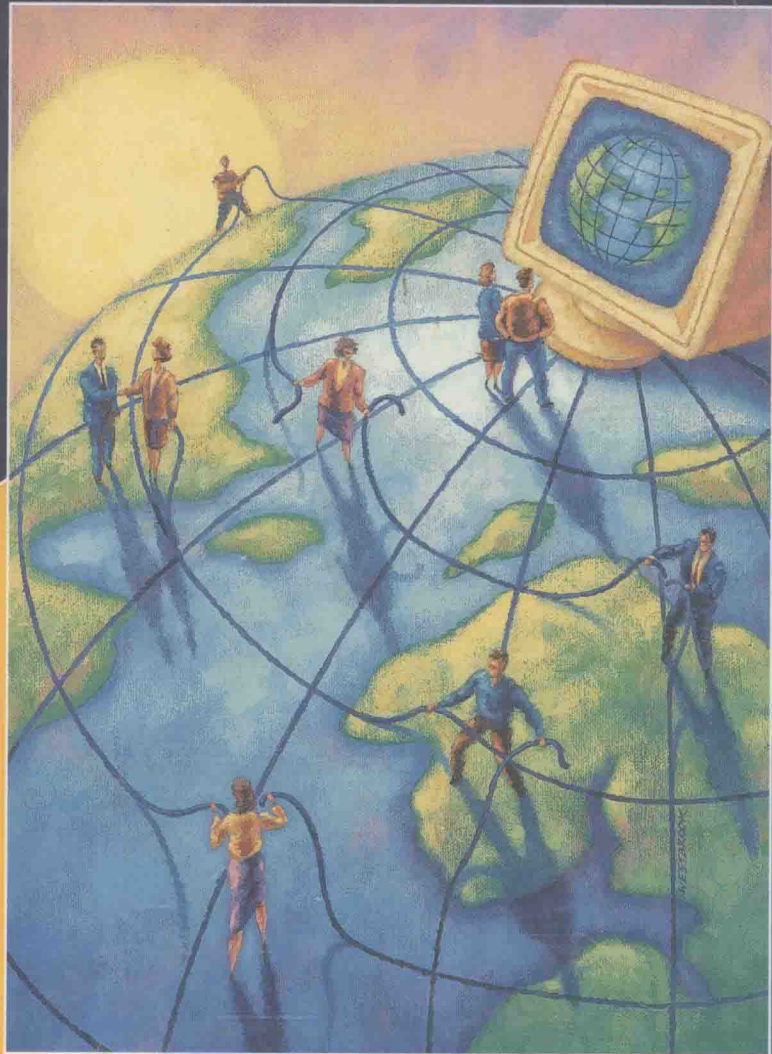


INTRODUCTION TO
DATA COMMUNICATIONS
AND NETWORKING



BEHROUZ
FOROUZAN

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING

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with

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PREFACE

Networks and digital communications may be the fastest growing technologies 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. Today students wanting to understand the concepts and mechanisms underlying telecommunications and networking come from a variety of academic and professional backgrounds. To be useful, a textbook on data communication and networking must be accessible to students without technical backgrounds while still providing substance comprehensive enough to challenge more experienced readers. This text is written with this new mix of students in mind.

Features of the Book

Several features of this book are designed to make it particularly easy for students to understand data communication.

Structure

We have used the seven-layer OSI model as the framework for the text not only because a thorough understanding of the model is essential to understanding most current networking theory but also because it is based on a structure of interdependencies: Each layer builds upon the layer beneath it and supports the layer above it. In the same way, each concept introduced in our text builds upon the concepts examined in the previous sections.

The first eight chapters emphasize the physical layer, which is essential for understanding the rest of the layers. These chapters are particularly needed for students with no background in networking or telecommunication.

Chapters 9 through 13 describe all issues related to the data link layer. Chapters 14 to 20 discuss topics associated with the network layer. Chapter 21 describes the transport layer. Chapter 22 focuses on upper layers, which are normally combined in most protocols.

Chapter 23 describes one of the most important protocols, TCP/IP.

Visual Approach

The book presents highly technical subject matter without complex formulas, using a balance of text and figures. The approximately 700 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, both often more easily grasped visually than verbally.

Highlighted Points

Important concepts have been repeated in colored 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, real-life applications have been added throughout each chapter to motivate students.

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 two parts: multiple choice questions and exercises. Multiple choice questions are designed to test students' grasp of basic concepts and terminology. Exercises require deeper understanding of the material.

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.

How to Use the Book

This book is written for both an academic and a professional audience. 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 through 12 and Chapters 14, 16, 20, 21, and 22 are fundamental to understanding the concepts of data communication and networking.
- Chapters 13, 14, 15, 20, and 23 can also be covered in a quarter or a semester.
- Chapters 17, 18, and 19, which discuss the emerging technologies, can be covered if time permits.

Acknowledgments

It is obvious that the development of a book of this scope needs the support of many people. We must first thank the hundreds of students at De Anza College who have used the text and made useful comments. We must also thank the De Anza staff; their encouragement and support materialized the project and contributed to its success. In particular, we thank Sandy Acebo, Richard Gilberg, Martha Kanter, Anne Oney, John Perry, George Rice, Mark Sherby, Orva Stewart, and John Wanlass.

The most important contribution to the development of a book such as this comes from peer reviews. We cannot express our gratitude in words to the many reviewers who spent numerous hours reading the manuscript and providing us with helpful comments and ideas. We would especially like to acknowledge the contributions of the following reviewers:

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