Experiment No 1

Aim: To implement basic concepts of CPP.

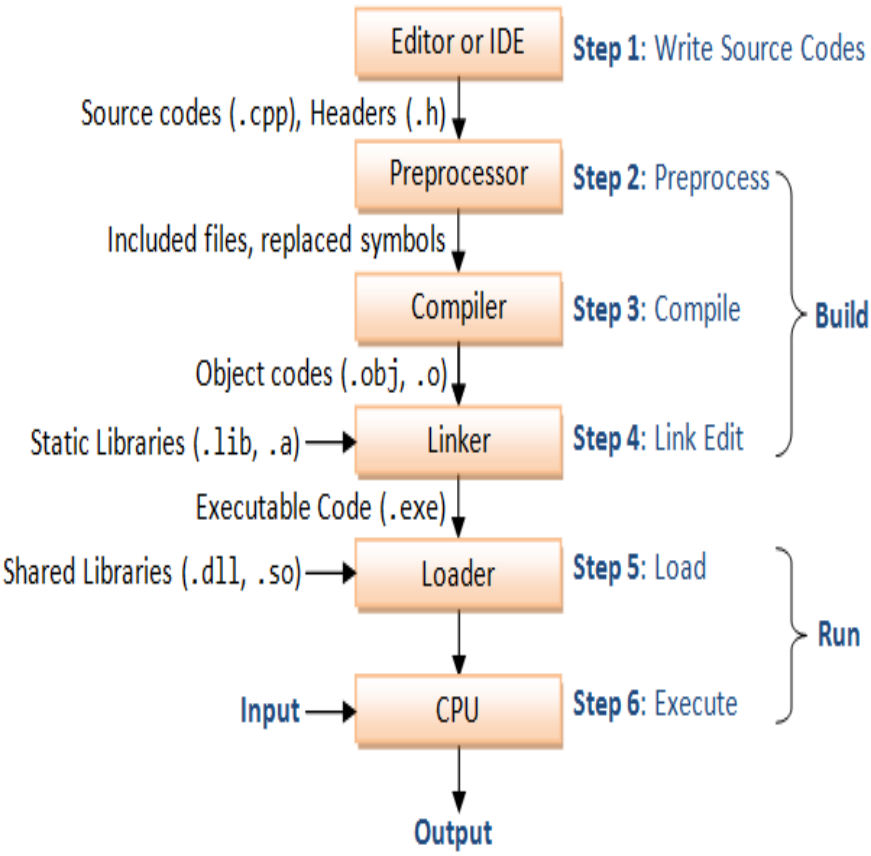
Theory:

Introduction :
C++ is a cross-platform language that can be used to create high-performance applications.C++ was developed by Bjarne Stroustrup, as an extension to the C language.C++ gives programmers a high level of control over system resources and memory.

Difference between C and C++:
C++ was developed as an extension of C, and both languages have almost the same syntax. The main difference between C and C++ is that C++ support classes and objects, while C does not.

Why Use C++:
C++ is one of the world's most popular programming languages. C++ can be found in today's operating systems, Graphical User Interfaces, and embedded systems. C++ is an object-oriented programming language which gives a clear structure to programs and allows code to be reused, lowering development costs. C++ is portable and can be used to develop applications that can be adapted to multiple platforms. C++ is fun and easy to learn! As C++ is close to C, C# and Java, it makes it easy for programmers to switch to C++ or vice versa.

Writing and Executing a C++ Program:



Output Statement(cout):

The cout stream is used in conjunction with the overloaded operator << (a pair of "less than" signs).

Syntax:

```
cout<<variable1<<variable2<<…….<<variablen;
```

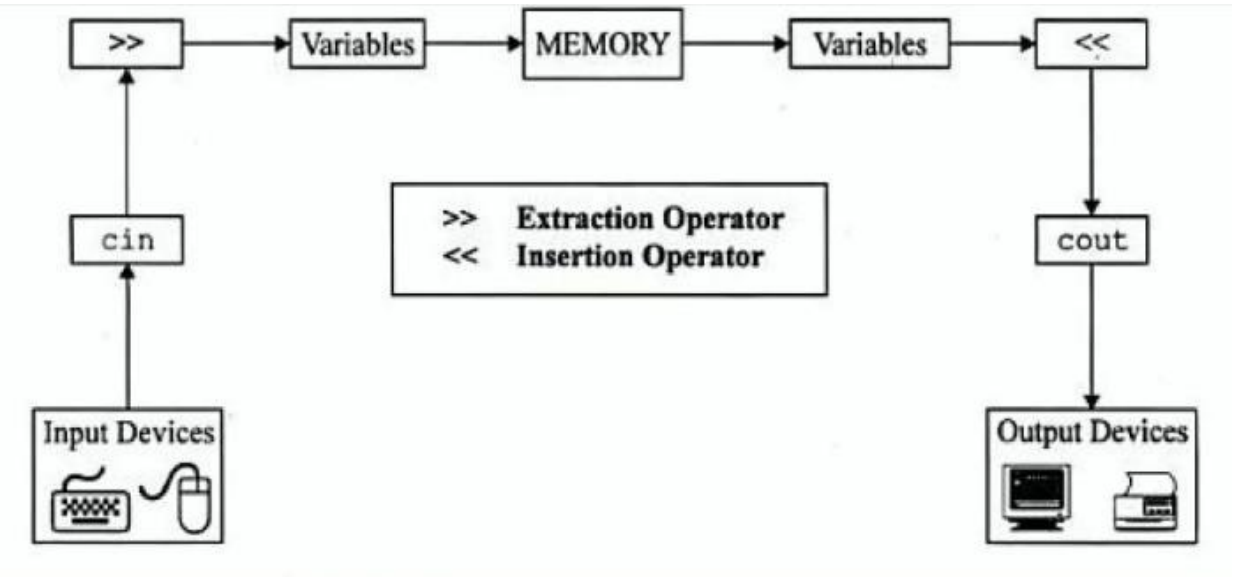
The << operator is known as insertion operator since it inserts the data that follows it into the stream that precedes it.

Input Statement(cin):

Handling the standard input in C++ is done by applying the overloaded operator >> (a pair of greater than sign) known as extraction operator on the cin stream. This must be followed by the variable that will store the data that would by keyed in.

Syntax:

```
Cin>>variable1>>variable2>>…….>>variablen;
```



C++ Variables

Variables are containers for storing data values.

In C++, there are different **types** of variables (defined with different keywords), for example:

- int - stores integers (whole numbers), without decimals, such as 123 or -123
- double - stores floating point numbers, with decimals, such as 19.99 or -19.99
- char - stores single characters, such as 'a' or 'B'. Char values are surrounded by single quotes
- string - stores text, such as "Hello World". String values are surrounded by double quotes
- bool - stores values with two states: true or false

Syntax

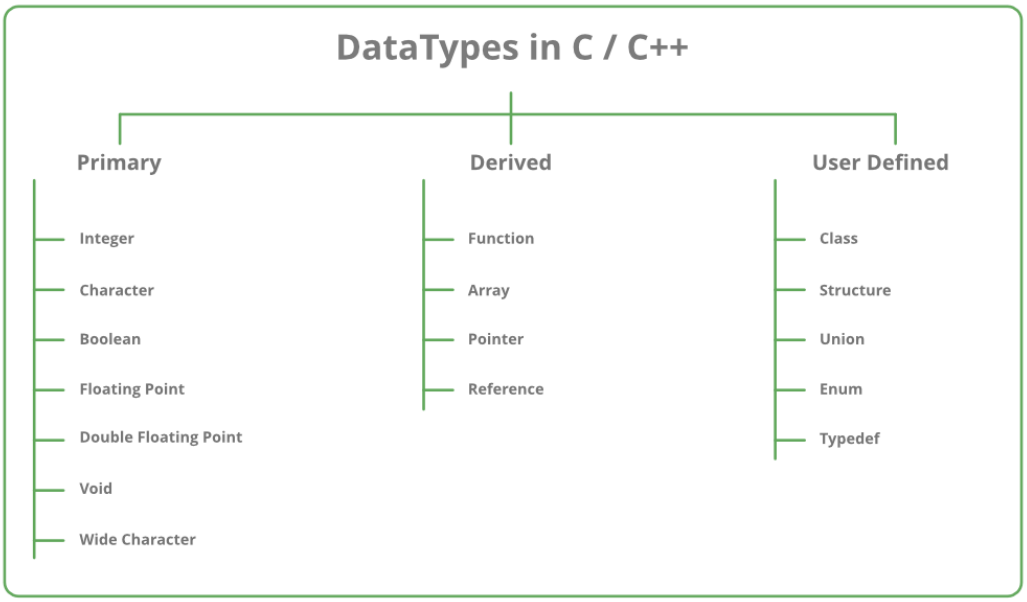
```
type variableName = value;
type variableName;
type variable1>>variable2>>……>>variablen;
```

The general rules for naming variables are:

- Names can contain letters, digits and underscores
- Names must begin with a letter or an underscore (_)
- Names are case-sensitive (myVar and myvar are different variables)

- Names cannot contain whitespaces or special characters like !, #, %, etc.
- Reserved words (like C++ keywords, such as int) cannot be used as names

Data Types:



Operators in C++ can be classified into 6 types:

1. Arithmetic Operators
2. Relational Operators
3. Logical Operators
4. Bitwise Operators
5. Assignment Operators
6. Ternary or Conditional Operators

Operators in C++

	Operator	Type
Unary operator →	+ +, - -	Unary operator
Binary operator →	+, -, *, /, %	Arithmetic operator
	<, <=, >, >=, ==, !=	Relational operator
	&&, ||, !	Logical operator
	&, |, <<, >>, ~, ^	Bitwise operator
	=, +=, -=, *=, /=, %=	Assignment operator
Ternary operator →	?:	Ternary or conditional operator

Practical Related Questions:

1.Write the advantages and disadvantages of C++.
2. Give the structure of C++ program.
3. List 5 rules for forming variable names.
4. Define:
    a. identifiers
    b. keywords
    c. constants
5. Which are the input and output operator in C++? Give its example.
6. Write a note on Scope of Variables.

Programs :

1. CPP Program to design a simple calculator using **Arithmetic Operators**
2. CPP Program to find whether the entered number is greater or smaller.
3. CPP Program to find the smaller of three numbers using **Logical Operators**
4. CPP Program to swap two numbers using **Assignment Operators**
5. CPP Program to solve the following expression **(3*i-2*j)%(2*a-b)**

Conclusion :

Hence, we learnt to implement the basic concepts of CPP.

PRACTICAL 1

i. WAP in cpp program to design a simple calculator using arithmetic operator

```
#include <iostream>
using namespace std;
int main()
{
        float num1,num2,add,mul,sub,div;
        cout << "Enter first number: ";
        cin >> num1;
        cout << "Enter second number: ";
        cin >> num2;
        add=num1+num2;
        sub=num1-num2;
        mul=num1*num2;
        div=num1/num2;
        cout << "Addition = " << add << endl;
        cout << "Subtraction = " << sub << endl;
        cout << "Multiplication = " << mul << endl;
        cout << "Division = " << div << endl;
        return 0;
}
```

ii. WAP in CPP to find whether the entered number is greater or smaller

```
#include <iostream>
int main()
{
        int a, b;
        cout << "Enter two numbers: ";
        cin >> a >> b;
        int result = (a - b) + ((a - b) > 0? a : b);  // using bitwise operators
        cout << "The largest number is: " << result << endl;
        return 0;
}
```

iii. WAP in CPP to find the smaller of three numbers using Logical Operators

```
#include <iostream>
int main()
 {
        int a, b, c;
        cout << "Enter three numbers: ";
        cin >> a >> b >> c;
```

```
    // Without using control statements, you can find the largest number using a
    mathematical operation.
    int largest = (a > b ? (a > c ? a : c) : (b > c ? b : c));
    cout << "The largest number is: " << largest << std::endl;
    return 0;
}
```

iv. WAP in CPP to swap two numbers using Assignment Operators

```
#include <iostream>
using namespace std;
int main()
{
    int a, b;
    cout << "Enter two numbers: ";
    cin >> a >> b;
    // Swapping using assignment operators
    a = a + b;
    b = a - b;
    a = a - b;
    cout << "After swapping: a = " << a << ", b = " << b << endl;
    return 0;
}
```

OR

```
#include <iostream>
using namespace std;
int main()
{
    int a, b,t;
    cout << "Enter value of a: ";
    cin >> a;
    cout << "Enter value of b: ";
    cin >> b;
    // Swapping using assignment operators
    t=a;
    a=b;
    b=t;
    cout << "After swapping: a = " << a << ", b = " << b << endl;
    return 0;
}
```

v. WAP in CPP to solve the following expression (3*i-2*j)%(2*a-b)

```
#include <iostream>
using namespace std;
int main()
{
        int i, j, a, b, result;
        cout << "Enter the values of i, j, a, and b: ";
        cin >> i >> j >> a >> b;
        // Calculate the numerator and denominator
        int numerator = 3 * i - 2 * j;
        int denominator = 2 * a - b;
        result = numerator/ denominator;
        cout << "Result: " << result << endl;
        return 0;
}
```