

Assignment: 1

(1)

Why are the primary purpose of operating system.  
Why should operating system prevent user from accessing boot access.

Ans:

The primary purpose of an operating system are:

- o To provide an environment for a computer user to execute programs on computer hardware in a convenient and efficient manner.
- o To allocate the separate resources of the computer as needed to solve the problem given. The allocation process should be as fair and efficient as possible.

As a control program it serves two major functions:

(i)

Supervision of the execution of user program to prevent errors and improper use of the computer and management of the operation and control of I/O devices.

(ii)

2) Explain various types of OS:

Ans:

i) Batch Processing:

In batch processing system, the grouping of similar job which consist of program data and system commands are done. The instructions, data and some controlled information are submitted to the computer operator in the form of job. The users are not allowed to interact with the computer system. The jobs are performed in FIFO manner, so the OS require very simple CPU scheduling techniques. The problems in

this system are:

- Lack of interaction between user and the job.
- CPU is often idle, because the speed of mechanical I/O devices is slower than the CPU.
- Difficult to provide the desired priority.

## ii) Multi-Processing:

A computer's capability to process more than one task simultaneously is called multiprocessing. A multiprocessing operating system is capable of running many programs simultaneously, and most modern network operating systems (NOSs) support multiprocessing. These operating systems include Windows NT, 2000, XP and UNIX.

Advantages:

- Increased throughput
- Economy of scale increased.

Disadvantages:

- If one processor fails then it will affect the speed.
- Multiprocessor systems are expensive.
- Complex OS is required.
- Large main memory required.

## iii) Time sharing operating system:

It is a technique which enables many people located at various terminals, to use a particular system at the same time. Time-sharing or multitasking is a logical extension of multiprocessing.

Processor's time which is shared among multiple user simultaneously is termed as time sharing.

### Advantages:

- o Provides the advantage of quick response.
- o Avoids duplication of software.
- o Reduces CPU idle time.

### Disadvantages:

- o Problem of reliability.
- o Question of security and integrity of user program and data.
- o Problem of data communication.

### iv) Real time system:

A real-time system is defined as data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. It is a multitasking operating system that aims at executing real-time application.

It is of two types:

#### a) Hard real-time system

It guarantees that critical task complete on time.

#### b) Soft real-time system

It is less restrictive.

### v) Network Operating System

A network OS runs on a server and provides the server the capability to manage data, users, groups, security applications, and other networking functions. The primary purpose of the network operating system is to allow shared file and printer access among multiple computers in a network.

It is further divided into two types:

### a. Peer-to-peer

It allows users to share resources and files located on their computers and to access shared resource found on other computers.

### b. Client/Server

It allows the network to centralize functions and applications in one or more dedicated file servers.

E.g: Novell Netware, Windows 2000 Server.

### vi) Distributed Operating System

A distributed OS is an operating system that runs on several machines. Its purpose is to provide a useful set of services, generally to make the collection of machines behave more like a single machine.

#### Advantages:

- o Sharing of resources
- o Reliability
- o Communication
- o Computation speedup.

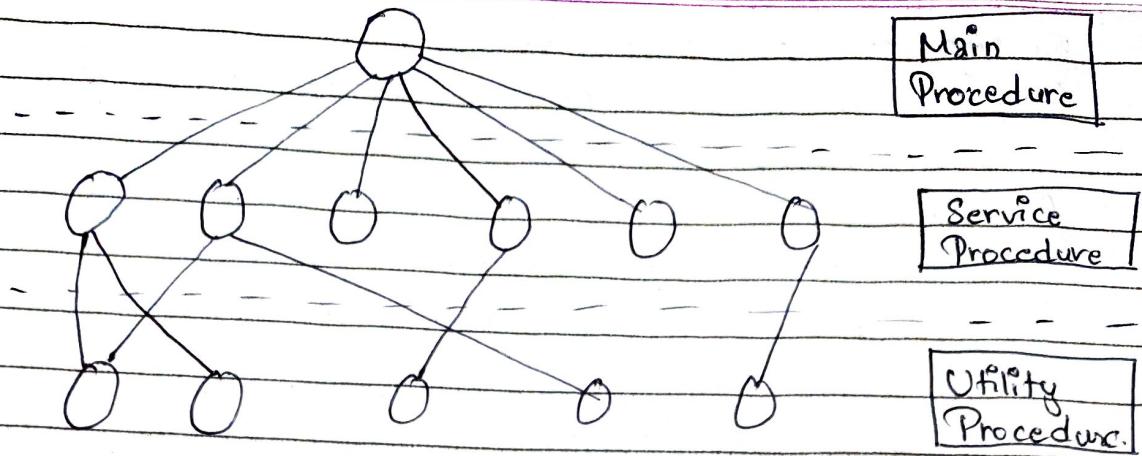
③ Explain the structure of OS with its advantages and disadvantages.

Ans:

The common system structures are given as:

#### i. Monolithic:

- Here, the kernel is a single large program.
- Functionality of the OS is invoked with simple function calls with the kernel.
- Device drivers are loaded into the running kernel and become part of the kernel.
- System calls from the user programs are kept in trap table which are executed in kernel mode switching from user mode.



iii) Layered structure

- Hierarchy of layers, each constructed upon another below it.
  - Layer 0 (hardware) to layer N (user interface).
  - Provide modularity.
  - With modularity, layers are selected such that each uses functions (operations) and services of only lower-level layers.
  - But difficult in differentiation and less efficient.
  - First system constructed in this way --- 'THE SYSTEM'
  - 'THE SYSTEM' was simple batch system consisting six layers.

The six layers are:

Layer 5	User program
Layer 4	Buffering for input and output
Layer 3	Process management
Layer 2	Memory management
Layer 1	CPV scheduling
Layer 0	Hardware

### iii. Microkernel

- Basic idea is to achieve high reliability by splitting of OS into small, well defined modules.
  - Only one among those modules always reside in memory &

always run on kernel mode.

- Others run as user process (device driver, file system)

Advantages:

- Easier to extend a microkernel.
- Easier to port the OS to new architecture.

#### iv. Client - server architecture.

- Two classes of processes - Server & Client
- Communication between client and server is via message passing.
- Client and server can run on different computers connected by LAN/WAN.
- Servers run as user mode. Hence, no system down if the server crashed.
- Well adapted in distributed system.

#### v. Virtual Machine

- It is an illusion of a real machine operating system, which make a single real machine appear to be several real machine.
- In this system, each user can choose a different OS.

Advantages:

- Complete protection of system resource.
- No direct sharing of resources.

Disadvantages:

- Difficult to implement.

#### 4. Explain the views on Operating System

⇒ The views on operating system are given as:

##### a. User mode

The user view depends on the system interface that is used by the users.

- If the user is using a personal computer, the operating system is largely designed to make interaction easy.
- If the user is using a system connected to a mainframe computer or a minicomputer, the operating system is largely concerned with resource utilization.
- If the user is sitting on a workstation connected to other workstations through networks, then OS needs to focus on both individual usage of resources & sharing through the network.
- If the user is using a hand held computer such as a mobile, then the OS handles the usability of the device including some remote application.

##### b. System view

According to computer system, the OS is the bridge between application and hardware.

- The system view the OS as a resource allocator.
- The OS can also work as a control program.
- OS can also be viewed as a way to make hardware easier.
- Operating system were developed to easily communicate with hardware.

5.) Define system calls. Illustrate the working of a system call with appropriate example.

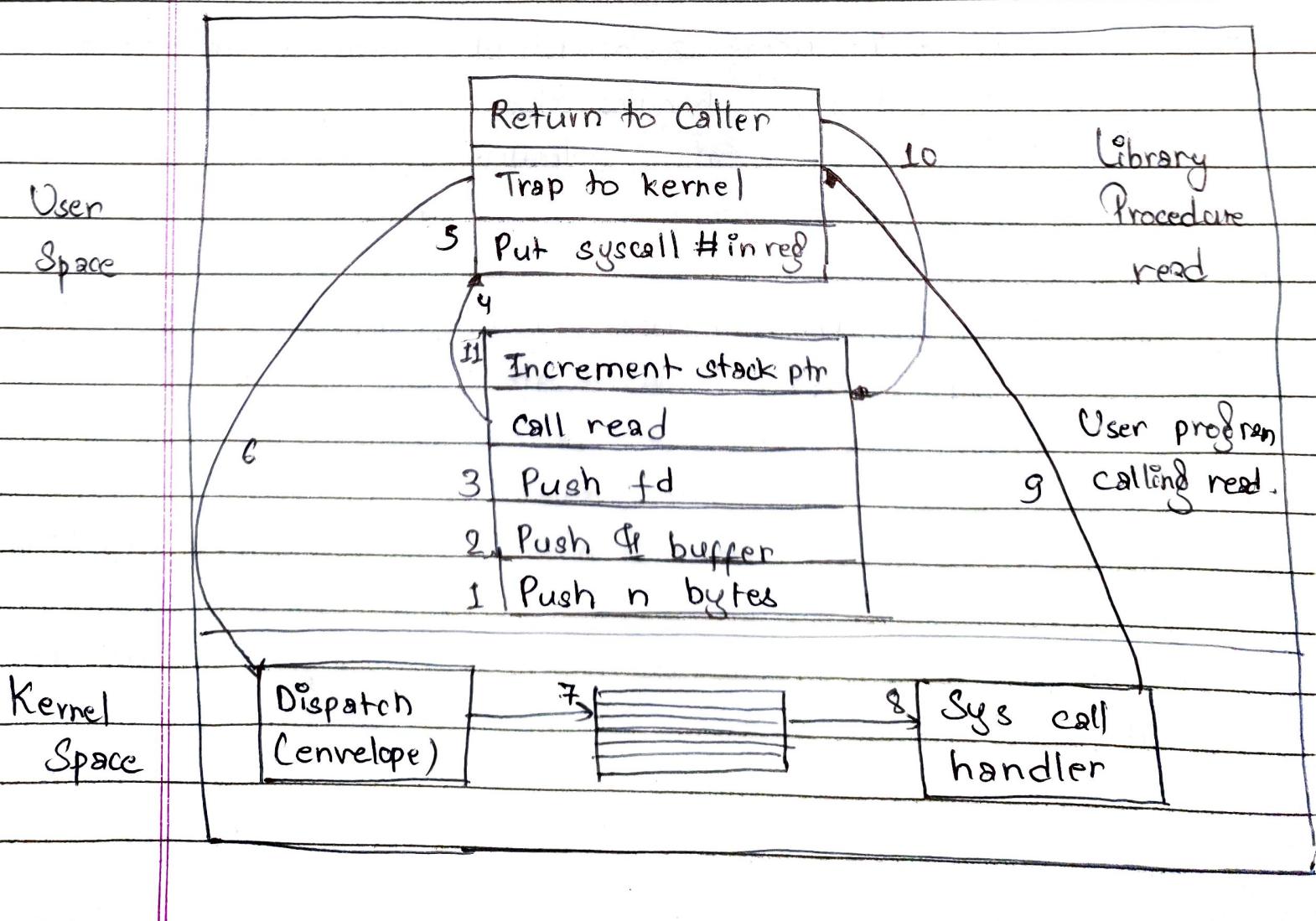
Ans:

A system call is how a program requests a service from an operating system's kernel. This may include hardware related services, creating and executing new processes and communicating with integral kernel services. System call provides an essential interface between a process and the Operating system.

For read(fd, buffer, n bytes);

The system call returns the number of bytes actually read in count. This value is normally the same as n bytes, but may be smaller, if for example end-of-file is encountered while reading.

It is represented in figure below:



6) Define shell and kernel along with its function.

Ans: Shell & kernel

When a user gives his command for performing any operation, then the request will go to the shell parts, the shell parts is also called as the interpreter which translates the human program into the machine language and then the request will be transferred to the kernel that means shell is just as the interpreter of the commands which converts the request of user into the machine language.

Functions of kernel:

- It controls the state of the process i.e. it checks whether the process is running or is waiting for the request of the user.
- It provides the memory for the processes those are running on the system mean i.e. kernel runs the allocation and deallocation process.
- It also maintains a time-table for all the processes those are running.

7) Operating system provides abstraction. Justify.

Ans: Operating system provides a set of basic commands or instructions to perform various operations such as read, write, modify, save or close. Also dealing with them is easier than directly dealing with hardware. Thus, operating system hides the complexity of hardware and presents a beautiful interface to the user. Just as the operating system shields the programmer from the disk hardware and

presents a simple file-oriented interface, it also conceals a lot of unpleasant business concerning interrupts, memory management and other low-level factors. In each case, the abstraction offered by the operating system is simple and easier to understand than offered by underlying hardware.

(8) Explain the various components of OS:

Ans:

i) Process management (Scheduling)

A process is the unit of work in a system. Operating system manages the execution of those processes. OS is responsible for the following activities in connection with process managed.

- o The creation and deletion of both user & system processes.

- o The suspension is resumption of processes.

- o The provision of mechanism for process synchronisation.

- o The provision of mechanism for deadlock handling.

ii) I/O management:

One of the important job of OS is to manage various I/O devices. I/O system requires to take an application I/O request and send it to physical device, then take whatever response come back from the device and send it to application.

### iii) Main memory management:

The operating system is responsible for the following activities in connection with memory management:

- keeping track of which part of memory is being used.
- Decide which process are to be loaded into memory when memory space becomes available.
- Allocate and deallocate memory space as needed.

### iv) Secondary storage management:

The operating system is responsible for the following activities in connection with disk management

- free space management
- Storage allocation
- Disk scheduling

### v) File management system

The operating system is responsible for the following activities in connection with file management

- The creation and deletion of files.
- The creation and deletion of directory.
- The support of primitives for manipulating files and directories.
- The mapping of files onto disk storage.
- Backup of files on stable storage.

### vi) Security & Protection

The various processes in an OS must be protected from each other's activities. For that purpose, various mechanisms which can be used to ensure that the files,

memory segment, CPU and other resources can be operated by the processes that have gained proper authorization from the operating system.

(g) Write short notes on:

(a) Windows

Windows is a personal computer's operating system from Microsoft Corporation that together comes with some commonly used applications. Windows have become a 'standard' for common users in most organizations as well as in most homes. Microsoft Windows is a series of operating system and graphical user interface produced by Microsoft. Microsoft first introduced on operating environment named Windows as MS-DOS.

(b) UNIX

UNIX is a computer operating system originally developed in 1969 by a group of AT&T employee at Bells Lab.

UNIX was originally meant to be a convenient platform for programmers developing software to be run on it and on other systems, rather than non-programmers.

Under UNIX, the operating system consist of many libraries and utilities along with the master control program, the kernel.

(c)

## Linux:

A Linux-based system is a modular Unix-like operating system, deriving much of its basic design from principles established in Unix during 1970s & 1980s. Such a system uses monolithic kernels, the Linux kernel, which handles process control, networking access to the peripherals and file system. Device drivers are either integrated directly with the kernel, or added as modules that are loaded with the system is running.