Tools for linking OpenStreetMap and Wikidata

Edward Betts
FOSDEM 2023
Royal Palace of Brussels
Royal Palace (Q633507)

<table>
<thead>
<tr>
<th>Item</th>
<th>Discussion</th>
</tr>
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<tbody>
<tr>
<td>palace in Brussels</td>
<td>Royal Palace of Brussels</td>
</tr>
</tbody>
</table>

**In more languages**

- **Language** | **Label** | **Description** | **Also known as**
- English | Royal Palace | palace in Brussels | Royal Palace of Brussels

**Statements**

- **instance of**
  - royal palace

- **image**
  - Belgium-598 - Palace (13935150270).jpg
    - 6,000 x 4,000; 16.04 MB

- **image of interior**
OpenStreetMap

www.openstreetmap.org
OpenStreetMap

- Collaborative built map
- Started in 2004
- Covers the whole world
- Anybody can edit
OpenStreetMap

Three types of object

- Nodes – simple point
- Ways – lines and polygons
- Relations – more complex, multiple points, lines and polygons
OpenStreetMap

Objects can have tags
Tags are key-value pairs (both arbitrary strings)

For example:

building=yes
historic=castle
castle_type=palace

😊
OpenStreetMap

Tags are not controlled by the software

There is a community process for deciding on preferred tagging schemes, which are then documented on the OSM Wiki
Objects are uniquely identified by the type and ID

Type: relation
ID: 3299902
Wikidata

www.wikidata.org
Wikidata

- Wiki for structured data
- Part of Wikimedia
- Launched in 2012
- 102 million items
- For comparison, English Wikipedia has 6.6 million articles
Royal Palace of Brussels

The Royal Palace of Brussels (French: Palais royal de Bruxelles, pronounced [pa.ʁɛː qDebug da bʁɛs], Dutch: Koninklijk Paleis van Brussel [ˈkoːnɪŋklɪk pɑˌlɛis vɑn bˈrɔsəl], German: Königlicher Palast von Brüssel) is the official palace of the King and Queen of the Belgians in the centre of the nation’s capital, Brussels. However, it is not used as a royal residence, as the king and his family live in the Royal Palace of Laeken in northern Brussels. The website of the Belgian Monarchy describes the function of the palace as follows:

The Palace is where His Majesty the King exercises his prerogatives as Head of State, grants audiences and deals with affairs of state. Apart from the offices of the King and the Queen, the Royal Palace houses the services of the Grand Marshal of the Court, the King’s Head of Cabinet, the Head of the King’s Military Household and the Intendant of the King’s Civil List. The Palace also includes the State Rooms where large receptions are held, as well as the apartments provided for foreign Heads of State during official visits.

The first nucleus of the present-day building dates from the end of the 18th century. However, the grounds on which the palace stands were once part of the Coudenberg Palace, a very old palatial complex that dated back to the Middle Ages. The facade existing today was only built after 1900 on the initiative of King Leopold II.

The Royal Palace is situated in front of Brussels Park, from which it is separated by a long square called the Place des Palais/Paleizenplein. The middle axis of the park marks both the middle persityle of the Royal Palace and of the Belgian Federal Parliament building (Palace of the Nation) on the other side of the park. The two facing buildings are said to symbolise Belgium's system of government: a constitutional monarchy. This area is served by Brussels Central Station, as well as...
The Royal Palace of Brussels (French: Palais royal de Bruxelles, pronounced [pa.lɛ ʁo.ʒal də bʁy.sɛl], Dutch: Koninklijk Paleis van Brussel [koːnɪŋklɪk paːˈleis fən ˈbrysəl], German: Königlicher Palast von Brüssel) is the official palace of the King and Queen of the Belgians in the centre of the nation's capital, Brussels. However, it is not used as a royal residence, as the king and his family live in the Royal Palace of Laeken in northern Brussels. The website of the Belgian Monarchy describes the function of the palace as follows:

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The Royal Palace of Brussels, also known as the Royal Palace of Laeken, is the official residence of the King and Queen of the Belgians. It is located in Brussels, the capital city of Belgium.

The palace was originally built in the 16th century and has undergone numerous renovations and expansions over the centuries. It is a complex of buildings that includes the Royal Palace itself, as well as other structures such as the Royal Stables and the Royal Hospital.

The palace is open to the public on a limited basis and is one of the most popular tourist attractions in Brussels. It is also used for various official ceremonies and events, including state banquets and other diplomatic occasions.

The palace is an example of Flemish Renaissance architecture and features intricate decorative stonework and stained glass windows. It is considered one of the most important historic buildings in Belgium and is protected as a national monument.

The palace is currently the official residence of King Philippe and Queen Mathilde of Belgium, and their family lives there with them. Despite its official status, the palace is not used as a royal residence and the king and his family live in other official residences in Brussels and Laeken.
Royal Palace (Q635307)

Estate of Brussels

Language | Label | Description | Also known as
--- | --- | --- | ---
English | Royal Palace | palace in Brussels | Royal Palace of Brussels

Wikipedia (26 entries)

<table>
<thead>
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### Royal Palace (Q635307)

**palace in Brussels**

Royal Palace of Brussels

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- **In more languages**
- **Statements**
- **image**
  - [Belgium-6598 - Palace (139335156270).jpg](#)
    - 6,000 x 4,000; 16.04 MB
    - 0 references
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Wikidata

- Items have statements
- Statements consist of properties and values
- Like OSM tags, but controlled by the software
- Values can be different data types, not just strings
Wikidata

- 9,731,589 items with location coordinates (single point)
- 28,886 items with a geoshape statement
Adding links
Wikidata tag

Objects in OSM can link to a Wikidata item by adding a tag.

Example: wikidata=Q635307
Why add links?

Wikidata links mean OSM data consumers can potentially access:

- Labels in more languages
- Wikipedia articles in multiple languages
- Wikimedia Commons
- Identifiers for other data catalogues
Category:Royal Palace, Brussels

From Wikimedia Commons, the free media repository

**English:** The [Royal Palace in Brussels](https://commons.wikimedia.org/wiki/Category:Royal_Palace,_Brussels) was built in the early 19th century and expanded by King [Leopold II, second King of the Belgians](https://commons.wikimedia.org/wiki/Category:Leopold_II,_second_King_of_the_Belgians). It is the working palace of His Majesty the King, and His Royal Household.

Media in category "Royal Palace, Brussels"

The following 16 files are in this category, out of 16 total.
More identifiers

Items on Wikidata includes identifiers for other data catalogues

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Adding Wikidata links to OpenStreetMap individually is time consuming. Better to automate it.
OWL Places

osm.wikidata.link

Web interface for linking places in OSM to Wikidata
OSM ↔ Wikidata matcher

Two great projects cataloguing the world, even more powerful when linked together.

Search for a place, pick one and leave the matcher to run for a few minutes. Then check out the list of matches.

place name search

osm.wikidata.link
Quartier Royal - Koninklijke Wijk, Brussels, Brussels-Capital, Belgium

Category: boundary | type: administrative | OSM: relation 7052710

Latest matcher run: Fri, 03 Feb 2023 10:41

Please check each match carefully before uploading to OpenStreetMap.
If in doubt, contact the local mapping community before adding Wikidata tags.

Match candidates | Already tagged | No match

16 candidates found

Run matcher again

Type filter

- architectural structure (Q811979): 6 matches – designed structure
- sculpture (Q860861): 4 matches – three-dimensional work of art
- building (Q41176): 3 matches – structure, typically with a roof and walls, standing more or less permanently in one place
- business enterprise (Q4830453): 2 matches – organization involved in the trade of goods, services, or both to customers for pay
- statue (Q179700): 2 matches – sculpture primarily concerned as a representational figure

Show: more / all (another 7 available)

Drag to adjust language order preference.

English (142 Wikidata labels / 24 OSM objects)

Français / French (145 Wikidata labels / 85 OSM objects) [move to top]

Nederlands / Dutch (143 Wikidata labels / 85 OSM objects) [move to top]

Italiano / Italian (37 Wikidata labels / no OSM objects) [move to top]

Deutsch / German (72 Wikidata labels / 33 OSM objects) [move to top]

Español / Spanish (36 Wikidata labels / 1 OSM objects) [move to top]

漢語 / Chinese (36 Wikidata labels / 1 OSM objects) [move to top]
Bozar (Q66382933) – restaurant in Belgium

item type: restaurant show on map Wikidata

Summary from Français / French Wikipedia (frwiki)

Bozar restaurant est un restaurant une étoile Michelin situé à Bruxelles, en Belgique, au sein du Palais des beaux-arts de Bruxelles (Bozar). Le chef est Karen Torosyan.

Matches from OpenStreetMap

Bozar Restaurant (node) [OSM]
226 m from Wikidata
name match
toggle name match detail
toggle OSM tags

Place du Musée - Museumplein (Q85089891) – square in Brussels, Belgium

item type: square show on map Wikidata

Summary from Nederlands / Dutch Wikipedia (nlwiki)

Het Museumplein (Frans: Place du Musée) is een plein in de Belgische hoofdstad Brussel. Het plein ligt in de omgeving van de Kunstberg en de Koninklijke Wijk. Via de Museumstraat is het plein met het Koningsplein verbonden. Ook is er een verbinding met de Koudenberg.

Matches from OpenStreetMap

Place du Musée - Museumplein (relation) [OSM]
6 m from Wikidata
name match
toggle name match detail
toggle OSM tags
**Bozar (Q66382933) – restaurant in Belgium**

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**Matches from OpenStreetMap**

- **Bozar Restaurant (node) [OSM](https://osm.org)**
  - 226 m from Wikidata
  - [name match](#)
  - [toggle name match detail](#)
  - [toggle OSM tags](#)

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**Matches from OpenStreetMap**

- **Place du Musée - Museumplein (relation) [OSM](https://osm.org)**
  - 6 m from Wikidata
  - [name match](#)
  - [toggle name match detail](#)
  - [toggle OSM tags](#)
Saving to OpenStreetMap
Login via OpenStreetMap
OAuth

Don't have an account? Register now

Email Address or Username:
Edward

Password:

Lost your password?

Remember me

Login

Alternatively, use a third party to login:
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Type filter
Charles of Lorraine (Q16964841) – statue by Louis Jéhotte in Brussel, Belgium

item type: statue  show on map  Wikidata

Summary from Français / French Wikipedia (frwiki)

La statue de Charles de Lorraine est une statue érigée sur la place du Musée à Bruxelles (Belgique) à la gloire de Charles de Lorraine (ou plus précisément Charles-Alexandre de Lorraine), gouverneur général des Pays-Bas autrichiens de 1741 à 1780.

Matches from OpenStreetMap

The Whirling Ear (Q55123016) – sculpture by Alexander Calder in Brussels, Belgium

item type: sculpture  show on map  Wikidata

Summary from English Wikipedia (enwiki)

The Whirling Ear is a 1958 sculpture by Alexander Calder, installed in Brussels. It was made using sheet metal and paint, with motor.

Matches from OpenStreetMap
Quartier Royal - Koninklijke Wijk

back to candidate list

Quartier Royal - Koninklijke Wijk, Brussels, Brussels-Capital, Belgium
category: boundary — type: administrative — OSM: relation 7052710

Please check each match carefully before uploading to OpenStreetMap.
If in doubt, contact the local mapping community before adding Wikidata tags.

change comment: Add wikidata tags to sculptures in Quartier Royal - Koninklijke Wijk, I

3 matches to upload
Untick the checkbox next to a match if you don’t want the wikidata tag added to OSM.

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Matching criteria
The Whirling Ear (Q55123016) – sculpture by Alexander Calder in Brussels, Belgium

Item type: sculpture  show on map  Wikidata

Summary from English Wikipedia (enwiki)

The Whirling Ear is a 1958 sculpture by Alexander Calder, installed in Brussels. It was made using sheet metal and paint, with motor.

Matches from OpenStreetMap

L'Oreille Tourbillonnante - Wervelend Oor (node)  [OSM]

OpenStreetMap tags

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The Whirling Ear (Q55123016)

sculpture by Alexander Calder in Brussels, Belgium

Whirling Ear

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<th>Language</th>
<th>Label</th>
<th>Description</th>
<th>Also known as</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>The Whirling Ear</td>
<td>sculpture by Alexander Calder in Brussels, Belgium</td>
<td>Whirling Ear</td>
</tr>
</tbody>
</table>

Statements

- instance of sculpture

0 references

image
sculpture (Q860861)

three-dimensional work of art
sculptures | piece of sculpture | sculptural work

In more languages

<table>
<thead>
<tr>
<th>Language</th>
<th>Label</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>sculpture</td>
<td>three-dimensional work of art</td>
<td>sculptures, piece of sculpture, sculptural work</td>
</tr>
</tbody>
</table>

Statements

instance of
genre
do not exactly match
- 0 references

form of art
do not exactly match
- 0 references

+ add reference
+ add value
OSM tag

Wikidata has a property for OpenStreetMap tag or key

The Wikidata item for sculpture has the OSM tag ‘artwork_type=sculpture’
OpenStreetMap and Wikidata matching criteria

- entity type AND
- coordinates AND
- name OR street address OR identifier
Match on identifier

- Railway station code
- IATA airport code
- ICAO airport code
- FAA airport code
- ISO 3166-2 country code
- NRHP reference number
- FIPS 6-4 (US counties)
- FIPS 5-2 (code for US states)
- USGS GNIS ID
- IBNR ID
- National Heritage List for England number
- UK Government Statistical Service code
- EDUBase URN
- Admiralty number (lighthouse)
- Website
Not using Wikipedia tags to find matches

- Sometimes wrong
- Less interesting problem
- Expected somebody else to
- Plan to do it eventually

Photo by Edward Betts // CC 0
Technology stack
Technology stack

Backend
- Python
- Flask
- SQLAlchemy
- PostGIS
- gevent

Frontend
- websockets
- Bootstrap
- jQuery
- Leaflet
- VueJS
APIs

- OSM Nominatim API
- OSM Overpass API
- Wikidata MediaWiki API
- Wikidata Query Service
Unsupported item types
Tunnels

Wikidata usually represents tunnels as a single item. OSM often represents them as two ways, one for each direction of traffic or tunnel bore. The software should be changed to recognise tunnels and add the Wikidata tag to both ways.
Rivers

OSM represents rivers as linear relations.

The only type of relation supported by osm2pgsql is a polygon.

The data model it uses has no support for linear relations.
Tram stops

Wikidata represents tram stops in both directions as a single item.

OSM represents tram stops as a two node, one for each direction.

The nodes are combined into a single relation.

These relations are unsupported in osm2pgsql, so the matcher fails to identifier the relation.
Language switcher
Service public fédéral Intérieur (Q281880)

Item type: Service public fédéral / ministère de l'Intérieur [show on map]

Summary from Français / French Wikipedia (frwiki)

Le service public fédéral Intérieur (nl: Federale Overheidsdienst Binnenlandse Zaken), abrégé IBZ pour Intérieur Binnenlandse Zaken, ou SPF Intérieur, est un service public fédéral belge (la dénomination de « ministère »).

Website: [http://www.ibz.be](http://www.ibz.be)

Matches from OpenStreetMap

FOD Binnenlandse Zaken - SPF Intérieur - FÖD Inneres (node) [OSM]

47 m from Wikidata [identifier match] [name match]

toggle name match detail
toggle OSM tags

archives générales du Royaume (Q2860528)

Item type: archives nationales [show on map] [Wikipedia]

Summary from Français / French Wikipedia (frwiki)

En Belgique, les Archives générales du Royaume (en néerlandais : Algemeen Rijksarchief ; en allemand : Generalstaatsarchiv), constituent le siège central des Archives de l'Etat. Situées dans la rue de Ruysbroeck à Bruxelles, à cinq minutes à pied de la gare centrale et de la place du Sablon, elles conservent en leurs murs plus de 70 km d'archives et de livres.
Federale Overheidsdienst Binnenlandse Zaken (Q281880) – Belgische federale overheidsdienst

item type: Federale Overheidsdienst / Ministerie van Binnenlandse Zaken
show on map  Wikidata

Summary from Nederlands / Dutch Wikipedia (nlwiki)
De Federale Overheidsdienst Binnenlandse Zaken is een federale overheidsdienst van België, afgekort als IBZ (Intérieur Binnenlandse Zaken). Deze FOD is onder meer verantwoordelijk voor de inschrijving en identificatie van natuurlijke personen, het vreemdelingenbeleid, de openbare orde, veiligheid en preventie, crisisbeheer.

website: http://www.ibz.be

Matches from OpenStreetMap

FOD Binnenlandse Zaken - SPF Intérieur - FÖD Inneres (node) [OSM]
47 m from Wikidata identifier match name match
toggle name match detail  toggle OSM tags

Algemeen Rijksarchief (België) (Q2860528) – hoofdzetel in Brussel van het Rijksarchief van België

item type: rijksarchief show on map  Wikidata
Federal Public Service Interior (Q281880) – Belgian government department

Item type: Federal Public Service / interior ministry

Summary from English Wikipedia (enwiki)

The FPS Interior (Dutch: FOD Binnenlandse Zaken, French: SPF Intérieur, German: FÖD Inneres), formerly the Ministry of the Interior, is a Federal Public Service of Belgium. It was created by Royal Order on January 14, 2002, as part of the plans of the Verhofstadt I Government to modernise the federal administration. The FPS Interior employs approximately 4,300 persons and is responsible for guaranteeing the rule of law, the registration and identification of natural persons, the immigration policy and for guaranteeing public order and safety.

website: http://www.ibz.be

Matches from OpenStreetMap

FOD Binnenlandse Zaken - SPF Intérieur - FÖD Inneres (node) [OSM]
47 m from Wikidata

National Archives of Belgium (Q2860528) – main seat (Brussels) of Belgium's National Archives
Stats
There are 2,675,380 objects with a ‘wikidata’ tag in OpenStreetMap
<table>
<thead>
<tr>
<th>Mappers</th>
<th>Changesets</th>
<th>Wikidata tags added</th>
<th>Added by this tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>402</td>
<td>23k</td>
<td>687k</td>
<td>26%</td>
</tr>
</tbody>
</table>

Number of people who have used the tool to edit OSM

Uploaded to OpenStreetMap

Things that have been matched

Percent of wikidata tags in OSM added by this tool
Licenses
Different licenses

- Wikidata is licensed CC0 or Public Domain
- OpenStreetMap uses the Open Database License (OdbL)
- Copying data from OpenStreetMap to Wikidata would violate the OdbL

Photo by Edward Betts // CC 0
Different intellectual property jurisdiction

- OpenStreetMap asserts database rights which exist under European law
- Wikidata operates under US intellectual property rules
- Facts are not protected in US law
OWL Place license

- License is GPL-3.0
- Code is on GitHub

github.com/Edwardbetts/osm-wikidata
Stable identifiers
To link we need stable identifiers

OSM doesn’t have stable identifiers

They have been discussed on the OSM Wiki since 2017

The existing IDs are stable enough

A concept of a "permanent ID" (or Persistent Place Identifier) has been frequently floated in the discussions. This page attempts to document the expectations and requirements for such features.

A permanent ID is some opaque string, whose value will always represent the same OSM feature, such as a street, a building, a country outline, or a point of interest (POI). The ID must remain valid even if the country outline geometry is changed, a POI gets renamed, or if the street gets split into multiple segments — in this case the ID itself can't group the segments, but generates a suggestion to group all with a relation that will preserve the ID instead of the first segment.

The Permanent ID represents a "concept"

As editors improve data, any aspect of that data may change. A restaurant node POI may become a building or a relation, and its name may be corrected. A single way representing a street may be split into multiple ways due to a partial speed restriction, or may become two ways separated by a divider. The ID must still point to the original "concept". Consequentially, not every OSM feature needs to have a Permanent ID. This Permanent ID characteristic is closed with POI concept, linked data concept, "One feature, one OSM element" principle and the Wikidata-tag attribution process.

Support ID resolution

Duplicates happen and other "official names" are welcome. As data gets corrected, multiple Permanent IDs may be discovered to represent the same concept, and should be merged. Yet, both IDs must remain, and point to the same feature.

Other popular identification authorities like ISO, Geonames and Wikidata, or official authorities (country-specific like [BGE ID]s) have their proper IDs that will be good synonyms for the Permanent IDs. All valid references (the "merged Permanent IDs" and the "external data identifiers") are expected to be documented on the OSM wiki.
 Wikidata

- Designed to have stable identifiers
- Turns out the Wikidata QIDs can change
- Wikidata includes duplicates, when they are merged one item is replaced with a redirect
- There are over 10,000 wikidata tags in OSM that point at redirects in Wikidata
## Wikidata

- OpenStreetMap element property added to Wikidata in April 2022
- OWL Places needs to be changed to start adding these statements to Wikidata
Demo
OWL Map

Map-based web interface for linking OSM to Wikidata
Ancienne patinoire à roulettes 'Royal Skating' (Q42431703)

Item type:
- warehouse (Q181623)

Street address:
- Rue Veydt 15, Rue Faider 6

OSM matches:
- 0m Rue Veydt - Veydtstraat 15
  - add tag: wikidata=Q42431703
- 18m Rue Faider - Faiderstraat 6
  - add tag: wikidata=Q42431703
I need your help
I need your help

- I’m Short of time to work on these tools
- Can I get help with hosting costs?
- Could I get paid to work on this?
- Should I find other volunteers to help me?