

RUG Virtual Research Environment (VRE)



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Here you can read more information about the RUG Virtual Research Environment. This document will contain information about installing the platform. As information about the used webhooks and security.

The platform can be run inside a docker setup or just local for development.

Chapter 1

Installation

The Virtual Research Environment will be installed with a docker compose setup. This way the whole platform is up and running within minutes.

First we need to checkout the code.

```
git clone https://git.web.rug.nl/VRE/Broker.git
```

1.1 Docker

Make sure you have Docker and Docker-Compose installed. On Debian based systems you can install it with the following setup <https://docs.docker.com/engine/install/debian/>

Run the following commands and a complete production setup is created.

```
cd Broker
docker-compose up
```

The docker setup is created according to the docker-compose.yaml in the root directory. This will create a own virtual network and some persistent storage volumes.

The following persistent volumes are created:

- Postgress data. This is used for Postgress database files
- Redis data. This is used for Redis storage
- TUSD data. This is used for the temporary file uploads that are being processed
- Static files data. This is used for Django static files served by NGINX

During installation the following docker containers will be created:

- Postgress DB server
- Redis DB server
- The Upload Service Daemon sever (TUSD)
- Django REST API server
- Django background scheduler server
- NGINX TUSD frontend server
- NGINX API frontend server

And there will be two extra docker containers running a demo site to communicate with the REST API

- Django demo portal server
- NGINX demo frontend server

Only the NGINX containers have an connection with the outside world. By default you have:

- REST API and admin on <http://localhost:1337/api/redoc/> and <http://localhost:1337/api/admin/>

- TUSD Upload server on <http://localhost:1080/files>
- Django demo portal on <http://localhost:8080>

1.1.1 Settings

You can change the Docker setup by changing the settings in the file `docker/project.env`. Every setting has some explanation what it does or where it is fore.

```
# The Postgress database container needs a database and user settings for use with Django
# The database and user will be created when the Postgress container is build
POSTGRES_USER=userone
POSTGRES_PASSWORD=secretpassword
POSTGRES_DB=project_db

# The Django super user username. This user is created during build of this docker instance
DJANGO_ADMIN_NAME=admin
# The Django super user password.
DJANGO_ADMIN_PASSWORD=password
# The Django super user email for password retrieval.
DJANGO_ADMIN_EMAIL=admin+no-reply@rug.nl

# The TUSD super user username. This user is created during build of this docker instance
# This user will also get a predefined token key and secret. Look for variable DROPOFF_API_
↳HAWK_KEY and DROPOFF_API_HAWK_SECRET
DROPOFF_API_USER=tusdhook
# The TUSD super user password.
DROPOFF_API_PASSWORD=doemaarwat
# The TUSD super user email for password retrieval.
DROPOFF_API_EMAIL=tusd+no-reply@rug.nl

# A uniquely secret key
# https://docs.djangoproject.com/en/dev/ref/settings/#secret-key
SECRET_KEY=@wb=#(f4uc0l%e!5*eo+aoflnxb(!l9!=c5w=4b+x$=!8&vy%'

# Disable debug in production
# https://docs.djangoproject.com/en/dev/ref/settings/#debug
DEBUG=True

# Allowed hosts that Django does server. Use comma separated list Take care when NGINX is
↳proxying in front of Django
# https://docs.djangoproject.com/en/dev/ref/settings/#allowed-hosts
ALLOWED_HOSTS=127.0.0.1,localhost,0.0.0.0,broker-api,broker-api-ngx

# All internal IPS for Django. Use comma separated list
# https://docs.djangoproject.com/en/dev/ref/settings/#internal-ips
INTERNAL_IPS=127.0.0.1

# Enter the database url connection. Enter all parts even the port numbers: https://github.
↳com/jacobian/dj-database-url
# By default a local sqlite3 database is used.
DATABASE_URL=postgres://userone:secretpassword@postgresdb:5432/project_db

# The location on disk where the static files will be placed during deployment. Setting is
↳required
# https://docs.djangoproject.com/en/dev/ref/settings/#static-root
STATIC_ROOT=staticfiles
```

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```
# Enter the default timezone for the visitors when it is not known.
# https://docs.djangoproject.com/en/dev/ref/settings/#std:setting-TIME_ZONE
TIME_ZONE=Europe/Amsterdam

# Email settings
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host
# EMAIL_HOST=

# Email user name
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host-user
# EMAIL_HOST_USER=

# Email password
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host-password
# EMAIL_HOST_PASSWORD=

# Email server port number to use. Default is 25
# https://docs.djangoproject.com/en/dev/ref/settings/#email-port
# EMAIL_PORT=

# Does the email server supports TLS?
# https://docs.djangoproject.com/en/dev/ref/settings/#email-use-tls
# EMAIL_USE_TLS=

https://docs.djangoproject.com/en/dev/ref/settings/#default-from-email
DEFAULT_FROM_EMAIL=Do not reply<no-reply@rug.nl>

# The sender address. This needs to be one of the allowed domains due to SPF checks
# The code will use a reply-to header to make sure that replies goes to the researcher and
↳not this address
EMAIL_FROM_ADDRESS=Do not reply<no-reply@rug.nl>

# The Redis server is used for background tasks. Enter the variables below. Leave password
↳empty if authentication is not enabled.
# The hostname or IP where the Redis server is running. Default is localhost
REDIS_HOST=redisdb

# The Redis port number on which the server is running. Default is 6379
REDIS_PORT=6379

# The Redis password when authentication is enabled
REDIS_PASSWORD=redispassword

# The amount of connections to be made inside a connection pool. Default is 10
REDIS_CONNECTIONS=10

# Enter the full path to the Web based file uploading without the Study ID part. The Study ID
↳will be added to this url based on the visitor.
DROPOFF_BASE_URL=http://localhost:8080/dropoffs/

# Enter the full url to the NGINX service that is in front of the TUSD service. By default
↳that is http://localhost:1090
DROPOFF_UPLOAD_HOST=http://localhost:1090

# Which file extensions are **NOT** allowed to be uploaded. By default the extensions exe,com,
↳bat,lnk,sh are not allowed
```

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```
DROPOFF_NOT_ALLOWED_EXTENSIONS=exe,com,bat,lnk,sh

# TUS Daemon settings
# Change the required variable below to your needs.
# You can here also overrule the default variables in the startup.sh script

# This is the full url to the REST API server to post updates during uploads.
WEBHOOK_URL=http://api-nginx/api/v1/dropoffs/webhook/

# The key for the token that is created on the REST API server for communication with the
↳REST API server.
# This token will be created during building the Docker image
DROPOFF_API_HAWK_KEY=dDl6UmRt

# The secret value that belongs to the token DROPOFF_API_HAWK_KEY.
# This token will be created during building the Docker image
DROPOFF_API_HAWK_SECRET=ExfcR524851PxBmbNzvR7quoHwzSSJ1A

# Enter the super API user his key and secret. This is used on the portal side for getting
↳study data on the upload page
# We abuse the TUSD user for this
DROPOFF_API_USER_KEY=sXl7YmRE
DROPOFF_API_USER_SECRET=ExfcG524851PxVmbNzvX7qkoHwzSSJ1A

# What is the full VRE Portal domains. By default http://localhost:1337/api
VRE_BROKER_API=http://api-nginx/api

# VRW API settings. This is for the VRW client to get data for creating Virtual Workspaces
# The security group that is allowed to access the VRW part of the REST API
VRW_API_GROUP=vrw-api
# The VRW username for the REST API
VRW_API_USER=vrw
# The VRW password for the REST API
VRW_API_PASSWORD=securepassword
# The VRW email address for the REST API
VRW_API_EMAIL=vrw+no-reply@rug.nl

# The IP number of the Load balancer which may change the IP address based on X-Forwarded-For
↳in NGINX
NGINX_REAL_IP_SOURCE_IP=127.0.0.1

# The config file that is created by Kubernetes which holds all the valid IP addresses that is
↳allowed to overwrite the IP address of the client. Mostly loadbalancers
# Leave empty to disable this security measure
NGINX_REAL_IP_LIST=
# The config file that is created by Kubernetes which holds all the valid IP addresses to
↳access the admin
# Leave empty to disable this security measure
NGINX_VALID_ADMIN_IP_LIST=
```

Chapter 2

Storages

Here you can read which storage engines are supported. And how they can be used. Per storage engine there is a short description how to setup.

Per storage engine the following options needs to be specified

- **location:** Full path of the storage engine or API
- **username:** The username that is able to connect to the storage
- **password:** The password that is needed to connect to the storage

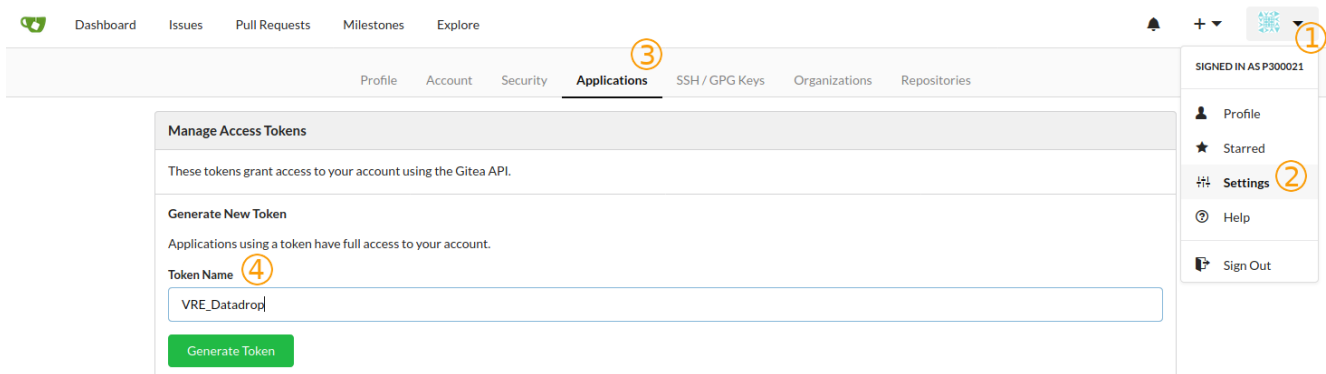
When we connect a storage to a study, the options to set a storage path and encryption will become available. So you are able to reuse the same storage configuration for multiple studies, but per combination storage/study you can specify storage paths, encryption, notification etc

2.1 Gitea

In order to use Gitea as a storage, you need to create an ‘Application’ in Gitea. This will create a new token that is used for authenticating with the API.

2.1.1 Creating access token

Login into the Gitea server with a webbrowser and go to your ‘Applications’ in your ‘Settings’.



1. Click on you profile menu
2. Click on ‘Settings’
3. Click on ‘Applications’
4. Enter a name for this Application.

Then press the ‘Generate token’ button and a new token will be generated with the new Application.

The screenshot shows the Gitea 'Applications' page. At the top, there's a navigation bar with 'Dashboard', 'Issues', 'Pull Requests', 'Milestones', and 'Explore'. Below that, a secondary navigation bar includes 'Profile', 'Account', 'Security', 'Applications' (which is active), 'SSH / GPG Keys', 'Organizations', and 'Repositories'. A green notification box at the top states: 'Your new token has been generated. Copy it now as it will not be shown again.' Below this, a light blue box displays a long alphanumeric token string, with a circled '5' next to it. The main content area is titled 'Manage Access Tokens' and contains a table of existing tokens. One token is listed with the name 'VRE_Datadrop', added on 'Mar 20, 2020', and 'No recent activity'. A circled '6' is next to the token name, and a circled '7' is next to a red 'Delete' button. Below the table, there is a 'Generate New Token' section with a text input field for 'Token Name' and a green 'Generate Token' button.

5. Store the token somewhere save
6. Here is your newly created Application with the latest activity. This will show you the last time this Application is used.
7. Here you can delete the Application. This will revoke the token, and will block new API calls and uploads.

2.1.2 VRE Storage values

Now we have created an Gitea API Application we can use this in the VRE Dropoff Storage settings.

- **location:** [https://\[gitea.host.com\]/api/v1#\[Your_Repository_Name\]](https://[gitea.host.com]/api/v1#[Your_Repository_Name]) (It is important to add '/api/v1' to the url)
- **username:** Your own username
- **password:** The saved Application token at step 5

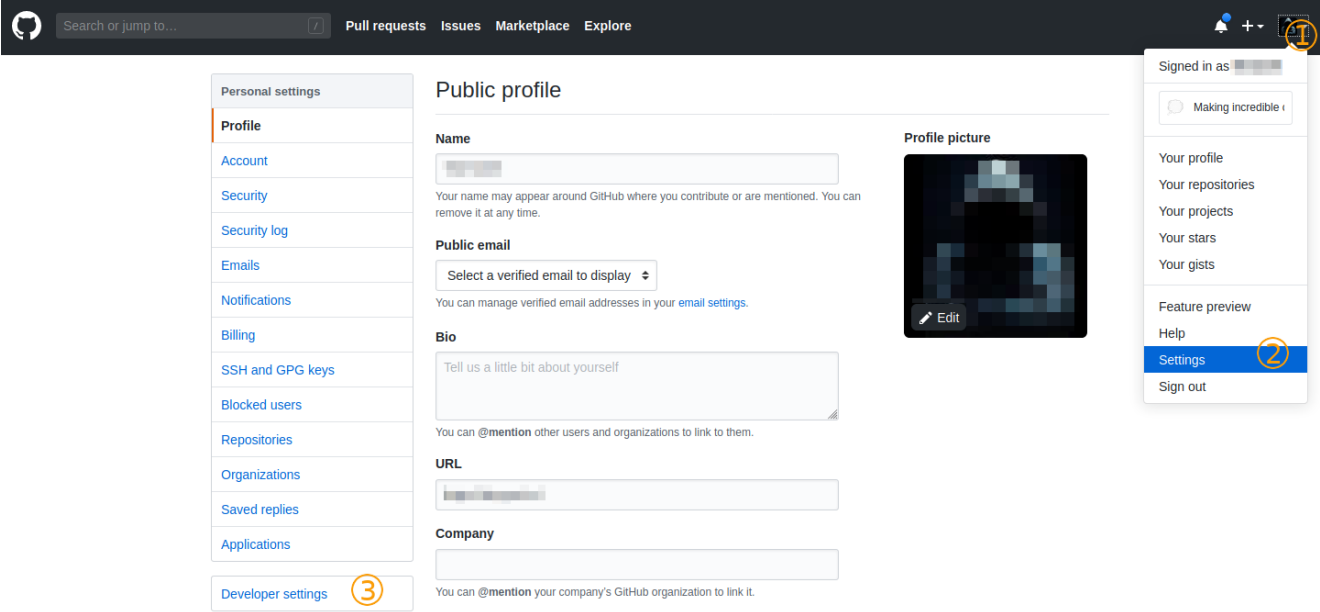
2.2 Github

In order to use Gitea as a storage, you need to create an 'Application' in Gitea. This will create a new token that is used for authenticating with the API.

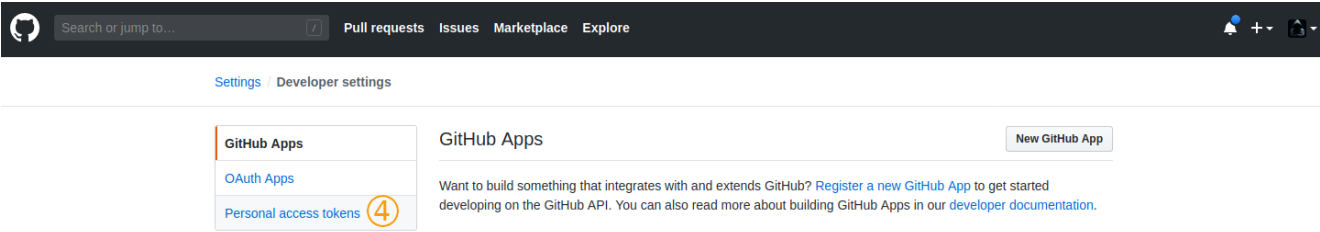
2.2.1 Creating access token

Login into the Github with a webbrowser and follow the steps below to make an API token.

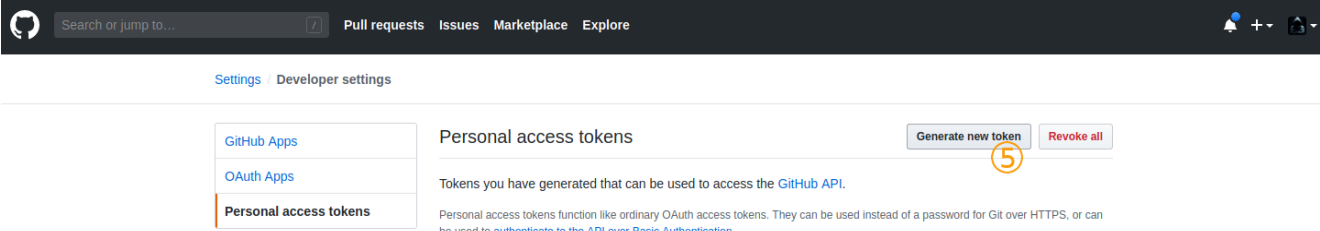
1. Click on you profile menu
2. Click on 'Settings'
3. Click on 'Developer settings'
4. Click on 'Personal access tokens'
5. Click on 'Generate new token'
6. Enter a name
7. Select the **Repo** checkbox.
8. Store the token somewhere save
9. Here is your newly created Application with the latest activity. This will show you the last time this Application is used.
10. Here you can delete the Application. This will revoke the token, and will block new API calls and uploads.



This screenshot shows the GitHub 'Public profile' settings page. On the left is a sidebar with 'Personal settings' and a list of categories: Profile, Account, Security, Security log, Emails, Notifications, Billing, SSH and GPG keys, Blocked users, Repositories, Organizations, Saved replies, Applications, and Developer settings (marked with a circled '3'). The main content area is titled 'Public profile' and includes fields for Name, Public email (with a dropdown to 'Select a verified email to display'), Bio, URL, and Company. A 'Profile picture' section shows a placeholder image with an 'Edit' button. On the right, a user menu is open, showing 'Signed in as [username]', 'Making incredible i...', and a list of links: Your profile, Your repositories, Your projects, Your stars, Your gists, Feature preview, Help, Settings (marked with a circled '2'), and Sign out.



This screenshot shows the 'Developer settings' page for 'GitHub Apps'. The breadcrumb trail is 'Settings > Developer settings'. The left sidebar has 'GitHub Apps' selected, with 'OAuth Apps' and 'Personal access tokens' (marked with a circled '4') also visible. The main content area is titled 'GitHub Apps' and features a 'New GitHub App' button. Below the title, there is a paragraph: 'Want to build something that integrates with and extends GitHub? Register a new GitHub App to get started developing on the GitHub API. You can also read more about building GitHub Apps in our developer documentation.'



This screenshot shows the 'Developer settings' page for 'Personal access tokens'. The breadcrumb trail is 'Settings > Developer settings'. The left sidebar has 'Personal access tokens' selected, with 'GitHub Apps' and 'OAuth Apps' also visible. The main content area is titled 'Personal access tokens' and features 'Generate new token' (marked with a circled '5') and 'Revoke all' buttons. Below the title, there is a paragraph: 'Tokens you have generated that can be used to access the GitHub API. Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.'



Settings Developer settings

- GitHub Apps
- OAuth Apps
- Personal access tokens

New personal access token

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

Note

VRE_Datadrop

What's this token for?

Select scopes

Scopes define the access for personal tokens. [Read more about OAuth scopes](#).

- repo Full control of private repositories
 - repo:status Access commit status
 - repo_deployment Access deployment status
 - public_repo Access public repositories
 - repo:invite Access repository invitations
- write:packages Upload packages to github package registry
- read:packages:se Download packages from github package registry
- workflow:ckages Update github action workflows:ckage registry
- admin:pgg_key Full control of user gpg keys (Developer Preview)
 - write:pgg_key Write user gpg keys
 - read:pgg_key Read user gpg keys

Generate token Cancel



Settings Developer settings

- GitHub Apps
- OAuth Apps
- Personal access tokens

Personal access tokens

Generate new token Revoke all

Tokens you have generated that can be used to access the [GitHub API](#).

Make sure to copy your new personal access token now. You won't be able to see it again!

- 5b20248d2fb680d97ea4829e77df3e2b1a31fad9 Delete
- VRE_DataDropOff — repo Last used within the last week Delete

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

2.2.2 VRE Storage values

Now we have created an Github.com API Application we can use this in the VRE Dropoff Storage settings.

- **location:** [https://api.github.com#\[Your_Repository_Name\]](https://api.github.com#[Your_Repository_Name])
- **username:** Your own username
- **password:** The saved Application token at step 8

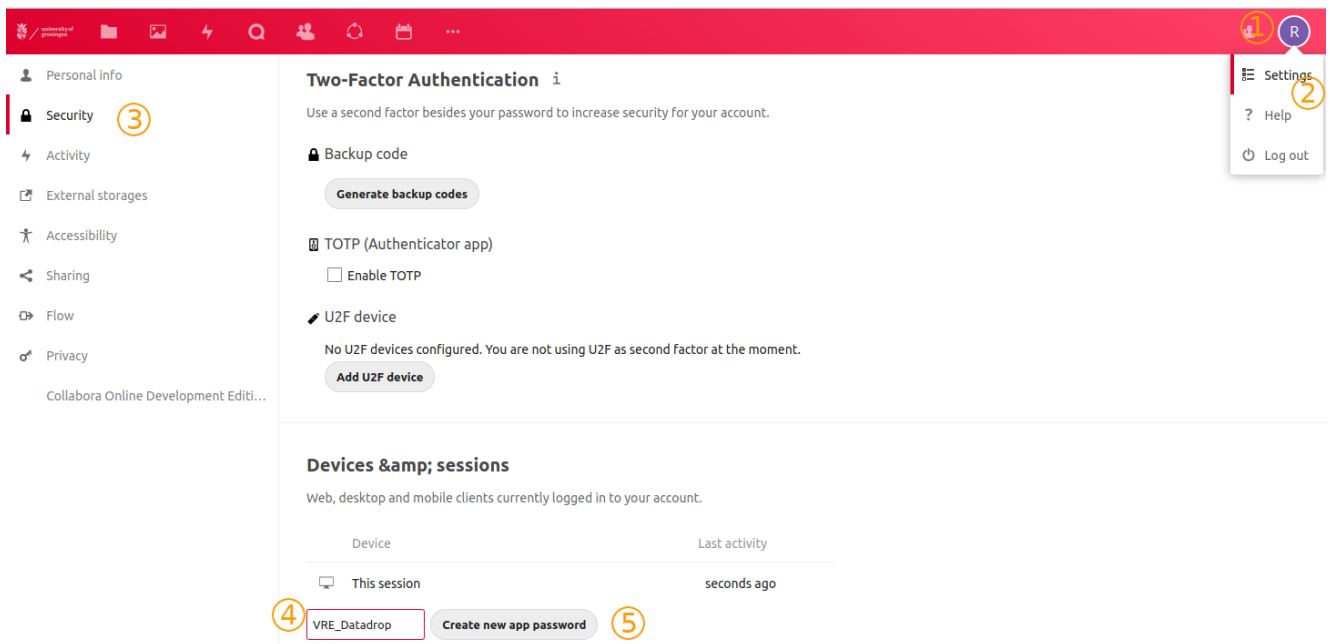
2.3 WebDAV

In order to use a WebDAV server as a storage there are different ways of creating API tokens and/or authentication. So for WebDAV we have steps per working known WebDAV servers.

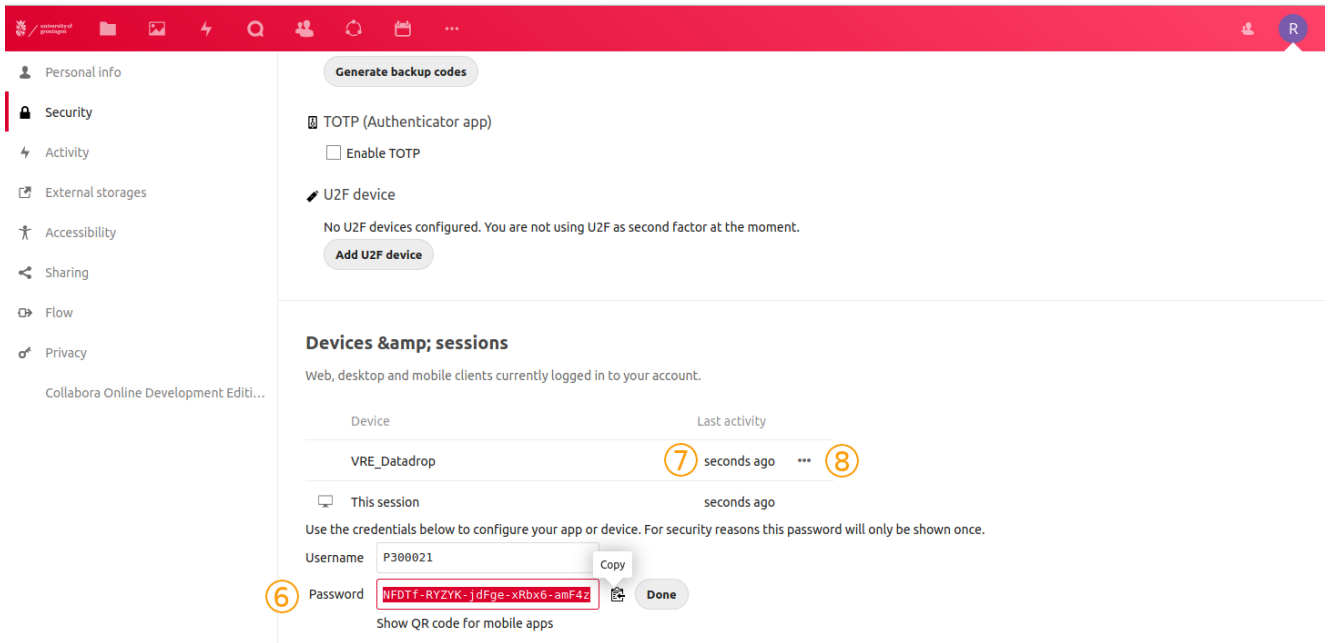
2.3.1 Owncloud/Nexcloud/Unishare

2.3.1.1 Creating access token

Login into the Owncloud/Nexcloud/Unishare server with a webbrowser and go to your ‘Security’ in your ‘Settings’.



1. Click on your profile menu
2. Click on ‘Settings’
3. Click on ‘Security’
4. Enter a name for this Application.
5. Press the ‘Generate token’ button and a new token will be generated with the new Application.
6. Store the token somewhere save
7. Here is your newly created Application with the latest activity. This will show you the last time this Application is used.
8. Here you can delete the Application. This will revoke the token, and will block new API calls and uploads.



2.3.1.2 VRE Storage values

Now we have created an Owncloud/Nexcloud/Unishare API Application we can use this in the VRE Dropoff Storage settings. For Owncloud/Nexcloud/Unishare there are some extra steps to get the right WebDAV settings.

1. Go to the Files Application
 2. Click on the Settings icon
 3. Copy the url value at the field WebDAV. Make sure you copy the full path
- **location:** <https://unishare.nl/remote.php/dav/files/>
 - **username:** Your own username shown at step 6
 - **password:** The saved Application token at step 6

2.4 iRODS

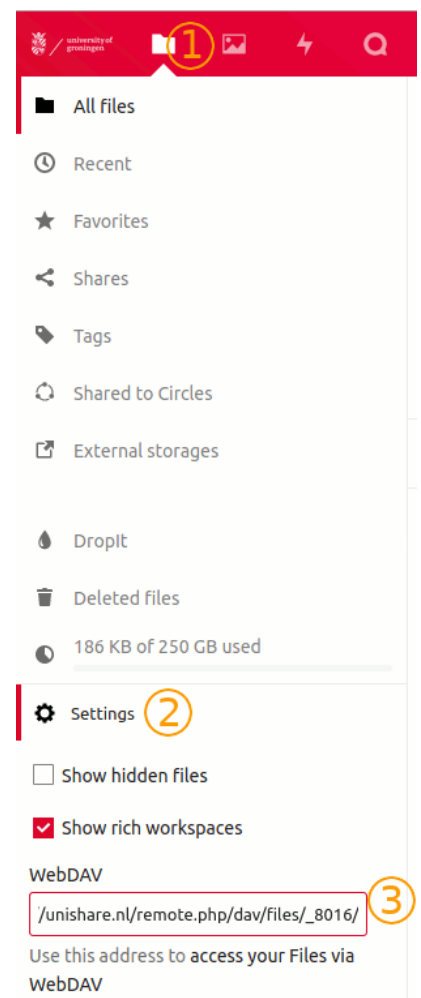
In order to use iRODS as a storage, you need to enter some credential values in the the data storage form.

2.4.1 Creating access token

There is no need for creating separate access tokens. As iRODS does not support multiple login tokens per user, we need to use the same credentials as the user is using when reading data from the iRODS server.

Keep in mind, that when you change the iRODS credentials (due to missing password), you need to update the credentials here as well.

As iRODS works with federation, you need to know your iRODS zone. This will be added to the address location when entering iRODS credentials.



2.4.2 VRE Storage values

- **location:** hostname or ip of the iRODS server with '[iRODS ZONE NAME]' appended
- **username:** Your own username
- **password:** Your own password

Chapter 3

Models

3.1 Base

```
class lib.models.base.MetaDataModel(*args, **kwargs)
```

This is an abstract Django model with some general meta fields that can be used for other models.

`created_at`

The date and time when the model has been created. This will be automatically set once during creating.

Type datetime

`updated_at`

The date and time when the model has been updated. This will be automatically updated when the model is updated.

Type datetime

3.2 Cloud

```
class lib.models.cloud.CloudBasicDataModel(*args, **kwargs)
```

This is an abstract Django model with some general meta fields that can be used for other models for cloud integration

`cloud_id`

A generic char field where you can store the remote ID from the cloud provider.

Type string

3.3 Dropoff

```
class apps.dropoff.models.DataDrop(*args, **kwargs)
```

A model off an upload action. This is the actual upload / datadrop that has been done.

It will inherit the attributes `created_at` and `updated_at` from the Abstract model `MetaDataModel`

`study`

The study to which this upload belongs to. An upload can only belong to a single study.

Type *Study*

`original_filename`

The original filename when the file was uploaded. Max length is 1024 chars.

Type string

upload_filename
The uploadname created by the upload server. This is a unique filename. Max length is 1024 chars.

Type string

filesize
The filesize of the uploaded file.

Type integer

filepath
The upload path of the file. At the moment this is not yet used.

Type string

ip
The IP address from where the upload came from.

Type string

encrypted
Checked if the upload is encrypted. At the moment this is not yet used

Type boolean

uploader
The user or data provider that has uploaded this file.

Type *Invitation*

status
The status type of this datadrop

Type *DataDropStatus*

status_message
A human readable status message of the status of this datadrop

Type string

exception `DoesNotExist`

exception `MultipleObjectsReturned`

class `apps.dropoff.models.DataDropStatus(value)`
Data drop statuses. This will hold all the available datadrop statuses as an enum value.

Valid status values:

- New
- Uploading
- Uploaded
- Moving
- Done
- Error

3.4 Invitation

class `apps.invitation.models.Invitation(*args, **kwargs)`
A model to represent an invitation for uploading files. Every invitation has his own unique upload code. It will inherit the attributes `created_at` and `updated_at` from the Abstract model *MetaDataModel*

study
The study to which this invitation belongs to. An invitation can only be used for a single study.

Type *Study*

name
The name of the uploader or data provider. Max length is 200 characters.
Type str

email
The email address of the uploader or data provider. Will be used to sent the upload information with unique urls and upload codes.
Type str

upload_code
A unique code that is used as a token for uploading. This is a unique code for this invitation only. This will be auto generated.
Type str

mail_sent
The date and time when the last invitation has been sent.
Type datetime

exception DoesNotExist

exception MultipleObjectsReturned

send_email()
Send the invitation by email with a nicely HTML formatted template.

3.5 Researcher

```
class apps.researcher.models.Researcher(*args, **kwargs)
    A model to represent a researcher. This is a One to One field with the Django user model. It will inherit the
    attributes created_at and updated_at from the Abstract model MetaDataModel

    user
        The Django User model that is the researcher.

        Type User

    exception DoesNotExist

    exception MultipleObjectsReturned

class apps.researcher.models.ResearcherManager(*args, **kwargs)
    Custom queryset which will prefetch related user table data

    get_queryset()
        Return a new QuerySet object. Subclasses can override this method to customize the behavior of the
        Manager.
```

3.6 Storage

```
class apps.storage.models.StorageDirectionType(value)
    A class for defining storage directions as choices

    DESTINATION
        This indicates that the content needs to pushed to

    SOURCE

        This indicates that the contents needs to be pulled.
        (Not supported yet)
```

```
class apps.storage.models.StorageEngine(*args, **kwargs)
```

A model for saving the storage for a Study. This model holds all the information that is needed to put the uploaded file to the right storage.

At the moment the following storage engines are supported:

- StorageEngineType.WEBDAV
- StorageEngineType.GITEA
- StorageEngineType.GITHUB
- StorageEngineType.IRODS

It will inherit the attributes `created_at` and `updated_at` from the Abstract model `MetaDataModel`

`study`

The researcher to which this storage belongs to.

Type `Researcher`

`name`

The name of this storage. Use a easy to remember name for humans.

Type `str`

`engine`

Specify the storage engine where to store or get the data from.

Type `StorageEngineType`

`location`

The full url including protocol and portnumbers if needed. For webdav (Owncloud/Nextcloud) also add the root path

Type `str`

`username`

The username that is needed to connect to the storage. This should be a user that is controlled by the study researcher. The data is stored encrypted in the database.

Type `str`

`password`

The password that is needed to connect to the storage. The data is stored encrypted in the database.

Type `str`

exception `DoesNotExist`

exception `MultipleObjectsReturned`

```
class apps.storage.models.StorageEngineType(value)
```

A class for defining storage engine types as choices. Currently the following storage engines are supported:

`WEBDAV`

WebDAV like servers. This can be all kinds of WebDAV servers including `Owncloud` and `Nextcloud`

`GITEA`

Support for `Gitea`.

`GITHUB`

Support for `Github`.

`IRODS`

Support for `iRODS`.

```
class apps.storage.models.StorageLocation(id, created_at, updated_at, study, storageengine, direction,
                                         path, uploadpath, encryption_password)
```

exception `DoesNotExist`

```
exception MultipleObjectsReturned
encrypted()
    boolean: Returns true when the storage has encryption enabled.
```

3.7 Study

```
class apps.study.models.Study(*args, **kwargs)
    A model to represent a study of a researcher. This study will receive the dropoff files from various sources.
    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel

    researcher
        The Django Researcher model that is the owner of this study.
        Type Researcher

    name
        The name of the study. Can be entered freely by the researcher.
        Type str

    description
        A small description what the study is about. This will be used on the upload page and invitation mail.
        Type str

    upload_code
        A unique code that is used as a token for uploading. This is a general upload code. Every Invitation
        will get his own upload code as well. This will be auto generated.
        Type str

    upload_uuid
        A UUID v4 string that is used to create a unique upload url. This will be auto generated when created.
        Type uuid4

    exception DoesNotExist
    exception MultipleObjectsReturned

    property api_upload_url
        Returns the full url for the study upload API endpoint.
        Type str

    property get_absolute_url
        Returns the full url to the study detail page.
        Type str

    property has_storage
        Returns true when there is at least one storage location connected to this study
        Type boolean

    property total_file_size
        Returns the total upload amount of the uploaded files
        Type int

    property total_files
        Returns the total amount of uploaded files
        Type int

    property total_invitations
        Returns the total amount of invitations
```

Type int

property web_upload_url

Returns the full url for the study upload page through web.

Type str

```
class apps.study.models.StudyManager(*args, **kwargs)
```

This is a custom study manager for getting extra information from a study model like:

- Total files / datadrops attached for a study.
- Total file size of all the data drops for a study.
- Total invitations that have been sent for a study.

get_queryset()

Returns the queryset with extra fields

- ‘_total_files’,
- ‘_total_file_size’
- ‘_total_invitations’.

This will overrule/alter the existing queryset.

```
class apps.study.models.StudyRole(id, created_at, updated_at, study, researcher, role, active)
```

exception DoesNotExist

exception MultipleObjectsReturned

```
class apps.study.models.StudyRoleNames(value)
```

Research study role options

Valid status values:

- Administrator
- Researcher
- Member

3.8 University

```
class apps.university.models.Faculty(*args, **kwargs)
```

A model to represent a faculty at a university and holds the study fields that are available with in this faculty. It will inherit the attributes *created_at* and *updated_at* from the Abstract model *MetaDataModel*

name

The name of the faculty. Max length is 200 characters.

Type str

university

The university where this faculty belongs to

Type *University*

exception DoesNotExist

exception MultipleObjectsReturned

```
class apps.university.models.StudyField(*args, **kwargs)
```

A model to represent a study field. These study fields are used for creating research studies. It will inherit the attributes *created_at* and *updated_at* from the Abstract model *MetaDataModel*

name

The name of the study field. Max length is 200 characters.

```

    Type str
faculty
    The faculty where this study belongs to.
    Type Faculty
exception DoesNotExist
exception MultipleObjectsReturned
class apps.university.models.University(*args, **kwargs)
    A model to represent a University. This model is used to combine faculties and their study fields. Also
    researchers are member of a university. It will inherit the attributes created_at and updated_at from the
    Abstract model MetaDataModel
name
    The name of the university. Max length is 200 characters.
    Type str
email
    The general email address for the university. Max length is 200 characters.
    Type str
website
    The general website for the university. Max length is 200 characters.
    Type str
exception DoesNotExist
exception MultipleObjectsReturned

```

3.9 Virtual Machine

```

class apps.virtual_machine.models.VirtualMachine(*args, **kwargs)
    A model which holds a complete virtual machine setup. A virtual machine is linked to a researcher.
    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel
name
    The name of the virtual machine. This name will be used for showing to the end user.
    Type str
researcher
    The researcher that owns this virtual machine. He/she will can login to this virtual machine.
    Type Researcher
profile
    The virtual machine profile that is selected when created.
    Type VirtualMachineProfile
operating_system
    The operating machine that is being used for this virtual machine
    Type VirtualMachineOperatingSystem
base_memory_type
    The memory type that is used for this virtual machine
    Type VirtualMachineMemory
base_memory_amount
    The amount of memory that is available for this virtual machine using the selected base_memory_type

```


Type int

base_storage_type
The storage type that is used for this virtual machine

Type *VirtualMachineStorage*

base_storage_amount
The amount of storage that is available for this virtual machine using the selected **storage_type**

Type int

additional_gpu_type
The GPU type that is used for this virtual machine

Type *VirtualMachineGPU*, optional

additional_gpu_amount
The amount of GPUs that is available for this virtual machine using the selected *additional_gpu_type*

Type int, optional

additional_memory_type
The additional memory type that is used for this virtual machine

Type *VirtualMachineMemory*, optional

additional_memory_amount
The amount of additional memory that is available for this virtual machine using the selected *additional_memory_type*

Type int, optional

additional_storage_type
The additional storage type that is used for this virtual machine

Type *VirtualMachineStorage*, optional

additional_storage_amount
The amount of additional storage that is available for this virtual machine using the selected *additional_storage_type*

Type int, optional

exception DoesNotExist

exception MultipleObjectsReturned

property has_workspace
This function will look through all the attribute looking for an attribute starting with *workspace_* that has a value. This will mean that there is a virtual workspace created for this machine.

Returns Return True when this Virtual Machine has a workspace configured. If not it return False

Return type bool

property total_memory
The total amount of memory in bytes for this virtual machine. This is the total memory of base memory + additional memory

Returns float – total memory size in bytes

property total_storage
The total amount of storage in bytes for this virtual machine. This is the total amount of base storage + additional storage

Returns float – total storage size in bytes

```

class apps.virtual_machine.models.VirtualMachineAccess(id, created_at, updated_at, researcher,
                                                       virtual_machine, login_key, password,
                                                       virtual_machine_ip)

    exception DoesNotExist

    exception MultipleObjectsReturned

    property username
        The username for the login

        Returns the username to login with
        Return type string

class apps.virtual_machine.models.VirtualMachineGPU(*args, **kwargs)
    The virtual machine operating GPU model. This will hold the information of available GPUs that can be
    used for creating virtual machines

    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel

    It will inherit the attributes name, is_available and vm_code from the Abstract model
    VirtualMachinePart

    exception DoesNotExist

    exception MultipleObjectsReturned

class apps.virtual_machine.models.VirtualMachineMemory(*args, **kwargs)
    The virtual machine memory model. This will hold the information of available memories that can be used
    for creating virtual machines

    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel

    It will inherit the attributes name, is_available and vm_code from the Abstract model
    VirtualMachinePart

    exception DoesNotExist

    exception MultipleObjectsReturned

    property unit_value
        This returns the base memory size which we use for calculations

        Returns float – base memory size in bytes

class apps.virtual_machine.models.VirtualMachineNetwork(*args, **kwargs)
    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel

    It will inherit the attributes name, is_available and vm_code from the Abstract model
    VirtualMachinePart

    exception DoesNotExist

    exception MultipleObjectsReturned

    property unit_value
        This returns the base storage size which we use for calculations

        Returns float – Unit value in Gbps

class apps.virtual_machine.models.VirtualMachineOperatingSystem(*args, **kwargs)
    The virtual machine operating system model. This will hold the information of available operating systems
    that can be used for creating virtual machines

    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel

    It will inherit the attributes name, is_available and vm_code from the Abstract model
    VirtualMachinePart

    exception DoesNotExist

```

exception `MultipleObjectsReturned`

class `apps.virtual_machine.models.VirtualMachinePart(*args, **kwargs)`

This is a base abstract class for multiple virtual machine models. This model provides default fields

`name`

The name of the virtual machine part. This is a free field which will be used for showing to the enduser

Type `str`

`is_available`

Is this virtual machine hardware part available for selecting by the enduser. When false, it is not available anymore to the enduser

Type `boolean`

class `apps.virtual_machine.models.VirtualMachineProfile(*args, **kwargs)`

The virtual machine profile. This is a predefined setup which can be used for creating new virtual machines.

It will inherit the attributes `created_at` and `updated_at` from the Abstract model `MetaDataModel`

It will inherit the attributes `name`, `is_available` and `vm_code` from the Abstract model `VirtualMachinePart`

`name`

The name of the virtual machine profile. This name will be used for showing to the end user.

Type `str`

`memory_type`

The memory type that is used for this profile

Type `VirtualMachineMemory`

`memory_amount`

The amount of memory that is available for this profile using the selected `memory_type`

Type `int`

`storage_type`

The storage type that is used for this profile

Type `VirtualMachineStorage`

`storage_amount`

The amount of storage that is available for this profile using the selected `storage_type`

Type `int`

`gpu_type`

The GPU type that is used for this profile

Type `VirtualMachineGPU`

`gpu_amount`

The amount of GPUs that is available for this profile using the selected `gpu_type`

Type `int`

exception `DoesNotExist`

exception `MultipleObjectsReturned`

property `description`

The description of this profile in the format '`[memory_amount]` x `[memory_type]` memory, `[storage_amount]` x `[storage_type]` storage'.

Returns `str` – small summary of the selected options

property `total_memory`

The total amount of memory in bytes for this profile

Returns float – total memory size in bytes

property total_storage

The total amount of storage in bytes for this profile

Returns float – total storage size in bytes

```
class apps.virtual_machine.models.VirtualMachineStorage(*args, **kwargs)
```

The virtual machine storage model. This will hold the information of available storages that can be used for creating virtual machines

It will inherit the attributes `created_at` and `updated_at` from the Abstract model `MetaDataModel`

It will inherit the attributes `name`, `is_available` and `vm_code` from the Abstract model `VirtualMachinePart`

exception DoesNotExist

exception MultipleObjectsReturned

property unit_value

This returns the base storage size which we use for calculations

Returns float – base memory size in bytes

```
class apps.virtual_machine.models.VirtualNetworkType(value)
```

3.10 Virtual Machine Provider VRW

```
class apps.virtual_machine.providers.vrw.models.Workspace(*args, **kwargs)
```

A class for creating `VRW` from Virtual Machines. When creating a new Workspace with the status `NEW`, it should be picked up by the Workspace system in order to create the new `VRW`.

By default the `VRW` is created by a signal process where it uses the variable 'VRW_MACHINE_ACTIVE_DURATION' to create `VRW` for 1 year.

It will inherit the attributes `created_at` and `updated_at` from the Abstract model `MetaDataModel` It will inherit the attributes `cloud_id` from the Abstract model `CloudBasicDataModel`

virtual_machine

The Virtual Machine that needs to be created as a `VRW`

Type `VirtualMachine`

starting_at

The date and timestamp when this `VRW` should be created.

Type Datetime

ending_at

The date and timestamp when this `VRW` should be removed.

Type int

status

The status of the `VRW`. When created. Default is `NEW`

Type string

exception DoesNotExist

exception MultipleObjectsReturned

```
class apps.virtual_machine.providers.vrw.models.WorkspaceQueue(id, created_at, updated_at, data)
```

exception DoesNotExist

exception MultipleObjectsReturned

```
class apps.virtual_machine.providers.vrw.models.WorkspaceStatus(value)
    A class for defining VRW status as choices. Currently the following statuses are supported:

    NEW
        This is the state where every VRW starts with. This means that the VRW config is created, but it has
        not been created yet by the cloud provider

    UPDATING
        The VRW is being created on the cloud provider infrastructure.

    DONE
        The VRW is created by the cloud provider and can be used by the customer

    ERROR
        The VRW could not be created by the cloud provider. There was an (unknown) error.

    OFFLINE
        The VRW is offline and not reachable. Reasons are not known. But this can be used for trigger an
        investigation

    DELETE
        The VRW is marked for deleting from the cloud platform

    TERMINATED
        The VRW is closed/deleted by the cloud provider without reason.
```

3.11 Virtual Machine Provider OpenStack

```
class apps.virtual_machine.providers.openstack.models.Workspace(*args, **kwargs)
    A class for creating VPS from Virtual Machines. When creating a new Workspace with the status NEW, it
    should be picked up by the Workspace system in order to create the new VPS.

    By default the VPS is created by a signal process where it uses the variable
    'OPENSTACK_MACHINE_ACTIVE_DURATION' to create VPS for 1 year.

    It will inherit the attributes created_at and updated_at from the Abstract model MetaDataModel It will
    inherit the attributes cloud_id from the Abstract model CloudBasicDataModel

    virtual_machine
        The Virtual Machine that needs to be created as a VPS

        Type VirtualMachine

    starting_at
        The date and timestamp when this VPS should be created.

        Type Datetime

    ending_at
        The date and timestamp when this VPS should be removed.

        Type int

    status
        The status of the VPS. When created. Default is NEW

        Type string

    exception DoesNotExist

    exception MultipleObjectsReturned

class apps.virtual_machine.providers.openstack.models.WorkspaceStatus(value)
    A class for defining VPS status as choices. Currently the following statuses are supported:
```

NEW

This is the state where every *VPS* starts with. This means that the *VPS* config is created, but it has not been created yet by the cloud provider

UPDATING

The *VPS* is being created on the cloud provider infrastructure.

DONE

The *VPS* is created by the cloud provider and can be used by the customer

ERROR

The *VPS* could not be created by the cloud provider. There was an (unknown) error.

OFFLINE

The *VPS* is offline and not reachable. Reasons are not known. But this can be used for trigger an investigation

DELETE

The *VPS* is marked for deleting from the cloud platform

TERMINATED

The *VPS* is closed/deleted by the cloud provider without reason.

3.12 Token

```
class apps.api.models.Token(*args, **kwargs)
```

Token model that holds all the tokens that are used for the API authentication.

A new token is generated every time when a new user is created. So there is no need for manual token creating. This is done through a signal `create_user_token`

user

The user to which this token belongs too

Type User

key

The key value that is used for token lookups

Type str

secret

The secret that is used for encrypting/signing the API messages

Type str

last_access

The date and time when the token is last used (logged in)

Type datetime

exception DoesNotExist

exception MultipleObjectsReturned

is_supertoken()

Boolean check if the token is belonging to a user with super user rights. Then this token is a super token.

Returns Returns true when the token belongs to a super user.

Return type bool

```
class apps.api.models.TokenManager(*args, **kwargs)
```

Custom queryset which will prefetch related user table data when requesting a token from the database as the user is mostly needed every time the token is requested.

`get_queryset()`

Return a new `QuerySet` object. Subclasses can override this method to customize the behavior of the `Manager`.

Chapter 4

API

The API can also be found at the location `/api/swagger/` `/api/redoc/`.

POST `/auth/hawk/create/`

This will let you login to the REST API. Login with your username and password, and get a key and a secret back that is used for further communication using HAWK signing of requests (<https://github.com/hapijs/hawk>).

Request JSON Object

- `password` (*string*) – Your password to login (required)
- `username` (*string*) – Your username to login (required)

Status Codes

- `200 OK` – response description

Response JSON Object

- `key` (*string*) – The key for this token. This is used for Hawk verification.
- `secret` (*string*) – The secret for this token. This is used for Hawk signing.

POST `/auth/jwt/create/`

Takes a set of user credentials and returns an access and refresh JSON web token pair to prove the authentication of those credentials.

Request JSON Object

- `password` (*string*) – (required)
- `username` (*string*) – (required)

Status Codes

- `201 Created` –

Response JSON Object

- `password` (*string*) – (required)
- `username` (*string*) – (required)

POST `/auth/jwt/refresh/`

Takes a refresh type JSON web token and returns an access type JSON web token if the refresh token is valid.

Request JSON Object

- `access` (*string*) – (read only)
- `refresh` (*string*) – (required)

Status Codes

- `201 Created` –

Response JSON Object

- `access` (*string*) – (read only)
- `refresh` (*string*) – (required)

POST `/auth/jwt/verify/`

Takes a token and indicates if it is valid. This view provides no information about a token's fitness for a particular use.

Request JSON Object

- token (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- token (*string*) – (required)

GET /auth/users/

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].email (*string*) –
- results[].id (*integer*) – (read only)
- results[].username (*string*) – Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only. (read only)

POST /auth/users/

Request JSON Object

- email (*string*) –
- id (*integer*) – (read only)
- password (*string*) – (required)
- username (*string*) – Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only. (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- email (*string*) –
- id (*integer*) – (read only)
- password (*string*) – (required)
- username (*string*) – Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only. (required)

POST /auth/users/activation/

Request JSON Object

- token (*string*) – (required)
- uid (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- token (*string*) – (required)
- uid (*string*) – (required)

GET /auth/users/me/

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].email (*string*) –
- results[].id (*integer*) – (read only)

- `results[].username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

PUT `/auth/users/me/`

Request JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

Status Codes

- [200 OK](#) –

Response JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

PATCH `/auth/users/me/`

Request JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

Status Codes

- [200 OK](#) –

Response JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

DELETE `/auth/users/me/`

Status Codes

- [204 No Content](#) –

POST `/auth/users/resend_activation/`

Request JSON Object

- `email` (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `email` (*string*) – (required)

POST `/auth/users/reset_password/`

Request JSON Object

- `email` (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `email` (*string*) – (required)

POST `/auth/users/reset_password_confirm/`

Request JSON Object

- `new_password` (*string*) – (required)
- `token` (*string*) – (required)
- `uid` (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `new_password` (*string*) – (required)
- `token` (*string*) – (required)
- `uid` (*string*) – (required)

POST `/auth/users/reset_username/`

Request JSON Object

- `email` (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `email` (*string*) – (required)

POST `/auth/users/reset_username_confirm/`

Request JSON Object

- `new_username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `new_username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (required)

POST `/auth/users/set_password/`

Request JSON Object

- `current_password` (*string*) – (required)
- `new_password` (*string*) – (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `current_password` (*string*) – (required)
- `new_password` (*string*) – (required)

POST `/auth/users/set_username/`

Request JSON Object

- `current_password` (*string*) – (required)
- `new_username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (required)

Status Codes

- [201 Created](#) –

Response JSON Object

- `current_password` (*string*) – (required)
- `new_username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (required)

GET `/auth/users/{id}/`

Parameters

- `id` (*integer*) – A unique integer value identifying this user.

Status Codes

- [200 OK](#) –

Response JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@./+/-/_` only. (read only)

PUT `/auth/users/{id}/`

Parameters

- `id` (*integer*) – A unique integer value identifying this user.

Request JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@/./+/-/_` only. (read only)

Status Codes

- [200 OK](#) –

Response JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@/./+/-/_` only. (read only)

PATCH `/auth/users/{id}/`

Parameters

- `id` (*integer*) – A unique integer value identifying this user.

Request JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@/./+/-/_` only. (read only)

Status Codes

- [200 OK](#) –

Response JSON Object

- `email` (*string*) –
- `id` (*integer*) – (read only)
- `username` (*string*) – Required. 150 characters or fewer. Letters, digits and `@/./+/-/_` only. (read only)

DELETE `/auth/users/{id}/`

Parameters

- `id` (*integer*) – A unique integer value identifying this user.

Status Codes

- [204 No Content](#) –

GET `/v1/researchers/`

API endpoint for getting researchers of the same faculty as the logged in user. This is a readonly endpoint ordered by lastname.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].email_address` (*string*) – (read only)
- `results[].faculty.id` (*integer*) – (read only)
- `results[].faculty.name` (*string*) – The name of the faculty. (required)
- `results[].faculty.university.id` (*integer*) – (read only)
- `results[].faculty.university.name` (*string*) – The name of the university. (required)
- `results[].first_name` (*string*) – (read only)
- `results[].id` (*integer*) – (read only)
- `results[].last_name` (*string*) – (read only)
- `results[].university.id` (*integer*) – (read only)

- `results[].university.name` (*string*) – The name of the university. (required)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET `/v1/studies/`

API endpoint for creating/reading/updating/deleting studies.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].code` (*string*) – The research study code. (required)
- `results[].contributors[].active` (*boolean*) –
- `results[].contributors[].id` (*integer*) – (read only)
- `results[].contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].contributors[].researcher.email_address` (*string*) – (read only)
- `results[].contributors[].researcher.faculty.id` (*integer*) – (read only)
- `results[].contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `results[].contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].contributors[].researcher.first_name` (*string*) – (read only)
- `results[].contributors[].researcher.id` (*integer*) – (read only)
- `results[].contributors[].researcher.last_name` (*string*) – (read only)
- `results[].contributors[].researcher.university.id` (*integer*) – (read only)
- `results[].contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `results[].contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].contributors[].role` (*string*) – The role within this research study.
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].description` (*string*) – Enter a short description for this study.
- `results[].field.faculty.id` (*integer*) – (read only)
- `results[].field.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].field.faculty.university.id` (*integer*) – (read only)
- `results[].field.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].field.id` (*integer*) – (read only)
- `results[].field.name` (*string*) – The name of the study field. (required)
- `results[].human_subject` (*boolean*) – Is this research study using real humans. (required)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Name of the research study. (required)
- `results[].owner.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].owner.email_address` (*string*) – (read only)
- `results[].owner.faculty.id` (*integer*) – (read only)
- `results[].owner.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].owner.faculty.university.id` (*integer*) – (read only)
- `results[].owner.faculty.university.name` (*string*) – The name of the university. (required)

- `results[].owner.first_name` (*string*) – (read only)
- `results[].owner.id` (*integer*) – (read only)
- `results[].owner.last_name` (*string*) – (read only)
- `results[].owner.university.id` (*integer*) – (read only)
- `results[].owner.university.name` (*string*) – The name of the university. (required)
- `results[].owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

POST `/v1/studies/`

API endpoint for creating/reading/updating/deleting studies.

Request JSON Object

- `code` (*string*) – The research study code. (required)
- `contributors[]` (*integer*) –
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – Enter a short description for this study.
- `field` (*integer*) – The study field for this reaserch study. (required)
- `human_subject` (*boolean*) – Is this research study using real humans. (required)
- `id` (*integer*) – (read only)
- `name` (*string*) – Name of the research study. (required)
- `owner` (*integer*) – The researcher that is the owner this study. By default the researcher that has created this study. (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

Status Codes

- 200 OK –

Response JSON Object

- `code` (*string*) – The research study code. (required)
- `contributors[].active` (*boolean*) –
- `contributors[].id` (*integer*) – (read only)
- `contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `contributors[].researcher.email_address` (*string*) – (read only)
- `contributors[].researcher.faculty.id` (*integer*) – (read only)
- `contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.first_name` (*string*) – (read only)
- `contributors[].researcher.id` (*integer*) – (read only)
- `contributors[].researcher.last_name` (*string*) – (read only)
- `contributors[].researcher.university.id` (*integer*) – (read only)
- `contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `contributors[].role` (*string*) – The role withing this research study.
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – Enter a short description for this study.
- `field.faculty.id` (*integer*) – (read only)
- `field.faculty.name` (*string*) – The name of the faculty. (required)
- `field.faculty.university.id` (*integer*) – (read only)
- `field.faculty.university.name` (*string*) – The name of the university. (required)
- `field.id` (*integer*) – (read only)
- `field.name` (*string*) – The name of the study field. (required)
- `human_subject` (*boolean*) – Is this research study using real humans. (required)
- `id` (*integer*) – (read only)

- `name` (*string*) – Name of the research study. (required)
- `owner.created_at` (*string*) – The date and time this model has been created (read only)
- `owner.email_address` (*string*) – (read only)
- `owner.faculty.id` (*integer*) – (read only)
- `owner.faculty.name` (*string*) – The name of the faculty. (required)
- `owner.faculty.university.id` (*integer*) – (read only)
- `owner.faculty.university.name` (*string*) – The name of the university. (required)
- `owner.first_name` (*string*) – (read only)
- `owner.id` (*integer*) – (read only)
- `owner.last_name` (*string*) – (read only)
- `owner.university.id` (*integer*) – (read only)
- `owner.university.name` (*string*) – The name of the university. (required)
- `owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/studies/fields/

Get the logged in researcher his study fields based on the faculty where he belongs to. In other words, this is the list of study fields where the logged in user can do research on.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- `[]`.`faculty.id` (*integer*) – (read only)
- `[]`.`faculty.name` (*string*) – The name of the faculty. (required)
- `[]`.`faculty.university.id` (*integer*) – (read only)
- `[]`.`faculty.university.name` (*string*) – The name of the university. (required)
- `[]`.`id` (*integer*) – (read only)
- `[]`.`name` (*string*) – The name of the study field. (required)

GET /v1/studies/roles/

Get all the available researcher roles for a study.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- `[]`.`id` (*string*) – (required)
- `[]`.`name` (*string*) – (required)

GET /v1/studies/{id}/

API endpoint for creating/reading/updating/deleting studies.

Parameters

- `id` (*integer*) – A unique integer value identifying this studie.

Status Codes

- 200 OK –

Response JSON Object

- `code` (*string*) – The research study code. (required)
- `contributors[]`.`active` (*boolean*) –
- `contributors[]`.`id` (*integer*) – (read only)
- `contributors[]`.`researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `contributors[]`.`researcher.email_address` (*string*) – (read only)
- `contributors[]`.`researcher.faculty.id` (*integer*) – (read only)
- `contributors[]`.`researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `contributors[]`.`researcher.faculty.university.id` (*integer*) – (read only)

- `contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.first_name` (*string*) – (read only)
- `contributors[].researcher.id` (*integer*) – (read only)
- `contributors[].researcher.last_name` (*string*) – (read only)
- `contributors[].researcher.university.id` (*integer*) – (read only)
- `contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `contributors[].role` (*string*) – The role withing this research study.
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – Enter a short description for this study.
- `field.faculty.id` (*integer*) – (read only)
- `field.faculty.name` (*string*) – The name of the faculty. (required)
- `field.faculty.university.id` (*integer*) – (read only)
- `field.faculty.university.name` (*string*) – The name of the university. (required)
- `field.id` (*integer*) – (read only)
- `field.name` (*string*) – The name of the study field. (required)
- `human_subject` (*boolean*) – Is this research study using real humans. (required)
- `id` (*integer*) – (read only)
- `name` (*string*) – Name of the research study. (required)
- `owner.created_at` (*string*) – The date and time this model has been created (read only)
- `owner.email_address` (*string*) – (read only)
- `owner.faculty.id` (*integer*) – (read only)
- `owner.faculty.name` (*string*) – The name of the faculty. (required)
- `owner.faculty.university.id` (*integer*) – (read only)
- `owner.faculty.university.name` (*string*) – The name of the university. (required)
- `owner.first_name` (*string*) – (read only)
- `owner.id` (*integer*) – (read only)
- `owner.last_name` (*string*) – (read only)
- `owner.university.id` (*integer*) – (read only)
- `owner.university.name` (*string*) – The name of the university. (required)
- `owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

PUT /v1/studies/{id}/

API endpoint for creating/reading/updating/deleting studies.

Parameters

- `id` (*integer*) – A unique integer value identifying this studie.

Request JSON Object

- `code` (*string*) – The research study code. (required)
- `contributors[]` (*integer*) –
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – Enter a short description for this study.
- `field` (*integer*) – The study field for this reaserch study. (required)
- `human_subject` (*boolean*) – Is this research study using real humans. (required)
- `id` (*integer*) – (read only)
- `name` (*string*) – Name of the research study. (required)
- `owner` (*integer*) – The researcher that is the owner this study. By default the researcher that has created this study. (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

Status Codes

- **200 OK** –

Response JSON Object

- `code` (*string*) – The research study code. (required)
- `contributors[].active` (*boolean*) –

- `contributors[].id` (*integer*) – (read only)
- `contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `contributors[].researcher.email_address` (*string*) – (read only)
- `contributors[].researcher.faculty.id` (*integer*) – (read only)
- `contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.first_name` (*string*) – (read only)
- `contributors[].researcher.id` (*integer*) – (read only)
- `contributors[].researcher.last_name` (*string*) – (read only)
- `contributors[].researcher.university.id` (*integer*) – (read only)
- `contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `contributors[].role` (*string*) – The role withing this research study.
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – Enter a short description for this study.
- `field.faculty.id` (*integer*) – (read only)
- `field.faculty.name` (*string*) – The name of the faculty. (required)
- `field.faculty.university.id` (*integer*) – (read only)
- `field.faculty.university.name` (*string*) – The name of the university. (required)
- `field.id` (*integer*) – (read only)
- `field.name` (*string*) – The name of the study field. (required)
- `human_subject` (*boolean*) – Is this research study using real humans. (required)
- `id` (*integer*) – (read only)
- `name` (*string*) – Name of the research study. (required)
- `owner.created_at` (*string*) – The date and time this model has been created (read only)
- `owner.email_address` (*string*) – (read only)
- `owner.faculty.id` (*integer*) – (read only)
- `owner.faculty.name` (*string*) – The name of the faculty. (required)
- `owner.faculty.university.id` (*integer*) – (read only)
- `owner.faculty.university.name` (*string*) – The name of the university. (required)
- `owner.first_name` (*string*) – (read only)
- `owner.id` (*integer*) – (read only)
- `owner.last_name` (*string*) – (read only)
- `owner.university.id` (*integer*) – (read only)
- `owner.university.name` (*string*) – The name of the university. (required)
- `owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

DELETE /v1/studies/{id}/

API endpoint for creating/reading/updating/deleting studies.

Parameters

- `id` (*integer*) – A unique integer value identifying this studie.

Status Codes

- **204 No Content** –

GET /v1/studies/{id}/contributors/

Get all the contributors that are assigned to a study

Parameters

- `id` (*integer*) – A unique integer value identifying this study role.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].active (*boolean*) –
- results[].id (*integer*) – (read only)
- results[].researcher.created_at (*string*) – The date and time this model has been created (read only)
- results[].researcher.email_address (*string*) – (read only)
- results[].researcher.faculty.id (*integer*) – (read only)
- results[].researcher.faculty.name (*string*) – The name of the faculty. (required)
- results[].researcher.faculty.university.id (*integer*) – (read only)
- results[].researcher.faculty.university.name (*string*) – The name of the university. (required)
- results[].researcher.first_name (*string*) – (read only)
- results[].researcher.id (*integer*) – (read only)
- results[].researcher.last_name (*string*) – (read only)
- results[].researcher.university.id (*integer*) – (read only)
- results[].researcher.university.name (*string*) – The name of the university. (required)
- results[].researcher.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].role (*string*) – The role withing this research study.

POST /v1/studies/{id}/contributors/

Update contributors that are assigned to a study. The list of contributors that are submitted will be used as the list.

So when you remove a contributor from this list, it will be deleted from the study.

You need to be an Administrator of the study to change the contributor list

Parameters

- id (*integer*) – A unique integer value identifying this study role.

Request JSON Object

- [].researcher_id (*integer*) – (required)
- [].role (*string*) – The role withing this research study.

Status Codes

- 200 OK –

Response JSON Object

- [].active (*boolean*) –
- [].id (*integer*) – (read only)
- [].researcher.created_at (*string*) – The date and time this model has been created (read only)
- [].researcher.email_address (*string*) – (read only)
- [].researcher.faculty.id (*integer*) – (read only)
- [].researcher.faculty.name (*string*) – The name of the faculty. (required)
- [].researcher.faculty.university.id (*integer*) – (read only)
- [].researcher.faculty.university.name (*string*) – The name of the university. (required)
- [].researcher.first_name (*string*) – (read only)
- [].researcher.id (*integer*) – (read only)
- [].researcher.last_name (*string*) – (read only)
- [].researcher.university.id (*integer*) – (read only)
- [].researcher.university.name (*string*) – The name of the university. (required)
- [].researcher.updated_at (*string*) – The date and time this model has been updated (read only)
- [].role (*string*) – The role withing this research study.

GET /v1/universities/

Give the list of all the available universities

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].id (*integer*) – (read only)
- results[].name (*string*) – The name of the university. (required)

GET /v1/universities/{id}/faculties/

Give the list of all the faculties that are available for a university.

Parameters

- id (*integer*) – A unique integer value identifying this faculty.

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].id (*integer*) – (read only)
- results[].name (*string*) – The name of the faculty. (required)
- results[].university.id (*integer*) – (read only)
- results[].university.name (*string*) – The name of the university. (required)

GET /v1/universities/{university}/faculties/{faculty}/study_fields/

Give the list of all the study fields that the faculty does research on.

Parameters

- faculty (*string*) – To wich faculty belongs this study
- university (*string*) –

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].faculty.id (*integer*) – (read only)
- results[].faculty.name (*string*) – The name of the faculty. (required)
- results[].faculty.university.id (*integer*) – (read only)
- results[].faculty.university.name (*string*) – The name of the university. (required)
- results[].id (*integer*) – (read only)
- results[].name (*string*) – The name of the study field. (required)

GET /v1/virtual_machines/{provider}/gpu/

API endpoint for listing virtual machines available GPU types filtered per provider. This is a readonly endpoint.

Parameters

- provider (*string*) – Cloud provider type.

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].created_at (*string*) – The date and time this model has been created (read only)
- results[].id (*integer*) – (read only)
- results[].name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].provider.id (*string*) – The provider key/ID (read only)
- results[].provider.name (*string*) – The provider name (read only)
- results[].updated_at (*string*) – The date and time this model has been updated (read only)

GET /v1/virtual_machines/{provider}/memory/

API endpoint for listing virtual machines available memory types filtered per provider. This is a readonly endpoint.

Parameters

- provider (*string*) – Cloud provider type.

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].created_at (*string*) – The date and time this model has been created (read only)
- results[].id (*integer*) – (read only)
- results[].name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].provider.id (*string*) – The provider key/ID (read only)
- results[].provider.name (*string*) – The provider name (read only)
- results[].unit_value (*string*) – (read only)
- results[].updated_at (*string*) – The date and time this model has been updated (read only)

GET /v1/virtual_machines/{provider}/network/

API endpoint for listing virtual machines available network types filtered per provider. This is a readonly endpoint.

Parameters

- provider (*string*) – Cloud provider type.

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- count (*integer*) – (required)
- next (*string*) –
- previous (*string*) –
- results[].created_at (*string*) – The date and time this model has been created (read only)
- results[].id (*integer*) – (read only)
- results[].name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].network_type (*string*) – Network type. Either private or public (required)

- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].unit_value` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET `/v1/virtual_machines/{provider}/os/`

API endpoint for listing virtual machines available operating systems filtered per provider. This is a readonly endpoint.

Parameters

- `provider` (*string*) – Cloud provider type.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET `/v1/virtual_machines/{provider}/profiles/`

API endpoint for listing virtual machines available profiles filtered per provider. This is a readonly endpoint.

Parameters

- `provider` (*string*) – Cloud provider type.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].cloud_id` (*string*) – The ID on the cloud platform
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].description` (*string*) – (read only)
- `results[].gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `results[].gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].gpu_type.id` (*integer*) – (read only)
- `results[].gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].gpu_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].gpu_type.provider.name` (*string*) – The provider name (read only)
- `results[].gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].id` (*integer*) – (read only)
- `results[].memory_amount` (*integer*) – Amount of memory. Default is 1
- `results[].memory_type.created_at` (*string*) – The date and time this model has been

- created (read only)
- results[].memory_type.id (*integer*) – (read only)
- results[].memory_type.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].memory_type.provider.id (*string*) – The provider key/ID (read only)
- results[].memory_type.provider.name (*string*) – The provider name (read only)
- results[].memory_type.unit_value (*string*) – (read only)
- results[].memory_type.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].name (*string*) – Easy to remember name for this virtual machine profile. (required)
- results[].networks[].created_at (*string*) – The date and time this model has been created (read only)
- results[].networks[].id (*integer*) – (read only)
- results[].networks[].name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].networks[].network_type (*string*) – Network type. Either private or public (required)
- results[].networks[].provider.id (*string*) – The provider key/ID (read only)
- results[].networks[].provider.name (*string*) – The provider name (read only)
- results[].networks[].unit_value (*string*) – (read only)
- results[].networks[].updated_at (*string*) – The date and time this model has been updated (read only)
- results[].os.created_at (*string*) – The date and time this model has been created (read only)
- results[].os.id (*integer*) – (read only)
- results[].os.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].os.provider.id (*string*) – The provider key/ID (read only)
- results[].os.provider.name (*string*) – The provider name (read only)
- results[].os.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].provider.id (*string*) – The provider key/ID (read only)
- results[].provider.name (*string*) – The provider name (read only)
- results[].storage_amount (*integer*) – Amount of disk storage. Default is 1
- results[].storage_type.created_at (*string*) – The date and time this model has been created (read only)
- results[].storage_type.id (*integer*) – (read only)
- results[].storage_type.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].storage_type.provider.id (*string*) – The provider key/ID (read only)
- results[].storage_type.provider.name (*string*) – The provider name (read only)
- results[].storage_type.unit_value (*string*) – (read only)
- results[].storage_type.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].updated_at (*string*) – The date and time this model has been updated (read only)

GET /v1/virtual_machines/{provider}/storage/

API endpoint for listing virtual machines available storage types filtered per provider. This is a readonly endpoint.

Parameters

- provider (*string*) – Cloud provider type.

Query Parameters

- page (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].unit_value` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/

API endpoint for creating/reading/updating/deleting virtual machines.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].access[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].access[].id` (*integer*) – (read only)
- `results[].access[].login_key` (*string*) – The private key to login to the virtual machine. (required)
- `results[].access[].password` (*string*) – The SSH password to login. (required)
- `results[].access[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].access[].username` (*string*) – Username to login with (read only)
- `results[].access[].virtual_machine_ip` (*string*) – The IP address to login to the virtual machine. (required)
- `results[].additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `results[].additional_gpu_type` (*integer*) – Additional GPU
- `results[].additional_memory_amount` (*integer*) – Amount of memory. Default is 0
- `results[].additional_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].additional_memory_type.id` (*integer*) – (read only)
- `results[].additional_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].additional_memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].additional_memory_type.provider.name` (*string*) – The provider name (read only)
- `results[].additional_memory_type.unit_value` (*string*) – (read only)
- `results[].additional_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].additional_storage_amount` (*integer*) – Amount of storage. Default is 0
- `results[].additional_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].additional_storage_type.id` (*integer*) – (read only)
- `results[].additional_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].additional_storage_type.provider.id` (*string*) – The provider key/ID (read only)

- `results[].additional_storage_type.provider.name (string)` – The provider name (read only)
- `results[].additional_storage_type.unit_value (string)` – (read only)
- `results[].additional_storage_type.updated_at (string)` – The date and time this model has been updated (read only)
- `results[].base_memory_amount (integer)` – Amount of memory. Default is 1
- `results[].base_memory_type.created_at (string)` – The date and time this model has been created (read only)
- `results[].base_memory_type.id (integer)` – (read only)
- `results[].base_memory_type.name (string)` – Easy to remember name for this virtual machine part. (required)
- `results[].base_memory_type.provider.id (string)` – The provider key/ID (read only)
- `results[].base_memory_type.provider.name (string)` – The provider name (read only)
- `results[].base_memory_type.unit_value (string)` – (read only)
- `results[].base_memory_type.updated_at (string)` – The date and time this model has been updated (read only)
- `results[].base_storage_amount (integer)` – Amount of disk storage. Default is 1
- `results[].base_storage_type.created_at (string)` – The date and time this model has been created (read only)
- `results[].base_storage_type.id (integer)` – (read only)
- `results[].base_storage_type.name (string)` – Easy to remember name for this virtual machine part. (required)
- `results[].base_storage_type.provider.id (string)` – The provider key/ID (read only)
- `results[].base_storage_type.provider.name (string)` – The provider name (read only)
- `results[].base_storage_type.unit_value (string)` – (read only)
- `results[].base_storage_type.updated_at (string)` – The date and time this model has been updated (read only)
- `results[].created_at (string)` – The date and time this model has been created (read only)
- `results[].id (integer)` – (read only)
- `results[].name (string)` – Easy to remember name for this virtual machine. (required)
- `results[].networks[].created_at (string)` – The date and time this model has been created (read only)
- `results[].networks[].id (integer)` – (read only)
- `results[].networks[].name (string)` – Easy to remember name for this virtual machine part. (required)
- `results[].networks[].network_type (string)` – Network type. Either private or public (required)
- `results[].networks[].provider.id (string)` – The provider key/ID (read only)
- `results[].networks[].provider.name (string)` – The provider name (read only)
- `results[].networks[].unit_value (string)` – (read only)
- `results[].networks[].updated_at (string)` – The date and time this model has been updated (read only)
- `results[].operating_system.created_at (string)` – The date and time this model has been created (read only)
- `results[].operating_system.id (integer)` – (read only)
- `results[].operating_system.name (string)` – Easy to remember name for this virtual machine part. (required)
- `results[].operating_system.provider.id (string)` – The provider key/ID (read only)
- `results[].operating_system.provider.name (string)` – The provider name (read only)
- `results[].operating_system.updated_at (string)` – The date and time this model has been updated (read only)
- `results[].profile.cloud_id (string)` – The ID on the cloud platform
- `results[].profile.created_at (string)` – The date and time this model has been

- created (read only)
- results[].profile.description (*string*) – (read only)
- results[].profile.gpu_amount (*integer*) – Amount of GPUs. Default is 0
- results[].profile.gpu_type.created_at (*string*) – The date and time this model has been created (read only)
- results[].profile.gpu_type.id (*integer*) – (read only)
- results[].profile.gpu_type.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].profile.gpu_type.provider.id (*string*) – The provider key/ID (read only)
- results[].profile.gpu_type.provider.name (*string*) – The provider name (read only)
- results[].profile.gpu_type.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].profile.id (*integer*) – (read only)
- results[].profile.memory_amount (*integer*) – Amount of memory. Default is 1
- results[].profile.memory_type.created_at (*string*) – The date and time this model has been created (read only)
- results[].profile.memory_type.id (*integer*) – (read only)
- results[].profile.memory_type.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].profile.memory_type.provider.id (*string*) – The provider key/ID (read only)
- results[].profile.memory_type.provider.name (*string*) – The provider name (read only)
- results[].profile.memory_type.unit_value (*string*) – (read only)
- results[].profile.memory_type.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].profile.name (*string*) – Easy to remember name for this virtual machine profile. (required)
- results[].profile.networks[].created_at (*string*) – The date and time this model has been created (read only)
- results[].profile.networks[].id (*integer*) – (read only)
- results[].profile.networks[].name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].profile.networks[].network_type (*string*) – Network type. Either private or public (required)
- results[].profile.networks[].provider.id (*string*) – The provider key/ID (read only)
- results[].profile.networks[].provider.name (*string*) – The provider name (read only)
- results[].profile.networks[].unit_value (*string*) – (read only)
- results[].profile.networks[].updated_at (*string*) – The date and time this model has been updated (read only)
- results[].profile.os.created_at (*string*) – The date and time this model has been created (read only)
- results[].profile.os.id (*integer*) – (read only)
- results[].profile.os.name (*string*) – Easy to remember name for this virtual machine part. (required)
- results[].profile.os.provider.id (*string*) – The provider key/ID (read only)
- results[].profile.os.provider.name (*string*) – The provider name (read only)
- results[].profile.os.updated_at (*string*) – The date and time this model has been updated (read only)
- results[].profile.provider.id (*string*) – The provider key/ID (read only)
- results[].profile.provider.name (*string*) – The provider name (read only)
- results[].profile.storage_amount (*integer*) – Amount of disk storage. Default is 1
- results[].profile.storage_type.created_at (*string*) – The date and time this model has been created (read only)
- results[].profile.storage_type.id (*integer*) – (read only)

- `results[].profile.storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].profile.storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].profile.storage_type.provider.name` (*string*) – The provider name (read only)
- `results[].profile.storage_type.unit_value` (*string*) – (read only)
- `results[].profile.storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].profile.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].remote_id` (*string*) – (read only)
- `results[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].researcher.email_address` (*string*) – (read only)
- `results[].researcher.faculty.id` (*integer*) – (read only)
- `results[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].researcher.faculty.university.id` (*integer*) – (read only)
- `results[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].researcher.first_name` (*string*) – (read only)
- `results[].researcher.id` (*integer*) – (read only)
- `results[].researcher.last_name` (*string*) – (read only)
- `results[].researcher.university.id` (*integer*) – (read only)
- `results[].researcher.university.name` (*string*) – The name of the university. (required)
- `results[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].study.code` (*string*) – The research study code. (required)
- `results[].study.contributors[].active` (*boolean*) –
- `results[].study.contributors[].id` (*integer*) – (read only)
- `results[].study.contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].study.contributors[].researcher.email_address` (*string*) – (read only)
- `results[].study.contributors[].researcher.faculty.id` (*integer*) – (read only)
- `results[].study.contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].study.contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `results[].study.contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].study.contributors[].researcher.first_name` (*string*) – (read only)
- `results[].study.contributors[].researcher.id` (*integer*) – (read only)
- `results[].study.contributors[].researcher.last_name` (*string*) – (read only)
- `results[].study.contributors[].researcher.university.id` (*integer*) – (read only)
- `results[].study.contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `results[].study.contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].study.contributors[].role` (*string*) – The role within this research study.
- `results[].study.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].study.description` (*string*) – Enter a short description for this study.
- `results[].study.field.faculty.id` (*integer*) – (read only)
- `results[].study.field.faculty.name` (*string*) – The name of the faculty. (required)

- `results[].study.field.faculty.university.id` (*integer*) – (read only)
- `results[].study.field.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].study.field.id` (*integer*) – (read only)
- `results[].study.field.name` (*string*) – The name of the study field. (required)
- `results[].study.human_subject` (*boolean*) – Is this research study using real humans. (required)
- `results[].study.id` (*integer*) – (read only)
- `results[].study.name` (*string*) – Name of the research study. (required)
- `results[].study.owner.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].study.owner.email_address` (*string*) – (read only)
- `results[].study.owner.faculty.id` (*integer*) – (read only)
- `results[].study.owner.faculty.name` (*string*) – The name of the faculty. (required)
- `results[].study.owner.faculty.university.id` (*integer*) – (read only)
- `results[].study.owner.faculty.university.name` (*string*) – The name of the university. (required)
- `results[].study.owner.first_name` (*string*) – (read only)
- `results[].study.owner.id` (*integer*) – (read only)
- `results[].study.owner.last_name` (*string*) – (read only)
- `results[].study.owner.university.id` (*integer*) – (read only)
- `results[].study.owner.university.name` (*string*) – The name of the university. (required)
- `results[].study.owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].study.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].total_memory` (*string*) – (read only)
- `results[].total_storage` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

POST `/v1/virtualmachines/`

API endpoint for creating/reading/updating/deleting virtual machines.

Request JSON Object

- `additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `additional_gpu_type` (*integer*) – Additional GPU
- `additional_memory_amount` (*integer*) – Amount of memory. Default is 0
- `additional_memory_type` (*integer*) – Additional memory
- `additional_storage_amount` (*integer*) – Amount of storage. Default is 0
- `additional_storage_type` (*integer*) – Additional storage
- `base_memory_amount` (*integer*) – Amount of memory. Default is 1
- `base_memory_type` (*integer*) – Basic memory (required)
- `base_storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `base_storage_type` (*integer*) – Basic disk size (required)
- `name` (*string*) – Easy to remember name for this virtual machine. (required)
- `networks[]` (*integer*) – Networks connected to this virtual machine.
- `operating_system` (*integer*) – The operating system for this virtual machine. (required)
- `profile` (*integer*) – The virtual machine selected profile. (required)
- `provider` (*string*) – Cloud provider type. (required)
- `study` (*integer*) – The study for which this virtual machine is used. (required)

Status Codes

- **200 OK** –

Response JSON Object

- `access[].created_at` (*string*) – The date and time this model has been created (read only)
- `access[].id` (*integer*) – (read only)
- `access[].login_key` (*string*) – The private key to login to the virtual machine. (re-

- quired)
- `access[].password` (*string*) – The SSH password to login. (required)
 - `access[].updated_at` (*string*) – The date and time this model has been updated (read only)
 - `access[].username` (*string*) – Username to login with (read only)
 - `access[].virtual_machine_ip` (*string*) – The IP address to login to the virtual machine. (required)
 - `additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
 - `additional_gpu_type` (*integer*) – Additional GPU
 - `additional_memory_amount` (*integer*) – Amount of memory. Default is 0
 - `additional_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `additional_memory_type.id` (*integer*) – (read only)
 - `additional_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `additional_memory_type.provider.id` (*string*) – The provider key/ID (read only)
 - `additional_memory_type.provider.name` (*string*) – The provider name (read only)
 - `additional_memory_type.unit_value` (*string*) – (read only)
 - `additional_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `additional_storage_amount` (*integer*) – Amount of storage. Default is 0
 - `additional_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `additional_storage_type.id` (*integer*) – (read only)
 - `additional_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `additional_storage_type.provider.id` (*string*) – The provider key/ID (read only)
 - `additional_storage_type.provider.name` (*string*) – The provider name (read only)
 - `additional_storage_type.unit_value` (*string*) – (read only)
 - `additional_storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `base_memory_amount` (*integer*) – Amount of memory. Default is 1
 - `base_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_memory_type.id` (*integer*) – (read only)
 - `base_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_memory_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_memory_type.provider.name` (*string*) – The provider name (read only)
 - `base_memory_type.unit_value` (*string*) – (read only)
 - `base_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `base_storage_amount` (*integer*) – Amount of disk storage. Default is 1
 - `base_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_storage_type.id` (*integer*) – (read only)
 - `base_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_storage_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_storage_type.provider.name` (*string*) – The provider name (read only)
 - `base_storage_type.unit_value` (*string*) – (read only)
 - `base_storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `created_at` (*string*) – The date and time this model has been created (read only)
 - `id` (*integer*) – (read only)
 - `name` (*string*) – Easy to remember name for this virtual machine. (required)
 - `networks[].created_at` (*string*) – The date and time this model has been created (read only)

- `networks[].id` (*integer*) – (read only)
- `networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `networks[].network_type` (*string*) – Network type. Either private or public (required)
- `networks[].provider.id` (*string*) – The provider key/ID (read only)
- `networks[].provider.name` (*string*) – The provider name (read only)
- `networks[].unit_value` (*string*) – (read only)
- `networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `operating_system.created_at` (*string*) – The date and time this model has been created (read only)
- `operating_system.id` (*integer*) – (read only)
- `operating_system.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `operating_system.provider.id` (*string*) – The provider key/ID (read only)
- `operating_system.provider.name` (*string*) – The provider name (read only)
- `operating_system.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.cloud_id` (*string*) – The ID on the cloud platform
- `profile.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.description` (*string*) – (read only)
- `profile.gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `profile.gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.gpu_type.id` (*integer*) – (read only)
- `profile.gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.gpu_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.gpu_type.provider.name` (*string*) – The provider name (read only)
- `profile.gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.id` (*integer*) – (read only)
- `profile.memory_amount` (*integer*) – Amount of memory. Default is 1
- `profile.memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.memory_type.id` (*integer*) – (read only)
- `profile.memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.memory_type.provider.name` (*string*) – The provider name (read only)
- `profile.memory_type.unit_value` (*string*) – (read only)
- `profile.memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.name` (*string*) – Easy to remember name for this virtual machine profile. (required)
- `profile.networks[].created_at` (*string*) – The date and time this model has been created (read only)
- `profile.networks[].id` (*integer*) – (read only)
- `profile.networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.networks[].network_type` (*string*) – Network type. Either private or public (required)
- `profile.networks[].provider.id` (*string*) – The provider key/ID (read only)
- `profile.networks[].provider.name` (*string*) – The provider name (read only)
- `profile.networks[].unit_value` (*string*) – (read only)
- `profile.networks[].updated_at` (*string*) – The date and time this model has been updated (read only)

- `profile.os.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.os.id` (*integer*) – (read only)
- `profile.os.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.os.provider.id` (*string*) – The provider key/ID (read only)
- `profile.os.provider.name` (*string*) – The provider name (read only)
- `profile.os.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.provider.id` (*string*) – The provider key/ID (read only)
- `profile.provider.name` (*string*) – The provider name (read only)
- `profile.storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `profile.storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.storage_type.id` (*integer*) – (read only)
- `profile.storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.storage_type.provider.name` (*string*) – The provider name (read only)
- `profile.storage_type.unit_value` (*string*) – (read only)
- `profile.storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.updated_at` (*string*) – The date and time this model has been updated (read only)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `remote_id` (*string*) – (read only)
- `researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `researcher.email_address` (*string*) – (read only)
- `researcher.faculty.id` (*integer*) – (read only)
- `researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `researcher.faculty.university.id` (*integer*) – (read only)
- `researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `researcher.first_name` (*string*) – (read only)
- `researcher.id` (*integer*) – (read only)
- `researcher.last_name` (*string*) – (read only)
- `researcher.university.id` (*integer*) – (read only)
- `researcher.university.name` (*string*) – The name of the university. (required)
- `researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.code` (*string*) – The research study code. (required)
- `study.contributors[].active` (*boolean*) –
- `study.contributors[].id` (*integer*) – (read only)
- `study.contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `study.contributors[].researcher.email_address` (*string*) – (read only)
- `study.contributors[].researcher.faculty.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `study.contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.first_name` (*string*) – (read only)
- `study.contributors[].researcher.id` (*integer*) – (read only)
- `study.contributors[].researcher.last_name` (*string*) – (read only)
- `study.contributors[].researcher.university.id` (*integer*) – (read only)

- `study.contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.contributors[].role` (*string*) – The role withing this research study.
- `study.created_at` (*string*) – The date and time this model has been created (read only)
- `study.description` (*string*) – Enter a short description for this study.
- `study.field.faculty.id` (*integer*) – (read only)
- `study.field.faculty.name` (*string*) – The name of the faculty. (required)
- `study.field.faculty.university.id` (*integer*) – (read only)
- `study.field.faculty.university.name` (*string*) – The name of the university. (required)
- `study.field.id` (*integer*) – (read only)
- `study.field.name` (*string*) – The name of the study field. (required)
- `study.human_subject` (*boolean*) – Is this research study using real humans. (required)
- `study.id` (*integer*) – (read only)
- `study.name` (*string*) – Name of the research study. (required)
- `study.owner.created_at` (*string*) – The date and time this model has been created (read only)
- `study.owner.email_address` (*string*) – (read only)
- `study.owner.faculty.id` (*integer*) – (read only)
- `study.owner.faculty.name` (*string*) – The name of the faculty. (required)
- `study.owner.faculty.university.id` (*integer*) – (read only)
- `study.owner.faculty.university.name` (*string*) – The name of the university. (required)
- `study.owner.first_name` (*string*) – (read only)
- `study.owner.id` (*integer*) – (read only)
- `study.owner.last_name` (*string*) – (read only)
- `study.owner.university.id` (*integer*) – (read only)
- `study.owner.university.name` (*string*) – The name of the university. (required)
- `study.owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.updated_at` (*string*) – The date and time this model has been updated (read only)
- `total_memory` (*string*) – (read only)
- `total_storage` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/gpu/

API endpoint for listing virtual machines available GPU types. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- **200 OK** –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/gpu/{id}/

API endpoint for listing virtual machines available GPU types. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine GPU.

Status Codes

- **200 OK** –

Response JSON Object

- `created_at` (*string*) – The date and time this model has been created (read only)
- `id` (*integer*) – (read only)
- `name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/memory/

API endpoint for listing virtual machines available memory types. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- **200 OK** –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].unit_value` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/memory/{id}/

API endpoint for listing virtual machines available memory types. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine memory.

Status Codes

- **200 OK** –

Response JSON Object

- `created_at` (*string*) – The date and time this model has been created (read only)
- `id` (*integer*) – (read only)
- `name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `unit_value` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/network/

API endpoint for listing virtual machines available network types. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- **200 OK** –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –

- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].network_type` (*string*) – Network type. Either private or public (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].unit_value` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/network/{id}/

API endpoint for listing virtual machines available network types. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine network.

Status Codes

- [200 OK](#) –

Response JSON Object

- `created_at` (*string*) – The date and time this model has been created (read only)
- `id` (*integer*) – (read only)
- `name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `network_type` (*string*) – Network type. Either private or public (required)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `unit_value` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/os/

API endpoint for listing virtual machines available operating systems. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- [200 OK](#) –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/os/{id}/

API endpoint for listing virtual machines available operating systems. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine operating system.

Status Codes

- [200 OK](#) –

Response JSON Object

- `created_at` (*string*) – The date and time this model has been created (read only)
- `id` (*integer*) – (read only)

- `name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/profiles/

API endpoint for listing virtual machines available profiles. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].cloud_id` (*string*) – The ID on the cloud platform
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].description` (*string*) – (read only)
- `results[].gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `results[].gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].gpu_type.id` (*integer*) – (read only)
- `results[].gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].gpu_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].gpu_type.provider.name` (*string*) – The provider name (read only)
- `results[].gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].id` (*integer*) – (read only)
- `results[].memory_amount` (*integer*) – Amount of memory. Default is 1
- `results[].memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].memory_type.id` (*integer*) – (read only)
- `results[].memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].memory_type.provider.name` (*string*) – The provider name (read only)
- `results[].memory_type.unit_value` (*string*) – (read only)
- `results[].memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine profile. (required)
- `results[].networks[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].networks[].id` (*integer*) – (read only)
- `results[].networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].networks[].network_type` (*string*) – Network type. Either private or public (required)
- `results[].networks[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].networks[].provider.name` (*string*) – The provider name (read only)
- `results[].networks[].unit_value` (*string*) – (read only)
- `results[].networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].os.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].os.id` (*integer*) – (read only)

- `results[].os.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].os.provider.id` (*string*) – The provider key/ID (read only)
- `results[].os.provider.name` (*string*) – The provider name (read only)
- `results[].os.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `results[].storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `results[].storage_type.id` (*integer*) – (read only)
- `results[].storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `results[].storage_type.provider.name` (*string*) – The provider name (read only)
- `results[].storage_type.unit_value` (*string*) – (read only)
- `results[].storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/profiles/{id}/

API endpoint for listing virtual machines available profiles. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine profile.

Status Codes

- [200 OK](#) –

Response JSON Object

- `cloud_id` (*string*) – The ID on the cloud platform
- `created_at` (*string*) – The date and time this model has been created (read only)
- `description` (*string*) – (read only)
- `gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
- `gpu_type.id` (*integer*) – (read only)
- `gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `gpu_type.provider.id` (*string*) – The provider key/ID (read only)
- `gpu_type.provider.name` (*string*) – The provider name (read only)
- `gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `id` (*integer*) – (read only)
- `memory_amount` (*integer*) – Amount of memory. Default is 1
- `memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `memory_type.id` (*integer*) – (read only)
- `memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `memory_type.provider.name` (*string*) – The provider name (read only)
- `memory_type.unit_value` (*string*) – (read only)
- `memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `name` (*string*) – Easy to remember name for this virtual machine profile. (required)
- `networks[].created_at` (*string*) – The date and time this model has been created (read only)
- `networks[].id` (*integer*) – (read only)

- `networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `networks[].network_type` (*string*) – Network type. Either private or public (required)
- `networks[].provider.id` (*string*) – The provider key/ID (read only)
- `networks[].provider.name` (*string*) – The provider name (read only)
- `networks[].unit_value` (*string*) – (read only)
- `networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `os.created_at` (*string*) – The date and time this model has been created (read only)
- `os.id` (*integer*) – (read only)
- `os.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `os.provider.id` (*string*) – The provider key/ID (read only)
- `os.provider.name` (*string*) – The provider name (read only)
- `os.updated_at` (*string*) – The date and time this model has been updated (read only)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `storage_type.id` (*integer*) – (read only)
- `storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `storage_type.provider.name` (*string*) – The provider name (read only)
- `storage_type.unit_value` (*string*) – (read only)
- `storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/providers/

Get all the available providers for creating virtual machines.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- `[].id` (*string*) – The provider key/ID (read only)
- `[].name` (*string*) – The provider name (read only)

GET /v1/virtualmachines/storage/

API endpoint for listing virtual machines available storage types. This is a readonly endpoint.

Query Parameters

- `page` (*integer*) – A page number within the paginated result set.

Status Codes

- 200 OK –

Response JSON Object

- `count` (*integer*) – (required)
- `next` (*string*) –
- `previous` (*string*) –
- `results[].created_at` (*string*) – The date and time this model has been created (read only)
- `results[].id` (*integer*) – (read only)
- `results[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `results[].provider.id` (*string*) – The provider key/ID (read only)
- `results[].provider.name` (*string*) – The provider name (read only)
- `results[].unit_value` (*string*) – (read only)
- `results[].updated_at` (*string*) – The date and time this model has been updated (read only)

only)

GET /v1/virtualmachines/storage/{id}/

API endpoint for listing virtual machines available storage types. This is a readonly endpoint.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine storage.

Status Codes

- **200 OK** –

Response JSON Object

- `created_at` (*string*) – The date and time this model has been created (read only)
- `id` (*integer*) – (read only)
- `name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `unit_value` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

GET /v1/virtualmachines/{id}/

API endpoint for creating/reading/updating/deleting virtual machines.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine.

Status Codes

- **200 OK** –

Response JSON Object

- `access[].created_at` (*string*) – The date and time this model has been created (read only)
- `access[].id` (*integer*) – (read only)
- `access[].login_key` (*string*) – The private key to login to the virtual machine. (required)
- `access[].password` (*string*) – The SSH password to login. (required)
- `access[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `access[].username` (*string*) – Username to login with (read only)
- `access[].virtual_machine_ip` (*string*) – The IP address to login to the virtual machine. (required)
- `additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `additional_gpu_type` (*integer*) – Additional GPU
- `additional_memory_amount` (*integer*) – Amount of memory. Default is 0
- `additional_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `additional_memory_type.id` (*integer*) – (read only)
- `additional_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `additional_memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `additional_memory_type.provider.name` (*string*) – The provider name (read only)
- `additional_memory_type.unit_value` (*string*) – (read only)
- `additional_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `additional_storage_amount` (*integer*) – Amount of storage. Default is 0
- `additional_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `additional_storage_type.id` (*integer*) – (read only)
- `additional_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `additional_storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `additional_storage_type.provider.name` (*string*) – The provider name (read only)
- `additional_storage_type.unit_value` (*string*) – (read only)
- `additional_storage_type.updated_at` (*string*) – The date and time this model has

- been updated (read only)
- `base_memory_amount` (*integer*) – Amount of memory. Default is 1
 - `base_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_memory_type.id` (*integer*) – (read only)
 - `base_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_memory_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_memory_type.provider.name` (*string*) – The provider name (read only)
 - `base_memory_type.unit_value` (*string*) – (read only)
 - `base_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `base_storage_amount` (*integer*) – Amount of disk storage. Default is 1
 - `base_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_storage_type.id` (*integer*) – (read only)
 - `base_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_storage_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_storage_type.provider.name` (*string*) – The provider name (read only)
 - `base_storage_type.unit_value` (*string*) – (read only)
 - `base_storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `created_at` (*string*) – The date and time this model has been created (read only)
 - `id` (*integer*) – (read only)
 - `name` (*string*) – Easy to remember name for this virtual machine. (required)
 - `networks[].created_at` (*string*) – The date and time this model has been created (read only)
 - `networks[].id` (*integer*) – (read only)
 - `networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `networks[].network_type` (*string*) – Network type. Either private or public (required)
 - `networks[].provider.id` (*string*) – The provider key/ID (read only)
 - `networks[].provider.name` (*string*) – The provider name (read only)
 - `networks[].unit_value` (*string*) – (read only)
 - `networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
 - `operating_system.created_at` (*string*) – The date and time this model has been created (read only)
 - `operating_system.id` (*integer*) – (read only)
 - `operating_system.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `operating_system.provider.id` (*string*) – The provider key/ID (read only)
 - `operating_system.provider.name` (*string*) – The provider name (read only)
 - `operating_system.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `profile.cloud_id` (*string*) – The ID on the cloud platform
 - `profile.created_at` (*string*) – The date and time this model has been created (read only)
 - `profile.description` (*string*) – (read only)
 - `profile.gpu_amount` (*integer*) – Amount of GPUs. Default is 0
 - `profile.gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `profile.gpu_type.id` (*integer*) – (read only)
 - `profile.gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `profile.gpu_type.provider.id` (*string*) – The provider key/ID (read only)
 - `profile.gpu_type.provider.name` (*string*) – The provider name (read only)

- `profile.gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.id` (*integer*) – (read only)
- `profile.memory_amount` (*integer*) – Amount of memory. Default is 1
- `profile.memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.memory_type.id` (*integer*) – (read only)
- `profile.memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.memory_type.provider.name` (*string*) – The provider name (read only)
- `profile.memory_type.unit_value` (*string*) – (read only)
- `profile.memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.name` (*string*) – Easy to remember name for this virtual machine profile. (required)
- `profile.networks[].created_at` (*string*) – The date and time this model has been created (read only)
- `profile.networks[].id` (*integer*) – (read only)
- `profile.networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.networks[].network_type` (*string*) – Network type. Either private or public (required)
- `profile.networks[].provider.id` (*string*) – The provider key/ID (read only)
- `profile.networks[].provider.name` (*string*) – The provider name (read only)
- `profile.networks[].unit_value` (*string*) – (read only)
- `profile.networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.os.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.os.id` (*integer*) – (read only)
- `profile.os.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.os.provider.id` (*string*) – The provider key/ID (read only)
- `profile.os.provider.name` (*string*) – The provider name (read only)
- `profile.os.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.provider.id` (*string*) – The provider key/ID (read only)
- `profile.provider.name` (*string*) – The provider name (read only)
- `profile.storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `profile.storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.storage_type.id` (*integer*) – (read only)
- `profile.storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.storage_type.provider.name` (*string*) – The provider name (read only)
- `profile.storage_type.unit_value` (*string*) – (read only)
- `profile.storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.updated_at` (*string*) – The date and time this model has been updated (read only)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `remote_id` (*string*) – (read only)
- `researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `researcher.email_address` (*string*) – (read only)

- `researcher.faculty.id` (*integer*) – (read only)
- `researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `researcher.faculty.university.id` (*integer*) – (read only)
- `researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `researcher.first_name` (*string*) – (read only)
- `researcher.id` (*integer*) – (read only)
- `researcher.last_name` (*string*) – (read only)
- `researcher.university.id` (*integer*) – (read only)
- `researcher.university.name` (*string*) – The name of the university. (required)
- `researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.code` (*string*) – The research study code. (required)
- `study.contributors[].active` (*boolean*) –
- `study.contributors[].id` (*integer*) – (read only)
- `study.contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `study.contributors[].researcher.email_address` (*string*) – (read only)
- `study.contributors[].researcher.faculty.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `study.contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.first_name` (*string*) – (read only)
- `study.contributors[].researcher.id` (*integer*) – (read only)
- `study.contributors[].researcher.last_name` (*string*) – (read only)
- `study.contributors[].researcher.university.id` (*integer*) – (read only)
- `study.contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.contributors[].role` (*string*) – The role withing this research study.
- `study.created_at` (*string*) – The date and time this model has been created (read only)
- `study.description` (*string*) – Enter a short description for this study.
- `study.field.faculty.id` (*integer*) – (read only)
- `study.field.faculty.name` (*string*) – The name of the faculty. (required)
- `study.field.faculty.university.id` (*integer*) – (read only)
- `study.field.faculty.university.name` (*string*) – The name of the university. (required)
- `study.field.id` (*integer*) – (read only)
- `study.field.name` (*string*) – The name of the study field. (required)
- `study.human_subject` (*boolean*) – Is this research study using real humans. (required)
- `study.id` (*integer*) – (read only)
- `study.name` (*string*) – Name of the research study. (required)
- `study.owner.created_at` (*string*) – The date and time this model has been created (read only)
- `study.owner.email_address` (*string*) – (read only)
- `study.owner.faculty.id` (*integer*) – (read only)
- `study.owner.faculty.name` (*string*) – The name of the faculty. (required)
- `study.owner.faculty.university.id` (*integer*) – (read only)
- `study.owner.faculty.university.name` (*string*) – The name of the university. (required)
- `study.owner.first_name` (*string*) – (read only)
- `study.owner.id` (*integer*) – (read only)
- `study.owner.last_name` (*string*) – (read only)
- `study.owner.university.id` (*integer*) – (read only)
- `study.owner.university.name` (*string*) – The name of the university. (required)

- `study.owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.updated_at` (*string*) – The date and time this model has been updated (read only)
- `total_memory` (*string*) – (read only)
- `total_storage` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

PUT /v1/virtualmachines/{id}/

API endpoint for creating/reading/updating/deleting virtual machines.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine.

Request JSON Object

- `additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `additional_gpu_type` (*integer*) – Additional GPU
- `additional_memory_amount` (*integer*) – Amount of memory. Default is 0
- `additional_memory_type` (*integer*) – Additional memory
- `additional_storage_amount` (*integer*) – Amount of storage. Default is 0
- `additional_storage_type` (*integer*) – Additional storage
- `base_memory_amount` (*integer*) – Amount of memory. Default is 1
- `base_memory_type` (*integer*) – Basic memory (required)
- `base_storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `base_storage_type` (*integer*) – Basic disk size (required)
- `name` (*string*) – Easy to remember name for this virtual machine. (required)
- `networks[]` (*integer*) – Networks connected to this virtual machine.
- `operating_system` (*integer*) – The operating system for this virtual machine. (required)
- `profile` (*integer*) – The virtual machine selected profile. (required)
- `provider` (*string*) – Cloud provider type. (required)
- `study` (*integer*) – The study for which this virtual machine is used. (required)

Status Codes

- 200 OK –

Response JSON Object

- `access[].created_at` (*string*) – The date and time this model has been created (read only)
- `access[].id` (*integer*) – (read only)
- `access[].login_key` (*string*) – The private key to login to the virtual machine. (required)
- `access[].password` (*string*) – The SSH password to login. (required)
- `access[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `access[].username` (*string*) – Username to login with (read only)
- `access[].virtual_machine_ip` (*string*) – The IP address to login to the virtual machine. (required)
- `additional_gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `additional_gpu_type` (*integer*) – Additional GPU
- `additional_memory_amount` (*integer*) – Amount of memory. Default is 0
- `additional_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `additional_memory_type.id` (*integer*) – (read only)
- `additional_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `additional_memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `additional_memory_type.provider.name` (*string*) – The provider name (read only)
- `additional_memory_type.unit_value` (*string*) – (read only)
- `additional_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `additional_storage_amount` (*integer*) – Amount of storage. Default is 0
- `additional_storage_type.created_at` (*string*) – The date and time this model has

- been created (read only)
- `additional_storage_type.id` (*integer*) – (read only)
 - `additional_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `additional_storage_type.provider.id` (*string*) – The provider key/ID (read only)
 - `additional_storage_type.provider.name` (*string*) – The provider name (read only)
 - `additional_storage_type.unit_value` (*string*) – (read only)
 - `additional_storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `base_memory_amount` (*integer*) – Amount of memory. Default is 1
 - `base_memory_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_memory_type.id` (*integer*) – (read only)
 - `base_memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_memory_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_memory_type.provider.name` (*string*) – The provider name (read only)
 - `base_memory_type.unit_value` (*string*) – (read only)
 - `base_memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `base_storage_amount` (*integer*) – Amount of disk storage. Default is 1
 - `base_storage_type.created_at` (*string*) – The date and time this model has been created (read only)
 - `base_storage_type.id` (*integer*) – (read only)
 - `base_storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `base_storage_type.provider.id` (*string*) – The provider key/ID (read only)
 - `base_storage_type.provider.name` (*string*) – The provider name (read only)
 - `base_storage_type.unit_value` (*string*) – (read only)
 - `base_storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `created_at` (*string*) – The date and time this model has been created (read only)
 - `id` (*integer*) – (read only)
 - `name` (*string*) – Easy to remember name for this virtual machine. (required)
 - `networks[].created_at` (*string*) – The date and time this model has been created (read only)
 - `networks[].id` (*integer*) – (read only)
 - `networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `networks[].network_type` (*string*) – Network type. Either private or public (required)
 - `networks[].provider.id` (*string*) – The provider key/ID (read only)
 - `networks[].provider.name` (*string*) – The provider name (read only)
 - `networks[].unit_value` (*string*) – (read only)
 - `networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
 - `operating_system.created_at` (*string*) – The date and time this model has been created (read only)
 - `operating_system.id` (*integer*) – (read only)
 - `operating_system.name` (*string*) – Easy to remember name for this virtual machine part. (required)
 - `operating_system.provider.id` (*string*) – The provider key/ID (read only)
 - `operating_system.provider.name` (*string*) – The provider name (read only)
 - `operating_system.updated_at` (*string*) – The date and time this model has been updated (read only)
 - `profile.cloud_id` (*string*) – The ID on the cloud platform
 - `profile.created_at` (*string*) – The date and time this model has been created (read only)
 - `profile.description` (*string*) – (read only)

- `profile.gpu_amount` (*integer*) – Amount of GPUs. Default is 0
- `profile.gpu_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.gpu_type.id` (*integer*) – (read only)
- `profile.gpu_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.gpu_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.gpu_type.provider.name` (*string*) – The provider name (read only)
- `profile.gpu_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.id` (*integer*) – (read only)
- `profile.memory_amount` (*integer*) – Amount of memory. Default is 1
- `profile.memory_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.memory_type.id` (*integer*) – (read only)
- `profile.memory_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.memory_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.memory_type.provider.name` (*string*) – The provider name (read only)
- `profile.memory_type.unit_value` (*string*) – (read only)
- `profile.memory_type.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.name` (*string*) – Easy to remember name for this virtual machine profile. (required)
- `profile.networks[].created_at` (*string*) – The date and time this model has been created (read only)
- `profile.networks[].id` (*integer*) – (read only)
- `profile.networks[].name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.networks[].network_type` (*string*) – Network type. Either private or public (required)
- `profile.networks[].provider.id` (*string*) – The provider key/ID (read only)
- `profile.networks[].provider.name` (*string*) – The provider name (read only)
- `profile.networks[].unit_value` (*string*) – (read only)
- `profile.networks[].updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.os.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.os.id` (*integer*) – (read only)
- `profile.os.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.os.provider.id` (*string*) – The provider key/ID (read only)
- `profile.os.provider.name` (*string*) – The provider name (read only)
- `profile.os.updated_at` (*string*) – The date and time this model has been updated (read only)
- `profile.provider.id` (*string*) – The provider key/ID (read only)
- `profile.provider.name` (*string*) – The provider name (read only)
- `profile.storage_amount` (*integer*) – Amount of disk storage. Default is 1
- `profile.storage_type.created_at` (*string*) – The date and time this model has been created (read only)
- `profile.storage_type.id` (*integer*) – (read only)
- `profile.storage_type.name` (*string*) – Easy to remember name for this virtual machine part. (required)
- `profile.storage_type.provider.id` (*string*) – The provider key/ID (read only)
- `profile.storage_type.provider.name` (*string*) – The provider name (read only)
- `profile.storage_type.unit_value` (*string*) – (read only)
- `profile.storage_type.updated_at` (*string*) – The date and time this model has been updated (read only)

- `profile.updated_at` (*string*) – The date and time this model has been updated (read only)
- `provider.id` (*string*) – The provider key/ID (read only)
- `provider.name` (*string*) – The provider name (read only)
- `remote_id` (*string*) – (read only)
- `researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `researcher.email_address` (*string*) – (read only)
- `researcher.faculty.id` (*integer*) – (read only)
- `researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `researcher.faculty.university.id` (*integer*) – (read only)
- `researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `researcher.first_name` (*string*) – (read only)
- `researcher.id` (*integer*) – (read only)
- `researcher.last_name` (*string*) – (read only)
- `researcher.university.id` (*integer*) – (read only)
- `researcher.university.name` (*string*) – The name of the university. (required)
- `researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.code` (*string*) – The research study code. (required)
- `study.contributors[].active` (*boolean*) –
- `study.contributors[].id` (*integer*) – (read only)
- `study.contributors[].researcher.created_at` (*string*) – The date and time this model has been created (read only)
- `study.contributors[].researcher.email_address` (*string*) – (read only)
- `study.contributors[].researcher.faculty.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.name` (*string*) – The name of the faculty. (required)
- `study.contributors[].researcher.faculty.university.id` (*integer*) – (read only)
- `study.contributors[].researcher.faculty.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.first_name` (*string*) – (read only)
- `study.contributors[].researcher.id` (*integer*) – (read only)
- `study.contributors[].researcher.last_name` (*string*) – (read only)
- `study.contributors[].researcher.university.id` (*integer*) – (read only)
- `study.contributors[].researcher.university.name` (*string*) – The name of the university. (required)
- `study.contributors[].researcher.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.contributors[].role` (*string*) – The role withing this research study.
- `study.created_at` (*string*) – The date and time this model has been created (read only)
- `study.description` (*string*) – Enter a short description for this study.
- `study.field.faculty.id` (*integer*) – (read only)
- `study.field.faculty.name` (*string*) – The name of the faculty. (required)
- `study.field.faculty.university.id` (*integer*) – (read only)
- `study.field.faculty.university.name` (*string*) – The name of the university. (required)
- `study.field.id` (*integer*) – (read only)
- `study.field.name` (*string*) – The name of the study field. (required)
- `study.human_subject` (*boolean*) – Is this research study using real humans. (required)
- `study.id` (*integer*) – (read only)
- `study.name` (*string*) – Name of the research study. (required)
- `study.owner.created_at` (*string*) – The date and time this model has been created (read only)
- `study.owner.email_address` (*string*) – (read only)
- `study.owner.faculty.id` (*integer*) – (read only)
- `study.owner.faculty.name` (*string*) – The name of the faculty. (required)

- `study.owner.faculty.university.id` (*integer*) – (read only)
- `study.owner.faculty.university.name` (*string*) – The name of the university. (required)
- `study.owner.first_name` (*string*) – (read only)
- `study.owner.id` (*integer*) – (read only)
- `study.owner.last_name` (*string*) – (read only)
- `study.owner.university.id` (*integer*) – (read only)
- `study.owner.university.name` (*string*) – The name of the university. (required)
- `study.owner.updated_at` (*string*) – The date and time this model has been updated (read only)
- `study.updated_at` (*string*) – The date and time this model has been updated (read only)
- `total_memory` (*string*) – (read only)
- `total_storage` (*string*) – (read only)
- `updated_at` (*string*) – The date and time this model has been updated (read only)

DELETE /v1/virtualmachines/{id}/

API endpoint for creating/reading/updating/deleting virtual machines.

Parameters

- `id` (*integer*) – A unique integer value identifying this virtual machine.

Status Codes

- [204 No Content](#) –

Chapter 5

Authentication

5.1 Web

Normal web login

5.2 API

```
class apps.api.authentication.APIHawk
```

This is the API authentication that is using the HAWK authentication mechanism.

This class will implement a custom credentials and user lookups so that we can dynamically add new users and update tokens.

```
hawk_credentials_lookup(id)
```

This method will perform the check if the used token is an existing/known token in the database. This will not lookup a user. Only an existing token.

Parameters *id* (*string*) – The token key to lookup in the database for existing token.

Raises exceptions.AuthenticationFailed – If the given token does not exist.

Returns The dictionary holds the token id, the token secret and the used hashing algorithm that is used.

Return type dict

```
hawk_user_lookup(request, credentials)
```

Return the user account that is connected to the used token.

Parameters

- *request* (*[type]*) – The incoming HTTP/API request
- *credentials* (*dict*) – The credentials from `hawk_credentials_lookup`

Raises exceptions.AuthenticationFailed – If the given token does not exist to an existing user

Returns Returns a tuple holding the user as first item

Return type tuple

Chapter 6

Signals

6.1 API

```
apps.api.signals.create_user_token(sender, instance=None, created=False, **kwargs)
```

When a new user is created, this signal will also create a new API token for this user. So every user will have an API token.

Parameters

- `sender` (*sender*) – The model that has triggered the signal
- `instance` (`User`) – The newly created user model data
- `created` (*boolean*) – Whether the object was created (True) or updated (False).

6.2 Invitation

```
apps.invitation.signals.send_first_invitation(sender, instance=None, created=False, **kwargs)
```

A signal that is fired when an invitation is created. This will trigger sending an email with instructions for the uploader.

Parameters

- `sender` (*sender*) – The model that has triggered the signal
- `instance` (`User`) – The newly created user model data
- `created` (*boolean*) – Whether the object was created (True) or updated (False).

6.3 Researcher

```
apps.researcher.signals.create_researcher_profile(sender, instance, created, **kwargs)
```

A signal that is fired when a user is created. This will create a researcher model with a link with the newly created user.

Parameters

- `sender` (*sender*) – The model that has triggered the signal
- `instance` (`User`) – The newly created user model data
- `created` (*boolean*) – Whether the object was created or updated. When true it is newly created

6.4 Virtual machine provider VRW

```
apps.virtual_machine.providers.vrw.signals.create_virtual_machine_vrw(sender, instance, created,
                                                                    **kwargs)
```

When a new virtual machine is created, this signal will be fired in order to check if a *VRW* needs to be created.

When a `VirtualMachine` is created for the first time, and does not have a `VRW` Workspace attached, the software will check on the operating system what to do.

At this point the check if a *VRW* needs to be created is done on the **operating system**. If the selected operating system has a *VRW* Part configured, it is assumed that we need to create the *VRW*.

Parameters

- `sender` (*class*) – The modelclass `VirtualMachine`
- `instance` (`VirtualMachine`) – The Virtual machine that is either created or updated.
- `created` (*bool*) – Is the Virtual Machine created. If false, it is an update.

6.5 Virtual machine provider OpenStack

```
apps.virtual_machine.providers.openstack.signals.create_virtual_machine_openstack(sender,
                                                                                  instance,
                                                                                  created,
                                                                                  **kwargs)
```

When a new virtual machine is created, this signal will be fired in order to check if a *VPS* needs to be created.

When a `VirtualMachine` is created for the first time, and does not have a `OpenStack` Workspace attached, the software will check on the operating system what to do.

At this point the check if a *VPS* needs to be created is done on the **operating system**. If the selected operating system has a *VPS* Part configured, it is assumed that we need to create the *VPS*.

Parameters

- `sender` (*class*) – The modelclass `VirtualMachine`
- `instance` (`VirtualMachine`) – The Virtual machine that is either created or updated.
- `created` (*bool*) – Is the Virtual Machine created. If false, it is an update.

Chapter 7

TUS Hooks

In order to process the uploads so that we know to which study an upload belongs to, we use web hooks.

More information about TUSD and hooks can be found here: <https://github.com/tus/tusd/blob/master/docs/hooks.md>

In the VRE setup, we have chosen for **file-based hooks** (<https://github.com/tus/tusd/blob/master/docs/hooks.md#file-hooks>) because then we can have more flexible power in handling the uploads. And with the file-based hooks we can still make HTTP requests in the hook code.

A dependency to the web hooks to work is the use of NGINX with LUA. In order to know to which study an upload belongs we, NGINX will add extra meta headers to the TUSD server so that the extra study information is available in for the hook scripts.

7.1 Settings

In order to communicate with the REST API server, we need some settings to be entered. Create a `.env` file

- WEBHOOK_URL
- DROPOFF_API_HAWK_KEY
- DROPOFF_API_HAWK_SECRET

```
# TUS Daemon settings
# Change the required variable below to your needs.
# You can here also overrule the default variables in the startup.sh script

# This is the full url to the REST API server to post updates during uploads.
WEBHOOK_URL=http://localhost:8000/api/v1/dropoffs/webhook/

# The key for the token that is created on the REST API server for communication with the
→REST API server.
DROPOFF_API_HAWK_KEY=[ENTER_HAWK_KEY]

# The secret value that belongs to the token DROPOFF_API_HAWK_KEY.
DROPOFF_API_HAWK_SECRET=[ENTER_HAWK_SECRET]
```

7.2 NGINX / LUA

Every file that is uploaded goes through NGINX with a virtual url. During the upload we add a UUID of the study to the upload url. When the client is uploading the data, NGINX will read out the UUID from the url, and add that to the meta data for the TUSD service. And NGINX will strip the url for the TUSD daemon in order to accept the upload. So basically, NGINX is needed in order to be able to add study information to the TUSD uploads.

NGINX config:

```
server_name _;

access_log /var/log/nginx/tusd.access.log;
error_log /var/log/nginx/tusd.error.log debug;

# This location is hit when the Tus upload is starting and providing meta data for the
→upload.
# The actual upload is done with the /files location below
location ~ /files/([0-9a-f]+\-[0-9a-f]+\-[1-5][0-9a-f]+\-[89ab][0-9a-f]+\-[0-9a-f]+)?/ {
    set $study_id $1; # Here we capture the UUIDv4 value to use in the Tus metadata
→manipulation

    # Here we update the Tus server metadata so we can add the project uuid to it for
→further processing
    proxy_set_header Upload-Metadata $updateTusMetadata;

    # Rewrite the url so that the project UUIDv4 is stripped from the url to the Tus
→server
    rewrite ^.*$ /files/ break;

    # Disable request and response buffering
    proxy_request_buffering off;
    proxy_buffering off;

    client_max_body_size 0;

    # Forward incoming requests to local tusd instance
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Host $host;
    # Make sure to hardcoded set to https. As kubernetes is proxying based on http from
→the ingress
    # Else TUSD will redirect incorrect http hosts
    # https://github.com/tus/tusd/blob/master/docs/faq.md#can-i-run-tusd-behind-a-reverse-
→proxy
    # https://github.com/tus/tusd/blob/master/examples/nginx.conf
    proxy_set_header X-Forwarded-Proto https;

    set $tus_upload localhost;
    proxy_pass http://$tus_upload:1080;

    proxy_http_version 1.1;
```

JavaScript code:

```
function updateTusMetadata(r) {
    return r.headersIn['Upload-Metadata'] + ',study ' + r.variables['study_id'].toString(
→'base64') + ',ip ' + r.remoteAddress.toString('base64');
}
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```

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```

}

export default {updateTusMetadata};

```

7.3 Python hooks

All the communication between the TUSD service and the REST API is secured with HAWK (<https://github.com/mozilla/hawk>). Therefore the hooks need to know a key and a secret of a user on the REST API that is allowed to make the webhook calls. Make sure you have created such a user.

7.3.1 pre-create

When a new upload is started, the *pre-create* hook will check if the study ID is valid and that the upload can start. This will also announce the upload to the REST API server and therefore can be found in the overview of data drops.

```

#!/usr/bin/env python
import os
import logging
import logging.config

if os.path.isfile('logging.custom.ini'):
    logging.config.fileConfig('logging.custom.ini')
else:
    logging.config.fileConfig('logging.ini')

logger = logging.getLogger(__name__)

from datetime import datetime
start_time = datetime.now()

import sys
import json
import requests
from requests_hawk import HawkAuth
from decouple import config, Csv

# !!!!! NO CHANGES BELOW THIS LINE !!!!!

# Tus webhook name
HTTP_HOOK_NAME = 'pre-create'
# Make sure you set the content-type to JSON. Else the Hawk authentication could fail due to
→missing content type header
webhook_headers = {
    'HOOK-NAME'      : HTTP_HOOK_NAME,
    'Content-Type'   : 'application/json',
    'cache-control' : 'no-cache'
}

# Django webserver with hook url path
WEBHOOK_URL = config('WEBHOOK_URL')
# Creating a Hawk Authentication headers
hawk_auth = HawkAuth(id=config('DROPOFF_API_HAWK_KEY'), key=config('DROPOFF_API_HAWK_SECRET'))

```

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```
logger.debug(f'Start reading from STDIN for \'{HTTP_HOOK_NAME}\' hook.')
```

```
# Read stdin input data from the TUS daemon
data = ''.join(sys.stdin.readlines())

# Test if data is valid JSON... just to be sure...
# And we need some data from the JSON as well
study = None
try:
    logger.debug('Start parsing STDIN to validate it as JSON data')
    upload_data = json.loads(data)
    study = upload_data['Upload']['MetaData'].get('study')
    logger.debug('STDIN data is valid JSON data')
    logger.info(f'Start processing data drop for study ID: \'{study}\')
```

```
except json.decoder.JSONDecodeError as ex:
    logger.exception(f'STDIN data is NOT valid JSON data. Will stop processing further.
↳Exception message: {ex}')
    # Send exit code higher then 0 to stop the upload process on the Tus server
    sys.exit(1)

# We know for sure that JSON input data is 'valid'. So we post to the webhook for further
↳checking and actions
try:
    # Create a webhook POST request with.
    logger.debug(f'Post hook data back to the API {WEBHOOK_URL}')
    # Exception will be caught if there are network errors
    webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth, json=upload_
↳data)
    # If the POST is ok, and we get a 200 status back, so the upload can continue
    if webhook.status_code == requests.codes.ok:
        # This will make the Tus server continue the upload
        logger.info(f'Done processing data drop for study ID: \'{study}\'' in {datetime.now()-
↳start_time} (h:mm:ss.ms).')
        sys.exit(0)
    else:
        logger.error(f'Got HTTP status code: {webhook.status_code}')
```

```
except requests.exceptions.RequestException as ex:
    # Webhook post failed
    logger.exception(f'Webhook network error for study ID: \'{study}\'. Exception message: {ex}
↳')
```

```
except json.decoder.JSONDecodeError as ex:
    # Webhook response data is not valid JSON
    logger.exception(f'Webhook response data for study ID: \'{study}\'' is not JSON valid.
↳Exception message: {ex}')
```

```
# We had some errors, so upload has to be stopped
sys.exit(1)
```

7.3.2 post-finish

When the upload is done, the file needs to be processed and moved to the final destination. This is done with the *post-finish* hook.

This hook is a bit more complex and does multiple things.

- Check if there is a study ID
- Get the storage information based on the study ID
- Then it encrypts the file if requested
- Upload the file to the destination storages
- Report back if upload is processed correctly

```

1  #!/usr/bin/env python
2  import os
3  import logging
4  import logging.config
5
6  if os.path.isfile('logging.custom.ini'):
7      logging.config.fileConfig('logging.custom.ini')
8  else:
9      logging.config.fileConfig('logging.ini')
10
11 logger = logging.getLogger(__name__)
12
13 from datetime import datetime
14 start_time = datetime.now()
15
16 import sys
17 import json
18 import requests
19 from requests_hawk import HawkAuth
20 from decouple import config, Csv
21
22 from storage.storage import Storage
23 import storage.exceptions as StorageException
24
25 # What is the default cleaning policy:
26 # - None: File will be deleted when processed correctly. When there are errors, the file
27   ↳ will remain here
28 # - True: File will ALWAYS be deleted
29 # - False: File will NEVER be deleted
30 AUTO_CLEAN = None
31
32 # !!!!! NO CHANGES BELOW THIS LINE !!!!!
33
34 # Tus webhook name
35 HTTP_HOOK_NAME = 'post-finish'
36 # Make sure you set the content-type to JSON. Else the Hawk authentication could fail due to
37   ↳ missing content type header
38 webhook_headers = {
39     'HOOK-NAME'      : HTTP_HOOK_NAME,
40     'Content-Type'   : 'application/json',
41     'cache-control' : 'no-cache'
42 }
43
44 # Django webserver with hook url path
45 WEBHOOK_URL = config('WEBHOOK_URL')
46 # Creating a Hawk Authentication headers
47 hawk_auth = HawkAuth(id=config('DROPOFF_API_HAWK_KEY'), key=config('DROPOFF_API_HAWK_SECRET'))

```

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```

45
46 clean_setting = 'force clean' if AUTO_CLEAN else ('all uploads ok' if AUTO_CLEAN is None else
↳ 'force keep')
47
48 logger.debug(f'Start reading from STDIN for \'{HTTP_HOOK_NAME}\'' hook with cleaning setting:
↳ '{clean_setting}')
49 # Read stdin input data from the TUS daemon
50 data = ''.join(sys.stdin.readlines())
51
52 # Test if data is valid JSON... just to be sure...
53 # And we need some data from the JSON as well
54 study = None
55 try:
56     logger.debug('Start parsing STDIN to validate it as JSON data')
57     upload_data = json.loads(data)
58     upload_data['error'] = 0
59     study = upload_data['Upload']['MetaData'].get('study')
60     logger.debug('STDIN data is valid JSON data')
61     logger.info(f'Start processing data drop for study ID: \'{study}\''')
62 except json.decoder.JSONDecodeError as ex:
63     logger.exception(f'STDIN data is NOT valid JSON data. Will stop processing further.
↳ Exception message: {ex}')
64     # Send exit code higher than 0 to stop the upload process on the Tus server
65     sys.exit(1)
66
67 uploaded_file = upload_data['Upload']['Storage'].get('Path',None)
68 if not os.path.exists(uploaded_file):
69     logger.error(f'Uploaded file for study ID: \'{study}\'' is not available on disk! It has
↳ vanished from location: {uploaded_file}')
70     sys.exit(1)
71
72 # Here we could add some business logic like virus scanning, unzipping archives, or anonymise
↳ the data etc...
73
74 # We know for sure that JSON input data is 'valid'. So we post to the webhook for further
↳ checking and actions
75 try:
76     # Create a webhook POST request with the needed headers and data.
77     logger.debug(f'Post hook data back to the API ({WEBHOOK_URL}) with headers: {webhook_
↳ headers}')
78     # Exception will be caught if there are network errors
79     webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth, json=upload_
↳ data)
80     # print('Webhook result')
81     # print(webhook.status_code)
82     # # If the POST is ok, and we get a 200 status back, so the management system is aware of
↳ this upload and has stored the info in the database
83     if webhook.status_code != requests.codes.ok:
84         logger.error(f'The API did not give back a valid response code for study ID: \'{study}\''
↳ Terminate with HTTP error code: {webhook.status_code}')
85         sys.exit(1)
86
87     # Exception will be caught if not valid JSON
88     storage_data = webhook.json()
89     # print('Start processing data')
90     # print(storage_data)

```

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```

91
92 # Keep track of upload statuses. Either they succeed, or fail
93 upload_actions = []
94
95 # Loop over all the storage actions that came from the API
96 for storage_action in storage_data['storages']:
97     # Get the original filename, so that the file can be renamed back to original when the
98     ↪upload is done.
99     original_file_name = upload_data['Upload']['MetaData'].get('filename',None)
100     if original_file_name is None:
101         logger.warning('We are missing the original file name in the uploaded metadata.')
102         original_file_name = 'We_Do_Not_Know_The_Original_Name.unknown'
103
104     # Now we are uploading the files. We are doing this in a normal sync way, so we have to
105     ↪wait here.
106     # We get back True when upload was successfull. Else we get back False.
107     upload_ok = False
108     #print('Make storage engine')
109     #print(storage_action)
110     try:
111         encryption_key = None if '' == storage_action.get('encryption_password') else storage_
112         ↪action.get('encryption_password')
113
114         data_storage = Storage(storage_action['engine'],
115                                storage_action['location'],
116                                storage_action['username'],
117                                storage_action['password'],
118                                uploaded_file,
119                                os.path.join(storage_action['path'],original_file_name),
120                                encryption_key,
121                                storage_data.get('uploader_name'),
122                                storage_data.get('uploader_email'))
123
124         if encryption_key is not None:
125             data_storage.encrypt_source()
126
127         upload_ok = data_storage.upload_file()
128
129     except StorageException.FileDoesNotExist as ex:
130         upload_data['error'] = 1
131         upload_data['error_message'] = f'Error uploading source file: {original_file_name}
132         ↪with error: {ex}'
133         logger.error(upload_data['error_message'])
134         webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth,
135         ↪json=upload_data)
136
137     # TODO: Webhook call for reporting issue
138     except StorageException.InvalidAuthentication as ex:
139         upload_data['error'] = 1
140         upload_data['error_message'] = f'Authentication error for user: {storage_action[
141         ↪"username"]} with error: {ex}'
142         logger.error(upload_data['error_message'])
143         webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth,
144         ↪json=upload_data)
145
146     # Store the upload action for later reporting

```

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```

140     upload_actions.append({'storage' : storage_action['engine'], 'success' : upload_ok})
141     if upload_ok:
142         upload_data['done'] = 1
143         webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth,
↳ json=upload_data)
144     else:
145         logger.error(f'Error uploading file for study ID: \'{study}\'' to storage \'{storage_
↳ action["engine"]}\')
146
147 except requests.exceptions.RequestException as ex:
148     # Webhook post failed
149     logger.exception(f'Webhook network error for study ID: \'{study}\'. Exception message: {ex}
↳ ')
150     sys.exit(1)
151
152 except json.decoder.JSONDecodeError as ex:
153     # Webhook response data is not valid JSON
154     logger.exception(f'Webhook response data for study ID: \'{study}\'' is not JSON valid.
↳ Exception message: {ex}')
155     sys.exit(1)
156
157 uploads_ok = all([storage.get('success', False) for storage in upload_actions])
158 if not uploads_ok:
159     logger.error('Error uploading to the following storage(s): {}'.format(','.join([storage[
↳ 'storage'] for storage in upload_actions if not storage['success']])))
160
161 # We clean up the files either forced, or when all uploads are OK.
162 if AUTO_CLEAN or AUTO_CLEAN is None and uploads_ok:
163     logger.debug('Clearing original files')
164     # Remove original file
165     try:
166         os.remove(uploaded_file)
167     except FileNotFoundError as ex:
168         pass
169
170     # Remove the metadata file that comes with the uploaded file
171     try:
172         os.remove(f'{uploaded_file}.info')
173     except FileNotFoundError as ex:
174         pass
175
176 # All done!
177 logger.info('Done processing data drop for study ID: \'{study}\'' to storage(s) \'{storage}\'' in {stud
↳ y}
↳ (h:mm:ss.ms)'.format(study,
↳ ','.join([storage['storage'] for storage in upload_actions if storage[
↳ 'success']])),
178
↳
179     datetime.now()-start_time))
180 sys.exit(0)

```


Chapter 8

VRW

This part of the application is for integrating with the RUG Virtual Research Workspaces ([VRW](#)). The app will provide a REST API interface for machine management. An external script or system can then retrieve the information from the API about which workspaces to create and which to clean up.

8.1 Authorization

This part of the API is only accessible with accounts that are added to a special [VRW](#) API group. By default this group is called 'vre-api' and be changed with the setting 'VRW_API_GROUP'. This is done so that normal users are not able to change [VRW](#) statuses. The authentication is done by the general REST API.

```
class apps.virtual_machine.providers.vrw.permissions.IsVRWAPIUser
    Global user check if the API user is a member of the 'VRW_API_GROUP' group. Else access is denied.

    The group needs to be added in the settings and created in the Django admin.

    has_permission(request, view)
        Return True if permission is granted, False otherwise.
```

8.2 Config

```
class apps.virtual_machine.providers.vrw.apps.VrwConfig(app_name, app_module)
    This is the default configuration for the VRW application.
```

The settings can be configured in the main settings.py file of the project.

Parameters

- `settings.VRW_API_GROUP` (*string*) – This is the [VRW](#) API group name that is allowed to make the VRW API calls on the REST server. Default `vrw-api`
- `settings.VRW_MACHINE_ACTIVE_DURATION` (*timedelta*) – This is the duration of which a [VRW](#) is available. Default 1 year.

```
ready()
    Load custom signals for creating VRW models
```

8.3 Models

```
class apps.virtual_machine.providers.vrw.models.Workspace(*args, **kwargs)
```

A class for creating *VRW* from Virtual Machines. When creating a new Workspace with the status *NEW*, it should be picked up by the Workspace system in order to create the new *VRW*.

By default the *VRW* is created by a signal process where it uses the variable 'VRW_MACHINE_ACTIVE_DURATION' to create *VRW* for 1 year.

It will inherit the attributes *created_at* and *updated_at* from the Abstract model *MetaDataModel*. It will inherit the attributes *cloud_id* from the Abstract model *CloudBasicDataModel*.

```
virtual_machine
```

The Virtual Machine that needs to be created as a *VRW*

Type *VirtualMachine*

```
starting_at
```

The date and timestamp when this *VRW* should be created.

Type Datetime

```
ending_at
```

The date and timestamp when this *VRW* should be removed.

Type int

```
status
```

The status of the *VRW*. When created. Default is *NEW*

Type string

```
exception DoesNotExist
```

```
exception MultipleObjectsReturned
```

```
class apps.virtual_machine.providers.vrw.models.WorkspaceQueue(id, created_at, updated_at, data)
```

```
exception DoesNotExist
```

```
exception MultipleObjectsReturned
```

```
class apps.virtual_machine.providers.vrw.models.WorkspaceStatus(value)
```

A class for defining *VRW* status as choices. Currently the following statuses are supported:

NEW

This is the state where every *VRW* starts with. This means that the *VRW* config is created, but it has not been created yet by the cloud provider

UPDATING

The *VRW* is being created on the cloud provider infrastructure.

DONE

The *VRW* is created by the cloud provider and can be used by the customer

ERROR

The *VRW* could not be created by the cloud provider. There was an (unknown) error.

OFFLINE

The *VRW* is offline and not reachable. Reasons are not known. But this can be used for trigger an investigation

DELETE

The *VRW* is marked for deleting from the cloud platform

TERMINATED

The *VRW* is closed/deleted by the cloud provider without reason.

8.4 Views

```
class apps.virtual_machine.providers.vrw.views.WorkspaceDetail(**kwargs)
```

Show detail information for a specific Virtual Workspace.

`serializer_class`

alias of `apps.virtual_machine.providers.vrw.serializers.WorkspaceSerializer`

```
class apps.virtual_machine.providers.vrw.views.WorkspaceList(**kwargs)
```

Give a list of all the available Virtual Workspaces ordered by the creating date. Showing oldest first by default.

The list can be filtered by using the status variable. Set the status to 'NEW' and you will only see Virtual Workspaces with that status.

Parameters `status (string) (optional)` – The status to filter on

Raises `NotFound` – When an invalid filter has been entered

Returns A list of `VRW` items based on `status`

Return type list

```
get_queryset()
```

Return a list of items optionally filtered by url query field `status` ordered by `created_at` ascending.

Raises `NotFound` – When an invalid status filter is used.

Returns A list of `VRW` items based on `status`

Return type list

`serializer_class`

alias of `apps.virtual_machine.providers.vrw.serializers.WorkspaceQueueSerializer`

```
class apps.virtual_machine.providers.vrw.views.WorkspaceStatusUpdate(**kwargs)
```

This is an update view where the status of a Virtual Workspace can be changed.

`serializer_class`

alias of `apps.virtual_machine.providers.vrw.serializers.WorkspaceStatusUpdateSerializer`

8.5 Serializers

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceQueueSerializer(*args, **kwargs)
```

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceResearcherSerializer(*args,
**kwargs)
```

This serializer will only pick the fields `first_name`, `last_name` and `email` from the `Researcher` model to use in the `VRW` output.

Parameters

- `first_name (str)` – `first_name`
- `last_name (str)` – `last_name`
- `email_address (str)` – `email`

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceSerializer(*args, **kwargs)
```

This serializer will hold all the data that is needed for a single `VRW`. It holds the following information:

Parameters

- `id (int)` – The `VRW` ID
- `study (WorkspaceStudySerializer)` – The study data for which the `VRW` needs to be created
- `researcher (WorkspaceResearcherSerializer)` – The researcher for which the `VRW` needs to be created
- `type (str)` – The `VRW` profile (`profile`)
- `disk (int)` – The total disk size for this `VRW` (`total_storage`)
- `memory (int)` – The total memory size for this `VRW` (`total_memory`)

- `gpu` (*int*) – The amount of GPUs for this *VRW* (*additional_gpu_amount*)
- `request_date` (*datetime*) – The date that this *VRW* has been requested
- `start_date` (*datetime*) – The date that this *VRW* should be created / available to the end user
- `end_data` (*datetime*) – The date that this *VRW* will be removed.
- `status` (*str*) – The current status for this *VRW* (`apps.vrw.models.WorkspaceStatus`).
- `remote_id` (*str*) – The ID that is created by the remote cloud system

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceStatusUpdateSerializer(*args,
                                                                                       **kwargs)
```

This serializer is used for updating the *VRW* status.

Parameters

- `status` (*str*) – The new status for this *VRW* (`apps.virtual_machine.providers.vrw.models.WorkspaceStatus`).
- `remote_id` (*str*) – The new ID that is created by the remote cloud system

```
update(instance, validated_data)
```

Update the actual *VRW* with new status data

Parameters

- `instance` (`Workspace`) – The original *VRW* object
- `validated_data` (*JSON*) – The cleaned and validated data to change with.

Returns The *VRW* object with the new status and optional remote id.

Return type `VirtualWorkspace`

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceStorageSerializer(*args, **kwargs)
```

```
class apps.virtual_machine.providers.vrw.serializers.WorkspaceStudySerializer(*args, **kwargs)
```

This serializer will only pick the fields `id` and `name` from the *Study* model to use in the *VRW* output.

Parameters

- `id` (*int*) – `id`
- `name` (*str*) – `name`

8.6 Signals

```
apps.virtual_machine.providers.vrw.signals.create_virtual_machine_vrw(sender, instance, created,
                                                                      **kwargs)
```

When a new virtual machine is created, this signal will be fired in order to check if a *VRW* needs to be created.

When a `VirtualMachine` is created for the first time, and does not have a *VRW* `Workspace` attached, the software will check on the operating system what to do.

At this point the check if a *VRW* needs to be created is done on the **operating system**. If the selected operating system has a *VRW* Part configured, it is assumed that we need to create the *VRW*.

Parameters

- `sender` (*class*) – The modelclass `VirtualMachine`
- `instance` (`VirtualMachine`) – The `Virtual machine` that is either created or updated.
- `created` (*bool*) – Is the `Virtual Machine` created. If false, it is an update.

8.7 Glossary

VRW A Virtual Research Workspace is a virtual desktop where the researcher can do its work.

Chapter 9

OpenStack

This part of the application is for integrating with the OpenStack at HPC for creating Virtual Private Systems (*VPS*). The app will provide a general OpenStack client and some logic for creating *VPS*-es.

9.1 Config

```
class apps.virtual_machine.providers.openstack.apps.OpenstackConfig(app_name, app_module)
    This is the default configuration for the OpenStack application.
```

The settings can be configured in the main settings.py file of the project.

Parameters `settings.OPENSTACK_MACHINE_ACTIVE_DURATION` (*timedelta*) – This is the duration of which a *VPS* is available. Default 1 year.

```
ready()
    Load custom signals for creating VPS models
```

9.2 Models

```
class apps.virtual_machine.providers.openstack.models.Workspace(*args, **kwargs)
    A class for creating VPS from Virtual Machines. When creating a new Workspace with the status NEW, it should be picked up by the Workspace system in order to create the new VPS.
```

By default the *VPS* is created by a signal process where it uses the variable 'OPENSTACK_MACHINE_ACTIVE_DURATION' to create *VPS* for 1 year.

It will inherit the attributes *created_at* and *updated_at* from the Abstract model *MetaDataModel* It will inherit the attributes *cloud_id* from the Abstract model *CloudBasicDataModel*

```
virtual_machine
    The Virtual Machine that needs to be created as a VPS
```

Type *VirtualMachine*

```
starting_at
    The date and timestamp when this VPS should be created.
```

Type Datetime

```
ending_at
    The date and timestamp when this VPS should be removed.
```

Type int

`status`

The status of the *VPS*. When created. Default is *NEW*

Type string

exception `DoesNotExist`

exception `MultipleObjectsReturned`

`class apps.virtual_machine.providers.openstack.models.WorkspaceStatus(value)`

A class for defining *VPS* status as choices. Currently the following statuses are supported:

NEW

This is the state where every *VPS* starts with. This means that the *VPS* config is created, but it has not been created yet by the cloud provider

UPDATING

The *VPS* is being created on the cloud provider infrastructure.

DONE

The *VPS* is created by the cloud provider and can be used by the customer

ERROR

The *VPS* could not be created by the cloud provider. There was an (unknown) error.

OFFLINE

The *VPS* is offline and not reachable. Reasons are not known. But this can be used for trigger an investigation

DELETE

The *VPS* is marked for deleting from the cloud platform

TERMINATED

The *VPS* is closed/deleted by the cloud provider without reason.

9.3 Signals

```
apps.virtual_machine.providers.openstack.signals.create_virtual_machine_openstack(sender,
                                                                                   instance,
                                                                                   created,
                                                                                   **kwargs)
```

When a new virtual machine is created, this signal will be fired in order to check if a *VPS* needs to be created.

When a `VirtualMachine` is created for the first time, and does not have a `OpenStack Workspace` attached, the software will check on the operating system what to do.

At this point the check if a *VPS* needs to be created is done on the **operating system**. If the selected operating system has a *VPS* Part configured, it is assumed that we need to create the *VPS*.

Parameters

- `sender` (*class*) – The modelclass `VirtualMachine`
- `instance` (`VirtualMachine`) – The `Virtual machine` that is either created or updated.
- `created` (*bool*) – Is the `Virtual Machine` created. If false, it is an update.

9.4 Glossary

VPS A Virtual Private System. This is a dedicated machine where the researcher can work on remotely.

Chapter 10

Development

In order to develop on this software, you can setup a development environment using these steps.

In order to install this Virtual Research Environment project, we use the following packages / software.

- Redis
- Django
- NGINX
- TUSD (The Upload Server Daemon)
- Demo portal

First we need to checkout the code.

```
git clone https://git.web.rug.nl/VRE/Broker.git
```

10.1 Redis

Redis is used for storing the schedule/background actions. For development we use the default Redis setup **without** authentication. Install Redis with the default package manager. For Debian based:

```
sudo apt install redis-server
```

10.2 Django

The Django code consists of three parts. There is a REST API server, a background scheduler and a demo portal. For development we use all three parts. They all work from the same Python3 virtual environment.

10.2.1 Common

First we need to create the Python virtual environment. This is done with Python 3.

```
python3 -m venv venv
```

This will give us a virtual python environment on the location *venv* in the root of the code dir. Next we need to install the required libraries

```
source venv/bin/activate  
pip install -r VRE/requirements.txt
```

10.2.2 REST API

Out of the box the REST API server only needs two required settings to work. These settings needs to be placed in a `.env` file located in the `VRE/VRE` folder. There should be an `.env.example` file which you can use as a template.

The minimal settings that needs to be set are:

- **SECRET_KEY**: A uniquely secret key. Used for cookie/session encryption
- **DEBUG**: Enable debug

Then we can setup and start the REST API server with the following commands.

```
source venv/bin/activate
./VRE/manage.py migrate
./VRE/manage.py loaddata virtual_machine_initial_data
./VRE/manage.py loaddata university_initial_data
./VRE/manage.py createsuperuser
```

And start with:

```
source venv/bin/activate
./VRE/manage.py runserver 0.0.0.0:1337
```

Now you can access your REST API server documentation on <http://localhost:1337/api/redoc/> and the admin at <http://localhost:1337/admin/>

There are more settings available to setup. These can be added the to `.env` file of the REST API.

```
# A uniquely secret key
# https://docs.djangoproject.com/en/dev/ref/settings/#secret-key
SECRET_KEY=@wb=#(f4uc0l%e!5*eo+aoflnxb(@!l9!=c5w=4b+x$=!8&vy%'

# Disable debug in production
# https://docs.djangoproject.com/en/dev/ref/settings/#debug
DEBUG=False

# Allowed hosts that Django does server. Use comma separated list Take care when NGINX is
→ proxying in front of Django
# https://docs.djangoproject.com/en/dev/ref/settings/#allowed-hosts
ALLOWED_HOSTS=127.0.0.1,localhost

# All internal IPS for Django. Use comma separated list
# https://docs.djangoproject.com/en/dev/ref/settings/#internal-ips
INTERNAL_IPS=127.0.0.1

# Enter the database url connection. Enter all parts even the port numbers: https://github.
→ com/jacobian/dj-database-url
# By default a local sqlite3 database is used.
DATABASE_URL=sqlite:///db.sqlite3

# The location on disk where the static files will be placed during deployment. Setting is
→ required
# https://docs.djangoproject.com/en/dev/ref/settings/#static-root
STATIC_ROOT=

# Enter the default timezone for the visitors when it is not known.
# https://docs.djangoproject.com/en/dev/ref/settings/#std:setting-TIME_ZONE
TIME_ZONE=Europe/Amsterdam

# Email settings
```

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```
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host
# EMAIL_HOST=

# Email user name
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host-user
# EMAIL_HOST_USER=

# Email password
# https://docs.djangoproject.com/en/dev/ref/settings/#email-host-password
# EMAIL_HOST_PASSWORD=

# Email server port number to use. Default is 25
# https://docs.djangoproject.com/en/dev/ref/settings/#email-port
# EMAIL_PORT=

# Does the email server supports TLS?
# https://docs.djangoproject.com/en/dev/ref/settings/#email-use-tls
# EMAIL_USE_TLS=

https://docs.djangoproject.com/en/dev/ref/settings/#default-from-email
DEFAULT_FROM_EMAIL=Do not reply<no-reply@rug.nl>

# The sender address. This needs to be one of the allowed domains due to SPF checks
# The code will use a reply-to header to make sure that replies goes to the researcher and
↳not this address
EMAIL_FROM_ADDRESS=Do not reply<no-reply@rug.nl>

# The Redis server is used for background tasks. Enter the variables below. Leave password
↳empty if authentication is not enabled.
# The hostname or IP where the Redis server is running. Default is localhost
REDIS_HOST=localhost

# The Redis port number on which the server is running. Default is 6379
REDIS_PORT=6379

# The Redis password when authentication is enabled
# REDIS_PASSWORD=

# The amount of connections to be made inside a connection pool. Default is 10
REDIS_CONNECTIONS=10

# Enter the full path to the Webbased file uploading without the Study ID part. The Study ID
↳will be added to this url based on the visitor.
DROPOFF_BASE_URL=http://localhost:8000/dropoffs/

# Enter the full url to the NGINX service that is in front of the TUSD service. By default
↳that is http://localhost:1090
DROPOFF_UPLOAD_HOST=http://localhost:1090

# Which file extensions are **NOT** allowed to be uploaded. By default the extensions exe,com,
↳bat,lnk,sh are not allowed
DROPOFF_NOT_ALLOWED_EXTENSIONS=exe,com,bat,lnk,sh

# Sentry settings
# Enter the full Sentry DSN string. This should contain a key and a project
SENTRY_DSN=
```

10.2.3 Scheduler

The scheduler is used for background tasks such as creating new workspaces or other long taking actions. The scheduler needs the same python3 environment as the REST API. So here we assume that the Python3 virtual environment is setup correctly.

```
source venv/bin/activate
./VRE/manage.py run_huey
```

10.2.4 Users

We also need a TUSD user for API communication between the REST API and the TUSD server. So we create a new user in the REST API admin. Go to <http://localhost:1337/admin/auth/user/add/> and create a new user. When the user is created go to the API tokens and select the token for the TUSD user. We need the *key* and *secret* of the TUSD user for later use. make sure the TUSD user has the **superuser** status. This is needed.

10.3 NGINX

NGINX is used on multiple places on the project. This means that we will create multiple virtual domains to get everything working correctly.

We do not cover SSL setups in this document

10.3.1 Common

First install NGINX with LUA support through the package manager. For Debian based this would be:

```
sudo apt install nginx libnginx-mod-http-lua
```

10.3.2 TUSD

10.3.2.1 LUA

There is usage of LUA in NGINX so we can handle some dynamic data on the server side. All LUA code should be placed in the folder */etc/nginx/lua*.

```
sudo ln -s /opt/deploy/VRE/nginx/lua /etc/nginx/lua
```

10.3.2.2 VHost

After installation of the packages, create a symbolic link in the */etc/nginx/sites-enabled* so that a new VHost is created.

Important parts of the VHost configuration:

```
##
# You should look at the following URL's in order to grasp a solid understanding
# of Nginx configuration files in order to fully unleash the power of Nginx.
# https://www.nginx.com/resources/wiki/start/
# https://www.nginx.com/resources/wiki/start/topics/tutorials/config_pitfalls/
# https://wiki.debian.org/Nginx/DirectoryStructure
#
```

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```

# In most cases, administrators will remove this file from sites-enabled/ and
# leave it as reference inside of sites-available where it will continue to be
# updated by the nginx packaging team.
#
# This file will automatically load configuration files provided by other
# applications, such as Drupal or Wordpress. These applications will be made
# available underneath a path with that package name, such as /drupal8.
#
# Please see /usr/share/doc/nginx-doc/examples/ for more detailed examples.
##

# Default server configuration
#

js_import dropoff_tus.js;
js_set $updateTusMetadata dropoff_tus.updateTusMetadata;

server {
    listen 1090;
    listen [::]:1090;

    # SSL configuration
    #
    # listen 443 ssl default_server;
    # listen [::]:443 ssl default_server;
    #
    # Note: You should disable gzip for SSL traffic.
    # See: https://bugs.debian.org/773332
    #
    # Read up on ssl_ciphers to ensure a secure configuration.
    # See: https://bugs.debian.org/765782
    #
    # Self signed certs generated by the ssl-cert package
    # Don't use them in a production server!
    #
    # include snippets/snakeoil.conf;

    # Kubernetes DNS resolv info...
    # https://www.nginx.com/blog/dns-service-discovery-nginx-plus/ -> 'Setting the Domain
    ↪Name in a Variable'
    # https://develloppaper.com/nginx-dynamic-resolve-upstream-servers/
    resolver 127.0.0.1 valid=30s;

    root /var/www/html;

    # Add index.php to the list if you are using PHP
    index index.html index.htm index.nginx-debian.html;

    server_name _;

    access_log /var/log/nginx/tusd.access.log;
    error_log /var/log/nginx/tusd.error.log debug;

    # This location is hit when the Tus upload is starting and providing meta data for the
    ↪upload.
    # The actual upload is done with the /files location below

```

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```

location ~ /files/([0-9a-f]+\-[0-9a-f]+\-[1-5][0-9a-f]+\-[89ab][0-9a-f]+\-[0-9a-f]+)?/ {
    set $study_id $1; # Here we capture the UUIDv4 value to use in the Tus metadata
    ↪manipulation

    # Here we update the Tus server metadata so we can add the project uuid to it for
    ↪further processing
    proxy_set_header Upload-Metadata $updateTusMetadata;

    # Rewrite the url so that the project UUIDv4 is stripped from the url to the Tus
    ↪server
    rewrite ^.*$ /files/ break;

    # Disable request and response buffering
    proxy_request_buffering off;
    proxy_buffering off;

    client_max_body_size 0;

    # Forward incoming requests to local tusd instance
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Host $host;
    # Make sure to hardcoded set to https. As kubernetes is proxying based on http from
    ↪the ingress
    # Else TUSD will redirect incorrect http hosts
    # https://github.com/tus/tusd/blob/master/docs/faq.md#can-i-run-tusd-behind-a-reverse-
    ↪proxy
    # https://github.com/tus/tusd/blob/master/examples/nginx.conf
    proxy_set_header X-Forwarded-Proto https;

    set $tus_upload localhost;
    proxy_pass http://$tus_upload:1080;

    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
}

location ~ /files {
    # Disable request and response buffering
    proxy_request_buffering off;
    proxy_buffering off;

    client_max_body_size 0;

    # Forward incoming requests to local tusd instance
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Host $host;
    # Make sure to hardcoded set to https. As kubernetes is proxying based on http from
    ↪the ingress
    # Else TUSD will redirect incorrect http hosts
    # https://github.com/tus/tusd/blob/master/docs/faq.md#can-i-run-tusd-behind-a-reverse-
    ↪proxy

```

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```

# https://github.com/tus/tusd/blob/master/examples/nginx.conf
proxy_set_header    X-Forwarded-Proto https;

set $tus_upload localhost;
proxy_pass           http://$tus_upload:1080;

proxy_http_version 1.1;
proxy_set_header    Upgrade $http_upgrade;
proxy_set_header    Connection "upgrade";
}
}

```

And there should be a *lua* folder in the */etc/nginx* folder. This can be a symbolic link to the LUA folder that is provided with this project.

In order to test if NGINX is configured correctly run *nginx -t* and it should give an OK message:

```

nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful

```

10.4 TUS

TUS = [The Upload Server](#). This is a resumable upload server that speaks HTTP. This server is a stand-alone server that is running behind the NGINX server. This is needed as NGINX is manipulating the headers so extra information is added to the uploads.

It is even possible to run a TUS instance on a different location (Amsterdam). As long as the TUS is reachable by the NGINX frontend server, and the TUS server can post webhooks back to the REST API server.

10.4.1 Setup

The services is started with a simple bash script. This makes sure that all settings are loaded and the right parameters are used with the TUSD Go daemon server.

The daemon needs to know the following information. These settings are required:

- **WEBHOOK_URL**: This is the full url to the REST API server to post updates during uploads.
- **DROPOFF_API_HAWK_KEY**: The key for the token that is created on the REST API server for communication with the REST API server.
- **DROPOFF_API_HAWK_SECRET**: The secret value that belongs to the token *DROPOFF_API_HAWK_KEY*.

This information can be placed in an *.env* file in the same folder where the startup (*startup.sh*) script is located. An example *.env* file:

```

# TUS Daemon settings
# Change the required variable below to your needs.
# You can here also overrule the default variables in the startup.sh script

# This is the full url to the REST API server to post updates during uploads.
WEBHOOK_URL=http://localhost:8000/api/v1/droptoffs/webhook/

# The key for the token that is created on the REST API server for communication with the
↳ REST API server.
DROPOFF_API_HAWK_KEY=[ENTER_HAWK_KEY]

```

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```
# The secret value that belongs to the token DROPOFF_API_HAWK_KEY.
DROPOFF_API_HAWK_SECRET=[ENTER_HAWK_SECRET]
```

In the startup.sh script there are some default variables that can be overwritten by adding them to the .env file above.

```
# The default TUSD working directory.
TUSD_WORKINGDIR="${PWD}"
# The TUSD Go executable location.
TUSD_EXECUTABLE="${TUSD_WORKINGDIR}/tusd"
# The TUSD upload folder where the files are temporary stored during uploads.
TUSD_UPLOADDIR="${TUSD_WORKINGDIR}/upload_data"
# Fixed setting in order to make TUSD work behind NGINX.
TUSD_ARGUMENTS="-behind-proxy"
# The location of the web hooks scripts. These are used for communicating with the REST API.
TUSD_HOOKDIR="${TUSD_WORKINGDIR}/hooks"
# Fixed setting which hooks are currently used.
TUSD_ENABLED_HOOKS="post-finish,pre-create"
```

This will start the TUS server running on TCP port 1080.

10.4.1.1 Data storage

The upload data is stored at a folder that is configured in the TUS startup command. This should be folder that is writable by the user that is running the TUS instance. **Make sure that the upload folder is not directly accessible by the webserver.** Else files can be downloaded.

10.4.1.2 Hooks

The TUS is capable of handling hooks based on uploaded files. There are two types of hooks. ‘Normal’ hooks and webhooks. It is not possible to run both hook systems at the same time due to the blocking nature of the pre-create hook. So we use the ‘normal’ hook system. That means that custom scripts are run. Those scripts can then post the data to a webserver in order to get a Webhook functionality with the ‘normal’ hooks. At the moment, there is only a HTTP API call done in the hook system. There is no actual file movement yet. For now we have used the following hooks:

- **pre-create:** This hook will run when a new upload starts. This will trigger the REST API server to store the upload in the database, and check if the upload is allowed based on an unique upload url and unique upload code.
- **post-finish:** This hook will run when an upload is finished. And will update the REST API server with the file size and actual filename (unique) on disk.

An example of a hook as used in this project is the *pre-create.py* script.

```
#!/usr/bin/env python
import os
import logging
import logging.config

if os.path.isfile('logging.custom.ini'):
    logging.config.fileConfig('logging.custom.ini')
else:
    logging.config.fileConfig('logging.ini')

logger = logging.getLogger(__name__)
```

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```

from datetime import datetime
start_time = datetime.now()

import sys
import json
import requests
from requests_hawk import HawkAuth
from decouple import config, Csv

# !!!!! NO CHANGES BELOW THIS LINE !!!!!

# Tus webhook name
HTTP_HOOK_NAME = 'pre-create'
# Make sure you set the content-type to JSON. Else the Hawk authentication could fail due to
↳missing content type header
webhook_headers = {
    'HOOK-NAME'      : HTTP_HOOK_NAME,
    'Content-Type'   : 'application/json',
    'cache-control'  : 'no-cache'
}
# Django webserver with hook url path
WEBHOOK_URL = config('WEBHOOK_URL')
# Creating a Hawk Authentication headers
hawk_auth = HawkAuth(id=config('DROPOFF_API_HAWK_KEY'), key=config('DROPOFF_API_HAWK_SECRET'))

logger.debug(f'Start reading from STDIN for \'{HTTP_HOOK_NAME}\'' hook.')
# Read stdin input data from the TUS daemon
data = ''.join(sys.stdin.readlines())

# Test if data is valid JSON... just to be sure...
# And we need some data from the JSON as well
study = None
try:
    logger.debug('Start parsing STDIN to validate it as JSON data')
    upload_data = json.loads(data)
    study = upload_data['Upload']['MetaData'].get('study')
    logger.debug('STDIN data is valid JSON data')
    logger.info(f'Start processing data drop for study ID: \'{study}\''')
except json.decoder.JSONDecodeError as ex:
    logger.exception(f'STDIN data is NOT valid JSON data. Will stop processing further.↳
↳Exception message: {ex}')
    # Send exit code higher than 0 to stop the upload process on the Tus server
    sys.exit(1)

# We know for sure that JSON input data is 'valid'. So we post to the webhook for further↳
↳checking and actions
try:
    # Create a webhook POST request with.
    logger.debug(f'Post hook data back to the API {WEBHOOK_URL}')
    # Exception will be caught if there are network errors
    webhook = requests.post(WEBHOOK_URL, headers=webhook_headers, auth=hawk_auth, json=upload_
↳data)
    # If the POST is ok, and we get a 200 status back, so the upload can continue
    if webhook.status_code == requests.codes.ok:
        # This will make the Tus server continue the upload
        logger.info(f'Done processing data drop for study ID: \'{study}\'' in {datetime.now()-
↳start_time} (h:mm:ss.ms).')

```

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```

    sys.exit(0)
else:
    logger.error(f'Got HTTP status code: {webhook.status_code}')

except requests.exceptions.RequestException as ex:
    # Webhook post failed
    logger.exception(f'Webhook network error for study ID: \'{study}\'. Exception message: {ex}
↳')

except json.decoder.JSONDecodeError as ex:
    # Webhook response data is not valid JSON
    logger.exception(f'Webhook response data for study ID: \'{study}\' is not JSON valid.↳
↳Exception message: {ex}')

# We had some errors, so upload has to be stopped
sys.exit(1)

```

This hook uses the same data payload as when TUS would use the Webhook system. So using ‘Normal’ hooks or using Webhooks with REST API Server should both work out of the box.

10.5 Demo portal

In order to test the REST API and be able to give a demo, there is a demo portal that can be used.

Out of the box the Demo portal only needs a few required settings to work. These settings needs to be placed in a .env file located in the demo_portal/demo_portal folder. There should be an .env.example file which you can use as a template.

The minimal settings that needs to be set are:

- **SECRET_KEY**: A uniquely secret key. Used for cookie/session encryption
- **DEBUG**: Enable debug
- **DROPOFF_API_USER_KEY**: The key for the token that is created on the REST API server for communication with the REST API server.
- **DROPOFF_API_USER_SECRET**: The secret value that belongs to the token *DROPOFF_API_USER_KEY*.

Then we can setup and start the demo portal with the following commands.

```

source venv/bin/activate
./VRE/manage.py migrate

```

And start with:

```

source venv/bin/activate
./VRE/manage.py runserver 0.0.0.0:8000

```

Now you can access your demo portal at <http://localhost:8000>. In order to login as a researcher, you need to create a new user on the REST API server admin. Because the portal is using the REST API server for logging users in.

There are more settings available to setup. These can be added the to .env file of the demo portal.

```

# A uniquely secret key
# https://docs.djangoproject.com/en/dev/ref/settings/#secret-key
SECRET_KEY=@wb=#(f4uc0l%e!5*eo+aoflnxb(@!l9!=c5w=4b+x$=!8&vy%'

# Disable debug in production

```

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```
# https://docs.djangoproject.com/en/dev/ref/settings/#debug
DEBUG=False

# Allowed hosts that Django does server. Use comma separated list Take care when NGINX is
↳ proxying in front of Django
# https://docs.djangoproject.com/en/dev/ref/settings/#allowed-hosts
ALLOWED_HOSTS=127.0.0.1,localhost

# All internal IPS for Django. Use comma separated list
# https://docs.djangoproject.com/en/dev/ref/settings/#internal-ips
INTERNAL_IPS=127.0.0.1

# Enter the database url connection. Enter all parts even the port numbers: https://github.com/jacobian/dj-database-url
↳ By default a local sqlite3 database is used.
# DATABASE_URL_PORTAL=

# The location on disk where the static files will be placed during deployment. Setting is
↳ required
# https://docs.djangoproject.com/en/dev/ref/settings/#static-root
STATIC_ROOT=

# Enter the default timezone for the visitors when it is not known.
# https://docs.djangoproject.com/en/dev/ref/settings/#std:setting-TIME\_ZONE
TIME_ZONE=Europe/Amsterdam

# Enter the super API user his key and secret
# DROPOFF_API_USER_KEY=
# DROPOFF_API_USER_SECRET=

# What is the full VRE Portal domains. By default http://localhost:1337/api
# VRE_BROKER_API=
```

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