ECE511/CSE521-COMPUTER ARCHITECTURE
Spring 2019

Lecture Time: Tuesday & Thursday 2:00-3:20 PM   Place: 2017 ECEB

Instructor
Rakesh Kumar
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Office Hours: 3:30-4:30 PM Tues, and by appointment.

TA
Ahmed Abulila
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Office Hours: 10:30-11:30 AM Wed in ECE3036, and by appointment.

Textbook
Dubois, Annavaram and Stenstrom. Parallel Computer Organization and Design (1st Ed.),
Cambridge Univ. Press, ISBN: 978-0521886758

Supplementary Textbooks
Shen and Lipasti. Modern Processor Design: Fundamentals of Superscalar Processors (1st Ed.),
Hennessy and Patterson. Computer Architecture: A Quantitative Approach (5th Ed.), The
Morgan Kaufmann, ISBN: 978-0123838728

Prerequisites
ECE411 or CS433
UNIX commands
C/C++ Programming
System Verilog

Homework
Homework assignments will be based on the GEM5 architectural simulator, and will require Linux competency. Please get an early start on the assignments, as many of them will require a significant amount of time to simulate. Each student will be allowed a late submission, of up to one week, of a single assignment.

Course Objectives
Advanced concepts in computer architecture: design, management, and modeling of memory hierarchies; pipelined computers; and multiple processor systems. Emphasis on hardware alternatives in detail and their relation to system performance and cost. Course Information: Same as CSE 521. Prerequisite: ECE 411 or CS 433. More specifically, assuming knowledge of pipelined processors with cache memories, as studied in depth in ECE 411, we continue with advanced techniques for extracting greater levels of instruction-level parallelism and memory-level parallelism in ECE 511. The former exploits opportunities for parallel execution of instructions from an inherently serial instruction stream, while the latter attempts to overlap increasing memory access latency with other useful work. We will study the memory hierarchy as well as virtual memory, and will also cover processor chips that with multiple cores, where concurrency is extracted from multiple sequential threads of execution.
Grading Policy
18% Assignments Assignment 1, 5%; Assignment 2, 5%; Assignment 3 (CP, 3%; Final, 5%)
21% Midterm Exam Topics: TBD
21% Final Exam Topics: TBD
40% Project Proposal, 5%; Proposal Presentation, 5%; Project Status Report 1, 7%;
Project Status Report 2, 8%; Project Presentation, 10%; Final Project Report, 5%

Course Outline and Important Dates

Course Introduction .................................................. Jan 15, 2019
Lecture Assignment 1 .................................................. Jan 17, 2019
GEM5 Tutorial 1 .......................................................... Jan 22, 2019
GEM5 Tutorial 2 .......................................................... Jan 24, 2019
Lecture Assignment 1 Due, Assignment 2 ................. Jan 29, 2019
Lecture ................................................................. Jan 31, 2019
Lecture ................................................................. Feb 05, 2019
Lecture ................................................................. Feb 07, 2019
Lecture ................................................................. Feb 12, 2019
Lecture Assignment 2 Due, Assignment 3 ................. Feb 14, 2019
Lecture ................................................................. Feb 19, 2019
Lecture ................................................................. Feb 21, 2019
Lecture Assignment 3 Checkpoint Due ....................... Feb 26, 2019
Lecture ................................................................. Feb 28, 2019
Lecture ................................................ Mar 05, 2019
Midterm Exam .................................................. Mar 07, 2019, 7-10pm
Lecture - Project Proposal Due ....................... Mar 12, 2019
Project Proposal Presentations ....................... Mar 14, 2019, 2-4:30pm
Spring Break .................................................. Mar 19, 2019
Spring Break .................................................. Mar 21, 2019
Lecture Assignment 3 Due ......................... Mar 26, 2019
Lecture Project Progress Report 1 Due ................. Mar 28, 2019
Lecture ................................................ Apr 02, 2019
Lecture ................................................ Apr 04, 2019
Lecture ................................................ Apr 09, 2019
Final Exam ................................................ Apr 11, 2019, 7-10pm
Extra Office Hours ................................................ Apr 16, 2019
Extra Office Hours Project Progress Report 2 Due ........ Apr 18, 2019
Extra Office Hours ................................................ Apr 23, 2019
Project Presentations ........................................ Apr 25, 2019
Project Presentations ........................................ Apr 30, 2019
Project Report Due ........................................ May 02, 2019