What would you like to know?

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Plugin: Google Cloud Build and Storage

The Singularity Registry client allows for a large set of options for external storage endpoints. Specifically, this plugin uses storage and build provided by Google, meaning:

- Google Build
- Google Storage

here. If you would like to discuss adding a builder and storage pair, please open an issue.

D rget to go back to the install docs where you left off. This quick start will walk through setting up custom storage using Google Cloud Build and Google Storage as an endpoint.

Configure sregistry

By default, google build is disabled. To configure sregistry to use Google Cloud build and Storage, in settings/config.py you can enable the plugin by uncommenting it from the list here:

```
PLUGINS_ENABLED = [
#    'ldap_auth',
#    'saml_auth',
#    'globus',
     'google_build'
]
```

Secrets

Next, set the following variables in `shub/settings/secrets.py` , that you can create from `dummy_secrets.py` in the shub/settings folder. The first two speak for themselves, your project name and path to your Google Application Credentials.

Project Identifiers

```
# =============================================================================
# Google Cloud Build + Storage
# Configure a custom builder and storage endpoint
# google-storage, s3, google-drive, dropbox
    E_APPLICATION_CREDENTIALS=/path/to/credentials.json
    STRY_GOOGLE_PROJECT=myproject-ftw
```

You can create custom Google Application Credentials for your server in the browser, and it will be enough to make the service account a project owner. If you are on a Google Cloud instance you can scp (with gcloud) using the command line as follows:

```
$ gcloud compute scp [credentials].json $USER@[INSTANCE]:/tmp --project [PROJECT]
```

Keep in mind that the path to the Google credentials file must be within the container (/code is the root folder that is bound to the filesystem).

Build Caching

```
SREGISTRY_GOOGLE_BUILD_CACHE="true"
```

If you set this variable (to anything), it means that after build, you will not delete intermediate dependencies in cloudbuild bucket (keep them as cache for rebuild if needed). This defaults to being unset, meaning that files are cleaned up. If you define this as anything, the build files will be cached.

Build Limit

```
SREGISTRY_GOOGLE_BUILD_LIMIT=100
```

builds. This number should be based on your expected number of users, repositories, and recipes per repository.

Singularity Version

By default, we use the default version that is set by the Google Build client that belongs to Singularity Registry Client. However, as this value is subject to be updated, we recommend that you set it in your secrets and can then decide when you want to update.

```
SREGISTRY_GOOGLE_BUILD_SINGULARITY_VERSION="v3.2.1-slim"
```

The version must coincide with a container tag hosted under singularityware/singularity.

Storage Bucket Name

By default, the bucket name will be called `sregistry-gcloud-build-[hostname]`, and since your host is a docker container, that will resolve to a random set of numbers and letters. For this reason, we *strongly recommend you set a consistent hostname*. If you do not and need to remove and bring up the containers again, the bucket metadata will not match the new bucket name. Here is an example of how to set a custom name:

```
SREGISTRY_GOOGLE_STORAGE_BUCKET="taco-singularity-registry"
```

Additionally, a temporary bucket is created with the same name ending in _cloudbuild. This bucket is for build time dependencies, and is cleaned up after the fact. If you are having trouble getting a bucket it is likely because the name is taken, and we recommend creating both `[name]` and `[name]_cloudbuild` in the console and then setting the name here.

Build Expiration

```
STRY_GOOGLE_BUILD_EXPIRE_SECONDS=28800
```

The default provided in the dummy secrets, shown above, would indicate 8 hours.

Private Containers

By default, images that you upload will be made public, meaning that a user that stumbles on the URL (or has permission to read your bucket otherwise) will be able to see and download them. If you want to make images globally private you should export this variable as some derivative of yes/true. If no variable is found, images are made public by default.

```
SREGISTRY_GOOGLE_STORAGE_PRIVATE=True
```

These variables are written in detail in the dummy_secrets.py file. If you need more information, you can read the Google Cloud Build page.

If you are missing some variable, there will be an error message on interaction with the Google Cloud Build API since you won't be able to authenticate. Once your settings are ready to go, you will want to continue with the install docs where you left off, and you can continue here after you've done:

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

and confirmed the registry running at localhost, and also have logged in (so you have an account with permission to push containers and recipes.)

What would you like to know?

If [illegible] aven't yet, you will need the sregistry client in order to push recipes to build with Google Cloud Build. The minimum version that s[illegible] s this is `0.2.19` . An easy way to install is any of the following:

```
$ pip install sregistry[google-build]
$ pip install sregistry[google-build-basic] # without local sqlite database
```

Next, export the client to be your registry.

```
$ export SREGISTRY_CLIENT=registry
```

If you are reading here from the installation docs, you likely haven't brought up your registry and should return there where you left off.

Building Containers

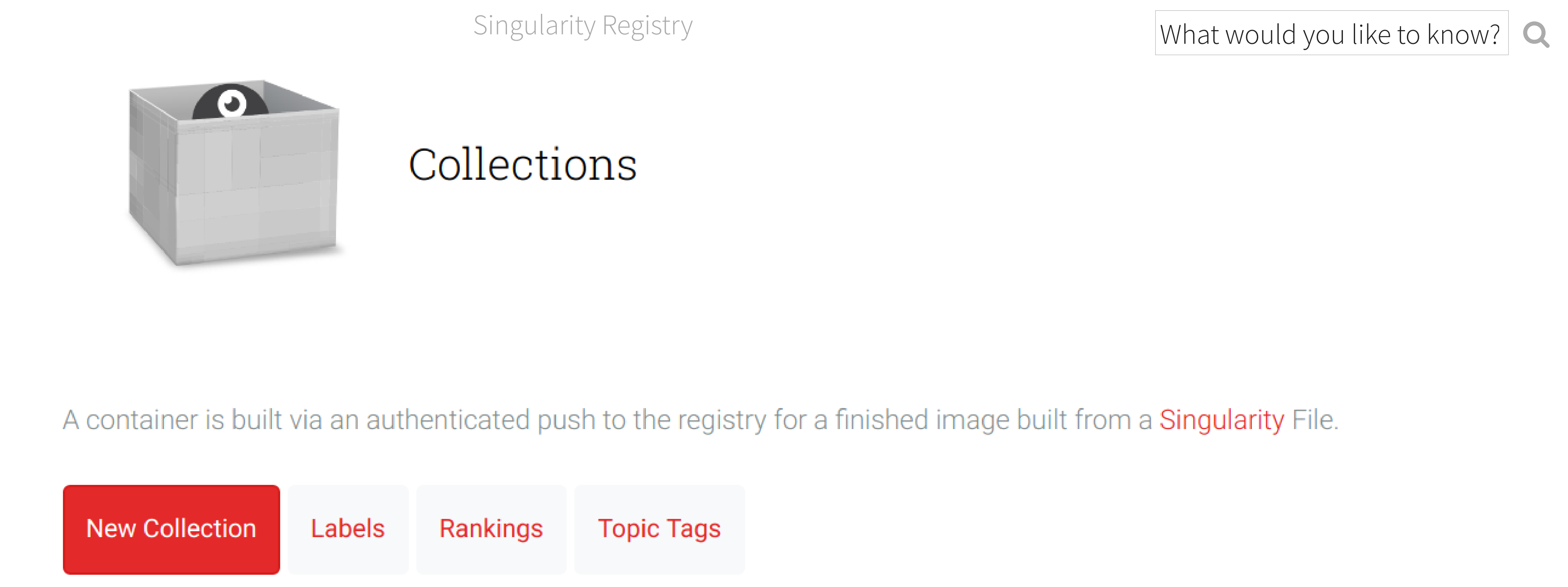
There are two ways to trigger builds:

1. Automated trigger from GitHub webhooks
2. Manual push of a recipe

The recommended approach is to enable GitHub authentication and then have pushes to your repository trigger builds. For the second approach, while you can upload a recipe directly, it is not recommended as it doesn't have the recipe kept under any version control.

Trigger from Github

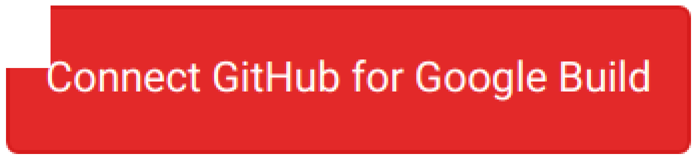
You will first need to log in with GitHub, and then navigate to the container collections page (the "Containers" link in the navigation):



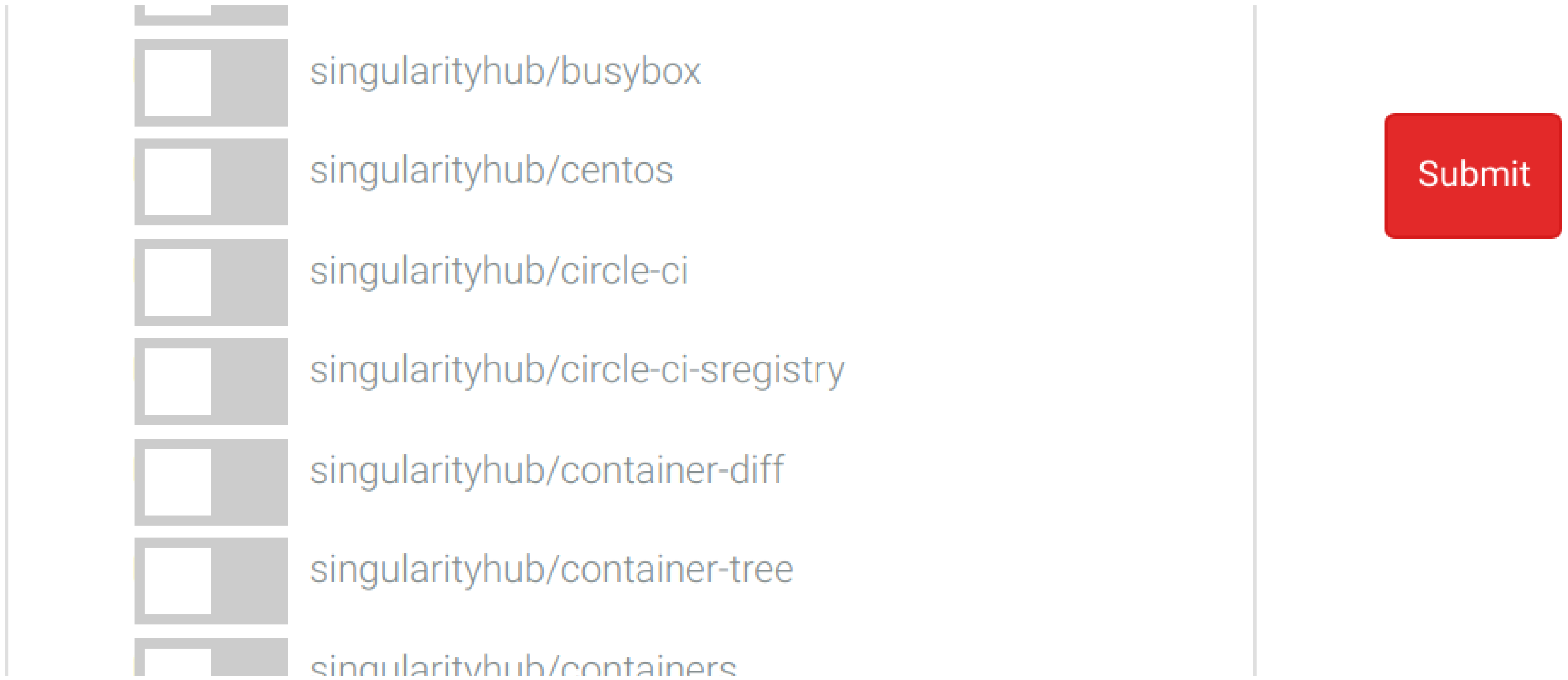
Collections

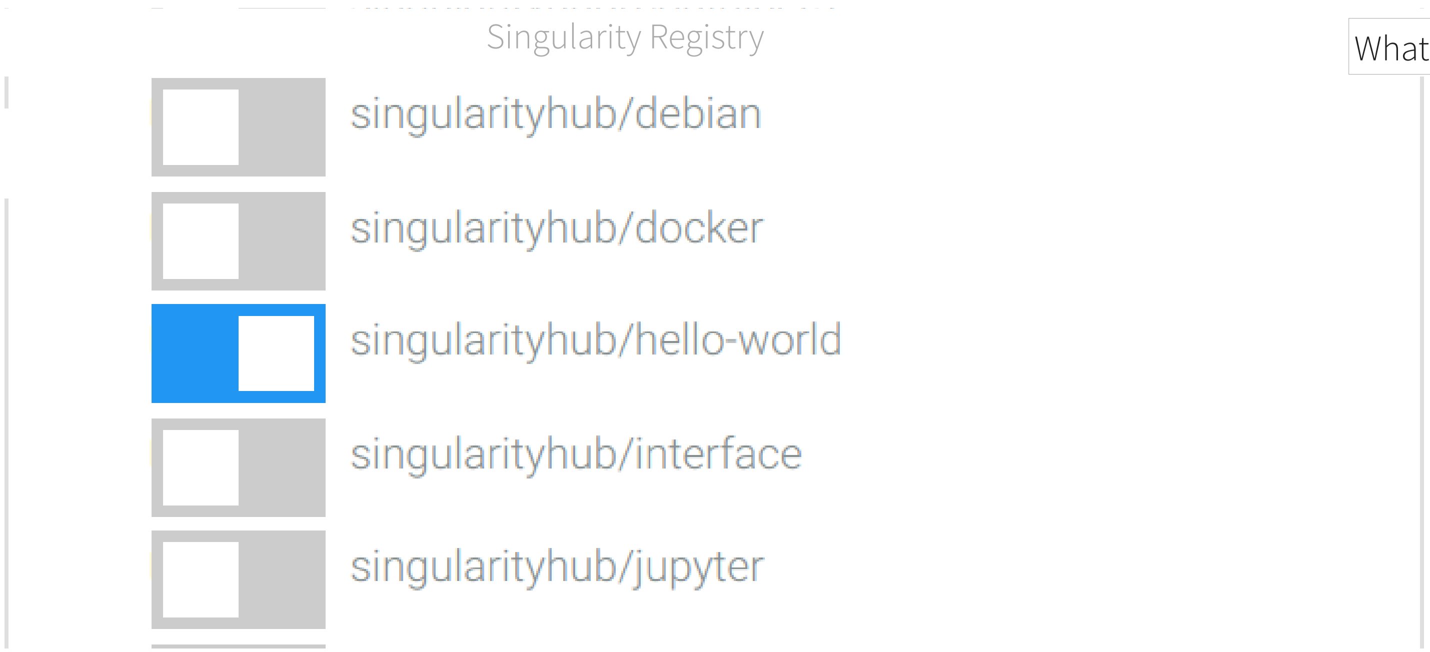
A container is built via an authenticated push to the registry for a finished image built from a Singularity File.

If the Google Build plugin is correctly enabled, you'll see a second option on the right:

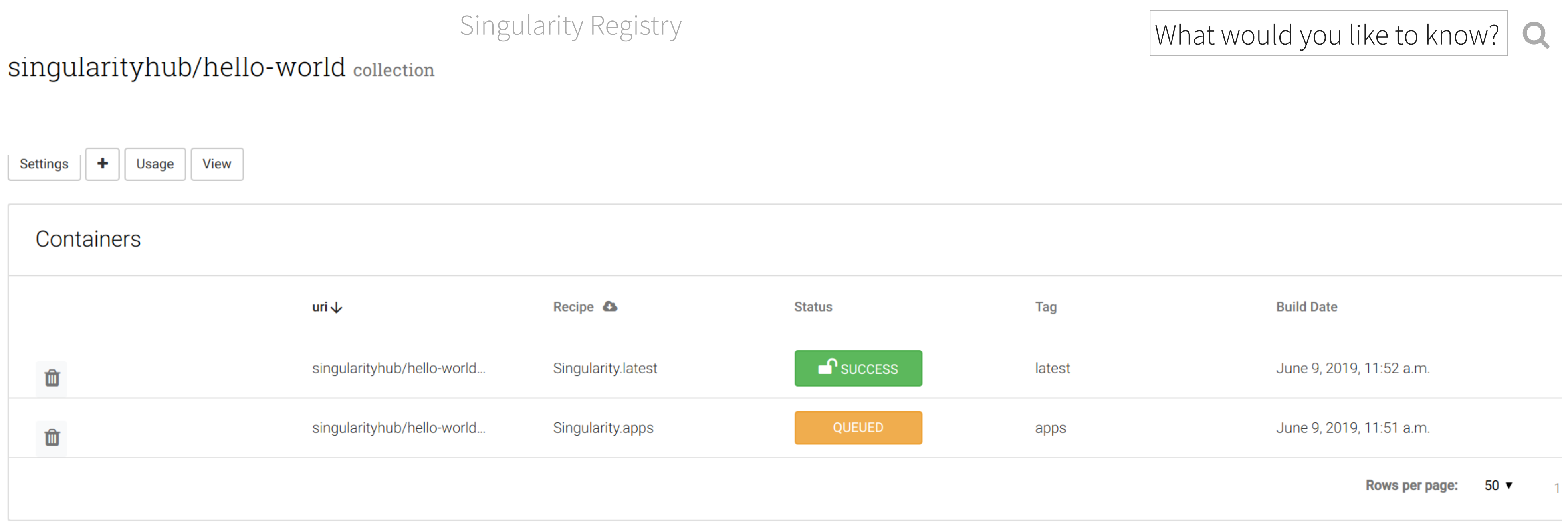


Select this, and your repositories (and organizations) that you granted permission to connect to will show up. You can select one:


singularityhub/busybox
singularityhub/centos
singularityhub/circle-ci
singularityhub/circle-ci-sregistry
singularityhub/container-diff
singularityhub/container-tree
singularityhub/containers
Submit



Once you've connected the repository, an initial build will build the latest version of the recipes that are discovered. Any recipe that is in the format `Singularity.<tag>` or just `Singularity` (tag defaults to latest) will be built.


Singularity Registry

singularityhub/hello-world collection

Containers

	uri	Recipe	Status	Tag	Build Date
	singularityhub/hello-world...	Singularity.latest	SUCCESS	latest	June 9, 2019, 11:52 a.m.
	singularityhub/hello-world...	Singularity.apps	QUEUED	apps	June 9, 2019, 11:51 a.m.

If you have two recipes named equivalently in different folders, the recipe that was more recently updated will be used.

Push a Recipe

When the server is started and the client is ready, it's time to push a recipe to build! By default, you will need to specify the name of the collection and container, and to include the fact that you want to use Google Cloud Build. You'll need to install Singularity Registry Client version 0.2.21 or later:

```
$ pip install sregistry[google-build]>=0.2.21
$ pip install sregistry[google-build-basic]>=0.2.21 # without local database
```

at `$HOME/.sregistry`. Once your token and registry base are defined, you will need to create the collection in the web interface first to e h yourself as an owner. **You cannot push to a collection that does not exist**. Once the collection is created (for example, below I created the collection "collection"), you can push like this:

```
$ sregistry build --name registry://collection/container:tag Singularity --builder google_build
```

Notice that we specify the builder to be "google_build." Also notice that the command simply requires a name for your collection (it doesn't need to exist, but you need push access and to have exported your token to your local machine.

If you get this error:

```
[================================] 0/0 MB - 00:00:00
Recipe upload failed: 403 Client Error: Forbidden for url: https://containers.page/google_build/build/.
```

you forgot to create a collection called "collection" and need to make it in the interface before proceeding.

Pull Containers

Once you have a container, you of course want to pull it! You can use the Singularity Client to do this. Let's say that our server is at `https://www.containers.page`:

```
$ singularity pull shub://containers.page/singularityhub/hello-registry:latest
 760.00 KiB / 760.00 KiB [==========================================================
```

And there you have it!

```
hello-registry_latest.sif

     gularity run hello-registry_latest.sif
Tacotacotaco!
```

Note that having a custom registry name (containers.page, in the above example) was a bug in early versions of Singularity 3.x. if you have trouble with this command, you will need to upgrade Singularity.

You can technically also just pull it with simple bash commands, if you don't want to rely on Singularity.

```
$ wget $(curl https://containers.page/api/container/singularityhub/hello-registry:latest | jq --raw-output .imag
```

If you want to pull with Singularity (but get the error) you can also do this:

```
$ singularity pull $(curl https://containers.page/api/container/singularityhub/hello-registry:latest | jq --raw-
```

Finally, it should be pointed out that you can use the Google Builder integration from your command line without having a registry at all. Singularity Registry Client can serve to build and then pull the image on its own.