International University of Business Agriculture and Technology

Lab Report 7

Course Code: CSC 284

Course Name: Programming in C++ Lab

Submitted To:

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Submitted By:

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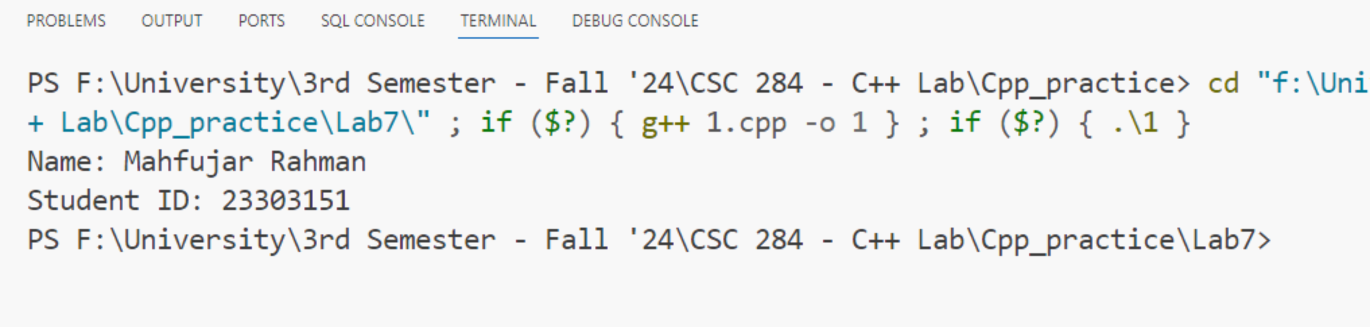
Section: C

1.Code:

```
#include <iostream>
#include <string>
using namespace std;
class Person
{
public:
    string name;
    Person(string n)
    {
        name = n;
    }
};
class Student : public Person
{
public:
    int studentID;
    Student(string name, int ID) : Person(name)
    {
        studentID = ID;
    }
};
int main()
{
    Student s1("Mahfujar Rahman", 23303151);

    cout << "Name: " << s1.name << endl;
    cout << "Student ID: " << s1.studentID << endl;

    return 0;
}
```

Output:

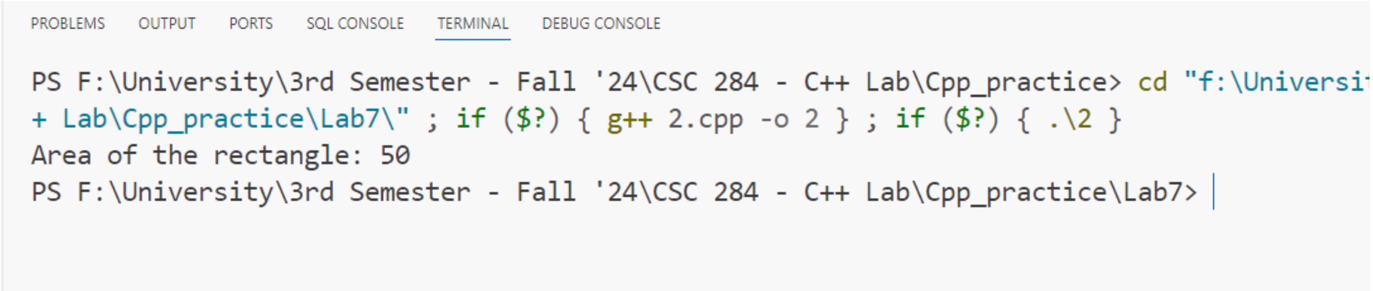


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Uni
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ 1.cpp -o 1 } ; if ($?) { .\1 }
Name: Mahfujar Rahman
Student ID: 23303151
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

2.Code:

```
#include <iostream>
using namespace std;
class Shape
{
public:
    int width;
    int height;
    Shape(int w, int h)
    {
        width = w;
        height = h;
    }
};
class Rectangle : public Shape
{
public:
    Rectangle(int width, int height) : Shape(width, height)
    {

    }
    int calculateArea()
    {
        return width * height;
    }
};
int main()
{
    Rectangle r1(5, 10);
    int area = r1.calculateArea();
    cout << "Area of the rectangle: " << area << endl;
    return 0;
}
```

Output:

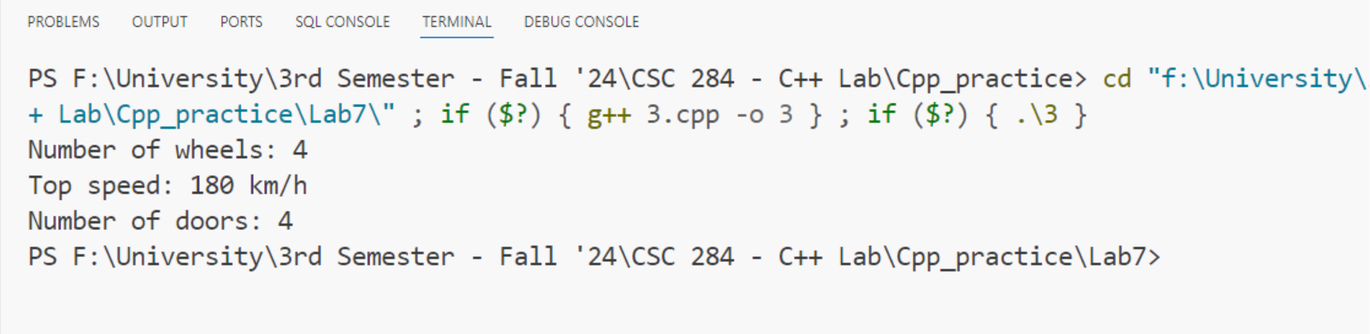


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Universi
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ 2.cpp -o 2 } ; if ($?) { .\2 }
Area of the rectangle: 50
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

3.Code:

```cpp
#include <iostream>
using namespace std;
class Vehicle
{
public:
    int numWheels;
    int topSpeed;
    Vehicle(int numWheels, int topSpeed)
    {
        this->numWheels = numWheels;
        this->topSpeed = topSpeed;
    }
};
class Car : public Vehicle
{
public:
    int numDoors;
    Car(int numWheels, int topSpeed, int numDoors) : Vehicle(numWheels, 
topSpeed)
    {
        this->numDoors = numDoors;
    }
};
int main()
{
    Car car(4, 180, 4);
    cout << "Number of wheels: " << car.numWheels << endl;
    cout << "Top speed: " << car.topSpeed << " km/h" << endl;
    cout << "Number of doors: " << car.numDoors << endl;
    return 0;
}
```

Output:

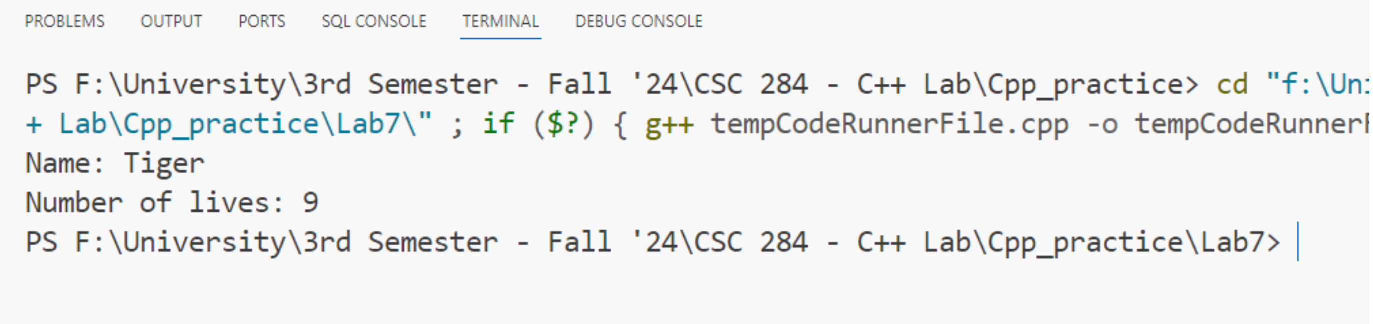


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\University\
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ 3.cpp -o 3 } ; if ($?) { .\3 }
Number of wheels: 4
Top speed: 180 km/h
Number of doors: 4
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

4.Code:

```cpp
#include <iostream>
#include <string>
using namespace std;
class Animal
{
public:
    string name;
    Animal(string name)
    {
        this->name = name;
    }
};
class Cat : public Animal
{
public:
    int numLives;

    Cat(string name, int numLives) : Animal(name)
    {
        this->numLives = numLives;
    }
};
int main()
{
    Cat c1("Tiger", 9);
    cout << "Name: " << c1.name << endl;
    cout << "Number of lives: " << c1.numLives << endl;
    return 0;
}
```

Output:

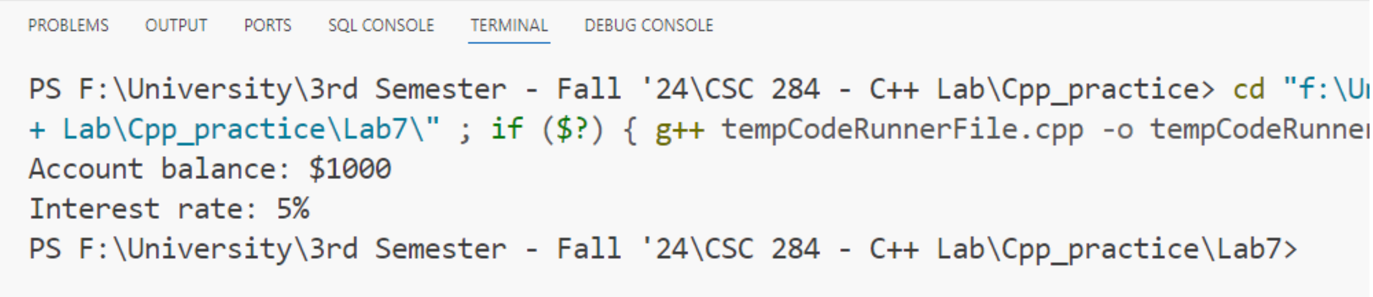


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Un
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunner
Name: Tiger
Number of lives: 9
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

5.Code:

```cpp
#include <iostream>
using namespace std;
class BankAccount
{
public:
    double balance;
    BankAccount(double balance)
    {
        this->balance = balance;
    }
};
class SavingsAccount : public BankAccount
{
public:
    double interestRate;
    SavingsAccount(double balance, double interestRate) :
BankAccount(balance)
    {
        this->interestRate = interestRate;
    }
};
int main()
{
    SavingsAccount sa1(1000.0, 0.05);
    cout << "Account balance: $" << sa1.balance << endl;
    cout << "Interest rate: " << sa1.interestRate * 100 << "%" << endl;
    return 0;
}
```

Output:



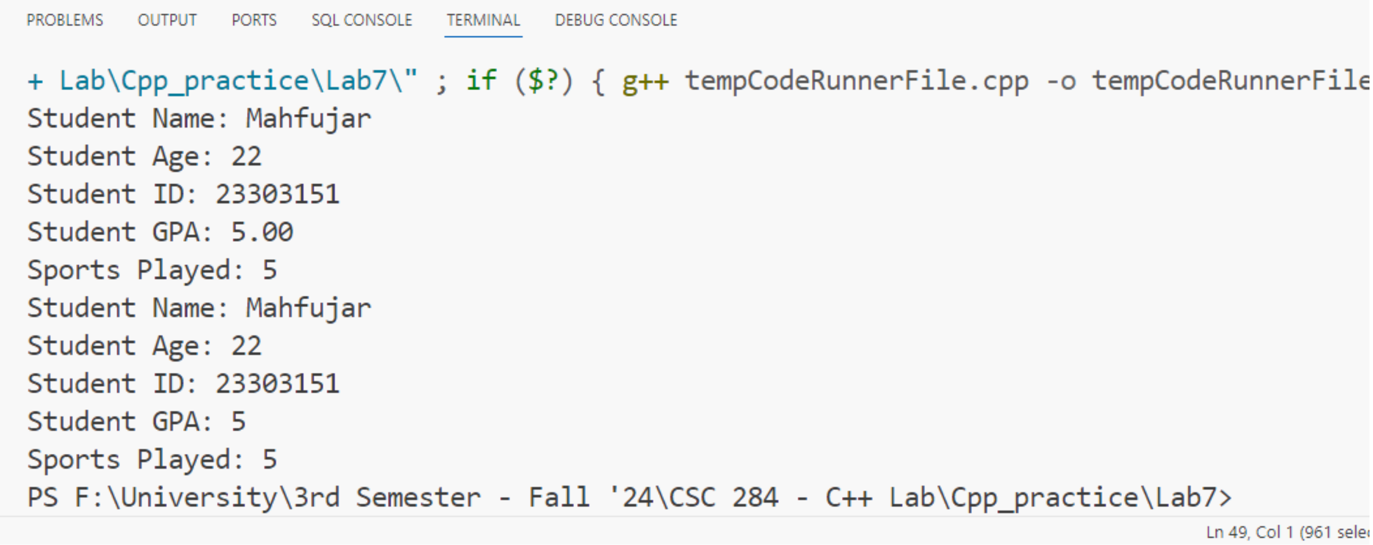
```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Ui
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunne
Account balance: $1000
Interest rate: 5%
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

6.Code:

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

class Person
{
protected:
    string name;
    int age;
};

class Student
{
protected:
    int studentID;
    double GPA;
};

class StudentAthlete : protected Person, protected Student
{
public:
    string sportsPlayed;
    StudentAthlete()
    {
        cout << "Student Name: ";
        cin >> name;
        cout << "Student Age: ";
        cin >> age;
        cout << "Student ID: ";
        cin >> studentID;
        cout << "Student GPA: ";
        cin >> GPA;
        cout << "Sports Played: ";
        cin >> sportsPlayed;
    }
    ~StudentAthlete()
    {
        cout << "Student Name: " << name << endl;
        cout << "Student Age: " << age << endl;
        cout << "Student ID: " << studentID << endl;
        cout << "Student GPA: " << GPA << endl;
        cout << "Sports Played: " << sportsPlayed << endl;
    }
};
```

```cpp
int main()
{
    StudentAthlete sa1;
}
```

Output:

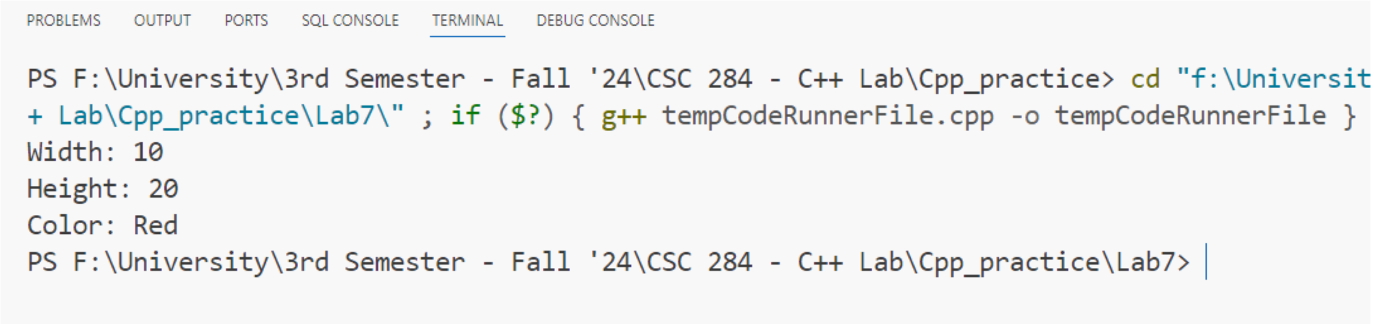


```
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerFile
Student Name: Mahfujar
Student Age: 22
Student ID: 23303151
Student GPA: 5.00
Sports Played: 5
Student Name: Mahfujar
Student Age: 22
Student ID: 23303151
Student GPA: 5
Sports Played: 5
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

7.Code:

```
#include <iostream>
#include <string>
using namespace std;
class Shape
{
public:
    int width;
    int height;
    Shape(int w, int h)
    {
        width = w;
        height = h;
    }
};
class Color
{
public:
    string color;

    Color(string colour)
    {
        color = colour;
    }
};
class ColoredShape : public Shape, public Color
{
public:
    ColoredShape(int width, int height, string color) : Shape(width, height),
Color(color) {}
    void printInfo()
    {
        cout << "Width: " << width << endl;
        cout << "Height: " << height << endl;
        cout << "Color: " << color << endl;
    }
};
int main()
{
    ColoredShape shape(10, 20, "Red");
    shape.printInfo();
    return 0;
}
```

Output:

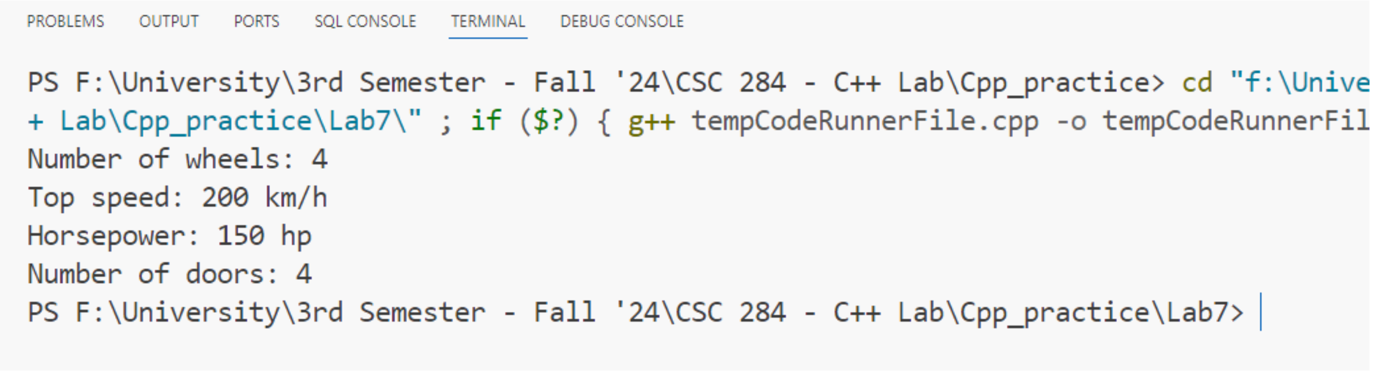


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Universit
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerFile }
Width: 10
Height: 20
Color: Red
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

8.Code:

```
#include <iostream>
using namespace std;
class Vehicle
{
protected:
    int numWheels;
    int topSpeed;

public:
    Vehicle(int wheels, int speed) : numWheels(wheels), topSpeed(speed) {}
};

class Engine
{
protected:
    int horsepower;

public:
    Engine(int hp) : horsepower(hp) {}
};

class Car : public Vehicle, public Engine
{
private:
    int numDoors;

public:
    Car(int wheels, int speed, int hp, int doors)
        : Vehicle(wheels, speed), Engine(hp), numDoors(doors) {}

    void displayInfo()
    {
        cout << "Number of wheels: " << numWheels << endl;
        cout << "Top speed: " << topSpeed << " km/h" << endl;
        cout << "Horsepower: " << horsepower << " hp" << endl;
        cout << "Number of doors: " << numDoors << endl;
    }
};
int main()
{
    Car myCar(4, 200, 150, 4);
    myCar.displayInfo();
    return 0;
}
```

Output:

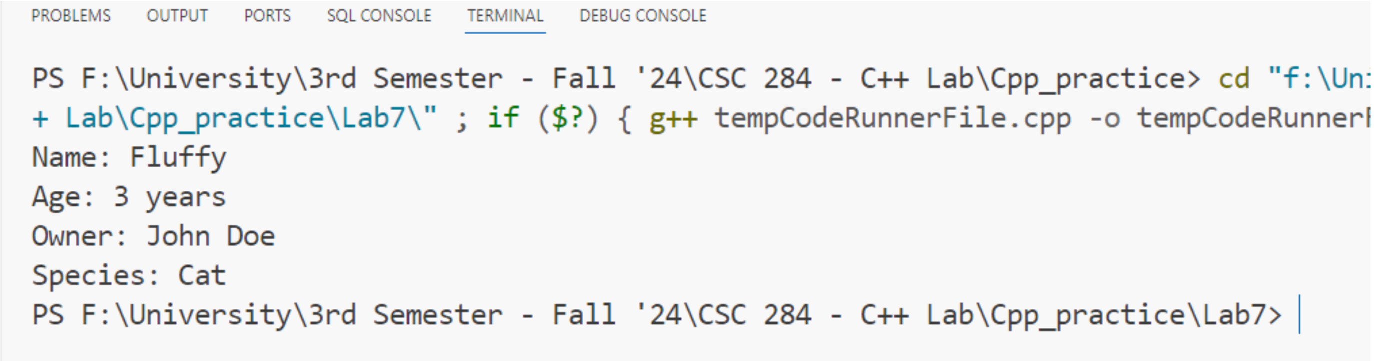


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Unive
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerFil
Number of wheels: 4
Top speed: 200 km/h
Horsepower: 150 hp
Number of doors: 4
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

9.Code:

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

class Animal
{
protected:
    string name;
    int age;

public:
    Animal(string n, int a) : name(n), age(a) {}
};

class Pet
{
protected:
    string owner;

public:
    Pet(string o) : owner(o) {}
};

class PetAnimal : public Animal, public Pet
{
private:
    string species;

public:
    PetAnimal(string n, int a, string o, string s)
        : Animal(n, a), Pet(o), species(s) {}

    void displayInfo()
    {
        cout << "Name: " << name << endl;
        cout << "Age: " << age << " years" << endl;
        cout << "Owner: " << owner << endl;
        cout << "Species: " << species << endl;
    }
};

int main()
{
    PetAnimal myPet("Fluffy", 3, "John Doe", "Cat");
    myPet.displayInfo();
    return 0;
}
```

Output:

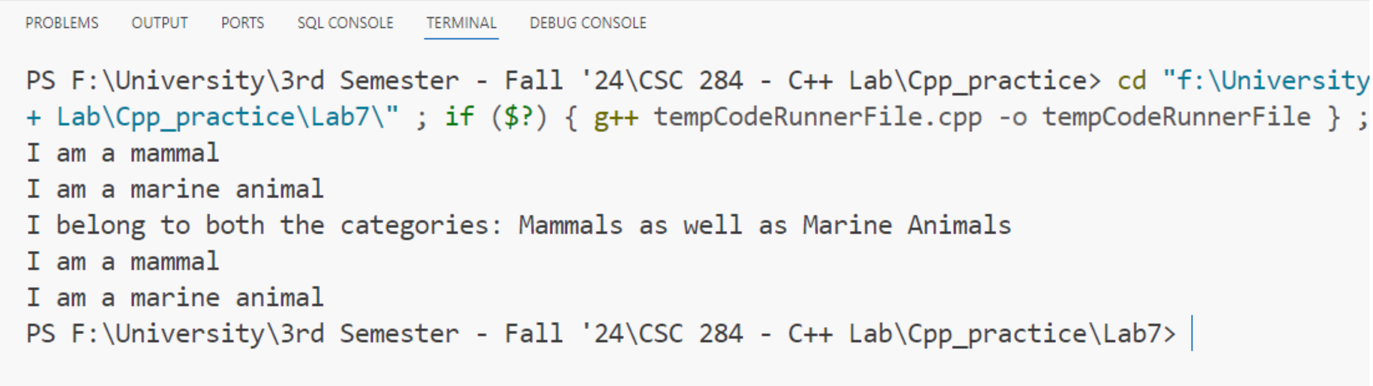


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Un
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerF
Name: Fluffy
Age: 3 years
Owner: John Doe
Species: Cat
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7> 
```

10.Code:

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

class Mammals
{
public:
    void print()
    {
        cout << "I am a mammal" << endl;
    }
};

class MarineAnimals
{
public:
    void print()
    {
        cout << "I am a marine animal" << endl;
    }
};

class BlueWhale : public Mammals, public MarineAnimals
{
public:
    void print()
    {
        cout << "I belong to both the categories: Mammals as well as Marine Animals" << endl;
    }
};

int main()
{
    Mammals mammal;
    MarineAnimals marine;
    BlueWhale whale;
    mammal.print();
    marine.print();
    whale.print();
    whale.Mammals::print();
    whale.MarineAnimals::print();

    return 0;
}
```

Output:



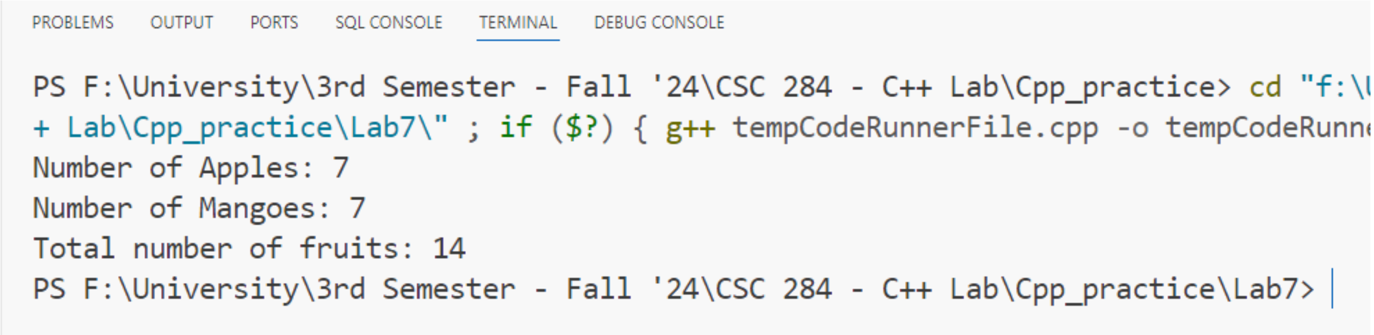
```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\University
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerFile } ;
I am a mammal
I am a marine animal
I belong to both the categories: Mammals as well as Marine Animals
I am a mammal
I am a marine animal
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

11.Code:

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

class Fruit
{
protected:
    int count;

public:
    Fruit() : count(0) {}

    void addFruit(int num)
    {
        count += num;
    }

    int getCount() const
    {
        return count;
    }

    virtual void printCount() const = 0;
};

class Apples : public Fruit
{
public:
    void printCount() const override
    {
        cout << "Number of Apples: " << getCount() << endl;
    }
};

class Mangoes : public Fruit
{
public:
    void printCount() const override
    {
        cout << "Number of Mangoes: " << getCount() << endl;
    }
};

class Basket
{
```

```
private:
    Apples apples;
    Mangoes mangoes;

public:
    void addApples(int num)
    {
        apples.addFruit(num);
    }

    void addMangoes(int num)
    {
        mangoes.addFruit(num);
    }

    void printFruitCounts() const
    {
        apples.printCount();
        mangoes.printCount();
        cout << "Total number of fruits: " << apples.getCount() +
mangoes.getCount() << endl;
    }
};

int main()
{
    Basket basket;

    basket.addApples(5);
    basket.addMangoes(3);
    basket.addApples(2);
    basket.addMangoes(4);

    basket.printFruitCounts();

    return 0;
}
```

Output:

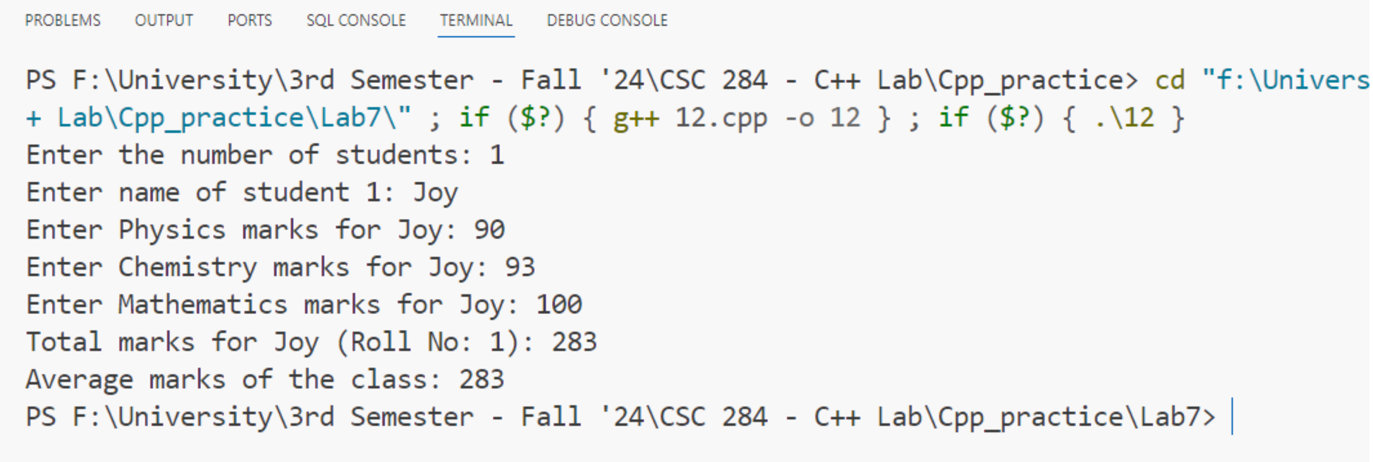


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\U
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunne
Number of Apples: 7
Number of Mangoes: 7
Total number of fruits: 14
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

12.Code:

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

class Marks
{
protected:
    static int rollCounter;
    int rollNumber;
    string name;
    int marks;

public:
    Marks(const string &studentName) : name(studentName), marks(0)
    {
        rollNumber = ++rollCounter;
    }

    virtual void inputMarks() = 0; // Pure virtual function
    int getMarks() const { return marks; }
    int getRollNumber() const { return rollNumber; }
    string getName() const { return name; }
};

int Marks::rollCounter = 0;

class Physics : public Marks
{
public:
    Physics(const string &studentName) : Marks(studentName) {}

    void inputMarks() override
    {
        cout << "Enter Physics marks for " << name << ": ";
        cin >> marks;
    }
};

class Chemistry : public Marks
{
public:
    Chemistry(const string &studentName) : Marks(studentName) {}
    void inputMarks() override
    {
        cout << "Enter Chemistry marks for " << name << ": ";
        cin >> marks;
    }
};

class Mathematics : public Marks
{
public:
    Mathematics(const string &studentName) : Marks(studentName) {}

    void inputMarks() override
    {
        cout << "Enter Mathematics marks for " << name << ": ";
        cin >> marks;
    }
};

int main()
{
    int numStudents;
    cout << "Enter the number of students: ";
    cin >> numStudents;
    cin.ignore(); // To ignore the newline character after entering the number

    vector<Physics> physicsStudents;
    vector<Chemistry> chemistryStudents;
    vector<Mathematics> mathStudents;

    for (int i = 0; i < numStudents; ++i)
    {
        string name;
        cout << "Enter name of student " << i + 1 << ": ";
        getline(cin, name);

        Physics physicsStudent(name);
        Chemistry chemistryStudent(name);
        Mathematics mathStudent(name);

        physicsStudent.inputMarks();
        chemistryStudent.inputMarks();
        mathStudent.inputMarks();
        physicsStudents.push_back(physicsStudent);
        chemistryStudents.push_back(chemistryStudent);
        mathStudents.push_back(mathStudent);
    }

    int totalMarks = 0;
    for (int i = 0; i < numStudents; ++i)
    {
        int studentTotal = physicsStudents[i].getMarks() +
chemistryStudents[i].getMarks() + mathStudents[i].getMarks();
        totalMarks += studentTotal;
        cout << "Total marks for " << physicsStudents[i].getName() << " (Roll
No: " << physicsStudents[i].getRollNumber() << "): " << studentTotal << endl;
    }

    double averageMarks = static_cast<double>(totalMarks) / numStudents;
    cout << "Average marks of the class: " << averageMarks << endl;

    return 0;
}
```

Output:



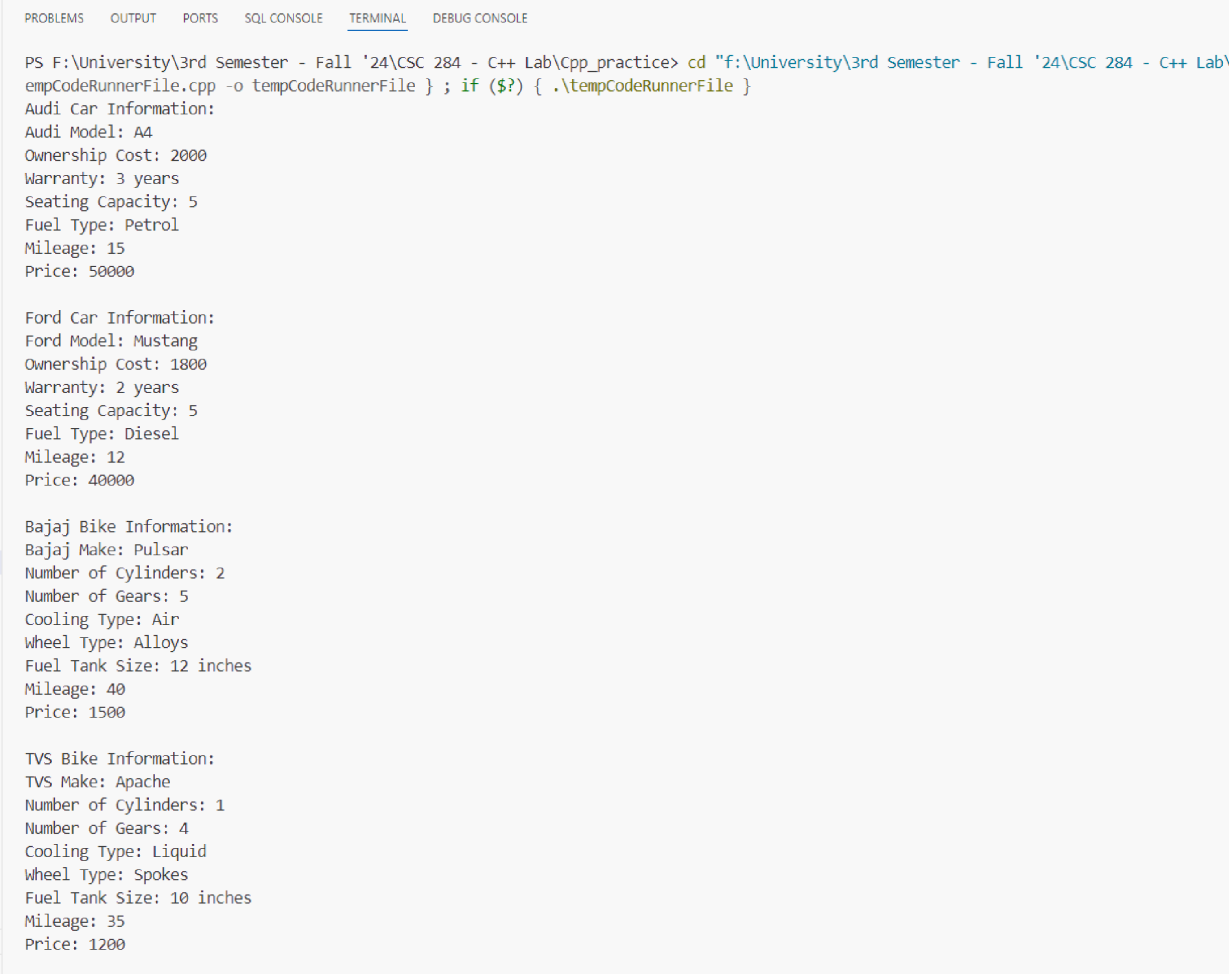
```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Univers
+ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ 12.cpp -o 12 } ; if ($?) { .\12 }
Enter the number of students: 1
Enter name of student 1: Joy
Enter Physics marks for Joy: 90
Enter Chemistry marks for Joy: 93
Enter Mathematics marks for Joy: 100
Total marks for Joy (Roll No: 1): 283
Average marks of the class: 283
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

13.Code:

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

class Vehicle
{
protected:
    double mileage;
    double price;

public:
    Vehicle(double mileage, double price) : mileage(mileage), price(price) {}
    virtual void displayInfo() const = 0; // Pure virtual function
};

class Car : public Vehicle
{
protected:
    double ownershipCost;
    int warranty; // in years
    int seatingCapacity;
    string fuelType;

public:
    Car(double mileage, double price, double ownershipCost, int warranty, int
seatingCapacity, const string &fuelType)
        : Vehicle(mileage, price), ownershipCost(ownershipCost),
warranty(warranty), seatingCapacity(seatingCapacity), fuelType(fuelType) {}
};

class Bike : public Vehicle
{
protected:
    int numberOfCylinders;
    int numberOfGears;
    string coolingType;
    string wheelType;
    double fuelTankSize; // in inches

public:
    Bike(double mileage, double price, int numberOfCylinders, int
numberOfGears, const string &coolingType, const string &wheelType, double
fuelTankSize)
```

```
        : Vehicle(mileage, price), numberOfCylinders(numberOfCylinders),
numberOfGears(numberOfGears), coolingType(coolingType), wheelType(wheelType),
fuelTankSize(fuelTankSize) {}
};

class Audi : public Car
{
private:
    string modelType;

public:
    Audi(double mileage, double price, double ownershipCost, int warranty,
int seatingCapacity, const string &fuelType, const string &modelType)
        : Car(mileage, price, ownershipCost, warranty, seatingCapacity,
fuelType), modelType(modelType) {}

    void displayInfo() const override
    {
        cout << "Audi Model: " << modelType << endl;
        cout << "Ownership Cost: " << ownershipCost << endl;
        cout << "Warranty: " << warranty << " years" << endl;
        cout << "Seating Capacity: " << seatingCapacity << endl;
        cout << "Fuel Type: " << fuelType << endl;
        cout << "Mileage: " << mileage << endl;
        cout << "Price: " << price << endl;
    }
};

class Ford : public Car
{
private:
    string modelType;

public:
    Ford(double mileage, double price, double ownershipCost, int warranty,
int seatingCapacity, const string &fuelType, const string &modelType)
        : Car(mileage, price, ownershipCost, warranty, seatingCapacity,
fuelType), modelType(modelType) {}

    void displayInfo() const override
    {
        cout << "Ford Model: " << modelType << endl;
        cout << "Ownership Cost: " << ownershipCost << endl;
        cout << "Warranty: " << warranty << " years" << endl;
        cout << "Seating Capacity: " << seatingCapacity << endl;
        cout << "Fuel Type: " << fuelType << endl;
        cout << "Mileage: " << mileage << endl;
        cout << "Price: " << price << endl;
    }
};

class Bajaj : public Bike
{
private:
    string makeType;

public:
    Bajaj(double mileage, double price, int numberOfCylinders, int numberOfGears, const string &coolingType, const string &wheelType, double fuelTankSize, const string &makeType)
        : Bike(mileage, price, numberOfCylinders, numberOfGears, coolingType, wheelType, fuelTankSize), makeType(makeType) {}

    void displayInfo() const override
    {
        cout << "Bajaj Make: " << makeType << endl;
        cout << "Number of Cylinders: " << numberOfCylinders << endl;
        cout << "Number of Gears: " << numberOfGears << endl;
        cout << "Cooling Type: " << coolingType << endl;
        cout << "Wheel Type: " << wheelType << endl;
        cout << "Fuel Tank Size: " << fuelTankSize << " inches" << endl;
        cout << "Mileage: " << mileage << endl;
        cout << "Price: " << price << endl;
    }
};

class TVS : public Bike
{
private:
    string makeType;

public:
    TVS(double mileage, double price, int numberOfCylinders, int numberOfGears, const string &coolingType, const string &wheelType, double fuelTankSize, const string &makeType)
        : Bike(mileage, price, numberOfCylinders, numberOfGears, coolingType, wheelType, fuelTankSize), makeType(makeType) {}

    void displayInfo() const override
    {
        cout << "TVS Make: " << makeType << endl;
        cout << "Number of Cylinders: " << numberOfCylinders << endl;
        cout << "Number of Gears: " << numberOfGears << endl;
        cout << "Cooling Type: " << coolingType << endl;
        cout << "Wheel Type: " << wheelType << endl;
        cout << "Fuel Tank Size: " << fuelTankSize << " inches" << endl;
        cout << "Mileage: " << mileage << endl;
        cout << "Price: " << price << endl;
    }
};

int main()
{
    Audi audiCar(15.0, 50000, 2000, 3, 5, "Petrol", "A4");
    Ford fordCar(12.0, 40000, 1800, 2, 5, "Diesel", "Mustang");

    Bajaj bajajBike(40.0, 1500, 2, 5, "Air", "Alloys", 12.0, "Pulsar");
    TVS tvsBike(35.0, 1200, 1, 4, "Liquid", "Spokes", 10.0, "Apache");

    cout << "Audi Car Information:" << endl;
    audiCar.displayInfo();
    cout << endl;

    cout << "Ford Car Information:" << endl;
    fordCar.displayInfo();
    cout << endl;

    cout << "Bajaj Bike Information:" << endl;
    bajajBike.displayInfo();
    cout << endl;

    cout << "TVS Bike Information:" << endl;
    tvsBike.displayInfo();
    cout << endl;

    return 0;
}
```

Output:

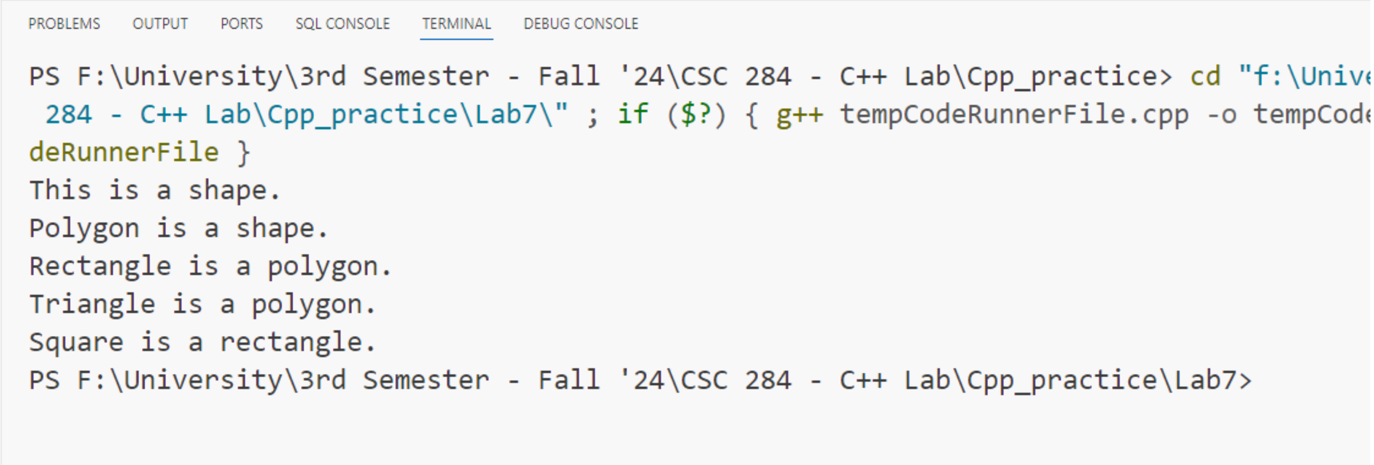


```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\
empCodeRunnerFile.cpp -o tempCodeRunnerFile } ; if ($?) { .\tempCodeRunnerFile }
Audi Car Information:
Audi Model: A4
Ownership Cost: 2000
Warranty: 3 years
Seating Capacity: 5
Fuel Type: Petrol
Mileage: 15
Price: 50000

Ford Car Information:
Ford Model: Mustang
Ownership Cost: 1800
Warranty: 2 years
Seating Capacity: 5
Fuel Type: Diesel
Mileage: 12
Price: 40000

Bajaj Bike Information:
Bajaj Make: Pulsar
Number of Cylinders: 2
Number of Gears: 5
Cooling Type: Air
Wheel Type: Alloys
Fuel Tank Size: 12 inches
Mileage: 40
Price: 1500

TVS Bike Information:
TVS Make: Apache
Number of Cylinders: 1
Number of Gears: 4
Cooling Type: Liquid
Wheel Type: Spokes
Fuel Tank Size: 10 inches
Mileage: 35
Price: 1200
```

14.Code:

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

class Shape
{
public:
    virtual void printMessage()
    {
        cout << "This is a shape." << endl;
    }
};

class Polygon : public Shape
{
public:
    void printMessage() override
    {
        cout << "Polygon is a shape." << endl;
    }
};

class Rectangle : public Polygon
{
public:
    void printMessage() override
    {
        cout << "Rectangle is a polygon." << endl;
    }
};

class Triangle : public Polygon
{
public:
    void printMessage() override
    {
        cout << "Triangle is a polygon." << endl;
    }
};

class Square : public Rectangle
{
public:
    void printMessage() override
    {
        cout << "Square is a rectangle." << endl;
    }
};

int main()
{
    Shape shape;
    Polygon polygon;
    Rectangle rectangle;
    Triangle triangle;
    Square square;

    shape.printMessage();
    polygon.printMessage();
    rectangle.printMessage();
    triangle.printMessage();
    square.printMessage();

    return 0;
}
```

Output:



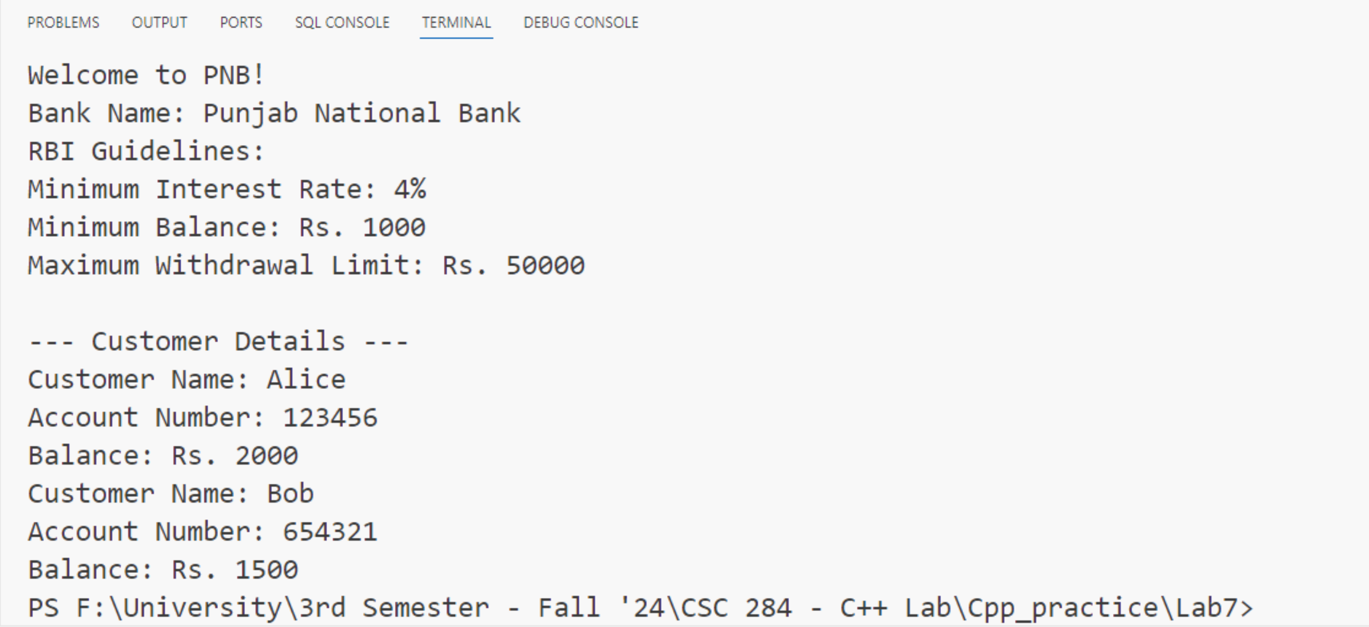
```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Unive
 284 - C++ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCode
deRunnerFile }
This is a shape.
Polygon is a shape.
Rectangle is a polygon.
Triangle is a polygon.
Square is a rectangle.
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

15.Code:

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

class RBI
{
protected:
    double minInterestRate = 4.0;
    double minBalance = 1000;
    double maxWithdrawalLimit = 50000;

public:
    virtual void displayGuidelines()
    {
        cout << "RBI Guidelines:" << endl;
        cout << "Minimum Interest Rate: " << minInterestRate << "%" << endl;
        cout << "Minimum Balance: Rs. " << minBalance << endl;
        cout << "Maximum Withdrawal Limit: Rs. " << maxWithdrawalLimit <<
endl;
    }
};

class Bank : public RBI
{
protected:
    string bankName;

public:
    Bank(const string &name) : bankName(name) {}

    virtual void displayBankDetails()
    {
        cout << "Bank Name: " << bankName << endl;
        displayGuidelines();
    }
};

class SBI : public Bank
{
public:
    SBI() : Bank("State Bank of India") {}

    void displayBankDetails() override
    {
        cout << "Welcome to SBI!" << endl;
        Bank::displayBankDetails();
    }
};

class ICICI : public Bank
{
public:
    ICICI() : Bank("ICICI Bank") {}

    void displayBankDetails() override
    {
        cout << "Welcome to ICICI Bank!" << endl;
        Bank::displayBankDetails();
    }
};

class PNB : public Bank
{
public:
    PNB() : Bank("Punjab National Bank") {}

    void displayBankDetails() override
    {
        cout << "Welcome to PNB!" << endl;
        Bank::displayBankDetails();
    }
};

class Customer
{
private:
    string name;
    int accountNumber;
    double balance;

public:
    Customer(const string &customerName, int accNum, double initialBalance)
        : name(customerName), accountNumber(accNum), balance(initialBalance)
{}

    void displayCustomerDetails()
    {
        cout << "Customer Name: " << name << endl;
        cout << "Account Number: " << accountNumber << endl;
```

```cpp
        cout << "Balance: Rs. " << balance << endl;
    }
};

int main()
{
    SBI sbi;
    ICICI icici;
    PNB pnb;

    Customer customer1("Alice", 123456, 2000.0);
    Customer customer2("Bob", 654321, 1500.0);

    cout << "--- SBI Details ---" << endl;
    sbi.displayBankDetails();

    cout << "\n--- ICICI Details ---" << endl;
    icici.displayBankDetails();

    cout << "\n--- PNB Details ---" << endl;
    pnb.displayBankDetails();
    cout << "\n--- Customer Details ---" << endl;
    customer1.displayCustomerDetails();
    customer2.displayCustomerDetails();

    return 0;
}
```

Output:



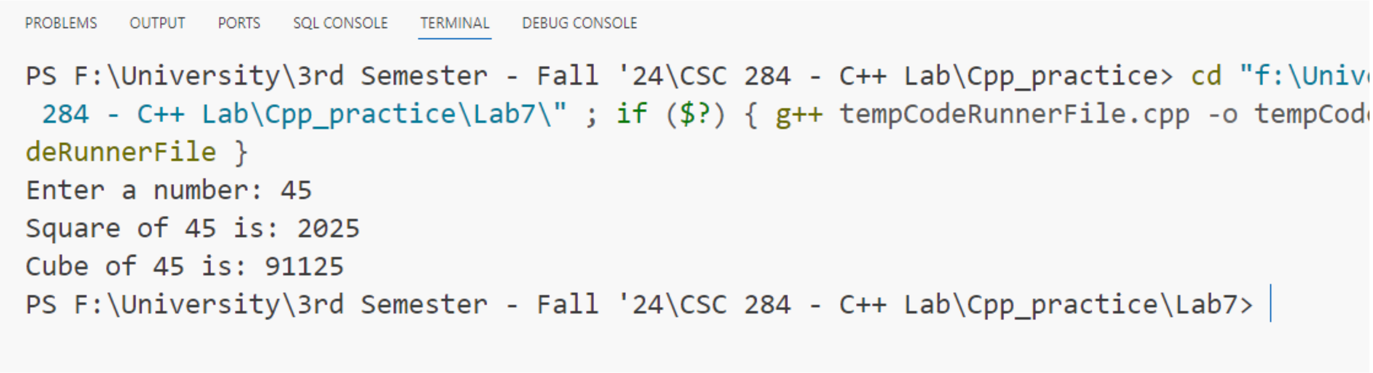
```
Welcome to PNB!
Bank Name: Punjab National Bank
RBI Guidelines:
Minimum Interest Rate: 4%
Minimum Balance: Rs. 1000
Maximum Withdrawal Limit: Rs. 50000

--- Customer Details ---
Customer Name: Alice
Account Number: 123456
Balance: Rs. 2000
Customer Name: Bob
Account Number: 654321
Balance: Rs. 1500
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```

16.Code:

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

class Number
{
protected:
    int num;
    int sqr;
    int cube;

public:
    Number(int n) : num(n), sqr(0), cube(0) {}
};

class Square : public Number
{
public:
    Square(int n) : Number(n)
    {
        sqr = num * num;
    }

    void display()
    {
        cout << "Square of " << num << " is: " << sqr << endl;
    }
};

class Cube : public Number
{
public:
    Cube(int n) : Number(n)
    {
        cube = num * num * num;
    }

    void print()
    {
        cout << "Cube of " << num << " is: " << cube << endl;
    }
};

int main()
{
```

```cpp
    int number;
    cout << "Enter a number: ";
    cin >> number;

    Square square(number);
    square.display();

    Cube cube(number);
    cube.print();

    return 0;
}
```

Output:



```
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice> cd "f:\Univ
 284 - C++ Lab\Cpp_practice\Lab7\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCod
deRunnerFile }
Enter a number: 45
Square of 45 is: 2025
Cube of 45 is: 91125
PS F:\University\3rd Semester - Fall '24\CSC 284 - C++ Lab\Cpp_practice\Lab7>
```