

長庚大學106學年度第二學期 作業系統實務 第二次小考

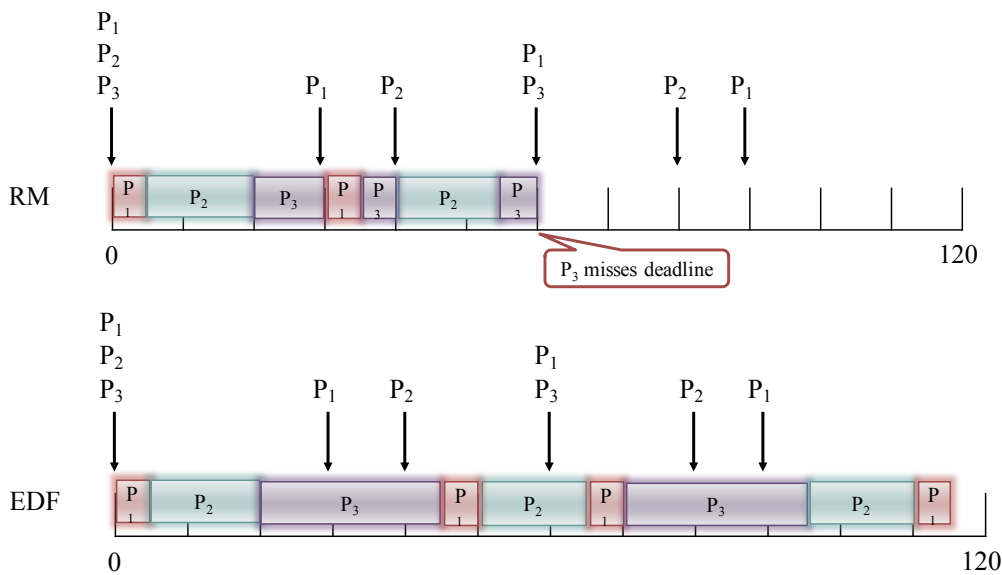
系級:

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1. (40%) There are three periodic tasks  $P_1$ ,  $P_2$  and  $P_3$ .  $P_1$  has its period 30 and execution time 5.  $P_2$  has its period 40 and execution time 15.  $P_3$  has its period 60 and execution time 25. Please draw the results of the (a) RM and (b) EDF scheduling algorithms. Assume that all tasks arrive at time 0. Please draw the schedule result from time 0 to time 120 if all task can meet deadline. Please draw the result from time 0 until the first deadline missing if any task will miss deadline.

Answer: (a) (b)



2. (40%) Consider 4 tasks,  $t_1$ ,  $t_2$ ,  $t_3$ , and  $t_4$  which have priorities  $x_1$ ,  $x_2$ ,  $x_3$ , and  $x_4$ , respectively, and assume  $x_1 > x_2 > x_3 > x_4$  ( $x_1$  is the highest priority). After we profile the programs of the 4 tasks, we have the following information:

- Task  $t_1$  will lock semaphore  $S_1$  for 20ms.
- Task  $t_2$  will lock semaphore  $S_1$  for 23ms.
- Task  $t_3$  will lock semaphore  $S_1$  for 7ms and lock semaphore  $S_2$  for 5ms.
- Task  $t_4$  will lock semaphore  $S_2$  for 10ms and lock semaphore  $S_3$  for 13ms.

(a) Please derive the priority ceiling of each semaphore. If the priority ceiling protocol is used to manage the semaphore locking, (b) please derive the worst-case blocking time of each task.

Answer: (a)  $S_1: x_1$ ,  $S_2: x_3$ ,  $S_3: x_4$  You have to provide the reason to support your answers.

(b)  $t_1: 23\text{ms}$ ,  $t_2: 7\text{ms}$ ,  $t_3: 10\text{ms}$ ,  $t_4: 0\text{ms}$ . You have to provide the reason to support your answers.

3. (40%) A sporadic server has a replenishment period 5 and an execution budget 2. Let the sporadic server have the budget 2 at time 0. Assume that events arrive at 1, 2, 4, 6, 8, and each event consumes the execution time 1. Please draw a diagram to show the changing of the execution budget at different time points.

Answer:

