Disk Scheduling

Disk:

- A process needs two type of time, CPU time and IO time. For I/O, it requests the Operating system to access the disk.
- Each Disk has a flat circular shape like a CD or DVD.
- Generally Diameter range from 1.8 to 5.25 inches.
- Surface of disk is divided into circular track, tracks are further divided into sectors.

Seek Time: Time required to move the read/write head on the desired track.

Disk Scheduling:

In case of multiple I/O request disk scheduling algorithm must decide which request must be executed first.

Disk Scheduling Algorithm:

- ❖ FCFS(First Come First Serve)
- ❖ SSTF(Shortest Seek Time First)
- ❖ SCAN
- ❖ C-SCAN(Circular Scan)
- ❖ LOOK
- ❖ C-LOOK(Circular Look)

FCFS(First Come First Serve):

- ➢ First and simplest disk scheduling algorithm.
- ➢ Every request is serviced according to come request.

Advantage:

- o Easy to understand

o Easy to implement
o It can be used with less load of process

Disadvantage :

o Required more Seek time and Waiting Time.

Example :

Consider the following disk request sequence for a disk with 90 tracks
12, 34, 52, 14,25,68,39
R/W head is starting at 53. Find the number of movements using First Come First Serve scheduling.

Answer:

No. of Move by the head:
(53-12)+(34-12)+(52-34)+(52-14) + (25-14)+(68-25)+(68-39)

= 202(Move).

| 0 | 12 | 14 | 25 | 34 | 39 | 52 | 53 | 68 | 80 | 90 |
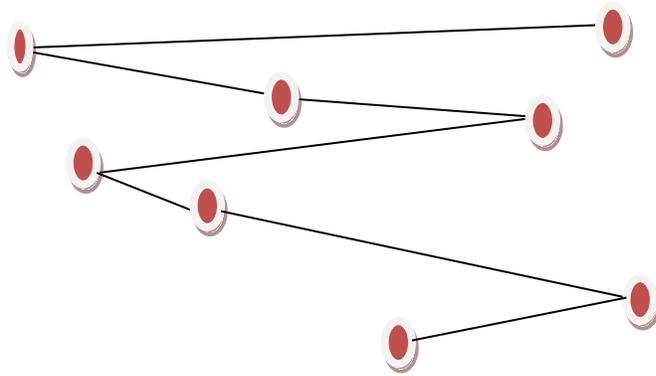
SSTF(Shortest Seek Time First)

➢ Services the request which is closest to the current position.
➢ Tie is broken is the direction of head movement

Advantage:

o Very Efficient in seek move
o Less average response time and waiting time.
o Increase Throughput.

Disadvantage :

o Overhead to find out the closet requirement
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Example :

Consider the following disk request sequence for a disk with 90 tracks
      12, 34, 52, 14,25,68,39
 R/W head is starting at 53. Find the number of movements using SSTF scheduling.

Answer:

No. of Move by the head: (53-52)+(52-39)+(39-34)+(34-25) + (25-14)+(14-12)+(68-12)

=97(MOVES).

0	12	14	25	34	39	52	**53**	68	80	90
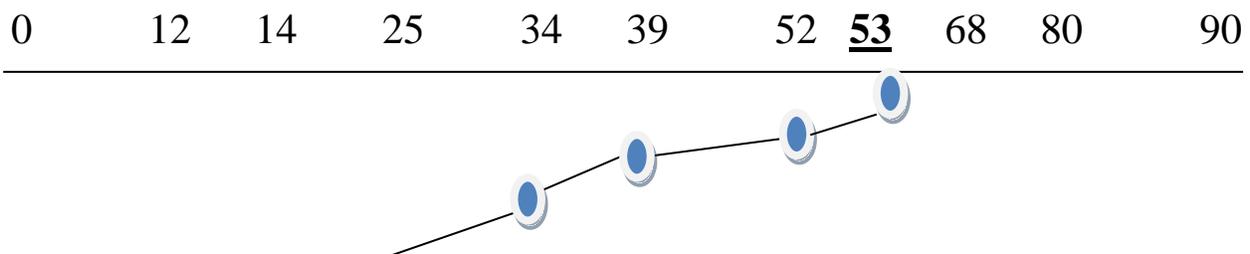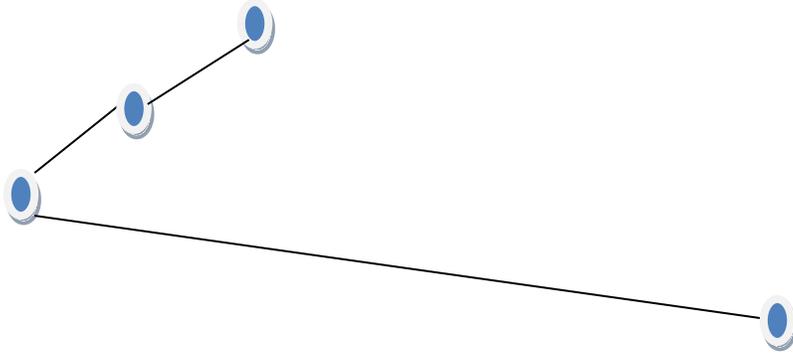
SCAN

➤ Head start at one end of the disk & moves towards the other end.
➤ Some time is called elevator Algorithm
➤ The direction of the head is reversed and process continues.

Advantage:

o Low variance and average waiting time.
o Simple easy to understand.

Disadvantage :

o Long waiting time for location just visited by head.

Example :

Consider the following disk request sequence for a disk with 90 tracks
          12, 34, 52, 14,25,68,39
 R/W head is starting at 53. Find the number of movements using SSTF scheduling.

Answer:

No. of Move by the head: (68-53)+(90-68)+(90-52)+(52-39) + (39-34)+(34-25)+(25-14)+(14-12)

=115(MOVES).

0   12   14   25   34   39   52 **53**   68   80   90
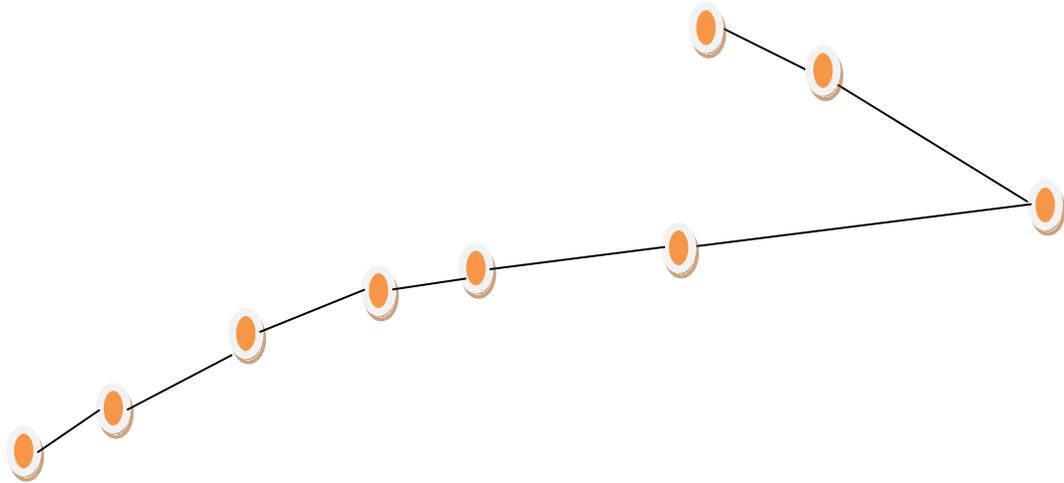
C-SCAN

➢ Head start at one end of the disk & moves towards the other end.
➢ The direction of the head is reversed and Head reaches First end without satisfy any request.

Advantage:

o Provide uniform waiting time.
o Better Response Time.

Disadvantage :

     o More Risk ,compare to simple Scan
      Algorithm

Example :

Consider the following disk request sequence for a disk with 90 tracks
     12, 34, 52, 14,25,68,39
R/W head is starting at 53. Find the number of movements using SSTF scheduling.

Answer:

No. of Move by the head:
(68-53)+(90-68)+(90-0)+(12-0)+
(14-12)+(25-14)+(34-25)+(39-34)
+(52-39)

=179(MOVES).

| 0 | 12 | 14 | 25 | 34 | 39 | 52 | **53** | 68 | 80 | 90 |
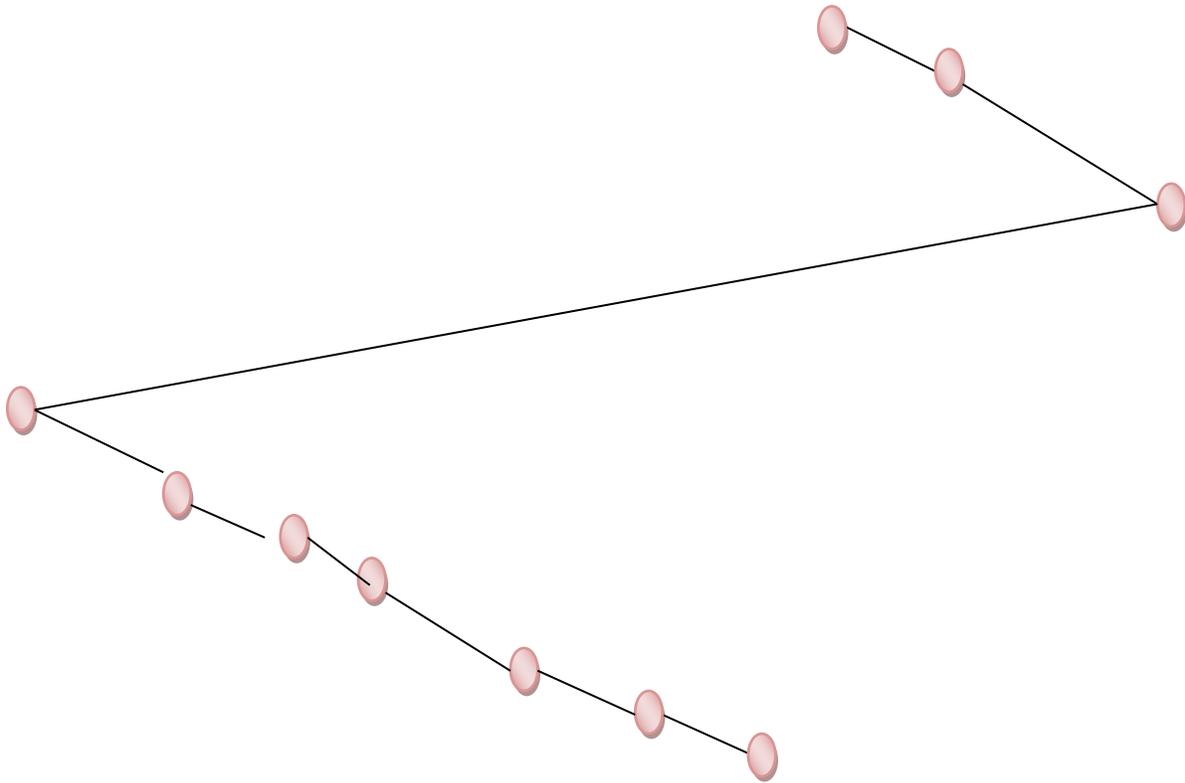
<u>LOOK</u>

It is same as scan algorithm but instead of going till last track we go till last request & then change direction.

<u>Advantage:</u>

- Better performance compare to scan algorithm

Disadvantage :

o Overhead to find the last request .

Example :

Consider the following disk request sequence for a disk with 90 tracks
    12, 34, 52, 14,25,68,39
 R/W head is starting at 53. Find the number of movements using SSTF scheduling.

Answer:

No. of Move by the head:
(68-53)+(68-52)+(52-39)+(39-34) + (34-25)+(25-14)+(14-12)

=71(MOVES).

0   12   14   25   34   39   52   **53**   68   80   90
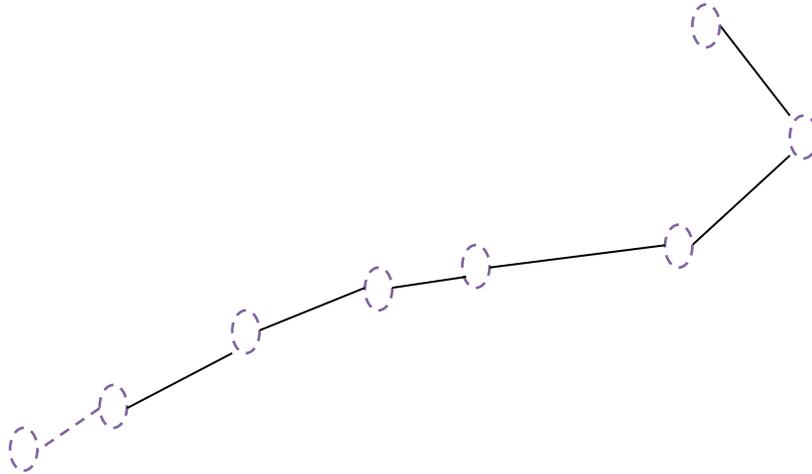
C-LOOK

- ➤ It takes the advantage of both C-Scan and Look algorithm.
- ➤ We will satisfy request only in are direction.
- ➤ We will go till last request & return but not till last track.

Advantage:

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- More uniform waiting time compare to LOOK algorithm.

Disadvantage :

o More Overhead in calculate

Example :

Consider the following disk request sequence for a disk with 90 tracks
        12, 34, 52, 14,25,68,39
 R/W head is starting at 53. Find the number of movements using SSTF scheduling.

Answer:

No. of Move by the head:
(68-53)+(68-12)+(14-12)+(25-14) +(34-25)+(39-34)+(52-39)

=111(MOVES).

0	12	14	25	34	39	52	**53**	68	80	90

0	12	14	25	34	39	52	**53**	68	80	90