

# Bridging the Gap: Using OSM Data with GIS Tools



Jochen Topf  
Geofabrik GmbH

# Geographic Information Systems

You need to know about

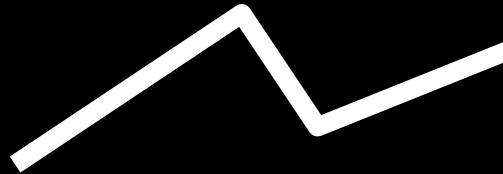
**4 concepts**

to understand  
everything about GIS

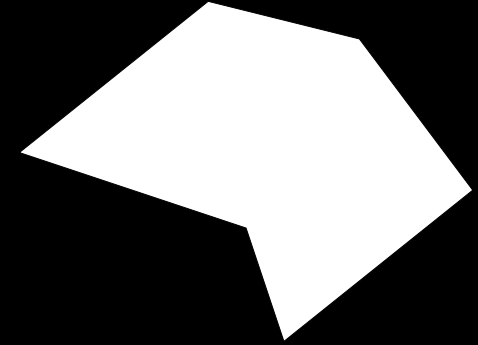
# 1. Simple Features



Point



LineString

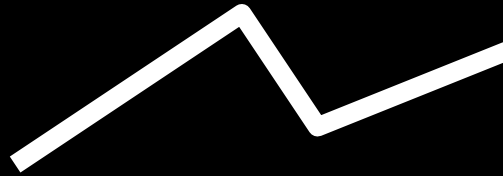


Polygon

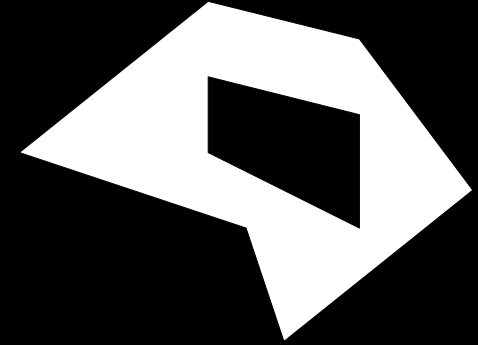
# 1. Simple Features



Point



LineString

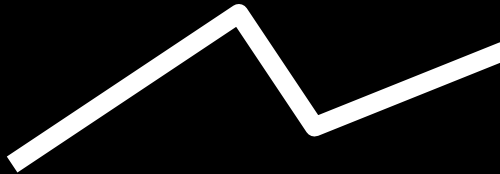


Polygon

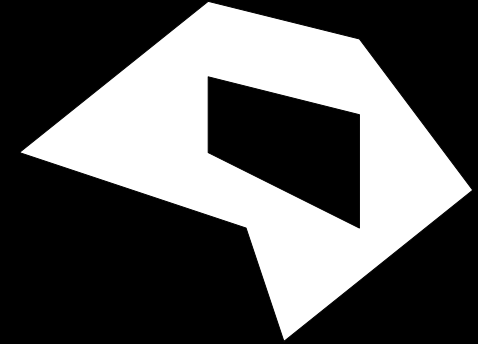
# 1. Simple Features



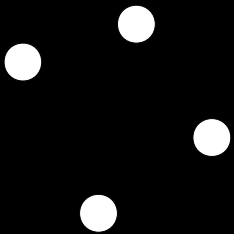
Point



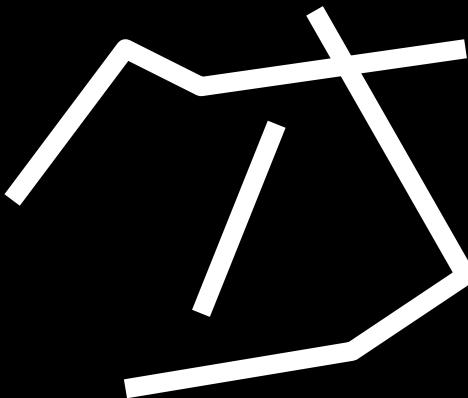
LineString



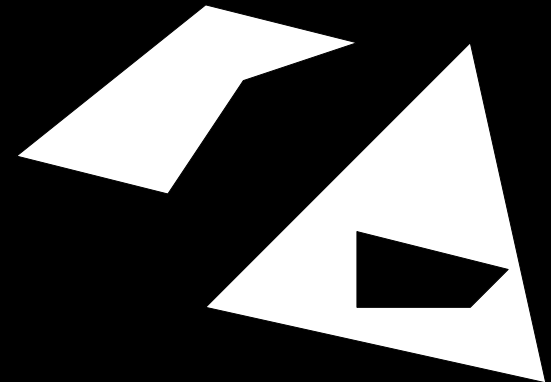
Polygon



MultiPoint



MultiLineString



MultiPolygon

## 2. Layers



# 2. Layers





## 2. Layers



# 3. Attributes

<b>Name (String)</b>	<b>Type (Integer)</b>	<b>MaxSpeed (Integer)</b>	<b>Oneway (Bool)</b>
<i>Main St</i>	<i>3</i>	<i>50</i>	<i>false</i>
<i>High St</i>	<i>2</i>	<i>80</i>	<i>false</i>
<i>Foo Ln</i>	<i>3</i>	<i>30</i>	<i>true</i>
<i>OSM CI</i>	<i>4</i>	<i>50</i>	<i>false</i>

# **4. Spatial Reference Systems (SRS)**

**Geographic Reference System**

**Geographic Coordinate System**

**Map Datum**

**WGS 84**

1. Simple Features

2. Layers

3. Attributes

4. Spatial Reference System

**Open Geospatial Consortium (OGC)**

[opengeospatial.org](http://opengeospatial.org)

**Open Source Geospatial Foundation (OSGeo)**

[osgeo.org](http://osgeo.org)

Standards



**Open Geospatial Consortium (OGC)**

[opengeospatial.org](http://opengeospatial.org)

**Open Source Geospatial Foundation (OSGeo)**

[osgeo.org](http://osgeo.org)



Open Source Software

# OGC Standards

Geography Markup Language – GML

Keyhole Markup Language – KML

Web Map Service – WMS

Web Feature Service – WFS

...



# Open Source Software

OpenLayers

Quantum GIS, gvSIG, uDig

UMN Mapserver, GeoServer

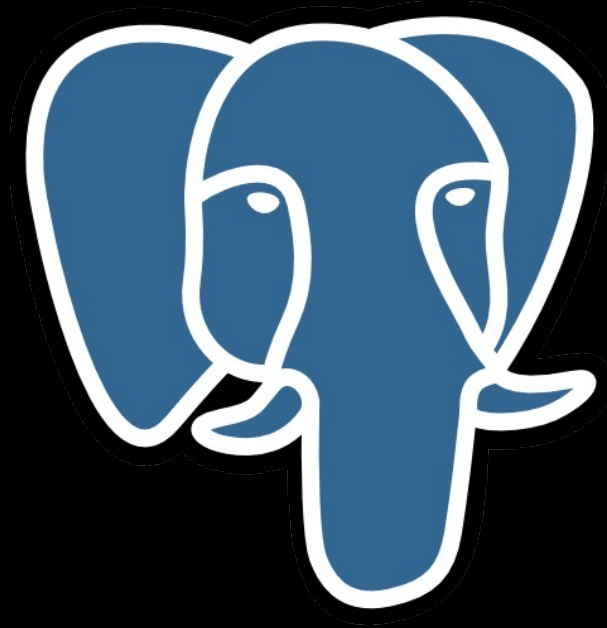
Mapbender, MapFish, deegree

GRASS

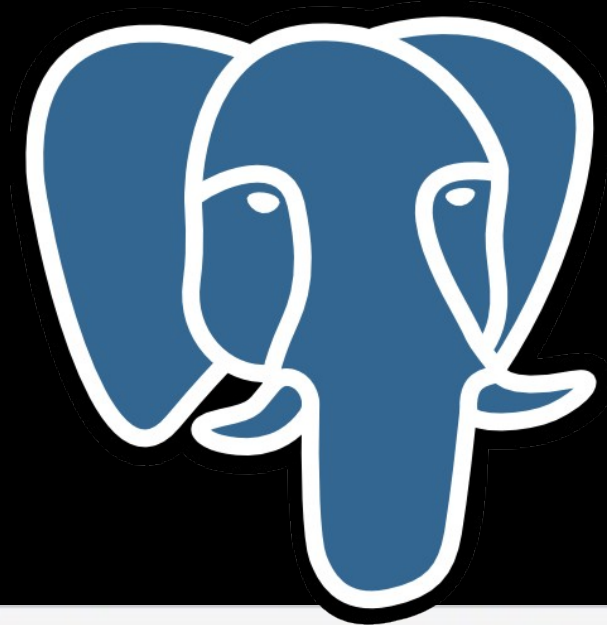
GDAL, OGR, GEOS, GeoTools

...

# Spatial Database



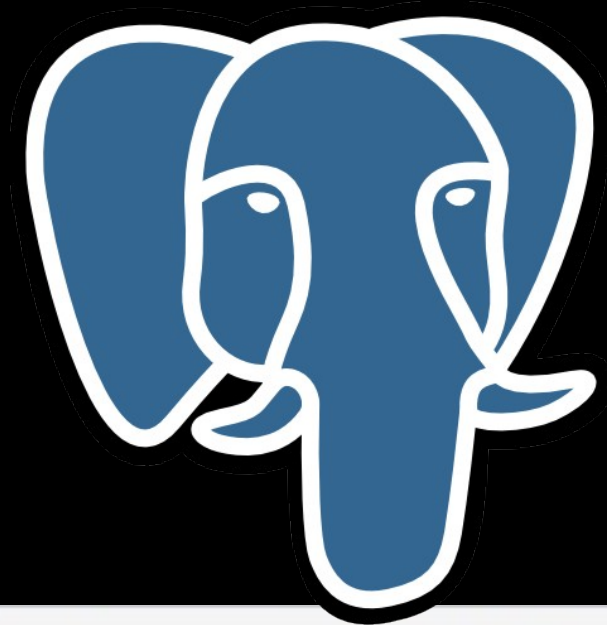
# Spatial Database



# Spatial Database

Geometric  
Types:

Point  
LineString  
Polygon  
...



Geometric  
Functions:

Centroid()  
ConvexHull()  
Buffer()  
Contains()

**Filling the database:**

**osm2pgsql**

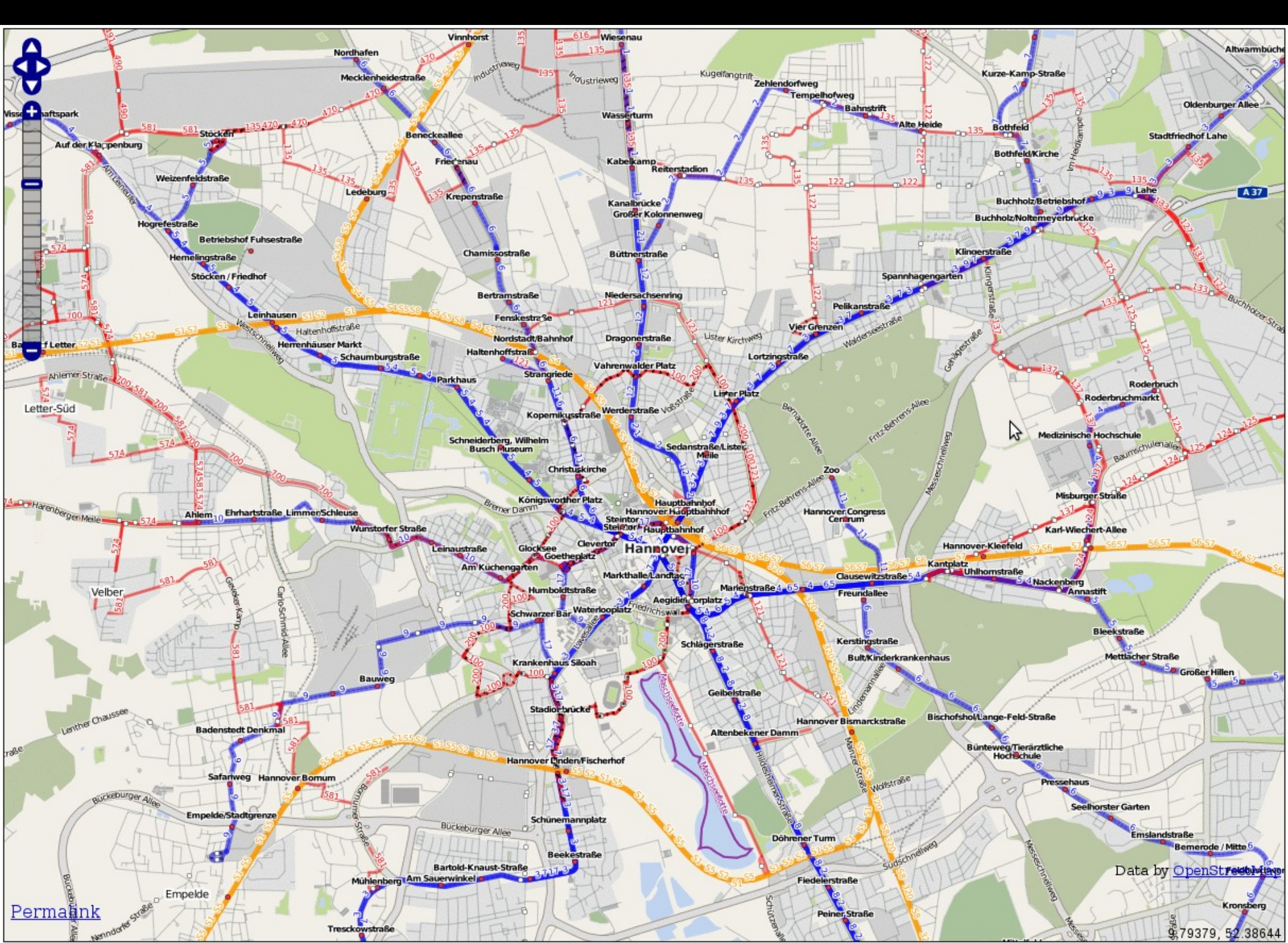
# Tables:

planet\_osm\_point

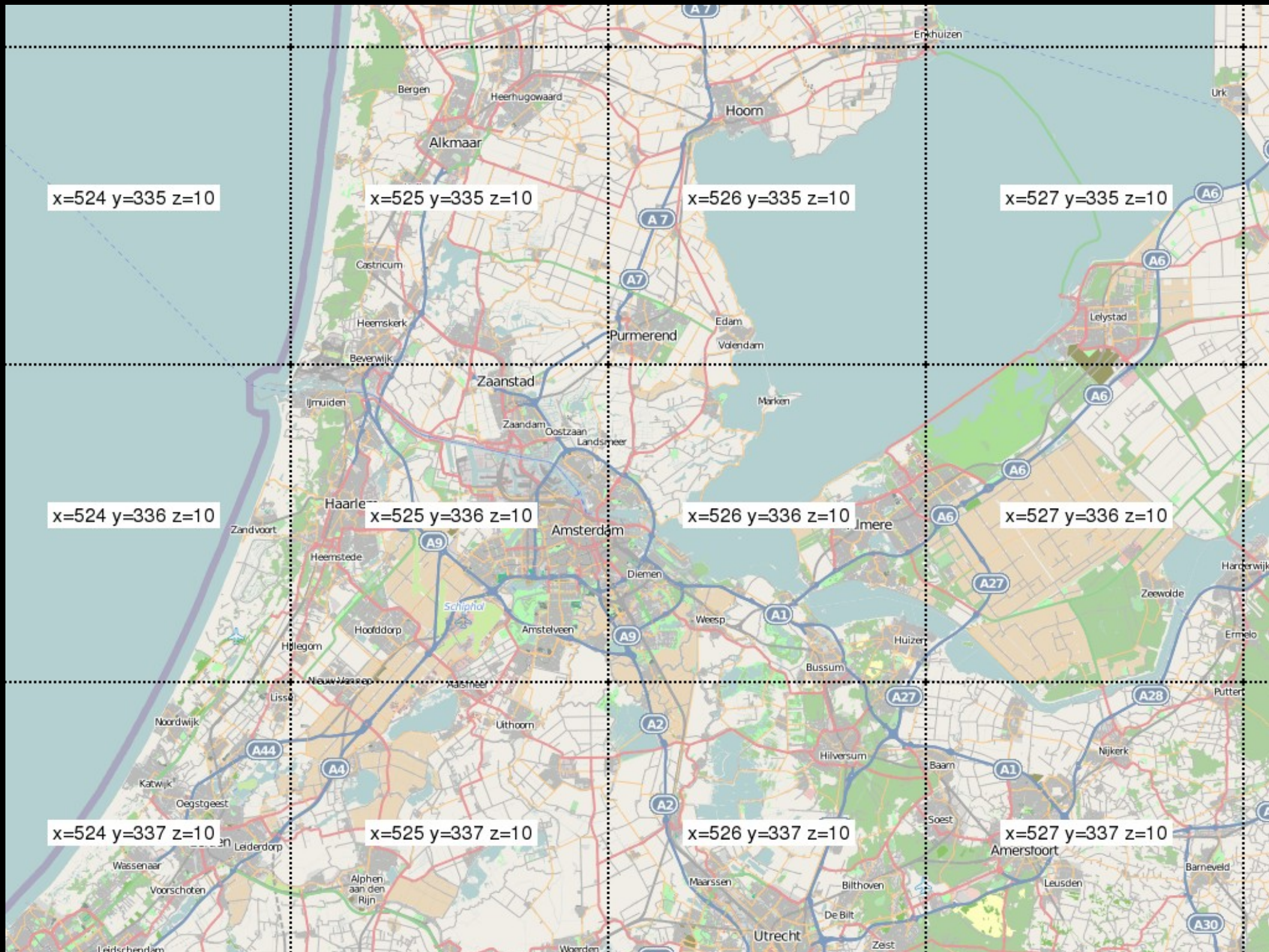
planet\_osm\_line

planet\_osm\_polygon

planet\_osm\_roads



Data by [OpenStreetMap](https://www.openstreetmap.org/)



x=524 y=335 z=10

x=525 y=335 z=10

x=526 y=335 z=10

x=527 y=335 z=10

x=524 y=336 z=10

x=525 y=336 z=10

x=526 y=336 z=10

x=527 y=336 z=10

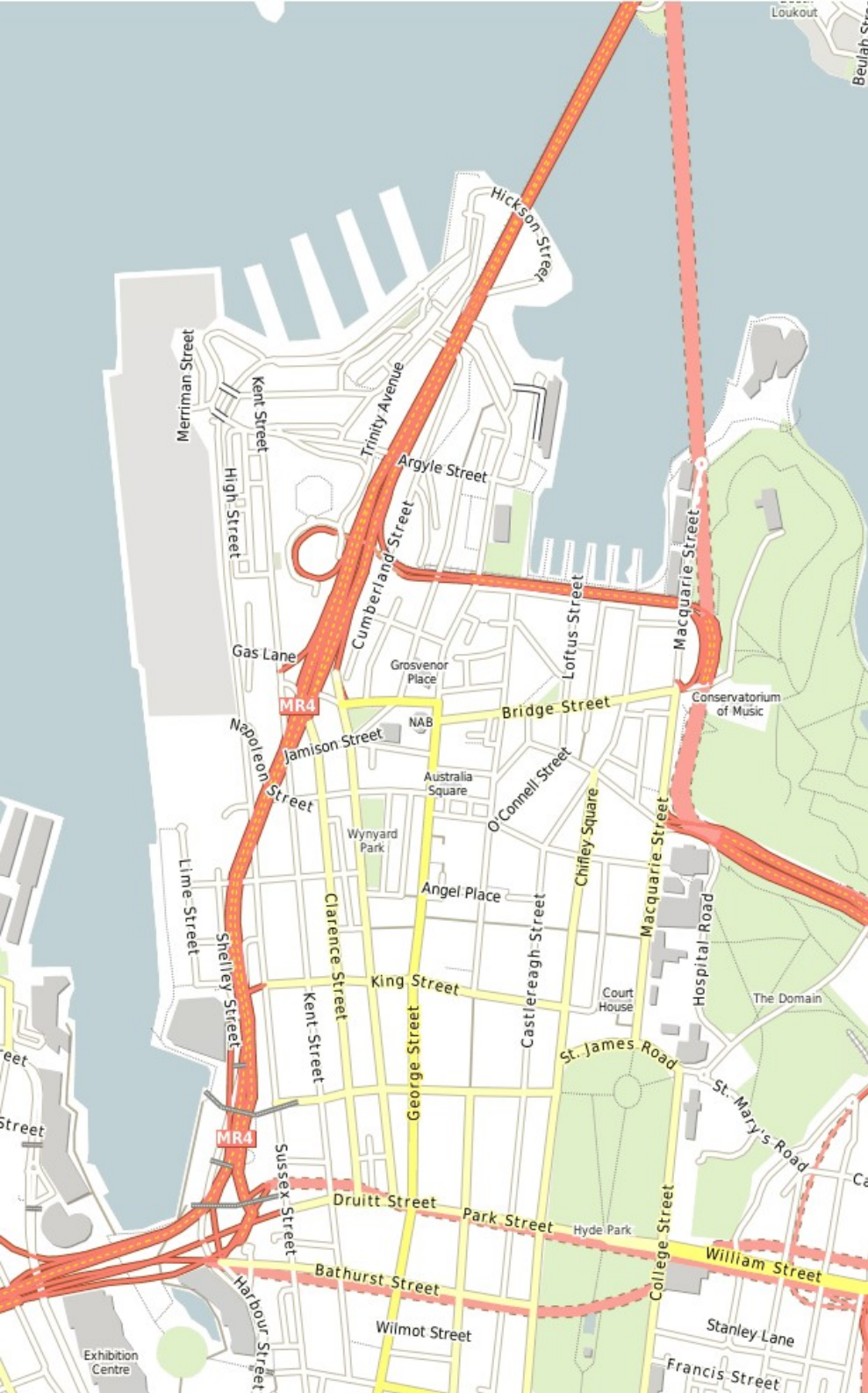
x=524 y=337 z=10

x=525 y=337 z=10

x=526 y=337 z=10

x=527 y=337 z=10





# UMN Mapserver

Web Map Service (WMS)

Web Feature Service (WFS)

**Filling the database:**

**Osmosis**

# Tables:

nodes	node_tags	
ways	way_tags	way_nodes
relations	relation_tags	relation_members
users		



Legend

- Pub near tram
- Tram
- Pubs
- Near Tram
- OSM Mapnik

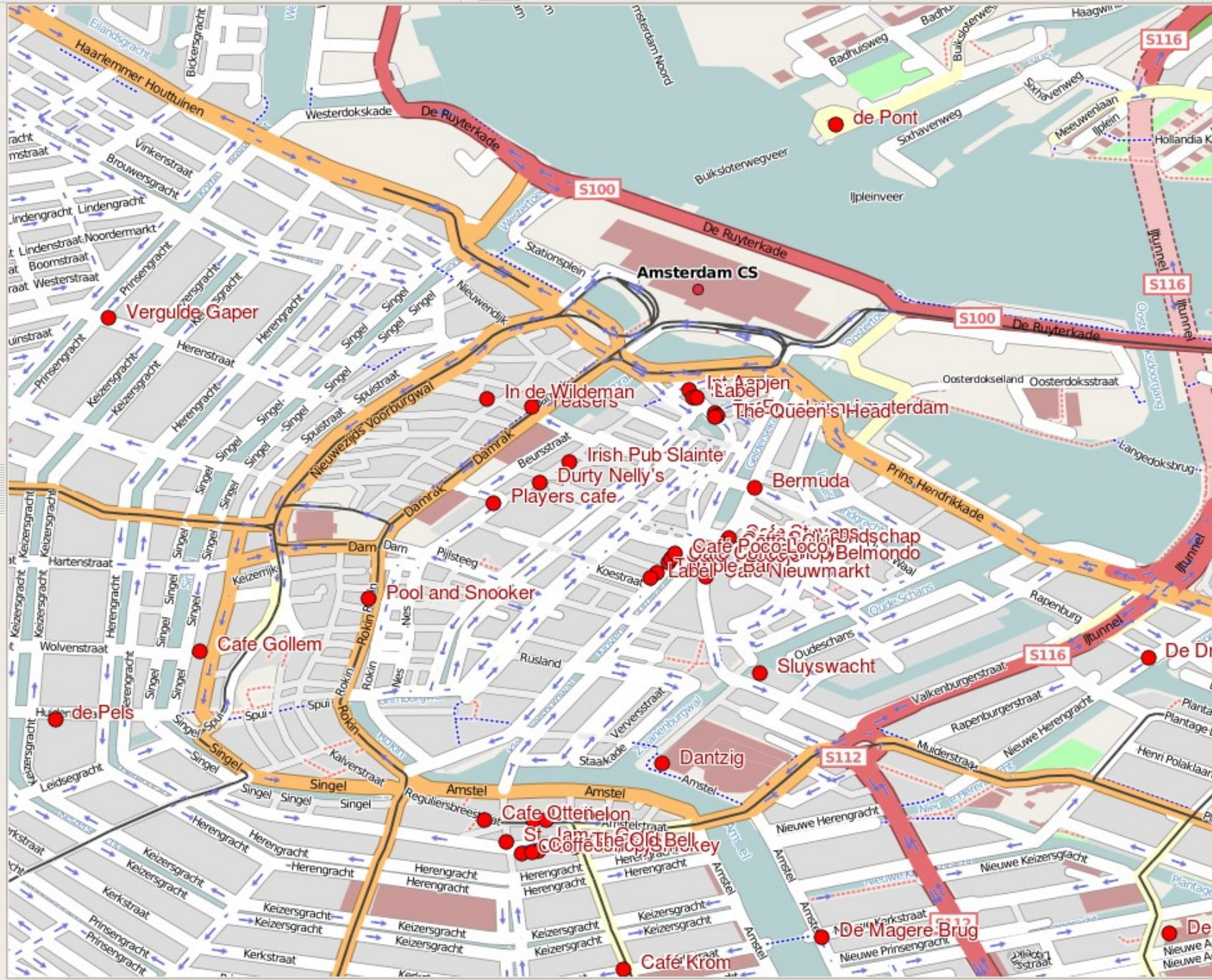


Overview



**Legend**

- Pub near tram
- Tram
- Pubs
- Near Tram
- OSM Mapnik



**Overview**



Legend

- Pub near tram
- Tram
- Pubs
- Near Tram
- OSM Mapnik



Overview



# PostGIS Example

```
CREATE TABLE near_tram (  
  id SERIAL PRIMARY KEY  
);
```

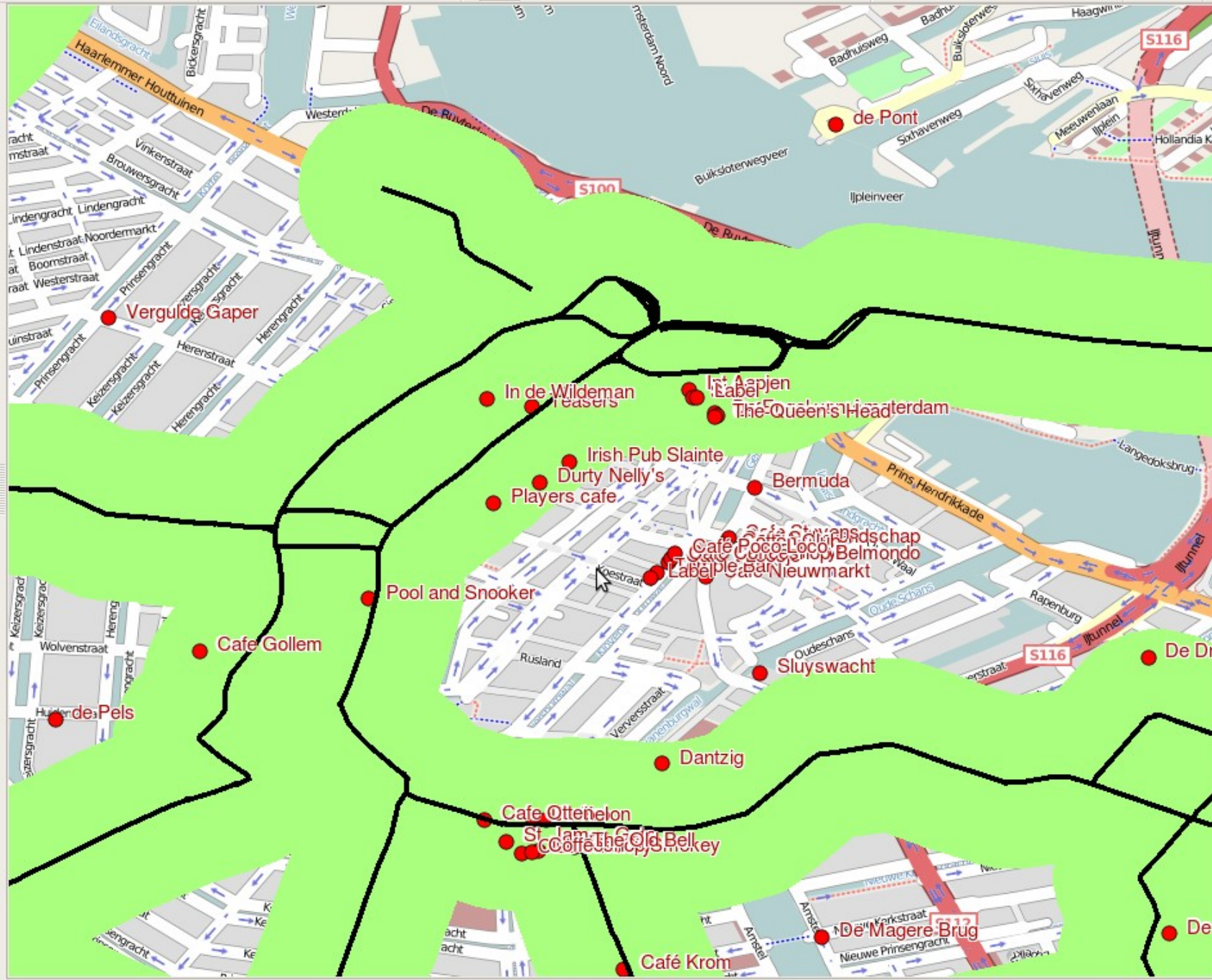
```
SELECT AddGeometryColumn('near_tram', 'geom',  
                          4326, 'POLYGON', 2);
```

```
INSERT INTO near_tram (geom)  
  SELECT ST_Buffer(geom, 0.002)  
  FROM ways w, way_tags t  
  WHERE w.id=t.way_id  
  AND t.k='railway' AND t.v='tram';
```



**Legend**

- Pub near tram
- Tram
- Pubs
- Near Tram
- OSM Mapnik



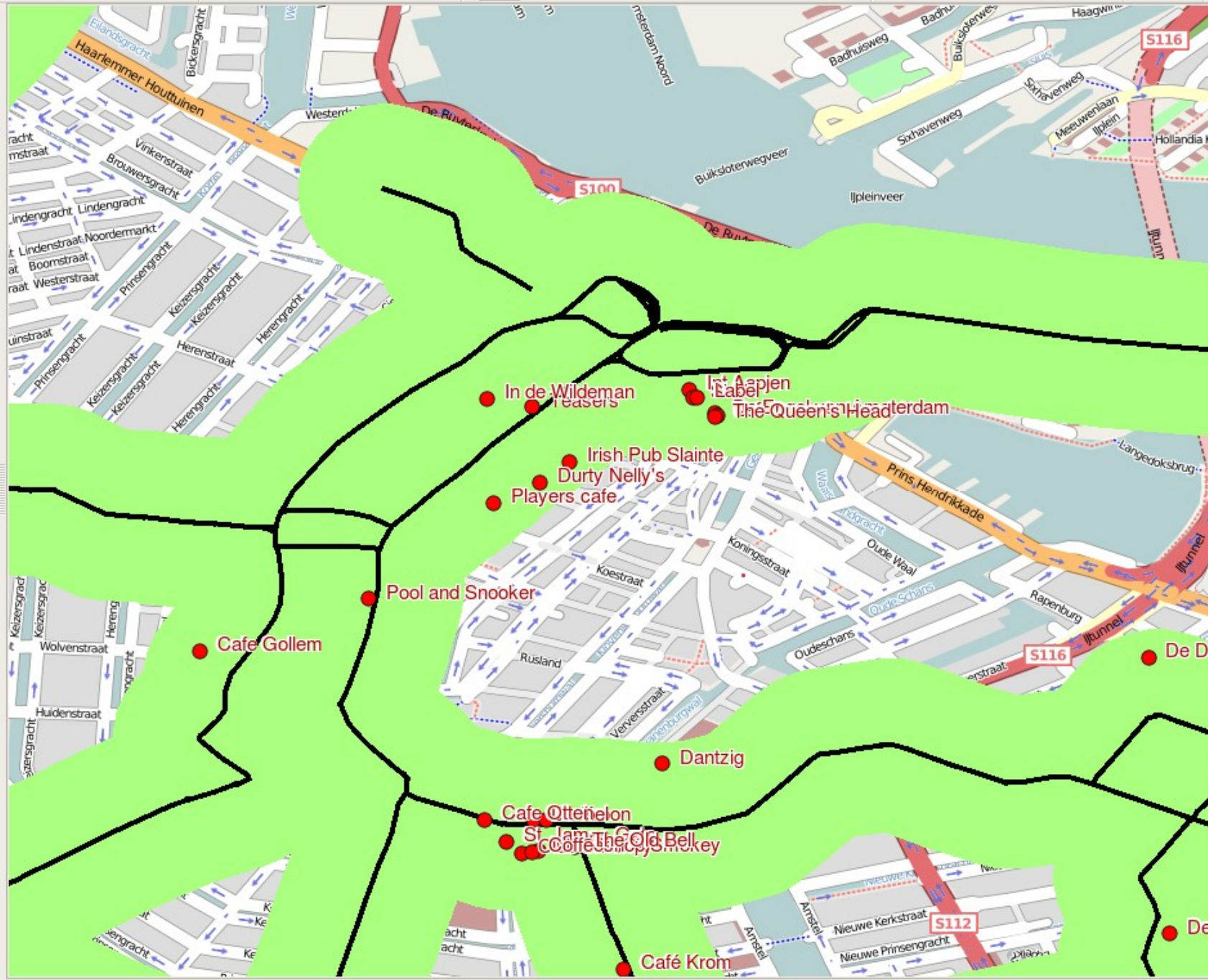
**Overview**





Legend

- Pub near tram
- Tram
- Pubs
- Near Tram
- OSM Mapnik



Overview

# Shapefiles

near\_tram.shp

near\_tram.shx

near\_tram.dbf

near\_tram.prj

...



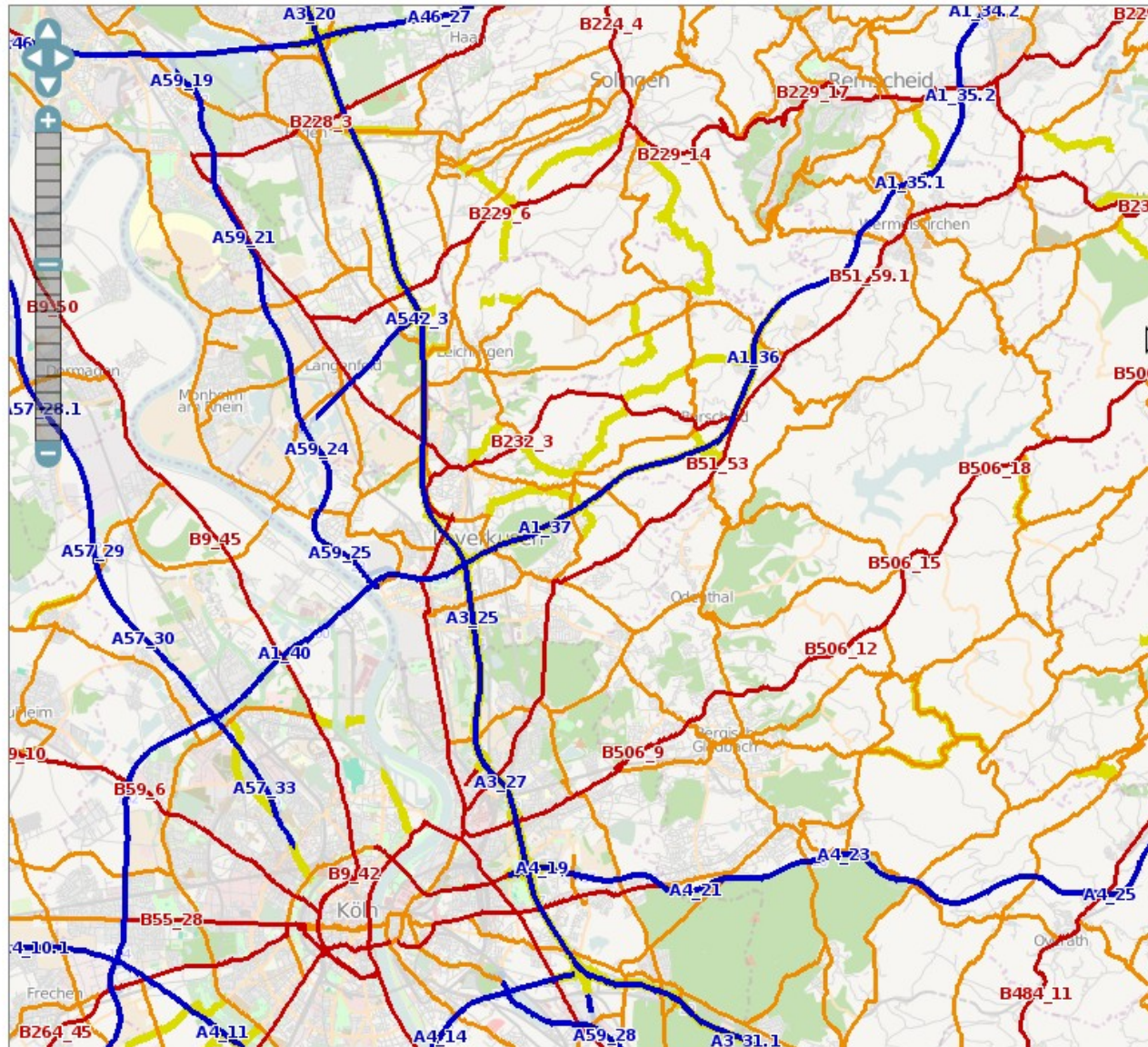
pgsql2shp



shp2pgsql

View: Straßen NRW Base layer: Mapnik

- Overlays**
- Bereits importiert
  - Unzugeordnete Straßen
  - Kreisstraßen (AST)
  - Kreisstraßen
  - Landesstraßen (AST)
  - Landesstraßen
  - Bundesstraßen (AST)
  - Bundesstraßen
  - Autobahnen (AST)
  - Autobahnen
  - Endpunkte



**Selection**

- layer: kreisstrassen
- ID: 1300
- ABS: 4908075049080810
- STRASSE: K2(GL)
- ABSNR\_ZUR: K2(GL)
- ABSNR\_ZAHL: 4.0
- ABSNR\_BUCH:
- ABSNR: 4
- STRASSE\_BE: K2(GL) / 4
- FILE: K2\_GL\_4
- OSMDL: [http://download.geofabrik.de/strassen-nrw/K/K2/K2\\_GL\\_4.osm](http://download.geofabrik.de/strassen-nrw/K/K2/K2_GL_4.osm)

**Data**

Bundesstraßen (AST)

Only 100 features are shown. There might be more.

id	abs	strasse	ab
362	4809048D4809048E	B229	B2
1193	500710715007107E	B55	B5
1239	5007018S5007018G	B55A	B5
1440	5006073K5006073L	B59	B5
1444	5006073G5006073R	B59	B5
1891	5008049B5008049C	B8	B8
1900	5008006C5008006D	B8	B8
1901	5008006F5008006A	B8	B8
1917	4908021E4908021K	B8	B8
1921	4907017F4907017D	B8	B8

Data from 2009-03-14 00:59:30

7.31972, 51.11178 zoom=11 [Permalink](#)

[www.geofabrik.de](http://www.geofabrik.de)  
[tools.geofabrik.de](http://tools.geofabrik.de)

[postgis.org](http://postgis.org)  
[opengeospatial.org](http://opengeospatial.org)  
[osgeo.org](http://osgeo.org)

**Jochen Topf**  
[topf@geofabrik.de](mailto:topf@geofabrik.de)

