SUSTech CS302 OS Lab10 Report

Title: Disk Scheduling Algorithm

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Time: 2019/May/17

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) Block Devices (2) Character Devices (3) Network Devices

b) I/O control methods can be classified as (1)_Programmed IO_____(2)_Direct memory access_____.

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

d) Data READ/WRITE time = (1) seek time_ + (2) rotation time +(3)transfer time.

e) The metric for measuring I/O performance are (1) Latency (2) Bandwidth

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

1. Program makes I/O request to device

2. CPU does initiation routine :

use programmed I/O (stores) to set up control regs

3. I/O device interface does transfer :

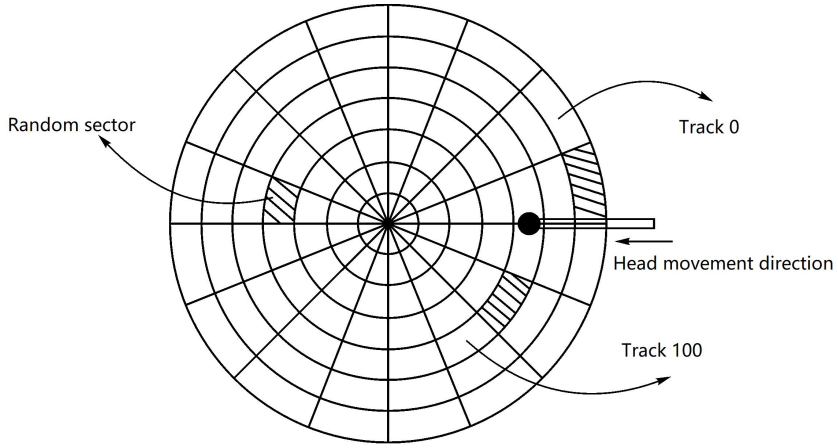
DMA controller access the disk directly and move it to the memory

4. CPU ISR runs completion routine :

check for errors, retry if necessary , notify program that transfer is done

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, 60, 70, 90

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

seek time:

- move from 100 to 199: 99 ms
- move from 0 to 90: 90ms

rotation time:

6 / 12000 * 60 * 1000 = 30 ms

total: 219 ms

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

FCFS

Because the time of seeking in SSD is negligible. And the scheduling algorithm is aimed to reduce the seek time.

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	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

Lab Conclusion:

Learn the disk schedule algorithm