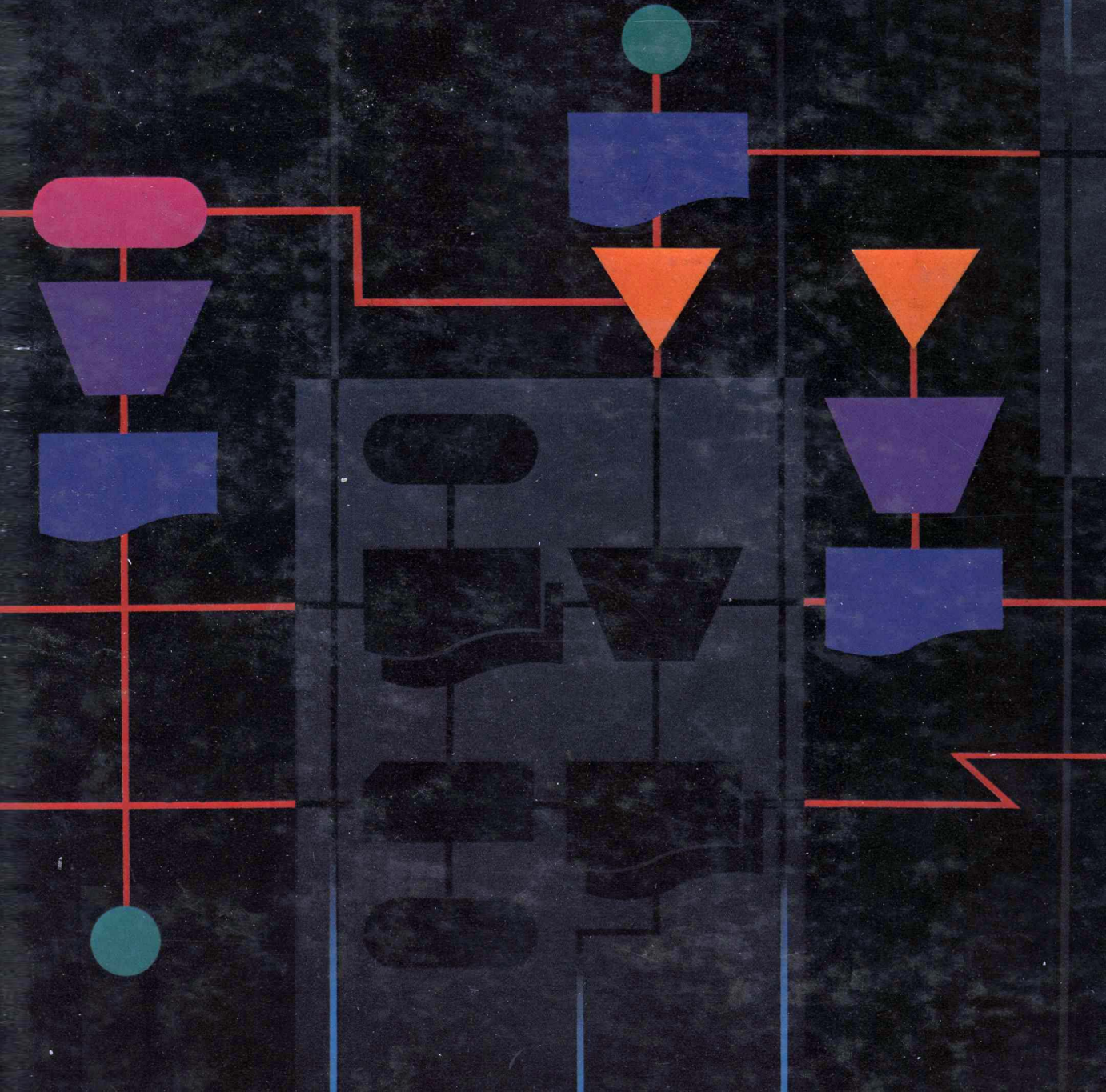


# ACCOUNTING AND INFORMATION SYSTEMS

Joseph W. Wilkinson

Second Edition



**Second Edition**

# **ACCOUNTING AND INFORMATION SYSTEMS**

**Joseph W. Wilkinson**

Arizona State University

**John Wiley & Sons**

New York

Chichester

Brisbane

Toronto

Singapore

## **Cover art by Roy Wiemann**

Material from the Certificate in Management Accounting Examinations, Copyright © 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983 by the National Association of Accountants, is reprinted (or adapted) with permission.

Material from the Uniform CPA Examinations, Copyright © 1956, 1958, 1962, 1963, 1964, 1965, 1968, 1971, 1972, 1973, 1974, 1975, 1978, 1979, 1980, 1981, 1982, 1983 by the American Institute of Certified Public Accountants, Inc., is reprinted (or adapted) with permission.

Material from the Certified Internal Auditor Examination, Copyright © 1977, 1978, 1979, 1980, 1981, 1982, 1983 by The Institute of Internal Auditors, Inc. is reprinted (or adapted) with permission.

Material from the Uniform SMAC Examinations, Copyright © 1972, 1975, 1976, 1977, 1978, 1979, 1980, 1982 is reprinted (or adapted) with permission.

Copyright © 1982, 1986 by John Wiley & Sons, Inc.

All rights reserved. Published simultaneously in Canada.

Reproduction or translation of any part of this work beyond that permitted by Sections 107 and 108 of the 1976 United States Copyright Act without permission of the copyright owner is unlawful. Requests for permission or further information should be addressed to the Permissions Department, John Wiley & Sons.

## **Library of Congress Cataloging in Publication Data**

Wilkinson, Joseph W.  
Accounting and information systems.

Includes bibliographies and index.

1. Accounting-Data processing. 2. Management information systems. I. Title.  
HF 5679.W52 1986 657'.028'5 85-17895  
ISBN 0-471-81292-7

Printed in the United States of America

10 9 8 7 6 5 4 3 2

To Sharon Rochelle

## PREFACE

Accountants encounter the information systems of business and governmental enterprises as users, evaluators, and designers. They **use** information systems, for instance, when they retrieve information to prepare such reports for managers as income statements, responsibility reports, and capital investment analyses. They **evaluate** information systems when they review internal controls during audits. They **design** information systems when they devise charts of accounts or propose the addition of specific controls within transaction processing cycles.

This textbook is primarily intended for advanced undergraduates who will soon be assuming the responsibilities of professional accountants. Most of these students are currently majoring in accounting, but some may be majoring in computer information systems or another business discipline and minoring in accounting. Presumably the students using this textbook will have completed courses in (1) elementary finan-

cial and managerial accounting and (2) fundamentals of computer hardware, software, and data processing.

The primary purpose of this textbook is to provide its users with a conceptual framework and body of knowledge concerning contemporary information systems, including:

1. A broad awareness of the concepts of information systems, especially those pertaining to systems, information, managerial decision making, organizational structures, accounting models, and computer technology.
2. A knowledge of the documents and reports generated by information systems, as well as the basic procedures and controls employed in processing (via computerized as well as noncomputerized systems) a variety of business transactions and accounting applications.
3. A basic familiarity with a wide range of sys-



tems analysis and design techniques, plus a thorough grasp of system flowcharts.

4. An understanding of the steps involved in comprehensive systems development, as well as the ability to apply the appropriate techniques in conducting a reasonably complex systems development project.

Armed with this framework and body of knowledge, students should be prepared to enter careers in accounting that will require them to be effective users, designers, and evaluators of information systems.

Several themes are dominant throughout the book. First, information is needed in an enterprise as much for managerial decision making as for the support of daily transaction processing and the satisfaction of demands arising outside the enterprise. Second, computers and related developments in information technology are transforming the features of an ever growing number of information systems; and these developments deserve careful and extended attention. Third, information is a resource that should be well managed; one critical means of management is the skillful multistage development of the underlying information system. Fourth, people represent another key resource of an enterprise and are critical to the success and failure of its information system.

Because of the broad scope and interdisciplinary nature of information systems, all relevant topics cannot be covered with equal emphasis. It is therefore necessary to select for emphasis those topics that are likely to have the greatest impact upon professional accountants in an age of rapidly developing technology, increasing specialization, and heightening social and economic awareness. Those topics selected to receive the greatest emphasis in this book are:

1. Accounting (internal) controls and security measures, pertaining both to manual systems and computer-based systems.
2. Computer-based data processing and data management concepts and techniques.
3. Basic transaction processing cycles.

4. Reports that provide needed information for managerial decision making.
5. System analysis and design techniques, especially systems flowcharting.
6. System design considerations and principles.
7. Computer-based auditing and evaluation techniques.
8. Management considerations during system development projects, especially with respect to planning, control, and people-related concerns.

This second edition primarily retains the overall organization of the first edition. Part I provides relevant concepts pertaining to accounting, information, systems, organizations, and managerial decision making. It also examines two key purposes of information systems: reporting to managerial decision makers and the processing of daily transactions. Part II examines the critical tasks of computer-based information systems: the conversion of data into information, the storage of data in and the retrieval of data from data bases, and the maintenance of control and security over the data and other assets. This part also discusses approaches and techniques suitable to the auditing of computer-based systems. Part III describes a variety of advanced and specialized systems that provide operational and decision support to managers and other users. It also discusses the application of microcomputers to small business firms. Part IV traverses the several phases of the systems development cycle, including systems planning, systems analysis, systems design, systems justification and selection, systems implementation, and systems operation and maintenance. Part V contains cases for use in extended class projects.

Changes both great and small appear in this second edition. New chapters have been added. Chapters from the first edition on data management, data control, and system support have each been split into two chapters, while the latter portion of the original Chapter 17 has been expanded into an entire chapter concerning com-

puter-based auditing. A new chapter has been devoted to microcomputers. In contrast, the systems analysis and systems design chapters have been combined, while the first half of Chapter 17 has been combined with the chapter concerning systems implementation. Illustrative cases that appeared at the ends of Chapter 12 through 16 in the first edition have been eliminated, with key portions integrated into the chapters themselves or presented as review problems. Other notable changes include: (1) the addition of sections concerning information resource management, controls and security measures in data base environments, relational data bases, fixed asset transaction processing systems, and legal requirements pertaining to internal control systems; (2) the expansion of such topics as internal control, the data base approach, auditing techniques relevant to computer-based systems, and behavioral consequences of system development; (3) the reduction of sections pertaining to the evolution of computer-based information systems and approaches for determining economic feasibility; and (4) the addition of new figures, problems and cases.

These changes have been incorporated to reflect current and emerging developments and concerns in the areas of accounting and information. Although an argument can be made that the resulting plan of organization is reasonably logical and internally consistent, and the content set represents the appropriate body of knowledge for accountants, I must agree that each of us has in mind a particular sequence and scope of content that is "right" for the teaching of accounting information systems. Thus, a degree of flexibility has been built into the parts and chapters of this book. It is possible and workable, for instance, to teach Part IV before Part II, or to omit the chapters concerning the data base approach or support systems. Another measure of flexibility has been introduced through the extensive use of study cases and appendices. For example, relevant portions of Study Case C, Transaction Processing Systems in Computer-Based Information Systems, may be assigned at any point during the study of Part II.

Several learning aids are incorporated throughout the textbook:

1. Each chapter begins with a brief statement of objectives and ends with a summary of text material.
2. Each chapter contains a number of figures and diagrams to clarify the concepts and techniques presented in narrative form.
3. Each chapter contains several end-of-chapter aids:
  - a. Review questions.
  - b. Discussion questions.
  - c. A review problem, which is intended to (1) illuminate important points covered in the chapter and (2) guide students in the preparation of assigned end-of-chapter problems and cases.
  - d. Problems and cases, many of which are drawn from professional accounting examinations.
  - e. A list of suggested readings.

In addition, an instructor's manual available from the publisher contains suggested answers to discussion questions, solutions to problems and cases, and a test bank. Furthermore, a study guide is available for the use of students who are interested in additional reviews of and exercises involving the material covered in this textbook. I wish to acknowledge the considerable assistance I received in preparing this book. Severin Grabski (Michigan State University), Michael Cerullo (Louisiana State University), Donald Bourque (State University of New York at Albany), and Daniel Norris (Iowa State University) provided very cogent and useful criticism of the first edition and of chapters in this revised edition. All their suggestion and comments were gratefully accepted, and many have been incorporated into the revision. Two of my colleagues at Arizona State, Sue McKinley and Dan Kneer, have offered many suggestions based on their use of the text and have provided excellent materials for inclusion. Numerous students have responded helpfully during the class testing of new materials from this edition. Although all the people who helped cannot be listed, I recognize the par-

## **X PREFACE**

ticular help of Carolyn Johnson. Finally, I appreciate the generous and cooperative support of my present and former Wiley editors, Frank Burrows and Lucille Sutton.

Four professional accounting groups have graciously permitted the extensive use of problem materials from past professional examinations: the American Institute of Certified Public Accountants, the Institute of Management Accounting of the National Association of Account-

ants, the Institute of Internal Auditors, and the Society of Management Accountants of Canada. To all these individuals and organizations, and to others not mentioned (including my family) go my thanks. It hardly needs saying that much of the value of this book is due to their assistance, but that they do not bear responsibility for errors or omissions within these covers.

*Tempe, Arizona*

**Joseph W. Wilkinson**





## A NOTE TO INSTRUCTORS

As recognized in the preface, each instructor has a unique view of accounting information systems and the content of the accounting information systems course. Some of you have a very broad view that encompasses all of the topics included in this textbook. Some of you have a less comprehensive view, in that you believe certain topics to be beyond the proper scope of accounting information systems.

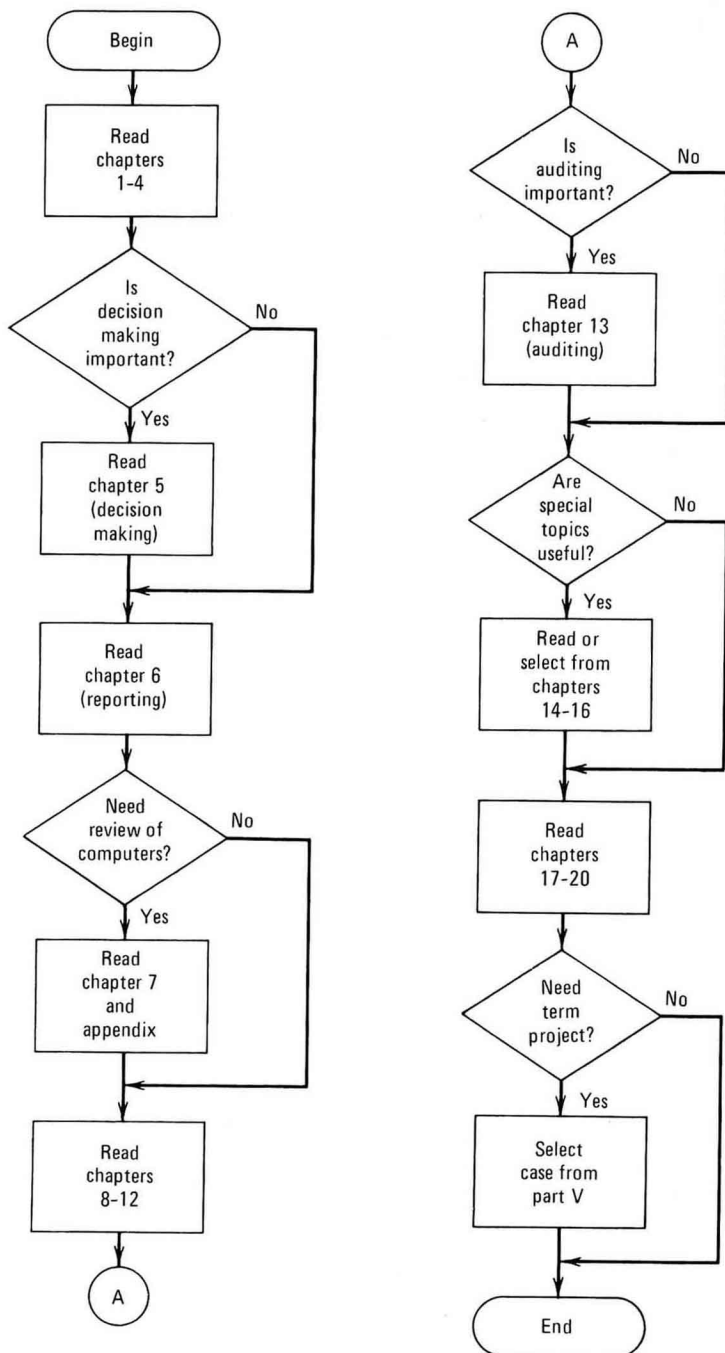
If you fall into the second category, you may consequently believe that this textbook is not truly an accounting information systems textbook—that it simply includes coverage of too many “nonaccounting” topics. However, based on a survey conducted by John Wiley and Sons, Inc., every included topic was endorsed by a significant percentage of the respondents. Those topics receiving the greatest endorsement, such

as internal accounting controls, have been given the greatest emphasis.

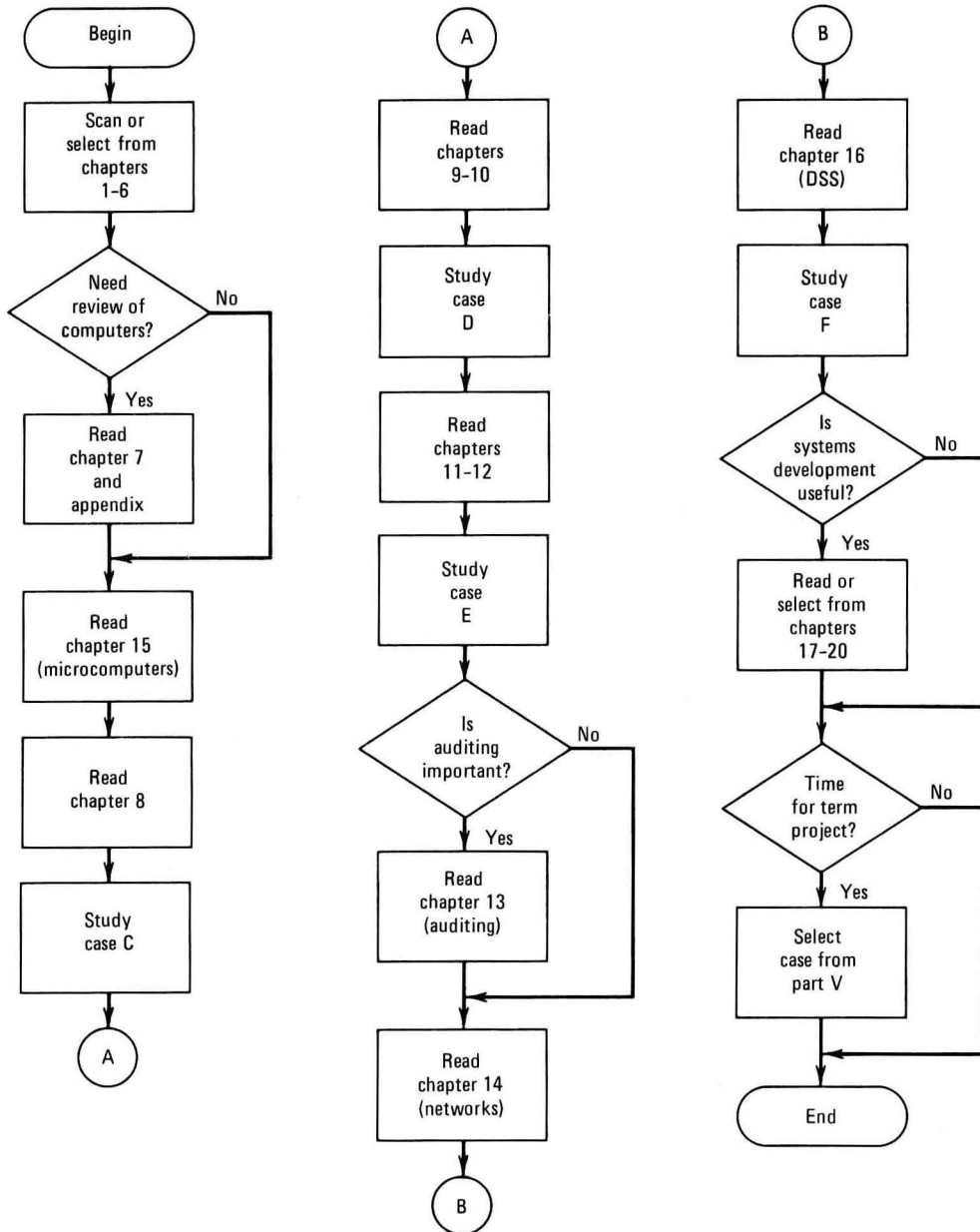
While the survey tends to support a comprehensive view of accounting information systems in a collective sense, it also reinforces the notion that there is a wide diversity of individual views. Thus, I have been encouraged to provide guidance for the use of the textbook in individual classes. The following flowcharts present sequences for its use based on five alternative views: a balanced comprehensive view, a computer-based information system view, a transaction processing view, a management information system (MIS) view, and a systems development view. While many variations of these views may be identified, one of these five views may provide a starting point for developing a course syllabus.

## xii A NOTE TO INSTRUCTORS

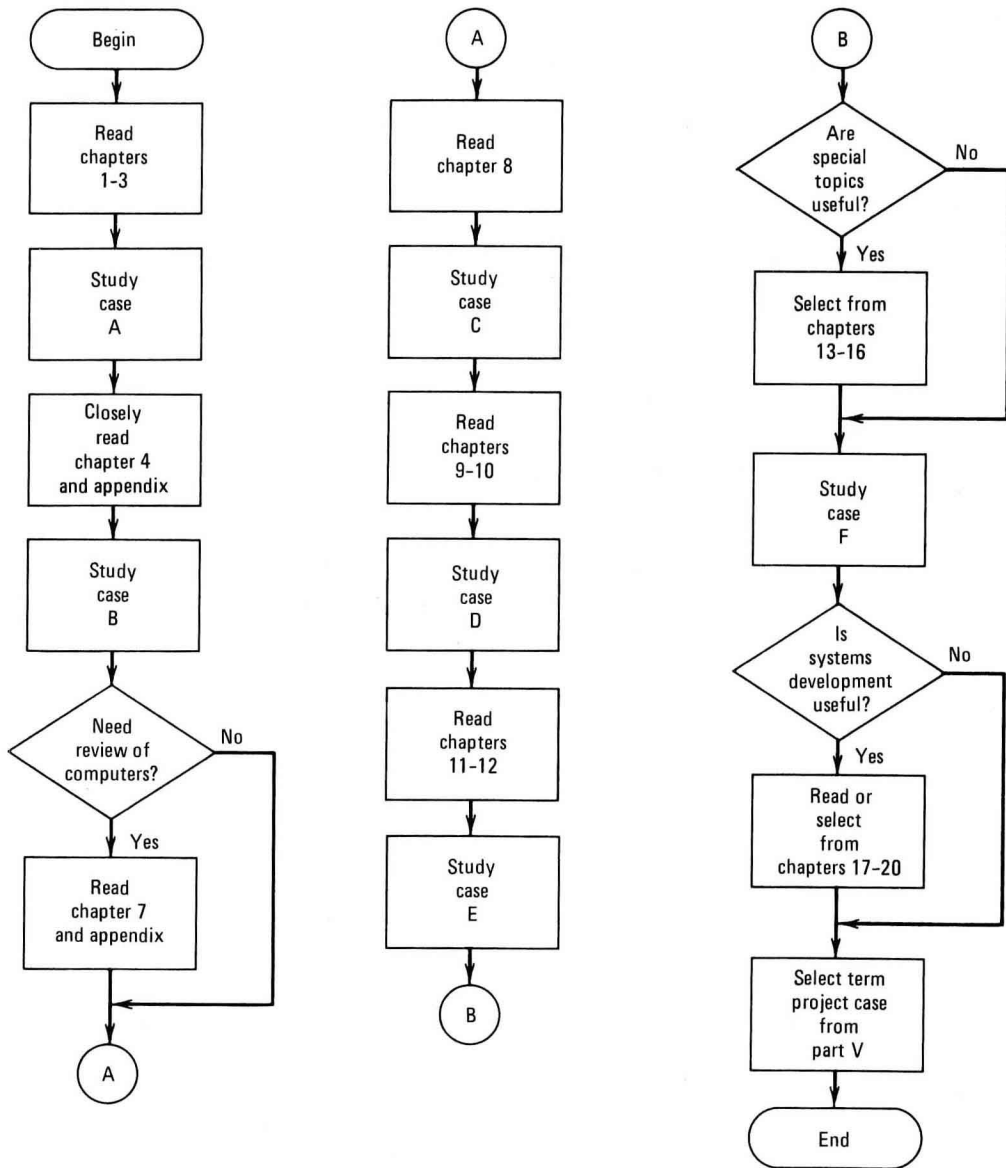
Follow this flowchart for a *balanced survey* of accounting information systems, with several possibilities of abbreviated coverage:



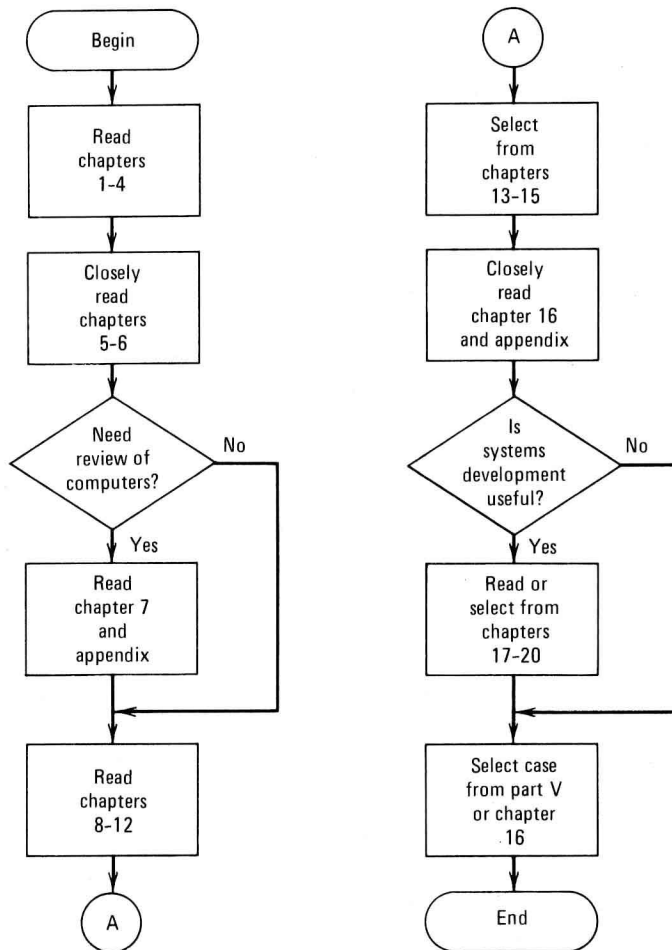
Follow this flowchart for an emphasis on *computer-based information systems*:



Follow this flowchart for an emphasis on *transaction processing*:

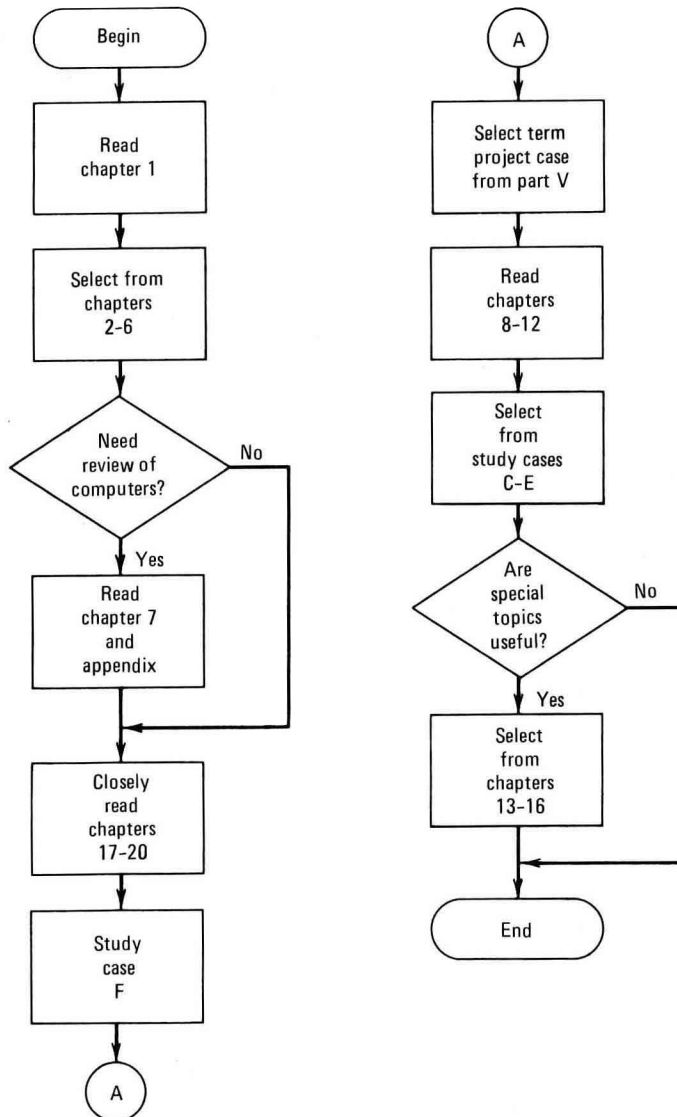


Follow this flowchart for an emphasis on *management information systems and decision making*:





Follow this flowchart for an emphasis on *systems development*:



# CONTENTS

## PART I CONCEPTS AND PURPOSES I

### **I OVERVIEW OF INFORMATION SYSTEMS AND ACCOUNTING 3**

Objectives and overview / 3

Characteristics of information systems / 4

Tasks performed by information systems / 10

Development of an information system / 13

Accounting information systems / 13

Summary / 18

### **2 ENVIRONMENTS OF INFORMATION SYSTEMS 27**

Objectives and overview / 27

Systems concepts / 28

The environment beyond the firm / 33

The operational system / 35

The organization: a task-oriented structure / 39

Summary / 44

### **3 TRANSACTION PROCESSING: ACCOUNTING CYCLES AND ELEMENTS 57**

- Objectives and overview / **57**
- Framework of transaction processing / **58**
- Elements of transaction processing / **62**
- Application to transaction processing cycles / **74**
- Data classifications and codes / **78**
- Summary / **82**

#### **STUDY CASE A**

### **4 TRANSACTION PROCESSING: CONTROLS AND DOCUMENTATION 103**

- Objectives and overview / **103**
- Controls and security measures / **104**
- Documentation pertaining to transaction processing and controls / **115**
- Summary / **123**
- Appendix to Chapter 4: Flowcharting / **124**

#### **STUDY CASE B**

### **5 MANAGERIAL DECISION MAKING AND INFORMATION PROCESSING 204**

- Objectives and overview / **204**
- Managerial decision making / **205**
- Information flows / **213**
- Information needs / **217**
- Summary / **224**
- Appendix to Chapter 5: Communication and Information Theory / **225**

### **6 REPORTING TO MANAGERIAL DECISION MAKERS 240**

- Objectives and overview / **240**
- Types of reports / **241**
- Design features of effective reports / **248**
- Reporting systems / **250**
- Summary / **261**

## **PART II COMPUTER-BASED INFORMATION SYSTEMS: FEATURES, TASKS AND DESIGN ALTERNATIVES 283**

### **7 COMPUTERS WITHIN BUSINESS INFORMATION SYSTEMS 285**

- Objectives and overview / **285**
- Impacts of computerization / **286**
- Evolution of computer-based information systems / **290**
- Emerging developments in computer technology / **301**
- Summary / **304**
- Appendix to Chapter 7: Computer-Related Technology / **305**

### **8 COMPUTER-BASED DATA CONVERSION 327**

- Objectives and overview / **327**
- Data conversion preliminaries / **328**
- Batch processing systems / **330**
- Online processing systems / **344**
- Design considerations / **351**
- Summary / **354**

## **STUDY CASE C**

### **9 COMPUTER-BASED DATA MANAGEMENT: BASIC FILE CONCEPTS 407**

- Objectives and overview / **407**
- Data management preliminaries / **408**
- Data storage definitions / **412**
- File structures / **419**
- Design considerations / **424**
- Summary / **426**

### **10 COMPUTER-BASED DATA MANAGEMENT: DATA BASE SYSTEMS 442**

- Objectives and overview / **442**
- Data base approach / **443**
- Physical methods of associating data / **448**
- Logical data models / **454**
- Data base management systems / **461**
- Design considerations / **465**
- Summary / **467**