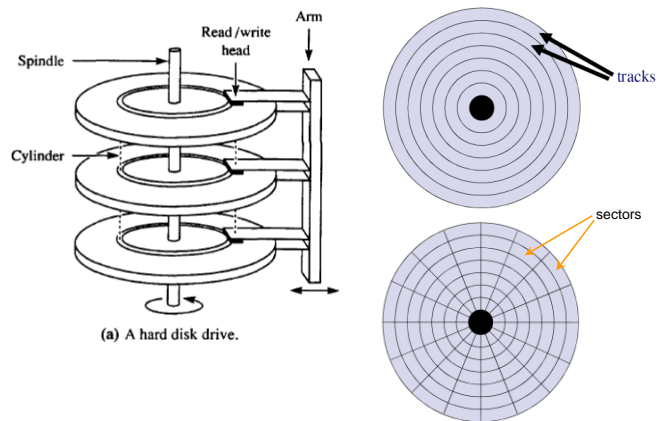


DISK SCHEDULING

Hard Disk



Operating System

DISK-SCHEDULING CRITERIA

- **Seek time:** Seek time is the time taken by the disk head to move from one cylinder to another. It is therefore dependent on the seek length, that is, the length between the current and the next position of the head.
$$\text{Seek}(n) = 0 \text{ if } n = 0$$
$$= a + bn \text{ if } n > 0,$$
where n is the seek distance, a is the mechanical settling time, and b is the acceleration factor.
- **Rotational delay/latency:** Rotational latency is the time taken by the addressed sector of the track to rotate into a position such that read/write head is accessible to it, that is, the sector comes under the head.
- **Transfer time:** Transfer time is the time for data transfer. For example, if it needs to read some data from the disk, then the transfer time is the time taken to transfer the data from the disk to the application. It depends on the rotational speed of the disk and the number of bytes to be transferred.
- **Disk access time** = seek time + rotational delay + transfer time

Operating System

DISK-SCHEDULING ALGORITHMS

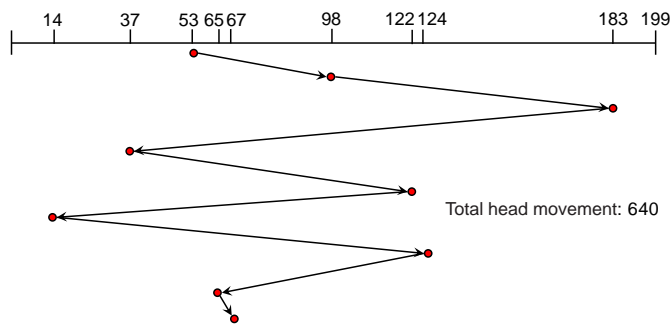
- *First Come, First Served* (FCFS)
- *Shortest-Seek-Time First* (SSTF)
- *SCAN*
- *C-SCAN* (Circular SCAN)
- *C-LOOK*

Operating System

First Come First Serve (FCFS)

Queue: 98, 183, 37, 122, 14, 124, 65, 67

The disk head is assumed to be at cylinder/track 53

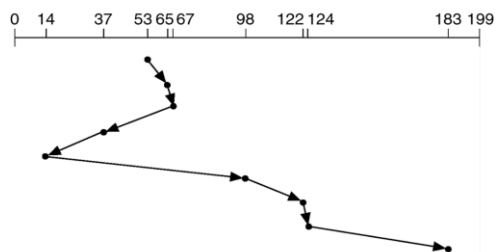


Operating System

Shortest-Seek-Time First (SSTF)

Queue: 98, 183, 37, 122, 14, 124, 65, 67

The disk head is assumed to be at cylinder/track 53

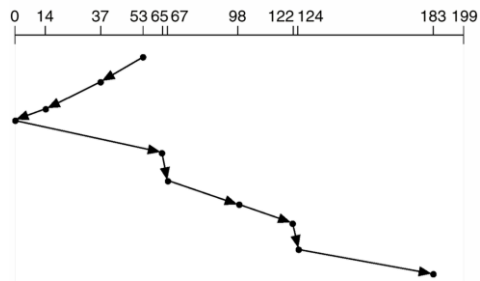


Operating System

SCAN (elevator algorithm)

Queue: 98, 183, 37, 122, 14, 124, 65, 67

The disk head is assumed to be at cylinder/track 53 and moving in the direction of decreasing number of cylinders.

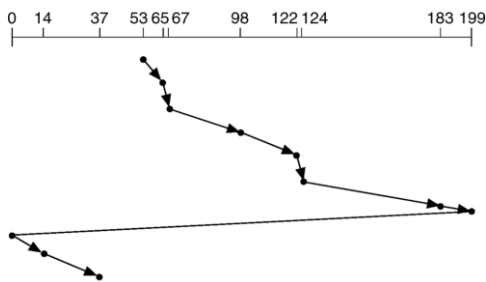


Operating System

C-SCAN algorithm (Circular SCAN)

Queue: 98, 183, 37, 122, 14, 124, 65, 67

The disk head is assumed to be at cylinder/track 53 and moving in the direction of increasing number of cylinders.

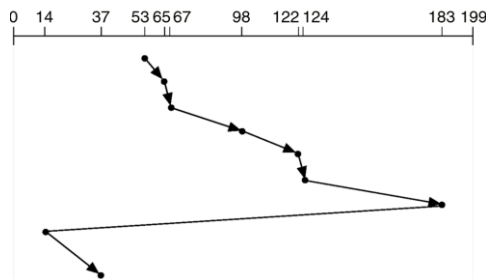


Operating System

C-LOOK algorithm

Queue: 98, 183, 37, 122, 14, 124, 65, 67

The disk head is assumed to be at cylinder/track 53 and moving in the direction of increasing number of cylinders.



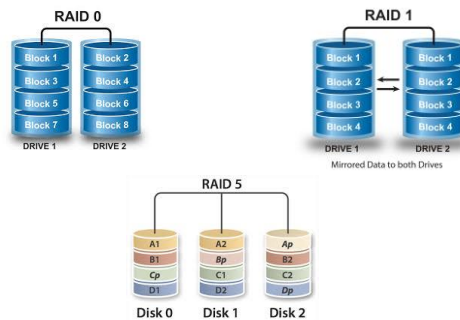
Operating System

RAID structure

- The multiple disks operate independently and in parallel to organize the data in various ways, and redundancy of data increases the reliability. This is known as **RAID** (**R**edundant **A**rrays of **I**nexpensive **D**isks / **R**edundant **A**rrays of **I**ndependent **D**isks)
- In RAID, the data is stored on separate disks as a strip. A strip may be a fixed size block on the disk.
- The set of strips at the same location on each disk in the array is known as a **stripe**. The small-sized strips are known as **fine-grained strips**, whereas the large-size strips are called **coarse-grained strips**.
- The RAID structure is organized in seven levels (zero to six) of disk arrays.

Operating System

RAID structure (read 11.8.3 of textbook)

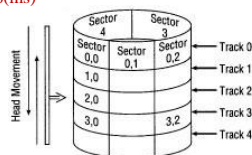


Operating System

Exercise

- ◆ Assuming the system uses a hard disk that takes 5ms to move the read/write head from one track to the next, currently the reader is on track 0, sector 0 and the transfer time is 1ms/sector. Calculate the total disk access time with FCFS algorithm to meet the requirements in the table below:

Answer: 36(ms)



Request List	
Track	Sector
0	1
1	4
1	3
2	0
2	3
2	4
3	2
3	0

Operating System