Homework 1 (HW1) - Domain Modelling (10 points)

Due on 16.10.2017 at 23:59
complete the homework in groups of 2 students.

Submission format: pdf
The submitted file should contain the class models and, if needed, notes specifying assumptions and/or constraints.

Grading criteria:
- Classes correctly identified
- Relations correctly identified
- Multiplicities correct
- Attributes correctly identified
- Correct use of other elements of a class model
- Simplicity of the overall model

Trip Planner
Part 1

The following is a map of the four Tallinn tramway routes. A similar map could be drawn for trolleybus and for bus routes.

Figure 1. Map of Tallinn’s Tramway lines as of December 2014
Task 1. [2 points] Draw a domain diagram for tramway routes such as the one shown above. Note that every tramway stop is associated to a GPS coordinate. Also, note you are not asked a model of the map itself, but only of the routes and location of stops. The domain model should also be able to cover trolleybus and bus routes.

Part 2

Below is a sample schedule of tramway line number 4. The schedule is given starting from one of the terminals of the route, namely Vana-Lõuna. There is a column missing in the picture corresponding to the “Sunday” schedule, which is similar to Saturday but with slightly different departure times. You can view the full schedule here: http://soiduplaan.tallinn.ee/#tram/4/a-b/en

Figure 2. Schedule of Tramway line #4 starting from the Vana-Lõuna stop

Task 2. [3 points] Design a new domain model by adding all information required to generate the schedule of a given tramway line starting from a given stop (you can use the model from the previous question as a basis, but this should be submitted as a separate model). Please assume that the tramway takes a given amount of minutes (e.g. 1, 2 or 3 minutes) to go from a stop to the next one. The number of minutes it takes from the tramway to go from one stop to another is the same regardless of the week, but differs depending on the pair of stops being considered, e.g. between Lubja and Majaka it takes 1 minute, whereas between Majaka and Sikupilli it takes 2 minutes. Note that the domain model produced for this task does not need to represent the concept of “schedule” itself, but only the information required to generate a schedule.
Part 3

A trip planner is an application that allows a user to enter a departure point, a destination point, and a time of departure, and returns a plan for going from the departure to the destination via public transport. The departure and destination points may be an address, a name of a stop or a place of interest (e.g. National museum). If the string entered for the departure (or destination) is incorrect, the application returns the most similar points it knows about (e.g. similar addresses), and allows the user to select one of the proposed alternatives or to type in a new departure or destination address, until the departure and destination points are recognized. If both the departure and destination points are recognized, the trip planner returns a plan.

The plan returned by the trip planner consists of travel legs. Some travel legs involve walking from one point to another (e.g. from an address to a given stop or vice-versa), while other legs involve taking a tramway or bus from one stop to another.

For example, the following is a plan produced by the Berlin travel planner. In this homework, we do not consider anything associated with “fares” (cost of tickets).

![Plan produced by the Berlin trip planner from Nürnberger Str. 8 to Karl-Marx-Platz](image)

**Figure 3. Plan produced by the Berlin trip planner from Nürnberger Str. 8 to Karl-Marx-Platz**

**Task 3. [5 points]** Design a new domain model for a trip planner (you can use the model from the previous question as a basis, but this should be submitted as a separate model). The model should capture all the information required to generate a plan, and it should capture the generated plan itself. You may assume that for every address or place of interest, the corresponding GPS coordinates are available. You may also assume that given two GPS coordinates, we can calculate the distance and the walking time between these two coordinates.