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 five parts of an information system: people, procedures, software, hardware, and data.
2. Distinguish between system software and application software.
3. Discuss the three kinds of system software programs.
4. Distinguish between basic and specialized application software.
5. Identify the four types of computers and the six 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, smartphone, 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 billons 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 issues and special coverage of how you can make IT work 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

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, and data. 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 will describe these parts of an information system in detail.

Fifteen 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.

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, especially mobile technologies like Apple's iPad, Motorola's Zoom, and Samsung's Galaxy Tab tablet PCs. Let me begin in this chapter by giving you an overview of the book and showing you some of its special features.

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 The five parts of an information system

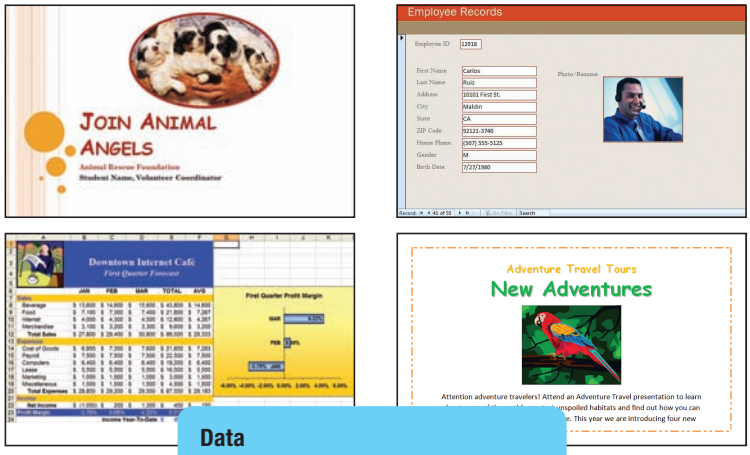
- New ways to communicate, to find people with similar interests, and to buy goods are available. People use electronic mail, electronic commerce, and the Internet to meet and to share ideas and products.

To be competent with computer technology, you need to know the five parts of an information system: people, procedures, software, hardware, and data. You also need to understand connectivity, 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 five parts: *people, procedures, software, hardware,* and *data.* (See Figure 1-1.)

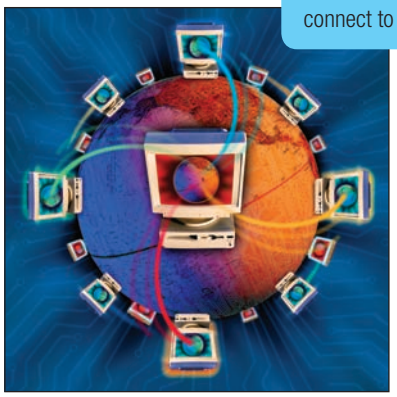
- **People:** It is easy to overlook people as one of the five parts of an information system. Yet this is what microcomputers are all about—making **people, end users** like you, more productive.
- **Procedures:** The rules or guidelines for people to follow when using software, hardware, and data are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



Data
consists of unprocessed facts including text, numbers, images, and sounds

Hardware
includes keyboard, mouse, monitor, system unit, and other devices

Connectivity
allows computers to share information and to connect to the Internet



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).

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.

In large computer systems, there are specialists who write procedures, develop software, and capture data. In microcomputer systems, however, end users often perform these operations. To be a competent end user, you must understand the essentials of **information technology (IT),** including software, hardware, and data.

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 man drops off a check for your contributions to going green. To see more environmental facts, visit our Web site at www.computing2013.com.

CONCEPT CHECK

- What are the five parts of an information system?
- What is the difference between data and information?
- What is connectivity?

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. Consider just the four examples in 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 Web site.

- **Making IT Work for You.** In the chapters that follow, you will find Making IT Work for You features that present numerous interesting and practical IT applications. Using a step-by-step procedure, you are provided

Figure 1-2 Computers in entertainment, business, medicine, and education

with specific instructions on how to use each application. For just a few of the Making IT Work for You topics, see Figure 1-3. For a complete list, visit our Web site at www.computing2013.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.
- **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.
- **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.
- **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

Application	Description
Twitter	Create and use your own microblog to communicate with friends and family. See page 44.
Digital Video Editing	Create, edit, and distribute your own movies. See page 112.
Virus Protection and Internet Security	Protect your computer from catching viruses and from being taken over and controlled by outside forces. See page 150.
E-book	Download and read electronic books using one of the most widely used e-book readers. See page 213.
Cloud Storage	Share large files easily and efficiently with others using the Internet and cloud storage. See page 242.

To see additional applications, visit our Web site at www.computing2013.com and enter the keyword **MIW**.

Figure 1-3 Making IT Work for You applications

tips

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.

1. **Online shopping.** Have you ever bought anything online? If not, it's likely that in the future you will join the millions who have. Consider a few guidelines to make your shopping easier and safer. See page 49.
2. **Creating and updating Web sites.** Are you thinking about creating your own Web site? Perhaps you already have one and would like to spruce it up a bit. Here are a few suggestions that might help. See page 118.
3. **Buying a new computer.** Are you considering a netbook or notebook? If so, then your decision will most likely be affected by many factors. Here are some to consider. See page 166.
4. **Improving hard-disk performance.** Does your internal hard-disk drive run a lot and seem slow? Are you having problems with lost or corrupted files? To clean up the disk and speed up access, consider defragging. See page 236.
5. **Protecting your privacy.** Are you concerned about your privacy while on the Web? Consider some suggestions for protecting your identity online. See page 41.

To see additional tips, visit our Web site at www.computing2013.com and enter the keyword **tips**.

Figure 1-4 Selected tips

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 Web site at www.computing2013.com.

- **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. 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 Web site.** Throughout the text you will find numerous text references to the Computing Essentials Web site at www.computing2013.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, Environment, Explorations, and Ethics features.
- Describe Tips, the Careers in IT, and the Computing Essentials Web site 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. Windows 7, Windows 8, and the Mac OS X are two of the best-known operating systems for today's microcomputer users. (See Figure 1-5 and Figure 1-6.)
- **Utilities** perform specific tasks related to managing computer resources. For example, the Windows utility called Disk Defragmenter locates and eliminates unnecessary file fragments and rearranges files and unused disk space to optimize computer operations.
- **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. These programs can be categorized as either *basic* or *specialized applications*.

Basic applications are widely used in nearly all career areas. They are the kinds of programs you have to know to be considered computer competent.

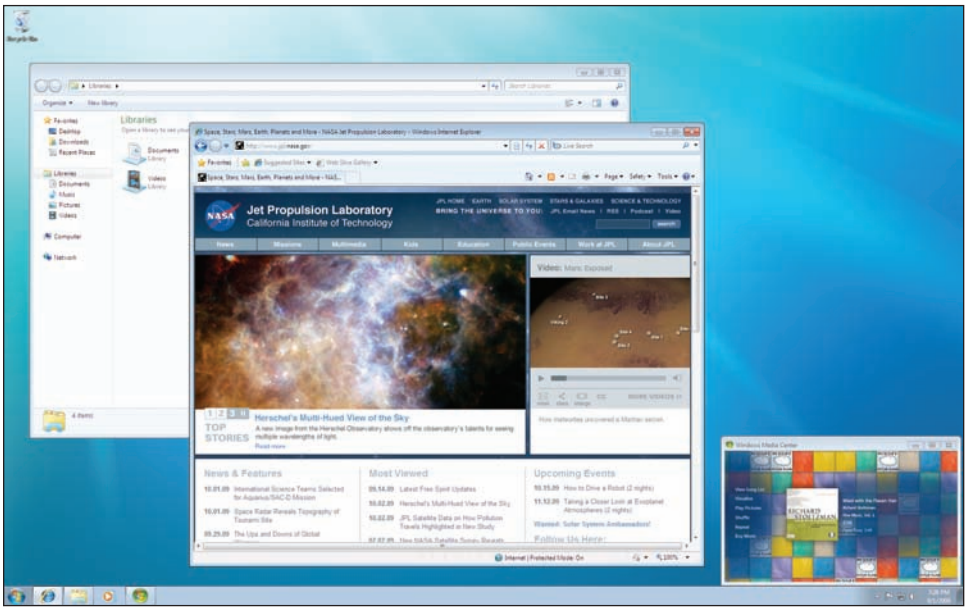


Figure 1-5 Windows 7 operating system

Figure 1-6 Mac OS X operating system

Type	Description
Browsers	Connect to Web sites and display Web pages
Word processors	Prepare written documents
Spreadsheets	Analyze and summarize numerical data
Database management systems	Organize and manage data and information
Presentation graphics	Communicate a message or persuade other people

Figure 1-7 Basic applications

One of these basic 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. For a summary of the basic applications, see Figure 1-7.

Specialized applications include thousands of other programs that are more narrowly focused on specific disciplines and occupations. Some of the best known are graphics, audio, video, multimedia, Web authoring, artificial intelligence programs, and mobile apps.

CONCEPT CHECK

- Describe the two major kinds of software.
- Describe three types of system software programs.
- Define and compare basic and specialized 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.

Types of Computers

There are four types of computers: supercomputers, mainframe computers, minicomputers, and microcomputers.

- **Supercomputers** are the most powerful type of computer. These machines are special high-capacity computers used by very large organizations. Fujitsu's K computer is one of the fastest computers in the world. (See Figure 1-8.)
- **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.
- **Minicomputers,** also known as **midrange computers,** are refrigerator-sized machines. Medium-sized companies or departments of large companies typically use them for specific purposes. For example, production departments use minicomputers to monitor certain manufacturing processes and assembly-line operations.
- **Microcomputers** are the least powerful, yet the most widely used and fastest-growing type of computer. There are six types of microcomputers: *desktop, media center, notebook, tablet PC, netbook,* and *handheld computers*. (See Figure 1-9.) **Desktop computers** are small enough to fit on top of or alongside a desk yet are too big to carry around. **Media centers** blur the line between desktop computers and dedicated entertainment devices. **Notebook computers,** also known as **laptop computers,** are portable, lightweight, and fit into most briefcases. There are two types of **tablet PCs.** The **traditional tablet PC** is effectively a notebook computer that accepts stylus input. The newer type of tablet PC is sometimes referred to as a **slate computer**. This computer's system unit is a thin slab that is almost all monitor. The best known tablet PCs are Apple's iPad, Motorola's Zoom, and Samsung's Galaxy Tab. **Netbooks** are smaller, lighter, and less expensive than notebook computers. **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 components, secondary storage,

environment

Did you know that the average American will own nearly 20 computers in his or her lifetime? This means not only will you purchase 20 computers for your use, but you will also discard at least that number. The disposal of old machines is becoming a great concern to communities across the globe, as many machines contain potentially toxic materials. What can you do to responsibly dispose of old technology? Many states now require manufacturers to recycle old machines, so contact them first. If no opportunity is available through the manufacturer, check with your local recycling center, or go online to find a reputable recycling company. To see more environmental facts, visit our Web site at www.computing2013.com.

Figure 1-8 IBM's Blue Gene supercomputer

Figure 1-9 Microcomputers

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. 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 1-10 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 1-11.) 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 electrical 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 1-12) and **printers.**

Explorations

To learn more about a leading manufacturer of microprocessors, visit our Web site at www.computing2013.com and enter the keyword microprocessor.

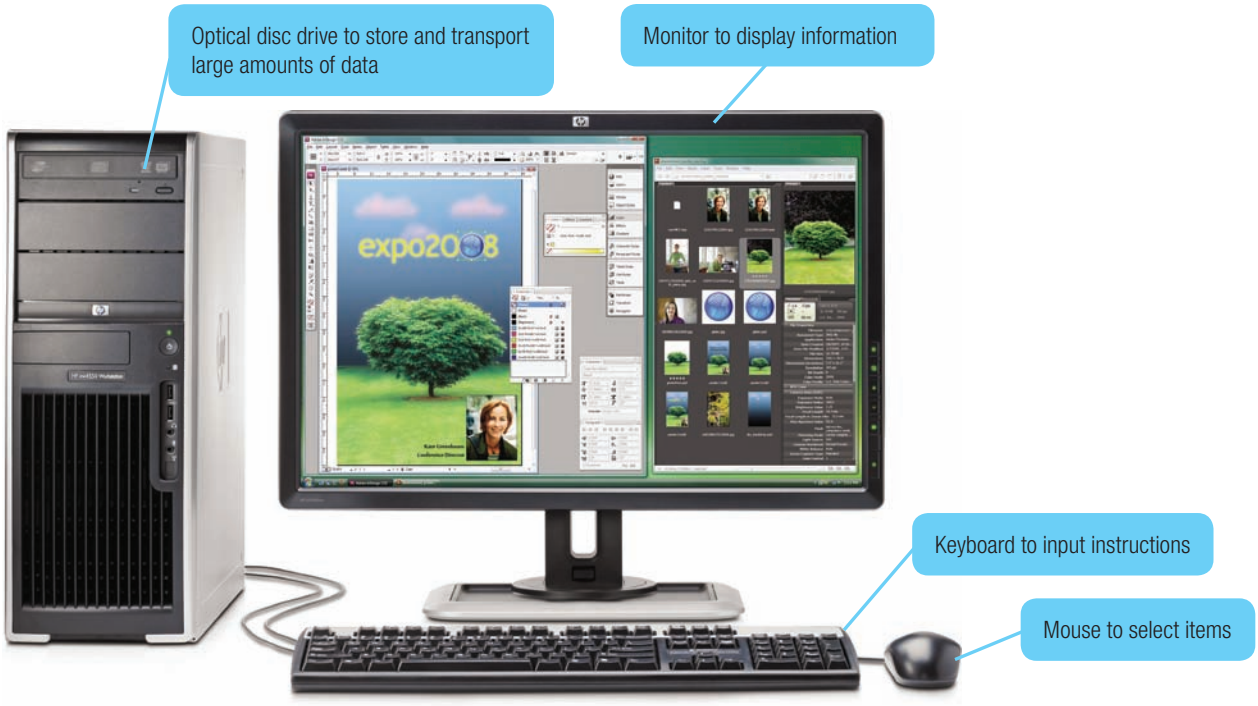


Figure 1-10 Microcomputer system

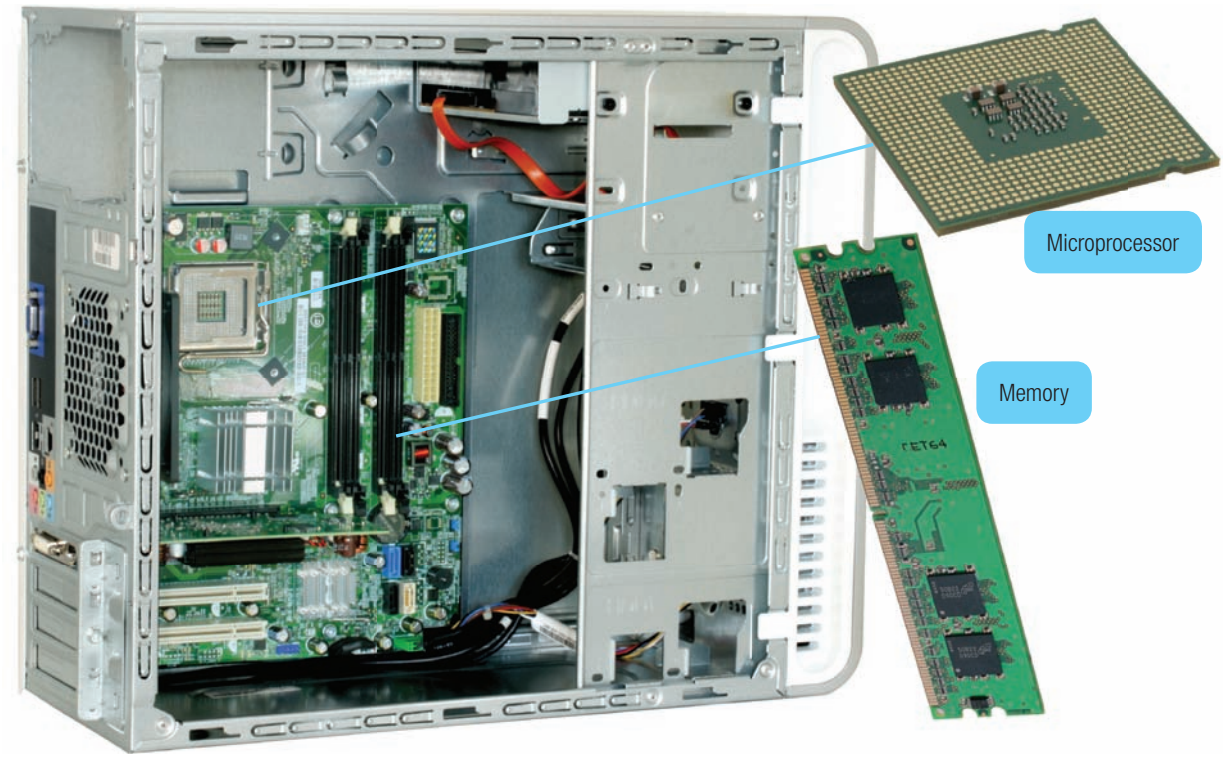


Figure 1-11 System unit

- **Secondary storage:** Unlike memory, **secondary storage** holds data and programs even after electrical 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

Figure 1-12 Monitor

Figure 1-13 Optical disc

Explorations

To learn more about one of the leaders in the development of DVD technology, visit our Web site at www.computing2013.com and enter the keyword dvd.

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 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 and have the greatest capacity. (See Figure 1-13.) Three types of optical discs are **compact discs (CDs), digital versatile** (or **video**) **discs (DVDs),** and **high-definition (hi def) 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. The most widely used communication device is a **modem,** which modifies telephone 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 telephone lines.

CONCEPT CHECK

- What are the four types of computers?
- Describe the six 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.

Four common types of files (see Figure 1-14) 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.

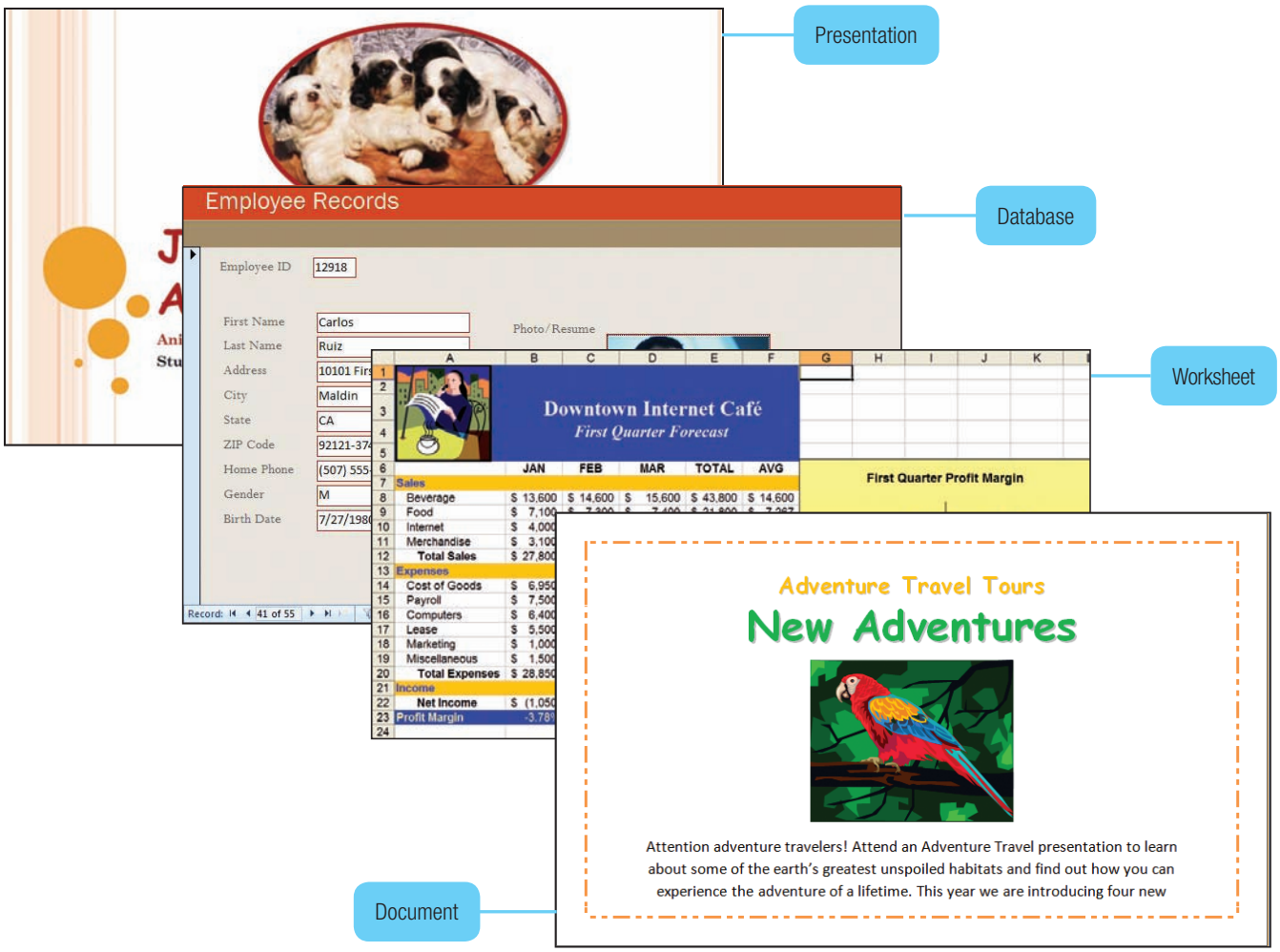


Figure 1-14 **Four types of files: presentation, database, worksheet, and document**

Connectivity, the Wireless Revolution, the Internet, and Cloud Computing

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 and cloud computing. For just a few of these mobile devices, see Figure 1-15. 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

Figure 1-15 Wireless communication devices

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 1-16. For a complete list, visit our Web site at www.computing2013.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 Web sites and Web resources. See page 57.
Computer trainer	Instructs end users on the latest software or hardware. See page 94.
Desktop publisher	Creates and formats publication-ready books, magazines, newsletters, and newspapers. See page 122.
Computer support specialist	Provides technical support to customers and other users. See page 152.
Computer technician	Repairs and installs computer components and systems. See page 184.
Technical writer	Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 219.
Software engineer	Analyzes users' needs and creates application software. See page 246.
Network administrator	Creates and maintains computer networks. See page 279.

Figure 1-16 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 the Web, communicate with others, and locate information are indispensable computer competencies. 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. Basic and specialized applications are presented in Chapters 3 and 4. System software is presented in Chapter 5.

Powerful Hardware

Microcomputers are now much more powerful than they used to be. New 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 6 through 9 explain what you need to know about hardware. A Buyer's Guide and an Upgrader's Guide are presented at the end of this book for those considering the purchase or upgrade of a microcomputer system.

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 10 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 not only will learn the basics of hardware, software, connectivity, the Internet, and the Web, but you also will learn 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 five parts of an information system:

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

Connectivity is an additional part to today's information systems. It allows computers to connect and share information. To be computer competent, end users need to understand information technology (IT).

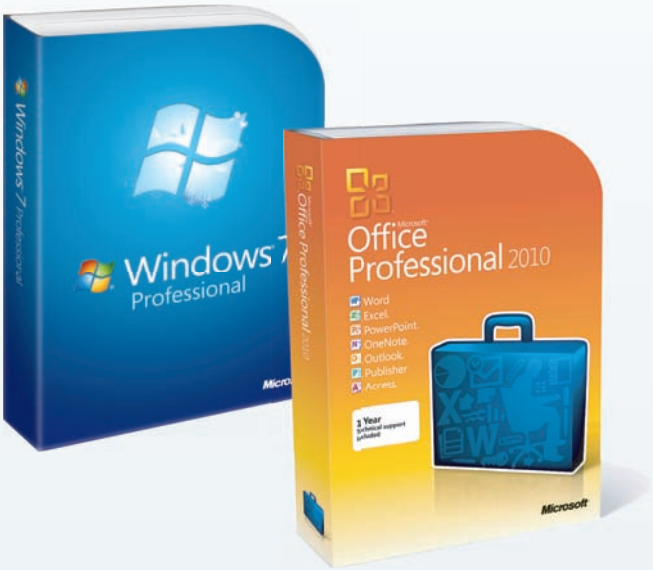
PEOPLE

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.
- **Explorations** direct you to important information and Web sites that relate to computers and technology.
- **Environment** discusses important and relevant environmental issues. The impact of computers and other technologies is more critical today than ever before.
- **Ethics** boxes pose a variety of different ethical/unethical situations for your consideration.
- **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.
- **Careers in IT** presents job descriptions, employment demands, educational requirements, salary ranges, and advancement opportunities.
- **Computing Essentials Web site** 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, and data. Also you need to understand connectivity through 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. It consists of a variety of programs:

- **Operating systems** coordinate resources, provide an interface for users and computer hardware, and run applications. Windows 7 and Mac OS X are the best-known microcomputer operating systems.
- **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 basic and specialized applications.

- **Basic applications** are widely used in nearly all career areas. Programs include browsers, word processors, spreadsheets, database management systems, and presentation graphics.
- **Specialized applications** focus on specific disciplines and occupations. These programs include graphics, audio, video, multimedia, Web authoring, and artificial intelligence programs.

HARDWARE

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

Types of Computers

Supercomputer, mainframe, minicomputer (midrange), and **microcomputer** are four types of computers. Microcomputers can be **desktop, media center, notebook (laptop computer), tablet PC (traditional** and **slate), netbook,** or **handheld (PDAs** and **smartphones** are the most widely used handheld microcomputers).

Microcomputer Hardware

There are four basic categories of hardware devices.

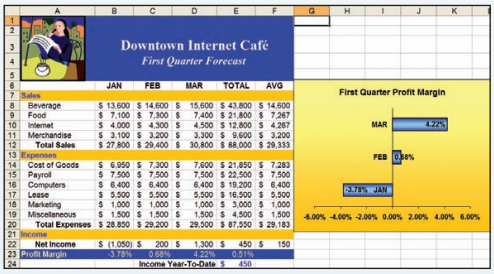
- **System unit** contains electronic circuitry, including the **microprocessor** and **memory. Random-access memory** (**RAM**) holds the program and data currently being processed.
- **Input/output devices** are translators between humans and computers. **Input devices** include the **keyboard** and **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 **hi def**).
- **Communication devices** allow microcomputers to communicate with other computer systems. **Modems** modify output for transmission.

DATA

Data are 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 AND THE INTERNET

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 Web sites and Web resources. See page 57.
Computer trainer	Instructs end users on the latest software or hardware. See page 94.
Desktop publisher	Creates and formats publication-ready books, magazines, newsletters, and newspapers. See page 122.
Computer support specialist	Provides technical support to customers and other users. See page 152.
Computer technician	Repairs and installs computer components and systems. See page 184.
Technical writer	Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 219.
Software engineer	Analyzes users' needs and creates application software. See page 246.
Network administrator	Creates and maintains computer networks. See page 279.

KEY TERMS

application software (9)
basic application (9)
cloud computing (17)
communication device (14)
compact disc (CD) (14)
computer competency (4)
connectivity (6, 16)
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)
handheld computer (11)
hard disk (13)
hardware (6)
high-definition (hi def) disc (14)
information (6)
information system (5)
information technology (IT) (6)
input device (12)
Internet (16)
keyboard (12)
laptop computer (11)
mainframe computer (11)
media center (11)
memory (12)
microcomputer (11)
microprocessor (12)
midrange computer (11)
minicomputer (11)
modem (14)
monitor (12)
mouse (12)
netbook (11)
network (16)
notebook computer (11)
operating system (9)
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)
slate computer (11)
smartphone (12)
software (6)
solid-state drive (SSD) (14)
solid-state storage (14)
specialized application (10)
supercomputer (11)
system software (9)
system unit (12)
tablet PC (11)
traditional tablet PC (11)
USB drive (14)
utility (9)
Web (17)
wireless revolution (16)
worksheet file (15)

To test your knowledge of these key terms with animated flash cards, visit our Web site at www.computing2013.com and enter the keyword **terms1**.

MULTIPLE CHOICE

Circle the letter of the correct answer.

1. The keyboard, mouse, monitor, and system unit are:
   a. hardware **c.** storage devices
   b. output devices **d.** software

2. Programs that coordinate computer resources, provide an interface, and run applications are known as:
   a. application programs **c.** storage systems
   b. operating systems **d.** utility programs

3. A browser is an example of a:
   a. basic application **c.** system application
   b. specialized program **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 **c.** midrange
   b. media center **d.** netbook

5. The smallest type of microcomputer:
   a. netbook **c.** midrange
   b. handheld **d.** tablet PC

6. RAM is a type of:
   a. computer **c.** network
   b. memory **d.** secondary storage

7. Unlike memory, this type of storage holds data and programs even after electrical power to the computer system has been turned off.
   a. primary **c.** ROM
   b. RAM **d.** secondary

8. The type of file created by word processors to save, for example, memos, term papers, and letters.
   a. database **c.** presentation
   b. document **d.** worksheet

9. The change in connectivity that uses the Internet and the Web to shift many computer activities from a user's computer to computers on the Internet.
   a. cloud computing **c.** network
   b. high definition **d.** USB

10. The largest network in the world is [the]:
    a. Facebook **c.** Web
    b. Internet **d.** USB

For an interactive multiple-choice practice test, visit our Web site at www.computing2013.com and enter the keyword multiple1.

MATCHING

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

a. desktop
b. modem
c. network
d. output
e. presentation
f. program
g. software
h. solid-state
i. system software
j. system unit

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

For an interactive matching practice test, visit our Web site at www.computing2013.com and enter the keyword matching1.

OPEN-ENDED

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

1. Explain the five 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 basic and specialized application software. Describe some different types of basic 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?

MAKING IT WORK FOR YOU

Making IT Work for You questions are designed to demonstrate ways that you can effectively use technology today.

Making a habit of keeping current with technology trends is a key to your success with information technology. In each of this book's chapters, the Making IT Work for You feature will present questions designed to help you gain a better understanding of how technology is being used today.

Some of the Making IT Work for You topics are listed below. Select the two that you find the most interesting and then describe why they are of interest to you and how you might use (or are using) those applications.

1 IPODS AND VIDEO FROM THE INTERNET

Did you know that you could use the Internet to locate movies and television shows, download them to your computer, and transfer them to a portable media player to watch on the go? All it takes is the right software and hardware and a connection to the Internet. See Making IT Work for You: iPODs and Video from the Internet on page 34.

2 GOOGLE DOCS

Do you need to collaborate with others on a document, presentation, or spreadsheet? Do you need access to a document from both home and school? Would you like to try a free alternative to traditional office software suites? If so, a cloud office suite might be for you. Online office suites such as Google Docs allow you to create and edit documents directly though a Web page with no additional software to install on your computer. See Making IT Work for You: Google Docs on pages 92 and 93.

3 DIGITAL VIDEO EDITING

Want to make your own movie? Would you like to edit some home movies and distribute them to family and friends on DVDs? It's easy with the right equipment and software. See Making IT Work for You: Digital Video Editing on pages 112 and 113.

4 VIRUS PROTECTION

Are you worried that a computer virus will erase your personal files? Did you know that others could be intercepting your private e-mail? It is even possible for others to gain access to and control over your computer system. Fortunately, Internet security suites are available to help ensure your safety while you are on the Internet. See Making IT Work for You: Virus Protection and Internet Security on pages 150 and 151.

5 HOME NETWORKING

Computer networks are not just for corporations and schools anymore. If you have more than one computer, you can use a wireless home network to share files and printers, to allow multiple users access to the Internet at the same time, and to play interactive computer games. See Making IT Work for You: Home Networking on pages 274 and 275.

EXPLORATIONS

Explorations questions are designed to add depth and detail to your understanding of specific topics presented within this chapter. The questions direct you to sources other than the textbook to obtain this knowledge.

A deeper knowledge of select topics can greatly enhance your understanding of information technology. In each of the following chapters, the Explorations feature presents questions designed to help you gain a deeper understanding of select topics.

Select the two topics that you find the most interesting and then describe why they are of interest to you and why they are important.

1 HOW COMPUTER VIRUS PROTECTION PROGRAMS WORK

Computer viruses are destructive and dangerous programs that can migrate through networks and operating systems. They often attach themselves to other programs, e-mail messages, and databases. It is essential to protect your computer systems from computer viruses. Visit our Web site at www.computing2013.com and enter the keyword virus.

2 HOW DIGITAL CAMERAS WORK

While traditional cameras capture images on film, digital cameras capture images and convert them into a digital form. These images can be viewed immediately and saved to a disk or into the camera's memory. Visit our Web site at www.computing2013.com and enter the keyword photo.

3 HOW INTERNET TELEPHONES WORK

Internet telephones offer a low-cost alternative to making long-distance calls. Using an Internet telephone (or other appropriate audio input and output devices), the Internet, a special service provider, a sound card, and special software, you can place long-distance calls to almost anywhere in the world. Visit our Web site at www.computing2013.com and enter the keyword phone.

4 HOW WIRELESS HOME NETWORKS WORK

Wireless home networks are becoming very popular. They are easy to set up and use. They allow different computers to share resources including a common Internet connection and printer. Visit our Web site at www.computing2013.com and enter the keyword network.

ETHICS

The following questions are designed to explore ethical issues related to technology and to develop the ability to think critically and communicate effectively. Respond to the questions by either creating a one-page paper or preparing for an in-depth classroom discussion.

In each of the following chapters, this Ethics feature will propose ethical questions for your consideration. In addition to exploring critical ethical issues, these questions are designed to help you develop critical thinking, analysis, and writing skills. Some of the topics are listed below. Select two that you find the most interesting and then describe why they are of interest to you.

1 DIGITAL PHOTO MANIPULATION

Image editing software has made it easy to alter photographs, which in the past were accepted as visual records of real events. In some cases, the purpose of digital editing is humor and exaggeration, while other times subtle changes are used to alter a photo's deeper meaning. Some caution that "seeing is believing" needs to be reconsidered for the digital age and argue that ethical standards need to be clearly established for photo manipulation. See page 132.

2 WEBCAMS

WebCams are almost everywhere, from dorm rooms to parking lots. They are used to communicate face-to-face with friends and family, to catch car thieves, and for any number of other applications. While acknowledging the many very positive applications of WebCams, some argue that their widespread and uncontrolled use has too many cases involving the loss of personal privacy. See page 207.

3 ELECTRONIC MONITORING

Surveillance of individuals occurs more frequently today than ever before. For example, the FBI has proposed the widespread use of a technology known as Carnivore to help them track terrorists. This technology supports widespread monitoring of individual Internet activity and e-mail. Privacy advocates claim that this would be an unnecessary and unneeded invasion of personal privacy. Others believe electronic surveillance is essential to protect national security. See page 289.

ENVIRONMENT

We can all agree that protecting our environment today is more important than ever before. In addition to the Environment boxes located throughout this book, each chapter ends with this Environment feature. This feature will propose environmental questions for your consideration.

In addition to exploring environmental issues, these questions are designed to help you develop critical thinking, analysis, and writing skills. Some of the topics are listed below. Select two that you find the most interesting and then describe why they are of interest to you.

1 SPAM

Spam is any unwelcome and unsolicited e-mail. You may be aware that spam e-mail is often the source of many computer viruses. But did you know that spam also hurts the environment by consuming as much energy as a million cars each year? See page 69.

2 DOWNLOADING MUSIC

Movies, music, instruction manuals, and software programs are typically sold or distributed on CDs and DVDs. In most cases, however, you could use the Internet to receive this content. A recent study by Microsoft concluded that directly downloading music would reduce CO_2 emissions by 80 percent. See page 105.

3 ENVIRONMENTAL UTILITY SOFTWARE

Utility software are programs that typically focus on making computers run safer and easier. Now, many are also looking for ways to make computing more environmentally friendly. These programs automatically monitor computer use and collect data on energy consumption. The programs then analyze the data to determine ways to minimize your computer's energy requirements. See page 105.

4 ROBOTS

Robots are computer-controlled machines that mimic the motor activities of living things. They have been traditionally used to perform a wide range of activities ranging from industrial applications to performing routine household tasks. Now, they are being used to roam the ocean bottom looking for and collecting garbage, oil, and other pollutants. See page 133.

NOTES