

“Inheritance in C++ Programming Language”

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Abstract

The objective of this review paper is to review concept of inheritance in C++ Programming Language. The review paper begins upon the survey of C++ OOP's concept like inheritance, programming & language technical concepts using examples to provide the reader's a feel for the language. Inheritance plays an important rule for code reusability. C++ is a general-purpose programming language with an influence towards system programming that supports efficient low-level computations, data abstraction, Object Oriented Programming and generic programming.

Keywords

C++, OOP's, Inheritance, Software reuse.

Introduction

C++ is an Object-Oriented development of C with classes [6], member functions, operators, overloading, constructors etc. It's the first language taught to undergraduates at CUED. C++ strongly supports the concept of reusability. [1]

Object- Oriented Programming is a practical and useful programming strategy

that encourages modular design and software reuse.[7] Object- Oriented language make the promises of reduced maintenance, code, reusability, improved reliability, flexibility and easier maintenance through better data encapsulation.[4] To attain these gains, Object -Oriented language introduces the concepts objects, classes, data abstraction, encapsulation, Inheritance and polymorphism.

Inheritance in C++

In C++ inheritance is a form of software reusability in which a new class acquires all the properties (the data members) and behaviors (the member function) of existing class in hierarchy. [8]

It is a process of creating new classes from existing. The existing class is known as base class and newly created class is called derived class. [1]

Example- A child inherits the traits of his/her parents.

Derived class

A class that does the inheriting is called as derived class, sub-class or child class.

Base class

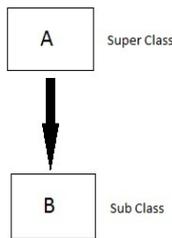
A class that is inherited is referred to as a base class, superclass or parent class.[5]

Access Specifiers [9]

| Base class member access specifier | Type of Inheritance | | |
|------------------------------------|-------------------------|-------------------------|-------------------------|
| | Public | Protected | Private |
| Public | Public | Protected | Private |
| Protected | Protected | Protected | Private |
| Private | Not accessible (Hidden) | Not accessible (Hidden) | Not accessible (Hidden) |

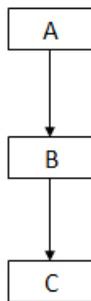
Types of Inheritance

• Single Inheritance



A derived class with only one base class is called single inheritance. [2]

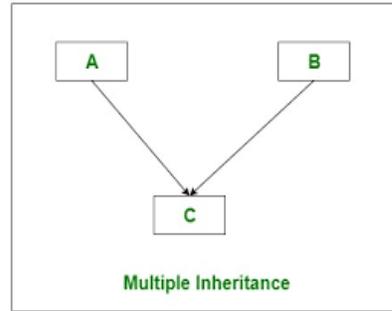
• Multilevel Inheritance



Multilevel Inheritance

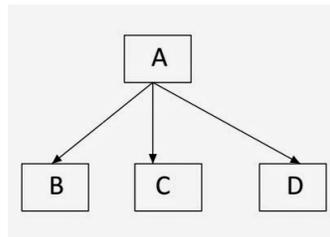
A derived class with one base class and that base class is derived a class of another is called multilevel inheritance.

• Multiple Inheritance



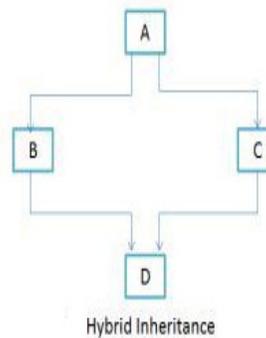
A derived class with multiple base class is called multiple inheritance. [3]

• Hierarchical Inheritance



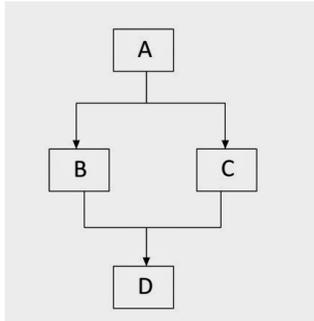
Multiple derived classes with same base class is called hierarchical inheritance.

• Hybrid Inheritance



Combination of multiple and hierarchical inheritance is called hybrid inheritance.

• Multipath Inheritance



A derived class with two base classes and these two base classes has a common base class is called multipath inheritance.

Comparison of C and C++

| C | C++ |
|--|---|
| • C is a structural programming language. | • C++ is both structural and object-oriented programming language. |
| • C doesn't support object – oriented features like inheritance, data abstraction etc. | • C++ supports object – oriented features like inheritance, data abstraction etc. |
| • Code reusability is not possible so it acquires more space and time. | • Code reusability is possible so it acquires less space and time. |
| • Data security is very less. | • Data security is very high. |

Applications of Inheritance in C++

- It saves memory space and time.
- It will remove frustration, improve the performance and increase reliability of code.
- It is used to correlate two or more classes.
- Code reusability.

Limitation of Inheritance in C++

- Overuse of inheritance in a software can make it more complex.
- Multiple inheritance can create ambiguity between attributes and operation and can increase the likelihood of errors.

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Conclusion

In this paper we discuss about inheritance concept, its types, various application and limitations in C++ language. We also discuss about base class and derived class. In C++ programming language, inheritance plays an important part for code reusability and maintainability and demonstrate how inheritance and code reusability had a connection.

C++ is better than C programming language due to availability of reusability of code (inheritance) in C++ which makes C++ programs to takes less space, time and achieve higher accuracy than C.

In C++ we can define class by inheritance and maintain a class correctly and easily. Data security is very high in C++ language due to access specifiers.[9]

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