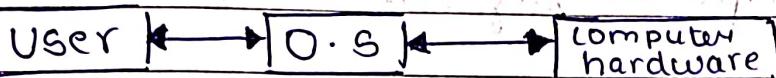
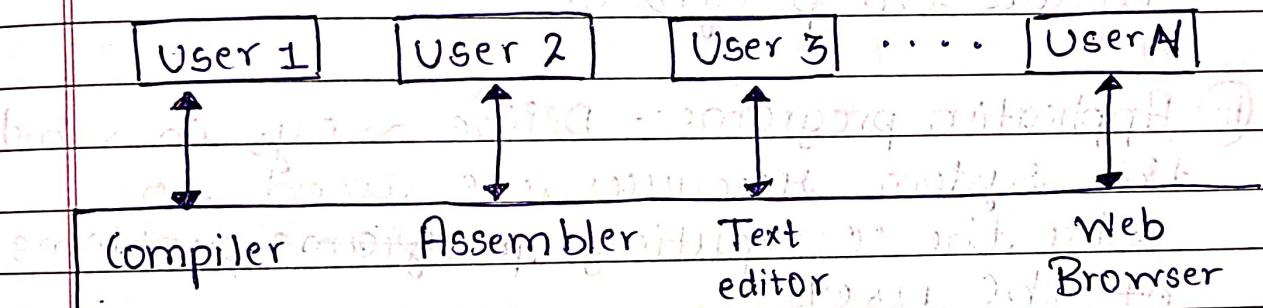


Introduction to Operating Systems

- ★ Operating system is a "set of programs which control/manage all the computer's resources and provide an operating environment in which users can execute programs."

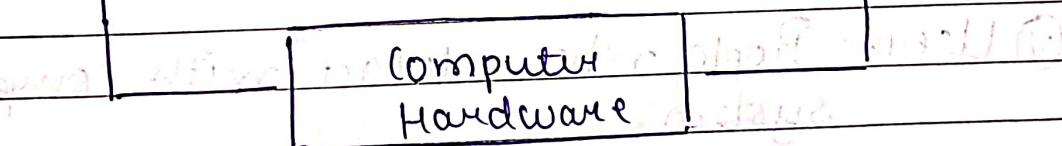


- ★ Computer System Overview.



System & Application Programs

Operating System



Conceptual view of computer system

trap(exception) → software generated interrupt caused by an error such as divide by zero or invalid memory access or by specific request by user application.

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Computer system is divided into:

- i) Hardware: Consists of Central Processing Unit (CPU), memory and Input/Output (I/O) devices which altogether used to provide the basic computing resources for the computer system.
- ii) Operating System: Set of programs which controls/manage all the computer's resources and provides an operating environment in which users can execute the programs.
- iii) Application programs: Define ways in which the system resources are used to solve the computing problems of the users.
- iv) System programs: Provide basic services for the computer users (compilers, text editors).
- v) Users: People who interact with computer system.

SPOOLing → Simultaneous Peripheral Operation On Line.
means putting data of various I/O jobs in buffer

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* Functions of O.S / Services of O.S

i) Memory Management :- An operating system deals with the allocation of main memory and other storage areas to the system programs as well as user programs and data.

ii) Processor Management :- An operating system deals with the assignment of processor to the different tasks being performed by computer system.

iii) Error detecting aids : Production of dumps, traces, error messages and other debugging and error detecting aids.

iv) Job Accounting: An OS Keeping the track of time and resources used by various jobs and users.

* Multiprocessor Operating System means the use of two or more processors within a single computer system.

Two Types:

i) Asymmetric multiprocessing:- In this system, specific task is assigned to each processor. One processor is master and other processors are slaves which follows the instructions of master.

ii) Symmetric multiprocessing:-

Doesn't follow master-slave concept
All processor are peer processor.

* Dual Mode Operation:

- ① The execution of operating system code and user code must be separated in order to ensure the correct execution of the program.
- ② Two separate modes:
 - a) User mode
 - b) Kernel mode
- ③ A bit called mode bit is added to the hardware of the computer to indicate current mode.

For kernel, the bit is 0.

- For user, the bit is 1.
- ④ The system is in user mode during execution of user application and in kernel mode, when function is performed by O.S.

- ⑤ The booting process starts in kernel mode. whenever interrupt occurs, the hardware switches from user to kernel mode.

- ⑥ The mode bit is set to 0 in the kernel mode. It is changed from 0 to 1 when switching from kernel mode to user mode.

* Computing Environments

- A computing environment consists of a computer system, its interfaces with other systems and services provided by its operating system to its users and their programs.

(i) Traditional Computing

- A few years ago, the computer is connected to network, with servers. Mainframes are used with number of terminals attached.
- Today, web technology is used with traditional computing. Companies are establishing portals, blogs etc. provide web accessibility to their internal servers.

(ii) Mobile Computing

- Mobile computing deals with human computer interaction using mobile devices.
- Compared with desktop and laptop computers, mobile systems have small screen size, memory capacity in return for services such as web-browsing, email. and also it is lightweight and portable.

- III Distributed computing
- Distributed computing environment contains multiple nodes that are physically separate but linked together using network.
 - Nodes in distributed systems can be arranged in

(a) Client-Server Systems :- the client

requests a resource and the server provides that resource.

(b) Peer-to-Peer systems :- contains

nodes that are equal participants in data sharing.

* Booting

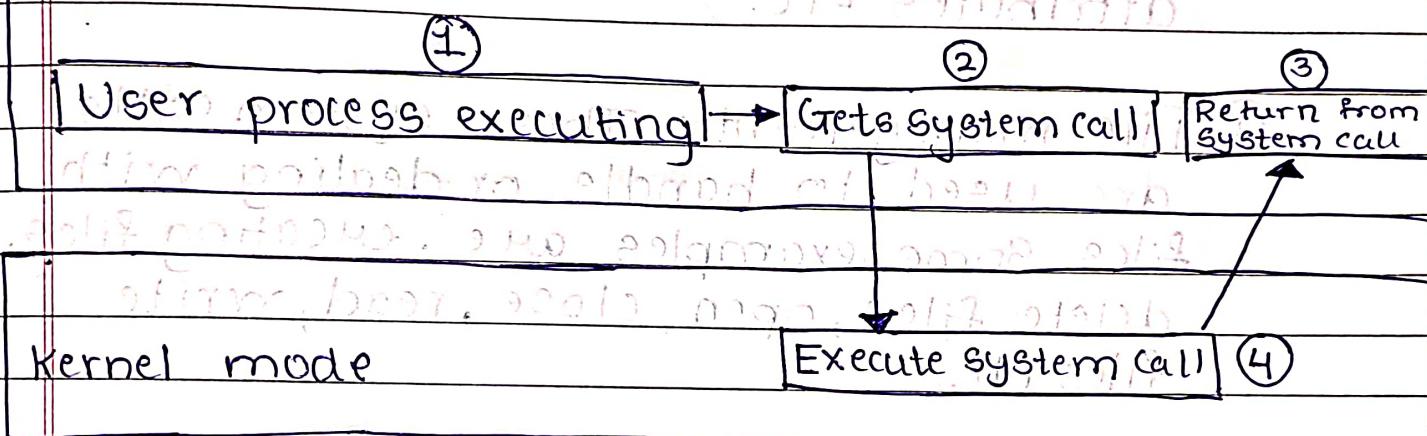
- Booting the system is done by loading the kernel into main memory and starting its execution. The process of starting a computer by loading the kernel is called known as system booting.
- The program called bootstrap or bootstrap loader is used to locate the kernel and loads it in main memory and starts execution.

System calls.

- System call provides an interface between a running program and an operating system.

★ Working of System Calls

User mode



★ Step 1: Processes executed in user mode

29.09.2020 till the timerd system call interrupt.

Step 2: After that, the system call is executed in the Kernel mode on a priority basis.

Step 3: Once system call execution is over control returns to the user mode.

Step 4: The execution of user processes
are resumed in Kernel mode.

* Types of System calls.

- ① Process Control: These system calls deal with processes. [Process is nothing but program in execution.] Some examples of these system calls are end, abort, load, execute, create, new, process, terminate process, setting and retrieving process attributes etc.
- ② File management: These system calls are used to handle or dealing with files. Some examples are . creating files, delete files, open, close, read, write files etc.
- ③ Device management: These system call is used to deal with devices manipulation. Some examples of these s. calls are call request device, release device , read and write device operations etc.
- ④ Information maintenance: These system calls handle information and its transfer between the operating system and the user program. Some examples of these system calls are get time or date, set time or date, get system data, set system data. etc.

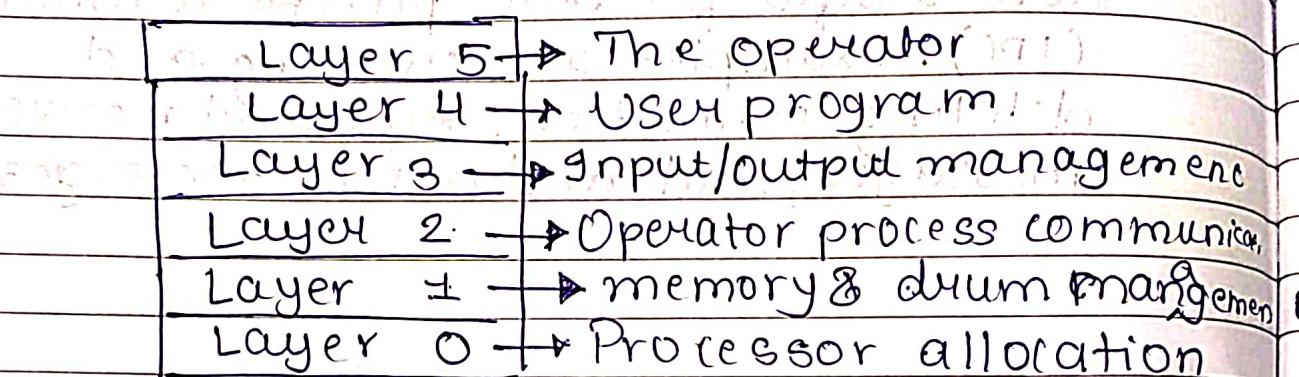
(v) Communication: These system calls are useful for interprocess communication (IPC). Examples are creating and deleting connection, send and receive messages, read and write messages etc.

Structure of O.S

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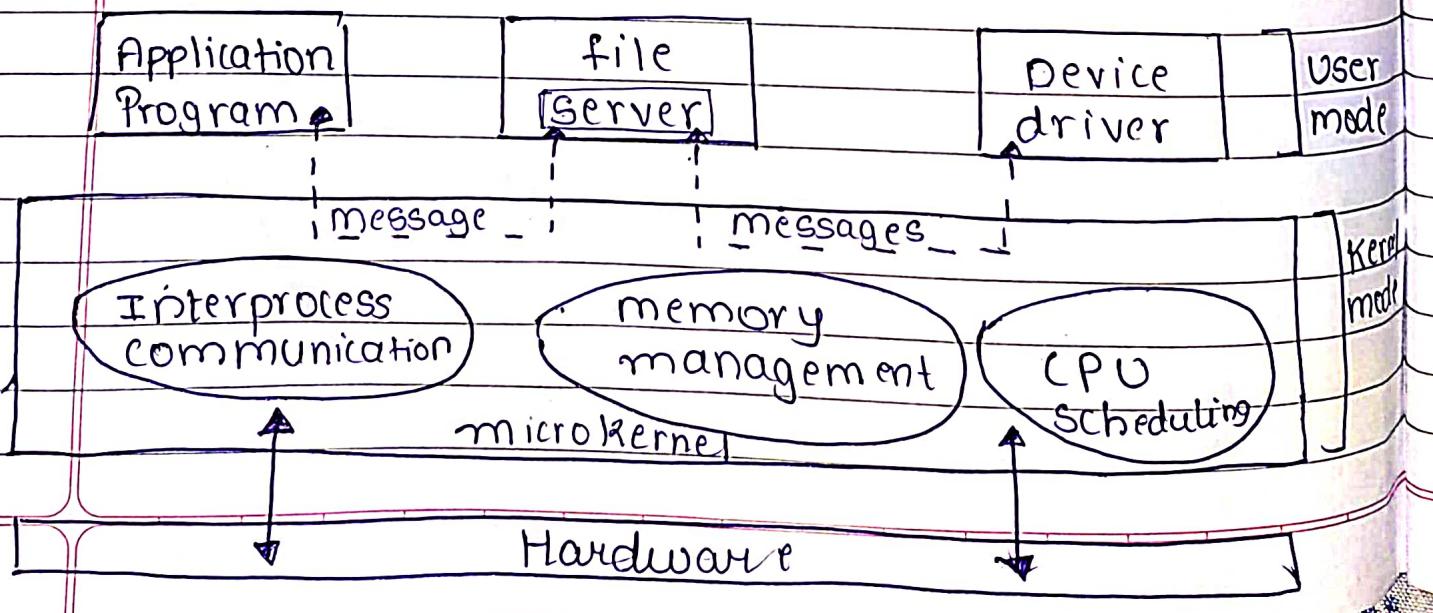
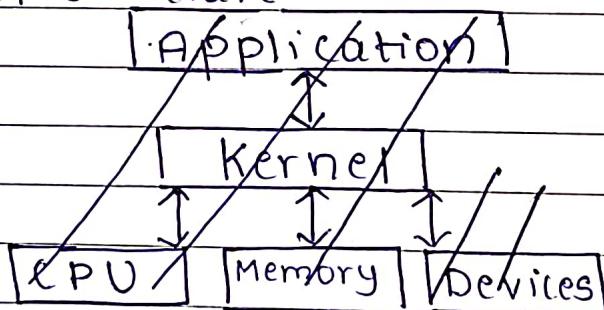
★ Layered Structure:



Advantages:-

- Gives modularity
- Easy for debugging
- Easy for system verification

★ MicroKernel Structure:



- Kernel is a system software that behaves as a bridge between application software and hardware of the system.
- micro means small so a microkernel is a small kind of kernel in which only basic functionality of kernel is placed.

Advantages

- Provides High security
- microkernel is portable
- OS can be extended.

Main function of micro-kernel is to provide communication facility between the client program and various services running in user mode.