Operating Systems – Fall 2004
University of Massachusetts, Amherst
www.cs.umass.edu/~emery/cmpsci377

Instructor Information
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Course Description
This course will provide an introduction to operating system design and implementation. The operating system provides a well-known, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for allowing resources (e.g., disks, networks, and processors) to be shared, providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from one another.

The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems.

Textbook
Operating Systems (3rd edition), by Deitel, Deitel & Choffnes. This is a required text.

Course Grade
Your course grade will be based on class participation (10%), homework (10%), programming projects (40%), and exams (40%), including a cumulative final exam.
Late Policy
Late work is not accepted without a doctor’s note or similar proof of a valid reason for lateness.

Homework
There will be a number of homework assignments throughout the semester. Most of these will be drawn from the textbook.

Projects
There will be a series of programming projects, primarily in Java. For many of these, we will be using a simulator framework built upon the PSimJ simulator. You will be implementing algorithms we discuss in class in the simulator and evaluating their impact using both synthetic and real program traces. A textbook describing PSimJ – Object-Oriented Discrete-Event Simulation with Java - A Practical Introduction – is on reserve in the DuBois library.

Class Schedule
This schedule is tentative and is subject to change. Any changes will be announced in class. Lecture slides will be available on-line on the course web page. However, these slides are not meant to be self-contained and to understand them, you need to attend class. There is a direct correlation between good grades and good attendance in this course, and vice versa.

1. Thursday September 9      Introduction
2. Tuesday September 14      Architecture
3. Thursday September 16      Structures & Processes I
4. Tuesday September 21      Structures & Processes II
5. Thursday September 23      Threads
6. Tuesday September 28      Scheduling
7. Thursday September 30      Synchronization I
8. Tuesday October 5         Synchronization II
9. Thursday October 7        Deadlock
10. Tuesday October 12        class cancelled
11. Thursday October 14       Security – guest lecturer: Brian Levine
12. Tuesday October 19        Exam 1
13. Thursday October 21       Memory Management
14. Tuesday October 26        Explicit Memory Management
15. Thursday October 28       Virtual Machines & Garbage Collection
16. Tuesday November 2        Paging & Page Replacement Algorithms
17. Thursday November 4       Virtual Memory in the Real World
18. Tuesday November 9        File Systems I

Thursday November 11         Holiday – Veterans Day
19. Tuesday November 16
20. Thursday November 18
21. Monday November 22
22. Tuesday November 23

File Systems II
Exam 2
I/O Systems
Storage Systems

Thursday November 25

Holiday – Thanksgiving

23. Tuesday November 30
24. Thursday December 2
25. Tuesday December 7
26. Thursday December 9

Network Structures
Distributed Computing
Distributed File Systems
Class Wrap-Up