Final Project Guidelines

Goals of Project

This project has two parts. First, you should do original research on advancing the state of the art in computer architecture. Second, you should present your work as you would for a conference, both through a short talk and a written report. As with the rest of your career, you work will be judged on the impact of the research and the effectiveness of the presentations.

Deadlines

Project presentations: April 28, 30; May 2 (in class).

Written report: Monday May 5, 5pm (send a pointer by e-mail to dahlin@cs.utexas.edu).

Class Presentation

A key avenue for letting the world know about your research results is the conference presentation. The class presentation portion of the class is meant to provide practice on this important part of your research career.

The goal of this talk should be the same as the goal of a conference presentation: you want to provide enough interesting information to encourage the audience to invest the time to read your full paper. ***It is generally not a good idea to try to cover all aspects of the project in detail in a short talk.*** Instead, cover the motivation, methodology, and results in just enough detail to convince the audience that they should read your paper.

Each team will have a 17 minute slot to present their project to the class. Use the 17 minutes however you want. I recommend you to leave at least 3 or 4 minutes for a question or two, but you can use your time however you think it will be most effective. ***Warning***: I will enforce the 17 minute time limit ruthlessly.

The talk will be graded according to how well it achieves its goal: after hearing the talk am I eager to read the paper? There are two components to achieving a positive result. First, the presentation must be good. I will talk more about this in class before the talks, but let me emphasize one point here: you will most likely get a poor grade if you have not practiced your presentation in front of a critical audience before the class presentation. Second, the content must be good. After the talk, the audience should understand the thrust of your project, including your motivation, basic approach, and key results. Even if your results are not complete by the time of the presentation, you should be far enough along to present some preliminary results to pique the audience's curiosity.

Written Report

The goal of a technical research paper is to explain your contribution to the state of the art on the problem you address well enough that others can benefit from your work. The reports for this class should include: the motivation for the study, your methodology, the relationship of the study to previous work, and your results. It should include sufficient details for others to (1) critically evaluate your results (e.g. do they believe your results enough to use them in their work) and (2) reproduce your results. Finally, the report should be well written -- a poorly written paper will never be read and is effectively worthless no matter how good your ideas.

Turn in completed reports electronically by placing them in a publicly readable directory and sending the instructor a pointer to them by the deadline listed above. Two pieces comprise the report. First, a postscript file of the full document. Second, an HTML file containing either the abstract of the document or the full document; in either case, the HTML document should also contain a pointer to the postscript file. The postscript file should be no longer than 20 pages, double spaced, 12-point font, standard margins (shorter is even better!). I will post both the postscript and the HTML file on the web.

I will evaluate written reports by the same criteria that I use to referee conference papers:

- **"What you discover in doing the project"**

The goal of a research project is to have impact -- to learn something important that no one else knows but that they would want to know. Notice the two ideas here: you should learn something new and it should be something that people actually care about.

- **"How coherently you present your results"**

The goal of a research project is to change how the world approaches a particular problem. If no one but you bothers to read the paper or can understand the paper, you have failed in your goal.

I will evaluate both the organization of the paper and the effectiveness of your writing. I will discuss the organization of a generic research paper in class. As for writing effectiveness, (1) practice, practice, practice, (2) read Strunk and White's *The Elements of Style*.

- **"How well you put your work into perspective relative to other research"**

This has four parts. *Motivation*: why is the problem you are solving important? *Contributions*: exactly what progress do you make towards solving the problem. Make this explicit: putting the paragraph "The contributions of this paper are..." in the introduction is not a bad idea. *Previous work*: you should discuss (and cite) other efforts to solve the problem that either compete with yours or that you build on, and you should explain how your work differs from (and hopefully improves on) this previous work. *Bibliography*: the last section of the paper should list references related to your work.

- **"[How well you] convince me that what you figured out is correct."**

Your experimental methodology should be convincing. Unfortunately, there is no one right approach. Prototype implementations are convincing because it is hard to assume problems away when you build a real system. The challenge with prototypes is to design experiments that isolate the important factors in the design. Simulations are nice because you can study a wider range of options with less effort than with a prototype, and simulations sometimes allow more carefully controlled studies or larger-scale studies than are feasible with implementations. The challenge with simulations is to get valid results by including all important factors in the simulation without increasing complexity by including unnecessary factors. Analytic studies offer the chance to prove certain characteristics about a design. Often, however, systems must be significantly simplified to afford an analytic approach, raising the risk that the proof is not applicable to the real system.

Consider what you are trying to accomplish with your project and consider which approach will be most convincing for your particular problem. In the paper, talk about any ways in which your approach limits the conclusions that should be drawn from the study. One of the most effective strategies to defuse criticisms of your methodology is to point out its limitations yourself rather than trying to hide them and having someone else point them out. Making this a habit will do wonders for your credibility and professional respect.

Generic Paper Outline

The particulars of your project may lend themselves to a different organization, but this is often a good place to start:

- Abstract
  - identify problem and state main result
- Introduction
  - general area of work
  - motivation
  - outline solution, results, and contributions
  - status
  - outline rest of paper
- Background/related work
- My system
  - design
  - implementation issues
- Performance/evaluation
  - methodology
  - results
- Discussion
- <related work can also go here>
- Conclusions
- References