CS430 Problem Set #5

Date assigned: Friday, October 26, 2012
Date due: Friday, November 2, 2012
Points: 60

1) (10 pts) Work problem 10.32 on p. 362

2) (10 pts) Consider the expression: A + B * C / D - E * F

a. Convert this expression from infix to postfix notation.

b. Write program segments for a stack machine and a 1-Address machine that evaluates the above expression. In the case of the stack machine, leave the result on top of the stack. In the case of the 1-Address machine, identify where your result is. The instruction sets are listed below:

Stack Machine	One-address Machine
push m	load m
pop m	store m
add	add m
sub	sub m
mul	mul m
div	div m

3) (10 pts) Design a variable length opcode to allow ALL of the following to be encoded in a 36-bit instruction:
a. 7 instructions with two 15-bit addresses and one 3-bit register number
b. 500 instructions with one 15-bit address and one 3-bit register number
c. 50 instructions with no addresses or registers

4) (10 pts) Write a fully documented C program 05endianPUNetID.c that determines the endianess of a machine. Your program is to print either a) BIG ENDIAN MACHINE or b) LITTLE ENDIAN MACHINE. I do not want you even talking about the solution to this problem at a high level as I am interested in how each of you attack this problem. Paste your C program into your solutions document and report on the endianess of the following machines: (a) zeus (b) ada and (c) circe. I have created an account for each of you on circe which we will talk about in class.

5) (10 pts) Work problem 11.4 a., b., e., f., g. on p. 429

6) (10 pts) The first few fibonacci numbers are 1 1 2 3 5 8 ... After the first two, the remaining fibonacci numbers are found by adding the two previous fibonacci numbers (e.g. 8 = 3 + 5). Using Visual Studio 10, write an inline assembly language program that returns the n^{th} fibonacci number. Write your solution in this code below. Also, do not add any more C variables.

```
#include <iostream>

int fib (int n)
{
  __asm
  {
       ; your code goes here
  }

}
```

```
using namespace std;

int main (void)
{
  char ch;

  for (int i = 1; i < 10; ++i)
  {
    cout << "fib number " << i << " = " << fib (i) << endl;
  }

  cin >> ch;

  return 0;
}
```

Extra Credit (up to 5 pts)

a) (2 pts) Implement strncpy as defined for C.

```
char * STRNCPY (char *pDest, char *pSrc, int max)
{
  _asm
  {
    ; your code goes here
  }
}
```

Write adequate code to test this function.

b) (3 pts) Implement a binary search on an array of integers. If the value is not found, return -1; otherwise, return the index of where the value is found.

```
int binarySearch (int values[], int low, int high, int target)
{
  _asm
  {
    ; your code goes here
  }
}
```

Write adequate code to test this function.

Note1: Please make sure your problem sets are typed, answered in order, and stapled together. Also, paste in your code solutions fully documented into your solution.

Note2: A hard copy of your Problem Set Solution is due on the instructor's desk by 11:45am on the day the assignment is due. Also, place a copy of this solution 05PUNetID.doc, 05endianPUNetID.c , and your Visual Studio 10 project 05PUNetID in a folder called 05PUNetID. Then place the folder 05PUNetID in the CS430 Drop Box by 11:45am on the day in which the assignment is due. As for the endian problem, place a copy of your solution on circe in a directory /home/youruserid/Documents/CS430 with the name 05endianPUNetID.c. This way I can run your program on circe and any other machine.

Note3: I don't mind you talking about particular problems at a very high level (not a specific solution level) except problem #4 and even lending resources of where more information can be found. Further, all of your solutions are to be original and in your own words. If you have any questions, let me know.