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TCP/IP PROTOCOL SUITE

SECOND EDITION

TCP/IP协议簇

（第2版）

Behrouz A. Forouzan
Sophia Chung Fegan 著

Mc Graw Hill 清华大学出版社

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进入21世纪，世界各国的经济、科技以及综合国力的竞争将更加激烈。竞争的中心无疑是对人才的竞争。谁拥有大量高素质的人才，谁就能在竞争中取得优势。高等教育，作为培养高素质人才的事业，必然受到高度重视。目前我国高等教育的教材更新较慢，为了加快教材的更新频率，教育部正在大力促进我国高校采用国外原版教材。

清华大学出版社从1996年开始，与国外著名出版公司合作，影印出版了“大学计算机教育丛书（影印版）”等一系列引进图书，受到了国内读者的欢迎和支持。跨入21世纪，我们本着为我国高等教育教材建设服务的初衷，在已有的基础上，进一步扩大选题内容，改变图书开本尺寸，一如既往地请有关专家挑选适用于我国高校本科及研究生计算机教育的国外经典教材或著名教材，组成本套“大学计算机教育国外著名教材系列（影印版）”，以飨读者。深切期盼读者及时将使用本系列教材的效果和意见反馈给我们。更希望国内专家、教授积极向我们推荐国外计算机教育的优秀教材，以利我们把“大学计算机教育国外著名教材系列（影印版）”做得更好，更适合高校师生的需要。

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Preface

Technologies related to networks and internetworking may be the fastest growing in our culture today. One of the ramifications of that growth is a dramatic increase in the number of professions where an understanding of these technologies is essential for success—and a proportionate increase in the number and types of students taking courses to learn about them.

This is a book about TCP/IP. It provides the information necessary for students who seek a degree in data communications and networking. It is also a reference for professionals who are supporting or preparing to work with networks based on TCP/IP. In short, this book is for anyone who needs to understand the TCP/IP protocols.

The book assumes the reader has no prior knowledge of the TCP/IP protocols, although a previous course in data communications is desirable.

Organization

This book is divided into five parts. The first part, comprising Chapters 1 to 3, reviews the basic concepts and underlying technologies that, although independent from the TCP/IP protocols, are needed to support them.

The second part of the text discusses the protocols in the network and transport layer. Chapters 4 to 10 emphasize the network layer protocols. Transport layer protocols are fully described in Chapters 11 and 12. Chapters 13 and 14 are devoted to a detailed description of routing protocols.

The third part discusses the application programs that use the network and transport layer protocols. Chapter 15 and 16 give a brief review of the client–server paradigm and socket programming and lay the foundation for Chapters 17 to 25, which discuss the application protocols.

The fourth part (Chapters 26 to 30) covers issues and topics relatively new to the Internet. We discuss IP over ATM, Mobile IP, Real-Time Communication, Internet Security, and Private Networks (including real and virtual private networks).

The fifth part of the book (Chapter 31) is devoted to the next generation of TCP/IP. We describe IPv6, ICMPv6, and the transition strategies from version 4 to version 6.

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Features

Several features of this text are designed to make it particularly easy for students to understand TCP/IP.

Visual Approach

The book presents highly technical subject matter without complex formulas by using a balance of text and figures. The approximately 590 figures accompanying the text provide a visual and intuitive opportunity for understanding the material. Figures are particularly important in explaining networking concepts, which are based on connections and transmission. These are both often more easily grasped visually than verbally.

Highlighted Points

We have repeated important concepts in boxes for quick reference and immediate attention.

Examples and Applications

Whenever appropriate, we have included examples that illustrate the concept introduced in the text. Also, we have added real-life applications throughout each chapter to motivate students.

Protocol Packages

Although we have not tried to give the detailed code for implementing each protocol, many chapters contain a section that discusses the general idea behind the implementation of each protocol. These sections provide an understanding of the ideas and issues involved in each protocol. They are optional.

Key Terms

The new terms used in each chapter are listed at the end of the chapter with definitions included in the glossary.

Summary

Each chapter ends with a summary of the material covered by that chapter. The summary is a bulleted overview of all the key points in the chapter.

Practice Set

Each chapter includes a practice set designed to reinforce salient concepts and encourage students to apply them. It consists of three parts: multiple-choice questions, exercises, and programming exercises. Multiple-choice questions test students' grasp of basic concepts and terminology. Exercises require deeper understanding of the material. The programming exercises are for those students or readers who have taken one or two programming courses in C or a similar language. These exercises prepare students for client–server programming courses.

Appendixes

The appendixes are intended to provide quick reference material or a review of materials needed to understand the concepts discussed in the book.

Glossary and Acronyms

The book contains an extensive glossary and a list of acronyms.

New to the Second Edition

There are six totally new chapters in the second edition:

- Chapter 14, Multicast Routing Protocols
- Chapter 26, IP over ATM
- Chapter 27, Mobile IP
- Chapter 28, Real-Time Traffic over the Internet
- Chapter 29, Internet Security
- Chapter 30, Private Networks

Several chapters have been revised. Classless addressing was added to Chapter 5. Chapter 10 was revised to reflect the new version of IGMP. Chapter 23 was revised to make the concepts easier to understand. Several examples were added to each chapter to provide real applications of theoretical issues. Key terms were added at the end of each chapter.

How to Use the Book

This book is written for both academic and professional audiences. The book can be used as a self-study guide for interested professionals. As a textbook, it can be used for a one-semester or one-quarter course. The chapters are organized to provide a great deal of flexibility. The following are some suggestions:

- Chapters 1 to 3 can be skipped if students have already taken a course in data communications and networking.
- Chapters 4 through 14 are essential for understanding TCP/IP.
- Chapters 15 and 16 can be covered briefly to open the way for a network programming course.
- Chapters 17 to 25 can be covered in detail in a semester system and briefly in a quarter system.
- Chapters 26 to 30 can be skipped if there are time constraints.
- Chapter 31 can be used as a self-paced chapter.

Acknowledgments for the Second Edition

It is obvious that the development of a book of this scope needs the support of many people. We acknowledged the contribution of many people in the preface of the first edition. For the second edition, we would like to acknowledge contributions to the

development of a book from peer reviews. We would especially like to acknowledge the contributions of the following reviewers:

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