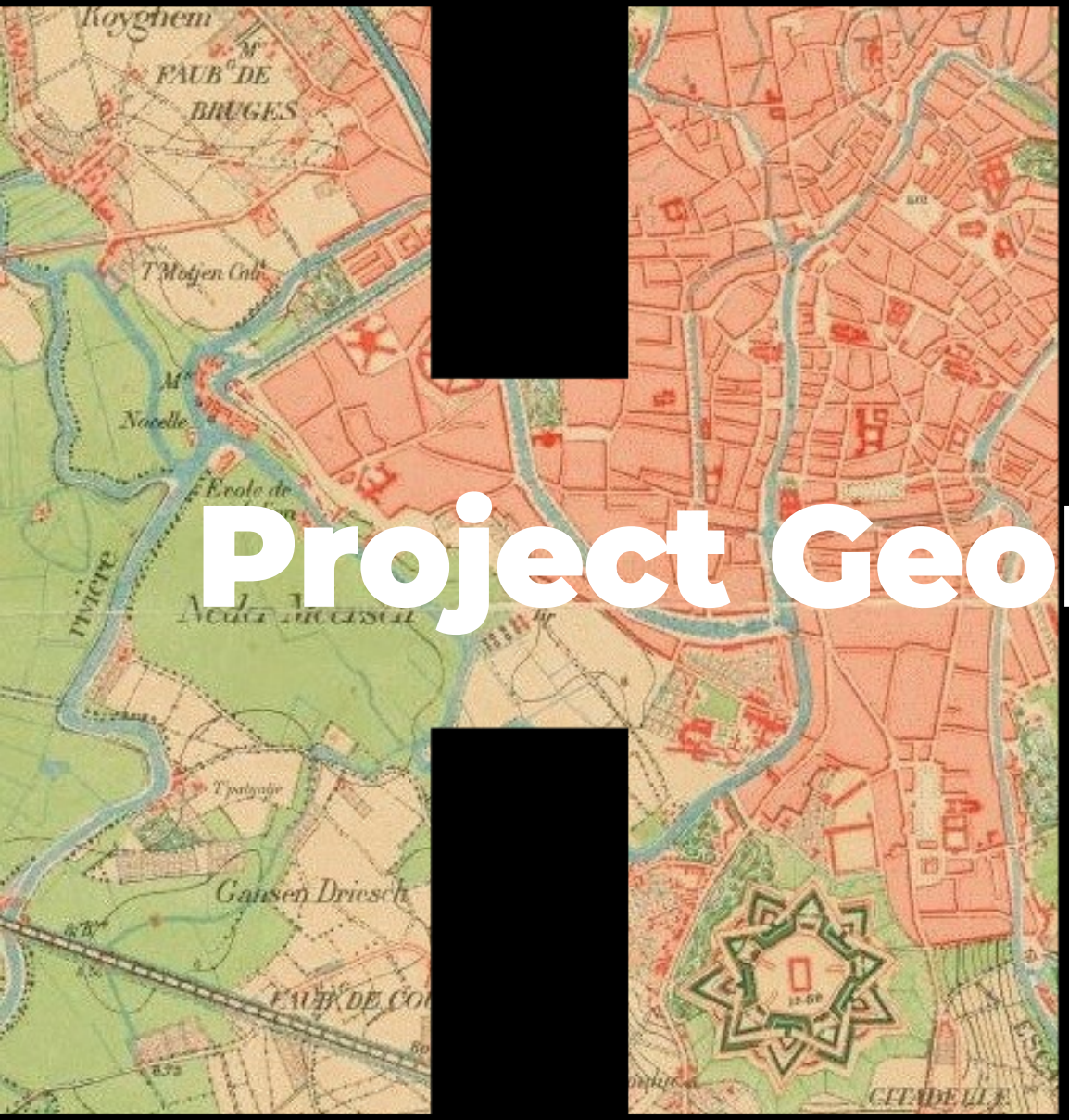

Project GeoICT

2021-2022

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Web services

Project GeoICT

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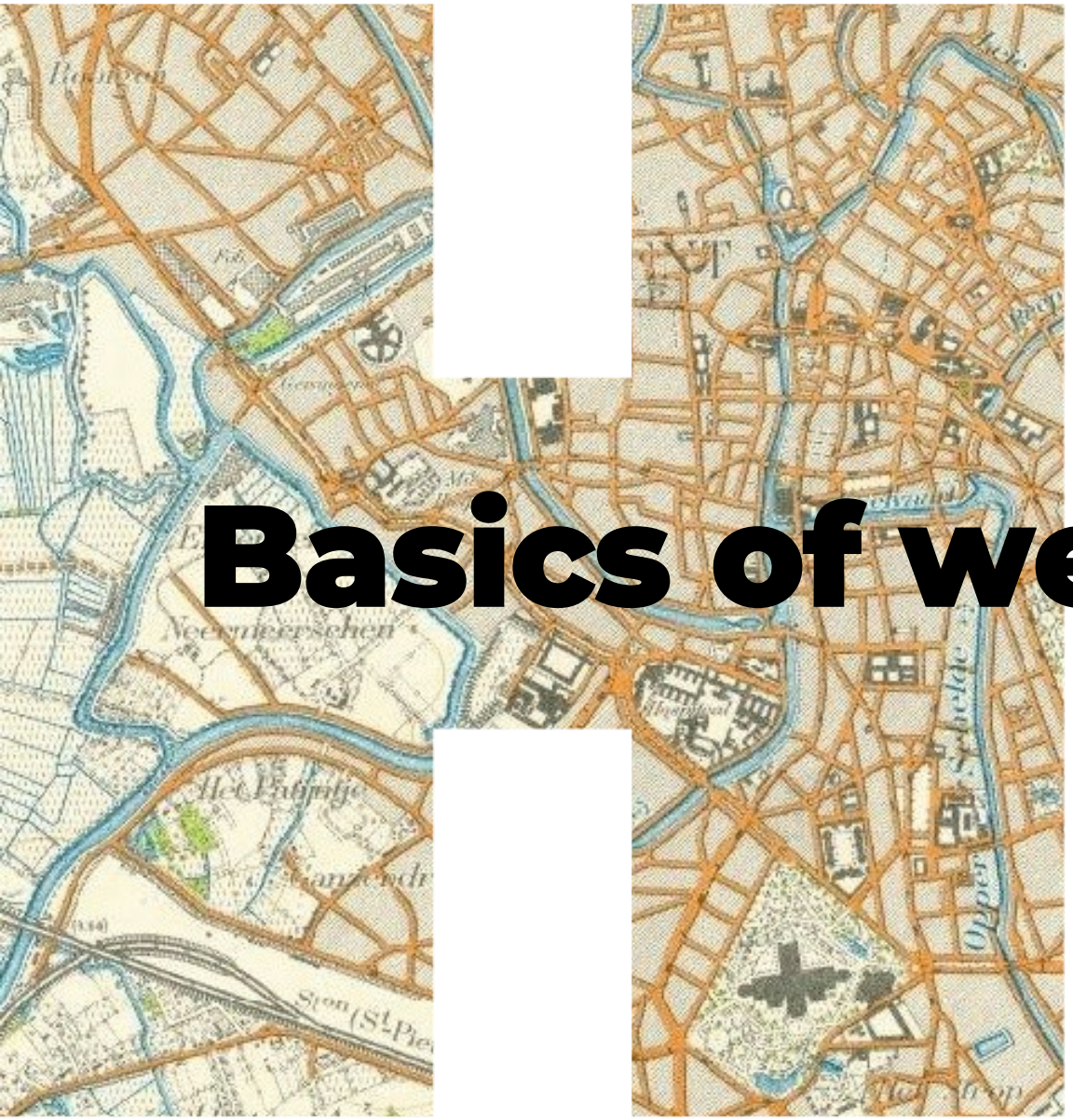

Basics of web services

Web services

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What are webservices?

- Data services that are available via the web
- Using (standardize) web protocols (HTTP, PHP, SOAP, REST, …)
- Allow various services:
  - Delivery of (spatial) data
  - Calculations
  - Execution of tasks
  - …
- According to certain agreements
  - OGC: WMS, WFS, …
  - Input, output, formats, parameters

Why webservices?

- Spatial data can be massive
- Once downloaded, spatial data become outdates (updates)
- Reference to authentic data sources might be required

→ Central data management
→ Defined responsibilities
→ Data reuse
→ Performance

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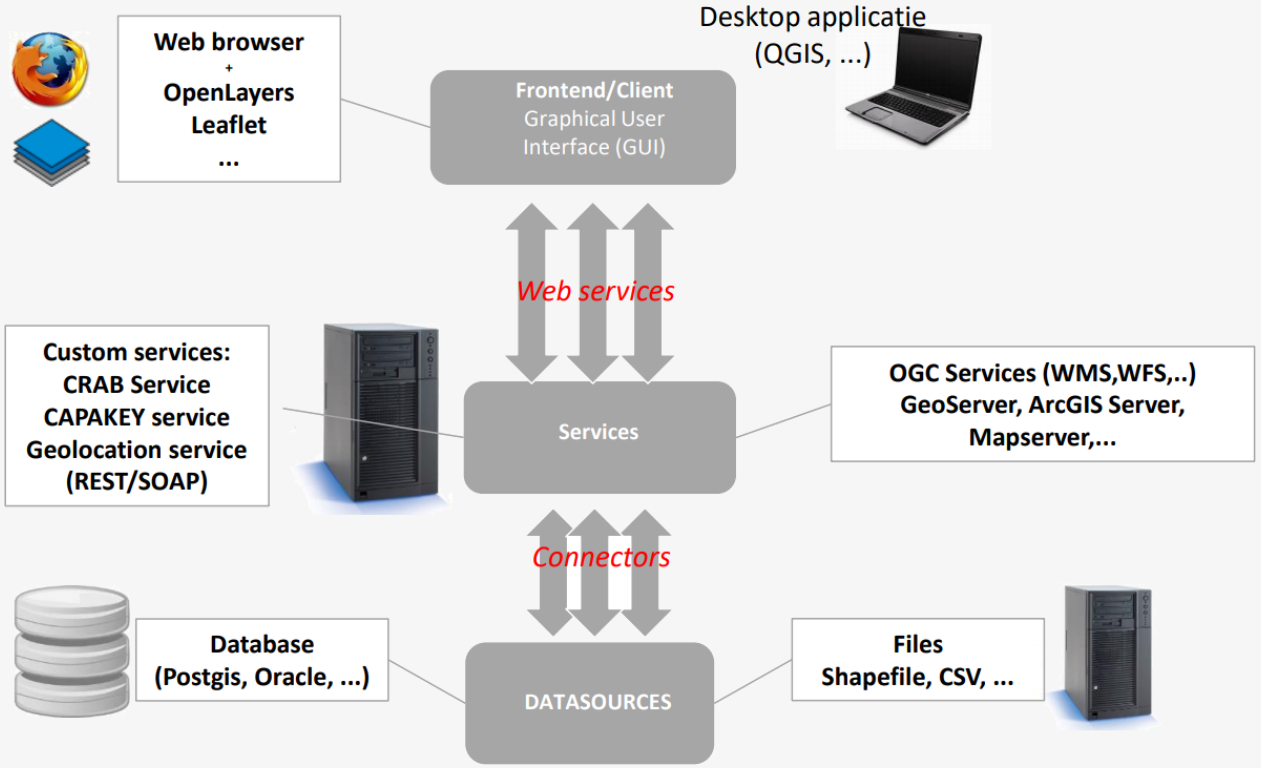
How do webservices work?

Platform and language independent

Data, service, and performance are separated components



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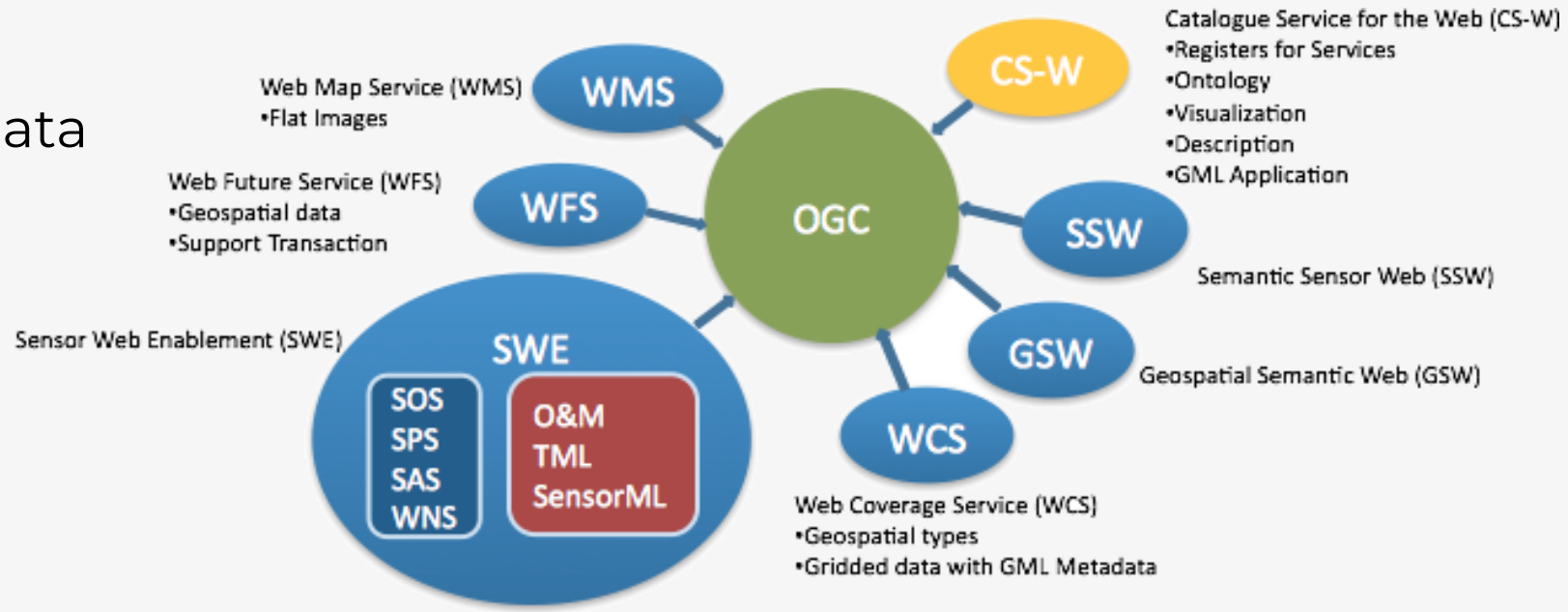
How are data made available?

Data types:
- Simple attribute data
- Raster data
- Vector data

Data formats:
- (geo)JSON
- JPEG
- PNG
- GML
- …



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Frequently used services: WMS

WMS (Web Map Services):

- Generates dynamic images from various datasets in your website, web application or desktop application;
- Compliance with the WMS standard (ISO19128) , developed by the Open Geospatial Consortium (OGC) and taken over by the International Organization for Standardization (ISO).

Three operations (using web browser via Uniform Resource Locators (URLs)):

- **`GetCapabilities`**: returns an XML file with all metadata inherent to this service;
- **`GetMap`**: displays the map, the cartographic representation of the underlying geographic data, as requested, taking into account the parameters specified or not;
- **`GetFeatureInfo`**: provides additional attribute information about specific features on the map for a specified location.

WMS services can be addressed and presented via various GIS viewers.

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Frequently used services: WFS

Web Feature Service (WFS):

- Transmission service for requesting and supplying geographic vector data;
- Communication and delivery of the data is done by means of XML;
- Data are provided in the form of a geographic data specific scheme: GML (Geography Markup Language).
- Compliance with WFS standard (ISO19142), developed by the Open Geospatial Consortium (OGC) and the International Organization for Standardization (ISO).

The WFS standard defines three operations (useful limited number of applications):

- **`GetCapabilities`**: displaying all metadata inherent to this service;
- **`DescribeFeatureType`**: describing the structure of the data;
- **`GetFeature`**: provides the data.

Implementing the standard is also less common on the server side. A WFS mainly focuses on querying the data, while a WMS is more intended for viewing the data.

Frequently used services: WMTS and VTS

Vector Tile Service:

- Delivering styled web maps;
- Combining benefits of pre-rendered raster map tiles with vector map data;
- Map data is requested by a client as a set of "tiles" corresponding to square areas of land of a pre-defined size and location;
- Server returns vector map data (clipped to the boundaries of each tile).

Advantages:

- Un-tiled vector map:
  - Transfer is reduced: only data within the current viewport, and at the current zoom level
  - Clipping operations can all be performed in advance: packaged up and distributed
- Tiled raster map:
  - Greatly reduced data transfer: vector data is typically much smaller than a rendered bitmap;
  - Styling can be applied later in the process: flexibility
  - Easy to provide interactivity with map features
- Less centralised server processing power required (rasterisation by the client)

More info: https://wiki.openstreetmap.org/wiki/Vector_tiles

WMTS (Web Mapping Tile Service): same as above, but delivered as raster tiles

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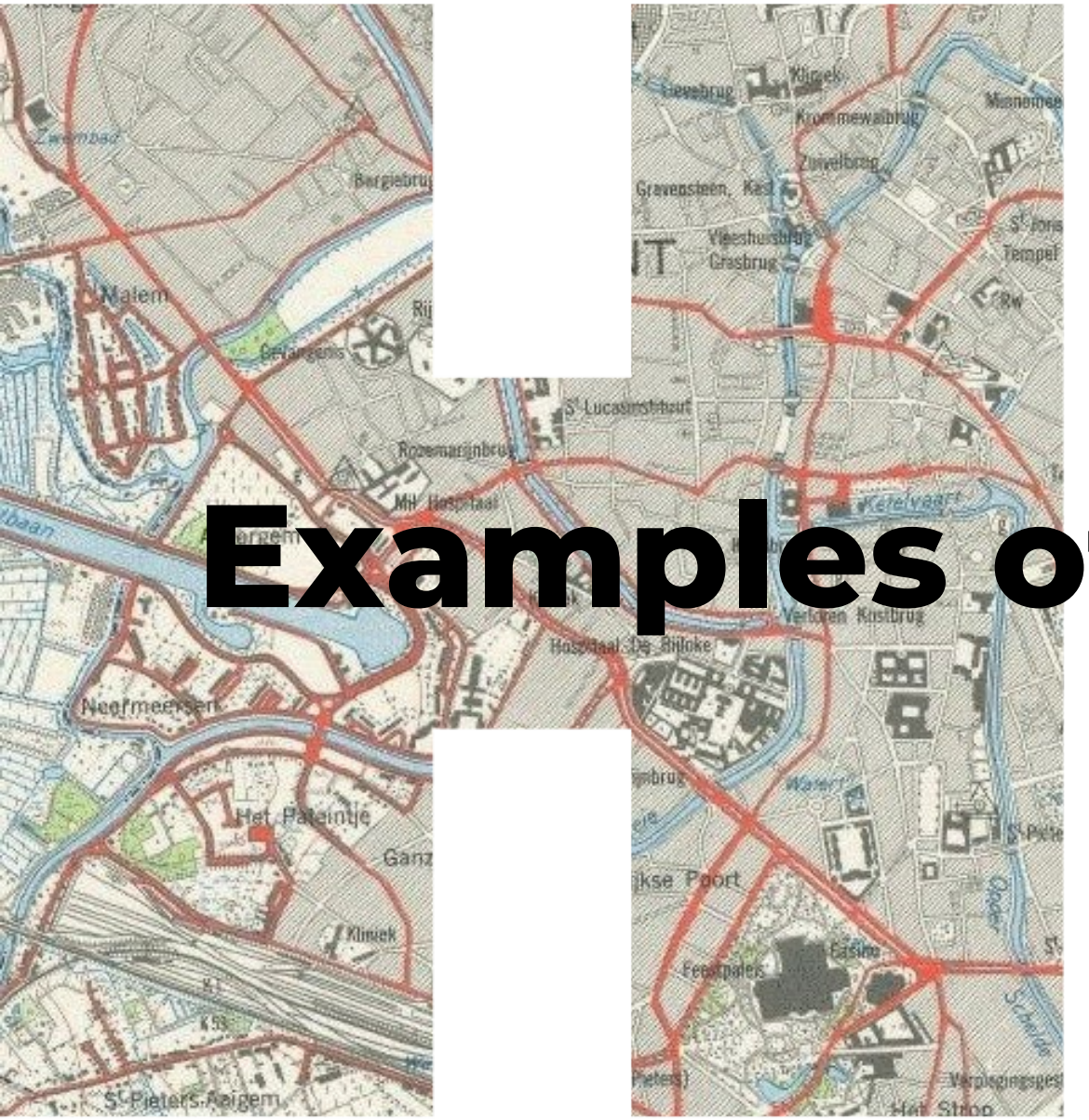

Examples of web services

Webservices

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Large scale mapping in Flanders

Large scale reference map of Flanders

- Highly accurate spatial database of topographic features in Flanders
- Free and authentic data source
- Continuously updated

WMS:
https://geoservices.informatievlaanderen.be/raadpleegdiensten/GRB-basiskaart/wms?request=getCapabilities
WFS:
https://geoservices.informatievlaanderen.be/overdrachtdiensten/GRB/wfs?request=getcapabilities
WMTS:
https://tile.informatievlaanderen.be/ws/raadpleegdiensten/wmts?SERVICE=WMTS&VERSION=1.0.0&REQUEST=getcapabilities

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Geological map of Iran

World geological map

- Map Showing Geology, Oil and Gas Fields, and Geologic Provinces of Iran
- Open-File Report 97-470- G
- By: R.M. Pollastro, F.M. Persits, and D.W. Steinshouer

  https://doi.org/10.3133/ofr97470G

WMS:
https://certmapper.cr.usgs.gov/arcgis/services/geology/iran/MapServer/WMSServer?request=GetCapabilities&service=WMS

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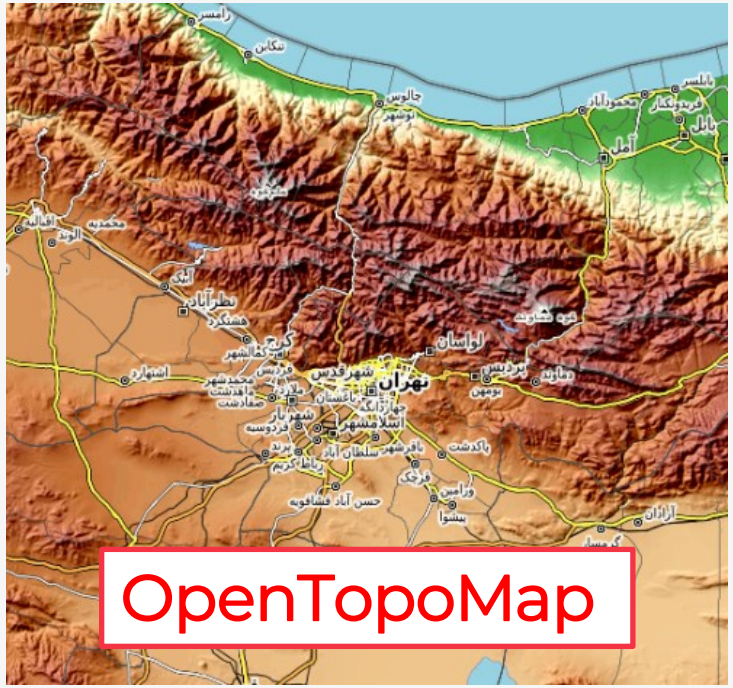
OSM

OSM = OpenStreetMap: project that creates and distributes free geographic data for the world

Useful list of tile services at https://wiki.openstreetmap.org/wiki/Tile_servers



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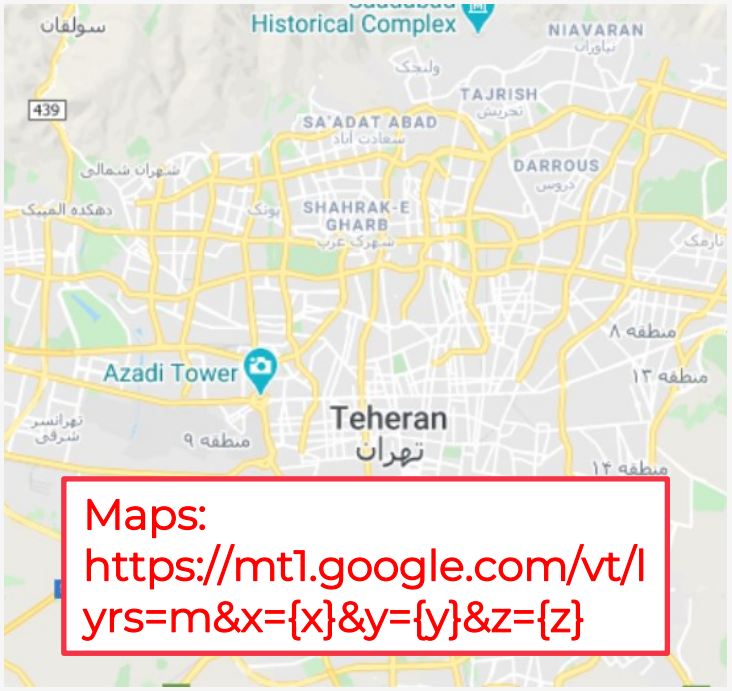
Google Maps

Google Maps: web mapping service developed by Google offers satellite imagery, aerial photography, street maps, …



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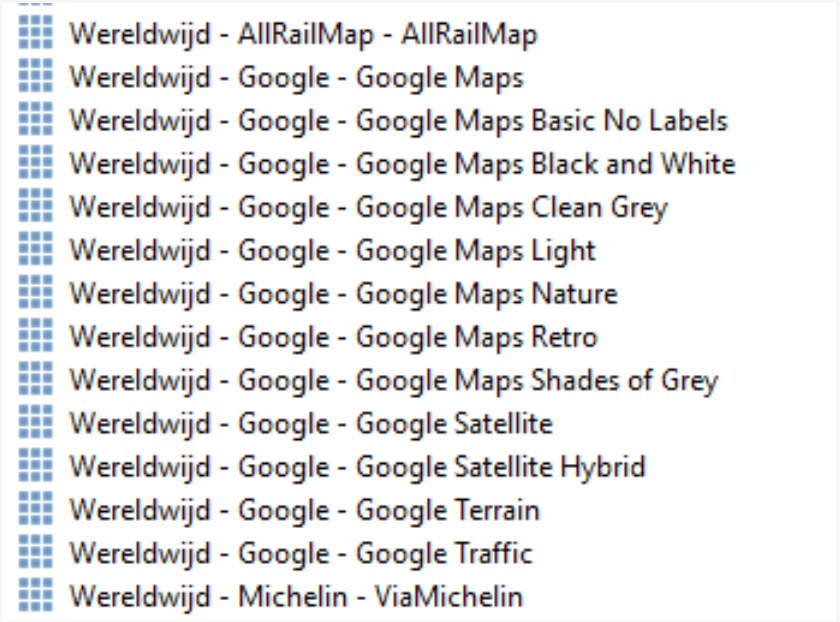
Other XYZ tile services

Add interesting tile services to QGIS:
https://raw.githubusercontent.com/klakar/QGIS_resources/master/collections/Geosupportsystem/python/qgis_basemaps.py



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Other international portals

Belgium:

- Flanders: www.geopunt.be
- Flanders : https://www.dov.vlaanderen.be/page/interessante-webservices
- Walloon Region: http://geoportail.wallonie.be
- Federal Belgium: https://geo.be
- Federal Belgium : https://michelstuyts.be/gis_nl.html

Other countries:

- Greece: https://geodata.gov.gr
- Denmark: https://download.kortforsyningen.dk
- Germany (NRW): https://www.geoportal.nrw
- Germany (RLP): http://www.geoportal.rlp.de
- France: https://www.geoportail.gouv.fr
- Luxemburg: https://www.geoportail.lu
- The Netherlands: https://www.pdok.nl
- United Kingdom: https://www.ordnancesurvey.co.uk
- United States of America: https://earthexplorer.usgs.gov

Web services in QGIS

Web services

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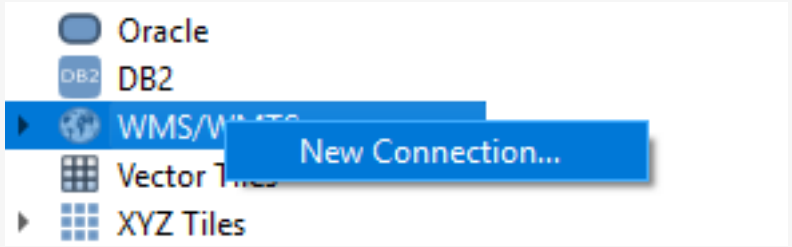
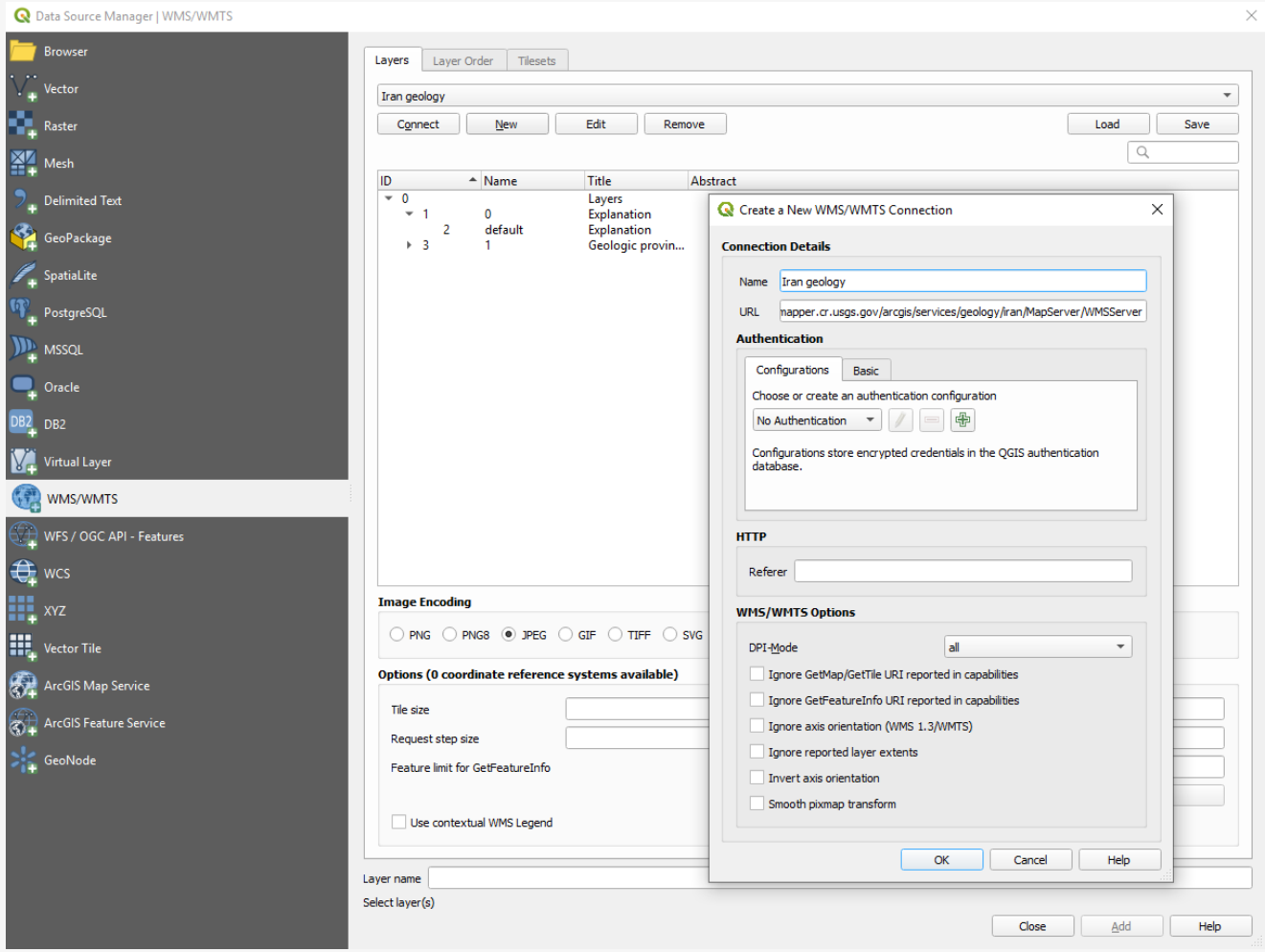
Add WM(T)S

- Add connection
- Provide (free) name
- Provide URL
- Possible authentication details
- Press connect to check available layers
- Press add to add layer to project





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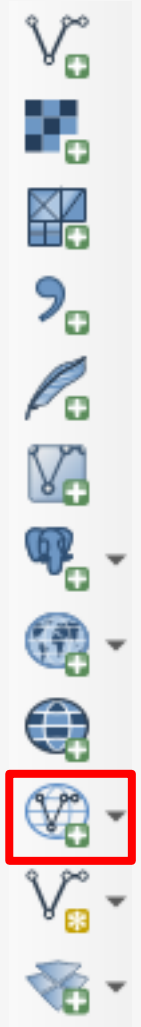
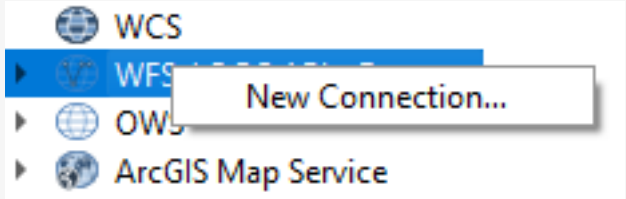
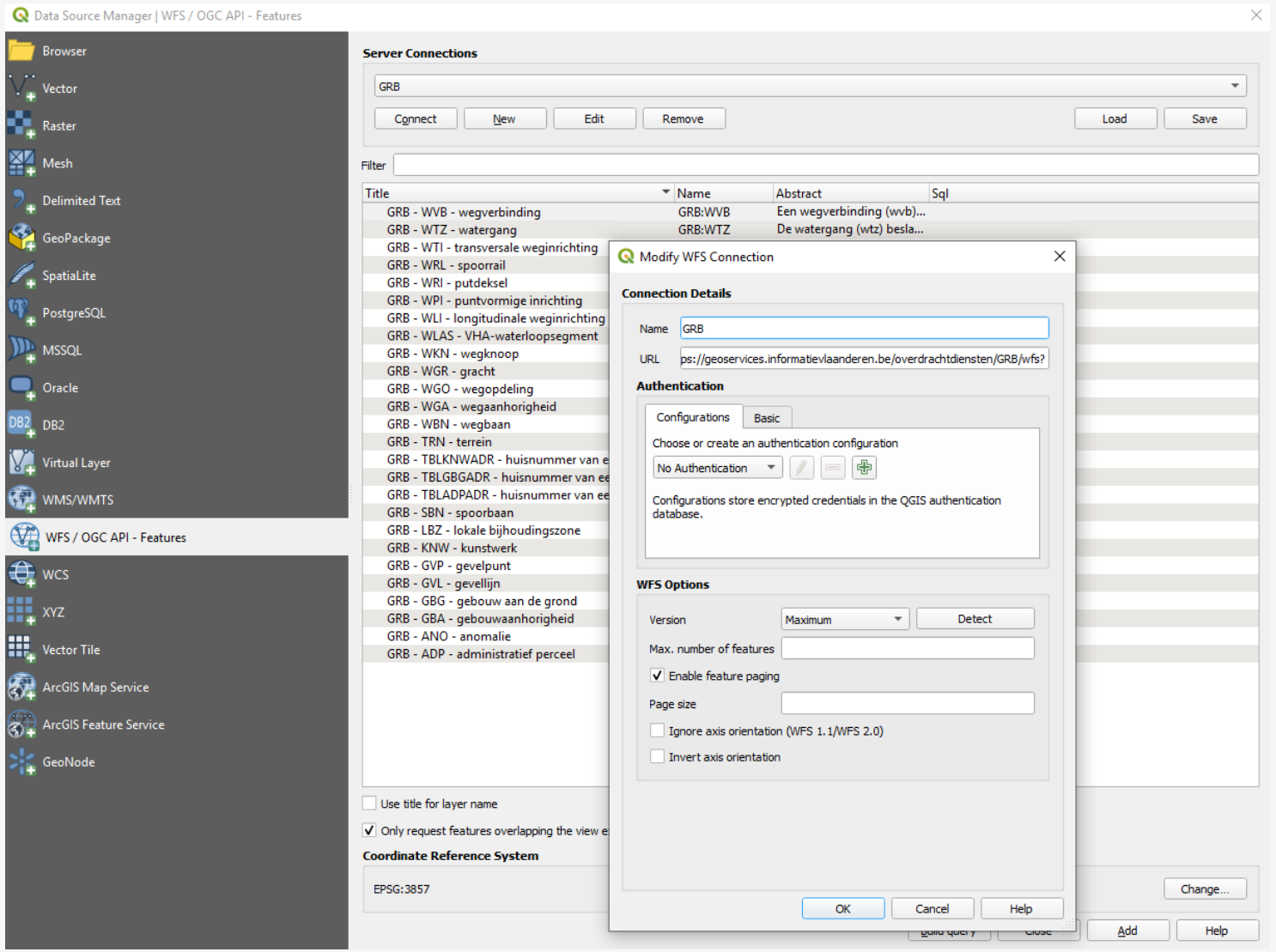
Add WFS

- Add connection
- Provide (free) name
- Provide URL
- Possible authentication details
- Press connect to check available layers
- Press add to add layer to project







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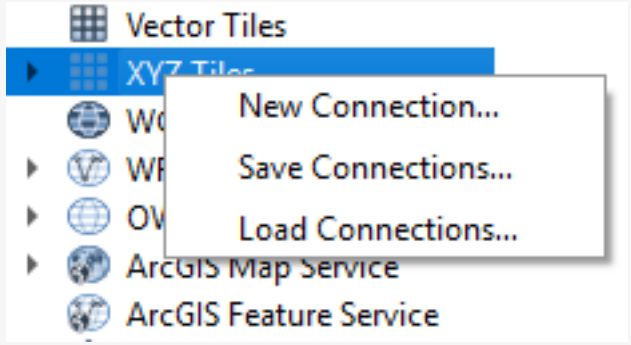
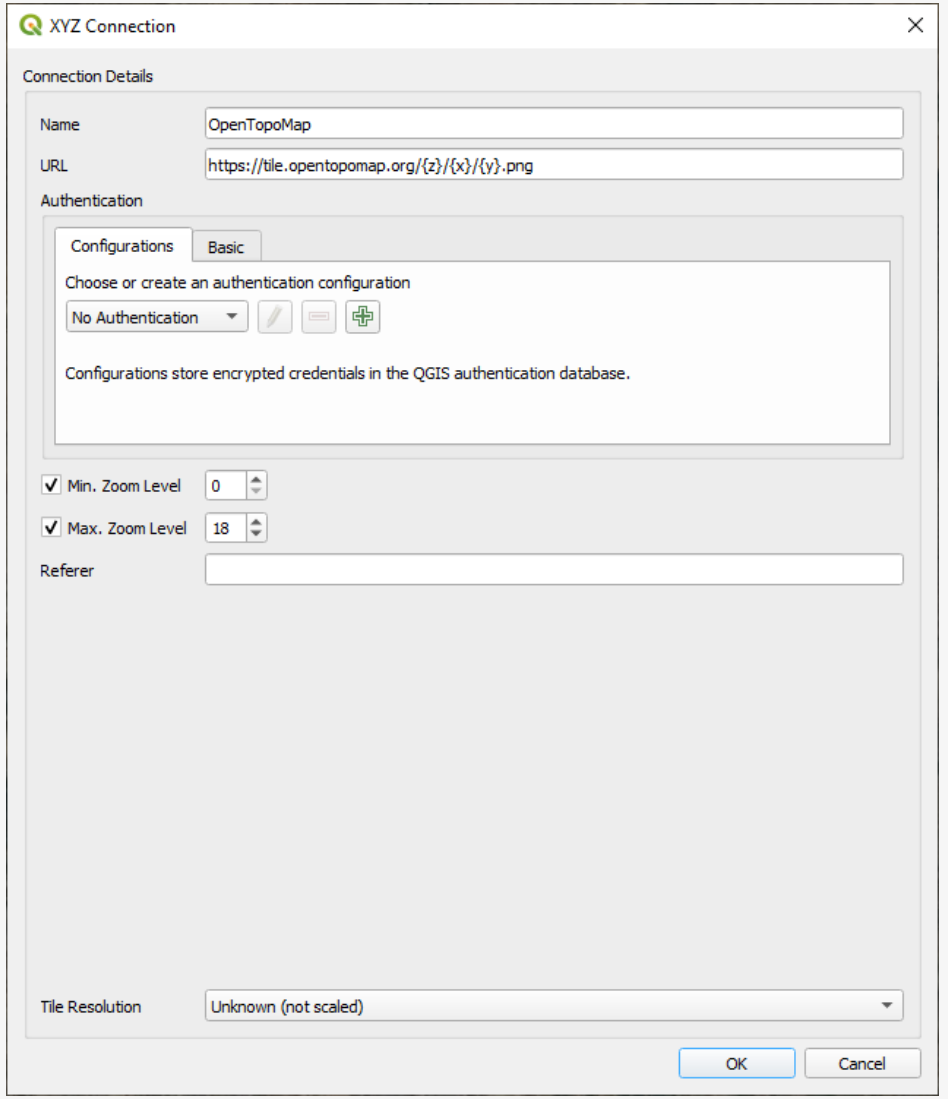
Add XYZ Tiles

- New connection
- Provide (free) name
- Provide URL
- Possible authentication details
- Drag and drop layer to project





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Web services

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