



# EI 338: Computer Systems Engineering (Operating Systems & Computer Architecture)

Dept. of Computer Science & Engineering  
Chentao Wu  
wuct@cs.sjtu.edu.cn



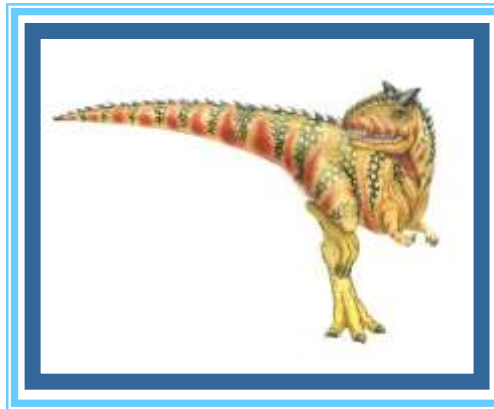
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- <ftp://public.sjtu.edu.cn>
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# Summary

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# Questions & Answers

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- Face to face Q & A
- Time: 10am to 5pm on Dec. 27th (Friday)
- Place: Room 513, SEIEE-3 Building





# About The Final Exam (1)

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- East Lower Building (东下院) 312&313
- On Dec. 30th (Monday)
- Time: 13:10-15:10
- Close Book
  - Computer Architecture ~20%
  - Operating System ~80%





# About The Final Exam (2)

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- Question Types
  - Blank Filling (20%)
    - Definitions
    - Pseudo Codes in Projects
  - Questions (~30%)
  - Calculations (~50%)
- Total Number of Questions: 15-18





# OS-Chapter 1: Introduction

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- Operating Systems Definitions
- Operating-System Structure
- Operating-System Operations
- Computer-System Architecture
- Computer-System Organization
- Interrupt, DMA, Cache
- Storage Hierarchy
- Process Management
- Memory Management
- Storage Management
- Multiprocessor Systems/Multi-core Systems
- Distributed Systems

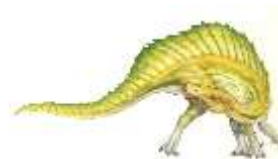




# OS-Chapter 2: Operating-System Structures

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- Operating System Services
- User Operating System Interface (CLI, GUI)
- System Calls
- Types of System Calls
- System Programs
- Operating System Design and Implementation
- Operating System Structure
  - Microkernel system structure
- System Boot







# OS-Chapter 3: Processes

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- Process Concept
- Process State
- Process Control Block (PCB)
- Process Scheduling
  - Context switch
- Operations on Processes (Creation and Termination)
- Interprocess Communication
  - Communication Models
  - Communication in Client-Server Systems





# OS-Chapter 4: Threads

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- Multithreading Concepts
- Multithreading Models
  - Many-to-One
  - One-to-One
  - Many-to-Many
- Thread Libraries
  - Pthread
- Threading Issues





# OS-Chapter 5: CPU Scheduling

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- Scheduling Concepts
- Scheduling Criteria
- Scheduling Algorithms
  - FCFS
  - SJF
  - Priority Scheduling
  - Round-Robin (RR)
  - Multi-core Scheduling





# OS-Chapter 6&7: Process Synchronization

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- Background
- The Critical-Section Problem
- Peterson's Solution
- Synchronization Hardware
- Locks, Semaphores
- Classic Problems of Synchronization
  - Bounded Buffer
  - Readers-Writers
  - Dining Philosophers
- Monitors
- Atomic Transactions





# OS-Chapter 8: Deadlocks

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- The Deadlock Problem
- Deadlock Characterization
- Methods for Handling Deadlocks
  - Resource-Allocation Graph
  - Banker's Algorithm
- Deadlock Prevention
- Deadlock Avoidance
- Deadlock Detection
- Recovery from Deadlock





# OS-Chapter 9: Main Memory

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- Background
- Swapping
- Contiguous Memory Allocation
- Paging
- Structure of the Page Table
- Segmentation
- Example: The Intel Pentium





# OS-Chapter 10: Virtual Memory

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- Background
- Demand Paging
- Copy-on-Write
- Page Replacement Algorithm
  - FIFO
  - Optimal
  - LRU
- Allocation of Frames
- Thrashing
- Memory-Mapped Files
- Allocating Kernel Memory
- Other Considerations





# OS-Chapter 11: Mass-Storage Systems

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- Overview of Mass Storage Structure
- Disk Structure
- Disk Attachment
- Disk Scheduling
- Disk Management
- Swap-Space Management
- RAID Structure







# OS-Chapter 12: I/O Systems

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- Typical I/O devices
- I/O bus architecture
- Interrupt-Driven I/O Cycle
- DMA





# OS-Chapter 13: File-System Interface

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- File Concept
- Access Methods
- Directory Structure
- File-System Mounting
- File Sharing





# OS-Chapter 14&15: File System Implementation

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- File-System Structure
- File-System Implementation
- Directory Implementation
- Allocation Methods
- Free-Space Management





# OS-Chapter 18: Virtual Machines

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- Benefits and Features
- Types of Virtual Machines and Their Implementations
- Virtualization and Operating-System Components





# CA-Chapter 1: Fundamentals of Quantitative Design and Analysis

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- Introduction
- Quantitative Principles of Computer Design
- Classes of Computers
- Computer Architecture
- Trends in Technology
- Trends in Cost
- Dependability
  - MTTF, MTTR
- Performance
  - Amdhal's law





# CA-Chapter 2 & Appendix B: Memory Hierarchy Design

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- Memory Hierarchies
- Six Basic Cache Optimizations
- Ten Advanced Cache Optimizations
- Calculate Memory Access Time based on Miss Rate.





# CA-Appendix A

## Instruction Set Principles

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- Instruction Set Architecture
- Classifying ISAs
- Encoding the Instruction Set



**Merry Christmas!**  
**Happy Chinese New Year!**  
**Wish all students have good grades!**

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**End of Summary**

