Setting up a CI/CD Pipeline in GitHub Actions

Introduction to Python Software Development on GitHub 2023

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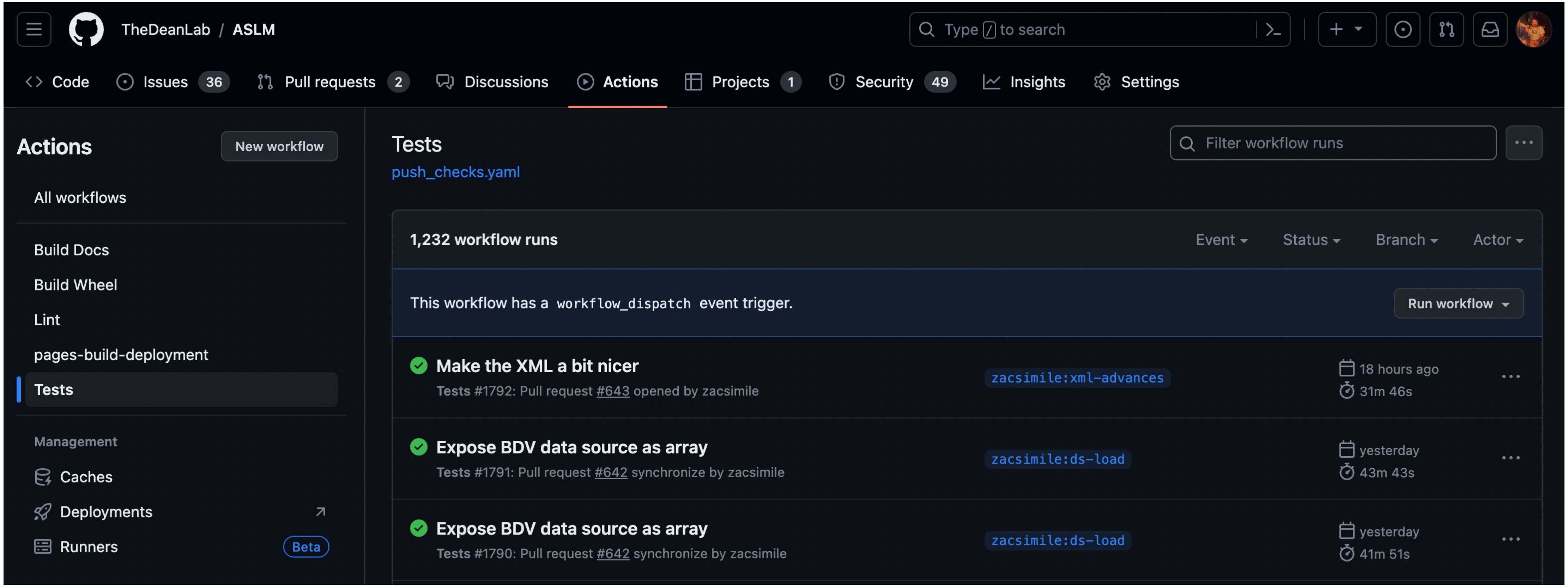
UT Southwestern Medical Center

https://www.eslflashcards.com/set/action-flashcards-set-a/

GitHub Actions Dashboard



Tests
push_checks.yaml

1,232 workflow runs

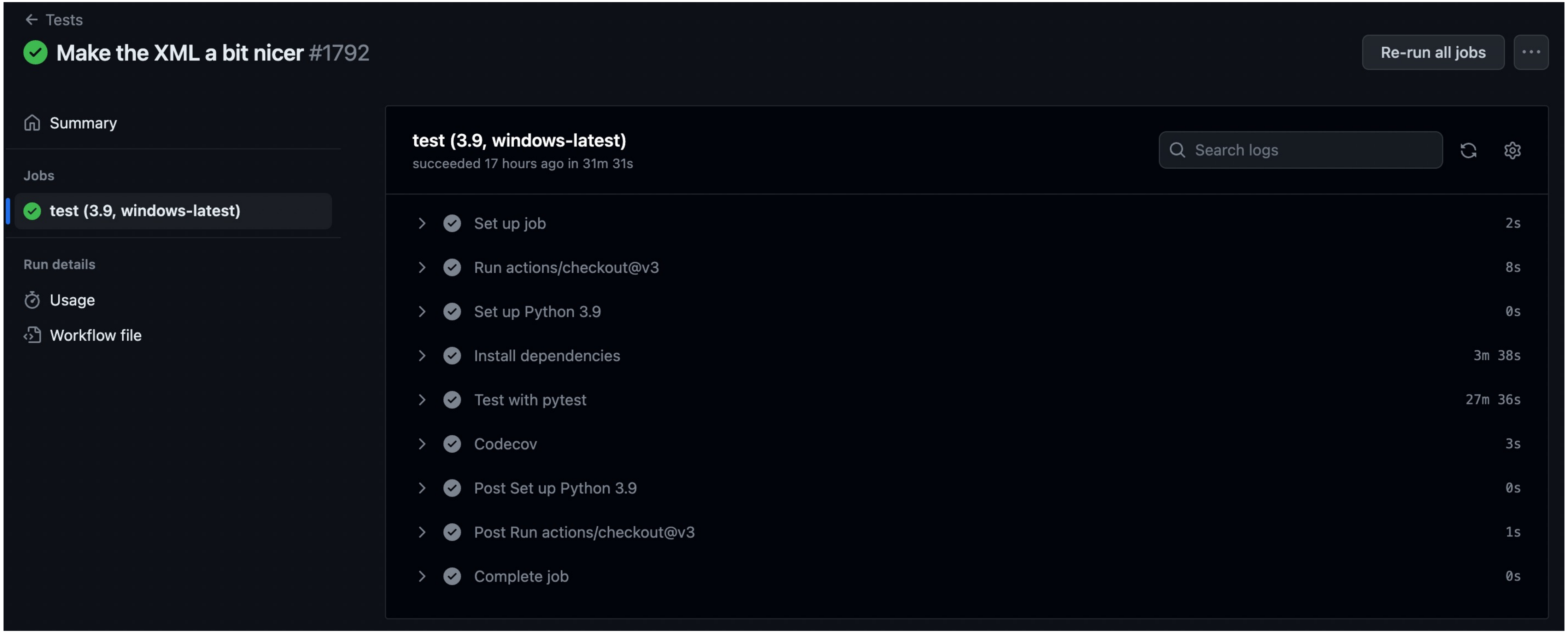
This workflow has a `workflow_dispatch` event trigger.

Make the XML a bit nicer
Tests #1792: Pull request #643 opened by zacsimile
`zacsimile:xml-advances`
18 hours ago
31m 46s

Expose BDV data source as array
Tests #1791: Pull request #642 synchronize by zacsimile
`zacsimile:ds-load`
yesterday
43m 43s

Expose BDV data source as array
Tests #1790: Pull request #642 synchronize by zacsimile
`zacsimile:ds-load`
yesterday
41m 51s

GitHub Actions Workflow Example



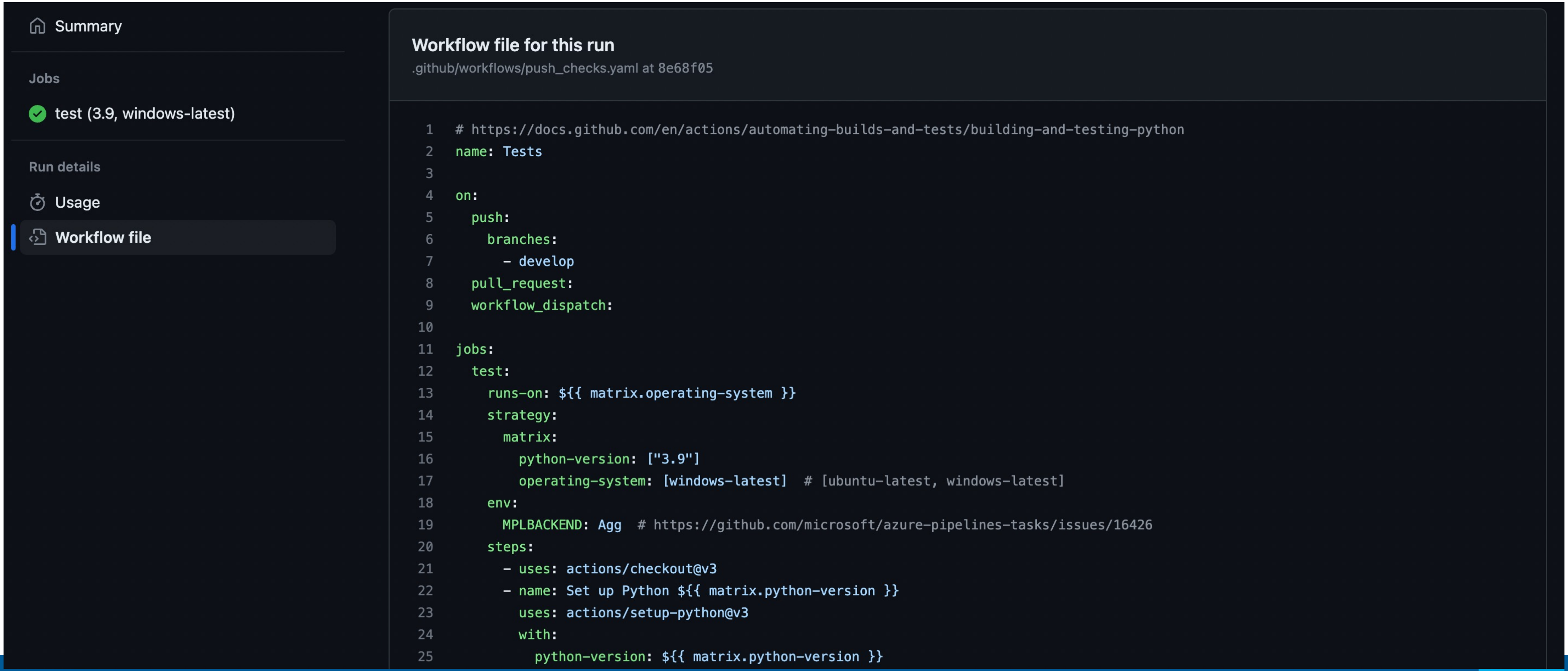
Make the XML a bit nicer #1792

test (3.9, windows-latest)

test (3.9, windows-latest)
succeeded 17 hours ago in 31m 31s

```
> ✓ Set up job                          2s
> ✓ Run actions/checkout@v3             8s
> ✓ Set up Python 3.9                   0s
> ✓ Install dependencies            3m 38s
> ✓ Test with pytest               27m 36s
> ✓ Codecov                             3s
> ✓ Post Set up Python 3.9              0s
> ✓ Post Run actions/checkout@v3        1s
> ✓ Complete job                        0s
```

GitHub Actions Workflow Example



Workflow file for this run

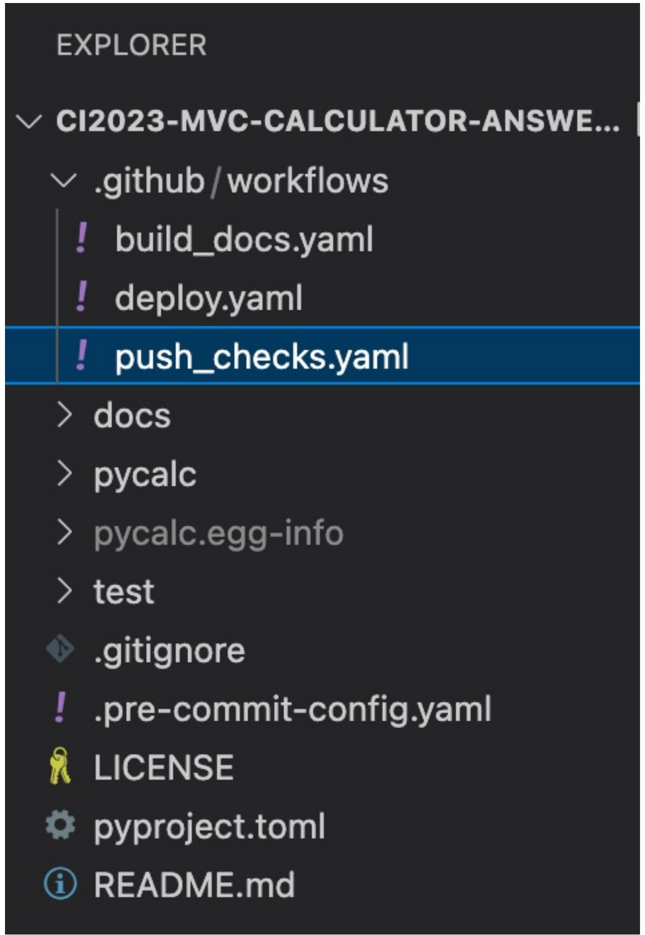
.github/workflows/push_checks.yaml at 8e68f05

```yaml
# https://docs.github.com/en/actions/automating-builds-and-tests/building-and-testing-python
name: Tests

on:
  push:
    branches:
      - develop
  pull_request:
  workflow_dispatch:

jobs:
  test:
    runs-on: ${{ matrix.operating-system }}
    strategy:
      matrix:
        python-version: ["3.9"]
        operating-system: [windows-latest]  # [ubuntu-latest, windows-latest]
    env:
      MPLBACKEND: Agg  # https://github.com/microsoft/azure-pipelines-tasks/issues/16426
    steps:
      - uses: actions/checkout@v3
      - name: Set up Python ${{ matrix.python-version }}
        uses: actions/setup-python@v3
        with:
          python-version: ${{ matrix.python-version }}
```

Let’s create a GitHub workflow

- You can follow along at https://docs.github.com/en/actions/quickstart

Where does the workflow file go?



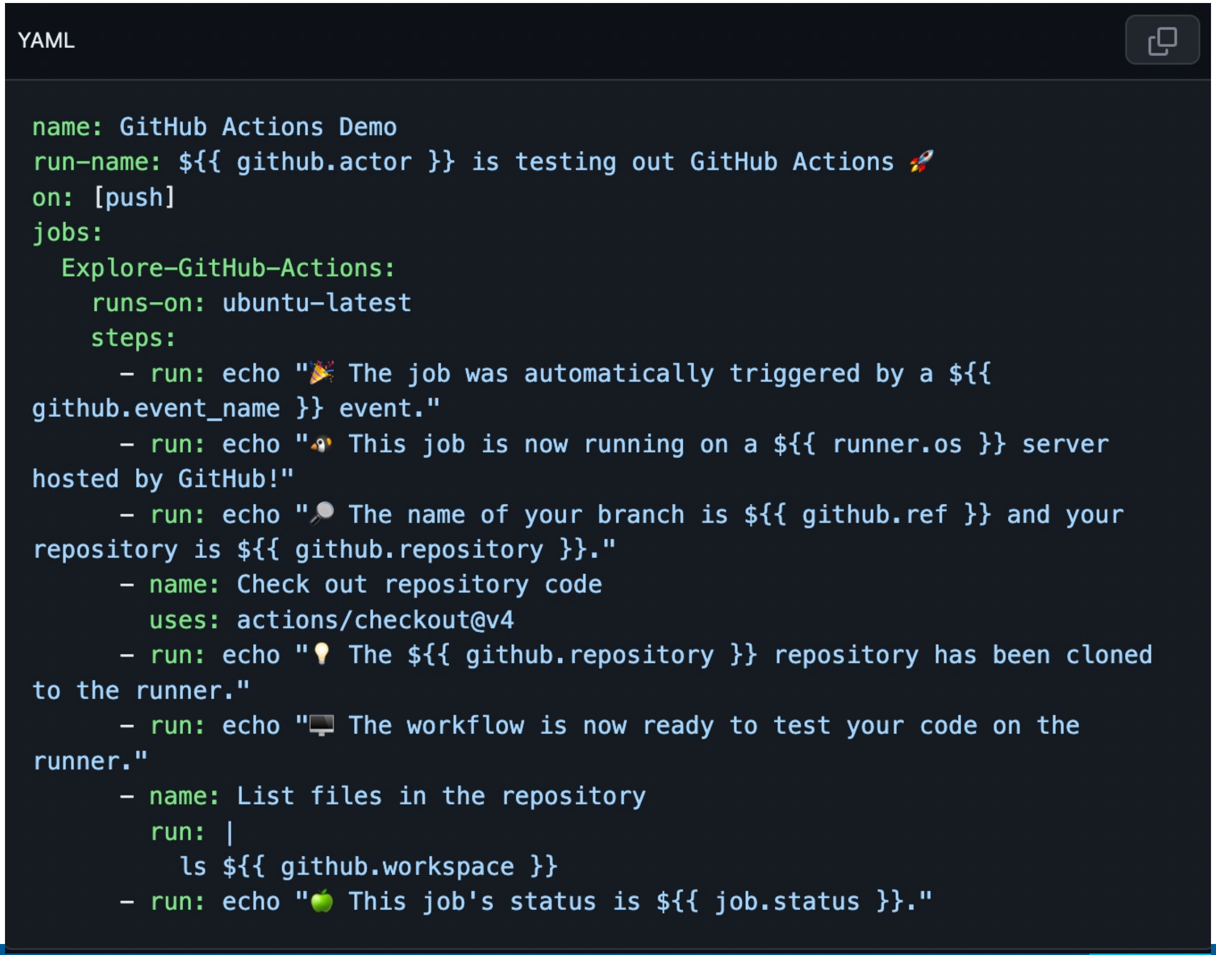
EXPLORER

```
∨ CI2023-MVC-CALCULATOR-ANSWE...
  ∨ .github / workflows
      ! build_docs.yaml
      ! deploy.yaml
      ! push_checks.yaml
  > docs
  > pycalc
  > pycalc.egg-info
  > test
    .gitignore
  ! .pre-commit-config.yaml
    LICENSE
    pyproject.toml
  ⓘ README.md
```

- They are stored in your Git repository, under .github/workflows
- Create the .github folder
- Create the .github/workflows folder
- Create github-actions-demo.yml

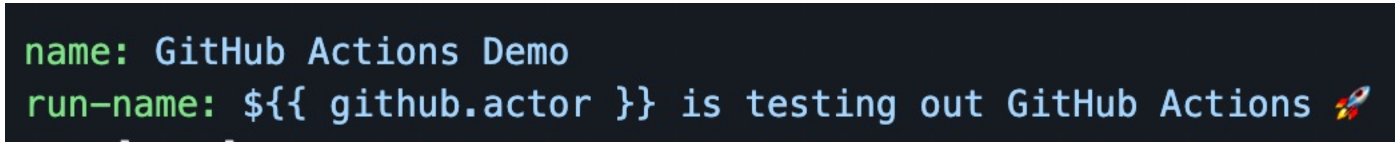
github-actions-demo.yml

- https://docs.github.com/en/actions/quickstart



```yaml
name: GitHub Actions Demo
run-name: ${{ github.actor }} is testing out GitHub Actions 🚀
on: [push]
jobs:
  Explore-GitHub-Actions:
    runs-on: ubuntu-latest
    steps:
      - run: echo "🎉 The job was automatically triggered by a ${{ github.event_name }} event."
      - run: echo "🐧 This job is now running on a ${{ runner.os }} server hosted by GitHub!"
      - run: echo "🔎 The name of your branch is ${{ github.ref }} and your repository is ${{ github.repository }}."
      - name: Check out repository code
        uses: actions/checkout@v4
      - run: echo "💡 The ${{ github.repository }} repository has been cloned to the runner."
      - run: echo "🖥️ The workflow is now ready to test your code on the runner."
      - name: List files in the repository
        run: |
          ls ${{ github.workspace }}
      - run: echo "🍏 This job's status is ${{ job.status }}."
```

What are these two lines doing??



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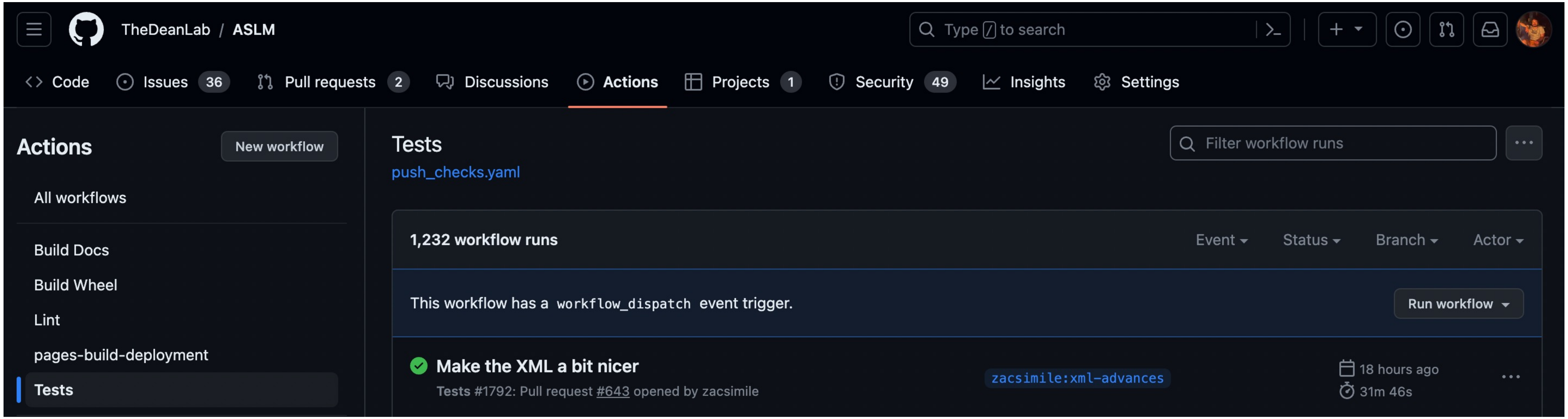
```



Tests

push_checks.yaml

1,232 workflow runs

This workflow has a `workflow_dispatch` event trigger.

✓ Make the XML a bit nicer

Tests #1792: Pull request #643 opened by zacsimile

`zacsimile:xml-advances`

18 hours ago

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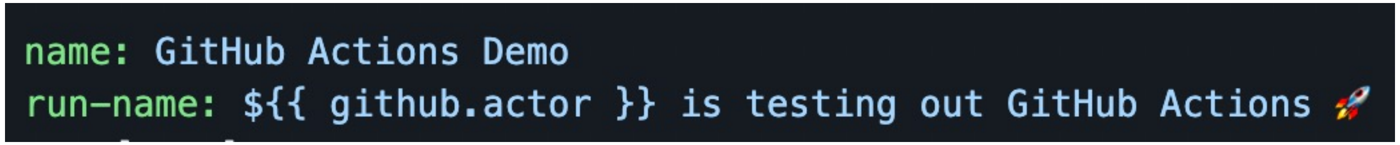

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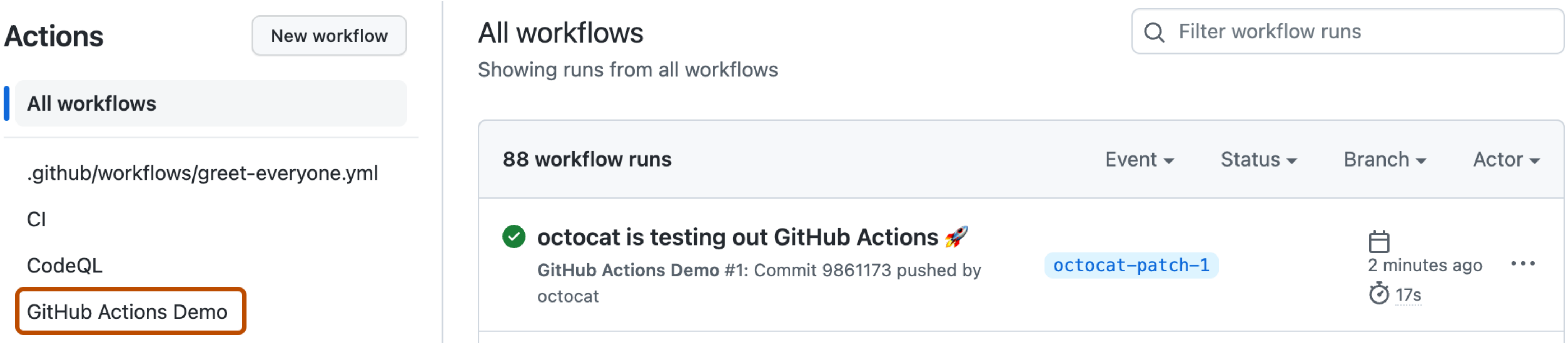


88 workflow runs

✓ octocat is testing out GitHub Actions 🚀
GitHub Actions Demo #1: Commit 9861173 pushed by octocat
`octocat-patch-1`
2 minutes ago
17s

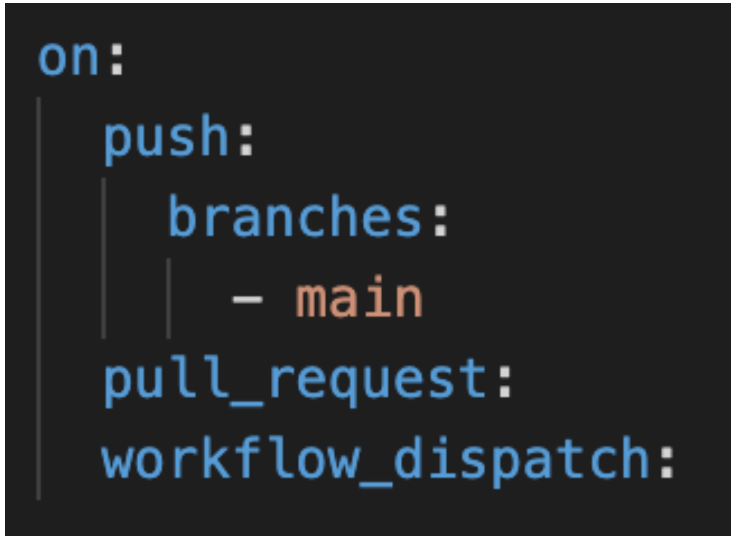
What is ${{ }}?

- It’s an expression (see https://docs.github.com/en/actions/learn-github-actions/expressions)
- Expressions evaluate what’s inside them
- `${{ github.actor }}` evaluates to `octocat` in the example
- `${{ github.actor == ”octocat” }}` evaluates to `true`

What does `on: [push]` do?

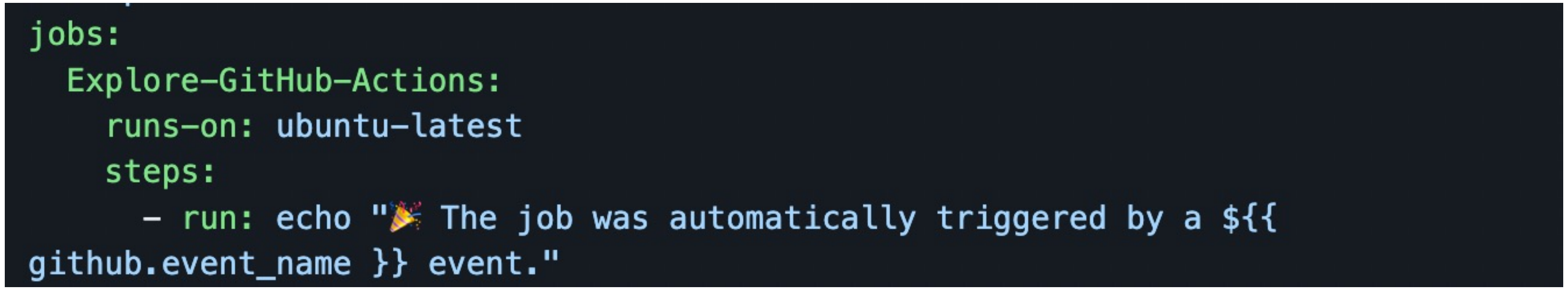
- It triggers the jobs under `jobs` when code is `git push`ed to the repository

- There are other events. For example, this will trigger a job
  - on a `git push` to the `main` branch
  - when a Pull Request is opened
  - if we hit ”Run workflow” in the Actions dashboard



```yaml
on:
  push:
    branches:
      - main
  pull_request:
  workflow_dispatch:
```

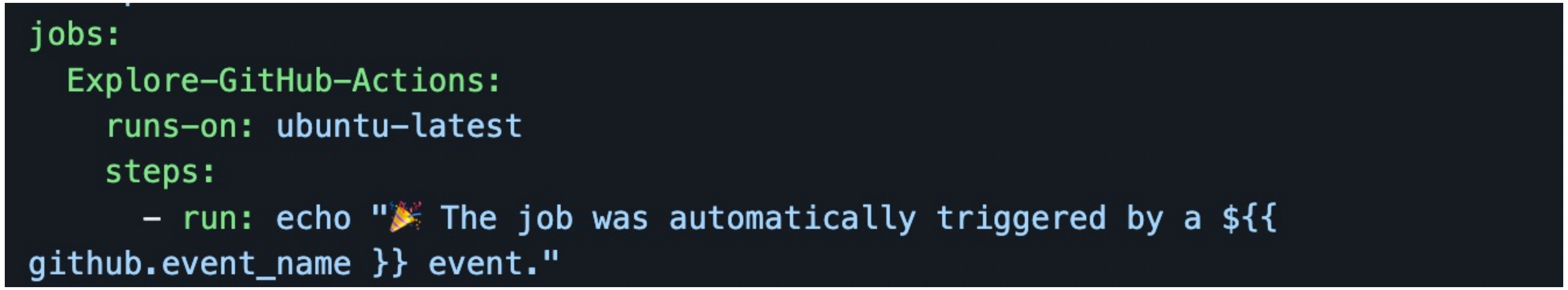
Defining the jobs



```
jobs:
  Explore-GitHub-Actions:
    runs-on: ubuntu-latest
    steps:
      - run: echo "🎉 The job was automatically triggered by a ${{
github.event_name }} event."
```

- What is `jobs`?

Defining the jobs



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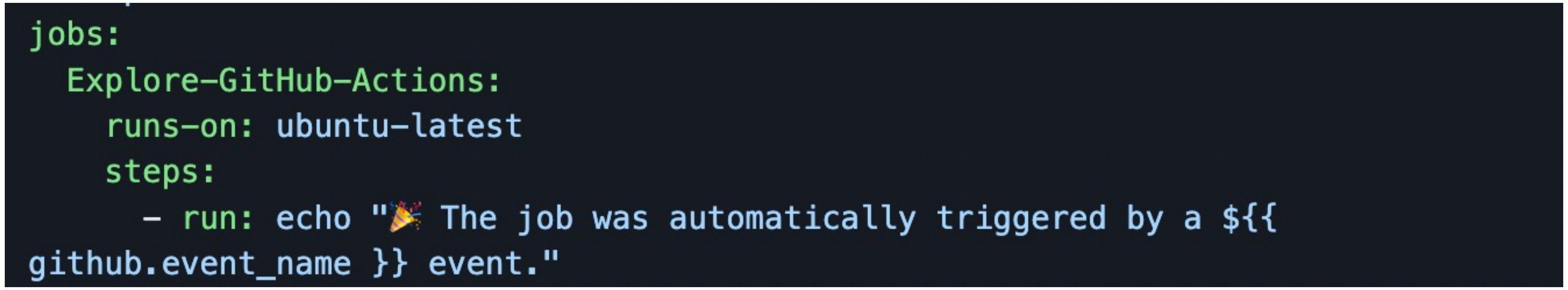
- What is `jobs`? The key that holds all the jobs that run in the workflow file.

Defining the jobs



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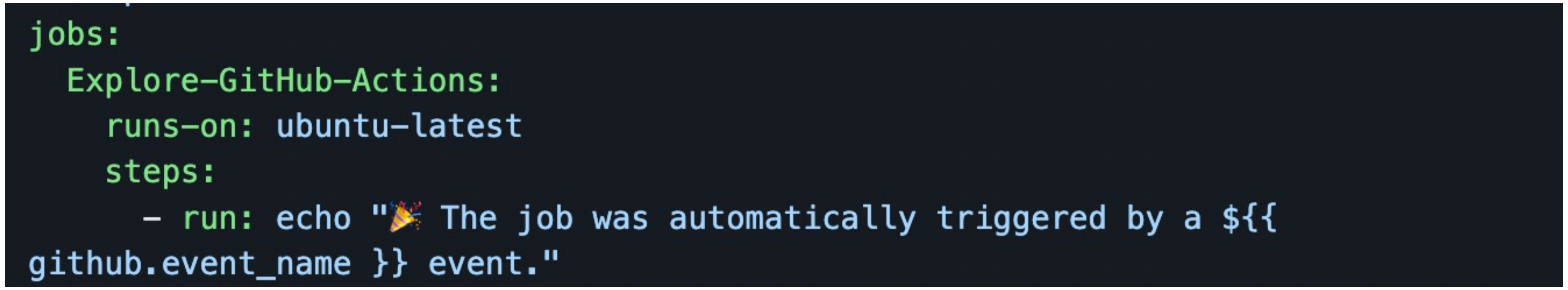
- What is `jobs`? The key that holds all the jobs that run in the workflow file.
- What is `Explore-GitHub-Actions`?

Defining the jobs



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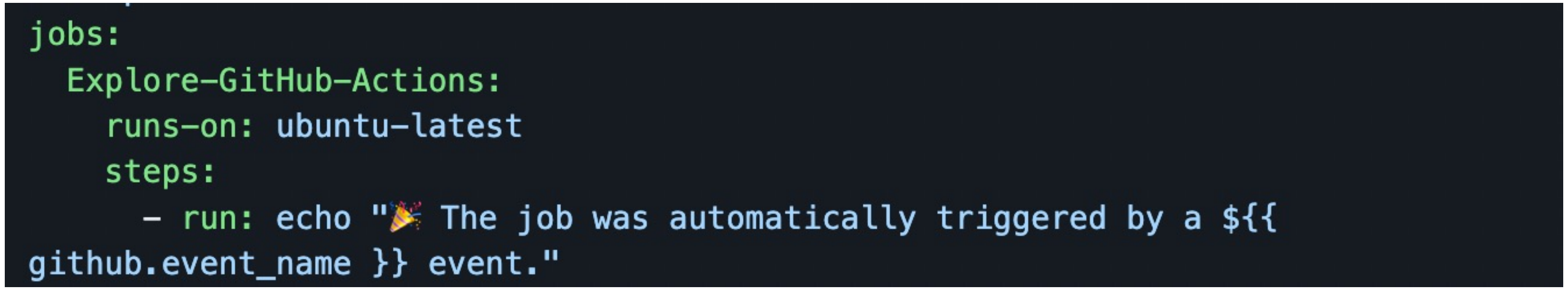
- What is `Explore-GitHub-Actions`? The name of a job.

Defining the jobs



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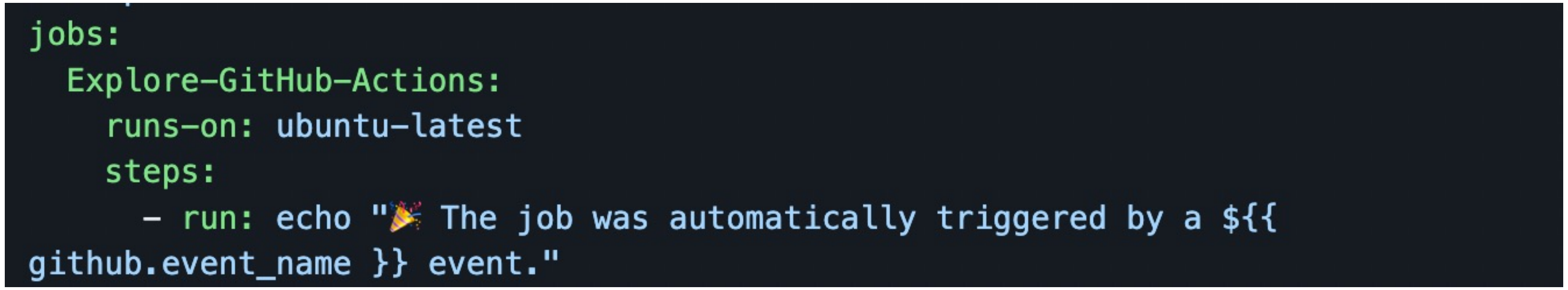
- What does `runs-on: ubuntu-latest` mean?

Defining the jobs



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    runs-on: ubuntu-latest
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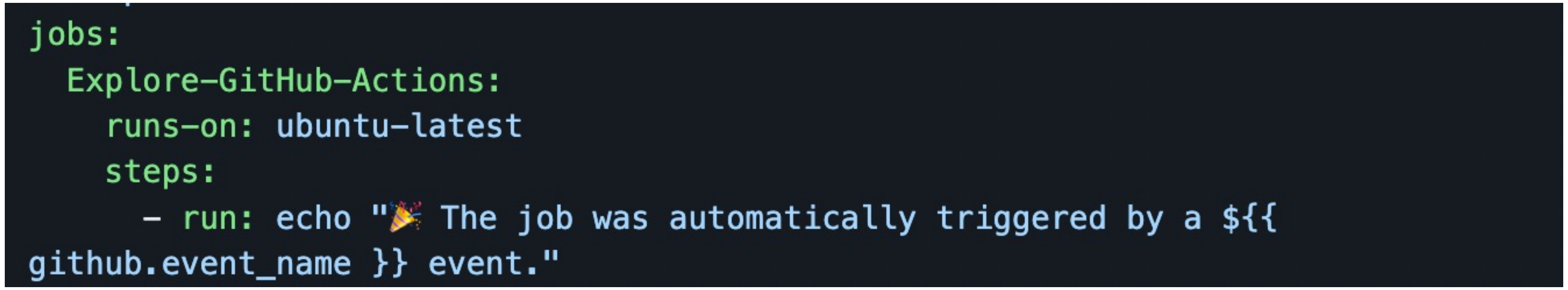
- What is `jobs`? The key that holds all the jobs that run in the workflow file.
- What is `Explore-GitHub-Actions`? The name of a job.
- What does `runs-on: ubuntu-latest` mean? This workflow will run on an Ubuntu Linux virtual machine.

Defining the jobs



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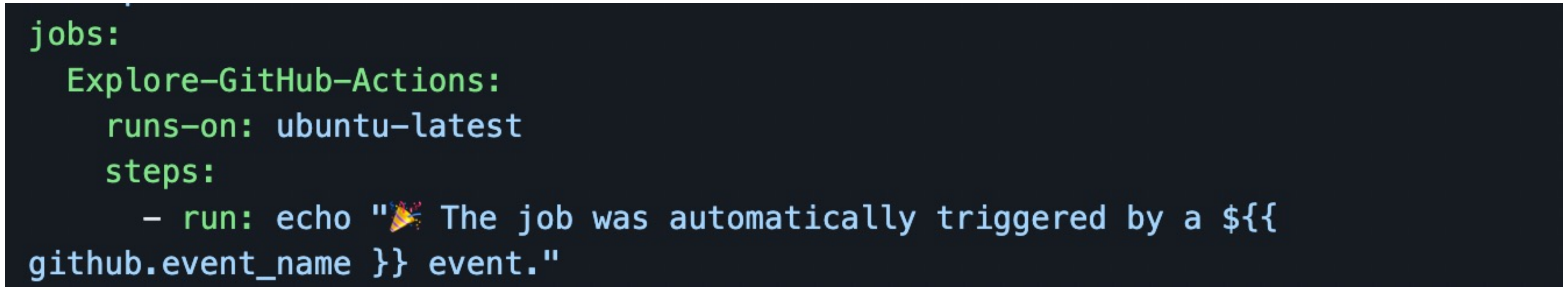
- What is `Explore-GitHub-Actions`? The name of a job.
- What does `runs-on: ubuntu-latest` mean? This workflow will run on an Ubuntu Linux virtual machine.
- What are `steps`?

Defining the jobs



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    steps:
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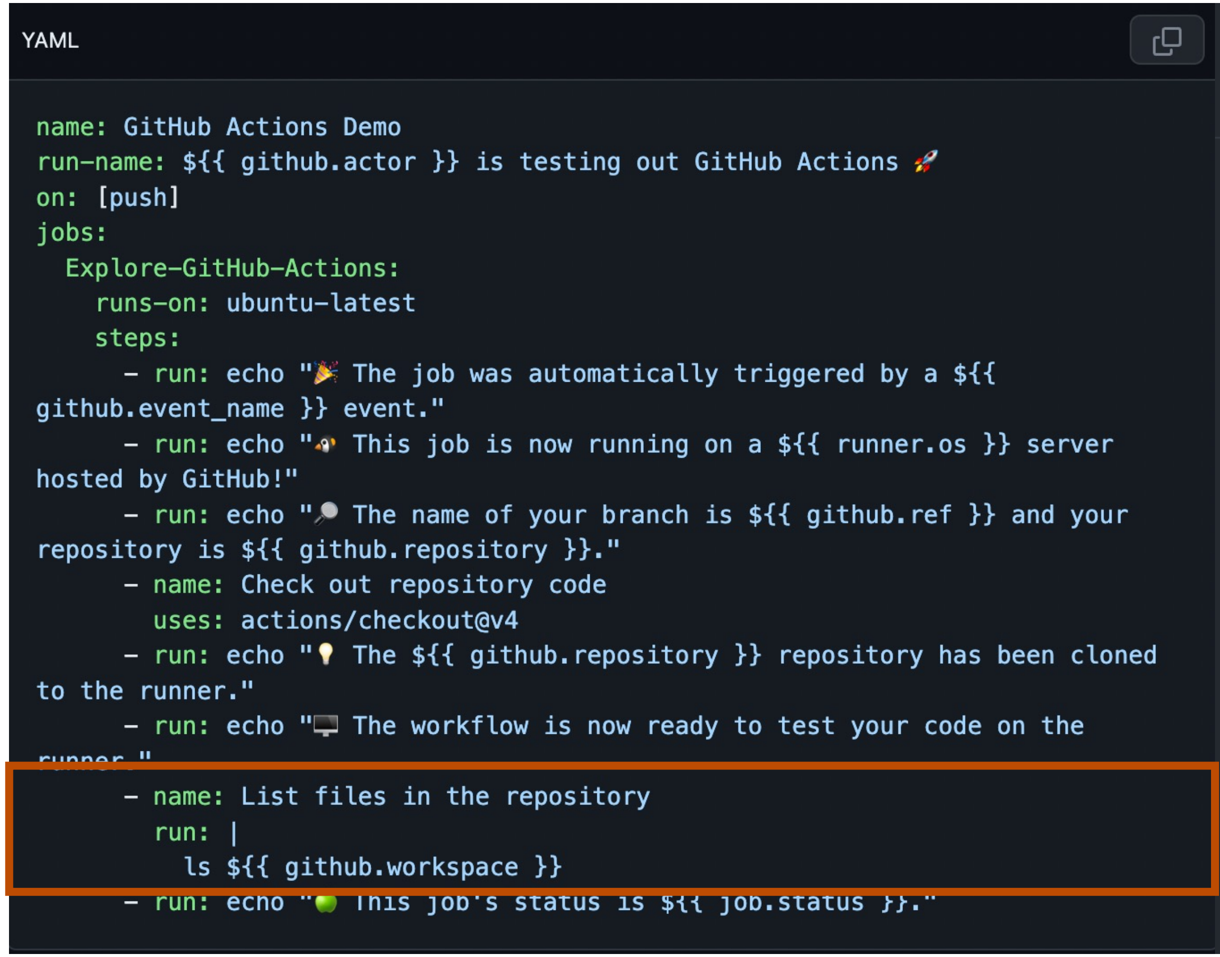
github.event_name }} event."
```

- What is `jobs`? The key that holds all the jobs that run in the workflow file.
- What is `Explore-GitHub-Actions`? The name of a job.
- What does `runs-on: ubuntu-latest` mean? This workflow will run on an Ubuntu Linux virtual machine.
- What are `steps`? The key that holds all of the steps to run in this job.

The full `Explore-GitHub-Actions` job



YAML

```yaml
name: GitHub Actions Demo
run-name: ${{ github.actor }} is testing out GitHub Actions 🚀
on: [push]
jobs:
  Explore-GitHub-Actions:
    runs-on: ubuntu-latest
    steps:
      - run: echo "🎉 The job was automatically triggered by a ${{
github.event_name }} event."
      - run: echo "🐧 This job is now running on a ${{ runner.os }} server
hosted by GitHub!"
      - run: echo "🔎 The name of your branch is ${{ github.ref }} and your
repository is ${{ github.repository }}."
      - name: Check out repository code
        uses: actions/checkout@v4
      - run: echo "💡 The ${{ github.repository }} repository has been cloned
to the runner."
      - run: echo "🖥️ The workflow is now ready to test your code on the
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      - name: List files in the repository
        run: |
          ls ${{ github.workspace }}
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```
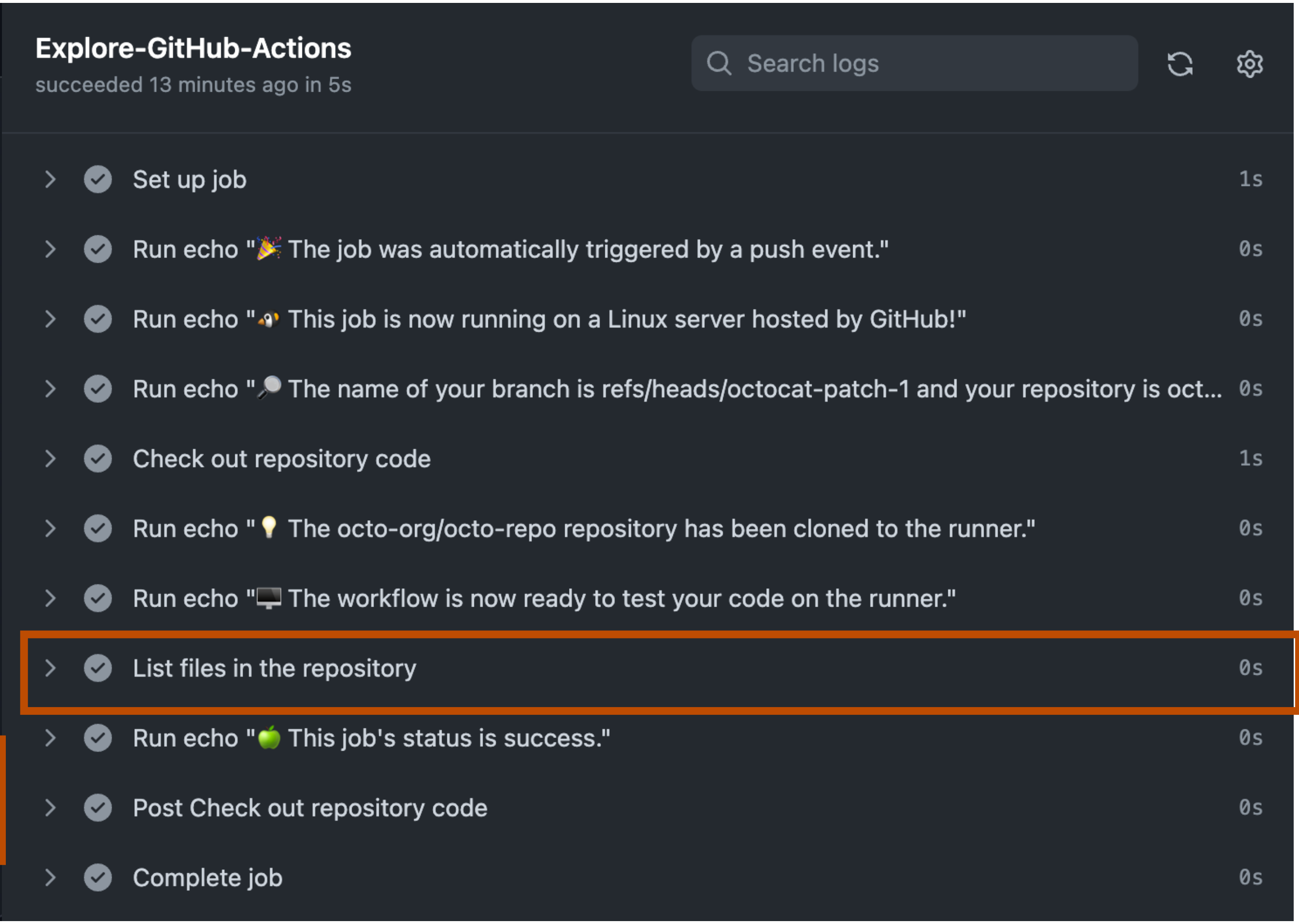
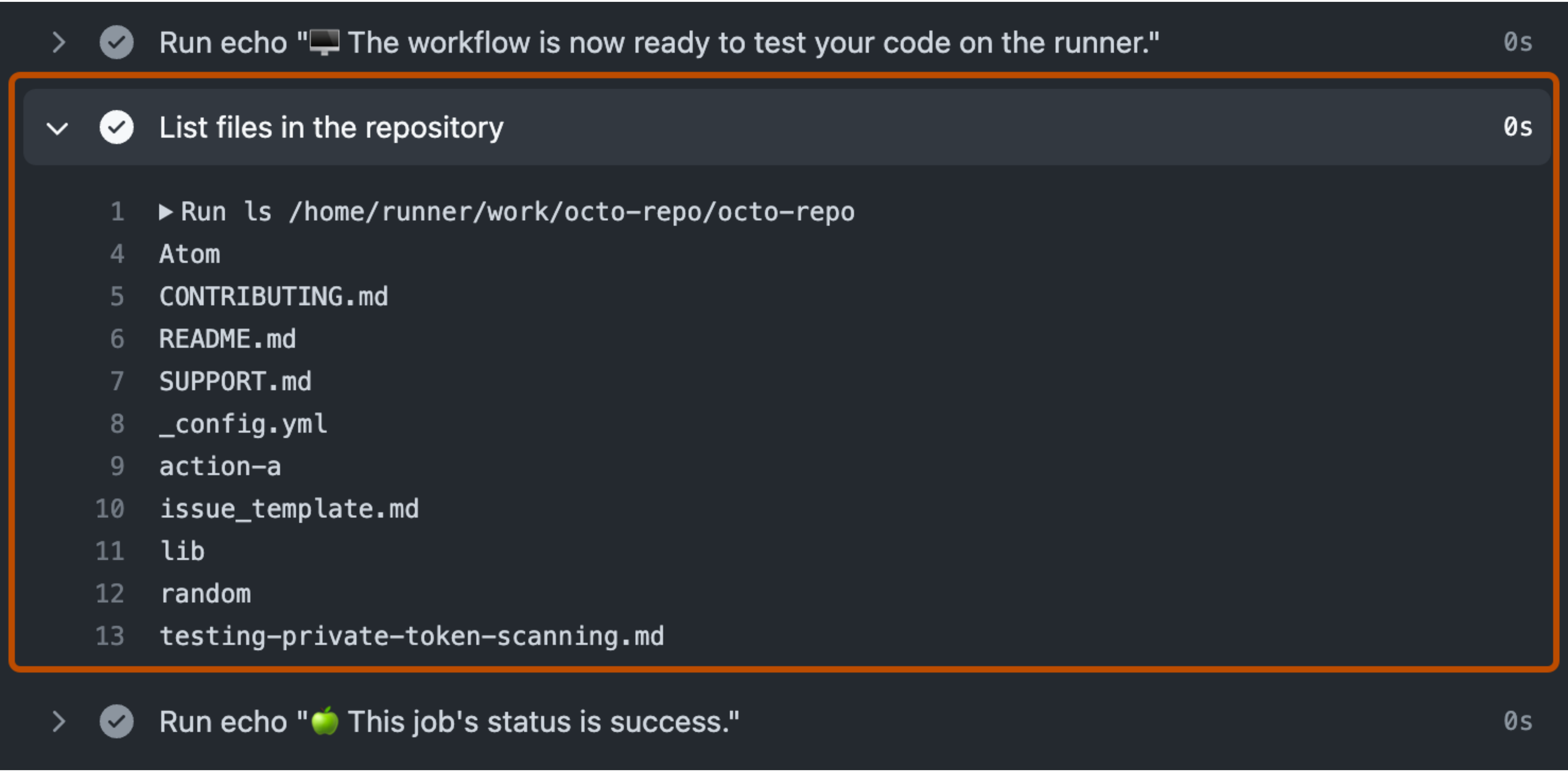



Explore-GitHub-Actions

succeeded 13 minutes ago in 5s

```
> ✓ Set up job                                                                                   1s
> ✓ Run echo "🎉 The job was automatically triggered by a push event."                           0s
> ✓ Run echo "🐧 This job is now running on a Linux server hosted by GitHub!"                    0s
> ✓ Run echo "🔎 The name of your branch is refs/heads/octocat-patch-1 and your repository is oct... 0s
> ✓ Check out repository code                                                                    1s
> ✓ Run echo "💡 The octo-org/octo-repo repository has been cloned to the runner."               0s
> ✓ Run echo "🖥️ The workflow is now ready to test your code on the runner."                     0s
> ✓ List files in the repository                                                                 0s
> ✓ Run echo "🍏 This job's status is success."                                                  0s
> ✓ Post Check out repository code                                                               0s
> ✓ Complete job                                                                                 0s
```



Run echo "🖥️ The workflow is now ready to test your code on the runner." 0s

List files in the repository 0s

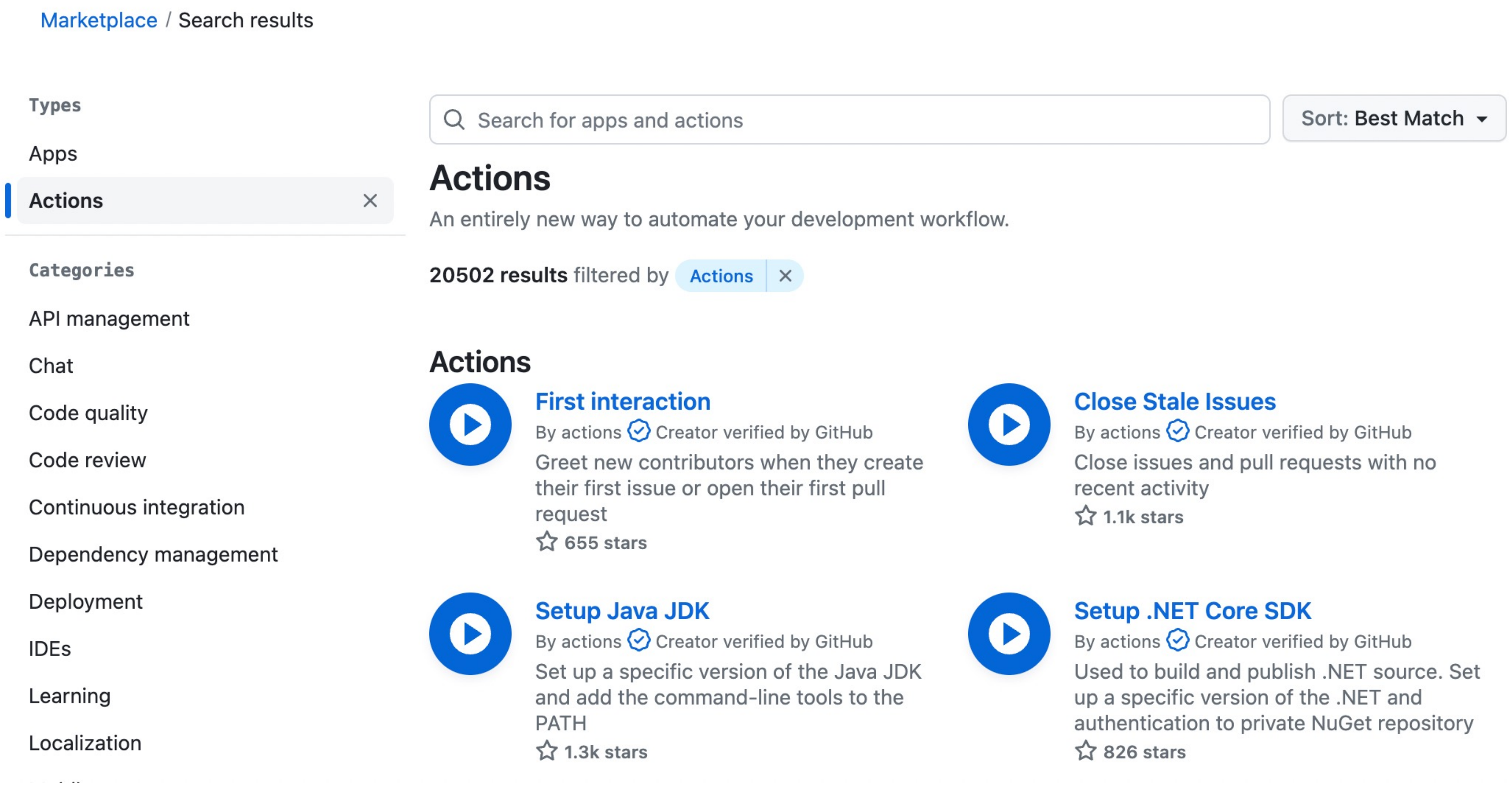
```
▶ Run ls /home/runner/work/octo-repo/octo-repo
Atom
CONTRIBUTING.md
README.md
SUPPORT.md
_config.yml
action-a
issue_template.md
lib
random
testing-private-token-scanning.md
```

Run echo "🍏 This job's status is success." 0s

How can we establish a useful set of steps?

- We can copy commands that work locally into `run:` operations
- We can find common actions on the GitHub Marketplace: https://github.com/marketplace?type=actions

GitHub Marketplace



Marketplace / Search results

Types

Apps

Actions ✕

Categories

API management

Chat

Code quality

Code review

Continuous integration

Dependency management

Deployment

IDEs

Learning

Localization

Search for apps and actions

Sort: Best Match ▾

Actions

An entirely new way to automate your development workflow.

20502 results filtered by Actions ✕

Actions

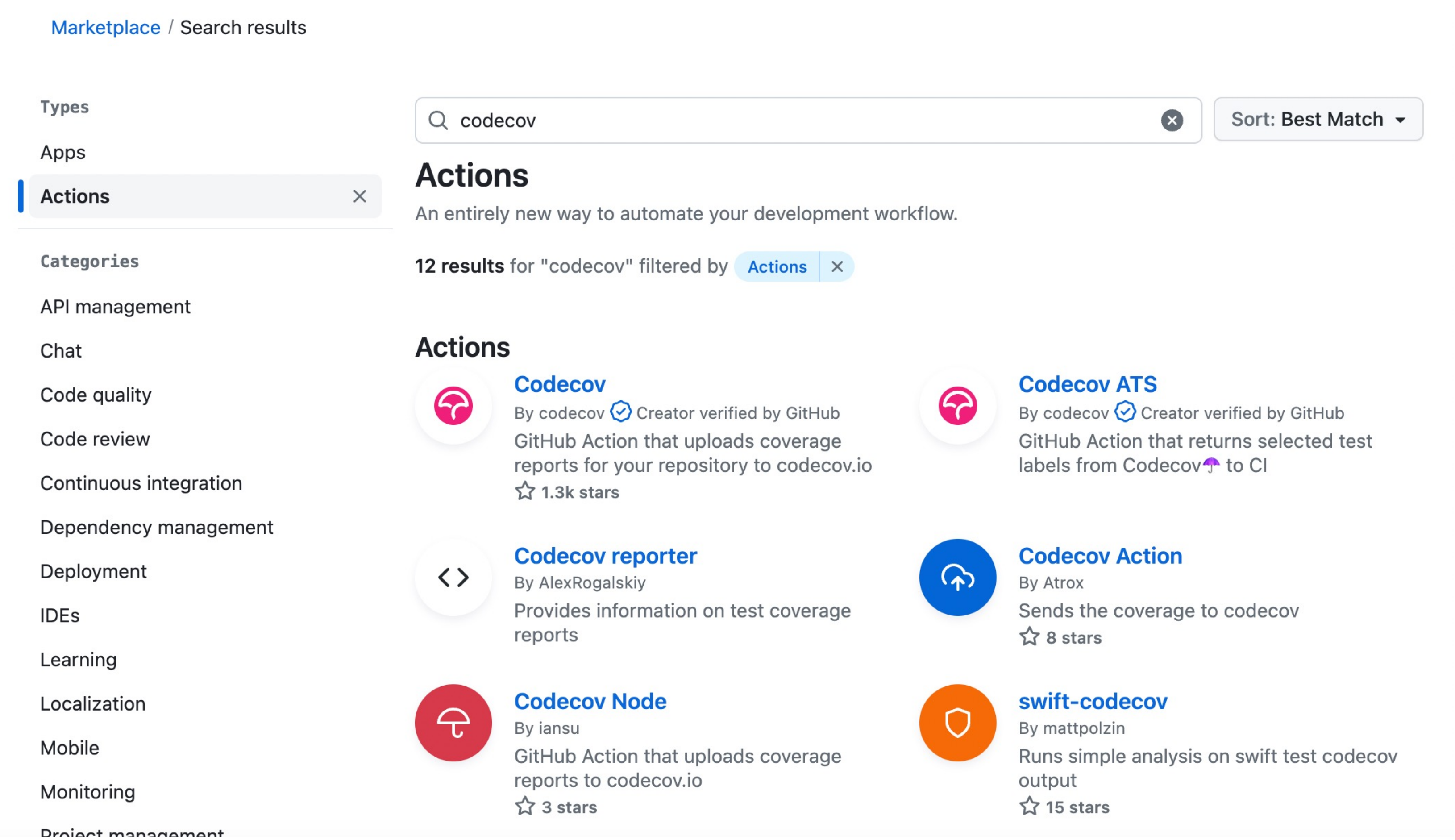
First interaction
By actions ✓ Creator verified by GitHub
Greet new contributors when they create their first issue or open their first pull request
☆ 655 stars

Close Stale Issues
By actions ✓ Creator verified by GitHub
Close issues and pull requests with no recent activity
☆ 1.1k stars

Setup Java JDK
By actions ✓ Creator verified by GitHub
Set up a specific version of the Java JDK and add the command-line tools to the PATH
☆ 1.3k stars

Setup .NET Core SDK
By actions ✓ Creator verified by GitHub
Used to build and publish .NET source. Set up a specific version of the .NET and authentication to private NuGet repository
☆ 826 stars

Search for Codecov



Marketplace / Search results

Types

Apps

Actions ✕

Categories

API management

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Learning

Localization

Mobile

Monitoring

Project management

codecov

Sort: Best Match

Actions

An entirely new way to automate your development workflow.

12 results for "codecov" filtered by Actions ✕

Actions

Codecov
By codecov Creator verified by GitHub
GitHub Action that uploads coverage reports for your repository to codecov.io
☆ 1.3k stars

Codecov ATS
By codecov Creator verified by GitHub
GitHub Action that returns selected test labels from Codecov☂ to CI

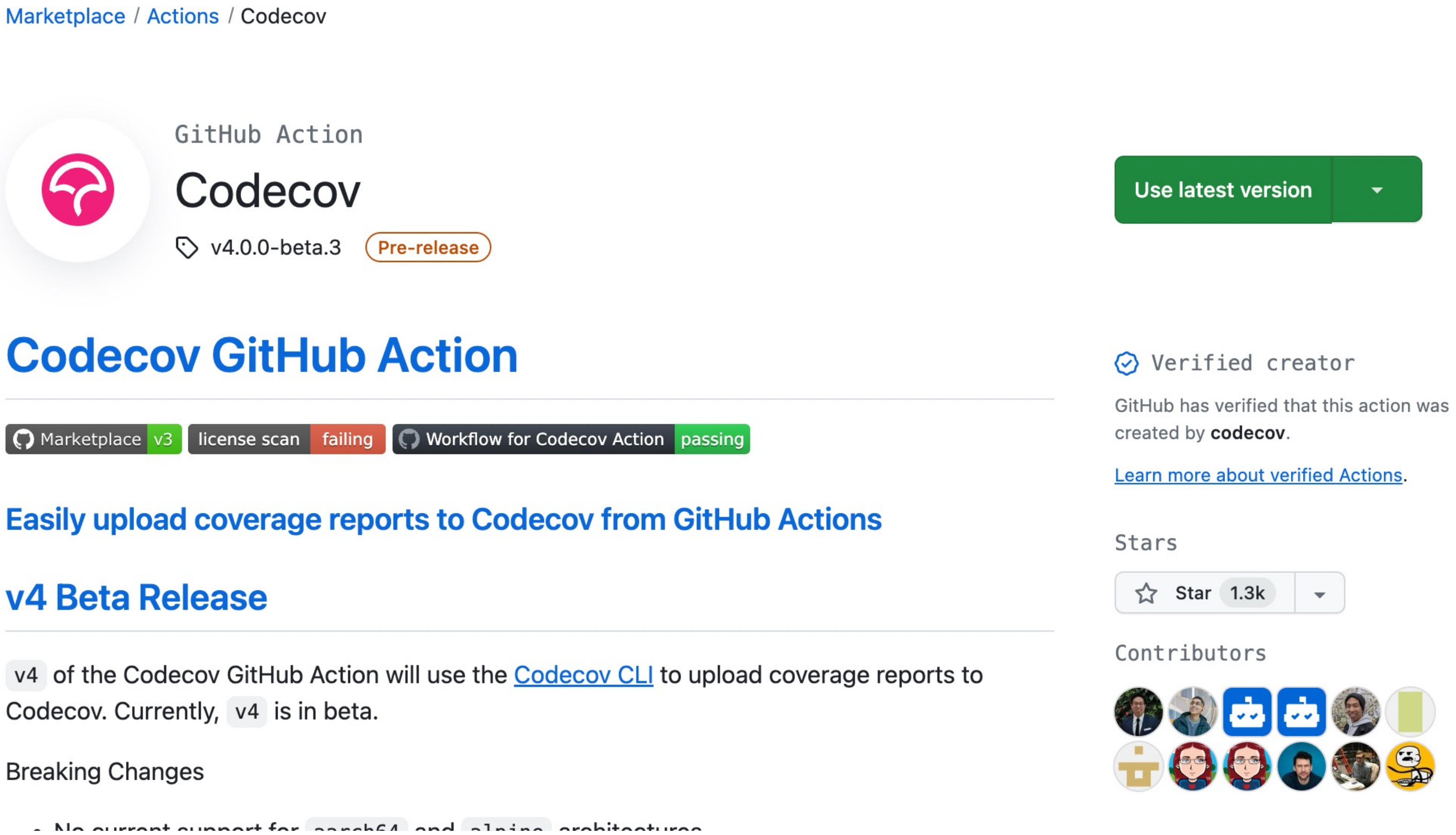
Codecov reporter
By AlexRogalskiy
Provides information on test coverage reports

Codecov Action
By Atrox
Sends the coverage to codecov
☆ 8 stars

Codecov Node
By iansu
GitHub Action that uploads coverage reports to codecov.io
☆ 3 stars

swift-codecov
By mattpolzin
Runs simple analysis on swift test codecov output
☆ 15 stars

Click “Use latest version”



Marketplace / Actions / Codecov

GitHub Action

Codecov

v4.0.0-beta.3 Pre-release

Codecov GitHub Action

Marketplace v3
license scan failing
Workflow for Codecov Action passing

Easily upload coverage reports to Codecov from GitHub Actions

v4 Beta Release

`v4` of the Codecov GitHub Action will use the Codecov CLI to upload coverage reports to Codecov. Currently, `v4` is in beta.

Breaking Changes

- No current support for `aarch64` and `alpine` architectures

Verified creator

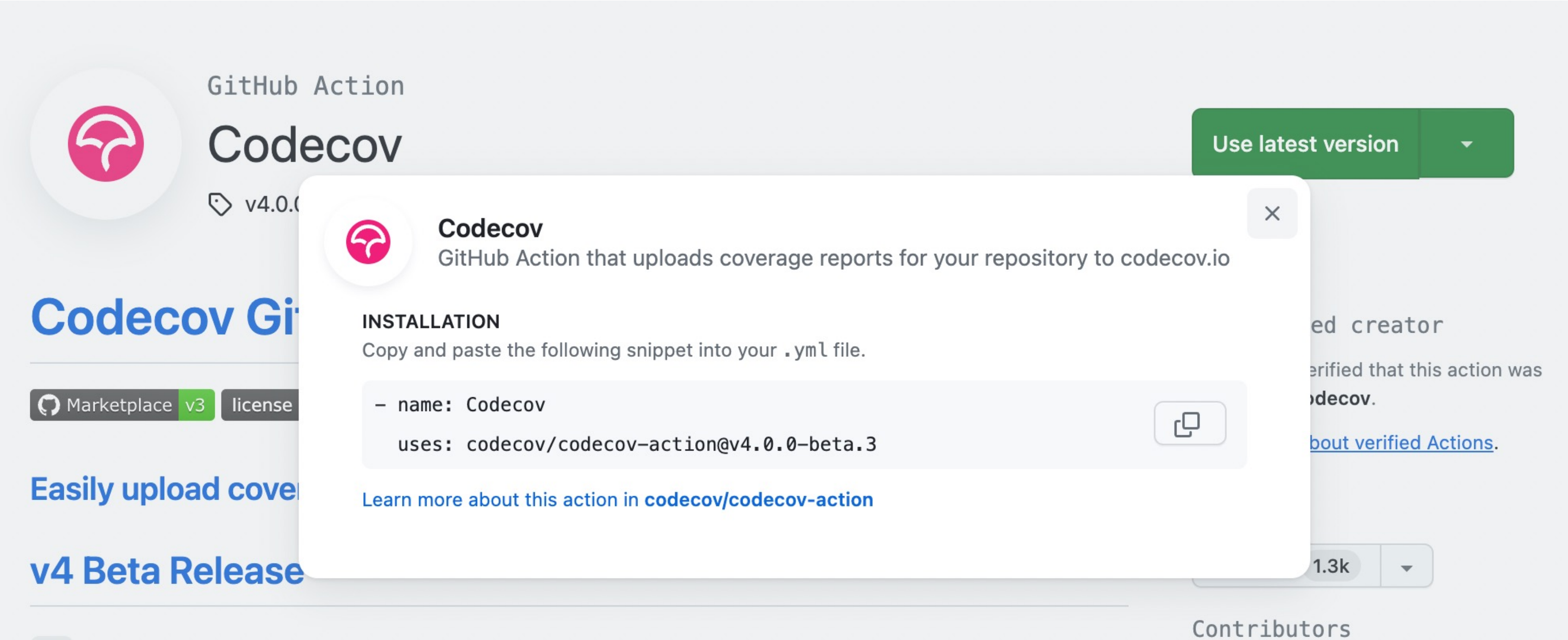
GitHub has verified that this action was created by **codecov**.

Learn more about verified Actions.

Stars

Contributors

Copy the action as a step in your job



Codecov

GitHub Action that uploads coverage reports for your repository to codecov.io

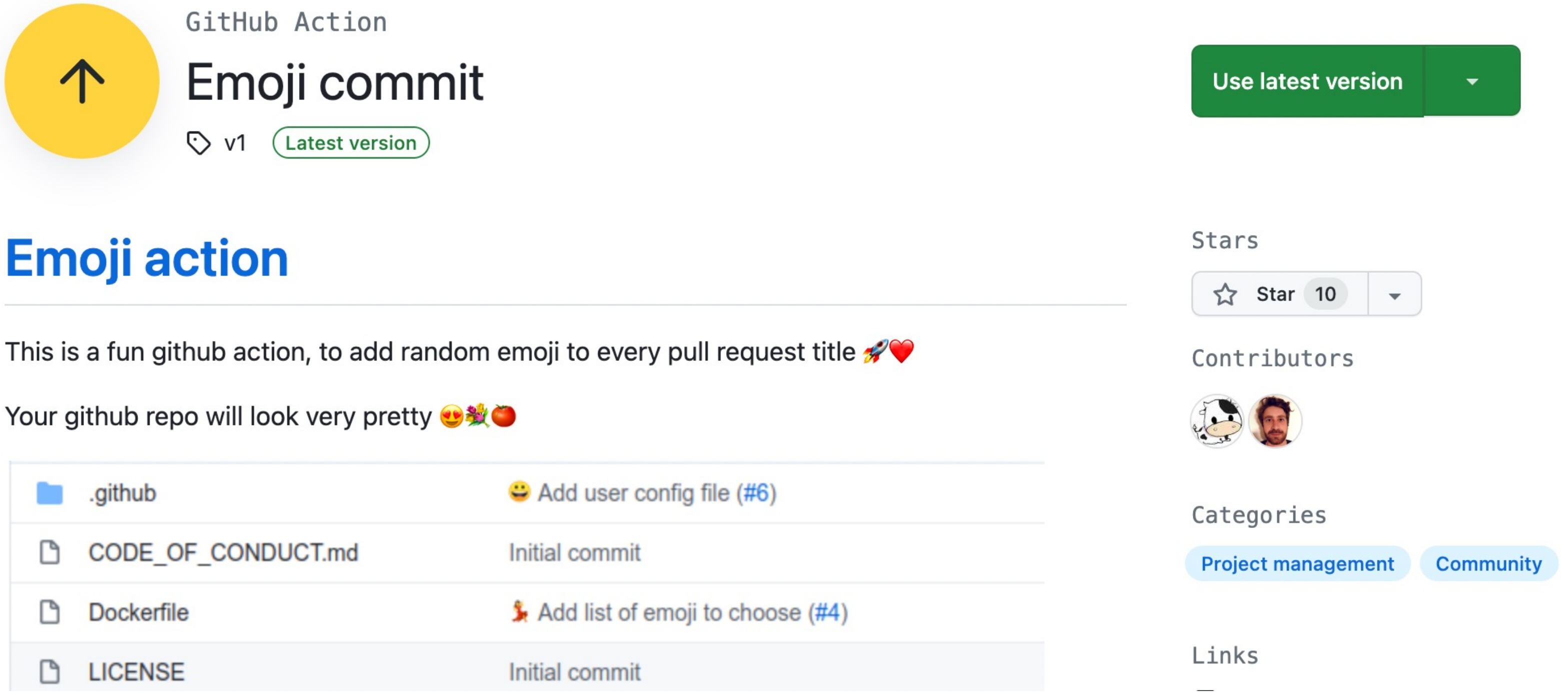
INSTALLATION

Copy and paste the following snippet into your .yml file.

```
- name: Codecov
  uses: codecov/codecov-action@v4.0.0-beta.3
```

Learn more about this action in **codecov/codecov-action**

There’s an action for everything



GitHub Action

Emoji commit

v1 Latest version

Emoji action

This is a fun github action, to add random emoji to every pull request title 🚀❤️

Your github repo will look very pretty 😍💐🍅

.github	😀 Add user config file (#6)
CODE_OF_CONDUCT.md	Initial commit
Dockerfile	💃 Add list of emoji to choose (#4)
LICENSE	Initial commit

Stars

Contributors

Categories

Links

Exercise: Add a workflow to automatically run unit tests on `git push` to your repository

- Use `pytest`

- Can you test on multiple versions of Python? Can you test on `windows-latest` and `macos-latest`?

- Hint hint: https://docs.github.com/en/actions/automating-builds-and-tests/building-and-testing-python