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Systems Analysis and Design

Fourth Edition

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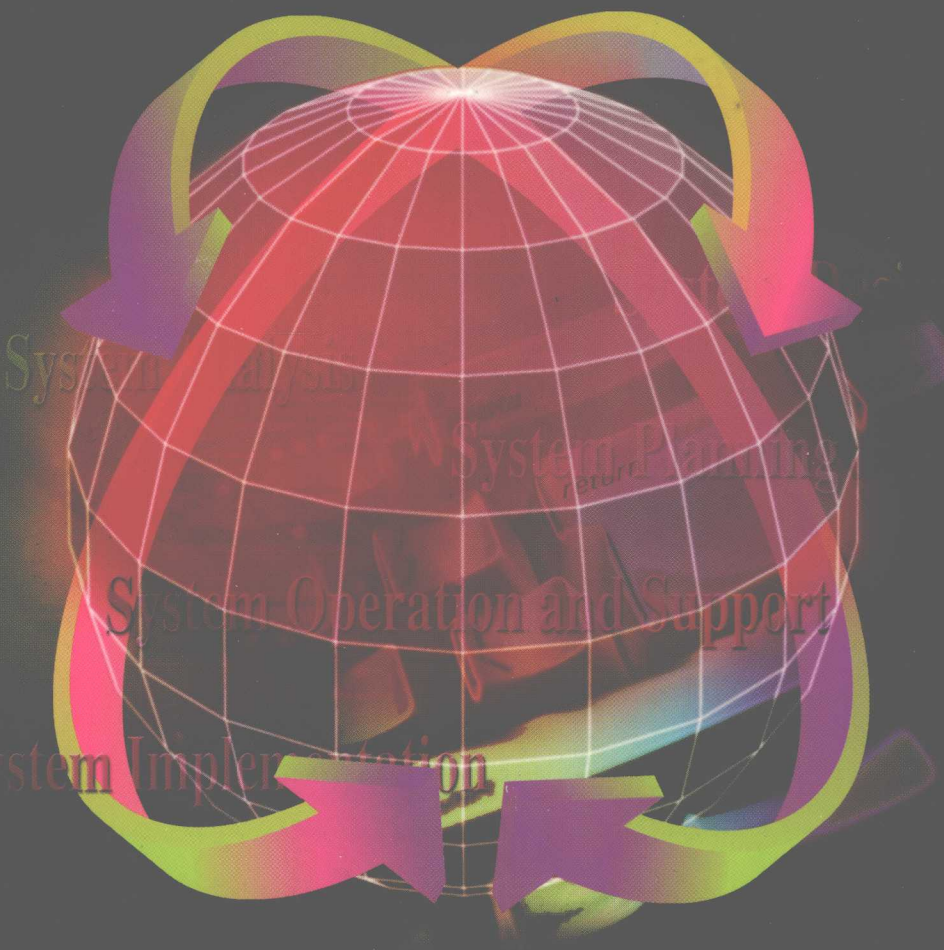

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Systems Analysis and Design

Fourth Edition

Gary B. Shelly
Thomas J. Cashman
Harry J. Rosenblatt

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PREFACE

The Shelly Cashman Series® offers the finest textbooks in computer education. *Systems Analysis and Design, Fourth Edition* continues with the innovation, quality, and reliability you have come to expect from this series. We are proud that our previous editions were best-sellers and we are confident that this edition will join its predecessors. This textbook emphasizes a practical approach to learning systems analysis and design. In it you will find an educationally sound and easy-to-follow pedagogy that artfully combines full-color pictures, drawings, and text to produce a visually appealing and straightforward presentation of systems analysis and design. The World Wide Web and the textbook integrate to offer students current information and links to Web-based resources, as well as a continuing Internet-based case study. These and other features provide you with the opportunity to deliver an exciting and dynamic systems analysis and design class.

OBJECTIVES OF THIS TEXTBOOK

Systems Analysis and Design, Fourth Edition is intended for a three-unit introductory systems analysis and design course. The objectives of this textbook are:

- To present a practical approach to systems analysis and design using a blend of traditional development with current technologies
- To define and describe in detail the five phases of the systems development life cycle (SDLC): systems planning, systems analysis, systems design, systems implementation, and systems operation and support
- To present the material in a visually appealing, full-color format and an exciting, easy-to-read style that invites students to learn
- To provide students with a comprehensive Systems Analysis Toolkit that highlights the importance of communications, economic analysis, and project planning skills across all phases of the SDLC, in addition to alternate development methodologies
- To give students an in-depth understanding of how information technology (IT) supports operational and business requirements in today's intensely competitive environment
- To provide examples of important IT developments and trends, using numerous screen shots of selected Web sites and Internet links
- To use the World Wide Web as an online information source and learning tool
- To teach real-world systems analysis and design skills in the context of solving realistic problems and present practical guidelines and tips for career success
- To provide a clear picture of how systems analysts interact with users, management, and other IT professionals in a typical business organization
- To offer interesting case studies and exercises that promote critical-thinking skills and encourage student participation

Detailed Coverage of Fundamental Topics

While providing broad coverage of the systems development life cycle, this textbook also presents topics that should be covered in any introductory systems analysis and design course. Such topics include business information systems concepts; mission statements; strategic planning; feasibility studies; fact-finding techniques; data flow diagrams; structured English; decision tables; decision trees; object-oriented analysis and design; enterprise computing; make or buy decisions;

employee empowerment; prototyping; CASE tools; systems flowcharts; the use of codes; reducing input errors; data security; automated design tools; entity-relationship diagrams; cardinality; normalization; UML notation; database design and management; traditional file organization; online versus batch processing; centralized versus distributed processing; LANs and WANs; client/server systems; software engineering; unit, link, and system testing; documentation; training; systems changeover; post-implementation evaluation; support activities; maintenance activities; capacity planning; communication tools; feasibility and cost analysis tools; and project management tools. Each of these topics is covered in detail and clearly linked to the appropriate phase or phases of the SDLC, so that students understand where they fit with the larger systems development life cycle.

DISTINGUISHING FEATURES

Systems Analysis and Design, Fourth Edition consists of the following distinguishing features:

A Proven Book

Based on our previous best-selling textbooks on systems analysis and design, this textbook evolved over the past eighteen years to ensure a presentation of the most current concepts, techniques, applications, and methodologies. More than three-quarter million students learned about systems analysis and design using the previous editions.

A Blend of Traditional Development with Current Technologies

This textbook does not present a theoretical view of systems analysis and design. Instead, we made every possible effort to teach the tools and techniques that systems analysts use in today's dynamic business world.

Numerous realistic examples support all text definitions, concepts, and techniques. We used examples and case studies from actual systems projects to teach students how to solve real-world problems. When students finish a systems analysis and design course using this book, they will know how to apply their skills in the real world of information technology and to complete IT projects successfully.

This textbook allows students to perform systems analysis and design tasks right from the start. Students begin applying concepts in Chapter 1 and continue performing systems analysis and design tasks in every following chapter.

Visually Appealing

In order to produce a visually appealing and easy-to-understand book, we used the latest technology, pictures, drawings, and text. Throughout the textbook, figures reinforce important points and the illustrations reflect the latest trends in systems analysis and design and simplify the more complex concepts. The color photos allow students to see examples of actual people, activities, and situations described in the textbook.

Nontechnical Language

This textbook assumes no previous systems analysis and design experience and requires no mathematics beyond the high school level. Drawing on the authors' many years of experience in teaching, consulting, management, and writing, we included numerous insights throughout the book. This provides continuity, simplicity, and practicality that students need and appreciate.

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Continuing Case Studies in Every Chapter

In the fourth edition of this book, we provide up to six continuing case studies per chapter. When students complete their coursework and enter the workforce, they need to understand the specific business operations of a company and how the systems analyst role can differ from company to company. By providing case studies in every chapter, we offer students an opportunity to plan, analyze, design, implement, and support information systems involving human resources administration, health care, recreational facility management, and technology training. The SoftWear Limited case study provides an opportunity for students to work as members of a systems development team and complete the Your Turn assignments following in each chapter. The New Century Health Clinic and Ridgeway Company case studies allow students to work as systems analysts in realistic settings, and apply their knowledge and skills to develop new information systems. Brand-new to this edition, SCR Associates is an interactive Web-based case study of a fictional IT firm. For further information on this case study, please see the Web Enhancement section of this preface. All of these case studies allow students to apply the skills learned in the textbook.

Coverage of Object-Oriented Analysis and Design (OOAD)

With the increasing popularity of object-oriented programming languages, OOAD also has increased in popularity. Coverage of OOAD is provided in the text and presented as an alternate methodology within the overall framework of structured systems analysis and design. If a particular methodology approaches the systems development process in a different way, the authors explain the alternatives to the student. Data and process modeling for structured systems analysis and design is described in Chapter 4. Chapter 5 is devoted to object modeling, because of the vast differences between structured and object-oriented analysis and design.

Web Enhancements

Each of the previous editions introduced sound educational innovations that separated them from the rest of the market. *Systems Analysis and Design, Fourth Edition* continues the tradition by offering innovative, timely, and reliable Web enhancements that set a new standard for systems analysis and design textbooks. The purpose of the Web enhancements is to (1) provide students an interactive and fun learning opportunity, (2) provide up-to-date information on the Web and suggest Internet sites for additional exploration, and (3) provide examples of Web resources that relate to key subjects in the text. We integrated the Web enhancements into the textbook in four major ways:

- SCR Associates, an IT consulting firm, is an interactive case study that students can complete using the Web. Students login to the company intranet, read e-mail addressed to them, and perform assigned tasks in a realistic corporate setting.
- Numerous screen shots of actual Web sites show state-of-the-art IT technology and major trends.
- Throughout the text, margin annotations provide suggestions on how to obtain additional information via the Web on an important topic covered on the page.
- Learning games, based on the Key Terms, reinforce concepts the student learned in each chapter.

Systems Analyst's Toolkit

The Systems Analyst's Toolkit, which follows Chapter 12, presents communication skills, economic analysis tools, project planning skills, and alternate systems development methodologies that can be used across the five phases of the SDLC. Topics include guidelines for successful communications; feasibility and cost analysis methodologies; project management tools; rapid application development (RAD); Microsoft Solutions Framework (MSF); and Microsoft solutions architecture certification opportunities.

End of Chapter Material

This textbook contains the most comprehensive end of chapter material of any systems analysis and design textbook. This edition offers a Chapter Summary, Key Terms, Chapter Review, Discussion Topics, Chapter Assignments, Apply Your Knowledge, and Case Studies.

Software Bundling Opportunities

You can bundle Visible Analyst — Student Edition with the textbook so students can have their own copy for use in the lab, at home, or in a distance education environment. An evaluation copy of Visible Analyst — Student Edition is available on the Teaching Tools CD-ROM. Please see Visible Analyst — Student Edition in a later section for product and adoption information.

You can bundle a fully functional trial edition of Microsoft Visio Professional 2000 with this textbook so students can use their own copy in the lab at home or in a distance education environment to create network diagramming and design; directory services diagramming; database design and documentation; software development; Web site mapping; data flow diagramming; network diagrams and documentation; database diagrams and documentation; software diagrams and documentation; and Internet and intranet diagrams and documentation.

Other bundling opportunities exist with Microsoft Visual Basic 6.0, Oracle Designer, and custom combination packages. For more information, contact your Course Technology, Thomson Learning Sales Representative.

ORGANIZATION OF THIS TEXTBOOK

Systems Analysis and Design, Fourth Edition contains twelve chapters and the Systems Analyst's Toolkit. We organized the textbook so students will know clearly where they are and how their progress relates to the systems development life cycle process. We provide an introduction at the beginning of each SDLC phase, indicate the phase at the top of each page, and list objectives that describe the key skills and knowledge that students learn in the chapter. Within the chapter, we challenge students to practice their skills with What Do You Think? and Your Turn tasks. End of chapter material relates directly to the chapter objectives, so students can measure and track their progress.

VISIBLE ANALYST — STUDENT EDITION

The Visible Analyst — Student Edition, a powerful, integrated, application development tool, is available bundled with this textbook so that each student can own a copy at a fraction of the retail cost. Each copy of the software comes with a tutorial and two sample projects. The ISBN for the textbook/Visible Analyst bundle is 0-7895-6322-3.

Visible Analyst — Student Edition provides graphical analysis and design for structured, data, and object modeling, as well as construction in one affordable, easy-to-use package. It contains a powerful repository for storing and documenting data, processes, and objects as well as full analysis checking and extensive reporting capabilities. The Visible Analyst — Student Edition also generates Oracle and Access SQL DDL, XML DCD files, and includes an interface to Visual Basic.

Visible Analyst — Student Edition includes all the operational and functional capabilities of the commercial editions; however, there are certain constraints, including the following:

- Users may create only one project at a time (users also can access a sample project at the same time)
- Each project is limited to 10 diagrams per each type
- Each project is limited to 40 entities and classes

Adopting schools that bundle the Visible Analyst — Student Edition with this textbook can receive up to two free copies of the Visible Analyst — Student Edition from Visible Systems Corporation, one for each 15 copies sold to the bookstore. Schools can purchase additional copies of the Visible Analyst — Student Edition or the Visible Analyst — University Edition, a multiuser LAN version for computer laboratories, direct from Visible Systems at a minimal price. For more information on purchasing options please contact Visible Systems direct by phone at 800-333-8984, ext. 304, by e-mail at edusales@visible.com, or visit their web site at www.visible.com. For more information on the bundling options, please contact your Course Technology, Thomson Learning Sales Representative.

SHELLY CASHMAN SERIES TEACHING TOOLS

A comprehensive set of Teaching Tools accompanies this textbook in the form of a CD-ROM. The CD-ROM includes the Instructor's Manual and other teaching and testing aids. The CD-ROM (ISBN 0-7895-5969-2) is available through your Course Technology representative or by calling one of the following telephone numbers: Colleges and Universities, 1-800-648-7450; High Schools, 1-800-824-5179; Career Colleges, 1-800-477-3692; Canada, 1-800-268-2222; and Corporations and Government Agencies, 1-800-340-7450. The contents of the CD-ROM follow.

- **Instructor's Manual** The Instructor's Manual is made up of Microsoft Word files. The files include chapter objectives, lecture notes, answers to the end of chapter exercises, and a large test bank. You can modify the lecture notes or generate quizzes and exams from the test bank using your own word processing software. Where appropriate, solutions to laboratory assignments are embedded as icons.
- **Figures in the Book** Illustrations for most of the figures in the textbook are available. Use this ancillary to create a slide show from the illustrations for lecture or print transparencies for use in lectures with an overhead projector.
- **Course Test Manager** Course Test Manager is a powerful testing and assessment package that instructors can use to create and print tests from the large test bank. Instructors with access to a networked computer lab (LAN) can administer, grade, and track tests online. Students also can take online practice tests, which generate customized study guides that indicate where in the textbook students can find more information for each question.
- **Course Presenter** Course Presenter is a multimedia lecture presentation system that provides PowerPoint slides for every subject in each chapter. Use this system to present well-organized lectures that are interesting and knowledge-based. Fifteen presentation files are provided for the textbook, one for each chapter. Each file contains PowerPoint slides for every subject in each chapter, along with optional choices to show any figure in the chapter, as you introduce the material in class.
- **Course Syllabus** Any instructor who has been assigned a course at the last minute knows how difficult it is to create a course syllabus. For this reason, a sample syllabus is included that can be customized easily for a course.
- **Instructor's Lab Solutions** This ancillary contains the solutions for the Interactive Labs assessment quizzes.
- **Interactive Labs** Eighteen hands-on interactive labs that take the student from 10 to 15 minutes each to step through help solidify and reinforce mouse and keyboard usage, as well as computer concepts. Student assessment is available in each interactive lab by means of a Print button. The assessment requires students to answer true and false, multiple choice, and fill-in-the-blank questions.

- **Visible Analyst —Student Edition** A copy of this powerful CASE tool is available on the Teaching Tools CD-ROM for instructor evaluation only. For more information on Visible Analyst — Student Edition, see the discussion earlier in the preface.
- **Case Study Forms** A full set of systems development forms and templates is available on the Teaching Tools CD-ROM. Instructors can copy these files to a network folder, so students can use the forms and templates in the case study projects and assignments. This material also is available on the Shelly Cashman Web site at www.scsite.com/sad4e. The SCR Associates case has its own set of Web-based forms and templates, which are stored in the SCR forms library at www.scsite.com/sad4e/scr
- **Student Files** The documents needed to complete the SCR Associated case study. You can distribute the files on the Teaching Tools CD-ROM to your students over a network or you can have them follow the instructions on the inside back cover of this book to obtain a copy of the *Systems Analysis and Design* Data Disk.

DISTANCE LEARNING

Various distance learning options are available for your systems analysis and design course:

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MyCourse.com is an online syllabus builder and course enhancement tool. Hosted by Course Technology, MyCourse.com adds value to your course by providing additional content that reinforces what students are learning.

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SHELLY CASHMAN ONLINE

Shelly Cashman Online is a World Wide Web service available to instructors and students of computer education. Visit Shelly Cashman Online at www.scsite.com. Shelly Cashman Online contains the following:

- **Series Information** Information on the Shelly Cashman Series products.
- **Teaching Resources** Designed for instructors teaching from and using Shelly Cashman Series textbooks and software. This area includes password-protected instructor materials that can be downloaded, course outlines, teaching tips, and much more.

- **Community** Opportunities to discuss your course and ideas with instructors in your field and the Shelly Cashman Series team.
- **Student Center** Dedicated to students learning about computers with Shelly Cashman Series textbooks and software. This area includes cool links, data that can be downloaded, and much more.

ACKNOWLEDGMENTS

The Shelly Cashman Series would not be the leading computer education series without the contributions of outstanding publishing professionals. First, and foremost among them is Becky Herrington, director of production and designer. She is the heart and soul of the Shelly Cashman Series, and it is only through her leadership, dedication, and tireless efforts that superior products are made possible. Becky created and produced the award-winning Windows series of books.

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We hope you find using this textbook an enriching and rewarding experience.

Gary B. Shelly
Thomas J. Cashman
Harry J. Rosenblatt

NOTES TO THE STUDENT

SCR Associates is a fictional IT consulting firm that offers solutions and training for small- and medium-sized companies. As shown in the following figures, the SCR case is an interactive Web based case study, where you work as a newly-hired systems analyst assigned to a systems development team. SCR has a Web site, with information about the company, and a company intranet, where you can receive e-mail messages addressed to you and obtain other information. On the Internet, you can visit www.scsite.com/sad4e/scr for instructions about how to use your login name and password.

To Login

(1) Launch your browser; (2) type `www.scsite.com/sad4e/scr` in the Address bar of your browser (Figure 1); (3) read and follow the instructions on the Web page to enter your first and last name; (4) type `scrteam` in the password field; (5) click the Login button to enter the SCR Associates site (Figure 2).

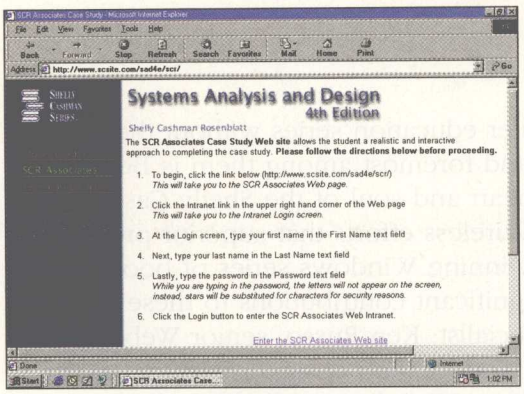

Figure 1

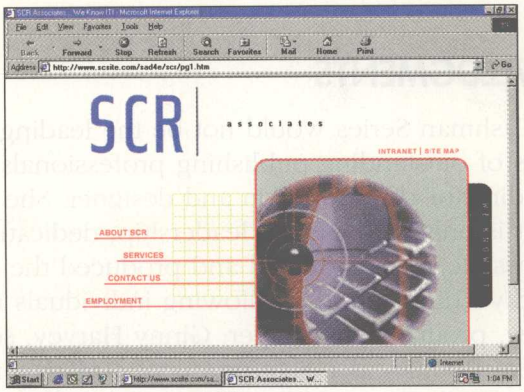

Figure 2

The Systems Analyst's Toolkit follows the text chapters, starting on page TK.1. All professionals, including systems analysts need a set of tools. The Toolkit provides four important cross-functional tools: communication tools, cost-benefit analysis tools, project management tools, and alternative systems development tools.

- Communication tools help you write effective reports, design and deliver powerful presentations, and conduct productive meetings.
- Feasibility and cost analysis tools provide valuable information about project feasibility and financial impact.
- Project management tools help you organize, plan, estimate, execute, and monitor IT projects.
- Alternative systems development methodologies explain two popular strategies: rapid application development (RAD) and Microsoft Solutions Framework (MSF).

You can use these flexible tools in several ways. For example, you can start by reviewing communication tools and cost-benefit analysis tools to prepare for the systems planning phase of the SDLC. On the other hand, you can wait until you need the skills for a specific case study or assignment, and use the tools at that time. Either way, make sure to study all the tools before the end of the course, because they are important to your success as a systems analyst. The following grid shows the four tools, and how they relate to the text chapters.

A star ★ indicates that you will need the tool to perform chapter tasks and assignments, and a bullet • indicates that the Toolkit information is desirable background.

SYSTEMS ANALYST'S TOOLKIT	Part 1 Communication Tools	Part 2 Feasibility and Cost Analysis Tools	Part 3 Project Management Tools	Part 4 Alternative Systems Development Methodologies
Chapter 1	•	•	•	•
Chapter 2	★	•	•	•
Chapter 3	★	•	•	★
Chapter 4	★	•	•	★
Chapter 5	★	★	★	★
Chapter 6	★	•	★	★
Chapter 7	★	★	★	★
Chapter 8	★	•	★	★
Chapter 9	★	★	★	★
Chapter 10	★	•	★	★
Chapter 11	★	•	★	★
Chapter 12	★	★	•	★

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