

Course Description:

If one views computer science as a series of layers, each built on top of the last, then this course considers some of the lowest layers of all: where the software meets the hardware. A central theme is to develop a thorough understanding of how a purely hardware architecture becomes a software abstraction. A secondary theme is how the architecture design choices are made, and how a better understanding of the chosen architecture can result in greater performance for application software. The topics before the midterm can be viewed as the prerequisites for a working architecture, while the remaining topics are concerned with optimizing performance.

In addition, we will continue to practice C/C++ pointers on a second, lighter track. That track leads through UNIX/Linux system calls, the heart of a UNIX shell (such as *tsh*), and a brief introduction to a popular scripting language such as Perl. That track will use the second textbook.

Faculty Information:

Professor G. Cooperman
Office: 336 West Village H
e-mail: gene@ccs.neu.edu
Phone: (617) 373-8686
Office Hours: Tues. and Fri. at 3:15 – 4:15, and by appointment.

Textbooks:

Computer Organization and Design: The Hardware/Software Interface (3rd edition; second printing includes Appendix A; first printing requires you to read Appendix A from CD),
by Patterson and Hennessy, Morgan Kaufmann Publishers

The C Programming Language (2nd edition),
by Kernighan and Ritchie, Prentice-Hall

Exams and Grades:

There will be approximately five homework assignments over the quarter, plus a midterm and a final. They will be weighted 40% for the final, 30% for the midterm, and 30% for the homework. All homework assignments will be weighted equally.

Syllabus:

<i>Week</i>	<i>Topics</i>	<i>Chapter</i>
Sept. 11	Introduction	Ch. 1-2
Sept. 15	Assembly/Machine Language	Ch. 2, Appendix A.6, A.9, A.10 and inside back cover
Sept. 22	Assembly/Machine Language, C ptrs. (cont.)	C book
Sept. 29	Arithmetic Representations and C ptrs.	Ch. 3, C book
Oct. 6	CPU Architecture	Ch. 5.1–5.4
Oct. 16	CPU chip layout (cont.)	Ch. 5.5–5.13
Oct. 20	CPU Optimizations (pipelining)	Ch. 6.1–6.13
Oct. 27	Review and Mid-term	
Nov. 3	Virtual Memory and Caches	Ch. 7.1–7.4
Nov. 10	Virtual Memory and Caches (cont.)	
Nov. 17	UNIX syscalls; Multiprocessors	parts of Ch. 8, 9 class lect.
Nov. 24	UNIX Shells; CPU-Memory gap	class lect.
Dec. 1	Perl; Latest CPUs, Issue of Power Dissipation	class lect.
Dec. 8	Review	
Dec. 12	Week of Final Exam: Wed., 12/17/08, 1:00 p.m.	