

C502 – Operating Systems Tutorial *

Disk Management

1. Briefly describe each of the following terms with respect to disk management:

- (a) Low-level format
- (b) Seek Time
- (c) SCAN scheduling
- (d) C-SCAN scheduling

(Exam question in 2016-17).

2. Suppose that the current position of the disk arm is over cylinder 200. The disk request queue contains requests for sectors on the following cylinders: 400, 20, 19, 74, 899

In which order will the requests be handled under:

- (a) the FCFS disk head scheduling policy?
- (b) the SSTF policy?
- (c) the SCAN policy?
- (d) the C-SCAN policy?

Briefly describe the policies and their respective trade-offs.

3. Consider the following parameters describing a disk:

Parameter	Description
C	Number of cylinders
T	Number of tracks per cylinder (number of platters)
S	Number of sectors per track
R	Rotational velocity (rotations per second)
B	Number of bytes per sector

In terms of these parameters, how many bytes of data are on each disk cylinder?

Assume that you are designing a disk drive, and you hope to reduce the expected rotational latency for requests from the disk. Which of the parameters above would you attempt to change, and in what way would you change them?

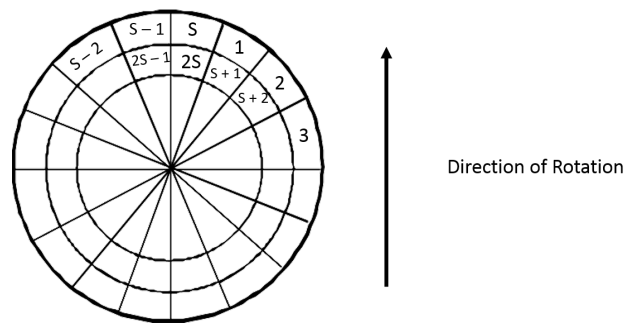
Suppose you wanted to reduce the disk's data transfer time – which parameters would you attempt to change?

4. A disk drive has S sectors per track and C cylinders. For simplicity, we will assume that the disk has only one, single-sided platter, i.e., the number of tracks per cylinder is one. The platter spins at R rotations per millisecond. The following function gives the relationship between seek distance d, in cylinders, and seek time, t_{seek} , in milliseconds:

$$t_{seek} = \begin{cases} 0 & \text{if } d = 0 \\ 5 + 0.05 * d & \text{if } 0 < d \leq C \end{cases}$$

The sectors are laid out and numbered sequentially, starting with the outer cylinder, as shown in the diagram below.

*with thanks to Morris Sloman



- (a) Suppose the disk read/write head is located over cylinder 10. The disk receives a request to read sector S . What is the expected service time for this request?
- (b) Exactly d milliseconds after completing the request for S , the disk receives a request for sector $S + 1$. What is the expected service time for this request?

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