



MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering
Course Hand-out

Operating Systems| CSI401 | 4 Credits

Session: 2015-2016 | Faculty: Mahesh Jangid

Course Outcomes: At the end of the course, students will be able to

- [1401.1]. Describe the objectives, structure, functionality and types of operating systems.
- [1401.2]. Write system programs using file and process system calls and PThread API.
- [1401.3]. Compare various algorithms used for process scheduling.
- [1401.4]. Describe concepts related to concurrency and achieve the same for cooperating processes.
- [1401.5]. Apply various deadlock handling strategies to solve resource allocation problems.
- [1401.6]. Evaluate the performance of different memory management techniques and page replacement algorithms and therefore develop employability skills.
- [1401.7]. Describe file concepts and analyse various disk scheduling and storage strategies.

A. SYLLABUS

Introduction: Operating system structure, Operating system operations, Process management, Memory management, Storage management, Protection and security, Special purpose systems. System structure: Operating system services, User operating system interfaces, System calls, Types of system calls, System programs, Operating system structure, Virtual machines, System boot. Process: Process Concept, Process scheduling, Operations on processes, Inter-process communication, Unix Pipes. Multithreaded Programming: Multithreaded models, Thread libraries, Programs using PThreads. Process scheduling: Basic concepts, scheduling criteria, Scheduling algorithms. Process Synchronization: Critical section problem, Peterson's solution, Synchronization Hardware, Semaphores, Classical problems of synchronization, Synchronization programs using PThreads. Deadlocks: System model, Deadlock Characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock. Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Demand Paging, Page Replacement Policies, Allocation of Frames, Thrashing. File System Interface and Implementation: File Concept, Access Methods, Directory and Disk Structure, File System Mounting, File System Structure, File System Implementation, Space Allocation Methods for Files, Free Space Management. Disk Management: Disk Scheduling Algorithms, Disk Management, Swap Space Management. Protection and Security: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Security Problem, User Authentication, Program Threats, System Threats, Intrusion Detection.

B. TEXT BOOKS

- i. A. Silberschatz, P. B. Galvin and G. Gagne, "Operating System Concepts", 9th Edition, Wiley, 2014.
- ii. A.S. Tanenbaum, "Modern Operating Systems", 3rd Edition, Prentice Hall India.
- iii. W. Stallings, "Operating Systems", 7th Edition, Pearson.
- iv. W. R. Stevens and S. A. Rago, "Advanced Programming in the UNIX Environment", 3rd Edition, Addison- Wesley, 2013.

