CS 201 Computer Architecture Section 001 - Winter 2000

Instructor:
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Course home page: http://www.cs.pdx.edu/~apt/cs201

Description

This course provides a basic introduction to computer architecture from the perspective of a computer scientist. The emphasis is on understanding the multi-layered organization of a computer system. Key topics include comparative study of instruction set architecture, fundamentals of ALU and processor implementation, the memory hierarchy, IO systems, and parallelism. Practical lab work will focus on the SPARC RISC architecture.

Prerequisites

Formal prerequisites are CS162 and CS200. You'll need the following skills and knowledge:

- Basic assembly language programming (preferably for the Intel x86 architecture), including instructions for arithmetic, memory access, control flow, and procedure call, and experience in using an assembler.
- Basic knowledge of digital logic circuits.
- Programming in C, C++, or Java.
- Knowing how to use the Unix operating system (any version).

Texts

The required textbook is Andrew Tanenbaum, "Structured Computer Organization," 4th edition, Prentice Hall, 1999. Additional readings from other sources will be made available on the course web page from time to time.

You will also want to use the "SPARC Assembly Language Reference Manual," which is available on the web (in html or pdf) at http://docs.sun.com/ab2/coll.45.10/SPARC/ or locally (in postscript) on the course home page.

Lecture notes will be available electronically in postscript format via the course home page. (To read or print postscript under Windows, you can use the ghostview previewing program, available from http://www.cs.wisc.edu/~ghost/) Notes will normally be available shortly before or after the lecture.

Grading

Homeworks	10%
Labs	30%
Midterm	25%
Final	35%

Class attendance is not required, but is strongly recommended as the best guide to the material that will appear on the exams.

Exams

There will be one mid-term and a final exam. Both are *closed-book*, but "cheat sheets" will be permitted. Exams will cover topics from lectures and readings. Not all the material is covered in the readings, so attention to the lecture material is important. The final will be cumulative over the entire term, but will emphasize material presented after the midterm. Exams are scheduled in advance; unless prior arrangements are made, a grade of zero will be recorded for missed exams.

Labs

There will be four lab assignments involving practical programming exercises using the Sun SPARC architecture and the Solaris operating system, as found on the CS department's Sun network. You should have been given an account on the CS machines automatically by virtue of registering for this course; to obtain your password, take your id to the PCAT lab. Any files associated with assignments will be available from the course web page.

In some cases, you may be able to develop some or all of your lab solutions on some different machine, e.g., a home PC, but the code you hand in *must* work using the CS department's SPARC machines and tools. Thus, you may be seriously handicapped by not using the CS department machines to do them in the first place.

Labs should be submitted by `mail`ing a "bundle" containing the relevant files to `cs201-1acc@cs.pdx.edu`. Bundles can be created by the Unix `shar` command, which combines the files given by its arguments into a single shell script that, when run, recreates the files. For example, you could submit the files `foo.s` and `bar.c` as follows:

```
shar foo.s bar.c | mail cs201-1acc
```

Do not send mail other than program submissions to `cs201-1acc`, as it is not regularly read.

Homework

There will be weekly homework assignments, to be turned in on paper. Note that these assignments are primarily for your benefit in learning the material and preparing for the exams; they don't count for much of your grade.

Mailing List

Important information will be distributed throughout the term via a Majordomo mailing list called `cs201-1list`. You can subscribe to this list by sending a mail message to `majordomo@cs.pdx.edu` with no subject line and a message body consisting of the single line

```
subscribe cs201-1list
```

Please mail questions to the instructor directly (at `apt`) rather than to this list; the instructor will copy mail of general interest to the list.

Schedule

All dates, including assignment deadlines, are tentative and subject to change.

Date		Assignment Due	Reading	Topics
Jan	5		1,2.1	Introduction; Layered Computer Organization; Processors
	10		7.1,7.3-4; SPARC	SPARC ISA; Assembler ; Linking/Loading; C Interfacing
	12		5.1	Comparative ISA design: Overview
	17			**Martin Luther King, Jr. Holiday – no class**
	19	HW1;HW2	5.2	Comparative ISA Design: Types and Encodings
	24	Lab1	5.3-5	Comparative ISA Design: Types, Addressing, Instructions
	26	HW3	5.6-8	Comparative ISA design: Control Flow
	31		2.4; 3.4; 3.7	I/O: Devices, Buses, and Programming
Feb	2	Lab2;HW4	4.1	Microarchitecture Basics
	7			**Midterm Exam**
	9	HW5	3.2, 3.4	Logic Circuit Review; ALU Basics
	14		ARITH	Computer Arithmetic; Floating Point
	16	HW6	4.2-3	ISA Implementation
	21		4.4	Microarchitecture Design
	23	Lab3;HW7	2.2, 3.3, 4.5.1	Memory Hierarchy; Primary Memory Design; Caches
	28		2.3, 6.1	Secondary Memory; Virtual Memory
Mar	1	HW8	4.5.2-4,4.6	Other Microarchitecture Optimizations
	6		6.2,6.4	Operating System Essentials
	8	Lab4;HW9	8.1	Parallel Architectures
	13			**Final Exam** (starting at **7:30 pm**)

Key: All readings specified as numbers are sections from the Tanenbaum textbook; for example "7.1;7.3-4" means sections 1,3, and 4 from Tanenbaum Chapter 7. SPARC and ARITH are extra readings that will be made available on the course web page.

Additional readings may be assigned from time to time. Assigned selections should be read *before* the associated date.

Rules

All homeworks are due in class, at the *beginning* of class, on the specified due date. All labs are due by email *by 6 p.m.* on the specified due date, i.e., just *before* class. Late homeworks and labs are *not* accepted except in extraordinary circumstances, and then preferably by prior arrangement.

All homeworks and labs must represent your own, individual work. It is permissible to discuss the assignments with other students, but when you come to writing up the homework solutions or typing in and debugging the lab programs, you must work on your own. *Do not, under any circumstances, copy another person's program and submit it as your own.* Writing code for use by another or using another's code in any form (even with their permission) will be considered cheating, the penalties for which are described in detail in the CS Department's booklet *Undergraduate Programs 1999-2000.* In particular, cheating will result in an automatic F for the assignment in question, and a letter to your departmental file.