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SUBJECT- Object Oriented Programming

ASSIGNMENT NO. 10

Title: Factory Design pattern

Aim: Design and implement Factory design pattern for the given context. Consider Car building process, which requires many steps from allocating accessories to final makeup. These steps should be written as methods and should be called while creating an instance of a specific car type. Hatchback, Sedan, SUV could be the subclasses of Car class. Car class and its subclasses, Car Factory and Test Factory Pattern should be implemented.

Objectives: To learn the concept of Design pattern

Theory:

1. Design pattern
2. Factory design pattern diagram with example
3. Advantages of factory design pattern
4. Usage and the application where factory design patterns can be applied .

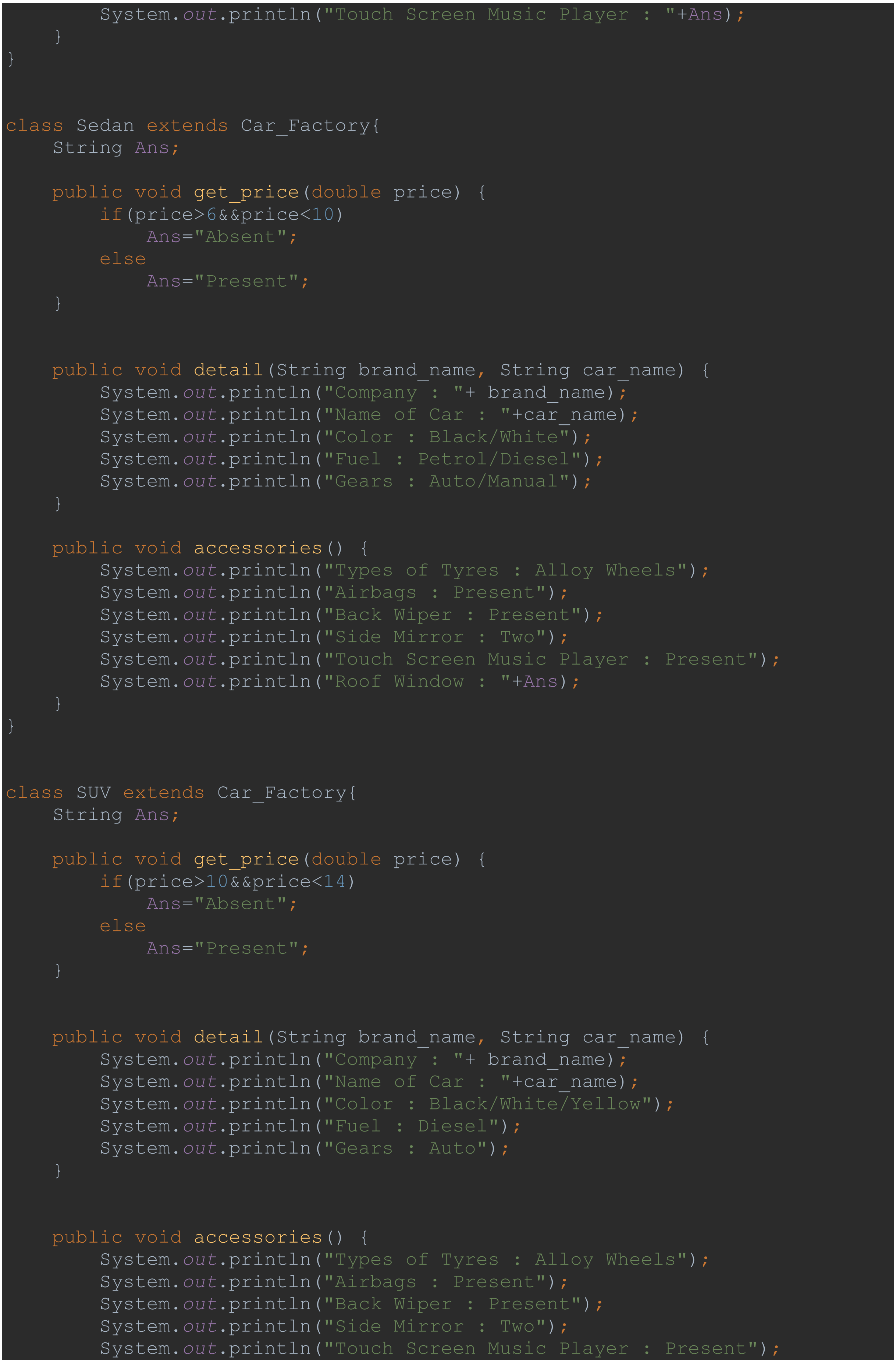
Sample Code:

- Draw the class diagram for given context
- Crate classes such as **Car.java ,CarFactory.java ,**CarType .java
- LuxuryCar.java ,SedanCar.java ,SmallCar.java ,TestFactorypatern.java

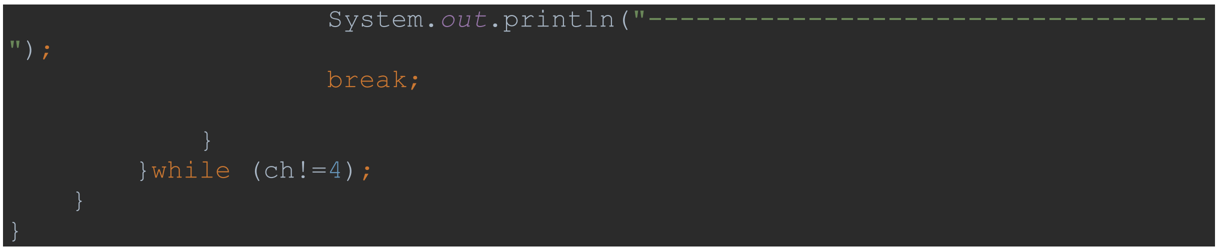
Input: Design and implement Factory design pattern for the given context. Consider Car building process, which requires many steps from allocating accessories to final makeup. These steps should be written as methods and should be called while creating an instance of a specific car type. Hatchback, Sedan, SUV could be the subclasses of Car class. Car class and its subclasses, Car Factory and Test Factory Pattern should be implemented.

Program:

```java
import java.util.Scanner;


abstract class Car_Factory{
    String company,car_name;
    double budget;

    abstract void get_price(double price);
    abstract void detail(String brand_name,String car_name);
    abstract void accessories();


    void input() {
        Scanner scan =new Scanner (System.in);
        System.out.print("Company : ");
        company=scan.next();
        System.out.print("Car : ");
        car_name=scan.next();
        System.out.print("Budget(in Lakhs) : Rs. ");
        budget=scan.nextDouble();
    }

    void display(Car_Factory obj1) {
        obj1.get_price(budget);
        System.out.println("\n-----------------------------------");
        System.out.println("* Car Details *");
        obj1.detail(company, car_name);
        System.out.println("==================================");
        System.out.println("* Car Accessories *");
        obj1.accessories();
        System.out.println("-----------------------------------");
    }

}


class hatchback extends Car_Factory{
    String Ans;

    public void get_price(double price) {
        if(price>2&&price<5)
            Ans="Absent";
        else
            Ans="Present";

    }

    public void detail(String brand_name, String car_name) {
        System.out.println("Company : "+ brand_name);
        System.out.println("Name of Car : "+car_name);
        System.out.println("Color : Black/White/Grey/Matt Black");
        System.out.println("Fuel : Petrol");
        System.out.println("Gears : Manual");
    }

    public void accessories() {
        System.out.println("Types of Tyres : Alloy Wheels");
        System.out.println("Airbags : Present" );
        System.out.println("Back Wiper : "+Ans);
        System.out.println("Side Mirror : Two");
```

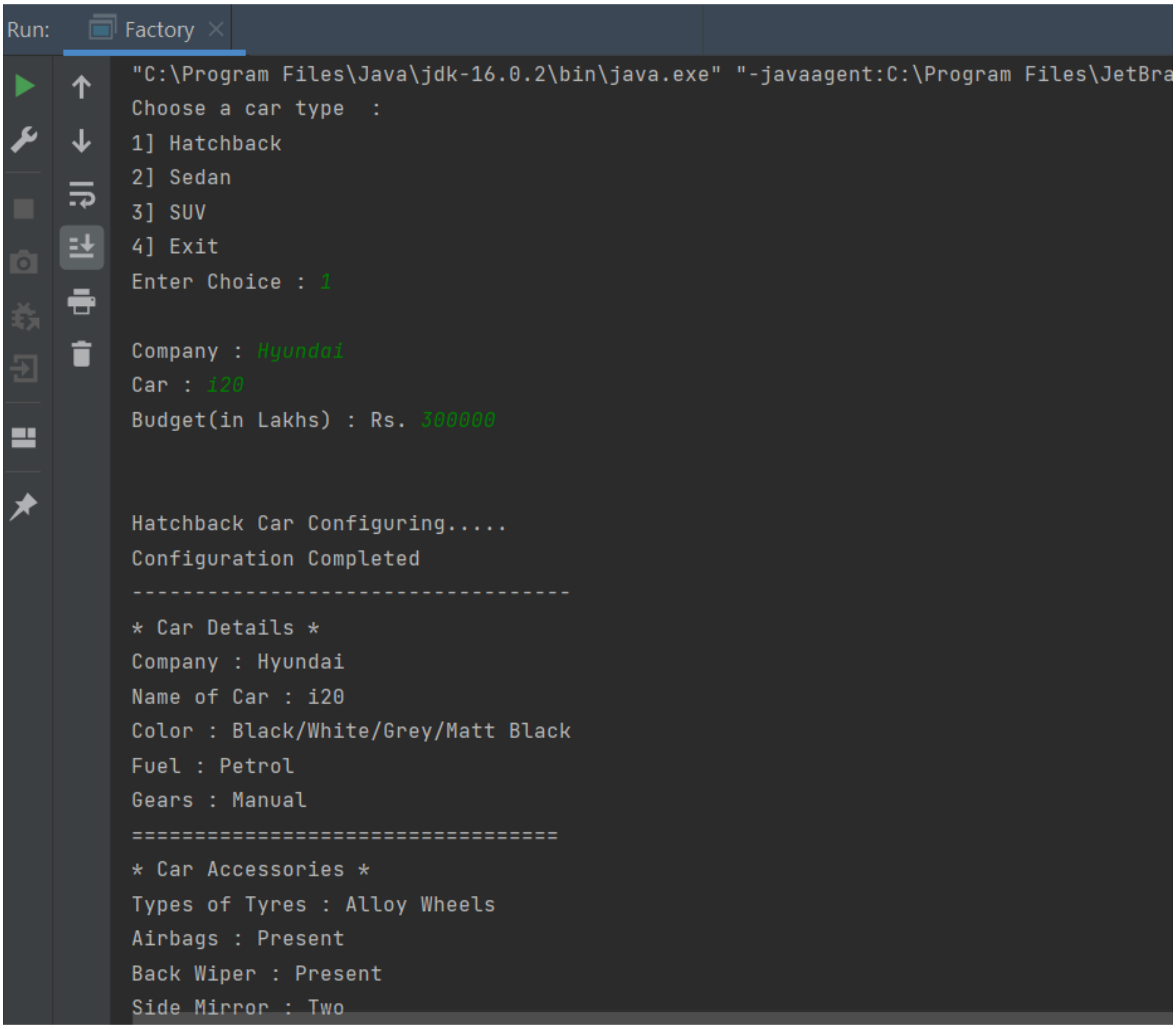


```
        System.out.println("Touch Screen Music Player : "+Ans);
    }
}


class Sedan extends Car_Factory{
    String Ans;

    public void get_price(double price) {
        if(price>6&&price<10)
            Ans="Absent";
        else
            Ans="Present";
    }


    public void detail(String brand_name, String car_name) {
        System.out.println("Company : "+ brand_name);
        System.out.println("Name of Car : "+car_name);
        System.out.println("Color : Black/White");
        System.out.println("Fuel : Petrol/Diesel");
        System.out.println("Gears : Auto/Manual");
    }

    public void accessories() {
        System.out.println("Types of Tyres : Alloy Wheels");
        System.out.println("Airbags : Present");
        System.out.println("Back Wiper : Present");
        System.out.println("Side Mirror : Two");
        System.out.println("Touch Screen Music Player : Present");
        System.out.println("Roof Window : "+Ans);
    }
}


class SUV extends Car_Factory{
    String Ans;

    public void get_price(double price) {
        if(price>10&&price<14)
            Ans="Absent";
        else
            Ans="Present";
    }


    public void detail(String brand_name, String car_name) {
        System.out.println("Company : "+ brand_name);
        System.out.println("Name of Car : "+car_name);
        System.out.println("Color : Black/White/Yellow");
        System.out.println("Fuel : Diesel");
        System.out.println("Gears : Auto");
    }


    public void accessories() {
        System.out.println("Types of Tyres : Alloy Wheels");
        System.out.println("Airbags : Present");
        System.out.println("Back Wiper : Present");
        System.out.println("Side Mirror : Two");
        System.out.println("Touch Screen Music Player : Present");
        System.out.println("Roof Window : Present");
        System.out.println("Button Start : "+Ans);
    }
}


class Factory {

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int ch;

        Car_Factory obj;
        do {

            System.out.println("""
                    Choose a car type  :\s
                    1] Hatchback
                    2] Sedan
                    3] SUV
                    4] Exit\s""");
            System.out.print("Enter Choice : ");
            ch=sc.nextInt();
            System.out.println();

            switch(ch) {

                case 1:
                    obj= new hatchback();
                    obj.input();
                    System.out.println("\n\nHatchback Car 
Configuring.....");
                    System.out.print("Configuration Completed");
                    obj.display(obj);
                    break;

                case 2:
                    obj= new Sedan();
                    obj.input();
                    System.out.println("\n\nSedan Car Configuring.....");
                    System.out.print("Configuration Completed");
                    obj.display(obj);
                    break;

                case 3:
                    obj= new SUV();
                    obj.input();
                    System.out.println("\n\nSUV Car Configuring.....");
                    System.out.print("Configuration Completed");
                    obj.display(obj);
                    break;

                case 4:
                    System.out.println("Thank You !!!");
                    System.out.println("\n---------------------------------
--");

                    break;

                default:
                    System.out.println("Invalid Choice. Enter a valid 
choice !!");
```

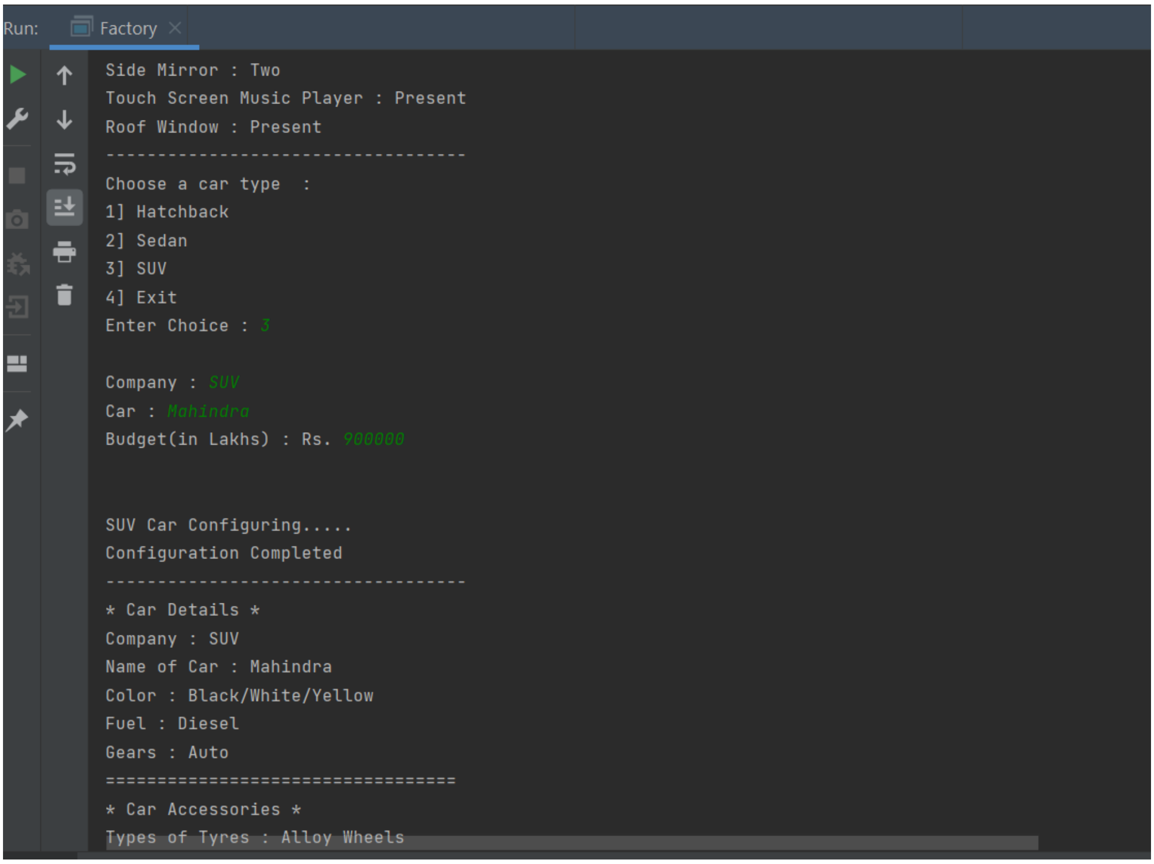


```
                    System.out.println("-----------------------------------
");
                    break;

            }
        }while (ch!=4);
    }
}
```

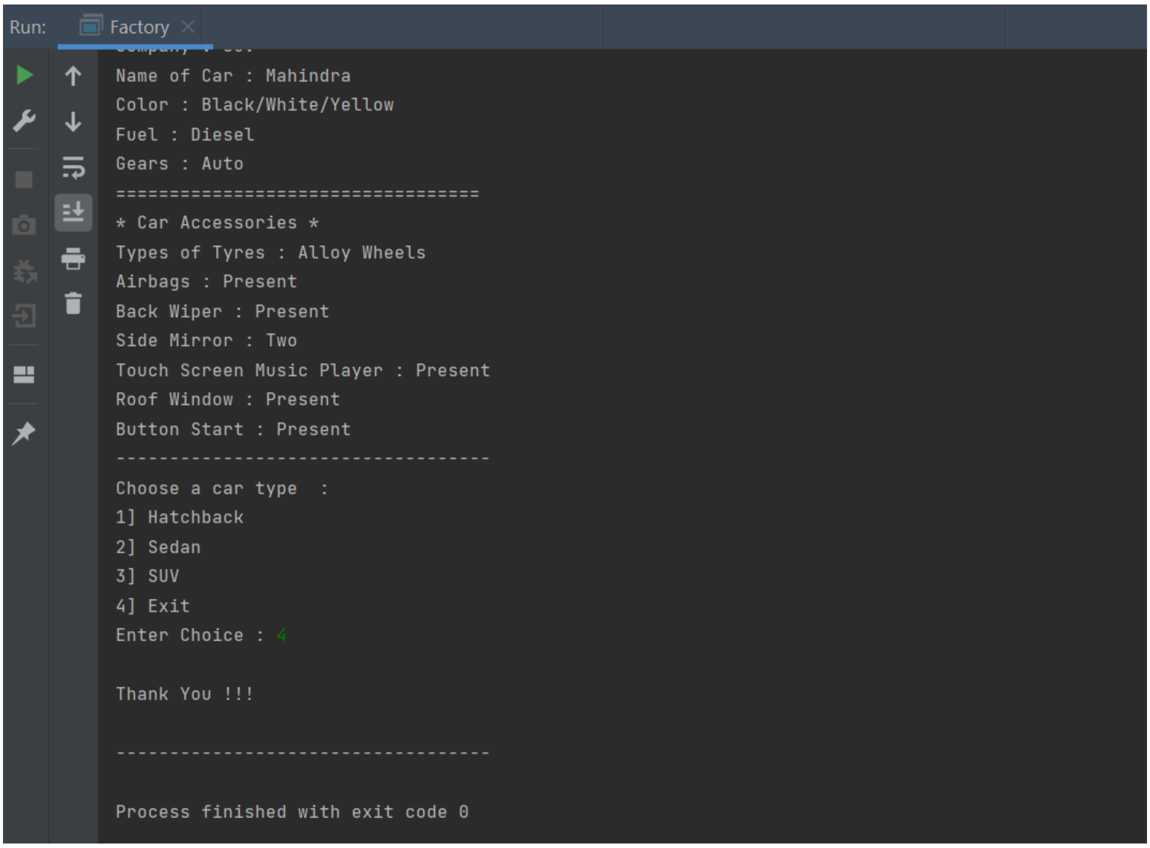
Output:



```
"C:\Program Files\Java\jdk-16.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBra
Choose a car type  :
1] Hatchback
2] Sedan
3] SUV
4] Exit
Enter Choice : 1

Company : Hyundai
Car : i20
Budget(in Lakhs) : Rs. 300000


Hatchback Car Configuring.....
Configuration Completed
-----------------------------------
* Car Details *
Company : Hyundai
Name of Car : i20
Color : Black/White/Grey/Matt Black
Fuel : Petrol
Gears : Manual
==================================
* Car Accessories *
Types of Tyres : Alloy Wheels
Airbags : Present
Back Wiper : Present
Side Mirror : Two
```



```
Side Mirror : Two
Touch Screen Music Player : Present
Roof Window : Present
-----------------------------------
Choose a car type  :
1] Hatchback
2] Sedan
3] SUV
4] Exit
Enter Choice : 3

Company : SUV
Car : Mahindra
Budget(in Lakhs) : Rs. 900000


SUV Car Configuring.....
Configuration Completed
-----------------------------------
* Car Details *
Company : SUV
Name of Car : Mahindra
Color : Black/White/Yellow
Fuel : Diesel
Gears : Auto
==================================
* Car Accessories *
Types of Tyres : Alloy Wheels
```



```
Name of Car : Mahindra
Color : Black/White/Yellow
Fuel : Diesel
Gears : Auto
==================================
* Car Accessories *
Types of Tyres : Alloy Wheels
Airbags : Present
Back Wiper : Present
Side Mirror : Two
Touch Screen Music Player : Present
Roof Window : Present
Button Start : Present
-----------------------------------
Choose a car type  :
1] Hatchback
2] Sedan
3] SUV
4] Exit
Enter Choice : 4

Thank You !!!

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Process finished with exit code 0
```

Conclusion- Hence, we have applied the concept of class, object, and constructor and performed Factory design pattern.