

Services and

Unit 2:- Components of OS

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* Services and Components of OS.

* System Calls.

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* Concept of System Calls

System call implementations

* Types of System Calls.

- Process and Job control
- File management
- Device management
- Info maintenance
- Communication.

* OS Components :-

- Process Management
- Main Memory Management
- I/O System Management
- Secondary Storage Management.

* Operating System Tools (Linux):

- User Management
- Security Management
- Performance
- Task Scheduler
- Device Management.

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* Operating System Services:-

1] Program Execution:-

- The purpose of Computer System is to allow users to execute programs in efficient manner.
- The OS provides environment where the user can conveniently run the programs.
- The user does not have to worry about memory allocation or deallocation because these things are taken care of by the OS.
- OS load the program into memory to execute it.

2] Input Output Operations:-

- Each program requires an input and after processing the input it produces the output this involves the use of I/O devices. The ip maybe either from the file or from some other ip device. Op maybe ^{written} return to some file on the disk or send to some op devices such as printers, monitors, etc. Since user programs cannot execute i/o operations directly, the OS must provide some means to perform I/O operations.

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* File System Manipulation:-

- While working on the Computer generally a user is requested to manipulate various types of files like opening a file, saving a file, & deleting a file from storage.

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- Program needs to read a file or write a file. The OS gives permission to the program for operation on file.

If ^{also gives} - Maintain to maintain details of files or directories with their respective details.

4] Communications :-

- OS performs communication among various types of processes in the form of shared memory.
- In multitasking environment the process needs to communicate with each other and to exchange with each other.
- These processes are created under hierarchical structure where the main process is known as parent process & the sub process is known as child process.
- Communication between these process is done by OS.

5] Error detection :-

- Error can occur anytime & anywhere error may occur in CPU, I/O devices or in memory hardware. OS deals with hardware problems to avoid hardware problems. The OS constantly monitors the system for detecting the errors & fixing these errors.

- The main functions of OS is like bad sectors on the hard Disk, and errors related appropriate actions for consistent computing.

6] Resource Allocation :-

- In the multitasking environment, when multiple jobs are running at a time, it is the responsibility of an OS to allocate the required resources (like as CPU, main memory, tape drive or Secondary Storage, etc) to each process for its better utilization. For this purpose various types of algorithms are implemented such as process scheduling, CPU Scheduling, disk Scheduling, etc.

* Operating System Components :-

- List :-

- 1] Process Management.
- 2] Main Memory Management.
- 3] File Management.
- 4] I/O System Management.
- 5] Secondary Storage Management.

1] Process Management :-

- A process is a program in execution. A time shared user program such as compiler is a process. A word processing program being run by an ideal machine is a process. Sending printout to printer is also a process.
- Now we consider a process to be a job or a time shared program. A process needs certain resources like CPU time, memory I/O devices & file to accomplish its task. These resources are provided when process is created or allocated while it is running.
- Program is not a process; a program is a passive entity such as contents of file is stored on disk, whereas a process is an active entity, with a program counter it specifies the next instruction to execute.

- The execution of a process must be sequential. The CPU executes instructions one after another, until the process completes.
- The OS is responsible for the following activities w.r.t. process Management:
 - 1) Creating & deleting both user & system process.
 - 2) Suspending & resuming process.
 - 3) Providing mechanisms for process communication.
 - 4) Providing mechanisms for process synchronization.
 - 5) Providing mechanisms for deadlock handling.

* System Calls :-

- A system call is the programmatic way in which a computer program requests a service from the kernel of the OS it is executed on. This may include hardware-related services (for ex, accessing a hard disk drive), creation & execution of new processes, & communication with integral kernel services such as process scheduling.
- OS provides a variety of system calls to control the process. Almost all modern

processors provides instructions that can be used as System Calls.

- A System Call is an instruction that does not execute a "Specific fun" in hardware but instead generates an interrupt that causes the OS to gain control of the processor.
- The OS then determines what kind of System call it is & performs the appropriate service for the System caller.

* Types of System Calls:-

- 1] Process and Job Control.
- 2] File Management.
- 3] Device Management.
- 4] Information Management.
- 5] Communication.

1] Process & Job Control :-

- A running program needs to be able to halt its execution either normally (end) or abnormally (abort). If the program discovers an error in its input & wants to terminate abnormally, it may also want to define an error level.

- A process or job executing one program may want to load & execute another program. This allows the Control Card interpreter to execute program as directly by the Control Cards of the user job. If we create a new job or process, we should be able to control its execution.

- We may also want to terminate a job or process that we created (terminate process). If we find that it is incorrect or no longer needed we need waiting time to finish execution.

- Example of process related System Call:-

- 1] End, Abort.
- 2] Load, Execute.
- 3] Create process, Terminate process.
- 4] Ready process, Dispatch process.
- 5] Suspend process, Resume process.
- 6] Get process attributes, Set process attributes.
- 7] Wait for Time.
- 8] Wait event, Signal event.
- 9] Change priority of process.

2] File Management :-

- We can identify several common system calls dealing with files. We first need to be able to create & delete files. Such a system call requires the name of the file & perhaps some of its attributes.
- Once, the file is created, we need to open it & use it. We may also read, write & reposition. Finally we need to close the file, indicating that we are no longer using it.
- We may need these same sets of operations for directories if we have a directory structure in the file system.
- File attributes include the file name, a file type, protection codes, accounting information & so on. Two system calls get file attributes & set file system attributes are required for this function. Some OS provide many more calls, such as calls for file move & copy.

- Example of file related System Call:-

- 1] Create file, Delete file.
- 2] Open a file, close a file.
- 3] ~~ft~~ Create directory.
- 4] Read, Write, Reposition.
- 5] Get file attributes, Set file attributes.
- 6] Create a link.
- 7] Change working directory.