Operating System Security

Course Code: BECCS2C028
Course Title: Operating System Security
Semester: IV
Credits: 03 (Theory) + 01 (Lab)

Rationale

An operating system (OS) is software that manages computer hardware and provides services for computer programs. It serves as an intermediary between users and the computer's hardware, facilitating tasks such as file management, memory allocation, and process scheduling. Key functions include managing resources, providing a user interface, and ensuring efficient communication between hardware and software components. Security measures guard a user's data and programs against interference from persons or programs outside the operating system.

Course Outlines

Contents	No. of Lectures
Unit - I **Introduction to Operating Systems:** Evolution of operating systems, Operating systems concepts, Types of operating systems, Different views of the operating system, Operating system services, System calls, Types of system calls, Operating system Structure, Layered Approach, Microkernels, Virtual machines	**10**
Unit – II **Process Management:** Process concept, Operation on processes, Process control block, Inter-process communication, Process Synchronization, Critical section Problem, Peterson's solution, Semaphores., Process scheduling: Basic Concepts, Scheduling criteria, Scheduling algorithms: FCFS, SJF, RR, Priority., Deadlocks: System Model, Characterization, Prevention, Avoidance, Recovery, Detection and Recovery.	**10**
Unit -III **Memory Management:** Memory management, Swapping, Contiguous memory allocation, relocation & protection, Paging, Segmentation, Virtual memory, Demand paging, Page replacement algorithms: FIFO, Optimal, LRU, Thrashing.	**10**

Unit - IV **File & I/O Management:** Files system structure, File system implementation, Directory Implementation, Allocation Methods, Contiguous allocation, Linked allocation, Indexed allocation. Disk organization, Disk management, Disk scheduling algorithms: FCFS, SSTF, SCAN, CSCAN, LOOK, RAID Structure. **Introduction to LINUX/UNIX**: Introduction to LINUX and UNIX architecture: Features of LINUX and UNIX operating system, Kernel, Files and Directories: pathname, Directory Tree, current working directory, relative pathname, device files, Unix Process control commands, Unix file system commands, File permissions, Pipes, tees, mount, init, Shell Programming: Shell Script, Logical Operators, If else Statement, Case structure, Looping.	**10**
Unit – V Operating System Security: Threats to Operating System, Types of Threats-Program threats and System Threats, How to Ensure Operating System Security?, Operating System Security Policies and Procedures. Introduction to LINUX/UNIX, Shell Programming: Shell Script, Logical Operators, If else Statement, Case structure, Looping	**10**

Course Outcomes

Upon successful completion of this course, students will be able to:

- **CO1:** Understanding the role of operating system with its function and services.
- **CO 2:** Compare various algorithm used for CPU Scheduling, Memory management and Disk Scheduling.
- **CO 3:** Apply various concepts related with Deadlock to solve problems.
- **CO 4:** To impart fundamentals of file concepts kernel support for file, File structure related system calls
- **CO 5:** Learn to use features of Unix/Linux for programming

Text Books

1. Silberschart, Galvin, Gagne, "Operating System Concepts", 9th Edition, WSE Wiley, 2016.
2. Andrew. S. Tanenbaum, "Modern operating systems" 4th Edition, Pearson Prentice Hall,2018
3. Milan Milenkovic, "Operating system-concepts and design", 2nd Edition, McGraw HillInternational Edition, 2005

References Books

1. A. S. Godbole, "Operating systems", 3rd Edition, Tata McGraw hill, 2017

2. Deitel H. M, “Operating System”, 3rd Edition, Pearson Publications, 2012
3. Madnick & Donovan, “Operating Systems”, Tata McGraw Hill, 2003Sumitabha Das, “UNIX Concepts and Application, 4th Edition, Tata McGraw Hill, 2017
4. Richard L. Petersen, “The Complete Reference Linux”, 6th Edition, Tata McGraw Hill,2010.
5. Yashwant Kanetkar, “Unix Shell programming”, BPB publications