complete

COMPUTERS IN YOUR FUTURE *2003*

bryan pfaffenberger

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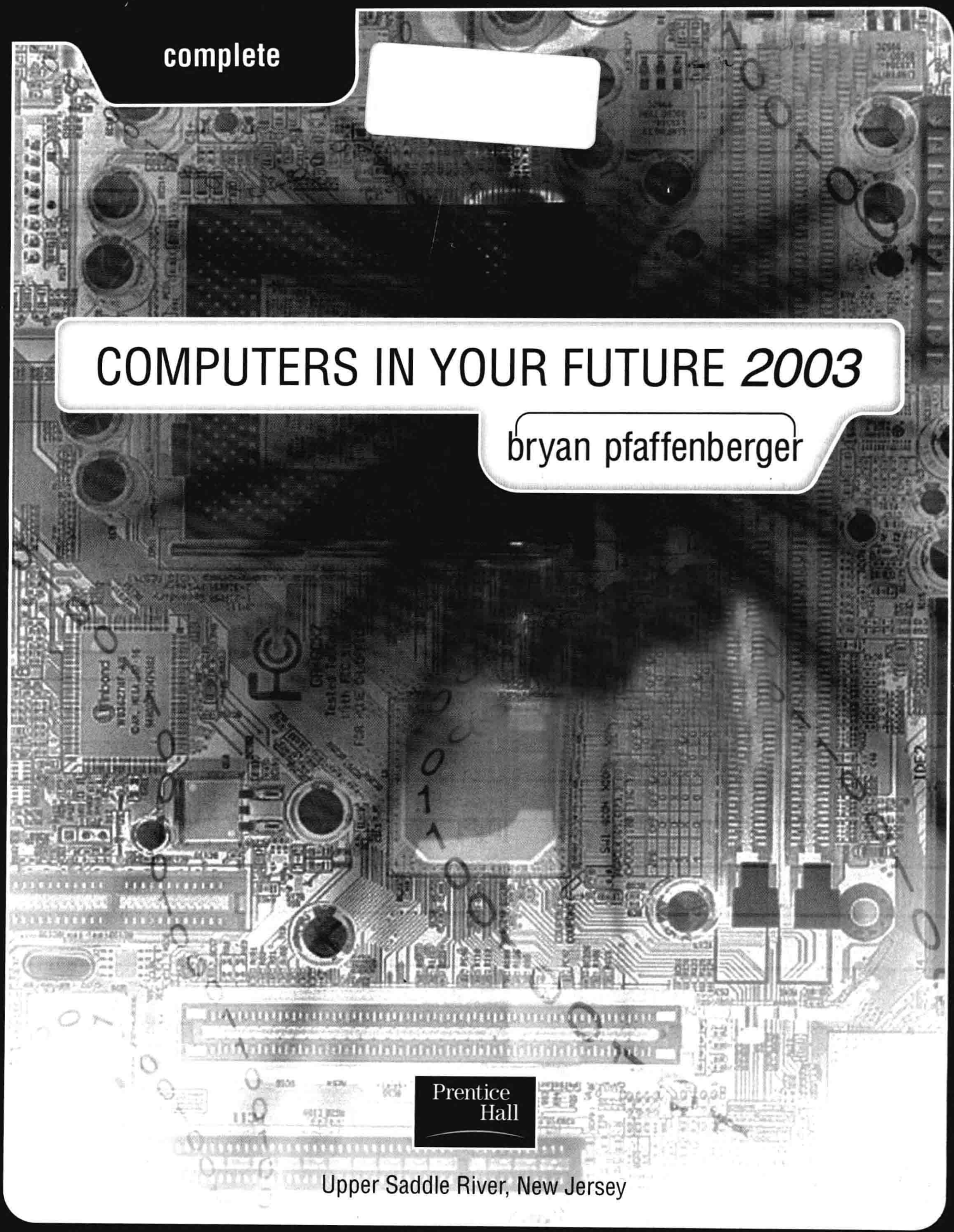

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Prentice Hall

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To Suzanne, Michael, and Julia,
for their love, patience,
understanding, and inspiration

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Bryan Pfaffenberger

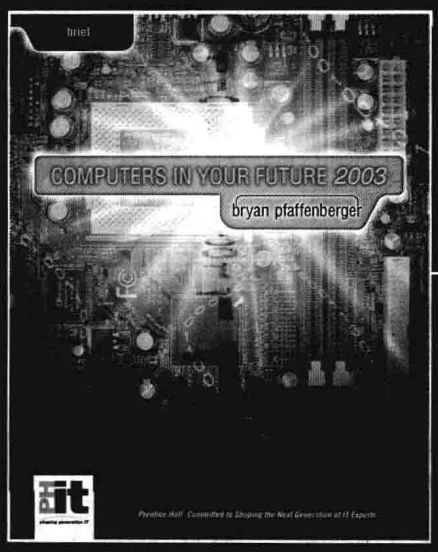
PREFACE

About This Edition

You've made suggestions, and we've listened.

- You want the new edition of ***Computers in Your Future*** to be more current and streamlined than the fourth edition—but without forcing changes in the way you're teaching the course.
- You want choices in how much coverage is included in the book.
- You want a concepts book with great learning tools that hold your students' interest and reinforce critical material—but without causing them to lose focus.
- You want a text-specific, interactive Web site that enhances your students' learning ability—as long as they are lead intuitively to key information that is concise, intelligent, and clearly laid out.
- You want a Web site with additional resources and practice exercises that are valuable for your students.

Now available as an annual edition, ***Computers in Your Future 2003*** brings a new design, updated coverage, completely new end of chapter materials, and a new accompanying Web site. This text is ready for the challenge of teaching even your most diversified class—without sacrificing quality, integrity, or choice. ***Computers in Your Future 2003*** now comes in three versions—Brief, Introductory, or Complete—to meet the needs of your classroom.



The 2003 edition offers you flexibility and currency.

- **Now available—three options for teaching: BRIEF, INTRODUCTORY, and COMPLETE.** Our Brief version contains Chapters 1–8. Our Introductory version contains Chapters 1–12. And, for the full breadth of coverage, our Complete version offers Chapters 1–16.

- **New electronic commerce Web case videos, E-COMMERCE IN ACTION, available on the Web site!** Students follow PFSWeb, Inc., a company based in Plano, Texas, that helps e-commerce companies keep up with the online buying and selling marketplace in our six new videos. Each video is designed to introduce students to electronic commerce strategies and issues, including privacy, security, and ethics.

- **SPOTLIGHT boxes highlight innovative thinking in each subject area.** For example, Emerging Technologies and Ethics: Doing the Right Thing; as well as Buying and Upgrading Your Computer System and Creating a Web Page.

- **IMPACTS boxes offer chapter-by-chapter insights on societal implications of computing.** Students are introduced to thought-provoking bites of information to stimulate class discussion or team debates on all aspects of the impact technology is having on life today.

- **CURRENTS boxes examine issues in computing as well as cutting-edge computer technology.** Students learn about what's going to change the face of computing by the time they become professionals. Currents boxes include: The U.S. Software Industry and Software Quality: Another Detroit in the Making?; Universal Service: The End of an Era?; Telemedicine; and Spies in the Sky.

- **The 2003 edition continues to emphasize computer FLUENCY.** It's one thing to be computer literate, but it's quite another to be computer fluent. Computer literate people are skilled computer and Internet users; computer fluent people are able to navigate the digital world easily. Their knowledge of the underlying concepts and principles of computers and the Internet gives them tremendous advantage. The more computer fluent people work with computer technology, the deeper and richer their understanding grows. They also understand enough about computing to recognize the risks, as well as the benefits, of technology.

- **CUTTING-EDGE topics.** Some examples of cutting-edge topics covered are: Microsoft Office XP, Microsoft Windows XP, open source software (including open source development and open source software licenses), information warfare, antitrust issues, digital copyrights and software patents.

- **Significantly UPDATED chapters.** Chapters 11 and 12 have been significantly updated, with additional coverage of privacy, security, and intellectual property issues.

For the Instructor

Instructor Resources

Instructor's Resource CD-ROM

The **Instructor's Resource CD-ROM** that is available with ***Computers in Your Future 2003*** contains:

- Instructor's Manual in Word and PDF
- Solutions to all questions and exercises from the book and Web site
- PowerPoint lectures with PresMan software
- A Windows-based test manager and the associated test bank in Word format with over 1,500 new questions
- *E-Commerce in Action* video cases

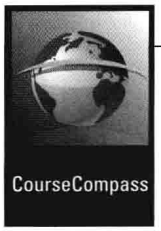
Tools for Online Learning

Companion Website www.prenhall.com/pfaffenberger

This text is accompanied by a companion Web site at **www.prenhall.com/pfaffenberger**. Features of this new site include the ability for you to customize your home page with real-time news headlines, current events, exercises, an interactive study guide, and downloadable supplements. The Web site will include additional end-of-chapter type materials including additional Web exercises. All links to Web exercises will be constantly updated to ensure accuracy for students.

ONLINE Courseware for Blackboard, WebCT, and CourseCompass

Now you have the freedom to personalize your own online course materials!
Prentice Hall provides the content and support you need to create and manage your own online course in WebCT, Blackboard, or Prentice Hall's own CourseCompass. Content includes lecture material, interactive exercises, e-commerce case videos, additional testing questions, and projects.



CourseCompass www.coursecompass.com

CourseCompass is a dynamic, interactive online course-management tool powered exclusively for Pearson Education by Blackboard. This exciting product allows you to teach market-leading Pearson Education content in an easy-to-use, customizable format.

Blackboard www.prenhall.com/blackboard

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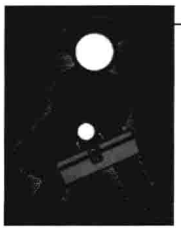


WebCT www.prenhall.com/webct

Course management tools within WebCT include page tracking, progress tracking, class and student management, a grade book, communication tools, a calendar, reporting tools, and more. GOLD LEVEL CUSTOMER SUPPORT, available exclusively to adopters of Prentice Hall courses, is provided free of charge upon adoption and provides you with priority assistance, training discounts, and dedicated technical support.

Train IT & Assess IT: www.prenhall.com/phit

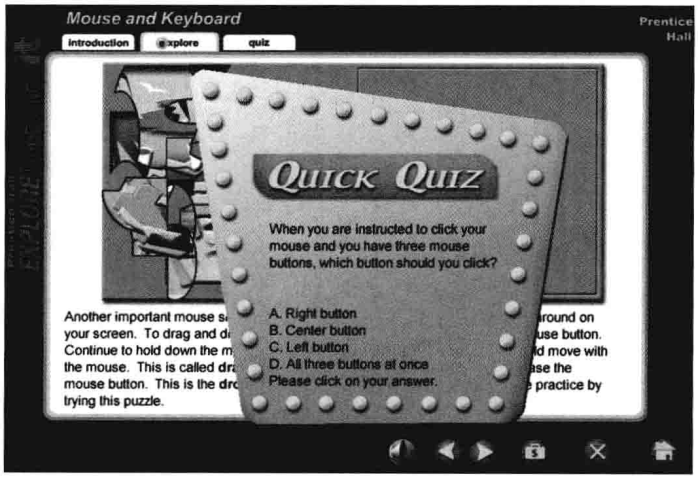
Prentice Hall train & assess it generation

Prentice Hall offers Performance-Based Training and Assessment in one product, Train & Assess IT. The Training component offers computer-based training that a student can use to preview, learn, and review Microsoft Office applications and computer literacy skills. Delivered on CD-ROM or the Web, the training component offers interactive, multimedia, computer-based training to augment classroom learning. Built-in prescriptive testing suggests a study path based not only on student test results but also on the specific textbook chosen for the course. The assessment component offers computer-based testing that shares the same user interface and is used to evaluate a student's knowledge about specific topics in Word, Excel, Access, PowerPoint, Windows, Outlook, and the Internet. It does this in a task-oriented environment to demonstrate proficiency as well as comprehension of the topics by the students.

Prentice Hall explore it generation

EXPLORE IT: www.prenhall.com/phit

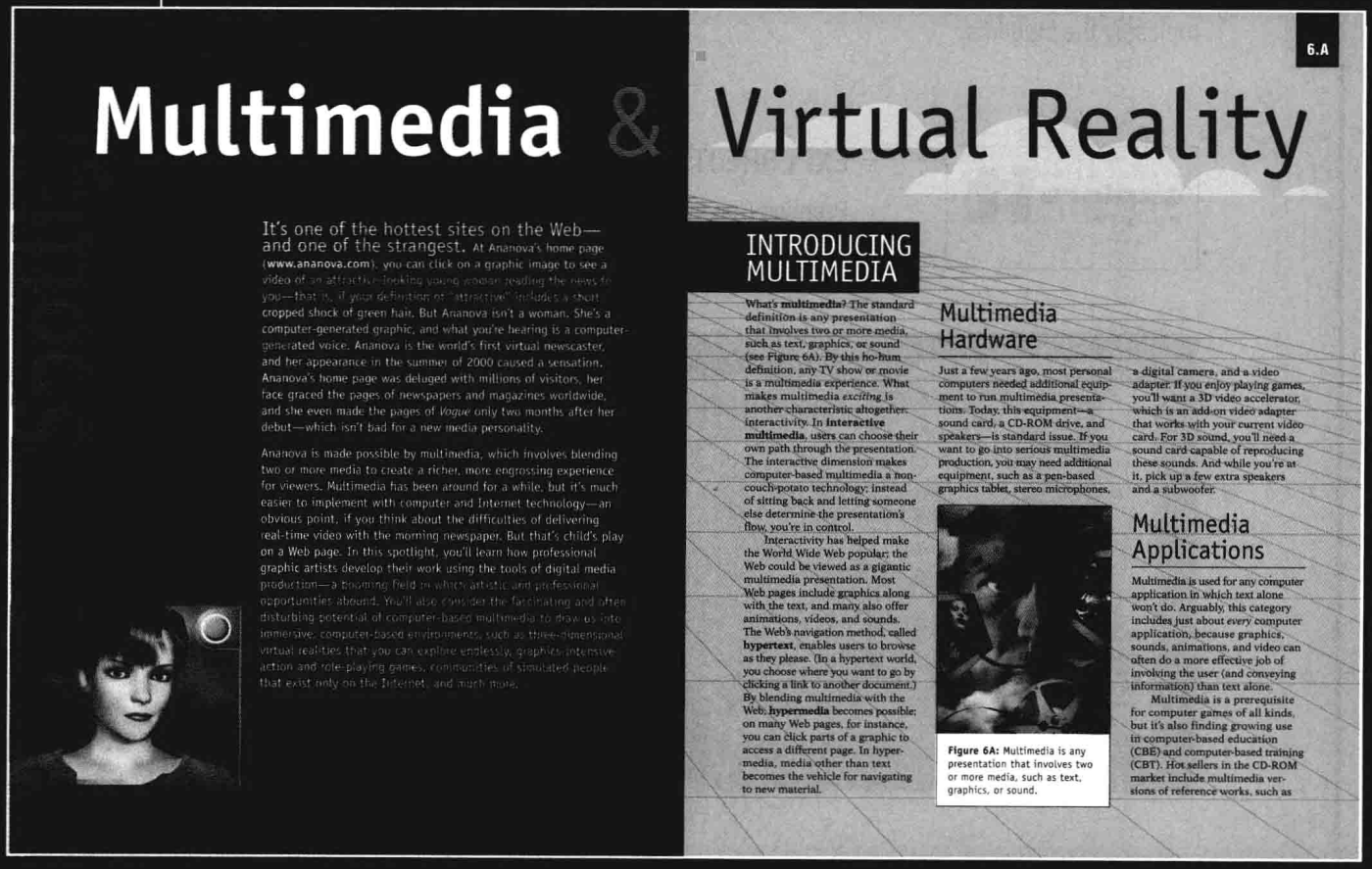
Prentice Hall offers computer-based training just for computer literacy. Designed to cover some of the most difficult concepts, as well as some current topical areas—EXPLORE IT is a Web- and CD-ROM based product designed to complement a course. Available for free with any Prentice Hall title, our new lab coverage includes: Troubleshooting, Programming Logic, Mouse and Keyboard Basics, Databases, Building a Web Page, Hardware, Software, Operating Systems, Building a Network, and more!



For the Student

Welcome to ***Computers in Your Future 2003!*** The following pages are designed to help you get the most out of the material and make the learning process rewarding. We call your attention to areas that may help you as you read through the book. Please read on, and enjoy!

SPOTLIGHT sections highlight innovative thinking in each subject area.



6.A

Multimedia & Virtual Reality

It's one of the hottest sites on the Web—and one of the strangest. At Ananova's home page (www.ananova.com), you can click on a graphic image to see a video of an attractive-looking young woman reading the news to you—that is, if your definition of "attractive" includes a short cropped shock of green hair. But Ananova isn't a woman. She's a computer-generated graphic, and what you're hearing is a computer-generated voice. Ananova is the world's first virtual newscaster, and her appearance in the summer of 2000 caused a sensation. Ananova's home page was deluged with millions of visitors, her face graced the pages of newspapers and magazines worldwide, and she even made the pages of *Vogue* only two months after her debut—which isn't bad for a new media personality.

Ananova is made possible by multimedia, which involves blending two or more media to create a richer, more engrossing experience for viewers. Multimedia has been around for a while, but it's much easier to implement with computer and Internet technology—an obvious point, if you think about the difficulties of delivering real-time video with the morning newspaper. But that's child's play on a Web page. In this spotlight, you'll learn how professional graphic artists develop their work using the tools of digital media production—a booming field in which artistic and professional opportunities abound. You'll also consider the fascinating and often disturbing potential of computer-based multimedia to draw us into immersive, computer-based environments, such as three-dimensional virtual realities that you can explore endlessly, graphics-intensive action and role-playing games, communities of simulated people that exist only on the Internet, and much more.

INTRODUCING MULTIMEDIA

What's **multimedia?** The standard definition is any presentation that involves two or more media, such as text, graphics, or sound (see Figure 6A). By this ho-hum definition, any TV show or movie is a multimedia experience. What makes multimedia *exciting* is another characteristic altogether: interactivity. In **interactive multimedia**, users can choose their own path through the presentation. The interactive dimension makes computer-based multimedia a non-couch-potato technology: instead of sitting back and letting someone else determine the presentation's flow, you're in control.

Interactivity has helped make the World Wide Web popular: the Web could be viewed as a gigantic multimedia presentation. Most Web pages include graphics along with the text, and many also offer animations, videos, and sounds. The Web's navigation method, called **hypertext**, enables users to browse as they please. (In a hypertext world, you choose where you want to go by clicking a link to another document.) By blending multimedia with the Web, **hypermedia** becomes possible: on many Web pages, for instance, you can click parts of a graphic to access a different page. In hypermedia, media other than text becomes the vehicle for navigating to new material.

Multimedia Hardware

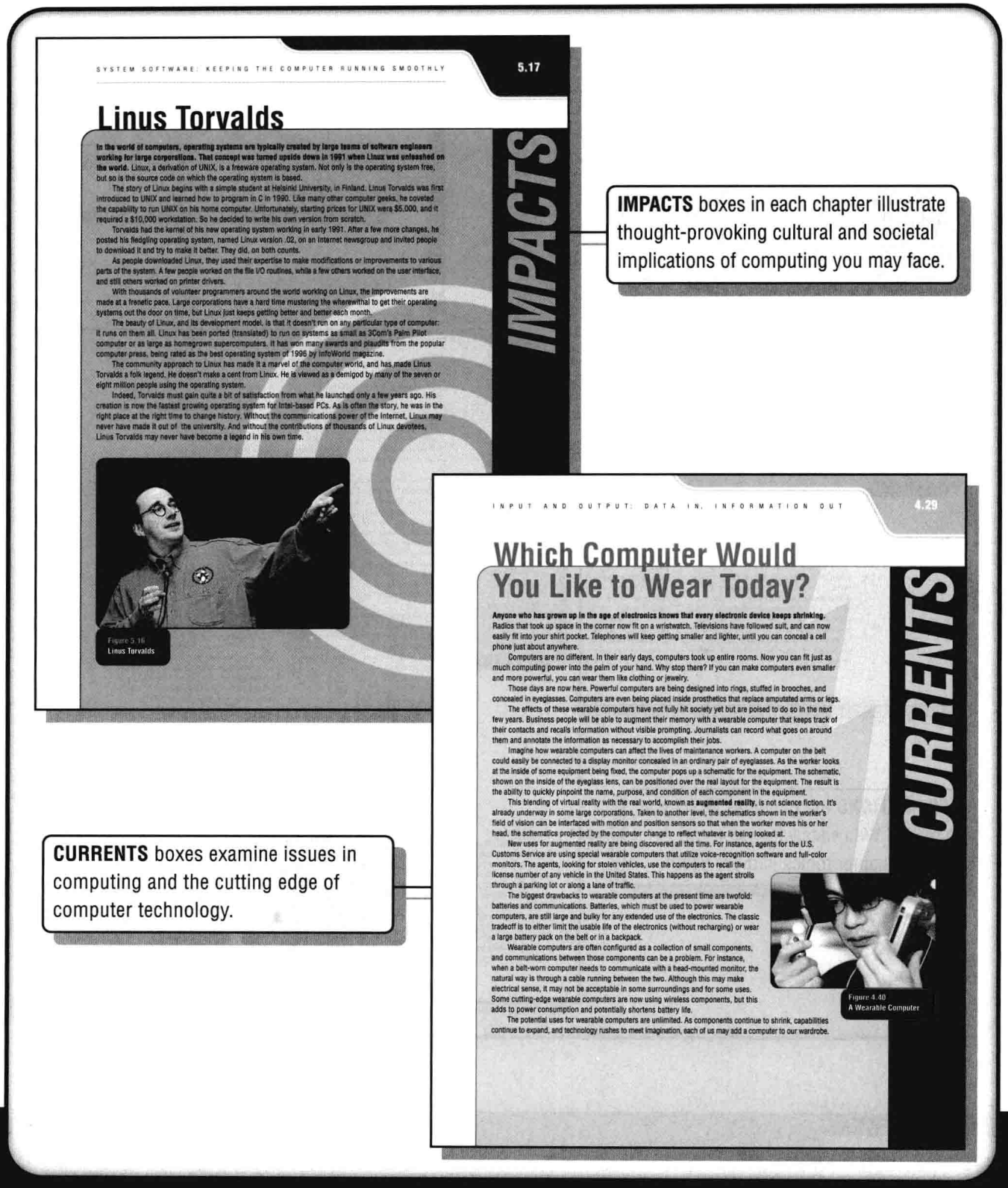
Just a few years ago, most personal computers needed additional equipment to run multimedia presentations. Today, this equipment—a sound card, a CD-ROM drive, and speakers—is standard issue. If you want to go into serious multimedia production, you may need additional equipment, such as a pen-based graphics tablet, stereo microphones, a digital camera, and a video adapter. If you enjoy playing games, you'll want a 3D video accelerator, which is an add-on video adapter that works with your current video card. For 3D sound, you'll need a sound card capable of reproducing these sounds. And while you're at it, pick up a few extra speakers and a subwoofer.

Figure 6A: Multimedia is any presentation that involves two or more media, such as text, graphics, or sound.

Multimedia Applications

Multimedia is used for any computer application in which text alone won't do. Arguably, this category includes just about *every* computer application, because graphics, sounds, animations, and video can often do a more effective job of involving the user (and conveying information) than text alone.

Multimedia is a prerequisite for computer games of all kinds, but it's also finding growing use in computer-based education (CBE) and computer-based training (CBT). Hot sellers in the CD-ROM market include multimedia versions of reference works, such as



SYSTEM SOFTWARE: KEEPING THE COMPUTER RUNNING SMOOTHLY 5.17

Linus Torvalds

IMPACTS

In the world of computers, operating systems are typically created by large teams of software engineers working for large corporations. That concept was turned upside down in 1991 when Linux was unleashed on the world. Linux, a derivation of UNIX, is a freeware operating system. Not only is the operating system free, but so is the source code on which the operating system is based.

The story of Linux begins with a simple student at Helsinki University, in Finland. Linus Torvalds was first introduced to UNIX and learned how to program in C in 1990. Like many other computer geeks, he coveted the capability to run UNIX on his home computer. Unfortunately, starting prices for UNIX were $5,000, and it required a $10,000 workstation. So he decided to write his own version from scratch.

Torvalds had the kernel of his new operating system working in early 1991. After a few more changes, he posted his fledgling operating system, named Linux version .02, on an Internet newsgroup and invited people to download it and try to make it better. They did, on both counts.

As people downloaded Linux, they used their expertise to make modifications or improvements to various parts of the system. A few people worked on the file I/O routines, while a few others worked on the user interface, and still others worked on printer drivers.

With thousands of volunteer programmers around the world working on Linux, the improvements are made at a frenetic pace. Large corporations have a hard time mustering the wherewithal to get their operating systems out the door on time, but Linux just keeps getting better and better each month.

The beauty of Linux, and its development model, is that it doesn't run on any particular type of computer: it runs on them all. Linux has been ported (translated) to run on systems as small as 3Com's Palm Pilot computer or as large as homegrown supercomputers. It has won many awards and plaudits from the popular computer press, being rated as the best operating system of 1996 by InfoWorld magazine.

The community approach to Linux has made it a marvel of the computer world, and has made Linus Torvalds a folk legend. He doesn't make a cent from Linux. He is viewed as a demigod by many of the seven or eight million people using the operating system.

Indeed, Torvalds must gain quite a bit of satisfaction from what he launched only a few years ago. His creation is now the fastest growing operating system for Intel-based PCs. As is often the story, he was in the right place at the right time to change history. Without the communications power of the Internet, Linux may never have made it out of the university. And without the contributions of thousands of Linux devotees, Linus Torvalds may never have become a legend in his own time.

Figure 5.16
Linus Torvalds

IMPACTS boxes in each chapter illustrate thought-provoking cultural and societal implications of computing you may face.

INPUT AND OUTPUT: DATA IN, INFORMATION OUT 4.29

Which Computer Would You Like to Wear Today?

CURRENTS

Anyone who has grown up in the age of electronics knows that every electronic device keeps shrinking. Radios that took up space in the corner now fit on a wristwatch. Televisions have followed suit, and can now easily fit into your shirt pocket. Telephones will keep getting smaller and lighter, until you can conceal a cell phone just about anywhere.

Computers are no different. In their early days, computers took up entire rooms. Now you can fit just as much computing power into the palm of your hand. Why stop there? If you can make computers even smaller and more powerful, you can wear them like clothing or jewelry.

Those days are now here. Powerful computers are being designed into rings, stuffed in brooches, and concealed in eyeglasses. Computers are even being placed inside prosthetics that replace amputated arms or legs.

The effects of these wearable computers have not fully hit society yet but are poised to do so in the next few years. Business people will be able to augment their memory with a wearable computer that keeps track of their contacts and recalls information without visible prompting. Journalists can record what goes on around them and annotate the information as necessary to accomplish their jobs.

Imagine how wearable computers can affect the lives of maintenance workers. A computer on the belt could easily be connected to a display monitor concealed in an ordinary pair of eyeglasses. As the worker looks at the inside of some equipment being fixed, the computer pops up a schematic for the equipment. The schematic, shown on the inside of the eyeglass lens, can be positioned over the real layout for the equipment. The result is the ability to quickly pinpoint the name, purpose, and condition of each component in the equipment.

This blending of virtual reality with the real world, known as **augmented reality**, is not science fiction. It's already underway in some large corporations. Taken to another level, the schematics shown in the worker's field of vision can be interfaced with motion and position sensors so that when the worker moves his or her head, the schematics projected by the computer change to reflect whatever is being looked at.

New uses for augmented reality are being discovered all the time. For instance, agents for the U.S. Customs Service are using special wearable computers that utilize voice-recognition software and full-color monitors. The agents, looking for stolen vehicles, use the computers to recall the license number of any vehicle in the United States. This happens as the agent strolls through a parking lot or along a lane of traffic.

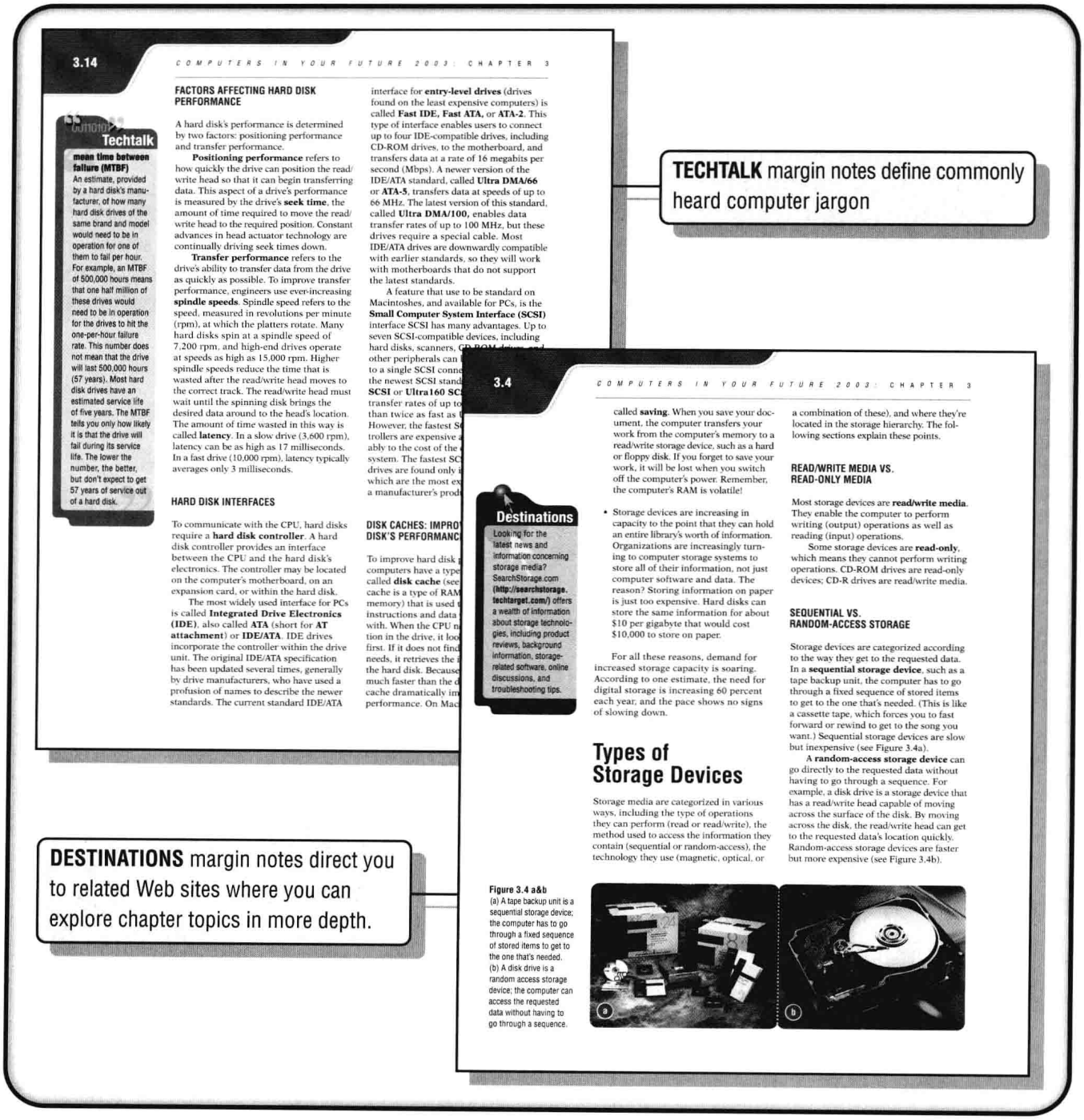
The biggest drawbacks to wearable computers at the present time are twofold: batteries and communications. Batteries, which must be used to power wearable computers, are still large and bulky for any extended use of the electronics. The classic tradeoff is to either limit the usable life of the electronics (without recharging) or wear a large battery pack on the belt or in a backpack.

Wearable computers are often configured as a collection of small components, and communications between those components can be a problem. For instance, when a belt-worn computer needs to communicate with a head-mounted monitor, the natural way is through a cable running between the two. Although this may make electrical sense, it may not be acceptable in some surroundings and for some uses. Some cutting-edge wearable computers are now using wireless components, but this adds to power consumption and potentially shortens battery life.

The potential uses for wearable computers are unlimited. As components continue to shrink, capabilities continue to expand, and technology rushes to meet imagination, each of us may add a computer to our wardrobe.

Figure 4.40
A Wearable Computer

CURRENTS boxes examine issues in computing and the cutting edge of computer technology.



3.14 COMPUTERS IN YOUR FUTURE 2003: CHAPTER 3

Techtalk

mean time between failure (MTBF)
An estimate, provided by a hard disk's manufacturer, of how many hard disk drives of the same brand and model would need to be in operation for one of them to fail per hour. For example, an MTBF of 500,000 hours means that one half million of these drives would need to be in operation for the drives to hit the one-per-hour failure rate. This number does not mean that the drive will last 500,000 hours (57 years). Most hard disk drives have an estimated service life of five years. The MTBF tells you only how likely it is that the drive will fail during its service life. The lower the number, the better, but don't expect to get 57 years of service out of a hard disk.

TECHTALK margin notes define commonly heard computer jargon

FACTORS AFFECTING HARD DISK PERFORMANCE

A hard disk's performance is determined by two factors: positioning performance and transfer performance.

Positioning performance refers to how quickly the drive can position the read/write head so that it can begin transferring data. This aspect of a drive's performance is measured by the drive's **seek time**, the amount of time required to move the read/write head to the required position. Constant advances in head actuator technology are continually driving seek times down.

Transfer performance refers to the drive's ability to transfer data from the drive as quickly as possible. To improve transfer performance, engineers use ever-increasing **spindle speeds**. Spindle speed refers to the speed, measured in revolutions per minute (rpm), at which the platters rotate. Many hard disks spin at a spindle speed of 7,200 rpm, and high-end drives operate at speeds as high as 15,000 rpm. Higher spindle speeds reduce the time that is wasted after the read/write head moves to the correct track. The read/write head must wait until the spinning disk brings the desired data around to the head's location. The amount of time wasted in this way is called **latency**. In a slow drive (3,600 rpm), latency can be as high as 17 milliseconds. In a fast drive (10,000 rpm), latency typically averages only 3 milliseconds.

HARD DISK INTERFACES

To communicate with the CPU, hard disks require a **hard disk controller**. A hard disk controller provides an interface between the CPU and the hard disk's electronics. The controller may be located on the computer's motherboard, on an expansion card, or within the hard disk.

The most widely used interface for PCs is called **Integrated Drive Electronics (IDE)**, also called **ATA** (short for **AT attachment**) or **IDE/ATA**. IDE drives incorporate the controller within the drive unit. The original IDE/ATA specification has been updated several times, generally by drive manufacturers, who have used a profusion of names to describe the newer standards. The current standard IDE/ATA interface for **entry-level drives** (drives found on the least expensive computers) is called **Fast IDE, Fast ATA,** or **ATA-2**. This type of interface enables users to connect up to four IDE-compatible drives, including CD-ROM drives, to the motherboard, and transfers data at a rate of 16 megabits per second (Mbps). A newer version of the IDE/ATA standard, called **Ultra DMA/66** or **ATA-5**, transfers data at speeds of up to 66 MHz. The latest version of this standard, called **Ultra DMA/100,** enables data transfer rates of up to 100 MHz, but these drives require a special cable. Most IDE/ATA drives are downwardly compatible with earlier standards, so they will work with motherboards that do not support the latest standards.

A feature that use to be standard on Macintoshes, and available for PCs, is the **Small Computer System Interface (SCSI)** interface SCSI has many advantages. Up to seven SCSI-compatible devices, including hard disks, scanners, CD-ROM drives, and other peripherals can b
to a single SCSI conne
the newest SCSI stand
SCSI or **Ultra160 SC**
transfer rates of up to
than twice as fast as
However, the fastest S
trollers are expensive
ably to the cost of the
system. The fastest SC
drives are found only i
which are the most ex
a manufacturer's prod

DISK CACHES: IMPRO
DISK'S PERFORMANC

To improve hard disk
computers have a type
called **disk cache** (see
cache is a type of RAM
memory) that is used
instructions and data
with. When the CPU n
tion in the drive, it loo
first. If it does not find
needs, it retrieves the
the hard disk. Because
much faster than the d
cache dramatically im
performance. On Mac

3.4 COMPUTERS IN YOUR FUTURE 2003: CHAPTER 3

Destinations

Looking for the latest news and information concerning storage media? SearchStorage.com **(http://searchstorage.techtarget.com/)** offers a wealth of information about storage technologies, including product reviews, background information, storage-related software, online discussions, and troubleshooting tips.

DESTINATIONS margin notes direct you to related Web sites where you can explore chapter topics in more depth.

called **saving**. When you save your document, the computer transfers your work from the computer's memory to a read/write storage device, such as a hard or floppy disk. If you forget to save your work, it will be lost when you switch off the computer's power. Remember, the computer's RAM is volatile!

- Storage devices are increasing in capacity to the point that they can hold an entire library's worth of information. Organizations are increasingly turning to computer storage systems to store all of their information, not just computer software and data. The reason? Storing information on paper is just too expensive. Hard disks can store the same information for about $10 per gigabyte that would cost $10,000 to store on paper.

For all these reasons, demand for increased storage capacity is soaring. According to one estimate, the need for digital storage is increasing 60 percent each year, and the pace shows no signs of slowing down.

Types of Storage Devices

Storage media are categorized in various ways, including the type of operations they can perform (read or read/write), the method used to access the information they contain (sequential or random-access), the technology they use (magnetic, optical, or a combination of these), and where they're located in the storage hierarchy. The following sections explain these points.

READ/WRITE MEDIA VS. READ-ONLY MEDIA

Most storage devices are **read/write media**. They enable the computer to perform writing (output) operations as well as reading (input) operations.

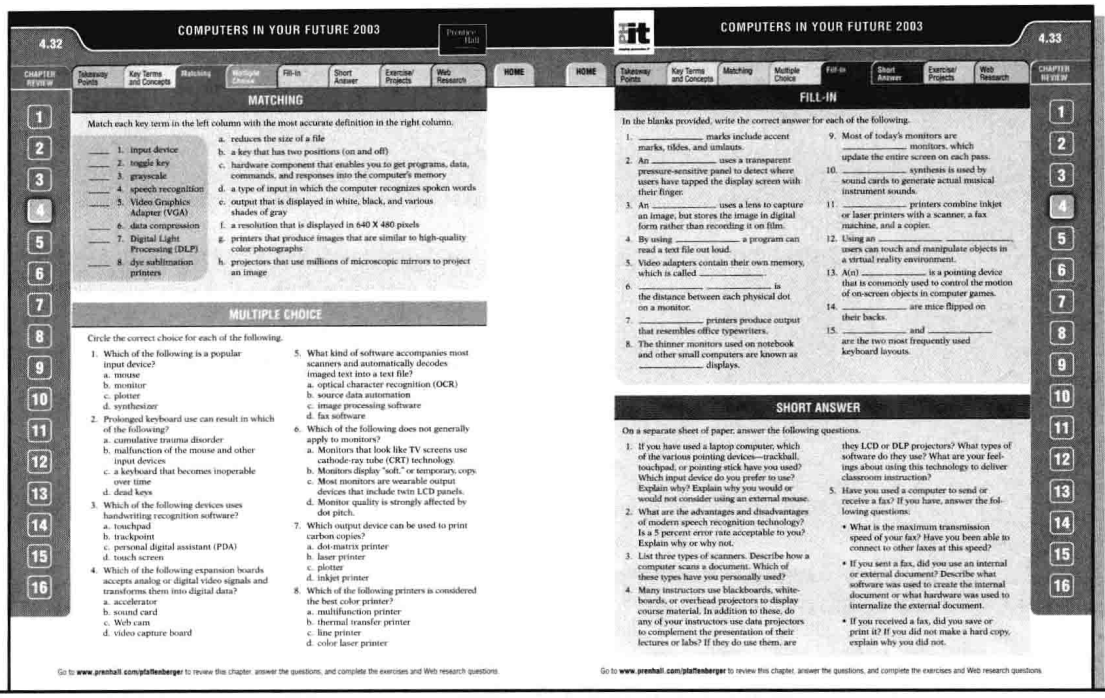
Some storage devices are **read-only**, which means they cannot perform writing operations. CD-ROM drives are read-only devices; CD-R drives are read/write media.

SEQUENTIAL VS. RANDOM-ACCESS STORAGE

Storage devices are categorized according to the way they get to the requested data. In a **sequential storage device**, such as a tape backup unit, the computer has to go through a fixed sequence of stored items to get to the one that's needed. (This is like a cassette tape, which forces you to fast forward or rewind to get to the song you want.) Sequential storage devices are slow but inexpensive (see Figure 3.4a).

A random-access storage device can go directly to the requested data without having to go through a sequence. For example, a disk drive is a storage device that has a read/write head capable of moving across the surface of the disk. By moving across the disk, the read/write head can get to the requested data's location quickly. Random-access storage devices are faster but more expensive (see Figure 3.4b).

Figure 3.4 a&b
(a) A tape backup unit is a sequential storage device; the computer has to go through a fixed sequence of stored items to get to the one that's needed. (b) A disk drive is a random access storage device; the computer can access the requested data without having to go through a sequence.



COMPUTERS IN YOUR FUTURE 2003 4.32

CHAPTER REVIEW: Takeaway Points | Key Terms and Concepts | Matching | Multiple Choice | Fill-In | Short Answer | Exercise/ Projects | Web Research | HOME

MATCHING

Match each key term in the left column with the most accurate definition in the right column.

____ 1. input device	a. reduces the size of a file
____ 2. toggle key	b. a key that has two positions (on and off)
____ 3. grayscale	c. hardware component that enables you to get programs, data, commands, and responses into the computer's memory
____ 4. speech recognition	d. a type of input in which the computer recognizes spoken words
____ 5. Video Graphics Adapter (VGA)	e. output that is displayed in white, black, and various shades of gray
____ 6. data compression	f. a resolution that is displayed in 640 X 480 pixels
____ 7. Digital Light Processing (DLP)	g. printers that produce images that are similar to high-quality color photographs
____ 8. dye sublimation printers	h. projectors that use millions of microscopic mirrors to project an image

MULTIPLE CHOICE

Circle the correct choice for each of the following.

1. Which of the following is a popular input device?
   a. mouse
   b. monitor
   c. plotter
   d. synthesizer
2. Prolonged keyboard use can result in which of the following?
   a. cumulative trauma disorder
   b. malfunction of the mouse and other input devices
   c. a keyboard that becomes inoperable over time
   d. dead keys
3. Which of the following devices uses handwriting recognition software?
   a. touchpad
   b. trackpoint
   c. personal digital assistant (PDA)
   d. touch screen
4. Which of the following expansion boards accepts analog or digital video signals and transforms them into digital data?
   a. accelerator
   b. sound card
   c. Web cam
   d. video capture board
5. What kind of software accompanies most scanners and automatically decodes imaged text into a text file?
   a. optical character recognition (OCR)
   b. source data automation
   c. image processing software
   d. fax software
6. Which of the following does not generally apply to monitors?
   a. Monitors that look like TV screens use cathode-ray tube (CRT) technology.
   b. Monitors display "soft," or temporary, copy.
   c. Most monitors are wearable output devices that include twin LCD panels.
   d. Monitor quality is strongly affected by dot pitch.
7. Which output device can be used to print carbon copies?
   a. dot-matrix printer
   b. laser printer
   c. plotter
   d. inkjet printer
8. Which of the following printers is considered the best color printer?
   a. multifunction printer
   b. thermal transfer printer
   c. line printer
   d. color laser printer

Go to www.prenhall.com/pfaffenberger to review this chapter, answer the questions, and complete the exercises and Web research questions.

COMPUTERS IN YOUR FUTURE 2003 4.33

CHAPTER REVIEW: Takeaway Points | Key Terms and Concepts | Matching | Multiple Choice | Fill-In | Short Answer | Exercise/ Projects | Web Research | HOME

FILL-IN

In the blanks provided, write the correct answer for each of the following.

1. _____ marks include accent marks, tildes, and umlauts.
2. An _____ uses a transparent pressure-sensitive panel to detect where users have tapped the display screen with their finger.
3. An _____ uses a lens to capture an image, but stores the image in digital form rather than recording it on film.
4. By using _____, a program can read a text file out loud.
5. Video adapters contain their own memory, which is called _____.
6. _____ is the distance between each physical dot on a monitor.
7. _____ printers produce output that resembles office typewriters.
8. The thinner monitors used on notebook and other small computers are known as _____ displays.
9. Most of today's monitors are _____ monitors, which update the entire screen on each pass.
10. _____ synthesis is used by sound cards to generate actual musical instrument sounds.
11. _____ printers combine inkjet or laser printers with a scanner, a fax machine, and a copier.
12. Using an _____, users can touch and manipulate objects in a virtual reality environment.
13. A(n) _____ is a pointing device that is commonly used to control the motion of on-screen objects in computer games.
14. _____ are mice flipped on their backs.
15. _____ and _____ are the two most frequently used keyboard layouts.

SHORT ANSWER

On a separate sheet of paper, answer the following questions.

1. If you have used a laptop computer, which of the various pointing devices—trackball, touchpad, or pointing stick have you used? Which input device do you prefer to use? Explain why? Explain why you would or would not consider using an external mouse.
2. What are the advantages and disadvantages of modern speech recognition technology? Is a 5 percent error rate acceptable to you? Explain why or why not.
3. List three types of scanners. Describe how a computer scans a document. Which of these types have you personally used?
4. Many instructors use blackboards, whiteboards, or overhead projectors to display course material. In addition to these, do any of your instructors use data projectors to complement the presentation of their lectures or labs? If they do use them, are they LCD or DLP projectors? What types of software do they use? What are your feelings about using this technology to deliver classroom instruction?
5. Have you used a computer to send or receive a fax? If you have, answer the following questions:
   - What is the maximum transmission speed of your fax? Have you been able to connect to other faxes at this speed?
   - If you sent a fax, did you use an internal or external document? Describe what software was used to create the internal document or what hardware was used to internalize the external document.
   - If you received a fax, did you save or print it? If you did not make a hard copy, explain why you did not.

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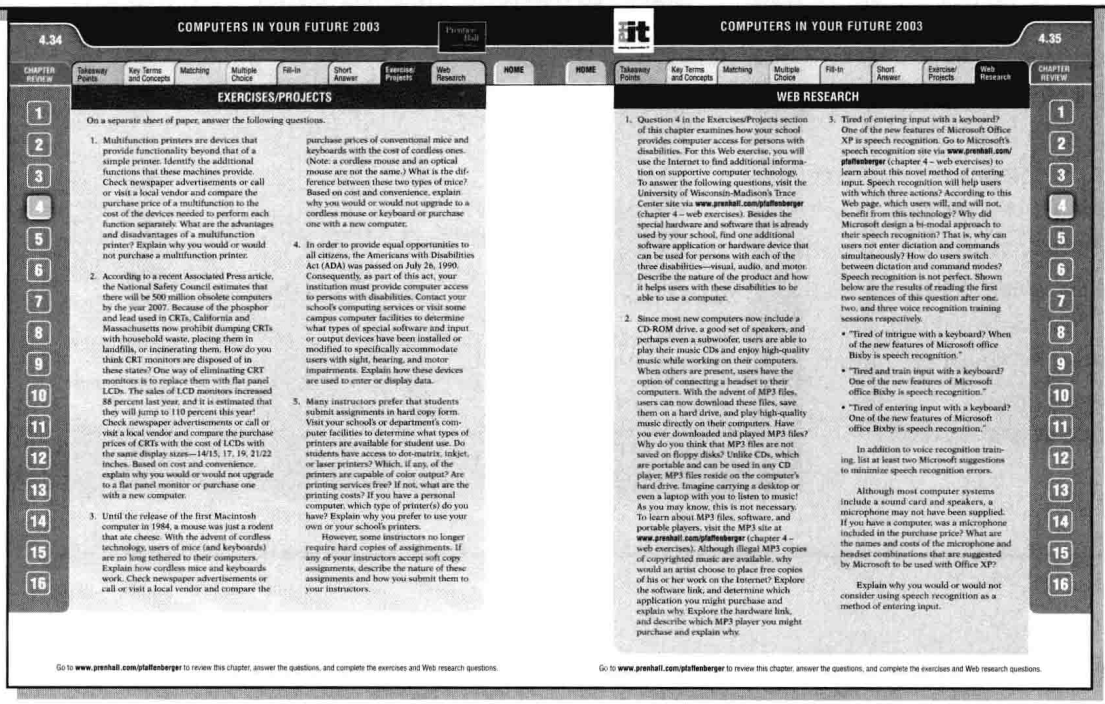
END-OF-CHAPTER MATERIAL includes updated multiple choice, matching, fill-in, and short answer questions, as well as Web research projects so you can prepare for tests.



COMPUTERS IN YOUR FUTURE 2003 4.34

CHAPTER REVIEW: Takeaway Points | Key Terms and Concepts | Matching | Multiple Choice | Fill-In | Short Answer | Exercise/ Projects | Web Research | HOME

EXERCISES/PROJECTS

On a separate sheet of paper, answer the following questions.

1. Multifunction printers are devices that provide functionality beyond that of a simple printer. Identify the additional functions that these machines provide. Check newspaper advertisements or call or visit a local vendor and compare the purchase price of a multifunction to the cost of the devices needed to perform each function separately. What are the advantages and disadvantages of a multifunction printer? Explain why you would or would not purchase a multifunction printer.
2. According to a recent Associated Press article, the National Safety Council estimates that there will be 500 million obsolete computers by the year 2007. Because of the phosphor and lead used in CRTs, California and Massachusetts now prohibit dumping CRTs with household waste, placing them in landfills, or incinerating them. How do you think CRT monitors are disposed of in these states? One way of eliminating CRT monitors is to replace them with flat panel LCDs. The sales of LCD monitors increased 88 percent last year, and it is estimated that they will jump to 110 percent this year! Check newspaper advertisements or call or visit a local vendor and compare the purchase prices of CRTs with the cost of LCDs with the same display sizes—14/15, 17, 19, 21/22 inches. Based on cost and convenience, explain why you would or would not upgrade to a flat panel monitor or purchase one with a new computer.
3. Until the release of the first Macintosh computer in 1984, a mouse was just a rodent that ate cheese. With the advent of cordless technology, users of mice (and keyboards) are no long tethered to their computers. Explain how cordless mice and keyboards work. Check newspaper advertisements or call or visit a local vendor and compare the purchase prices of conventional mice and keyboards with the cost of cordless ones. (Note: a cordless mouse and an optical mouse are not the same.) What is the difference between these two types of mice? Based on cost and convenience, explain why you would or would not upgrade to a cordless mouse or keyboard or purchase one with a new computer.
4. In order to provide equal opportunities to all citizens, the Americans with Disabilities Act (ADA) was passed on July 26, 1990. Consequently, as part of this act, your institution must provide computer access to persons with disabilities. Contact your school's computing services or visit some campus computer facilities to determine what types of special software and input or output devices have been installed or modified to specifically accommodate users with sight, hearing, and motor impairments. Explain how these devices are used to enter or display data.
5. Many instructors prefer that students submit assignments in hard copy form. Visit your school's or department's computer facilities to determine what types of printers are available for student use. Do students have access to dot-matrix, inkjet, or laser printers? Which, if any, of the printers are capable of color output? Are printing services free? If not, what are the printing costs? If you have a personal computer, which type of printer(s) do you have? Explain why you prefer to use your own or your school's printers.

   However, some instructors no longer require hard copies of assignments. If any of your instructors accept soft copy assignments, describe the nature of these assignments and how you submit them to your instructors.

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COMPUTERS IN YOUR FUTURE 2003 4.35

CHAPTER REVIEW: Takeaway Points | Key Terms and Concepts | Matching | Multiple Choice | Fill-In | Short Answer | Exercise/ Projects | Web Research | HOME

WEB RESEARCH

1. Question 4 in the Exercises/Projects section of this chapter examines how your school provides computer access for persons with disabilities. For this Web exercise, you will use the Internet to find additional information on supportive computer technology. To answer the following questions, visit the University of Wisconsin-Madison's Trace Center site via **www.prenhall.com/pfaffenberger** (chapter 4 – web exercises). Besides the special hardware and software that is already used by your school, find one additional software application or hardware device that can be used for persons with each of the three disabilities—visual, audio, and motor. Describe the nature of the product and how it helps users with these disabilities to be able to use a computer.
2. Since most new computers now include a CD-ROM drive, a good set of speakers, and perhaps even a subwoofer, users are able to play their music CDs and enjoy high-quality music while working on their computers. When others are present, users have the option of connecting a headset to their computers. With the advent of MP3 files, users can now download these files, save them on a hard drive, and play high-quality music directly on their computers. Have you ever downloaded and played MP3 files? Why do you think that MP3 files are not saved on floppy disks? Unlike CDs, which are portable and can be used in any CD player, MP3 files reside on the computer's hard drive. Imagine carrying a desktop or even a laptop with you to listen to music! As you may know, this is not necessary. To learn about MP3 files, software, and portable players, visit the MP3 site at **www.prenhall.com/pfaffenberger** (chapter 4 – web exercises). Although illegal MP3 copies of copyrighted music are available, why would an artist choose to place free copies of his or her work on the Internet? Explore the software link, and determine which application you might purchase and explain why. Explore the hardware link, and describe which MP3 player you might purchase and explain why.
3. Tired of entering input with a keyboard? One of the new features of Microsoft Office XP is speech recognition. Go to Microsoft's speech recognition site via **www.prenhall.com/pfaffenberger** (chapter 4 – web exercises) to learn about this novel method of entering input. Speech recognition will help users with which three actions? According to this Web page, which users will, and will not, benefit from this technology? Why did Microsoft design a bi-modal approach to their speech recognition? That is, why can users not enter dictation and commands simultaneously? How do users switch between dictation and command modes? Speech recognition is not perfect. Shown below are the results of reading the first two sentences of this question after one, two, and three voice recognition training sessions respectively.
   - "Tired of intrigue with a keyboard? When of the new features of Microsoft office Bixby is speech recognition."
   - "Tired and train input with a keyboard? One of the new features of Microsoft office Bixby is speech recognition."
   - "Tired of entering input with a keyboard? One of the new features of Microsoft office Bixby is speech recognition."

   In addition to voice recognition training, list at least two Microsoft suggestions to minimize speech recognition errors.

   Although most computer systems include a sound card and speakers, a microphone may not have been supplied. If you have a computer, was a microphone included in the purchase price? What are the names and costs of the microphone and headset combinations that are suggested by Microsoft to be used with Office XP?

   Explain why you would or would not consider using speech recognition as a method of entering input.

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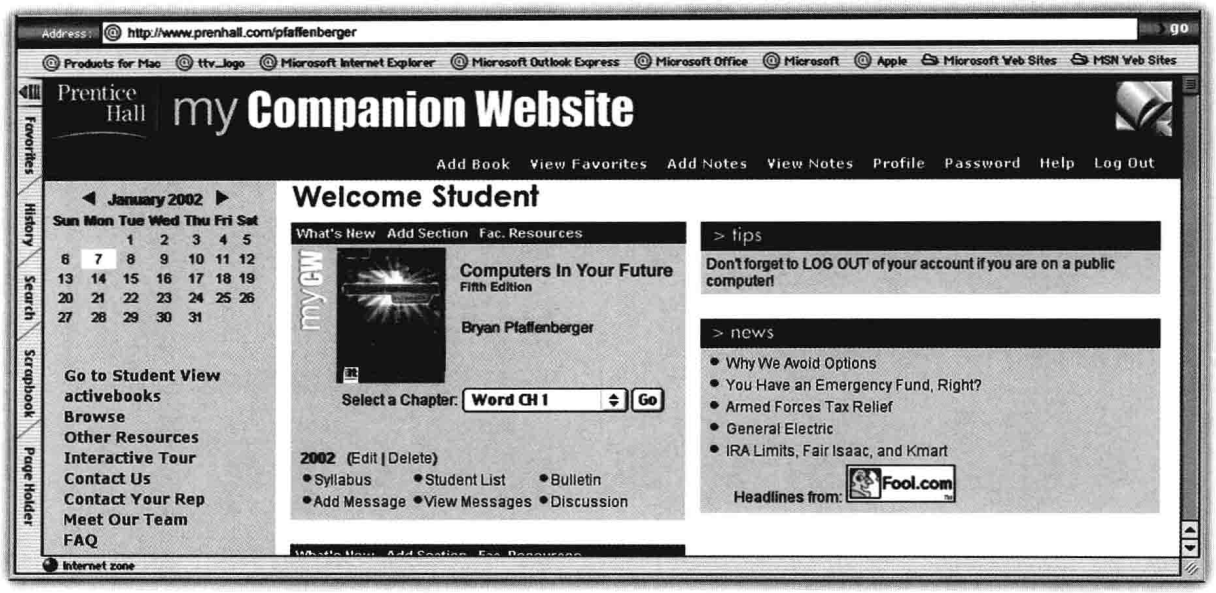
Visit our Web site at **www.prenhall.com/pfaffenberger** for additional practice tests and quizzes.



EXPLORE IT LABS present you with an interactive look into the world of computer concepts! These 16 labs bring challenging topics in computer concepts to life through interactivity and assess your knowledge via a Quiz section, which can be e-mailed, saved to disk, or printed.

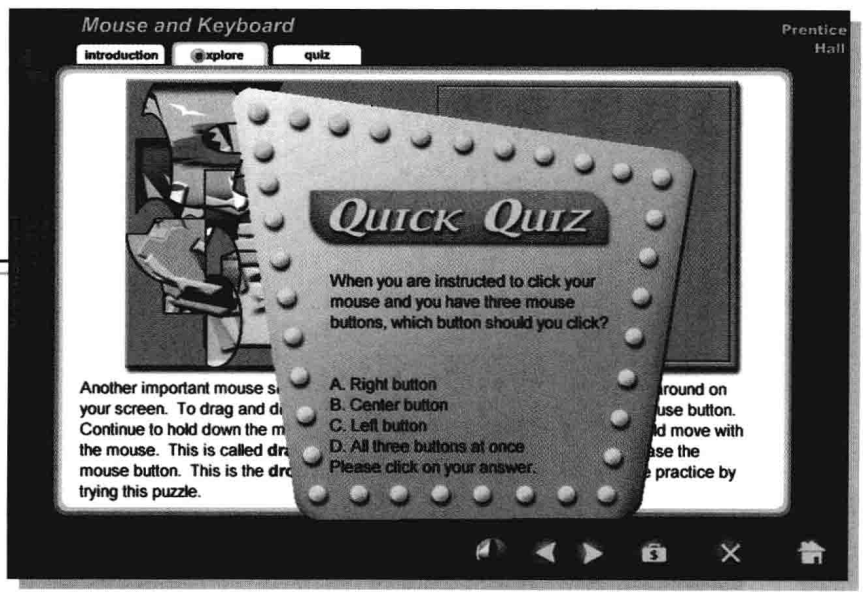


TABLE OF CONTENTS

At a Glance

Chapter 1

Becoming Fluent with Computers and the Internet

CHAPTER 1 OUTLINE