Accounting Information Systems

FIFTEENTH EDITION
GLOBAL EDITION

Marshall B. Romney
Professor Emeritus, Brigham Young University

Paul John Steinbart
Professor Emeritus, Arizona State University

Scott L. Summers
Brigham Young University

David A. Wood
Brigham Young University

Pearson
Contents

Preface 19

PART I Conceptual Foundations of Accounting Information Systems 27

CHAPTER 1 Accounting Information Systems: An Overview 28
Introduction 29
Information Needs and Business Processes 31
  Information Needs 32
  Business Processes 33
Accounting Information Systems 36
  How an AIS Can Add Value to an Organization 37
  An AIS Can Use Artificial Intelligence and Data Analytics to Improve Decision Making 38
  The AIS and Blockchain 40
  Cloud Computing, Virtualization, and the Internet of Things 44
  The AIS and Corporate Strategy 44
  The Role of the AIS in the Value Chain 45
Summary and Case Conclusion 46 ■ Key Terms 47
AIS IN ACTION: Chapter Quiz 47 ■ Discussion Questions 48 ■ Problems 49 ■
AIS IN ACTION SOLUTIONS: Quiz Key 54

CHAPTER 2 Overview of Transaction Processing and Enterprise Resource Planning Systems 56
Introduction 57
Transaction Processing: The Data Processing Cycle 58
  Data Input 58
  Data Storage 59
  Data Processing 65
  Information Output 65
Transaction Processing: Blockchain 67
Enterprise Resource Planning (ERP) Systems 68
Summary and Case Conclusion 71 ■ Key Terms 71
AIS IN ACTION: Chapter Quiz 71 ■ Discussion Questions 72 ■ Problems 73
CASE 2-1 Bar Harbor Blueberry Farm 79
CASE 2-2 SDC 80
AIS IN ACTION SOLUTIONS: Quiz Key 81
CHAPTER 3 Systems Documentation Techniques 84

Introduction 85

Business Process Diagrams 86

Flowcharts 89
  Types of Flowcharts 91
  Program Flowcharts 94

Data Flow Diagrams 95
  Subdividing the DFD 97

Summary and Case Conclusion 100 ■ Key Terms 100

AIS IN ACTION: Chapter Quiz 101 ■ Comprehensive Problem 102 ■ Discussion Questions 102 ■ Problems 102

CASE 3-1 Dub 5 107

AIS IN ACTION SOLUTIONS: Quiz Key 108 ■ Comprehensive Problem Solution 110

PART II Data Analytics 117

CHAPTER 4 Relational Databases 118

Introduction 118

Databases and Files 119
  Using Data Warehouses for Data Analytics 121
  The Advantages of Database Systems 121
  The Importance of Good Data 122

Database Systems 122
  Logical and Physical Views of Data 122
  Schemas 123
  The Data Dictionary 124
  DBMS Languages 126

Relational Databases 126
  Types of Attributes 127
  Designing a Relational Database for S&S, Inc. 127
  Basic Requirements of a Relational Database 129
  Two Approaches to Database Design 131
  Creating Relational Database Queries 131
    Query 1 131
    Query 2 134
    Query 3 137
    Query 4 137
    Query 5 139
  Database Systems and the Future of Accounting 140

Summary and Case Conclusion 142 ■ Key Terms 142

AIS IN ACTION: Chapter Quiz 142 ■ Comprehensive Problem 143 ■ Discussion Questions 144 ■ Problems 145

CASE 4-1 Research Project 153

AIS IN ACTION SOLUTIONS: Quiz Key 154 ■ Comprehensive Problem Solution 155

Appendix: Data Normalization 158 ■ Summary 161

CHAPTER 5 Introduction to Data Analytics in Accounting 162

Introduction 163

Ask the Right Questions 165

Extract, Transform, and Load Relevant Data 165
  Extracting Data 166
  Transforming Data 169
  Loading Data 170
CHAPTER 6  Transforming Data  188
Introduction  189
Attributes of High-Quality Data  190
Data Structuring  191
Aggregate Data  191
Data Joining  192
Data Pivoting  192
Data Standardization  193
Data Parsing and Data Concatenation  193
Cryptic Data Values  195
Misfielded Data Values  196
Data Formatting and Data Consistency  196
Data Cleaning  198
Data De-Duplication  198
Data Filtering  198
Data Contradiction Errors  199
Data Threshold Violations  199
Violated Attribute Dependencies  200
Data Entry Errors  200
Data Validation  200
Visual Inspection  201
Basic Statistical Tests  201
Audit a Sample  201
Advanced Testing Techniques  202
Summary and Case Conclusion  202 ■ Key Terms  202
AIS IN ACTION: Chapter Quiz  203 ■ Discussion Questions  204 ■ Problems  204
CASE 6-1 Hotel Data Cleaning Case  209
AIS IN ACTION SOLUTIONS: Quiz Key  210

CHAPTER 7  Data Analysis and Presentation  214
Introduction  215
Data Analysis  215
Descriptive Analytics  215
Diagnostic Analytics  217
Predictive Analytics  219
Prescriptive Analytics  220
Common Problems with Data Analytics  220
Data Presentation  222
Choosing the Right Visualization  222
Designing High-Quality Visualizations  225
Summary and Case Conclusion  235 ■ Key Terms  235
PART III Control of Accounting Information Systems 247

CHAPTER 8 Fraud and Errors 248
Introduction 249
AIS Threats 249
- Natural and Political Disasters 249
- Software Errors and Equipment Malfunctions 251
- Unintentional Errors 251
- Intentional Acts 252

Introduction to Fraud 253
- Misappropriation of Assets 254
- Fraudulent Financial Reporting 255
- SAS No. 99 (AU-C Section 240): The Auditor’s Responsibility to Detect Fraud 255

Who Perpetrates Fraud and Why 256
- The Fraud Triangle 256

Computer Fraud 261
- The Rise in Computer Fraud 261
- Computer Fraud Classifications 262

Preventing and Detecting Fraud and Abuse 264
- Using Data Analytics to Prevent and Detect Fraud 266

Summary and Case Conclusion 265
AIS IN ACTION: Chapter Quiz 269 ■ Discussion Questions 270 ■ Problems 271
CASE 8-1 David L. Miller: Portrait of a White-Collar Criminal 276
CASE 8-2 Heirloom Photo Plans 277
AIS IN ACTION SOLUTIONS: Quiz Key 279

CHAPTER 9 Computer Fraud and Abuse Techniques 282
Introduction 282
Computer Attacks and Abuse 283
Social Engineering 292
Malware 296

Summary and Case Conclusion 305 ■ Key Terms 306
AIS IN ACTION: Chapter Quiz 306 ■ Discussion Questions 307 ■ Problems 308
CASE 9-1 Shadowcrew 318
AIS IN ACTION SOLUTIONS: Quiz Key 319

CHAPTER 10 Control and Accounting Information Systems 322
Introduction 323
- Why Threats to Accounting Information Systems Are Increasing 323

Overview of Control Concepts 324
- The Foreign Corrupt Practices and Sarbanes–Oxley Acts 325

Control Frameworks 326
- COBIT Framework 326
- COSO’S Internal Control Framework 328

The Control Environment 330
- Management’s Philosophy, Operating Style, and Risk Appetite 331
- Commitment to Integrity, Ethical Values, and Competence 331
- Internal Control Oversight by the Board of Directors 332
CHAPTER 12 Confidentiality and Privacy Controls 394

Introduction 395

Protecting Confidentiality and Privacy 395
- Identify and Classify Information to Be Protected 396
- Protecting Sensitive Information with Encryption 396
- Controlling Access to Sensitive Information 396
- Training 398

Privacy Regulations and Generally Accepted Privacy Principles 398
- The EU's GDPR and U.S. Laws 398
- Generally Accepted Privacy Principles 399

Encryption 402
- Factors That Influence Encryption Strength 403
- Types of Encryption Systems 403
- Virtual Private Networks (VPNs) 405

Hashing 406
- Digital Signatures 407
- Digital Certificates and Public Key Infrastructure 408
- Blockchain 409

Summary and Case Conclusion 412 ■ Key Terms 412

AIS IN ACTION: Chapter Quiz 412 ■ Discussion Questions 414 ■ Problems 414

CASE 12-1 Protecting Privacy of Tax Returns 418
CASE 12-2 Generally Accepted Privacy Principles 419

AIS IN ACTION SOLUTIONS: Quiz Key 419

CHAPTER 13 Processing Integrity and Availability Controls 422

Introduction 422

Processing Integrity 423
- Input Controls 423
- Processing Controls 425
- Output Controls 426
- Illustrative Example: Credit Sales Processing 427
- Processing Integrity Controls in Spreadsheets 429

Availability 429
- Minimizing Risk of System Downtime 429
- Recovery and Resumption of Normal Operations 430

Summary and Case Conclusion 435 ■ Key Terms 436

AIS IN ACTION: Chapter Quiz 436 ■ Discussion Questions 437 ■ Problems 438

CASE 13-1 Ensuring Systems Availability 447
CASE 13-2 Ensuring Process Integrity in Spreadsheets 447

AIS IN ACTION SOLUTIONS: Quiz Key 448

PART IV Accounting Information Systems Applications 451

CHAPTER 14 The Revenue Cycle: Sales to Cash Collections 452

Introduction 454

Revenue Cycle Information System 456
- Process 456
- Threats and Controls 456
CONTENTS

Sales Order Entry  459
  Taking Customer Orders  460
  Credit Approval  462
  Checking Inventory Availability  464
  Responding to Customer Inquiries  465

Shipping  467
  Pick and Pack the Order  467
  Ship the Order  469

Billing  471
  Invoicing  472
  Maintain Accounts Receivable  474

Cash Collections  477
  Process  477
  Threats and Controls  478

Summary and Case Conclusion  480  ■ Key Terms  481
AIS IN ACTION: Chapter Quiz  481  ■ Discussion Questions  482  ■ Problems  482
CASE 14-1 Research Project: The Use of RFID in Retail  491
AIS IN ACTION SOLUTIONS: Quiz Key  491

CHAPTER 15 The Expenditure Cycle: Purchasing to Cash Disbursements  494

Introduction  495
Expenditure Cycle Information System  496
  Process  496
  Threats and Controls  499

Ordering Materials, Supplies, and Services  503
  Identifying What, When, and How Much to Purchase  503
  Choosing Suppliers  505

Receiving  509
  Process  510
  Threats and Controls  511

Approving Supplier Invoices  512
  Process  512
  Threats and Controls  515

Cash Disbursements  515
  Process  515
  Threats and Controls  515

Summary and Case Conclusion  518  ■ Key Terms  519
AIS IN ACTION: Chapter Quiz  519  ■ Discussion Questions  520  ■ Problems  520
CASE 15-1 Group Case Analysis: School District Expenditure Fraud  529
CASE 15-2 Anatomy of a Multi-Million Dollar Embezzlement at ING Bank  529
AIS IN ACTION SOLUTIONS: Quiz Key  530

CHAPTER 16 The Production Cycle  532

Introduction  533
Production Cycle Information System  535
  Process  536
  Threats and Controls  536

Product Design  537
  Process  537
  Threats and Controls  539

Planning and Scheduling  539
  Production Planning Methods  539
CHAPTER 17 The Human Resources Management and Payroll Cycle 562

Introduction 563

HRM/Payroll Cycle Information System 564
  Overview of HRM Process and Information Needs 564
  Threats and Controls 566

Payroll Cycle Activities 569
  Update Payroll Master Database 570
  Validate Time and Attendance Data 571
  Prepare Payroll 573
  Disburse Payroll 577
  Calculate and Disburse Employer-Paid Benefits, Taxes, and Voluntary Employee Deductions 579

Outsourcing Options: Payroll Service Bureaus and Professional Employer Organizations 579
  Summary and Case Conclusion 580
  Key Terms 581

AIS IN ACTION: Chapter Quiz 581
  Discussion Questions 582
  Problems 583

CASE 17-1 Excel Project: Sorting and Grouping Data 589

AIS IN ACTION SOLUTIONS: Quiz Key 589

CHAPTER 18 General Ledger and Reporting System 592

Introduction 593

General Ledger and Reporting System 594
  Process 595
  Threats and Controls 595

Update General Ledger 597
  Process 597
  Threats and Controls 598

Post Adjusting Entries 600
  Process 601
  Threats and Controls 602

Prepare Financial Statements 602
  Process 602
  Threats and Controls 609

Produce Managerial Reports 610
  Process 610
  Threats and Controls 610

Summary and Case Conclusion 614

AIS IN ACTION: Chapter Quiz 615
  Discussion Questions 616
  Problems 616

CASE 18-1 Exploring iXBRL Viewers 621
CASE 18-2 Evaluating a General Ledger Package 621

AIS IN ACTION SOLUTIONS: Quiz Key 622
PART V  The REA Data Model  625

CHAPTER 19  Database Design Using the REA Data Model  626
  Introduction  626
  Database Design Process  627
  Entity-Relationship Diagrams  628
  The REA Data Model  629
    Three Basic Types of Entities  630
    Structuring Relationships: The Basic REA Template  630
  Developing an REA Diagram  633
    Step 1: Identify Relevant Events  633
    Step 2: Identify Resources and Agents  635
    Step 3: Determine Cardinalities of Relationships  636
  What an REA Diagram Reveals About an Organization  640
    Business Meaning of Cardinalities  640
    Uniqueness of REA Diagrams  641
  Summary and Case Conclusion  642  ■  Key Terms  643
  AIS IN ACTION: Chapter Quiz  643  ■  Comprehensive Problem  646  ■
  Discussion Questions  646  ■  Problems  647
  CASE 19-1  REA Data Modeling Extension  651
  AIS IN ACTION SOLUTIONS: Quiz Key  652  ■  Comprehensive Problem Solution  656

CHAPTER 20  Implementing an REA Model in a Relational Database  660
  Introduction  661
  Integrating REA Diagrams Across Cycles  661
    Merging Redundant Resource Entities  664
    Merging Redundant Event Entities  665
    Validating the Accuracy of Integrated REA Diagrams  666
  Implementing an REA Diagram in a Relational Database  666
    Step 1: Create Tables for Each Distinct Entity and M:N Relationship  666
    Step 2: Assign Attributes to Each Table  668
    Step 3: Use Foreign Keys to Implement 1:1 and 1:N Relationships  669
    Completeness Check  670
  Using REA Diagrams to Retrieve Information from a Database  671
    Creating Journals and Ledgers  671
    Generating Financial Statements  672
    Creating Managerial Reports  673
  Summary and Case Conclusion  673  ■  Key Term  674
  AIS IN ACTION: Chapter Quiz  674  ■  Comprehensive Problem  675  ■
  Discussion Questions  675  ■  Problems  676
  CASE 20-1  Practical Database Design  678
  AIS IN ACTION SOLUTIONS: Quiz Key  679  ■  Comprehensive Problem Solution  681

CHAPTER 21  Special Topics in REA Modeling  684
  Introduction  685
  Additional Revenue and Expenditure Cycle Modeling Topics  685
    Additional Revenue Cycle Events and Attribute Placement  685
    Additional Expenditure Cycle Events and Attribute Placement  687
    Sale of Services  690
    Acquisition of Intangible Services  690
    Digital Assets  691
    Rental Transactions  691