

國立中央大學98學年度碩士班考試入學試題卷

所別：通訊工程學系碩士班 乙組(通訊網路) 科目：計算機系統 共 2 頁 第 1 頁
 *請在試卷答案卷(卡)內作答

【計算機組織】

1. Please briefly explain
 - (1) (2%) Microprogramming
 - (2) (2%) Structural hazards in pipeline
 - (3) (2%) Load/store instruction set architecture
2. (6%) Please compare the difference between interrupt driven I/O and DMA.
3. The engineers want to add a new index addressing mode to an existing machine so that the addition instruction can be more powerful. This new addressing mode can determine the effective address of the memory location by adding the content of two registers and an offset before load/store operation and can replace two old load/store related instructions by single instruction as follows:

Using old instructions		Using new instruction
Add R1, R1, R2 Load Rd, 50(R1)	→	Load Rd, 50(R1)(R2)
Add R3, R3, R4 Store 10(R3), Rs	→	Store 10(R3)(R4), Rs

Use the instruction frequencies of the following Table.

Instruction	Percentage
Add/Sub	15%
Load	24%
Store	11%
Compare	10%
Jump/Call	18%
Others	22%

- (1) (8%) If the new addressing mode can be used for 10% of the loads and stores, what is the percentage reduction in the number of instructions on the new machine compared with the old machine.
- (2) (12%) In order to implement the new addressing mode, the designers have to lengthen the clock cycle by 6%. If the CPI does not change with this modification, which machine will be faster? and by how much?
4. (8%) The CPI of a processor is 1.0 if all references hit in the L1 cache. The clock rate is 2 GHz and the main memory access time is 100ns (including all miss handling). However, actually, the miss rate per instruction at the L1 cache is 2%. If we add a L2 cache that has 5ns access time for either a hit or a miss and this design can reduce the miss rate to main memory to 0.5%. Will this design be faster or slower when compared to the original design? and by how much?
5. (10%) We know that Booth's algorithm uses two consecutive bits to determine which operation will be performed as follows:
 - 01 → Add and shift
 - 10 → Subtract and shift
 - 00, 11 → Shift
 Please prove the correctness of Booth's algorithm,

參考用

注意：背面有試題

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【計算機網路】

6. (15%) Explain the following terminologies, and describe the functions they provide.
- (1) Dynamic Host Configuration Protocol (DHCP)
 - (2) Network Address Translation (NAT)
 - (3) Mobile IP
7. (10%)
- (1) What advantage does a circuit-switched network have over a packet-switched network?
 - (2) What advantages does TDM have over FDM in a circuit-switched network?
8. (10%) Explain TCP congestion control function, and how the TCP slow start process works.
9. (15%) Consider communication interoperability across different, heterogeneous networks. Explain the following two approaches, describe the functions they provide, and make comparison between them.
- (1) Tunneling
 - (2) Application Gateway
 - (3) What are the advantage and disadvantage by using tunneling and application gateway respectively?

參考用

注意：背面有試題