

# SUSTech CS302 OS Lab10 Report

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Title: Disk Scheduling Algorithm

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Experimental Environment: Linux

## Experiments:

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### 1. Fundamentals:

- According to unit data read mode, I/O devices can be classified as (1) **Sequential** (2) **Random** (3) **Interrupt**.
- I/O control methods can be classified as (1) **I/O Interrupt** (2) **Polling**
- Each physical record on the disk has a unique address that consists of three parts: (1) **Head identifier** (2) **Track identifier** (3) **Sector identifier**
- Data READ/WRITE time = (1) **Seek time** + (2) **Rotation delay** + (3) **Transfer time**
- The metric for measuring I/O performance are (1) **Latency**, (2) **Throughput**
- What are the work steps of the DMA controller? Please answer it and briefly describe the process of each step.
  1. Device driver is told to transfer disk data to buffer at address X.
  2. Device driver tells disk controller to transfer C bytes from disk to buffer at address X.
  3. Disk controller initiates DMA transfer.
  4. Disk controller sends each byte to DMA controller.
  5. DMA controller transfers bytes to buffer X, increasing memory address and decreasing C until C = 0.
  6. When C = 0, DMA interrupts CPU to signal transfer completion.

### 2. Application

- **If the C-SCAN algorithm is used to read the six sectors,**
  - Write the track access sequence  
 $100 \rightarrow 120 \rightarrow 20 \rightarrow 30 \rightarrow 60 \rightarrow 70 \rightarrow 90$
  - How much time is required in total? The calculation process is required.

Time needed to read a sector is  $60/12000/100 * 1000 = 0.05ms$ . To read the sector, we may have to access 1, 2, ... 100 sectors. On average, it takes  $0.05 * 50 = 2.5ms$ . Total load time  $T_{load} = 2.5 * 6 = 15ms$ .

Head movement time is  $T_{move} = (199 - 100) + (90 - 0) = 189ms$

Total time  $T_{total} = T_{load} + T_{move} = 15 + 189 = 214ms$ .

- **If using SSD, which scheduling algorithm do you think should be used? Explain why.** FCFS should be used.

Reason: SSDs don't have seek time and rotational delay. FCFS provides as good performance as other algorithms.

### 3. Programming

Read the OS\_lab10\_DiskScheduling\_guide\_en.docx, finish Five Disk Schedule Algorithms (SSTF, SCAN, C-SCAN, LOOK, and C-LOOK) and fill the following table.

Algorithm/Test	1.in	2.in	3.in
FCFS	676	22173758	215124803
SSTF	554	102429	95951
SCAN	850	93760	95987
C-SCAN	542	65445	65529
LOOK	508	93744	95951
C-LOOK	367	65301	65505