

CS310 Data Structures Fall 2019

Programming Assignment 2

Round Robin Process Scheduling Simulation

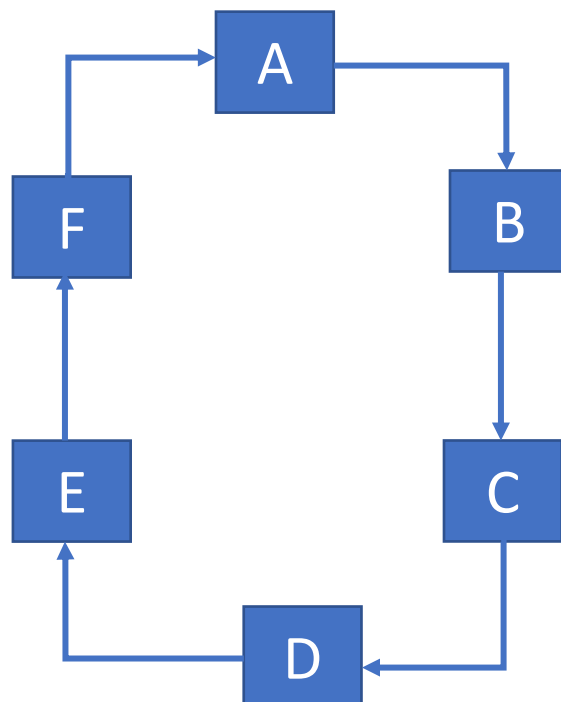
Circular Singly Linked List Implementation of a Queue

What is a Round Robin Algorithm?

Round Robin algorithm is a pre-emptive process scheduling algorithm. Round Robin algorithm gives a user a feel that the processor is running for that user only and gives a feel of multi-tasking to the user. It can be easily implemented by using circular queue.

Working:

In Round Robin Algorithm, A Circular Linked List Data structure is used. You start by processing the first process in this case, Process A. for the defined time quantum. after you emptied the time quantum, you stop the processing and move to the next process i.e. process B. You continue this process of processing for the pre-emptive time and keep moving ahead if you complete any of the process, then you remove the process from the queue and move ahead processing the next process.



For Example:

Suppose there are 6 processes, A, B, C, D, E, F. Time Quantum: 3

PROCESS CPU TIME REQUIRED

A	5
B	2
C	3
D	4
E	6
F	7

First process: A

Last Process: F

FIRST CYCLE:	SECOND CYCLE:	THIRD CYCLE:
A -> 2 B -> 0 (Remove B) C -> 0 (Remove C) D -> 1 E -> 3 F -> 4	A -> 0 (Remove A) D -> 0 (Remove D) E -> 0 (Remove E) F -> 1	F -> 0 (Remove F)

Program Execution:

1. The Main program starts execution by displaying a user option to enter the Time Quantum.
2. Next Display the following User Menu:
 - a. Enter a process
 - b. Start Execution
3. For option a: Enter the process name, process time and process priority, create an object of the ProcessInfo class.
4. Enter the node with ProcessInfo Object according to priority into the Circular Singly Linked List.
5. FIFO rules apply for processes with the same priority.
6. Loop the Main user menu option till all the processes needed are entered.
7. For option b: Traverse the circular linked list queue and decrement the Process Time for each object by Time Quantum – Simulating running of process.
8. Once the running process Time becomes 0 or less than 0, it is removed / de-queued from the Queue.
9. Display the updated queue for every cycle, till the queue becomes empty.

Once all processes are de-queued you may either end the program or repeat the user menu.

Developing Code for Round Robin Scheduling:

You will require a circular linked list. The following classes will be used for the implementation:

1. QueueInterface.java
2. Node.java
3. QueueClass.java – Implemented as a Circular Singly Linked List

The Data in the nodes will be from a class ProcessInfo.java:

1. Process Time – Float
2. Process Priority - Integer
3. Process Name – String

What to Submit?

All code must use Generic Programming and Parameterized Types

Submit an appropriately named ZIP file containing the following:

1. ReadMe File:
A technical document explaining all the classes used.
2. JAR file of the following classes:
 - a. QueueInterface.java
 - b. QueueClass.java
 - c. RoundRobin.java
 - d. ProcessInfo.java

