设计思路：1 对于服务员打蔡和学生点餐，同时对菜品采用不同的操作所以使用访问者模式
2 对于食堂学生在食堂可以找座位，选窗口排队等，把这些功能整合到一个食堂类中，学生调用食堂类提供的接口采用外观模式
3 学生点餐需要排队，排队可以看成学生的集合，对集合进行遍历采用迭代器模式
4 食堂的窗口有的比较高级，有的比较差，考虑可以对窗口进行升级因此采用了装饰模式，同理食堂也可以进行升级，对食堂也采用装饰模式。

源码架构：

```
import java.util.ArrayList;

public abstract class DiningHall {
    protected ArrayList<Window> windows = new ArrayList<Window>();
    protected SeatIterator  seats;
    public void setSeats(SeatIterator seats) {
        this.seats = seats;
    }
    public void addSeat(Seat s) {
        this.seats.addSeat(s);
    }
    public void addWindow(Window w) {
        this.windows.add(w);
    }
    abstract public Seat findSeat();
    public abstract void lineup(int windownumber,Student s);
    public abstract void process();
}

abstract public class DiningHallDecorator extends DiningHall {
    protected DiningHall dininghall;
     DiningHallDecorator(DiningHall dininghall){
         this.dininghall = dininghall;
     }
}
public class TAODiningHall extends DiningHall {

    @Override
    public Seat findSeat() {
        // TODO 自动生成的方法存根
        Seat s = this.seats.getEmptySeat();
        if(s == null ) {
            System.out.println("没座位了");
            return null;
        }
        return s;
    }

    @Override
    public void lineup(int windownumber,Student s) {
```

```
        // TODO 自动生成的方法存根
        if(windownumber>= this.windows.size()) {
            System.out.println("没有这个窗口");
            return;
        }
        this.windows.get(windownumber).addStudent(s);
    }

    @Override
    public void process() {
        // TODO 自动生成的方法存根
        // 调用每个窗口的process函数
        int i =0;
        for(Window w:this.windows) {
            System.out.println("窗口"+i+"工作中");
            w.process();
            i++;
        }
    }

}
public class MEIDiningHall extends DiningHallDecorator {

    public MEIDiningHall(DiningHall dininghall) {
        super(dininghall);
        // TODO 自动生成的构造函数存根
    }

    @Override
    public Seat findSeat() {
        // TODO 自动生成的方法存根
        System.out.println("梅园的椅子更加舒适");
        return this.dininghall.findSeat();
    }

    @Override
    public void lineup(int windownumber, Student s) {
        // TODO 自动生成的方法存根
        this.dininghall.lineup(windownumber, s);
    }

    @Override
    public void process() {
        // TODO 自动生成的方法存根
```

```
        System.out.println("梅园的饭菜更加可口，服务更好，打的菜更多");
        this.dininghall.process();
    }

}
public class Seat {
    protected boolean state =false;

    public boolean getState() {
        return state;
    }

    public void setState(Boolean state) {
        this.state = state;
    }



}
import java.util.ArrayList;

public class SeatList {
    protected ArrayList<Seat> seats = new ArrayList<Seat>();
    public SeatList() {
        int i=0;
        for(i=0;i<3;i++) {
            seats.add(new Seat());   //默认有3把椅子
        }
    }
    public SeatIterator createSeatIterator() {
        return new  SeatIterator();
    }
    class SeatIterator{      //迭代器模式
        public Seat getEmptySeat() {
            Seat currentSeat = null;
            for(Seat s :seats) {
                if(s.getState()) { //如果是空的
                    currentSeat =s;
                }
            }
            return currentSeat;
        }
        public void addSeat(Seat s) {
            seats.add(s);
```

```
        }
    }
}
public abstract class Window {
    protected Visitor server;
    public void setServer(Visitor server) {
        this.server = server;
    }
    private StudentQueue sq = new StudentQueue();
    protected QueueIterator queue = this.sq.createQueueIterator();
    public void setQueue(QueueIterator queue) {
        this.queue = queue;
    }
    protected HashMap<String,Food> foodList = new HashMap<String,Food>() ;
//采用哈希表将Food对象和 Food名称（字符串）相匹配，为了符合模拟场景，这个用在
process函数和student类的takeorder函数中
    public void addFood(Food f) {
        this.foodList.put(f.getName(), f);
    }
    public void addStudent(Student s) {
        this.queue.addStudent(s);
    }
    public int getNum() {
        return this.queue.getNum();
    }
    abstract public void process();      //按顺序排队点餐函数，由子类实现
}
public abstract class WindowDecorator extends Window {
    protected Window window;
    public WindowDecorator(Window w){
        this.window = w;
    }
}


public class BaseWindow extends Window {

    @Override
    public void process() {
        // TODO 自动生成的方法存根
        do{
            Student currentStudent = this.queue.currentStudent();
            if (currentStudent==null) {
                return;
```

```
            }
            String foodName = currentStudent.takeOrder();      //设置hash表和
student里的 wishFood就是为了这里
            Food f = this.foodList.get(foodName);
            if(f==null) {
                System.out.println("没有学生想要吃的菜");
            }else {
                f.accept(currentStudent);            //访问者模式
                f.accept(this.server);
            }
            System.out.println("请下一位学生取餐");
        }while(this.queue.next());
    }

}
package DiningHallSimulate;

public class AdvancedWindow extends WindowDecorator {

    public AdvancedWindow(Window w) {
        super(w);
        // TODO 自动生成的构造函数存根
    }

    @Override
    public void process() {
        // TODO 自动生成的方法存根
        System.out.println("窗口前有显示所有菜品的LED屏幕");
        this.window.process();
    }

}

public abstract class Food {
    protected Double price;
    public Double getPrice() {
        return price;
    }
    public String getName() {
        return name;
    }
    protected String name;
    public Food(Double price,String name) {
        this.price = price;
```

```
        this.name = name;
    }
    abstract public void accept(Visitor v);
}
public class HangMenJi extends Food {

    public HangMenJi(Double price, String name) {
        super(price, name);
        // TODO 自动生成的构造函数存根
    }

    @Override
    public void accept(Visitor v) {
        // TODO 自动生成的方法存根
        v.visit(this);
    }

}
public class DiaoZhaBing extends Food {

    public DiaoZhaBing(Double price, String name) {
        super(price, name);
        // TODO 自动生成的构造函数存根
    }

    @Override
    public void accept(Visitor v) {
        // TODO 自动生成的方法存根
        v.visit(this);
    }

}

public class NiuRouMian extends Food {

    public NiuRouMian(Double price, String name) {
        super(price, name);
        // TODO 自动生成的构造函数存根
    }

    @Override
    public void accept(Visitor v) {
        // TODO 自动生成的方法存根
        v.visit(this);
```

```
    }

}

public abstract interface Visitor {
    public abstract void visit(HangMenJi f);
    public abstract void visit(DiaoZhaBing f);
    public abstract void visit(NiuRouMian f);
}
public class Server implements Visitor {
    //食堂工作人员类
    @Override
    public void visit(HangMenJi f) {
        // TODO 自动生成的方法存根
        System.out.println("食堂工作人员打了"+f.getName());
    }

    @Override
    public void visit(DiaoZhaBing f) {
        // TODO 自动生成的方法存根
        System.out.println("食堂工作人员打了"+f.getName());
    }

    @Override
    public void visit(NiuRouMian f) {
        // TODO 自动生成的方法存根
        System.out.println("食堂工作人员打了"+f.getName());
    }

}
public class Student implements Visitor {
    private String name;
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public PayMethod getPayMethod() {
        return payMethod;
    }
    public void setPayMethod(PayMethod payMethod) {
        this.payMethod = payMethod;
    }
```

```
    private PayMethod payMethod;
    public String wishFood=null;

    public Student(String name) {
        this.name=name;
    }
    @Override
    public void visit(HangMenJi f) {
        // TODO 自动生成的方法存根
        System.out.println("学生点了"+f.getName());
        this.pay(f.price);
    }

    @Override
    public void visit(DiaoZhaBing f) {
        // TODO 自动生成的方法存根
        System.out.println("学生点了"+f.getName());
        this.pay(f.price);
    }

    @Override
    public void visit(NiuRouMian f) {
        // TODO 自动生成的方法存根
        System.out.println("学生点了"+f.getName());
        this.pay(f.price);
    }

    //点餐函数
    public String takeOrder() {
        //这个函数从学生出获得想要吃的食物的名称...这里假设从类里的一个变量获得,
这个变量可以随便指定
        return this.wishFood;
    }
    //付钱
    public void pay(Double d) {
        this.payMethod.pay(d);
    }
}
public class StudentQueue {
    private ArrayList<Student> students=new ArrayList<Student>();
    public QueueIterator createQueueIterator() {
        return new QueueIterator();
    }
```

```
    class QueueIterator{
        public boolean next() {
            if(!students.isEmpty()) {
                students.remove(0);
                return true;
            }else {
                System.out.println("没有学生排队了");
                return false;
            }
        }
        public Student currentStudent() {
            if(! students.isEmpty()) {
                return students.get(0);
            }else {
                System.out.println("没有学生排队了");
                return null;
            }
        }
        public void addStudent(Student s) {
            students.add(s);
        }
        public int getNum() {
            return students.size();
        }
    }
}
public abstract interface PayMethod {
    abstract public void pay(Double d);
}

public class Cash implements PayMethod {

    @Override
    public void pay(Double d) {
        // TODO 自动生成的方法存根
        System.out.println("使用现金支付了 "+d+" 元");
    }

}
public class Card implements PayMethod {

    @Override
    public void pay(Double d) {
        // TODO 自动生成的方法存根
```

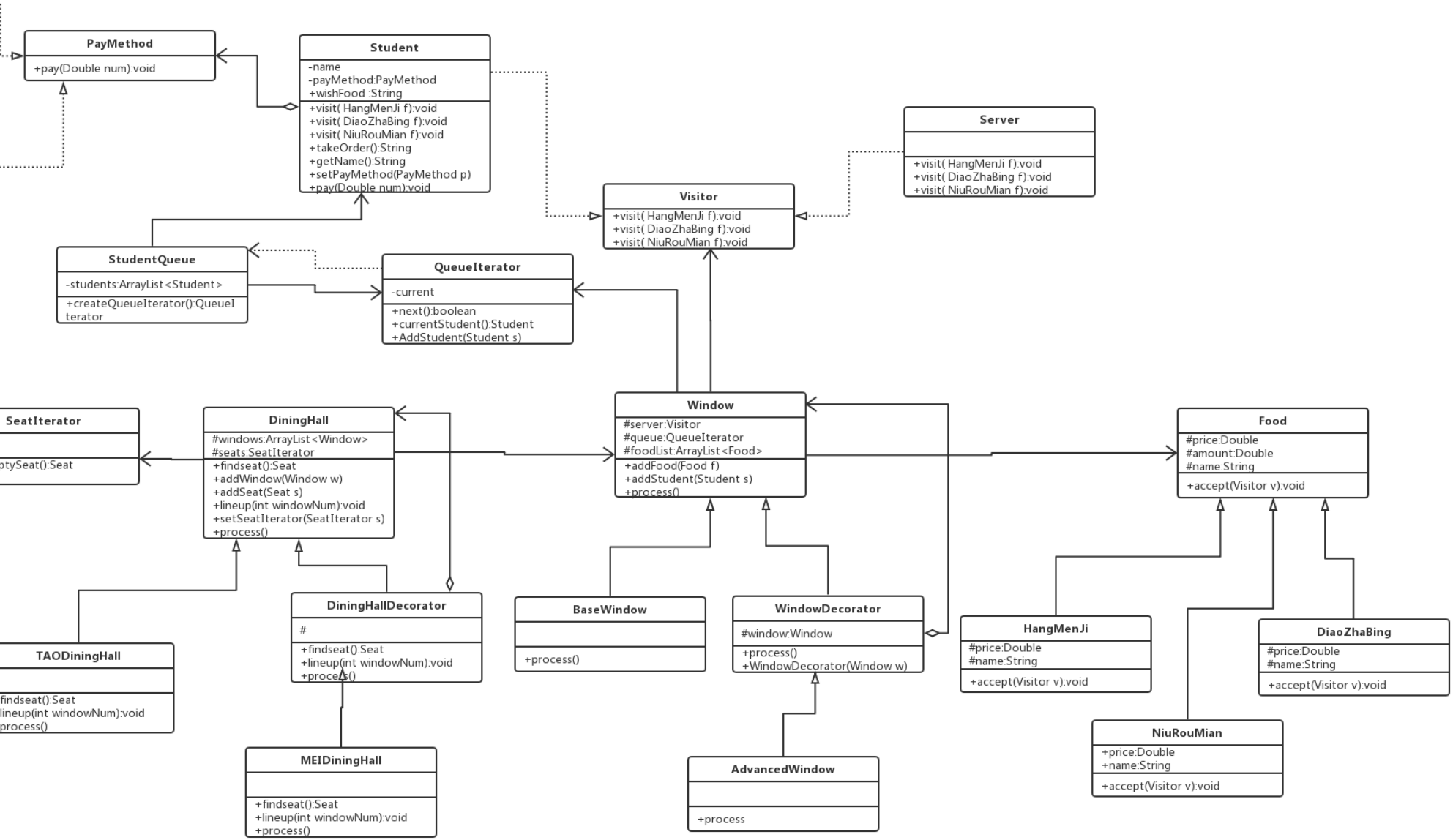
```
        System.out.println("使用校园卡支付了 "+d+" 元");
    }

}
public class test {



    public static void main(String[] args) {
        // TODO 自动生成的方法存根
        //测试类
        //菜品 有三种 黄焖鸡 掉渣饼和牛肉面
        HangMenJi food1 = new HangMenJi(13.0, "黄焖鸡");
        DiaoZhaBing food2 = new DiaoZhaBing(11.5, "掉渣饼");
        NiuRouMian food3 = new NiuRouMian(10.0,"牛肉面");
        //食堂
        //桃园食堂
        TAODiningHall taoyuan = new TAODiningHall();
        //假设有2个窗口
        BaseWindow w1 = new BaseWindow();
        BaseWindow tempW = new BaseWindow();
        BaseWindow w2 = new  BaseWindow();  //窗口2 比窗口1更加高级 装饰模式
        //一个窗口有一个厨师
        Server s1 = new Server();
        Server s2 = new Server();
        //设置窗口服务员和菜品
        w1.setServer(s1);
        w2.setServer(s2);
        w1.addFood(food1); //窗口1 卖黄焖鸡
        w2.addFood(food2); //窗口 2、3买掉渣饼和牛肉面
        w2.addFood(food3);
        //设置椅子
        SeatList seats1 = new SeatList();
        SeatList seats2 = new SeatList();
        seats2.createSeatIterator().addSeat(new Seat()); //添加椅子
        //组装桃园食堂
        taoyuan.setSeats(seats1.createSeatIterator());
        //taoyuan.addWindow(w1);
        taoyuan.addWindow(w2);
        // 梅园食堂配置和桃园食堂基本相似只是增加了一些新的功能
        MEIDiningHall meiyuan = new MEIDiningHall(taoyuan);

        //学生
        //付款方式
```

```
        Cash cash = new Cash();
        Card card = new Card();
        Student student1 = new Student("小王");
        student1.setPayMethod(card);
        student1.wishFood="黄焖鸡";
        Student  student2 = new Student("小明");
        student2.setPayMethod(card);
        student2.wishFood="牛肉面";
        Student student3 = new Student("小刚");
        student3.setPayMethod(cash);
        student3.wishFood="掉渣饼";
        //学生去食堂吃饭了
        taoyuan.lineup(0, student1);
        taoyuan.lineup(0, student2);
        taoyuan.lineup(0, student3);
        //开始点餐 一个个顺序进行，没有用多线程
        System.out.println("------------------------桃园----------------------
-------");
        taoyuan.process();

    }

}
```

部分结果

```
------------------------桃园----------------------------
窗口0工作中
没有学生想要吃的菜
请下一位学生取餐
学生点了牛肉面
使用校园卡支付了 10.0 元
食堂工作人员打了牛肉面
请下一位学生取餐
学生点了掉渣饼
使用现金支付了 11.5 元
食堂工作人员打了掉渣饼
请下一位学生取餐
没有学生排队了
```

UML 图


PayMethod
+pay(Double num):void
Student
-name
-payMethod:PayMethod
+wishFood :String
+visit(HangMenJi f):void
+visit(DiaoZhaBing f):void
+visit(NiuRouMian f):void
+takeOrder():String
+getName():String
+setPayMethod(PayMethod p)
+pay(Double num):void
Server
+visit(HangMenJi f):void
+visit(DiaoZhaBing f):void
+visit(NiuRouMian f):void
Visitor
+visit(HangMenJi f):void
+visit(DiaoZhaBing f):void
+visit(NiuRouMian f):void
StudentQueue
-students:ArrayList<Student>
+createQueueIterator():QueueIterator
QueueIterator
-current
+next():boolean
+currentStudent():Student
+AddStudent(Student s)
SeatIterator
ptySeat():Seat
DiningHall
#windows:ArrayList<Window>
#seats:SeatIterator
+findseat():Seat
+addWindow(Window w)
+addSeat(Seat s)
+lineup(int windowNum):void
+setSeatIterator(SeatIterator s)
+process()
Window
#server:Visitor
#queue:QueueIterator
#foodList:ArrayList<Food>
+addFood(Food f)
+addStudent(Student s)
+process()
Food
#price:Double
#amount:Double
#name:String
+accept(Visitor v):void
TAODiningHall
findseat():Seat
lineup(int windowNum):void
process()
DiningHallDecorator
#
+findseat():Seat
+lineup(int windowNum):void
+process()
BaseWindow
+process()
WindowDecorator
#window:Window
+process()
+WindowDecorator(Window w)
HangMenJi
#price:Double
#name:String
+accept(Visitor v):void
DiaoZhaBing
#price:Double
#name:String
+accept(Visitor v):void
NiuRouMian
+price:Double
+name:String
+accept(Visitor v):void
MEIDiningHall
+findseat():Seat
+lineup(int windowNum):void
+process()
AdvancedWindow
+process