

Managing Technology and Information

Chapter 15 Using Technology to Manage Information

Chapter 16 Understanding Accounting and Financial Statements

Part 5

PHOTODISC/GETTY IMAGES



Chapter 15

Learning Goals

- 1** Distinguish between data and information and explain the role of management information systems in business.
- 2** Identify and briefly describe the different types of information system programs.
- 3** Describe the hardware and software used in managing information.
- 4** Identify how different types of software can help businesspeople.
- 5** Explain the importance of special network technologies.
- 6** List the ways that companies can protect themselves from computer crimes.
- 7** Explain the steps that companies go through in anticipating, planning for, and recovering from information system disasters.

Using Technology to Manage Information

Less than a decade ago, Larry Page and Sergey Brin came up with a brilliant—and ambitious—idea. What if they could organize all the information in the world *and* make it accessible to anyone with a computer? And what if they could somehow turn this idea into a business? With these lofty goals, Google was born.

“Googol” is the mathematical term for a 1 followed by 100 zeros. The term was created by Milton Sirota, nephew of American mathematician Edward Kasner. Google’s use of the term reflects the company’s mission to organize the vast amount of information available on the Internet. Founders Page and Brin have been true to their company’s name: Google’s Internet search engine is so powerful that it has “essentially tamed the Web,” writes one industry watcher. And the name is already so pervasive in everyday life and lan-



Google pulls in revenues from the text ads that appear next to search results. When a user clicks the ad, the advertiser is charged a fee. These revenues allow the firm to hire engineers and designers to develop new search products. “The number of new [Google] products is related

Google: How to Succeed without Really Selling



guage that it has become a verb. People routinely say, “I’ll Google that.” Why has Google become this successful this quickly?

First, Google’s search products are easy to access and use. Second, they are free. Both consumers and businesses like Google’s convenience. Its index now consists of more than 8 billion Web pages. Whether you are looking for information on an obscure artist or a list of Web sites that sell gourmet coffee, you’ll find what you need through Google. Specialized Google search products include inboxes (Gmail) and photos (Picasa). If you’ve forgotten what you searched for in the past, you can click My Search History. Google will hold the data for you until you decide to delete it—an important feature in many people’s security-conscious minds. With Google Earth, you can pinpoint just about any location on the planet, including your own home. In fact, the launch of this most recent product has some government officials worried that it could actually provide satellite photos of potential terrorist targets. The governments of India, South Korea, Thailand, and the Netherlands have already expressed concern about Google Earth’s capabilities. But Google insists that its software uses only information that is already available to the public.

to the number of engineers—it’s a linear function,” explains Marissa Mayer, director of the firm’s consumer Web products. With more than 4,000 employees, Google is poised to grow much larger. In fact, some industry watchers warn that it is already nipping at the heels of Microsoft, which employs 61,000 workers and holds \$38 billion in cash. “When we see a remarkable new company that redefines the technology industry, we either fear it because of all the things it might do or we expect more from it than it can possibly deliver,” notes business author John Battelle.

What’s next for Google? Engineers are currently working on ways to remove language barriers from the Internet. Currently, Google can automatically translate Web pages from English into German, Spanish, French, Italian, Japanese, Chinese, and several other languages. But Google engineers are developing the technology for all search results to return automatically in a user’s native language, regardless of what it is. “The goal is to make the Internet language-independent,” explains Alan Eustace, head of Google’s research. “In the long term, if you can create technology that can unify information around the world and remove the language barrier, that would be very special.”

An Internet free of all language barriers would be very special indeed. Google does not shy away from such challenges. "Google wants to be everywhere that people are," says Danny Sullivan, editor of the newsletter *Search Engine Watch*. It's a simple goal, with far-reaching

implications. "The biggest question is whether they can accomplish everything they want before someone else comes along with even better ideas," remarks Battelle. But Google engineers won't stop trying until everyone can say, "I'll Google that."¹

Chapter Overview

This chapter explores how businesses manage information as a resource, particularly how they use technology to do so. The chapter begins by differentiating information and data, and describing management information systems. It then looks at ways companies use information systems to organize and use information, including databases and information system programs. Because computers drive information systems, the chapter also

discusses computer types and their applications in business settings. Today, specialized networks make information access and transmission function smoothly, so the chapter examines new types of networks to see how businesses are applying them for competitive advantage. Finally, the chapter explores the importance of protecting valuable information and recovering from information system disasters.

data raw facts and figures that may or may not be relevant to a business decision.

information knowledge gained from processing data.

management information system (MIS) organized method for providing past, present, and projected information on internal operations as well as external intelligence to support decision making.

MANAGEMENT INFORMATION SYSTEMS

Every day, businesspeople ask themselves questions such as the following:

- How well is our brand selling in Seattle compared with Charlotte? How has the bird flu epidemic affected sales of poultry products in Asia? In Europe?
- If we raise the price of our products by 2 percent, how will the change affect sales in each city? In each country?
- What impact have higher energy prices had on the cost of raw materials?
- If employees can access the benefits system through our network, will it increase or decrease benefits costs?

An effective information system can help answer these and many other questions. **Data** consist of raw facts and figures that may or may not be relevant to a business decision. **Information** is knowledge gained from processing those facts and figures. So although businesspeople need to gather data about the demographics of a target market or the specifications of a certain product, the data are useless unless they are transformed into relevant information that can be used to make a competitive decision. Technology has advanced so quickly that all businesses, regardless of size or location, now have access to data and information that can make them competitive in a global arena.

A **management information system (MIS)** is an organized method for providing past, present, and projected information on internal operations as well as external intelligence to support decision making. A large organization typically assigns responsibility for directing its MIS and related computer operations to an executive called the **chief information officer (CIO)**. Often the CIO reports directly to the firm's chief executive officer (CEO). But small companies rely just as much on an MIS as do large ones, even if they do not employ a manager assigned to this area on a full-time basis. An effective CIO can understand and harness technology so that the company can communicate internally and externally in one seamless operation.

"They Said It"

"You can give people responsibility and authority, but without information they are helpless."

—Bill Gates (b. 1955)
Co-founder, Microsoft Corporation

The role of the CIO is both expanding and changing as the technology to manage information continues to develop. According to one recent survey, around half of all CIOs stated that their job responsibilities have broadened significantly in recent years.² CIOs are also well compensated. The Gartner Group, an information technology consulting company, found that annual compensation for CIOs today exceeds \$300,000 on average, with many CIOs at larger firms earning more than \$1 million per year.³

The importance of managing information can also be seen in the growth in demand for college graduates with degrees in information systems. According to the Bureau of Labor Statistics, the number of people employed in information systems and related fields will grow by around 55 percent between now and 2012.⁴ Starting salaries for those with undergraduate degrees in information systems average more than \$43,000 per year.⁵

Information systems can be tailored to assist many business functions and departments—providing reports for everything from marketing and manufacturing, to finance and accounting. They can manage the overwhelming flood of information by organizing data in a logical and accessible manner. Through the system, a company can monitor all components of its business strategy, identifying problems and opportunities. Information systems gather data from inside and outside the organization; they then process the data to produce information that is relevant to all aspects of the organization. Processing steps could involve storing data for later use, classifying and analyzing it, and retrieving it easily when needed. Computerized location systems are a booming technology that has many applications.

Many companies—and nations—combine high-tech and low-tech solutions to manage the flow of information. E-mail, wireless communications, and videoconferencing haven't totally replaced paper memos, phone conversations, and face-to-face meetings, but they are increasingly common. Information can make the difference between staying in business and going bankrupt. Keeping on top of changing consumer demands, competitors' actions, and the latest government regulations will help a firm fine-tune existing products, develop new winners, and maintain effective marketing.

Databases

The heart of a management information system is its **database**, a centralized integrated collection of data resources. A company designs its databases to meet particular information processing and retrieval requirements that its decision makers encounter. Businesses create databases in many ways. They can hire a staff person to build them on site, hire an outside source to do so, or buy readily available database programs. A database serves as an electronic filing cabinet, capable of storing massive amounts of data and retrieving it within seconds. A database should be continually updated; otherwise, a firm may find itself with data that are outdated and possibly useless. One problem with databases is that they can contribute to information overload—too much data for people to absorb or data that are not relevant to decision making. Because computer processing speed and storage capacity are both increasing rapidly, and as data have become more abundant, businesspeople need to be careful that their databases contain only the facts they need, so they do not waste time wading through unnecessary data.

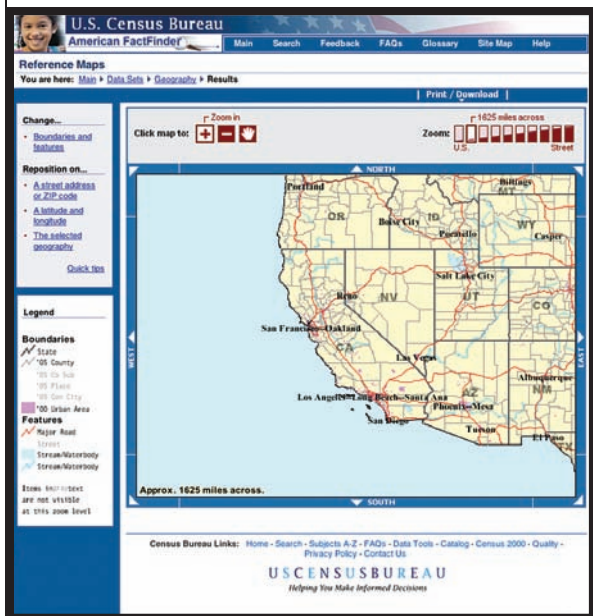
Decision makers can also look up online data. Online systems give access to enormous amounts of government data, such as economic data from the Bureau of Labor Statistics and the Department of Commerce. One of the largest online databases is that of the U.S. Census Bureau. The census of population, conducted every ten years, attempts to collect data on more than 120 million households across the United States. Selected participants fill out forms containing questions about marital status, place of birth, ethnic background, citizenship, workplaces, commuting time, income, occupation, type of housing, number of telephones and vehicles, even grandparents as caregivers. Households receiving the most recent questionnaire could

“They Said It”

“Information is not knowledge.”

—Albert Einstein
(1879–1955)
Physicist

database centralized integrated collection of data resources.



The U.S. Census Bureau's Web site is a large, searchable online database with all sorts of information. The "Reference Maps" link in the American Factfinder topic area contains information on states, such as major roads, bodies of water, and other details. Visitors can zoom in and out for different sets of data.

respond in English as well as a variety of other languages including Spanish, Chinese, Vietnamese, and Korean. Not surprisingly, sifting through all the collected data takes time. Although certain restrictions limit how businesspeople can access and use specific census data, the general public may access the data via the American FactFinder on the Census Bureau's Web site (<http://www.census.gov>), as well as at state data centers and public libraries.

Another source of free information is company Web sites. Interested parties can visit firms' home pages to look for information about customers, suppliers, and competitors. Trade associations and academic institutions also maintain Web sites with information on topics of interest.

Companies also subscribe to commercial online services that provide fee-for-service databases on particular topics. In addition to broad-based online databases available through such services as LexisNexis and Infotrac, firms can also access specialized databases geared to particular industries and functions. Many professional groups and trade associations have set up electronic bulletin board systems on the Internet where data and information are available. For instance, *Bicycle Retailer* maintains a bulletin board on its Web site where bike shop owners and employees can exchange ideas and information. It also provides data to members on bike sales and other industry trends. Businesspeople who gather data online should always try to verify the reliability of their sources, however.

Business Intelligence

Once a company has built a database, its managers need to be able to analyze the data in it. As discussed in Chapter 12, *data mining*, or *business intelligence*, is the task of using computer-based technology to retrieve and evaluate data in a database to identify useful trends. It focuses on identifying relationships that are not obvious to businesspeople—in a sense, answering questions that they may not even have thought to ask. Data mining is an efficient way to sort through huge databases and to make sense of that data. Among other things, data mining can help create customer profiles, pinpoint reasons for customer loyalty, analyze the impact of pricing changes, and forecast sales.

Specialized data mining and business intelligence software is available from a variety of companies such as Oracle and SAP. IBM offers a software product called DB2 Intelligent Miner for Data. Customers use the program to gain new business insights and to harvest valuable business intelligence from all of a company's data, such as high-volume transaction data generated by point-of-sale, ATM, and credit card transactions or call center and e-commerce activities. With Intelligent Miner for Data, executives are better equipped to make insightful decisions, whether the problem is how to develop more precisely targeted marketing campaigns, reduce customer attrition, or increase revenue generated by online shopping.⁶

Some consulting firms, such as Boston-based Data Miners, specialize in data mining for their clients. Recently, Data Miners was asked to

SAS Institute offers business intelligence software to companies to help them analyze their data.

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investigate transaction-level data from loyalty cardholders of a New England health food supermarket. Data Miners found that 50 percent of the supermarket's customers were meat eaters, and this group was among the store's most valuable customers. Had the supermarket eliminated meat, assuming that its customers were vegetarians, it would have lost a very profitable business segment. The data clearly showed that meat-eating customers were interested in, and willing to pay for, health food.⁷ As this example illustrates, successful data mining can help a business discover patterns in the sale of certain goods and services, find new customers, track customer complaints and requests, and evaluate the cost of materials.

assessment check

1. What is the difference between data and information?
2. Define management information system.
3. What is the purpose of business intelligence?

INFORMATION SYSTEMS FOR DECISION MAKING

So much data clogs the Internet, databases, and other data sources that the challenge for businesses has shifted from acquiring data to sorting through it to find the most useful elements, which can then be turned into valuable information. New types of information system software are being developed all the time. These range from tools that help users look up data on various topics to specialized systems that track costs, sales, inventory levels, and other data. Businesses can develop and implement their own systems or hire someone else to do so. Many also hire an outside service to manage data for them.

Decision Support System

A **decision support system (DSS)** is an information system that quickly provides relevant data to help businesspeople make decisions and choose courses of action. It includes software tools that help decision makers generate the type of information they need. These DSS tools may vary from company to company, but they typically include retrieval features that help users obtain needed information from a database, simulation elements that let decision makers create computer models to evaluate future company performance under different conditions, and presentation tools that create graphs and charts.

An information interface is a software program between the user and the underlying information system. Advances in information interfaces have simplified and synthesized data into useful information for a variety of users. For instance, visitors to the *Cooking Light* Web site (<http://www.cookinglight.com>) can access recipes through an easy-to-use interface. Visitors can search the magazine's vast database by main ingredient, cooking technique, ethnicity, and even special dietary requirements. Comments from users are also available. With a few mouse clicks visitors can create an entire menu, accompanied by a shopping list. Such sophisticated interfaces make information retrieval more efficient.

Executive Support Systems Although the trend is increasingly toward employee empowerment and decision making at all levels of an organization, sometimes companies need to create specialized information systems to address the needs of executives. An **executive support system (ESS)** lets top managers access the firm's primary databases, often by touching the computer screen, pointing with a mouse, or even speaking via voice recognition. The typical ESS allows users to choose from many kinds of data, such as the firm's financial statements and sales figures as well as stock market trends for the company and for the industry as a whole. If they wish, managers can start by looking at summaries and then proceed toward more detailed information.

decision support system (DSS) information system that quickly provides relevant data to help businesspeople make decisions and choose courses of action.

executive support system (ESS) system that allows top managers to access a firm's primary databases.

“They Said It”

“One of the best things to come out of the home computer revolution could be the general and widespread understanding of how severely limited logic really is.”

—Frank Herbert
(1920–1986)
Science fiction writer

Expert Systems An **expert system** is a computer program that imitates human thinking through complicated sets of “if-then” rules. The system applies human knowledge in a specific subject area to solve the problem. Expert systems are used for a variety of business purposes: determining credit limits for credit card applicants, monitoring machinery in a plant to predict potential problems or breakdowns, making mortgage loans, and determining optimal plant layouts. They are typically developed by capturing the knowledge of recognized experts in a field whether within a business itself or outside it.

Trends in Information Systems

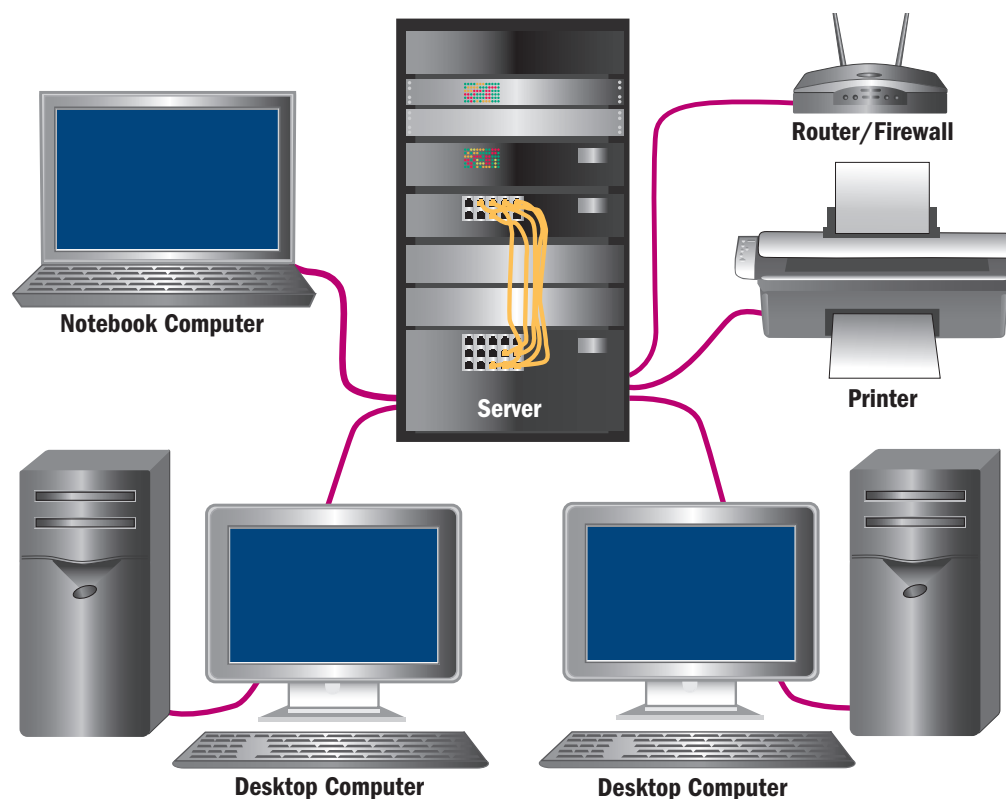
New information systems are being developed all the time. Today’s computer systems help businesspeople obtain and share information in real time, across departments, across the country, and around the world through networks.

Local Area Networks and Wide Area Networks Most organizations connect their offices and buildings by creating **local area networks (LANs)**, computer networks that connect machines within limited areas, such as a building or several buildings near one another. LANs are useful because they link personal computers and allow them to share printers, documents, and information, as well as provide access to the Internet. Figure 15.1 shows what a small business computer network might look like.

Wide area networks (WANs) tie larger geographical regions together by using telephone lines and microwave and satellite transmission. One familiar WAN is long-distance telephone service. Companies such as AT&T and Verizon provide WAN services to businesses and con-

Figure

15.1 A Local Area Network



sumers. Firms also use WANs to conduct their own operations. Typically, companies link their own network systems to outside communications equipment and services for transmission across long distances. Later in the chapter, we discuss other specialized networking systems.

Wireless Local Networks A wireless network allows computers, printers, and other devices to be connected without the hassle of stringing cables in traditional office settings. The current standard for wireless networks is called **Wi-Fi**. Wi-Fi—short for *wireless fidelity*—is a wireless network that connects various devices and allows them to communicate with one another through radio waves. Any PC with a Wi-Fi receptor can connect with the Internet at so-called *hot spots*—locations with a wireless router and a high-speed Internet modem. By one estimate, the number of registered hot spots worldwide now exceeds 70,000.⁸ They are found in a variety of places including airports, libraries, and coffee shops. For instance, virtually all Starbucks locations throughout the United States, and in many other countries, are Wi-Fi hot spots. Some hot spots provide free Internet access; others charge fees. AT&T, for example, offers the Freedom Network, a collection of hot spots throughout the nation. Access requires either an annual subscription or the payment of a onetime access fee.

Many believe that the successor to Wi-Fi will be **Wi-Max**, a new wireless standard. Wi-Max recently got a huge boost when Intel announced that it would begin producing computer chips incorporating this new wireless standard.⁹ Unlike Wi-Fi's relatively limited geographic coverage area—generally around 300 feet—a single Wi-Max access point can provide coverage over many miles. Hundreds of cities, including San Francisco and Philadelphia, have announced plans to build Wi-Max networks that will, in essence, turn these cities into giant hot spots. Wi-Max also has the potential to bring high-speed Internet access to rural areas where traditional forms of broadband access are too expensive or impractical. For instance, Morrow County, Oregon, has only 11,000 people but covers more than 2,000 square miles. Wi-Max is the only practical and cost-effective way to provide broadband access to this sparsely populated region. So Morrow County became one of the first rural areas in the country to be blanketed by a Wi-Max network. Now onion farmer Bob Hale can open his laptop to check his e-mail, find out the current price of onions, send digital photographs of his crop to restaurant buyers throughout the country, or adjust his irrigation sprinklers. And Hale can accomplish these tasks sitting in the cab of his truck in the middle of his vast onion fields.¹⁰

Application Service Providers and On-Demand Computing

Because of the increasing cost and complexity of obtaining and maintaining information systems, many firms hire an **application service provider (ASP)**, an outside supplier that provides both the computers and the application support for managing an information system. An ASP can simplify complex software for its customers so that it is easier for them to manage and use. When an ASP relationship is successful, the buyer can then devote more time and resources to its core businesses instead of struggling to manage its information systems. Other benefits include stretching the firm's technology dollar farther and giving smaller companies the kind of information power that in the past has been available only to much larger organizations. Even large companies turn to ASPs to manage some or all of their information systems. Recently, the Walt Disney Company decided to outsource much of its IT functions to IBM and Affiliated Computer Services to save money. Around 1,000 Disney employees moved into new jobs with the two vendors.¹¹

Another recent trend is **on-demand computing**, also called **utility computing**. Instead of purchasing and maintaining expensive software, firms essentially rent the software time from application providers and pay only for their usage of the software, similar to purchasing

Wi-Fi wireless network that connects various devices and allows them to communicate with one another through radio waves; short for *wireless fidelity*.

application service provider (ASP) specialist in providing both the computers and the application support for managing information systems for clients.



HIT & MISS

How Does Dell Do It?

When is a computer company not a computer company? When it changes its name—as Dell did several years ago, shifting from Dell Computer Corp. to Dell Inc.—and when it creates a new name for an existing category of products. Dell is still the largest PC vendor in the United States, and its total PC sales make up the majority of its revenues. But in a business environment in which PC sales are generally flat or declining, Dell has fashioned a new term for the category of products it sells the most: *mobility*.

Dell's mobility products include laptops, wireless devices, handheld computers, and digital music players. These items account for about 20 percent of Dell's sales, mostly from laptops. While some skeptics wonder about the firm's distinction between desktop computers and laptops as two different types of products, Michael Dell believes the distinction is important to his company's new direction. Dell believes that wireless technology has created a new type of demand for laptops, making them completely different from the way desktops are used. Then there's the obvious distinction: laptops are portable, while desktops are not.

Dell is still very much in the PC business. The packages it sells, which include software, printers, monitors, storage devices, and services, all surround the PC itself. But these additional products truly help bolster the firm during a time when the industry itself is sluggish. For instance, Dell entered the services marketplace focusing on what it does best—offering flexibility and a low price. "Dell has been flexible in defining the level of service. There are different levels of service even in one

data center," says one business customer. In addition, Dell offers a nearly unbeatable financing service, following its original direct-sales business model. Loans or leases made by Dell Financial Services to Dell customers have increased more than 35 percent annually in recent years.

Meanwhile, Dell has also made inroads overseas, particularly in Asia—Japan, South Korea, India, China, and Vietnam—where it is focusing on its business customers. Dell faces two formidable competitors in Asia: Hewlett-Packard and Lenovo Group. But it's not backing down. "Everyone wants to be number one," says one analyst who follows the companies.

Questions for Critical Thinking

1. Do you agree with Dell's distinction between laptops and desktops? Why or why not?
2. Describe ways in which Dell might market its "mobility" category of products.

Sources: Stan Gibson, "Dell Makes Services Inroads," *eWeek*, accessed July 21, 2006, <http://www.eweek.com>; "Sales Hiccup as Dell Gobbles Market Share," *Datamonitor*, accessed July 21, 2006, <http://www.datamonitor.com>; Satish Shankar and Ravi Vijayaraghavan, "It Can Pay to Be a Copycat," *Financial Times*, accessed July 21, 2006, <http://www.financialtimes.com>; Gretchen Morgenson, "Dude, You're Getting a Loan," *New York Times*, accessed July 21, 2006, <http://www.nytimes.com>; Sumner Lemon, "Dell Wants More Satisfaction in Asia," *IT World.com*, accessed September 23, 2005, <http://www.itworld.com>; Crayton Harrison, "Dell Sees Much of its Future Grow in Mobility Products," *Dallas Morning News*, accessed April 8, 2005, <http://www.dallasnews.com>.

electricity from a utility. On-demand computing is particularly useful for firms that experience annual peaks in demand or seasonal spikes in customer usage of their applications. By renting the service they need only when they need it, they can avoid buying equipment and software that is not routinely required. On-demand computing can also help companies remain current with the most efficient software on the market without purchasing huge upgrades.

Companies that decide to use ASPs should check the backgrounds and references of these firms before hiring them to manage critical systems. In addition, customers should try to ensure that the service provider has taken appropriate measures to block computer hackers or other unauthorized access to the data, that its data centers are up and running consistently, and that adequate backups are maintained.

Although information systems can help a company run smoothly and efficiently, the firm must carefully plan and organize them. Otherwise, it can lose control of a critical function—and tremendous amounts of time and money. Issues of privacy and security also arise. Should

everyone in the company be able to access all of the company's data? What about confidential human resources files or the corporation's payroll system? These issues are explored later in the chapter.

COMPUTER HARDWARE AND SOFTWARE

Just a few decades ago, computers were considered exotic curiosities, used only for very specialized applications and understood by only a few people. Up until the 1980s, the idea of a computer on every desk, or in every home, seemed far-fetched. Today they have become indispensable not only to businesses but also to households. Who can imagine daily life without sending e-mails to friends and co-workers, booking airline tickets over the Internet, preparing reports with a word-processing program, or balancing a checkbook using a personal money management program? Computers have become not only much more powerful and faster over the past 25 years but less expensive as well. IBM's first personal computer, introduced in the early 1980s, cost close to \$5,000 (fully configured) and yet its computing power was only a small fraction of that of today's PCs. Today's PCs also cost thousands less than IBM's original PC. According to one recent survey, the average desktop sells for less than \$800 today.¹²

As the price of computers continues to drop, so have profit margins for computer manufacturers. IBM, which along with Apple pretty much invented the personal computer, recently sold its PC business to concentrate on servers, larger computers, software, and technology services. Many of the remaining manufacturers such as Gateway and HP struggle to make money. The one exception is Dell, the world's largest PC maker. Its success is profiled in the "Hit & Miss" feature.

Types of Computer Hardware

Hardware consists of all tangible elements of a computer system—the input devices, the components that store and process data and perform required calculations, and the output devices that present the results to information users. Input devices allow users to enter data and commands for processing, storage, and output. Common input devices include the keyboard, mouse, scanner, modem, microphone, and touch screen. Storage and processing components consist of the hard drive as well as various other storage components, including CD and DVD drives and flash memory devices. Most computers today have CD and DVD drives that allow users to create (or burn) CDs and DVDs as well as read them. Flash memory devices are becoming increasingly popular because they are small, hold large amounts of data—as much as two gigabytes or more—and fit in a pocket. They can be plugged into an unused USB (universal serial bus) port found on virtually all of today's computers.

Output devices are the hardware elements that transmit or display documents and other results of a computer system's work. Examples include the monitor, printer, fax machine, modem, and audio system. Notice that some devices, such as the monitor and modem, can perform both input and output functions. While CRT monitors are still in use, most new desktop computers today come with so-called *flat-panel LCD monitors*. (Notebook computers use LCD displays.) LCD monitors take up much less desk space, and use less electricity, than CRT monitors.

assessment check

1. What is a decision support system?
2. Why do some organizations use application service providers?



LCD monitors are now standard with many of today's PCs.

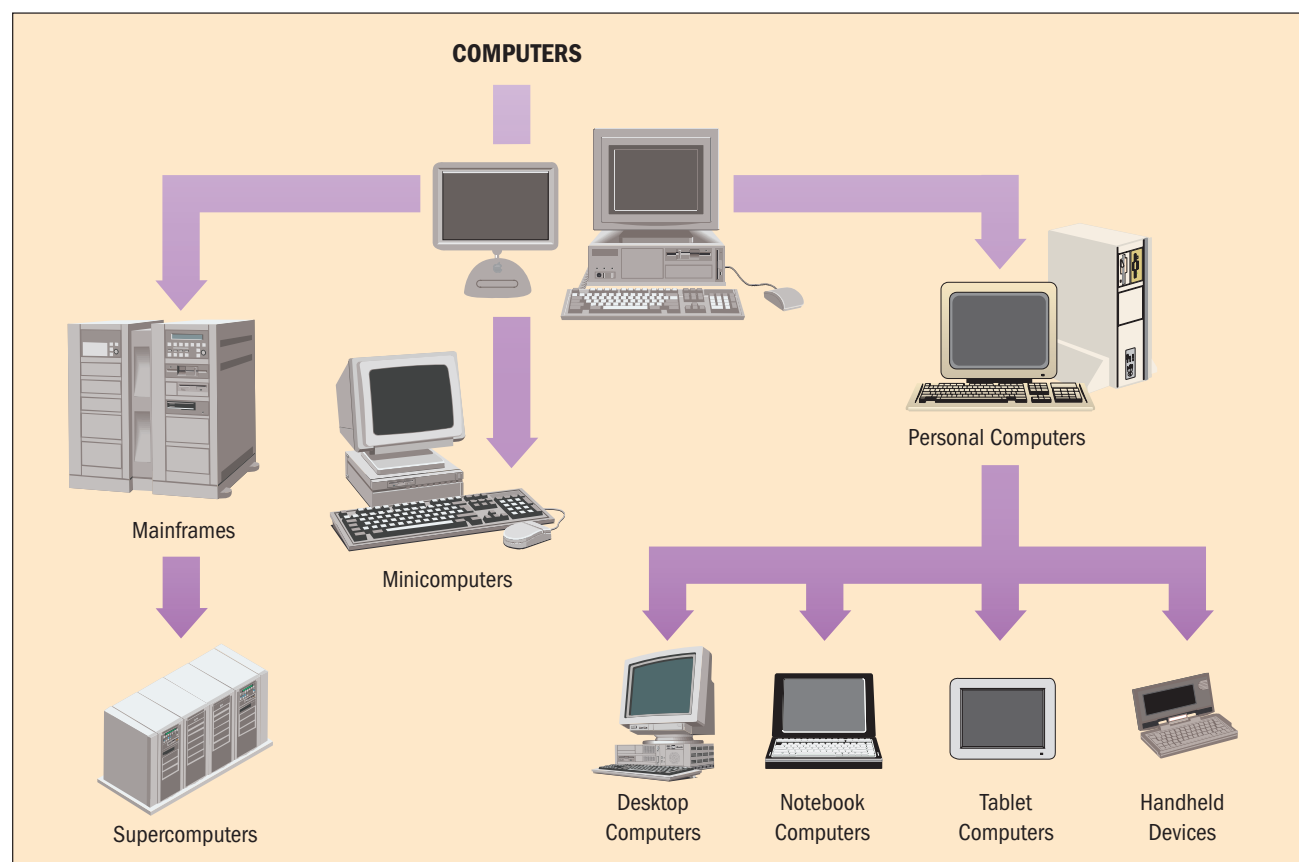
Different types of computers incorporate widely varying memory capacities and processing speeds. As shown in Figure 15.2, these differences define three broad classifications: mainframes, minicomputers, and personal computers. A **mainframe** computer is the largest type of computer system with the most extensive storage capacity and the fastest processing speeds. Especially powerful mainframes called *supercomputers* can handle extremely rapid, complex calculations involving thousands of variables. A **minicomputer** is an intermediate-size computer—more compact and less expensive than a mainframe but also somewhat slower and with less memory. These intermediate computers often toil in universities, factories, and research labs. Minicomputers also appeal to many small businesses that need more power than personal computers can offer to handle specialized tasks. IBM, Sun Microsystems, and Silicon Graphics are major manufacturers of minicomputers.

Personal computers (PCs) are everywhere today—in homes, schools, businesses, nonprofit organizations, and government agencies. For example, an estimated two-thirds of American households have at least one personal computer. They have earned increasing popularity because their ever-expanding capability to handle many of the functions that cumbersome mainframes performed only a few decades ago. These advances were made possible by the development of powerful chips—thin silicon wafers that carry integrated circuits (networks of transistors and electronic circuits). A microprocessor is a fingernail-size chip that contains the PC's entire central processing unit. Intelligent functions of today's new cars, toys, watches, and other household items also rely on microprocessors. Additional chips provide instruction and memory to convert a microprocessor into a PC.

As technology continues to advance, computers have diminished in size. Desktop computers are still the standard PC seen in offices and homes. However, notebook computers are

Figure

15.2 Types of Computers



gaining an increasing share of the PC market each year. While sales of desktop computers have remained relatively flat in recent years, sales of notebook computers are growing at double-digit rates. Recently, for instance, sales of notebook computers exceeded sales of desktop computers for the first time.¹³ The increasing popularity of notebook computers is due to many factors, including the increased computing power of notebooks, better displays, expansion in wireless access, and, perhaps most important, a shrinking of the price gap between notebooks and desktops, although notebooks still cost more on average.

A more recent innovation in personal computers is the tablet PC, which looks like a notebook computer but with a difference. The screen is detachable. Users can write on the screen using a special-purpose pen. The handwriting is then digitized and can be converted into a format that can be read by word-processing programs. The pen can also be used to edit existing documents. When tablet PCs were first introduced in 2002, some thought that they would quickly be embraced by a wide variety of users. So far, however, that hasn't happened. Tablet PCs make up less than 5 percent of the notebook computers sold worldwide, although they have taken hold in some markets such as education and healthcare. Experts cite higher prices and the mediocre performance of many handwriting recognition software applications as reasons for slow start to tablet PC sales. However, tablet PC prices are falling, along with notebook prices, and handwriting recognition is improving. So many of these same experts are more optimistic about the future of tablet PCs.¹⁴

Handheld devices—made by companies such as BlackBerry, Nokia, Palm, HP, Toshiba, and Dell—are even smaller. They fit in a shirt pocket and run on rechargeable batteries. Two kinds of handheld devices are available to most business and consumer users. The original type is the personal digital assistant (PDA). PDAs keep schedules and contact information and have limited software applications such as word processing and spreadsheets. Most PDAs today allow users to access the Internet through wireless networks. The other type of handheld device is the so-called *smart phone*. A smart phone is essentially a device that combines a cell phone with a PDA. Many users like the added features offered by smart phones; consequently, sales of smart phones are growing rapidly. Gartner Research estimates that annual sales of smart phones exceed 20 million units, while the number of PDAs sold per year has declined to less than 13 million units.¹⁵



DIGITAL VISION/GETTY IMAGES

Notebook computers are gaining a larger share of the PC market.



COURTESY OF RESEARCH IN MOTION

The BlackBerry, made by Research In Motion, is one of the most popular handheld devices.

“They Said It”

“Buying the right computer and getting it to work properly is no more complicated than building a nuclear reactor from wristwatch parts in a darkened room using only your teeth.”

—Dave Barry (b. 1947)
Humorist



Microsoft Windows runs the majority of PCs.

software set of instructions that tell the computer hardware what to do.

its **operating system**. More than 80 percent of personal computers use a version of Microsoft's popular Windows operating system. Personal computers made by Apple use the Mac operating system. Most handheld devices use either the Palm operating system or a special version of Windows called Windows Mobile. Other operating systems include Unix, which runs many minicomputers, and Linux.

A program that performs the specific tasks that the user wants to carry out—such as writing a letter or looking up data—is called **application software**. Examples of application software include Oracle Supply Chain Management Suite, Microsoft Excel, Adobe Acrobat, and QuickBooks. Realtor Trevor Thirsk uses Microsoft Outlook to control his e-mail and organize client paperwork and Microsoft Publisher to create marketing materials. Using these and other software programs helps Thirsk save time—he estimates up to an hour a day—and become one of the top producers at John L. Scott Real Estate, a large residential real estate company in the Pacific Northwest. Even more impressive, Thirsk is one of the youngest, least experienced real estate agents at the firm.¹⁶ The next section discusses the major categories of application software used by business.

assessment check

1. How are computers classified?
2. What are the two major categories of computer software?

HOW COMPUTERS HELP BUSINESSPEOPLE

Computers and their related technologies continue to revolutionize the methods by which businesses manage information. These technologies affect contemporary business in three important ways. First, the enhanced speed and quantity of information available improves the speed and effectiveness of decision making. Second, computers make accurate, unbiased data available to everyone. Third, their information-sharing capabilities support team decision making at low levels of an organization's hierarchy. Every industry has felt at least some impact as computers and information systems have spread.

Consider the Great Harvest Bread Company, headquartered in Dillon, Montana, which operates more than 200 franchised bakeries. Unlike other franchise operations, Great Harvest believes that its franchise operators should be free—after a one-year apprenticeship—to run their stores as they see fit. They aren't required to use the same bread recipe or paint their store-

fronts the same color. But they are required to share information with each other, which they do via computers. The Great Harvest internal Web site, called the Breadboard, contains announcements of equipment for sale, ongoing electronic charts among franchisees, new recipes, tips for maintaining certain ovens, and archives of other information. Computers help people manage information in an industry that has historically been considered low tech.¹⁷

Some of the most widely used business applications of computers include enterprise resource planning, word processing, spreadsheets, electronic mail, presentation graphics, and multimedia and interactive media, which are discussed shortly. Users once acquired applications such as these as individual software packages. Today, however, they normally buy integrated software, or *software suites*, which combine several applications into a single package that can share modules for data handling and processing. For personal computer users, the most popular software suite is Microsoft Office, a package that includes word-processing, database management, spreadsheet, presentation, electronic mail, and personal information management software. Businesspeople, for instance, can import data from Access, the database program, into Excel, the spreadsheet program, to create reports and graphs. As another example, you're likely to use PowerPoint—the presentation program—to create dynamic classroom presentations containing text, figures, and even multimedia elements, in many of the classes you take in the coming years.

Some integrated software packages help businesses handle more specific tasks. For example, Palo Alto Software has several software packages that help businesspeople create customized advertising campaigns, marketing plans, and even overall business plans. These programs contain such features as spreadsheet templates designed to evaluate a company's competitiveness in the marketplace.¹⁸

Today's network technology and software allows multiple users to collaborate on reports and other projects even if they're separated by thousands of miles. Say Ashley and Juan are working on a project. Ashley—who works in the Denver office—writes a preliminary draft using Microsoft Word. She then sends the electronic document to Juan in the Chicago office by e-mail. Juan reviews the document, inserts several figures he created using Microsoft Excel, electronically marks some changes in the Word document, and returns the entire document, including the figures, to Ashley. The process is repeated until they agree on the finished product.

Despite all the advantages of computers, they do have their limitations and should be used to serve the mission of the organization, not just for their own sake. Many businesses have found that their use of computers is actually enhanced by maintaining a human touch—or adding it—to the process. Computers will never replace such face-to-face interactions as phone conversations and meetings.

Enterprise Resource Planning System

As information systems developed in organizations, they were at first contained within functional departments. Soon managers noticed that the data collected about customers during order processing were reentered by inventory control and shipping. The same duplication was found in human resources management systems and finance and accounting. To avoid such rework, eliminate mistakes or inconsistencies in data, and streamline processes, businesses began to demand a system to unify these separate systems. An **enterprise resource planning (ERP) system** is a set of integrated programs designed to collect, process, and provide information about all business operations. Firms such as Microsoft, Oracle, and SAP offer enterprise software programs and suites to help companies run factories, keep track of accounting, manage the human resources function, and assist in marketing efforts.

Oracle, for instance, offers a variety of ERP software suites and programs, each tailored to specific business applications. One is called Oracle Internet Expenses, part of the company's

“They Said It”

“Computers make it easier to do a lot of things, but most of the things they make it easier to do don't need to be done.”

—Andy Rooney (b. 1919)
News commentator

enterprise resource planning (ERP) system information system that collects, processes, and provides information about an organization's various functions.



HIT & MISS

Nobody Does It Better: Oracle

Oracle founder Larry Ellison has been described as “a slightly grizzled survivor,” having weathered all kinds of storms in the software industry. His reputation for being brash and aggressive hasn’t changed, but it has mellowed somewhat as the 60-something entrepreneur continues to run the database company he started in 1977.

In an era when the software industry has become increasingly fragmented, Ellison remains focused—providing his customers with the best business application software in the world and on acquiring the companies he believes he needs in order to do so. Consolidation could be termed Ellison’s mantra. “The industry is maturing. It is going to consolidate,” maintains Ellison. In fact, Oracle had begun to snap up other companies long before Ellison made the prediction. In a highly publicized takeover, Oracle acquired PeopleSoft, a large human resources ERP software company. Recently, Oracle also acquired Siebel Systems, producer of customer relationship management (CRM) applications. CRM applications collect and navigate through all customer interactions so that businesses can better understand and fulfill their customers’ needs. The move was huge for Oracle. “In a single step, Oracle becomes the number one CRM applications company in the world,” boasted Ellison.

Even with its acquisitions, Oracle still lags behind Cisco, Google, IBM, Intel, and Microsoft in size. And its largest direct ERP competitor is SAP, a German firm. But some industry experts note that hundreds of small software companies are still out there in the market for Oracle—which has plenty of cash—to purchase. And

the point of all this acquisition isn’t size alone; its ultimate goal is to allow Oracle to surge ahead as the best in the business of providing software applications to companies. The CRM market alone accounts for nearly \$10 billion.

Some analysts give Ellison credit for anticipating the next trend in corporate software as well as the move toward consolidation in the industry. “Larry Ellison is a technology visionary and someone who has taken a long-term perspective,” notes one industry analyst. Others warn that it will be years before Ellison’s strategy proves itself. Bill McDermott, CEO of SAP America, notes that Oracle is only poising itself for larger battles. “The games begin when Microsoft and Oracle lock horns,” he predicts. “That’s the big looming battle: Oracle versus Microsoft. You’ve got IBM in there, too.”

Questions for Critical Thinking

1. Oracle seeks to dominate the business software industry. What challenges do you think the firm will face in the next five years?
2. How can a firm like Oracle help its customers improve their own businesses?

Sources: Glen Fest, “Battle of Tech Titans: Oracle vs. SAP: Smoke, but No Fire,” *Bank Technology News*, accessed July 21, 2006, <http://www.banktechnews.com>; Daniel Gross, “The J. P. Morgan of Silicon Valley,” *Slate*, accessed July 21, 2006, <http://slate.msn.com>; Benjamin Pimentel, “Top CEO: Larry Ellison Convinced That the Future in High Tech Depends on Consolidation,” *San Francisco Chronicle*, accessed July 21, 2006, <http://www.sfgate.com>.

E-Business Suite. It is designed to improve the efficiency of travel and entertainment expense reporting and approval. MasterCard International uses Internet Expenses to process the company’s own travel and entertainment transactions. The online application quickly validates and approves expense reports while flagging unusual transactions for further investigation. According to MasterCard, since it started using Internet Expenses, productivity increased by 118 percent and reporting costs dropped by more than 50 percent.¹⁹ Through a series of recent acquisitions, Oracle has become one of the world leaders in ERP software. The firm is profiled in the “Hit & Miss” feature.

word processing software that uses a computer to input, store, retrieve, edit, and print various types of documents.

Word Processing

One of the original business applications—and currently one of the most popular—**word processing** uses computers to input, store, retrieve, edit, and print various types of documents.

With word processing, users can revise sentences, check spelling, correct mistakes, and move copy around quickly and cleanly.

Word processing helps a company handle huge volumes of correspondence, process numerous documents, and personalize form letters. Today virtually all companies use general-purpose computers running word-processing software. By far the most popular word-processing software is Microsoft Word, part of the firm's Office suite. Other word-processing programs include Corel's WordPerfect. These programs enable users to include graphics and spreadsheets from other programs in their documents and to create Web sites by translating documents into hypertext markup language (HTML), the language of the World Wide Web.

Many businesses extend word-processing capabilities to create sophisticated documents. **Desktop publishing** employs computer technology to allow users to design and produce attractively formatted printed material themselves rather than hiring professionals. Desktop publishing software combines high-quality type, graphics, and layout tools to create output that can look as attractive as documents produced by professional publishers and printers. Advanced equipment can scan photos and drawings and duplicate them on printed pages. Documents created through desktop publishing can not only be printed on paper but also published on the Web. Two popular desktop publishing programs are Microsoft Publisher and Adobe InDesign.

Many firms use desktop publishing systems to print newsletters, reports, form letters, and Web pages. Advertising and graphic arts departments often use desktop publishing systems to create brochures and marketing materials. A good desktop publishing system can save a company money by allowing staff members to produce such documents, whether they are for internal or external use.

Word processing and desktop publishing can also be used to reduce the amount of paper generated by the typical office. While a true "paperless" office may never become a reality, many businesses realize that cutting down on paper can improve efficiency and save money. For instance, Minnesota-based Farmers Home Mutual Insurance uses the Intelligent Document Platform from Adobe as part of a Web-based system to improve client service and reduce administrative costs. Instead of using a paper application, agents enter client information electronically. Farmers estimates that it saves more than \$500,000 per year by eliminating paper application forms. Moreover, the electronic application shortens the time needed to process applications by 70 percent and virtually eliminates errors.²⁰

Spreadsheets

An electronic **spreadsheet** is the computerized equivalent of an accountant's worksheet. This software permits businesspeople to manipulate decision variables and determine their impact on such outcomes as profits and sales. With a spreadsheet, a manager can have an accurate answer to a question in seconds and can often glance at the whole financial picture of a company on a single page. Not surprisingly, Microsoft Excel, part of the Office suite, is by far the most popular spreadsheet program. Another popular spreadsheet program is Corel Quattro Pro. Spreadsheet programs can also be used to create graphs and charts, and they have statistical analysis capabilities. Spreadsheets aren't just for accountants or finance professionals; people in other business areas such as marketing, human resources, and production rely on spreadsheet programs as well.

Figure 15.3 demonstrates how a manager uses a spreadsheet to set a price for a proposed product. Note that the manager can analyze alternative decisions using a spreadsheet. For instance, he or she can estimate the impact on sales given a change in the product's price. A more complex spreadsheet may stretch across many more columns and rows and even contain multiple worksheets, but the software still makes new calculations as fast as the manager can change the variables.

spreadsheet software package that creates the computerized equivalent of an accountant's worksheet, allowing the user to manipulate variables and see the impact of alternative decisions on operating results.

15.3 How a Spreadsheet Works

With an \$8 selling price, \$4 in variable costs for each unit sold, and total fixed costs of \$350,000, we have to sell 87,500 units just to break even. Now marketing suggests that we increase marketing expenses another \$100,000 to stimulate additional sales. Let's see what the spreadsheet says.

Fixed Costs			Fixed Cost	Per Unit		Breakeven Point in Units
Manu- facturing	Marketing	R&D		Variable Cost	Sales Price	
\$80,000	\$100,000	\$170,000	\$350,000	\$4	\$8.00	87,500
\$80,000	\$200,000	\$170,000	\$450,000	\$4	\$8.00	112,500

That extra \$100,000 had better expand sales! The spreadsheet shows that we now have to sell 112,500 units just to break even. Maybe the second proposal would be better—the one to cut variable costs per unit to \$3 and use the savings to shave \$1.50 off the retail price. Let's run it through the spreadsheet.

Fixed Costs			Fixed Cost	Per Unit		Breakeven Point in Units
Manu- facturing	Marketing	R&D		Variable Cost	Sales Price	
\$80,000	\$100,000	\$170,000	\$350,000	\$4	\$8.00	87,500
\$80,000	\$200,000	\$170,000	\$450,000	\$4	\$8.00	112,500
\$80,000	\$100,000	\$170,000	\$350,000	\$3	\$6.50	100,000

Electronic Mail

Businesspeople need to communicate directly with associates as well as customers, suppliers, and others outside their organization. Increasingly, they turn to their computers for this function, replacing much of their regular mailings (jokingly called *snail mail*) by sending messages via e-mail. Popular e-mail programs include Microsoft Outlook, Outlook Express, and Eudora. While e-mail may be a regular part of your business day, it is important to understand clearly when and how to use it—and the Internet in general—as described in the “Business Etiquette” feature.

As discussed in Chapter 7, a popular adaptation of e-mail is instant messaging. Instant messaging allows users to create private chat rooms with other individuals on their personal lists. The instant messaging system alerts a user whenever somebody on his or her list is online. The user can then initiate a chat session with that individual. There are several different instant messaging systems, including AOL Instant Messenger, Yahoo! Messenger, and Windows Messenger. To communicate, however, all users must use the same instant messaging system.

E-mail and instant messaging are rapid ways to communicate both inside and outside the organization. As a means of internal communication, e-mail is especially useful in organizations with employees located in different parts of the country or in different countries altogether. Employees can typically access their organization's e-mail anytime, anywhere. All it takes is a Web connection.

Certainly e-mail can help companies reduce paperwork, time wasted in playing telephone tag, and similar inefficiencies. But e-mail does have its limitations. It works best for short unemotional messages. Longer documents are best sent as attachments to e-mail or via fax. And e-mail users should be aware that messages are not private; employers may be monitor-

ing messages, so employees should refrain from sending personal messages or jokes to each other. Some messages, such as those containing potentially emotional news or those that may need an explanation, are best transmitted by telephone or in person. Also, as we noted in Chapter 7, some of the benefits of e-mail have been undermined by the proliferation of spam, or junk e-mail.

Presentation Graphics

Analyzing columns of numbers can be a tedious task. But when people see data displayed as charts or graphs, they can often identify patterns and relationships that raw data do not reveal. Businesspeople once had to labor to create charts and graphs or send the data or rough sketches to professional artists and then wait for the finished products. Computer software has greatly simplified the process of creating graphics. As noted earlier, spreadsheet programs can create dozens of types of high-quality graphs. **Presentation software**, the most popular of which is Microsoft PowerPoint, goes one step further. These programs create entire presentations. Users can create bulleted lists, charts, graphs, pictures, audio, and even short video clips. Examples are shown in Figure 15.4. By combining these elements in ways that are easy to read, a user can prepare presentations and handouts for a business meeting. To persuade management to fund a new project, an employee might create a series of graphs and charts to illustrate how the project will benefit the organization over time.

Multimedia and Interactive Media

Today's computers have leaped beyond numbers, text, and graphs to encompass multimedia and interactive media capabilities.

presentation software
computer program that includes graphics and tools to produce a variety of charts, graphs, and pictures.



When—and How—to Use Your Computer at Work

Just about anywhere you work, you are bound to have access to a computer. Whether you're in sales, marketing, finance, or human resources, a computer will be nearby—if not actually on your desk. You already know what your computer is for: work. Despite this fact, one recent survey revealed that 93 percent of workers who had a computer at work also used it for personal purposes—e-mailing or accessing the Web. The most popular sites accessed were news, personal e-mail, online banks, travel companies, and shopping. Gaming has also soared in popularity. Microsoft's game site, Zone.com, reports that its busiest time of day is midafternoon Eastern time—when most people are at work.

While this practice may seem harmless, businesses that allow employees to surf the Internet freely may face serious consequences. An employer may be held legally responsible for employees' misuse of e-mail—bullying, threatening, or making sexually explicit comments. A firm is also vulnerable to disclosure of its private information, as well as viruses spread via e-mail. Then there's the lost productivity of employees who are gaming and shopping during work time. So before you log on at work, consider the following:

- Make sure you know your company's policy about computer and Internet use. One firm might allow casual e-mailing or shopping during lunch hours; another might not. If you violate the policy, you could find yourself un-

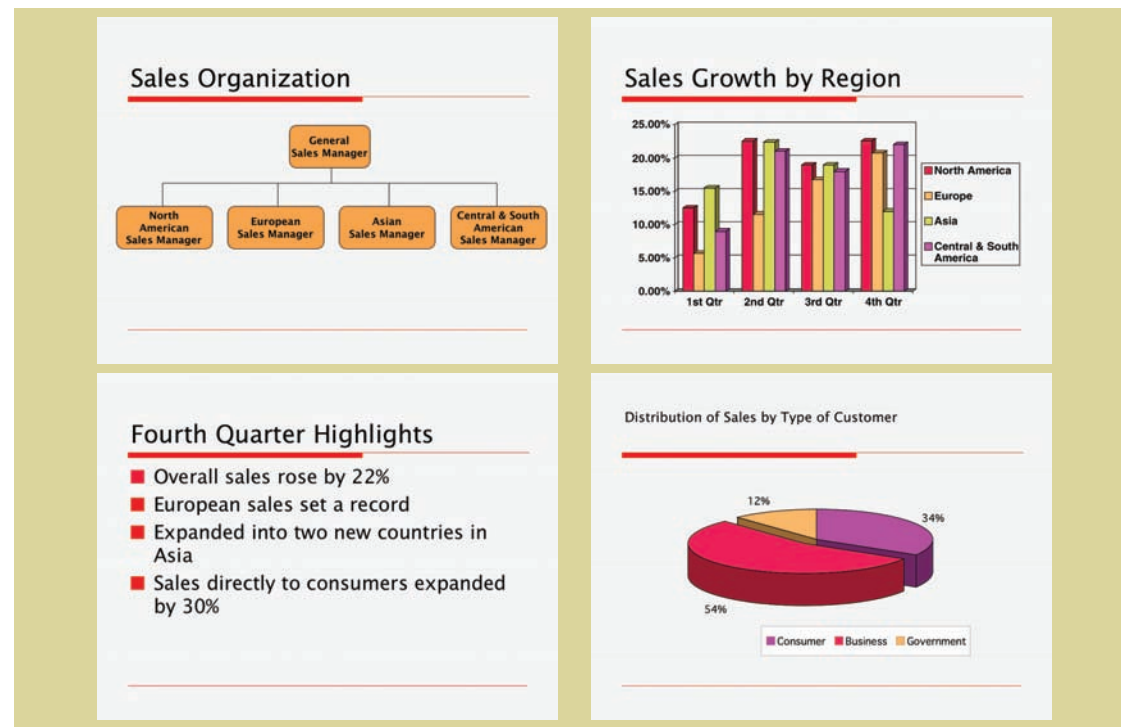
employed. If your firm doesn't have a formal policy, ask your supervisor for guidelines before you log on. Then use common sense.

- If you may use your computer for some personal messages, be aware that most firms can monitor employee e-mail. "[Employees] should avoid pretty much anything they wouldn't want to print out and hang up on their cubicle walls," warns one technology consultant.
- Be honest about whether you really need to use the Internet during the workday. If you need to make a quick bank deposit online or check the time of your next flight, fine. But if you're surfing the Web for a great pair of shoes to wear next weekend, save it for after work.

Every firm is different, but "the solution lies in balancing employees' needs for personal use of the Web at work without draining overall productivity," advises Geoff Haggart of Internet firm Websense.

Sources: "Monitoring Employees' Use of Company Computers and the Internet," Texas Workforce, accessed July 21, 2006, <http://www.twc.state.tx.us>; Mimi Ho, "Internet Surfing at the Workplace," CIO, accessed July 21, 2006, <http://www2.cio.com>; Michele Marrinan, "Beware the Wandering Mouse," Monster.com, accessed July 21, 2006, <http://wlb.monster.com>; Bureau of Labor Statistics, "Most Common Uses for Computers at Work," U.S. Department of Labor, accessed July 21, 2006, <http://www.bls.gov>; "Web Surfing as Addictive as Coffee," CNN.com, accessed July 21, 2006, <http://edition.cnn.com>.

15.4 Examples of Presentation Graphics Software



Multimedia computing refers to technologies that integrate two or more types of media, such as text, voice, sound, full-motion video, still video, graphics, and animation into computer-based applications. Many popular business applications have multimedia computing capabilities. For example, as we just noted, Microsoft PowerPoint users can add audio and video clips to their presentations.

One of the growing business applications for multimedia computing is employee business presentations and conferences. The Internet has made transmission of these meetings widely available. Many companies routinely provide multimedia Webcasts of their annual meetings for viewing on their Web sites. Salespeople use their notebook computers to make presentations to customers in the field.

Many applications of multimedia computing use interactive media—programs that allow users to interact with computer displays. Home Depot's Expo Design Centers interactive software allows customers to plan and design home remodeling and building projects either online or at Home Depot stores. Customers can view a variety of 3D products, enter their room dimensions, create orders, and track the installation of their projects on a computer screen.

assessment check

1. What is enterprise resource planning software?
2. Explain the difference between word-processing and desktop publishing software.
3. Briefly discuss how a spreadsheet program might be used to help solve a common business problem.

INTRANETS, VIRTUAL PRIVATE NETWORKS, AND VoIP

A previous section discussed the use of LANs and WANs to allow businesses to communicate, transmit and print documents, and share data. These networks require businesses to install special equipment and connections between office sites. But Internet technology has also been

applied to internal company communications and business tasks, tapping a ready-made network. Among these new Internet-based applications are intranets, virtual private networks (VPNs), and voice over Internet protocol (VoIP). Each has contributed to the effectiveness and speed of business processes.

Intranets

A broad approach to sharing information in an organization is to establish a company network patterned after the Internet. Such a network, called an **intranet**, links employees through Internet tools such as e-mail and searches using Web browsers. Intranets are similar to the Internet, but they limit access to employees or other authorized users. An intranet blocks outsiders without valid passwords from entering its network by incorporating software or hardware known as a **firewall**. Firewalls limit data transfers to certain locations and log system use so that managers can identify attempts to log on with invalid passwords and other threats to a system's security. Highly sophisticated packages immediately alert system administrators about suspicious activities and permit authorized personnel to use smart cards to log on from remote terminals.

Intranets solve the problem of linking different types of computers. Like the Internet, intranets can integrate computers running all kinds of operating systems. In addition, intranets are relatively easy and inexpensive to set up because most businesses already have some of the required hardware and software. For instance, a small business can simply purchase a DSL router and a few cables and create an intranet using phone jacks and internal phone lines. All the business's computers will be linked with each other as well as with the Internet.

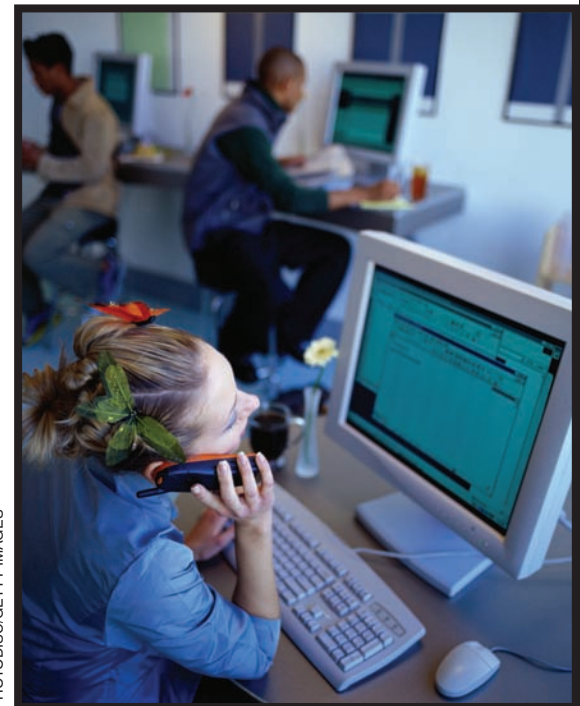
Intranets also support teamwork among employees who travel or work from home. Any intranet member with the right identification, a PC, and some sort of Internet access—either dial-up or broadband—can access the intranet and gain access to group calendars, e-mail, documents, and other files. Intranets can also be used for videoconferencing and other forms of virtual meetings.

Global financial services firm Rothschild uses intranet services provided by Interwoven. Interwoven replaced the firm's ad hoc shared network drives and various filing systems with a uniform document management system. The intranet allows access and sharing of financial dealings and client data. Documents, financial models, agreements, reports, and market data can be accessed securely by Rothschild bankers anywhere in the world. This speeds research, facilitates knowledge sharing, and, in the end, provides more consistent client relationships.²¹

Virtual Private Networks

To gain increased security for Internet communications, companies often turn to **virtual private networks (VPNs)**, secure connections between two points on the Internet. These VPNs use firewalls and programs that encapsulate data to make them more secure during transit. Loosely defined, a VPN can include a range of networking technologies, from secure Internet connections to private networks from service providers like IBM and AT&T. A VPN is cheaper for a company to use than leasing several of its own lines. It can also take months to install a leased line in some parts of the world, but a new user can be added to a VPN in a day. Because a VPN uses the Internet, it can be wired, wireless, or a combination of the two.

intranet a computer network that links employees and other authorized users.



PHOTODISC/GETTY IMAGES

Network management and security are increasing concerns of businesses.

Singapore's Nanyang Technological University (NTU) uses a VPN provided by Juniper Networks. The VPN enables the university's IT staff to remotely manage 85 e-learning servers, which make up the university's e-learning operations center. This eliminates the need for the company's information technology (IT) staff to be physically near the servers, greatly reducing the amount of time and expense needed for server maintenance. Chye Seng of NTU says, "instead of working on the server console in the data center, staff members now have the option to work remotely, saving us time and money, and improving the quality of our e-learning service."²²

VoIP

VoIP—which stands for *voice over Internet protocol*—is an alternative to traditional telecommunication services provided by companies such as Verizon and Qwest. The VoIP telephone is not connected to a traditional phone jack but rather is connected to a personal computer with any type of broadband connection. Special software transmits phone conversations over the Internet, rather than through telephone lines. A VoIP user dials the phone as usual. Recipients can receive calls made using VoIP through regular telephone connections (land or wireless). Moreover, you can call another person who has VoIP using a regular landline or cell phone.

A growing number of consumers and businesses have embraced VoIP, mainly due to the cost savings and extra features offered by VoIP. For instance, Skype—owned by eBay—has around 6 million users.²³ Home Care Delivered, a Virginia-based healthcare supply firm, decided to go with VoIP when it opened a new facility recently. For CEO Gordy Fox, it made perfect sense because a corporate data network was already in place. Fox believes that the company will save thousands of dollars by bypassing the public phone network. VoIP allows the company to set up an office anywhere there's a fast Internet connection.²⁴

In spite of VoIP's apparent advantages, there are several potential drawbacks to replacing traditional telephony with Internet telephony. For one thing, your Internet phone service will be only as reliable as your broadband connection. If your broadband connection goes out, so will your phone service. For another, without extensive safeguards, VoIP can expose a phone system to the havoc affecting the rest of the Internet, such as worms and viruses. Gary Heller, deputy CIO for the Arizona Healthcare Cost Containment System, recently helped install VoIP in system offices throughout the state. Before installing VoIP, Heller focused hard on security and didn't go ahead with VoIP until he thought that all the potential security issues had been resolved. "You'll be sorry if security is an afterthought with VoIP," he says.²⁵

assessment check

1. Explain the differences between an intranet and a virtual private network.
2. What are some of the major advantages and disadvantages of VoIP?

PROTECTING INFORMATION SYSTEMS

As information systems become increasingly important business assets, they also become progressively harder to replace. When computers are connected to a network, a problem at any individual computer can affect the entire network. Although many computer security issues go beyond the scope of this book, the following sections discuss three important security threats: computer crime, or e-crime; viruses; and disasters that may damage information systems.

E-Crime

Computers provide efficient ways for employees to share information. But they may also allow people with more malicious intentions to access information. Or they may allow pranksters—who have no motive other than to see whether they can hack into a system—to gain access to classified information. Common e-crimes involve stealing or altering data in several ways:

- Employees or outsiders may change or invent data to produce inaccurate or misleading information.
- Employees or outsiders may modify computer programs to create false information or illegal transactions or to insert viruses.
- Unauthorized people can access computer systems for their own illicit benefit or knowledge or just to see if they can get in.

E-crime is on the rise. According to a recent survey of IT professionals and managers conducted by *CSO* magazine in cooperation with the U.S. Secret Service and Carnegie Mellon University's CERT Coordination Center, 70 percent of respondents reported at least one e-crime and almost half reported an increase in e-crimes compared with the prior year. The typical respondent reported more than 130 e-crimes during the year. The total cost of these crimes was estimated at around \$700 million. Of course, the statistics don't include the number of incidents that were not reported, so the total number and cost are probably higher.

Individuals, businesses, and government agencies are all vulnerable to computer crime. Computer hackers—unauthorized users—sometimes work alone and sometimes in groups. Sometimes hackers break into computer systems just to show that they can do it; other times they have more sinister motives. Along a stretch of highway in a shopping area near downtown Miami, hackers obtained credit card information for thousands of customers at four major stores. The thieves identified stores with strong wireless signals and weakly protected data networks. For more than a month, hackers gained access to the stores' computer systems and obtained sensitive financial information from their databases. Security experts and law enforcement officials estimated that more than 1.4 million customer accounts were exposed. The exact dollar amount of losses is not known.²⁶ In another recent incident, hackers gained access to a LexisNexis database. The security of thousands of Social Security numbers, driver's license data, and other personal information may have been compromised.²⁷

Information system administrators implement two basic protections against computer crime: they try to prevent access to their systems by unauthorized users and the viewing of data by unauthorized system users. To prevent access, the simplest method requires authorized users to enter passwords. The company may also install firewalls, described earlier. To prevent system users from reading sensitive information, the company may use encryption software, which encodes, or scrambles, messages. To read encrypted messages, users must use an electronic key to convert them to regular text. But as fast as software developers invent new and more elaborate protective measures, hackers seem to break through their defenses. So security is an ongoing battle. Debate continues over whether stronger laws are needed to protect the sensitive personal information contained in many computer databases. This debate is summarized in the "Solving an Ethical Controversy" feature.

Another form of computer theft is as old as crime itself: theft of equipment. As the size of computer hardware diminishes, it becomes increasingly vulnerable to theft. Handheld devices, for instance, can vanish with a pickpocket or purse snatcher. And because these machines may contain all kinds of important information for a business, employees need to be especially careful not to leave them unattended or out of reach. The recent theft, and subsequent recovery, of a

DOES DATABASE SECURITY EXIST?

Everywhere you go, companies obtain information about you—enough for just about anyone to steal your identity. Firms vow to keep your information secure, but increasingly, those promises are broken by technologically savvy thieves, who in one fell swoop may gain access to a single database containing information about millions of individuals.

Businesses, consumer groups, and the U.S. Congress continue to debate who is ultimately responsible for database security. New legislation and regulations have been proposed.

Are companies doing enough to protect their customer database information?

PRO

1. Companies that engage in financial transactions are already required to establish and enforce information security programs to prevent identify theft. In addition, new legislation strengthens customer notification requirements when security is breached.
2. Companies that make security a top priority have professional support staff who constantly review any possible compromises in the system. This type of vigilance is the best way to maintain security.

CON

1. Experts warn that identity theft is often committed by a company's own workers, vendors, and sup-

pliers, who have access to passcodes, passwords, or key codes. "We're creating this façade that we can protect this information, and in reality we can't," warns Pete Lindstrom of Spire Security LLC. "There are too many people who have legitimate access to this stuff."

2. Although well intentioned, many companies focus too much on outdated methods of security such as encryption. While encryption was once enough protection, experts now advise that it is merely one layer of defense.

Summary

Database security has become increasingly critical as large companies have admitted to massive losses of personal data. ChoicePoint, which collects and sells personal information to government agencies and private firms, announced the potential exposure of information on 35,000 consumers in California. Data provider LexisNexis discovered a security breach of data on more than

310,000 consumers. Organizations as diverse as Bank of America, San Jose Medical Group, and Boston College have also reported security breaches. As a result, financial institutions have agreed to work more closely with the Federal Trade Commission to solve—and ultimately thwart—identity theft crimes.

Sources: Jon Oitsik, "The Truth about Database Security," CNet News.com, accessed July 21, 2006, <http://news.com.com>; Charles Garry, "Taking a Trip Down Denial," eWeek, accessed July 21, 2006, <http://www.eweek.com>; Lisa Vaas, "Congress Nears Final Identity Theft Legislation," eWeek, accessed July 21, 2006, <http://www.eweek.com>; Karen D. Schwartz, "Financial Institutions to Share Identity-Theft Data," eWeek, accessed July 21, 2006, <http://www.eweek.com>; Judith M. Collins, "Identity Theft: An Inside Job," eWeek, accessed July 21, 2006, <http://www.eweek.com>; Jon Swartz, "Personal Info about 310,000 at Risk," USA Today, accessed July 21, 2006, <http://www.usatoday.com>; Bob Sullivan, "Database Giant Gives Access to Fake Firms," MSNBC, accessed July 21, 2006, <http://www.msnbc.com>.

solving
an

ETHICAL

controversy



notebook computer belonging to an official of the Department of Veterans Affairs, containing sensitive information on millions of veterans and active duty military personnel, illustrates the vulnerability of these devices. Many notebook computers and handheld devices contain special security software that makes it difficult for a thief or any unauthorized person to access the data stored in the computer's memory.

Computer Viruses, Worms, Trojan Horses, and Spyware

Rather than directly tampering with a company's data or computers, computer hackers may create viruses, worms, or Trojan horses to infect computers at random. Attacks by these and other forms of malicious software cost consumers and businesses billions of dollars annually.

Computer *viruses* are programs that secretly attach themselves to other programs (called *hosts*) and change them or destroy data. Viruses can be programmed to become active immediately or to remain dormant for a period of time, after which the infections suddenly activate themselves and cause problems. A virus can reproduce by copying itself onto other programs stored in the same drive. It spreads as users install infected software on their systems or exchange files with others, usually by exchanging e-mail, accessing electronic bulletin boards, trading disks, or downloading programs or data from unknown sources on the Internet.

A *worm* is a small piece of software that exploits a security hole in a network to replicate itself. A copy of the worm scans the network for another machine that has a specific security hole. It copies itself to the new machine using the security hole and then starts replicating from there as well. Unlike viruses, worms don't need host programs to damage computer systems.

A *Trojan horse* is a program that claims to do one thing, but in reality does something else, usually something malicious. For example, a Trojan horse might claim, and even appear, to be a game. When an unsuspecting user clicks the Trojan horse, the program might erase the hard drive or steal any personal data stored on the computer.

Spyware is software that covertly gathers user information through the user's Internet connection without his or her knowledge, usually for advertising purposes. Spyware applications are typically bundled with other programs downloaded from the Internet. Once installed, the spyware monitors user activity on the Internet and transmits that information in the background to someone else.

Attacks by viruses, worms, Trojan horses, and spyware are not limited to computers and computer networks; handheld devices, including cell phones, have been affected as well. Recently, for example, a Trojan horse was discovered that turned Sony's popular PSP (PlayStation Portable) into what one expert referred to as a "brick." The program—which posed as a patch allowing a user to run games not approved by Sony—actually deleted four critical system files, rendering the PSP inoperable. The owner had little choice but to send the infected PSP into Sony for expensive repairs.²⁸

As viruses, worms, and Trojan horses become more complex, the technology to fight them must increase in sophistication as well. The simplest way to protect against computer viruses is to install one of the many available antivirus software programs, such as Norton AntiVirus and McAfee VirusScan. These programs, which also protect against worms and some Trojan horses, continuously monitor systems for viruses and automatically eliminate any they spot. Users should regularly update them by downloading the latest virus definitions. In addition, computer users should also install and regularly update antispyware programs because many Trojan horses are forms of spyware.

But management must begin to emphasize security at a deeper level: software design, corporate servers, Web gateways, and Internet service providers. Because more than 80 percent of the world's PCs run on Microsoft operating systems, a single virus, worm, or Trojan horse can spread quickly among them. Individual computer users should carefully choose the files they load onto their systems, scan their systems regularly, make sure their antivirus software is up-to-date, and install software only from known sources. They should also be very careful when opening attachments to e-mails, because many viruses, worms, and Trojan horses are spread that way.

assessment check

1. List some examples of e-crime.
2. Explain the differences between a virus, a worm, and a Trojan horse.

DISASTER RECOVERY AND BACKUP

Natural disasters, power failures, equipment malfunctions, software glitches, human error, and terrorist attacks can disrupt even the most sophisticated computer systems. These disruptions can cost businesses and other organizations billions of dollars.

Recently flooding from the Delaware River damaged a bakery and café owned by Jane and Joel Vitart in New Hope, Pennsylvania. The flood caused about \$120,000 in damage and cleanup costs, but the biggest blow was the loss of the business's computer system. As Jane Vitart noted, "I ran my whole business on that computer—all my financial data, inventory, vendor bills, my marketing materials, customer lists, menus." She had backed up some of her financial data, but the backup disk turned out to be defective. The business was closed for six weeks and then reopened only after the couple stretched their credit to the limit and used all their personal savings. Jane Vitart said "I feel like I'm starting from scratch." Now, at the first hint of flooding, she makes sure the computer system is among the first items evacuated.²⁹

Software glitches are no less serious. Recently, a software glitch shut down the systems running the New York Stock Exchange. The shutdown halted all trading for about twelve minutes right before the market closed, creating havoc in the financial markets throughout the country. Another recent software glitch at Bank of America resulted in teachers in several California districts not getting paid on time. And a software glitch at a Baltimore Gas and Electric computer caused about 7,000 customers to be overcharged for electricity, some for many years.³⁰

Disaster recovery planning—deciding how to prevent system failures and continue operations if computer systems fail—is a critical function of all organizations. Disaster prevention programs can avoid some of these costly problems. The most basic precaution is routinely backing up software and data—at the organizational and individual levels.

Disaster planning helped the Veterans Health Information System get back to normal quickly following Hurricane Katrina. The hurricane affected Veterans Affairs (VA) facilities in New Orleans and in Jackson and Biloxi, Mississippi. However, within a couple of days, the patient database was operating as it did the day before the hurricane. Any patient who was being treated by VA facilities in the affected areas could walk into any VA provider, anywhere in the country, and his or her records could be pulled up on the screen.³¹

Companies can now back up data at such online storage services as Iron Mountain or Network Associates. Technology planners may decide to respond to the possibility of a natural disaster such as an earthquake or flood by paying for extra hardware installation in a secure location that can be accessed during an emergency. PSS/World, a medical equipment distributor based in Jacksonville, uses disaster recovery services from SunGard Availability Services, which cost the company around \$500,000 per year. Among other items, PSS/World stores its data in the vendor's Philadelphia facility. As Katrina neared the Gulf Coast, PSS/World decided that its Jackson, Mississippi, call center might be affected. Losing the call center would cost the firm an estimated \$3 million a day. The firm alerted SunGard that it was putting its emergency plan into effect. The storm did knock out the Jackson call center for several days, but thanks to its disaster plan and the services provided by SunGard, PSS/World's business wasn't hurt.³²

assessment check

1. What is a software glitch?
2. Explain disaster recovery planning as it relates to information systems.

WHAT'S AHEAD

This is the first of two chapters devoted to managing technology and information. Chapter 16, "Understanding Accounting and Financial Statements," focuses on the functions of accounting, steps in the accounting process, functions and components of financial statements, and the role of budgets in an organization.



Summary of Learning Goals

1 Distinguish between data and information and explain the role of management information systems in business.

It is important for businesspeople to know the difference between data and information. Data are raw facts and figures that may or may not be relevant to a business decision. Information is knowledge gained from processing those facts and figures. An effective information system can help answer many management questions. A management information system (MIS) is an organized method for providing past, present, and projected information on internal operations as well as external intelligence to support decision making. The heart of an MIS is its database, which serves as an electronic filing cabinet for facts and figures.

Assessment Check Answers

1.1 What is the difference between data and information?

Data consist of raw facts and figures that may or may not be relevant to a business decision. Information is the knowledge gained from processing data.

1.2 Define *management information system*.

A management information system is an organized method for providing past, present, and projected information on internal operations as well as external intelligence to support decision making.

1.3 What is the purpose of business intelligence?

Business intelligence is the task of using computer-based technology to retrieve and evaluate data in a database to identify useful trends.

2 Identify and briefly describe the different types of information system programs.

The key to a useful information system is the program that links users to data. Different types of information system programs include decision support systems (DSSs), which provide relevant data to help businesspeople make decisions and choose courses of action; executive support systems, which allow top managers to access the firm's primary databases; and expert systems, which imitate human thinking. Trends in information systems include local area and wide area networks (LANs and WANs); wireless local networks (Wi-Fi and Wi-Max); and application service

providers (ASPs), outside firms that provide both computers and application support for managing an information system.

Assessment Check Answers

2.1 What is a decision support system?

A decision support system is an information system that quickly provides relevant data to help businesspeople make decisions and choose courses of action.

2.2 Why do some organizations use application service providers?

The major advantages of using application service providers are cost and added expertise. Many organizations find it much more cost-effective to outsource information technology than to try to handle it in house.

3 Describe the hardware and software used in managing information.

Hardware consists of all tangible elements of a computer system, including input and output devices. Major categories of computers include mainframes, supercomputers, minicomputers, and personal computers (PCs). Newer developments in PCs include notebooks, tablet PCs, and handheld devices. Computer software provides the instructions that tell the hardware what to do. The software that controls the basic workings of the computer is its operating system. Other programs, called *application software*, perform specific tasks that users want to complete.

Assessment Check Answers

3.1 How are computers classified?

Computers are classified as being either mainframes, minicomputers, or personal computers. Personal computers are divided into desktop computers, notebook computers, tablet computers, and handheld devices (PDAs and smart phones).

3.2 What are the two major categories of computer software?

Operating systems control the basic workings of a computer. A program that performs a specific task is called *application software*.

4 Identify how different types of software can help businesspeople.

Individual types of software can help businesses in a variety of ways. Word processing helps a company handle massive volumes of correspondence, reports, and other documents. Desktop publishing allows users to design and produce attractively formatted printed material. Spreadsheets calculate and present information clearly. Electronic mail allows businesspeople to communicate rapidly anywhere in the world. Presentation graphics provide graphs and charts that help businesspeople see patterns in data. Multimedia integrates two or more types of media. Interactive media are programs that allow users to interact with computer displays. Integrated software combines several applications into a single package that can share modules for data handling and processing.

Assessment Check Answers

4.1 What is enterprise resource planning software?

Enterprise resource planning software is a set of integrated programs designed to collect, process, and provide information about all business operations.

4.2 Explain the difference between word-processing and desktop publishing software.

Word-processing software uses computers to input, store, retrieve, edit, and print various types of documents. Desktop publishing takes word processing one step further by combining high-quality type and graphics. Documents can be printed or published on the Web.

4.3 Briefly discuss how a spreadsheet program might be used to help solve a common business problem.

A spreadsheet is a computerized equivalent of an accountant's worksheet. The software helps businesspeople manipulate decision variables and determine their impact on such outcomes as profits and sales. For example, a marketing manager might use a spreadsheet to evaluate the impact of increased promotional expenditures on sales and profits.

5 Explain the importance of special network technologies.

Intranets allow employees to share information on a ready-made company network. Access to an intranet is restricted to authorized users and is protected by a firewall. Virtual private networks (VPNs) help save companies money by providing a secure Internet con-

nection between two or more points. VoIP—voice over Internet protocol—uses a personal computer running special software and a broadband Internet connection to make and receive telephone calls over the Internet rather than over traditional telephone networks. VoIP is usually cheaper than traditional telephony and offers users added flexibility.

Assessment Check Answers

5.1 Explain the differences between an intranet and a virtual private network.

An intranet is a physical network that links an organization's computers, allowing them to share documents, printers, and other devices. A virtual private network links two or more computers over a secure Internet connection.

5.2 What are some of the major advantages and disadvantages of VoIP?

The major advantages of VoIP are lower cost, increased communications flexibility, and additional features. Security and reliability are two drawbacks of VoIP.

6 List the ways that companies can protect themselves from computer crimes.

Companies can protect themselves from computer crime by requiring users to enter passwords, installing firewalls or encryption software, and keeping up to date on new security methods. In addition, managers should install antivirus security programs on all computers and networks.

Assessment Check Answers

6.1 List some examples of e-crime.

Examples of e-crime include the stealing or altering of data and the theft of computer hardware.

6.2 Explain the differences between a virus, a worm, and a Trojan horse.

A virus is a program that secretly attaches itself to other programs and changes the host program or destroys data. A worm is a small piece of software that exploits a security hole in a network and duplicates itself. Worms don't require host programs. A Trojan horse is a program that claims to do one thing but in reality does something else, usually something malicious.

7 Explain the steps that companies go through in anticipating, planning for, and recovering from information system disasters.

Businesses can avoid the results of disaster by routinely backing up software and data, both at an organizational level and at an individual level. They can back up data at online storage services or pay for extra hardware installation in a secure location. They may also want to invest in extra hardware and software sites, which can be accessed during emergencies.

Assessment Check Answers

7.1 What is a software glitch?

A software glitch is an error in a computer program that has an unintended consequence, such as shutting down a system at the wrong time.

7.2 Explain disaster recovery planning as it relates to information systems.

Disaster recovery planning involves deciding how to prevent system failures and to continue operations if computer systems fail because of natural disasters or human error. A basic precaution is routinely backing up data and software and storing the backups in a secure location.

Business Terms You Need to Know

data 484
information 484
management information system (MIS) 484
database 485
decision support system (DSS) 487
executive support system (ESS) 487

Wi-Fi 489
application service provider (ASP) 489
software 494
enterprise resource planning (ERP) system 495
word processing 496

spreadsheet 497
presentation software 499
intranet 501

Other Important Business Terms

chief information officer (CIO) 484
expert system 488
local area network (LAN) 488
wide area network (WAN) 488
Wi-Max 489

on-demand (utility) computing 489
hardware 491
mainframe 492
minicomputer 492
handheld devices 493

operating system 494
application software 494
desktop publishing 497
firewall 501
virtual private network (VPN) 501
VoIP 502

Review Questions

1. Distinguish between data and information. Why is the distinction important to businesspeople in their management of information?
2. What is business intelligence?
3. Describe three different types of information system programs and give an example of how each might help a particular business.
4. Explain decision support systems, executive support systems, and expert systems.
5. What are the major categories of computers? What is a smart phone?
6. How might a hotel chain use desktop publishing to manage its marketing program?
7. What is enterprise resource planning? How has it streamlined business processes?
8. What is an intranet? Give specific examples of benefits for firms that set up their own intranets.

9. Briefly explain how VoIP works. Why might a business switch from regular telephony to Internet telephony?
10. What steps can organizations and individuals take to prevent computer crime?
11. How does a computer virus work? What can individuals and organizational computer users do to reduce the likelihood of acquiring a computer virus?
12. Why is disaster recovery important for businesses? Relate your answer to a natural disaster such as a hurricane.

Projects and Teamwork Applications

1. Do you believe that information overload is a serious problem in your life? What steps do you (or can you) take to reduce this overload so that you can function more effectively in all areas of your life?
2. Suppose you were chief information officer for Great Harvest Bread Company. Describe the different parts of an integrated software package (in addition to the intranet described in the chapter) that would help your company manage its flow of information. Give an example of how each application you choose would help the company.
3. Working with a partner, research the current status of Wi-Max. Prepare a short report on its growth, its current uses, and its future for business computing.
4. Do you think computer hacking is a serious crime? Defend your answer.
5. What information-related technology lessons do you think businesses learned from Hurricanes Katrina, Rita, and Wilma? How will these lessons help firms respond to other disasters—natural as well as those caused by humans?
6. Assume you're in the market for a new personal computer. First, make a list of your needs. Needs represent the basic configuration that will meet your individual computing requirements. Next, make a list of your wants. Wants represent features you'd like to have in your new PC but don't necessarily need. Finally, decide between a notebook computer and a desktop computer. List the reasons why you chose a desktop or a notebook.
 - a. Visit the CNet (<http://www.cnet.com>) or ZDNet (<http://www.zdnet.com>) Web site. Research different computer makes and models that meet your specifications. Make a list of the five top-rated systems. What criteria did CNet or ZDNet consider when developing the rankings?
 - b. Decide where you will buy your new computer. Will you order it from a direct seller, such as Dell, or will you buy it at a retail store, such as Best Buy? What are the advantages and disadvantages of each option?
 - c. Finally, working in a small group, repeat the exercise, assuming you're buying a computer for your job. Explain any differences between a computer purchased for personal and school use and one purchased for business use.
7. Computer viruses and worms pose a major problem for computer users and systems. Software publishers constantly scramble to update their antivirus software programs in response to newly discovered viruses and worms. Searching online, research the current status of worms and viruses and then answer the following questions:
 - a. Approximately how many different computer viruses have been discovered?
 - b. How many new viruses are discovered each month?
 - c. What are the names of the most recently discovered viruses?
 - d. What is the best way to protect a computer from viruses?
8. After the terrorist attacks of September 11, 2001, and the more recent string of major hurricanes, interest in data backup and recovery software for critical computer data increased dramatically. Visit the following Web sites and, working with a partner, prepare a report outlining some of the key features of these programs with the goal of convincing the owner of a small business that he or she should invest in critical data backup and recovery software.

<http://www.baymountain.com>
<http://www.unitrends.com>

Case 15.1**Compaq and Hewlett-Packard: Can They Live Happily Ever After?**

Business mergers between companies sometimes seem nearly as common as marriages between people. And like marriages, they may or may not result in happy relationships. The merger between Hewlett-Packard and Compaq—the largest so far in the computer industry—has proved to be rocky. HP's acquisition of Compaq was orchestrated by HP's former CEO, Carly Fiorina. The move met its greatest resistance from HP director Walter Hewlett, son of HP's co-founder William Hewlett. Hewlett argued that the match would dilute HP's profits, trigger layoffs, and not benefit either firm in the long run.

After the first year, HP reported that it had obtained some valuable service contracts, including a \$243 million deal to provide help desk and other services to Telecom Italia. Later it announced a contract with Procter & Gamble worth \$3 billion over the next decade. But in technological innovation, HP continued to move too slowly, and the acquisition of Compaq failed to satisfy investors. HP's once-healthy market share in printers began to falter because it was devoting resources to its PC business. So far the HP merger with Compaq has yet to produce effective integration between the two organizations and their products—and Fiorina has left the company.

HP is trying to recover its image as a force for innovation and engineering, blend with Compaq, and

offer products such as desktop computers at lower prices to consumers and business customers through its HP Compaq division. Industry experts warn that the firm will also have to jump ahead of its competitors—such as Dell—in developing whole new categories of goods and services. It's a task nearly as large as reinventing the wheel.

Questions for Critical Thinking

1. Visit the HP Web site to learn more about HP products and services. Select a new offering that you think will be successful, and explain why.
2. Do you think that eventually the relationship between HP and Compaq will be successful? Why or why not?

Sources: John Gallant, "The Firing of Fiorina: Overdue or Premature?" *Network World*, accessed August 16, 2006, <http://www.networkworld.com>; John Spooner, "HP Does Desktop PC Price Limbo," *PC Magazine*, accessed July 21, 2006, <http://www.PCMagazine.com>; "Fallen Star," Online NewsHour, accessed July 21, 2006, <http://www.pbs.org/newshour>; Robert X. Cringely, "What Carly Will Be Missing," Public Broadcasting Service, accessed July 21, 2006, <http://www.pbs.org/cringely>; "Hewlett-Packard Top Executive Ousted," MSNBC, accessed July 21, 2006, <http://www.msnbc.msn.com>.

**Case 15.2****Peet's Coffee & Tea: Just What the Customer Ordered**

This video case appears on page 624. A recently filmed video, designed to expand and highlight the written case, is available for class use by instructors.