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Donald H. Sanders

COMPUTER CONCEPTS AND APPLICATIONS

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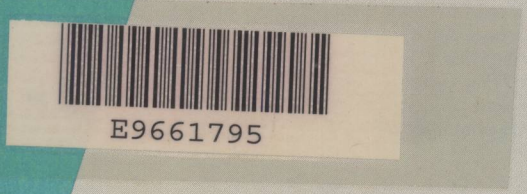
COMPUTER CONCEPTS AND APPLICATIONS

Donald H. Sanders
Educational Consultant
Ft. Worth, Texas



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COMPUTER
CONCEPTS
AND APPLICATIONS

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COMPUTER CONCEPTS AND APPLICATIONS

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ABOUT THE AUTHOR

DONALD H. SANDERS is the author of seven books about computers—their uses and their impact—spanning more than 25 years. Over a million copies of his books have been used in college courses and in industry and government training programs.

Dr. Sanders has 20 years of teaching experience. After receiving degrees from Texas A & M University and the University of Arkansas, he was a professor at the University of Texas at Arlington, at Memphis State University, and at Texas Christian University. In addition to his books, Dr. Sanders has contributed articles to journals such as Data Management, Automation, Banking, Journal of Small Business Management, Journal of Retailing, *and* Advanced Management Journal. *He has also encouraged his graduate students to contribute computer-related articles to national periodicals, and over 70 of these articles have been published. Dr. Sanders chairs the "Computers and Data Processing" Subject Examination Committee, CLEP Program, College Entrance Examination Board, Princeton, N.J.*

PREFACE

We woke up the other day and found ourselves smack in the middle of the Information Society . . . . The power of computing brings information to the masses and lets us alter that information . . . A word, a number, a graph, or a set of conclusions is now nothing but a series of electronic pulses, subject to the whims of any individual who intercepts them . . . . Many people view a populace able to find whatever it wants, whenever it needs it, as the ultimate informed society. At the same time, . . . the vulnerability of databases containing information about our private lives haunts us . . . . Are we mature enough to provide access to the information necessary to advance knowledge, yet still manage to protect our privacy, our security, and the information itself, which looms as the most valuable commodity of our new age?

—Pamela Clark, Editor-in-Chief,
Popular Computing, March 1985.
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Today's students must ultimately answer the broad question just raised by Pamela Clark. In the years ahead, they'll inherit the freedom and responsibilities—and realize the potential for use or abuse—of our Information Society. An important educational goal now is to make sure that today's students are computer literate so that they can participate in such a society, and help shape its policies in humane ways.

The Purpose of This Book

To be computer literate, today's students must know what computers are, what they can and cannot do, how they're put to work to process applications, and how their use in homes, schools, and workplaces can affect society. Thus, the *purpose* of *Computer Concepts and Applications* is to supply information in each of these related computer literacy areas so that readers will:

1 ***Know What Computers Are.*** Key concepts pertaining to the organization, capabilities, and limitations of computer *hardware* are presented, but unnecessary technical details have been omitted.

2 ***Know What Computers Do.*** Many uses or *applications* of computers in today's Information Society are considered. For example, the general functions performed by word processing, spreadsheet, data base, graphics, communications, time/project management, and other common applications programs are outlined early in the text and then in later chapters. And dozens of applications found in government and law, health care, education, the humanities, science, engineering, and business are discussed throughout the book.

3 ***Know How Computer Systems Are Put to Work.*** The emphasis in the text on word processing, spreadsheet, data base, and other common *software* packages (and the similar emphasis in the software supplement that accompanies this text) is designed to support courses that give students "hands-on" experience in putting computers to work to process the kinds of packaged software they'll be working with in the future. In addition, text material shows students how general analysis, design, and program preparation procedures are carried out to produce customized written programs of instruction.

4 ***Understand Their Social Impact.*** Computers don't operate in a vacuum; they're found in larger systems that include people. Some of the ways that computer usage may impact the people and organizations in our society are considered.

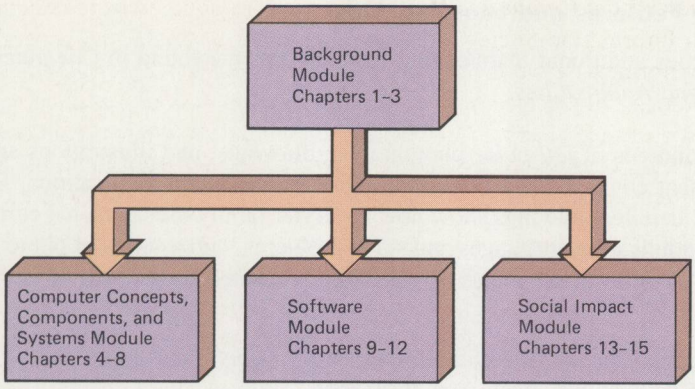
Computer Concepts and Applications provides a well-rounded introduction to these four related topics and is designed for use in the introductory one-term course in computers and information processing that's now taught around the world.

The Organization of This Book

This is the seventh in a series of computer texts that I've written over a period spanning two decades. Several titles have appeared in multiple editions, and have been translated into German, French, Spanish, and Portuguese versions. Over a million of these earlier books have been used in college courses and industry/government training programs.

The organization of *Computer Concepts and Applications* benefits from this earlier experience. For example, this text (like my *Computers Today,* a larger text with a more business-oriented approach) is organized into *modules,* giving it the flexibility to meet the needs of courses with different subject emphasis and with different presentation sequences. The chapters in the first Background Module provide an overview of the four related areas of study mentioned above. (Chapter 1 introduces readers to hardware and stored program concepts and limitations; Chapter 2 presents an overview of what people do with computers and how computers are put to work; and Chapter 3 outlines ways in which people and organizations may be affected by present and future computer applications.) Once these chapters have been completed, readers can then turn immediately to any of the remaining modules shown in the chart (facing page) to meet whatever sequence and depth requirements are needed in a particular course.

Modules 2 through 4 build on the topics introduced in Module 1. Thus, a course can easily be designed so that discussions of prewritten applications packages (Chapters 9–10 in the Software Module) immediately follow the completion of Chapter 3. Or, readers may be more motivated to study other



Modules if some time is spent on the Social Impact chapters (13–15) after Chapter 3 is completed. It's also logical to consider hardware concepts and systems in more detail (Chapters 4–8) before moving to another module. Regardless of the path selected, you'll have the flexibility to choose the sequence that's best for your needs, and you'll be able to vary the depth of the material you elect to cover in Modules 2 through 4.

Computers at Work: A Unifying Theme

Other books give examples of what computers do and how computer systems are put to work. But these examples often involve applications that (1) are unrelated to anything in a student's past, (2) go beyond a beginning student's current interest and experience, or (3) involve solutions to problems that a student never expects to have to deal with. Such examples, of course, are usually viewed as random and boring exercises.

Student interest and motivation is enhanced in this text with the introduction, in Chapter 2, of the computer-using Byter family. The Byters show, by example, how working parents and children in grade school, high school, and college can use personal computers to solve problems related to their work, school, and personal lives. Some of the problems encountered by the Byters in Chapter 2 are solved by using the types of data base, outlining, spreadsheet, graphics, and word processing packages that can be bought at any computer store. But other problems the Byters face use programs written specifically for the task at hand.

What the Byters do with computers is a unifying theme that's carried from Chapter 2 to chapters in the Software Module. Further discussion of their use of prewritten applications packages is found in Chapter 9, for example. Describing a realistic family that students can identify with, discussing the common applications packages family members use, and then following their analyses as they prepare customized programs is an approach unique to *Computer Concepts and Applications*.

Other Features and Learning Aids

Numerous additional features and learning aids are found in *Computer Concepts and Applications*.

- Hundreds of *full-color* photographs, drawings, and illustrations are used to present concepts effectively and demonstrate useful applications. For example, detailed drawings show how the Byter family uses personal computers to run applications packages and solve problems, and a series of photo galleries reveals the broad range of possibilities created by the use of computers today.

- Each chapter opens with an interesting *vignette* that highlights some aspect of its contents. Each vignette is then followed by a *Looking Ahead* section that lists the *learning objectives* for the chapter, and by an *Outline* section that previews its topics.

- *Boxed inserts* are included in each chapter to provide additional applications, cases, and items of interest to support chapter material. These inserts are effective in stimulating discussions. And important new terms and concepts are highlighted in boldface type in the chapter in which they first appear.

- *Feedback and Review* sections are found in every chapter to reinforce reader understanding. Crossword puzzle, scrambled letter, and a variety of other formats are used in these sections, and answers to review material are found at the end of each chapter.

- Readers will also find at the end of each chapter a *Looking Back* section that summarizes the chapter's main points, a *Key Terms and Concepts* listing that includes the chapter page where the term or concept is first mentioned, a number of *review and discussion questions,* a *projects/issues* section that suggests student research topics based on chapter material, and, finally, a *Closer Look* reading that provides additional optional information to stimulate discussion and provide more in-depth coverage of selected subjects.

- Experts in the fields of Government and Law, Health Care, Education, the Humanities, and Science and Engineering were asked to participate in the preparation of the Social Impact Module, and their contributions are included and acknowledged in Chapters 13 through 15.

- A *Glossary* of the terms frequently found in the computer/information processing field is included at the back of the book.

Supplements for Computer Concepts and Applications

Computer Concepts and Applications is more than just a textbook—it's a complete teaching/learning package. Other components of this package include:

- ***Study Guide.*** This student *Study Guide* provides extensive self-tests for each corresponding chapter in *Computer Concepts and Applications*. Each *Study Guide* chapter contains learning objectives; a chapter overview and summary; and varied self-test sections including key term matching, multiple choice, true or false, and completion exercises. Answers for all exercises are

included in the *Study Guide*. The *Study Guide* reinforces and integrates text concepts. It's designed for success—no "tricky" questions have been included intentionally—and it's a straightforward, no-frills, implement written for students, not for teachers. Successfully completing the *Study Guide* exercises should increase the confidence of students at all levels.

- **Software.** To provide students with their own inexpensive software which they can use in practical, hands-on applications and exercises keyed to the text, McGraw-Hill, in collaboration with Ashton-Tate, is making available a special, limited version of Framework, the popular integrated software package, for use with IBM systems and compatibles. Framework, which includes word processing, spreadsheeting, data base management, and graphics, is accompanied by an instruction manual which guides students in its use and provides exercises keyed to the text. For those who want software for the Apple II, McGraw-Hill provides an integrated software package of word processing, spreadsheeting, data base management, and graphics.

- ***Instructors' Manual.*** In addition to sample course outlines and guidance for preparing a syllabus, the *Instructors' Manual* supplies, for each chapter of the text, a chapter overview; teaching objectives; a detailed teaching outline; answers and suggestions for the Topics for Review and Discussion; and comments and suggestions for the Projects/Issues to Consider.

- ***Overhead Transparencies.*** A set of 64 color transparencies serves as a visual classroom aid which can be used to further explain text concepts.

- ***Test Bank.*** This complete set of more than 3,000 questions covers all of the important ideas and definitions in *Computer Concepts and Applications*. For your convenience the test bank is available for use with the computer. *MicroExaminer* allows you to generate tests using your Apple IIc or II+, IBM PC, or TRS 80 microcomputer. Questions can be scrambled into two versions, allowing you to create alternative exams for multiple sections of the same course. You also have the option of adding your own questions to the test bank. *The EXAMINER System* contains a magnetic tape which can be installed in your computer center, and offers the same features as *MicroExaminer*.

- **Slide Package.** A package of 80 slides, many of them not found in the text, is available to adopters. This package includes separate 20-slide presentations on history, computer graphics, a tour of a computer center, and computer applications. A descriptive narrative script is provided for each of the four slide presentations.

Acknowledgments

It's particularly appropriate to conclude this Preface with an acknowledgment section because a colorful package of this scope just doesn't happen without the input of many people. For example, the professionals who responded to research studies, participated in focus groups, and reviewed parts of the manuscript made many useful suggestions and helped shape the content and organization of *Computer Concepts and Applications*. These authorities are listed separately following this Preface.

Another debt is owed to the experts who contributed materials used in the module on Social Impact. These subject matter specialists are Donald F. Nor-

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Preface

MODULE 1: BACKGROUND 2

1 *Let's Get Started* 5
2 *Computers at Work* 51
3 *The Computer Impact* 91

MODULE 2: COMPUTER CONCEPTS, COMPONENTS, AND SYSTEMS 126

4 *Central Processors* 129
5 *Entering Data* 157
6 *Storing Data and Receiving Output* 195
7 *Personal Computers* 239
8 *Data Communications Networks* 273

MODULE 3: SOFTWARE 312

9 *Prewritten Software: Single-Function Applications Programs* 315
10 *Prewritten Software: Integrated Packages, Package Selection, and Operating Systems* 345
11 *Developing Custom-Made Systems* 369
12 *Preparing Application Programs: Practices and Languages* 397

MODULE 4: SOCIAL IMPACT 440

13 *Government, Law, and Health Care* 443
14 *Education and the Humanities* 473
15 *Science, Engineering, and Business* 499

GLOSSARY 526
INDEX 535

CONTENTS

Preface

MODULE 1

BACKGROUND 2

CHAPTER 1
LET'S GET STARTED 5

Opening Vignette The Dawn of a New Age 5

The Need for Computer Literacy | The Purpose of This Book | How This Book Is Organized

Looking Ahead 11

Chapter Outline 11

What's a Computer? 12

Speed and Accuracy Capabilities | Processing Capabilities

Window 1-1 Computer Fingers a Killer 17

Computer System Organization 18

The System Concept | Organization of Computer System Components

The Stored Program Concept: An Example 24

Processing the Beautification Charges

图书馆藏书

Computer Systems Today: Advances, Differences, and Limitations 27

Computer Advances | *Computer Differences* | *Computer Limitations*

Feedback and Review 1 37

Looking Back 38

A Closer Look From Abacus to Personal Computer: Our Debt to the Past 43

CHAPTER 2
COMPUTERS AT WORK ***51***

Opening Vignette The Things People Do 51

Looking Ahead 53

Chapter Outline 53

Organizing Data for Computer Processing 54

What People Do with Computers: An Introduction to Applications 54

The Byter Family | *Input/Output Applications* | *Calculation Applications* | *Text Manipulation Applications* | *Interactive and Batch Processing* | *A Logic/Comparison Application* | *Storage/Retrieval Applications* | *Sequential and Direct Storage and Retrieval*

Obtaining Application Software 78

Prewritten Packages

Window 2-1 Computer Helps Flutie Score Big 79

Development of Custom-Made Software

Feedback and Review 2 83

Looking Back 84

A Closer Look Controlling Your Home by Computer 89

CHAPTER 3
THE COMPUTER IMPACT ***91***

Opening Vignette Asimov Ponders PCs 91

Looking Ahead 93

Chapter Outline 93

Human Thinking and Artificial Intelligence 94

Can Computers Think?

Window 3-1 Artificial Intelligence and "Fuzzy" Thinking 97

AI in Action: Expert Systems

The Impact of Computers on People 99

The Positive Impact | *The Potential Dangers*

The Impact of Computers on Organizations 109

The Information Processing Industry | *The Positive Impact on Using Organizations* | *The Potential Dangers for Using Organizations*

Let's Summarize 116

Optimistic Views | *Pessimistic Views* | *Another View* | *A Recap of This Background Module*

Feedback and Review 3 119

Looking Back 121

A Closer Look Computers and the Handicapped 125

MODULE 2

COMPUTER CONCEPTS, COMPONENTS, AND SYSTEMS 126

CHAPTER 4
CENTRAL PROCESSORS 129

Opening Vignette Biochips 129

Looking Ahead 131

Chapter Outline 131

Primary Storage Concepts 132

Storage Locations and Addresses | *Capacity of Storage Locations*

Coding Data in Storage 135

The Binary Numbering System | *Computer Codes*

Storage Components in the Processor Unit 139

Primary Storage Components of the Past | *Primary Storage Components of the Present* | *Primary Storage Components of the Future* | *Specialized Storage Elements in the Processor Unit*

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