Nile University

School of Engineering

Computer Engineering Department

Operating Systems - Fall - 2018

Assignment (1) - Task Scheduler

Design and implement a task scheduler using C/C++. In your scheduler you will implement the following scheduling policies:

1- Non-Preemptive First Come First Serve

2- Round Robin (with quantum to be set as input)

3- Shortest Job First

4- Shortest Remaining Time First

5- Real Time Earliest Deadline First

You will have an input file that reads the task name, arrival time, burst time and computes the scheduling plan. It would output the sequence of tasks to be executed as well as the duration of execution for each task. It would also calculate the following metrics:

1- Average Waiting Time (AWT)

2- Average Response Time (ART)

3- Average Turn around Time (ATT)

4- Throughput

5- CPU utilization

6- Proportionality - the maximum ratio of the turn around time to the expected running time.

In your scheduler, you will have to maintain the different states and queues used in typical process management. At least you will have a ready queue for each scheduler and a single running state for the processor. Whenever the scheduler preempts a task it would push it into its ready queue as it will suspend its execution until it is resumed later.

Your program receives two command line parameters: first, the path of an input file containing the process information, and second, a positive integer to be used as the quantum of the round-robin scheduler.

The program outputs its results in a table form and tasks list. The table lists the metrics such as AWT, ART, ATT, Throughput, Utilization, and Proportionality in its first column. Then it lists the corresponding policies performance from best to worst.

```
> Scheduler [input-file] [qunatum]

AWT                     FCFS (xxxx)     SRTF (xxxx) …………………..
ART                     FCFS (xxxx)     SJF (xxxx)….……………………
ATT                     SRTF (xxxx)     FCFS (xxxx)…………………..
Throughput              RR (xxxx)       SRTF (xxxx)…………………..
Utilization             SJF (xxxx)       RR (xxxx)……………………
Proportionality         SRTF (xxxx)     FCFS (xxxx)………………….
```

The tasks' list shows the order of executing the tasks and their start, finish and duration. The list should be for each individual scheduling policy as shown in the following example.

```
Policy: RR
Task   Start Time   End Time   Duration    Status
 A       xxx          xxx        xxx         S
 B       xxx          xxx        xxx         S
 C       xxx          xxx        xxx         S

Policy: EDF
Task   Start Time   End Time   Duration    Status
 A       xxx          xxx        xxx         S
 B       xxx          xxx        xxx         F
 C       xxx          xxx        xxx         S

Policy: SJF
Task   Start Time   End Time   Duration     Status
 A       xxx          xxx        xxx          S
 B       xxx          xxx        xxx          S
 C       xxx          xxx        xxx          S
```

The input file has the following format with arbitrarily number of tasks:

Task Name	Arrival Time	Burst Time	deadline
A	0	5	20
B	3	10	30
C	4	12	40

Submission:

You have to submit a (.zip) archive with the following:

- **Makefile to compile all of the code and produce the executable**
- **Source code of the scheduler**
- **Sample of the input file that you used to test your code and the received output file.**
- **Readme file describing any necessary clarifications (if any).**

The executable name should be (scheduler.exe).