A - Course Overview    B – What you will learn   C - Internet and networking history
D - Networking's building blocks

A. Overview
• Course Website: http://pages.cs.wisc.edu/~akella/CS640/F14/
• Book: Larry Peterson and Bruce Davie, Computer Networks: A Systems Approach. Fifth Edition
• Grading: Projects 45%, Homework(Assignments) 15%, Midterm1 20%, Midterm2 20%
• There will be 4 projects. They will be related to 1. Network apps – socket api, 2. Routing, 3. SDN and 4. Higher layer API to write distributed apps (REST)
• There will be 3 assignments. They will be related to 1. Naming, 2. TCP Congestion control and 3. HTTP Waterfall
• Further instructions will be given on the assignments and projects.
• Projects will be done in groups of 2. Form your project group quickly.

B. What you will learn in this class
• Mostly interact with network in the form of “users”.
• What are some common networks you use?
  ○ CS dept
  ○ Campus
  ○ Data centers
  ○ Internet
  ○ Cellular
  ○ Home
  ○ Telephone
  ○ Cable
  ○ CDNS
  ○ P2P
  ○ Social
  ○ Cloud
  ○ ........
• Interact using “applications” - email, skype, FB, Browser, mobile apps.
• Applications use the network to send and receive messages.

Some key questions:
1. How do applications of various kinds communicate over the network? How they meet the requirements?
2. What impacts their performance, robustness etc?
3. What goes into the network to support these applications? Make it cost effective? Easy to mange?
4. What aspects of networks enable them to be future proof?
5. What's next for networking technology and use cases?

These questions are important for almost any tech job. The lectures, projects and assignments will gear you towards understanding the key principles (along with their implementation) used
to answer these questions.

C. History of the Internet and Networking

• Started in 1950s, 1960s. The motivation was to connect up remote computers.
• Use the telephone network. Initially circuit switched network was used but then it changed to more effective packet switching [This will be revisited in next lecture].
• Important achievements
  ◦ 1961 – Packet switching shown to be effective
  ◦ 1967 – Packet switch designed
  ◦ 1969 – ARPANET developed by Cerf and Kahn
  ◦ 1972 to 73 - Email and Ethernet invented. Internet has 15 nodes
  ◦ 1974 – TCP/IP architecture
  ◦ 1979 - 200 nodes
  ◦ 1989 – 100k nodes, TCP improvements
  ◦ 1991 – HTTP and Web
  ◦ 1993 – MOSAIC browser, age of apps
  ◦ 1998 – Google, Napster
  ◦ 2000s – Social networks, streaming, Gaming
  ◦ Now – Cloud and SDNs, mobile devices, Internet of things

D. Building blocks

Apps

Networks

Apps – process running on computer systems

Networks:
1. Directly/shared connectivity

2. Switched network

\[ S = \text{switch} \]
3. Internetwork: stitching together of switched networks

R = Router or Gateway

4. The entire Internet: recursively grouped

e.g. ISP, Campus, access provider network