Versioning and Stable Releases

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Outline

- Why stable releases?
- Creating tags in Github
- Creating a stable release from a Tag
- Creating a Uploading a Package using PyPI and Twine
- Versioning
- Stable DOIs for publications using Zenodo

Why stable release?

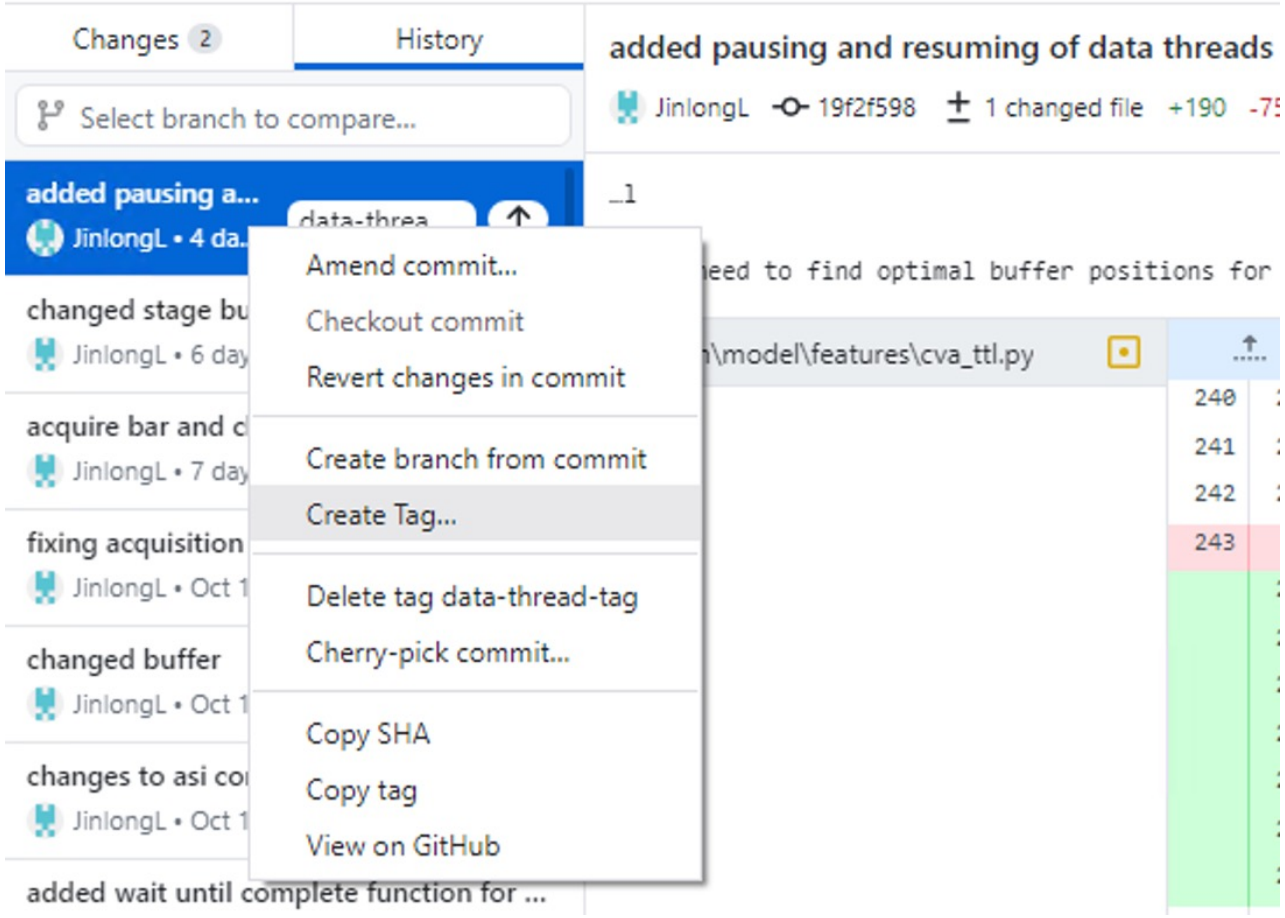
- Collaborative codebases are constantly updated and changed.
  - Having stable versions helps with managing releases
- Important for reproducibility of research for publications.
- It is important to have a specific release that ensures code is still functional
  - Ensure packages that are installed to make the

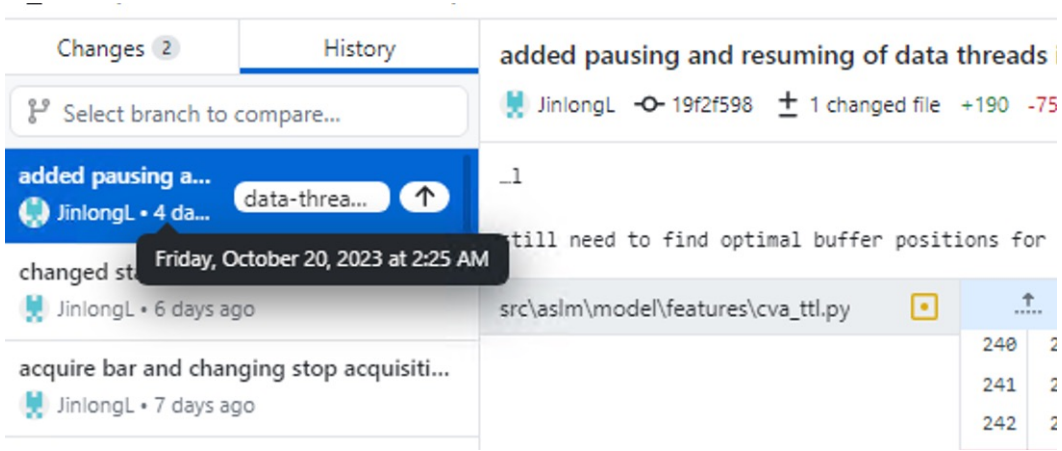
Implementing stable release

- Github Tag
- Github Stable Release
- Packaging Projects using PyPI and twine
- Github Release and stable DOI via Zenodo
- If we have time: Conda Constructor

Creating a Github Tag to a commit

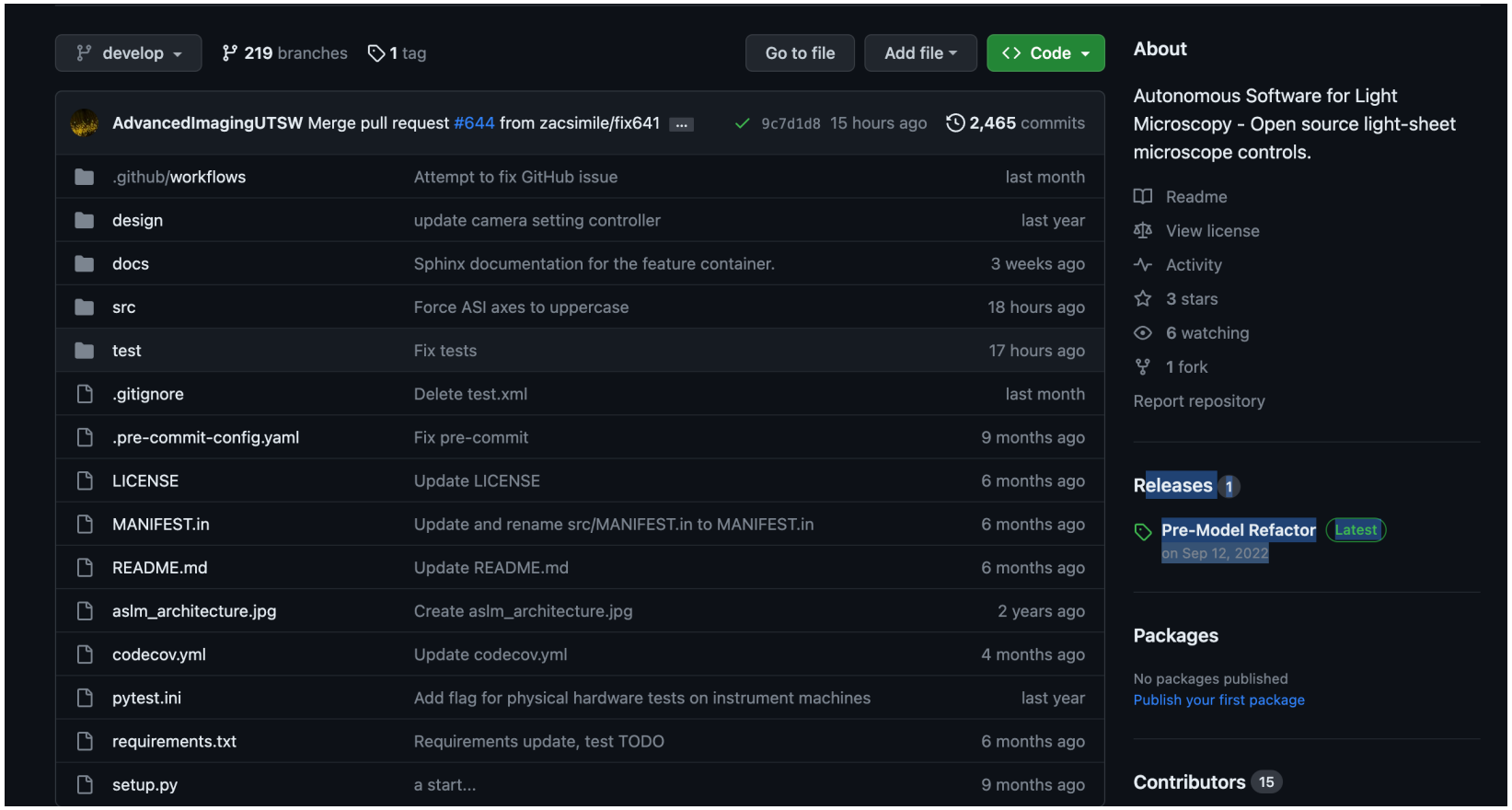
- In Github it is possible tag a to a commit





Creating a stable release in Github

- Can create a stable release from a tag on recent commit using Github



Creating a stable release using Github

Releases | Tags

Draft a new release | Find a release

Sep 12, 2022

codeCollision4

v0.0.1-alpha

f1a11da

Compare

Pre-Model Refactor

Latest

This release aims to create a stable build prior to the major refactoring of the Model. Below are the pull requests and change-log.

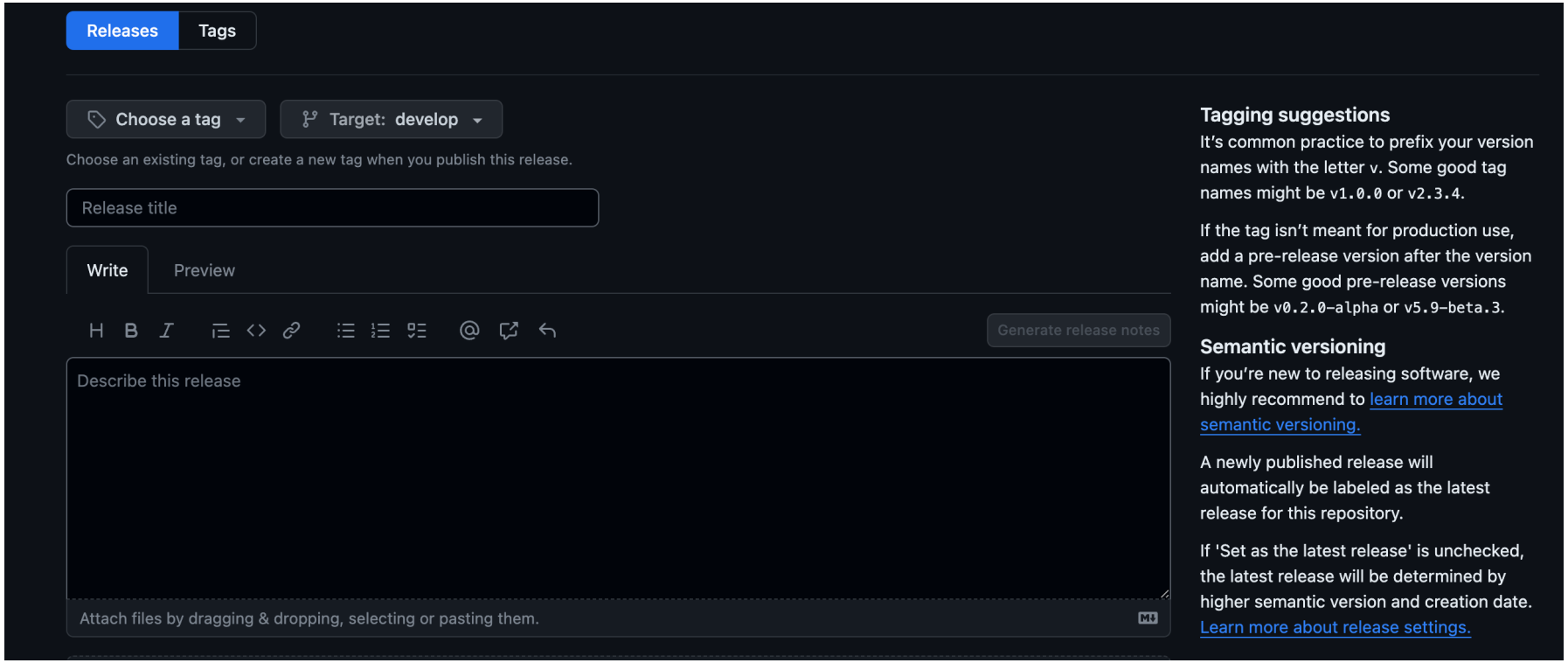
What's Changed

- Yaml refactor by @AdvancedImagingUTSW in #31
- Cam view by @codeCollision4 in #35
- Add multi_position controller by @annie-xd-wang in #40
- Camera attempt by @AdvancedImagingUTSW in #43
- Refactored experiment.yml by @annie-xd-wang in #42
- First pass with laser base by @AdvancedImagingUTSW in #44
- Model in process test merge by @AdvancedImagingUTSW in #51
- Model in process by @annie-xd-wang in #50
- Swampland 2 by @AdvancedImagingUTSW in #57
- Evaluation of Widget List by @AdvancedImagingUTSW in #60

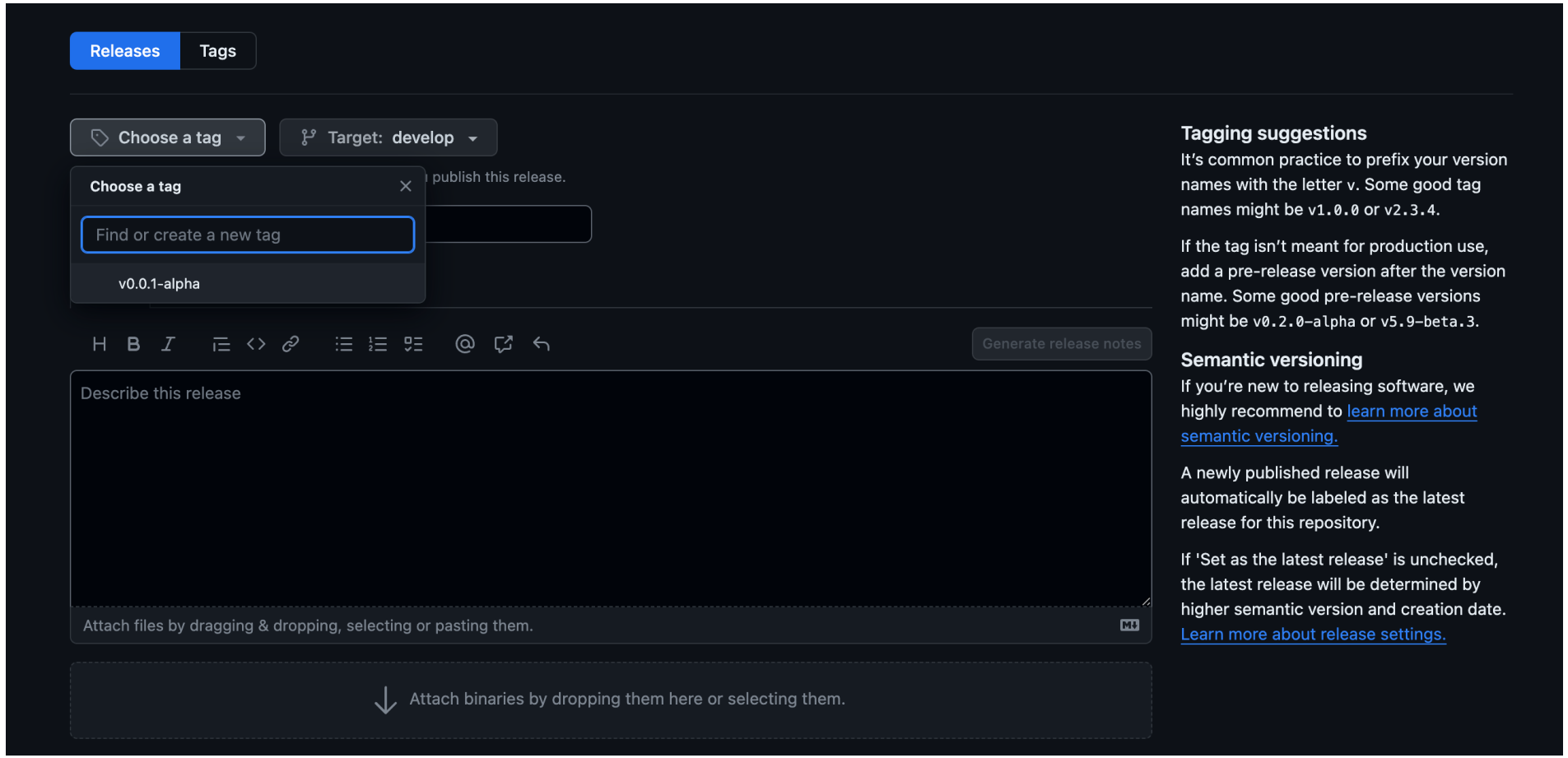
heDeanLab/ASLM/releases/latest

Drafting a stable release using Github

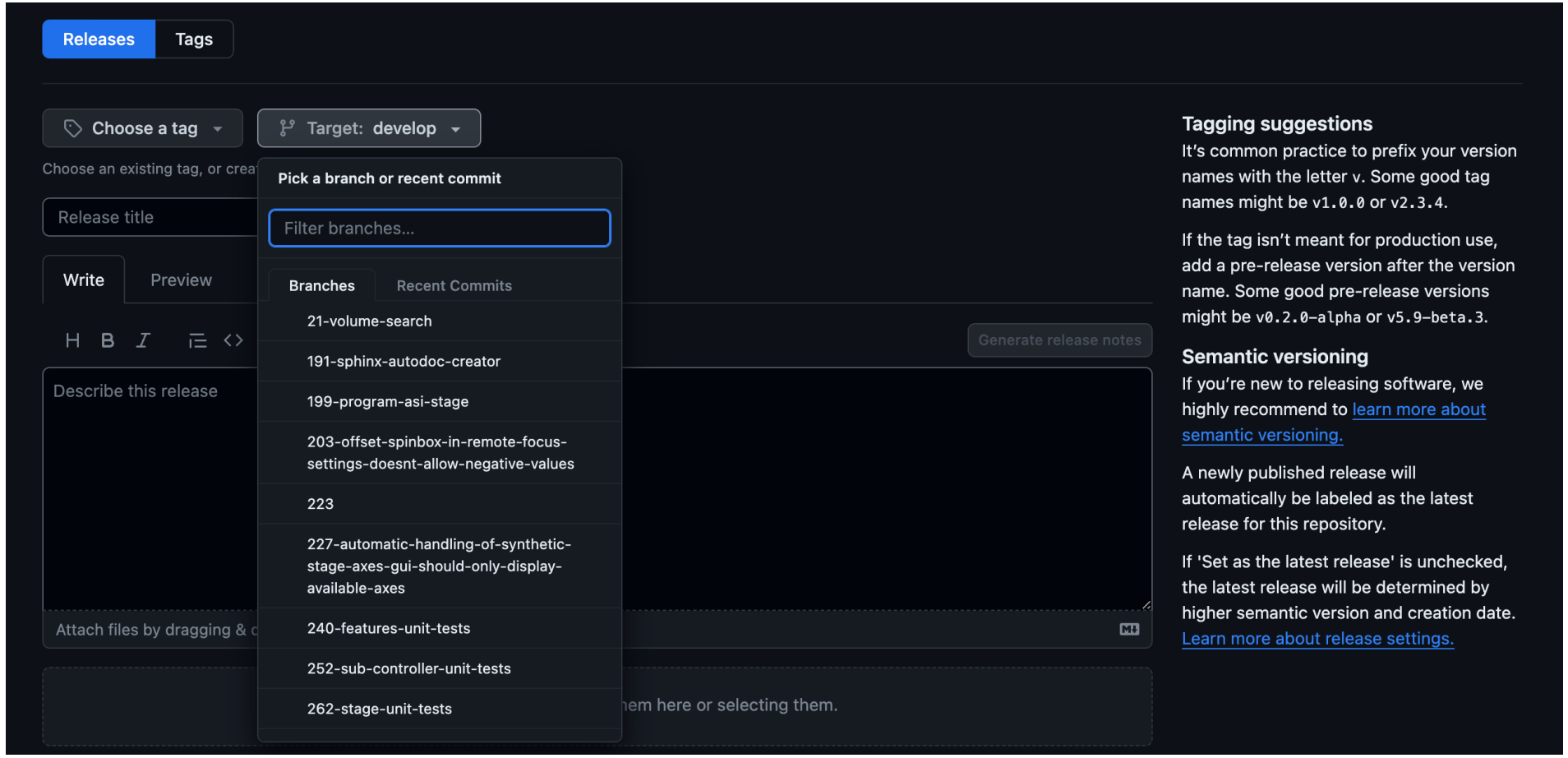
- Click draft stable release using Github



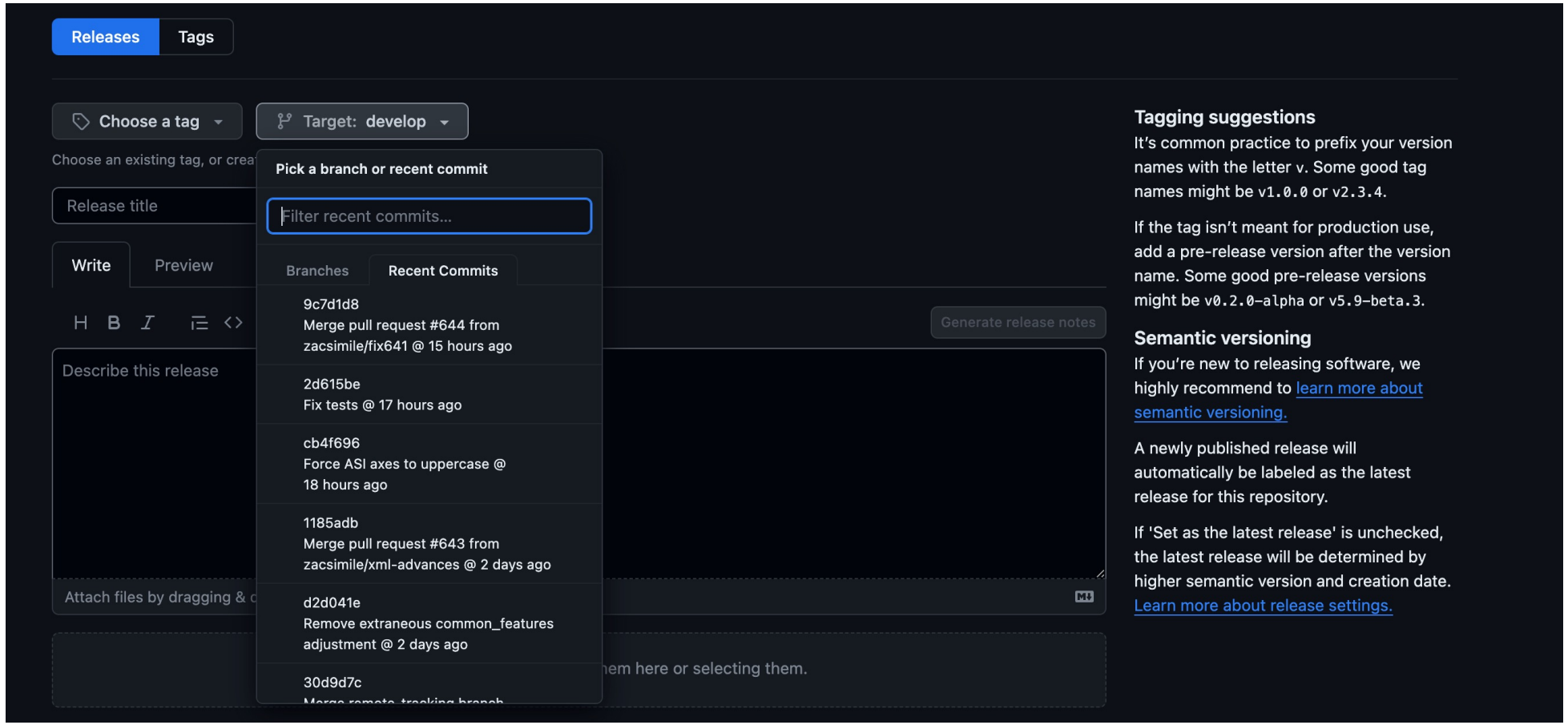
Creating a stable release from a tag using Github



Creating a stable release from a branch

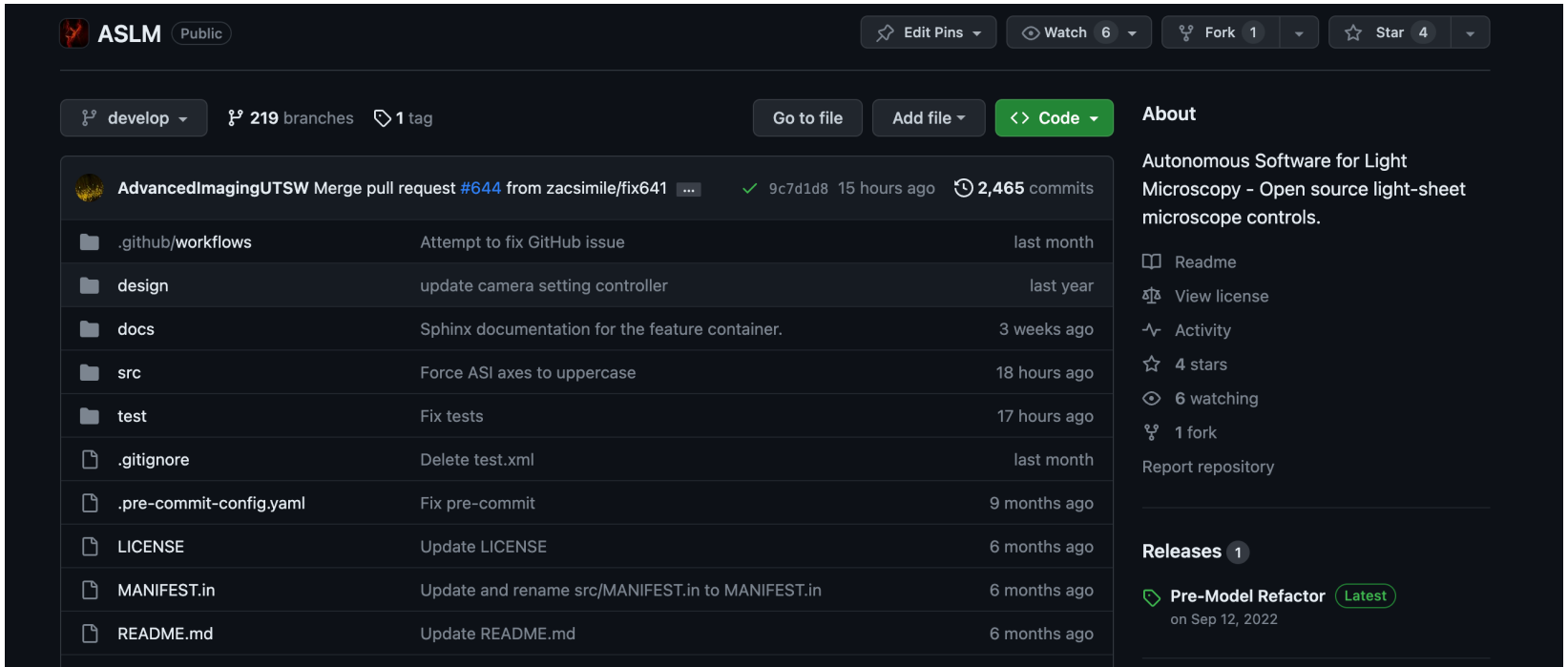


Creating a stable release from a commit



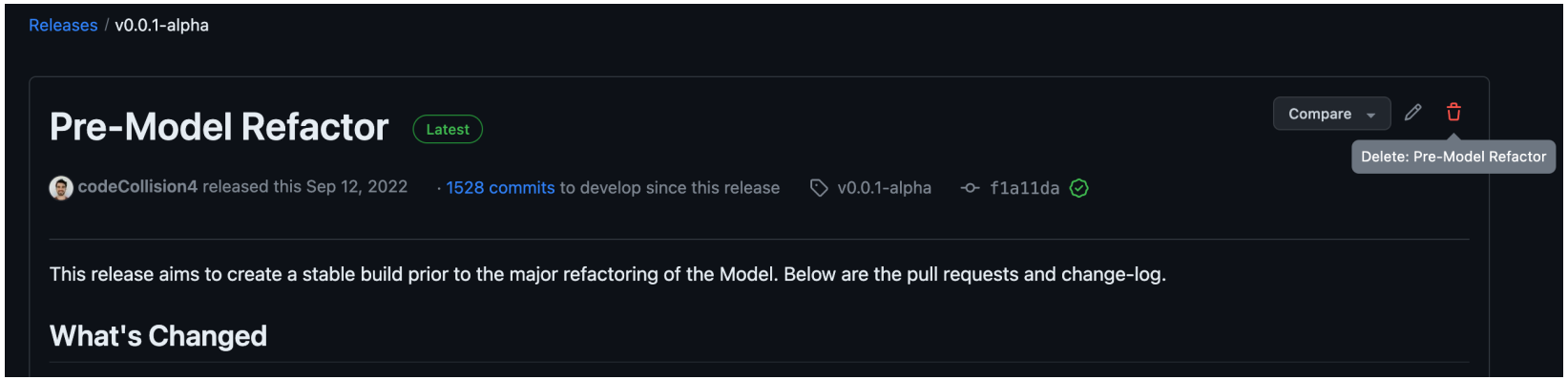
Stable Release

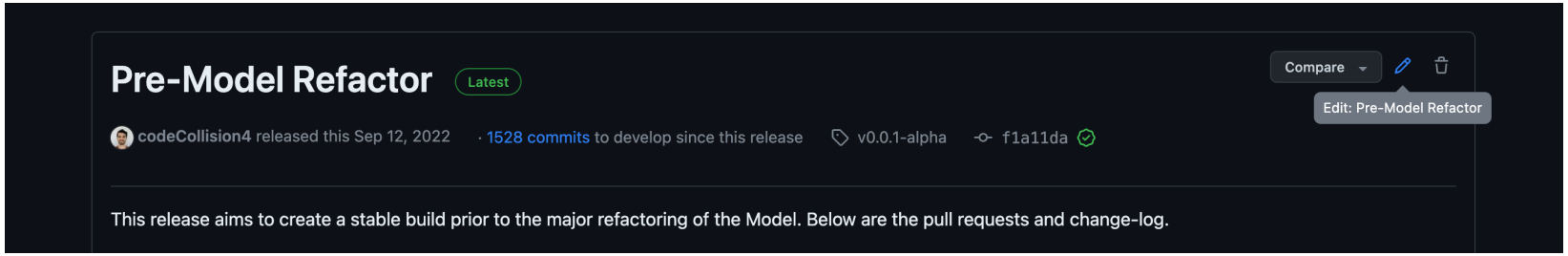
- Stable releases are shown on the main github page and will link to that branch
- Make sure versions of dependences are also included in the pyproject.toml file and operating systems are defined.
- Release will come with a link that can be used for citation



Editing or Deleting Stable Release

- It is possible to edit or delete a stable release by editing the tag or changing the fix.



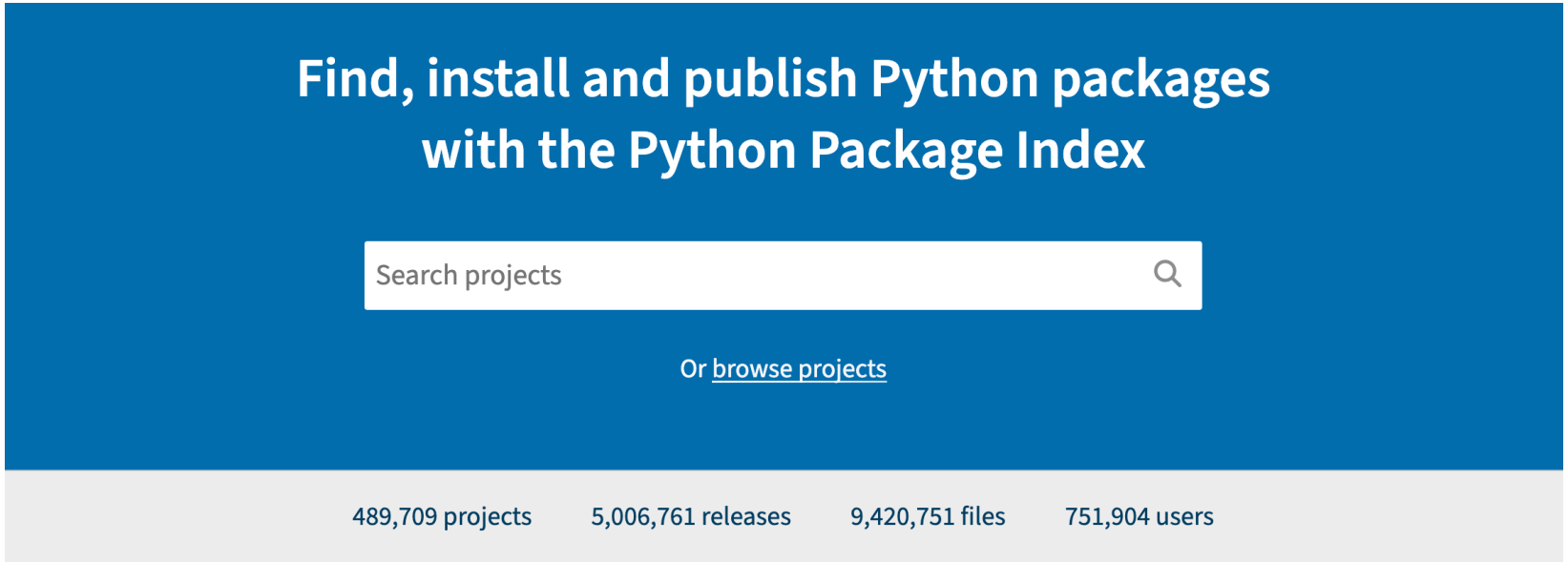


Downloading Release from Github

- To download latest version of software package, we can use
  - pip install “git+https://github.com/user/project”
- To download a stable release:
  - Pip install “git+https://github.com/user/project1.2.3”
- Include stable release as dependency in pyproject.toml:
  - Dev = [“project @ git+https//github.com/user/project1.2.3”]
- Zip files of releases can be created and can be used for faster install. For stable release:
  - Pip install “https://github.com/user/project1.2.3.zip”
- For dependency in pyproject.toml:
  - Dev = [“project @ https//github.com/user/project1.2.3.zip”]

Python Packaging Index (PyPI)

- We have used PyPI to install python packages before
- PyPI is a package management server that can can be used
- PyPI is a package management server to find install and publish packages



Publishing Packages using PyPI and Twine

- Step 1: Create a Readme.md file
- Step 2: Create a license file
- Step 3: Organize files in src and tests folder
- Step 4: buiding and versioning in pyproject.toml file
- Step 5: building wheel
- Step 6: pushing to PyPI
- Step 7: automatically publish releases using Github Actions

Step 1: Create a README.md file

- Create a README.md file that includes
  - Description of Package
  - How to install package
  - How to use package
  - Authors
- Include README.md in pyproject.toml
- Include citation in README.md for academic research

```md
# pyqt5-calc

## Simple calculator based on MVC pattern with Python and PyQt5 library.

Calculator based on tutorial from [Real Python](https://realpython.com/):  [Python and PyQt: Building a GUI
Desktop Calculator](https://realpython.com/python-pyqt-gui-calculator/). I updated the implementation to split the
application into separate [modules](https://docs.python.org/3/tutorial/modules.html) to follow the [MVC
(model-view-controller)](https://realpython.com/the-model-view-controller-mvc-paradigm-summarized-with-legos)
pattern used in the tutorial, with those modules further placed into a package.

## Installation

For a development install, enter `pip install -e .[dev]`.
```

Step 2: Create a license file

- Create a license file that includes rights for usage or redistribution
- Important for code distribution
- Use UTSW license file.
- Include license in pyproject.toml

```
MIT License

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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
```
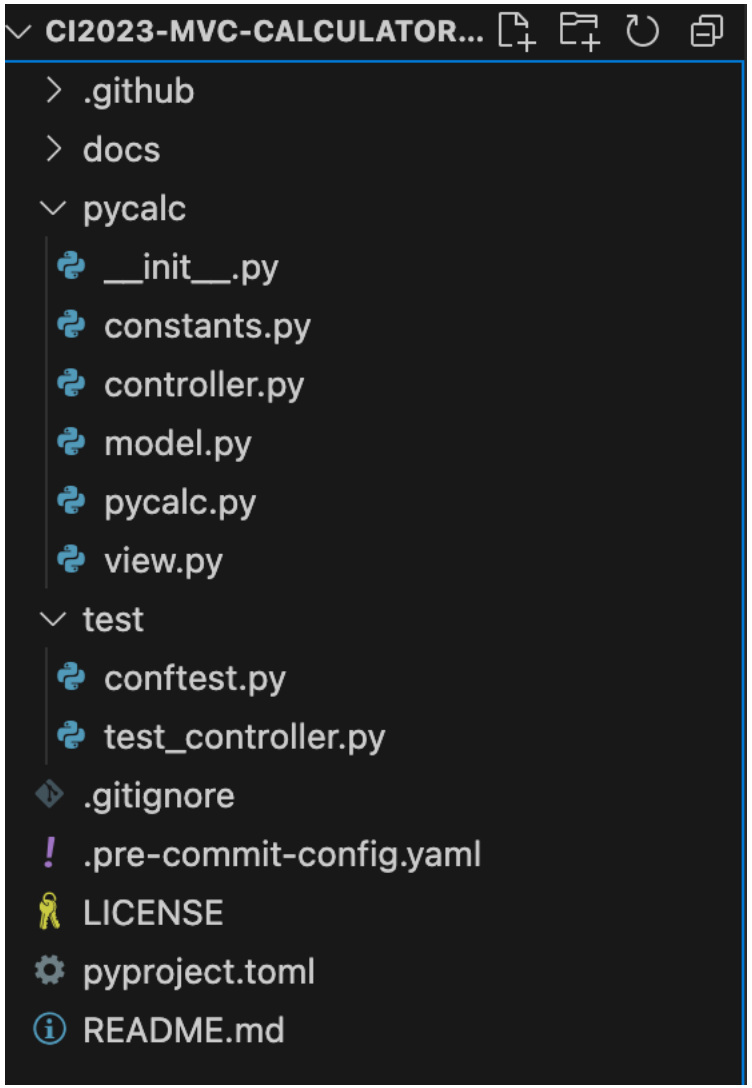

```
[project]
name = "pycalc"
description = "An MVC calculator made in Qt."
authors = [{name = "Tim Jones"}]
readme = "README.md"
license = {file = "LICENSE.md"}
dynamic = ["version"]
```

Step 3: Organize files in src and tests folder

- Organize files into test and src folders similar to first calculator exercise
- Make sure that README.md, pyproject.toml, and license file are at the top level



Step 4: building and versioning in pyproject.toml file

- Versions of code are defined in 3 locations
  - Git Tag
  - Version field in pyproject.toml
  - __version__ in __init__.py
- By using setuptools.scm it will be possible to sync all three
- Add setuptools to build section of pyproject.toml
- Add set dynamic to version in project section of pyproject.toml

```
[build-system]
requires = ["setuptools"]
build-backend = "setuptools.build_meta"
```

```
[project]
name = "pycalc"
description = "An MVC calculator made in Qt."
authors = [{name = "Tim Jones"}]
readme = "README.md"
license = {file = "LICENSE.md"}
dynamic = ["version"]
```

Step 5: Building wheel

- With using pyproject.toml, build is included so we can use the function to build a wheel
  - Python –m build
- Without using pyproject.toml, we would need to install build using
  - Pip install build
  - Python -m build
- Wheel file will be created in dist folder within repo
- Check wheel file by going to directory and unzipping file
  - Cd dist
  - Unzip project.whl

```
dist
|
|____ epi_models-0.1.0-py3-none-any.whl
|____ epi_models-0.1.0.tar.gz
```

Step 6: publishing wheel to PyPI using twine

- Install twine to convert packages to wheels to push to PyPI
  - Pip install twine
- Check package with twine
  - twine check dist/*
- Register for PyPI and possibly TestPyPI
  - https://pypi.org/
  - https://test.pypi.org/ (check if package works)
- Install into testPyPI
  - twine upload --repository testpypi dist/*
  - pip install -i https://test.pypi.org/pypi/
  - Wheel file will be created in dist folder within repo
- Install into PyPI
  - twine upload dist/*
  - Check if package works by using
    - pip install project

Step 7: automatically publish releases using Github Actions

- Use Github actions to automatically publish a package when a new release is setup in github
- Specify Yaml file to build package into wheel file
- Use github actions to publish package of a specific release instead of using twine.

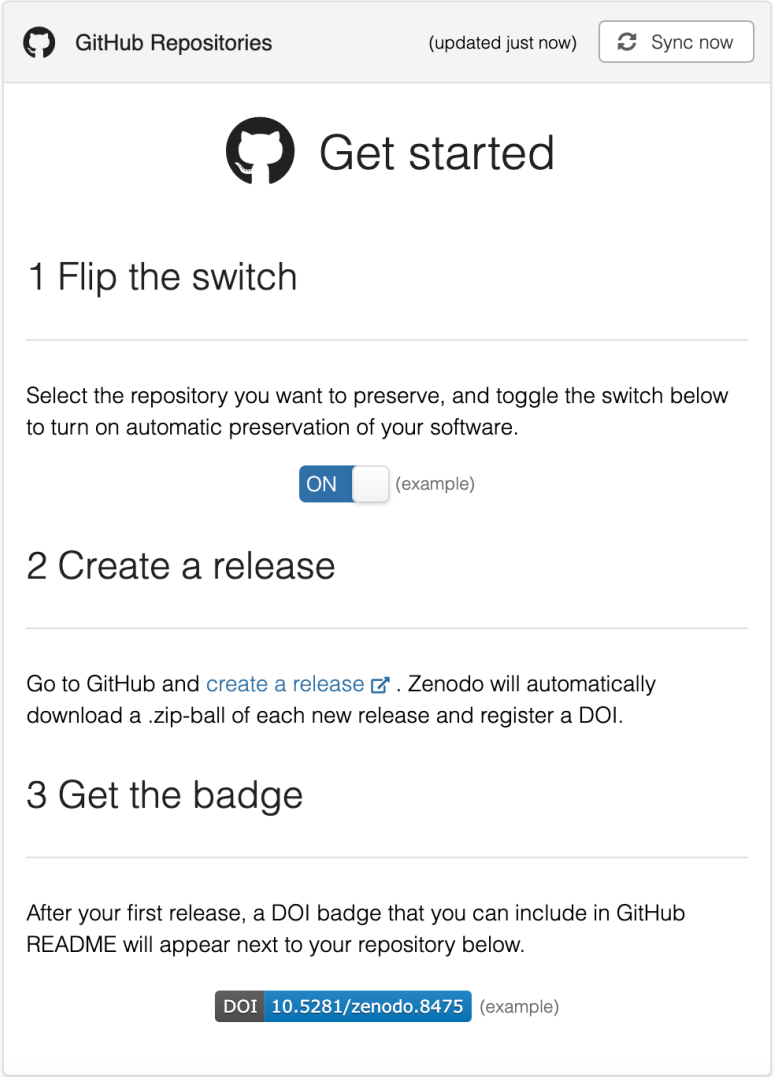
```yaml
# Provide a name for the workflow
name: Upload Python Package

# Tell GitHub when to run the action
# This will run every time a new release is published
on:
  release:
    types: [published]

jobs:
  deploy:
    # Run the workflow on the latest Ubuntu version
    runs-on: ubuntu-latest
    steps:
      # This will checkout our GitHub project and enter
      # the directory
      - uses: actions/checkout@v3
      # This will set up a Python environment
      - name: Set up Python
        uses: actions/setup-python@v4
        with:
          python-version: '3.x'
      # Here we update pip to the latest version and
      # install 'build'. We won't need 'twine' here.
      - name: Install dependencies
        run: |
          python -m pip install --upgrade pip
          pip install build
      # Here we run build to create a wheel and a
      # .tar.gz source distribution.
      - name: Build package
        run: python -m build --sdist --wheel
      # Finally, we use a pre-defined action to publish
      # our package in place of twine.
      - name: Publish package
        uses: pypa/gh-action-pypi-publish@release/v1
        with:
          user: __token__
          password: ${{ secrets.PYPI_API_TOKEN }}
```

Notes on Versioning

- Versioning is an important part of stable releases
  - Different stable release versions can alter functionality of code.
- Versions of stable releases need to be defined just like packages when listing dependencies
- Versions below 1 often signify that a repo is going through constant updates between versions and is considered unstable
  - Very little to no notification of changes before release is published
- Versions 1 or above signify a stable release constant updates between versions and is considered unstable
  - Functions which are being phased out in newer versions might be tagged with a depreciation warning so users know that this function will be removed or updated in a new released

Archiving using Github and Zenodo

- For publications, we would need a stable DOI that shows what code was used to facilitate the study
- Often, we adapt a repo to generate specific plots for a paper
- You don't want to place all of the code you used to create the plots into the repo
  - You might also have datasets you want to include that are larger than the limit allowed by github (~50 gb) or not necessary for the repo.
- Go to Zenodo Github page and login with github account
- Authorize zenodo access to github
- Follow Zenodo instructions to create a stable doi for a release in a repository



Conclusions

- Creating stable releases of code is a useful method to share codebases with others
  - Helps with reproducibility
- It is possible to create releases with github tags, releases, and creating packages on PyPI
- Create stable DOIs for publication using zenodo.

Exercise

- Build a wheel and create a stable release of codebase using PyPI and twine

Further Reading

- Creating tags and releases in github: https://docs.github.com/en/repositories/releasing-projects-on-github/managing-releases-in-a-repository
- Creating packages with PyPI: https://carpentries-incubator.github.io/python_packaging/instructor/05-publishing.html#versions-and-releases
- Create stable releases with zenodo: https://docs.github.com/en/repositories/archiving-a-github-repository/referencing-and-citing-content
- Conda Constructor: https://anaconda.org/anaconda/constructor, https://github.com/conda/constructor
- Creating packages from releases with github actions: https://docs.github.com/en/packages/managing-github-packages-using-github-actions-workflows/publishing-and-installing-a-package-with-github-actions
- Verisioning packages: https://setuptools.pypa.io/en/latest/userguide/pyproject_config.html