<h1 style="text-align:center">实验名称：Class Inheritance 重修刷分</h1>

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分析设计	代码实现	分析总结	总评

实验类型：设计型

实验目的：

1. Master the definition and use of classes.
2. Be able to define and use class inheritance relationships, and define derived classes.
3. Be able to use virtual base classes to solve ambiguity problems.

实验要求：

1. Define an Employee class that includes attributes such as name, address, city, and postal code, including functions such as setName() and display(). Display() uses cout statements to display attributes such as name, address, city, and postal code, while the setName() function changes the name attribute of the object. Implement and test this class.

2. Define a Vehicle base class with member variables such as MaxSpeed and Weight, and member functions such as Run and Stop, from which Bicycle and Motorcar classes are derived. The Bicycle class has attributes such as Height, while the Motorcar class has attributes such as SeatNum. The Motorcycle class is derived from Bicycle and Motorcar, and attention should be paid to setting the Vehicle as a virtual base class during the inheritance process. Implement and test these classes. What would be the problem if Vehicle was not set as a virtual base class?

实验内容与设计：（学生作答区）

说明：根据每一实验要求，给出：（1）分析与设计（画出类图、算法流程图等）；（2）程序代码（注意代码风格和必要注释）；（3）测试数据和执行结果（用截图展现输入和输出）

任务一：
定义一个 Employee 类，要有属性：姓名、地址、城市、邮编，和 display 函数和 setName 函数。

```
#include <iostream>
#include <string>

using namespace std;
```

```cpp
// 1. Employee class
class Employee {
private:
    string name;
    string address;
    string city;
    string postalCode;

public:
    // Constructor
    Employee(string n, string addr, string c, string code)

        : name(n), address(addr), city(c), postalCode(code) {}


    // Function to set name
    void setName(string n) {
        name = n;
    }


    // Function to display employee information
    void display() {
        cout << "Name: " << name << endl;
        cout << "Address: " << address << endl;
        cout << "City: " << city << endl;
        cout << "Postal Code: " << postalCode << endl;
    }
};
```

任务二：
对于任务二，我们要定义一个 Vehicle 基类，并从中派生出 Bicycle 类和 Motorcar 类，而且要探究如果没有把 Vehicle 设置为虚类会怎么样

```cpp
class Vehicle {
protected:
    int maxSpeed;
    int weight;

public:
    // Constructor
    Vehicle(int speed, int w) : maxSpeed(speed), weight(w) {}
```

```cpp
    // Function to run the vehicle
    void run() {
        cout << "Vehicle is running." << endl;
    }

    // Function to stop the vehicle
    void stop() {
        cout << "Vehicle has stopped." << endl;
    }
};

// Derived class: Bicycle
class Bicycle : virtual public Vehicle {
protected:
    int height;

public:
    // Constructor
    Bicycle(int speed, int w, int h) : Vehicle(speed, w), height(h) {}
};

// Derived class: Motorcar
class Motorcar : virtual public Vehicle {
protected:
    int seatNum;

public:
    // Constructor
    Motorcar(int speed, int w, int seats) : Vehicle(speed, w),
seatNum(seats) {}
};

// Derived class: Motorcycle
class Motorcycle : public Bicycle, public Motorcar {
public:
    // Constructor
    Motorcycle(int speed, int w, int h, int seats) : Vehicle(speed, w),
Bicycle(speed, w, h), Motorcar(speed, w, seats) {}
};

int main() {
    // Testing Employee class
```

```
    Employee emp("John Doe", "123 Main St", "Anytown", "12345");

    emp.display();
    emp.setName("Jane Smith");
    emp.display();

    // Testing Vehicle hierarchy

    Motorcycle bike(60, 100, 30, 2);

    bike.run();
    bike.stop();

    return 0;
}
```
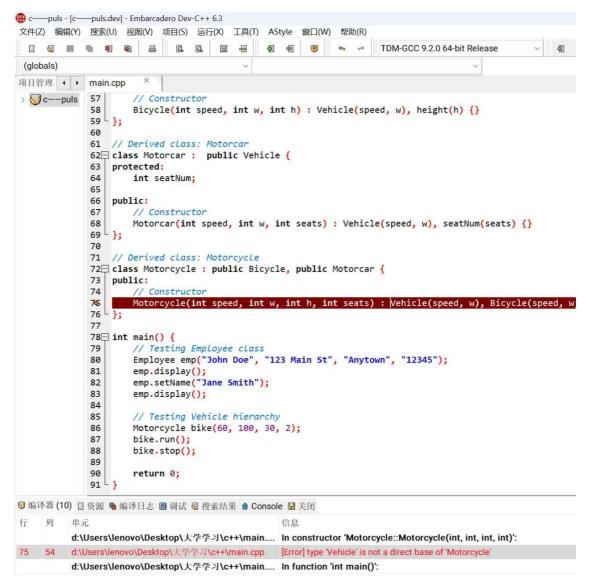
分析总结：（学生作答区）

说明：遇到的 bug 和排错、多种解决方法、实验要求之外更多的尝试、心得体会等。

运行成功！

如果不加 virtual 关键词的话会报错：

我遇到的问题是在多重继承中，尤其是当派生类同时继承自两个基类，而这两个基类又继承自同一个虚基类时，可能会遇到歧义问题。例如，如果我们在 Motorcycle 类中调用 Vehicle 类的成员函数，编译器可能不知道该调用哪个基类的成员函数，这一直导致报错。后来我查阅资料最终发现解决方法：确保在定义继承关系时，将虚基类明确地标记为 virtual。