Introduction to Computers and the Internet

WORDS TO KNOW

BIOS
The basic input-output system is the component that checks your computer's components and causes the operating system to start.

CMOS
Complementary Metal Oxide Semiconductor is a chip whose configuration is controlled by a setup program.

CPU
The Central Processing Unit is a chip, located on the motherboard, which performs mathematical calculations and logic functions.

Hardware
Refers to all the pieces of physical equipment that make up a computer system.

Input
Data entered into a computer.

Lesson 1

What Is a Computer?

- Computers are a vital part of today's world. They make controlling and using devices faster, easier, and more accurate. They are in everything from automobiles to washing machines.

- A computer is a machine that receives **input** (data), performs **processing**, and produces **output** (information).

- Uses of the computer can be viewed as variations of input–processing–output. This is as true of complex tasks, like computer simulations of weather events, as it is of common ones, like typing a letter. Some examples of input–processing–output are given in the following table.

- If the input contains errors, the output will contain errors. Sometimes computers break down. But most "computer errors" result from human errors—bad data or bad programming.

- Think of examples of input–processing–output from your own experience that you might add to the table.

INPUT	PROCESSING	OUTPUT
Text typed on the keyboard	Formatting and preparation for printing by word processing program	Letter, book report, memo, story
Text typed on the keyboard and pictures inserted from disk drive or downloaded from the Internet	Text formatting, picture placement, sizing, and scaling in desktop publishing program	Newsletter, advertisement, flyer
Text and numbers typed on the keyboard	Calculations performed in spreadsheet program	Banking record, budget, grade book
Text and numbers typed on the keyboard	Formatting into tables, sorting, searching, selection of data in database program	Address book, membership list, product sales report, employee information
Temperatures, wind velocities and direction, air pressure readings, frontal boundaries, humidity readings, jet stream location and speed	Calculations based on meteorological research and assumptions and comparisons with a database of weather patterns	Weather forecast

Personal Computer Hardware

- **Hardware** refers to all the pieces of physical equipment that make up a computer system. The computer hardware you are most familiar with is probably the **personal computer** or **PC**.
- A PC includes several pieces of hardware or devices:
  - The **power supply** is a device that distributes electricity to the various components of the system. The electrical cord runs from the power supply to an electrical outlet. The power supply also includes a fan that cools the internal components.
  - The **motherboard** is the largest circuit board inside your personal computer. It contains millions of electronic circuit elements on chips of silicon. These chips store programmed instructions in active memory (see RAM on the next page). They also execute the instructions stored in other chips. The motherboard has expansion sockets or slots (known as the bus, see the next page). These slots permit installation of additional circuit boards.
  - On the motherboard are some special **ROM** (Read-Only Memory) chips that contain the **BIOS** (Basic Input/Output System). The BIOS is the component that checks your computer's components and causes the operating system to start.
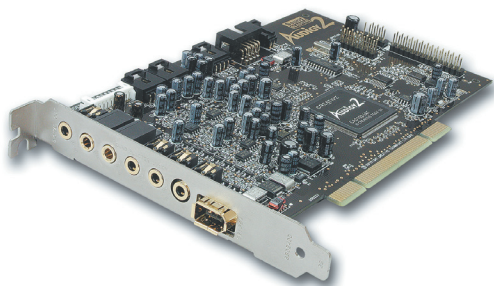
Figure 1.1   A motherboard is like the brain of your computer.

- To work properly, the BIOS needs to know the configuration of your computer's hardware. This hardware information is stored in the **CMOS (Complementary Metal Oxide Semiconductor)**—
a chip whose configuration is controlled by a setup program. The CMOS includes information about the following components:
  - System date and time
  - Mouse
  - Keyboard
  - Hard drive (number of drives and their sizes)
  - DVD±R/W drive

LCD
Liquid crystal display technology, similar to that used in some television sets, is used to display input on the monitor.

Monitor
An output device that displays input and the results of processing.

Motherboard
The largest circuit board inside your personal computer.

Output
Results of processing.

peripheral
A device connected to the computer through the bus.

Personal computer (PC)
Any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals.

Power supply
A device that distributes electricity to the various components of the system.

Processing
Actions that computer programs perform on the input.

RAM
Special chips connected to the CPU, is the area where programs and data reside while in use.

ROM
Read-Only Memory chips that contain the BIOS (Basic Input/Output System).

- The settings are permanently saved in a 64-byte piece of CMOS. The CMOS power is supplied by a small battery, so its contents are not lost when the PC is turned off.
- The **CPU (Central Processing Unit)** is a chip, located on the motherboard, which performs mathematical calculations and logic functions (determining if one value is greater than another, and so on). The CPU is often referred to as the brain of the computer because it administers the functions of the other components. When users say their machine has a Core 2 Duo processor, they are talking about the CPU chip.
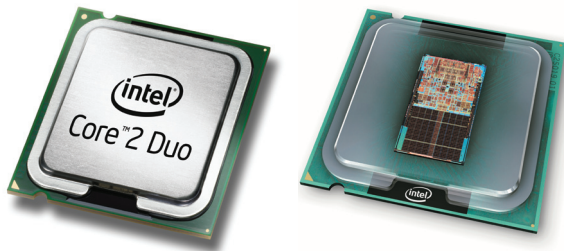
Figure 1.2   The Core 2 Duo processor by Intel is a widely used CPU chip.

- The bus is the main communication path, or series of paths, on the motherboard that connects the system's components with the CPU. The bus also connects external components through expansion slots. These slots can contain plug-in cards that let the computer communicate with other devices, such as monitors and printers.

- **RAM (Random Access Memory)**, special chips connected to the CPU, is the area where programs and data reside while in use. When you start an application (Microsoft Word, for example), the computer places the program into RAM. If you then open a document, it also loads the document into RAM.
  - When you save a document, the CPU copies the document from RAM to permanent storage. When you close a document, the CPU frees up the memory that was occupied by the document. When you close a program, memory is also freed up.
  - RAM holds data only so long as it has electricity. If the machine is turned off or loses power, information in RAM is lost. That's why any changes not saved before the machine is turned off cannot be retrieved.
  - In modern PCs, RAM capacity is measured in gigabytes. (See the section "Bits and Bytes" for a definition of bits and bytes.) In general, the more RAM your computer has, the better it is able to run programs that require processing power.
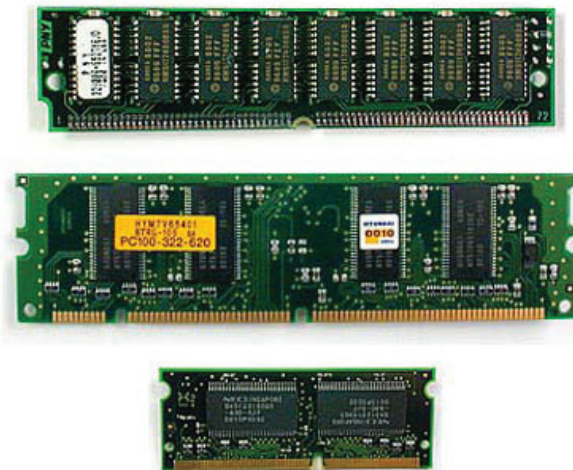
Figure 1.3   The size and type of RAM varies on different computers.

Peripherals

- A **peripheral** is a device connected to the computer through the bus. Many essential components of a PC system are peripherals, including monitors, keyboards, and disk drives. Printers and scanners are also peripherals.

- Some peripherals, because of their small size or delicate nature, are mounted directly inside the computer case. Video boards, inboard modems, and sound cards are devices inside the computer that depend on the bus.

- Peripherals are often divided into two categories—**input** devices and **output** devices. Some peripherals serve as both input and output devices, so the categories are not exclusive. Some common peripherals and their functions are described below.

  - The **monitor** is an output device that displays input and the results of processing. Most monitors on PCs and laptops use liquid crystal display (**LCD**) technology, similar to that used in some television sets. (In fact, some computers can use TV sets as monitors.)

- The **mouse** is an input device that you use to control a pointer that displays on the monitor. A wide variety of mouse pointing devices exists. Some are moved over a surface and may be wireless; some let you use your thumb or fingers to roll a ball that moves the pointer; others, especially on laptop computers, work when you drag your finger across a small screen called a touch pad.

Figure 1.5   This mouse is typical for use with desktop computers.

Regardless of the mouse type, when the pointer is located at the spot where you want the software to respond, you click the left button once (**click**), the right button (**right-click**), or the left button twice rapidly (**double-click**). Wheel mice, such as the Microsoft IntelliMouse, include a wheel between the two buttons. The wheel can be used for scrolling and zooming in Microsoft Office 2010.
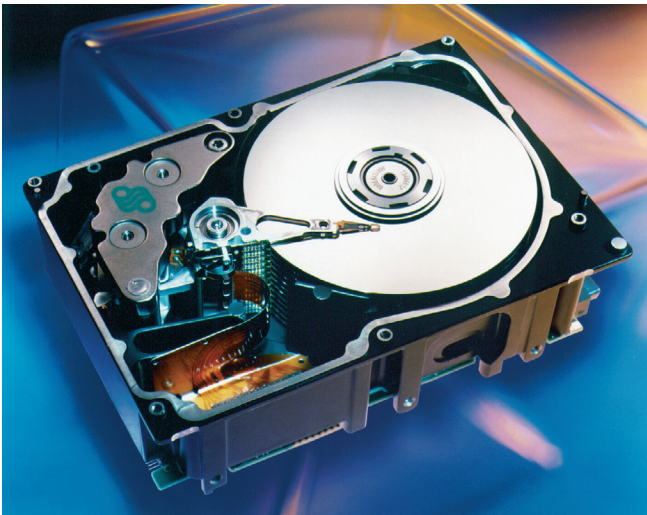
The mouse pointer changes appearance to indicate that the system is working. These appearance changes are described in later exercises.

Figure 1.4   LCD technology is used for most PC monitors (top), as well as laptops (bottom).

- The **keyboard** is an input device with alphabetic, numeric, and function keys in a standardized layout. (Some keyboards change the location of certain keys and include keys that other keyboards do not have.) The special keys (such as the **F**unction, **Ctrl** (control), and **Alt** keys) are used alone or in combinations to cause programs to perform actions.
- Most computers contain a **hard disk** (or **hard drive**) and an **Optical drive**, such as a DVD drive. DVDs can be removed and carried from one place to another; hard disks are installed inside the computer and are not considered portable.

  Disk drives are identified by letter. The typical personal computer has an optical drive identified as D:. It probably also has a hard drive known as C:.

  Hard disks and DVDs and their drives serve as both input and output devices.

  - When output such as a letter is stored (saved) on a hard disk or DVD, the disk is an output device.
  - When you retrieve data from a disk, it serves as an input device.

- **Modems** and other telecommunication hardware (when used with the appropriate software) serve as sources of both input and output. Telecommunication gives you access to the world outside your personal computer—to such services as MSN and that vast network of computers known as the **Internet** or **World Wide Web**. A modem may be installed inside the computer case (an internal modem) or the modem may be connected through a communications port (external modem).
- **Printers**, next to monitors and disk drives, are the most common output devices. A wide variety of printer types is available:
  - **Laser** printers use copier-like technology to spread patterns of toner and affix it to paper using heat.
  - **Ink Jet** and **Bubble Jet** printers spray ink onto paper to produce the output.
  - **Plotters** use a needle to draw on paper; they are frequently used by engineers and architects to produce schematic drawings.

Figure 1.7   An inkjet printer is a good choice for printing photographs.

Figure 1.6   This hard disk drive would be installed inside of a computer.

- **Scanners**, which let you create files from pictures, drawings, or text, are input devices.
- **Voice input devices** (microphones) are becoming more common as hardware and software makers improve their efficiency.

Bits and Bytes

- Your personal computer operates through a vast number of on/off switches called **binary digits** or **bits** (bit is short for **B**inary dig**IT**). All the reception of input, processing, and output are accomplished by bits that are either turned on or turned off.

- Bits are grouped together into **bytes**, a string of 8 bits that can be translated by the computer into a letter or an action. For example, when you press the capital letter A on the keyboard, a signal from the keyboard passes to the computer and gets translated into a string of 8 bits that are represented like this: 01000001. Each 0 represents a switch that is turned off and a 1 represents a switch that is turned on.

- A byte is the most common measurement of storage in the digital computer.

Size	Number of Bytes
Kilobyte	1,024 (8,192 bits) 1 thousand bytes
Megabyte	1,024,000 1 million bytes
Gigabyte	1,024,000,000 1 billion bytes
Terabyte	1,024,000,000,000 1 trillion bytes

Computer Speed and MHz and GHz

- The speed of your personal computer is measured in megahertz (MHz) or gigahertz (GHz). A Hertz is a single oscillation (up-and-down movement) per second of an electromagnetic wave. When coupled with the prefix *mega*, it refers to millions of wave oscillations per second; when used with the prefix *giga*, it refers to billions of wave oscillations per second.

- In the computer, the activity of the CPU microchip is coordinated by a clock that is part of the chip. Thus, a 400 MHz chip has a clock that receives electricity and switches on and off 400 million times per second. It is twice as fast as a chip that has a 200 MHz clock. Similarly, a 1.2 GHz chip is three times as fast as a chip with a 400 MHz clock.

- The clock speed of your computer describes how quickly computations are performed in RAM. A personal computer's overall speed and efficiency, however, depend not only on the speed of the CPU but also on the following:

- *Size of RAM.* If RAM is too small for the kind of processing being performed, the system may place some of the data or program on the hard drive temporarily while processing other data. If your machine is slow, watch the light that indicates that the hard drive is in use. If it lights up and goes out frequently while your program is processing, your computer may not have enough RAM. Most recent computers come with 2 or more GB of RAM, but a computer that is primarily for games or computer-aided design may profit from more RAM.

- *Speed and capacity of the hard disk.* If the hard disk does not take advantage of the latest technology or is filled nearly to capacity, the computer's efficiency will be impaired.

- *Speed of the bus.* If the CPU operates at 1.6 GHz and the bus at 50 MHz, the bus slows the computer down when the CPU is communicating with cards in the bus slots. More recent bus speeds, however, reach 1,333 MHz and more.

Computer Types

- The computer with which you are most familiar, and the one with which you will probably have the most direct contact throughout your life, is the personal computer. But you will have indirect contact with other, larger computers.

- If you make a career in science, higher mathematics, advanced computing, or military or industrial research, you may use a **supercomputer**. Supercomputers are the fastest problem solvers available. They work at extremely high speeds. Often, they process data in "parallel," breaking a complicated problem into smaller units, each of which is handled by a part of the computer, then combined to produce the final result. (Some recent "supercomputers" are made from a large number of personal computers linked together because each PC can function like a part of a large computer.)

Figure 1.8   Servers are used in many businesses to manage large amounts of data.

- **Servers** are machines that many large companies use to manage the huge amounts of data required to keep their operations running. For example, your local telephone company gathers usage data from a large number of telephone users, calculates the charges, and produces telephone bills. For this huge undertaking, the company requires a machine that can handle a large database, process rapidly, and print quickly. While many personal computers manage several gigabytes (billions of bytes) of storage, server computers control and process terabytes (trillions of bytes) of storage.

Servers may still control as much as 90% of the data major businesses rely on for their critical applications, such as inventory, manufacturing, billing, and other accounting activities. For such applications, servers offer superior performance, reliability, and security, and they are usually easy to expand as the business grows.

- If you work at a telephone company, you may use a PC to gain access to the large amounts of information stored under the control of a server. You may also use a "dumb" terminal (keyboard and monitor) directly connected by a network to the server. The terminals are called "dumb" because, unlike PCs, they have no processing capabilities of their own but simply give users direct access to server computing capacities.

- **Personal computers** come in a wide variety of styles and sizes. Some are designed for the **desktop**, with a cathode ray tube or LCD monitor separate from the rest of the computer.

- **Laptop** computers and **Personal Digital Assistants (PDAs)** grow lighter and sturdier with each new version. Laptops are compact with built-in liquid crystal display monitors that provide crisp displays. Most hand-held computers are used for a specific purpose, such as taking notes and sending/receiving messages. Their portability makes them ideal for salespeople and other business professionals who travel a great deal.

- Tablet PCs, such as the Apple iPad, are another type of portable computer that use touchscreens to input and manipulate data.

Figure 1.9   Though not as powerful as laptops, tablet PCs are a convenient way to keep in touch when you're traveling.

Lesson 2

Software

- **Software** refers to the instructions that allow a computer to run and act on the data that is input. Software is usually divided into two types: operating system software and application software. Software and **programs** mean the same thing.

- **Operating system software** includes instructions that allow a computer to run. BIOS startup involves checking for equipment attached to the computer, such as the keyboard, to ensure that it is working and can communicate with the computer's operating system. Operating system startup completes the **boot-up** (computer startup) process and prepares the computer's components and environment for actual use. Unix, Linux, Mac OS, Windows XP, and Windows 7 are examples of operating systems.

- **Application software** includes programs that allow you to make the computer do what you want—write a letter, browse the Internet, draw a picture, create a computer program.

- Application software depends on the operating system. It uses operating system–specific instructions to tell the operating system to do something. Because application software interacts with the operating system in this way, applications designed for one operating system (Windows, for example) cannot run on a different operating system (Unix or Mac OS, for example).

- Application software can be educational in nature, such as a program that teaches you how to type. Video games are examples of entertainment software.

- Software can also be used to communicate. A class project might require you to write a report and give a presentation. A word processing application like Microsoft Word and a slideshow application like Microsoft PowerPoint would be the right choices in this case.

WORDS TO KNOW

Application
The term application comes from the idea that a group of programs work together to apply the abilities of the computer to a specific task, such as word processing or weather forecasting.

Application software
Programs that allow you to make the computer do what you want, such as write a letter or browse the Internet.

Boot-up
Computer startup process.

Commercial software
Copyrighted software that you must buy before using it.

Freeware
Copyrighted software given away for free.

Installed
Prepared to run on a computer.

Programs
Means the same thing as software. (See below.)

Public domain software
Program that can be shared, given away, or even altered to meet certain needs.

Software
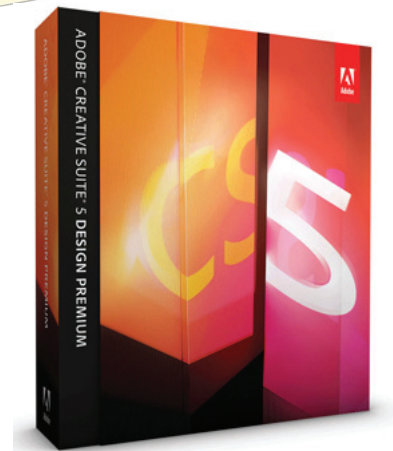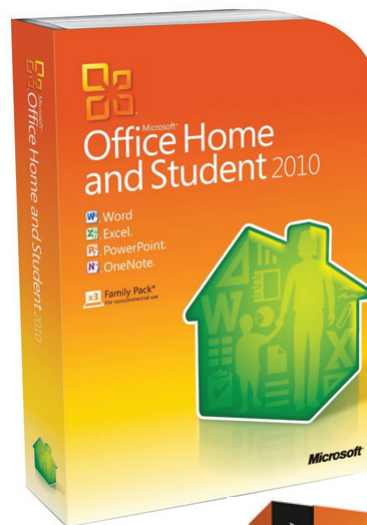The instructions that allow a computer to run and act on the data that is input.

Obtaining Application Software

■ Some application software is already loaded on new computers. You can also obtain additional software in multiple forms.

■ Companies own the copyrights to the application software they sell to the public. This prevents you from illegally copying it to sell it to others, giving it away, or sharing it. **Commercial software** is copyrighted software that you must buy before using it.

■ Some companies give away their copyrighted software for free. This is known as **freeware**. The companies allow users to install the program as long as they do not resell it to other people.

Figure 1.10   There are many Web sites from which you can download freeware.

■ On occasion, program authors allow you to use programs, share them, give them away, or even alter them to meet certain needs. This is called **public domain software**. Beware, the quality of these programs can vary widely, and they may contain more errors than other types of software.

■ Application software must be **installed**, or prepared to run on a computer, before it can be used. You must copy it from a location such as a disk, a CD, or the Internet to the computer's hard drive. Most programs come with an installation, or setup, program that prompts you to load the software onto the computer. Companies that make commercial software often provide printed or online guides, or telephone support, to help solve users' problems.

Figure 1.11   Whether you download software from the Internet, or purchase software from a store, it will still need to be installed correctly on your computer before may use it.

Lesson 3

The Internet

■ The **Internet** is the global system of interconnected computer networks that is used to share data and information. The Internet can be used for many different things, from reading and sending **electronic mail (e-mail)** to storing data and surfing the **World Wide Web** (WWW or Web).

■ There are different ways to connect to the Internet. The reasons for various options are availability, location, speed, and price.

   ● The least expensive way to get online is to use a **dialup connection** between a standard phone line and a modem. These connections are called "dialup" because your computer must connect to the Internet by using a telephone number to contact a server. When the session is over, the connection is broken.

   ● Some **Digital Subscriber Lines (DSL)** require a special telephone line. **Integrated Services Digital Network (ISDN)** lines require a special ISDN adapter and modem. As a result, both services cost more than regular phone service. Furthermore, DSL and ISDN are not available in all areas.

   ● Cable television companies offer Internet access through **cable modems**. This access is at speeds much faster than dialup modems. You need a network card in your computer, a cable modem, and cable access. Satellite access is also very fast for downloading files to your computer, but it requires a phone line and a modem for sending files to outside users.

■ Multiple computers can be connected to one modem through a **router**. The router takes the Internet signal from the modem and splits it up so that multiple computers can access it at once. Multiple computers connected together this way is known as a **network**.

Figure 1.12   **Linksys and Netgear are companies that make commonly used routers. Does either one look like what you might have in your home?**

WORDS TO KNOW

Boolean search
Operators such as AND, OR, or NOT to link the keywords in the search box.

Cable modem
Needed for Internet access through cable.

Dialup connection
Internet access between a standard phone line and a modem.

Digital Subscriber Lines (DSL)
Require a special telephone line in order to access the Internet.

E-commerce
The use of telecommunications networks or the Internet to conduct business.

E-mail
Electronic mail sent and received over the Internet.

Internet
Global system of interconnected computer networks that is used to share data and information.

Integrated Services Digital Network (ISDN)
Internet connection that requires a special ISDN adapter and modem.

Link
A connection between two different Web pages.

Network
Multiple computers connected to one modem through a router.

WORDS TO KNOW

Router
Takes the Internet signal from the modem and splits it up so that multiple computers can access it at once.

Search engine
Designed to search for information on the World Wide Web.

Subject guide
Pages on the Web grouped together under headings like Careers, News, or Travel.

Web browser
Used to access pages on the Web.

Wireless Internet access
Connecting to the Internet without being plugged into the router.

Wireless router
Broadcasts the Internet signal to any device in its coverage area.

World Wide Web
A system of interlinked hypertext documents accessed via the Internet.

- Since many devices that connect to the Internet are portable, **wireless Internet access** is now very common. A wireless network setup consists of a modem connected to a **wireless router.** The router broadcasts the signal to any device in its coverage area. Devices must contain a wireless card that can receive the signal broadcast by the router.
- Since anyone with a wireless device can access a network if they are in range, most wireless networks are protected by some form of network security. This usually comes in the form of a password needed to connect your device to the wireless network.
- The Web consists of hundreds of millions of different pages that are linked together. A **link** is a connection between two different Web pages. Clicking on a link will transfer you from the current page to the destination page.

Figure 1.13   Wireless devices that can connect to a home network include gaming platforms (such as Playstation), computers, printers, faxes, smartphones, and tablet PCs.

- To access pages on the Web, users must use a **Web browser**. A browser is a software application designed to connect to and display pages from the Web. Examples of browsers are Microsoft Internet Explorer, Mozilla Firefox, and Google Chrome.
- One popular type of Web site is an e-commerce site like amazon.com or zappos.com. **E-commerce** is the use of telecommunications networks or the Internet to conduct business. E-commerce is not new; companies have used wide area networks, or WANs, to do business for years.
- Thanks to the Internet and affordable computers, e-commerce has become accessible to anyone who has an Internet connection and a Web browser. More and more Internet users are researching products, shopping, opening bank accounts, and trading stocks online. Many businesses realize that they may lose customers if they do not have an online presence. In 2008, $141 billion was spent shopping online. A site like amazon.com allows users to search for an item, browse to find the right match, and read reviews that other buyers write about how good an item is. Payment is made with a credit card, debit card, or online payment service like PayPal.
- The Internet is useful for solving many real-life problems. When traveling, flight information can be looked up in advance. That way, if your plane is cancelled, instead of wasting a trip to the airport, you can reschedule your flight from your own home. And, you can check what the weather will be like and if you were traveling to another country you can find out what the current money exchange rate is.

Finding Information on the Web

- Because the Web is so vast, it can be hard to locate information on a specific topic. Subject guides and search engines can help focus that task.

- Many Web sites offer **subject guides** to the Web, pages grouped together under headings like Careers, News, or Travel. These guides include only pages that provide useful information about the subject.

- If you cannot locate what you are looking for in a subject guide, use a **search engine** such as Bing, Google™, Lycos®, or HotBot®. Type one or two keywords that describe the subject you're looking for, and then click Search. The search engine will display a list of Web pages that contain the keywords you specified. For example, if you type the word dog as your keyword, the search engine will list Web pages that contain that word.

- You can improve your chances of getting worthwhile results by conducting a **Boolean search**. To conduct a Boolean search, type an operator such as AND, OR, or NOT to link the keywords in the search box. For example, if you use the word telescope as your keyword, the search engine will list pages containing information about every type of telescope. But if you are primarily interested in reflecting telescopes, you can use the Boolean search telescope AND reflecting to see pages that include both terms and ignore pages that include only one of them.

Evaluating Information on the Web

- You can find excellent and reliable information on the Web. As with print references, you can also find some Web pages that are biased, objectionable, misleading, inaccurate, or dangerous. Web sites from universities, governments, and news organizations are usually reliable, while a page without an author or sources can be unreliable.

- Verify any information you find by checking another source. The freedom of the Web leads to a greater potential for error, since pages may not be checked for accuracy of the information they contain. Ask yourself these questions about any information you find on the Web:
  - Who is the author of the page? Is that author qualified to write about this topic?
  - Does the author indicate the source of the information presented?
  - Does the information appear to be accurate? Are there misspelled words and bad grammar that might indicate poor quality of content?

  - Is the information presented logically and thoughtfully?
  - Does the language seem balanced and objective, or is it biased and argumentative?
  - What is the purpose of the page? Is the author trying to sell you something or convince you to believe something? Who benefits if the information is accepted?
  - Who provides the server for publishing this Web site? Who pays for the page?
  - Does the page show when it was created or revised? Is the page up to date?

- Internet searches can help you find all sorts of information. Research for a class project, help with your computer, or finding a birthday gift for a friend can all be done using Internet searches.

alias
A nickname for an e-mail recipient.

attachments
Anything sent with an e-mail message.

blogs
Short for weB log, a page where a user writes something for anyone on the Internet to read and comment on.

e-mail
Allows people to send messages quickly and easily to anyone with an e-mail address.

e-mail address
Includes the mailbox name (the part of the address before the @ symbol) and the server address.

e-mail client
Program that lets you create, send, receive, and manage e-mails.

e-mail etiquette
Following proper convention and courtesy in online correspondence.

e-mail server
A computer, operated by your Internet service provider (ISP).

e-mail viruses
Programs that can destroy data and cause network problems.

social network
Allows users to connect with others on the Internet.

texting
People sending over a network brief written message with their mobile phones or other portable device.

Lesson 4

Understanding E-mail

- **E-mail** allows people to send an unlimited number of messages quickly and easily to anyone with an e-mail address. It is also less expensive than standard mail and voice, fax, and telephone messages. To use e-mail, all you need is a computer, an Internet connection, e-mail software, and an e-mail account. E-mail also lets you attach files to a message. Anything sent with an e-mail message is called an **attachment**. Common attachments include word-processing documents, spreadsheets, photos, artwork, and videos.

- All **e-mail addresses** have two parts. The mailbox name is the part of the address before the "at" symbol (@) that identifies the user. The server address follows the symbol. It names the domain name of the computer that houses the mailbox. An **e-mail server** is a computer, operated by your Internet service provider (ISP), that handles three key jobs:
  - accepts incoming messages
  - sends outgoing messages
  - delivers incoming messages

- When you send a message, it goes from your computer to your ISP's e-mail server, which examines the address of the recipient—the person to whom you are sending the message. If the recipient uses the same ISP as you do, the message is delivered directly to the recipient's mailbox. If the recipient uses a different ISP, the message is sent to that server through the Internet. The receiving server accepts the message and delivers it to the recipient's mailbox.

Mailbox name

jsmith@isp.net
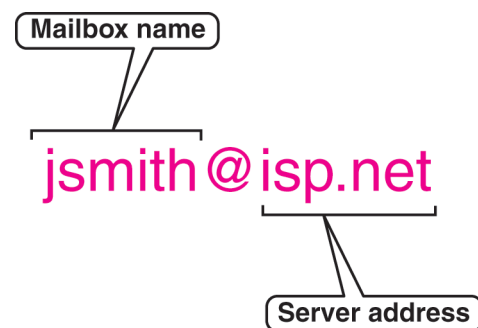
Server address

Figure 1.14   Every e-mail address has two basic parts—a mailbox name and a server address.

# Sending and Receiving E-mail and Other Forms of Digital Communication

- Services such as Google Gmail, Microsoft Hotmail, as well as companies and universities, provide users with an e-mail address. Letters can be typed on a computer and then sent to somebody's e-mail address using these services.

- To send or receive e-mail, you use an **e-mail client**, which is a program that lets you create, send, receive, and manage e-mail messages. You may get the program from your ISP, as part of a productivity suite, or with a Web browser.

- To compose a new message, you click a button within the e-mail client. The client displays a form for you to complete. First, you must specify the message's recipient. Depending on your e-mail client's features, you may select someone's name from an address book. You may also type the e-mail address, which can be a name or a combination of letters and numbers. For example, the e-mail address for Chris Rodriguez might be chris_rodriguez@isp.net or cjr615@isp.net.

- Instead of typing a complete address, you may be able to type an **alias**, or select it from a list. An alias is an easy-to-remember nickname for the recipient, such as Chris_R. The recipient's name or address appears in the To: line of the message form. Similarly, if you want to send a copy of the message to other recipients, you can add their names or addresses to the To: line or place them in the Cc: line. (The characters Cc stand for "carbon copy.")

- Next, fill in the Subject line. The Subject line gives the recipient an idea of the message's content and may help the recipient decide whether to open it or delete it. Then, write the text message. You can add attachments by clicking a button and then clicking the name of the file you want to attach to the e-mail. Finally, click Send.
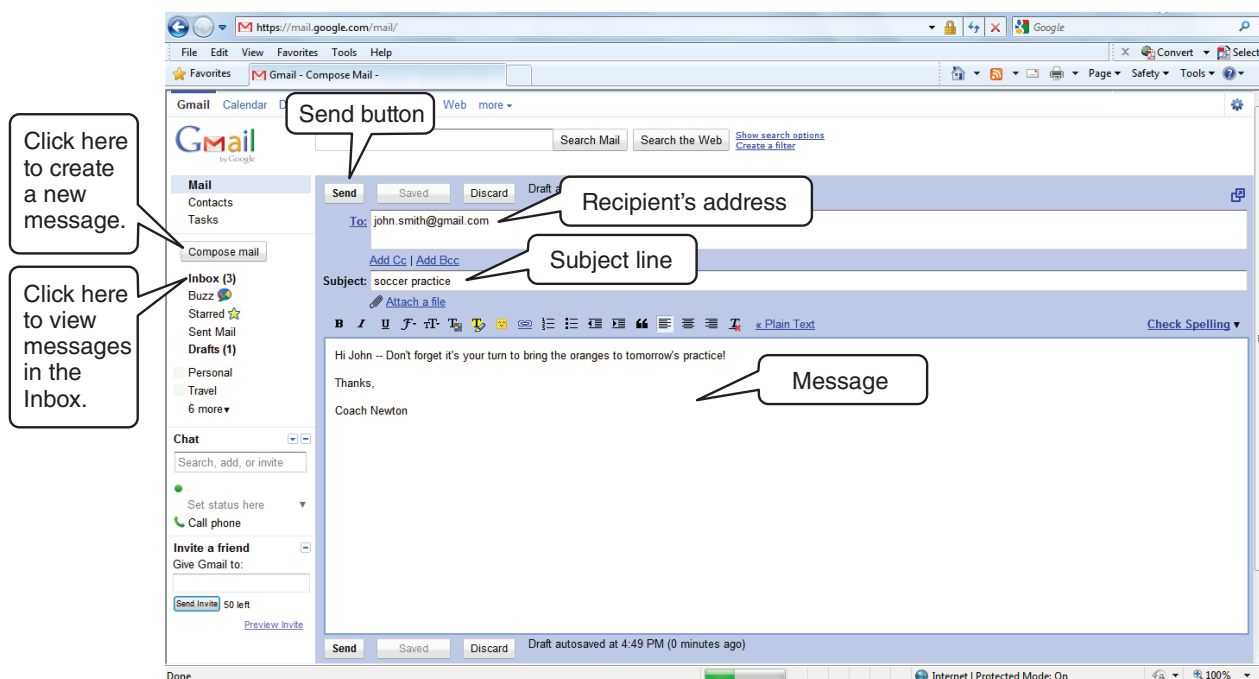
Figure 1.15   Creating an e-mail message with Google's Gmail.

- Suppose you received an e-mail message inviting you to a party. You can respond to the invitation by clicking Reply, which responds only to the person who sent you the message. You can also click Reply All, which responds to all the people who received the original message. Several things occur when a response is prepared:
  - The client displays a reply form with the original sender's address shown in the To: field.
  - The subject field may show Re: in front of the subject of the original message. (Re means "regarding.")
  - The original message is copied into the body of the reply. Most e-mail programs give you the option of including the original text in your reply.
  - You can type your reply above or below the original text.
- When you receive a message, you can pass it along to someone else. This is called forwarding a message. For example, you could forward the party invitation to your parents to ask them if you can attend. They will receive the message from you, but the Subject line may include the characters Fw: before the subject text to show that the message has been forwarded. You can add your comments before the original message's text.

- E-mail messages can also contain file attachments, such as Word documents, Excel spreadsheets, and digital photos. The steps to attach a file to an e-mail message varies depending on the e-mail client that you use, but basically you click an attach file icon—often the icon looks like a paperclip—and then browse your computer for the file that you wish to attach.
- Use proper **e-mail etiquette** when communicating over the Internet. Think of an e-mail like a regular letter. Open with a salutation such as "Dear Mr. Smith," or "Hello Jane," and end with a closing like "Sincerely." Writing in all capital letters is rude and is considered the equivalent of shouting at someone. Also, avoid abbreviations and slang such as "LOL" and "ROFL." These would never be included in a letter, and should also be left out of e-mails. Be sure to always include a brief subject line. Make sure to spell check your e-mail before sending.
- A **social network**, such as Facebook, allows users to connect with other people on the Internet. Social networks consist of individual pages for each user. The users can enter information about themselves, such as interests, work or school info, even pictures. The user can then establish connections with other people on the social network, exchanging messages and other communications.
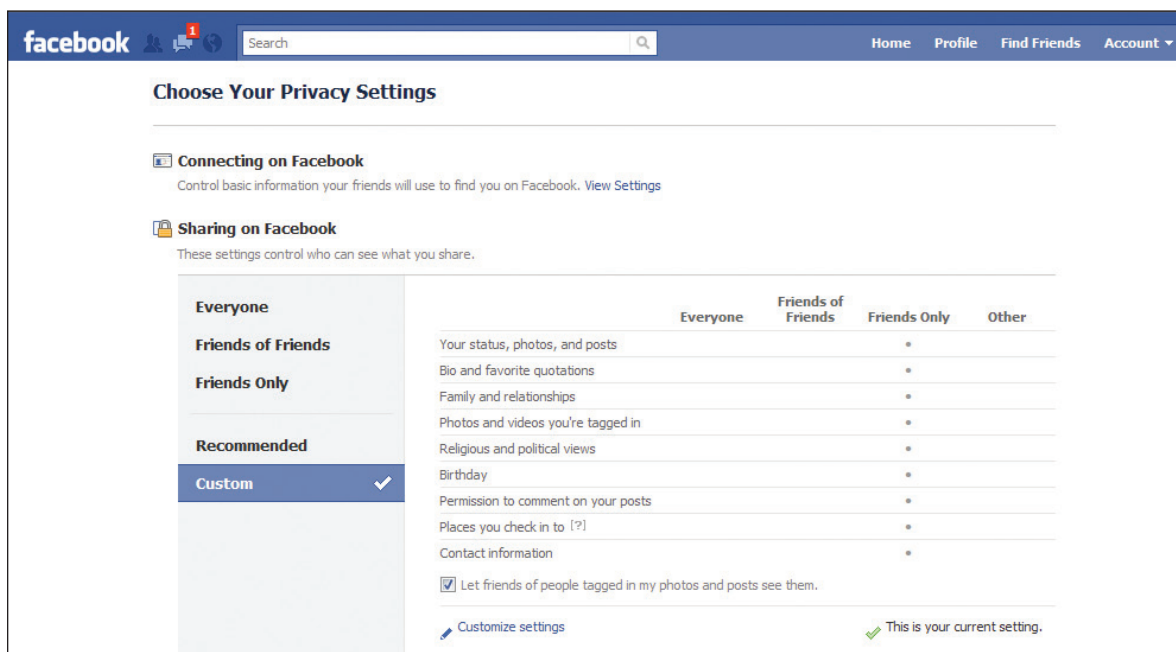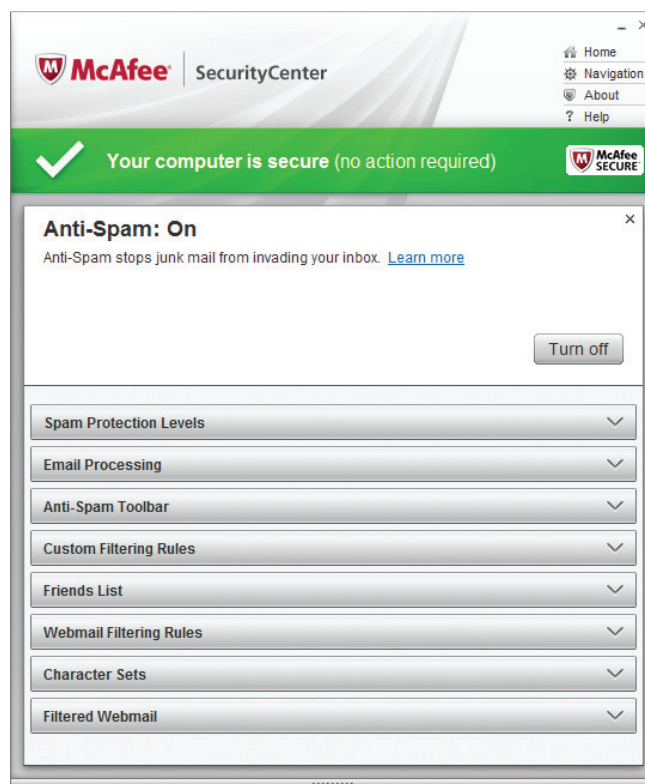

Figure 1.16
Facebook is a popular social networking site. It allows users to enter personal information about themselves, and customize their security settings to keep that information safe.

- **Discussion boards** and **blogs** are other ways to communicate over the Internet. A discussion board is a place where different people can leave messages about a specific topic. Users can respond to each other, start new discussions, and leave links to Web sites with more information.

- Some discussion boards include chat features so that you can communicate with other people in real-time, rather than post a message and wait for a response. When chatting online, proper conduct is essential.

- A blog, short for weB log, is a page where a user writes something for anyone on the Internet to read and comment on. Blog topics range from news to cooking to personal stories. If your class has a blog or discussion board, it could be a good way to ask questions about assignments or get help on a subject that you are having a hard time with. What you post to a blog is for all to see, so be sure that you proofread your work and only post relevant information.

- Another form of digital communication is **texting**. With texting, people send over a network brief written message with their mobile phones or other portable device. With texting, like with other forms of communication, proper protocol must be followed. That includes treating people with respect and using appropriate language.

Dangerous E-mail

- Some e-mail messages can damage programs and data. **E-mail viruses** are programs that can destroy data and cause network problems. Most e-mail viruses are sent as attachments to messages. When the recipient opens the attachment, a script or program can launch. This program can modify or destroy data and programs, or change the computer's settings.

- Not all e-mail viruses are distributed as attachments. Most e-mail programs can create and open messages in HTML format. A virus programmer can insert virus code directly in an HTML-format message. If you receive an infected message in HTML format, all you have to do is view the message in your e-mail program. The virus then infects your computer.

- Nearly all e-mail viruses copy themselves and then send themselves to everyone in your address book. When recipients see a message from you, they think it's safe to read. They open the message, and the destructive process repeats itself.

- Beware of any e-mail attachment that has an .EXE, .BAT, .COM, or .VBS extension at the end of its file name. These files are usually programs that can be used to launch a virus. If you're uncertain of an attachment, delete it and report it—don't open it! Running up-to-date virus protection software to scan e-mail for harmful attachments is an important safeguard.

Figure 1.17   It is important to have up-do-date virus protection software.

WORDS TO KNOW

Copyright
Gives the creator of an original work exclusive rights to it.

Ethics
A set of moral principles.

Fair use
Means you can use a portion of a copyrighted work without permission in certain cases.

Licensing infringement
Unauthorized distribution of software.

Macro virus
Takes advantage of the macro languages in applications, such as word processors.

Phishing
When criminals try to lure victims into giving them passwords, bank account numbers, or credit card details.

Plagiarism
Using material without crediting the source.

Scam
A trick to get your money.

Software piracy
The illegal copying of computer programs.

Trojan horse
A program that does something useful but also, hidden from view, does something destructive.

Virus
A program that performs one or more tasks that the user doesn't expect.

Worm
A computer virus commonly hidden inside another program.

Lesson 5

Types of Computer Crime

■ The Internet has opened the door to new kinds of crime and new ways of carrying out traditional crimes. Computer crime is any act that violates state or federal laws and involves using a computer. The term cybercrime often refers specifically to crimes carried out by means of the Internet.

■ Whether you're working with a small home network of just two computers or a large office with hundreds of networked computers, it's important to understand what kinds of threats your network may encounter. Regardless of the network size, being connected to a network opens up the risk of exposure to a virus or computer attack.

■ There are many different kinds of computer crime. Some of them require criminals to have a deep knowledge of programming.

■ A **virus** is a program that performs one or more tasks that the user doesn't expect. Some viruses are designed to do real harm, such as delete files, slow down network traffic, disable programs, or allow an unauthorized person to access the victim's computer.

■ Most viruses are designed to hide themselves, avoiding detection by the victim for as long as possible. If a virus is copied to your computer, the machine is said to be "infected." A virus can infect your computer in a number of ways. You might receive an infected disc from a friend. You might download an infected file from a Web site or receive it attached to an e-mail message. Most viruses can affect only the operating system in which they were written. However, they can spread from one computer to another. It is important that you always run antivirus software, such as Norton, on your computer.

■ A **macro virus** takes advantage of the macro languages in application programs, such as word processors or spreadsheets. Macro viruses launch themselves when an infected file is opened. These viruses are different from normal viruses because they can work on different operating systems.

- The most common computer viruses work by hiding inside another program. Although a **worm** doesn't need to be hidden within another program, worms are commonly hidden inside document files in the form of macros. Most worms make many copies of themselves, using up the victim's disk space and memory. They spread to other computers through network connections and by e-mail. The notorious I Love You virus of the year 2000 created e-mail messages and mailed itself to other computers using the e-mail addresses found on the victim's machine.

- A **Trojan horse** is a program that does something useful but at the same time, hidden from view, does something destructive. It can damage the system it enters, including erasing all the data on a hard drive. A Trojan horse might come in the form of a simple game. The victim plays the game; however, the program does something else in the background, such as opening a port on the computer. Someone can then use this port to access the computer through the Internet.

- Some computer crimes have nothing to do with programming. Criminals use a computer to commit theft. Internet advertisements and e-mail messages might claim that you can make huge sums of money with very little effort. According to these ads, all you have to do is send some money to receive full instructions. This is a **scam**—a trick to get your money.

- A special kind of scam is called **phishing**. Phishing criminals try to lure victims into giving them passwords, bank account numbers, or credit card details. For example, in a typical phishing scam, a thief sends an e-mail message that looks as if it is from your bank. The message may say that the bank needs you to verify or update account information. When you click on a link within the message, you are not taken to the real Web site of the bank. Instead, you link to a site that has been created to look like the bank's Web site, but has a slightly different URL or Web site name. You are then asked to enter your account number, password, and personal information number (PIN). The thief captures the information you enter and can then steal from your account. To avoid phishing scams, do not link to any site from within an e-mail message, and simply delete a message that asks you to update account information.

- One kind of computer crime is very widespread. It is called **software piracy**, the illegal copying of computer programs. One business group estimates that about one third of all software in use is pirated. Most programs that people buy are licensed only to the purchaser. In other words, it is illegal for you to copy such a program and give it to a friend. It is also illegal to accept a copy of software from someone else. Software piracy is the easiest computer crime to prevent. Make sure that you pay for all the software you use that requires payment. Unauthorized distribution of software is considered **licensing infringement** and is a crime typically punishable with a fine.

- Although many computer criminals get away with their crimes, cybercrimes can be considered a felony crime in the United States, and if convicted the criminal can face both jail time and fines. Fines for cybercrime offenders range from $5,000 per offense to $1,000,000, depending on the type of offense and the number of previous crimes committed.
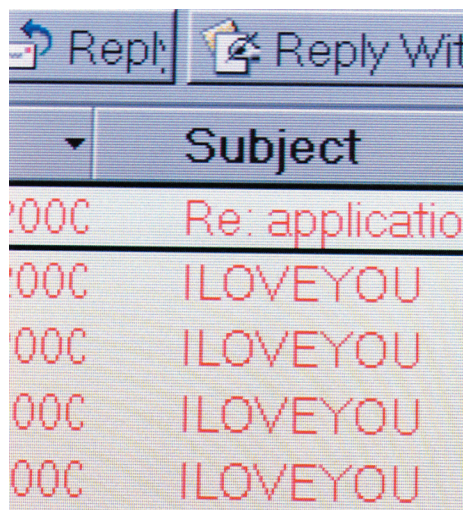
Figure 1.18 What steps can you take to help protect your computer from a virus?

Privacy in Cyberspace

■ Many consumers share personal information about themselves, their habits, and their finances. Sometimes, however, such information is gathered without a person's knowledge or approval.

■ Some businesses gather information from public records kept by the government. They may also access information that people volunteer about themselves in several ways:

  ● Web site registration—Many Web sites require visitors to fill out registration forms.

  ● Online purchases—Some Web sites gather information about people who buy their goods or services.

  ● Warranty registration—Products of all kinds come with a warranty that enables the user to get help if the product breaks or fails. To take advantage of a product warranty, you usually must register with the manufacturer. Some warranty registrations ask for a great deal of personal information.

  ● Sweepstakes entries—Many people fill out sweepstakes entry forms hoping to win a prize. In doing so, they provide important personal information.

■ What consumers may not know is that companies that gather personal information often sell it to other organizations, such as marketing companies, whose job is to sell products and services to consumers. As a result, marketing companies have access to enormous quantities of data about people. This information is stored in large computerized databases.

■ Some people say that individuals should have the right to refuse to provide information about themselves, as well as the right to have information about themselves removed from a database. Although such a guarantee does not yet exist in the United States, you can protect your privacy. The main thing you can do is be careful to whom you give out personal information about yourself.

■ While it is up to the individual what information he or she shares about him- or herself online, it is never ethical to share confidential business-related information online.
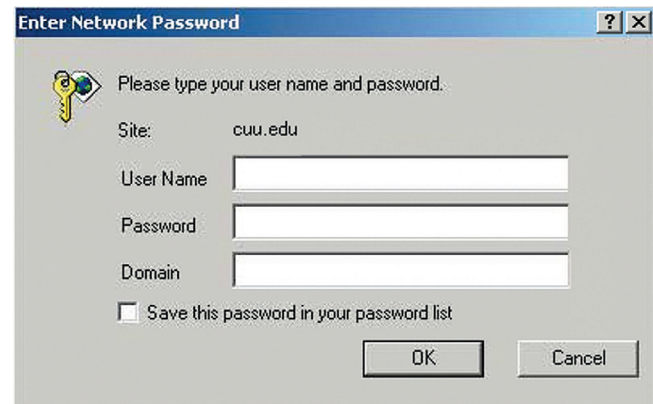
Figure 1.19   You may be required to provide a user name and password before accessing a computer network. Be sure to use a "strong" password.

Copyright Laws

■ Laws that involve **copyright** protect individuals and companies from the theft or misuse of their creative, literary, or artistic work. It is a crime to copy this kind of work without the permission of the person who owns the copyright to it.

■ The idea of **fair use** means you can use a portion of a copyrighted work without permission in certain cases. Fair use applies when a limited portion of the work is used for research or as part of schoolwork. Reviewers also have the right to quote part of an original work in their reviews.

- Computers and the Internet make it easy to copy someone else's work, including other people's photographs, documents, videos, recorded sounds, and music. Using material from a Web site or a book without crediting the source is **plagiarism**. This is copying someone else's work and passing it off as your own. You should always follow the rules of fair use and acknowledge the source of information you use.

- Professional writers learn how to properly cite and use sources to avoid plagiarizing them. Writers must be able to apply strong language skills to develop their own ideas and express things in their own words—not in the words of sources. Writers work in many different media, including books, magazines, newspapers, television and radio, and the Internet.

Acceptable Use Policies

- People who practice **ethics** behave morally. One way you can act ethically is to follow your school district's acceptable use policy, or AUP, while using computers at school. These policies identify for computer users the responsibilities of Internet use. They spell out certain rules of behavior and explain the consequences of breaking those rules. Many businesses use AUPs, too, to govern the way workers use company-owned computers.

- A school district's AUP may include the following ethical guidelines:
  - Users agree not to visit objectionable Web sites that contain content that does not meet community standards.

- Users agree not to use inappropriate language, such as language that is profane, abusive, or impolite.
- Users agree not to copy copyrighted material or to damage computer equipment belonging to the school.
- Users agree to respect the privacy of other people.

- Users of school computers who do not follow these rules may face consequences. They might lose privileges or be suspended from school activities. Very serious violations, such as using a school computer to threaten someone, may require police involvement.
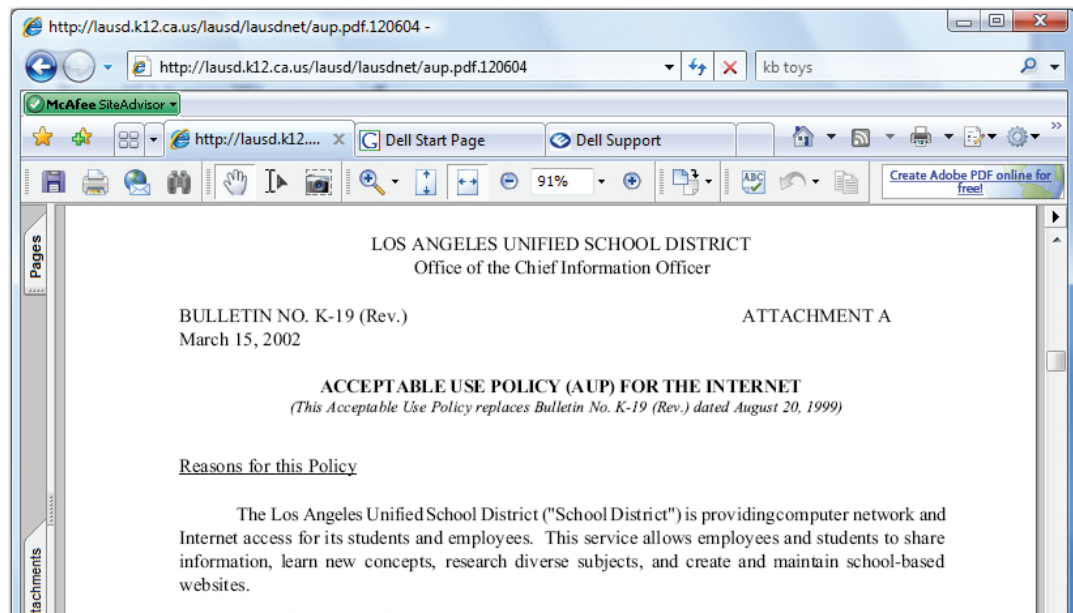
Figure 1.20
Your school district's AUP provides guidelines for using your school's computers, network, and Internet access.

Lesson 6

Computer Workers

■ Computer chips, hard disks, CD-ROM and DVD drives, and all other computer components are designed by **electronics engineers**. They include hardware and software engineers. These professionals specialize in microcircuitry or imaging technology or hundreds of other areas involved with the design and manufacture of computing equipment.

■ Supercomputers and servers require specially trained personnel to keep them running efficiently. Most server installations have a **systems administrator** who has studied the inner workings of the server operating system and knows how to keep it working correctly.

■ In addition, such installations may have a person in charge of managing disk storage, called a **DASD (Direct Access Storage Device)** manager. Just as you may accumulate a great deal of data that you no longer need on your personal computer, a server installation may pile up data it should archive (file permanently elsewhere) and information needed only temporarily. The DASD manager sees to it that the installation gets the most efficient use of its storage capacity.

■ Server installations usually also have a staff of **application programmers** who ensure that the programs the organizations need are created, maintained, and improved. Such programmers work on fixing problems in programs, adding new features, and creating special programs to perform specific tasks. Application programmers are necessary because many of the programs that run on servers are not purchased from a software supplier.

■ Companies like Microsoft, Google, Adobe, Nintendo, and other software vendors also employ application programmers. They use a variety of programming languages to create and enhance the companies' products.

■ **Database administrators and developers** are people who specialize in designing and overseeing the maintenance of databases.

■ **Network administrators** are people who specialize in making sure that a company's local area network operates efficiently. They need to be well-acquainted with the operation and maintenance of personal computers.

- **Help desk professionals** are people who are trained to provide help to users of applications. They work in the information processing department of large organizations and are called upon to install programs on PCs, answer questions about how to use programs, and help users recover from problems.

- Those who manage, support, and maintain computer installations are known as **information systems personnel**. Their specialties may be housed in a department called **MIS (Management Information Systems)** or **IT (Information Technology)**, and the department head may be a corporate officer called the **CIO (Chief Information Officer)**.

- **Web site designers and programmers** are those who decide what Web pages should look like and those who prepare the code that make Web pages perform properly. Sometimes Web page design and programming are done by the same person. In many cases, however, a graphics professional designs the look of a Web site, and a programmer makes sure that the Web site looks and works as designed.

- Web site programmers know how to use Web building tools like HTML (hypertext markup language) and Java and special-purpose programs like Adobe Dreamweaver.

- For more information on careers in information technology, you can look at the Web site of the Bureau of Labor Statistics, which is located at http://www.bls.gov/oco.

Figure 1.21   Computer technicians work to build or repair computer systems. What skills and interests do you think might be necessary to become a computer technician?

WORDS TO KNOW

MIS (Management Information Systems)
Another term for IT.

Network administrator
People who specialize in making sure that a company's local area network operates efficiently.

Systems administrator
People who have studied the inner workings of the server operating system and know how to keep it working correctly.

Web site designer and programmer
People who decide what Web pages should look like and those who prepare the code that make Web pages perform properly.