CS 162 – Operating Systems and Systems Programming

Course Information

August 23, 1993

Instructor: Tom Anderson (tea@cs)

Office: 521 Evans Hall

Office Hours: Monday 1–2, Wednesday 3–4

T.A.'s: Drew Roselli (drew@cs)
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T.A. Office Hours: Time and location TBD

Course Description: The purpose of this course is to teach the design of operating systems.

Course Prerequisites: CS 60B, 60C, and a familiarity with C.

Grading: Grades will be (roughly) computed as follows:
Final exam: 40%, midterm: 20%, and the project: 40%. The exams are graded on a curve (to correct for an overly easy or overly hard exam); the project grades are *not* curved, however.

Midterm and Final: Both the midterm and the final will be given *in common*, approximate dates and times listed below. Both exams will be closed book, and will cover material from lecture, sections, the required readings, and the project.

Project: The project in this course is to build an operating system for a simulated MIPS-style workstation. The project consists of five phases: thread management, multiprogramming, virtual memory, file systems, and distributed systems. We will use flexible slip dates for the project. Further details about the project will be covered in later handouts.

Readings: "Operating System Concepts, 3rd Edition," Silberschatz, Peterson, and Galvin
A set of papers from Copy Central on Euclid; I will let you know when they are available.

You may find it convenient to have a copy of "The C++ Programming Language" by Stroustrup and "The MIPS RISC Architecture" by Kane, but they are not required. Although the programming assignments will be in C++, we will give you a handout that describes what you need to know about C++.

Course Outline and Approximate Dates

Aug. 23: Introduction and historical perspective
Readings – OSC Chap. 1, 2.1-2.2, 3.1-3.5
Hoare, The Emperor's Old Clothes

Aug. 25 - 30: Threads: creating and dispatching
Readings – OSC Chap. 4.1-4.2

Sept. 1 - 10: Synchronization: semaphores and monitors
Readings – OSC Chap. 5.1-5.6
Birrell, An Introduction to Programming with Threads

Sept. 13: Deadlock
Readings – OSC Chap. 6

Sept. 15 - 17: CPU scheduling
Readings – OSC 4.3-4.8

Sept. 20 - 24: Address spaces, multiprogramming, and I/O
Readings – OSC Chap. 2.3-2.5, 15.1-15.5
Ritchie and Thompson, The UNIX Timesharing System

Sept. 21: Assignment 1 due (threads)

Sept. 27 - Oct. 4: Address translation and memory management
Readings – OSC Chap. 7

Oct. 6 - 11: Virtual memory
Readings – OSC Chap. 8, 15.6
Levy and Lipman, Virtual Memory Management in VAX/VMS

Oct. 12: Assignment 2 due (multiprogramming)

Oct. 13 - 25: File systems
Readings – OSC Chap. 9, 10.1-10.5, 10.7, 15.7
McKusick et al., A Fast File System for UNIX

Oct 18: Midterm exam

Oct. 27: Transactions
Readings – Gray, The Transaction Concept

Oct. 28: Assignment 3 due (virtual memory)

Oct. 29 - Nov. 5: Network protocols: TCP/IP and RPC
Readings – OSC Chap. 5.7-5.8, 12
Hedrick, Introduction to the Internet Protocols

Nov. 8 - 15: Distributed applications: file systems, virtual memory, and e-mail
Readings – OSC Chap. 14

Nov. 16: Assignment 4 due (file systems)

Nov. 17 - Dec. 1: Protection and security
Readings – OSC Chap. 10.6, 11.1-11.2, 11.5.1, 11.7-11.10
Morris and Thompson, Password Security: A Case History

Dec. 3: Operating system structure, micro and nano-kernels
Readings – OSC Chap. 16.1-16.3, 16.6
Anderson, The Case for Application-Specific Operating Systems

Dec 5: Assignment 5 due (networking)

Dec 11, 12:30 - 3:30: Final exam (tentative)

Project Readings:
Christopher et al., The Nachos Instructional Operating System
Lampson, Hints for Computer System Design