Ontrack Documentation 4.13.7

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Version 4.13.7

Table of Contents

Chapter 1. Quick start

1.1. On Kubernetes

You can install Ontrack using its Helm chart:

```
helm repo add ontrack https://nemerosa.github.io/ontrack-chart
```

To install the `ontrack` chart:

```
helm install ontrack ontrack/ontrack
```

To uninstall the chart:

```
helm delete ontrack
```

This installs 4 services:

- Ontrack itself
- a Postgres 15 database
- an Elasticsearch 7 single node
- a RabbitMQ message broker

To connect to Ontrack, enable the ingress or activate a port forward.

See https://github.com/nemerosa/ontrack-chart for more options.

1.2. With Docker Compose

On a local machine, you can start Ontrack using Docker Compose:

```
curl -fsSLO https://raw.githubusercontent.com/nemerosa/ontrack/master/compose/docker-
compose.yml
docker compose up -d
```

This sets up:

- a Postgres database
- an ElasticSearch (single node)
- a RabbitMQ message broker
- Ontrack running on port 8080

Go to http://localhost:8080 and start using Ontrack.

The initial administrator credentials are `admin` / `admin`.

Where to go from there?

- learn how to feed information into Ontrack
- learn how to use the Ontrack UI
- … or to use its Ontrack API

You can also check the following sections:

- Installation
- Setup

Chapter 2. Installation

There are several ways to install Ontrack.

2.1. Docker Compose installation

The fastest way to start Ontrack is to use Docker Compose, but it might not be adapted for a production environment.

The Docker Compose file can be downloaded from:

https://github.com/nemerosa/ontrack/blob/4.13.7/compose/docker-compose.yml

You can simply run it using:

```
docker-compose up -d
```

This starts three services:

- Ontrack itself at http://localhost:8080
- a Postgres database
- an Elasticsearch single node
- a RabbitMQ message broker

Neither Postgres, Elasticsearch and RabbitMQ are exposed by default, but you can of course edit the Docker Compose file at your convenience.

The version of Ontrack is set by default to `4` (latest 4.x version) but you can override it using the `ONTRACK_VERSION` environment variable.

The memory settings and other JVM parameters for Ontrack can be passed using the `JAVA_OPTIONS` environment variable, which defaults to `-Xms1024m -Xmx1024m`.

Other Ontrack configuration properties must be passed through environment variables.

Three named Docker volumes are created for the data to be persisted:

- `ontrack_postgres`
- `ontrack_elasticsearch`
- `ontrack_data`

For other volume configuration, please edit the Docker Compose file.

2.2. Docker installation

The Ontrack Docker image is available in the Docker Hub at https://hub.docker.com/r/nemerosa/

ontrack.

Each specific version is available and also a "latest" version per major and minor version. For example:

- 4
- 4.0
- 4.0.0

To run Ontrack, you need to make sure that the minimal dependencies are available:

- Postgres
- Elasticsearch
- RabbitMQ

See Installation dependencies for details.

You can then run Ontrack using:

```
docker container run \
    --detach \
    --publish 8080:8080 \
    -e SPRING_DATASOURCE_URL=<Postgres Ontrack DB JDBC URL> \
    -e SPRING_DATASOURCE_USERNAME=<Postgres Ontrack DB Username> \
    -e SPRING_DATASOURCE_PASSWORD=<Postgres Ontrack DB Password> \
    -e SPRING_ELASTICSEARCH_URIS=<Elasticsearch URL> \
    -e SPRING_RABBITMQ_HOST=<RabbitMQ Host>
    -e SPRING_RABBITMQ_USERNAME=<RabbitMQ Username>
    -e SPRING_RABBITMQ_PASSWORD=<RabbitMQ Password>
    nemerosa/ontrack:4
```

The memory settings and other JVM parameters for Ontrack can be passed using the `JAVA_OPTIONS` environment variable.

Other Ontrack configuration properties must be passed through environment variables.

Optionally, a volume can be mapped to the Ontrack `/var/ontrack/data` Docker volume. This is particularly needed when using a secret storage based on the file system (see Setup).

2.3. Helm installation

You can install Ontrack into a Kubernetes cluster using Helm:

```
helm repo add ontrack https://nemerosa.github.io/ontrack-chart
helm install my-ontrack-release ontrack/ontrack
```

This installs 4 services:

- Ontrack itself
- a Postgres 11 database
- an Elasticsearch 7 single node
- a RabbitMQ message broker

To connect to Ontrack, enable the ingress or activate a port forward.

For more options and documentation, please check the chart repository at https://github.com/nemerosa/ontrack-chart

2.4. Package installation

Ontrack provides installation packages for Debian & CentOS. Both packages can be downloaded in the release page in GitHub: https://github.com/nemerosa/ontrack/releases.

To run Ontrack, you need to make sure that the minimal dependencies are available:

- Postgres
- Elasticsearch
- RabbitMQ

2.4.1. RPM installation

To install Ontrack using RPM:

```
rpm -i ontrack.rpm
```

The following directories are created:

Directory	Description
`/opt/ontrack`	Binaries and scripts
`/usr/lib/ontrack`	Working and configuration directory
`/var/log/ontrack`	Logging directory

You can optionally create an `application.yml` configuration file in `/usr/lib/ontrack`. For example, to customise the port Ontrack is running on:

```
server:
  port: 9080
```

Ontrack is installed as a service using `/etc/init.d/ontrack`.

```
# Starting Ontrack
sudo service ontrack start
# Status of Ontrack
sudo service ontrack status
# Stopping Ontrack
sudo service ontrack stop
```

To upgrade Ontrack:

```
# Stopping Ontrack
sudo service ontrack stop
# Updating
sudo rpm --upgrade ontrack.rpm
# Starting Ontrack
sudo service ontrack start
```

The optional `/etc/default/ontrack` file can be used to define environment variables like `JAVA_OPTIONS` or `SPRING_DATASOURCE_URL`.

For example:

/etc/default/ontrack

```
JAVA_OPTIONS=-Xmx2048m
SPRING_DATASOURCE_URL=jdbc:postgres://pg/ontrack
```

Other Ontrack configuration properties can be passed the same way.

2.4.2. Debian installation

To install Ontrack using Debian:

```
dpkg -i ontrack.deb
```

The following directories are created:

Directory	Description
`/opt/ontrack`	Binaries and scripts
`/usr/lib/ontrack`	Working and configuration directory
`/var/log/ontrack`	Logging directory

Ontrack is installed as a service using `/etc/init.d/ontrack`.

```
# Starting Ontrack
sudo service ontrack start
# Status of Ontrack
sudo service ontrack status
# Stopping Ontrack
sudo service ontrack stop
```

The optional `/etc/default/ontrack` file can be used to define environment variables like `JAVA_OPTIONS` or `SPRING_DATASOURCE_URL`.

For example:

/etc/default/ontrack

```
JAVA_OPTIONS=-Xmx2048m
SPRING_DATASOURCE_URL=jdbc:postgres://pg/ontrack
```

Other Ontrack configuration properties can be passed the same way.

2.5. JAR installation

Ontrack can be downloaded as a JAR and started as a JVM application.

To run Ontrack, you need to make sure that the minimal dependencies are available:

- Postgres
- Elasticsearch
- RabbitMQ

❗ You need a JDK 11 or better to run Ontrack.

Download the JAR from the Ontrack release page.

Start it using:

```
java -jar ontrack.jar
```

Options can be passed on the command line, either:

- using system properties:

```
-Dspring.datasource.url=...
```

- or environment variables:

```
SPRING_DATASOURCE_URL=...
```

2.6. Installation dependencies

Ontrack relies on the following components to be available:

- Postgres - for storage of information
- Elasticsearch - for search indexation
- RabbitMQ - for asynchronous processing

2.6.1. Postgres

Versions 9.5.+ to version 11.+ of Ontrack have been tested.

By default, Ontrack will use the following configuration properties and their default values to connect to Postgres:

Property	Env variable	Description	Default value
spring.datasource.url	SPRING_DATASOURCE_URL	JDBC URL to the Postgres Ontrack DB	`jdbc:postgresql://localhost/ontrack`
spring.datasource.username	SPRING_DATASOURCE_USERNAME	Username used to connect to the Postgres Ontrack DB	`ontrack`
spring.datasource.password	SPRING_DATASOURCE_PASSWORD	Password used to connect to the Postgres Ontrack DB	`ontrack`

Other properties are available in Spring Boot.

2.6.2. Elasticsearch

Version 7.5.+ has been tested.

By default, Ontrack will use the following configuration properties and their default values to connect to ElasticSearch:

Property	Env variable	Description	Default value
spring.elasticsearch.uris	SPRING_ELASTICSEARCH_URIS	REST URI of Elasticsearch	`http://localhost:9200`

Other properties are available in Spring Boot.

2.6.3. RabbitMQ

Version 3.8.+ has been tested.

By default, Ontrack will use the following configuration properties and their default values to connect to Postgres:

Property	**Env variable**	**Description**	**Default value**
spring.rabbitmq.host	SPRING_RABBITMQ_HOST	RabbitMQ host name	`localhost`
spring.rabbitmq.username	SPRING_RABBITMQ_USERNAME	RabbitMQ user name	`ontrack`
spring.rabbitmq.password	SPRING_RABBITMQ_PASSWORD	RabbitMQ password	`ontrack`

Other properties are available in Spring Boot.

Chapter 3. Setup

While Ontrack can be configured using the UI, it's recommended to use the Configuration as Code (CasC) feature.

3.1. Configuration as Code

Ontrack supports to be configured as code by default. It uses a set of YAML resources defined as comma-separated list of locations by the `ontrack.config.casc.locations` configuration property. For example, when using the environment variables:

```
ONTRACK_CONFIG_CASC_LOCATIONS=file:/path/to/file.yaml,https://path.com/file
```

All YAML resources defined by those locations are merged together according to the following rules:

- right-most files take precedence for single values
- arrays are always concatenated to each other

The list of locations can contain path to folders on a file system. In this case, Ontrack will use all the files in this folder.

3.1.1. [experimental] Casc secrets

Secrets can be injected into Casc file using this syntax:

```
{{ secret.<base>.<name> }}
```

For example:

```
some-secret-field: {{ secret.my-secret.my-property }}
```

By default, this is interpolated and evaluated using the `SECRET_<BASE>_<NAME>` environment variable, `SECRET_MY_SECRET_MY_PROPERTY` for the example above. If this environment variable value is `my-password`, the final Casc file will be:

```
some-secret-field: my-password
```

Alternatively, the secrets can be mapped to files by settings the `ontrack.config.casc.secrets.type` configuration property to `file` and the `ontrack.config.casc.secrets.directory` one to a valid directory.

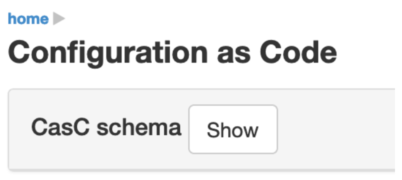
Ontrack will then look for the secrets in files called `<base>/<name>`.

In the example above, the value of the `{{ secret.my-secret.my-property }}` expression will be looked for in the `<directory>/my-secret/my-property` file.

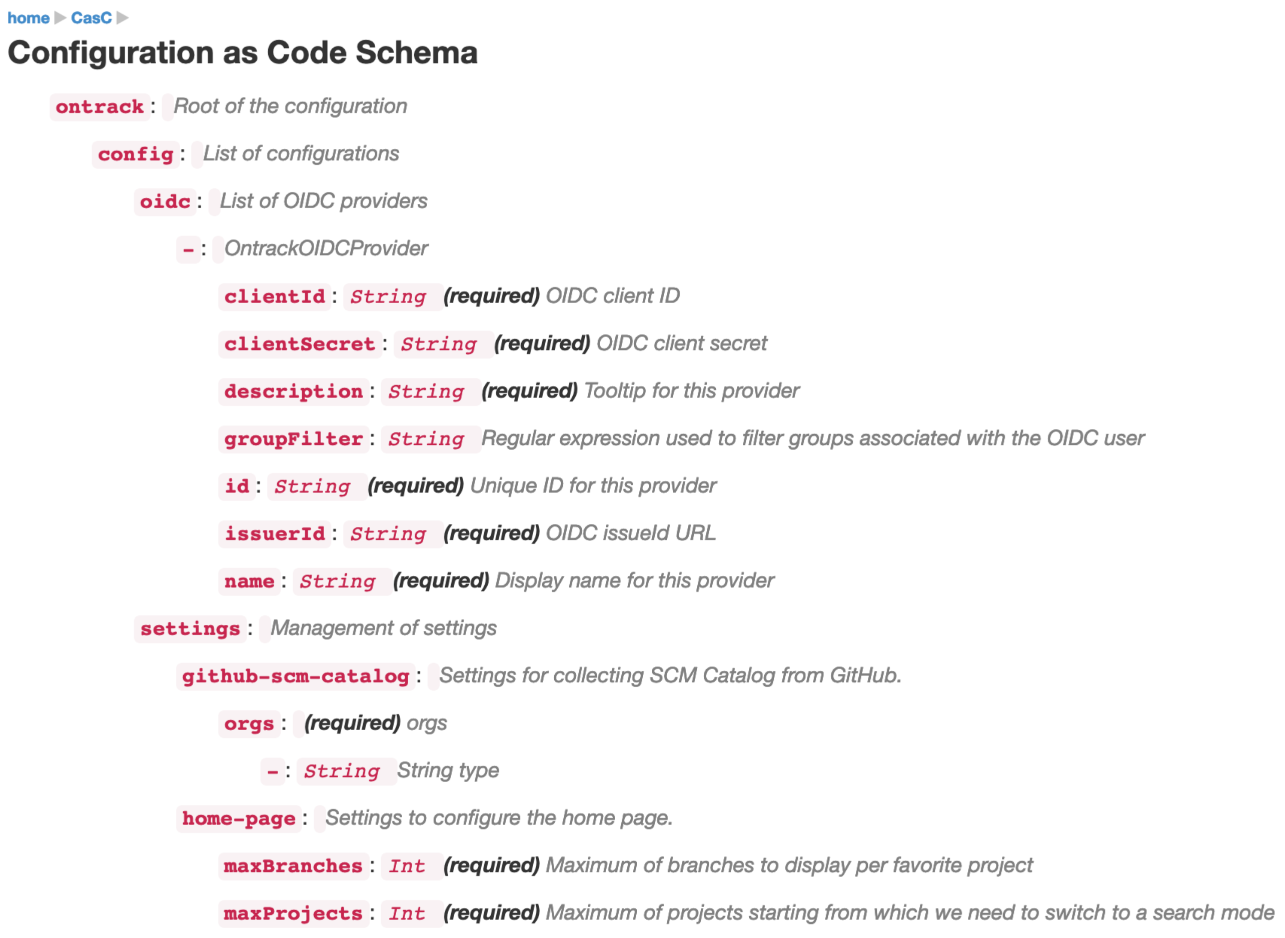
The `file` secret mapping is particularly well suited for Kubernetes deployments. See the `ontrack-chart` for more information.

3.1.2. Casc schema

All those files must comply with the Ontrack CasC format. This schema is available in the UI in the user menu at *Configuration as code*, and by clicking on the *Show* button right of the *CasC schema* section:



This goes to the page at http://localhost:8080/#/extension/casc/casc-schema :



```
ontrack : Root of the configuration
  config : List of configurations
    oidc : List of OIDC providers
      - : OntrackOIDCProvider
        clientId : String (required) OIDC client ID
        clientSecret : String (required) OIDC client secret
        description : String (required) Tooltip for this provider
        groupFilter : String Regular expression used to filter groups associated with the OIDC user
        id : String (required) Unique ID for this provider
        issuerId : String (required) OIDC issueId URL
        name : String (required) Display name for this provider
    settings : Management of settings
      github-scm-catalog : Settings for collecting SCM Catalog from GitHub.
        orgs : (required) orgs
          - : String String type
      home-page : Settings to configure the home page.
        maxBranches : Int (required) Maximum of branches to display per favorite project
        maxProjects : Int (required) Maximum of projects starting from which we need to switch to a search mode
```

3.1.3. Examples

To configure the security settings so that all authenticated users have access to all the projects and can participate in all of them:

```
ontrack:
  config:
    settings:
      security:
        grantProjectViewToAll: true
        grantProjectParticipationToAll: true
```

To add an OIDC provider (Okta for example):

```
ontrack:
  config:
    oidc:
      - id: okta
        name: My Okta
        description: The Okta account used by my company
        issueId: https://<okta domain>.okta.com/oauth2/default
        clientId: <Client ID of the application in Okta>
        clientSecret: <Client secret of the application in Okta>
        groupFilter: ontrack-.*
```

To add a GitHub configuration based on an OAuth2 token:

```
ontrack:
  config:
    github:
      - name: GitHub
        token: <your secret token>
```

3.1.4. Controls

The *Configuration as code* configuration page is available at:

- *user menu* > *Configuration as code*
- directly at http://localhost:8080/#/extension/casc/casc-schema

On this page, you can:

- display the schema
- see the list of locations where Ontrack fetches its CasC YAML resources
- reload the configuration as code
- display the current configuration as YAML (handy when migrating an existing installation to CasC)

Reloading the configuration as code can be done from the UI as mentioned above but also:

- through a `PUT` REST call at `/extension/casc/reload`:

```
curl -X PUT --user admin <ontrack>/extension/casc/reload
```

- through the following GraphQL mutation:

```
mutation {
    reloadCasc {
        errors {
            message
        }
    }
}
```

3.1.5. Upload

The default Casc setup relies on files (or URL) available from the Ontrack application and in a SaaS context, these may not be available or even configurable.

A CasC upload endpoint can be enabled to allow users to upload their own Casc configuration, by using the `ontrack.config.casc.upload.enabled` configuration property or `ONTRACK_CONFIG_CASC_UPLOAD_ENABLED` environment property.

When done, it becomes possible to upload a YAML file, which is will be picked up next time the Casc is reloaded. For example, given a `casc.yaml` file:

```
curl --user $USER:$TOKEN \
  $URL/extension/casc/upload \
  -F "file=@casc.yaml;type=application/yaml"
```

The user must have the *Global settings* user rights (typically an administrator).

3.1.6. Using a JSON schema to edit Casc YAML files

You can download a [JSON Schema](https://json-schema.org/) that can be used to edit Casc YAML files.

First, download this schema locally by navigating to *System* > *Configuration as Code*. Select *Schema* and click on *JSON Schema*.

This offers to download an `ontrack-casc-schema.json` file: save it locally.

The Ontrack Casc JSON schema is versioned using the Ontrack version you download it from.

To use it for the edition of a Casc YAML file, you can do the following in Intellij IDEA:

- in the *Settings*, select *Languages & Frameworks* > *Schema & DTDs* > *JSON Schema Mappings*

- in *Schema file or URL*, click on the folder icon and select the downloaded `ontrack-casc-schema.json` file
- apply and save the settings

Open a YAML file. To associate it with the Ontrack Casc schema, click on the *Schema* component in the bottom right corner of the file and select `ontrack-casc`.

You should now have auto-completion and validation.

Chapter 4. Authentication

Ontrack supports the following authentication backends:

- built-in (enabled by default)
- LDAP
- OpenID

Ontrack is able to work with multiple sources of authentication.

4.1. Built-in authentication

Ontrack comes with its own registry to store accounts. In particular, it contains the built-in `admin` user.

While having a fallback `admin` user, it's not recommended to use the built-in authentication for the rest of the users. Privilegiate using either the LDAP or OIDC integrations for production usage.

No configuration is needed to enable the built-in authentication.

To create and manage accounts, go to your user menu and select *Account management*.

When user are connected using the built-in authentication mechanism, they are able to change their password using the *Change password* user menu.

Administrators can *lock* built-in users so they cannot change their password; this is needed to create fixed guest accounts.

For the management of built-in accounts, see Accounts management.

4.2. LDAP authentication

It is possible to enable authentication using a LDAP instance and to use the LDAP-defined groups to map them against Ontrack groups.

4.2.1. LDAP general setup

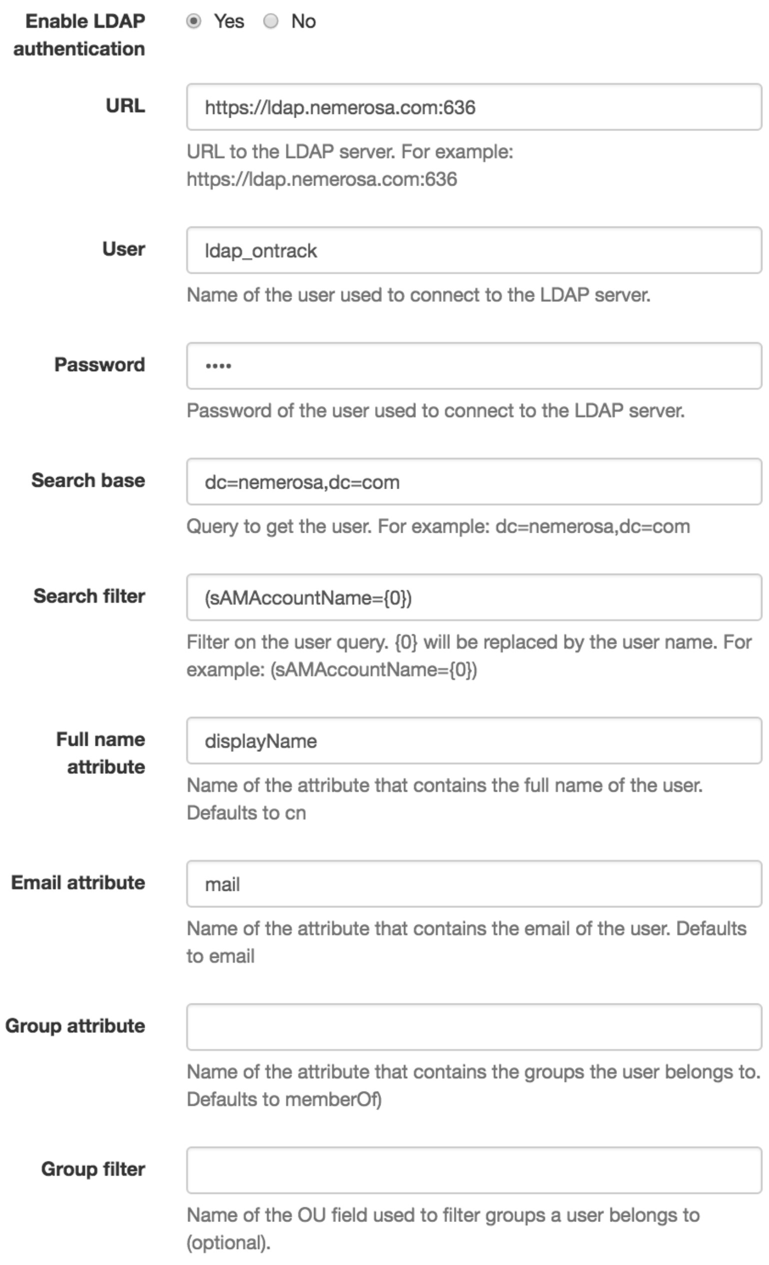
As an *administrator*, go to the *Settings* menu. In the *LDAP settings* section, click on *Edit* and fill the following parameters:

- *Enable LDAP authentication*: Yes
- *URL*: URL to your LDAP
- *User* and *Password*: credentials needed to access the LDAP
- *Search base*: query to get the user

- *Search filter*: filter on the user query
- *Full name attribute*: attribute which contains the full name, `cn` by default
- *Email attribute*: attribute which contains the email, `email` by default
- *Group attribute*: attribute which contains the list of groups a user belongs to, `memberOf` by default
- *Group filter*: optional, name of the OU field used to filter groups a user belongs to

The list of groups (indicated by the `memberOf` attribute or any other attribute defined by the *Group attribute* property) is not searched recursively and that only the direct groups are taken into account.

For example:



Enable LDAP authentication	[✓ Yes] No
URL	https://ldap.nemerosa.com:636 URL to the LDAP server. For example: https://ldap.nemerosa.com:636
User	ldap_ontrack Name of the user used to connect to the LDAP server.
Password	•••• Password of the user used to connect to the LDAP server.
Search base	dc=nemerosa,dc=com Query to get the user. For example: dc=nemerosa,dc=com
Search filter	(sAMAccountName={0}) Filter on the user query. {0} will be replaced by the user name. For example: (sAMAccountName={0})
Full name attribute	displayName Name of the attribute that contains the full name of the user. Defaults to cn
Email attribute	mail Name of the attribute that contains the email of the user. Defaults to email
Group attribute	 Name of the attribute that contains the groups the user belongs to. Defaults to memberOf)
Group filter	 Name of the OU field used to filter groups a user belongs to (optional).

The settings shown above are suitable to use with an Activate Directory LDAP instance.

4.2.2. LDAP group mapping

A LDAP group a user belongs to can be used to map onto an Ontrack group.

As an *administrator*, go to the *Account management* menu and click on the *LDAP mapping* command.

> This command is only available if the LDAP authentication has been enabled in the general settings.

To add a new mapping, click on *Create mapping* and enter:

- the *name* of the LDAP group you want to map
- the Ontrack *group* which must be mapped

For example, if you map the `ontrack_admin` LDAP group to an *Administrators* group in Ontrack, any user who belongs to *ontrack_admin* will automatically be assigned to the *Administrators* group when connecting.

> This assignment based on mapping is dynamic only, and no information is stored about it in Ontrack.

Note that those LDAP mappings can be generated using configuration as code.

Existing mappings can be updated and deleted.

4.3. OpenID authentication

Ontrack supports OpenId identify providers for authentication and group permissions.

Ontrack has been tested with Keycloak and Okta.

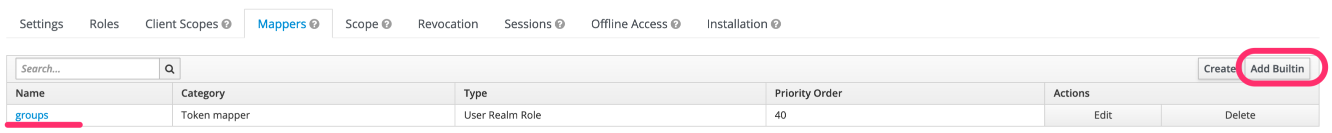
4.3.1. Keycloak setup

> Ontrack has been tested with Keycloak 12.0.4.

Given a Keycloak realm, the Ontrack client can be configured this way:

- client protocol: `openid-connect`
- valid redirect URLs: `<ontrack url>/*`
- base URL: `<ontrack url>/login/oauth2/code/<keycloak realm>`
- web origins: `<ontrack url>`

If you want to use Keycloak for group mappings in Ontrack, go to *Mappers* and add the built-in "groups" mapper:


Settings | Roles | Client Scopes | Mappers | Scope | Revocation | Sessions | Offline Access | Installation

Search... | Create | Add Builtin

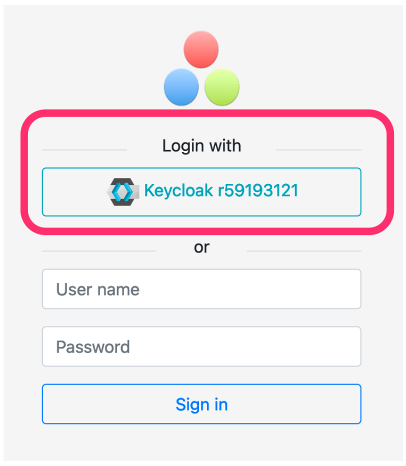
Name	Category	Type	Priority Order	Actions	
groups	Token mapper	User Realm Role	40	Edit	Delete

On the Ontrack side, as an administrator:

- navigate to the *OIDC providers* menu
- click on "Create provider"
- add the following information:
  - ID: unique ID for your provider. It must be aligned with the name of the Keycloak realm (see Keycloak configuration above)
  - Name: a display name, which will be used on the login page
  - Description: used as a tooltip on the login page
  - Issuer ID: `<keycloak url>/auth/realms/<keycloak realm>`
  - Client ID: ID of the client in Keycloak
  - Client secret: can be left blank for Keycloak
  - Group filter: regular expression to filter the group list sent by Keycloak in the `groups` claim

> If Ontrack runs behind a SSL termination proxy and if the HTTP headers are not all forwarded, the "Force HTTPS" option can be set to `true` in order to force the redirect URI to use HTTPS.

In the OIDC provider list, you can optionally set a picture for this configuration. This picture will be used on the login page. For example:



When the users click on the button, they will be redirected to Keycloak for authentication.

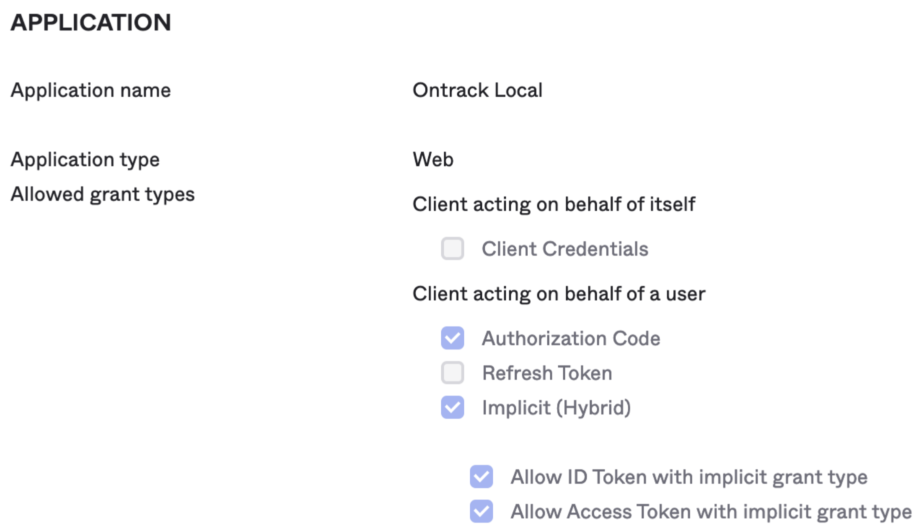
Upon a first connection, an account will be created automatically on Ontrack, based on the information returned by Keycloak.

> Keycloak is better configured using Configuration as Code. See some examples here.

4.3.2. Okta setup

In Okta, an Ontrack application must be configured with the following parameters:

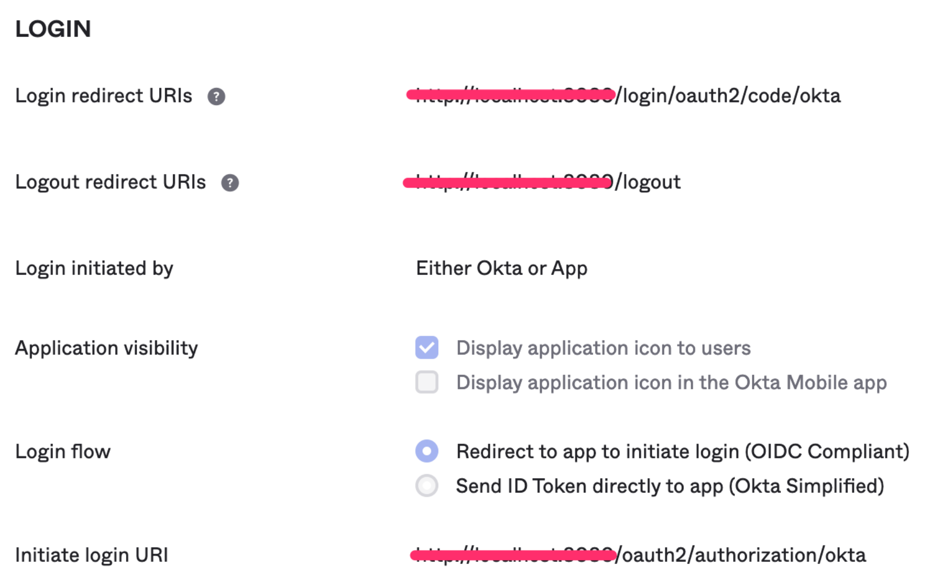
- application type: `Web`
- Allowed grant types:
  - Client acting on behalf of a user:
    - Authorization code `ON`
    - Implicit (hyprid)
      - Allow ID Token with implicit grant type `ON`
      - Allow Access Token with implicit grant type `ON`



APPLICATION

Application name	Ontrack Local
Application type	Web
Allowed grant types	Client acting on behalf of itself
	☐ Client Credentials
	Client acting on behalf of a user
	✓ Authorization Code
	☐ Refresh Token
	✓ Implicit (Hybrid)
	✓ Allow ID Token with implicit grant type
	✓ Allow Access Token with implicit grant type

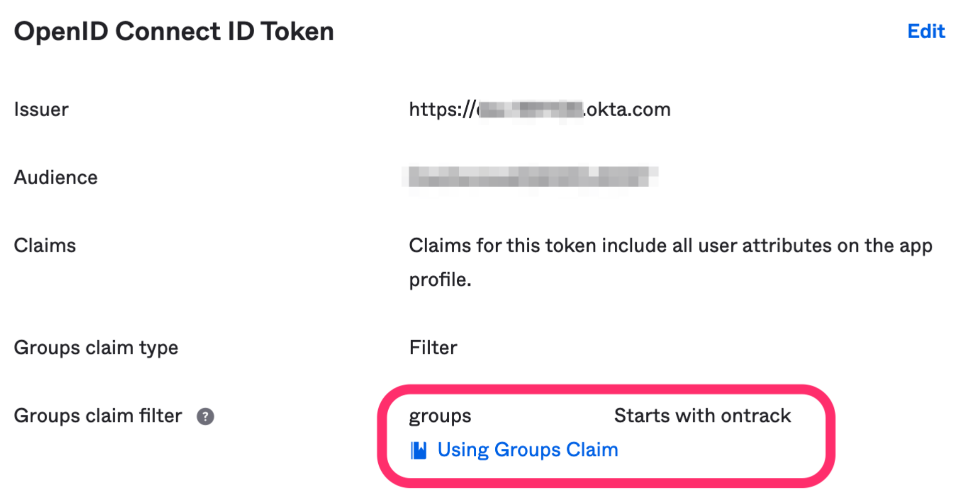
- Login redirect URIs: `<ontrack url>/login/oauth2/code/okta`
- Logout redirect URIs: `<ontrack url>/logout`
- Login initiated by: `Either Okta or App`
- Application visibility:
  - Display application icon to users `ON`
- Login flow:
  - Redirect to app to initiate login (OIDC Compliant) `ON`
- Initiate login URI: `<ontrack url>/oauth2/authorization/okta`



LOGIN

Login redirect URIs	[redacted]/login/oauth2/code/okta
Logout redirect URIs	[redacted]/logout
Login initiated by	Either Okta or App
Application visibility	✓ Display application icon to users ☐ Display application icon in the Okta Mobile app
Login flow	● Redirect to app to initiate login (OIDC Compliant) ○ Send ID Token directly to app (Okta Simplified)
Initiate login URI	[redacted]/oauth2/authorization/okta

If you want to use Okta groups in the group mappings in Ontrack, go to *Sign On* section of the application and make sure to select a list of groups (using a filter):



OpenID Connect ID Token

Issuer	https://[redacted].okta.com
Audience	[redacted]
Claims	Claims for this token include all user attributes on the app profile.
Groups claim type	Filter
Groups claim filter	groups Starts with ontrack Using Groups Claim

In this example, we select all groups whose name starts with `ontrack`.

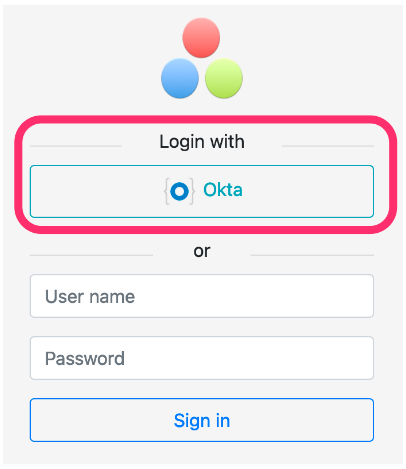
On the Ontrack side, as an administrator:

- navigate to the *OIDC providers* menu
- click on "Create provider"
- add the following information:
  - ID: unique ID for your provider, typically `okta`
  - Name: a display name, which will be used on the login page
  - Description: used as a tooltip on the login page
  - Issuer ID: `https://<okta domain>.okta.com/oauth2/default`
  - Client ID of the application in Okta
  - Client secret of the application in Okta

  - Group filter: regular expression to filter the group list sent by Okta in the `groups` claim

If Ontrack runs behind a SSL termination proxy and if the HTTP headers are not all forwarded, the "Force HTTPS" option can be set to `true` in order to force the redirect URI to use HTTPS.

In the OIDC provider list, you can optionally set a picture for this configuration. This picture will be used on the login page. For example:



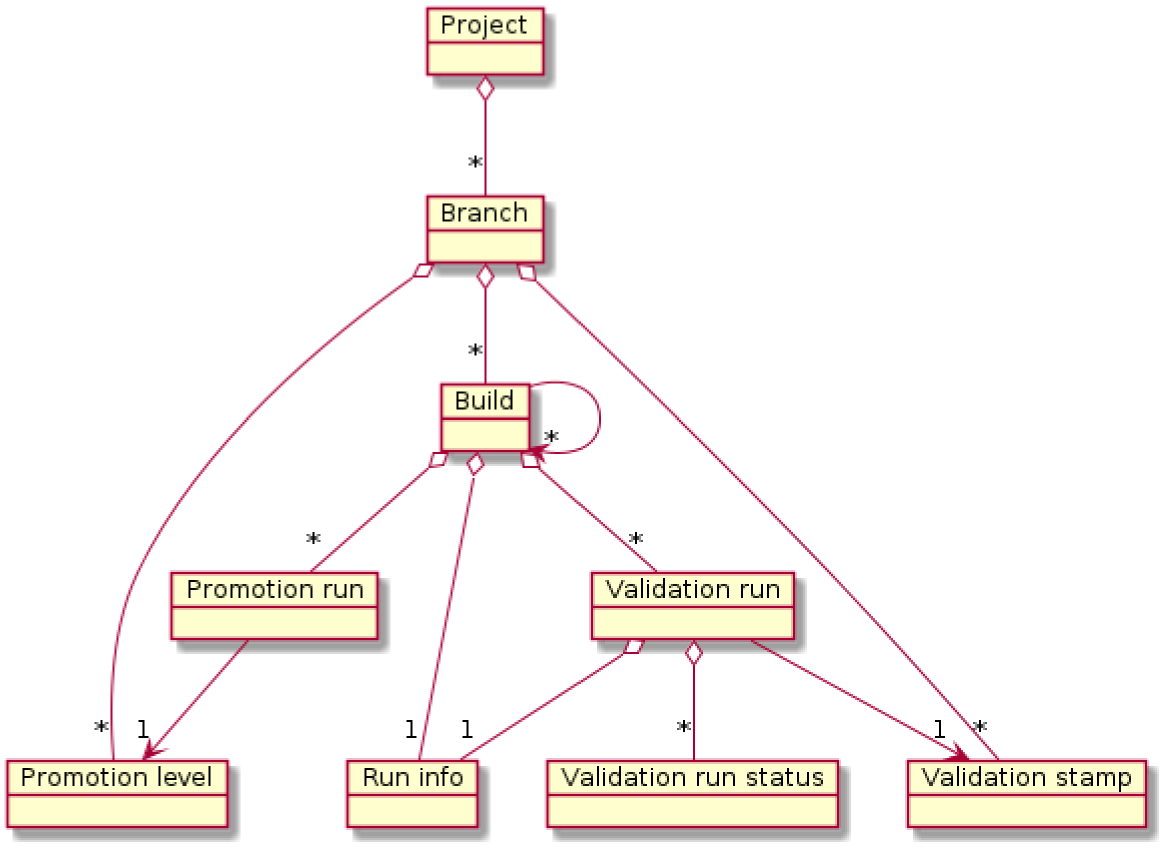
When the users click on the button, they will be redirected to Okta for authentication.

Upon a first connection, an account will be created automatically on Ontrack, based on the information returned by Okta.

Okta is better configured using Configuration as Code. See some examples here.

Chapter 5. Concepts

The root entity in Ontrack is the *project*.



Several *branches* can be attached to a *project*. *Builds* can be created within a branch and linked to other builds (same or other branches).

Promotion levels and *validation stamps* are attached to a *branch*:

- a *promotion level* is used to define the *promotion* a given *build* has reached. A *promotion run* defines this association.
- a *validation stamp* is used to qualify some tests or other validations on a *build*. A *validation run* defines this association. There can be several runs per build and per validation stamp. A run itself has a sequence of statuses attached to it: passed, failed, investigated, etc.

Builds and validation runs can be attached to some "run info" which gives additional information like the duration of the build or the validation.

Branches, *promotion levels* and *validation stamps* define the *static structure* of a *project*.

Chapter 6. Security

The Ontrack security is based on accounts and account groups, and on authorizations granted to them.

6.1. Concepts

Each action in Ontrack is associated with an *authorisation function* and those functions are grouped together in *roles* which are granted to *accounts* and *account groups*.

An *account* can belong to several *account groups* and his set of final *authorisation functions* will be the aggregation of the rights given to the account and to the groups.

See Accounts management to manage accounts and groups.

6.1.1. Roles

> As of now, only roles can be assigned to groups and accounts, and the list of roles and their associated functions is defined by Ontrack itself.

Ontrack distinguishes between *global roles* and *project* roles.

Extensions can contribute to built-in roles and functions - see Extending the security for details.

6.1.2. Global roles

An **ADMINISTRATOR** has access to all the functions of Ontrack, in all projects. At least such a role should be defined.

> By default, right after installation, a default `admin` account is created with the `ADMINISTRATOR` role, having *admin* as password. This password should be changed as soon as possible.

A **CREATOR** can create any project and can, on all projects, configure them, create branches, create promotion levels and validation stamps. This role should be attributed to service users in charge of automating the definition of projects and branches.

An **AUTOMATION** user can do the same things than a *CREATOR* but can, on all projects, additionally edit promotion levels and validation stamps, create builds, promote and validate them, manage account groups and project permissions. This role is suited for build and integration automation (CI).

A **CONTROLLER** can, on all projects, create builds, promote and validate them. It is suited for a basic CI need when the Ontrack structure already exists and does not need to be created.

A **GLOBAL VALIDATION MANAGER** can manage validation stamps across all projects.

A **PARTICIPANT** can view all projects, and can add comments to all validation runs.

A **READ_ONLY** can view all projects, but cannot perform any action on them.

The global roles can only be assigned by an *administrator*, in the *Account management* page, by going to the *Global permissions* command.

A *global permission* is created by associating:

- a *permission target* (an account or a group)
- a *global role*

Creation:

1. type the first letter of the account or the group you want to add a permission for
2. select the account or the group
3. select the role you want to give
4. click on *Submit*

Global permissions are created or deleted, not updated.

6.1.3. Project roles

A project **OWNER** can perform all operations on a project but to delete it.

A project **PARTICIPANT** has the right to see a project and to add comments in the validation runs (comment + status change).

A project **VALIDATION_MANAGER** can manage the validation stamps and create/edit the validation runs.

A project **PROMOTER** can create and delete promotion runs, can change the validation runs statuses.

A project **PROJECT_MANAGER** cumulates the functions of a PROMOTER and of a VALIDATION_MANAGER. He can additionally manage branches (creation / edition / deletion) and the common build filters. He can also assign labels to the project.

A project **READ_ONLY** user can view this project, but cannot perform any action on it.

Only project owners, automation users and administrators can grant rights in a project.

In the project page, select the *Permissions* command.

A *project permission* is created by associating:

- a *permission target* (an account or a group)
- a *project role*

Creation:

1. type the first letter of the account or the group you want to add a permission for

2. select the account or the group
3. select the role you want to give
4. click on *Submit*

Project permissions are created or deleted, not updated.

6.1.4. Accounts

Accounts are created:

- by an administrator in the built-in authentication system, with a password stored and encrypted in Ontrack itself
- upon login when using external authentication systems like a LDAP or Open ID provider.

6.1.5. Account groups

An *administrator* can create groups using a name and a description, and assign them a list of global or project roles.

An account can be assigned to several groups.

If an external authentication system, like a LDAP or Open ID provider, is enabled, the external groups can be mapped to the account groups.

6.2. General settings

By default, all authenticated users have access to all the projects, in read only mode.

You can disable this global access by going to the *Settings* and click the *Edit* button in the *General* section. There you can set the *Grants project view to all* option to *No*.

6.3. Extending the security

Extensions can extend the security model beyond what if defined in the Ontrack core. See Extending the security for more details.

Chapter 7. Feeding information in Ontrack

Ontrack gathers and structures information which is sent by other tools in a CI/CD ecosystem or collected from them.

Foremost among the tools which will feed information into Ontrack are the CI engines. They can initialize projects and branches, they can create builds, validations and promotions, they can inject meta-information like timings, test results or links between builds.

Ontrack gathers also information out of ticketing systems, artifact managers or source control systems. This aspect is covered in the Integrations chapter.

Ontrack provides an API for tools to inject data, but more specialized integrations are provided as well:

- the Ontrack CLI
- the Ontrack Jenkins plug-in
- a set of Ontrack GitHub actions

7.1. Using the API

Ontrack provides a GraphQL API to interact with it:

- queries to get information from Ontrack
- mutations to inject information from Ontrack

Example: to create a new build for an existing project & branch:

```
mutation {
    createBuild(input: {
        projectName: "my-project",
        branchName: "my-branch",
        name: "1234",
        runInfo: {
            runTime: 12
        }
    }) {
        build {
            id
        }
        errors {
            message
        }
    }
}
```

See Ontrack GraphQL API for a complete information.

7.2. Ontrack CLI

Instead of using the API directly, you can use the Ontrack CLI, a multi-platform client which wraps the API calls into convenient commands.

For example, to create a new build for an existing project & branch:

```
ontrack-cli build setup \
  --project my-project \
  --branch my-branch \
  --build 1234
```

See the Ontrack CLI documentation for more information about the installation, configuration & usage of this client.

7.3. Jenkins plug-in

If you're using Jenkins as a CI engine, you can either use the Ontrack Jenkins plug-in or the Ontrack Jenkins pipeline library.

7.3.1. Jenkins plug-in

The Ontrack Jenkins plug-in relies on API to inject data into Ontrack.

For example, to create a build:

```
pipeline {
    stages {
        stage('Build') {
            // ...
            // Computes the `version` variable
            // ...
            post {
                success {
                    ontrackBuild(
                        project: 'my-project',
                        branch: 'my-branch',
                        build: version,
                    )
                }
            }
        }
    }
}
```

⚠ The Ontrack Jenkins plug-in will be deprecated at some point, in favor of using the Ontrack Jenkins pipeline library described below.

7.3.2. Jenkins pipeline library

The Ontrack Jenkins pipeline library wraps the Ontrack CLI into convenient pipeline steps.

> To be implemented. As much as possible, the pipeline library will mimic the steps which were provided by the Jenkins plug-in.

For example, to create a build:

```
pipeline {
    stages {
        stage('Build') {
            // ...
            // Computes the `version` variable
            // ...
            post {
                success {
                    ontrackBuild(
                        project: 'my-project',
                        branch: 'my-branch',
                        build: version,
                    )
                }
            }
        }
    }
}
```

7.4. GitHub

There are several ways to integrate GitHub Actions workflows with Ontrack:

- ingestion of workflow data in Ontrack through a GitHub Webhook
- direct integration using GitHub Actions or the Ontrack CLI

7.4.1. GitHub Ingestion Hook

Integration of Ontrack inside of GitHub workflows is cumbersome and does not feel very natural.

A more seamless way to get GitHub workflows data into Ontrack is to work by ingesting the data directly from the workflow, without even adapting it.

We can do this by registering a webhook at the repository or organization level.

See GitHub Ingestion for the detailed configuration of the hook and all its options.

As a quick start:

1. Generate a unique token randomly (GitHub suggests using `ruby -rsecurerandom -e 'puts`

`SecureRandom.hex(20)'` but any other method would do)

2. In the repository or organization, register a Webhook:
   - URL - `<ontrack>/hook/secured/github/ingestion`
   - Content type - `application/json`
   - Secret - the secret you generated in step (1)
   - Permissions:
   - Workflow jobs
   - Workflow runs
   - Pushes (for autoconfiguration)
3. In Ontrack, create at least one GitHub configuration
4. Still in Ontrack, go to the *Settings* > *GitHub workflow ingestion* section and set the token as generated in step (1)

From now on, everytime a working runs in GitHub, data about its steps will be created automatically in Ontrack.

7.4.2. Ontrack CLI & GitHub Actions

You can easily use the Ontrack CLI from your GitHub workflows by using the following actions:

- `nemerosa/ontrack-github-actions-cli-setup` - install, configures and use the CLI to setup a project and branch in Ontrack based on GitHub information:

```
- name: Setup the CLI
  uses: nemerosa/ontrack-github-actions-cli-setup@v1
  with:
    github-token: ${{ github.token }}
    only-for: nemerosa
    url: <ontrack-url>
    token: ${{ secrets.ONTRACK_TOKEN }}
    config: github.com
    indexation: 120
```

- `nemerosa/ontrack-github-actions-cli-validation` - creates a validation run for a build based on GitHub information:

```
- name: Ontrack build validation
  uses: nemerosa/ontrack-github-actions-cli-validation@main
  with:
    step-name: Ontrack build
    validation: BUILD
    build: ${{ github.run_number }}
    token: ${{ github.token }}
```

Note that when `nemerosa/ontrack-github-actions-cli-setup` has been called into your workflow job, the Ontrack CLI becomes available in all subsequent steps and be used directly:

```
- name: Setup the CLI
  uses: nemerosa/ontrack-github-actions-cli-setup@v1
  with:
    # ...
- name: Using the CLI
  run: ontrack-cli ...
```

Chapter 8. Features

8.1. Managing projects

8.2. Managing branches

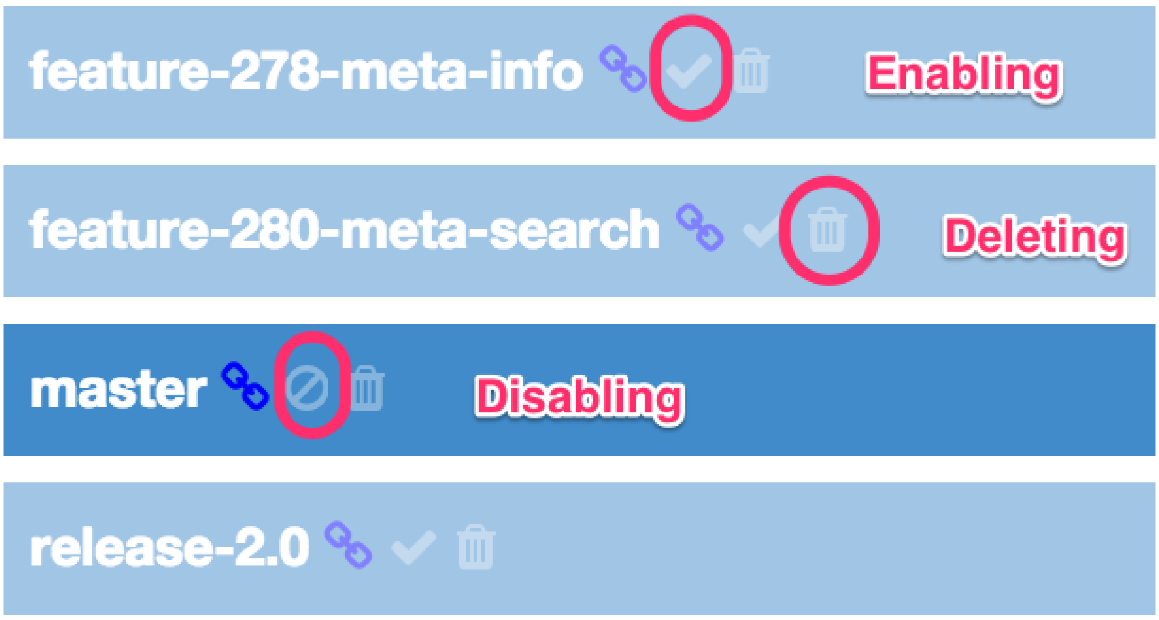
Several branches can be defined per project.

8.2.1. Managing the branches in the project page

If you click on the *Show all branches* button in the project page, you can display all the branches, including the ones being disabled.

According to your authorizations, the following commands will be displayed as icons just on the right of the branch name, following any other decoration:

- disabling the branch
- enabling the branch
- deleting the branch



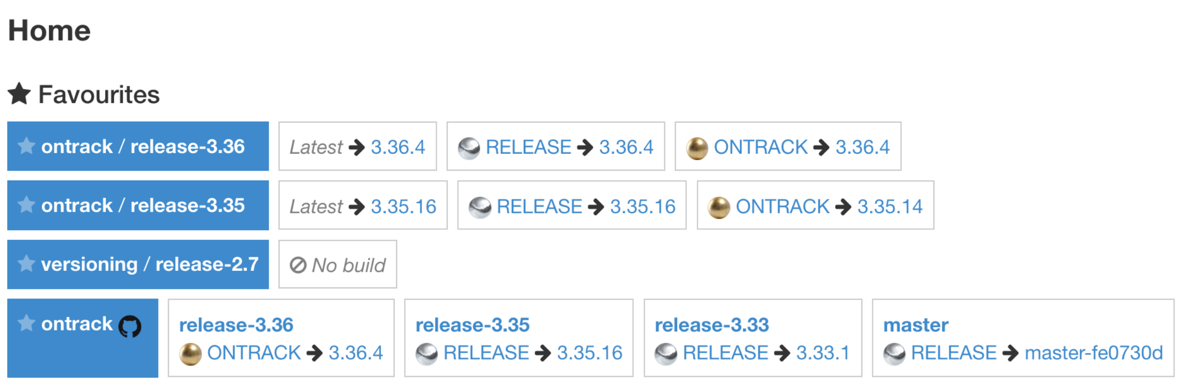
This allows you to have quick access to the management of the branches in a project. Only the deletion of a branch will prompt you about your decision.

8.2.2. Branch favorites

Instead of selectioning a project as a favorite, one might find more convenient to select branches only.

This reduces the clutter on the home page when projects tend to have a lot of branches.

All favorite branches do appear on the home page, together with any favorite project:


Home

Favourites

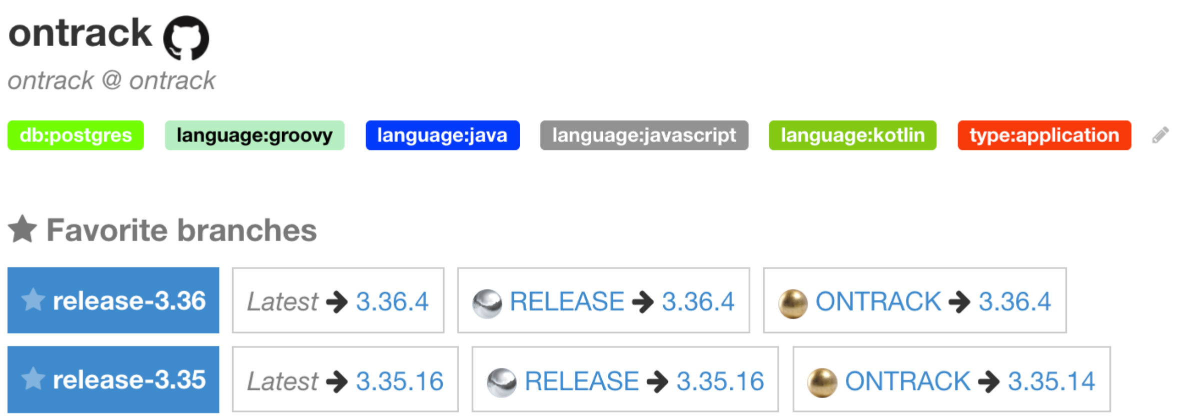
ontrack / release-3.36 — Latest → 3.36.4 — RELEASE → 3.36.4 — ONTRACK → 3.36.4

ontrack / release-3.35 — Latest → 3.35.16 — RELEASE → 3.35.16 — ONTRACK → 3.35.14

versioning / release-2.7 — No build

ontrack — release-3.36 ONTRACK → 3.36.4 — release-3.35 RELEASE → 3.35.16 — release-3.33 RELEASE → 3.33.1 — master RELEASE → master-fe0730d

The favorite branches of a given project do also appear on the project page:


ontrack

ontrack @ ontrack

db:postgres language:groovy language:java language:javascript language:kotlin type:application

Favorite branches

release-3.36 — Latest → 3.36.4 — RELEASE → 3.36.4 — ONTRACK → 3.36.4

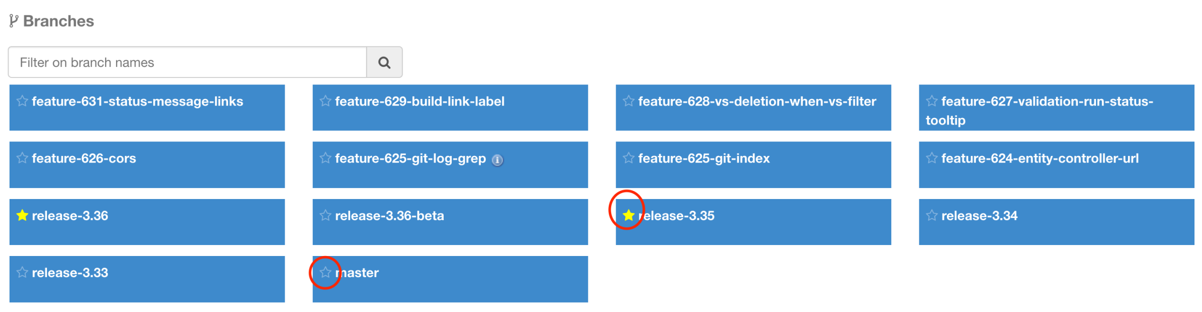
release-3.35 — Latest → 3.35.16 — RELEASE → 3.35.16 — ONTRACK → 3.35.14

In both cases, following information is displayed:

- latest build
- latest build per promotion

Branches can be unselected as favorite using the star left of their name.

In order to select a branch as favorite, use the little star left of its name in the branch list in the project page:


Branches

Filter on branch names

☆ feature-631-status-message-links | ☆ feature-629-build-link-label | ☆ feature-628-vs-deletion-when-vs-filter | ☆ feature-627-validation-run-status-tooltip

☆ feature-626-cors | ☆ feature-625-git-log-grep | ☆ feature-625-git-index | ☆ feature-624-entity-controller-url

★ release-3.36 | ☆ release-3.36-beta | ★ release-3.35 | ☆ release-3.34

☆ release-3.33 | ☆ master

You can use this star to unselect it as well. When selected, the star is marked as yellow.

8.2.3. Pull requests

When Git is enabled for a project, the Ontrack branches can point to either regular Git branches or to pull requests when this feature is enabled.

See [git-pull-requests] for more information.

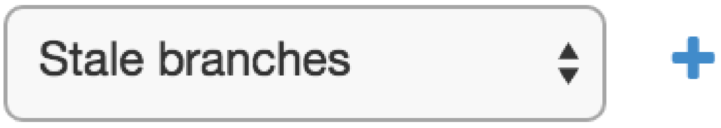
8.2.4. Managing stale branches

By default, Ontrack will keep all the branches of a project forever. This can lead to a big number of branches to be displayed.

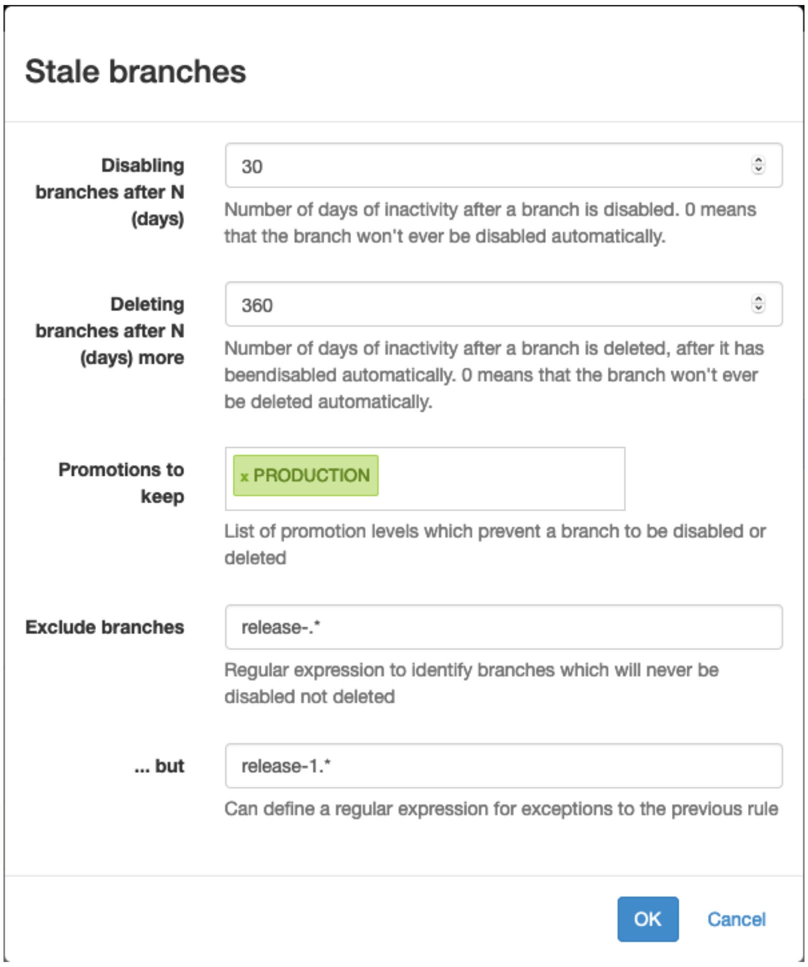
You can configure a project to *disable* branches after a given number of days has elapsed since the last build, and then to *delete* them after an additional number of days has elapsed again.

To configure this:

- go to the project page
- select the *Stale branches* property and add it:



- set the number of days before disabling and the number of days before deleting



Stale branches

Disabling branches after N (days): 30
Number of days of inactivity after a branch is disabled. 0 means that the branch won't ever be disabled automatically.

Deleting branches after N (days) more: 360
Number of days of inactivity after a branch is deleted, after it has beendisabled automatically. 0 means that the branch won't ever be deleted automatically.

Promotions to keep: x PRODUCTION
List of promotion levels which prevent a branch to be disabled or deleted

Exclude branches: release-.*
Regular expression to identify branches which will never be disabled not deleted

... but: release-1.*
Can define a regular expression for exceptions to the previous rule

If the *disabling* days are set to 0, no branch will be ever disabled or deleted.

If the *deleting* days are set to 0, no branch will ever be deleted.

You can also set a list of promotion levels - a branch which is or has been promoted to such a promotion level will not be eligible for being disabled or deleted.

In the sample above, the stale branches will be disabled after 60 days (not shown any longer by default), and after again 360 days, they will be deleted (so after 390 days in total). Branches which have at least one build being promoted to `PRODUCTION` will not be deleted or disabled.

Additional, two regular expressions can be used to add further protection against the disabling & deletion of the branches:

- the first one ("includes") is used to select the branches which are *not* eligible to disabling and deletion
- the second expression ("excludes") can be used to refine the first expression, by matching branches which still must be disabled or deleted.

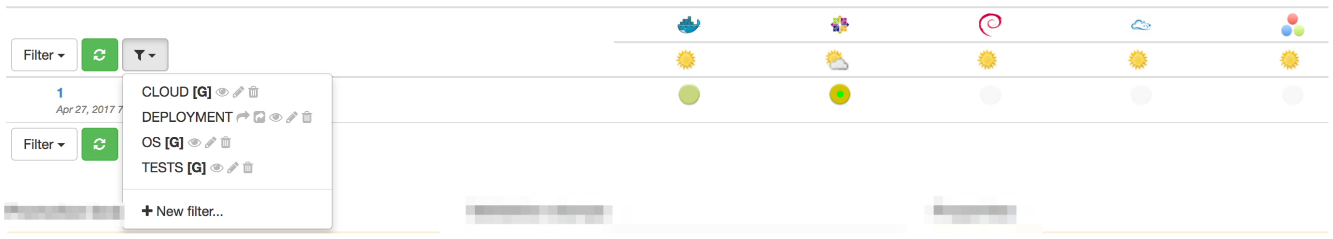
8.2.5. Validation stamp filters

When a branch defines many validation stamps, the view can become cluttered and not really useful any longer, because displaying too much information.

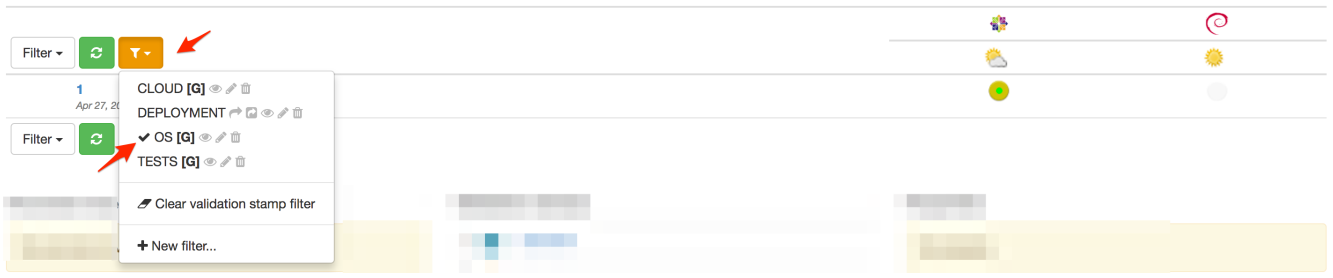
Validation stamp filters can be defined to restrict the view to a set of known validation stamps.

Using filters

Validation stamp filters can be selected in the branch view, just on the left of the list of validation stamp headers:

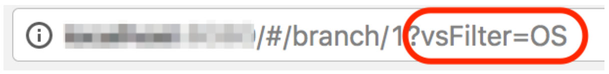


When a filter is selected, it is marked as such and only associated validation stamp columns are shown in the view:

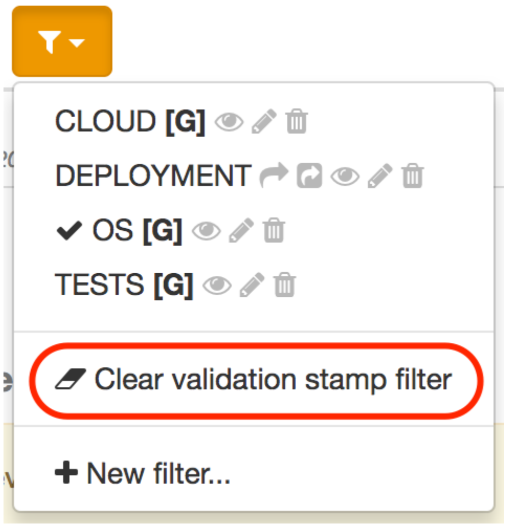


The validation stamp filter menu is also marked in orange to indicate that a filter has been applied.

When the filter is applied, its name appears also in the URL. This can be used as a permalink:



You can remove the filter by selecting *Clear validation stamp filter* in the filter menu:



Editing filters

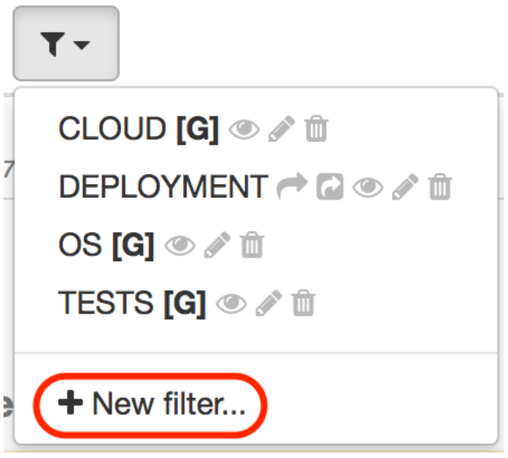
Only authorized users are allowed to edit the validation stamp filters for a branch. See Authorisations for more details.

A validation stamp filter is defined by:

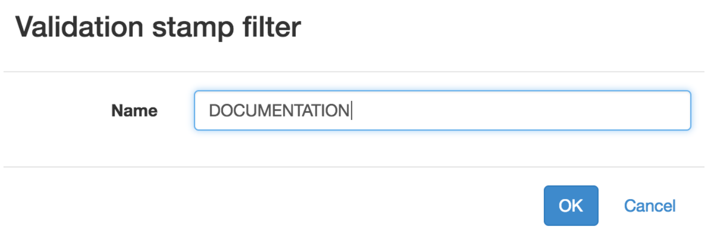
- a name
- a list of validation stamp names to include

While it is possible to edit a filter using a dialog (see later), it is far easier to use the in-place editor.

Start by creating a validation stamp filter by selecting the *New Filter…* entry in the filter menu:

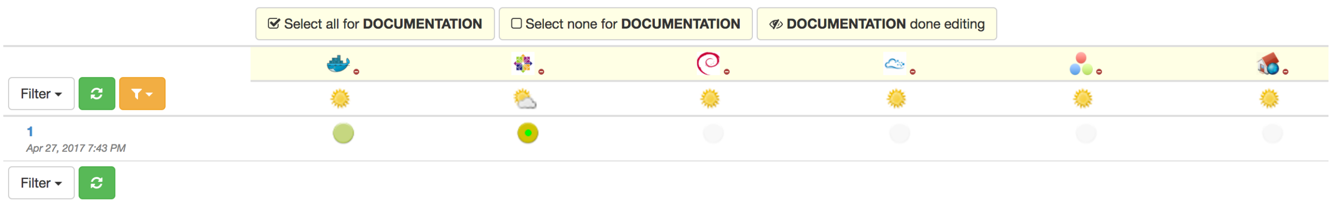


This displays a dialog to create the new filter:



Only the name is required and all current validation stamps filters are included by default.

When created, the filter can be directly edited in-place:

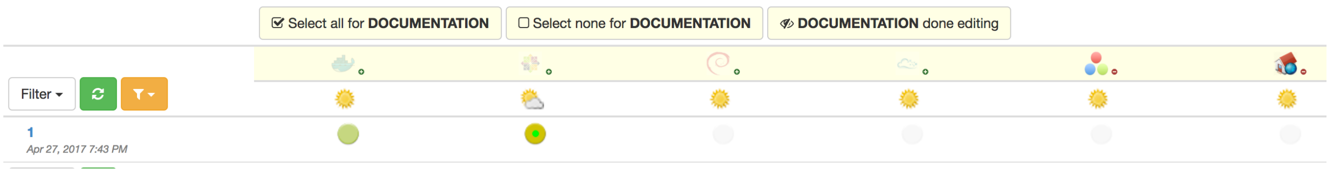

Select all for DOCUMENTATION
Select none for DOCUMENTATION
DOCUMENTATION done editing
Filter
1
Apr 27, 2017 7:43 PM
Filter

The following actions are possible:

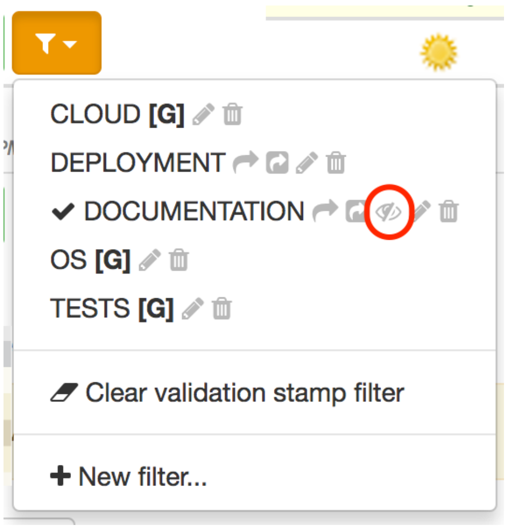
- by clicking on the *Select none* button, no validation stamps is associated with the filter.
- by clicking on the *Select all* button, all validation stamps are associated with the filter.
- by clicking on the *Done with edition* button, the in-place edition stops and the normal display is resumed

You can also click on a validation stamp to remove it or to add it to the filter.

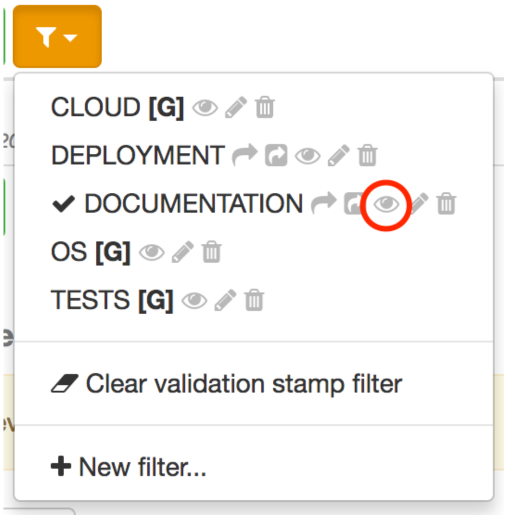
In case the validation stamp is associated with the filter, a *minus* icon appears close to its name. It it is not associated, the icon is dimmed and a plus icon appears:


Select all for DOCUMENTATION
Select none for DOCUMENTATION
DOCUMENTATION done editing
Filter
1
Apr 27, 2017 7:43 PM

Note that you can also stop the edition by selecting the eye icon in the menu:

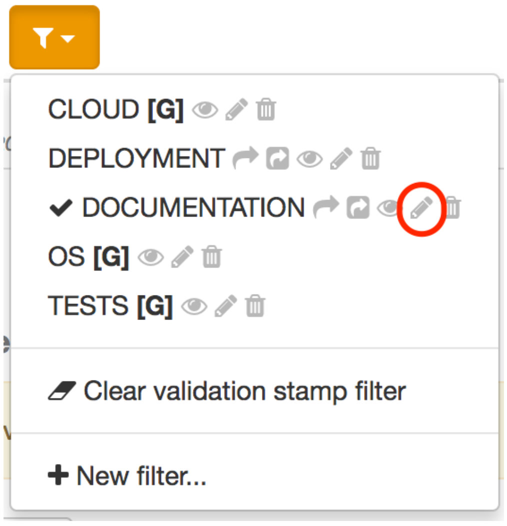


To start editing an existing filter, just click also on the eye icon close to its name:

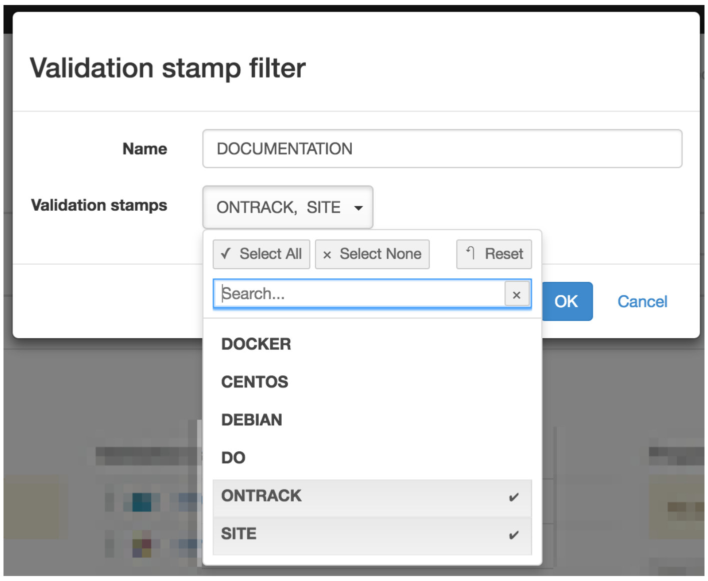


Select any other filter, or removing the filter, will also stop the in-place edition.

To edit a filter directly, you can also select the pencil icon and edit the filter using a dialog:



This displays an edition dialog allowing to change the name and the list of validation stamps.

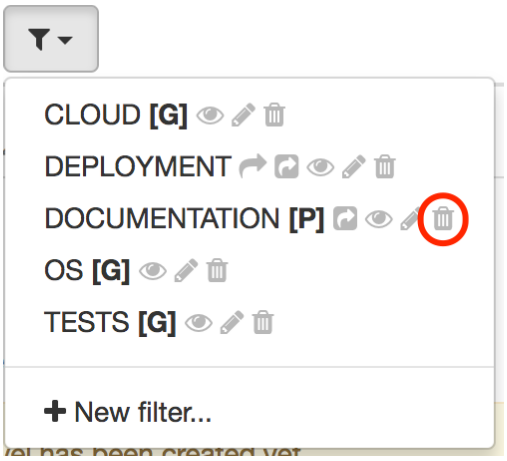


For a filter associated with a branch (see below, sharing), names can be selected among the validation stamps of the branch.

For a filter associated with a project, the list of validation stamps for *all* the branches is available.

For a *global* filter, names are no longer selected but must be edited.

Finally, to delete a filter, click on the trash icon:



A confirmation will be asked before the deletion actually occurs.

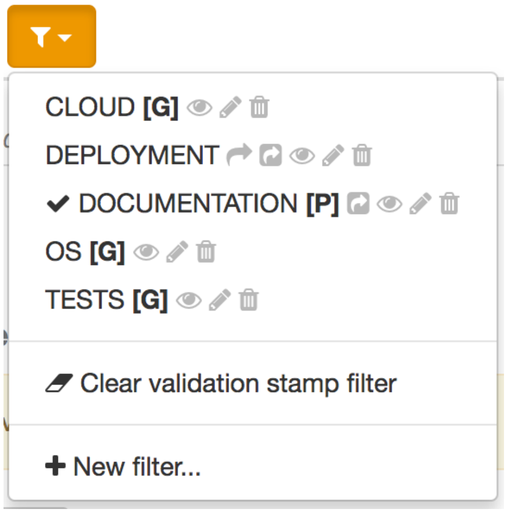
Sharing

A filter is created by default at branch level and is only visible when the associated branch is displayed.

An authorized user can:

- share the filter at project level - in this case, the filter is available for all the branches of the project
- share the filter at global level - in this case, the filter is available for all projects and all branches

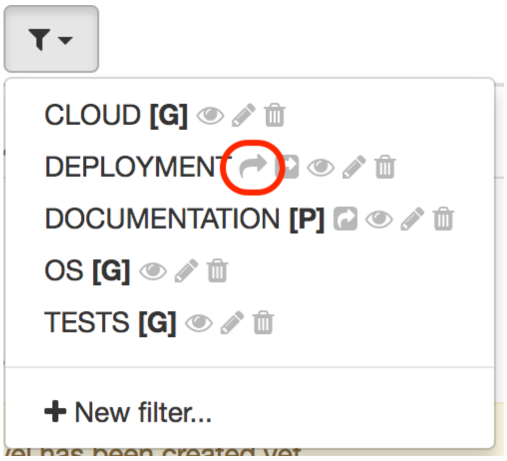
A filter shared at project level is shown with a `[P]` close to its name and a global filter with a `[G]`:



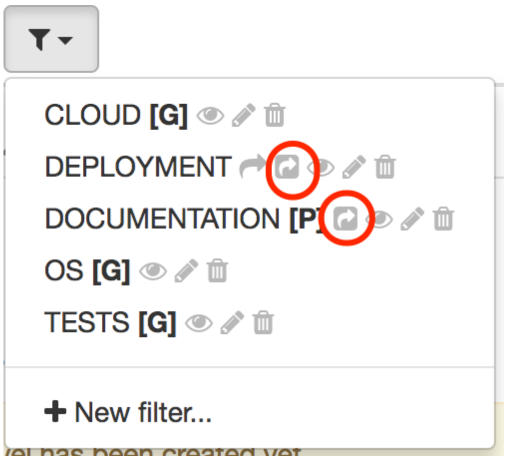
In the screenshot above:

- `DEPLOYMENT` is associated with the current branch
- `DOCUMENTATION` is associated with the project
- the other filters are global

To share a filter at project level, click on the share icon:



To share a filter at global level, click on the share icon:



Authorisations

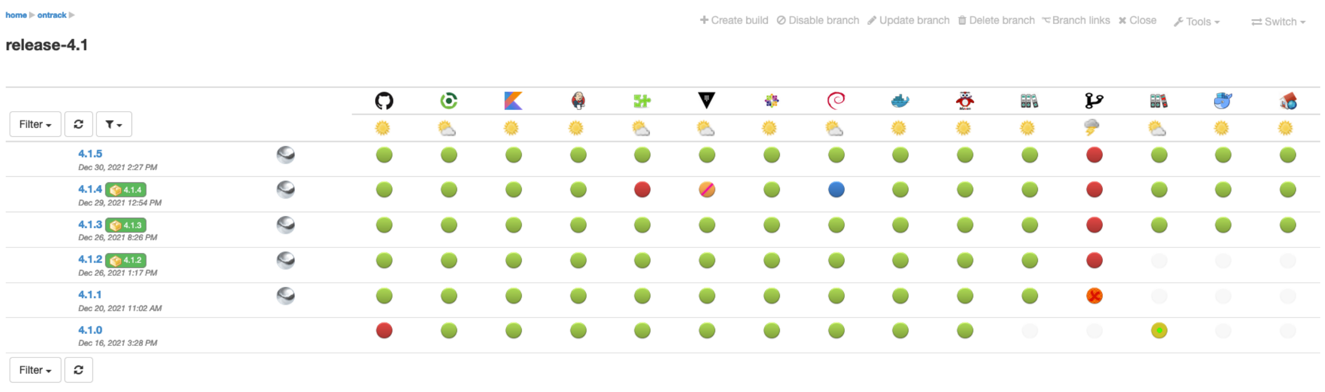
According to the role of the authenticated used, following actions are possible:

Scope	Action	Participant	Validation stamp manager	Project manager/owner	Administrator
Branch	Create	Yes	Yes	Yes	Yes
Branch	Edit	Yes	Yes	Yes	Yes
Branch	Delete	Yes	Yes	Yes	Yes
Branch	Share to project	No	Yes	Yes	Yes
Project	Edit	No	Yes	Yes	Yes
Project	Delete	No	Yes	Yes	Yes
Project	Share to global	No	No	No	Yes
Global	Edit	No	No	No	Yes
Global	Delete	No	No	No	Yes

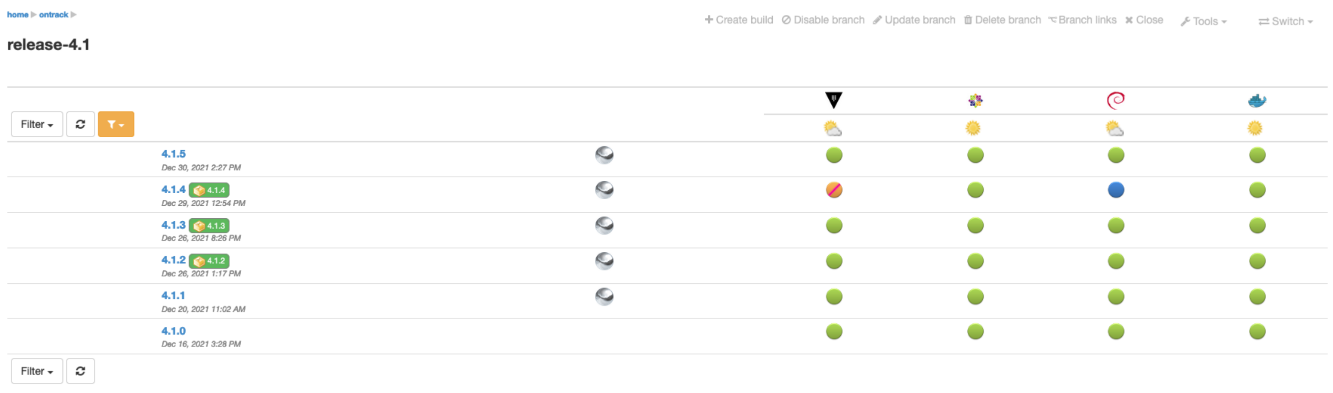
8.2.6. Validation stamp display options

In the branch view, you can tune the display of the validations using different options.

By default, you get all the validation stamps of the branch:

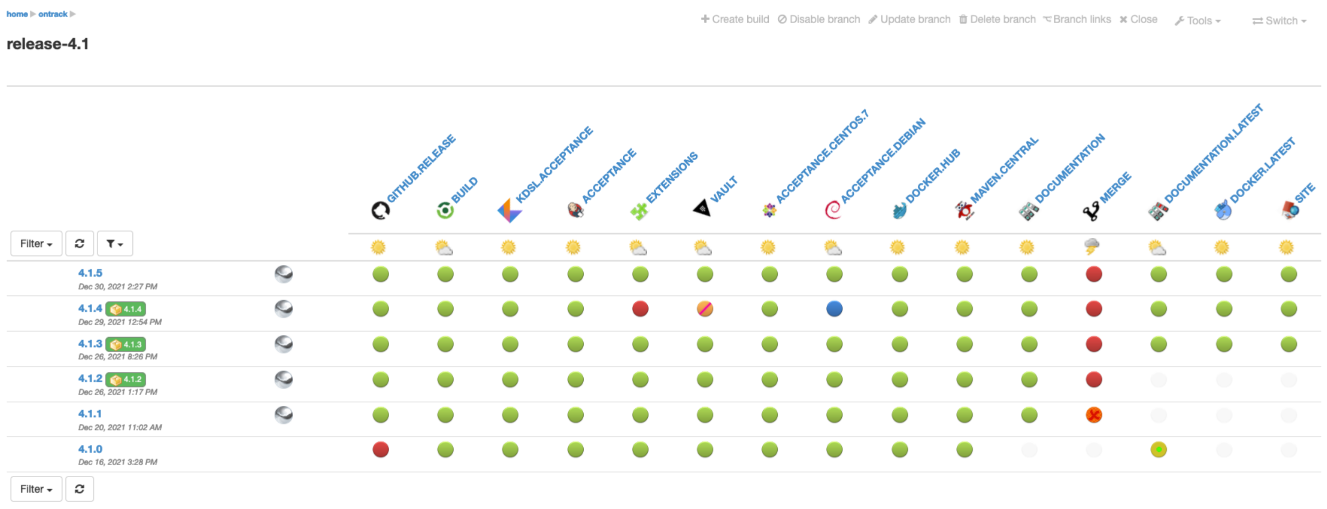


You can restrict the number of validation stamps being displayed by using a validation stamp filter:



Additionally, you can display the names of the validation stamps by selecting the *Display validation stamp names* option in the validation stamp filter menu:

This displays:

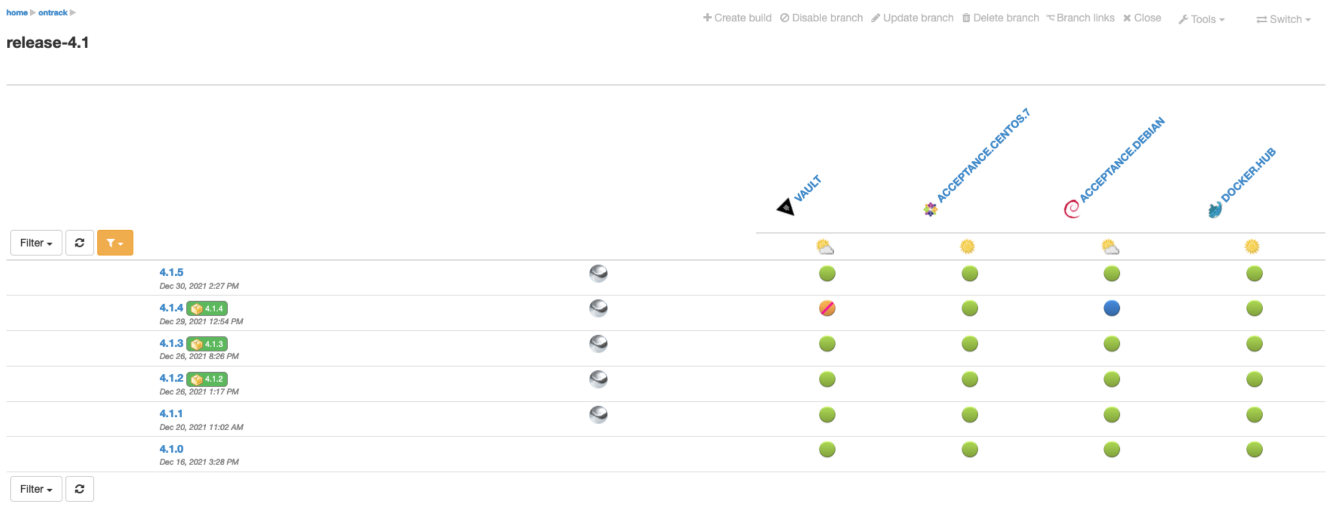


home ▸ ontrack ▸

release-4.1

		GITHUB.RELEASE	BUILD	KDSL.ACCEPTANCE	ACCEPTANCE	EXTENSIONS	VAULT	ACCEPTANCE.CENTOS.7	ACCEPTANCE.DEBIAN	DOCKER.HUB	MAVEN.CENTRAL	DOCUMENTATION	MERGE	DOCUMENTATION.LATEST	DOCKER.LATEST	SITE
4.1.5 Dec 30, 2021 2:27 PM	◉	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🟢	🟢	🟢
4.1.4 4.1.4 Dec 29, 2021 12:54 PM	◉	🟢	🟢	🟢	🟢	🔴	⊘	🟢	🔵	🟢	🟢	🟢	🔴	🟢	🟢	🟢
4.1.3 4.1.3 Dec 26, 2021 8:26 PM	◉	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🟢	🟢	🟢
4.1.2 4.1.2 Dec 26, 2021 1:17 PM	◉	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴			
4.1.1 Dec 20, 2021 11:02 AM	◉	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	✖			
4.1.0 Dec 16, 2021 3:28 PM		🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢			🟡		

or with a filter:



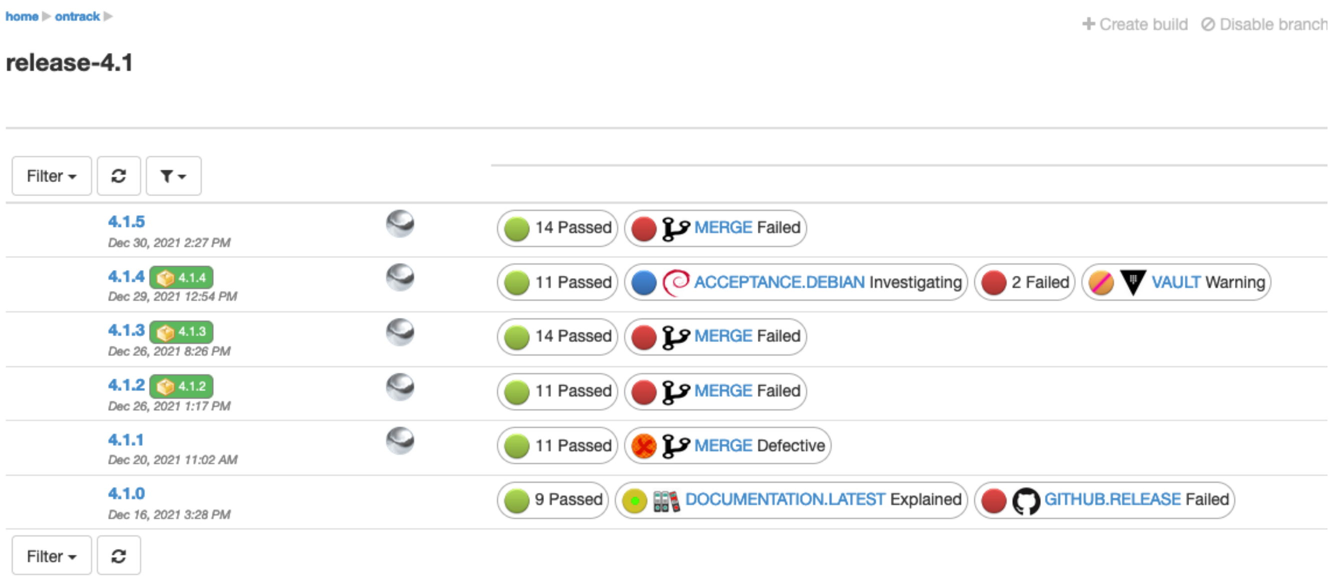
home ▸ ontrack ▸

release-4.1

		VAULT	ACCEPTANCE.CENTOS.7	ACCEPTANCE.DEBIAN	DOCKER.HUB
4.1.5 Dec 30, 2021 2:27 PM	◉	🟢	🟢	🟢	🟢
4.1.4 4.1.4 Dec 29, 2021 12:54 PM	◉	⊘	🟢	🔵	🟢
4.1.3 4.1.3 Dec 26, 2021 8:26 PM	◉	🟢	🟢	🟢	🟢
4.1.2 4.1.2 Dec 26, 2021 1:17 PM	◉	🟢	🟢	🟢	🟢
4.1.1 Dec 20, 2021 11:02 AM	◉	🟢	🟢	🟢	🟢
4.1.0 Dec 16, 2021 3:28 PM		🟢	🟢	🟢	🟢

Finally, when dealing with too many validation stamps for the display to be OK, you can choose to group validations per status:

And this displays:

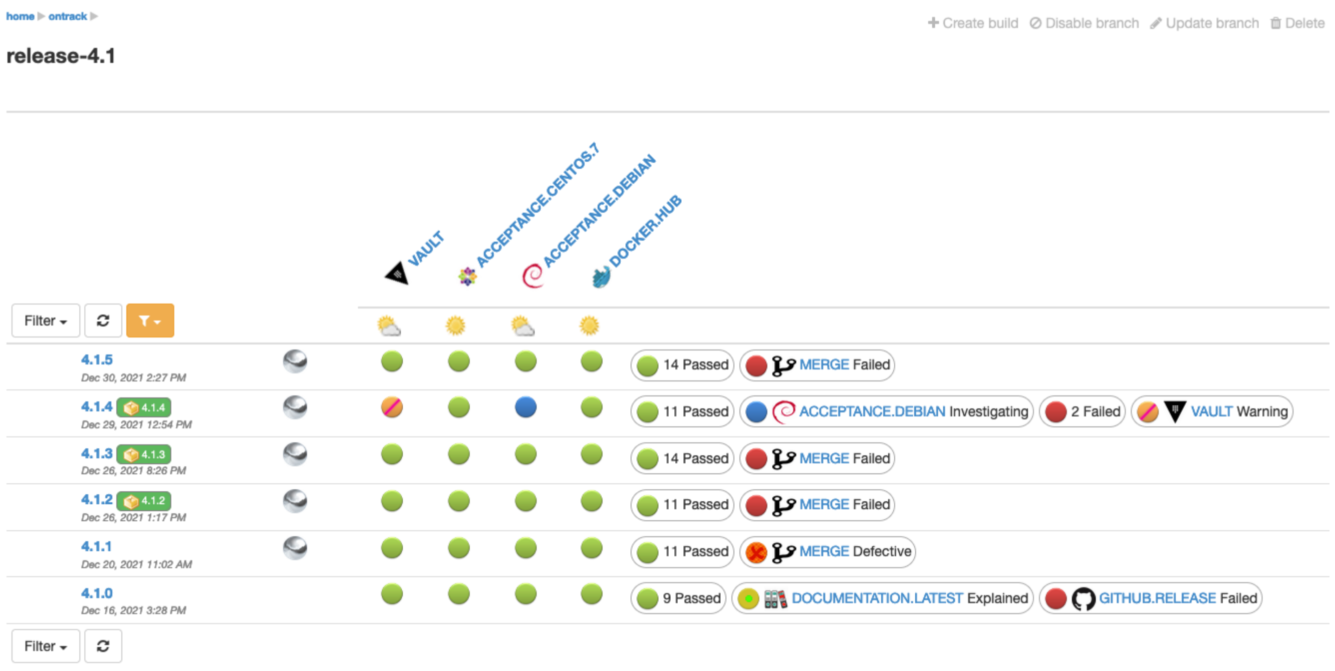

home ▶ ontrack ▶

release-4.1

+ Create build ⊘ Disable branch

Build	Date	Validations
4.1.5	Dec 30, 2021 2:27 PM	14 Passed · MERGE Failed
4.1.4 (4.1.4)	Dec 29, 2021 12:54 PM	11 Passed · ACCEPTANCE.DEBIAN Investigating · 2 Failed · VAULT Warning
4.1.3 (4.1.3)	Dec 26, 2021 8:26 PM	14 Passed · MERGE Failed
4.1.2 (4.1.2)	Dec 26, 2021 1:17 PM	11 Passed · MERGE Failed
4.1.1	Dec 20, 2021 11:02 AM	11 Passed · MERGE Defective
4.1.0	Dec 16, 2021 3:28 PM	9 Passed · DOCUMENTATION.LATEST Explained · GITHUB.RELEASE Failed

When using a validation stamp filter, the validation stamps matched by the selected filter are always displayed, on the left of the groups:

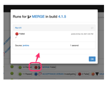

home ▶ ontrack ▶

release-4.1

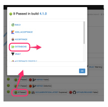
+ Create build ⊘ Disable branch ✎ Update branch 🗑 Delete

Build	Date	VAULT	ACCEPTANCE.CENTOS.7	ACCEPTANCE.DEBIAN	DOCKER.HUB	Validations
4.1.5	Dec 30, 2021 2:27 PM	●	●	●	●	14 Passed · MERGE Failed
4.1.4 (4.1.4)	Dec 29, 2021 12:54 PM	●	●	●	●	11 Passed · ACCEPTANCE.DEBIAN Investigating · 2 Failed · VAULT Warning
4.1.3 (4.1.3)	Dec 26, 2021 8:26 PM	●	●	●	●	14 Passed · MERGE Failed
4.1.2 (4.1.2)	Dec 26, 2021 1:17 PM	●	●	●	●	11 Passed · MERGE Failed
4.1.1	Dec 20, 2021 11:02 AM	●	●	●	●	11 Passed · MERGE Defective
4.1.0	Dec 16, 2021 3:28 PM	●	●	●	●	9 Passed · DOCUMENTATION.LATEST Explained · GITHUB.RELEASE Failed

If one validation has a particular status, clicking on the validation displays the latest validation run, and from there, you can progress its status and/or enter comments:



When several validations have the same status, the dialog will display the list of validations having this status. Clicking on a validation will then display the latest validation run for this validation:



8.3. Working with SCM

Source Control Management (SCM) is at the core of Continuous Integration and Continuous Delivery chains. It’s therefore not a surprise that they play a major role in Ontrack.

8.3.1. SCM Catalog

Ontrack allows to collect information about all registered SCMs and to correlate this information with the Ontrack projects.

Model

A *SCM Catalog entry* represents a physical SCM repository which is accessible by Ontrack. An entry contains the following information:

- *SCM* - type of SCM, like `github` or `bitbucket`.
- *Configuration* - associated configuration in Ontrack to access this repository (URL, credentials, etc.).
- *Repository* - identifier for this repository. It depends on the type of SCM. For example, for GitHub, it can be name of the repository, like `nemerosa/ontrack`.

A SCM catalog entry can be:

- *linked* if an Ontrack project exists which is associated to this repository
- *unlinked* otherwise

Some Ontrack projects are *orphan* if they are not associated with any repository accessible by Ontrack or if their associated repository is not accessible.

SCM Catalog list

To access the SCM catalog, you must be logged in. You must select the *SCM Catalog* item in your user menu.

The list looks like:

The *Project* column indicates if the entry is *linked* or *unlinked*. In case it is linked, a link to the Ontrack project page is available.

Filtering is possible using text boxes at the top. You can also navigate back and forth in the list using the *Previous* and *Next* buttons.

The main filter, labelled *Only SCM entries*, allows to select the type of entry:

- *Only SCM entries* - selected by default, shows all repositories accessible by Ontrack
- *All entries and orphan projects* - additionally, shows the *orphan* projects
- *Linked entries only* - shows only the entries which are *linked* to projects

- *Unlinked entries only* - shows only the *unlinked* entries
- *Orphan projects only* - shows only the *orphan* projects, as shown below:

In this case, only the link to the project is available since no repository information is accessible.

Orphan project decoration

Since *orphan* projects are an anomaly (because every Ontrack project should be associated with some kind of SCM), they get a special decoration, so that they can easily be identified (and fixed):

Project labels

If the collection of project labels is enabled, the following labels will be set for projects:

- `scm-catalog:entry` when the project is associated with a SCM Catalog entry
- `scm-catalog:no-entry` when the project is NOT associated with a SCM Catalog entry

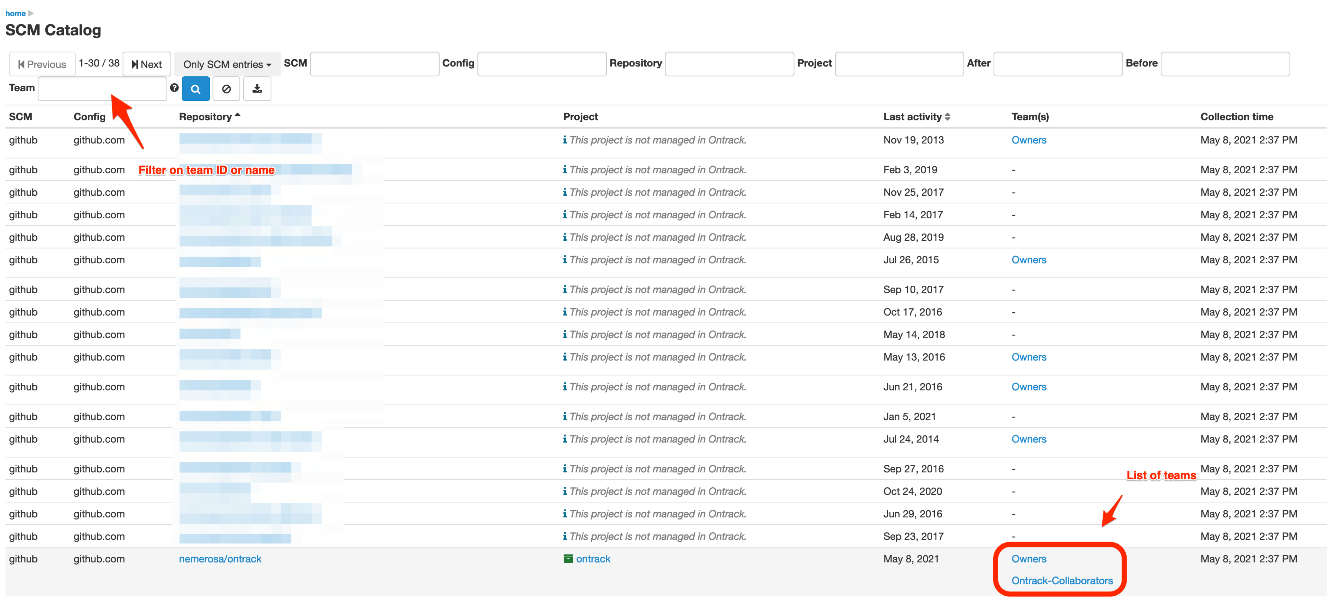
Those labels can be used to filter *orphan* projects on the home page for example, or in GraphQL queries.

Teams

For SCM which allow for this, the SCM catalog collects the list of teams for each repositoy.

> The teams collection is only enabled for GitHub right now.
>
> When trying to get the teams for GitHub, the GitHub token needs to have `read:org` in its organization scope.

The teams do appear in the SCM catalog list and can be used to filter the SCM catalog entries:

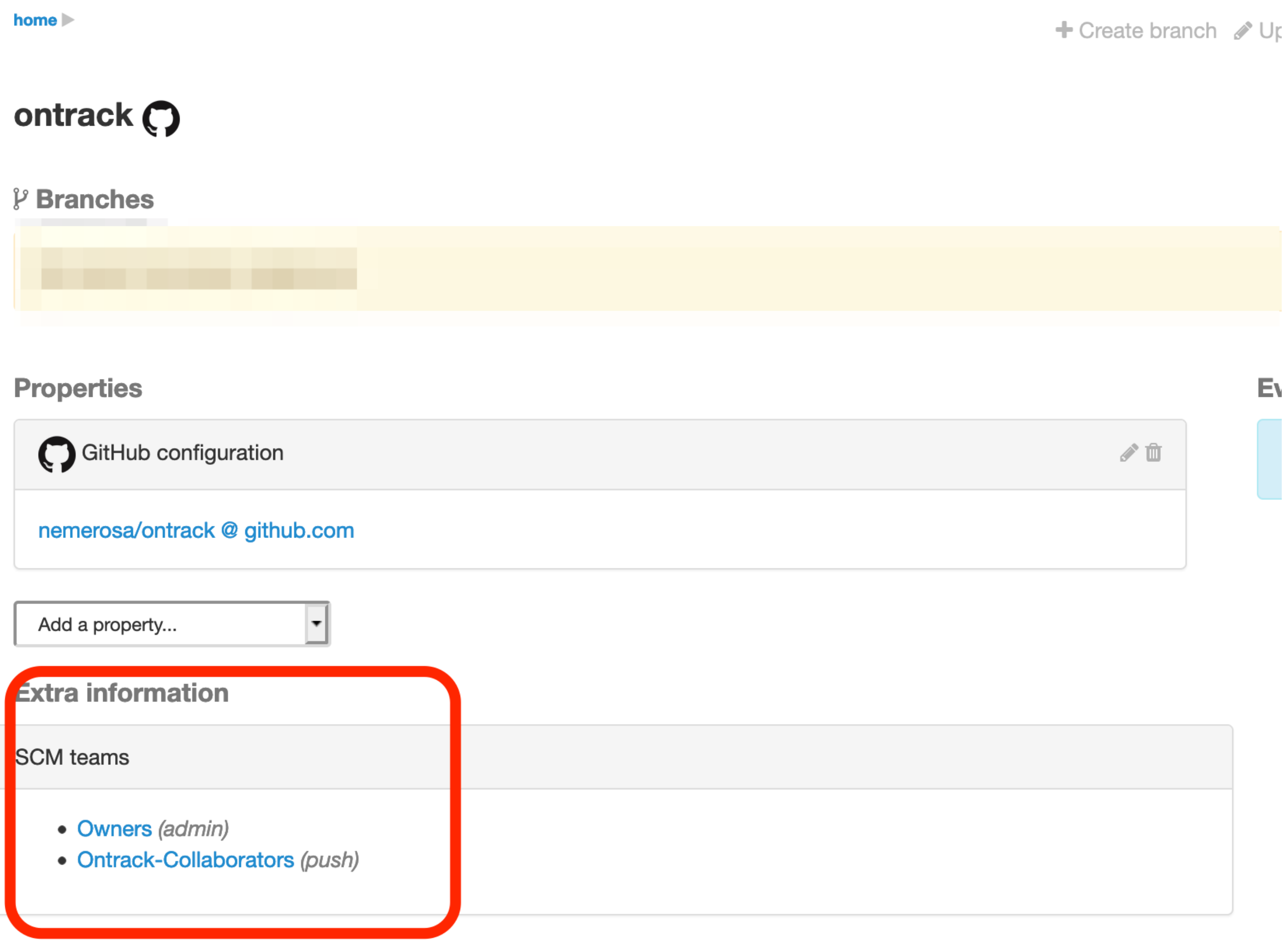


SCM Catalog

SCM	Config	Repository	Project	Last activity	Team(s)	Collection time
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Nov 19, 2013	Owners	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Feb 3, 2019	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Nov 25, 2017	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Feb 14, 2017	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Aug 28, 2019	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Jul 26, 2015	Owners	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Sep 10, 2017	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Oct 17, 2016	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	May 14, 2018	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	May 13, 2016	Owners	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Jun 21, 2016	Owners	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Jan 5, 2021	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Jul 24, 2014	Owners	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Sep 27, 2016	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Oct 24, 2020	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Jun 29, 2016	-	May 8, 2021 2:37 PM
github	github.com	[redacted]	*This project is not managed in Ontrack.*	Sep 23, 2017	-	May 8, 2021 2:37 PM
github	github.com	nemerosa/ontrack	ontrack	May 8, 2021	Owners Ontrack-Collaborators	May 8, 2021 2:37 PM

Each team is associated with a link to its page in the SCM.

The teams information is also available in the Ontrack project page:



On this page, the role of the team for this project is also displayed, but usually, more details can be accessed by following the link to the SCM team page.

Catalog synchronization

Synchronization between the SCM and Ontrack can be enabled:

- creating an Ontrack project automatically from an SCM repository
- disabling Ontrack projects when their repository is no longer present

These two synchronizations are distinct and configured with their own flag in the *SCM Catalog Synchronization* settings.

GraphQL schema

The SCM Catalog is accessible through the Ontrack GraphQL schema.

At root level, the `scmCatalog` query allows to query the SCM Catalog itself and to filter the catalog.

For example, to get the list of *orphan* projects:

```
{
  scmCatalog(link: "ORPHAN") {
    pageItems {
      project {
        name
      }
    }
  }
}
```

or to get the entries which are unlinked:

```
{
  scmCatalog(link: "UNLINKED") {
    pageItems {
      entry {
        scm
        config
        repository
        repositoryPage
      }
    }
  }
}
```

See the GraphQL schema documentation for more fields and filters.

Additionally, the `scmCatalogEntry` field is available on the `Project` tpe to provide information about any associated SCM Catalog entry:

```
{
  projects(name: "ontrack") {
    scmCatalogEntry {
      scm
      config
      repository
      repositoryPage
    }
  }
}
```

Metrics

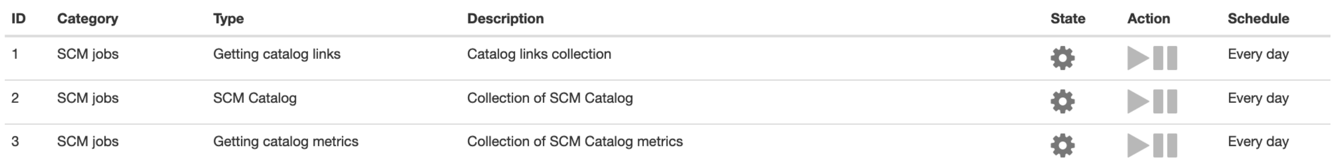
The following metrics are available:

- `ontrack_extension_scm_catalog_total` (gauge) - count of SCM catalog entries + orphan projects

- `ontrack_extension_scm_catalog_entries` (gauge) - count of SCM catalog entries
- `ontrack_extension_scm_catalog_linked` (gauge) - count of *linked* SCM catalog entries
- `ontrack_extension_scm_catalog_unlinked` (gauge) - count of *unlinked* SCM catalog entries
- `ontrack_extension_scm_catalog_orphan` (gauge) - count of orphan projects

Administration

This feature is enabled by default but can be controlled using some administrative jobs:



ID	Category	Type	Description	State	Action	Schedule
1	SCM jobs	Getting catalog links	Catalog links collection	⚙	▶ ❚❚	Every day
2	SCM jobs	SCM Catalog	Collection of SCM Catalog	⚙	▶ ❚❚	Every day
3	SCM jobs	Getting catalog metrics	Collection of SCM Catalog metrics	⚙	▶ ❚❚	Every day

- *Collection of SCM Catalog* - gets the list of repositories accessible from Ontrack. Runs once a day.
- *Catalog links collection* - gets the links between the projects and associated SCM repositories. Runs once a day.
- *Collection of SCM Catalog metrics* - computes some metrics about the SCM catalog

Specific configuration for GitHub

The GitHub repositories are *not* collected unless their organization is specifically allowed. By default, none are.

In order to enable the scanning of a GitHub organization, log as administrator, go to the *Settings*, scroll to the *GitHub SCM Catalog* section and enter the names of the organizations to authorise for collection. For example, below, only the `nemerosa` organization is allowed:

8.4. Workflows

Workflows allow the execution of several actions orchestrated in a DAG (directed acyclic graph).

As of version 4.8, workflows can only be triggered using the Notifications.

There is already some partial and undocumented support through API calls to run some standalone workflows but this is very experimental.

8.4.1. Workflows definitions

To run a workflow, you can define a notification whose channel is `workflow`.

This can be done through the UI or as code.

Workflows definitions in the UI is only supported in the Next UI of Ontrack and won't be supported in the legacy UI.

A workflow:

- has a name, used for information and display purposes
- has a list of nodes

Each node:

- has an ID which must be unique inside the workflow
- an executor ID that points to a *workflow node executor*
- some data for the *workflow node executor*
- a list of parent nodes

The list of parent nodes is what defines the workflow DAG.

When defining or running workflows, graph cycles are automatically detected.

Workflows notifications can be defined as code, like all other notifications.

For example:

```
channel: workflow
channelConfig:
  workflow:
    name: My workflow
    nodes:
      - id: ticket
        executorId: notification
        data:
          channel: jira-creation
          channelConfig:
            # Configuration for the ticket creation
      - id: mail
        executorId: notification
        parents:
          - id: ticket
        data:
          channel: mail
          channelConfig:
            # Configuration for the mail
          template: |
            Link to ticket: ${workflow.ticket?path=url}
```

8.4.2. Workflows nodes executors

A *workflow node executor* is a component which is responsible to "run a node".

See Workflow nodes executors for a list of all existing workflow node executors.

8.4.3. Workflow templating

Many elements in the workflow definition are subject to templating.

The workflow name is itself considered as a template when being run as a notification (which is the default in 4.8).

When using notifications as node executors, the configuration elements are templates as usual.

Note that for a workflow notification, the event is passed as a context element and all template functions and sources are available.

Additionally, when a notification is run as part of a workflow, a new templating function is available: `workflow`.

This function allows the access to the output data of any successful node in the workflow.

For example, let's take a workflow which:

- creates a ticket in Jira
- then send a link to this ticket with an email

```
channel: workflow
channelConfig:
  workflow:
    name: My workflow
    nodes:
      - id: ticket
        executorId: notification
        data:
          channel: jira-creation
          channelConfig:
            # Configuration for the ticket creation
      - id: mail
        executorId: notification
        parents:
          - id: ticket
        data:
          channel: mail
          channelConfig:
            # Configuration for the mail
          template: |
            Link to ticket: ${workflow.ticket?path=url}
```

The `ticket` node runs and set some information in its output (see Jira ticket creation (`jira-creation`) for the full details), including a `url` property.

Then, the `mail` node is run and is using the `notification` *workflow node executor* again, with the `mail` channel being configured to send a mail.

This channel can use the `template` for the mail’s body and is using the `workflow` function to get the output of the `ticket` node and the `url` property of its output.

8.4.4. Workflows management

The progress of running workflows can be accessed in *Information* > *Workflow audit*.

Clicking on a workflow displays more details about its current status, node per node.

When using the *workflow notification channel*, the workflow status link is also accessible from the *Information* > *Notification recordings*, when selecting the notification.

8.4.5. Workflows settings

Workflow statuses are saved by default for 14 days.

To change this value, you can go to *System* > *Settings* > *Workflows*.

This can also be defined as code using CasC:

```
ontrack:
  config:
    settings:
      workflows:
        retentionDuration: 1209600000 # 14 days in ms
```

8.5. Delivery metrics

One of the core features of Ontrack is the assignment of promotion levels to some builds, either explicitly from the CI or through auto promotion.

Delivery metrics are about measuring the performance and stability of these promotions on four different axes:

- *lead time to promotion* - how long does it take from the moment a build is created to the moment it is promoted to a given level? This gives an indication on the performance of your delivery.
- *frequency* - how many promotions do you get over a given period of time? This gives an absolute indicator about how often your delivery process performs.
- *success rate* - what is the percentage of builds reaching a given promotion level? While 100% is not a goal (because of the very nature of a delivery pipeline, where failure is expected when finding actual issues), high values indicate a high stability of your delivery process.
- *time to restore* - given a build which is *not* promoted, how long does it take to restore this promotion? The time it takes to *fix* an issue is a strong indicator of the resilience of your delivery process.

These metrics are valid for:

- one project
- one branch
- one promotion level

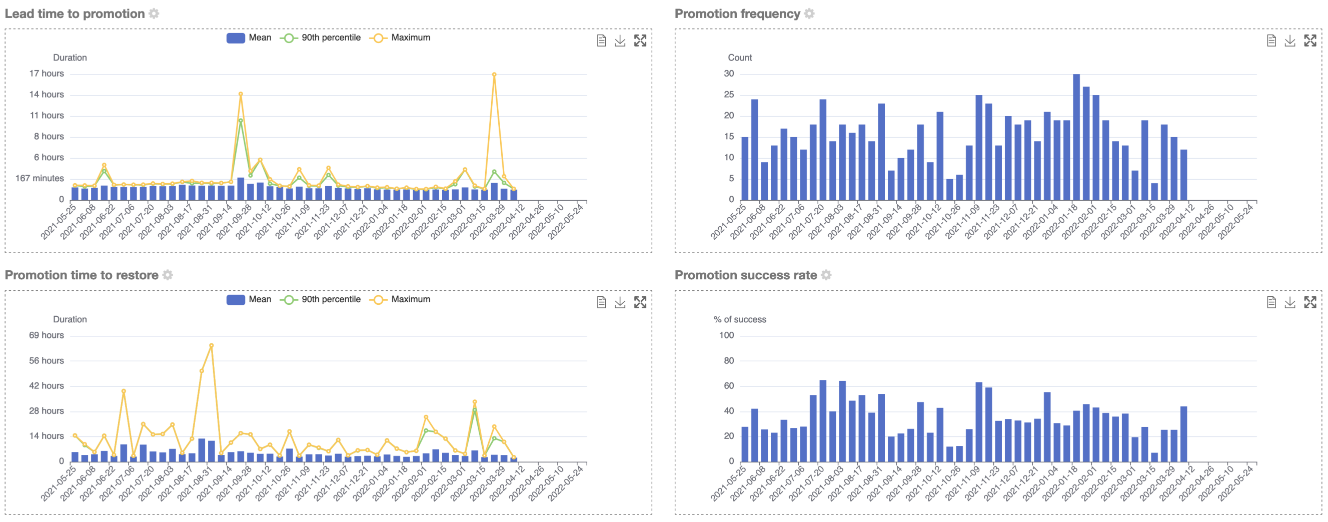
Additionally, Ontrack distinguishes between:

- single project metrics - where we measure the performance of a promotion level within the same project
- end-to-end project metrics - where we measure the performance of a promotion level *across* several projects, by following the build links. Single project metrics are a special case of end-to-end project metrics.

8.5.1. Single project delivery metrics

Navigate to any promotion level. Four charts are displayed, one for each of the axes:

- lead time, with mean, 90th percentile & maximum
- frequency, count of promotions over the selected period
- success rate
- time to restore, with mean, 90th percentile & maximum

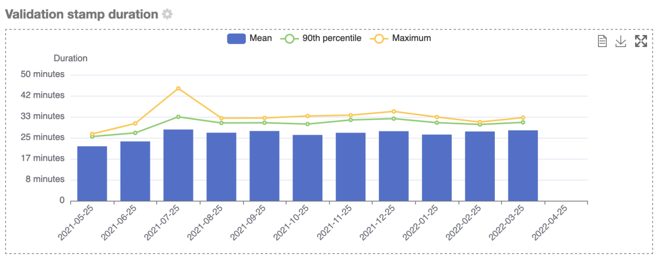


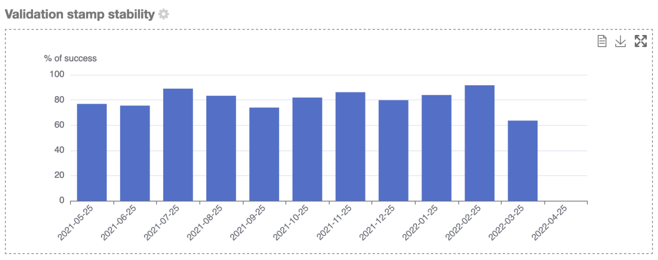
For each chart, you can:

- visualize the data
- export the chart as an image
- put the chart fullscreen

You can select the interval and the period (cog icon next to the chart title). These settings are valid for all the charts for all the promotions.

Additionally, you also have two charts a validation stamp level:





- how long lasts the validation?
- how stable it is?

For API access to the single project delivery metrics, consider using the exported End-to-end project delivery metrics.

8.5.2. End-to-end project delivery metrics

As of now, end-to-end delivery metrics are not available in the UI, only as metrics. You'll need to use tools like Grafana or Kibana to show them on charts.

The end-to-end delivery metrics are performance metrics for the promotions across several projects, following the links between the builds.

For example:

- given a project P depending on a component C which itself depends on a library L
- given a promotion GOLD valid on all these components

We can measure the performance of this promotion by following the links from L to C to P.

The metric axes exposed at the beginning translate into:

- lead time - how long does it take from the moment a L build is created to the moment it is available in C and P, with all builds are all levels being GOLD?
- frequency - how often does it happen that for each L build, all linked L, C and P builds will all be GOLD?
- success rate - for each L build, how many of them are GOLD and also their linked C and P builds?
- time to restore - if a chain L → C → P is not GOLD, how long does it take to restore it to full GOLD?

All these metrics are exported for each transitive link, branch & promotion. In our previous example, we'll have records for the pairs:

- L:L - same as single project delivery metric
- L:C, C:P - one level of dependency
- L:P - two levels of dependency

The following metrics are available:

- `ontrack_dm_promotion_lead_time` - in seconds - for the lead time
- `ontrack_dm_promotion_success_rate` - percentage (from 0.0 to 1.0) - success rate - can be used for the frequency by *counting* the occurences
- `ontrack_dm_promotion_ttr` - in seconds - for the time to restore

Each metric is associated with the following tags:

- sourceProject, sourceBranch
- targetProject, targetBranch
- promotion

8.6. Auto versioning on promotion

Beside collecting data about the performance of your delivery, Ontrack can in turn use this information to drive other automation processes.

One of these processes that Ontrack can drive is the "auto promotion on promotion", which allows the propagation of versions from one repository to others using quality gates based on Ontrack promotions.

Let’s imagine a project `parent` which has a dependency on a `module` expressed through a version property somewhere in a file.

Ideally, whenever the `module` has a new version is a given range, we want this version to be used automatically by the `parent`.

Manually, we can do this of course:

- we update the version in the `parent`
- we perform any needed post-processing like a resolution of locks
- we commit and push the change. Voilà.

If we put extra automation in the mix, you can define a perfectly valid auto versioning process.

This becomes more complex whenever having a new version of the `module` is not enough of a criteria to have it used. This may be a release which has not been qualified yet by extra quality processes (long running ones maybe).

That’s where the concept of promotion in Ontrack can play a very important rule:

- the `module` is promoted
- this starts the following process:
- Ontrack creates a pull request for the `parent` where the version of the `module` has been changed to the one being promoted
- any required post processing is performed on this PR

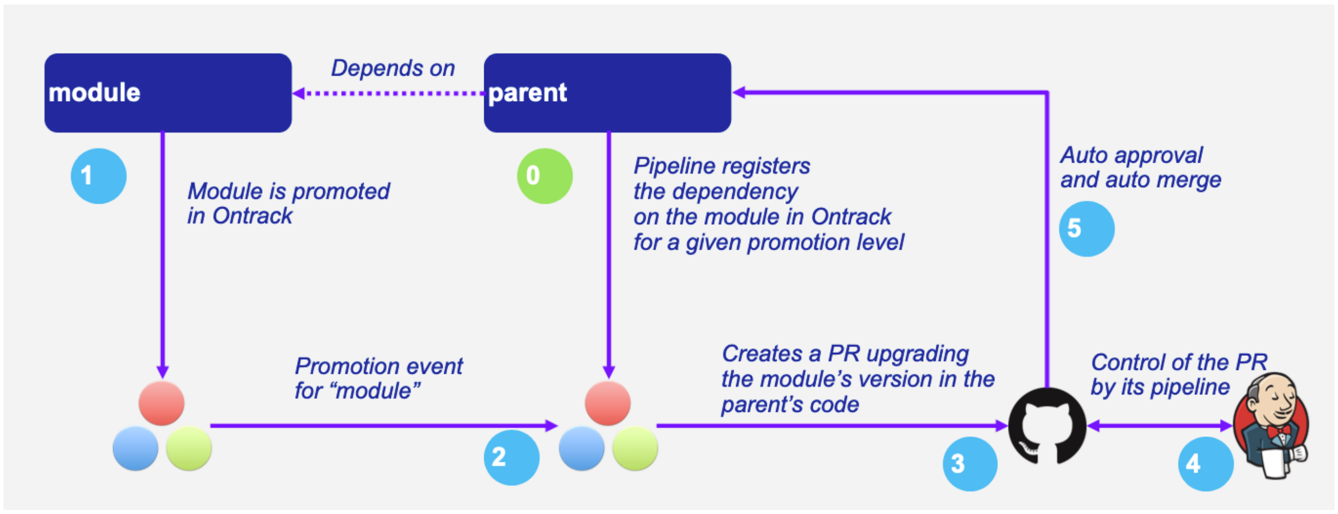
- when the PR is ready to be merged (with all its controls), it's merged automatically

Result:

- versions are propagated automatically only when "promotion gates" are opened

This is valid from one module to a project, and can be easily extended to a full tree of dependent modules.

The diagram below shows how this works:


module
Depends on
parent
1
Module is promoted in Ontrack
0
Pipeline registers the dependency on the module in Ontrack for a given promotion level
Auto approval and auto merge
5
Promotion event for "module"
2
Creates a PR upgrading the module's version in the parent's code
3
Control of the PR by its pipeline
4

8.6.1. When not to use auto versioning

While auto versioning is pretty easy to put in place, it should not be used where traditional dependency management based on locks can be used instead for simple code libraries.

Auto versioning on promotion is however particularly well suited to deal with situations like:

- modular monoliths
- GitOps repositories with fixed versions

8.6.2. General configuration

Auto versioning is not enabled by default. This can be done in the *Settings* > *Auto Versioning*.

Three parameters are available:

- *Enabled* - check to enable auto versioning
- *Audit retention* - maximum number of seconds to keep non-running audit entries for auto versioning requests (see Audit logs for more information)
- *Audit cleanup* - maximum number of seconds to keep audit entries for auto versioning requests. This time is counted after the retention period for the non-running entries (see Audit logs for more information)

These settings can also be configured as code. For example using:

```
ontrack:
  config:
    settings:
      auto-versioning:
        enabled: true
        auditRetentionDuration: 14d
        auditCleanupDuration: 90d
```

Queue configuration

Ontrack uses queues in RabbitMQ to schedule and process auto versioning events.

By default, one and only one queue, called `auto-versioning.default.1` is available. When the load becomes too important, you can use two mechanisms to scale the auto versioning:

- increase the number of default queues. You can set the `ontrack.extension.auto-versioning.queue.scale` configuration property to a higher number than 1
- create dedicated queues for some projects, see below.

Dedicated queues

For a given Ontrack project, you can setup a dedicated queue, which will be used exclusively for this project (whereas the default queues are shared between all projects).

Use the `ontrack.extension.auto-versioning.queue.projects` configuration property to defined a comma-separated list of projects which must have dedicated queues. For example, using environment variables:

```
ONTRACK_EXTENSION_AUTO_VERSIONING_QUEUE_PROJECTS=project-one,project-two
```

8.6.3. Branch configuration

The configuration of a branch for the auto versioning of its dependencies can be done using:

- the GraphQL `setAutoVersioningConfig` or `setAutoVersioningConfigByName` mutation
- Jenkins Ontrack pipeline library for Jenkins pipelines
- GitHub for the GitHub ingestion

All these integrations rely on setting up a version of the *auto versioning model* for a branch which contains a list of *auto versioning source configurations*. This can be represented as YAML using:

```
# List of configurations
configurations:
    # Project to watch
```

```
  - sourceProject: String
    # Name of the branch to take into account for the dependency. Several branches can
be selected using
    # a regular expression. If several branches are eligible, only the latest version
    # can be used, based on inverted order of semantic versioning. Branches which
    # do not comply with semantic versioning are discarded.
    #
    # See <Targeting a series of branches> for more information.
    #
    # Alternatively, the sourceBranch parameter can be set to "&<expression>" where
`<expression>` is
    # used to detect the valid source branch from the source project.
    #
    # See <Branch expressions> below for more information.
    sourceBranch: String
    # Promotion to watch
    sourcePromotion: String
    # Comma-separated list of file to update with the new version
    targetPath: String
    # Regex to use in the target file to identify the line to replace with the new
version.
    # It must have a capturing group in position 1, which will be replaced by the
actual version.
    # For example:
    # `coreVersion = (.*)`
    targetRegex: String?
    # Can be used instead of the `regex` when we consider
    # property files. In the sample above, the target property can be set to
`coreVersion`
    targetProperty: String?
    # When `property` is used, `propertyRegex` can define a regular expression to
extract / update
    # the actual version from/into the property value. The regular expression must
contain at least
    # one capturing group, holding the actual version value. This `propertyRegex` is
useful for cases
    # when the version is part of a bigger string, for example, for a Docker image
qualified name.
    # Example:
    # When targetProperty = "repository/image:tag"
    # to target tag, you can use targetPropertyRegex: "repository\/image\:(.*)"
    targetPropertyRegex: String
    # when `property` is set, defines how the target file
    # must be handled. For example, it could be a dependency notation in a NPM
`package.json` file, or
    # a property entry in Java properties file for Gradle. For NPM, use `npm`. For
Java properties,
    # use `properties`. When not specified, it defaults to `properties`. Other types
are available,
    # see <Target files types>
    targetPropertyType: String?
    # Check if the PR must be approved automatically or not (`true` by default)
    autoApproval: Boolean?,
    # Prefix to use for the upgrade branch in Git, defaults to `feature/auto-upgrade-
<project>-<version>-<branch>`.
    # If set manually, the `<project>` and `<version>` tokens can be used to be
replaced respectively
    # by the dependency project (the `project` above) and the actual version.
    #
    # The `<branch>` token is replaced by the MD5 digest of the target branch.
    #
    # Only the `<version>` token is required.
    #
    # Starting from 4.7.30 & 4.8.14, the `<branch>` token is not required but will be
added (with the `-<branch>` suffix) if not present.
    upgradeBranchPattern: String?
    # Type of post-processing to launch after the version has been updated
    postProcessing: String?
    # Configuration of the post processing
    postProcessingConfig: JsonNode?
    # See "Auto versioning checks"
    validationStamp: String?
    # Auto approval mode
    autoApprovalMode: CLIENT | SCM
    # Build link creation when running the checks. True by default.
    buildLinkCreation: Boolean?
    # Qualifier to use for the build links
    qualifier: String?
    # How must the version to use be computed from the source build?
    # See "Version source" below
    versionSource: String?
    # Additional paths to change.
    # See "Additional paths" below
    additionalPaths:
      - # Comma-separated list of file to update with the new version
        path: String
        # Regex to use in the target file to identify the line to replace with the new
version.
        # The first matching group must be the version.")
        regex: String?
        # Optional replacement for the regex, using only a property name
        property: String?
        # Optional regex to use on the property value
        propertyRegex: String?
        # When property is defined, defines the type of property (defaults to Java
properties
        # file, but could be NPM, etc.)
        propertyType: String?
        # Source of the version for the build. By default, uses the build label is the
source project
        # is configured so, or the build name itself. This allows the customization of
this behavior.
```

```
        versionSource: String?
```

The auto versioning model for a branch, if set, is shown on the branch page.

Targeting a series of branches

In this scenario, the parent wants to be notified of a promotion on a series of branches, and Ontrack triggers the upgrade *only* if the promotion has occurred on the *latest* branch.

Setup:

- set the `branch` parameter to a regular expression on the Git branch, for example: `release\/.\..*`

How does it work?

- when a promotion occurs on the desired level, Ontrack gets the list of branches for the dependency, orders them by descending version, filter them using the regular version, and triggers an upgrade only if the promoted branch is the first in this list (latest in terms of version)

Pro's:

- simple
- allows auto upgrades fairly easily

Con's:

- the dependency must really take care of a strong semantic versioning

Branch expressions

The `sourceBranch` parameter can be set to `&<expression>` where `<expression>` is an expression used to detect the source branch on the source project for a branch eligible for auto versioning.

Supported values are:

`&regex`

By using:

```
sourceBranch: "&regex:<regex>"
```

this is equivalent to the default behaviour:

```
sourceBranch: "<regex>"
```

`&same`

The source branch must have the exact same name as the target branch.

Example: if you have a branch `release-1.24` on a parent project `P` and you want to get updates from a `dependency` project only for the same branch, `release-1.24`, you can use:

```
sourceBranch: "&same"
```

`&most-recent`

Two branches (`release/1.1` & `release/1.2`) are available for a project which is dependency of an auto versioned parent project with the following default branch source:

```
branch: 'release\/1\..*'
```

In this scenario, no promotion has been granted yet in `release 1.2` of the dependency.

When 1.1 is promoted, Ontrack identifies a branch on the parent project to be a potential candidate for auto versioning.

This branch is configured to accept only the latest `release/1.*` branch, which is - now - the `release/1.2`.

Therefore, a 1.1 promotion is no longer eligible as soon as the 1.2 branch was created (and registered in Ontrack).

What exactly do we want to achieve? In this scenario, we always want the version promoted in 1.1 as long as there is none in 1.2. Let’s imagine we promote a 1.1 while 1.2 was already promoted, what then? How do we protect ourselves?

The idea is to accept a promotion as long as there is no such a promotion in later branches.

- a 1.1 is promoted and there is no such promotion in more recent branches (1.2, etc.) - we accept it
- a 1.1 is promoted and there is already such a promotion in a more recent branch (1.2 for example) - we reject it

To implement this strategy, we have to use:

```
branch: '&most-recent:release\/1\..*'
```

`&same-release`

On the same model as the "&same" `sourceBranch` parameter, there is the possibility to get a "&same-release" branch source.

This is to be used in cases where the dependency and its parent follow the same branch policy at `release/` branch level, but only for a limited number of levels.

For example, a parent has release branches like release/1.24.10, with a dependency using on release/1.24.15. We want release/1.x.y to always depend on the latest release/1.x.z branch (using 1.

as a common prefix).

One way to do this is to use: `sourceBranch: "release/1.24.*"` but this would force you to always update the source branch parameter for every branch:

- release/1.24.* in release/1.24.x branch
- release/1.25.* in release/1.25.x branch
- etc.

A better way is to use, in this scenario:

```
sourceBranch: "&same-release:2"
```

This means:

- if you're on a release/x.y.z branch, use release/x.y.* for the latest branch
- for any other branch (main) for example, we use the same branch

Note that `:2` means: take the first two numbers of the version of the release branch. By default, it'd be `:1` and can be omitted: `sourceBranch: "&same-release"`.

Version source

By default, the version to use in the target project is computed directly from the build which has been promoted.

The default behavior is:

- if the source project is configured to use the labels for the builds ("Build name display" property), the label (or release, or version) of the build is used. If this label is not present, the auto versioning request will be rejected
- if the source project is not configured, the build name is taken as the version

This version computation can be adapted using the `versionSource` configuration parameter.

The different options for this parameter are:

- `default` - uses the default behavior described above
- `name` - uses the name of the build, regardless of the source project configuration
- `labelOnly` - uses the label attached to the build, regardless of the source project configuration. If there is no label, the auto versioning request is rejected
- `metaInfo/<category>/<name>` or `metaInfo/<name>` - the version is the value of a meta information item of the request category (optional) or name. If so such meta information is found, the auto versioning request is rejected.

Additional paths

The `additionalPaths` configuration property allows the specification of additional paths to update instead of just the main one.

> This can somehow be considered as a form of post-processing but without the need to call an external service.

Example:

```
configurations:
  - # ...
    targetPath: "gradle.properties"
    targetProperty: "one-version"
    additionalPaths:
      - path: manifest.toml
        property: global.oneVersion
        propertyType: toml
        versionSource: metaInfo/rpmVersion
```

In this example, we want the auto-versioning to:

- update the `one-version` property of the `gradle.properties` file using the version of the build having been promoted
- update the `global.oneVersion` property of the `manifest.toml` file, but this time using the `rpmVersion` meta-information of the build having been promoted

Both changes will be part of the same PR.

Post-processing is still possible and would be run after all changes have been applied first (default path & additional paths).

Target files types

Auto versioning, in the end, works by updating a *target file*, designed in the configuration by the `path` property. Typically, it'll be a `gradle.properties` or a `package.json` file but it could be anything else.

A regular expression (`regex` parameter) can be used to identify the change. This expression is used to 1) identify the current version 2) replace the current version by a new one. In order for this to work, the regular expression must:

- match the whole target line in the target file
- have a capturing group in position 1 identifying the version to read or replace

It is also possible to use a higher level of file type, by specifying a *propertyName* and optionally a *propertyType*.

The *propertyName* designates a *property* in the target file and the *propertyType* designates the type of the file to replace. Two types are currently supported:

- `properties` (default) - Java properties file, typically used for a `gradle.properties` file
- `npm` - NPM package file, typically used for `package.json`
- `maven` - Maven POM file
- `yaml` - YAML file, see YAML files
- `toml` - TOML file, see [auto-versioning-config-type-toml]

See the examples section for their usage.

Maven POM file

For the `maven` type, the file to transform is a Maven `pom.xml` file. The `property` is *required* to be one of the `<properties>` elements of the file.

For example, given the following POM:

```
<project>
    <properties>
        <dep.version>1.10</dep.version>
        <ontrack.version>4.4.10</ontrack.version>
    </properties>
</project>
```

we can refer to the `ontrack.version` using the following auto versioning configuration:

```
configurations:
  # ...
  targetPath: pom.xml
  propertyType: maven
  property: ontrack.version
```

YAML files

When `propertyType` is set to `yaml`, `property` is expected to define a path inside the YAML file.

This path is expressed using the Spring Expression Language.

For example, given the following YAML file (a deployment fragment in Kubernetes):

```
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-app
spec:
  template:
    spec:
      containers:
      - name: component
        image: repo/component:0.1.1
```

In order to get to the `repo/component:0.1.1` value, the path to set will be:

```
#root.^[kind == 'Deployment' and metadata.name == 'my-
app'].spec.template.spec.containers.^[name == 'component'].image
```

See the Spring Expression Language reference for a complete reference but this expression already illustrates some key points:

- `#root` refers to the "root object", used to evaluate the expression, in our case, the list of YAML "documents", separated by `---`
- `.^[<filter>]` is an operator for a list, evaluating the given filter for each element until one element is found. Only the found element is returned.
- `.name` returns the value of the `name` property on an object
- literal strings are using single quotes, for example: `'Deployment'`

If `property` is set to the expression mentioned above, the value being returned will be `repo/component:0.1.1`. However, we want to use `0.1.1`only.

For this purpose, you need to specify also the `propertyRegex` and set it, for this example to:

```
^repo\/component:(.*)$
```

TOML files

When `propertyType` is set to `yaml`, `property` is expected to define a path inside the YAML file.

For example, given the following TOML file:

```
[images]
myVersion = "2.0.0"
```

To update the `myVersion` property in the `images` table, one can set the auto versioning `property` to `images.myVersion`.

The support of TOML in the Ontrack auto versioning uses the 4koma library and this comes with some caveats:

- comments are not supported and will be *stripped* from the file after the auto versioning request has been processed
- only basic expressions like `a.b.c` are supported. Arrays and other structures are not supported.

Request for help: if you know of a better TOML Java/Kotlin library which would support comments, updates of the TOML structure, more complex queries, please let me know.

Integrations

Jenkins pipeline

By using the Jenkins Ontrack pipeline library, you can setup the auto versioning configuration for a branch.

For example:

```
ontrackCliAutoVersioning {
    branch "main"
    yaml "auto-versioning.yml"
}
```

where `auto-versioning.yml` is a file in the repository containing for example:

```
dependencies:
  - project: my-library
    branch: release-1.3"
    promotion: IRON
    path: gradle.properties
    property: my-version
    postProcessing: jenkins
    postProcessingConfig:
        dockerImage  : openjdk:8
        dockerCommand: ./gradlew clean
```

GitHub Actions

TBD

`ontrack-github-ingestion-auto-versioning` GitHub action which sets up auto versioning for the GitHub ingestion

Examples

Gradle update for last release

To automatically update the `dependencyVersion` in `gradle.properties` to the latest version `1.*` of the project `dependency` when it is promoted to `GOLD`:

- project: `dependency`
- branch: `release/1\..*`
- promotion: `GOLD`
- path: `gradle.properties`
- propertyName: `dependencyVersion`
- propertyType: `properties` (or nothing, it's a default)
- postProcessing: `…`
- postProcessingConfig:
  - `dockerImage`: `openjdk/8`
  - `dockerCommand`: `./gradlew resolveAndLockAll --write-locks`

NPM update for last release

To automatically update the `@test/module` in `package.json` to the latest version `1.*` of the project `dependency` when it is promoted to `GOLD`:

- project: `dependency`
- branch: `release/1\..*`
- promotion: `GOLD`
- path: `package.json`
- propertyName: `@test/module`
- propertyType: `npm`
- postProcessing: `…`
- postProcessingConfig:
  - `dockerImage`: `node:jessie`
  - `dockerCommand`: `npm -i`

8.6.4. Post processing

In some cases, it's not enough to have only a version being updated into one file. Some additional post-processing may be needed.

For example, if using Gradle or NPM dependency locks, after the version is updated, you'd need to resolve and write the new dependency locks.

The Auto Versioning feature allows you to configure this post-processing.

In the branch configuration, you can set two properties for each source configuration:

- `postProcessing` - ID of the post-processing mechanism
- `postProcessingConfig` - configuration for the post-processing mechanism

As of now, only two post-processing mechanisms are supported. See the sections below for their respective configurations.

GitHub post-processing

You can delegate the post-processing to a GitHub workflow.

There is a global configuration and there are a specific configuration at branch level (in the `postProcessingConfig` property).

For the global configuration, you can go to *Settings* > *GitHub Auto Versioning Post Processing* and define the following attributes:

- *Configuration* - Default GitHub configuration to use for the connection
- *Repository* - Default repository (like `owner/repository`) containing the workflow to run
- *Workflow* - Name of the workflow containing the post-processing (like `post-processing.yml`)
- *Branch* - Branch to launch for the workflow
- *Retries* - The amount of times we check for successful scheduling and completion of the post-processing job
- *Retry interval* - The time (in seconds) between two checks for successful scheduling and completion of the post-processing job

The `postProcessingConfig` property at branch level must contain the following parameters:

- `dockerImage` - This image defines the environment for the upgrade command to run in
- `dockerCommand` - Command to run in the Docker container
- `commitMessage` - Commit message to use to commit and push the result of the post-processing
- `config` - GitHub configuration to use for the connection (optional, using defaults if not specified)
- `workflow` - If defined, name of the workflow in *this* repository containing the post-processing (like `post-processing.yml`)
- `version` - the version which is upgraded to

The `workflow` branch configuration property can be used to set the post-processing workflow to one in the very branch targeted by the auto versioning process. This would override the global settings.

Example of a simple configuration relying on the global settings:

```
postProcessing: github
postProcessingConfig:
  dockerImage: openjdk:11
  dockerCommand: ./gradlew dependencies --write-locks
  commitMessage: "Resolving the dependency locks"
```

The code below shows an example of a workflow suitable for post-processing:

post-processing.yml

```
name: post-processing

on:
  # Manual trigger only
  workflow_dispatch:
    inputs:
      id:
        description: "Unique client ID"
        required: true
        type: string
      repository:
        description: "Repository to process, like 'nemerosa/ontrack'"
        required: true
        type: string
      upgrade_branch:
        description: "Branch containing the changes to process"
        required: true
        type: string
      docker_image:
        description: "This image defines the environment for the upgrade command to
run in"
        required: true
        type: string
      docker_command:
        description: "Command to run in the Docker container"
        required: true
        type: string
      commit_message:
        description: "Commit message to use to commit and push the result of the post
processing"
        required: true
        type: string

jobs:
  processing:
    runs-on: ubuntu-latest
    container:
      image: ${{ inputs.docker_image }}
    steps:
      - name: logging
```

```
        run: |
          echo id = ${{ inputs.id }} > inputs.properties
          echo repository = ${{ inputs.repository }} >> inputs.properties
          echo upgrade_branch = ${{ inputs.upgrade_branch }} >> inputs.properties
          echo docker_image = ${{ inputs.docker_image }} >> inputs.properties
          echo docker_command = ${{ inputs.docker_command }} >> inputs.properties
          echo commit_message = ${{ inputs.commit_message }} >> inputs.properties
      - name: artifact
        uses: actions/upload-artifact@v3
        with:
          name: inputs-${{ inputs.id }}.properties
          path: inputs.properties
          if-no-files-found: error
      - name: checkout
        uses: actions/checkout@v3
        with:
          repository: ${{ inputs.repository }}
          ref: ${{ inputs.upgrade_branch }}
          token: ${{ secrets.ONTRACK_AUTO_VERSIONING_POST_PROCESSING }}
      - name: processing
        run: ${{ inputs.docker_command }}
      - name: publication
        run: |
          git config --local user.email "<some email>"
          git config --local user.name "<some name>"
          git add --all
          git commit -m "${{ inputs.commit_message }}"
          git push origin "${{ inputs.upgrade_branch }}"
```

- all mentioned `inputs` are required by Ontrack
- the `id` input and its output into a local file artifact is required by Ontrack to follow up on the workflow process
- commit & pushing the changed files is required for the post processing to be considered complete

The rest of the workflow can be adapted at will.

Jenkins post-processing

You can delegate the post-processing to a Jenkins job.

There is a global configuration and there are a specific configuration at branch level (in the `postProcessingConfig` property).

For the global configuration, you can go to *Settings* > *Jenkins Auto Versioning Processing* and define the following attributes:

- *Configuration* - default Jenkins configuration to use for the connection
- *Job* - default path to the job to launch for the post-processing, relative to the Jenkins root URL

(note that `/job/` separators can be omitted)

- *Retries* - the amount of times we check for successful scheduling and completion of the post-processing job
- *Retry interval* - the time (in seconds) between two checks for successful scheduling and completion of the post-processing job

The `postProcessingConfig` property at branch level must contain the following parameters:

Parameter	Default value	Description
`dockerImage`	*Required*	Docker image defining the environment
`dockerCommand`	*Required*	Command to run in the working copy inside the Docker container
`commitMessage`	*Required*	Commit message for the post processed files. If not defined, a default message will be provided
`config`	*Optional*	Jenkins configuration to use for the connection (optional, using defaults if not specified)
`job`	*Optional*	Path to the job to launch for the post processing (optional, using defaults if not specified)
`credentials`	*Optional*	List of credentials to inject in the command (see below)

Example of such a configuration:

```
postProcessing: jenkins
postProcessingConfig:
  dockerImage: openjdk:11
  dockerCommand: ./gradlew dependencies --write-locks
  commitMessage: "Resolving the dependency locks"
```

The Jenkins job must accept the following parameters:

Parameter	Description
`REPOSITORY_URI`	Git URI of the repository to upgrade
`DOCKER_IMAGE`	This image defines the environment for the upgrade command to run in.
`DOCKER_COMMAND`	Command to perform the upgrade.

Parameter	Description
`COMMIT_MESSAGE`	Commit message to use to commit and push the upgrade.
`UPGRADE_BRANCH`	Branch containing the code to upgrade.
`CREDENTIALS`	Pipe (|) separated list of credential entries to pass to the command.
`VERSION`	The version which is upgraded to

The Jenkins job is responsible to:

- running a Docker container based on the `DOCKER_IMAGE` image
- inject any credentials defined by `CREDENTIALS` parameter
- checkout the `UPGRADE_BRANCH` branch of the repository at `REPOSITORY_URI` inside the container
- run the `DOCKER_COMMAND` command inside the container
- commit and push any change using the `COMMIT_MESSAGE` message to the `UPGRADE_BRANCH` branch

8.6.5. Pull requests

After a branch is created to hold the new version, after this branch has been optionally post-processed, Ontrack will create a pull request from this branch to the initial target branch.

The `autoApproval` branch configuration property (set to `true` by default) is used by Ontrack to check if created pull requests must managed at all.

If set to `false`, Ontrack will just create a pull request and stop here.

If set to `true`, the fate of the pull request depends on the *auto approval mode* which has been set in the branch configuration:

Auto approval mode	Description	Pro's	Con's
`CLIENT`	This is the default behaviour. Ontrack takes the ownership of the pull request lifecycle: • PR is approved automatically • Ontrack waits for the PR to become mergeable • Ontrack merges the PR	Full visibility on the PR lifecycle within Ontrack	This creates additional load on Ontrack

Auto approval mode	Description	Pro’s	Con’s
`SCM`	Ontrack relies on the SCM (GitHub for example) for the lifecycle of the pull request, in a "fire and forget" mode: • PR is approved automatically • PR is set for auto merge • In the background, the PR will be merged automatically once all the conditions are met, but Ontrack does not follow that up	Less load on Ontrack since the PR lifecycle is fully managed by the SCM	Less visibility on the PR lifecycle from Ontrack

General configuration

Both modes, `CLIENT` and `SCM`, need the SCM configuration used by Ontrack to have additional attributes.

General configuration for GitHub

The GitHub configuration used by the Ontrack project must have its `autoMergeToken` attribute set to a GitHub Personal Access Token with the following permissions:

* `repo`

and the corresponding user must have at least the `Triage` role on the target repositories.

This `autoMergeToken` must be linked to a user *which is not* the user used by the GitHub configuration. It’s because a user cannot approve their own pull requests.

`CLIENT` mode

No specific configuration is needed for the `CLIENT` mode.

`SCM` mode

There is some configuration to be done at SCM level.

`SCM` mode for GitHub

The target repository, the one defining the project being auto-versioned, must have the following settings:

- the `Allow auto-merge` feature must be enabled in the repository

8.6.6. Auto versioning checks

While auto versioning is configured to automatically upgrade branches upon the promotion of some other projects, it's also possible to use this very configuration to check if a given build is up-to-date or not with the latest dependencies.

By calling the `POST /extension/auto-versioning/build/{buildId}/check` end point, where `buildId` is the ID of the build to check, you create a validation run on this build:

- it'll be PASSED if the dependencies are up-to-date
- FAILED otherwise

The name of the validation stamp is defined by the `validationStamp` parameter in the configuration of the branch:

- if defined, will use this name
- if set to `auto`, the validation stamp name will be `auto-versioning-<project>`, with `<project>` being the name of the source project
- if not set, no validation is created

> You should seldom call this endpoint directly and rather use one of the existing integrations:
>
> - GitHub ingestion
> - the Jenkins pipeline library

8.6.7. Audit logs

All auto versioning processes and all their statuses are recorded in an audit log, which can be accessed using dedicated pages (and the GraphQL API).

The auto versioning audit can be accessed:

- from the *Auto versioning audit* user menu, for all projects and branches
- from the *Tools* > *Auto versioning audit (target)* from a project page when the project is considered a *target* of the auto versioning
- from the *Tools* > *Auto versioning audit (source)* from a project page when the project is considered a *source* of the auto versioning
- from the *Tools* > *Auto versioning audit* from a branch page when the branch is targeted by the auto versioning

All these pages are similar and show:

- a form to filter the audit log entries
- a paginated list of audit log entries

Each log entry contains the following information:

- target project and branch (only available in global & project views)
- source project
- version being updated
- post-processing ID if any
- auto approval mode if any
- running flag - is the auto versioning process still running?
- current state of the auto versioning process
- link to the PR if any
- timestamp of the latest state
- duration of the process until the latest state
- a button to show more details about the process

When the details are shown, the following information is available:

- the history of the states of the process
- a JSON representation of the auto versioning order

Audit cleanup

To avoid accumulating audit log entries forever, a cleanup job is run every day to remove obsolete entries. The behaviour of the cleanup is controlled through the global settings.

Audit metrics

The following operational metrics is exposed as a gauge by the Ontrack auto versioning feature:

- `ontrack_extension_auto_versioning_audit_state`
- tags: `state` auto versioning state
- count of auto versioning entries having this state

8.6.8. Notifications

The auto versioning feature integrates with the Notifications framework by emitting several events you can subscribe to:

- `auto-versioning-success` - whenever an auto versioning process completes
- `auto-versioning-error` - whenever an auto versioning process finishes with an error

- `auto-versioning-pr-merge-timeout-error` - whenever an auto versioning process cannot merge a pull request because of a timeout on its merge condition (only when `autoApprovalMode` is set to `CLIENT` - see Pull requests)

8.6.9. Cancellations

By default, when auto versioning requests pile up for a given source and target, all the intermediary processing requests are cancelled.

For example, given the following scenario, for a given source project and a given target branch:

- (1) auto versioning to version 1.0.1
- auto versioning to version 1.0.2 while (1) is still processed
- auto versioning to version 1.0.3 while (1) is still processed
- auto versioning to version 1.0.4 while (1) is finished

In this scenario, the processing of 1.0.1 and 1.0.4 will have been processed and completed while 1.0.2 and 1.0.3 would have been cancelled.

The auto cancellation can be disabled by setting the `ontrack.extension.auto-versioning.queue.cancelling` configuration property to `false`.

8.6.10. Metrics

The following operational metrics are exposed by Ontrack, which allow to track the load of the auto versioning processes:

Metric	Tags	Description	Type
ontrack_extension_auto_versioning_queue_produced_count	• `routingKey` - RabbitMQ routing key used for the processing • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of processing orders queued	Count

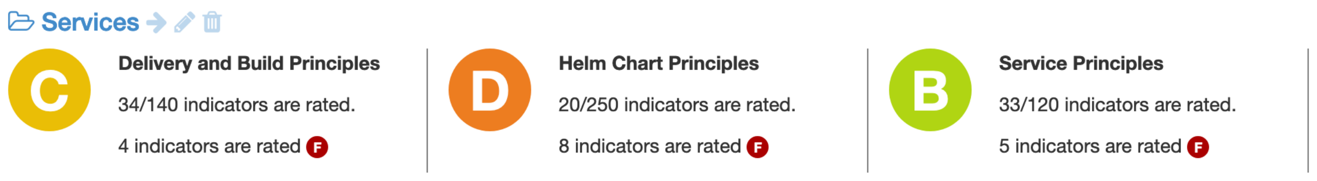
Metric	Tags	Description	Type
ontrack_extension_auto_versioning_queue_consumed_count	• `queue` - RabbitMQ queue used for the processing • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of processing orders queued	Count
ontrack_extension_auto_versioning_processing_completed_count	• `outcome` - Result of the processing, one of `CREATED`, `SAME_VERSION` or `NO_CONFIG` • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of processing orders queued	Count
ontrack_extension_auto_versioning_processing_error_count	None	Number of processing orders stopped because of an error	Count
ontrack_extension_auto_versioning_processing_time	• `queue` - RabbitMQ queue used for the processing • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Time it took to process an order	Timer

Metric	Tags	Description	Type
ontrack_extension_auto_versioning_post_processing_started_count	• `postProcessing` - ID of the post-processor (`github`, …) • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of post-processing having started	Count
ontrack_extension_auto_versioning_post_processing_success_count	• `postProcessing` - ID of the post-processor (`github`, …) • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of post-processing having completed with success	Count
ontrack_extension_auto_versioning_post_processing_error_count	• `postProcessing` - ID of the post-processor (`github`, …) • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Number of post-processing having completed with an error	Count

Metric	Tags	Description	Type
ontrack_extension_auto_versioning_post_processing_time	• `postProcessing` - ID of the post-processor (`github`, …) • `sourceProject` - source project • `targetProject` - target project • `targetBranch` - target branch	Time it took to complete the post-processing	Timer

8.7. Project indicators

Project indicators are set at project level to hold values about different *types* of information.


Services

C	Delivery and Build Principles	34/140 indicators are rated. 4 indicators are rated F
D	Helm Chart Principles	20/250 indicators are rated. 8 indicators are rated F
B	Service Principles	33/120 indicators are rated. 5 indicators are rated F

Those types of information are grouped into *categories* and can have a specific *value type*, like a boolean (yes/no), a percentage, a numeric value, etc. Types can be entered manually, imported or computed.

Every of those indicator values have a level of *compliance* which computed as a percentage (from 0% - very bad - to 100% - very good) according to the configuration of the type. The compliance is also associated with a rating, from `F` (very bad) to `A` (very good).

The indicator values can be entered manually at project level or be computed.

Projects can be grouped together in *portfolios* which are also associated with a subset of categories. And a global view of all portfolios is associated with a specific subset of categories.

Finally, the history of indicators is retained by Ontrack and can be used to compute trends at the different levels (at project level, at portfolio level or globally).

Indicators functions can be accessed either by:

- the *Indicators* menu for the managers, leading to a page listing all the different options
- the *Indicator portfolios* menu for the non managers, leading the list of existing portfolios

8.7.1. Indicators authorization model

Having access to a project grants automatically access to viewing the associated indicators.

However, managing indicators, types & portfolios is granted according to the following matrix:

Function	**Administrator**	**Global indicator manager**	**Global indicator portfolio manager**	**Project manager/owner**	**Project indicator manager**	
Global indicators	Yes	Yes	No	No	No	
Type and category management (1)	Yes	Yes	No	No	No	
View management	Yes	Yes	No	No	No	
Portfolio management	Yes	Yes	Yes	No	No	
Indicator edition (2)	Yes	Yes	No	Yes	Yes	

(1) Imported types & categories are not open to edition. (2) Computed indicators are not open to manual edition.

8.7.2. Indicator types management

Categories & types can be managed manually by an authorized using the following user menus:

- *Indicators* > *Categories*
- *Indicators* > *Types*

A *category* must have the following attributes:

- *id* - unique ID for this category among all the categories
- *name* - display name for this category

A *type* must have the following attributes:

- *id* - unique ID for this type among all the type
- *name* - display name for this type
- *link* - optional URL for more information about this type
- *value type* - type of indicator value this type. For example, a percentage or a boolean
- *value config* - configuration for the *value type*, used to compute the indicator compliance and rating

Categories and types can also be imported orcomputed. In such a case, both the category and the type are associated with a *source* and they cannot be edited.

Value types

The following value types are available in Ontrack:

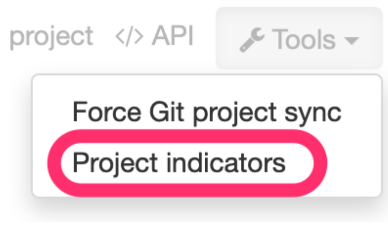
Type	Description	Configuration	Example
Yes/No	Value which can be either *Yes* (`true`) or *No* (`false`)	`required` - flag to indicate if the indicator *must* be *Yes* in order for the project to be fully compliant. If `required` is `false`, the rating willbe `A` is the value is set to *Yes* and `D` if the value is *No*. For a_No_ value on a *required* indicator, the rating would be `F`.	"Project should be build with Gradle" - because of the "should", the indicator_required_ value is set to `false`.
Percentage	Integer value between `0` and `100` inclusive	`threshold` - pivot value (see example) `higherIsBetter` - a higher percentage in the value of the indicator indicates a better quality (see example)	"Test coverage" is expressed as a percentage and `higherIsBetter` will be set to `true`. If `threshold` is set to 80: * any value >= 80% has a rating of `A` * for values below 80%, the rating is computed proportionally, with 0% having a rating of `F` "Duplicated code" can also be expressed as a percentage, but this time with `higherIsBetter` being set to `false`. If `threshold` is set to 10: * any value ⇐ 10% has a rating of `A` * for values above 10%, the rating is computed proportionally, with 100% having a rating of `F`

Type	Description	Configuration	Example
Number	Integer value >= 0	`min` - pivot value (see example) `max` - secondary pivot value (see example) `higherIsBetter` - a higher value of the indicator indicates a better quality (see example)	"Number of blocking issues" is expressed as a number with `higherIsBetter` being set to `false`. If `min` is 0 and `max` is 10: * any value set to 0 has a rating of `A` * any value >= 10 has a rating of `F` * for any value in between, the rating is computed proportionally A "Number of tests" could be expressed as a number with `higherIsBetter` being set to `true`. If `min` is 100 and `max` is 1000: * any value ⇐ 100 has a rating of `F` * any value >= 1000 has a rating of `A` * for any value in between, the rating is computed proportionally

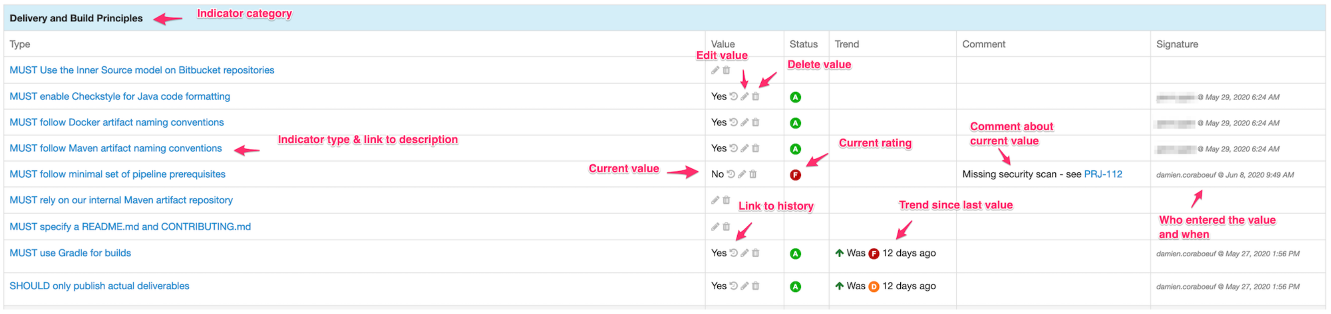
Additional value types can be created by registering an extensionimplementing the `IndicatorValueType` interface. See existing value types for examples.

8.7.3. Indicator edition

An authorized user can edit the indicator for a project by going to the *Tools* menu and select *Project indicators*:



All available types are displayed, grouped by categories, and each indicator value is shown together with its value, its rating:



Delivery and Build Principles

Type	Value	Status	Trend	Comment	Signature
MUST Use the Inner Source model on Bitbucket repositories					
MUST enable Checkstyle for Java code formatting	Yes	A			[redacted] @ May 29, 2020 6:24 AM
MUST follow Docker artifact naming conventions	Yes	A			[redacted] @ May 29, 2020 6:24 AM
MUST follow Maven artifact naming conventions	Yes	A			[redacted] @ May 29, 2020 6:24 AM
MUST follow minimal set of pipeline prerequisites	No	F		Missing security scan - see PRJ-112	damien.coraboeuf @ Jun 8, 2020 9:49 AM
MUST rely on our internal Maven artifact repository					
MUST specify a README.md and CONTRIBUTING.md					
MUST use Gradle for builds	Yes	A	↑ Was F 12 days ago		damien.coraboeuf @ May 27, 2020 1:56 PM
SHOULD only publish actual deliverables	Yes	A	↑ Was D 12 days ago		damien.coraboeuf @ May 27, 2020 1:56 PM

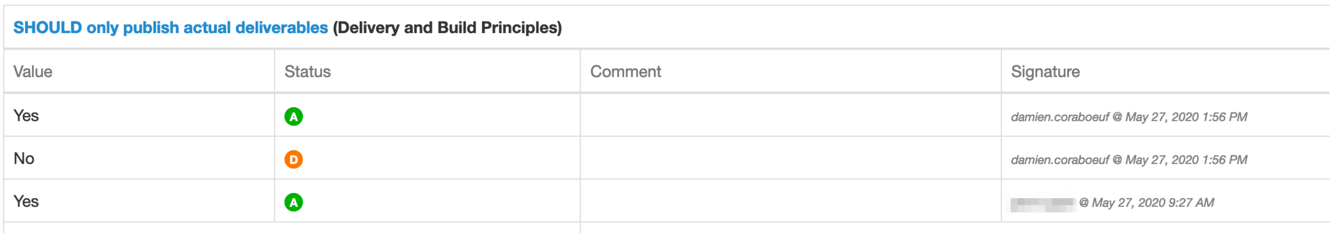
If the indicator has a previous value, its previous rating is displayed.

If the indicator is open to edition, the user can click on the pencil icon to edit the value according to the value type. Upon validation, a *new* indicator value is stored ; the old value is kept for history and trend computation.

Comments can be associated with an indicator values. Links & issue references will be rendered as links.

An authorized user can also *delete* the indicator ; this actually register a new *null* value for the indicator. The historical values are kept.

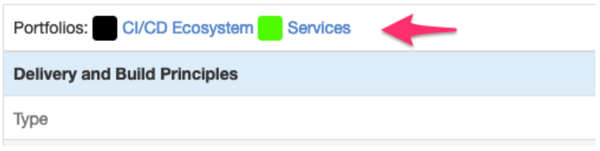
The history of an indicator can be accessed by clicking on the *History* icon:



SHOULD only publish actual deliverables (Delivery and Build Principles)

Value	Status	Comment	Signature
Yes	A		damien.coraboeuf @ May 27, 2020 1:56 PM
No	D		damien.coraboeuf @ May 27, 2020 1:56 PM
Yes	A		[redacted] @ May 27, 2020 9:27 AM

The list of portfolios the project belongs to is displayed at the top of the indicator list:



Portfolios: ■ CI/CD Ecosystem 🟩 Services

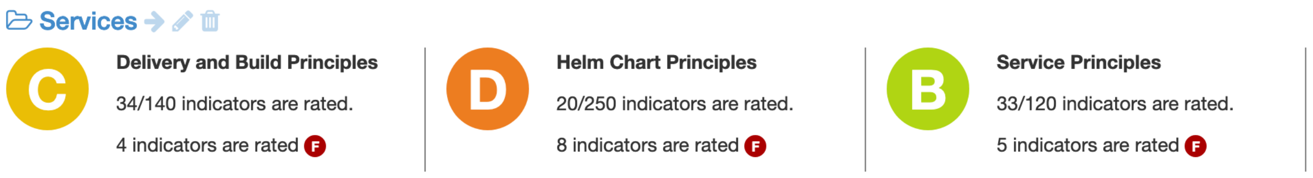
Delivery and Build Principles

Type

8.7.4. Indicator portfolios

Portfolios are available in the *Indicator portfolios* user menu (or *Indicators* > *Portfolios* for the managers) and the associated page displays the list of already created portfolios.

In this list, each portfolio is associated with the list of categories for the current view and each of these categories is associated with the average rating for all the projects and all the types of this category.


Services

C Delivery and Build Principles
34/140 indicators are rated.
4 indicators are rated F

D Helm Chart Principles
20/250 indicators are rated.
8 indicators are rated F

B Service Principles
33/120 indicators are rated.
5 indicators are rated F

Only indicators having an actual value are used to compute the average rating. The indicators which are not set are not used for the computation and the ratio "number of indicators being set" to the"number of total indicators" is also displayed. This gives an idea about the trust we can have in this average rating.

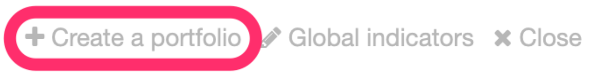
The minimum ratings are also mentioned if they diverge from the average.

The trend period allows to display the average value from the past, and to compare it with the current value.

Management of portfolios

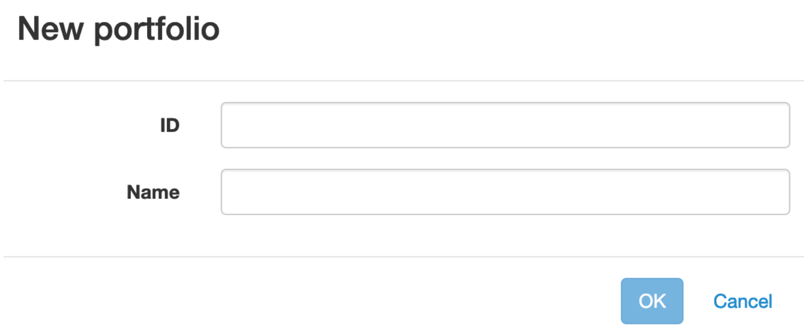
Authorized users can create, edit and delete portfolios.

Creating a portfolio is done using the *Create portfolio* command:



The portfolio creation dialog requires:

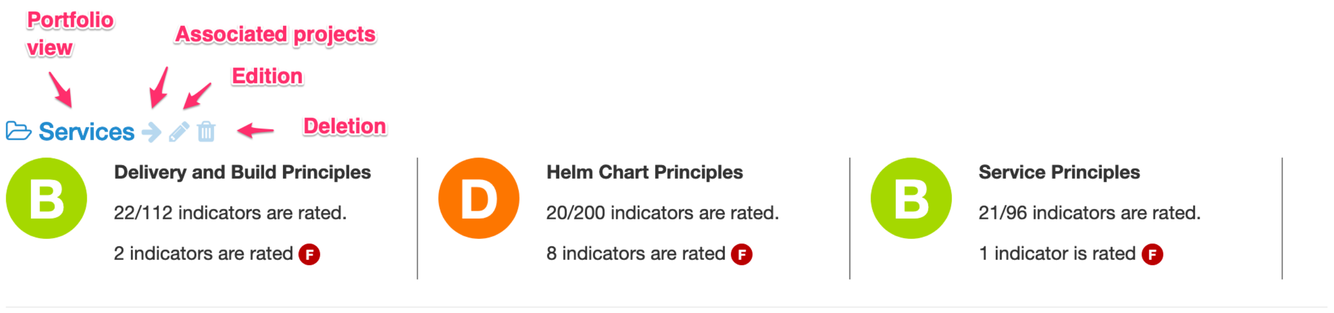
- an ID - must be unique amont all the portfolios and will be used as an identifier. It must therefore comply with the following regular expression: `[a-z0-9:-]+` (lowercase letters, digits, `:` colon or `-` dashes). The ID cannot be modified later on.
- a display name


New portfolio

ID

Name

Once created, the portfolio appears on the portfolio overview and can be edited or deleted using the appropriate icons:



Services

B	Delivery and Build Principles 22/112 indicators are rated. 2 indicators are rated F
D	Helm Chart Principles 20/200 indicators are rated. 8 indicators are rated F
B	Service Principles 21/96 indicators are rated. 1 indicator is rated F

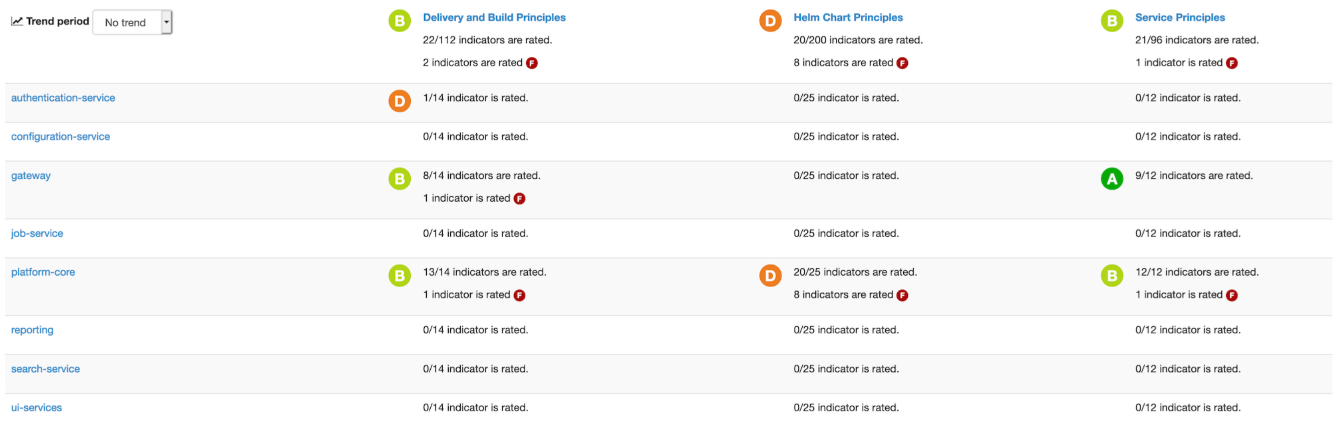
- the portfolio name is actually a link going to the detailed portfolio view
- the arrow icon goes to the home page and displays only the projects associated to this portfolio
- the edition icon goes to the portfolio edition page
- the deletion icon displays a warning and allows the user to delete the portfolio.

The deletion of a portfolio *does not* delete any indicator in any project.

Portfolio page

By clicking on the portfolio name in the portfolio overview, you get to a page displaying:

- the list of projects associated with this portfolio
- the list of categories associated with this portfolio
- the average indicator rating for project and for each category



Trend period: No trend	B Delivery and Build Principles 22/112 indicators are rated. 2 indicators are rated F	D Helm Chart Principles 20/200 indicators are rated. 8 indicators are rated F	B Service Principles 21/96 indicators are rated. 1 indicator is rated F
authentication-service	D 1/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.
configuration-service	0/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.
gateway	B 8/14 indicators are rated. 1 indicator is rated F	0/25 indicator is rated.	A 9/12 indicators are rated.
job-service	0/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.
platform-core	B 13/14 indicators are rated. 1 indicator is rated F	D 20/25 indicators are rated. 8 indicators are rated F	B 12/12 indicators are rated. 1 indicator is rated F
reporting	0/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.
search-service	0/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.
ui-services	0/14 indicator is rated.	0/25 indicator is rated.	0/12 indicator is rated.

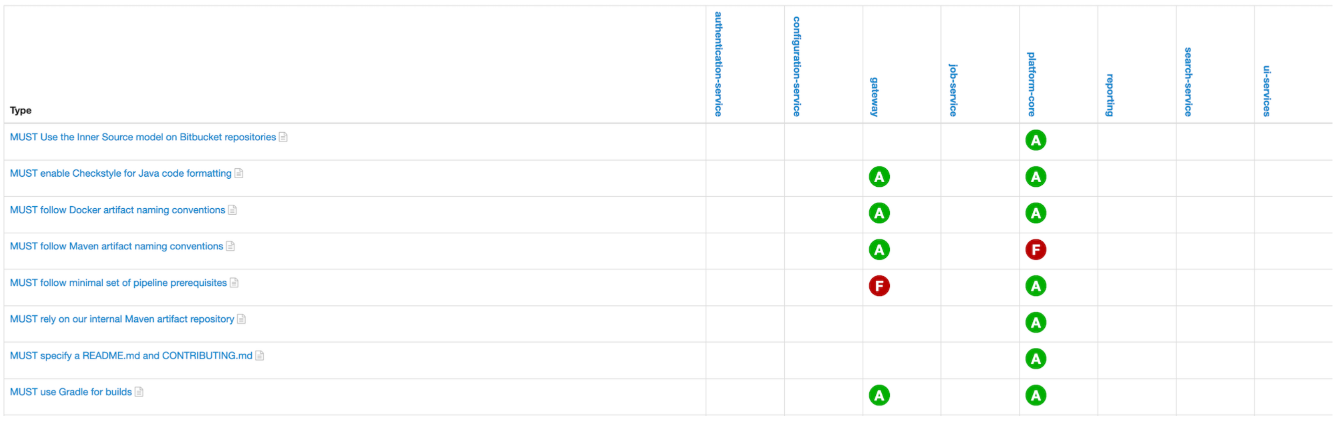
As for the portfolio overview, the average rating is computed only using the indicators which are actually set, and the ratio filled vs. total is displayed.

You can also select a view to change the selected categories.

The trend period selector allows you to check the past average values and the associated trends.

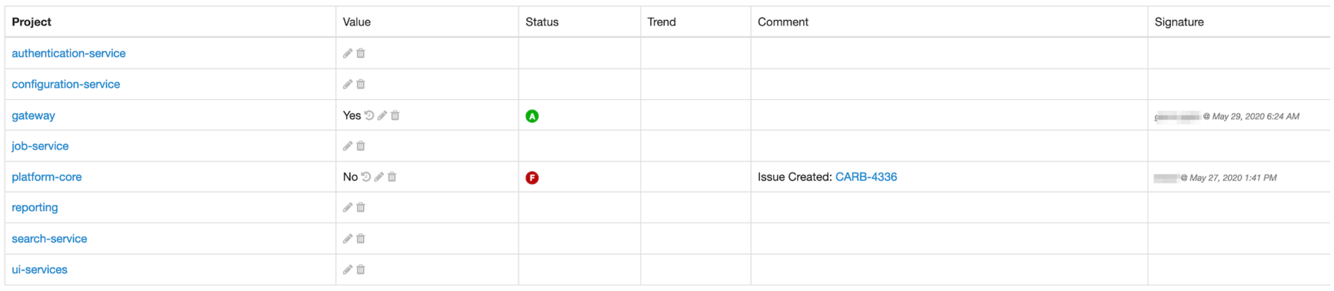
Clicking on a project name goes to the project indicators page.

Clicking on a category name goes to a page displaying a detailed view of indicators for all the types in this category and for all the projects of this portfolio:



Type	authentication-service	configuration-service	gateway	job-service	platform-core	reporting	search-service	ui-services
MUST Use the Inner Source model on Bitbucket repositories					A			
MUST enable Checkstyle for Java code formatting			A		A			
MUST follow Docker artifact naming conventions			A		A			
MUST follow Maven artifact naming conventions			A		F			
MUST follow minimal set of pipeline prerequisites			F		A			
MUST rely on our internal Maven artifact repository					A			
MUST specify a README.md and CONTRIBUTING.md					A			
MUST use Gradle for builds			A		A			

In this view, clicking on the icon right to the type name will bring up a page displaying the indicator values for this type for all the projects of this portfolio:



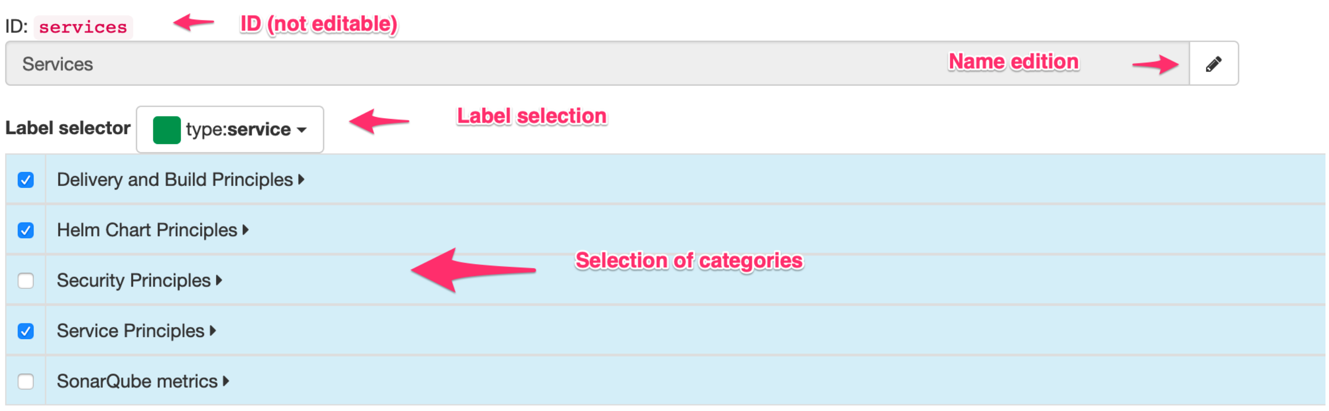
Project	Value	Status	Trend	Comment	Signature
authentication-service					
configuration-service					
gateway	Yes	A			[redacted] @ *May 29, 2020 6:24 AM*
job-service					
platform-core	No	F		Issue Created: CARB-4336	[redacted] @ *May 27, 2020 1:41 PM*
reporting					
search-service					
ui-services					

According to your rights, you can edit and delete indicator values from this page.

Portfolio edition

The portfolio edition page allows you to:

- edit the portfolio display name (not the ID)
- set a label to select the associated projects
- select the categories associated with this portfolio



ID: `services`

Services

Label selector type:**service**

✓	Delivery and Build Principles
✓	Helm Chart Principles
	Security Principles
✓	Service Principles
	SonarQube metrics

The label allows a portfolio to be associated to all projects which have this label. See [projects-labels] for more information on how to manage labels.

"Global indicator portfolio managers" and"Global indicator managers" can associate existing labels to projects but cannot create new labels.

8.7.5. Indicator views

Indicator views group categories together under a common name. These views can be used in the following pages to restrict the categories which are shown:

- overview of all portfolios
- portfolio page
- project indicators

The list of views can be edited by administrators and global indicator managers, using the *Indicators* > *Views* menu.

In the view management page, the user can:

- create new views
- edit the list of categories for an existing view
- delete existing views

8.7.6. Importing categories and types

While indicator categories and types can be entered manually, it is also possible to import lists of categories and their associated types.

> In a company, a number of "principles" have been created for projects to comply with. They have been written as Asciidoc and are published as a browsable web site. The associated principles, grouped in pages, have been imported as types (and categories) in Ontrack, by parsing the Asciidoc.

To import categories & types in Ontrack, you need a user allowed to manage types and you can use the `POST /extension/indicators/imports` end point, passing a JSON as payload.

For example, with Curl:

```
curl --user <user> \
  -H "Content-Type: application/json" \
  -X POST \
  http://ontrack/extension/indicators/imports \
  --data @payload.json
```

where:

payload.json

```
{
  "source": "principles",
  "categories": [
    {
      "id": "service-principles",
      "name": "Service Principles",
      "types": [
        {
          "id": "java-spring-boot",
          "name": "SHOULD Use Java & spring boot stack",
          "required": false,
          "link": "https://example.com/architecture-
principles/latest/service_principles.html#java-spring-boot"
        }
      ]
    }
  ]
}
```

The `source` is an ID identifying the nature of this list.

Each category must have an `id` (unique in Ontrack) and a display `name`.

Each type must have:

- an `id` (unique in Ontrack)
- a display `name`
- a `required` flag - as of now, only "Yes/No" value types are supported
- an optional `link` to some external documentation

Upon import:

- new existing & types are created
- existing categories & types are updated and associated indicators are left untouched
- removed categories & types are marked as deprecated, and associated indicators are kept

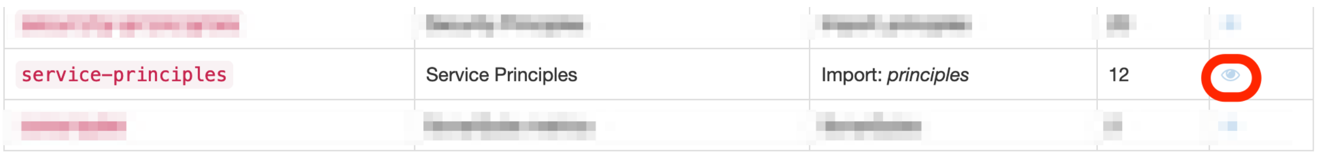
Instead of marking obsolete categories & types as deprecated, those can be deleted using the `ontrack.config.extension.indicators.importing.deleting = true`configuration property but this is not recommended.

Imported categories & types cannot be edited.

8.7.7. Exporting categories and types

The list of indicators for a category or a type can be visualized and exported as CSV for all projects or for a selection of projects.

In the list of categories or types, click on the eye icon to access a report about the indicators for this category or type:



[illegible]	[illegible]	[illegible]	[illegible]	👁
service-principles	Service Principles	Import: *principles*	12	👁
[illegible]	[illegible]	[illegible]	[illegible]	👁

The indicator category report page displays a matrix of all indicator values for the selected projects and the types which are in this category. For the indicator type page, it's the same layout, but only one column for the selected type.

By default, only projects having at least one indicator filled in for the selected types are displayed. You can unselect the *Only projects with values* to display all projects.

In both the category and type report page, you can select the *CSV Export* link to download this list as a CSV file.

8.7.8. Computing indicators

It is possible to define some types whose value is not entered manually but is computed by Ontrack itself.

You do so by registering an extension which implements the `IndicatorComputer` interface, or the `AbstractBranchIndicatorComputer` class when the value must be computed from the "main branch" of a project.

See the documentation of those two types for more information.

The `SonarQubeIndicatorComputer` extension is an example of such an implementation.

Computed categories & types cannot be edited, and their values cannot be edited manually.

8.7.9. Configurable indicators

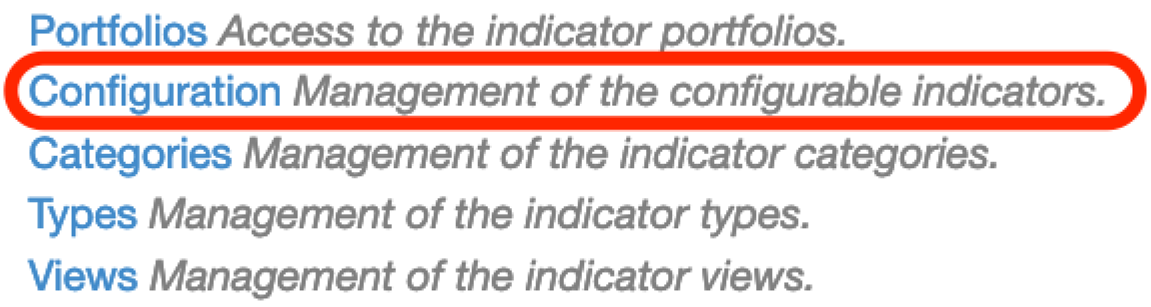
Some indicators, provided by Ontrack, are configurable:

- they are disabled by default, and an administrator must enable them
- optionally, these indicators take some parameters

Once enabled, these configurable behave like any other computed indicator:

- they are computed in the background
- they cannot be edited

As an administrator, you can access the list of configurable indicators through *Indicators* > *Configuration*:



Portfolios *Access to the indicator portfolios.*

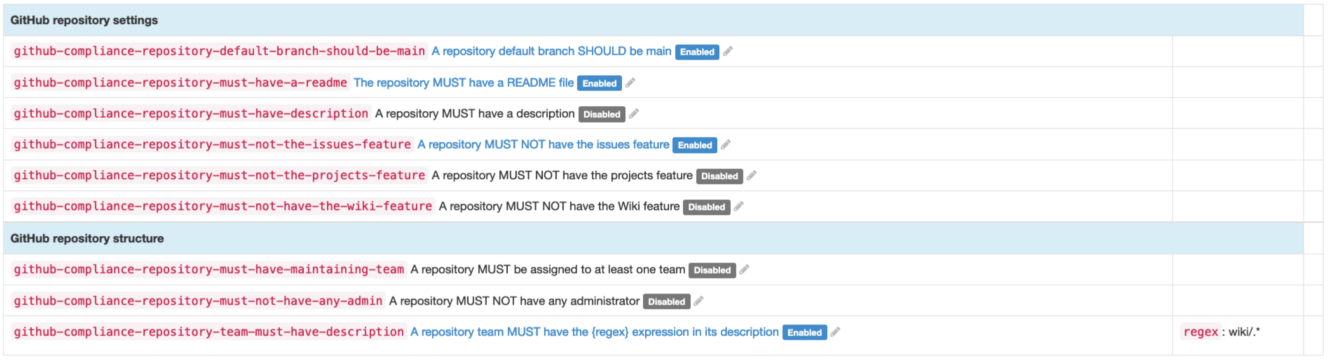
Configuration *Management of the configurable indicators.*

Categories *Management of the indicator categories.*

Types *Management of the indicator types.*

Views *Management of the indicator views.*

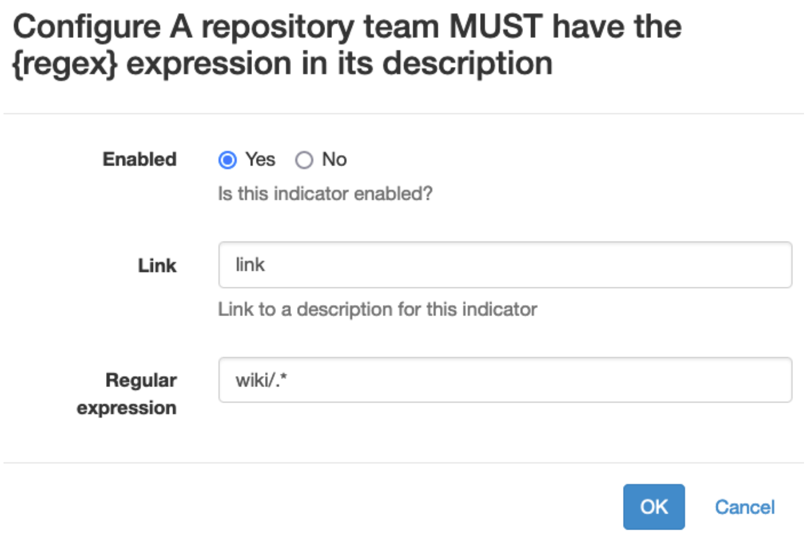
In the following page, the list of configurable indicators is shown, with their current status (enabled / disabled), their parameters, etc.



GitHub repository settings			
`github-compliance-repository-default-branch-should-be-main`	A repository default branch SHOULD be main	Enabled	
`github-compliance-repository-must-have-a-readme`	The repository MUST have a README file	Enabled	
`github-compliance-repository-must-have-description`	A repository MUST have a description	Disabled	
`github-compliance-repository-must-not-the-issues-feature`	A repository MUST NOT have the issues feature	Enabled	
`github-compliance-repository-must-not-the-projects-feature`	A repository MUST NOT have the projects feature	Disabled	
`github-compliance-repository-must-not-have-the-wiki-feature`	A repository MUST NOT have the Wiki feature	Disabled	
GitHub repository structure			
`github-compliance-repository-must-have-maintaining-team`	A repository MUST be assigned to at least one team	Disabled	
`github-compliance-repository-must-not-have-any-admin`	A repository MUST NOT have any administrator	Disabled	
`github-compliance-repository-team-must-have-description`	A repository team MUST have the {regex} expression in its description	Enabled	`regex` : wiki/.*

The administrator can use the edit button (pencil icon) to edit a given indicator and fill:

- its status: enabled or disabled
- an optional link (to some additional and specific documentation for example)
- some parameters specific to this indicator



Configure A repository team MUST have the {regex} expression in its description

Enabled	[✓ Yes] No Is this indicator enabled?
Link	link Link to a description for this indicator
Regular expression	wiki/.*

Chapter 9. Integrations

Ontrack interfaces with several systems, both for its own functioning and for collecting data.

9.1. Working with GitHub

GitHub is an enterprise Git repository manager on the cloud or hosted in the premises.

When working with Git in Ontrack, one can configure a project to connect to a GitHub repository.

9.1.1. General configuration

The access to a GitHub instance must be configured.

1. as administrator, go to the *GitHub configurations* menu
2. click on *Create a configuration*
3. in the configuration dialog, enter the following parameters:
   - **Name** - unique name for the configuration
   - URL - URL to the GitHub instance. If left blank, it defaults to the https://github.com location

Several authentication modes are supported:

- User & Password - credentials used to access GitHub
- OAuth2 token - authentication can also be performed using a Personal Access Token instead of using a user/password pair
- GitHub App - see below for more information

The existing configurations can be updated and deleted.

Although it is possible to work with an anonymous user when accessing GitHub, this is not recommended. The rate of the API call will be limited and can lead to some errors.

9.1.2. GitHub App authentication

In large Ontrack setup, with hundreds of GitHub repositories, using a GitHub Personal Access Token might not be enough any longer since we can very fast hit the 5000 API rate limit of GitHub.

Using a GitHub App extends this limit a bit more.

Creating a GitHub app

In your *personal* settings, go to *Developer settings* > *GitHub Apps* and click *New GitHub App*:

- *GitHub App name* - any name
- *Homepage URL* - your Ontrack URL (for example, not used, but required)

- Uncheck *Webhook* > *Active*
- *Repository permissions*:
  - Actions / Read-only (optional)
  - Contents / Read-only
  - Issues / Read-only
  - Pull requests / Read-only
  - Organization permissions
  - Members / Read-only
- Select the *Any account* option
- Select *Create GitHub App*

Then *Generate a private key* and save the generated PEM file.

This PEM file *must* be converted in order to be used in Ontrack. Given the `app.pem` file downloaded from GitHub in the previous step, generate a new PEM file (`ontrack.pem` for example, it does not matter):

```
openssl pkcs8 -topk8 -inform PEM -outform PEM \
  -nocrypt \
  -in app.pem \
  -out ontrack.pem
```

The content of the generated PEM file will be used for the GitHub configuration in Ontrack.

Installing the GitHub app

Still on the GitHub app page:

- Note down the ID of the app
- Select the *Install App* menu
- Select the organization/user you want to use this app into
- Select its scope
- Select *Install*

Configuring authentication

When creating a GitHub configuration, the following parameters must be set to use a GitHub App for the connection from Ontrack:

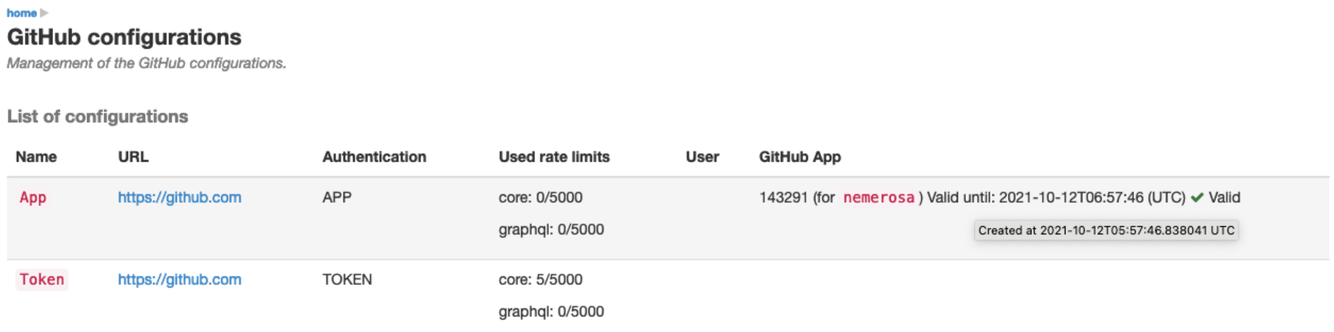
- App ID - the ID that you noted in the previous step
- App Private Key - the content of the PEM that you generated previously. It must start with `-----BEGIN PRIVATE KEY -----`

The *App Installation Account Name* is needed whenever you have installed this app in more than one organization. In this case, specify the organization name in this field.

GitHub app tokens

Authentication tokens based on GitHub Apps are valid for one hour. They are renewed automatically by Ontrack.

The list of GitHub configurations lets you see the validity of the tokens for the configurations based on GitHub Apps:



home ▸

GitHub configurations

Management of the GitHub configurations.

List of configurations

Name	URL	Authentication	Used rate limits	User	GitHub App
App	https://github.com	APP	core: 0/5000 graphql: 0/5000		143291 (for `nemerosa`) Valid until: 2021-10-12T06:57:46 (UTC) ✓ Valid Created at 2021-10-12T05:57:46.838041 UTC
Token	https://github.com	TOKEN	core: 5/5000 graphql: 0/5000		

9.1.3. Project configuration

The link between a project and a GitHub repository is defined by the *GitHub configuration* property:

- **Configuration** - selection of the GitHub configuration created before - this is used for the accesses
- **Repository** - GitHub repository, like `nemerosa/ontrack`
- Indexation interval - interval (in minutes) between each synchronisation (Ontrack maintains internally a clone of the GitHub repositories)
- Issue configuration - issue service. If not set or set to "GitHub issues", the issues of the repository will be used

Branches can be configured for Git independently.

SCM Catalog configuration

The SCM Catalog feature requires some additional configuration for GitHub. See the specific section for more information.

9.1.4. GitHub metrics

When Ontrack contains at least one GitHub configuration, the following metrics are exposed to signal how the rate limit currently is:

- `ontrack_extension_github_ratelimit_core_limit`
- `ontrack_extension_github_ratelimit_core_remaining`
- `ontrack_extension_github_ratelimit_core_used`
- `ontrack_extension_github_ratelimit_graphql_limit`

- `ontrack_extension_github_ratelimit_graphql_remaining`
- `ontrack_extension_github_ratelimit_graphql_used`

All these metrics are tagged with `configuration`. The value of the tag is the name of the configuration in Ontrack.

These metrics are enabled by default but can be disabled by setting the `ontrack.extension.github.metrics.enabled` configuration property to `false`.

9.2. GitHub Ingestion

In addition to Ontrack being able to interact with GitHub, it is also possible to set up a webhook in GitHub so that data from GitHub Actions workflows is automatically ingested by Ontrack, without having the workflows being adapted in any way. This allows for a seamless integration between GitHub Actions workflows and Ontrack.

9.2.1. GitHub ingestion features

When a workflow runs, the following items are created or updates in Ontrack.

The project in Ontrack will be called like the *repository*, adjusted for Ontrack naming conventions for entities. It'll be associated with the first matching GitHub configuration. Optionally, the organization name can be set as a prefix to the project names using the global settings.

The branch is Ontrack will be called according the head branch (or the PR name) and its Git branch will also be set.

The build is created by aggregating the workflow name and the run number. Additionally, the following properties are set:

- the Git commit property
- the run info

Validation stamps are created using `<job>-<step>`, adjusted for the Ontrack naming convventions.

Builds and validation runs are associated with properties & decorations linking to the source workflow run in GitHub.

The creation of the validation runs occurs as the workflow run is in progress, allowing Ontrack to collect information as it goes.

Release property on tag

If a tag is pushed, Ontrack will look for all builds being associated with tag's commit, and the release property will be set on these builds using the shortened tag name.

For example:

- a build has been created with commit property set to `1abcdef`

- a tag `1.2.1` is pushed for the `1abcdef` commit
- the build is "tagged" (its release property is set) to `1.2.1`

9.2.2. Ontrack setup

At least one GitHub configuration must be created.

The communication between GitHub and Ontrack is secured through a specific token, outside the Ontrack normal authentication mechanisms.

This secret can be generated by using:

```
ruby -rsecurerandom -e 'puts SecureRandom.hex(20)'
```

but other ways are also acceptable.

In the *Settings*, go to the *GitHub workflow ingestion* section and set the token as previously generated.

9.2.3. GitHub setup

In GitHub, the Ontrack ingestion hook can be setup at repository or at organization level.

Go to the *Settings* > *Webhooks* section and add a new webhook:

- URL - `<ontrack>/hook/secured/github/ingestion`
- Content type - `application/json`
- Secret - the secret you generated in the Ontrack setup
- Permissions:
  - Workflow jobs
  - Workflow runs
  - Pushes (for autoconfiguration, see later)

9.2.4. Link to the GitHub configuration

Upon reception of hook events by Ontrack, the created projects will be associated with a GitHub configuration using the following order of priority:

- the `configuration` parameter of the hook request (see below) is used to get an existing GitHub configuration by name
- if there is one and only one existing GitHub configuration, it’s used
- if there are more than one GitHub configuration, we get the list of configurations whose URL matches the incoming event. If there one and only one matching configuration, it is used
- in all other cases, the payload is marked as being failed.

When configuring the hook in GitHub, the `configuration` parameter may be added to explicitly select an existing GitHub configuration:

```
<ontrack>/hook/secured/github/ingestion?configuration=<name>
```

If you have only one configuration in Ontrack, this parameter is not needed. Use it only when dealing with several configurations using the same root URL (for example, when having several organizations using a GitHub App for authentication).

9.2.5. Customization

The default behaviour of the ingestion can be customized by putting a `.github/ontrack/ingestion.yml` file in the repository.

All fields are optional and when omitted, default values are used.

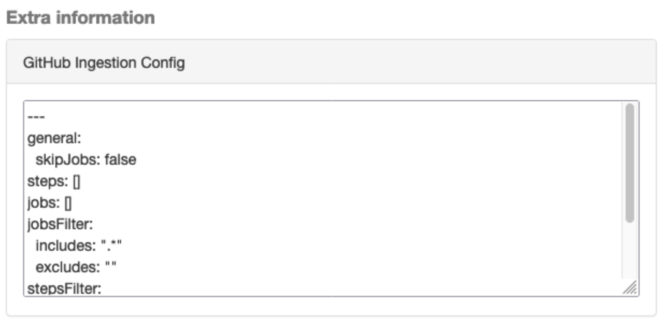
This file is taken into account automatically, on push or when the ingestion configuration has not been loaded yet.

```
# Version of the configuration (required)
version: v2
# Optional: Configuration for the ingestion of the workflows
# workflows:
  # Optional: Filter on the workflow names
  # filter:
  #   includes: ".*"
  #   excludes: ""
  # Optional: Creation of validation runs at the workflow level
  # validations:
    # Optional: Is the creation of validation runs for workflows enabled?
    # enabled: true
    # Optional: Filter on workflows to select the ones for which a validation must be
created
    # filter:
    #     includes: ".*"
    #     excludes: ""
    # Optional: Prefix to use for the validation stamp
    # prefix: "workflow-"
    # Optional: Suffix to use for the validation stamp
    # suffix: ""
  # Optional: List of events to accept for the processing of a workflow
  # Default value: `push` event only
  # events:
  #   - push
  # Optional: Filter on the Git branch names
  # branchFilter:
  #     includes: ".*"
  #     excludes: ""
  # Optional: Filtering the pull requests
  # includePRs: true
# Optional: Configuration for the ingestion of the jobs
# jobs:
    # Optional: Filter on the jobs names
    # filter:
    #   includes: ".*"
    #   excludes: ""
    # Optional: Using the job name as a prefix for the validation stamps
    # validationPrefix: true
    # Optional: Mappings between job names and validation stamps
    # mappings:
      # Required: Name of the job
      # - name: ...
      # Optional: Name of the validation stamp
      # Default value: Name of the job
      #   validation: ...
      # Optional: Must we use the job name as a prefix to the validation stamp?
      # Default value: same than "jobs.validationPrefix"
      #   validationPrefix:
      # Optional: Description of the validation stamp
      # Default value: Name of the job
      #   description: ...
# Optional: Configuration for the ingestion of the steps
# steps:
    # Optional: Filter on the steps names
    # By default, no step is ingested
    # filter:
    #   includes: ""
    #   excludes: ".*"
    # Optional: Mapping between step names and validation stamps
    # mappings:
      # Required: Name of the step
      # - name: ...
      # Optional: Name of the validation stamp
      # Default value: Name of the step
      #   validation: ...
      # Optional: Description of the validation stamp
      # Default value: Name of the steo
      #   description: ...
# Optional: Setup of Ontrack resources
# setup:
    # Optional: Configuration of the validation stamps
    # validations:
      # Required: Unique name for the validation stamp in the branch
      # - name: ...
      # Optional: Description of the validation stamp
      #   description: ...
      # Optional: Data type for the validation stamp
      #   dataType:
            # Required: FQCN or shortcut for the data type
            # type: ...
            # Optional: JSON data type configuration
            # config: ...
      # Optional: Reference to the image to set
      #   image: ...
    # Optional: Configuration of the promotion levels
    # promotions:
      # Required: Unique name for the promotion in the branch
      # - name: ...
      # Optional: Description of the promotion
      #   description: String
      # Optional: List of validations triggering this promotion. Important: these
names are the names of the validations after step name resolution.
      #   validations: []
      # Optional: List of promotions triggering this promotion
      #   promotions: []
      # Optional: Regular expression to include validation stamps by name
      #   include: ""
      # Optional: Regular expression to exclude validation stamps by name
      # exclude: ""
      # Optional: Reference to the image to set
      #   image: ...
    # Optional: Casc for the project
    # project:
      # Optional: Regular expression for the branches which can setup the entity
      #   includes: "main"
      # Optional: Regular expression to exclude branches
      #   excludes: ""
      # Optional: JSON Casc configuration for the entity
      #   casc: {}
    # Optional: Casc for the branch
    # branch:
      # Optional: Regular expression for the branches which can setup the entity
      #   includes: "main"
      # Optional: Regular expression to exclude branches
      #   excludes: ""
      # Optional: JSON Casc configuration for the entity
      #   casc: {}
# Optional: Configuration for the tag ingestion
# tagging:
  # Optional: If the commit property strategy must be applied. True by default.
  # commitProperty: true
  # Optional: List of tagging strategies to apply
  # strategies: []
    # Required: ID of the tagging strategy
    # type: ...
    # Required: JSON configuration of the tagging strategy
    # config: {}
# Optional: configuration of the validation stamp names normalization
# Choices: DEFAULT, LEGACY
# vs-name-normalization: DEFAULT
```

For example, if we want to associate the validation stamp `unit-tests` to the step `Runs unit tests` in the `build` job, we can use:

```
steps:
  filter:
    # Steps are excluded by default
    includes: ".*"
    excludes: ""
  mappings:
  - name: Runs unit tests
    validation: unit-tests
    validationJobPrefix: false
```

The ingestion configuration is saved together with the branch and is visible in the UI as extra information:


Extra information

GitHub Ingestion Config

```
---
general:
  skipJobs: false
steps: []
jobs: []
jobsFilter:
  includes: ".*"
  excludes: ""
stepsFilter:
```

This information is also available programmatically using a GraphQL query:

```
{
  branches(id: 589) {
    gitHubIngestionConfig {
      steps {
        filter {
          includes
          excludes
        }
      }
      # ...
    }
  }
}
```

Customization examples

To configure auto-promotions:

```
setup:
  validations:
    - name: unit-tests
      description: Running all unit tests
      dataType:
        type: test-summary
        config:
          warningIfSkipped: true
  promotions:
    - name: BRONZE
      description: Basic build is OK.
      validations:
        - build
        - unit-tests
    - name: SILVER
      description: End to end tests are OK.
      validations:
        - ui-acceptance
        - api-acceptance
      promotions:
        - BRONZE
```

Validation stamps

Validation stamps can be defined using the `validations` list.

Each validation stamp can be associated with a name and an optional description.

Additionally, a data type can be set. The FQCN of the data type can be used but most common types have also shortcuts. Therefore, the following declarations are equivalent:

```
setup:
  validations:
    - name: unit-tests
      description: Running all unit tests
      dataType:
        type: test-summary
        config:
          warningIfSkipped: true
```

and

```
setup:
  validations:
    - name: unit-tests
      description: Running all unit tests
      dataType:
        type:
net.nemerosa.ontrack.extension.general.validation.TestSummaryValidationDataType
        config:
          warningIfSkipped: true
```

The following shortcuts are supported:

- `test-summary`
- `metrics`
- `percentage`
- `chml`

See [validation-runs-data] for more information.

Configuration as code for projects and branches

The `ingestion.yml` file can be used to configure the projects and the branches.

⚠ The support for CasC of the projects and branches is currently experimental. While the feature would probably stay, it's possible that some syntax may change. Also, not many configuration aspects are supported at the moment.

Example - configuring the stale property at project level from the `main` branch:

```
setup:
  project:
    properties:
      staleProperty:
        disablingDuration: 30
        deletingDuration: 0
        promotionsToKeep:
          - GOLD
        includes: main
        excluded: ""
```

Whenever the `ingestion.yml` is pushed on the `main` branch, the stale property will be set on the project.

Change log

v1

- added a vs-name-normalization optional field with LEGACY as the default value - see Validation stamp names for more information

v2

- added a vs-name-normalization optional field with DEFAULT as the default value - see Validation stamp names for more information

9.2.6. General settings

In the *Settings* > *GitHub workflow ingestion* section, you can configure the following features:

- if the ingestion of GitHub hooks is enabled or not
- the secret token used by the GitHub hook
- the number of days GitHub hook payloads are kept by Ontrack
- if the organization name must be used as a prefix for the generated project names
- the default Git indexation interval to use for the projects
- inclusion/exclusion rules for the repositories to be ingested
- the identifier of the issue service to use by default. For example `self` for GitHub issues or `jira//config`.

9.2.7. Validation stamp names

By default, a step `My step` running in the `My job` job will be associated with the following name: `My job-My step`. This can be configured in many ways.

The validation stamp name can be specified in the step configuration using the `validation` field. For example, we can force the `My step` to be named `my-job-unit-tests` by using the following configuration:

```
steps:
  mappings:
    - name: My step
      validation: unit-tests
```

The job prefix (`my-job` in our example) is added by default, and is computed from the job name, and can also be configured using the `validation` field in the job configuration.

Configuring the addition or not of the job as a prefix to the general validation stamp can be done at several levels:

- at the step ingestion configuration level
- at the job ingestion configuration level

When facing the naming of a step, how to decide if the job prefix must be used or not?

- if defined at step level, use this value
- if defined at job level, use this value

There is a `vs-name-normalization` which can be set at the root of the configuration with one of the following values:

- `DEFAULT` - a "My job" job and a step "My step" are rendered as `My job-My step`
- `LEGACY` - lowercase & escaping the whitespaces: `my-job-my-step`.

9.2.8. Support for pull requests

Ingestion of events for the pull requests is supported.

The support for the ingestion of pull request events is in `beta` mode so changes are expected to happen in subsequent releases.

From an Ontrack point of view, the following lifecycle is supported:

- a PR is `opened` - a corresponding branch is opened
- a PR is built or is `synchronized` - if a workflow is run for this PR, a build and its validation stamps will be created the same way as for regular branches. Note that the ingestion configuration for a PR is always fetched from the head branch of the pull request.
- a PR is `closed` (merged or not) - the corresponding branch is disabled

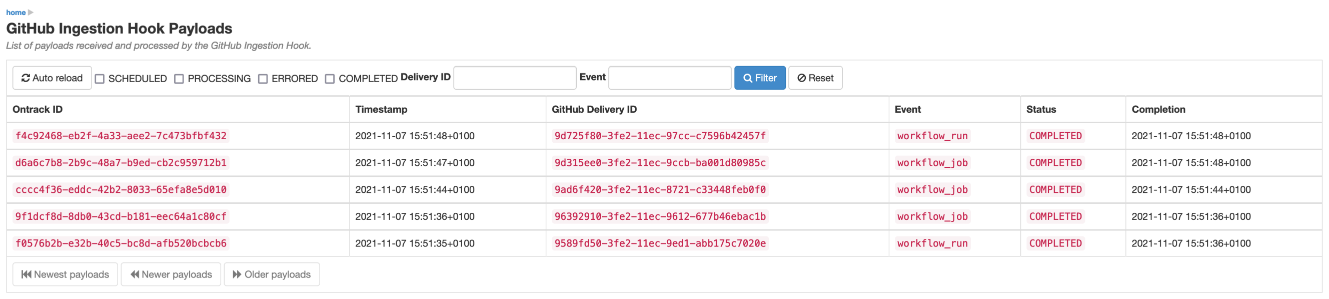
9.2.9. Management

The Ontrack hook receives all registered GitHub event payloads. The latter are processed in a queue and then kept for investigation and inspection.

The payloads whose signature cannot be be checked or is not OK are not stored.

The number of days these payloads are kept is configured in the global settings.

An Ontrack administrator can access the list of payloads using the *GitHub Ingestion Hook Payloads* user menu:



GitHub Ingestion Hook Payloads

List of payloads received and processed by the GitHub Ingestion Hook.

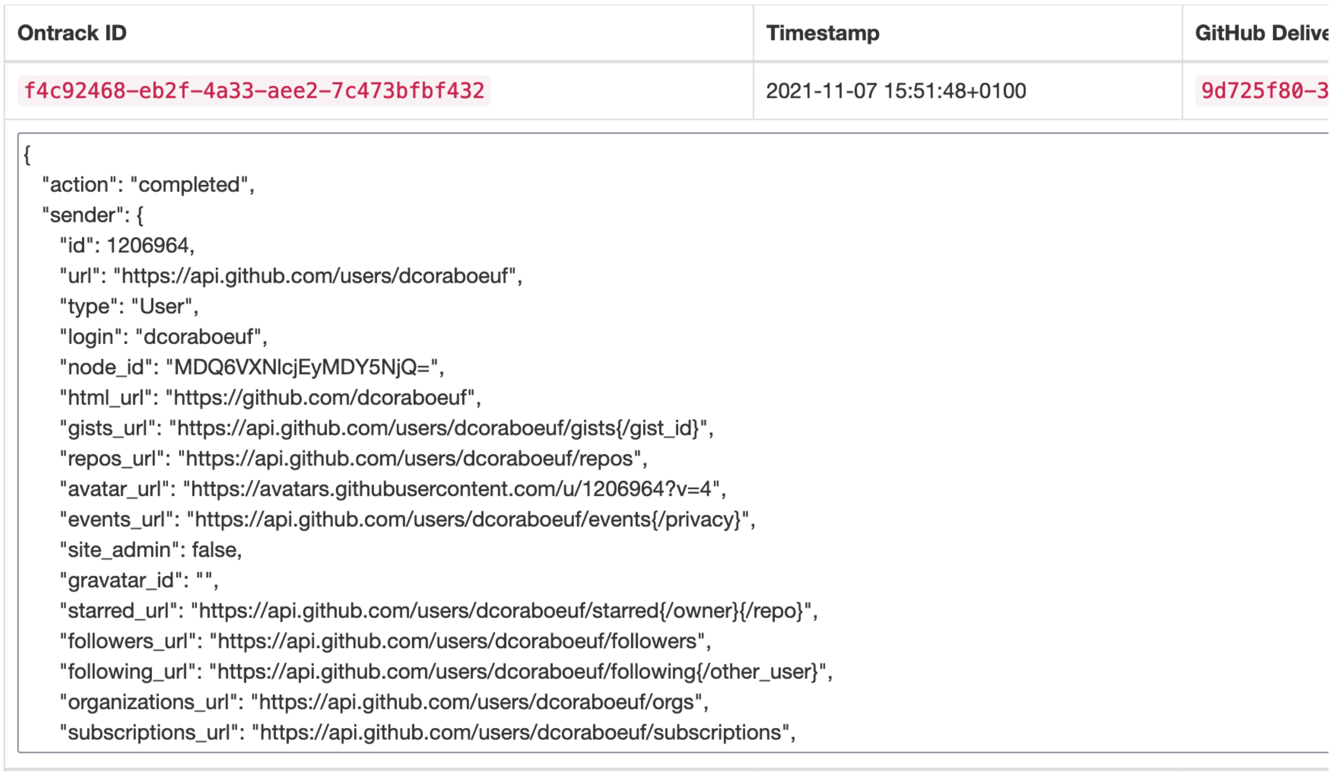
Ontrack ID	Timestamp	GitHub Delivery ID	Event	Status	Completion
f4c92468-eb2f-4a33-aee2-7c473bfbf432	2021-11-07 15:51:48+0100	9d725f80-3fe2-11ec-97cc-c7596b42457f	workflow_run	COMPLETED	2021-11-07 15:51:48+0100
d6a6c7b8-2b9c-48a7-b9ed-cb2c959712b1	2021-11-07 15:51:47+0100	9d315ee0-3fe2-11ec-9ccb-ba001d80985c	workflow_job	COMPLETED	2021-11-07 15:51:48+0100
cccc4f36-eddc-42b2-8033-65efa8e5d010	2021-11-07 15:51:44+0100	9ad6f420-3fe2-11ec-8721-c33448feb0f0	workflow_job	COMPLETED	2021-11-07 15:51:44+0100
9f1dcf8d-8db0-43cd-b181-eec64a1c80cf	2021-11-07 15:51:36+0100	96392910-3fe2-11ec-9612-677b46ebac1b	workflow_job	COMPLETED	2021-11-07 15:51:36+0100
f0576b2b-e32b-40c5-bc8d-afb520bcbcb6	2021-11-07 15:51:35+0100	9589fd50-3fe2-11ec-9ed1-abb175c7020e	workflow_run	COMPLETED	2021-11-07 15:51:36+0100

The *Auto refresh* button allows the content of the payload list to be automatically refreshed every 10 seconds. The settings are saved in the browser local storage.

The list can be filtered using the following arguments:

- the processing statuses:
  - `SCHEDULED` - the payload has been received and queued for later processing.
  - `PROCESSING` - the payload is currently being processed. Some Ontrack elements may have already been created.
  - `ERRORED` - the processing failed. The payload entry in the list will have an explanation.
  - `COMPLETED` - the processing of the payload completed successfully.
- the GitHub Delivery ID - each event payload sent by GitHub is associated with a unique delivery ID.
- the GitHub event - the event which sent the payload

By clicking on the internal Ontrack ID (leftmost column), you can display for information about the payload, including its complete JSON content:



Ontrack ID	Timestamp	GitHub Delive
f4c92468-eb2f-4a33-aee2-7c473bfbf432	2021-11-07 15:51:48+0100	9d725f80-3

```
{
  "action": "completed",
  "sender": {
    "id": 1206964,
    "url": "https://api.github.com/users/dcoraboeuf",
    "type": "User",
    "login": "dcoraboeuf",
    "node_id": "MDQ6VXNlcjEyMDY5NjQ=",
    "html_url": "https://github.com/dcoraboeuf",
    "gists_url": "https://api.github.com/users/dcoraboeuf/gists{/gist_id}",
    "repos_url": "https://api.github.com/users/dcoraboeuf/repos",
    "avatar_url": "https://avatars.githubusercontent.com/u/1206964?v=4",
    "events_url": "https://api.github.com/users/dcoraboeuf/events{/privacy}",
    "site_admin": false,
    "gravatar_id": "",
    "starred_url": "https://api.github.com/users/dcoraboeuf/starred{/owner}{/repo}",
    "followers_url": "https://api.github.com/users/dcoraboeuf/followers",
    "following_url": "https://api.github.com/users/dcoraboeuf/following{/other_user}",
    "organizations_url": "https://api.github.com/users/dcoraboeuf/orgs",
    "subscriptions_url": "https://api.github.com/users/dcoraboeuf/subscriptions",
```

9.2.10. Metrics

The metrics are grouped in the following categories:

- hook reception level
- ingestion queing
- ingestion processing

Hook metrics

Metric	Type	Tags	Description
ontrack_extension_github_ingestion_hook_signature_error_count	Counter	event	Number of rejections because of signature mismatch
ontrack_extension_github_ingestion_hook_repository_rejected_count	Counter	event,owner,repository	Number of repository-based events rejected because the repository was rejected
ontrack_extension_github_ingestion_hook_repository_accepted_count	Counter	event,owner,repository	Number of accepted repository-based events
ontrack_extension_github_ingestion_hook_accepted_count	Counter	event,owner?,repository?	Number of events which are scheduled for processing
ontrack_extension_github_ingestion_hook_ignored_count	Counter	event,owner?,repository?	Number of events which were accepted but won’t be processed

Queue metrics

Metric	Type	Tags	Description
ontrack_extension_github_ingestion_queue_produced_count	Counter	event,owner?,repository?,routing	Number of payloads sent to the queues
ontrack_extension_github_ingestion_queue_consumed_count	Counter	event,owner?,repository?,queue	Number of payloads received by the queues

Processing metrics

Metric	Type	Tags	Description
ontrack_extension_github_ingestion_process_started_count	Counter	event,owner?,repository?	Number of payloads whose processing has started
ontrack_extension_github_ingestion_process_success_count	Counter	event,owner?,repository?	Number of payloads whose processing has succeeded
ontrack_extension_github_ingestion_process_ignored_count	Counter	event,owner?,repository?	Number of payloads whose processing has been ignored
ontrack_extension_github_ingestion_process_error_count	Counter	event,owner?,repository?	Number of payloads whose processing has finished with an error

Metric	Type	Tags	Description
ontrack_extension_github_ingestion_process_finished_count	Counter	event,owner?,repository?	Number of payloads whose processing has finished
ontrack_extension_github_ingestion_process_time	Timer	event,owner?,repository?	Time it took to process this payload

9.2.11. Configuration

See Configuration properties for the list of all available properties.

Routing

By default, Ontrack uses one unique RabbitMQ queue to process all incoming payloads, with a maximum concurrency of 10.

In some cases, when some repositories are more active than others, it may be useful to create other queues in order to prioritize the work.

You can define routing configurations based on regular expressions matching the repository owner & names. For example:

```
ontrack:
  extension:
    github:
      ingestion:
        processing:
          repositories:
            very-active:
              repository: my-very-active-repository
```

This will create an additional queue, called `github.ingestion.very-active` where all the processing for the `my-very-active-repository` repository will be sent to.

Queues configurations

Both the default queue and the repository specific queues can have their number of consumers being configured:

```
ontrack:
  extension:
    github:
      ingestion:
        processing:
          repositories:
            very-active:
              repository: my-very-active-repository
              config:
                concurrency: 20
          default:
            concurrency: 10
```

See Configuration properties for the list of all available properties.

9.3. Working with Bitbucket Cloud

Bitbucket Cloud is an enterprise SaaS Git repository manager by Atlassian.

When working with Git in Ontrack, one can configure a project to connect to a Git repository defined in Bitbucket Cloud.

9.3.1. General configuration

The access to a Bitbucket Cloud *workspace* must be configured.

The access to Bitbucket Cloud from Ontrack is configured at Bitbucket Cloud *workspace* level. If your Ontrack instance uses several workspaces, you can define several Bitbucket Cloud configurations, one per workspace.

1. as administrator, go to the *Bitbucket Cloud configurations* menu
2. click on *Create a configuration*
3. in the configuration dialog, enter the following parameters:
   - **Name** - unique name for the configuration
   - **Workspace** - name of the Bitbucket Cloud workspace to use
   - **User** & **Password** - credentials used to access Bitbucket Cloud. The password must be a Bitbucket Cloud app password.

The app password must be granted at least the following rights:

- project > read
- repository > read
- pull requests > read
- issues > read

The existing configurations can be updated and deleted.

Configuration as Code

You can use configuration as code to configure the Bitbucket Cloud configurations. For example:

```
ontrack:
  config:
    bitbucket-cloud:
      - name: my-config
        workspace: my-workspace
        user: my-user
        password: <app password>
```

9.3.2. Project configuration

The link between a project and a Bitbucket Cloud repository is defined by the *Bitbucket Cloud configuration* property:

- **Configuration** - selection of the Bitbucket Cloud configuration created before
- **Repository** - name of the Bitbucket Cloud repository
    - Indexation interval - interval (in minutes) between each synchronization (Ontrack maintains internally a clone of the Bitbucket Cloud repositories)
    - Issue configuration - configured issue service to use when looking for issues in commits.

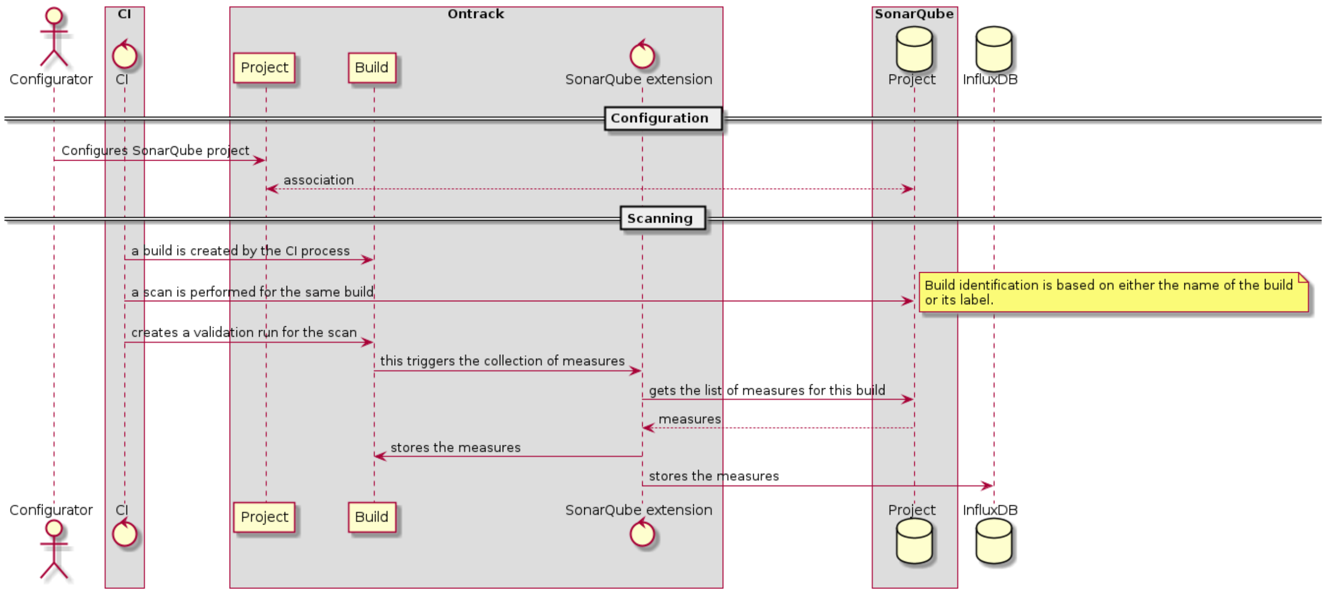
Branches can be configured for Git independently.

9.4. JIRA integration

9.5. Artifactory integration

9.6. SonarQube integration

It's possible to configure projects so that any build which has been scanned by SonarQube gets some measures registered in Ontrack and those same measures can then be exported as metrics.


CI
Ontrack
SonarQube
Configurator
CI
Project
Build
SonarQube extension
Project
InfluxDB
Configuration
Configures SonarQube project
association
Scanning
a build is created by the CI process
a scan is performed for the same build
Build identification is based on either the name of the build or its label.
creates a validation run for the scan
this triggers the collection of measures
gets the list of measures for this build
measures
stores the measures
stores the measures

9.6.1. General configuration

One configuration must be created per SonarQube server you want to integrate.

As an administrator, you need to select "SonarQube configurations" in your user menu and create SonarQube configurations by setting three parameters:

- *Name* - name for this configuration
- *URL* - the root URL of the SonarQube server
- *Token* - an authentication token to get information from SonarQube

9.6.2. Global settings

As an *administrator*, go to the *Settings* menu. In the *SonarQube* section, click on *Edit* and fill the following parameters:

Name	Default value	Description
Measures	`critical_violations`, `coverage`	List of SonarQube metric names to collect. They can be completed or overridden at project level.
Disabled	`No`	Global flag to disable the collection of SonarQube measures

9.6.3. Project configuration

In order to enable the collection of SonarQube measures for a project, it must be associated with the "SonarQube" property.

The property needs the following parameters:

Name	Default value	Description
Configuration	*Required*	SonarQube server configuration
Key	*Required*	Key of the project in SonarQube (typically `group:artifact`)
Validation stamp	`sonarqube`	Name of the validation stamp, which, when granted to a build, triggers the collection of SonarQube measures.
Measures	*Empty*	List of SonarQube metric names to collect for this project, additionally to those defined globally.
Override	`No`	If set to `Yes`, this causes the list of metric names defined by the value of *Measures* to take precedence on the global settings.
Branch model	`No`	If set to `Yes`, restricts the collection of SonarQube measures to the builds which are branch which comply with the project branch model.
Branch pattern	*Empty*	If set, it defines a regular expression to use against the branch name (or Git path)

The *Branch model* and *Branch pattern* can be combined together.

9.6.4. Identifying measures in SonarQube

Ontrack looks for the measures in SonarQube using the following approach.

It looks first for analyses in SonarQube for the corresponding:

- *project* as defined in the SonarQube property of the Ontrack project, typically `group:artifact`
- *branch* - either the Git branch associated with the Ontrack branch if any or the Ontrack branch name

This implies that your SonarQube analysis parameters must include the corresponding branch name. If you use the Git branch name for your SonarQube analysis, make sure that the same Git branch is associated with your Ontrack branch.

Once the analyses have been collected, the specific analysis for the Ontrack build will be looked for based on the:

- *version* - set to either the release label associated to the Ontrack build if any or the Ontrack build name

Once the analysis for the Ontrack build has been found, its measures are collected and filtered based on the *measures* property.

9.6.5. Build measures

Once SonarQube measures have been collected for a build, they are available in the *Information* section of the build page.

9.6.6. Export of measures

Once SonarQube measures have been collected for a build, they are automatically exported as metrics if enabled.

See Metrics for more information.

The list of metrics are the following.

Collection metrics

All metrics linked to the collection of the measures are associated with the following tags:

- `project` - name of the build's project
- `branch` - name of the build's branch
- `uri` - SonarQube URL

Following metrics are collected:

- `ontrack_sonarqube_collection_started_count` - counter - number of times a collection is started
- `ontrack_sonarqube_collection_success_count` - counter - number of times a collection is a success
- `ontrack_sonarqube_collection_error_count` - counter - number of times a collection is a failure
- `ontrack_sonarqube_collection_time` - timer - histogram of times for the collections

Missing measures

- `ontrack_sonarqube_collection_none` - counter - number of times a measure is collected but none such measure was available in SonarQube

This metric is associated with following tags:

- `project` - name of the build's project
- `branch` - name of the build's branch
- `uri` - SonarQube URL

- `measure` - name of the measure

Measures

Measures associated to builds are exported to metrics using:

- metric name - `ontrack_sonarqube_measure`
- tags:
  - `project` - name of the build's project
  - `branch` - name of the build's branch
  - `build` - name of the build for which measures are collected
  - `version` - display name of the build
  - `status` - the validation run status reported for the stamp
  - `measure` - name of the measure
- value - value of the measure
- timestamp of the metric is the creation time of the build

9.7. Integration with Jenkins

Jenkins can inject data into Ontrack - see Jenkins plug-in for this purpose. But Ontrack can also link builds to Jenkins by:

- defining a Jenkins configuration
- setting a link to a Jenkins folder at project or branch level
- setting a link to a Jenkins build at build level
- triggering Jenkins builds on Notifications

9.7.1. Triggering Jenkins builds on notifications

Upon a notification, one may want to trigger a Jenkins build. For example, given a build being promoted to a certain level ("BRONZE" for example), one may want to trigger a Jenkins build to complete additional validations. This is a pretty good way to perform long-running deployment pipelines (security scans, performance tests, etc.) while avoiding coupling pipelines together.

To do this, a subscription can be created at the promotion level, to listen to "new promotion runs" events and to trigger a Jenkins pipeline.

Using the UI, the subscription looks like:

- *Configuration* - the Jenkins configuration to use (it defines the URL to connect to, the credentials to use)
- *Job* - the relative path to the job to launch.
- *Parameters* - a list of name/value pairs to pass to the Jenkins job as parameters

- *Call mode* - defines if the job must be called asynchronously (the default) or synchronously. In the former case, Ontrack fires the job and then returns immediately. In the later case, Ontrack will wait for the job to complete and check its result before considering the notification successful. Note that this can have impacts on performances.
- *Timeout* - in case the synchronous call mode is used, defines the amount of seconds to wait for the completion of the Jenkins build

Several remarks:

- for the job, a reduced path, without the `/job/` separator can be used. Keeping the `/job/` separator is fine as well. So the `job/sandbox/job/test-notification` and `sandbox/test-notification` are in this regard equivalent.
- the *job* and *parameters* values are using the templating engine

For example, a parameter value may contain `${project}` as a value, indicating that the project name linked to the event the notification is about will be used as a value.

Other placeholders, like `branch`, `promotionLevel`, etc., are available, depending on the type of event. Their values can also be updated and encoded. See Templating engine for a list of options.

Using the API

The GraphQL API can be used to setup the promotion:

```
mutation {
    subscribePromotionLevelToEvents(input: {
        project: "my-project",
        branch: "my-branch",
        promotion: "BRONZE",
        channel: "jenkins",
        channelConfig: {
            config: "my-jenkins-config-name",
            job: "my-folder/my-pipeline/${branch.scmBranch|urlencode}",
            parameters: [
                {
                    name: "PROMOTION",
                    value: "${promotionLevel}"
                }
            ],
            callMode: "ASYNC"
        },
        events: [
            "new_promotion_run"
        ]
    }) {
        errors {
            message
        }
        subscription {
            id
        }
    }
}
```

Definition as code

Like all other subscriptions, the Jenkins notifications can be defined as code. For example, to define a trigger for a promotion level:

```
ontrack:
  extensions:
    notifications:
      entity-subscriptions:
        - entity:
            project: my-project
            branch: my-branch
            promotion: GOLD
          subscriptions:
            - channel: jenkins
              channel-config:
                config: my-jenkins-config-name
                job: "my-folder/my-pipeline/${branch.scmBranch|urlencode}",
                parameters:
                  - name: PROMOTION
                    value: "${promotionLevel}"
                callMode: ASYNC
              events:
                - new_promotion_run
```

9.8. Notifications

Ontrack has the possibility to send notifications to different backends like some webhooks, email, Slack messages, etc.

By default, notifications are *not* enabled. You need to activate them by setting the `ontrack.config.extension.notifications.enabled` configuration property to `true`.

A notification is the association between an *event* occurring on an *entity* and sent to a given *channel* using some *configuration*.

For example, a notification can be:

- event: a build has been promoted
- entity: the branch the build belongs to
- channel: email
- channel configuration: the subject & the email addresses
- an optional custom template

In this example, the body of the email would be a text like "Build B of branch R in project P has been promoted to P", which various links to Ontrack.

By default, the notifications use the default templates of the events but a custom template can be provided.

Administrators of Ontrack can create and configure the different backends.

They can also configure the notifications at entity level to respond to some events using notification configurations (*subscriptions*).

Subscriptions can be either local (subscribing to the events on a given branch) or global (subscribing to the events in all Ontrack, regardless of the entity).

9.8.1. Notification backends

See Notifications for a complete list of the existing notification backends and their configurations.

9.8.2. Subscriptions

Subscriptions can be done at entity level (project, branch, promotion, etc.) or globally.

Local subscriptions

On an entity page (like the page for a project, a branch, etc.), go to the *Tools* menu and select _ Subscriptions_:

[Subscriptions menu] | *integration-notifications-subscriptions-menu.png*

On the subsequent, you can manage the list of subscriptions at this entity level.

[List of subscriptions] | *integration-notifications-subscriptions-list.png*

To create a subscription, select the *New subscription* command and enter the fields for the subscription:

[New subscription dialog] | *integration-notifications-new-subscription.png*

- events - list of events to listen to
- keywords - space-separated list of words which will be used to restrict the events being listened to
- channel - destination for the notification. Depending on the channel being selected, additional fields are needed (for example, for a Slack notification, the Slack channel is required)
- custom template - if provided, it'll override the default template associated with the event. See Templating engine for its syntax.

On the subscription list, you can:

- enable/disable each subscription
- delete a subscription

Global subscriptions

The management of the global subscriptions is exactly the same as for the local ones, but for the fact that the global subscriptions are accessible through the *Global subscriptions* menu.

Global subscriptions can be configured using CasC. For example:

```
ontrack:
    extensions:
        notifications:
            global-subscriptions:
                - events:
                    - new_promotion_run
                  keywords: "GOLD main"
                  channel: slack
                  channel-config:
                    channel: "#my-channel"
                  contentTemplate: |
                    Promoted to ${promotionLevel}.
```

9.8.3. Recordings

For audit and troubleshooting purposes, all notifications are recorded and administrators can have access to them using the *Notification recordings* user menu:

[Notifications recordings] | *integration-notifications-recordings.png*

Each recording has the following columns:

- timestamp (UTC) - when was the notification actually sent
- channel - which channel was used by the notification
- result - outcome of the notification
  - OK - notification was sent successfully
  - NOT_CONFIGURED - the notification channel not configured
  - INVALID_CONFIGURATION - the notification channel is wrongly configured
  - DISABLED - the notification channel has been disabled
  - ERROR - there was an error

By clicking on the eye icon left of the timestamp, you can see more details about the notification:

[Notification recording details] | *integration-notifications-recording-details.png*

- Channel config - the JSON representation of the configuration of the notification channel
- Event - the JSON representation of the event being sent

Finally, the administrator can filter recordings on their results and the *Delete ALL records* can be used to clear out all recordings.

9.8.4. Examples

This section shows a number of custom templates for some events.

To send a change log on a promotion, subscribe to the `new_promotion_run` event and use for example:

```
Change log:

${promotionRun.changelog}
```

If the project builds have linked to a `dependency` project's builds, it may be interesting to follow the links recursively:

```
Change log for ${build.release}:

${promotionRun.changelog}

Change log for the dependency:

${promotionRun.changelog?project=dependency}
```

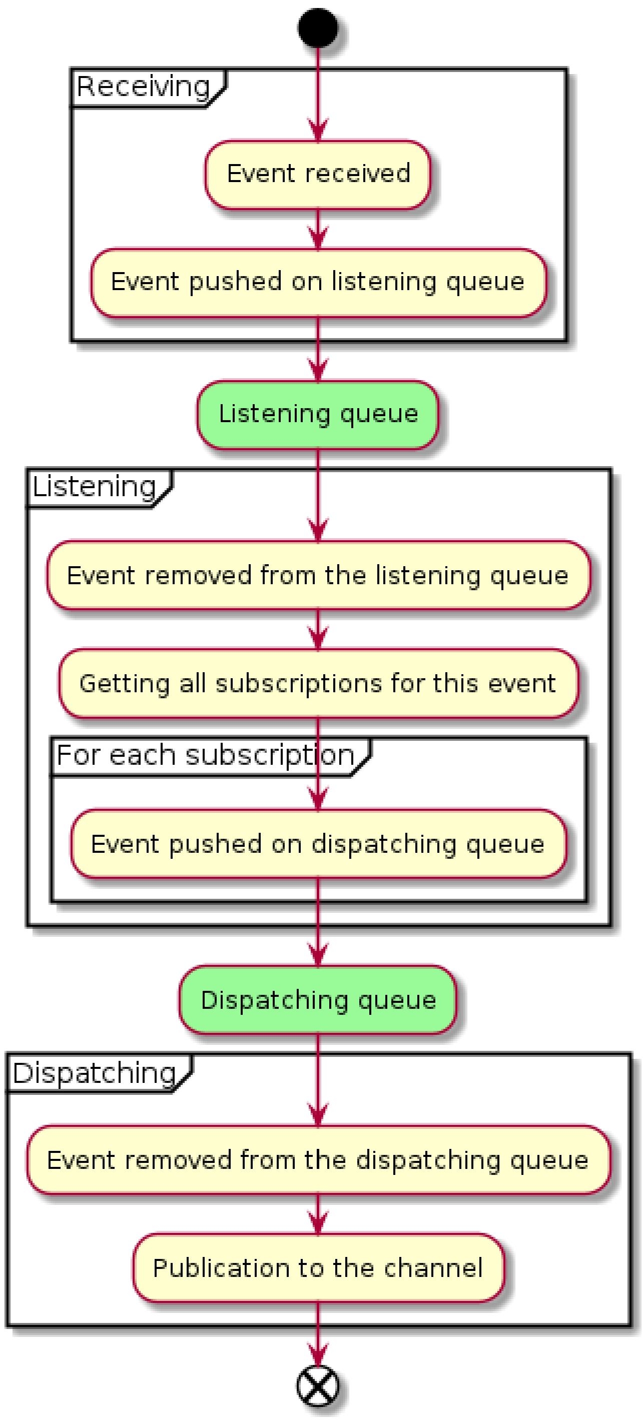
9.8.5. Metrics

Following metrics are sent by Ontrack about the notifications:

Metric	Tags	Description
`ontrack_extension_notifications_event_listening_received`	`event`	Count of events being received
`ontrack_extension_notifications_event_listening_queued`	`event`	Count of events being actually queued
`ontrack_extension_notifications_event_listening_dequeued`	`event`	Count of events being removed from the queue for dispatching
`ontrack_extension_notifications_event_listening_dequeued_error`	None	Count of uncaught errors when listening to events
`ontrack_extension_notifications_event_listening`	`event`	Count of events whose dispatching starts
`ontrack_extension_notifications_event_dispatching_queued`	`event`, `channel`, `routing`	Count of events whose dispatching starts (pushed into the dispatching queue)
`ontrack_extension_notifications_event_dispatching_dequeued`	`event`, `channel`, `routing`	Count of events whose dispatching starts (pulled from the dispatching queue)

Metric	Tags	Description
`ontrack_extension_notifications_event_dispatching_result`	`event`, `channel`, `result`	Count of events whose dispatching is finished
`ontrack_extension_notifications_event_processing_started`	`event`, `channel`	Count of events whose processing is started
`ontrack_extension_notifications_event_processing_channel_started`	`event`, `channel`	Count of events whose processing is started on an actual channel
`ontrack_extension_notifications_event_processing_channel_unknown`	`event`, `channel`	Count of events whose processing is stopped because the channel is unknown
`ontrack_extension_notifications_event_processing_channel_invalid`	`event`, `channel`	Count of events whose processing is stopped because the channel or its configuration is invalid
`ontrack_extension_notifications_event_processing_channel_publishing`	`event`, `channel`	Count of events whose publication into a channel has started
`ontrack_extension_notifications_event_processing_channel_result`	`event`, `channel`, `result`	Count of events whose publication into a channel has finished
`ontrack_extension_notifications_event_processing_channel_error`	`event`, `channel`	Count of events whose publication into a channel has failed

The overall processing of events looks like this:


Receiving
Event received
Event pushed on listening queue
Listening queue
Listening
Event removed from the listening queue
Getting all subscriptions for this event
For each subscription
Event pushed on dispatching queue
Dispatching queue
Dispatching
Event removed from the dispatching queue
Publication to the channel

9.9. Integration with Slack

Ontrack can be configured to send notifications to Slack.

Slack settings are available in *Settings* > *Slack settings*:

- *Enabled* - if Slack integration is enabled or not
- *Token* - Slack token
- *Emoji* - optional, a string like `:ontrack:` to set as icon for the Slack messages sent by Ontrack
- *Endpoint* - optional, a URL for the Slack API (if custom)

The logo from Ontrack can be find in the source code at https://github.com/nemerosa/ontrack/blob/master/ontrack-web/src/assets/logo-128.png (other sizes are available).

This configuration can also be set as code:

```
ontrack:
  config:
    settings:
      slack:
        enabled: true
        token: some-secret-token
        emoji: ":ontrack:"
```

9.9.1. Slack setup

This section explains how to setup your workspace for Ontrack to be able to send messages in some channels.

First, you need to create a Slack app by following the instructions at https://api.slack.com/authentication/basics:

- create the Slack App
- the `chat:write` scope is enough for Ontrack
- add also `chat:write.public` if you want to allow all public channels to be writable by Ontrack
- install the App into your workspace and copy the Bot token value for the setup above

For public channels, unless the `chat:write.public` scope has been granted, and for private channels, you need to invite the App into the channel:

```
/invite @<App>
```

9.10. Webhooks

Ontrack can be configured to send notifications to some webhooks using HTTP.

Webhooks are disabled by default and must be enabled explicitly. See global settings.

9.10.1. Definitions

Ontrack administrators can create webhooks using the *Webhooks* entry in their user menu.

Webhooks can be created and deleted.

A webhook is defined by the following fields:

- name - a unique name for the webhook, which will be referred to when used in a subscription
- enabled - a flag to disable or enable the webhook
- url - a HTTP URL for the webhook. HTTPS is recommended but not required.
- timeout - number of seconds to wait before the connection to the webhook *url* is abandoned (see also timeouts below)
- *authentication* - the way to authenticate to the webhook (see below)

9.10.2. Authentication

Three types of authentication are supported:

- basic authentication - a username and a password must be provided
- bearer authentication - a token must be provided and will be sent in the `Authorization` header with its value set to `Bearer <provided token>`
- header authentication - a header name and value must be provided

Authentication of webhooks is required.

9.10.3. Timeouts

Timeouts for the execution of the webhooks are defined at two levels:

- global settings
- webhook definition

The actual timeout is the *maximum* value between these two values.

9.10.4. Global settings

The *Webhooks* section in the global settings allows the configuration of the following:

- enabled - global flag used for *all* webhooks - set to *No* by default
- timeout - number of minutes for the global timeout - set to 5 minutes by default
- retention days for the deliveries - number of days to keep the webhooks deliveries records - set to 30 days by default

Webhooks are disabled by default and must be enabled explicitly.

9.10.5. Webhooks deliveries

Additionally to the notification recordings, deliveries to the webhooks are also registered by Ontrack and accessible by an administrator.

The deliveries for a given webhook are accessible through the *Deliveries* button on the list of webhooks.

[Webhook deliveries] | *integration-webhooks-deliveries.png*

The following columns are displayed:

- unique ID for the delivery
- name of the webhook
- timestamp of the *request*
- type of payload
- HTTP status sent by the remote webhook

You can get more details by clicking on the UUID or the eye icon:

[Webhook delivery details] | *integration-webhooks-deliveries-details.png*

- request payload - the JSON actually sent to the webhook
- response payload - the payload returned by the webhook (interpreted as text)
- response timestamp - when the response was received
- stack - the error stacktrace in case of error

Webhooks deliveries are kept only a given number of days before being deleted. See global settings.

9.10.6. Payloads

Several types of payloads can be sent by Ontrack but they all share the same structure:

- type: `application/json`
- schema:

```
{
  "uuid" : "<uuid>",
  "type" : "<payload type>",
  "data" : {}
}
```

The `data` node type and content depends on the payload `type`.

`event` payload

The `event` payload is sent upon a notification. A typical payload looks like:

```
{
  "uuid" : "fcf07059-6158-4acc-a965-9cbf30c8bdd7",
  "type" : "event",
  "data" : {
    "eventType" : {
      "id" : "new_branch",
      "template" : "New branch ${BRANCH} for project ${PROJECT}."
    },
    "signature" : null,
    "entities" : {
      "PROJECT" : {
        "id" : 260,
        "name" : "p42127192",
        "description" : "",
        "disabled" : false,
        "signature" : {
          "time" : "2022-05-02T07:42:12.751100Z",
          "user" : {
            "name" : "admin"
          }
        }
      },
      "BRANCH" : {
        "id" : 154,
        "name" : "b42128333",
        "description" : "",
        "disabled" : false,
        "project" : {
          "id" : 260,
          "name" : "p42127192",
          "description" : "",
          "disabled" : false,
          "signature" : {
            "time" : "2022-05-02T07:42:12.751100Z",
            "user" : {
              "name" : "admin"
            }
          }
        },
        "signature" : {
          "time" : "2022-05-02T07:42:12.862900Z",
          "user" : {
            "name" : "admin"
          }
        }
      }
    },
    "ref" : null,
    "values" : { }
  }
}
```

The `entities`, `ref` and `values` fields will vary a lot depending on the type of event.

`ping` payload

A `ping` payload can be sent from the webhooks list by clicking on the *Test* button.

It's used to test a webhook and its payload looks like:

```
{
  "uuid" : "b438b771-e20c-4012-adf6-adb0f1aaa43b",
  "type" : "ping",
  "data" : {
    "message" : "Webhook wh48546511 ping"
  }
}
```

9.10.7. Webhooks metrics

The following metrics are emitted by Ontrack for the processing of the webhooks:

Metric	Tags	Description
`ontrack_extension_notifications_webhooks_delivery_started`	`webhook`, `type`	Webhook delivery is about to start
`ontrack_extension_notifications_webhooks_delivery_answered`	`webhook`, `type`, `status`	Webhook delivery has completed with a HTTP status
`ontrack_extension_notifications_webhooks_delivery_error`	`webhook`, `type`	Webhook delivery has completed with an error
`ontrack_extension_notifications_webhooks_delivery_duration`	`webhook`, `type`	Duration of the delivery duration

9.11. Email

Ontrack can be configured to send notifications by email.

9.11.1. Configuration

Email must be configured statically before being used.

See the Spring boot documentation for the configuration parameters.

Additionally, the `ontrack.config.extension.notifications.mail.from` configuration property should be set for the return address.

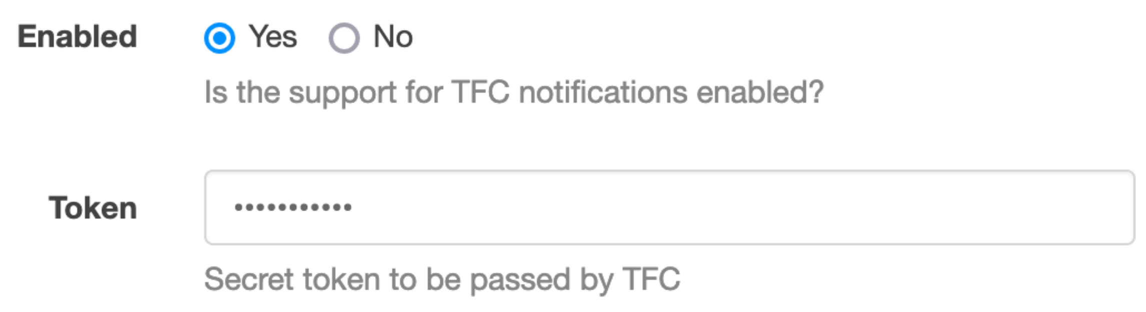
9.12. Terraform Cloud integration

In Terraform Cloud, upon the completion of a run (success or failure) you can notify Ontrack of the result by adding a hook into the Notifications settings of a TFC workspace.

The result of this notification will be the creation of a validation in a build, with a status Passed or Failed, depending on the result of the run execution.

In turn, you can use this validation to trigger other events, typically a promotion.

This feature is not enabled by default: in Ontrack, you need to go to the *Settings* > *TFC* section:


Enabled [✓ Yes] No
Is the support for TFC notifications enabled?

Token ••••••••••••
Secret token to be passed by TFC

- enabled - set this to *Yes* to enable the webhook at Ontrack level
- token - set a secret value which will then be set in Terraform Cloud (see later)

You can define these settings as code:

```
ontrack:
    config:
        settings:
            tfc:
                enabled: true
                token: xxxxx
```

In Terraform Cloud, you can register the Ontrack webhook by going to a workspace settings and then select *Notifications*.

There, create a *Webhook* notification and enter the following values:

- Name - not used by Ontrack, set whichever name suits you the best
- URL - http://<ontrack-url>/hook/secured/tfc?project=&branch=&build=&validation= - see next section for the parameters
- Token - the token you've set in Ontrack TFC settings before
- Triggers - Ontrack only listens to "Completed" and "Errored" events but will just ignore any other trigger

For the parameters of the Webhook URL, there are 4 possible parameters:

Parameter	Description
`project` (required)	Name of the project in Ontrack. It must exist.

Parameter	Description
`branch` (optional)	Name of the branch in Ontrack. If set, it must exist. If this parameter is not set, the build will be search among all the branches of the project.
`build` (optional)	Name of the build in Ontrack. If set, it must exist. If the project is configured to use labels for the builds, then this parameter is considered a label. If the build is not set, the `branch` *must* be set and the latest build of the `project` will be used.
`promotion` (optional)	Name of a promotion in Ontrack. It's used when `branch` is set and not `build`, to look for the latest build having this promotion.
`validation` (required)	Name of the validation in Ontrack. If it does not exist, it'll be created.

Each of these parameters can be hardcoded:

```
project=my-project
```

or set by reference:

```
project=@variable
```

In this case, the value following `@` represents a variable of the Terraform Cloud workspace.

This variable must exist and must not be sensitive.

When using variable references, Ontrack will contact Terraform Cloud in order to get the values for the referenced variables.

To this purpose, you need to define a *TFC Configuration*:

- go to the user menu, at *TFC configurations*
- *Create a configuration*
- Name: anything meaningful
- URL: set to `https://app.terraform.io` by default, put something else when using Terraform Enterprise
- Token: generate a *user token* in Terraform Cloud

The mapping between the calls from the hook and the associated TFC configuration will be based on the URL.

9.13. Monitoring

Ontrack is based on Spring Boot and exports metrics and health indicators that can be used to monitor the status of the applications.

9.13.1. Health

The `/manage/health` end point provides a JSON tree which indicates the status of all connected systems: JIRA, Jenkins, Git repositories, etc.

Note than an administrator can have access to this information as a dashboard in the *Admin console* (accessible through the user menu).

9.13.2. Metrics

Since version 2.35 / 3.35, Ontrack uses the Micrometer framework to manage metrics, in order to allow a better integration with Spring Boot 2.

See [appendix-metrics-migration] for information about the migration.

See Metrics for the different options for the metrics backends.

List of metrics

The list of Ontrack specific metrics and their tags and values is available using the `/manage/ontrack_metrics` endpoint. Note that this endpoint needs authentication and some administrator privileges.

General metrics:

- `ontrack_error` (counter) - number of error (the `type` tag contains the type of error)

Statistics about the objects stored by Ontrack:

- `ontrack_entity_project_total` (gauge) - total number of projects
- `ontrack_entity_branch_total` (gauge) - total number of branches
- `ontrack_entity_build_total` (gauge) - total number of builds
- `ontrack_entity_promotionLevel_total` (gauge) - total number of promotion levels
- `ontrack_entity_promotionRun_total` (gauge) - total number of promotion runs
- `ontrack_entity_validationStamp_total` (gauge) - total number of validation stamps
- `ontrack_entity_validationRun_total` (gauge) - total number of validation runs
- `ontrack_entity_validationRunStatus_total` (gauge) - total number of validation run statuses
- `ontrack_entity_property_total` (gauge) - total number of properties
- `ontrack_entity_event_total` (gauge) - total number of events

General metrics about jobs:

- `ontrack_job_count_total` (gauge) - total number of jobs
- `ontrack_job_running_total` (gauge) - total number of running jobs
- `ontrack_job_error_total` (gauge) - total number of jobs in error
- `ontrack_job_timeout_total` (gauge) - total number of jobs in timeout
- `ontrack_job_paused_total` (gauge) - total number of paused jobs
- `ontrack_job_disabled_total` (gauge) - total number of disabled jobs
- `ontrack_job_invalid_total` (gauge) - total number of invalid jobs
- `ontrack_job_error_count_total` (gauge) - total number of errors among all the jobs
- `ontrack_job_timeout_count_total` (gauge) - total number of timeouts among all the jobs

Information about individual jobs:

- `ontrack_job_duration_ms` (timer) - duration of the execution of the job
- `ontrack_job_run_count` (counter) - number of times a job has run
- `ontrack_job_errors` (counter) - number of errors for this job

Job metrics have the following tags:

- `job-category` - category of the job
- `job-type` - type of the job

Run information:

- `ontrack_run_build_time_seconds` (timer) - duration of a run for a build. It is associated with `project` and `branch` tags.
- `ontrack_run_validation_run_time_seconds` (timer) - duration of a run for a validation run. It is associated with `project`, `branch`, `validation_stamp` and `status` tags.

More details at [run-info].

Information about connectors (Jenkins, JIRA, Git, etc.):

- `ontrack_connector_count` (gauge) - number of connectors
- `ontrack_connector_up` (gauge) - number of UP connectors
- `ontrack_connector_down` (gauge) - number of DOWN connectors

Connector metrics have the following tags:

- `type` - type of connector (like `jenkins`, `jira`, ...)

Information about the execution times of event listeners:

- `ontrack_event_listener_time` (timer) - duration for the synchronous processing of an event on the backend. The `eventListener` tag contains the FQCN of the event listener service.

Information about the connectivity of remote Git operations:

- `ontrack_git_connect_retries` - Number of retries on connection errors
- `ontrack_git_connect_errors` -Number of terminal connection errors

Information about the delivery, see Delivery metrics.

9.14. Encryption service

Secrets used by Ontrack are encrypted using keys managed by a `ConfidentialStore`.

Ontrack provides three types of storage:

- file based storage (default)
- Vault storage
- database storage

If needed, you can also create your own form of storage using extensions.

9.14.1. Selection of the confidential store

The selection of the confidential store is done at startup time using the `ontrack.config.key-store`configuration property.

It defaults to `file` (see below).

Additional configuration properties might be needed according to the type of store.

9.14.2. File confidential store

This is the default store but its selection can be made explicit by setting the `ontrack.config.key-store`configuration property to `file`.

This store will store the keys in theworking directory under the `security/secrets` subfolder.

A `master.key` file is used to encrypt the individual keys themselves, so two files will be typically present:

- `master.key`
- `net.nemerosa.ontrack.security.EncryptionServiceImpl.encryption`

9.14.3. Secret confidential store

The secret confidential store is particularly well suited for a Kubernetes deployment of Ontrack, where a K8S secret is mapped to a volume mounted in the Ontrack pod.

See the Ontrack chart for more details.

This store is *read-only* and provides a unique key.

The configuration of this store looks like:

```
ontrack.config.key-store = secret
ontrack.config.file-key-store.directory = <path>
```

Alternatively, the following environment variables can be set:

`ONTRACK_CONFIG_KEY_STORE = secret ONTRACK_CONFIG_FILE_KEY_STORE_DIRECTORY = <path>`

`<path>` is the path to a directory which:

- must exist
- must contain the `net.nemerosa.ontrack.security.EncryptionServiceImpl.encryption` file
- this file must exist and must be readable

The content of this file is the key used for the encryption of the credentials in Ontrack. It can be generated using:

```
openssl rand 256 > net.nemerosa.ontrack.security.EncryptionServiceImpl.encryption
```

9.14.4. JDBC confidential store

This store manages the keys directly in the Ontrack database. It can be selected by setting the `ontrack.config.key-store`configuration property to `jdbc`.

No further configuration is needed.

9.14.5. Vault confidential store

By setting the `ontrack.config.key-store`configuration property to `vault`, Ontrack will use Vault to store its encryption keys.

Following configuration properties are available to configure the connection to Vault:

Property	Default	Description
`ontrack.config.vault.uri`	http://localhost:8200	URI to the Vault end point
`ontrack.config.vault.token`	`test`	Token authentication

Property	Default	Description
ontrack.config.vault.prefix	secret/ontrack/key	Path prefix for the storage of the keys WARNING: As of now, the support for Vault storage is **experimental** and is subject to change in later releases. In particular, the authentication mechanism might change.

9.14.6. Migrating encryption keys

In the event you want to migrate the encryption keys from one type of storage to another, follow this procedure.

In the procedure below, `${ONTRACK_URL}` designates the Ontrack URL and `${ONTRACK_ADMIN_USER}` the name of an Ontrack user which has the `ADMINISTRATOR` role.

Using the initial configuration for the store, start by exporting the key:

```
curl ${ONTRACK_URL}/admin/encryption \
   --user ${ONTRACK_ADMIN_USER} \
   --output ontrack.key
```

This command will export the encryption key into the local `ontrack/key` file.

Start Ontrack using the new configuration.

There might be errors are startup, when some jobsstart to collect some data from the external applications. Those errors can be safely ignored for now.

Import the key file into Ontrack:

```
curl ${ONTRACK_URL}/admin/encryption \
   --user ${ONTRACK_ADMIN_USER} \
   -X PUT \
   -H "Content-Type: text/plain" \
   --data @ontrack.key
```

Restart Ontrack.

9.14.7. Losing the encryption keys

In case you lose the encryption keys, the consequence will be that the secrets stored by Ontrack won’t be able to be decrypted. This will typically make the external applications your Ontrack instance connects to unreachable.

The only to fix this is to reenter the secrets.

> Some pages might not display correctly if some applications are not reachable.

9.14.8. Adding custom confidential store

See Extending confidential stores.

Chapter 10. Ontrack API

10.1. Ontrack GraphQL API

10.2. Ontrack DSL

Up to version 4.5, a Groovy DSL was shipped and published with each Ontrack release.

This has changed since version 4.6:

Version	DSL
4.5	DSL is still published in the Maven Central and maintained
4.6	DSL is no longer published, but old versions should still be compatible with 4.x
5.x	The DSL code is gone from Ontrack and no backward compatibility is insured any longer.

To replace the Ontrack DSL, several alternatives are possible:

- direct calls to the GraphQL API
- using the Ontrack CLI
- using the Jenkins Ontrack pipeline library
- using GitHub ingestion

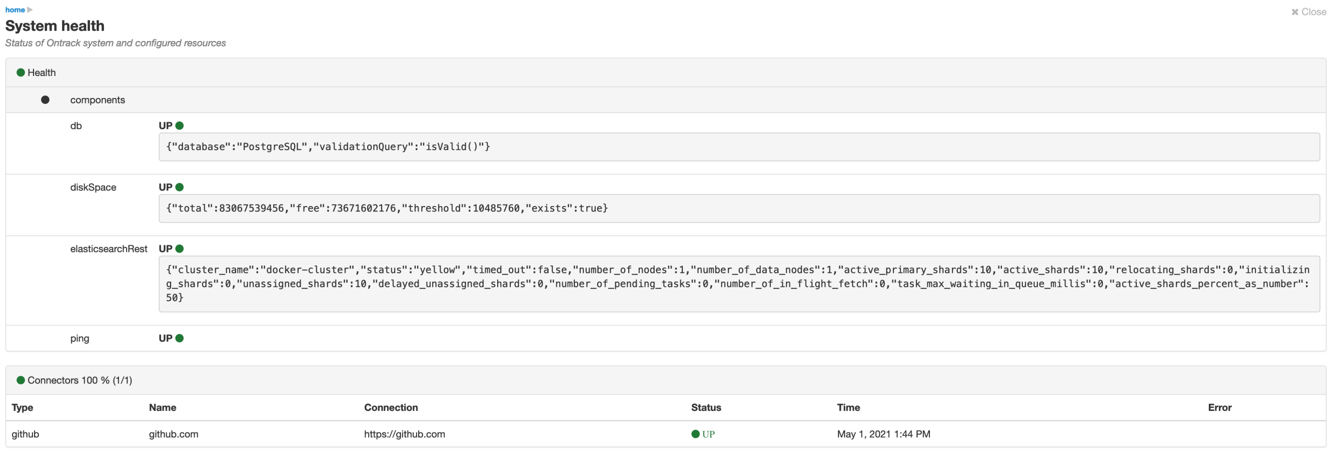
Chapter 11. Administration

11.1. Accounts management

11.2. Management end points

The overall health of the Ontrack system can be accessed in the user menu under *System health*:

- it displays the status of the components Ontrack needs to work properly
- and all the connections that Ontrack holds for projects



System health

Status of Ontrack system and configured resources

● Health

● components

db UP ●

```
{"database":"PostgreSQL","validationQuery":"isValid()"}
```

diskSpace UP ●

```
{"total":83067539456,"free":73671602176,"threshold":10485760,"exists":true}
```

elasticsearchRest UP ●

```
{"cluster_name":"docker-cluster","status":"yellow","timed_out":false,"number_of_nodes":1,"number_of_data_nodes":1,"active_primary_shards":10,"active_shards":10,"relocating_shards":0,"initializin
g_shards":0,"unassigned_shards":10,"delayed_unassigned_shards":0,"number_of_pending_tasks":0,"number_of_in_flight_fetch":0,"task_max_waiting_in_queue_millis":0,"active_shards_percent_as_number":
50}
```

ping UP ●

● Connectors 100 % (1/1)

Type	Name	Connection	Status	Time	Error
github	github.com	https://github.com	● UP	May 1, 2021 1:44 PM	

11.2.1. REST info

The `/rest/info` REST end point returns basic information:

```
{
  "_self": "/rest/info/",
  "version": {
    "date": "2021-04-29T11:15:20.271757Z",
    "display": "4.0-beta.28",
    "full": "release-4.0-beta-0062120",
    "branch": "release-4.0-beta",
    "build": "0062120",
    "commit": "006212063f9ad62bb52cb24f675f2fafeb83d12b",
    "source": "release/4.0-beta",
    "sourceType": "release"
  },
  "extensionList": {
    "extensions": [
      {
        "id": "oidc",
        "name": "OIDC",
        "description": "Support for OIDC authentication",
        "version": "4.0-beta.28",
        "options": {
          "gui": true,
          "dependencies": [
            "casc"
          ]
        }
      }
    ]
  }
}
```

11.2.2. Actuator end points

Ontrack exposes Spring Boot actuator end points:

- over HTTP (JMX is disabled)
- port `8800`
- on `/manage` context path

The management port can be configured using the default `management.server.port` system property or `MANAGEMENT_SERVER_PORT` environment variable.

The management end points authentication is disabled by default in Ontrack, so make sure the chosen port (`8800` by default) is not exposed unnecessarily or enable authentication.

Check the Spring Boot documentation for more information.

The following end points are exposed by default:

* `/manage/health` - health of Ontrack and its components
* `/manage/info` - basic information about the Ontrack instance
* `/manage/prometheus` - exposes environment metrics for being consumed by Prometheus

Additionally, custom management end points are available:

* `/manage/influxdb` - if InfluxDB integration is enabled. The `GET` method returns the status of the connection between Ontrack and InfluxDB, and the `POST` method forces a reconnection. See InfluxDB metrics for more information.
* `/manage/connectors` - the connectors are used to connect to external systems like Jenkins, JIRA, Git repositories, etc. The `manage/connectors` end point allows an administrator to get information about the state of those connectors.
* `/manage/account` - `POST` method to reset the password of a given account by name, for example:

```
POST /manage/account

{
    "username": "admin",
    "password": "new-password"
}
```

This returns `true` or `false` to show the success of the operation.

Chapter 12. Development

12.1. Developing tests

12.1.1. Integration tests

12.1.2. Database integration tests

While the vast majority of tests might never need to interact directly with the database, some tests may need a direct JDBC access to it.

For example, for a migration test, we cannot use the normal API to insert test records into the database, since the API is already up-to-date. A typical scenario would be then:

1. insert some records into the database using JDBC
2. run the migration
3. use the API to check everything is OK

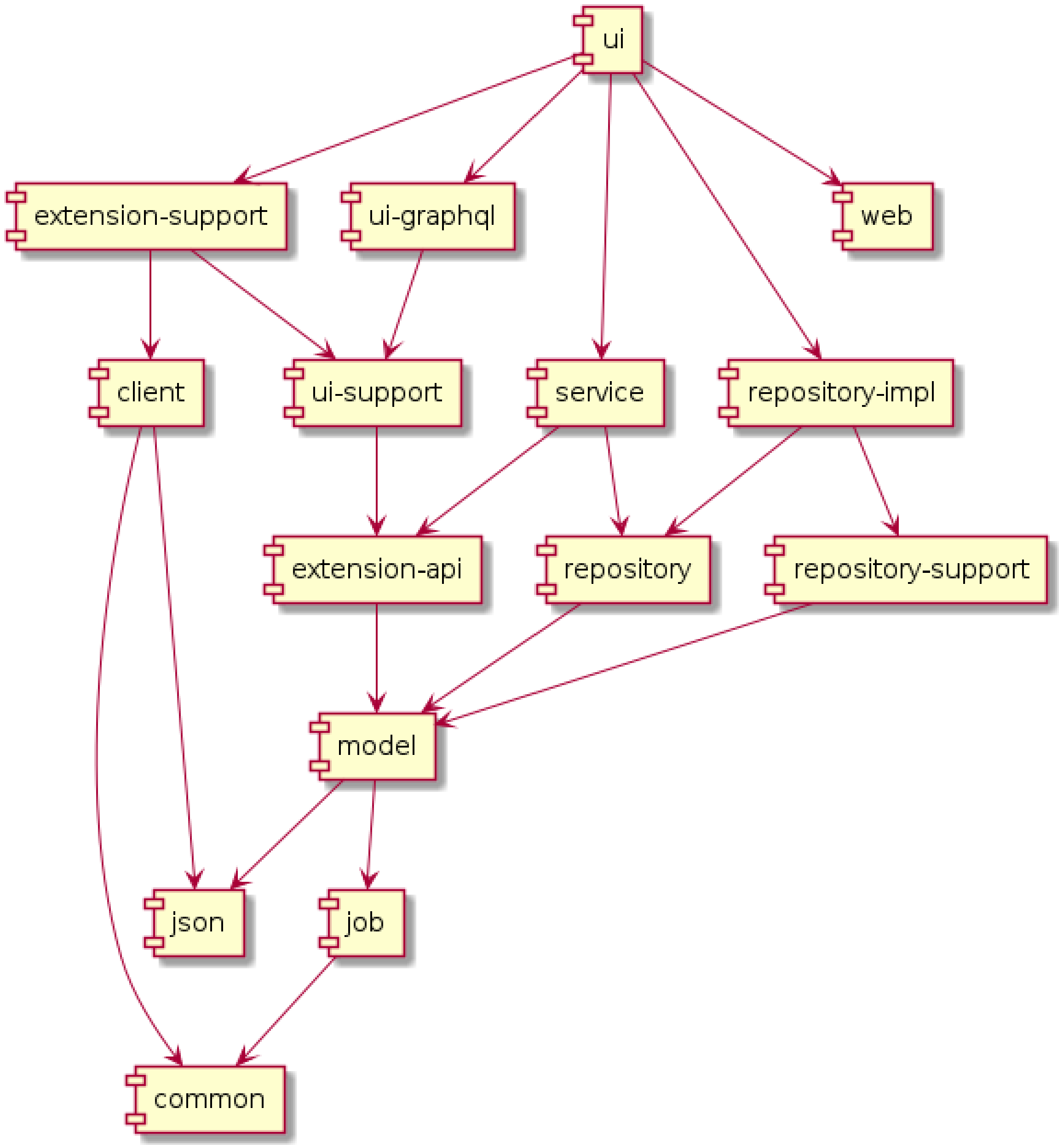
For the rest, this type of test will be coded as any other integration test.

To run JDBC statements directly, use the `jdbcTemplate` property or the `namedJdbcTemplate` one, made available by the `AbstractITTestJUnit4Support` class or one of its subclass.

Example: `GitHubConfigurationTokenMigrationIT`

Chapter 13. Architecture

13.1. Modules



Not all modules nor links are shown here in order to keep some clarity. The Gradle build files in the source remain the main source of authority.

Modules are used in *ontrack* for two purposes:

- isolation
- distribution

We distinguish also between:

- core modules

* extension modules

Extension modules rely on the `extension-support` module to be compiled and tested. The link between the core modules and the extensions is done through the `extension-api` module, visible by the two worlds.

Modules like `common`, `json`, `tx` or `client` are purely utilitarian (actually, they could be extracted from `ontrack` itself).

The main core module is the `model` one, which defines both the API of the Ontrack services and the domain model.

13.2. UI

13.2.1. Resources

The UI is realized by REST controllers. They manipulate the *model* and get access to it through *services*.

In the end, the controllers return *model* objects that must be decorated by links in order to achieve Hateoas.

The controllers are not directly responsible for the decoration of the model objects as *resources* (model + links). This is instead the responsibility of the *resource decorators*.

The *model* objects are not returned as such, often their content needs to be filtered out. For example, when getting a list of branches for a project, we do not want each project to bring along its own copy of the project object. This is achieved using the *model filtering* technics.

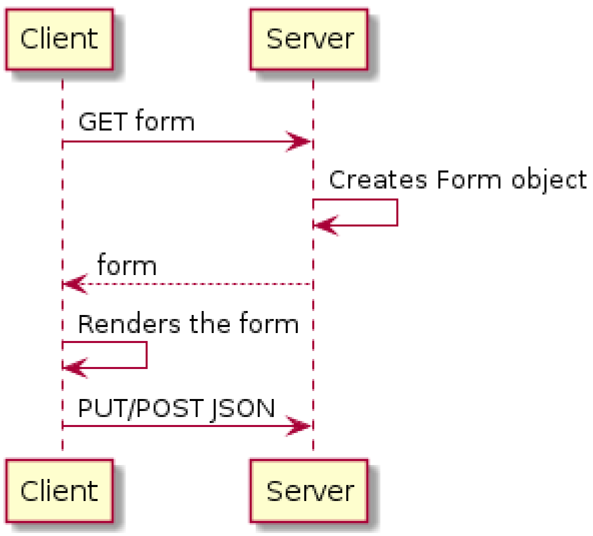
13.2.2. Resource decorators

TODO

13.3. Forms

Simple input forms do not need a lot of effort to design in Ontrack. They can be used directly in pages or in modal dialogs.

Server components (controllers, services, …) are creating instances of the `Form` object and the client libraries (`service.form.js`) is responsible for their rendering:



Form object

The `Form` object is created by adding `Field`s into it using its `with` method:

```
import net.nemerosa.ontrack.model.form.Form;
public Form getMyForm() {
   return Form.create()
      .with(field1)
      .with(field2)
      ;
}
```

See the next section on how to create the field objects. The `Form` object contains utility methods for common fields:

```
Form.create()
   // `name` text field (40 chars max), with "Name" as a label
   // constrained by the `[A-Za-z0-9_\.\-]+` regular expression
   // Suitable for most name fields on the Ontrack model objects
   // (projects, branches, etc.)
   .name()
   // `password` password field (40 chars max) with "Password" as a label
   .password()
   // `description` memo field (500 chars max), optional, with "Description"
   // as a label
   .description()
   // `dateTime` date/time field (see below) with "Date/time" as a label
   .dateTime()
   // ...
   ;
```

In order to fill the fields with actual values, you can either use the `value(…)` method on the field object (see next section) or use the `fill(…)` method on the `Form` object.

```
Map<String, ?> data = ...
Form.create()
   // ...
   // Sets `value` as the value of the field with name "fieldName"
   .fill("fieldName", value)
   // Sets all values in the map using the key as the field name
   .fill(data)
```

Fields

Common field properties

Property	Method	Default value	Description
`name`	`of(…)`	*required*	Mapping
`label`	`label(…)`	*none*	Display name
`required`	`optional()`	`true`	Is the input required?
`readOnly`	`readOnly()`	`false`	Is the input read-only?
`validation`	`validation(…)`	*none*	Message to display is the field content is deemed invalid
`help`	`help(…)`	*none*	Help message to display for the field (see below for special syntax)
`visibleIf`	`visibleIf(…)`	*none*	Expression which defines if the field is displayed or not - see below for a detailed explanation
`value`	`value(…)`	*none*	Value to associated with the field

`help` property

TODO

`visibleIf` property

TODO

`text` field

The `text` field is a single line text entry field, mapped to the HTML `<input type="test"/>` form field.

Property	Method	Default value	Description
`length`	`length(…)`	`300`	Maximum length for the text
`regex`	`regex(…)`	`.*`	The text must comply with this regex in order to be valid

Example:

```
Form.create()
   .with(
      Text.of("name")
         .label("Name")
         .length(40)
         .regex("[A-Za-z0-9_\\.\\-]+")
         .validation("Name is required and must contain only alpha-numeric characters,
underscores, points or dashes.")
   )
```

`password` **field**

TODO

`memo` **field**

TODO

`email` **field**

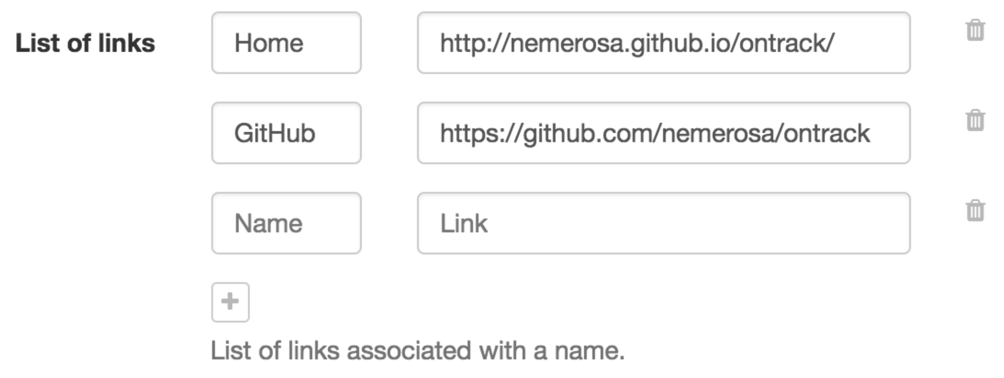
TODO

`url` **field**

TODO

`namedEntries` **field**

Multiple list of name/value fields:



List of links	Home	http://nemerosa.github.io/ontrack/
	GitHub	https://github.com/nemerosa/ontrack
	Name	Link

List of links associated with a name.

The user can:

- add / remove entries in the list
- set a name and a value for each item
- the name might be optional - the value is not

Property	**Method**	**Default value**	**Description**
`nameLabel`	`nameLabel(…)`	"Name"	Label for the "name" input part of an entry.
`valueLabel`	`valueLabel(…)`	"Value"	Label for the "value" input part of an entry.
`nameRequired`	`nameOptional()`	`true`	If the name part is required.
`addText`	`addText(…)`	"Add an entry"	Label for the "add" button.

Example:

```
Form.create()
    .with(
        NamedEntries.of("links")
            .label("List of links")
            .nameLabel("Name")
            .valueLabel("Link")
            .nameOptional()
            .addText("Add a link")
            .help("List of links associated with a name.")
            .value(value != null ? value.getLinks() : Collections.emptyList())
    )
```

`date` **field**

TODO

`yesno` **field**

TODO

`dateTime` **field**

TODO

`int` **field**

TODO

`selection` field

TODO

`multi-strings` field

TODO

`multi-selection` field

TODO

`multi-form` field

TODO

Creating your custom fields

TODO

Form usage on the client

TODO

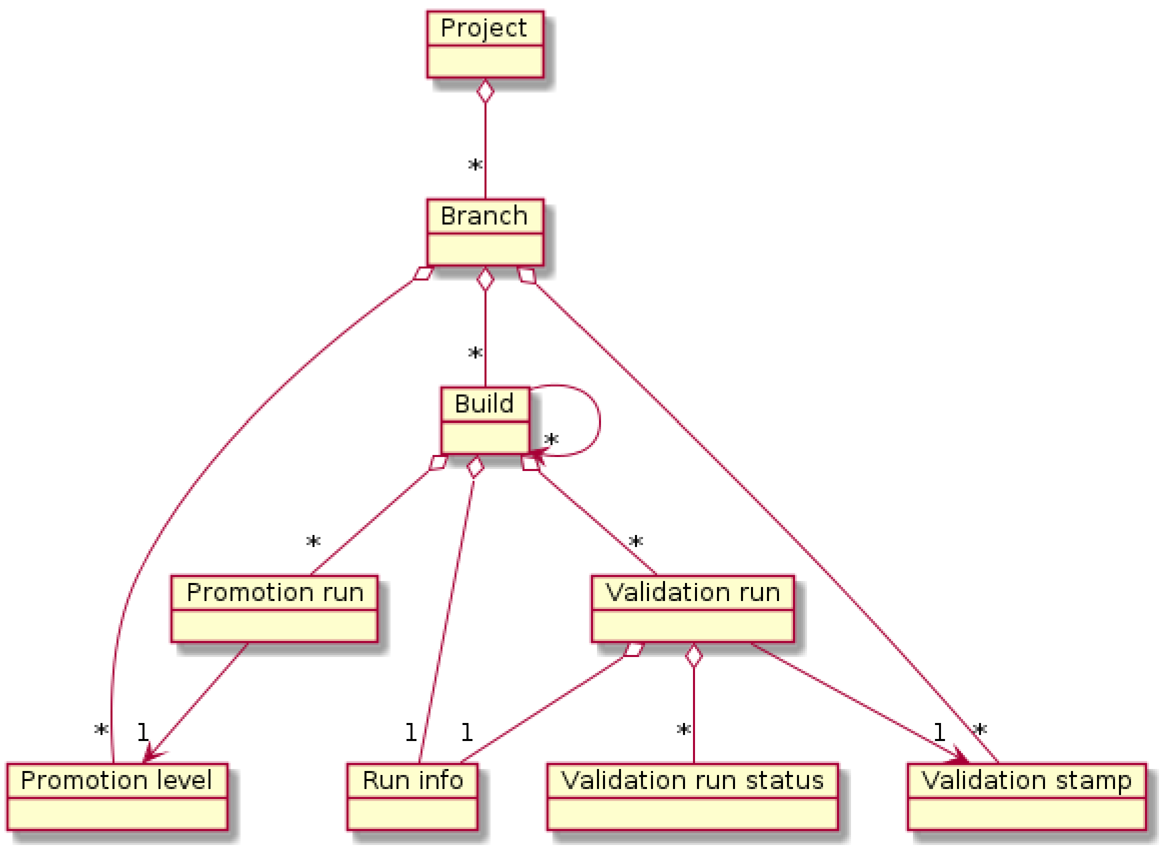
Fields rendering

TODO

13.4. Model

Chapter 14. Concepts

The root entity in Ontrack is the *project*.



Several *branches* can be attached to a *project*. *Builds* can be created within a branch and linked to other builds (same or other branches).

Promotion levels and *validation stamps* are attached to a *branch*:

- a *promotion level* is used to define the *promotion* a given *build* has reached. A *promotion run* defines this association.
- a *validation stamp* is used to qualify some tests or other validations on a *build*. A *validation run* defines this association. There can be several runs per build and per validation stamp. A run itself has a sequence of statuses attached to it: passed, failed, investigated, etc.

Builds and validation runs can be attached to some "run info" which gives additional information like the duration of the build or the validation.

Branches, *promotion levels* and *validation stamps* define the *static structure* of a *project*.

14.1. Model filtering

TODO

14.1.1. Jobs

Ontrack makes a heavy use of *jobs* in order to schedule regular activities, like:

- SCM indexation (for Git repositories for example)
- SCM/build synchronisations
- Branch templating synchronisation
- etc.

Services and extensions are responsible for providing Ontrack with the list of *jobs* they want to be executed. They do this by implementing the `JobProvider` interface that simply returns a collection of \`JobRegistration\`s to register at startup.

One component can also register a `JobOrchestratorSupplier`, which provides also a stream of \`JobRegistration\`s, but is more dynamic since the list of jobs to register will be determined regularly.

The *job scheduler* is in charge to collect all *registered jobs* and to run them all.

Job architecture overview

This section explains the underlying concepts behind running the jobs in Ontrack.

When a job is registered, it is associated with a schedule. This schedule is dynamic and can be changed with the time. For example, the indexation of a Git repository for a project is scheduled every 30 minutes, but then, is changed to 60 minutes. The job registration schedule is then changed to every 60 minutes.

A job provides the following key elements:

- a unique identifier: the *job key*
- a task to run, provided as a `JobRun` interface:

```
@FunctionalInterface
public interface JobRun {
    void run(JobRunListener runListener);
}
```

The task defined by the job can use the provided `JobRunListener` to provide feedback on the execution or to execution messages.

The job task is wrapped into a `Runnable` which is responsible to collect statistics about the job execution, like number of runs, durations, etc.

In the end, the `JobScheduler` can be associated with a `JobDecorator` to return another `Runnable` layer if needed.

The job scheduler is responsible to orchestrate the jobs. The list of jobs is maintained in memory using an index associating the job itself, its schedule and its current scheduled task (as a ScheduledFuture).

Job registration

A JobRegistration is the associated of a Job and of Schedule (run frequency for the job).

A Schedule can be built in several ways:

```
// Registration only, no schedule
Schedule.NONE
// Every 15 minutes, starting now
Schedule.everyMinutes(15)
// Every minute, starting now
Schedule.EVERY_MINUTE
// Every day, starting now
Schedule.EVERY_DAY
// Every 15 minutes, starting after 5 minutes
Schedule.everyMinutes(15).after(5)
```

see the Schedule class for more options.

By enabling the scattering options, one can control the schedule by adding a startup delay at the beginning of the job.

The Job interface must define the unique for the job. A key in unique within a type within a category.

Typically, the category and the type will be fixed (constants) while the key will depend on the job parameters and context. For example:

```
JobCategory CATEGORY = JobCategory.of("category").withName("My category");
JobType TYPE = CATEGORY.getType("type").withName("My type");
public JobKey getKey() {
   return TYPE.getKey("my-id")
}
```

The Job provides also a description, and the desired state of the job:

- disabled or not - might depend on the job parameters and context
- valid or not - when a job becomes invalid, it is not executed, and will be unregistered automatically. For example, a Git indexation job might become invalid if the associated repository configuration has been deleted.

Finally, of course, the job must provide the task to actually execute:

```
public JobRun getTask() {
   return (JobRunListener listener) -> ...
}
```

The task takes as parameter a `JobRunListener`.

All job tasks run with *administrator* privileges. *Job tasks* can throw runtime exceptions - they will be caught by the *job scheduler* and displayed in the administration console.

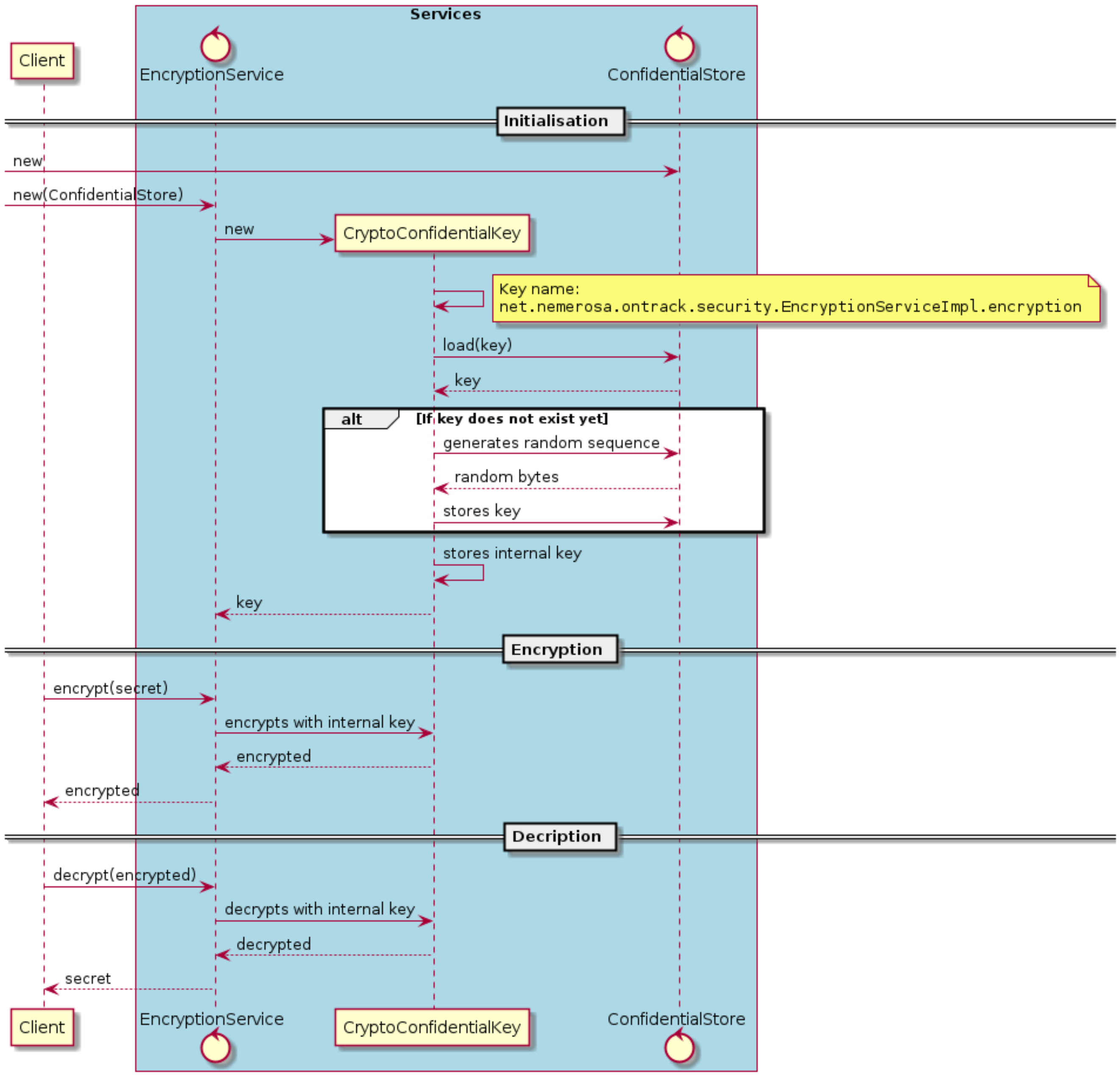
14.1.2. Encryption

Ontrack will store secrets, typically passwords and tokens, together with the configurations needed to connect to external applications: Git, JIRA, etc.

In order to protect the integrity of those external applications, those secrets must be protected.

Ontrack does so by encrypting those secrets in the database, using the `AES128` algorithm. The `EncryptionService` is used for encryption.

The key needed for the encryption is stored and retrieved using a `ConfidentialStore` service.



See Encryption service for more details about using a confidential store.

14.2. Build filters

The *build filters* are responsible for the filtering of *builds* when listing them for a *branch*.

14.2.1. Usage

By default, only the last 10 builds are shown for a branch, but a user can choose to create filters for a branch, and to select them.

The filters he creates are saved for later use: * locally, in its local browser storage * remotely, on the server, if he is connected

For a given branch, a filter is identified by a name. The list of available filters for a branch is composed of those stored locally and of those returned by the server. The later ones have priority when there is a name conflict.

14.2.2. Implementation

The `BuildFilter` interface defines how to use a filter. This filter takes as parameters:

- the current list of filtered builds
- the branch
- the build to filter

It returns two boolean results:

- is the build to be kept in the list?
- do we need to go on with looking for other builds?

The `BuildFilterService` is used to manage the build filters:

- by creating `BuildFilter` instances
- by managing `BuildFilterResource` instances

The service determines the type of `BuildFilter` by using its type, and uses injected `BuildFilterProvider`s to get an actual instance.

14.2.3. Reference services

⚠ This is a work in progress and this list is not exhaustive yet. In the meantime, the best source of information remains the source code…

Service	Description
`StructureService`	Access to projects, branches and all entities
`SecurityService`	Checks the current context for authorizations
`PropertyService`	Access to the properties of the entities
`EntityDataService`	This service allows to store and retrieve arbitrary data with entities
`EntityDataStore`	This service allows to store audited and indexed data with entities. See `EntityDataStore` for more information.

`EntityDataStore`

The `EntityDataStore` is a service which allows extensions to store some data associated with entities with the following properties:

- data stored as JSON
- data always associated with an entity
- indexation by category and name, not necessarily unique
- grouping of data using a group ID

- unique generated numeric ID
- audit data - creation + updates

See the Javadoc for `net.nemerosa.ontrack.repository.support.store.EntityDataStore` for more details.

Example:

```
@Autowired
EntityDataStore store;
@Autowired
SecurityService securityService;

Branch branch = ...

store.add(branch, "Category", "Name", securityService.getCurrentSignature(), null,
json);
```

14.3. Technology

14.3.1. Client side

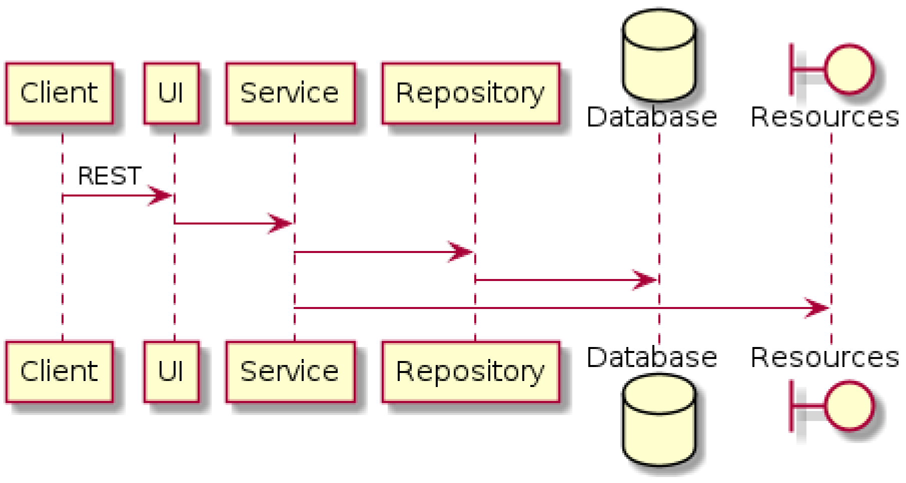
One page only, pure AJAX communication between the client and the server.

- AngularJS
- Angular UI Router
- Angular UI Bootstrap
- Bootstrap
- Less

14.3.2. Server side

- Spring Boot for the packaging & deployment
- Spring MVC for the REST API
- Spring for the IoC
- Spring Security & AOP for the security layer
- Plain JDBC for the data storage
- H2 in MySQL mode for the database engine

14.3.3. Layers


Client
UI
Service
Repository
Database
Resources
REST

Chapter 15. Extending Ontrack

Ontrack allows extensions to contribute to the application, and actually, most of the core features, like Git change logs, are indeed extensions.

This page explains how to create your own extensions and to deploy them along Ontrack. The same coding principles apply also for coding core extensions and to package them in the main application.

Having the possibility to have external extensions in Ontrack is very new and the way to provide them is likely to change (a bit) in the next versions. In particular, the extension mechanism does not provide classpath isolation between the "plugins".

15.1. Preparing an extension

In order to create an extension, you have to create a Java project.

The use of Kotlin is also possible.

Note that Ontrack needs at least a JDK 11.0.6 to run.

Your extension needs to a Gradle project and have at least this minimal `build.gradle` file:

Maven might be supported in the future.

```
buildscript {
   repositories {
      mavenCentral()
   }
   dependencies {
      classpath 'net.nemerosa.ontrack:ontrack-extension-plugin:{{ontrack-version}}'
   }
}
repositories {
   mavenCentral()
}
apply plugin: 'ontrack'
```

The `buildscript` section declares the version of Ontrack you're building your extension for.

The repository declaration might be simplified in later versions.

The plug-in must declare the Maven Central as repository for the dependencies (Ontrack libraries are published in the Maven Central).

Finally, you can apply the `ontrack` plug-in. This one will:

- apply the `java` plug-in. If you want to use Groovy, you'll have to apply this plug-in yourself. Kotlin is very well supported.
- add the `ontrack-extension-support` module to the `compile` configuration of your extension
- define some tasks used for running, testing and packaging your extension (see later)

15.2. Extension ID

Your extension must be associated with an identifier, which will be used throughout all the extension mechanism of Ontrack.

If the `name` of your extension project looks like `ontrack-extension-<xxx>`, the `xxx` will be ID of your extension. For example, in the `settings.gradle` file:

```
rootProject.name = 'ontrack-extension-myextension'
```

then `myextension` is your extension ID.

If for any reason, you do not want to use `ontrack-extension-` as a prefix for your extension name, you must specify it using the `ontrack` Gradle extension in the `build.gradle` file:

```
ontrack {
   id 'myextension'
}
```

15.3. Coding an extension

All your code must belong to a package starting with `net.nemerosa.ontrack` in order to be visible by the Ontrack application.

Typically, this should be like: `net.nemerosa.ontrack.extension.<id>` where `id` is the ID of your extension.

> This limitation about the package name is likely to removed in future versions of Ontrack.

You now must declare your extension to Ontrack by creating an *extension feature* class:

```
package net.nemerosa.ontrack.extension.myextension;

import net.nemerosa.ontrack.extension.support.AbstractExtensionFeature;
import net.nemerosa.ontrack.model.extension.ExtensionFeatureOptions;
import org.springframework.stereotype.Component;

@Component
public class MyExtensionFeature extends AbstractExtensionFeature {
    public MyExtensionFeature() {
        super(
            "myextension",
            "My extension",
            "Sample extension for Ontrack",
            ExtensionFeatureOptions.DEFAULT
        );
    }
}
```

The `@Component` annotation makes this extension feature visible by Ontrack.

The arguments for the extension feature constructor are:

- the extension ID
- the display name
- a short description
- the extension options (see below)

15.4. Extension options

If your extension has some web components (templates, pages, etc.), it must declare this fact:

```
ExtensionFeatureOptions.DEFAULT.withGui(true)
```

If your extension depends on other extensions, it must declare them. For example, to depend on GitHub and SCM extensions, first declare them as dependencies in the `build.gradle`:

```
ontrack {
   uses 'github'
   uses 'scm'
}
```

then, in your code:

```
@Component
public class MyExtensionFeature extends AbstractExtensionFeature {
    @Autowired
    public MyExtensionFeature(
      GitHubExtensionFeature gitHubExtensionFeature,
      SCMExtensionFeature scmExtensionFeature
    ) {
        super(
            "myextension",
            "My extension",
            "Sample extension for Ontrack",
            ExtensionFeatureOptions.DEFAULT
               .withDependency(gitHubExtensionFeature)
               .withDependency(scmExtensionFeature)
        );
    }
}
```

15.5. Writing tests for your extension

Additionally to creating unit tests for your extension, you can also write integration tests, which will run with the Ontrack runtime enabled.

This feature is only available starting from version 2.23.1.

When the `ontrack-extension-plugin` is applied to your code, it makes the `ontrack-it-utils` module available for the compilation of your tests.

In particular, this allows you to create integration tests which inherit from `AbstractServiceTestJUnit4Support`, to inject directly the Ontrack services you need and to use utility methods to create a test environment.

For example:

```
public MyTest extends AbstractServiceTestSupport {
   @Autowired
   private StructureService structureService
   @Test
   public void sample_test() {
      // Creates a project
      Project p = doCreateProject();
      // Can retrieve it by name...
      asUser().withView(p).execute(() ->
         assertTrue(structureService.findProjectByName(p.getName()).isPresent())
      );
   }
}
```

15.6. List of extension points

Ontrack provides the following extension points:

- Properties - allows to attach a property to an entity
- Decorators - allows to display a decoration for an entity
- User menu action - allows to add an entry in the connected user menu
- Settings - allows to add an entry in the global settings
- Metrics - allows to contribute to the metrics exported by Ontrack
- Event types - allows to define additional event types.
- GraphQL - allows contributions to the GraphQL Ontrack schema.
- Encryption key store - allows to define a custom store for the encryption keys.
- **TODO** Entity action - allows to add an action for the page of an entity
- **TODO** Entity information - allows to add some information into the page of an entity
- **TODO** Search extension - provides a search end point for global text based searches
- **TODO** Issue service - provides support for a ticketing system
- **TODO** SCM service - provides support for a SCM system
- **TODO** Account management action - allows to add an action into the account management

Other topics:

- Creating pages
- **TODO** Creating services
- **TODO** Creating jobs

See Reference services for a list of the core Ontrack services.

15.7. Running an extension

A Postgres database must be available to run an extension, since it is needed by Ontrack.

See the development section to see how quickly set it up.

15.7.1. Using Gradle

To run your extension using Gradle:

```
./gradlew ontrackRun
```

This will make the application available at http://localhost:8080

The ontrackRun Gradle task can be run directly from Intellij IDEA and if necessary in debug mode.

When running with Gradle in your IDE, if you edit some web resources and want your changes available in the browser, just rebuild your project (Ctrl F9 in Intellij) and refresh your browser.

15.8. Packaging an extension

Just run:

```
./gradlew clean build
```

The extension is available as a JAR (together with its transitive dependencies, see below) in build/dist.

15.9. Extension dependencies

If your extension depends on dependencies which are not brought by Ontrack, you have to collect them explicitly and put them in the same directory which contain your main JAR file.

The Ontrack plug-in provides an ontrackPrepare task which copies all dependencies (transitively) and the main JAR in the build/dist directory.

This task is called by the main build task.

15.10. Deploying an extension

15.10.1. Using the Docker image

The Ontrack Docker image uses the /var/ontrack/extensions volume to load extensions from. Bind this volume to your host or to a data container to start putting extensions in it. For example:

```
docker run --volume /extension/on/host:/var/ontrack/extensions ...
```

You can also create your own image. Create the following Dockerfile:

Dockerfile

```
# Base Ontrack image
FROM nemerosa/ontrack:<yourversion>
# Overrides the extension directory, as to NOT use a volume
ENV EXTENSIONS_DIR /var/ontrack/your-extension
# Copies the extensions in the target volume
COPY extensions/*.jar /var/ontrack/your-extension/
```

We assume here that your extensions are packaged in an `extensions` folder at the same level than your `Dockerfile`:

```
/-- Dockerfile
|-- extensions/
     |-- extension1.jar
     |-- extension2.jar
```

When using a *child* `Dockerfile`, the extension directory has to be customized because we cannot use the `VOLUME` in this case.

15.10.2. Using the CentOS or Debian/Ubuntu package

The RPM and Debian packages both use the `/usr/lib/ontrack/extensions` directory for the location of the extensions JAR files.

You can also create a RPM or Debian package which embeds both Ontrack and your extensions.

The means to achieve this depend on your build technology but the idea is the same in all cases:

Your package must:

- put the extension JAR files in `/usr/lib/ontrack/extensions`
- have a dependency on the `ontrack` package

15.10.3. In standalone mode

When running Ontrack directly, you have to set the `loader.path` to a directory containing the extensions JAR files:

```
java -Dloader.path=/path/to/extensions -jar ... <options>
```

15.10.4. Extending properties

Any entity in Ontrack can be associated with a set of properties. Extensions can contribute to create new ones.

A *property* is the association some Java components and a HTML template to render it on the screen.

Java components

First, a property must be associated with some data. Just create an invariant POJO like, for example:

```
package net.nemerosa.ontrack.extension.myextension;

import lombok.Data;

@Data
public class MyProperty {
    private final String value;
}
```

Note that Ontrack extensions can take benefit of using Lombok in order to reduce the typing. But this is not mandatory as all.

Then, you create the *property type* itself, by implementing the `PropertyType` interface or more easily by extending the `AbstractPropertyType` class. The parameter for this class is the data created above:

```
@Component
public class MyPropertyType extends AbstractPropertyType<MyProperty> {
}
```

The `@Component` notation registers the property type in Ontrack.

A property, or any extension is always associated with an extension feature and this one is typically injected:

```
@Autowired
public MyPropertyType(MyExtensionFeature extensionFeature) {
  super(extensionFeature);
}
```

Now, several methods need to be implemented:

- `getName` and `getDescription` return respectively a display name and a short description for the property
- `getSupportedEntityTypes` returns the set of entities the property can be applied to. For example, if your property can be applied only on projects, you can return:

```
@Override
public Set<ProjectEntityType> getSupportedEntityTypes() {
  return EnumSet.of(ProjectEntityType.PROJECT);
}
```

- `canEdit` allows you to control who can create or edit the property for an entity. The `SecurityService` allows you to test the authorizations for the current user. For example, in this sample, we authorize the edition of our property only for users being granted to the project configuration:

```
@Override
public boolean canEdit(ProjectEntity entity, SecurityService securityService) {
  return securityService.isProjectFunctionGranted(entity, ProjectConfig.class);
}
```

- `canView` allows you to control who can view the property for an entity. Like for `canEdit`, the `SecurityService` is passed along, but you will typically return `true`:

```
@Override
public boolean canView(ProjectEntity entity, SecurityService securityService) {
  return true;
}
```

- `getEditionForm` returns the form being used to create or edit the property. Ontrack uses `Form` objects to generate automatically user forms on the client. See its Javadoc for more details. In our example, we only need a text box:

```
@Override
public Form getEditionForm(ProjectEntity entity, MyProperty value) {
  return Form.create()
          .with(
                  Text.of("value")
                          .label("My value")
                          .length(20)
                          .value(value != null ? value.getValue() : null)
          );
}
```

- the `fromClient` and `fromStorage` methods are used to parse back and forth the JSON into a property value. Typically:

```
@Override
public MyProperty fromClient(JsonNode node) {
  return fromStorage(node);
}

@Override
public MyProperty fromStorage(JsonNode node) {
  return parse(node, ProjectCategoryProperty.class);
}
```

- the `getSearchKey` is used to provide an indexed search value for the property:

```
@Override
public String getSearchKey(My value) {
  return value.getValue();
}
```

- finally, the `replaceValue` method is called when the property has to be cloned for another entity, using a replacement function for the text values:

```
@Override
public MyProperty replaceValue(MyProperty value, Function<String, String>
replacementFunction) {
  return new MyProperty(
      replacementFunction.apply(value.getValue())
  );
}
```

Web components

A HTML fragment (or template) must be created at:

```
src/main/resources
  \-- static
     \-- extension
         \-- myextension
            \-- property
               \-- net.nemerosa.ontrack.extension.myextension.MyPropertyType.tpl.html
```

Replace `myextension`, the package name and the property type accordingly of course.

The `tpl.html` will be used as a template on the client side and will have access to the `Property` object. Typically, only its `value` field, of the property data type, will be used.

The template is used the AngularJS template mechanism.

For example, to display the property as bold text in our sample:

```
<b>{{property.value.value}}</b>
```

The property must be associated with an icon, typically PNG, 24 x 24, located at:

```
src/main/resources
  \-- static
     \-- extension
         \-- myextension
            \-- property
               \-- net.nemerosa.ontrack.extension.myextension.MyPropertyType.png
```

Property search

By default, properties are not searchable - their value cannot be used to perform search.

If the property contains some text, it might be suitable to allow this property to be used in search.

To enable this, two main methods must be provided:

- `containsValue`
- `getSearchArguments`

The `containsValue` is used to check if a given string token is present of not in an instance of a property value. Let's take a property data type which has a `text` field, we could implement the `containsValue` method by checking if this field contains the search token in a case insensitive manner:

```
override fun containsValue(value: MessageProperty, propertyValue: String): Boolean {
    return StringUtils.containsIgnoreCase(value.text, propertyValue)
}
```

The `getSearchArguments` method is more complex - it allows the Ontrack search engine to plug some SQL fragment into a more global search, for example like when searching for builds.

This method returns a `PropertySearchArguments` instance with three properties:

- `jsonContext` - expression to join with to the `PROPERTIES` table in order to contraint the JSON scope, for example `jsonb_array_elements(pp.json->'items') as item`. This expression is optional.
- `jsonCriteria` - Criteria to act on the `jsonContext` defined above, based on a search token, for example: `item->>'name' = :name and item->>'value' ilike :value`. This expression is optional. Variables in this expression can be mapped to actual parameters using the `criteriaParams` map parameter below.
- `criteriaParams`- Map of parameters for the criteria, for example: `name` → `"name"` and `value` → `"%value%"`. See the Spring Documentation for more information.

Most of the time, the `jsonContext` and `jsonCriteria` expressions will rely on the `json` column of the `PROPERTIES` table, which is a Postgres JSONB data type containing a JSON representation of the property data type.

Refer to the Postgres JSON documentation for more information about the syntax to use in those expressions.

In the `jsonContext` and `jsonCriteria` expressions, the `PROPERTIES` table is designed using the `pp` alias.

The `getSearchArguments` returns a `null` `PropertySearchArguments` instance by default - this means that any search on this property does not return anything.

Example, for a property data type having a `links` list of `name/value` strings, and we want to look in the `value` field in a case insensitive way:

```
override fun getSearchArguments(token: String): PropertySearchArguments? {
    return PropertySearchArguments(
            jsonContext = "jsonb_array_elements(pp.json->'links') as link",
            jsonCriteria = "link->>'value' ilike :value",
            criteriaParams = mapOf(
                    "value" to "%$token%"
            )
    )
}
```

15.10.5. Extending decorators

A decorator is responsible to display a decoration (icon, text, label, etc.) close to an entity name, in the entity page itself or in a list of those entities. Extensions can contribute to create new ones.

A *decorator* is the association some Java components and a HTML template to render it on the screen.

Java components

First, a decorator must be associated with some data. You can use any type, like a `String`, an `enum` or any other invariant POJO. In our sample, we'll take a `String`, which is the value of the `MyProperty` property described as example in Extending properties.

Then, you create the *decorator* itself, by implementing the `DecorationExtension` interface and extending the `AbstractExtension`. The parameter type is the decorator data defined above.

```
@Component
public class MyDecorator extends AbstractExtension implements
DecorationExtension<String> {
}
```

The `@Component` notation registers the decorator in Ontrack.

A decorator, or any extension is always associated with an extension feature and this one is typically injected. Other services can be injected at the same time. For example, our sample decorator needs to get a property on an entity so we inject the `PropertyService`:

```
private final PropertyService propertyService;
@Autowired
public MyDecorator(MyExtensionFeature extensionFeature, PropertyService
propertyService) {
   super(extensionFeature);
   this.propertyService = propertyService;
}
```

Now, several methods need to be implemented:

* `getScope` returns the set of entities the decorator can be applied to. For example, if your property can be applied only on projects, you can return:

```
@Override
public EnumSet<ProjectEntityType> getScope() {
   return EnumSet.of(ProjectEntityType.PROJECT);
}
```

* `getDecorations` returns the list of decorations for an entity. In our case, we want to return a decoration only if the project is associated with the `MyProperty` property and return its value as decoration data.

```
@Override
public List<Decoration<String>> getDecorations(ProjectEntity entity) {
  return propertyService.getProperty(entity, MyPropertyType.class).option()
          .map(p -> Collections.singletonList(
                  Decoration.of(
                          MyDecorator.this,
                          p.getValue()
                  )
          ))
          .orElse(Collections.emptyList());
}
```

Web components

A HTML fragment (or template) must be created at:

```
src/main/resources
  \-- static
     \-- extension
         \-- myextension
            \-- decoration
               \-- net.nemerosa.ontrack.extension.myextension.MyDecorator.tpl.html
```

Replace `myextension`, the package name and the decorator type accordingly of course.

The `tpl.html` will be used as a template on the client side and will have access to the `Decoration` object. Typically, only its `data` field, of the decoration data type, will be used.

The template is used the AngularJS template mechanism.

For example, to display the decoration data as bold text in our sample:

```
<!-- In this sample, `data` is a string -->
<b>{{decoration.data}}</b>
```

15.10.6. Extending the user menu

An extension can add a entry in the connected user menu, in order to point to an extension page.

Extension component

Define a component which extends `AbstractExtension` and implements `UserMenuExtension`:

```
package net.nemerosa.ontrack.extension.myextension;

@Component
public class MyUserMenuExtension extends AbstractExtension implements
UserMenuExtension {

    @Autowired
    public MyUserMenuExtension(MyExtensionFeature extensionFeature) {
        super(extensionFeature);
    }

    @Override
    public Action getAction() {
        return Action.of("my-user-menu", "My User Menu", "my-user-menu-page");
    }

    @Override
    public Class<? extends GlobalFunction> getGlobalFunction() {
        return ProjectList.class;
    }
}
```

In this sample, `my-user-menu-page` is the relative routing path to the page the user action must point to.

The `getGlobalFunction` method returns the function needed for authorizing the user menu to appear.

15.10.7. Extending pages

Extensions can also contribute to pages.

Extension menus

Extension pages must be accessible from a location:

- the global user menu
- an entity page

From the global user menu

TODO

From an entity page

In order for an extension to contribute to the menu of an entity page, you have to implement the `ProjectEntityActionExtension` interface and extend the `AbstractExtension`.

```
@Component
public class MyProjectActionExtension extends AbstractExtension implements
ProjectEntityActionExtension {
}
```

The `@Component` notation registers the extension in Ontrack.

An action extension, or any extension is always associated with an extension feature and this one is typically injected. Other services can be injected at the same time. For example, our sample extension needs to get a property on an entity so we inject the `PropertyService`:

```
private final PropertyService propertyService;
@Autowired
public MyProjectActionExtension(MyExtensionFeature extensionFeature, PropertyService
propertyService) {
   super(extensionFeature);
   this.propertyService ==== propertyService;
}
```

The `getAction` method returns an optional `Action` for the entity. In our sample, we want to associate an action with entity if it is a project and if it has the `MyProperty` property being set:

```
@Override
public Optional<Action> getAction(ProjectEntity entity) {
    if (entity instanceof Project) {
        return propertyService.getProperty(entity, MyPropertyType.class).option()
                .map(p ->
                        Action.of(
                                "my-action",
                                "My action",
                                String.format("my-action/%d", entity.id())
                        )
                );
    } else {
        return Optional.empty();
    }
}
```

The returned `Action` object has the following properties:

- an `id`, uniquely identifying the target page in the extension
- a `name`, which will be used as display name for the menu entry
- a URI fragment, which will be used for getting to the extension end point (see later). Note that this URI fragment will be prepended by the extension path. So in our example, the final path for the `SAMPLE` project with id `12` would be: `extension/myextension/my-action/12`.

Extension global settings

TODO

Extension page

Before an extension can serve some web components, it must be declared as being GUI related. See the documentation to enable this (`ExtensionFeatureOptions.DEFAULT.withGui(true)`).

The extension must define an AngularJS module file at:

```
src/main/resources
  \-- static
     \-- extension
         \-- myextension
            \-- module.js
```

The `module.js` file name is fixed and is used by Ontrack to load the web components of your extension at startup.

This is an AngularJS (1.2.x) module file and can declare its configuration, its services, its controllers, etc. Ontrack uses `UI Router`(), version `0.2.11` for the routing of the pages, allowing a routing declaration as module level.

For our example, we want to declare a page for displaying information for `extension/myextension/my-action/{project}` where `{project}` is the ID of one project:

```
angular.module('ontrack.extension.myextension', [
        'ot.service.core',
        'ot.service.structure'
    ])
    // Routing
    .config(function ($stateProvider) {
        $stateProvider.state('my-action', {
            url: '/extension/myextension/my-action/{project}',
            templateUrl: 'extension/myextension/my-action.tpl.html',
            controller: 'MyExtensionMyActionCtrl'
        });
    })
    // Controller
    .controller('MyExtensionMyActionCtrl', function ($scope, $stateParams, ot,
otStructureService) {
        var projectId ==== $stateParams.project;

        // View definition
        var view ==== ot.view();
        view.commands ==== [
            // Closing to the project
            ot.viewCloseCommand('/project/' + projectId)
        ];

        // Loads the project
        otStructureService.getProject(projectId).then(function (project) {
            // Breadcrumbs
            view.breadcrumbs ==== ot.projectBreadcrumbs(project);
            // Title
            view.title ==== "Project action for " + project.name;
            // Scope
            $scope.project ==== project;
        });
    })
;
```

The routing configuration declares that the end point at `/extension/myextension/my-action/{project}` will use the `extension/myextension/my-action.tpl.html` view and the `MyExtensionMyActionCtrl` controller defined below.

The `ot` and `otStructureService` are Ontrack Angular services, defined respectively by the `ot.service.core` and `ot.service.structure` modules.

The `MyExtensionMyActionCtrl` controller:

- gets the project ID from the state (URI) definition
- it defines an Ontrack view, and defines a close command to go back to the project page
- it then loads the project using the `otStructureService` service and upon loading completes some information into the view

Finally, we define a template at:

```
src/main/resources
  \-- static
     \-- extension
         \-- myextension
            \-- extension/myextension/my-action.tpl.html
```

which contains:

```
<ot-view>
    Action page for {{project.name}}.
</ot-view>
```

The `ot-view` is an Ontrack directive which does all the layout magic for you. You just have to provide the content.

Ontrack is using Bootstrap 3.x for the layout and basic styling, so you can start structuring your HTML with columns, rows, tables, etc. For example:

```
<ot-view>
   <div class="row">
      <div class="col-md-12">
         Action page for {{project.name}}.
      </div>
   </div>
</ot-view>
```

Extension API

TODO

Extension API resource decorators

TODO

15.10.8. Extending event types

Extensions can define additional event types which can then be used to add custom events to entities.

To register a custom event type:

```
@Autowired
public static final EventType CUSTOM_TYPE = SimpleEventType.of("custom-type", "My
custom event");
public MyExtension(..., EventFactory eventFactory) {
   super(extensionFeature);
   eventFactory.register(CUSTOM_TYPE);
}
```

Then, you can use it this way when you want to attach an event to, let's say, a build:

```
EventPostService eventPostService;
Build build;
...
eventPostService.post(
    Event.of(MyExtension.CUSTOM_TYPE).withBuild(build).get()
);
```

15.10.9. Extending validation data

If built-in validation data types are not enough, additional ones can be created using the extension mechanism.

To register a custom validation data type:

1. implement a component implementing the `ValidationDataType` interface or preferably the `AbstractValidationDataType` class (which provides some utility validation methods)
2. looks at the Javadoc of the `ValidationDataType` interface to get the list of methods to implement and some guides

The main choice to consider is about the *configuration data type* (`C`) and the *data type* (`T`).

The *data type* is the type of the data you actually associate with a validation run. For example, for some code coverage, it would be a percentage, and therefore represented as an `Int`. It could be any other type, either complex or simple.

The *configuration data type* is responsible for the configuration of the validation stamp, how the actual data will be interpreted when it comes to computing a status. It could be one or several thresholds for example.

The best thing to get started would be to copy the code of existing built-in data types.

15.10.10. Extending GraphQL

Extensions can contribute to the Ontrack GraphQL core schema:

- custom types
- root queries
- additional fields in project entities

Preparing the extension

In your extension module, import the `ontrack-ui-graphql` module:

```
dependencies {
   compile "net.nemerosa.ontrack:ontrack-ui-graphql:${ontrackVersion}"
}
```

If you want to write integration tests for your GraphQL extension, you have to include the GraphQL testing utilities:

```
dependencies {
   testCompile "net.nemerosa.ontrack:ontrack-ui-graphql:${ontrackVersion}:tests"
}
```

Custom types

To define an extra type, you create a component which implements the `GQLType` interface:

```
@Component
public class PersonType implements GQLType {
    @Override
    public GraphQLObjectType getType() {
        return GraphQLObjectType.newObject()
                .name("Person")
                .field(f -> f.name("name")
                        .description("Name of the person")
                        .type(GraphQLString)
                )
                .build();
    }
}
```

See the graphql-java documentation for the description of the type construction.

You can use this component in other ones, like in queries, field definitions or other types, like shown below:

```
@Component
public class AccountType implements GQLType {

    private final PersonType personType;

    @Autowired
    public AccountType (PersonType personType) {
        this.personType = personType;
    }

    @Override
    public GraphQLObjectType getType() {
        return GraphQLObjectType.newObject()
                .name("Account")
                .field(f -> f.name("username")
                        .description("Account name")
                        .type(GraphQLString)
                )
                .field(f -> f.name("identity")
                        .description("Identity")
                        .type(personType.getType())
                )
                .build();
    }
}
```

You can also create GraphQL types dynamically by using introspection of your model classes.

Given the following model:

```
@Data
public class Person {
   private final String name;
}
@Data
public class Account {
   private final String username;
   private final Person identity;
}
```

You can generate the `Account` type by using:

```
@Override
public GraphQLObjectType getType() {
   return GraphQLBeanConverter.asObjectType(Account.class);
}
```

The `GraphQLBeanConverter.asObjectType` is still very **experimental** and its implementation is likely to change in the next versions of Ontrack. For example, `Map` and `Collection` types are not supported.

Root queries

Your extension can contribute to the root query by creating a component implementing the `GQLRootQuery` interface:

```
@Component
public class AccountGraphQLRootQuery implements GQLRootQuery {

    private final AccountType accountType;

    @Autowired
    public AccountGraphQLRootQuery(AccountType accountType) {
        this.accountType = accountType;
    }

    @Override
    public GraphQLFieldDefinition getFieldDefinition() {
        return GraphQLFieldDefinition.newFieldDefinition()
                .name("accounts")
                .argument(a -> a.name("username")
                        .description("User name pattern")
                        .type(GraphQLString)
                )
                .type(accountType.getType())
                .dataFetcher(...)
                .build();
    }
}
```

This root query can then be used into your GraphQL queries:

```
{
   accounts(username: "admin*") {
      username
      identity {
         name
      }
   }
}
```

Extra fields

The Ontrack GraphQL extension mechanism allows contributions to the project entities like the projects, builds, etc.

For example, to contribute a `owner` field of type `Account` on the `Branch` project entity:

```
@Component
public class BranchOwnerGraphQLFieldContributor
   implements GQLProjectEntityFieldContributor {

   private final AccountType accountType;

   @Autowired
   public BranchOwnerGraphQLFieldContributor(AccountType accountType) {
      this.accountType = accountType;
   }

   @Override
   public List<GraphQLFieldDefinition> getFields(
         Class<? extends ProjectEntity> projectEntityClass,
         ProjectEntityType projectEntityType) {
     return Collections.singletonList(
             GraphQLFieldDefinition.newFieldDefinition()
                     .name("owner")
                     .type(accountType.getType())
                     .dataFetcher(GraphqlUtils.fetcher(
                        Branch.class,
                        (environment, branch) -> return ...
                     ))
                     .build()
     );
}
```

You can now use the `owner` field in your queries:

```
{
   branches(id: 1) {
      name
      project {
         name
      }
      owner {
         username
         identity {
            name
         }
      }
   }
}
```

Built-in scalar fields

The Ontrack GraphQL module adds the following scalar types, which you can use in your field or type definitions:

- `GQLScalarJSON.INSTANCE` - maps to a `JsonNode`
- `GQLScalarLocalDateTime.INSTANCE` - maps to a `LocalDateTime`

You can use them directly in your definitions:

```
...
.field(f -> f.name("content").type(GQLScalarJSON.INSTANCE))
.field(f -> f.name("timestamp").type(GQLScalarLocalDateTime.INSTANCE))
...
```

Testing GraphQL

In your tests, create a test class which extends `AbstractQLITSupport` and use the `run` method to execute a GraphQL query:

```
MyTestIT extends AbstractQLITSupport {
   @Test
   void my_test() {
     def p = doCreateProject()
     def data = run("""{
      projects(id: ${p.id}) {
         name
      }
     }""")
     assert data.projects.first().name == p.name
   }
}
```

While it is possible to run GraphQL tests in Java, it's easier to do using Groovy.

15.10.11. Extending cache

Ontrack uses Caffeine to cache some data in memory to avoid reloading it from the database. The cache behaviour can be configured using properties.

Extensions can also use the Ontrack cache and make it configurable.

In order to declare one or several caches, just a declare a `Component` which implements `CacheConfigExtension` and set the Caffeine spec string for each cache.

```
@Component
class MyCacheConfigExtension : CacheConfigExtension {
    override val caches: Map<String, String>
        get() = mapOf(
                "myCache" to "maximumSize=1000,expireAfterWrite=1h,recordStats"
        )
}
```

The cache statistics are available as metrics if the `recordStats` flag is set.

The cache thus declared become configurable through external configuration. For example:

application.yml

```
ontrack:
    config:
        cache:
            specs:
                myCache: "maximumSize=2000,expireAfterWrite=1d,recordStats"
```

In order to use the cache in the code, you can just use the Spring cache annotations. For example:

```
@Service
class MyServiceImpl: MyService {
    @Cacheable(cacheNames = "myCache")
    fun getValue(id: Int): MyObject = ...
}
```

15.10.12. Extending metrics

There are several ways to contribute to metrics in Ontrack:

- Meter registry direct usage
- Validation run metrics
- Run info listeners
- Metrics export service

Meter registry direct usage

Starting from version 2.35/3.35, the metrics framework used by Ontrack has been migrated to Micrometer. This is a breaking change - and the way metrics can be contributed to by extensions is totally different and some effort must be done in the migration.

In order for extensions to add their own metrics, they can interact directly with an inject

MeterRegistry and then get gauges, timers, counters, etc.

Or they can create some MeterBinder beans to register some gauges at startup time.

Usually, migrating (monotonic) counters and timers will be straightforward:

```
val meterRegistry: MeterRegistry
meterRegistry.counter("...", tags).increment()
meterRegistry.timer("...", tags).record {
    // Action to time
}
```

For gauge, you have to register them so that they can be call at any time by the meter registry:

```
val meterRegistry: MeterRegistry
meterRegistry.gauge("...", tags,
    sourceObject,
    { obj -> /* Gets the gauge value from the object */ }
)
```

See the Micrometer documentation for more information on how to register metrics.

Validation run metrics

Every time a validation run is created, an event is sent to all instances of ValidationRunMetricsExtension.

You can register an extension to react to this creation:

```
class InfluxDBValidationRunMetricsExtension(myExtensionFeature: MyExtensionFeature) :
AbstractExtension(myExtensionFeature), ValidationRunMetricsExtension {
    override fun onValidationRun(validationRun: ValidationRun) {
        // Does something with the created validation run
    }
}
```

Run info listeners

Builds and validation runs can be associated with some run info, which contain information about the execution time, source and author.

Every time a run info is created, an event is sent to all instances of RunInfoListener. To react to those run info events, you can also declare a @Component implementing RunInfoListener. For example:

```
@Component
class MyRunInfoListener : RunInfoListener {
    override fun onRunInfoCreated(runnableEntity: RunnableEntity, runInfo: RunInfo) {
        // Exports the run info to an external metrics system
    }
}
```

Metrics export service

The MetricsExportService can be used to export any set of metrics, to any registered metrics system.

See Metrics for a list of supported metric backends for this feature.

To export a metric, just call the exportMetrics method on the service:

```
metricsExportService.exportMetrics(
        "my-metric-name",
        tags = mapOf(
                "tag1" to "name1",
                "tag2" to "name2"
        ),
        fields = mapOf(
                "value1" to value1,
                "value2" to value2
        ),
        timestamp = Time.now()
)
```

Metrics exporters must declared an extension of type MetricsExportExtension in order to be accessible by the MetricsExportService service.

15.10.13. Using Kotlin in extensions

An extension can use Kotlin additionally to Java.

Just mention kotlin() in the Ontrack configuration in your build.gradle file:

build.gradle

```
ontrack {
    kotlin()
    ...
}
```

The Kotlin Gradle plug-in will be automatically applied and the Kotlin JVM for JRE8, with the same version than for Ontrack, will be added in compileOnly mode to your dependencies. Enjoy!

15.10.14. Extending the settings

An extension can add a entry in the list of global settings.

Start by creating an invariant class which contains the data to manage in the new settings.

in the sample below, we use some PuppetDB connection settings, which need a URL, a user name and a password.

```
@Data
public class PuppetDBSettings {
    private final String url;
    private final String username;
    private final String password;
}
```

The settings are managed in Ontrack by two distinct services:

- a manager - responsible for the edition of the settings
- a provider - responsible for retrieving the settings

as-of today, the service cannot be the same class.

To define the manager, extend the `AbstractSettingsManager` class and use your settings class as a parameter:

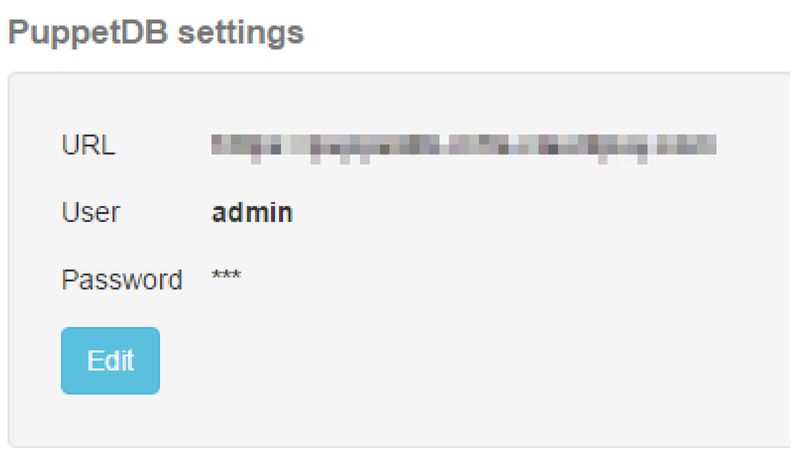
```
@Component
public class PuppetDBSettingsManager extends AbstractSettingsManager<PuppetDBSettings>
{

    private final SettingsRepository settingsRepository;
    private final EncryptionService encryptionService;

    @Autowired
    public PuppetDBSettingsManager(CachedSettingsService cachedSettingsService,
SecurityService securityService, SettingsRepository settingsRepository,
EncryptionService encryptionService) {
        super(PuppetDBSettings.class, cachedSettingsService, securityService);
        this.settingsRepository = settingsRepository;
        this.encryptionService = encryptionService;
    }

    @Override
    protected void doSaveSettings(PuppetDBSettings settings) {
        settingsRepository.setString(PuppetDBSettings.class, "url",
settings.getUrl());
        settingsRepository.setString(PuppetDBSettings.class, "username",
settings.getUsername());
```

```
        settingsRepository.setPassword(PuppetDBSettings.class, "password",
settings.getPassword(), false, encryptionService::encrypt);
    }

    @Override
    protected Form getSettingsForm(PuppetDBSettings settings) {
        return Form.create()
                .with(
                        Text.of("url")
                                .label("URL")
                                .help("URL to the PuppetDB server. For example:
http://puppetdb")
                                .value(settings.getUrl())
                )
                .with(
                        Text.of("username")
                                .label("User")
                                .help("Name of the user used to connect to the
PuppetDB server.")
                                .optional()
                                .value(settings.getUsername())
                )
                .with(
                        Password.of("password")
                                .label("Password")
                                .help("Password of the user used to connect to the
PuppetDB server.")
                                .optional()
                                .value("") // Password never sent to the client
                );
    }

    @Override
    public String getId() {
        return "puppetdb";
    }

    @Override
    public String getTitle() {
        return "PuppetDB settings";
    }
}
```

To define the provided, implement the `AbstractSettingsManager` and use your settings class as a parameter:

```
@Component
public class PuppetDBSettingsProvider implements SettingsProvider<PuppetDBSettings> {

    private final SettingsRepository settingsRepository;
    private final EncryptionService encryptionService;

    @Autowired
    public PuppetDBSettingsProvider(SettingsRepository settingsRepository,
EncryptionService encryptionService) {
        this.settingsRepository = settingsRepository;
        this.encryptionService = encryptionService;
    }

    @Override
    public PuppetDBSettings getSettings() {
        return new PuppetDBSettings(
                settingsRepository.getString(PuppetDBSettings.class, "url", ""),
                settingsRepository.getString(PuppetDBSettings.class, "username", ""),
                settingsRepository.getPassword(PuppetDBSettings.class, "password", "",
encryptionService::decrypt)
        );
    }

    @Override
    public Class<PuppetDBSettings> getSettingsClass() {
        return PuppetDBSettings.class;
    }
}
```

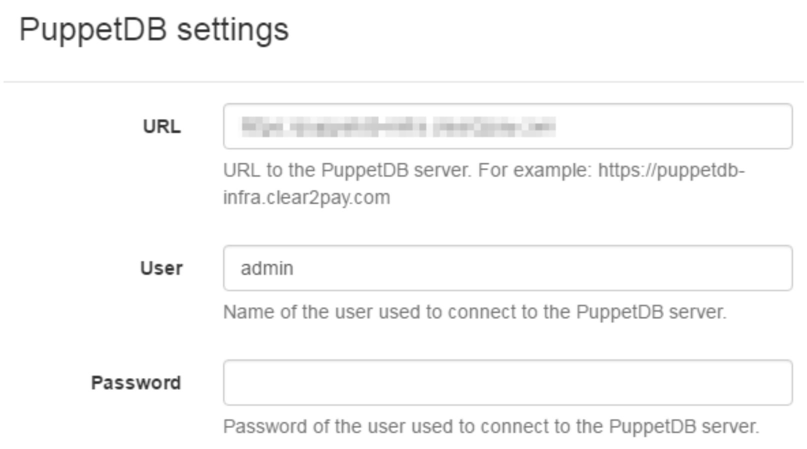
That's all there is to do. Now, the new settings will automatically appear in the *Settings* page:



PuppetDB settings

URL	[redacted]
User	admin
Password	***

and can be edited using the form defined above:



PuppetDB settings

URL	[redacted]
	URL to the PuppetDB server. For example: https://puppetdb-infra.clear2pay.com
User	admin
	Name of the user used to connect to the PuppetDB server.
Password	
	Password of the user used to connect to the PuppetDB server.

15.10.15. Extending the security

The security model of Ontrack can be extended to fit for specific needs in extensions.

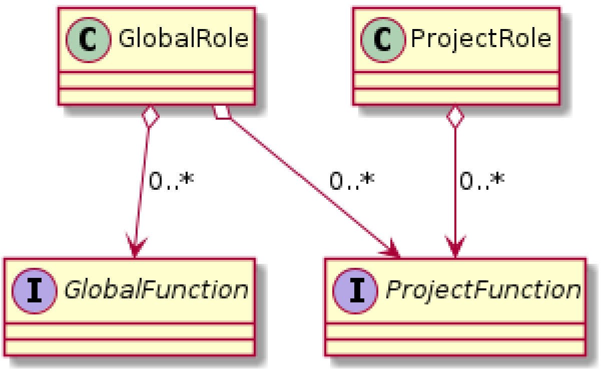
Adding functions

All authorizations in the code are granted through *functions*. We distinguish between:

- *global* functions about Ontrack in general
- *project* functions linked to a given project

Global roles are then linked to a number of global functions and project functions.

On the other hand, project roles can only be linked to project functions.



The association of *core* functions and *core* roles is fixed in the Ontrack core, but extensions can:

- define new global and project functions
- assign them to existing roles

> For security reasons, extensions cannot associate *existing core* functions to roles.

In order to define a *global function*, just define an interface which extends `GlobalFunction`:

```
public interface MyGlobalFunction extends GlobalFunction {}
```

Almost the same thing for a *project function*:

```
public interface MyProjectFunction extends ProjectFunction {}
```

No method is to be implemented.

Now, you can link those functions to existing roles by providing a `RoleContributor` component. In our example, we want to grant the global function and the project function to the `AUTOMATION` global role and the project function to the `PROJECT_OWNER` project role.

```
@Component
public MyRoleContributor implements RoleContributor {
    @Override
    public Map<String, List<Class<? extends GlobalFunction>>>
getGlobalFunctionContributionsForGlobalRoles() {
        return Collections.singletonMap(
            Roles.GLOBAL_AUTOMATION,
            Collections.singletonList(
                MyGlobalFunction.class
            )
        );
    }
    @Override
    public Map<String, List<Class<? extends ProjectFunction>>>
getProjectFunctionContributionsForGlobalRoles() {
        return Collections.singletonMap(
            Roles.GLOBAL_AUTOMATION,
            Collections.singletonList(
                MyProjectFunction.class
            )
        );
    }
    @Override
    public Map<String, List<Class<? extends ProjectFunction>>>
getProjectFunctionContributionsForProjectRoles() {
        return Collections.singletonMap(
            Roles.PROJECT_OWNER,
            Collections.singletonList(
                MyProjectFunction.class
            )
        );
    }
}
```

All available roles are listed in the `Roles` interface.

You can now check for those functions in your code by injecting the `SecurityService`:

```
private final SecurityService securityService;
...
if (securityService.isGlobalFunctionGranted(MyGlobalFunction.class)) {
   ...
}
if (securityService.isProjectFunctionGranted(project, MyProjectFunction.class)) {
   ...
}
```

or:

```
private final SecurityService securityService;
...
securityService.checkGlobalFunction(MyGlobalFunction.class)) {
securityService.checkProjectFunction(project, MyProjectFunction.class))
```

The project functions can be tested on a `Project` or any other entity which belongs to a project (branches, builds, etc.).

Adding roles

Both *global* and *project* roles can be added using the same `RoleContributor` extension class, by overriding the following methods:

```
@Component
public MyRoleContributor implements RoleContributor {
    @Override
    public List<RoleDefinition> getGlobalRoles() {
        return Collections.singletonList(
            new RoleDefinition(
                "MY_GLOBAL_ROLE",
                "My Global Role",
                "This is a new global role"
            )
        );
    }
    @Override
    public List<RoleDefinition> getProjectRoles() {
        return Collections.singletonList(
            new RoleDefinition(
                "MY_PROJECT_ROLE",
                "My Project Role",
                "This is a new project role"
            )
        );
    }
}
```

A new role can inherit from a built-in role:

```
    @Override
    public List<RoleDefinition> getProjectRoles() {
        return Collections.singletonList(
            new RoleDefinition(
                "MY_PROJECT_ROLE",
                "My Project Role",
                "This is a new project role",
                Roles.PROJECT_PARTICIPANT
            )
        );
    }
```

In the previous example, the `MY_PROJECT_ROLE` will inherit from all functions of the built-in `PARTICIPANT` role.

Same principle applies for global roles.

Those roles becomes eligible for selection when managing accounts and groups.

Note that functions (built-in or contributed) can be associated to those new roles - see Adding functions. By default, no function is associated to a contributed role.

15.10.16. Extending confidential stores

Extensions can define a custom confidential store used to store encryption keys.

Create a component which extends the `AbstractConfidentialStore` class:

```
@Component
@ConditionalOnProperty(name = OntrackConfigProperties.KEY_STORE, havingValue =
"custom")
public class CustomConfidentialStore extends AbstractConfidentialStore {

    public CustomConfidentialStore() {
        LoggerFactory.getLogger(CustomConfidentialStore.class).info(
                "[key-store] Using custom store"
        );
    }

    @Override
    public void store(String key, byte[] payload) throws IOException {
      // ...
      // Stores the key
    }

    @Override
    public byte[] load(String key) throws IOException {
      // ...
      // Retrives the key or ...
      return null;
    }
}
```

Note the use of the `ConditionalOnProperty`, which allows to select this store when the `ontrack.config.key-store`property is set to `custom`.

15.10.17. Free text annotations

Some free text can be entered as description for some elements of the model and can be automatically extended with hyperlinks.

See [validation-run-status-hyperlink] for this feature in the validation run statuses.

Using extensions, it is possible to extend this hyperlinked to other elements.

For example, let's imagine that we have a system where all references like `[1234]` can be replaced to a link to `http://reference/1234` with `1234` as a text.

For this, you have to create a `@Component` bean which implements the `FreeTextAnnotatorContributor` interface.

The `getMessageAnnotators` returns a list of `MessageAnnotator`s used to transform the text into a tree of nodes (typically some HTML).

In our example, this can give something like:

```
@Component
class RefFreeTextAnnotatorContributor : FreeTextAnnotatorContributor {
    override fun getMessageAnnotators(entity: ProjectEntity): List<MessageAnnotator> {
        val regex = "\\[(d+)\\]".toRegex()
        return listOf(
                RegexMessageAnnotator(
                        "\\[d+]\\"
                ) { match ->
                    val result = regex.matchEntire(match)
                    result
                            ?.let {
                                val id = it.groups[1].value.toInt(10)
                                MessageAnnotation.of("a")
                                        .attr("href", "http://reference/$id")
                                        .text(id.toString())
                            }
                            ?: match
                }
        )
    }
}
```

This component returns a single `RegexMessageAnnotator` (other implementations are of course possible, but this one is very convenient) which, given a regular expression, uses any match to transform into something else.

In our example, we extract the ID from the expression and return a link.

15.10.18. Label providers

Labels can be created and associated manually with projects.

Ontrack allows also some automation of this process using the concept of a *label provider*.

Labels created and associated to projects by *label providers* cannot be managed manually: they cannot be edited, deleted or unselected.

Implementation

A *label provider* is a `Service` which extends the `LabelProvider` class and returns a list of labels for a project.

For example, we could have a *label provider* which associates a "quality" label according to the "health" of the validation stamps in all "main" branches of the project. The label category would be "quality" and different names could be "high", "medium" and "low".

The code would look like:

```
@Service
class QualityLabelProvider : LabelProvider {

    override val name: String = "Quality"

    override val isEnabled: Boolean = true

    override fun getLabelsForProject(project: Project): List<LabelForm> {
      // Computes quality of the project
      val quality: String = ...
      // Returns a label
      return listOf(
         LabelForm(
            category = "quality",
            name = quality,
            description = "",
            color = ... // Computes color according to quality
         )
      )
   }
}
```

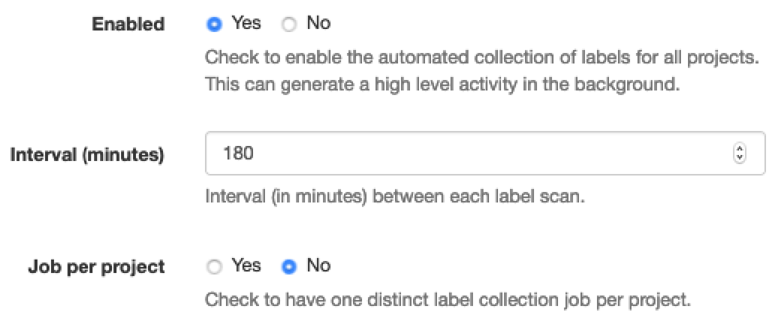
Activation

Even if you code such a *label provider*, nothing will happen until you activate the collection of labels.

Ontrack disables this collection by default, because there is no default label provider and that would be a useless job.

To activate the label collection job, just set the `ontrack.config.job-label-provider-enabled` configuration property to `true`.

Additionally, the label collection can be configured by administrators in the *Settings*:



Enabled [✓ Yes] No
Check to enable the automated collection of labels for all projects.
This can generate a high level activity in the background.

Interval (minutes) 180
Interval (in minutes) between each label scan.

Job per project Yes [✓ No]
Check to have one distinct label collection job per project.

- *Enabled* - Check to enable the automated collection of labels for all projects. This can generate a high level activity in the background.

- *Interval* - Interval (in minutes) between each label scan.
- *Per project* - Check to have one distinct label collection job per project.

15.10.19. Extending promotion checks

Promotion checks like "checking if the previous promotion is granted" are built-in in Ontrack but one can create its own by creating instances of the `PromotionRunCheckExtension` extension.

For example, to create a check on the name of the promotion level, that it should be uppercase only:

```
@Component
class UppercasePromotionRunCheckExtension(
    extensionFeature: YourExtensionFeature
): AbstractExtension(extensionFeature), PromotionRunCheckExtension {
    override fun checkPromotionRunCreation(promotionRun: PromotionRun) {
        if (promotionRun.promotionLevel.name !=
promotionRun.promotionLevel.name.toUpperCase()) {
            throw UppercasePromotionRunCheckException(/* ... */)
        }
    }
}
```

15.10.20. Extending the search

The Search capabilities of Ontrack can be extended through extensions and the core capabilities are also coded through extensions.

A Search extension is a component which implements the `SearchIndexer` interface.

In versions 3.40 and before, search extensions were done using `SearchProvider` implementations. Search was always done dynamically, without going through an index, making it particularly slow on big volumes or when scanning external systems.

The `SearchProvider` is now deprecated and will be removed in version 4 of Ontrack, to be replaced exclusively by ElasticSearch.

Search indexer overview

A `SearchIndexer` is responsible for two things:

- feeding a search index
- transforming found index entries into displayable search results

The `SearchIndexer` must be parameterized by a `SearchItem` class - see

The `indexerName` is the display name for the indexer, used to log information or to name the indexation jobs.

Indexation jobs can be totally disabled by setting `true` as the `isIndexationDisabled` property. They cannot even be triggered manually - set `isIndexationDisabled` to `true` when search indexes are not applicable. For example, some `SearchIndexer` instances might be fed by other indexers.

The `indexerSchedule` is used to set a schedule to the indexation job. It defaults to `Schedule.NONE` meaning that the job can be run only manually. Set another schedule for an automated job.

The `indexName` defines the name of the technical index used by this `SearchIndexer` - when using ElasticSearch, it corresponds to the name of ElasticSearch index to use. The index can be configured by setting the `indexMapping` property - see Search indexation mapping for more information on this subject.

At Ontrack startup time, all indexes are created (in ElasticSearch) and their mapping updated.

The `searchResultType` defines the type of result returned by an index search capability. It's used:

1. to provide a user a way to filter on the types of results
2. a way for the front-end to associate an icon to the type of result

For example:

```
@Component
class MySearchIndexer: SearchIndexer<MySearchItem> {
    override val searchResultType = SearchResultType(
            feature = feature.featureDescription,
            id = "my-result",
            name = "My result",
            description = "Use a comma-separated list of tokens"
    )
}
```

The `feature` is the `ExtensionFeature` associated with this `SearchIndexer` (see Coding an extension).

The `description` property is used to describe the type of search token one should use to find this type of result (when applicable).

Search indexation

The `indexAll` method is called by the system when indexation job for this indexer is enabled (it is by default, unless `isIndexationDisabled` returns `true`).

It must:

- loop over all items to be indexed for a search (for example: all projects for the project indexer)
- transform all those items into instances of the `SearchItem` class associaed with this indexer (for example: keeping only the project ID, its name and description)
- call the the provided `processor` function

The `indexAll` method is called by the system user.

For example:

```
override fun indexAll(processor: (ProjectSearchItem) -> Unit) {
    structureService.projectList.forEach { project ->
        processor(ProjectSearchItem(project))
    }
}
```

Behind the scene, the indexation job will send the items to index to an index service in batches (which makes the indexation quite performant).

The batch size is set by default to `1000` but can be:

1. configured using the `ontrack.config.search.index.batch` property
2. set explicitly using the `indexBatch` property of the `SearchIndexer` (this takes precedence)

Search results

When a search is performed, the `SearchService` will call the `toSearchResult` method of the `SearchIndexer` in order to transform an indexed item into a result which can be displayed to the user.

See the documentation of the `SearchIndexer.toSearchResult` and of `SearchResult` for a complete information.

Usually, the indexer will:

- load the actual Ontrack object or extract information from the indexed item (this latter method is preferred for performance reasons)
- in particular, it'll check if the target object makes sense: does it still exist? Is it authorized to the current user?
- setup a `SearchResult` instance to describe the result

For example, for the build indexer:

```
override fun toSearchResult(id: String, score: Double, source: JsonNode): SearchRe
        structureService.findBuildByID(ID.of(id.toInt()))?.run {
            SearchResult(
                    title = entityDisplayName,
                    description = description ?: "",
                    uri = uriBuilder.getEntityURI(this),
                    page = uriBuilder.getEntityPage(this),
                    accuracy = score,
                    type = searchResultType
            )
        }
```

In this example:

- `findBuildByID` checks both the existence of the build and if it is accessible by the current user, returning `null` when not available
- the `title` of the result is set of the complete build name (including project and branch name)
- the `uri` and `page` can be computed using an injected `URIBuilder`
- the `accuracy` is the score returned by ElasticSearch
- for the `type` just use the `searchResultType` of the indexer

As of now, the `accuracy` is used for sorting results, but is not displayed

The `toSearchResult` runs with the authorizations of the user who is performing the search. Results should be filtered accordingly using an injected `SecurityService`. If not, either the search will fail because of forbidden accesses or the final access will be rejected.

Search index items

The `SearchItem` class used to parameterize the `SearchIndexer` must return two values:

- `id` - the unique ID of this item in the index
- `fields` - a map of values to store together with the index

Most of the times, you can define:

- a primary constructor listing the properties who want to store
- a secondary constructor using the domain model of Ontrack

Example for the Git commit indexer:

```
class GitCommitSearchItem(
        val projectId: Int,
        val gitType: String,
        val gitName: String,
        val commit: String,
        val commitShort: String,
        val commitAuthor: String,
        val commitMessage: String
) : SearchItem {

    constructor(project: Project, gitConfiguration: GitConfiguration, commit:
GitCommit) : this(
            projectId = project.id(),
            gitType = gitConfiguration.type,
            gitName = gitConfiguration.name,
            commit = commit.id,
            commitShort = commit.shortId,
            commitAuthor = commit.author.name,
            commitMessage = commit.shortMessage
    )

    override val id: String = "$gitName::$commit"

    override val fields: Map<String, Any?> = asMap(
            this::projectId,
            this::gitType,
            this::gitName,
            this::commit,
            this::commitAuthor,
            this::commitShort,
            this::commitMessage
    )
}
```

For the `fields` of the item, try to get only simple types or list of simple types.

The `asMap` utility method is optional and can be replaced by a direct map construction. However, it avoids to hard-code the field names and uses the property references instead.

Search indexation mapping

By default, indexes are mapped automatically to the provided fields (like in ElasticSearch) but explicit mappings can be provided to:

- disable the indexation of some fields (like the `projectId` in the example above - while this field is needed for creating a search result, it should not be used for searches)
- set a type, like keyword or text (the search won't work the same way)
- boosting the search result score on some fields (a match on a key might be better than a match on a free description text)

While the SearchIndexer mechanism has been made independent on ElasticSearch, the concept of mapping is very close to this application, in particular the mapping types (see below).

In order to specify a mapping, the indexMapping of the SearchIndexer must return an instance of SearchIndexMapping.

While it's possible to build such an instance manually, it's more convenient to use the provided DSL. For example, for the Git commit indexer mentioned above:

```
override val indexMapping: SearchIndexMapping? = indexMappings<GitCommitSearchItem> {
    +GitCommitSearchItem::projectId to id { index = false }
    +GitCommitSearchItem::gitType to keyword { index = false }
    +GitCommitSearchItem::gitName to keyword { index = false }
    +GitCommitSearchItem::commit to keyword { scoreBoost = 3.0 }
    +GitCommitSearchItem::commitShort to keyword { scoreBoost = 2.0 }
    +GitCommitSearchItem::commitAuthor to keyword()
    +GitCommitSearchItem::commitMessage to text()
}
```

The syntax is:

```
+<SearchItem::property>> [to <type>[ { <configuration> }]]*
```

The type for the property can be set using:

- `id` for a `long`
- `keyword`
- `text`
- any other type supported by ElasticSearch using `type("typeName")

The configuration is optional but accepts the following properties:

- `index: Boolean` - unset by default - to specify if this property must be indexed or not
- `scoreBoost: Double` - multiplicator for the significance of a match on this field (similar to the boost indicator in ElasticSearch)

A property can be associated with two types, for example when a field can be both considered as a keyword or as plain text.

```
+SearchItem::myProperty to keyword { scoreBoost = 2.0 } to text()
```

Search indexation jobs

Unless its isIndexationDisabled property returns true, every SearchIndexer is associated with a job which runs the indexation of all items.

By default, those jobs must be launched manually but the `indexSchedule` can be used to define a run schedule.

Additionally, there is "All re-indexations" job which launches all re-indexations ; this is useful when migrating Ontrack to a deployment using ElasticSearch or to reset all indexes.

Search result icon

The `searchResultType` returned by a `SearchIndexer` contains a feature description and an ID. Both are used to identify the path to an icon which is used on client side:

- in the search box dropdown to select and restrict the type of result
- in the list of results

The icon (PNG, square, will be rescaled at client side) must be put in the `resources` at:

```
static/extension/<feature>/search-icon/<id>.png
```

where:

- `<feature>` is the feature ID
- `<id>` is the search result type id

Search indexing on events

Re-indexation of a complete index is costly. While some indexes don't have any other choice but to recompute the index regularly, it's more efficient to have the following steps:

- re-indexation once (when Ontrack is migrated to ElasticSearch)
- populating the index on events

Example: the project index is updated when a project is created, updated or deleted.

The type of event to listen to depends on the type of indexed item, but most of the cases are covered by:

- implement `EventListener` - when you want to listen to events on project entities like projects, branches, validation runs, etc.
- `PropertyType.onPropertyChanged/onPropertyDeleted` to react on properties being created, updated or deleted
- other types of listeners, more specialized, are also available in Ontrack

In all cases, you have to inject the `SearchIndexService` and call the appropriate methods, typically `createSearchIndex`, `updateSearchIndex` and `deleteSearchIndex`, to update the index.

Don’t try to cover all the cases. For example, if your index is linked to a build property, listen only to the property change, and not to the events occurring to the build, its branch or its project. It’s better to check in the `toSearchResult` method if the indexed object is still available or not.

Chapter 16. Operations

16.1. Metrics

Ontrack can export operational & data metrics to different systems:

- Prometheus
- InfluxDB
- Elastic

By default, only the Prometheus export is enabled.

The list of available metrics is available at Monitoring.

16.2. Elastic metrics

To enable the export of metrics into Elastic, set the `ontrack.extension.elastic.metrics.enabled` configuration property to `true`.

This will send Ontrack metrics to Elastic in a unique index following ECS conventions.

See [configuration-properties-elastic] for the configuration of this export to Elastic.

When this export of metrics to Elastic is enabled, Ontrack will provide operational metrics about this export, typically available in Prometheus:

- `ontrack_extension_elastic_metrics_queue` - current size of the queue
- `ontrack_extension_elastic_metrics_buffer` - current size of the buffer

16.3. InfluxDB metrics

The InfluxDB extension is shipped by default with Ontrack but is activated only if some properties are correctly set:

Property	Environment variable	Default	Description
`ontrack.influxdb.enabled`	`ONTRACK_INFLUXDB_ENABLED`	`false`	Enables the export of run info to InfluxDB
`ontrack.influxdb.uri`	`ONTRACK_INFLUXDB_URI`	"http://localhost:8086"	URI of the InfluxDB database

Optionally, the following properties can also be set:

Property	Environment variable	Default	Description
`ontrack.influxdb.username`	`ONTRACK_INFLUXDB_USERNAME`	"root"	User name to connect to the InfluxDB database
`ontrack.influxdb.password`	`ONTRACK_INFLUXDB_PASSWORD`	"root"	Password to connect to the InfluxDB database
`ontrack.influxdb.db`	`ONTRACK_INFLUXDB_DB`	"ontrack"	Name of the InfluxDB database
`ontrack.influxdb.create`	`ONTRACK_INFLUXDB_CREATE`	`true`	If `true`, the database is created at startup
`ontrack.influxdb.ssl.host-check`	`ONTRACK_INFLUXDB_SSL_HOST_CHECK`	`true`	If `false`, disables host checking for certificates. **This should not be used for a production system!**
`ontrack.influxdb.log`	`ONTRACK_INFLUXDB_LOG`	`NONE`	Level of log when communicating with InfluxDB. Possible values are: `NONE`, `BASIC`, `HEADERS` and `FULL`

When an InfluxDB connector is correctly set, some Ontrack information is automatically sent to create timed values:

- run info
- validation run data

16.3.1. InfluxDB management

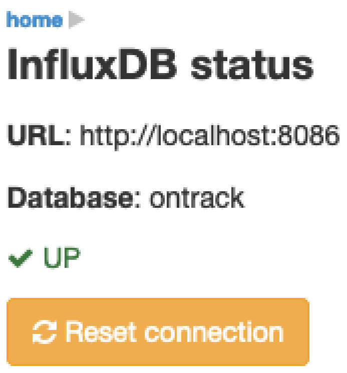
In case the connection to InfluxDB drops, Ontrack will re-attempt to reconnect after 15 minutes by default.

The retry period can be configured using the `ontrack.influxdb.validity` configuration property. For example, to set to one hour:

```
ontrack.influxdb.validity = 1h
```

You can force Ontrack to reconnect using several ways:

- through the `POST /manage/influxdb` management end point if you have access to it (depending on your installation)
- through the `POST /extension/influxdb` HTTP end point if you're an administrator
- through the UI under the _InfluxDB status" user menu:


home ▶

InfluxDB status

URL: http://localhost:8086

Database: ontrack

✓ UP

16.4. Logging

Ontrack is using Spring Boot default logging settings.

16.4.1. Enabling JSON logging

To enable JSON logging, just add the `logging-json` profile to Ontrack.

For example:

- `spring.profiles.active=prod,logging-json` when using system properties
- or `SPRING.PROFILES.ACTIVE=prod,logging-json` when using environment variables
- `PROFILE=prod,logging-json` when using the Docker image

Chapter 17. Appendixes

17.1. Configuration properties

Ontrack uses the Spring Boot mechanism for its configuration. See the documentation on how to set those properties in your Ontrack installation.

All Spring Boot properties are available for configuration.

Additionally, Ontrack defines the following ones.

The names of the configuration properties are given for a `.properties` file format but you can configure them in YAML of course. They can also be provided as system properties or environment variables. See the Spring Boot documentation for more details.

This sample file is meant as a guide only. Do **not** copy/paste the entire content into your application; rather pick only the properties that you need.

When applicable, the default value is mentioned.

17.1.1. Notifications configuration

General configuration for the notifications.

Name	Environment	Description	Default value	Notes
`ontrack.config.extension.notifications.enabled`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_ENABLED`	Are the notifications enabled?	`false`	
`ontrack.config.extension.notifications.in-memory.enabled`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_INMEMORY_ENABLED`	Is the in-memory notification channel enabled? Used for testing only.	`false`	
`ontrack.config.extension.notifications.mail.from`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_MAIL_FROM`	From address for the email notifications	`no-reply@localhost`	
`ontrack.config.extension.notifications.processing.queue.concurrency`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_PROCESSING_QUEUE_CONCURRENCY`	Maximum parallel processing of queues	`10`	
`ontrack.config.extension.notifications.processing.queue.async`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_PROCESSING_QUEUE_ASYNC`	Is asynchronous processing of notifications enabled?	`true`	

Name	Environment	Description	Default value	Notes
`ontrack.config.extension.notifications.webhook.internal.enabled`	`ONTRACK_CONFIG_EXTENSION_NOTIFICATIONS_WEBHOOK_INTERNAL_ENABLED`	Are internal webhooks enabled?	`false`	

17.1.2. WorkflowConfigurationProperties

Name	Environment	Description	Default value	Notes
`ontrack.config.extension.workflows.parent-waiting-interval`	`ONTRACK_CONFIG_EXTENSION_WORKFLOWS_PARENTWAITINGINTERVAL`	Time to wait for the completion of the parents of a node in a workflow	`PT1S`	

17.1.3. General configuration

General configuration of Ontrack.

Name	Environment	Description	Default value	Notes
`ontrack.config.application-log-enabled`	`ONTRACK_CONFIG_APPLICATIONLOGENABLED`	Disabling the collection of log entries in the application	`true`	
`ontrack.config.application-log-info-max`	`ONTRACK_CONFIG_APPLICATIONLOGINFOMAX`	Maximum number of errors to display as notifications in the GUI	`10`	
`ontrack.config.application-log-retention-days`	`ONTRACK_CONFIG_APPLICATIONLOGRETENTIONDAYS`	Maximum number of days to keep the log entries	`7`	
`ontrack.config.application-working-dir`	`ONTRACK_CONFIG_APPLICATIONWORKINGDIR`	Directory which contains all the working files of Ontrack. It is usually set by the installation.	`work/files`	

Name	Environment	Description	Default value	Notes
ontrack.config.build-filter-count-max	ONTRACK_CONFIG_BUILDFILTERCOUNTMAX	# Maximum number of builds which can be returned by a build filter. Any number above is truncated down to this value	200	
ontrack.config.configuration-test	ONTRACK_CONFIG_CONFIGURATIONTEST	Testing the configurations of external configurations. Used only for internal testing, to disable the checks when creating external configurations.	true	
ontrack.config.documents.engine	ONTRACK_CONFIG_DOCUMENTS_ENGINE	engine field	jdbc	
ontrack.config.file-key-store.directory	ONTRACK_CONFIG_FILEKEYSTORE_DIRECTORY	directory field	``	
ontrack.config.job-label-provider-enabled	ONTRACK_CONFIG_JOBLABELPROVIDERENABLED	Activation of the provided labels collection job	false	
ontrack.config.jobs.orchestration	ONTRACK_CONFIG_JOBS_ORCHESTRATION	Interval (in minutes) between each refresh of the job list	2	
ontrack.config.jobs.paused-at-startup	ONTRACK_CONFIG_JOBS_PAUSEDATSTARTUP	Set to true to not start any job at application startup. The administrator can restore the scheduling jobs manually	false	
ontrack.config.jobs.pool-size	ONTRACK_CONFIG_JOBS_POOLSIZE	Number of threads to use to run the background jobs	10	

Name	Environment	Description	Default value	Notes
`ontrack.config.jobs.scattering`	`ONTRACK_CONFIG_JOBS_SCATTERING`	Enabling the scattering of jobs. When several jobs have the same schedule, this can create a peak of activity, potentially harmful for the performances of the application. Enabling scattering allows jobs to be scheduled with an additional delay, computed as a fraction of the period.	`true`	
`ontrack.config.jobs.scattering-ratio`	`ONTRACK_CONFIG_JOBS_SCATTERINGRATIO`	Scattering ratio. Maximum fraction of the period to take into account for the scattering. For example, setting 0.5 would not add a period greater than half the period of the job. Setting 0 would actually disable the scattering altogether.	`1.0`	
`ontrack.config.jobs.timeout`	`ONTRACK_CONFIG_JOBS_TIMEOUT`	# Global timeout for all jobs. Any job running longer than this time will be forcibly stopped (expressed by default in hours)	`PT4H`	

Name	Environment	Description	Default value	Notes
`ontrack.config.jobs.timeout-controller-interval`	`ONTRACK_CONFIG_JOBS_TIMEOUTCONTROLLERINTERVAL`	Amount of time to wait between two controls of the job timeouts (expressed by default in minutes)	`PT15M`	
`ontrack.config.key-store`	`ONTRACK_CONFIG_KEYSTORE`	Key store type to use to store encryption keys	`file`	
`ontrack.config.search.index.batch`	`ONTRACK_CONFIG_SEARCH_INDEX_BATCH`	When performing full indexation, the indexation is performed by batch. The parameter below allows to set the size of this batch processing. Note: this is a default batch size. Custom indexers can override it.	`1000`	
`ontrack.config.search.index.ignore-existing`	`ONTRACK_CONFIG_SEARCH_INDEX_IGNOREEXISTING`	Option to ignore errors when creating indexes. For test only, allowing for concurrent testing.	`false`	

Name	Environment	Description	Default value	Notes
`ontrack.config.search.index.immediate`	`ONTRACK_CONFIG_SEARCH_INDEX_IMMEDIATE`	By default, indexation is ElasticSearch is done after some time after the index has been requested. The flag below forces the index to be refreshed immediately. This SHOULD NOT be used in production but is very useful when testing Ontrack search capabilities	`false`	
`ontrack.config.search.index.logging`	`ONTRACK_CONFIG_SEARCH_INDEX_LOGGING`	When performing full indexation, the indexation is performed by batch. The parameter below allows to generate additional logging when indexing actions are actually taken.	`false`	
`ontrack.config.search.index.tracing`	`ONTRACK_CONFIG_SEARCH_INDEX_TRACING`	When performing full indexation, the indexation is performed by batch. The parameter below allows to generate additional deep level logging for all actions on Git issues. Note: if set to `true` this generates a lot of information at DEBUG level.	`false`	

Name	Environment	Description	Default value	Notes
`ontrack.config.security.tokens.cache.enabled`	`ONTRACK_CONFIG_SECURITY_TOKENS_CACHE_ENABLED`	enabled field	`true`	Deprecated: Will be removed in V5
`ontrack.config.security.tokens.cache.max-count`	`ONTRACK_CONFIG_SECURITY_TOKENS_CACHE_MAXCOUNT`	maxCount field	`1000`	Deprecated: Will be removed in V5
`ontrack.config.security.tokens.cache.validity`	`ONTRACK_CONFIG_SECURITY_TOKENS_CACHE_VALIDITY`	validity field	`PT720H`	Deprecated: Will be removed in V5
`ontrack.config.security.tokens.password`	`ONTRACK_CONFIG_SECURITY_TOKENS_PASSWORD`	password field	`true`	
`ontrack.config.security.tokens.transient-validity`	`ONTRACK_CONFIG_SECURITY_TOKENS_TRANSIENTVALIDITY`	transientValidity field	`PT30M`	
`ontrack.config.security.tokens.validity`	`ONTRACK_CONFIG_SECURITY_TOKENS_VALIDITY`	validity field	`PT0S`	
`ontrack.config.templating.errors`	`ONTRACK_CONFIG_TEMPLATING_ERRORS`	errors field	`IGNORE`	
`ontrack.config.templating.html-tags.<0>`	`ONTRACK_CONFIG_TEMPLATING_HTMLTAGS_<0>`	HTML tags to accept on top of the default ones	`Empty list`	
`ontrack.config.ui.enabled`	`ONTRACK_CONFIG_UI_ENABLED`	enabled field	`false`	
`ontrack.config.ui.uri`	`ONTRACK_CONFIG_UI_URI`	uri field	`http://localhost:3000/ui`	
`ontrack.config.url`	`ONTRACK_CONFIG_URL`	Root URL for this Ontrack installation, used for notifications	`http://localhost:8080`	

17.1.4. GitHub configuration

Configuration of the GitHub extension

Name	Environment	Description	Default value	Notes
`ontrack.extension.github.metrics.enabled`	`ONTRACK_EXTENSION_GITHUB_METRICS_ENABLED`	Set to `false` to disable the export of the GitHub API rate limit	`true`	

17.1.5. GitHub Ingestion configuration

Configuration of the ingestion of GitHub workflows

Name	Environment	Description	Default value	Notes
`ontrack.extension.github.ingestion.hook.signature.disabled`	`ONTRACK_EXTENSION_GITHUB_INGESTION_HOOK_SIGNATURE_DISABLED`	Set to `true` to disable the signature checks (OK for testing, NOT for production)	`false`	
`ontrack.extension.github.ingestion.processing.async`	`ONTRACK_EXTENSION_GITHUB_INGESTION_PROCESSING_ASYNC`	By default, true, using a RabbitMQ engine. Set to false to use a direct processing (synchronous)	`true`	
`ontrack.extension.github.ingestion.processing.repositories.<*>`	-	List of specific bindings. Each entry is indexed by the name of the configuration (just a key).	*Empty*	
`ontrack.extension.github.ingestion.processing.repositories.<*>.owner`	`ONTRACK_EXTENSION_GITHUB_INGESTION_PROCESSING_REPOSITORIES_<*>_OWNER`	Regex for the repository owner, null for match all	``	
`ontrack.extension.github.ingestion.processing.repositories.<*>.repository`	`ONTRACK_EXTENSION_GITHUB_INGESTION_PROCESSING_REPOSITORIES_<*>_REPOSITORY`	Regex for the repository name, null for match all	``	
`ontrack.extension.github.ingestion.processing.scale`	`ONTRACK_EXTENSION_GITHUB_INGESTION_PROCESSING_SCALE`	Extending the number of default queues to spread the load	`1`	

17.1.6. Jenkins configuration

Configuration of the connection to Jenkins

Name	Environment	Description	Default value	Notes
`ontrack.jenkins.timeout`	`ONTRACK_JENKINS_TIMEOUT`	Default timeout to connect to Jenkins, in seconds	`30`	

17.1.7. Auto-versioning configuration

Configuration of the auto-versioning

Name	Environment	Description	Default value	Notes
`ontrack.extension.auto-versioning.queue.async`	`ONTRACK_EXTENSION_AUTO_VERSIONING_QUEUE_ASYNC`	By default, Ontrack uses RabbitMQ queue to manage the auto versioning processes. Disabling this mechanism is not recommended and is used only for internal testing.	`true`	
`ontrack.extension.auto-versioning.queue.cancelling`	`ONTRACK_EXTENSION_AUTO_VERSIONING_QUEUE_CANCELLING`	Cancelling the previous orders for the same source and same target if a new order comes in	`true`	
`ontrack.extension.auto-versioning.queue.projects.<0>`	`ONTRACK_EXTENSION_AUTO_VERSIONING_QUEUE_PROJECTS_<0>`	List of projects which must have dedicated queues	`Empty list`	
`ontrack.extension.auto-versioning.queue.scale`	`ONTRACK_EXTENSION_AUTO_VERSIONING_QUEUE_SCALE`	Default number of RabbitMQ queues to use	`1`	

17.1.8. Terraform Cloud configuration

Configuration of the TFC hooks.

Name	Environment	Description	Default value	Notes
`ontrack.extension.tfc.hook.signature.disabled`	`ONTRACK_EXTENSION_TFC_HOOK_SIGNATURE_DISABLED`	Set to `true` to disable the signature checks (OK for testing, NOT for production)	`false`	

17.1.9. Time since event metrics configuration

Configuration of the export of the metrics of the "Time since events" (TSE).

Name	Environment	Description	Default value	Notes
ontrack.extension.delivery-metrics.tse.enabled	ONTRACK_EXTENSION_DELIVERY_METRICS_TSE_ENABLED	Is the "time since event" metric enabled?	true	
ontrack.extension.delivery-metrics.tse.interval	ONTRACK_EXTENSION_DELIVERY_METRICS_TSE_INTERVAL	Interval between two scans for "time since events" (expressed by default in minutes)	PT30M	

17.1.10. Git configuration

Configuration of the connections to Git.

Name	Environment	Description	Default value	Notes
ontrack.config.extension.git.indexation.cleanup.cron	ONTRACK_CONFIG_EXTENSION_GIT_INDEXATION_CLEANUP_CRON	Cron for the job (empty to let it run manually)	` `	
ontrack.config.extension.git.indexation.cleanup.enabled	ONTRACK_CONFIG_EXTENSION_GIT_INDEXATION_CLEANUP_ENABLED	Cleanup of Git indexations working directories	true	
ontrack.config.extension.git.indexation.timeout	ONTRACK_CONFIG_EXTENSION_GIT_INDEXATION_TIMEOUT	Timeout for the Git indexations (expressed by default in minutes)	PT30M	
ontrack.config.extension.git.pull-requests.cache.duration	ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_CACHE_DURATION	Caching duration for pull requests. Time before a new connection is needed to get information about the PR from the SCM.	PT6H	
ontrack.config.extension.git.pull-requests.cache.enabled	ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_CACHE_ENABLED	Is the cache for pull requests enabled?	true	
ontrack.config.extension.git.pull-requests.cleanup.deleting	ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_CLEANUP_DELETING	Days before deleting a PR branch after it’s been closed or merged	7	

Name	Environment	Description	Default value	Notes
`ontrack.config.extension.git.pull-requests.cleanup.disabling`	`ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_CLEANUP_DISABLING`	Days before disabling a PR branch after it's been closed or merged	`1`	
`ontrack.config.extension.git.pull-requests.cleanup.enabled`	`ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_CLEANUP_ENABLED`	Auto cleanup of pull requests	`true`	
`ontrack.config.extension.git.pull-requests.enabled`	`ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_ENABLED`	Is the support for pull requests enabled?	`true`	Deprecated: Will be removed in V5. Support for pull requests will be transformed in V5.
`ontrack.config.extension.git.pull-requests.timeout`	`ONTRACK_CONFIG_EXTENSION_GIT_PULLREQUESTS_TIMEOUT`	Timeout before giving up on PR check	`PT5S`	Deprecated: Will be removed in V5. Support for pull requests will be transformed in V5.
`ontrack.config.extension.git.remote.interval`	`ONTRACK_CONFIG_EXTENSION_GIT_REMOTE_INTERVAL`	Interval between retries (by default in seconds and set to 30 seconds by default).	`PT30S`	Deprecated: Will be removed in V5. No fetch nor clone of Git repository will be done by Ontrack any longer.
`ontrack.config.extension.git.remote.max-no-remote`	`ONTRACK_CONFIG_EXTENSION_GIT_REMOTE_MAXNOREMOTE`	Number of times we accept a "no remote" exception is thrown before deactivating the project in Ontrack. If ⇐ 0, we always retry and never disable the project.	`3`	Deprecated: Will be removed in V5. No fetch nor clone of Git repository will be done by Ontrack any longer.

Name	Environment	Description	Default value	Notes
`ontrack.config.extension.git.remote.operation-timeout`	`ONTRACK_CONFIG_EXTENSION_GIT_REMOTE_OPERATIONTIMEOUT`	Timeout (by default in minutes) for a given remote operation to *complete* (like fetch & clone) Set to 10 minutes by default.	`PT10M`	Deprecated: Will be removed in V5. No fetch nor clone of Git repository will be done by Ontrack any longer.
`ontrack.config.extension.git.remote.timeout`	`ONTRACK_CONFIG_EXTENSION_GIT_REMOTE_TIMEOUT`	Timeout (by default in seconds) for a given remote operation to start (like fetch & clone). Leave 0 to use the default system value. Set to 60 seconds by default. This timeout is used for the *connection* part, not the total duration of the operation.	`PT1M`	Deprecated: Will be removed in V5. No fetch nor clone of Git repository will be done by Ontrack any longer.

17.1.11. Git Search configuration

Configuration of the search for Git objects.

Name	Environment	Description	Default value	Notes
`ontrack.config.search.git.commits.schedule`	`ONTRACK_CONFIG_SEARCH_GIT_COMMITS_SCHEDULE`	Interval between two indexations, in minutes.	`PT1H`	
`ontrack.config.search.git.commits.scheduled`	`ONTRACK_CONFIG_SEARCH_GIT_COMMITS_SCHEDULED`	Enabling auto indexation	`true`	

17.1.12. Queues configuration

General configuration for the RabbitMQ queues.

Name	Environment	Description	Default value	Notes
`ontrack.extension.queue.general.warn-if-async`	`ONTRACK_EXTENSION_QUEUE_GENERAL_WARNIFASYNC`	Emits a warning if the queues are not asynchronous (careful: the property name is a misnomer and will be renamed at one point into warnIfSync	`true`	
`ontrack.extension.queue.general.async`	`ONTRACK_EXTENSION_QUEUE_GENERAL_ASYNC`	async field	`true`	
`ontrack.extension.queue.specific.<*>`	-	specific field	*Empty*	
`ontrack.extension.queue..specific.<*>.scale`	`ONTRACK_EXTENSION_QUEUE__SPECIFIC_<*>_SCALE`	Number of queues	`1`	
`ontrack.extension.queue..specific.<*>.async`	`ONTRACK_EXTENSION_QUEUE__SPECIFIC_<*>_ASYNC`	async field	`true`	

17.1.13. Recordings configuration

Name	Environment	Description	Default value	Notes
`ontrack.extension.recordings.cleanup.<*>`	-	cleanup field	*Empty*	
`ontrack.extension.recordings..cleanup.<*>.cleanup`	`ONTRACK_EXTENSION_RECORDINGS__CLEANUP_<*>_CLEANUP`	How much more time after the retention must all the records be kept	`PT240H`	
`ontrack.extension.recordings..cleanup.<*>.retention`	`ONTRACK_EXTENSION_RECORDINGS__CLEANUP_<*>_RETENTION`	How much time must the closed records be kept	`PT240H`	

17.1.14. CasC configuration

Configuration of the "Configuration as Code".

Name	Environment	Description	Default value	Notes
`ontrack.config.casc.enabled`	`ONTRACK_CONFIG_CASC_ENABLED`	Is the configuration as code enabled?	`true`	

Name	Environment	Description	Default value	Notes
`ontrack.config.casc.locations.<0>`	`ONTRACK_CONFIG_CASC_LOCATIONS_<0>`	List of resources to load and to monitor for changes	`Empty list`	
`ontrack.config.casc.reloading.cron`	`ONTRACK_CONFIG_CASC_RELOADING_CRON`	Cron schedule for the reloading. Leave blank or empty to disable the automated reloading.	``	
`ontrack.config.casc.reloading.enabled`	`ONTRACK_CONFIG_CASC_RELOADING_ENABLED`	Enables the creation of a job to reload the CasC.	`false`	
`ontrack.config.casc.secrets.directory`	`ONTRACK_CONFIG_CASC_SECRETS_DIRECTORY`	Directory used to store the secret files (used only when type == "file"	``	
`ontrack.config.casc.secrets.type`	`ONTRACK_CONFIG_CASC_SECRETS_TYPE`	Source for the secrets. Either "env" (default) or "file"	`env`	
`ontrack.config.casc.upload.enabled`	`ONTRACK_CONFIG_CASC_UPLOAD_ENABLED`	Is the upload of Casc YAML file enabeld?	`false`	

17.1.15. Indicators configuration

Configuration of the indicators

Name	Environment	Description	Default value	Notes
`ontrack.extension.indicators.importing.deleting`	`ONTRACK_EXTENSION_INDICATORS_IMPORTING_DELETING`	When a category/type does not exist any longer for a given import ID, must it be deleted?	`false`	
`ontrack.extension.indicators.metrics.cron`	`ONTRACK_EXTENSION_INDICATORS_METRICS_CRON`	Cron for the scheduled export of metrics	`@daily`	

Name	Environment	Description	Default value	Notes
ontrack.extension.indicators.metrics.enabled	ONTRACK_EXTENSION_INDICATORS_METRICS_ENABLED	Enabling the scheduled export of metrics (a manual job is always available)	true	

17.1.16. License configuration

Name	Environment	Description	Default value	Notes
ontrack.config.license.provider	ONTRACK_CONFIG_LICENSE_PROVIDER	License provider	none	
ontrack.config.license.warning	ONTRACK_CONFIG_LICENSE_WARNING	Duration before the expiry date, when to emit a warning (expressed by defaults in days)	PT336H	

17.1.17. Embedded license configuration

Name	Environment	Description	Default value	Notes
ontrack.config.license.embedded.key	ONTRACK_CONFIG_LICENSE_EMBEDDED_KEY	License key	` `	

17.1.18. Fixed license configuration

Name	Environment	Description	Default value	Notes
ontrack.config.license.fixed.active	ONTRACK_CONFIG_LICENSE_FIXED_ACTIVE	Is the license active?	true	
ontrack.config.license.fixed.assignee	ONTRACK_CONFIG_LICENSE_FIXED_ASSIGNEE	Assignee of the license	n/a	
ontrack.config.license.fixed.max-projects	ONTRACK_CONFIG_LICENSE_FIXED_MAXPROJECTS	Maximum number of projects	0	
ontrack.config.license.fixed.name	ONTRACK_CONFIG_LICENSE_FIXED_NAME	Name of the license	n/a	
ontrack.config.license.fixed.valid-until	ONTRACK_CONFIG_LICENSE_FIXED_VALIDUNTIL	Validity of the license	` `	

17.1.19. StripeLicenseConfigurationProperties

Name	Environment	Description	Default value	Notes
`ontrack.config.license.stripe.subscription`	`ONTRACK_CONFIG_LICENSE_STRIPE_SUBSCRIPTION`	subscription field	``	
`ontrack.config.license.stripe.token`	`ONTRACK_CONFIG_LICENSE_STRIPE_TOKEN`	token field	``	

17.1.20. Artifactory configuration

Configuration of the Artifactory extension

Name	Environment	Description	Default value	Notes
`ontrack.extension.artifactory.build-sync-disabled`	`ONTRACK_EXTENSION_ARTIFACTORY_BUILDSYNCDISABLED`	Disabling the build sync jobs?	`false`	

17.1.21. Vault configuration

Ontrack can be configured to use Vault to store the encryption keys.

Name	Environment	Description	Default value	Notes
`ontrack.config.vault.prefix`	`ONTRACK_CONFIG_VAULT_PREFIX`	Prefix to be used to store the keys	`ontrack/keys`	
`ontrack.config.vault.token`	`ONTRACK_CONFIG_VAULT_TOKEN`	Token for the authentication	`test`	
`ontrack.config.vault.uri`	`ONTRACK_CONFIG_VAULT_URI`	URI to the Vault end point	http://localhost:8200	

17.1.22. InfluxDB configuration

Configuration of the connection to InfluxDB for the export of metrics.

Name	Environment	Description	Default value	Notes
`ontrack.influxdb.create`	`ONTRACK_INFLUXDB_CREATE`	If the database must be created automatically	`true`	
`ontrack.influxdb.db`	`ONTRACK_INFLUXDB_DB`	Name of the InfluxDB database where to send the metrics	`ontrack`	
`ontrack.influxdb.enabled`	`ONTRACK_INFLUXDB_ENABLED`	Enabling the export of metrics to InfluxDB	`false`	

Name	Environment	Description	Default value	Notes
`ontrack.influxdb.log`	`ONTRACK_INFLUXDB_LOG`	Log level of the InfluxDB commands	`NONE`	
`ontrack.influxdb.password`	`ONTRACK_INFLUXDB_PASSWORD`	Password used to connect to InfluxDB	`root`	
`ontrack.influxdb.prefix`	`ONTRACK_INFLUXDB_PREFIX`	Prefix to add before the metric name. For example, if prefix = `ontrack` * `validation_data` becomes `ontrack_validation_data` * `ontrack_metric` becomes `ontrack_metric` (no change) For example, if prefix = `ontrack_acceptance` * `validation_data` becomes `ontrack_acceptance_validation_data` * `ontrack_metric` becomes `ontrack_acceptance_metric` For example, if prefix = `instance` * `validation_data` becomes `instance_validation_data` * `ontrack_metric` becomes `instance_metric`	`ontrack`	

Name	Environment	Description	Default value	Notes
`ontrack.influxdb.ssl.host-check`	`ONTRACK_INFLUXDB_SSL_HOSTCHECK`	If the SSL connection must be valid	`true`	
`ontrack.influxdb.uri`	`ONTRACK_INFLUXDB_URI`	URL of the InfluxDB instance	`http://localhost:8086`	
`ontrack.influxdb.username`	`ONTRACK_INFLUXDB_USERNAME`	Username used to connect to InfluxDB	`root`	
`ontrack.influxdb.validity`	`ONTRACK_INFLUXDB_VALIDITY`	Duration after which the connection to InfluxDB is checked for validity and renewed if necessary.	`PT15M`	

17.1.23. ElasticSearch metrics configuration

Configuration of the export of metrics into ElasticSearch

Name	Environment	Description	Default value	Notes
`ontrack.extension.elastic.metrics.allow-drop`	`ONTRACK_EXTENSION_ELASTIC_METRICS_ALLOWDROP`	Set to false to disable the deletion of the index when performing a re-indexation	`true`	
`ontrack.extension.elastic.metrics.api-compatibility-mode`	`ONTRACK_EXTENSION_ELASTIC_METRICS_APICOMPATIBILITYMODE`	Set to true to enable the API Compatibility mode when accessing a 8.x ES server. See https://www.elastic.co/guide/en/elasticsearch/client/java-rest/7.17/java-rest-high-compatibility.html	`false`	

Name	Environment	Description	Default value	Notes
`ontrack.extension.elastic.metrics.debug`	`ONTRACK_EXTENSION_ELASTIC_METRICS_DEBUG`	Must we trace the behaviour of the export of the metrics in the logs?	`false`	
`ontrack.extension.elastic.metrics.enabled`	`ONTRACK_EXTENSION_ELASTIC_METRICS_ENABLED`	Is the export of metrics to Elastic enabled?	`false`	
`ontrack.extension.elastic.metrics.index.immediate`	`ONTRACK_EXTENSION_ELASTIC_METRICS_INDEX_IMMEDIATE`	Flag to enable immediate re-indexation after items are added into the index (used mostly for testing. It should not be used in production. If set to true, this overrides the asynchronous processing of the metrics	`false`	
`ontrack.extension.elastic.metrics.index.name`	`ONTRACK_EXTENSION_ELASTIC_METRICS_INDEX_NAME`	Name of the index to contains all Ontrack metrics	`ontrack_metrics`	
`ontrack.extension.elastic.metrics.queue.flushing`	`ONTRACK_EXTENSION_ELASTIC_METRICS_QUEUE_FLUSHING`	Every such interval, the current buffer of metrics is flushed to Elastic (expressed by default in minutes)	`PT1M`	

Name	Environment	Description	Default value	Notes
`ontrack.extension.elastic.metrics.target`	`ONTRACK_EXTENSION_ELASTIC_METRICS_TARGET`	Defines where the Elastic metrics should be sent. Possible values are: * MAIN - When this option is selected, the ES instance used by Ontrack for the regular search will be used. * CUSTOM -When this option is selected, the ES instance defined by the metrics properties will be used.	`MAIN`	

17.1.24. RabbitMQ configuration

Configuration of the client from Ontrack to Rabbit MQ. Note that basic connection parameters are handled using Spring Boot configuration.

Name	Environment	Description	Default value	Notes
`ontrack.config.rabbitmq.transactional`	`ONTRACK_CONFIG_RABBITMQ_TRANSACTIONAL`	True (default) to make the sending of messages part of the current transaction.	`true`	

17.2. Templating engine

The templating engine is used to render some text (plain or in some markup language).

Each template is available to refer to a *context*, typically linked to an event. These context items can be rendered directly, enriched through *source fields*, optional configured, and finally *filtered* for additional formatting.

The general format of a template is a string which contains expressions like:

```
${expression}
```

Each expression is either a *function call* or a *context reference*.

For a function call, the general syntax is:

```
#.function?name1=value1&name2=value2|filter
```

A function can have any number of named configuration parameters or none at all like below:

```
#.function
```

For a context reference, the general syntax is similar:

```
ref(.source)?name1=value1&name2=value2|filter
```

The `.source` is optional and allows to refine the context reference.

Examples of valid context references:

```
project
branch.scmBranch|urlencode
promotionRun.changelog?acrossBranches=false
```

The list of context elements (project, branch, …) depends on the execution context for the template.

For example, when using notifications, it all depends on the *event* being subscribed to.

To see the list of possible events and their contexts, see Event types.

The next sections list the available sources, functions, contexts and filters.

There are also special objects, known as *templating renderable*, which are specific to some contexts, like Auto versioning on promotion or Workflows.

17.2.1. Execution contexts

Different root contexts are available for the template expressions, depending on the context in which the template is executed.

For a notification, the template is always executed in regard to an *event*. Each event provides its own list of root contexts. See the list of events.

There are several specific contexts:

Auto-versioning context

For the templates used during an auto-versioning process (post-processing parameters, pull request templates, etc.), the following root contexts are available:

Context	Type	Description
`sourceProject`	Project	Reference to the project where the promotion was done
`targetBranch`	Branch	Branch being updated
`sourceBuild`	Build	Build which has been promoted
`sourcePromotionRun`	Promotion run	Promotion object
`PROMOTION`	String	Name of the promotion
`PATH`	String	*First* path being updated
`PATHS`	String	Comma-separated list of all paths being updated
`PROPERTY`	String	Target property being updated
`VERSION`	String	Version being set
`av`	See Auto-versioning context (av)	Specific object for the auto-versioning

17.2.2. List of templating sources

- Build.changelog
- description
- linked
- meta
- PromotionRun.changelog
- qualifiedLongName
- release
- scmBranch
- version

Build.changelog

Renders a change log for this build.

The "to build" is the one being referred to.

The "from build" is the build whose ID is set by the "from" parameter.

If `project` is set to a comma-separated list of strings, the change log will be rendered for the recursive links, in the order to the projects being set (going deeper and deeper in the links).

Applicable for:

- build

Configuration:

- **allQualifiers** - Boolean - required - Loop over all qualifiers for the last level of `dependencies`, including the default one. Qualifiers at `dependencies` take precedence.
- **commitsOption** - NONE, OPTIONAL, ALWAYS - required - Defines how to render commits for a change log
- **defaultQualifierFallback** - Boolean - required - If a qualifier has no previous link, uses the default qualifier (empty) qualifier.
- **dependencies** - List - required - Comma-separated list of project links to follow one by one for a get deep change log. Each item in the list is either a project name, or a project name and qualifier separated by a colon (:).
- **empty** - String - required - String to use to render an empty or non existent change log
- **from** - Int - required - ID to the build to get the change log from
- **title** - Boolean - required - Include a title for the change log

Example:

```
${build.changelog?from=1}
```

description

Getting the description for an entity.

Applicable for:

- project
- branch
- promotion level
- validation stamp
- build
- promotion run
- validation run

Configuration:

- **default** - String - optional - default field

Example:

```
${branch.description}
```

linked

Getting a linked build and displaying its name or release name.

Applicable for:

- build

Configuration:

- **mode** - NAME, RELEASE, AUTO - required - How to the linked build must be rendered.
    - name: build name only
    - release: build release/version/label (required in this case)
    - auto: build release/version/label if available, build name otherwise
- **project** - String - required - Name of the project to get a link to.
- **qualifier** - String - optional - Qualifier of the link (optional).

Example:

```
${build.linked?project=dependency&mode=auto}
```

meta

Gets some meta information from a project entity.

Applicable for:

- project
- branch
- promotion level
- validation stamp
- build
- promotion run
- validation run

Configuration:

- **category** - String - optional - Category of the key of the meta information to get
- **error** - Boolean - required - If true, an error is raised when meta information is not found
- **link** - Boolean - required - If true, the link of the meta information is rendered instead of the value
- **name** - String - required - Name of the key of the meta information to get

Example:

```
${build.release}
```

PromotionRun.changelog

Renders a change log for this promotion run.

The "to build" is the one being promoted.

The "from build" is the last build (before this one) having been promoted to the associated promotion level.

If no such previous build is found on the associated branch, the search will be done across the whole project, unless the `acrossBranches` configuration parameter is set to `false`.

If `project` is set to a comma-separated list of strings, the change log will be rendered for the recursive links, in the order to the projects being set (going deeper and deeper in the links).

Applicable for:

- promotion run

Configuration:

- **acrossBranches** - Boolean - required - By default, if a previous promotion is not found on the current branch, it'll be looked for in all branches of the projects. Set this parameter to `false` to disable this behaviour.
- **allQualifiers** - Boolean - required - Loop over all qualifiers for the last level of `dependencies`, including the default one. Qualifiers at `dependencies` take precedence.
- **commitsOption** - NONE, OPTIONAL, ALWAYS - required - Defines how to render commits for a change log
- **defaultQualifierFallback** - Boolean - required - If a qualifier has no previous link, uses the default qualifier (empty) qualifier.
- **dependencies** - List - required - Comma-separated list of project links to follow one by one for a get deep change log. Each item in the list is either a project name, or a project name and qualifier separated by a colon (:).
- **empty** - String - required - String to use to render an empty or non existent change log
- **title** - Boolean - required - Include a title for the change log

Example:

```
${promotionRun.changelog}
```

qualifiedLongName

Getting the qualified long name for an entity. For a branch, it'd look like `branch project/main`.

Applicable for:

- project
- branch
- promotion level
- validation stamp
- build
- promotion run
- validation run

Example:

```
${branch.qualifiedLongName}
```

release

Gets the release/version/label associated to a build or renders an empty string is there is none.

Applicable for:

- build

Example:

```
${build.release}
```

scmBranch

Gets the SCM branch associated with a branch. Renders an empty string if there is none.

Applicable for:

- branch

Example:

```
${branch.scmBranch}
```

version

Extract a version string from a branch name

Applicable for:

- branch

Configuration:

- **default** - String - required - Default value to use
- **policy** - NAME_ONLY, DISPLAY_NAME_OR_NAME, DISPLAY_NAME_ONLY - required - Which branch name to use

Example:

```
${branch.version}
```

17.2.3. List of templating functions

- datetime
- lastPromotion
- link
- pipeline
- since
- slot
- user

datetime

Displays the current time

Configuration:

- **days** - Long - optional - days field
- **format** - String - optional - format field
- **hours** - Long - optional - hours field
- **minutes** - Long - optional - minutes field
- **months** - Long - optional - months field
- **seconds** - Long - optional - seconds field
- **timezone** - String - optional - timezone field
- **years** - Long - optional - years field

Example:

```
#.datetime?format=yyyy-MM-dd&timezone=Europe/Brussels&days=1
```

lastPromotion

Renders the last build having a given promotion in a project

Configuration:

- **branch** - String - optional - Restricting the search to this branch
- **link** - Boolean - optional - Renders a link to the build or only the name
- **name** - String - optional - Using the release name or build name. `auto` for the first available, `release` for a required release name, `name` for only the name
- **project** - String - required - Project where to look for the build
- **promotion** - String - required - Name of the promotion level to look for

Example:

```
#.lastPromotion?project=prj&promotion=BRONZE
```

link

Creates a link

Configuration:

- **href** - String - required - Address for the link. This must be a value which is part of the templating context.
- **text** - String - required - Text of the link. This must be a value which is part of the templating context.

Example:

```
#.link?text=PR_TITLE&href=PR_LINK
```

pipeline

Renders a slot pipeline using its ID

Configuration:

- **id** - String - optional - ID of the slot pipeline. Defaults to PIPELINE_ID

Example:

```
#.pipeline

or

#.pipeline?id=workflow.pipeline.targetPipelineId
```

since

Renders a period of time

Configuration:

- **format** - String - optional - How to render the period. Supported values are: seconds, millis. Defaults to seconds.
- **from** - String - required - Origin time. Expression which must be rendered as a date/time
- **ref** - String - optional - Last time. Expression which is must be rendered as a date/time. Defaults to current time

Example:

```
#.since?from=workflowInfo.start
```

slot

Renders a slot using its ID

Configuration:

- **id** - String - optional - ID of the slot. Defaults to SLOT_ID

Example:

```
#.slot
```

user

Displays the current user

Configuration:

- **field** - NAME, DISPLAY, EMAIL - optional - Field to display for the user. Defaults to the username.

Example:

```
#.user
```

17.2.4. List of templating filters

- lowercase
- strong
- uppercase

- urlencode

lowercase

Making a value lower case

Example:

```
${project|lowercase}
```

strong

Making a value in a stronger typography

Example:

```
${VALUE|string}
```

uppercase

Making a value upper case

Example:

```
${project|uppercase}
```

urlencode

URL encoding of the value

Example:

```
${branch.scmBranch|urlencode}
```

17.2.5. List of special templating objects

- Auto-versioning context (av)
- Deployment context (deployment)
- Information about the workflow (workflow)
- Global information about the workflow (workflowInfo)

Auto-versioning context (av)

The `av` context can be used in templates in the PR title & body templates, in order to access information about the auto-versioning request.

Context: Auto-versioning

Available fields:

- `changelog`: Changelog for the project & version being updated
  - **allQualifiers** - Boolean - required - Loop over all qualifiers for the last level of `dependencies`, including the default one. Qualifiers at `dependencies` take precedence.
  - **commitsOption** - NONE, OPTIONAL, ALWAYS - required - Defines how to render commits for a change log
  - **defaultQualifierFallback** - Boolean - required - If a qualifier has no previous link, uses the default qualifier (empty) qualifier.
  - **dependencies** - List - required - Comma-separated list of project links to follow one by one for a get deep change log. Each item in the list is either a project name, or a project name and qualifier separated by a colon (:).
  - **empty** - String - required - String to use to render an empty or non existent change log
  - **title** - Boolean - required - Include a title for the change log

Deployment context (deployment)

The `deployment` context is injected into workflows triggered by deployments being started, run or completed.

Context: Environments

Available fields:

- `changelog`: Getting the changelog since a previous deployment
  - **allQualifiers** - Boolean - required - Loop over all qualifiers for the last level of `dependencies`, including the default one. Qualifiers at `dependencies` take precedence.
  - **commitsOption** - NONE, OPTIONAL, ALWAYS - required - Defines how to render commits for a change log
  - **defaultQualifierFallback** - Boolean - required - If a qualifier has no previous link, uses the default qualifier (empty) qualifier.
  - **dependencies** - List - required - Comma-separated list of project links to follow one by one for a get deep change log. Each item in the list is either a project name, or a project name and qualifier separated by a colon (:).
  - **empty** - String - required - String to use to render an empty or non existent change log
  - **since** - CANDIDATE, RUNNING, CANCELLED, DONE - required - Status to use when looking for the previous deployment
  - **title** - Boolean - required - Include a title for the change log
- `default`: Displays a link to the deployment
- `id`: Displays the ID of the deployment
- `link`: Displays a link to the deployment

* `name`: Displays the name of the deployment
* `number`: Displays the number of the deployment

Information about the workflow (workflow)

The `workflow` context is used to access information about the nodes of the workflow, in notifications or other templates rendered in the context of the workflow execution.

Context: Workflow

Available fields:

* `<node id>`: Getting information about a node in the current workflow
    * **path** - String - required - JSON path to the data to render

Global information about the workflow (workflowInfo)

The `workflowInfo` context is used to access information about the workflow itself, in notifications or other templates rendered in the context of the workflow execution.

Context: Workflow

Available fields:

* `start`: Starting time of the workflow

17.3. Event types

Find below the list of all events and their context.

17.3.1. List of events

* auto-versioning-error
* auto-versioning-post-processing-error
* auto-versioning-pr-merge-timeout-error
* auto-versioning-success
* delete_branch
* delete_build
* delete_configuration
* delete_project
* delete_promotion_level
* delete_promotion_run
* delete_validation_stamp
* disable_branch

- disable_project
- enable_branch
- enable_project
- environment-creation
- environment-deleted
- environment-updated
- image_promotion_level
- image_validation_stamp
- mock
- new_branch
- new_build
- new_configuration
- new_project
- new_promotion_level
- new_promotion_run
- new_validation_run
- new_validation_run_status
- new_validation_stamp
- property_change
- property_delete
- reorder_promotion_level
- reorder_validation_stamp
- slot-creation
- slot-deleted
- slot-pipeline-cancelled
- slot-pipeline-creation
- slot-pipeline-deployed
- slot-pipeline-deploying
- slot-pipeline-status-changed
- slot-pipeline-status-overridden
- slot-updated
- update_branch
- update_build
- update_configuration
- update_project

- update_promotion_level
- update_validation_run_status_comment
- update_validation_stamp
- worflow_standalone

auto-versioning-error

When an auto versioning request fails because of a general error.

Context:

- `project` - project - Target project
- `branch` - branch - Target branch
- `xPromotionRun` - promotion run - Source promotion run
- `VERSION` - string - Version being set
- `MESSAGE` - string - Auto versioning message
- `ERROR` - string - Error message

Default template:

```
Auto versioning of ${project}/${branch} for dependency ${xProject} version
"${VERSION}" has failed.

${MESSAGE}

Error: ${ERROR}
```

auto-versioning-post-processing-error

When an auto versioning request fails because of the post-processing.

Context:

- `project` - project - Target project
- `branch` - branch - Target branch
- `xPromotionRun` - promotion run - Source promotion run
- `VERSION` - string - Version being set
- `MESSAGE` - string - Auto versioning message
- `LINK` - string - Link to the post processing process

Default template:

```
Auto versioning post-processing of ${project}/${branch} for dependency ${xProject}
version "${VERSION}" has failed.

${#.link?text=MESSAGE&href=LINK}
```

auto-versioning-pr-merge-timeout-error

When an auto versioning request fails because the corresponding PR could not be merged in time.

Context:

- `project` - project - Target project
- `branch` - branch - Target branch
- `xPromotionRun` - promotion run - Source promotion run
- `VERSION` - string - Version being set
- `PR_NAME` - string - Title of the PR having been created
- `PR_LINK` - string - Link to the PR having been created

Default template:

```
Auto versioning of ${project}/${branch} for dependency ${xProject} version
"${VERSION}" has failed.

Timeout while waiting for the PR to be ready to be merged.

Pull request ${#.link?text=PR_NAME&href=PR_LINK}
```

auto-versioning-success

When an auto versioning request succeeds with the creation of a PR (merged or not).

Context:

- `project` - project - Target project
- `branch` - branch - Target branch
- `xPromotionRun` - promotion run - Source promotion run
- `VERSION` - string - Version being set
- `MESSAGE` - string - Auto versioning message
- `PR_NAME` - string - Title of the PR having been created
- `PR_LINK` - string - Link to the PR having been created

Default template:

```
Auto versioning of ${project}/${branch} for dependency ${xProject} version
"${VERSION}" has been done.

${MESSAGE}

Pull request ${#.link?text=PR_NAME&href=PR_LINK}
```

delete_branch

When a branch is deleted.

Context:

- `project` - project - Branch’s project
- `BRANCH` - string - Name of the deleted branch

Default template:

```
Branch ${BRANCH} has been deleted from ${project}.
```

delete_build

When a build is deleted.

Context:

- `project` - project - Build’s project
- `branch` - branch - Build’s branch
- `BUILD` - string - Name of the deleted build

Default template:

```
Build ${BUILD} for branch ${branch} in ${project} has been deleted.
```

delete_configuration

When a configuration is deleted.

Context:

- `CONFIGURATION` - string - Name of the configuration

Default template:

```
${CONFIGURATION} configuration has been deleted.
```

delete_project

When a project is deleted.

Context:

- `PROJECT` - string - Name of the deleted project

Default template:

```
Project ${PROJECT} has been deleted.
```

delete_promotion_level

When a promotion level is deleted.

Context:

- `project` - project - Promotion level’s project
- `branch` - branch - Promotion level’s branch
- `PROMOTION_LEVEL` - string - Deleted promotion level
- `PROMOTION_LEVEL_ID` - string - ID of the deleted promotion level

Default template:

```
Promotion level ${PROMOTION_LEVEL} for branch ${branch} in ${project} has been
deleted.
```

delete_promotion_run

When the promotion of a build is deleted.

Context:

- `project` - project - Project
- `branch` - branch - Branch
- `build` - build - Promoted build
- `promotionLevel` - promotion level - Promotion level

Default template:

```
Promotion ${promotionLevel} of build ${build} has been deleted for branch ${branch} in
${project}.
```

delete_validation_stamp

When a validation stamp is deleted.

Context:

- `project` - project - Validation stamp’s project
- `branch` - branch - Validation stamp’s branch
- `VALIDATION_STAMP` - string - Name of the deleted validation stamp
- `VALIDATION_STAMP_ID` - string - ID of the deleted validation stamp

Default template:

```
Validation stamp ${VALIDATION_STAMP} for branch ${branch} in ${project} has been
deleted.
```

disable_branch

When a branch is disabled.

Context:

- `project` - project - Branch’s project
- `branch` - branch - Disabled branch

Default template:

```
Branch ${branch} in ${project} has been disabled.
```

disable_project

When a project is disabled.

Context:

- `project` - project - Disabled project

Default template:

```
Project ${project} has been disabled.
```

enable_branch

When a branch becomes enabled again.

Context:

- `project` - project - Branch's project
- `branch` - branch - Enabled branch

Default template:

```
Branch ${branch} in ${project} has been enabled.
```

enable_project

When a project becomes enabled again.

Context:

- `project` - project - Enabled project

Default template:

```
Project ${project} has been enabled.
```

environment-creation

When an environment is created

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment

Default template:

```
Environment ${ENVIRONMENT_NAME} has been created.
```

environment-deleted

When an environment is deleted

Context:

- `ENVIRONMENT_NAME` - string - Name of the environment

Default template:

```
Environment ${ENVIRONMENT_NAME} has been deleted.
```

environment-updated

When an environment is updated

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment

Default template:

```
Environment ${ENVIRONMENT_NAME} has been updated.
```

image_promotion_level

When a promotion level's image is updated.

Context:

- `project` - project - Promotion level's project
- `branch` - branch - Promotion level's branch
- `promotionLevel` - promotion level - Updated promotion level

Default template:

```
Image for promotion level ${promotionLevel} for branch ${branch} in ${project} has
changed.
```

image_validation_stamp

When a validation stamp's image is updated.

Context:

- `project` - project - Validation stamp's project
- `branch` - branch - Validation stamp's branch
- `validationStamp` - validation stamp - Updated validation stamp

Default template:

```
Image for validation stamp ${validationStamp} for branch ${branch} in ${project} has
changed.
```

mock

Mock event

Context:

- `mock` - string - Mock test

Default template:

```
Mock event
```

new_branch

When a branch is created.

Context:

- `project` - project - Branch’s project
- `branch` - branch - Created branch

Default template:

```
New branch ${branch} for project ${project}.
```

new_build

When a build is created.

Context:

- `project` - project - Build’s project
- `branch` - branch - Build’s branch
- `build` - build - Created build

Default template:

```
New build ${build} for branch ${branch} in ${project}.
```

new_configuration

When a configuration is created.

Context:

- `CONFIGURATION` - string - Name of the configuration

Default template:

```
${CONFIGURATION} configuration has been created.
```

new_project

When a project is created.

Context:

- `project` - project - Created project

Default template:

```
New project ${project}.
```

new_promotion_level

When a promotion level is created.

Context:

- `project` - project - Promotion level’s project
- `branch` - branch - Promotion level’s branch
- `promotionLevel` - promotion level - Created promotion level

Default template:

```
New promotion level ${promotionLevel} for branch ${branch} in ${project}.
```

new_promotion_run

When a build is promoted.

Context:

- `project` - project - Project
- `branch` - branch - Branch
- `build` - build - Promoted build
- `promotionLevel` - promotion level - Promotion level
- `promotionRun` - promotion run - Promotion run

Default template:

```
Build ${build} has been promoted to ${promotionLevel} for branch ${branch} in
${project}.
```

new_validation_run

When a build is validated.

Context:

- `project` - project - Project
- `branch` - branch - Branch
- `build` - build - Validated build
- `validationStamp` - validation stamp - Validation stamp
- `validationRun` - validation run - Validation run
- `STATUS` - string - ID of the validation run status
- `STATUS_NAME` - string - Name of the validation run status

Default template:

```
Build ${build} has run for the ${validationStamp} with status ${STATUS_NAME} in branch
${branch} in ${project}.
```

new_validation_run_status

When the status of the validation of a build is updated.

Context:

- `project` - project - Project
- `branch` - branch - Branch
- `build` - build - Validated build
- `validationStamp` - validation stamp - Validation stamp
- `validationRun` - validation run - Validation run
- `STATUS` - string - ID of the validation run status
- `STATUS_NAME` - string - Name of the validation run status

Default template:

```
Status for the ${validationStamp} validation ${validationRun} for build ${build} in
branch ${branch} of ${project} has changed to ${STATUS_NAME}.
```

new_validation_stamp

When a validation stamp is created.

Context:

- `project` - project - Validation stamp’s project
- `branch` - branch - Validation stamp’s branch
- `validationStamp` - validation stamp - Created validation stamp

Default template:

```
New validation stamp ${validationStamp} for branch ${branch} in ${project}.
```

property_change

When a property is edited.

Context:

- `entity` - any entity - Entity where the property has been edited
- `PROPERTY` - string - FQCN of the property type
- `PROPERTY_NAME` - string - Display name of the property

Default template:

```
${PROPERTY_NAME} property has changed for ${entity.qualifiedLongName}.
```

property_delete

When a property is deleted.

Context:

- `entity` - any entity - Entity where the property has been edited
- `PROPERTY` - string - FQCN of the property type
- `PROPERTY_NAME` - string - Display name of the property

Default template:

```
${PROPERTY_NAME} property has been removed from ${entity.qualifiedLongName}.
```

reorder_promotion_level

When the promotion levels of a branch are reordered.

Context:

- `project` - project - Promotion levels project
- `branch` - branch - Promotion levels branch

Default template:

```
Promotion levels for branch ${branch} in ${project} have been reordered.
```

reorder_validation_stamp

When the validation stamps of a branch are reordered.

Context:

- `project` - project - Validation stamps project
- `branch` - branch - Validation stamps branch

Default template:

```
Validation stamps for branch ${branch} in ${project} have been reordered.
```

slot-creation

When a slot is created

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project for the slot
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot

Default template:

```
Slot ${#.slot} for environment ${ENVIRONMENT_NAME} has been created.
```

slot-deleted

When a slot is updated

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project for the slot
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot

Default template:

```
Slot ${project} (qualifier = "${SLOT_QUALIFIER}") for environment ${ENVIRONMENT_NAME}
has been deleted.
```

slot-pipeline-cancelled

When a slot pipeline is cancelled

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline

Default template:

```
Pipeline ${#.pipeline} has been cancelled.
```

slot-pipeline-creation

When a slot pipeline has started

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline

Default template:

```
Pipeline ${#.pipeline} has started.
```

slot-pipeline-deployed

When a slot pipeline has completed its deployment

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline

Default template:

```
Pipeline ${#.pipeline} has been deployed.
```

slot-pipeline-deploying

When a slot pipeline is starting its deployment

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline

Default template:

```
Pipeline ${#.pipeline} is starting its deployment.
```

slot-pipeline-status-changed

When a slot pipeline status is updated

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline

Default template:

```
Pipeline ${#.pipeline} status has been updated.
```

slot-pipeline-status-overridden

When a slot pipeline status is updated

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project of the build in the pipeline
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot
- `PIPELINE_ID` - string - ID of the pipeline
- `branch` - branch - Branch of the build in the pipeline
- `build` - build - Build in the pipeline
- `PIPELINE_OVERRIDING_USER` - string - User who has overridden the pipeline status

Default template:

```
Pipeline ${#.pipeline} status has been overridden by ${PIPELINE_OVERRIDING_USER}.
```

slot-updated

When a slot is updated

Context:

- `ENVIRONMENT_ID` - string - ID of the environment
- `ENVIRONMENT_NAME` - string - Name of the environment
- `project` - project - Project for the slot
- `SLOT_ID` - string - ID of the slot
- `SLOT_QUALIFIER` - string - Qualifier of the slot

Default template:

```
Slot ${#.slot} for environment ${ENVIRONMENT_NAME} has been updated.
```

update_branch

When a branch is updated.

Context:

- `project` - project - Branch’s project
- `branch` - branch - Updated branch

Default template:

```
Branch ${branch} in ${project} has been updated.
```

update_build

When a build is updated.

Context:

- `project` - project - Build’s project
- `branch` - branch - Build’s branch
- `build` - build - Updated build

Default template:

```
Build ${build} for branch ${branch} in ${project} has been updated.
```

update_configuration

When a configuration is updated.

Context:

* `CONFIGURATION` - string - Name of the configuration

Default template:

```
${CONFIGURATION} configuration has been updated.
```

update_project

When a project is updated.

Context:

* `project` - project - Updated project

Default template:

```
Project ${project} has been updated.
```

update_promotion_level

When a promotion level is updated.

Context:

* `project` - project - Promotion level’s project
* `branch` - branch - Promotion level’s branch
* `promotionLevel` - promotion level - Updated promotion level

Default template:

```
Promotion level ${promotionLevel} for branch ${branch} in ${project} has changed.
```

update_validation_run_status_comment

When the status message of the validation of a build is updated.

Context:

* `project` - project - Project
* `branch` - branch - Branch
* `build` - build - Validated build
* `validationStamp` - validation stamp - Validation stamp
* `validationRun` - validation run - Validation run

Default template:

```
A status message for the ${validationStamp} validation ${validationRun} for build
${build} in branch ${branch} of ${project} has changed.
```

update_validation_stamp

When a validation stamp is updated.

Context:

- `project` - project - Validation stamp's project
- `branch` - branch - Validation stamp's branch
- `validationStamp` - validation stamp - Updated validation stamp

Default template:

```
Validation stamp ${validationStamp} for branch ${branch} in ${project} has been
updated.
```

worflow_standalone

Event created when launching a standalone workflow

Context:

Default template:

```
Started a standalone workflow
```

17.4. Notifications

Find below the list of all notification backends and their configurations.

17.4.1. List of notification backends

- Jenkins (`jenkins`)
- Jira ticket creation (`jira-creation`)
- Jira link creation (`jira-link`)
- Jira Service Desk (`jira-service-desk`)
- Mail (`mail`)
- Ontrack validation (`ontrack-validation`)
- Slack (`slack`)
- Webhook (`webhook`)

- Workflow (`workflow`)

17.4.2. Jenkins (`jenkins`)

This channel is used to trigger remote Jenkins jobs with some parameters.

This channel does not use the custom template.

Links:

- Jenkins notifications

Configuration:

- **callMode** - ASYNC, SYNC - required - How to call the Jenkins job. ASYNC (the default) means that the job is called in "fire and forget" mode. When set to SYNC, Ontrack will wait for the completion of the job to success, with a given timeout (not recommended).
- **config** - String - required - Name of the Jenkins configuration to use for the connection.
- **job** - String - required - URL of the Jenkins job to call
- **parameters** - List - required - Parameters to send to to the job
  - **name** - String - required - Name of the parameter
  - **value** - String - required - Value of the parameter
- **timeout** - Int - required - Timeout in seconds

Output:

- **buildUrl** - String - optional - URL to the build (only available when call mode is SYNC)
- **jobUrl** - String - required - URL to the job
- **parameters** - List - required - Parameters sent to the job
  - **name** - String - required - Name of the parameter
  - **value** - String - required - Value of the parameter

17.4.3. Jira ticket creation (`jira-creation`)

Creation of a Jira ticket

Configuration:

- **assignee** - String - optional - Username of the assignee
- **configName** - String - required - Name of the Jira configuration to use for the connection
- **customFields** - List - required - List of custom fields for the ticket
  - **name** - String - required - Name of the field
  - **value** - JSON - required - Value for the field, as understood by the Jira API
- **fixVersion** - String - optional - Name of the fix version to assign to the ticket

* **issueType** - String - required - Name of the issue type to use for the ticket
* **labels** - List - required - List of labels for the ticket
* **projectName** - String - required - Key of the Jira project where to create the ticket
* **titleTemplate** - String - required - (template) Summary of the ticket
* **useExisting** - Boolean - required - If true, no ticket is created if it exists already

Output:

* **body** - String - optional - Actual body for the ticket
* **customFields** - List - optional - Actual custom fields of the ticket
  * **name** - String - required - Name of the field
  * **value** - JSON - required - Value for the field, as understood by the Jira API
* **existing** - Boolean - optional - True if the ticket was already existing
* **fixVersion** - String - optional - Actual fix version assigned to the ticket
* **jql** - String - optional - JQL query used to identify the existing ticket
* **labels** - List - optional - Actual labels of the ticket
* **ticketKey** - String - optional - Ticket key
* **title** - String - optional - Actual summary of the ticket
* **url** - String - optional - URL to the ticket page

17.4.4. Jira link creation (`jira-link`)

Linking two Jira tickets together

Configuration:

* **configName** - String - required - Name of the Jira configuration to use for the connection
* **linkName** - String - required - Name of the link
* **sourceQuery** - String - required - JQuery to get the source ticket
* **targetQuery** - String - required - JQuery to get the target ticket

Output:

* **sourceTicket** - String - required - Source ticket
* **targetTicket** - String - required - Target ticket

17.4.5. Jira Service Desk (`jira-service-desk`)

This channel is used to create a Jira Service Desk ticket.

This channel does not use the custom template.

Configuration:

- **configName** - String - required - Name of the Jira configuration to use for the connection
- **fields** - List - required - List of fields to set into the service desk ticket
  - **name** - String - required - Name of the field
  - **value** - JSON - required - Value for the field, as understood by the Jira API
- **requestStatus** - CLOSED, OPEN, ALL - optional - If looking for existing tickets, which type of requests to look for (ALL by default)
- **requestTypeId** - Int - required - ID of the Request Type of the ticket to create
- **searchTerm** - String - optional - Search token to use to identify any existing ticket. This is a template.
- **serviceDeskId** - Int - required - ID of the Service Desk where to create the ticket
- **useExisting** - Boolean - required - If true, no ticket is created if it exists already

Output:

- **existing** - Boolean - optional - True if the ticket was already existing
- **fields** - List - optional - List of actual fields which have been set
  - **name** - String - required - Name of the field
  - **value** - JSON - required - Value for the field, as understood by the Jira API
- **requestTypeId** - Int - required - ID of the Request Type of the created ticket
- **serviceDeskId** - Int - required - ID of the Service Desk where the ticket has been created
- **ticketKey** - String - optional - Key of the created ticket
- **url** - String - optional - URL to the created ticket

17.4.6. Mail (`mail`)

Sending a message by mail. The notification template is used for the body of the mail.

Configuration:

- **cc** - String - optional - Comma-separated list of mail targets (cc)
- **subject** - String - required - (template) Mail subject
- **to** - String - required - Comma-separated list of mail targets (to)

Output:

- **body** - String - required - Actual generated body for the mail
- **cc** - String - optional - List of recipients in cc
- **subject** - String - required - Actual generated subject for the mail
- **to** - String - required - List of recipients

17.4.7. Ontrack validation (`ontrack-validation`)

Validates a build in Ontrack

Configuration:

- **branch** - String - optional - [template] Name of the branch to validate. If not provided, looks for the event's branch if available.
- **build** - String - optional - [template] Name of the build to validate. If not provided, looks for the event's build if available.
- **project** - String - optional - [template] Name of the project to validate. If not provided, looks for the event's project if available.
- **runTime** - String - optional - Run time. Can be a template must be rendered as a number of seconds.
- **validation** - String - required - Name of the validation stamp to use.

Output:

- **runId** - Int - required - ID of the validation run

17.4.8. Slack (`slack`)

Sending messages to Slack. The notification template is used for the message.

Links:

- Slack documentation

Configuration:

- **Channel** - String - required - Slack channel
- **Notification type** - INFO, SUCCESS, WARNING, ERROR - required - Used for the color of the message

Output:

- **message** - String - required - Actual content of the message

17.4.9. Webhook (`webhook`)

Calling an external webhook

This channel does not use the custom template.

Configuration:

- **name** - String - required - Name of the webhook to use

Output:

- **payload** - Object - required - Description of the payload sent to the webhook
  - **data** - JSON - required - Webhook actual payload
  - **type** - String - required - Webhook type
  - **uuid** - String - required - Unique ID for the payload

17.4.10. Workflow (`workflow`)

Launches a workflow

This channel does not use the custom template.

Configuration:

- **pauseMs** - Long - required - (used for test only) Short pause before launching the workflow
- **workflow** - Object - required - Workflow to run
  - **name** - String - required - Display name for the workflow
  - **nodes** - List - required - List of nodes in the workflow
    - **data** - JSON - required - Raw data associated with the node, to be used by the node executor.
    - **description** - String - optional - Description of the node in its workflow.
    - **executorId** - String - required - ID of the executor to use
    - **id** - String - required - Unique ID of the node in its workflow.
    - **parents** - List - required - List of the IDs of the parents for this node
      - **id** - String - required - ID of the parent node
    - **timeout** - Long - required - Timeout in seconds (5 minutes by default)

Output:

- **workflowInstanceId** - String - required - ID of the workflow instance. Can be used to track the progress and outcome of the workflow.

17.5. Workflow nodes executors

Find below the list of all workflow node executors and their configurations.

17.5.1. List of workflow node executors

- Auto-versioning (auto-versioning)
- Mock (mock)
- Notification (notification)
- Pause (pause)
- Pipeline creation (slot-pipeline-creation)

- Deployed pipeline (slot-pipeline-deployed)
- Deploying pipeline (slot-pipeline-deploying)

Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-auto-versioning.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-mock.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-notification.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-pause.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-slot-pipeline-creation.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-slot-pipeline-deployed.adoc[] Unresolved directive in workflow-node-executors/index.adoc - include::workflow-node-executor-slot-pipeline-deploying.adoc[]

17.6. List of properties

- Artifactory promotion sync
- Auto-versioning
- Bitbucket Cloud configuration
- Auto promotion levels
- Auto promotion
- Auto validation stamps
- Build link display options
- Links
- Main build links
- Message
- Meta information
- Previous promotion condition
- Promotion dependencies
- Release
- Validation on release/label
- Branching Model
- Git branch
- Git commit
- Git configuration
- GitHub configuration
- GitHub Workflow Run
- GitHub Workflow Job
- GitLab configuration

- Jenkins Build
- Jenkins Job
- JIRA Links to follow
- SonarQube
- Auto-disabling of branches based on patterns
- Stale branches
- Bitbucket Server configuration

17.6.1. Artifactory promotion sync

ID: `net.nemerosa.ontrack.extension.artifactory.property.ArtifactoryPromotionSyncPropertyType`

Synchronisation of the promotions with Artifactory build statuses

Scope:

- branch

Configuration:

- **buildName** - String - required - Artifactory build name
- **buildNameFilter** - String - required - Artifactory build name filter
- **configuration** - String - required - Name of the Artifactory configuration
- **interval** - Int - required - Interval between each synchronisation in minutes.

17.6.2. Auto-versioning

ID: `net.nemerosa.ontrack.extension.av.project.AutoVersioningProjectPropertyType`

Auto-versioning rules at project level

Scope:

- project

Configuration:

- **branchExcludes** - List - optional - List of regular expressions. AV requests match if no regular expression is matched by the target branch name. If empty, the target branch is considered matching.
- **branchIncludes** - List - optional - List of regular expressions. AV requests match if at least one regular expression is matched by the target branch name. If empty, all target branches match (the default).
- **lastActivityDate** - LocalDateTime - optional - If defined, any target branch whose last activity (last build creation) is before this date will be ignored by the auto-versioning

17.6.3. Bitbucket Cloud configuration

ID: `net.nemerosa.ontrack.extension.bitbucket.cloud.property.BitbucketCloudProjectConfigurationPropertyType`

Associates the project with a Bitbucket Cloud repository

Scope:

- project

Configuration:

- **configuration** - String - required - Name of the Bitbucket Cloud configuration
- **indexationInterval** - Int - required - How often to index the repository, in minutes. Use 0 to disable indexation.
- **issueServiceConfigurationIdentifier** - String - optional - Identifier for the issue service
- **repository** - String - required - Name of the repository

17.6.4. Auto promotion levels

ID: `net.nemerosa.ontrack.extension.general.AutoPromotionLevelPropertyType`

If set, this property allows promotion levels to be created automatically from predefined promotion levels

Scope:

- project

Configuration:

- **isAutoCreate** - Boolean - required - isAutoCreate field

17.6.5. Auto promotion

ID: `net.nemerosa.ontrack.extension.general.AutoPromotionPropertyType`

Allows a promotion level to be granted on a build as soon as a list of validation stamps and/or other promotions has been passed

Scope:

- promotion level

Configuration:

- **exclude** - String - required - Regular expression to exclude validation stamps by name
- **include** - String - required - Regular expression to include validation stamps by name

* **promotionLevels** - List - required - List of needed promotion levels
* **validationStamps** - List - required - List of needed validation stamps

17.6.6. Auto validation stamps

ID: `net.nemerosa.ontrack.extension.general.AutoValidationStampPropertyType`

If set, this property allows validation stamps to be created automatically from predefined validation stamps

Scope:

* project

Configuration:

* **autoCreate** - Boolean - required - If true, creates validations from predefined ones
* **autoCreateIfNotPredefined** - Boolean - required - If true, creates validations even if not predefined

17.6.7. Build link display options

ID: `net.nemerosa.ontrack.extension.general.BuildLinkDisplayPropertyType`

Configuration of display options for the build links towards this project.

Scope:

* project

Configuration:

* **useLabel** - Boolean - required - Configuration at project label to specify that a build link decoration should use the release/label of a build when available. By default, it displays the release name if available, and then the build name as a default.

17.6.8. Links

ID: `net.nemerosa.ontrack.extension.general.LinkPropertyType`

List of links.

Scope:

* project
* branch
* promotion level
* validation stamp
* build

* promotion run
* validation run

Configuration:

* **links** - List - required - links field

17.6.9. Main build links

ID: `net.nemerosa.ontrack.extension.general.MainBuildLinksProjectPropertyType`

List of project labels which describes the list of build links to display in a build links decoration.

Scope:

* project

Configuration:

* **labels** - List - required - labels field
* **overrideGlobal** - Boolean - required - overrideGlobal field

17.6.10. Message

ID: `net.nemerosa.ontrack.extension.general.MessagePropertyType`

Associates an arbitrary message (and its type) to an entity. Will be displayed as a decorator in the UI.

Scope:

* project
* branch
* promotion level
* validation stamp
* build
* promotion run
* validation run

Configuration:

* **text** - String - required - Content of the message
* **type** - ERROR, WARNING, INFO - required - Type of message

17.6.11. Meta information

ID: `net.nemerosa.ontrack.extension.general.MetaInfoPropertyType`

List of meta information properties

Scope:

- project
- branch
- promotion level
- validation stamp
- build
- promotion run
- validation run

Configuration:

- **items** - List - required - items field

17.6.12. Previous promotion condition

ID: `net.nemerosa.ontrack.extension.general.PreviousPromotionConditionPropertyType`

Makes a promotion conditional based on the fact that a previous promotion has been granted.

Scope:

- project
- branch
- promotion level

Configuration:

- **previousPromotionRequired** - Boolean - required - previousPromotionRequired field

17.6.13. Promotion dependencies

ID: `net.nemerosa.ontrack.extension.general.PromotionDependenciesPropertyType`

List of promotions a promotion depends on before being applied.

Scope:

- promotion level

Configuration:

- **dependencies** - List - required - dependencies field

17.6.14. Release

ID: `net.nemerosa.ontrack.extension.general.ReleasePropertyType`

Release indicator on the build.

Scope:

- build

Configuration:

- **name** - String - required - name field

17.6.15. Validation on release/label

ID: `net.nemerosa.ontrack.extension.general.ReleaseValidationPropertyType`

When set, adding a release/label on a build will also validate this build.

Scope:

- branch

Configuration:

- **validation** - String - required - Validation to set whenever the release/label property is set.

17.6.16. Branching Model

ID: `net.nemerosa.ontrack.extension.git.branching.BranchingModelPropertyType`

Defines the branching model used by a project

Scope:

- project

Configuration:

- **patterns** - List - required - List of branch patterns (name & value). The name is the category of branch and the value is a regular expression on the SCM branch.

17.6.17. Git branch

ID: `net.nemerosa.ontrack.extension.git.property.GitBranchConfigurationPropertyType`

Git branch

Scope:

- branch

Configuration:

- **branch** - String - required - Git branch or pull request ID
- **buildCommitLink** - Object - optional - How builds are linked to their Git commit
    - **data** - JSON - optional - Configuration of the service
    - **id** - String - required - ID of the service
- **buildTagInterval** - Int - required - Interval in minutes for build/tag synchronization
- **isOverride** - Boolean - required - Build overriding policy when synchronizing

17.6.18. Git commit

ID: `net.nemerosa.ontrack.extension.git.property.GitCommitPropertyType`

Git commit

Scope:

- build

Configuration:

- **commit** - String - required - Commit hash

17.6.19. Git configuration

Deprecated: Will be removed in V5. Pure Git configuration won't be supported any longer.

ID: `net.nemerosa.ontrack.extension.git.property.GitProjectConfigurationPropertyType`

Associates the project with a Git repository

Scope:

- project

Configuration:

- **configuration** - String - required - Name of the Git configuration

17.6.20. GitHub configuration

ID: `net.nemerosa.ontrack.extension.github.property.GitHubProjectConfigurationPropertyType`

Associates the project with a GitHub repository

Scope:

- project

Configuration:

- **configuration** - String - required - Name of the configuration
- **indexationInterval** - Int - required - How often to index the repository, in minutes. Use 0 to disable indexation.
- **issueServiceConfigurationIdentifier** - String - optional - Identifier for the issue service
- **repository** - String - required - GitHub repository, ie. org/name

17.6.21. GitHub Workflow Run

ID: `net.nemerosa.ontrack.extension.github.workflow.BuildGitHubWorkflowRunPropertyType`

Link to the GitHub Workflow Run which created this build.

Scope:

- build

Configuration:

- **workflows** - List - required - All workflows associated to a build.
  - **event** - String - optional - Event having led to the creation of this build
  - **name** - String - required - Name of the workflow
  - **runId** - Long - required - ID of the run
  - **runNumber** - Int - required - Number of the run
  - **running** - Boolean - required - True if the run is still flagged as running
  - **url** - String - required - Link to the GitHub Workflow run

17.6.22. GitHub Workflow Job

ID: `net.nemerosa.ontrack.extension.github.workflow.ValidationRunGitHubWorkflowJobPropertyType`

Link to the GitHub Workflow Job which created this validation run.

Scope:

- validation run

Configuration:

- **event** - String - optional - Event having led to the creation of this validation
- **job** - String - required - Name of the workflow job which created this validation
- **name** - String - required - Name of the workflow
- **runId** - Long - required - ID of the run
- **runNumber** - Int - required - Number of the run
- **running** - Boolean - required - True if the run is still flagged as running
- **url** - String - required - Link to the GitHub Workflow run

17.6.23. GitLab configuration

ID: `net.nemerosa.ontrack.extension.gitlab.property.GitLabProjectConfigurationPropertyType`

Associates the project with a GitLab repository

Scope:

- project

Configuration:

- **configuration** - String - required - Name of the GitLab configuration
- **indexationInterval** - Int - required - How often to index the repository, in minutes. Use 0 to disable indexation.
- **issueServiceConfigurationIdentifier** - String - optional - Issue service identifier
- **repository** - String - required - Repository name

17.6.24. Jenkins Build

ID: `net.nemerosa.ontrack.extension.jenkins.JenkinsBuildPropertyType`

Link to a Jenkins Build

Scope:

- build
- promotion run
- validation run

Configuration:

- **build** - Int - required - Number of the build
- **configuration** - String - required - Name of the Jenkins configuration
- **configuration** - String - required - Name of the Jenkins configuration
- **configuration** - String - required - Name of the Jenkins configuration
- **job** - String - required - Path to the Jenkins job, relative to root. It may or may not include `/job` URL separators.
- **job** - String - required - Path to the Jenkins job, relative to root. It may or may not include `/job` URL separators.

17.6.25. Jenkins Job

ID: `net.nemerosa.ontrack.extension.jenkins.JenkinsJobPropertyType`

Link to a Jenkins Job

Scope:

- project
- branch
- promotion level
- validation stamp

Configuration:

- **configuration** - String - required - Name of the Jenkins configuration
- **configuration** - String - required - Name of the Jenkins configuration
- **job** - String - required - Path to the Jenkins job, relative to root. It may or may not include `/job` URL separators.

17.6.26. JIRA Links to follow

Deprecated: Will be removed in V5. Not used any longer.

ID: `net.nemerosa.ontrack.extension.jira.JIRAFollowLinksPropertyType`

List of links to follow when displaying information about an issue.

Scope:

- project

Configuration:

- **linkNames** - List - required - List of links to follow when displaying information about an issue.

17.6.27. SonarQube

ID: `net.nemerosa.ontrack.extension.sonarqube.property.SonarQubePropertyType`

Association with a SonarQube project.

Scope:

- project

Configuration:

- **branchModel** - Boolean - required - branchModel field
- **branchPattern** - String - optional - branchPattern field
- **configuration** - String - required - Name of the SonarQube configuration
- **key** - String - required - key field
- **measures** - List - required - measures field

- **override** - Boolean - required - override field
- **projectUrl** - String - required - projectUrl field
- **validationMetrics** - Boolean - required - If checked, collected SQ measures will be attached as metrics to the validation.
- **validationStamp** - String - required - validationStamp field

17.6.28. Auto-disabling of branches based on patterns

ID: `net.nemerosa.ontrack.extension.stale.AutoDisablingBranchPatternsPropertyType`

Given a list of patterns and their behaviour, allows the disabling of branches based on their Ontrack names.

Scope:

- project

Configuration:

- **items** - List - required - List of patterns and their behaviour
  - **size** - Int - required - size field

17.6.29. Stale branches

ID: `net.nemerosa.ontrack.extension.stale.StalePropertyType`

Allows to disable or delete stale branches

Scope:

- project

Configuration:

- **deletingDuration** - Int - optional - Number of days of inactivity after a branch has been disabled after which the branch is deleted. If 0, the branches are never deleted.
- **disablingDuration** - Int - required - Number of days of inactivity after which the branch is disabled
- **excludes** - String - optional - Can define a regular expression for exceptions to the includes rule
- **includes** - String - optional - Regular expression to identify branches which will never be disabled not deleted
- **promotionsToKeep** - List - optional - List of promotions to always keep. If a branch has at least one build having one of these promotions, the branch will never be disabled not deleted.

17.6.30. Bitbucket Server configuration

ID: `net.nemerosa.ontrack.extension.stash.property.StashProjectConfigurationPropertyType`

Associates the project with a Bitbucket Server repository

Scope:

- project

Configuration:

- **configuration** - String - required - Name of the Bitbucket Server configuration
- **indexationInterval** - Int - required - How often to index the repository, in minutes. Use 0 to disable indexation.
- **issueServiceConfigurationIdentifier** - String - optional - Identifier for the issue service
- **project** - String - required - Name of the project
- **repository** - String - required - Name of the repository