Software Engineering 2

A practical course in software engineering

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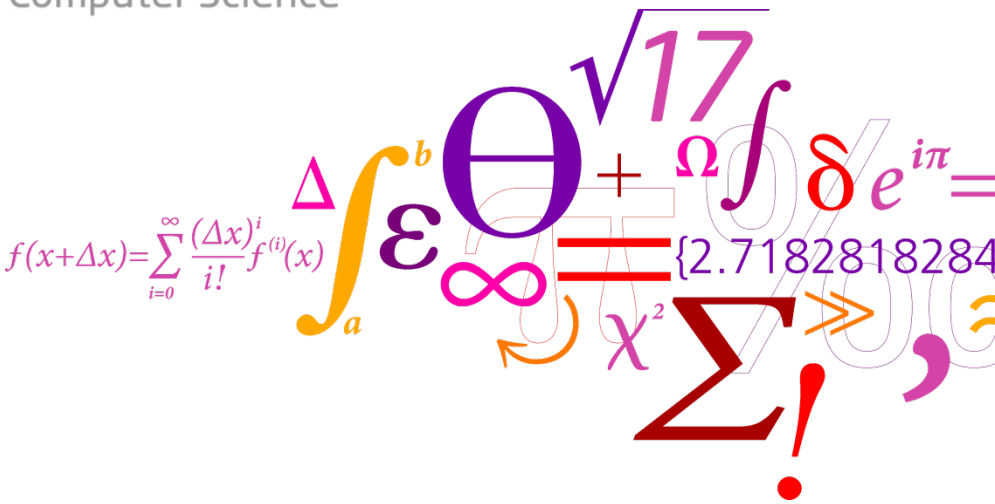

Tutorial 1:
Technologies: Overview and Pointers

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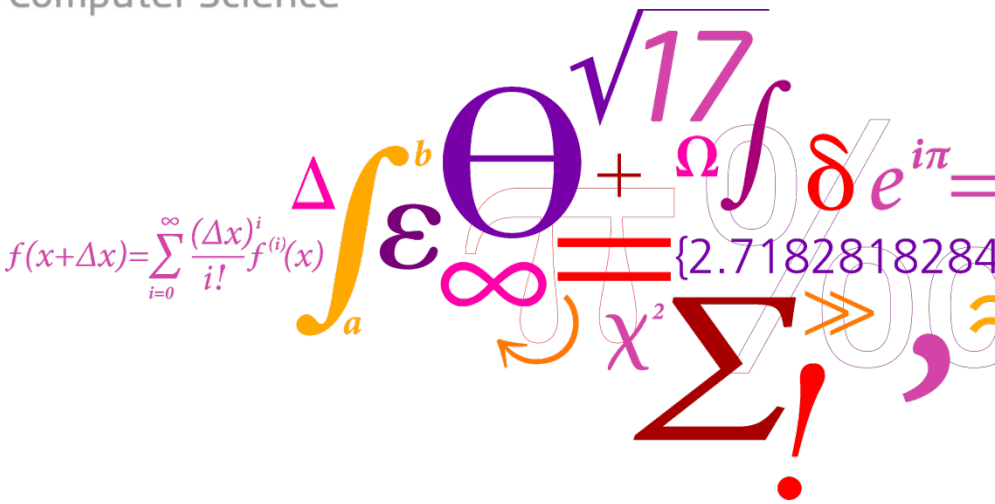

Topics

Infrastructure

- (Git: GitHub, GitLab)
- Jenkins
- (Docker, …)

Development

- Microservice Architectures
- React
- OSM
  - Leaflet (Interactive Maps based on OSM)
  - Overpass querying OSM map data

Jenkins (Integration Server)

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Tool for Continuous Integration (CI):

- Code analysis
- Compile, build, and test the software
  - on every checkin to the repository
  - in a controlled and explicitly specified environment (→ e.g. Maven POM files)
  - revert if not successful
- Deploy the software to VM / web server / …

Jenkins Material

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Tutorial

`https://www.tutorialspoint.com/jenkins/`

Covers installation, Git and Maven setup, configuration, setup of build jobs, testing, …

Homepage:

`https://jenkins.io/`

You will receive a VM on which you can install and configure your own Jenkins.

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Microservice Architecture

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Architecture which allows for

- loosely coupled components
- deploying different parts of software independently of each other (no “monolithic deployment”)
- better scalablility
- …

Lots of material on the internet, e.g.:

https://microservices.io/
https://microservices.io/patterns/index.html

Microservice Architecture

→ Black board discussion

Ingredients:

- **Message Queues** (Pub/Sub) for lightweight communication
- **Lightweight implementation** of services reacting to published messages (via subscriptions)
- **API Gateway** (Backend for Frontend): external interface (single entry point), in particular for Web frontends, exposing services, that internally split the services up into many different microservices

React (JS)

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JavaScript library for responsive interactive web applications (View part of MVC):

- Systematic way of maintaining the **state** of an application (page)
- Updates (renders) page, when the state of the page changes

For more information and a quick start, see

https://reactjs.org/

Code First (EF)

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- Developer defines the application classes (→ refined domain model) as code
- The Entity Framework
  - creates the model and mappings to a database from there
  - and allows to read and write objects to and from a database

For more information, see e.g.

https://www.entityframeworktutorial.net/code-first/simple-code-first-example.aspx

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Leaflet

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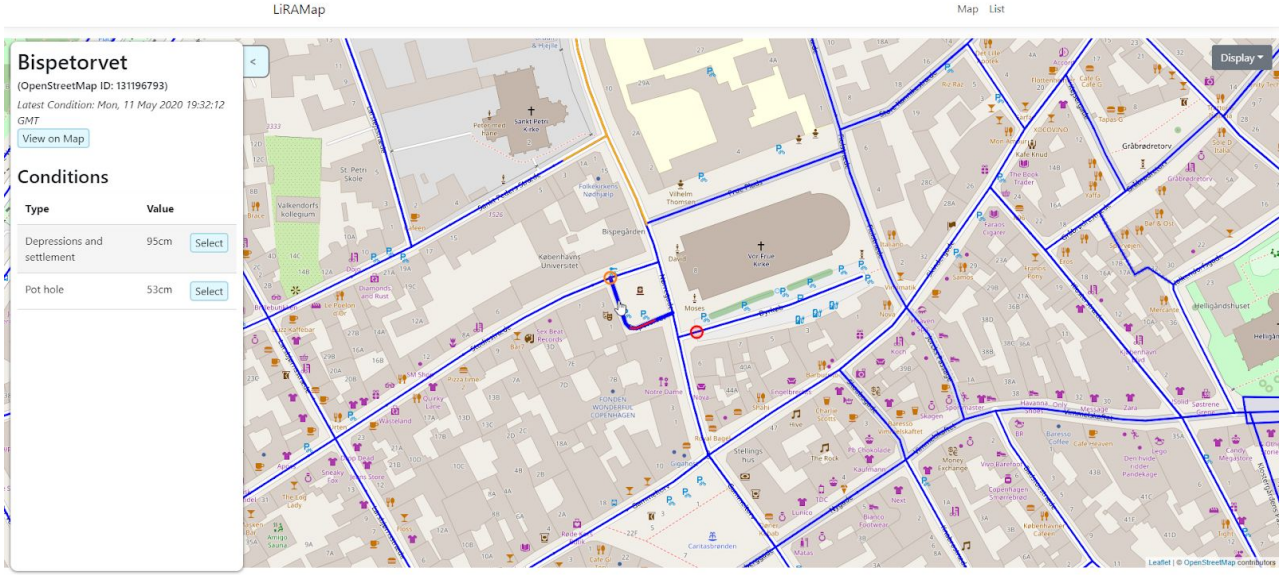
Leaflet is an open source JS library for implementing applications with interactive maps, e.g. for showing geographic information on top of an OSM Map.



Source: Jonathan Drud Bendsen: LiRA Map: A Cloud-based Geo-information System for Road Maintenance. BSc project 2020.

Leaflet

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On top of the map, additional information can be added by markers, polygons or other shapes

Material and resources:

https://leafletjs.com/

https://leafletjs.com/examples/quick-start/

https://leafletjs.com/examples.html

https://leafletjs.com/reference-1.7.1.html

Overpass API

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Overpass is an API for obtaining OSM map data, optimized for obtaining the data consumers really need.

- Overpass comes with its own query language (QL)

At first, the syntax and semantics might appear a bit awkward.

You can experiment with the overpass QL at

http://overpass-turbo.eu/

http://overpass-turbo.eu/

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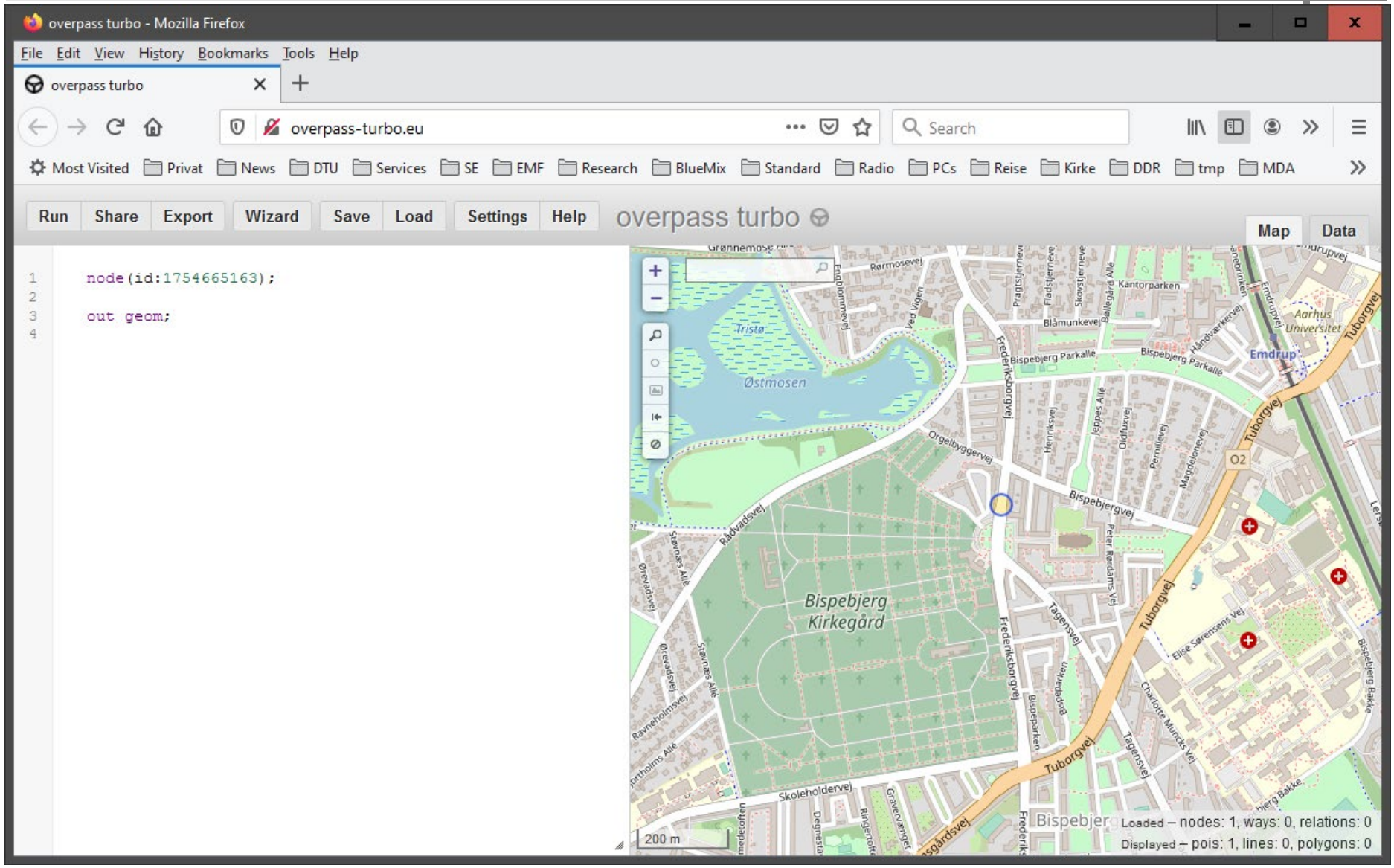

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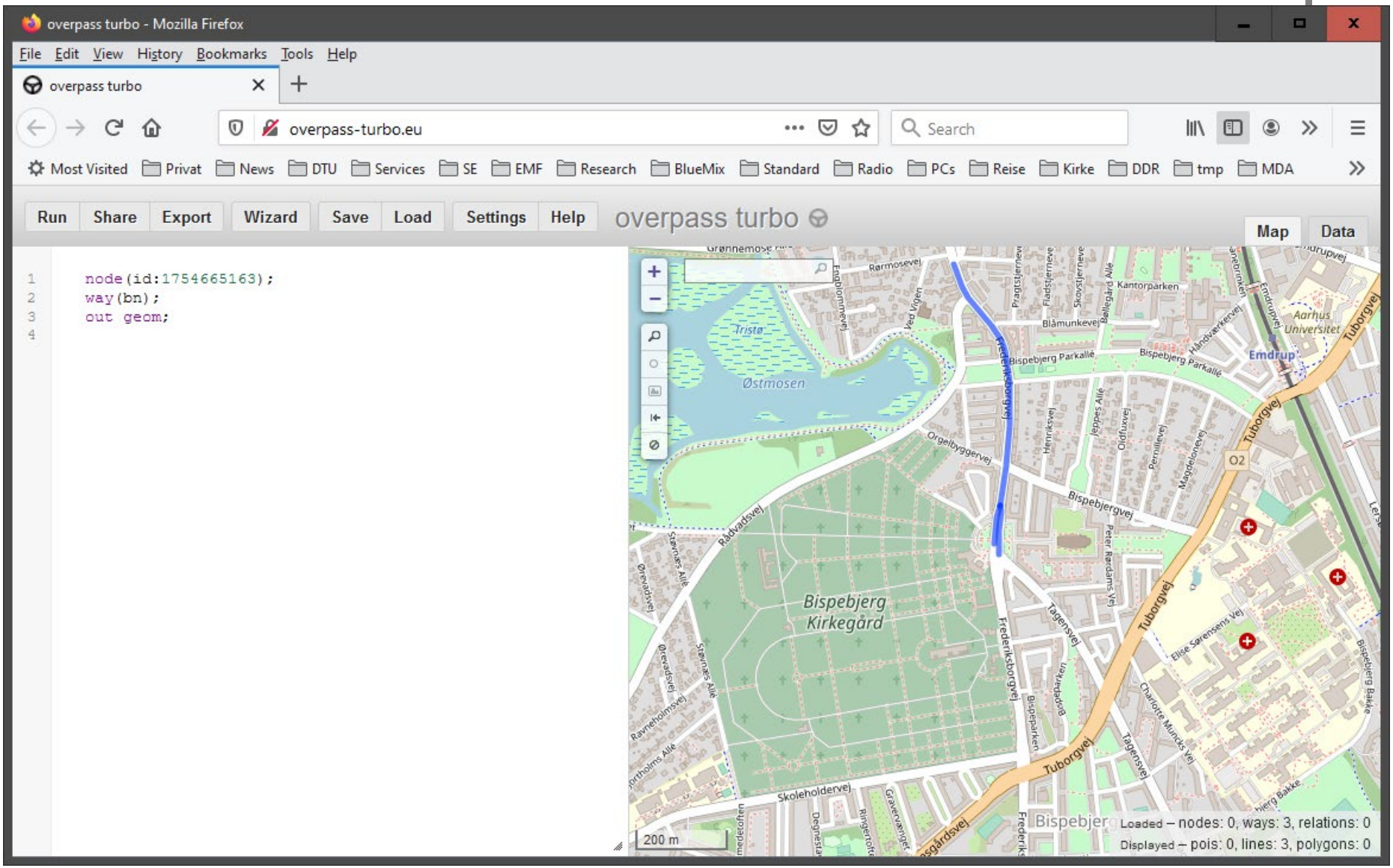

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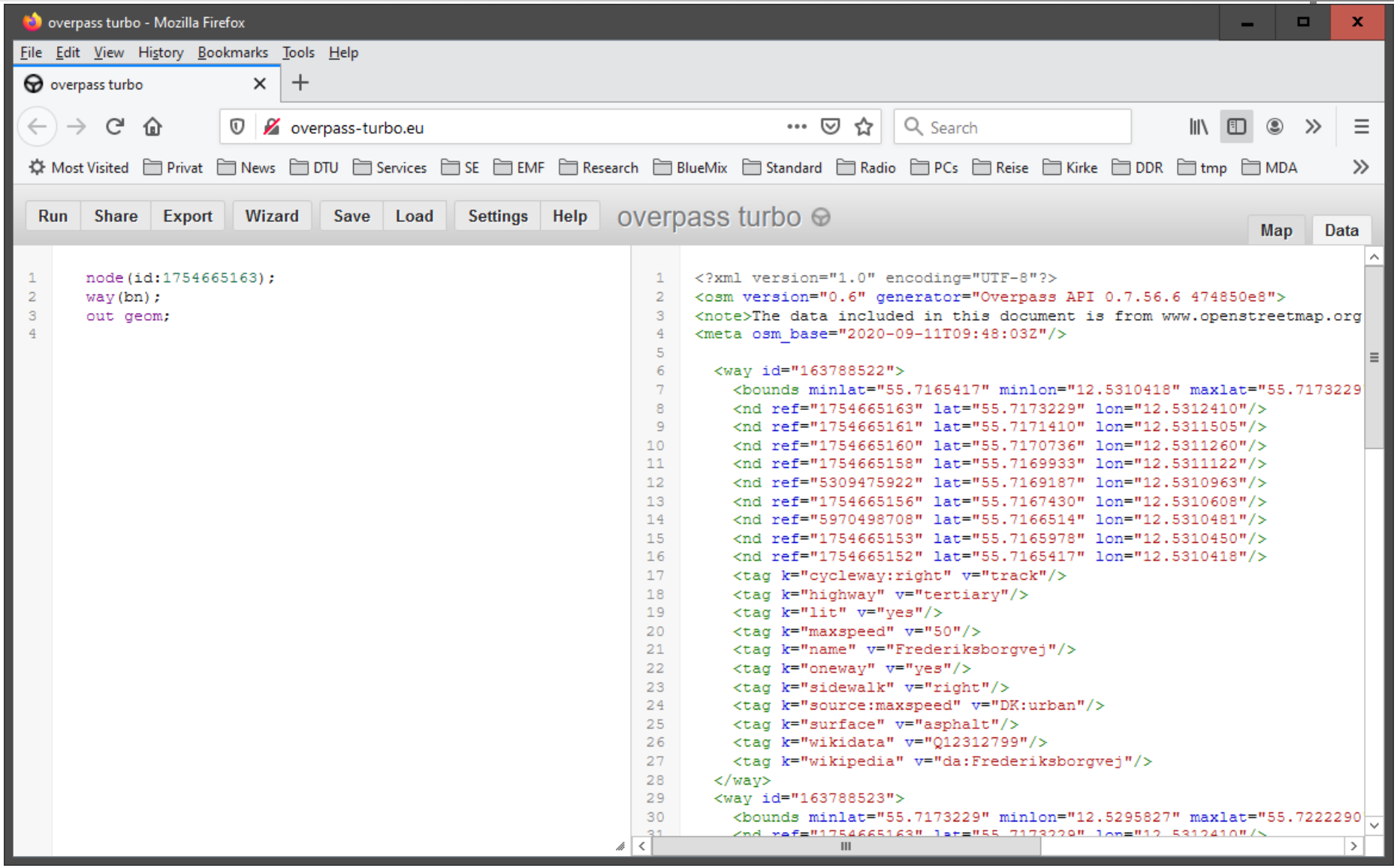

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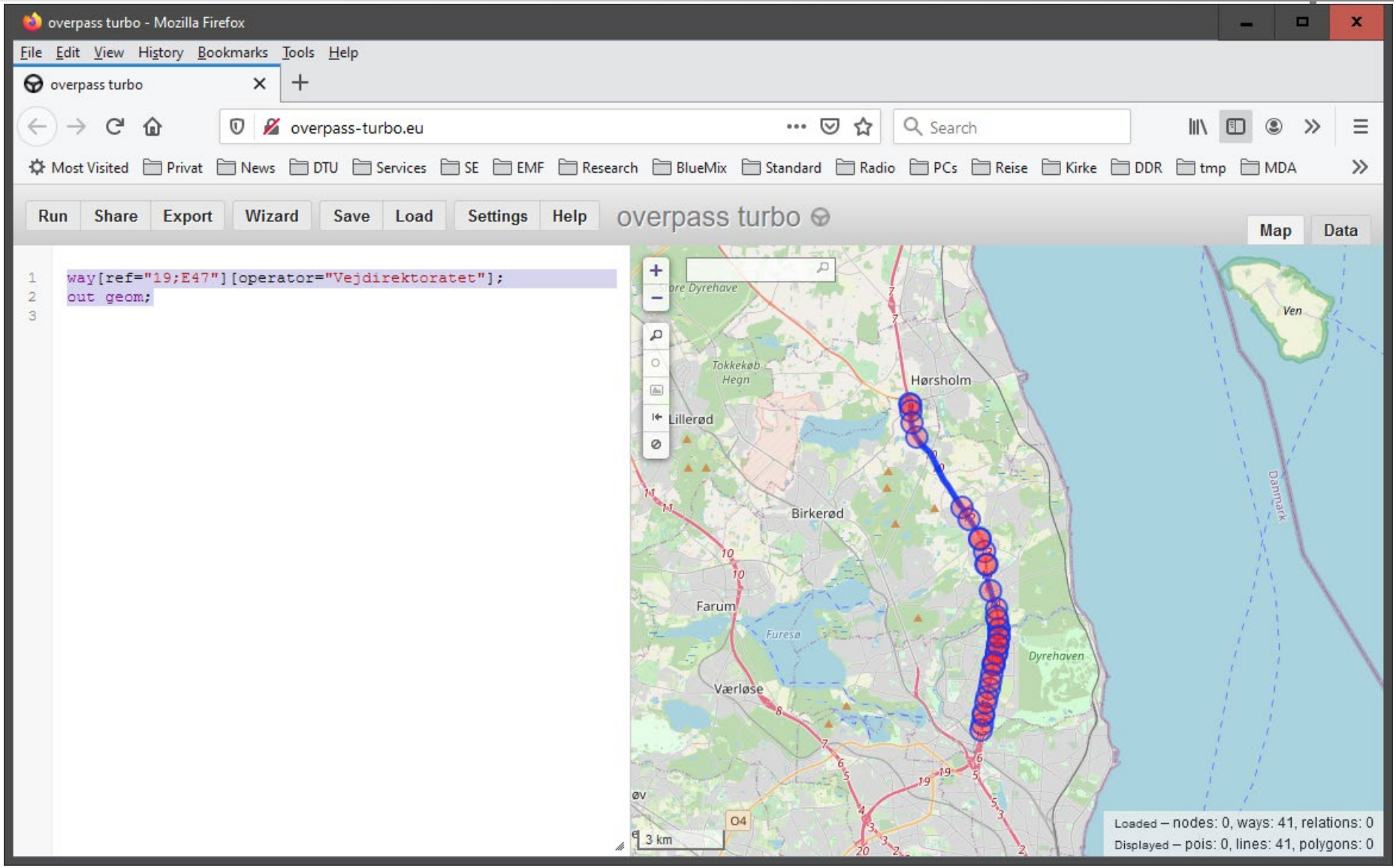

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More information on overpass and its QL

https://wiki.openstreetmap.org/wiki/Overpass_API

Group Meeting Today

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- Group leader and deputy (if not decided yet)
- Assign a responsible (for planning and tracking all actions necessary) for all submissions and all presentations. In particular the upcoming ones

What are the upcoming ones?

In particular: Project vision, Status Report

- Arrange facilities in a way that supports groups needs
- Agenda and minutes!

Status Report

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- Each group should report on (max. 5-10 minutes) how far they are with their work up to release 0:
  - First presentation (status)
  - Set up of infrastructure (web server and Jenkins)
  - Project vision
  - Organization (issues and problems)

- Some time for follow-up questions (max. 5 minutes)

The status reports will not be used for evaluating students individually!

Rooms for group meeting

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Group A: 210.008

Group B: 210.018

Group C: 210.012 (!!)

Group D: 210.112

Group E: 210.118