

Computer Networks and Internets with Internet Applications, 4e

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Lecture PowerPoints

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Chapter 1

Introduction

Topics Covered

- 1.1 Growth Of Computer Networking
- 1.2 Complexity In Network Systems
- 1.3 Mastering The Complexity
- 1.4 Concepts And Terminology
- 1.5 The Value Of Hands-On Experience
- 1.6 Organization Of The Text

1.1 Growth Of Computer Networking (1)

- Computer networks (NW) have been growing explosively
- NW is used in every aspect of business
 - including advertising, production, shipping, planning, billing, and accounting
- Federal, state, and local government offices use networks, as do military organizations
 - In short, computer NW are everywhere
- Continued growth of the global Internet is one of the most interesting and exciting phenomena in NW

1.1 Growth Of Computer Networking (2)

- The growth in NW has an economic impact:
 - Data NW have made telecommuting available to individuals and have changed business communication
 - In addition, an entire industry has emerged that develops NW technologies, products, and services
 - The popularity and importance of computer NW has produced a demand in all industries for people with more NW expertise
 - Companies need workers to plan, acquire, install, operate, and manage the hardware (HW) and software (SW) systems that comprise computer NW and internets

1.2 Complexity In Network Systems (1)

- Computer NW is a complex subject:
 - Many technologies exist, and each has features that distinguish it from the others
 - Multiple organizations have created NW standards independently, which are not all compatible
 - Many companies have created commercial NW products and services that use the technologies in unconventional ways
 - Finally, NW is complex because multiple technologies exist that can be used to interconnect two or more NW
- As a result, many combinations of NW are possible

1.2 Complexity In Network Systems (2)

- NW can be especially confusing to a beginner
 - because there is no single underlying theory that explains the relationship among all parts.
- In fact, various organizations and research groups have attempted to define conceptual models that can be used
 - to explain the differences and similarities among NW HW and SW systems
- Unfortunately, the set of technologies is diverse and changing rapidly
 - models are either so simplistic that they do not distinguish among details
 - or so complex that they do not help simplify the subject

1.2 Complexity In Network Systems (3)

The lack of an underlying theory has produced another challenge for beginners:

- There is no simple and uniform terminology for NW concepts
- Because multiple organizations define NW technologies and standards, multiple terms exist for a given concept
- Professionals often use a technical term from one technology when referring to an analogous feature of another
- In addition, technical terms are sometimes confused with the names of popular products
- In addition to a large set of terms and acronyms that contains many synonyms
 - NW jargon contains terms that are often abbreviated, misused, or associated with products

1.3 Mastering The Complexity

- To master the complexity
 - one must look beyond the details and concentrate on concepts
- For example (Ex):
 - although it is not important to understand the details of wires used to connect computers to a specific NW
 - it is important to understand the few basic categories of wiring schemes that exist and the advantages of each
- Similarly,
 - although it is not important to learn the details of how a particular communication protocol handles a congested NW
 - it is important to know what congestion is and why it must be handled

1.4 Concepts And Terminology

- The text focuses on concepts and avoids unnecessary detail
 - explains the purpose of each NW technology
 - gives the advantages and disadvantages
 - describes some of the consequences of using the technology
 - uses analogies and illustrations to simplify explanations
 - introduces networking terminology
 - notes popular abbreviations and synonyms that professionals use

1.5 The Value Of Hands-On Experience

- This text provides a conceptual overview of the material that is essential for a beginner:
 - deep understanding can only result from personal experience
- Readers are strongly encouraged to gain as much hands-on experience as possible with NW HW and SW, Possibilities include:
 - building application programs that communicate over a NW
 - configuring network systems
 - observing protocols in action
 - and measuring system performance
- The companion lab text, “Hands-On Networking”, contains many suggestions for experiments and projects
 - Some of the exercises throughout the text refer to “Hands-On Networking”
 - and recommend specific experiments that will help the reader gain deeper appreciation of the material

1.6 Organization Of The Text

- Major parts of the text are:
 - First part
 - describes data transmission
 - Second part
 - focuses on packet transmission
 - Third part
 - covers internetworking
 - Fourth part
 - discuss networking applications