Assignment – Zagreb Metro©

Corvus

The Zagreb Metro

The Mayor of Zagreb decided to build a metro (underground) railway service. The groundwork is well under way, stations are being built and there is detailed plan of the lines that will run underneath the streets of Zagreb. Because of rough economic times, it has been decided that all the lines will be "one way". This means that a route from Maksimir to station Španska does not imply the existence of a route from Španska to Maksimir. In fact, even if both routes do happen to exist, they are distinct and are not necessarily the same distance!

You have been selected as the developer who will deliver the capabilities to provide the Metro passengers information about the routes – such as distances along routes, number of ways to get from one station to another and the shortest route between two stations! To help you with your task, you have been given the following information:

1. The input for your application will be a directed graph where a node represents a station and an edge represents the distance between stations – example: **A-B:4 – A and B are stations and 4 is the distance between them**
2. A given route will never appear more then once
3. For a given route, the starting and ending station will not be the same

Assumptions

1. Do not make any extra stops when calculating trips! For example, the first user story means to start at Maksimir, and then travel directly to Siget (a distance of 5), then directly to Spansko (a distance of 4).

Clarifications

The Mayor of Zagreb is available at joinus@corvus.hr if during the course of developing the application you have any questions or want clarification on the requirements.

User stories

METRO–1:

As a Metro manager, I want to be able to read in a text file that contains data about the Zagreb Metro network.
Input metro.txt:
MAKSIMIR-SIGET:5, SIGET-SPANSKO:4, SPANSKO-MEDVESCAK:8, MEDVESCAK-SPANSKO:8, MEDVESCAK-DUBRAVA:6, MAKSIMIR-MEDVESCAK:5, SPANSKO-DUBRAVA:2, DUBRAVA-SIGET:3, MAKSIMIR-DUBRAVA:7

Your program should take 1 parameter:

1. The text file to read

Output:
From Maksimir to Siget -> 5
From Siget to Spansko -> 4
From Spansko to Medvescak -> 8
From Medvescak to Spansko -> 8
From Medvescak to Dubrava -> 6
From Maksimir to Medvescak -> 5
From Spansko to Dubrava -> 2
From Dubrava to Siget -> 3
From Maksimir to Dubrava -> 7

METRO–2:

As a citizen or visitor to Zagreb I want to be able to find out the distance of a trip (a series of routes) using Http ReST services which output JSON data.

The following are the requests you wish to make.

- **POST /zagreb-metro/trip/distance**: Which returns the distance of the trip. If there is no possible trip (the stations are not connected in that way), the service returns "NO SUCH ROUTE". Stations are provided in a JSON data structure in the request body (see samples)

Samples:

Request: POST /zagreb-metro/trip/distance

```
{
   "stations" : ["MAKSIMIR", "SIGET", "SPANSKO"]
}
```

Response:

```
{
   "distance" : 9
}
```

Request: POST /zagreb-metro/trip/distance

```
{
   "stations" : ["MAKSIMIR", "MEDVESCAK"]
}
```

Response:

```
{
   "distance" : 5
}
```

Request: POST /zagreb-metro/trip/distance

```
{
   "stations" : ["MAKSIMIR", "MEDVESCAK", "SPANSKO"]
}
```

Response:

```
{
   "distance" : 13
}
```

Request: POST /zagreb-metro/trip/distance

```
{
   "stations" : ["MAKSIMIR", "DUBRAVA", "SIGET", "SPANSKO", "MEDVESCAK"]
}
```

Response:

```
{
   "distance" : 22
}
```

Request: POST /zagreb-metro/trip/distance

```
{
   "stations" : ["MAKSIMIR", "DUBRAVA", "MEDVESCAK"]
}
```

Response:

```
{
   "distance" : "NO SUCH ROUTE"
}
```

METRO–3:

As a citizen or visitor to Zagreb I want to be able to find out how many trips there are starting and ending at the same station with a maximum of 3 stops using Http ReST services which output JSON data.

Request:
GET /zagreb-metro/trip/round/count/S where S is the station (start and end)

Samples:

Request: GET /zagreb-metro/trip/round/count/SPANSKO
Response: status = 200

```
{
        "count" : 2,
        "roudtrips" : [

                "SPANSKO-MEDVESCAK-SPANSKO",

                "SPANSKO-DUBRAVA-SIGET-SPANSKO"]

}
```

METRO–4:
As a citizen or visitor to Zagreb I want to be able to find out how many trips there are starting at one station and ending at another station with exactly 4 stops using Http ReST services which output JSON data.

Request:
POST /zagreb-metro/trip/count - stations are provided in a JSON data structure in the request body (see samples)

Samples:

Request: POST /zagreb-metro/trip/count/

```
{
  "stations" : {
        "start": "MAKSIMIR",
        "end": "SPANSKO"
  },
  "stops": 4
}
```

Response: status = 200

```
{
        "count" : 3,
        "stops" : [

                "SIGET-SPANSKO-MEDVESCAK",

                "MEDVESCAK-SPANSKO-MEDVESCAK",

                "MEDVESCAK-DUBRAVA-SIGET"]

}
```

METRO–5:

As a citizen or visitor to Zagreb I want to be able to find the shortest route (distance of travel) between two stations (can be different or the same start and stop stations) using Http ReST services which output JSON data.

Request:

POST /zagreb-metro/trip/shortest - stations are provided in a JSON data structure in the request body (see samples)

Samples:

Request: POST /zagreb-metro/trip/shortest/

```
{
   "stations" : {
          "start": "MAKSIMIR",
          "end": "SPANSKO"
   }
}
```

Response: status = 200

```
{
          "distance" : 9,
}
```

Request: POST /zagreb-metro/trip/shortest/

```
{
   "stations" : {
          "start": "SIGET",
          "end": "SIGET"
   }
}
```

Response: status = 200

```
{
          "distance" : 9,
}
```

Bonus assignments

Congratulations! You've made it this far! The Mayor of Zagreb has come up with a few more user stories. These are all of equal business value to him, so you're allowed to pick and choose which one(s) you implement.

METRO–6:

As a citizen or visitor to Zagreb I want to have a user interface in my browser, which I can use to see distances of routes, number of trips and shortest routes.

The user interface should be able to get this information using the exposed ReST services, and provide feedback in a visually attractive way.

METRO–7:

As the Mayor of Zagreb I want to be surprised by your ingenuity so that I can show off to my fellow mayors. You can do anything that we haven't thought of, so that I can show off some cool stuff on our monthly mayor meeting!