CSCI 136 Section 05 – Fall 2014

Lab Assignment #4

This week's assignment will have you write programs that introduce you file IO, predefined functions and call-by-reference function parameters. Feel free to work in pairs and ask for help early.

Using the Terminal command line, create a folder (using the mkdir command) called lab04 and cd into that folder. I have added examples of what should happen when the programs are run to the end of this document. Your source code files must each have a preamble at the top (see the programming rules and guidelines document in Blackboard for more on the preamble).

a. (`lab04a.cpp`) Write a program that reads information for multiple investment accounts from a file and computes the expected future value of each, outputting it to the console. The file containing the investment information is "`lab04a-data.txt`" and is attached to this assignment. Each account entry in the file will have values for the account balance, the number of times interest is compounded per year, and the number of years to calculate for (3 values). The future value of an account can be computed with the following formula:

$$FV = CV \times (1 + i)^t$$

- **`FV`** is the future value of the account
- **`CV`** is the current value of the account
- **`i`** is the interest rate *per compound period*
- **`t`** is the total number of compound periods

Use a global constant for the annual interest rate of **`6%`**. Decimal values should be output with two-place precision. You must use the **`pow`** predefined function in your solution. You must also write and use a function that computes and returns the future value of an account when it is provided with the current balance, the compounds-per-year and the number of years.

As an example, suppose $10,000.00 is invested at the annual interest rate of 6%, compounded 6 times a year over 5 years. What is the future value?

$$CV = 10000.00$$
$$i = \frac{0.06}{6} = 0.01$$
$$t = 6 \times 5 = 30$$
$$FV = 10000.00 \times (1 + 0.01)^{30} = 13478.49$$

b. (`lab04b.cpp`) Write a program that repeatedly reads three whole numbers from a file and outputs them in ascending order (smallest to largest). The data file is "`lab04b-data.txt`" and is attached to this assignment.

You must write and use a function that swaps two call-by-reference parameters. You must then utilize the swap function to put the values of the three variables into ascending order. **You may only have a single output statement in your code, so the values must be sorted prior to your output.**

Submitting your work

Make sure you are in your `lab04` folder (use the `pwd` command) with your four source code files (use the `ls` command) and then run the following to create a zip archive of them:

```
$ mkdir lastname_firstname_lab04
$ cp lab04a.cpp lastname_firstname_lab04/lab04a.cpp
$ cp lab04b.cpp lastname_firstname_lab04/lab04b.cpp
$ zip -r lastname_firstname_lab04.zip lastname_firstname_lab04/
```

You'll need to change `lastname` and `firstname` to your actual last and first names in the steps above. Once you have your zipfile, you can use that file as your submission for the assignment in Blackboard.

If you are working in pairs, then you should have both of your names included as comments in the source code file's preamble (see the programming rules and guidelines document in Blackboard for more on the preamble). Also, write both your names to the notes section in the submission form when submitting to Blackboard.

Sample output

```
$ ./lab04a
$10000.00, 6% rate, compounded 6 times a year for 5 years yields: $13478.49
$15205.50, 6% rate, compounded 12 times a year for 4 years yields: $19318.42
$292041.66, 6% rate, compounded 8 times a year for 30 years yields: $1754922.59
```

```
$ ./lab04b
2 9 73
132 133 165
5 10 20
-20 20 20
7 7 7
```