長庚大學 112 學年度第一學期 資訊工程學系博士班資格考 計算機架構 考題

1. The cache access performance can be determined by three variables: hit time, miss rate and miss penalty.
   (a) List an equation to explain how these three variables affect the cache access performance. (5 points)
   (b) List one approach for each of these variables (totally list three approaches) and explain why each of them can improve the variable. (5/5/5 points)

2. The execution time of a program on a CPU can be determined by three variables: instruction counts, cycles per instruction, and cycle time.
   (a) List an equation to explain how these three variables affect the CPU execution time. (5 points)
   (b) List one approach for each of these variables (totally list three approaches) and explain why each of them can improve the variable. (5/5/5 points)

3. Translation Lookaside Buffer (TLB) is an efficient structure to speedup address translation for a virtual memory system.
   (a) Explain why. (10 points)
   (b) Can we design a TLB such that its size (capacity) equals to the page table size (capacity)? Why or why not? (10 points)

4. There are two possible challenges which limit the performance of applying the parallel processing techniques to a multi-core processor: program parallelism and data consistency. Explain why. You can use programs as examples.
   (10/10 points)

5. List two possible compiler approaches to show why the compiler optimization can speedup a program's execution. (10/10 points)