Assignment 2

Operating Systems(Scheduling)

Instructions: Attempt all the questions according to the information given with each question.
Upload your answers on GitHub account only.
Deadline for submitting assignment is 6/09/2017(wednesday).

1. Several processes are listed in the table 1. Draw a Gantt chart illustrating their execution using following:

   (a) First come first serve
   (b) Shortest Job First
   (c) Shortest Remaining Time
   (d) Round Robin(quantum =2)
   (e) Round Robin(quantum =1)

Process	Arrival Time	Processing Time
P1	0.000	3
P2	1.001	6
P3	4.001	4
P4	6.001	2

2. For the above question calculate the Turn around time, average throughput for the processes.

3. Several processes are listed in table 2. Draw a chart illustrating their execution using priority scheduling. A larger number has higher priority.

Process	Arrival Time	Burst Time	Priority
P1	0.0000	4	3
P2	1.0001	3	4
P3	2.0001	3	6
P4	3.0001	5	5

   (a) Preemptive
   (b) Non-preemptive

4. On a system using Multilevel feedback queues, a totally CPU-bound process requires 40 seconds to execute. If the first queue uses a time quantum of 2 and at each level the time quantum increases by 5 time-units, how many times will the job be interrupted and on what queue will it be when it terminates?

5. Consider a set of 5 processes whose arrival time, CPU time needed and the priority are given below:

Process	Arrival Time	CPU Time	Priority

P1	0	10	5
P2	0	5	2
P3	2	4	1
P4	5	20	4
P5	0	2	3

Assuming that smaller the number, higher the priority. The CPU scheduling used is priority scheduling with preemption, the average throughput will be:

6. Using the Non-preemption scheduling algorithm proves to be a good choice for an interactive system or not? Briefly describe you answer.

7. If a parent process dies, what should happen to the child process? What happens to a parent process when a child dies?

8. An operating system uses Shortest Remaining Time first(SRT) process scheduling algorithm. Consider the arrival times and execution times for the following processes:

Process	Execution time	Arrival time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

What is the total waiting time for process P2?

9. Which scheduling algorithms require a timer interrupt for the CPU?

10. We wish to schedule three processes P1, P2, P3 on a uniprocessor system. The priorities, CPU time requirements and arrival times of the presence are as shown below:

Process	Priority	CPU time required	Arrival time
P1	10(Highest)	20	00:00:05
P2	9	10	00:00:03
P3	8	15	00:00:00

What are the turnaround times of P2 using preemptive and non-preemptive scheduling respectively?

11. Given the following task set, check whether they can be scheduled according to Earliest Deadline first and find the schedule.

Task	Period	Deadline	Execution time
1	20	7	3
2	5	4	2
3	10	8	1

12. Given the following task set, find the schedule with least laxity first algorithm.

Task	Period	Deadline	Execution time
1	20	7	3
2	5	4	2
3	10	8	1

13. For each of the following transitions between processes states, indicate whether or not the transition is possible. If it is possible, give an example of one thing that would cause it.

    (a) ready -> run
    (b) ready -> swapped-blocked
    (c) ready -> held
    (d) blocked -> ready
    (e) swapped-blocked -> swapped-ready

14. On a system using non-preemptive scheduling, processes with expected run times of 5, 18, 9, and 12 are in the ready queue. In what order should they be run to minimize wait time?

15. The following jobs arrived at time 0 in order P, Q, R, S and T and are to be executed on a uniprocessor system. Find the departure time for job P if scheduling is round robin with time slice 1.

Job id	CPU burst time
P	4
Q	1
R	8
S	1
T	2

16. We are given a computer system consisting of a CPU and a disk. We are told each user request has a compute time of 80 ms and on average generates 10 disk requests. We are further told that the service time at the disk is 10 ms.

    - Is this system compute bound or I/O bound?
    - What is the maximum number of the user requests that can be satisfied per second?
    - If we are told that disk is used 50 % of the time, how many user request are being satisfied per second?

17. Consider three CPU intensive processes, which require 11, 10, 30 time units and arrives at time 0, 1, and 6 respectively. How many context switches are needed if the operating system implements a Shortest Remaining Time first scheduling algorithm?
    (a) By considering the context switch at 0 and at the end of the system.
    (b) By ignoring the context switch at 0 and end of the system.

18. Consider three processes(process id P1, P2, P3) with compute time burst 2, 4, And 8 time units. All the processes arrive at time zero. Consider the Longest Remaining Time First(LRTF) scheduling algorithm. In LRTF ties are broken by giving priority to the process with lowest process id. The average turn around time is?

19. Consider three processes, all arriving at time zero with total execution time of 10, 20, and 30 units respectively. Each process spends the first 30% of execution time doing I/O, the next 60% CPU time doing computation, and last 10% of the time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process get blocked on I/O or when running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle?

20. On a system using multilevel feedback queue, what is the advantage of using a different time quantum in each queue?

ALL THE BEST ☺

Regards-
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