EE557: Computer Systems Architecture
Units: 4
Fall 2020

IMPORTANT NOTE: THIS IS A PRELIMINARY SYLLABUS ASSUMING IN-PERSON, ON-CAMPUS TEACHING. HOWEVER IT LOOKS LIKE CLASSES WILL BE HELD REMOTELY THIS FALL. IF THIS IS THE CASE THERE WILL BE SOME CHANGES: 1) CLASSES AND DISCUSSION SESSIONS WILL BE ONLINE AND 2) TESTS AND EXAMS WILL BE REMOTE

MORE TO COME ABOUT THIS

EE-557 has two regular lectures of 100 minutes each week and a 50 minutes discussion session per week, over 15 weeks. The discussion session is an opportunity to discuss the material covered in class, the homework, the simulation assignments and the exams with the TA. At times class material may be expounded during the discussion session. Attendance is not taken but attending the class and the discussion session is part of the course requirements.

Location: TBD

Instructor: Michel Dubois
Office: EEB228
Office Hours: TBD
Contact Info: E-mail: dubois@paris.usc.edu; Office: EEB228; Tel: (213) 740-4475
Lectures: MW 4-5:50
Discussion: F 4-4:50

Teaching Assistant: TBD
Office: TBD
Office Hours: TBD
Contact Info: TBD

Course Description
The main objective of EE557 is computer architecture exploration at a more abstract level than in previous courses on architecture. Because architectures are described at a block diagram level a large number of machines, memory structures, and interconnections will be taught. In ee457, we learned how to design a simple five-stage pipeline in great details, down to the circuit level. In ee557, we assume that these implementation details are known. We will learn about computer systems as they are designed today, including processors, memories, interconnects and multiprocessors. We will also cover some emerging topics such as GPU/GPGPU and Memory controller microarchitecture. The focus of the course is not on research but on actual, commercial, existing machines.

Learning Objectives
At the end of this course students will be ready to work on research in the area of computer architecture. They will have the knowledge to design chip architecture for components of a computer system. Moreover, they will have gained practical experience in using architectural design tools, such as architecture simulators, area/complexity estimators and power/energy estimators, to design and evaluate processors and large-scale systems at the architectural level.

Prerequisite(s): EE457: Computer Systems Organization
Course Notes
Communication will be done electronically through DEN’s D2L. Copies of lecture slides and other class information will be posted.

Technological Proficiency and Hardware/Software Required
Students should be able to access a computer and run simulations, i.e., be able to use the simulation tools, input data into them and read the results. No programming is needed. Also the ability to download and upload files to the DEN site is required.

Required Readings and Supplementary Materials

Homework:
There will be five homework.

Simulation Assignments:
There will be five simulation assignments. These assignments do require to use design tools under Unix. The first and second simulation assignments use a tracing tool called PIN. The goal of the third simulation assignment is to familiarize you with area and performance tools, such as SimpleScalar and Cacti. The fourth assignment is a microarchitecture design project using the tools. The fifth assignment will use a simulator for GPGPUs

Quizzes:
There will be 8-10 quizzes. Quizzes are announced in previous lectures.

Grading Breakdown
Homework: 15% (3pts per homework); Simulation assignments: 22% (Assignment 0: 2pts; Assignment 1: 5pts; Assignment 2: 5pts; Assignment 3: 5pts; Assignment 4: 5pts); Quizzes: 3%; Midterm: 25%; Final: 35%.

Grading Scale (Example)
Grades are curved and are assigned according to students performance. However I guarantee the following:
Total score > 80: A or A-
Total score > 60: B- or higher
Total score > 50: passing grade (C or higher)

Assignment Submission Policy
Homework is assigned electronically online. Homework is due two weeks from assignment. We use paperless homework submission, grading and return. Homework is submitted electronically online. Your homework solution must be in PDF (scan it if you need to). Homework will be graded electronically online. Late homework will be accepted through electronic submission for two additional days after the due date. The penalty is 25% of the maximum grade if submitted by 5pm the next day after the deadline and 50% of the maximum grade if submitted by 5pm two days after the deadline. No homework will be accepted after that.

The submission and grading of simulation assignments follow the same procedure as for homework.

Grading Timeline
Homework and simulation assignments: 2 weeks after due date. Midterm and Final: 2 weeks after exam

Revised June 2017
Course Schedule: A Weekly Breakdown

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<th>Readings and Assignments</th>
<th>Deliverable/Due Dates</th>
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<td>Dynamic pipelines/speculative execution</td>
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<td>4</td>
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<td>DRAM controllers micro-architecture/caches</td>
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<td>HWK 3; Simulation assignment 2</td>
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<td>14</td>
<td>Memory Consistency models</td>
<td>Chapter 7</td>
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<td>15</td>
<td>Chip Multiprocessors</td>
<td>Chapter 8</td>
<td>Simulation assignment 4</td>
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<td>FINAL</td>
<td>Material: comprehensive</td>
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<td>Time: see schedule of classes</td>
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Statements on Academic Conduct and Support Systems

Academic Conduct:
Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems:
Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime. Provides overall safety to USC community. dps.usc.edu