Disk Management, Scheduling, and Protection

Magnetic Disk Structure

In modern computers, most of the secondary storage is in the form of magnetic disks. Knowing the structure of a magnetic disk is necessary to understand how the data in the disk is accessed.

Important Disk Terms

Seek Time: Time to position the disk arm over the track.
Rotational Latency: Time for the sector to rotate under the read/write head.
Transfer Time: Time to transfer data based on disk speed and bytes.
Disk Access Time = Seek Time + Rotational Latency + Transfer Time.
Response Time: Average time spent by a request waiting for I/O operation.

Disk Scheduling Algorithms

1. FCFS (First Come First Serve): Requests handled in arrival order.
2. SSTF (Shortest Seek Time First): Request with minimum seek time served first.
3. SCAN (Elevator Algorithm): Arm moves in one direction, then reverses.
4. C-SCAN (Circular SCAN): Arm moves circularly instead of reversing.
5. LOOK: Like SCAN but reverses only at last request, not end of disk.
6. C-LOOK: Like C-SCAN but jumps only between last requests.

Disk Management

Utility in OS to create, delete, and format partitions, assign drive letters, and manage file systems.

Swap-Space Management

OS can copy a memory page to swap space on disk to free up RAM.

Protection and Security

Protection: Mechanism controlling access to resources.
Security: Ensures system integrity and prevents unauthorized access.

Goals of Protection

• Prevent destructive behavior
• Ensure fair resource use
• Enforce usage policies

Domain of Protection

Domain specifies resources a process may access.
Domain = set of pairs.

Access Matrix

General model of protection using a matrix of domains and objects.
Implemented as Global Tables, Access Lists, or Capability Lists.

Revocation of Access Rights

Access rights may be revoked immediately, selectively, partially, or permanently.
Schemes: Reacquisition, Back-pointers, Indirection, Keys mechanism.

Example: Access Matrix

Domain/Object	File1	File2	Printer
Domain1	Read	Read/Write	—
Domain2	—	Read	Print