CS 1428 Honors
Lab 1

Jared Wallace

Questions

Throughout the semester, we will be building a program piece by piece. This program that you will be writing will function as an *assembler*, which means that it will in turn run other, much smaller and much more basic, programs. I will be writing and giving to you those small, basic programs for your assembler to run. Today we will start writing the assembler. To facilitate the modular approach we are taking with this project, we are going to maintain it in a *Git* repository.

1. (10 pts) Every C++ program starts out with the same basic form, or skeleton. What are the different parts of this skeleton? What is the name of the function that all C++ functions must include?

2. (10 pts) Evaluate the following expressions. Write the answers on this work sheet (You may show your work for partial credit). Do *not* use the computer to evaluate these expressions.

   (a) 10 % 456

   (b) 12 % 3

   (c) 16 % 5

   (d) 0 % 456

3. (10 pts) Evaluate the following expressions exactly as the computer would evaluate them. (You may show your work for partial credit). Do *not* use the computer to evaluate these expressions. Be sure and account for floating point vs. integer division *and* order of operations!

(a) 12 / 2 - 4

(b) 7 / 3

(c) 6.0 / 4

(d) (6 + 17) % 2 - 1

(e) 14 / (11 / 4)

4. (10 pts) Consider the following C++ snippet:

```
int cars = 10;
int trucks = 2;
int busses = 1;
int vans = 5;
int count = 2;

cars += busses;
trucks += trucks + busses;
busses += 3;
++busses;
vans = vans/ count;
```

step	cars	trucks	busses	vans	count
1					
2					
3					
4					
5					

After execution, what are the values of the following variables? (Hint: use the table)

cars:

trucks:

busses:

vans:

5. (10 pts) The mini-programs I give you will use simple integers to represent various commands the program you write can execute. For instance, the number 0 will mean “add”. Each instruction line in the mini-program will have 3 extra integer values (representing the data for the matching command) along with it. How do you declare 4 integer variables named inst, data0, data1, and data2? How would you declare an additional string variable named source?

6. (5 pts) How would you set the value of inst to 0, data0 to 5, data1 to 4, and data2 to 2?

7. (10 pts) How would you assign the sum, difference, product, modulo, and quotient of data1 and data2 to the variable named data0? (Do each assignment as a separate statement)

8. (10 pts) Let's decide that we wanted to use named constants to represent the various commands our program can execute. Declare the following named constants with the given values: (All are integer constants)

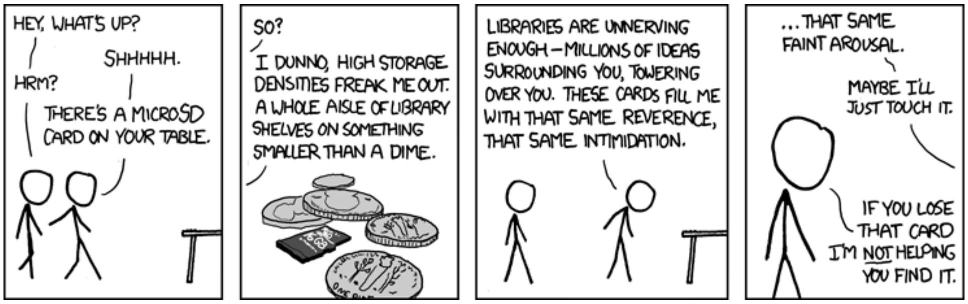
   - OP_ADD with a value of 0
   - OP_SUB with a value of 1
   - OP_MUL with a value of 2
   - OP_DIV with a value of 3
   - OP_MOD with a value of 4
   - OP_EXP with a value of 5
   - OP_RED with a value of 6
   - OP_WRT with a value of 7

9. (25 pts) You will need to make a program named lab1h.cpp that combines what you have done in questions 1 through 5. Requirements:

   - Make sure you have the proper header and includes
   - Make sure you have the 'using namespace' compiler directive and a 'main' function.
   - At the top of your main function, include the named constants you declared in question 5.
   - Inside your main function, you will need to declare the 4 integer variables you wrote in question 2. You will also need to prompt the user for the values of each variable, and then store the value they input into the appropriate variable.
   - You will also need to perform the 5 calculations in question 4, and after performing each one, output the result of the calculation to the screen on its own line.
   - Ensure that your program compiles *and* produces correct output.

Deliverables

Hard copy of the source code you wrote (assembler.cpp) and the answers to the questions. Soft copy (upload to homework upload) of your source code.


HEY, WHAT'S UP?
HRM?
SHHHHH.
THERE'S A MICROSD CARD ON YOUR TABLE.
SO?
I DUNNO, HIGH STORAGE DENSITIES FREAK ME OUT. A WHOLE AISLE OF LIBRARY SHELVES ON SOMETHING SMALLER THAN A DIME.
LIBRARIES ARE UNNERVING ENOUGH—MILLIONS OF IDEAS SURROUNDING YOU, TOWERING OVER YOU. THESE CARDS FILL ME WITH THAT SAME REVERENCE, THAT SAME INTIMIDATION.
...THAT SAME FAINT AROUSAL.
MAYBE I'LL JUST TOUCH IT.
IF YOU LOSE THAT CARD I'M NOT HELPING YOU FIND IT.

That card holds a refrigerator carton's worth of floppy discs, and a soda can full of those cards could hold the entire iTunes store's music library. Mmmm.