

Information Technology, the Internet, and You



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Competencies

After you have read this chapter, you should be able to:

- 1 Explain the parts of an information system: people, procedures, software, hardware, data, and connectivity.
- 2 Distinguish between system software and application software.
- 3 Discuss the three kinds of system software programs.
- 4 Define and compare general purpose, specialized, and mobile applications.
- 5 Identify the four types of computers and the four types of microcomputers.
- 6 Describe the different types of computer hardware, including the system unit, input, output, storage, and communication devices.
- 7 Define data and describe document, worksheet, database, and presentation files.
- 8 Explain computer connectivity, the wireless revolution, the Internet, and cloud computing.

Why should I read this chapter?

When microcomputers were first introduced, they were used by relatively few people to create simple documents and analyze data. These computers were expensive, slow, and difficult to use. Now, microcomputers are used widely throughout the world. Every day billions of people use microcomputers and the Internet socially and professionally. Today's microcomputers are inexpensive, very powerful, and easy to use.

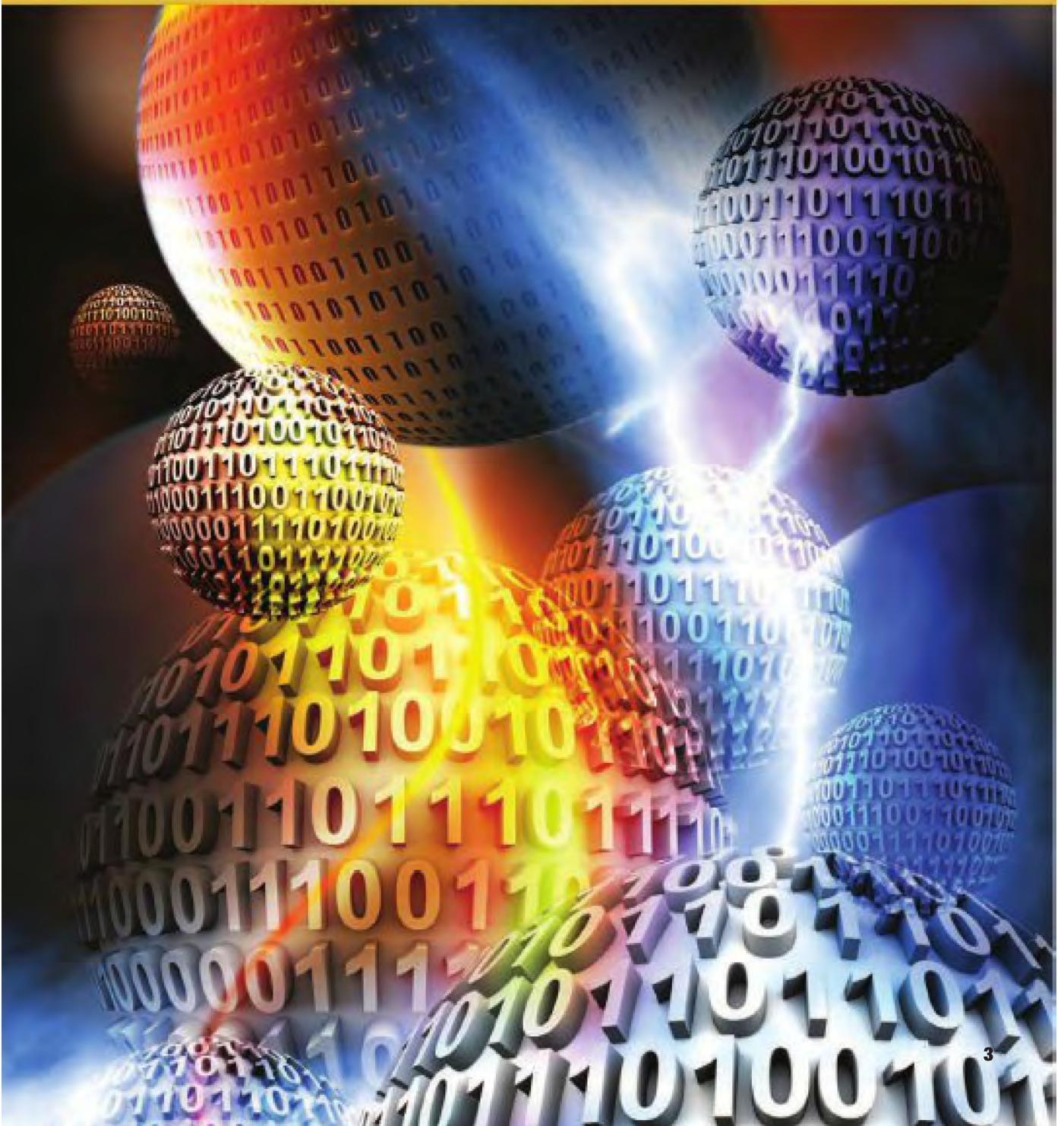
This chapter provides a very concise overview of computing

and the organization of this text. It presents the various features of the text including boxes presenting environmental and ethical issues and special coverage of how you can make your computer work efficiently and effectively for you. Additionally, an

overview of hardware, software, and data is presented. Finally, the concept of connectivity is introduced along with the Internet, web, the wireless revolution, and cloud computing. To effectively start to use this text, you need to understand these things.



chapter 1



Introduction



Welcome to *Computing Essentials*. I'm Alan and I work in information technology. On the following pages, we'll be discussing some of the most exciting new developments in computer technology including smartphones, tablet computers, and cloud computing. Let me begin in this chapter by giving you an overview of the book and showing you some of its special features.

The purpose of this book is to help you become competent with computer technology. **Computer competency** refers to acquiring computer-related skills—indispensable tools for today. They include how to effectively use popular application packages and the Internet.

In this chapter, we present an overview of an information system: people, procedures, software, hardware, data, and connectivity. It is essential to understand these basic parts and how connectivity through the Internet and the web expands the role of information technology in our lives. Later, we describe these parts of an information system in detail.

Twenty years ago, most people had little to do with computers, at least directly. Of course, they filled out computerized forms, took computerized tests, and paid computerized bills. But the real work was handled by specialists. Then microcomputers came along and changed everything. Today it is easy for nearly everybody to use a computer.

- Microcomputers are common tools in all areas of life. Writers write, artists draw, engineers and scientists calculate—all on microcomputers. Students and businesspeople do all this and more.
- New forms of learning have developed. People who are homebound, who work odd hours, or who travel frequently may take online courses. A college course need not fit within a quarter or a semester.



People
are end users who use computers to make themselves more productive.



Software
provides step-by-step instructions for computer hardware.



Procedures
specify rules or guidelines for computer operations.

Figure 1-1 Parts of an information system

- New ways to communicate, to find people with similar interests, and to buy goods are available. People use electronic mail, electronic commerce, and the Internet to meet and to share ideas and products.

To be competent with computer technology, you need to know the parts of an information system: people, procedures, software, hardware, data, and connectivity. You also need to understand the wireless revolution, the Internet, and the web and to recognize the role of information technology in your personal life as well as your professional life.

Information Systems

When you think of a microcomputer, perhaps you think of just the equipment itself. That is, you think of the monitor or the keyboard. Yet, there is more to it than that. The way to think about a microcomputer is as part of an information system. An **information system** has several parts: *people, procedures, software, hardware, data, and connectivity*. (See Figure 1-1.)

- **People:** It is easy to overlook people as one of the parts of an information system. Yet this is what microcomputers are all about—making **people, end users** like you, more productive.
- **Procedures:** The rules or guidelines for people to follow when using software, hardware, and data are **procedures**. These procedures are typically



documented in manuals written by computer specialists. Software and hardware manufacturers provide manuals with their products. These manuals are provided in either printed or electronic (web link) form.

- **Software:** A **program** consists of the step-by-step instructions that tell the computer how to do its work. **Software** is another name for a program or programs. The purpose of software is to convert **data** (unprocessed facts) into **information** (processed facts). For example, a payroll program would instruct the computer to take the number of hours you worked in a week (data) and multiply it by your pay rate (data) to determine how much you are paid for the week (information).
- **Hardware:** The equipment that processes the data to create information is called **hardware**. It includes the keyboard, mouse, monitor, system unit, and other devices. Hardware is controlled by software.
- **Data:** The raw, unprocessed facts, including text, numbers, images, and sounds, are called data. Processed data yields information. Using the previous example of a payroll program, the data (number of hours worked and pay rate) is processed (multiplied) to yield information (weekly pay).
- **Connectivity:** Almost all of today's computer systems add an additional part to the information system. This part, called **connectivity**, typically uses the Internet and allows users to greatly expand the capability and usefulness of their information systems.

environment

Did you know that over 10 million tons of material was diverted from landfills last year alone as a result of recycling efforts? This success is largely due to voluntary participation of people across the country, who have made "reduce, reuse, and recycle" a personal commitment. This includes recycling old computers, cell phones, printers, and monitors. Your participation in recycling means fewer one-use products, cleaner water, cleaner air. But recycling may someday pay off financially too. Many now see waste as a resource, and one that we shouldn't squander by filling up the garbage can instead of the recycling bin. Imagine a future where the garbage collector drops off a check for your contributions to going green. To see more environmental facts, visit our website at www.computing2014.com and enter the keyword [environment](#).



concept check

- What are the parts of an information system?
- What is a program?
- What is the difference between data and information?

People

People are surely the most important part of any information system. Our lives are touched every day by computers and information systems. Many times the contact is direct and obvious, such as when we create documents using a word processing program or when we connect to the Internet. Other times, the contact is not as obvious. (See Figure 1-2.)

Throughout this book you will find a variety of features designed to help you become computer competent and knowledgeable. These features include Making IT Work for You, Explorations, Environment, Ethics, Tips, Careers in IT, and the Computing Essentials website.

- **Making IT Work for You.** Throughout this book you will find



Figure 1-2 People and computers

Application	Description
Online Entertainment	Use your computer to watch your favorite television programs, movies, and other video content. See page 30.
Image Editing	Manage and fix the problems with your photos with a free image editing program. See page 75.
Google Docs	Create, collaborate, and access documents from almost anywhere with a free online office suite. See page 83.
SKYPE	Visit face to face with friends and family located almost anywhere at little or no cost. See page 170.
Cloud Storage	Send large files using a free tool and the cloud. See page 198.
To see additional applications, visit our website at www.computing2014.com and enter the keyword MIW .	

Figure 1-3 Making IT Work for You applications

Making IT Work for You features that present numerous interesting and practical IT applications. For just a few of the Making IT Work for You topics, see Figure 1-3. For a complete list, visit our website at www.computing2014.com.

- **Tips.** We all can benefit from a few tips or suggestions. Throughout this book you will find numerous Tips to make your computing safer, more efficient, and more effective. These tips range from the basics of keeping your computer system running smoothly to how to protect your privacy while surfing the web. For a partial list of the Tips presented in the following chapters, see Figure 1-4. For a complete list, visit our website at www.computing2014.com.
- **Explorations.** The informational content of the web is limitless; the challenge is to locate the information you are looking for. In this chapter and the ones that follow, you will find Explorations boxes in the margin that direct you to relevant web information locations.
- **Ethics.** Most people agree that we should behave ethically. That is, we should follow a system of moral principles that direct our everyday lives. However, for any given circumstance, people often do not agree on the ethics of the situation. Throughout this book you will find numerous Ethics boxes posing a variety of different ethical/unethical situations for your consideration.
- **Environment.** Today it is more important than ever that we be aware of our impact on the environment. In this chapter and the following ones, you will find Environment boxes in the margin that present important relevant environmental information.

Are you getting the most out of your computer? Here are just a few of the tips to make your computing safer, more efficient, and more effective.

tips

- 1 **Low battery.** Do you find that your laptop's battery keeps its charge for less time than it used to? Here are some ways to make your battery last longer. See page 139.
 - 2 **Compressed files.** Have you ever received a compressed file that you could not open? If so, follow these steps to acquire a free program that can open most compressed files. See page 191.
 - 3 **Lost files.** Have you ever accidentally deleted or lost important files from your flash drive? Here are a few suggestions that might help. See page 195.
 - 4 **Identity theft.** Identity theft is a growing problem that can be financially devastating. Some steps to help protect your identity are on page 245.
 - 5 **Wireless networks.** Do you use your laptop to connect to wireless networks at school, coffee shops, airports, or hotels? If so, it is important to use caution to protect your computer and your privacy. A few suggestions are on page 223.
- To see additional tips, visit our website at www.computing2014.com and enter the keyword **tips**.

Figure 1-4 Selected tips

- **Careers in IT.** One of the most important decisions of your life is to decide upon your life's work or career. Perhaps you are planning to be a writer, an artist, or an engineer. Or you might become a professional in **information technology (IT)**. Each of the following chapters highlights a specific career in information technology. This feature provides job descriptions, projected employment demands, educational requirements, current salary ranges, and advancement opportunities.
- **Computing Essentials Website.** Throughout the text you will find numerous text references to the Computing Essentials website at www.computing2014.com. This site is carefully integrated with the textbook. At the site, you'll find animations, career information, tips, test review materials, and much more.



concept check



Which part of an information system is the most important?



Describe the Making IT Work for You, Tips, Explorations, and Ethics features.



Describe the Environment, the Careers in IT, and the Computing Essentials website features.

Software

Software, as we mentioned, is another name for programs. Programs are the instructions that tell the computer how to process data into the form you want. In most cases, the words *software* and *programs* are interchangeable. There are two major kinds of software: *system software* and *application software*. You can think of application software as the kind you use. Think of system software as the kind the computer uses.

System Software

The user interacts primarily with application software. **System software** enables the application software to interact with the computer hardware. System software is “background” software that helps the computer manage its own internal resources.

System software is not a single program. Rather it is a collection of programs, including the following:

- **Operating systems** are programs that coordinate computer resources, provide an interface between users and the computer, and run applications. Microsoft's Windows 8 and Apple's Mac OS X are two of the best-known operating systems for today's microcomputer users. (See Figures 1-5 and 1-6.)
- **Utilities** perform specific tasks related to managing computer resources. One of the most essential utility programs that every computer system should have is an antivirus program. These programs protect your computer system from **viruses** or malicious programs that are all too often deposited onto your computer from the Internet. These programs can damage software and hardware, as well as compromise the security and privacy of your personal data. If your computer does not have an antivirus program installed on it, you need to get one. To see how you can install a free antivirus program on your computer, see Making IT Work for You: Installing a Free Antivirus Program on page 10.

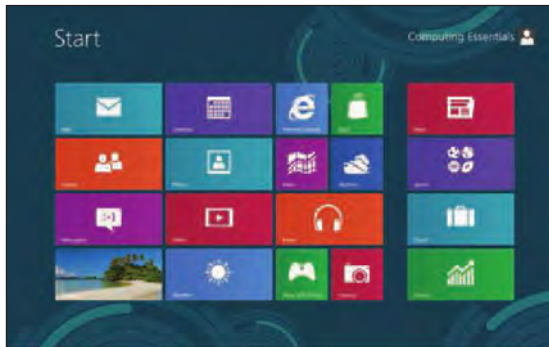


Figure 1-5 Windows 8



Figure 1-6 Mac OS X

- **Device drivers** are specialized programs designed to allow particular input or output devices to communicate with the rest of the computer system.

Application Software

Application software might be described as end user software. Three types of application software are *general-purpose*, *specialized*, and *mobile apps*.

General-purpose applications are widely used in nearly all career areas. They are the kinds of programs you have to know to be considered computer competent. One of these general-purpose applications is a browser to navigate, explore, and find information on the Internet. The three most widely used browsers are Mozilla's Firefox, Microsoft's Internet Explorer, and Google's Chrome.

Specialized applications include thousands of other programs that are more narrowly focused on specific disciplines and occupations. Two of the best known are graphics and web authoring programs.

Mobile apps, or **mobile applications**, are small programs designed for mobile devices such as smartphones, tablet computers, and other mobile devices. There are over half a million apps. The most popular mobile apps are for text messaging, Internet browsing, and connecting to social networks.



concept check



- Describe the two major kinds of software.
- Describe three types of system software programs.
- Define and compare general-purpose, specialized, and mobile applications.

Hardware

Computers are electronic devices that can follow instructions to accept input, process that input, and produce information. This book focuses principally on microcomputers. However, it is almost certain that you will come in contact, at least indirectly, with other types of computers.

Making IT work for you

INSTALLING A FREE ANTIVIRUS PROGRAM

Have you or someone you know had a slower computing experience due to a spyware infection? Even worse, perhaps a malicious piece of software stole crucial, personal information or caused a total system failure. Most of these problems can be averted by having an up-to-date antivirus program running in your computer's memory at all times. This exercise shows you how to download and install a free antivirus program if your computer does not yet have one.

Getting Started First, make sure your computer does not have an antivirus or security suite running. If it does, be sure to completely uninstall that program, even if the subscription is expired. Now, follow these steps to install AVG, a popular, free antivirus program:

- 1 Visit <http://free.avg.com> and click the **Download** button. You will be asked to confirm that you want the free edition and then redirected to a download site.
- 2 Run the installation file and follow the prompts.
- 3 Select **basic protection** if you are asked which product you would like to install.
- 4 Choose **Express Install** and wait for files to be downloaded and installed.

Using AVG Generally speaking, your antivirus program watches your system for malware and updates itself automatically. However, you can always download updates manually, set a schedule for full-system scans, and change basic settings for various components of the software.

- 1 After installation, verify that the software is downloading updates by clicking **Update now** on the left side. Wait for all updates to be downloaded.
- 2 Click **Scan now** to run a full scan on your computer.
- 3 Just below that, click **Scan options** if you want to set a schedule for automated scans.
- 4 Click **Overview** to reach the main screen, where you can click various elements of the program to configure them. For example, clicking **Anti-Virus** will allow you to turn on a feature that detects cookies that may be used to track your online activity.



The web is continually changing, and some of the specifics presented in this Making IT Work for You may have changed. To learn about other ways to make information technology work for you, visit our website at www.computing2014.com and enter the keyword **miw**.



Figure 1-7 Supercomputer

Types of Computers

There are four types of computers: supercomputers, mainframe computers, mid-range computers, and microcomputers.

- **Supercomputers** are the most powerful type of computer. These machines are special high-capacity computers used by very large organizations. IBM's Blue Gene supercomputer is one of the fastest computers in the world. (See Figure 1-7.)
- **Mainframe computers** occupy specially wired, air-conditioned rooms. Although not nearly as powerful as supercomputers, mainframe computers are capable of great processing speeds and data storage. For example, insurance companies use mainframes to process information about millions of policyholders.
- **Midrange computers**, also referred to as **servers**, are computers with processing capabilities less powerful than a mainframe computer yet more powerful than a microcomputer. Originally used by medium-size companies or departments of large companies to support their processing needs, today midrange computers are most widely used to support or serve end users for such specific needs as retrieving data from a database or supplying access to application software.
- **Microcomputers** are the least powerful, yet the most widely used and fastest-growing type of computer. There are four types of microcomputers: *desktop*, *notebook*, *tablet*, and *handheld computers*. (See Figure 1-8.) **Desktop computers** are small enough to fit on top of or alongside a desk yet are too big to carry around. **Notebook computers**, also known as **laptop computers**, are portable and lightweight and fit into most briefcases. **Tablets**, also known as **tablet computers**, are the newest type of computer. They are smaller, lighter, and generally less powerful than notebooks. Like a notebook, tablets have a flat screen but typically do not have a standard keyboard. Instead tablets typically use a virtual keyboard that appears on the screen and is touch-sensitive. The best known tablet is Apple's iPad. **Handheld computers** are the smallest and are designed to fit into the palm of one hand. These systems contain an entire computer system, including the electronic



Figure 1-8 Microcomputers

components, secondary storage, and input and output devices. **Personal digital assistants (PDAs)** and **smartphones** are the most widely used handheld computers. Smartphones are cell phones with wireless connections to the Internet and processing capabilities. Their growth has been explosive in the past few years.

Microcomputer Hardware

Hardware for a microcomputer system consists of a variety of different devices. See Figure 1-9 for a typical desktop system. This physical equipment falls into four basic categories: system unit, input/output, secondary storage, and communication. Because we discuss hardware in detail later in this book, here we will present just a quick overview of the four basic categories.

- **System unit:** The **system unit** is a container that houses most of the electronic components that make up a computer system. Two important components of the system unit are the *microprocessor* and *memory*. (See Figure 1-10.) The **microprocessor** controls and manipulates data to produce information. **Memory** is a holding area for data, instructions, and information. One type, **random-access memory (RAM)**, holds the program and data that is currently being processed. This type of memory is sometimes referred to as *temporary storage* because its contents will typically be lost if the electric power to the computer is disrupted.
- **Input/output:** **Input devices** translate data and programs that humans can understand into a form that the computer can process. The most common input devices are the **keyboard** and the **mouse**. **Output devices** translate the processed information from the computer into a form that humans can understand. The most common output devices are **monitors** (see Figure 1-11) and **printers**.

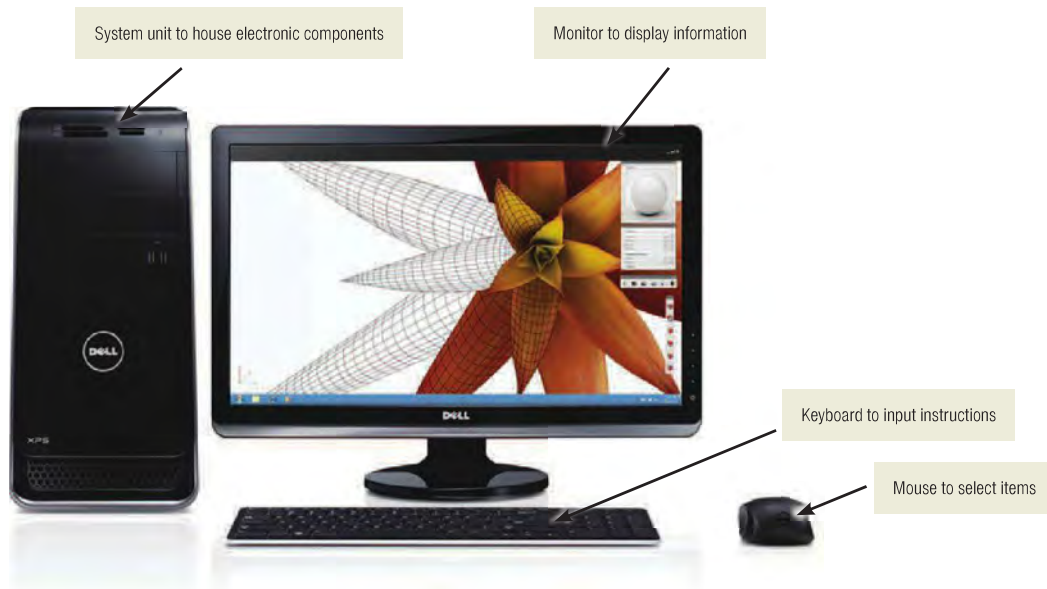


Figure 1-9 Microcomputer system

- **Secondary storage:** Unlike memory, **secondary storage** holds data and programs even after electric power to the computer system has been turned off. The most important kinds of secondary media are *hard disks*, *solid-state storage*, and *optical discs*. **Hard disks** are typically used to store programs and very large data files. Using rigid metallic platters and read/write heads that move across the platters, data and information are stored using magnetic charges on

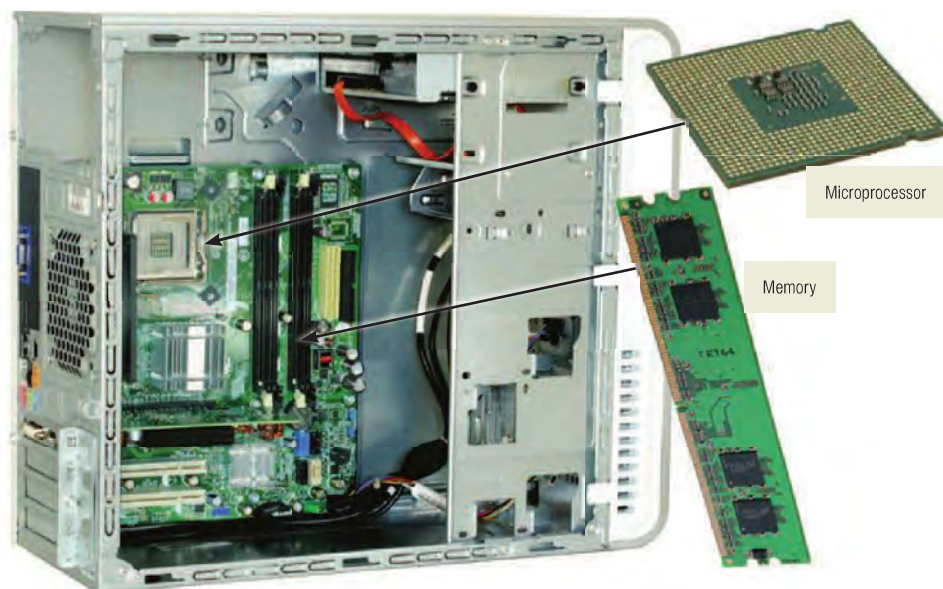


Figure 1-10 System unit



Figure 1-11 Monitor



Figure 1-12 Optical disc

the disk's surface. In contrast, **solid-state storage** does not have any moving parts, is more reliable, and requires less power. It saves data and information electronically similar to RAM except that it is not volatile. Three types are **solid-state drives (SSDs)** that are used much the same way as an internal hard disk, **flash memory cards** that are widely used in portable devices, and **USB drives** that are a widely used compact storage medium for transporting data and information between computers and a variety of specialty devices. **Optical discs** use laser technology to store data and programs. (See Figure 1-12.) Three types of optical discs are **compact discs (CDs)**, **digital versatile (or video) discs (DVDs)**, and **Blu-ray discs**.

- **Communication:** At one time, it was uncommon for a microcomputer system to communicate with other computer systems. Now, using **communication devices**, a microcomputer can communicate with other computer systems located as near as the next office or as far away as halfway around the world, using the Internet. A **modem** is a widely used communication device that modifies audio, video, and other types of data communications into a form that can be processed by a computer. Modems also modify computer output into a form that can be transmitted across standard cable and telephone lines.



concept check



What are the four types of computers?

Describe the four types of microcomputers.

Describe the four basic categories of microcomputer hardware.

Data

Data is raw, unprocessed facts, including text, numbers, images, and sounds. As we mentioned earlier, processed data becomes information. When stored electronically in files, data can be used directly as input for the system unit.

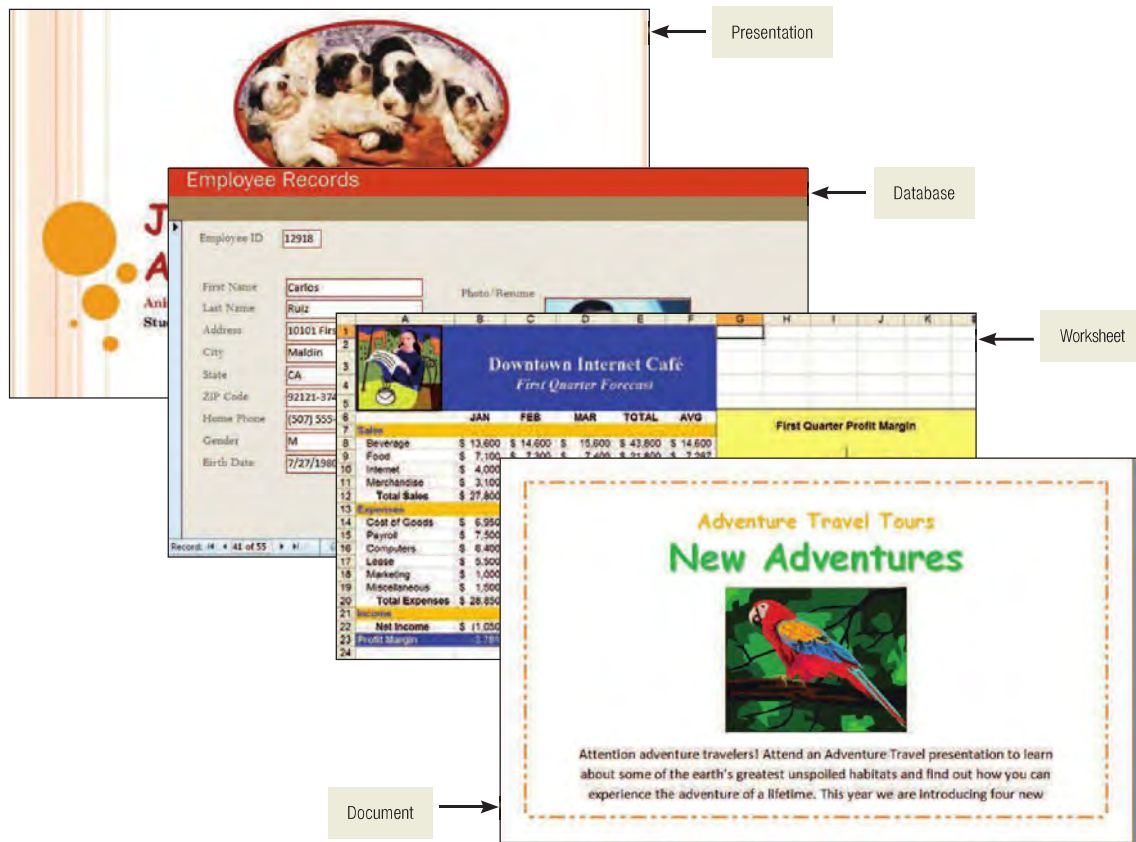


Figure 1-13 Four types of files: presentation, database, worksheet, and document

Four common types of files (see Figure 1-13) are

- **Document files**, created by word processors to save documents such as memos, term papers, and letters.
- **Worksheet files**, created by electronic spreadsheets to analyze things like budgets and to predict sales.
- **Database files**, typically created by database management programs to contain highly structured and organized data. For example, an employee database file might contain all the workers' names, Social Security numbers, job titles, and other related pieces of information.
- **Presentation files**, created by presentation graphics programs to save presentation materials. For example, a file might contain audience handouts, speaker notes, and electronic slides.

Connectivity

Connectivity is the capability of your microcomputer to share information with other computers. The two most dramatic changes in connectivity in the past five years have been the widespread use of mobile or wireless communication devices



Figure 1-14 Wireless communication devices

and cloud computing. For just a few of these mobile devices, see Figure 1-14. Many experts predict that these wireless applications are just the beginning of the **wireless revolution**, a revolution that will dramatically affect the way we communicate and use computer technology.

Central to the concept of connectivity is the **network**. A network is a communications system connecting two or more computers. The largest network in the world is the **Internet**. It is like a giant highway that connects you to millions of other people and organizations located throughout the world. The **web** provides a multimedia interface to the numerous resources available on the Internet. **Cloud computing** uses the Internet and the web to shift many computer activities from a user's computer to computers on the Internet. The wireless revolution and cloud computing promise the potential to dramatically affect the entire computer industry and how you and I will interact with computers. Each will be discussed in detail in the following chapters.



concept check



- Define data. List four common types of files.
- Define connectivity and the wireless revolution.
- What is a network? Describe the Internet, web, and cloud computing.

Careers in IT

As mentioned previously, each of the following chapters highlights a specific career in information technology. Each provides specific job descriptions, salary ranges, advancement opportunities, and more. For a partial list of these careers, see Figure 1-15. For a complete list, visit our website at www.computing2014.com and enter the keyword **careers**.



Now that you know the basic outline and important features of this book, I'd like to talk about some of the most exciting and well-paid careers in information technology.

Career	Description
Webmaster	Develops and maintains websites and web resources. See page 51.
Software engineer	Analyzes users' needs and creates application software. See page 82.
Computer support specialist	Provides technical support to customers and other users. See page 112.
Computer technician	Repairs and installs computer components and systems. See page 141.
Technical writer	Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 174.
Network administrator	Creates and maintains computer networks. See page 229.

Figure 1-15 Careers in information technology

A LOOK TO THE FUTURE

Using and Understanding Information Technology Means Being Computer Competent

The purpose of this book is to help you use and understand information technology. We want to help you become computer competent in today's world and to provide you with a foundation of knowledge so that you can understand how technology is being used today and anticipate how technology will be used in the future. This will enable you to benefit from six important information technology developments.

The Internet and the Web

The Internet and the web are considered by most to be the two most important technologies for the 21st century. Understanding how to efficiently and effectively use the Internet to browse, communicate, and locate information are essential skills. These issues are presented in Chapter 2, The Internet, the Web, and Electronic Commerce.

Powerful Software

The software that is now available can do an extraordinary number of tasks and help you in an endless number of ways. You can create professional-looking documents, analyze massive amounts of data, create dynamic multimedia web pages, and much more. Today's employers are expecting the people they hire to be able to effectively and efficiently use a variety of different types of software. General-purpose, specialized, and mobile applications are presented in Chapter 3. System software is presented in Chapter 4.

Powerful Hardware

Microcomputers are now much more powerful than they used to be. Smartphones, tablets, and communication technologies such as wireless networks are dramatically changing the ways to connect to other computers, networks, and the Internet. However, despite the rapid change of specific equipment, their essential features remain unchanged. Thus, the competent end user should focus on these features. Chapters 5 through 8

explain what you need to know about hardware. For those considering the purchase of a computer, an appendix—The Buyer's Guide: What Type of Computer to Purchase—is provided at the end of this book. This guide provides a very concise comparison of desktops, notebooks, tablets, and smartphones.

Security and Privacy

What about people? Experts agree that we as a society must be careful about the potential of technology to negatively impact our personal privacy and security. Additionally, we need to be

aware of potential physical and mental health risks associated with using technology. Finally, we need to be aware of negative effects on our environment caused by the manufacture of computer-related products. Thus, Chapter 9 explores each of these critical issues in detail.

Organizations

Almost all organizations rely on the quality and flexibility of their information systems to stay competitive. As a member or employee of an organization, you will undoubtedly be involved in these information

systems. In order to use, develop, modify, and maintain these systems, you need to understand the basic concepts of information systems and know how to safely, efficiently, and effectively use computers. These concepts are covered throughout this book.

Changing Times

Are the times changing any faster now than they ever have? Almost everyone thinks so. Whatever the answer, it is clear we live in a fast-paced age. The Evolution of the Computer Age section presented at the end of this book tracks the major developments since computers were first introduced.

After reading this book, you will be in a very favorable position compared with many other people in industry today. You will learn not only the basics of hardware, software, connectivity, the Internet, and the web but also the most current technology. You will be able to use these tools to your advantage.



VISUAL SUMMARY

Information Technology, the Internet, and You

INFORMATION SYSTEMS



The way to think about a microcomputer is to realize that it is one part of an **information system**. There are several parts of an information system:

- **People** are an essential part of the system. The purpose of information systems is to make people, or **end users** like you, more productive.
- **Procedures** are rules or guidelines to follow when using software, hardware, and data. They are typically documented in manuals written by computer professionals.
- **Software (programs)** provides step-by-step instructions to control the computer to convert **data** into **information**.
- **Hardware** consists of the physical equipment. It is controlled by software and processes data to create information.
- **Data** consists of unprocessed facts including text, numbers, images, and sound. **Information** is data that has been processed by the computer.
- **Connectivity** allows computers to connect and share information.

To be computer competent, end users need to understand **information technology (IT)**, including software, hardware, data, and connectivity.

PEOPLE



People are the most important part of an information system. This book contains several features to demonstrate how people just like you use computers. These features include the following:

- **Making IT Work for You** presents several interesting and practical applications. Topics include using digital video editing and locating job opportunities.
- **Tips** offer a variety of suggestions on such practical matters as how to improve slow computer performance and how to protect your privacy while on the web.
- **Explorations** direct you to important information and websites that relate to computers and technology.
- **Ethics boxes** pose a variety of different ethical/unethical situations for your consideration.
- **Environment** discusses important and relevant environmental issues. The impact of computers and other technologies is more critical today than ever before.
- **Careers in IT** presents job descriptions, employment demands, educational requirements, salary ranges, and advancement opportunities.
- **Computing Essentials website** integrates the textbook with information on the web, including animations, career information, tips, test review materials, and much more.

To prepare for your future as a competent end user, you need to understand the basic parts of an information system: people, procedures, software, hardware, data, and connectivity. Also you need to understand the Internet and the web and to recognize the role of technology in your professional and personal life.

SOFTWARE



Software, or programs, consists of system and application software.

System Software

System software enables application software to interact with computer hardware.

- Operating systems coordinate resources, provide an interface, and run applications.
- Utilities perform specific tasks to manage computer resources.
- Device drivers are specialized programs to allow input and output devices to communicate with the rest of the computer system.

Application Software

Application software includes general-purpose, specialized, and mobile applications.

- **General purpose**—widely used in nearly all career areas; programs include browsers, word processors, spreadsheets, database management systems, and presentation graphics.
- **Specialized**—focus more on specific disciplines and occupations; programs include graphics and web authoring.
- **Mobile apps**—designed for mobile devices; most popular are for text messaging, Internet browsing, and connecting to social networks.

HARDWARE



Hardware consists of electronic devices that can follow instructions to accept input, process the input, and produce information.

Types of Computers

Supercomputer, mainframe, midrange (server), and microcomputer are four types of computers. Microcomputers can be desktop, notebook (laptop computer), tablet, or handheld (PDAs and smartphones are the most widely used handheld microcomputers).

Microcomputer Hardware

There are four basic categories of hardware devices.

- **System unit** contains electronic circuitry, including the microprocessor and memory. Random-access memory (RAM) holds the program and data currently being processed.
- **Input/output devices** are translators between humans and computers. Input devices include the keyboard and mouse. Output devices include monitors and printers.
- **Secondary storage** holds data and programs. Typical media include hard disks, solid-state storage (solid-state drives, flash memory cards, and USB drives), and optical discs (CD, DVD, and Blu-ray).
- **Communication devices** allow microcomputers to communicate with other computer systems. Modems modify audio, video, and other types of data for transmission and processing.

DATA

Data is the raw unprocessed facts about something. Common file types include

- Document files created by word processors.



- Worksheet files created by spreadsheet programs.



- Database files created by database management programs.



- Presentation files created by presentation graphics programs.



CONNECTIVITY

Connectivity

Connectivity describes the ability of end users to use resources well beyond their desktops.

The Wireless Revolution

The wireless revolution is the widespread and increasing use of mobile (wireless) communication devices.

Internet

The Internet is the world's largest computer network. The web provides a multimedia interface to resources available on the Internet.

Cloud Computing

Cloud computing uses the Internet and the web to shift many activities from users' computers to computers on the Internet.

CAREERS IN IT

Career	Description
Webmaster	Develops and maintains websites and web resources. See page 51.
Software engineer	Analyzes users' needs and creates application software. See page 82.
Computer support specialist	Provides technical support to customers and other users. See page 112.
Computer technician	Repairs and installs computer components and systems. See page 141.
Technical writer	Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 174.
Network administrator	Creates and maintains computer networks. See page 229.

KEY TERMS

application software (9)
Blu-ray disc (14)
cloud computing (16)
communication device (14)
compact disc (CD) (14)
computer competency (4)
connectivity (6, 15)
data (6)
database file (15)
desktop computer (11)
device driver (9)
digital versatile disc (DVD) (14)
digital video disc (DVD) (14)
document file (15)
end user (5)
flash memory card (14)
general-purpose application (9)
handheld computer (11)
hard disk (13)
hardware (6)
information (6)
information system (5)
information technology (IT) (8)
input device (12)
Internet (16)
keyboard (12)
laptop computer (11)
mainframe computer (11)
memory (12)
microcomputer (11)
microprocessor (12)
midrange computer (11)
mobile app (application) (9)
modem (14)
monitor (12)
mouse (12)
network (16)
notebook computer (11)
operating system (8)
optical disc (14)
output device (12)
people (5)
personal digital assistant (PDA) (12)
presentation file (15)
printer (12)
procedures (5)
program (6)
random-access memory (RAM) (12)
secondary storage (13)
server (11)
smartphone (12)
software (6)
solid-state drive (SSD) (14)
solid-state storage (14)
specialized application (9)
supercomputer (11)
system software (8)
system unit (12)
tablet (11)
tablet computer (11)
USB drive (14)
utility (8)
virus (8)
web (16)
wireless revolution (16)
worksheet file (15)

To test your knowledge of these key terms with animated flash cards, visit our website at www.computing2014.com and enter the keyword [terms1](#). You can also access flash cards using the *Computing Essentials 2014* app.

MULTIPLE CHOICE

Circle the letter of the correct answer.

1. The keyboard, mouse, monitor, and system unit are:
 - a. hardware
 - b. output devices
 - c. storage devices
 - d. software
2. Programs that coordinate computer resources, provide an interface, and run applications are known as:
 - a. application programs
 - b. operating systems
 - c. storage systems
 - d. utility programs
3. A browser is an example of a:
 - a. general-purpose application
 - b. specialized program
 - c. system application
 - d. utility program
4. Although not as powerful as a supercomputer, this type of computer is capable of great processing speeds and data storage.
 - a. mainframe
 - b. midrange
 - c. notebook
 - d. tablet
5. The smallest type of microcomputer:
 - a. handheld
 - b. notebook
 - c. midrange
 - d. tablet
6. RAM is a type of:
 - a. computer
 - b. memory
 - c. network
 - d. secondary storage
7. Unlike memory, this type of storage holds data and programs even after electric power to the computer system has been turned off.
 - a. primary
 - b. RAM
 - c. ROM
 - d. secondary
8. The type of file created by word processors to save, for example, memos, term papers, and letters.
 - a. database
 - b. document
 - c. presentation
 - d. worksheet
9. Uses the Internet and the web to shift many computer activities from a user's computer to computers on the Internet.
 - a. cloud computing
 - b. high definition
 - c. network
 - d. USB
10. The largest network in the world is [the]:
 - a. Facebook
 - b. Internet
 - c. web
 - d. USB

For an interactive multiple-choice practice test, visit our website at www.computing2014.com and enter the keyword [multiple1](#). You can also access quizzes using the *Computing Essentials 2014* app.

MATCHING

Match each numbered item with the most closely related lettered item. Write your answers in the spaces provided.

- | | |
|--------------------|---|
| a. desktop | ___ 1. Consists of the step-by-step instructions that tell the computer how to do its work. |
| b. modem | ___ 2. Another name for a program. |
| c. network | ___ 3. Enables the application software to interact with the computer hardware. |
| d. output | ___ 4. Type of computer that is small enough to fit on top of or alongside a desk yet is too big to carry around. |
| e. presentation | ___ 5. A container that houses most of the electronic components that make up a computer system. |
| f. program | ___ 6. Devices that translate the processed information from the computer into a form that humans can understand. |
| g. software | ___ 7. Unlike hard disks, this type of storage does not have any moving parts, is more reliable, and requires less power. |
| h. solid-state | ___ 8. The most widely used communication device. |
| i. system software | ___ 9. A type of a file that might contain, for example, audience handouts, speaker notes, and electronic slides. |
| j. system unit | ___ 10. A communications system connecting two or more computers. |

For an interactive matching practice test, visit our website at www.computing2014.com and enter the keyword [matching1](#). You can also access quizzes using the *Computing Essentials 2014* app.

OPEN-ENDED

On a separate sheet of paper, respond to each question or statement.

1. Explain the parts of an information system. What part do people play in this system?
2. What is system software? What kinds of programs are included in system software?
3. Define and compare general-purpose, specialized, and mobile application software. Describe some different types of general-purpose applications. Describe some types of specialized applications.
4. Describe the different types of computers. What is the most common type? What are the types of microcomputers?
5. What is connectivity? What are wireless devices and the wireless revolution? What is a computer network? What are the Internet and the web? What is cloud computing?

DISCUSSION

Respond to each of the following questions.

1 Making IT Work for You

Making it a habit of keeping current with technology applications can be a key to your success. Numerous full-page spreads identified as *Making IT Work for You* are presented in the following chapters. These sections address some of today's most interesting and useful applications. They include online entertainment in Chapter 2, Skype in Chapter 6, cloud storage in Chapter 7, and remote access in Chapter 8. Select one that you find the most interesting and then respond to the following: (a) Why did you select this application? (b) Have you used this application? If so when and how? If not, do you plan to in the near future? (c) Go to the chapter containing your selected application and locate the application's Making IT Work for You coverage. Review and briefly describe its contents. (d) Did you find the coverage useful? Why or why not?

2 Explorations

Expanding your knowledge of select technology topics beyond this textbook can be very valuable to you. Numerous Explorations boxes appear in the margins of the upcoming chapters. These boxes direct you to information sources for a variety of topics. These topics include Linux in Chapter 4, robots in Chapter 6, BitTorrent in Chapter 8, and privacy organizations in Chapter 9. Select one topic that you find the most interesting and then respond to the following: (a) Why did you select this topic? (b) Do you have knowledge or experience with the topic? If so, describe your knowledge or experience. If not, do you anticipate using knowledge of the topic in the near future? (c) Go to the chapter containing your selected topic and locate the Explorations box. Then connect to the information source and briefly describe its contents. (d) Did you find the coverage useful? Why or why not?

3 Ethics

Computer ethics are guidelines for the morally acceptable use of computers in our society. Numerous Ethics boxes appear in the margins of the upcoming chapters presenting a variety of ethical issues. These issues include job loss due to technology in Chapter 3, unauthorized use of webcams in Chapter 6, and unauthorized monitoring of Internet activity in Chapter 8. Select one issue that you find the most interesting and then respond to the following: (a) Why did you select this issue? (b) Do you have knowledge or experience with the issue? If so, describe your knowledge or experience. If not, do you consider the issue critical for individuals or organizations? (c) Go to the chapter containing your selected issue, locate the Ethics box, then read it and describe its contents. (d) Did you find the coverage thought-provoking? Why or why not?

4 Environment

Almost everyone agrees that protecting our environment today is more important than ever before. Numerous Environment boxes appear in the margins of the upcoming chapters. These boxes present a variety of environmental topics including cloud computing benefits in Chapter 2, operating systems reducing energy consumption in Chapter 4, recycling in Chapter 5, and robots and pollution in Chapter 6. Select one that you find the most interesting and then respond to the following: (a) Why did you select this topic? (b) Do you have knowledge or experience with the topic? If so, describe your knowledge or experience. If not, do you consider the topic to be important for protecting the environment? (c) Go to the chapter containing your selected topic, locate the Environment box, read it, and describe its contents. (d) Did you find the coverage thought-provoking? Why or why not?