Computer Architecture
EECE7352
Prof. Kaeli

Final Project description:

Option A:
The assignment is to evaluate an architectural feature, or evaluate a code/data transformation, within a modeling infrastructure. The purpose of this assignment is to allow you practice some of the theory that has been presented in lecture. We have a very easy-to-use toolsets to implement your design on COE systems: Pin, Multi2Sim, GEM5 or some other simulator. You can find a wealth of simulators and tools at:

http://www.cs.wisc.edu/arch/www/tools.html

For your project you should select a particular architectural feature (e.g., branch predictor, L2 cache, value predictor, TLB) or code transformation (e.g., basic block layout, function inlining), and you should implement it in the simulation framework. Then you will run programs (e.g., benchmarks) to evaluate the effectiveness of the studied feature.

It is helpful to base your proposal off of a prior published study. You can find appropriate papers in the following conferences: ISCA, HPCA, MICRO, ASPLOS, IISWC, ISPASS, ICCD, PACT and ICS.

Before starting the project, you should submit a project proposal, which includes the following information:

1. Problem you will study (e.g., study the impact of tagged prefetching on the cache hit rate).
2. Tools you will use in the study (e.g., Pin, Multi2Sim or GEM5).
3. Experiments you will run (e.g., 3 benchmarks, 12 different configurations)
4. The results you will generate, and the associated grade you would expect to receive. For example:
>	*A = 3 benchmarks studied, 12 different configurations modeled, all results reported in project writeup.*
>	*A- = only 1 benchmark studied, 12 different configurations modeled, all results reported in project writeup.*
>	*B+ = only 1 benchmark studied, 6 different configurations modeled, all results reported in project writeup.*
>	*Etc…..*

You can work in teams of 1, 2 or 3, but of course, a team of 2 should produce 2.25X as much output, and a team of 3 should produce 3.5X as much output. All team members will receive the same project grade. You will have the option of submitting your project to be presented in class. I reserve the right to ask any team member to present the presentation.

When you are done with your project, you should submit your completed project in a report. Your report should include the original proposal, as well as a well-written description of the work completed and analysis of the results obtained. We will try to leave time during the last class of

the semester for students to give a 10-minute presentation on their project. This is not a required component of the project, though can add up to 10 points of extra credit to your project grade.

Option B: Select a research topic in the field of computer architecture. The topic can involve the processor pipeline, branch predictors, memory systems, multiprocessors, or related topic. Complete a literature review on that topic, carefully characterizing and comparing a minimum of 10 different papers related to the topic. The project write-up should include 1-page summaries of each paper, following by an 8-10 page (12 pt, single-spaced) discussion comparing the various approaches and suggesting what future directions should be considered on this research problem. It is expected that the paper will include more than 20 cited papers in the citation list.

Option C: If you have an alternative project you want to pursue, I will consider it, as long as the proposal is rich in terms of exploring computer architecture principles.

For your project, please note: (copied from the course syllabus)

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As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. **Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.**

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