



Programming and Computer Applications-2

Introduction to C++ Programming

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History of C++

- C++ was developed by Bjarne Stroustrup in the early 1980s at Bell Laboratories
 - Originally called “C with classes”
 - The name C++ is based on C’s increment operator (++)
 - Indicating that C++ is an enhanced version of C
- Widely used in many applications and fields
- The C++ logo endorsed by Standard C++

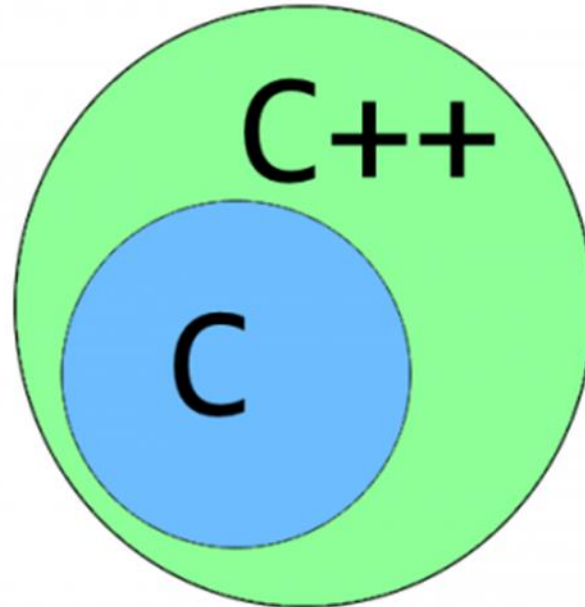


C++

- Improves on many of C's features
- Has object-oriented capabilities
 - Increases software quality and reusability
- Superset of C
 - Can use a C++ compiler to compile C programs
 - Gradually evolve the C programs to C++

C++

C++ is a superset of C



Similarities Between C And C++

- Both the languages have a similar syntax.
- Code structure of both the languages are same.
- The compilation of both the languages is similar.

Differences Between C And C++

- **Language Type**

C is procedural programming.

C++ supports both procedural and object-oriented programming paradigms.

- **OOPs feature Support**

C does not support the OOPs concept so it has no support for polymorphism, encapsulation, and inheritance.

C++ has support for polymorphism, encapsulation, and inheritance as it is being an object-oriented programming language

Differences Between C And C++

- **Data Security**

As C does not support encapsulation so data behave as a free entity and can be manipulated by outside code.

C++ encapsulation hides the data to ensure that data structures and operators are used as intended.

- **Driven type**

C in general known as function-driven language.

C++ is known as object driven language.

Differences Between C And C++

- **Feature supported**

C does not support function and operator overloading also do not have namespace feature and reference variable functionality.

C++ supports both function and operator overloading also have namespace feature and reference variable functionality.

Differences Between C And C++

Header file used by C is `stdio.h`.

Header file used by C++ is `iostream.h`.

Virtual and friend functions are not supported by C.

Virtual and friend functions are supported by C++.

`scanf()` and `printf()` functions are used for input/output in C.

`cin>>` and `cout<<` are used for input/output in C++.

Differences Between C And C++

Namespace features are not present inside the C.

Namespace is used by C++, which avoid name collisions.

For instance, two students enrolled in the same university cannot have the same roll number while two students in different universities might have the same roll number. The universities are two different namespace & hence contain the same roll number(identifier) but the same university(one namespace) cannot have two students with the same roll number (identifier)

C++ program template

```
/*  
 * Comment to state the purpose of this program  
 (filename.cpp)  
 */  
#include <iostream>  
using namespace std;  
  
int main() {  
    // Your Programming statements HERE!  
  
    return 0;  
}
```

First C++ program

```
// Simple C++ program
```

```
// Header file for input output functions
```

```
#include<iostream>
```

```
using namespace std;
```

```
int main()
```

```
{
```

```
cout<<"Welcome to C++ Programming";
```

```
cout<<endl;
```

```
    return 0;
```

```
}
```

C++ Program Structure

```
#include <iostream>
using namespace std;
// main() is where program execution begins.
int main()
{
    cout << "Hello World"; // prints Hello World
    return 0;
}
```

Let us look various parts of the above program:

- The C++ language defines several headers, which contain information that is either necessary or useful to your program. For this program, the header **<iostream>** is needed.
- The line **using namespace std;** tells the compiler to use the std namespace. Namespaces are a relatively recent addition to C++.

C++ Program Structure

- The next line **// main() is where program execution begins.** is a single-line comment available in C++. Single-line comments begin with // and stop at the end of the line.
- The line **int main()** is the main function where program execution begins.
- The next line **cout << "This is my first C++ program.";** causes the message "This is my first C++ program" to be displayed on the screen.
- The next line **return 0;** terminates main()function and causes it to return the value 0 to the calling process.

Object-Oriented Programming

- C++ provides capabilities for object-oriented programming.
- Objects are essentially reusable software components that model items in the real world.
- Objects all have attributes (e.g., size, shape, color and weight), and they all exhibit behaviors (e.g., a ball rolls, bounces, inflates and deflates; a baby cries, sleeps, crawls, walks and blinks; a car accelerates, brakes and turns; a towel absorbs water).
- Modular, object-oriented design and implementation makes programmers much more productive than can previous popular programming techniques.
- Object-oriented programs are easier to understand, correct and modify.

Basic Object Technology Concepts

- **Object-oriented design (OOD)** models software in terms similar to those that people use to describe real-world objects.
 - Takes advantage of class relationships, where objects of a certain class, have the same characteristics.
 - Takes advantage of **inheritance** relationships, where new classes of objects are derived by absorbing characteristics of existing classes and adding unique characteristics of their own.
- Object-oriented design provides a natural and intuitive way to view the software design process.
- OOD also models communication between objects.

Basic Object Technology Concepts

- OOD **encapsulates** attributes and **operations** into objects.
- Objects have the property of **information hiding**.
 - Objects may know how to communicate with one another across well-defined **interfaces**, but normally they're not allowed to know how other objects are implemented.
 - Information hiding is crucial to good software engineering.

Basic Object Technology Concepts

- Languages like C++ are **object oriented**.
- Programming in such a language is called **object-oriented programming (OOP)**, and it allows computer programmers to implement object-oriented designs as working software systems.
- C++ classes contain functions that implement operations and data that implements attributes.