Home Work No.4

PF (Fall-2022) 29-09-2022

Content:

1) Control Structures
2) Relational operators
3) Practice Codes

1) Control Structures:

Any program can be written in terms of control structures. A control structure defines the execution of a program.

Three types of control structures:

1. **Sequential control structure:** Statements execute one after the other in the order in which they are written that is, in sequence. Until now, we have done programming (Problem solving) in sequential fashion.
2. **Selection Control Structure:** In Selection control structure, we can select or not select a statement or block of statements. Therefore, the order of execution of statement can change. Three types of selection control structure.
    1. Single control selector (using if or simple if statement)
    2. Two way control selector (using if…else statement or Ternary conditional "**? :" operator)**
    3. Multi control selector (using multiple if statements, if…else…if or switch statement)
3. **Repetition Statements:** Repetition statements that enable programs to perform statements repeatedly as long as a condition remains true. The repetition statements are the ***while***, ***do…while*** and ***for*** statements.

2) Relational Operators:

- **Relational operators allow you to compare or relate two operands.**
- **Arity: Binary (operates on two operands)**
- **Associativity: Left to Right**

NOTE: All the relational operators have left-to-right associativity. Recall that associativity is the order in which an operator works with its operands.

- **Input/operand: Relational operators can operate on Numeric Data (integral or floating point), Character and string. Usually relates or compared same type of operands.**
- **Output: Relational operator always result in Boolean value (True or false)**
- **Six relational operator:**

Relational Operators	Meaning
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
==	Equal to
! =	Not equal to

- **Notice the equality operator is two "=" symbols together. Donot confuse this operator with the assignment operator, which is one = symbol. The == operator determines whether a variable is equal to another value, but the = operator assigns the value on the operator's right to the variable on its left.**

Table 4-3 (Assume x is 10 and y is 7.)

Expression	Value
x < y	False, because x is not less than y.
x > y	True, because x is greater than y.
x >= y	True, because x is greater than or equal to y.
x <= y	False, because x is not less than or equal to y.
y ! = x	True, because y is not equal to x.

What is Truth?

Remember! In Logic, everything other than zero or null is TRUE. Only zero or null is FALSE. Remember the following rules:

- When a relational expression is true it has the value 1.
- When a relational expression is false it has the value 0.
- Any expression that has the value 0 is considered false by the if statement. This includes the bool value false, which is equivalent to 0.
- Any expression that has any value other than 0 is considered true by the if statement. This includes the bool value true, which is equivalent to 1.

//////////……Practice Codes PART-1 ……..……/////////

Run following programs in separate .cpp files and carefully understand the output.

What is wrong with following code.

```
//……1.cpp……..
#include <iostream>

using namespace std;
int main ()
{

        int a=5, b=8;
        cout<<a<b;

        return 0;
}
```

```
//……2.cpp……..

#include <iostream>

using namespace std;

// function main begins program execution
int main()
{

        bool trueValue, falseValue;
        int x = 5, y = 10;

        trueValue = x < y;
        falseValue = y == x;
        cout << "True is " << trueValue << endl;
        cout << "False is " << falseValue << endl;
return 0;
}

} // end function main
```

```
//…… 3.cpp……
#include <iostream>
using namespace std;
int main ()
{
	int a=5,b=8;
	bool check = a<b;
	cout<<endl;
	cout<<"First value is a "<<a <<"  Second value is b"<<b<<endl;
	cout<<endl<<"checking \"a < b\" "<<(a<b)<<endl;
	cout<<endl<<"checking \"a > b\" "<<(a>b)<<endl;
	cout<<endl<<"checking \"a <= b\" "<<(a<=b)<<endl;
	cout<<endl<<"checking \"a >= b\" "<<(a>=b)<<endl;
	cout<<endl<<"checking \"a==b\" "<<(a==b)<<endl;
	cout<<endl<<"checking \"a != b\" "<<(a!=b)<<endl;
	cout<<endl<<"Printing bool variable check = "<<check<<endl;
	return 0;
	}
//…… 4.cpp……

#include <iostream>
using std::cout;  // program uses cout
using std::cin;   // program uses cin
using std::endl;  // program uses endl
// function main begins program execution
int main()
{
	int num1;  // first number to be read from user
	int num2;  // second number to be read from user

	 cout << "Enter two integers, and I will tell you\n"
```

```
        << "the relationships they satisfy: ";

    cin >> num1 >> num2;   // read two integers


     if ( num1 == num2 )
        cout << num1 << " is equal to " << num2 << endl;
    if ( num1 != num2 )
        cout << num1 << " is not equal to " << num2 << endl;
    if ( num1 < num2 )
        cout << num1 << " is less than " << num2 << endl;
     if ( num1 > num2 )
        cout << num1 << " is greater than " << num2 << endl;
     if ( num1 <= num2 )
        cout << num1 << " is less than or equal to "
            << num2 << endl;


     if ( num1 >= num2 )
        cout << num1 << " is greater than or equal to "
            << num2 << endl;


   return 0; // indicate that program ended successfully


} // end function main
```

Run following programs in separate .cpp files and carefully understand the output.

```
//……..……5.cpp…….
#include <iostream>

int main() {

        if ('\0')
                cout << "Truth";
        if (NULL)
                cout << "Truth";
        if (0)
```

```
                cout << "Truth";
        if (5-5)
                cout << "Truth";


return 0;
}
```

What is problem in the code 6.cpp

```
//……6.cpp……..

#include <iostream>

using namespace std;

// function main begins program execution
int main()
{

        int a;

        cout<<"\nEnetr a value";
        cin>>a;

        if (a=10)
                cout<<"\nvalue is  equal to 10";


} // end function main
```

What is problem in the code 7.cpp

```
//……7.cpp……..

#include <iostream>

using namespace std;

// function main begins program execution
int main()
{
        const float HIGH_SCORE = 90.0;
        float average;
        cout << "\n Enter your average Score \n";
        cin>>average;
    if (average > HIGH_SCORE)
                cout << "Congratulations!\n";
                cout << "That's a high score.\n";
                cout << "You deserve a pat on the back!\n";
```

```
   cout<<”\nOutside if Block”;
} // end function main

//……
```

Challenge question What is wrong with following two code? Make it correct?

```
//…..8.cpp……

#include <iostream>

using namespace std;

// function main begins program execution
int main ()
{

    float check = 1.2;

    if (check==1.2)
            cout<<"Everything is OK";


} // end function main

//……..9.cpp……..


#include <iostream>
 using namespace std;

int main()
{
 int number;

            cout << "Enter an integer and I will tell you if it\n";
            cout << "is odd or even. ";
            cin >> number;
            if (number % 2 == 1)//mixed expression/test
                        cout << number << " is Odd.\n";

return 0;
}
```

```
//……..10.cpp……
#include <iostream>
using namespace std;
int main ()
{
	int per;
	cout<<"\nEnter Value of Percentage ::";
	cin>>per;
	if ( per >= 60 )
		cout << "Passed";
	return 0; // indicate that program ended successfully
}
```

//////////……PART-2 ……..……..//////

Carefully see what following code is printing!

```
//……..7.cpp……
#include <iostream>
using namespace std;
int main() {

	float f = 0.1f;
	cout <<setprecision(16)<< f;

return 0;
}
```

Interesting Facts about Comparing Floating point Values

Kindly read following two pages to find out interesting facts about Floating point comparison.

https://bitbashing.io/comparing-floats.html
http://www.cplusplus.com/reference/cfloat/

//////////……PART- 3 Two way selector with if… else……..……/////////

```
//…….. 1.cpp ……..

#include <iostream>

using namespace std;

// function main begins program execution
int main() {


        if (cout << 0)
        {
                cout << "Hello";

        }
        else
        {
                cout << "Not Hello";
        }
return 0;
}


//…..2.cpp

#include <iostream>
 using namespace std;

int main()
{
 int number;

        cout << "Enter an integer and I will tell you if it\n";
        cout << "is odd or even. ";
        cin >> number;
        if (number % 2 == 0)
                cout << number << " is Odd.\n";
        else
                cout << number << " is Even.\n";
```

```
	return 0;
	}


//……..3.cpp……..

#include <iostream>

using namespace std;

int main ()

{

	int grade;

	cout<<"\nEnter Value of Grade ::";

	cin>>grade;

	if ( grade >= 60 )

		cout << "Passed";

	else

		cout << "Failed";

	 return 0; // indicate that program ended successfully

}


	///……4.cpp……..///
	//Nesting of if else ........//

	#include <iostream>

	using namespace std;

	// function main begins program execution
	int main()
	{

		int n1,n2;
		cout<<"\nEnter two integers";
		cin>>n1>>n2;
		if(n1>n2)
		{
			cout<<"\nn1 is Larger";
			if (n1%2==0)
			{
				cout<<" and n1 is Even\n";
```

```
                }
                else
                {
                        cout<<" and n1 is Odd\n";
                }
        }
        else
        {
                cout<<"\nn2 is Larger";
                if (n2%2==0)
                {
                        cout<<" and n2 is Even\n";
                }
                else
                {
                        cout<<" and n2 is Odd\n";
                }
        }

        return 0;


}
////////////////////////////////////////////////////////////////////////////////////////
        #include <iostream>

        using namespace std;
        int main ()
        {
                int n1,n2;
                cout<<"\nEnter two integers";
                cin>>n1>>n2;
                if(n1>n2)
                        cout<<"n1 is larger\n";
                else
                        cout<<"\nn2 is larger\n";

                return 0;
        }

        //……5.cpp……
        // This program demonstrates the nested if statement.
         #include <iostream>
        using namespace std;

        int main()
        {
                char employed, // Currently employed, Y or N
```

```
        recentGrad; // Recent graduate, Y or N

        // Is the user employed and a recent graduate?
        cout << "Answer the following questions\n";
        cout << "with either Y for Yes or ";
        cout << "N for No.\n";
        cout << "Are you employed? ";
        cin >> employed;
        cout << "Have you graduated from college ";
        cout << "in the past two years? ";
        cin >> recentGrad;
         // Determine the user's loan qualifications.
        if (employed == 'Y'|| employed == 'y')
        {
                if (recentGrad == 'Y' || recentGrad == 'y') // Nested if
                {
                        cout << "You qualify for the special ";
                        cout << "interest rate.\n";
                }
                else // Not a recent grad, but employed
                {
                        cout << "You must have graduated from ";
                        cout << "college in the past two\n";
                        cout << "years to qualify.\n";
                }
        }
        else // Not employed
        {
        cout << "You are not employed so you are not qualifying.\n";
        }
return 0;
}
```