CSE and EE 461
Lecture 1

Autumn Quarter 1997

Goals of the Course

- Learn the basic ideas in computer networks, ideas that will transcend changes in technology.
- Learn some of the important current technologies. There are far too many to cover in depth in this course.
- Develop mathematical skills in analyzing network problems. Develop analytical skills that focus on alternative approaches to solving problems. (homeworks)
- Develop programming skills in designing network protocols. (projects)

Course Information and Policies

- Instructor: Richard E. Ladner
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  Office Hours: Wednesday and Thursday 11 -12
- Teaching Assistant: Jong Hee Kang
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  Office Hours: TBA
- http://www.cs.washington.edu/education/courses/461/
- Text: Computer Networks, Third Edition
  Andrew S. Tanenbaum
  Prentice Hall, 1996

Text Coverage

- Chapter 1: Network Architecture and Examples
- Chapter 2: Physical Layer - transmission media
- Chapter 3: Data Link Layer - How to send data from point to point
- Chapter 4: Medium Access Layer - How to access a broadcast channel
- Chapter 5: Network Layer - How to route data
- Chapter 6: Transport Layer - How to make the network invisible
- Chapter 7: Application Layer - Selected topics as time permits

Homework Policy

- 20% of grade
- Due Every Friday in the classroom at 8:30 am
- No late homeworks
- Graded homeworks returned by the following Friday
- Solution Sets will be provided
- Homework assignments can be found on WWW
- Discussion with other students about homework is encouraged, but copying another student's work or allowing your work to be copied is never allowed.

Exam Policies

- Final Exam - 8:30 - 10:20, Monday, December 15th
  40% of grade
  Covers the entire course
  Closed book
  Handwritten notes will be allowed
- Midterm Exam, Monday, November 3rd
  20% of grade
  Closed book
  Handwritten notes will be allowed

Project Policies

- 20% of grade
- Uses Unix machines, sanjuan@cs and orcas@cs, in CS Lab
- Can use Sieg 329 or telnet to these machines
- Projects using unix sockets: Goal of the project is to build a simple applications that uses TCP or UDP as services.
- Project using a simulator developed by Tanenbaum.
- Discussion with other students about the projects is encouraged, but copying another student's work or allowing your work to be copied is never allowed.

461 On-line

- Netscape or other WWW browser
- http://www.cs.washington.edu/education/courses/461/
- Class messages
  - e-mail instructor or TA with question or comment
  - we will e-mail back and archive in class messages
- Overhead thumbnails
- Homework and solutions
- Projects
- Other handouts

Computer Networks - What Are They

- Read Chapter 1, sections 1 - 4.
- A computer network connects many computers together to enable

  Sharing information - e-mail, file transfer, b-boards, WWW

  Access to remote services - file servers, printers, database queries, name servers, WWW
- Computer network vs. distributed system

  A computer network provides the infrastructure for a distributed system. In a distributed system remote services are accessed transparently without the user knowing anything about the network.

  e.g. "rcp file1 wolf:file2" vs. "cp file1 file2"
- Parallel Computers - The backbone of a parallel computer is often a special purpose computer network.

Goals to Achieve in Networks

- Reliability- delivering data correctly in spite of data loss, data corruption, out of order data delivery, and limited buffer space
- Low latency or delay - delivering data as quickly as possible

  - measured in seconds
- High bandwidth - delivering the most data per second

  - measured in bits per second
- High utilization - maximizing the use of the resources available

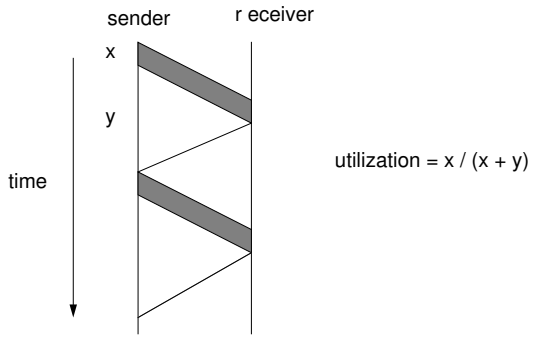
  - measured in percentage or ratio
- Security - secure from eavesdropping, viruses, break-ins, and impersonation

Bandwidth Utilization

$$utilization = \frac{bandwidth\ of\ data\ delivered}{bandwith\ possible}$$

$$utilization = \frac{time\ transmitting\ data}{total\ elapsed\ time}$$

Utilization affected by:

1. Error detection and correction bits
2. Resend of data because of loss
3. Inherent inefficiency of the delivery protocol - data transmitted must be acknowledged before more data is sent.

More on Utilization