

國立臺灣科技大學  
八十九學年度碩士班招生考試試題

系所組別：資訊工程研究所  
科 目：作業系統

1. Consider the process state transition. Assume each process may be in one of the following states:
- New: The process is being created.
  - Running: Instruction are being executed.
  - Waiting: The process is waiting for some event to occur (such as an I/O completion or reception of a signal).
  - Ready: The process is waiting to be assigned to a processor.
  - Terminated: The process has finished executed.

The long-term scheduler (or called job scheduler) selects processes from New state to Ready state. The short-term scheduler (or called CPU scheduler) selects from among the processes that are ready to execute, and locates the CPU to one of them.

(a) Give three cases that the long-term scheduler might be invoked. (10%)

(b) Give four cases that the short-term scheduler might be invoked. (10%)

2. Which of the following programming techniques and structures are "good" for a demand-paged environment? Which are "not good"? Explain your answers. (15%)
- a. Hashed symbol table
  - b. Sequential search
  - c. Binary search
  - d. Array
  - e. Linked List

3. Consider a demand-paging system with the following time-measured utilizations:

CPU utilization	13%
Disk utilization	97%

Which (if any) of the following will (probably) improve CPU utilization? Explain your answer. (15%)

- a. Install a faster CPU
- b. Increase the degree of multiprogramming
- c. decrease the degree of multiprogramming
- d. Install more main memory
- e. Install a fast hard disk

**Please fill in the following blanks; the blank may be a noun, an adjective, or a number. (50%)**

4. The file system consists of two distinct parts: a collection of \_\_\_\_\_, each storing related data, and a \_\_\_\_\_, which organizes and provides information about all the files in the system. Some file systems have a third part, \_\_\_\_\_, which are used to separate physically or logically large collections of directories.



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5. The file system is generally composed of many different levels. The lowest level, the I/O control, consists of \_\_\_\_\_ and \_\_\_\_\_ to transfer information between the memory and the disk system. The basic file system level needs only to issue generic commands to the appropriate \_\_\_\_\_ to read and write physical blocks on the disk.

6. Three major methods of allocating disk space are in wide use: contiguous, linked, and indexed. It is inefficient to support a direct-access capability for \_\_\_\_\_ allocation files. Linked allocation solves the \_\_\_\_\_ and \_\_\_\_\_ problems of contiguous allocation. Indexed allocation supports direct access, without suffering from external fragmentation. The pointer overhead of the index block is generally \_\_\_\_\_ than pointer overhead of linked allocation.

7. Consider a disk queue with requests for I/O blocks on cylinders  
98, 37, 122, 14, 124, 65, 67

in that order. Assume the disk head is initially at cylinder 53. The FCFS(First Come First Service) scheduling has a total dish head movement of \_\_\_\_\_ cylinders. The SSTF(Shortest Seek Time First) scheduling has a total dish head movement of \_\_\_\_\_ cylinders. In the SCAN scheduling, we assume the disk arm is moving toward cylinder 0, then the SCAN scheduling has a total dish head movement of \_\_\_\_\_ cylinders.

8. The three most common routing schemes are fixed routing, virtual routing, and dynamic routing. Usually in fixed routing the \_\_\_\_\_ path is chosen, so that the communication costs are \_\_\_\_\_. In virtual circuit, a path from site A to site B is fixed for the duration of one session. Different sessions involving messages from A to B may have \_\_\_\_\_ paths. In dynamic routing, the path used to send a message from site A to site B is chosen only when a message is sent. Because the decision is made dynamically, separate messages may be assigned \_\_\_\_\_ path.

9. The three most common schemes are \_\_\_\_\_ switching, \_\_\_\_\_ switching, and packet switching. In packet switching, one logical message may have to be divided into a numbers of packets. Each packet may be sent to its destination separately, and therefore must include a source and destination address with its data. Each packet may take a \_\_\_\_\_ path through the network. The packets must be reassembled into messages as they arrive.

10. A distributed system provides the user with access to the various resources the system provides. Access to a shared resource can be provided by \_\_\_\_\_ migration, \_\_\_\_\_ migration, or job(process) migration.

11. For atomicity to be ensured, all the sites in which a transaction T executed must agree on the final outcome of execution. T either \_\_\_\_\_ at all sites or \_\_\_\_\_ at all sites. To ensure this property, the transaction coordinator of T must execute a commit protocol. The most widely used commit protocol is the \_\_\_\_\_ protocol.

