

I. Choice problem (4% for each)

1. Which statement is incorrect about BIOS (basic input & output system)? (a) it can be written in assembly language; (b) it can check most equipment like memory when it works; (c) it is executed before operating system; (d) diskless workstation can use BIOS to run FFTP (fast FTP) to download OS from the host; (e) it is generally stored in disk; (f) it can be updated by user; (g) it contains a small portion of codes to load operating system.

2. How many times the for loop is executed for the following codes? (a) 0; (b) 1; (c) 2; (d) 3; (e) 4; (f) none of the above.

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For (int k = 1, m = 2; k <= 3*m && m != 4; m--, k++)
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  k++;
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3. Which statement is incorrect for the class in Java or C# language? (a) an abstract class should contain at least one abstract method; (b) an class inheriting an abstract class can not be an abstract class; (c) interface usage is like an abstract class; (d) an abstract method only contains the method name, parameters, and return type; (e) private method cannot be called by outer class (object); (f) protective method can be inherited.

4. Which statement is incorrect for the Object-oriented analyses? (a) use case diagram can be used to describe the possible usage of users for the system; (b) swim lines in sequence diagram describes the responsibility of each involved users or objects; (c) activity diagram cannot describe the dynamic operation of a system; (d) state transition diagram can describe the change of states of a set of objects; (e) deployment diagram describes the deployment of components or the hardware; (f) class diagram can be modified into table schema(s).

5. Which sentence is incorrect for the big data? (a) Its data cannot come from heterogeneous database; (b) Its data can spread into a set of machines for fast reasons; (c) Its infrastructure cares the fault tolerance; (d) Statistic data can be calculated faster; (e) Data visualization is focused in big data; (f) It tries to have in-memory computation instead of in-disk computation.

6. Which one is incorrect? (a) High-level languages look much similar to everyday English compared to assembly language; (b) The mainboard is the central PCB in a system devices, where processors and main memory are attached; (c) graphics card contains a coprocessors that executes special-purpose instructions, like drawing graphs; (d) dynamic RAM (DRAM) doesn't require refresh circuit; (e) machine language consists of streams of numbers (1s and 0s) that instruct computers how to perform elementary operations; (f) cache inside CPU can speed up the execution of disk access.
7. Which one is incorrect? (a) SQL language is defined by each Data base company; (b) normalization is needed in Database; (c) Program counter (PC) holds the address of the instruction to be fetched next; (d) Byte code used in Java is a virtual machine language; (e) Bandwidth is the amount of data that can be transferred per unit of time; (f) Buffer uses high-speed memory to hold recently-accessed data;
8. What statement is incorrect for the recursion? (a) generally, it needs to call itself while execution; (b) in most time, it has the corresponding mathematical expression; (c) a binary sorting can be written in a recursive way; (d) we do not need to define the base condition where no more recursive call is needed; (e) generally, the performance is worse than the iterative version for the same problem; (f) a recursive function can be easily written in recursive program
9. Which statement about bubble sort is incorrect? (a) generally, n passes of the data are needed to sort the data array, where n is the number of elements; (b) swapping values requires one assignment; (c) two nested loops are needed in the sorting; (d) it is very simple compared to quick sorting procedures; (e) the value of the data can be considered as the weight of the bubble, which is the concept of bubble sorting; (f) the sorting can sort data in decreasing and increasing order
10. Which statement is incorrect for the system software? (a) editor, like MS word, can be classified as a system software; (b) Operating system manages the resources of the computer; (c) TCP/IP provides interface to connect the computer and internet; (d) system library can lift the load of the programmer; (e) compiler and assembly is also a type of system software; (f) Mobile devices,

like Apple and Android, use the same operating system.

II. Briefly answer the following questions (10% for each):

1. Please transform the following binary numbers into decimal numbers: (a)
11100101; (b)10010000
2. What is virtual machine, like .Net or Java platform? How do they work in the viewpoint of platform independent?
3. Why do we change our programming style from structured programming to object-oriented programming? Please explain the following terms: polymorphism, and overloading.
4. Please write a recursive function and recursive program to calculate the function, $f(n) = 5^n$, where n is a positive integer.
5. Please write the post-order and pre-order for the following expression,
$$a/(b-c*d)+e+f*g-h/(i-j).$$
where $*$ and $/$ are multiplication and division operations.
6. What is the difference among database, data warehouse, big data and data mining.

