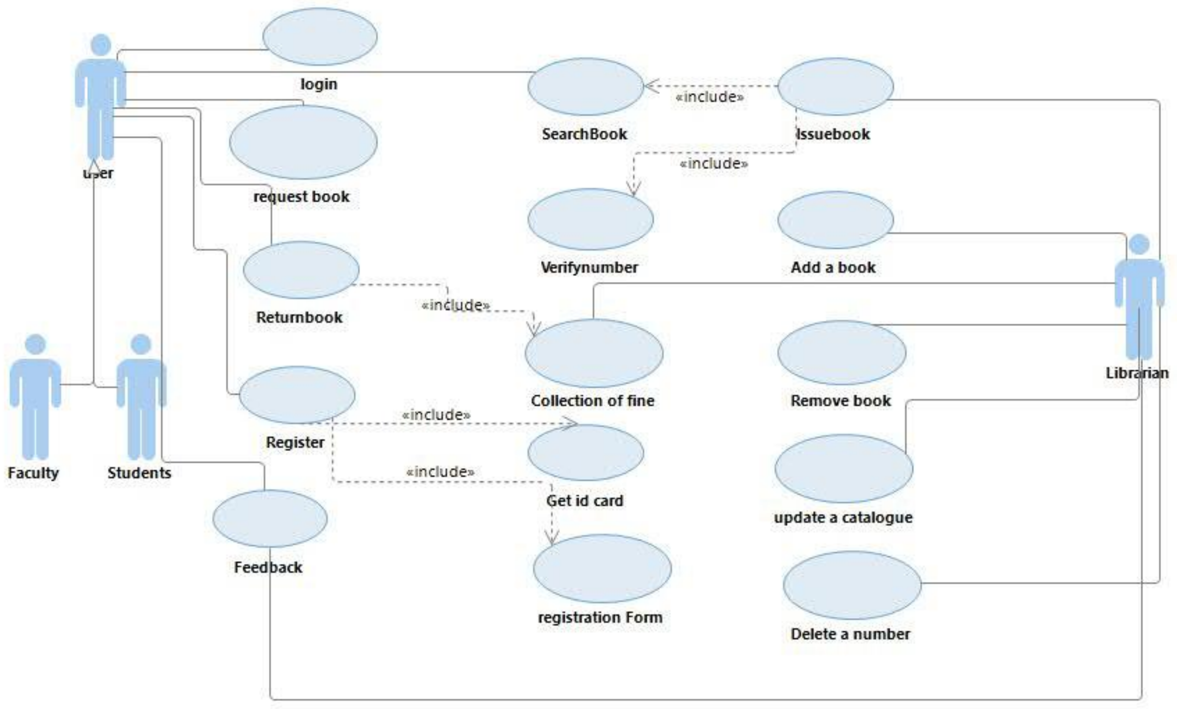
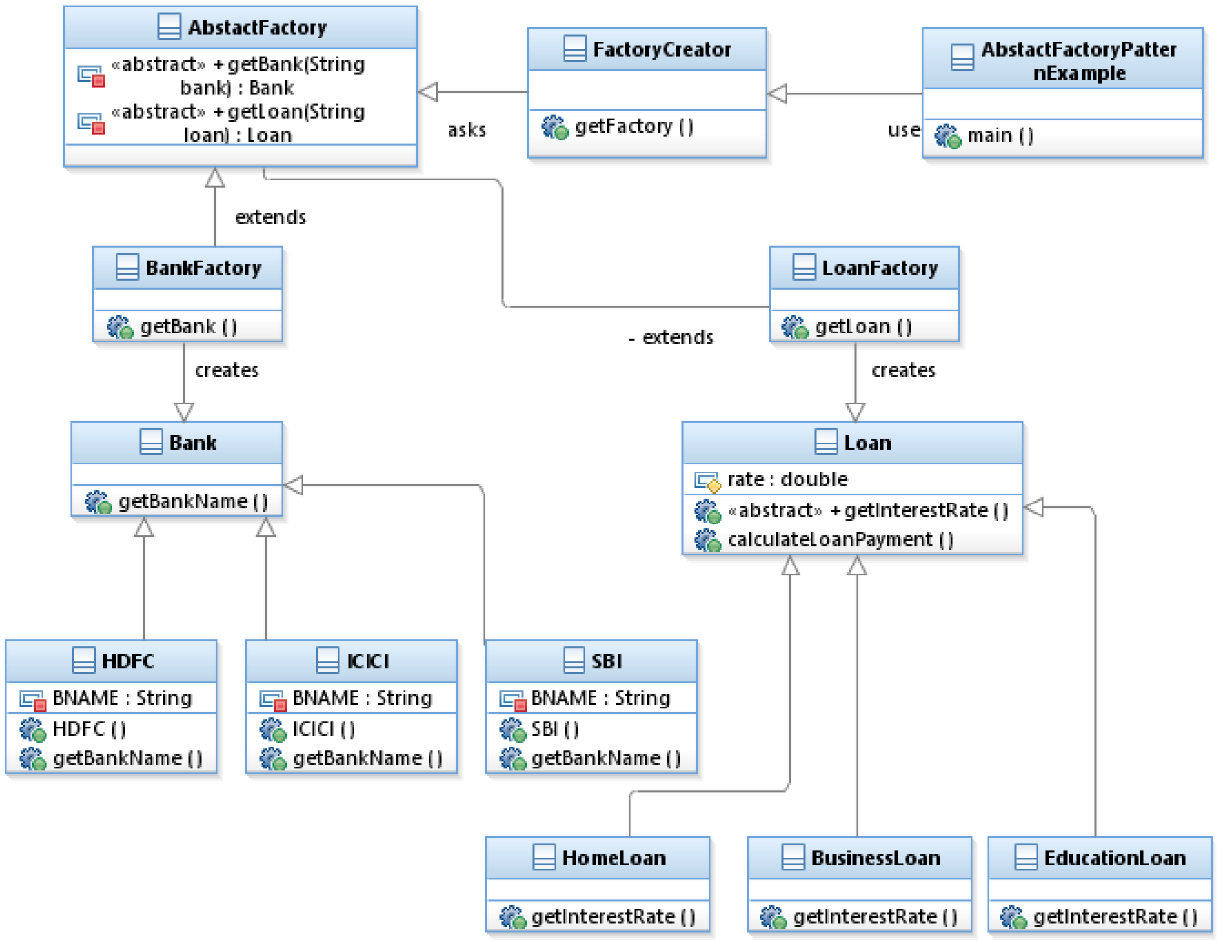
DESIGN PATTERNS LAB PROGRAMS

1.USECASE DIAGRAM:librarian



2.Abstract Factory

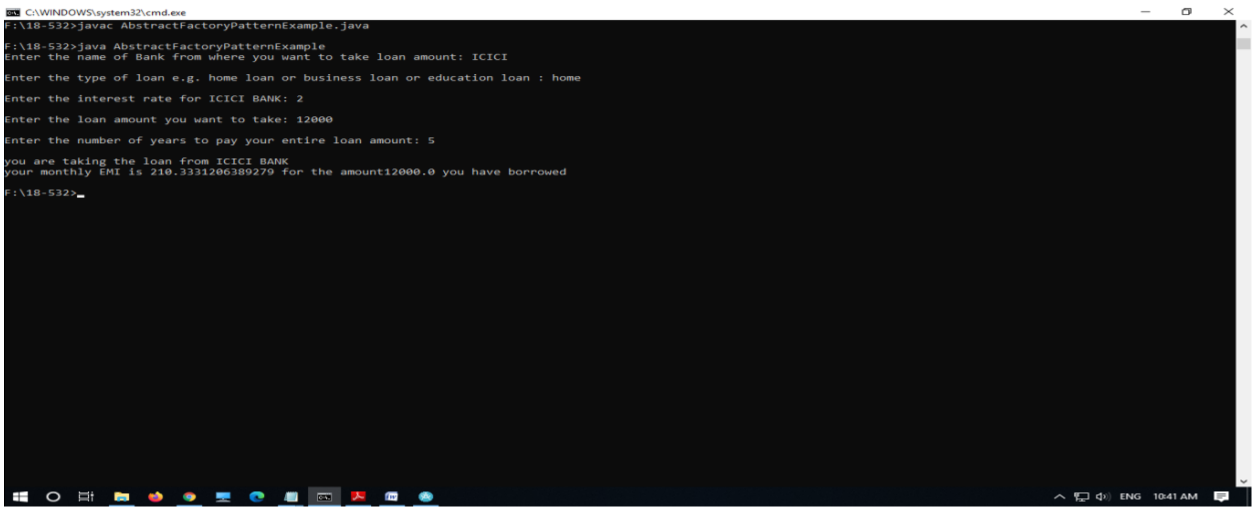


Program:

```
import java.io.*;

interface Bank{

        String getBankName();

}

class HDFC implements Bank{

         private final String BNAME;

         public HDFC(){

               BNAME="HDFC BANK";

        }
        public String getBankName() {
                return BNAME;
        }
}
class ICICI implements Bank{
       private final String BNAME;
       ICICI(){
               BNAME="ICICI BANK";
        }
        public String getBankName() {
                return BNAME;
       }
}
class SBI implements Bank{
      private final String BNAME;
      public SBI(){
               BNAME="SBI BANK";
        }
       public String getBankName(){
                return BNAME;
       }
}
abstract class Loan{
   protected double rate;
   abstract void getInterestRate(double rate);
   public void calculateLoanPayment(double loanamount, int years)

   {

         double EMI;

         int n;



         n=years*12;

         rate=rate/1200;

         EMI=((rate*Math.pow((1+rate),n))/((Math.pow((1+rate),n))-1))*loanamount;

System.out.println("your monthly EMI is "+ EMI +" for the amount"+loanamount+" you have
borrowed");

 }

}// end of the Loan abstract class.

class HomeLoan extends Loan{

     public void getInterestRate(double r){

         rate=r;

    }

}//End of the HomeLoan class.

class BussinessLoan extends Loan{

    public void getInterestRate(double r){

          rate=r;

     }


}//End of the BusssinessLoan class.

class EducationLoan extends Loan{

     public void getInterestRate(double r){

       rate=r;
 }
}//End of the EducationLoan class.
abstract class AbstractFactory{
  public abstract Bank getBank(String bank);
  public abstract Loan getLoan(String loan);
}
class BankFactory extends AbstractFactory{
   public Bank getBank(String bank){
      if(bank == null){
         return null;
      }
      if(bank.equalsIgnoreCase("HDFC")){
         return new HDFC();
      } else if(bank.equalsIgnoreCase("ICICI")){
         return new ICICI();
      } else if(bank.equalsIgnoreCase("SBI")){
         return new SBI();
      }
      return null;
   }
  public Loan getLoan(String loan) {
      return null;
   }
}//End of the BankFactory class.
```

```
class LoanFactory extends AbstractFactory{
          public Bank getBank(String bank){
               return null;
         }

     public Loan getLoan(String loan){
      if(loan == null){
         return null;
      }
      if(loan.equalsIgnoreCase("Home")){
         return new HomeLoan();
      } else if(loan.equalsIgnoreCase("Business")){
         return new BussinessLoan();
      } else if(loan.equalsIgnoreCase("Education")){
         return new EducationLoan();
      }
      return null;
   }

}
class FactoryCreator {
     public static AbstractFactory getFactory(String choice){
      if(choice.equalsIgnoreCase("Bank")){
         return new BankFactory();
      } else if(choice.equalsIgnoreCase("Loan")){
          return new LoanFactory();
        }
        return null;
      }
}//End of the FactoryCreator.


public class AbstractFactoryPatternExample {
      public static void main(String args[])throws IOException {


      BufferedReader br=new BufferedReader(new InputStreamReader(System.in));


      System.out.print("Enter the name of Bank from where you want to take loan amount: ");
      String bankName=br.readLine();


System.out.print("\n");
System.out.print("Enter the type of loan e.g. home loan or business loan or education loan : ");


String loanName=br.readLine();
AbstractFactory bankFactory = FactoryCreator.getFactory("Bank");
Bank b=bankFactory.getBank(bankName);


System.out.print("\n");
System.out.print("Enter the interest rate for "+b.getBankName()+ ": ");


double rate=Double.parseDouble(br.readLine());
```

```
System.out.print("\n");

System.out.print("Enter the loan amount you want to take: ");


double loanAmount=Double.parseDouble(br.readLine());

System.out.print("\n");

System.out.print("Enter the number of years to pay your entire loan amount: ");

int years=Integer.parseInt(br.readLine());


System.out.print("\n");

System.out.println("you are taking the loan from "+ b.getBankName());


AbstractFactory loanFactory = FactoryCreator.getFactory("Loan");

      Loan l=loanFactory.getLoan(loanName);

      l.getInterestRate(rate);

      l.calculateLoanPayment(loanAmount,years);

 }

}//End of the  AbstractFactoryPatternExample
```



```
F:\18-532>javac AbstractFactoryPatternExample.java

F:\18-532>java AbstractFactoryPatternExample
Enter the name of Bank from where you want to take loan amount: ICICI

Enter the type of loan e.g. home loan or business loan or education loan : home

Enter the interest rate for ICICI BANK: 2

Enter the loan amount you want to take: 12000

Enter the number of years to pay your entire loan amount: 5

you are taking the loan from ICICI BANK
your monthly EMI is 210.3331206389279 for the amount12000.0 you have borrowed

F:\18-532>_
```

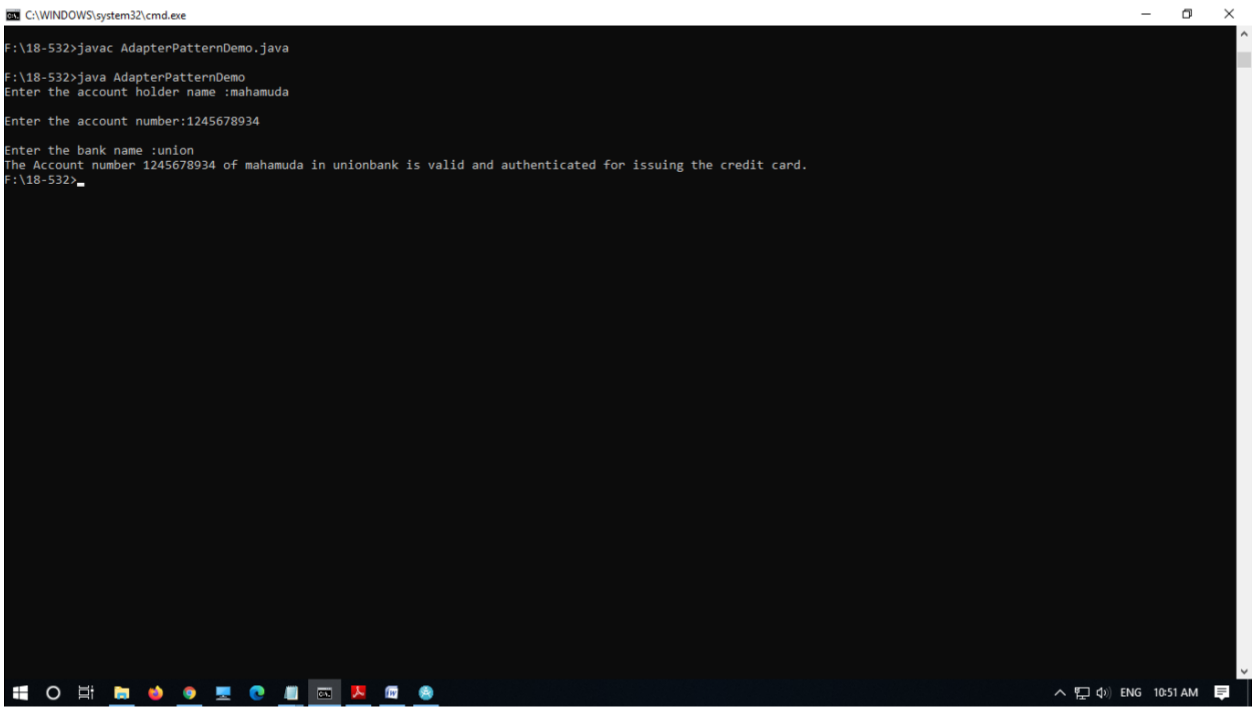
3.Adapter

Program:

```
import java.io.BufferedReader;

import java.io.InputStreamReader;

 interface CreditCard {

    public void giveBankDetails();

    public String getCreditCard();

}

 class BankDetails{

    private String bankName;

    private String accHolderName;

    private long accNumber;


    public String getBankName() {

        return bankName;

    }

    public void setBankName(String bankName) {

this.bankName = bankName;

    }

    public String getAccHolderName() {

        return accHolderName;

    }

    public void setAccHolderName(String accHolderName) {

this.accHolderName = accHolderName;

    }
    public long getAccNumber() {
        return accNumber;
    }
    public void setAccNumber(long accNumber) {
this.accNumber = accNumber;
    }
}
 class BankCustomer extends BankDetails implements CreditCard {
 public void giveBankDetails(){
try{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
System.out.print("Enter the account holder name :");
   String customername=br.readLine();
System.out.print("\n");
System.out.print("Enter the account number:");
   long accno=Long.parseLong(br.readLine());
System.out.print("\n");
System.out.print("Enter the bank name :");
   String bankname=br.readLine();
setAccHolderName(customername);
setAccNumber(accno);
setBankName(bankname);
}catch(Exception e){
e.printStackTrace();
   }
```

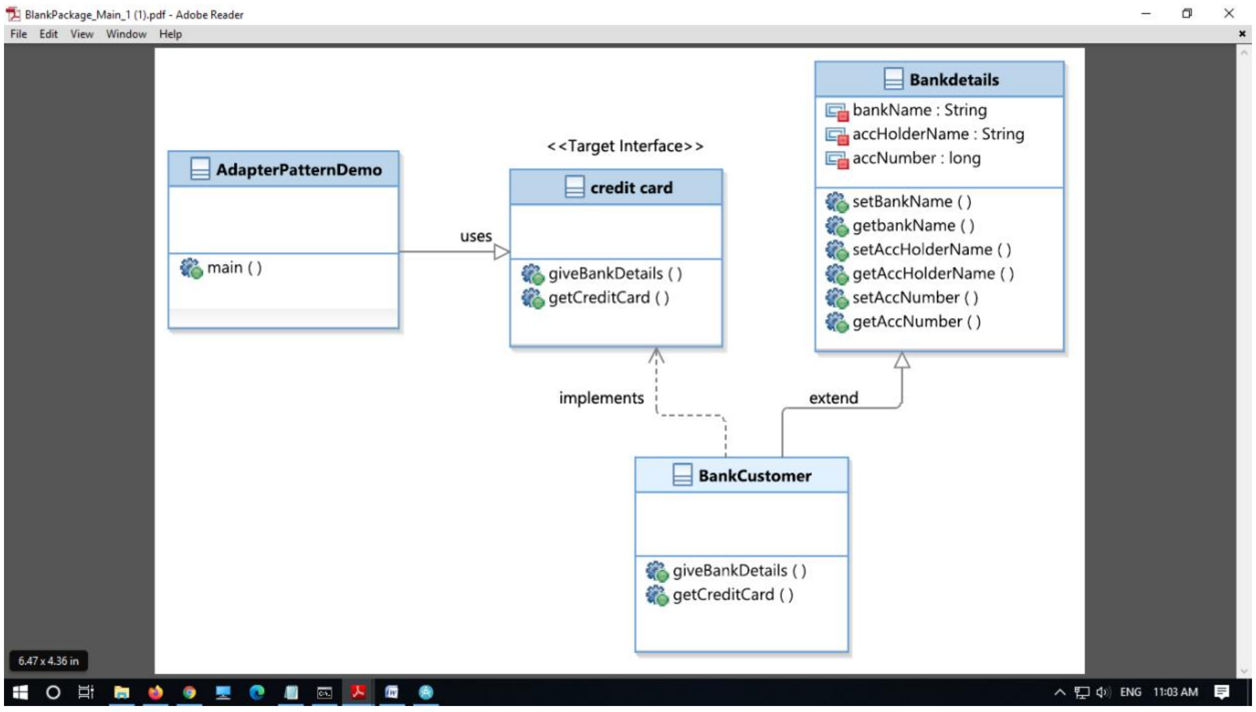
```
  }

 public String getCreditCard() {

   long accno=getAccNumber();

   String accholdername=getAccHolderName();

   String bname=getBankName();

   return ("The Account number "+accno+" of "+accholdername+" in "+bname+ "bank is valid and
authenticated for issuing the credit card. ");

  }

}

public class AdapterPatternDemo {

 public static void main(String args[]){

CreditCard targetInterface=new BankCustomer();

targetInterface.giveBankDetails();

System.out.print(targetInterface.getCreditCard());

 }

}
```

Output:



```
F:\18-532>javac AdapterPatternDemo.java

F:\18-532>java AdapterPatternDemo
Enter the account holder name :mahamuda

Enter the account number:1245678934

Enter the bank name :union
The Account number 1245678934 of mahamuda in unionbank is valid and authenticated for issuing the credit card.
F:\18-532>
```

Diagram:



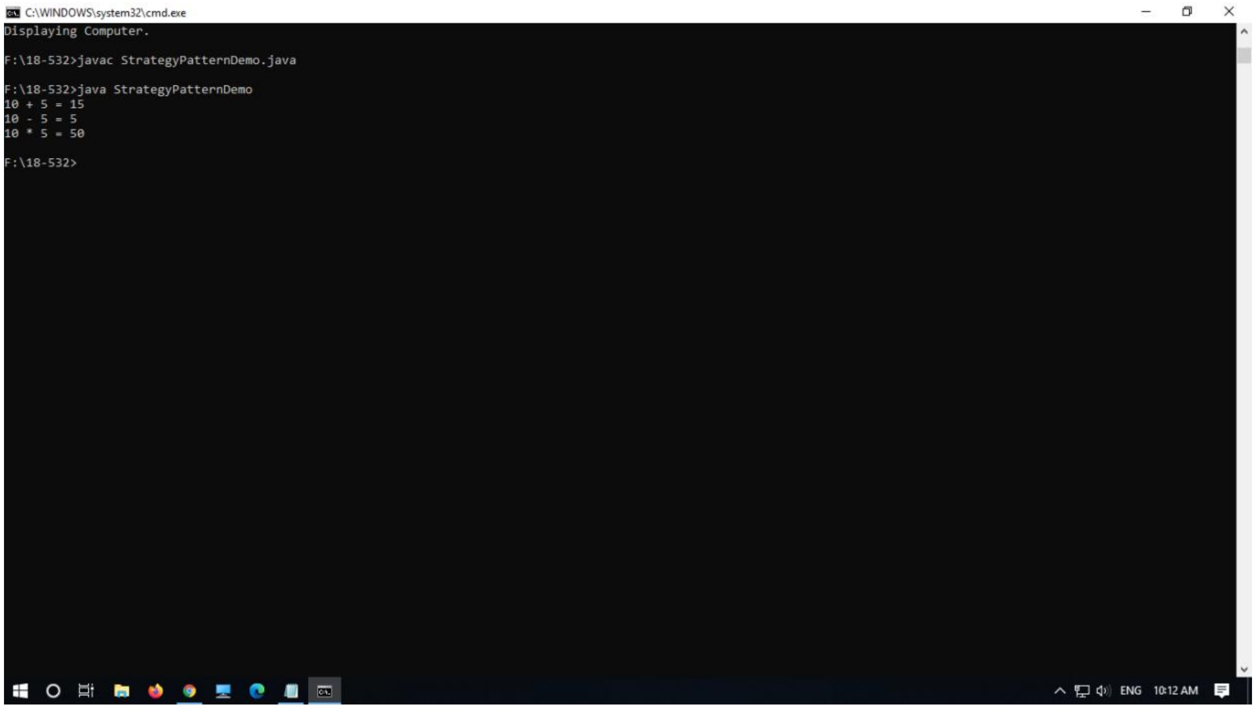
5.Strategy

Program:

```
interface Strategy {
  public int doOperation(int num1, int num2);
}
class OperationAdd implements Strategy{
  @Override
  public int doOperation(int num1, int num2) {
    return num1 + num2;
  }
}
class OperationSubstract implements Strategy{
  @Override
  public int doOperation(int num1, int num2) {
    return num1 - num2;
  }
}
class OperationMultiply implements Strategy{
  @Override
  public int doOperation(int num1, int num2) {
    return num1 * num2;
  }
}
class Context {
  private Strategy strategy;
```

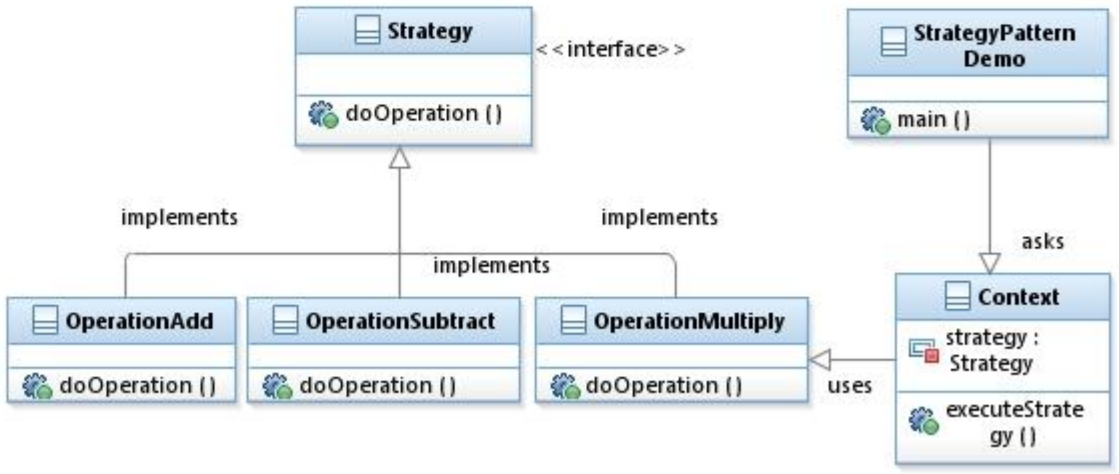
```
 public Context(Strategy strategy){
      this.strategy = strategy;
   }
 public int executeStrategy(int num1, int num2){
      return strategy.doOperation(num1, num2);
   }
}
public class StrategyPatternDemo {
   public static void main(String[] args) {
      Context context = new Context(new OperationAdd());
      System.out.println("10 + 5 = " + context.executeStrategy(10, 5));

      context = new Context(new OperationSubstract());
      System.out.println("10 - 5 = " + context.executeStrategy(10, 5));

      context = new Context(new OperationMultiply());
      System.out.println("10 * 5 = " + context.executeStrategy(10, 5));
   }
}
```

Output:



```
C:\WINDOWS\system32\cmd.exe
Displaying Computer.

F:\18-532>javac StrategyPatternDemo.java

F:\18-532>java StrategyPatternDemo
10 + 5 = 15
10 - 5 = 5
10 * 5 = 50

F:\18-532>
```

Diagram:



6.Builder:

Program:

import java.io.BufferedReader;

import java.io.InputStreamReader;

import java.io.IOException;

import java.util.ArrayList;

```
import java.util.List;

interface Item

{

   public String name();

    public String size();

    public float price();

}// End of the interface Item.

abstract class Pizza implements Item

{

              public abstract float price();

}

abstract class ColdDrink implements Item

{

              public abstract float price();

}

abstract class VegPizza extends Pizza

{

    public abstract float price();



    public abstract  String name();



    public abstract  String size();

}// End of the abstract class VegPizza.

abstract class NonVegPizza extends Pizza

{
}


    public abstract float price();


    public abstract String name();

    public abstract String size();

}// End of the abstract class NonVegPizza.

class SmallCheezePizza extends VegPizza

{

    public float price()

            {

        return 170.f;

    }

    public String name()

            {

        return "Cheeze Pizza";

    }

    public String size()

            {

       return "Small size";

    }

}// End of the SmallCheezePizza class.

class MediumCheezePizza extends VegPizza{

    public float price()

            {

       return  220.f;

    }
```

```
   public String name()
            {
      return "Cheeze Pizza";
   }
   public String size()
            {
    return "Medium Size";
            }
}// End of the MediumCheezePizza class.


class LargeCheezePizza extends VegPizza{
   public float price()
            {
      return 260.0f;
   }
   public String name()
            {
      return "Cheeze Pizza";
   }
   public String size()
            {
      return "Large Size";
   }
}// End of the LargeCheezePizza class.
class ExtraLargeCheezePizza extends VegPizza{
   public float price()
            {
      return 300.f;
   }
   public String name()
            {
      return  "Cheeze Pizza";
   }
   public String size()
            {
      return "Extra-Large Size";
   }
}// End of the ExtraLargeCheezePizza class.
class SmallOnionPizza extends VegPizza
{
   public float price()
            {
      return 120.0f;
   }
   public String name()
            {
      return  "Onion Pizza";
   }
   public String size()
            {
```

```
       return  "Small Size";

    }

}// End of the SmallOnionPizza class

class MediumOnionPizza extends VegPizza

{

    public float price()

              {

        return 150.0f;

    }

    public String name()

              {

        return  "Onion Pizza";

    }

    public String size()

              {

       return  "Medium Size";

    }

}// End of the MediumOnionPizza class.

class LargeOnionPizza extends  VegPizza

{

    public float price()

              {

        return 180.0f;

    }

    public String name()
```

```
            {
        return "Onion Pizza";
    }
    public String size()
            {
      return  "Large size";
    }
}// End of the LargeOnionPizza class.
class ExtraLargeOnionPizza extends VegPizza
{
    public float price()
            {
       return 200.0f;
    }
    public String name()
            {
        return  "Onion Pizza";
    }
    public String size()
            {
      return  "Extra-Large Size";
    }
}// End of the ExtraLargeOnionPizza class
class SmallMasalaPizza extends VegPizza
{
    public float price()
            {
        return 100.0f;
    }
    public String name()
            {
        return  "Masala Pizza";
    }
    public String size()
            {
       return  "Samll Size";
    }
}// End of the SmallMasalaPizza class
class MediumMasalaPizza extends VegPizza
{
    public float price()
            {
        return 120.0f;
    }
    public String name()
            {
        return  "Masala Pizza";

    }
    public String size()
```

```
            {
       return  "Medium Size";
    }
}
class LargeMasalaPizza extends  VegPizza
{
    public float price()
            {
        return 150.0f;
    }
    public String name()
            {
        return  "Masala Pizza";
    }
    public String size()
            {
       return  "Large Size";
    }
} //End of the LargeMasalaPizza class
class ExtraLargeMasalaPizza extends VegPizza
{
    public float price()
            {
        return 180.0f;
    }
    public String name()
              {
        return  "Masala Pizza";
    }
    public String size()
              {
       return  "Extra-Large Size";
    }
}// End of the ExtraLargeMasalaPizza class
class SmallNonVegPizza extends NonVegPizza
{
    public float price()
              {
        return 180.0f;
    }
    public String name()
              {
       return "Non-Veg Pizza";
    }
    public String size()
              {
        return "Samll Size";
    }
}
class MediumNonVegPizza extends NonVegPizza
```

```
{
   public float price()
            {
      return 200.0f;
   }
   public String name()
            {
     return "Non-Veg Pizza";
   }
   public String size()
            {
      return "Medium Size";
   }
}
class LargeNonVegPizza extends NonVegPizza
{
   public float price()
            {
      return 220.0f;
   }
   public String name()
            {
     return "Non-Veg Pizza";
   }
   public String size()
```

```
          {
      return "Large Size";
   }
}// End of the LargeNonVegPizza class
class ExtraLargeNonVegPizza extends NonVegPizza
{
   public float price()
          {
      return 250.0f;
   }
   public String name()
          {
     return "Non-Veg Pizza";
   }
   public String size()
          {
      return "Extra-Large Size";
   }
}
abstract class Pepsi extends ColdDrink
{
   public abstract  String name();
   public abstract  String size();
   public abstract  float price();
}// End of the Pepsi class
```

```
abstract class Coke  extends ColdDrink

{

   public abstract  String name();

   public abstract  String size();

   public abstract  float price();

}// End of the Coke class

class SmallPepsi  extends Pepsi

{

   public String name()

             {

      return "300 ml Pepsi";

   }

   public float price()

             {

       return 25.0f;

   }

   public String size()

             {

       return "Small Size";

   }

}// End of the SmallPepsi class


class MediumPepsi extends Pepsi

{

   public String name()
```

```
          {
      return "500 ml Pepsi";
    }
    public String size()
          {
       return "Medium Size";
    }
    public float price()
          {
       return 35.0f;
    }
}// End of the MediumPepsi class
class LargePepsi extends Pepsi
{
    public String name()
          {
      return "750 ml Pepsi";
    }
    public String size()
          {
       return "Large Size";
    }
    public float price()
          {
       return 50.0f;
    }

}// End of the LargePepsi class

class SmallCoke extends Coke

{

    public String name()

              {

         return "300 ml Coke";

    }

    public String size() {

        return "Small Size";

    }

    public float price()

              {


        return  25.0f;

    }

 }// End of the SmallCoke class

class MediumCoke extends Coke

{

    public String name()

              {

         return "500 ml Coke";

    }

    public String size()

              {
```

```
        return "Medium Size";

    }

    public float price()

            {

        return  35.0f;

            }

}// End of the MediumCoke class


class LargeCoke extends Coke

{

    public String name()

            {

         return "750 ml Coke";

    }

    public String size()

            {

        return "Large Size";

    }

    public float price()

            {

        return  50.0f;

    }

}// End of the LargeCoke class

class OrderedItems

{
    List<Item> items=new ArrayList<Item>();
    public void addItems(Item item)
            {
items.add(item);
    }
    public float getCost()
            {
        float cost=0.0f;
                        for (Item item : items)
                        {
                                    cost+=item.price();
                        }
        return cost;
    }
    public void showItems()
            {
        for (Item item : items)
                        {
System.out.println("Item is:" +item.name());
System.out.println("Size is:" +item.size());
System.out.println("Price is: " +item.price());
        }
    }
}// End of the OrderedItems class
```

```
class OrderBuilder
{
   public OrderedItems OrderedItemspreparePizza() throws IOException
           {
OrderedItems itemsOrder=new OrderedItems();
BufferedReader br =new BufferedReader(new InputStreamReader(System.in));
System.out.println(" Enter the choice of Pizza ");
System.out.println("============================");
System.out.println("        1. Veg-Pizza       ");
System.out.println("        2. Non-Veg Pizza   ");
System.out.println("        3. Exit            ");
System.out.println("============================");
int pizzaandcolddrinkchoice=Integer.parseInt(br.readLine());
      switch(pizzaandcolddrinkchoice)
      {
        case 1:
                        {
System.out.println("You ordered Veg Pizza");
System.out.println("\n\n");
System.out.println(" Enter the types of Veg-Pizza ");
System.out.println("-----------------------------");
System.out.println("        1.Cheeze Pizza        ");
System.out.println("        2.Onion Pizza        ");
System.out.println("        3.Masala Pizza        ");
System.out.println("        4.Exit            ");
System.out.println("------------------------------");
int vegpizzachoice=Integer.parseInt(br.readLine());
                    switch(vegpizzachoice)
                    {
                        case 1:
                             {
System.out.println("You ordered Cheeze Pizza");
System.out.println("------------------------------------");
System.out.println("    1. Small Cheeze Pizza ");
System.out.println("    2. Medium Cheeze Pizza ");
System.out.println("    3. Large Cheeze Pizza ");
System.out.println("    4. Extra-Large Cheeze Pizza ");
System.out.println("------------------------------------");
int cheezepizzasize=Integer.parseInt(br.readLine());
                                   switch(cheezepizzasize)
                                       {
                                          case 1:
itemsOrder.addItems(new SmallCheezePizza());
                                               break;
                                         case 2:
itemsOrder.addItems(new MediumCheezePizza());
                                               break;
                                         case 3:
itemsOrder.addItems(new LargeCheezePizza());
                                               break;
```

```
                                        case 4:
itemsOrder.addItems(new ExtraLargeCheezePizza());
                                           break;
                                                                                }
                                                                  }
                              case 2:
                                 {
System.out.println("You ordered Onion Pizza");
System.out.println("Enter the Onion pizza size");
System.out.println("----------------------------------");
System.out.println("    1. Small Onion Pizza ");
System.out.println("    2. Medium Onion Pizza ");
System.out.println("    3. Large Onion Pizza ");
System.out.println("    4. Extra-Large Onion Pizza ");
System.out.println("----------------------------------");
int onionpizzasize=Integer.parseInt(br.readLine());
                                   switch(onionpizzasize)
                                        {
                                          case 1:
itemsOrder.addItems(new SmallOnionPizza());
                                           break;
                                          case 2:
itemsOrder.addItems(new MediumOnionPizza());
                                           break;
                                          case 3:
```

```
itemsOrder.addItems(new LargeOnionPizza());
                                        break;
                                       case 4:
itemsOrder.addItems(new ExtraLargeOnionPizza());
                                        break;
                                    }
                         }
                        break;
                   case 3:
                        {
System.out.println("You ordered Masala Pizza");
System.out.println("Enter the Masala pizza size");
System.out.println("------------------------------------");
System.out.println("    1. Small Masala Pizza ");
System.out.println("    2. Medium Masala Pizza ");
System.out.println("    3. Large Masala Pizza ");
System.out.println("    4. Extra-Large Masala Pizza ");
System.out.println("------------------------------------");
int masalapizzasize=Integer.parseInt(br.readLine());
                                switch(masalapizzasize)
                                    {
                                       case 1:
itemsOrder.addItems(new SmallMasalaPizza());
                                        break;
                                       case 2:
```

```
itemsOrder.addItems(new MediumMasalaPizza());
                                            break;
                                           case 3:
itemsOrder.addItems(new LargeMasalaPizza());
                                            break;
                                           case 4:
itemsOrder.addItems(new ExtraLargeMasalaPizza());
                                            break;
                                        }
                            }
                            break;
                     }
                    }
                    break;// Veg- pizza choice completed.
              case 2:
                    {
                  System.out.println("You ordered Non-Veg Pizza");
                  System.out.println("\n\n");
                          System.out.println("Enter the Non-Veg pizza size");
                          System.out.println("------------------------------------");
                          System.out.println("    1. Small Non-Veg  Pizza ");
                          System.out.println("    2. Medium Non-Veg  Pizza ");
                          System.out.println("    3. Large Non-Veg  Pizza ");
                          System.out.println("    4. Extra-Large Non-Veg  Pizza ");
                          System.out.println("------------------------------------");
```

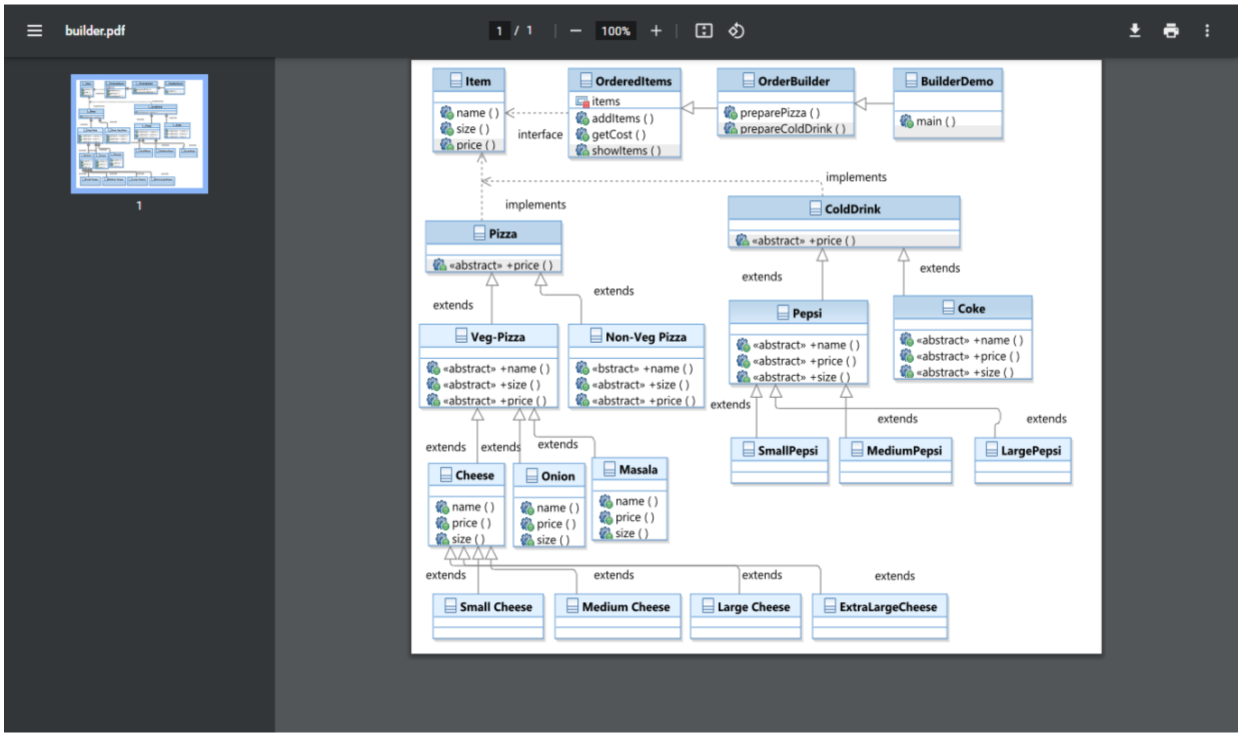
```
int nonvegpizzasize=Integer.parseInt(br.readLine());
                    switch(nonvegpizzasize)
                        {
                            case 1:
itemsOrder.addItems(new SmallNonVegPizza());
                                break;
                            case 2:
itemsOrder.addItems(new MediumNonVegPizza());
                                break;
                            case 3:
itemsOrder.addItems(new LargeNonVegPizza());
                                break;
                            case 4:
itemsOrder.addItems(new ExtraLargeNonVegPizza());
                                break;
                         }
                    }
                    break;
          default:
          {
               break;
          }
                        }
System.out.println(" Enter the choice of ColdDrink ");
System.out.println("============================");
System.out.println("       1. Pepsi           ");

System.out.println("       2. Coke            ");

System.out.println("       3. Exit           ");

System.out.println("===========================");

int coldDrink=Integer.parseInt(br.readLine());

       switch (coldDrink)

          {

            case 1:

                                        {

                                                  System.out.println("You ordered Pepsi ");

                                                  System.out.println("Enter the  Pepsi Size ");

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

                                                  System.out.println("    1. Small Pepsi ");

                                                  System.out.println("    2. Medium Pepsi ");

                                                  System.out.println("    3. Large Pepsi ");

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

                                                  int pepsisize=Integer.parseInt(br.readLine());

                                                  switch(pepsisize)

                                                  {

                                                  case 1:

                                                            itemsOrder.addItems(new SmallPepsi());

                                                                                   break;

case 2:

itemsOrder.addItems(new MediumPepsi());

                                                                                   break;
```

```
                                                    case 3:

                                                            itemsOrder.addItems(new LargePepsi());

                                                                              break;

}

                                             }

                                            break;

                    case 2:

                                            {

                                                    System.out.println("You ordered Coke");

                                                    System.out.println("Enter the Coke Size");

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

                                                    System.out.println("    1. Small Coke ");

                                                    System.out.println("    2. Medium Coke  ");

                                                    System.out.println("    3. Large Coke  ");

                                                    System.out.println("    4. Extra-Large Coke ");

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

                                                    int cokesize=Integer.parseInt(br.readLine());

                                                    switch(cokesize)

                                                    {

case 1:

itemsOrder.addItems(new SmallCoke());

break;

case 2:

itemsOrder.addItems(new MediumCoke());

break;
```

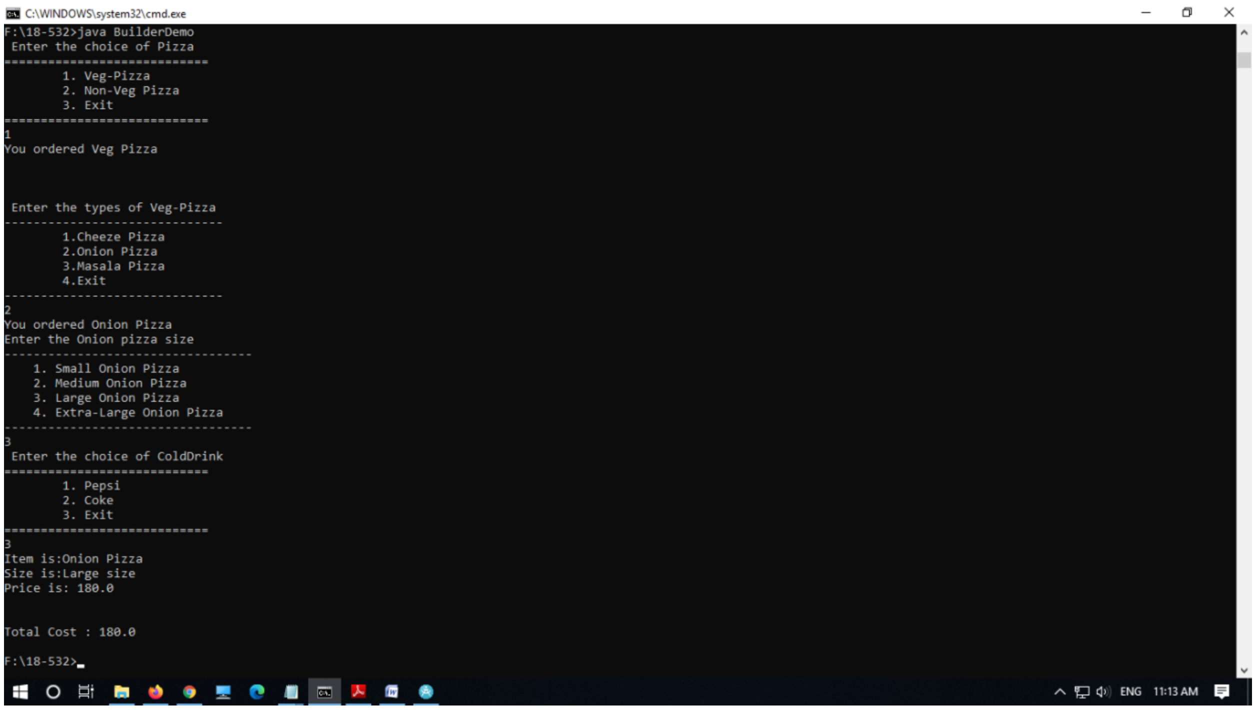
```
case 3:

itemsOrder.addItems(new LargeCoke());

break;

                                                                    }

                                        }

                                        break;

           default:

                                        {

                                                  break;

                                        }


        }//End of the Cold-Drink switch

            return itemsOrder;

      } //End of the preparePizza() method

}

public class BuilderDemo

{

   public static void main(String[] args) throws IOException

          {

OrderBuilder builder=new OrderBuilder();

OrderedItems orderedItems=builder.OrderedItemspreparePizza();

orderedItems.showItems();

System.out.println("\n");

System.out.println("Total Cost : "+ orderedItems.getCost());

   }
```

}

Diagram:



Output:


C:\WINDOWS\system32\cmd.exe

```
F:\18-532>java BuilderDemo
 Enter the choice of Pizza
============================
        1. Veg-Pizza
        2. Non-Veg Pizza
        3. Exit
============================
1
You ordered Veg Pizza



 Enter the types of Veg-Pizza
------------------------------
        1.Cheeze Pizza
        2.Onion Pizza
        3.Masala Pizza
        4.Exit
------------------------------
2
You ordered Onion Pizza
Enter the Onion pizza size
----------------------------------
    1. Small Onion Pizza
    2. Medium Onion Pizza
    3. Large Onion Pizza
    4. Extra-Large Onion Pizza
----------------------------------
3
 Enter the choice of ColdDrink
============================
        1. Pepsi
        2. Coke
        3. Exit
============================
3
Item is:Onion Pizza
Size is:Large size
Price is: 180.0


Total Cost : 180.0

F:\18-532>_
```

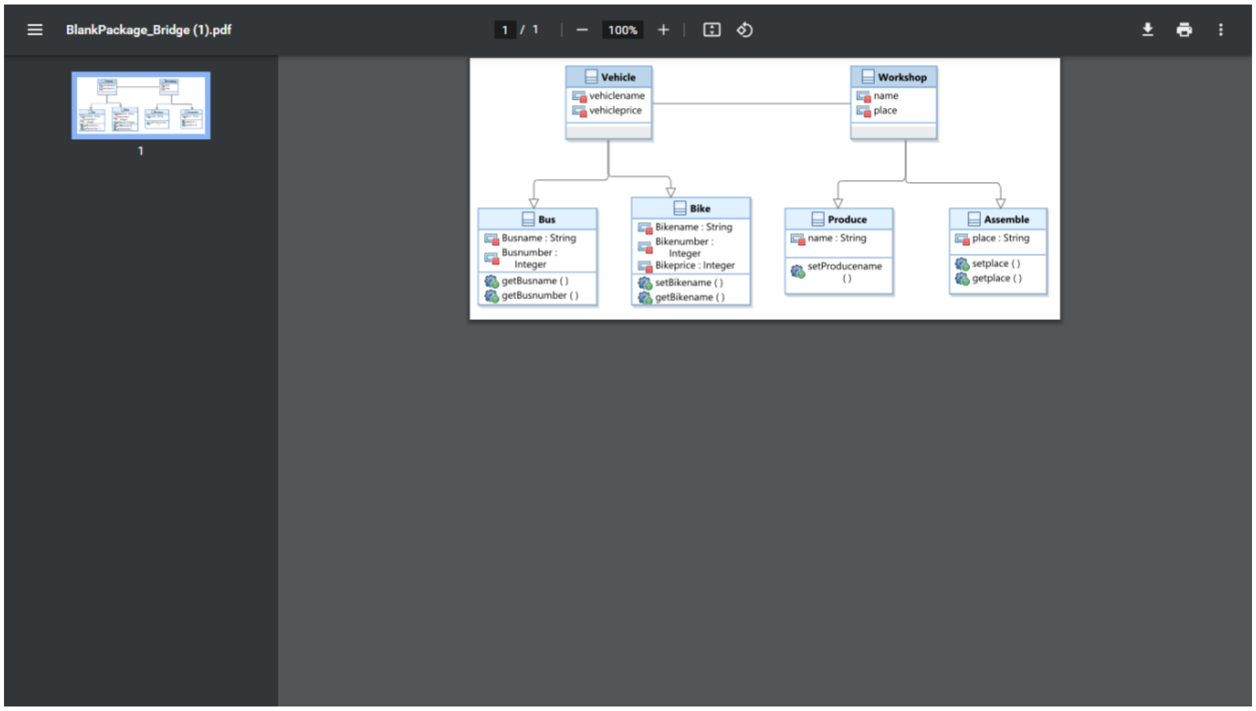
ENG 11:13 AM

7.Bridge:

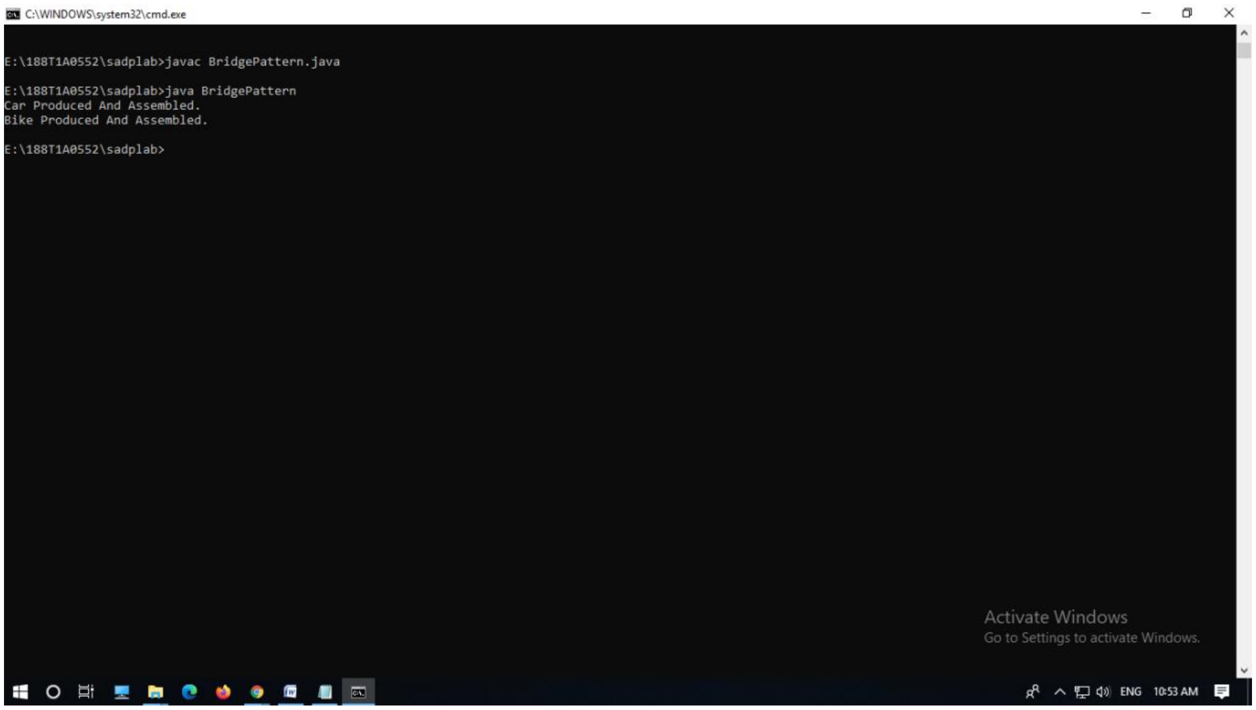
Program:

```
abstract class Vehicle {
    protected Workshop workShop1;
    protected Workshop workShop2;
    protected Vehicle(Workshop workShop1, Workshop workShop2)
    {
this.workShop1 = workShop1;
this.workShop2 = workShop2;
    }
    abstract public void manufacture();
}
class Car extends Vehicle {
    public Car(Workshop workShop1, Workshop workShop2)
    {
super(workShop1, workShop2);
    }
    public void manufacture()
    {
System.out.print("Car ");
        workShop1.work();
        workShop2.work();
    }
}
class Bike extends Vehicle {
    public Bike(Workshop workShop1, Workshop workShop2)
    {
super(workShop1, workShop2);
    }
    public void manufacture()
    {
System.out.print("Bike ");
        workShop1.work();
        workShop2.work();
    }
}
interface Workshop
{
    abstract public void work();
}
class Produce implements Workshop {
    public void work()
    {
System.out.print("Produced");
    }
}
class Assemble implements Workshop {
    public void work()
    {
System.out.print(" And");
System.out.println(" Assembled.");
    }
}
public class BridgePattern{
    public static void main(String[] args)
    {
        Vehicle vehicle1 = new Car(new Produce(), new Assemble());
        vehicle1.manufacture();
        Vehicle vehicle2 = new Bike(new Produce(), new Assemble());
        vehicle2.manufacture();
    }
}
```

diagram:



Output:



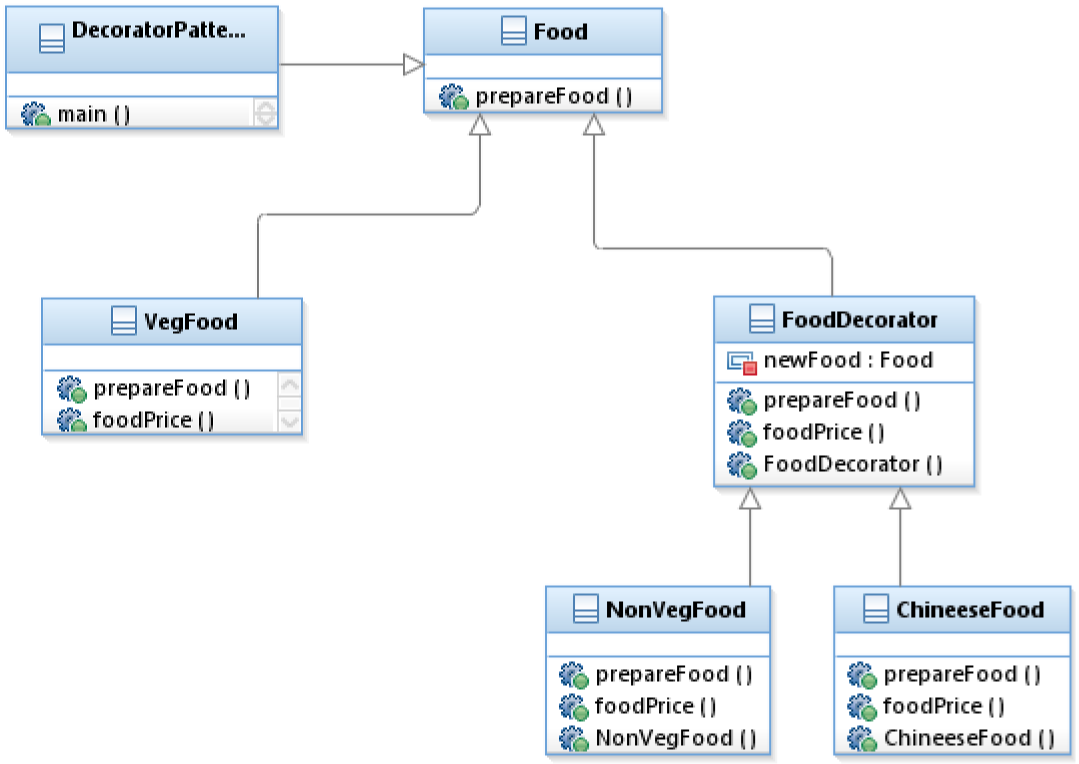
```
C:\WINDOWS\system32\cmd.exe

E:\188T1A0552\sadplab>javac BridgePattern.java

E:\188T1A0552\sadplab>java BridgePattern
Car Produced And Assembled.
Bike Produced And Assembled.

E:\188T1A0552\sadplab>
```

8.Decorator

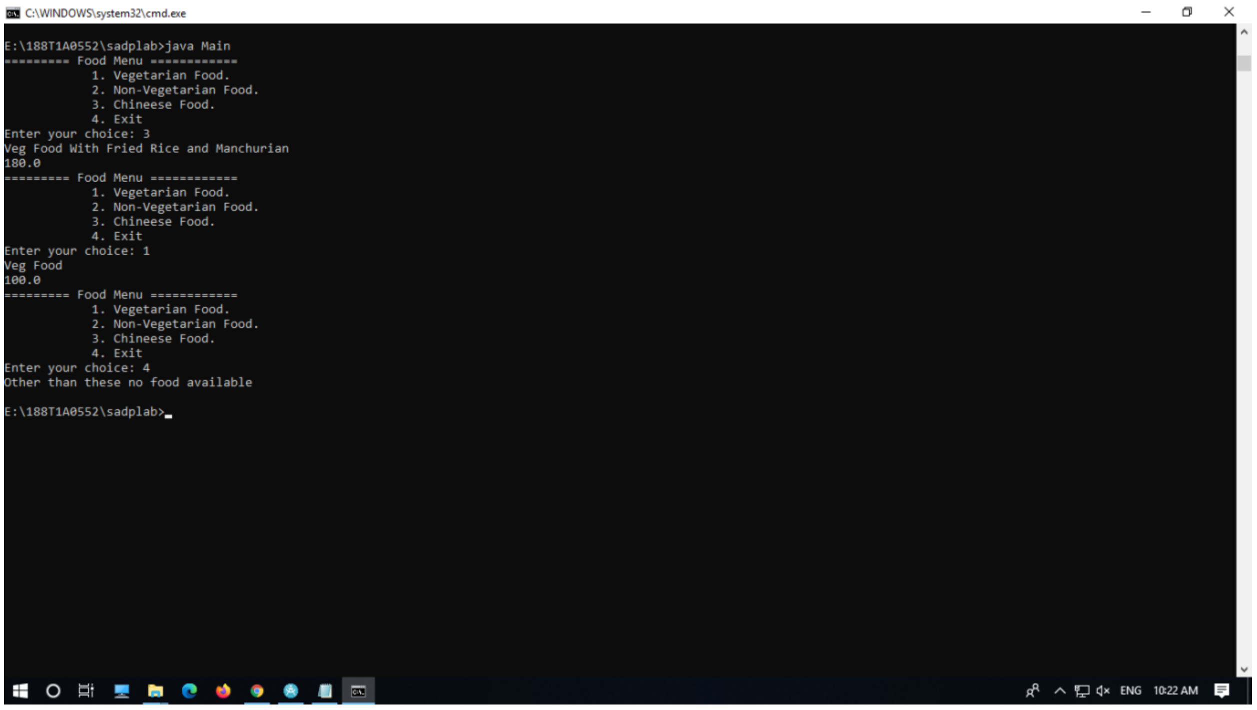
Program:

```
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
interface Food {
    public String prepareFood();
    public double foodPrice();
}// End of the Food interface.

 class VegFood implements Food {
    public String prepareFood(){
         return "Veg Food";
    }

        public double foodPrice(){
        return 100.0;
    }
}

 abstract class FoodDecorator implements Food{
    private Food newFood;
    public FoodDecorator(Food newFood)  {
        this.newFood=newFood;
    }
    @Override
    public String prepareFood(){
        return newFood.prepareFood();
    }
    public double foodPrice(){
        return newFood.foodPrice();
    }
}

class NonVegFood extends FoodDecorator{
    public NonVegFood(Food newFood) {
        super(newFood);
    }
    public String prepareFood(){
        return super.prepareFood() +" With Roasted Chiken and Chiken Curry  ";
    }
    public double foodPrice()   {
        return super.foodPrice()+200.0;
    }
}
```

```
class ChineeseFood extends FoodDecorator{
  public ChineeseFood(Food newFood)    {
        super(newFood);
  }
    public String prepareFood(){
        return super.prepareFood() +" With Fried Rice and Manchurian  ";
    }
    public double foodPrice()   {
        return super.foodPrice()+80.0;
        }
}

public class DecoratorPatternCustomer {
    private static int  choice;
    public static void main(String args[]) throws NumberFormatException, IOException    {
       do{
        System.out.print("========= Food Menu ============ \n");
        System.out.print("            1. Vegetarian Food.   \n");
        System.out.print("            2. Non-Vegetarian Food.\n");
        System.out.print("            3. Chineese Food.         \n");
        System.out.print("            4. Exit                        \n");
        System.out.print("Enter your choice: ");
        BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
        choice=Integer.parseInt(br.readLine());
        switch (choice) {
        case 1:{
                 VegFood vf=new VegFood();
              System.out.println(vf.prepareFood());
              System.out.println( vf.foodPrice());
            }
            break;

                case 2:{
                Food f1=new NonVegFood((Food) new VegFood());
                    System.out.println(f1.prepareFood());
                System.out.println( f1.foodPrice());
        }
            break;
     case 3:{
             Food f2=new ChineeseFood((Food) new VegFood());
                     System.out.println(f2.prepareFood());
                    System.out.println( f2.foodPrice());
              }
            break;
        default:{
           System.out.println("Other than these no food available");
        }
    return;
     }//end of switch

}while(choice!=4);
    }
}
```
diagram:



Output:



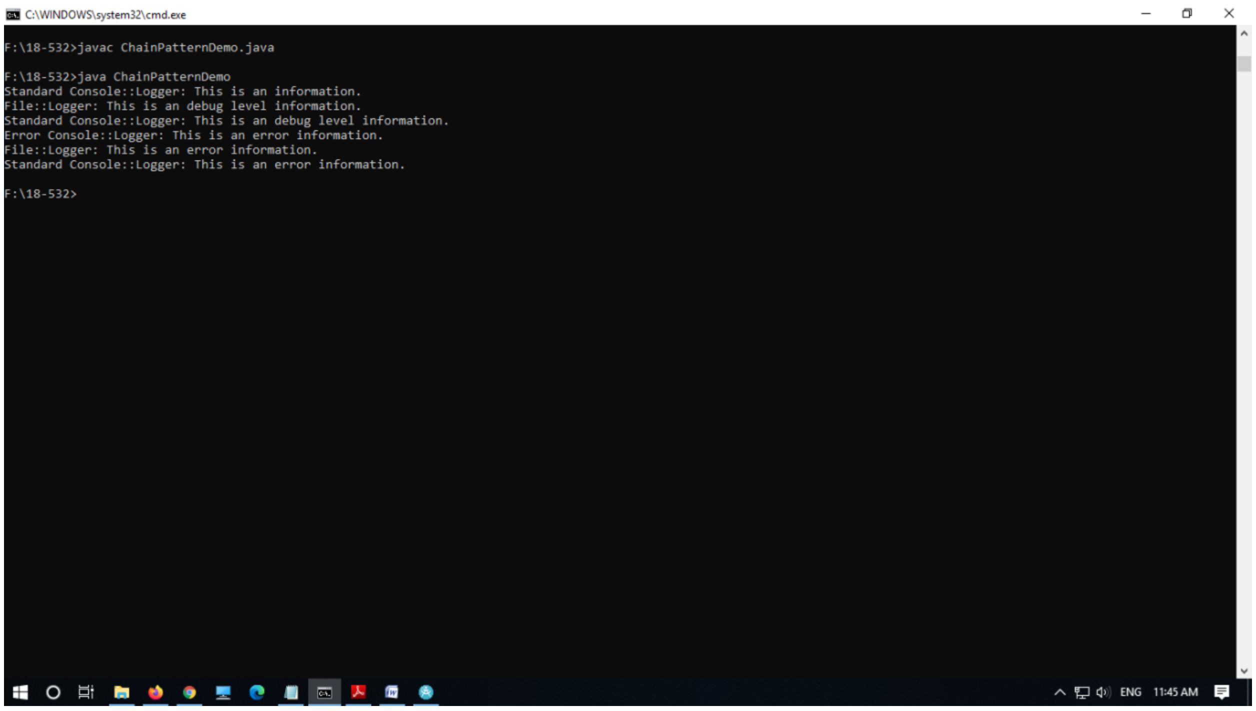
```
E:\188T1A0552\sadplab>java Main
========= Food Menu ============
            1. Vegetarian Food.
            2. Non-Vegetarian Food.
            3. Chineese Food.
            4. Exit
Enter your choice: 3
Veg Food With Fried Rice and Manchurian
180.0
========= Food Menu ============
            1. Vegetarian Food.
            2. Non-Vegetarian Food.
            3. Chineese Food.
            4. Exit
Enter your choice: 1
Veg Food
100.0
========= Food Menu ============
            1. Vegetarian Food.
            2. Non-Vegetarian Food.
            3. Chineese Food.
            4. Exit
Enter your choice: 4
Other than these no food available

E:\188T1A0552\sadplab>
```

9.Chain of responsibility:

Program:

```
abstract class AbstractLogger {
   public static int INFO = 1;
   public static int DEBUG = 2;
   public static int ERROR = 3;

   protected int level;
   protected AbstractLogger nextLogger;

   public void setNextLogger(AbstractLogger nextLogger){
      this.nextLogger = nextLogger;
   }

   public void logMessage(int level, String message){
      if(this.level <= level){
         write(message);
      }
      if(nextLogger !=null){
         nextLogger.logMessage(level, message);
      }
   }
```

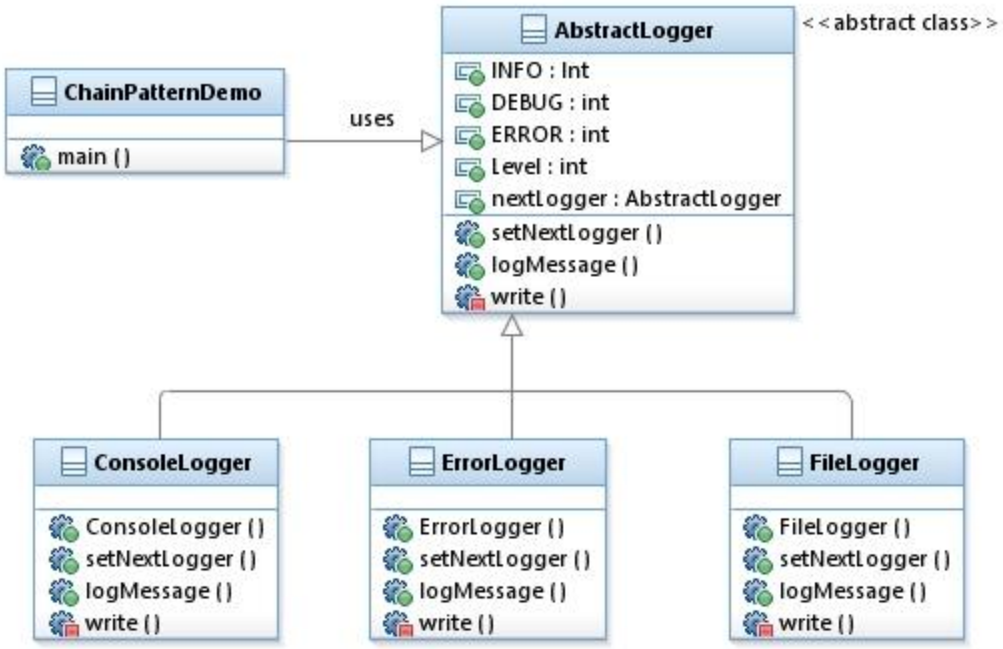
```
  abstract protected void write(String message);

}
class ConsoleLogger extends AbstractLogger {

  public ConsoleLogger(int level){
    this.level = level;
  }

  @Override
  protected void write(String message) {
    System.out.println("Standard Console::Logger: " + message);
  }
}
class ErrorLogger extends AbstractLogger {

  public ErrorLogger(int level){
    this.level = level;
  }

  @Override
  protected void write(String message) {
    System.out.println("Error Console::Logger: " + message);
  }
}
class FileLogger extends AbstractLogger {

  public FileLogger(int level){
    this.level = level;
  }

  @Override
  protected void write(String message) {
    System.out.println("File::Logger: " + message);
  }
}
public class ChainPatternDemo {

  private static AbstractLogger getChainOfLoggers(){

    AbstractLogger errorLogger = new ErrorLogger(AbstractLogger.ERROR);
    AbstractLogger fileLogger = new FileLogger(AbstractLogger.DEBUG);
    AbstractLogger consoleLogger = new ConsoleLogger(AbstractLogger.INFO);

    errorLogger.setNextLogger(fileLogger);
    fileLogger.setNextLogger(consoleLogger);
    return errorLogger;
  }

  public static void main(String[] args) {
    AbstractLogger loggerChain = getChainOfLoggers();

    loggerChain.logMessage(AbstractLogger.INFO,
      "This is an information.");

    loggerChain.logMessage(AbstractLogger.DEBUG,
      "This is an debug level information.");

    loggerChain.logMessage(AbstractLogger.ERROR,
      "This is an error information.");
  }
}
```
output:



C:\WINDOWS\system32\cmd.exe

```
F:\18-532>javac ChainPatternDemo.java

F:\18-532>java ChainPatternDemo
Standard Console::Logger: This is an information.
File::Logger: This is an debug level information.
Standard Console::Logger: This is an debug level information.
Error Console::Logger: This is an error information.
File::Logger: This is an error information.
Standard Console::Logger: This is an error information.

F:\18-532>
```

Diagram:



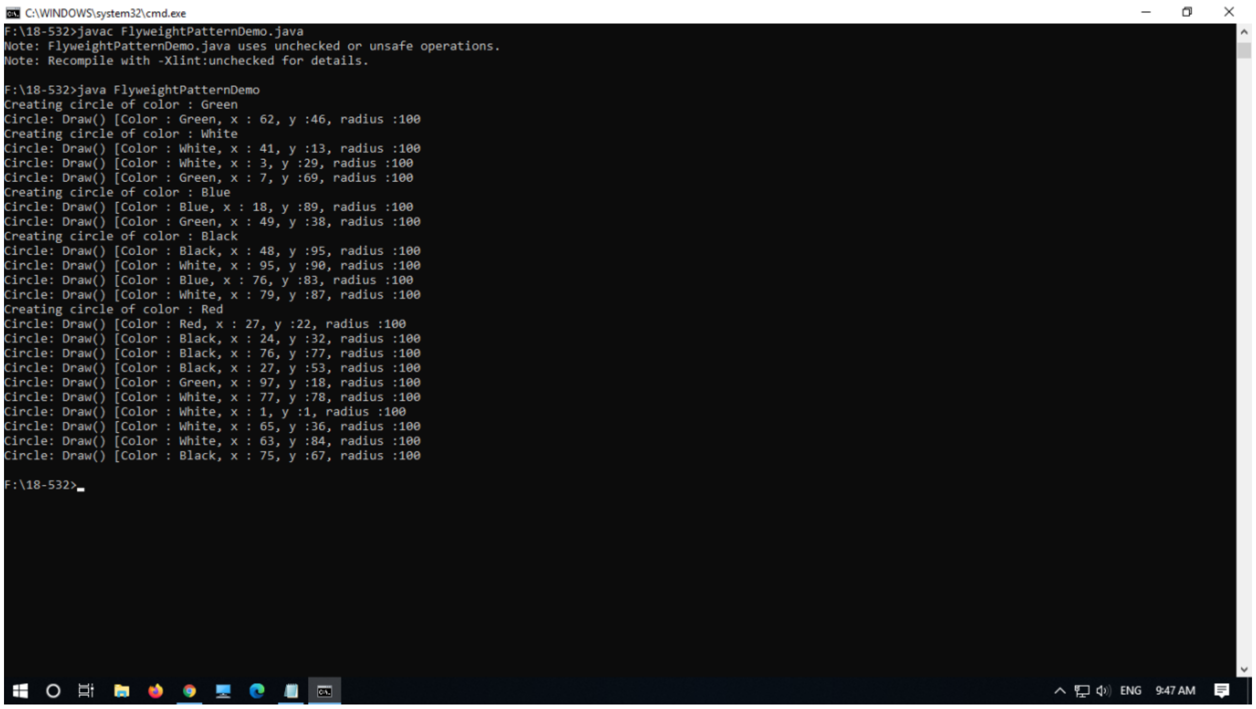
10.Flyweight:

Program:

```
import java.util.HashMap;

interface Shape {

  void draw();

}

class Circle implements Shape {

  private String color;

  private int x;

  private int y;

  private int radius;



  public Circle(String color){
     this.color = color;
  }

  public void setX(int x) {
     this.x = x;
  }

  public void setY(int y) {
     this.y = y;
  }

  public void setRadius(int radius) {
     this.radius = radius;
  }

  @Override
  public void draw() {
     System.out.println("Circle: Draw() [Color : " + color + ", x : " + x + ", y :" + y + ", radius :" + radius);
  }
}
class ShapeFactory {
  private static final HashMap circleMap = new HashMap();
   public static Shape getCircle(String color) {
     Circle circle = (Circle)circleMap.get(color);
      if(circle == null) {
           circle = new Circle(color);

           circleMap.put(color, circle);

           System.out.println("Creating circle of color : " + color);

       }

       return circle;

   }

}

public class FlyweightPatternDemo{

   private static final String colors[] = { "Red", "Green", "Blue", "White", "Black" };

   public static void main(String[] args) {


       for(int i=0; i < 20; ++i) {

           Circle circle = (Circle)ShapeFactory.getCircle(getRandomColor());

           circle.setX(getRandomX());

           circle.setY(getRandomY());

           circle.setRadius(100);

           circle.draw();

       }

   }

   private static String getRandomColor() {

       return colors[(int)(Math.random()*colors.length)];

   }

   private static int getRandomX() {

       return (int)(Math.random()*100 );

   }
```

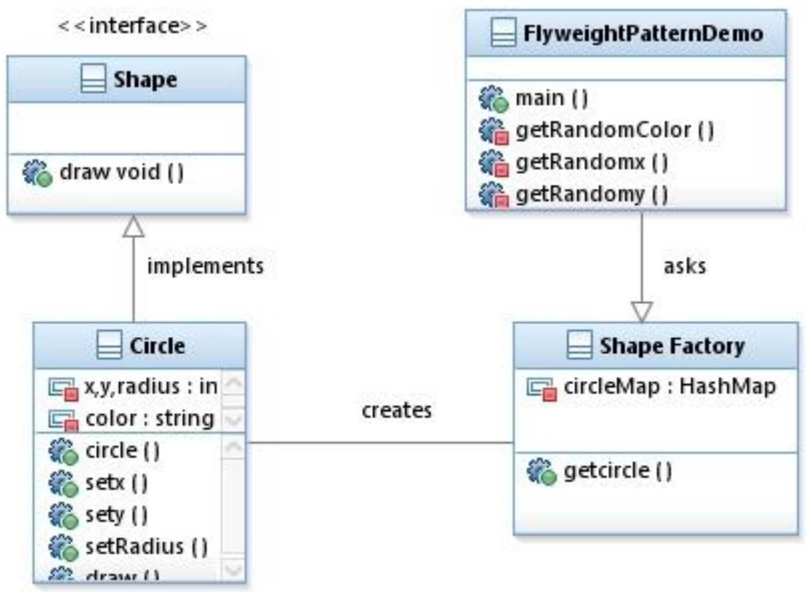
```
  private static int getRandomY() {

    return (int)(Math.random()*100);

  }

}
```

Output



```
C:\WINDOWS\system32\cmd.exe
F:\18-532>javac FlyweightPatternDemo.java
Note: FlyweightPatternDemo.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

F:\18-532>java FlyweightPatternDemo
Creating circle of color : Green
Circle: Draw() [Color : Green, x : 62, y :46, radius :100
Creating circle of color : White
Circle: Draw() [Color : White, x : 41, y :13, radius :100
Circle: Draw() [Color : White, x : 3, y :29, radius :100
Circle: Draw() [Color : Green, x : 7, y :69, radius :100
Creating circle of color : Blue
Circle: Draw() [Color : Blue, x : 18, y :89, radius :100
Circle: Draw() [Color : Green, x : 49, y :38, radius :100
Creating circle of color : Black
Circle: Draw() [Color : Black, x : 48, y :95, radius :100
Circle: Draw() [Color : White, x : 95, y :90, radius :100
Circle: Draw() [Color : Blue, x : 76, y :83, radius :100
Circle: Draw() [Color : White, x : 79, y :87, radius :100
Creating circle of color : Red
Circle: Draw() [Color : Red, x : 27, y :22, radius :100
Circle: Draw() [Color : Black, x : 24, y :32, radius :100
Circle: Draw() [Color : Black, x : 76, y :77, radius :100
Circle: Draw() [Color : Black, x : 27, y :53, radius :100
Circle: Draw() [Color : Green, x : 97, y :18, radius :100
Circle: Draw() [Color : White, x : 77, y :78, radius :100
Circle: Draw() [Color : White, x : 1, y :1, radius :100
Circle: Draw() [Color : White, x : 65, y :36, radius :100
Circle: Draw() [Color : White, x : 63, y :84, radius :100
Circle: Draw() [Color : Black, x : 75, y :67, radius :100

F:\18-532>_
```

Diagram:



11.Facade Design Pattern

Program:

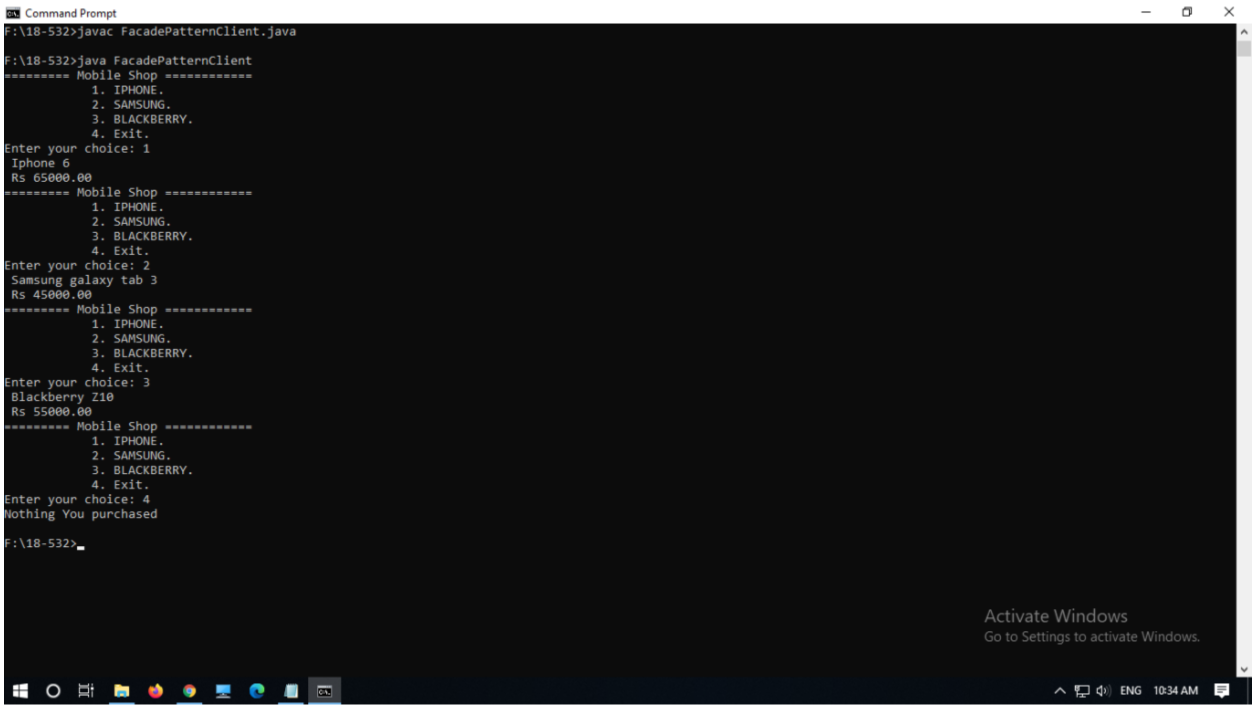
```
import java.io.BufferedReader;

import java.io.IOException;

import java.io.InputStreamReader;


interface MobileShop {

   public void modelNo();

   public void price();

}

class Iphone implements MobileShop {

   @Override

   public void modelNo() {

      System.out.println(" Iphone 6 ");
```

```
    }
    @Override
    public void price() {
    System.out.println(" Rs 65000.00 ");
    }
}
class Samsung implements MobileShop {
    @Override
    public void modelNo() {
    System.out.println(" Samsung galaxy tab 3 ");
    }
    @Override
    public void price() {
        System.out.println(" Rs 45000.00 ");
    }
}
class Blackberry implements MobileShop {
    @Override
    public void modelNo() {
    System.out.println(" Blackberry Z10 ");
    }
    @Override
    public void price() {
        System.out.println(" Rs 55000.00 ");
    }
```

```
}

class ShopKeeper {

    private MobileShop iphone;

    private MobileShop samsung;

    private MobileShop blackberry;


    public ShopKeeper(){

        iphone= new Iphone();

        samsung=new Samsung();

        blackberry=new Blackberry();

    }

    public void iphoneSale(){

        iphone.modelNo();

        iphone.price();

    }

        public void samsungSale(){

        samsung.modelNo();

        samsung.price();

    }

   public void blackberrySale(){

    blackberry.modelNo();

    blackberry.price();

        }

}
```

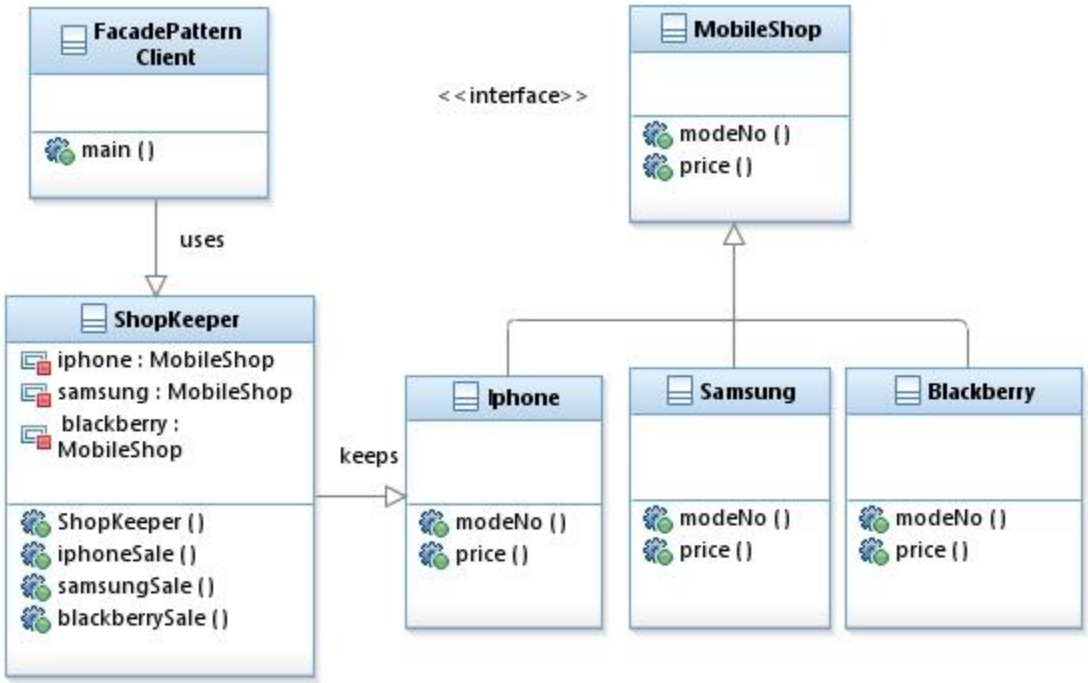
```
public class FacadePatternClient {
   private static int  choice;
   public static void main(String args[]) throws NumberFormatException, IOException{
      do{
         System.out.print("========= Mobile Shop ============ \n");
         System.out.print("          1. IPHONE.            \n");
         System.out.print("          2. SAMSUNG.            \n");
         System.out.print("          3. BLACKBERRY.          \n");
         System.out.print("          4. Exit.                  \n");
         System.out.print("Enter your choice: ");

         BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
         choice=Integer.parseInt(br.readLine());
         ShopKeeper sk=new ShopKeeper();

         switch (choice) {
         case 1:
            {
              sk.iphoneSale();
               }
            break;
     case 2:
            {
              sk.samsungSale();
               }
            break;
        case 3:
                    {
                    sk.blackberrySale();
                    }
              break;
          default:
          {
            System.out.println("Nothing You purchased");
          }
            return;
          }


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

Output:



```
F:\18-532>javac FacadePatternClient.java

F:\18-532>java FacadePatternClient
========= Mobile Shop ============
            1. IPHONE.
            2. SAMSUNG.
            3. BLACKBERRY.
            4. Exit.
Enter your choice: 1
 Iphone 6
 Rs 65000.00
========= Mobile Shop ============
            1. IPHONE.
            2. SAMSUNG.
            3. BLACKBERRY.
            4. Exit.
Enter your choice: 2
 Samsung galaxy tab 3
 Rs 45000.00
========= Mobile Shop ============
            1. IPHONE.
            2. SAMSUNG.
            3. BLACKBERRY.
            4. Exit.
Enter your choice: 3
 Blackberry Z10
 Rs 55000.00
========= Mobile Shop ============
            1. IPHONE.
            2. SAMSUNG.
            3. BLACKBERRY.
            4. Exit.
Enter your choice: 4
Nothing You purchased

F:\18-532>_
```

Diagram:

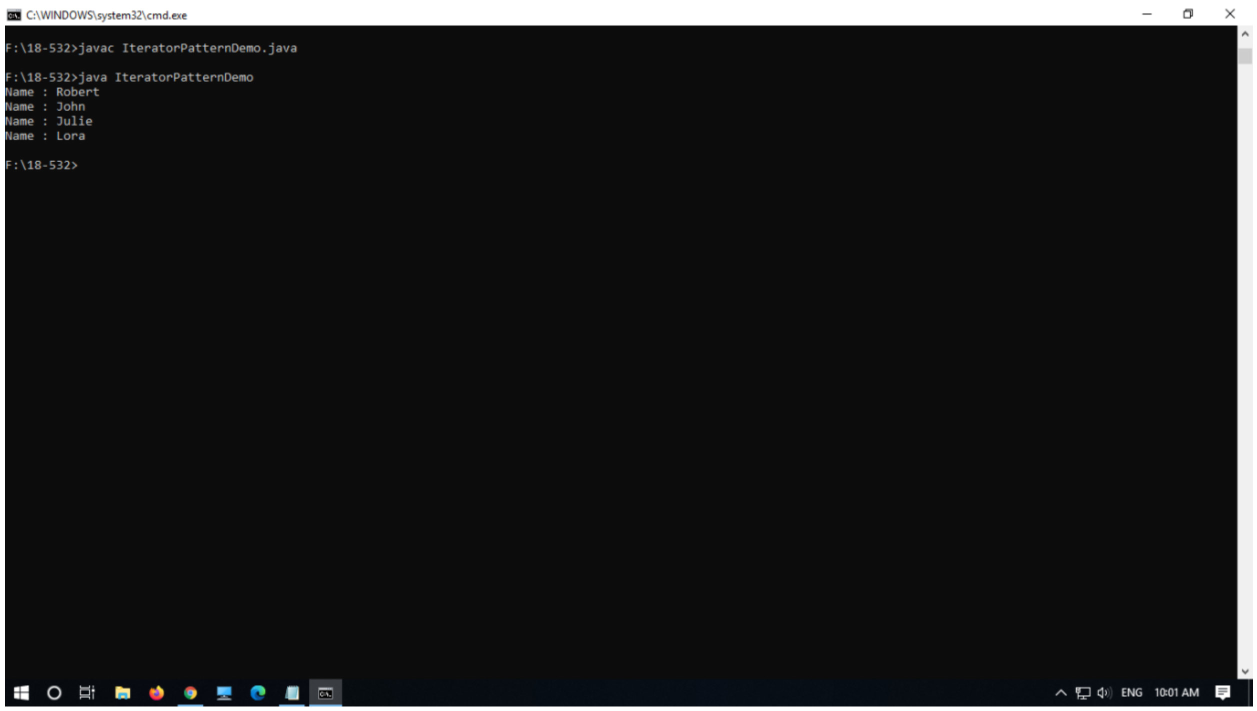


12.Iteratordesign pattern

Program:

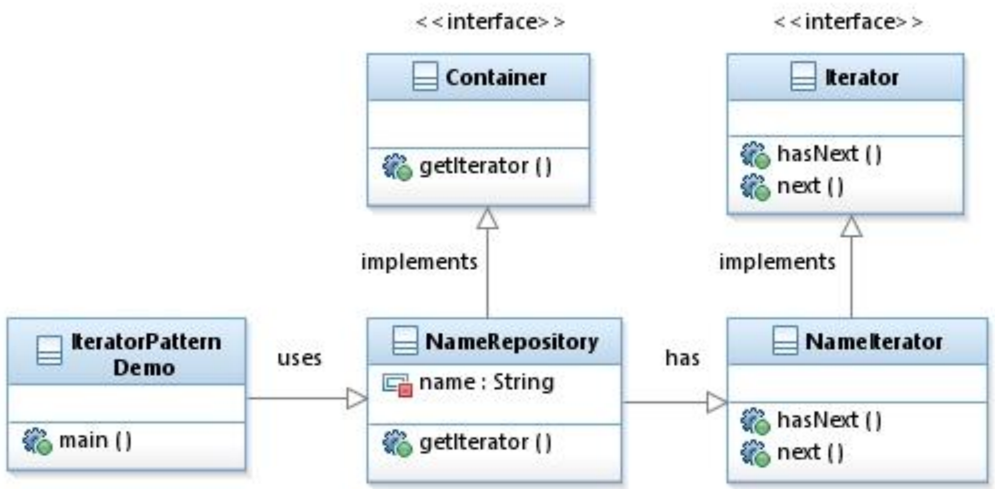
```
interface Iterator {
   public boolean hasNext();
   public Object next();
}
interface Container {
   public Iterator getIterator();
}
class NameRepository implements Container {
   public String names[] = {"Robert" , "John" ,"Julie" , "Lora"};

   @Override
   public Iterator getIterator() {
      return new NameIterator();
   }

   private class NameIterator implements Iterator {
    int index;
    @Override
      public boolean hasNext() {
      if(index < names.length){
            return true;
         }
         return false;
      }

      @Override

      public Object next() {

      if(this.hasNext()){

            return names[index++];

         }

         return null;

      }

   }

}

public class IteratorPatternDemo {

            public static void main(String[] args) {

      NameRepository namesRepository = new NameRepository();


      for(Iterator iter = namesRepository.getIterator(); iter.hasNext();){

         String name = (String)iter.next();

         System.out.println("Name : " + name);

      }

   }

}
```

Output:



```
F:\18-532>javac IteratorPatternDemo.java

F:\18-532>java IteratorPatternDemo
Name : Robert
Name : John
Name : Julie
Name : Lora

F:\18-532>
```

Diagrams:



13.Mediator:

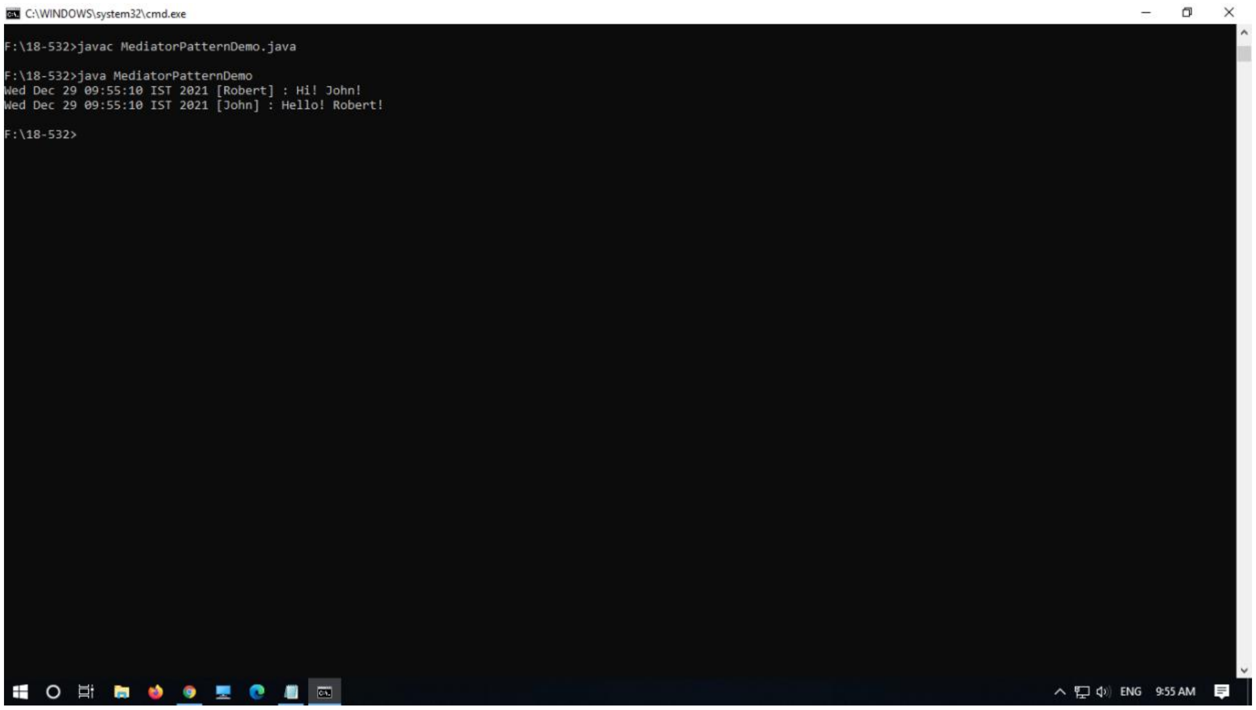
Program:

```
import java.util.Date;

class ChatRoom {
  public static void showMessage(User user, String message){
    System.out.println(new Date().toString() + " [" + user.getName() + "] : " + message);
  }
}
class User {
  private String name;
public String getName() {
    return name;
  }
public void setName(String name) {
    this.name = name;
  }
public User(String name){
    this.name  = name;
  }
public void sendMessage(String message){
    ChatRoom.showMessage(this,message);
  }
}
public class MediatorPatternDemo {
  public static void main(String[] args) {
    User robert = new User("Robert");
    User john = new User("John");
    robert.sendMessage("Hi! John!");
    john.sendMessage("Hello! Robert!");
```

  }

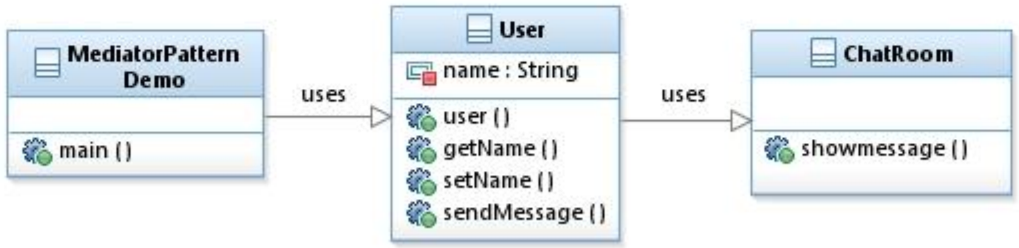
}

Output:



```
F:\18-532>javac MediatorPatternDemo.java

F:\18-532>java MediatorPatternDemo
Wed Dec 29 09:55:10 IST 2021 [Robert] : Hi! John!
Wed Dec 29 09:55:10 IST 2021 [John] : Hello! Robert!

F:\18-532>
```

Diagram:



14.Proxy:

Program:

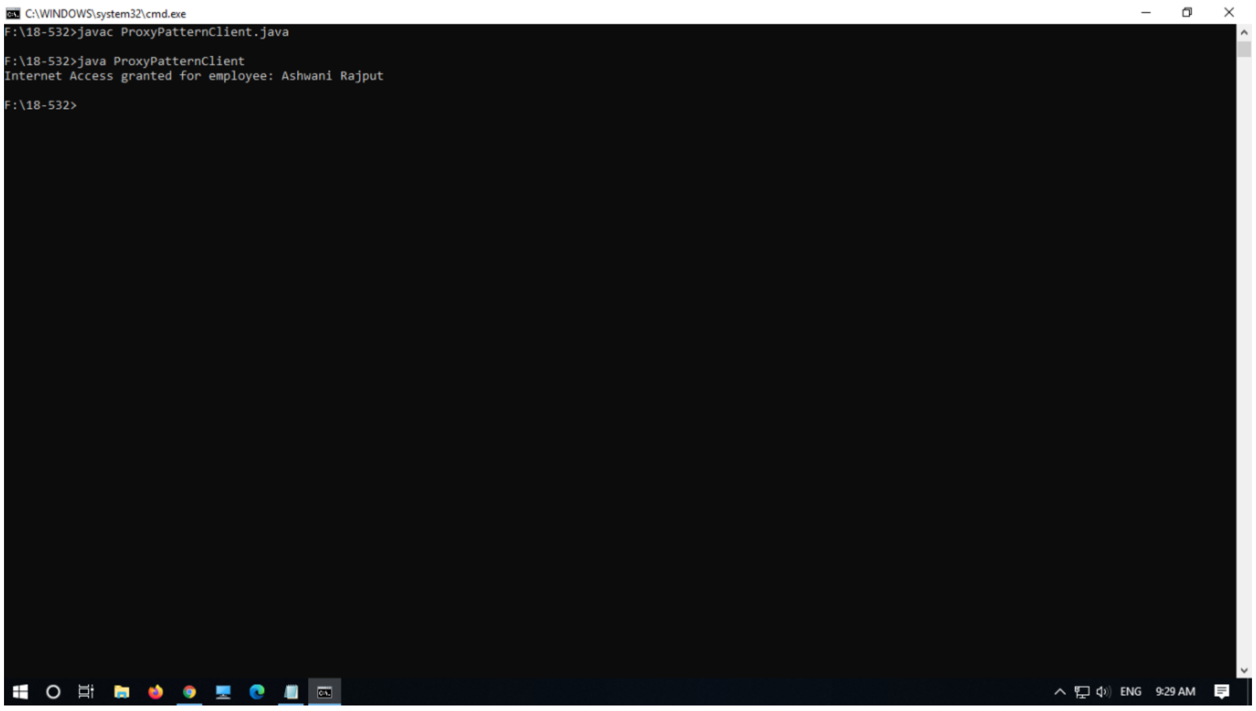
interface OfficeInternetAccess {

public void grantInternetAccess();

}

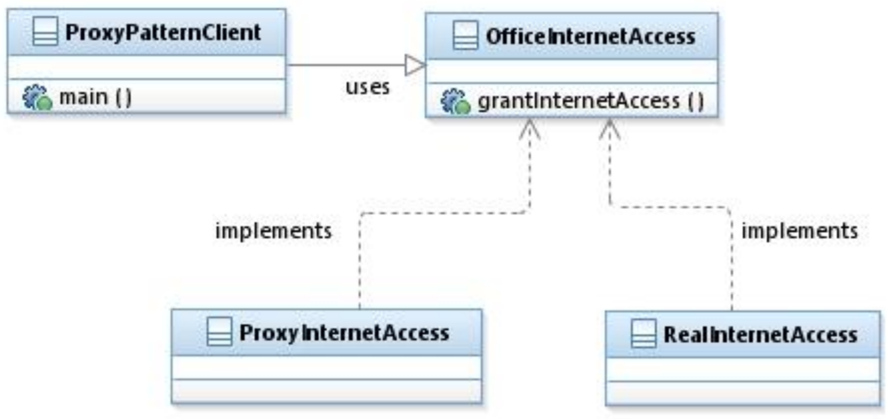
```
class RealInternetAccess implements OfficeInternetAccess {

private String employeeName;

public RealInternetAccess(String empName) {

this.employeeName = empName;

}

public void grantInternetAccess() {

System.out.println("Internet Access granted for employee: "+ employeeName);

}

}

class ProxyInternetAccess implements OfficeInternetAccess {

private String employeeName;

private RealInternetAccess realaccess;

public ProxyInternetAccess(String employeeName) {

this.employeeName = employeeName;

}

public void grantInternetAccess()

{

if (getRole(employeeName) > 4)

{

realaccess = new RealInternetAccess(employeeName);

realaccess.grantInternetAccess();

}

else

{

System.out.println("No Internet access granted. Your job level is below 5");
}

}

public int getRole(String emplName) {

return 9;

}

}

public class ProxyPatternClient{


public static void main(String[] args)

{

OfficeInternetAccess access = new ProxyInternetAccess("Ashwani Rajput");

access.grantInternetAccess();

}

}
```

Output:



```
F:\18-532>javac ProxyPatternClient.java

F:\18-532>java ProxyPatternClient
Internet Access granted for employee: Ashwani Rajput

F:\18-532>
```

Diagram:



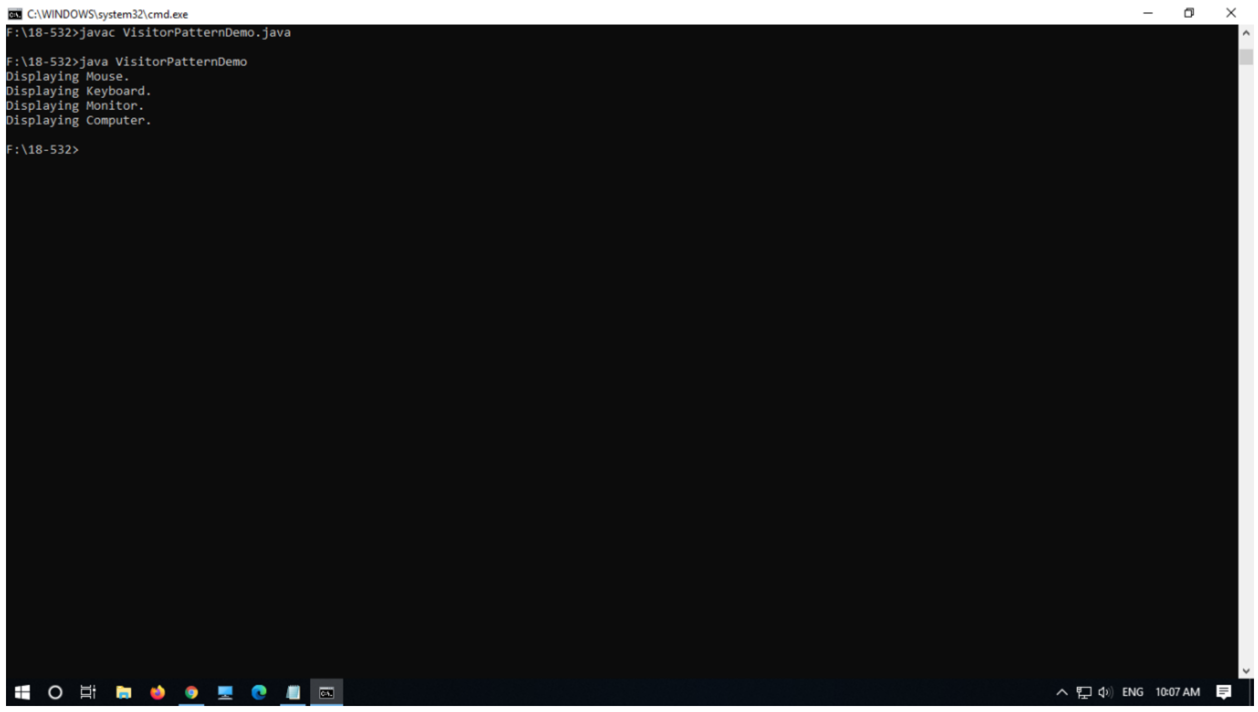
15.Visitor:

Program:

```
interface ComputerPart {
  public void accept(ComputerPartVisitor computerPartVisitor);
}
class Keyboard implements ComputerPart {

  @Override
  public void accept(ComputerPartVisitor computerPartVisitor) {
    computerPartVisitor.visit(this);
  }
}
class Monitor implements ComputerPart {

  @Override
  public void accept(ComputerPartVisitor computerPartVisitor) {
    computerPartVisitor.visit(this);
  }

}

class Mouse implements ComputerPart {


  @Override

  public void accept(ComputerPartVisitor computerPartVisitor) {

    computerPartVisitor.visit(this);

  }

}

class Computer implements ComputerPart {


  ComputerPart[] parts;


  public Computer(){

    parts = new ComputerPart[] {new Mouse(), new Keyboard(), new Monitor()};

  }

 @Override

  public void accept(ComputerPartVisitor computerPartVisitor) {

    for (int i = 0; i < parts.length; i++) {

      parts[i].accept(computerPartVisitor);

    }

    computerPartVisitor.visit(this);

  }

}

interface ComputerPartVisitor {
```

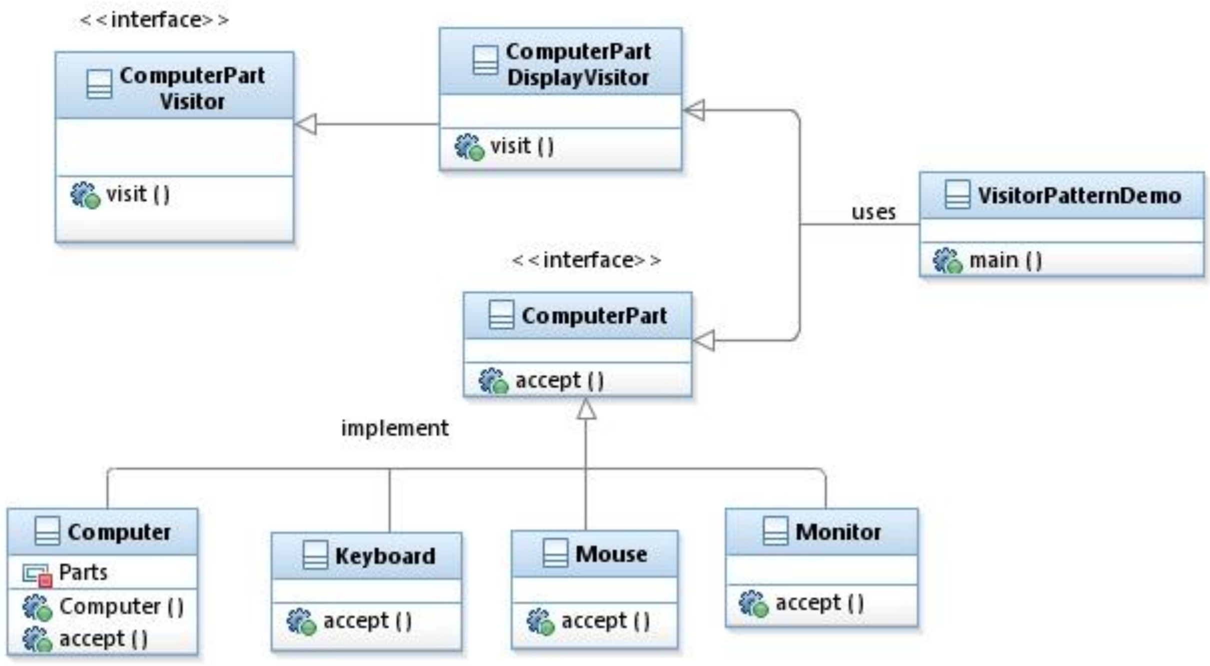
```
            public void visit(Computer computer);

            public void visit(Mouse mouse);

            public void visit(Keyboard keyboard);

            public void visit(Monitor monitor);

}

class ComputerPartDisplayVisitor implements ComputerPartVisitor {


  @Override

  public void visit(Computer computer) {

    System.out.println("Displaying Computer.");

  }


  @Override

  public void visit(Mouse mouse) {

    System.out.println("Displaying Mouse.");

  }


  @Override

  public void visit(Keyboard keyboard) {

    System.out.println("Displaying Keyboard.");

  }


  @Override

  public void visit(Monitor monitor) {

    System.out.println("Displaying Monitor.");
  }

}

public class VisitorPatternDemo {

  public static void main(String[] args) {



    ComputerPart computer = new Computer();

    computer.accept(new ComputerPartDisplayVisitor());

  }

}
```

Output:



```
F:\18-532>javac VisitorPatternDemo.java

F:\18-532>java VisitorPatternDemo
Displaying Mouse.
Displaying Keyboard.
Displaying Monitor.
Displaying Computer.

F:\18-532>
```

Diagram:



<<interface>>
ComputerPart Visitor
visit ()
ComputerPart DisplayVisitor
visit ()
uses
VisitorPatternDemo
main ()
<<interface>>
ComputerPart
accept ()
implement
Computer
Parts
Computer ()
accept ()
Keyboard
accept ()
Mouse
accept ()
Monitor
accept ()