Distributed Systems in Challenging Environments

Winter 2018
What is this about?

- Distributed systems
  A set of independent, interconnected processors that communicate and coordinate their action by exchanging messages

- Our goal – discuss cool ideas and projects that push distributed systems and their underlying networks to “uncomfortable places”
  – How uncomfortable?
Some of the topics we’ll cover
A higher-level goal

- Learn research by reading and doing
- Reading and discussing other people’s research
- Presenting research ideas
- Picking a project and executing it
- Writing a paper
Class structure

- Class meetings
  - Reading, presenting and discussing research papers

- Taking part of a mini-conference
  - Reading list as the submissions
  - You as the PC, reviewing papers

- Project
  - Come up with fresh idea, we can brainstorm together
  - Research, build, test (a proof of concept), …
  - Write a report/paper on your project
  - Present it to the class
Grading

- **No exams**
- **Class (50%)**
  - Participation 10%
  - Presentation and discussion leading 20%
  - Paper review and PC meeting 20%
- **Project (50%)**
  - Proposal 10%
  - Midterm report/meeting 10%
  - Final report and presentation 30%
Reading papers

- Why reading?
  - Get an overview, write a review, present a paper, …

- Deciding what to read
  - What did they do? Title & abstract should tell you that

- Reading for breadth
  - Develop a framework of the paper and assess authors’ credibility by skimming; if you want to know how they did it …
Reading papers

... 

Reading in depth *(the assigned list)*
- Challenge argument, assumptions, methods, experimental framework, statistics, conclusions
- Can you apply their research to your work?

Take notes
- Highlight major points, note definitions, construct an example, ...
Reading papers

- ...

- For the class
  - Reviews due before class (so 3-4 people will have read the paper in depth)
  - 24hr before I will post a question (per paper) in Piazza
  - All *but* reviewers and presenters must answer before class
A mini-conference

• In-depth reading
• Practice reviewing papers for conference/journal
• The PC process
  – State preferences for papers
  – Assignment based on them
  – Each of the 18 paper will receive 3 reviews, you will write …
    • Undergraduates: ~4 reviews each
    • Graduate students: ~5 reviews each
  – Discuss papers in a two-part PC meeting
A mini-conference

- To do next – read the linked papers on reviewing
  - Allman’s Thoughts on reviewing
  - Roscoe’s Writing reviews for systems conferences
  - Register with HotCRP (find it in the course website)
Review form

- Overall merit
- Reviewer confidence
- Paper summary
- Strength
- Weaknesses
- Comments for authors
- Comments for PC
Giving a good research talk …

- The talk is not an in-depth treatment of the work
  - Primary audience
  - Key/main takeaway

- Think of what motivated the authors
  - Examples to motivate the work and approach
  - Examples to illustrate your points

- Saying enough without saying too much
  - Convey the ideas, don’t overwhelm your audience
    - Follow a non-uniform approach
Giving a good research talk

- Don’t put too much on the slide
  - Prune multiple times
  - People can only take very limited info per slide: 5+/−2 things
  - Just one figure per slide!
  - Use the slide header when possible

- Careful with use of animation

- Mind the time!
Every class meeting

- **Before**
  - Those presenting have shared the slides with me
  - 3 people per paper have written reviews
  - Everyone have read the paper(s) and answered the question(s)

- **During**
  - One or two presentations
  - Clarification questions
  - Open discussion
Project

- One single project – a critical piece – 50%
- Your goal
  - Design, construct, evaluate an interesting distributed system
- Final report and in-class presentation by the team
- Teams of 2+ people; based on topics you will be assigned a project leader (me or somebody else)
Schedule

- Form a group – Jan 8-12
- Project meeting with me – Jan 15-19
- First project presentation – Jan 29 (in class)
- Project meeting with me – Feb 19 week
- Final presentation – Mar 20 ...
- Final report due – Finals week (Mar 20 ...)
  - HotNets format: <= 6 2-col. pages, including all figures and references, 11-point fonts, standard spacing, and 1-inch margins
A common approach

• Pick a topic/area
• Learn about the area, typically by reading papers
• Come up with a new idea
  – A solution to a problem you notice
  – An open research question
• Execute your idea
  – Model, implement, evaluate, …
• Share what you have learned by writing a paper and presenting it somewhere
Light project presentations

• Initial presentation – 4 slides
  – Project name and team members
  – Research contributions of the project; list of new/interesting concepts to explore
  – Why do we care if you are successful?
  – Project milestones and schedule for the rest of the quarter

• Midterm meeting …
Light project presentations

- Midterm meeting
  - Revised statement of project goals; list of new/interesting concepts to explore
  - List of issues addressed and pending
  - Updated project milestones, highlighting accomplishments to date, and schedule for the rest of the quarter

- Final presentation – ~15’ based on final report
Final report

• Abstract
  – What did you do, why is important & what are your high-level results?

• Problem statement
  – What is the problem you tried to solve?

• Prior work
  – How has the problem being dealt with before? Why was that not enough?

• ...

Final report

- Research approach
  - *Approach to solving the problem? What did you design, built? What was your evaluation methodology?*

- Results
  - *How did you evaluate the work? What were your figures of merit?*

- Lessons learned and future work
  - *What would you have done differently? What’s left for future work?*

- Summary and conclusions
Next time/TODO

- Register with HotCRP and enter your preferences
- Form a group if you haven’t already!
- Start thinking of project topics; talk to me
- Read *Cell spotting?* – to be presented by Fabián
  - I will post a question shortly
  - Enter your reviews for it
- Review the course website