

Objects and Classes in C Plus Plus

Module 4 - Friend Function in C Plus Plus



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Friend Class

A **friend class** can access private and protected members of other classes in which it is declared as a friend. It is sometimes useful to allow a particular class to access private and protected members of other classes.

Let **A and B are two classes** and if class B is capable to use all private data of class A then class B will be called friend class of A. Friend class is declared using friend class.

We can declare a friend class in C++ by using the **friend** keyword.

Syntax:

```
friend class class_name; // declared in the base class
```

Friend Function

A function which is not a member of the class but capable to use private data of that class called friend function. In C++ friend function is declared using friend keyword.

Syntax of Friend Function

```
class ClassName {  
    private:  
        int data;  
  
    public:  
        ClassName(int value) : data(value) {}  
  
        // Declaring the friend function  
        friend void display(const ClassName& obj);  
};  
  
// Definition of the friend function  
void display(const ClassName& obj) {  
    cout << "Data: " << obj.data << endl;  
}
```



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Key Points

- A friend function is declared using the keyword friend inside the class.
- It is defined outside the class like a normal function.
- It has access to private and protected members of the class.

Example Code for Friend Function

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

class Rectangle {
private:
    int length, breadth;

public:
    Rectangle(int l, int b) : length(l), breadth(b) {}

    // Declaring a friend function
    friend void showDimensions(const Rectangle& rect);
};

// Friend function definition
void showDimensions(const Rectangle& rect) {
    cout << "Length: " << rect.length << ", Breadth: " << rect.breadth << endl;
}

int main() {
    Rectangle rect(10, 5);

    // Call the friend function
    showDimensions(rect);

    return 0;
}
```

OUTPUT:
Length: 10, Breadth: 5

Explanation of the Program

Class Declaration

- **Private Members:** The class Rectangle has two private data members, length and breadth.

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- **Constructor:** A parameterized constructor is used to initialize these members.
- **Friend Function Declaration:**
 1. The function showDimensions is declared as a friend using the friend keyword.
 2. This allows showDimensions to access the private members of the Rectangle class.

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Friend Function Definition

```
void showDimensions(const Rectangle& rect) {
    cout << "Length: " << rect.length << ", Breadth: " << rect.breadth << endl;
}
```

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- This is a standalone function defined outside the class.
- It accesses the private members (length and breadth) of the Rectangle class using the object rect passed as a constant reference.

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Main Function

```
int main() {
    Rectangle rect(10, 5); // Create an object of Rectangle

    // Call the friend function
    showDimensions(rect);

    return 0;
}
```

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- An object rect of class Rectangle is created with dimensions 10 (length) and 5 (breadth).
- The friend function showDimensions is called with rect as an argument.
- The function outputs the private members length and breadth of the object.

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Assignment

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- Ques 1: Create a class Student with private members name (string) and marks (float).
- Declare a friend function displayStudentDetails to display the details of a student.
 - Assign values to the private members using setter functions.

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Importance of Friend Functions in C++

- Friend functions allow controlled access to the private data of a class, enabling encapsulation while granting external functions limited access when necessary.
- Friend functions facilitate communication between two classes by allowing access to their private members.
- They provide flexibility to perform certain tasks that are difficult or impossible to achieve using only member functions.
- A single friend function can operate on multiple class objects, promoting code reuse.
- They simplify complex operations like comparison or arithmetic between objects of different classes.

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