Санкт-Петербургский Национальный Исследовательский Университет
Информационных Технологий, Механики и Оптики

Лабораторная работа №4

по дисциплине
«Программирование»

Вариант – 10765.9

Выполнил: Данилов Павел Юрьевич P3110
Преподаватель: Горбунов Михаил
Витальевич

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Описание предметной области, по которой должна быть построена объектная модель:

Бутылка между тем наклонилась от тряски больше, и вода полилась из нее тонкой струйкой. С удовольствием глотая эту сладкую, пахучую, приятно щиплющую за язык жидкость, Скуперфильд прикидывал в уме, во сколько обошлась бы ему газированная вода, если бы понадобилось уплатить за нее. Эту сумму он вычитал из суммы, затраченной на покупку пропавшей трости, и испытывал удовольствие оттого, что сумма пропажи как бы становилась меньше. Бутылка тем временем наклонялась больше, благодаря чему газированная вода текла не переставая. В соответствии с этим текли и мысли в голове Скуперфильда. Постепенно увлекшись, он стал мечтать о том, как было бы хорошо, если бы при каждой железнодорожной поездке ему удавалось выпить хотя бы бутылку газированной воды бесплатно. Разделив стоимость пропавшей трости на стоимость бутылки газированной воды с сиропом, он вычислил количество железнодорожных поездок, которые пришлось бы совершить, чтоб вернуть сумму денег, затраченных на покупку трости. Занимаясь этими приятными расчетами, Скуперфильд постепенно забыл о своих огорчениях и пришел в хорошее настроение. Как раз в этот момент бутылка окончательно опрокинулась и, полетев вниз, стукнула Скуперфильда по лбу. Потрогав ушибленный лоб, он убедился, что на этот раз отделался шишкой. Чувствуя, что боль от удара понемногу проходит, он успокоился и наконец заснул. Поезд между тем мчался вперед. Колеса мерно постукивали. Время тоже не стояло на месте. Когда Скуперфильд заснул, было далеко за полночь. Не прошло и двух часов, как впереди засветились огни Брехенвиля. Колеса застучали на стрелках. Поезд постепенно замедлил ход и вскоре остановился. Скуперфильд, однако, продолжал спать. Проводник забыл его разбудить и вспомнил об этом, лишь когда поезд уже отошел от станции. Чтоб избежать неприятных объяснений, он решил пока не будить Скуперфильда, а принялся тормошить его, как только поезд остановился на следующей станции, которая имела какое-то странное название -- "Паноптикум". В ответ на это Скуперфильд только отмахивался рукой и продолжал храпеть, словно не к нему обращались. Видя, что поезд скоро отойдет и от этой станции, проводник рассердился не на шутку и закричал Скуперфильду прямо в ухо: Услыхав, что ему придется за что-то платить, но не разобрав за что, Скуперфильд на минутку очнулся и, соскочив со скамьи, осовело уставился на проводника. Воспользовавшись этим, проводник схватил его за шиворот, подтащил к выходу и вытолкнул на перрон. Вернувшись обратно, он поднял валявшуюся на полу газету, достал из-под лавки цилиндр, набитый всякой всячиной, и, подойдя к двери, сунул все это в руки ошалевшему Скуперфильду. Скуперфильд хотел о чем-то спросить и уже раскрыл рот, но поезд как раз в это мгновение тронулся, и он так и остался на перроне с разинутым ртом. Незнайка и Козлик даже не слыхали, что произошло ночью. Они спали достаточно крепко, так как в предыдущую ночь им не удалось как следует выспаться из-за кинокошмаров. Уже давно рассвело, а они продолжали спать и, наверно, проехали бы Сан-Комарик, если бы проводник не разбудил их. Видя, что Незнайка и Козлик даже не пошевелились, он принялся стучать по их полкам стальными щипцами, которыми пользовался для пробивки билетов. Услышав стук, Незнайка и Козлик проснулись.

Программа должна удовлетворять следующим требованиям:

1. В программе должны быть реализованы 2 собственных класса исключений (checked и unchecked), а также обработка исключений этих классов.
2. В программу необходимо добавить использование локальных, анонимных и вложенных классов (static и non-static).

Отчет должен содержать:

1. Текст задания.
2. Диаграмма классов объектной модели.
3. Исходный код программы.
4. Результат работы программы.
5. Выводы по работе.

Диаграмма классов объектной модели

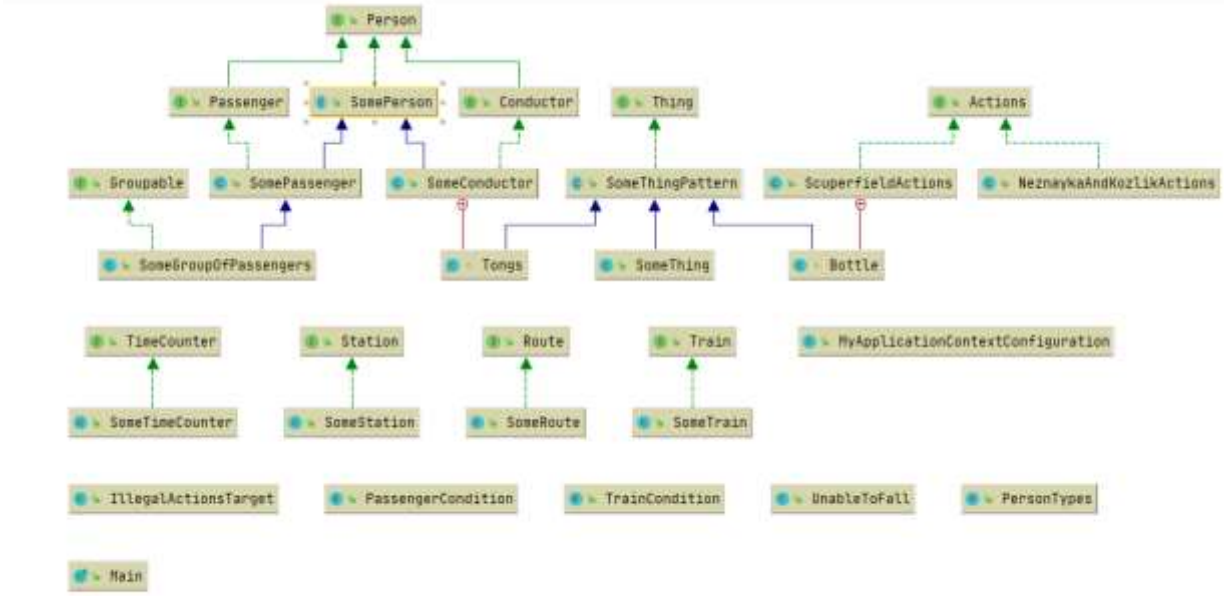
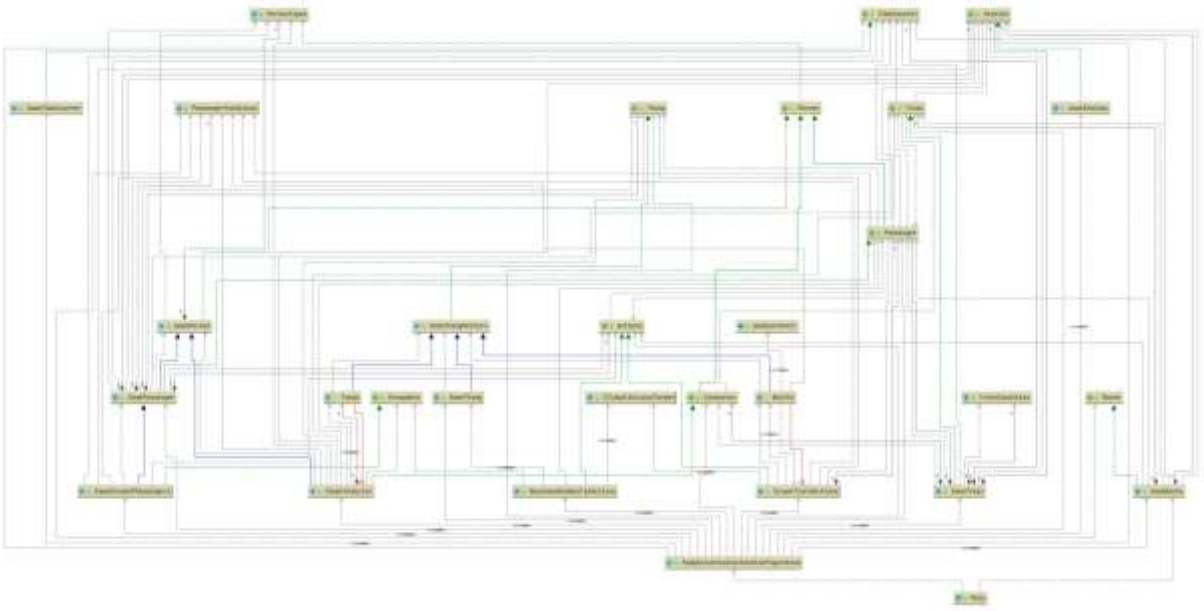


Диаграмма классов объектной модели с указанием связей классов:



Исходный код

Исходный код можно найти по ссылке

```
public interface Actions {
    void completeActions(Passenger passenger) throws UnableToFall;
}

public interface Conductor extends Person {
    void checkPassengersOut(Train train);
    void doubleCheck(Train train);
}

public interface Groupable {
}
```

```java
public class IllegalActionsTarget extends RuntimeException {
    public IllegalActionsTarget(String message) {
        super (message);
    }
}

import org.springframework.context.ApplicationContext;
import
org.springframework.context.annotation.AnnotationConfigApplicationContext;

public class Main {
    public static void main(String[] args) throws UnableToFall {
        ApplicationContext ctx = new
AnnotationConfigApplicationContext(MyApplicationContextConfiguration.class);
        SomeRoute route = ctx.getBean(SomeRoute.class);
        route.runFullRoute();
    }
}

import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;

import java.util.ArrayList;
import java.util.List;

@Configuration
public class MyApplicationContextConfiguration {
    @Bean
    public Conductor conductor(){
        return new SomeConductor("Conductor", 1.0);
    }

    @Bean
    public Train train(){
        Train train = new SomeTrain(station0(), conductor(), timeCounter());
        train.addPassenger(passenger());
        train.addPassenger(passenger2());
        return train;
    }

    @Bean
    public TimeCounter timeCounter(){
        return new SomeTimeCounter(3);
    }

    @Bean
    public Route route(){
        return new SomeRoute(train(), stations());
    }

    @Bean
    public List<Station> stations(){
        List<Station> stations = new  ArrayList<>();
        stations.add(station1());
        stations.add(station2());
        stations.add(station3());
        return stations;
    }

    @Bean
    public Thing thing1() {
        return new SomeThing("newspaper");
    }
```

```
    @Bean
    public Thing thing2() {
        return new SomeThing("top hat with some stuff");
    }

    @Bean List<Thing> baggage(){
        List<Thing> baggage = new ArrayList<>();
        baggage.add(thing1());
        baggage.add(thing2());
        return baggage;
    }

    @Bean
    public Station station0() {
        return new SomeStation("some station", 2);
    }
    @Bean
    public Station station1() {
        return new SomeStation("Brehenville", 1);
    }

    @Bean
    public Station station2() {
        return new SomeStation("Panopticon", 1);
    }

    @Bean
    public Station station3() {
        return new SomeStation("San-Komarik", 10);
    }

    @Bean
    public Passenger passenger(){
        return new SomePassenger("Scuperfield",
PassengerCondition.REGULAR_AWAKE, station1(), 10, baggage(), actions());
    }

    @Bean Actions actions(){
        return new ScuperfieldActions();
    }

    @Bean Actions actions2(){
        return new NeznaykaAndKozlikActions();
    }

    @Bean
    public Passenger passenger2(){
        return new SomeGroupOfPassengers("Neznayka and Kozlik",
PassengerCondition.SATISFIED, station3(), 5, actions2());
    }
}

public class NeznaykaAndKozlikActions implements Actions{
    NeznaykaAndKozlikActions() { }

    public void completeActions(Passenger passenger) {
        if(!passenger.getName().equals("Neznayka and Kozlik") || !(passenger
instanceof Groupable))
            throw new IllegalActionsTarget("Either passenger must be instance
of \"Groupable\" or " +
                    "passengerGroup name must be \"Neznayka and Kozlik\"!");
        System.out.println(passenger + " are watching " + new
SomeThing("Horror movies"){});
```

```
    }
}

import java.util.List;

public interface Passenger extends Person {
    PassengerCondition getCondition();
    Station getDestination();
    void leave(Train train);
    void sleep();
    boolean isAsleep();
    void setCondition(PassengerCondition condition);
    double getDepthOfSleep();
    void commentOnLeavingTrain(Station station);
    void fallAsleepTime(TimeCounter counter);
    List<Thing> getBaggage();
    Actions getActions();
}

public enum PassengerCondition {
    ASLEEP{
        public String toString() {
            return "asleep";
        }
    },
    REGULAR_AWAKE {
    //REGULAR_AWAKE = !ASLEEP with no emotions
        public String toString() {
            return "awake";
        }
    },
    SHOCKED{
        public String toString() {
            return "shocked";
        }
    },
    WOUNDED_IN_FOREHEAD{
        public String toString() {
            return "having a big bump on the head";
        }
    },
    LIGHT_WOUNDED_IN_FOREHEAD{
        public String toString() {
            return "having a small bump on the head";
        }
    },
    SATISFIED{
        public String toString() {
            return "satisfied";
        }
    },
    HAPPY{
        public String toString() {
            return "happy";
        }
    }
}

public interface Person {
    String getName();
    void setName(String name);
    void say(String phrase);
    void think(String thought);
```

```
    PersonTypes getType();
}

public enum PersonTypes {
    PASSENGER {
        public String toString() {
            return "Passenger";
        }
    },
    CONDUCTOR {
        public String toString() {
            return "Conductor";
        }
    }
}

public interface Route {
    void runFullRoute() throws UnableToFall;
}

import java.util.Objects;

public class ScuperfieldActions implements Actions{
    private Passenger passenger;

    public ScuperfieldActions() {
    }

    class Bottle extends SomeThingPattern{
        private final String liquid;
        private boolean IsSpilling = false;
        private int pitch = 0;
        private boolean hasFallen = false;
        private String liquidDescription;

        Bottle(String name, String liquid, double price, int pitch, String
liquidDescription) throws UnableToFall {
            super(name, price);
            this.liquid = liquid;
            this.liquidDescription = liquidDescription;
            for(int i = 0; i < pitch; i++)
                tilt();
        }

        public void tilt() throws UnableToFall {
            System.out.println(this + " tilts.");
            pitch++;
            if(pitch > 2)
                fallOnPersonsHead();
            else if(pitch > 1)
                spillOnPerson();
            else if(pitch == 1)
                spill();
        }

        public void fallOnPersonsHead() throws UnableToFall{
            if(hasFallen)
                throw new UnableToFall(this + " has already fallen!");
            String s = "";
            System.out.println(this + " falls on " + passenger + "'s head" +
s + ".");
            System.out.println(this + " hits " + passenger + "'s forehead.");
            double hitPower = Math.random() * 10;
            if(hitPower < 5)
```

```
passenger.setCondition(PassengerCondition.LIGHT_WOUNDED_IN_FOREHEAD);
            else

passenger.setCondition(PassengerCondition.WOUNDED_IN_FOREHEAD);
            hasFallen = true;
        }

        public void spill() {
            System.out.println(getLiquid() + " spills from " + this + ".");
            IsSpilling = true;
        }

        public void spillOnPerson(){
            if(IsSpilling) {
                System.out.println(getLiquid() + " from " + this + " spills
on " + passenger + ".");
                System.out.println(passenger + " drinks " + liquidDescription
+ " " + getLiquid() + " from " + this + ".");
            }
        }

        public String getLiquid() {
            return liquid;
        }

        public boolean equals(Object that) {
            if (this == that) return true;
            if (!(that instanceof Bottle)) return false;
            Bottle bottle = (Bottle) that;
            return Objects.equals(bottle.getName(), getName())
                    && Objects.equals(bottle.getLiquid(), liquid) &&
Objects.equals(bottle.getPrice(), getPrice())
                    && Boolean.compare(bottle.IsSpilling, IsSpilling) == 1;
        }

        public String toString() {
            return getName();
        }

        public int hashCode() {
            return Objects.hash(getName(), getPrice(), getLiquid(),
IsSpilling);
        }
    }

    public void completeActions(Passenger passenger) throws UnableToFall {
        this.passenger = passenger;
        if(!passenger.getName().equals("Scuperfield"))
            throw new IllegalActionsTarget("You can only complete
ScuperfieldActions for passengers named Scuperfield.");

        class Cane extends SomeThingPattern{
            Cane(String name, double price) {
                super(name, price);
                System.out.println("//Previously " + passenger + " lost his "
+ this + " which costs " +
                        (int) this.getPrice() + ".");
            }
        }

        Cane lostCane = new Cane("Cane", 10000);
        Bottle bottle = new Bottle("Bottle", "Soda", 10, 2, "sweet, great
smelling, " +
```

```
                "pleasantly pinching mouth");
        makeCalculations(bottle, lostCane);
        bottle.tilt();
    }

    private void makeCalculations(Thing thing, Thing secondThing) {
        calcPrice(thing);
        sub(thing.getPrice(), secondThing.getPrice());
        calculateNum(thing.getPrice(), secondThing.getPrice());
    }

    private void calcPrice(Thing thing) {
        double res = thing.getPrice();
        passenger.think("I would have to pay " + (int) res + " for this " +
thing);
    }

    private void sub(double price, double price0) {
        double res = price0 - price;
        passenger.think("The sum of my loss has lowered. It's only " + (int)
res + " now!");
        passenger.setCondition(PassengerCondition.SATISFIED);
    }

    private void calculateNum(double price, double price0) {
        double res = price0 / price;
        if (price0 % price > 0)
            res++;
        String MIDDLE = "trips";
        if(res == 1)
            MIDDLE = "trip";
        passenger.think("I have to take only " + (int) res + " train " +
MIDDLE + " to get my money back!");
        passenger.setCondition(PassengerCondition.HAPPY);
    }
}

import java.util.ArrayList;
import java.util.List;
import java.util.Objects;

public class SomeConductor extends SomePerson implements Conductor {
    private double forgetfulness;
    private final Tongs tongs = new Tongs();

    static class Tongs extends SomeThingPattern {
        public Tongs() {
            super("tongs");
        }
    }

    public SomeConductor(String s, double forgetfulness) {
        super(s);
        super.setType(PersonTypes.CONDUCTOR);
        this.forgetfulness = forgetfulness;
    }

    public void checkPassengersOut(Train train) {
        Station station = train.getStation();
        Station prevStation = train.getPrevStation();
        ArrayList<Passenger> passengers= train.getPassengers();
        ArrayList<Passenger> out = new ArrayList<>();
        for(Passenger passenger: passengers) {
            if(passenger.getDestination().equals(station) && Math.random() >
```

```
forgetfulness
                    || passenger.getDestination().equals(prevStation)){
                out.add(passenger);
            }
        }
        for(Passenger passenger: out) {
            remindToLeave(passenger, train);
        }
    }

    public void doubleCheck(Train train) {
        Station station = train.getStation();
        ArrayList<Passenger> passengers= train.getPassengers();
        int counter = 0;
        System.out.print(this + " checks if he forgot to tell anybody to
leave the train.\n");
        for(Passenger passenger: passengers) {
            String START = "he";
            String MIDDLE = "his";
            if(passenger instanceof Groupable){
                START = "they";
                MIDDLE = "their";
            }
            if(passenger.getDestination().equals(station)){
                System.out.print("Oh no! " + this + " forgot to tell " +
passenger + " to leave.\n");
                counter++;
                System.out.print(this + " decides to wait till the next
station and not to say " + passenger
                                 + " that " + START +" skipped " + MIDDLE + "
station, because " + this +" wants to avoid explanations.\n");
                this.forgetfulness = 0;
                System.out.print(this + " tries to get more concentrated. He
won't forget about any passenger from now on.\n");
            }
        }
        if(counter == 0)
            System.out.print(this + " didn't forget anyone.\n");
    }

    private void remindToLeave(Passenger passenger, Train train) {
        say(passenger + ", you have to leave now!");
        if(!passenger.getCondition().equals(PassengerCondition.ASLEEP)) {
            passenger.leave(train);
        }
        else {
            String MIDDLE = "is";
            if(passenger instanceof Groupable)
                MIDDLE = "are";
                System.out.println(passenger + " didn't hear " + this + "
cause " + passenger + " " + MIDDLE + " sleeping.");
            shake(passenger, train);
        }
    }

    private void throwBaggageOut(Passenger passenger) {
        List<Thing> baggage = passenger.getBaggage();
        List<Thing> out = new ArrayList<>();
        if(!baggage.isEmpty()) {
            for(Thing thing: baggage) {
                System.out.println(this + " throws out " + passenger + "'s "
+ thing + ".");
                out.add(thing);
            }
```

```
            for(Thing thing: out) {
                baggage.remove(thing);
            }
        }
    }

    private void shake(Passenger passenger, Train train) {
        System.out.println(this + " shakes " + passenger + ".");
        double depthOfSleep = passenger.getDepthOfSleep();
        if(depthOfSleep < 3) {
                System.out.print(this + " wakes " + passenger + " up.\n");
                passenger.setCondition(PassengerCondition.REGULAR_AWAKE);
        }
        else {
            String BEGINNING = "";
            String ENDING = "";
            String MIDDLE;
            if(passenger instanceof Groupable){
                BEGINNING += (passenger + " are ");
                ENDING += "their shelves";
                MIDDLE = "they";
            }
            else {
                BEGINNING += (passenger + " is ");
                ENDING += "his shelf";
                MIDDLE = "he";
            }
            if(depthOfSleep < 6) {
                System.out.println(BEGINNING + "still sleeping. " + this + "
takes out " + tongs
                        + " and starts knocking on " + ENDING + ".");
                passenger.setCondition(PassengerCondition.REGULAR_AWAKE);
                passenger.leave(train);
            }
            else {
                System.out.println(BEGINNING + "still sleeping. " + this + "
realizes that " + MIDDLE +
                        " won't wake up and gets angry. " + this + " shouts
into " + passenger + "'s ear.");
                passenger.setCondition(PassengerCondition.REGULAR_AWAKE);
                kickOutOfTrain(passenger, train);
                throwBaggageOut(passenger);
            }
        }
    }

    private void kickOutOfTrain(Passenger passenger, Train train) {
        System.out.println(this + " kicks " + passenger + " out of the
train.");
        passenger.setCondition(PassengerCondition.SHOCKED);
        passenger.leave(train);
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeConductor)) return false;
        SomeConductor conductor = (SomeConductor) that;
        return Double.compare(conductor.forgetfulness, forgetfulness) == 0
                && Objects.equals(getName(), conductor.getName()) &&
Objects.equals(getType(), conductor.getType());
    }

    public String toString() {
        return getName();
```

```
    }

    public int hashCode() {
        return Objects.hash(getName(), getType(), forgetfulness);
    }
}

public class SomeGroupOfPassengers extends SomePassenger implements Groupable
{
    SomeGroupOfPassengers(String names, PassengerCondition condition, Station
destination, double depthOfSleep,
                          Actions actions) {
        super(names, condition, destination, depthOfSleep, actions);
    }

    public String toString() {
        return super.getType() + "s " + super.getName();
    }

    public void say(String s) {
        System.out.print(this + " say: \"" + s + "\"\n");
    }

    public void sleep() {
        System.out.print(this+ " are sleeping. ");
        say("Zzz..");
    }

    protected void commentOnSetCondition(PassengerCondition condition){
        System.out.print(this + " are now " + condition + ". \n");
    }

    public void commentOnLeavingTrain(Station station) {
        System.out.print(this + " leave the train at " + station + ".\n");
        if(station != getDestination()) {
            if(!getCondition().equals(PassengerCondition.SHOCKED))
                say("Hey! That's not our station!");
            else
                System.out.println(this + " want to say something but are too
shocked to open their mouths.");
        }
    }

    public void fallAsleepTime(TimeCounter counter) {
        if(!super.getCondition().equals(PassengerCondition.ASLEEP)) {
            System.out.print(this + " fall asleep because the time is " +
counter + "\n");
            super.setCondition(PassengerCondition.ASLEEP);
        }
    }

}

import java.util.ArrayList;
import java.util.List;
import java.util.Objects;

public class SomePassenger extends SomePerson implements Passenger {
    private PassengerCondition condition;
    private final Station destination;
    private final double depthOfSleep;
    private List<Thing> baggage = new ArrayList<>();
    private Actions actions;
```

```
    public SomePassenger(String name, PassengerCondition condition, Station
destination, double depthOfSleep,
                         Actions actions) {
        super(name);
        super.setType(PersonTypes.PASSENGER);
        this.destination = destination;
        this.condition = condition;
        this.depthOfSleep = depthOfSleep;
        this.actions = actions;
    }

    public SomePassenger(String name, PassengerCondition condition, Station
destination, double depthOfSleep,
                         List<Thing> baggage, Actions actions) {
        super(name);
        super.setType(PersonTypes.PASSENGER);
        this.destination = destination;
        this.condition = condition;
        this.depthOfSleep = depthOfSleep;
        this.baggage = baggage;
        this.actions = actions;
    }

    public Station getDestination() {
        return destination;
    }

    public void leave(Train train) {
        train.removePassenger(this);
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomePassenger)) return false;
        SomePassenger passenger = (SomePassenger) that;
        return Objects.equals(passenger.destination, destination) &&
Objects.equals(getName(), passenger.getName())
                && Objects.equals(getType(), passenger.getType())
                && Objects.equals(getCondition(), passenger.getCondition());
    }

    public void commentOnLeavingTrain(Station station) {
        System.out.print(this + " leaves the train at " + station + ".\n");
        if(station != destination) {
            if(!condition.equals(PassengerCondition.SHOCKED))
                say("Hey! That's not my station!");
            else
                System.out.println(this + " wants to say something but is too
shocked to open his mouth.");
        }
    }

    public void sleep() {
        System.out.print(this+ " is sleeping. ");
        say("Zzz..");
    }

    public void setCondition(PassengerCondition condition) {
        this.condition = condition;
        commentOnSetCondition(condition);
    }

    protected void commentOnSetCondition(PassengerCondition condition){
        System.out.print(this + " is now " + condition + ". \n");
```

```
    }

    public void fallAsleepTime(TimeCounter counter) {
        if(!condition.equals(PassengerCondition.ASLEEP)) {
            System.out.print(this + " falls asleep because the time is " +
counter + "\n");
            setCondition(PassengerCondition.ASLEEP);
        }
    }

    public List<Thing> getBaggage() {
        return baggage;
    }

    public Actions getActions() {
        return actions;
    }

    public double getDepthOfSleep() {
        return this.depthOfSleep;
    }

    public PassengerCondition getCondition() {
        return condition;
    }

    public boolean isAsleep() {
        return (getCondition() == PassengerCondition.ASLEEP);
    }

    public int hashCode() {
        return Objects.hash(getCondition(), getName(), getType(),
destination);
    }
}

abstract public class SomePerson implements Person {
    private String name;
    private PersonTypes type;

    public SomePerson(String name){
        this.name = name;
    }

    public void say(String s) {
        System.out.print(this + " says: \"" + s + "\"\n");
    }

    public void think(String s) {
        System.out.print(this + " thinks: \"" + s + "\"\n");
    }

    protected void setType(PersonTypes type) {
        this.type = type;
    }

    public String toString() {
        return type + " " + name;
    }

    public String getName() {
        return name;
    }
```

```
    public void setName(String name) {
        this.name = name;
    }

    public PersonTypes getType() {
        return type;
    }
}

import java.util.List;
import java.util.Objects;

public class SomeRoute implements Route {
    private final List<Station> stations;
    private final Train train;

    public SomeRoute(Train train, List<Station> stations) {
        this.stations = stations;
        this.train = train;
    }

    private void timeToSleepCheck() {
        List<Passenger> passengers = train.getPassengers();
        TimeCounter timeCounter = train.getTimeCounter();
        if(timeCounter.getHour() < 6)
            for(Passenger passenger: passengers)
                passenger.fallAsleepTime(timeCounter);
        for(Passenger passenger : passengers)
            if(passenger.isAsleep())
                passenger.sleep();
    }

    public void runFullRoute() throws UnableToFall {
        int ind = 0;
        for(Station station: stations) {
            if(ind == 0 && !train.getPassengers().isEmpty()) {
                train.noCheckStart();
                for(Passenger passenger: train.getPassengers()) {
                    Actions actions = passenger.getActions();
                    if(actions != null)
                        actions.completeActions(passenger);
                }
                timeToSleepCheck();
                train.stopAt(station);
            }
            else if (!train.getPassengers().isEmpty()) {
                train.start();
                timeToSleepCheck();
                train.stopAt(station);
            }
            else {
                train.lastStart();
            }
            ind++;
        }
        train.lastStart();
    }

    public int hashCode(){
        return Objects.hash(stations, train);
    }

    public String toString() {
        return "The route is: " + stations + " with a " + train;
```

```
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeRoute)) return false;
        SomeRoute route = (SomeRoute)that;
        return Objects.equals(route.stations, stations)
                && Objects.equals(route.train, train);
    }
}

import java.util.Objects;

public class SomeStation implements Station{
    private final String name;
    private final int stageTime;

    public SomeStation(String name, int stageTime) {
        this.name = name;
        this.stageTime = stageTime;
    }

    public String getName(){
        return name;
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeStation)) return false;
        SomeStation station = (SomeStation) that;
        return Objects.equals(name, station.name);
    }

    public int getStageTime() {
        return stageTime;
    }

    public String toString() {
        return name;
    }

    public int hashCode() {
        return Objects.hash(name);
    }
}

public class SomeThing extends SomeThingPattern {
    public SomeThing(String name) {
        super(name, 300);
    }
}

import java.util.Objects;

public abstract class SomeThingPattern implements Thing{
    private final String name;
    private final double price;

    public SomeThingPattern(String name, double price){
        this.name = name;
        this.price = price;
        if(price <= 0) throw new IllegalArgumentException();
    }
```

```
    public SomeThingPattern(String name){
        this.name = name;
        price = 300;
    }

    public double getPrice() {
        return this.price;
    }
    public String getName() {
        return name;
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeThingPattern)) return false;
        SomeThingPattern someThing = (SomeThingPattern) that;
        return Objects.equals(name, someThing.name);
    }

    public String toString() {
        return this.name;
    }

    public int hashCode() {
        return Objects.hash(name);
    }
}

import java.util.Objects;

public class SomeTimeCounter implements TimeCounter{
    private int currentHour;
    SomeTimeCounter(int currentHour) {
        this.currentHour = currentHour;
    }

    public int getHour() {
        return this.currentHour;
    }

    public void addHours(int number) {
        currentHour = (currentHour + number) % 24;
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeTimeCounter)) return false;
        SomeTimeCounter counter = (SomeTimeCounter) that;
        return Objects.equals(currentHour, counter.currentHour);
    }

    public String toString() {
        String out = "";
        if(currentHour < 12) {
           out += currentHour + " am.";
        }
        else {
            out += (currentHour - 12) + " pm.";
        }
        return out;
    }

    public int hashCode() {
        return Objects.hash(currentHour);
```

```
    }
}

import java.util.ArrayList;
import java.util.Objects;

public class SomeTrain implements Train {
    private Station station;
    private Station prevStation;
    private TrainCondition condition;
    private final Conductor conductor;
    private final TimeCounter timeCounter;
    private final ArrayList<Passenger> passengers = new ArrayList<>();

    public SomeTrain(Station station, Conductor conductor, TimeCounter
timeCounter) {
        this.station = station;
        condition = TrainCondition.STAYING;
        this.conductor = conductor;
        System.out.print(this.toString());
        this.timeCounter = timeCounter;
    }

    public void start() {
        noCheckStart();
        conductor.doubleCheck(this);
        condition = TrainCondition.MOVING;
    }

    public void lastStart() {
        System.out.print("Train starts moving and goes away from " + station
+ ".\n");
        condition = TrainCondition.MOVING;
        System.out.print("The train disappears in the distance...\n");
    }

    public void noCheckStart() {
        System.out.print("Train starts moving and goes away from " + station
+ ".\n");
        condition = TrainCondition.MOVING;
    }

    public TimeCounter getTimeCounter() {
        return timeCounter;
    }

    public void stopAt(Station station) {
        condition = TrainCondition.STAYING;
        timeCounter.addHours(this.station.getStageTime());
        prevStation = this.station;
        this.station = station;
        System.out.print("Train stops at " + this.station + " at " +
timeCounter + "\n");
        conductor.checkPassengersOut(this);
    }

    public Station getStation(){
        return station;
    }


    public Station getPrevStation(){
        return prevStation;
    }
```

```
    public ArrayList<Passenger> getPassengers() {
        return passengers;
    }

    public void addPassenger(Passenger passenger) {
        passengers.add(passenger);
    }

    public void removePassenger(Passenger passenger) {
        passengers.remove(passenger);
        String beginning = "Current station is";
        if(passenger.getDestination().equals(station))
            System.out.print( beginning + " " + passenger + "'s destination
station.\n");
        else
            System.out.print( beginning +"n't " + passenger + "'s destination
station\n");
        passenger.commentOnLeavingTrain(station);
    }

    public boolean equals(Object that) {
        if (this == that) return true;
        if (!(that instanceof SomeTrain)) return false;
        SomeTrain train = (SomeTrain) that;
        return Objects.equals(station, train.station) &&
Objects.equals(prevStation, train.prevStation)
                && Objects.equals(condition, train.condition) &&
Objects.equals(passengers, train.passengers);
    }

    public String toString() {
        final String BEGINNING = "Train is " + condition;
        final String ENDING = station + ". The train's conductor's name is "
+ conductor.getName() + ".\n";
        if(condition.equals(TrainCondition.MOVING))
            return BEGINNING + " from " + ENDING;
        else
            return BEGINNING + " at " + ENDING;
    }

    public int hashCode() {
        return Objects.hash(station, prevStation, condition, passengers);
    }
}

public interface Station {
    String getName();
    int getStageTime();
}

public interface Thing {
    String getName();
    double getPrice();
}

public interface TimeCounter {
    int getHour();
    void addHours(int number);
}

import java.util.ArrayList;

public interface Train {
```

```
    void start();
    void lastStart();
    void noCheckStart();
    void stopAt(Station station);
    Station getStation();
    Station getPrevStation();
    void addPassenger(Passenger passenger);
    void removePassenger(Passenger passenger);
    ArrayList<Passenger> getPassengers();
    TimeCounter getTimeCounter();
}

public enum TrainCondition{
    STAYING {
        public String toString() {
            return "staying";
        }
    },
    MOVING {
        public String toString() {
            return "moving";
        }
    }
}

public class UnableToFall extends Exception{
    UnableToFall(String message) {
        super(message);
    }
}
```

Output

```
Train is staying at some station. The train's conductor's name is Conductor.
Train starts moving and goes away from some station.
//Previously Passenger Scuperfield lost his Cane which costs 10000.
Bottle tilts.
Soda spills from Bottle.
Bottle tilts.
Soda from Bottle spills on Passenger Scuperfield.
Passenger Scuperfield drinks sweet, great smelling, pleasantly pinching mouth Soda from Bottle.
Passenger Scuperfield thinks: "I would have to pay 10 for this Bottle"
Passenger Scuperfield thinks: "The sum of my loss has lowered. It's only 9990 now!"
Passenger Scuperfield is now satisfied.
Passenger Scuperfield thinks: "I have to take only 1000 train trips to get my money back!"
Passenger Scuperfield is now happy.
Bottle tilts.
Bottle falls on Passenger Scuperfield's head.
Bottle hits Passenger Scuperfield's forehead.
Passenger Scuperfield is now having a big bump on the head.
Passengers Neznayka and Kozlik are watching Horror movies
Passenger Scuperfield falls asleep because the time is 3 am.
Passenger Scuperfield is now asleep.
Passengers Neznayka and Kozlik fall asleep because the time is 3 am.
Passengers Neznayka and Kozlik are now asleep.
Passenger Scuperfield is sleeping. Passenger Scuperfield says: "Zzz.."
Passengers Neznayka and Kozlik are sleeping. Passengers Neznayka and Kozlik say: "Zzz.."
Train stops at Brehenville at 5 am.
```

Train starts moving and goes away from Brehenville.
Conductor checks if he forgot to tell anybody to leave the train.
Oh no! Conductor forgot to tell Passenger Scuperfield to leave.
Conductor decides to wait till the next station and not to say Passenger Scuperfield that he skipped his station, because Conductor wants to avoid explanations.
Conductor tries to get more concentrated. He won't forget about any passenger from now on.
Passenger Scuperfield is sleeping. Passenger Scuperfield says: "Zzz.."
Passengers Neznayka and Kozlik are sleeping. Passengers Neznayka and Kozlik say: "Zzz.."
Train stops at Panopticon at 6 am.
Conductor says: "Passenger Scuperfield, you have to leave now!"
Passenger Scuperfield didn't hear Conductor cause Passenger Scuperfield is sleeping.
Conductor shakes Passenger Scuperfield.
Passenger Scuperfield is still sleeping. Conductor realizes that he won't wake up and gets angry.
Conductor shouts into Passenger Scuperfield's ear.
Passenger Scuperfield is now awake.
Conductor kicks Passenger Scuperfield out of the train.
Passenger Scuperfield is now shocked.
Current station isn't Passenger Scuperfield's destination station
Passenger Scuperfield leaves the train at Panopticon.
Passenger Scuperfield wants to say something but is too shocked to open his mouth.
Conductor throws out Passenger Scuperfield's newspaper.
Conductor throws out Passenger Scuperfield's top hat with some stuff.
Train starts moving and goes away from Panopticon.
Conductor checks if he forgot to tell anybody to leave the train.
Conductor didn't forget anyone.
Passengers Neznayka and Kozlik are sleeping. Passengers Neznayka and Kozlik say: "Zzz.."
Train stops at San-Komarik at 7 am.
Conductor says: "Passengers Neznayka and Kozlik, you have to leave now!"
Passengers Neznayka and Kozlik didn't hear Conductor cause Passengers Neznayka and Kozlik are sleeping.
Conductor shakes Passengers Neznayka and Kozlik.
Passengers Neznayka and Kozlik are still sleeping. Conductor takes out tongs and starts knocking on their shelves.
Passengers Neznayka and Kozlik are now awake.
Current station is Passengers Neznayka and Kozlik's destination station.
Passengers Neznayka and Kozlik leave the train at San-Komarik.
Train starts moving and goes away from San-Komarik.
The train disappears in the distance...

Выводы: в результате выполнения этой работы я понял основы работы с reflection API, ознакомился с системой исключений и их иерархией, понял, когда и зачем применяются различные вложенные и локальные классы.