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# COMPUTERS IN BUSINESS

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# Computers in Business
## AN INTRODUCTION

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*To my family:*
Joyce, Gary, Linda, and Craig

# Preface

In recent months, a number of articles have appeared in information system and data processing periodicals with titles such as "The Primacy of the User" and "The Age of the End User." Many of these articles stress the importance of having those who must use the output of information systems participate in the planning and development of such systems. But there is really nothing new in this recognition of the importance of users. In fact, this edition of *Computers in Business*, like the three previous editions, is written with the needs of future users specifically in mind. Such students probably accept the fact that in their future work they will need a basic understanding of computerized information processing and a familiarity with computers, but they have not chosen to become computer scientists or information system specialists. Rather, they are preparing for management or staff positions in such functional areas of business as accounting, finance, marketing, personnel, and production, or they are planning to become administrators in government, health, or educational organizations that make use of business procedures.

As future end-users (rather than as designers) of information systems, then, these students have needs and objectives that will eventually differ from those of students who expect to work more closely with computers. But at the introductory course level, the needs of end-users may not differ significantly from the needs of those students who may be thinking of embarking on a career in business data processing. Initially, both types of students will need to understand basic computer hardware concepts, and both will need to learn the concepts relating to system/program development and implementation. Furthermore, if we are now in "the age of the end-user,"an understanding by specialists of the broad implications that their future efforts may have on business management and on society may be as important to them in their dealings with users as it is to the users themselves. (If both users and specialists had had a better understanding of the consequences of their actions in the past, perhaps Robert Townsend would not have written

in *Up the Organization* about "managers drowning in ho-hum reports they've been conned into asking for and are ashamed to admit are of no value.")

In summary, then, *the purpose of this book* is to introduce both future users and data processing beginners, at an early stage in their college programs, to many of the important common topics that are likely to be relevant to them in their future careers. More specifically, *the objectives of this edition are to provide students with* (1) some of the fundamental concepts of (and developments associated with) computerized information processing; (2) a general orientation to the computer—what it is, what it can and cannot do, how it operates, and how it may be instructed to solve problems; and (3) some insights into the broad impact that computers have had, are having, and may be expected to have on businesspeople, on the environment in which they work, and on the society in which they live.

## REVISION FEATURES AND TEXT ORGANIZATION

There have been more changes made in the organization and content of this version of Computers in Business than in any previous edition. There were 18 chapters in the third edition. The contents of nine of these earlier chapters have been reorganized, rewritten, and condensed into five present chapters; three of the earlier chapters have been dropped; and the remaining six chapters have been thoroughly reviewed and updated. Six new chapters have been added. Although the net effect of these changes has been to reduce the size of the book by nearly 200 pages, the essential material needed for a balanced presentation of a broad range of topics has been retained, and much that is new and relevant has been added.

New opening pages containing *learning objectives* and *chapter outlines* are presented at the beginning of each chapter. The review and discussion questions at the end of each chapter support the learning objectives of the chapter. Finally, *cartoons* have been inserted in a number of places in the text to help maintain student interest and to reinforce important points that are presented. (This approach differs from some books where cartoons and inserts are randomly placed in such a way as to cause distraction rather than reinforcement.)

To achieve the book objectives that were listed above, this edition is divided into *five parts*. Each of these parts is introduced by a brief opening statement. *A brief summary of these five parts, along with a more specific outline of the significant revisions made in this edition, is presented below.*

## Part I: Information and Computers: Some Introductory Thoughts

The chapters included in Part I (which is aimed at the first objective of the book) are

1. *Information and Information Processing: Concepts and Historical Developments.* Materials previously covered in the first two chapters have been updated and condensed into this single chapter.

2. The Information Revolution in Perspective. Although it combines some of the material previously found in Chapters 3 and 4, this chapter has several entirely new sections. For example, much of the material presented on adapting to the information revolution is new.

## Part II: Basic Computer Concepts

The chapters included in Part II (which focuses on the hardware aspects of the second objective) are

3. *Introduction to Computers.* A new introduction and updated examples of computer capabilities and limitations have been added, and the material on overlapped processing and buffer storage previously found in Chapter 7 has been moved to this chapter.

4. *Input and Output: I.* This chapter (and the one which follows) has been completely reworked and reorganized. The introductory section on data organization concepts has been greatly expanded to include discussions of logical data structures, physical structures, and file organization approaches. Sections dealing with character recognition equipment, printing and microfilm equipment, and direct-access storage devices have been repositioned in this and the following chapter. The material on punched cards and punched paper tape has been condensed.

5. Input and Output: II In addition to being reorganized, this chapter has new sections dealing with magnetic bubble storage and with the latest online terminal devices. Much of the material on data communications is new.

6. The CPU: Concepts and Codes. The section on computer numbering systems has been condensed, and the supplement on hexadecimal numbers has been deleted.

7. *The CPU: Components and Comparisons.* A new section on the types of CPU storage elements has been included, much greater emphasis has been placed on the discussion of semiconductor storage devices, and a new section that compares some of the characteristics of CPUs of different sizes has been added.

## Part III: Using Computers to Solve Problems

The chapters found in Part III (which focuses on the software aspects of the second objective) are

8. *Information System Development: Overview and Analysis.* This is a new chapter that first outlines the general procedure to be followed in using computers to solve problems. The remainder of the chapter is then devoted to the system-analysis stage of the system development effort.

9. *Information System Development: The Design Stage.* Another new chapter, this one deals with the system-design stage of a system development project.

10. *Programming Analysis.* This chapter has been modified somewhat because of text reorganization.

11. *Program Preparation and Programming Languages.* Combining elements found in Chapters 11 and 12 of the third edition, this chapter also has entirely new sections on the techniques that may be used to (a) organize programmers and (b) establish a structured programming environment. Examples of programs coded in FORTRAN, COBOL, PL/I, BASIC, and RPG are presented, and the general characteristics of each language are discussed.

12. *System/Program Implementation.* This new chapter deals with the final steps required to complete a system development project.

## Part IV: Computer Implications for Management

The chapters included in Part IV (which is aimed at the third objective) are

13. *The Computer's Impact on Planning and Organizational Structure.* Although it combines, condenses, and updates materials found in two chapters of the previous edition, this chapter also has a new section that deals with the question of where data should be stored in an organization.

14. *The Computer's Impact on Staffing and Management Control.* Here is another chapter that condenses, combines, and updates topics found in two chapters of the previous edition.

15. *Social Implications of the Business Use of Computers.* Some of the beneficial and negative effects of business computer usage on society as a whole are treated in this *new chapter.* It is thus more sharply focused than the "computers in society" chapter found in the third edition.

16. *The Management of Computing Resources.* The factors, considerations, and procedures that may be relevant in planning, organizing, staffing, and controlling activities in a computer department are the subjects of this *new chapter.*

### Part V: Epilogue

The chapter included in this part (which is also related to the third objective) is

17. *Computers and the Future.* New for this edition, this chapter is a brief essay on the future outlook for computer technology, for business information systems, and for society.

## USE OF THIS BOOK

This text is designed for use in an introductory one-semester or one-quarter course in computer data processing offered at an early stage in a college program. No mathematical or data processing background is required or assumed; no specific computer make or model is featured. The book may be used without access to a machine.

Two issues dealing with program preparation are as unresolved today as they were a decade ago when this book first appeared. The *first* issue is concerned with *how much* should be attempted—i.e., it is concerned with the *depth* of instruction on program preparation that students should receive in an introductory course. Once a decision has

been made on this issue of how much should be attempted in a single course (because in many schools future end-users may only take a single course), the second issue then involves the selection of the programming language(s) to use.

For many introductory courses, the limited programming language emphasis contained in this book will be sufficient. (Coded examples written in the most popular high-level languages are presented, and the basic language characteristics of each are noted.) However, when emphasis is to be placed on the writing of programs in a specific language for a specific make and model of machine, then the following two types of instructional materials are generally required: (1) a basic text to provide the necessary breadth to the course and to put program coding in its proper perspective, and (2) a programming manual available from a commercial publisher or from the computer manufacturer, and/or notes and materials prepared by the instructor to cope with any idiosyncrasies that may exist at a particular computer installation.

In such situations, this book is well suited for use as the basic text. No attempt has been made in this edition, however, to present the coding rules for any language. In fact, the 57 pages devoted to program coding in Chapter 12 of the third edition have been substantially reduced in this book for economic reasons. Why was this done? Well, on the one hand, there was probably more coding detail presented in the previous edition than was necessary for those courses where only a limited language emphasis is needed. On the other hand, however, much more space would be needed to do justice to the syntax of each language presented if the book were used as the *only* text in courses where students are expected to prepare several programs. (But in that case, of course, only one language would probably be selected and students would then be buying many extra pages of material that would not be used.) Given the fact that a wealth of programming language materials now exists in paperback form (there are nearly 200 manuals sold by commercial publishers listed in the January 1978 issue of *Computing Newsletter for Schools of Business*; this listing is certainly not a complete inventory of commercial products; and it does not include any of the dozens of language manuals supplied by computer manufacturers), and given the fact that from these manuals can be selected a relatively inexpensive one that is probably closely targeted to the needs of a particular course, the conclusion reached for this edition was that it was in the best economic interests of the students to leave the coverage of detailed coding topics to the scores of good programming manuals that are available.

The organization of the book into five parts permits some *modular flexibility*. Although the order of presentation is logical and has served the needs of many in the past, there is no necessary reason why all parts

must be covered in the sequence in which they appear in the text. For example, if a number of programs are to be written, the first three chapters can be quickly covered, and then the first chapter in Part III can be considered early in the course to provide background for the problem-solving process.

Since this is an introductory text dealing with the general uses, operations, and implications of computers, and since the author has written other volumes that deal with many of the same basic subjects, there are a number of similarities between this book and the other works. In general, however, *when there is an overlap* of the topics presented, *the coverage in this book is likely to be much more thorough* than the coverage given in the others. In addition, extra chapters on hardware/software concepts and on managing computing resources are included here but are missing from *Computer Essentials for Business* (McGraw-Hill Book Company, 1978). Of course, the chapter dealing with the broader social implications of the business use of computers is abridged when compared with similar material presented in the second edition of *Computers in Society* (McGraw-Hill Book Company, 1977).

It is customary at about this point in a preface (although there is always the question of whether anyone is reading a preface at this point) to acknowledge the contributions and suggestions received from numerous sources. A special tribute must go to those equipment manufacturers and magazine publishers who furnished technical materials, cartoons, photographs, and other visual aids. Their individual contributions are often acknowledged in the body of the book.

It is appropriate here, however, to pay special tribute to the publishers of the periodicals from which the cartoons found in this text are taken. More specifically, the cartoon found on page 398 was reprinted with permission of *Creative Computing*, copyright © 1977 by Creative Computing, Morristown, New Jersey 07960. The cartoons found on pages 95, 169, 248, 295, 349, 457, 464, 474, 484, 509, and 519 are reprinted with permission *Datamation*,® copyright © 1976, 1977, and 1978 by Technical Publishing Company, Greenwich, Connecticut 06830. The cartoons found on pages 91, 100, 103, 185, 279, 353, 386, and 434 are reprinted with permission of *Infosystems*,® copyright © 1976 and 1977 by Hitchcock Publishing Company, Wheaton, Illinois 60187.

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