Homework 5

1. For a certain program, 2% of the code accounts for 50% of the execution time. Compare the following three strategies with respect to programming time and execution time. Assume that it would take 100 man months to write it in C, and that assembly code is 10 times slower to write and four time more efficient.

   i) Entire program in C
   ii) Entire program in assembler.
   iii) First all in C, then the key 2% in assembly.

2. Do the considerations that hold for two pass assembler also hold for compilers?
   i) Assume that the compilers produce object modules, not assembly code.
   ii) Assume that the compilers produce symbolic assembly language.

4. Can the following program be assembled in two passes? EQU is pseudo-instruction that equates the label to the expression in the operand field.
   
P EQU Q
Q EQU R
R EQU S
S EQU 4
6. What is the difference between an instruction and pseudoinstruction?

7. What is the difference between instruction location counter and program counter if any? After all both keep track of the next instruction in a program.

8. Show the symbol tables after the following Pentium 4 statements have been encountered. The first statement is assigned to address 1000.
   a. Everest: POP BX (1 byte)
   b. K2: PUSH BP (1 byte)
   c. WHITNEY: MOV BP, SP (2 bytes)
   d. MCKINLEY: PUSH X (3 bytes)
   e. FUJI: PUSH SI (1 byte)
   f. KIBO: SUB SI, 300 (3 bytes)

10. Show the steps needed to look up Berkeley using binary search on the following list: Ann Arbor, Berkeley, Cambridge, Eugene, Madison, New Haven, Palo Alto, Pasadena, Santa Cruz, Stony Brook, Westwood and Yellow Springs. When computing the middle element of a list with an even number of elements, use the element just after the middle index.

12. Compute the hash code for each of the following symbols by adding up the letters (A=1, B = 2, etc.) and taking the result module the hash table size. The hash table has 19 slots, numbered 0 to 18.

   els, jan, jelle, maaike

   Does each of them generate unique hash code? If not, how to deal with the collision?

16. Programs often link to multiple DLLs. Would it not be more efficient just to put all the procedures in one big DLL and then link to it?

22. A linker reads five modules, whose lengths are 200, 800, 600, 500, 700 words. If they are loaded in that order, what are the relocation constants?