長庚大學 100 學年度第一學期 電機所博士班資工領域資格考試
科目:作業系統

1. (20 points total; 5 points each sub-question) Please explain the following terminology : (1) Race condition　(2) External fragmentation　(3) Preemptive scheduling　(4) CPU-bound process

2. (8 points) What is the relationship between a guest operating system and a host operating system in a system like VMware?

3. (12 points total; 4 points each sub-question) What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

4. (8 points) Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs. What would be the effect of putting two pointers to the same process in the ready queue? What would be the major advantages and disadvantages of this scheme?

5. (8 points) Consider a system with four processes P_1 through P_4 and five allocatable resources R_1 through R_5. The current allocation and maximum needs are as follows:

	Allocated	Maximum	Available
P_1	1 0 2 1 1	1 1 2 1 3	0 0 x 1 1
P_2	2 0 1 1 0	2 2 2 1 0	
P_3	1 1 0 1 0	2 1 3 1 0	
P_4	1 1 1 1 0	1 1 2 2 1	

   What is the smallest value of x for which this is a safe state? For full credit, justify your answer.

6. (8 points) Explain and compare deadlock prevention and deadlock avoidance.

7. (10 points total; 5 points each sub-question) Under what circumstances do page faults occur? Describe the actions taken by the operating system when a page fault occurs.

8. (8 points) Discuss how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes.

9. (8 points) Buffer-overflow attacks can be avoided by adopting a better programming methodology or by using special hardware support. Discuss these solutions.

10. (10 points total; 5 points each sub-question) Consider a RAID level 5 organization comprising five disks, with the parity for sets of four blocks on four disks stored on the fifth disk. How many blocks are accessed in order to perform the following?

    (1) A write of one block of data

    (2) A write of seven continuous blocks of data