

**Project 5**  
**Advanced OS(COEN 383)**

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<b>Algorithm</b>	<b>#Cylinder Movement</b> (Considering End to Start Seek Distance)
FIFO	13279
SSTF	6763
SCAN	7487
LOOK	7333
C-SCAN	9798
C-LOOK	9132

Here is the order of algorithms in terms of distance from lowest to highest:

**Lowest** is SSTF with 6763,  
followed by LOOK with 7333,  
followed by SCAN with 7487,  
followed by C-LOOK with 9132,  
followed by C-SCAN with 9798,  
**Highest** is FCFS with 13279

## Calculations

### 1. FCFS:

It is the simplest Disk Scheduling algorithm. It services the IO requests in the order in which they arrive. There is no starvation in this algorithm, every request is serviced.

Given, the drive is currently serving a request at cylinder 2255

**Order of Cylinders:** Services requests in the order they arrive, i.e.

2055, 1175, 2304, 2700, 513, 1680, 256, 1401, 4922, 3692

**Total Distance (in cylinders):**

$$= |2255 - 2055| + |2055 - 1175| + |1175 - 2304| + |2304 - 2700| + |2700 - 513| + |513 - 1680| + |1680 - 256| + |256 - 1401| + |1401 - 4922| + |4922 - 3692|$$

$$= 200 + 880 + 1129 + 396 + 2187 + 1167 + 1424 + 1145 + 3521 + 1230$$

$$= 13279$$

### 2. SSTF:

Shortest seek time first (SSTF) algorithm selects the disk I/O request which requires the least disk arm movement from its current position regardless of the direction. It reduces the total seek time as compared to FCFS. It allows the head to move to the closest track in the service queue.

**Order of Cylinders:**

Input: I/O requests - 2055, 1175, 2304, 2700, 513, 1680, 256, 1401, 4922, 3692

Initial head position - 2255

Arranging all the requests in the corrected order:

{2304, 2055, 1680, 1401, 1175, 513, 256, 2700, 3692, 4922}

**Total Distance (in cylinders):**

A. Find the nearest request to the current head position (2255), which is 2304. The head will move from 2255 to 2304. Head movement = 49.

B. The nearest request to 2304 is 2055, so the head will move from 2304 to 2055, and

- head movement becomes  $49 + (2304 - 2055) = 49 + 249 = 298$ .
- C. Similarly, the nearest request to 2055 is 1680, so the head will go from 2055 to 1680, and head movement becomes  $298 + (2055 - 1680) = 298 + 375 = 673$ .
  - D. Similarly, the nearest request to 1680 is 1401, so the head will go from 1680 to 1401, and head movement becomes  $673 + (1680 - 1401) = 673 + 279 = 952$ .
  - E. Similarly, the nearest request to 1401 is 1175, so the head will go from 1401 to 1175, and head movement becomes  $952 + (1401 - 1175) = 952 + 226 = 1178$ .
  - F. Similarly, the nearest request to 1175 is 513, so the head will go from 1175 to 513, and head movement becomes  $1178 + (1175 - 513) = 1178 + 662 = 1840$ .
  - G. Similarly, the nearest request to 513 is 256, so the head will go from 513 to 256, and head movement becomes  $1840 + (513 - 256) = 1840 + 257 = 2097$ .
  - H. Similarly, the nearest request to 256 is 2700, so the head will go from 256 to 2700, and head movement becomes  $2097 + (2700 - 256) = 2097 + 2444 = 4541$ .
  - I. Similarly, the nearest request to 2700 is 3692, so the head will go from 2700 to 3692, and head movement becomes  $4541 + (3692 - 2700) = 4541 + 992 = 5533$ .
  - J. Finally, the nearest request to 3692 is 4922, so the head will go from 3692 to 4922, and head movement becomes  $5533 + (4922 - 3692) = 5533 + 1230 = 6763$ .
  - K. Since 4922 was the last request, the process will stop. The total head movement is 6763.

So, the total distance for this SSTF scheduling with the corrected order is 6763.

### 3. SCAN:

It is also called the Elevator Algorithm. In this algorithm, the disk arm moves into a particular direction till the end, satisfying all the requests coming in its path, and then it turns back and moves in the reverse direction satisfying requests coming in its path.

It works in the way an elevator works, elevator moves in a direction completely till the last floor of that direction and then turns back.

#### Order of Cylinders:

Input: I/O requests - 2055, 1175, 2304, 2700, 513, 1680, 256, 1401, 4922, 3692

Initial head position - 2255

Previous request - 1723, shows that the arm of the disk is rotating outwards (to 4999).

Hence the order is,

{2304, 2700, 3692, 4922, **4999**, 2055, 1680, 1401, 1175, 513, 256}

#### Total Distance (in cylinders):

$$= |2255 - 2304| + |2304 - 2700| + |2700 - 3692| + |3692 - 4922| + |\mathbf{4922 - 4999}| + |\mathbf{4999 - 2055}| + |2055 - 1680| + |1680 - 1401| + |1401 - 1175| + |1175 - 513| + |513 - 256|$$

$$= 49 + 396 + 992 + 1230 + 77 + 2944 + 375 + 279 + 226 + 662 + 257$$

$$= 7487$$

#### 4. LOOK:

It is like the SCAN scheduling Algorithm to some extent except for the difference that, in this scheduling algorithm, the arm of the disk stops moving inwards (or outwards) when no more request in that direction exists. This algorithm tries to overcome the overhead of the SCAN algorithm which forces the disk arm to move in one direction till the end regardless of knowing if any request exists in the direction or not.

##### Order of Cylinders:

Input: I/O requests - 2055, 1175, 2304, 2700, 513, 1680, 256, 1401, 4922, 3692

Initial head position - 2255

Previous request - 1723, shows that the arm of the disk is rotating outwards (to 4999).

Hence the order is

{2304, 2700, 3692, 4922, 2055, 1680, 1401, 1175, 513, 256}

##### Total Distance (in cylinders):

$$= |2255 - 2304| + |2304 - 2700| + |2700 - 3692| + |3692 - 4922| + |4922 - 2055| + |2055 - 1680| + |1680 - 1401| + |1401 - 1175| + |1175 - 513| + |513 - 256|$$

$$= 49 + 396 + 992 + 1230 + 2867 + 375 + 279 + 226 + 662 + 257$$

$$= 7333$$

#### 5. C-SCAN:

In the C-SCAN algorithm, the arm of the disk moves in a particular direction servicing requests until it reaches the last cylinder, then it jumps to the last cylinder of the opposite direction without servicing any request, then it turns back and starts moving in that direction servicing the remaining requests.

##### Order of Cylinders:

Input: I/O requests - 2055, 1175, 2304, 2700, 513, 1680, 256, 1401, 4922, 3692

Initial head position - 2255

Previous request - 1723, shows that the arm of the disk is rotating outwards (to 4999).

Hence the order is

{2304, 2700, 3692, 4922, **4999**, **0**, 256, 513, 1175, 1401, 1680, 2055}

##### Total Distance (in cylinders):

$$= |2255 - 2304| + |2304 - 2700| + |2700 - 3692| + |3692 - 4922| + |4922 - 4999| + |4999 - 0| \\ + |0 - 256| + |256 - 513| + |513 - 1175| + |1175 - 1401| + |1401 - 1680| + |1680 - 2055|$$

$$= 49 + 396 + 992 + 1230 + 77 + 4999 + 256 + 257 + 662 + 226 + 279 + 375$$

$$= 9798$$

## 6. C-LOOK:

The C-Look Algorithm is similar to the C-SCAN algorithm to some extent. In this algorithm, the arm of the disk moves outwards servicing requests until it reaches the highest request cylinder, then it jumps to the lowest request cylinder without servicing any request, then it again starts moving outwards servicing the remaining requests.

It is different from C-SCAN algorithm in the sense that, C-SCAN forces the disk arm to move till the last cylinder regardless of knowing whether any request is to be serviced on that cylinder or not.

### Order of Cylinders:

{2304, 2700, 3692, 4922, 256, 513, 1175, 1401, 1680, 2055}

### Total Distance (in cylinders):

$$= |2255 - 2304| + |2304 - 2700| + |2700 - 3692| + |3692 - 4922| + |4922 - 256| \\ + |256 - 513| + |513 - 1175| + |1175 - 1401| + |1401 - 1680| + |1680 - 2055|$$

$$= 49 + 396 + 992 + 1230 + 4666 + 257 + 662 + 226 + 279 + 375$$

$$= 9132$$