GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS

Course Code: GR15A2069   L:3 T:1 P:0 C:4
II Year II Semester

Prerequisites
- Fundamentals of Computer Engineering
- Fundamentals of system software

Course Objectives
- Understand main components of operating system and their working.
- To study the operations performed by operating system as a resource manager.
- Implementation of different memory management techniques.
- To study different operating system and compare their features.

Course Outcomes
- Understand the major algorithms used in various operating system components and the factors used to evaluate different designs.
- Analyze different memory management techniques.
- Plan the application program interface (API) for at least one contemporary operating system to construct programs that illustrate that API.
- Relate the methods for providing concurrency, communication and synchronization among concurrent tasks.

Unit-I
Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation

Unit-II
Process Management: Process concepts threads, scheduling-criteria algorithms, their evaluation, Thread scheduling, case studies Linux, Windows

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case studies Linux, Windows

Unit-III
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table , segmentation, virtual memory, demand paging, page replacement algorithms, case studies**:** Linux, Windows, Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

I/O systems, Hardware, application interface, kernel I/O subsystem, Transforming I/O requests, Hardware operation, performance.

Unit-IV
File system Interface: The concept of a file, Access Methods, Directory structure, file sharing, protection. File System implementation- File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance.

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

Unit-V
Protection: Protection, Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection, Security- The Security problem, program threats, system and network threats, cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer – security classifications.

Teaching Methodologies
1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books
1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems- Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

References Books
1. Operating systems- A Concept based Approach-D. M. Dhamdhere, 2nd Edition, TMH
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.