

台灣聯合大學系統 94 學年度學士班轉學生考試命題紙

科目 計算機概論 類組別 A5 共 3 頁第 1 頁 \*請在試卷答案卷(卡)內作答

1. (15%)

- (a) Describe the differences between the software engineering terms *coupling* and *cohesion*? (10%)
- (b) The following table shows data collected to assess productivity for two programmers John and Mary. Which one has a higher productivity? Why? (5%)

Programmer	Software Development Function Point (FP) per Month	Code Reuse Proportion	Structure of the Code	
			Coupling Level	Cohesion Ratio
John	100	20%	0.7	0.3
Mary	75	10%	0.2	0.8

2. (10%)

- (a) Contrast a memory-mapped I/O system with an isolated I/O system. (5%)
- (b) Explain the term *handshaking* as it applies to computer I/O systems. (5%)

3. (10%)

- (a) A process is said to be I/O-bound if it requires a lot of I/O operations, whereas a process that consists of mostly computations within the CPU/memory system is said to be compute-bound. If both a compute-bound process and an I/O-bound process are waiting for a time slice, which should be given priority? Why? (5%)
- (b) Would greater throughput be achieved by a system running two processes in a time-sharing environment if both processes were I/O-bound or if one was I/O-bound and the other was compute-bound? Why? (5%)

4. (15%) In the Internet, which is made up of interconnected physical networks of computers, each computer (or more precisely, each network connection of a computer) is assigned an *Internet address*. In Version 4 of the Internet Protocol (IPv4), now in use, an address is a string of 32 bits. It begins with a *network number (netid)*. The netid is followed by a *host number (hostid)*, which identifies a computer as a member of a particular network.

Three forms of addresses are used, with different numbers of bits used for netids and hostids. **Class A addresses**, used for the largest networks, consist of 0, followed by a 7-bit netid and a 24-bit hostid. **Class B addresses**, used for medium-sized networks, consist of 10, followed by a 14-bit netid and a 16-bit hostid. **Class C addresses**, used for the smallest networks, consist of 110, followed by a 21-bit netid and an 8-bit hostid. There are several restrictions on addresses because of special uses: 1111111 is not available as the netid of a Class A network, and the hostids consisting of all 0s and all 1s are not available for use in any network. A computer on the Internet has either a Class A, a Class B, or a Class C address.

How many different IPv4 addresses are available for computers on the Internet?

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5. (4%) Consider the following two tables:

Employee

ID	Name	Dept
12	Chen	CS
13	Wang	Ch
14	Lin	CS
15	Liu	EE

Department

Dept	Name	Location
CS	Computer Science	EECS430
Ch	Chinese	EECS434
EE	Electrical Engineering	EECS401

Write a SQL statement to find out the names of employees and their working locations.

6. (6%) Identify two database models and explain them.

7. (5%) In each blank below place a P or an S to indicate whether the associated activity is performance oriented (P) or simulation oriented (S).

- \_\_\_\_\_ Writing a program to diagnose a patient's mental status
- \_\_\_\_\_ Writing a program to allow a database system to receive requests verbally
- \_\_\_\_\_ Writing a program to control an automated aircraft landing system.
- \_\_\_\_\_ Writing a program to recognize the zip codes on the envelopes
- \_\_\_\_\_ Writing a program to train baseball pitchers

8. (5%) **Matching Questions**

In the blank next to each phrase, write the term from the following list that is best described by the phrase.

Terms:

Agent, Turing test, image analysis, template matching, production system, heuristic, breadth-first search, state graph, artificial neural network, genetic algorithms, associative memory, expert system, semantic net, contextual analysis, linguistics

- \_\_\_\_\_ The result of considering all options equally important
- \_\_\_\_\_ A tool for simulating intuition
- \_\_\_\_\_ The task of understanding an image
- \_\_\_\_\_ A multiprocessor computer consisting of many simple processors
- \_\_\_\_\_ A means of measuring a machine's ability to perform like a human

9. (2%) Represent the bit pattern 1011010010011111 in hexadecimal notation.

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10. (3%) Using a two's complement notation system in which each value is represented by a pattern of six bits, represent the value -3.

11. (10%) Let the procedure Mymodify be defined by

```
procedure Mymodify(Y)
begin
  X ← 9;
  print the value of Y;
end
```

Suppose that X is a global variable. Please answer the following questions.

- (a) (5%) If parameters are passed by value, what will be printed when the following program segment is executed?
- (b) (5%) If parameters are passed by reference, what will be printed when the following program segment is executed?

```
X ← 5;
apply the procedure Mymodify to X;
```

12. (5%) Let procedure MyPrint be defined by

```
procedure MyPrint(N)
begin
  if (N > 0) then
    begin
      print the value of N - 2;
      apply the procedure MyPrint to the value N - 2;
      print the value of N;
    end
  end
end
```

Please apply the procedure MyPrint to the value 5 and record the values that are printed.

13. (10%) Design a Turing machine that increments the value on the tape if it is less than 255 or leaves the value unaltered if it is equal to 255, where the value is an integer ranging from 0 to 255 in binary representation.