

Package ‘gypsum’

May 1, 2024

Version 1.1.0

Date 2024-04-25

Title Interface to the gypsum REST API

Description Client for the gypsum REST API (<https://gypsum.artifactdb.com>), a cloud-based file store in the ArtifactDB ecosystem.
This package provides functions for uploads, downloads, and various administrative and management tasks.
Check out the documentation at <https://github.com/ArtifactDB/gypsum-worker> for more details.

License MIT + file LICENSE

Imports utils, tools, httr2, jsonlite, paws.storage, parallel,
filelock

Suggests knitr, rmarkdown, testthat, BiocStyle, digest, jsonvalidate,
DBI, RSQLite, S4Vectors, methods

RoxygenNote 7.3.1

VignetteBuilder knitr

URL <https://github.com/ArtifactDB/gypsum-R>

BugReports <https://github.com/ArtifactDB/gypsum-R/issues>

biocViews DataImport

git_url <https://git.bioconductor.org/packages/gypsum>

git_branch devel

git_last_commit 45c0671

git_last_commit_date 2024-04-30

Repository Bioconductor 3.20

Date/Publication 2024-05-01

Author Aaron Lun [aut, cre]

Maintainer Aaron Lun <infinite.monkeys.with.keyboards@gmail.com>

Contents

abortUpload	3
accessToken	4
approveProbation	5
cacheDirectory	6
cloneVersion	7
completeUpload	9
createProject	10
fetchLatest	11
fetchManifest	12
fetchMetadataDatabase	13
fetchMetadataSchema	14
fetchPermissions	15
fetchQuota	16
fetchSummary	17
fetchUsage	18
formatObjectMetadata	19
listAssets	20
listFiles	20
listProjects	21
listVersions	22
prepareDirectoryUpload	23
publicS3Config	24
refreshLatest	25
refreshUsage	26
rejectProbation	27
removeAsset	28
removeProject	29
removeVersion	30
resolveLinks	31
restUrl	32
saveFile	33
saveVersion	34
searchMetadataText	35
setPermissions	37
setQuota	38
startUpload	39
uploadDirectory	41
uploadFiles	43
validateMetadata	44

Index

46

abortUpload	<i>Abort an upload</i>
-------------	------------------------

Description

Abort an upload session, usually after an irrecoverable error.

Usage

```
abortUpload(init, url = restUrl())
```

Arguments

init	List containing abort_url and session_token. This is typically the return value from startUpload .
url	String containing the URL of the gypsum REST API.

Value

NULL is invisibly returned on successful abort.

Author(s)

Aaron Lun

See Also

[startUpload](#), to create init.

Examples

```
tmp <- tempfile()
dir.create(tmp)
write(file=file.path(tmp, "blah.txt"), LETTERS)
dir.create(file.path(tmp, "foo"))
write(file=file.path(tmp, "foo", "bar.txt"), 1:10)

if (interactive()) {
  init <- startUpload(
    project="test-R",
    asset="upload-abort-check",
    version="v1",
    files=list.files(tmp, recursive=TRUE),
    probation=TRUE,
    directory=tmp
  )

  # Aborting the upload.
  abortUpload(init)
```

```
}

```

accessToken

Get and set GitHub access tokens

Description

Get and set GitHub access tokens for authentication to the gypsum API's endpoints.

Usage

```
accessToken(full = FALSE, request = TRUE, cache = cacheDirectory())
```

```
setAccessToken(
  token,
  app.url = restUrl(),
  app.key = NULL,
  app.secret = NULL,
  github.url = "https://api.github.com",
  user.agent = NULL,
  cache = cacheDirectory()
)
```

Arguments

full	Logical scalar indicating whether to return the full token details.
request	Logical scalar indicating whether to request a new token if no cached token is available or if the current token has expired.
cache	String containing a path to the cache directory, to store the token across R sessions. If NULL, the token is not cached to (or read from) disk, which improves security on shared filesystems.
token	String containing a GitHub personal access token. This should have the "read:org" and "read:user" scopes. If missing, the user will be prompted to use GitHub's OAuth web application flow to acquire a token. If NULL, any existing tokens are cleared from cache.
app.url	String containing a URL of the gypsum REST API. This is used to obtain app.key and app.secret if either are NULL.
app.key	String containing the key for a GitHub OAuth app.
app.secret	String containing the secret for a GitHub OAuth app.
github.url	String containing the URL for the GitHub API. This is used to acquire more information about the token.
user.agent	String specifying the user agent for queries to various endpoints.

Value

setAccessToken sets the access token and invisibly returns a list containing:

- token, a string containing the token.
- name, the name of the GitHub user authenticated by the token.
- expires, the Unix time at which the token expires.

If full=TRUE, accessToken returns the same list, typically retrieved from one of the caches. If no token was cached or the cached token has expired, it will call setAccessToken with default arguments to obtain one if request=TRUE; otherwise if request=FALSE, NULL is returned.

If full=FALSE, accessToken will return a string containing a token (or NULL, if no token is available and request=FALSE).

Author(s)

Aaron Lun

Examples

```
if (interactive()) {
  accessToken()
}
```

approveProbation *Approve a probational upload*

Description

Pretty much as it says: approve a probational upload of a version of a project's asset. This removes the on_probation tag from the uploaded version.

Usage

```
approveProbation(
  project,
  asset,
  version,
  url = restUrl(),
  token = accessToken()
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to an owner of project.

Value

NULL is invisibly returned upon successful approval.

Author(s)

Aaron Lun

See Also

[rejectProbation](#), to reject the probational upload.

[startUpload](#), to specify probational uploads.

Examples

```
if (interactive()) {
  # Mocking up a versioned asset.
  init <- startUpload(
    project="test-R",
    asset="probation-approve",
    version="v1",
    files=character(0),
    probation=TRUE
  )
  completeUpload(init)

  # Approving the probation:
  approveProbation("test-R", "probation-approve", "v1")

  # Just cleaning up after we're done.
  removeProjectAsset("test-R", "probation-approve")
}
```

cacheDirectory

Cache directory

Description

Specify the cache directory in the local filesystem for gypsum-related data.

Usage

```
cacheDirectory(dir)
```

Arguments

`dir` String containing the path to a cache directory.

Details

If the GYPSUM_CACHE_DIR environment variable is set before the first call to `cacheDirectory`, it is used as the initial location of the cache directory. Otherwise, the initial location is based on `R_user_dir`.

Value

If `dir` is missing, the current setting of the cache directory is returned.

If `dir` is provided, it is used to replace the current setting of the cache directory, and the *previous* setting is invisibly returned.

Author(s)

Aaron Lun

Examples

```
cacheDirectory()
old <- cacheDirectory(tempfile())
cacheDirectory()
cacheDirectory(old) # setting it back.
```

cloneVersion

Clone a version's directory structure

Description

Clone the directory structure for a versioned asset into a separate location. This is typically used to prepare a new version for a lightweight upload.

Usage

```
cloneVersion(
  project,
  asset,
  version,
  destination,
  download = TRUE,
  cache = cacheDirectory(),
  config = publicS3Config(cache = cache),
  ...
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
destination	String containing a path to a destination directory at which to create the clone.
download	Logical scalar indicating whether the version's files should be downloaded first. This can be set to <code>FALSE</code> to create a clone without actually downloading any of the version's files.
cache	String containing the path to the cache directory.
config	Configuration object for the S3 bucket, see publicS3Config for details.
...	Further arguments to pass to saveVersion . Only used if <code>download=TRUE</code> .

Details

Cloning of a versioned asset involves creating a directory at `destination` that has the same contents as the corresponding `project-asset-version` directory. All files in the specified version are represented as symlinks from `destination` to the corresponding file in the cache. The idea is that, when `destination` is used in [prepareDirectoryUpload](#), the symlinks are converted into upload links, i.e., `links=` in [startUpload](#). This allows users to create new versions very cheaply as duplicate files are not uploaded to/stored in the backend.

Users can more-or-less do whatever they want inside the cloned `destination`, but they should treat the symlink targets as read-only. That is, they should not modify the contents of the linked-to file, as these refer to assumed-immutable files in the cache. If a file in `destination` needs to be modified, the symlink should be deleted and replaced with an actual file; this avoids mutating the cache and it ensures that [prepareDirectoryUpload](#) recognizes that a new file actually needs to be uploaded.

Advanced users can set `download=FALSE`, in which case symlinks are created even if their targets are not present in cache. In such cases, `destination` should be treated as write-only due to the potential presence of dangling symlinks. This mode is useful for uploading a new version of an asset without downloading the files from the existing version, assuming that the modifications associated with the former can be achieved without reading any of the latter.

On Windows, the user may not have permissions to create symbolic links, so the function will transparently fall back to creating hard links or copies instead. This precludes any optimization by [prepareDirectoryUpload](#) as the hard links/copies cannot be converted into upload links. It also assumes that `download=TRUE` as dangling links/copies cannot be created.

Value

The directory structure of the specified version is cloned to `destination`, and a `NULL` is invisibly returned.

Author(s)

Aaron Lun

See Also

[prepareDirectoryUpload](#), to prepare an upload based on the directory contents.

Examples

```
tmp <- tempfile()
out <- cloneVersion("test-R", "basic", "v1", destination=tmp)
list.files(tmp, recursive=TRUE)
Sys.readlink(file.path(tmp, "foo", "bar.txt"))

# Files should be replaced rather than modified via the symlink:
existing <- file.path(tmp, "foo", "bar.txt")
unlink(existing) # Deleting the symlink...
write(file=existing, "YAY") # ... and writing a replacement file.

# Symlinks are converted to upload links:
prepareDirectoryUpload(tmp)
```

completeUpload

Complete an upload

Description

Complete an upload session after all files have been uploaded.

Usage

```
completeUpload(init, url = restUrl())
```

Arguments

init	List containing complete_url and session_token. This is typically the return value from startUpload .
url	String containing the URL of the gypsum REST API.

Value

NULL is invisibly returned on successful completion.

Author(s)

Aaron Lun

See Also

[startUpload](#), to create init.

Examples

```
tmp <- tempfile()
dir.create(tmp)
write(file=file.path(tmp, "blah.txt"), LETTERS)
dir.create(file.path(tmp, "foo"))
write(file=file.path(tmp, "foo", "bar.txt"), 1:10)

if (interactive()) {
  init <- startUpload(
    project="test-R",
    asset="upload-complete-check",
    version="v1",
    files=list.files(tmp, recursive=TRUE),
    probation=TRUE,
    directory=tmp
  )
  uploadFiles(init, directory=tmp)

  # Finishing the upload.
  completeUpload(init)
}
```

createProject

Create a new project

Description

Create a new project with the associated permissions.

Usage

```
createProject(
  project,
  owners,
  uploaders = list(),
  baseline = NULL,
  growth = NULL,
  year = NULL,
  url = restUrl(),
  token = accessToken()
)
```

Arguments

project	String containing the project name.
owners	Character vector containing the GitHub users or organizations that are owners of this project.

uploaders	List specifying the authorized uploaders for this project. See the uploaders field in the fetchPermissions return value for the expected format.
baseline	Numeric scalar specifying the baseline quota in bytes. If NULL, the backend's default is used.
growth	Numeric scalar specifying the quota's annual growth rate in bytes. If NULL, the backend's default is used.
year	Integer scalar specifying the year of the project creation. If NULL, the backend's default is used - this should be the current year.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

NULL is invisibly returned if the project was successfully created.

Author(s)

Aaron Lun

See Also

[removeProject](#), to remove a project.

Examples

```
if (interactive()) {
  createProject(
    "test-R-create",
    owners="LTLA",
    uploaders=list(list(id="ArtifactDB-bot"))
  )
}
```

fetchLatest

Fetch the latest version

Description

Fetch the latest version of a project's asset.

Usage

```
fetchLatest(project, asset, config = publicS3Config())
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

String containing the latest version of the project.

Author(s)

Aaron Lun

See Also

[refreshLatest](#), to refresh the latest version.

Examples

```
fetchLatest("test-R", "basic")
```

fetchManifest	<i>Fetch version manifest</i>
---------------	-------------------------------

Description

Fetch the manifest for a version of an asset of a project.

Usage

```
fetchManifest(  
  project,  
  asset,  
  version,  
  cache = cacheDirectory(),  
  overwrite = FALSE,  
  config = publicS3Config(cache = cache)  
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
cache	String containing the cache directory. If NULL, no caching is performed.
overwrite	Logical scalar indicating whether to overwrite an existing file in cache, if one is present.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

List containing the manifest for this version. Each element is named after the relative path of a file in this version. The value of each element is another list with the following fields:

- size, an integer specifying the size of the file in bytes.
- md5sum, a string containing the hex-encoded MD5 checksum of the file.
- link (optional): a list specifying the link destination for a file. This contains the strings project, asset, version and path. If the link destination is itself a link, an ancestor list will be present that specifies the final location of the file after resolving all intermediate links.

Author(s)

Aaron Lun

Examples

```
fetchManifest("test-R", "basic", "v1")
```

fetchMetadataDatabase *Fetch a metadata database*

Description

Fetch a SQLite database containing metadata from the gypsum backend (see <https://github.com/ArtifactDB/bioconductor-metadata-index>). Each database is generated by aggregating metadata across multiple assets and/or projects, and can be used to perform searches for interesting objects.

Usage

```
fetchMetadataDatabase(  
  name = "bioconductor.sqlite3",  
  cache = cacheDirectory(),  
  overwrite = FALSE  
)
```

Arguments

name	String containing the name of the database. This can be the name of any SQLite file in https://github.com/ArtifactDB/bioconductor-metadata-index/releases/tag/latest .
cache	String containing the cache directory. If NULL, no caching is performed.
overwrite	Logical scalar indicating whether to overwrite an existing file in cache, if one is present.

Details

This function will automatically check for updates to the SQLite files and will download new versions accordingly. New checks are performed when one hour or more has elapsed since the last check. If the check fails, a warning is raised and the function returns the currently cached file.

Value

String containing a path to the downloaded database.

Author(s)

Aaron Lun

See Also

[fetchMetadataSchema](#), to get the JSON schema used to define the database tables.

Examples

```
fetchMetadataDatabase()
```

fetchMetadataSchema *Fetch a metadata schema*

Description

Fetch a JSON schema file for metadata to be inserted into a SQLite database (see <https://github.com/ArtifactDB/bioconductor-metadata-index>). Each SQLite database is created from metadata files uploaded to the gypsum backend, so clients uploading objects to be incorporated into the database should validate their metadata against the corresponding JSON schema.

Usage

```
fetchMetadataSchema(  
  name = "bioconductor/v1.json",  
  cache = cacheDirectory(),  
  overwrite = FALSE  
)
```

Arguments

name	String containing the name of the schema. This can be the name of any JSON schema file published at https://github.com/ArtifactDB/bioconductor-metadata-index .
cache	String containing the cache directory. If NULL, no caching is performed.
overwrite	Logical scalar indicating whether to overwrite an existing file in cache, if one is present.

Value

String containing a path to the downloaded schema.

Author(s)

Aaron Lun

See Also

[validateMetadata](#), to validate metadata against a chosen schema.

[fetchMetadataDatabase](#), to obtain the SQLite database of metadata.

Examples

```
fetchMetadataSchema()
```

fetchPermissions	<i>Fetch project permissions</i>
------------------	----------------------------------

Description

Fetch the permissions for a project.

Usage

```
fetchPermissions(project, config = publicS3Config())
```

Arguments

project	String containing the project name.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

List containing the permissions for this project. This has the following elements:

- `owners`, a character vector containing the GitHub users or organizations that are owners of this project.
- `uploaders`, a list of lists specifying the users or organizations who are authorized to upload to this project. Each entry is a list with the following fields:
 - `id`, a string containing the GitHub user or organization that is authorized to upload.
 - (optional) `asset`, a string containing the name of the asset that the uploader is allowed to upload to. If not provided, there is no restriction on the uploaded asset name.
 - (optional) `version`, a string containing the name of the version that the uploader is allowed to upload to. If not provided, there is no restriction on the uploaded version name.
 - (optional) `until`, a [POSIXct](#) object containing the expiry date of this authorization. If not provided, the authorization does not expire.
 - (optional) `trusted`, whether the uploader is trusted. If not provided, defaults to `FALSE`.

Author(s)

Aaron Lun

See Also

[setPermissions](#), to set the permissions.

Examples

```
fetchPermissions("test-R")
```

fetchQuota

Fetch project quota details

Description

Fetch the quota details for a project.

Usage

```
fetchQuota(project, config = publicS3Config())
```

Arguments

<code>project</code>	String containing the project name.
<code>config</code>	Configuration object for the S3 bucket, see publicS3Config for details.

Value

List containing `baseline`, the baseline quota at time zero in bytes; `growth_rate`, the annual growth rate for the quota in bytes; and `year`, the creation year (i.e., time zero) for this project.

Author(s)

Aaron Lun

See Also

[setQuota](#), to set the quota details.

Examples

```
fetchQuota("test-R")
```

fetchSummary	<i>Fetch version summary</i>
--------------	------------------------------

Description

Fetch the summary for a version of an asset of a project.

Usage

```
fetchSummary(  
  project,  
  asset,  
  version,  
  cache = cacheDirectory(),  
  overwrite = FALSE,  
  config = publicS3Config(cache = cache)  
)
```

Arguments

<code>project</code>	String containing the project name.
<code>asset</code>	String containing the asset name.
<code>version</code>	String containing the version name.
<code>cache</code>	String containing the cache directory. If NULL, no caching is performed.
<code>overwrite</code>	Logical scalar indicating whether to overwrite an existing file in cache, if one is present.
<code>config</code>	Configuration object for the S3 bucket, see publicS3Config for details.

Value

List containing the summary for this version, with the following fields:

- `upload_user_id`, string containing the identity of the uploader.
- `upload_start`, a [POSIXct](#) object containing the upload start time.
- `upload_finish`, a [POSIXct](#) object containing the upload finish time.
- `on_probation` (optional), a logical scalar indicating whether the upload is probational. If missing, this can be assumed to be `FALSE`.

Author(s)

Aaron Lun

Examples

```
fetchSummary("test-R", "basic", "v1")
```

fetchUsage

Fetch project usage details

Description

Fetch the quota usage for a project.

Usage

```
fetchUsage(project, config = publicS3Config())
```

Arguments

`project` String containing the project name.

`config` Configuration object for the S3 bucket, see [publicS3Config](#) for details.

Value

Numeric scalar specifying the quota usage for the project, in bytes.

Author(s)

Aaron Lun

See Also

[refreshUsage](#), to recompute the used quota.

Examples

```
fetchUsage("test-R")
```

formatObjectMetadata *Format object-related metadata*

Description

Create object-related metadata to validate against the default schema from [fetchMetadataSchema](#). This is intended for downstream package developers who are auto-generating metadata documents to be validated by [validateMetadata](#).

Usage

```
formatObjectMetadata(x)
```

Arguments

x An R object, typically an instance of a Bioconductor class.

Value

List containing the object-related metadata, typically stored in the `applications.takane` field of the metadata.

Author(s)

Aaron Lun

Examples

```
df <- S4Vectors::DataFrame(alpha=LETTERS, numeric=runif(26))
formatObjectMetadata(df)
```

listAssets	<i>List assets</i>
------------	--------------------

Description

List all assets in a project.

Usage

```
listAssets(project, config = publicS3Config())
```

Arguments

project	String containing the project name.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

Character vector of asset names.

Author(s)

Aaron Lun

Examples

```
listAssets("test-R")
```

listFiles	<i>List files for a version</i>
-----------	---------------------------------

Description

List files belonging to a version of a project asset.

Usage

```
listFiles(  
  project,  
  asset,  
  version,  
  prefix = NULL,  
  include.. = TRUE,  
  config = publicS3Config()  
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
prefix	String containing the remaining prefix for the object key. If provided, a file is only listed if its object key starts with {project}/{asset}/{version}/{prefix}. If NULL, all files associated with this version of the asset are listed.
include..	Logical scalar indicating whether to list files with /.. in their object keys.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

Character vector of relative paths of files associated with the versioned asset.

Author(s)

Aaron Lun

Examples

```
listFiles("test-R", "basic", "v1")
```

listProjects	<i>List all projects</i>
--------------	--------------------------

Description

List all projects in the gypsum backend.

Usage

```
listProjects(config = publicS3Config())
```

Arguments

config	Configuration object for the S3 bucket, see publicS3Config for details.
--------	---

Value

Character vector of project names.

Author(s)

Aaron Lun

Examples

```
if (interactive()) {  
  listProjects()  
}
```

listVersions	<i>List asset versions</i>
--------------	----------------------------

Description

List all versions of a project asset.

Usage

```
listVersions(project, asset, config = publicS3Config())
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

Character vector of versions.

Author(s)

Aaron Lun

Examples

```
listVersions("test-R", "basic")
```

`prepareDirectoryUpload`*Prepare to upload a directory*

Description

Prepare to upload a directory's contents via [startUpload](#). This goes through the directory to list its contents and convert symlinks to upload links.

Usage

```
prepareDirectoryUpload(  
    directory,  
    links = c("auto", "always", "never"),  
    cache = cacheDirectory()  
)
```

Arguments

<code>directory</code>	String containing the path to a directory, the contents of which are to be uploaded via startUpload .
<code>links</code>	String indicating how to handle symlinks in <code>directory</code> . <ul style="list-style-type: none">• "auto" will attempt to convert symlinks into upload links. If the conversion fails, a regular upload is performed.• "always" will attempt to convert symlinks into upload links. If the conversion fails, an error is raised.• "never" will never attempt to convert symlinks into upload links. All symlinked files are treated as regular uploads.
<code>cache</code>	String containing a path to the cache directory, used to convert symlinks into upload links.

Details

Files in `directory` (that are not symlinks) are used as regular uploads, i.e., `files=` in [startUpload](#).

If `directory` contains a symlink to a file in `cache`, we assume that it points to a file that was previously downloaded by, e.g., [saveFile](#) or [saveVersion](#). Thus, instead of performing a regular upload, we attempt to create an upload link, i.e., `links=` in [startUpload](#). This is achieved by examining the destination path of the symlink and inferring the link destination in the backend. Note that this still works if the symlinks are dangling.

If a symlink cannot be converted into an upload link, it will be used as a regular upload, i.e., the contents of the symlink destination will be uploaded by [startUpload](#). In this case, an error will be raised if the symlink is dangling as there is no file that can actually be uploaded. If `links="always"`, an error is raised instead upon symlink conversion failure.

This function is intended to be used with [cloneVersion](#), which creates symlinks to files in `cache`.

Value

List containing files, a character vector to be used as files= in `startUpload`; and links, a data frame to be used as links= in `startUpload`.

See Also

`startUpload`, to actually start the upload.

`cloneVersion`, to prepare the symlinks.

Examples

```
tmp <- tempfile()
out <- cloneVersion("test-R", "basic", "v1", destination=tmp)
write(file=file.path(tmp, "heanna"), "sumire")
prepareDirectoryUpload(tmp)
```

publicS3Config

Public S3 configuration

Description

Fetch S3 credentials and other configuration details for read-only access to the underlying gypsum bucket.

Usage

```
publicS3Config(refresh = FALSE, url = restUrl(), cache = cacheDirectory())
```

Arguments

refresh	Logical scalar indicating whether to refresh the credentials in the in-memory cache.
url	String containing a URL to the gypsum REST API.
cache	String containing a path to the cache directory, to store the configuration across R sessions.

Details

The configuration is obtained through a query to url on the first use of this function. The result is automatically cached in memory and on disk to reduce the number of network requests to the API. New credentials are automatically fetched if the on-disk cache is older than a week; this refresh can be performed manually by calling this function with refresh=TRUE.

Value

List containing:

- key, a string containing the read-only S3 access key ID.
- secret, a string containing the associated S3 access secret.
- bucket, a string containing the name of the bucket.
- endpoint, a string containing the URL for the S3 API.

Author(s)

Aaron Lun

Examples

```
publicS3Config()
```

refreshLatest	<i>Refresh the latest version</i>
---------------	-----------------------------------

Description

Recompute the latest version of a project's asset. This is useful on rare occasions where multiple simultaneous uploads cause the latest version to be slightly out of sync.

Usage

```
refreshLatest(project, asset, url = restUrl(), token = accessToken())
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

String containing the latest version of the project, or NULL if there are no non-probational versions.

Author(s)

Aaron Lun

See Also

[fetchLatest](#), to get the latest version without recomputing it.

Examples

```
if (interactive()) {  
    refreshLatest("test-R", "basic")  
}
```

refreshUsage

Refresh the quota usage

Description

Recompute the quota usage of a project. This is useful on rare occasions where multiple simultaneous uploads cause the usage calculations to be out of sync.

Usage

```
refreshUsage(project, url = restUrl(), token = accessToken())
```

Arguments

project	String containing the project name.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

Numeric scalar specifying the total quota usage of this project, in bytes.

Author(s)

Aaron Lun

See Also

[fetchUsage](#), to get the usage without recomputing it.

Examples

```
if (interactive()) {  
    refreshUsage("test-R")  
}
```

rejectProbation	<i>Reject a probational upload</i>
-----------------	------------------------------------

Description

Pretty much as it says: reject a probational upload of a version of a project's asset. This removes all files associated with that version.

Usage

```
rejectProbation(  
    project,  
    asset,  
    version,  
    url = restUrl(),  
    token = accessToken()  
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to an owner of project.

Value

NULL is invisibly returned upon successful rejection.

Author(s)

Aaron Lun

See Also

[approveProbation](#), to approve the probational upload.

[startUpload](#), to specify probational uploads.

Examples

```
if (interactive()) {  
  # Mocking up a versioned asset.  
  init <- startUpload(  
    project="test-R",  
    asset="probation-reject",  
    version="v1",  
    files=character(0),  
    probation=TRUE  
  )  
  completeUpload(init)  
  
  # Rejecting the probation:  
  rejectProbation("test-R", "probation-reject", "v1")  
}
```

removeAsset

Remove an asset

Description

Remove an asset of a project from the gypsum backend.

Usage

```
removeAsset(project, asset, url = restUrl(), token = accessToken())
```

Arguments

project	String containing the project to remove.
asset	String containing the asset to remove.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

NULL is invisibly returned if the asset was successfully removed.

Author(s)

Aaron Lun

See Also

[removeProject](#), to remove a project.
[removeVersion](#), to remove a specific version.

Examples

```
if (interactive()) {
  # Mocking up a versioned asset.
  init <- startUpload(
    project="test-R",
    asset="removal",
    version="v1",
    files=character(0),
    probation=TRUE
  )
  completeUpload(init)

  removeAsset("test-R", asset="removal")
}
```

removeProject	<i>Remove a project</i>
---------------	-------------------------

Description

Remove a project from the gypsum backend.

Usage

```
removeProject(project, url = restUrl(), token = accessToken())
```

Arguments

project	String containing the project to remove.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

NULL is invisibly returned if the project was successfully removed.

Author(s)

Aaron Lun

See Also

[createProject](#), to create a project.
[removeAsset](#) and [removeVersion](#), to remove an asset or version.

Examples

```
if (interactive()) {
  createProject("test-R-remove", owners="LTLA")
  removeProject("test-R-remove")
}
```

removeVersion	<i>Remove a version of an asset</i>
---------------	-------------------------------------

Description

Remove a version of an asset from the gypsum backend.

Usage

```
removeVersion(project, asset, version, url = restUrl(), token = accessToken())
```

Arguments

project	String containing the project to remove.
asset	String containing the asset to remove.
version	String containing the version of the asset to remove.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

NULL is invisibly returned if the project or its contents was successfully removed.

Author(s)

Aaron Lun

See Also

[removeAsset](#) and [removeProject](#), to remove an asset or project.

Examples

```
if (interactive()) {
  # Mocking up a versioned asset.
  init <- startUpload(
    project="test-R",
    asset="removal",
    version="v1",
    files=character(0),
```

```
        probation=TRUE
    )
    completeUpload(init)

    removeVersion("test-R", asset="removal", version="v1")
}
```

resolveLinks*Resolve links in the cache directory*

Description

Create hard links (or copies, if filesystem links are not supported) for linked-from files to their link destinations.

Usage

```
resolveLinks(
  project,
  asset,
  version,
  cache = cacheDirectory(),
  overwrite = FALSE,
  config = publicS3Config(cache = cache)
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
cache	String containing the path to the cache directory.
overwrite	Logical scalar indicating whether to replace existing files at the linked-from paths.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

NULL is returned on successful completion.

Author(s)

Aaron Lun

Examples

```
cache <- tempfile()
saveVersion("test-R", "basic", "v3", relink=FALSE, cache=cache)
list.files(cache, recursive=TRUE, all.files=TRUE)

resolveLinks("test-R", "basic", "v3", cache=cache)
list.files(cache, recursive=TRUE, all.files=TRUE)
```

restUrl	<i>URL for the REST API</i>
---------	-----------------------------

Description

Get or set the URL for the gypsum REST API.

Usage

```
restUrl(url)
```

Arguments

url String containing the URL of the REST API.

Value

If url is missing, the current setting of the URL is returned.

If url is provided, it is used replace the current setting of the URL, and the *previous* setting of the URL is invisibly returned.

Author(s)

Aaron Lun

Examples

```
restUrl()
old <- restUrl("https://some-other.rest-api.io") # replace it.
restUrl()
restUrl(old) # setting it back.
```

saveFile	<i>Save a file from a version of a project asset</i>
----------	--

Description

Download a file from the gypsum bucket, for a version of an asset of a project.

Usage

```
saveFile(  
    project,  
    asset,  
    version,  
    path,  
    cache = cacheDirectory(),  
    overwrite = FALSE,  
    config = publicS3Config(cache = cache)  
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
path	String containing the suffix of the object key for the file of interest, i.e., the relative “path” inside the version’s “subdirectory”. The full object key is defined as {project}/{asset}/{version}/{path}.
cache	String containing the path to the cache directory.
overwrite	Logical scalar indicating whether to overwrite an existing file in cache. If FALSE and the file exists in cache, the download is skipped.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Details

The full object key is defined as {project}/{asset}/{version}/{path}. If no file exists in the project-asset-version combination at path, this function will check the `..links` file to check whether path refers to a linked-from file. If so, the contents of the link destination is downloaded to the cache and a link/copy is created at the returned file path.

Value

The file is downloaded to the local file system. The destination file path is returned.

Author(s)

Aaron Lun

See Also

[saveVersion](#), to save all files with the same prefix.
[cacheDirectory](#), for file caching.

Examples

```
out <- saveFile("test-R", "basic", "v1", "blah.txt")
readLines(out)
```

saveVersion	<i>Save all files for a version of a project asset</i>
-------------	--

Description

Download all files associated with a version of an asset of a project from the gypsum bucket.

Usage

```
saveVersion(
  project,
  asset,
  version,
  cache = cacheDirectory(),
  overwrite = FALSE,
  relink = TRUE,
  concurrent = 1,
  config = publicS3Config(cache = cache)
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name.
version	String containing the version name.
cache	String containing the path to the cache directory.
overwrite	Logical scalar indicating whether to overwrite existing files in the cache. If FALSE and the files already exist in cache, the download is skipped.
relink	Logical scalar indicating whether links should be resolved, see resolveLinks .
concurrent	Integer specifying the number of concurrent downloads.
config	Configuration object for the S3 bucket, see publicS3Config for details.

Value

The version's files are downloaded to the local file system, and the path to the local subdirectory is returned.

Author(s)

Aaron Lun

See Also[saveFile](#), to save a single file.[cacheDirectory](#), for file caching.**Examples**

```
out <- saveVersion("test-R", "basic", "v1")
list.files(out, recursive=TRUE, all.files=TRUE)
```

searchMetadataText *Text search on the metadata database*

Description

Perform a text search on a SQLite database containing metadata from the gypsum backend. This is based on a precomputed tokenization of all string properties in each metadata document; see <https://github.com/ArtifactDB/bioconductor-metadata-index> for details.

Usage

```
searchMetadataText(path, query, latest = TRUE, include.metadata = TRUE)
```

```
defineTextQuery(text, field = NULL, partial = FALSE)
```

```
searchMetadataTextFilter(query, pid.name = "paths.pid")
```

Arguments

path	String containing a path to a SQLite file, usually obtained via fetchMetadataDatabase .
query	Character vector specifying the query to execute. Alternatively, a <code>gypsum.search.object</code> produced by <code>defineTextQuery</code> .
latest	Logical scalar indicating whether to only search for matches within the latest version of each asset.
include.metadata	Logical scalar indicating whether metadata should be returned.
text	String containing the text to query on. This will be automatically tokenized, see Details .
field	String specifying the name of the metadata field in which to search for text. If <code>NULL</code> , the search is performed on all available metadata fields.
partial	Logical scalar indicating whether text contains SQLite wildcards (<code>%</code> , <code>_</code>) for a partial search. If <code>TRUE</code> , the wildcards are preserved during tokenization.
pid.name	String containing the name/alias of the column of the paths table that contains the path ID.

Details

Each string is tokenized by converting it to lower case and splitting it on characters that are not Unicode letters/numbers or a dash. We currently do not remove diacritics so these will need to be converted to ASCII by the user. If a text query involves only non-letter/number/dash characters, the filter will not be well-defined and will be ignored when constructing SQL statements.

For convenience, a non-empty character vector may be used in query. A character vector of length 1 is treated as shorthand for a text query with default arguments in `defineTextQuery`. A character vector of length greater than 1 is treated as shorthand for an AND operation on default text queries for each of the individual strings.

Value

For `searchMetadataText`, a data frame specifying the containing the search results.

- The project, asset and version columns contain the identity of the version with matching metadata.
- The path column contains the suffix of the object key of the metadata document, i.e., the relative “path” within the version’s “directory” to the metadata document. The full object key of the document inside the bucket is defined as `{project}/{asset}/{version}/{path}`.
- If `include.metadata=TRUE`, a metadata column is present with the nested metadata for each match.
- If `latest=TRUE`, a latest column is present indicating whether the matching version is the latest for its asset. Otherwise, only the latest version is returned.

For `searchMetadataTextFilter`, a list containing where, a string can be directly used as a WHERE filter condition in a SQL SELECT statement; and parameters, the parameter bindings to be used in where. The return value may also be NULL if the query has no well-defined filter.

For `defineTextQuery`, a `gypsum.search.clause` object that can be used in `|`, `&` and `!` to create more complex queries involving multiple text clauses.

Author(s)

Aaron Lun

See Also

[fetchMetadataDatabase](#), to download and cache the database files.

<https://github.com/ArtifactDB/bioconductor-metadata-index>, for details on the SQLite file contents and table structure.

Examples

```
path <- fetchMetadataDatabase()
searchMetadataText(path, c("mouse", "brain"), include.metadata=FALSE)

# Now for a slightly more complex query:
is.mouse <- defineTextQuery("10090", field="taxonomy_id")
query <- (defineTextQuery("brain") | defineTextQuery("pancreas")) & is.mouse
```

```
searchMetadataText(path, query, include.metadata=FALSE)

# Throwing in some wildcards.
has.neuro <- defineTextQuery("Neuro%", partial=TRUE)
searchMetadataText(path, has.neuro, include.metadata=FALSE)
```

setPermissions *Set project permissions*

Description

Set the owner and uploader permissions for a project.

Usage

```
setPermissions(
  project,
  owners = NULL,
  uploaders = NULL,
  append = TRUE,
  url = restUrl(),
  token = accessToken()
)
```

Arguments

project	String containing the project name.
owners	Character vector containing the GitHub users or organizations that are owners of this project. If NULL, no change is made to the existing owners of the project.
uploaders	List specifying the authorized uploaders for this project. See the uploaders field in the fetchPermissions return value for the expected format. If NULL, no change is made to the existing uploaders of the project.
append	Logical scalar indicating whether owners and uploaders should be appended to the existing owners and uploaders, respectively, of the project. If FALSE, the owners and uploaders are used to replace the existing values.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to an owner of the project.

Value

NULL is invisibly returned upon successful setting of the permissions.

Author(s)

Aaron Lun

See Also

[fetchPermissions](#), to fetch the permissions.

Examples

```
if (interactive()) {
  # Creating a project for demonstration purposes.
  createProject("test-R-perms", owners="LTLA")

  # Setting extra permissions on this project.
  setPermissions("test-R-perms",
    owners="jkanche",
    uploaders=list(list(id="lawremi", until=Sys.time() + 1000))
  )
}
```

 setQuota

Set project quota

Description

Set the storage quota for a project.

Usage

```
setQuota(
  project,
  baseline = NULL,
  growth = NULL,
  year = NULL,
  url = restUrl(),
  token = accessToken()
)
```

Arguments

project	String containing the project name.
baseline	Numeric scalar specifying the baseline quota (i.e., at time zero) in bytes. If NULL, no change is made to the existing baseline of the project.
growth	Numeric scalar specifying the annual growth rate of the quota, in bytes. If NULL, no change is made to the existing growth rate of the project.
year	Integer scalar specifying the year of creation (i.e., time zero) for the project. If NULL, no change is made to the existing creation year of the project.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a gypsum administrator account.

Value

NULL is invisibly returned upon successful setting of the quota.

Author(s)

Aaron Lun

See Also

[fetchQuota](#), to fetch the quota.

Examples

```
if (interactive()) {
  # Creating a project for demonstration purposes.
  createProject("test-R-quota", owners="LTLA")

  # Setting a baseline of 10 GB with 5 GB in growth per year.
  setQuota("test-R-quota", baseline=10^10, growth=5^9, year=2019)
}
```

startUpload

Start an upload

Description

Start an upload of a new version of an asset, or a new asset of a project.

Usage

```
startUpload(
  project,
  asset,
  version,
  files,
  links = NULL,
  deduplicate = TRUE,
  probation = FALSE,
  url = restUrl(),
  token = accessToken(),
  directory = NULL
)
```

Arguments

project	String containing the project name.
asset	String containing the asset name. This should not contain / or start with ...
version	String containing the version name. This should not contain / or start with ...
files	Character vector containing the paths of the files to be uploaded. These should be relative to the version's directory. Alternatively, a data frame where each row corresponds to a file and contains information about those files. This data frame should contain the following fields: <ul style="list-style-type: none"> • path, a string containing the relative path of the file inside the version's subdirectory. • size, a non-negative integer specifying the size of the file in bytes. • md5sum, a string containing the hex-encoded MD5 checksum of the file. • (optional) dedup, a logical indicating whether deduplication should be attempted for each file.
links	A data frame where each row corresponds to a linked-from file and contains the link destination for that file. This data frame should contain the following fields: <ul style="list-style-type: none"> • from.path, a string containing the relative path of the file inside the version's subdirectory. • to.project, a string containing the project of the list destination. • to.asset, a string containing the asset of the list destination. • to.version, a string containing the version of the list destination. • to.path, a string containing the path of the list destination.
deduplicate	Logical scalar indicating whether the backend should attempt deduplication of files in the immediately previous version. Only has an effect if files is not a data frame or if the dedup field is missing.
probation	Logical scalar indicating whether to perform a probational upload. Such uploads must be approved by the project owner before they are considered official.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a user that is authorized to upload to the specified project.
directory	String containing the path to a directory containing the files to be uploaded. This directory is assumed to correspond to a version of an asset. It only has an effect if files is a character vector, as it is used to determine the MD5 checksums and sizes. If NULL, directory is set to the current working directory.

Value

List containing:

- file_urls, a list of lists containing information about each file to be uploaded. This is used by [uploadFiles](#).
- complete_url, a string containing the completion URL, to be used by [completeUpload](#).
- abort_url, a string specifying the abort URL, to be used by [abortUpload](#).
- session_token, a string for authenticating to the newly initialized upload session.

Author(s)

Aaron Lun

See Also[uploadFiles](#), to actually upload the files.[completeUpload](#), to indicate that the upload is completed.[abortUpload](#), to abort an upload in progress.[prepareDirectoryUpload](#), to create files and links from a directory.**Examples**

```
tmp <- tempfile()
dir.create(tmp)
write(file=file.path(tmp, "blah.txt"), LETTERS)
dir.create(file.path(tmp, "foo"))
write(file=file.path(tmp, "foo", "bar.txt"), 1:10)

if (interactive()) {
  blob <- startUpload(
    project="test-R",
    asset="upload-start-check",
    version="v1",
    files=list.files(tmp, recursive=TRUE),
    directory=tmp
  )
  print(blob)

  abortUpload(blob) # just cleaning up after we're done.
}
```

`uploadDirectory`*Upload a directory to the gypsum backend*

Description

Convenience method to upload a directory to the gypsum backend as a versioned asset of a project. This requires uploader permissions to the relevant project.

Usage

```
uploadDirectory(
  directory,
  project,
  asset,
  version,
```

```

    cache = cacheDirectory(),
    deduplicate = TRUE,
    probation = FALSE,
    url = restUrl(),
    token = accessToken(),
    concurrent = 1,
    abort.failed = TRUE
  )

```

Arguments

directory	String containing the path to a directory to be uploaded.
project	String containing the project name.
asset	String containing the asset name. This should not contain / or start with ...
version	String containing the version name. This should not contain / or start with ...
cache	String containing the path to the cache for saving files, e.g., in saveVersion . Used to convert symbolic links to upload links, see prepareDirectoryUpload .
deduplicate	Logical scalar indicating whether the backend should attempt deduplication of files in the immediately previous version. Only has an effect if files is not a data frame or if the dedup field is missing.
probation	Logical scalar indicating whether to perform a probational upload. Such uploads must be approved by the project owner before they are considered official.
url	String containing the URL of the gypsum REST API.
token	String containing a GitHub access token to authenticate to the gypsum REST API. The token must refer to a user that is authorized to upload to the specified project.
concurrent	Integer scalar specifying the number of concurrent uploads in uploadFiles .
abort.failed	Logical scalar indicating whether to abort the upload on any failure. Setting this to FALSE can be helpful for diagnosing upload problems.

Details

This function is a wrapper around [prepareDirectoryUpload](#) and [startUpload](#) and friends. The aim is to streamline the upload of a directory's contents when no customization of the file listing is required.

Value

On successful upload, NULL is invisibly returned.

Author(s)

Aaron Lun

Examples

```

tmp <- tempfile()
dir.create(tmp)
write(file=file.path(tmp, "blah.txt"), LETTERS)
dir.create(file.path(tmp, "foo"))
write(file=file.path(tmp, "foo", "bar.txt"), 1:10)

if (interactive()) {
  # Uploading a probational version for test purposes.
  uploadDirectory(staging, "test-R", "upload-dir-check", version, probation=TRUE)

  # Cleaning up after ourselves.
  gypsum::rejectProbation("test-R", "upload-dir-check", version)
}

```

uploadFiles	<i>Upload files for a versioned asset</i>
-------------	---

Description

Upload files in an initialized upload session for a version of an asset.

Usage

```
uploadFiles(init, directory = NULL, url = restUrl(), concurrent = 1)
```

Arguments

init	List containing file_urls and session_token. This is typically the return value from startUpload .
directory	String containing the path to a directory containing the files to be uploaded. This directory is assumed to correspond to a version of an asset. It only has an effect if files is a character vector, as it is used to determine the MD5 checksums and sizes. If NULL, directory is set to the current working directory.
url	String containing the URL of the gypsum REST API.
concurrent	Integer specifying the number of concurrent uploads.

Value

NULL is invisibly returned on successful upload of all files.

Author(s)

Aaron Lun

See Also

[startUpload](#), to create `init`.

Examples

```
tmp <- tempfile()
dir.create(tmp)
write(file=file.path(tmp, "blah.txt"), LETTERS)
dir.create(file.path(tmp, "foo"))
write(file=file.path(tmp, "foo", "bar.txt"), 1:10)

if (interactive()) {
  init <- startUpload(
    project="test-R",
    asset="upload-files-check",
    version="v1",
    files=list.files(tmp, recursive=TRUE),
    directory=tmp
  )

  # Executing the upload for all files.
  uploadFiles(init, directory=tmp)

  # Cleaning up after we're done.
  abortUpload(init)
}
```

 validateMetadata

Validate metadata against a JSON schema

Description

Validate metadata against a JSON schema for a SQLite database. This ensures that it can be successfully inserted in the database in downstream indexing steps.

Usage

```
validateMetadata(metadata, schema = fetchMetadataSchema(), stringify = NULL)
```

Arguments

<code>metadata</code>	Metadata to be checked. This is usually an R object like a named list, but may also be a JSON-formatted string.
<code>schema</code>	String containing a path to a schema.
<code>stringify</code>	Logical scalar indicating whether to convert metadata to a JSON-formatted string. Defaults to TRUE if metadata is not already a string.

Value

NULL is invisibly returned upon successful validation.

Author(s)

Aaron Lun

See Also

[fetchMetadataSchema](#), to get the JSON schemas.

[fetchMetadataDatabase](#), to obtain the SQLite database files.

Examples

```
metadata <- list(  
  title="Fatherhood",  
  description="Luke ich bin dein Vater.",  
  sources=list(  
    list(provider="GEO", id="GSE12345")  
  ),  
  taxonomy_id=list("9606"),  
  genome=list("GRCm38"),  
  maintainer_name="Darth Vader",  
  maintainer_email="vader@empire.gov",  
  bioconductor_version="3.10"  
)  
  
validateMetadata(metadata)
```

Index

abortUpload, [3](#), [40](#), [41](#)
accessToken, [4](#)
approveProbation, [5](#), [27](#)

cacheDirectory, [6](#), [7](#), [34](#), [35](#)
cloneVersion, [7](#), [23](#), [24](#)
completeUpload, [9](#), [40](#), [41](#)
createProject, [10](#), [29](#)

defineTextQuery (searchMetadataText), [35](#)

fetchLatest, [11](#), [26](#)
fetchManifest, [12](#)
fetchMetadataDatabase, [13](#), [15](#), [35](#), [36](#), [45](#)
fetchMetadataSchema, [14](#), [14](#), [19](#), [45](#)
fetchPermissions, [11](#), [15](#), [37](#), [38](#)
fetchQuota, [16](#), [39](#)
fetchSummary, [17](#)
fetchUsage, [18](#), [26](#)
formatObjectMetadata, [19](#)

gypsum.search clause
 (searchMetadataText), [35](#)

listAssets, [20](#)
listFiles, [20](#)
listProjects, [21](#)
listVersions, [22](#)

Ops.gypsum.search clause
 (searchMetadataText), [35](#)

POSIXct, [16](#), [18](#)
prepareDirectoryUpload, [8](#), [23](#), [41](#), [42](#)
publicS3Config, [8](#), [12](#), [13](#), [15–18](#), [20–22](#), [24](#),
 [31](#), [33](#), [34](#)

R_user_dir, [7](#)
refreshLatest, [12](#), [25](#)
refreshUsage, [18](#), [26](#)
rejectProbation, [6](#), [27](#)

removeAsset, [28](#), [29](#), [30](#)
removeProject, [11](#), [28](#), [29](#), [30](#)
removeVersion, [28](#), [29](#), [30](#)
resolveLinks, [31](#), [34](#)
restUrl, [32](#)

saveFile, [23](#), [33](#), [35](#)
saveVersion, [8](#), [23](#), [34](#), [34](#), [42](#)
searchMetadataText, [35](#)
searchMetadataTextFilter
 (searchMetadataText), [35](#)
setAccessToken (accessToken), [4](#)
setPermissions, [16](#), [37](#)
setQuota, [17](#), [38](#)
startUpload, [3](#), [6](#), [8](#), [9](#), [23](#), [24](#), [27](#), [39](#), [42–44](#)

uploadDirectory, [41](#)
uploadFiles, [40–42](#), [43](#)

validateMetadata, [15](#), [19](#), [44](#)