

國立臺北科技大學九十五學年度碩士班招生考試

系所組別：1522 自動化科技研究所乙組

第二節 計算機概論（選考）試題

填准考證號碼

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第一頁 共二頁

注意事項：

1. 本試題共八題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、 Indicate whether a stack would be a suitable data structure for each of the following applications. (1% each, total 8%)

1. A program to evaluate arithmetic expressions according to the specific order of operators.
2. A bank simulation of its teller operation to see how waiting times would be affected by adding another teller.
3. A program to receive data that are to be saved and processed in the reverse order.
4. An address book to be maintained.
5. A word processor to have a PF key that causes the preceding command to be redisplayed. Every time the user presses the PF key, the program shows the command that preceded the one currently displayed.
6. A dictionary of words used by a spelling checker to be built and maintained.
7. A program to keep track of patients as they check into a medical clinic, assigning patients to doctors on a first come, first served basis.
8. A data structure used to keep track of the return addresses for nested functions while a program is running.

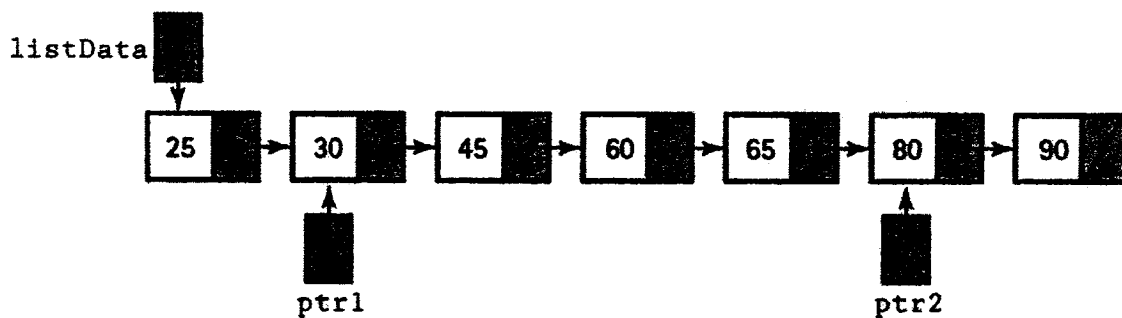
二、 Indicate whether each of the following applications would be suitable for a queue. (1% each, total 8%)

1. An ailing company wants to evaluate employee records so as to lay off some workers on the basis of service time (the most recently hired employees are laid off first).
2. A program is to keep track of patients as they check into a clinic, assigning them to

doctors on a first come, first served basis.

3. A program to solve a maze is to backtrack to an earlier position (the last place where a choice was made) when a dead-end position is reached.
4. An inventory of parts is to be processed by part number.
5. An operating system is to process requests for computer resources by allocating the resources in the order in which they are requested.
6. A grocery chain wants to run a simulation to see how the average customer wait time would be affected by changing the number of checkout lines in its stores.
7. A dictionary of words used by a spelling checker is to be initialized.
8. Customers are to take numbers at a bakery and be served in order when their numbers come up.

三、 Use the linked list pictured below in the following questions: (2% each, total 32%)



1. Give the values of the following expressions:

- (1) ptr1->info
- (2) ptr2->next->info
- (3) listData->next->next->info

2. Are the following expressions true or false?

- (1) listData->next == ptr1
- (2) ptr1->next->info == 60
- (3) ptr2->next == NULL
- (4) listData->info == 25

3. Decide whether the syntax of each of the following statements is valid or invalid. If it is valid, mark it as such; if it is invalid, explain what is wrong.

- (1) listData->next = ptr1->next;

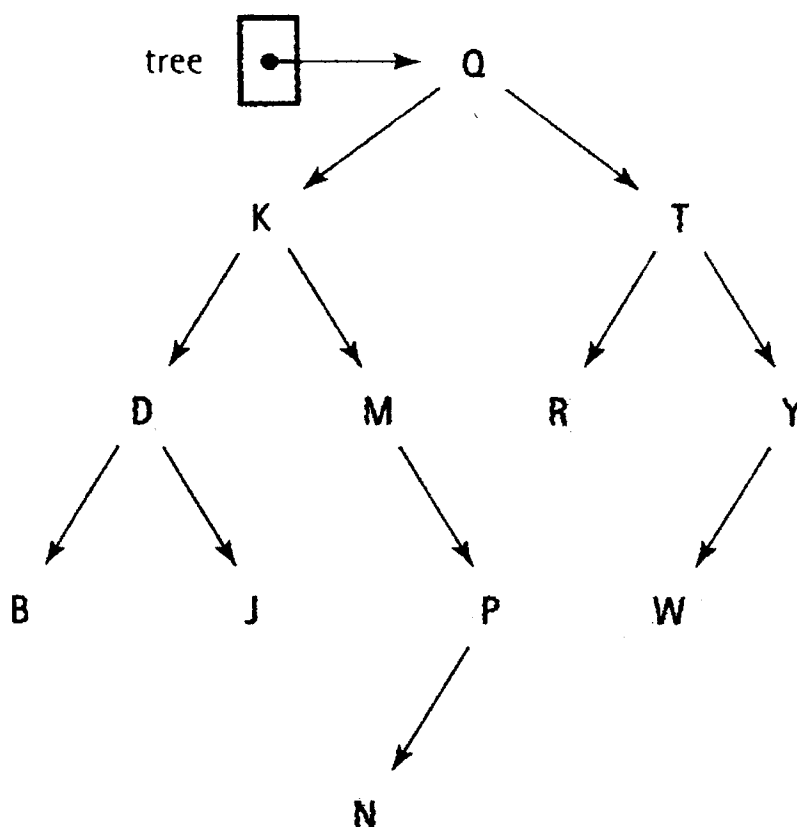
注意：背面尚有試題

- (2) `listData->next = *(ptr2->next);`
- (3) `*listData = ptr2;`
- (4) `ptr2 = ptr1->next->info;`
- (5) `ptr1->info = ptr2->info;`
- (6) `ptr2 = ptr2->next->next;`

4. Write *one* statement to do each of the following:

- (1) Make listData point to the node containing 45.
- (2) Make ptr2 point to the last node in the list.
- (3) Set the info member of the node containing 45 to 60.

四、 Answer the questions independently, using the given tree show below. (2% each, total 16%)



1.

- (1) What are the ancestors of node P?
- (2) What are the descendants of node K?
- (3) What is the maximum possible number of nodes in the tree at the level of node W?

at 2-4

- (4) What is the maximum possible number of nodes in the tree at the level of node N?
- (5) Insert node O. How many nodes would be in the tree if it were completely full down to and including the level of node O?

2. Show the order in which the nodes in the tree are processed by

- (1) an inorder traversal of the tree.
- (2) a postorder traversal of the tree.
- (3) a preorder traversal of the tree.

五、What are the necessary conditions when a dead lock occurs? (4%)

六、Explain following terms used in Object Oriented Programming paradigm: (4% each)

- 1. Polymorphism
- 2. Inheritance
- 3. Instance
- 4. Class

七、Explain convoy effect in CPU scheduling. (8%)

八、Suppose a RISC processor has 4 registers (R0 to R3). The processor can access 1024 memory locations, and has 16 instructions (add, sub, etc). The width of data bus is 8-bit wide. This process uses a typical instruction format as following:

```
add 565, R2; Add the content at memory location
           ; 565 with Register R2 and stored the
           ; result in Accumulator
```

What is the minimum number of bits required for each instruction? Provide detail of your design. (8%)