

國立暨南國際大學九十二學年度碩士班研究生入學考試試題

第 1 節計算機結構與作業系統 適用：(資工所 411)

(本試題共 / 頁，第 / 頁)

考生注意：1. 依次序作答，只要標明題號，不必抄題。

2. 答案必須寫在答案卷上，否則不予計分，並限以藍黑色筆作答。

3. 試題隨卷繳回。(餘詳詳閱試場規則)

The following problems may be answered in Chinese or English. You need to give all details in order to receive credit (point).

1. (10 points) Explain the following terminologies.
 - (a) stack frame
 - (b) nonuniform memory access
 - (c) write-through
 - (d) multiple-instruction issue
 - (e) out-of-order commit
2. (15 points) Suppose that in 1000 memory references there are 50 misses in the first-level cache, 20 misses in the second-level cache, and 5 misses in the third-level cache. What are the various miss rates? Assume the miss penalty from the L3 cache to memory is 100 clock cycles, the hit time of the L3 cache is 10 clocks, the hit time of the L2 cache is 4 clocks, the hit time of L1 is 1 clock cycle, and there are 1.2 memory references per instruction. What is the average memory access time (average cycles per memory access) and average stall cycles per instruction? Ignore the impact of writes.
3. (10 points) Describe how to reduce the miss rate of a cache and list the classes of cache misses that exist.
4. (15 points) Draw a configuration showing a processor, four 16Kx8-bit ROMs, and a bus containing 16 address lines and 8 data lines. Add a chip-select logic block that will select one of the four ROM modules for each of the 64K addresses.
5. (a) (5 points) What is Belady's anomaly?
(b) (10 points) Why does not LRU exhibit Belady's anomaly?
6. (10 points) In UNIX's implementation, the inode holds the meta-data for a file. If an inode contains 12 direct indexes and 3 indirect indexes and the block size is 4K (4x1024) bytes, assuming the inode is in memory, how many disk access are needed to access the 70000-th byte of the file?
7. (25 points) The reader-writer problem is as follows. A data object is shared among several concurrent processes. Some of them want to update and others want to read. Of course, the updating and reading could not be done at the same time. But many processes may read the data object simultaneously. We call a process a writer if he wants to write and a reader vice versa. In this problem, we assume that if a writer is waiting, no NEW reader may start reading. Please solve this problem by semaphores.