

计算机科学引论

(2013 影印版)

Computing Essentials

- Timothy J. O'Leary
- Linda I. O'Leary

Mc
Graw
Hill
Education

高等教育出版社

计算机科学引论

Introduction to Computer Science

Computing

Essentials

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(Complete Edition)

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出版说明

本书是美国麦格劳-希尔(McGraw-Hill)出版公司出版的 Computing Essentials 2013, Complete Edition 一书的影印版。原书自 1989 年以来每年都出一次新版,主要用作英语为母语国家的计算机导论性课程的教材。我社曾经影印过本书的 2000 版、2005 版及 2008 版,并作为《计算机科学引论》教材推荐给各高等学校使用,采用的学校变遍反映较好。本书是今年出版的新版,内容做了全面更新,突出知识的先进性、系统性和教学的实践性,并提供更为丰富的习题和在线学习功能。

本书概括地介绍了计算机与信息技术的常见概念和专业术语、主要应用领域及其对社会的影响。全书由 15 章和附录组成,主要内容包括:信息技术概述;因特网、万维网与电子商务;基础应用软件与专业应用软件;系统软件;硬件系统;输入输出设备;存储设备;通信与网络;隐私与安全;信息系统;数据库;系统分析与设计;程序设计与编程语言;信息技术展望等。书中含有大量丰富的图示,用于说明计算机及各种技术、设备的结构、原理和组成,使各种概念、术语和技术一目了然。每章之后附有未来展望、综合性的图示小结、关键词和术语列表、习题、技术应用、知识扩展、自制文档等丰富的实践内容。

本书内容丰富,体裁新颖,文字叙述简练、清楚,英语语言规范、流畅。书中较全面地覆盖了计算机科学与信息技术领域中的基本名词和术语,尤其是一些目前十分流行及最新的概念和词汇。因此,本书在使学生了解和掌握计算机及信息技术专业基础知识的同时,也有助于他们掌握相应的英文词汇,提高专业英语的阅读能力。

本书既可作为计算机、信息管理及相关专业“计算机导论”课程的教材,也可作为相关专业的“计算机英语”课程教材。

本书配有丰富的教学资源,包括教师手册、PPT、在线测试、辅助教学的多媒体资源等。采用本书作为教材的教师可以通过麦格劳-希尔教育出版集团北京办事处的教师热线(8008101936)、传真(010-62790292)、电子邮件(instructorchina@mcgraw-hill.com)获取相关教学资源。

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2014 年 12 月

New to Computing Essentials 2013

Every chapter begins with a new, concise “Why Should I Read This Chapter” feature and has all new multiple choice and matching questions. Additionally, four new end-of-chapter features have been added: Making IT Work for You, Explorations, Ethics, and Environment. Each feature provides assignments that expand upon concepts and ideas presented within the text.

- Chapter 1** Coverage of Mozilla’s Firefox
Expanded discussion of tablet PCs to include traditional and slate computers including iPad2
Updated wireless communication devices
- Chapter 2** Updated coverage of the basic parts of a URL
Comparison of client-based versus Web-based e-mail accounts
Expanded coverage of MySpace, Facebook, and LinkedIn
Expanded coverage of streaming technology, Webcasts, and Podcasts
Revised coverage of search engines and Web directories
- Chapter 3** Comparison of traditional versus ribbon graphical user interfaces
Improved page layout to improve continuity and comprehension
- Chapter 4** Expanded coverage of image editors
Expanded coverage of illustration programs
Expanded and updated coverage of mobile applications
- Chapter 5** Expanded coverage of Mac OS
Expanded coverage of mobile operating systems including iOS, WebOS, and Android
- Chapter 6** Expanded coverage of traditional and slate tablet PCs
Consolidated coverage of expansion buses
- Chapter 7** New coverage of digital interactive whiteboards
New coverage of cloud printers and Google Cloud Print
New discussion of portable media players and Mobile DTV
New coverage of cable Internet telephone service providers including Ooma, Vonage, MagicJack, and Skype
- Chapter 8** Revised and repositioned Cloud Storage Making IT Work for You section
- Chapter 9** More coverage of wireless technologies
Expanded coverage of hotspots
Updated and more concise coverage of network topologies
Updated and more concise coverage of network strategies
- Chapter 10** New coverage on privacy modes including InPrivate Browsing and Private Browsing
Expanded coverage of carders
New coverage on cyber-bullying

The 20th century brought us the dawn of the digital information age and unprecedented changes in information technology. There is no indication that this rapid rate of change will be slowing—it may even be increasing. As we begin the 21st century, computer literacy is undoubtedly becoming a prerequisite in whatever career you choose.

The goal of *Computing Essentials* is to provide you with the basis for understanding the concepts necessary for success. *Computing Essentials* also endeavors to instill an appreciation for the effect of information technology on people and our environment and to give you a basis for building the necessary skill set to succeed in the 21st century.

Times are changing, technology is changing, and this text is changing too. As students of today, you are different from those of yesterday. You put much effort toward the things that interest you and the things that are relevant to you. Your efforts directed at learning application programs and exploring the Web seem, at times, limitless. On the other hand, it is sometimes difficult to engage in other equally important topics such as personal privacy and technological advances.

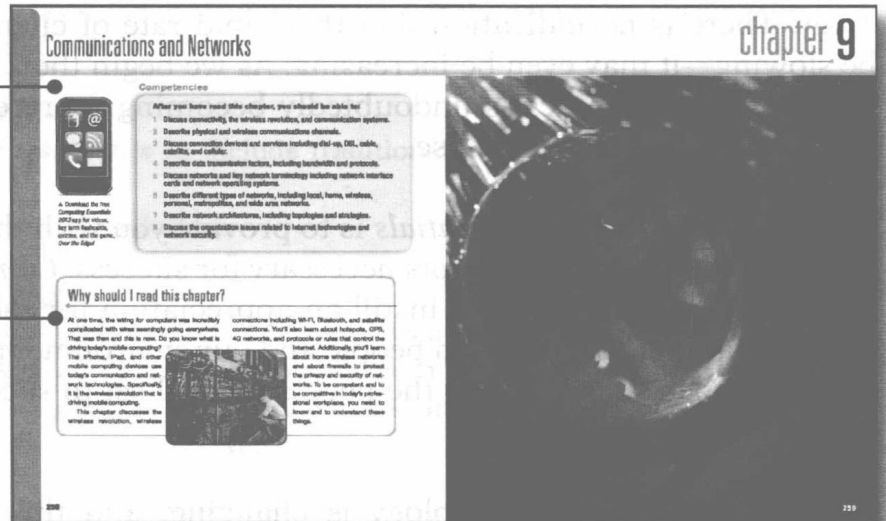
In this text, we present practical tips related to key concepts through the demonstration of interesting applications that are relevant to your lives. Topics presented focus first on outputs rather than processes. Then, we discuss the concepts and processes.

Motivation and relevance are the keys. This text has several features specifically designed to engage and demonstrate the relevance of technology in your lives. These elements are combined with a thorough coverage of the concepts and sound pedagogical devices.

Visual Learning

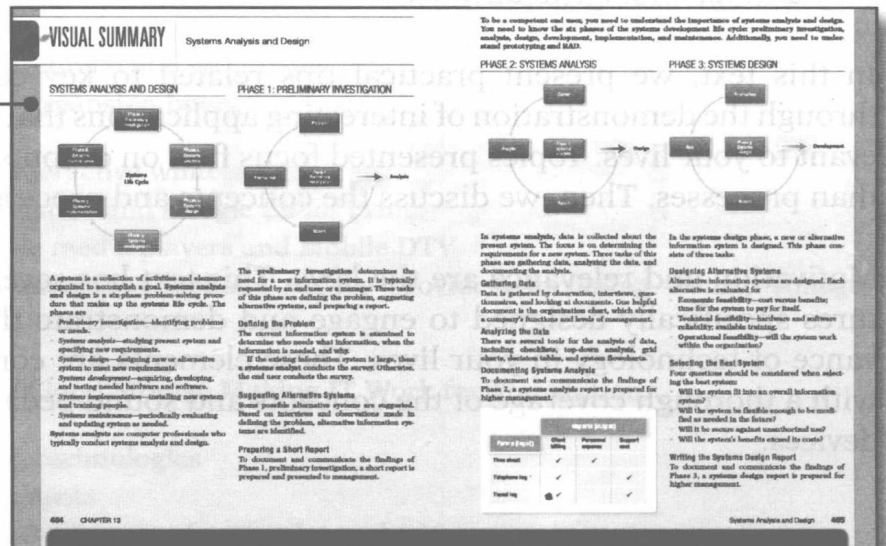
VISUAL CHAPTER OPENERS

Each chapter begins with a list of chapter competencies or objectives and provides a brief introduction to what will be covered in the chapter. Additionally, the “Why Should I Read This?” feature provides relevance through a brief discussion of the content’s historical context.



VISUAL SUMMARIES

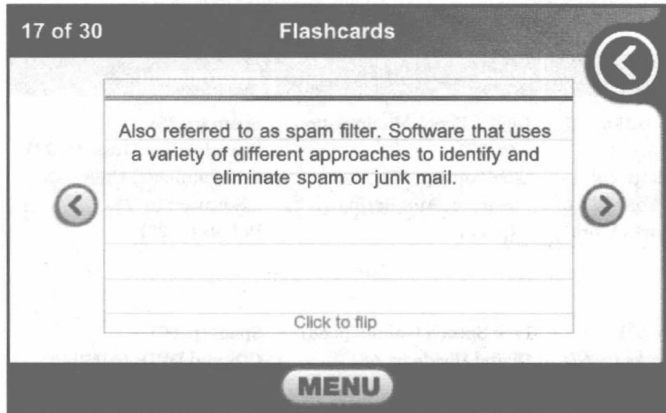
Visual summaries appear at the end of every chapter and summarize major concepts covered throughout the chapter. Like the chapter openers, these summaries use graphics to reinforce key concepts in an engaging and meaningful way.



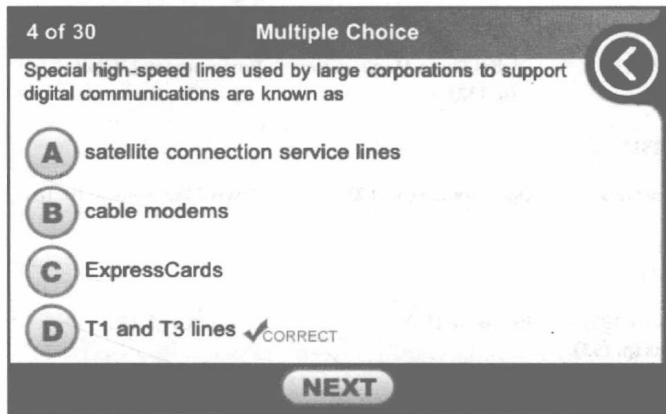
Learning Tools: The CE 2013 App

Download the free *Computing Essentials 2013* App for:

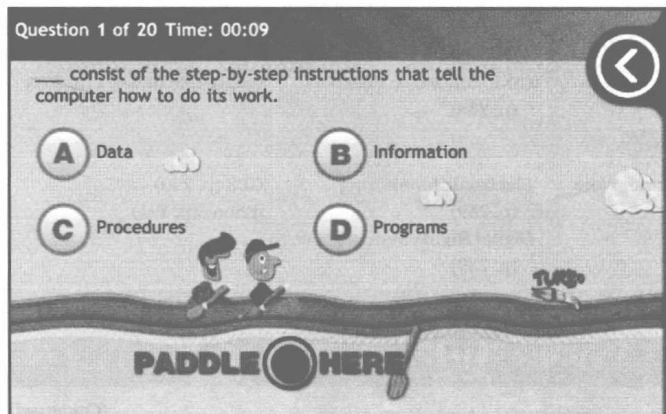
• Key term flash cards



• Quizzes



• Game, *Over the Edge*



We have specifically designed the end-of-chapter materials to this text to meet the different needs of students and instructors. In addition to the traditional end-of-chapter review materials, you will find four unique categories: (1) Making IT Work for You is designed to help students gain a better understanding of how the technology covered in a particular chapter is used today; (2) Explorations offers a deeper understanding to topics covered in that particular chapter; (3) Ethics explores ethical issues related to technology; and (4) Environment explores environmental issues related to technology.

This table offers a glimpse of the unique coverage you can find at the end of each chapter.

END-OF-CHAPTER COVERAGE

Chapter	Making IT Work for You	Explorations	Ethics	Environment
1	iPods and Video from the Internet (p. 25) Google Docs (p. 25) Digital Video Editing (p. 25) Virus Protection and Internet Security (p. 25) Home Networking (p. 25)	How Computer Virus Protection Programs Work (p. 26) How Digital Cameras Work (p. 26) How Internet Telephones Work (p. 26) How Wireless Home Networks Work (p. 26)	Digital Photo Manipulation (p. 27) WebCams (p. 27) Electronic Monitoring (p. 27)	Spam (p. 28) Downloading Music (p. 28) Environmental Utility Software (p. 28) Robots (p. 28)
2	iPods and Video from the Internet (p. 66) Twitter (p. 66)	How Spam Filters Work (p. 67) How Instant Messaging Works (p. 67) Domain Registration (p. 67)	Free Speech Online (p. 68) Digital Divide (p. 68)	Spam (p. 69) CDs and DVDs (p. 69)
3	Speech Recognition (p. 102) Google Docs (p. 102)	How Speech Recognition Works (p. 103) Sharing Data between Applications (p. 103) Shareware (p. 103)	Acquiring Software (p. 104) Audio and Video Clips (p. 104)	Digital Software Distribution (p. 105) Green Software Utilities (p. 105)
4	Digital Video Editing (p. 130) Adobe Flash (p. 130) Streaming Multimedia Players (p. 130)	How Digital Video Editing Works (p. 131) Personal Web Site (p. 131) Streaming Multimedia (p. 131)	Digital Photo Manipulation (p. 132)	Environmental Robots (p. 133)
5	Virus Protection (p. 160) Windows Update (p. 160) Disk Defragmentation (p. 160)	How Virus Protection Programs Work (p. 161) Booting and POST (p. 161) Customized Desktop (p. 161)	Open Source (p. 162)	Power Management (p. 163)
6	TV Tuner Cards and Video Clips (p. 192) Desktop and Notebook Computers (p. 192) Custom System Units (p. 193)	How TV Tuner Cards Work (p. 193) How Virtual Memory Works (p. 193) Binary Numbers (p. 194)	RFIDs (p. 194)	Green PCs (p. 195)
7	WebCams and Instant Messaging (p. 227) E-Book Readers (p. 228)	How Digital Cameras Work (p. 229) How Internet Telephones Work (p. 229) Handwriting Recognition (p. 229)	WebCams (p. 230)	Printing (p. 231) Printer Cartridges (p. 231)
8	Cloud Storage (p. 254) USB Storage Devices (p. 254)	iPod (p. 255) File Compression (p. 255) Cloud Storage Services (p. 255)	CD-R and Music Files (p. 256)	Solid-State Storage (p. 257)
9	Home Networking (p. 287) Distributed Computing (p. 287) Wireless Mobile Devices (p. 287)	How Wireless Home Networks Work (p. 288) BitTorrent (p. 288) Hotspots (p. 288)	Electronic Monitoring (p. 289) Digital Rights Management (p. 289)	GPS (p. 290) iPhone (p. 291)
10	Spyware (p. 325) Personal Firewalls (p. 325) Personal Backups (p. 325)	How Web Bugs Work (p. 326) Mistaken Identity (p. 326) Air Travel Database (p. 326)	Plagiarism (p. 327)	Environmental Scams (p. 327)

(Continued)

Chapter	Applying Technology	Expanding Your Knowledge	Writing About Technology	
11	CAD (p. 351) Knowledge Work Systems (p. 351) Online Personal Information Managers (p. 351)	DVD Direct Information Systems (p. 352) Executive Support Systems (p. 352)	Consumer Information Systems (p. 353) Identity Theft (p. 353)	
12	Free Database Software (p. 380) Internet Movie Database (p. 380) Online Databases (p. 380)	DVD Direct Databases (p. 381) SQL (p. 381)	Personal Information (p. 382) Database Security (p. 382)	
13	Systems Design Software (p. 411) Systems Analysis Software (p. 411) Preliminary Investigation (p. 411)	DVD Direct Systems Analysis and Design (p. 412) Conversion (p. 412) UML (p. 412)	Legacy Systems (p. 413) Managing Choices (p. 413)	
14	Version Control Systems (p. 446) .NET Framework (p. 446) Integrated Development Environments (p. 446)	DVD Direct Program Development (p. 447) Source Code Generators (p. 447) Capability Maturity Model (p. 447)	Bugs (p. 448) Security and Privacy (p. 448)	
Chapter	Making IT Work for You	Explorations	Ethics	Environment
15	Jobs Online (p. 469) Maintain Computer Competence (p. 469)	Your Career (p. 470) Resume Advice (p. 470)	Ethical Issues (p. 471)	Environmental Issues (p. 471)

CONCEPT CHECKS

Located at points throughout each chapter, the Concept Check cues you to note which topics have been covered and to self-test your understanding of the material already discussed.



CONCEPT CHECK

- What are search services, spiders, and search engines?
- What is the difference between a search engine and a Web directory?
- Compare metasearch and specialized search engines.
- What are the four considerations for evaluating Web site content?

KEY TERMS

address (36, 38)	filter (54)	social networking (40)
Advanced Research Project Agency Network (ARPANET) (32)	friend (39)	spam blocker (39)
AJAX (37)	header (38)	spam filter (39)
applets (37)	hit (46)	specialized search engine (47)
attachment (38)	hyperlink (36)	spider (46)
auction house site (50)	Hypertext Markup Language (HTML) (36)	streaming (42)
BitTorrent (55)	instant messaging (IM) (39)	subject (38)
blog (42)	Internet (32)	subject directory (46)
browser (35)	Internet security suite (56)	suit (35)
business-to-business (B2B) (50)	Internet service provider (ISP) (35)	top-level domain (TLD) (36)
business-to-consumer (B2C) (49)	Java (37)	Twitter (42)
cable (35)	JavaScript (37)	uniform resource locator (URL) (36)
carder (51)	link (36)	universal instant messenger (40)
Center for European Nuclear Research (CERN) (32)	LinkedIn (41)	uploading (55)
client-based e-mail account (38)	location (36)	virus (39)
cloud computing (52)	message (39)	Web (32)
consumer-to-consumer (C2C) (50)	metasearch engine (47)	Web 1.0 (32)
digital cash (51)	microblog (42)	Web 2.0 (32)
domain name (36)	mobile browser (37)	Web 3.0 (32)
downloading (55)	MySpace (40)	Web auction (50)
DNS (35)	online (32)	Web-based e-mail account (38)
e-commerce (49)	online banking (50)	Web-based file transfer services (55)
e-learning (33)	online shopping (50)	Websites (42)
electronic commerce (49)	online stock trading (50)	Web directory (46)
electronic mail (38)	person-to-person auction site (50)	Web log (42)
e-mail (38)	plug-in (54)	Webmail (38)
e-mail client (38)	podcast (42)	Webmail client (38)
Facebook (40)	protocol (36)	Webmaster (57)
Facebook groups (41)	search engine (46)	Web page (36)
Facebook Pages (40)	search service (46)	Web utility (54)
Facebook Profile (40)	secure file transfer protocol (SFTP) (55)	wiki (43)
file transfer protocol (FTP) (55)	signature (39)	Wikipedia (43)
		wireless modem (35)

To test your knowledge of these key terms with animated flash cards, visit our Web site at www.computing2013.com and enter the keyword **terms2**.

KEY TERMS

Throughout the text, the most important terms are presented in **bold** and are defined within the text. You will also find a list of key terms at the end of each chapter and in the glossary at the end of the book.

MULTIPLE CHOICE

Circle the correct answer.

1. The network that connects computers all over the world.
 - a. CERN
 - b. Internet
 - c. LAN
 - d. Web
2. The rules for exchanging data between computers.
 - a. DSL
 - b. protocols
 - c. Web
 - d. WWW
3. Client-based e-mail accounts require this special program to be installed on your computer.
 - a. e-mail client
 - b. hyperlink
 - c. Java
 - d. utility
4. Communities of individuals who share a common interest typically create Facebook:
 - a. clients
 - b. groups
 - c. pages
 - d. profiles
5. E-mail that does not require an e-mail program installed on a user's computer is known as:
 - a. a blog
 - b. a podcast
 - c. Webmail
 - d. a utility
6. A very well known microblog.
 - a. LinkedIn
 - b. MySpace
 - c. Twitter
 - d. Wikipedia
7. These programs continually look for new information and update search services' database programs.
 - a. filters
 - b. IM
 - c. spiders
 - d. wikis
8. A type of search engine that submits requests to other search engines, organizes their responses, eliminates duplicate responses, orders hits, and then provides an edited list.
 - a. directory search
 - b. ISP
 - c. metasearch engine
 - d. specialized search engine
9. This is the Internet's equivalent to traditional cash.
 - a. digital cash
 - b. e-commerce
 - c. iCash
 - d. Internet dollars
10. Using file transfer utility software, you can copy files to your computer from specially configured servers on the Internet. This is called:
 - a. downloading
 - b. filtering
 - c. blogging
 - d. uploading

For an interactive multiple-choice practice test, visit our Web site at www.computing2013.com and enter the keyword **multiple2**.

CHAPTER REVIEW

Following the Visual Summary, the chapter review includes material designed to review and reinforce chapter content. It includes a Key Terms list that reiterates the terms presented in the chapter, Multiple Choice questions to help test your understanding of information presented in the chapter, Matching exercises to test your recall of terminology presented in the chapter, and Open-Ended questions or statements to help review your understanding of the key concepts presented in the chapter.

The Future of Information Technology

CAREERS IN IT

- **RAID systems**—larger versions of the specialized devices discussed earlier in this chapter that enhance organizational security by constantly making backup copies of files moving across the organization's network.
- **Tape library**—device that provides automatic access to data archived on a library of tapes.
- **Organizational cloud storage**—high-speed Internet connection to a dedicated remote organizational cloud storage server.

Storage Area Network

A recent mass storage development is **storage area network (SAN)** systems. SAN is an architecture to link remote computer storage devices such as enterprise storage systems, to computers such that the devices are as available as locally attached drives. In a SAN system, the user's computer provides the file system for storing data, but the SAN provides the disk space for data. The key to a SAN is a high-speed network, connecting individual computers to mass storage devices. Special file systems prevent simultaneous users from interfering with each other. SANs provide the ability to house data to remote locations and still allow efficient and secure access.

CONCEPT CHECK

- 1 Define RAID devices and list the main storage centers.
- 2 What is an enterprise storage system?
- 3 What is a storage area network system?



Careers in IT

Software engineers analyze users' needs and create application software. Software engineers typically have experience in programming but focus on the design and development of programs using the principles of mathematics and engineering.

A bachelor's or an advanced specialized associate's degree in computer science or information systems and an extensive knowledge of computers and technology are required by most employers. Internships may provide students with the kinds of experience employers look for in a software engineer. Those with specific experience with networking, the Internet, and Web applications may have an advantage over other applicants. Employers typically look for software engineers with good communication and analytical skills.

Software engineers can expect to earn an annual salary in the range of \$43,000 to \$98,500. Advancement opportunities are usually tied to experience. Experienced software engineers may be promoted to project manager or have opportunities in systems design. To learn about other careers in information technology, visit us at www.computing2013.com and enter the keyword careers.

How fast you're learning about necessary storage, let us let you a little bit about my career as a systems engineer.

308 CHAPTER 6

Some of the fastest-growing career opportunities are in information technology. Each chapter highlights one of the most promising careers in IT by presenting job titles, responsibilities, educational requirements, and salary ranges. Among the careers covered are Webmaster, software engineer, and database administrator. You will learn how the material you are studying relates directly to a potential career path.

A LOOK TO THE FUTURE

Each chapter concludes with a brief discussion of a recent technological advancement related to the chapter material, reinforcing the importance of staying informed.

A LOOK TO THE FUTURE

Your Entire Life Recorded on a Single Disk

Imagine if you could store every conversation you ever had on a single disk. What if you could capture your entire life on video storage on just a few

discs? What if you could hold

in your pocket the contents

of the Library of Congress?

Innovations in necessary storage

promise all of the and more.

Currently, information is

stored on magnetic or optical

media. In the future, the elec-

tron states of atoms in a mol-

ecule will hold information at

a much greater density. Currently,

scientists have

created devices of 200 gigab-

ytes per square inch. If suc-

cessfully brought to market,

such a device would store two

terabytes on one disc, enough

to hold every conversation

a person has throughout his

or her entire lifetime. Dis-

coveries with three-dimensional

storage (before information is

stored in digital media) and

optical holography before

information is stored by light

photons on one disc, enough

to hold every conversation

a person has throughout his

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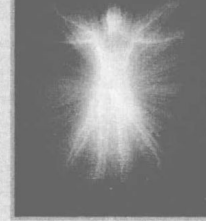
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coveries with three-dimensional

storage (before information is

The capability to store vast amounts of data offers a future both tantalizing and problematic. Although having a video of your life would be a wonderful memory tool, how could you sort and use so much information? Imagine having to search through hours of video just to verify the time of a lunch date or to remember where you parked your car. Fortunately, computer scientists are developing computer programs that can rapidly sort through and understand audio and visual materials. Great strides have been made in creating programs that can scan photos and video searching for a particular person's face. The technology is currently being used in airports to identify suspected terrorists. In the future, you may use the technology to search for photos of a loved one or video of the family reunion.

Is there a downside to recording every event in a person's life? Could your personal video log be used to prosecute you in a court of law? Could someone else snoop into an invasion of your right to privacy? The technology will soon be here. Are you ready for it? Would you use it to record your every move?



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Using IT at DVD Direct—a case study

INFORMATION SYSTEMS AT DVD DIRECT

DVD Direct, a fast-paced organization, is an entirely Web-oriented movie rental business. Unlike traditional movie rental businesses, DVD Direct conducts all business over the Web at its Web storefront. For a monthly fee, their customers are able to order up to three movies at a time from a listing posted at the company Web site. The movies the customers select are delivered to them on DVD discs by mail within three working days. After viewing, customers return one or more discs by mail. They are allowed to keep the discs as long as they wish but can never have more than three discs in their possession at one time.

Although in operation for only three years, DVD Direct has experienced rapid growth. To help manage and to accelerate the growth, the company has just hired Alice, a recent college graduate. To follow Alice on her first day at DVD Direct, which begins with a meeting with Bob, the vice president of marketing, visit us on the Web at www.computing2013.com and enter the keyword information.



"She said she was concerned about how our members were connecting to our Web site."

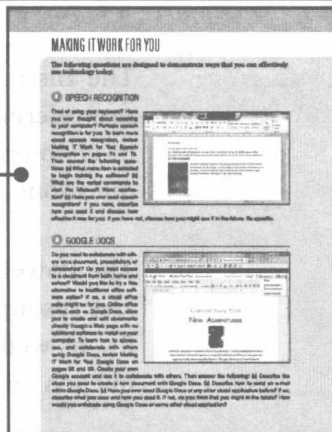
USING IT AT DVD DIRECT—A CASE STUDY

Beginning in Chapter 11 and continuing through Chapter 14, Using IT at DVD Direct—A Case Study of a fictitious organization provides an up-close look at what you might expect to find on the job in the real world. You will follow Alice, a recent college graduate hired as a marketing analyst, as she navigates her way through accounting, marketing, production, human resources, and research, gathering and processing data to help manage and accelerate the growth of the three-year-old company.

Unique End-of-Chapter Materials

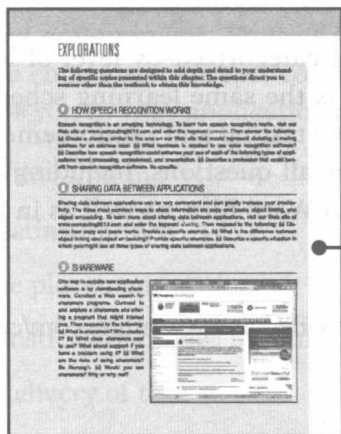
MAKING IT WORK FOR YOU

Making IT Work for You presents questions designed to help you gain a better understanding of how technology is being used today. The first question is related directly to the chapter's Making IT Work for You topics. Other questions focus on interesting applications of technology that relate directly to you.



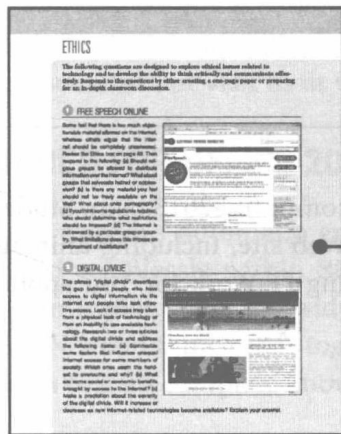
EXPLORATIONS

Explorations presents questions that help you gain a deeper understanding of select topics. Typically, one question relates to a topic presented at the book's Web site, www.computing2013.com, such as How Instant Messaging Works, How Streaming Media Works, and How Virus Protection Works. Other questions in Expanding Your Knowledge typically require Web research into carefully selected topics.



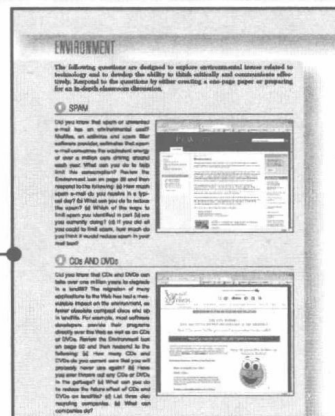
ETHICS

Ethics presents questions designed to explore ethical issues related to technology and to help you develop the ability to think critically and communicate effectively. Typically, the questions relate directly to the Ethics boxes within each chapter. Topics include free speech online, acquiring software, and digital photo manipulation.



ENVIRONMENT

Environment presents questions designed to explore environmental issues related to technology and to help you develop the ability to think critically and communicate effectively. Typically, the questions relate directly to the Environmental boxes within each chapter. Topics include spam, Green pcs, and environmental robots.



Support Materials

The Instructor's Manual offers lecture outlines with teaching notes and figure references. It provides definitions of key terms and solutions to the end-of-chapter material, including multiple-choice, matching, and open-ended questions.

The PowerPoint slides are designed to provide instructors with a comprehensive resource for lecture use. The slides include a review of key terms and topics, as well as artwork taken from the text to further explain concepts covered in each chapter.

The testbank contains over 2,200 questions categorized by level of learning (definition, concept, and application). This is the same learning scheme that is introduced in the text to provide a valuable testing and reinforcement tool. Text page references have been provided for all questions, including a level-of-difficulty rating. The testbank is offered in Word files, as well as in EZ Test format.

The instructor support materials can be downloaded at www.mhhe.com/ce2013.

The O'Leary Web site

The O'Leary Web site can be found at www.computing2013.com. Students can find a host of additional resources on the Web site, including animations of key concepts, videos relating to select Making IT Work for You applications, and in-depth coverage of select topics.

O'LEARY SERIES

The O'Leary Application Series for Microsoft® Office is available separately or packaged with *Computing Essentials*. The O'Leary Application Series offers a step-by-step approach to learning computer applications and is available in both complete and introductory versions.

SIMNET ONLINE TRAINING AND ASSESSMENT FOR OFFICE APPLICATIONS



SimNet™ Online provides a way for you to test students' software skills in a simulated environment. SimNet is available for Microsoft Office 2010 and will have enhanced concepts coverage coming in 2012! SimNet provides flexibility for you in your applications course by offering:

- Pretesting options
- Posttesting options
- Course placement testing
- Diagnostic capabilities to reinforce skills
- Web delivery of tests
- Learning verification reports

For more information on skills assessment software, please contact your local sales representative, or visit us at www.mhhe.com/simnet2010.

SIMGRADER FOR OFFICE 2010

SimGrader provides automatic grading of projects for Microsoft Office and can be used seamlessly within SimNet Online or can be used separately, if needed. SimGrader offers the widest range of projects from any of our Office series. SimNet and SimGrader together provide an ideal, easy-to-use solution for students to gain complete knowledge of Office skills.