朝陽科技大學 97 學年度碩士班招生考試試題

系（所）別：資訊工程系
組　　別：一般生甲組
科　　目：計算機系統(含計算機組織與結構、作業系統)

總分：100 分

注意：答案卷上題號請標示清楚

Part 1. Computer Organization

1. Explain the following terminologies. (10%)
   (a) **Memory Hierarchy** (b) **Structural Hazard**
   (c) **CPI** (d) **Amdahl's Law** (e) **RAID**

2. (a) What are the **benefits** by **memory hierarchy**? (2%)
   (b)What is called the **principle of locality**? (You should **give an example** to explain it) (8%)

3. (a)What are the **average cost** for bit and access time of the four-level memory system specified in the following. (6%)

Memory	Capacity(bits)	Cost($/bit)	Access Time(s)	Hit Ratio
Cache	2^{10}	10^{-1}	10^{-8}	0.98
Main	2^{20}	10^{-2}	10^{-6}	0.998
Secondary	2^{30}	10^{-4}	10^{-3}	0.9998
Tenitary	2^{40}	10^{-6}	10^{-1}	1

   (b)Please explain (1) **Direct Mapping Cache** (2) **Fully Associative Mapping Cache** (3) **Set Associative Mapping Cache.** (6%)

4. (a) What are the **five steps** required for the **normal MIPS instructions**? (5%)
   (b) Give an example to illustrate the **rearrange method** to solve the **data hazard**. (3%)

5. Suppose we enhance a machine making all floating-point instructions run 10 times faster.
   (a) If the execution time of some benchmark before the floating-point enhancement is 20 seconds, what the **speedup** will be if 5 seconds is spent executing floating-point instructions? (5%)
   (b) If the execution time of a benchmark before the floating-point enhancement were 50 seconds, how much of the **initial execution time would floating-point instructions** have to account for to show an **overall speedup of 2** on this benchmark? (5%)

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Part 2. Operating System

6. (a) What are the **short-term** and **medium-term** scheduling schemes of an operating system? (4%)
   (b) **Compare** these two scheduling schemes in detail. (4%)
   (c) What are "**Swap**" and "**Context Switch**"? **Bind** these two terms with above two scheduling schemes. (4%)

7. Determine the **AWT** (Average waiting time) and **ATT** (Average turnaround time) by using the **Round-Robin** (RR) scheme with time-slice=4 and the following parameters? (8%) [Note: (1) If several processes with the same arrival time, the process with the shortest burst time will be scheduled firstly. (2) **Give a detail time-line based figure for solving them.**]

Process	Burst time	Arrival time
P1	8	2
P2	5	0
P3	3	0
P4	2	9

8. **What type of address** does the CPU refer to? (3%) **Why**? (3%) **Why** need **paging** for memory management? (3%) **Describe the paging mechanism** for memory management. (6%)

9. (a) Why we need the **synchronization** mechanism in the operating system? (2%)
   (b) Define the **Dining Philosopher** (DP) problem in the operating system. (3%)
   (c) Solve the DP problem by using the "**Monitor**" method. (10%)