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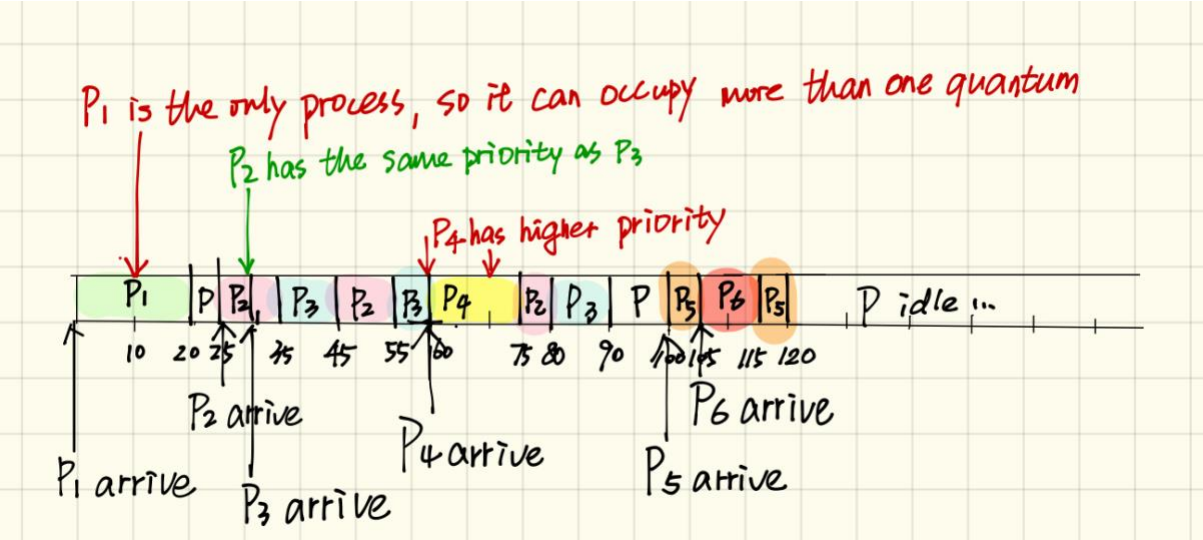
6.4 What advantage is there in having different time-quantum sizes at different levels of a multilevel queueing system?

Processes that need more CPU time can get it whereas processes that don't will not be continuously swapped in and out of the CPU resulting in more unnecessary context switches thus making more efficient use of the computer. Using different time-quantum size for different levels helps to save context switching time.
As the turnaround time is related to time-quantum size, if the quantum size is optimal, it helps to save the average turnaround time as well.

6.17 The following processes are being scheduled using a preemptive, round-robin scheduling algorithm. Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. In addition to the processes listed below, the system also has an idle task (which consumes no CPU resources and is identified as P idle). This task has priority 0 and is scheduled whenever the system has no other available processes to run. The length of a time quantum is 10 units. If a process is preempted by a higher-priority process, the preempted process is placed at the end of the queue.

Thread	Priority	Burst	Arrival
P_1	40	20	0
P_2	30	25	25
P_3	30	25	30
P_4	35	15	60
P_5	5	10	100
P_6	10	10	105

a. Show the scheduling order of the processes using a Gantt chart.



b. What is the turnaround time for each process?

p1: 20-0 = 20,
p2: 80-25 = 55,

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p3: 90 - 30 = 60,
p4: 75-60 = 15,
p5: 120-100 = 20,
p6: 115-105 = 10

c. What is the waiting time for each process?

p1: 0, p2: 40, p3: 35, p4: 0, p5: 10, p6: 0

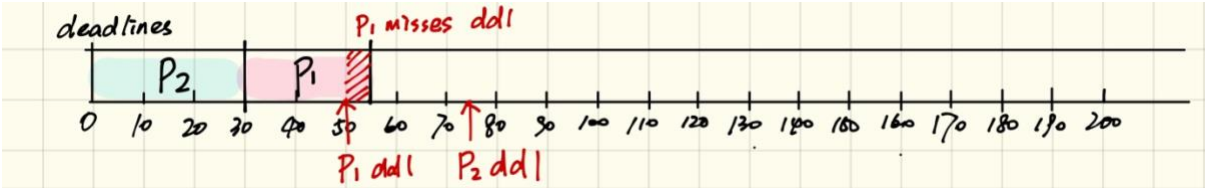
d. What is the CPU utilization rate?

105/120 = 87.5 %

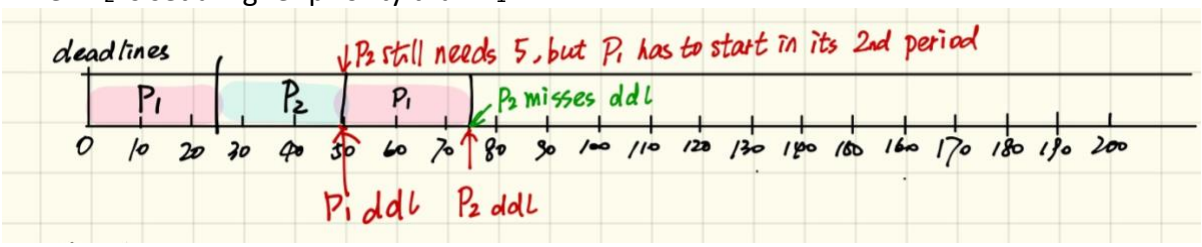
6.31 Consider two processes, P_1 and P_2 , where P_1 = 50, t_1 = 25, P_2 = 75, and t_2 = 30.

a. Can these two processes be scheduled using rate-monotonic scheduling? Illustrate your answer using a Gantt chart such as the ones in Figure 6.16–Figure 6.19.

When P_2 is set a higher priority than P_1



When P_2 is set a higher priority than P_1



Thus, rate-monotonic scheduling is not suitable for scheduling P_1 and P_2.

b. Illustrate the scheduling of these two processes using earliest deadline-first (EDF) scheduling.

EDF doesn't require the process execute periodically. So, the two process can be scheduled as following: