SYSTEM CALLS

An operating system (OS) serves as an intermediary between the user and the computer hardware, managing both software and hardware resources. one of the most essential functions of an operating system is to provide a convenient and efficient environment for program execution. To achieve this the OS offers a set of services that user applications can access Through system calls.

System calls are the mechanism through which user level applications interact with the operating system. Since user programs are generally not allowed to directly access hardware or critical system resources, system calls act as the gateway to request services such as file manipulation, process control, memory management and device handling. They provide a controlled interface to the kernel, which is the core component of the OS responsible for low level tasks.

System calls ~~are~~ can be broadly classified into five main categories.

1. Process control
2. File managment.
3. device managment.
4. information maintenance
5. Communication

Process control calls allow the creation, execution and termination of processes using functions. ~~like fork, e~~. File managment system calls such as open() read(), write() and close() enable programs to work with files and directories. Device managment system call help to manage input/output devices. information maintenance calls are used to get or set system data like the current time or process ID. communication system calls allow processes to exchange data using techniques like pipes, message queues. and shared memory.

The execution of a system call involves a switch from user mode to kernel mode, ensuring that only the operating system has direct access to the hardware. for example. when a program needs to read a file. it issues a read() system call. The control is then transfered to the kernel. which performs the read operation and returns the result to the user program.

System calls are fundamental to maintaining system security, stability and abstraction. By controlling access to system resources, they prevent accidental or malicious actions by user programs. They also abstract hardware complexities, allowing developers to write programs without needing detailed knowledge of the underlying hardware.

System calls are the vital part of modern operating systems, for enabling communication between user applications and the kernel. They ensure the secure and efficient operation of computer systems by providing essential services in a controlled manner.