

# Operating Systems Viva Questions & Answers

## Assignment 1 – Shell Programming

Q: What are different types of shells and how do they differ?

A: Common shells are Bourne (sh), C (csh), Korn (ksh), and Bash (bash). They differ in syntax, features, and scripting capabilities.

Q: What is the exit status of a command?

A: Exit status indicates success or failure. 0 means success, non-zero indicates an error. It is checked with \$?.

Q: What are user-defined and system variables?

A: System variables are predefined (e.g., \$HOME, \$PATH). User-defined are created by users (e.g., name='Sourabh').

Q: What is the use of the man command?

A: Displays manual pages for Linux commands. Example: man ls.

Q: What does the test command do?

A: Checks conditions like file existence, strings, or arithmetic comparisons.

Q: How does a shell program get executed?

A: The shell reads and interprets each line of the script and executes it sequentially.

Q: Explain syntax of if-else, for, while, and case statements.

A: if, for, while, and case are control structures for decision-making and iteration.

Q: What are quotes in shell scripting?

A: Single ( ' ) - literal, Double ( " ) - variable expansion, Back quotes ( ` ) - command execution.

Q: What are loops used for?

A: Loops repeat command execution multiple times based on conditions.

## **Assignment 2 – Process Control System Calls**

Q: What is a process?

A: A process is a program in execution with its own address space and PID.

Q: Explain the fork() system call.

A: Creates a child process. Returns 0 to the child and PID to the parent.

Q: Explain the execve() system call.

A: Replaces current process image with a new program; doesn't return on success.

Q: What does the wait() system call do?

A: Parent waits for child to finish; prevents zombie processes.

Q: What is a zombie process?

A: A terminated child process whose parent hasn't called wait().

Q: What is an orphan process?

A: A child process whose parent terminated; adopted by init (PID 1).

Q: What is a daemon process?

A: Background process not attached to a terminal, e.g., sshd.

### **Assignment 3 – CPU Scheduling Algorithms**

Q: What is CPU scheduling?

A: Decides which ready process gets CPU next.

Q: What are objectives of CPU scheduling?

A: Maximize CPU utilization, minimize waiting time, ensure fairness.

Q: What is preemptive scheduling?

A: CPU can interrupt a process to allocate CPU to another process.

Q: What is non-preemptive scheduling?

A: Once a process starts, it runs until completion.

Q: Explain Shortest Job First (SJF).

A: Executes process with shortest burst time next.

Q: Explain Round Robin (RR).

A: Each process gets equal CPU time (quantum) cyclically.

### **Assignment 4 – Thread Synchronization**

Q: What is a semaphore?

A: An integer variable for synchronization. Operations: wait (P) and signal (V).

Q: What are binary and counting semaphores?

A: Binary takes 0/1; counting can take multiple positive values.

Q: What is the producer-consumer problem?

A: A classic synchronization problem managing shared buffer.

Q: Why use mutex with semaphore?

A: Mutex ensures one thread accesses the critical section at a time.

Q: What is the reader-writer problem?

A: Readers can read simultaneously; only one writer at a time.

### **Assignment 5 – Page Replacement & Banker's Algorithm**

Q: What is page replacement?

A: Replacing pages in memory when a page fault occurs.

Q: Describe FCFS, LRU, and Optimal.

A: FCFS replaces oldest, LRU replaces least recently used, Optimal replaces page not used for longest future time.

Q: Define page fault.

A: Occurs when the requested page is not in memory.

Q: What is Banker's Algorithm?

A: Allocates resources only if system remains in safe state.

Q: What is safe state?

A: A state where processes can complete without deadlock.

### **Assignment 7 – Interprocess Communication (IPC)**

Q: What is IPC?

A: Allows processes to communicate and synchronize their actions.

Q: What is FIFO?

A: Named pipe that connects unrelated processes.

Q: What is difference between pipe and FIFO?

A: Pipe connects related processes; FIFO connects unrelated ones.

Q: What is full-duplex communication?

A: Two-way communication using two FIFOs.

Q: Which system calls are used with FIFO?

A: mkfifo(), open(), read(), write(), close(), unlink().

## **Assignment 8 – Disk Scheduling Algorithms**

Q: What is disk scheduling?

A: Determines order of servicing disk I/O requests.

Q: What is SSTF?

A: Selects request closest to current head position.

Q: What is SCAN algorithm?

A: Head moves one way servicing requests then reverses direction.

Q: What is C-LOOK?

A: Head moves one direction and returns to start without servicing on return.

Q: What is seek time and rotational latency?

A: Seek time is head movement delay; rotational latency is waiting for sector rotation.

## **Study Assignment – Adding a New System Call**

Q: What is a system call?

A: Interface between user space and kernel space for OS services.

Q: Steps to add new system call?

A: Define function, add to kernel source, update syscall table, recompile, test with `syscall()`.

Q: Where does `printk()` output appear?

A: In kernel logs viewed with `dmesg` or `/var/log/kern.log`.

Q: What is kernel space vs user space?

A: Kernel space runs privileged code; user space runs restricted applications.

Q: Why recompile kernel for new system call?

A: System calls must be linked into the kernel binary.