Министерство образования Республики Беларусь

Учреждение образования

«Брестский государственный технический университет»

Кафедра ИИТ

Лабораторная работа №5

По дисциплине «Современные платформы программирования»

Выполнила:

Студентка 3 курса

Группы ПО-3

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Цель работы:

Приобрести практические навыки в области объектно-ориентированного проектирования.

Вариант 9

Постановка задачи:

Задание 1:

Вариант 9

Реализовать абстрактные классы или интерфейсы, а также наследование и полиморфизм для следующих классов:

interface Корабль ← class Грузовой Корабль ← class Танкер

Задание 2:

В следующих заданиях требуется создать суперкласс (абстрактный класс, интерфейс) и определить общие методы для данного класса. Создать подклассы, в которых добавить специфические свойства и методы. Часть методов переопределить. Создать массив объектов суперкласса и заполнить объектами подклассов. Объекты подклассов идентифицировать конструктором по имени или идентификационному номеру. Использовать объекты подклассов для моделирования реальных ситуаций и объектов.

Создать суперкласс Транспортное средство и подклассы Автомобиль, Велосипед, Повозка. Подсчитать время и стоимость перевозки пассажиров и грузов каждым транспортным средством.

Задание 3:

В задании 3 ЛР No4, где возможно, заменить объявления суперклассов объявлениями абстрактных классов или интерфейсов.

Ход работы

Текст программы:

Задание 1

Код программы

Main

```java
package com.company;

public class Main {

    public static void main(String[] args) {
        // by interface
        Ship cargoShipOne = new CargoShip();
        System.out.println("Cargo ship one: ");
        cargoShipOne.swim();
        cargoShipOne.load();
        cargoShipOne.weight();
        Ship tankerOne = new Tanker();
        System.out.println("Tanker one: ");
        tankerOne.swim();
        tankerOne.load();
        tankerOne.weight();
        System.out.println("");
        // by class
        CargoShip cargoShipTwo = new CargoShip();
        System.out.println("Cargo ship two: ");
        cargoShipTwo.swim();
        cargoShipTwo.load();
        cargoShipTwo.weight();
        cargoShipTwo.passengers();
        Tanker tankerTwo = new Tanker();
        System.out.println("Tanker two: ");
        tankerTwo.swim();
        tankerTwo.load();
        tankerTwo.typeOfGoods();
        tankerTwo.weight();
        tankerTwo.passengers();
    }
}
```

Ship

```java
package com.company;

public interface Ship {
    default void swim() {
        System.out.println("I can swim in the sea!");
    }
    void weight();
    void load();
}
```

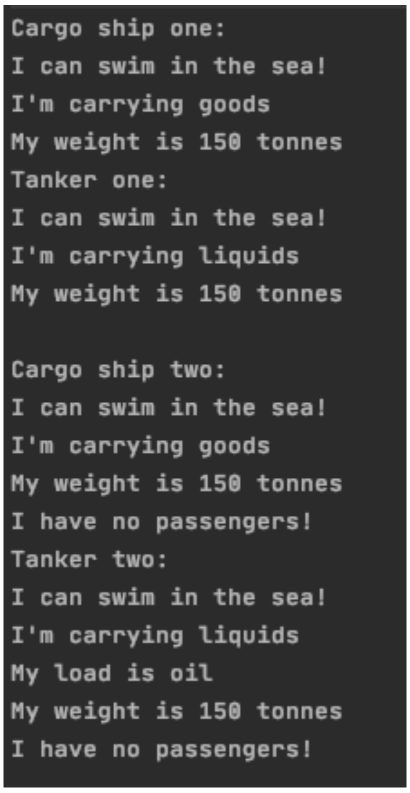
CargoShip

```java
package com.company;

public class CargoShip implements Ship {
    @Override
    public void load() {
        System.out.println("I'm carrying goods");
    }
    @Override
    public void weight() {
        System.out.println("My weight is 150 tonnes");
    }
    public void passengers(){
        System.out.println("I have no passengers!");
    }
}
```

Tanker

```java
package com.company;

public class Tanker extends CargoShip {
    public void typeOfGoods() { System.out.println("My load is oil");
    }
    @Override
    public void load() {
        System.out.println("I'm carrying liquids");
    }
}
```

Рисунок с результатом работы программы



```
Cargo ship one:
I can swim in the sea!
I'm carrying goods
My weight is 150 tonnes
Tanker one:
I can swim in the sea!
I'm carrying liquids
My weight is 150 tonnes

Cargo ship two:
I can swim in the sea!
I'm carrying goods
My weight is 150 tonnes
I have no passengers!
Tanker two:
I can swim in the sea!
I'm carrying liquids
My load is oil
My weight is 150 tonnes
I have no passengers!
```

Задание 2
Код программы

Main
```
package com.company;
import java.util.ArrayList;

public class Main {
        public static final int DISTANCE = 70;

        public static void main(String[] args) {
            ArrayList<Vehicle> vehicles = new ArrayList<>();
            Car car = new Car("Skoda", 60);
            vehicles.add(car);
            car.sayBeep();
            Bicycle bicycle = new Bicycle("Mustang", 15);
            vehicles.add(bicycle);
            bicycle.sayDing();
            Wagon wagon = new Wagon(12, 25);
            vehicles.add(wagon);
            wagon.sayCap();
            for (int i = 0; i < vehicles.size(); i++) {
                System.out.println("");
                System.out.println("Vehicle: " +
vehicles.get(i).toString());
                System.out.println("Distance: " + DISTANCE + " kms");
                System.out.println("Time: " +
vehicles.get(i).rideTime(DISTANCE) + " hours");
                System.out.println("Cost for person: " +
vehicles.get(i).rideCost(DISTANCE) + " dollars");
                System.out.println("Cost for goods: " +
vehicles.get(i).loadCost(DISTANCE) + " dollars");
                vehicles.get(i).ride();
            }
        }
}
```

Vehicle
```
package com.company;

public interface Vehicle {
    default void ride() { System.out.println("Let's go!");
    }
    double rideTime(double distance);
    double rideCost(double distance);
    double loadCost(double distance);
}
```

Car
```
package com.company;

public class Car implements Vehicle {
    private String name;
    private double speed;
    private double cargoCoeff;
    private double personCoeff;
    private double seatsAmount;
    public Car(String name, double speed) { this.name = name;
```

```java
        this.speed = speed;
        this.cargoCoeff = 2.5; this.personCoeff = 1.75; this.seatsAmount =
4;
    }
    public void sayBeep() { System.out.println("Beep-beep!");
    }
    @Override
    public double rideTime(double distance) {
        return distance / this.speed;
    }

    @Override
    public double rideCost(double distance) {
        return distance * personCoeff;
    }

    @Override
    public double loadCost(double distance) {
        return distance * cargoCoeff;
    }
    @Override
    public String toString() {
        return "Car{" + "name='" + name + '\'' + '}';
    }
}
```

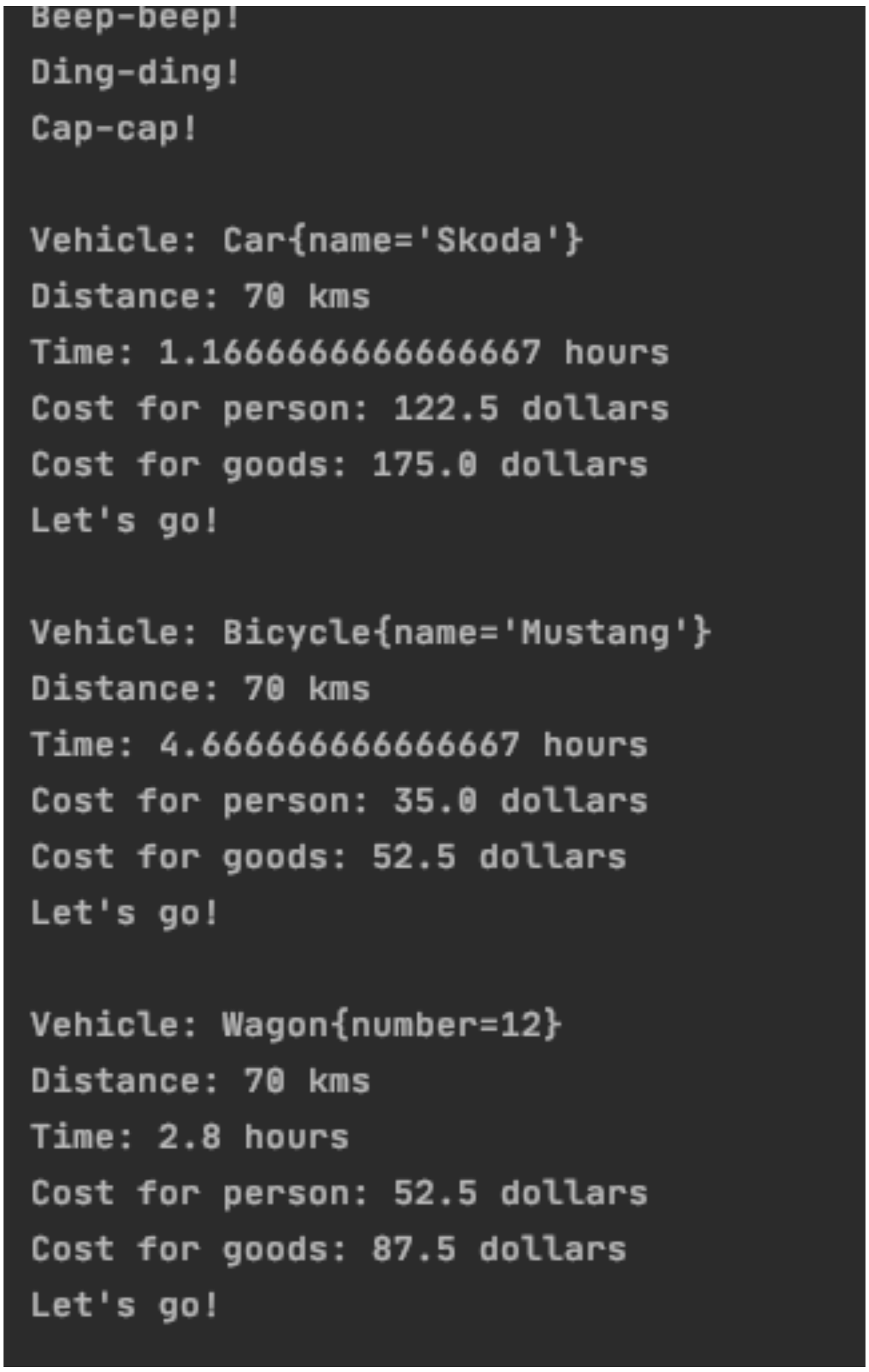
Wagon

```java
package com.company;

public class Wagon implements Vehicle {

    private int number;
    private double speed;
    private double cargoCoeff;
    private double personCoeff;
    private double horseAmount;

    public Wagon(int number, double speed) {
        this.number = number;
        this.speed = speed;
        this.cargoCoeff = 1.25;
        this.personCoeff = 0.75;
        this.horseAmount = 4;
    }

    public void sayCap() {
        System.out.println("Cap-cap!");
    }
    @Override
    public double rideTime(double distance) {
        return distance / this.speed;
    }
    @Override
    public double rideCost(double distance) {
        return distance * personCoeff;
    }
    @Override
    public double loadCost(double distance) {
        return distance * cargoCoeff;
    }
    @Override
    public String toString() {
        return "Wagon{" + "number=" + number + '}';
    }
}
```

Bicycle

```
package com.company;

public class Bicycle implements Vehicle {
    private String name;
    private double speed;
    private double cargoCoeff;
    private double personCoeff;

    public Bicycle(String name,double speed){
        this.name = name;
         this.speed = speed;
         this.cargoCoeff = 0.75;
         this.personCoeff = 0.5;
    }

    public void sayDing() {
        System.out.println("Ding-ding!");
    }
    @Override
    public double rideTime(double distance) {
        return distance / this.speed;
    }
    @Override
    public double rideCost(double distance) {
        return distance * personCoeff;
    }
    @Override
    public double loadCost(double distance) {
        return distance * cargoCoeff;
    }

    @Override
    public String toString() {
        return "Bicycle{" + "name='" + name + '\'' + '}';
    }
}
```

Рисунок с результатом работы программы



```
Beep-beep!
Ding-ding!
Cap-cap!

Vehicle: Car{name='Skoda'}
Distance: 70 kms
Time: 1.1666666666666667 hours
Cost for person: 122.5 dollars
Cost for goods: 175.0 dollars
Let's go!

Vehicle: Bicycle{name='Mustang'}
Distance: 70 kms
Time: 4.666666666666667 hours
Cost for person: 35.0 dollars
Cost for goods: 52.5 dollars
Let's go!

Vehicle: Wagon{number=12}
Distance: 70 kms
Time: 2.8 hours
Cost for person: 52.5 dollars
Cost for goods: 87.5 dollars
Let's go!
```

Задание 3
Код программы

Person

```
package com.company;

public interface Person {
    void sayHello();
}
```

Admin

```
package com.company;
import java.time.LocalDateTime;
import java.time.format.DateTimeFormatter;
import java.util.ArrayList;

public class Admin implements Person {
    private RailwayCash railwayCash;

    @Override
    public void sayHello() {
        System.out.println("Hello! I'm an admin. I'm ready to help you.");
    }
    public Admin(RailwayCash railwayCash) { this.railwayCash = railwayCash;
    }
    public void addTrain(
            String dayAndTime,
            Integer number,
            Integer seatsAmount,
            ArrayList<String> stations,
            Float pricePerSeat
    ) {
        DateTimeFormatter formatter = DateTimeFormatter.ofPattern("yyyy-MM-
dd HH:mm");
        Train train = new Train(
                LocalDateTime.parse(dayAndTime, formatter),
                number,
                seatsAmount,
                stations,
                pricePerSeat
        );
        railwayCash.addTrains(train); }
}
```

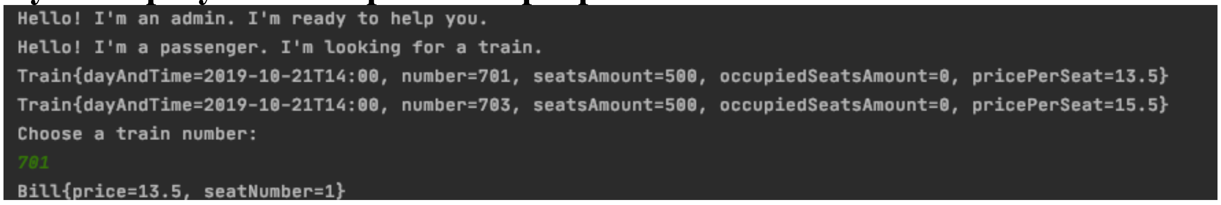
Passenger

```
package com.company;

import java.time.LocalDateTime;
import java.time.format.DateTimeFormatter;
import java.util.ArrayList;
import java.util.Scanner;

public class Passenger implements Person {
    @Override
    public void sayHello() {
        System.out.println("Hello! I'm a passenger. I'm looking for a
train.");
    }
        public Request createRequest(String destination, String date)
        {
            DateTimeFormatter formatter =
DateTimeFormatter.ofPattern("yyyy-MM-dd HH:mm");
            Request request = new Request();
            request.setDayAndTime(LocalDateTime.parse(date, formatter));
            request.setDestination(destination);
            return request;
        }
        public Bill chooseTrain(ArrayList<Train> trains) {
        Scanner scanner = new Scanner(System.in);
        for (Train train : trains) {
            System.out.println(train);
        }
        System.out.println("Choose a train number: ");
        Integer chosenNumber = scanner.nextInt();
        boolean trainIsNotFound = true;
        Train chosenTrain = null;
        for (int i = 0; i < trains.size() && trainIsNotFound; i++) {
            if (trains.get(i).getNumber().equals(chosenNumber)) {
                chosenTrain = trains.get(i);
                chosenTrain.reserveSeat();
                 trainIsNotFound = false;
             }
        }
        if (chosenTrain != null) {
        Bill bill = new Bill();
        bill.setPrice(chosenTrain.getPricePerSeat());
        bill.setSeatNumber(chosenTrain.getOccupiedSeatsAmount());
        return bill;
        } else {
            throw new RuntimeException("Train is not found!");
         }
    }
}
```

Main

```
package com.company;
import java.util.ArrayList;
import java.util.Arrays;

public class Main {

    public static void main(String[] args) {
        RailwayCash railwayCash = new RailwayCash();
        Admin admin = new Admin(railwayCash);
        admin.sayHello();
        admin.addTrain(
                "2019-10-21 14:00",
                701,
                500,
                new ArrayList<String>(Arrays.asList("Жабинка", "Берёза",
"Барановичи", "Минск")),
                13.50f
                );
        admin.addTrain(
                "2019-10-21 14:00",
                703,
                500,
                new ArrayList<String>(Arrays.asList("Барановичи", "Минск"
)),
                15.50f
        );
        Passenger passenger = new Passenger();
        passenger.sayHello();
        Request request = passenger.createRequest(
                "Барановичи",
                "2019-10-21 14:00");
        Bill bill =
passenger.chooseTrain(railwayCash.findTrainsByRequest(request));
        System.out.println(bill);
    }
}
```

Рисунок с результатом работы программы



```
Hello! I'm an admin. I'm ready to help you.
Hello! I'm a passenger. I'm looking for a train.
Train{dayAndTime=2019-10-21T14:00, number=701, seatsAmount=500, occupiedSeatsAmount=0, pricePerSeat=13.5}
Train{dayAndTime=2019-10-21T14:00, number=703, seatsAmount=500, occupiedSeatsAmount=0, pricePerSeat=15.5}
Choose a train number:
701
Bill{price=13.5, seatNumber=1}
```

Выводы:

Я приобрела практические навыки в области объектно-ориентированного проектирования.