pygeoapi Documentation

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Contents:

CHAPTER 1

pygeoapi project

pygeoapi is a Python server implementation of the emerging suite of OGC API standards. pygeoapi is development using the 12-factor app approach, allowing for easy deployment in cloud systems.

pygeoapi is a OsGEO recognized project (here).

1.1 Demo server

There is a demo server on https://demo.pygeoapi.io running the latest (Docker) version from the master branch of this repo. pygeoapi runs there at https://demo.pygeoapi.io/master .

The demo server setup and config is maintained within a seperate GH repo: https://github.com/geopython/demo.pygeoapi.io.

CHAPTER 2

Install

pygeoapi, by default, is natively run as a Flask app (the code struct is an API and Flask is used as a wrapper). Optionally it can be run as a Starlette app.

pygeoapi uses two configuration files: **pygeoapi-config.yml** and **openapi.yml**. First configuration contains all the information and setup to run pygeoapi while the second is exclusivally for the openapi.

pygeoapi requires setting `PYGEOAPI_CONFIG` and `PYGEOAPI_OPENAPI` env variable. `PYGEOAPI_CONFIG` points to the yaml file containing the configuration, in the example below we copy the `local.config.yml` default configuration to `pygeoapi-config.yml` and use this configuration file.

`PYGEOAPI_OPENAPI` variable is the path to openapi file configuration, this file **needs to be autogenerated** using the `pygeoapi generate-openapi-document` command and the pygeoapi config files e.g.: `pygeoapi generate-openapi-document -c local.config.yml > openapi.yml`. And then setting the env variable to the path: `export PYGEOAPI_OPENAPI=/path/to/openapi.yml`

For production environments it is recommended to use *Docker* or specialized servers like WSGI HTTP server *WSGI* or ASGI HTTP server *ASGI*

2.1 Copy/paste install

It is advisable to run pygeoapi inside an isolated enviroment either *virtualenv* or *docker*, mainly to avoid python package conflicts.

```
# create virtualenv
virtualenv -p python pygeoapi
cd pygeoapi
. bin/activate
git clone https://github.com/geopython/pygeoapi.git
cd pygeoapi

# install requirements
pip install -r requirements.txt
pip install -r requirements-dev.txt
```

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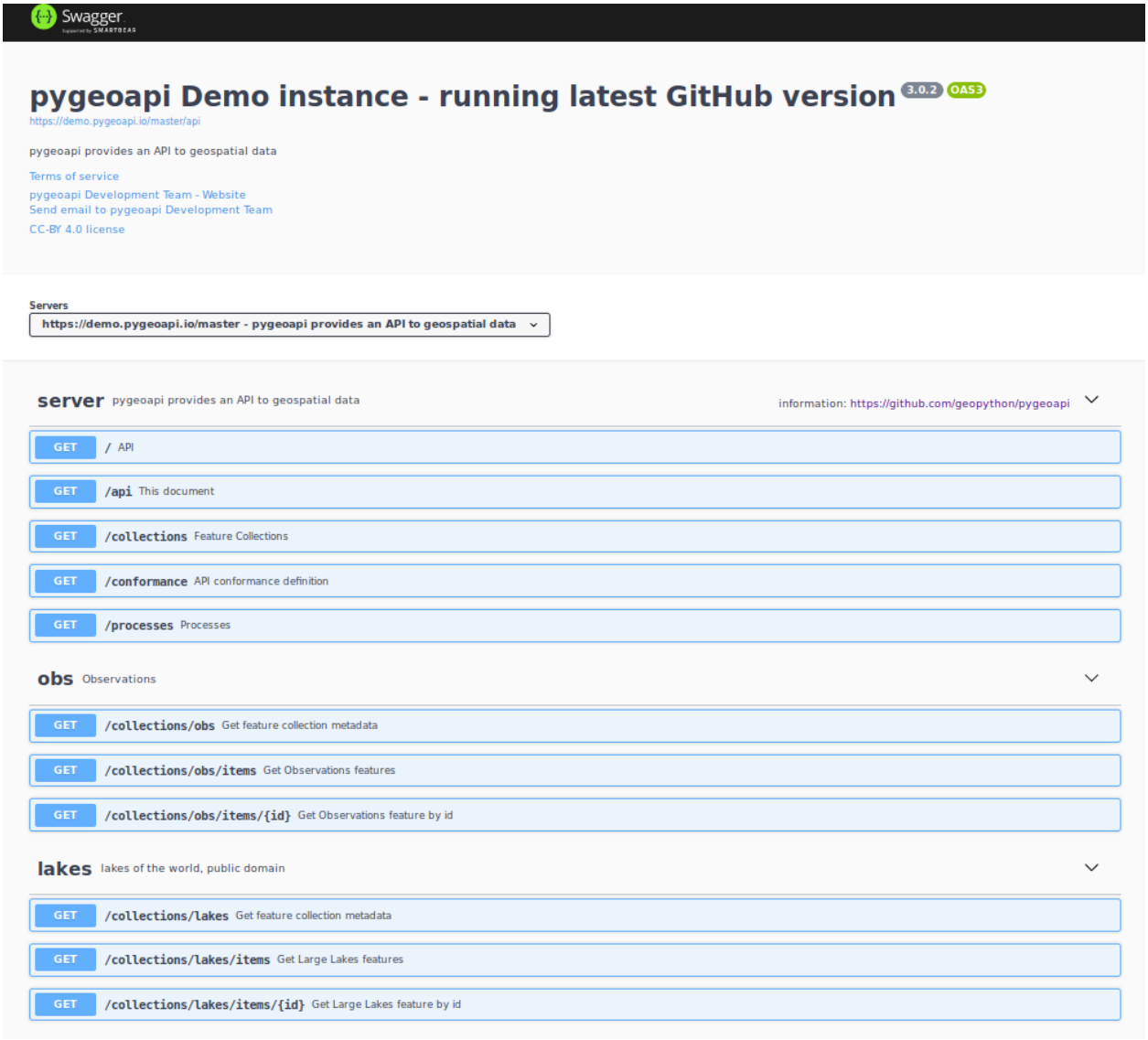
```
# optionally install requirements for starlette
pip install -r requirements-starlette.txt

# install source in current directory
pip install -e .
cp pygeoapi-config.yml local.config.yml
# edit configuration file
nano  local.config.yml

export PYGEOAPI_CONFIG=/path/to/local.config.yml
# generate OpenAPI Document
pygeoapi generate-openapi-document -c local.config.yml > openapi.yml
export PYGEOAPI_OPENAPI=/path/to/openapi.yml

# run pygeoapi
pygeoapi serve

# optionally run pygeoapi with starlette
pygeoapi serve --starlette
```

If the default configuration was used then we should have pygeoapi running on


Swagger
pygeoapi Demo instance - running latest GitHub version
3.0.2
OAS3
https://demo.pygeoapi.io/master/api
pygeoapi provides an API to geospatial data
Terms of service
pygeoapi Development Team - Website
Send email to pygeoapi Development Team
CC-BY 4.0 license
Servers
https://demo.pygeoapi.io/master - pygeoapi provides an API to geospatial data
server pygeoapi provides an API to geospatial data
information: https://github.com/geopython/pygeoapi
GET / API
GET /api This document
GET /collections Feature Collections
GET /conformance API conformance definition
GET /processes Processes
obs Observations
GET /collections/obs Get feature collection metadata
GET /collections/obs/items Get Observations features
GET /collections/obs/items/{id} Get Observations feature by id
lakes lakes of the world, public domain
GET /collections/lakes Get feature collection metadata
GET /collections/lakes/items Get Large Lakes features
GET /collections/lakes/items/{id} Get Large Lakes feature by id

CHAPTER 3

OpenAPI

OpenAPI spec is an open specification for REST end points, currentely OGC services are being redefined using such specification. The REST structure and payload are defined using yaml file structures, the file structure is described here: https://swagger.io/docs/specification/basic-structure/

pygeoapi REST end points descriptions on OpenAPI standard are automatically generated based on the configuration file:

```
pygeoapi generate-openapi-document -c local.config.yml > openapi.yml
```

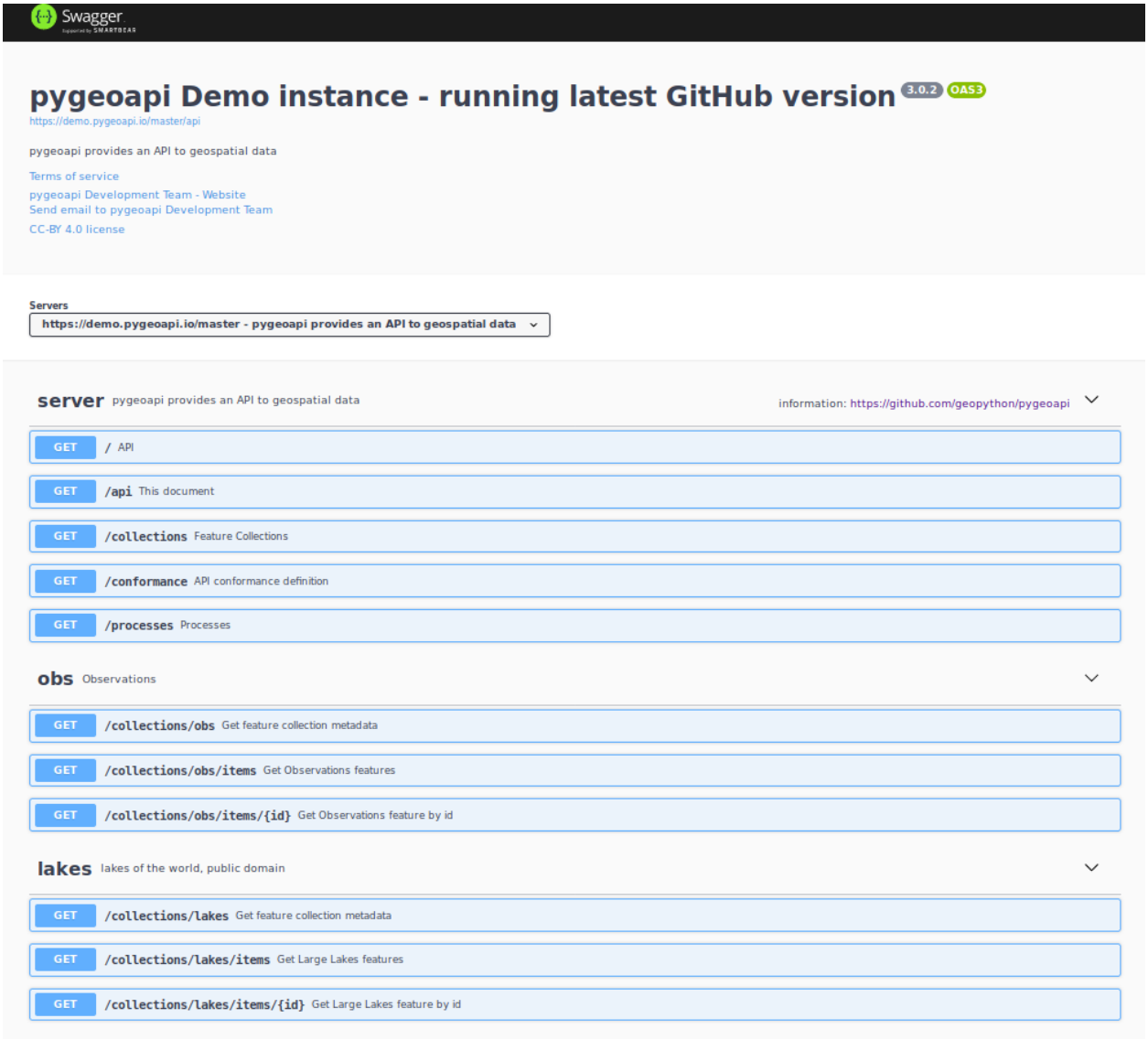
The api will them be accessible at */openapi* endpoint.

For api demo please check: https://demo.pygeoapi.io/master/openapi

The api page has REST description but also integrated clients that can be used to send requests to the REST end points and see the response provided

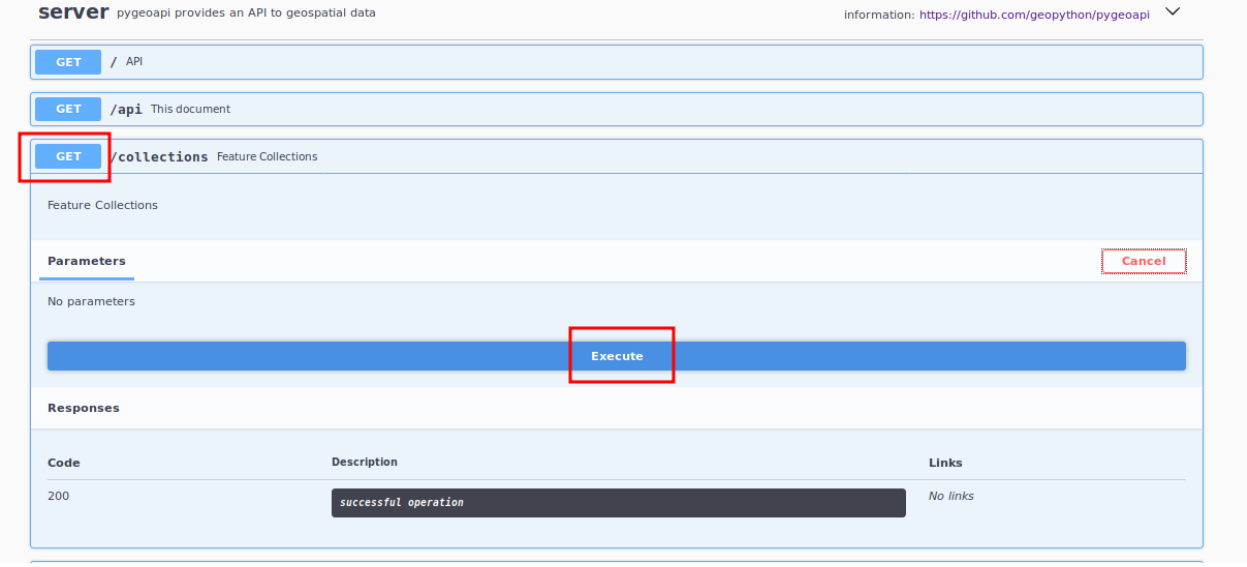
3.1 Using OpenAPI

Acessing the openAPI webpage we have the following structure:

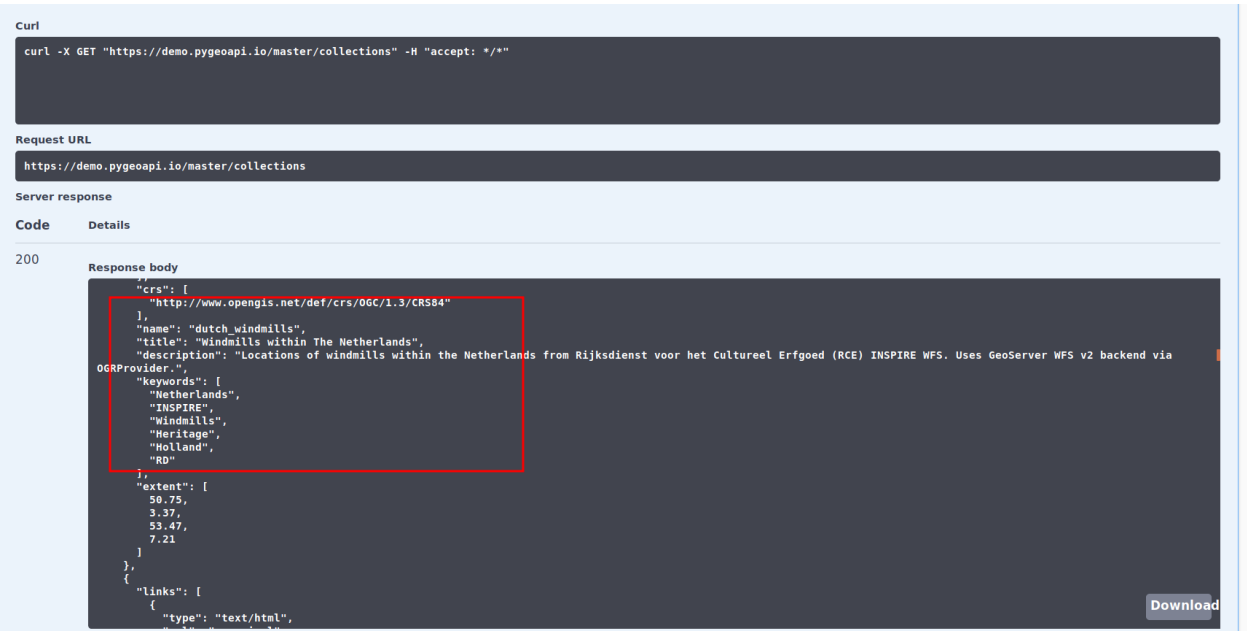


Please notice that **each dataset** will be represented as a REST end point under *collections*

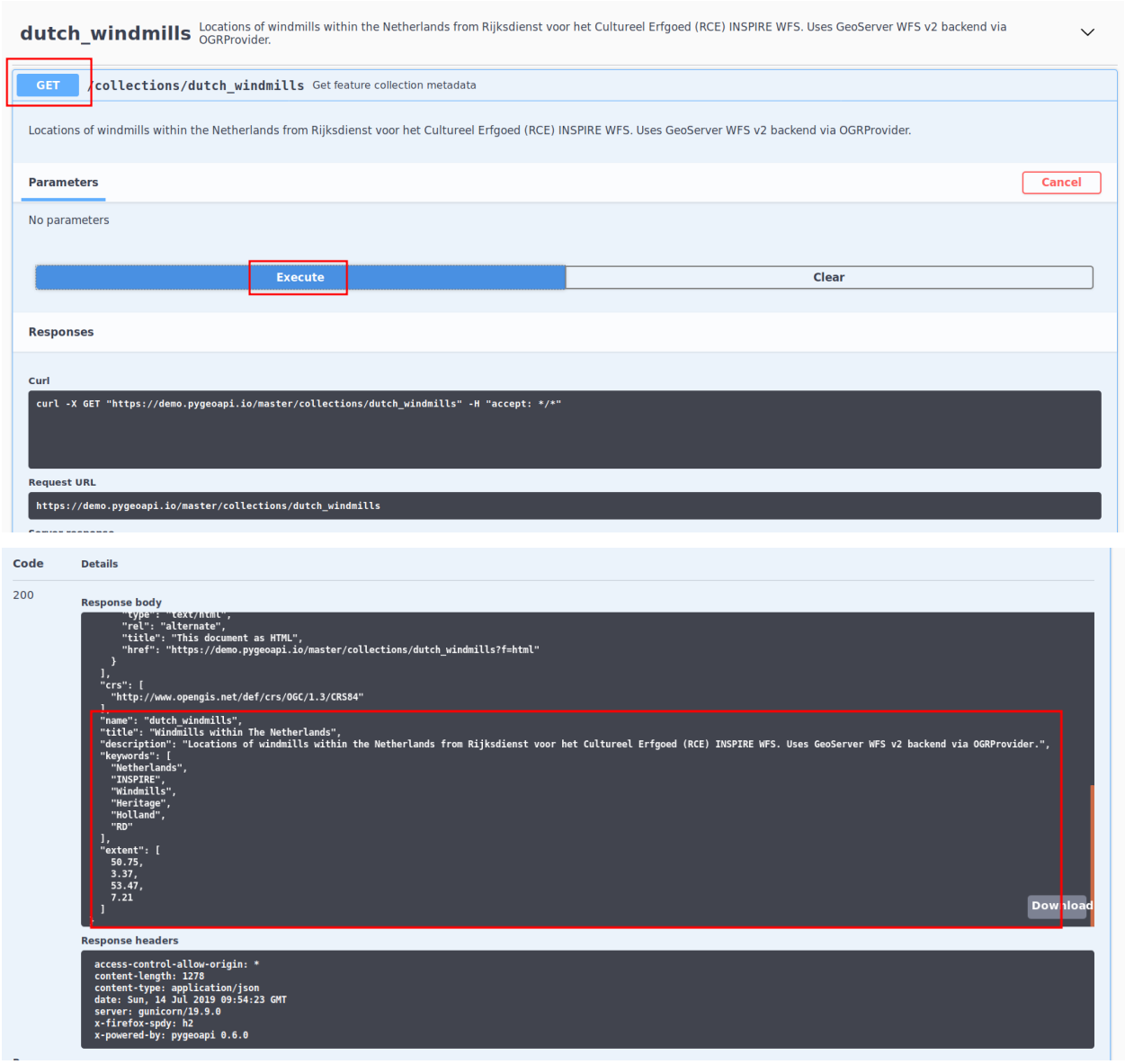
In this example we will test and *GET* data concerning windmills in the Netherlands, first we will check the avaiable datasets, by accessing the service's collections:



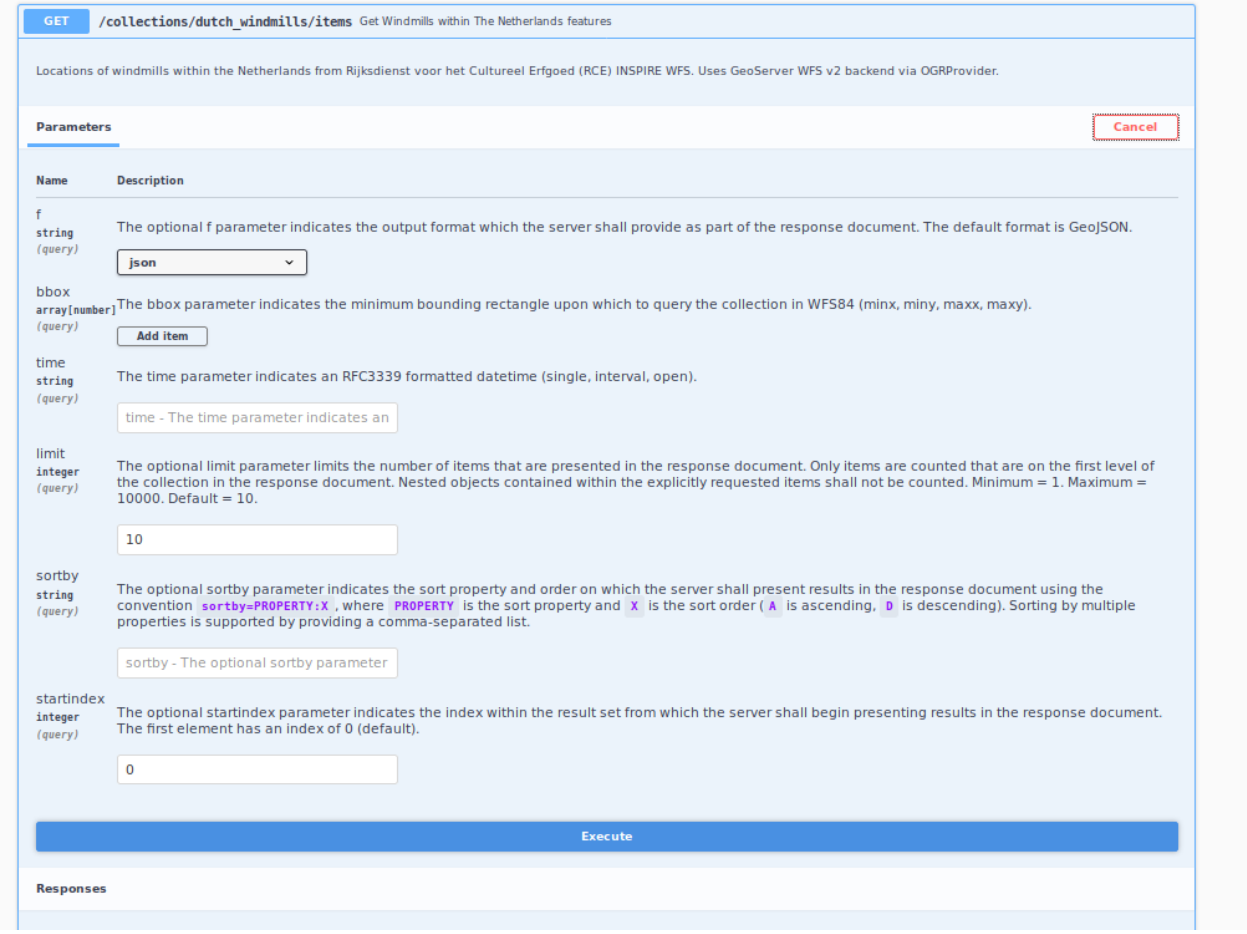
The service collection metadata will contain a description of the collections provided by the server



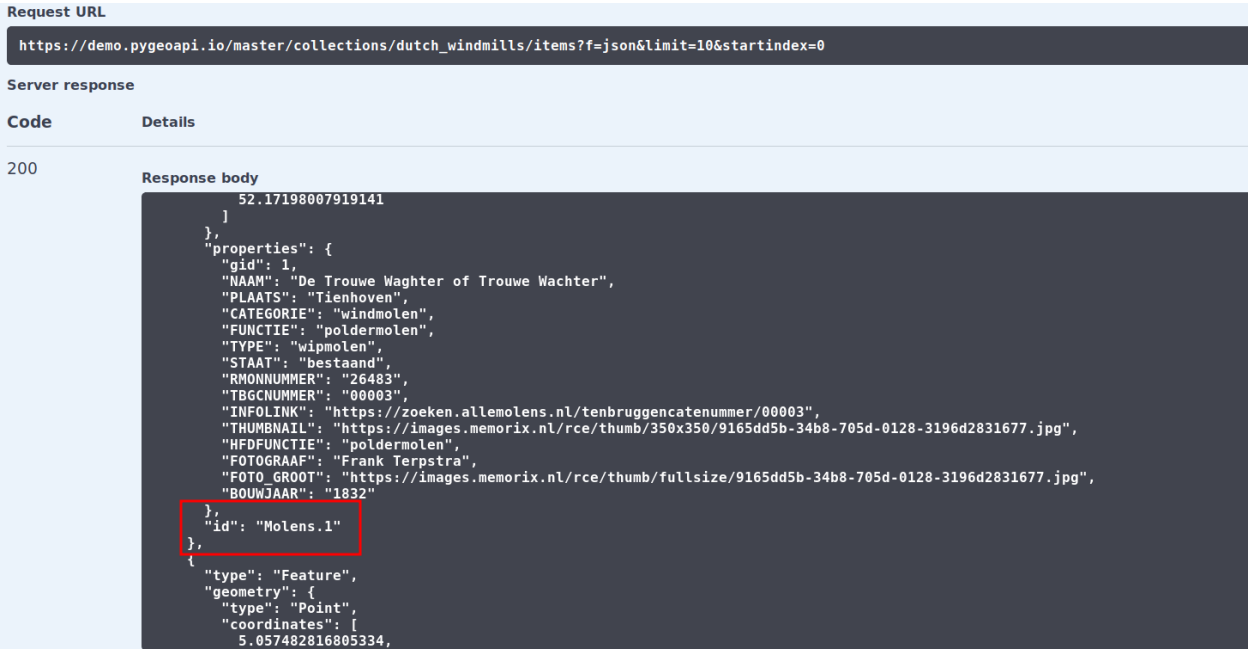
The dataset *dutch_windmills* will be available on the *collections* end point, in the following example we'll obtain the specific metadata of the dataset



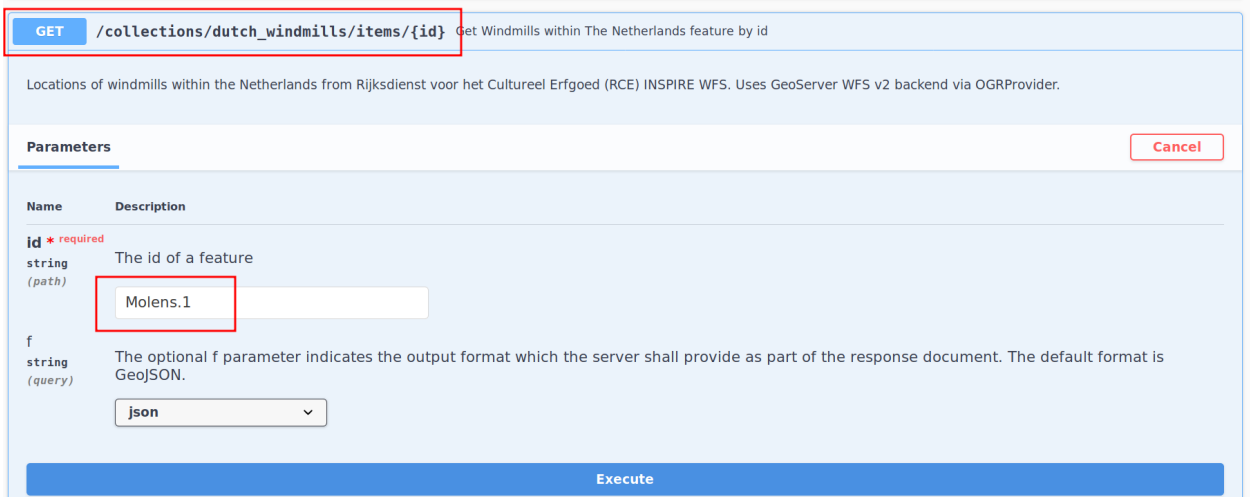
features/items composing the data are agregated on the */items* end point, in this REST end point it is possible to obtain all dataset, or restrict it features/items to a **numerical limit**, **bounding box**, **time stamp**, **pagging** (start index)



For each feature in dataset we have a **specific identifier** (notice that the identifier is not part of the JSON properties),



This identifier can be used to obtain a specific item from the dataset using the *items{id}* end point as follows:


GET
/collections/dutch_windmills/items/{id}
Get Windmills within The Netherlands feature by id
Locations of windmills within the Netherlands from Rijksdienst voor het Cultureel Erfgoed (RCE) INSPIRE WFS. Uses GeoServer WFS v2 backend via OGRProvider.
Parameters
Cancel
Name
Description
id * required
string
(path)
The id of a feature
Molens.1
f
string
(query)
The optional f parameter indicates the output format which the server shall provide as part of the response document. The default format is GeoJSON.
json
Execute

CHAPTER 4

Docker

Docker Images `geopython/pygeoapi:latest` and versions are available on DockerHub .

Each Docker Image contains a default configuration `default.config.yml` with the project's test data and WFS3 datasets.

You can override this default config via Docker Volume mapping or by extending the Docker Image and copying in your config.

See an example for the geoapi demo server for the latter method.

https://github.com/geopython/demo.pygeoapi.io/tree/master/services Depending on your config you may need specific backends to be available.

4.1 Running - Basics

By default this Image will start a pygeoapi Docker Container using `gunicorn` on internal port 80.

To run with default built-in config and data:

```
docker run -p 5000:80 -it geopython/pygeoapi run
# or simply
docker run -p 5000:80 -it geopython/pygeoapi
```

then browse to **http://localhost:5000**

You can also run all unit tests to verify:

```
docker run -it geopython/pygeoapi test
```

4.2 Running - Overriding the default config

Normally you would override the `default.config.yml` with your own `pygeoapi` config. This can be effected best via Docker Volume Mapping.

For example if your config is in `my.config.yml`:

```
docker run -p 5000:80 -v $(pwd)/my.config.yml:/pygeoapi/local.config.yml -it␣
↪geopython/pygeoapi
```

But better/cleaner is to use `docker-compose`. Something like:

```
version: "3"
services:
  pygeoapi:
    image: geopython/pygeoapi:latest
    volumes:
      - ./my.config.yml:/pygeoapi/local.config.yml
```

Or you can create a `Dockerfile` extending the base Image and **COPY** in your config:

```
FROM geopython/pygeoapi:latest
COPY ./my.config.yml /pygeoapi/local.config.yml
```

See how the demo server is setup (here)

4.3 Running - Running on a sub-path

By default the `pygeoapi` Docker Image will run from the `root` path `/`. If you need to run from a sub-path and have all internal URLs correct you need to set `SCRIPT_NAME` environment variable.

For example to run with `my.config.yml` on `http://localhost:5000/mypygeoapi`:

```
docker run -p 5000:80 -e SCRIPT_NAME='/mypygeoapi' -v $(pwd)/my.config.yml:/pygeoapi/
↪local.config.yml -it geopython/pygeoapi
```

browse to **http://localhost:5000/mypygeoapi**

Or within a `docker-compose.yml` full example:

```
version: "3"
services:
  pygeoapi:
    image: geopython/pygeoapi:latest
    volumes:
      - ./my.config.yml:/pygeoapi/local.config.yml
    ports:
      - "5000:80"
    environment:
     - SCRIPT_NAME=/pygeoapi
```

See pygeoapi demo service for an full example.

CHAPTER 5

WSGI

Web Server Gateway Interface (WSGI) is standard for forwarding request to web applications written on Python language. pygeoapi it self doesn't implement WSGI since it is an API, therefore it is required a webframework to access HTTP requests and pass the information to pygeoapi

```
HTTP request --> Flask (flask_app.py) --> pygeopai API
```

the pygeoapi package integrates Flask as webframework for defining the API routes/end points and WSGI support.

The flask WSGI server can be easily run as a pygeoapi command with the option *–flask*:

```
pygeoapi serve --flask
```

Running a native Flask server is not advisable, the prefered option is as follows:

```
HTTP request --> WSGI server (gunicorn) --> Flask (flask_app.py) --> pygeoapi API
```

By having a specific WSGI server, the HTTPS are efficiently processed into threads/processes. The current docker pygeoapi implement such strategy (see section: *Docker*), it is prefered to implement pygeopai using docker solutions than running host native WSGI servers.

5.1 Running gunicorn

Gunicorn is one of several WSGI supporting server on python (list of server supporting WSGI: here). This server is simple to run from the command, e.g:

```
gunicorn pygeoapi.flask_app:APP
```

For extra configuration parameters like port binding, workers please consult the gunicorn settings

CHAPTER 6

ASGI

Asynchronous Server Gateway Interface (ASGI) is standard interface between async-capable web servers, frameworks, and applications written on Python language. pygeoapi itself doesn't implement ASGI since it is an API, therefore it is required a webframework to access HTTP requests and pass the information to pygeoapi

```
HTTP request --> Starlette (starlette_app.py) --> pygeoapi API
```

the pygeoapi package integrates starlette_app as webframework for defining the API routes/end points and WSGI support.

The starlette ASGI server can be easily run as a pygeoapi command with the option *–starlette*:

```
pygeoapi serve --starlette
```

Running a Uvicorn server is not advisable, the preferred option is as follows:

```
HTTP request --> ASGI server (gunicorn) --> Starlette (starlette_app.py) --> pygeoapi␣
↪API
```

By having a specific ASGI server, the HTTPS are efficiently processed into threads/processes. The current docker pygeoapi implement such strategy (see section: *Docker*), it is prefered to implement pygeopai using docker solutions than running host native ASGI servers.

6.1 Running gunicorn

Uvicorn includes a Gunicorn worker class allowing you to run ASGI applications, with all of Uvicorn's performance benefits, while also giving you Gunicorn's fully-featured process management. This server is simple to run from the command, e.g:

```
gunicorn pygeoapi.starlette_app:app -w 4 -k uvicorn.workers.UvicornWorker
```

For extra configuration parameters like port binding, workers please consult the gunicorn settings

CHAPTER 7

Configuration

pygeoapi uses a yaml file as configuration source and the file location is read from the `PYGEOAPI_CONFIG` env variable

Note: pygeoapi is under high development, and new configuration paramenters are constantely being added. For the lastest parameters please consult the pygeoapi-config.yml file provided on github

Using `pygeoapi-config.yml` as reference we will have the following sections:

- *server* for server related configurations
- *logging* for logging configuration
- *metadata* server and content metadata (information used to populate multiple content)
- *datasets* data content offered by server (collections in WFS3.0)

7.1 Structured data

pygeoapi supports structured metadata about a deployed instance, and is also capable of presenting feature data as structured data. JSON-LD equivalents are available for each HTML page, and are embedded as data blocks within the corresponding page for search engine optimisation (SEO). Tools such as the Google Structured Data Testing Tool can be used to check the structured representations.

The metadata for an instance is determined by the content of the *metadata* section of the configuration YAML. This metadata is included automatically, and is sufficient for inclusion in major indices of datasets, including the Google Dataset Search.

For collections, at the level of an item or items, by default the JSON-LD representation adds:

- The GeoJSON JSON-LD vocabulary and context to the `@context`.
- An `@id` for each feature in a collection, that is the URL for that feature (resolving to its HTML representation in pygeoapi)

Note: While this is enough to provide valid RDF (as GeoJSON-LD), it does not allow the *properties* of your features to be unambiguously interpretable.

---

pygeoapi currently allows for the extension of the `@context` to allow properties to be aliased to terms from vocabularies. This is done by adding a `context` section to the configuration of a *dataset*.

The default pygeoapi configuration includes an example for the `obs` sample dataset:

```
context:
    - datetime: https://schema.org/DateTime
    - vocab: https://example.com/vocab#
      stn_id: "vocab:stn_id"
      value: "vocab:value"
```

This is a non-existent vocabulary included only to illustrate the expected data structure within the YAML configuration. In particular, the links for the `stn_id` and `value` properties do not resolve. We can extend this example to one with terms defined by schema.org:

```
context:
    - schema: https://schema.org/
      stn_id: schema:identifer
      datetime:
          "@id": schema:observationDate
          "@type": schema:DateTime
      value:
          "@id": schema:value
          "@type": schema:Number
```

Now this has been elaborated, the benefit of a structured data representation becomes clearer. What was once an unexplained property called `datetime` in the source CSV, it can now be expanded to https://schema.org/observationDate, thereby eliminating ambiguity and enhancing interoperability. Its type is also expressed as https://schema.org/DateTime.

This example demonstrates how to use this feature with a CSV data provider, using included sample data. The implementation of JSON-LD structured data is available for any data provider but is currently limited to defining a `@context`. Relationships between features can be expressed but is dependent on such relationships being expressed by the dataset provider, not pygeoapi.

CHAPTER 8

Plugins

In this section we will explain how pygeoapi uses a plugin approach for data providers, formatters and processes.

8.1 Plugin data provider plugin

Plugins are in general modules containing derived classed classes that ensure minimal requirements for the plugin to work. Lets consider the steps for a data provider plugin (source code is located here: *Provider*)

1. create a new module file on the *provider folder* (e.g myprovider.py)
2. copy code from *base.py*
3. import base provider class

```
from pygeoapi.provider.base import BaseProvider
```

4. create a child class from the *BaseProvider* class with a specific name

```
class BaseProvider(object):
    """generic Provider ABC"""

    def __init__(self, provider_def):
        """
        Initialize object
```

to become:

```
class MyDataProvider(object):
    """My data provider"""

   def __init__(self, provider_def):
     """Inherit from parent class"""
     BaseProvider.__init__(self, provider_def)
```

5. implement class methods.

```
def query(self):

def get(self, identifier):

def create(self, new_feature):

def update(self, identifier, new_feature):

def delete(self, identifier):
```

The above class methods are related to the specific URLs defined on the OGC openapi specification:

CHAPTER 9

Code documentation

Top level code documentation. Follow link in section for module/class member information

9.1 API

Root level code of pygeoapi, parsing content provided by webframework. Returns content from plugins and sets reponses

class pygeoapi.api.**API**(*config*)

API object

__init__(*config*)

constructor

Parameters **config** – configuration dict

Returns *pygeoapi.API* instance

__weakref__

list of weak references to the object (if defined)

execute_process(*headers*, *args*, *data*, *process*)

Execute process

Parameters

- **headers** – dict of HTTP headers
- **args** – dict of HTTP request parameters
- **data** – process data
- **process** – name of process

Returns tuple of headers, status code, content

get_collection_items(*headers*, *args*, *dataset*, *pathinfo=None*)

Queries feature collection

Parameters

- **headers** – dict of HTTP headers
- **args** – dict of HTTP request parameters
- **dataset** – dataset name
- **pathinfo** – path location

Returns tuple of headers, status code, content

pygeoapi.api.**FORMATS = ['json', 'html', 'jsonld']**
Formats allowed for ?f= requests

pygeoapi.api.**HEADERS = {'Content-Type': 'application/json', 'X-Powered-By': 'pygeoapi 0.**
Return headers for requests (e.g:X-Powered-By)

pygeoapi.api.**check_format**(*args*, *headers*)
check format requested from arguments or headers

Parameters

- **args** – dict of request keyword value pairs
- **headers** – dict of request headers

Returns format value

pygeoapi.api.**pre_process**(*func*)
Decorator performing header copy and format checking before sending arguments to methods

Parameters **func** – decorated function

Returns *func*

9.2 flask_app

Flask module providing the route paths to the api

pygeoapi.flask_app.**conformance**()
OGC open api conformance access point

Returns HTTP response

pygeoapi.flask_app.**dataset**(*feature_collection*, *feature=None*)
OGC open api collections/{dataset}/items/{feature} access point

Returns HTTP response

pygeoapi.flask_app.**describe_collections**(*name=None*)
OGC open api collections access point

Parameters **name** – identifier of collection name

Returns HTTP response

pygeoapi.flask_app.**describe_processes**(*name=None*)
OGC open api processes access point (experimental)

Parameters **name** – identifier of process to describe

Returns HTTP response

pygeoapi.flask_app.**execute_process**(*name=None*)
OGC open api jobs from processes access point (experimental)

Parameters **name** – identifier of process to execute

Returns HTTP response

pygeoapi.flask_app.**openapi**()
OpenAPI access point

Returns HTTP response

pygeoapi.flask_app.**root**()
HTTP root content of pygeoapi. Intro page access point

Returns HTTP response

9.3 Logging

Logging system

pygeoapi.log.**setup_logger**(*logging_config*)
Setup configuration

Parameters **logging_config** – logging specific configuration

Returns void (creates logging instance)

9.4 OpenAPI

pygeoapi.openapi.**gen_media_type_object**(*media_type*, *api_type*, *path*)
Generates an OpenAPI Media Type Object

Parameters

- **media_type** – MIME type
- **api_type** – OGC API type
- **path** – local path of OGC API parameter or schema definition

Returns *dict* of media type object

pygeoapi.openapi.**gen_response_object**(*description*, *media_type*, *api_type*, *path*)
Generates an OpenAPI Response Object

Parameters

- **description** – text description of response
- **media_type** – MIME type
- **api_type** – OGC API type

Returns *dict* of response object

pygeoapi.openapi.**get_oas**(*cfg*, *version='3.0'*)
Stub to generate OpenAPI Document

Parameters

- **cfg** – configuration object

- **version** – version of OpenAPI (default 3.0)

Returns OpenAPI definition YAML dict

pygeoapi.openapi.**get_oas_30**(*cfg*)
Generates an OpenAPI 3.0 Document

Parameters **cfg** – configuration object

Returns OpenAPI definition YAML dict

9.5 Plugins

Note: Please consult section *Plugins*

Plugin loader

exception pygeoapi.plugin.**InvalidPluginError**
Bases: Exception

Invalid plugin

__weakref__
list of weak references to the object (if defined)

pygeoapi.plugin.**PLUGINS = {'formatter': {'CSV': 'pygeoapi.formatter.csv_.CSVFormatter'},**
Loads provider plugins to be used by pygeoapi,formatters and processes available

pygeoapi.plugin.**load_plugin**(*plugin_type*, *plugin_def*)
loads plugin by name

Parameters

- **plugin_type** – type of plugin (provider, formatter)
- **plugin_def** – plugin definition

Returns plugin object

9.6 Utils

Generic util functions used in the code

pygeoapi.util.**dategetter**(*date_property*, *collection*)
Attempts to obtains a date value from a collection.

Parameters

- **date_property** – property representing the date
- **collection** – dictionary to check within

Returns *str* (ISO8601) representing the date. ('..' if null or "now", allowing for an open interval).

pygeoapi.util.**get_typed_value**(*value*)
Derive true type from data value

Parameters **value** – value

Returns value as a native Python data type

pygeoapi.util.**is_url**(*urlstring*)
Validation function that determines whether a candidate URL should be considered a URI. No remote resource is obtained; this does not check the existence of any remote resource. :param urlstring: *str* to be evaluated as candidate URL. :returns: *bool* of whether the URL looks like a URL.

pygeoapi.util.**json_serial**(*obj*)
helper function to convert to JSON non-default types (source: https://stackoverflow.com/a/22238613) :param obj: *object* to be evaluated :returns: JSON non-default type to *str*

pygeoapi.util.**render_j2_template**(*config*, *template*, *data*)
render Jinja2 template

Parameters

- **config** – dict of configuration
- **template** – template (relative path)
- **data** – dict of data

Returns string of rendered template

pygeoapi.util.**str2bool**(*value*)
helper function to return Python boolean type (source: https://stackoverflow.com/a/715468)

Parameters **value** – value to be evaluated

Returns *bool* of whether the value is boolean-ish

pygeoapi.util.**to_json**(*dict_*)
Serialize dict to json

Parameters **dict** – *dict* of JSON representation

Returns JSON string representation

pygeoapi.util.**yaml_load**(*fh*)
serializes a YAML files into a pyyaml object

Parameters **fh** – file handle

Returns *dict* representation of YAML

9.7 Formatter package

Output formatter package

9.7.1 Base class

class pygeoapi.formatter.base.**BaseFormatter**(*formatter_def*)
Bases: object

generic Formatter ABC

__init__(*formatter_def*)
Initialize object

Parameters **formatter_def** – formatter definition

Returns pygeoapi.providers.base.BaseFormatter

__repr__()
Return repr(self).

__weakref__
list of weak references to the object (if defined)

write(*options={}*, *data=None*)
Generate data in specified format

Parameters

- **options** – CSV formatting options
- **data** – dict representation of GeoJSON object

Returns string representation of format

9.7.2 csv

class pygeoapi.formatter.csv_.**CSVFormatter**(*formatter_def*)
Bases: *pygeoapi.formatter.base.BaseFormatter*

CSV formatter

__init__(*formatter_def*)
Initialize object

Parameters **formatter_def** – formatter definition

Returns *pygeoapi.formatter.csv_.CSVFormatter*

__repr__()
Return repr(self).

write(*options={}*, *data=None*)
Generate data in CSV format

Parameters

- **options** – CSV formatting options
- **data** – dict of GeoJSON data

Returns string representation of format

9.8 Process package

OGC process package, each process is an independent module

9.8.1 Base class

class pygeoapi.process.base.**BaseProcessor**(*processor_def*, *process_metadata*)
Bases: object

generic Processor ABC. Processes are inherited from this class

__init__(*processor_def*, *process_metadata*)
Initialize object :param processor_def: processor definition :returns: pygeoapi.processors.base.BaseProvider

__repr__()
Return repr(self).

__weakref__
list of weak references to the object (if defined)

execute()
execute the process :returns: dict of process response

exception pygeoapi.process.base.**ProcessorExecuteError**
Bases: Exception

query / backend error

__weakref__
list of weak references to the object (if defined)

9.8.2 hello_world

Hello world example process

class pygeoapi.process.hello_world.**HelloWorldProcessor**(*provider_def*)
Bases: *pygeoapi.process.base.BaseProcessor*

Hello World Processor example

__init__(*provider_def*)
Initialize object :param provider_def: provider definition :returns: pygeoapi.process.hello_world.HelloWorldProcessor

__repr__()
Return repr(self).

execute(*data*)
execute the process :returns: dict of process response

pygeoapi.process.hello_world.**PROCESS_METADATA = {'description': 'Hello World process', 'ex**
Process metadata and description

9.9 Provider

Provider module containing the plugins wrapping data sources

9.9.1 Base class

class pygeoapi.provider.base.**BaseProvider**(*provider_def*)
Bases: object

generic Provider ABC

__init__(*provider_def*)
Initialize object

Parameters **provider_def** – provider definition

Returns pygeoapi.providers.base.BaseProvider

__repr__()
Return repr(self).

__weakref__
list of weak references to the object (if defined)

create(*new_feature*)
Create a new feature

delete(*identifier*)
Updates an existing feature id with new_feature

Parameters **identifier** – feature id

get(*identifier*)
query the provider by id

Parameters **identifier** – feature id

Returns dict of single GeoJSON feature

get_fields()
Get provider field information (names, types)

Returns dict of fields

query()
query the provider

Returns dict of 0..n GeoJSON features

update(*identifier*, *new_feature*)
Updates an existing feature id with new_feature

Parameters

- **identifier** – feature id
- **new_feature** – new GeoJSON feature dictionary

exception pygeoapi.provider.base.**ProviderConnectionError**
Bases: Exception

query / backend error

__weakref__
list of weak references to the object (if defined)

exception pygeoapi.provider.base.**ProviderQueryError**
Bases: Exception

query / backend error

__weakref__
list of weak references to the object (if defined)

exception pygeoapi.provider.base.**ProviderVersionError**
Bases: Exception

Incorrect provider version

__weakref__
list of weak references to the object (if defined)

9.9.2 CSV provider

class pygeoapi.provider.csv_.**CSVProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

CSV provider

_load(*startindex=0*, *limit=10*, *resulttype='results'*, *identifier=None*, *bbox=[]*, *datetime=None*, *properties=[]*)
Load CSV data

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **properties** – list of tuples (name, value)

Returns dict of GeoJSON FeatureCollection

get(*identifier*)
query CSV id

Parameters **identifier** – feature id

Returns dict of single GeoJSON feature

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)
CSV query

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns dict of GeoJSON FeatureCollection

9.9.3 Elasticsearch provider

class pygeoapi.provider.elasticsearch_.**ElasticsearchProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

Elasticsearch Provider

get(*identifier*)
Get ES document by id

Parameters **identifier** – feature id

Returns dict of single GeoJSON feature

get_fields()

Get provider field information (names, types)

Returns dict of fields

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)
query Elasticsearch index

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns dict of 0..n GeoJSON features

9.9.4 GeoJSON

class pygeoapi.provider.geojson.**GeoJSONProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

Provider class backed by local GeoJSON files

This is meant to be simple (no external services, no dependencies, no schema)

at the expense of performance (no indexing, full serialization roundtrip on each request)

Not thread safe, a single server process is assumed

This implementation uses the feature 'id' heavily and will override any 'id' provided in the original data. The feature 'properties' will be preserved.

TODO: * query method should take bbox * instead of methods returning FeatureCollections, we should be yielding Features and aggregating in the view * there are strict id semantics; all features in the input GeoJSON file must be present and be unique strings. Otherwise it will break. * How to raise errors in the provider implementation such that * appropriate HTTP responses will be raised

_load()
Load and validate the source GeoJSON file at self.data

Yes loading from disk, deserializing and validation happens on every request. This is not efficient.

create(*new_feature*)
Create a new feature

Parameters **new_feature** – new GeoJSON feature dictionary

delete(*identifier*)
Updates an existing feature id with new_feature

Parameters **identifier** – feature id

get(*identifier*)
query the provider by id

Parameters **identifier** – feature id

Returns dict of single GeoJSON feature

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)
query the provider

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns FeatureCollection dict of 0..n GeoJSON features

update(*identifier*, *new_feature*)
Updates an existing feature id with new_feature

Parameters

- **identifier** – feature id
- **new_feature** – new GeoJSON feature dictionary

9.9.5 OGR

class pygeoapi.provider.ogr.**CommonSourceHelper**(*provider*)
Bases: *pygeoapi.provider.ogr.SourceHelper*

SourceHelper for most common OGR Source types: Shapefile, GeoPackage, SQLite, GeoJSON etc.

close()
OGR Driver-specific handling of closing dataset. If ExecuteSQL has been (successfully) called must close ResultSet explicitly. https://gis.stackexchange.com/questions/114112/explicitly-close-a-ogr-result-object-from-a-call-to-executesql # noqa

disable_paging()
Disable paged access to dataset (OGR Driver-specific)

enable_paging(*startindex=-1*, *limit=-1*)
Enable paged access to dataset (OGR Driver-specific) using OGR SQL https://www.gdal.org/ogr_sql.html e.g. SELECT * FROM poly LIMIT 10 OFFSET 30

get_layer()
Gets OGR Layer from opened OGR dataset. When startindex defined 1 or greater will invoke OGR SQL SELECT with LIMIT and OFFSET and return as Layer as ResultSet from ExecuteSQL on dataset. :return: OGR layer object

class pygeoapi.provider.ogr.**ESRIJSONHelper**(*provider*)
Bases: *pygeoapi.provider.ogr.SourceHelper*

disable_paging()
Disable paged access to dataset (OGR Driver-specific)

enable_paging(*startindex=-1*, *limit=-1*)
Enable paged access to dataset (OGR Driver-specific)

exception pygeoapi.provider.ogr.**InvalidHelperError**
Bases: Exception

Invalid helper

class pygeoapi.provider.ogr.**OGRProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

OGR Provider. Uses GDAL/OGR Python-bindings to access OGR Vector sources. References: https://pcjericks.github.io/py-gdalogr-cookbook/ https://www.gdal.org/ogr_formats.html (per-driver specifics).

In theory any OGR source type (Driver) could be used, although some Source Types are Driver-specific handling. This is handled in Source Helper classes, instantiated per Source-Type.

The following Source Types have been tested to work: GeoPackage (GPKG), SQLite, GeoJSON, ESRI Shapefile, WFS v2.

_load_source_helper(*source_type*)
Loads Source Helper by name.

Parameters **type** (*Source*) – Source type name

Returns Source Helper object

_response_feature_collection(*layer*, *limit*)
Assembles output from Layer query as GeoJSON FeatureCollection structure.

Returns GeoJSON FeatureCollection

_response_feature_hits(*layer*)
Assembles GeoJSON hits from OGR Feature count e.g: http://localhost:5000/collections/hotosm_bdi_waterways/items?resulttype=hits

Returns GeoJSON FeaturesCollection

get(*identifier*)
Get Feature by id

Parameters **identifier** – feature id

Returns feature collection

get_fields()
Get provider field information (names, types)

Returns dict of fields

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)
Query OGR source

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns dict of 0..n GeoJSON features

class pygeoapi.provider.ogr.**SourceHelper**(*provider*)
Bases: object

Helper classes for OGR-specific Source Types (Drivers). For some actions Driver-specific settings or processing is required. This is delegated to the OGR SourceHelper classes.

close()
OGR Driver-specific handling of closing dataset. Default is no specific handling.

disable_paging()
Disable paged access to dataset (OGR Driver-specific)

enable_paging(*startindex=-1*, *limit=-1*)
Enable paged access to dataset (OGR Driver-specific)

get_layer()
Default action to get a Layer object from opened OGR Driver. :return:

class pygeoapi.provider.ogr.**WFSHelper**(*provider*)
Bases: *pygeoapi.provider.ogr.SourceHelper*

disable_paging()
Disable paged access to dataset (OGR Driver-specific)

enable_paging(*startindex=-1*, *limit=-1*)
Enable paged access to dataset (OGR Driver-specific)

9.9.6 postgresql

class pygeoapi.provider.postgresql.**DatabaseConnection**(*conn_dic*, *table*, *context='query'*)
Bases: object

Database connection class to be used as 'with' statement. The class returns a connection object.

class pygeoapi.provider.postgresql.**PostgreSQLProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

Generic provider for Postgresql based on psycopg2 using sync approach and server side cursor (using support class DatabaseCursor)

_PostgreSQLProvider__response_feature(*row_data*)
Assembles GeoJSON output from DB query

Parameters **row_data** – DB row result

Returns *dict* of GeoJSON Feature

_PostgreSQLProvider__response_feature_hits(*hits*)
Assembles GeoJSON/Feature number e.g: http://localhost:5000/collections/hotosm_bdi_waterways/items?resulttype=hits

Returns GeoJSON FeaturesCollection

get(*identifier*)
Query the provider for a specific feature id e.g: /collections/hotosm_bdi_waterways/items/13990765

Parameters **identifier** – feature id

Returns GeoJSON FeaturesCollection

get_fields()
Get fields from PostgreSQL table (columns are field)

Returns dict of fields

get_next(*cursor*, *identifier*)
Query next ID given current ID

Parameters **identifier** – feature id

Returns feature id

get_previous(*cursor*, *identifier*)
Query previous ID given current ID

Parameters **identifier** – feature id

Returns feature id

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)
Query Postgis for all the content. e,g: http://localhost:5000/collections/hotosm_bdi_waterways/items?limit=1&resulttype=results

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns GeoJSON FeaturesCollection

9.9.7 sqlite/geopackage

class pygeoapi.provider.sqlite.**SQLiteGPKGProvider**(*provider_def*)
Bases: *pygeoapi.provider.base.BaseProvider*

Generic provider for SQLITE and GPKG using sqlite3 module. This module requires install of libsqlite3-mod-spatialite TODO: DELETE, UPDATE, CREATE

_SQLiteGPKGProvider__load()
Private method for loading spatiallite, get the table structure and dump geometry

Returns sqlite3.Cursor

_SQLiteGPKGProvider__response_feature(*row_data*)
Assembles GeoJSON output from DB query

Parameters **row_data** – DB row result

Returns *dict* of GeoJSON Feature

_SQLiteGPKGProvider__response_feature_hits(*hits*)
Assembles GeoJSON/Feature number

Returns GeoJSON FeaturesCollection

get(*identifier*)
Query the provider for a specific feature id e.g: /collections/countries/items/1

Parameters **identifier** – feature id

Returns GeoJSON FeaturesCollection

get_fields()

Get fields from sqlite table (columns are field)

Returns dict of fields

query(*startindex=0*, *limit=10*, *resulttype='results'*, *bbox=[]*, *datetime=None*, *properties=[]*, *sortby=[]*)

Query SQLite/GPKG for all the content. e,g: http://localhost:5000/collections/countries/items?limit=5&startindex=2&resulttype=results&continent=Europe&admin=Albania&bbox=29.3373,-3.4099,29.3761,-3.3924 http://localhost:5000/collections/countries/items?continent=Africa&bbox=29.3373,-3.4099,29.3761,-3.3924

Parameters

- **startindex** – starting record to return (default 0)
- **limit** – number of records to return (default 10)
- **resulttype** – return results or hit limit (default results)
- **bbox** – bounding box [minx,miny,maxx,maxy]
- **datetime** – temporal (datestamp or extent)
- **properties** – list of tuples (name, value)
- **sortby** – list of dicts (property, order)

Returns GeoJSON FeaturesCollection

CHAPTER 10

Indices and tables

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