

[1] Give an answer for each blank. (填充題每格 1.5 分 共 24 分, 總分四捨五入)

- (1) The command interpreter in Unix is called (A).
- (2) The language construct used to define functions or procedures that are executed mutually exclusively is called (B). Java supports a keyword called (C) used to specify a method that must be executed in a mutually exclusive way.
- (3) In a protected multi-user computer system, if a privileged instruction is executed in user mode, a (or an) (D) would be generated and control will be transferred to (E).
- (4) The four necessary conditions to lead to a deadlock are mutual exclusion, circular wait, (F) and (G).
- (5) The bit in a page table entry used to indicate that the page is just read or written is generally called (H). The purpose of this bit is for (I).
- (6) A technique used to map independent program modules on overlapping address space to reduce the total requirement of a program's memory size is called (J). This technique is typically supported by (K).
- (7) The technique that is applied to execute the MS-DOS code on Pentium-based Windows systems in V86 mode is called (L).
- (8) In a virtual memory system, when the operating system is spending more time doing paging activity than executing user programs, we say that the system is in (M). In such situation, the CPU utilization would be (> 50% or < 50%) (please choose one as the answer of (N)).
- (9) A symbolic link in Unix is very similar to (O) (*answer this in Chinese*) in Windows.
- (10) All files accessible in a Unix system are arranged in one tree. The mechanism used in Unix to attach a disk partition to the file tree is called (P).

[2] Please evaluate the advantages using multi-thread approach to implement a server providing services for multiple clients concurrently. (8%)

Suppose the system (with single CPU) runs this server as the only application, then which of the following situations would get more performance benefit using the multi-threading approach to implement the server? Why? (4%)

- (1) the server is CPU-bound
- (2) the server is IO-bound

(背面仍有題目,請繼續作答)

[3] Contiguous allocation is one of the methods to allocate files on disks (hard disk floppy or CD etc.).

(1) Please list and describe another two methods. (6%)

(2) Which method is taken by Windows FAT? (2%)

(3) Which method is used for CD-ROM? (2%)

(4) In a computer that does *not* use virtual memory, the memory allocation methods may be something similar to those used for file allocation. However, there are differences between them. What are the major differences? (4%)

[4] Suppose that, given the conditions below, you are assigned to implement an optimizing compiler for programming language L:

- The compiler will be executed on computer B with instruction set H.
- The compiler will generate object code of instructions in H.
- The source code of the compiler must be implemented using L.
- The system environment for developing this compiler includes
 - Computer A with instruction set M
 - Software available on computer A
 - Operating system, assembler for instruction set M
 - C language compiler running on A generating object code in M
 - Text editor, Linker, Loader, Lex, YACC, and debugging tools.
 - Computer B with instruction set H
 - Software available on computer B
 - Operating system, assembler for instruction set H
 - Linker, Loader.
 - Tools to transfer text and binary files from computer A to B

Please describe how you will complete this assignment? (10 points)

[5] Comparison of top-down parsing and bottom-up parsing:

(1) What is top-down parsing? Give at least two popular techniques. (3 points)

(2) What is bottom-up parsing? Give at least two popular techniques. (3 points)

(3) Compare top-down parsing with bottom-up parsing. (6 points)

[6] Can the following information uniquely define a binary tree? Please give your answer by YES or NO for each of the following. (2 points each)

- (1) the pre-order sequence of a complete binary tree
- (2) the in-order sequence and the degree of each node in a binary tree
- (3) the post-order sequence and level-order sequence of a binary tree
- (4) the level-order sequence and the height of a binary tree
- (5) the pre-order sequence and the number of leaf nodes in a binary tree
- (6) the pre-order sequence and the post-order sequence of a binary tree
- (7) the in-order sequence and the leaf nodes of a binary tree
- (8) the level-order sequence of a binary tree and the number of nodes in each level

[7] Explain briefly the following terms: (2 points each)

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|---|---------------------|
| (A) DAG | (D) Literal pool |
| (B) (Asymptotic notation) $\Omega(n^2)$ | (E) Call by value |
| (C) DLL | (F) Overlay manager |