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Text: Collected readings.

Prerequisite: A standard course on computer architecture, equivalent to CmpSci 535, using a text such as Hennessy and Patterson, Computer Architecture: A Quantitative Approach. You should feel comfortable with the basic concepts of instruction set architecture, cache memory, pipelining, branch prediction, secondary storage, shared memory and vector parallel processing.

Course Goals: The architecture of computers underlies everything that we do with our software. For many years, the progress of architecture was primarily in the realm of enhancing the performance of serial processors. Today we are facing a dramatic shift toward more and more explicit parallelism. Our goal is to examine where we are, how we got here, and where we might be headed. We will be looking at material in a variety of papers ranging from classics in the field to recent ideas in architecture. Along the way, we'll also be looking at modern approaches to memory, cache, pipelines, branch prediction, and secondary storage.

Reading: You will be reading at least one paper for each class. There will typically be a choice of reading assignments per class, selecting among several papers.

Course Notes: Available at
https://people.cs.umass.edu/~weems/homepage/courses/cmpsci-635.html

I will be keeping a blog with an outline of what we cover in class, plus all of the slides.

Grading: Midterm: 20%   Final: 20%   Reading: 60%

Exams are **open papers** and **open notes**. This is so that you can look up formulas or data as needed -- I don't expect you to memorize this sort of information for exams. I do expect you to have read the material, participated in the discussions, and to know where to look up the information that you need. There won't be time in the exams to read material you're unfamiliar with. The purpose of the exams is for you to demonstrate that you have attained an operational level of understanding of the material. **Bring a calculator** to all exams unless I specifically tell you that it won't be needed. I will give out sample exam questions to help you prepare. Each section of an exam will have a set of questions corresponding to the papers, so you can choose the one that corresponds to the paper you read.

Reading Homework
Assignment: For each reading, list two points of strength, two points of weakness, and two discussion points (questions or assertions to be debated). The separate course schedule lists all of the reading. Please distinguish these clearly in your writeup.

Due Dates: They are each due in class on the assigned day of the reading.

Late Policy: You must do your work on time because we'll be using it in class. I will be calling on people at random to lead off discussions, so have your discussion points ready. Better to turn in partial work than to lose full credit.

Collaboration: The purpose of the homework is to give each person a chance to show their unique comprehension of the reading. If I feel people are submitting answers that are merely copies of each other, I will grade the one solution and divide the credit equally among the copies.

Grading: Each reading makes up the same percentage of your final grade.

Overall Grading: Earning full credit for one reading per class (24 readings) is equivalent to B-level work. One way to earn a higher grade is to do extra reading (27 = B+, 30 = A-, 33 = A). You can earn up to 25% extra by listing additional points for a paper. You could review a paper beyond those that are given (show it to me in advance so I can check that it is appropriate). Presenting a new paper and leading a class discussion is equivalent to three extra readings. A third way is to do additional research to address the weaknesses you identify in a paper, and write a summary of what you find, including references (be sure to use refereed sources, i.e., not Wikipedia). Or you could choose to do a project.

Optional Semester Project Examples:

One project would be to write an NSF grant proposal for doing architecture research, perhaps to address an open question from one of our papers. Other projects could involve doing some simulations with one of the publicly available research simulators such as MARSSx86, doing an analysis of an application using hardware performance counters in a processor, or using a performance analysis tool such as Pin.

Accommodation Statement
The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Academic Honesty Statement
Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent (http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).