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# 计算机科学引论

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

Computing Essentials 2014

Making **IT** work for you

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

COMPLETE

(2014英文版)

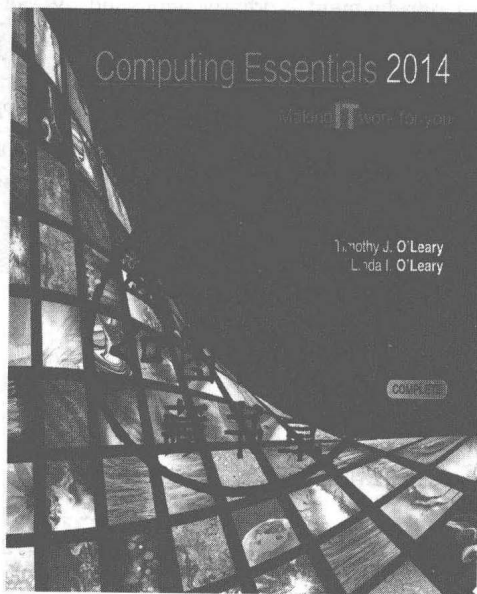
*Computing Essentials 2014  
Making IT Work for You Complete Edition*

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*Computing Essentials 2014*  
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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, Brain 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.



# 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

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 active-matrix organic light-emitting diode (AMOLED) (163)  
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 aspect ratio (163)  
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## 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
  - b. output devices
  - c. storage devices
  - d. software
2. Programs that coordinate computer resources, provide an interface, and run applications are known as:
  - a. application programs
  - b. operating systems
  - c. storage systems
  - d. utility programs
3. A browser is an example of a:
  - a. general-purpose application
  - b. specialized program
  - c. system application
  - 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
  - b. midrange
  - c. notebook
  - d. tablet
5. The smallest type of microcomputer:
  - a. handheld
  - b. notebook
  - c. midrange
  - d. tablet
6. RAM is a type of:
  - a. computer
  - b. memory
  - c. network
  - 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
  - b. RAM
  - c. ROM
  - d. secondary
8. The type of file created by word processors to save, for example, memos, term papers, and letters.
  - a. database
  - b. document
  - c. presentation
  - 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
  - b. high-definition
  - c. network
  - d. USB
10. The largest network in the world is [bn].
  - a. Facebook
  - b. Internet
  - c. web
  - d. USB

For an interactive multiple-choice practice test, visit our website at [www.computing2014.com](http://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

**Explorations**  
An ongoing in-class activity that allows students to explore a topic in more depth.

**Concept Check**  
Check your understanding of the key concepts in this chapter.

- 1. Define the term *data backup*.
- 2. What is a *data backup*?
- 3. What is a *data backup*?

**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 their job is to use storage devices and media to ensure that all company data is backed up and, in some cases, stored off-site.

Employers typically look for candidates with a bachelor's or advanced specialized associate'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 database 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 \$75,000 to \$100,000. Opportunities for advancement typically include upper-management positions. With so many types of disasters facing organizations, demand for these types of specialists is expected to grow. To learn about other careers in information technology, visit us at [www.computer24.com](http://www.computer24.com) and enter the keyword *careers*.



With the help of our experts, you can learn more about the careers in IT that interest you. Visit us at [www.computer24.com](http://www.computer24.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**

**Using IT at DVD Direct—A Case Study**

**Information Systems at DVD Direct**

DVD Direct, a fictitious organization, is an online, self-oriented music retail business. Unlike traditional music retail businesses, DVD Direct conducts all business over the web at all web storefronts. For a marketing firm, the customers are able to order up to three months in advance from a catalog online at the company website. The music the customers select are ordered to them on DVD discs by mail within three working days. After shipping, customers return one or more discs by mail. They are allowed to keep the discs as long as they wish but pay over time for the 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 had three hires, a recent college graduate, to follow Alice for her first day at DVD Direct, which began with a meeting with Bob, the vice president of marketing. Call us to see the web at [www.computer24.com](http://www.computer24.com) and enter the keyword *careers*.




"We need you and we're committed about how you members will contribute to our website."

**Using IT at DVD Direct—a case study**

**Information Systems at DVD Direct**

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"We need you and we're committed about how you members will contribute to our website."

## 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 30 and 31 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(s)? If not, do you plan on using one in the future? Why or why not? (b) Have at least three IT shows that you currently watch or are interested in watching. Next, list a few shows that include these shows as part of a subscription. If you do, 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? Why or why not? (d) Could ever see yourself "clouding" the content 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, teachers, and celebrities, as well as discuss 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 posted 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?

**3 Explorations: INTERNET HISTORY**  
How much do you know about the history of the Internet and the web? Review the Explorations box on page 28 and then respond to the following: (a) What was the original Internet known as? (b) What year was it introduced? (c) How many locations did it connect? (d) In what year was "WWW" created? (e) Who was the development so important? (f) Who created the World Wide Web? In what year was it introduced to the public? (g) What were some of the factors that allowed it to succeed? (h) What was the first graphical web browser? Who created it? (i) Why was the browser so revolutionary?

**4 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 46 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 its setup, transaction? 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 this technology. If none exists in your area, list three online stores. (e) Would you use a digital wallet? Why or why not?

## 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.

**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 review be indicated? 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 responses, 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 56 and then respond to the following: (a) When it comes to sending letters, holiday cards, and notices to friends and family, do you mostly 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 do you stack up for paperless billing 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 66 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 companies 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.

## 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

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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](http://www.mhhe.com/ce2014).

# The O'Leary Website

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The O'Leary website can be found at [www.computing2014.com](http://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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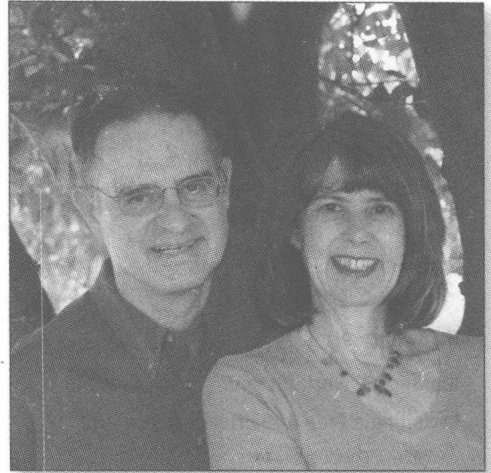
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## About the Authors

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.

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