School Of Mechanical & Manufacturing Engineering, NUST



Department of Mechanical Engineering

CS-114 - Fundamentals of Programming Lab Assignment # 1

Course Instructor: Dr Talha Shahid

Lab Instructor: Muhammad Affan

Student Name: AMINA SHAHID

CMS ID: 479106

DATE: 11/10/2023

• Abstract

This assignment comprises of C++ codes for problems assigned as the home tasks in Lab Manual # 1, and lab, home tasks in Lab Manual # 2.

LAB MANUAL #1

Home Tasks

Q 1: Write a C++ program to calculate distance between two points. The values of coordinates should be input by user.

$$d=(x_2-x_1)^2+(y_2-y_1)^2$$

A: To insert exponential function, this formula was written as

$$dist = ((x_2 - x_1)^*(x_2 - x_1) + (y_2 - y_1)^*(y_2 - y_1))$$

```
[] 6
                                                                       Run
 main.cpp
                                                                                                                                                             Clear
 1 // Online C++ compiler to run C++ program online
                                                                                   /tmp/nhjS0jZWJw.o
 2 #include <iostream>
                                                                                   insert the \boldsymbol{x} and \boldsymbol{y} coordinate of first point
 3 using namespace std;
                                                                                   X1:4
                                                                                   Y1:7
 5 - int main() {
                                                                                   insert the x and y coordinate of second point
 6 //declaring variables as integers
                                                                                   X2:3
       int x1, y1, x2, y2, dist;
   //to input coordinates, initialising
                                                                                   the distance between these points is:50
      cout<<"insert the x and y coordinate of first point"<<endl;</pre>
        cout << "X1:":
11
        cin>>x1:
       cout<<"Y1:";
12
13
       cin>>y1;
       cout<<"insert the x and y coordinate of second point"<<endl;</pre>
        cout<<"X2:";
        cin>>x2;
        cout<<"Y2:"
17
18
       cin>>y2;
19 //formula for calculating distance, initialising dist
       dist = ((x2-x1)*(x2-x1) + (y2-y1)*(y2-y1));
   //output
        cout<<"the distance between these points is:"<<dist<<endl;</pre>
23
        return 0;
24 }
```

Q 2: Write a code in C++ to take length from user in centimeter and convert it into meter and kilometer.

```
[] 6
main.cpp
 1 // Online C++ compiler to run C++ program online
                                                                                 /tmp/3hJFZznTYT.o
 2 #include <iostream>
                                                                                input length in centimeter:789
 3 using namespace std:
                                                                                length in meters:7.89
                                                                                length in kilometers:0.00789
 5 - int main() {
 6 //declaring all, initialising variable cm as floats
       float cm, m, km;
        cout<<"input length in centimeter:";</pre>
       cin>>cm:
10 //formulas for conversion, initialising m and km
       m=cm/100;
11
        km=cm/100000;
     cout<<"length in meters:"<<m<<endl;
15
        cout<<"length in kilometers:"<<km<<endl;</pre>
16
       return 0;
17 }
```

Q 3: Write a code in C++ that takes values of a and b from the user and displays result of polynomial

$$a2 + 2ab + b2$$

A: To simplify code, this polynomial was written as $(a+b)^2 = (a+b)*(a+b)$



Q 4: Write a program in C++ to convert temperature in Fahrenheit to Celsius.

A: The user would input the value in Fahrenheit, and using the formula: C = (32F - 32)*5/9 temperature in degree Celsius was calculated.

14

15

16 }

return 0;

cout<<"Temperature in Celsius:"<<C;</pre>

[] 6 main.cpp Run Output Clear 1 // Online C++ compiler to run C++ program online /tmp/H7yFxhaT80.o 2 #include <iostream> input value of temperature in Fahrehnheit:56 3 using namespace std; Temperature in Celsius:977 5 - int main() { $6 \hspace{0.1in} \mbox{// declaring the variables for both values}$ int F, C; //initialising F cout<<"input value of temperature in Fahrehnheit:";</pre> //Formula for conversion 12 C = (32*F-32)*5/9;13 //output

LAB MANUAL # 2

Lab Tasks

Q 1: Write a program that determines if a person is eligible to vote based on their age (e.g., 18 years or older) using logical operators.



Q 2: Write a program that takes an integer as input and checks if it falls within the range [10, 50] using logical operators.



Q 3: Write a C++ program to compare two integers and find the maximum value.

```
[] 6
                                                                    Run
                                                                                 Output
                                                                                                                                                       Clear
 1 // Online C++ compiler to run C++ program online
                                                                                /tmp/Uja7Ng1vpq.o
 2 #include <iostream>
                                                                                Input Integer A:8
                                                                                Input Integer B:59
 3 using namespace std;
                                                                                The maximum value is: 59
 5 - int main() {
 6 //declaring, initialsing variable
        int num1, num2;
 8
        cout<<"Input Integer A:";
        cin>>num1;
        cout<<"Input Integer B:";</pre>
10
       cin>>num2;
12 //applying conditions, possible results
13 if (num1>num2)
14
        cout<<"The maximum value is: "<<num1;</pre>
15 else if (num1<num2)
       cout<<"The maximum value is: "<<num2;</pre>
16
17 else
18
       cout<<"Both values are same";
19
       return 0;
20 }
```

Q 4: Write a C++ program to calculate the average of three exam scores and determine if it's above a passing grade (e.g., average ≥ 60).

```
[] 6
main.cpp
                                                                                 Output
 1 // Online C++ compiler to run C++ program online
                                                                               /tmp/lYaOPzvxHB.o
2 #include <iostream>
                                                                               Exam Score 1:80
3 using namespace std;
                                                                               Exam Score 2:57
                                                                               Exam Score 3:60
5 · int main() {
                                                                               The student has passed
 6 // declaring,initialising variables for score and mean
      int s1,s2,s3,avg;
      cout<<"Exam Score 1:";
      cin>>s1:
      cout<<"Exam Score 2:";
cin>>s2;
10
11
      cout<<"Exam Score 3:";
cin>>s3;
14 //formula for mean calculation
      avg=(s1+s2+s3)/3;
16 //conditions and logical operation
17 if (avg>=60)
       cout<<"The student has passed";
18
    cout<<"The student has failed";</pre>
21
22 }
```

Home Tasks

Q 1:Create a program that takes a student's score as input and assigns a grade based on predefined criteria using logical operators (e.g., A, B, C, D, F).

A-Grade: 90-100 Marks B-Grade: 75-90 Marks C-Grade: 60-75 Marks D-Grade: 45-60 Marks F-Grade: 0-45 Marks

```
[] G Run
                                                                                 Output
                                                                                                                                                       Clear
 1 // Online C++ compiler to run C++ program online
                                                                                /tmp/EMbdjVj154.o
 2 #include <iostream>
                                                                               Student's Score:78
 3 using namespace std;
                                                                               Grade Recieved: B
 5 - int main() {
 6 // declaring,initialising variables for score
      int s;
       cout<<"Student's Score:";</pre>
      cin>>s;
10 //conditions of grading criteria, output
11 if(s<=100 && s>=90)
       cout<<"Grade Received: A";</pre>
13 else if (s<90 && s>=75)
      cout<<"Grade Recieved: B";</pre>
15 else if (s<75 && s>=60)
      cout<<"Grade Recieved: C";
17 else if (s<60 && s>=45)
      cout<<"Grade Recieved: D";</pre>
19 else if (s<45&& s>=0)
       cout<<"Grade Recieved: F";</pre>
21 else
     cout<<"Error";
22
23
        return 0;
24 }
```

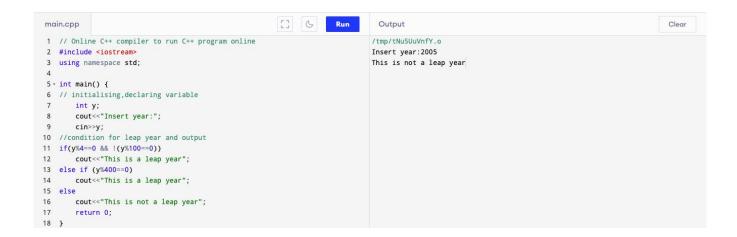
Q 2: Write a program that takes an integer as input and determines if it is both even and divisible by 5.

A: Any number that is divisible by 5 and is even, is a multiple of 10

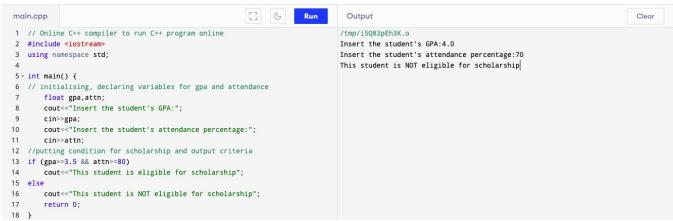


Q 3:Create a C++ program that checks if a user-provided year is a leap year.

A: A leap year is every 4 years with the exception of centuries. At centuries, leap year repeats every 4 centuries (400 years)



Q 4:Create a C++ program that determines if a student is eligible for a scholarship based on their GPA (must have GPA >= 3.5) and attendance (must have attended at least 80% of classes).



Q 5: Write a program that checks if a given character is a vowel (a, e, i, o, u) or a consonant using logical operators.



• Conclusion

This assignment dealt with practicing different functions in C++. This included operational functions, if/else functions, logical operators. This also introduced us to the syntax of C++.