Accounting
Information Systems

Third Edition

Vernon J. Richardson
University of Arkansas
Xi’an Jiaotong Liverpool University

C. Janie Chang
San Diego State University

Rodney Smith
California State University, Long Beach
About the Authors

Vernon J. Richardson  University of Arkansas; Xi’an Jiaotong Liverpool University

Vernon J. Richardson is Professor of Accounting and the S. Robson Walton Distinguished Chair in the Sam M. Walton College of Business at the University of Arkansas. He also serves as Accounting Department chair. He is also a research fellow at the International Business School Suzhou, Xi’an Jiaotong Liverpool University. He received his BS, MAcc, and MBA from Brigham Young University and has a PhD in accounting from the University of Illinois at Urbana-Champaign. He has taught students at the University of Arkansas, University of Illinois, Brigham Young University, Aarhus University, University of Kansas, Xi’an Jiaotong Liverpool University, and the China Europe International Business School (Shanghai).


C. Janie Chang  San Diego State University

C. Janie Chang is the Vern Odmark Professor of Accountancy at San Diego State University (SDSU). Currently, she serves as the William E. Cole Director of the Charles W. Lamden School of Accountancy at SDSU. She received her PhD from the University of California–Irvine. Before coming to SDSU, Dr. Chang served as Professor of Accounting Information Systems (AIS) at San Jose State University (SJSU). At SJSU, she established the undergraduate AIS program. She also taught students at University of California–Davis, University of California–Irvine, and California State University–San Marcos.

Dr. Chang’s teaching interests in AIS include information systems audit, data modeling, issues in e-business, and business networks and controls.

Dr. Chang is a member of the American Accounting Association and Information Systems Audit and Control Association (ISACA). Dr. Chang has studied issues in auditing, accounting, and information systems to investigate information processing of experts in addition to cross-cultural issues related to professional judgments and decisions. Her studies have been published in Abacus, Auditing: A Journal of Practice and Theory, Behavioral Research in Accounting, Data Base, International Journal of Accounting, International Journal of Accounting Information Systems, Journal of Accounting Literature, Journal of Accounting and Public Policy, and Journal of Emerging Technologies in Accounting, among others.

Rod Smith  California State University–Long Beach

Rod Smith is Professor of Accountancy at California State University–Long Beach and Director of the MS in Accountancy program. He received his BS in Mathematics from the University of Oregon; MS in Financial Management from the Naval Postgraduate School, Monterey, California; and PhD in Management (Accounting) from University of California–Irvine. He previously taught at the University of Arkansas, University of California–Irvine, and University of Alaska.

His research interests include use of financial and nonfinancial measures to assess organizational performance; accounting information systems, enterprise systems, business processes, and business value; design science; and systems dynamics and business process simulation.
Preface

Whether accountants work in public accounting or in industry, they use a variety of technology tools. The International Federation of Accountants (IFAC) describes four roles for accountants with respect to information technology: (1) users of technology and information systems, (2) managers of users of technology and related information systems, (3) designers of information systems, and (4) evaluators of information systems. As users, managers, designers, and evaluators of technology and technology-driven business processes, accountants must understand the organization and how organizational processes generate information important to management. To ensure that processes and systems are documented—and to participate in improvements to processes and systems—accountants must be business analysts.

This text aims to provide students with a variety of technology and business analysis concepts and skills. It is intended for use in the first Accounting Information Systems course at both the undergraduate and graduate levels. Ongoing changes in business technology—such as the move to internet-based systems, Big Data and Data Analytics, software as a service, and mobile access to enterprise information, as well as increased security and control requirements—make technological skills more important than ever for accounting graduates. This text also aims to show how current changes in accounting and technology affect each of these roles. For example, the Sarbanes-Oxley Act affects financial reporting system controls, and XBRL changes system requirements and affects how companies develop and report financial information. We also consider the role of Big Data and Data Analytics and how they are used in financial accounting, managerial accounting, and auditing. Additionally, we consider both the COBIT and COSO frameworks to describe how organizations deal with risk management. In their roles as managers, designers, and evaluators, accountants must know how those frameworks affect their accounting and related information systems.

The core competencies of the American Institute of Certified Public Accountants (AICPA) emphasize accounting skills over content. This text emphasizes examples, problems, and projects through which students can develop the technological skills they need for their accounting careers. It uses real-world companies such as Starbucks, Walmart, Google, and Amazon that students can relate to. It takes a broad view of accounting information systems that emphasizes the accountants’ roles in the use, management, design, and evaluation of the systems and the management information that they produce. To assist accounting students in experiencing the benefit of learning information technology/services (IT/IS) concepts and using IT/IS skills in accounting, we focus on business processes, business requirements, how information technology supports those requirements, and how accountants contribute. In particular, this text helps students:

- **Design business processes and represent them with standard documentation tools.** The role of the accounting function has evolved from stewardship and reporting to full partnership, supporting management decisions throughout the organization. As business analysts, accountants must be able to document business processes, identify potential improvements, and design and implement new business processes. Thus, this text helps develop business process modeling skills.

- **Design and implement well-structured databases to enable business processes.** Accountants must also understand how business processes generate data and how such data are structured, interrelated, and stored in a database system. To ensure that business processes and the database systems are documented and to help make
improvements to processes and systems, accountants must understand and be able
to model such systems. Thus, this text helps develop data modeling and database
implementation skills.

- **Query databases to provide insights about the performance of business
  operations.** Most organizational information resides in databases. To support
  management decisions throughout the organization, accountants must understand
  how those data are structured and how to retrieve information to support business
  management decisions. Thus, this text develops skills on the use of Microsoft
  Access and databases in general. This text also develops Data Analytics tools
  through the use of Microsoft Excel and Tableau.

- **Evaluate internal control systems and apply business rules to implement
  controls and mitigate information systems risks.** Recent federal legislation—
  for example, the Sarbanes-Oxley Act of 2002 and COSO and COBIT guidance—
  emphasizes the importance of risk mitigation in modern organizations. Internal
  control systems must constantly evolve to meet a changing risk environment.
  Accountants are often the internal control experts and must, therefore, understand
  how internal controls should be implemented in business processes as part of the
  organization’s overall risk mitigation and governance framework. Thus, this text
  presents specific material on internal control and accounting information systems,
  as well as general information about computer fraud and security. It also describes
  how to monitor and audit accounting information systems.

- **Apply Data Analytics and understand the basic concepts of blockchain and
  artificial intelligence.** This includes using three different data analytics tools:
  Excel, Tableau, and Power BI. The use of technology is rapidly changing the
  accounting profession. The CPA exam now includes material on Data Analytics.
  Interest in, and use of, blockchain is exploding. Increased computing power and
  availability of data is driving advances in artificial intelligence. Today’s accountant
  must be familiar with all these topics and able to use prominent tools.
AIS 3e Content Updates

General Updates for the 3rd Edition
- Added an additional chapter on Data Analytics (now two chapters, Chapters 10 and 11), and an additional chapter on Blockchain and Artificial intelligence (all-new Chapter 12).
- Introduced to Tableau and Power BI for data analysis.
- Added additional end-of-chapter Multiple Choice Questions and Problems throughout the text.
- Significantly revised many end-of-chapter Problems for availability and auto-grading within Connect.
- Revised and added many new Discussion Questions in most chapters.
- Updated integrated projects.

Chapter by Chapter Updates
Specific chapter changes for Accounting Information Systems, 3rd Edition, are as follows:

Chapter 1
- Updated the opening vignette, highlighting the use of Starbucks Clover coffee machines.
- Updated real-world references with current examples.

Chapter 2
- Increased introductory coverage of BPMN.
- Added discussion of flow object types, including gateway and event types.
- Introduced repeating activities.
- Added introduction to data objects, data stores, and associations.

Chapter 3
- Updated discussion of how the multiplicities for associations indicate where foreign keys are posted in relational tables.
- Added discussion of business rules, decision requirements, and decision tables.

Chapter 4
- Updated the section, Using Microsoft Access to Implement a Relational Database. Figures 4.6 through 4.17 were updated using Microsoft Access 2019.

Chapter 5
- Added additional figures related to sales activity models.
- Updated the Chapter 5 Comprehensive Exercise.

Chapter 6
- Updated the Chapter 6 Comprehensive Exercise.
Chapter 7
- Updated BPMN diagrams to include revisions to Chapter 2.

Chapter 8
- Revised both integrated projects to accommodate various class schedules and to allow instructors to rotate projects.
- The first of the two integrated projects is a more challenging project that includes issues related to managing inventory levels and internal inventory transfers. Other topics covered include multiple sales types, including internet, wholesale, and retail sales, where customers can pay by cash, check, or credit card.
- The second of the two integrated projects is shorter and less challenging and focuses on wholesale sales from multiple distribution centers.

Chapter 9
- Reordered chapter to emphasize importance of reporting processes.
- Updated opening vignette.
- Updated discussion on the uses of XBRL.

Chapter 10
- Introduced the AMPS model for Data Analytics.
- Introduced four types of analyses, including descriptive, diagnostic, predictive, and prescriptive analytics.
- Added four labs (one for each type of analysis) with two data sets, each illustrating Data Analytics in both Excel and Tableau.
- Added additional problems to the end of the chapter.

Chapter 11
- All-new chapter on Data Analytics.
- Provides some hands-on introduction to Data Analytics tools.
- Guides students through the use of Excel for Data Analytics.
- Guides students through the use of Tableau for Data Analytics.
- Guides students through the use of Power BI for Data Analytics.

Chapter 12
- A new chapter to introduce emerging technologies on blockchain and artificial intelligence and their impact on accounting and auditing.

Chapter 13
- Added the new components and principles of COSO ERM 2017 framework regarding enterprise risk management.
- Updated the COBIT framework using COBIT 2019.
- Updated the Appendix on ERP and control issues.
Chapter 14
- Introduced the AICPA attestation guide on cybersecurity risk management.
- Introduced General Data Protection Regulation (GDPR) on privacy protection.
- Updated computer fraud schemes.

Chapter 15
- Updated the opening vignette.
- Added information on continuous monitoring in AIS.

Chapter 16
- Added discussion of the business model canvas as a business model development and communication tool.

Chapter 17
- Added an all-new opening vignette, highlighting Gerri Martin-Flickinger as the Starbucks chief technology officer and Starbucks’ relationship with Microsoft.

Chapter 18
- Updated the opening vignette highlighting technology used at Walmart.
- Updated Figure 18.2 with recent information technology project outcomes.
- Added additional problems.
Accounting Information Systems, 3rd Edition, focuses on the accountant’s role as business analyst in solving business problems by database modeling, database design, and business process modeling.

Chapter Maps
Chapter Maps provide a handy guide at the start of every chapter. These remind students what they have learned in previous chapters, what they can expect to learn in the current chapter, and how the topics will build on each other in chapters to come. This allows them to stay more focused and organized along the way.

Chapter-Opening Vignettes
Do your students sometimes wonder how the course connects with their future? Each chapter opens with a vignette, which sets the stage for the rest of the chapter and encourages students to think of concepts in a business context.

“I like how it relates many of the concepts to real companies, like Starbucks.”
—Linda Wallace, Virginia Tech
“I believe that the sequence of topics follows a logical pattern by moving from introducing the general concepts of AIS to students to internal controls and a need to automate them, to design of the DB—'backbone' of the IT system—and then to specific accounting cycles, and to general IT-related issues.”

—Dmitriy Shaltayev, Christopher Newport University

Chapter Outline
Each chapter opens with an Outline that provides direction to the students about the topics they can expect to learn throughout the chapter.

Learning Objectives
Learning Objectives are featured at the beginning of each chapter. The objectives provide students with an overview of the concepts they should understand after reading the chapter. These Learning Objectives are repeated in the margin of the text where they apply.

“Well-written with great examples. Students should like reading this book.”

—Marcia Watson, Mississippi State University
Integrated Project
Projects can generate classroom discussion, foster good teamwork, and prepare students for their accounting careers. Chapter 8 provides guidance to students on how to approach a systems project; related material provides information and data for the projects. There are now two different projects, so instructors can select the project level of difficulty to match the time available or the sophistication of their students. Both integrated projects require students to apply the different techniques they have learned in Chapters 5, 6, and 7 to a realistic situation. One project focuses on inventory management in a small business with multiple retail stores and a central warehouse. The second project also involves a small wholesale distribution business with multiple stores but without inventory management complications. Students use Microsoft Access to implement their data models and prepare financial reports in both projects.

Data Analytics
Due to its importance and popularity, we have expanded coverage on Data Analytics. Chapter 10 introduces the importance and impact of Data Analytics in the business world, specifically in the accounting profession. It introduces a framework to facilitate the Data Analytics process, suggesting the AMPS model (i.e., ask the question, master the data, perform the analysis, share the story). We illustrate the AMPS model specifically by highlighting the types of questions asked; the types of data that are available; and four types of analyses, including descriptive, diagnostic, predictive, and prescriptive analysis. Chapter 11 continues the discussion and introduces students to using tools such as Excel, Tableau, and Power BI to help with reporting and visualizations.

“I like comprehensive problems that extend across multiple chapters so students can see how different components of a problem fit together.”
—Janice Benson, University of Wyoming
Progress Checks
These self-test questions and problems in the body of the chapter enable the student to determine whether he or she has understood the preceding material and to reinforce that understanding before reading further. Detailed solutions to these questions are found at the end of each chapter.

“I really like the Progress Check box. It is a great tool for students’ self-assessment.”
—Chih-Chen Lee, Northern Illinois University

Data Modeling and Microsoft Access
Chapter 3 describes how data modeling supports the design, implementation, and operation of database systems. Basic modeling tools are used throughout the rest of the text.

“This textbook would be good when using the database approach. It provides the information needed to develop and use a database without getting into the details of transaction processing (activities, documents, and internal control).”
—Janice Benson, University of Wyoming

Chapter Three
Data Modeling

A look at this chapter
Today’s accountants must understand how business processes generate data and how those data are structured, interrelated, and stored in a database system. To ensure that business processes and the database systems are documented and to participate in improvements to processes and systems, accountants must understand and be able to model such systems. This chapter describes data modeling. It explains how data models support database-driven systems. It introduces basic data modeling tools to guide the student’s development of modeling skills. Finally, it discusses business rules and how the identification of relevant business rules supports both process and data modeling.
Connect Accounting for Accounting Information Systems

The 3rd Edition of Accounting Information Systems has a full Connect package, with the following features available for instructors and students.

- **SmartBook 2.0®** A personalized and adaptive learning tool used to maximize the learning experience by helping students study more efficiently and effectively. Smartbook 2.0 highlights where in the chapter to focus, asks review questions on the materials covered and tracks the most challenging content for later review recharge. Smartbook 2.0 is available both online and offline.
- **Multiple Choice Questions.** The multiple choice questions from the end-of-chapter materials are assignable in Connect, providing students with instant feedback on their answers.
- **Problems.** Select problems from the text are available for assignment in Connect to ensure students are building an analytical skill set.

**Example of End-of-Chapter Problem**

**Problem 4-1 [LO 4-3]**

**Required:**
Using the Cash table below, show the output for the following SQL query: *(Using the dropdowns, identify which rows and columns would included in the SQL query output shown below. Select "Not included" for rows and columns that would not be included in the output.)*

```sql
SELECT Account#, Balance
FROM Cash
WHERE Balance < 50000;
```

<table>
<thead>
<tr>
<th>Cash</th>
<th>Account #</th>
<th>Type</th>
<th>Bank</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BA-6</td>
<td>Checking</td>
<td>Boston 5</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>BA-7</td>
<td>Checking</td>
<td>Shawmut</td>
<td>48,000</td>
</tr>
<tr>
<td></td>
<td>BA-8</td>
<td>Draft</td>
<td>Shawmut</td>
<td>75,000</td>
</tr>
<tr>
<td></td>
<td>BA-9</td>
<td>Checking</td>
<td>Boston5</td>
<td>950</td>
</tr>
</tbody>
</table>
• Comprehensive Exercises and Integrated Project. The setup information for the Comprehensive Exercises for Chapters 5 and 6 and the Integrated Project in Chapter 8 have been added to Connect, along with the ability for students to upload their submission files for their instructors to grade.

• Test Bank: The Test Bank for each chapter has been updated and significantly expanded for the 3rd Edition to stay current with new and revised chapter material, with all questions available for assignment through Connect. Instructors can also create tests and quizzes from the Test Bank through our TestGen software.

• The Instructor and Student Resources have been updated for the 3rd edition and are available in the Connect Instructor Resources page. Available resources include Solutions Manuals, Comprehensive Exercise and Integrated Project setup and solutions files, PowerPoint presentations, Test Bank files, and other ancillary materials. All applicable Student Resources will be available in a convenient file that can be distributed to students for classes either directly, through Connect, or via courseware.

Example of End-of-Chapter Problem

[Diagram of a UML class diagram]

Each question should be attempted after you have completed Exercise Requirement 2. From the information provided in the text and the corresponding Excel data, complete a UML class diagram of the EDI process for purchasing fabric and miscellaneous items from vendors. Then, answer the following questions about the missing elements of the UML class diagram.
You’re in the driver’s seat.

Want to build your own course? No problem. Prefer to use our turnkey, prebuilt course? Easy. Want to make changes throughout the semester? Sure. And you’ll save time with Connect’s auto-grading too.

They’ll thank you for it.

Adaptive study resources like SmartBook® help your students be better prepared in less time. You can transform your class time from dull definitions to dynamic debates. Hear from your peers about the benefits of Connect at www.mheducation.com/highered/connect

Make it simple, make it affordable.

Connect makes it easy with seamless integration using any of the major Learning Management Systems—Blackboard®, Canvas, and D2L, among others—to let you organize your course in one convenient location. Give your students access to digital materials at a discount with our inclusive access program. Ask your McGraw-Hill representative for more information.

Solutions for your challenges.

A product isn’t a solution. Real solutions are affordable, reliable, and come with training and ongoing support when you need it and how you want it. Our Customer Experience Group can also help you troubleshoot tech problems—although Connect’s 99% uptime means you might not need to call them. See for yourself at status.mheducation.com
Effective, efficient studying.

Connect helps you be more productive with your study time and get better grades using tools like SmartBook, which highlights key concepts and creates a personalized study plan. Connect sets you up for success, so you walk into class with confidence and walk out with better grades.

Study anytime, anywhere.

Download the free ReadAnywhere app and access your online eBook when it’s convenient, even if you’re offline. And since the app automatically syncs with your eBook in Connect, all of your notes are available every time you open it. Find out more at www.mheducation.com/readanywhere

“I really liked this app—it made it easy to study when you don’t have your textbook in front of you.”

- Jordan Cunningham,
Eastern Washington University

No surprises.

The Connect Calendar and Reports tools keep you on track with the work you need to get done and your assignment scores. Life gets busy; Connect tools help you keep learning through it all.

Learning for everyone.

McGraw-Hill works directly with Accessibility Services Departments and faculty to meet the learning needs of all students. Please contact your Accessibility Services office and ask them to email accessibility@mheducation.com, or visit www.mheducation.com/about/accessibility for more information.

Acknowledgments

Throughout the development of this book, we were privileged to have the candid and valuable advice of our contributors, reviewers, and survey and focus group participants. These instructors provided us with priceless suggestions, feedback, and constructive criticism. The depth and sincerity of their reviews indicate that they are a devoted group of teacher-scholars. The content of the book over various versions and editions was greatly enhanced because of their efforts.

T. S. Amer  
Northern Arizona University
Deniz Appelbaum  
Montclair State University
Victoria Badura  
Chadron State College
James Bay  
University of Utah
Tanya Benford  
Florida Gulf Coast University
Janice Benson  
University of Wyoming
Jennifer Blaskovich  
University of Nebraska, Omaha
A. Faye Borthick  
Georgia State University
Daniel Boylan  
University of North Georgia
Kristine Brands  
Regis University
Linda Bressler  
University of Houston
Kimberly Brickler-Ulrich  
Lindenwood University
Sandra Cereola  
James Madison University
Siew Chan  
Nova Southeastern University
Shifei Chung  
Rowan University
Kim Church  
Oklahoma State University
Ronald Clark  
Auburn University
Curtis Clements  
Abilene Christian University
Donna Free  
Oakland University
Graham Gal  
University of Massachusetts, Amherst

Andy Garcia  
Bowling Green State University
David Gelb  
Seton Hall University
Jan Gillespie  
University of Texas
Terry Glandon  
University of Texas, El Paso
Severin Grabski  
Michigan State University
Marina Grau  
Houston Community College
Gerry Grant  
California State University, Fullerton
Jennifer Grennan  
Queens University
Michael Griffin  
UMASS Dartmouth
Deborah L. Habel  
Wayne State University
Rebekah Heath  
St. Ambrose University
William Heninger  
Brigham Young University
Kenneth Henry  
Florida International University
Sarah Hill  
Northcentral Technical College
Rani Hoitash  
Bentley University
Diane Janvrin  
Iowa State University
Steven Johnson  
Minnesota State University, Mankato
Nancy Jones  
California State University, Chico
Grover Kearns  
University of South Florida, St. Petersburg
Acknowledgments

Kevin Kobelsky
University of Michigan, Dearborn
Joseph Komar
University of St. Thomas
Don Kovacic
California State University, San Marcos
Brenda Lauer
Davenport University
Mark Lawrence
University of North Alabama
Yvette Lazdowski
Plymouth State University
Maria Leach
Auburn University
Chih-Chen Lee
Northern Illinois University
Picheng Lee
Pace University
Adena LeJeune
Louisiana College
Chan Li
University of Pittsburgh
Tina Loraas
Auburn University
Sakthi Mahenthiran
Butler University
Lois Mahoney
Eastern Michigan University
James Mensching
California State University, Chico
Mike Metzcar
Indiana Wesleyan University
Bonnie Morris
West Virginia University
Johnna Murray
University of Missouri, St. Louis
Bruce Neumann
University of Colorado, Denver
Oluwakemi Onwuchekwa
University of Central Florida
Debra Petrozzo
Franklin University
Theresa Phinney
Texas A&M University
Ronald Premuroso
University of Montana
Helen Pruitt
University of Maryland
Jeffrey Pullen
University of Maryland
Austin Reitenga
University of Alabama

Jennifer Riley
University of Nebraska Omaha
Juan Roman
American Public University System
Mohd Rujob
Eastern Connecticut State University
Juan Manuel Sanchez
Texas Tech University
Paul San Miguel
Western Michigan University
Arlene Savage
Cal Poly, San Luis Obispo
Lloyd Seaton
University of Northern Colorado
George Schmelzle
Missouri State University
Dmitriy Shaltayev
Christopher Newport University
Lewis Shaw
Suffolk University
Robert Slater
University of North Florida
Gary Smith
Georgia State University
Kathleen Sobieralski
University of Maryland
Eileen Taylor
North Carolina State University
Ryan Teeter
University of Pittsburgh
Katie Terrell
University of Arkansas
Barbara Uliss
Metropolitan State University of Denver
Linda Wallace
Virginia Tech
Ting Wang
Governors State University
Marcia Watson
Mississippi State University
Andy Welchel
University of Montana
Mitchell Wenger
The University of Mississippi
Veronda Willis
The University of Texas at Tyler
Darryl Woolley
University of Idaho
Al Chen Yuang-Sung
North Carolina State University
Dedications

To my eldest son, Hyrum, for his love and loyalty.

—Vern Richardson

To my students and my family who have inspired and supported me.

—Janie Chang

To my wife, Gayla.

—Rod Smith
Brief Contents

Preface vii

PART ONE AIS and the Business
1 Accounting Information Systems and Firm Value 2
2 Accountants as Business Analysts 32
3 Data Modeling 66
4 Relational Databases and Enterprise Systems 88

PART TWO Business Processes
5 Sales and Collections Business Process 132
6 Purchases and Payments Business Process 168
7 Conversion Business Process 194
8 Integrated Project 216
9 Reporting Processes and eXtensible Business Reporting Language (XBRL) 226

PART THREE Data Analytics and Emerging Technologies in AIS
10 Data Analytics in Accounting: Concepts and the AMPS Model 248
11 Data Analytics in Accounting: Tools and Practice 296
12 Emerging Technologies: Blockchain and AI Automation 330

PART FOUR Managing and Evaluating AIS
13 Accounting Information Systems and Internal Controls 362
14 Information Security and Computer Fraud 396
15 Monitoring and Auditing AIS 424

PART FIVE Optional AIS Topics
16 The Balanced Scorecard, Business Model Canvas, and Business Value of Information Technology 444
17 Evaluating AIS Investments 468
18 Systems Development and Project Management for AIS 488

GLOSSARY OF MODELS 510
GLOSSARY 524
INDEX 534
Contents

About the Authors v
Preface vii

PART ONE AIS and the Business

Chapter 1 Accounting Information Systems and Firm Value 2

Introduction 4
Accountants as Business Analysts 4
Definition of Accounting Information Systems 5
A Simple Information System 5
Attributes of Useful Information 6
Data versus Information 7
Discretionary versus Mandatory Information 8
Role of Accountants in Accounting Information Systems 9
Specific Accounting Roles 9
Certifications in Accounting Information Systems 10
The Value Chain and Accounting Information Systems 11
AIS and Internal Business Processes 14
AIS and External Business Processes 15
The Supply Chain 15
Customer Relationship Management 17
AIS, Firm Profitability, and Stock Prices 18
AIS and Firm Profitability 18
AIS and Stock Prices 19
Summary 20
Key Words 20
Answers to Progress Checks 22
Multiple Choice Questions 23
Discussion Questions 25
Problems 26

Chapter 2 Accountants as Business Analysts 32

Changing Roles of Accountants in Business 34
IMA Competency Framework 35
CGMA Competency Framework 35
IFAC Accountant Roles 36
Business Process Documentation 36
Definitions 36
Purposes of Documentation 36
Value of Business Models 38
Types of Business Models 38
Activity Models 39
Business Process Modeling Notation 39
Basic Building Blocks for BPMN Diagrams and Modeling Concepts 40
Example of a Business Process Diagram 41
Identifying Participants in Business Process Diagrams 42
Messages in BPMN 42
Extended Building Blocks for BPMN Diagrams and Modeling Concepts 43
Subprocesses and Repeating Activities 47
Data Objects, Datastores, and Associations 48
Rules for Connecting Symbols with Sequence Flows and Message Flows 49
Best Practices in Preparing BPMN Diagrams 50
Summary 50
Key Words 51
Appendix A: Flowcharting 51
Appendix B: Data Flow Diagrams 56
Answers to Progress Checks 58
Multiple Choice Questions 58
Discussion Questions 61
Problems 62

Chapter 3 Data Modeling 66

Structure Models 68
Unified Modeling Language Class Diagrams 68
Building Blocks for UML Class Diagrams 68
Best Practices in Preparing Class Diagrams 72
UML Class Models for Relational Database Design 72
Decision Requirements and Business Rules 75
Business Rules and Decision Tables 76
Summary 77
Key Words 78
Appendix A: Entity-Relationship Diagrams 79
Answers to Progress Checks 81
Multiple Choice Questions 82
Discussion Questions 86
Problems 86
Chapter 4
Relational Databases and Enterprise Systems 88
Introduction 90
Definitions for Databases 90
Fundamentals of Relational Databases 91
Entities and Attributes 91
Keys and Relationships 91
Basic Requirements of Tables 93
Using Microsoft Access to Implement a Relational Database 93
Introduction to Microsoft Access 93
Steve’s Stylin’ Sunglasses 94
A Data Model and Attributes for Steve’s Stylin’ Sunglasses’ Sales Process 94
Multiplicities in Steve’s Stylin’ Sunglasses’ Data Model 95
Using Access to Implement a Simple Database for Steve’s Stylin’ Sunglasses 97
Structured Query Language (SQL) 104
Enterprise Systems 110
Challenges of Enterprise System Implementation 111
Enterprise Systems Computing in the Cloud 112
Summary 113
Key Words 113
Answers to Progress Checks 114
Appendix A: Creating a Form for Data Entry and Display 115
Multiple Choice Questions 122
Discussion Questions 125
Problems 125

PART TWO Business Processes

Chapter 5
Sales and Collections Business Process 132
Sales and Collection Process 134
Sunset Graphics Example 134
Company Overview 134
Sunset Graphics’ Sales and Collection Process Description 135
Sunset Graphics’ Activity Models 135
Basic Sales Activity Model 135
Refining the Model to Show Collaboration 136

Chapter 6
Purchases and Payments Business Process 168
Purchases and Payments Process 170
Sunset Graphics Example 170
Company Overview 170
Sunset Graphics’ Purchases and Payments Process Description 170
Sunset Graphics’ Activity Models 171
Basic Purchases Activity Model 171
Refining the Model to Show Collaboration 171
Refining the Model for Credit Card Payments 173
Business Rules and Sunset Graphics’ Purchases and Payments Process Controls 174
Sunset Graphics’ Structure Models 175
Basic UML Class Diagram for Purchases and Payments 176
Refining the UML Class Diagram for Purchases and Payments 177
Contents

Chapter 11
Data Analytics in Accounting: Tools and Practice  296

Data Visualization Concepts  298
Common Elements of Performing and Sharing Data Analysis  299
Using Excel for Data Analysis  300
  Preparing the Excel Data  300
  Get Data  300
  Set Relationships among Tables  300
  Select Attributes for Visualizations  302
  Select and Modify the Visualization  306
Using Tableau for Data Analysis  309
  Get Data  309
  Set Relationships among Tables  310
  Select Attributes for Visualizations  312
  Select and Modify the Visualization  312
Using Power BI for Data Analysis  315
  Get Data  315
  Set Relationships among Tables  317
  Select Attributes for Visualizations  317
  Select and Modify the Visualization  319
Summary  322
Key Words  322
Appendix A: Sample Charts and Their Uses  322
Answers to Progress Checks  324
Multiple Choice Questions  324
Discussion Questions  326
Problems  327

Chapter 12
Emerging Technologies: Blockchain and AI Automation  330

Blockchain  332
  A Brief History of Blockchain  332
  What Is Blockchain?  332

When Is Blockchain Useful?  334
How Does Blockchain Work?  335
Popular Cryptocurrency Applications  337
Types of Blockchain  339
Platforms Using Blockchain Technology  340
Blockchain Applications  342
  Blockchain Use Cases  342
  Current Challenges with Adopting Blockchain Technology  344
  The Impact of Blockchain on Audit and Assurance  344
  Getting Started with Blockchain  346
Artificial Intelligence  346
  Introduction to Artificial Intelligence  346
  Assessing Performance  351
AI Applications Important to Accounting  352
  Natural Language Processing  352
  Robotic Process Automation  352
Summary  353
Key Words  354
Answers to Progress Checks  355
Multiple Choice Questions  356
Discussion Questions  360

PART FOUR  Managing and Evaluating AIS

Chapter 13
Accounting Information Systems and Internal Controls  362

Introduction  364
Ethics, the Sarbanes-Oxley Act of 2002, and Corporate Governance  364
  The Need for a Code of Ethics  364
  Corporate Governance as Addressed by Sarbanes-Oxley  364
Control and Governance Frameworks  366
  Overview of Control Concepts  366
  Commonly Used Frameworks  366
  COSO Internal Control Framework  367
  COSO ERM Framework  370
  COBIT Framework  379
  Information Technology Infrastructure Library  381
  ISO 27000 Series  382
Comparing Control/Governance Frameworks  384
Summary  384
Key Words  384
Answers to Progress Checks  386
Appendix: ERP Architecture and Control Issues  386
PART FIVE  Optional AIS Topics

Chapter 16
The Balanced Scorecard, Business Model Canvas, and Business Value of Information Technology 444

Balanced Scorecard Framework 446
  Learning and Growth Perspective 447
  Process Perspective 447
  Customer Perspective 448
  Financial Perspective 448

Framework Integrating Strategy, Operations, And IT Investment 449
Role of AIS/IT in a Balanced Scorecard Framework 449
Using a Balanced Scorecard Management Process 451
Role of AIS/IT in the Balanced Scorecard Management Process 452
IT Governance Institute Val IT Framework 453
Implementing Val IT Governance 454
Business Model Canvas 455
  Elements of the Business Model Canvas 455
  Impact of Information Technology 458
  Similarities with Strategy Maps 458

Summary 459
Key Words 460
Answers to Progress Checks 461
Multiple Choice Questions 461
Discussion Questions 466
Problems 466

Chapter 17
Evaluating AIS Investments 468

Large IT Projects Require Economic Justification 470
The Business Case for IT Initiatives 470
  Assessing Business Requirements for IT Initiatives 471

Estimating Benefits 472
Estimating Costs 473
  Acquisition Costs 473
  Operating Costs 474

Assessing Risks 474
Developing the Value Proposition 476
  Test the Sensitivity of Estimates to Changes in Assumptions 478
  Prepare the Value Proposition 478

Summary 479
Key Words 479
Answers to Progress Checks 480
Chapter 18
Systems Development and Project Management for AIS 488

Introduction 490
Description of the Systems Development Life Cycle 490
Effective Information Technology Planning 492
Projects, Project Management, and Project Sponsors 493
Challenges of IT Project Management 494
Constraining Factors of IT Projects 495
  Scope 496
  Cost 496
  Time 496
  The 15-15 Rule 496

Project Management Tools 497
Will the System Be Used, and Will It Be Useful? 499
  Addressing Perceived Usefulness 500
  Addressing Perceived Ease of Use 500
Summary 501
Key Words 502
Answers to Progress Checks 503
Multiple Choice Questions 504
Discussion Questions 506
Problems 506

GLOSSARY OF MODELS 510
  Structure Models Using the REA Framework 510
  Activity Models Using BPMN 519

GLOSSARY 524

INDEX 534