Final Review

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Specs

❒ Similar style to midterm
❒ Mostly short answer
❒ I like compare/contrast questions
❒ I like "can you think about this idea in a different way" questions
❒ Goal: do you understand fundamental trade-offs/issues and basics of how realized in real systems

❒ Warning: These slides are not an exhaustive list of the topics covered simply a guide to major topics and priorities.

First Half

❒ Lectures through 10/3
❒ Book through chapter 8 (not chapter 3)
❒ Topics
  ❍ OS History
  ❍ Hardware Support for OS
  ❍ Processes
  ❍ Threads
  ❍ CPU Scheduling
  ❍ Synchronization
    · Object, Classic Problems
  ❍ Deadlock
  ❍ Transactions

Second Half

❒ Lectures 10/8 on
❒ Book chapters 9-12, 14.1- 14.3, 15-18
❒ Topics
  ❍ Storage Systems
  ❍ File Systems
  ❍ Memory Management
  ❍ Virtual Memory
  ❍ Networking
  ❍ Protection and Security
  ❍ Distributed Systems
  ❍ Distributed Coordination

Storage Systems

❒ Memory Hierarchy
  ❍ Volatile vs Non-volatile storage
  ❍ Primary, Secondary, Tertiary
❒ Disk Basics
  ❍ Physical Geometry, Addressing, Format, Performance
❒ Disk Scheduling
❒ Technology Trends

File System Basics

❒ Files, Directories, Superblocks, Inodes, Bitmaps, Hard/Soft Links, Mount Points
❒ Path Name Translation
❒ File Buffer Cache
❒ File Layout
  ❍ Contiguous Allocation, Blocks, Extents
❒ FFS vs LFS
  ❍ Cylinder groups, cleaning, inode map
❒ Update in place, journalling/logging

Memory Management

❑ Virtual Memory
  ❍ Protection, Illusion of Full Address Space
❑ HW Support for VM
  ❍ Fixed vs Variable Partitions, Paging, Segmentation
  ❍ Page Table Entries, TLB
  ❍ What happens on context switch

Memory Management (con't)

❑ Working Set
❑ Demand Paging
❑ Thrashing
❑ Page Replacement Algorithms
❑ Fairness in Page Replacement

Networking

❑ Protocols, Protocol Encapsulation
❑ Layered Architectures (App, Transport, Network, Link Layers)
❑ Domain Name System (DNS)
❑ Multiplexing and Demultiplexing
❑ TCP features
  ❍ Reliable, In-Order, Congestion and Flow control
❑ IP Addressing (Classless vs Classful)
❑ Static (Hierarchical) vs Dynamic Routing

Protection

❑ Policy vs Mechanism
❑ Protection Domains
❑ Access Matrix
❑ Access Lists vs Capabilities
❑ Protection vs Security

Distributed Systems

❑ Loosely vs Tightly Coupled
❑ Process Migration
❑ Decomposing process into a collection of parallel processes
❑ Problems of DS (Failure Detection, Reconfiguration, Security)

Distributed Coordinatino

❑ Event Ordering and Happens Before
❑ Distributed Mutual Exclusion: Centralized, Fully Distributed, Token Passing
❑ Two Phase Commit
❑ Deadlock Handling
  ❍ Bankers Algorithm on Single Coordinator
  ❍ Why manual detection/recovery harder
  ❍ Why automatic detection requires global knowledge

Distributed Coordination (con't)

❑ Election Algorithms (ring and bully)
❑ Byzantine Generals Problem
  ❍ How that maps onto DS
  ❍ Not proving solution works!

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Distributed File Systems

❑ Freebie ☺

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Logistics

❑ Friday December 13, 9-11:30 AM
❑ Olin 155

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