EDITION 8

SYSTEMS ANALYSIS AND DESIGN

KENDALL & KENDALL

SYSTEMS ANALYSIS AND DESIGN

EIGHTH EDITION

KENNETH E. KENDALL
Rutgers University
School of Business–Camden
Camden, New Jersey

JULIE E. KENDALL
Rutgers University
School of Business–Camden
Camden, New Jersey

Prentice Hall
Boston Columbus Indianapolis New York San Francisco
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To the memory of Julia A. Kendall and the memory of Edward J. Kendall,
whose lifelong example of working together will inspire us forever.

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SYSTEMS ANALYSIS AND DESIGN

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PREFACE

NEW TO THIS EDITION

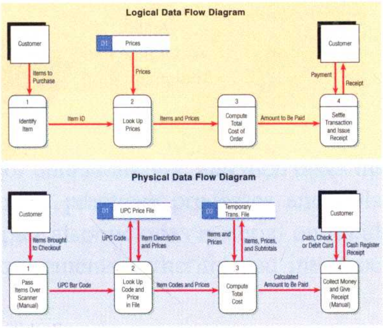
The eighth edition of Kendall & Kendall: *Systems Analysis and Design* includes substantial changes mandated by the rapid changes in the IS field in the last three years, and they are included as a response to the input of our adopters, students, and reviewers. Many new and updated features are integrated throughout. In particular:

- Early introduction of three methodologies: SDLC, agile approaches, and object-oriented systems analysis and design with UML, along with reasons and situations for when to use them (Chapter 1)
- Expanded coverage of COTS due to their increasing use in organizations (Chapter 3)
- Object-oriented analysis and design expanded and featured in the center of the text so it can be more easily incorporated into term projects (Chapter 10)
- New object-oriented analysis and design problems included in the O-O CPU Episode (Chapter 10)
- New feature throughout the text called *Mac Appeal,* which discusses innovative software available on Macs
- New coverage of cloud computing (Chapter 16)
- New section on SOA (service-oriented architecture) (Chapter 16)
- New end-of-chapter Review Questions, Problems, and Group Exercises
- Reorganized, updated, and strengthened chapter on agile methods (Chapter 6)
- Strengthened project management by introducing the project charter early in the process (Chapter 3)
- Early introduction of how to prepare the systems proposal (Chapter 3)
- Updated and streamlined *CPU Case Episodes*, the case that runs throughout the text. Students can use Microsoft Access, Microsoft Visio, or Visible Analyst to complete new assignments throughout the text
- Updated scenarios, problems, and graphics throughout the text to accompany HyperCase 2.8, a graphical simulation for the Web that allows students to apply their new skills

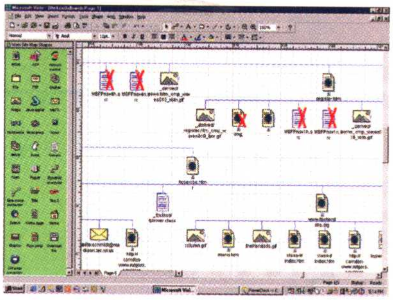
DESIGN FEATURES

Figures take on a stylized look in order to help students more easily grasp the subject matter.

Conceptual diagrams are used to introduce the many tools that systems analysts have at their disposal. This example shows the differences between logical data flow diagrams and physical data flow diagrams. Conceptual diagrams are color coded so that students can distinguish easily among them, and their functions are clearly indicated. Many other important tools are illustrated, including use case diagrams, sequence diagrams, and class diagrams.

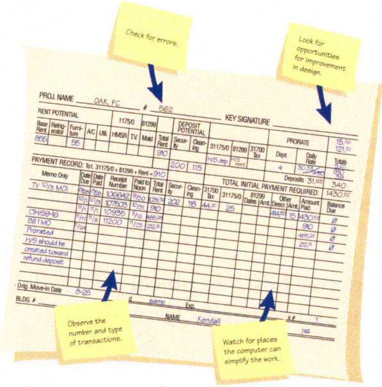


Logical Data Flow Diagram
Customer
D1 Prices
Customer
Items to Purchase
Prices
Payment
Receipt
1 Identify Item
Item ID
2 Look Up Prices
Items and Prices
3 Compute Total Cost of Order
Amount to Be Paid
4 Settle Transaction and Issue Receipt
Physical Data Flow Diagram
Customer
D1 UPC Price File
D2 Temporary Trans. File
Customer
Items Brought to Checkout
UPC Code
Item Description and Prices
Items and Prices
Items, Prices, and Subtotals
Cash, Check, or Debit Card
Cash Register Receipt
1 Pass Items Over Scanner (Manual)
UPC Bar Code
2 Look Up Code and Price in File
Item Codes and Prices
3 Compute Total Cost
Calculated Amount to Be Paid
4 Collect Money and Give Receipt (Manual)



Computer displays demonstrate important software features that are useful to the analyst. This example shows how a Web site can be evaluated for broken links by using a package such as Microsoft Visio. Actual screen shots show important aspects of design. Analysts are continuously seeking to improve the appearance of the screens and Web pages they design. Colorful examples help to illustrate why some screen designs are particularly effective.

Paper forms are used throughout to show input and output design as well as the design of questionnaires. Blue ink is always used to show writing or data input, thereby making it easier to identify what was filled in by users. Although most organizations have computerization of manual processes as their eventual goal, much data capture is still done using paper forms. Improved form design enables analysts to ensure accurate and complete input and output. Better forms can also help streamline new internal workflows that result from newly automated business-to-consumer (B2C) applications for ecommerce on the Web.



Check for errors.

Look for opportunities for improvement in design.

PROJ. NAME OAK. FC # 562

KEY SIGNATURE

RENT POTENTIAL

Base Rent	Refrig-erator	Furni-ture	A/C	Util.	HMSR	TV	Maid	Total Rent	Secur-ity	Clean-ing	31175/0	81299	31700 Tax	Days	Daily Rate	Totals
855		56						910	200	115	H/S dep	H/S rent		4	30.33	

PAYMENT RECORD: Tot. 31175/0 + 81299 + Rent = 910

TOTAL INITIAL PAYMENT REQUIRED: 1430.52

Memo Only	Date Due	Date Paid	Receipt Number	Paid to Noon	Total Rent	Secur-ity	Clean-ing	31700 Tax	31175/0	81299 Dates	Amt.	Other Descr.	Amt.	Amount Paid	Balance Due
TV 10/3 MO1	8/26	8/26	106642	8/30		202	115	44.20	25			414.88	15	1430.52	Ø
	10/1	10/1	107505	10/31	910									910	Ø
CTH/5916	11/1	11/1	10935	11/16	486.25									486.25	Ø
Bill 1 MO	11/17	11/18	11200	11/23	282.31									282.31	Ø
Prorated	11/24														
H/S should be created toward refund deposit															

Orig. Move-in Date 8-28

BLDG. # same Exp.

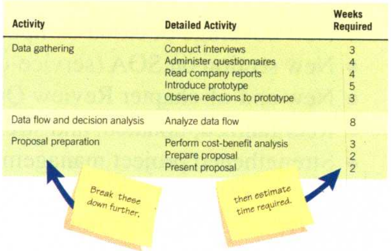
NAME Kendall

Observe the number and type of transactions.

Watch for places the computer can simplify the work.

Tables are used when an important list needs special attention, or when information needs to be organized or classified. In addition, tables are used to supplement the understanding of the reader in a way that departs from how material is organized in the narrative portion of the text. Most analysts find tables a useful way to organize numbers and text into a meaningful "snapshot."

This example of a table from Chapter 3 shows how analysts can refine their activity plans for analysis by breaking them down into smaller tasks and then estimating how much time it will take to complete them. The underlying philosophy of our book is that systems analysis and design is a process that integrates the use of many tools with the unique talents of the systems analyst to systematically improve business through the implementation or modification of computerized information systems. Systems analysts can grow in their work by taking on new IT challenges and keeping current in their profession through the application of new techniques and tools.

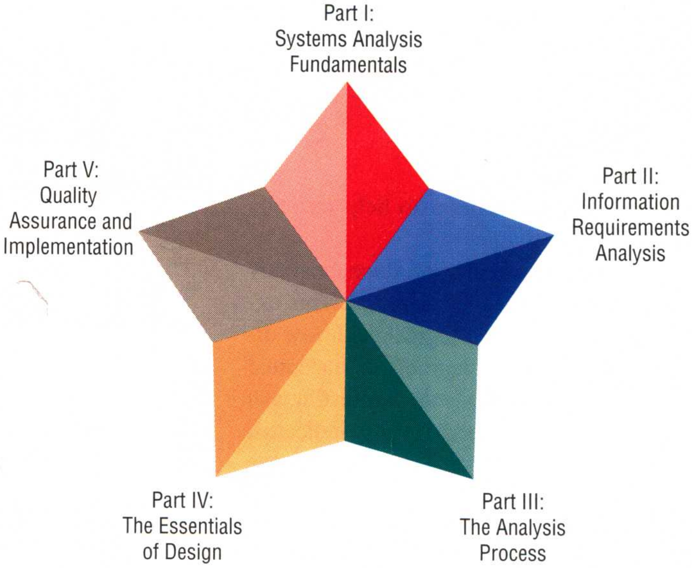


Activity	Detailed Activity	Weeks Required
Data gathering	Conduct interviews	3
	Administer questionnaires	4
	Read company reports	4
	Introduce prototype	5
	Observe reactions to prototype	3
Data flow and decision analysis	Analyze data flow	8
Proposal preparation	Perform cost-benefit analysis	3
	Prepare proposal	2
	Present proposal	2

Break these down further.

then estimate time required.

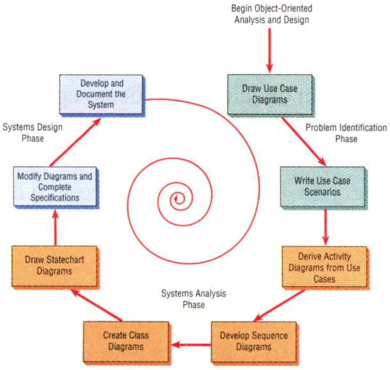
A BRIEF TOUR OF THE EIGHTH EDITION



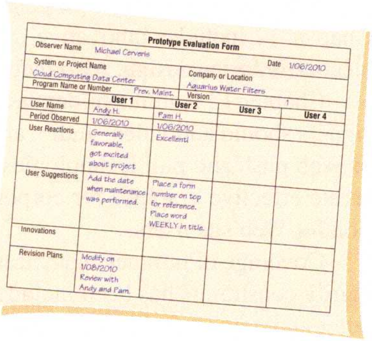
Systems analysis and design is typically taught in one or two semesters. Our book may be used in either situation. The text is appropriate for undergraduate (junior or senior) curricula at a four-year university, graduate school, or community college. The level and length of the course can be varied and supplemented by using real-world projects, HyperCase, or other materials available on the Instructor Resource Center.

The text is divided into five major parts: Systems Analysis Fundamentals (Part I), Information Requirements Analysis (Part II), The Analysis Process (Part III), The Essentials of Design (Part IV), and Quality Assurance and Implementation (Part V).

Part I (Chapters 1–3) stresses the basics that students need to know about what an analyst does and introduces the three main methodologies of the systems development life cycle (SDLC), agile approaches, and object-oriented analysis with UML, along with reasons and situations for when to use them. Part I shows how a variety of emerging information systems, including mobile and wireless technologies, and enterprise systems integrate IT and fit into organizations; how to determine whether a systems project is worthy of commitment; ecommerce project management; and how to manage a systems project using special software tools. The three roles of the systems analyst as consultant, supporting expert, and agent of change are introduced, and ethical issues and professional guidelines for serving as a systems consultant are covered. There is also material on virtual teams and virtual organizations, and the concept of HCI is introduced. The use of open source software (OSS) is also introduced. Chapter 2 includes how to initially approach an organization by drawing context-level data flow diagrams, using entity-relationship models, and developing use cases and use case scenarios. Chapter 3 introduces expanded material on creating the project charter and introduces writing the systems proposal early in the process, no matter what method of analysis and design has been chosen. Expanded coverage of evaluating software and hardware, and when to use COTS (commercial off-the-shelf software), is included. This chapter teaches several methods for forecasting costs and benefits, which are necessary to the discussion of acquiring software and hardware. Chapter 3 helps students evaluate software by assessing trade-offs among creating custom software, purchasing commercial-off-the-shelf (COTS) software, or outsourcing to an application service provider (ASP). Creating a problem definition and determining feasibility are also covered. Chapter 3 guides students in professionally writing and presenting an effective systems proposal, one that incorporates figures and graphs to communicate with users.


Begin Object-Oriented Analysis and Design
Draw Use Case Diagrams
Problem Identification Phase
Write Use Case Scenarios
Derive Activity Diagrams from Use Cases
Develop Sequence Diagrams
Create Class Diagrams
Systems Analysis Phase
Draw Statechart Diagrams
Modify Diagrams and Complete Specifications
Systems Design Phase
Develop and Document the System

Part II (Chapters 4–6) emphasizes the use of systematic and structured methodologies for performing information requirements analysis. Attention to analysis helps analysts ensure that they are addressing the correct problem before designing the system. Chapter 4 introduces a group of interactive methods, including interviewing, joint application design (JAD), and constructing questionnaires. Chapter 5 introduces a group of unobtrusive methods for ascertaining information requirements of users. These methods include sampling, investigating hard and archival data, and observation of decision makers' behavior and their physical environment. Chapter 6 on agile modeling and prototyping is innovative in its treatment of prototyping as another data-gathering technique that enables the analyst to solve the right problem by getting users involved from the start. Agile approaches have their roots in prototyping, so this chapter begins with prototyping to provide a proper context for understanding, and then takes up the agile approach. The values and principles, activities, resources, practices, processes, and tools associated with agile methodologies are presented. This chapter also includes material on rapid application development (RAD) for human information-requirements gathering and interface design.



Prototype Evaluation Form

Observer Name Michael Cerveris

System or Project Name Cloud Computing Data Center

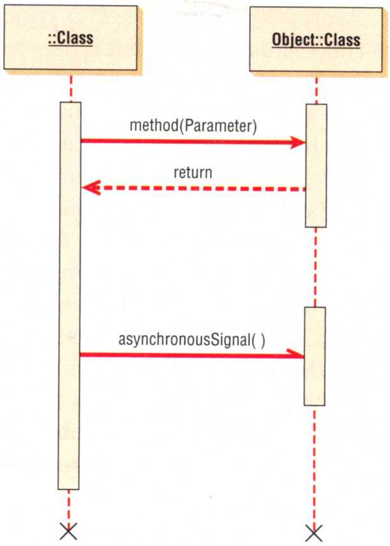
Date 1/06/2010

Program Name or Number Prev. Maint.

Company or Location Aquarius Water Filters

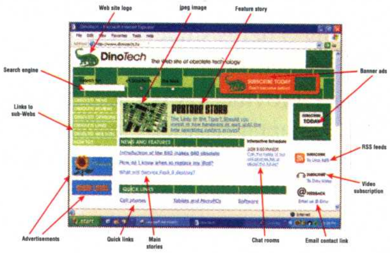
Version 1

	User 1	User 2	User 3	User 4
User Name	Andy H.	Pam H.		
Period Observed	1/06/2010	1/06/2010		
User Reactions	Generally favorable, got excited about project	Excellent!		
User Suggestions	Add the date when maintenance was performed.	Place a form number on top for reference. Place word WEEKLY in title.		
Innovations				
Revision Plans	Modify on 1/08/2010 Review with Andy and Pam.			



Part III (Chapters 7–10) details the analysis process. It builds on the previous two parts to move students into analysis of data flows as well as structured and semistructured decisions. It provides step-by-step details on how to use structured techniques to draw data flow diagrams (DFDs). Chapter 7 provides coverage of how to create child diagrams; how to develop both logical and physical data flow diagrams; and how to partition data flow diagrams. Chapter 8 features material on the data repository and vertical balancing of data flow diagrams. Chapter 8 also includes extensive coverage of extensible markup language (XML) and demonstrates how to use data dictionaries to create XML. Chapter 9 includes material on developing process specifications. A discussion of both logical and physical process specifications shows how to use process specifications for horizontal balancing. Chapter 9 also covers how to diagram structured decisions with the use of structured English, decision tables, and decision trees. In addition, the chapter covers how to choose an appropriate decision analysis method for analyzing structured decisions and creating process specifications. Push technologies are also introduced.

Part III concludes with Chapter 10 on object-oriented systems analysis and design. This chapter includes an in-depth section on using unified modeling language (UML). There is detailed coverage of the use case model, creating the class model diagram with UML, sequence diagrams, creating gen/spec diagrams, use case scenarios, and activity diagrams. Through several examples and Consulting Opportunities, this chapter demonstrates how to use an object-oriented approach. Consulting Opportunities, diagrams, and problems enable students to learn and use UML to model systems from an object-oriented perspective. Students learn the appropriate situations for using an object-oriented approach. This chapter helps students to decide whether to use the SDLC, the agile approach, or object-oriented systems analysis and design to develop a system.



Part IV (Chapters 11–14) covers the essentials of design. It begins with designing output, because many practitioners believe systems to be output driven. The design of Web-based forms is covered in detail. Particular attention is paid to relating output method to content, the effect of output on users, and designing good forms and screens. Chapter 11 compares advantages and disadvantages of output, including Web displays, audio, DVD, and electronic output such as email and RSS feeds. Designing a Web site for ecommerce purposes is emphasized, and output production and XML is covered. Chapter 12 includes innovative material on designing Web-based input forms, as well as other electronic forms design. Also included is computer-assisted forms design.

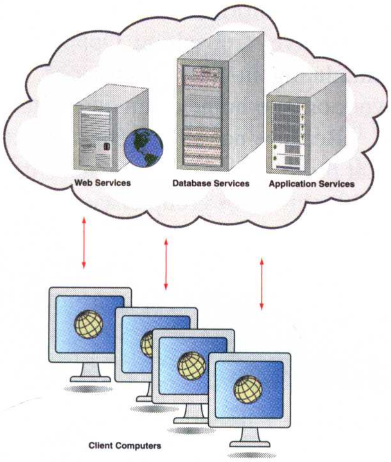
Chapter 12 features in-depth coverage of Web site design, including guidelines on when designers should add video, audio, and animation to Web site designs. The chapter also covers uses of Web push and pull technologies for output designs. There is detailed consideration of how to create effective graphics for corporate Web sites and ways to design effective onscreen navigation for Web site users.

Coverage of intranet and extranet page design is also included. Consideration of database integrity constraints has been included as well, in addition to how the user interacts with the computer and how to design an appropriate interface. The importance of user feedback is also found in Part IV. How to design accurate data entry procedures that take full advantage of computer and human capabilities to assure entry of quality data is emphasized here.

Chapter 13 demonstrates how to use the entity-relationship diagram to determine record keys, as well as providing guidelines for file/database relation design. Students are shown the relevance of database design for the overall usefulness of the system, and how users actually use databases.

Chapter 14 emphasizes Human–Computer Interaction (HCI), especially as it relates to interface design. It introduces HCI, discussing its importance in designing systems that suit individuals and assisting them in achieving personal and organizational goals through their use of information technology. The concepts of usability, fit, perceived usefulness, and perceived ease of use are introduced, as is the Technology Acceptance Model (TAM), so that systems students can knowledgeably incorporate HCI practices into their designs. Chapter 14 also features material on designing easy onscreen navigation for Web site visitors. The chapter presents innovative approaches to searching on the Web, highlights material on GUI design, and provides innovative approaches to designing dialogs. Chapter 14 articulates specialized design considerations for ecommerce Web sites. Mashups, new applications created by combining two or more Web-based application programming interfaces, are also introduced. Chapter 14 also includes extensive coverage on how to formulate queries, all within the framework of HCI.

Part V (Chapters 15 and 16) concludes the book. Chapter 15 focuses on designing accurate data entry procedures and includes material on managing the supply chain through the effective design of business-to-business (B2B) ecommerce. Chapter 16 emphasizes taking a total quality approach to improving software design and maintenance. In addition, material on system security and firewalls is included. Testing, auditing, and maintenance of systems are discussed in the context of total quality management. This chapter helps students understand how service-oriented architecture (SOA) and cloud computing are changing the nature of information systems design. In addition, students learn how to design appropriate training programs for users of the new system, how to recognize the differences among physical conversion strategies, and how to be able to recommend an appropriate one to a client. Chapter 16 also presents techniques for modeling networks, which can be done with popular tools such as Microsoft Visio.



Material on security and privacy in relation to designing ecommerce applications is included. Coverage of security, specifically firewalls, gateways, public key infrastructure (PKI), secure electronic translation (SET), secure socket layering (SSL), virus protection software, URL filtering products, email filtering products, and virtual private networks (VPN), is included. Additionally, current topics of interest to designers of ecommerce applications, including the development and posting of corporate privacy policies, are covered.

Important coverage of how the analyst can promote and then monitor a corporate Web site is included in this section, which features Web activity monitoring, Web site promotion, Web traffic analysis, and audience profiling to ensure the effectiveness of new ecommerce systems. Techniques for evaluating the completed information systems project are covered systematically as well.

The eighth edition contains an updated **Glossary** of terms and a separate list of updated **Acronyms** used in the book and in the systems analysis and design field.

PEDAGOGICAL FEATURES

Chapters in the eighth edition contain:

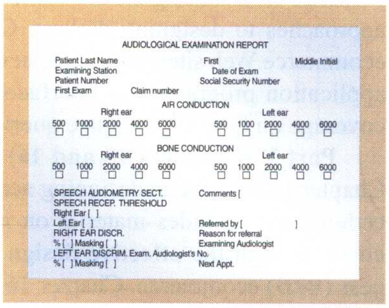
- **Learning Objectives** at the beginning of each chapter
- **Summaries** that tie together the salient points of each chapter while providing an excellent source of review for exams
- **Keywords and Phrases**
- **Review Questions**
- **Problems**
- **Group Projects** that help students work together in a systems team to solve important problems that are best solved through group interaction
- **Consulting Opportunities**—now more than 60 minicases throughout the book

- **Mac Appeal** columns that update students on design software available on the Mac and iPhone
- **HyperCase Experiences**
- **CPU Case Episodes**—parts of an ongoing case threaded throughout the book

CONSULTING OPPORTUNITIES

The eighth edition presents more than 60 Consulting Opportunities, and many of them address relevant and emerging topics that have arisen in the field, including designing systems from an HCI perspective, ecommerce applications for the Web, COTS software, and using UML to model information systems from an object-oriented perspective. Consulting Opportunities can be used for stimulating in-class discussions, or assigned as homework or take-home exam questions.

Because not all systems are extended two- or three-year projects, our book contains many Consulting Opportunities that can be solved quickly in 20 to 30 minutes of group discussion or individual writing. These minicases, written in a humorous manner to enliven the material, require students to synthesize what they have learned up to that point in the course, ask students to mature in their professional and ethical judgment, and expect students to articulate the reasoning that led to their systems decisions.



AUDIOLOGICAL EXAMINATION REPORT

Patient Last Name First Middle Initial
Examining Station Date of Exam
Patient Number Social Security Number
First Exam Claim number

AIR CONDUCTION

Right ear Left ear
500 □ 1000 □ 2000 □ 4000 □ 6000 □ 500 □ 1000 □ 2000 □ 4000 □ 6000 □

BONE CONDUCTION

Right ear Left ear
500 □ 1000 □ 2000 □ 4000 □ 6000 □ 500 □ 1000 □ 2000 □ 4000 □ 6000 □

SPEECH AUDIOMETRY SECT. Comments [
SPEECH RECEP. THRESHOLD
Right Ear [ ]
Left Ear [ ] Referred by [ ]
RIGHT EAR DISCR. Reason for referral
% [ ] Masking [ ] Examining Audiologist
LEFT EAR DISCRIM. Exam. Audiologist's No.
% [ ] Masking [ ] Next Appt.

HYPERCASE EXPERIENCES

HyperCase® Experiences that pose challenging student exercises are present in each chapter. New scenarios, graphics, and problems to accompany HyperCase version 2.8 are included in the eighth edition. HyperCase has organizational problems featuring state-of-the-art technological systems. HyperCase represents an original virtual organization that allows students who access it to become immediately immersed in organizational life. Students will interview people, observe office environments, analyze their prototypes, and review the documentation of their existing systems. HyperCase 2.8 is Web-based, interactive software that presents an organization called Maple Ridge Engineering (MRE) in a colorful, three-dimensional graphics environment. HyperCase permits professors to begin approaching the systems analysis and design class with exciting multimedia material. Carefully watching their use of time and managing multiple methods, students use the hypertext characteristics of HyperCase on the Web to create their own individual paths through the organization.

HYPERCASE® EXPERIENCE 3.2

"Sometimes the people who have been here for some time are surprised at how much we have actually grown. Yes, I do admit that it isn't easy to keep track of what each person is up to or even what purchases each department has made in the way of hardware and software. We're working on it, though. Snowden would like to see more accountability for computer purchases. He wants to make sure we know what we have, where it is, why we have it, who's using it, and if it's boosting MRE productivity, or, as he so delicately puts it, 'to see whether it's just an expensive toy' that we can live without."

HYPERCASE Questions

1. Complete a computer equipment inventory for the Training and Management Systems Unit, describing all the systems you find. Hint: Create an inventory form to simplify your task.
2. Using the software evaluation guidelines given in the text, do a brief evaluation of GEMS, a software package used by the Management Systems employees. In a paragraph, briefly critique this custom software by comparing it with commercial off-the-shelf software such as Microsoft Project.
3. List the intangible costs and benefits of GEMS as reported by employees of MRE.
4. Briefly describe the two alternatives Snowden is considering for the proposed project tracking and reporting system.
5. What organizational and political factors should Snowden consider in proposing his new system at MRE? (In a brief paragraph, discuss three central conflicts.)

FIGURE 3.HC1

The reception room resembles a typical corporation. While you are in this HyperCase screen, find the directory if you want to visit someone.

Maple Ridge Engineering is drawn from the actual consulting experiences of the authors of the original version (Raymond Barnes, Richard Baskerville, Julie E. Kendall, and Kenneth E. Kendall). Allen Schmidt joined the project for version 2.0 and has remained with it. Peter Schmidt was the HTML programmer, and Jason Reed created the images for the initial Web version.

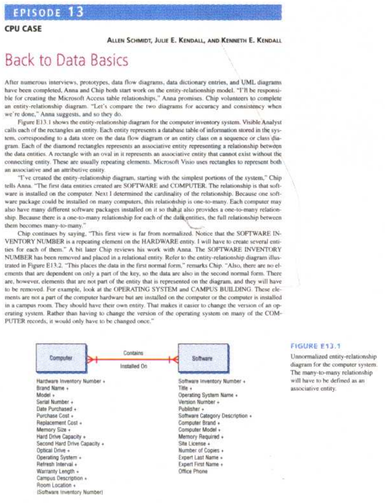
In each chapter, there are newly updated HyperCase Experiences that include assignments (and even some clues) to help students solve the difficult organizational problems including developing new systems, merging departments, hiring of employees, security, ecommerce, and disaster recovery planning they encounter at MRE. HyperCase has been fully tested in classrooms, and was an award winner in the Decision Sciences Institute Innovative Instruction competition.

CPU CASE EPISODES

In keeping with our belief that a variety of approaches are important, we have once again integrated the Central Pacific University (CPU) case into every chapter of the eighth edition. The

CPU case makes use of Microsoft Access, Microsoft Visio, and the popular CASE tool Visible Analyst by Visible Systems, Inc., for the example screen shots and the student exercises.

The CPU case takes students through all phases of the systems development life cycle. This running case gives students an opportunity to solve problems on their own, using a variety of tools and data that users of the book can download from the Web containing Microsoft Visio, Microsoft Access, and Visible Analyst exercises specifically keyed to each chapter of the book. Additionally, partially completed exercises in Microsoft Access files are available for student use on the Web. The CPU case has been fully tested in classrooms around the world with a variety of students over numerous terms. The case is detailed, rigorous, and rich enough to stand alone as a systems analysis and design project spanning one or two terms. Alternatively, the CPU case can be used as a way to teach the use of CASE tools in conjunction with the assignment of a one- or two-term, real-world project outside the classroom.



EPISODE 13

CPU CASE

ALLEN SCHMIDT, JULIE E. KENDALL, AND KENNETH E. KENDALL

Back to Data Basics

After numerous interviews, prototypes, data flow diagrams, data dictionary entries, and UML diagrams have been completed, Anna and Chip both start work on the entity-relationship model. "I'll be responsible for creating the Microsoft Access table relationships," Anna promises. Chip volunteers to complete an entity-relationship diagram. "Let's compare the two diagrams for accuracy and consistency when we're done," Anna suggests, and so they do.

Figure E13.1 shows the entity-relationship diagram for the computer inventory system. Visible Analyst calls each of the rectangles an entity. Each entity represents a database table of information stored in the system, corresponding to a data store on the data flow diagram or an entity class on a sequence or class diagram. Each of the diamond rectangles represents an associative entity representing a relationship between the data entities. A rectangle with an oval in it represents an associative entity that cannot exist without the connecting entity. These are usually repeating elements. Microsoft Visio uses rectangles to represent both an associative and an attributive entity.

"I've created the entity-relationship diagram, starting with the simplest portions of the system," Chip tells Anna. "The first data entities created are SOFTWARE and COMPUTER. The relationship is that software is installed on the computer. Next I determined the cardinality of the relationship. Because one software package could be installed on many computers, this relationship is one-to-many. Each computer may also have many different software packages installed on it so that it also provides a one-to-many relationship. Because there is a one-to-many relationship for each of the data entities, the full relationship between them becomes many-to-many."

Chip continues by saying, "This first view is far from normalized. Notice that the SOFTWARE INVENTORY NUMBER is a repeating element on the HARDWARE entity. I will have to create several entities for each of them." A bit later Chip reviews his work with Anna. The SOFTWARE INVENTORY NUMBER has been removed and placed in a relational entity. Refer to the entity-relationship diagram illustrated in Figure E13.2. "This places the data in the first normal form," remarks Chip. "Also, there are no elements that are dependent on only a part of the key, so the data are also in the second normal form. There are, however, elements that are not part of the entity that is represented on the diagram, and they will have to be removed. For example, look at the OPERATING SYSTEM and CAMPUS BUILDING. These elements are not a part of the computer hardware but are installed on the computer or the computer is installed in a campus room. They should have their own entity. That makes it easier to change the version of an operating system. Rather than having to change the version of the operating system on many of the COMPUTER records, it would only have to be changed once."

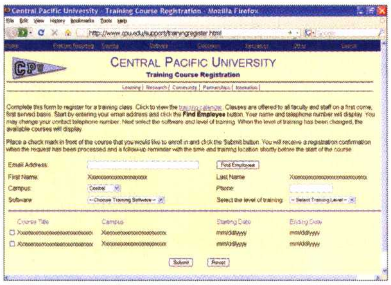
FIGURE E13.1

Unnormalized entity-relationship diagram for the computer system. The many-to-many relationship will have to be defined as an associative entity.

EXPANDED WEB SUPPORT

Kendall & Kendall's *Systems Analysis and Design*, Eighth Edition, features Web-based support for solid but lively pedagogical techniques in the information systems field.

- The Web site, located at **www.pearsonhighered.com/kendall,** contains a wealth of critical learning and support tools, which keep class discussions exciting.
- **HyperCase 2.8,** is an award-winning, virtually interactive organization game. Students are encouraged to interview people in the organization, analyze problems, modify data flow diagrams and data dictionaries, react to prototypes, and design new input and output. HyperCase now has a distinctive 3-D look.
- **Student Exercises based on the ongoing CPU case,** with partially solved problems and examples stored in Microsoft Access and Visible Analyst files, allow students to develop a Web-based computer management system.



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Extended support for instructors using this edition can be found at the official Web site located at www.pearsonhighered.com/kendall. Resources include:

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- **Image Library,** a collection of all text art organized by chapter
- **Instructor's Manual** with answers to problems, solutions to cases, and suggestions for approaching the subject matter
- **Test Item File** in Microsoft Word and TestGen with WebCT- and Blackboard-ready conversions
- **Solutions to Student Exercises** based on the ongoing CPU case, with solutions and examples stored in Visible Analyst files and Microsoft Access files.

ACKNOWLEDGMENTS

Rapid and dramatic changes in IT occurred as we were writing the eighth edition of *Systems Analysis and Design*. We are delighted that this edition is being published at the right time for us to capture many of these changes in systems development.

One major change is that three primary approaches to development are emerging the SDLC, agile approaches, and object-oriented systems analysis and design—and we are able to show where and in what situations each is useful to you as a systems analyst.

Another big change is the rapidly increasing use of the Web as a platform for information systems. Service-oriented architecture and cloud computing both change the way that the analyst approaches designing systems solutions. Along with the Web, analysts are being pushed to design for a wide spectrum of emerging information technologies such as wireless and mobile technologies, enterprise systems, and virtual contexts such as virtual teams and virtual organizations.

Another major change addressed in this edition is the ability of users to personalize and customize their desktops, workspaces, and Web pages, and even for users to alter the professional designs of systems analysts. Analysts see the big picture that users cannot see, and they must always be aware of the organizational impacts of changing systems.

Throughout the book you will learn and apply numerous techniques, methods, tools, and approaches. But when the time comes to interpret what is happening in the organization and to develop meaningful information systems from the application of rules to your analysis, your training combines with creativity to produce a system that is in some ways a surprise: It is structured, yet intuitive; multilayered and complex, in keeping with the character of the organization and uniquely reflective of you as a systems analyst and a human being.

Our students deserve credit for this new edition by providing feedback and suggestions for improvements and asking for increased depth in certain topics. Students told us that they rapidly put to use the new material on object-oriented systems analysis and design as well as that on agile modeling. Their eagerness to teach us new things keeps the book fresh. We want to thank our coauthor, Allen Schmidt, who once again worked with us on the *CPU Case Episodes* and HyperCase 2.8, for all of his hard work, dedication, and humor during our collaboration. He is a wonderful person. Our appreciation also goes to Peter Schmidt and Jason Reed for their improvements to the early HyperCase. We also want to thank the other two original authors of HyperCase, Richard Baskerville and Raymond Barnes, who contributed so much.

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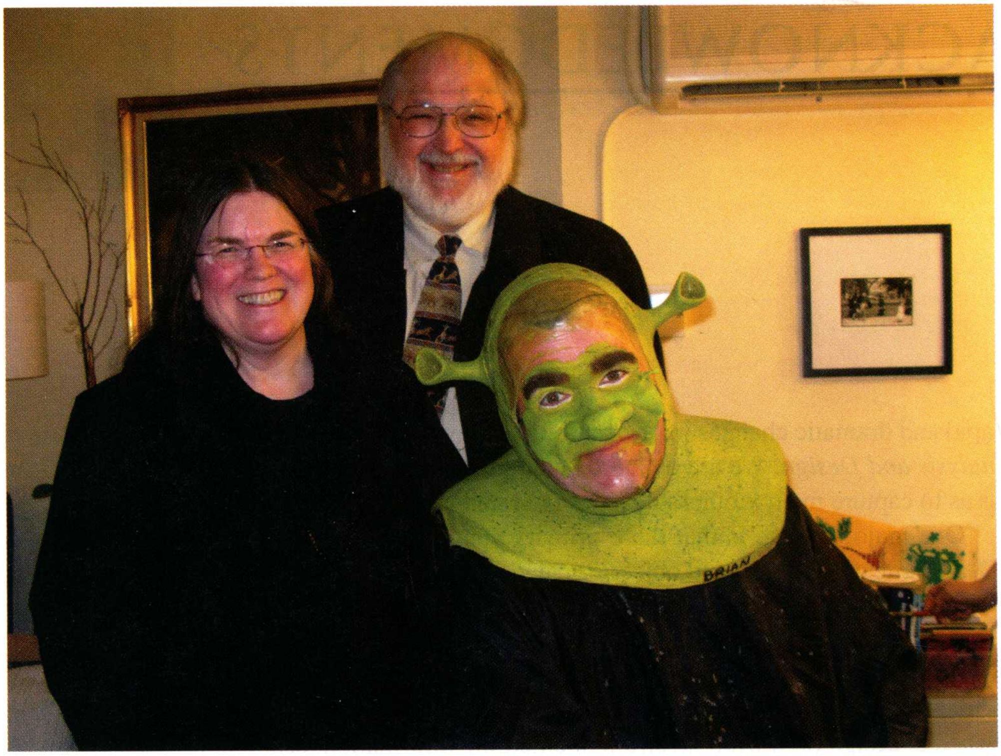

Julie and Ken Kendall personally thank Shrek (Brian d'Arcy James) and all of our dear friends in the theatre and the performing arts.

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Our heartfelt thanks go to the memory of Julia A. Kendall and to the memory of Edward J. Kendall. Their belief that love, goals, and hard work are an unbeatable combination continues to infuse our every endeavor.

CONSULTING OPPORTUNITIES

BRIEF CONTENTS