Q1 WHAT IS TLB ? ...

Ans:

A translation lookaside buffer (TLB) is a memory cache that stores recent translations of virtual memory to physical addresses for faster retrieval.

When a virtual memory address is referenced by a program, the search starts in the CPU. First, instruction caches are checked. If the required memory is not in these very fast caches, the system has to look up the memory's physical address. At this point, TLB is checked for a quick reference to the location in physical memory.

Q2 Define access time

Ans :

It is the time interval between the instant at which an instruction control unit initiates a call for data or a request to store data, and the instant at which delivery of the data is completed or the storage is started.

Computer **access time** is commonly measured in nanoseconds or milliseconds and the lower the time the, better or faster the computer should perform.

For example, the read/write head is on track 1 but we need to read data from another track or segment. Thus, the read/write head will move to the data block location before the actual transfer can take place.

Q3 : What is time sharing OS?

Ans :

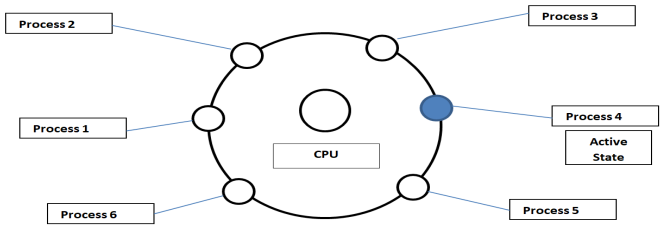
Time-sharing enables many people, located at various terminals, to use a particular computer system at the same time
Time-Sharing Systems is a logical extension of multiprogramming. Processor's time is shared among multiple users simultaneously is termed as time-sharing.

Advantages of Timesharing operating systems are −

- It provides the advantage of quick response.
- This type of operating system avoids duplication of software.
- It reduces CPU idle time.

Disadvantages of Time-Sharing operating systems are −

- Time sharing has problem of reliability.
- Question of security and integrity of user programs and data can be raised.
- Problem of data communication occurs.



Q4: What is worm?

Ans:

It refers to a malicious program that replicates itself, automatically spreading through a network. In this definition of computer worms, the worm virus exploits vulnerabilities in your security software to steal sensitive information, install backdoors that can be used to access the system, corrupt files, and do other kinds of harm.

Worms consume large volumes of memory, as well as bandwidth. This results in servers, individual systems, and networks getting overloaded and malfunctioning. A worm is different from a virus, however, because a worm can operate on its own while a virus needs a host computer.

Classifications and Names of Worms

Email-Worm

An email-worm refers to a worm that is able to copy itself and spread through files attached to email messages.

IM-Worm

An Instant Messenger (IM) worm is a kind of worm that can spread through IM networks.

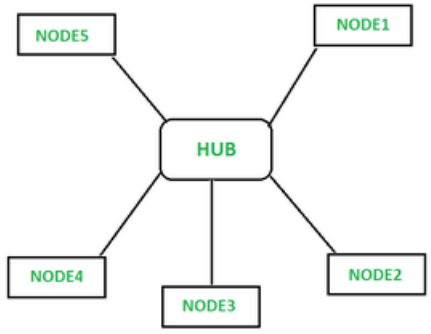
Net-Worm

A net-worm refers to a kind of worm that can find new hosts by using shares made over a network.

Q5: What are advantages of star topology?

Ans:

A star may be a topology for a Local Area Network (LAN) during which all nodes are individually connected to a central connection point, sort of a hub or a switch.



Advantages of Star Topology

- It is very reliable – if one cable or device fails then all the others will still work
- It is high-performing as no data collisions can occur
- Less expensive because each device only need one I/O port and wishes to be connected with hub with one link.
- Easier to put in
- Robust in nature
- Easy fault detection because the link are often easily identified.
- No disruptions to the network when connecting or removing devices.
- Each device requires just one port i.e. to attach to the hub.

Q6 : Given a total of 10 units of a resource type, and given the safe state shown below, should process P2 be granted a request of 2 additional resources?

Process	Used	Max
P1	2	5
P2	1	6
P3	2	6
P4	1	2
P5	1	4

Ans :

Date / 20

Applying Banker's algo

Process	Used	Max	Need
P1	2	5	3
P2	1	6	5
P3	2	6	4
P4	1	2	1
P5	1	4	3

Total resources Type = 10
Used = 2+1+2+1+1 = 7
Available = 3

(1) P1 is allocated
Now available resource = 3+2 = 5

(2) P2 is allocated
Now available resource = 5+1 = 6

(3) P3 allocated
available resource = 6+2 = 8

(4) P4 is allocate
available resource = 8+1 = 9

(5) P5 is allocate
Now available resource = 9+1 = 10

one of Safe sequence is

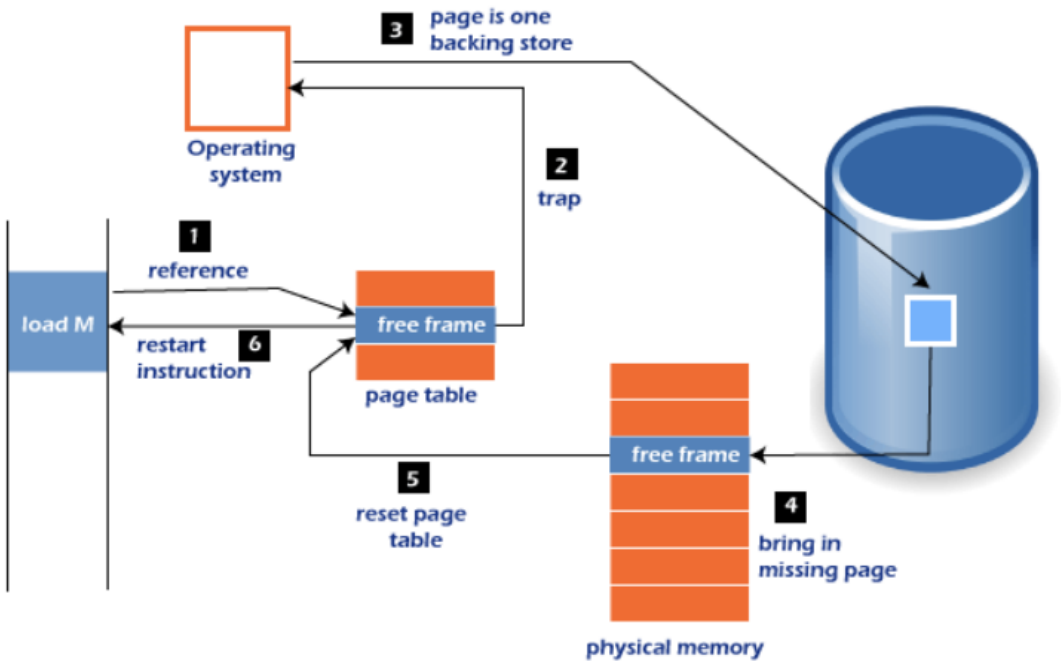
<P1 P2 P3 P4 P5>

and No P2 Shouldn't grant access else it will lead to deadlock

Q7 : What do you mean by page-fault? When does page-fault occur? Describe the action taken by the O.S when page fault occur

Ans :

Page faults dominate more like an **error**. A page fault will happen if a program tries to access a piece of memory that does not exist in physical memory (main memory). The fault specifies the operating system to trace all data into virtual memory management and then relocate it from secondary memory to its primary memory, such as a hard disk.



The Page fault process occurs in the background, and thus the user is unaware of it.

- The computer's hardware track to the kernel and the program counter is often saved on the stack. The CPU registers hold information about the current state of instruction.
- An assembly program is started, which saves the general registers and other volatile data to prevent the Operating system from destroying it.

Page Fault Handling

A Page Fault happens when you access a page that has been marked as invalid. The paging hardware would notice that the invalid bit is set while translating the address across the page table, which will cause an operating system trap. The trap is caused primarily by the OS's failure to load the needed page into memory.

let's understand the procedure of page fault handling in the OS:

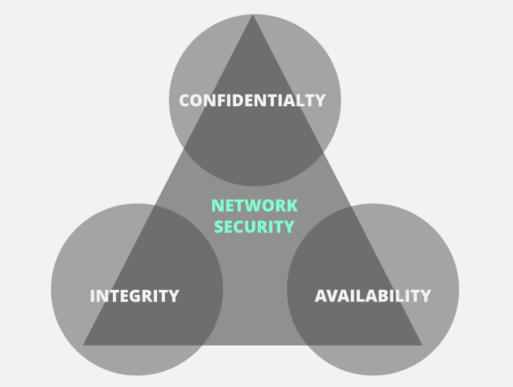
- Firstly, an internal table for this process to assess whether the reference was valid or invalid memory access.
- If the reference becomes invalid, the system process would be terminated. Otherwise, the page will be paged in.
- After that, the free-frame list finds the free frame in the system.
- Now, the disk operation would be scheduled to get the required page from the disk.
- When the I/O operation is completed, the process's page table will be updated with a new frame number, and the invalid bit will be changed. Now, it is a valid page reference.
- If any page fault is found, restart these steps from starting.

Q8 Explain CIA in detail

Ans :

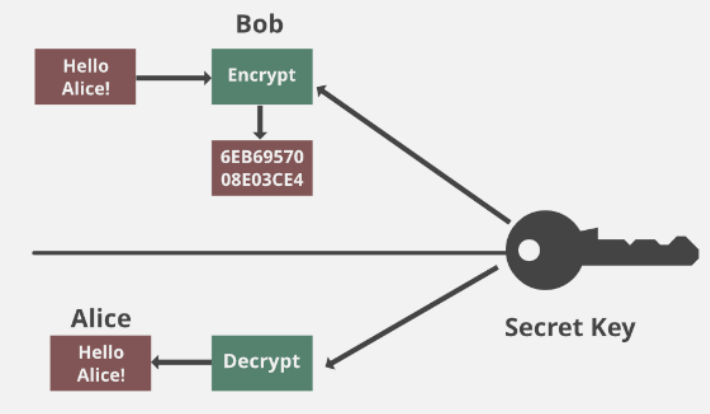
When talking about network security, the **CIA** triad is one of the most important models which is designed to guide policies for information security within an organization.
CIA stands for :

- ***Confidentiality***
- ***Integrity***
- ***Availability***



Confidentiality :

Confidentiality means that only authorized individuals/systems can view sensitive or classified information. The data being sent over the network should not be accessed by unauthorized individuals. The attacker may try to capture the data using different tools available on the Internet and gain access to your information.

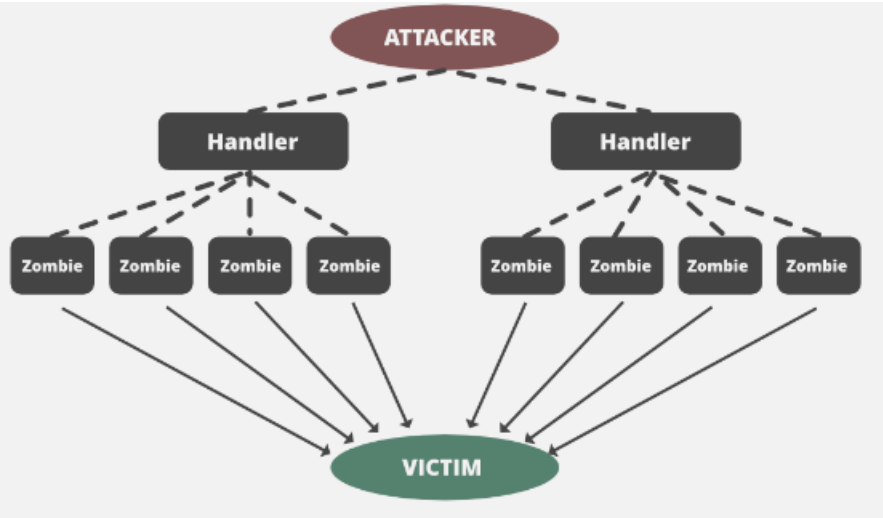


Integrity :

The next thing to talk about is integrity. Well, the idea here is to make sure that data has not been modified. Corruption of data is a failure to maintain data integrity. To check if our data has been modified or not, we make use of a hash function.

Availability :

This means that the network should be readily available to its users. This applies to systems and to data. To ensure availability, the network administrator should maintain hardware, make regular upgrades, have a plan for fail-over, and prevent bottlenecks in a network



Write a short note on

a) levels of security measures

b) difference between security and protection

Ans:

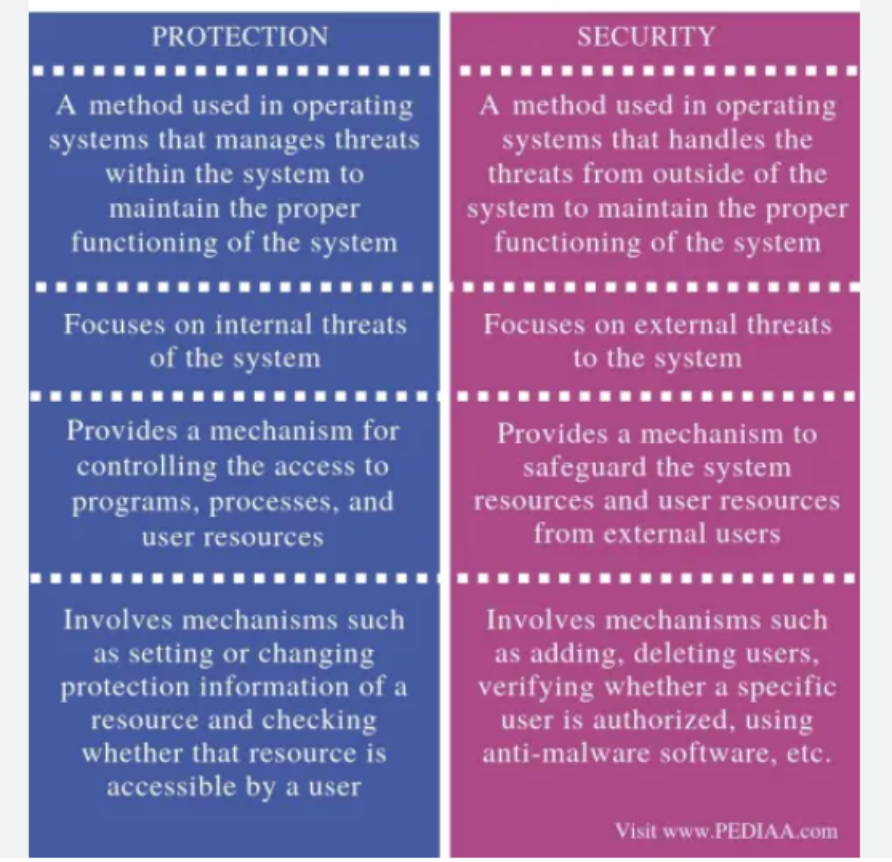
Security Measures Taken – To protect the system, Security measures can be taken at the following levels:

● **Physical:** The sites containing computer systems must be physically secured against armed and malicious intruders. The workstations must be carefully protected.

● **Human:** Only appropriate users must have the authorization to access the system. Phishing(collecting confidential information) and Dumpster Diving(collecting basic information so as to gain unauthorized access) must be avoided.

● **Operating system:** The system must protect itself from accidental or purposeful security breaches.

● **Networking System:** Almost all of the information is shared between different systems via a network. Intercepting these data could be just as harmful as breaking into a computer. Henceforth, Network should be properly secured against such attacks.



Qus 10 : What are the different type of operating systems in detail. Also describe advantages and disadvantages of each type?

Ans:

An **Operating System (OS)** is a software that acts as an interface between computer hardware components and the user. Every computer system must have at least one operating system to run other programs. Applications like Browsers, MS Office, Notepad Games, etc., need some environment to run and perform its tasks.

Types of Operating System (OS)

Batch Operating System

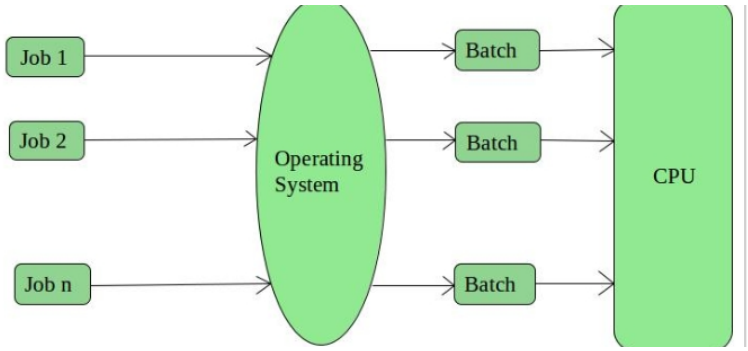
Multitasking/Time Sharing OS

Real Time OS

Distributed OS

Network OS

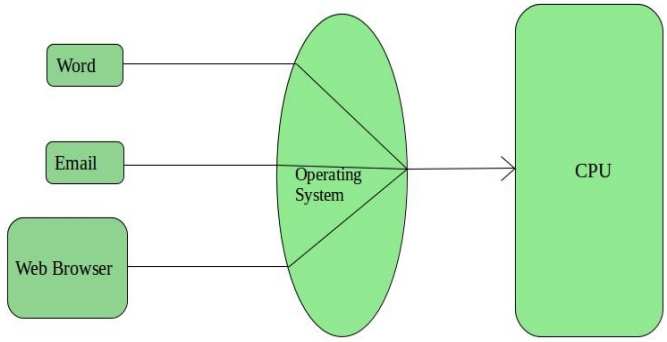
1. Batch Operating System –
This type of operating system does not interact with the computer directly. There is an operator which takes similar jobs having the same requirement and group them into batches. It is the responsibility of the operator to sort jobs with similar needs.



Advantages of Batch Operating System:
- Multiple users can share the batch systems
- The idle time for the batch system is very less
- It is easy to manage large work repeatedly in batch systems

Disadvantages of Batch Operating System:
- The computer operators should be well known with batch systems
- Batch systems are hard to debug
- It is sometimes costly

Time-Sharing Operating Systems –
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. The task can be from a single user or different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to the next task.



Advantages of Time-Sharing OS:

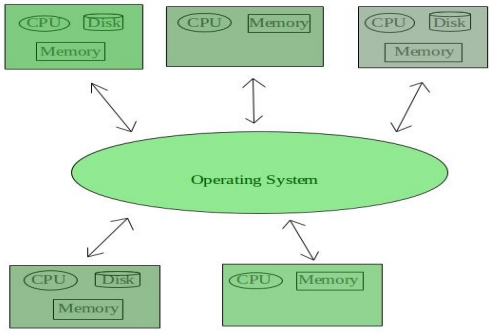
- Each task gets an equal opportunity
- Fewer chances of duplication of software
- CPU idle time can be reduced

Disadvantages of Time-Sharing OS:

- Reliability problem
- One must have to take care of the security and integrity of user programs and data
- Data communication problem

Distributed Operating System –

These types of the operating system is a recent advancement in the world of computer technology and are being widely accepted all over the world and, that too, with a great pace. Various autonomous interconnected computers communicate with each other using a shared communication network. Independent systems possess their own memory unit and CPU. These are referred to as **loosely coupled systems** or distributed systems.



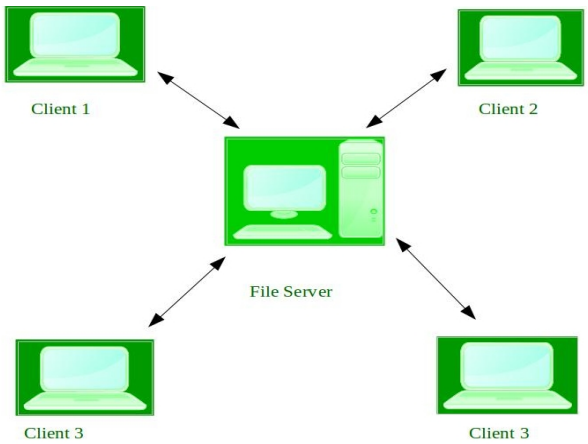
Advantages of Distributed Operating System:

- Failure of one will not affect the other network communication, as all systems are independent from each other
- Electronic mail increases the data exchange speed
- Load on host computer reduces
- Delay in data processing reduces

Disadvantages of Distributed Operating System:

- Failure of the main network will stop the entire communication
- To establish distributed systems the language which is used are not well defined yet
- These types of systems are not readily available as they are very expensive. Not only that the underlying software is highly complex and not understood well yet

Network Operating System –
These systems run on a server and provide the capability to manage data, users, groups, security, applications, and other networking functions. These types of operating systems allow shared access of files, printers, security, applications, and other networking functions over a small private network



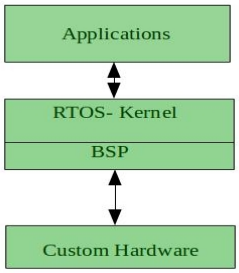
Advantages of Network Operating System:

- Highly stable centralized servers
- Security concerns are handled through servers
- New technologies and hardware up-gradation are easily integrated into the system
- Server access is possible remotely from different locations and types of systems

Disadvantages of Network Operating System:

- Servers are costly
- User has to depend on a central location for most operations
- Maintenance and updates are required regularly

Real-Time Operating System –
These types of OSs serve real-time systems. The time interval required to process and respond to inputs is very small. This time interval is called **response time**.
Real-time systems are used when there are time requirements that are very strict like missile systems, air traffic control systems, robots, etc.



Advantages of RTOS:

- **Maximum Consumption:** Maximum utilization of devices and system, thus more output from all the resources
- **Task Shifting:** The time assigned for shifting tasks in these systems are very less. For example, in older systems, it takes about 10 microseconds in shifting one task to another, and in the latest systems, it takes 3 microseconds.
- **Error Free:** These types of systems are error-free.
- **Memory Allocation:** Memory allocation is best managed in these types of systems.

Disadvantages of RTOS:

- **Limited Tasks:** Very few tasks run at the same time and their concentration is very less on few applications to avoid errors.
- **Use heavy system resources:** Sometimes the system resources are not so good and they are expensive as well.
- **Complex Algorithms:** The algorithms are very complex and difficult for the designer to write on.

Qus : Explain the concept of FRAGMENTATION in detail
Ans:

Fragmentation is an unwanted problem in the operating system in which the processes are loaded and unloaded from memory, and free memory space is fragmented. Processes can't be assigned to memory blocks due to their small size, and the memory blocks stay unused.
Contiguous memory allocation allocates space to processes whenever the processes enter **RAM**. These **RAM** spaces are divided either by fixed partitioning or by dynamic partitioning. As the process is loaded and unloaded from memory, these areas are fragmented into small pieces of memory that cannot be allocated to coming processes

Causes of Fragmentation

User processes are loaded and unloaded from the main memory, and processes are kept in memory blocks in the main memory. Many spaces remain after process loading and swapping that another process cannot load due to their size. Main memory is available, but its space is insufficient to load another process because of the dynamical allocation of main memory processes.

Types of Fragmentation

There are mainly two types of fragmentation in the operating system. These are as follows:

1st**Internal Fragmentation**

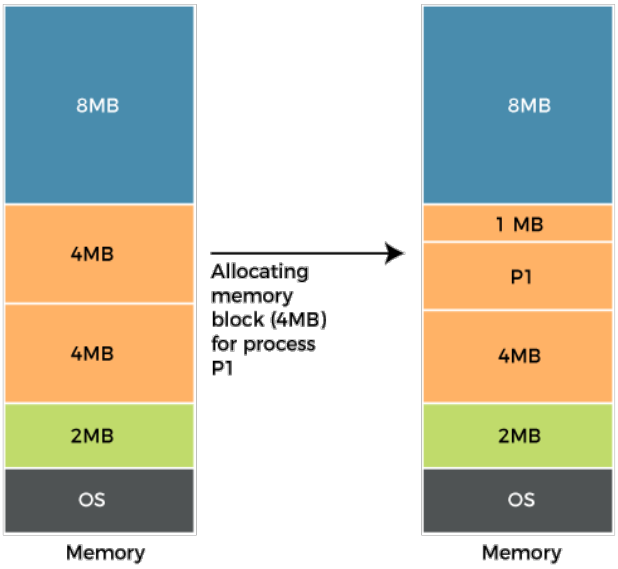
2nd**External Fragmentation**

Internal Fragmentation

When a process is allocated to a memory block, and if the process is smaller than the amount of memory requested, a free space is created in the given memory block. Due to this, the free space of the memory block is unused, which causes **internal** fragmentation.

For Example:

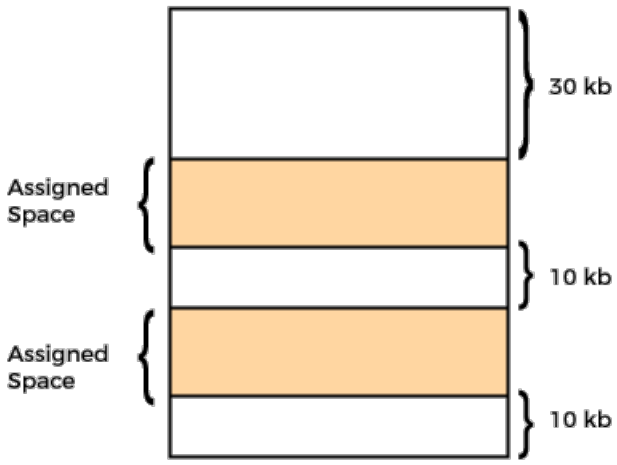
Assume that memory allocation in RAM is done using fixed partitioning (i.e., memory blocks of fixed sizes). **2MB, 4MB, 4MB**, and **8MB** are the available sizes. The Operating System uses a part of this RAM.



External Fragmentation

External fragmentation happens when a dynamic memory allocation method allocates some memory but leaves a small amount of memory unusable. The quantity of available memory is substantially reduced if there is too much external fragmentation. There is enough memory space to complete a request, but it is not contiguous. It's known as **external** fragmentation.

For Example:



Process 05 needs 45kb memory space

Advantages and disadvantages of fragmentation

There are various advantages and disadvantages of fragmentation. Some of them are as follows:

Advantages

There are various advantages of fragmentation. Some of them are as follows:

Fast Data Writes

Data write in a system that supports data fragmentation may be faster than reorganizing data storage to enable contiguous data writes.

Fewer Failures

If there is insufficient sequential space in a system that does not support fragmentation, the write will fail.

Storage Optimization

A fragmented system might potentially make better use of a storage device by utilizing every available storage block.

Disadvantages

Need for regular defragmentation

A more fragmented storage device's performance will degrade with time, necessitating the requirement for time-consuming defragmentation operations.

Slower Read Times

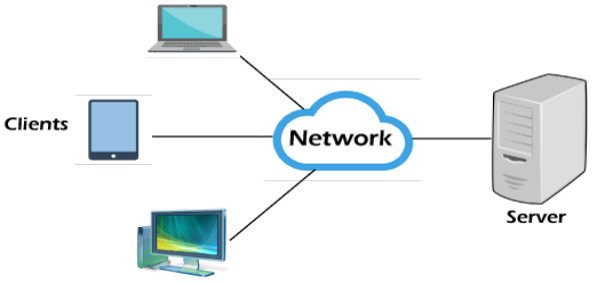
The time it takes to read a non-sequential file might increase as a storage device becomes more fragmented

Qus 12 :a) What is the difference between a client and a server?

b)Distinguish between client-server and peer to peer models of distributed system.

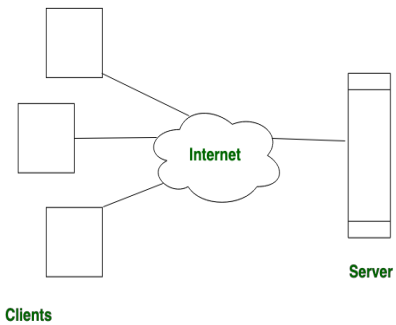
Ans: A)

Based on	Client	Server
Basic functionality	Client relies on the services of server, and generates requests for various services.	Server authorizes the client's requests and facilitates them with the requested services.
Configuration	The configuration of client systems is simple. Their tasks are limited to generating requests. It has a basic hardware configuration.	The configuration of the server is more complex and sophisticated. Server has advanced hardware configuration.
Efficiency	The efficiency of client is limited.	The performance of server is high, and they are highly efficient.
Tasks	The common tasks for client are simple and mostly include requesting services.	The complex tasks like fulfilling client requests, storing and processing large datasets, data analysis are common for server.
Switch off	The client systems can be switch off without any fear.	Switching off servers may be disastrous for client systems that continuously request the services.
Login Support	There can be single user logins.	Server support multiple user login and request processing simultaneously.
Examples	Examples of clients are smartphones, desktops, laptops, etc.	Examples of servers are web servers, file servers, database servers, etc.

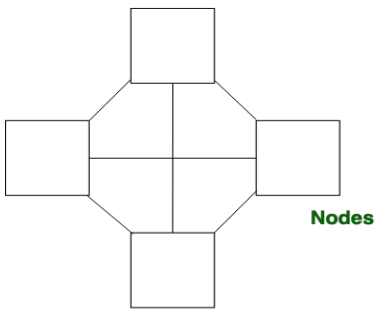


Difference between Client-Server and Peer-to-Peer Network:

S.NO	Client-Server Network	Peer-to-Peer Network
1.	In Client-Server Network, Clients and server are differentiated, Specific server and clients are present.	In Peer-to-Peer Network, Clients and server are not differentiated.
2.	Client-Server Network focuses on information sharing.	While Peer-to-Peer Network focuses on connectivity.
3.	In Client-Server Network, Centralized server is used to store the data.	While in Peer-to-Peer Network, Each peer has its own data.
4.	In Client-Server Network, Server respond the services which is request by Client.	While in Peer-to-Peer Network, Each and every node can do both request and respond for the services.
5.	Client-Server Network are costlier than Peer-to-Peer Network.	While Peer-to-Peer Network are less costlier than Client-Server Network.
6.	Client-Server Network are more stable than Peer-to-Peer Network.	While Peer-to-Peer Network are less stable if number of peer is increase.
7.	Client-Server Network is used for both small and large networks.	While Peer-to-Peer Network is generally suited for small networks with fewer than 10 computers.



Client-Server Network Model



Peer-to-Peer Network Model