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Computer Networking

计算机网络（影印版）

(美) Stanford H. Rowe
Marsha L. Schuh 著

清华大学出版社

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Dedicated to our mothers, Katherine H. Rowe and Josephine A. Binnquist, who have loved and believed in us longer than anyone else.

PREFACE

Computer Networking is a comprehensive introduction to the rapidly changing world of wired and wireless computer interconnection. Designed as an introductory course in networking, the book is also an excellent reference source. It is easy to understand and contains an extensive glossary, acronym list, and index, which makes finding material on particular topics easy. The book is targeted for the individual who has little background in networking, other than what can be gained by reading business and popular press or by using a PC at home, school, or work. This text neither assumes nor expects that the reader has a background in programming or advanced computer technology.

OBJECTIVES

The specific objectives of the text are:

- to provide comprehensive coverage for a first course in networking;
- to place emphasis on the basic principles and concepts of networking, those that don't change or change very little as technology advances and implementations become more sophisticated and specialized;
- to highlight networking standards that have become important in this field;
- to provide networking theory illustrated by real-world examples;
- to be appropriate for use at all levels, including community colleges, universities, and technical schools;
- to serve as a reference for people working in industry; and
- to be easy for the reader to understand.

ORGANIZATION

Computer Networking is organized into five sections that group topics for ease of teaching and learning. Part One presents introductory material that lays the foundation and provides a framework for the more detailed material in subsequent chapters. Chapter 1 introduces the subject matter and provides an overview of networking concepts. Chapter 2 describes and illustrates several ways of classifying networks, many of which will already be familiar to readers. Chapter 3 introduces and explains the OSI model for networks and the TCP/IP architecture that is the foundation of the Internet and many contemporary networks. The importance of network standards is also explained, and the need for both network architectures and standards is discussed. Chapter 4 introduces protocols, the "rules of the road" for networks. The need for protocols is explained, and the basic components that make up a protocol are examined.

Part Two delves into the fundamental technology that underlies all telecommunications and networking, and provides the technical foundation for networks. Chapter 5 examines how data are coded for transmission on a network. Readers learn the requirements for a good coding system and the reasons certain codes are more appropriate than others for use on telecommunications networks. Chapter 6 describes analog and digital signals, transmission methods, and the way they are combined in various network systems. Four cases are studied: transmitting analog signals on analog circuits; analog signals on digital circuits, digital signals on analog circuits, and digital signals on digital circuits. The reasons why digital transmission is superior to analog transmission are explained. Chapter 7 describes the protocols that are used on data links. Several protocols are examined in detail, and many more are introduced. Both LAN and WAN protocols are emphasized. Chapter 8 examines the media used for circuits that make up a network. The attributes of each medium are studied and compared, and the advantages and disadvantages of selecting one medium over another for a particular application are studied and discussed. Chapter 9 describes communications circuits. Various types of analog and digital circuits are studied. Circuit switching, packet switching, and multiplexing are explained. The types of errors that can occur on a circuit and the way in which errors are detected and corrected are examined in detail.

Part Three examines networks in detail. LANs are studied first, followed by WANs. Chapter 10 examines the technology used for LANs. Various topologies, access control techniques, protocols, and routing techniques are explained. Chapter 11 looks at the way the technologies are combined to make LANs such as Ethernets and token rings. Wireless networks, in their many forms, are examined in detail. The intricacies and limitations of the technologies of real-world networks are covered. Chapter 12 examines the requirements for installing, operating, and managing a LAN. The need for LAN management and security is explained. The issues surrounding home networks are explored. Many of the principles in this chapter apply to WANs as well. Chapter 13 describes WANs and examines their topologies. Packet data networks and the way traffic is routed in a WAN are explained. Broadband networks are studied, and specific WAN systems, such as frame relay and ATM, are explained.

Part Four deals with the ways in which networks of all types are interconnected into internets. Chapter 14 looks at the technology required to interconnect networks that may be fundamentally different in design. TCP/IP, as well as domains and domain naming, are examined in detail. Tools that are useful in managing an internet are also introduced. Chapter 15 relates the history and technology of the Internet and the WWW, which have both become so pervasive throughout society in the past several years. Various ways to connect to the Internet are described. Chapter 16 presents various Inter-

net applications such as e-mail and Internet telephony. Specifically, those of the WWW and the technologies that underlie its operation are explored. Browsers are introduced, and an explanation of how to create Web pages is given. Other Internet tools, such as FTP and Telnet, are also explained.

Part Five examines network security, network design, and network management. Chapter 17 covers the important topic of network security in detail. Network access control is described, and various techniques for implementing security are examined. Encryption is explained, and the importance of personnel and physical security is described. Security for home networks is also studied. Chapter 18 describes the process of designing and implementing new networks or changes to existing networks. Each phase of network design and implementation is discussed in detail. Chapter 19 examines techniques for operating and managing networks. The need for managing networks is first explained. Problem management, performance management, change management, and configuration control are described. Various types of management reporting of network operations are shown.

PEDAGOGICAL FEATURES

Computer Networking contains many pedagogical features designed to assist both students and instructors.

- A set of Objectives appears at the beginning of each chapter, outlining what the student is expected to learn.
- Many WWW addresses (URLs) are given throughout the text, and are summarized in Appendix B, to direct the student to websites where they may find the most current information or conduct additional research.
- A list of Key Terms at the beginning of each chapter serves as a checklist of important terms, concepts, and ideas.
- A Case Study at the end of each chapter illustrates the way concepts and techniques are applied within real companies and networks.
- Extensive Review Questions for each chapter give readers an opportunity to test their knowledge of the material.
- A Problems and Projects section at the end of each chapter is designed to stimulate student's thinking. The problems are challenging questions that will lead the student beyond the text. In many cases, real-world situations are presented for the student's consideration. The projects are suitable for individual or team effort, and often take the student outside the classroom to talk to networking professionals or users or to research information on the Internet.
- A comprehensive Glossary and a separate list of Acronyms used in the book appear at the end of the text.

For instructors, there is a comprehensive Instructor's Manual that includes:

- suggestions for ways to organize the course, depending on the desired emphasis and focus;
- transparency masters of the chapter Outlines;
- a CD containing PowerPoint™ slides of all figures in the text;
- answers to the Review Questions in the text;
- suggested solutions to the Problems and Projects in the text;

- hints for the presentation of material in the classroom; and
- test bank questions for examinations.

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