CS302
Operating System
Lab 9

Disk Scheduling

May 16th , 2018

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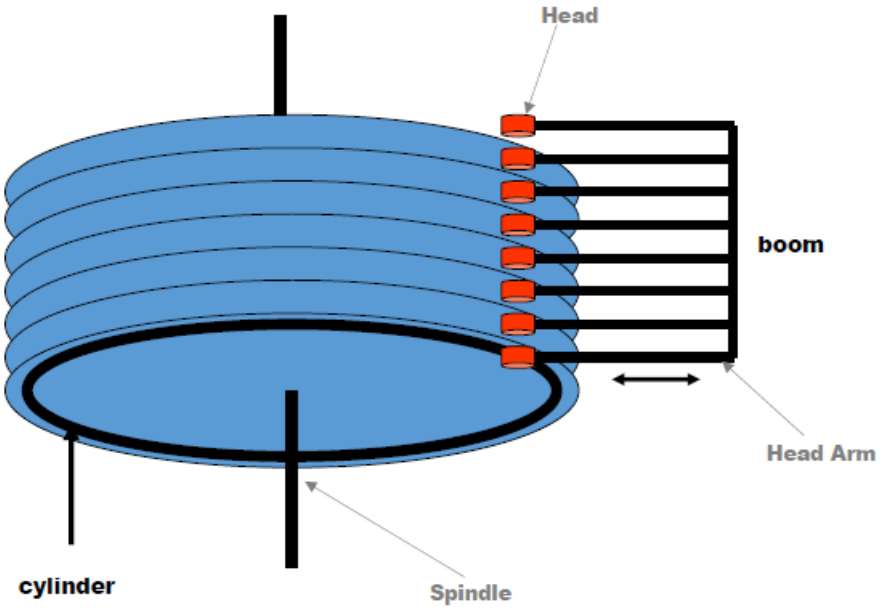
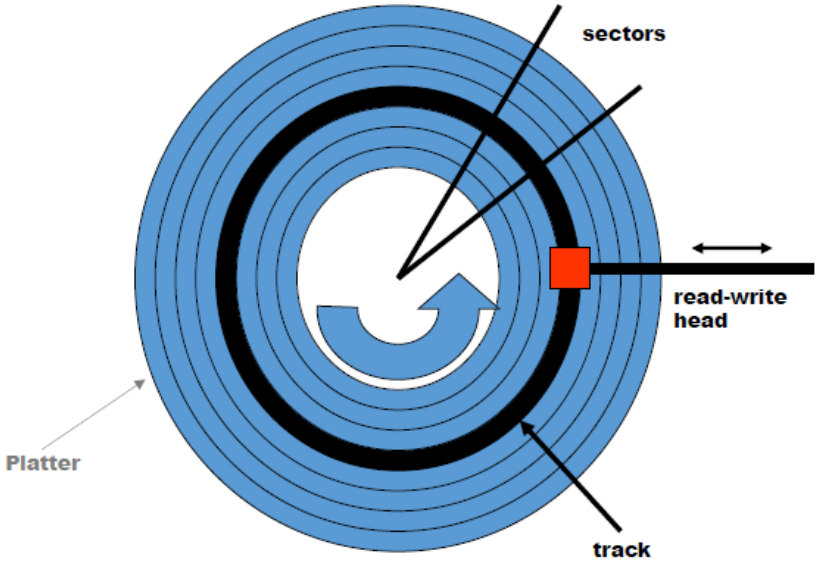
Disk Structure



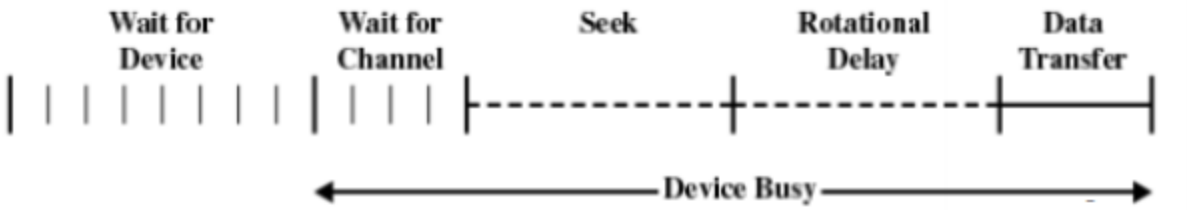


Disk Organization

- Each physical record on the disk has a unique address. The address includes three parts: **Head identifier**, **Track identifier**, **Sector identifier**
- When the disk drive is operating, the disk is rotating at constant speed
- To read or write, the disk head must be positioned on the desired track and the beginning of the desired sector

Performance Parameters

- **Seek time** is the time it takes to position the head on the desired track
- **Rotational delay** or **rotational latency** is the additional time it takes for the beginning of the sector to reach the head once the head is in position
- **Transfer time** is the time for the sector to pass under the head



Disk Scheduling

- Seek time is the reason for differences in performance
- Disk Scheduling Algorithms are used to reduce the total seek time of any request
- I/O request issues a system call to the OS
  - If desired disk drive or controller is available, request is served immediately.
  - If busy, new request for service will be placed in the queue of pending requests.
  - When one request is completed, the OS has to choose which pending request to service next.

Disk Scheduling Algorithms

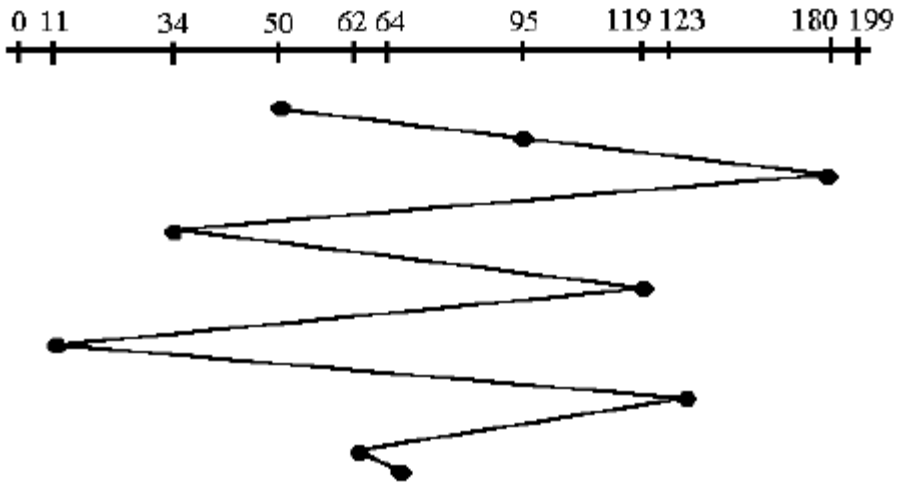
- First Come-First Serve (FCFS)
- Shortest Seek Time First (SSTF)
- Elevator (SCAN)
- Circular SCAN (C-SCAN)
- LOOK
- C-LOOK

Disk Scheduling - FCFS

- **First Come First Serve**
  - Process request sequentially
  - Fair to all processes
  - Approaches random scheduling in performance if there are many processes

Disk Scheduling - FCFS

- Given the following queue:
  - 95, 180, 34, 119, 11, 123, 62, 64
  - with the Read-write head initially at the track 50
  - the tail track being at 199



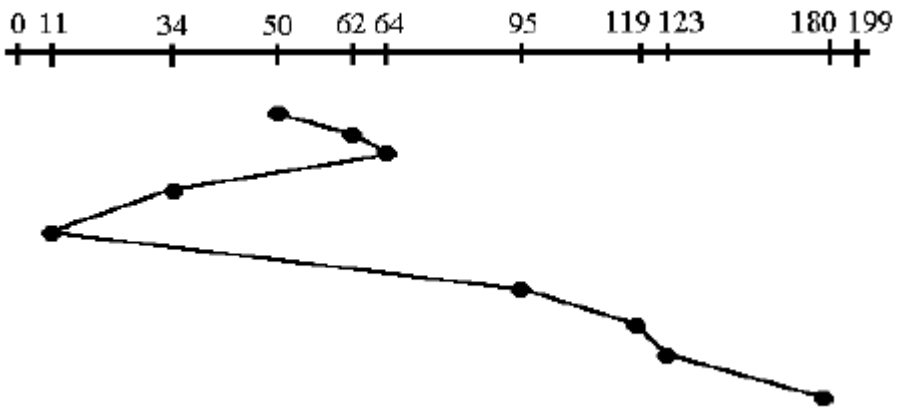
- |50-95|+|95-180|+|180-34|+|34-119|+|119-11|+|11-123|+ |123-62|+|62-64|
- Total: 45+85+146+85+108+112+61+2 = 640

Disk Scheduling - SSTF

- **Shortest Seek Time First (SSTF)**
  - Select the disk I/O request that requires the least movement of the disk arm from its current position
  - Always choose the minimum seek time
  - Requests for tracks far away from the current position may never be served, if requests for closer tracks are issued continuously

Disk Scheduling - SSTF

- Given the following queue:
  - 95, 180, 34, 119, 11, 123, 62, 64
  - with the Read-write head initially at the track 50
  - the tail track being at 199



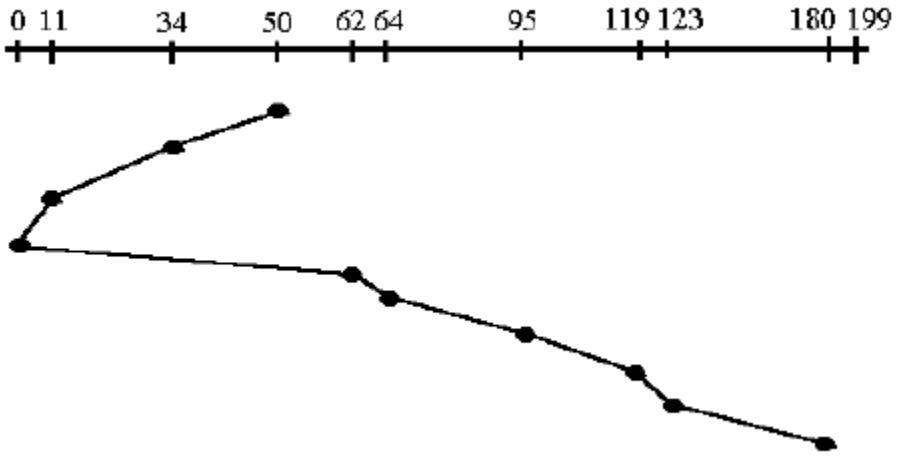
- Total: 236

Disk Scheduling - SCAN

- **SCAN (aka Elevator Algorithm)**
  - Arm moves in one direction only, satisfying all outstanding requests until it reaches the last track in that direction
  - This approach works like an elevator does.

Disk Scheduling – SCAN

- Given the following queue:
  - 95, 180, 34, 119, 11, 123, 62, 64
  - with the Read-write head initially at the track 50
  - the tail track being at 199



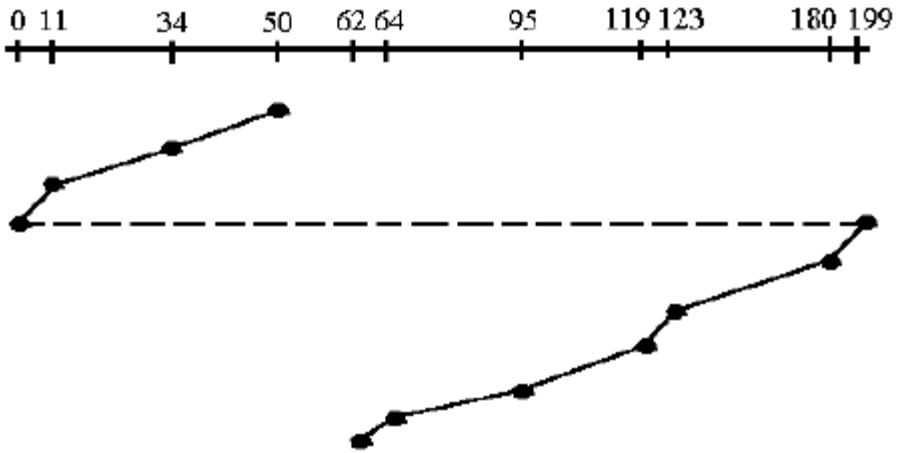
- Total: 230

Disk Scheduling – C-SCAN

- **C-SCAN**
  - Restricts scanning to one direction only
  - When the last track has been visited in one direction, the arm is returned to the opposite end of the disk and the scan begins again

Disk Scheduling – C-SCAN

- Given the following queue:
  - 95, 180, 34, 119, 11, 123, 62, 64
  - with the Read-write head initially at the track 50
  - the tail track being at 199



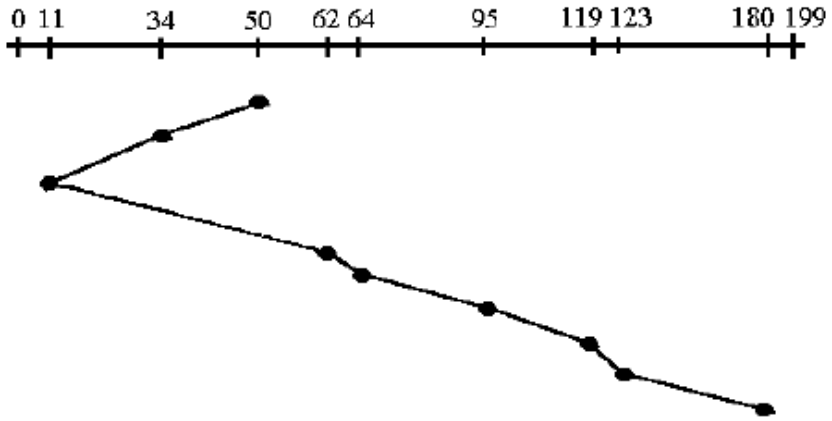
- Keep in mind that the huge jump doesn't count as a head movement.
- Total: 187

Disk Scheduling – LOOK

- **LOOK**
  - This is just an enhanced version of SCAN.
  - The magnetic arm only moves to the furthest requested position.

Disk Scheduling – LOOK

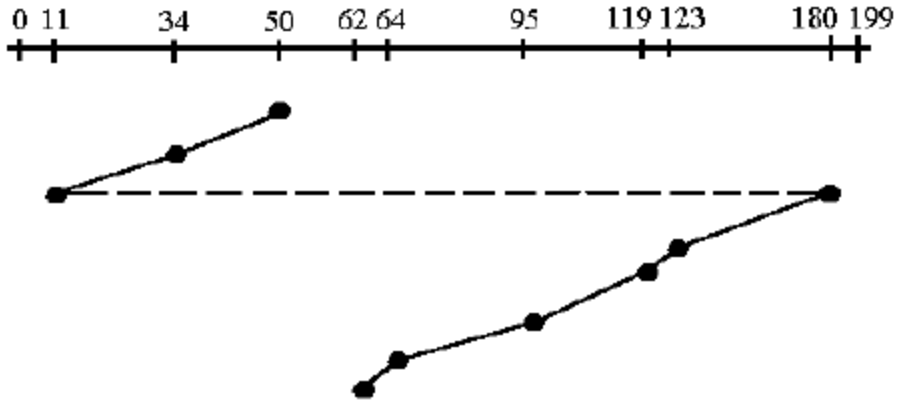
- Given the following queue:
  - 95, 180, 34, 119, 11, 123, 62, 64
  - with the Read-write head initially at the track 50
  - the tail track being at 199



- Total: 208

Disk Scheduling – C-LOOK

- **C-LOOK**
  - This is just an enhanced version of C-SCAN.
  - It too jumps to the other end but not all the way to the end. Just to the furthest request.



- C-SCAN had a total movement of 187, but this scan (C-LOOK) reduced it down to 157 tracks.

Lab Requirement

- Write or Complete the code, so that it can run SSTF, SCAN, C-SCAN, LOOK, C-LOOK algorithm.
- Package should be named as: OS_lab9_Name_xxxxxxxx where xxxxxxxx is your student id, Name is your name. This package should contain: your report, your code.
- Check blackboard for ddl.

Thanks