Institute of Business Administration, Karachi (Main Campus)
Department of Computer Science
Fall 2024 Quiz-2
Operating Systems (CSE-331)

Q1 In xv6, each process is represented by a `struct proc` which contains all the necessary information for process management. One of the key fields in this structure is the process's state. The state determines how the kernel manages the process at any given time.

(a) List and briefly explain the possible states a process can be in within xv6.

(b) When a process transitions from the **RUNNING** state to the **SLEEPING** state, what system call is likely involved, and why does this transition occur?

Q2 What is a zombie process in xv6, and how is it different from a process in the **UNUSED** state?

Q3 Explain what happens in xv6 when a trap occurs due to a system call.

Q4 What is the significance of the `syscall()` function in the trap handling process in xv6?

Multiple Choice Questions

1. **What is the purpose of a trap in the xv6 operating system?**
   A) To perform direct I/O operations
   B) To handle system calls, interrupts, and exceptions
   C) To manage memory allocation
   D) To switch between user and kernel mode

2. **Which function in xv6 is responsible for handling traps?**
   A) `trapinit()`
   B) `trap()`
   C) `usertrap()`
   D) `interrupt()`

3. **In xv6, what happens when a user process makes a system call?**
   A) It triggers a hardware interrupt.
   B) The trap frame is loaded with register values, and a trap is raised.
   C) The kernel ignores the request.
   D) The process immediately enters kernel mode.

4. **What is the role of the trap frame (`trapframe` structure) in xv6?**
   A) It holds the current process's memory pages.
   B) It saves the register state during a trap to resume execution afterward.
   C) It manages the CPU's instruction pipeline.
   D) It allocates stack space for each process.

5. **Which interrupt is responsible for time-slicing between processes in xv6?**
   A) Hardware interrupt
   B) Disk interrupt
   C) Timer interrupt
   D) Page fault