

### Phase 3 (Activity sheet for fast learners)

Question 1: Which disk scheduling algorithm is best for high-performance servers?

Answer 1: For high-performance servers, the most efficient disk scheduling algorithms are typically SSTF (Shortest Seek Time First) and LOOK. These algorithms prioritize requests based on proximity to the current position of the disk head, minimizing seek time and improving overall system throughput.

Question 2: Why two algorithms (SSTF and LOOK) are high performance based?

Answer 2: The two algorithms are high performance based because of the following factors:  
**Minimized Seek Time:** SSTF and LOOK prioritize requests based on proximity, which drastically reduces the time spent moving the disk arm and improves overall system speed.

**Improved Throughput:** By minimizing seek time, these algorithms allow for a higher rate of data transfers, increasing the system's overall throughput.

**Reduced Response Time:** SSTF and LOOK reduce the time it takes to respond to a request, leading to faster application responsiveness.

Question 3: Why the performance of FCFS, SCAN and C-SCAN are not as good as SSTF and LOOK disk scheduling algorithms?

Answer 3: FCFS can result in poor performance, particularly when requests are not uniformly distributed, as it processes requests in the order they arrive without considering their proximity. SCAN and C-SCAN algorithms, while fairer in terms of access time, can be slower than SSTF and LOOK due to the disk arm moving to the end of the disk before reversing direction.

Question 4: Explain the concept of rotational latency and how it affects disk access time in different scheduling algorithms.

Answer 4: Rotational latency is the time it takes for the desired sector to rotate under the read/write head. While disk scheduling algorithms primarily focus on minimizing seek time, rotational latency is a constant factor in all algorithms. Some algorithms, like SSTF, might inadvertently increase rotational latency by jumping between tracks far apart, while SCAN and C-SCAN try to minimize it by moving in a more sequential manner.

Question 5: How does the number of requests in a queue affect the performance of LOOK and C-LOOK algorithms compared to SCAN and C-SCAN?

Answer 5: As the number of requests in the queue increases, LOOK and C-LOOK can show performance improvements over SCAN and C-SCAN, especially if the requests are clustered near the head position. However, as the requests become more widely distributed, SCAN and C-SCAN might provide more efficient overall performance by systematically servicing all requests.

Question 6: What is starvation in the context of disk scheduling? Which disk scheduling algorithm is most prone to causing starvation?

Answer 6: Starvation occurs when a disk request is repeatedly ignored by the scheduling algorithm, leading to indefinite delays or the request never being serviced. SSTF (Shortest Seek Time First) can cause starvation because it prioritizes requests closest to the current head position, potentially ignoring requests at the outer tracks.

Question 7: Why is disk scheduling algorithm needed?

Answer 7: Disk Scheduling Algorithms are needed because a process can make multiple I/O requests and multiple processes run at the same time. The requests made by a process may be located at different sectors on different tracks. Due to this, the seek time may increase more. These algorithms help in minimizing the seek time by ordering the requests made by the processes.

Question 8: Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. The FCFS scheduling algorithm is used. The head is initially at cylinder

number 53. The cylinders are numbered from 0 to 199. The total head movement (in number of cylinders) incurred while servicing these requests is \_\_\_\_\_.

Answer 8: 632

Question 9: Discuss important terms related to Disk Scheduling Algorithms.

Answer 9: **Seek Time** - It is the time taken by the disk arm to locate the desired track.

**Rotational Latency** - The time taken by a desired sector of the disk to rotate itself to the position where it can access the Read/Write heads is called Rotational Latency.

**Transfer Time** - It is the time taken to transfer the data requested by the processes.

**Disk Access Time** - Disk Access time is the sum of the Seek Time, Rotational Latency, and Transfer Time.

Question 10: Consider an imaginary disk with 51 cylinders. A request comes in to read a block on cylinder 11. While the seek to cylinder 11 is in progress, new requests come in for cylinders 1, 36, 16, 34, 9, and 12, in that order. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling Algorithms? 1. FCFS (First come first serve), 2. SSTF (Shorted seek time first), 3. SCAN, 4. C-SCAN, 5. LOOK (Elevator), 6. C-LOOK.

Answer 10: FCFS=111, SSTF=61, SCAN=88, CSCAN=98, LOOK=60, C-LOOK=68.

## **Phase 2 (Activity sheet for moderate learners)**

Question 1: Write about the authentication in file system.

Answer 1: In a file system, authentication questions and answers are used to verify the identity of a user or process before granting them access to files and resources. This process helps ensure that only authorized users can access sensitive information and perform specific actions on the file system.

Question 2: Write about the security in file systems.

Answer 2: File system security involves protecting data stored on a computer's hard drive or other storage media from unauthorized access, modification, or deletion. It's a critical aspect of operating system (OS) management and data protection. File security measures prevent files from being deleted, tampered with, or accessed by unauthorized users.

Question 3: Write about the access control in file systems.

Answer 3: File system access control limits who can interact with files and directories, ensuring only authorized users have the necessary permissions. This is achieved through a variety of mechanisms, including permissions, access control lists (ACLs), and various access control models like discretionary access control (DAC) and role-based access control (RBAC).

Question 4: Write about the access control list in file systems.

Answer 4: An access control list (ACL) contains rules that grant or deny access to certain digital environments.

Question 5: Write about the threats and its types in file systems.

Answer 5: File systems, the foundation of how operating systems store and manage data, are vulnerable to various threats that can compromise data integrity, availability, and confidentiality. These threats include malware, unauthorized access, and data corruption, all of which can have severe consequences for individuals and organizations.

Question 6: Write about the consequences of threats.

Answer 6: **Data Loss:** Corrupted or stolen files can lead to financial losses, reputational damage, and legal repercussions.

**Business Disruption:** System crashes or malware infections can disrupt business operations, leading to lost productivity and revenue.

**Legal and Regulatory Penalties:** Data breaches can lead to fines and legal action from regulatory bodies.

**Reputational Damage:** Data breaches can damage an organization's reputation and erode customer trust.

Question 7: Discuss different types of threats.

Answer 7: **Malware:** Viruses, worms, and ransomware can corrupt files, steal sensitive information, or even take control of an entire network.

**Unauthorized Access:** Weak passwords, inadequate authentication, and vulnerabilities in file-sharing systems can allow hackers to gain access to sensitive data.

**Data Corruption:** Malware or system errors can lead to corrupted files, making them unusable or causing data loss.

**Social Engineering:** Phishing attacks can trick users into providing sensitive information or opening malicious files, leading to malware infections or data breaches.

**Insider Threats:** Employees with malicious intent can use their access to steal, modify, or destroy data.

**File-Based Attacks:** These attacks exploit how files are handled in a system, including file injection, unauthorized access, and file manipulation.

Question 8: Write about the different security features.

Answer 8: **Encryption:** Protecting files at rest or in transit with encryption can prevent unauthorized access.

**File Integrity Checks:** Ensuring that files have not been tampered with.

**Auditing:** Monitoring user access to files and directories.

**Data Loss Prevention (DLP):** Preventing sensitive data from being moved outside of the organization's control.

Question 9: Discuss the importance of File Access Control.

Answer 9: **Data Security:** Protecting sensitive information from unauthorized access and modification.

**System Stability:** Preventing malicious code or unintended actions from compromising the system.

**Compliance:** Meeting regulatory requirements for data protection and access control.

Question 10: Discuss about the different authentication methods.

Answer 10: **Username and Password:** A widely used method where users provide a unique username and password.

**Certificates:** Used in networked environments to verify the identity of computers and servers.

**Biometrics:** Uses unique biological characteristics (e.g., fingerprints, facial recognition) for authentication.

### **Phase 1 (Activity sheet for slow learners)**

Question 1: What is FLAT. Explain its significance.

Answer 1: In file systems, FAT stands for File Allocation Table. It's a critical table that tracks how files are stored on a storage device, like a hard drive or flash drive, according to NordVPN.

Essentially, it maps which clusters (blocks of storage) are used by which files, enabling the operating system to locate and access data.

Question 2: Define NTFS file system.

Answer 2: NTFS is a file system primarily used by Windows operating systems to manage and organize files on storage devices like hard drives and SSDs. It's an advanced file system that offers improvements over its predecessors like FAT (File Allocation Table). NTFS supports features like file permissions, encryption, compression, and journaling, making it suitable for modern storage and security needs.

Question 3: What are disk scheduling algorithms?

Answer 3: Disk scheduling algorithms are methods used by operating systems to manage the order in which read and write requests are processed on a hard disk drive (HDD) or solid-state drive (SSD). These algorithms aim to optimize disk performance, minimize access time, and improve overall system efficiency. By strategically scheduling requests, they reduce the time it takes to access data on the disk.

Question 4: List Different types of disk scheduling algorithms.

Answer 4: Common disk scheduling algorithms include First-Come, First-Served (FCFS), Shortest Seek Time First (SSTF), SCAN, C-SCAN, LOOK, and C-LOOK.

Question 5: What is the function of access control in OS?

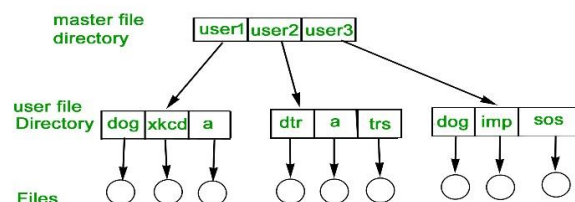
Answer 5: Access control in an operating system (OS) determines how the OS manages access to its resources, ensuring security objectives like integrity, availability, and secrecy. It defines which subjects (users, processes) are allowed to perform specific actions (read, write, execute) on objects (files, devices, etc.). This is crucial because the OS manages multiple users and resources, making information security a significant concern.

Question 6: Define the purpose of authentication in OS?

Answer 6: In an operating system, authentication verifies a user's identity before granting access to system resources. It ensures that only authorized users or processes can access protected information and functions, safeguarding data and system integrity. This process typically involves providing credentials, such as a password or biometric data, to prove one's identity.

Question 7: How file systems organize and manage files on storage devices?

Answer 7: File systems organize and manage files on storage devices, acting as a bridge between the operating system and the hardware. They provide a structured way to store, access, and delete files. Different operating systems use various file systems, each with its own characteristics and strengths. The diagram is given below.



Question 8: Write the full forms of the FAT, NTFS and exFAT.

Answer 8: Their full forms are File Allocation Table, New Technology File System and Extended File Allocation Table.

Question 9: List different versions of FAT and what number represents in those versions?

Answer 9: There are different versions of FAT, including FAT12, FAT16, FAT32, and exFAT. The number (12, 16, 32) refers to the number of bits used for each entry in the table.

Question 10: Write the advantages and disadvantages of FAT.

Answer 10: **Advantages:** FAT is a simple and robust file system, making it well-suited for lightweight uses and data exchange between various devices.

**Disadvantages:** FAT has limitations in terms of scalability and speed compared to newer file systems like NTFS.