INTRODUCTION TO COMPUTERS AND INFORMATION SYSTEMS WITH HANDS-ON SOFTWARE TUTORIALS

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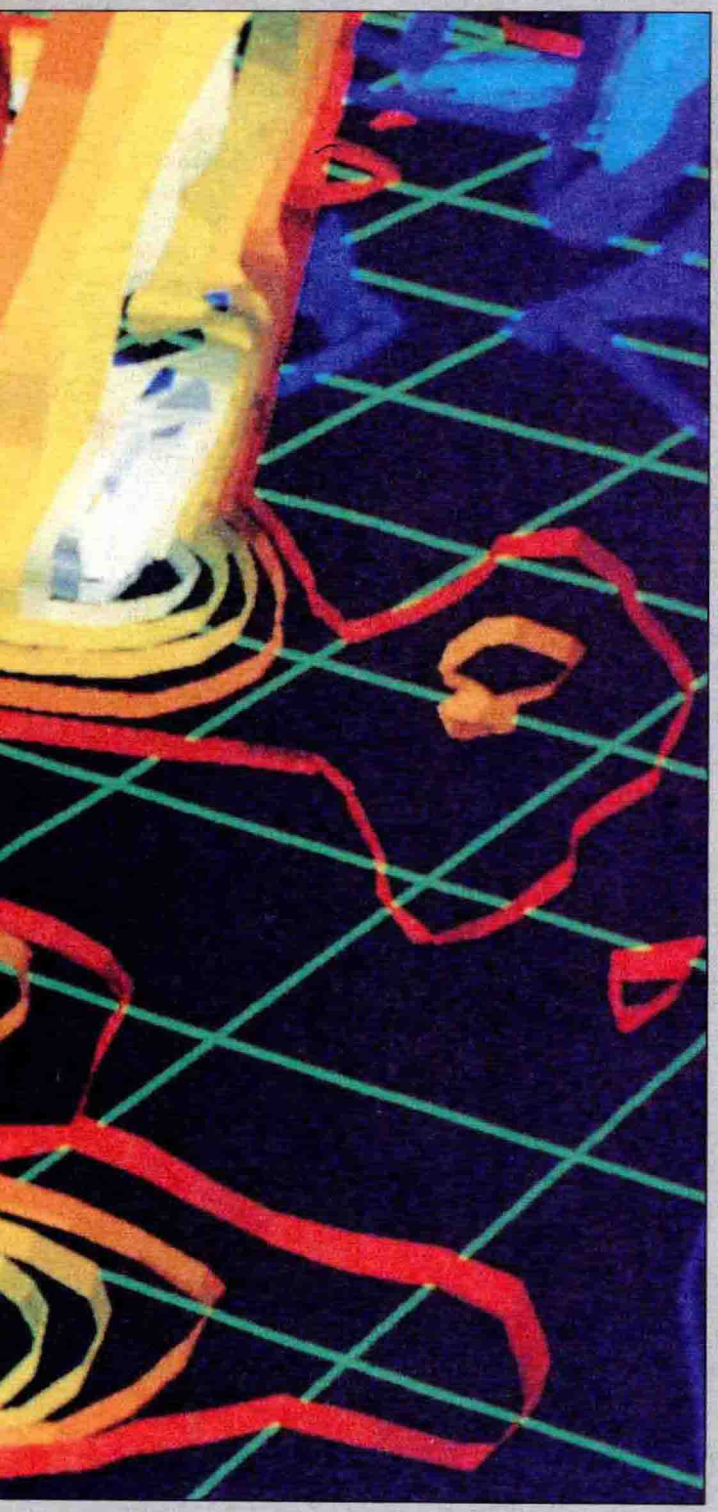

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Macmillan Publishing Company
New York

Collier Macmillan Canada, Inc.
Toronto

Maxwell Macmillan International Publishing Group
New York Oxford Singapore Sydney

Cover art copyright 1989 J. P. Thirion—LIENS/CNRS (Paris)

Executive Editor: Vernon R. Anthony
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This book was set in Meridien and Univers.

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Printed in the United States of America

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Macmillan Publishing Company
866 Third Avenue, New York,New York 10022

Collier Macmillan Canada, Inc.

Library of Congress Catalog Card Number: 90–63571
International Standard Book Number:
0–675–22184–6
Printing: 1 2 3 4 5 6 7 8 9 Year: 1 2 3 4

Photographs without specific credits following their captions are by Macmillan Publishing/Cobalt Productions.

Part opening quotations: Part One (p. 1), Asimov, Isaac. "Asimov Ponders PCs." *PC World.* (September 1985): 190. Part Two (p. 161), Diebold, John. "Rethinking Automation." *Computerworld.* (3 November 1986): 124. Part Three (p. 289), Ritchie, David. *The Binary Brain: Artificial Intelligence in the Age of Electronics.* (Boston: Little, Brown, & Co., 1984): 196. Part Four (p. 399), Case, John. *Digital Future: The Personal Computer Explosion—Why It's Happening and What It Means.* (New York: William Morrow & Co.,1985): 177. Part Five (p. 603), Kurzweil, Raymond. "The Second Industrial Revolution." *Computerworld.* (3 November 1986): 58.

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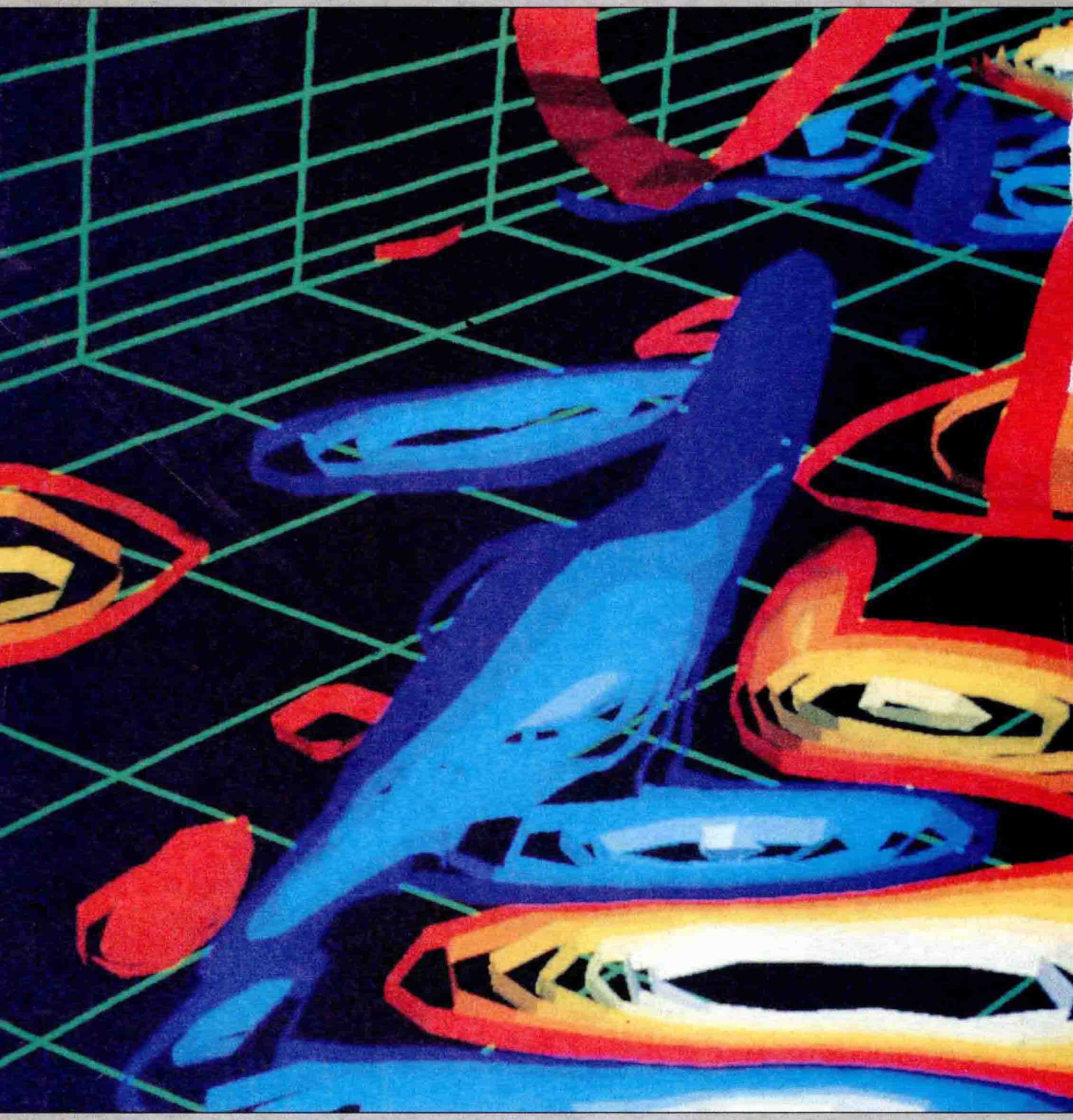
Chapter opening artwork courtesy of: Alias Research Corporation, pp. 125 (top), 322, 365 (top), 583 (bottom), 637 (bottom); Autodesk, Inc., pp. 2 (top), 46 (bottom), 290, 291, 509, 547 (top); Luz Bueno, Berkeley, California, pp. 3 (bottom), 162, 163 (bottom), 401 (bottom); Sheriann Ki-Sun Burnham, p. 479 (bottom); Fractal landscape generated by computer from the decimal expansion of pi, Gregory and David Chudnovsky, Columbia University



Department of Mathematics, p. 583 (top); Tracy Colby, p.479 (top); Cognivision, Inc. using FOTO, pp. 80, 81; D. Cox/S. Meyers/D. Sandin/E. Sandor, Electronic Visualization Laboratory, University of Illinois at Chicago, p. 243 (bottom); Phil Cunningham, Purdue University CADLAB, p. 3 (top); David S. Ebert, Department of Computer Science, The Ohio State University, p. 323 (bottom); David Goodsell, Research Institute of Scripps Clinic, p. 582 (top); Monica Granfield, p. 636 (bottom), Stephen Harrison and Jorge Stolfi, Digital Equipment Corporation, pp. 400 (bottom), 478 (bottom), 605 (top); John Hart, p. 47 (bottom); Bruce Lindbloom, DuPont and Fujifilm Electronic Imaging Company, Dicomed Division, p. 400 (top); Lasergraphics, Inc., pp. 2 (bottom), 124 (top), 204, 205, 323 (top), 365 (bottom), 401 (top), 439 (top), 438 (bottom), 508 (bottom), 546, 547 (bottom), 604 (bottom); Gregory MacNicol, p. 637 (top); Marsha J. McDevitt, Advanced Computing Center for the Arts and Design, The Ohio State University, p. 243 (top); NASA Ames Research Center, pp. 242 (top), 439 (bottom), 636 (top); Thomas C. Palmer, National Cancer Institute, 47 (top); Catherine Pelachaud, Richard Quach, and Jean Griffin, University of Pennsylvania, p. 163 (top); S. K. Robinson/K. C. Hu/P. R. Spalart, NASA Ames Research Center, pp. 438 (top), 508 (top), 582 (bottom); Judson Rosebush and Gail Goldstein, p. 364 (top); Randi J. Rost, p. 364 (bottom); Bob Sabiston, Visible Language Workshop, MIT Media Lab, p. 605 (bottom); Robert Skinner, UCSC, p. 46 (top); Michelle Tsui, Digital Equipment Corporation, p. 604 (top); Frances Valesco, p. 478 (top); John S. Willette/Emerald City, p. 124 (bottom); and Wasatch Computer Technology, pp. 125 (bottom), 242 (bottom).

Profile artwork courtesy of: Luz Bueno, Berkeley, California.

Title page artwork courtesy of: S. K. Robinson/K. C. Hu/P. R. Spalart, NASA Ames Research Center.

To Laura for her love and friendship, and for making it all worthwhile, and to my loving parents

R. A. S.

For the truly meaningful part of my life, my wife Sue and children Paul, Stacy, and Michael

D. P. S.

To Edward, Erin, Jason, and Rachel who lovingly encouraged and supported me throughout this project

N. A. M.

For the Chip in my main memory and my dear Mother "bored"

D. M. P.

PREFACE

On the premise that information is essential to survival and that computers are essential to the best use of information, this book explains how computers and information systems work, where they work, and how they affect the physical, political, and ethical environment of society. This work reflects our commitment to students and their need to prepare for the demands of the information age. Whether a student wishes simply to understand the use of computers and the role they play in today's world, or to work with computers to manage information in his or her own life, or to design information systems, this text offers a comprehensive, up-to-date look at computers and their considerable impact.

Note to the Student

Computers *will* be an important part of your future, whether in your personal life or at your workplace. Some experts think that if you do not know how to use a computer, you eventually will be just as handicapped in performing your job as the person today who cannot read.

To be computer literate, you must know not only who uses computers, but also how and where they can be used, the tasks they perform, how they affect our society and economy, and how to use them to benefit your own life and career. If you are taking this course to familiarize yourself with the world of computers, *Introduction to Computers and Information Systems with Hands-On Software Tutorials* is an interesting and informative guide on your journey to computing literacy. If you intend to become a computer professional, this book gives you the broad-based background you need to pursue more advanced coursework.

Long after you have completed this course, this book will remain a handy reference. When you select and purchase your own personal computer system, you can use the consumer information and checklists in the Infomodule "A Buyer's Guide" on pages 193–203. The chapters on pop-

ular application packages will provide additional information when you are ready to evaluate and select your own software. After you have purchased your computer system, the Infomodule on pages 153–58, "The Care and Handling of Microcomputers," will provide numerous tips. The consumer information found in the Infomodule "Electronic Networks" on pages 279–286 describes networks, commercial databases, and information services that you may want to use in your academic research, in your work, or for your personal interest.

Appendix C, Getting Started on the MS-DOS Operating System, can be used to review the basics of the DOS operating system. Appendix D, Working With Lotus 1-2-3 Version 2.2; Appendix E, Working with dBASE III Plus; and Appendix F, Working with WordPerfect 5.1, can be used to review and reinforce your knowledge of these software packages.

Computers in Preparation of This Text

The existence of this textbook confirms the relevance and importance of the new technologies of the information age. From the contract negotiation stage, when the publisher ran computer budgeting and production analysis, to the drafting, revising, and typesetting of the manuscript, the computer was a team member.

The image on the cover was created using state-of-the-art computer graphics equipment, and computer-generated graphics appear on all pages that begin each part and chapter. Computers even enhanced the color in many photographs.

The manuscript was prepared using microcomputers and word-processing software. It was then sent on floppy diskettes to the editor for copyediting. After these changes were made, the manuscript was transmitted electronically through telephone lines to a compositor's larger computers and typesetting equipment located in another state. There, exact margins were set and text lines were justified. Then, the text was retransmitted electronically to the publisher for further corrections. Final composition of the pages was executed on computer, and pages were printed out for editorial review. Final film was sent to the printer, and computer-controlled presses produced the finished book. Finally, computers were key players in the sale and distribution of the book.

While computers played an important role in the preparation of this text, so did a talented group of publishing professionals. Computers and people working together made this book possible.

Key Features of the Text

To present thorough coverage of concepts, hardware, software, computer systems, information systems, and related topics that educators have indicated are important, we have included these key features:

- **Unique organization,** through the use of subchapters called Infomodules, which allow for flexibility and expandability in structuring a course.

- **Readability** at the appropriate level, and a conversational writing style to hold the student's interest.
- **Sound and effective pedagogy** designed to facilitate student understanding and interest in the subject matter.
- **Current examples** of computer applications that relate concepts to actual situations.
- **Comprehensive coverage** which, beyond the usual core coverage, includes discussions of contemporary issues such as:
  - Artificial intelligence, neural networks, and artificial reality
  - Expert systems
  - Work monitoring
  - Robotics
  - Legal issues, computer-related legislation, and ethics
- Trends in new chip technologies, optoelectronics, parallel processing, and communication
- Object-oriented programming language, object-oriented databases, and computer-assisted systems engineering (CASE).
  - Popular types of application packages
  - Increasing use of communication technology
  - Increasing use of networks, commercial information services, and database services by professionals, organizations, businesses, and home users
  - Increasing home use of computers and helpful microcomputer and software buyers' tips
  - Career information about computer professions and about noncomputer professions that use computers
  - Structured programming concepts
  - The BASIC programming language
- **Software tutorials**—that give the student hands-on practice with the DOS operating system and today's most popular application software packages—Lotus 1-2-3, dBASE III Plus, and WordPerfect.
- **Written for everyone**—not only introductory-level students who may be interested in continuing their study of computers and information systems as a career, but also for those who plan to enter noncomputer fields.

Pedagogy

The following pedagogical devices were chosen with both student and instructor in mind:

- **Chapter objectives** alert students and instructor to the major points or concepts to be gleaned from the chapter.
- **Chapter outlines** preview chapter topics and organization so students can see the relationships among the topics covered.
- **Profiles** acquaint students with people who have made major contributions to the information age.
- **Highlight boxes** focus on current computer uses and issues.

- **Sidebars,** placed in the margin near relevant text, reiterate key points and serve as memory joggers.
- **Summaries** review major concepts in the chapter.
- **Vocabulary Self-Tests** spotlight words that are important to understanding the material. These words are boldfaced in the text and listed alphabetically at the end of the chapter or Infomodule with text page numbers for reference and review. They are also listed in the glossary.
- **Review questions** check the student's understanding of the main topics in the chapter. They appear at the end of each chapter as a self-test comprised of about 30 questions.
- **Infomodules** provide significant coverage of special-interest topics. These subchapters (one per chapter) offer flexibility in structuring course content. Most include key terms in boldface as well as review questions.
- **Glossary** a handy reference at the end of the book, defines all of the key terms.
- **Index** is a detailed guide to text and Infomodule topics. The number of the page on which a key term is defined is boldface.

Finally, full-color functional illustrations and over 220 photographs clarify concepts, depict applications, and show equipment.

Comprehensive Coverage

The text includes several chapters on hardware, software, information systems, application software, ethics and social concerns, and trends. Also discussed are basic concepts and the ways in which these concepts are integrated into work situations, personal business, school activities, and leisure-time activities.

Because microcomputers are the easiest to use, and because most people will encounter them (rather than larger systems) in their daily lives, we have included significant microcomputer coverage throughout the text.

Instruction and hands-on practice are provided for DOS, Lotus 1-2-3, dBASE III Plus, and WordPerfect in Appendices C, D, E, and F, respectively.

Expandability/Flexibility

The most unique feature of this text is the series of subchapters called Infomodules. These enable instructors to modify courses by expanding or deleting according to time constraints and individual preference. The Infomodules present succinct but significant coverage of additional topics, such as computer evolution, number systems, hypertext and multimedia, desktop publishing, expert systems, legislation, and electronic networks. Infomodules include key terms (if any) and review questions so the material can be treated as separate chapters. If preferred, the material can be assigned as outside reading.

Organization

The text is divided into five parts:

- Part One (Chapters 1 through 4) is an overview of computers
- Part Two (Chapters 5 through 7) describes computer systems
- Part Three (Chapters 8 through 10) explains information systems and file and database concepts
- Part Four (Chapters 11 through 16) describes popular application packages
- Part Five (Chapters 17 and 18) examines social concerns and trends.

Here is a quick look at the topics discussed in each chapter and Infomodule.

Chapter 1, "Computers in Your World," introduces computers, gives examples of where they are used, and briefly explains how they work, what they can and cannot do, and the need to become computing-literate. **Infomodule, "A History of Computers,"** provides a summary of events, significant people, and their contributions throughout the history of computers and computing.

Chapter 2, " The Central Processing Unit," overviews the internal design and operation of the central processing unit. It also explains data representation. **Infomodule, "Number Systems,"** describes various number systems used to represent data, including the binary system used in computers.

Chapter 3, "Input and Output," explains input and output concepts and describes devices for both large and small computer systems. **Infomodule, "The Value of Information,"** discusses the importance of information in today's world, sources of information, management of information, and the ways in which the value of information is determined.

Chapter 4, "Secondary Storage and File Organization," describes various secondary storage media and ways to organize and access data on media. **Infomodule, "The Care and Handling of Microcomputers,"** offers microcomputer owners many helpful tips on maintaining and protecting systems and data.

Chapter 5, "Large Computers and Microcomputers," describes computer systems, gives criteria for classifying large computers, describes the popularity of microcomputers, and presents a brief history of the microcomputer industry. **Infomodule, "A Buyer's Guide,"** offers suggestions for selecting and purchasing hardware and software for a microcomputer system.

Chapter 6, "Computer Software," describes systems and application software, emphasizing operating systems and their importance. **Infomod-**

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ule, "Programming Languages: Software Development Tools," looks at different levels of computer programming languages; introduces the latest programming techniques, including object-oriented programming; and lists criteria for choosing a programming language.

Chapter 7, "Data Communication," explains how data are transferred from one computer to another and describes applications of data communications. It also explains local-area networks, wide-area networks, topologies, and distributed data processing. **Infomodule, "Electronic Networks,"** describes networks that a computer can access with communication software. Those discussed include bulletin boards, electronic mail, information services, commercial database services, and videotext services.

Chapter 8, "Overview of Information Systems," defines information systems and describes transaction processing systems, management information systems, decision support systems, and executive support systems. **Infomodule, "Computers and Information Systems in Manufacturing,"** focuses on computers as an integral part of the design and manufacturing processes. It includes coverage of computer-integrated manufacturing (CIM), computer-aided design and computer-aided manufacturing (CAD/CAM), computer-numerical control, robotics, and programmable controllers.

Chapter 9, " The System Development Life Cycle," describes steps in a system life cycle. **Infomodule, "The System Life Cycle in a Small Business,"** shows how these steps might be implemented in a small business.

Chapter 10, "File and Database Processing," describes the use of files and databases. It includes coverage of file management systems, database management systems, database models, and concerns for developing and managing a database. **Infomodule, "Knowledge-Based (Expert) Systems,"** describes the evolution, components, and operation of expert systems.

Chapter 11, "Introduction to Application Software for Microcomputers," introduces the five major application software programs and distinguishes among the various types of integrated packages. It also describes several features common to most application software. **Infomodule, "The Automated Office,"** discusses the use of computers and information technology within the office environment, including ergonomics.

Chapter 12, "Word Processors," describes the uses and features of a typical word processor. **Infomodule, "Desktop Publishing,"** describes the growing interest in and the facets of that technology—the process, hardware, and software.

Chapter 13, "Data Managers," describes the uses and features of a typical data manager. **Infomodule, "Hypertext and Multimedia,"** looks at software that allows text, graphs, pictures, sound, and video to be combined into one application.

Chapter 14, "Spreadsheets," describes the uses and features of a typical electronic spreadsheet. **Infomodule, "Computers in Business,"** describes a variety of computer applications in the business environment.

Chapter 15, "Graphics for Microcomputers," describes the types of, applications for, and features of typical graphics software. **Infomodule, "Computer Graphics in Use,"** looks at popular and interesting uses of graphics.

Chapter 16, "Microcomputer Communications," describes the uses and features of typical communications software. **Infomodule, "Case Study: Putting It All Together,"** shows typical ways in which application software programs are used in a small business. Data from several applications can be integrated for multiple purposes.

Chapter 17, "Social Concerns," discusses major social concerns including privacy of personal data, computer crimes, electronic work monitoring, health and safety, and computer ethics. **Infomodule, "Legal Issues and Legislation,"** discusses responsibility and liability for computer errors and incorrect information. It also presents software reliability, copyright infringement, and a table of some computer-related federal legislation.

Chapter 18, "Computers in Your Future," looks at some technological trends—chip technologies, neural networks, artificial reality, parallel processing, and optoelectronics. It also discusses some societal trends, the emergence of a "global village," and progress and competition at the international level. **Infomodule, "Careers in an Information Age,"** describes major computer-related professions and discusses how computers affect other jobs and professions.

Appendix A, "Structured Programming Concepts," covers structured programming concepts, including top-down design, the qualities of a good program, and the importance of documentation.

Appendix B, "The BASIC Programming Language," introduces BASIC.

Appendix C, "Getting Started on the MS-DOS Operating System," covers the basic commands used with this operating system.

Appendix D, "Working with Lotus 1-2-3 Version 2.2" covers the basic functions of spreadsheet programs, and provides hands-on practice.

Appendix E, "Working with dBASE III Plus," covers the basic functions of this data-manager program and provides hands-on practice.

Appendix F, "Working with WordPerfect 5.1," covers the basic functions of this word processing program and provides hands-on practice.

The Instructional Package

- **Instructor's Resource Manual** contains chapter-by-chapter lecture outlines, answers to all questions in the text, suggestions for using alternative instructional material, and a list of sources for additional reading. For instructors who prefer to use an integrated software package, the manual includes an explanation of how Microsoft Works can be used with the text; 100 questions on Works are included in the Computerized Test Bank. An ASCII disk copy of the manual is included, to allow instructors to modify material and add their own teaching notes. In addition, an electronic disk copy of transparencies is included, along with a display show for ease of use in the classroom.
- **Computerized Test Bank** includes 3,000 true/false, short answer, multiple choice, and fill-in questions. All questions are coded with the chapter or Infomodule number and organized by objective. This versatile test bank program allows the instructor to generate tests, edit existing questions, and add new questions.
- **Printed Test Bank** is a hard-copy version of all 3,000 questions in the computerized test bank.
- **Transparency Package** consists of overhead transparencies that illustrate concepts presented in the text.
- **Electronic Transparency Package** utilizing the Harvard Graphic "Screenshow" allows instructors to present transparencies in the classroom using their PC.
- **Studyguide for the Student** is a learning aid to the student that includes drill and practice exercises, supplemental chapter notes, and case studies for application of concepts learned. Included are software tutorials on DOS, WordPerfect 5.1, Lotus 2.2, and dBase III PLUS.
- **Data Diskettes** are files that save keyboarding time for instructors and eliminate the possibility of introducing incorrect data during rekeyboarding.
- Videotapes can be purchased by adopters of *Introduction to Computers and Information Systems with Hands-On Software Tutorials* directly from American Micro Media at a discounted rate:

  "Electronic Words"—Word Processing and Microcomputers

  "Keeping Track"—Database Management and Microcomputers

  "Computer Calc"—Electronic Spreadsheets and Microcomputers

  "Computer Talk"—Microcomputer Communications

  "Computer Images"—Computer Graphics

Reviewers

We wish to thank the following people who reviewed the manuscript and provided thoughtful and helpful suggestions for *Introduction to Computers and Information Systems with Hands-On Software Tutorials:* Sydney Bennett, Nashville State Tech.; Diane Delisio, Miami University-Middletown; Kevin Duggan, Midlands Technical College; Richard Ender, University of Alaska; James Gatza, Insurance Institute of America; Judy Hill, Purdue University-Calumet; Sharon Hill, Prince George Community College; William Harrison, Oregon State University; Richard Hatch, San Diego State University; Carl Hommer, Purdue University North Central; Jim Kris, Cuyahoga Community College-Western; Diane Larsan, Purdue Calumet; Chang Yang Lin, Eastern Kentucky University; Roy McCormick, Ball State; Dennis McNeal, Delta College; Ron Mummaw, Antelope Valley College; Jon Persavich, Kennebec Valley Vo. Tech.; Leonard Presby, William Paterson State College; Al Schroeder, Richland College; Dorothy Smalley, Arizona Western; Lou Squyres, DeKalb College; Wanda Staggers, Anderson College; John Stewart, Grand Valley State University; Tim Sylvester, College of Dupage; Ralph Szweda, Monroe College; Murrat Tanik, Southern Methodist University; Pat Tormey, UW Madison; Marianne Vakalis, Western Michigan University; Jane Varner, Montgomery College; Thomas Voight, Franklin University; Lister Wayne, Pensicola Junior College; Paul Wolotkin, SUNY Farmingdale; and Alfred Wudarski, West Liberty State.

Acknowledgments

Once again, we have had the pleasure of working with a very professional and friendly group of individuals throughout this endeavor. So many people were involved in the development, production, and creative aspects of this project that the list of names would go on and on. All of the professionals we worked with at Macmillan provided support, enthusiasm, and helpful suggestions. Special acknowledgment, however, goes to our executive editor and friend, Vernon Anthony, for once again bringing his unparalleled talents and steadfast dedication to this project. The developmental editorial support of Peggy Jacobs is unrivaled. Everyone in Macmillan's production, art, and design department is to be commended for their creativity, dedication, and hard work. In particular, we thank Sharon Rudd, production editor; Lorry Woost, art coordinator; Cindy Brunk, text designer; and Brian Deep, cover designer. Additionally, we are grateful to the organizations and businesses that provided photographs and technical material for use in this book. We also appreciate the work of Seth Hock, who developed the instructor's manual and test bank for this book. Last but not least, thank you to Teresa George for many jobs well done.

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Donald P. Szymanski
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