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IT2060/IE2061

Operating Systems and System Administration

Lecture 09

Mass Storage Scheduling

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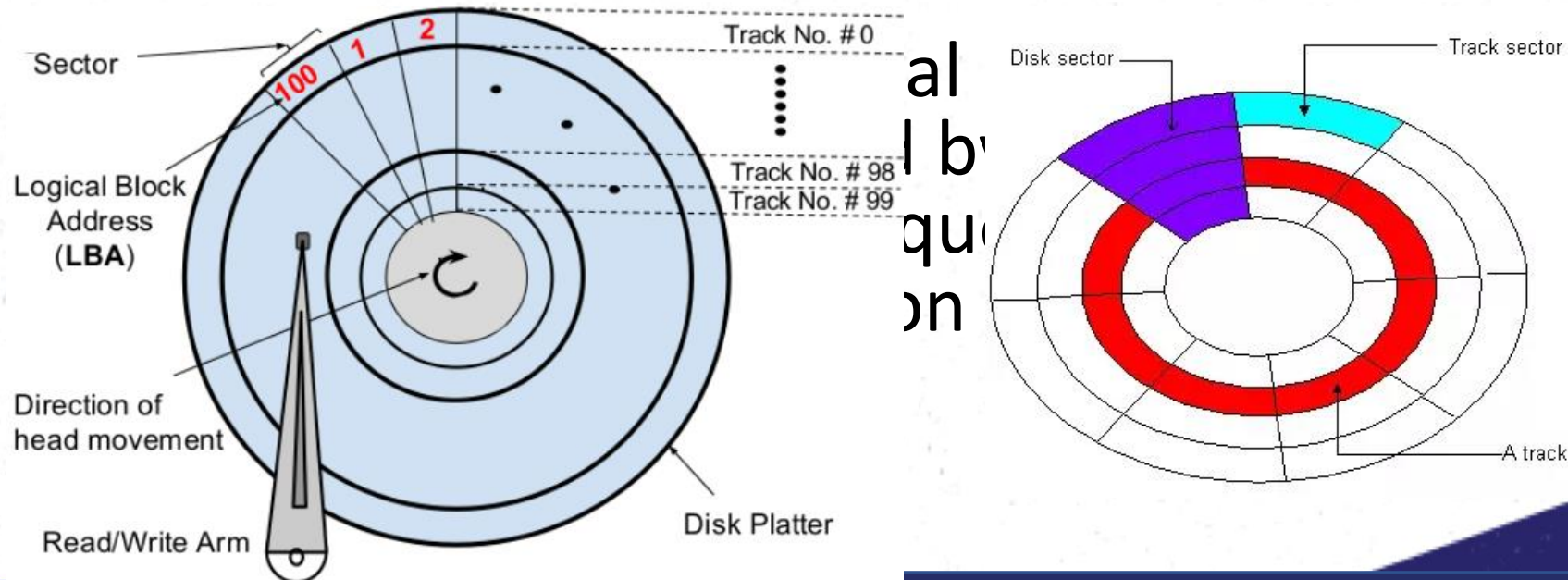
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Disk Scheduling

- The operating system is responsible for using hardware efficiently — for the disk drives, this means having a fast access time and disk bandwidth
- Minimize seek time
- Seek time \approx seek distance



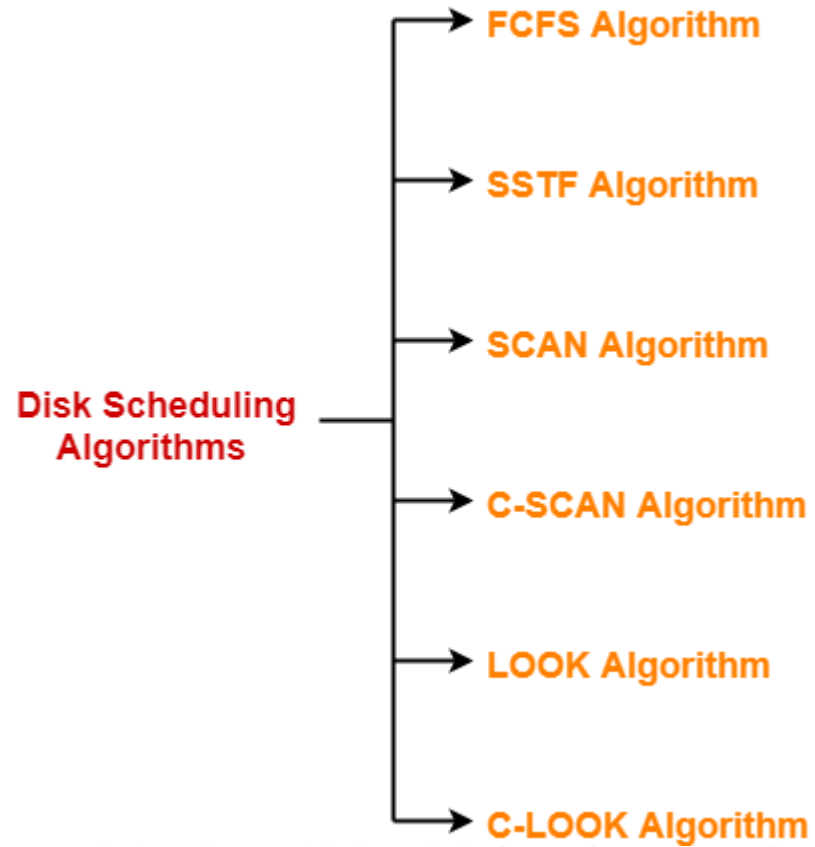
Disk Scheduling (Cont.)

- Note that drive controllers have small buffers and can manage a queue of I/O requests (of varying “depth”)
- Several algorithms exist to schedule the servicing of disk I/O requests
- The analysis is true for one or many platters
- We illustrate scheduling algorithms with a request queue (0-199)

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

Head pointer 53

Disk Scheduling

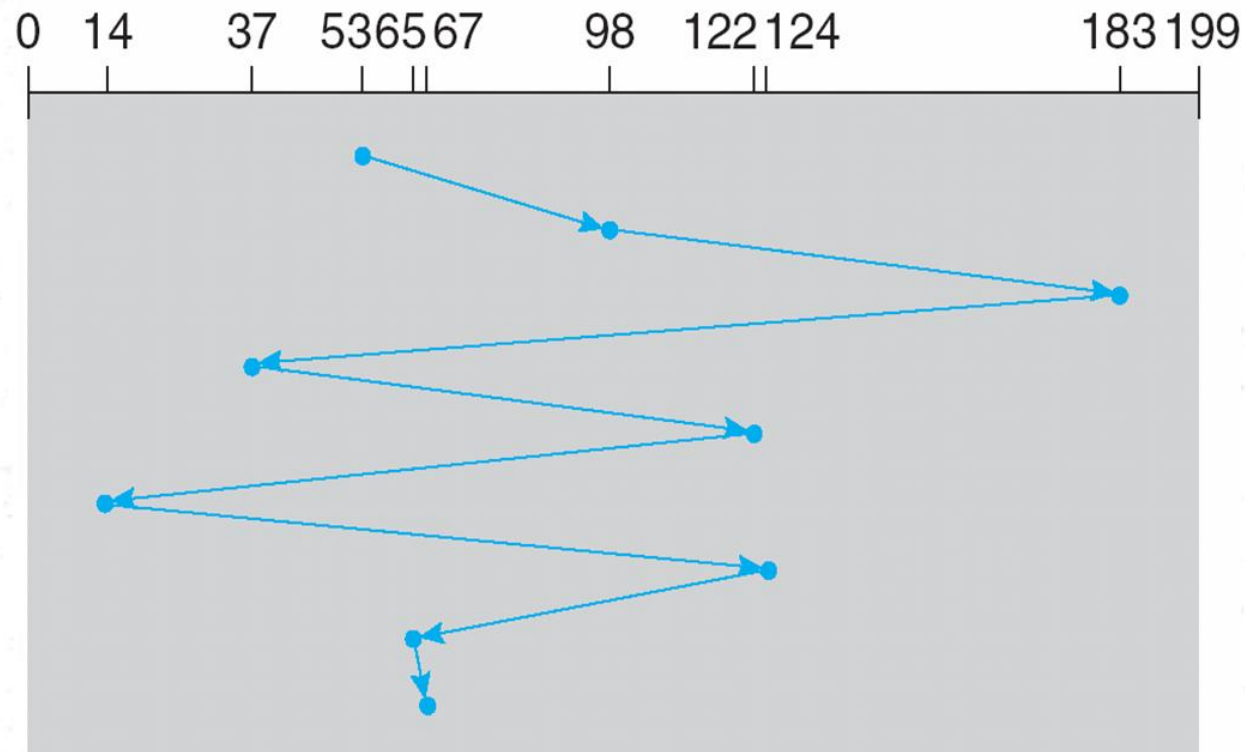


FCFS

Illustration shows total head movement of 640 cylinders

queue = 98, 183, 37, 122, 14, 124, 65, 67

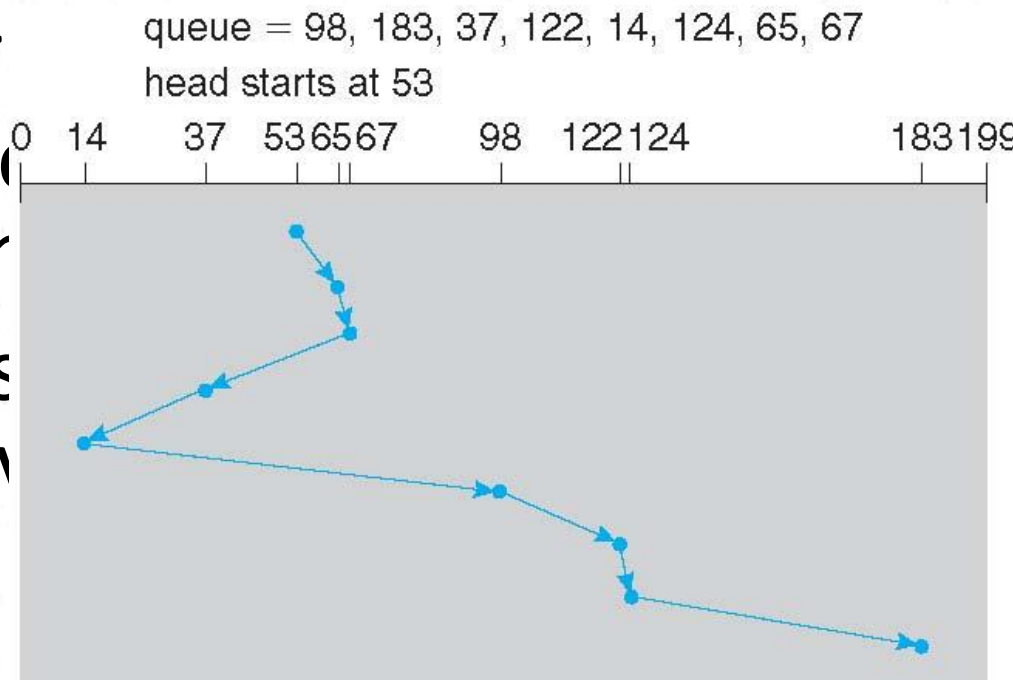
head starts at 53



SSTF

- Shortest Seek Time First selects the request with the minimum seek time from the current head position

- SSTF schedule
- Illustration of movement



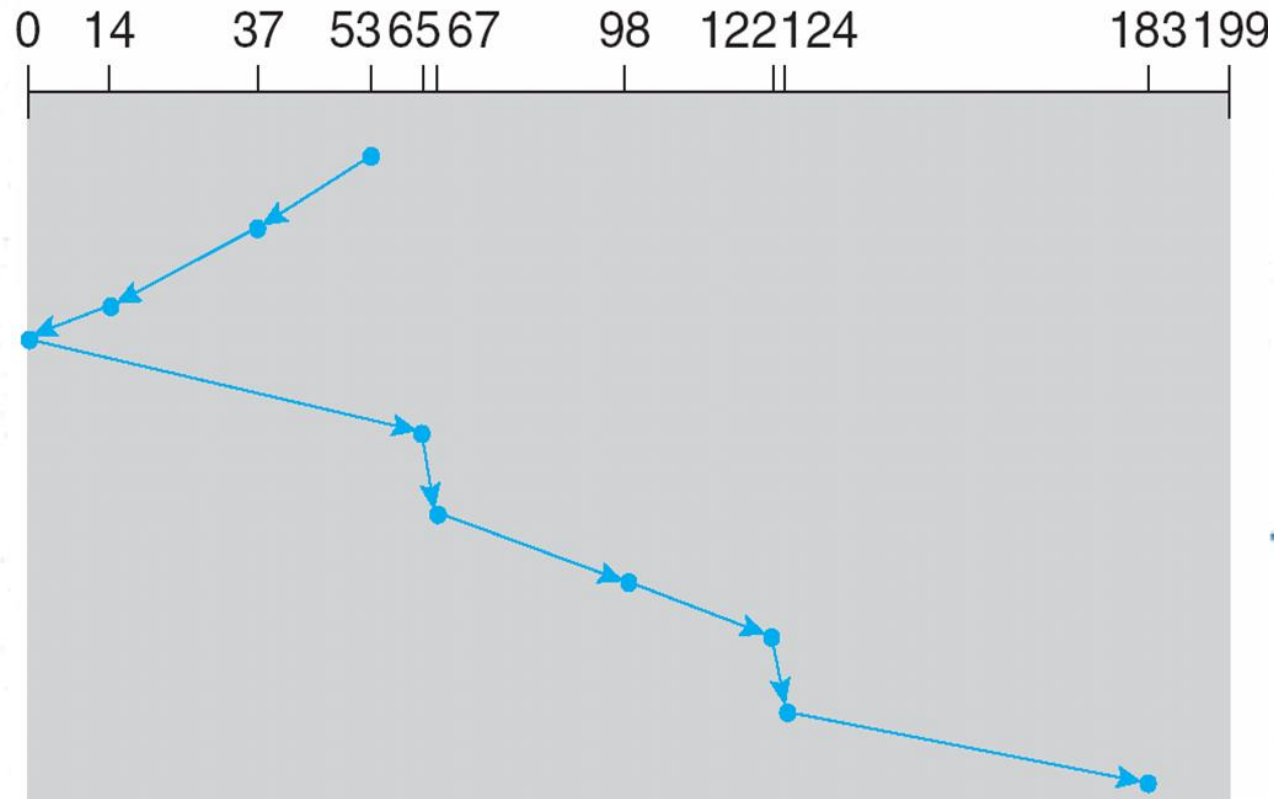
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SCAN

- The disk arm starts at one end of the disk, and moves toward the other end, servicing requests until it gets to the other end of the disk, where the head movement is reversed and servicing continues.
- **SCAN algorithm** Sometimes called the **elevator algorithm**
- Illustration shows total head movement of 236 cylinders
- But note that if requests are uniformly dense, largest density at other end of disk and those wait the longest

SCAN (Cont.)

queue = 98, 183, 37, 122, 14, 124, 65, 67
head starts at 53

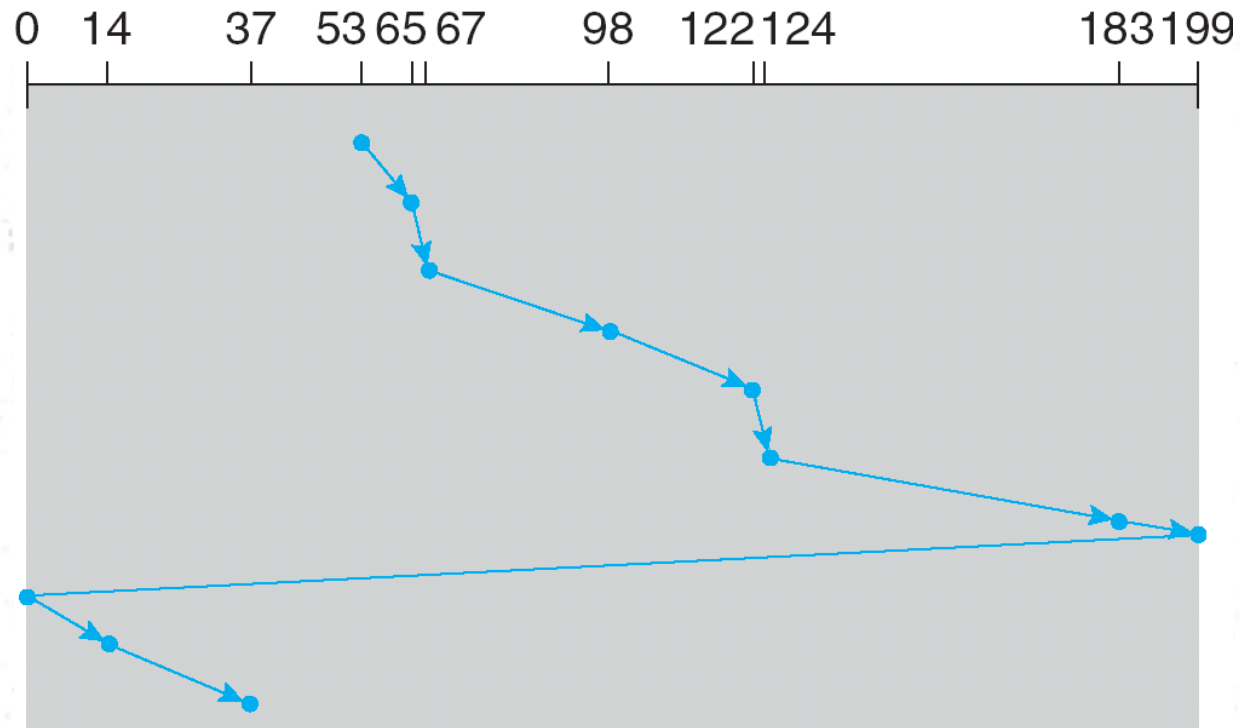


C-SCAN

- Provides a more uniform wait time than SCAN
- The head moves from one end of the disk to the other, servicing requests as it goes
 - When it reaches the other end, however, it immediately returns to the beginning of the disk, without servicing any requests on the return trip
- Treats the cylinders as a circular list that wraps around from the last cylinder to the first one
- Total number of cylinders?

C-SCAN (Cont.)

queue = 98, 183, 37, 122, 14, 124, 65, 67
head starts at 53

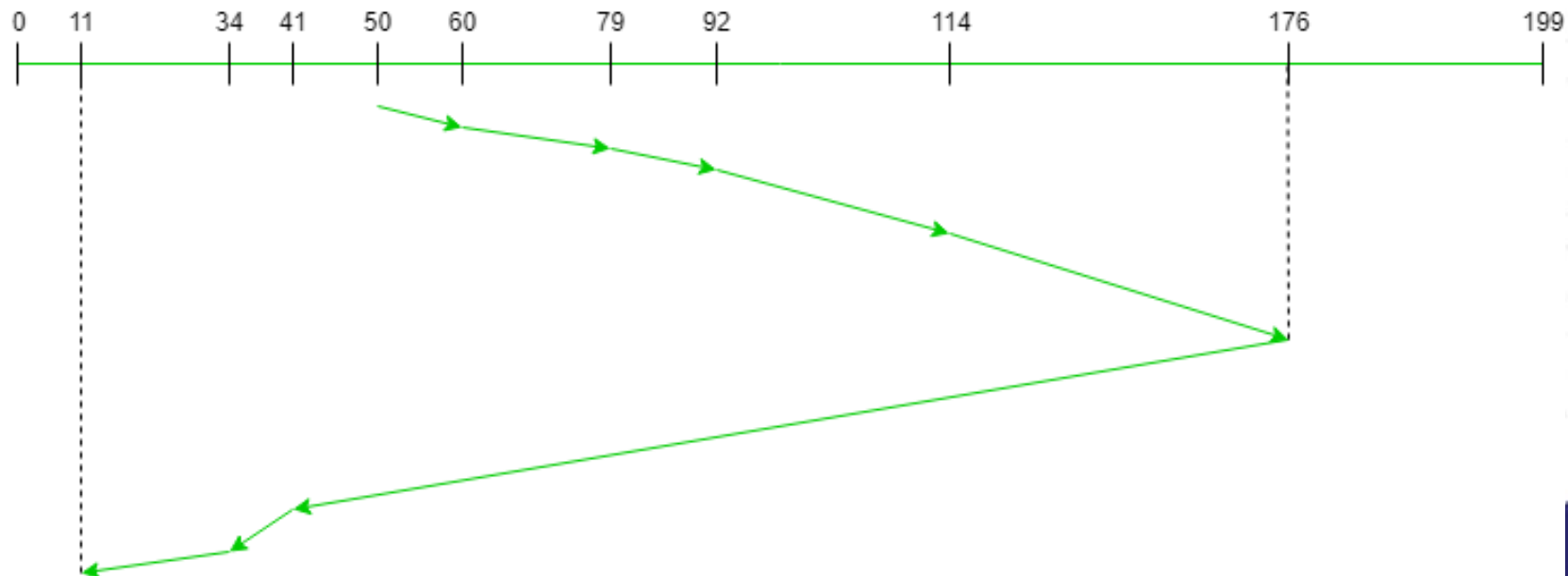


Look Scheduling

Request sequence = {176, 79, 34, 60, 92, 11, 41, 114}

Initial head position = 50 Direction = right (We are moving from left to right)

The LOOK algorithm services request similarly as SCAN algorithm meanwhile it also “looks” ahead as if there are more tracks that are needed to be serviced in the same direction. If there are no pending requests in the moving direction the head reverses the direction and start servicing requests in the opposite direction.



C-LOOK

- LOOK a version of SCAN, C-LOOK a version of C-SCAN
- Arm only goes as far as the last request in each direction, then reverses direction immediately, without first going all the way to the end of the disk
- Total number of cylinders?

C-LOOK (Cont.)

queue = 98, 183, 37, 122, 14, 124, 65, 67
head starts at 53

