

GitHub Actions

Andrea Ceccanti
Corso OLSS 2021

Shamelessly inspired by Alexey Golub [Github Actions in action slides](#)



GitHub Actions

<https://docs.github.com/en/actions>

Available since Nov. 13, 2019

Implemented on Microsoft Azure Pipelines

Tightly integrated with the GitHub API

YAML-based configuration

Modular architecture, community-driven

Windows, Linux, MacOS, self hosted runners

Free for public repositories

More than CI/CD?

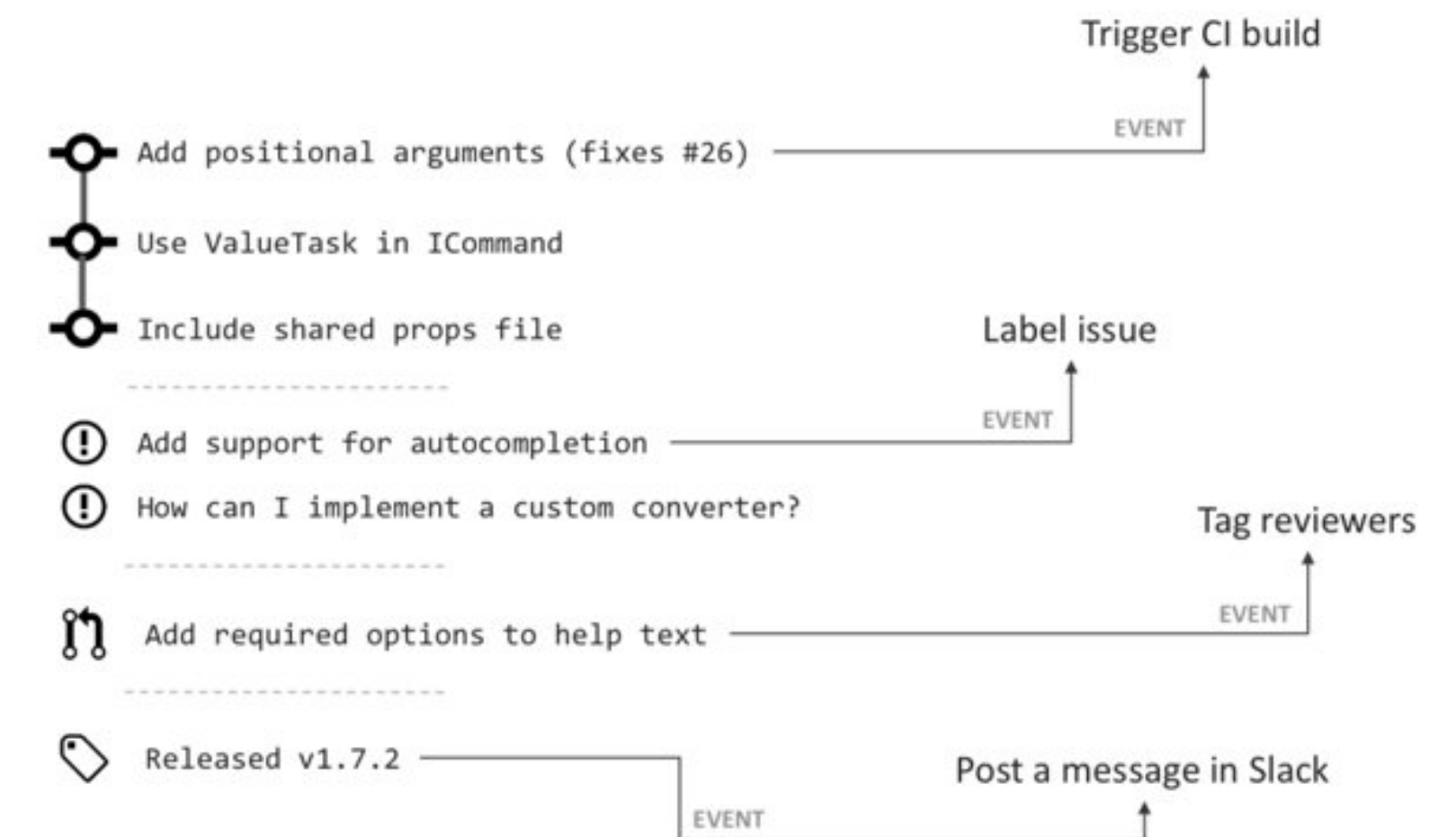
GH Actions provides tools to automate any task on your Github-hosted repository

GitHub Events

on: pull_request_comment on: delete on: release on: deployment on: pr

on: check_suite on: pull_request on: pull_request_review on: scheduled

on: issue_comment on: push on: page_build on: check_run on: mil

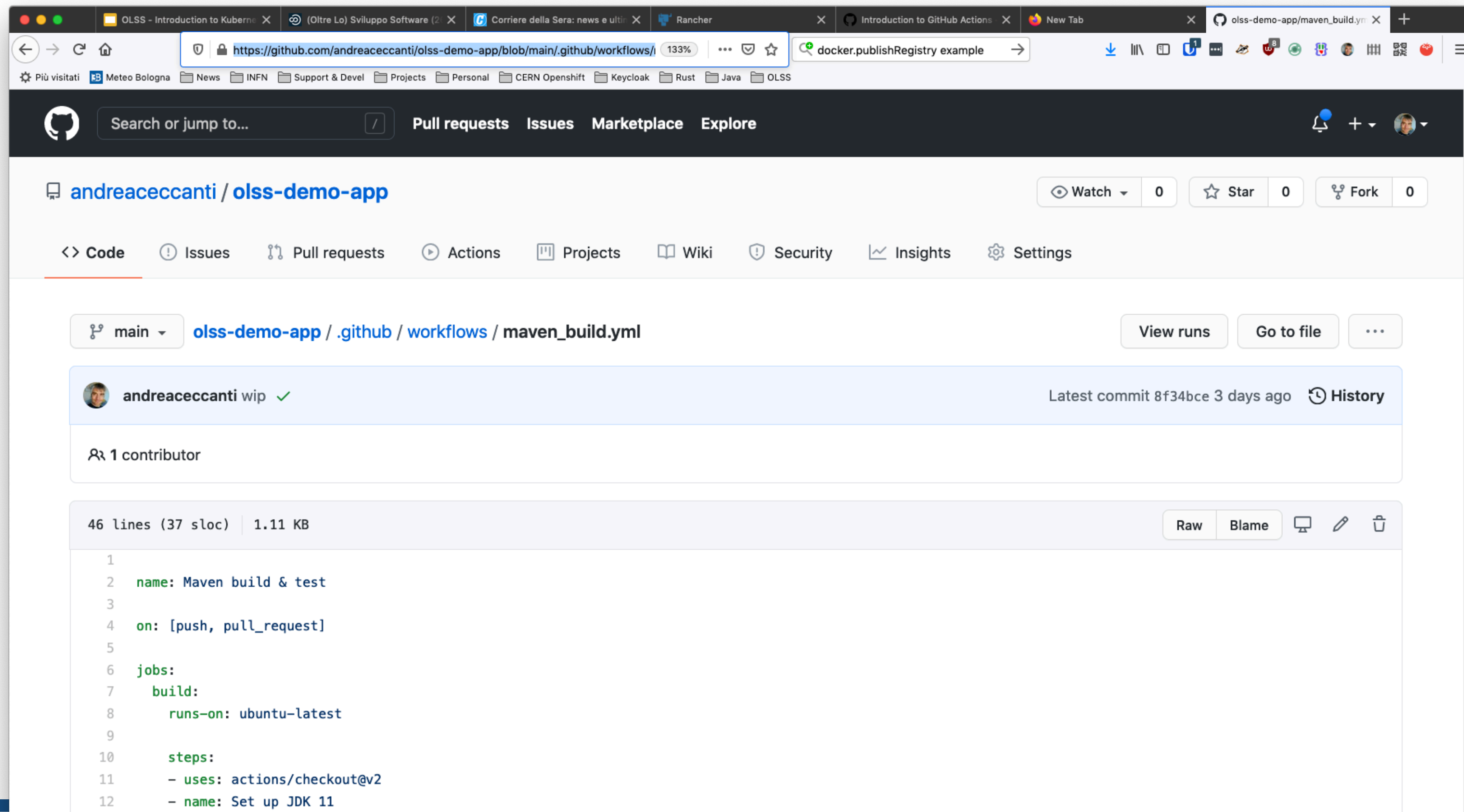


Speaker: Alexey Golub

@Tyrrrz

An example

https://github.com/andreaceccanti/olss-demo-app/blob/main/.github/workflows/maven_build.yml



.github/workflows/maven_build.yml

46 lines (37 sloc) | 1.11 KB

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2 name: Maven build & test
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4 on: [push, pull_request]
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Workflow name

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Events that trigger this workflow

see <https://docs.github.com/en/actions/reference/events-that-trigger-workflows>

This workflow will run on every push and pull_request

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Workflow jobs

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We have only one job in this workflow,
the **build** job

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Jobs

A job is a set of steps that execute on the same runner. By default, a workflow with multiple jobs will run those jobs in parallel. You can also configure a workflow to run jobs sequentially. For example, a workflow can have two sequential jobs that build and test code, where the test job is dependent on the status of the build job. If the build job fails, the test job will not run.

from <https://docs.github.com/en/actions/learn-github-actions/introduction-to-github-actions>

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The job runs on an ubuntu runner

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The job runs on an ubuntu runner

to know more about runners see:

<https://docs.github.com/en/actions/using-github-hosted-runners/about-github-hosted-runners>

Supported runners and hardware resources

Hardware specification for Windows and Linux virtual machines:

- 2-core CPU
- 7 GB of RAM memory
- 14 GB of SSD disk space

Hardware specification for macOS virtual machines:

- 3-core CPU
- 14 GB of RAM memory
- 14 GB of SSD disk space

Virtual environment

YAML workflow label

Windows Server 2019

windows-latest or windows-2019

Windows Server 2016

windows-2016

Ubuntu 20.04

ubuntu-latest or ubuntu-20.04

Ubuntu 18.04

ubuntu-18.04

Ubuntu 16.04

ubuntu-16.04

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The **steps** that make up this build job

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Steps

A step is an individual task that can run commands in a job. A step can be either an *action* or a shell command. Each step in a job executes on the same runner, allowing the actions in that job to share data with each other.

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The first step is the execution of the checkout action, which checks out the code for this repository

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Actions

Actions are standalone commands that are combined into *steps* to create a *job*. Actions are the smallest portable building block of a workflow. You can create your own actions, or use actions created by the GitHub community. To use an action in a workflow, you must include it as a step.

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Then we setup the Java Development Kit version 11 using an already available action

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We provide input parameters to the action using the **with** keyword.

Each action defines its set of allowed input parameter

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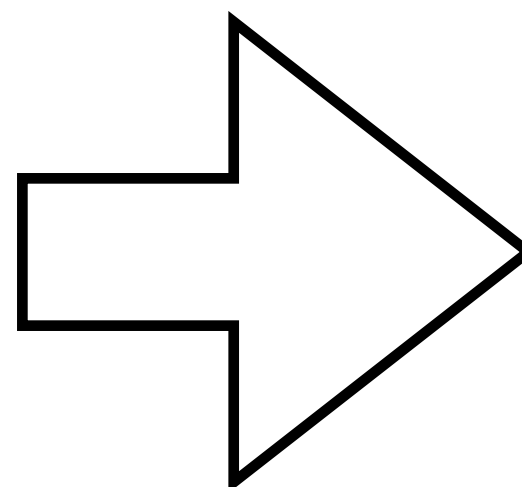
The **run** keyword tells the job to execute a command on the runner.

Here we use it to build the codebase using the **mvn** tool, which is installed in the previous step by the setup-java action

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build

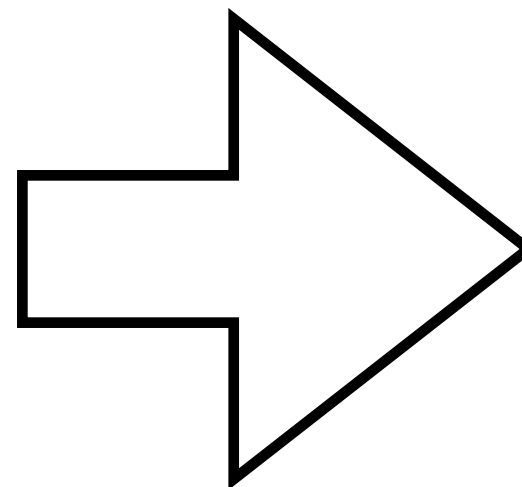
succeeded 10 hours ago in 47s

- > ✓ Set up job
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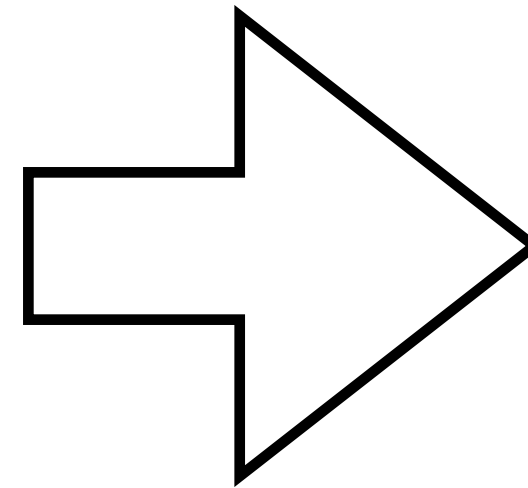
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build

succeeded 10 hours ago in 47s

> ☒ Set up job

▼ ☒ Run actions/checkout@v2

1 ▶ Run actions/checkout@v2

11 Syncing repository: ***/olss-demo-app

12 ▶ Getting Git version info

16 Deleting the contents of '/home/runner/work/olss-demo-app/olss-demo-a

17 ▶ Initializing the repository

31 ▶ Disabling automatic garbage collection

33 ▶ Setting up auth

39 ▶ Fetching the repository

144 ▶ Determining the checkout info

145 ▶ Checking out the ref

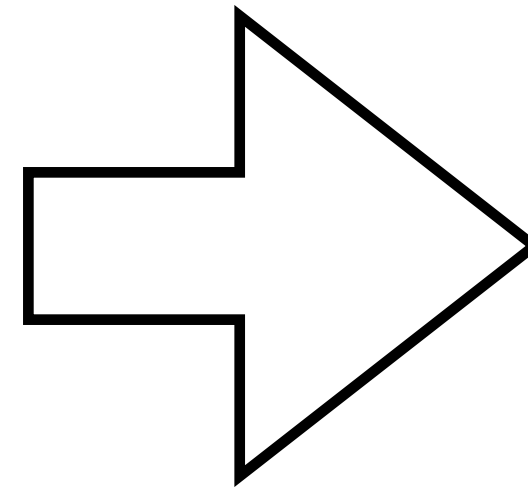
149 /usr/bin/git log -1 --format='%H'

150 'b0a6d1bd515b3d62eb91afb991cd4325481853ae'

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succeeded 10 hours ago in 47s

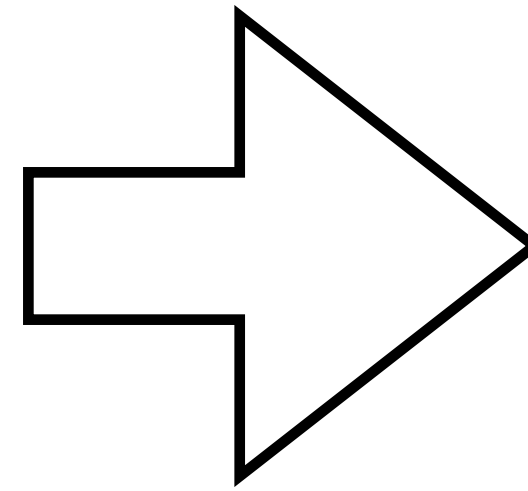
- > ✓ Set up job
- > ✓ Run actions/checkout@v2
- ▼ ✓ Set up JDK 11

```
1  ► Run actions/setup-java@v1
9  /usr/bin/tar --version
10 tar (GNU tar) 1.30
11 Copyright (C) 2017 Free Software Foundation, Inc.
12 License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/
13 This is free software: you are free to change and redistribute it.
14 There is NO WARRANTY, to the extent permitted by law.
15
16 Written by John Gilmore and Jay Fenlason.
17 /usr/bin/tar xz --warning=no-unknown-keyword -C /home/runner/work/_te
18 creating settings.xml with server-id: github; environment variables:
19 writing /home/runner/.m2/settings.xml
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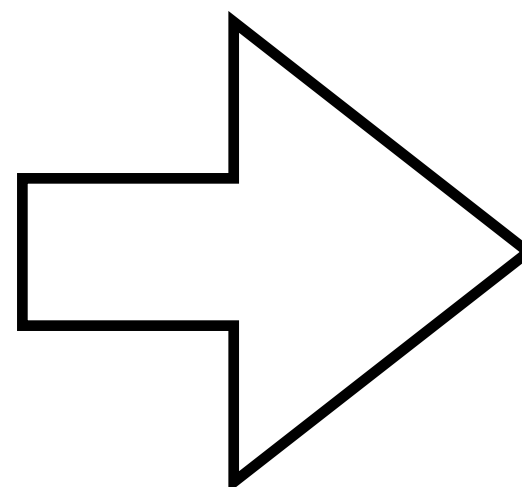
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- ▼ ✓ Set up JDK 11

```
1  ▶ Run actions/setup-java@v1
9  /usr/bin/tar --version
10 tar (GNU tar) 1.30
11 Copyright (C) 2017 Free Software Foundation, Inc.
12 License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/
13 This is free software: you are free to change and redistribute it.
14 There is NO WARRANTY, to the extent permitted by law.
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16 Written by John Gilmore and Jay Fenlason.
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New workflow

All workflows

Maven build & test

All workflows

Showing runs from all workflows

Filter workflow runs

24 workflow runs

	Event ▾	Status ▾	Branch ▾	Actor ▾
✔ More docs work Maven build & test #34: Commit b0a6d1b pushed by andraceccanti			main	10 hours ago 1m 1s
✔ More docs Maven build & test #33: Commit 3f02ba3 pushed by andraceccanti			main	11 hours ago 1m 4s
✔ More K8S resources Maven build & test #32: Commit b2e04d4 pushed by andraceccanti			main	2 days ago 1m 21s
✘ wip Maven build & test #31: Commit b9fbe1d pushed by andraceccanti			v0.0.4-native	3 days ago 2m 22s
✔ wip Maven build & test #30: Commit b9fbe1d pushed by andraceccanti			native	3 days ago 6m 7s
✔ wip Maven build & test #25: Commit 9c5b8b8 pushed by andraceccanti			native	3 days ago 7m 13s
✔ v0.0.4 Maven build & test #22: Commit e973756 pushed by andraceccanti			v0.0.4	3 days ago 1m 9s
✔ v0.0.4			main	3 days ago

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Workflows

New workflow

All workflows

Maven build & test

All workflows

Showing runs from all workflows

Filter workflow runs

24 workflow runs

Event

Status

Branch

Actor

More docs work

Maven build & test #34: Commit b0a6d1b pushed by andreaceccanti

main

10 hours ago

1m 1s

...

More docs

Maven build & test #33: Commit 3f02ba3 pushed by andreaceccanti

main

11 hours ago

1m 4s

...

More K8S resources

Maven build & test #32: Commit b2e04d4 pushed by andreaceccanti

main

2 days ago

1m 21s

...

wip

Maven build & test #31: Commit b9fbe1d pushed by andreaceccanti

v0.0.4-native

3 days ago

2m 22s

...

wip

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native

3 days ago

6m 7s

...

wip

Maven build & test #25: Commit 9c5b8b8 pushed by andreaceccanti

native

3 days ago

7m 13s

...

v0.0.4

Maven build & test #22: Commit e973756 pushed by andreaceccanti

v0.0.4

3 days ago

1m 9s

...

v0.0.4

Maven build & test #21: Commit e973756 pushed by andreaceccanti

main

3 days ago

1m 10s

...

Workflow name

Successful build

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✔ v0.0.4			main	

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Introduction to GitHub Actions

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Actions - andreaceccanti/olss-d

https://github.com/andreaceccanti/olss-demo-app/actions

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docker.publishRegistry example

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New workflow

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🔗 Maven build & test

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More docs work
Maven build & test #34: Commit b0a6d1b pushed by andreaceccanti
main
10 hours ago
1m 1s

More docs
Maven build & test #33: Commit 3f02ba3 pushed by andreaceccanti
main
11 hours ago
1m 4s

More K8S resources
Maven build & test #32: Commit b2e04d4 pushed by andreaceccanti
main
2 days ago
1m 21s

❌ wip
Maven build & test #31: Commit b9fbe1d pushed by andreaceccanti
v0.0.4-native
3 days ago
2m 22s


More docs work
Maven build & test #30: Commit b9fbe1d pushed by andreaceccanti
native
3 days ago
6m 7s


More docs
Maven build & test #25: Commit 9c5b8b8 pushed by andreaceccanti
native
3 days ago
7m 13s

v0.0.4
Maven build & test #22: Commit e973756 pushed by andreaceccanti
v0.0.4
3 days ago
1m 9s

v0.0.4
Maven build & test #21: Commit e973756 pushed by andreaceccanti
main
3 days ago
1m 10s


Failed build












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 **andreaceccanti / olss-demo-app** Watch 0 Star 0 Fork 0


<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 2 branches 3 tags Go to file Add file Code

 **andreaceccanti** More docs work ✓ b0a6d1b 11 hours ago 35 commits

 .github/workflows		3 days ago
 .mvn/wrapper		5 months ago
 docker		4 days ago
 k8s	More docs	
 src	Faster memory growth	
 .gitignore	First import	
 .gitlab-ci.yml	wip	8 days ago
 README.md	More docs work	11 hours ago
 mvnw	First import	5 months ago
 mvnw.cmd	First import	5 months ago
 pom.xml	v0.0.4	3 days ago

All checks have passed
1 successful check




✓  Maven build & test / ... [Details](#)



About Demo Spring Boot application for the OLSS course
[Readme](#)

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Languages

 Java 86.2%	 Dockerfile 9.9%
 Shell 3.9%	




 **README.md** 

OLSS demo application

 Maven build & test **passing**

Manual build instructions

Triggers

- **GitHub API events** 
push, pull_request, issues, release, and 20 others
- **Schedule** 
Cron syntax, e.g.: */15 * * * *
- **Manual** 
POST to /repos/:owner/:repo/dispatches

Triggers




```
# Trigger on push events on specific branches
on:
  push:
    branches:
      - 'master'
      - 'release/*'
```

```
# Trigger on manual dispatch
on: repository_dispatch
```

```
# Trigger every midnight UTC
on:
  schedule:
    - cron: '0 0 * * *'
```

```
# Trigger when an issue is opened or labeled
on:
  issues:
    types: [opened, labeled]
```

Referencing actions

- By GitHub repository 
`{owner}/{repo}@{ref}`
`{owner}/{repo}/{path}@{ref}`
- By file path 
`./path/to/dir`
- By Docker image 
`docker://{image}:{tag}`

`jessfraz/branch-cleanup-action@master`
`johndoe/my-actions/push-image@v1`

`./.github/actions/my-action`

`docker://hello-world:latest`

Advanced configurations

Matrices

```
name: Matrix Reloaded
```

```
on: [push]
```

```
jobs:
```

```
  build:
```

```
    runs-on: ${{ matrix.os }}
```

```
    strategy:
```

```
      max-parallel: 4
```

```
      matrix:
```

```
        os: [ubuntu-16.04, ubuntu-18.04]
```

```
        node-ver: [6, 8, 10]
```

```
    steps:
```

```
      - uses: actions/setup-node@v1
```

```
        with:
```

```
          node-version: ${{ matrix.node-ver }}
```

Ubuntu-16.04	Ubuntu-18.04
Node v6	Node v6
Node v8	Node v8
Node v10	Node v10

Reference variables from the matrix



Docker containers

```
jobs:
  build:
    runs-on: ubuntu-latest

  services:
    redis:
      image: redis
      ports:
        - 6379/tcp
      options: --entrypoint redis-server

  steps:
    - uses: actions/checkout@v1

    - run: node client.js
      env:
        REDIS_HOST: localhost
        REDIS_PORT: ${ job.services.redis.ports[6379] }
```

Image from the Docker registry

Bind port 6379 in container to a random port on host

Custom arguments passed to docker create

Exposed port is resolved dynamically

Secrets

- **name:** Login to Dockerhub
uses: docker/login-action@v1
with:
 - username:** `${{ secrets.DOCKERHUB_USERNAME }}`
 - password:** `${{ secrets.DOCKERHUB_PASSWORD }}`
- **name:** Docker meta
id: docker_meta
uses: crazy-max/ghaction-docker-meta@v2
with:
 - images:** `${{ secrets.DOCKERHUB_USERNAME }}/ols`
 - tags:** |
 - `type=sha`
 - `type=semver,pattern={{raw}}`
 - `type=ref,event=branch`
- **name:** Build & Push image
uses: docker/build-push-action@v2
with:
 - context:** .
 - file:** docker/Dockerfile
 - push:** `${{ startsWith(github.ref, 'refs/tags/') }}`

The screenshot shows the GitHub repository settings page for 'olss-demo-app' by 'andreaceccanti'. The 'Secrets' section is highlighted in the left sidebar. The main content area shows 'Actions secrets' with a message: 'There are no secrets for this repository's environments.' Below this, there is a section for 'Repository secrets' which contains two secrets: 'DOCKERHUB_PASSWORD' and 'DOCKERHUB_USERNAME', both updated on Nov 26, 2020. The 'DOCKERHUB_PASSWORD' secret is highlighted with a red box.

Options

- Manage access
- Security & analysis
- Branches
- Webhooks
- Notifications
- Integrations
- Deploy keys
- Actions
- Environments
- Secrets
- Actions
 - Codespaces
 - Dependabot
- Pages
- Moderation settings

Actions secrets

Secrets are environment variables that are **encrypted**. Anyone with **collaborator** access to this repository can use the Actions.

Secrets are not passed to workflows that are triggered by a pull request from a fork. [Learn more.](#)

Environment secrets

There are no secrets for this repository's environments.

Encrypted environment secrets allow you to store sensitive information, such as access tokens, in your repository.

[Manage your environments and add environment secrets](#)

Repository secrets

DOCKERHUB_PASSWORD	Updated on Nov 26, 2020
DOCKERHUB_USERNAME	Updated on Nov 26, 2020

Action to action I/O

- `name: Create release`
`id: create_release` ← Actions can be referenced by their ID
`uses: actions/create-release@v1`
`env:`
 `GITHUB_TOKEN: ${ secrets.GITHUB_TOKEN }`
`with:`
 `tag_name: ${ github.ref }`
 `release_name: ${ github.ref }`
- `name: Upload release asset`
`uses: actions/upload-release-asset@v1.0.1`
`env:`
 `GITHUB_TOKEN: ${ secrets.GITHUB_TOKEN }` ← Resolved from the outputs of another action
`with:`
 `upload_url: ${ steps.create_release.outputs.upload_url }` ←
 `asset_path: DiscordChatExporter/bin/Publish/Archive.zip`
 `asset_name: DiscordChatExporter.zip`

Conditionals


```
jobs:
  build:
    runs-on: ubuntu-18.04

    steps:
      - uses: actions/checkout@v1
      - uses: actions/setup-dotnet@v1
        with:
          dotnet-version: 3.1.100

      - run: dotnet test src
      - run: dotnet pack src

      - if: github.event_name == 'push' && startsWith(github.ref, 'refs/tags/v')
        run: dotnet nuget push src/**/*.nupkg -k ${{secrets.NUGET_TOKEN}}
```

Conditional expression



Things that can be done with GH actions

Run tests on every commit

Publish docker image when a tag is published

Label an issue by content when it's created

Run nightly E2E tests

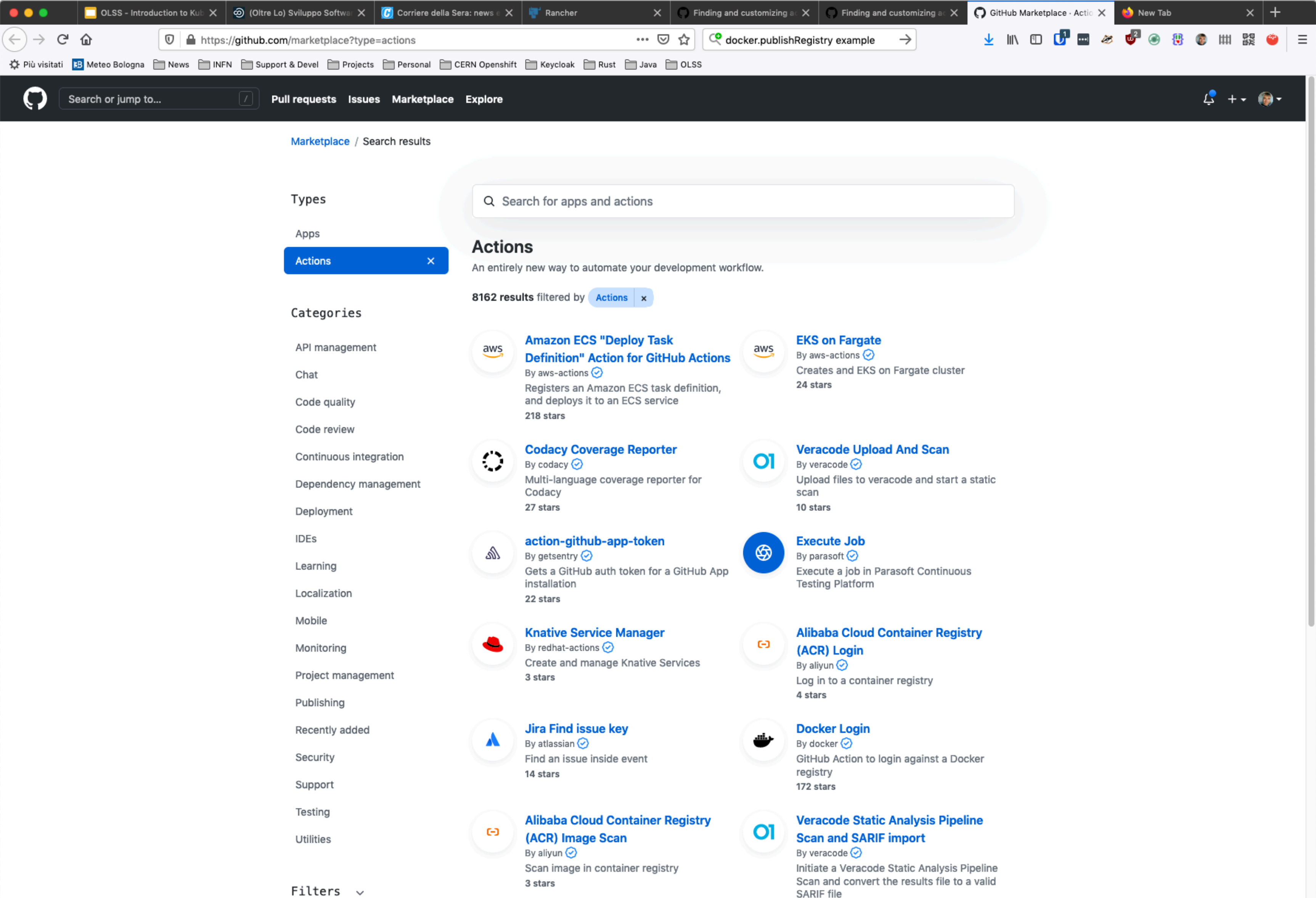
Automatically close stale issues every week

Invite new contributors to sign the CLA when a PR is opened

Automatically format the code on push

...

Discovering actions



Making your own actions

The screenshot shows a web browser window with the GitHub Docs page for 'Creating actions'. The browser's address bar shows the URL `https://docs.github.com/en/actions/creating-actions`. The page has a dark blue sidebar on the left with the GitHub logo and 'GitHub Docs' text. The sidebar contains a list of navigation links: 'All products', 'GitHub Actions', 'QUICKSTART FOR GITHUB ACTIONS', 'GUIDES', 'LEARN GITHUB ACTIONS', 'MANAGING WORKFLOW RUNS', 'CREATING ACTIONS' (which is expanded to show sub-links like 'About actions', 'Creating a Docker container action', 'Creating a JavaScript action', 'Creating a composite run steps action', 'Metadata syntax', 'Docker', 'Setting exit codes', and 'Publishing actions in GitHub Marketplace'), 'USING GITHUB-HOSTED RUNNERS', and 'HOSTING YOUR OWN RUNNERS'. The main content area has the title 'Creating actions' and a sub-header 'You can create your own actions, use and customize actions shared by the GitHub community, or write and share the actions you build.' Below this is a list of links: 'About actions', 'Creating a Docker container action', 'Creating a JavaScript action', 'Creating a composite run steps action', 'Metadata syntax for GitHub Actions', 'Dockerfile support for GitHub Actions', 'Setting exit codes for actions', and 'Publishing actions in GitHub Marketplace'. At the bottom of the page, there are two sections: 'Did this doc help you?' with thumbs up/down icons and a 'Privacy policy' link, and 'Help us make these docs great!' with a 'Make a contribution' button and a link to 'learn how to contribute'.

GitHub Docs

← All products

GitHub Actions

QUICKSTART FOR GITHUB ACTIONS

GUIDES

LEARN GITHUB ACTIONS

MANAGING WORKFLOW RUNS

CREATING ACTIONS

About actions

Creating a Docker container action

Creating a JavaScript action

Creating a composite run steps action

Metadata syntax

Docker

Setting exit codes

Publishing actions in GitHub Marketplace

USING GITHUB-HOSTED RUNNERS

HOSTING YOUR OWN RUNNERS

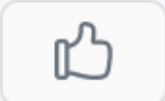
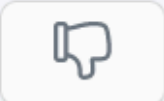
Creating actions

You can create your own actions, use and customize actions shared by the GitHub community, or write and share the actions you build.

- [About actions](#)
- [Creating a Docker container action](#)
- [Creating a JavaScript action](#)
- [Creating a composite run steps action](#)
- [Metadata syntax for GitHub Actions](#)
- [Dockerfile support for GitHub Actions](#)
- [Setting exit codes for actions](#)
- [Publishing actions in GitHub Marketplace](#)


Did this doc help you?

[Privacy policy](#)

Help us make these docs great!

All GitHub docs are open source. See something that's wrong or unclear? Submit a pull request.

 [Make a contribution](#)

Or, [learn how to contribute](#).

Hands on

Fork the olss-demo-app repo:

<https://github.com/andreaceccanti/olss-demo-app>

Add a workflow that adds the **olss** label to any issue opened against your fork

Hint:

<https://github.com/marketplace/actions/auto-label>