

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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Lecture-1 Vivek Dubey



COMPUTER SCIENCE AND ENGINEERING

CS403PC

COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CS403PC

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Scheme of Operating System

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Lecture-1 By Vivek Dubey

S. No.	Course Code	Course Title	L	T	P	Credits
3	CS403PC	Operating Systems	3	0	0	3
6	CS406PC	Operating Systems Lab	0	0	3	1.5

Prerequisites

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- A course on “Computer Programming and Data Structures”.
- A course on “Computer Organization and Architecture”.

Course Objectives

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- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
- Introduce the issues to be considered in the design and development of operating system.
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes

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- 1. Will be able to control access to a computer and the files that may be shared.**
- 2. Demonstrate the knowledge of the components of computer and their respective roles in computing.**
- 3. Ability to recognize and resolve user problems with standard operating environments.**
- 4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.**



- **U1 - Operating System - Introduction**
- **U2 - Process and CPU Scheduling**
- **U3 -**
 - **Deadlocks,**
 - **Process Management and Synchronization,**
 - **Interprocess Communication Mechanisms**
- **U4 - Memory Management and Virtual Memory**
- **U5 - File System Interface and Operations**

UNIT-1: Operating System - Introduction



- Structures –
 - Simple Batch, Multiprogrammed, Time-shared,
- Systems –
 - Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components,
- Operating System services
- System Calls

UNIT-2: Process and CPU Scheduling



- Operations on processes
- Cooperating Processes
- Threads, and Interposes Communication
- Scheduling Criteria
- Scheduling Algorithms
- Multiple - Processor Scheduling
- System call interface for process management-
 - fork, exit, wait, waitpid, exec

UNIT-3

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- **Deadlocks** - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
- **Process Management and Synchronization** - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
- **Interprocess Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT-4: Memory Management and Virtual Memory



- Logical versus Physical Address Space
- Swapping Memory,
- Contiguous Allocation,
- Paging,
- Segmentation,
 - Segmentation with Paging,
 - Demand Paging,
 - Page Replacement,
 - Page Replacement Algorithms.

UNIT-5: File System Interface and Operations



- Access methods,
- Directory Structure,
- Protection,
- File System Structure,
 - Allocation methods,
 - Free-space Management.
- Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS

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1. **Operating System Principles-** *Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.*
2. **Advanced programming in the UNIX environment,** *W.R. Stevens, Pearson education.*

REFERENCE BOOKS



- 1. Operating Systems – Internals and Design Principles**
Stallings, Fifth Edition–2005, Pearson Education/PHI
- 2. Operating System A Design Approach-** Crowley, TMH.
- 3. Modern Operating Systems,** Andrew S. Tanenbaum 2nd edition, Pearson/PHI
- 4. UNIX programming environment, Kernighan and Pike,** PHI/ Pearson Education
- 5. UNIX Internals -The New Frontiers,** U. Vahalia, Pearson Education.

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CS406PC: OPERATING SYSTEMS LAB (Using UNIX/LINUX)

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B.TECH II Year II Sem

Prerequisites

- A course on “Programming for Problem Solving”.
- A course on “Computer Organization and Architecture”.

Co-requisite:

- A course on “Operating Systems”.

Course Objectives & Course Outcomes

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Course Objectives:

- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments -1



- Write C programs to simulate the following CPU Scheduling algorithms:
 - a) FCFS
 - b) SJF
 - c) Round Robin
 - d) priority

List of Experiments - 2



- Write programs using the I/O system calls of UNIX/LINUX operating system:
 - open, close
 - read, write,
 - fcntl, seek,
 - stat,
 - opendir,
 - readdir

List of Experiments -3



- Write a C program to simulate
 - Bankers Algorithm
 - for Deadlock Avoidance and
 - Prevention.

List of Experiments -4



- Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

List of Experiments -5



- Write C programs to illustrate the following IPC mechanisms:
 - a) Pipes
 - b) FIFOs
 - c) Message Queues
 - d) Shared Memory

List of Experiments -6



- Write C programs to simulate the following memory management techniques:
 - a) Paging
 - b) Segmentation

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2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

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