BLG 312E - Computer Operating Systems
Assignment #3

Due: May, 15th 23:59

Introduction

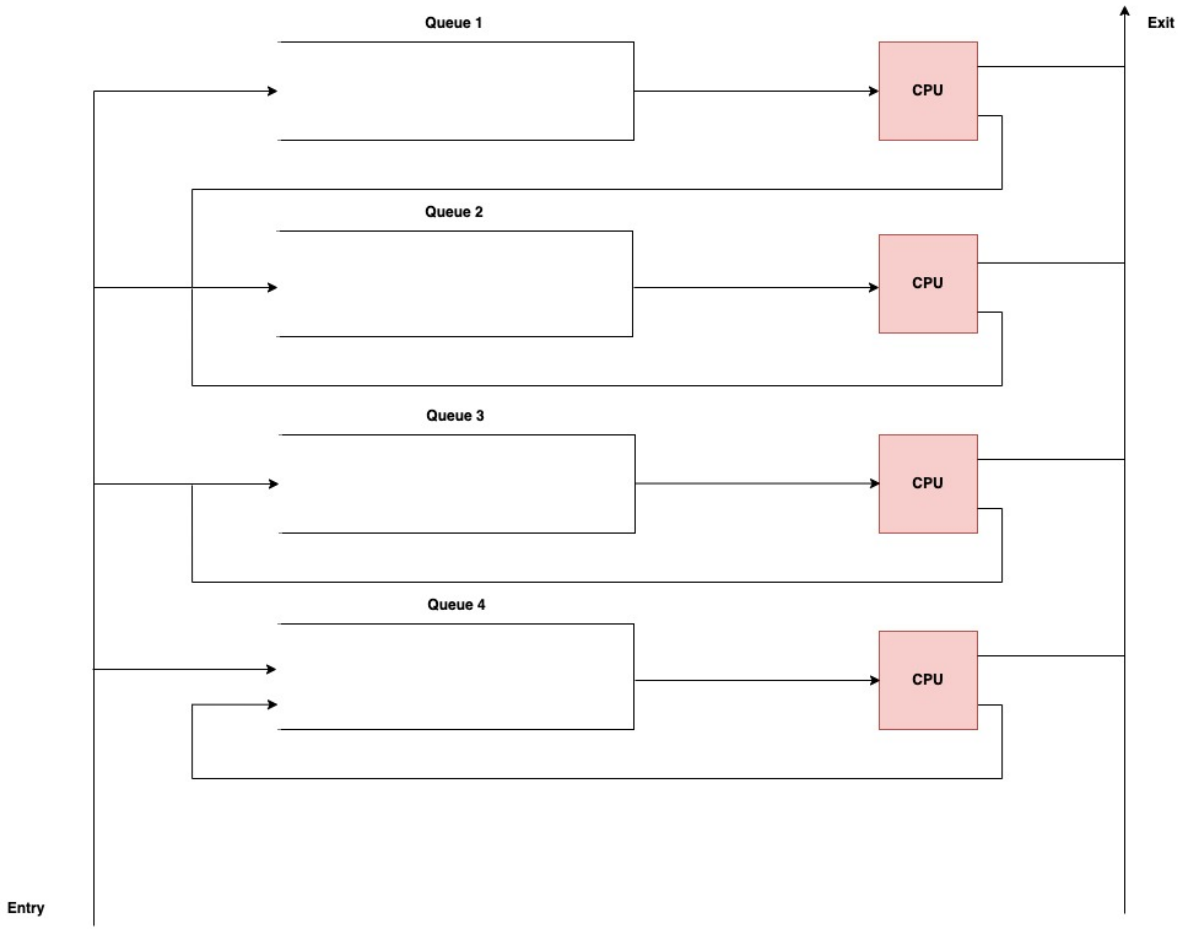
For this assignment, you are expected to share CPU (scheduling) among processes based on the given diagram.

For any issues regarding the assignment, please contact Doğukan Arslan (**arslan.dogukan@itu.edu.tr**).

Submission Notes

1. You should convert your solution to a PDF file (`.pdf`). You should only submit necessary files. Also, please write your name and ID to each document that you will upload.
2. Submissions are made through **only** the Ninova system and have a strict deadline. Assignments submitted after the deadline will not be accepted.
3. This is not a group assignment and getting involved in any kind of cheating is subject to disciplinary actions. Your homework should not include any copy-paste material.

1 Scheduling with Multi-level Feedback Queue



- Queue numbers represent priority of the queues.
- Quantum (Q) assigned to each process at a level (l) is calculated based on the level as follows:

$$Q = 2^{l-1} + 1$$

- If a process is not completed within assigned quantum, it goes to end of the lower level of the same type if there is one. Otherwise, it goes to end of the current level.
- If a process waits enough in a level (3Q unit), it goes to end of the higher level of the same type if there is one.
- Only one process can utilize the CPU at a time and there is only one CPU (not four).
- A process in a lower priority queue can execute only when higher priority queues are empty.
- A process running in the lower priority queue should be interrupted by a process arriving in the higher priority queue.

1.1 Queue 1

- Interactive processes are placed in this queue.
- Processes are operated based on First-In-First-Out algorithm.

1.2 Queue 2

- Interactive processes are placed in this queue.
- Processes are operated based on Shortest-Job First algorithm.

1.3 Queue 3

- Background processes are placed in this queue.
- Processes are operated based on Shortest-Job Remaining First algorithm.

1.4 Queue 4

- Batch processes are placed in this queue.
- Processes are operated based on Round-Robin algorithm.

2 Process Information Table

Process ID	Process Type	Arrival Time	Service Time
4	Background	0	10
8	Background	2	6
15	Batch	2	4
16	Interactive	6	3
23	Interactive	7	4
42	Batch	11	2
46	Background	14	4
54	Interactive	20	10
69	Interactive	23	9
85	Interactive	27	7

3 Process Diagrams and Process Chart

Diagrams.docx is given for you to show system diagram and which process is using CPU at the time. Consider below steps while filling that file;

- Fill the diagram in the file as indicated in first two steps. Notice that first number in a process indicates process ID and the one between parenthesis indicates remaining service time. You should only show steps that a change occurs (like arriving of a new process or change of process in CPU).
- Fill last process chart according to information of which process is operating at that time, considering the diagram that you filled.
- Do not corrupt integrity of the file (one step for each page), do not make any unnecessary changes, and do not forget to add brief explanations.
- Convert file into PDF before submitting.