



computers

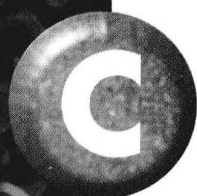
8th Edition



Larry Long

Nancy Long

Brief Edition



Brief Edition
Computers
8th Edition

Larry Long

Nancy Long

Prentice
Hall

Upper Saddle River, New Jersey 07458

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Preface to the Student

Welcome to the computer and information technology revolution. You've taken the first step toward information technology (IT) competency, the bridge to an amazing realm of adventure and discovery. Once you have read and understood the material in this text and have acquired some hands-on experience with computers, you will be poised to play an active role in this revolution.

- You'll be an intelligent consumer of PCs and related products.
- You'll be better prepared to travel the Internet and take advantage of its wealth of resources and services.
- You'll become a participant when conversations at work and school turn to computers and technology.
- You'll be better able to relate your computing and information processing needs to those who can help you.
- You'll know about a wide variety of software and services that can improve your productivity at work and at home, give you much needed information, expand your intellectual and cultural horizons, amaze you, your family, and your friends, and give you endless hours of enjoyment.

Achieving IT competency is the first step in a lifelong journey toward greater knowledge and interaction with more and better applications of IT. IT competency is your ticket to ride. Where you go, how fast you get there, and what you do when you arrive is up to you.

LEARNING AIDS

Computers is supported by a comprehensive learning assistance package that includes these helpful learning aids.

The Long and Long INTERNET BRIDGE

The Long and Long INTERNET BRIDGE at <http://www.prenhall.com/long> is a site on the Internet that is accessible from any PC with Internet access. The site, which is designed to help you make the transition between textbook learning and real-world understanding, has a variety of learning aids, including these three main components.

- *Internet Exercises*. The INTERNET BRIDGE invites you to go online and explore the wonders of the Internet through a comprehensive set of Internet exercises. These entertaining exercises invite you to learn more about the topics in this book and to do some serendipitous (just-for-fun) surfing.
- *Interactive Study Guide (ISG)*. The INTERNET BRIDGE's comprehensive Interactive Study Guide gives you an opportunity to sharpen your problem-solving skills and to gauge your understanding of the material in the chapter. For each chapter, the ISG has multiple-choice, true or false, matching, and essay quizzes. The built-in grading feature gives you immediate feedback in the form of a report. The report also includes a question-by-question summary with an explanation or hint, your response, and the correct response with section reference (if needed).
- *Monthly Technology Update*. The printed book alone is no longer sufficient to keep you abreast of a rapidly advancing technology. The INTERNET

BRIDGE's Monthly Technology Update section helps you bridge this technology gap. Each month the authors post a chapter-by-chapter update to the INTERNET BRIDGE. The monthly update includes summaries of important technological events that occurred during the previous month.

The WEB icons in the margins throughout the book relate material in the book to applicable INTERNET BRIDGE exercises, *Interactive Study Guide* chapters, and technology updates.

Online Distance Learning with Computers

Online distance learning in conjunction with *Computers*, 8th ed., is available on two popular Internet-based platforms, Blackboard and WebCT. This and other Prentice Hall online courses can be found at cms.prenhall.com/blackboard and cms.prenhall.com/webct. These sites let you take computer competency courses via distance learning or allow you to enhance your classroom experience with on-line learning. That is, you log on to the Blackboard or WebCT *Computers*, 8th ed., page on the Internet to interact with instructors and classmates, go over chapter summaries, evaluate your understanding of course material, participate in on-line discussion groups, take quizzes and tests, gain access to class information (schedule, homework, and so on), make inquiries about your grades, and much more.

YOU, COMPUTERS, AND THE FUTURE

Whether you are pursuing a career as an economist, a social worker, a politician, an attorney, a dancer, an accountant, a computer specialist, a sales manager, or virtually any other career, the knowledge you gain from this course ultimately will prove beneficial. Keep your course notes and your book; they will prove to be valuable references in other courses and in your career.

Even though computers are all around us, we are seeing only the tip of the information technology iceberg. You are entering the IT era in its infancy. Each class you attend and each page you turn will present a learning experience to help you advance one step closer to an understanding of how computers and IT are making the world a better place in which to live and work.

Preface to the Instructor

THE PARADIGM SHIFT

The rules are changing. The criteria by which we make decisions, the way we do things, and even what we do is changing, dramatically. Affordable PCs with tremendous power can reach around the world via the Internet, a rapidly expanding worldwide network of computers. Each increment in PC power and Internet resources adds fuel to the personal computing phenomena, accelerating the pace of change. We are now members of an interconnected society where we can shop at online Wal-Mart Supercenters, research our family tree, take virtual tours of thousands of sites from the White House to the pyramids, take courses for college credit, work at home, and much, much more, all from a linked PC.

This paradigm shift is causing radical changes in all facets of society, including the way we teach and learn. We are entering a new era of education in which technology plays an increasingly significant role. This is especially true of introductory information technology courses where the integration of the technology is a natural extension of the learning process. After all, the best place to learn about computers is at the computer.

THE INTRO COURSE

The introductory IT course poses tremendous teaching challenges. To be effective, we must continually change our lecture style and even the vehicle by which we convey content and interact with students. Throughout the term we are continually changing hats. Sometimes we are historians. Much of the time we are scientists presenting technical material. On occasion we are sociologists commenting on social issues. In the same course we now toggle between lecture, lab, and, for some, distance learning via the Internet. If that's not enough, we teach an ever-increasing amount of material to students with a wide range of career objectives and technical abilities. We and Prentice Hall, have done everything we can to help you meet this challenge.

Opportunity, challenge, and competition are forcing all of us to become IT competent and to prepare ourselves for a more interconnected world. *Computers*, 8th ed., its mixed-media components, and its ancillary materials provide a launch pad toward these objectives. The target course for this text and its teaching/learning system:

- *Provides overview coverage of computing/IT concepts and applications for introductory courses. Computers, 8th ed., comes in two versions so that you can get the best fit for your course's educational objectives.*
- *Accommodates students from a broad spectrum of disciplines and interests.*
- *May or may not include a laboratory component. Prentice Hall offers an extensive array of optional learning resources for hands-on laboratories.*

COMPUTERS, EIGHTH EDITION: A FAST-PACED INTRODUCTION TO THE WORLD OF COMPUTING

About six Internet years pass in one real-time year—the elapsed time between the seventh and eighth editions. This new edition is a *technology update* intended to bring *Computers* abreast with a rampaging technology. For the past 18 years,

your peers have told us that we consistently publish the most up-to-date IT concepts textbook. We take great pride in your confidence in us and are committed to presenting a current and forward-looking picture of IT innovations and issues.

We have listened to your feedback and feel that this new edition strikes a good balance between *efficiency of presentation* and content that *holds the student's interest and invites learning*.

- *Efficient presentation.* To achieve our *efficiency-of-presentation* goal, we cover only that material which is critical to general IT competency. We avoid dated concepts; we don't cover basic concepts from every angle; and, we're careful not to present topics at depths inconsistent with introductory learning. We feel that students at this stage of their IT competency journey need a breadth of understanding that is applicable *today* and in the *future*. Also, we present only that information that will have an impact on the student's ability to cope with the IT revolution, avoiding superfluous information that might dampen a student's interest in learning more about technology.
- *Interesting and inviting content.* The text and all supplements are written in a style that remains pedagogically sound while communicating the energy and excitement of IT to the student. We used every writing tool and pedagogical technique in our arsenal to entice the student to turn the page and learn more. Throughout the book we make learning about IT a very personal experience by relating terms or concepts to their personal and professional lives. Students make the effort to learn when they can see why it's important to them.

The eighth edition presents that body of knowledge that students need to become active participants in this exciting new era of technological innovation and application. The book's content runs the gamut from motherboard technologies, such as USB, to ethical issues, such as spam. Our guiding objective during the writing of the eighth edition was to impart this crucial and substantial body of information in a manner that can be absorbed, retained, and enjoyed.

POPULAR FEATURES IN THE EIGHTH EDITION

One reason that *Computers* has remained the choice of thousands of your colleagues through seven editions is because we try very hard to embed the features you need to teach successful courses. Here are a few of those features.

- *Conversational writing style.* The book "talks" to the student in a manner that is more consistent with their everyday conversation.
- *Engaging design.* The eighth edition has a "reader-friendly" face that is more engaging to today's students.
- *Applications-oriented.* The continuing theme throughout the text is applications. Hundreds of applications are presented from online universities to telemedicine to robotics.
- *Readability.* All elements (photos, figures, sidebars, and so on) are integrated with the textual material to complement and reinforce learning.
- *Currency-plus.* The eighth edition actually anticipates emerging technology. If it's current and it's within the IT-competency body of knowledge, it's in this book. It has the latest on the Internet: online publishing, portals, video-phones, flaming, firewalls, extranets, spam, and more. The software is right out of the box: Office 2000, Windows 2000, and many more innovative applications. The latest hardware is here, too: infrared ports, CD-RW, SuperDisk, Apple iBook, Intel Itanium processor, Compaq's color PDA, and more. And, of course, it's current with the acronyms: USB, MP3, AGP, SDRAM, OLE, RAD, OOP, PNG, DVD, and all the rest. The numbers for modems, disks, RAM, processors, printers, the Internet, and so on are extrapolated from trends to reflect 2001–2002.

- *Flexibility.* The text and its mixed-media teaching/learning system are organized to permit maximum flexibility in course design and in the selection, assignment, and presentation of material.
- *Analogies.* Analogies are used throughout the book to relate information technology concepts they are learning to concepts they already understand, such as airplanes (computer systems), audio CDs (random processing), and cars/parking lots (files/disks).
- *Colorful Focus on ITs.* Focus on ITs combine dynamic photos with in-depth discussions of topics that are of interest to students, such as how chips are made, the history of computers, and how to buy a PC.
- *Walkthrough illustrations.* Every attempt has been made to minimize conceptual navigation between the running text and figures. This was done by including relevant information within the figures in easy-to-follow numbered walkthroughs.
- *Mixed-media margin icons.* The WEB and PHitLab (*Computers Interactive Labs*) icons in the margin point students to interactive multimedia learning resources on the Internet and the PHitLab CD-ROM. The WEB icons invite students to check out the Monthly Technology Update, do applicable Internet exercises, and use the Interactive Study Guide to assess their grasp of the material. The PHitLab icons identify applicable laboratory exercises that let students interactively explore IT concepts.
- *Up-to-date software and Internet captures.* All of the software and Internet screen capture images are as current as print publishing will allow, reflecting the latest releases and innovations in software and the latest Web page designs.
- *Many colorful photo images.* Almost 200 photo images give the student a better feel for state-of-the-art hardware and the role of IT in our information society.
- *Chapter pedagogy.* Chapter organization and pedagogy are consistent throughout the text. Each chapter is prefaced by *Learning Objectives* and *Why This Chapter Is Important to You*. The Learning Objectives are framed within the context of what “you will have learned.” The “Why This Chapter Is Important to You” section personalizes the student’s learning experience. In the body of the chapter, all major headings are numbered (1.1, 1.2, and so on) to facilitate selective assignment and to provide an easy cross-reference to all related material in the supplements. Important terms and phrases are highlighted in **boldface** type. Words and phrases to be emphasized appear in *italics*. Informative boxed features (*Emerging IT* and *IT Ethics*), photos, and *Memory Bits* (outlines of key points) are positioned strategically to complement the running text. Each chapter concludes with a *Summary and Key Terms* and *Discussion and Problem Solving*. A *Section Self-Check* gives students an opportunity to assess their understanding at the end of each section (Self-Check answers follow Chapter 13). Margin icons direct students to applicable INTERNET BRIDGE exercises and activities and the PHitLabs CD-ROM-based lab activities.
- *Transition friendly.* *Computers*, eighth edition, was written to enable a smooth, seamless transition for those colleges moving from any previous edition of *Computers*.

A MIXED-MEDIA LEARNING TOOL

This textbook is one component of a *mixed-media learning tool*. Although it can be used as a standalone resource, its effectiveness is enhanced when used in conjunction with the Long and Long INTERNET BRIDGE (companion Internet site), the distance learning components—Blackboard and WebCT, the *Computers*, 8th ed., PHitLABs (CD-ROM-based courseware), Image Library (multimedia lec-

ture aid), the *Prentice-Hall Test Manager*, and other media-based ancillaries. The mixed-media orientation of *Computers*, gives students a power boost up the learning curve and instructors an innovative vehicle for delivery of course content. The margin icons throughout the book direct students to applicable mixed media learning tools.

We've designed the *Computers*, 8th ed., mixed-media resources to give you maximum flexibility in course design and instruction. Use these resources to offer IT competency education in whatever formats meet your student and curriculum needs. We are proud that *Computers* has been and remains the standard of excellence for traditional classroom/lab instruction through seven editions. Now it has emerged as the standard for courses offered completely online via distance learning.

Throughout all aspects of this mixed-media approach to learning, we play to the student's sense of exhilaration by projecting the excitement of the age of information. We have attempted to include something on every printed page, every Internet page, and every CD-ROM-based laboratory that will tickle their senses and inspire them to learn more. Eventually anxieties and fears fade away as students recognize the dawning of a new era in their life, an era bursting with opportunity.

A COMPUTERS EDITION FOR EVERY COURSE

Computers is organized into three modules.

- *Information Technology Concepts module.* These *eight core chapters* introduce students to the world of computing; concepts relating to interaction with computers; fundamental hardware, software, and communications concepts; going online (the Internet, online information services); and the Windows environment. This module includes three Focus on IT segments: the making of integrated circuits, computer history, and a PC buyer's guide.
- *Living in an Information Society module.* These *three chapters* are intended to give students greater insight into personal computing and our information society. Chapter 9 introduces students to a variety of PC software that can enrich their personal computing experience. The other two issue-oriented chapters discuss computing in context with society, addressing the many issues raised by the coming of the Information Age. Also, in these chapters students travel the information superhighway making frequent stops to discuss current and future applications. This module has one Focus on IT: Robots and Robotics.
- *Business Information Systems module.* This *two-chapter* module introduces students to the various types of information systems (MIS, DSS, expert systems, intelligent agents, and so on) and includes an overview of the latest approaches to system development.

The Right PHit program offers a complete solution for introductory computer courses, from concepts to applications. Components of the Prentice Hall Application Series can be bound with the eighth edition of *Computers* via Prentice Hall's Right PHit program. Office 97 and Office 2000 titles are available in this custom binding program and comprise part of the most extensive array of hands-on laboratory materials offered by any textbook publisher. These hands-on manuals can be bound together with *Computers*, 8th ed., or, if you prefer, bound separately and shrink-wrapped as a package so students can carry them to the lab one at a time. Your Prentice Hall representative will be happy to work with you to identify that combination of student support materials and packaging that best meets the needs of your lab environment.

THE COMPUTERS TEACHING/LEARNING SYSTEM

Computers, 8th ed., continues the Long and Long tradition of having the most comprehensive, innovative, and effective support package on the market. The teaching/learning system includes the following components.

Long and Long INTERNET BRIDGE

The Long and Long INTERNET BRIDGE at <http://www.prenhall.com/long> is designed to help students studying Long and Long resources make the transition between textbook learning and real-world understanding. To use this resource, the student connects to the Internet, navigates to the INTERNET BRIDGE, and clicks on the *Computers*, 8th ed., image. The site offers a variety of activities and services, including these main components:

Internet Exercises

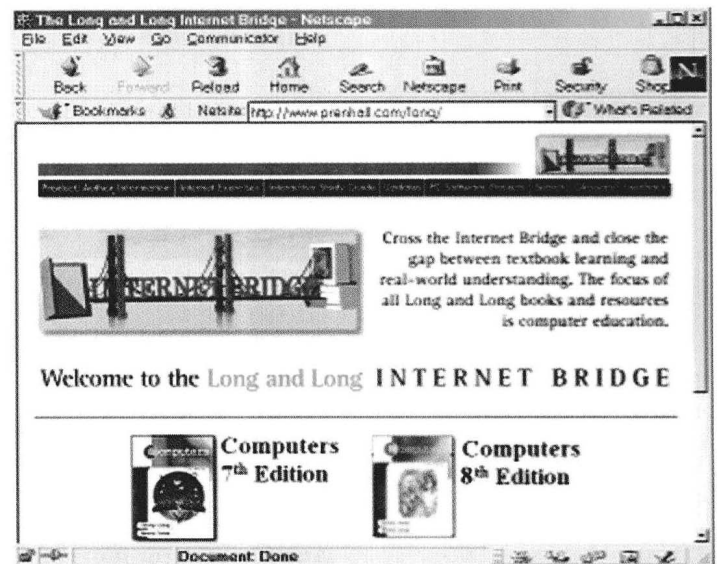
The Internet exercises encourage students to more fully explore IT competency topics while familiarizing themselves with the Internet. The student selects a specific chapter to begin an online adventure that will take him or her around and into the exciting world of computing. The student's journey will include many stops that can increase his or her understanding and appreciation of the technologies that change and embellish our lives.

Each chapter has from one to seven topics (for example, Printers, Telecommuting, Multimedia, Artificial Intelligence), at least one of which is Serendipitous Surfing (for example, movies, sports, or popular culture). Each topic has from three to seven Internet Exercises. For each exercise, the student: 1) reads the exercise; 2) searches for then navigates to the applicable Internet site(s); 3) notes the source(s) title(s) and URL(s); 4) finds the requested information; and 5) returns to the topic page and enters the requested information in the response box. When all Internet exercises are completed for a given topic, the student clicks the "Submit for Grade" button to e-mail the responses to his or her instructor/grader.

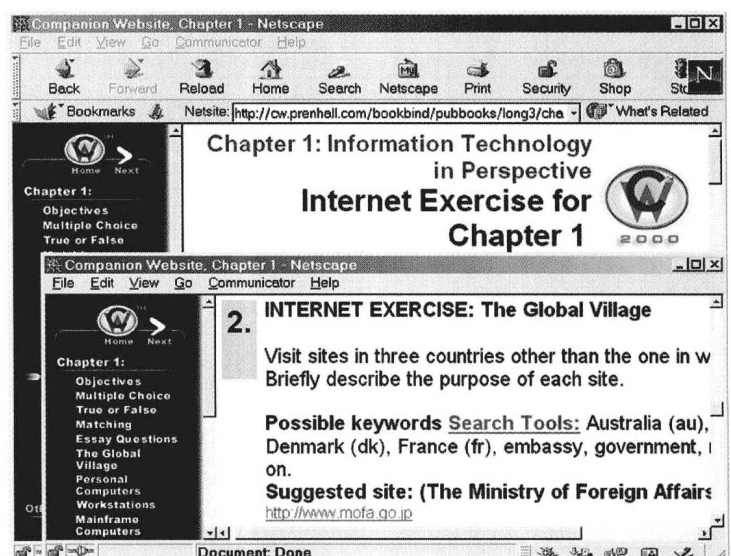
Interactive Study Guide

The Internet-based Interactive Study Guide (ISG) helps the student learn and retain concepts presented in the text. After navigating to the applicable chapter, the student can view the chapter learning objectives then choose from four skills quizzes: multiple choice, true or false, matching, or essay. These quizzes are designed to give students the opportunity to sharpen their problem-solving skills and assess their grasp of concepts.

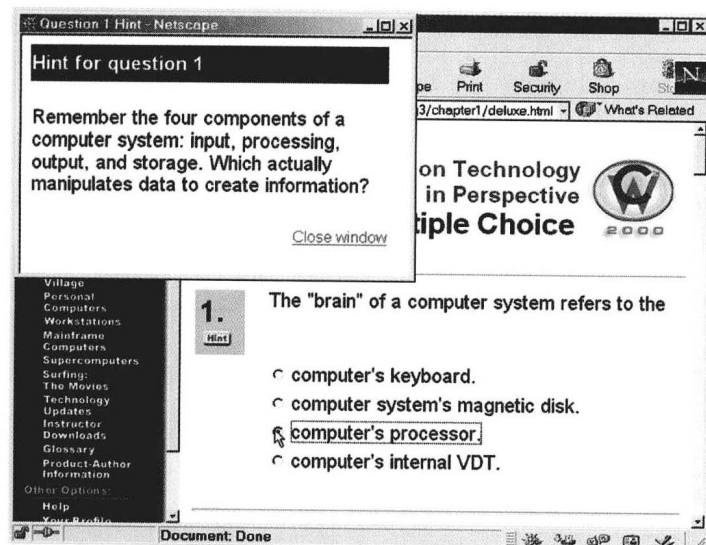
- **Multiple Choice.** When taking the multiple-choice quiz the student simply clicks the radio button for the correct response for each question. After answering all of the questions, the student submits the answers for automatic grading. A summary report is returned to the student within seconds. The summary report includes the percentage correct, the number of incorrect answers, and the number of unan-



Long and Long Internet Bridge



Internet Exercises



Interactive Study Guide

swered questions. The report also includes a question-by-question summary with an explanation, the student's response, and the correct response with section reference (if needed).

- **True or False.** The true/false interface and summary report is like that of a multiple-choice quiz.
- **Essay Questions.** The essay exam includes a text response box for each question into which the student inserts the answer.
- **Matching.** The student matches a term with an applicable description by selecting a response from a drop-down box.

Most questions have hints or they provide a reference to the applicable section in the text. After completing a quiz, the student has the option of routing the answers to his/her e-mail address and/or to that of his/her instructor. The summary report is sent for multiple-choice, true/false, and matching

quizzes, and the questions and answers are sent for the essay exams.

Monthly Technology Update

Each month we compile a summary of important changes and happenings in the world of computing and IT. These summaries, which are keyed to chapters, are intended to help keep the student's learning experience current with a rampaging technology.

Syllabus Manager

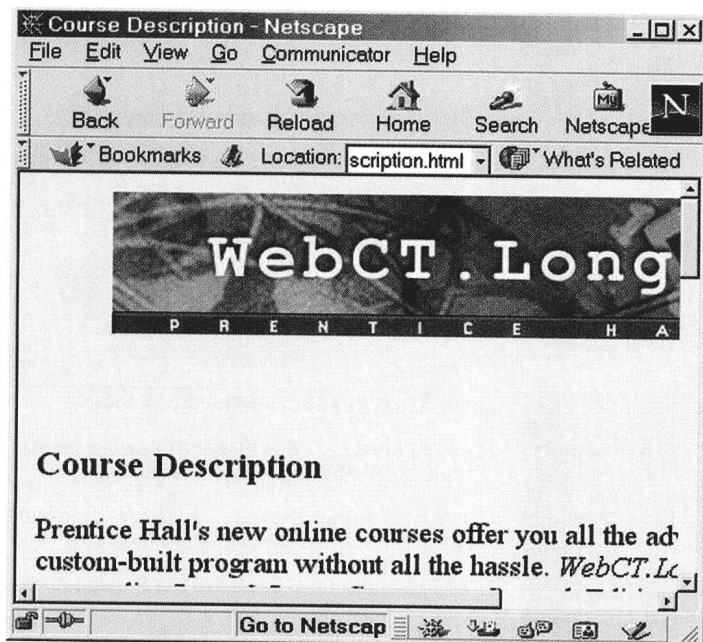
The Syllabus Manager component of the INTERNET BRIDGE is a free utility for instructors and students who use our book/website products. Faculty can easily build and maintain one or more syllabi on the Web. The course syllabus is readily available to students from any PC with Internet access.

Instructor's Resource Page on the INTERNET BRIDGE

The INTERNET BRIDGE includes a continuously updated, password-protected Instructor's Resource page that is available to all instructors who adopt the Long and Long package. The instructor's resource page contains a variety of downloadable resources, including supplementary images, the *IRM*, crossword puzzles, PowerPoint Slides, a buyer's guide worksheet, supplementary PC exercises, PDF format transparencies, applicable material contributed by colleagues, and other helpful teaching/learning aids.

Distance Learning via the Internet with Long and Long Online Resources

For several years, professors from around the world have relied on Long and Long online teaching/learning resources to create and administer online courses for thousands of students, some taking courses entirely online while others go both online and to class. Previous editions of *Computers* have been made available in the WebCT, a popular Web course development and management tool. This edition is available in two formats: WebCT and



WebCT.long for Online Learning

Blackboard. These two Web-course tools have enabled professors to create a Web-based educational environment for millions of students at over 3,000 colleges throughout the world. The Internet sites supporting distance learning for Long and Long resources can be accessed at cms.prenhall.com/webct and cms.prenhall.com/blackboard. These online course tools, along with embedded Long and Long content, offer you and your colleagues all the advantages of a custom-built program, but without the hassle. If you are considering offering all or part of your course via distance learning, then WebCT or Blackboard can help you create and implement a high-quality online course or course component with relative ease. If you already offer an online course, then these tools can assist you in formalizing your course. These Web-course tools give you the flexibility to integrate your custom material with the continuously updated *Computers*, 8th ed., content. *Computers*, 8th ed., content is packaged within these course-authoring tools so you can customize the content to meet the most demanding curriculum requirements. Whether you are off and running or this is your first online course, these ready-to-go online course resources can save you countless hours of preparation and course administration time.

WebCT and Blackboard include these and many other features in each of their learning modules: an introduction, objectives, summaries of key concepts, online activities that use the Internet, offline activities that integrate the text with Web content, self-check exercises, online quizzes (auto-scored and recorded), test item database and test preparation tools (auto-scored and recorded), e-mail accounts for students and instructors, and a bulletin board primed with interesting discussion topics.

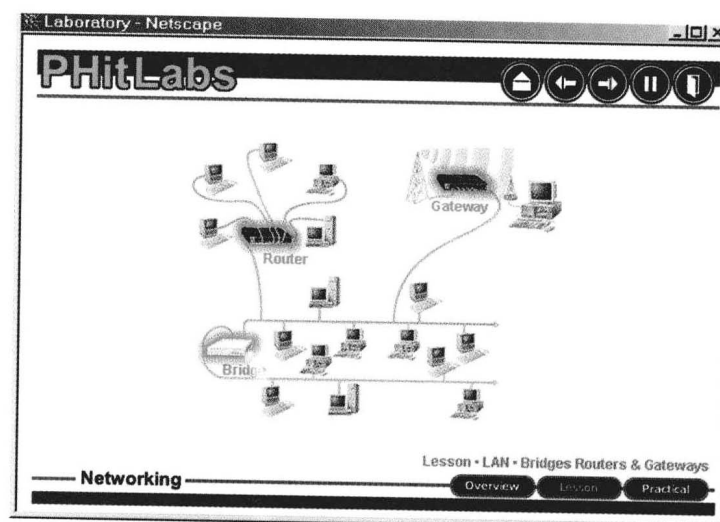
A wizard program guides you through the initial stages of course development, including the creation of a password-protected course home page. One feature automatically grades online tests and records scores in your electronic grade book. Another lets you monitor individual and overall student progress. You can even determine how often and for how long each and every student visits an online course page. The WebCT and Blackboard shells also let you integrate files without using HTML.

PHitLabs

PHitLabs offer students the opportunity to experience many of the concepts covered in the text. Labs use sound, animation, and video to assist students in learning about selected topics. Each topic is presented within Overview, Lesson, and Practical sections. These interactive hands-on labs help students complete their learning experience. Interactive topics include operating systems, computer fundamentals, central processing unit, storage devices, disk fragmentation, binary numbers, multimedia, word processing, spreadsheets, databases, networking, programming, e-mail, internet tools, Web pages, and Web servers.

The Instructor's One-Stop CD-ROM Resource

A variety of helpful instructor resources are distributed on the Instructor's Resource CD-ROM that includes an Image Library with PowerPoint slides, Windows PH Test Manager, Test Item File, Instructor's Resource Manual (Microsoft Word format), and Transparency Masters. Please see the next page for detailed descriptions of each. (ISBN013-089330-7)



PHitLAB (Computers Interactive Labs)

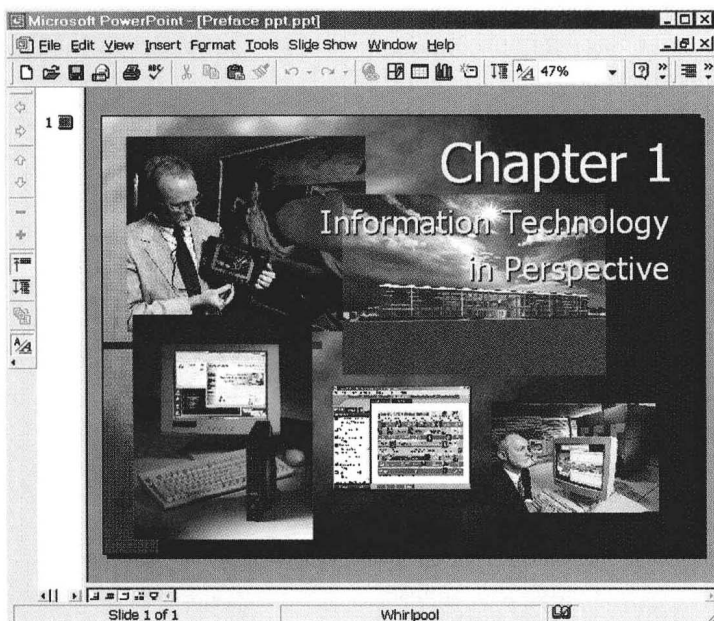


Image Library

Image Library with PowerPoint Presentations

The *Image Library* is a wonderful resource for creating vibrant lecture presentations. The *Image Library* includes the following.

- **PowerPoint Slides.** Several hundred colorful and illustrative PowerPoint slides are available for use with Microsoft PowerPoint. The chapter-by-chapter PowerPoint slides can be easily customized to meet lecture needs.
- **Figures and Photos from the Textbook.** The *Image Library* contains just about every figure and photo in the text, all organized by chapter and section for your convenience. Caption/notes are supplied for each image within a Microsoft Word file which can be copied or exported to a spreadsheet or database. These images and caption/notes can easily be integrated into Microsoft PowerPoint to create new presentations, or to add to existing presentations. Simply drag-and-drop slides and images in PowerPoint to sequence them for your presentation needs.
- **PDF-Format Color Transparency Masters.** Approximately seventy-five color transparency masters, which support material in the text, are provided in PDF format for projection via Acrobat Reader. Acrobat Reader lets you zoom in on those portions of the image discussed.

Windows PH Test Manager and Test Item File

Windows PH Test Manager is an integrated PC-compatible test-generation and classroom-management software package. The package permits instructors to design and create tests, to maintain student records, and to provide online practice testing for students. The accompanying *Test Item File* contains thousands of multiple-choice, true/false, matching, and essay questions. The questions are organized by numbered section head.

Instructor's Resource Manual (IRM)

The *IRM*, which is available in hardcopy, is also included in Microsoft Word format on the Instructor's Resource CD-ROM and on the INTERNET BRIDGE in the Instructor's Download Section. The IRM contains teaching hints, references to other resources, selected images, lecture notes, key terms with definitions, solutions to review exercises, and much more.

Color Transparency Acetates

Approximately seventy-five color transparency acetates, which support material in the text, are provided to facilitate in-class explanation. Transparency masters are also provided in PDF format for viewing on Acrobat Reader.

Author Link

If you have questions about the text, its package, or course planning, call us (see the *IRM* for number) or contact us via the INTERNET BRIDGE authors' page (click on the "Feedback" option).

Storing and Retrieving Information 4

LEARNING OBJECTIVES

Once you have read and studied this chapter, you will have learned:

- The relationship between mass storage and the various types of files.
- The various types of magnetic disk devices and media, including organization, principles of operation, maintenance, performance considerations, and security concerns.
- Procedures for backing up disk files to tape, data cartridges or to interchangeable disks.
- The operational capabilities and applications for the various types of optical laser disk storage.
- If there is disk storage in your future.

OVERVIEW AND LECTURE OUTLINE

TEACHING OBJECTIVES

Instructor's Resource Manual

ACKNOWLEDGMENTS

Several hundred people have contributed to the making of this eighth edition of *Computers* and its many mixed-media ancillaries. The considerable talents of my family at Prentice Hall in editorial, production, marketing, research, and sales are evident throughout this book. We wish that every author had an editorial team with people like Mickey Cox, Melissa Whitaker, and Kerri Limpert who bring harmony, purpose, and passion to their projects. And to the miracle workers in production, Anne Graydon, Cheryl Asherman, Richard Bretan, Christy Mahon, and Lisa DiMauro Babin, with the support of Sondra Greenfield, Pat Smythe, Karen Goldsmith, Paul Smolenski, Vinnie Scelta, Michael Weinstein, and their colleagues, we say, “Way to go”—again! Nancy Evans, Kris King, Dana Simmons, Jonathan Ahlbrand, Vanessa Jeunger, Matt Denham, Jason Dodge, and Greg Christoffer-son in marketing/sales and Patty Arneson in research have provided us with the insight we need to fine-tune content to meet course needs. The artistic gifts of Nancy Welcher in New Media are embedded in our Web and mixed-media supplements. And for a truly beautiful and effective design we thank Cary Henrie (cover) and Amanda Kavanagh of Ark Design (interior design), with revisions by Jill Little. In addition, we would like to thank Gretchen Miller at York Production Services and Nancy Marcello for their patience and attention to detail in the production process.

We would like to thank those who created key ancillaries for *Computers*: Jack Pesci of Owens Community College (*Interactive Study Guide* and *Test Item File*), Edna Levernier of Georgia Southern University (*Instructor's Resource Manual*), Nancy Surynt of Stetson University (PowerPoint slides) and Tom Gorecki of the College of Southern Maryland (Content for WebCT and Blackboard online courses).

The feedback from numerous college professors, both invited and voluntary, has proven invaluable in refining this new edition to better serve their course needs. We would like to extend our heartfelt gratitude to these professors for their insight on this and previous editions of *Computers*.

7th and 8th Editions:

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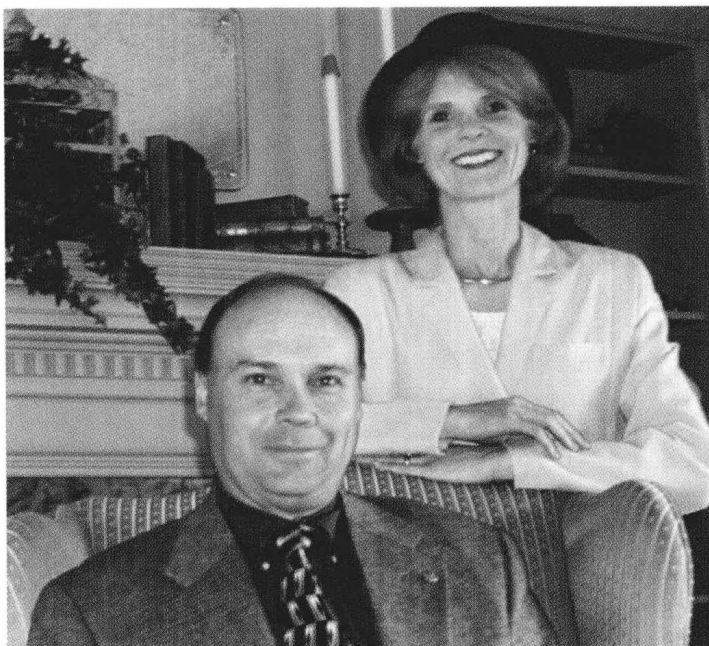
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