Computer Organization & Architecture
Pierce College CoSci 546
CSUN Comp 222

Prerequisites

Pierce College

CoSci 516 Assembly Language

California State University

Comp 122 Assembly Language

Instructor

C. Robert Putnam
cputnam@csun.edu

Grades in all prerequisites must be at least at the "C" level

Textbook

Computer Organization & Architecture, 9th ed.
William Stallings
Prentice Hall 0-13-293633-X
976-0-13-293633-0

Office Hours

Pierce College
Tuesday 4:45pm-5:45pm
CSUN
See Office Hours on Website

Course Description

The course consists of a comprehensive review of the current state of hardware design and performance. It is generally considered good protocol to start the course with a discussion of computer evolution and performance, starting from the earliest known developments through to the use of vacuum tubes, transistors, integrated circuits and later technologies. At this point in the development of computers driven by electrons, the remainder of the course follows the improvements in chip organization and architecture.

The first order of business is to review the top-level view of computer functions and interconnections. The remainder of the course consists of in-depth analysis of targeted aspects of various computer systems. The first component to be analyzed is the design and implementation of cache memory, which is followed by an equally intense analysis of internal memory, e.g., RAM and ROM memory. The organization of advanced DRAM semiconductor memory is discussed in detail. Error correction coding will be discussed, but because a complete discussion of such a topic could dominate the entire course, we must limit our discussion.

The architecture of storage devices, e.g., tape drives, magnetic disk, DVD's, solid state devices, etc., as standalone devices will be undertaken. This discussion will meld into a discussion of the operation of input/output devices. Programmed I/O, Interrupt-Driven I/O, Direct Memory Access and I/O Channels are all discussed. Some time is spent on Thunderbolt and Infiniband External Interfaces.

In order to fully understand current hardware architecture and organization, it is also necessary to cover some aspects of Operating Systems Support, e.g., scheduling, memory management, and concurrent processing. A brief review of number systems will be undertaken followed by a discussion of floating point arithmetic. A final support topic is the discussion of digital logic, e.g., boolean algebra, gate design, Karnaugh Maps, combinatorial circuits, sequential circuits programmable logic devices and associative memory.

At this point, the course focuses on the Central Processing aspects of computer systems. The next topic to discuss will be the impact of instruction set design on the computer's performance. After that we will investigate the internals of the processor, i.e., CPU, e.g., the number and organization of registers, the instruction cycle, and Instruction Pipelining. Then, RISC and CICS systems will be briefly discussed.

The next segment of the course will consist in analysis of four different architectures.

1) **Instruction-Level Parallelism**
2) **Superscalar Processors**
3) **Parallel Processing**
4) **Multi-core Computers**

Finally, if time allows, we will discuss Control Unit Operation and Microprogrammed Control.

Course Objectives

Investigate computer systems architecture and organization. Develop an understanding of the major architectural components in computer systems.

Evaluation

`

Midterm Examination	20%
Projects	50%
Final Examination	30%
	100%

A	90%-100
B	80%-89%
C	70%-79%
D	60%-69%
F	0%-59%

All homework and programming assignments are due at the **beginning** of the class period on the assigned due date. **Late homework assignments will not be accepted.**

No makeup examinations will be given. Examinations must be taken on the assigned dates at the assigned time.

Students will be expected to attend each scheduled meeting.

Pierce

Students with three absences before the first census will be dropped from the course. If you are absent and you have a valid reason for the absence, see the instructor as soon as possible. Students are responsible for all lectures and handouts even if absent from, or late to, class. Attendance records will not be maintained after the first census period; students will be responsible for submitting official drop slips after this period. Any student who stops attending class and neglects to submit a drop form will be given an "F" grade for the course.

CSUN

Any student who stops attending class and neglects to submit a drop form will be given an "WU" grade for the course.

Students are expected to do their own work on all class assignments and examinations. Any student who violates this requirement will be given a failing grade for the course!