

招生學年度	九十九	招生類別	碩士班
系所班別	資訊工程學系碩士班		
科目	作業系統與計算機組織		
注意事項	本考科禁止使用掌上型計算機		

1. [15%] To Banker's algorithm for deadlock avoidance, describe:
 - (a) [10%] The data structure needed.
 - (b) [5%] The advantages and restrictions on its use.

2. [10%] Draw and explain the diagram that show the address translation of the paging memory management approach.

3. [10%]
 - (a) [5%] How do caches help improve performance?
 - (b) [5%] Why do system not use more or larger caches if they are so useful?

4. [15%]
 - (a) [5%] What is race condition?
 - (b) [4%] What is a critical section?
 - (c) [6%] What three requirements must a solution to the critical section problem satisfy?

5. [10%] A computer system has 32 address lines and 32-Kbyte cache, where each cache block size is 32-byte. How many tag-bit is required for each cache block in the following cases?
 - (a) [5%] A direct mapped cache
 - (b) [5%] A fully associative cache

6. [20%] Explain the following terminology pairs and tell the differences between them.
 - (a) [5%] Pipelining / Parallelism
 - (b) [5%] Multiprogramming OS / Multiprocessing OS
 - (c) [5%] DMA / Interrupt-driven I/O
 - (d) [5%] Write through cache / Write back cache

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7. [10%] Consider the machine with three instruction classes and CPI measurements as follows:

Instruction class	CPI for this instruction class
A	1
B	2
C	3

Now suppose we measure the code for the same program from two different compilers and obtain the following data:

Code from	Instruction counts (in billions) for each instruction class		
	A	B	C
Compiler A	5	1	1
Compiler B	10	1	1

Assume that the machine's clock rate is 500 MHz. Which code sequence will execute faster according to MIPS? According to execution time?

8. [10%] A computer system contains:

- A CPU that sustains 300 million instructions per second and averages 50,000 instructions in the operation system per I/O operation
- A memory backplane bus capable of sustaining a transfer rate of 100 MB/sec
- SCSI-2 controllers with a transfer rate of 20 MB/sec and accommodating up to seven disks
- Disk drives with a read/write bandwidth of 5 MB/sec and an average seek plus rotational latency of 10 ns

If the workload consists of 64-KB reads (where the block is sequential on a track) and the user program needs 100,000 instructions per I/O operation, find the maximum sustainable I/O rate and the number of disks and SCSI controllers required. Assume that the reads can always be done on an idle disk if one exists (i.e., ignore disk conflicts).

招生學年度	九十九	招生類別	碩士班
系所班別	資訊工程學系碩士班、資訊工程學系網路與多媒體科技碩士班		
科目	科技英文		
注意事項	本考科禁止使用掌上型計算機		

I. 英翻中

1. (15%) Some of the computer codes used in the recent attacks on the networks of Google and dozens of other major U.S. companies were developed by a diverse group of Chinese hackers, including security professionals, consultants and temporary contractors, according to an industry source.

2. (10%) Each frame sent is individually acknowledged. In this way, the sender knows whether or not a frame has arrived safely. If it has not arrived within a specified time interval, it can be sent again.

3. (10%) The usual solution is to introduce flow control to throttle the sender into sending no faster than the receiver can handle the traffic. This throttling generally requires some kind of a feedback mechanism, so the sender can be made aware of whether or not the receiver is able to keep up.

4. (10%) Computer science researchers at the University of Washington and Cornell University are deploying a system that will blend teamwork and collaboration with powerful graphics algorithms to create three-dimensional renderings of buildings, neighborhoods and potentially even entire cities.

II. 中翻英

5. (10%) 宏碁去年踢下戴爾(Dell)，成為全球第 2 大 PC 品牌，戴爾近日對外宣稱，將啟動作戰計畫，鎖定大陸、印度，重新奪回 PC 市占率。

6. (10%) 大家對新奇程式的熱度很快就會退燒，尤其是那些免費取得的自由軟體。

7. (10%) 這套系統可讓銀髮族透過電視上網與人聊天，也可同時與朋友一起看電視、電影。

8. (9%) 液晶電視已經成為台灣客廳的主流。

III. 請解釋(不能光翻譯)下列的名詞

9. (16%) (每個四分) (a) SaaS, (b) Ethernet, (c) Cloud Computing, (d) Data Mining