



Topic: Role and Operation of Interrupts

Understanding the Role and Operation of Interrupts

Introduction:

Interrupts play a crucial role in the efficient operation of a computer system by allowing the processor to respond to specific events or conditions that require immediate attention. In this lecture, we will discuss the role and operation of interrupts, including how they are generated, handled, and their impact on the system.

How an Interrupt is Generated:

Interrupts can be generated by both hardware and software. Hardware interrupts are triggered by external devices, such as a keyboard or a mouse, while software interrupts are generated by the software or the operating system itself, often in response to an error or exceptional condition.

Examples of interrupt sources include:





Hardware Interrupts: Pressing a key on the keyboard, moving the mouse, or receiving data from a network card.

Software Interrupts: Division by zero, two processes trying to access the same memory location, or a system call initiated by an application.

How Interrupts are Handled using an Interrupt Service Routine (ISR):

When an interrupt occurs, the processor temporarily suspends its current task and jumps to a predefined location in memory, where the corresponding interrupt service routine (ISR) is stored. The ISR is a special piece of code that handles the specific event or condition that caused the interrupt.

The general steps for handling an interrupt are as follows:

-  Save the current processor state, including registers and program counter.
-  Determine the source of the interrupt and jump to the corresponding ISR.
-  Execute the ISR, which processes the interrupt and takes the necessary actions.
-  Restore the saved processor state and resume executing the interrupted task.








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What Happens as a Result of the Interrupts:

Interrupts allow the processor to quickly respond to events or conditions that require immediate attention, improving the overall efficiency and responsiveness of the system. As a result of the interrupts:

-  The processor can handle external events (e.g., user inputs or incoming data) in a timely manner.
-  The operating system can manage system resources more effectively and enforce process isolation.
-  The system can detect and handle exceptional conditions, such as errors or resource conflicts.

Conclusion:

Understanding the role and operation of interrupts is essential for grasping how a computer system manages and prioritizes various tasks and events. Interrupts ensure that the processor can quickly respond to important events or conditions, leading to a more efficient and responsive system.

