

THIRTEENTH EDITION

ACCOUNTING INFORMATION SYSTEMS

MARSHALL B. ROMNEY



PAUL JOHN STEINBART



Accounting Information Systems



This page intentionally left blank



Accounting Information Systems

THIRTEENTH EDITION

Marshall B. Romney
Brigham Young University

Paul John Steinbart
Arizona State University



PEARSON

Boston Columbus Indianapolis New York San Francisco Upper Saddle River
Amsterdam CapeTown Dubai London Madrid Milan Munich Paris Montréal Toronto
Delhi Mexico City São Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

Editor in Chief: Donna Battista
Acquisitions Editor: Ellen Geary
Editorial Assistant: Christine Donovan
Director of Marketing: Maggie Moylan Leen
Marketing Manager: Alison Haskins
Team Lead, Project Management: Jeff Holcomb
Senior Production Project Manager: Liz Napolitano
Manager, Rights & Permissions Manager: Michael Joyce
Rights & Permissions Coordinator: Samantha Graham

Senior Manufacturing Buyer: Carol Melville
Interior Designer: Liz Harasymcuk
Cover Designer: Laura Gardner, Creative Circle
Cover Art: Roman Okopny/iStock Vectors/Getty Images
Full-Service Project Management: Jen Carley, PreMediaGlobal, Inc.
Composition: PreMediaGlobal, Inc.
Printer/Binder: Courier/Kendallville
Cover Printer: Lehigh-Phoenix Color/Hagerstown
Typeface: 10/12 Times

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear on the appropriate page within text.

Photo Credits: Laptop icon, throughout book: Zentilia/Shutterstock; Blue eye icon, throughout book: Sam D. Cruz/Shutterstock; pp. i, iii (top), 1, 3, 25, 49, 83: Ian Dagnall/Alamy; pp. i, iii (bottom), 121, 123, 151, 189, 229, 261, 287, 311: ViewApart/Fotolia; pp. 337, 339, 379, 415, 443, 471: Image Source/Getty Images; pp. 587, 589, 623, 651: Radius Images/Alamy.

Microsoft and/or its respective suppliers make no representations about the suitability of the information contained in the documents and related graphics published as part of the services for any purpose. All such documents and related graphics are provided “as is” without warranty of any kind. Microsoft and/or its respective suppliers hereby disclaim all warranties and conditions with regard to this information, including all warranties and conditions of merchantability, whether express, implied or statutory, fitness for a particular purpose, title and non-infringement. In no event shall Microsoft and/or its respective suppliers be liable for any special, indirect or consequential damages or any damages whatsoever resulting from loss of use, data or profits, whether in an action of contract, negligence or other tortious action, arising out of or in connection with the use or performance of information available from the services.

The documents and related graphics contained herein could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Microsoft and/or its respective suppliers may make improvements and/or changes in the product(s) and/or the program(s) described herein at any time. Partial screen shots may be viewed in full within the software version specified.

Microsoft® and Windows® are registered trademarks of the Microsoft Corporation in the U.S.A. and other countries. This book is not sponsored or endorsed by or affiliated with the Microsoft Corporation.

Copyright © 2015, 2012, 2009 by Pearson Education, Inc. All rights reserved. Manufactured in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. To obtain permission(s) to use material from this work, please submit a written request to Pearson Education, Inc., Permissions Department, One Lake Street, Upper Saddle River, New Jersey 07458, or you may fax your request to 201-236-3290.

Many of the designations by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed in initial caps or all caps.

Library of Congress Cataloging-in-Publication Data

Romney, Marshall B.

Accounting information systems / Marshall B. Romney, Brigham Young University, Paul J. Steinbart,

Arizona State University. — Thirteenth Edition.

pages cm

Includes index.

ISBN 978-0-13-342853-7 (alk. paper)

1. Accounting—Data processing. 2. Information storage and retrieval systems—Accounting. I. Steinbart,

Paul John. II. Title.

HF5679.R6296 2014

657.0285—dc23

2013044830

10 9 8 7 6 5 4 3 2 1

PEARSON

ISBN 10: 0-13-342853-2

ISBN 13: 978-0-13-342853-7

Brief Contents

Preface xix

PART I Conceptual Foundations of Accounting Information Systems 1

CHAPTER 1 Accounting Information Systems: An Overview 2

CHAPTER 2 Overview of Transaction Processing and Enterprise Resource Planning Systems 24

CHAPTER 3 Systems Documentation Techniques 48

CHAPTER 4 Relational Databases 82

PART II Control and Audit of Accounting Information Systems 121

CHAPTER 5 Computer Fraud 122

CHAPTER 6 Computer Fraud and Abuse Techniques 150

CHAPTER 7 Control and Accounting Information Systems 188

CHAPTER 8 Controls for Information Security 228

CHAPTER 9 Confidentiality and Privacy Controls 260

CHAPTER 10 Processing Integrity and Availability Controls 286

CHAPTER 11 Auditing Computer-Based Information Systems 310

PART III Accounting Information Systems Applications 337

CHAPTER 12 The Revenue Cycle: Sales to Cash Collections 338

CHAPTER 13 The Expenditure Cycle: Purchasing to Cash Disbursements 378

CHAPTER 14 The Production Cycle 414

CHAPTER 15 The Human Resources Management and Payroll Cycle 442

CHAPTER 16 General Ledger and Reporting System 470

PART IV The REA Data Model 501**CHAPTER 17** Database Design Using the REA Data Model 502**CHAPTER 18** Implementing an REA Model in a Relational Database 534**CHAPTER 19** Special Topics in REA Modeling 556**PART V** The Systems Development Process 587**CHAPTER 20** Introduction to Systems Development and Systems Analysis 588**CHAPTER 21** AIS Development Strategies 622**CHAPTER 22** Systems Design, Implementation, and Operation 650*Glossary* 676*Index* 697

Contents

Preface xix

PART I Conceptual Foundations of Accounting Information Systems 1

CHAPTER 1 Accounting Information Systems: An Overview 2

Introduction 3

Information Needs and Business Processes 5

Information Needs 5

Business Processes 6

Accounting Information Systems 10

How an AIS Can Add Value to an Organization 11

The AIS and Corporate Strategy 12

The Role of the AIS in the Value Chain 14

Summary and Case Conclusion 15 ■ Key Terms 16

AIS IN ACTION: Chapter Quiz 16 ■ Discussion Questions 17 ■ Problems 18

CASE 1-1 Ackoff's Management Misinformation Systems 21

AIS IN ACTION SOLUTIONS: Quiz Key 22

CHAPTER 2 Overview of Transaction Processing and Enterprise Resource Planning Systems 24

Introduction 25

Transaction Processing: The Data Processing Cycle 26

Data Input 26

Data Storage 27

Data Processing 33

Information Output 33

Enterprise Resource Planning (ERP) Systems 35

Summary and Case Conclusion 38 ■ Key Terms 38

AIS IN ACTION: Chapter Quiz 38 ■ Discussion Questions 39 ■ Problems 40

CASE 2-1 Bar Harbor Blueberry Farm 44

AIS IN ACTION SOLUTIONS: Quiz Key 45

CHAPTER 3 Systems Documentation Techniques 48

Introduction 49

Data Flow Diagrams 50

Subdividing the DFD 52

Flowcharts 56

Types of Flowcharts 57

Program Flowcharts 60

Business Process Diagrams 60

Summary and Case Conclusion 64 ■ Key Terms 64

AIS IN ACTION: Chapter Quiz 64 ■ Comprehensive Problem 65 ■

Discussion Questions 66 ■ Problems 66

CASE 3-1 Dub 5 73**AIS IN ACTION SOLUTIONS:** Quiz Key 74 ■ Comprehensive Problem Solution 76**CHAPTER 4 Relational Databases 82****Introduction 82**

Files Versus Databases 83

Using Data Warehouses for Business Intelligence 84

The Advantages of Database Systems 85

The Importance of Good Data 85

Database Systems 86

Logical and Physical Views of Data 86

Schemas 86

The Data Dictionary 88

DBMS Languages 88

Relational Databases 88

Types of Attributes 88

Designing a Relational Database for S&S, Inc. 90

Basic Requirements of a Relational Database 92

Two Approaches to Database Design 93

Creating Relational Database Queries 93

Query 1 95

Query 2 97

Query 3 98

Query 4 98

Query 5 100

Database Systems and the Future of Accounting 100

Summary and Case Conclusion 101 ■ Key Terms 102

AIS IN ACTION: Chapter Quiz 102 ■ Comprehensive Problem 103 ■

Discussion Questions 104 ■ Problems 104

CASE 4-1 Research Project 110**AIS IN ACTION SOLUTIONS:** Quiz Key 110 ■ Comprehensive Problem Solution 112 ■

Appendix: Data Normalization 114 ■ Summary 117 ■ Second Normalization Example 117

PART II**Control and Audit of Accounting Information Systems 121****CHAPTER 5 Computer Fraud 122****Introduction 123****AIS Threats 124****Introduction to Fraud 126**

Misappropriation of Assets 127

Fraudulent Financial Reporting 128

SAS No. 99: The Auditor's Responsibility to Detect Fraud 128

Who Perpetrates Fraud and Why 129

The Fraud Triangle 129

Computer Fraud 134

The Rise in Computer Fraud 134

Computer Fraud Classifications 136

Preventing and Detecting Fraud and Abuse 138

Summary and Case Conclusion 139 ■ Key Terms 140

AIS IN ACTION: Chapter Quiz 140 ■ Discussion Questions 141 ■ Problems 142**CASE 5-1** David L. Miller: Portrait of a White-Collar Criminal 144**CASE 5-2** Heirloom Photo Plans 145**AIS IN ACTION SOLUTIONS:** Quiz Key 147**CHAPTER 6 Computer Fraud and Abuse Techniques 150****Introduction 150****Computer Attacks and Abuse 151****Social Engineering 159****Malware 164**

Summary and Case Conclusion 173 ■ Key Terms 174

AIS IN ACTION: Chapter Quiz 175 ■ Discussion Questions 176 ■ Problems 176**CASE 6-1** Shadowcrew 184**AIS IN ACTION SOLUTIONS:** Quiz Key 185**CHAPTER 7 Control and Accounting Information Systems 188****Introduction 189**

Why Threats to Accounting Information Systems are Increasing 189

Overview of Control Concepts 190

The Foreign Corrupt Practices and Sarbanes–Oxley Acts 191

Control Frameworks 192

COBIT Framework 192

COSO's Internal Control Framework 194

COSO's Enterprise Risk Management Framework 194

The Enterprise Risk Management Framework Versus the Internal Control Framework 196

The Internal Environment 196

Management's Philosophy, Operating Style, and Risk Appetite 197

Commitment to Integrity, Ethical Values, and Competence 197

Internal Control Oversight by the Board of Directors 198

Organizational Structure 198

Methods of Assigning Authority and Responsibility 198

Human Resources Standards that Attract, Develop, and Retain

Competent Individuals 198

External Influences 200

Objective Setting 200**Event Identification 201****Risk Assessment and Risk Response 201**

Estimate Likelihood and Impact 202

Identify Controls 203

Estimate Costs and Benefits 203

Determine Cost/Benefit Effectiveness 203

Implement Control or Accept, Share, or Avoid the Risk 203

Control Activities 204

Proper Authorization of Transactions and Activities 204

Segregation of Duties 205

Project Development and Acquisition Controls 207

Change Management Controls 208

Design and Use of Documents and Records 208
 Safeguard Assets, Records, and Data 208
 Independent Checks on Performance 209

Information and Communication 210

Monitoring 210

Perform Internal Control Evaluations 210
 Implement Effective Supervision 210
 Use Responsibility Accounting Systems 210
 Monitor System Activities 211
 Track Purchased Software and Mobile Devices 211
 Conduct Periodic Audits 211
 Employ a Computer Security Officer and a Chief Compliance Officer 212
 Engage Forensic Specialists 212
 Install Fraud Detection Software 212
 Implement a Fraud Hotline 213

Summary and Case Conclusion 213 ■ Key Terms 214

AI IN ACTION: Chapter Quiz 214 ■ Discussion Questions 216 ■ Problems 216

CASE 7-1 The Greater Providence Deposit & Trust Embezzlement 224

AI IN ACTION SOLUTIONS: Quiz Key 225

CHAPTER 8 Controls for Information Security 228

Introduction 228

Two Fundamental Information Security Concepts 230

Security is a Management Issue, Not Just a Technology Issue 230
 Defense-in-Depth and the Time-Based Model of Information Security 231

Understanding Targeted Attacks 232

Preventive Controls 233

People: Creation of a “Security-Conscious” Culture 233
 People: Training 234
 Process: User Access Controls 235
 It Solutions: Antimalware Controls 238
 It Solutions: Network Access Controls 238
 It Solutions: Device and Software Hardening Controls 243
 It Solutions: Encryption 244
 Physical Security: Access Controls 245
 Change Controls and Change Management 246

Detective Controls 247

Log Analysis 247
 Intrusion Detection Systems 248
 Penetration Testing 248
 Continuous Monitoring 248

Corrective Controls 248

Computer Incident Response Team (CIRT) 249
 Chief Information Security Officer (CISO) 249
 Patch Management 250

Security Implications of Virtualization and the Cloud 250

Summary and Case Conclusion 251 ■ Key Terms 252

AI IN ACTION: Chapter Quiz 252 ■ Discussion Questions 253 ■ Problems 254

CASE 8-1 Assessing Change Control and Change Management 257

CASE 8-2 Role-Play: Designing an Effective Information Security Program 257

AI IN ACTION SOLUTIONS: Quiz Key 258