

Course Number: CIS 215

Course Title: Operating System Principles

Number of Units: 4

Schedule: Three hours of lecture and one hour of discussion per week.

Prerequisite: CIS 120, 160

Catalog Description

The organization and structure of modern operating systems and concurrent programming concepts. Operating system concepts: concurrent processes, basic synchronization techniques, deadlock, memory management, file systems, security, networks, distributed processing.

Expanded Description

1. Processes and concurrent programming
Basic concepts: states, transitions. Mutual exclusion, synchronization, semaphores, monitors, Ada rendezvous. Deadlock and indefinite postponement; prevention, avoidance, detection, recovery
2. Operating system components
Real and virtual memory; paging and segmentation; fetch, placement, and replacement algorithms; thrashing. Processor scheduling; disk space management and allocation; seek and rotational optimization; blocking and buffering. File systems; directory structures; access methods; access control.
Non-sequential files (e.g., hashed files, tree-structured files, B-trees, multiple-key files)
3. Security and Protection
Capabilities and access lists, privacy, covert channels
Physical security, authentication mechanisms (passwords, challenges, key), formalisms
Library call, interface, argument validation and translation
4. Distributed Systems
Distributed-System Structures
Distributed-File Systems

Software

- Gnu C or Borland C
- Nachos source/documentation: <http://http.cs.berkeley.edu/~tea/nachos/index.html>
- More Nachos
information: <http://www.cs.uchicago.edu/~odonnell/OData/Courses/CS230/NACHOS/reading-code.html>
- Linux/Windows 2000 dual boot systems

Hardware

A dedicated computer laboratory is required for system experimentation.

Course Objectives and Role in Program

The course objective is to introduce the essential elements of operating systems. The organization and structure of modern operating systems and concurrent programming concepts will be discussed in the course. The knowledge of operating system plays significant role in the program since it manages computer system resources and is essential to their efficient use.

Learning Outcomes

At the end of the course students will be able to

- Write and understand multi-threaded code
- Write and understand simple programs that manage system resources
- Configure appropriate security mechanisms on a machine

Method of Evaluation

Student learning will be evaluated on the basis of

- Completeness and quality of a term project developed in several stages.
- Grade on midterm examination
- Grade on final examination
- Class participation

The weight assigned to each element of evaluation will be determined by the instructor of the course on the first day of the class.

Required Textbook

“Operating System Concepts”, 5th edition, Silbershatz and Galvin, John Wiley & Sons, 1998.

Recommended Reference

“Modern Operating Systems”, Andrew Tannenbaum, Prentice Hall, 1992.

Modified by: R. Akerkar

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