

CSEN 602 Operating Systems, Spring 2020  
Project description - Milestone 2  
Multi-Programming Batch system  
Due on Friday 24/4/2020 by 11:59 pm

## 1 Multi-programming Batch Systems

Batch processing is a technique in which an Operating System collects similar jobs together in a batch and then starts executing the batches sequentially, one job at a time. In a multi-programmed batch system, the CPU will never be idle. The Operating System keeps multiple jobs in the main memory, these are the jobs waiting to be executed. The Operating System will choose one of these jobs and begins execution. Once this job needs an I/O operation, the Operating System switches to another job. If several jobs are ready to run at the same time, then the Operating System chooses which one to run through the process of CPU Scheduling.

**Project Objective:** The best way for you to understand the concepts of an Operating System is to build an operating system and then to experiment with it. Your OS will be a SIMULATION only. In this project, you are asked to build a simulation of a multi-programming batch system using **JAVA**.

## 2 Milestone 2

In this milestone, you are required to extend your milestone 1 code by implementing semaphores and a scheduler.

### 2.1 Semaphore

A semaphore is a variable used to control access to a common resource by multiple processes in a concurrent system such as a multi-programming operating system by using two atomic operations, wait and post that are used for process synchronization and a variable indicating the availability of this resource.

**You are required to implement 4 semaphores, one for each resource we have:**

1. Reading data
2. Write into file in the disk.
3. Print data on the screen.
4. Take text input from the user.

For an illustration, to print on the screen, there will be 2 methods and a variable:-

1. **semPrintWait:** any process calls it whenever it wants to print something on the screen to acquire the key of the resource.
2. **semPrintPost:** any process calls it whenever it finishes printing to release the key of the resource.

**Note:** ONLY ONE process is allowed to use the resource at a time.

## 2.2 Scheduling

A scheduling Algorithm is an algorithm used to schedule between processes to ensure that all processes get to execute. As mentioned in the lecture, there are many different scheduling algorithms to schedule processes. You are required to implement **ONLY ONE** of the following algorithms:

1. Round Robin: Each process is assigned a fixed time slot in a cyclic way.
2. First Come First Serve (FCFS): Processes are executed on first come, first serve basis.
3. Shortest Job First: Processes are executed depending on their execution time, the shortest process being the first to execute. The processor should know in advance how much time each process will take to execute to order the processes accordingly.

## 2.3 Output:

You are required to run the main class, where you create and schedule the process. The processes should execute in the appropriate order according to the algorithm you have chosen, and they should not interfere with each other if they are using the same resource.

## 2.4 Work Distribution

During the evaluation, each team member will be evaluated on the component that they worked on. **However**, the whole team grade will still be affected by any missing part. Each team member must pick and work on one of the three following components:

1. Semaphore of print on screen & reading the data.
2. Semaphore of writing and taking input.
3. Scheduling algorithm.

### Project Deliverable and Submission

The project should be submitted as ONE zip folder containing java files you created. Late submissions will not be accepted.

Have fun :)