CSC3320 System Level Programming
Program Challenge 7

Due at 11:59 pm on Wednesday, Oct. 19, 2016

In this assignment, you need to try some simple C programs and understand some basic differences between C and Java through practices.

Part 1:

Create and run Kernighan and Ritchie's famous "hello,world" program.

Step 1: Go to your home directory (cd ~) and create a new file named as **hello.c (vi hello.c or nano hello.c),** then include following lines in your **hello.c .**

```
#include <stdio.h>

int main(void)
{
  printf("Hello,world\n");
  return 0;
}
```

Step 2: Save your file and exit editor.

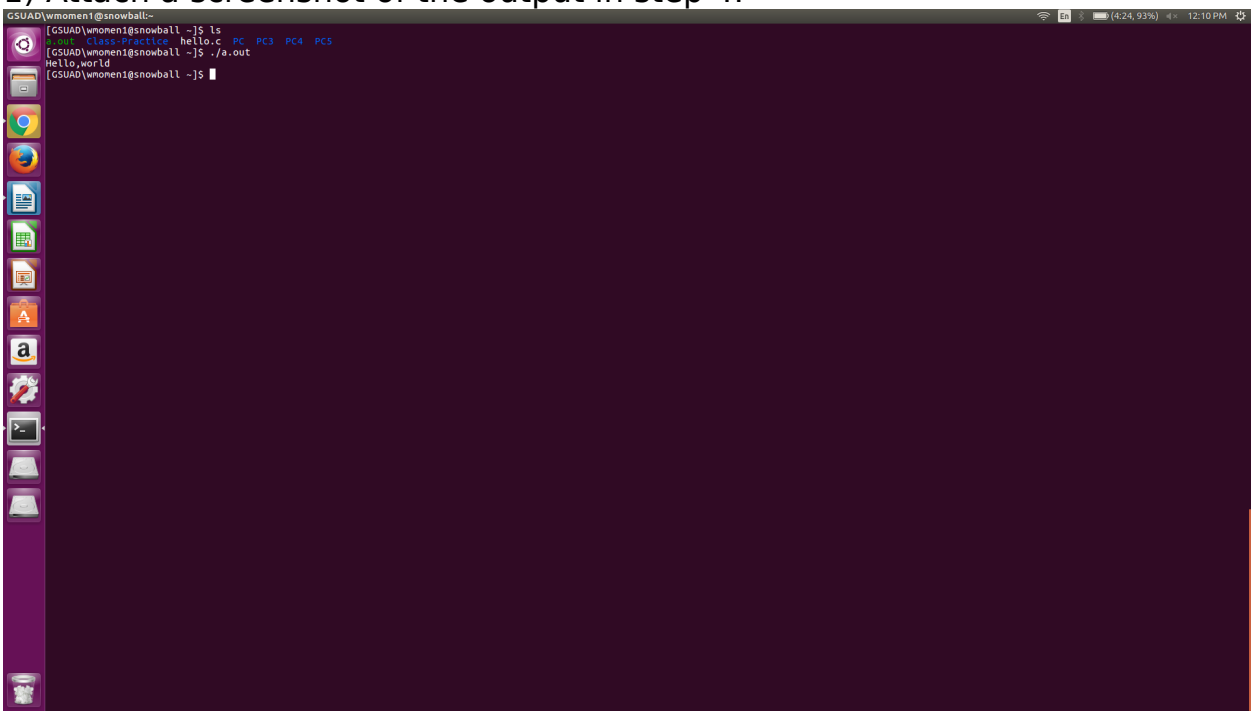
Step 3: Compile and link the hello.c program by following command.
$cc hello.c

Note*: after this command, a default executable program named as "****a.out****" will be generated in current directory if there are no errors with your C program. You can use* ***ls*** *to check the existence of a.out .*

Step 4: Run the executable program ***a.out***
$./a.out

Questions:

1) Attach a screenshot of the output in step 4.

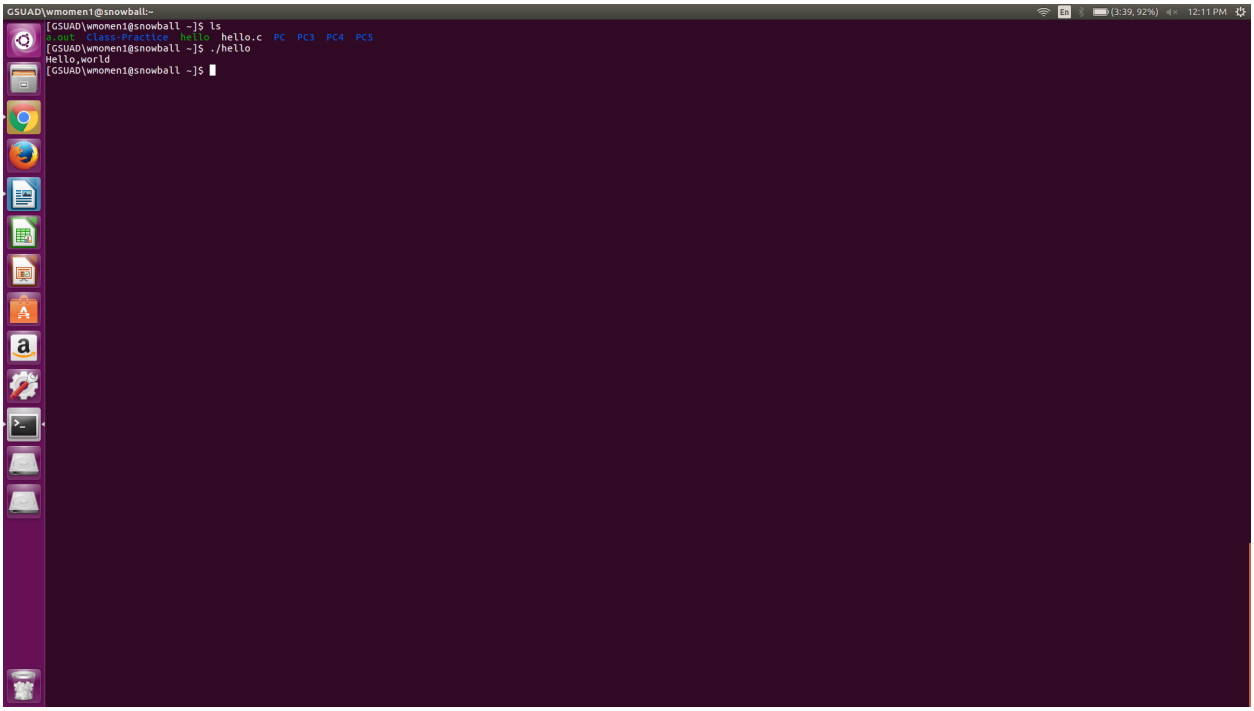


2) Try following command to compile and link **hello.c** again. And tell what new file is generated after this command?

$cc -o hello hello.c

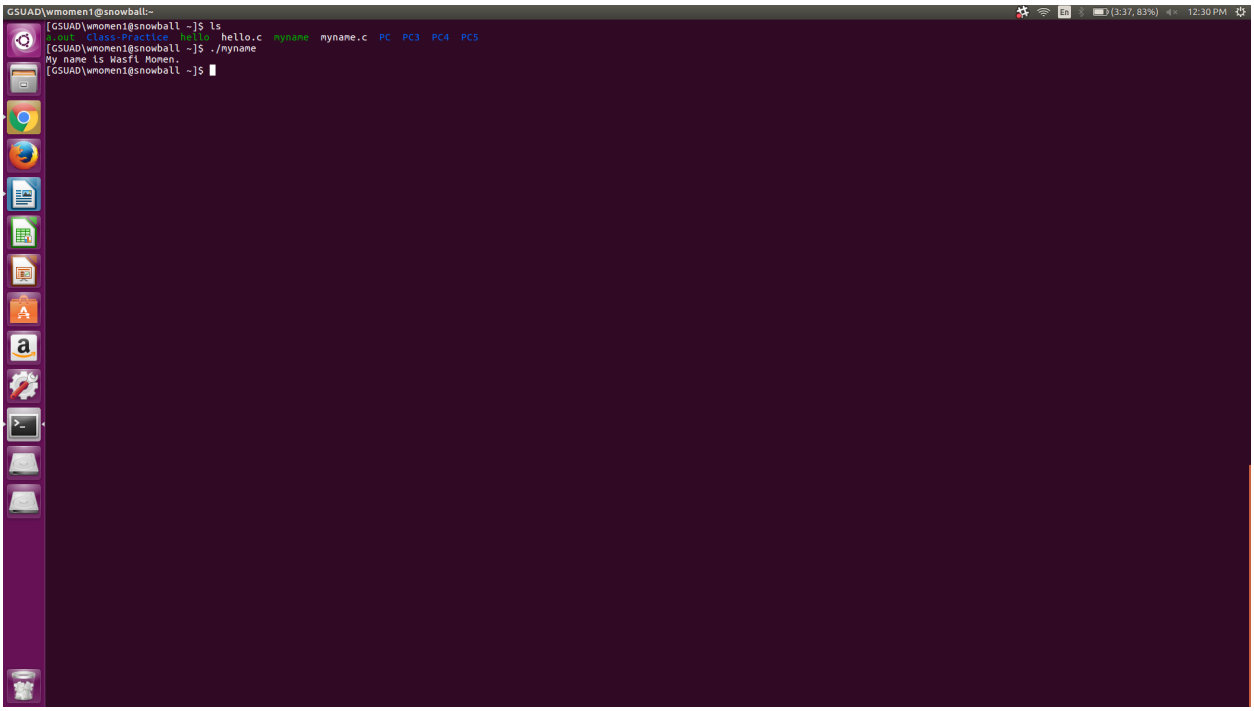
a hello file is created. It is the executable for the hello.c program.

3) Try command below and attach a screenshot of the output.
$./hello



4) Now write a new C program named as **myName.c** based on **hello.c**. In this program, print out your first name and last name instead of "Hello,world". For example, the output could be "My name is Yuan Long".
Execute your **myName.c** and attach a screenshot of the output. Then write the source code of **myName*.c*** in your answer sheet and upload your file **myName*.c*** to iCollege.

```
# include <stdio.h>


int main(void)
{
  printf("My name is Wasfi Momen.\n");
  return 0;

}
```



Part 2:

In program challenge 5 you have created a shell script to calculate factorial of a given integer number. Now it is your turn to write a C program for it.

Questions:

1) The function of C is similar to the method of Java. If you know how to write Java program, it will be much easier for you to write a C program for the same task. So please write a Java program first in this part and name your Java program as **factorial.java**.

In your Java program, define a variable named as ***num*** to store the value of the given integer number, e.g. *int num=5*. And define another variable named as ***res*** to store the final result (i.e. the factorial of a given integer number). Please use ***while loop*** instead of for loop. Besides, you do not need to write other methods, just add some statements in the **main** method. Then put the source code of ***factorial.java*** in your answer sheet.

Note: If you want to run your Java program in terminal,

- to compile factorial.java, please try
  $javac factorial.java
- To execute it, please try
  $java factorial

```
public class factorial {

  public static void main (String [] args) {
      int num = 5;
      int res = 1;

      while(num > 0 ){
            res=res*num;
            num--;
      }

      System.out.println("Factorial of 5 is: " + res);
  }
}
```

2) Now convert your Java program to C program by following steps.

Step 1: create a new file named as **factorial.c (vi factorial.c or nano factorial.c),** then include following lines in your **factorial.c.**

```
#include <stdio.h>

int main(void)
{
  /* Replace this comment with the statements
  from main method of factorial.java */
  return 0;
}
```

Step 2: Replace the comments in factorial.c with the statements from main method of **factorial.java**

Step 2: You may have used System.out.println(….) in your Java code. Please remove this statement in factorial.c and replace it by the statement below:

```
printf("The factorial of %d is %d\n",num,res);
```

Step 3: Compile and link the **factorial.c** program

$cc -o factorial factorial.c

Step 4: Run the executable program

$./factorial

Then put the source code of ***factorial.c*** in your answer sheet. Attach a screenshot of the output (note: the given number should be **5**) and upload

your file ***factorial.c*** to iCollege.

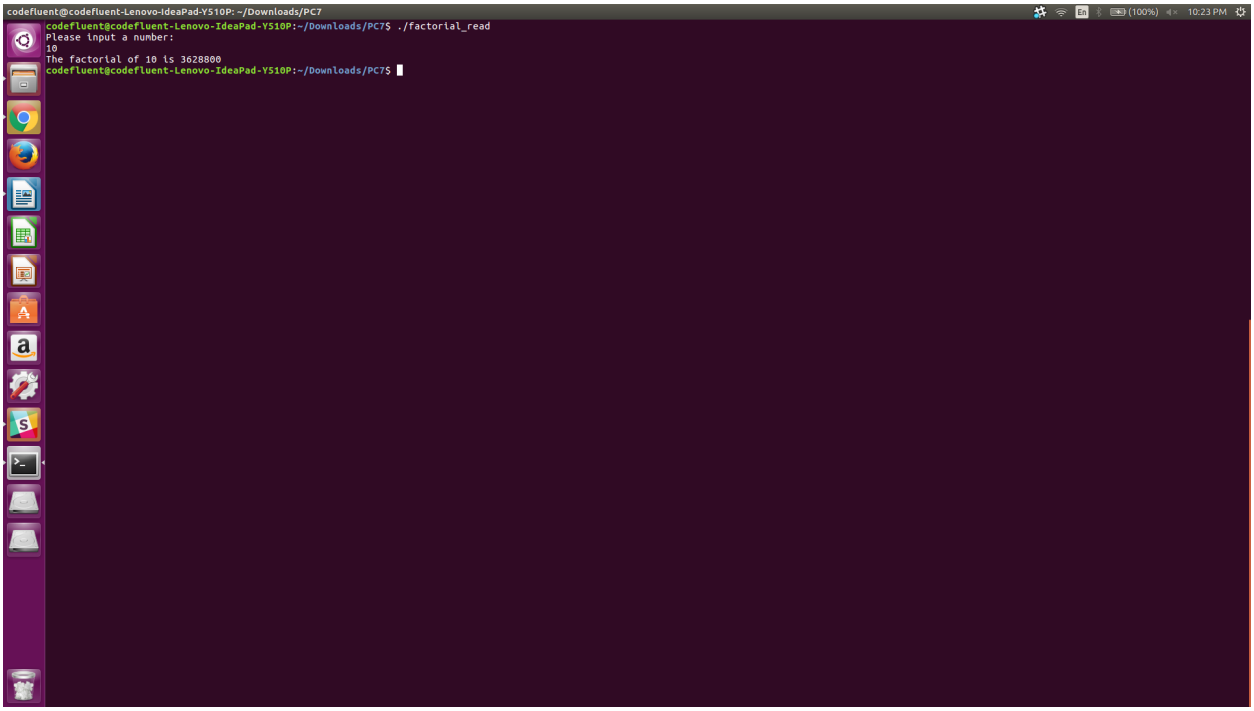
```
#include <stdio.h>

int main(void)
{

	int num = 5;
	int num2 = num;
	int res = 1;

	while(num2 > 0 ){
		res=res*num2;
		num2--;
	}

	printf("The factorial of %d is %d\n",num, res);
	return 0;
}
```

Part 3:

Modify **factorial.c** in part 2 and read user's input as the given integer number. Name your new C program as **factorial_read.c** . Sample outputs are as below:

```
$ ./factorial
Please input a number:2
The factorial of 2 is 2
$ ./ factorial
Please input a number:4
The factorial of 4 is 24
$ ./ factorial
Please input a number:5
The factorial of 5 is 120
```

Then put the source code of ***factorial_read.c*** in your answer sheet. Attach a screenshot of the output (given interger number 10) and upload your file ***factorial_read.c*** to iCollege.



Submssion:

- Upload an electronic copy (MS word or pdf) of your answer sheet to the folder named "**PC7**" of the dropbox in the iCollege system
- Upload files **myName.c, factorial.c, factorial_read.c** to the folder named "**PC7**" of the dropbox in the iCollege system. Note: if you do not upload these three C files, you would get zero for this assignment.
- Please add the program challenge number and your name at the top of your answer sheet.
- Name your file in the format of PC7_FirstnameLastname (eg. PC7_YuanLong.docx, PC7_YuanLong.pdf)