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# **FAIR Data Point**

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## ABOUT FAIR DATA POINT

**FAIRDataPoint** is a REST API and Web Client for creating, storing, and serving **FAIR metadata**. The metadata contents are generated **semi-automatically** according to the [FAIR Data Point software specification](#) document.

### 1.1 Features

- Store catalogs, datasets, and distributions
- Manage users
- Manage access rights to your catalogs, datasets, and distributions

### 1.2 Security

We have two levels of accessibility in FDP. All resources (e.g., catalogs, datasets,...) are publicly accessible. You don't need to be logged in to browse them. If you want to upload your own resources, you need to be logged in. To get an account, you need to contact an administrator of the FDP. By default, all uploaded resources are publicly accessible by anyone. But if you want to allow someone to manage your resources (edit/delete), you need to allow it in the resource settings.

We have two types of roles in FDP - an administrator and a user. The administrator is allowed to manage users and all resources. The user can manage just the resources which he owns.



## USERS AND ROLES

There are different roles for different levels in the FAIR Data Point.

### 2.1 FAIR Data Point Roles

#### 2.1.1 Admin

Admin can manage other user accounts and access everything in the FAIR Data Point.

#### 2.1.2 User

User can create new catalogs and access existing catalogs where she was added.

### 2.2 Catalog Roles

#### 2.2.1 Owner

Owner can update catalog details, add other users and upload new datasets.

#### 2.2.2 Data Provider

Data Provider can create new data sets in the catalog.

### 2.3 Dataset Roles

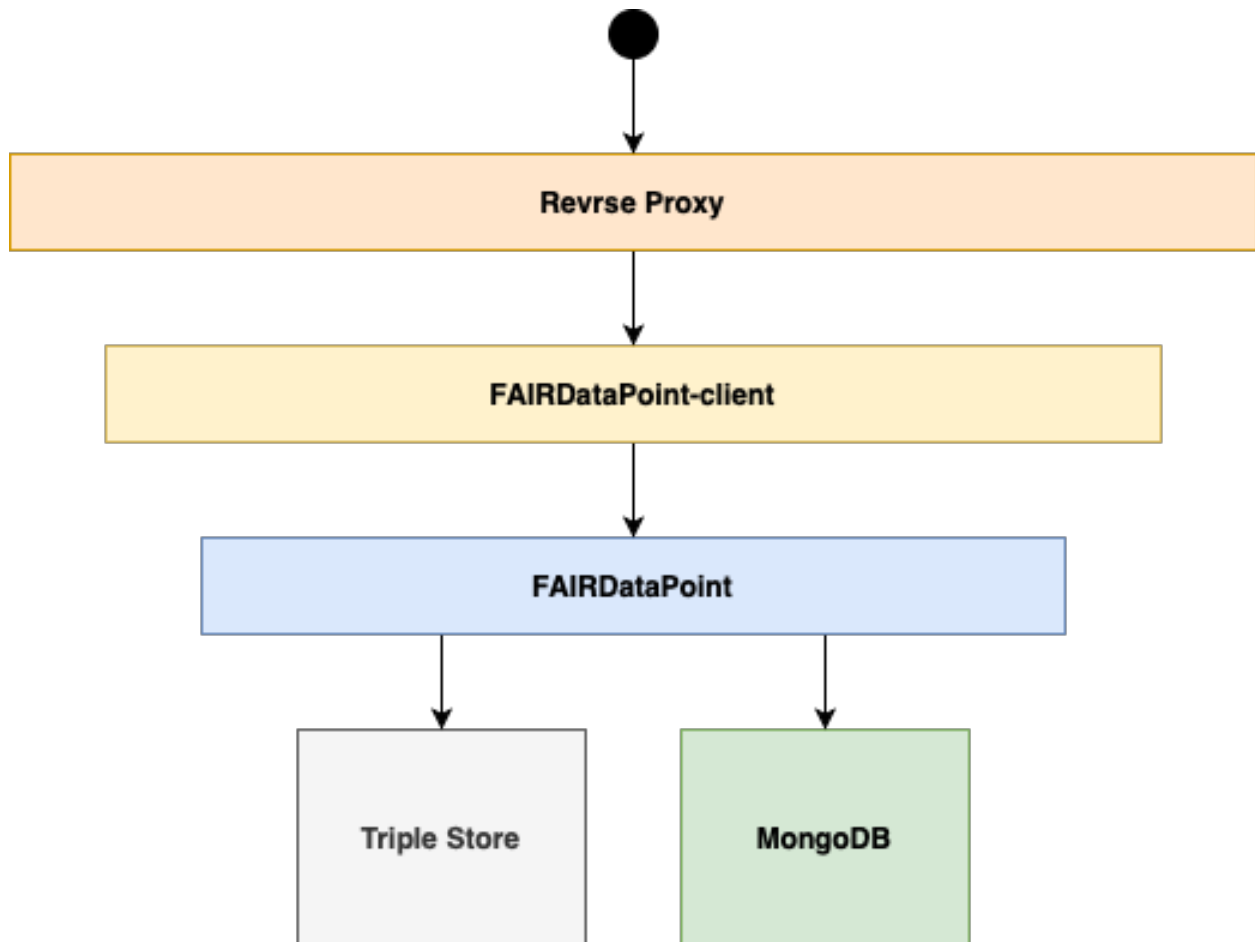
#### 2.3.1 Owner

Owner of the data set can update catalog details and add other users.



## COMPONENTS

The deployment of the FAIR Data Point consists of a couple of components. See the following image for the overview:



## 3.1 Triple Store

Every FAIR Data Point needs to store the semantic data somewhere. A triple Store is a place where the data is. It is possible to configure different stores, see *Triple Stores configuration* for more details.

## 3.2 MongoDB

Besides semantic data, FDP needs information about user accounts and their roles. These data are stored in [MongoDB](#) database.

## 3.3 FAIRDataPoint

FAIRDataPoint is distributed in Docker image `fairdata/fairdatapoint`. It is the core component which handles all the business logic and operations with the semantic data. It also provides API for working with data in different formats.

## 3.4 FAIRDataPoint-client

FDP client is distributed in Docker image `fairdata/fairdatapoint-client`. It provides the user interface for humans. It works as a reverse proxy in front of the FAIR Data Point which decides whether the request is for machine-readable data and passes it to the FAIRDataPoint or from a web browser in which case it serves the interface for humans.

## 3.5 Reverse Proxy

In a production deployment, there is usually a reverse proxy that handles HTTPS certificates, so the connection to the FAIR Data Point is secured. See *production deployment* to learn how to configure one.

## LOCAL DEPLOYMENT

FAIR Data Point is distributed in Docker images. For a simple local deployment, you need to run `fairdatapoint`, `fairdatapoint-client` and `mongo` images. See the [Components](#) section to read more about what each image is for.

Here is an example of the simplest [Docker Compose](#) configuration to run FDP.

```
# docker-compose.yml

version: '3'
services:

  fdp:
    image: fairdata/fairdatapoint:1.6.0

  fdp-client:
    image: fairdata/fairdatapoint-client:1.6.0
    ports:
      - 80:80
    environment:
      - FDP_HOST=fdp

  mongo:
    image: mongo:4.0.12
```

Then you can run it using `docker-compose up -d`. It might take a while to start. You can run `docker-compose logs -f` to follow the output log. Once you see a message, that the application started, the FAIR Data Point should be working, and you can open <http://localhost>.

There are two default user accounts. See the [Users and Roles](#) section to read more about users and roles. The default accounts are

User name	Role	Password
<a href="mailto:albert.einstein@example.com">albert.einstein@example.com</a>	admin	password
<a href="mailto:nikola.tesla@example.com">nikola.tesla@example.com</a>	user	password

**Danger:** Using the default accounts is alright if you run FDP on your machine, but you should change them if you want to run FDP publicly.

## 4.1 Running locally on a different port

If you want to run the FAIR Data Point locally on a different port than the default 80, additional configuration is necessary. First, we need to create a new file `application.yml` and set the client URL to the actual URL we want to use.

```
# application.yml

instance:
  clientUrl: http://localhost:8080
```

Then, we need to mount the application config into the FDP container and update the port which the FDP client runs on.

```
# docker-compose.yml

version: '3'
services:

  fdp:
    image: fairdata/fairdatapoint:1.6.0
    volumes:
      - ./application.yml:/fdp/application.yml:ro

  fdp-client:
    image: fairdata/fairdatapoint-client:1.6.0
    ports:
      - 8080:80
    environment:
      - FDP_HOST=fdp

  mongo:
    image: mongo:4.0.12
```

## 4.2 Persistence

We don't have any data persistence with the previous configuration. Once we remove the containers, all the data will be lost. To keep it, we need to configure MongoDB volume and persistent triple store.

### 4.2.1 MongoDB volume

We use MongoDB to store information about user accounts and access permissions. We can configure a `volume` so that the data keep on our disk even if we delete MongoDB container.

We can also expose port 27017 so we can access MongoDB from our local computer using a client application like Robo 3T.

Here is the updated docker-compose file:

```
# docker-compose.yml

version: '3'
services:
```

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```

fdp:
  image: fairdata/fairdatapoint:1.6.0

fdp-client:
  image: fairdata/fairdatapoint-client:1.6.0
  ports:
    - 80:80
  environment:
    - FDP_HOST=fdp

mongo:
  image: mongo:4.0.12
  ports:
    - 27017:27017
  volumes:
    - ./mongo/data:/data/db

```

### 4.2.2 Persistent Repository

FAIR Data Point uses repositories to store the metadata. By default, it uses the in-memory store, which means that the data is lost after the FDP is stopped.

In this example, we will configure Blazegraph as a triple store. See [Triple Stores](#) for other repository options.

If we don't have it already, we need to create a new file `application.yml`. We will use this file to configure the repository and mount it as a read-only volume to the `fdp` container. This file can be used for other configuration, see [Advanced Configuration](#) for more details.

```

# application.yml

# ... other configuration

repository:
  type: 5
  blazegraph:
    url: http://blazegraph:8080/blazegraph

```

We now need to update our `docker-compose.yml` file, we add a new volume for the `fdp` and add `blazegraph` service. We can also expose port 8080 for Blazegraph so we can access its user interface.

```

# docker-compose.yml

version: '3'
services:

  fdp:
    image: fairdata/fairdatapoint:1.6.0
    volumes:
      - ./application.yml:/fdp/application.yml:ro

  fdp-client:
    image: fairdata/fairdatapoint-client:1.6.0
    ports:
      - 80:80

```

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```
environment:
  - FDP_HOST=fdp

mongo:
  image: mongo:4.0.12
  ports:
    - 27017:27017
  volumes:
    - ./mongo/data:/data/db

blazegraph:
  image: metaphacts/blazegraph-basic:2.2.0-20160908.003514-6
  ports:
    - 8080:8080
  volumes:
    - ./blazegraph:/blazegraph-data
```

## PRODUCTION DEPLOYMENT

If you want to run the FAIR Data Point in production it is recommended to use HTTPS protocol with valid certificates. You can easily configure FDP to run behind a reverse proxy which takes care of the certificates.

In this example, we will configure FDP to run on `https://fdp.example.com`. We will see how to configure the reverse proxy in the same Docker Compose file. However, it is not necessary, and the proxy can be configured elsewhere.

First of all, we need to generate the certificates on the server where we want to run the FDP. You can use [Let's Encrypt](#) and create the certificates with [certbot](#). The certificates are generated in a standard location, e.g., `/etc/letsencrypt/live/fdp.example.com` for `fdp.example.com` domain. We will mount the whole `letsencrypt` folder to the reverse proxy container later so that it can use the certificates.

As a reverse proxy, we will use [nginx](#). We need to prepare some configuration, so create a new folder called `nginx` with the following structure and files:

```
nginx/
├─ nginx.conf
├─ sites-available
│   └─ fdp.conf
└─ sites-enabled
    └─ fdp.conf -> ../sites-available/fdp.conf
```

The file `nginx.conf` is the configuration of the whole nginx, and it includes all the files from `sites-enabled` which contains configuration for individual servers (we can use one nginx, for example, to handle multiple servers on different domains). All available configurations for different servers are in the `sites-available`, but only those linked to `sites-enabled` are used.

Let's see what should be the content of the configuration files.

```
# nginx/nginx.conf

# Main nginx config
user www-data www-data;
worker_processes 5;

events {
    worker_connections 4096;
}

http {
    # Docker DNS resolver
    # We can then use docker container names as hostnames in other configurations
    resolver 127.0.0.11 valid=10s;
```

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```
# Include all the configurations files from sites-enabled
include /etc/nginx/sites-enabled/*.conf;
}
```

Then, we need to configure the FDP server.

```
# nginx/sites-available/fdp.conf

server {
    listen 443 ssl;

    # Generated certificates using certbot, we will mount these in docker-compose.yml
    ssl_certificate /etc/letsencrypt/live/fdp.example.com/fullchain.pem;
    ssl_certificate_key /etc/letsencrypt/live/fdp.example.com/privkey.pem;

    server_name fdp.example.com;

    # We pass all the request to the fdp-client container, we can use HTTP in the
    ↪ internal network
    # fdp-client_1 is the name of the client container in our configuration, we can
    ↪ use it as host
    location / {
        proxy_pass http://fdp-client_1;
    }
}

# We redirect all request from HTTP to HTTPS
server {
    listen 80;
    server_name fdp.example.com;
    return 301 https://$host$request_uri;
}
```

Finally, we need to create a soft link from sites-enabled to sites-available for the FDP configuration.

```
$ cd nginx/sites-enabled && ln -s ../sites-available/fdp.conf
```

We have certificates generated and configuration for proxy ready. Now we need to add the proxy to our `docker-compose.yml` file so we can run the whole FDP behind the proxy.

```
# docker-compose.yml

version: '3'
services:
  proxy:
    image: nginx:1.17.3
    ports:
      - 80:80
      - 443:443
    volumes:
      # Mount the nginx folder with the configuration
      - ./nginx:/etc/nginx:ro
      # Mount the letsencrypt certificates
      - /etc/letsencrypt:/etc/letsencrypt:ro

  fdp:
```

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```

    image: fairdata/fairdatapoint:1.6.0
    volumes:
      - ./application.yml:/fdp/application.yml:ro

    fdp-client:
      image: fairdata/fairdatapoint-client:1.6.0
      environment:
        - FDP_HOST=fdp

    mongo:
      image: mongo:4.0.12
      volumes:
        - ./mongo/data:/data/db

    blazegraph:
      image: metaphacts/blazegraph-basic:2.2.0-20160908.003514-6
      volumes:
        - ./blazegraph:/blazegraph-data

```

The last thing to do is to update our `application.yml` file. We need to add `clientId` so that FDP knows the actual URL even if hidden behind the reverse proxy. It's a good practice to set up a persistent URL for the metadata too. We recommend using `https://purl.org`. If you don't specify `persistentUrl`, the `clientId` will be used instead. And we also need to set a random JWT token for security.

```

# application.yml

instance:
  clientId: https://fdp.example.com
  persistentUrl: https://purl.org/fairdatapoint/example

security:
  jwt:
    token:
      secret-key: <random 128 characters string>

# repository settings (can be changed to different repository)
repository:
  type: 5
  blazegraph:
    url: http://blazegraph:8080/blazegraph

```

At this point, we should be able to run all the containers using `docker-compose up -d` and after everything starts, we can access the FAIR Data Point at <https://fdp.example.com>. Of course, the domain you want to access the FDP on must be configured to the server where it runs.

**Danger:** Don't forget to change the default user accounts as soon as your FAIR Data Point becomes publicly available.

**Danger:** Do not expose mongo port unless you secured the database with username and password.

**Warning:** In order to improve findability of itself and its content, the FAIR Data Point has a built-in feature that registers its URL into our server and pings it once a week. This feature facilitates the indexing of the metadata of each registered and active FAIR Data Point. If you do not want your FAIR Data Point to be included in this registry, add these lines to your application configuration:

```
# application.yml
```

```
ping:  
  enabled: false
```

## ADVANCED CONFIGURATION

### 6.1 Triple Stores

FDP uses InMemory triple store by default. In previous examples, there is Blazegraph used. However, you can choose from 3 additional options.

#### List of possible triple stores:

1. In-Memory Store
2. Native Store
3. Allegro Graph Repository
4. GraphDB Repository
5. Blazegraph Repository

#### 6.1.1 1. In-Memory Store

There is no need to configure additional properties to run FDP with In-Memory Store because it's the default option. If you want to explicitly type in configuration provided in `application.yml`, add following lines there:

```
# application.yml

repository:
  type: 1
```

#### 6.1.2 2. Native Store

With this option, FDP will simply save the data to the file system. If you want to use the Native Store, make sure that you have these lines in your `application.yml` file:

```
# application.yml

repository:
  type: 2
  native:
    dir: /tmp/fdp-store
```

where `/tmp/fdp-store` is a path to a location where you want to keep your data stored.

### 6.1.3 3. Allegro Graph

For running [Allegro Graph](#), you need to first set up your Allegro Graph instance. For configuring the connection from FDP, add these lines to your `application.yml` file:

```
# application.yml

repository:
  type: 3
  agraph:
    url: http://agraph:10035/repositories/fdp
    username: user
    password: password
```

URL, username and password should be configured according to your actual Allegro Graph setup.

### 6.1.4 4. GraphDB

For running [GraphDB](#), you need to first set up your GraphDB instance and **create the repository**. For configuring the connection from FDP, add these lines to your `application.yml` file:

```
# application.yml

repository:
  type: 4
  graphDb:
    url: http://graphdb:7200
    repository: <repository-name>
```

URL and repository should be configured according to your actual GraphDB setup.

### 6.1.5 5. Blazegraph

For running [Blazegraph](#), you need to first set up your Blazegraph instance. For configuring the connection from FDP, add these lines to your `application.yml` file:

```
# application.yml

repository:
  type: 5
  blazegraph:
    url: http://blazegraph:8080/blazegraph
    repository:
```

URL and repository should be configured according to your actual Blazegraph setup. Repository should be set only if you don't use the default one.

## 6.2 Mongo DB

We store users, permissions, etc. in the [MongoDB database](#). The default connection string is `mongodb://mongo:27017/fdp`. If you want to modify it, add these lines to your `application.yml` file:

```
# application.yml

spring:
  data:
    mongodb:
      uri: mongodb://mongo:27017/fdp
```

The `uri` should be adjusted by your actual MongoDB setup.

## 6.3 Default attached metadata

There are several default values that are attached to each created metadata. If you want to modify it, add the lines below to your `application.yml` file. The default values are listed below, too:

```
# application.yml

metadataProperties:
  language: http://id.loc.gov/vocabulary/iso639-1/en
  license: http://rdflicense.appspot.com/rdflicense/cc-by-nc-nd3.0
  accessRightsDescription: This resource has no access restriction

metadataMetrics:
  https://purl.org/fair-metrics/FM_F1A: https://www.ietf.org/rfc/rfc3986.txt
  https://purl.org/fair-metrics/FM_A1.1: https://www.wikidata.org/wiki/Q8777
```

## 6.4 Customizations

You can customize the look and feel of FDP Client using [SCSS](#). There are three files you can mount to `/src/scss/custom`. If there are any changes in these files, the styles will be regenerated when FDP Client starts.

### 6.4.1 Customization files

#### `_variables.scss`

A lot of values related to styles are defined as variables. The easiest way to customize the FDP Client is to define new values for these variables. To do so, you create a file called `_variables.scss` where you define the values that you want to change.

Here is an example of changing the primary color.

```
// _variables.scss

$color-primary: #087d63;
```

Have a look in `src/scss/_variables.scss` to see all the variables you can change.

### **`_extra.scss`**

This file is loaded before all other styles. You can use it, for example, to define new styles or import fonts.

### **`_overrides.scss`**

This file is loaded after all other styles. You can use it to override existing styles.

## **6.4.2 Example of setting a custom logo**

To change the logo, you need to do three steps:

1. Create `_variables.scss` with correct logo file name and dimensions
2. Mount the new logo to the assets folder
3. Mount `_variables.scss` to SCSS custom folder

```
// _variables.scss

$header-logo-url: '/assets/my-logo.png'; // new logo file
$header-logo-width: 80px; // width of the new logo
$header-logo-height: 40px; // height of the new logo
```

```
# docker-compose.yml

version: '3'
services:
  fdp:
    # ... FDP configuration

    fdp-client:
    # ... FDP Client configuration
    volumes:
      # Mount new logo file to assets in the container
      - ./my-logo.png:/usr/share/nginx/html/assets/my-logo.png:ro

      # Mount _variables.scss so that styles are regenerated
      - ./_variables.scss:/src/scss/custom/_variables.scss:ro
```

## **6.5 Running FDP on a nested route**

Sometimes, you might want to run FDP alongside other applications on the same domain. Here is an example of running FDP on `https://example.com/fairdatapoint`. If you run FDP in this configuration, you have to set `PUBLIC_PATH` ENV variable, in this example to `/fairdatapoint`. Also, don't forget to set correct client URL in the application config.

```
# docker-compose.yml

version: '3'
services:
  fdp:
    image: fairdata/fairdatapoint:1.6.0
```

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```
volumes:
  - ./application.yml:/fdp/application.yml:ro
  # ... other volumes

fdp-client:
  image: fairdata/fairdatapoint-client:1.6.0
  ports:
    - 80:80
  environment:
    - FDP_HOST=fdp
    - PUBLIC_PATH=/fairdatapoint
```

```
# application.yml
```

```
instance:
  clientId: https://example.com/fairdatapoint
```

```
# Snippet for nginx configuration
```

```
server {
  # Configuration for the server, certificates, etc.

  # Define the location FDP runs on
  location ~ /fairdatapoint(/.*)?$ {
    rewrite /fairdatapoint(/.*) $1 break;
    rewrite /fairdatapoint / break;
    proxy_pass http://<client_host>;
  }
}
```

When running on nested route, don't forget to change paths to all custom assets referenced in SCSS files.



## USAGE

Here you can read how to use the **metadata** extension for OpenRefine to store FAIR data and create metadata in FAIR Data Point.

### 7.1 About metadata extension

The **metadata** extension for OpenRefine promotes FAIRness of the data by its integration with FAIR Data Point. With the extension you can easily FAIRify your data that you work on in directly in OpenRefine in two steps:

1. *Store FAIR data* in configured storage.
2. *Create metadata in FAIR Data Point* in selected FAIR Data Point.

It replaces the legacy project called [FAIRifier](#).

### 7.2 Features

The extension provides the features only through *FAIR Metadata* extension menu located in top right corner above data table (typically next to *Wikidata* and others).

#### 7.2.1 Store FAIR data

1. Open the dialog for storing the data by clicking *FAIR Metadata > Store data to FAIR storage*
2. Select the desired storage (see *Storages*)
3. Select the desired format (the selection changes based on storage)
4. Press *Preview (download)* to download the file to verify the contents
5. Press *Store* to store the data in the storage
6. You will see the URL to the file which you can easy copy to clipboard by clicking a button

## 7.2.2 Create metadata in FAIR Data Point

1. Open the dialog for creating the metadata by clicking *FAIRMetadata > Create metadata in FAIR Data Point*
2. Select pre-configured FAIR Data Point connection or select *Custom FDP connection* and fill information (if allowed, see [Settings](#))
3. Press *Connect* to connect to the selected FAIR Data Point
4. Select a catalog from available or create a new one
  - For a new one, fill in the metadata form (see also the optional fields) and press *Create catalog*
5. Select a dataset from available or create a new one
  - For a new one, fill in the metadata form (see also the optional fields) and press *Create dataset*
5. Create a new distribution
6. Fill in the metadata form (see also the optional fields)
  - For the download URL you can easily access [Store FAIR data](#) feature and field will be filled after storing the data
7. Check your new distribution (and/or other layers) listed

This part describes how to set up your own OpenRefine with the **metadata** extension and how to configure it according to your needs.

## 8.1 Installation

There are two ways of using our **metadata** extension for OpenRefine. You can have installed OpenRefine and add extension to it or use Docker with our prepared image.

### 8.1.1 Installed OpenRefine

This option requires you to have installed compatible version of OpenRefine, please check [Compatibility](#). In case you need to install OpenRefine first, visit their [documentation](#).

- Get the desired version of the **metadata** extension from our [GitHub releases page](#) by downloading tgz or zip archive, e.g., `metadata-X.Y.Z-OpenRefine-X.Y.zip`.
- Extract the archive to `extensions` folder of your OpenRefine (see [OpenRefine documentation](#)).

```
unzip metadata-X.Y.Z-OpenRefine-X.Y.zip path/to/openrefine-X.Y/webapp/extensions
```

### 8.1.2 With Docker

If you want to use Docker, we provide a Docker image [fairdata/openrefine-metadata-extension](#) that combines the extension with OpenRefine of supported version. It is of course possible to use volume for the data directory (eventually `data/extensions` to include other extensions). All you need to have is Docker running and then:

```
docker run -p 3333:3333 -v /home/me/openrefine-data:/data:z fairdata/openrefine-  
↪metadata-extension
```

This will run the OpenRefine with **metadata** extension on port 3333 that will be exposed and mounts your folder `/home/me/openrefine-data` as OpenRefine data folder. You should be able to open OpenRefine in browser on `localhost:3333`. If there are some other extensions in `/home/me/openrefine-data/extensions`, those should be loaded as well. For more information, see [OpenRefine documentation](#).

For configuration files you need to mount `/webapp/extensions/metadata/module/config`, see [Configuration](#) for more details.

## 8.2 Configuration

Configuration files of the **metadata** extension use the YAML (YAML Ain't Markup Language) format and are stored in `extensions/metadata/module/config` directory of the used OpenRefine installment. The configuration files are loaded when OpenRefine is started. Therefore, you are required to restart OpenRefine before changes in configuration files take effect. We provide [examples](#) of the configuration files that you can (re)use.

### 8.2.1 Settings

Settings configuration file serves for generic configuration options that adjust behaviour of the extension. The structure of the file is following:

- `allowCustomFDP` (boolean) = should be user allowed to enter custom FAIR Data Point URI (Uniform Resource Identifier), username, and password (or use only the pre-configured)
- `metadata` (map) = key-value specification of instance-wide pre-defined metadata, e.g., set `license` to `http://purl.org/NET/rdflicense/cc-by3.0` and that URI will be pre-set in all metadata forms in field `license` (but can be overwritten by the user)
- `fdpConnections` (list) = list of pre-configured FAIR Data Point connections that users can use, each is object with attributes:
  - `name` (string) = custom name identifying the connection
  - `baseURI` (string) = base URI of FAIR Data Point
  - `email` (string) = email address identifying user of FAIR Data Point
  - `password` (string) = password for authenticating the user of FAIR Data Point
  - `preselected` (boolean, optional) = flag if should be pre-selected in the form (in case that more connections have this set to true, only first one is applied)
  - `metadata` (map, optional) = similar to instance-wide but only for specific connection

For more information and further configuration options, see [examples](#).

### 8.2.2 Storages

Storages configuration file holds details about storages that are possible to use for *Store FAIR data* feature. In the file, list of storage object is expected where each of them has:

- `name` (string) = custom name identifying the storage
- `type` (string) = one of the allowed types (others are ignored): `ftp`, `virtuso`, `tripleStoreHTTP`
- `details` (object) = configuration related to specific type of storage (see [examples](#))

For FTP (File Transfer Protocol) and Virtuoso, `directory` should contain absolute path where files should be stored. In case of triple stores, repository name is used to specify the target location.

## 8.3 Compatibility

Check in-app “About” dialog for compatibility information.



## **CONTRIBUTING**

### **9.1 Development**

Our projects are open source and you can contribute via GitHub (fork and pull request):

- <https://github.com/FAIRDataTeam/FAIRDataPoint>
- <https://github.com/FAIRDataTeam/FAIRDataPoint-client>
- <https://github.com/FAIRDataTeam/OpenRefine-metadata-extension>



ROADMAP