Distributed Systems in Challenging Environments

Today
- Welcome
- Class organization and guidance
- Some advice
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 to uncomfortable places
  – How uncomfortable?
What topics will we cover?

- On the streets (self-driving vehicles)
- On buildings
- Over volcanoes
- As flying bugs
- In an augmented-reality world
A higher level goal

- Learn research by doing
  - Reading research papers
  - Discussing them in depth
  - Presenting research ideas (yours and others)
  - Picking a research project and executing it
  - Writing a research paper
Communication channels

- Website for most things
  http://aqualab.cs.northwestern.edu/classes/eecs-395-s13

- Piazza for class discussion
  https://piazza.com/northwestern/spring2013/eecs395/home

- Email for what you shouldn’t post ("DSCE: …")
Class structure

• Classes
  – Read research papers
  – Present research ideas
  – Learn about ongoing work

• Take part of a mini-conference
  – You as the Program Committee
  – Our reading list as the submissions
  – Task – review 3-4 papers and discuss them in a PC meeting

• Project
  – Come up with fresh idea, we can brainstorm together
  – Research, build, test, …
  – Write a report/paper on your project
  – Present it to the class
Grading

- No exams
- Class (50%)
  - Participation 15%
  - Paper review and PC meeting 20%
  - Presentation and discussion leading 15%
- Project (50%)
  - Proposal 10%
  - Midterm report and presentation 15%
  - Final report and presentation 25%
Reading papers

- Why reading?
  - Get an overview, to present the paper, writing a review, …

- 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
  - Challenge their argument – examine their assumptions, methods, experimental framework, statistics, conclusions
  - Can you apply their research to your work?

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

- Before class
  - 24hr before I will post a question
  - Answers need to be long enough to demonstrate that you understand the paper
A mini-conference

- Practice reviewing papers for conference/journal
- How does it work?
  - State your preferences
  - Papers assigned based on them
  - Each paper will receive 3 reviews, you will write 3
  - Discuss papers in a two-part PC meeting
- To do next – read the linked papers on reviewing
  - Mark Allman’s Thoughts on reviewing
  - Timothy Roscoe’s Writing reviews for systems conferences
  - Register with HotCRP (find it in the course website)
Review form

- Overall merit
  [1: Reject, 2: Weak reject, 3: Weak accept, 4: Accept, 5: Strong accept]
- Reviewer expertise
  [1: Reject, 2: Weak reject, 3: Weak accept, 4: Accept, 5: Strong accept]
- Paper summary
- Paper strength
- Paper weaknesses
- Comments for authors
- Comments for PC
Giving a good research talk …

- Not easy – some guidelines
- The talk is just a taster, not an in-depth treatment of the work
  - Who is your primary audience? *Easy to do in our case*
  - If someone remembers one thing from the talk, what would you like it to be?
- Think of what motivated you (or the authors)
  - Use examples to motivate the work and approach
  - Use examples to illustrate your points
- Saying enough without saying too much
  - Enough to convey your ideas, not too much to 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!
  - Don’t repeat what you plan to say
  - Use the slide header when possible

- Seriously consider dropping the typical “overview/roadmap” slide

- Careful with use of animation

- Mind the time!

- Number your slides

- …

- Pick papers to present and email me
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 – April 2-6
- Project meeting with me – April 8
- Project initial presentation – April 15
- Midterm presentation and report – May 6
- Project meeting with me – June 6-7
- Final presentation – Finals week (June 10-14)
- Final report due – Finals week (June 10-14)
  - 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
  - What is the 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 presentation and report – 4 slides**
  - Project name and team members
  - Revised statement of project goals and 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

- Form a group if you haven’t already!
- Start thinking of project topics or talk to me
- Read CarSpeak— to be presented by Fabián
  - I will post the question shortly
- Review the course website