CSE 550: Systems for All

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Who we are

Ratul

Emmanuel

Ghana -> MIT -> Amazon -> UW ICTD

Research: Intersection of Systems ML & International Development w/ Kurtis Heimerl & Luis Vega (SAMPA Lab)

Hobbies: Biking, Kayaking, Cooking, Dancing! Dabbling in philosophy & nature photography

Fun fact: Once met Bill Gates while working on ML application in agriculture at MSR

Course structure

CSE 550: Systems for All

- Quals course that covers foundational systems topics from:
  - Operating Systems, Networks, Distributed Systems, Databases
- No “real” prerequisites
  - Designed to allow first-year undergrads from other areas to engage
  - Functional knowledge of real systems will be helpful
- Gateway course to CSE 551, 552, and 561 or a terminal course for students desiring breadth
- Goal: A thorough understanding and appreciation of the work your systems colleagues are doing!

Course organization

1. Read papers
    - Deeply read 1-2 per class
    - Shallow reads (optional)

Check out: https://derekchia.com/how-to-read-a-research-paper-3-pass-approach/
    - Deep read = All three passes
    - Shallow read = 1st pass

Course organization

2. Discuss papers
   - For each lecture, we will post a small set of questions on the assigned papers.
     - We'll create one thread per discussion question set.
     - You're required to add a comment to the discussion for each of the threads by 9am on the day of the class (to give time for everyone to read the responses before class.)
     - For each thread, pick one of the questions in the question set to answer.

   - Free-form discussion

Course organization

3. Lead paper's discussion in a group of 2
    - Sign up sheet on the course Web page

Ratul will do a short intro to the topic prior to that

Course organization

4. Projects
   - Two programming/measurement assignments
     - Done in groups of 2 or 3
     - Meant to both clarify the nature of systems contributions as well as engage you in tooling issues (a defining feature of Systems)
     - Assignment #1 is already posted
   - Project 3
     - Choose: Independent research project or in-depth assignment from us
       - Implement Paxos!
     - Same groups of 2 or 3
     - Both conclude with writeup of results.

Course organization

No exams!

Tools

- Canvas for projects/assignments
- Ed for discussions
- Slides posted on the Web page after the lecture
  - Adapted from Arvind and Kurtis
- Feedback: email/chat, mid-quarter eval, feedback.cs.washington.edu

Office hours

- Opportunity to have more personal interactions with us
  - Ratul: On-demand by Zoom; around after class
  - Emmanuel: 4-5 pm Wed

Grading

- Online discussions: 10%
- In-class discussion leading and participation: 10%
- First two projects: 25% + 25%
- Project 3: 30%

Late policy, getting off-track

Each **person** gets three late days for reading responses.

If you projects/assignments will be late, reach out to us beforehand and we'll figure it out.

Special circumstances: Come talk to us.

Questions?

Course content

Dictionary

Search for a word

sys·tem

/ˈsistəm/

See definitions in:

All | Physiology | Computing | Science | Gambling | Music

noun

plural noun: **systems**

1. a set of things working together as parts of a mechanism or an interconnecting network.
   "the state railroad system"

   Similar: structure | organization | order | arrangement | complex

2. a set of principles or procedures according to which something is done; an organized scheme or method.
   "a multiparty system of government"

   Similar: method | methodology | technique | process | procedure

Definitions from Oxford Languages *Feedback*

Translations and more definitions

Our focus

S*oftware* systems

- Though the overlap with hardware is large!

Understand how software systems achieve a specific external behavior

- e.g., deliver videos, online social network, email, ML execution

Comprises of many components

- Components interact and cooperate to provide overall behavior
- They typically have (well) specified interfaces

Large-scale, running across thousands or millions of hardware devices

Let’s build a social network together

Assume that you have computer hardware

Common themes across systems

Correctness – does it work as advertised?

Reliability – stay functional as components fail

Performance

Scalability

Efficiency

Security