

# PRACTICAL-1

1. What is operating System? Explain the objectives & Functions of operating system.

→ An operating System is a collection of software that manages computer hardware resources & provides various services for computer programs. It acts as an intermediary between the user of a computer & the computer hardware.

→ Objectives of OS:

1. Convenience: An OS makes a computer more convenient to use.
2. Efficiency: An OS allows the computer system resources to be used in an efficient manner.
3. Ability to evolve: An OS should be constructed in such a way as to permit the effective development, testing, & introduction of new system functions without interfering with service.

→ Functions of OS:

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control Over System performance
- Job accounting
- Error detection & Response
- Booting the computer
- Coordination between other software & users.

2. Write different Services provided by Operating System.

→ Operating System Services & Facilities can be grouped into following areas:

### Program development:

- Operating System provides editors & debuggers to assist (help) the programmer in creating programs.
- Usually these services are in the form of utility programs & not strictly part of core operating system. They are supplied with operating system & referred as application program development tools.

### Program execution:

- A number of tasks need to be performed to execute a program & not strictly part of such as instructions & data must be initialized.
- The operating system handles these scheduling duties for the user.

### Access to I/O devices

- Each I/O device requires its own set of instructions for operations.
- Operating System provides a uniform interface that hides these details, so the programmer can access such devices using simple reads & writes.

### Memory Management

- Operating System manages memory hierarchy.
- It keeps the track of which parts of memory are in use and free memory.
- It allocates the memory to programs when they need it.



- It de-allocates the memory when program finish execution.

### Controlled access to file :

- In the case a file access, operating system provides a directory hierarchy for easy access and management of files.
- Os provides various file handling commands using which users can easily read, write & modify files.
- In case of system with multiple users, the operating system may provide protection mechanism to control access to file.

### System access

- In case of public systems, the operating system controls access to the system as a whole.
- The access function must provide protection of resources & data unauthorized users.

### Accounting

- A good operating system collects usage for various resources & monitor performance parameters.
- On any system, this information is useful in anticipating need for future enhancements.

### Protection & Security :

- Operating System provides various options for protection & security purpose.
- It allows the users to secure files from unwanted usage
- It protects restricted memory areas from unauthorized access.

3. Write the View & goal of operating System.

→ There are mainly two types of views of the operating System. These are as follows:

(1) User View

(2) System View

→ Goal of operating System is as follows:

(1) Manage the computer's resources, such as the central processing unit, memory, disk drives & printers.

(2) Establish a user interface

(3) Execute & provide services for applications software.

So the main goal is to thus make the computer environment more convenient to use & the secondary goal is to use the resources in the most efficient manner.

4. Explain the different types of operating System.

Mainframe Operating Systems:

• The operating system found in those room sized computers which are still found in major corporate data centers.

• They typically offer three kinds of services.

(1) Batch operating system :- Is the one that processes routine jobs without any interactive user presents, such as claim processing in an insurance & sales reporting etc.

(2) Transaction processing :- System handles large number of small requests, for example check processing at a bank & airline reservation.



(3) Time sharing : allows multiple remote users to run jobs on the computer at once, such as querying a database.

### Server Operating System :

- They run on servers, which are very large personal computers, workstations or even mainframes.
- They serve multiple users at once over a network and allow the users to share hardware & software resources.
- Servers can provide print service, file service or web service.
- Typically Server operating Systems are Solaris, FreeBSD and Linux and Windows Server 200X.

### Multiprocessor Operating System :

- An increasingly common way to get major group computing power is to connect multiple CPUs into a single system. Depending on precisely how they are connected & what is shared, these systems are called parallel computers, multicomputers or multiprocessors.
- They need special operating systems, but often these are variations on the server OS with special features for communication, connectivity & consistency.
- It includes Windows & Linux, run on multiprocessors.

### Personal Computer Operating System :

- The next category is the personal computer operating system. All modern computers support multi-programming, often with more than one program started up at a boot time. Their job is to provide good support to a single user.

- They are widely used for word processing, spreadsheets and internet access.
- Common examples are Linux, FreeBSD, Windows Vista & Macintosh OS.

### Handhelds Computer Operating Systems.

- Continuing on down to smaller & smaller systems, we come to handheld computers. A handheld computer or PDA is a small computer that fits in a pocket & performs a small number of functions, such as electronic address book & memo pad.
- The OS that runs on handhelds are increasingly sophisticated with the ability to handle technology telephony, photography & other functions.

### Embedded Operating Systems:

- Embedded systems run on the computers that control devices that are not generally thought of as computers & which do not accept user installed software.
- The main property which distinguishes embedded systems from handhelds is the certainty that no untrusted software will ever run on it.
- So, there is no need for protections between applications, leading to some simplifications.

### Sensor Node Operating Systems

- Networks of tiny sensor nodes are being deployed for numerous purposes. These nodes are tiny computers that communicate with each other & with a base station using wireless communication.
- These sensor networks are used to protect the perimeters of buildings, guard national borders, detect



fires in forests, measure temperature & precipitation for weather forecasting, glean information about enemy movements on battlefields, & much more.

- All the programs are loaded in advance which makes the design much simpler.

### Real time Operating Systems

- These systems are characterized by having time as a key parameter.
- Real time operating System has well defined, fixed time constraints. Processing must be done within defined constraints or the system will fail.
- Types of Real time Operating System:
  - Hard real time System
  - Soft real time System

### Smart Card Operating Systems

- The Smallest Operating Systems run on smart cards, which are credit card sized devices containing a CPU chip. They have very severe processing power & memory constraints.
- Some of them can handle only a single function such as electronic payments but others can handle multiple functions on the same card.
- Often these are proprietary systems.

### 5. Write a short note on System Calls.

- The interface between the Operating System & the user programs is defined by the set of System calls that the operating system provides.
- The system calls available in the interface vary

- from operating system to operating system.
- Any single CPU computer can execute only one instruction at a time.
  - If a process is running a user mode & needs a system service, such as reading data from a file, it has to execute a trap or system call instruction to transfer control to the operating system.
  - The operating system then figures out what the calling process wants by inspecting the parameters.
  - When it carries out the system call & returns control to the instruction following the system call.

6. Explain Virtual Machine & Client Server architecture of operating system.

- Virtual Machine:
- The initial releases of OS/360 were strictly batch systems. But many users wanted to be able to work interactively at a terminal, so OS designers decided to write time sharing systems for it.
  - The heart of the system, known as the virtual machine monitor, run on the base hardware & does the multiprogramming, providing not just one but several virtual machines to the next layer up.
  - Each virtual machine is identified to the true hardware; each one can run any OS that will run directly on the base hardware.
  - Different virtual machines can run different operating systems.

- On VM/370, some run OS/360 while the others run single user interactive system called CMS.



→ When CMS program executed a system call, a call was trapped to the operating system in its own virtual machine, not on VM/370

→ These I/O instructions were trapped by VM/370 which then performs them

→ The idea of a virtual machine is heavily used nowadays in a different context.

### Client Server architecture of operating system:

→ A slight variation of the microkernel idea is to distinguish classes of processes in two categories.

→ First one is the Servers, each of which provides some services, and the second one is clients, which use these services

→ This model is known as the Client Server model.

→ Communication between clients & servers is done by message passing.

→ To obtain a service, a client process constructs a message saying what it wants and sends it to the appropriate servers.

→ The service then does the work & sends back the answer.

→ The generalization of this idea is to have the clients & servers run on different computers, connected by a local or wide area network.

→ Since a client communicates with a server by sending messages, it handles the client need not know whether the message is handled locally in its own machine.

→ A PC sends a request for a web page to the server & the web page comes back. This is a typical use of client server model in a network.

## 7. Explain UNIX System Structure.

- UNIX is a powerful operating system originally developed at AT&T Bell Labs.
- It is very popular among the scientific, engineering & academic communities due to its multi user & multi-tasking environment, flexibility & portability, electronic mail & networking capabilities, & the numerous programming text processing & scientific utilities available.
- The UNIX System is mainly composed of three different parts: the kernel, the file system & the shell.
- The Kernel is that part of the system which manages the resources of whatever computer system it lives on, to keep track of the disks, tapes, printers, terminals, communication lines & any other devices.
- The File System is the operating structure for data. The file system is perhaps the most important part of the Linux operating system. The file system goes beyond being a simple repository of data and provides the means of organizing the layout of the data storage in complex ways.
- The shell is the command interpreter. Although the shell is just a utility program, and is not properly a part of the system, it is the part that the user sees. The shell listens to your terminal & translates your requests into actions on the part of the kernel & the many utility programs.



8. What is SHELL? Explain different types of SHELL.

→ A shell is an environment in which we can run our commands, programs and shell scripts. There are different flavors of shells, just as there are different flavors of operating systems. Each flavor of shell has its own set of recognized command & functions.

Types of Shell:

- The C Shell

If you are using a C-type shell, the default prompt is the % character.

- The Bourne shell

If you are using a Bourne-type shell, the default prompt is the \$ character.

9. Explain KERNAL.

→ The kernel is the essential center of a computer operating system. It is the core that provides basic services for all other parts of the OS. It is main layer between the OS and hardware, and it helps with process and memory management, file systems, device control & networking.

→ A kernel is often contrasted with a shell, which is the outermost part of an OS that interacts with user commands.

→ A kernel is not to be confused with a basic input/output system, which is an independent program stored on a chip within a computer's circuit board.

→ A Kernel might include a manager for the OS address spaces in memory or storage. The manager shares the address spaces among all components & other users of the kernel's services.

# 10. Differentiate Multi-Programming, Multi-tasking & Multiprocessing.

No.	characteristics	Multi Programming	Multi Processing	Multi tasking
1.	What it is	The concurrent residency of more than 1 program in the main memory is called Multi programming.	The availability of more than one processor per system, which can execute several set of instructions in parallel is called multiprocessing.	The execution of more than one task simultaneously is called as multitasking.
2.	No. of CPU	1	More than 1	
3.	Job processing time.	More time is taken to process the jobs.	less time is taken for job processing.	Moderate amount of time.
4.	Economical	It is economical.	Is less economical	It is economical
5.	No. of users	one at a time	can be one or more than one	More than one.
6.	efficiency	less	Maximum	Moderate.