Solution Operating System Assignment 01:

Question Number 01:

Discuss the role of System Calls in the interaction between the user programs and operating System. How does System Calls facilitate access to operating system services?

Answer: System call works as the interface between user programs and the operating system. It also allows programs to request OS services such as file I/O, process management etc. When a program requires OS services, it invokes a system call, triggering a switch to kernel mode and execution of the corresponding kernel routine.

System calls provide a mechanism for accessing OS functionality, and security while abstracting hardware-specific details from user programs.

Question Number 02:

Explain process management and what are the primary components involved in process management?

Answer: Process management involves creating, scheduling, and terminating processes within an operating system. The primary components include PCB, scheduler, dispatcher, and synchronization mechanisms.

- The PCB stores process information.
- The scheduler selects which process to execute next based on scheduling systems.
- The dispatcher transfers control from the scheduler to the selected process
- Synchronization mechanisms helps in proper coordination between processes and preventing conflicts.

Question Number 03:

What is Computer System organization. Write its key aspects?

Answer: Computer system organization refers to the arrangement and structure of various components within a computer system, including hardware and software, to achieve specific functionalities and goals.

Its key aspects include process initiation, system call, transition, I/O request, devices interruption, and process resumption.

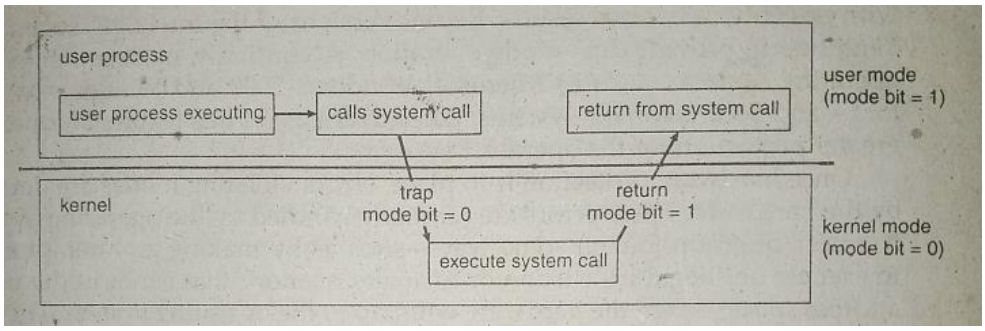
Question Number 04:

Discuss the importance of memory management in Operating System. Explain the techniques which improve memory management?

Answer: Memory management in operating systems is crucial for efficient resource allocation and system stability. Techniques such as paging, and segmentation optimize memory utilization by dividing physical memory into manageable units and supporting virtual memory. By implementing memory protection mechanisms and dynamic memory allocation, operating systems ensure security and flexibility in managing memory resources, ultimately improving overall system performance and responsiveness.

Question Number 05:

Explain the concept of transitioning from user mode to kernel mode using figure below. Explain why this transition is necessary, and provide an example situation where this transition occur?



Answer: Transitioning from user mode to kernel mode involves switching from a restricted user environment to a privileged kernel environment within the operating system. This transition is necessary for performing tasks that require privileges, such as accessing hardware, managing resources and executing critical system operations.

For Example, when a user program needs to read data from a file stored on disk, it invokes a system call to request the operating system's file I/O service. This request triggers a transition to kernel mode, allowing the operating system to access the disk hardware and retrieve the requested data on behalf of the user program. Once the operation is completed, the system returns to user mode, and the user program continues its execution.