CS118:
Computer Network Fundamentals

Instructor: Songwu Lu

Spring 2020

About Me

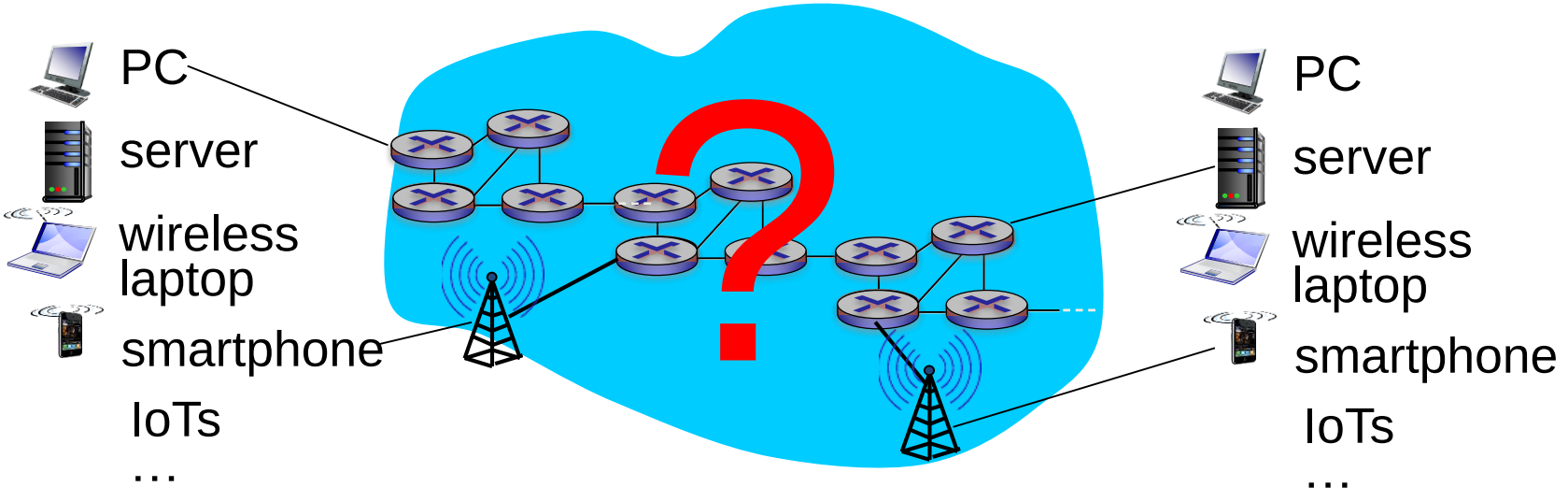
- Name: Songwu Lu
  - 1999/07~ , Professor, UCLA Computer Science
  - 1993/08~1999/06, MS&PhD @ UIUC
- slu@cs.ucla.edu (email preferred)
- Research interests & projects
  - 5G/4G wireless mobile networks, mobile systems, network security, cloud computing
- I am recruiting: undergraduate students on 5G/4G system projects based on mobile data and ML/AI

Today's Agenda

- What is this course about?
- Syllabus
  - Basic information
  - Course assignments and exams
  - Grading policy
  - Course policy
  - Q&A
- Chapter 1

What is CS118 about? (1/3)

- Networks for Computers



What is CS118 about? (2/3)

- **Internet**: networks for computers
  - One of greatest inventions in the past 50 years
  - Get almost every computer (machine) connected

- How is Internet built?
  - Hardware
  - Software
    - Layered network protocols

What is CS118 about? (3/3)

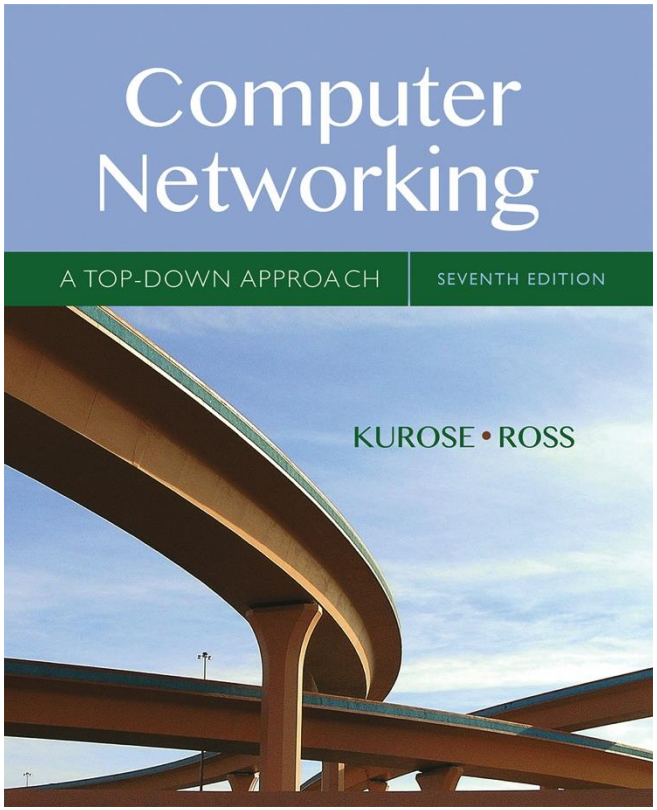
- Layered network protocols
  - **Application layer** : HTTP, DNS, P2P, socket programming
  - **Transport: layer**: TCP, UDP, TCP congestion control
  - **Network layer**: data-plane (forwarding and NAT), control-plane (routing), routing algorithms and protocols, SDN
  - **Link layer** : multiple access links and protocols, Ethernet, data center networking
  - **Wireless and Mobile Networks** : CDMA, WiFi, 4G LTE, mobile IP
- A focus on TCP/IP protocol suite in today's Internet
  - Understand basic concepts and principles of computer networks: design and practice
  - Develop network programming skills

More on CS118

- Introductory (first) course on the Internet
  - Comprehensive w/o necessarily going into depth
- Prerequisites:
  - Upper division standing
  - ***CS111: strictly enforced!***
  - Coursework (or experience with) algorithms, architecture, programming language is recommended but *not required*

Textbooks

- Plus online lecture notes
- Prerequisites
  - Coursework on (or experience with) **Algorithms** (e.g., graph, dynamic programing), **Operating Systems** (e.g., thread, socket programming)
  - Programming in **C/C++**



Computer Networking: A Top Down Approach

7th edition

Jim Kurose, Keith Ross

Pearson/Addison Wesley

Basic course information

- Course homepage
  - UCLA CCLE site
  - Gradescope (grades & assignment submission)
- Electronic copies are posted online
  - paper copies cannot be distributed

- Please enroll yourself at gradescope with TA's help

My Office Hours

- Monday 5:00 - 6:00PM
- Wed 4:00-5:00PM
- I will also remain online after MW lecture time
  - 10-10:30am MW for more Q&A
- CCLE Zoom sessions
  - No real in-person meetings for this quarter
- or by appointment (send e-mail)
  - If you need individual meetings, we can use Skype

TAs

- Zhehui Zhang (zhehui@cs.ucla.edu)
- Qianru Li (qianruli@cs.ucla.edu)
- Zhiyi Zhang (zhiyi@cs.ucla.edu)
- All three are excellent PhD candidates on networked systems
- Their Friday recitations are on the CCLE site
- Possible readers for this course too

Contact us

- Before/after the class (in the class of course)
- Office hours
- Email to me or your TA

Course Workload

- Weekly homework assignments
- Two programming projects
- 4 quizzes (no midterm/final exams)
- Reading
  - Mostly from the textbook, occasionally materials posted on the CCLE homepage

- Class participation
  - Online office hours, lecture time, etc.

Grading Policy

- Homework: 20%
- Programming projects: 20%
- 4 quizzes: 60%
- Bonus credit: up to 3% for extra work in the programming project

Homeworks

- Weekly homeworks are posted on Wednesdays. They are due by 6:00pm (PDT) next Thursday
  - Distributed at CCLE
  - Submitted to Gradescope only
  - Your TA should show you to use it this Friday
- You need to work out individually!
  - Collaboration is considered *cheating*
- *Solutions are posted @7pm every Thursday*

Programming Projects

Two programming projects:

- #1: A simple Web server
  - Introduction to Internet programming
- #2: A user-level TCP-like transport protocol
  - Phase I: TCP-like connection management
  - Phase II: Reliable data transfer using Go-back-N
    - Bonus: if you also implement Selective Repeat
- Single-person effort for both projects
  - In C/C++ in the Unix/Linux environment
  - TAs will guide you throughout the projects

Quizzes

- No midterm & final exams, only four quizzes
  - Weighting on each quiz is to be determined
- Each quiz covers 1~2 chapters (tentatively)
  - Each quiz is typically given in 7~10 days after the covered chapters are completed in the lecture
  - Quiz is given online
    - You download it from CCLE, and have 1.5~2 hours to work on it
    - Scan it or take a picture from your phone on your worksheet, upload to Gradescope by the deadline
    - Exact time to be announced for each quiz

Course Policy

- No late turn-in will be accepted for credit
- No make-up quiz
- No misconduct
  - need to sign and submit online "CS118 Academic Integrity Agreement" (posted online) to Gradescope this Friday
    - Your TA will show you how to submit the signed form this Friday
- Please check CCLE regularly for announcement/schedule update/assignments etc
  - Announcement/reminders in class

- More at CCLE homepage

Tentative Schedule (19 lectures):

Lectures:

Part 1: Introduction *(2 lectures, text: Chapter 1)*

Part 2: Application Layer *(2 lectures, text: Ch.2)*

-- introduction to socket programming is provided on Friday recitations

***Quiz 1 to cover Parts 1 &2**

Part 3: Transport Layer *(4.5 lectures, text Ch. 3)*

**Project 1: April 24, Friday*

***Quiz 2 to cover Part 3**

Part 4: Network Layer *(4 lectures, text: Ch. 4 and 5)*

***Quiz 3 to cover Part 4**

Part 5: Link Layer, LANs *(3.5 lectures, text: Ch. 6)*

Part 6: Wireless and Mobile Networks *(1.5 lectures, text: Ch. 7)*

Part 8: Network Security (0.5 lecture: Ch. 8)

**Project 2: June 5, Friday*

***Quiz 4 to cover Parts 5, 6 & 8 (using final exam slot).**