AdvancedMicroprocessorArchitecture

Instructor

ScottRixner,rixner@rice.edu,DH3028,713-348-6353
Officehours:Bypriorarrangement

CourseInformation

Class: T/Th10:50am-12:05pmDH1075
Web: http://www.owlnet.rice.edu/~elec525/
Labby: TBA

CourseDescription

Theclasswillexplorethecurrenttrendsandfutur   edirectionsofprocessormicroarchitecture,lookin   gahead
to billion transistor chips. The focus of the class   will be on high-performance processor and memory
architectures. We will explore various techniques d   esigned to maximize parallelism and improve
performance.Wewillalsolookattheinfluenceof   technologyonprocessorandmemoryarchitecturesan   d
howthatmayaffectfutureprocessordesigns.Knowl   edgeofthematerialcoveredinCOMP/ELEC425will
beassumed.The   classwillincludein-depthcoverageoftopicssuchas:

- •Frontenddesign(e.g.branchprediction,instructionfetch,tracecaching)
- •Exploitinginstruction-levelparallelism(e.g.VLIW,simultaneousmul   tithreading,processor
  coupling)
- •Memorysystemissues(e.g.caching,prefetching,bandwidth)
- •Technologyimplications(e.g.scaling,power)
- •Futureprocessorarchitectures(e.g.MAJC,Raw,reliability)

The class will include a mix of lectures and discussions on assi   gned readings of recent
publications. Students will be responsible for leading and participa   ting in these discussions. A
courseprojectthatcanbeperformedingroupswillalsoberequired.

Prerequisites

COMP/ELEC425orequivalentandprogrammingexperience

Readings

Selectedpapersfromtheliteraturetobeprovidedonthecoursewebpag   e

Discussions

Most classes will consist of a discussion of two papers on a particular topic in microprocessor architecture. All students are expected to read the papers. In addition, for each discussion, a student will be assigned to prepare a presentation of the papers and come prepared with a set of important questions to kick off a discussion of the topic.

Project

The project will involve investigating some aspect of high-performance microprocessor architecture via simulation. For example, you may develop and evaluate new memory operations, storage architectures, or core organizations. I suggest that the project investigate one of the areas that we will be discussing during class, but you are free to propose any research topic in microprocessor architecture. You may work on these projects in groups.

Grading

20% Discussion Leading
20% Discussion Participation
60% Project

Students with Disabilities

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Ley Student Center.