

Project GeoICT

2021-2022

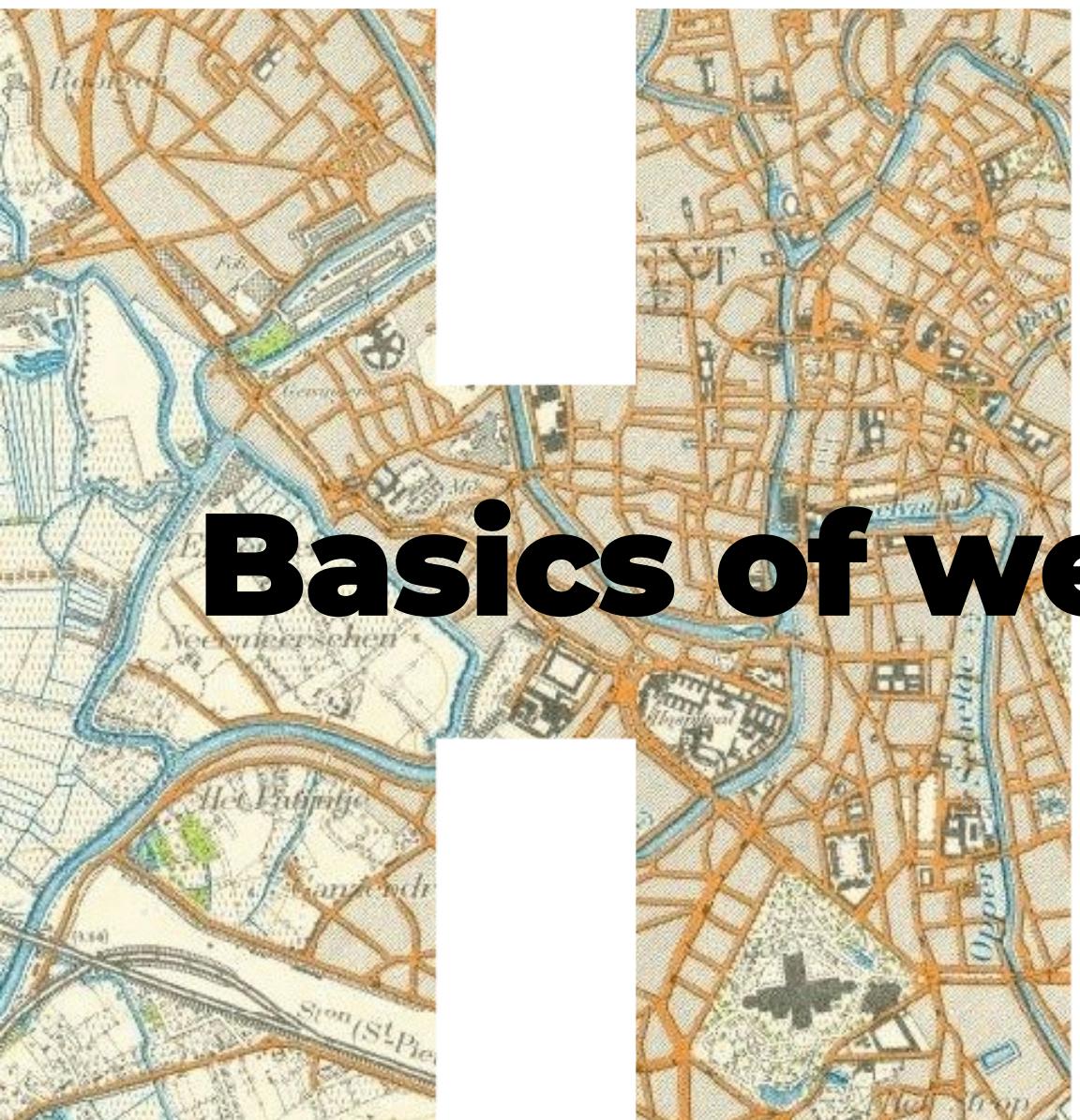
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Web services

Project GeolICT

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Basics of web services

Web services

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

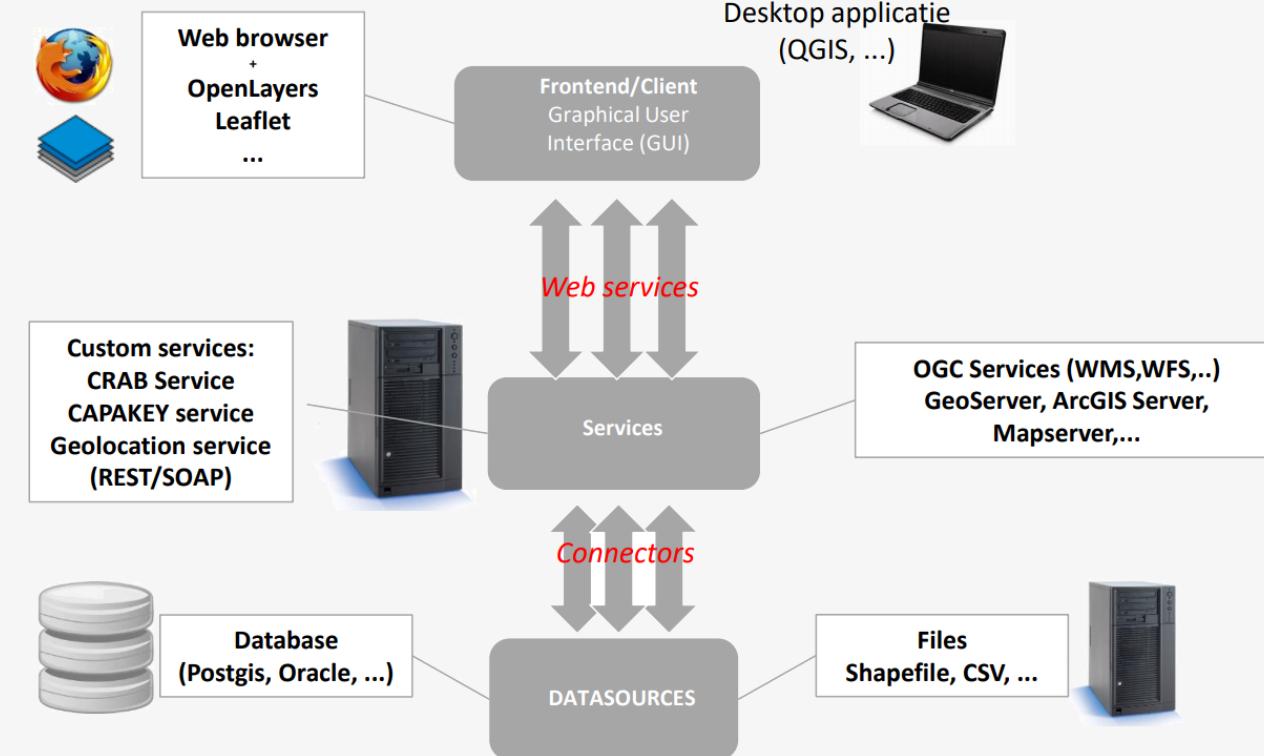
Why webservices?

- Spatial data can be massive
 - Once downloaded, spatial data become outdated (updates)
 - Reference to authentic data sources might be required
-
- Central data management
 - Defined responsibilities
 - Data reuse
 - Performance

How do webservices work?

Platform and language independent

Data, service, and performance are separated components



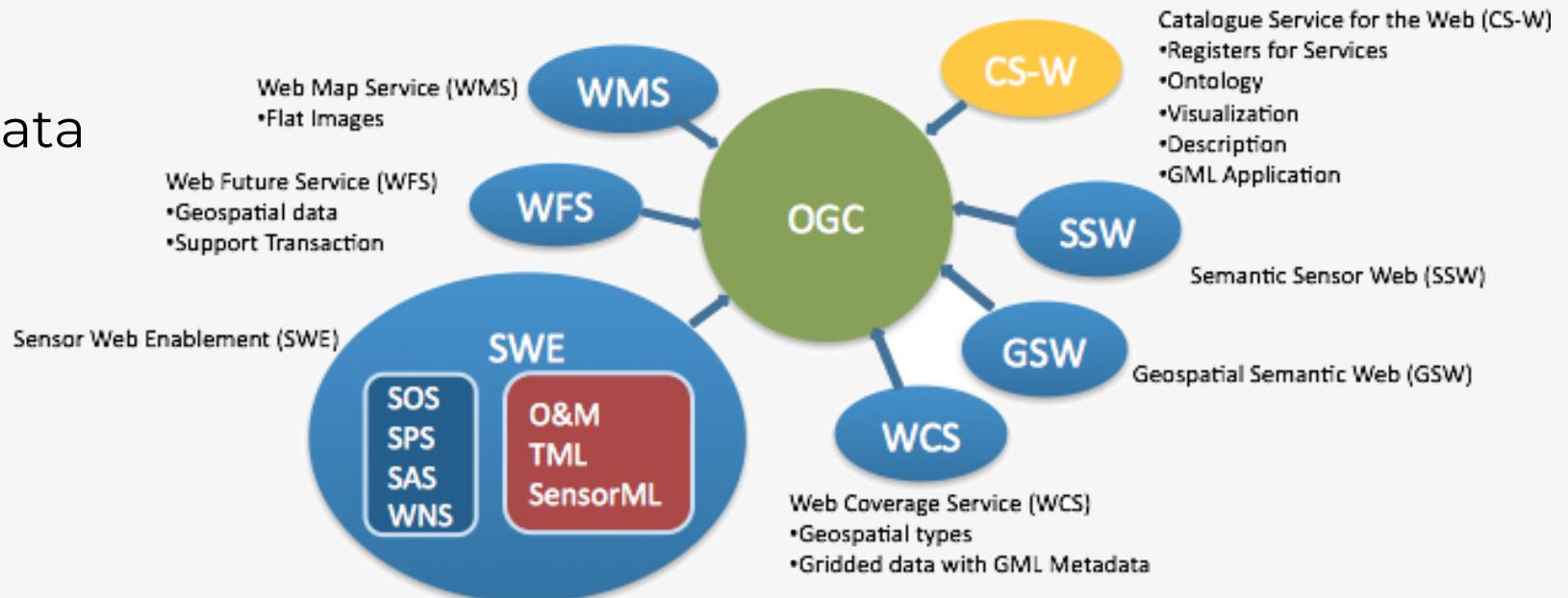
How are data made available?

Data types:

- Simple attribute data
- Raster data
- Vector data

Data formats:

- (geo)JSON
- JPEG
- PNG
- GML
- ...



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.

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:

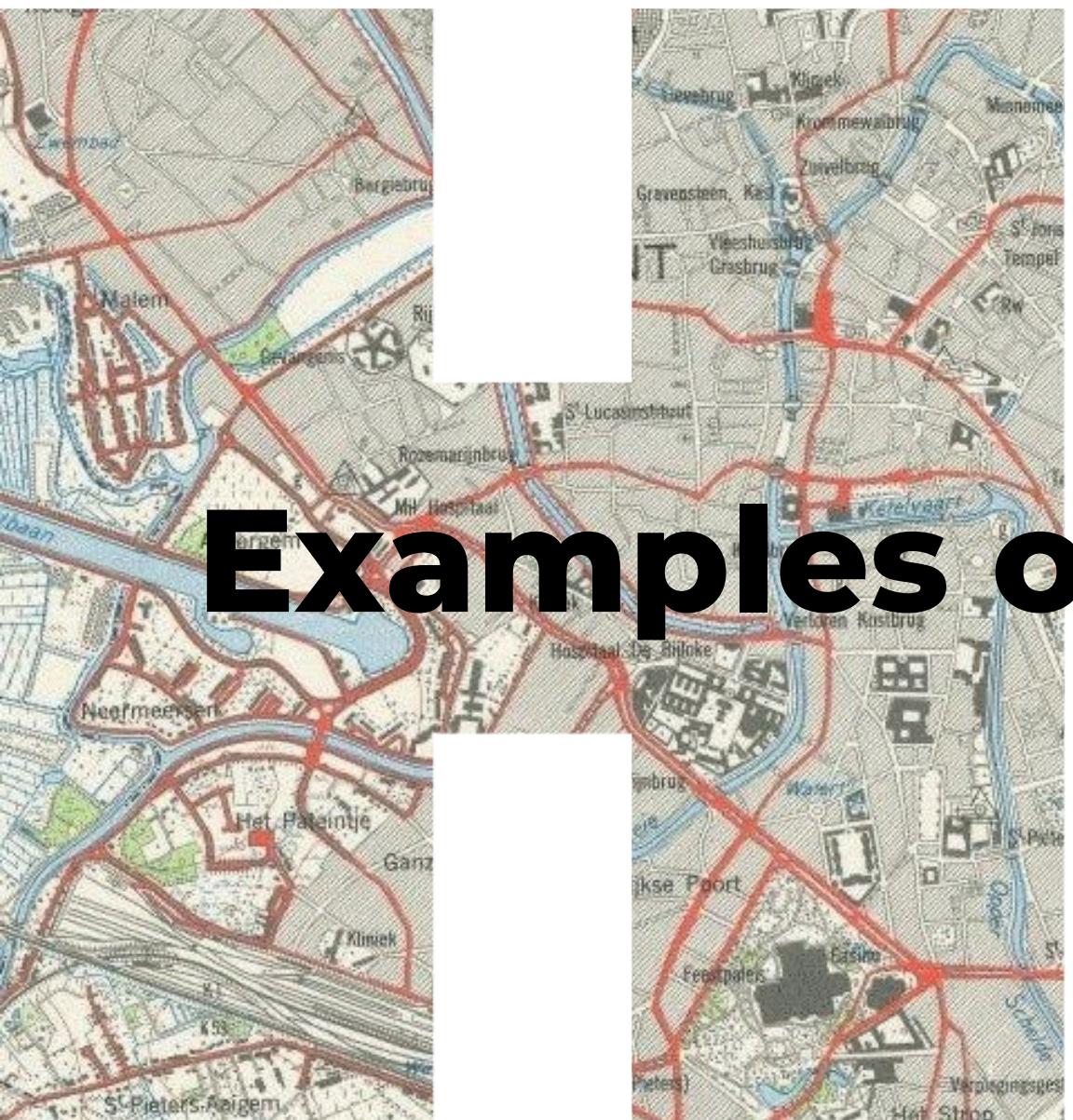
- Delivering styled web maps;
- Combining benefits of pre-rendered raster map tiles with vector map data;
- Map data is requested by a client as a set of "tiles" corresponding to square areas of land of a pre-defined size and location;
- Server returns vector map data (clipped to the boundaries of each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



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>

Geological map of Iran

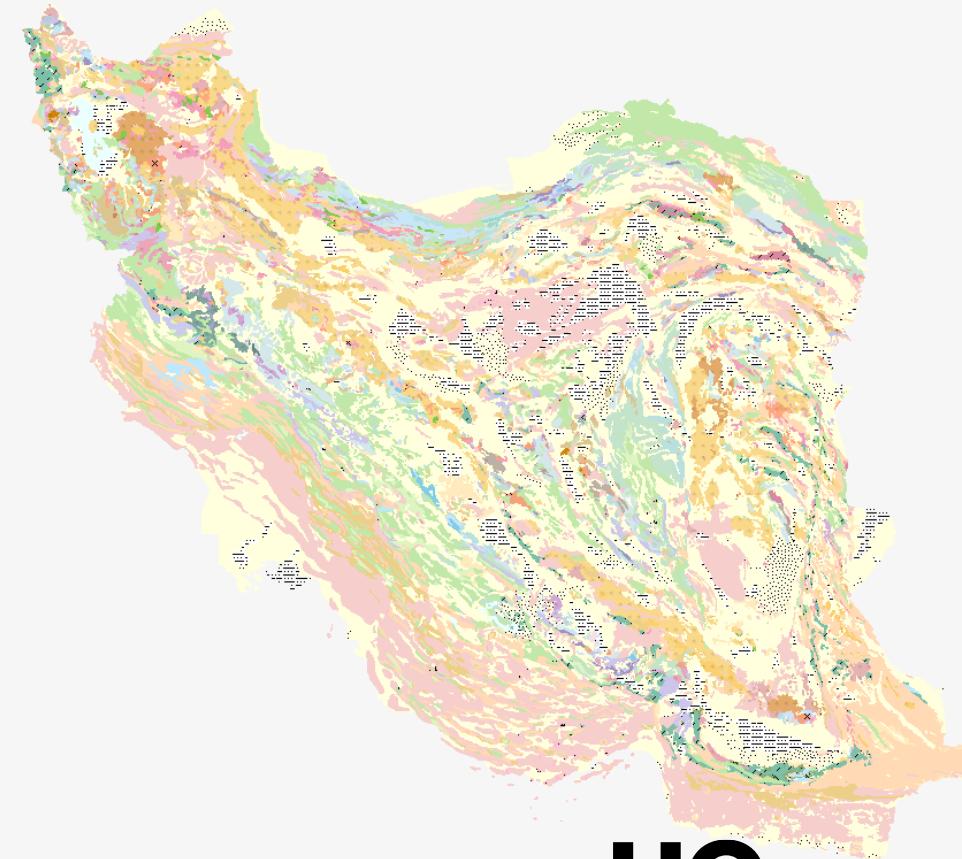
World geological map

- 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>

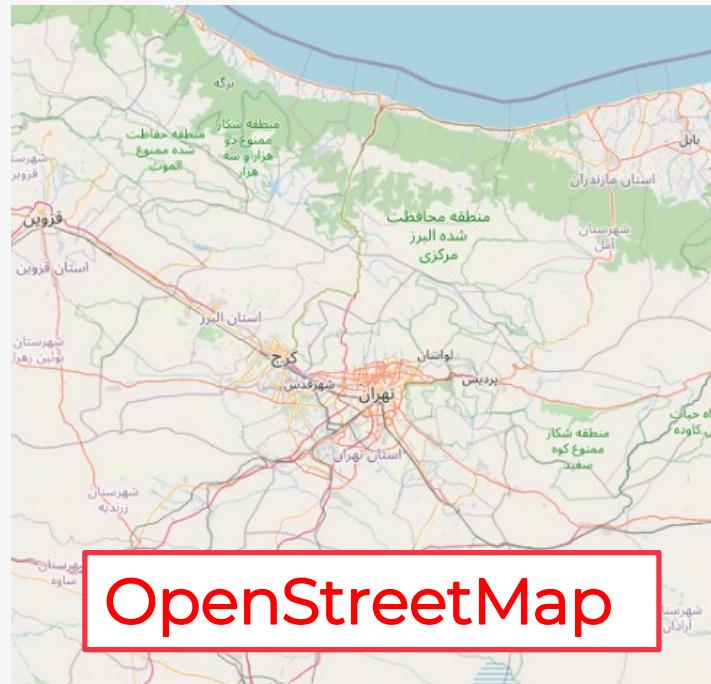
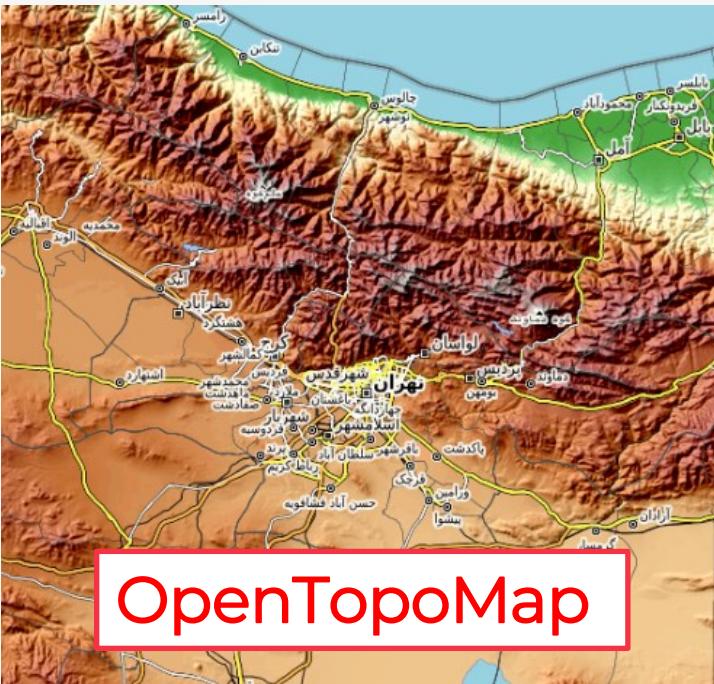


Examples of web services

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

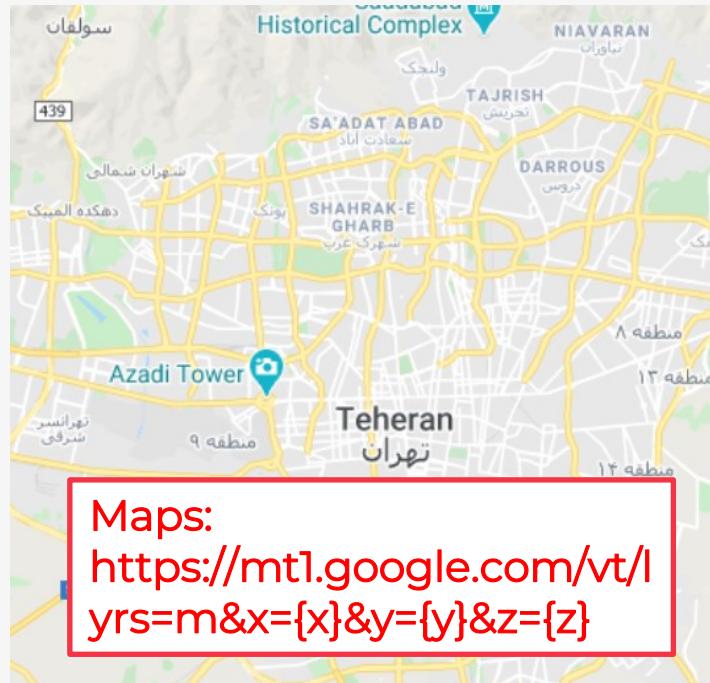


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Examples of web services

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

-  Wereldwijd - AllRailMap - AllRailMap
-  Wereldwijd - Google - Google Maps
-  Wereldwijd - Google - Google Maps Basic No Labels
-  Wereldwijd - Google - Google Maps Black and White
-  Wereldwijd - Google - Google Maps Clean Grey
-  Wereldwijd - Google - Google Maps Light
-  Wereldwijd - Google - Google Maps Nature
-  Wereldwijd - Google - Google Maps Retro
-  Wereldwijd - Google - Google Maps Shades of Grey
-  Wereldwijd - Google - Google Satellite
-  Wereldwijd - Google - Google Satellite Hybrid
-  Wereldwijd - Google - Google Terrain
-  Wereldwijd - Google - Google Traffic
-  Wereldwijd - Michelin - ViaMichelin

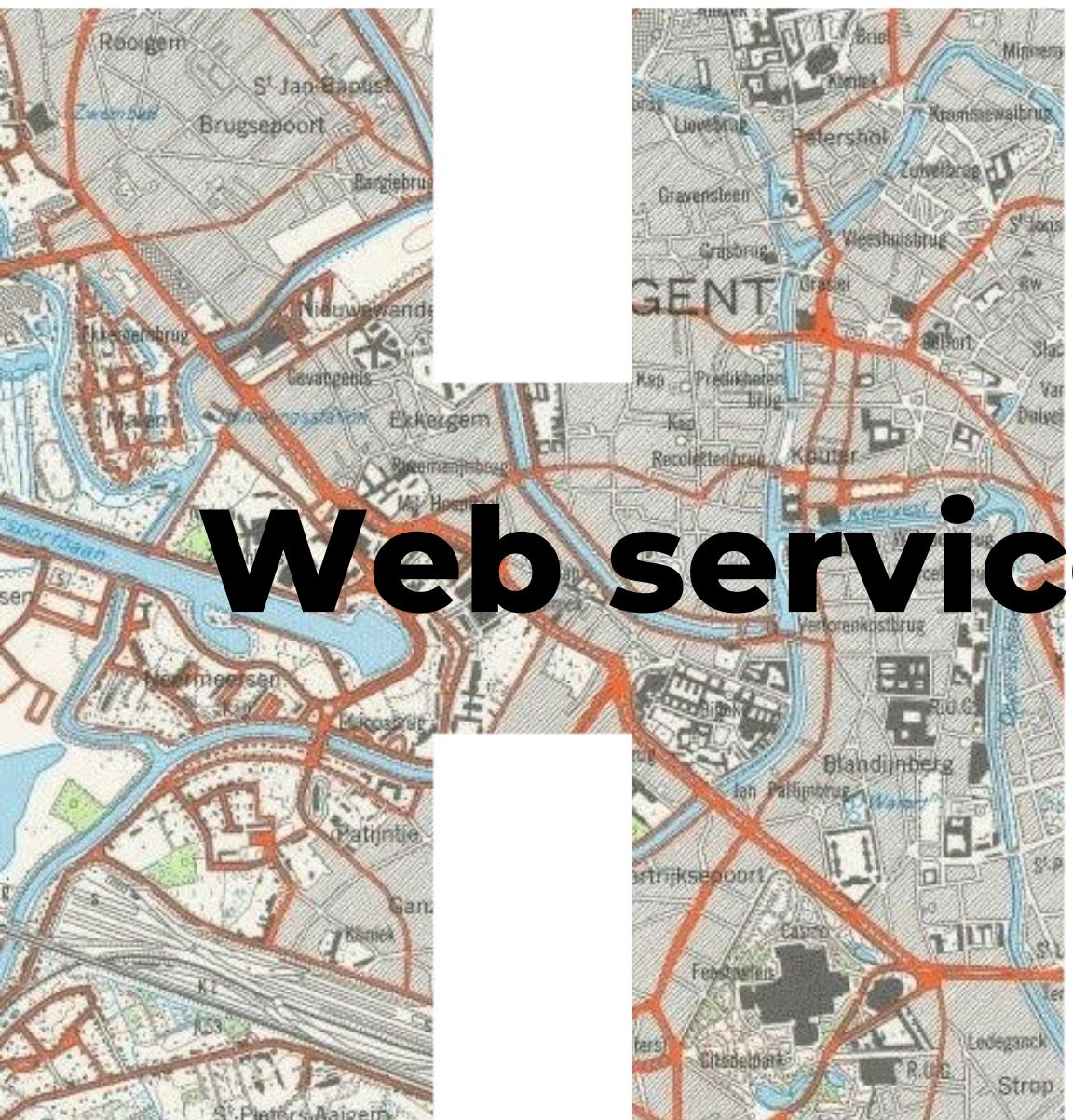
Other international portals

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>



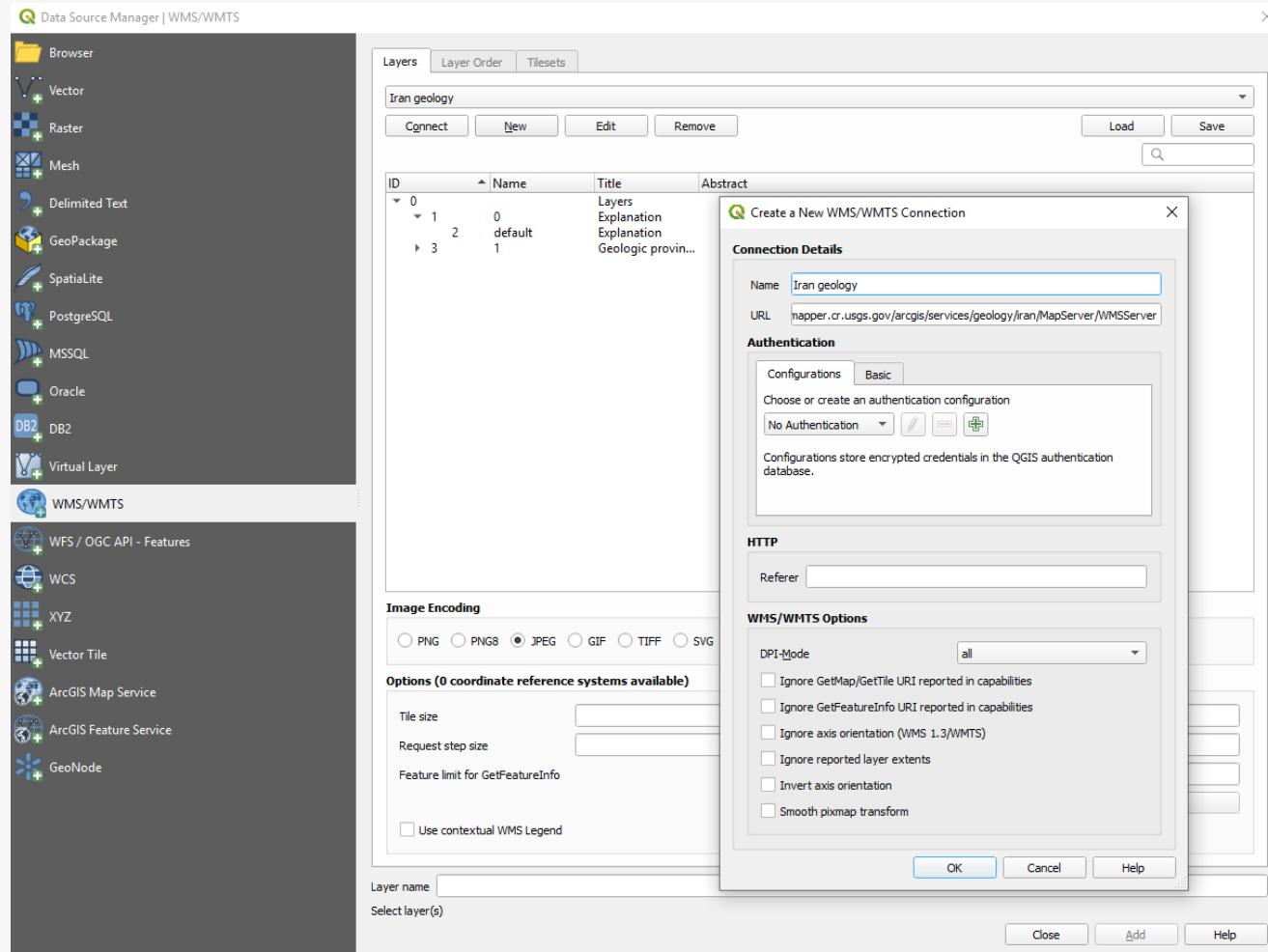
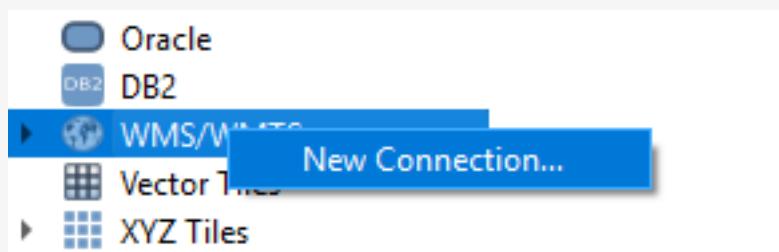
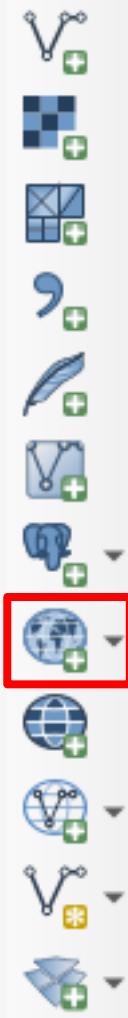
Web services in QGIS

Web services

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Add WM(T)S

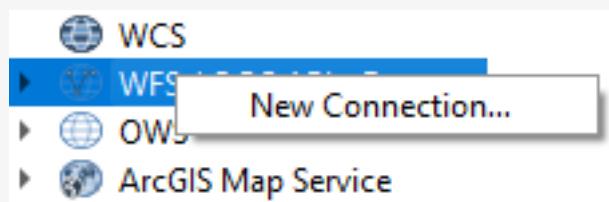
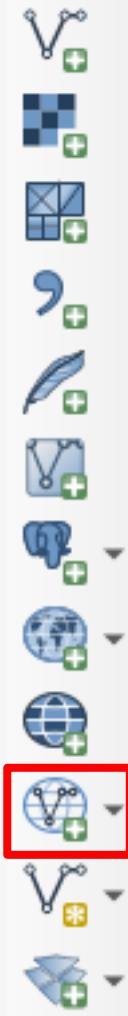
- Add connection
- Provide (free) name
- Provide URL
- Possible authentication details
- Press connect to check available layers
- Press add to add layer to project



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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



Q Data Source Manager | WFS / OGC API - Features

Server Connections

Title	Name	Abstract	Sql
GRB - WVB - wegverbinding	GRB:WVB	Een wegverbinding (wvb)...	
GRB - WTZ - watergang	GRB:WTZ	De watergang (wtz) besla...	
GRB - WTI - transversale weginrichting			
GRB - WRL - spoorrail			
GRB - WRI - putdeksel			
GRB - WPI - puntvormige inrichting			
GRB - WLI - longitudinale weginrichting			
GRB - WLAS - VHA-waterloopsegment			
GRB - WKN - wegknoopp			
GRB - WGR - gracht			
GRB - WGP - wegopdeling			
GRB - WGA - wegaanhorigheid			
GRB - WBN - wegbaan			
GRB - TRN - terrein			
GRB - TBLKNWADR - huisnummer van een woning			
GRB - TBLGBGADR - huisnummer van een gebouw			
GRB - TBLADPADR - huisnummer van een administratief perceel			
GRB - SBN - spoorbaan			
GRB - LBZ - lokale bijhoudingszone			
GRB - KNW - kunstwerk			
GRB - GVP - gevelpunt			
GRB - GVL - gevallenlijn			
GRB - GBG - gebouw aan de grond			
GRB - GBA - gebouwaanhorigheid			
GRB - ANO - anomalie			
GRB - ADP - administratief perceel			

Modify WFS Connection

Connection Details

Name: GRB
URL: <ps://geoservices.informatievlaanderen.be/overdrachtdiensten/GRB/wfs?>

Authentication

Configurations Basic
Choose or create an authentication configuration
No Authentication

WFS Options

Version: Maximum Detect
Max. number of features:
 Enable feature paging
Page size:
 Ignore axis orientation (WFS 1.1/WFS 2.0)
 Invert axis orientation

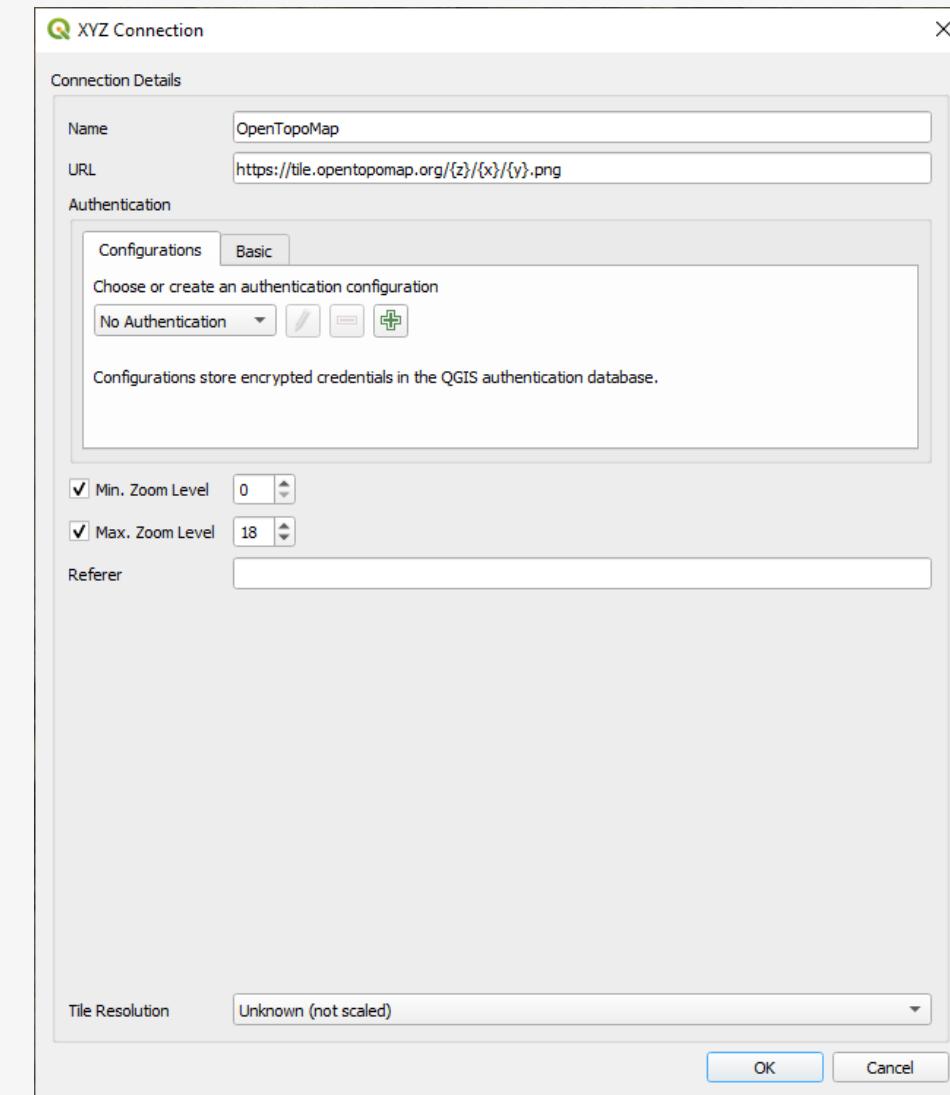
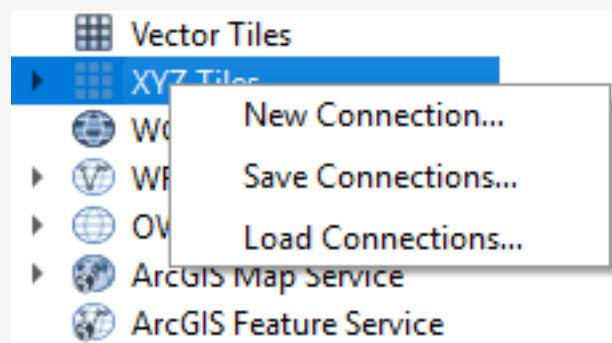
Coordinate Reference System

EPSG:3857

OK Cancel Help Build query Close Add Help

Add XYZ Tiles

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





Web services

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