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Program BS SE
Section : B
Date 23-06-2020

Q1: Draw Use Case diagram

Propose a use case diagram for a vending machine that sells beverages and snacks.
Make use of inclusion and extension associations and remember that a vending.

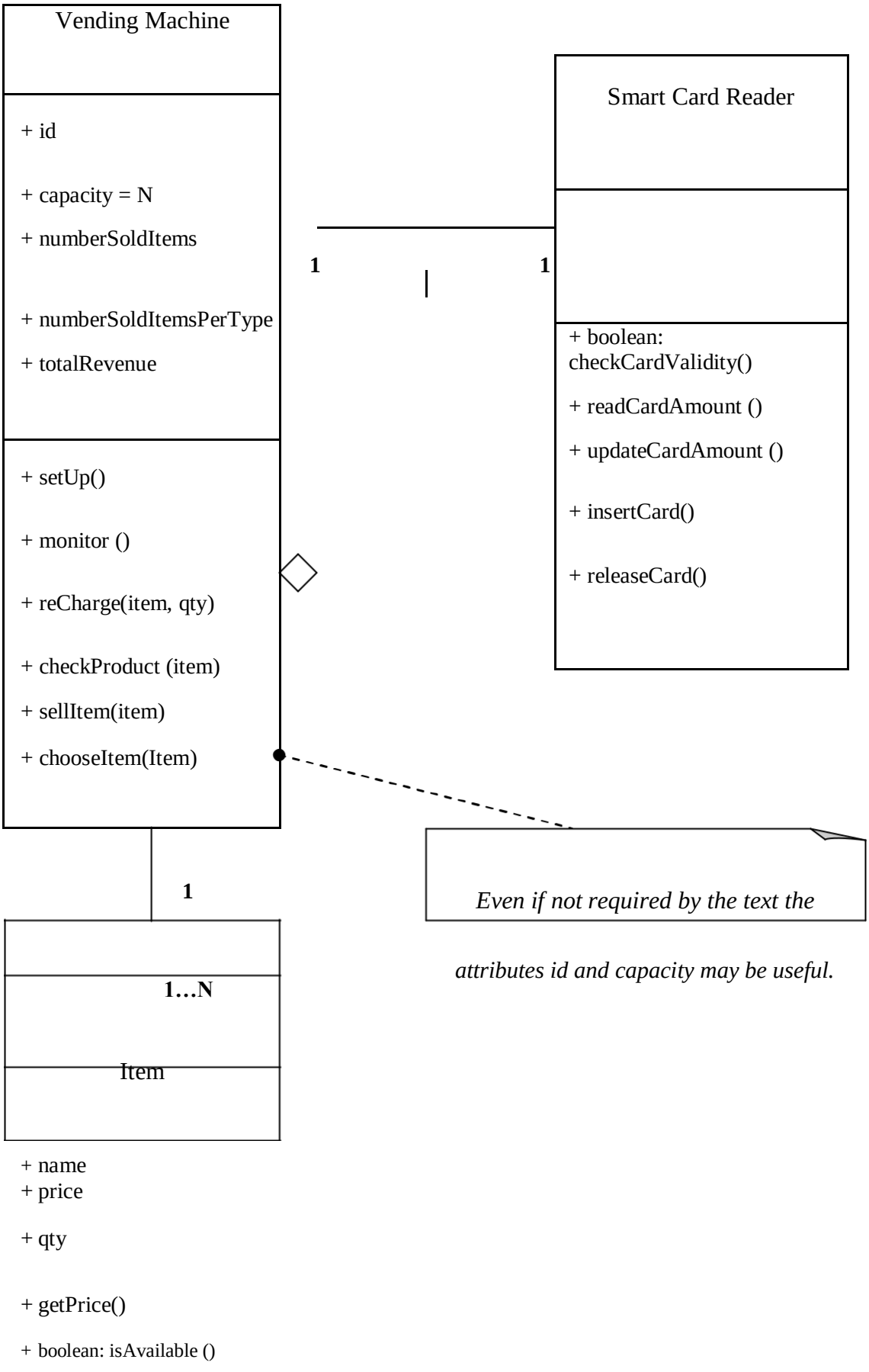
Ans. Model with a **class diagram** the following System: Vending Machine.

A vending machine sells small, packaged, ready to eat items (chocolate bars, cookies, candies, etc.). Each item has a price and a name. A customer can buy an item, using a smart card (issued by the vending machine company) to pay for it. No other payment forms (i.e. cash, credit card) are allowed. The smart card records on it the amount of money available. The functions supported by the system are:

- Sell an item (choose from a list of items, pay item, distribute item)
- Recharge the machine
- Set up the machine (define items sold and price of items)
- Monitor the machine (number of items sold, number of items sold per type, total revenue)

The system can be used by a customer, a maintenance employee (who recharges items in the machines), an administrator (who sets up the machine).

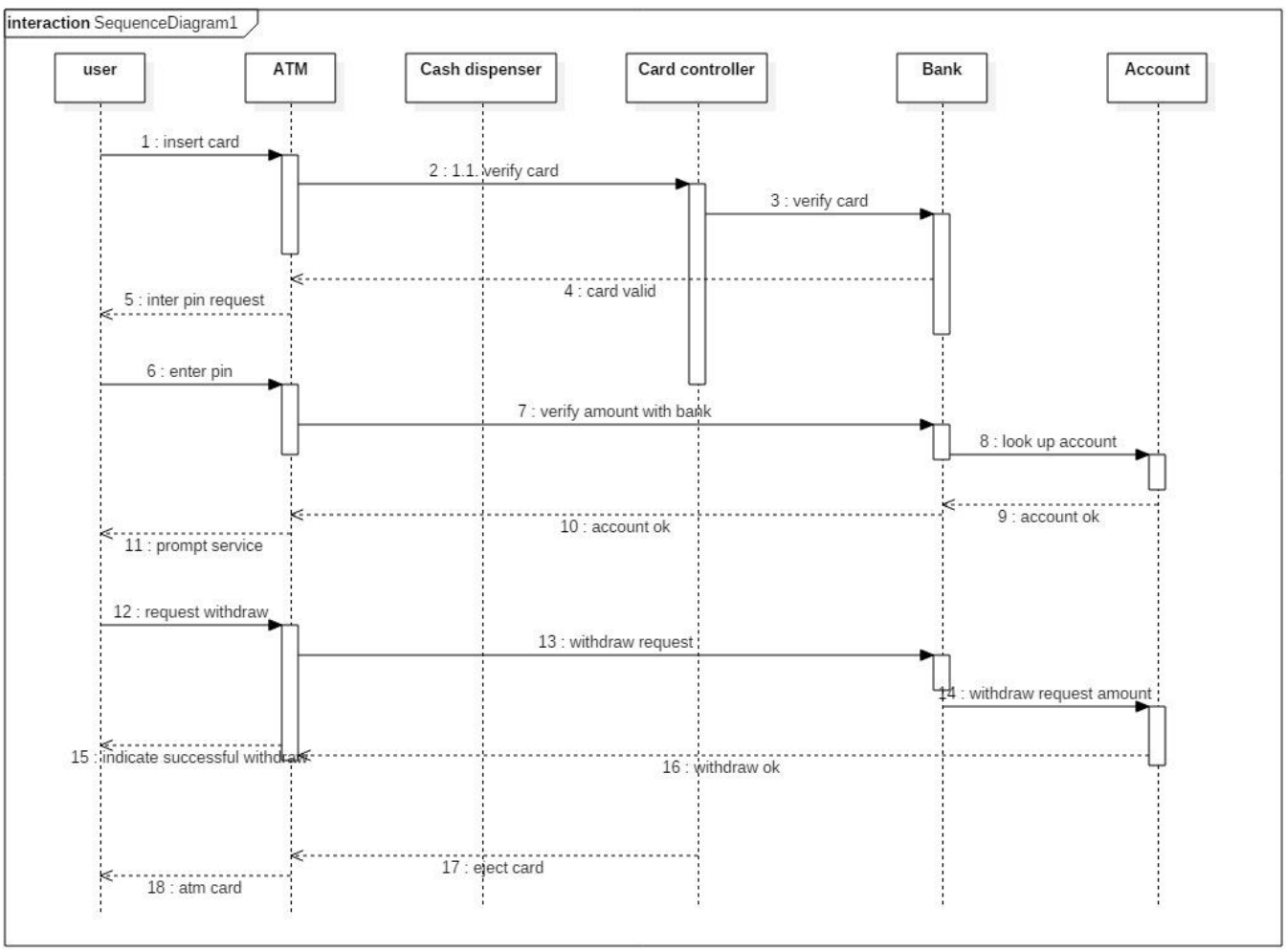
POSSIBLE SOLUTION



Q2: Draw Sequence Diagram

Model a scenario of the Withdraw Money use case of a Bank ATM system. The user is
able to make withdrawal of money. The system employs a standard procedure of validating the card and account holder's password.

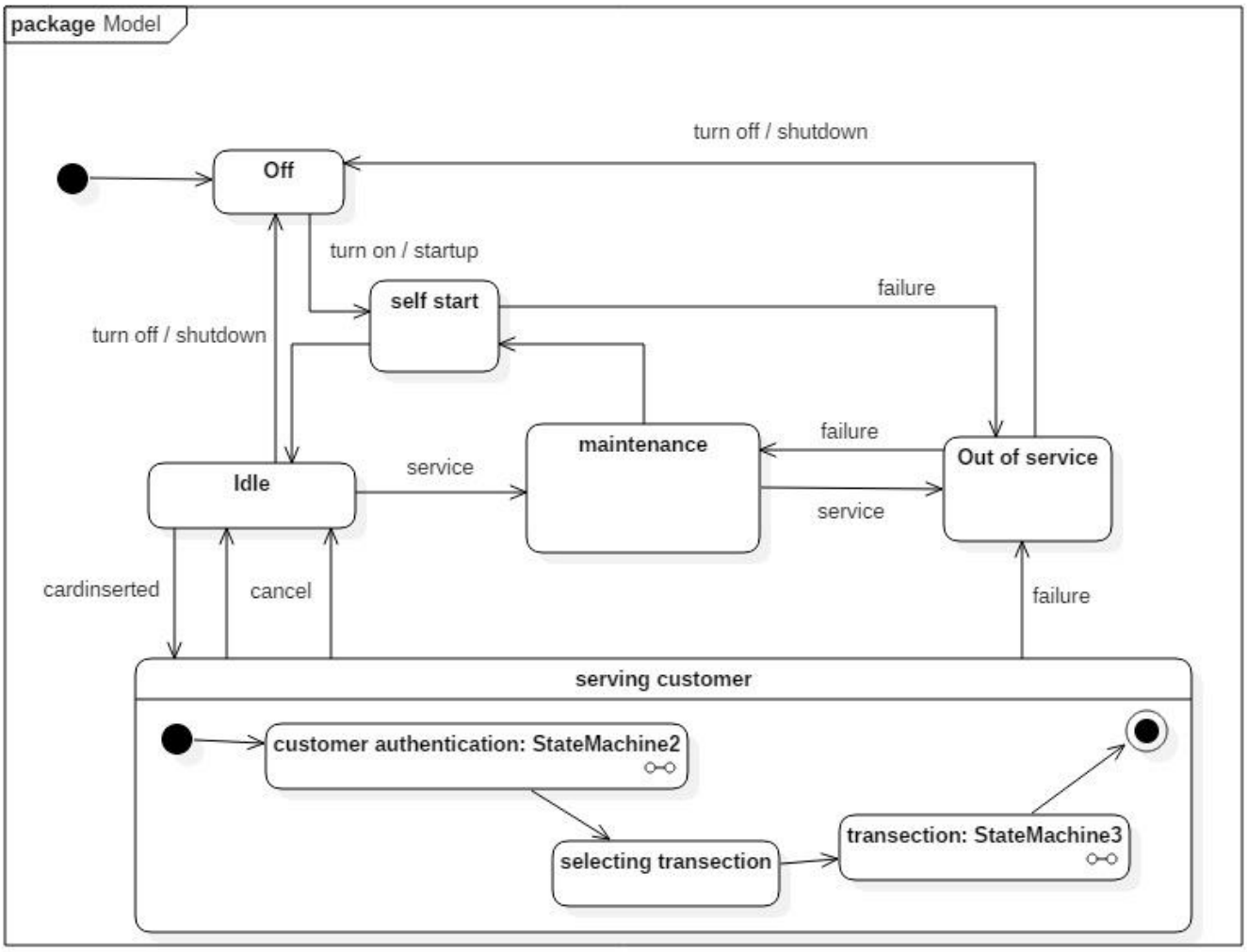
Ans.



Q3: Draw State chart diagram

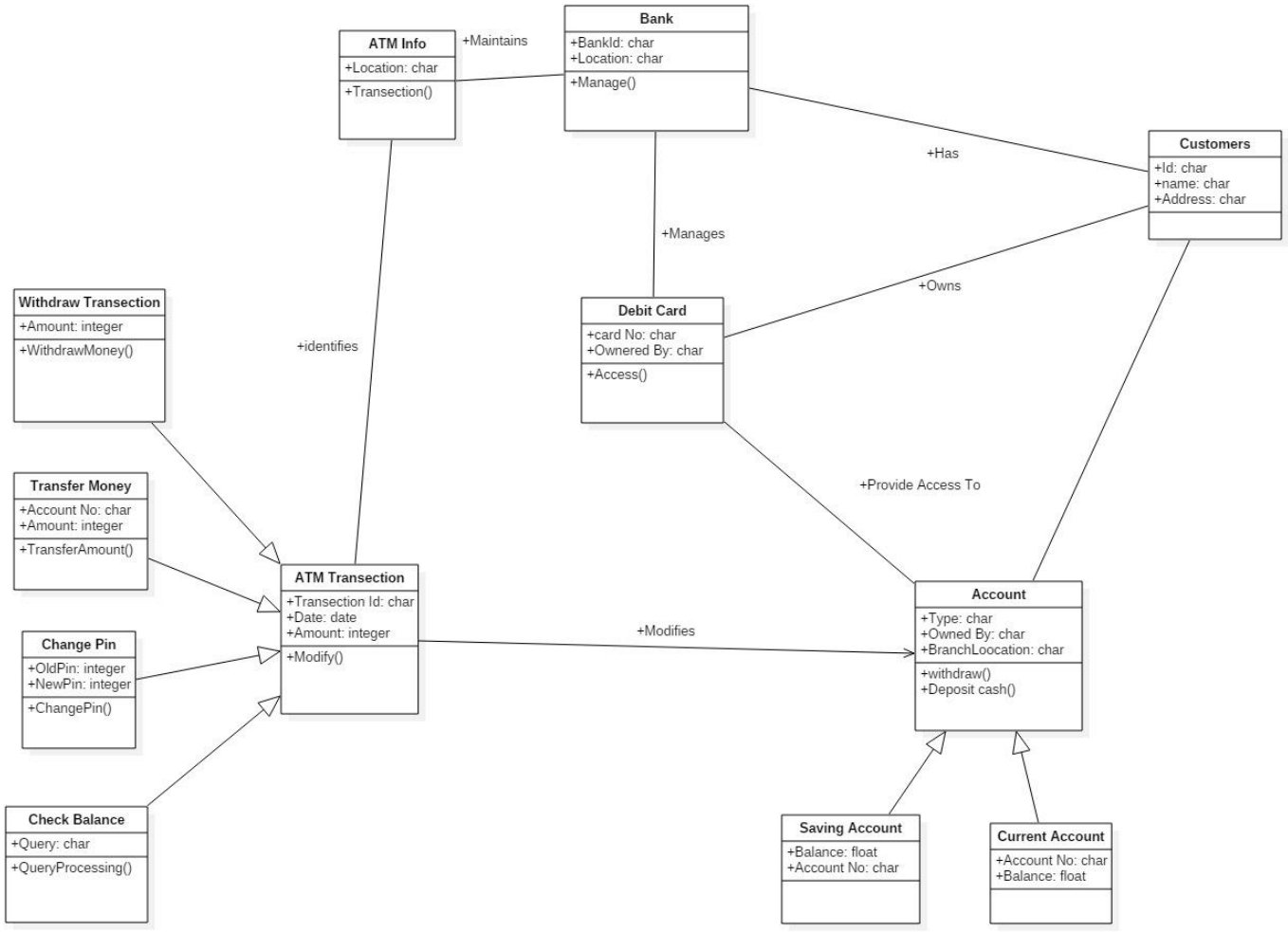
ATM is initially turned off. After the power is turned on, ATM performs startup action and enters Self Test state. If the test fails, ATM goes into Out of Service state, otherwise
transition to the Idle state. In this state ATM waits for customer interaction.
The ATM state changes from Idle to Serving Customer when the customer inserts banking or credit card in the ATM's card reader. On entering the Serving Customer state
that is composed of basic ATM functions i.e authentication, money withdrawal etc.

Ans.



Q4: Draw Class Diagram

Illustrate Class diagram for ATM Machine. The various Classes involved in the system
are: Bank, Account, Customer Info, Debit Card, Current Account, Saving Account, ATM Info, ATM Transaction, Withdraw Transaction, Change Pin, Transfer Money, Check Balance. The Bank maintains personal and ATM information of each customer. The customer can access their account using Debit Card issued by the Bank. In this system there could be two types of Account: Current Account and Saving Account. Both use to share many of the properties and methods. The ATM Machine can perform multiple transactions such as Withdrawing cash, change pin, check
balance and Transfer Money to each account.
Ans.



Q5: Design Pattern

Suppose we have the following java files. Identify the pattern also Considering the java
files draw class diagram.

Ans. Decorator pattern allows a user to add new functionality to an existing object without altering its structure. This type of design pattern comes under structural pattern as this pattern acts as a wrapper to existing class.

This pattern creates a decorator class which wraps the original class and provides additional functionality keeping class methods signature intact.

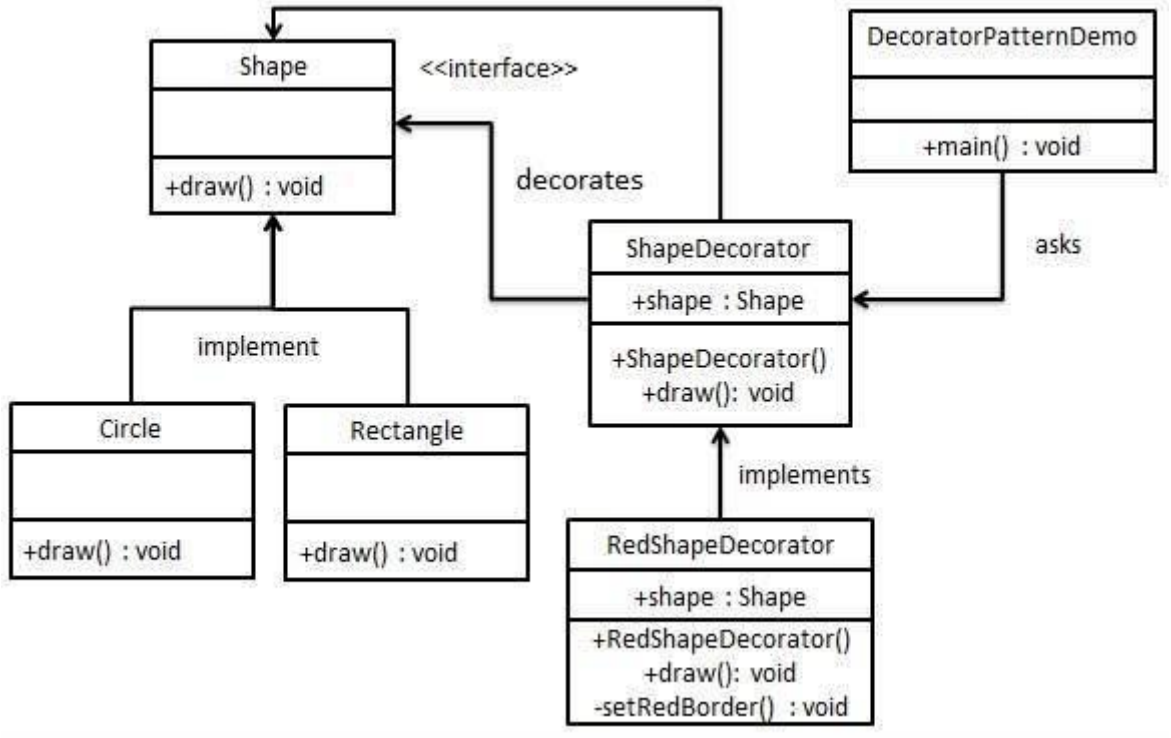
We are demonstrating the use of decorator pattern via following example in which we will decorate a shape with some color without alter shape class.

Implementation

We're going to create a *Shape* interface and concrete classes implementing the *Shape* interface. We will then create an abstract decorator class *ShapeDecorator* implementing the *Shape* interface and having *Shape* object as its instance variable.

RedShapeDecorator is concrete class implementing *ShapeDecorator*.

DecoratorPatternDemo, our demo class will use *RedShapeDecorator* to decorate *Shape* objects.



Step 1

Create an interface.

Shape.java

```
public interface Shape {
   void draw();
}
```

Step 2

Create concrete classes implementing the same interface.

Rectangle.java

```
public class Rectangle implements Shape {

   @Override
   public void draw() {
      System.out.println("Shape: Rectangle");
   }
}
```

Circle.java

```
public class Circle implements Shape {

   @Override
   public void draw() {
      System.out.println("Shape: Circle");
   }
}
```

Step 3

Create abstract decorator class implementing the *Shape* interface.

ShapeDecorator.java

```
public abstract class ShapeDecorator implements Shape {
   protected Shape decoratedShape;

   public ShapeDecorator(Shape decoratedShape){
      this.decoratedShape = decoratedShape;
   }

   public void draw(){
      decoratedShape.draw();
   }
}
```

Step 4

Create concrete decorator class extending the *ShapeDecorator* class.

RedShapeDecorator.java

```
public class RedShapeDecorator extends ShapeDecorator {

   public RedShapeDecorator(Shape decoratedShape) {
      super(decoratedShape);
   }

   @Override
   public void draw() {
      decoratedShape.draw();
      setRedBorder(decoratedShape);
   }

   private void setRedBorder(Shape decoratedShape){
      System.out.println("Border Color: Red");
   }
}
```

Step 5

Use the *RedShapeDecorator* to decorate *Shape* objects.

DecoratorPatternDemo.java

```
public class DecoratorPatternDemo {
   public static void main(String[] args) {

      Shape circle = new Circle();

      Shape redCircle = new RedShapeDecorator(new Circle());

      Shape redRectangle = new RedShapeDecorator(new Rectangle());
      System.out.println("Circle with normal border");
```

```
      circle.draw();

      System.out.println("\nCircle of red border");
      redCircle.draw();

      System.out.println("\nRectangle of red border");
      redRectangle.draw();
   }
}
```

Step 6

Verify the output.

```
Circle with normal border
Shape: Circle

Circle of red border
Shape: Circle
Border Color: Red

Rectangle of red border
Shape: Rectangle
Border Color: Red
```