CS 271 Lab 1 - C Basics

Goals:

- **Learn to use Kate editor to create and debug C programs.**
- **Learn to use gcc compiler with math library and one source file.**
- **Learn to convert Java syntax to C syntax**
- **Learn Linux commands: cd, pwd, cp, dir, mkdir, mv, and rm**

1. Log in. Open the Kate editor.

   To make the Terminal window visible in Kate, do the following, go to the Settings menu.
   ➔ Configure Kate
   ➔ Plugins
   ➔ check the box next to Terminal Tool View
   ➔ then click OK.

Linux Commands

pwd	"present working directory" – shows the full path of the current directory Note: a folder and a directory are the same thing.
cd ___	"change directory" – changes the working directory to the directory specified in the command. cd with nothing after it changes to your home directory. You can specify a full path or just a subdirectory name. Examples: cd changes to home directory cd cs271 changes to the subdirectory named cs271 cd .. (two periods) changes to one directory higher than the current one cd /home/cs271/Lab1 uses full path
cp file1 file2	"copy" -- copies file1 to file2. **Caution!** If file2 already exists, it is overwritten.
mv file1 file2	"move" – Linux command for rename. Renames file1 to file2.
rm file	"remove" – Linux command for delete.
dir	"directory" – displays a list of files in the current directory. The * may be used as a wildcard. Example: dir *.c -- displays all files that end with .c
mkdir ___	"make directory" – creates a new directory

2. **Terminal Window:** Click in the terminal window. Type **`pwd`** and press Enter. Note the directory information. Type **`cd`** and press Enter. Type **`pwd`** again and note the difference in the directory information.

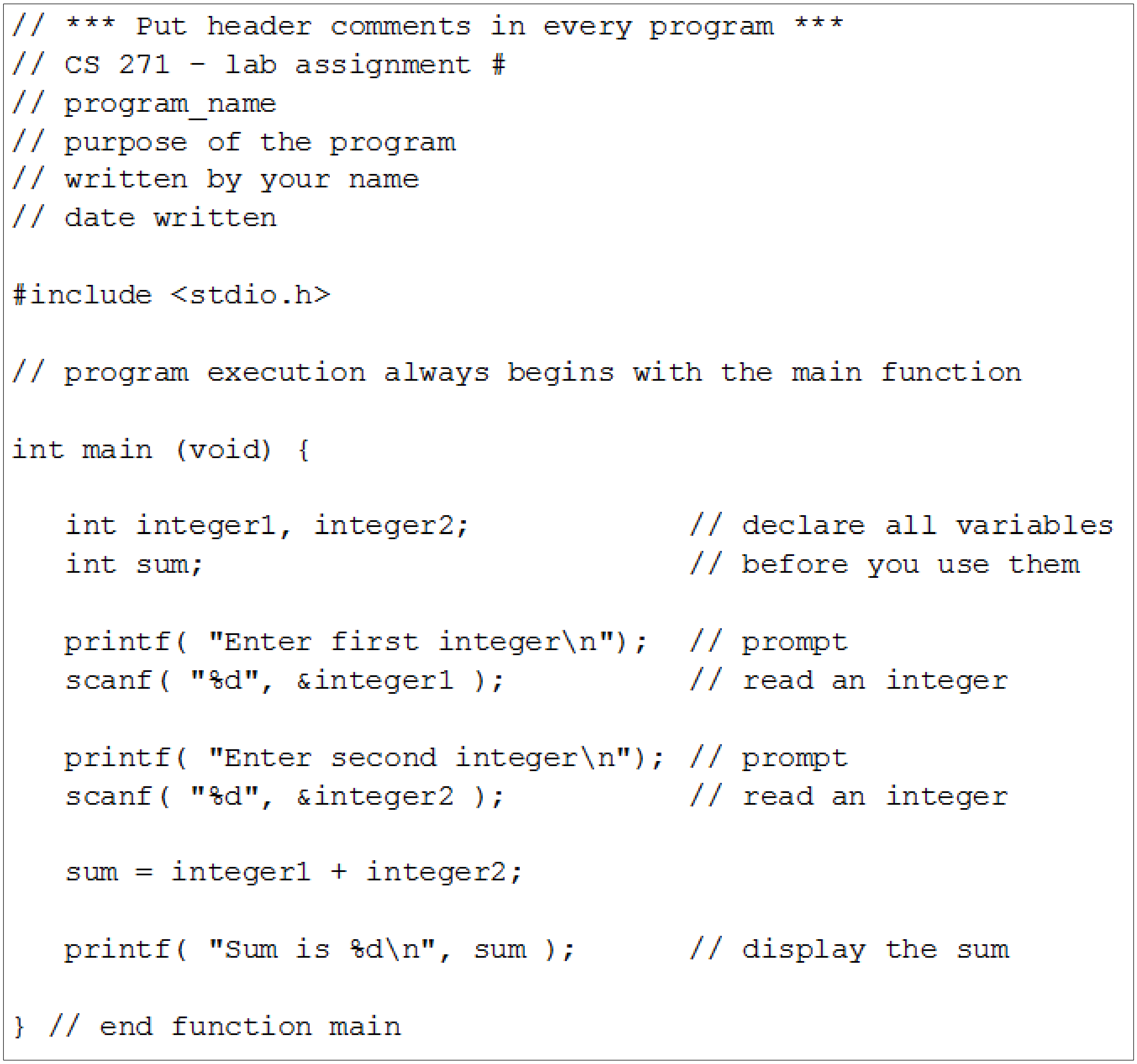
3. **Terminal:**

   - Type **`mkdir cs271`** and press Enter.
   - Change directory to cs271 by typing **`cd cs271`**.
   - Type **`mkdir Lab1`** and press Enter.
   - Type **`cd Lab1`** to change directory to Lab1. This is where you will save your files

4. **Editor:** Type in the program shown on the next page.

   Save the file as program1.c in the cs271/Lab1 directory.

Reminder: In the terminal window, you must set your working directory to the folder where you saved your program. If you log in again at a later time, you must set your working directory again.



```
// *** Put header comments in every program ***
// CS 271 - lab assignment #
// program_name
// purpose of the program
// written by your name
// date written

#include <stdio.h>

// program execution always begins with the main function

int main (void) {

   int integer1, integer2;            // declare all variables
   int sum;                           // before you use them

   printf( "Enter first integer\n");  // prompt
   scanf( "%d", &integer1 );          // read an integer

   printf( "Enter second integer\n"); // prompt
   scanf( "%d", &integer2 );          // read an integer

   sum = integer1 + integer2;

   printf( "Sum is %d\n", sum );      // display the sum

} // end function main
```

5. **Terminal:** In the Terminal window, compile the program and produce an executable file named program1. Here's the command:

```
        gcc program1.c -o program1
```

   Note: -o is a "flag" or option. It preceeds the name of the executable file.

   If you have syntax errors, go back to the editor window and fix them.

6. **Terminal:** Run the program by typing a period, a slash, then the name of the executable:

```
   ./program1
```

   The program should prompt you for two integers then display the sum of the integers. If it doesn't, you have some debugging to do.

7. **Editor:** Close program1.c.

8. **Terminal:** Copy program1.c to a new file named circle.c. The command is:

   ```
   cp program1.c  circle.c
   ```

9. **Editor:** Open circle.c. Change the program so that it will do the following:

   - Declare variables named radius and area using the data type double.
   - Display an informative prompt.
   - Input the radius of a circle.
   - Calculate the area of the circle. (Note: The C constant for pi is M_PI. It is in the math.h library.)
   - Display an informative message along with the area of the circle.

   Save the file.

10. **Terminal:** Compile the program with:

    ```
    gcc circle.c –lm -o circle
    ```

    Note: -lm (minus el em) is required for programs that use math.h

    Debug if needed.

11. **Terminal:** Run the program several times with different input values to make sure that you've thoroughly tested all of the statements. Debug if needed.

    ```
    ./circle
    ```

12. **Editor:** Create a new program. *((Try to type in the complete program without looking at the book or previous programs.))* Save it as hypotenuse.c.

    Write a C program to perform the tasks shown below:

    - Input the lengths of two sides (legs) of a right triangle. (Values may have a decimal point so use type double.)

    - Calculate the length of the hypotenuse of the triangle. The math formula you may have memorized is $a^2 + b^2 = c^2$. However, a more meaningful version of the formula, written in the form you need to calculate the hypotenuse is:

    $$hyp = \sqrt{\text{leg1}^{\,2} + \text{leg2}^{\,2}}$$

    - Output a message with meaningful text and the length of the hypotenuse.

13. **Terminal:** Compile, debug, and test the program.

Submit program1.c, circle.c, and hypotenuse.c on Canvas. (do not tar or zip files)

Before the next lab:

- Speed up your typing. Here are some web sites: www.powertyping.com, www.typingtest.com, www.typing-lessons.org, www.typeonline.co.uk, http://games.yahoo.com/console/tps

- Do the self-review exercises at the end of chapter 2

- Write additional programs. I recommend exercises 2.24, 2.26, 2.30 and 2.32.

Hint: These additional programs make excellent questions for pop quizzes and exams.