

CSE3241: Operating System and System Programming

Lecture-1 (Syllabus)

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At a Glance

1. Operating System (OS) is a software which-
 - ▶ manages the computer resources (hardware, software) and
 - ▶ provides an environment where application software can run in order to fulfill users' demands.
2. In this course, students will-
 - ▶ learn very basic things of OS.
 - ▶ be familiar with the Command Line Interface (CLI) of Linux kernel based OS.
3. Recommended Books: [1] and [2].

Summary of Syllabus

- Overview
 - ⊗ Introduction
 - ⊗ System Structures
- Process Management
 - ⊗ Process Concept
 - ⊗ Threads
 - ⊗ CPU Scheduling
- Process Coordination
 - ⊗ Synchronization
 - ⊗ Deadlocks
- Memory Management
 - ⊗ Memory-Management Strategy
 - ⊗ Virtual Memory
- Storage Management
 - ⊗ File System
 - ⊗ Disk Management
 - ⊗ I/O Systems
- Protection and Security
 - ⊗ System Protection
 - ⊗ System Security



Syllabus I

- Overview

- ⊗ Introduction

- * What is OS?
 - * Tasks of OS
 - * Evaluation of OS
 - * Types of OS

- ⊗ System Structures

- * Computer System Operation
 - * I/O structure
 - * Storage Structure
 - * Storage Hierarchy
 - * Different Types of Protections
 - * Operating System Structure
 - * Operating System Services
 - * System Call

- Process Management

- ⊗ Process Concept

- * What is Process?
 - * Operations on Process

Syllabus II

- * Co-operating Processes
- * Interprocess Communication

(*) Threads

- * Overview
- * Benefits of Threads
- * User and Kernel Threads

(*) CPU Scheduling

- * Process Scheduling
- * Scheduling Criteria
- * Preemptive & Non-Preemptive Scheduling
- * Scheduling Algorithms
- * Algorithm Evaluation
- * Multi-Processor Scheduling

• Process Coordination

(*) Synchronization

- * Background
- * Critical Section Problems
- * Critical Region
- * Synchronization Hardware

Syllabus III

- * Classical Problems of Synchronization
- * Semaphores

⊛ Deadlocks

- * What is Deadlock?
- * Deadlock Characterization
- * Methods for Handling Deadlocks
- * Deadlock Prevention
- * Deadlock Avoidance
- * Deadlock Detection
- * Recovery from Deadlock

● Memory Management

⊛ Memory-Management Strategy

- * Background
- * Logical Vs. Physical Address Space
- * Swapping
- * Contiguous Memory Allocation
- * Paging
- * Segmentation
- * Segmentation with Paging

Syllabus IV

⊗ Virtual Memory

- * Background
- * Demand Paging
- * Page Replacement
- * Page Replacement Algorithm
- * Allocation of Frames
- * Trashing

• Storage Management

⊗ File System

- * File Concept
- * Access Methods
- * Directory Structure
- * File System Structure
- * Allocation Methods
- * Free-Space Management
- * Directory Implementation
- * Efficiency and Performance

⊗ Disk Management

- * Disk Reliability



Syllabus V

- * Disk Formatting
- * Boot Block
- * Bad Blocks
- * Swap-Space Management

⊗ I/O Systems

- * I/O Hardware
- * Polling
- * Interrupts
- * DMA
- * Application I/O Interface
- * Kernel I/O Subsystem
- * Performance

● Protection and Security

⊗ System Protection

- * Goals of Protection
- * Domain of Protection

⊗ System Security

- * Security Problem
- * User Authentication

Syllabus VI

- * One Time Password
- * Program Threats
- * System Threats
- * Threat Monitoring
- * Encryption



Recommended Books



P. B. Galvin A. Silbeschatz and G. Gagne.
Operating System Concepts.
John Wiley & Sons, 9 edition, 2012.



A. S. Tanenbaum and A. S. Woodhull.
Operating Systems– Design and Implementation.
Pearson Prentice Hall, 3 edition, 2006.