Initiative for digital transformation in the Metadata and Reference Data Sector of the Publications Office of the European Union

Installation guide for the RDF validation service

Disclaimer

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Document metadata

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Abstract

This document provides technical guidance on how to install and configure the suite of micro-services and applications necessary for the asset metadata lifecycle process at the Standardisation Unit at the Publications Office of the European Union.

Contents

1 Introduction

The Standardisation Unit (SU) at the Publications Office of the European Union (OP) is engaged in a digital transformation process oriented towards semantic technologies. In [1] is described a working definition of the architectural stance and design decisions that are to be adopted for the asset publication life-cycle process. The report describes the baseline (current) solution and the (new) target solution for the asset publication workflow that is part of the life-cycle process.

The software components building up the target publication workflow solution have been packaged as into a suite of interconnected services.

This document describes the installation and configuration procedures along with stating the scope, and target audience.

2 Scope

This document aims at covering the installation and configuration instructions for the suite of the following software services:

1. RDF validator
2. Validator celery worker

3 Target audience

The target audience for this document comprises the following groups and stakeholders:

- Technical staff in charge of operating workflow components
- System administrators
- Enterprise architects and data governance specialists
- Documentalists involved in the reference data life-cycle
- Developers in charge of workflow and component implementation
- Third parties using the SU services and data

4 Technology background

Infrastructure and deployment configuration rely on services deployed on a CentOS system.

5 Requirements

There is a range of ports that must be available on the host machine as they will be bound to by different services. Although the system administrator may choose to change them by changing the values in of specific environment variables. The inventory of pre-configured ports is provided in Table 1.

Service name	HTTP port UI	HTTP port API
RDF validator	8010	4010
redis		6379

Table 1: Port usage inventory

The minimal hardware requirements are as follows

1. CPU: 3.2 Ghz quad core
2. RAM: 16GB
3. SDD system: 32GB
4. SDD data: 128GB

6 Installation

In order for the services to function properly a CentOS system with python version 3.6 and redis service should be setup and running with the appropriate ports and addresses configured in the environment variable file.

Copy the rdf validator zip on the system you intend to run it and unzip it.

Then change directory into the *project* folder. Makefile commands to start and stop services will be available.

To start the services using Makefile

```
make install-python-dependencies
make setup-rdfunit
make run-api
make run-ui
```

To stop the services using Makefile

```
make stop-gunicorn
```

To start services without Makefile commands

```
set -o allexport; source bash/.env; set +o allexport

python3 -m venv env
source env/bin/activate
pip install -r requirements/prod.txt
```

then start the services

```
set -o allexport; source bash/.env; set +o allexport

source env/bin/activate

celery -A validator.adapters.celery.celery_worker worker --loglevel
    ${RDF_VALIDATOR_LOG_LEVEL} --logfile ${
   RDF_VALIDATOR_CELERY_LOGS} --detach
gunicorn --timeout ${RDF_VALIDATOR_GUNICORN_TIMEOUT} --workers ${
   RDF_VALIDATOR_GUNICORN_API_WORKERS} --bind 0.0.0.0:${
   RDF_VALIDATOR_API_PORT} --reload validator.entrypoints.api.run:
   app --log-file ${RDF_VALIDATOR_API_LOGS} --log-level ${
   RDF_VALIDATOR_LOG_LEVEL} --daemon
gunicorn --timeout ${RDF_VALIDATOR_GUNICORN_TIMEOUT} --workers ${
   RDF_VALIDATOR_GUNICORN_UI_WORKERS} --bind 0.0.0.0:${
   RDF_VALIDATOR_UI_PORT} --reload validator.entrypoints.ui.run:app
    --log-file ${RDF_VALIDATOR_UI_LOGS} --log-level ${
   RDF_VALIDATOR_LOG_LEVEL} --daemon
```

To stop the services run

```
source env/bin/activate

celery -A rdf_differ.adapters.celery.celery_worker control shutdown
pkill -f gunicorn
```

7 Configuration

At deployment and at runtime, the service configurations are provided through OS environment variables available in the *.env* file. The role of the *.env* file is to enable the system administrators to easily change default configurations as necessary in the context of their environment.

The suite of micro-services is built, started and shut down via Makefile commands.

In order to avoid hard coding parameters, they are defined externally in the *.env*. Having them in a single file makes sense and it is more pragmatic, as you can see and manage all parameters in one place, add the file to the version control system (the contents of the file will evolve and be in sync with the actual code) and have different files for different environments.

The following sections describe the configuration options available for each of the services.

7.1 RDF validator

The RDF validator is an online platform for validating RDF data with SHACL shape definitions. It exposes an API and an UI. The RDF validator API is the core service providing the RDF validation functionality. The URL and port are described below, as well as the request timeout:

Description	Value	Associated variable
Service URL	http://localhost	RDF_VALIDATOR_API_LOCATION
Service API port	4010	RDF_VALIDATOR_API_PORT
Is in debug mode	False	RDF_VALIDATOR_DEBUG
Service UI port	8030	RDF_VALIDATOR_UI_PORT
Web server worker process timeout	1200	RDF_VALIDATOR_GUNICORN_TIMEOUT

Table 2: RDF validator configurations

7.2 Celery worker

Celery is a simple, flexible, and reliable distributed system to process vast amounts of messages, while providing operations with the tools required to maintain such a

system. It's a task queue with focus on real-time processing.

In the RDF validator project it serves the purpose of enabling multiprocessing of validation report generation.

The RDF validator application uses the following Celery environment variables

Description	Value	Associated variable
Redis location	`redis://localhost`	RDF_VALIDATOR_REDIS_LOCATION
Redis port	6379	RDF_VALIDATOR_REDIS_PORT

Table 3: Celery environment configurations

More about the implementation of multiprocessing can be found in the *adapters/celery.py*. A fragment of how celery is used and the asynchronous diff creation is presented below:

```
celery_worker = Celery('rdf-validator-tasks',
        broker=config.RDF_VALIDATOR_REDIS_SERVICE,
        backend=config.RDF_VALIDATOR_REDIS_SERVICE)
celery_worker.conf.update(result_extended=True)

CELERY_VALIDATE_FILE = 'validate_file'


@celery_worker.task(name=CELERY_VALIDATE_FILE, bind=True)
def async_validate_file(self, uid: str, data_file: str,
   shacl_shapes: list, db_cleanup_location: str,
   application_profile: str = ''):
        ...
```

7.3 Configure and read logs

Every service provided by the RDF validator has it's own log history and is configurable through the aforementioned *.env* file. The current configuration accepts a relative path to where the logs to be written *logs/api.log*, for example.

API log example

```
[2022-01-09 15:34:35 +0000] [8] [INFO] Starting gunicorn 20.1.0
[2022-01-09 15:34:35 +0000] [8] [DEBUG] Arbiter booted
```

```
[2022-01-09 15:34:35 +0000] [8] [INFO] Listening at: http
   ://0.0.0.0:4010 (8)
[2022-01-09 15:34:35 +0000] [8] [INFO] Using worker: sync
[2022-01-09 15:34:35 +0000] [11] [INFO] Booting worker with pid: 11
[2022-01-09 15:34:35 +0000] [12] [INFO] Booting worker with pid: 12
[2022-01-09 15:34:35 +0000] [8] [DEBUG] 2 workers
[2022-01-09 15:37:04 +0000] [11] [DEBUG] POST /validate/ap/file
[2022-01-09 15:37:04 +0000] [11] [DEBUG] start validate file
   endpoint
[2022-01-09 15:37:04 +0000] [11] [DEBUG] finish request to validate
    file endpoint
```

UI log example

```
[2022-01-09 15:34:45 +0000] [11] [DEBUG] GET /
[2022-01-09 15:34:45 +0000] [11] [DEBUG] request index view
[2022-01-09 15:34:45 +0000] [11] [DEBUG] render index view
```

The RDF validator application uses the following environment variables to define logs location:

Description	Value	Associated variable
API logs	logs/api.log	RDF_VALIDATOR_API_LOGS
UI logs	logs/ui.log	RDF_VALIDATOR_UI_LOGS
Celery logs	logs/celery.log	RDF_VALIDATOR_CELERY_LOGS

Table 4: RDF validator log configurations

8 API documentation

8.1 Get application profiles

Get application profiles names and their SHACL shapes files.

URL	ACTION
`/aps`	`GET`

Response

200


```
[
  {
      "application_profile": "main",
      "shapes_files": [
          "skosShapes.shapes.ttl",
          "euvocShapes.shapes.ttl",
          "extensionShapes.shapes.ttl"
      ]
  }
]
```


8.2 Get all validation reports

List the existent validation reports and the metadata about the validation.

URL	ACTION
`/validations`	`GET`

Response

200


```
[
  {
      "application_profile": "",
      "created_at": "09-Jan-2022T16:42:02",
      "custom_html_report": "custom.html",
      "custom_json_report": "custom.json",
      "file": "/usr/src/app/db/7d5a0396-7fbc-4d86-b84b-261f306f20a0
         /777a3696-637f-4f41-83f4-47b2062b83cbcourts-source-ap.rdf
         ",
      "graphs": null,
      "html_report": "report.html",
      "shacl_shape_files": [
          "/usr/src/app/db/7d5a0396-7fbc-4d86-b84b-261f306f20a0/
             dfeaa507-6c93-4418-839b-1441d2aaa9bfskosShapes.shapes.
             ttl",
          "/usr/src/app/db/7d5a0396-7fbc-4d86-b84b-261f306f20a0/
             e1657ec9-88d2-4979-bb87-ccec352b570aeuvocShapes.shapes
```

```
                .ttl"
        ],
        "ttl_report": "report.ttl",
        "type": "file",
        "uid": "31ada0d2-b822-46b5-96b5-0d3c8d067ddf",
        "url": "",
        "zip_report": "report.zip"
    },
    {
        "application_profile": "main",
        "created_at": "09-Jan-2022T16:37:04",
        "custom_html_report": "custom.html",
        "custom_json_report": "custom.json",
        "file": "/usr/src/app/db/96e0e5db-7b82-4e64-aede-f65ce5a5f19b
           /6bf7bf64-c82c-4333-85a1-cbb395687625filetypes-source-ap.
           rdf",
        "graphs": null,
        "html_report": "report.html",
        "shacl_shape_files": [
            "/usr/src/app/resources/aps/main/skosShapes.shapes.ttl",
            "/usr/src/app/resources/aps/main/euvocShapes.shapes.ttl",
            "/usr/src/app/resources/aps/main/extensionShapes.shapes.
               ttl"
        ],
        "ttl_report": "report.ttl",
        "type": "file",
        "uid": "c53a0f42-653f-43f8-9768-532dcada4b47",
        "url": "",
        "zip_report": "report.zip"
    }
]
```


8.3 Get validation report

Get specific HTML, JSON, TTL or ZIP (all report types in a zipped file) report.

URL	ACTION
`/validations/{validation_id}`	`GET`

Parameters

Name	Description
validation_id	validation unique id
report_type	type of report requested. accepted values: html, json, ttl and zip

Response

200

Report successfully retrieved.

422


```
{
  "detail": "Wrong report_extension format. Accepted formats: ttl,
     html, json, zip",
  "status": 422,
  "title": "Unprocessable Entity",
  "type": "about:blank"
}
```


8.4 Delete validation report

Delete specific validation

URL	ACTION
/validations/{validation_id}	DELETE

Parameters

Name	Description
validation_id	validation unique id

Response

200

```
{
  "message": "Validation with c53a0f42-653f-43f8-9768-532dcada4b47
     successfully removed"
}
```

404

```
{
  "detail": "Validation with c53a0f42-653f-43f8-9768-532dcada4b47
     doesn't exist",
  "status": 404,
  "title": "Not Found",
  "type": "about:blank"
}
```

8.5 Delete all validation reports

Delete all validations

URL	ACTION
`/remove-reports`	`DELETE`

Response

200

```
{
  "message": "Successfully removed all validations"
}
```

8.6 Validate file

Validate an RDF file with the provided SHACL shapes.

URL	ACTION
`/validate/shapes/file`	`POST`

Body

multipart/form-data

Name	Required	Type	Description
`data_file`	true	`file`	The file to be validated.
`schema_file0` - `schema_file4`	false	`file`	The content of the SHACL shape files defining the validation constraints.

Response

200

```
{
  "task_id": "1dffa147-d25f-4a6e-a767-b7417b9c0b9e"
}
```

8.7 Validate file with Application Profile

Validate an RDF file with the provided Application Profile.

URL	ACTION
`/validate/ap/file`	`POST`

Body

multipart/form-data

Name	Required	Type	Description
`data_file`	true	`file`	The file to be validated.
`application_profile`	true	`string`	The application profile selected for validation. Check section 8.1 to get available application profiles.

Response

200

```
{
  "task_id": "1dffa147-d25f-4a6e-a767-b7417b9c0b9e"
}
```

8.8 Validate SPARQL Endpoint

Validate a SPARQL endpoint with the provided SHACL shapes and optionally restricted to provided graphs.

URL	ACTION
`/validate/shapes/url`	`POST`

Body

multipart/form-data

Name	Required	Type	Description
`sparql_endpoint_url`	true	`string`	The endpoint to validate
`graphs`	false	`array`	An optional list of named graphs to restrict the scope of the validation

Table 17 continued from previous page

`schema_file0` - `schema_file4`	-	false	`file`	The content of the SHACL shape files defining the validation constraints.

Response

200

```
{
  "task_id": "1dffa147-d25f-4a6e-a767-b7417b9c0b9e"
}
```

8.9 Validate SPARQL Endpoint with Application Profile

Validate a SPARQL endpoint with the provided Application Profile and optionally restricted to provided graphs.

URL	ACTION
`/validate/ap/url`	`POST`

Body

application/json

Name	Required	Type	Description
`sparql_endpoint_url`	true	`string`	The endpoint to validate
`graphs`	false	`array`	An optional list of named graphs to restrict the scope of the validation
`application_profile`	true	`string`	The application profile selected for validation. Check section 8.1 to get available application profiles.

Table 19 continued from previous page

Response

200


```
{
  "task_id": "1dffa147-d25f-4a6e-a767-b7417b9c0b9e"
}
```


8.10 List active tasks

URL	ACTION
/tasks/active	GET

Response

200


```
[
  {
      "acknowledged": true,
      "args": [
          "b1a25374-0bf6-416b-94c3-c63c2e8fe827",
          "/usr/src/app/db/7767c52a-ccdc-400a-a927-41a70d745c48/8
             d0e2b10-a451-4bac-935c-7bd31d2ed274courts-source-ap.
             rdf",
          [
              "/usr/src/app/db/7767c52a-ccdc-400a-a927-41a70d745c48
                 /1de6320f-fe6d-4d0b-9363-f485a42018e2skosShapes.
                 shapes.ttl",
              "/usr/src/app/db/7767c52a-ccdc-400a-a927-41a70d745c48
                 /ed9b67d1-dfe1-4880-8962-dc800eec06d6euvocShapes.
                 shapes.ttl"
          ],
          "/usr/src/app/db/7767c52a-ccdc-400a-a927-41a70d745c48"
      ],
      "delivery_info": {
          "exchange": "",
          "priority": 0,
```

```
            "redelivered": null,
            "routing_key": "celery"
        },
        "hostname": "celery@1014fd21d778",
        "id": "dfb406f8-d59c-4c73-b332-47b7259e447e",
        "kwargs": {},
        "name": "validate_file",
        "time_start": 1641745019.7248263,
        "type": "validate_file",
        "worker_pid": 28
    }
]
```


8.11 Get task status

Get specific task status

URL	ACTION
`/tasks/{task_id}`	`GET`

Parameters

Name	Description
`task_id`	task unique id

Response

200


```
{
  "task_id": "dfb406f8-d59c-4c73-b332-47b7259e447e",
  "task_result": null,
  "task_status": "PENDING"
}
```


8.12 Stop task execution

URL	ACTION
`/tasks/{task_id}`	`DELETE`

Parameters

Name	Description
`task_id`	task unique id

Response

200

```
{
  "message": "task 26651a0f-e8ae-490a-b500-ccf7b90080dd set for
     revoking."
}
```

406

```
{
  "detail": "task already finished executing or does not exist",
  "status": 406,
  "title": "Not Acceptable",
  "type": "about:blank"
}
```

References

[1] E. Costetchi. Asset publication lifecycle architecture. Recommendation, Publications Office of the European Union, September 2020.