Unit 2

* operating System Services.

An operating System provides an Environment for the Execution of program. The System provide Certain services to program and to user of those program.

These services are:

→ Program Execution.
→ I/O operation.
→ File System Manipulation.
→ Communication.
→ Error detection.
→ Accounting
→ Resource Allocation.
→ protection.

1. program Execution ⇒ The System must be able to load the program into memory and run it.

The program must be able to End its Execution either normally or abnormally.

2. I/O operation => The running program may require I/O. This Input Output may involve a file or Input Output device.

3. File System Manipulation => program needs to read or write files. They also needs to create and delete files by name.

4. Communication => There are many circumstances in which one process need to exchange information with another process. There are two ways in which communication can occur. first takes place between process executing on same computer and second takes place between process executing on different computer, that are tied together by computer network.

5. Accounting => We need to keep track of which user uses how much and which kind of ~~data~~ computer resource.

6. Error detection => operating system needs to aware of possible errors. Errors may occur in CPU and the hardware, in I/O devices or in user program. Operating should take appropriate action to detect, isolate and correct such errors.

7. Resource allocation => When multiple users or multiple jobs running at same time, the resource must allocate to each of them. CPU cycles, main memory and file storage may have special allocation code.

8. protection => protection involves that all access to system resources is controlled. Security of the system from outsiders is also important.

* System Call.

When a program in user mode, it require access to RAM or hardware resource, it must ask the kernel to provide access to that resource. This is done something via called system call.

System calls provide interface between the process and operating system. System calls occur in different ways depending on computer in use.

System calls are broadly divided into following categories:

1. Process control.
2. File manipulation.
3. Device manipulation.
4. Information maintenance
5. Communication.

1. process control => The system that deals with the progress of execution of process are as:
   - → create process, terminate process
   - → End, abort.
   - → load, execute.
   - → Get process attributes, set process attributes
   - → wait time, wait signal, signal event.
   - → Allocate, free memory.

2. File manipulation ⇒ The operating system provides several system calls dealing with files as :

→ Create file, delete file.
→ open, close.
→ Read, write, repposition.
→ Get file attribute, set file attributes.

3. Device manipulation ⇒ The operating system provides several system calls dealing with devices as :

→ Request device, Release device.
→ Read, write, repozition.
→ Get device ~~manipulation~~ attributes, Set device attributes

4. Information Maintenance

→ Get time or date, set time or date.
→ Get system data, Set system data.
→ Get process file, Set process file.

5. Communication.

→ Create, delete communication connection.
→ Send, receive message.
→ transfer status information.
→ attach or detach remote device.

* Operating system

Operating system is a system program that acts as an Interface b/w the user of computer system and the computer hardware. In other words, operating system ~~gives~~ is a collection of program that governs the control of resources,

such as processor, main-memory, secondary storage, I/O devices and files.

Operating System can be classified into different types based on their Interface, user friendliness and functionality. They are :-

1. character user Interface (CUI) based operating system.
2. Graphical user Interface (GUI) based operating system.
3. Single user operating System.
4. Multi-user operating System.
5. Single tasking operating System.
6. Multi-tasking operating system.
7. Real-time operating System.

1. character user Interface (CUI) based OS
MS-DOS and UNIX, such an Interface is called command-line Interface.

2. Graphical user Interface (GUI) based OS.
GUI operating System are easy to use because the user can click on menus and Icons rather than type cryptic commands. User can use a device called mouse through which it can click on Icons, after which operating system will load and run it.

3. Single user O.S.
Operating System performed on personal computers are examples of single user operating System.
Ex → MS-DOS, WIN95, WIN 98.

4. Multiple user OS.

Multiple operating system allows multiple user to work [illegible] on computer system.

Ex→ LINUX, UNIX, WINDOWS NT4.

5. Single-Tasking OS.

A Single Tasking OS can support only one task at a time. In Single Tasking OS, the task execution is sequential.

Ex→ MS-DOS.

6. Multi-tasking OS.

A multi-tasking OS can support multiple task at a time. In this, the processor divide its time to execute multiple tasks.

7. Real-Time OS

Real-Time operating systems, that are used to respond to input within a defined time period. RTOS have less user Interface capability. They are parts of [illegible]. CD players, washing machine.

* Types of operating System.

1. Batch processing operating System.
2. Serial processing operating System.
3. Multi-programming operating System.
4. Real-time operating System.
5. Distributed operating System.
6. Multi-processing operating system
7. parallel operating System.

1. Serial processing operating system.

The serial processing operating system are those which performs all operations in sequential manner or the instructions given by user will be executed in FIFO manner, means first in first out. All the instructions these are entered first will be executed first and the instructions these are entered later will be executed later.

2. Batch processing operating system.

→ The Batch processing is same as serial processing OS but in of batch processing, similar type of job are prepared first and they are sorted on the card. and that card will sent to system for processing. The system performs all the operations on the instruction one by one.

→ In this, the system will first prepare a batch and after that it will execute all the jobs stored on the batch.

3. Multiprogramming operating system.

→ In multiprogramming operating system, ~~the~~ there are one or more programs that are ready to execute. only one program is able to get to get the CPU at a time for executing the instructions while all others are waiting for their turn.

→ The main idea of multiprogramming is to maximize the use of CPU time.

Ex:

Job 1	CPU	I/O	I/O	I/O	CPU
Job 2	I/O	CPU	I/O	I/O	I/O
Job 3	I/O	I/O	CPU	I/O	I/O
Job 4	I/O	I/O	I/O	CPU	I/O.

4. Real-time operating System.

In Real time operating System, the response time is already fixed, means time to display the Result after processing has fixed by the processor or the CPU. Real time O.S is used at those place In which we require higher and Timely response.

They are of two types:

1. Hard time real-time OS.

Hard time OS guarantee that Critical tasks complete on time. In this, secondary Storage is limited or missing and the data is stored In ROM. In these Systems, Virtual Memory is almost never found

2. Soft real time OS.

→ They are less restrictive. A Critical real time gets priority over other tasks and retains the priority until it completes.

→ They have limited utility than hard real time

Ex: Multimedia, Virtual reality etc.

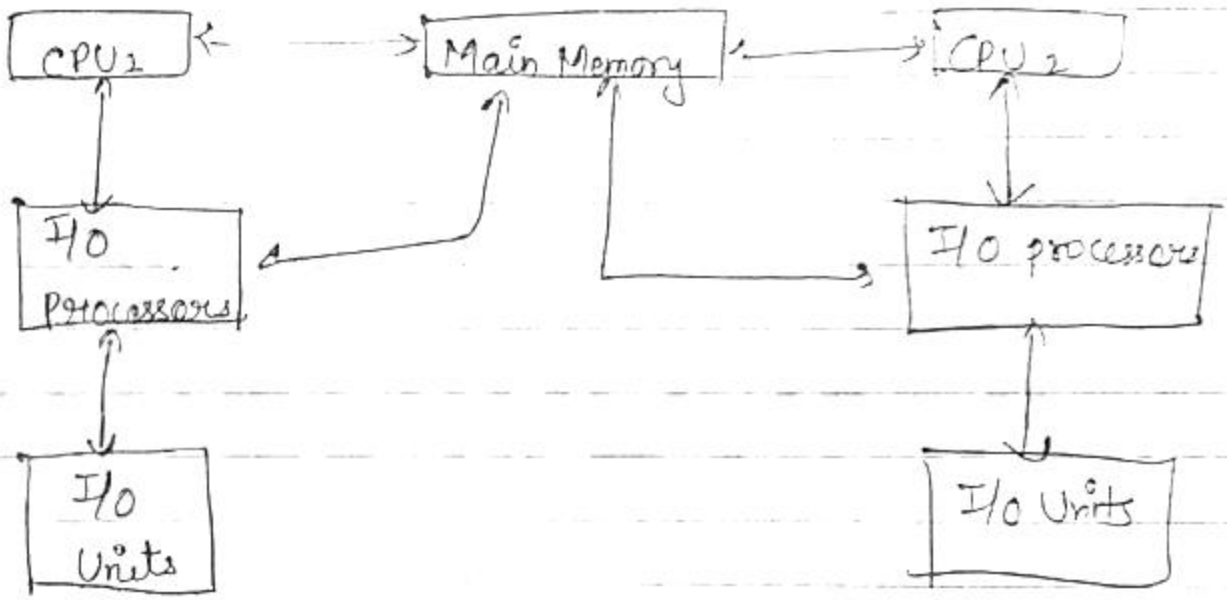
5. Distributed operating System.

Distributed means Data is stored and processed on multiple locations. A distributed operating system is a collection of processes that do not share memory or a clock. Each processor has its own local memory and the processes Communicate with one another through Various Communication lines such as high speed buses or telephone lines.

6. Multiprocessing operating System.

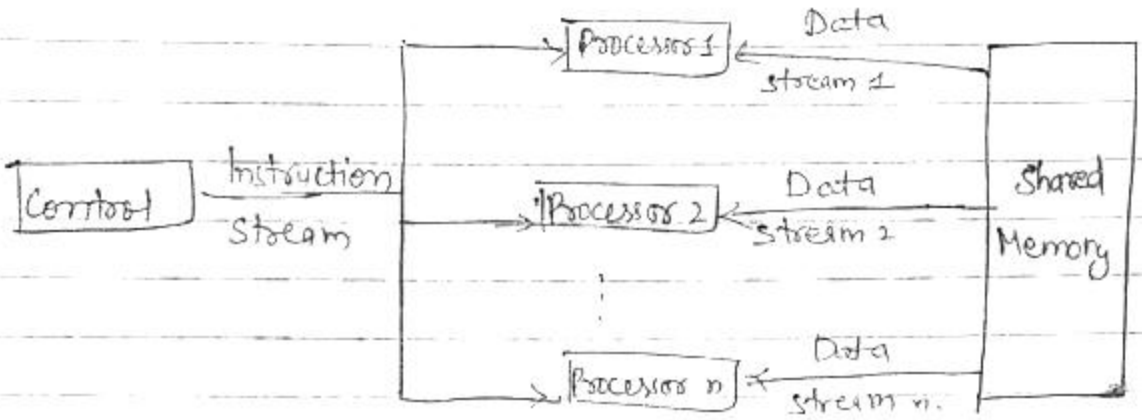
→ Multiprocessing is sometimes refer to the Execution of multiple Concurrent processes In a system, with each process running on seperate CPU or Core.

→ Multiprocessing OS is a System having two or more processing units each sharing main memory and peripherals, In order to simultaneously process programs.



7. parallel operating System.

They are designed to Speed up the Execution of programs by dividing the programs into fragments and processing these fragments simultaneously. Such Systems are multiprocessor Systems also known as tightly Coupled Systems. parallel System deal with simultaneous use of multiple Computer resources that Can Include a Single Computer with multiprocessor, a number of Computers ~~with mu~~ Connected by a network to form a parallel processing cluster or a Combination of both.



8. Network operating System.

A Network operating system runs on a Server and provides the server the Capability to manage data, users, groups, Security, applications and other networking functions. The primary function of Network operating System is to allow shared files and printer access among multiple Computers In a network

Ex-> Microsoft windows Server 2003, Unix, Linux, mac etc.

9. Time sharing operating systems.

Time Sharing is a technique which enables many people, located at Various terminals, to use a particular Computer System at Same time. Time sharing is a logical Extension of multiprogramming.

10. Batch programming.

When a batch file is run, the Shell program reads the file and Executes its Commands, normally line by line.

The file Extension ".bat" is used In DOS and windows