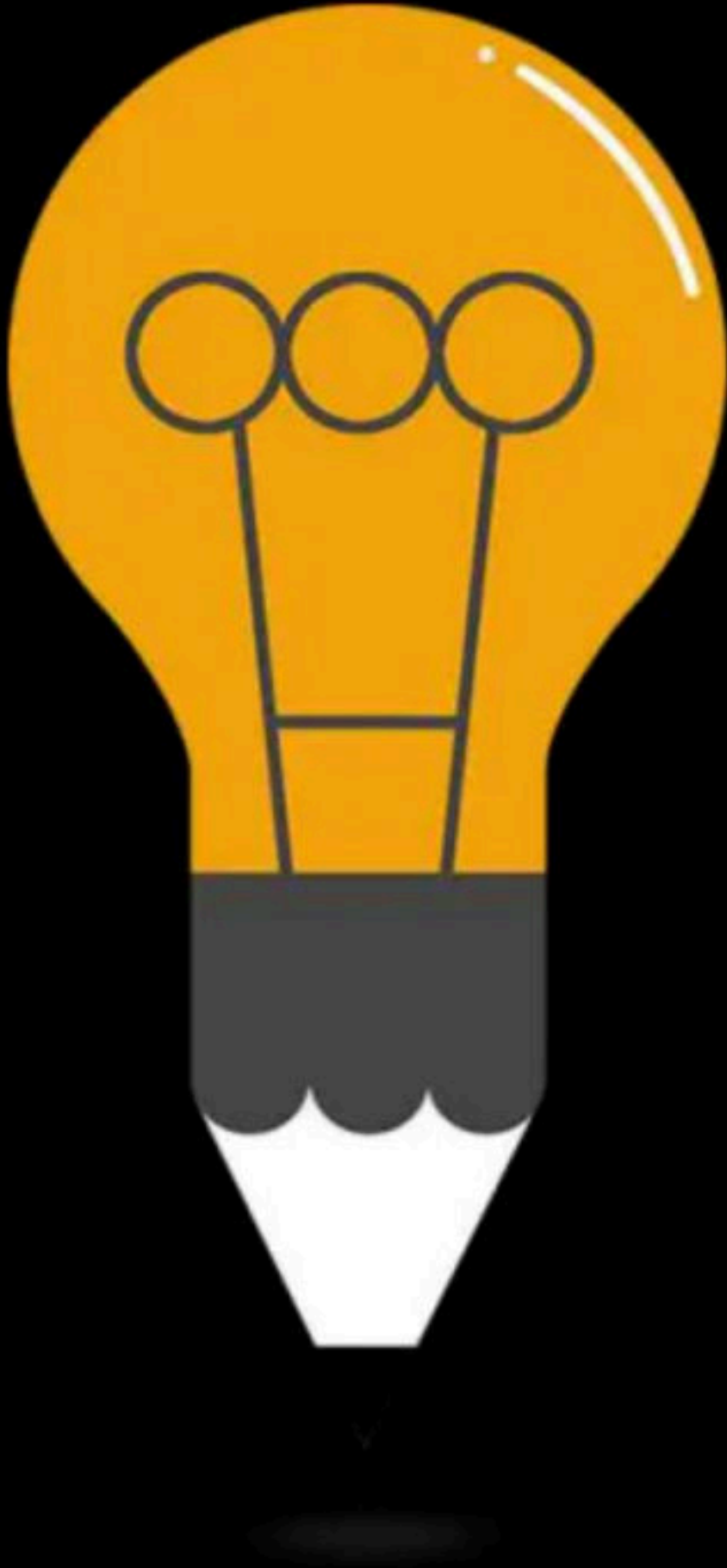


Disk Scheduling Algorithm

Comprehensive Course on Operating System for GATE - 2024/25

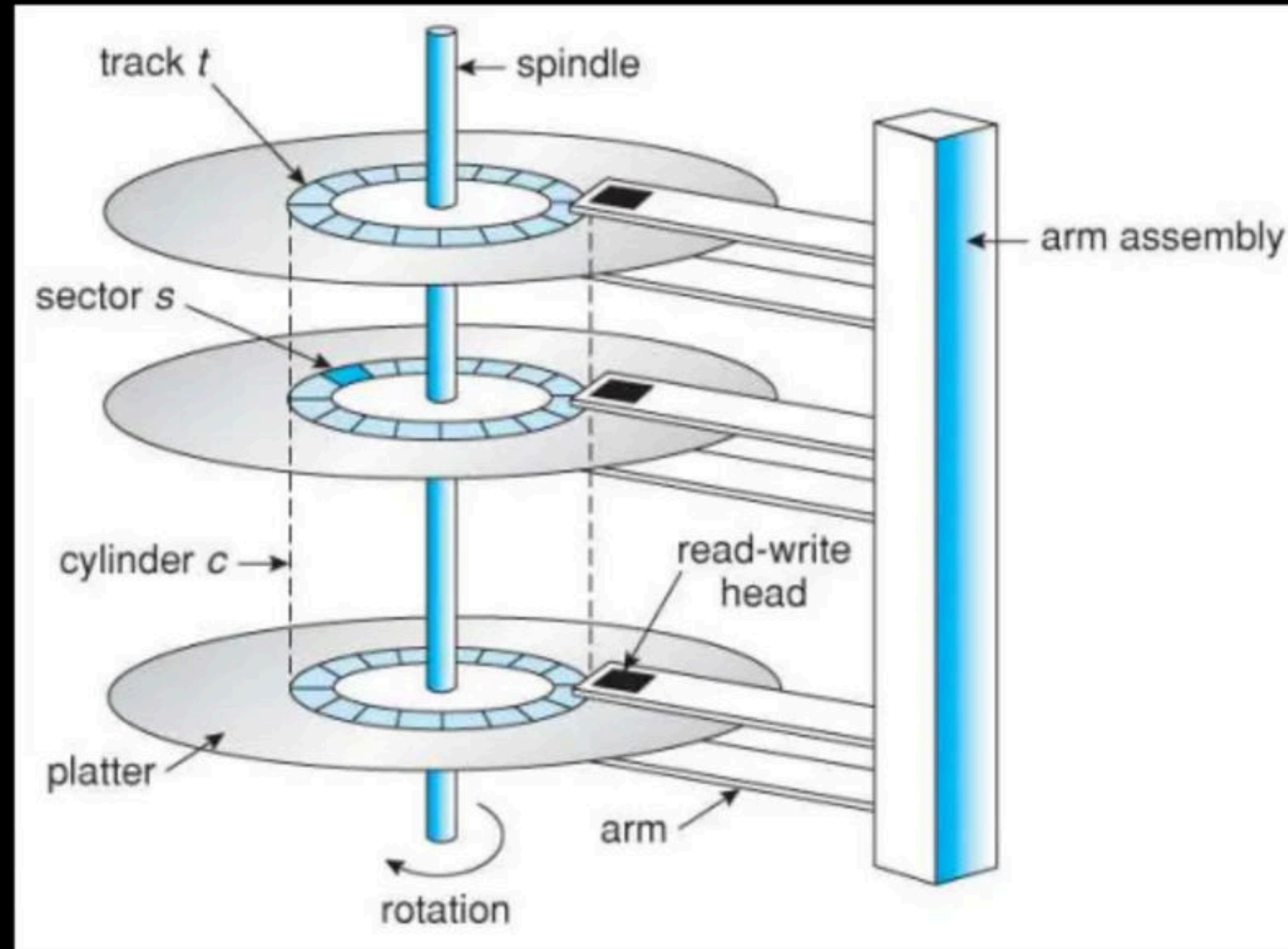


Operating System

Disk Scheduling

By: **Vishvadeep Gothi**

Disk



seek time
+
rotational latency
+
transfer time

Cylinder

- © Collection of tracks of same radius from all surfaces

↳ To save seek time.

Disk Scheduling

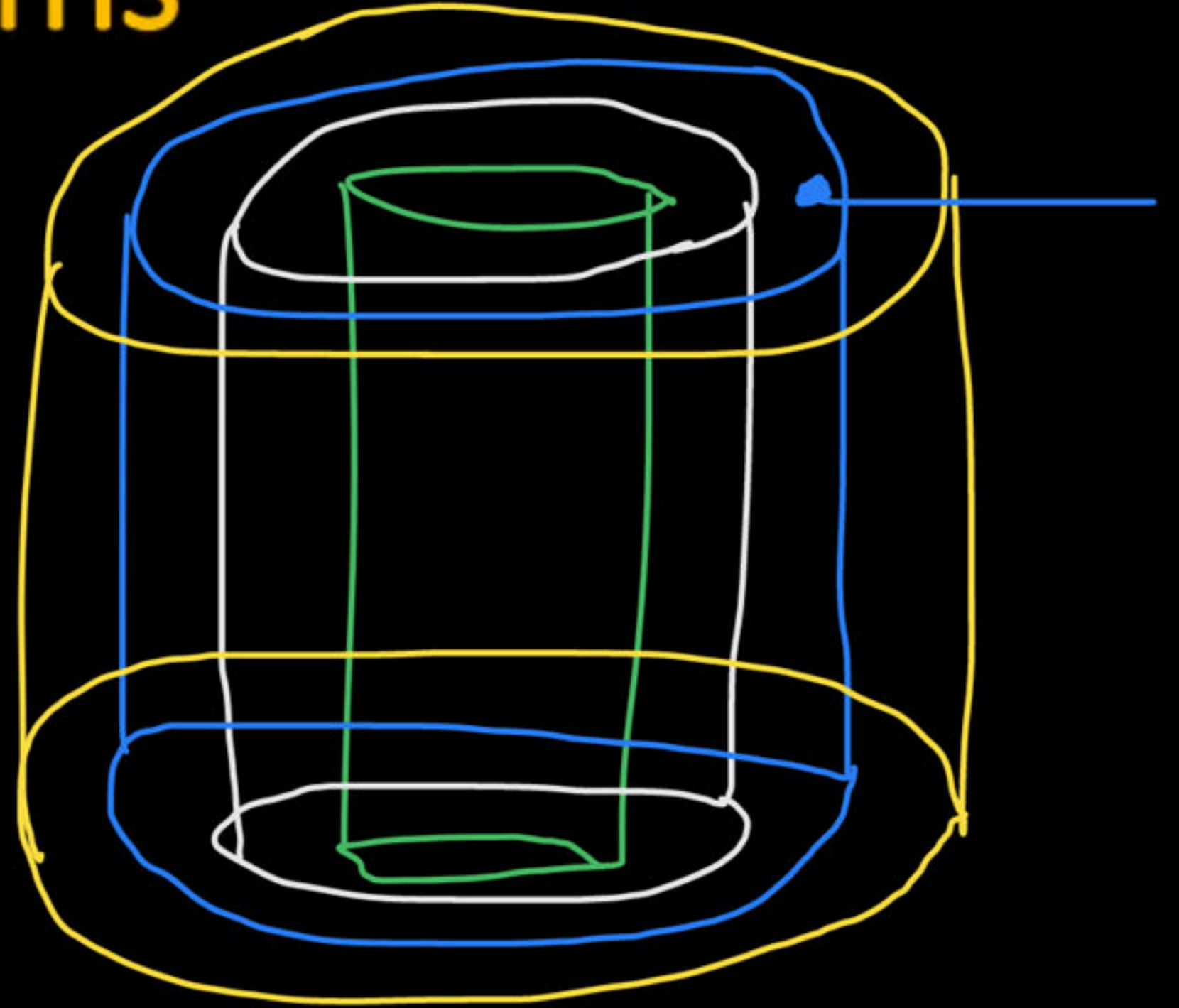
- © Done by operating systems to schedule I/O requests arriving for the disk
file system

→ CPU can generate addr. of sector where file is stored.

false ⇒ CPU doesn't know where the file is stored

Disk Scheduling Algorithms

1. FCFS (First Come First Serve)
2. SSTF (Shortest Seek Time First)
3. Scan
4. C-Scan (Circular-Scan)
5. Look
6. C-Look (Circular-Look)

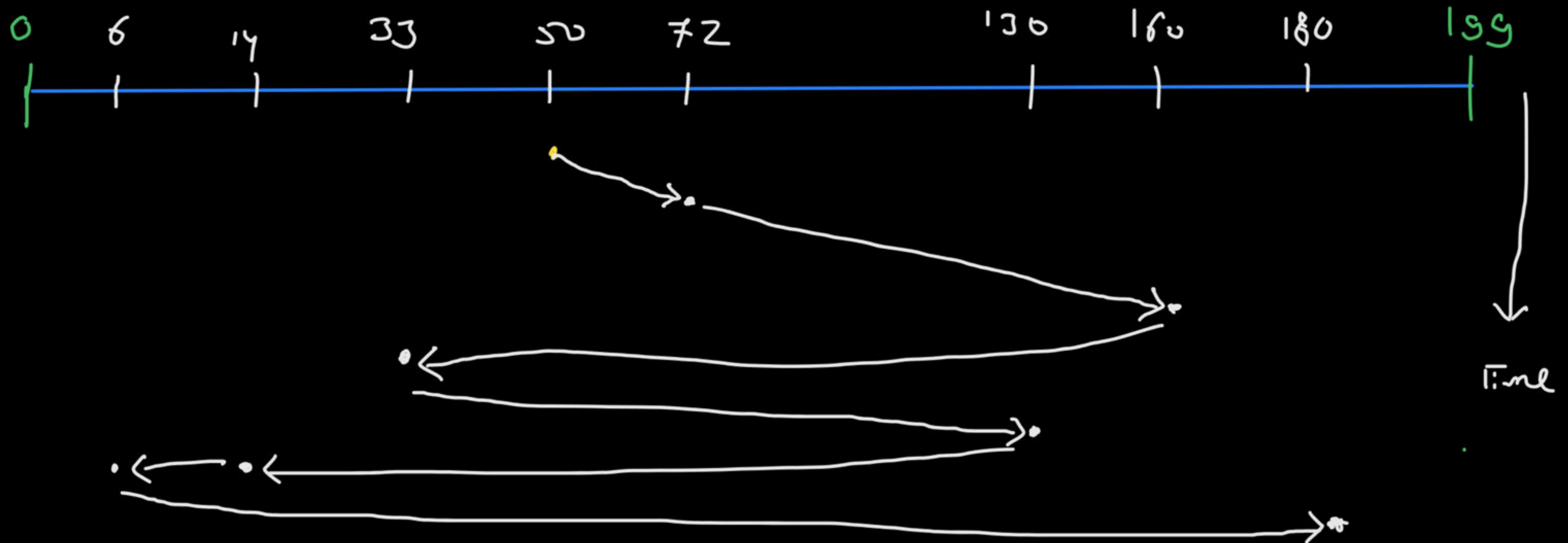


FCFS (First Come First Serve)

Total 200 cylinder
(0-199)

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180 ← cylinder no.

The Read/Write arm is at 50



FCFS (First Come First Serve)

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

Number of head movements = ~~1513~~

$$\begin{aligned} & (72 - 50) + (160 - 72) + (160 - 33) + \\ & (130 - 33) + (130 - 14) + (14 - 6) + (180 - 6) \\ & = 632 \end{aligned}$$

ans \Rightarrow if one cylinder head movement takes = 1.5 ms
Total seek time = ? = $632 * 1.5 \text{ ms} = 948 \text{ msec}$

if every time disk head changes direction, then additionally 1 msec needed.

$$\begin{aligned}\text{Total seek time} &= (632 * 0.5 \text{ ms}) + 4 * 1 \text{ msec} \\ &= 326 \text{ msec}\end{aligned}$$

↑
head
changes
direction 4 times

Ques) In prev. questⁿ if seek time per 100 cylinder head movement is 25 msec.

Head directⁿ change time = 2 msec

Total seek Time =

$$\underline{\underline{\text{Sol}^n}} = \frac{100}{100} * 25 \text{ msec} + 4 * 2 \text{ msec}$$

$$= 166 \text{ msec}$$

FCFS (First Come First Serve)

Advantages:

- © Every request gets a fair chance
- © No indefinite postponement (starvation)

Disadvantages:

- © Does not try to optimize seek time
- © May not provide the best possible service → min. seek time

SSTF (Shortest Seek Time First)

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

The Read/Write arm is at 50

SSTF (Shortest Seek Time First)

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

Number of head movements = 208

SSTF (Shortest Seek Time First)

Advantages:

- ◎ Average Response Time decreases
- ◎ Throughput increases

Disadvantages:

- ◎ Overhead to calculate seek time in advance
- ◎ Can cause Starvation for a request if it has higher seek time as compared to incoming requests
- ◎ High variance of response time as SSTF favors only some requests

Scan (Elevator)

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

The Read/Write arm is at 50,

The arm should move “towards the larger value”

Advantages:

- © High throughput
- © Low variance of response time
- © Average response time

Disadvantages:

- © Long waiting time for requests for locations just visited by disk arm

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

The Read/Write arm is at 50,

The arm should move “towards the larger value”

Advantages:

- © Provides more uniform wait time compared to SCAN

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

The Read/Write arm is at 50,

The arm should move “towards the larger value”

Suppose the order of request is: 72, 160, 33, 130, 14, 6, 180

The Read/Write arm is at 50,

The arm should move “towards the larger value”

Happy Learning.!

