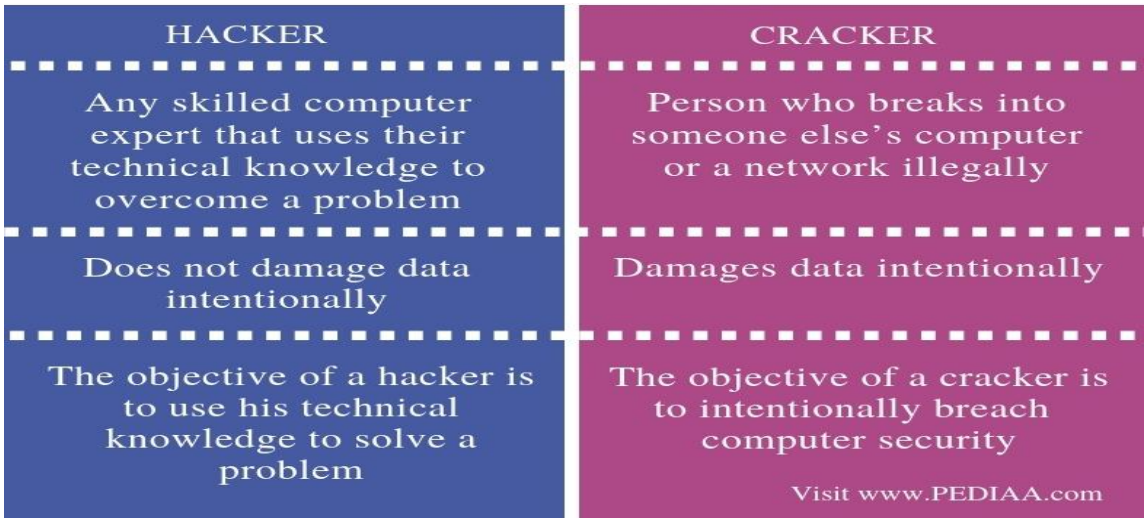
OS Solved Model Paper

Q1. What is Fork system call?
Ans. Fork system call is used for creating a new process, which is called child process, which runs concurrently with the process that makes the fork() call (parent process). After a new child process is created, both processes will execute the next instruction following the fork() system call.

Q2. What is a semaphore?
Ans. Semaphores refer to the integer variables that are primarily used to solve the critical section problem via combining two of the atomic procedures, wait and signal, for the process synchronization.

Q3. Distinguish between hacker and cracker?
Ans.



Q4. What is cypher text?
Ans. Cipher text is encrypted text transformed from plain text using an encryption algorithm. Cipher text can't be read until it has been converted into plain text (decrypted) with a key. The decryption cipher is an algorithm that transforms the cipher text back into plain text.

Q5. What is a peer to peer network?

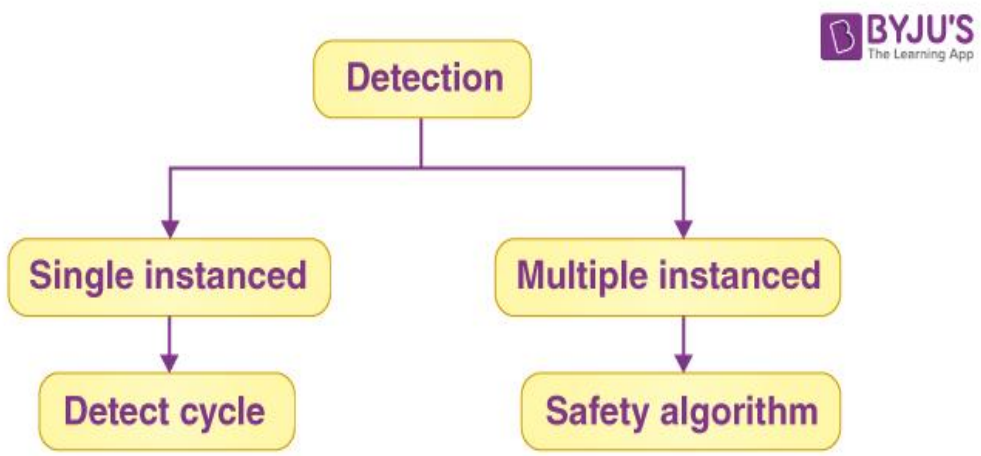
Ans. Peer-to-peer network operating systems allow users to share resources and files located on their computers and to access shared resources found on other computers. However, they do not have a file server or a centralized management source. In a peer-to-peer network, all computers are considered equal, they all have the same abilities to use the

resources available on the network. Peer-to-peer networks are designed primarily for small to medium local area networks. Nearly all modern desktop operating systems, such as Macintosh OSX, Linux, and Windows, can function as peer-to-peer network operating systems.

Q6. When does the deadlock occur? Explain deadlock detection and recovery in detail.

Ans. Deadlock occurs when a set of processes are in a wait state, because each process is waiting for a resource that is held by some other waiting process. Therefore, all deadlocks involve conflicting resource needs by two or more processes.

Deadlock detection:- The OS does not use any mechanisms to avoid or prevent deadlocks in this approach. As a result, the system predicts that the deadlock will occur. The OS periodically scans the system for any deadlocks in order to avoid them. If any deadlocks are discovered, the OS will attempt to restore the system using several ways.



Deadlock Recovery:- OS examines either resources or processes to recover the system from deadlocks.

For Resource

Preempt the resource:- We can take one of the resources from the resource owner (process) and give it to another process in the hopes that it will finish the execution and release the resource sooner. Choosing a resource that will be snatched will be challenging.

Rollback to a safe state:- To reach the deadlock state, the system happens to go through several states. The operating system has the ability to

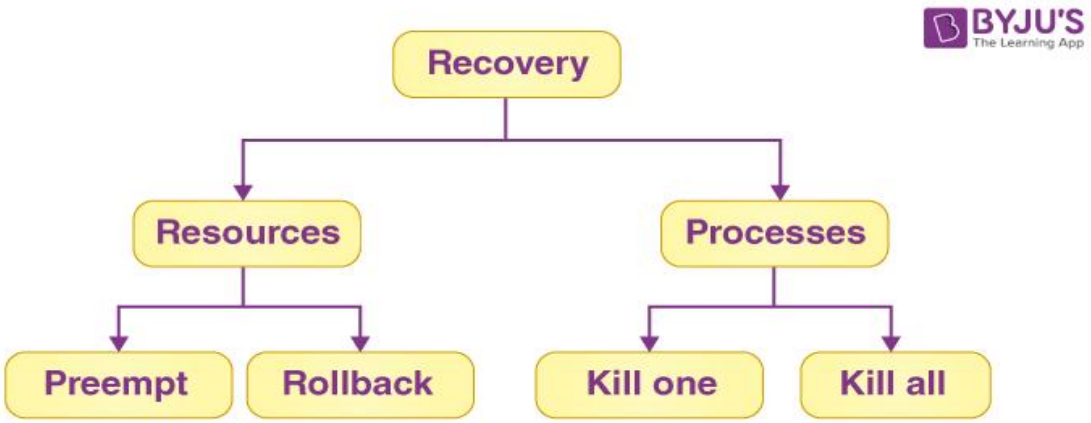
restore the system to a previous safe state. The OS must implement checkpointing at each state for this to work.

When we reach a deadlock, we must reverse all allocations and return to the prior safe state.

For Process

Kill a process:- Our problem can be solved by killing a process; however, the bigger issue is deciding which process to kill. A process that has done the least amount of work till now is usually killed by the operating system.

Kill all processes:- This is not a persuasive strategy, but it may be used if the problem becomes extremely serious. Killing all processes will result in system inefficiencies because all processes will have to start over.



Q7. What is critical section problem? Explain any one problem with solution.

Ans. The critical section problem is to make sure that only one process should be in a critical section at a time. When a process is in the critical section, no other processes are allowed to enter the critical section. This solves the race condition.

Progress:- Progress means that if a process is not using the critical section, then it should not stop any other process from accessing it. In other words, any process can enter a critical section if it is free.

Q8. Explain with the help of diagram functionality of client server network?

Ans. A client-server network is the medium through which clients access resources and services from a central computer, via either a local area network (LAN) or a wide-area network (WAN), such as the Internet.

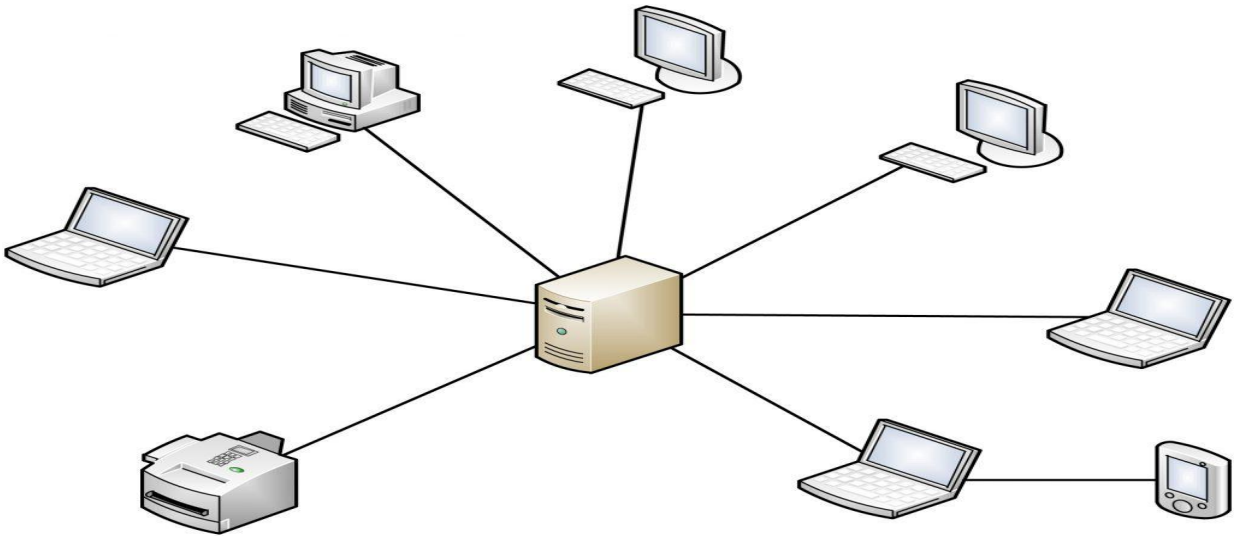


Diagram of Client Server Network

Q9. Elaborate the concept of system threat with the help of example.

Ans. System threat contains viruses, worms, trojan horses, and other dangerous software. These are generally short code snippets that may corrupt files, delete the data, replicate to propagate further, and even crash a system.

Q10. Which of the following scheduling algorithms could result in starvation? Explain in detail:-
a. First-come, first-served
b. Shortest job first
c. Round robin
d. Priority

Ans. Priority Scheduling:- It is a non pre-emptive Algorithm that works in batch systems and in this each process is given a priority and the process with highest priority is executed first and others are executed according to priorities which can lead to starvation for those processes.

a. First-come, first-served:- FCFS is the simplest of CPU Scheduling Algorithm which executes the process that comes first. It is a non-preemptive algorithm. The process that arrives first in the ready queue gets to be executed by the CPU first, then the second one, then the third one, and so on.

b. Shortest job first:- Shortest job first is a scheduling algorithm in which the process with the smallest execution time is selected for

execution next. Shortest job first can be either preemptive or non-preemptive. Owing to its simple nature, shortest job first is considered optimal.

c. Round robin:- Round Robin is a CPU scheduling algorithm where each process is assigned a fixed time slot in a cyclic way. It is basically the preemptive version of First come First Serve CPU Scheduling algorithm.

d. Priority:- Priority scheduling is a non-preemptive algorithm and one of the most common scheduling algorithms in batch systems. Each process is assigned first arrival time (less arrival time process first) if two processes have same arrival time, then compare to priorities (highest process first).

Q11. Explain the concept of virtual memory along with demand paging?

Ans.Virtual memory:- It is actually the memory of the hard disk and it is then mapped into the physical memory.

Demand Paging:- Demand paging is a type of swapping done in virtual memory systems. In demand paging, the data is not copied from the disk to the RAM until they are needed or being demanded by some program.

Q12. Explain DDOs? Explain the difference between DDOS and DOS attack.

Ans. DDoS (Distributed Denial of Service) is a category of malicious cyber-attacks that hackers or cyber criminals employ in order to make an online service, network resource or host machine unavailable to its intended users on the Internet.

DOS	DDOS
DOS Stands for Denial of service attack.	DDOS Stands for Distributed Denial of service attack.
In Dos attack single system targets the victim system.	In DDoS multiple systems attacks the victims system..
Victim PC is loaded from the packet of data sent from a single	Victim PC is loaded from the packet of data sent from Multiple

DOS	DDOS
	location.
Dos attack is slower as compared to DDoS.	DDoS attack is faster than Dos Attack.
Can be blocked easily as only one system is used.	It is difficult to block this attack as multiple devices are sending packets and attacking from multiple locations.
In DOS Attack only single device is used with DOS Attack tools.	In DDoS attack,The volumeBots are used to attack at the same time.
DOS Attacks are Easy to trace.	DDOS Attacks are Difficult to trace.
Volume of traffic in the Dos attack is less as compared to DDos.	DDoS attacks allow the attacker to send massive volumes of traffic to the victim network.
Types of DOS Attacks are: 1. Buffer overflow attacks 2. Ping of Death or ICMP flood 3. Teardrop Attack 4. Flooding Attack	Types of DDOS Attacks are: 1. Volumetric Attacks 2. Fragmentation Attacks 3. Application Layer Attacks 4. Protocol Attack.

SET 3

Q13. What are the three main uses of OS?

Ans. An operating system has three main uses:-

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

2. Establish a user interface.

3. Execute and provide services for applications software.

Q14. What is deadlock?

Ans. A deadlock is a situation in which two computer programs sharing the same resource are effectively preventing each other from accessing the resource, resulting in both programs ceasing to function. The earliest computer operating systems ran only one program at a time.

Q15. What is segmentation?

Ans. In Operating Systems, Segmentation is a memory management technique in which the memory is divided into the variable size parts. Each part is known as a segment which can be allocated to a process.

Q16. What are the different types of networks?

Ans. There are 4 types of network:-

1. PAN

2. WAN

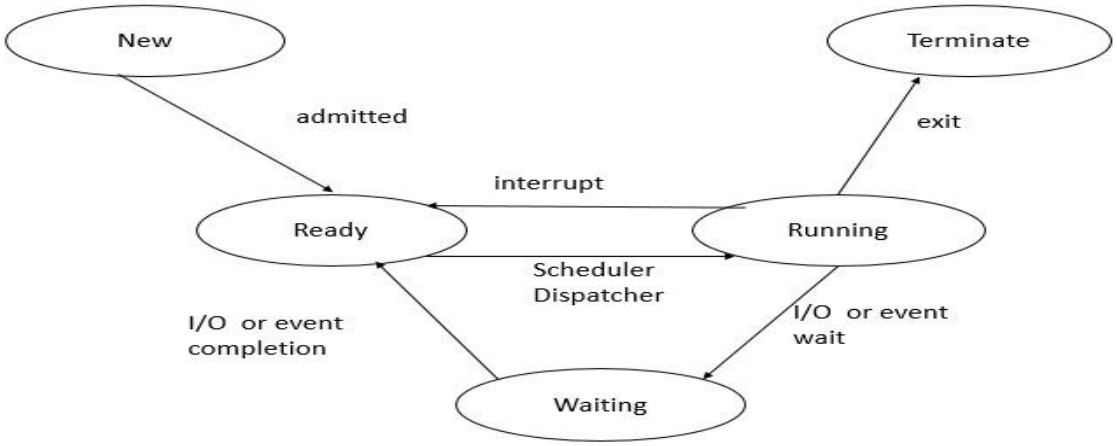
3. LAN

4. Campus Network

Q17. What is session hijacking?

Ans. Session hijacking is a technique used by hackers to gain access to a target's computer or online accounts. In a session hijacking attack, a hacker takes control of a user's browsing session to gain access to their personal information and passwords.

Q18. a.) With the help of a neat diagram elaborate the concept of process and its states?
b.) Construct the Process Control Block along with its description in detail?
Ans.
a.



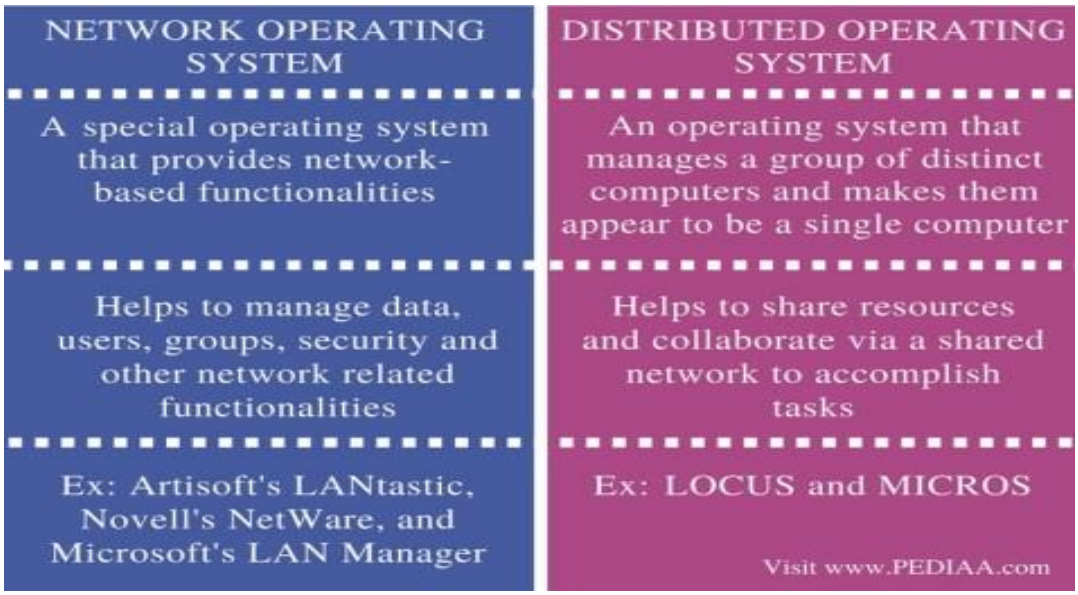
b. A **process control block** (**PCB**) is a data structure used by computer operating systems to store all the information about a process. It is also known as a process descriptor. When a process is created (initialized or installed), the operating system creates a corresponding process control block. This specifies the process state i.e. new, ready, running, waiting or terminated.

Q18. Consider a disk with 200 tracks and the queue has random requests from different processes in the order:
55, 58, 39, 18, 90, 160, 150, 38, 184
Initially arm is at 100. Find the Average Seek length using FIFO, SSTF.

Ans. We assume a disk with 200 tracks and disk request queue has random requests in it. The requested disks in the order are 55,58,39,18,90,160,150,38,184 starting with a track 100. (ques10.com)

Q19. With suitable example differentiate between Network Operating System and Distributed Operating System.

Ans.



Q21. What is access matrix? Explain the implementation of access matrix?

Ans. Access Matrix is a security model of protection state in computer system. It is represented as a matrix. Access matrix is used to define the rights of each process executing in the domain with respect to each object. The rows of matrix represent domains and columns represent objects.

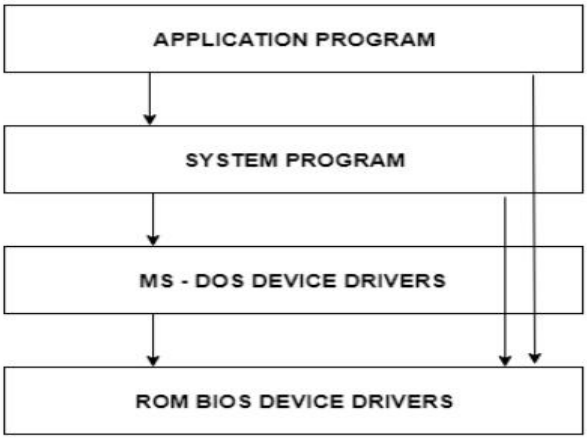
There are various methods of implementing the access matrix in the operating system. These methods are as follows:

- Global Table
- Access Lists for Objects
- Capability Lists for Domains
- Lock-Key Mechanism

Q22. Enumerate the different operating system structure and explain with neat sketch?

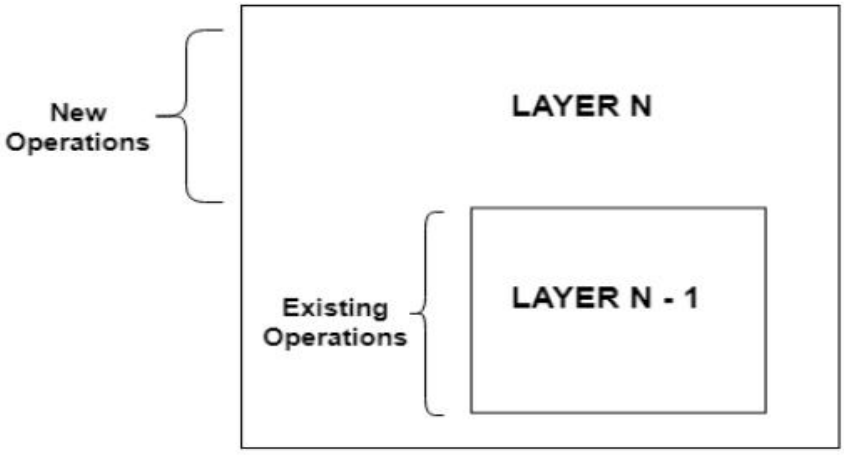
Ans. There are 2 different OS structure:-

1. Simple Structure:-



MS-DOS STRUCTURE

2. Layered Structure:-



Layered Structure of Operating System

Q23.
a. Evaluating the maximum number of pages needed, if a system supports 16 bit address line and 1K page size.
b. What is the difference between user-level instructions and privileged instructions?

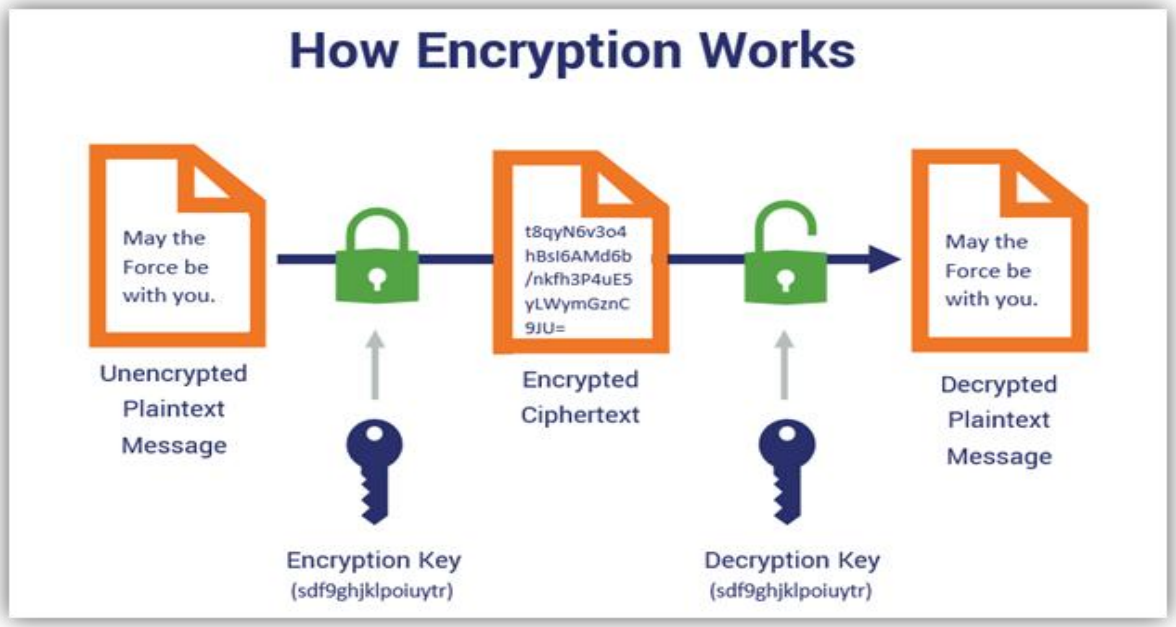
Ans.
a. A 16 bit address can locate up to 2^16 = 65536 locations (bytes).
Given page size is 0.5 KB = 512 Bytes (Ref: 1 KB = 1024 Bytes).
Therefore, total pages = 65536/512 = **128 pages**.

b. i. User-level Instruction:- The Instructions that can run only in User Mode are called Non-Privileged Instructions or User-level Instruction.

ii. Privileged Instructions:- The Instructions that can run only in Kernel Mode are called Privileged Instructions.

Q24. What is encryption? Explain the working with the help of example?

Ans. Encryption is an important way for individuals and companies to protect sensitive information from hacking. For example, websites that transmit credit card and bank account numbers encrypt this information to prevent identity theft and fraud.



SET 2

Q25. 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.

Q26. Define access time?

Ans. Access time refers to how fast the disk or memory can locate and begin retrieving (accessing) a specific piece of information or transfer data to the CPU. For a disk drive, the access time includes both the head seek time and the latency.

Q27. What is time sharing OS?
Ans. The Time-Sharing OS provides computer resources to numerous programs simultaneously in a time-dependent manner. As a result, it aids in providing direct access to the main computer to a large number of users.

Q28. What is worm?
Ans. A worm is a type of malware whose primary function is to self-replicate and infect other computers while remaining active on infected systems. A computer worm duplicates itself to spread to uninfected computers.

Q29. What are the advantages of star topology?
Ans.

- 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.
- If N devices are connected to every other in star, then the amount of cables required to attach them is N. So, it's easy to line up.

Q30. 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. In computing, a page fault (sometimes called PF or hard fault) is an exception that the memory management unit (MMU) raises when a process accesses a memory page without proper preparations. Accessing the page requires a mapping to be added to the process's virtual address space.
Page fault occurs when a requested page is mapped in virtual address space but not present in memory.
A page fault occurs when an access to a page that has not been brought into main memory takes place. The operating system verifies the memory access, aborting the program if it is invalid.

Q31. Explain CIA in detail?

Ans. Confidentiality, integrity and availability, also known as the CIA triad, is a model designed to guide policies for information security within an organization. The model is also sometimes referred to as the AIC triad (availability, integrity and confidentiality) to avoid confusion with the Central Intelligence Agency.

Q32. Write a short note on levels of security measures and what is the difference between security and protection

Ans. The most common techniques used to protect operating systems include the use of antivirus software and other endpoint protection measures, regular OS patch updates, a firewall for monitoring network traffic, and enforcement of secure access through least privileges and user controls.

Q33. What are the different type of operating systems in detail. Also describe advantages and disadvantages of each type?

Ans.

- Batch OS
- Time-sharing OS
- Network OS
- Distributed OS
- Real-time OS

1. Batch OS:-

Advantages of Batch Operating System:

- It is very difficult to guess or know the time required for any job to complete. Processors of the batch systems know how long the job would be when it is in queue
- 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
- The other jobs will have to wait for an unknown time if any job fails

2. Time-sharing OS:-
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

3. Network OS:-
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

4. Distributed OS:-
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
- Since resources are being shared, computation is highly fast and durable
- Load on host computer reduces
- These systems are easily scalable as many systems can be easily added to the network
- 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

5. Real-time OS:-
Advantages of RTOS:
- Maximum Consumption
- Task Shifting
- Focus on Application
- Real-time operating system in the embedded system
- Error Free
- Memory Allocation

Disadvantages of RTOS:
- Limited Tasks
- Use heavy system resources
- Complex Algorithms
- Device driver and interrupt signals
- Thread Priority

Q34. Explain the concept of FRAGMENTATION in detail?
Ans. Fragmentation refers to an unwanted problem that occurs in the OS in which a process is unloaded and loaded from memory, and the free memory space gets fragmented. The processes can not be assigned to the memory blocks because of their small size. Thus the memory blocks always stay unused.

Q35.
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.

Parameters	**Server OS**	**Client OS**
Basics	We use a Server OS for providing various services to multiple numbers of clients.	We use a Client OS for obtaining various services from any given server.
Number of Users/ Clients	A Server OS is capable of serving multiple clients at any given time.	The Client OS is capable of serving just a single client at any given time.
Complexity	It is a complex type of OS.	It is a fairly simple type of OS.
Medium	A server OS basically runs on a given server.	A client OS basically runs on various client devices, such as computers, laptops, etc.
Operations	This type of OS is designed in a way that it operates on any server.	This type of OS is designed in a way that it operates within a desktop.
Security	It is comparatively more secure.	It is comparatively much less secure.
Processing Power	The processing power is fairly high in Server OS.	The processing power is much lower in Client OS.
Efficiency	The Server OS is highly efficient.	The Client OS is comparatively less efficient.
Stability	Server OS is much more stable.	Client OS is much less stable.
Examples	Linux, Red Hat, etc., are a few examples of the Server OS.	Android, Windows, etc., are a few examples of the Client OS.

B.

Client-Server Architecture	Peer-to-Peer Architecture
A clear separation between clients and servers.	No differentiation between clients and servers.
Data is provided only in response to a request.	Peers have the authority to request as well as provide a service.
Centralized data management.	It has own data and applications.
Purpose is to store and exchange information.	Goal is to maintain connections among peers.
Suitable for small as well as large networks.	Suitable for less number of users or devices.