

Introduction to C Plus Plus

Module 2 - Basic Syntax and Program Structure in C Plus Plus

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Introduction of C++:

- C++ is an object-oriented programming language.
- The programming language C++ was developed by Bjarne Stroustrup at Bell Lab in New Jersey in early 1980s as extension of C.
- He named 'C with Classes'. In 1983 it was renamed to C++.
- The operator ++ meaning that increment in C. ++ is increment operator in C/C++.
- C++ is a superset of C. Almost all C programs are also C++ programs.
- C++ is a general-purpose programming language. The C++ language corrects most of the deficiencies of C by offering improved compile time type checking and support for modular and object oriented programming.

Uses of C++

C++ is a versatile and powerful programming language with wide-ranging applications. Its features make it suitable for systems programming, application development, and performance-critical tasks. Here are the key uses of C++:

1. System Programming

• **Operating Systems:**

C++ is used to develop operating systems like Windows, Linux components, and macOS due to its speed and low-level access to memory.

• **Drivers:**

Device drivers for hardware components are often written in C++.

2. Game Development

• **High Performance:**

C++ provides better control over hardware resources, which is essential for real-time gaming.

• **Game Engines:**

Popular game engines like Unreal Engine and CryEngine are built using C++.

3. GUI-Based Applications

• **Graphical Applications:**

C++ is used for developing graphical applications like Adobe Photoshop, Illustrator, and other desktop software.

4. Database Management Systems (DBMS)

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• Database Engines:

C++ is used in the development of popular DBMS systems like MySQL and MongoDB.

5. Embedded Systems

• Real-Time Systems:

C++ is commonly used in embedded systems for devices like medical instruments, smart TVs, and IoT devices, where performance and efficiency are critical.

6. Web Browsers

• Back-End Development:

Web browsers such as Google Chrome and Mozilla Firefox have their core functionalities implemented in C++.



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Comparison of C and C++

Aspect	C	C++
Programming Paradigm	Procedural Oriented Programming (POP)	Object-Oriented Programming (OOP) with POP support
Primary Focus	Focuses on functions and procedures.	Focuses on objects and classes.
Approach	Top-down approach.	Bottom-up approach.
Encapsulation	Does not support data encapsulation.	Supports encapsulation through classes.
Inheritance	Not supported.	Supported (allows code reuse).
Polymorphism	Not available.	Supported (compile-time and run-time polymorphism).
Dynamic Binding	Does not support dynamic binding.	Supports dynamic binding using virtual functions.
Data Security	Data is less secure (no abstraction).	Provides data security through encapsulation.
Memory Management	Uses functions like malloc and free for memory management.	Provides dynamic memory management using new and delete.
Standard I/O	Uses printf and scanf.	Uses cin and cout for input and output operations.
Extensibility	Limited extensibility.	Highly extensible with features like operator overloading.
File Extensions	.c	.cpp

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The First C++ program

Following is a sample program in C++ that prints a string on the screen (monitor).

```
#include<iostream.h>
int main()
{
cout<<"Hi everyone">>;
return 0;
}
```

Like in C, functions are the basic building block in C++. The above example consists of a single function called main ().

- When a C++ program executes, the first statement that executes will be the first statement in main () function.
- The main function calls member functions of various classes (using objects) to carry out the real work.
- It may also call other stand-alone functions.

Comment syntax

In C++, comments start with a double slash (//) symbol and end at the end of the line.

- A comment may start at the beginning of a line or anywhere in the line and whatever follows till the end of that line is ignored.
- There is no closing symbol. If we need to comment multiple lines, we can write as
// this is an
// example
// of multi line comments

- The C comment style /*.....*/ may also be used for multi line comments.

The output operator (Output using "cout")

The statement: cout<<"Hi Everyone;", in the above example prints the phrase in quotation marks on the screen.

Here, the identifier 'cout', pronounced as "see out", is a predefined object of standard stream in C++< is called 'insertion' or 'put to' operator. It inserts the content on its right to the object on its left.

```
cout<<a;
In the above case, the statement will display the content of the variable 'a'.
```

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The input operator(Input using cin)

A statement `cin>>a;` is an input statement.

This causes the program to wait for the user to type and give some input. The given input is stored in the variable `a`.

Here, the identifier 'cin', pronounced as 'see in' is an object of standard input stream.

The operator '>>' is called 'extraction' or 'get from' operator. It extracts or gets value from keyboard and assigns it to the variable on its right.

Cascading I/O operators(multiple input/output)

The i/o operators can be used repeatedly in a single i/o statements as follows.

```
cout<<a<<b<<c;  
cin>x>>y>>z;
```

These are perfectly legal. The above **cout statement** first sends the value of 'a' to cout, then sends the value of b and then sends the value of c.

Similarly, the **cin statement** first reads a value and stores in x, then reads again and stores in y and then in z. The multiple uses of i/o operators in one statement is called **cascading**.

#include<iostream>

Lines beginning with a hash sign (#) are directives for the preprocessor. They are not regular code lines with expressions but indications for the compiler's preprocessor.

In this case the directive `#include` tells the preprocessor to include the `iostream` standard file. This specific file (`iostream`) includes the declarations of the basic standard input-output library in C++, and it is included because its functionality is going to be used later in the program.



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