In the name of god

Operating Systems – Shiraz University

Homework #2
Fall 2021

Shiraz University

Question #1

Assume the Round Robin algorithm (time quantum = 3 ms) for the following processes. Calculate

- **response time for each process (and Average)**
- **waiting time for each process (and Average)**
- **turn around time for each process (and Average)**
- **throughput**
- **CPU utilization**

Your answer has to contain a ready queue and a CPU chart

Process	Arrival time (ms)	CPU time (ms)
P1	5	5
P2	4	6
P3	3	7
P4	1	9
P5	2	2
P6	6	3

Question #2

Assume the SRT algorithm for the following processes. All IO operations can be overlapped as much as possible. Calculate

- **response time for each process (and Average)**
- **waiting time for each process (and Average)**
- **turn around time for each process (and Average)**
- **throughput**
- **CPU utilization**

Your answer has to contain a ready queue, a CPU chart and an IO chart (Context switch = 1 ms)

Process	Arrival time (ms)	CPU time 1 (ms)	IO time (ms)	CPU time 2 (ms)
P1	0	6	5	3
P2	22	3	5	6
P3	20	8	0	0
P4	20	4	4	5
P5	4	8	8	4
P6	3	0	5	2

Question #3

Consider the following processes scheduling using the Round Robin (RR) algorithm.

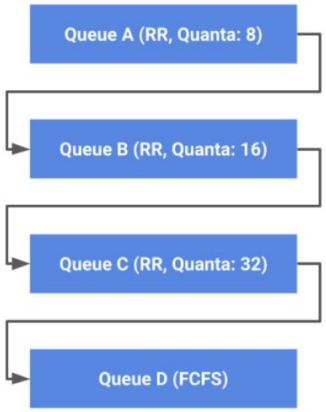
- Each process has a priority value (A larger number indicates a higher priority).
- In addition to these processes, the system has an idle process specified with "P_{idle}" that does not occupy any of the hardware resources and its priority value is 0.
- When no other process is ready to use resources, the idle process schedules.
- Consider that the time quantum is 10 time units of time (q_t=10).
- When a process preempted by a higher priority process, the preempted process is located at the end of the queue

Process	Priority	Burst	Arrival
P1	40	20	0
P2	30	25	25
P3	30	25	30
P4	35	15	60
P5	5	10	100
P6	10	10	105

A) Show the result of scheduling with a Gantt chart and details.
B) What is the turnaround time for each process? What is the average turnaround time?
C) What is the waiting time for each process? What is the average waiting time?
D) What is throughput for this scheduling?

Question #4

You are a Bitcoin miner, and You now need to write a program that will run your mining algorithm forever. You know that the machines you're targeting use a MLFQS algorithm to schedule jobs, as below:



You decide that the best strategy is to guarantee that your mining job will **always** be placed on Queues B and C. So your mining algorithms will run forever. Assume that your mining algorithm (**mine()** function) can be run in 10 units of time and your program processing will start at Queue B.

A) Implement your mining program as shown, and explain your design. (hint: You must indicate a loop that runs the mine() function considering that your program shouldn't exceed the Queue C)

```
void mine_forever() {
     while(1) {
          ------------------------
               ------------------------
          printf(\Not a Bitcoin miner!!!");
     }
}
```

B) Explain why, regardless of how you implement your mining program, your job will never be placed on Queue A twice in a row.

Best wishes

Operating Systems TA Team

- *Amin Baghbanbashi*
- *Milad Barooni*
- *Saina Daneshmand*

Fall 2021