SUSTech CS302 OS Lab10 Report

Title: Disk Scheduling Algorithm

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Experimental Environment: linux

Objective: (1) Understand the structure of the disk (2) Understand the organization of the data storage on the disk (3) Master the common disk scheduling algorithm and algorithm characteristics

Deadline: 11:59 AM, 2019-05-17

Summit by: Blackboard

Task:

Task 1. Understand the details and ideas of different disk scheduling algorithms

Task 2. Write a simulation program

Experiments:

1. Fundamental(23 points, 1 point/blank):

a) According to unit data read mode, I/O devices can be classified as(1)byte I/O.(2)block I/O (3).

b) I/O control methods can be classified as (1)Programmed control(2)DMA control.

c) Each physical record on the disk has a unique address that consists of three parts: (1)track (2)sector (3)head.

d) Data READ/WRITE time = (1)Seek time + (2) Rotational delay +(3)Transfer time .

e) The metric for measuring I/O performance are (1)Response Time, (2)Throughput

f) What are the work steps of the DMA controller? Please answer it and briefly describe the process of each step.(10 points)

   a) Device driver is told to transfer disk data to buffer at address.

   b) Device diver tells disk controller to transfer C bytes from disk to buffer at address X.

   c) Disk controller initiates DMA transfer.

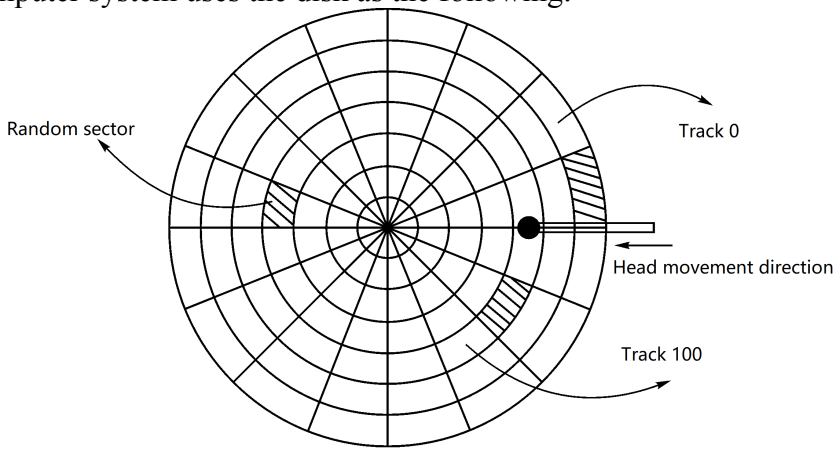
   d) Disk controller sends each byte to DMA controller.

   e) DMA controller transfers bytes to buffer X, increasing memory address and decreasing C until C = 0

   f) When C=0, DMA interrupts CPU to signal transfer completion.

2. Application(17 points):

Suppose the computer system uses the disk as the following:



Let a single-sided disk rotation speed be 12000r/min, each track has 100 sectors, 200 tracks in total, and the average movement time between adjacent tracks is 1 ms.

If at some point, the head is located at track 100 and moves in the direction in which the track number increases, the track number request queue is 70, 90, 30, 120, 20, 60. For each track in the request queue, a randomly distributed sector is read.

a) If the C-SCAN algorithm is used to read the six sectors,

(1) Write the track access sequence (2 points)

100->120->199->0->20->30->60->90

(2) How much time is required in total? The calculation process is required. (8 points).

b) If using SSD, which scheduling algorithm do you think should be used, and explain why? (7 points)

Time to scan a sector: (2pi/2)*(24000pi/min) = 2.5ms (for average sector hit)

99+90+2.5*6 = 204ms

3. Programming (60 points):

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.

Running results: (Fill in the total distance the head moves)

Algorithms/Test	1.in	2.in	3.in
FCFS	1947	29170741	303424274
SSTF	554	102429	95951
SCAN	850	93760	95987
C-SCAN	542	65445	65535

LOOK	508	93744	95951
C-LOOK	367	65301	65511

Lab Conclusion: