Review for Final

- Final Exam
  - 05/16/2025 (Fri): 01:30 P.M.~ 4:00 P.M.
- Comprehensive Test
  - Introduction to Operating System
  - Process and Thread
  - Memory Management
  - File System
  - Deadlock
  - Input / Output

Review for Final

- Instruction Cycle: Fetch, Decode, Execute
- Von Newmann Bottleneck
- History of Operating System
  - The First Generation – Vacuum Tubes
  - The Second Generation – Transistors
    - Batch System
  - The Third Generation – IC (Integrated Circuits)
    - Time sharing
    - Multiprogramming
    - Spooling
  - The Fourth Generation – VLSI
  - The Fifth Generation – Mobile Devices

Review for Final

- System Call
- Operating System Structure
  - Monolithic
  - Layered System
  - Virtual Machine
- Process Management
  - Process Models
  - Process Creation
  - Process Termination
  - Process State
  - Process Implementation

Review for Final

- Concept of Threads
- Thread Implementation
  - User level thread
  - Kernel level thread
- Multithreading Model
  - Many-to-one
  - One-to-One
  - Many-to-Many
- The Threading Issues
  - Issues with fork(), exec()
  - Signal handling
  - Thread termination
  - Thread local storage

Review for Final

- Inter-Process Communication
  - Race Condition
  - Mutual Exclusion Solutions with Busy Waiting
    - Disabling Interrupt
    - Lock Variable
    - Strict Alternation
    - Peterson's Solution

Review for Final

- Mutual Exclusion with busy waiting
  - Test and Set Lock
  - Priority Inversion problem with busy waiting
- Mutual Exclusion with Sleep and Wakeup
  - The Producer-Consumer Problem
  - Race Condition in Producer-Consumer Problem
  - Semaphore
  - The producer-consumer problem with semaphore
  - Mutexes
  - Monitor
  - Message Passing

Review for Final

- Process Scheduling
  - Schedulers
    - Long term, Short Term, Memory
  - Scheduling Algorithms
    - Shortest Job First
    - Shortest Remaining Time :preemptive, non-preemptive
    - Round Robin
    - Priority Queue: preemptive, non-preemptive

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- Memory Management
  - With Mono-Process
  - With Multi-Processes
    - Multi-process with Fixed partition
    - Multi-process with variable partition
  - Modeling Multiprogramming: probabilistic model
  - Swapping
  - Memory Management with Bitmap
  - Memory Management with Free-List
    - Memory allocation with Free-List
      - First fit, Next fit, Best fit Worst fit

Review for Final

- Virtual Memory with Paging
  - Page tables
  - Page Table with Hardware Support
    - Translation Look-Aside Buffer
  - Page Table Structure
    - Shared Pages
    - Multilevel Page Table
    - Hashed Page Table
    - Inverted Page table

Review for Final

- Virtual Memory with paging
  - Page Replacement Algorithms
    - Optimal Algorithm
    - Not Recently Used
    - First Come First Out
    - Second Chance
    - Least Recently Used
  - Modeling Page Replacement Algorithm
    - Belady's Anomaly
    - Stack Algorithm
      - Model for Stack Algorithm
      - Property of Stack Algorithm

Review for Final

- Memory Management
  - Design Issues for Page System
    - Local versus Global allocation Policies
    - Page size
  - Segmentation
    - Segmentation Implementation
    - Advantage of Segmentation
      - Protection
      - Sharing
  - Segmentation with Paging
    - Segmentation with Paging (MULTICS)

Review for Final

- File System
  - File Name
  - File Structure
  - File Types
  - File Access
  - File Attributes
  - File Operation
- Directories
- Directory Operations
- File System Layout
- Implementing File
  - Contiguous Allocation
  - Linked List Allocation
  - Linked List Allocation with File Allocation Table
  - Index-Node

Review for Final

- Shared File
  - Save i-node index
  - Symbolic link
- Log-Structured File System
- Disk Space Management
  - Block size
  - Free block management
    - Linked List
    - Bit Map

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- File System Backup
  - Physical Backup
  - Logical Backup
- Deadlocks
  - Resources for a Process
  - Deadlock Condition
  - Resource Allocation Graph
  - Four Strategies for Dealing Deadlock

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- Deadlock Detection and Recovery
  - Detection with one resource of each type
  - Detection with Multiple resource of each type
    - Deadlock Detection Algorithm
  - Recovery from Deadlock

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- Deadlock Avoidance
  - Safe and Unsafe state
  - Banker's Algorithm
- Deadlock Prevention
  - Attack Mutual Exclusion
  - Attack Hold and Wait
  - Attack No-Preemption
  - Attack Circular Wait

Review for Final

- Input /Output
  - Input /Input Devices
  - Device Controllers
  - Memory Mapped Input / Output
  - Non-Memory Mapped Input/Output
  - Direct Memory Access (DMA)

Review for Final

- Principle of I/O Software
  - Goal of I/O Software
  - Programmed I/O
  - Interrupt-Driven I/O
  - I/O using DMA
- Input /Output Software Layer
  - Interrupt Handler
  - Device Driver

Review for Final

- Disk
  - Disk Structure
  - Disk Search Scheduling
    - FCFS
    - Shortest Seek time First (SSTF)
    - Elevator (SCAN)
    - C-SCAN
    - LOOK
    - C-LOOK

Review for Final

- Solid State Driver
  - Structure of Solid State Driver
  - Architecture of a SSD
  - Basic Operations in SSD (read, write erase)
  - Flash Translation Layer (FTL)
  - Garbage Collection