

Assignment 1 OS.

Q1. Explain types of OS.

- Operating system is an interface betⁿ computer & user which is responsible for management of and coordination of activities & sharing of the resources of computer.

* Types of OS

i) Batch OS :- It is type of OS that does not interact with computer directly. There is an operator which takes similar jobs having same requirement & group them into batches. It is responsibility of operator to sort jobs with similar needs.

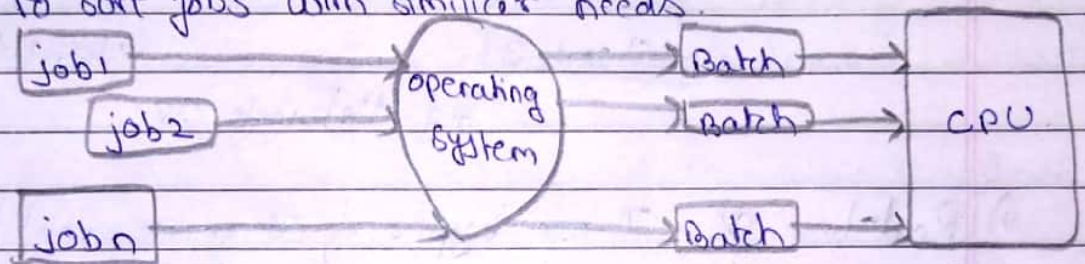


fig. Batch OS.

ii) Time sharing Operating system :- Each task is given some time to execute so that all the tasks work smoothly. Each user gets the time of CPU as they use a single system. These systems are also known as multitasking systems.

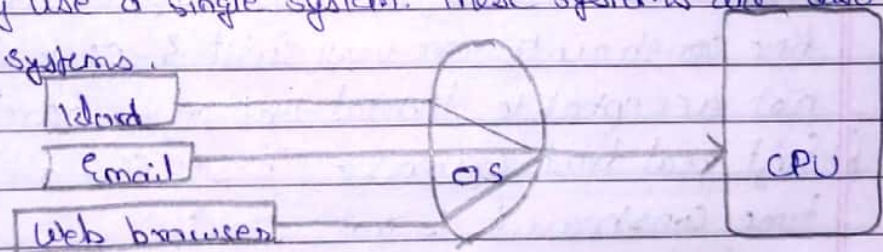


fig. Time sharing OS.

iii) Distributed OS :- Various autonomous interconnected computers can communicate with each other over shared network. It uses many central processors to serve multiple real-time application & users.

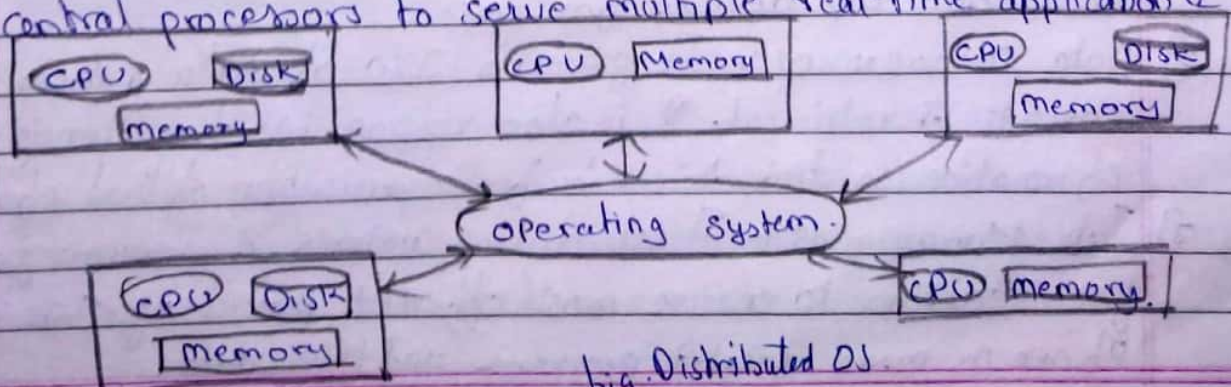


fig. Distributed OS.

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iv) Network OS :- These systems run on a server & provide capability to manage data, users, groups, security, applications & other networking functions. These OS allow shared access of files, printers, security applications & other networking functions over a small private net.

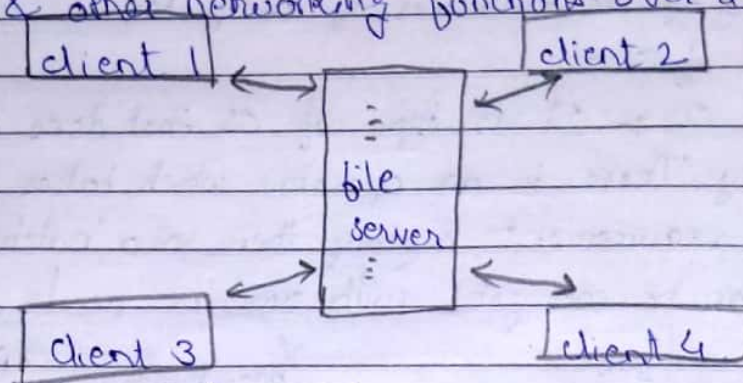


fig. Network OS

v) Real-time OS :- These types of OS serve real-time systems, where time interval required to respond inputs is very low. This time interval is called response time. They are used where time requirements are very strict like missile systems, air traffic control, etc.

- There are 2 types of real time OS.

a) Hard real time systems :- They are meant for applications where time constraints are very strict & even shortest possible delay is not acceptable. Virtual memory is rarely found in these systems.

b) Soft real time systems :- These OS are for applications where time constraint is not strict.

Q2. Describe functions of Operating Systems.

1] Resource management :- This funⁿ of an OS allocates computer resources such as CPU time, main memory, secondary storage, & i/p and o/p devices for use.

2] Data management :- It governs I/O of data & their location storage & retrieval. It is also responsible for storing & retrieving information on disk drives & for organisation of that info. on drive.

3] Job Management :- It schedules, controls, & monitors jobs submitted for execution to ensure most efficient processing. Job is collection of one or more related programs and their data.

4) Standard means of Commⁿ betⁿ user & computer: OS establishes standard means of commⁿ betⁿ users & their computer systems. It does this by providing a user interface & a standard set of commands that control the hardware.

5) Error detecting aid: The OS constantly monitors system to detect errors & avoid the malfunctioning of a computer system.

6) Device management: OS manages device communication via their respective drivers. Keeps track of all devices connected to system, designate a program responsible for every device, decides which process gets access to a certain device & for how long.

Q3. Explain structure of an OS: Layered, Monolithic, Microkernel OS, system calls.

- i) Layered structure: One way to achieve modularity in the OS is layered approach. In this bottom layer is the hardware & topmost layer is user interface.

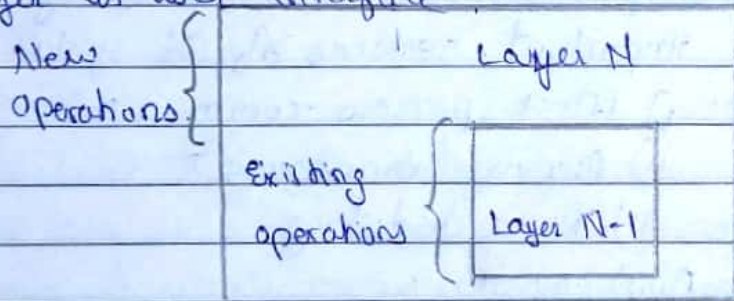


fig. layered structure of OS.

- Each layer is built on bottom layer. All layer hide some structures, operations from their upper layers.
- A problem with Layered structure is that each layer needs to be carefully defined so that upper layers can only use functionality of layers below them.

ii) Monolithic System architecture: Entire OS works in kernel space in monolithic system. This increases size of kernel as well as OS.

- This is different from Microkernel system where minimum SW that is required to correctly implement an OS is kept in the kernel.

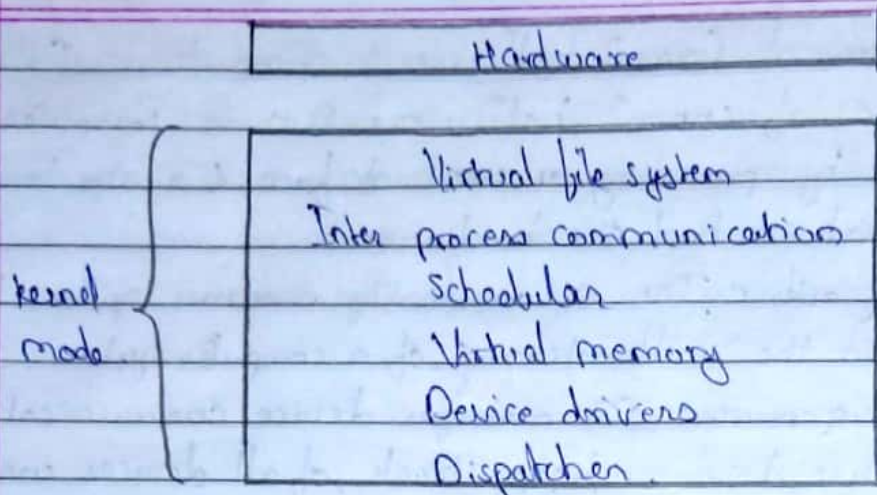


fig. Monolithic kernel OS.

- iii) Microkernel OS: kernel is meant for handling most important services only, thus in Architecture, only most imp services are inside the kernel & rest of OS services are present outside system application program. Microkernel is solely responsible for the most important services of OS system they are as follows:-
- i) inter process - communication
 - ii) Memory management
 - iii) CPU - scheduling

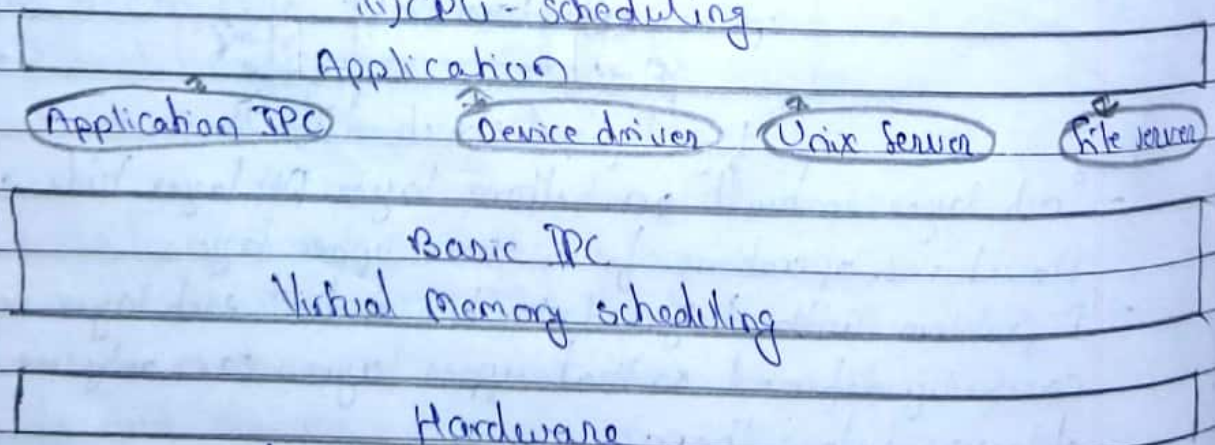


fig. Microkernel OS.

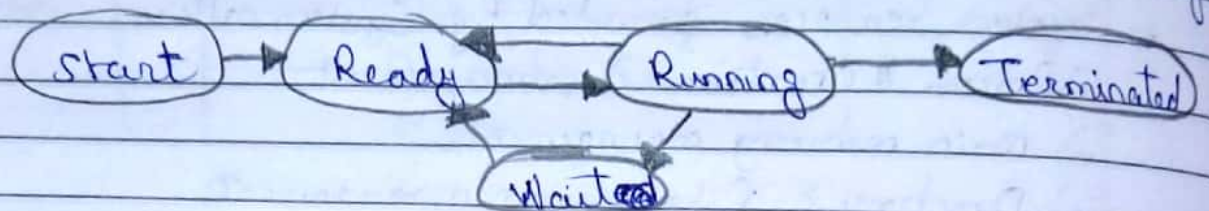
- iv) System Calls: A system call is a way for programs to interact with the OS. Computer program makes system call when it makes a request to the operating system.

- System call provides services of OS to user programs via APIs.
- It provides interface betⁿ processes to request services of OS & OS to allow user-level processes to request services of OS. They are only entry points into the kernel system.
- ~~System~~ Services provided by System calls:-
 - i) Process Creation & management
 - ii) Main memory management
 - iii) Directory & File system management
 - iv) Device handling (I/O)
 - v) Protection & Networking, etc.
- Types of system calls:- There are 5 diff. types of system calls.
 - i) Process control
 - ii) File management
 - iii) Device management
 - iv) Information maintenance
 - v) Communication.

Q4. Describe different states of process.

- Process is defined as an entity which represents basic unit of work to be implemented in system. A process is basically program in execution.
- When process executes, it passes through diff. states:-
 - i) Start:- This is initial state when the process is first created / started.
 - ii) Ready:- Ready processes are waiting to have the processor allocated to them by the OS so that they can run. Process may come to this state after start or while running it by but interrupted by scheduler to assign (PU) to some other process.
 - iii) Running:- Once the process has been assigned to processor by OS scheduler, the process state is set to running & processor executes its instructions.

- ii) Waiting :- Process moves in Waiting state if it needs to wait for a user input, or waiting for a file to become available.
- v) Terminated or Exit :- Once process finishes its execution or it is terminated by the OS, it is moved to the terminated state where it waits to be removed from main memory.



big. process life cycle.

Q5. ~~Describe~~ Explain Types of Threads.

- A thread is a flow of execution through the process code, with its own program counter, system registers & stack.
- There are two types of threads.

i) User level thread (ULT)

- They are faster to create & manage.
- ULT implements in user level libraries.
- Kernel knows nothing about ULT & manages them as if they were single-threaded process.
- ULT is generic and can run on any OS.
- Multi threading cannot take advantages of multiprocessing.

Advantages of ~~the~~ ULT

- Don't require modification to OS.
- Easy to represent & manage.
- ULT can run on any OS.
- They are fast & efficient.

Disadvantages of ULT

- Lack of coordination b/w threads & OS kernel.
- ULT require non-blocking system call (i.e. ~~Multi~~ Multithreaded kernel).