

Iona College
Department of Computer Science
Spring Trimester 2005

Course: CS750 Advanced Operating Systems
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Office Hours: Monday, Wednesday, and Thursday, 9:00-10:00am or by appointment
Class Meetings: Monday night from 6:30pm to 9:30pm in room M209

Course Description:

Having examined the general theoretical and implementation aspects of a modern operating system in CS650, we shall now begin an in-depth study of one of the most widely used and powerful operating system - UNIX. We shall begin with a quick introduction to the user aspects of UNIX - the file system and the basic commands to manipulate it. We will then study scripting with the built-in shell scripting languages, examine some important UNIX utilities such as *grep*, *awk*, *find*, etc, and finally, turn to UNIX system programming, including issues such as process and memory management, pipes, and sockets. Throughout our discussion, we will get an opportunity to study the basic design and implementation principles behind UNIX.

Course Objectives:

1. gain hands-on experience working with the file system of a selected operating system.
2. acquire practical skills in user-level process management – checking the status of a process, suspending, terminating a process, placing a process in the background or foreground, etc.
3. be able to write scripts in scripting languages for a selected operating system.
4. be able to write system-level programs, which use system calls for file management such as creating, opening, and closing files, reading/writing from/to files, manipulating the file pointer, etc.
5. be able to write system-level programs, which use system calls for process management, such as creating, sequencing, and terminating processes, signaling, etc.
6. be able to write system-level programs, which use system calls for Inter-Process Communication (IPC), such as those used for implementing pipes, sockets, message-passing, etc.
7. understand the basic components of a selected modern operating system, their function and inter-component interactions.
8. understand the lifecycle of processes and threads within the context of a selected operating system,
9. know the data structures and algorithms involved in implementing process management and scheduling for a selected operating system.
10. understand the mechanisms for achieving processes synchronization and deadlock prevention avoidance in a choice operating system.
11. know the various data structures and algorithms used in implementing and maintaining/accessing the file system of a selected operating system.
12. know the data structures and algorithms involved in inter-process communication for a specific operating system, including the issues of shared memory access, distributed memory message passing, etc.

Grading Policy:

Homework and projects:	25%
Best five out of ten 10-minute quizzes:	15%
Midterm exam:	30%
Final exam:	30%

Policy on Plagiarism and Academic Dishonesty:

Cheating will not be tolerated in any form. A first attempt to cheat on a homework- or a lab assignment will result in loss of credit for that assignment. A second attempt will be brought up with the academic dean. Cheating on any exam will also be brought up with the academic dean and may result in loss of credit for the exam or even failure in the class. DO NOT CHEAT!!!

Policy on Attendance:

As outlined in the College Bulletin, unless the reasons for the absence or the quality of the student's work justifies an exemption from the rule, a student who has been absent from 20% or more of the scheduled class sessions will be dismissed from the class and assigned the failing grade of "FA".

Required Texts:

"UNIX for Programmers and Users", by G.Glass, 3rd edition, Prentice Hall

Additional References:

- "UNIX Internals: New Frontiers" by Vahalia, Pearson Education
- "Operating Systems Concepts", by Silberschatz, 6th Edition, Wiley

Course Topics:

1. Introduction to UNIX. History of UNIX. Design principles.
2. The UNIX file system. Directory hierarchy.
3. Creating, deleting, and changing directories, creating, deleting, moving, renaming files. File attributes, printing, counting words in a file, and other basic utilities.
4. Process management utilities, pipes, background processing, etc.
5. The UNIX shells. Common features.
6. UNIX utilities. The *grep* utility. Comparing, sorting, finding, archiving files. Scheduling commands.
7. Shell scripting.
8. UNIX system programming. File management system calls.
9. Process management system calls.
10. Signals and signal handling
11. Pipes and sockets.
12. UNIX internals. Structure of the UNIX kernel. Data structures and algorithms for process and memory management. Implementation of process management system calls.
13. File system organization and implementation. File system data structures. Implementation of file management system calls.
14. Interprocess communication. Data structures and internal implementation of pipes and sockets.
15. System administration issues. *

* If time permits...

Enjoy the class!

