

國立台灣科技大學九十八學年度碩士班招生試題

系所組別：電子工程系碩士班甲組

科目：計算機系統

(總分爲 100 分)

[計算機組織]

1. (5%) "Multi-core" has become a popular technology for new generation processors. However, the amount of performance gained by the use of a multi-core processor does not increase as the core numbers inside chip, why?
2. (15%) Please explain the following terms:
 - Simultaneous multithreading (3%)
 - Thread-Level Parallelism (3%)
 - Branch target buffer (BTB) (3%)
 - Precise interrupt (3%)
 - Branch prediction (3%)
3. (10%) What does TLB mean? Which stage(s) should it be used for a five-stage MIPS architecture? Why?
4. (10%) Is it possible to have structure, data, and branch hazards in single-cycle, multi-cycle, and pipelined implementations, respectively? Why?
5. (10%) Please use Verilog or VHDL to design a 4-bit 3 input Multiplexer.
The 4-bit input: A, B, C;
The 2-bit selection input: sel;
The 4-bit output: y_out;

y_out = A, when sel = 00
y_out = B, when sel = 01
y_out = C, when sel = 10
y_out = 0, when sel = 11

57



國立台灣科技大學九十八學年度碩士班招生試題

系所組別：電子工程系碩士班甲組

科目：計算機系統

[資料結構]

6. (20%)

Explain the following terms.

- (a) data structures (5%)
- (b) heaps (5%)
- (c) topological sorting (5%)
- (d) hash tables (5%)

7. (10%)

What is a trie? Discuss the advantages and disadvantages of tries and binary search trees.

8. (10%)

A *self-adjusting* list is like a regular list, except that all insertions are performed at the front, and when an element is accessed by a **search** operation, it is moved to the front of the list without changing the relative order of the other elements. Write a linked list implementation of self-adjusting lists.

9. (10%)

Suppose that we are given a sequence S of n numbers, each of which is 0 or 1. Assuming S is represented as an array, write a C/C++ function by an in-place method for ordering S so that all 1's are listed before all 0's.

