
Transitous
meets GNOME Maps
meets MOTIS Project

Problem

Finding public transport routes across multiple countries

Existing (partial) solutions

- APIs and apps of operators (Deutsche Bahn, ÖBB, BVG)
  - incomplete information
  - no complete routes across different apps and APIs
- Rail Planner app
  - infrequent updates to schedule
  - only trains
  - no realtime information
  - limited routing
- Google Maps
  - UI pretty focused on local transport (missing platform information, limited filter options etc.)

Fixing this with open-source software

- Choosing a different API to query based on region
  - needs very detailed coverage information
  - no way to combine APIs covering disjunct areas to get single route
- Using the Google Transit API
  - API can’t be used for free

Fixing this with open-source software

→ We need to run our own routing service

Transitous

- Started at FOSDEM 2024
- First service running about a month later
- Quickly growing coverage since then

Current State

- Good coverage in the EU
- Growing coverage in the US
- Coverage islands in other parts of the world
- Service running fairly reliably, but could be faster
- Easy to implement API

Coverage

Numbers

- 94 regions (countries / states in the US)
- 39 region maintainers
- 1417 static feeds (timetables)
- 167 realtime feeds
- 5 apps using Transitous

Data Sources

- GTFS / GTFS-RT
- Same format that Google Maps uses
- Already exists in lots of places

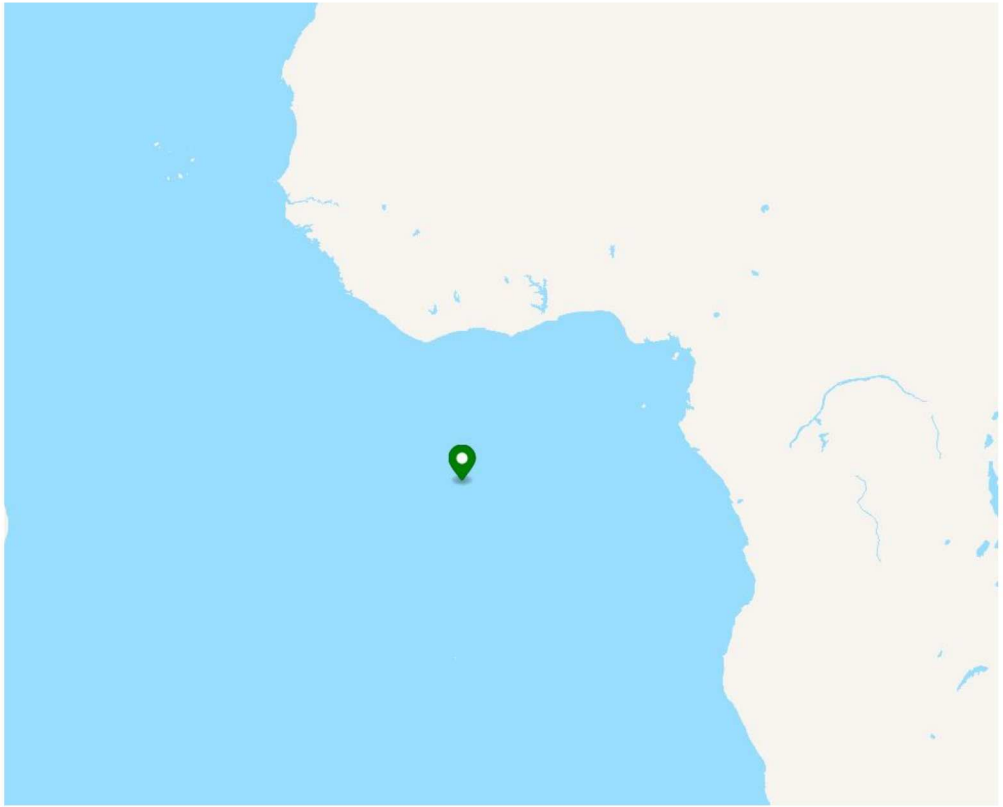
Contributing

- Maintainers for regions
  - Update URLs if needed
- JSON-based metadata format for specifying sources

```
[
    {
        "name": "zet",
        "type": "transitland-atlas",
        "transitland-atlas-id": "f-u25k-zagrebačkielektričnitramvaj"
    },
    {
        "name": "zet",
        "type": "transitland-atlas",
        "transitland-atlas-id": "f-u25k-zagrebačkielektričnitramvaj~rt"
    }
]
```

Data Quality

Data Quality



Dealing with data issues

- Common issues:
  - (0, 0)-coordinates
  - unrealistically fast trips
  - invalid values
- Problematic entries can be automatically removed using gtfstidy/gtfsclean
  - exposed as `fix`-option in metadata

GNOME Maps

Background: GNOME Maps

- Core component of the GNOME desktop environment
- Using OSM
- Map rendering implemented in libshumate, GTK 4 map widget library

GNOME Maps

Public transit routing, earlier steps...

- I floated the idea of public transit routing in Maps the first time at FOSDEM 2015
- Initial implementation in 2017, utilizing OpenTripPlanner
- Initial idea at the time was to setup a dedicated OpenTripPlanner instance with a selection of regions

GNOME Maps

Next iteration

- As the original plan of using OpenTripPlanner never materialized, in 2019 public transit support was refactored into supporting plugins
- Transit support have then been re-written into a region-based “router” dispatching requests to plugin instances based on regions defined in a JSON file

GNOME Maps

“Islands of Transit”

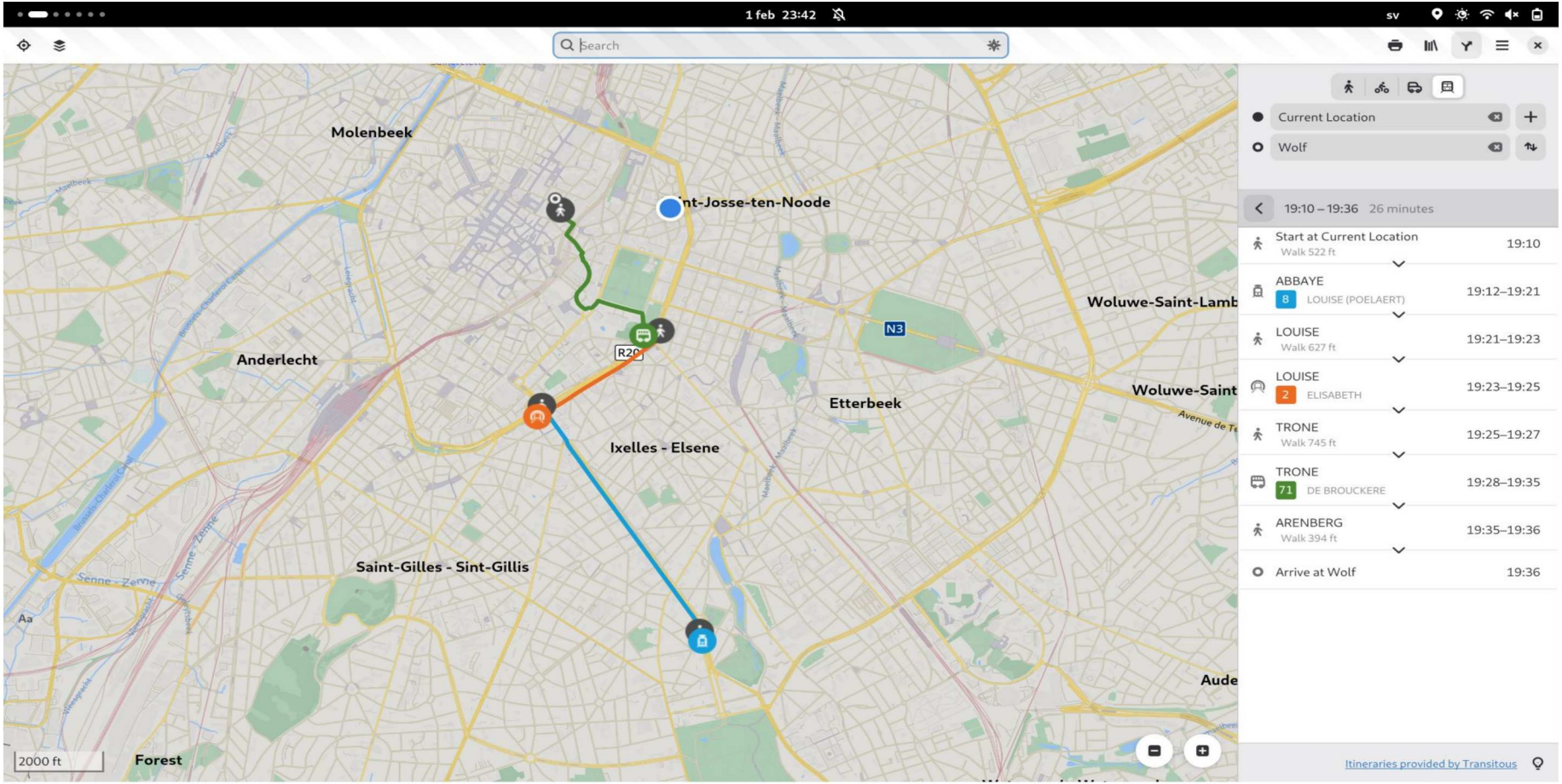
- This has resulted in an “isolated islands” situation, where where
- smaller, disjoint areas can support transit routing
- Most areas didn’t support transit
- Routing can not traverse between these “islands”

GNOME Maps

Implementing MOTIS/Transitous in GNOME Maps

- Started implementing support in the spring of 2024
- MOTIS 2 API has a structure very similar to OpenTripPlanner 1.x, which maps better to Maps' internal data model

GNOME Maps


1 feb 23:42
sv
Search
Molenbeek
Anderlecht
Saint-Gilles - Sint-Gillis
Ixelles - Elsene
Etterbeek
Woluwe-Saint-Lamb
Woluwe-Saint
Aude
Forest
N3
R20
2000 ft
Current Location
Wolf
19:10 – 19:36 26 minutes
Start at Current Location
Walk 522 ft
19:10
ABBAYE
8 LOUISE (POELAERT)
19:12–19:21
LOUISE
Walk 627 ft
19:21–19:23
LOUISE
2 ELISABETH
19:23–19:25
TRONE
Walk 745 ft
19:25–19:27
TRONE
71 DE BROUCKERE
19:28–19:35
ARENBERG
Walk 394 ft
19:35–19:36
Arrive at Wolf
19:36
Itineraries provided by Transitous

MOTIS is a swiss army knife for mobility and comes with all features you need for a mobility platform:

- **routing**: one mode public transport, walking, bike, car, sharing mobility / multimodal
- **geocoding**: multi-language address and stop name completion with fuzzy string matching and resolution to geo coordinates
- **reverse geocoding**: resolving geo coordinates to the closest PoIs / stops
- **tile server**: background map tiles
- … and many more endpoints for departure tables, arrival tables, trips, etc.

Features can be turned on and off as needed.

MOTIS Project

MOTIS

What's new since the last MOTIS presentation on FOSDEM 2023? **everything.**

2023

- Public transit routing:
  Multi-Criteria-Dijkstra (MCD)
  on a a time-dependent graph
- OSRM for street routing
  (700+GB for planet-size routing!)
- No GeoCoding for addresses

2025

- **nigiri** for transit routing:
  RAPTOR with bitfield encoding
  for full year transport traffic days
  Transitous timetable fits in ~16GB
- **osr** - street routing from scratch
  ~16GB for planet-size routing – all profiles,
  including combined profiles like Park & Ride
- **adr** - geocoding
  ~8GB for all addresses and places from OSM