telemedicine*, health-care professionals in separate locations conduct live conferences on the computer. For example, a doctor at one location can have a conference with a doctor at another location to discuss a bone X-ray. Live images of each doctor, along with the X-ray, are displayed on each doctor's computer.

With *telesurgery*, also called *remote surgery*, a surgeon performs an operation on a patient who is not located in the same physical room as the surgeon. Telesurgery enables surgeons to direct robots to perform an operation via computers connected to a high-speed network.

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. Cameras small enough to swallow — sometimes called a camera pill — take pictures inside your body to detect polyps, cancer, and other abnormalities (Figure 1-40).

A *neural network* is a system that attempts to imitate the behavior of the human brain. Scientists create neural networks by connecting thousands of processors together much like the neurons in the brain are connected. The capability of a personal computer to recognize spoken words is a direct result of scientific experimentation with neural networks.

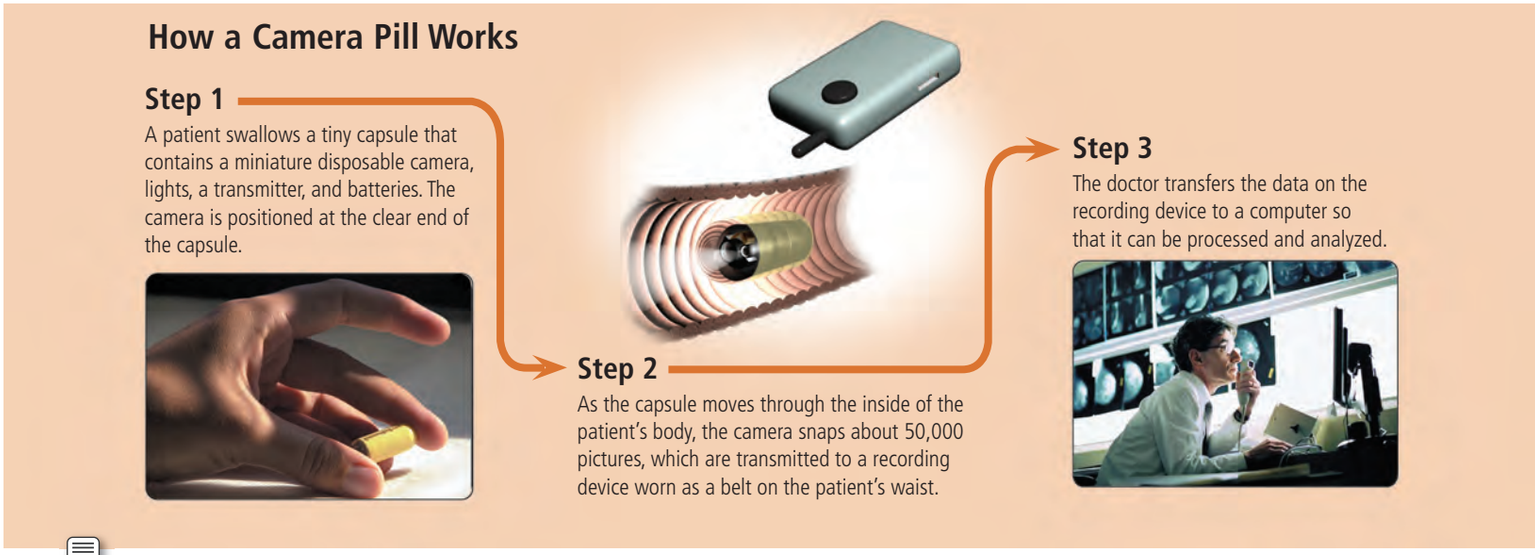


Figure 1-40 This figure shows how a camera pill works.

Publishing

Publishing is the process of making works available to the public. These works include books, magazines, newspapers, music, film, and video. Special software assists graphic designers in developing pages that include text, graphics, and photos; artists in composing and enhancing songs; filmmakers in creating and editing film; and journalists and mobile users in capturing and modifying video clips.

Many publishers make their works available online (Figure 1-41). Some Web sites allow you to copy the work, such as a book or music, to your desktop computer, mobile computer, smart phone, or other mobile device.

Figure 1-41 Many magazine and newspaper publishers make the content of their publications available online.

Travel

Whether traveling by car or airplane, your goal is to arrive safely at your destination. As you make the journey, you may interact with some of the latest technology.

Vehicles manufactured today often include some type of onboard navigation system, such as OnStar. Many mobile devices such as smart phones have built-in navigation systems. Some mobile users prefer to carry specialized handheld navigation devices (Figure 1-42). For a technical discussion about how navigation devices determine your location, read the High-Tech Talk article on page 40.

OnStar
For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Web Link resource for this book, and then click OnStar.

In preparing for a trip, you may need to reserve a car, hotel, or flight. Many Web sites offer these services to the public. For example, you can order airline tickets on the Web. If you plan to drive somewhere and are unsure of the road to take to your destination, you can print directions and a map from the Web.

Figure 1-42 This handheld navigation device gives users turn-by-turn voice-prompted directions to a destination.

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 (Figure 1-43).

Special computers on the shop floor record actual labor, material, machine, and computer time used to manufacture a particular product. The computers process this data and automatically update inventory, production, payroll, and accounting records on the company's network.

Figure 1-43 Automotive factories use industrial robots to weld car bodies.

QUIZ YOURSELF 1-3

Instructions: Find the true statement below. Then, rewrite the remaining false statements so that they are true.

1. A desktop computer is a portable, personal computer designed to fit on your lap.
2. A personal computer contains a processor, memory, and one or more input, output, and storage devices.
3. Each enterprise user spends time on the computer for different reasons that include personal financial management, Web access, communications, and entertainment.
4. A home user requires the capabilities of a workstation or other powerful computer.
5. Mainframes are the fastest, most powerful computers — and the most expensive.
6. The elements of an information system are hardware, e-mail, data, people, and the Internet.
7. With embedded computers, users access account balances, pay bills, and copy monthly transactions from the bank's computer right into their personal computers.

Quiz Yourself Online: To further check your knowledge of pages 18 through 38, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 8 – 11.

Chapter Summary

Chapter 1 introduced you to basic computer concepts such as what a computer is, how it works, and its advantages and disadvantages (read Ethics & Issues 1-5 for a related discussion). You learned about the components of a computer. Next, the chapter discussed networks, the Internet, and computer software. The many different categories of computers, computer users, and computer applications in society also were presented.

This chapter is an overview. Many of the terms and concepts introduced will be discussed further in later chapters. For a history of hardware and software developments, read the Timeline feature that follows this chapter.

ETHICS & ISSUES 1-5

Should Recycling of Electronics Be Made Easier?

Experts estimate that more than one billion computers have been discarded to date. The discarded items often are known as *e-waste*. As technology advances and prices fall, many people think of computers, cell phones, and portable media players as disposable items. These items often contain several toxic elements, including lead, mercury, and barium. Computers and mobile devices thrown into landfills or burned in incinerators can pollute the ground and the air. A vast amount of e-waste ends up polluting third world countries. One solution is to recycle old electronic equipment, but the recycling effort has made little progress especially when compared to recycling programs for paper, glass, and plastic.

Some lawmakers prefer an aggressive approach, such as setting up a recycling program that would be paid for by adding a small fee to the purchase price of computers and computer equipment, or forcing computer manufacturers to be responsible for collecting and recycling their products. California already requires a recycling fee for any products sold that include certain electronic equipment. Manufacturers have taken steps, such as offering to recycle old computers and using energy efficient and environmentally friendly manufacturing techniques, but some claim that consumers should bear the responsibility of disposing of their old computer parts. While some companies have set up recycling programs, many claim that forcing them to bear the cost of recycling programs puts the company at a competitive disadvantage when compared to foreign companies that may not be forced to maintain a recycling program.

Why is electronics recycling not as popular as other types of recycling? How can companies make it easier to recycle electronics while being compensated fairly for the cost of recycling? Should the government, manufacturers, or users be responsible for recycling of obsolete equipment? Why? Should the government mandate a recycling program for electronics? Why or why not?

Computer Usage @ Work

Transportation

What is transportation like without computers? Delivery drivers use clipboards to hold their records. Human navigators use paper maps to track routes for pilots. Ship captains rely solely on experience to navigate through shallow waters. Today, the transportation industry relies heavily on computer usage.

As presented in this chapter, many vehicles include onboard navigation systems to help you navigate from one location to another. These systems also usually provide other services such as dispatching roadside assistance, unlocking the driver's side door if you lock the keys in your vehicle, and tracking the vehicle if it is stolen.

The shipping and travel industries identify items during transport using bar codes, which are identification codes that consist of lines and spaces of different lengths. When you ship a package, the shipping company, such as UPS or FedEx, places a bar code on the package to indicate its destination to a computer. Because a package might travel to its destination by way of several trucks, trains, and airplanes, computers automatically route the package as efficiently as possible.

When you travel by airplane, baggage handling systems ensure that your luggage reaches its destination on time. When you check in your baggage at the airport, a bar code identifies the airplane on which the bags should be placed. If you change planes, automated baggage handling systems route your bags to connecting flights with very little, if any, human intervention. When the bags reach their destination, they are routed automatically to the baggage carousel in the airport's terminal building.

Pilots of high-technology commercial, military, and space aircraft today work in a glass cockpit, which features computerized instrumentation, navigation, communication, weather reports, and an autopilot. The electronic flight information shown on high-resolution displays is designed to reduce pilot workload, decrease fatigue, and enable pilots to concentrate on flying safely.

Boats and ships also are equipped with computers that include detailed electronic maps, help the captain navigate, as well as calculate the water depth and provide a layout of the underwater surface so that the captain can avoid obstructions.

As you travel the roadways, airways, and waterways, bear in mind that computers often are responsible for helping you to reach your destination as quickly and safely as possible.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Computer Usage @ Work resource for this book, and then click Transportation.

High-Tech Talk

Triangulation: Can You Find Me Now?

Have you wondered how a Nintendo Wii game console is able to determine the precise location of a Wii Remote while a player interacts with a game? How does the Wii console know where the player is pointing the Wii Remote, swinging it like a golf club, or motioning as if you are throwing a bowling ball? The answer is triangulation.

Triangulation is the process by which you can use trigonometry to determine the location of an object by measuring the angles from two or more fixed points. Surveyors often use triangulation to measure distance. Starting at a known location and elevation, surveyors measure a predetermined length to create a base line and then use an instrument called a theodolite to measure the angle to the unknown point from each side of the base line. The length of the base line along with the two known angles allows a computer or individual to determine the exact location of the third point (Figure 1-44). Electronic theodolites calculate angles automatically and then send the calculated angles to a computer for analysis.

In Figure 1-44, the distance between points A and B is known. The theodolite calculates angle CAB (α) and also calculates angle ABC (ß). A human or computer can calculate the location of point C by determining the distance between points A and C and between points B and C. The formula used to determine the location of an object will vary depending upon the number of fixed points used in the measurement. With two fixed points, a relatively simple formula calculates the location of the third point. As the number of fixed points increases, the calculation becomes more complex.

Similarly, the Nintendo Wii game console uses triangulation to determine the location of a Wii Remote. When you set up a Wii game system, you place a sensor bar, which contains two infrared transmitters, near or on top of a television set. While you are using a Wii Remote, the Wii console determines the remote's location by calculating the distance and angles between the Wii Remote and the two transmitters on the sensor bar. Determining the location of a Wii Remote is relatively simple because the sensor bar only contains two fixed points: the transmitters.

A more complex application of triangulation occurs in global positioning systems. A *global positioning system* (*GPS*) is a navigation system that consists of one or more earth-based receivers that accept and analyze signals sent by satellites in order to determine the receiver's geographic location. GPS receivers are found in handheld navigation devices and many vehicles. GPS receivers use triangulation to determine their location relative to at least three geostationary satellites. Geostationary satellites, the fixed points in the triangulation formula, remain in the same location above the earth. Because 24 geostationary GPS satellites orbit the earth, a GPS receiver can increase its accuracy by using more than three satellites to determine its location by measuring the distance from each of the satellites, which always are a fixed distance apart, that are in range. In addition to determining position, GPS receivers also are able to calculate the speed of a moving object by recording its change in location from each satellite during a period of time. For instance, if a GPS receiver determines that you travel two-hundredths of a mile in one second, it automatically would be able to calculate that you are traveling at a rate of 72 miles per hour.

Another form of triangulation also can be used to determine the exact location of certain cell phones, usually after a caller dials for emergency assistance. Although some cell phones are not equipped with a GPS receiver, computers still can determine the phone's distance from other known locations, which might include cell towers. Because the location of two or more cell towers within range are known, computers easily can calculate the location of the cell phone. If you are unsure of whether the position of your cell phone can be determined automatically, always be prepared to give your location to an emergency dispatcher.

The next time you are passing a surveyor, playing a Nintendo Wii, following a prescribed route on a vehicle's navigation system, or observing emergency personnel respond to an accident, keep in mind that none of it might have been possible without the concept of triangulation.

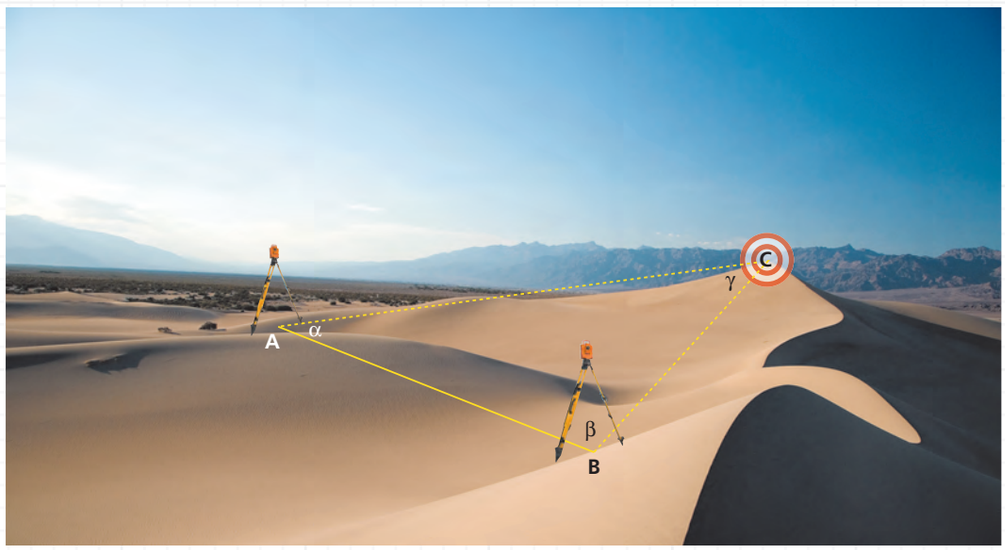


Figure 1-44 Triangulation example.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 High-Tech Talk resource for this book, and then click Triangulation.

Companies on the Cutting Edge

APPLE Innovative Industry Products

Apple recently sold a record 5.2 million of its latest iPhone models in one quarter, establishing the company's appeal to both consumer and corporate cell phone users. Apple is noted for introducing innovative products, starting with the Apple II, which was the first mass-marketed personal computer, in 1977 and the Macintosh, which featured a graphical user interface, in 1984.

Steve Jobs and Steve Wozniak founded Apple in 1976 when they marketed the Apple I, a circuit board they had developed in Jobs's garage. Under Jobs's direction as CEO, Apple developed the OS X operating system; iLife for working with photos, music, videos, and Web sites; and iWork, a collection of business programs. Apple also is leading the digital media revolution with its iPod portable media players, iPad tablet computer, and iTunes online store, which is the most popular Web site selling music. More than 10 million downloads occur each day from Apple's App Store, for a total download count exceeding 7 billion.

AMAZON Retailer Focused on Consumers

Online shoppers can find practically any product they desire on *Amazon*.com. Billing itself as the "Earth's most customer-centric company," it offers books, movies, electronics, clothing, toys, and many other items.

Jeff Bezos founded Amazon in 1995 knowing that book lovers would gravitate toward a Web site offering the convenience of browsing through millions of book titles in one sitting. He fulfilled orders for customers in every U.S. state and 45 additional countries during the first 30 days of business, all shipped from his Seattle-area garage.

The company has grown to permit third parties to sell products on its Web site. Its Kindle portable reader wirelessly downloads more than 450,000 books along with blogs, magazines, and newspapers to a high-resolution electronic paper display. Recently, it launched Kindle Singles, which are Kindle books with up to 30,000 words, the equivalent of two chapters of a typical book.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Companies on the Cutting Edge resource for this book.

Technology Trailblazers

BILL GATES Microsoft Founder

When *Bill Gates* stepped down from his day-to-day activities at Microsoft in 2008, his action marked the end of an era that shaped the computer world. He remains the company's chairman and advisor, but he now devotes much of his time directing the Bill & Melinda Gates Foundation, a philanthropic organization working to help people worldwide lead healthy, productive lives. His foundation currently is awarding $3 billion in grants to improve education and graduation rates via technology, with an emphasis on online learning.

Gates learned to program computers when he was 13 years old. Early in his career, he developed the BASIC programming language for the MITS Altair, one of the first microcomputers. He founded Microsoft in 1975 with Paul Allen, and five years later they licensed the first operating system, called PC-DOS, to IBM for $80,000. This decision to license, rather than sell, the software is considered one of the wisest business decisions Gates ever made. Today, Microsoft's Windows and Office products dominate the software market.

TOM ANDERSON MySpace Cofounder and President

Having more than 11 million friends is all in a day's work for *Tom Anderson*, the current president and one of the founders of MySpace, one of the world's largest online social networks. Every MySpace account includes Anderson as a default first friend who is invited to view each personal network.

When Anderson's own rock group failed, he needed a place to post his songs. He started MySpace in 2003 with his friend, Chris DeWolfe, as a free tool to help musicians promote their songs and allow music lovers to create their own Web pages devoted to sharing their favorite music with like-minded admirers. Two years later they sold the business to Rupert Murdoch's News Corporation for $580 million. Anderson graduated from the University of California – Los Angeles in 2001 with a master's degree in film and from the University of California – Berkeley in 1998 with a bachelor's degree in English and rhetoric.

For more information, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Technology Trailblazers resource for this book.

Chapter Review

The Chapter Review reinforces the main concepts presented in this chapter.

To listen to an audio version of this Chapter Review, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Chapter Review resource for this book.

1. **Why Is Computer Literacy Vital in Today's World?** **Computer literacy**, or *digital literacy*, involves having current knowledge and understanding of computers and their uses. The requirements that determine computer literacy change as technology changes. As computers become more a part of everyday life, many people believe that computer literacy is vital to success.

2. **What Is a Computer, and What Is the Relationship between Data and Information?** A **computer** is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data according to specified rules, produce results, and store the results for future use. **Data** is a collection of unprocessed items, which can include text, numbers, images, audio, and video. **Information** conveys meaning and is useful to people.

3. **List and Describe the Five Components of a Computer.** The electric, electronic, and mechanical components of a computer, or **hardware**, include input devices, output devices, a system unit, storage devices, and communications devices. An **input device** allows you to enter data or instructions into a computer. An **output device** conveys information to one or more people. The **system unit** is a case that contains the electronic components of a computer that are used to process data. A **storage device** records and/or retrieves items to and from **storage media**. A **communications device** enables a computer to send and receive data, instructions, and information to and from one or more computers.

4. **What Are the Advantages and Disadvantages That Users Experience When Working with Computers?** A **user** is anyone who communicates with a computer or utilizes the information it generates. Computers have the advantages of speed, reliability, consistency, storage, and communications. They perform operations at incredibly fast speeds, are dependable and reliable, consistently generate error-free results, can store enormous amounts of data, and can share processing with other computers. Disadvantages of computers relate to health risks, the violation of privacy, public safety, the impact on the labor force, and the impact on the environment.

Visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 1 – 4.

5. **What Is a Network, and What Are Its Benefits?** 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. The world's largest computer network is the Internet.

6. **How Are the Internet and World Wide Web Used?** The Internet is a worldwide collection of networks that connects millions of businesses, government agencies, educational institutions, and individuals. People use the Internet to communicate with and meet other people; conduct research and access information and news; shop for goods and services; bank and invest; participate in online training; engage in entertaining activities; download music and videos; share information, photos, and videos; and access and interact with Web applications. The **Web**, short for World Wide Web, is a global library of documents containing information that is available to anyone connected to the Internet.

7. **How Is System Software Different from Application Software?** **Software**, also called a **program**, is a series of related instructions, organized for a common purpose, that tells the computer what actions to perform and how to perform them. **System software** consists of the programs that control or maintain the operations of a computer and its devices. Two types of system software are the *operating system*, which coordinates activities among computer hardware devices, and *utility programs*, which perform maintenance-type tasks usually related to managing a computer, its devices, or its programs. **Application software** consists of programs designed to make users more productive and/or assists them with personal tasks. Popular application software includes Web browsers, word processing software, spreadsheet software, database software, and presentation software.

Visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 5 – 7.

Chapter Review

8. What Are the Differences among the Types, Sizes, and Functions in the Following Categories: Personal Computers (Desktop), Mobile Computers and Mobile Devices, Game Consoles, Servers, Mainframes, Supercomputers, and Embedded Computers? Industry experts typically classify computers in seven categories: personal computers (desktop), mobile computers and mobile devices, game consoles, servers, mainframes, supercomputers, and embedded computers. A **personal computer** is a computer that can perform all of its input, processing, output, and storage activities by itself. A **mobile computer** is a personal computer you can carry from place to place, and a **mobile device** is a computing device small enough to hold in your hand. A **game console** is a mobile computing device designed for single-player or multiplayer video games. A **server** controls access to the hardware, software, and other resources on a network and provides a centralized storage area for programs, data, and information. A **mainframe** is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously and can store tremendous amounts of data, instructions, and information. A **supercomputer** is the fastest, most powerful, and most expensive computer and is used for applications requiring complex, sophisticated mathematical calculations. An **embedded computer** is a special-purpose computer that functions as a component in a larger product.

9. What Is the Role of Each Element in an Information System? An *information system* combines hardware, software, data, people, and procedures to produce timely and useful information. People in an information technology (IT) department develop procedures for processing data. Following these procedures, people use hardware and software to enter the data into a computer. Software processes the data and directs the computer hardware to store changes on storage media and produce information in a desired form.

10. How Do the Various Types of Computer Users Interact with Computers? Computer users can be separated into five categories: home user, small office/home office user, mobile user, power user, and enterprise user. A **home user** is a family member who uses a computer for a variety of reasons, such as budgeting and personal financial management, Web access, communications, and entertainment. A **small office/home office** (*SOHO*) includes any company with fewer than 50 employees, as well as the self-employed individual who works from home. SOHO users access the Internet to look up information and use basic business software and sometimes industry-specific software. **Mobile users** are employees and students who work on a computer while away from a main office, home office, or school. A **power user** uses a workstation or other powerful computer to work with industry-specific software. Power users exist in all types of businesses. An **enterprise user** works in or interacts with a company with many employees and uses a computer and computer network that processes high volumes of transactions in a single day.

11. How Does Society Use Computers in Education, Finance, Government, Health Care, Science, Publishing, Travel, and Manufacturing? In education, students use computers and software to assist with learning or take distance learning classes. In finance, people use computers for **online banking** and **online investing**. Government offices have Web sites to provide citizens with up-to-date information, and government employees use computers as part of their daily routines. In health care, computers are used to maintain patient records, monitor patients, deliver medication to nurse stations via robots, assist with medical tests and research, correspond with patients, file insurance claims, provide greater precision during operations, and as implants. All branches of science use computers to assist with collecting, analyzing, and modeling data and to communicate with colleagues around the world. Publishers use computers to assist in designing pages and make the content of their works available online. Many vehicles use some type of online navigation system to help people travel more quickly and safely. Manufacturers use **computer-aided manufacturing** (*CAM*) to assist with manufacturing processes.

Visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 Quiz Yourself resource for this book, and then click Objectives 8 – 11.

Key Terms

You should know the Primary Terms and be familiar with the Secondary Terms. The list below helps focus your study.

To see an example of and a definition for each term, and to access current and additional information from the Web, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Key Terms resource for this book.

Primary Terms

(shown in bold-black characters in the chapter)

application software (16)
communications device (8)
computer (6)
computer literacy (5)
computer-aided manufacturing (38)
data (6)
desktop computer (20)
digital camera (23)
e-book reader (22)
embedded computer (26)
enterprise user (32)
game console (24)
graphical user interface (GUI) (15)
green computing (10)
handheld computer (22)
hardware (6)
home user (28)
information (6)
input device (6)
installing (16)
Internet (11)
Internet-enabled (21)
laptop computer (20)
mainframe (25)
mobile computer (20)
mobile device (20)
mobile users (31)
network (10)
notebook computer (20)
online (10)
online banking (34)
online investing (35)
output device (7)
PDA (22)
personal computer (19)
photo sharing community (14)
portable media player (23)
power user (31)
program (15)
run (17)
server (25)
small office/home office (30)
smart phone (21)
social networking Web site (14)
software (15)
storage device (8)
storage media (8)
supercomputer (25)
system software (15)
system unit (7)
Tablet PC (21)
telecommuting (32)
user (9)
video sharing community (14)
Web (13)
Web 2.0 (14)
Web application (14)
Web page (13)
Web site (13)

Secondary Terms

(shown in italic characters in the chapter)

blog (14)
CAM (38)
camera phone (22)
client (10)
convergence (18)
convertible tablet (21)
CPU (central processing unit) (7)
developer (18)
digital literacy (5)
digital pen (21)
e-book (22)
e-commerce (30)
e-reader (22)
enterprise computing (32)
execute (17)
FAQ (14)
gaming desktop computer (20)
garbage in, garbage out (9)
handhelds (22)
home theater PC (HTPC) (20)
icon (15)
information processing cycle (6)
information system (27)
information technology (IT) department (32)
instant message (22)
instructions (6)
loads (17)
memory (7)
microblog (14)
multimedia (31)
netbook (20)
neural network (36)
online social network (14)
operating system (15)
PC-compatible (19)
personal digital assistant (22)
picture message (22)
podcast (14)
processor (7)
programmer (18)
publish (13)
remote surgery (36)
resources (10)
server (10)
slate tablet (21)
SOHO (30)
telematics (26)
telemedicine (36)
telesurgery (36)
text message (22)
tower (20)
Ultra-Mobile PC (UMPC) (22)
utility program (16)
video blog (14)
video message (22)
video phone (22)
Web cam (30)

handheld computer (22)

Checkpoint

The Checkpoint exercises test your knowledge of the chapter concepts. The page number containing the answer appears in parentheses after each exercise. The Beyond the Book exercises will help broaden your understanding of the concepts presented in this chapter.

To complete the Checkpoint exercises interactively, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Checkpoint resource for this book.

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

_____ 1. Many people believe that computer literacy is vital to success in today's world. (5)

_____ 2. Hardware consists of a series of instructions that tells the computer what actions to perform and how to perform them. (6)

_____ 3. The circuitry of the system unit usually is part of or is connected to a circuit board called the server. (7)

_____ 4. Green computing involves reducing the electricity consumed and environmental waste generated when using a computer. (10)

_____ 5. The client controls access to the resources on a network. (10)

_____ 6. Web pages rarely have built-in connections, or links, to other documents, graphics, other Web pages, or Web sites. (13)

_____ 7. A video sharing community is a type of social networking Web site that allows users to store and share their personal videos. (14)

_____ 8. A text message is a short note, typically fewer than 300 characters, sent to or from a smart phone or other mobile device. (22)

_____ 9. Because embedded computers are components in larger products, they usually are small and have limited hardware. (26)

_____ 10. Telecommuting is a work arrangement in which employees work away from a company's standard workplace and often communicate with the office through the computer. (32)

_____ 11. With online investing, the transaction fee for each trade usually is much more than when trading through a broker. (35)

Multiple Choice Select the best answer.

1. Computer literacy, also known as digital literacy, involves having a current knowledge and understanding of _____. (5)
   a. computer programming
   b. computers and their uses
   c. computer repair
   d. all of the above

2. _____ is/are a collection of unprocessed items, which can include text, numbers, images, audio, and video. (6)
   a. Data
   b. Instructions
   c. Programs
   d. Information

3. A _____ is a specific type of social networking Web site that allows users to create an online photo album and store and share their digital photos. (14)
   a. vodcast
   b. blog
   c. photo sharing community
   d. chat room

4. A _____ is recorded audio stored on a Web site that can be downloaded to a computer or portable media player. (14)
   a. podcast
   b. social networking Web site
   c. blog
   d. speaker

5. _____ consists of the programs that control or maintain the operations of the computer and its devices. (15)
   a. System software
   b. A communications device
   c. A graphical user interface (GUI)
   d. Application software

6. A(n) _____ message is a real-time Internet communication, where you exchange messages with other connected users. (22)
   a. text
   b. instant
   c. picture
   d. video

7. Many large companies use the word(s), _____, to refer to the huge network of computers that meets their diverse computing needs. (32)
   a. information technology
   b. enterprise computing
   c. telecommuting
   d. multimedia

8. _____ is a system that attempts to imitate the behavior of the human brain. (36)
   a. Telemedicine
   b. A kiosk
   c. E-commerce
   d. A neural network

Checkpoint

Matching Match the terms with their definitions.

_____ 1. processor (7)
_____ 2. storage device (8)
_____ 3. online social network (14)
_____ 4. application software (16)
_____ 5. install (16)
_____ 6. execute (17)
_____ 7. portable media player (23)
_____ 8. digital camera (23)
_____ 9. multimedia (31)
_____ 10. neural network (36)

a. interprets and carries out basic instructions that operate a computer
b. carry out the instructions in a computer program
c. combines text, graphics, audio, and video into one application
d. programs designed to make users more productive and/or assist them with personal tasks
e. a system that attempts to imitate the behavior of the human brain
f. mobile device on which you can store, organize, and play digital media
g. online community that encourages members to share their interests, ideas, stories, photos, music, and videos with other registered users
h. set up software to work with a computer and other hardware components
i. device that allows users to take pictures and store the photographed images digitally, instead of on traditional film
j. records (writes) and/or retrieves (reads) items to and from storage media

Short Answer Write a brief answer to each of the following questions.

1. What is a computer? _____ What is the information processing cycle? _____
2. Describe two health risks posed by computers. _____ How might computers have a negative effect on the environment? _____
3. What is a Web application? _____ What are some features of a Web 2.0 site? _____
4. What are seven categories of computers? _____ What determines how a computer is categorized? _____
5. How do Web sites benefit individuals' health care? _____ How does telesurgery differ from telemedicine? _____

Beyond the Book Follow the book element instructions below; present your findings (brief report, presentation, discussion, or other means).

1. Ethics & Issues — Select an Ethics & Issues in this chapter (9, 13, 29, 35, 39), find a recent newspaper/magazine article that supports one point of view presented, and then evaluate the article.
2. Computer Usage @ Work — Use the Web or a recent newspaper/magazine to locate three additional unique usages of computer technology in the transportation industry (39). What makes the use of these technologies unique to the transportation industry?
3. Companies on the Cutting Edge and Technology Trailblazers — Use the Web or a recent business newspaper/magazine to locate an interesting fact about Apple, Amazon, Bill Gates, or Tom Anderson that was not presented in the chapter (41).
4. High-Tech Talk — Locate a recent newspaper/magazine article that discusses topics related to Triangulation (40). Would you recommend the article you found? Why or why not?
5. FAQs and Web Links — Use the Web or a recent newspaper/magazine to locate three additional facts about an FAQ (14, 16, 17, 20, 22, 29) and Web Link (10, 12, 14, 15, 22, 23, 27, 28, 32, 38) that were not presented in the chapter.
6. Looking Ahead — Use the Web or a recent newspaper/magazine to discover additional uses of the technology presented in Embedded Computers May Improve Quality of Life (34).
7. Innovative Computing — Use the Web or a recent newspaper/magazine to locate two additional interesting facts about Wii a Welcome Medical Skill Builder (24) and E-Receipts Save Paper, Organize Life (29).
8. Making Use of the Web — Visit three of the Fun and Entertainment Web Sites (125) and outline the information on each Web site and the possible uses for each Web site.
9. Timeline — Select an event from the Timeline (54) and then research the history surrounding the event using the Web or a magazine article.

Learn It Online

The Learn It Online exercises are interactive Web exercises designed to reinforce and expand your understanding of the chapter concepts. The descriptions below briefly summarize each exercise.

To complete the Learn It Online exercises, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com, navigate to the Chapter 1 resources for this book, click the link for the exercise you want to complete, and then read the instructions.

1 At the Movies — Computer History in a Barn
Watch a movie to tour the Digibarn Computer Museum and then answer questions about the movie.

2 Video and Audio: You Review It — Social Networking
Search for, choose, and write a review of a video, podcast, or vodcast that discusses social networking.

3 Student Edition Labs — Using Input Devices and Using Windows
Enhance your understanding and knowledge about input devices and the Windows operating system by completing the Using Input Devices and Using Windows Labs.

4 Practice Test
Take a multiple choice test that checks your knowledge of the chapter concepts and review the resulting study guide.

5 Who Wants To Be a Computer Genius²?
Play the Shelly Cashman Series version of this popular game by answering questions to find out if you are a computer genius. Panic buttons are available to provide assistance during game play.

6 Wheel of Terms
Identify important key terms presented in this chapter by playing the Shelly Cashman Series version of this popular game.

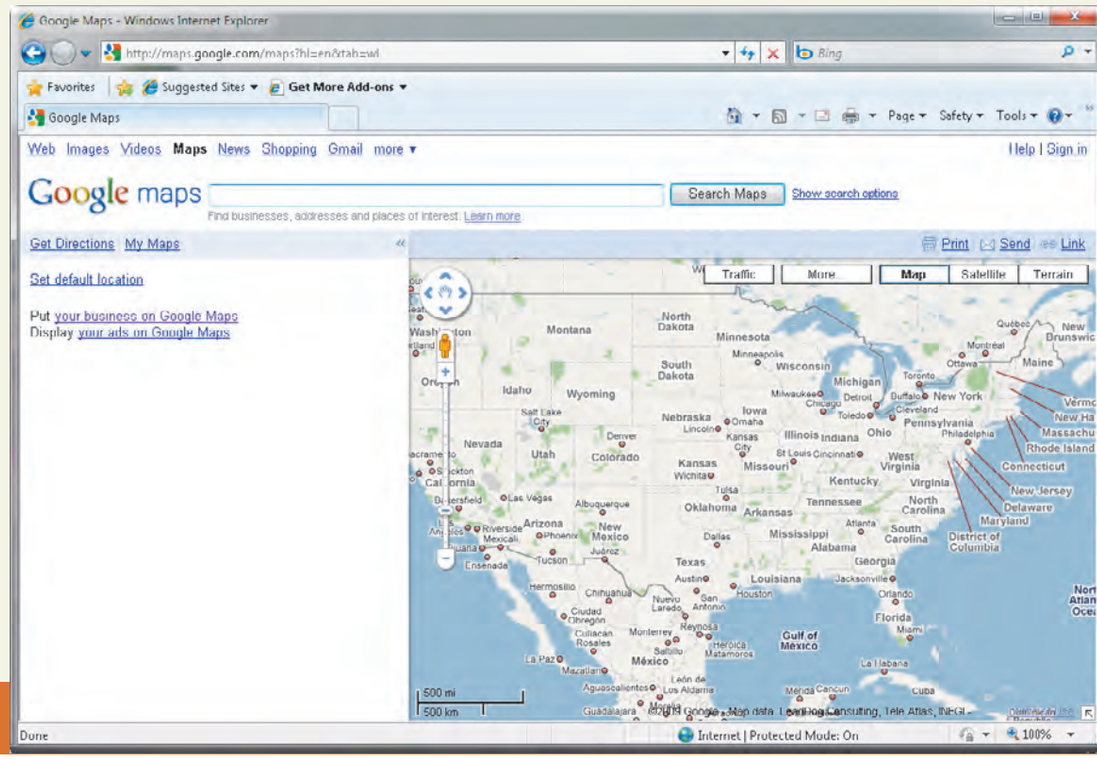
7 You're Hired!
Embark on the path to a career in computers by answering questions and solving puzzles related to concepts discussed in this chapter.

8 Crossword Puzzle Challenge
Complete an interactive crossword puzzle to reinforce concepts presented in this chapter.

9 Windows Exercises
Step through the Windows 7 exercises to learn how to use help, improve mouse skills, and identify computer information.

10 Exploring Computer Careers
Read about a career as a computer salesperson, search for relevant employment advertisements, and then answer related questions.

11 Web Apps — Google Maps
Learn how to locate businesses in your area, view a location's surroundings via satellite, and find directions from one location to another using Google Maps.



Problem Solving @ Home

The Problem Solving @ Home exercises extend your knowledge of the chapter concepts by seeking solutions to practical computer problems that you may encounter at home or school. The Collaboration exercise should be completed with a team.

In the real world, practical problems often can be solved in multiple ways. Provide one solution to each of the following problems using available resources, such as articles on the Web or in print, blogs, podcasts, videos, television, user guides, other individuals, and electronics and computer stores. You may need to use multiple resources to obtain an answer. Present your solutions in the form requested by your instructor (brief report, presentation, discussion, or other means).

1. **Incorrect Grade Report** Your grade report came in the mail today. On the grade report, your grade point average (GPA) is not what you expect. After computing it manually, you discover that the GPA on your grade report is incorrect. What might be causing the error?
2. **Suspicious Charges** Your credit card company called to inform you that your account has a suspicious charge. Upon further investigation, you realize that the charge does not belong to you. What will you do?
3. **Shared Printer Error** At the beginning of the semester, your roommate configured your computer so that it could print on the printer in his bedroom. He left for vacation three days ago, and you recently have noticed that you are unable to print to his printer from your computer. Each time you attempt to print, you receive an error message stating that the printer is unavailable. What might be wrong?

4. **Software Installation Trouble** You have purchased a new video game for your home computer and attempt to install it. Upon inserting the installation disc, however, nothing appears to happen on your computer. What is your next step?
5. **Problematic Player** After charging your portable media player overnight, you turn it on only to find that it is reporting a low battery. Seconds later, it shuts off automatically. What might be wrong?
6. **Inaccessible Media** You insert an optical disc with digital photos from your most recent family vacation, and discover that your computer will not read the optical disc. What might be wrong?
7. **Bank Account Postings** While reviewing your checking account balance online, you notice that debit card purchases have not posted to your account for the past several days. Because you use online banking to balance your account, you become concerned about your unknown account balance. What steps will you take to correct this situation?
8. **GPS Error** You are driving to your friend's house and are using your GPS receiver for directions. While approaching your destination, you realize that the GPS receiver instructed you to turn the wrong way on your friend's street. How could this have happened?
9. **Shopping for Software** You are shopping for software that will assist with your home landscape 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?

Collaboration

10. **Unsolicited Communications** Lately, you have been receiving many unsolicited e-mail messages, text messages, instant messages, and telephone calls. These messages not only are annoying, but they also are consuming large amounts of your time. Form a team of three people and decide what steps are necessary to minimize these unsolicited communications. One team member should research how to stop unsolicited e-mail messages, one team member should research how to stop unsolicited text messages and instant messages, and another team member should research how to stop unsolicited telephone calls. Finally, all team members should research where these unsolicited calls and messages might be originating and how to prevent being added to distribution lists in the future.

Problem Solving @ Work

The Problem Solving @ Work exercises extend your knowledge of the chapter concepts by seeking solutions to practical computer problems that you may encounter at work. The Collaboration exercise should be completed with a team.

In the real world, practical problems often can be solved in multiple ways. Provide one solution to each of the following problems using available resources, such as articles on the Web or in print, blogs, podcasts, videos, television, user guides, other individuals, and electronics and computer stores. You may need to use multiple resources to obtain an answer. Present your solutions in the form requested by your instructor (brief report, presentation, discussion, or other means).

1. **Insufficient Disk Space** Recently, you purchased a USB flash drive that you plan to use to store work-related files. When you attempt to store a file on the USB flash drive, the computer displays an error message indicating that the file will not fit. How could a brand new USB flash drive not have enough room to store the first file you attempted to store on it?
2. **Computer Replacement** The technical support department at your company has informed you that you will be receiving a new computer within the next week. Before they will replace your computer, they told you to back up anything that is important. What types of files do you feel are important to back up?
3. **Power Outage** The power in your office has been out for the last two hours and has just come back on. When you attempt to start your computer by pressing the power button, nothing happens. What is your next step before calling technical support?
4. **Incorrect Login Credentials** Upon returning to the office from a well-deserved two-week vacation, you turn on your computer. Upon entering your user name and password, an error message appears stating that your password is incorrect. What are your next steps?
5. **Software Installation** You are attempting to install a program on your office computer. After inserting the installation disc and specifying that you would like to begin the installation, your computer appears to begin installing the software. Halfway through the installation process, an error message appears stating that you must have administrative privileges to perform the installation. Why were you not informed immediately upon beginning the installation? What are your next steps?

6. **Dead Battery** While traveling for business, you realize that you forgot to bring the battery charger for your notebook computer. Knowing that you need to use the notebook computer to give a presentation tomorrow, what will you do to make sure that you have enough battery power?
7. **Discarding Old Computer Equipment** Your company has just given you a new computer to replace your current, outdated computer. Because of the negative environmental impact of throwing the computer away, your supervisor has asked you to suggest options for its disposal. How will you respond?

Collaboration

8. **Computers in Transportation** Your project team has been accepted to present a business proposal to a group of potential investors. Because the presentation will take place in San Francisco, CA, you will need to transport people and ship some materials to that location. Form a team of three people and determine how to use technology to ship materials and how to make travel arrangements. One team member should research the steps required to use a Web site to make flight reservations, one team member should determine the steps necessary to print a UPS shipping label from his or her computer and track the package while it is en route, and another team member should find directions from San Francisco International Airport to a nearby hotel.

STUDENT ASSIGNMENTS

Learn How To

The Learn How To activities step you through fundamental technology skills when using a computer. The Learn How To exercises enable you to become more proficient with these skills.

Premium Activity: To relate this Learn How To activity to your everyday life, see a visual demonstration of the activity, and complete a short assessment, visit the Computer Concepts CourseMate Web site at www.cengagebrain.com and then navigate to the Chapter 1 Learn How To resource for this book.

Learn How To 1: Start and Close a Program

You can start any program by using the Start button. Complete these steps to start the Web browser program called Internet Explorer:

1. Click the Start button ( ) at the left of the Windows taskbar on the bottom of the screen to display the Start menu.
2. Click All Programs on the Start menu to display the All Programs list (Figure 1-45).
3. Click the Internet Explorer in the All Programs list to start Internet Explorer (Figure 1-46).

An item in the All Programs list might have an open folder icon next to it. When this occurs, click the item and another list will appear. Click the program name in this list to start the program. Some program names might appear on the Start menu itself. If so, click any of these names to start the corresponding program.

The Start menu displays the names of the programs recently opened on the computer. You can start any of these programs by clicking the name of the program.

To close a program, click the Close button ( ) in the upper-right corner of the window. If you have created but not saved a document, Windows will ask if you want to save the document. If you do not want to save it, click the No button in the displayed dialog box. If you want to save it, refer to Learn How To 1 in Chapter 3 on page 188.

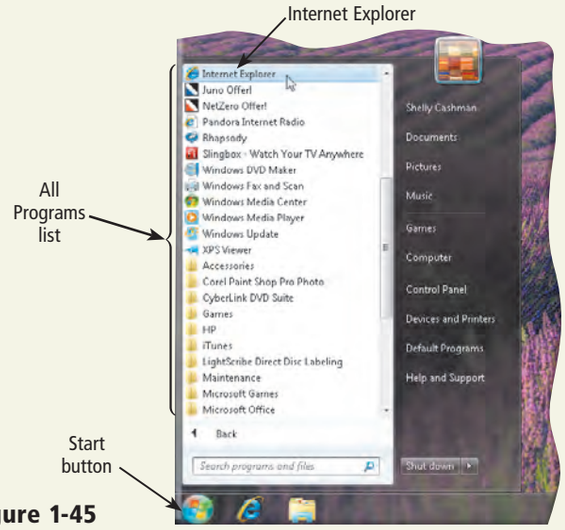


Figure 1-45

Figure 1-46

Exercises

1a. Using the Start button, start the program named WordPad found in the Accessories list in the All Programs list. WordPad is a word processing program. Type the following: `To start a program, click the program name in the All Programs list` and then type your name. Print the document, and then submit the printout to your instructor.

1b. Close the WordPad program. If you are asked if you want to save changes to the document, click the Don't Save button. Start the WordPad program again, type some new text, and then close the WordPad program. When the dialog box is displayed, click the Cancel button. What happened? Now, close the WordPad window without saving the document. Submit your answer to your instructor.

2. Using the Start menu, start the e-mail program on the computer. What is the name of the e-mail program? In the program window, what menu names are displayed on the menu bar at the top of the window? Close the e-mail program. Submit your answers to your instructor.

Learn How To 2: Create and Use Your Own Blog

A blog can contain any information you wish to place in it. For example, blogs contain addresses, thoughts, diaries, and anything else a person or group wants to share.

Once you have created a blog, you can update it. A variety of services available on the Web can help you create and maintain your blog. One widely used service is called Blogger. To create a blog using Blogger, complete the following steps:

1. Start your Web browser, type `blogger.com` in the Address bar, and then press the ENTER key to display the Blogger home page (Figure 1-47).
2. Click the CREATE A BLOG button.

Learn How To

3. Enter the data required on the 'Create Blogger Account' page. Your e-mail address and password will allow you to change and manage your blog. Your Display name is the name that will be shown on the blog as its author. Many people use their own names, but others use pseudonyms as their "pen names" so that they are not readily identifiable.
4. Click the Continue arrow and then enter your Blog title and Blog address. These are the names and addresses everyone will use to view your blog.
5. Click the Continue arrow to display the 'Choose a template' screen.
6. Choose a template for your blog and then click the Continue arrow to create your blog.
7. When the 'Your blog has been created!' screen appears, click the START BLOGGING arrow.
8. When the screen appears, you can post items for or view your blog, specify settings, and change the layout.
9. When you are finished, click the Sign out link at the top right of the screen to log out.
10. To edit your blog and add or change information on it, visit the Blogger home page, sign in by entering your user name and password, and then make changes.
11. Others can view your blog by entering its address in the browser's Address bar and then pressing the ENTER key.

Figure 1-47

Exercises

1. Start your Web browser and visit blogger.com. Click the 'Take a quick tour' link and go through all the screens that explain about a blog. What did you learn that you did not know? What type of blog do you find most compelling — a group or an individual blog? Why? Submit your answers to your instructor.
2. Optional: Create your own blog. Carefully name it and begin your posts at this time. What is your blog name and address? What is its primary purpose? Is it an individual or group blog? Write a paragraph containing the answers to these questions and any other information you feel is pertinent. Submit this paragraph to your instructor.

Learn How To 3: Use the Computer Concepts CourseMate Web Site for Discovering Computers

The Computer Concepts CourseMate Web site for Discovering Computers provides a variety of activities, exercises, and other resources. To use the site, you first must create a student account and then register this book, as described in the following steps:

1. Start the Web browser, type the Web address of `www.cengagebrain.com` in the browser Address bar, and then press the ENTER key to display the CengageBrain home page.
2. If you do not have an account, follow the on-screen instructions to sign up for a new account. If you have an account, log in with your user name and password.
3. Register this book by entering its Access Code in the appropriate text box and then clicking the corresponding button.
4. To open the resources for this book, click the button corresponding to Computer Concepts CourseMate Web site for Discovering Computers.

Exercise

1a. With a student account created and this book registered, type `www.cengagebrain.com` in the Address bar of your browser, press the ENTER key to display the CengageBrain home page, and then log in to your student account with your user name and password.

1b. Open the resources for this book by clicking the button corresponding to Computer Concepts CourseMate Web site for Discovering Computers.

1c. Select Chapter 1 and then click each resource listed below the chapter title to display the content associated with the selected resource.

1d. Write a report that describes the use of each of the Chapter 1 resources for this book. Which resource do you think will prove the most valuable to you when using the book and the Web site? Why? Which will be the least useful? Why? Submit your report to your instructor.

Web Research

The Web Research exercises broaden your understanding of the chapter concepts by presenting questions that require you to search the Web for answers.

1 Search Sleuth

Use one of the search engines listed in Figure 2-10 in Chapter 2 on page 85 or your own favorite search engine to find the answers to the following questions. Copy and paste the Web address from the Web page where you found the answer. Some questions may have more than one answer. If required, submit your answers to your instructor. (1) What company was the first to sell a USB flash drive? (2) What is the significance of the Universal symbol on Apple's Mac application programs? (3) Which retailers offer to dispose of old computers and other electronic products properly to help protect the environment? (4) What are three Illustrative Grant Commitments the Bill & Melinda Gates Foundation has made? (5) According to *Fortune*, at what company do MBA students most want to work when they graduate? (6) Who created the first set of icons for the Macintosh computer? What sound does her Clarus the Dogcow make? (7) What company manufactured the first notebook computer, the UltraLite, in 1989?

2 Green Computing

Computer usage requires electricity, whether to power the system unit and monitor, recharge batteries, or print. In addition, the computer manufacturing process depletes natural resources and often uses toxic chemicals. As you learned in this chapter, many environmentally conscious people practice green computing by attempting to reduce electricity and environmental waste. Examine your computing practices, and determine 10 ways that you can use less power on your computing equipment at home, work, and school. Consider how often you use the printer and the types of documents you print. Examine your monitor, system unit, and printer. Do you see any notation indicating they are environmentally sound? Do they hibernate or go into a power save mode when not being used? Write a 50-word summary of the green computing practices in your life.

3 Social Networking

One of the more popular social networking Web sites is Facebook. This quickly growing service differentiates itself from other online social networks by having widespread privacy controls. In addition, its development platform, called f8, allows developers to create programs (called applications) that users can add to a Web page. Hostels, for example, lets world travelers research and rate hostels and includes photos and descriptions. Visit the Facebook site (facebook.com), click the About link at the bottom of the page, and then read about Facebook's features. What are three of Facebook's top features? What information is given in the recent Facebook blog posts? Visit the AppRate Web site (apprate.com) and then summarize three Facebook application reviews and ratings.

4 Blogs

Blogs profiling the music industry discuss new technologies, legal issues, podcasts, and business news. Visit the CNET blog (blogs.cnet.com) and then read and summarize at least three of the articles in the Most Recent Posts section. Locate the Crave, Gaming and Culture, and Green Tech features and then read and summarize at least one story from each blog. Then visit the iLounge (ilounge.com) Web site and read reviews of at least three new products for the iPhone. Would you purchase any of the products discussed? What books and buyer's guides are available to download from the Library? Which iPod cases and speakers received favorable reviews? Read and summarize at least three stories and associated comments in the News section.

5 Ethics in Action

The Internet has increased the ease with which students can plagiarize material for research paper assignments. Teachers are using online services, such as Turnitin and PlagiarismDetect.com, to help detect plagiarized papers and to help students understand how to cite sources correctly. Visit the Turnitin Web site (turnitin.com) and then write a summary of how this service is used. How does this service attempt to prevent plagiarism through the Turnitin Write Cycle? How prevalent is plagiarism on your campus? What is your school's official policy on disciplining students who submit plagiarized papers? Does your school have an honor code? If required, submit your summary to your instructor.

Critical Thinking

The Critical Thinking exercises challenge your assessment and decision-making skills by presenting real-world situations associated with the chapter concepts. The Collaboration exercise should be completed with a team.

To evaluate the situations below, use personal experiences and available resources such as articles on the Web or in print, blogs, podcasts, videos, television, user guides, other individuals, and electronics and computer stores. You may need to use multiple resources to form conclusions and make recommendations.

1. **Class Discussion — Reactions to Computer Problems** Virtually everyone who works with computers has experienced problems with computer software. Problems can range from not being able to install the software on your computer to installed software producing unanticipated results. Depending on the situation and time these problems occur, it can result in a great amount of user stress. Some people compare these types of problems to a craftsman's tools malfunctioning in the middle of a project. On the other hand, many people feel reactions to computer software problems tend to be more extreme than reactions to problems with other tools they use. Evaluate situations in which you have seen people react to computer software problems. Discuss how these users can reduce their frustration when dealing with such problems.

2. **Class Presentation — Technology in Education** You are a member of your local school district's board of education. During the past year, the number of computers purchased by the district increased by 85 percent, while the supply of library books declined by almost 10 percent. School officials claim that computers extend learning opportunities and develop the computer literacy needed in today's technological world. Yet, some parents complain that computer purchases represent frivolous, status-seeking spending. Notebook computers are purchased for teachers, while textbooks and library books are too old, too worn, and too scarce. Analyze how computers are being used in schools, and then present your recommendation of the percentage of the instructional materials budget that should be spent on computers versus the percentage that should be spent on library books and textbooks. Note the factors that influenced your decision.

3. **Research — Energy Efficiency** Increases in fuel prices result in increases in energy prices. When this occurs, many individuals and companies look at purchasing energy-efficient computers. These energy-efficient computers require less energy to operate and often look and perform similarly to equivalent computers that are not as energy efficient. 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) alter your preference to purchase an energy-efficient computer instead of one that is not energy efficient? What other ways might you be able to configure your computer to save energy? Compile your findings into a brief report and then submit it to your instructor.

Collaboration

4. **Recommending Technology Solutions** People use computers in a variety of fields, including education, finance, government, health care, science, publishing, travel, and manufacturing. Although the way people use computers varies, each use of a computer involves computer hardware, computer software, and normally some type of communications capability over networks, such as the Internet. Form a three-member team and choose a field in which you all are interested. Assign one member of your team to investigate hardware used in the field, another member to investigate software used in the field, and the third member to investigate communications capabilities used in the field. Each team member should develop a list of related items that may be used in the selected field. After the team's investigation, characterize a hypothetical business or organization in the field. Based on your investigation, recommend specific hardware, software, and networking capabilities that would be best for the business or organization. Each team member should provide an explanation for each selected item. Be sure to include comparisons of specific items. Prepare a report and/or presentation summarizing your investigations, describing the hypothetical business or organization, and outlining and supporting your recommendations.