Programming Assignment 4: Disk Scheduling Algorithms

Due June 7, 2024

Write a program that implements the following disk-scheduling algorithms:

a. FCFS
b. SSTF
c. SCAN
d. C-SCAN
e. LOOK
f. CLOOK
g. Optimal (minimizes the total latency / distance the head needs to travel).

Your program will service a disk with 5,000 cylinders numbered 0 to 4,999. The program will generate a random series of 1,000 cylinder requests and service them according to each of the algorithms listed above. The program will be passed the initial position of the disk head (as a parameter on the command line). You can assume the disk head starts at 0.

Note: Disk head movement only refers to the change from one cylinder to another. The disk head does not move when reading a cylinder or waiting for the cylinder to rotate to a specific sector in a cylinder.

Note: You may assume all requests arrive at the same time.

For this program you will need to compute:

1) Compute the total amount of head movement required by each algorithm.
2) Assume 1ms for every 100 cylinders the head needs to move. Compute the average latency for each algorithm.

Design document items:

Be sure to address the following questions:

1) What does each algorithm do? Describe its behavior.
2) What is the objective / goal of each algorithm?
3) What are the strengths and weaknesses of each disk-scheduling algorithm?
4) What is the average latency of each algorithm (assume 1ms for every 100 cylinders)?
5) What is the total head movement required for each algorithm?
6) Think about each algorithm, when would you use one algorithm versus another? List 2 applications where each algorthm would perfom best.

What to turn in

A compressed tar file of your project directory, including your design document. You must do "make clean" before creating the tar file. In addition, include a README file to explain anything unusual to the TA — testing procedures, etc. Your code and other associated files must be in a single directory so they'll build properly in the submit directory.

REMEMBER: *Do not* submit object files, assembler files, or executables. Only submit source files and the design document(s).