Programming Assignment 3 [30 pts]

COMP4270/6270 Operating Systems – Spring'20

Due 4/24/2020

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1. [5 pts] Write a C program that creates a table consisting of 1,000 randomly generated 3-tuple entries where each entry consists of processID, arrivalTime, and burstTime. The processID should be a "unique" 3-digit positive integer (e.g., 382, 881, 923, etc.). The arrivalTime should be an integer randomly picked from a range of values between 1 and 1,000. Note that the arrival times of two processes can be the same. The burstTime is an integer randomly picked from a range of values between 1 and 500. Your program should print out the table. An example output of your program would look something like:

processID	arrivalTime	burstTime
839	1	83
228	4	20
102	3	30
…		

2. [10 pts] Using the code for Problem 1, write a C program that simulates the first come first served (FCFS) algorithm and calculates the average waiting time. If the arrival times are the same use the unique processID to break the tie by scheduling a process with a smaller ID first. Run this program 1,000 times. Note that each time you run this program, a new table should be generated, and thus, the average waiting time would be different. An example output would look like this.

Average waiting time for FIFO

12.2

13.3

15.2

…

3. [10 pts] Using the code for Problems 1 and 2, write a C program that simulates both the first come and first served (FCFS) and shortest job first (SJF) algorithms. In this problem, you will compare the performance of the two algorithms. Therefore, your program should calculate the

average waiting times for both algorithms for the same table. Note here again that the same table should be used for both algorithms. Run your program 1,000 times. Note that each time you run this program, a new table should be generated (but the same table for running both algorithms). An example output would look like this.

FIFO SJF

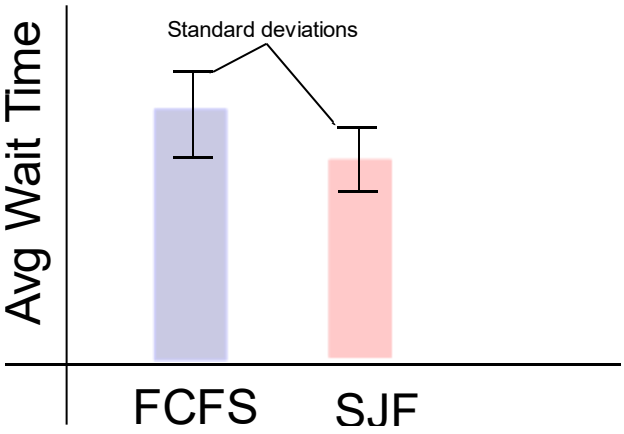
10.1 9.1

19.1 12.3

20.4 15.2

…

4. [5 pts] Write a report that analyzes the performance of the two algorithms. In your analysis, include a graph that visually represents the performance difference. For example,



The mean average waiting time for SFJ was … and the standard deviation was … SJF performs better than FCFS by X% in terms of the average waiting time. The reason is that …

Files to submit:

- Firstname_p1.c
- Firstname_p2.c
- Firstname_p3.c
- Firstname_report.docx (or Firstname_report.pdf)