Project – Simulation of OS scheduling algorithms

Objective:

Study of performance of various CPU scheduling algorithms used by OS- measured by response time, average turnaround time

Description:

Write a program that simulates some of the following scheduling algorithms for CPU:

- FIFO*
- RR*
- SJF
- SRF
- ML
- MLF*
- Another algorithm of your choice

1. Scheduling algorithms noted with * are required. Others are optional.
2. Assume that all jobs will be CPU-bound.
3. Assume context-switch takes 0 time unit, that is, no overhead.
4. Input parameters to the simulation program are the max duration of simulation (in time units), the total number of jobs (up to 50), the predetermined arrival time and total CPU time of each job. (Deterministic approach)
5. Alternatively, you may use a certain distribution to randomly generate job arrival times and total CPU times. (Probabilistic approach- this is optional.)
6. Simulation ends when there is no more jobs in the system or the simulation time reaches to the input max duration.
7. Simulation is done in time-driven. That is, simulation runs with the advancement of time unit and at each time unit, you are to simulate all the possible events happening in the system.
8. You are to check the status of each job in the system for its remaining CPU time.
9. You are to record the arrival time, departure time, total CPU time, for each job during the simulation.

Run multiple simulations with different parameters to compare the performance of algorithms.

OS

<u>Example Test Scenarios:</u>

1. For each algorithm, compute the performance metrics such as response time, turnaround time, and total wait time, when running 5 jobs of the same job duration 200.
2. Now do the same with jobs of different durations such as 100, 200 and 300.
3. For the RR algorithm, do the same with different time slices such as 1, 5 10, 30.

This is not exhaustive, but preliminary.

Output your simulation results in meaningful way and explain what you observe from them. For example, you may explain

- What happens to response time with RR as time slice changes
- What happens with SJF as job durations increase
- If there is any trend

What to submit:
- Your code
- Simulation test plan (what algorithms, what parameters, etc will be used)
- Outputs (in meaningful ways)
- Write-up (explain your observations)

You are to give a presentation to the class after the due date of the project, around the end of the semester. Exact date will be announced.