

Lecture 38 - File Systems: Disk Scheduling

CprE 308

April 16, 2014

Intro

Today's topics:

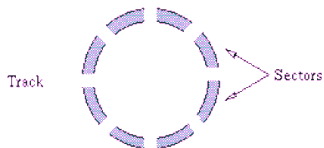
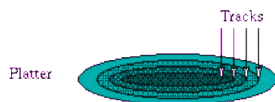
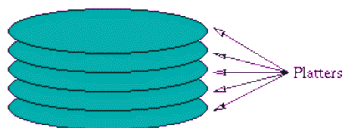
- Disk Scheduling (Section 5.4.3)

Disk Scheduling

Disk Scheduling

- In multiprogramming systems several different processes may want to use the system's resources simultaneously.
- The disk drive needs some mechanism to resolve this contention, sharing the resource between the processes fairly and efficiently.

Disk Parts



Disk scheduling goals

- In order to satisfy an I/O request the disk controller must first move the head to the correct track and sector.
- Maximize the number of I/O requests
- Minimize the movement of the head.

Disk scheduling goals

- trade-off between **throughput** (the average number of requests satisfied in unit time)
- and **response time** (the average time between a request arriving and it being satisfied)
- Disk Scheduling Policies

FCFS

- The disk controller processes the I/O requests in the order in which they arrive
- This policy aims to minimize response time with little regard for throughput
- The head may move almost randomly across the surface of the disk

Practice

- Assume that a disk has 100 cylinders labeled 0-99. The read head is positioned over the cylinder 50 moving toward the cylinder 99. Accessing data requires 5 time units, moving from one cylinder to the next requires 1 time unit. The incoming requests arrive as follows:
 - Arrive time: 0 15 32 40 55 63 123
 - Cylinder: 10 35 78 92 60 75 40
- What is the order of the requests which will be serviced by FCFS disk scheduling algorithm? Each request is labeled by the cylinder it accesses.

Shortest Seek Time First (SSTF)

- Each time an I/O request has been completed the disk controller selects the waiting request whose sector location is **closest** to the **current** position of the head.
- time spent in movement is minimized
- but a request may be delayed for a long period if many closely located requests arrive just after it

SCAN

- The drive head sweeps across the entire surface of the disk
- visiting the outermost cylinders before changing direction and sweeping back to the innermost cylinders
- It selects the next waiting requests whose location it will reach on its path backwards and forwards across the disk.
- movement time should be less than FCFS
- the policy is clearly fairer than SSTF

LOOK

- Similarly to SCAN, the drive sweeps across the surface of the disk, satisfying requests, in alternating directions.
- a sweep out towards the outer edge of the disk will be reversed when there are no waiting requests for locations beyond the current cylinder.

(Circular SCAN) C-SCAN

- C-SCAN is similar to SCAN but I/O requests are only satisfied when the drive head is traveling in one direction across the surface of the disk.
- Go from the innermost cylinder to the outermost cylinder satisfying the waiting requests
- When it reaches the outermost cylinder it sweeps back to the innermost cylinder without satisfying any requests.