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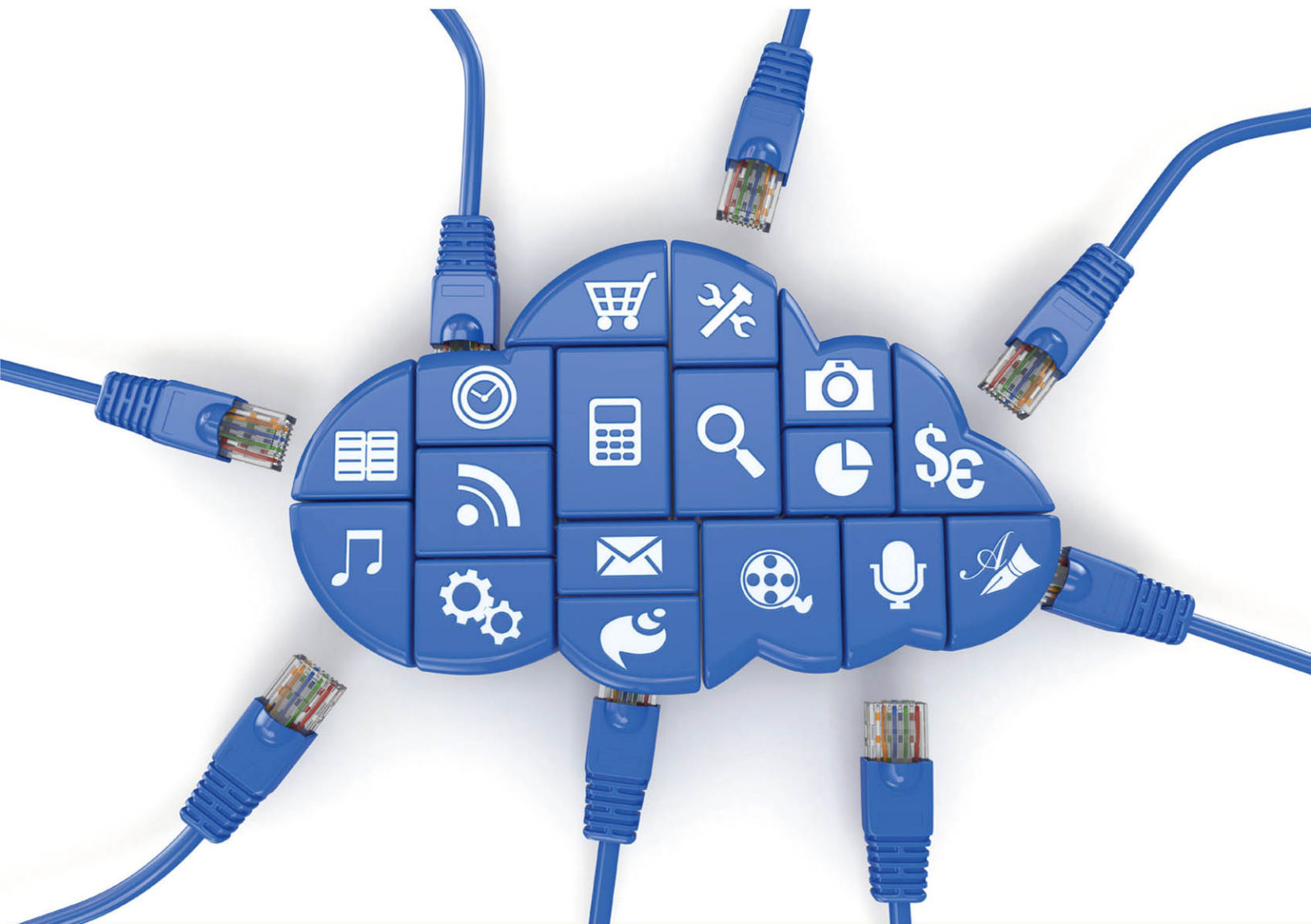


Technology in Action

Complete

TWELFTH EDITION

Alan Evans • Kendall Martin • Mary Anne Poatsy



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What's New

Technology in Action, 12th Edition

We are delighted for you to explore the Twelfth Edition of *Technology in Action*!

*Explore, discover, and experience technology with the immersive and adaptive **Technology in Action**—the book that uses technology to teach technology!*

Technology in Action is a learning system that pushes the envelope of what is possible in technology, and what is helpful in teaching. It is a system that fits the way students are learning today and uses rich companion media to engage students in and out of the classroom while providing essential training on computer concepts.

What's New?

- All content has been updated as needed to ensure coverage of the most current technology, and updated end-of-chapter exercises are included throughout the book, including a NEW end-of-chapter quiz and updated versions of the Check Your Understanding reviews.
- **NEW Make This** projects address the hot area of mobile app creation! Mobile app creation skills are already highly valued in the workplace. The Make This projects are a fun way to engage your students while helping them develop cutting-edge skills. Each chapter includes a *Make This* mobile app project, most of which use App Inventor. By the end of the course, students will have completed 13 small app projects that provide them with new skills they can use to create their own apps. And if they don't have an Android device, they can use the emulator and still learn the skills.
- **NEW Solve This** projects put the concepts students are learning into action through real-world problem solving using a Microsoft Office application or other technology tool!

UPDATED AND ENHANCED media offerings including:

- **Sound Bytes:** These multimedia lessons help demystify computer concepts with audio and video presentations. All Sound Bytes have been reviewed and updated as needed to provide timely and accurate information. This edition also includes two NEW Sound Bytes: "Using the Arduino Microcontroller" and "Programming with the Processing Language."
- **Active Helpdesk:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via live chat, FAQ searches, etc. at a helpdesk. Students play the role of a helpdesk staffer answering technology questions using these various approaches. All Helpdesks have been reviewed and updated as needed.
 - A virtual supervisor provides support to the student throughout the activity.

- Assessment questions after each Helpdesk provide instructors with a tool to gauge and track students' progress. This edition includes three NEW or completely revised Helpdesks: "Evaluating Websites," "Working with Smartphones," and "Keeping Your Data on Hand."
- **UPDATED Replay Videos:** The *Replay* Videos provide an author-narrated video review of each chapter part in an easy-to-use format students can view on their phones, tablets, or computers.
- **With Tech Bytes Weekly, every week is new!** This weekly newsfeed provides two timely articles to save instructors the prep time required for adding interesting and relevant news items to their weekly lectures. Tech Bytes Weekly also features valuable links and other resources, including discussion questions and course activities.
- **Jeopardy! Game and Crossword Puzzles:** These engaging games give students a fun way to challenge their knowledge.

In addition to these changes, all chapters have been updated with new images, current topics, and state-of-the-art technology coverage. Some of the chapter changes are listed here:

Chapter 1: Using Technology to Change the World

- Throughout the chapter, text, figures, and photos have been updated.
- A new example of social networking tools used in political context has been added.
- The Ethics in IT, "The Digital Divide and the Mobile Bridge" has been updated.
- The Try This has been updated to reflect Skype site content changes.
- The concept of Big Data has been introduced in the section on data mining.
- The end-of-chapter Ethics Project has been replaced with a new project on big data, "Can Big Data Predict Your Grade?"
- NEW Bits & Bytes "Compute Me a Picture" on generative design using the free tool Processing has been added, replacing the previous edition Bits & Bytes, "NASA Wants You to Learn."

Chapter 2: Looking at Computers: Understanding the Parts

- Throughout the chapter, text, figures, and photos have been updated.

- Next generation gesture technology is now covered in the “How Cool Is This?” feature.
- NEW Bits & Bytes “Forget HDTV...Here Comes Ultra HD!” has been added, replacing the previous edition Bits & Bytes “Testing and Calibrating Your PC Monitor.”
- NEW Bits & Bytes “Green Computing” has been added, replacing the previous edition Bits & Bytes “Taking Care of Flash Drives.”
- Throughout the chapter, text and figures have been updated to reflect Windows 8.1 changes.
- The end-of-chapter Team Time project has been replaced with a new project, “Data Storage Options.”

Chapter 3: Using the Internet: Making the Most of the Web’s Resources

- Throughout the chapter, text, figures, and photos have been updated.
- Updated Bits & Bytes on HTML5 versus Flash.
- Revised Bits & Bytes “Making Safe Online Payments” to include Apple Pay.
- Try This has been updated to reflect Microsoft Office Online changes.
- NEW “Evaluating Websites” Helpdesk has been added, replacing the “Using Subject Directories and Search Engines” Helpdesk.

Technology in Focus: The History of the PC

- This Tech in Focus has been updated as needed.

Chapter 4: Application Software: Programs That Let You Work and Play

- Throughout the chapter, text, figures, and photos have been updated.
- “How Cool Is This?” feature on eye-tracking software has been updated.
- “Trends in IT: Mobile Commerce: What Have You Bought with Your Phone Lately?” has been updated.
- New Alternative Note-Taking Applications have been added to Figure 4.12.

Chapter 5: System Software: The Operating System, Utility Programs, and File Management

- Throughout the chapter, text, figures, and photos have been updated.
- Content throughout has been updated to include coverage of Windows 8.1 update and OS X Yosemite.
- NEW “How Cool Is This?” feature has been added on smartwatches.
- “The Windows Interface” section has been revised and updated to reflect changes in Windows 8.1 update.

- UPDATED Sound Byte, “File Management,” to reflect Windows updates.
- UPDATED Sound Byte, “Customizing Windows,” to reflect Windows updates.

Technology in Focus: Information Technology Ethics

- This Tech in Focus has been updated throughout.
- A new section “Who Sets the Ethics for Robots?” has been added, replacing the “Brain Technology: Creating Cyborgs” section.

Chapter 6: Understanding and Assessing Hardware: Evaluating Your System

- Throughout the chapter, text has been updated to match current hardware standards, and figures and photos have been updated.
- All references to operating system utilities have been updated to reflect changes in Windows 8.1.
- UPDATED Sound Byte, “Installing RAM,” to show RAM being added to a laptop computer.
- NEW Sound Byte, “Installing an SSD Drive,” has been added, replacing the Sound Byte “Installing a Blu-Ray Drive.”

Chapter 7: Networking: Connecting Computing Devices

- Throughout the chapter, text, figures, and photos have been updated.
- NEW Bits & Bytes “The Internet of Things” has been added, replacing “How Do You Find Your WiFi?”
- NEW Bits & Bytes “Analyzing Network Problems” has been added, replacing “Want to Use Your Phone as a Remote Control?”
- The content on Network-Attached Storage Devices has been updated to include Apple AirPort Time Capsule.
- The Trends in IT: “Where Should You Store Your Files: The Cloud Is Calling” has been updated.

Technology in Focus: Under the Hood

- This Tech in Focus has been updated throughout, with several new photos.
- Bits & Bytes “Forget CPUs: SoC Is the Future for Mobile Devices!” has been updated to reflect current trends in SoC.

Chapter 8: Digital Devices and Media: Managing a Digital Lifestyle

- Throughout the chapter, text, figures, and photos have been updated.
- NEW Bits & Bytes “Bluetooth and LE Beacons” has been added, replacing Bits & Bytes on mobile speech recognition.

- NEW “Working with Smartphones” Helpdesk has been added, replacing the “Using Portable Media Players” Helpdesk. This new Helpdesk uses much of the information previously found in the “Keeping Data on Hand” Helpdesk.
- REVISED “Keeping Your Data on Hand” Helpdesk to include coverage of cloud computing.
- UPDATED Sound Byte, “Smartphones Are Really Smart” for currency.
- UPDATED Sound Byte, “Connecting with Bluetooth,” to include other uses of Bluetooth.

Chapter 9: Securing Your System: Protecting Your Digital Data and Devices

- Throughout the chapter, text, figures, and photos have been updated.
- Screenshots throughout have been updated to reflect changes in the Windows 8.1 update.
- NEW “How Cool is This?” on biometric authentication using vein scanning technology has been added.
- NEW Bits & Bytes “Multifactor Authentication: Don’t Rely Solely on Passwords” has been added, replacing “Can’t Remember Passwords? Try a Passphrase Instead!”
- UPDATED Sound Byte, “Installing a Personal Firewall,” to cover wireless connections and Windows updates.

Technology in Focus: Careers in IT

- This Tech in Focus has been updated throughout.
- NEW Bits & Bytes “Cool New Jobs on the Horizon” has been added, replacing Bits & Bytes “Matching a Career to Your Skills.”

Chapter 10: Behind the Scenes: Software Programming

- Throughout the chapter, text, figures, and photos have been updated.
- Updated “How Cool Is This” on open data initiative.

- NEW Bits & Bytes “Hackathons” detailing collegiate and civic hackathons has been added, replacing Bits & Bytes “Competitive Coding.”
- NEW coverage of the Swift programming language for iOS mobile development has been added.
- NEW Sound Byte, “Programming with the Processing Language,” has been added, replacing the “Looping Around the IDE” Sound Byte.
- NEW Sound Byte, “Using the Arduino Microcontroller,” has been added, replacing the “3D Programming the Easy Way” Sound Byte.

Chapter 11: Behind the Scenes: Databases and Information Systems

- Throughout the chapter, text, figures, and photos have been updated.
- NEW “How Cool Is This?” feature has been added on the SHADOW app.
- NEW Bits & Bytes “Google’s Knowledge Vault” replaces “iTunes Smart Playlists—They’re Just Queries!”

Chapter 12: Behind the Scenes: Networking and Security in the Business World

- Throughout the chapter, text, figures, and photos have been updated.
- Bits & Bytes “Go Green with Mobile Apps” has been updated to include more information on green apps.

Chapter 13: Behind the Scenes: How the Internet Works

- Throughout the chapter, text, figures, and photos have been updated.
- The Bits & Bytes “Gmail Features You Should Know About” has been updated.
- NEW “How Cool Is This?” feature on the Ruby on Rails web application development platform has been added.



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Dedication

For my wife, Patricia, whose patience, understanding, and support continue to make this work possible . . . especially when I stay up past midnight writing! And to my parents, Jackie and Dean, who taught me the best way to achieve your goals is to constantly strive to improve yourself through education.

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Letter from the Authors

Our 12th Edition—A Letter from the Authors



Why We Wrote This Book

The pace of technological change is ever increasing. In education, we have seen this impact us more than ever in the past year—MOOCs, touch-screen mobile delivery, and Hangouts are now fixed parts of our environment.

Even the most agile of learners and educators need support in keeping up with this pace of change. We have responded by integrating material to help students develop skills for web application and mobile programming. We see the incredible

value of these skills and their popularity with students, and have introduced Make This exercises for each chapter. These exercises gently bring the concepts behind mobile app development to life. In addition, we have added a Solve This exercise in each chapter that reinforces chapter content while also reinforcing Microsoft Office skills. These projects help to promote students' critical thinking and problem-solving skills, which employers highly value.

Our combined almost 50 years of teaching computer concepts have coincided with sweeping innovations in computing technology that have affected every facet of society. From iPads to Web 2.0, computers are more than ever a fixture of our daily lives—and the lives of our students. But although today's students have a much greater comfort level with their digital environment than previous generations, their knowledge of the machines they use every day is still limited.

Part of the student-centered focus of our book has to do with making the material truly engaging to students. From the beginning, we have written *Technology in Action* to focus on what matters most to today's student. Instead of a history lesson on the microchip, we focus on tasks students can accomplish with their computing devices and skills they can apply immediately in the workplace, the classroom, and at home.

We strive to keep the text as current as publishing timelines allow, and we are constantly looking for the next technology trend or gadget. We have augmented the text with weekly technology updates to help you keep your classroom on top of the latest breaking developments and continue to include a number of multimedia components to enrich the classroom and student learning experience. The result is a learning system that sparks student interest by focusing on the material they want to learn (such as how to integrate computing devices into a home network) while teaching the material they need to learn (such as how networks work). The sequence of topics is carefully set up to mirror the typical student learning experience.

As they read through this text, your students will progress through stages of increasing difficulty:

1. Thinking about how technology offers them the power to change their society and their world
2. Examining why it's important to be computer fluent
3. Understanding the basic components of computing devices

4. Connecting to and exploring the Internet
5. Exploring software
6. Learning the operating system and personalizing their computer
7. Evaluating and upgrading computing devices
8. Understanding home networking options and keeping computing devices safe from hackers
9. Going mobile with smartphones, netbooks, tablets, and laptops
10. Going behind the scenes, looking at technology in greater detail

We continue to structure the book in a “spiraling” manner, intentionally introducing on a basic level in the earlier chapters concepts that students traditionally have trouble with and then later expanding on those concepts in more detail when students have become more comfortable with them. Thus, the focus of the early chapters is on practical uses for the computer, with real-world examples to help the students place computing in a familiar context.

For example, we introduce basic hardware components in Chapter 2, and then we go into increasingly greater detail on some hardware components in Chapter 6 and in the “Under the Hood” Technology in Focus feature. The Behind the Scenes chapters venture deeper into the realm of computing through in-depth explanations of how programming, networks, the Internet, and databases work. They are specifically designed to keep more experienced students engaged and to challenge them with interesting research assignments.

In addition to extensive review, practice, and assessment content, each chapter contains several problem-solving, hands-on activities that can be carried out in the classroom or as homework:

- The Try This exercises lead students to explore a particular computing feature related to the chapter.
- The Make This exercises are hands-on activities that lead students to explore mobile app development.
- The Solve This exercises integrate and reinforce chapter concepts with Microsoft Office skills.

Throughout the years we have also developed a comprehensive multimedia program to reinforce the material taught in the text and to support both classroom lectures and distance learning:

- The **Helpdesk training content**, created specifically for *Technology in Action*, enables students to take on the role of a helpdesk staffer fielding questions posed by computer users. These have been updated to reflect the way in which users access help today.
- Exciting **Sound Byte multimedia**—fully updated and integrated with the text—expand student mastery of complex topics.
- The **Tech Bytes Weekly updates** deliver the latest technology news stories to you for use in your classroom. Each is accompanied by specific discussion topics and activities to expand on what is within the textbook materials.

This book is designed to reach the students of the twenty-first century and prepare them for the role they can take in their own community and the world. It has been an honor to work with you over the past 12 years to present and explain new technologies to students, and to show them the rapidly growing importance of technology in our world.

Visual Walk-Through

Topic Sequence

Concepts are covered in a progressive manner between chapters to mirror the typical student learning experience.

CHAPTER 2

storing data and INFORMATION

Because RAM is volatile storage, it can't be used to store information indefinitely. To save your data and information permanently, you need to save it to a nonvolatile storage device, such as a hard drive, cloud storage location, DVD, or flash drive.

Hard Drives

Are there different kinds of hard drives? The hard disk drive (HDD, or hard drive) is your computer's primary device for permanent storage of software and documents. The hard drive is a nonvolatile storage device. An internal hard drive resides within the system unit and usually holds all permanently stored programs and data. Today's internal hard drive (see Figure 2.28) has capacities of as much as 8 TB or more. External hard drives offer similar storage capacities but reside outside the system unit and connect to the computer via a port.

The most common type of hard drive has movable parts—spinning platters and a moving arm with a read/write head—that can fail and lead to devastating disk failure. However, the solid-state drive (SSD) has recently become a popular option for ultrabooks and laptop storage. SSDs have no moving parts, so they're more efficient, fail with no noise, emit little heat, and require little power. In addition, they're less likely to fail after being bumped or dropped.

Permanent storage devices are located in your desktop or laptop computer in a space called a **drive bay**. There are two kinds of drive bays:

- Internal drive bays cannot be seen or accessed from outside the system unit. Generally, internal drive bays are reserved for internal hard drives.
- External drive bays can be seen and accessed from outside the system unit. External drive bays house CD and DVD drives, for example. On desktop computers, sometimes there are empty external drive bays that can be used to install additional drives. These extra spaces are covered by a faceplate on the front panel. Laptop computers generally do not give you the ability to add additional drives. Such expansion is done by attaching an external drive to the computer through a USB port.

Cloud Storage

How can I easily access my files if I consistently switch between devices? You may find yourself using multiple devices, such as a smartphone, laptop, and a tablet, at different times during the day. Inevitably, you'll find you need access to a current version of a file that is stored on a device other than the one you're using. If your devices are connected to the Internet, cloud storage provides a convenient option.

Cloud storage refers to using a service that keeps your files on the Internet (in the "cloud") rather than storing your files solely on a local device. Using a cloud storage service requires that you install software on apps on your device. A popular web-based application for storing files on the cloud is Dropbox. Dropbox supports computers running Windows, OS X, and Linux as well as many smartphones and tablets. After installing the Dropbox software on your devices, any files you save in the Dropbox folder are accessible by all your other devices via the Internet. You can also share folders in Dropbox with other Dropbox users, making it ideal for group projects.

For example, when you save a history paper to Dropbox on your laptop, the Dropbox software also copies the paper onto a computer attached to the web. Now when you grab your smartphone and head off to class, you can access the paper created on your laptop through the Internet connection on your smartphone and make changes to it if necessary.

Dropbox storage capacity is limited to between 2 GB and 18 GB for free accounts. Other cloud storage alternatives include Microsoft OneDrive and Google Drive, each of which provides 15 GB of free space, and Apple iCloud, which offers 5 GB of free storage.

Portable Storage Options

How can I take my files with me without relying on cloud storage? For large portable storage needs, there are portable external hard drives, which are small enough to fit into your pocket and have storage capacities of 4 TB (or larger). These devices are lightweight and enclosed in a protective case. They attach to your computer via a USB port (see Figure 2.29).




FIGURE 2.28 Internal hard drive as a computer's primary nonvolatile storage. (Illustration: iStockphoto.com)




FIGURE 2.29 Slashes, portable external hard drive enable you to take a significant amount of data and programs on the road with you. (Illustration: iStockphoto.com)

CHAPTER 6

ACTIVE HELPDESK

Evaluating Your CPU and RAM

In the Active HelpDesk, you'll get a list of helpful staff. Asking questions about what the CPU does and how to evaluate its performance. You'll also find questions about how memory works and how to evaluate how much memory a computer needs.

INSTALL BYTE

Standard RAM

In this Standard Byte, you'll learn how to select the appropriate type of memory you purchase, how to order memory you like, and how to install it yourself. As you'll discover, the procedure is a simple one and can yield great performance benefits to your system.

How much RAM do I need?

At a minimum, your system needs enough RAM to run the OS. Running the 64-bit version of Windows 8.1 requires a minimum of 2 GB of RAM. However, because you run more applications at one time than just the OS, you'll want to have more RAM than just what's needed for the OS. For example, Figure 6.12 shows how much RAM is recommended for the OS, a web browser, and some software.

It's a good idea to have more than the minimum amount of RAM you need now so you can use more programs in the future. Remember, too, that "teardown" means these are the minimum values recommended by manufacturers; having more RAM often helps programs run more efficiently. New systems today ship with at least 4 GB of RAM, and high-end systems can come with 24 GB. The rule of thumb, then: When buying a new computer, buy as much RAM as you can afford.

FIGURE 6.12 Sample RAM Allocation

APPLICATIONS	RAM RECOMMENDED
Windows 8.1 (64 bit)	2 GB
Microsoft Office Professional 2013	2 GB
Internet Explorer 11	2 GB
Photos 15	4 GB
Adobe Photoshop Elements 12	2 GB
Total RAM recommended to run all programs simultaneously	9 GB

Adding RAM

Is there a limit to how much RAM I can add to my computer?

The motherboard is designed with a specific number of slots to which the memory can fit, and each slot has a limit on the amount of RAM it can hold. To determine your specific system limits, check the system manufacturer's website.

In addition, the OS running on your machine imposes its own RAM limit. For example, the maximum amount of RAM for the 32-bit version of Windows 8.1 is 4 GB, whereas the maximum memory limit using the 64-bit version of Windows 8.1 Pro is 12 GB.

Is it difficult or expensive to add RAM?

Adding RAM is fairly easy (see Figure 6.13). Be sure that you purchase a memory module that's compatible with your computer. Also be sure to follow the installation instructions that come with the RAM module. Typically, you simply line up the notches and gently push the memory module in place.

RAM is a relatively inexpensive system upgrade. The cost of RAM does fluctuate in the marketplace as much as 40% over time, though, so if you're considering adding RAM, you should watch the prices of memory in online and print advertisements.




FIGURE 6.13 Adding RAM to a computer is easy and relatively inexpensive. On a laptop, you often gain access through a panel on the bottom. (Illustration: iStockphoto.com)

Technology in Focus

Under the Hood

Some people are drawn to understanding things in detail; others are happy just to have things work. If you use a computer, you may not have been tempted to "look under the hood." However, if you can understand the hardware inside a computer, you'll have some real advantages:

- You won't have to pay a technician to fix or upgrade your computer. You'll be able to fine-tune it yourself, and you'll be able to make your investment in your computer last longer.
- You'll be able to evaluate new advances in technology. For example, what's the impact of a new type of memory or a new processor?
- If you're a programmer, you'll be able to write more efficient and faster programs.

And if you're preparing for a career in information technology, understanding computer hardware is critical for you. In this Technology in Focus feature, we'll build on what you've learned about computer hardware in other chapters and go "under the hood" to look at the components of your system unit in more detail. Let's begin by looking at the building blocks of computers: switches.


Switches

How does a computer process the data you input? A computer system can be viewed as an enormous collection of on/off switches. These simple on/off switches are combined in different ways to perform addition and subtraction and to move data around the system.

Electrical Switches

To process data into information, computers need to work in a language they understand. Computers understand only two states of electricity: on and off. Inside a computer, these two possibilities, or bits, are defined using the two numbers 1 and 0. In the language represented by these numbers is called **binary language** because just two numbers are used. Everything in a computer, such as processing data or printing a report, is broken down into a series of 0s and 1s. **Electrical switches** are the devices inside the computer that are flipped between the two states of 1 and 0, signifying "on" and "off."

You use various forms of switches every day. The light switch in your kitchen either is ON, allowing current to flow to the light bulb, or OFF. Another switch you use each day is



Hardware First Introduced

Chapter 2 is the first time students read about introductory hardware. It's covered at the beginning level because this is students' experience level at this point of the book.

Hardware Taught in More Depth in Additional Chapters

In later chapters, students read about hardware in greater depth because they're more experienced and comfortable working with their computers.

Technology in Focus

Four special features that teach key uses of technology today.

Multimedia Cues

Visual integration of multimedia.

How Cool Is This?

Highlights the latest and greatest websites, gadgets, and multimedia.

1 Using Technology to Change the World

How Will You Put Technology in Action?

Technology on the World Stage

OBJECTIVE

- How can becoming proficient with technology help you understand and participate in important issues in the world today? (pp. 34-36)

How Will Technology Improve Your Life?

Technology at Home

OBJECTIVES

- What does "mean" mean to be computer literate? (pp. 41-44)
- How does being computer literate make you a savvy computer user and consumer? (pp. 44-45)

Source: Apple. Questions to Ask Before You Buy a Computer

Technology and Our Society

OBJECTIVE

- How can knowledge of technology help you influence the direction our society takes? (pp. 39-40)


Technology and Your Career

OBJECTIVE

- How can becoming computer literate help you in a career? (pp. 40-52)

Make This: Explore an App Builder Skill on page 43

For all media in this chapter go to www.pearsonglobaleditions.com/itw



HOW COOL IS THIS?

Want to **make a difference with technology**? The good news is that it has never been easier. Technology is allowing more and more of us to become agents of change in our communities and in the world. For example, in London, over 20,000 school-age children are joining **Apps for Good**, a program that links students, educators, and local experts to guide students in designing and building apps to help solve problems they see around them. In the United States, the **Verizon Innovative App Challenge** offered students across the United States prize money for student teams that design apps to address the needs of their communities. In Philadelphia, people met for a week-long civic planning event called **Random Hacks of Kindness**. They created apps to help track of lobbyists in city government, to map the location of meals in the city, and to help organize people to dig out fire hydrants after snowstorms. What kind of good can you do with technology? (Illustration: Getty Images; Photo: iStockphoto.com)

Student Textbook

ethics in IT




FIGURE 1.5 Can we bridge the digital divide through multiple devices?

The digital divide, the gap between those with easy access to technology and those with little to no access (see Figure 1.5), is a problem that leads to complex social issues. For those who lack access to the Internet and computers, it is difficult to develop computer skills, which are very often critical to future success. Less familiarity with the Internet can also lead to a lower level of active, engaged citizenship. How should we attack the problem of the digital divide in the United States?

Recent studies from the University of Michigan show that without Internet access at home, teens from low-income households (family income under \$20,000 a year) are more likely to use their cell phones to go online. So the widening penetration of cell phones might be the answer to ending the digital divide. Or is it?

Going online using a cell phone plan is the most expensive of all options, and data transfer speeds are often slow. So teens with the least money are likely paying the most to get the slowest online experience.

In focus, you will learn how to use technology to solve social issues. You will also learn how to use technology to solve social issues.

trends in IT

With the advent of the computer, many speculated that ours would become a paperless society. Instead of saving printed documents and other output as was done prior to the PC, information would be saved in a digital state. Hard drives replacing filing cabinets, online photo buckets replacing photo albums and scrapbooks, and e-books replacing our favorite texts. Hard drive capacities do enable us to save more content, and online storage systems enable us to save pictures and other files to the "cloud." Additionally, e-book readers have increased in popularity. But has this push toward digital content begun to make the printer obsolete? Surprisingly, no. People still have a deep-rooted need to see, feel, smell, taste, or use their digital images or information in a physical form. New technologies that push the boundaries of printing, such as printing from the cloud and 3-D printing, are being developed and refined.

Cloud Printing
To print a document from a desktop or laptop computer, you must have a printer associated with them. Cloud printing allows you to print from any device, anywhere, without a printer. It uses the Internet to connect to a printer. This is a great way to save space and money. You can print from your phone, tablet, or laptop, and the document will be sent to a printer in the cloud. This is a great way to save space and money. You can print from your phone, tablet, or laptop, and the document will be sent to a printer in the cloud.

FIGURE 2.45 Cloud-ready printers only need an Internet connection to be used.

FIGURE 2.46 Looking at Computers: Understanding the Parts

DIG DEEPER Making Reality Even More Real

We're comfortable with carrying around digital data in our pockets. But the advent of wearable computing is now allowing us to integrate digital information directly into our bodies, both to add more detail and at times to remove unwanted visual effects. How does this happen?

Augmented reality combines our normal sense of the world around us with an additional layer of digital information. The extra information can be displayed on a separate device, such as an augmented reality app for smartphones. Displays in stores can even augment your image with the clothing you're interested in, creating a virtual fitting room (see Figure 1.16).

But having an app and a separate device is clumsy. Google Glass is a project that attempts to solve this problem. It's a separate camera mounted to the side of a lightweight headset (see Figure 1.17). You can record images and videos by simply saying, "Take a picture." When you say "Glass, how long is the Brooklyn Bridge?" Glass communicates wirelessly with your phone and is seen as a request to the Internet. The returned information is formatted and then sent to a projector. Instead of the projector you're used to seeing in your classroom, this projector is so small it fits into the armband of the glasses. The output beam from the projector bounces off a glass prism that

is aligned so that the beam is sent directly to the retina of your eye, as shown in Figure 1.18. (This is why Google Glass is not available for those who wear glasses now. To adjust the prism so that the projector's beam goes through the person's eye.)

FIGURE 1.16 This high-tech fitting room uses augmented reality to allow shoppers to try on clothes virtually. (Illustration: Shutterstock/Steve D'Amico)

FIGURE 1.17 Google Glass is a test that adds digital information directly into your view of the world. (Photo: Google/Google)

FIGURE 1.18 Google Glass illustrates the need for a separate head-mounted device by projecting an image directly on the retina of your eye. (Photo: Justin Rose/Steve D'Amico)

FIGURE 2.45 Cloud-ready printers only need an Internet connection to be used.

FIGURE 2.46 Looking at Computers: Understanding the Parts

BITS & BYTES

Putting Your Computer to Work . . . While You Sleep

Complex scientific research, such as human genome exploration, requires vast computing power. Software has been developed to let individual computing devices (including tablets and smartphones) in a grid to enable them to work together. This effectively creates a cheap supercomputer that many not-for-profit research organizations use to research problems that will benefit the greater good, and your computer can help. Visit the World Community Grid (www.worldcommunitygrid.org) and download its software. Check installed on your device, it allows your computer to work on research during the many times when your CPU is idle for at least not working to its full potential. Your computing device can participate in exciting research projects on new drugs, sustainable water, and cancer. So tell your computer to get to work!

FIGURE 2.6 Help solve complex problems by adding your computer to the World Community Grid. (Illustration: Pictal)

Bits & Bytes
Help make the topics immediately relevant to students' lives.

Ethics in IT
Boxes examine the ethical dilemmas involved with technology.

Trends in IT
Boxes explore hot topics in computing.

Dig Deeper
Boxes cover technical topics in depth to challenge advanced students.

Try This and Make This
Hands-on activities found between Parts 1 and 2 of each chapter.

End of Chapter Quiz
Multiple Choice, True/False, and Critical Thinking questions at the end of each chapter help students assess their comprehension of chapter material.

chapter quiz // assessment

For a quick review to see what you've learned, answer the following questions. Submit the quiz as requested by your instructor.

multiple choice

1. Social networking
 - a. prevents two-way dialing between people.
 - b. is incorporated as part of political strategy by many politicians.
 - c. cannot be translated enough to react to quickly developing issues.
 - d. only is useful for personal friendships.
2. Web 2.0 has led to a shift from just consuming content toward
 - a. spending all our time on leisure activities.
 - b. less sharing of the work we produce.
 - c. new standards for HTML.
 - d. producing content.
3. Skype is a software tool
 - a. to protect yourself from identity theft.
 - b. to make free phone calls over the Internet.
 - c. to diagnose and fix computer software.
 - d. to enable users to fabricate 3-D objects.
4. Being computer literate includes being able to
 - a. avoid spam, adware, and spyware.
 - b. use the web effectively.
 - c. diagnose and fix hardware and software problems.
 - d. all of the above.
5. Computer domains
 - a. sets computers for hardware malfunction.
 - b. analyze computer systems to gather potential legal evidence.
 - c. analyze the design of a computer system.
 - d. is used to create three-dimensional art.
6. The Khan Academy is
 - a. a free technology tool used for education.
 - b. a program in Africa to encourage study of mathematics.
 - c. of use to students but not used for instructors.
 - d. a simulation package to teach users how to run a business.

true/false

1. The move toward access instead of ownership is a sign of collaborative consumption.
2. Kickstarter is a product platform that connects people to community projects seeking for funding.
3. Internet users have been using social networking tools such as Twitter and Facebook to communicate and distribute information.
4. Data mining is a process of searching and classifying huge amounts of data for pattern recognition.

critical thinking

1. What Occupies Your Mind?
What do you think about is influenced by the information fed to our mind all day long. Web 2.0 has created numerous channels for people to offer their own work for free—open-access software, free music, books, and movies. How has this affected your thinking? Have you changed things to share freely with the online world? Has it changed the value you put on music, books, and art?

2. Working It to 5
This chapter lists many ways in which becoming computer literate is beneficial. Think about what your life will be like once you're started in your career. What areas of computing will be most important for you to understand? How would an understanding of computer hardware and software help you in working from home, working with groups in other countries, and conducting your taxes?

Chapter Review 55

TRY THIS What's Inside My Computer?

Understanding what capabilities your current computer has is one of the first steps toward computer literacy. In this exercise, you'll learn how to explore the components of your Windows computer.

Step 1 To gather information about the storage devices on your computer, on the Start screen, click **File Explorer** (previously called Windows Explorer) to switch to the Desktop and display File Explorer. In the navigation pane, click **This PC** to display information about your computer's drives.

Step 2 The **File Explorer** This PC screen displays information about internal storage devices (such as internal hard drives), optical storage devices (such as DVD drives), and portable storage devices (such as flash drives and external hard drives). The total amount of available storage space, as well as the amount of space actually free (unreserved), on the device is shown. To display the System screen, click the Computer tab on the File Explorer ribbon, and then the System properties button.

FIGURE 2.45 Cloud-ready printers only need an Internet connection to be used.

FIGURE 2.46 Looking at Computers: Understanding the Parts

MAKE THIS

FOOL: App Inventor 2

MAKE: A Mobile App
Want to build your own Android app from scratch? You can, with a simple tool called **App Inventor** to get started, here's why:

1. A computer connected to a WiFi network
2. The Chrome browser
3. A Google account
4. The MIT App Inventor Companion app
5. [optional] An Android device connected to the same WiFi network.
6. [optional] An Android device to test your app.

In this exercise, you'll explore the **App Inventor** tool and begin working with your first mobile app. As you work, making your app work for you is as easy as drag and drop with **App Inventor**.

App Inventor is a programming platform used to create apps for Android devices. Using App Inventor, you can easily drag and drop components to design your App's interface...and its behavior.

For the instructions for this exercise, please go to www.personalubedil.com/Evans.

Try This, Make This 81

Solve This
Exercises that put the concepts students are learning into action using a Microsoft Office application

Solve This

How Technology Is Used on the World Stage and in My Personal Life

In this activity, you'll use Microsoft Word to reflect on how technology is affecting the world as well as you, personally and professionally. Reflect on the content in Chapter 1 as you work through this exercise.

You will use the following skills as you complete this activity:

- Open and Modify a Document Template
- Insert Text
- Apply Styles and Advanced Font Formats
- Apply Themes
- Use Format Painter
- Change a Header and Footer

Instructions

1. Start Microsoft Word 2013 and open the Project design (Blank) template. Save the document as **TIA_Ch1_LastFirst**, using your own Last and First names.
2. Double-click the **This placeholder and type Introduction**, then double-click the **Heading placeholder and type Introduction**. Review the content (placeholder text) with the following: **Political and global issues are showing that technology is accelerating change across the world and galvanizing groups of people in new ways. Tech-**

Companion Media

Companion Website for *Technology in Action* includes an interactive study guide, online end-of-chapter material, additional Internet exercises, and much more. Specific features include:

- **UPDATED Sound Bytes:** These multimedia lessons help demystify computer concepts with audio and video presentations. Select Sound Bytes have been updated to provide timely and accurate information. This edition includes two NEW Sound Bytes: “Using the Arduino Microcontroller” and “Programming with the Processing Language.”
- **UPDATED Active Helpdesks:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via live chat, FAQ searches, and so on. Students play the role of a helpdesk staffer answering technology questions using these various approaches.
 - A virtual supervisor provides support to the student throughout the activity.
 - Assessment questions after each Helpdesk provide instructors with a tool to gauge and track students’ progress. This edition includes three NEW or completely revised Helpdesks: “Evaluating Websites,” “Working with Smartphones,” and “Keeping Your Data on Hand.”
- **NEW Make This** projects address the hot area of mobile app creation! Each chapter includes a Make This mobile app project, most of which use App Inventor. By the end of the course, students will have completed 13 small app projects that provide them with new skills they can use to create their own apps. And if they don’t have an Android device, they can use the emulator and still learn the skills.
- **NEW Solve This** projects put the concepts students are learning into action through real-world problem solving using a Microsoft Office application or other technology tool.
- **UPDATED Replay Videos:** The Replay Videos provide an author-narrated video review of each chapter part in an easy-to-use format students can view on their phones, tablets, or computers!
- **With Tech Bytes Weekly, every week is new!** This weekly newsfeed provides two timely articles to save instructors the prep time required for adding interesting and relevant news items to their weekly lectures. Tech Bytes Weekly also features valuable links and other resources, including discussion questions and course activities.
- **Jeopardy! Game and Crossword Puzzles:** These engaging games give students a fun way to challenge their knowledge.

Note: To access the premium content, including Helpdesks, Sound Bytes, and Replay Videos from the companion site, students need to use the access code printed on the inside front cover of the book.

Sound Bytes

Multimedia lessons with video, audio, or animation and corresponding labs featuring multiple-choice quizzing.

Navigational tool

Transcript button

Used to turn transcript on or off

Audio leads students through

Video or animation teaches key concepts

Active Helpdesk

Interactive training that puts the student in the role of a helpdesk staffer fielding questions about technology.

Supervisor available to assist students.

Features textbook references within each Helpdesk and assessment at the end.

Related Sound Bytes are referenced.

Audio on or off.