Course Material

The purpose of this course is to give you a broad understanding of the concepts behind several advanced microarchitectural features in today’s supercomputers and to illustrate these concepts with appropriate hardware and/or software examples. It will cover the architecture and design of strategies for instruction set, dynamic branch prediction, multiple-instruction issue, dynamic (out-of-order) instruction scheduling, a unifactorial processor, shared memory, multiprocessors, and, if time is available, a multithreaded processor. Some of these topics require a background in what is normally thought of as undergraduate material; for these, we’ll briefly review that material and then go on from there.

You will augment your knowledge of the architectural features by doing experimental studies that examine and compare the performance of several alternative implementations for a particular feature. A computer science course like this one teaches you how to design experiments, how to write efficient code to analyze performance data, how to analyze performance data, and how to write up your experiments and results – skills that professional designers and developers in any applied subfield of computer science use on a regular basis.

Reading

Most reading assignments will be taken from Computer Architecture: A Quantitative Approach by John L. Hennessy & David A. Patterson, Morgan Kaufmann, 2003. To get the most out of the lectures, read the material before topics are discussed in class. My lectures won’t necessarily follow the same order of subtopics as the text and will take a different slant; I think you’ll find that reading the nuts and bolts approach of the authors before class to be helpful.

There will also be some supplementary reading that you can access from the course web pages.

Schedule

There is a weekly schedule in the course web area. The schedule will tell you what topics we will cover and when, what readings should be done before you come to a particular lecture, and when projects are due and exams will be held. The schedule will hold the schedule continuously, so if you plan each lecture, you should check it frequently, so that you can anticipate what material we will be covering.

Class Discussion

Since each class is a whopping three hours long, they will all be held because of the quality of our discussions. So think about what you’ve read for the upcoming lecture and about the material in the previous lecture before each class and come prepared to ask and answer questions, present your opinions of the architecture schemes we discuss and offer alternatives.
Exams/Projects

- There will be a final.
- The projects will be experimental studies that will help you experience evaluating architecture features and hone your intuition about the performance ramifications of changing certain aspects of the implementation. Experiments will typically be done using the SimpleScalar simulator. Douglas will explain how to use the simulator.
- You can work in teams of two students for each project. You should be with a different partner for each assignment.
- A project report is due at the beginning of class; no late assignments will be accepted.

Grading

- Grades will be computed using the following approximate weighting: final = 30% and projects = 70%. This may change, depending on the size of the projects.

Collaboration

- Discussing the course content with fellow students is an effective way to learn the material and is encouraged. However, the exam must represent your own mastery of the material, and projects must represent the contribution of your team.

Communicating

- We will communicate a lot through e-mail. Douglas and I will be mailing out assignments and clarifications, if needed. And you should use e-mail for asking and answering each other's questions. If you have questions that need a detailed or long explanation, I would much rather call during office hours. Therefore, you should register on the class mailing list.
- To add yourself to the class mailing list, you can visit http://mailman.cs.washington.edu/mailman/listinfo/csep548. Alternatively, you can email csep548-request@cs.washington.edu with the word "help" in the subject to receive a message listing all of the email command options. The list archives can be accessed by clicking on the very first URL on the list front page.
- The direct link is http://mailman.cs.washington.edu/mailman/private/csep548.

Schedule

- The schedule is flexible, and the class meets every Thursday 12:30-1:20 PM in room PHH 303. The first homework assignment will be due at the beginning of class.

Schedule (2)

- The exam will be on Wednesday, February 28th, 2007, in classroom HU 1001, from 9:30-11:30 AM. The exam will be open book. There will be a take-home portion of the exam, which includes 2-3 discussion questions. 50% of the exam will be multiple choice, 50% will be short answer.
- The final project will be due at the beginning of class on April 5th, 2007. The final project will be a comprehensive project that will include all the material covered in the course.
- The final exam will be on Wednesday, April 18th, 2007, in classroom HU 1001, from 9:30-11:30 AM. The exam will be open book. There will be a take-home portion of the exam, which includes 2-3 discussion questions. 50% of the exam will be multiple choice, 50% will be short answer.
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