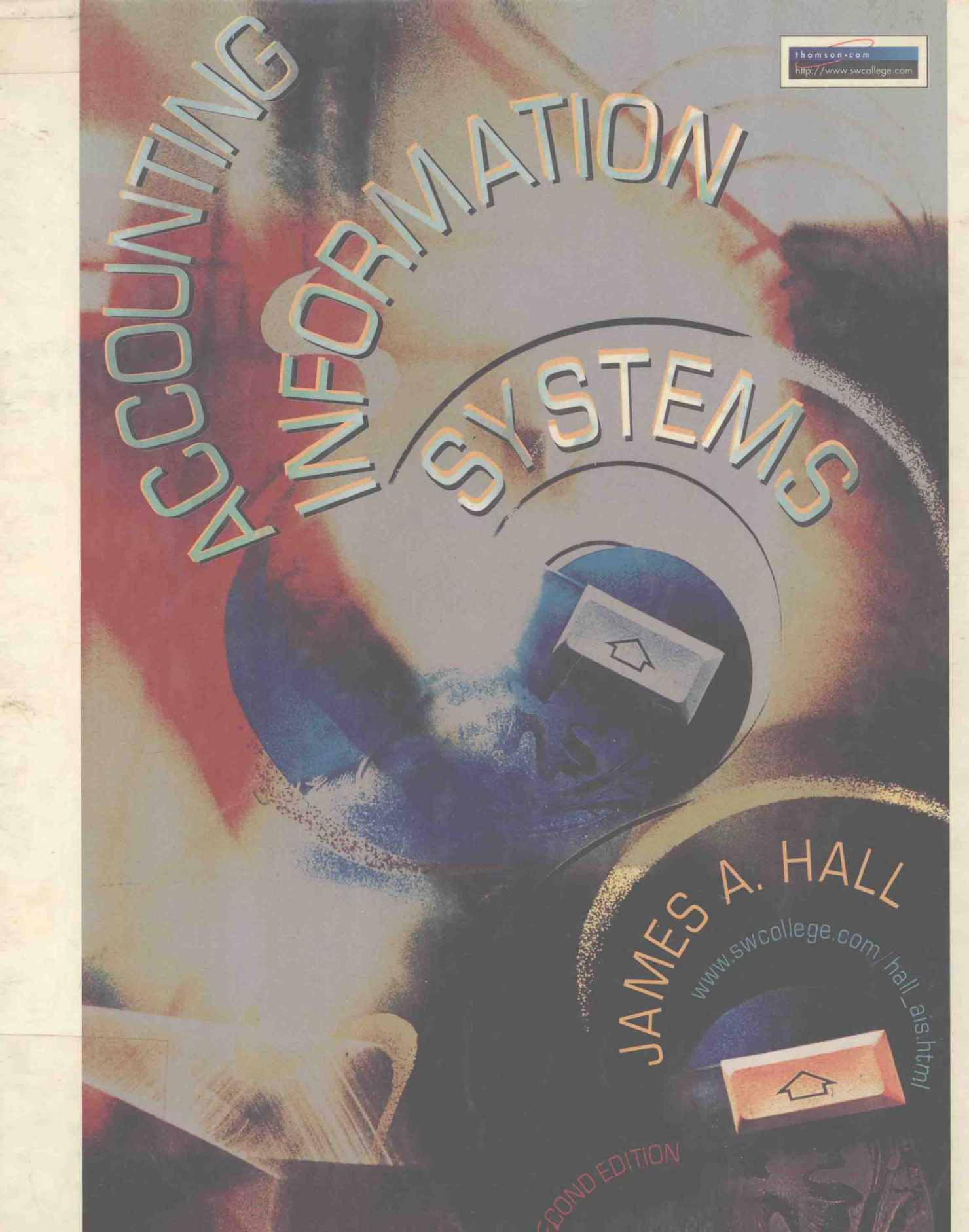
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SECOND EDITION

SOUTH-WESTERN College Publishing
An International Thomson Publishing Company

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2 3 4 5 6 7 8 9 D1 6 5 4 3 2 1 0 9 8

Printed in the United States of America

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International Thomson Publishing
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Library of Congress Cataloging-in-Publication Data

Hall, James A., 1944-
Accounting information systems / James A. Hall.
p. cm.
Includes bibliographical references and index.
ISBN 0-538-87796-0 (alk. paper)
1. Information storage and retrieval systems--Accounting.
2. Accounting--Data processing. I. Title.
HF5679.H26 1998
657'.0285'574--dc21 97-20137
CIP

PREFACE

This textbook is intended for use in an introductory accounting information systems (AIS) course. The book assumes that the student is familiar with fundamental accounting principles and basic computer concepts and terminology and has been exposed to computer programming. Throughout the book, AIS topics are presented from the accountant's perspective. The focus is on the needs and responsibilities of accountants as end users of systems, systems designers, and auditors. While the book was written primarily to meet the needs of accounting majors about to enter the modern business world, it can also be useful to general business and industrial engineering students who seek a thorough understanding of AIS as part of their professional education.

KEY FEATURES

CONCEPTUAL FRAMEWORK

This book employs a conceptual framework to emphasize the professional and legal responsibility of accountants, auditors, and management for the design, operation, and control of AIS applications. This responsibility pertains to business events that are narrowly defined as financial transactions. Systems that process nonfinancial transactions are not subject to the same standards of design, operation, and control. Supporting the information needs of all the users in a modern organization, however, requires systems that integrate both accounting and nonaccounting functions. While providing the organization with unquestioned benefit, a potential consequence of such integration is a loss of control due to the blurring of the lines that traditionally separate AIS from non-AIS applications. The conceptual framework presented in this book distinguishes AIS applications and promotes recognition of this important domain of responsibility.

CYCLE APPROACH

The book takes a transaction cycles approach to AIS that focuses conceptually on sources of data, key tasks, accounting records, and internal controls that constitute business cycles. Each cycle's subsystems are examined under different technological assumptions to assess the effects of alternative data processing methods. The student

learns the operational and control implications associated with manual, automated, and reengineered systems.

EMPHASIS ON INTERNAL CONTROLS

The book presents a conceptual model for internal control based on *Statement on Auditing Standards (SAS) No. 78*. This model is used to discuss control issues for both manual and computer-based information systems (CBIS). Special emphasis is given to controlling the following aspects of the CBIS environment: computer operating systems, data base management systems, electronic data interchange (EDI), distributed data processing and networks (including the Internet), microcomputer systems, the systems development and maintenance process, the organization of the computer function, the security of data processing centers, and computer applications.

EXPOSURE TO SYSTEMS DESIGN AND DOCUMENTATION TOOLS

The book examines various approaches and methodologies used in systems analysis and design, including structured design, computer-aided software engineering, joint application development, and prototyping. In conjunction with these general approaches, professional systems analysts and programmers use a number of documentation techniques to specify the key features of systems. Accountants and auditors often work closely with systems professionals during systems design and must learn to communicate in their language. This book deals extensively with such documentation techniques as data flow and entity relationship diagrams, as well as systems, program, and document flowcharts. There are numerous cases and assignments in the text that develop the students' competency with these tools.

SIGNIFICANT CHANGES IN THE SECOND EDITION

CHANGES TO TEXT ORGANIZATION

1. An appendix (Introduction to Computer Hardware and Software) now follows Chapter 2 (Introduction to Transaction Processing). The appendix provides background support for the data processing techniques discussed in Chapter 2.
2. The Management Reporting System (MRS) has been moved up from Chapter 16 to Chapter 8 to directly follow the transaction cycles material. This permits a smooth transition between nondiscretionary systems, covered to this point, and discretionary reporting systems that constitute the MRS. These chapters are brought together under a major section called "Transaction Processing and Information Reporting Systems."
3. The chapter dealing with decision support, expert systems, and neural networks is now grouped with other AIS technology chapters on Data Base Management Systems and Distributed Data Processing and Networking. The three chapters form a section called "Advanced Technologies in AIS."

CHANGES TO CONTENT

The end-of-chapter problems have been significantly revised for all chapters. Some of the better internal control cases have been retained from the first edition, but new

ones have been added and the total number of cases has been increased. Two new term project cases have been added to the appendix. Other major changes to the chapter content is as follows:

Chapter 1—The Information System: An Accountant's Perspective. The framework for information systems has been modified to reflect a more accurate treatment of artificial intelligence technologies, including decision support systems, expert systems, and neural networks.

Chapter 2—Introduction to Transaction Processing. The data base concept is introduced much earlier than in the First Edition as an alternative to the flat file approach to data management. Detailed treatment of this topic is, however, deferred to Chapter 9.

Chapter 3—Ethics, Fraud, and Internal Control. The discussion of internal controls has been revised to reflect the framework presented in SAS 78, which became effective January 1, 1997.

Chapters 4 and 5—Revenue and Expenditure Cycles. The basic approach to the revenue and expenditure cycle material has remained unchanged. Chapter 4 has, however, been revised to include a detailed discussion of point-of-sale systems. In addition, the treatment of internal controls has been revised in accordance with SAS 78. The technology discussion in the chapter has been updated to reflect the impact of reengineering on transactions processing systems.

Chapter 6—Conversion Cycle. The chapter has been reorganized to more efficiently present the information technologies used to achieve manufacturing flexibility. As an example of a world-class information system, the chapter provides an overview of the key features of SAP. In addition, the Resources-Events-Agents (REA) model is discussed as an alternative model for supporting enterprise-wide information needs.

Chapter 7—General Ledger, Financial Reporting, and Fixed Asset Systems. This chapter has been revised to reflect SAS 78.

Chapter 9—Data Base Management Systems. The emphasis of the chapter has been placed on the relational data base model. The hierarchical and network models are also discussed. The discussion of the REA model is continued here and reconciled with traditional data modeling techniques.

Chapter 14—The Systems Development Process: Part 3. The chapter has been reorganized to reflect a data base approach to systems design. This involves first designing the user views (output reports and documents and input screens) and then designing the normalized base tables that are used to produce the user views. The discussion emphasizes the support of multiple user views.

Chapters 15 and 16—Controlling Computer-Based AIS. The chapters have been revised to be consistent with the SAS 78 framework. LAN and Internet risks are examined in detail. Controls topics covered include backup devices for LANS, one-time password security, firewalls, and other access control techniques. The section on microcomputer controls has been updated to include recent developments in security hardware and software for PCs, including backup devices, disk locks, and encryption techniques.

ORGANIZATION AND CONTENT

PART I: INTRODUCTION TO ACCOUNTING INFORMATION SYSTEMS

CHAPTER 1, THE INFORMATION SYSTEM: AN ACCOUNTANT'S PERSPECTIVE. Chapter 1 presents foundation material that sets the tone for the rest of the book. The chapter is divided into three major sections. The first section presents a conceptual framework that distinguishes clearly between traditional accounting information systems and nonaccounting systems. After reading this section, the student will understand the criteria used to classify applications as AIS. The second section describes the functional areas of a hypothetical organization and their relationship to the information system. The focus is on the unique role of the accounting function as the purveyor of financial information for the firm and its relationship with the computer services function in meeting this responsibility. Finally, the chapter examines the significant roles played by accountants as end users, designers, and auditors of information systems.

CHAPTER 2, INTRODUCTION TO TRANSACTION PROCESSING. The second chapter expands on the subject of transaction cycles introduced in Chapter 1. While the operational details of specific transaction cycles are covered in subsequent chapters, this chapter presents material that is common to all cycles, including the relationship between source documents, journals, ledgers, and financial statements in both manual and computer-based systems; system documentation techniques, such as data flow diagrams, entity relationship (ER) diagrams, document systems, and program flowcharts; and data processing techniques, including batch systems with sequential files, batch systems with direct access files, and real-time systems. The techniques and approaches presented in this chapter are applied to specific business cycle applications in later chapters. The chapter is followed by an appendix that provides a review of basic computer technology.

CHAPTER 3, ETHICS, FRAUD, AND INTERNAL CONTROL. Chapter 3 deals with the related topics of ethics, fraud, and internal control. The chapter first examines ethical issues related to business and specifically to computer systems. The questions raised are intended to stimulate class discussions.

The chapter then addresses the subject of fraud. There is perhaps no area of greater controversy for accountants than their responsibility to detect fraud. Part of the problem stems from confusion about what constitutes fraud. This section distinguishes between management fraud and employee fraud. The chapter presents techniques for identifying unethical and dishonest management and for assessing the risk of management fraud. Employee fraud can be prevented and detected by a system of internal controls. The section discusses several fraud techniques that have been perpetrated in both manual and computer-based environments.

The final section of the chapter describes the internal control structure and control activities specified in SAS 78. The control concepts discussed in this chapter are applied to specific applications in chapters that follow.

PART II: TRANSACTION PROCESSING AND INFORMATION REPORTING

CHAPTERS 4 AND 5, THE REVENUE AND EXPENDITURE CYCLES. Chapters 4 and 5 present the revenue and expenditure cycles, respectively. The approach taken in both

chapters is similar. First, the business cycle is reviewed conceptually using data flow diagrams to present key features of each major subsystem. Then the subsystems are examined in detail within the context of a manual environment. Taking this approach promotes the students' understanding of key activities, data requirements, and the critical segregation of duties that pertain to the business cycle. Each system is then reexamined using alternative technology assumptions. First, we assume an automated batch system with sequential files; then we see how the system changes using direct access files. Finally, each system is reengineered to incorporate real-time technology.

At each technology juncture, the effects on procedures, operational efficiency, and internal controls are examined. This approach provides the student with a solid understanding of the business tasks in each cycle and an awareness of how different technologies influence changes in the operation and control of the systems.

CHAPTER 6, THE CONVERSION CYCLE. Manufacturing systems represent a dynamic aspect of AIS. Chapter 6 describes several manufacturing environments, including traditional mass production (batch) processing, just-in-time production systems, and computer-integrated manufacturing. These environments are driven by such information technologies as materials requirements planning (MRP), manufacturing resources planning (MRP II), and electronic data interchange (EDI). The chapter addresses the shortcomings of traditional accounting models and the advantages of activity-based accounting (ABC) in assessing value-added business activities. Emphasis is given to the need for systems that integrate both financial and nonfinancial information to support all users in the organization. The chapter presents the concepts underlying the REA model and concludes with an overview of SAP as an example of a world-class information system.

CHAPTER 7, THE GENERAL LEDGER, FINANCIAL REPORTING, AND FIXED ASSET SYSTEMS. Chapter 7 examines the objectives, operational features, and control issues of three related systems: the general ledger system (GLS), the financial reporting system (FRS), and the fixed asset system (FAS). The emphasis is on operational controls and the use of advanced computer technology to enhance efficiency in each of these systems. The chapter also examines the use of data coding techniques, which are essential to the effective functioning of the GLS/FRS and, indeed, to all AIS applications.

CHAPTER 8, THE MANAGEMENT REPORTING SYSTEM. To this point, the book has focused on nondiscretionary systems. These are systems that organizations must implement, operate, and control in accordance with accounting rules and legal statutes. This chapter presents issues related to discretionary systems—those that organizations may choose to install that constitute the management reporting system (MRS). Although discretionary in nature, the MRS can be an important element in the internal control system of an organization. A reporting system that directs management's attention to problems on a timely basis also promotes effective management and thus supports the organization's business objectives. Chapter 8 deals conceptually with the MRS by examining factors that influence and shape management information needs. These include the decision-making process, management principles, decision type and management level, problem structure, reports and reporting methods, responsibility reporting, and behavioral issues pertaining to reporting.

PART III: ADVANCED TECHNOLOGIES IN AIS

CHAPTER 9, DATA BASE MANAGEMENT SYSTEMS. Chapter 9 deals with the design and management of an organization's data resource. It distinguishes between the flat file and the data base approaches to data management, and describes how the data base approach solves many of the operational and control problems associated with the flat file approach. The chapter demonstrates the impact of data base technology on the organization's accounting records, audit trail, and transaction processing procedures. Accountants must have a working knowledge of these technologies to meet their professional obligations. The chapter examines the REA model as a mechanism for creating an entity-wide data base of financial and nonfinancial data, capable of supporting multiple user views. It presents the relationship between user views, the underlying base tables, and the data normalization process.

The topics discussed include data definition language, data manipulation language, structured query language, schemas and subschemas, and several data structures used to construct the physical data base. In addition, the operational features of three popular data base models are described: hierarchical, network, and relational. Each model employs different technologies, operates under different assumptions, and has unique implications for accountants. The discussion emphasizes the importance of the relational model.

CHAPTER 10, DISTRIBUTED DATA PROCESSING AND NETWORKING. Most organizations use some form of networking to process their business transactions. Chapter 10 presents the most important considerations of this option, from the accountant's perspective. The chapter begins by distinguishing between centralized and distributed data processing (DDP) systems. It examines the organizational impact and the control implications of the DDP environment from both the centralized and the distributed data base approach. Once the business and accounting issues have been addressed, the chapter presents such networking topics as local area networks, wide area networks, and network topologies, including star, ring, bus, hierarchical, and client/server. The chapter concludes with a discussion of network control, protocols, and risks associated with the Internet and networks in general. Several control issues and security techniques are introduced. A complete discussion of this subject matter is deferred to Chapter 16.

CHAPTER 11, ADVANCED TECHNOLOGIES IN MANAGEMENT REPORTING. Chapter 11 examines the use of advanced technologies in satisfying organizations' information needs. The focus is on three classes of advanced technologies: decision support systems, expert systems, and neural networks. Several practical examples of each of these technologies are presented.

PART IV: AIS APPLICATIONS DEVELOPMENT

CHAPTERS 12, 13, and 14, THE SYSTEMS DEVELOPMENT PROCESS. This book devotes three chapters to the accountant's role in the systems development process. Chapter 12 deals with the tasks of systems planning and systems analysis. It reviews the commercial software and in-house systems development options available to organizations. The chapter examines automated techniques to improve the systems development process such as prototyping, computer-aided software engineering (CASE), and joint application development (JAD). Chapter 13 examines the conceptual design and systems selection phases of the systems development process. The basic features of both the structured and object-oriented approaches to systems design

are presented. The chapter focuses on the role of accountants in systems design. Their participation is particularly important in conducting the feasibility studies and cost-benefit analysis of proposed information systems and in selecting commercial software. Chapter 14 covers issues related to detailed systems design and systems implementation. Topics include the creation of user views from ER diagrams, the development of structure diagrams from data flow diagrams, and the selection of programming languages. Broader issues pertaining to planning system implementation are also examined.

The Appendix contains several comprehensive cases designed to serve as team-based systems development projects. These cases have been used effectively by groups of three or four students working as a design team. Each case has sufficient details to allow analysis of user needs, preparation of a conceptual solution, and the development of a detailed design, including user views (input and output), processes, and data bases.

PART V: CONTROLLING AND AUDITING COMPUTER-BASED SYSTEMS

CHAPTERS 15 AND 16, CONTROLLING COMPUTER-BASED INFORMATION SYSTEMS. The introduction of computer technology restructures traditional business processes and requires unique internal control techniques that address new forms of exposures. Computer control issues are raised and discussed conceptually throughout the text. However, due to the need for an integrating framework that incorporates many different aspects of the computer environment, specific computer control techniques and procedures are treated separately after all the relevant technology topics have been examined. The control framework for addressing these exposures identifies ten classes of controls. Chapter 15 discusses controls for operating systems, data base management systems, organizational structure of the computer function, systems development activities, systems maintenance procedures, and the operation of the computer center. Chapter 16 deals with controlling networks, EDI systems, microcomputers, and applications programs.

CHAPTER 17, AUDITING COMPUTER-BASED INFORMATION SYSTEMS. The proliferation of computer-based information systems has had a tremendous impact on the field of auditing. Computer technology has engendered the need for new auditing techniques for evaluating AIS internal controls and for verifying the accuracy of the data produced by accounting systems. The computer auditing topics covered in this chapter build directly on the control material presented in Chapters 15 and 16. The following topics are discussed at length: the differences between internal and external auditing, assessing the control structure of the firm, the components of audit risk, and the relationship between control objectives and tests of internal controls. The chapter presents techniques for performing tests of general and application controls as well as substantive testing techniques that are used in CBIS environments.

SUPPLEMENTS

SOFTWARE

Integrated Accounting for Accounting Information Systems, by Dale Klooster and Warren Allen, is a completely functioning Windows-based accounting system that performs the following tasks: sales order processing, cash receipts, billing, accounts payable,

cash disbursements, payroll, fixed asset accounting, general ledger processing, and financial reporting. The system uses a combination of real-time and batch processing techniques. It has an extensive on-line help feature. *Integrated Accounting for Accounting Information Systems* modules relate specifically to material covered in Chapters 4, 5, and 7, and includes operating instructions and homework problems that test students' knowledge and exposes them to a realistic accounting system.

Building Accounting Systems Using Access 7.0, 2/e, by James Perry and Gary Schneider, leads students through the creation of data base tables, forms, queries, and reports for each major transaction cycle. This text and CD-ROM combination help students understand how relational data bases are constructed and used in accounting systems.

INTERNET COVERAGE

Additional teaching and learning resources, including PowerPoint slides, student study notes, and cases on internal control and systems development will be available for Internet delivery only. Visit our web site at: **http://www.swcollege.com/hall_ais.html** to access these resources.

INSTRUCTOR'S MANUAL

The instructor's manual, by Elizabeth Rosa of Allentown College of Saint Francis de Sales, was written with the first-time instructor in mind. The manual contains lecture notes for each chapter and also suggests which parts of the chapter to cover in class and which to leave to the students for independent study. At the end of each chapter, the manual includes a helpful assignment grid indicating subject content and degree of difficulty of each exercise. Selected figures from the chapters are provided in the back of the manual as overhead transparency masters.

TEST BANK

The test bank, prepared by Dr. Helen Savage of Youngstown State University, has been revised and expanded and contains true/false, multiple-choice, short answer, and essay questions. It is available in both print and computerized versions (DOS and Windows).

SOLUTIONS MANUAL

The solutions manual, written by Dr. Marilyn Greenstein of Lehigh University, contains solutions to all end-of-chapter problems and cases and suggested solutions to the comprehensive case studies in the Appendix.

ACKNOWLEDGMENTS

I want to thank the Institute of Internal Auditors, Inc., and the Institute of Certified Management Accountants for permission to use problem materials from past examinations. I wish to thank Dr. Marilyn Greenstein for preparing the end-of-chapter material and solutions manual for the text. I am grateful to Dr. Helen Savage for her work on the test bank. I am also grateful to Professor Elizabeth Rosa for preparing the instructor's manual.

My thanks also to the following people for reviewing the book in various stages of its production and for providing helpful input:

Arnold Barkman
Texas Christian University

Somnath Bhattacharya
University of Texas, El Paso

Darrell Brown
Portland State University

Lloyd J. Buckwell, Jr.
Indiana University Northwest

Charles E. Carter
University of Missouri—Kansas City

Michael J. Cerullo
Southwest Missouri State University

Ted R. Compton
Ohio University

Graham Gal
University of Massachusetts

W. Ken Harmon
Arizona State University—West

Glenn L. Helms
University of North Carolina at Greensboro

Laurie J. Henry
Old Dominion University

Jay S. Holmen
University of Wisconsin—Eau Claire

James Holmes
University of Kentucky

M. A. Houston
Wright State University

James Hunton
University of South Florida

Robert L. Hurt
California State Polytechnic University—Pomona

Robert Kee
University of Alabama

A. Ronald Kucic
University of Denver

John J. Maher
Virginia Polytechnic Institute and State University

Harry V. Poynter
Central Missouri State University

David A. Remmele
University of Wisconsin—Whitewater

Jep Robertson
New Mexico State University

Arjan T. Sadhwani
The University of Akron

W. M. Sailors
Western Washington University

Helen Savage
Youngstown State University

Lynne M. Severance
Eastern Washington University

Bor-Yi Tsay
University of Alabama at Birmingham

Leslie D. Turner
Northern Kentucky University

Craig A. VanLengen
Northern Arizona University

W. Darrell Walden
University of Richmond

Curt Westbrook
California State University—San Bernardino

Christopher Wolfe
Texas A&M University

Jeanne H. Yamamura
University of Nevada, Reno

Dedication

To my wife Eileen, and my children Elizabeth and Katie

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