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计算机科学引论

(美) Timothy J. O'Leary Linda I. O'Leary 著

(2014英文版)

Computing Essentials 2014

Making **IT** work for you

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

COMPLETE

*Computing Essentials 2014
Making IT Work for You Complete Edition*

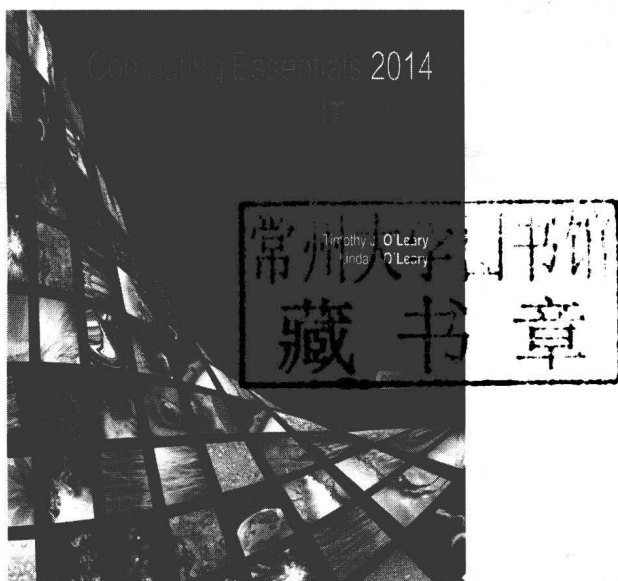
机械工业出版社
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出版者的话

文艺复兴以来，源远流长的科学精神和逐步形成的学术规范，使西方国家在自然科学的各个领域中取得了垄断性的优势；也正是这样的优势，使美国在信息技术发展的六十多年间名家辈出、独领风骚。在商业化的进程中，美国的产业界与教育界越来越紧密地结合，计算机学科中的许多泰山北斗同时身处科研和教学的最前线，由此而产生的经典科学著作，不仅擘划了研究的范畴，还揭示了学术的源变，既遵循学术规范，又自有学者个性，其价值并不会因年月的流逝而减退。

近年，在全球信息化大潮的推动下，我国的计算机产业发展迅猛，对专业人才的需求日益迫切。这对计算机教育界和出版界都既是机遇，也是挑战；而专业教材的建设在教育战略上显得举足轻重。在我国信息技术发展时间较短的现状下，美国等发达国家在其计算机科学发展的几十年间积淀和发展的经典教材仍有许多值得借鉴之处。因此，引进一批国外优秀计算机教材将对我国计算机教育事业的发展起到积极的推动作用，也是与世界接轨、建设真正的世界一流大学的必由之路。

机械工业出版社华章公司较早意识到“出版要为教育服务”。自1998年开始，我们就将工作重点放在了遴选、移译国外优秀教材上。经过多年的不懈努力，我们与Pearson, McGraw-Hill, Elsevier, MIT, John Wiley & Sons, Cengage等世界著名出版公司建立了良好的合作关系，从他们现有的数百种教材中甄选出Andrew S. Tanenbaum, Bjarne Stroustrup, Brian W. Kernighan, Dennis Ritchie, Jim Gray, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Abraham Silberschatz, William Stallings, Donald E. Knuth, John L. Hennessy, Larry L. Peterson等大师名家的一批经典作品，以“计算机科学丛书”为总称出版，供读者学习、研究及珍藏。大理石纹理的封面，也正体现了这套丛书的品位和格调。

“计算机科学丛书”的出版工作得到了国内外学者的鼎力相助，国内的专家不仅提供了中肯的选题指导，还不辞劳苦地担任了翻译和审校的工作；而原书的作者也相当关注其作品在中国的传播，有的还专门为其书的中译本作序。迄今，“计算机科学丛书”已经出版了近两百个品种，这些书籍在读者中树立了良好的口碑，并被许多高校采用为正式教材和参考书籍。其影印版“经典原版书库”作为姊妹篇也被越来越多实施双语教学的学校所采用。

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华章科技图书出版中心

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.

Hands-On

MAKING IT WORK FOR YOU

Making **IT** work for you

CLOUD STORAGE

Have you ever wished you could instantly share photos and videos with your family, friends, or colleagues, as if it were instant Mail? Or do you have a growing collection of photos and videos that you need a way to store them safely, securely, and conveniently? If so, this is your chance to get it done.

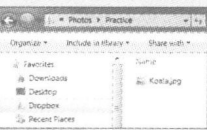

Getting Started To use Dropbox, you need to create an account. To take advantage of the synchronization features, you will need to install the software on each of your computers.

- 1 Go to www.dropbox.com, and click the Download Dropbox button.
- 2 Select the "I don't have a Dropbox account" option during the installation process (if this is your first installation).
- 3 Enter your information to create a new account.
- 4 Select the Free option when asked for a Dropbox size, and then choose the Typical setup.
- 5 Continue clicking the Next button to view the important task.

If you have a tablet or smartphone, be sure to install its free app in order to access your files.

The Dropbox Folder After installation, a folder named "Dropbox" will be created on your hard drive and connected to your computer's user account. This folder is the basis for all synchronization—any file placed here will immediately be uploaded to your Dropbox account and will be kept synchronized between all your computers. A good use of this folder would be to place all of your screenshots and favorite photos, so that you can access them from any internet-connected computer, tablet, or smartphone. Follow these steps to use your Dropbox folder:

- 1 Open Windows Explorer, and look at your Favorites area.
- 2 Click the Dropbox folder, and notice the files and folders already in there. Open the Photos subfolder.
- 3 Create a subfolder in this location named "Practice" (this will serve as a photo gallery or album).
- 4 Copy any photo from your computer and paste it in this new folder.



187

Special-interest topics are presented in the Making IT Work for You section found within nearly every chapter. These topics include Online Entertainment, Image Editing, Google Docs, Skype, and Cloud Storage.

Reinforcing Key Concepts

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

- Define data. List four common types of files.
- Define connectivity and the wireless revolution.
- What is a network? Describe the Internet, web, and cloud computing.

KEY TERMS

- | | | |
|---|---|--|
| active display area (163) | high-definition television (HDTV) (165) | picture element (162) |
| active-matrix organic light-emitting diode (AMOLED) (163) | household robot (169) | pixel (162) |
| artificial intelligence (AI) (169) | industrial robot (169) | pixel pitch (163) |
| aspect ratio (163) | inkjet printer (166) | platform scanner (159) |
| bar code (159) | input (154) | plotter (167) |
| bar code reader (159) | input device (154) | pointing device (156) |
| bar code scanner (159) | interactive whiteboard (165) | pointing stick (157) |
| card reader (159) | Internet telephone (169) | portable media player (168) |
| carpal tunnel syndrome (173) | Internet telephony (169) | portable scanner (159) |
| cathode-ray tube (CRT) (165) | IP telephony (169) | printer (163) |
| clarity (162) | joystick (157) | repetitive strain injury (RSI) (173) |
| cloud printer (167) | keyboard (154) | resolution (162, 166) |
| combination key (155) | laser printer (167) | RFID reader (160) |
| contrast ratio (163) | liquid crystal display (LCD) (163) | RFID (radio-frequency identification) tag (159) |
| cordless mouse (156) | magnetic card reader (159) | robot (169) |
| dance pad (157) | magnetic-ink character recognition (MICR) (160) | robotics (169) |
| digital camera (160) | mobile digital television (168) | scanner (158) |
| digital media player (160) | mobile DTV (166) | scanning devices (158) |
| digital video camera (160) | mobile robot (169) | shared laser printer (167) |
| digital whiteboard (165) | monitor (162) | Skype (169) |
| display screen (162) | motion-sensing device (157) | soft copy (162) |
| document scanner (159) | mouse (156) | speakers (168) |
| dot pitch (163) | mouse pointer (156) | stylus (157) |
| dots per inch (dpi) (166) | multifunctional device (MFD) (169) | technical writer (174) |
| duplex printing (166) | multitouch screen (157) | telephony (169) |
| e-book reader (163) | notebook keyboard (155) | thermal printer (167) |
| e-books (163) | optical-character recognition (OCR) (160) | thin-film transistor liquid crystal (TFT-LC) (163) |
| e-ink (163) | optical-mark recognition (OMR) (160) | thumb keyboard (155) |
| e-reader (163) | optical mouse (156) | toggle key (155) |
| electronic books (163) | optical scanner (158) | touch pad (157) |
| ergonomics (172) | output (162) | touch screen (157) |
| flat-panel monitor (163) | output device (162) | trackball (156) |
| flatbed scanner (159) | perception system (161) | traditional keyboard (155) |
| game controller (157) | robot (169) | Universal Product Code (UPC) (159) |
| gamepads (157) | personal laser printer (167) | virtual keyboard (155) |
| gloves (172) | photo printer (161) | virtual reality (VR) (172) |
| Google Cloud Print (167) | | voice over IP (VoIP) (169) |
| grayscale (166) | | voice recognition system (161) |
| handwriting recognition software (157) | | wand reader (159) |
| hard copy (165) | | webcam (161) |
| headgear (172) | | wheel button (156) |
| headsets (168) | | wireless mouse (156) |

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 letter of the correct answer.

1. The keyboard, mouse, monitor, and system unit are:

a. hardware	c. storage devices
b. output devices	d. software
2. Programs that coordinate computer resources, provide an interface, and run applications are known as:

a. application programs	c. storage systems
b. operating systems	d. utility programs
3. A browser is an example of a:

a. general-purpose application	c. system application
b. specialized program	d. utility program
4. Although not as powerful as a supercomputer, this type of computer is capable of great processing speeds and data storage.

a. mainframe	c. notebook
b. midrange	d. tablet
5. The smallest type of microcomputer:

a. handheld	c. midrange
b. notebook	d. tablet
6. RAM is a type of:

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

a. primary	c. ROM
b. RAM	d. secondary
8. The type of file created by word processors to save, for example, memos, term papers, and letters.

a. database	c. presentation
b. document	d. worksheet
9. Uses the Internet and the web to shift many computer activities from a user's computer to computers on the Internet.

a. cloud computing	c. network
b. high definition	d. USB
10. The largest network in the world is [the]:

a. Facebook	c. web
b. Internet	d. USB

For an interactive multiple-choice practice test, visit our website at www.computing2014.com and enter the keyword **multiple**. You can also access quizzes using the **Computing Essentials 2014** app.

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

Tags 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 major storage development is storage area network (SAN) systems. SAN is an abbreviation for disk storage computer storage devices, such as computer 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 attached data, but the SAN provides the disk space for data.

The key to a SAN is 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 recover data in remote locations and still allow efficient and secure access.

Explorations

As you prepare to read this chapter, explore the following concepts and their applications in the real world.

concept check


- 1. Define mass storage and how it is used in storage devices.
- 2. What is an enterprise storage system?
- 3. What is a storage area network?

Careers in IT

Disaster recovery specialists are responsible for recovering systems and data after a disaster strikes an organization. In addition, they often create plans to prevent and prepare for such disasters. A crucial part of that plan is to save storage devices and media in order to ensure that all company data is backed up and, in some cases, stored off-site.

Engineers typically look for candidates with a bachelor's or advanced specialized assistant's degree in information systems or computer science. Experience in this field is usually required, and additional skills in the areas of networking, security, and disaster administration are desirable. Disaster recovery specialists should possess good communication skills and be able to handle high-stress situations.

Disaster recovery specialists can expect to earn an annual salary of \$39,000 to \$73,000. Opportunities for advancement through technical, supervisory, and management positions. With no master type of degree faculty organizations, demand for these types of specialists is expected to grow. To learn about other careers in information technology, visit us at www.computing2011.com and enter the keyword **careers**.



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

What's the Future of Information Technology?

What's the future of information technology? The answer is simple: it's bright. The future of information technology is bright and it's yours to shape. The future of information technology is bright and it's yours to shape. The future of information technology is bright and it's yours to shape.

Keynote and Future

The keynote of this book is to help you see the bright future of information technology. The future of information technology is bright and it's yours to shape. The future of information technology is bright and it's yours to shape.

The Future of Information Technology

The future of information technology is bright and it's yours to shape. The future of information technology is bright and it's yours to shape. The future of information technology is bright and it's yours to shape.




Using IT at DVD Direct—A Case Study

INFORMATION SYSTEMS AT DVD DIRECT

DVD Direct, a fictitious organization, is an online web-oriented media rental business. Unlike traditional media rental businesses, DVD Direct provides all business and retail services. For a monthly fee, the customers select and download to their DVD discs for 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 it operates for only three years, DVD Direct has experienced rapid growth. To help manage and to continue this growth, the company has had three Albas, a recent college graduate. To follow Albas on her day at DVD Direct, which begins with a meeting with Bob, the vice president of marketing, visit us at www.computing2011.com and enter the keyword **case study**.



USING IT AT DVD DIRECT—A CASE STUDY

Beginning in Chapter 10 and continuing through Chapter 13, 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 Discussion Materials

MAKING IT WORK FOR YOU

Making IT Work for You discussion questions are carefully integrated with the chapter's Making IT Work for You topics. The questions facilitate in-class discussion or written assignments focusing on applying specific technologies into a student's day-to-day life. They are designed to expand a student's awareness of technology applications.

EXPLORATIONS

Explorations discussion questions are carefully integrated with the chapter's marginal Explorations boxes. The questions facilitate in-class discussion or written assignments focusing on locating and learning more in-depth content on specific topics. They are designed to encourage independent investigation and learning.

DISCUSSION

Respond to each of the following questions.

1 Making IT Work for You: ONLINE ENTERTAINMENT

Are you one of the millions of people who regularly use streaming technology to watch favorite television programs, movies, and other video content? Review the Making IT Work for You: Online Entertainment on pages 35 and 37 and then respond to the following: (a) Do you currently have a subscription to Netflix, Hulu Plus, or another service that allows you to stream movies and TV shows? If so, which one? If not, do you plan on using one in the future? Why or why not? (b) Name at least three TV shows that you currently watch or are interested in watching. Next, list a few series that include these shows as part of a subscription. If none does, list a few online stores where you can purchase and stream these episodes. (c) What device do you use most often to watch video content from the web? Would you consider purchasing a dedicated streaming device such as the Roku HD or why not? (d) Could ever see yourself canceling or "cutting the cord" from your current cable or satellite service? Why or why not?

2 Making IT Work for You: TWITTER

Did you know that Twitter can be used to follow friends, businesses, and celebrities, as well as discover breaking news and emerging trends? Review the Making IT Work for You: Twitter on pages 40 and 41 and create a Twitter account if you do not already have one. Then respond to the following: (a) In your opinion, what are the primary benefits of Twitter? (b) List five users that you currently follow or would like to follow in the future. Why did you select those individuals or organizations? (c) If you have already created your own tweets, briefly explain the type of content you typically post. If you have not posted anything, do you feel that you will in the future? Why or why not?

Explorations: INTERNET HISTORY

How much do you know about the history of the Internet and the web? Review the Explorations box on page 38 and then respond to the following: (a) What was the original Internet began set in what year was it invented? How many locations did it connect? (b) In what year was TCP/IP created? Why was this development so important? (c) Who created the World Wide Web? In what year was it introduced to the public? What were some of the factors that allowed it to succeed? (d) What was the first graphical web browser? Who created it? Why was the browser so revolutionary?

Explorations: DIGITAL WALLETS

Did you know that your smartphone could be used to hold all your credit cards, coupons, and gift cards? Review the Explorations box on page 43 and then respond to the following: (a) What is the name of the digital wallet product? Which mobile operating systems is it compatible with? Does your smartphone need to have a specific technology to complete in-person transactions? If so, what? (b) How does this product work? Provide details on both the setup and use of the product. (c) Is this technology safe and secure? Support your answer with details. (d) Find three stores in your area that accept payments with the technology. If none exists in your area, list three online stores. (e) Would you use a digital wallet? Why or why not?

1 Ethics: BLOGS

Almost half a million people are paid to create blogs, and many of those are being paid to write favorable reviews of products and services. Review the Ethics box on page 38 and respond to the following: (a) Do you think it is unethical for bloggers to write positive reviews for the companies that pay them? Why or why not? (b) Should there be disclaimers on paid blog posts? If so, how can such a policy be enforced? Explain your answer. (c) If you found out that a particular company paid bloggers for favorable reviews, would you continue to buy its products? Why or why not? (d) If you were to use a blog for product information, what could you do to determine whether the content is unbiased?

2 Ethics: FILTERING AND MONITORING

Parents can use content filters and monitoring software to restrict or monitor their child's Internet behavior. Review the Ethics box on page 48 and respond to the following: (a) Is it ethical for parents to filter internet content that they deem to be unsafe or inappropriate for their children? Does your answer depend on the age of the child? Defend your position. (b) Is it ethical for parents to monitor the Internet activity of their children? What if the monitoring software captures more than just web pages? What if it records instant messages, incoming e-mail, and even passwords? Explain your position. (c) Should parents inform their children that Internet activity is being filtered or monitored? Why or why not? (d) Do you feel that filtering or monitoring software is the best way to protect children? Do you feel that it hurts the trust between a parent and child? In your response, be sure to include your opinion as to whether or not you would ever use such software.

3 Environment: E-MAIL

Did you know that using e-mail and managing your bills on the web are good for the environment? Review the Environment box on page 35 and then respond to the following: (a) When it comes to sending letters, holiday cards, and invitations to friends and family, do you really use e-mail or postal mail? What are your reasons for choosing one over the other? (b) Are there any situations where you feel that using e-mail would not be advantageous? (c) How you support or do companies taking from your financial institutions and utility companies? Why or why not? (d) Go through all the paper mail you have received in the last week or two. Is there anything there that you could receive via e-mail or view on the web? List a few examples.

4 Environment: CLOUD COMPUTING

Did you know that the move to cloud computing could benefit the environment? Review the Environment box on page 45 and then use a search engine to find a cloud computing company that claims to offer energy-saving benefits. Respond to the following questions about your research: (a) How does this company's cloud services benefit the environment? (b) What steps has the cloud company taken to reduce their carbon emissions? (c) Do you believe that cloud computing is more energy efficient than having many computers running their own servers? Why or why not? (d) Is it possible that the expansion of cloud computing could actually increase the overall energy consumption of the planet? Explain your answer.

ETHICS

Ethics discussion questions are carefully integrated with the chapter's marginal Ethics boxes. The questions facilitate in-class discussion or written assignments focusing on ethical issues relating to technology. They are designed to develop a student's ability to think critically and communicate effectively.

ENVIRONMENT

Environment discussion questions are carefully integrated with the chapter's marginal Environment boxes. The questions facilitate in-class discussion or written assignments focusing on environmental issues relating to technology. They are designed to develop a student's ability to think critically and communicate effectively.

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/ce2014.

The O'Leary Website

The O'Leary website can be found at www.computing2014.com. Students can find a host of additional resources on the website, including animations of key concepts and in-depth coverage of select topics.

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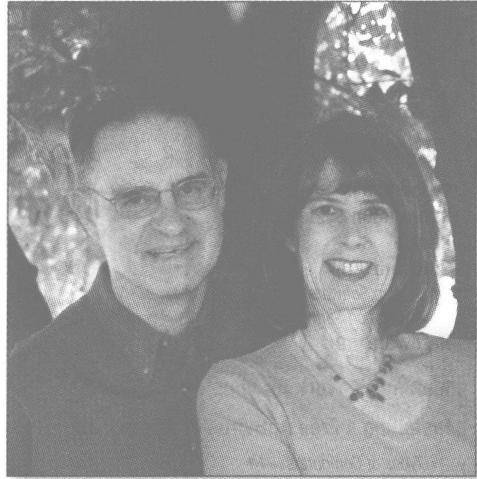
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About the Authors

Tim and Linda O'Leary live in the American Southwest and spend much of their time engaging instructors and students in conversation about learning. In fact, they have been talking about learning for over 25 years. Something in those early conversations convinced them to write a book, to bring their interest in the learning process to the printed page. Today, they are as concerned as ever about learning, about technology, and about the challenges of presenting material in new ways, in terms of both content and method of delivery.



A powerful and creative team, Tim combines his 25 years of classroom teaching experience with Linda's background as a consultant and corporate trainer. Tim has taught courses at Stark Technical College in Canton, Ohio, and at Rochester Institute of Technology in upstate New York, and is currently a professor emeritus at Arizona State University in Tempe, Arizona. Linda offered her expertise at ASU for several years as an academic advisor. She also presented and developed materials for major corporations such as Motorola, Intel, Honeywell, and AT&T, as well as various community colleges in the Phoenix area.

Tim and Linda have talked to and taught numerous students, all of them with a desire to learn something about computers and applications that make their lives easier, more interesting, and more productive.

Each new edition of an O'Leary text, supplement, or learning aid has benefited from these students and their instructors who daily stand in front of them (or over their shoulders). *Computing Essentials* is no exception.

Contents

1

INFORMATION TECHNOLOGY, THE INTERNET, AND YOU 2

- Introduction 4
- Information Systems 5
- People 6
- Software 8
 - System Software 8
 - Application Software 9
- Hardware 9

Making IT work for you:

Installing a Free Antivirus Program 10

- Types of Computers 11
- Microcomputer Hardware 12

Data 14

- Connectivity 15
- Careers in IT 17

A Look to the Future: Using and Understanding Information Technology Means Being Computer Competent 18

- Open-Ended 19
- Discussion 19

2

THE INTERNET, THE WEB, AND ELECTRONIC COMMERCE 22

- Introduction 24
- The Internet and the Web 24

Making IT work for you:

Online Entertainment 26

Access 28

- Providers 28
- Browsers 28

Communication 31

- E-mail 31
- Messaging 32
- Social Networking 33
- Blogs, Microblogs, Webcasts, Podcasts, and Wikis 34

Making IT work for you:

- Twitter 36

Search Tools 38

- Search Engines 39
- Specialized Search Engines 39
- Content Evaluation 40

Electronic Commerce 40

- Security 41

Cloud Computing 42

Web Utilities 44

- Plug-ins 44
- Filters 45
- File Transfer Utilities 45
- Internet Security Suites 46

Careers in IT: Webmaster 47

A Look to the Future: Your Car's Dashboard as a Powerful, Internet-Connected Computing Device 48

- Open-Ended 49
- Discussion 49

3

APPLICATION SOFTWARE 52

Introduction 54

Application Software 54

- User Interface 54
- Common Features 56

General-Purpose Applications 56

- Word Processors 56
- Spreadsheets 59
- Database Management Systems 61
- Presentation Graphics 61

Specialized Applications 63

- Graphics 63

Making IT work for you:

Image Editing 65

- Web Authoring Programs 67
- Other Professional Specialized Applications 68

Mobile Apps 68

- Apps 70
- App Stores 70

Software Suites 71

- Office Suites 71
- Cloud Computing 71
- Specialized and Utility Suites 72

Careers in IT: Software Engineer 72

Making IT work for you:

- Google Docs 73

A Look to the Future: Next-Generation User Interfaces 74

Open-Ended 75
Discussion 75

4

SYSTEM SOFTWARE 78

Introduction 80

System Software 80

Operating Systems 81

Functions 81

Features 82

Categories 83

Mobile Operating Systems 84

Desktop Operating Systems 85

Windows 85

Mac OS 86

UNIX and Linux 86

Virtualization 87

Utilities 88

Windows Utilities 88

Making IT work for you:

Windows Task Manager 89

Utility Suites 93

Device Drivers 93

Careers in IT: Computer Support Specialist 95

A Look to the Future: Self-Healing Computers Could Mean an End to Computer Crashes and Performance Problems 96

Open-Ended 97
Discussion 97

5

THE SYSTEM UNIT 100

Introduction 102

System Unit 102

Desktops 102

Notebooks 102

Tablets 103

Handhelds 104

Components 104

Making IT work for you:

Keeping Your Computer Cool 105

System Board 107

Microprocessor 108

Microprocessor Chips 109

Specialty Processors 110

Memory 110

RAM 110

ROM 111

Flash Memory 111

Expansion Slots and Cards 112

Bus Lines 113

Expansion Buses 113

Ports 114

Standard Ports 115

Specialized Ports 115

Cables 115

Making IT work for you:

TV Tuners 116

Power Supply 117

Electronic Data and Instructions 118

Numeric Representation 118

Character Encoding 118

Careers in IT: Computer Technician 119

A Look to the Future: Chips inside Your Brain 120

Open-Ended 121
Discussion 121

6

INPUT AND OUTPUT 124

Introduction 126

What Is Input? 126

Keyboard Entry 126

Keyboards 127

Pointing Devices 128

Mice 128

Touch Screens 129

Game Controllers 129

Stylus 129

Scanning Devices 130

Optical Scanners 130

Card Readers 131

Bar Code Readers 131

RFID Readers 131

Character and Mark Recognition Devices 132

Image Capturing Devices 132

Digital Cameras 132

Webcams 133

Audio-Input Devices 133

Voice Recognition Systems 133

What Is Output? 134

Monitors 134

Features 134

Flat-Panel Monitors 135

E-book Readers 135

Making IT work for you: E-Books 136

Other Monitors 137

Printers 137

Features 138

Inkjet Printers 138

Laser Printers 139

Other Printers 139

- Audio and Video Devices** 140
 - Portable Media Players 140
- Combination Input and Output Devices** 140
 - Multifunctional Devices 141
 - Internet Telephones 141
 - Robots 141

Making IT work for you: Skype 142

- Virtual Reality Headgear and Gloves 144

- Ergonomics** 144
- Careers in IT: Technical Writers** 146

A Look to the Future: Augmented Reality Displays 147

- Open-Ended 148
- Discussion 148

7

SECONDARY STORAGE 152

- Introduction** 154
- Storage** 154
- Hard Disks** 155
 - Internal Hard Disk 156
 - External Hard Drives 156
 - Performance Enhancements 156
- Optical Discs** 158
 - Compact Disc 158
 - Digital Versatile Disc 159
 - Blu-ray Disc 159
- Solid-State Storage** 160
 - Solid-State Drives 160
 - Flash Memory Cards 160
 - USB Drives 161
- Cloud Storage** 161

Making IT work for you:

Cloud Storage 163

- Mass Storage Devices** 165
 - Enterprise Storage System 165
 - Storage Area Network 166

Careers in IT: Disaster Recovery Specialist 166

A Look to the Future: Next-Generation Storage 167

- Open-Ended 168
- Discussion 168

8

COMMUNICATIONS AND NETWORKS 170

- Introduction** 172
- Communications** 172

- Connectivity 172
 - The Wireless Revolution 173
 - Communication Systems 173
- Communication Channels** 174
 - Physical Connections 174
 - Wireless Connections 175
- Connection Devices** 176
 - Modems 176
 - Connection Service 177
- Data Transmission** 178
 - Bandwidth 178

Making IT work for you:

Mobile Internet 179

- Protocols 180

Networks 181

- Terms 181

Network Types 182

- Local Area Networks 182
- Home Networks 183
- Wireless LAN 183
- Personal Area Network 184
- Metropolitan Area Networks 184
- Wide Area Networks 184

Network Architecture 185

- Topologies 185
- Strategies 186

Organizational Networks 187

- Internet Technologies 187
- Network Security 188

Careers in IT: Network Administrator 189

Making IT work for you:

Remote Access 190

A Look to the Future: Telepresence Lets You Be There without Actually Being There 191

- Open-Ended 192
- Discussion 192

9

PRIVACY, SECURITY, AND ETHICS 194

Introduction 196

People 196

Privacy 197

- Large Databases 197
- Private Networks 200
- The Internet and the Web 201
- Online Identity 204
- Major Laws on Privacy 204

Security 205

- Cybercrime 205
- Measures to Protect Computer Security 209

Making IT work for you: