CS244 Final Project

Now that you've gotten some practice reading and digesting research papers and reproducing a known result, it's time for the final project! This project will give you a chance to learn something new about an exciting piece of work, and will give you an introduction to the research process.

In the past, students have been able to recreate research, find flaws in published papers, and begun projects that eventually led to publication. We're excited to see what you do!

You may choose to either:

- **reproduce a result from a networking paper** that hasn't been reproduced in previous iterations of CS244, or
- **an original research project** in the area of computer networking

Much of this project is intentionally underspecified, and you should pick a project that you have sufficient time and experience to accomplish. Depending on what you propose, your project could require using a profiler, modifying the Linux kernel, implementing a custom simulator, learning a new scripting language, proving an interesting new result, or coordinating a software development effort across multiple group members.

You will likely need to read research papers outside of the class reading list or the particular paper you are trying to reproduce. (Check the references of any paper for the most closely related prior work, and read or skim the prior work!)

Reproduction Projects

For a **reproduction project**, here are some sample questions your project might try to answer:

- Does the primary result in the paper hold up? Your reproduction effort should be designed in a way that it can, in principle, detect if the original paper is wrong.
- Can you generate a plot or graph that looks the same as one of the main figures in the original paper, and explain where it came from?
- What kind of "reproduction" is appropriate? Any figure can be "reproduced" if you simply re-plot the authors' original data on the same axes. Can the data be generated afresh?
- Are the assumptions behind the data-generating process, and the way the system was compared with prior work, realistic? Do your results support the paper's claims about the generalizability, or applicability, of the results?
- What was difficult to reproduce? Are you able to package the contribution of the paper in a way that makes it easier to reproduce in the future?
- What happens if you vary a parameter the original experimenter didn't consider?
- Having reproduced the primary result, can you now extend or improve the work?

- Can you find a simplification to the system that still preserves most of the claimed improvements? If so, this can indicate that the original authors are mistaken about why their system outperforms prior work.

Selecting a paper
We would like you to reproduce a paper which has not yet been reproduced by a CS 244 student. The previous class projects are on the Reproducing Network Research blog.

You could reproduce an older, classic paper which hasn't been reproduced or one that was published more recently. To find papers, you could look at the programs of recent networking conferences, the websites of networking authors you know (e.g. ones we've read in class), papers which cite or are cited by networking papers, and so on.

Networking venues include:
- SIGCOMM: major conference in computer networking
- NSDI: networking and systems (overlap with OSDI)
- IMC: top-tier conference in Internet measurement
- CoNEXT: second-tier conference in computer networking
- OSDI: major conference in computer systems (sometimes including networking)
- SOSP: alternates years with OSDI
- USENIX ATC: second-tier conference in computer systems (sometimes including networking)
- HotNets: upcoming work and position papers in networking. Intended to be exciting, half-baked proposals.
- CCR: Computer Communications Review.

Original Projects

An **original project** can be a proof of concept of a novel networked system, an extension of existing work, or any research project that you could realistically extend to a conference-quality paper.

Note that original projects can be a bit more risky than reproduction projects, since research often does not go as planned.

Some ideas include:
- **New systems.** Questions to answer: how and why did you design the system the way you did? How does the system perform in comparison with prior work in similar areas? Why does it perform as it does (i.e., which design decisions account for what benefits)? What are the system's weaknesses and limitations?
- **Measurements.** What can you learn (about the Internet, about another network, about applications, about people, about spam email, about cryptocurrency, about online video games, about social science) by using the tools of computer networking? What kind of measurement tools or techniques did you use, and what did they tell you about

something in the real world? How can somebody reproduce your measurement? What are some weaknesses or potential confounders of your measurement?
- **Any other creative project** using the tools or problem domain of computer networking.

Timeline

Project Proposal

Due Friday, April 22nd 2022, 11:59pm

Please propose the topic for your project. If you're not sure of what you want to do by the proposal deadline, you can submit a few possible options and we can help you decide.

Please be wise and mindful of your (other) deadlines and other commitments when picking the project.

Please submit one page or less on canvas, which includes:
- Who you will be working with (we encourage groups of two, but working alone is okay)
- The particular results you would like to replicate, or the overall goal of your original project.
- A brief outline of incremental steps you will need to do to finish the project as well as a timeline. The goal here is to convince both us and yourself that your project is neither too small nor too big.