

Sequence Diagrams: Interaction Frames

Ferd van Odenhoven

Fontys Hogeschool voor Techniek en Logistiek

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Introduction: exam recap

- A simple class diagram about a restaurant was given.
- The task was to draw the sequence diagramm for the use case: order a meal.

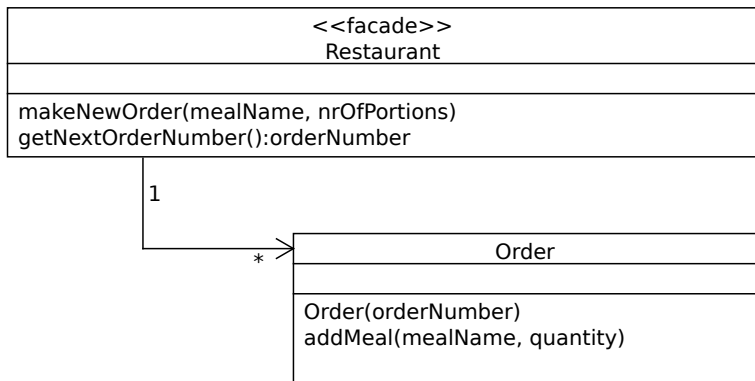


Figure : The class diagram

Introduction

- Concrete scenario: order 1 pizza 'Peperoni'.

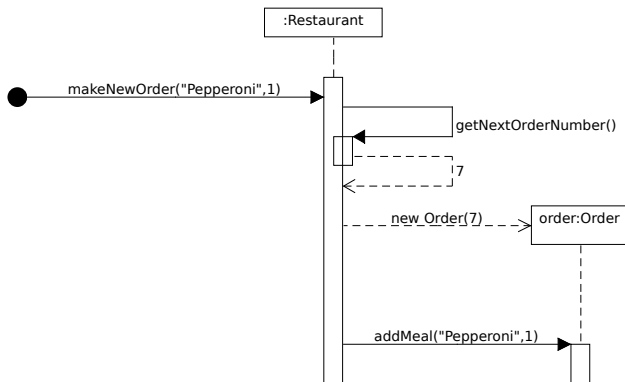


Figure : The sequence diagram

Java Code Example

```
package restaurant;

public class Restaurant {
    public void makeNewOrder(String mealName, int nrOfPortions) {
        int nr = this.getNextOrderNumber();
        Order o = new Order(nr);
        o.addMeal(mealname, nrOfPortions);
    }

    private int getNextOrderNumber() {
        return 7;
    }
}

class Order {
    private int orderNr;
    private Set<String> meals;

    Order(int orderNr) {
        this.nr = orderNr;
        meals = new HashSet<>();
    }

    void addMeal(String mealName) {
        this.meals.add(mealName);
    }
}
```

Interaction Frames

More details: for implementation.

Interaction frames (or fragments) can:

- show loops and conditional behaviour
- an interaction frame has an *operator* and possibly a *guard*
- a frame can be divided into one or more *fragment*'s each of which may have a *guard*

Use an activity diagram if you only want to explain a control structure.

An interaction frame (UMLet)

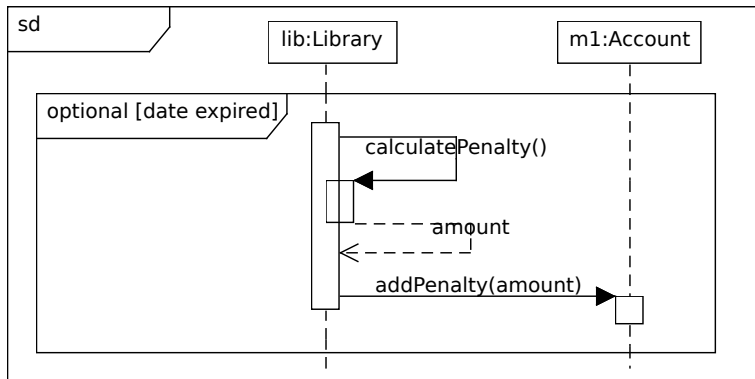


Figure : A small example

Library Example: class diagram

Let's try to find all the books of a given author, that have copies available.

We want to have a list of titles of the books for which copies are available for a rental.

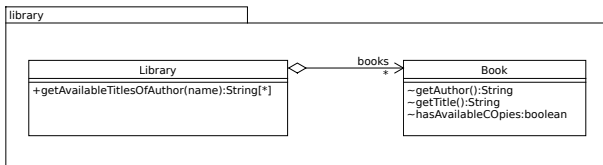


Figure : This part of the class diagram is relevant for searching a book.
We will make a sequence diagram.

Library Example: sequence diagram

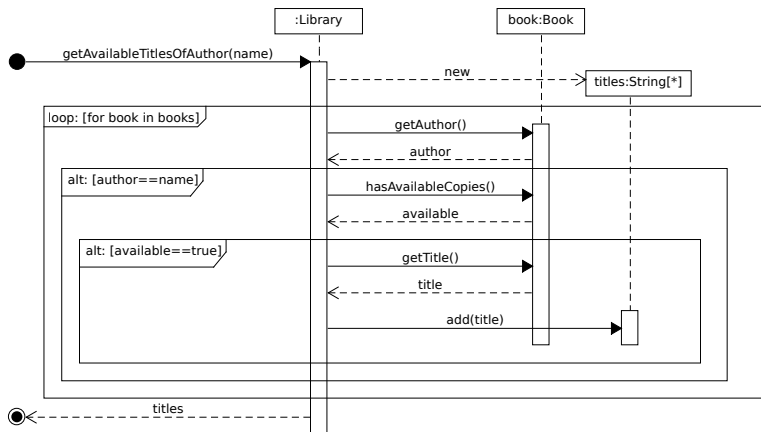
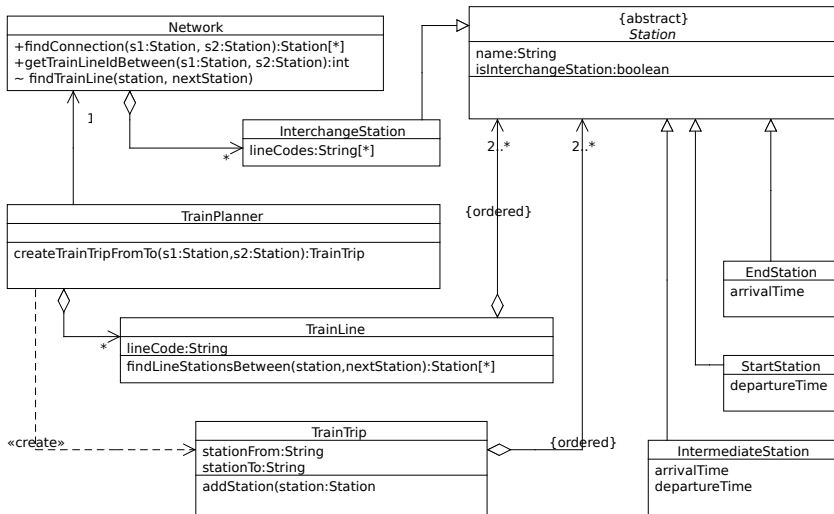


Figure : The sequence diagram shows how interaction frames can be used to show how a loop is to be interpreted.

Train planner example

- Train line: you don't have to change trains on your train trip. A train line has an id.
- Interchange station: a station where you can change the train line.

Train planner example: class diagram



Train planner example: use case diagram

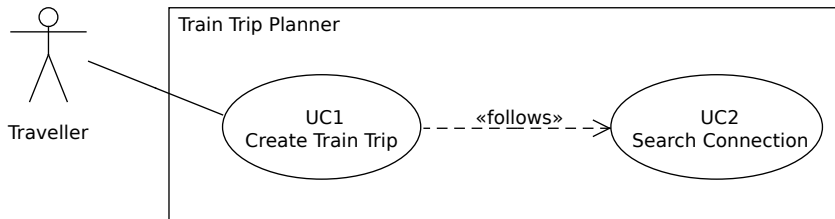


Figure : Use case diagram for the creation of a train trip. A sub use case (UC2) for finding the connection should be executed first.

start sequence diagram

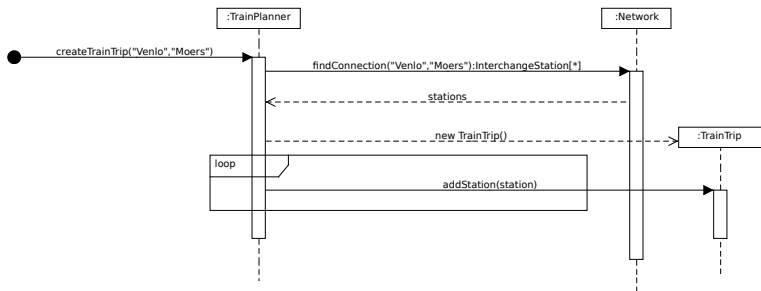


Figure : Use case 2 is present in method: `findConnection(station,station)` of the `Network` class, but without any detail about how it works.

Train planner example: Use case

In the train travel planner case we look at a the way a trip could be planned.

Name:	UC1: Create a train trip
Pre:	Systeem staat gereed
Description:	A train trip from Venlo to Moers has to be planned
Result:	A orderd row of stations, first one is Venlo, laat one is Moers.
Scenario:	<ol style="list-style-type: none">1. UC2: A connection is searched from Venlo to Moers.2. The system takes as a starting point the first station of the axchahge stations: Venlo.3. Search a train connection with code that is present in Venlo and in Viersen.4. All simple stations between Venlo and Viersen in the connection are searched for.5. Repeat steps 3 and 4 for the next part: Viersen to Krefeld.6. If the total connection is treated this way, we have the total train trip.

Train planner: UC2

The following use case is not yet completely described.

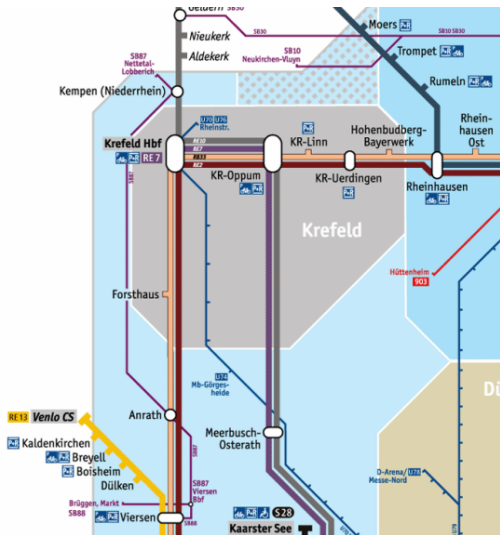
Name:	UC2: Zoek een Verbinding
Scenario:	1. Input: two stations 2. Test if both stations are exchange stations.
Result:	An ordered row of exchange stations.
Extension:	If an input station is not an exchange station, search the optimal first exchange station.

In the UC1 scenario:

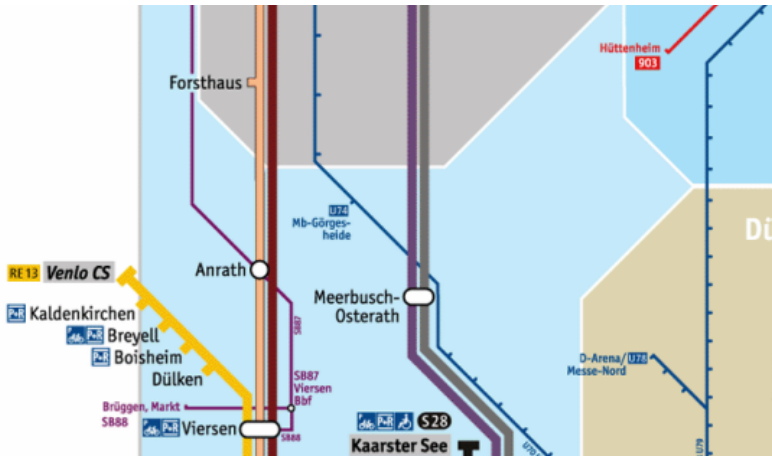
Venlo → **Viersen** → **Krefeld** → **KR-Oppum** → **KR-Uerdingen**
→ **Rheinhausen**

Moers is not an exchange station

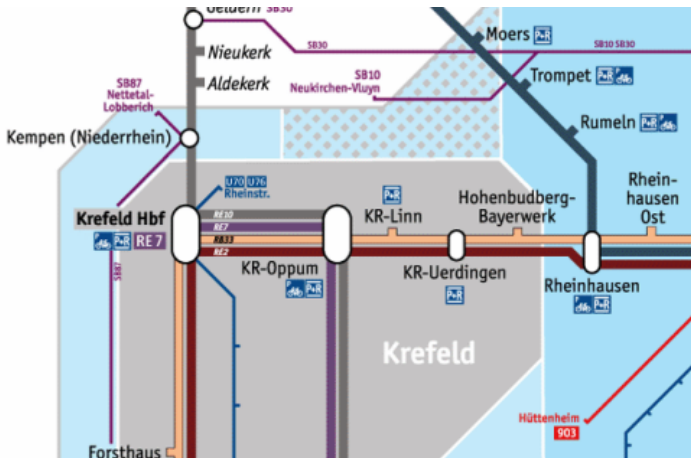
On the map



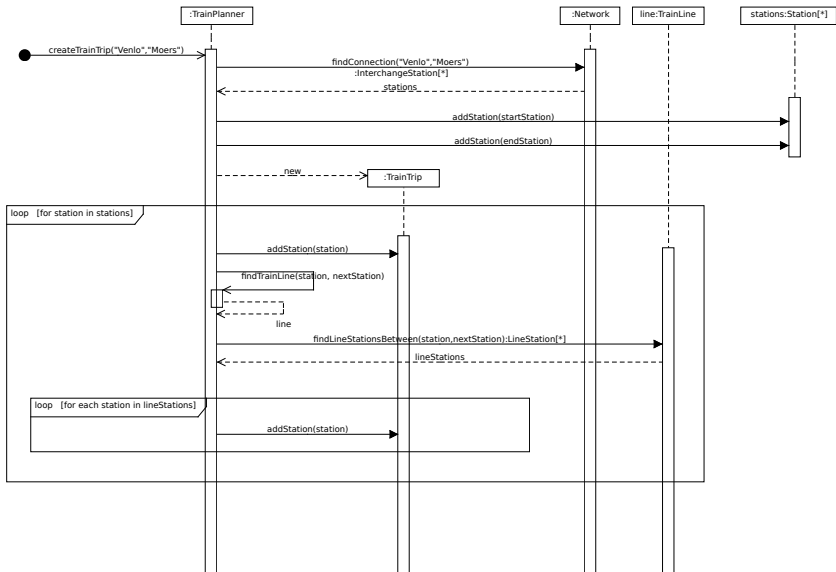
On the map



On the map



Total sequence diagram



Interaction Frames: how much detail?

- Sequence diagrams: not to the very last detail!
- Show how a scenario proceeds in main steps.
- Leave the implementation details to the programmer.
- The sequence diagram should be a hint for the programmer.