

# Review

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# Chapter1 Introduction

- ❖ What is OS?
- ❖ OS History
- ❖ OS Classification
- ❖ OS Concepts
- ❖ System Calls
- ❖ OS Structure

# Chapter2 Process and Thread (1)

- ❖ Process Model

  - ✧ Multiprogramming, concurrency

- ❖ Process

  - ✧ Definition

  - ✧ Process vs. Program

- ❖ Process States

  - ✧ Three basic states

  - ✧ Transition between these states

- ❖ Process creation and termination

# Chapter2 Process and Thread (2)

- ❖ Process Control Block (PCB)
  - ✎ Function and contents
- ❖ Process context switch
- ❖ Thread
  - ✎ What is thread?
  - ✎ Why need threads?
  - ✎ Thread vs. process
  - ✎ TCB
  - ✎ Implementation (kernel & user space)

# Chapter2 Process and Thread (3)

## ❖ Inter-Process Communication (IPC)

- ⌘ Process Synchronization and Mutual Exclusion
- ⌘ Critical Resource, Critical Region/Section
- ⌘ Semaphore and PV operations
- ⌘ Monitors, why use monitor?
- ⌘ Message passing
- ⌘ Using semaphore to solve Classical IPC problems
  - ❖ The Producer-Consumer Problem
  - ❖ Dining-Philosophers Problem
  - ❖ Readers and Writers Problem

# Chapter2 Process and Thread (4)

## ❖ Process Scheduling

- ⌚ Scheduling opportunity (when to schedule)

- ⌚ Scheduling algorithm

- ❖ Batch systems

- ⌚ First-Come First-Served (FCFS)

- ⌚ Short Job First (SJF)

- ❖ Interactive system

- ⌚ Round Robin (RR)

- ⌚ Priority Scheduling

- ⌚ Multi Queue & Multi-level Feedback

# Chapter6 Deadlock (1)

- ❖ Resource Type
  - ↪ Preemptable Resources
  - ↪ Non-preemptable Resources
- ❖ Deadlock Definition
- ❖ Four Conditions for Deadlock
  - ↪ Mutual exclusion condition
  - ↪ Hold and wait condition
  - ↪ No preemption condition
  - ↪ Circular wait condition

# Chapter6 Deadlock (2)

- ❖ Deadlock Modeling

  - ↪ Resource Allocation Graph

- ❖ Methods for Handling Deadlocks

  - ↪ The Ostrich Algorithm

  - ↪ Detection

    - ❖ One resource of each type: resource allocation graph algorithm

    - ❖ Multiple resources of each type: matrix-based algorithm



# Chapter6 Deadlock (3)

## ❖ Methods for Handling Deadlocks

### ↻ Recovery

- ❖ Through preemption
- ❖ Through rollback
- ❖ Through killing process

### ↻ Avoidance

- ❖ Safe state
- ❖ Banker's algorithm

### ↻ Prevention

- ❖ Attacking one of the conditions for deadlock

# Chapter3 Memory Management (1)

- ❖ Storage Hierarchy

- ❖ Memory Management Schema

- ✧ No Memory Abstraction

- ❖ Every program simply saw the physical memory
- ❖ It is not possible to run two programs in memory at the same time.

- ✧ Address Space

- ❖ Protection & Relocation: base and limit register

- ✧ Memory Management: Bitmap, Linked List

- ✧ Partition Allocation: First fit, Next fit, Best fit, Worst fit, Quick fit

# Chapter3 Memory Management (2)

## ❖ Virtual Memory

- ❧ Principal

- ❧ Implementation: Paging, Segmentation with paging

## ❖ Paging

- ❧ Page tables

  - ❖ TLB

  - ❖ Multi-level page tables, Inverted page tables

- ❧ Address Translation Scheme

- ❧ Page Fault

- ❧ Page Replacement Algorithm

  - ❖ Optimal, FIFO, Second Chance, Clock, NRU, LRU, NFU, Aging, Working Set, WSClock

# Chapter3 Memory Management (3)

## ❖ Design Issues for Paging Systems

- ↪ Frame allocation algorithm

- ↪ Replacement Scope

  - ❖ Local Replacement

  - ❖ Global Replacement

- ↪ Page Size

- ↪ Separate Instruction and Data Spaces

- ↪ Shared Pages

## ❖ Segmentation: Address Translation

## ❖ Segmentation with paging: Address Translation

# Chapter4 File System (1)

## ❖ File and File System

- ⌘ File: A named collection of related information that is recorded on secondary storage.
- ⌘ File System: A method for storing and organizing files and the data they contain to make it easy to find and access them.

## ❖ Basic Functions of File System

- ⌘ Present logical (abstract) view of files and directories
- ⌘ Facilitate efficient use of storage devices
- ⌘ Support sharing

# Chapter4 File System (2)

## ❖ Files Types

- ⌘ Regular file (ASCII, Binary) and Directory
- ⌘ Character and Block special file (UNIX)

## ❖ File Structure

## ❖ File Access: Sequential and Random access

## ❖ Directory Structure

- ⌘ One-level directory system
- ⌘ Two-level directory system
- ⌘ Hierarchical directory system

## ❖ Path Name: Absolute and Relative path name

# Chapter4 File System (3)

- ❖ File Implementation
  - ↪ Contiguous Allocation
  - ↪ Linked List Allocation
  - ↪ Indexed Allocation
- ❖ Directory Implementation
  - ↪ Directory entry
  - ↪ i-node
- ❖ Shared Files: Hard link, Symbolic link
- ❖ Disk Space Management
- ❖ File System Reliability (block consistency)
- ❖ Example File Systems (UNIX)



# Chapter5 Input/Output (1)

- ❖ Goals of I/O Software: Device independence...
- ❖ I/O Software Layers
  - ⌘ Interrupt handlers
  - ⌘ Device drivers
  - ⌘ Device independent OS Software
  - ⌘ User-level I/O Software



# Chapter5 Input/Output (2)

## ❖ Disk

- ❧ Disk Organization

- ❧ Disk Formatting

- ❧ Cylinder Skew

- ❧ Disk Arm Scheduling Algorithms

  - ❖ FCFS

  - ❖ Shortest Seek First (SSF)

  - ❖ Elevator Algorithm

考试时间：17周周三 (2024.06.18) 上午08:50-10:50

考试方式：英文闭卷 (可中文作答)

考试题型：

1. 选择题 (20)
2. 简答题 (20)
3. 综合题 (60)