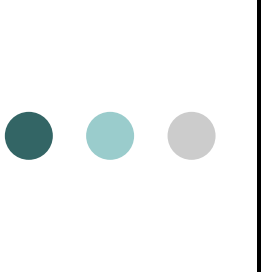# CS519: Computer Networks

Lecture 0: Jan 26, 2004

Course Description

Welcome to CS519: Computer Networking

CS519

- Instructor: Prof. Paul Francis
- Graduate TAs:
  - Hitesh Ballani
  - Fidanboylu Mehmet
  - Manpreet Singh
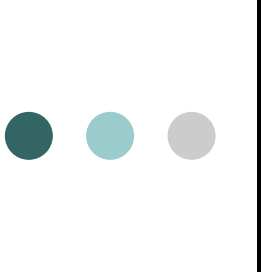- Undergrad TAs:
  - Rohan Murty, Joe Hoegler

About myself

- Nearly 20 years networking experience
  - Mostly industry research labs
  - But a few years in startups
- A lot of my research has had commercial implementation
  - Especially NAT (Network Address Translation)
  - Also: shortcut routing, shared multicast trees, scaling though multiple addresses . . .

My goals for you

- To have a deep understanding for the basic architectural principles of computer networking

- To understand good network and networked application design: simplicity, scalability, performance, and the end-to-end principle

- To understand specifically how the Internet works today, and where it is going in the near future

How will these goals be achieved?

CS519

- Of course lectures and homework
- Implementation projects:
  - Three simulation projects
    - Basic network queuing
    - TCP performance
    - Routing
  - One networked application programming project (real time voice and video)
  - Network measurements project
- Or you may propose a project of your own

Class-defined Projects

- You must complete the class-defined projects alone
  - Which means…write the code yourself, run simulations and present the results yourself
  - *But you may consult with classmates*
- Simulations are on NS2
  - Any coding will consist of modifying existing protocol modules
  - Tcl scripting for setting up and running simulations
  - C++ for actual protocol development

Class-defined Projects

CS519

- Networked application
  - Can be either C or Java
  - On Windows XP (in the CSUG lab)
  - Goal will be high performance
- Network measurements
  - Ethereal and tools like traceroute and ping

Self-defined project

- At any time during the semester you may propose your own project in lieu of the remaining class-defined projects
  - Goals and deliverables must be clearly defined
- Self-defined projects may be done by teams
- Self-defined projects may be done for combined MEng (CS790) and CS519 credit

Simulations

○ Why simulation?
  ● Can't do networking without a network!

○ Run simulations on a cluster of Linux boxes
  ● Donated by Intel® specifically for this class
  ● NS2 simulator

Homework and tests

- Small weekly homework assignments
  - You may discuss these among yourselves, but again you must do your own homework
- Homework answers to be discussed in class
  - Grading will be simple √ (check), √+, √−
- Two exams (in-class)
  - One midterm to be held during class hours, and one final during finals week

Homework and tests

- Tests will be open-note open-book
  - But only the Davie-Peterson text
- Tests will be based on reading assignments and homework
  - But much of the homework will go beyond the contents of the book
- If you do the homework, and show up for class discussions of the homework, you should have no trouble with the tests

Grading of projects

- Different projects will be graded differently
- I want to avoid demos for the class-assigned projects
  - I.e., for simulations you'll turn in your code and your graphs and if appropriate animations of your simulations
  - We need to design the simulations and decide the best grading scheme
- Self-defined projects will probably require demos
- **But I reserve the right to request a demo and discussion and to base your grade on that**

Grade formula

- The grade will be weighted more heavily by the tests and the projects, less so by the homework

  - But, the homework is important because it will show up in the tests

- I probably won't decide until the end of the course the exact weightings

- I also reserve the right to raise or lower your grade outside the scope of the weighting

Other administrivia

- Class discussion on netnews
  - cornell.class.cs519
  - http://adm/Newuser/newsgroups.htm for how to access
- Class will be administered by CMS
  - Homework and project hand-ins

Course Text

- *Computer Networks: A Systems Approach*
  - Larry Peterson and Bruce Davie
- Authors represent a nice combination of education (Peterson, Princeton) and industry (Davie, Cisco)
- We'll follow this text quite closely

Course content

- The textbook
  - (architecture, links, packet switching, IP and routing, TCP, congestion control, security, DNS, applications)
- Plus stuff the text doesn't cover much
  - VPNs, tunneling, IPv6, Overlay networks, anycast, NAT and firewalls