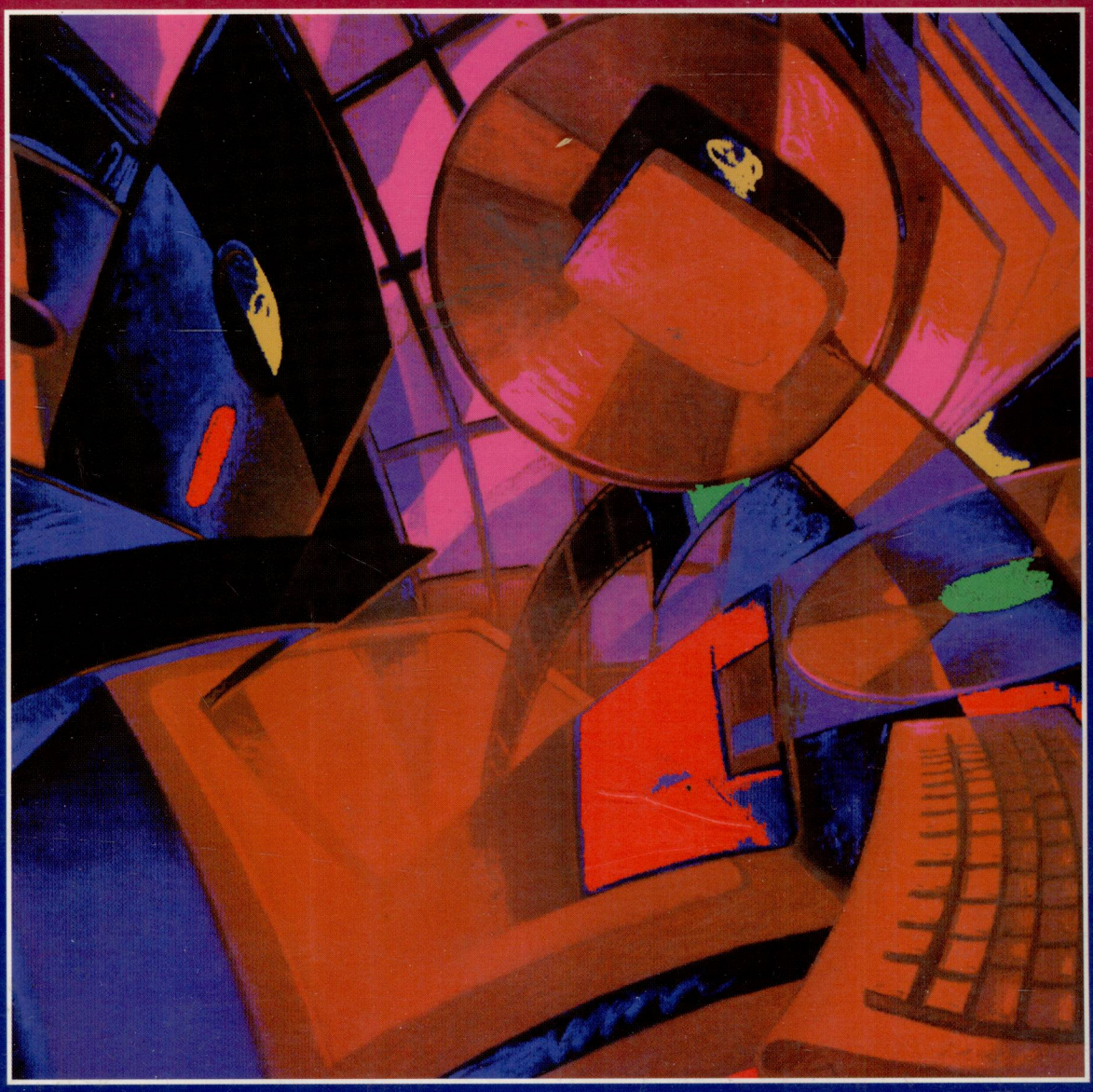
COMPUTER ESSENTIALS

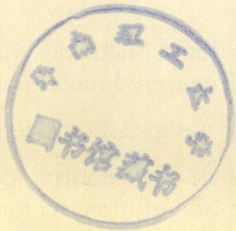


HUTCHINSON
SAWYER

Computer Essentials

Sarah E. Hutchinson

Stacey C. Sawyer



IRWIN
Advantage Series for Computer Education

Burr Ridge, Illinois
Boston, Massachusetts
Sydney, Australia

Associate editor: Rebecca Johnson
Project editor: Stacey C. Sawyer
Production: Stacey C. Sawyer, Sawyer & Williams
Designer: Adriane Bosworth
Cover designer: Michael Rogondino
Cover art: Ardon von Haeger
Artists: GTS Graphics
Compositor: GTS Graphics
Typeface: 10/12 Garamond Light
Printer: Wm. C. Brown

ISBN 0-256-15259-4

Printed in the United States of America

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

Photo credits are on p. xv

Preface

Why We Wrote This Book: Meeting the Needs of Users

Computer Essentials is written for future computer users—people for whom the computer will be an everyday tool for working with reports, spreadsheets, databases, and the like. It is not intended for specialists who will write programs or design computer systems.

We wrote this book in order to provide instructors and students with the most useful information possible for a concise introductory computer course. Specifically, we offer the following five important features.

1. Practicality and Completeness

A textbook, we feel, should above all be *practical and complete.* It should give users all the information they need to understand the basics of information systems and to effectively use a microcomputer at work or at home. Thus we try to avoid the weaknesses we've seen elsewhere of stressing software to the detriment of hardware coverage or of being too encyclopedic. We try to give users just what they need to know to use a computer competently for business or personal purposes.

2. Flexible, Reasonably Priced Software Labs

We realize that students (and instructors) have a great deal of concern about the cost of textbooks. Accordingly, we offer many *reasonably priced,* separately bound software tutorials. These hands-on tutorials from *Irwin's Advantage Series for Computer Education* include the following:

dBASE III Plus
dBASE IV
dBASE for Windows
DOS 3.3
DOS 5.0
DOS 6.0
Excel for the Macintosh
Excel 3.0 for Windows
Excel 4.0 for Windows
Excel 5.0 for Windows
Filemaker Pro for the Macintosh
Lotus 1-2-3 release 2.01 and 2.2
Lotus 1-2-3 release 2.3
Lotus 1-2-3 release 2.4
Lotus 1-2-3 release 3.1
Lotus 1-2-3 for Windows release 1.01
Lotus 1-2-3 for Windows release 4.0
Paradox 3.5
Paradox 4.0/4.5
Paradox 4.5 for Windows
Quattro 1.01
Quattro Pro 3.0
Quattro Pro 4.0
Quattro Pro 5.0 for Windows
QBASIC
System 7.0/7.1 for the Macintosh
Windows 3.1
Word for the Macintosh
Word 2.0 for Windows
Word 6.0 for Windows
WordPerfect 5.1
WordPerfect 5.2 for Windows
WordPerfect 6.0
WordPerfect 6.0 for Windows

Additional tutorials will be added to the series as the need arises.

3. Avoidance of Clutter

Our market research finds that many instructors have become tired of the cluttered, over-illustrated look and style of many introductory texts. Thus, you will not find margin notes, confusing icons, cartoons, and other such distractions here.

Also, we have attempted to use color to enhance content, not overpower it. We use four specific colors to indicate input (red), storage (blue), processing (gray), and output (yellow).

4. Interesting, Readable Style

We are gratified that reviewers have consistently found our writing style praiseworthy. Our primary goal is to reach students by making our explanations as clear, relevant, and interesting as possible.

5. Effective Pedagogy

We have carefully developed our learning aids to maximize students' comprehension and learning:

- *Chapter previews and outlines:* Each chapter opens with a list of chapter objectives, a brief outline of the chapter's content, and an introductory section called "Why Is This Chapter Important?" which explains why the material in the chapter is important to the user.
- *Chapter summaries:* Each chapter concludes with a useful summary section to help students review.
- *Key terms:* All the important terms covered—and the numbers of the pages on which they are defined—appear in a section called Key Terms at the end of each chapter. All key terms are also listed and defined in the glossary in the back of the book.
- *Self-tests and exercises:* Fill-in-the-blank tests, short-answer exercises, and projects test students' comprehension and encourage them to learn more about microcomputers on their own.
- *Career boxes:* One- or two-page boxes show students how computers are used in some common and uncommon ways in business and the professions.
- *Episodes:* Four running-case episodes appear at the back of the book. These episodes—without being overly technical—help the students understand how a computer system is conceived and used in a real business: Professor Pizza.
- *Glossary:* All boldface key terms are included, with their definitions, in the comprehensive glossary at the back of the book. We have also listed many terms that are not included among the key terms but that might crop up in students' readings.

Supplements That Work

It's not important how many supplements a book has but whether they're truly useful, accurate, and of high quality. We offer a number of supplements that you will find useful.

- *Instructor's Resource Manual with Transparency Masters*, prepared by Phil Koneman, Colorado Christian University (text available also on DOS or Windows disk). This supplement contains:

  —Course planning guidelines
  —Chapter outlines
  —Lecture notes
  —Teaching tips
  —Suggestions for using transparencies and transparency masters
  —Approximately 100 transparency masters

- *Color Transparencies*

  —65 full-color overhead transparencies of key illustrations and tables are available to qualified adopters.

- *Test Bank*, prepared by Anne Breene, Texas A&M

  —True/false, multiple choice, fill-in-the blank questions graded in difficulty
  —Sample midterm exam
  —Sample final exam
  —Answers to test questions

- *Irwin's Computerized Testing Software: Computest 3*

  —This computer-based test bank is available to qualified adopters.

- *Videos*

  —These 21 videos are from the acclaimed PBS series, Computer Chronicles. Each video is approximately 30 minutes long. The videos cover topics ranging from computers and politics to CD-ROM and visual programming languages.

Customer Designed Solutions (CDS)

The preceding supplements are available with Hutchinson/Sawyer, *Computers and Information Systems: 1994-1995 Edition* and/or *Computer Essentials*.

In addition, Irwin is proud to offer adopters an exciting new *customization* program. Now it's possible to order chapters from either text in a sequence that best fits the needs of your course. You may also order a *combination* of chapters from both texts. In addition, you may order an array of lab manuals (see above) from the Irwin Advantage Series to accompany any customized text.

Your custom product will be spiral bound and shipped to your bookstore approximately six weeks from the time you place your order. The only limitation to an order is that the custom text not exceed 1.75 inches. For more information about CDS, please contact your local Irwin representative or Faculty Service at 1-800-323-4560.

Acknowledgments

We're grateful for the assistance of our editor, Rebecca Johnson, who served in an invaluable capacity to guarantee the quality control of this book and to organize the many complicated pieces of a customized publishing program. In addition, we thank Micky Lawler for her careful line-by-line analysis of all our books.

We are also grateful to our many reviewers, who provided helpful comments over the course of several drafts. In particular, we thank the following people, who reviewed all or portions of this revised edition:

Teresa Adelson, Catherine College
Cathi Chambey-Miller, Aiken Technical College
Robert E. Collins, DeVry Institute of Technology
Virginia R. Gibson, University of Maine
Diane Graf, Saint Xavier University
Don Hutchinson, Independent Software Developer
Kenny Jih, University of Tennessee at Chattanooga
William A. Newman, University of Nevada/Las Vegas
Dick Ricketts, Lane Community College
Jerry Post, Western Kentucky University
Fred Ramos, Oklahoma City University

In addition, we are appreciative of the efforts of the photo researcher, Judy Mason; the copyeditor, Patterson Lamb; and proofreaders Susan Lyon and Martha Ghent—whose work significantly improved the quality of this book. The staff at GTS Graphics, typesetter and producer of the illustrations—especially Elliott Derman and Daniel Casquilho—are at the top of their field of electronic typesetting and graphics services.

Finally, we thank our cohort in computer book publishing, Brian Williams, for all his expert advice—at least for the advice that we took.

Write to Us

Finally, we need to know: Was this book truly useful to students? We'd like to hear from you about any improvements we might make. Write to us in care of our publisher, Richard D. Irwin.

Sarah E. Hutchinson
Stacey C. Sawyer

Contents in Detail

Photo credits

Figure 1.1 (a) © J. Pickerell/The Image Works; **1.1 (b)** © Dion Ogust/The Image Works; **1.1 (c)** © Laima Druskis/Stock, Boston; **1.1 (d)** Courtesy of Hewlett Packard; **1.3** © Giandomenico & Fiore/courtesy of UNISYS Corp.; **1.5** courtesy of Apple Computer, Inc.; **1.7** courtesy of Sun Microsystems; **1.14** Key Tronic; **1.15** courtesy of IBM; **1.17** courtesy of Digital Equipment Corporation; **1.19** (top) courtesy of Compaq; **1.19** (bottom) John Greenleight/Apple Computer, Inc.; **1.20** (left and right) courtesy of Hewlitt Packard; **1.21** Monkmeyer Press/Collins; **1.22** courtesy of Compaq; **1.23** © Rick Kopstein/Monkmeyer Press; **1.24** © Ed Kashi/Phototake NYC; **1.26** © Rick Kopstein/Monkmeyer Press; **2.2** © Peter Menzel/Stock, Boston; **2.3** © B.Daemmrick/ The Image Works; **2.5 (a)** © Toav Levy, Phototake NYC; **2.5 (b)** © Susan van Etten/Monkmeyer Press; **2.5 (c)** © Valrie Massey/Photo 20-20; **2.6** SCANTRON; **2.8 (b)** © David Wells/The Image Works; **2.9 (a) (b)** courtesy of Hewlett Packard; **2.9 (c)** courtesy of Caere; **2.9 (d)** courtesy of Nikon Electronic Imaging; **2.10** © Jim Pickerell/Stock, Boston; **2.11** MLS/A for Kurzweil AI; **2.14** TrackMan; **2.15** Microtouch Systems, Inc.; **2.16** © Charles Gupton/Stock, Boston; **2.17** © Matthew Borkowski/Stock, Boston; **2.18** AST Research; **2.19 (a)** © David Young-Wolff/PhotoEdit; **2.19 (b)** © Tony Freeman/PhotoEdit; **2.23** © The Image Works Archives; **2.24 (b)** © Haramaty Mula/Phototake NYC; **2.26** © The Image Works Archives; **2.29 (a)** © David Young-Wolff/PhotoEdit; **2.29 (b)** Monkmeyer Press/Collins; **2.34 (b)** Monkmeyer Press/Collins; **2.34** (c) courtesy of Quantum; **2.35** (top, bottom) IBM, Corp.; **2.37** © Jeffrey Dunn/Monkmeyer Press; Inc.; **2.38 (c)** Comstock; **2.38 (c)** NEC Technologies; **2.39** courtesy of Tallgrass Technologies; **2.40 (b)** courtesy of IBM, Corp.; **2.42** (left) John Greenleigh/Apple Computer, Inc.; **2.42** (right) NEC Technologies, Inc.; **2.43 (a)** John Greenleigh/Apple Computer, Inc.; **2.43 (b)** Toshiba; **2.44** Mike Kagan/Monkmeyer Press; **2.46** Hewlett Packard; **2.47** © Richard Pasley/Stock, Boston; **2.48** Courtesy of Hewlett Packard; **2.49 (a, b)** courtesy of Houston Instruments; **2.49 (c)** Versatec; **3.5** © Richard Pasley/Stock, Boston; **3.11** © Peter A. Simon/Phototake NYC; **3.12 (a)** David Parker, Science Photo Library/Photo Researchers, Inc.; **3.12 (b)** Gamma Kurita; **3.13** Comstock; **4.8** courtesy of AT&T; **4.9** (top) courtesy of Codex; **4.9** (bottom) Hayes; **4.10 (b)** The Image Works Archives; **4.13** © Chris Andrews/Stock, Boston; **4.14** Codex; **4.15** Charles Gupton/Stock, Boston; **4.16** © Hank Morgan/Photo Researchers, Inc.; **4.26** © Apple Computer, Inc.; **6.6** © Roger Foley/Photo Researchers, Inc.; **8.2** (left) IBM Corp.; **8.2** (right) Compaq Computer Corp; **8.3** Apple Computer Corp.; **8.4** Apple Computer Corp.; **8.6** © Monkmeyer Press/Collins; **8.7 (a, b)** © The Image Works Archives; **8.8** courtesy of IBM, Corp.; **8.11** Kinesis Corp.

Contents in Brief

CHAPTER

1

Overview of the Computer: The Power Tool for Your Future

Most employers do not expect potential employees to be computer experts. However, many expect them to be prepared to use computers as everyday tools *to solve job-related problems. Two questions a job seeker being interviewed may be asked today are, "What do you know about computers?" and "What kind of software are you familiar with?" The more you know about computers, the better you'll be handle such questions—and the more effective you'll be in your career.*

PREVIEW

When you have completed this chapter you will be able to:

- Define what it means to be computer literate and computer competent
- Describe the four main types of computer systems
- Explain what a computer system is by focusing on hardware, software, data/information, procedures, people, and connectivity
- Briefly describe the four phases of a computer-based information system: input, processing, output, storage
- Name the three main parts of a microcomputer system
- Distinguish between batch and on-line processing
- Describe how data is organized in a computer system
- Briefly describe the five generations of computer development
- Discuss the difference between general computer users and several types of computer professionals

Why Is This Chapter Important?

The automatic teller machine. The supermarket checkout scanner. The library on-line book-search system. The cheerful but mechanical-sounding telephone voice that tells you "Please hang up and dial your call again."

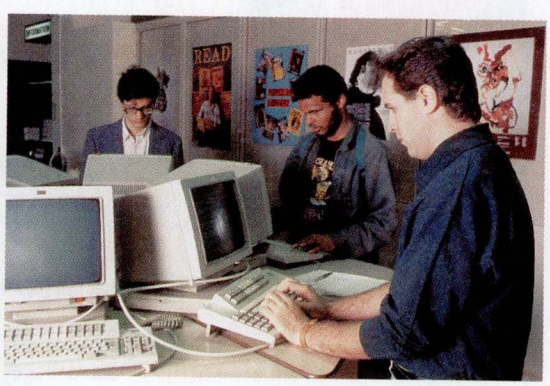
These are all special-purpose computer devices. If you did not come in contact with one of these today, no doubt you encountered something similar. Like most people, then, you are already a computer user, interacting directly or indirectly with these devices several times a day. (See Figure 1.)

We assume you're reading this book, however, because you want to become a true computer user—to become "computer literate" and "computer competent." You want to go beyond pushbuttons and artificial voices and learn to use this technology as a problem-solving tool in your own career. This chapter will start you on your way by giving you a brief overview of computers, computer systems, and data processing. Subsequent chapters will cover these topics in greater detail.

Chapter Topics

Becoming Computer Literate and Computer Competent
▼
Types of Computers: Supercomputers, Mainframes, Minicomputers, Microcomputers
▼
What a Computer System Is: Parts and Phases
▼
Batch and On-Line Processing
▼
Hardware
▼
Software
▼
Data and Information
▼
Procedures
▼
People: Users and Computer Professionals
▼
Connectivity
▼
The Evolution of Computers


(a)



(b)

(c)


(d)

Figure 1

Computers in daily life. As these commonplace examples show, today it is almost impossible to avoid using a computer. (a) shopping with a bank card; (b) using a computer to locate books at a New York public library; (c) using an automatic teller machine (ATM); (d) monitoring and analyzing a tennis game.

Becoming Computer Literate and Computer Competent

***Computer literacy* is having an understanding of what a computer is and how to use it as a resource.** Literacy, which is understanding, needs to be distinguished from competency, which is having a skill. ***Computer competency* is having some skill with a computer so that you can use it to meet your information needs and improve your productivity.**

To help you achieve this kind of competence, we will help you learn the following:

- *Terms:* You should master the terminology used to describe computers and their operations.
- *Functions:* You should learn the functions of the parts of a computer system.
- *Uses:* You should learn how to use a computer to produce the information or perform the tasks you need done.

Types of Computers

A *computer* is a device made of electronic and electromechanical parts. The word *electromechanical* means both electronic and mechanical.

At present, computers come in four basic sizes and shapes. (*See Table 1.*) They are:

1. Supercomputers
2. Mainframes
3. Minicomputers
4. Microcomputers

TABLE 1

The Four Kinds of Computers*

	MICROCOMPUTER	MINICOMPUTER	MAINFRAME	SUPERCOMPUTER
Main memory (RAM)	512,000–32,000,000 characters	8,000,000–50,000,000 characters	32,000,000–200,000,000 characters	100,000,000–2,000,000,000 characters
Storage	360,000–300,000,000 characters	120,000,000–1,000,000,000+ characters	500,000,000–? characters	No limitation
Processing speed	700,000–10,000,000 instructions per second	8–40 mips†	30 mips and up	200 mips and up
Cost	$500–20,000	$10,000–$475,000	$250,000 and up	$10,000,000 and up

*The figures in this table represent average approximations. These numbers change rapidly as changing technology blurs the distinctions between categories.

†mips = million instructions per second

Supercomputers

FIGURE 2

Supercomputer. Cray supercomputer.

***Supercomputers* are the largest and most powerful kinds of computers, costing millions of dollars.** (*See Figure 2.*) They are generally owned by large organizations and are used principally for research, oil exploration, weapons development, or weather forecasting. A supercomputer is maintained in a special room or environment and is about 50,000 times faster than a microcomputer. You probably would have contact with a supercomputer if you worked in the areas of defense and weaponry, weather forecasting, or scientific research; at one of several large universities; or for the National Aeronautics and Space Administration.

Mainframes

***Mainframe computers* are large computers costing up to $10 million that can process billions of characters of data.** (*See Figure 3.*) They are used by banks, airlines, universities, government agencies, and other large organizations. The mainframe computer, which required a special room with air conditioning, was the backbone of the computer industry for many years. Today, however, its popularity has declined as smaller-size desktop computers, often hooked together in networks, have gained in power and speed.

FIGURE 3

Mainframe computer. Unisys mainframe (behind the people).

Minicomputers

***Minicomputers* are computers costing thousands of dollars that are smaller than mainframes in processing speeds and data-storing capacities**. (*See Figure 4.*) Until recently, these refrigerator-size devices were frequently used in medium-size companies or in divisions of large companies for special tasks, such as accounting or certain manufacturing activities. The use of minicomputers is declining as microcomputers become more powerful.

Microcomputers

***Microcomputers* are small computers costing only a few hundred or few thousand dollars.** (*See Figure 5.*) This is the type of computer you will no doubt use. A 1992 survey found that 85% of a sampling of U.S. workers and 88% of Canadian workers use a microcomputer on the job.

Microcomputers are of two types, personal computers and workstations.

FIGURE 4

Minicomputer. Vax 6000.

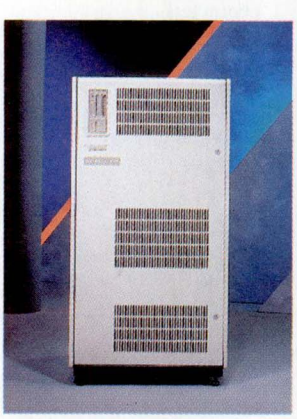


FIGURE 5

Microcomputer. Macintosh Classic II.