

1. What is an OS?
2. Standard Library and Resource Coordinator
3. Functionalities in OS
4. Evolution of OS: Batch processing, Spooling, Multiprogramming, Time Sharing (Multi Tasking)
5. Programme and Process
6. Threads and processes (remember your assignment 1)
7. Dispatch Mechanism
 - User mode
 - System/Kernel/Privileged mode
 - Traps and Hardware Interrupts
 - System call – When a process executing in user mode requests something from the system that can be done only in the kernel mode
8. Process Creation – fork()
9. Synchronization
 - Independent Vs Cooperating Processes
 - Race conditions
 - Mutual exclusion
 - Deadlock
 - Starvation
 - Solution to Critical Section using Boolean lock, 2 boolean locks, using turn, final
 - Bakery Algorithm
10. Synchronization using Semaphores
 - Motivation and Definition
 - P()/down()/wait() and S()/up()/signal()
 - Mutual Exclusion with Semaphore
 - Two types of Semaphores
 - Deadlock and Starvation with Semaphores
 - Scheduling Constraint w/ Semaphore
 - Bounded Buffer and Producer/Consumer – 3 solutions
 - Dining Philosophers Problem and Readers Writers problem
11. Monitors
 - Hoare Vs Mesa Semantics and Java Style
12. Message Passing Systems
 - Message
 - Mailbox
 - Operations
 - Naming, Synchronization, Buffering and Message Size
13. Deadlocks (serially sharable resources)
 - Representing deadlocks in Wait-for graph and Resource Allocation graph
 - Four necessary conditions
 - Handling deadlocks
14. Scheduling Processes
 - Types of resources (Preemptible/Non preemptible)
 - Dispatcher Vs Scheduler
 - Scheduling Performance metrics
 - Scheduling Algorithms (Short-term scheduling): FCFS, SJF, SRTF/STCF, RR(q), Priority, MLFQ
15. Memory Management
 - Allocation
 - Allocation Algorithms – First Fit, Best Fit, Next Fit, Worst Fit
 - Fragmentation – Internal and External
 - Compaction and Garbage Collection: Reference Counting, Mark and Sweep, Generational
 - Swapping
16. Paging
 - Virtual/logical and Physical address
 - Page Fault
 - What will Interrupt Handler do on Page Fault
 - Page Tables
 - Page size = Frame size = offset
 - How to calculate number of entries in page table?
 - Page Allocation Algorithms and determining # of Page Faults
 - FIFO, RAND, OPT (or Belady's MIN), LRU