

School of Computer Science

Operating Systems and Concurrency (G52OSC) Coursework:

Implement a scheduler program in C Language for the following process scheduling algorithms.

- (i) First Come First Served (FCFS)
- (ii) Round Robin (RR)
- (iii) Multi-Level Feedback Queue (MLFQ) with two queues.

Part A (Software Part) - 30%

After the implementation, perform the following experimental evaluation of the schedulers using three workloads. Each workload executes a certain process mix and compare the average waiting time and the average turnaround time for the above schedulers (i) and (ii) that have been implemented. Workload (necessary details to run a particular scheduler algorithm) be given during the run time (don't use the fixed workload (data) in your program).

For the First Come First Served (FCFS) scheduler: Each process on the ready queue to run for their burst time.

For the Round Robin scheduler: Each process on the ready queue is run in turn for a fixed time quantum. A process whose time quantum has expired must be taken off the CPU (preemption).

For the Multi-Level Feedback Queue (MLFQ) with two queues:

Make use of two ready queues. The first queue is meant to be used for interactive processes and is scheduled using RR. The second queue is scheduled using FCFS. The New processes enter the system through the first queue. If a process exhausts its time quantum it is demoted to the second queue. There is no ageing and therefore no rule is implemented for process promotion. Note that you can re-use the implementations of FCFS and RR in in your implementation of MLFQ . Any process that is ready in the "interactive" RR queue gets precedence over the lower priority FCFS queue. Finally, implement process demotion. All processes start in the "interactive" queue. Once a process has used its full time quantum, demote the process to the lower priority FCFS queue. At the end display both queues with its current processes.

Note:

Your program should allow the user to enter the the necessary input and show the following results using the above scheduling algorithms (i) and (ii).

The turnaround time for a process is the difference between a job's submission and completion times. The average turnaround time reports the average for the set of processes that were scheduled.

The waiting time for a process reflects the total amount of time spent by that process in the ready queue. The average waiting time reports the average for the set of processes that were scheduled.

The throughput for a scheduling algorithm (i) and (ii) measures the total number of tasks processes per unit of time.

Total Weightage: 50% (Software part 30% + Report 20%)

Software Part: 30%

1. First Come First Served (FCFS) – 5%
2. Round Robin (RR) -10%
3. Multi-Level Feedback Queue (MLFQ) with two queues - 15%

Part B (Writing Report) - 20%

Your Report should include the following information (referring your program result based on your input):

- (1) Which scheduler is preferred for each workload and why?
- (2) Determine the average waiting time and the average turnaround time for the different workloads when running under the different schedulers.
- (3) What is the influence of different time quantum settings in RR on the average waiting time and on the interactivity of the system?
- (4) How would you tune the MLFQ scheduler? What time quantum works best?

(Note: To answer the above questions, you may cut and paste of your original code (not all but a portion of a code not more than a A4 page will do) from your program to answer this question. (OR) You can also use the pseudocode or by using an algorithm for your explanation. Good to refer your own program code for any of your answer)