

Midterm Review

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Specs

- Lectures through 10/3
- Book through chapter 8 (not chapter 3)

- 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.

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Topics

- OS History
- Hardware Support for OS
- Processes
- Threads
- CPU Scheduling
- Synchronization
 - Object, Classic Problems
- Deadlock
- Transactions

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OS History

- Define major classes of systems (batch, multiprogrammed batch, timesharing, etc.)
 - Understand how and why they evolved
 - Compare and contrast them
- No dates or names

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Hardware Support

- Understand what the OS has to work with
 - RAW hardware interfaces
- Understand that HW must give tools for OS to be able offer certain features
- Give examples of how the OS abstracts the hardware

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Processes

- Program vs Process
- Address Space of a Process
- How Processes are Created
- What information OS maintains about processes (PCBs)
- Why the OS must support inter-process communication
- Types of IPC

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Threads

- Threads vs Processes
- Address Space for Multithreaded applications
- User vs Kernel Level Threads
 - Pros and cons of each
 - Basics of User level thread packages

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CPU Scheduling

- Policy vs Mechanism
- Context Switch
- Compare and contrast various scheduling algorithms
- Problems of evaluating scheduling algorithms
- Problems of starvation and priority inversion

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Synchronizatn

- Understand why synchronization primitives are necessary
- Understand why need hardware support
- Spinlocks vs Disable/Enable Interupts vs Semaphores
- Binary vs Counting Semaphores
- Event Signaling
- Monitors
- Condition Variables

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Classic Synchronization Problems

- Evaluate solutions to bounded buffer/readers writers
 - Correctness? Performance?
- Why does the naïve solution to dining philosophers lead to deadlock

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Deadlock

- Four necessary conditions
- Preventing deadlock by breaking one of the four conditions
- Deadlock avoidance and deadlock detection
 - Basic idea behind algorithm
 - Why not used in practice?

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Transactions

- ACID properties
- Volatile/Nonvolatile/Stable Storage
- Log-based recovery
- How ability to abort allows additional concurrent operations

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Logistics

- Thursday October 10, 10:10-11:25 AM
- Two locations: Olin 255 and Barnes Auditorium
 - Sign up for space in Olin
 - Room for everyone in Barnes but no desks
 - We will bring some trays but no guarantees
- No one can leave before 10:30; no one admitted after 10:30