



BBOX – a modular OGC API server

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SOURCEPOLE
Linux & Open Source Solutions





BBOX services

Composable spatial services.

CI passing Docker image v2023.03.14.01

```
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| - ) - ) / - \ \ /  
| - \ - \ (-) > <  
|_ / _ \ / _ \ / \ \
```

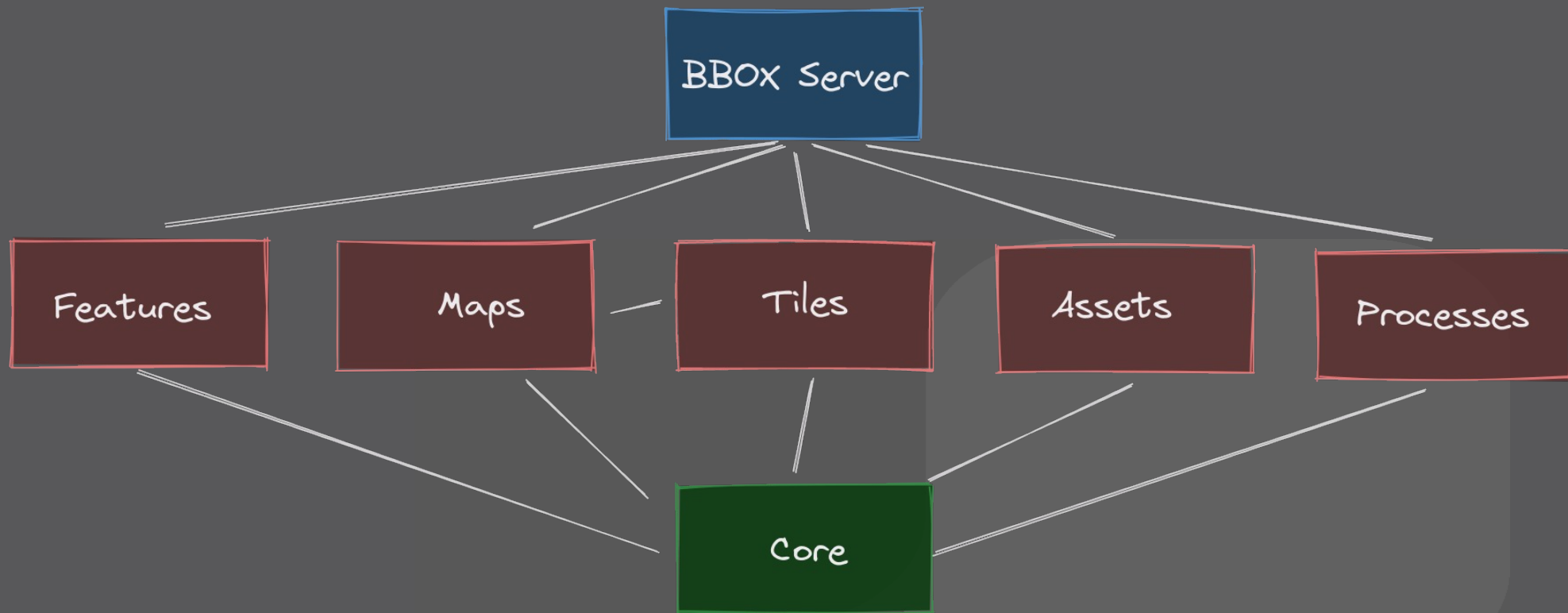
Components:

- [BBOX Feature server](#): OGC API Features service
- [BBOX Map server](#): OGC API Map service
- [BBOX Tile server](#): OGC API Tile service
- [BBOX Asset server](#): Serving static and templated files
- [BBOX Processes server](#): OGC API Processes service

> <https://github.com/sourcepole/bbox>



BBOX Services





› Standardized endpoints

- › Landing page (JSON/HTML) with links
- › /conformance
- › /collections
- › /map
- › /tiles
- › /processes

› OpenAPI support



OGC
APIs

Building Blocks
for Location





Programming Language Rust

› Why Rust

- › Performance
- › Reliability
- › Productivity



› Empowerment

- › Fearless concurrency
- › Keep complex projects long-term maintainable

› Compiles to Native and WebAssembly





BBOX Feature Server

- › **OGC API - Features - Part 1: Core 1.0**
 - › Compatibility: WFS + WFS-T via QGIS Server
- › **JSON + HTML viewer**
- › **OpenAPI support**
 - › Built-In Swagger UI
 - › Built-In ReDoc UI
- › **Core backends**
 - › PostGIS, GeoPackage, FlatGeoBuf*
- › **Optional backends**
 - › GDAL*





Feature Server - Configuration

› Datasources for features



```
[[datasource.directory]]  
dir = "./data"
```

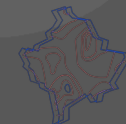
```
[[datasource.postgis]]  
url = "postgresql://t_rex:t_rex@127.0.0.1:5439/t_rex"
```





BBOX Map Server

- › OGC API – Maps
- › Compatibility: OGC WMS 1.3 Server
- › Map rendering backends (FCGI)
 - › QGIS Server
 - › UNN Mapserver
- › Backend dispatch modes:
 - › Random, Round Robin, WMS Optimized
- › Embedded QWC2 Map viewer
- › Instrumentation data for WMS backends





Map Server - Configuration



[mapserver]

```
# Environment variable prefix: BBOX_MAPSERVER__  
num_fcgi_processes = 4           # Default: number of CPU cores  
# wait_timeout = 30000          # FCGI wait timeout in ms
```

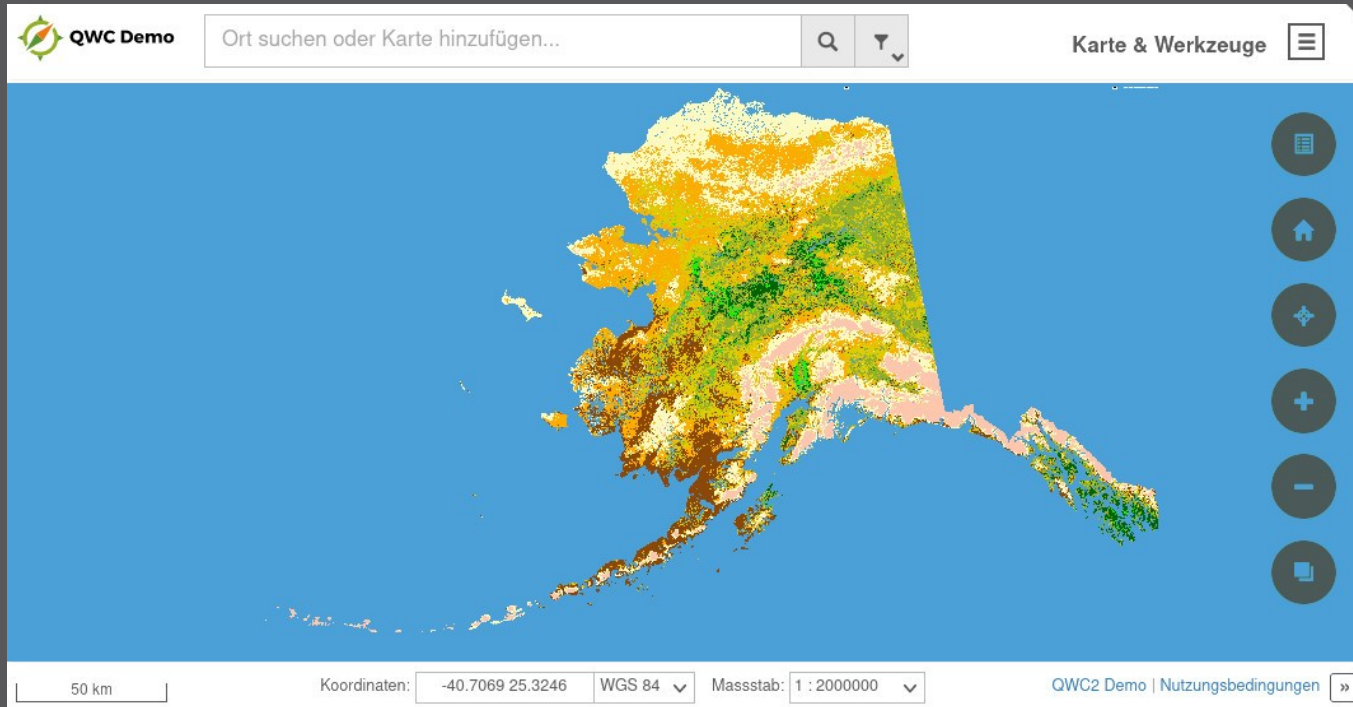
[mapserver.qgis_backend]

```
# QGIS Server settings  
# Environment variable prefix: BBOX_MAPSERVER__QGIS_BACKEND__  
project_basedir = "./projects"  # Base dir for project files  
qgs.path = "/qgis"             # WMS URL base path  
qgz.path = "/qgz"              # WMS URL base path
```

[mapserver.umn_backend]

```
# UMN MapServer settings  
# Environment variable prefix: BBOX_MAPSERVER__UMN_BACKEND__  
project_basedir = "./maps"      # Base dir for project files  
path = "/wms/map"              # WMS URL base path
```





```
bbox-server serve --map alaska.qgz
```



CLI: UMN Mapserver



QWC Demo

Ort suchen oder Karte hinzufügen...

Karte & Werkzeuge

50 km

Koordinaten: -40.7069 25.3246 WGS 84

Maßstab: 1 : 2000000

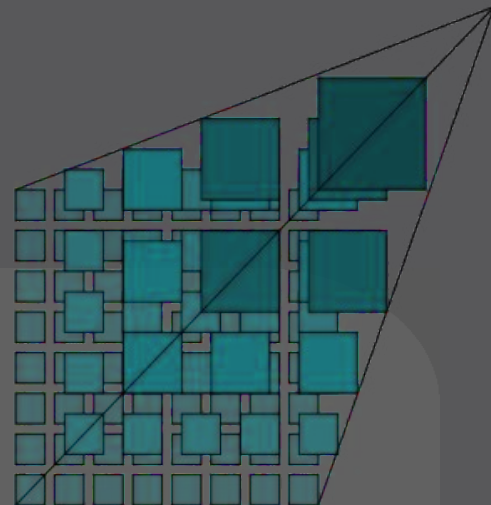
QWC2 Demo | Nutzungsbedingungen

```
bbox-server serve -map itasca.map
```



BBOX Tile Server

- › **OGC API – Tiles - Part 1: Core 1.0**
- › **Raster tile server**
 - › Backends: QGIS Server and MapServer
 - › Compatibility: OGC WMTS (pass-through)
- › **WMS Proxy**
- › **Vector tile server**
 - › File: MBTiles
 - › Planned: PostGIS, GDAL (T-rex functionality)
 - › Compatibility: XYZ Tileserver (tilejson)
- › **Parallelized Tile seeding (S3, Local storage)**
- › **Support for Custom Tile Matrix Sets**





Tile Server - Configuration

```
[[tileserver.grid]]  
json = "./grids/lv95.json"
```

```
[[tileserver.cache]]  
name = "tilecache"  
[tileserver.cache.files]  
base_dir = "/var/tilecache"
```

```
[[tileserver.cache]]  
name = "aws"  
[tileserver.cache.s3]  
path = "s3://tiles"
```

```
[[tileserver.source]]  
name = "gebco"  
[tileserver.source.wms_proxy]  
baseurl = "https://www.gebco.net/service/mapserv?version=1.3.0"  
format = "image/jpeg"
```





Tile Server - Configuration



```
[[tileserver.tileset]]  
name = "mbtiles_mvt_osm"  
cache = "aws"  
mbtiles = { path = "/var/data/osm.mbtiles" }
```

```
[[tileserver.tileset]]  
name = "rivers_lakes"  
tms = "LV95"  
[tileserver.tileset.wms_project]  
project = "ne_extracts"  
suffix = "qgz"  
layers = "ne_10m_lakes,ne_10m_rivers_lake_centerlines"  
params = "transparent=true"
```

```
[[tileserver.tileset]]  
name = "gebco"  
wms_proxy = { source = "gebco", layers = "gebco_latest" }  
path = "s3://tiles"
```





- › **Integrated file server**
 - › Assets: Fonts, Styles, Sprites, ...
 - › Data downloads
- › **Integrated template server**
 - › Custom viewers, Story maps, ...
- › **QGIS Plugin repository**

← → ↻ 🏠 🔍 📄 🗨️ localhost:8080/qgis/plugins.xml

BBOX QGIS Plugin Repository

Instant Print : 3.0.0

Instantly print map excerpts

<https://github.com/sourcepole/qgis-instantprint-plugin>

QGIS version: 3.0

Download: [instantprint.zip](#)

Author: Sandro Mani, Sourcepole AG



Asset Server - Configuration



```
[[assets.static]]  
# ./assets/* -> http://localhost:8080/assets/  
dir = "./assets"  
path = "/assets"
```

```
[[assets.template]]  
# Env var: BBOX_ASSETS__TEMPLATE='[{dir="templates",path="/html"}]'  
# ./templates/name.html -> http://localhost:8080/html/name/param  
dir = "./templates"  
path = "/html"
```

```
[[assets.repo]]  
# QGIS plugin repository  
# ./plugins/*.zip -> http://localhost:8080/qgisrepo/plugins.xml  
dir = "./plugins"  
path = "/qgisrepo"
```




BBOX Processes Server

- › **OGC API – Processes Core**
- › **Synchronous + Asynchronous processes**
- › **Processing Backend: Dagster**
 - › Multiple Runtime environments
 - › Python
 - › Celery, Dask
 - › Docker, Kubernetes
 - › Support for Pandas, dbt, Spark
 - › API: Python, GraphQL
- › **Planned Backend: Windmill**
 - › <https://www.windmill.dev/>





Authentication / Authorization

- › Protected OGC API services
- › Protected WMS + maps
- › **Built-in Authentication Providers**
 - › OAuth2 / Openid Connect
 - › Planned: Basic Authentication
- › **Integrates with external Identity Providers:**
 - › Keycloak, Authentik, etc.
 - › Multi-Factor Login, LDAP, SAML2





Instrumentation + Monitoring


- Prometheus metrics
- Jaeger tracing






BBOX

 Home

 Maps

 Routing

 Processes

 Collections

 Catalog

 API

 Admin

Maps

WMS catalog

- /wms/qgs/ne: [Capabilities Viewer](#)
- /wms/qgs/helloworld: [Capabilities Viewer](#)
- /wms/qgs/cascaded: [Capabilities Viewer](#)
- /wms/qgz/earthquakes: [Capabilities Viewer](#)
- /wms/map/bbox-routing-server/viewer/map-viewer.cc7d3747: [Capabilities Viewer](#)
- /wms/map/bbox-routing-server/viewer/map-viewer.49a49e61: [Capabilities Viewer](#)
- /wms/map/data/ne: [Capabilities Viewer](#)



Modularity

- › All-in-one executable binary
- › Separate binaries for each service
- › Docker containers
- › Common configuration file
- › Configuration via Environment variables



BBOX



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Prague, 2023



Current state



- › **In production use:**
 - › BBOX Map Server
 - › BBOX Processes Server
- › **OGC API conformance testing**
 - › BBOX Feature Server
 - › BBOX Map Server (OGC code sprint)
 - › BBOX Tile Server (OGC code sprint)
 - › Some test suites in alpha state or not available yet
- › **Experimental**
 - › BBOX Routing Server
- › **Public alpha releases coming shortly**



- › **Metadata services**
 - › STAC, OGC API – Records
- › **Fulltext search engine**
 - › Adresses, custom fields, etc.
- › **Arrow Support**
 - › Provide features in Apache Arrow format
- › **Story maps**
 - › Markdown with map functions
- › **Edge services**
 - › Provide OGC API as Edge service
- › **More**
 - › Dashboards, IoT, 3D Tiles, Point cloud service (COPC), ...



Whats next?



BBOX

- › **Community building**
 - › Feedback from early adopters
 - › Finding contributors
 - › GH Organisation / Homepage / Documentation
- › **Setting priorities**
 - › High-Performance use cases?
 - › Driven by Users, Customers and Contributors



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Summary



- › **Modular OGC API Services**
- › **Enterprise ready**
 - › Instrumentation + Monitoring
 - › 1st class Docker support
 - › Authentication / Authorization
- › **Easy to use**
 - › `bbox serve -map alaska.qgz`
- › **Leverage existing services**
 - › Full support of MapServer and QGIS maps
- › **Fully Open Source**
 - › <https://github.com/sourcepole/bbox>



BBOX

Thank you!



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