Welcome to CS519: Computer Networking

- Instructor: Prof. Paul Francis
- Graduate TAs:
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  - 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 through 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?

- Of course lectures and homework
- Implementation projects:
  - Build your own network (BYONet)!!
    - Run over a UDP “overlay” on sockets
    - You build IP, UDP, queuing, routing algorithm, management
  - 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
  - And later describe it during a code walkthrough
  - But you may consult with classmates
- Projects will run over a stack of high-end linux servers donated by Intel®

Class-defined Projects

- BYONet
  - Can be either C or Java
  - On Linux (via CSUG lab machines)
  - You will run processes that act like IP routers
  - We will test these by running packets through them
  - And by doing a code walkthrough at some time later in the semester
- 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
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 $\checkmark$ (check), $\checkmark+$, $\checkmark-$
- 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
- BYONet project will be tested mainly via packets sent and received by our test platform
- Plus a code walkthrough to validate that you really wrote the code
- 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