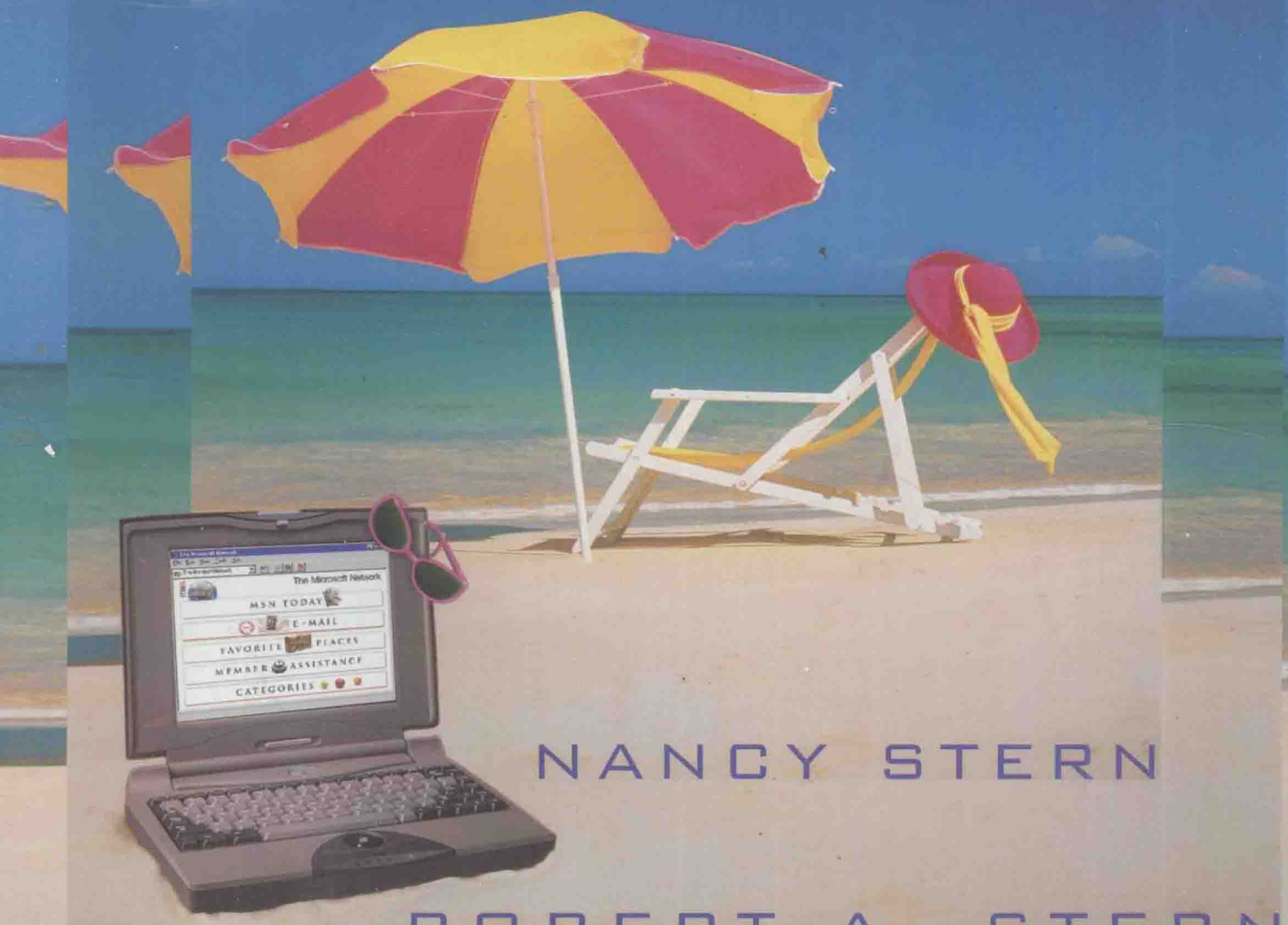
2ND EDITION

COMPUTING

IN THE INFORMATION AGE



NANCY STERN

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ND EDITION

COMPUTING
IN THE INFORMATION AGE

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PREFACE

We have written *Computing in the Information Age,* Second Edition, for introductory students. While the focus is on business applications, the book, which draws on our experience as instructors and textbook authors, is appropriate for a wide range of course offerings. Our main objective is to explain computing today in a clear and meaningful way and to focus on those concepts likely to have the greatest impact as we approach the next century and the next phase of the information revolution.

A primary goal of this text is student understanding of both the "tools" and the "whys and hows" of computing. We focus on the unique applicability of computers to business and to life, the advantages we gain from knowing how and why to use computers, and the potential of computers to enrich our lives.

While *Computing in the Information Age* is more substantive than a tutorial, it is by no means an encyclopedia. Rather, we have taken great care to provide what we regard as the ideal mix of concepts that belong in the introductory course, along with optional, add-on interactive multimedia software and tutorials to supplement the text for instructors who want a more customized approach.

Balanced Coverage of Both Concepts and Application Software

During the past decade, the focus of introductory courses shifted from the lecture hall to the lab. While teaching students in a laboratory setting how to use software remains important, hands-on learning is but one part of the broader quest toward understanding how computers can enrich our lives, how they work, and how computer information systems can help people make decisions and solve problems.

We believe that introductory computing courses are moving into a new phase. The emphasis now is on a more balanced approach, moving beyond the microcomputer lab and back toward concepts. While the lab remains vital, a useful text for the introductory course must offer a solid foundation of concepts.

Discussions of technology must be integrated with discussions of applications in a meaningful way so that students are not overwhelmed by complex concepts or by an overemphasis on terms. We make concepts understandable as well as concrete by presenting an appropriate mix of technology and applications. When teaching students about computing, we believe that knowing when to stop is at least as important as knowing what to focus on. Books that mention every conceivable subject are not usually the best books. We hope we have achieved an appropriate balance of depth and breadth of coverage.

We integrate application software concepts with our information processing focus so that students learn *why* major productivity tools and other types of programs are important. Once the student understands the applicability of the software, we present a conceptual explanation of *how* each major type of tool is used.

Because instructors tend to have differing ideas about the best package to use, we keep our software discussions generic. A *Getting Started* series on Windows, all the major productivity tools, and the Internet is also available.

Four Organizing Themes

Students must learn to look critically at four main elements—hardware, software, networks (connectivity), and the people who make them work. Only then can they anticipate and appreciate the fruits of the Information Age. We have

divided the text into five parts. The first part provides an overview of the four major elements—hardware, software, networks, and people. Each of the four succeeding parts focuses on one of these main elements.

In order to emphasize that all four elements must be integrated for effective computerization, we include applications or brief highlights of each in all chapters. A chapter that focuses on hardware, then, will also include an emphasis on the other three components of computing—as a way of tying together specific subjects and reinforcing the themes. When used in this way, the four elements are highlighted with icons:


Hardware


Software


Connectivity


People

With these pointers throughout the text students can understand that the concept under discussion is gradually being developed from chapter to chapter. In this way, themes are reinforced as vital elements in all areas of computing.

Changes in Second Edition

Based on our classroom experience and the comments and recommendations of our colleagues, we have tried to enhance the effectiveness of *Computing in the Information Age.* Building on the successful elements of the First Edition, we have made the following changes in the Second Edition:

1. *The text has been significantly streamlined to present concepts in a clear and meaningful way, without overwhelming students with detail and technical discussions.* While we maintain our emphasis on providing students with a solid conceptual foundation to computing, we have minimized some details such as binary arithmetic, feasibility studies in systems analysis, and design of executive information systems. We have also provided a more focused approach to many technical topics such as computer architecture and the structure of networks.
2. *Coverage is balanced by discussing microcomputers both as networked devices and as standalone machines.* As a result, students fully understand that PCs can indeed be personal tools for productivity as well as nodes in a distributed or client-server environment. Also, we emphasize the place of larger computers today so students appreciate that mainframes are the backbone for many organizations' computing needs.
3. *Current issues in computing are emphasized with consideration of how the computer has affected (and will continue to affect) our lives.* Topics such as the infor-

mation superhighway, multimedia, global issues in computing, distance learning, and social concerns about privacy and security are brought to the forefront. Critical thinking questions throughout the chapters, in the margins, and at the end of chapters help the students address social issues.

4. *A thematic approach integrates the four components in computerization: hardware, software, connectivity, and people.* We introduce these themes in the first chapter and include them in every chapter, highlighted by icons in the margins. Hence students will fully understand the need to have all four elements properly balanced in the information system. The Instructor's Manual provides references that assist instructors who wish to use this thematic approach in their lectures.
5. *A wider range of supplements is available to help instructors customize materials to fit the needs of their courses.* Instructors can select from a vast array of *Getting Started* titles for all the major software products. These productivity manuals have been field-tested and widely reviewed. In addition, a CD-ROM that includes a great deal of material is available to instructors to augment material presented in the text and to serve as lecture enhancers. The CD-ROM includes PassPort software, electronic transparencies, additional topics, and multimedia demonstrations that help explain various concepts.

Other Distinguishing Characteristics

In addition to providing a more balanced approach to information processing, *Computing in the Information Age* offers several other features that distinguish it from other texts in the marketplace:

EMPHASIS ON BUSINESS APPLICATIONS (WITH ADDITIONAL DISCUSSIONS OF CONSUMER, EDUCATION, AND GLOBAL ISSUES) This text focuses on computing concepts as well as on real-world examples of how computers are used, mainly in the business world. Emphasis is on hardware used in business, productivity tools and other business software, networks used in commercial organizations, and the people who work in business to design, develop, and use information systems. We also provide a balance by focusing on how computers are used globally, in education, in the home, and in a wide variety of other application areas.

ALL COMPUTERS FROM MICROS TO MAMMOTHS Our book begins with the concept that all computers process data in essentially the same way, keeping in mind that the differences among categories of computers are essentially differences of degree. Since many students enter introductory courses having had some exposure to personal computers, we begin with micro concepts and build up to larger systems in Part One. Then all subsequent chapters reinforce the fact that large computers are simply faster, more expensive, and more powerful than micros. In this way, the distinctions among computers are not rigidly cast, and students gradually lose their fear of "big" machines. They come to understand that with proper connectivity, it does not really matter to users whether they are on a mainframe, mini (midrange), or microcomputer.

Although mainframes can be viewed as quantifiably different from micros, the fact is that certain tasks are best performed on larger machines. We make the analogy that a mainframe is to a micro what a mass transportation system is to a personal car. The former is most efficient for handling the needs of the largest number of users, but it requires users to follow more structured rules and schedules. Many books today emphasize the micro so much that the importance

of mainframes is virtually ignored. Using client-server computing as a major topic, we put into perspective the relationships among different types and sizes of computers.

While emphasizing IBM-compatible micros when discussing personal computers, we do not ignore the Macintosh or the Power PC. Indeed, we highlight the features that make these computers ideally suited for some applications.

CONNECTIVITY AND THE HUMAN FACTOR This book goes beyond the traditional units of hardware and software that appear in most books and adds two very important perspectives: *connectivity* and the *human factor.*

Throughout the text we emphasize connectivity and the human factor and, in addition, focus on these topics in more detail in Parts Four and Five. For example, the networking of computers and other devices such as modems, fax machines, and CD-ROM drives has changed the focus of computing; we highlight how these changes have occurred and their anticipated long-term impact. Most importantly, the information superhighway and the Internet—and their significance in society—are discussed in great detail, as is client-server computing.

Similarly, social, ethical, legal, environmental, and global issues continue to be important topics in education, as indeed they should be. We integrate these issues throughout the text and give them special emphasis in Part Five. We also focus on technologies that have the potential to significantly affect an individual's quality of life, such as multimedia, smart devices, and interactive TV.

A BUILDING BLOCK APPROACH Another feature of this text is its layered, "building block" approach to topics and themes. That is, topics are introduced in a simplified way, then further developed at key points throughout the text. For example, the four main topics of the book—hardware, software, connectivity, and people power are introduced in the first unit and expanded upon in subsequent units. Major topics such as the information superhighway, multimedia, and global issues in computing are presented in numerous chapters; each discussion builds upon the previous one and has a specific focus depending on where it is presented. When students complete the text, they will have a full understanding of these major topics from a hardware, software, connectivity, and social perspective.

CRITICAL THINKING EMPHASIS To improve their understanding of the world around them and to become effective decision-makers, students need to learn to think more critically. Our goal is to help students to examine controversies and current events in computing, to analyze the factors affecting them, and to ask the right questions—in short, to encourage critical thinking. We regard our critical thinking emphasis as a way of motivating and empowering students.

Consequently, we present issues and brief analytical problems in computing designed to encourage students to think about social issues in computing and to ask pertinent questions relating to them. Critical thinking questions appear in text margins, in end-of-chapter Critical Thinking Exercises, and in the form of brief cases at the end of each chapter.

A main objective of the text is to help students evaluate products and resources. Obviously, we include the state-of-the-art, but if that were all we did the book would become obsolete very quickly. We also cover techniques used by computer-proficient users, managers, and professionals to evaluate software, hardware, networks, and information systems, providing readers with tools to understand and assess future developments and their probable impact on society. More importantly, products are featured for students to analyze and evaluate as part of their critical thinking training.

Pedagogy

Our unique approach to teaching the student computing concepts, which has been refined and updated, remains the most important pedagogic feature of this text. Furthermore, all chapters have a common structure designed to facilitate comprehension, self-study, and retention:

- **Chapter Outline.** A brief outline showing the organization of the major topics covered in the chapter appears on the first page as a chapter preview.
- **Opening Description.** Each chapter opens with a brief description of an event or issue in computing that motivates the student and emphasizes *why* the chapter topics are important.
- **Learning Objectives.** A list of objectives points the student to the main learning outcomes at the beginning of the chapter. In addition, these objectives reappear in the margin beside the pertinent text discussion *and* in the margin beside the Chapter Summary. The constant reinforcement of these objectives serves as a very effective study aid.
- **In a Nutshell.** Throughout each chapter, these marginal notes highlight crucial material (such as criteria used to evaluate computers) and, where appropriate, present brief summaries of major topics in outline or list form.
- **Looking Back** and **Looking Ahead.** These special boxes provide historical perspective on major innovations (*Looking Back*) and project into the future regarding the impact of new technologies (*Looking Ahead*).
- **Critical Thinking Questions.** The reader is challenged to integrate what they are learning with what they know about life through questions placed in the margins at strategic places.
- **Extensive Illustration Program.** Carefully chosen photographs and specially created screen dumps and illustrations help to clarify ideas presented in the narrative. Detailed captions clearly tie the art to the text. In addition, a photo essay sets the stage for each of the five parts of the book.
- **Self-Tests.** At the end of each major section within each chapter, a short self-test with solutions reinforces understanding and retention of the material just presented.
- **End-of-Chapter Materials.** Each chapter concludes with a series of materials intended to assist students in review and application of the concepts discussed.
    - A *Chapter Summary* provides a concepts-oriented review and is directly related to the learning objectives.
    - The *Chapter Self-Test* assesses the student's understanding of the entire chapter and gives immediate feedback by including solutions.
    - *Key Terms* are presented in a list to serve as a review. If the student cannot recall a term, a page number refers back to where the term was defined in the chapter. The Glossary at the end of the text includes definitions of all key terms.
    - *Review Questions* and *Critical Thinking Exercises* serve as a final test of the student's comprehension of the chapter topics and their implications in real life.
    - A *Case Study* serves as a final challenge for the student. It focuses on an event or recent innovation in computing, along with relevant critical thinking questions, to reinforce concepts covered in the chapter.

SUPPLEMENTS

The text is available with a wide variety of supplements to help customize your course and to reinforce the concepts presented in the text.

GETTING STARTED SERIES An array of software manuals is offered by the publisher to provide support for the lab portion of your course. These include carefully tested, practically oriented tutorials for DOS, Windows, and various productivity packages.

ANNOTATED INSTRUCTOR'S MANUAL (AIM) is a unique resource which integrates the entire text package to help instructors organize the text and supplementary materials into an informative and exciting course. A detailed outline of the text is annotated with suggestions for the use of video, software, transparencies, and/or World Wide Web sites, and an explanation of how to incorporate it into the text coverage. It also includes overviews, lecture introductions and extenders, teaching hints, review question and case study solutions, activities and exercises, points to emphasize, and advice to first-time instructors.

TEST BANK AND COMPUTERIZED TEST BANK Approximately 150 test items per chapter include multiple-choice, true-false, and essay questions. MicroTest is a computerized test bank available for IBM-compatibles.

COLOR TRANSPARENCIES These include 75 full-color acetates of key figures from the text.

STUDENT STUDY GUIDE Intended to help the novice student get through the course, this manual includes chapter outlines, key terms, fill-in exercises, sample test questions, games and exercises, and common misconceptions demystified.

Electronic Supplements

Implementing the tools of the Information Age, we also offer a number of new media supplements to enhance both teaching and learning.

CD-ROM A truly multimedia instrument, this item includes *PassPort: A Multimedia Tour of the Information Age,* electronic slides, and multimedia demonstrations that illustrate basic introductory computing concepts. *PassPort* is a collection of multimedia programs that uses text, graphics, photos, animation, and sound to enhance and extend the information provided in the text. These programs can be used either in a lecture hall that has a projection system, in a computer lab, or individually by students. PassPort extends textbook information by:

1. Introducing productivity tool concepts (*TechTools*)—there are three modules on word processing, spreadsheets, and database management.
2. Providing in-depth explorations of new products through *TechTours* and overviews of new technologies through *TechBytes.*

VIDEOS A selection of news segments from "Nightly Business Report," the longest-running, most-watched daily business, financial, and economic news program on television, is available as a companion to the text. NBR anchors provide lead-ins to tie the video segments directly to text coverage.

COMPUTERIZED STUDY GUIDE The student is offered the option of learning computing by using an electronic study guide.

PRODIGY DEMONSTRATION PACK The popular subscriber service, Prodigy, is introduced on a disk. A discount coupon is also included.

ACKNOWLEDGMENTS

This text has been improved as a result of our own classroom experience. In addition, feedback from our colleagues around the country has helped us to refine the content and presentation of the Second Edition. The manuscript has been reviewed by instructors teaching from *Computing in the Information Age,* First Edition, as well as those using other texts. Other professors participated in a focus group to help the publisher to identify the most effective teaching and learning package. We wish to thank the following reviewers for their invaluable comments, suggestions, and criticism, which have helped us to develop this text:

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BRIEF CONTENTS

CONTENTS

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