CSE316:OPERATING SYSTEMS

Course Outcomes: Through this course students should be able to

CO1 :: describe the basic structure of operating system and classify its roles and responsibilities

CO2 :: analyze the various CPU scheduling algorithms

CO3 :: use various operations on processes, threads and analyze methods to synchronize their execution

CO4 :: analyze the preventive measures to ensure deadlock free execution and optimizing memory allocation of processes

CO5 :: use and outline the various security measures that ensure threat free operation of a system

CO6 :: construct the internal modules of an Operating System like memory management, process management, disk management and inter process communication etc.

Unit I

Introduction to Operating System : Operating System Operations and Functions, Multiprogramming and Multiprocessing System

Operating System Structure : System Calls

Process Management : Process states, Process scheduling, Operations on processes, Process concept, Life cycle, Process control box

Introduction to OS concepts : Evolution of OS, Operating system (OS) modes, services and functions, OS structure - kernel and its types, shell

Unit II

CPU Scheduling : CPU scheduler and dispatcher, Scheduling criteria, CPU scheduler - preemptive and non preemptive, Scheduling algorithms - process management in UNIX, First come first serve, Shortest job first, Round robin, Priority, Multi level feedback queue, multiprocessor scheduling, real time scheduling

Unit III

Threads : Overview, Multithreading Models

Process Synchronization : Critical Section Problem, Dining Philosopher Problem,Reader-writer Problem etc, Semaphores, Monitors, Synchronization hardware, Critical section problem - Two process solution, Peterson's Solution

Unit IV

Deadlock : Deadlock Characterization, Handling, Handling of deadlocks- Deadlock Prevention, Deadlock Avoidance & Detection, Deadlock Recovery, Starvation, Critical regions

Information management : Files and directories, Directory structure, Directory implementation - linear list and hash table

File Management : Allocation methods, Free-Space Management

Unit V

Memory Management : Objectives and functions, Simple resident monitor program, Overlays - swapping, Schemes - Paging - simple and multi level, Fragmentation - internal and external, Virtual memory concept, Demand paging, Page interrupt fault, Page replacement algorithms, Segmentation - simple, multi-level and with paging

Unit VI

Protection and Security : Need for Security, Different Security Environments, Application Security - Virus, Program Threats, Goals of protection, Principles of protection, Domain of protection, Access matrix, System and network threats, User authentication

Device management : Dedicated, shared and virtual devices, Serial access and direct access devices, Disk scheduling methods, Direct Access Storage Devices – Channels and Control Units

Inter process communication : Introduction to IPC (Inter process communication) Methods, Pipes - popen and pclose functions, Co-processes, Shared memory, Message queues, Passing File descriptors

Text Books:

1. OPERATING SYSTEM CONCEPTS by SILBERSCHATZ AND GALVIN,, WILEY

References:

References:

1. OPERATING SYSTEMS – INTERNALS AND DESIGN PRINCIPLES by WILLIAMSTALLINGS, PRENTICE HALL