**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.**

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| **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**

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.

**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.

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| 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** |

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

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| **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.

**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:

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| **$ ./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)