C Programming lab
Assignment Zero

Revision Date: August 12, 2014

Preliminaries

This assignment has a total of 100 points. All tasks are all or nothing. There is no partial credit given for this test. You must put all your programs in the correct directories and submit from the specified directory or you will receive zero credit.

Task 1: Linux (10 points)

Create a directory named *assign0* that hangs off your (home) `~/` directory. Create three directories inside the *assign0* directory: *q1*, *q2*, *q3*. Now, while in the `~/assign0` directory, type the system command:

```
du
```

You should see the following output:

```
4    ./q1
4    ./q2
4    ./q3
12   .
```

The names must be as shown, but the order and the numbers do not matter.

Task 2: Editing C Program (30 points)

Inside the *assign0* directory, move to the *q1* directory. Inside this directory, create a file named *energy.c*. This program will be used to determine the kinetic energy of a moving object based on its mass and velocity. Place the following program into *energy.c*:

```c
#include<stdio.h>

int main()
    {
    float mass,speed,energy;
    printf("Calculating kinetic energy of a moving object:\n");
    printf("Enter the object's mass in kilograms: ");
    scanf("%f",&mass);
    printf("Enter the object's speed in meters per second: ");
    scanf("%f",&speed);
    energy = mass * speed;
```

```
        printf("The object has %3.2f joules of energy\n",energy);
        return 0;
        }
```

Compile the program energy.c as follows:

```
    gcc energy.c -o energy
```

Run the program as follows:

Example output:

```
    ubuntu@ubuntu:~/assign0/q1$ ./energy
    Calculating kinetic energy of a moving object:
    Enter the object's mass in kilograms: 2
    Enter the object's speed in meters per second: 3
    The object has 6.00 joules of energy
```

Here is another output

```
    ubuntu@ubuntu:~/assign0/q1$ ./energy
    Calculating kinetic energy of a moving object:
    Enter the object's mass in kilograms: 24
    Enter the object's speed in meters per second: 3.7
    The object has 88.80 joules of energy
```

If you get an error when you run the *energy.c* program or you get a different output, you have made an editing error and you need to re-edit the file and fix the problem.

Task 3: Editing C Program (30 points)

Inside the *assign0* directory, move to the *q2* directory. Inside this directory, create a file named *dna.c*. This program is used to compute the percentage of g-c and c-g combinations in a given DNA sequence. Place the following code into *gcCounter.c*:

```
#include<stdio.h>
#include<string.h>

int chCount(char *str, char x)
    {
    int len, count=0, i;
    len = strlen(str);
    for (i=0;i<len;i++)
        if(str[i] == x) count++;
    return count;
    }
float gcCount(char *seq)
    {
    int lenSeq, cCount, gCount;
    float gcPercent;
    lenSeq = strlen(seq);
```

```
    gCount = chCount(seq,'g');
    cCount = chCount(seq,'c');
    gcPercent = 100 * (float)(gCount+cCount)/lenSeq;
    return gcPercent;
    }
int main()
    {
    char dna[100];
    printf("Enter a DNA sequence: ");
    scanf("%s",dna);
    printf("The g-c and c-g combinations in this dna is:%3.2f\n",gcCount(dna));
    return 0;
    }
```

Note: valid nucleotides found in DNA are denoted by the letters a, t, g, and c.

Here are some example uses of the program:

```
    ubuntu@ubuntu:~/assign0/q2$ ./dna
    Enter a DNA sequence: acaagatgccattgtcccccggcctcctgct
    The g-c and c-g combinations in this dna is:62.50
```

Another example is:

```
    ubuntu@ubuntu:~/assign0/q2$ ./dna
    Enter a DNA sequence: gattaca
    The g-c and c-g combinations in this dna is:28.57
```

Task 4: Editing Source code (30 points)

Inside the *assign0* directory, move to the *q3* directory. Download a source code (C Program) named *error.c* file from LMS. Move the error.c file to q3 directory. The *error.c* is a broken code. There are few syntax errors and hence the code will not compile properly. Fix the program and make sure the program compiles with no warning or errors and provides the following output.

```
ubuntu@ubuntu:~/assign0/q3$ ./error
Enter the degrees in fahrenheit ?100
Degrees Fahrenheit is: 100.00
Degrees Celsius is: 37.78
Degrees Kelvin is: 310.78
```

Another example is

```
ubuntu@ubuntu:~/assign0/q3$ ./error
Enter the degrees in fahrenheit ?97.32
Degrees Fahrenheit is: 97.32
Degrees Celsius is: 36.29
Degrees Kelvin is: 309.29
```

Submitting your assignment

First, move into your ~/assign0 directory. Then run this system command:

```
du -a
```

You should see the output:

```
4    ./q1/energy.c
8    ./q1
4    ./q2/dna.c
8    ./q2
4    ./q3/error.c
8    ./q3
```

The order and numbers do not matter.

Submit your solutions while in the ~/assign0/ directory with the command:

```
submit clab mr assign0 <xxxxx>
```

Replace *xxxxx* with your iiitb email address.