CS533: PROTOCOLS FOR COMPUTER NETWORKS

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ASSIGNMENT

• Email to kenw@arl.wustl.edu the following in the BODY of the email in PLAIN TEXT:

  ★ Syntax
  <TAB>     <TAB>
  |         |
  v         v
  CS533  last,first  email Address

  ★ Example
  CS533  wong,ken  kenw@arl.wustl.edu

  • Begin reading Stallings, Chapters 1-3

GENERAL INFORMATION

• Course Web Site: http://www.arl.wustl.edu/~kenw (Follow link)
  ★ Syllabus, latest handouts, solutions
• News Group: wu.cs.class.533
• Textbook
  ★ Stallings, High-Speed Networks and Internets
  ★ Stevens, TCP/IP Illustrated, Volume 1: The Protocols
• Other Books
  ★ Stevens, Unix Network Programming
  ★ Tannenbaum, Computer Networks
  ★ Partridge, Gigabit Networking
• Internet
  ★ www.ietf.org: Internet Engineering Task Force

EXAMPLE PROBLEMS

• Protocol implementation

  Implement a C/C++ transmitter and receiver for evaluating a family of
  sliding-window protocols. Your transmitter should establish a connection to
  your receiver through a third program called netsim that emulates packet
  loss and transmission delay. Experimentally determine the efficiency and
  goodput for window sizes of 1, ..., 256 packets. Compare with simulation
  results.

• Protocol simulation

  The course Web page contains the source code (C++) for a fluid simulation
  of a distributed queuing (DQ) algorithm. Design an algorithm for including
  the FCFS feature of output queuing and experimentally determine how well
  your algorithm mimics output queuing.

• Exercise

  Suppose that two CSMA/CD transmitters try to transmit one minimum-size
  frame at the same time on a shared medium. Let Z be a random variable
  that denotes the number of attempts before one transmitter is successful.
  Derive an expression for $E[Z]$, the expectation of $Z$ and evaluate it for a 10
  Mbps network whose diameter is 1500 meters.
**COURSE WORKLOAD AND GRADING**

- Programs *(Simple C++ and Unix)*
  - About 2 or 3 protocol implementations
  - About 2 or 3 protocol simulations
- Several Exercises
- Two Exams: Midterm, Final
- Late Policy: Late submissions will **NOT** be accepted.
- Grader/Consultants: To Be Announced
- Workload: Expect to spend 7-10 hours/week outside of class
- Grading:
  - 60% Graded Assignments
  - 40% Exams (20% each)

**COURSE MYTHS**

- I have to know something about networking to take this course.
  - Graduate level maturity in science, engineering, programming, and mathematics
  - Mathematics (e.g., basic calculus, probability, logic) is our language
- This course is identical to CS423 *(Intro to Networking).*
  - CS5335 is deeper and leans more towards *science* and *implementation.*
- This is a course on how to write network programs.
  - I assume you can use C++ classes and can debug a multiprocess program
  - C++ programming is just a tool (like calculus) that every graduate student knows
- All graduate *(undergraduate)* students will get A's (C's).
- I will learn a lot.
  - You get as much as you put into the course.

**INTERNETS AND THE INTERNET**

- An Internet: A network composed of heterogeneous networks
- THE (Global) Internet: An internet that uses IP
- Goals of Internetworking
  - Universal connectivity
  - Uniform access (hide hardware/software heterogeneity)
- Killer Applications
  - Electronic mail
  - File transfer and Remote login
  - Network file system and Distributed computing
  - World Wide Web (WWW)
  - Multimedia

**INTERNET HOSTS**

![Internet Hosts Chart](http://www.isc.org and RFC 1296)
KEY INTERNET TECHNOLOGIES

- **TCP/IP** *(Matching Needs)*
  - Protocol layering
  - Emergence outside of the military network

- **Dynamic Routing** *(Evolution)*
  - Route discovery
  - Route adjustments

- **Packet Switching** *(Resilience to Failures)*

- **Ethernet**
  - Complements packet switching (WAN) at the LAN level