

General Operating System Questions

1. What is the main function of an operating system?
 - A) Execute the machine code directly
 - B) Manage and coordinate the system hardware and software
 - C) Translate high-level code into machine code
 - D) Increase CPU speed
 - **Correct answer: B**
2. Which of the following is *not* a component of the operating system?
 - A) Memory Manager
 - B) Device Manager
 - C) File system
 - D) Compiler
 - **Correct answer: D**
3. What is the main function of a *system call*?
 - A) Allow the user to access the CPU directly
 - B) Allow user programs to request services from the operating system
 - C) Organize the memory structure
 - D) Manage the network
 - **Correct answer: B**
4. In an operating system, which of these hardware protection levels is the most privileged?
 - A) User level
 - B) Kernel level
 - C) Intermediate level
 - D) Application level
 - **Correct answer: B**
5. The *program counter (PC)* register contains:
 - A) The memory address of the first instruction of each process
 - B) The memory address of the operands of an instruction
 - C) The address in memory of the next instruction to be executed
 - D) The time quantum associated with each process
 - **Correct answer: C**

CPU Scheduling Exercises

6. Suppose we have the following processes with arrival times and execution times. What is the average waiting time with First Come First Serve (FCFS) algorithm?
- **Processes and execution times:**
 - P1: Arrival = 0, Execution = 6 ms
 - P2: Arrival = 0, Execution = 8 ms
 - P3: Arrival = 0, Execution = 7 ms
 - P4: Arrival = 0, Execution = 3 ms
 - **A) 8.75 ms**
 - **B) 10.5 ms**
 - **C) 9.25 ms**
 - **D) 10.25 ms**
 - **Correct answer: B**
7. Suppose we have the following processes with arrival times and execution times. What is the average waiting time with First Come First Serve (FCFS) algorithm?
- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 6 ms
 - P2: Arrival = 2 ms, Execution = 8 ms
 - P3: Arrival = 4 ms, Execution = 7 ms
 - P4: Arrival = 6 ms, Execution = 3 ms
 - **A) 5.75 ms**
 - **B) 6.5 ms**
 - **C) 7.25 ms**
 - **D) 8 ms**
 - **Correct answer: C**
8. With a time quantum of 2 ms in Round Robin, what will be the execution order and average waiting time for the following processes?
- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 3 ms
 - P2: Arrival = 0 ms, Execution = 5 ms
 - P3: Arrival = 0 ms, Execution = 2 ms
 - P4: Arrival = 0 ms, Execution = 7 ms
 - **A) Average waiting time: 5.5 ms**
 - **B) Average waiting time: 7.25 ms**
 - **C) Average waiting time: 6.75 ms**
 - **D) Average waiting time: 8 ms**
 - **Correct answer: B**

9. With a time quantum of 4 ms in Round Robin, what will be the execution order and average waiting time for the following processes?

- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 8 ms
 - P2: Arrival = 1 ms, Execution = 5 ms
 - P3: Arrival = 2 ms, Execution = 10 ms
 - P4: Arrival = 3 ms, Execution = 4 ms
- **A) Average waiting time: 12.75 ms**
- **B) Average waiting time: 13.25 ms**
- **C) Average waiting time: 11.75 ms**
- **D) Average waiting time: 12.25 ms**
- **Correct answer: A**

10. With the Shortest Job First (SJF) algorithm, what will be the execution order and average waiting time?

- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 8 ms
 - P2: Arrival = 0 ms, Execution = 4 ms
 - P3: Arrival = 0 ms, Execution = 2 ms
 - P4: Arrival = 0 ms, Execution = 6 ms
- **A) Average waiting time: 5.5 ms**
- **B) Average waiting time: 5 ms**
- **C) Average waiting time: 4.5 ms**
- **D) Average waiting time: 6 ms**
- **Correct answer: B**

11. With the Shortest Job First (SJF) algorithm, what will be the execution order and average waiting time?

- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 7 ms
 - P2: Arrival = 1 ms, Execution = 4 ms
 - P3: Arrival = 2 ms, Execution = 1 ms
 - P4: Arrival = 3 ms, Execution = 4 ms
- **A) Average waiting time: 5.5 ms**
- **B) Average waiting time: 5 ms**
- **C) Average waiting time: 4.5 ms**
- **D) Average waiting time: 5.25 ms**
- **Correct answer: D**

12. With the Shortest Remaining Time First (SRTF) algorithm, what is the average waiting time?

- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 6 ms
 - P2: Arrival = 2 ms, Execution = 4 ms
 - P3: Arrival = 4 ms, Execution = 3 ms

- P4: Arrival = 6 ms, Execution = 5 ms
- **A) 6.25 ms**
- **B) 6.5 ms**
- **C) 5.5 ms**
- **D) 5.25 ms**
- **Correct answer: B**

13. With Shortest Remaining Time First (SRTF) algorithm, what is the average waiting time?

- **Processes and execution times:**
 - P1: Arrival = 0 ms, Execution = 8 ms
 - P2: Arrival = 1 ms, Execution = 4 ms
 - P3: Arrival = 2 ms, Execution = 9 ms
 - P4: Arrival = 3 ms, Execution = 5 ms
- **A) 3.75 ms**
- **B) 4.25 ms**
- **C) 3.5 ms**
- **D) 3.25 ms**
- **Correct answer: A**

14. Suppose processes alternate CPU and I/O in a Round Robin system with a time quantum of 3 ms. What will be the average waiting time for the processes?

- **Processes and CPU/I/O execution times:**
 - P1 = 5 ms (CPU), 2 ms (I/O), 4 ms (CPU)
 - P2 = 7 ms (CPU), 3 ms (I/O)
 - P3 = 4 ms (CPU), 5 ms (I/O), 3 ms (CPU)
 - **A) 9.67 ms**
 - **B) 10.5 ms**
 - **C) 10.67 ms**
 - **D) 11 ms**
 - **Correct answer: C**
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Creating Processes and Threads

15. Upon a successful fork() system call, what will be the value returned to the child process created?

- **A) 0 to the child, PID of the child to the parent**
- **B) PID of the child to both parent and child**
- **C) 0 to parent, parent's PID to child**
- **D) 0 to the child, 0 to the parent**
- **Correct answer: A**

16. What does thread termination mean in a multithreaded process?

- **A) The parent process terminates automatically**

- **B)** All threads in the process terminate
- **C)** The process continues to run with the remaining threads
- **D)** The operating system restarts the thread
- **Correct answer: C**

17. Which system call allows the parent process to wait for the child process to complete?

- **A)** exec()
- **B)** wait()
- **C)** join()
- **D)** sleep()
- **Correct answer: B**

18. When a thread accesses a shared variable, what is the risk without proper synchronization measures?

- **A)** Deadlock
- **B)** Race conditions
- **C)** Starvation
- **D)** Mutual exclusion
- **Correct answer: B**

19. Why can using threads improve performance in an application?

- **A)** Threads require more memory than the process
- **B)** Threads allow parallel execution within a process
- **C)** Threads reduce CPU usage
- **D)** Threads replace the process
- **Correct answer: B**

Synchronization (Lock, Semaphores, Monitor)

20. Which of the following statements is true about binary semaphores?

- **A)** They can only take values 0 or 1
- **B)** They are more efficient than locks
- **C)** They cannot be used for access control
- **D)** They do not require synchronization
- **Correct answer: A**

21. What is the main advantage of using monitors for synchronization?

- **A)** They allow non-exclusive access to resources
- **B)** They avoid race condition problems more easily
- **C)** They are faster than semaphores
- **D)** They do not require access blocks
- **Correct answer: B**

22. Which of the following synchronization mechanisms uses a counter to manage access to a multiple resource?

- **A) Monitor**
- **B) Counting semaphore**
- **C) Mutex**
- **D) Binary lock**
- **Correct answer: B**

23. What is a deadlock in terms of process synchronization?

- **A) A process waiting to terminate**
- **B) An area of memory occupied by multiple processes**
- **C) A situation where no process can advance because it is blocked**
- **D) A simultaneous access to a shared variable**
- **Correct answer: C**

24. What is the main difference between mutex and semaphore?

- **A) Mutexes are counters, semaphores are not**
- **B) Semaphores only protect global variables**
- **C) Mutexes allow only a single process at a time, semaphores allow more than one.**
- **D) Semaphores cannot cause deadlocks**
- **Correct answer: C**