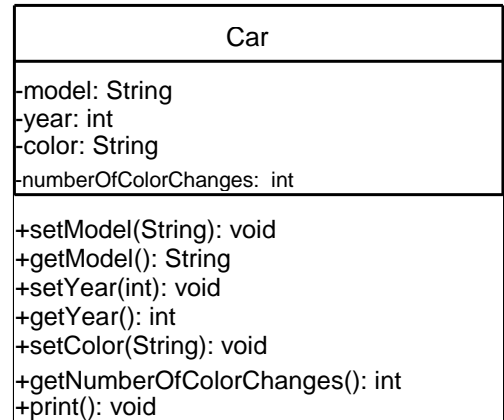


Question 1:

Define the class Car as shown in the UML Class diagram. Then Implement a main to test your class. The main should create three cars and change their colors 2,4,1 times respectively and print them.

The method `getNumberOfColorChanges()` returns how many times the method `setColor()` was called.



Question 2:

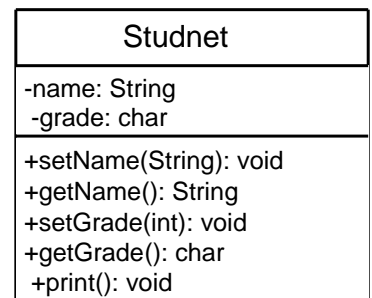
Update the class Car in the previous question to limit the number of color changing to three times. Then run the same main.

The method `setColor()` should maintain this limit before setting the new color.

This time the run should displays 2,3,1 as the numbers of color changes

Question 3:

Define the class Student as shown in the UML Class diagram. Then write a program that reads the name and the mark of a student then prints his grade. The program should repeat the previous procedure (reading mark then print grade) until the user types "done" when the program prompt the name of the next student.



Benefits of Encapsulation:

- Data members can be read only or write only.
 - o numberOfColorChanges in the class Car is read only.
- The class has a full control over its data members.
 - o We can limit the number of changes or the values range.
- The users of a class do not know how the class stores its data.

Q.1 Solution

```
public class Car {
    private String model;
    private int year;
    private String color;
    private int numberOfColorChanges = 0;

    public void setModel(String ml)
    {
        model = ml;
    }
    public void setYear(int y1)
    {
        year = y1;
    }
    public void setcolor(String cl)
    {
        color = cl;
        numberOfColorChanges++;
    }
    public String getModel()
    {
        return model;
    }
    public int getyear()
    {
        return year;
    }
    public String getcolor()
    {
        return color;
    }
    public int getcount()
    {
        return    numberOfColorChanges;
    }

    public void display()
    {
        System.out.println("The model of the car "+model);
    }
}
```

```
System.out.println("The year of the car "+year);
System.out.println("The color of the car "+color);
System.out.println("The times of color changes "+getcount());

}
}
```

```
import java.util.Scanner;
public class CarMain {

    public static void main(String[] args) {

        Car C1,C2,C3;
        C1 = new Car();
        C2 = new Car();
        C3 = new Car();
        C1.setModel("Toyota");
        C1.setYear(1992);
        C1.setcolor("red");
        C1.setcolor("blue");
        C1.display();
        C2.setModel("Honda");
        C2.setYear(1993);
        C2.setcolor("red");
        C2.setcolor("blue");
        C2.setcolor("black");
        C2.setcolor("red");
        C2.display();
        C3.setModel("Nissan");
        C3.setYear(1995);

        C3.setcolor("red");
        C3.display();

    }

}
```

Q.2. Solution

Change following syntax in question 1. and remaining will be same.

```
public void setcolor(String cl)
    {
        color = cl;
        if(numberOfColorChanges<3)
            numberOfColorChanges++;
    }
```

```
public class Student {
    private String name;
    private char grade;

    public void setName(String n1)
```

```
    {
        name = n1;
    }
    public void setGrade(int g1)
    {
        if (g1 >= 90)
            grade = 'A';
        else if (g1 >=80)
            grade = 'B';
        else if (g1 >= 70)
            grade = 'C';
        else if (g1 >= 60)
            grade = 'D';
        else
            grade = 'F';
    }
```

```
public String getName()
    {
        return name;
    }
    public char getGrade()
    {
        return grade;
    }
```

```
public void print()
{
    System.out.println("Name of the Student "+name);
    System.out.println("the grade obtained "+grade);
}
}
```

```
import java.util.Scanner;
public class StudentM {
    public static void main(String[] args) {
        Student S;
        S = new Student();
        S.setName("Mohammed Wakil Ahmed");
        S.setGrade(89);
        S.print();
        String n1;
        int M;
        do{
            Student S1;
            S1 = new Student();
            System.out.println("Enter name and marks of the student");
            Scanner input = new Scanner(System.in);
            n1 = input.next();
            if(n1 != "done"){
                M = input.nextInt();
                S1.setName(n1);
                S1.setGrade(M);
                S1.print();
            }
            //System.out.print(n1);
        }while(n1 != "done");
    }
}
```