

Unit 1: Overview of Operating System

- * Topics :-
- * Structure of OS | Components of OS.
- * Components of Computer System.
- * Classification of OS.
- * Function of OS.
- * Operation of OS.
- * Types of OS.
 - Serial processing (sequential processing)
 - Batch Operating System.
 - Spooling.
 - Multiprogramming System.
 - Multitasking OS.
 - Time Sharing.
 - Multiprocessor System.
 - Distributed System.
 - Real-time System.
 - Clustered System.
 - Mobile Operating System.
- * Command line based OS & GUI based OS.
- * CLI → MS DOS, Unix
- * GUI → Windows, Linux,

- Q.1. List & explain Components of OS. [4M]
- Q.2. List Components of OS & Explain process Management in Detail.
- Q.3. List and draw neat label diagram for Components of Computer System.
- Q.3. Enlist types of OS Explain multiprogramming in details.
- Q.5. List any 4 function of OS.

(Q1)

Ans:-

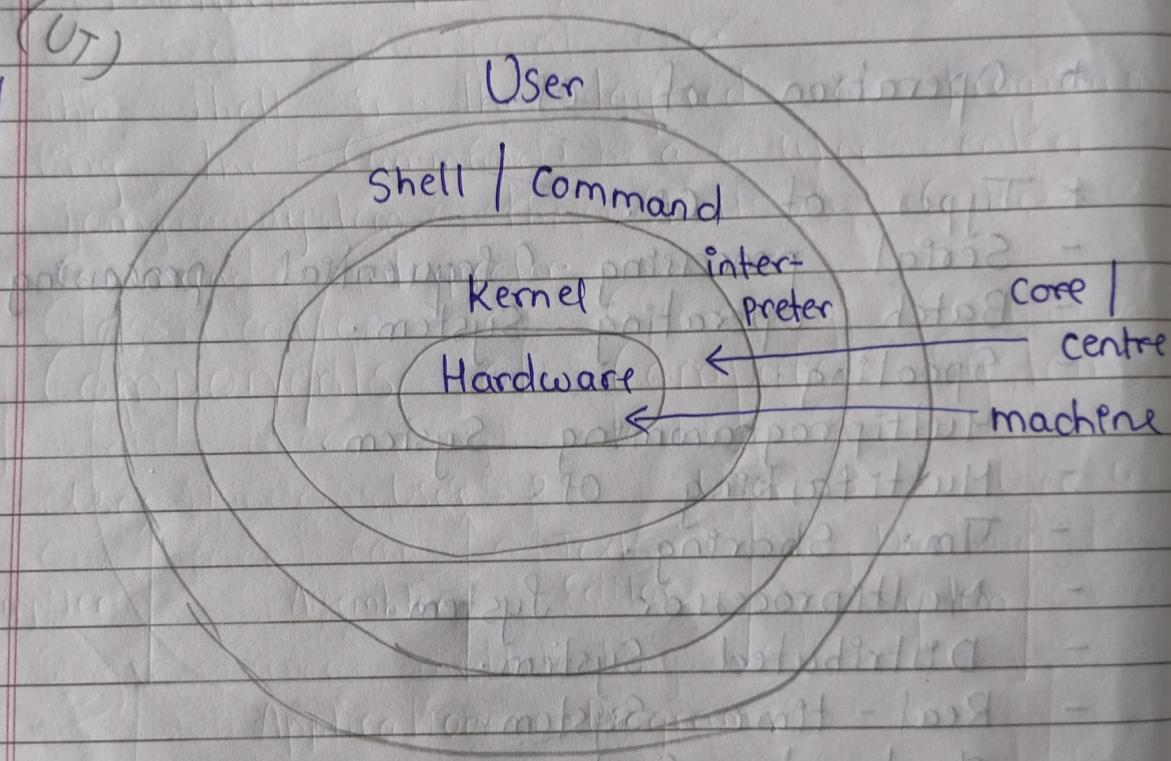


Fig. Basic Structure of an OS

* Shell :-

In Computing Shell is a Computer program that exposes an OS service to the human.

* Kernel :-

If it is an central module of an OS core of OS.

* Operating System (OS) :-

Operating System is a set of programs which controls all the computers resource & provide environment in which user can develop application programs. It acts as an interface between the user & the Computer hardware.

- Above Diagram Shows the Components of OS which are nothing but Various parts of OS & each part consist of Number of programs.
- Structure of an OS have a layered structures where the bottom most layer shows hardware & topmost layers show user Interface (UI) in between these 2 layers are kernel layer & shell layer.
- Kernel is the Central Controlling part of the OS. It provides basic services for all the other parts of OS.

- The Services of the kernel are requested by other parts of or by application program, to prove a Specified Set of program Sometimes known as System Calls.
- The Shell is the next layer to the kernel. A shell is a Software that provides an interface for user of an OS. Access the Services of the User.
- The Shell is the layered of programming the Commands a user enters in some System the Shell is Called Command interpreter

* Components of Computer System :-

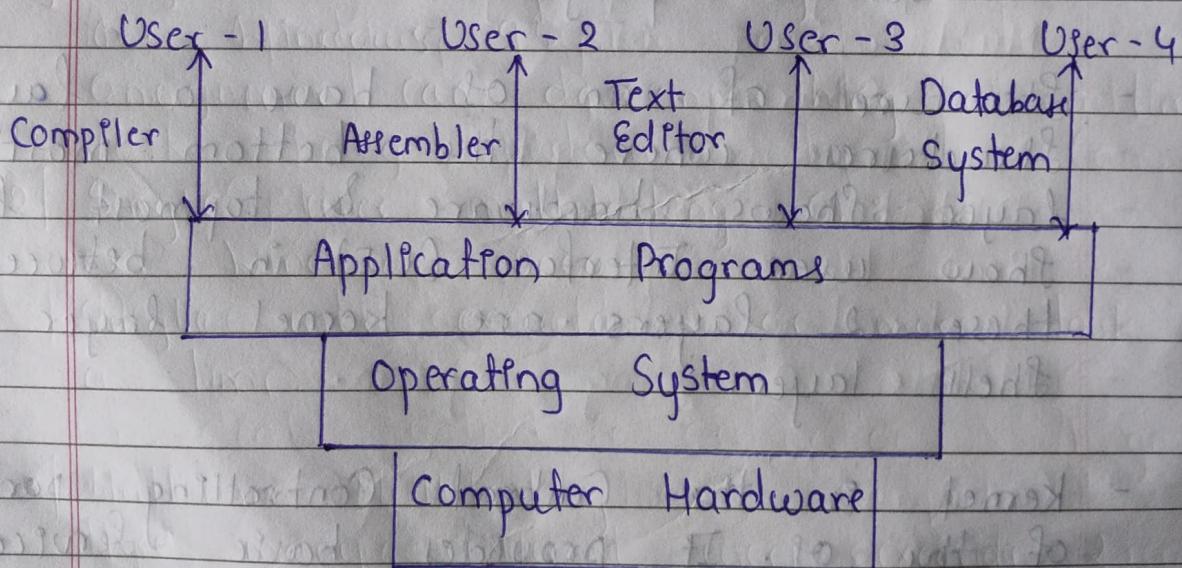


fig. Components of Computer System

- A Computer System is a Collection of hardware and software Components. Hardware refers to the physical Computing equipments & Software refers programs / code.
- [A Computer System can be divided into 4 Components] they are hardware or relation program users.
- Hardware :- Hardware physical part of machine which provide basic Computing resources.
- The Hardware devices are Central processing Unit (CPU), Memory, input device keyboard, mouse, scanner, etc. Output devices, Monitor, Speaker, printer, etc.
- Networking devices :- Router, hub, Switches and other devices like Motherboard, power Supply.
- Operating System : An Operating System is a Software program that enables the Computer hardware to [Communicate & Operate] with Computer Software.
- Examples of Computer Operating System are Mac, window, Linux, etc.

* Structure of OS

- Application programs :- Compilers, web browser, database system, word processor, etc. are examples of Application programs.
- Application are readymade packages that are ready to use by the user such as Microsoft office 2010. Packages include MS Excel, powerpoint, etc.
- Users :- User can be categorized as programmers, operational user, end users.

* Classification of Operating System :-

- 1] Single user, Single tasking or :-
ex. Windows 95
One user can do one thing at a time.
- 2] Single user multitasking or :-
ex. Windows 2000.
Single user execute 2 or more task at a time.
- 3] Multiuser Multitasking :-
Here many different users execute 2 or more task at a time.
ex. :- Unix

4] Real - time OS :-

Here particular operation user executes 2 or more task at a time.

Here particular operation executed in precisely the same amount of time every time it occurs.

ex. QNX, QNX

5] Distributed OS :-

Here data is [shared] & [processed] on multiple locations like in a network.

ex. Solaris, IRIX

6] Time Sharing OS :-

Here each user is given particular amount time in which he proccts.

e.g. Windows NT, windows xp.

7] Multiprocessing Operating System:

Here Single CPU has more than 1 processor.

8] Multitasking OS :-

It allows executing more than one task at a time.

e.g. Windows 7, windows Vista.

* Functions of OS :-

There are many functions those are performed by the Operating System. But the main goal of OS is to provide interface for working on the System by the user.

1] Memory Management :-

Operating System deals with allocation of main memory & other storage area to system programs as well as user programs & data.

2] Processor Management :-

An Operating System deals with assignment of processor to different task being performed by the Computer System.

3] Device Management :-

OS deals with co-ordination & Assignment of the different output & input device while 1 or more programs are being executed.

OS manages device communication via their respective drivers.

4] File Management :-

It deals with storage of file of various storage devices it allows all files to be easily changed & modified through the use of text editor or some other application.

5] Error Detecting :-

Production of dumps, traces, error messages.

6] Security :-

By means of Password & similar other techniques it prevents unauthorized access to programs & data.

* Types of Operating System :-

There are many type of OS those are categorized by using their working techniques

- [4M]
- Q.1. Enlist types of OS.
 - Q.2. Explain Multiprogramming OS in details.
 - Q.3. Explain Batch Monitoring functions
 - Q.4. List advantages & disadvantages of Batch Monitoring OS.
 - Q.5. Explain Multiprogramming OS with diagram.
 - Q.6. Explain Multiprogramming OS & Multi-tasking OS / Give difference between Multiprogramming & Multi-tasking OS.
 - Q.7. Explain Time Sharing OS? State its advantages & disadvantages / Describe working of Time sharing OS with diagram.
 - Q.8. Explain Multi processor OS. And its 2 types. / Give 2 advantages.
 - Q.9. State and describe Advantages & disadvantages of Distributed OS.
 - Q.10. Explain Real-time OS with diagram / List applications / Explain types.
 - Q.11. Explain Clustered OS. Four characteristics.
 - Q.12. Define Unix OS. [2 M]

* Sequential Processing / Serial Processing :-

- With the earliest Computer 1940 - 1950, the programmer interacted directly with the computer hardware.
- There was no OS the machines work run from console, consisting of display lights, switches, input output devices and printer.
- Programs in machine code were loaded via I/O devices (i.e. card devices)
- If an error occurs that where indicated by lights, if program is normally completed the error appeared on the printer.
- The Serial processing means that resources of Computer are allocated to single job and remain allocated until job is done.
- A serial processing of allows only one single user to run a single program at a time.
- A Serial processing System which performs all the instructions into Sequential manner.
- This instructions will be executed by using FIFO manner
- All the instructions those are entered first in the System will be executed first. And the instr. those are entered later in the System will be executed later. for running this instr. the program Counter is used.

- Mainly the punched card are used for this, in this all the jobs are stored in the card & the card is entered in the system.
- Here user does not interact with the system

Step 1 :- Type program on punch card.

Step 2 :- Convert Punch Card to Card reader.

Step 3 :- Submit it to Computing machine.
(If error will be indicated by the lights)

Step 4 :- Takes O/p from printer.

* Advantage :-

It is very simple.

* Disadvantage :-

1] Time Consuming.

2] Poor utilisation of resources.

(UT)

* Batch Operating System :-

- Batch OS is one where programs and data are collected together in a batch before processing starts.
- A job is predefined sequence of commands, programs and data that are combined into a single unit called job.
- In batch Operating System, jobs with similar need batched together by Operator and run as a group on a Computer system.
- Memory management in batch System is very simple. Memory is usually divided into two areas namely, OS and user program area.
- With the use of this type of OS, the user no longer has direct access to the machine, rather the user submits the job on Cards.
- To understand how work let Scheme we see two points of view i.e. the monitor point of view & of the processor point of view.

1] Monitor Point of View :-

- It is the monitor that controls the sequence of events, much of the monitor must always be in Main memory & available for execution.
- The boundary monitor reads in jobs one at a time from Input device. As it is read it is read in the current job is placed in the User program area, & Control is passed to the job. User program area, & Control is passed to the job.
- When the job is completed, it returns control to the monitor, which immediately reads in the next job. The result of each job are sent to output devices, such as a printer for delivery to the user.

2] Processor Point of View :-

- The processor is executing instructions from the portion of main memory. This instruction causes the next job to be read into another portion of main memory.

* Advantages :-

- 1] Increased performance Since it was possible for job to start as soon as the previous job finished.
- 2] In batch os huge amount of a data can be processed efficiently.
- 3] It reduces idle time of a Computer because operator intervention is not required in automatic job-to-job transition.
- 4] Multiple users could Share batch Systems.
- 5] Repeated Jobs are done fast.

* Disadvantages :-

- 1] CPU Remains idle for Long time.
- 2] Batch system was sometimes costly.
- 3] Difficult to debug program.
- 4] Due to lack of protection scheme, one batch job can affect pending jobs.
- 5] No interaction is possible with the program is being execution.

* Spooling :-

- Spooling stands for simultaneous peripheral operation on line. Programs and data are punched on cards and cards being read from the card reader directly into memory.
- When job is executed, the OS satisfies its requests for card reader input by reading from the disk.
- Similarly when job requests the printer to output a line that line is copied into a system buffer and is written to the disk. When the job is completed, the output is actually printed. This form of processing is called as Spooling.
- Spooling uses a disk as a huge buffer, for reading as far ahead as possible on input devices and for storing output files until the output devices are able to accept them.
- Spooling is useful because buffer provides a waiting station where data can rest while the slower device catches up.
- Spooling also lets we place a number of print jobs on a queue instead of waiting for each one to finish before specifying

the next one.

- The CPU sends the data via communication paths to remote printer. The remote processing is done at its own speed, with no CPU intervention. The CPU just needs to be notified when the processing is completed, so that it can spool the next batch of data.

* Advantages of Spooling :-

- I] The Spooling Operation uses a disk as a very large buffer.

* Disadvantage of Spooling :-

- I] There is an extra overhead of maintaining table of card images.

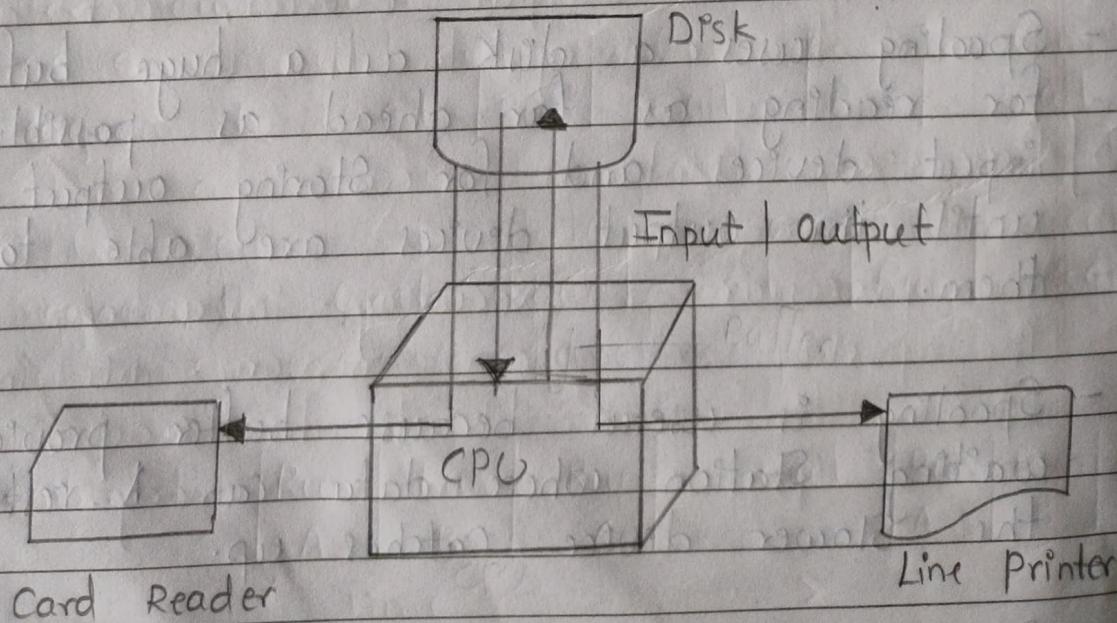
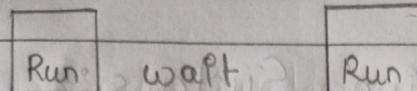


fig. i Spooling

* Multiprogramming Systems :-

- The execution of multiple job in an interleaved manner is known as multiprogramming. Multiprogramming is a technique to execute number of programs simultaneously by a single processor.
- Multiprogramming increases CPU utilization by organizing jobs such the CPU always has one to execute. In multiprogrammed systems the Operation Systems keeps several jobs in memory at a time.
- The Operating System picks & begins to execute one of the jobs in the memory. Eventually the job may have to wait for some task, such as a tape is mounted, or an input / output operation to complete.
- In a non-multiprogramming system, the CPU would sit idle. In a multiprogramming system the Operating System simply switches to & executes another job.
- When that job needs to wait, the CPU is switched to another job and so on. Eventually the first job finishes waiting & gets the CPU back. As long as there is always some job to execute, the CPU will never be idle.

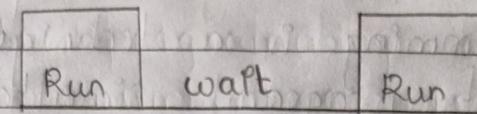
Program A



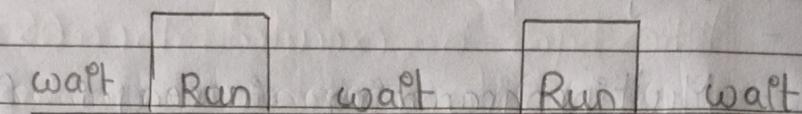
Time →

a) Uniprogramming

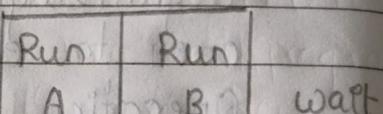
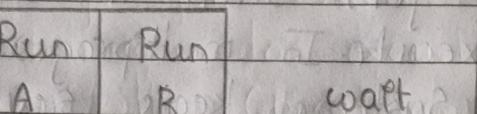
Program A



Program B



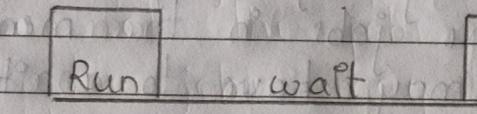
Combined



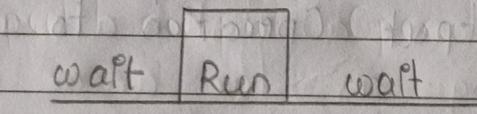
Time →

b) Multiprogramming with Two Programs

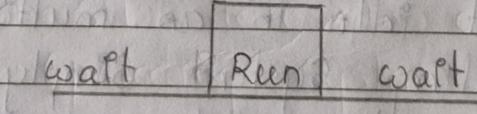
Program A



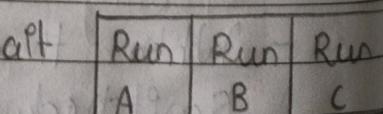
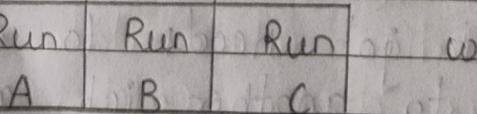
Program B



Program C



Combined



Time →

c) Multiprogramming with Three Programs

fig. Multiprogramming Systems

* Advantages of Multiprogramming Systems:

- 1] CPU utilization is maximum.
- 2] Short time jobs get executed faster.
- 3] Resources are used efficiently.
- 4] Response time is shorter.
- 5] Multiprogramming executes number of programs simultaneously by a single processor.

* Disadvantages

- 1] Multiprogramming Systems requires CPU Scheduling.
- 2] Maintenance is expensive in multiprogramming.
- 3] Due to high load of tasks, long time jobs have to wait long.
- 4] In multiprogr

* Multitasking Operating Systems.

- Task means a process. A process means a program in execution. A CPU handling multiple tasks at a time is known as multitasking. A multitasking OS can handle multiple task together by applying multiprogramming techniques.
- An instance of a program in execution is called a process or task. Multitasking OS supports two or more active process simultaneously.
- A multi-process Operating System is also called multitasking OS. Multitasking is the ability to support two or more active process simultaneously.
- In multitasking, only one CPU is involved, but it switches from one program to another so quickly that it gives the appearance of executing all the programs at the same time.
- Multitasking is, on single-processor machines, implemented by letting the running process own the CPU for a while and when required gets replaced with another process, which then owns the CPU.
- Two most common methods for sharing the CPU time is either cooperative multitasking or preemptive multitasking.

i) Cooperative Multitasking :

The simplest form of multitasking is Cooperative multitasking. It lets the program decide when they wish to let other tasks run. This method is not good since it lets other processes run.

ii) Preemptive Multitasking :- Preemptive multitasking moves the control of the CPU to the OS, letting each process run for a given amount of time (a time slice) & the switching to another task. This method prevents one process from taking complete control of the system.

- The user gives instruction to the OS or to a program directly, & receives an immediate response.

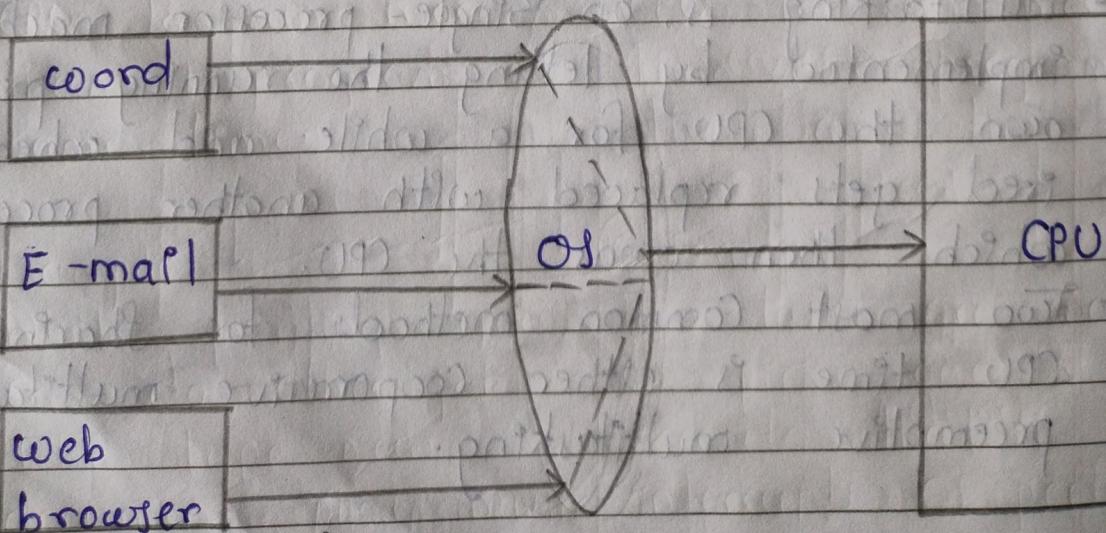


fig. Multitasking Process

* Advantages of Multitasking :-

- Multitasking helps in increasing the overall productivity of the user by performing a number of tasks at the same time.
- It helps in increasing the overall performance of the Computer System.

* Disadvantages of Multitasking :-

- It requires more system resources. For ex, large amount of memory is required to execute several programs at the same time.
- To performing multiple tasks at a single time in multitasking, the CPU speed must be very high.

* Multiprogramming vs Multitasking of

Multiprogramming of

Multitasking of

- | | |
|--|--|
| ① CPU is not allocated to process for fix time. | ① Time Quantum Concept is used for CPU allocation |
| ② Process leaves the CPU at RTI call. | ② OS takes CPU from processes when time quantum elapsed. |
| ③ Can't be simultaneously. others programs because while CPU processing. | ③ We can do other task during CPU processing |

Multiprogramming or

④ Can be used on some slow CPU processing speed.

⑤ Can be used on low memory.

⑥ Less used in PC.

⑦ Less switching overhead.

⑧ Multiprogramming is the capacity to run or handle overall programs at the same time.

⑨ It is not possible for CPU to run more than 1 program at same time.

⑩ Example :-
While printing you can do other jobs like type new document play music etc.

Multitasking or

④ Difficult to use slow speed CPU.

⑤ Big size memory is required.

⑥ High used in PC.

⑦ High switching overhead.

⑧ Multitasking is ability of computer to handle tasks simultaneously, i.e. run for a time quantum.

⑨ It is possible for CPU to run more than one program at the same time.

⑩ Example :-
Two tasks are waiting or picks one & executes that if it interrupts or performs second.

* Distributed Systems :-

- A distributed System Consists of a collection of autonomous computers, connected through a network & distribution middleware, which enables computers to coordinate their activities and to share the resources of the system.
- In multiprocessor System the processors do not share memory or a clock ; instead each processor has its own local memory. In such systems, if one machine or site fails the remaining sites can continue operation. So these types of systems are the reliable systems.
- The processors communicate with one another through various communications lines, such as a high speed buses or telephone lines.
- The middleware enables computers to coordinate their activities & to share the resources of the system , so that users perceive the system as a single , integrated computing facility.
- Thus, middleware is the bridge that connects distributed applications across dissimilar physical locations , with similar hardware platforms , dis

network technologies, operating systems, and programming languages.

- The middleware software is being developed following agreed standards and protocols. It provides standard services such as naming, persistence, concurrency control to ensure that accurate results for concurrent processes are produced and obtains the results as fast as possible.
- The nodes in the system communicate by passing message over the communication network. Communication protocols are used for sending messages from one node to another.

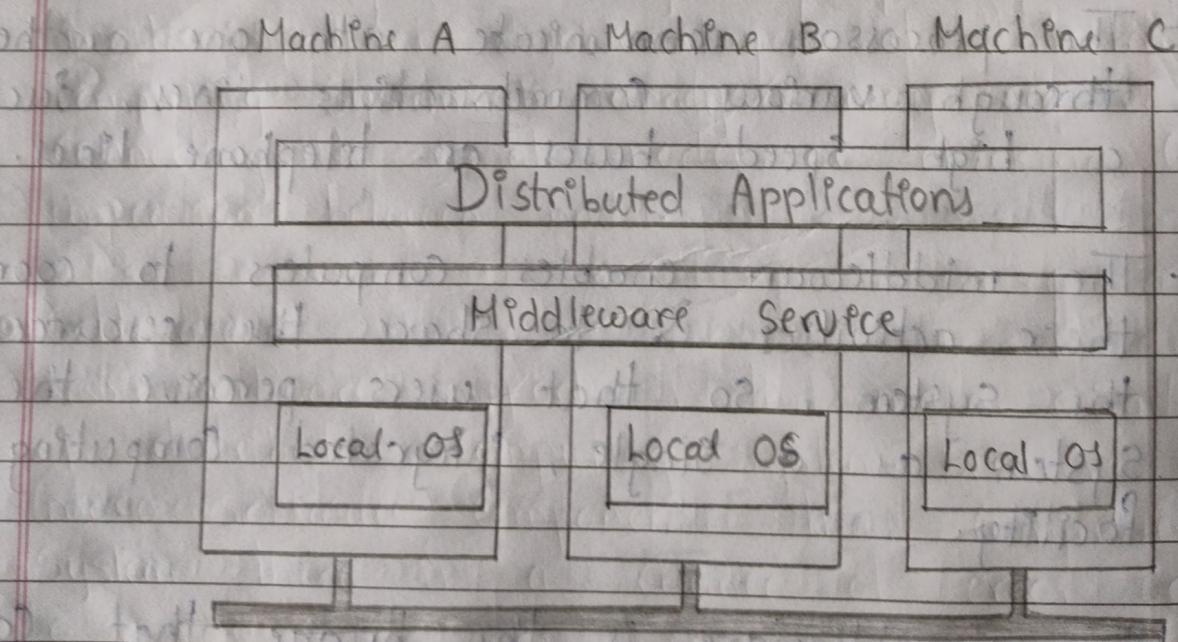


Fig. Distributed Systems

* Advantages of distributed Systems :-

1] Reliability :-

The important advantage of distributed computing System is reliability. It is more reliable than a single system. If one machine from system crashes, the rest of the computers remain unaffected and the system can survive as a whole.

2] Incremental Growth :-

In distributed computing the computer power can be added in small increments i.e. new machines can be added incrementally as per requirements on processing power grow.

3] Sharing Resources :-

Shared data is required to many applications such as banking, reservation system and Computer-Supported Cooperative work. As data or resources are shared in distributed system, it is essential for various applications.

4] Flexibility :-

As the system is very flexible, it is very easy to install, implement and debug new services. Each service is equally accessible to every client remote or local.

5] Open System :-

As it is open System, it can communicate with other Systems at any time. Because of an Open System it has an advantage over self-contained System as well as closed System.

6] Performance :-

It is yet another advantage of distributed Computing System. The collection of processors in the System can provide higher performance than a Centralized Computer.

* Disadvantages of Distributed Systems :-

1] Troubleshooting :-

Troubleshooting and diagnosing problems are the most important disadvantages of distributed Computing System. The analysis may require connecting to remote nodes or checking communication between nodes.

2] Software :-

Lack of Software Support is the main disadvantage of distributed Computing System. Because of more Software Components that comprise a System there is a chance of error occurring.

3] Networking :-

The underlying network in distributed Computer System can cause several problems such as transmission problem, overloading, loss of messages. Hence, the problems created by network infrastructure are the disadvantage of distributed computing.

4] Security :-

The easy distributed Access in distributed Computer System which increases the risk of Security. The Sharing of data creates the problem of data Security. More Susceptible to external attack.

5] Complexity :-

Typically, distributed Systems are more complex than centralized Systems.

6] Manageability :-

More effort required for System Management.

(UT)

* Real Time System :-

- Real time operating System is used in an environment where a large number of events, mostly external to Computer System must be accepted & processed in a short time or within stipulated deadline.
- A real time System is defined as, "a System in which the Correctness of Computations depends not only on logical Correctness of Computation but also on the time at which the result is produced so we can say that it has strict time constraints.
- The key is the execution sufficiently quickly. This is what is called a Response Time. A Real time System usually has a response time measured in seconds or even millisecond.
- The real time System finds many applications such as military, industry and medicine. A real time System has well defined fixed time Constraints.

* Characteristics of the Real time Systems:

- 1) To provide quick event response time.
- 2) User convenience and resource utilization are of secondary concern to Real time System designers.

- 3) The processor is normally allocated to the highest priority processes.
- 4) File management is usually found only in larger installation of real time Systems.

* Types of Real Time OS :-

a) Hard Real Time Systems :-

- Hard real-time Systems guarantee that critical tasks complete on Time.
- In hard real-time Systems, 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 System :-

- Soft real-time Systems are less restrictive.
- A critical real-time task gets priority over other task and retains the priority until it completes.
- Soft real-time System for ex, multimedia, industrial control of robotics, virtual reality, etc.

Saturday Test Topic

Q.1. Real time OS.

Q.2. Multiprocessor OS.

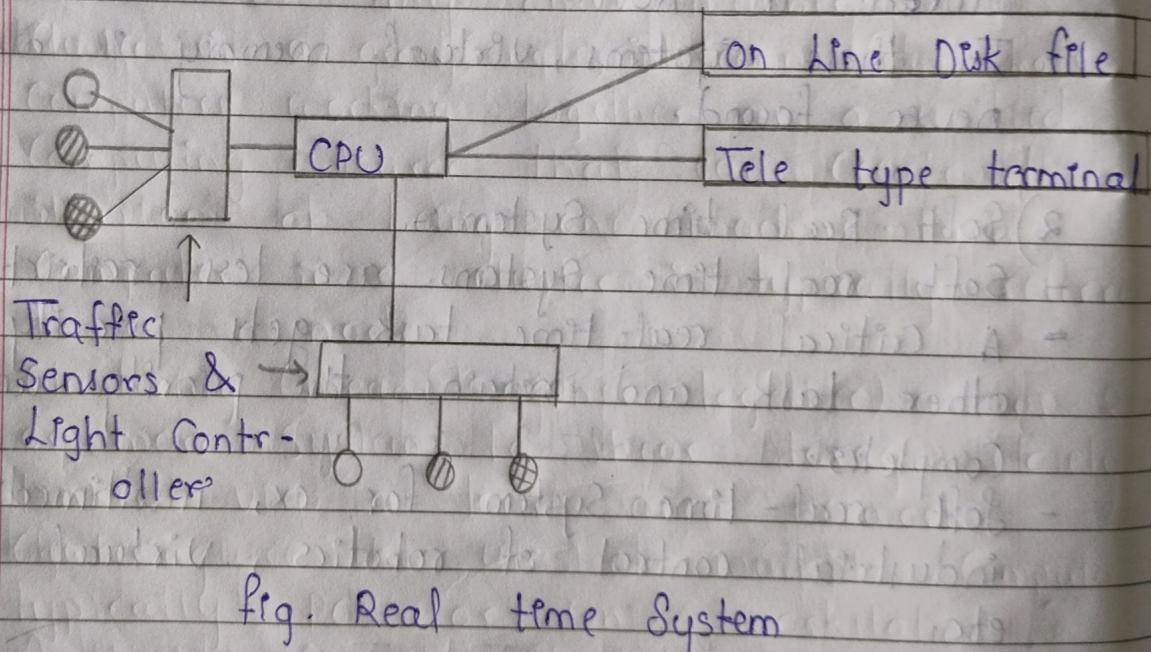
Q.3. Distributed OS.

Q.4. Difference between CLI & GUI.

Q.5. Short note on Unix & Components of Computer System.

* Applications of Real Time Systems :-

- 1) Nuclear Power Plant Control.
- 2) Medical Imaging System.
- 3) Industrial Control Systems.
- 4) Weapon System.
- 5) Robot.
- 6) Air Traffic Control Systems.
- 7) Space Navigation.
- 8) Flight Control Systems.
- 9) Military Application.



* Advantages :-

- 1] Useful for real time practical industrial applications.
- 2] As user gets a higher degree of Control the flexibility in setting up the priority of process is greater.
- 3] fast response , the System is immediately updated.

* Disadvantages :-

- 1] They are very Complex and expensive , there by difficult to maintain.
- 2] Needs good degree of hardware support for responding to external interrupt as fast as possible.
- 3] It is more difficult to backup these Systems when they are in use.

* Clustered System:-

- Clustered System is Composed of 2 or more individual computer System joined together.
- Share Common Storage and are closely linked through local area network.
- Individual Computers are called nodes.
- Most cases - Hardware Sharing
Some times - OS Sharing .
- A cluster is a collection of Computers in which any member of the cluster is Capable of Supporting the processing funcⁿs of any other member.
- Cluster is a group of interconnected , whole Computers working together as a unified Computing source that can create the illusion of being one machine . Each Computer in a cluster is typically referred to as a node.
- Clustering (means gather together) allows 2 or more System to Share Storage closely linked via a local area network.
- Clustering is the use of multiple computers, typically PCs or Unix workstations, multiple storage devices & redundant interconnections, to form a single highly available system.
- Cluster computer can be used for load balancing as well as for high availability.

- A cluster has a redundant $n+k$ configuration where n processing nodes are actively processing the application & k processing nodes are in a Standby state, serving as spares.
- In the event of a failure of a active node, the application that was running on the failed node is moved to one of the standby nodes.
- The simplest redundant configuration is active/Standby, in which one node is actively processing the application & the other node is in a Standby State.
- Other common cluster configurations include Simplex (one active node, no spare), $n+1$ active nodes (n active nodes, 1 spare), & n active nodes, the applications from the failed node are redistributed among the other active nodes using a pre-specified algorithm.
- Cluster operating system divide the tasks amongst the available servers. Clusters of systems or workstations, on the other hand, connect a group of system together to jointly share a critically demanding computational task.
- Theoretically, a cluster or should provide seamless optimization in every case. At the present time, cluster server & workstation systems are mostly used in high availability application & in scientific.

applications such as numerical Computations.

i) Asymmetric cluster (At least two Servers):
One is in a stand by mode while the other is monitoring the other one.
If one stops other will work.

ii) Symmetric cluster (All work with one):
They work together & monitor each other.

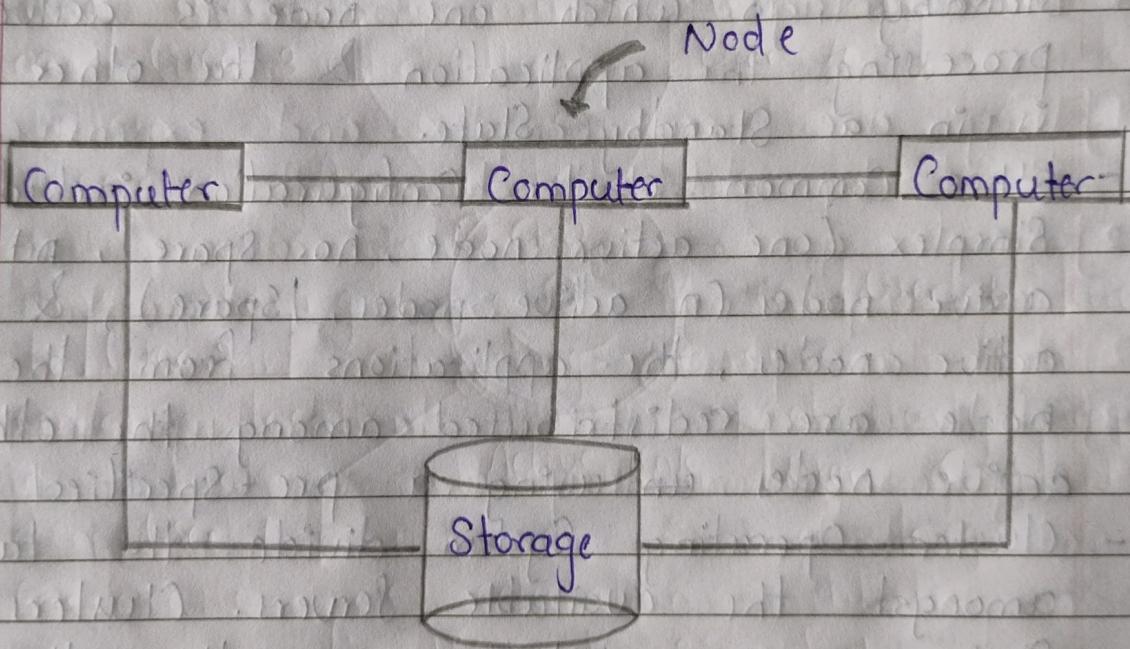


fig. Structure of Clustered System.

* Advantages of Clustered System :-

- 1) Automatic recovery from failure, thru user intervention.
- 2) High performance.
- 3) Large Capacity.

- 4) High availability.
- 5) Incremental growth.

* Time Sharing Systems :-

- The main idea of time sharing System is to allow a large number of users to interact with a single Computer Concurrently.
- A time Sharing System allows many users to share the Computer's resources simultaneously. In other words, time Sharing refers to the allocation of Computer resources in time slots to several programs simultaneously.
- In other words a time - Sharing System is basically a multiprogramming, multitasking and multi-users environment of a large Computer System.
- In time Sharing a small time slots are available for each user. This short period of time during that a user gets attention of the CPU.
- Those time slots may only a few microseconds. By using multiprogramming techniques, which quickly alternate between many users.

each receiving a small amount of time. It seems that each is given a constant attention by user.

- One of the first time-sharing OS to be developed was the Compatible Time Sharing System (CTSS). The system was first developed for the IBM 709 in 1961.

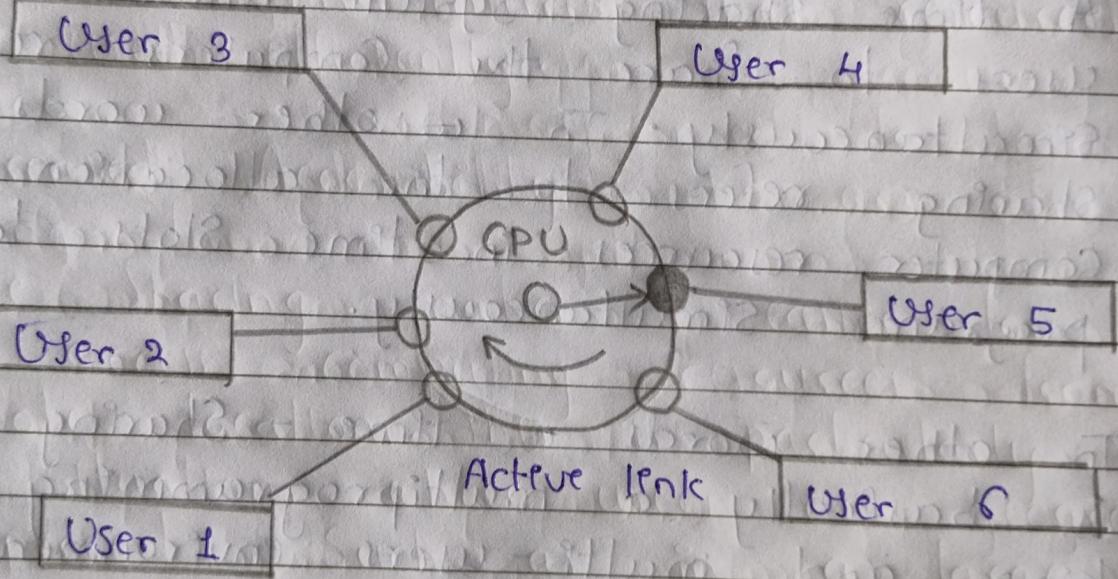


fig. Time Sharing System

- In the fig below, the user 5 is active but user 1, user 2, user 3 and user 4 are in waiting State whereas user 6 is in ready States.

- As soon as the time slice for user 5 is completed, the control moves to the next ready user. In this state user 2, user 3 & user 4 are in waiting state & user 1 is in ready state. The process continues in same way & so on.
- Example :-

The figure shows an example of Time Sharing System which allows many users to simultaneously share the computer resources.

* Advantages :-

1] Increased Efficiency :-

Time Sharing allows multiple users to access the same computer simultaneously, making it possible for them to complete tasks more efficiently.

2] Reduced Cost :-

Time Sharing can be a cost effective solution for businesses and organizations as it allows them to maximize the use of

their Computer resources. Rather than investing in multiple computers for each user they can share single computer with several users.

3] Improved Resource Utilization :-

With a time sharing of resources such as CPU time and memory are allocated dynamically, based on the needs of each user. This ensures that resources are used efficiently.

4] Increased Accessibility :-

Time sharing makes it easier for users to access computing resources from remote locations. This is particularly important in situations where users are geographically dispersed; such as in a large corporation or education institute.

5] Enhanced Collaboration :-

Time sharing can help to faster collaboration among users as it allows them to work together on the same project in real-time.

* Disadvantages :-

1] Slow Performance :-

When multiple users are logged into same system at once, the computer's resources have to be divided upto support each user's task.

This can lead to slower performance.

2] System Crashes :-

With so many users accessing the system at once, there is greater risk of system failures.

If one user's program encounters an error, it could cause the entire system to crash, affecting all the other users as well.

3] Security Issues :-

TSoS requires a lot of user authentication to ensure that only authorized users can access the system. However, they also create a security vulnerabilities.

4] Limited Resources :-

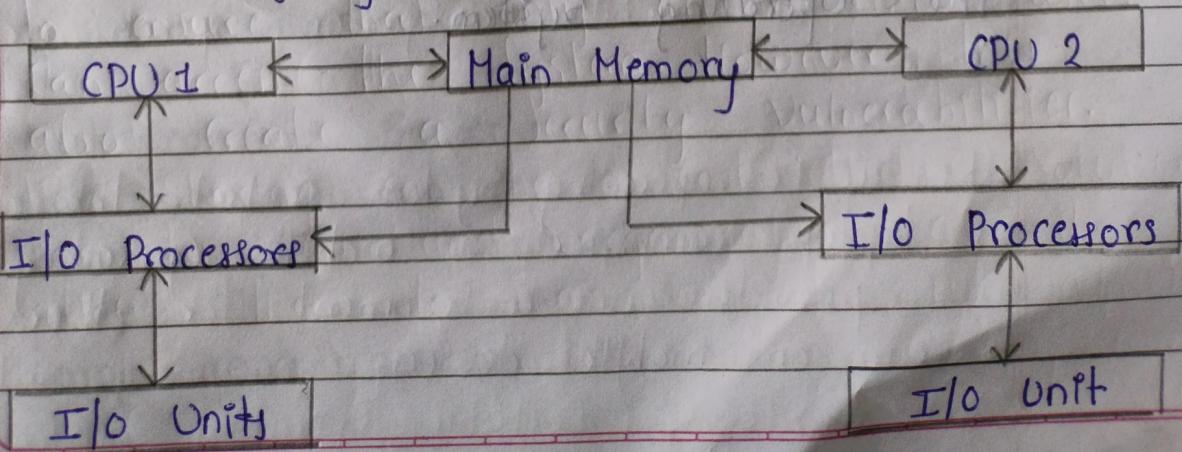
Because a TSOS needs to allocate resources to multiple users at once, there may be limitations on how much storage each user can access.

5] Learning Curve :-

Using a TSOS can be more complicated than using a single-user system. There are often more rules & procedures to follow, & users may need to learn how to work with others who are also using the same system.

* Multiprocessor Systems :-

- Multiprocessing is the use of two or more Central Processing Units (CPU) within a Single Computer System. The term multiprocessing also refers to the ability of a System to Support more than one processor and / or the ability to allocate tasks between them.
- Multiprogramming is more appropriate to describe the use of multiple software whereas multiprocessing is more appropriate to describe the use of multiple hardware (CPUs).
- A System can be both multiprocessing and multiprogramming, only one of the two, or neither of the two.
- Multiprocessor System (Parallel System) :
Most Systems to date are Single processor i.e. they have only one main CPU.
- Some Systems have more than one processor in close communication, Sharing the Computer bus, the clock and Sometimes memory and peripheral devices. These Systems are referred to as tightly Coupled Systems.



- These types of Systems are used when very high Speed is required to process a large Volume of data. These Systems are generally used in environment like Satellite Control, weather forecasting ,etc.
- The basic organization of multiprocessing System is Shown above.

* Types of Multiprocessor Systems :

1] Asymmetric Multiprocessing :-

In this System, a Specific task is assigned to each processor. The System has one master processor and others are Slave processors.

A master processor Controls the System and Slave processors follows the instructions of master or perform their predefined task.

2] Symmetric Multiprocessing :-

In Symmetric multiproccessing, there is no master slave concept used. All the processors are peer processors. They perform all tasks within the Operating System.

* Advantages of Multiprocessor Systems:-

- 1) It increased throughput by increasing the number of processors, more work done in a shorter period of time.
- 2) Multiprocessors can also save money (cost) compared to multiple single systems. Because the processors can share peripherals, cabinets and power supplies.
- 3) It increases reliability, if functions can be distributed properly among several processors, then the failure of one processor will not halt the system, but rather will only slow it down.
- 4) These systems provide higher performance due to parallel processing.

* Disadvantages of Multiprocessor Systems:-

- 1) If one processor fails then it will affect in the speed.
- 2) Multiprocessor systems are expensive.
- 3) Complex OS is required.
- 4) Large main memory required.

* Mobile Operating System :-

- A mobile Operating System is one that Controls Smartphones, Personal Digital Assistants (PDAs), tablet PCs, and information appliances.
- A mobile Operating System, also known as a OS, a mobile platform, or a handheld Operating System, is the Operating System that Controls a mobile device.
- Compared to the Standard general-purpose Operating Systems, mobile operating Systems are currently somewhat simpler, and focus on wireless versions of broadband and local connectivity, mobile multimedia formats, and different input methods.
- Modern mobile Operating Systems mix the features of PC Operating Systems and with many other features, such as touch screen, video camera, voice recorder, Bluetooth, Infrared, Wi-Fi, GPS mobile navigation, speech recognition etc.
- Like a PC operating System controls the desktop or laptop computer, a mobile Operating System also provides an environment for other programs to run on mobile devices.

- Some of the most popular mobile Operating Systems are given below:

1] Android :-

Android is a mobile operating System developed by Google.

2] Windows Mobile :-

It is a mobile operating System developed by Microsoft.

3] iOS :-

iOS (formerly iPhone OS) is a mobile operating System created and developed by Apple INC.

* Command Line Interface (CLI) Based OS :-

- In CLI the user interacts with the Operating System by typing Commands / instructions on a Command line.
- Various Commands needs to be typed for carrying out various jobs like creating, deleting, editing, renaming or printing a file.
- Usually in CLI each Command represents an executable program, which is run when the Command is typed with the proper parameters.

1] MS-DOS :-

- MS - DOS (Microsoft Disk Operating System) is a non - graphical Command Line Operating System created by IBM Compatible Computers.
- In DOS the Commands are executed by Comm. and - line interpreter by translating them into System calls.

2] Unix :-

- Unix was originally developed by a group of AT&T employees.
- It is a CLI based OS. The UNIX Shell is a Command - line interface, similar in some ways to the old DOS prompt on the PC platform.
- A Shell is a program that provides the Command Line Interface. It inputs Commands from the user, interprets them, and executes them. Using a Shell, user type a command, press enter, and the command is immediately executed.
- Typically a user access a computer through an application program's interface and the application logic communicates with Unix through an application programming interface such as POSIX (Portable Operating System)

Interface for Unix:-

- At times, however, it is necessary to communicate directly with the Operating System to perform such functions as launching a program. Unix line commands are processed by a command processor or shell that lies between user & the kernel.

FreeBSD manta bacon ~ 405 : ls

Bootcamp | assemble |

Connect -to -UWM WiFi - assemble. tar. bz2

XP. pdf

Desktop |

bin /

Documents |

Intro - Checklist. txt

FVCOM |

net

Facil |

netops

Fonts |

notes

Map |

scripts /

old - manta |

todo

Sculpin

wifi - Select *

Teach |

FreeBSD manta bacon ~ 406 : □

fig. Unix Shell

* Graphical User Interface (GUI) based OS:-

- GUI is an alternative and more user friendly method to interface with the Operating System. GUI provides a rectangular area of screen called window in which files, programs, directories and System functions are represented as small images or symbols called as icons.
- Such interface enables user to interact with Operating System by moving mouse to the position thru mouse cursor and clicking on some icon or menu option.
- A GUI provides a window & menu based graphical interface that can, be operated by using a pointing device like a mouse.
- The mouse can be used to point & click on command button pictures or icons to execute Commands, Open folders, or run programs. Thus user no longer have to remember commands to type and execute them.

* Advantages of GUI :-

- 1) GUIs are ease of use, operate & provides better accessibility.
- 2) User can switch quickly between tasks on the GUI interface.

- 3) GUI allows multiple programs and/or instances to be displayed simultaneously.
- 4) GUI is convenient and user friendly. It also improved efficiency due to getting faster results.

* Disadvantages of GUI :-

- 1) Difficulty of displaying all necessary controls because of limited window space.
- 2) Slow Speed because of long pointer operations.

- Examples :-

1] Windows :-

- Windows is a series of operating systems developed by Microsoft. Each version of windows includes a graphical user interface, with a desktop that allows user to view files and folders in windows.

2] Linux :-

- Linux is a Unix like operating system created by Linus Torvalds.

(C7)

* Differentiate between CLI & GUI

Q10) CLI (Command Line Interface)

1) It is a text-based interface used to interact with software and OS by typing commands into the interface and receiving a response in the same way.

2) A computer that is only using the Command line takes a lot less of the Computer's System resources than a GUI.

3) CLI is faster and difficult to use than GUI.

4) CLI consumes low memory.

5) In CLI Commands have to be typed in the Command line to execute them.

Q10) GUI (Graphical User Interface)

1) It is a visual-based interface which features the use of graphics, including Windows, Icons, and Menus.

2) A GUI requires more system resources because of elements that require loading, such as icons.

3) GUI is slower and easier to use than CLI.

4) GUI consumes high memory.

5) In GUI one can point and click on icons to execute commands. A mouse is the most common way to navigate through

CLI

6) Not much flexible.

7) In CLT, commands need to be remembered to be able to type and execute them.

8) Drag and drop features are usually absent. This makes the execution of certain commands lengthy or difficult.

9) CLI is less user friendly.

10) Examples :-
DOS, Unix, etc.

GUI

a GUI, although the keyboard is used sometimes.

6) GUI is more flexible.

7) Commands need not be remembered as they can be executed by simply clicking on icons.

8) Drag and drop features make certain command execution easier (like dragging a file from one folder to another to copy it).

9) GUI is more user friendly.

10) Examples :-
Windows, Linux, etc.