Carleton University
Department of Systems and Computer Engineering
SYSC 2006 - Foundations of Imperative Programming - Fall 2019

Lab 2 – Try it out based on C intro

Attendance/Demo

After you finish the exercises, a TA will review your solutions, ask you to run and assign a grade. For those who don't finish early, a TA will grade the work you've completed, starting about 30 minutes before the end of the lab period. **Any unfinished exercises should be treated as "homework"; complete these on your own time, before your next lab.**

Exercise 1 – Comparing int and float

Objective

In the exercise, you'll learn some C basics covered in lectures.

Step 1

In your Lab 2 folder, create a new project named f_to_c. Remember, the project type should be Win32 Console program (EXE) or Win 64 Console program (EXE), depending on which edition of Pelles C you're using.

After creating the project, you should have a project folder named f_to_c in your Lab 2 folder. Check this. If you do not have a folder named f_to_c, close this project and repeat Step 1.

Step 2

Download file f_to_c.c from cuLearn or use your own f_to_c.c for Lab 1. Move this file into your f_to_c folder.

Step 3

Moving a source file into a project folder doesn't automatically add the file to the project. To do this, select Project > Add files to project... from the menu bar. In the dialogue box, select f_to_c.c, then click Open. An icon labelled f_to_c.c will appear in the project window, below the Source files icon.

Double-click the f_to_c.c icon in the project window. This will open the file in the editor window.

Step 4

Change some statements and see the effect of the change by running and walking through the code.

(1) Change the statement `upper = 300;` to `upper = 10;`

- What output did you get (ignore the actual calculation, only consider the number of Fahrenheit temperatures)? Walk through the code and explain why.
- Repeat it with `upper = -5;` `upper = 0;` and `upper = 30;`
- What is the expected output in terms of the number of Fahrenheit temperatures?

(2) Change upper to 0 (i.e., `upper = 0`) and change the statement

celsius = 5.0 / 9.0 * (fahr - 32.0);

to the follwoing **five** statements (as shown in the Lecture notes):

1) celsius1 = 5.0 / 9 * (fahr – 32);
2) celsius2 = 5 / 9.0 * (fahr – 32);
3) celsius3 = (fahr - 32) * 5 / 9;
4) celsius4 = 5 / 9 * (fahr – 32);
5) celsius5 = (fahr – 32) * (5 / 9);

Duplicate the printf() statement for each celsius temperature (celsius1, celsius2, …, celsius5). Make sure that the format for the printf statement is correctly coded. Build the project. If you get compilation errors, fix the errors, e.g., each variable needs to be declared.

It should build without any compilation or linking errors.

Step 5

Execute the project. The program will output a Fahrenheit temperature (only 0) and its equivalent Celsius temperatures (celsius1, celsius2, …, celsius5). What results did you get? Which variable will have a different value?

Step 6

Add a few statements to the code:

- int temp1, temp2;
- float temp3, temp4
- temp1 = 5.0 / 9;
- temp3 = 5.0 / 9;
- printf (“temp1 = %d, temp3 = %f\n”, temp1, temp3); // %d is for integer
- temp2 = 5 / 9;
- temp4 = 5 / 9;
- Write a statement to print the value of temp2 and temp4. The format for integer and float needs to be correct.

What are the expected values for temp1, temp2, temp3, and temp4?

Build and execute the project. What are the results? Go over the code and explain. Go back to Step 4: explain why the value of celsius5 you got.

Step 7

Modify the printf statement with different numbers of length after the decimal point. Examples:

- %6.2f
- %6.3f
- %f
- %2.6f

Build and execute the project.

Exercise 2 – Writing a program to convert Celsius temperatures to Fahrenheit

The formula for Celsius and Fahrenheit conversion is celsius = 5 / 9 * (fahr – 32).

Step 1

Write a c_to_f.c program to covert a list of Celsius temperatures to their equivalent Fahrenheit temperatures by modifying the f_to_c.c program. Initial values are:

- lower = -40; // In Ottawa, the temperature could be -40C in winter
- upper = 40; // In Ottawa, the temperature could be +40C in summer
- step = 10;

Note that you need to take care of integer or float operations correctly in order to get correct results.

Step 2

Build and execute the project.

Wrap-up

1. Remember to backup your Lab 2 folder; for example, copy it to a flash drive and/or a cloud-based file storage service.
2. Demo your outputs to a TA.