Internet Systems Experimentation

Today
• Welcome
• Class organization and guidance
• Some good advice
What is this about?

- **Topic** – Internet system experimentation and experimental platforms
  - “... the location of exactly where a measurement is performed can significantly skew the interpretation of the measurement, in quite not apparent ways ...” – V. Paxson

- **Goal** – to explore the challenges with large-scale system testing and strengths/weaknesses of existing and proposed experimental platforms
What topics will we cover?

- Reviewing existing and proposed experimental platforms
  - Planetlab, Emulab, SatelliteLab, Dimes, Dipzoom, Dasu …

- Discuss their pros and cons
  - What you can/cannot do with them, coverage, use model, heterogeneity, control, …

- Study some useful building blocks for new platforms
  - Consistency, notification, coordination, …
A higher level goal

- Goal – to learn systems research by doing
  - Read research papers
  - Present research ideas (yours and others)
  - Pick a research project and execute it
  - Write a research paper
Class structure

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

• Project
  – Come up with a new idea, but I’ll give you something to get started
  – Implement, evaluate, …
  – Write a report/paper on your project
  – Present
Grading

- No exams
- Class (50%)
  - Participation 15%
  - Summaries 15% (*90% required*)
  - Presentation and discussion leading 20%
- Project (50%)
  - Proposal 10%
  - Midterm report and presentation 15%
  - Final report and presentation 25%
Reading papers

- Why reading?
  - You need an overview, you are presenting the 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 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, …
Reviews

- After reading and writing down your notes
- What have you learned? What were the main points?
- To submit
  - Paper title and its authors
  - Brief one-line summary, in your own words
  - A paragraph of the most important ideas
  - A paragraph of the largest flaws
  - A last paragraph where you state the relevance of the ideas today, potential future research suggested by the article, etc.

Useful: Hanson, McNamee, “Efficient reading of papers in Science and Technology”

- Due – 10AM Mon/Wed
- Next PlanetLab (2) papers
Presentations

- Given a good research talk is not easy – some guidelines
- The talk is just a taster rather than an in-depth treatment of the work; determine …
  - Who is your primary audience? *Easy to do in our case*
  - If someone remembers one thing from your 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 depth to convey your ideas, but not to much to overwhelm your audience – follow a non-uniform approach
Presentations

- Don’t put too much on the slide
  - Prune and then prune again
  - 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
- Don’t start to work on the slides too early
- *Pick papers to present and email me*
Project

- One single project – this is a critical component of the course – 50%

- Your goal
  - To design, construct and evaluate an interesting system or property that highlight platforms strengths/weaknesses
    - Your work (and report) should include a component on the evaluation of the platform itself
  - To propose new platforms or extension to existing ones

- Projects must be written up in a term paper and teams will present their results at the end of the course in a systems class mini-conference

- Teams of 2+ people; based on topics you will be assigned a project leader (could be me or somebody from outside the class)
Schedule

- Form a group – Jan 3-6
- Project meeting with me – Jan 9-13
- Project initial presentation – Jan 16 & 18
- Midterm presentation and report – Feb 8 & 13
- Project meeting with me – Feb 20-24
- Final presentation – Finals week
- Final report due – Finals week
  - HotNets format: submissions should contain six or fewer two-column pages, including all figures and references, using 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
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 be investigated
  – 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 be investigated
  – 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, build? 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 PlanetLab papers for next class
- Pick papers to present