

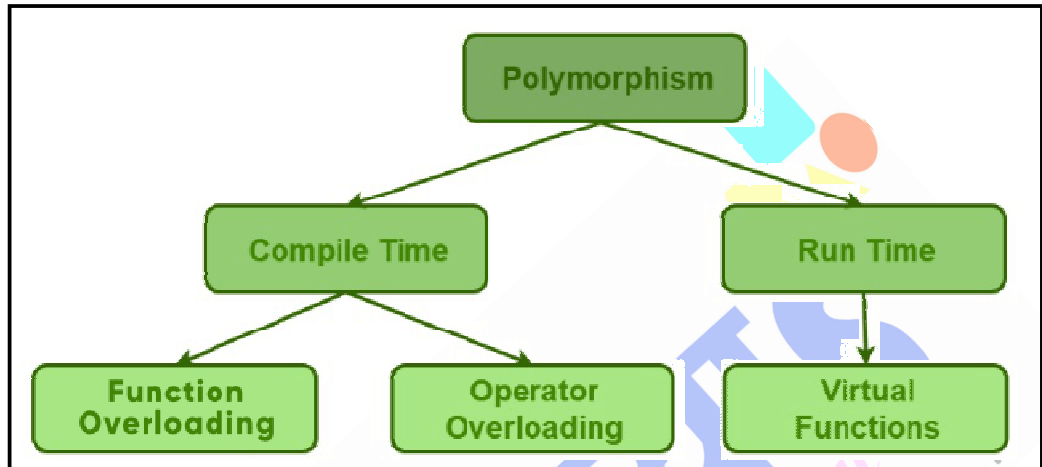
Course  
&  
Test Series

Introduction to 'C++' Language

Polymorphism in C Plus Plus

Module 2 - Function Overloading in C Plus Plus

The word "polymorphism" comes from the Greek words *poly* (many) and *morph* (forms), meaning "many forms."



**Overloading** refers to the use of the same thing for different purposes. C++ also permits overloading functions.

This means that we can use the same function name to creates functions that perform a variety of different tasks. This is known as function polymorphism in oops.

Using the concepts of function overloading, a family of functions with one function name but with different argument lists in the functions call.

The correct function to be invoked is determined by **checking the number and type of the arguments but not on the function type.**

For example an overloaded add() function handles different types of data as shown below.

```

//Declaration
int add(int a, int b); //prototype 1
int add (int a, int b, int c); //prototype 2
double add(double x, double y); //prototype 3
double add(double p , double q); //prototype 4
  
```

Banking & Insurance

Central Govt. Service

State Govt. Services

LAW Entrance

MBA Entrance

Railways & Metro Services

...many more

abhyasonline.in

**Course  
&  
Test Series**

**Introduction to 'C++' Language**

 **CBSE**

 **ICSE**

 **NTSE**

 **Banking &  
Insurance**

 **Central Govt.  
Service**

 **State Govt.  
Services**

 **LAW  
Entrance**

 **MBA  
Entrance**

 **Railways & Metro  
Services**

...many more

**abhyasonline.in**

```
//function call
cout<<add(5,10); //uses prototype 1
cout<<add(15,10.0); //uses prototype 4
cout<<add(12.5,7.5); //uses prototype 3
cout<<add(5,10,15); //uses prototype 2
cout<<add(0.75,5); //uses prototype 5
```

A function call first matches the prototype having the same no and type of arguments and then calls the appropriate function for execution. The function selection invokes the following steps:-

a) The compiler first tries to find an exact match in which the types of actual arguments are the same and use that function.

b) If an exact match is not found the compiler uses the integral promotions to the actual arguments such as :

**char to int**

**float to double** to find a match

c) When either of them fails, the compiler tries to use the built in conversions to the actual arguments and then uses the function whose match is unique. If the conversion is possible to have multiple matches, then the compiler will give error message.

**Solved Example of Function Overloading**

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

class Shape {
public:
    // Function to calculate the perimeter of a circle
    double perimeter(double radius) {
        return 2 * 3.14 * radius; // Formula: 2 * π * r
    }

    // Function to calculate the perimeter of a rectangle
    int perimeter(int length, int breadth) {
        return 2 * (length + breadth); // Formula: 2 * (length + breadth)
    }

    // Function to calculate the perimeter of a triangle
    int perimeter(int side1, int side2, int side3) {
        return side1 + side2 + side3; // Formula: sum of all sides
    }
};
```

Course  
&  
Test Series

 CBSE

 ICSE

 NTSE

 Banking & Insurance

 Central Govt. Service

 State Govt. Services

 LAW Entrance

 MBA Entrance

 Railways & Metro Services

...many more

abhyasonline.in

Introduction to 'C++' Language

```
int main() {
    Shape shape;

    // Perimeter of a circle
    double circlePerimeter = shape.perimeter(2.0);
    cout << "Perimeter of a circle: " << circlePerimeter << endl;

    // Perimeter of a rectangle
    int rectanglePerimeter = shape.perimeter(10, 10);
    cout << "Perimeter of a rectangle: " << rectanglePerimeter << endl;

    // Perimeter of a triangle
    int trianglePerimeter = shape.perimeter(10, 10, 10);
    cout << "Perimeter of a triangle: " << trianglePerimeter << endl;

    return 0;
}
```

**OUTPUT:**

Perimeter of a circle: 12.56  
Perimeter of a rectangle: 40  
Perimeter of a triangle: 30

**Explanation of the Code**

**1. Function Overloading:**

- The function perimeter is overloaded with three different signatures:
  - perimeter(double radius) for a circle.
  - perimeter(int length, int breadth) for a rectangle.
  - perimeter(int side1, int side2, int side3) for a triangle.

**2. Implementation:**

- Each overloaded function calculates the perimeter based on the formula for the specific shape.
- The appropriate version of perimeter is called depending on the number and type of arguments passed to it.

**Assignment**

**Ques 1: Overload a function to calculate the area of different shapes:**

- Write a program to overload a function area to calculate:
  - The area of a circle ( $\pi * r^2$ ).
  - The area of a rectangle (length \* breadth).
  - The area of a triangle ( $0.5 * base * height$ ).

Course  
&  
Test Series

Introduction to 'C++' Language

Ques 2: Overload a function to calculate volume:

- Create a function volume to calculate:
  - The volume of a cube ( $\text{side}^3$ ).
  - The volume of a cylinder ( $\pi * r^2 * \text{height}$ ).
  - The volume of a cuboid ( $\text{length} * \text{breadth} * \text{height}$ ).

 CBSE

 ICSE

 NTSE

 Banking & Insurance

 Central Govt. Service

 State Govt. Services

 LAW Entrance

 MBA Entrance

 Railways & Metro Services

...many more

abhyasonline.in

