

College of Engineering Technology

***Computer Science Department***

**Comp431 Final project-S21 Due: midnight 12/6/2022**

**Programming Project CPU Scheduling**

**Implement the** **following 3 CPU scheduling algorithms**

* Simulate and evaluate each with the set of eight processes below.
* You can use C or JAVA programming language.
* Your code will be tested against Turnitin program.
* Submit your project by replying to the message “**431-Project-S21**”.
* No project will be accepted after the deadline or by any other mean such as Email or Ritaj memo.

1. **FCFS.**
2. **SJF non-preemptive**
3. **MLFQ**

**Multilevel Feedback Queue (absolute priority in higher queues)**

Queue 1 uses RR scheduling with Q = 5

Queue 2 uses RR scheduling with Q = 10

Queue 3 uses FCFS

All processes enter first queue 1. If the time quantum (Q) expires before CPU burst is complete, the process is downgraded to next lower priority queue. Processes are not downgraded when their CPU burst is finished before the (Q) expires by a higher queue. Once a process has been downgraded, it will not be upgraded.

**Assumptions:**

1. All processes are activated at time 0
2. After completing an I/O event, a process is transferred to the ready queue.
3. Waiting time is accumulated while a process waits in the ready queue.
4. Turnaround time is a total of (Waiting time) + (CPU burst time) + (I/O time)
5. Response time is the first measure of waiting time from arrival at time 0 until the first time on the CPU.

**Process Data**:

Process goes {CPU burst, I/O time, CPU burst, I/O time, CPU burst, I/O time,…….., last CPU burst}

**P1 {5, 27, 3, 31, 5, 43, 4, 18, 6, 22, 4, 26, 3, 24, 4}**

**P2 {4, 48, 5, 44, 7, 42, 12, 37, 9, 76, 4, 41, 9, 31, 7, 43, 8}**

**P3 {8, 33, 12, 41, 18, 65, 14, 21, 4, 61, 15, 18, 14, 26, 5, 31, 6}**

**P4 {3, 35, 4, 41, 5, 45, 3, 51, 4, 61, 5, 54, 6, 82, 5, 77, 3}**

**P5 {16, 24, 17, 21, 5, 36, 16, 26, 7, 31, 13, 28, 11, 21, 6, 13, 3, 11, 4}**

**P6 {11, 22, 4, 8, 5, 10, 6, 12, 7, 14, 9, 18, 12, 24, 15, 30, 8}**

**P7 {14, 46, 17, 41, 11, 42, 15, 21, 4, 32, 7, 19, 16, 33, 10}**

**P8 {4, 14, 5, 33, 6, 51, 14, 73, 16, 87, 6}**

For example. Simulation completed for FCFS (see results in table below).

**Output of your Project:**

***I want to see two tables as shown below.***

Write the simulation program in a programming language (such as C, Java).

Table of results comparison (SJF, FCFS, MLFQ)

**Table of results comparison (SJF, FCFS, MLFQ)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **SJF** | **FCFS** | **MLFQ** |
| CPU utilization |  | 85.34% |  |
| Avg Waiting time (AWT) |  | 185.25 |  |
| Avg Turnaround time (ATAT) |  | 521.37 |  |
| Avg Response time (ART) |  | 24.37 |  |
| **Table of details for the running processes** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SJF CPU utilization:** | | | | **FCFS** **CPU utilization:** 85.34% | | | | **MLFQ** **CPU utilization:** | | | |
|  | ***WT*** | ***TAT*** | ***RT*** |  | ***WT*** | ***TAT*** | ***RT*** |  | ***WT*** | ***TAT*** | ***RT*** |  |
| P1 |  |  |  | 170 | 395 | 0 |  |  |  |
| P2 |  |  |  | 164 | 591 | 5 |  |  |  |
| P3 |  |  |  | 165 | 557 | 9 |  |  |  |
| P4 |  |  |  | 164 | 648 | 17 |  |  |  |
| P5 |  |  |  | 221 | 530 | 20 |  |  |  |
| P6 |  |  |  | 230 | 445 | 36 |  |  |  |
| P7 |  |  |  | 184 | 512 | 47 |  |  |  |
| P8 |  |  |  | 184 | 493 | 61 |  |  |  |
| **Avg** |  |  |  | ***185.25*** | ***521.37*** | ***24.37*** |  |  |  |