

Operating system I

Assignment # 2

CPU Schedulers Simulator

Write a java program to simulate the following schedulers:

1. **preemptive** Shortest- Job First (SJF) Scheduling with context switching
2. Round Robin (RR) with context switching
3. **preemptive** Priority Scheduling (~~with the~~ solving of starvation problem)
4. AG Scheduling :
 - a. Each process is provided a static time to execute called quantum.
 - b. Once a process is executed for given time period, it's called **FCFS** till the finishing of (ceil(25%)) of its Quantum time then it's converted to **non-preemptive Priority** till the finishing of the next (ceil(25%)), after that it's converted to **preemptive** Shortest- Job First (SJF).
 - c. We have 3 scenarios of the running process
 - i. The running process used all its quantum time and it still have job to do (add this process to the end of the **queue**, then increases its Quantum time by **Two**).
 - ii. The running process was execute as **non-preemptive Priority** and didn't use all its quantum time based on another process converted from ready to running (add this process to the end of the **queue**, and then increase its Quantum time by ceil(**the remaining Quantum time/2**)).
 - iii. The running process was execute as **preemptive** Shortest- Job First (SJF) and didn't use all its quantum time based on another process converted from ready to running (add this process to the end of the **queue**, and then increase its Quantum time by **the remaining Quantum time**).
 - iv. The running process didn't use all of its quantum time because it's no longer need that time and the job was completed (set it's quantum time to **zero**).

Example :

Processes	Burst time	Arrival time	Priority	Quantum
P1	17	0	4	7
P2	6	2	7	9
P3	11	5	3	4
P4	4	15	6	6

Answer:

- Quantum (7, 9, 4, 6) -> ceil(25%) = (2,-,-) && ceil(50%) = (4,-,-)
- Quantum (7+3,9,4,6) -> ceil(25%) = (-,3,-) && ceil(50%) = (-,5,-)
- Quantum (10,9+3,4 ,6) -> ceil(25%) = (-,1,-) && ceil(50%) = (-,2,-)
- Quantum (10,12,4+2,6) -> ceil(25%) = (-,3,-) && ceil(50%) = (-,6,-)
- Quantum (10,0,6,6) -> ceil(25%) = (3,-,-) && ceil(50%) = (5,-,-)
- Quantum (10+4,0,6,6) -> ceil(25%) = (-,2,-) && ceil(50%) = (-,3,-)
- Quantum (14,0,6+3,6) -> ceil(25%) = (-,2,-) && ceil(50%) = (-,3)
- Quantum (14,0,9,6+2) -> ceil(25%) = (-,3,-) && ceil(50%) = (-,5,-)
- Quantum (14,0,0,8) -> ceil(25%) = (4,-,-) && ceil(50%) = (7,-,-)
- Quantum (14+7,0,0,8) -> ceil(52%) = (0,0,0,2) && ceil(50%) = (-,4)
- Quantum (21,0,0,0) -> ceil(25%) = (6,-,-) && ceil(50%) = (11,-,-)

P1	P2	P3	P2	P1	P3	P4	P3	P1	P4	P1	
0	4	7	9	12	15	18	20	26	33	35	38

Program Input

- Number of processes
- Round robin Time Quantum
- Context switching

For Each Process you need to receive the following parameters from the user:

- Process Name
- Process Arrival Time
- Process Burst Time
- Process Priority

Program Output

For each scheduler output the following:

- Processes execution order
- Waiting Time for each process
- Turnaround Time for each process
- Average Waiting Time
- Average Turnaround Time
- Print all history update of quantum time for each process (**AG Scheduling**)

- The assignment is submitted in group of max. 5 students and min. 4 students.
- Late submission is not allowed

Grading Criteria
BOUNS (15 grades)

	preemptive Shortest- Job First (SJF) Scheduling	Round Robin (RR) Scheduling	Priority Scheduling	AG Scheduling	Grade
Processes execution order	6	6	6	13	31
Waiting Time for each process	6	6	6	13	31
Turnaround Time for each process	2	2	2	4	10
Average Waiting Time	2	2	2	4	10
Average Turnaround Time	2	2	2	4	10
Print all history update of quantum time for each process (AG Scheduling)	0	0	0	8	8
Grade	18	18	18	46	100