銘傳大學九十二學年度資訊傳播工程學系碩士班招生考試

第二節

計算機系統 試題

(含作業系統及計算機結構)

【Operation System】

(1) Briefly explain the difference between the user *mode* and the *privileged mode* of a CPU? Why is that difference for the goals of an operating system?

(4%×2=8%)

(2) What is the difference between an *Interrupt* and a *System Call*?

(6%)

(3) The page replacement algorithm *last-recently-used* (LRU) could perform very well. Why is it hard to implement plain LRU in a real system? What techniques can be used to approximate LRU?

(4%×2=8%)

(4) Many computer viruses add their own code to existing files, changing their length. A simple way of detecting this is to compare file lengths before and after. Discuss the advantages and disadvantages of this.

(8%)

(5) Given a heap memory management scheme with the following free list:

Free element	Size in kb
1	100
2	500
3	200
4	300
5	600

The following process requests will be received in order:

Process number	Size in kb
1	212
2	417
3	112
4	426

Show the memory is allocated using the memory allocation schemes

1. First Fit
2. Best Fit

(6%×2=12%)

(6) Consider the following mechanism for adding a new data block to a file:

Get a new block from the free list
Write data to the block
Update FAT(File Allocation Table) pointers
Update size and last modified fields

If the system crashes somewhere during this (or is switched off, etc), discuss some of the ways in which the file system can become 'inconsistent' i.e. have some erroneous values.

(6%)

(7) Assume three processes with estimate CPU bursts:

P1: 7 time units
P2: 1 time unit
P3: 16 time units

(a) Assume that all three processes are ready for execution. Explain and calculate the benefit of using *shortest-job-first* (SJF) scheduling over just *FIFO* scheduling (first P1, then P2, then P3)

(b) Now, assume that P1 and P3 are ready for execution. But P2 becomes ready only after 2 time units. Explain what is necessary to still achieve an optimal execution order that minimizes the average turnaround time. What is the resulting execution schedule?

(5%×2=10%)

【Computer Architecture】

(8) Two digital functions are enabled by control variables C_1 and C_2. The Boolean functions for the control signals are

$C_1=ABT_1+A'B'T_2$

$C_2=AT_1+B'T_2$

Under what conditions of input variables A, B and timing variables T_1, T_2 will the two digital functions be enabled at the same time?

(10%)

(9) What is the purpose using a benchmark suite? Discuss the potential problems of choosing different benchmark suites.

(10) Draw a block diagram of a bus system connected to four registers with information transferred serially from any register to any other register. Use a decoder and a multiplexer to select the source register and a decoder to select the destination register.

(10%)

(11) Distinguish and explain the computer terminologies in the following groups

(a) Parallelism versus pipelining

(b) Serial processing versus parallel processing

(c) MIPS versus MFLOPS

(4%×3=12%)