

CSE3241: Operating System and System Programming
75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 33 Contact hours, Exam. Time: 4 hours

Introduction: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management: Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication.

Threads: overview, benefits of threads, user and kernel threads.

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management: Memory Management: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management: Disk reliability, disk formatting, boot block, bad blocks.

Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Books Recommended:

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| 1. | Abraham Silberschatz and Peter Baer Galvin | : | Operating Systems Concepts , Wiley Publisher. |
| 2. | Tanenbaum | : | Operating Systems , Prentice-Hall |
| 3. | Madnick and J. Donovan | : | Operating systems , McGraw-Hill |
| 4. | B. Hausen | : | Operating System Principles , Prentice-Hall of India |
| 5. | Donovan | : | Systems Programming , McGraw-Hill. |
| 6. | Maurice. J. Bach | : | The design of the Unix operating system , Prentice-Hall. |
| 7. | M. MilenKovic | : | Operating System Concept and Design , Tata McGraw Hill. |
| 8. | Terrence | : | Unix System Programming in C++ , Prentice Hall Publication |