Customizing Search for Special-Interest Maps

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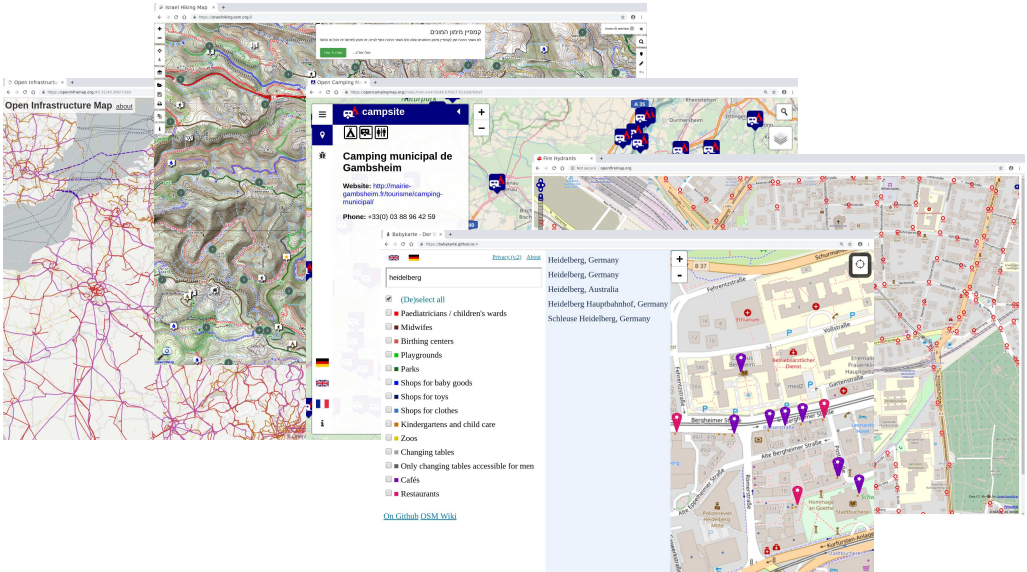
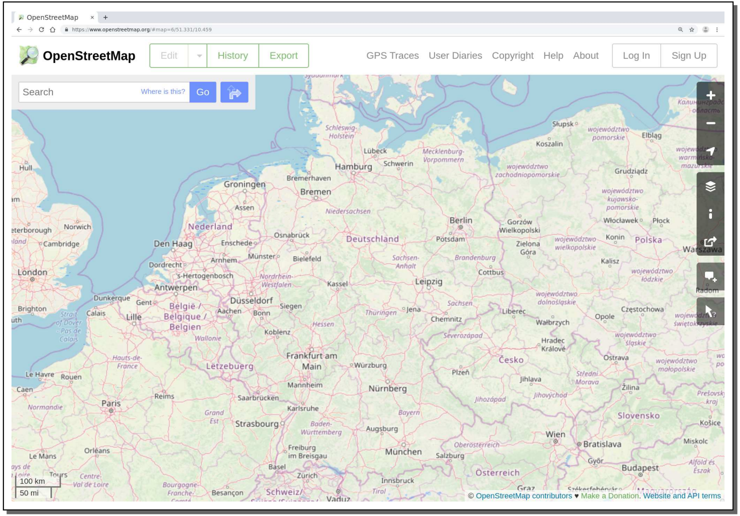
28th July 2018

State of the Map 2019
Heidelberg

Special-Interest Maps




OpenStreetMap
https://www.openstreetmap.org/#map=6/51.331/10.459
OpenStreetMap
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Export
GPS Traces
User Diaries
Copyright
Help
About
Log In
Sign Up
Search
Where is this?
Go
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Norwich
Cambridge
London
Brighton
Groningen
Bremerhaven
Bremen
Hamburg
Lübeck
Schwerin
Nederland
Den Haag
Dordrecht
Antwerpen
Deutschland
Berlin
Potsdam
Leipzig
Düsseldorf
Kassel
Frankfurt am Main
Nürnberg
München
Paris
Lille
Reims
Strasbourg
Polska
Warszawa
Česko
Slovensko
Wien
Bratislava
Budapest
Österreich
100 km
50 mi
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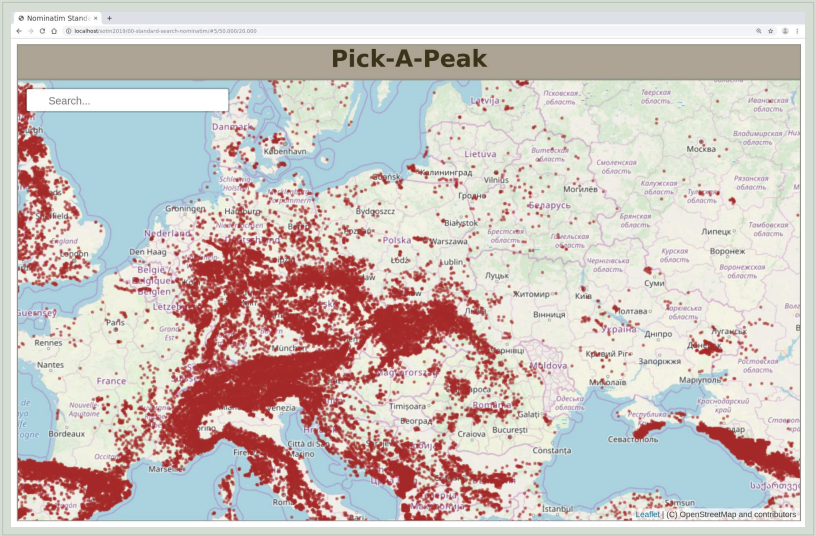
Ingredients

- Leaflet with Mapnik-style base map
- specialised data: OSM nodes with `natural=mountain` and `natural=volcano`
- Leaflet-control-geocoder for searching
  `https://github.com/perliedman/leaflet-control-geocoder`

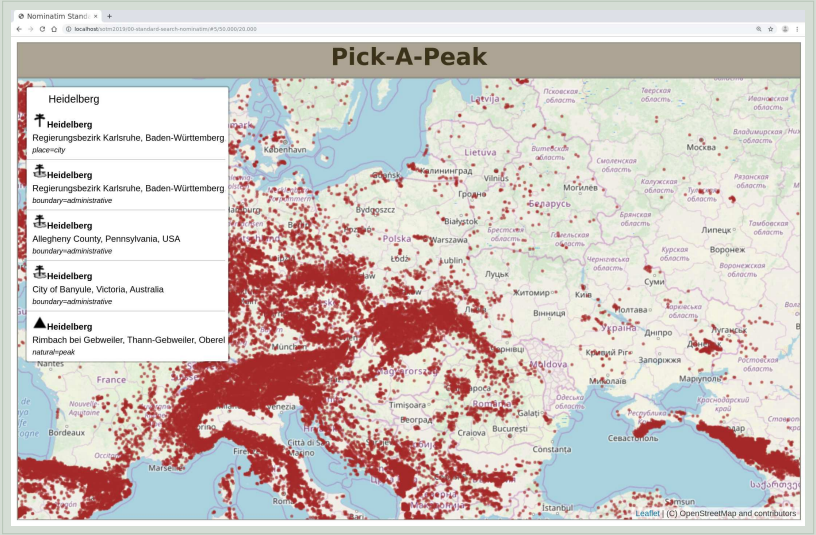
Geocoders

- Nominatim `https://nominatim.openstreetmap.org`
- Photon `https://photon.komoot.org`



https://github.org/lonvia/pick-a-peak-examples

Tuning the Search Engine



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00-standard-search-nominatim

Filters exclude results

Example

- Nominatim: `countrycodes=de,ch`
- Photon: `osm_tag=amenity:restaurant`

Ranking reorders the results

Example

- Photon: `lat=52.3879&lon=13.0582`
- Nominatim: `viewbox=1.0,1.0,2.0,2.0`

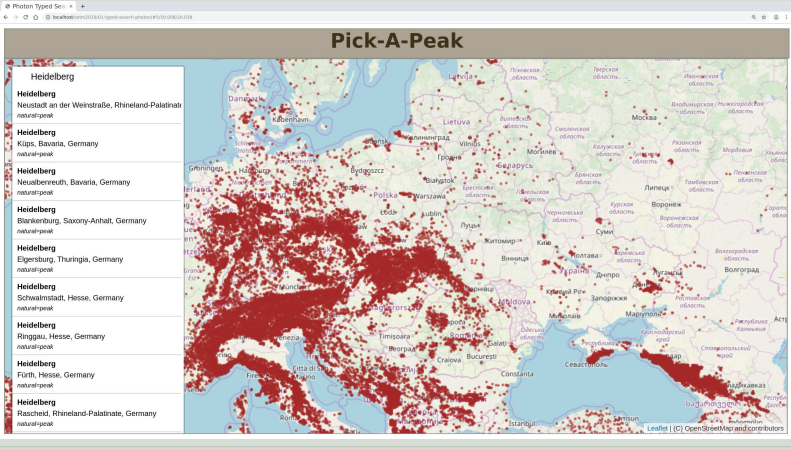
Filter for Mountains

Photon

`https://photon.komoot.org/q=Heidelberg&osm_tag=natural:peak`

Nominatim

`https://nominatim.os.org/q=Heidelberg [natural=peak]`



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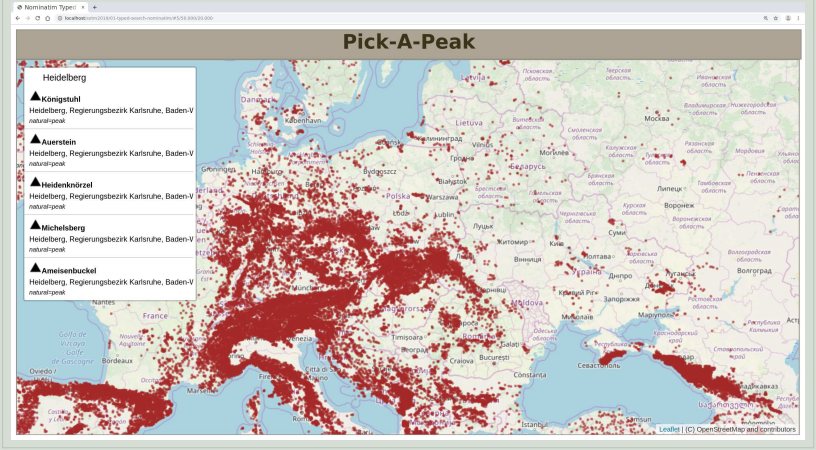
01-typed-search-photon



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01-typed-search-nominatim

Nominatim `q=Everest [natural=peak]`

- finds mountains *named* Everest
- finds mountains *near* Everest

Photon `q=Everest&osm_tag=natural:peak`

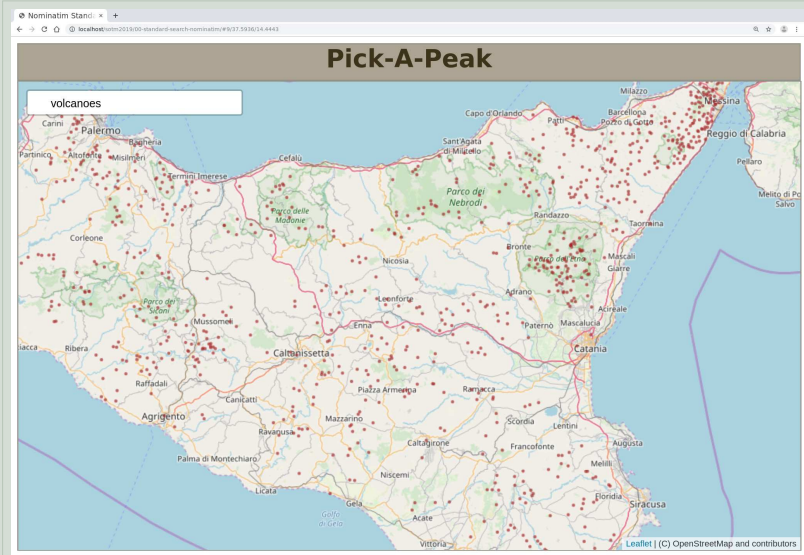
- finds mountains *named* Everest
- finds mountains with Everest *in the address*

It's not a nail...

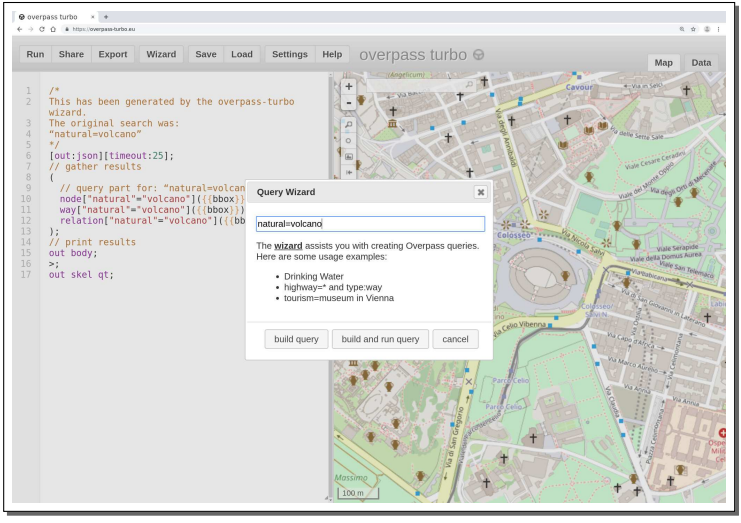
Geocoders are...

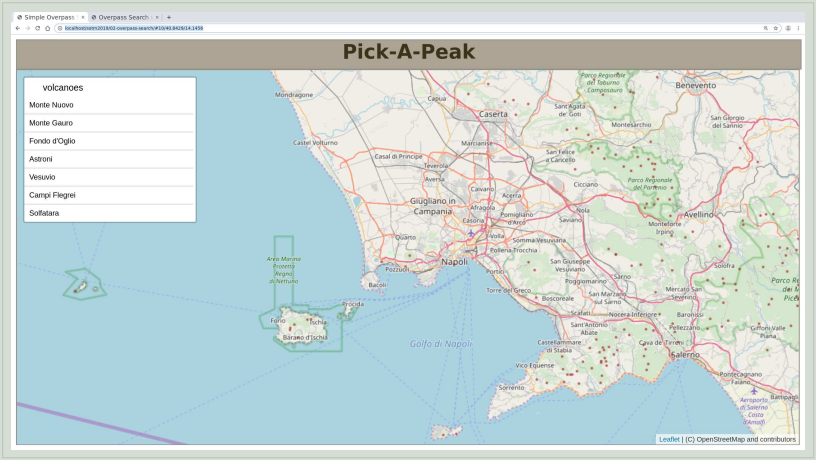
- ... optimised for generic use-case
- ... built for name search
- ... tuned to give you best matches, not all matches

Adding a screwdriver: Overpass


Nominatim Standi
localhost/osm2019/00-standard-search-nominatim/#9/37.5936/14.4443
Pick-A-Peak
volcanoes
Milazzo
Messina
Capo d'Orlando
Barcellona
Pozzo di Gotto
Patti
Palermo
Carini
Partinico
Altofonte
Misilmeri
Cefalù
Sant'Agata di Militello
Reggio di Calabria
Pellaro
Termini Imerese
Parco dei Nebrodi
Parco delle Madonie
Randazzo
Taormina
Corleone
Nicosia
Bronte
Parco dell'Etna
Mascali
Giarre
Adrano
Leonforte
Acireale
Parco dei Sicani
Mussomeli
Enna
Paternò
Mascalucia
Catania
Ribera
Caltanissetta
Raffadali
Piazza Armerina
Ramacca
Canicattì
Agrigento
Mazzarino
Scordia
Lentini
Ravanusa
Caltagirone
Francofonte
Augusta
Palma di Montechiaro
Niscemi
Melilli
Licata
Floridia
Gela
Siracusa
Golfo di Gela
Acate
Vittoria
Leaflet | (C) OpenStreetMap and contributors

Find mountains with Overpass

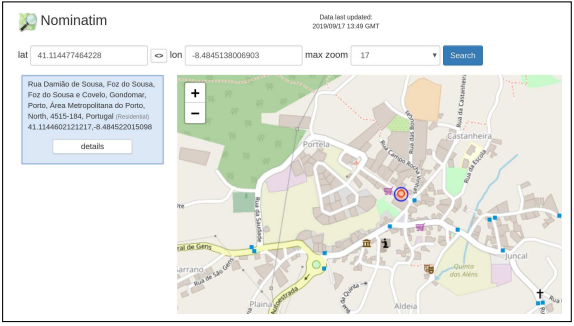




https://github.org/lonvia/pick-a-peak-examples

02-overpass-search

Reverse Geocoding computes the address of a given coordinate

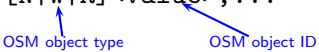


Blocking Danger!

... when sending one request per result.

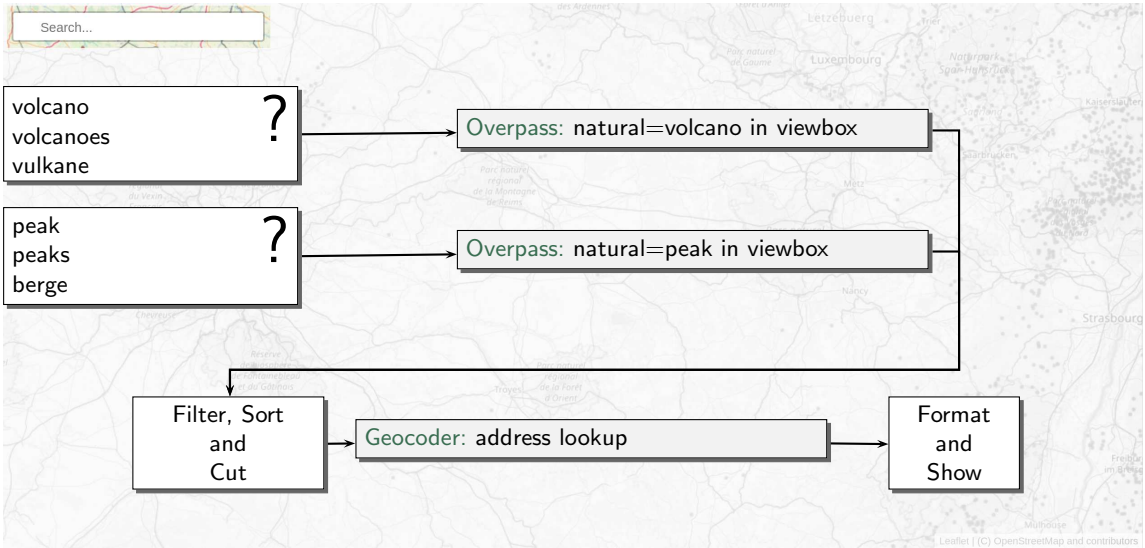
Nominatim /lookup API

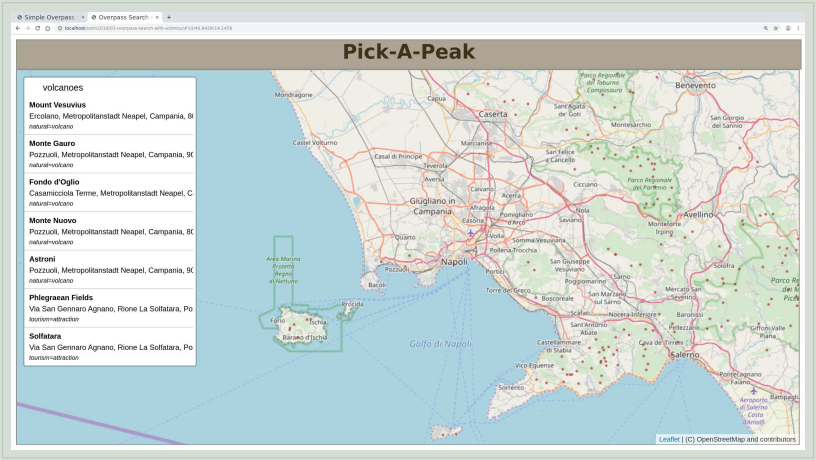
```
nominatim.osm.org/lookup.php?osm_ids=[N|W|R]<value>,...
```



- batch address resolution for OSM objects
- restriction: Nominatim needs to know object

Extended Type Search





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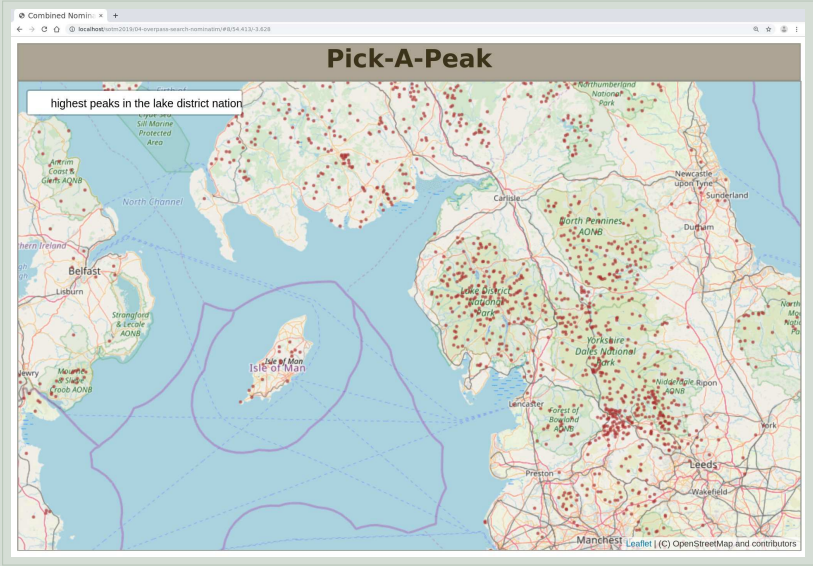
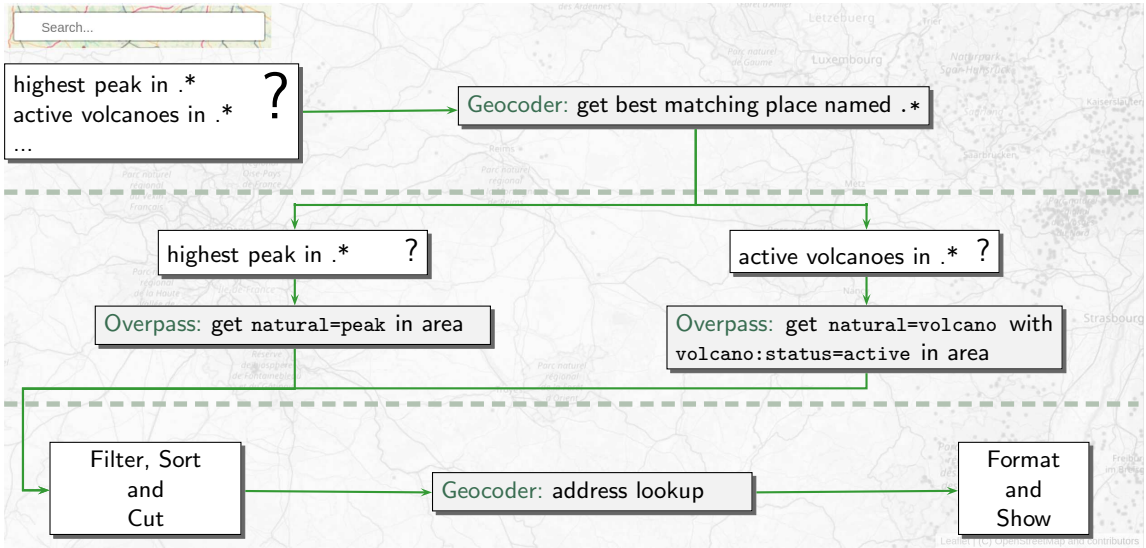
03-overpass-search-with-address

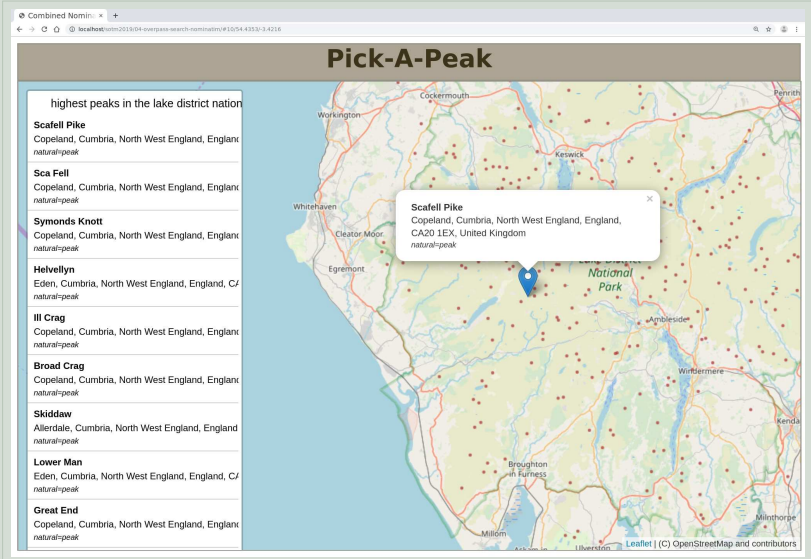


https://github.org/lonvia/pick-a-peak-examples

04-overpass-search-nominatim

Teaming up Overpass with the Geocoder

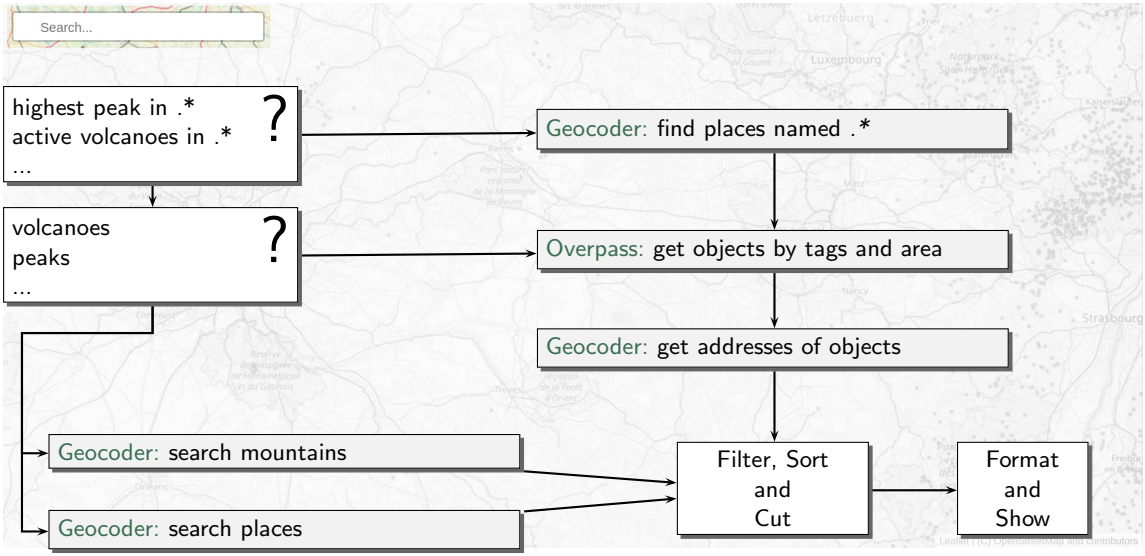




https://github.org/lonvia/pick-a-peak-examples

04-overpass-search-nominatim

Putting it all together



Limits of Overpass

- rather slow
- no real name search
- no search-as-you-type and spelling corrections

Building Your Own Search Database

SQLite vs. Postgres

SQLite

- lightwight
- usable for off-line search
- search-as-you-type: yes, spelling correction: no

Postgres

- heavyweight
- popular OSM data storage
- search-as-you-type: yes, spelling correction: yes

Normalisation

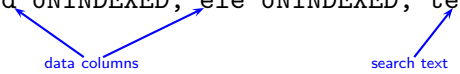
- remove capitalisation
- normalise diacratics
- (abbreviations)
- (spelling)

Tokenization

- split query into terms which are matched and indexed
- customized splitting for better results

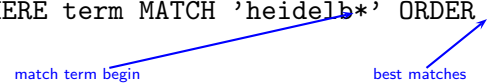
Create the Database

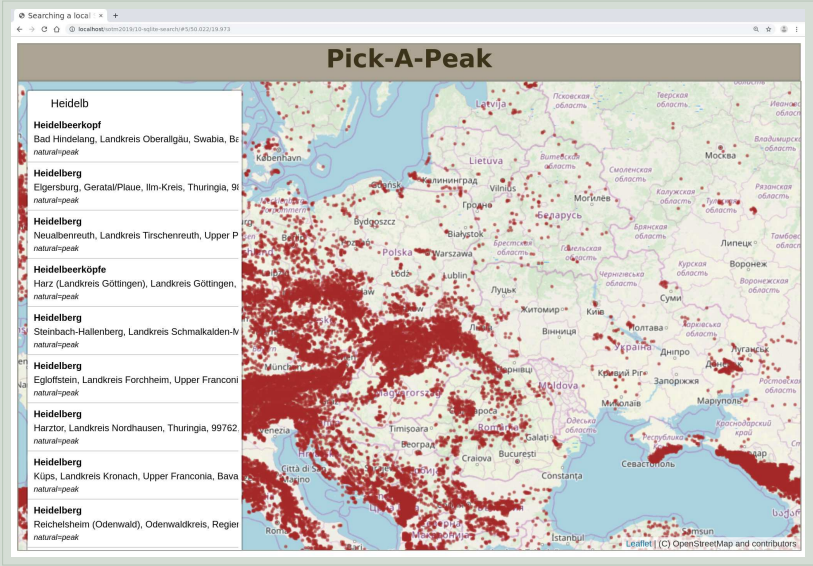
```
CREATE VIRTUAL TABLE search
USING FTS5(id UNINDEXED, ele UNINDEXED, term);
```



Query the Database

```
SELECT id, ele, term
FROM search WHERE term MATCH 'heidelb*' ORDER BY rank LIMIT 20;
```





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10-sqlite-search

Prerequisite

```
CREATE TABLE planet_osm_point
  (id TEXT, natural TEXT, name TEXT, ele TEXT, way GEOMETRY);
```

Create the Database

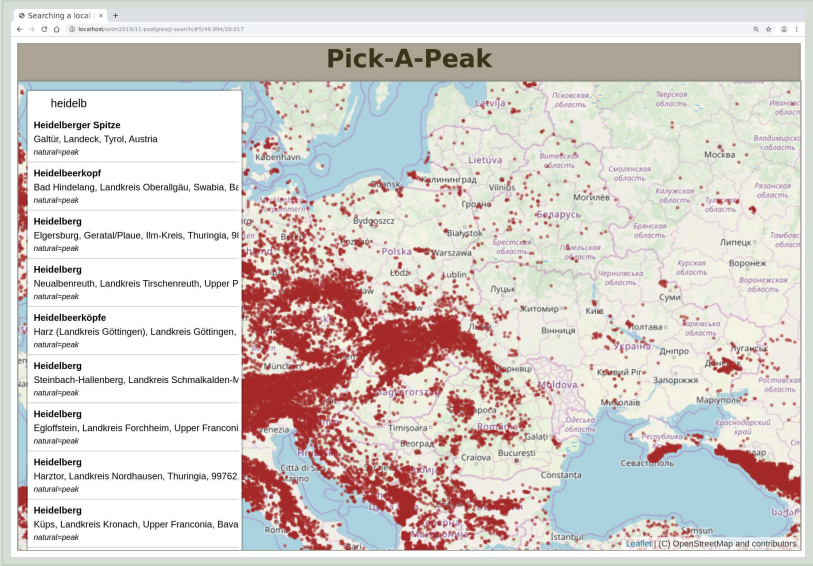
```
CREATE EXTENSION unaccent;

CREATE TABLE search AS
 SELECT id, ele, name, way,
        to_tsvector('simple', unaccent(name)) as terms
   FROM planet_osm_point
  WHERE natural in ('peak', 'volcano') AND name IS NOT NULL;

CREATE INDEX term_idx ON search USING gin(terms);
```

Query the Database

```
SELECT id, tags, name
  FROM search
 WHERE terms @@ unaccent('Heidelb:*')::tsquery
 ORDER BY ts_rank(terms, unaccent('Heidelb:*')::tsquery)
 LIMIT 20
```



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11-postgresql-search

Create the Database

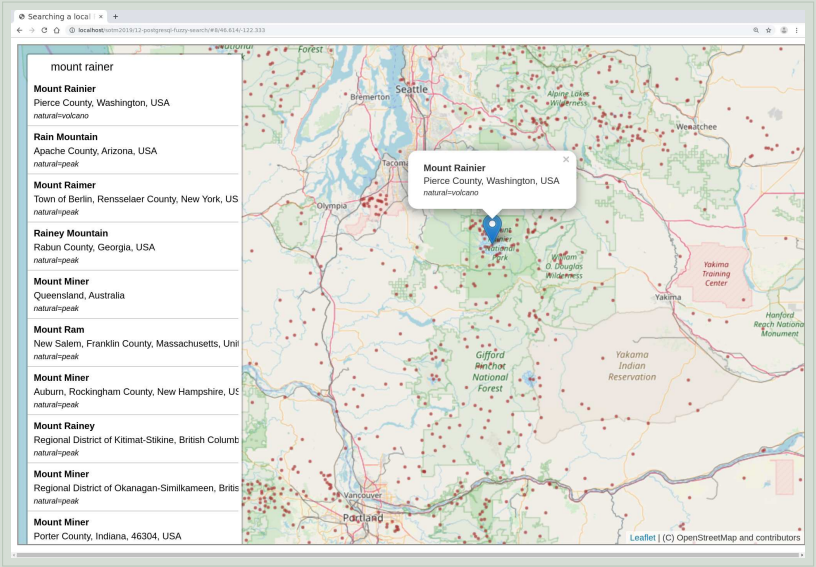
```
CREATE EXTENSION unaccent;
CREATE EXTENSION pg_trgm;

CREATE TABLE search AS
  SELECT id, ele, name, way, lower(unaccent(name)) as terms
    FROM peaks
   WHERE natural in ('peak', 'volcano') AND name IS NOT NULL;

CREATE INDEX term_idx ON search USING gist(terms gist_trgm_ops);
```

Query the Database

```
SELECT id, ele, name, way
  FROM search
 WHERE terms %% lower(unaccent('Mount Rainer'))
 ORDER BY terms <-> unaccent('Mount Rainer')
 LIMIT 20
```



https://github.org/lonvia/pick-a-peak-examples

12-postgresql-fuzzy-search

Taking it further

- Elastic Search
- customized geocoder installations

Just remember...

- ... think about what your users want to find.
- ... look for services next to traditional geocoders.

Thank You

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