PSG College of Technology

Department of Applied Mathematics & Computational Sciences

M.Sc. Software Systems

1. Draw the process state transition diagram of an O S in which

i) each process is in one of the five states: created, ready, running , blocked (i.e . sleep or wait), or terminated, and

ii) only non-pre-emptive scheduling is used by the O S .

Explain the state transitions.

The table below is a representation of the OS's internal process table. Each process has a stack, PID, a status, a priority and a next field. The next field is used to store the index of the process table using two circular linked list. One list contains all the ready and running processes (0 -> 4 > 3 -> 2 -> 0) and another list contains all the blocked pro cesses (1 -> 1). Assume that a higher priority value means a higher priority.

	Stack	PID	Status	Priority	Next	C P U B urst
0	Ptr	4	Ready	1	4	33
1	Ptr	5	Blocked	10	1	134
2	Ptr	7	Running	7	0	58
3	Ptr	11	Ready	5	2	150
4	Ptr	13	Ready	8	3	145

- Suppose that round-robin scheduling is being used. Which process would be run after the current time slice expires?
- Suppose that priority scheduling is being used and process 7 makes a blocking request. Which process would be run next?
- Suppose that process 7 makes a blocking request and round robin scheduling is being used. What would the table look like?
- Suppose that while process 7 is running, process 5's blocking request is satisfied and it is no longer blocking. What would the pro cess table loo k like (just before the next process context switch)?
- Suppose a new process with PID 24 and priority 6 is created. What would the process table lo ok like?

- Suppose the following processes arrive at the times indicated. The total available memory is 35 units. OS occupies 10 units and the remaining 25 units for user process. Assume all processes are CPU bound and the content switch time is 1.

2. Calculate the turnaround time for each process using FCFS, SJF, SRTF, preemptive priority, RR with TQ= 5ms & multilevel feedback queue with 3 queues with TQ=4ms & TQ=9ms respectively scheduling policy.

Process	**Arrival Time**	**CPU Burst Time**	**Priority**
P1	0	5	3
P2	3	3	5
P3	7	9	8
P4	12	10	12
P5	18	16	2
P6	25	2	6
P7	29	8	9

3. Consider two processes, each with two CPU bursts with one I/O burst in between. Process 1 has a CPU burst of 9 units followed by an I/O burst of 7 units and a CPU burst of 6 unit.Process 2 has a CPU burst of 2 units followed by an I/O burst of 1 units and a CPU burst of 5 units.Suppose that Process 1 arrives in the ready queue just before Process 2 and just after Process 2 arrives the process that was in the CPU terminates. No other processes are in the system. For each of the scheduling algorithms below create Ganttcharts as given below. Fill each box with the state of the corresponding process. Use R for running, W for waiting/blocked, and D for ready. Calculate the waiting times and CPU utilization (as a fraction) for each process.

- First-Come/First-Served
- Shortest Job First (non-preemptive)
- Preemptive Shortest Job First
- Round Robin with a quantum of 3.