CprE 489
Lecture 1

Fall Semester 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.
- Develop mathematical skills in analyzing network problems. (homework)
- Develop programming skill in designing network protocols. (project)

Course Information and Policies

- Instructor: Arun K. Somani
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  Office Hours: Tuesday, Thursday 9:30-10:30
- Teaching Assistant: Deepali Deshpande
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  Office Hours: Monday, Friday
- www.ee.iastate.edu
- 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

- 25% of grade
- Due Every Thursday in the classroom at 8:00 am
- No late homeworks
- Graded homeworks returned by the following Thursday
- Solution Sets will be provided
- Homework assignments can be found on WWW
  www.ee.iastate.edu
- 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 - December, 1997 at 8:30 am
  30% of grade
  Covers the entire course
  Closed book
- Midterm Exam - October 28, 1997
  15% of grade (Other 15% for class quizes)
  Closed book

Project Policies

- 15% of grade
- Goal of the project is to design, implement, and test a series of protocols which leads to a reliable file transfer protocol over a single link. Each protocol will solve progressively more difficult problems.
  Bounded receiving buffer
  Data errors on the transmission channel
  Data loss on the transmission channel
  Simple transport protocol
- Discussion with other students about the project is encouraged, but copying another student's work or allowing your work to be copied is never allowed.

489 On-line

- Netscape or other WWW browser
- Go to the Departmental "home page" from there
  Go to "course webs"
  Go to "CprE 489"
- Class messages
  Overheads
  Handouts

Computer Networks - What Are They

- 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.

Wireless Networks

- Satellite
- Cellular network
- Mobile vs. wireless networks

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 - 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

Bandwidth Utilization

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

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.