長庚大學107學年度第二學期 作業系統實務 第二次小考

系級: 姓名: 學號:

1. (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 3ms.
   - Task t_2 will lock semaphore S_2 for 10ms and lock semaphore S_3 for 16ms.
   - Task t_3 will lock semaphore S_1 for 8ms and lock semaphore S_3 for 18ms.
   - Task t_4 will lock semaphore S_2 for 12ms and lock semaphore S_3 for 14ms.

   Please derive the priority ceiling of each semaphore. Let the priority ceiling protocol be used to manage the semaphore locking, please derive the worst-case blocking time of each task.

Answer:
Priority ceilings: S_1: x_1, S_2: x_2, S_3: x_2
Worst-case blocking times: t_1: 8ms, t_2: 18ms, t_3: 14ms, t_4: 0ms.

2. (30%) (a) Compared with the interrupt server, please provide the disadvantage of the polling server. (b) Compared with the deferrable server, please provide the disadvantage of the interrupt server (c) Compared with the sporadic server, please provide the disadvantage of the deferrable server.

Answer:
(a) When there is an even, it has to wait for the computing service until the checking time point of the next period.
(b) An interrupt server might seriously affect the computing environment of the other periodic tasks.
(c) Aperiodic tasks might continuously use computing resource at the end of a period and at the beginning of the next period.

3. (40%)
   - A sporadic server has a replenishment period 5 and an execution budget 2
   - Each event consumes the execution 1
   - Events arrive at 2, 4, 8, 9, 10
   - Please draw the diagram of the execution budget management

Answer: