Introduction to System Calls

System calls are essential functions that allow programs to interact with the operating system. They provide access to low-level operations and resources, enabling developers to create powerful applications.

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Definition and Purpose

System calls are interfaces between user-level programs and the operating system. They allow programs to request services from the kernel, such as creating processes, accessing files, communicating with other processes, and managing memory.

Types of System Calls

Process Control

These system calls manage the creation, termination, and control of processes, including process creation, termination, and process status retrieval.

File System

File system system calls perform operations related to file manipulation, including file creation, reading, writing, deletion, and accessing file attributes.

Communication

Communication system calls facilitate inter-process communication, allowing processes to send messages, establish connections, and synchronize actions.

Memory Management

Memory management system calls manage the allocation and deallocation of memory resources, mapping files to memory, and handling shared memory regions.

Advantages of Using System Calls

1 Abstraction

System calls provide a higher-level interface, abstracting complex operations and allowing developers to focus on application logic rather than low-level details.

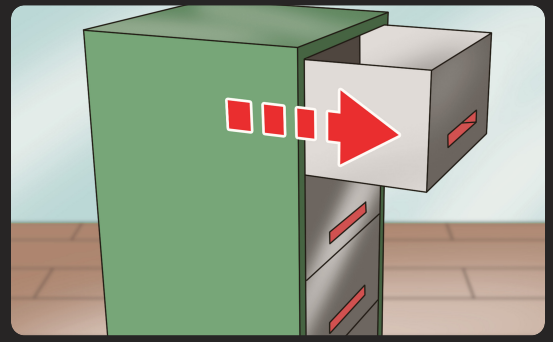
2 Portability

System calls provide a standardized interface to the operating system, ensuring that applications can run on various platforms without modification.

3 Security

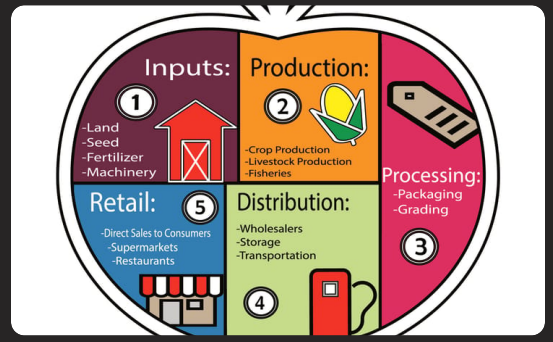
System calls implement privilege mechanisms, allowing the operating system to restrict access to sensitive resources and enforce security policies.

Examples of Common System Calls



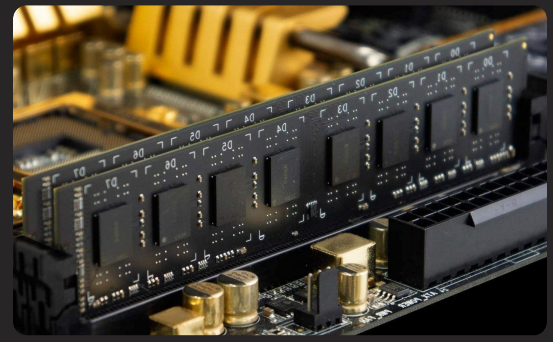
open()

Opens a file, creating a file descriptor for subsequent file operations. Supports various flags for read, write, create, and more.



fork()

Creates a new child process by duplicating the existing process. The child process can execute a different program or code section.



malloc()

Allocates a block of memory from the heap dynamically. Returns a pointer to the allocated memory, or NULL if the allocation failed.

Conclusion and Summary

System calls are the vital bridge between user-level applications and the underlying operating system, enabling effective communication and resource management. Understanding system calls is crucial for developers to harness the full potential of the operating system.