Programming and Problem solving
Lecture 4
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Programming in C++

There are multiple compilers and text editors could be used to run C++ programming. These may differ from system to system. We will use CodeBlockes editor in this course.

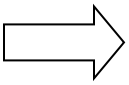
3.1Basic Input/Output

Cin : standard input stream

```
    1 int age;
    2 cin >> age
```

Cout : standard output stream

```
    1 cout << "Output sentence"; // prints Output sentence on
screen
    2 cout << 120;               // prints number 120 on screen
    3 cout << x;                 // prints the value of x on
screen
```



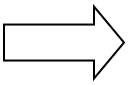
Simple input/output program:

```
// input output example

#include <iostream>
using namespace std;

int main ()
{
  int a,b;
  cout << "Please enter the first number: ";
  cin >> a;
  cout << " Please enter the second number: "<< b;
  cin>> b;

    return 0;
}
```

3.2Arithmetic Operators

There are following arithmetic operators supported by C++ language −
Assume variable A holds 10 and variable B holds 20, then

Operator	Description	Example
+	Adds two operands	A + B will give 30
-	Subtracts second operand from the first	A - B will give -10
*	Multiplies both operands	A * B will give 200
/	Divides numerator by de-numerator	B / A will give 2
%	Modulus Operator and remainder of after an integer division	B % A will give 0
++	Increment operator, increases integer value by one	A++ will give 11
--	Decrement operator, decreases integer value by one	A-- will give 9



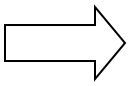
```
// C++ arithmetic
#include <iostream>
using namespace std;
int main()
{
  float biscuit;
  int  babies;

  cout << "Enter a number: ";
  cin >> biscuit;
  cout << "Enter another number: ";
  cin >> babies;

  cout << " biscuit = " << biscuit << "; babies = " << babies <<
endl;
  cout << " biscuit + babies = " << biscuit + babies << endl;
  cout << " biscuit - babies = " << biscuit - babies << endl;
  cout << " biscuit * babies = " << biscuit * babies << endl;
  cout << " biscuit / babies = " << biscuit / babies << endl;
```

```
return 0;}
```

3.3Relational Operators

There are following relational operators supported by C++ language Assume variable A holds 10 and variable B holds 20, then –

Operator	Description	Example
==	Checks if the values of two operands are equal or not, if yes then condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not, if values are not equal then condition becomes true.	(A != B) is true.
>	Checks if the value of left operand is greater than the value of right operand, if yes then condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand, if yes then condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand, if yes then condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand, if yes then condition becomes true.	(A <= B) is true.



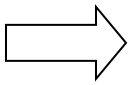
```
// relational operators
   #include<iostream>
```

```
    using namespace std;

    int main()
    {
int a=10,b=20,c=10;

if(a>b)
   cout<<"a is greater"<<endl;

if(a<b)
   cout<<"a is smaller"<<endl;

if(a<=c)
   cout<<"a is less than/equal to c"<<endl;

if(a>=c)
   cout<<"a is less than/equal to c"<<endl;

return 0;}
```

3.4Logical Operators

There are following logical operators supported by C++ language. Assume variable A holds 1 and variable B holds 0, then −

Operator	Description	Example
&&	Called Logical AND operator. If both the operands are non-zero, then condition becomes true.	(A && B) is false.
||	Called Logical OR Operator. If any of the two operands is non-zero, then condition becomes true.	(A || B) is true.
!	Called Logical NOT Operator. Use to reverses the logical state of its operand. If a condition is true, then Logical NOT operator will make false.	!(A && B) is true.



```
// Logical Operators
#include <iostream>
  using namespace std;
```

```
 int main()
{
    cout << "Enter a number: ";
    int value;
    cin >> value ;

    if (value > 10 && value < 20)
        cout << "Your value is between 10 and 20" << endl;
    else
        cout << "Your value is not between 10 and 20" << endl;
    return 0;
}
```

3.5Bitwise Operators

Bitwise operator works on bits and perform bit-by-bit operation. The truth tables for &, |, and ^ are as follows −

p	q	p & q	p | q	p ^ q
0	0	0	0	0
0	1	0	1	1
1	1	1	1	0
1	0	0	1	1

Assume if A = 60; and B = 13; now in binary format they will be as follows

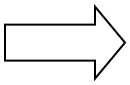
A = 0011 1100

B = 0000 1101

A&B = 0000 1100

A|B = 0011 1101

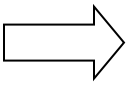
A^B = 0011 0001



~A = 1100 0011

```
// (~ ) one's compliment operator
#include <iostream>
```

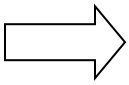
```
using namespace std;

int main()
{
   // 12 = 0000 1100
   unsigned int num1 = 12
   int num2 = 0;

   num2 = ~num1;
   cout << "Value of num2 is: " << num2 << endl ;

   return 0;
}
```



```
#include <iostream>
  using namespace std;

   int main()
   {
unsigned int num1 = 10;        // 10 = 0000 1010
unsigned int num2 = 12;        // 12 = 0000 1100
int num3 = 0;

num3 = num1 & num2;          // 8 = 0000 1000
cout << "Value of num3 is : " << num3 << endl ;

return 0;
}
```

3.6Mathematical Functions

C++ provides various mathematical functions like log( ), modf( ), pow( ), sqrt(), sin(), cos(), abs() etc. that aid in mathematical calculations. <math.h> library should be called.



Example shows few of the mathematical operations:

```
 // C++ Mathematical Functions
#include<iostream.h>
#include<conio.h>
#include<math.h>
int main()
{
```

```
       Short int si = 100;
       int i = -1000;
       long int li = 8;
       float f = 230.47;
       double d = 200.347;

       cout<<"sqrt(si): "<<sqrt(si)<<endl;
       cout<<"pow(li, 3): "<<pow(li, 3)<<endl;
       cout<<"sin(d): "<<sin(d)<<endl;
       cout<<"abs(i) : "<<abs(i)<<endl;
       cout<<"floor(d): "<<floor(d)<<endl;
       cout<<"sqrt(f): "<<sqrt(f)<<endl;
       cout<<"pow(d, 2): "<<pow(d, 2)<<endl;

           return 0;
     }
The output of the above C++ program
sqrt(si): 10
pow(li, 3): 512
sin(d):-0.6555
abs(i) : 1000
floor(d): 200
sqrt(f):15.181
pow(d, 2): 40138.92
```