POLITECNICO
MILANO 1863

Working with OpenStreetMap data

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Background

OSM looks to map ALL visible physical objects such as:
points of interest, roads, buildings, transportation systems,
land use, social facilities such as health, education, government,
law, shops, industry, water systems, sanitation systems,
energy systems, environmental features.

Also looks to map administrative and legal boundaries,
land parcels, administrative zones, transportation lines etc..

Data Model

All features in OSM are either nodes, polylines, polygons or relations

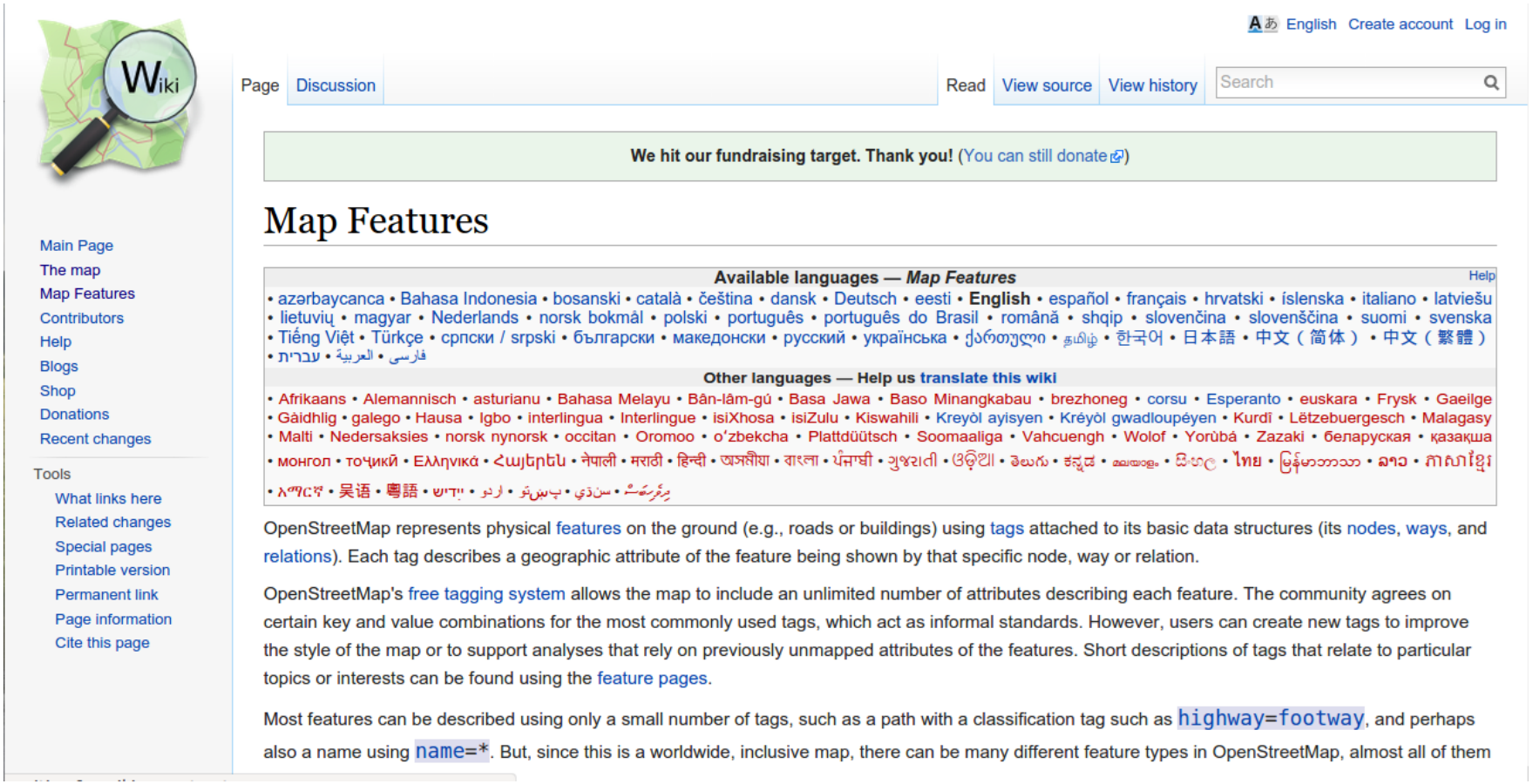
- **Nodes** – single point -geo coordinate + tags
- **Polylines** – an ordered list of nodes + tags (start and end node are different)
- **Polygons** – an ordered list of nodes + tags (start and end node are the same)
- **Relations** – a logical grouping of nodes, polylines and polygons + tags (example – country boundary)

Data Model

- In OSM terminology the term **WAY** is used to describe either polylines or polygons
- Usually tags are then used to distinguish between WAYS which represent polylines or polygons.
- In many websites you will find the term WAY instead of polylines or polygon. They can be used interchangeably

Data Structure - Tags

- Tagging is one of the most important aspects of OpenStreetMap
- Tagging in OpenStreetMap is very flexible



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Map Features

Main Page
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Available languages — *Map Features* Help

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OpenStreetMap represents physical features on the ground (e.g., roads or buildings) using tags attached to its basic data structures (its nodes, ways, and relations). Each tag describes a geographic attribute of the feature being shown by that specific node, way or relation.

OpenStreetMap's free tagging system allows the map to include an unlimited number of attributes describing each feature. The community agrees on certain key and value combinations for the most commonly used tags, which act as informal standards. However, users can create new tags to improve the style of the map or to support analyses that rely on previously unmapped attributes of the features. Short descriptions of tags that relate to particular topics or interests can be found using the feature pages.

Most features can be described using only a small number of tags, such as a path with a classification tag such as `highway=footway`, and perhaps also a name using `name=*`. But, since this is a worldwide, inclusive map, there can be many different feature types in OpenStreetMap, almost all of them

Data Structure - Tags

- An object can have at minimum 1 attribute (tag) – and there is no upper limit.
- There are no strict rules on how many attributes any object should have
- This flexibility means that you must use your own judgement in regards to how many attributes you provide

Data Structure - Tags

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We hit our fundraising target. Thank you! (You can still donate)

Tag:amenity=restaurant

Available languages — *Tag:amenity=restaurant*

• Deutsch • **English** • español • français • italiano • português do Brasil • русский • 日本語

Other languages — Help us translate this wiki

- Main Page
- The map
- Map Features
- Contributors
- Help
- Blogs
- Shop
- Donations
- Recent changes

Tools

- What links here
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`amenity=restaurant` is for a generally formal place with sit-down facilities selling full meals served by waiters and often licensed (where allowed) to sell alcoholic drinks.

Contents [hide]

1 How to Map
2 Examples
3 Rendering
4 See Also

Descriptio

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sit-down fa
served by
licensed (w
alcoholic d

How to Map

Add a node at the centre of the building and add `amenity=restaurant` to it. You can name it with `name=*`. If the whole building is used for this feature and its footprint is present in OSM, you can apply the tags on the area if you prefer.

Optionally, you can further classify it using the `cuisine=*` tag with a value suitable for your nation's environment

Data Structure - Tags

One tag is mandatory. In this case the most appropriate is amenity = restaurant
All the others are not mandatory

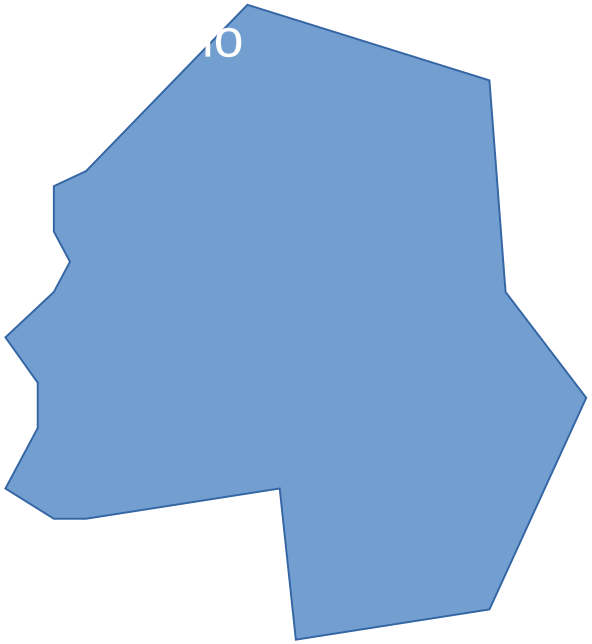
amenity = restaurant
name = Riva
cuisine = Italian
smoking = no
internet_access = wlan

Data Structure - Tags

Highway=residential
Name = Sleepy Street
Ref = R167

Building = yes
Address = 17 S. Street
City = Como

Name = NH Hotel
Amenity = Hotel
Building = hotel
Address = 27 S. Street
City = Como

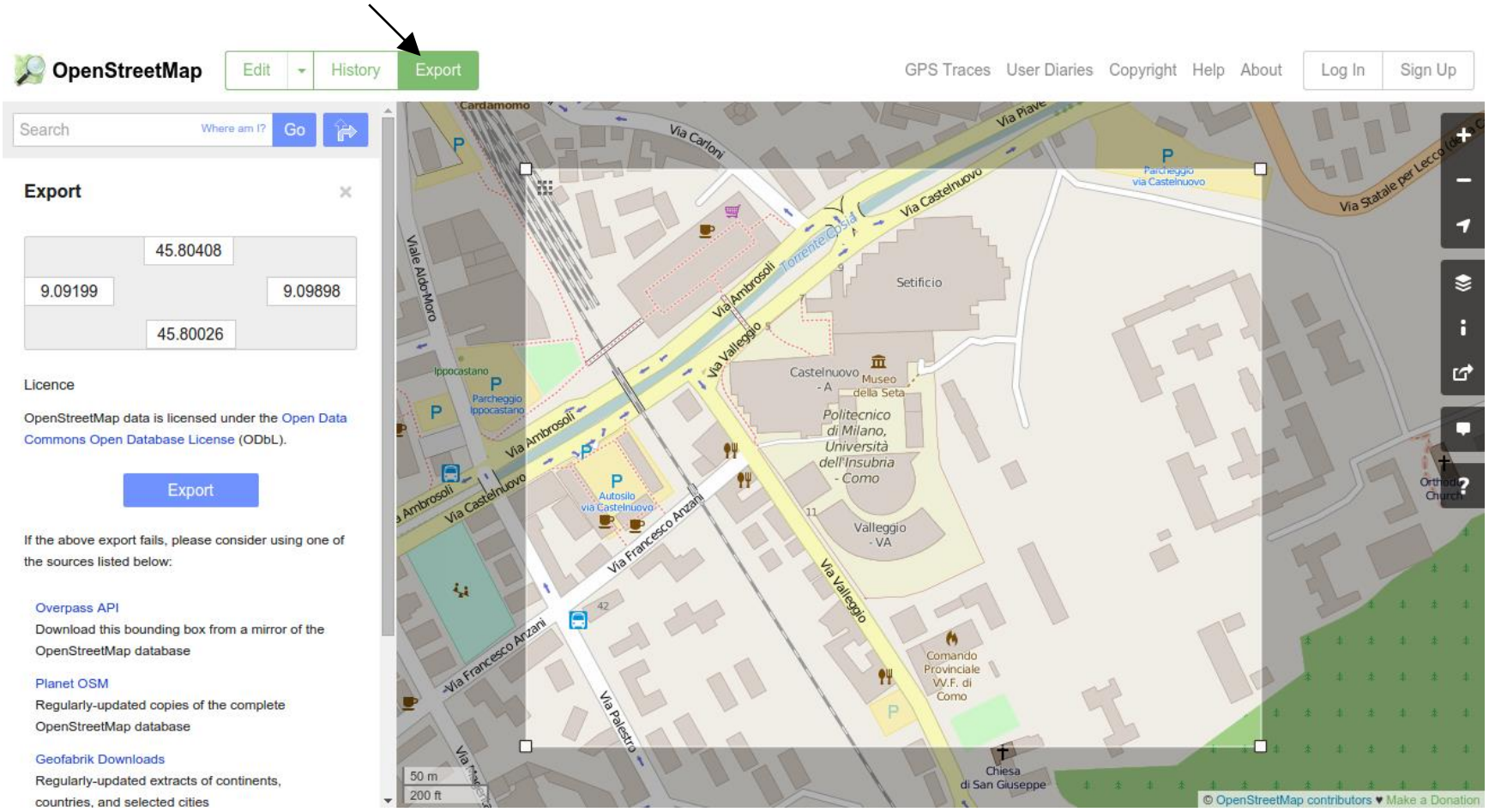


Data Structure - Tags

All the tags can be found in taginfo, with statistical information:
https://taginfo.openstreetmap.org/

Data Download

OpenStreetMap allows users to download the data from their main website (http://www.openstreetmap.org/), in XML format.



Data Download

Even though XML format contains all the necessary information it is quite difficult to read sometimes. And for large areas, the size of the file could be very big

```
<nd ref="945090749"/>
<tag k="addr:city" v="Como"/>
<tag k="addr:housenumber" v="42"/>
<tag k="addr:postcode" v="22100"/>
<tag k="addr:street" v="Via Anzani"/>
<tag k="building" v="university"/>
<tag k="name" v="Politecnico di Milano"/>
<tag k="wheelchair" v="yes"/>
</way>
<way id="31722004" visible="true" version="3" changeset="11049724" timestamp="2012-03-21T08:59:01Z" user="N
<nd ref="354922518"/>
<nd ref="354922521"/>
<tag k="highway" v="tertiary"/>
<tag k="name" v="Via Valleggio"/>
<tag k="oneway" v="yes"/>
</way>
<way id="31722068" visible="true" version="2" changeset="11049724" timestamp="2012-03-21T08:59:01Z" user="N
<nd ref="354922521"/>
<nd ref="354922523"/>
<nd ref="273205003"/>
<tag k="highway" v="tertiary"/>
<tag k="name" v="Via Valleggio"/>
<tag k="oneway" v="yes"/>
</way>
<way id="31722069" visible="true" version="6" changeset="27554027" timestamp="2014-12-18T16:47:07Z" user="m
<nd ref="354922521"/>
<nd ref="3120553222"/>
<nd ref="3241236209"/>
<nd ref="769081171"/>
<nd ref="273205915"/>
<nd ref="769081179"/>
<nd ref="2083450731"/>
```

- ID of the object
- VERSION of the object
- CHANGESET it is part of
- TIMESTAMP of when it was created/edited
- USER who created it
- USER ID

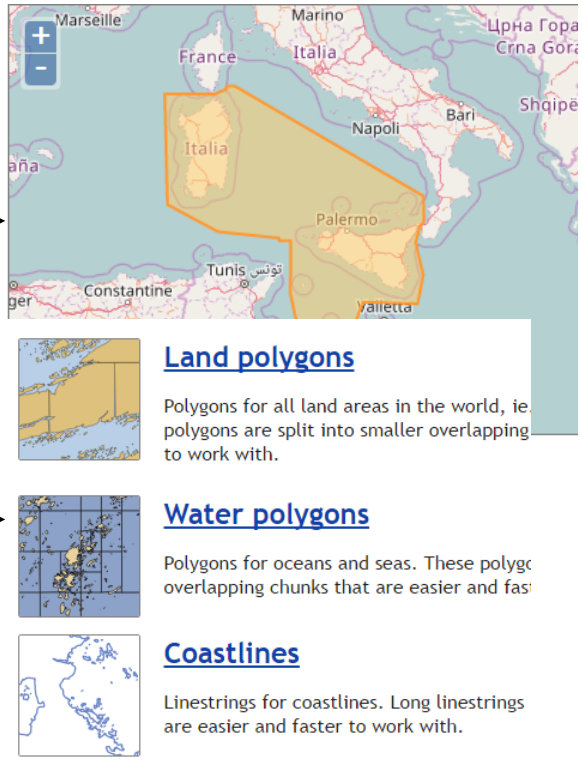
- The ordered list of NODES

- The list of tags (no order)

Data Download – Different formats

There are services where you can download OSM data in different formats

- Geofabrik (http://download.geofabrik.de/)
  - Download in ESRI SHAPEFILE Format (but not custom area)



- The OpenStreetMap Data (http://openstreetmapdata.com/) website provides access to OSM data in SHAPEFILE format.
- Other services are available to provide access to OSM data in other formats such as JSON and GPX

Data Download – Metro Extracts

Mapzen - metro extracts (https://mapzen.com/data/metro-extracts/) permits to download custom area in bulk, in an easy way. It is the best method to download large area, such cities or provinces, keeping the consistency of the data.

metro extracts

Every week, Metro Extracts automatically creates snapshots of OpenStreetMap data into manageable, metro-area files in a variety of formats for you to use. Download an extract from the list of **200 most popular extracts** below to get started right away.

Can't find what you are looking for? You can get **custom extracts** of anywhere in the world! To get started, search for the place you are looking for.

Your Custom Extracts | Documentation | Tutorial | File Format Guide

SEARCH FOR A CITY OR REGION

Città metropolitana di Milano, Italy SEARCH

Looks like the place you are looking for is part of a popular extract:

Milan

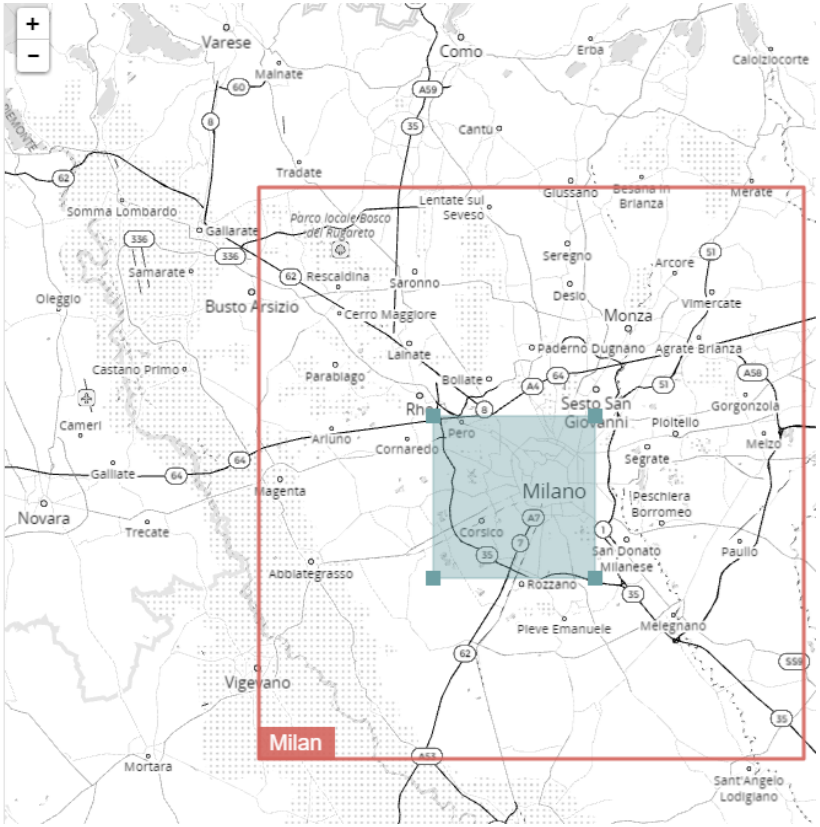
You can make your own extract for Città metropolitana di Milano too!

Step 1: Confirm the boundaries of your custom extract. Drag the corners of the blue box on the map to adjust.

Step 2: Choose a name for your extract: Città metropolitana di Milano, Italy

GET EXTRACT

(Note: Custom extracts take about 30-60 minutes to generate and you will be guided to sign in or sign up for a free Mapzen



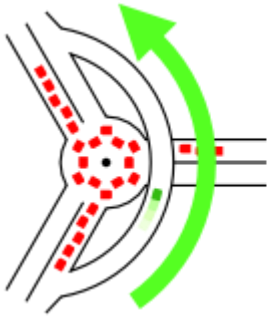
Data Download – Italian regional extracts

Provided by Wikimedia Italy (OSM Italian chapter): http://osm-estratti.wmflabs.org/estratti

Data Download – Overpass API

- The Overpass API serves up custom selected parts of the OSM map data. It acts as a database over the web: the client sends a query to the API and gets back the data set that corresponds to the query.

- Overpass API is optimized for data consumers that need a few elements within a glimpse or up to roughly 100 million elements in some minutes



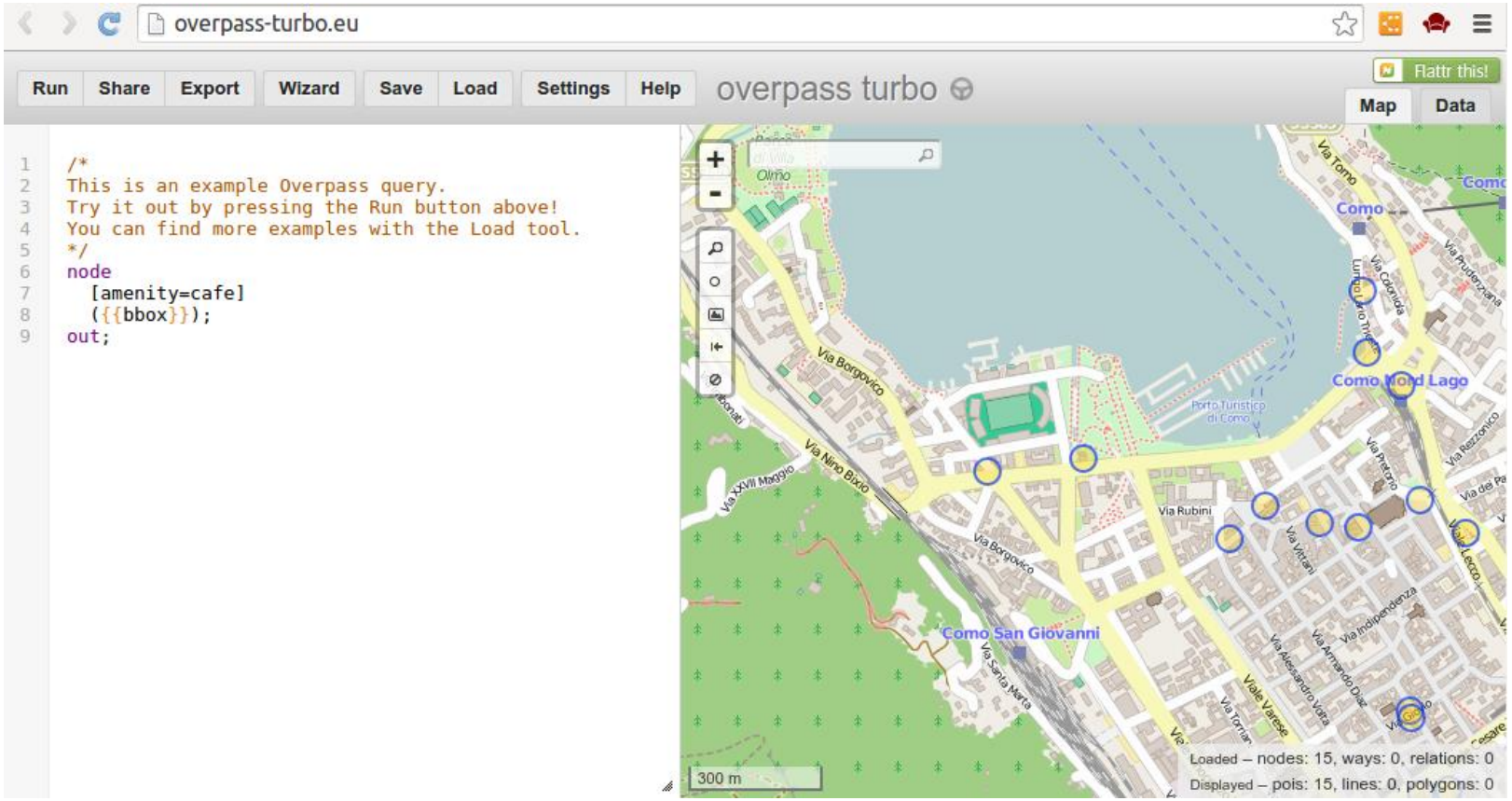
Overpass API

https://overpass-turbo.eu/

Data Download – Overpass API

The Overpass API has its own specific query language

http://wiki.openstreetmap.org/wiki/Overpass_API/Language_Guide



Data Download – Overpass API

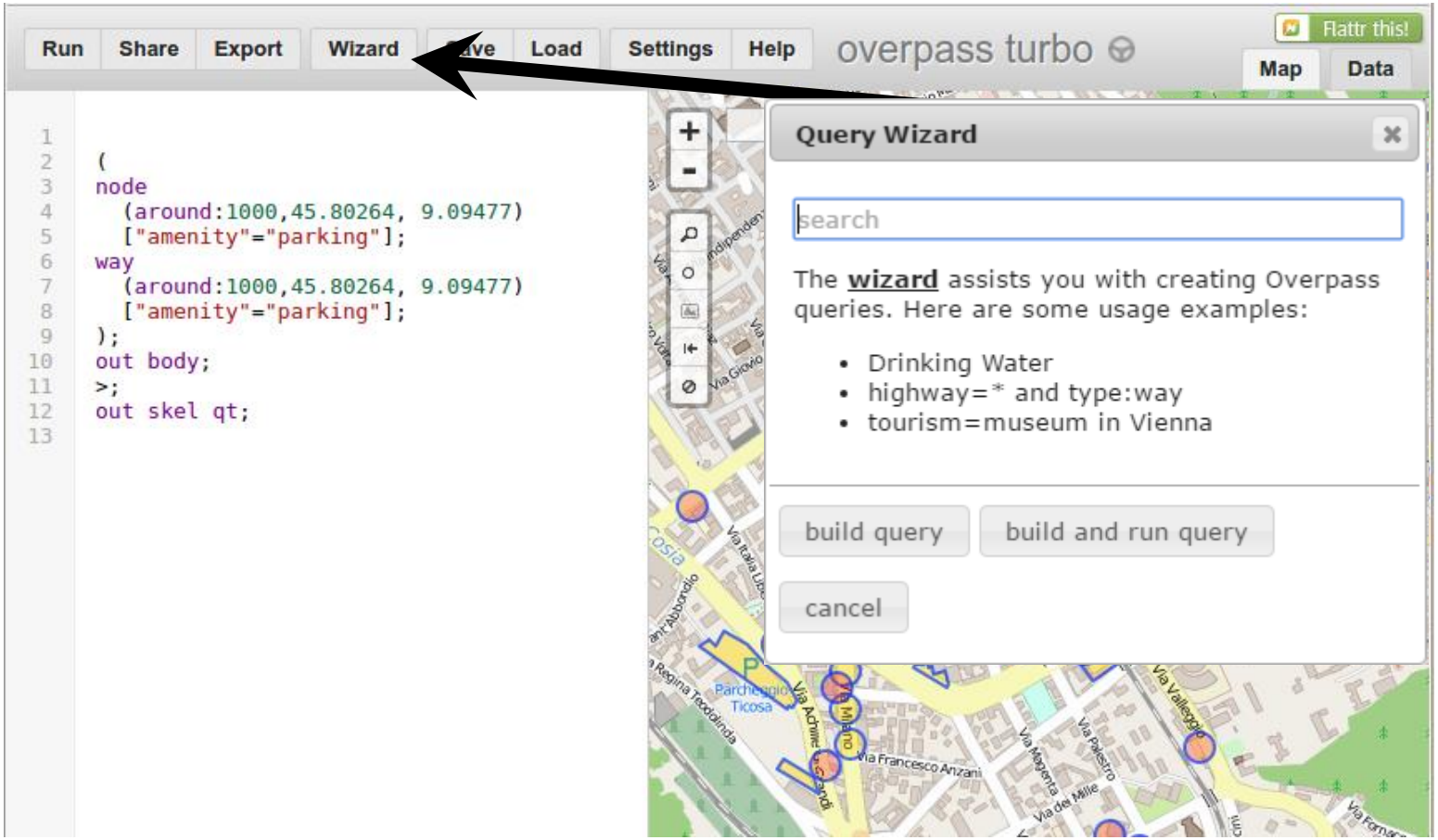
Example to extract all feature tagged with amenity=parking, around a specific point

Run | Share | Export | Wizard | Save | Load | Settings | Help | overpass turbo | Flattr this! | Map | Data

```
(
node
  (around:1000,45.80264, 9.09477)
  ["amenity"="parking"];
way
  (around:1000,45.80264, 9.09477)
  ["amenity"="parking"];
);
out body;
>;
out skel qt;
```

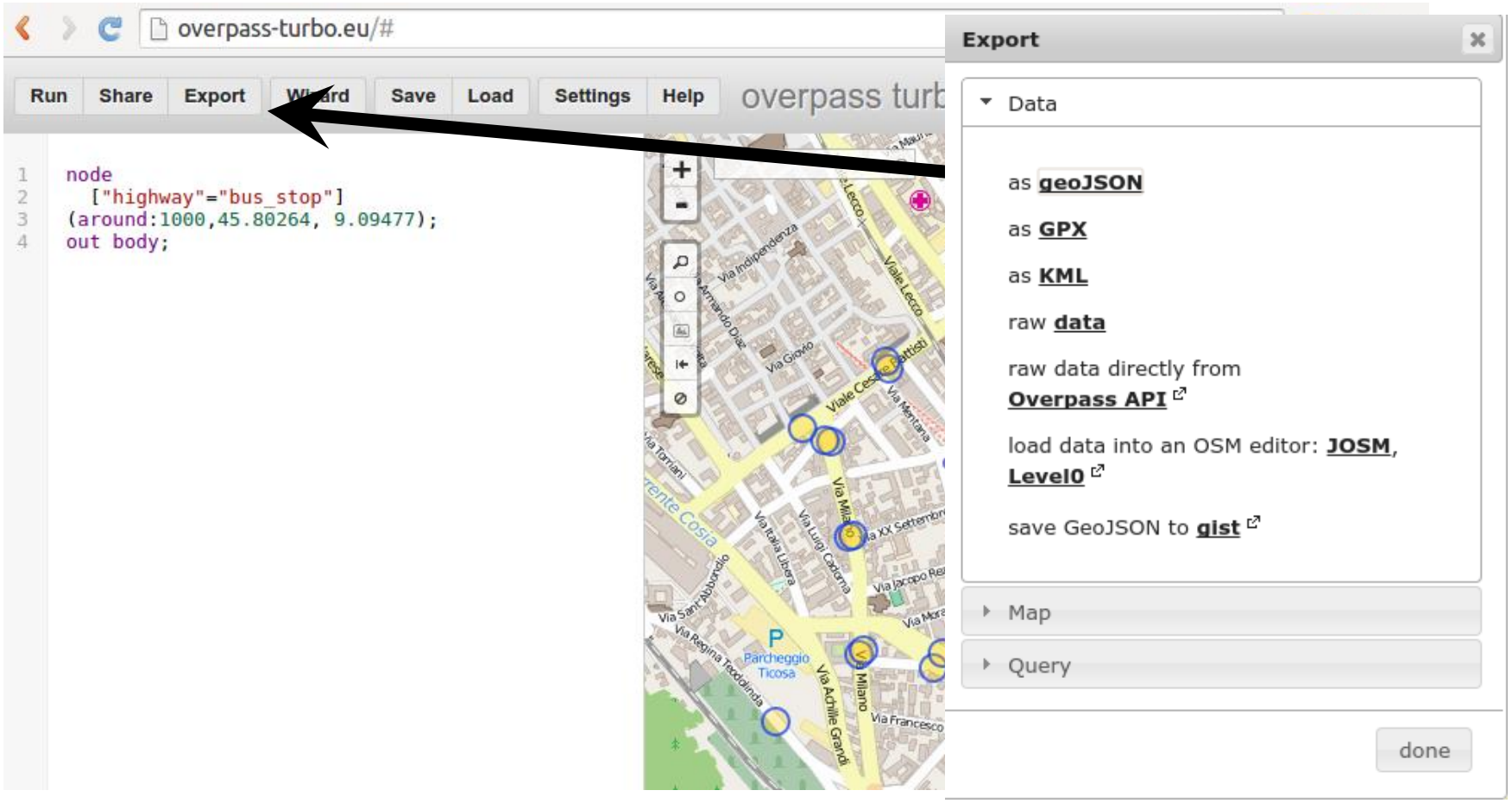
Data Download – Overpass API

It is also available a Wizard, to help you compose a query using natural language



Data Download – Overpass API

It is possible to export the data in different formats



Data Download – Differences

Data Differences	Geofabrik	Osm-Estratti	OSM	Metro Extracts	Overpass
Custom Area	+ 100-200Km	++ Limited customization	+++	++ Registration required	+++
Completeness	+ 1 Tag	+ 1 Tag	+++	+++	+++
Custom Features	-	-	-	+	+
Data Export Format	++ No raw XML, No GeoJSON	++ No raw XML	+ Only raw XML	+++	+++
Total Score	**4/10**	**5/10**	**7/10**	**9/10**	**10/10**

Thanks for the attention!

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