

Internet

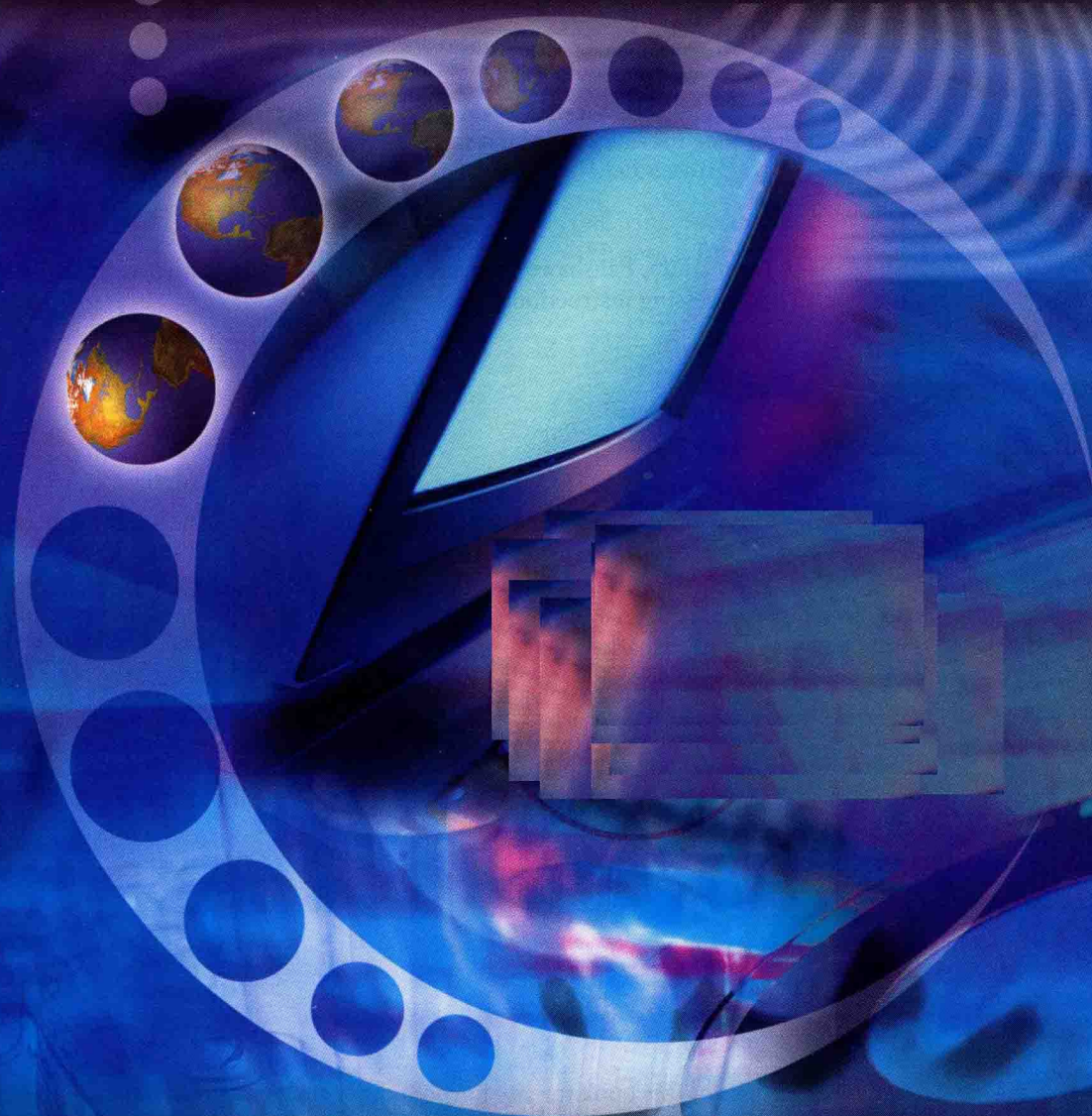
Systems and Applications

John Marshall Baker



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Developmental Editor	Desiree Faulkner
Cover and Text Designer	Leslie Anderson
Desktop Production	Desktop Solutions, Lisa Beller
Illustrator	Colin Hayes
Technical Editor/Copyeditor	Lisa A. Bucki
Proofreader	Teresa Hudoba
Indexer	Nancy Fulton

Publishing Team

George Provol, Publisher; Janice Johnson, Vice President of Marketing; Shelley Clubb, Electronic Design and Production Manager

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PREFACE

In less than a single generation the Internet has become a ubiquitous part of daily life for many people around the world. People use the portion of the Internet known as the World Wide Web to send and receive messages, shop, make travel reservations, research information, listen to radio and watch videos, download programs, play games, make phone calls, and much more. *Internet: Systems and Applications* teaches the essential skills necessary to take full advantage of the Internet and the World Wide Web, using simple but informative explanations and step-by-step exercises that are rich with illustrative screen captures and detailed instructions. After completing this book, students will have a thorough understanding of how the Internet works, and will be able to use the skills they have learned to enjoy everything it has to offer, including creating and publishing their own Web pages.

Organization of the Text

The chapters that compose *Internet: Systems and Applications* are organized into five different units covering related material. Unit 1, *Using the Internet*, begins with Chapter 1, *Understanding the Internet*, which introduces the Internet and the World Wide Web and explains their relationship and how they work. Chapter 2, *Accessing the Internet*, describes the various methods that can be used to access the Internet. Chapter 3, *Ensuring Internet Security*, deals with the different security threats to the Internet and describes the steps that can be taken to counter threats.

Unit 2, *Accessing Information on the Web*, begins with Chapter 4, *Using a Web Browser*, which teaches students Web browser fundamentals using exercises based on Microsoft Internet Explorer. Chapter 5, *Accessing Information Resources*, teaches skills and strategies that can be used to mine the information available on the Web. Chapter 6, *Downloading and Storing Information*, provides instruction on downloading material from the Web to a computer or network, as well as the different methods that can be used for saving information.

Unit 3, *Communications Technology*, begins with Chapter 7, *Using E-mail*, which provides a thorough explanation of e-mail clients using Microsoft Outlook Express as an example. Chapter 8, *Asynchronous Communications*, teaches students

how to use various forms of asynchronous communication methods such as mailing lists, newsgroups, Web logs, and so on. Chapter 9, *Synchronous Communications*, teaches students how to use synchronous communication methods such as Internet Relay Chat, instant messaging clients, and Voice over Internet Phone (VoIP).

Unit 4, *Multimedia and E-commerce*, begins with Chapter 10, *Experiencing Multimedia*, which describes the various multimedia formats available for use on the Web. Chapter 11, *Understanding E-commerce*, explains the different e-commerce business and advertising models as well as payment methods.

Unit 5, *HTML and Web Page Publishing*, contains Chapter 12, *Learning HTML Part I*, and Chapter 13, *Learning HTML Part II*, which explain the HTML code and coding techniques used to create Web pages. Chapter 14, *Creating and Publishing Web Pages*, teaches the skills necessary to plan, create, publish, and maintain a Web site, and covers advice on selecting a suitable Web host.

Appendices include instructions covering the downloading and use of the popular Mozilla Firefox Web browser, an HTML/XHTML tag and attribute table, a Web-safe colors chart, and a CSS tag and attribute table.

To reinforce instruction, each chapter includes Concept Review questions and a Skill Review exercise after each major skill. The end of each chapter begins with a chapter summary outlining key concepts. Chapter summaries are followed by a key terms list including the terms found in the margins of the chapter displayed with a page reference. The Net Check section contains 10 multiple choice and 10 true/false questions designed to reinforce key concepts and topics. Virtual Perspectives discussion questions challenge students to think through important issues related to chapter content. Internet Lab Projects require the students to demonstrate proficiency using guided instructions. Internet Research Activities invite students to use the Web to further explore Internet-related topics. Each chapter ends with a Net Challenge activity that allows advanced students to demonstrate their mastery of advanced skills.

Student Resources

Student resources include an Encore Companion CD including a glossary, image bank, flashcards, chapter quizzes, and tech tutorials. Also found at the IRC student pages are chapter outlines for note taking; PowerPoint slides; Skills Review model answers (where applicable); online chapter quizzes; and online access to end-of-chapter exercises, appendices, and glossary.

Instructor Resources

Instructor resources include a syllabus; teaching hints for each chapter; answers to the Concept Review questions; Skill Review model answers (where applicable); Net Check answers; model answers and/or hints for evaluating Virtual Perspectives questions, Internet Lab Projects, and Internet Research Activities; PowerPoint teaching slides; and chapter and unit quizzes. All instructor resources are furnished on both the password-protected instructor pages of the IRC and on the Instructor Resources CD.

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This book could not have been written without the invaluable assistance of a number of individuals. Janice Johnson, Vice President of Marketing at EMC/Paradigm Publishing, provided importance guidance and support during the formative stages of the book development process. Desiree Faulkner, Developmental Editor at EMC/Paradigm, contributed the editorial and project management skills that turned raw material into a finished product. Lisa A. Bucki, computer author, editor, and trainer, provided assistance as tech editor and copyeditor. Janet Blum, Professor, Fanshawe College, London, Ontario, tested exercises to ensure they work as written. Finally, Teresa Hudoba provided proofreading services to produce a polished manuscript. To everyone who contributed to this effort, both named and unnamed, a heartfelt thank you!



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UNIT 1

Using the Internet

- **Understanding the Internet**
- **Accessing the Internet**
- **Ensuring Internet Security**

Chapter 1

Understanding the Internet

Learning Objectives

- Define open architecture philosophy and explain its importance to the development of the Internet.
- Describe circuit and packet switching and explain how they work.
- Define the role and function of TCP/IP.
- Describe IP addresses and domain names.
- Explain the function of HTML in creating Web pages.
- Describe how hyperlinks work.
- Explain the concepts behind computer networking and how they relate to the development of the Internet.
- Differentiate between an intranet and an extranet.
- Explain wireless networking and describe its advantages and disadvantages.
- Examine and evaluate Internet2's role in the development of new Internet technologies and applications.



Living on the Net

A soft buzzing from his alarm clock tells Bob Wagoner that it is time to get up for work. After eating breakfast, he turns on his personal computer (PC) to check his e-mail before going to work. He is excited to see a message from his girlfriend, Carolyn. She is in Rome on business and writes to tell him how much she misses him. He types a short message to her, letting her know the feeling is mutual, and then clicks the Send button to transmit his reply. Before shutting down his computer, Bob checks the CNN and BBC

Web sites to read the latest news, and checks his investments at his broker's Web site. Soon Bob realizes he may be late for work, so he shuts off his computer and heads out the door.

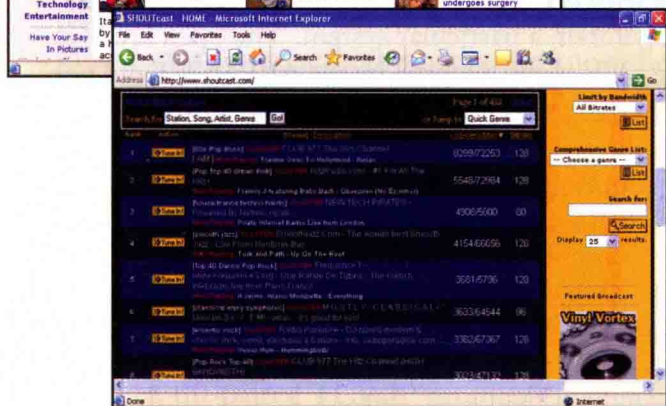
One of the first items on Bob's agenda after arriving at work is a Web conference to discuss some new product developments with affiliates located in Southeast Asia. Once the conference concludes, Bob checks his work e-mail account and communicates with customers located around the world. Because he has so much work to do, Bob decides to eat lunch at his desk. Suddenly, he remembers that he needs to get some

additional tax forms from the IRS so that he can file his tax return on time. The IRS Web site offers the forms he needs via download. Bob downloads the forms and attaches them to a message that he sends to his personal e-mail account, so he can later print the forms at home.

The afternoon passes quickly, and Bob is ready to call it a day. While driving he realizes that he did not receive an e-mail message he had been expecting from a supplier. Rather than waiting until he gets home to access his e-mail account, Bob pulls over and uses his Web-enabled cellular phone to check his work e-mail account again. Seeing that there is still no reply, he sends a short message reminding the supplier to send a response. Soon Bob is back home,

where he relaxes by tuning into a Swedish Internet radio station that uses streaming technology to broadcast jazz over the Internet. Before going to bed, he sends one more e-mail to Carolyn.

The events in Bob's day provide just a few examples of the many ways that the Internet can make life easier. In the relatively few years that the Internet has been available to the public, the increase in both the number of different applications available and the number of Internet users has been nothing short of astounding. Before learning more about using the Internet, study how the Internet developed to understand how it works.



Development of the Internet

The concept of the Internet is generally attributed to a Massachusetts Institute of Technology (MIT) professor named J.C.R. Licklider, who in 1962 described a future “Galactic Network” of linked computers that would enable everyone access to computer resources. While the wisdom of this idea seems obvious now, at the time many computer industry experts thought that sharing computers was a waste of valuable resources and thus did not support Licklider’s visionary idea. Fortunately, Licklider had a chance to develop his ideas thanks to the Advanced Research Projects Agency (ARPA). ARPA was established under the control of the U.S. Department of Defense in 1958 to help the United States win the “space race” that began with the Soviet Union’s successful 1957 launch of Sputnik, the world’s first man-made satellite.

In 1962, J.C.R. Licklider went to work for ARPA as head of the computer research program, where he continued to promote his computer network ideas. A few years later, a former MIT researcher named Lawrence G. Roberts joined ARPA, and in 1967 he published his plan for a computer network called the *ARPANET*. The ARPANET became a reality in 1969, when four computer networks were linked through telephone lines, creating the precursor of what we now know as the Internet. Figure 1.1 shows the original hand-drawn schematic diagram for the ARPANET.

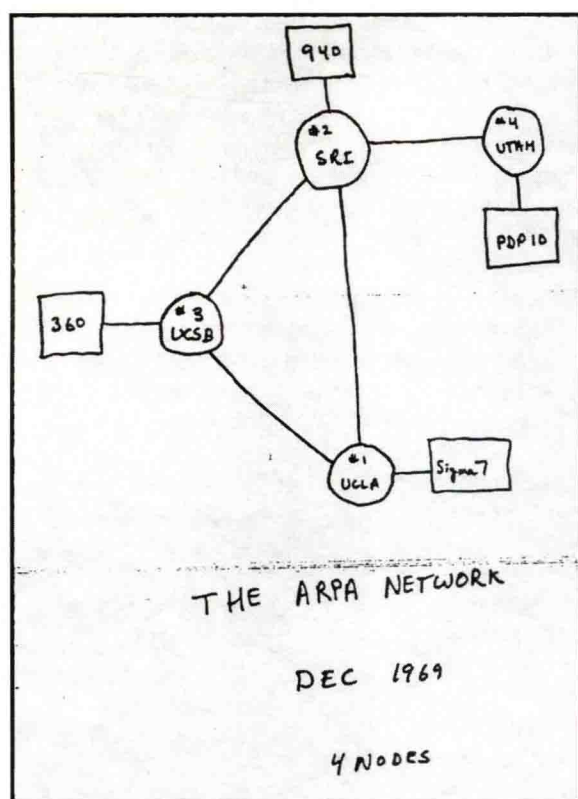
Shortly after the ARPANET’s inception, its developers made an important decision by adopting what they termed an open architecture philosophy to encourage other computer networks to link to the ARPANET. At the time, most of the big players in the computer industry operated under a closed architecture philosophy and deliberately made their local networks incom-

patible with competitors’ networks to lock customers into relying on a particular system. The open architecture philosophy adopted by the ARPANET did not require changes to internal network operations and thus facilitated connection to the ARPANET. Thanks to the adoption of open architecture philosophy, over 200 computers were connected to the ARPANET by 1981.

By the 1980s other large networks not connected with the ARPANET appeared. For example, BITNET connected mainframe computers at educational institutions across the country. The arrival of personal computers (PCs) in the 1980s accelerated the spread of computer networking. Eventually, the National Science Foundation (NSF) created NSFnet to connect non-ARPANET networks. In 1984, security concerns saw the ARPANET split in two—MILNET for military operations and ARPANET for research. In 1989, the last ARPANET node was shut down, and the NSFnet became the sole backbone for the fledgling Internet. A *backbone* is a high-speed line that forms the major pathway for a network. NSFnet was restricted initially to noncommercial purposes, but the NSF lifted that restriction in 1991.

ARPANET the first packet-switched computer network

backbone a high-speed line that forms the major pathway for a network



Courtesy of the Computer History Museum

Figure 1.1 Original ARPANET Schematic Diagram