Operating Systems (Comp Sci 3SH3), Fall 2024
Prof. Neerja Mhaskar
Assignment 5 [40 points]
Due by 11:59pm on December 5th, 2024

- **No late assignment accepted, unless an MSAF is provided**
- **If an MSAF is provided, then you will get 5 days extension on the assignment.**
- It is advisable to start your assignment early.
- Make sure to submit a version of your assignment ahead of time to avoid last minute uploading issues.
- Note that students/groups copying each other's solution will get a zero.
- The assignment should be submitted on Avenue under Assessments -> Assignments -> Assignment 4 -> [Group #] folder.
- In your C programs, you should follow good programming style, which includes providing instructive comments and well-indented code. If this is not followed, marks will be deducted.
- **If working in a group of two, a `Readme` file containing information on your individual contributions should be provided.**
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**Deliverables:**
1. assignment5.c - You are to provide your solution to this assignment as a single C program named assignment5.c.

You are to write a C program that implements the following disk scheduling algorithms:

a. FCFS [5 marks]
b. SSTF [10 marks]
c. SCAN [10 marks]
d. C-SCAN [5 marks]
e. LOOK [5 marks]
f. C-LOOK [5 marks]

Your program will service a disk with **300** cylinders numbered **0 to 299**. The program will service the requests (a list of 20 cylinder numbers) given in the file **request.bin**. This file can be downloaded from Assessments -> Assignments -> Assignment V folder. This file contains (4 byte) integer values representing requests ranging from 0 − 299. Your program will take the initial position of the disk head as the **first command line argument** and the direction of the head as the **second command line argument**. It will then output the requests in the order in which they are serviced, and the total amount of head movements required by each algorithm.

In particular, your program needs to do the following:

1. Your program should take two command line arguments
   a. First command line argument - initial position of the disk head (an integer value)
   b. Second command line argument - direction of the head (LEFT or RIGHT)
2. Read the requests from the binary file (`requests.bin`) and store these requests in an integer array (for example: `requests`), after which you need to close the file.
3. Write functions for each disk scheduling algorithm.
4. The FCFS and SSTF algorithms will service requests present in the `requests` array.
5. Since the requests are serviced in **an order** by the SCAN, C-SCAN, LOOK and C-LOOK algorithms, you will need to first sort the requests in the `requests` array in an increasing order and store the sorted requests in another integer array (for example: `sortedrequests`). These algorithms will then service the requests in the `sortedrequests` array and compute the head movements.
6. You can use any sorting algorithm of your choice. If you use the code for sorting that is not your own, make sure to cite it properly.
7. Your program should output the following (see sample output given below):
   a. Requests in the order in which they are serviced by each algorithm.
   b. Total amount of head movement incurred by each algorithm while servicing all the requests.

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Sample Output: **/.assignment5 100 LEFT**
See outputLeft.txt (This file can be found in Assessments -> Assignments -> Assignment 5 folder)
Sample Output: **/.assignment5 100 RIGHT**
See outputRight.txt (This file can be found in Assessments -> Assignments -> Assignment 5 folder)