CSE 549 "Classic Machines"

Introduction: In this class we will study the architecture of classic machines - those systems that broke new ground or otherwise pushed the envelope in some way. I think the goal is three fold: (1) to understand the constraints past designers were under and how they worked with them; (2) to appreciate what has come before; (3) to synthesize this understanding to be able to better work with future technological changes.

Format: The format of this class will be discussion-style. Each day a person in the class will lead the discussion on a particular machine of their choosing (subject to project constraints - see below). Leading the discussion means synthesizing the available literature on the subject (which everyone will also read), and then presenting a 30-40 minute description of the machine. The remainder of the class period will then be taken up with discussion.

Workload (Summary): The class has two workload components. The first is the daily reading and reporting. The second is the project. There are no exams. These components are discussed below.

Grading: 50% project, 20% reading assignments and 10% project presentation, 10% reading presentation, and 10% discussion participation.

Reading assignments (everyone except presenter): For everyone except the presenter, hopefully one week, but sometimes 3-4 days before class 1-3 readings on a given architecture will be posted. You should read these and then synthesize 4-5 slides about them. In your slides you should cover the architecture of the machine, features you found interesting, why the machine was built, how the machine dealt with the technological constraints of the time. Finally, you should develop at least one slide of questions that you either have about the machine or you think would make interesting discussion topics. *You should email me this presentation 1 day before class.* ***I also strongly encourage you to share your presentation with the student presenter for that day. You can do this directly, or just indicate in your email if you do not want me to share your slides with the presenter.***

Reading assignments (presenter): At least a week before your presentation you should choose (in consultation with myself) 1-3 readings about the machine you are presenting. These readings will be posted to the website for everyone else to read. Please do not feel you need to find these readings on your own. Please come talk to me often with questions and for suggestions on readings. You should prepare a 30-40 talk describing the architecture of the machine, innovations, and pitfalls. Be sure to also prepare 1-2 slides on questions or discussion topics. My hope is, however, that the class will share their slides with you to assist in this area.

Project: This class has a heavy project component. In groups of two you should select a classic machine and write a simulator for it. Once written you should explore the

performance characteristics of the machine and nearby design points. Some questions to consider in your analysis are: Were there more attractive designs? How does it compare to modern machines? Does it perform well for some benchmarks but not others? My expectations on the project are that each group will perform "comparable" work, although this work will not lead to comparable output. For example, modeling the CM-5 is perhaps more complex than modeling the Stretch. Hence, I would expect the simulator of the CM-5 to be more high-level than the Stretch. The key here is the effort you put in to either project should be about the same. Some important notes about the project: (a) You should get started "now". (b) You must choose a machine that is *different* than the one you present for reading. (c) You do not have to model the ISA of the machine precisely. We have some nice execution box code for the Alpha that you can use instead. That is, unless the ISA was important (e.g., it was a vector or VLIW machine or something). (d) At the end of the quarter we will have presentations on your projects. These presentations should cover the machine, the simulator and your performance study results. Presentations should be about 30 minutes (e.g., 3 per day). (e) Finally, you should prepare a 10 page report on your project. The report should cover the machine architecture, the simulator, and your performance exploration including the methodology, results, discussion, and related work (e.g., nearby machines). The project report is the primary contributor to the 50% component of your grade.

Late Policy: Some things can be late, while others cannot. If you are presenting in class (reading or project), obviously that cannot be late. Other things like reading summaries (due 1 day prior to class) or project report can be late without much harm to the overall class operation. For these, you may turn in anything late by 1 day if you first email me ahead of time (on or before it was first due) with a funny (but no need to be truthful) excuse in the form of a Haiku. You may also turn in anything late by 1 week if you email me an excuse, formatted as a song parody (any song will do / 80's vintage is preferred).

Sickness: Of course we will work around it.

Research activities: The class will try and work around any major research deadlines you may have. Just let me know your situation and we will devise a reasonable course of action.