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# Essentials of Systems Analysis and Design

## Fifth Edition

# 系统分析与设计基础

## (第5版)



Joseph Valacich

Joey George 著

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PEARSON

清华大学出版社

大学计算机教育国外著名教材系列（影印版）

# Essentials of Systems Analysis and Design

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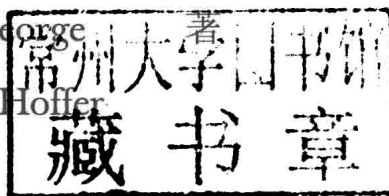
## 系统分析与设计基础

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## 出版说明

进入 21 世纪, 世界各国的经济、科技以及综合国力的竞争将更加激烈。竞争的中心无疑是对人才的竞争。谁拥有大量高素质的人才, 谁就能在竞争中取得优势。高等教育, 作为培养高素质人才的事业, 必然受到高度重视。目前我国高等教育的教材更新较慢, 为了加快教材的更新频率, 教育部正在大力促进我国高校采用国外原版教材。

清华大学出版社从 1996 年开始, 与国外著名出版公司合作, 影印出版了“大学计算机教育丛书(影印版)”等一系列引进图书, 受到国内读者的欢迎和支持。跨入 21 世纪, 我们本着为我国高等教育教材建设服务的初衷, 在已有的基础上, 进一步扩大选题内容, 改变图书开本尺寸, 一如既往地请有关专家挑选适用于我国高等本科及研究生计算机教育的国外经典教材或著名教材, 组成本套“大学计算机教育国外著名教材系列(影印版)”, 以飨读者。深切期盼读者及时将使用本系列教材的效果和意见反馈给我们。更希望国内专家、教授积极向我们推荐国外计算机教育的优秀教材, 以利我们把“大学计算机教育国外著名教材系列(影印版)”做得更好, 更适合高校师生的需要。

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What We've Learned about Agile Methodologies	391
Key Points Review	392
Key Terms Checkpoint	393
Review Questions	393
Problems and Exercises	393
References	395
Glossary of Acronyms	401
Glossary of Terms	403
Index	409



# Preface

## Our Approach

In today's information- and technology-driven business world, students need to be aware of three key factors. First, it is more crucial than ever to know how to organize and access information strategically. Second, success often depends on the ability to work as part of a team. Third, the Internet will play an important part in their work lives. *Essentials of Systems Analysis and Design, Fifth Edition*, addresses these key factors.

More than 50 years' combined teaching experience in systems analysis and design have gone into creating *Essentials of Systems Analysis and Design, Fifth Edition*, a text that emphasizes hands-on, experimental learning. We provide a clear presentation of the concepts, skills, and techniques students need to become effective systems analysts who work with others to create information systems for businesses. We use the systems development life cycle model as an organizing tool throughout the book to provide a strong conceptual and systematic framework.

Internet coverage is provided in each chapter via an integrated, extended illustrative case (Pine Valley Furniture WebStore) and an end-of-chapter case (Petrie's Electronics).

Many systems analysis and design courses involve lab work and outside reading. Lecture time can be limited. Based on market research and our own teaching experience, we understand the need for a book that combines depth of coverage with brevity. So we have created a ten-chapter book that covers key systems analysis and design content without overwhelming students with unnecessary detail.

## New to the Fifth Edition

The following features are new to the Fifth Edition:

- *Emphasis on current changes in systems analysis and design.* The move to structured analysis and design in the late 1970s was considered to be a revolution in systems development. We are undergoing another revolution now, as we move away from complex, plan-driven development to new approaches called "Agile Methodologies." Although the best-known Agile Methodology is eXtreme Programming, many other approaches are also available. The Agile revolution in systems development is acknowledged and briefly explained in Chapter 1 and then explored in much greater depth in Appendix B.
- *Increased focus on make versus buy and systems integration.* More and more systems development involves the use of packages in combination with legacy applications and new modules. Coverage of the make-versus-buy decision and of the multiple sources of software and software components is highlighted in Chapter 2 to show how companies deal with these issues.
- *New end-of-chapter running case.* Petrie's Electronics, a fictional electronics retailer, is a student project case that allows students to study and develop a Web-based customer loyalty program to enhance a customer relationship management system.



- *Updated illustrations of technology.* Screen captures have been updated throughout the text to show examples using the latest versions of programming and Internet development environments, and user interface designs.
- *New entity-relationship notation.* We now use a new notation for entity-relationship diagramming in Chapter 7 and elsewhere. This notation is consistent with that used in *Modern Database Management, Tenth Edition*, by Hoffer, Ramesh, and Topi (2011).
- *Updated content.* Throughout the book, the content in each chapter has been updated where appropriate.
- *End-of-chapter updates.* We have provided extensive updates to existing problems along with several new problems in every chapter.

## Themes

*Essentials of Systems Analysis and Design, Fifth Edition*, is characterized by the following themes:

- *Systems development is firmly rooted in an organizational context.* The successful systems analyst requires a broad understanding of organizations, organizational culture, and operations.
- *Systems development is a practical field.* Coverage of current practices as well as accepted concepts and principles is essential for today's systems analyst.
- *Systems development is a profession.* The text presents standards of practice, and fosters a sense of continuing personal development, ethics, and a respect for and collaboration with the work of others.
- *Systems development has significantly changed with the explosive growth in databases, data-driven architecture for systems, and the Internet.* Systems development and database management can be taught in a highly coordinated fashion. The Internet has rapidly become a common development platform for database-driven electronic commerce systems.
- *Success in systems analysis and design requires not only skills in methodologies and techniques, but also in the management of time, resources, and risks.* Learning systems analysis and design requires a thorough understanding of the process as well as the techniques and deliverables of the profession.

Given these themes, the text emphasizes these approaches:

- A business rather than a technology perspective
- The role, responsibilities, and mind-set of the systems analyst as well as the systems project manager, rather than those of the programmer or business manager
- The methods and principles of systems development rather than the specific tools or tool-related skills of the field

## Audience

The book assumes that students have taken an introductory course on computer systems and have experience writing programs in at least one programming language. We review basic system principles for those students who have

not been exposed to the material on which systems development methods are based. We also assume that students have a solid background in computing literacy and a general understanding of the core elements of a business, including basic terms associated with the production, marketing, finance, and accounting functions.

## Organization

The outline of the book follows the systems development life cycle:

- Part I, “Foundations for Systems Development,” gives an overview of systems development and previews the remainder of the book.
- Part II, “Systems Planning and Selection,” covers how to assess project feasibility and build the baseline project plan.
- Part III, “Systems Analysis,” covers determining system requirements, process modeling, and conceptual data modeling.
- Part IV, “Systems Design,” covers how to design the human interface and databases.
- Part V, “Systems Implementation and Operation,” covers system implementation, operation, closedown, and system maintenance.
- Appendix A, “Object-Oriented Analysis and Design,” and Appendix B, “Agile Methodologies,” can be skipped or treated as advanced topics at the end of the course.

## Distinctive Features

Here are some of the distinctive features of *Essentials of Systems Analysis and Design, Fifth Edition*:

1. The grounding of systems development in the typical architecture for systems in modern organizations, including database management and Web-based systems.
2. A clear linkage of all dimensions of systems description and modeling—process, decision, and data modeling—into a comprehensive and compatible set of systems analysis and design approaches. Such broad coverage is necessary for students to understand the advanced capabilities of many systems development methodologies and tools that automatically generate a large percentage of code from design specifications.
3. Extensive coverage of oral and written communication skills (including systems documentation), project management, team management, and a variety of systems development and acquisition strategies (e.g., life cycle, prototyping, rapid application development, object orientation, joint application development, participatory design, and business process reengineering).
4. Coverage of rules and principles of systems design, including decoupling, cohesion, modularity, and audits and controls.
5. A discussion of systems development and implementation within the context of management of change, conversion strategies, and organizational factors in systems acceptance.
6. Careful attention to human factors in systems design that emphasize usability in both character-based and graphical user interface situations.

## Pedagogical Features

The pedagogical features of *Essentials of Systems Analysis and Design, Fifth Edition*, reinforce and apply the key content of the book.

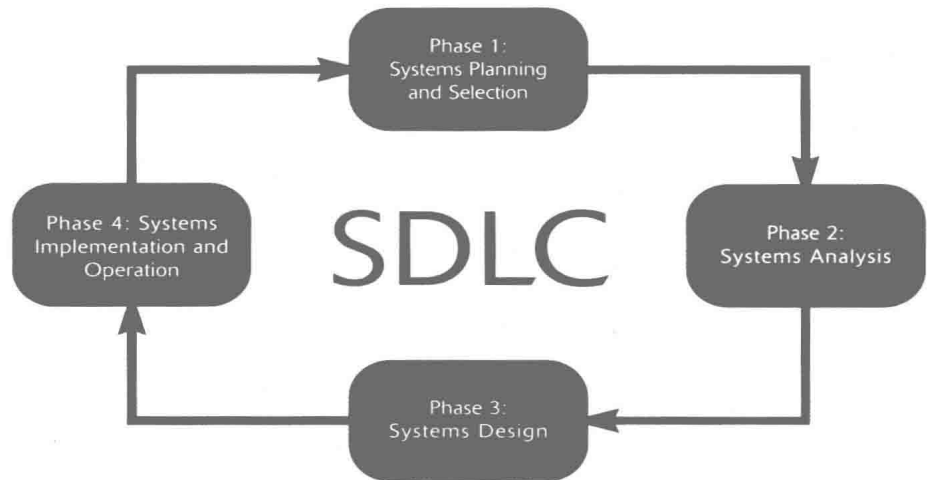
## SDLC Framework

Although several conceptual processes can be used for guiding a systems development effort, the systems development life cycle (SDLC) is arguably the most widely applied method for designing contemporary information systems. We highlight four key SDLC steps (Figure P-1):

- Planning and selection
- Analysis
- Design
- Implementation and operation

**FIGURE P-1**

The systems development life cycle (SDLC): management is necessary throughout.



We use the SDLC to frame the part and chapter organization of our book. Most chapters open with an SDLC figure with various parts highlighted to show students how these chapters, and each step of the SDLC, systematically builds on the previous one.

## Internet Coverage and Features



**Pine Valley Furniture WebStore** A furniture company founded in 1980 has decided to explore electronic commerce as an avenue to increase its market share. Should this company sell its products online? How would a team of analysts work together to develop, propose, and implement a plan? Beginning in Chapter 4, we explore the step-by-step process.



**Petrie's Electronics** This end-of-chapter fictional case illustrates how a national electronics retailer develops a Web-based customer loyalty program to build and strengthen customer relationships. The case first appears at the end of Chapter 2 and concludes at the end of Chapter 10.

### Three Illustrative Fictional Cases

**Pine Valley Furniture (PVF)** This case is introduced in Chapter 3 and revisited throughout the book. As key systems development life cycle concepts are presented, they are applied and illustrated. For example, in Chapter 3, we explore how PVF implements the purchasing fulfillment system, and in Chapter 4, we explore how PVF implements a customer tracking system. A margin icon identifies the location of the case segments. A case problem related to PVF is included in the end-of-chapter material.



**Hoosier Burger (HB)** This second illustrative case is introduced in Chapter 6 and revisited throughout the book. Hoosier Burger is a fictional fast-food restaurant in Bloomington, Indiana. We use this case to illustrate how analysts would develop and implement an automated food-ordering system. A margin icon identifies the location of these case segments. A case problem related to HB is included in the end-of-chapter material.



**Petrie's Electronics** This fictional electronics retailer is used as an extended case at the end of each chapter, beginning with Chapter 2. Designed to bring the chapter concepts to life, this case illustrates how a company initiates, plans, models, designs, and implements a Web-based customer loyalty program. Discussion questions are included to promote critical thinking and class participation. Suggested solutions to the discussion questions are provided in the Instructor's Manual.



### End-of-Chapter Material

We have developed an extensive selection of end-of-chapter material designed to accommodate various learning and teaching styles.

**Key Points Review** This section repeats the learning objectives that appear at the opening of the chapter and summarizes the key points related to the objectives.

**Key Terms Checkpoint** In this self-test feature, students match each key term in the chapter with its definition.

**Review Questions** These questions test students' understanding of key concepts.

**Problems and Exercises** These exercises test students' analytical skills and require them to apply key concepts.

**Discussion Questions** These questions promote class participation and discussion.

**Case Problems** These problems require students to apply the concepts of the chapter to fictional cases from various industries. The two illustrative cases from the chapters are revisited—Pine Valley Furniture and Hoosier Burger. Other cases are from various fields such as medicine, agriculture, and technology. Solutions are provided in the Instructor's Manual.

### Margin Term Definitions

Each key term and its definition appear in the margin. A glossary of terms appears at the back of the book.

### References

Located at the end of the text, references are organized by chapter and list more than 200 books and journals that can provide students and faculty with additional coverage of topics.

The Supplement Package: [www.pearsonhighered.com/valacich](http://www.pearsonhighered.com/valacich)

A comprehensive and flexible technology support package is available to enhance the teaching and learning experience. Instructor supplements are available at [www.pearsonhighered.com/valacich](http://www.pearsonhighered.com/valacich):

- An *Instructor's Resource Manual* provides chapter-by-chapter instructor objectives, teaching suggestions, and answers to all text review questions, problems, and exercises.
- The *Test Item File* and *TestGen* include a comprehensive set of more than 1,500 test questions in multiple-choice, true-false, and short-answer format; questions are ranked according to level of difficulty and referenced with page numbers and topic headings from the text. The Test Item File is available in Microsoft Word and as the computerized Prentice Hall TestGen software. The software is PC/Mac-compatible and preloaded with all of the Test Item File questions. You can manually or randomly view test questions and drag-and-drop to create a test. You can add or modify test-bank questions as needed.
- *PowerPoint Presentation Slides* feature lecture notes that highlight key text terms and concepts. Professors can customize the presentation by adding their own slides or by editing the existing ones.
- The *Image Library* is a collection of the text art organized by chapter. This collection includes all of the figures, tables, and screenshots (as permission allows) from the book. These images can be used to enhance class lectures and PowerPoint slides.

## Materials for Your Online Course

Our TestGens are converted for use in BlackBoard and WebCT. These conversions can be found on the Instructor's Resource Center. Conversions to D2L or Angel can be requested through your local Pearson Sales Representative.

## CourseSmart

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We would like to recognize the efforts of the many faculty and practicing systems analysts who have been reviewers of the five editions of this text and its

associated text, *Modern Systems Analysis and Design*. We have tried to deal with each reviewer comment, and although we did not always agree with specific points (within the approach we wanted to take with this book), all reviewers made us stop and think carefully about what and how we were writing. The reviewers were:

- |   |  |
|---|--|
| Richard Allen, <i>Richland Community College</i>                  | David McNair, <i>Maryville University</i>                    |
| Charles Arbutina, <i>Buffalo State College</i>                    | Loraine Miller, <i>Cayuga Community College</i>              |
| Paula Bell, <i>Lock Haven University of Pennsylvania</i>          | Klara Nelson, <i>University of Tampa</i>                     |
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Dr. Valacich serves on the editorial board of *MIS Quarterly* and was formerly an associate editor for *Information Systems Research*. His research has appeared in publications such as *MIS Quarterly*, *Information Systems Research*, *Management Science*, and *Academy of Management Journal*. He is a coauthor of the best-selling *Modern Systems Analysis and Design* (Sixth Edition), as well as *Object-Oriented Systems Analysis and Design*, *Information Systems Today* (Fifth Edition), and *Information Systems Project Team Management*; all are published by Pearson Prentice Hall.

**Joey F. George** is professor and Dean's Chair in the Iowa State University College of Business. Dr. George earned his bachelor's degree at Stanford University in 1979 and his Ph.D. in management at the University of California at Irvine in 1986. He was previously the Edward G. Schlieder Chair of Information Systems in the E. J. Ourso College of Business Administration at Louisiana State University. He also served at Florida State University as Chair of the Department of Information and Management Sciences from 1995 to 1998.

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Dr. George is coauthor of the textbooks *Modern Systems Analysis and Design*, Sixth Edition, published in 2010, and *Object-Oriented Systems Analysis and Design*, Second Edition, published in 2007, both from Pearson Prentice Hall. He has served as an associate editor and senior editor for both *MIS Quarterly* and *Information Systems Research*. He served three years as the editor-in-chief of the *Communications of the AIS*. Dr. George was the conference cochair for the 2001 ICIS, held in New Orleans, Louisiana, and the doctoral



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