# 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 (harware, software) and
   - provides an environment where application software can run in order to fullfill 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

# Syllabus VI

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

# Recommended Books

📄 A. Silberschatz, P. B. Galvin, 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.