CS240 - Operating Systems
Study Guide for the Final Exam
Spring 2024

Look at the glossary at the end of each chapter.

- Basic O/S Concepts
  - Types of Operating Systems and their characteristics
  - Operating System Services
  - System calls vs traps vs interrupts
- Processes
  - What is a process?
  - Threads
    - User level vs kernel level
    - Lightweight
  - Process creation - `fork` and `exec`
  - Parent/child relationship, orphans, zombies'
  - CPU Scheduling of processes
    - Scheduling criteria
    - Scheduling algorithms - FCFS, RR, SPN, SRT, etc.
    - Priority, aging, multi-level priority
    - Real-time scheduling
  - Process synchronization
    - Concepts: critical section, mutual exclusion
    - Semaphores
    - The producer-consumer model
- Deadlocks
  - What is Deadlock?
  - Deadlock detection
  - Methods for handling: prevention, avoidance, ignore
  - Deadlock recovery
- Memory Management
  - Logical vs Virtual vs Physical addresses
  - Allocation schemes - advantages vs disadvantages
  - Contiguous Allocation - partitioning, allocation schemes
  - Segmentation
  - Paging
    - Basic operations
    - Page table, contents

    - Translation Hardware (TLB)

- Virtual Memory - Demand Paging
  - Basic operation - page tables, swapping, etc.
  - Page fault handling
  - Page replacement algorithms
  - Thrashing - what is it, what to do about it, etc.
- File System Interface
  - File Attributes and structure
  - File operations, access methods
  - Directory Structure - single level, multi-level, tree, acyclic graph, general graph
- File System Implementation
  - File system structure and organization
  - Allocation methods - contiguous, linked, indexed
  - Allocation examples
    - FAT File system (MSDos)
    - inodes (UNIX, Linux)
    - NTFS (Windows)
  - RAID
- I/O Systems
  - I/O device access methods
    - Polled
    - Interrupt-driven
    - Direct Memory Access
  - I/O Device abstractions
    - Block
    - Character
    - Network
  - Role of the OS kernel with I/O devices
- Disk Systems
  - Physical layout - heads, tracks, cylinders, sectors
  - Scheduling algorithms