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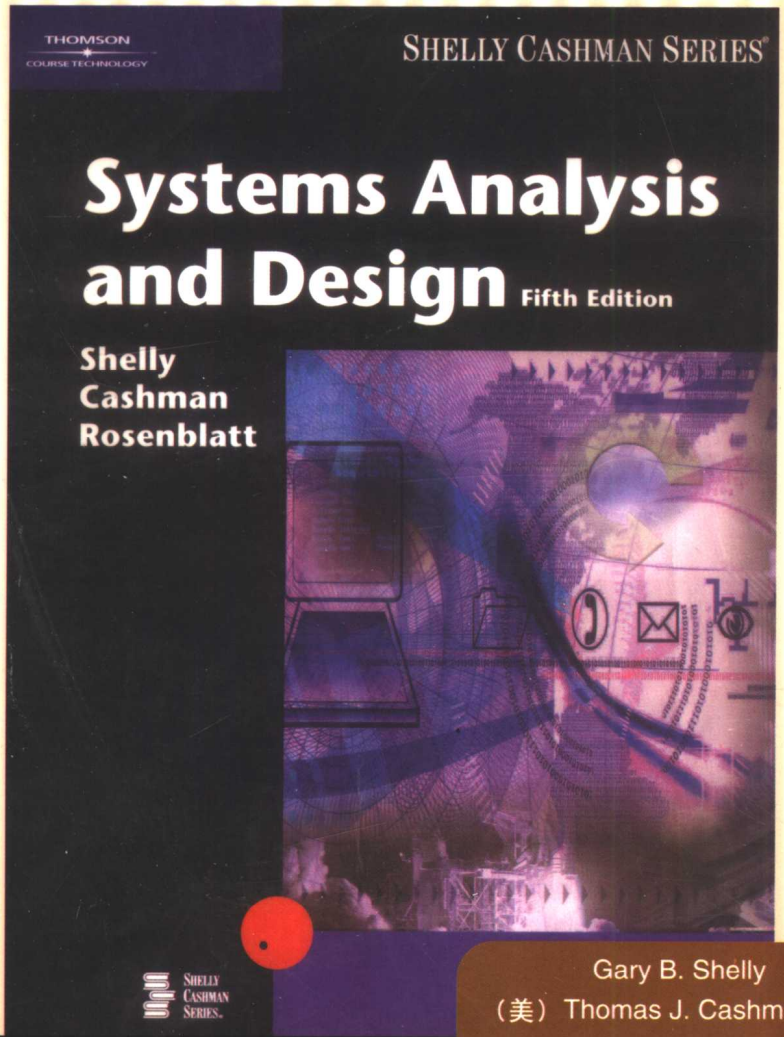
(英文版 · 第5版)



附赠 CD-ROM

Gary B. Shelly
(美) Thomas J. Cashman 著
Harry J. Rosenblatt

机械工业出版社
China Machine Press

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Systems Analysis and Design

(Fifth Edition)

Gary B. Shelly
（美）Thomas J. Cashman 著
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Gary B. Shelly, Thomas J. Cashman, and Harry J. Rosenblatt
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出版者的话

文艺复兴以降，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；也正是这样的传统，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，还揭橥了学术的源变，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、从业人员较少的现状下，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图文信息有限公司较早意识到“出版要为教育服务”。自1998年开始，华章公司就将工作重点放在了遴选、移译国外优秀教材上。经过几年的不懈努力，我们与Prentice Hall，Addison-Wesley，McGraw-Hill，Morgan Kaufmann等世界著名出版公司建立了良好的合作关系，从它们现有的数百种教材中甄选出Tanenbaum，Stroustrup，Kernighan，Jim Gray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、研究及庋藏。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襄助，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，有的还专诚为其书的中译本作序。迄今，“计算机科学丛书”已经出版了近百个品种，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，为进一步推广与发展打下了坚实的基础。

随着学科建设的初步完善和教材改革的逐渐深化，教育界对国外计算机教材的需求和应用都步入一个新的阶段。为此，华章公司将加大引进教材的力度，在“华章教育”的总规划之下出版三个系列的计算机教材：除“计算机科学丛书”之外，对影印版的教材，则单独开辟出“经典原版书库”；同时，引进全美通行的教学辅导书“Schaum's Outlines”系列组成“全美经典学习指导系列”。为了保证这三套丛书的权威性，同时也为了更好地为学校和老师们服务，华章公司聘请了中国科学院、北京大学、清华大学、国防科技大学、复旦大学、上海交通大学、南京大学、浙江大学、中国科技大学、哈尔滨工业大学、西安交通大学、中国人民大学、北京航空航天大学、北京邮电大学、中山大学、解放军理工大学、郑州大学、湖北工学院、中国国

家信息安全测评认证中心等国内重点大学和科研机构在计算机的各个领域的著名学者组成“专家指导委员会”，为我们提供选题意见和出版监督。

这三套丛书是响应教育部提出的使用外版教材的号召，为国内高校的计算机及相关专业的教学度身订造的。其中许多教材均已为M. I. T.，Stanford，U.C. Berkeley，C. M. U. 等世界名牌大学所采用。不仅涵盖了程序设计、数据结构、操作系统、计算机体系结构、数据库、编译原理、软件工程、图形学、通信与网络、离散数学等国内大学计算机专业普遍开设的核心课程，而且各具特色——有的出自语言设计者之手、有的历经三十年而不衰、有的已被全世界的几百所高校采用。在这些圆熟通博的名师大作的指引之下，读者必将在计算机科学的宫殿中由登堂而入室。

权威的作者、经典的教材、一流的译者、严格的审校、精细的编辑，这些因素使我们的图书有了质量的保证，但我们的目标是尽善尽美，而反馈的意见正是我们达到这一终极目标的重要帮助。教材的出版只是我们的后续服务的起点。华章公司欢迎老师和读者对我们的工作提出建议或给予指正，我们的联系方法如下：

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PREFACE

The Shelly Cashman Series® offers the finest textbooks in computer education. We are proud that previous editions of *Systems Analysis and Design* have been so well received by instructors and students. *Systems Analysis and Design, Fifth Edition* continues with the innovation, quality, and reliability you have come to expect from the Shelly Cashman Series.

OVERVIEW

Systems Analysis and Design, Fifth Edition presents a practical approach to information technology and systems development. Many two- and four-year colleges and schools use this book in information systems, computer science, and e-commerce curriculums. The text emphasizes the role of the systems analyst in a dynamic, business-related environment.

Using this book, students learn how to translate business requirements into information systems that support a company's short- and long-term objectives. Case studies and assignments teach analytical, problem-solving, and decision-making techniques. Extensive end-of-chapter exercises emphasize the development of critical-thinking skills.

OBJECTIVES OF THIS TEXTBOOK

Systems Analysis and Design, Fifth Edition is intended for a three-credit hour introductory systems analysis and design course. This textbook is designed to:

- Present the material in an appealing full-color format, with an easy-to-read style that invites students to learn
- Describe important IT developments and trends, using numerous screen shots of selected Web sites and links
- Describe the five phases of the systems development life cycle (SDLC): systems planning, systems analysis, systems design, systems implementation, and systems operation and support
- Give students an in-depth understanding of how information technology (IT) supports operational and business requirements in today's intensely competitive environment
- Explain how systems analysts interact with users, management, and other IT professionals in a typical business organization
- Provide case studies and exercises that promote critical-thinking skills and encourage students to apply their skills and knowledge
- Provide students with a comprehensive Systems Analyst's Toolkit that highlights six major cross-functional tools that all systems analysts need, including communications tools, CASE tools, financial analysis tools, project management tools, object-oriented tools, and Internet resource tools

New to this Edition

Systems Analysis and Design, Fifth Edition offers many exciting new features:

- The textbook introduces a streamlined, 10-chapter layout that reflects real-world systems analysis skills and techniques within the framework of the systems development life cycle (SDLC).
- Each chapter begins with an opening case that uses a college bookstore scenario to highlight key objectives and tasks for each chapter.
- Material has been added to cover new IT trends including outsourcing; software acquisition options; e-commerce, including B2B and B2C; application service providers; enterprise resource planning (ERP); supply chain management; total cost of ownership (TCO); client/server architecture; network concepts; Web-based application development; and future IT issues, challenges, and opportunities.
- End-of-chapter exercises have been expanded to include a set of review questions, discussion questions, and projects for each chapter.
- Each chapter features a Learn It Online section with a variety of Web-based exercises, quizzes, and games.
- A new continuing case study features Personal Trainer, a fitness center chain that requires IT support for its new Canadian supercenter facility.
- Case-Sim® features SCR Associates, a unique, interactive, Web-based case study that has been updated and expanded, with a Web Preview in each chapter that describes the online session for that part of the case.
- The Systems Analyst's Toolkit expands to include cross-phase coverage of communications tools, a new section on CASE tools, financial analysis tools, project management tools; a new section on objected-oriented tools; and a new section on Internet resource tools.

Organization of This Textbook

Systems Analysis and Design, Fifth Edition contains 16 units of instruction, consisting of 10 chapters and six toolkit parts:

CHAPTER 1 – INTRODUCTION TO SYSTEMS ANALYSIS AND DESIGN Chapter 1 provides an up-to-date overview of IT issues, major trends, the systems development life cycle, and the important role of systems analysis and design in supporting business objectives.

CHAPTER 2 – ANALYZING THE BUSINESS CASE Chapter 2 offers a business-related starting point for successful systems analysis. Topics include strategic planning, review of systems requests, how to conduct a feasibility study, and the steps in a preliminary investigation.

CHAPTER 3 – REQUIREMENTS MODELING Chapter 3 describes fact-finding techniques and team-based modeling methods, including JAD and RAD, that systems analysts use to model and document a new system.

CHAPTER 4 – ENTERPRISE MODELING Chapter 4 explains how systems analysts create a logical model for the new system by using entity-relationship diagrams, data flow diagrams, and process description tools.

CHAPTER 5 – DEVELOPMENT STRATEGIES Chapter 5 focuses on software acquisition options, including outsourcing, application service providers, and other trends that view software as a service rather than a product. This chapter also provides a transition to the systems design phase.

CHAPTER 6 – DATA DESIGN Chapter 6 describes data design terms, concepts, and skills, including cardinality, data normalization rules, data warehousing, data mining, a comparison of logical and physical records, and data control measures.

CHAPTER 7 – USER INTERFACE, INPUT, AND OUTPUT DESIGN Chapter 7 highlights the interaction between humans and computers, including usability issues, graphical screen design, input and data entry guidelines, and printed report design.

CHAPTER 8 – SYSTEM ARCHITECTURE Chapter 8 explains the elements of system architecture, with emphasis on ERP, supply chain management, client/server architecture, and network topology.

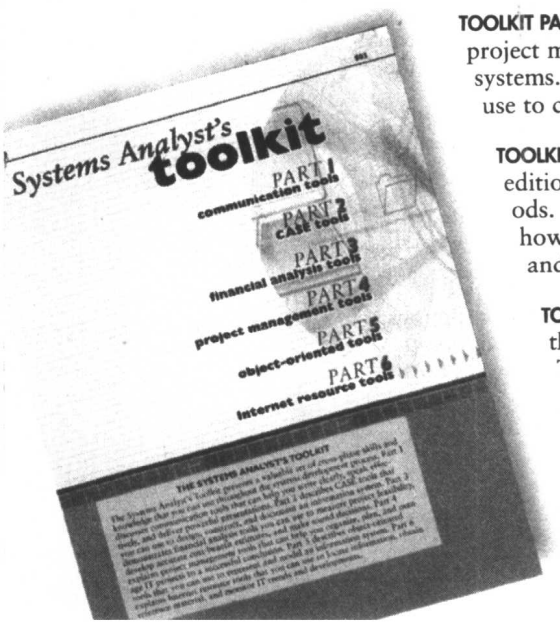
CHAPTER 9 – SYSTEMS IMPLEMENTATION Chapter 9 includes coverage of application development and implementation topics, including structure charts, documentation techniques, system testing, user training, data conversion, changeover methods, and post-implementation evaluation.

CHAPTER 10 – SYSTEMS OPERATION AND SUPPORT Chapter 10 describes user support activities, various types of maintenance techniques for managing systems operation and support, and how to identify factors that indicate the end of a system's useful life. This chapter also explains future challenges and opportunities that IT professionals will face in a dynamic workplace.

TOOLKIT PART 1 – COMMUNICATION TOOLS Part 1 of the Toolkit describes oral and written communication tools that can make a systems analyst more effective. Topics include guidelines for successful communications, tips for better readability, how to organize and plan an oral presentation, and effective speaking techniques.

TOOLKIT PART 2 – CASE TOOLS Part 2 of the Toolkit, new to this edition, focuses on computer-aided software engineering (CASE) tools that systems analysts use to document, model, and develop information systems. Examples of several popular CASE tools are provided, along with sample screens that show CASE tool features.

TOOLKIT PART 3 – FINANCIAL ANALYSIS TOOLS Part 3 of the Toolkit explains various tools that systems analysts use to determine feasibility and evaluate the costs and benefits of an information system. Specific tools include payback analysis, return on investment (ROI), and net present value (NPV).



TOOLKIT PART 4 – PROJECT MANAGEMENT TOOLS Part 4 of the Toolkit explains project management, cost estimating, and change control for information systems. This section also includes hands-on skills that systems analysts can use to create Gantt charts and PERT charts.

TOOLKIT PART 5 – OBJECT-ORIENTED TOOLS Part 5 of the Toolkit, new to this edition, explains how systems analysts use object-oriented analysis methods. This section describes object-oriented terms and concepts and shows how the Unified Modeling Language can be used to document, analyze, and model an information system.

TOOLKIT PART 6 – INTERNET RESOURCE TOOLS Part 6 of the Toolkit, new to this edition, explains Internet-based information gathering strategies. Topics include search engines, subject directories, the invisible Web, advanced search techniques, Boolean logic, and Venn diagrams. This section also discusses newsgroups, newsletters, mailing lists, Web-based discussion groups, chat rooms, instant messaging, and online learning opportunities.

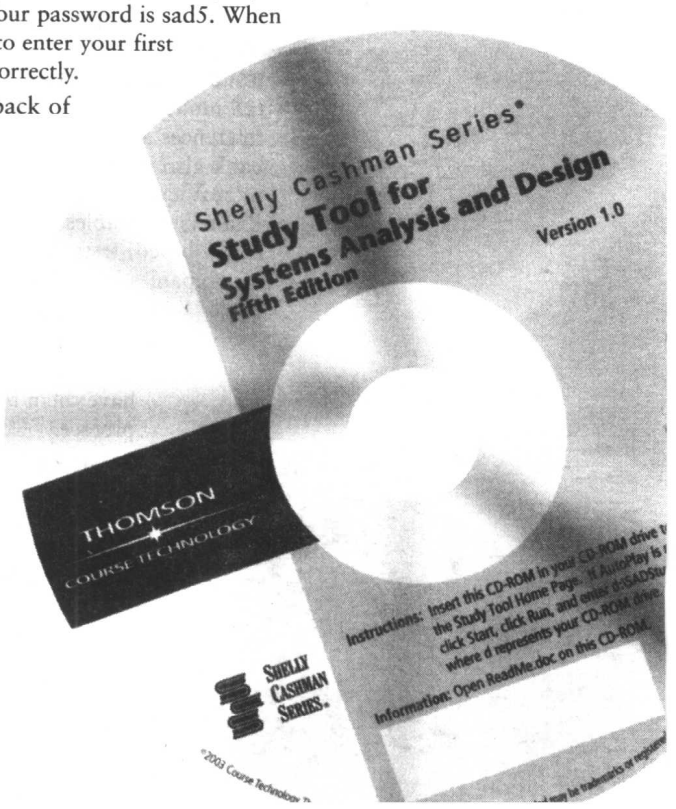
FOR THE STUDENT

The Shelly Cashman Series wants you to have a valuable learning experience that will provide you with the knowledge and skills you need to be successful. With that goal in mind, we have included many activities, games, and learning tools. We hope that you find them to be interesting, challenging, and enjoyable.

End-of-Chapter Exercises

You will find the following exercises in every text chapter:

- **LEARN IT ONLINE** Each chapter features a Learn It Online page consists of six exercises. These exercises utilize the Web to offer chapter-related reinforcement activities that will help you gain confidence in systems analysis and design. These exercises include True/False, Multiple Choice, Short Answer, Flash Cards, Practice Test, and several learning games.
- **CHAPTER EXERCISES** In this section, you will find ten Review Questions, four Discussion Topics, and four Projects. These exercises allow you to apply your knowledge of the material and will help you prepare for tests and assessments.
- **APPLY YOUR KNOWLEDGE** This section includes four mini-cases per chapter. Each mini-case requires you to use the knowledge and skills you learned in the chapter.
- **CASE STUDIES** Case studies provide practical experience and allow you to practice specific skills learned in the chapter. Each chapter contains several case studies, two of which (New Century Health Clinic and Personal Trainer, Inc.) continue throughout the textbook. You can complete your assignments using Microsoft Word and Excel forms, available at www.scsite.com/sad5e/forms.
- **CASE-SIM** SCR Associates is an interactive case study that you can complete using the Web. You can log on to the company intranet, read e-mail addressed to you, and perform assigned tasks in a realistic corporate setting. Detailed instructions on how to use this case are available at www.scsite.com/sad5e/scr. To log on to the company intranet, you will be required to provide a password. Your password is sad5. When you log on to the SCR intranet, you also will be asked to enter your first and last name so your e-mail can be addressed to you correctly.
- **STUDENT STUDY TOOL** This CD-ROM, provided in the back of your book, contains:
  - Detailed outlines of every chapter that clearly highlight key topics covered and can be used as a guide when reviewing for an exam.
  - Chapter glossaries that allow you to look up all key terms in one place. They also provide page references where key terms can be found if you need more information.
  - Web Links, Figures, and Test Yourself questions that provide additional reinforcement of chapter concepts.



FOR THE INSTRUCTOR

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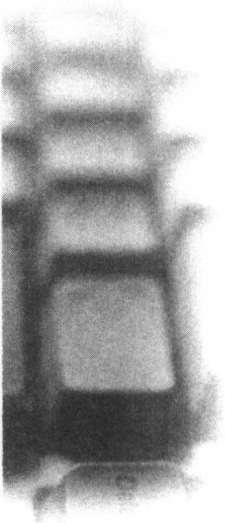
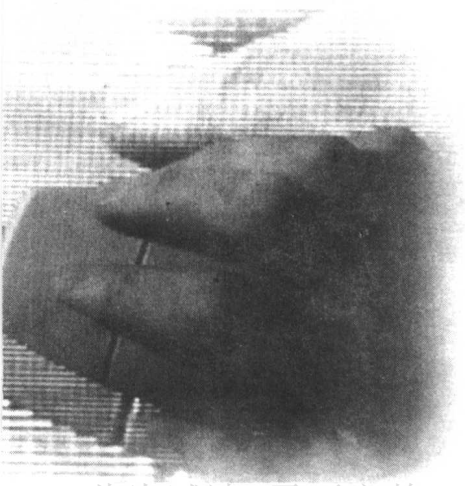


Instructor Resources CD-ROM

The Instructor Resources CD-ROM (ISBN 0-7895-6713-X) for this textbook includes both teaching and testing aids. The contents of the CD-ROM are listed below:

- **INSTRUCTOR'S MANUAL** The Instructor's Manual is made up of Microsoft Word files. The Instructor's Manual includes detailed lecture notes with page number references, teacher's notes, classroom activities, discussion topics, and projects to assign.
- **COURSE SYLLABUS** Sample syllabi are included, and can be customized easily for your course.
- **POWERPOINT PRESENTATION** PowerPoint Presentation is a multimedia lecture presentation system that provides PowerPoint slides for each chapter. Presentations are based on chapter objectives. Use this presentation system to present well-organized lectures that are both interesting and knowledge based. PowerPoint Presentation provides consistent coverage at schools that use multiple lecturers.
- **FIGURE FILES** Illustrations for every figure in the textbook are available in electronic form. Use this ancillary to present a slide show in lecture or to print transparencies for use in lecture with an overhead projector. If you have a personal computer and LCD device, this ancillary can be an effective tool for presenting lectures.
- **SOLUTIONS TO EXERCISES** Solutions are included for all end-of-chapter exercises, as well as the Chapter Reinforcement activities and Crossword Puzzle Challenge games at the companion Web site.
- **TEST BANK & TEST ENGINE** The test bank includes 110 questions for every chapter (25 multiple-choice, 50 true/false, and 35 fill-in-the-blank) with page number references and, when appropriate, figure references. A printable version of the test bank also is included. The test bank comes with a copy of the test engine, ExamView. ExamView is a state-of-the-art test builder that is easy to use. ExamView enables you quickly to create printed tests, Internet tests, and computer (LAN-based) tests. You can enter your own test questions or use the test bank that accompanies ExamView.
- **DATA FILES FOR STUDENTS** The forms that students can use to complete the Case Studies are included. You can distribute the files on the Instructor Resources CD-ROM to your students over a network, or you can have them follow the instructions in the For the Student section of this preface.
- **ADDITIONAL ACTIVITIES FOR STUDENTS** Two additional case studies are provided for every chapter. You can assign them as homework, extra credit, or to assess student understanding of the chapter.
- **SOFTWARE** A copy of the powerful CASE tool, Visible Analyst Student Edition, is provided for your evaluation.



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Software Bundling Opportunities

Systems Analysis and Design, Fifth Edition can be bundled with several popular software programs:

- **VISIBLE ANALYST STUDENT EDITION** Whether you are designing e-business applications, developing a data warehouse, or integrating your legacy systems with new enterprise applications, Visible Analyst has all the power you need. Educating tomorrow's developers today, Visible Analyst helps students become more marketable with advanced, affordable, application development and training tools. This special version of Visible Analyst is a separate product with a unique goal of educating the future application development work force. A network version, called the Visible Analyst University Edition, is available to colleges and universities for installation in computer labs.
- **SYSTEM ARCHITECT STUDENT EDITION** A comprehensive and powerful modeling solution, System Architect is designed to provide you with all of the tools necessary for development of successful enterprise systems. System Architect is the only tool to integrate industry-leading support for all major areas of modeling, including business process modeling, object-oriented and component modeling with the UML, relational data modeling, and structured analysis and design. All functionality is harnessed within System Architect's extensible repository with native support for Microsoft Visual Basic for Applications.

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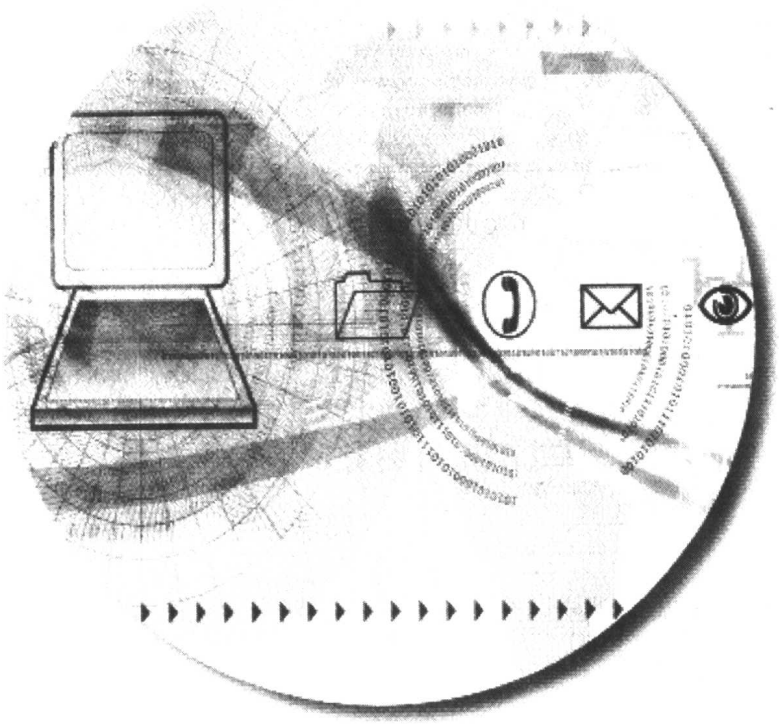

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