

國立中央大學九十學年度碩士班研究生入學試題卷

所別: 資訊工程學系 不分组 科目: 系統程式 共 1 頁 第 1 頁

1. System software like assembler has intimate relation about the CPU architecture. Following are some question about the CPU architecture design.
 - a) The common types of operands include immediate, register and memory. Explain the difference. (5%)
 - b) In order to handle complex data types, there are several addressing mode designed. Explain what addressing mode can be used to access 1-dimension array and two-dimension array. (5%)
2. Immediate operands and literals are both ways of specifying operand value in a source statement. What are the advantages and disadvantages of each? When might each be preferable to the other? (10%)
3. Suppose that you are writing assembler for a machine that has only program-counter relative addressing. (that is, there are no direct-addressing instruction formats and no base relative addressing.) Suppose that you wish to assemble an instruction whose operand is an absolute address in memory-for example,
LDA 100
to load register A from address (hexadecimal)100 in memory. How might such an instruction be assembled in a relocatable program? What relocation operations would be required? (10%)
4. About the design of assembler or macro processor, we often use 2-pass assembler design and one-pass macro processor design, why? (10%)
5. In order to provide a multi-programming environment, program should be relocatable. What hardware and software design is necessary to provide relocatable program? (10%)
6. Construct a general resource graph for the following scenario and determine if the graph is completely reducible: R_1 , R_2 , and R_3 are reusable resources with a total of 2, 2, and 3 units. Process P_1 is allocated one unit of each R_2 and R_3 and is requesting 1 unit of R_1 ; Process P_2 is allocated 1 unit of R_1 and is requesting 2 units of R_3 ; and Process P_3 is allocated 1 unit each of R_1 and R_2 and is requesting 1 unit of R_3 . (20%)
7. Please list the components of the UNIX System memory. Also please describe a typical memory layout of the UNIX operating system. (10%)
8. A page-replacement algorithm should minimize the number of page faults. We can do this minimization by distributing heavily used pages evenly over all of memory, rather than having them compete for a small number of page frames. We can associate with each page frame a counter of the number of pages that are associated with that frame. Then, to replace a page, we search for the page frame with the smallest counter.
 - (a) Define a page-replacement algorithm using this basic idea. Specifically, address the problems of (1) what the initial value of the counters is, (2) when counters are increased, (3) when counters are decreased, and (4) how the page to be replaced is selected. (10%)
 - (b) How many page faults occur for your algorithm for the following reference string, for four page frames? (5%)
1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2.
 - (c) What is the minimum number of page faults for an optimal page-replacement strategy for the reference string in part (b) with four page frames? (5%)

