

Version 1.0

09/06/21



Prerequisites

- Account at GitHub.com - free tier is fine
- Labs doc for workshop
 - In <https://github.com/skilldocs/gh-actions> (file is github-actions-labs.pdf)
 - direct link:
 - » <https://github.com/skilldocs/gh-actions/blob/main/github-actions-labs.pdf>



Introduction to GitHub Actions

Tech Skills Transformations & Brent Laster



About me

- R&D Director, DevOps
- Global trainer – training (Git, Jenkins, Gradle, CI/CD, pipelines, Kubernetes, Helm, ArgoCD, operators)
- Author -
 - OpenSource.com
 - Professional Git book
 - Jenkins 2 – Up and Running book
 - Continuous Integration vs. Continuous Delivery vs. Continuous Deployment mini-book on Safari

<https://www.linkedin.com/in/brentlaster>

@BrentCLaster

GitHub: brentlaster

techskillstransformations.com
getskillsnow.com



Book - Professional Git

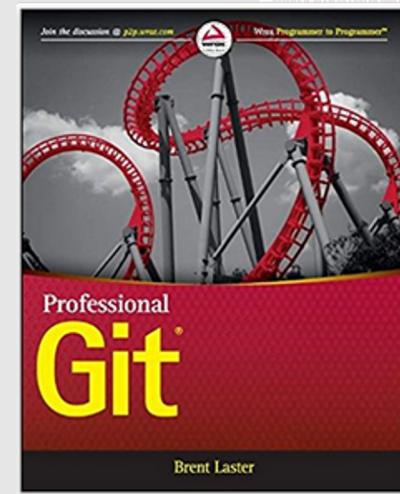
- Extensive Git reference, explanations, and examples
- First part for non-technical
- Beginner and advanced reference
- Hands-on labs

Professional Git 1st Edition

by Brent Laster (Author)

5 customer reviews

[Look inside](#)



Amazon Customer

I can't recommend this book more highly

February 12, 2017

Format: Kindle Edition

Brent Laster's book is in a different league from the many print and video sources that I've looked at in my attempt to learn Git. The book is extremely well organised and very clearly written. His decision to focus on Git as a local application for the first several chapters, and to defer discussion about it as a remote application until later in the book, works extremely well.

Laster has also succeeded in writing a book that should work for both beginners and people with a fair bit of experience with Git. He accomplishes this by offering, in each chapter, a core discussion followed by more advanced material and practical exercises.

I can't recommend this book more highly.

Ideal for hands-on reading and experimentation

February 23, 2017

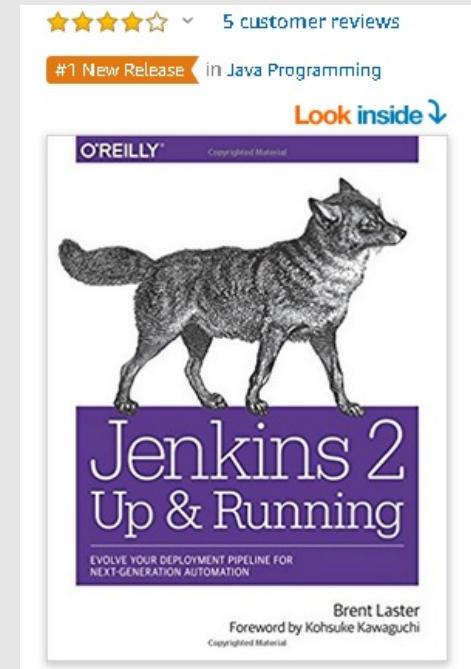
Format: Paperback | **Verified Purchase**

I just finished reading Professional Git, which is well organized and clearly presented. It works as both a tutorial for newcomers and a reference book for those more experienced. I found it ideal for hands-on reading and experimentation with things you may not understand at first glance. I was already familiar with Git for everyday use, but I've always stuck with a convenient subset. It was great to be able to finally get a much deeper understanding. I highly recommend the book.



Jenkins 2 Book

- Jenkins 2 – Up and Running
- “It’s an ideal book for those who are new to CI/CD, as well as those who have been using Jenkins for many years. This book will help you discover and rediscover Jenkins.” *By Kohsuke Kawaguchi, Creator of Jenkins*



★★★★★ This is highly recommended reading for anyone looking to use Jenkins 2 to ...

By [Leila](#) on June 2, 2018

Format: Paperback

Brent really knows his stuff. I'm already a few chapters in, and I'm finding the content incredibly engaging. This is highly recommended reading for anyone looking to use Jenkins 2 to implement CD pipelines in their code.

★★★★★ A great resource

By [Brian](#) on June 2, 2018

Format: Paperback

I have to admit that most of the information I get usually comes through the usual outlets: stack overflow, Reddit, and others. But I've realized that having a comprehensive resource is far better than hunting and pecking for scattered answers across the web. I'm so glad I got this book!



NFJS Virtual Workshops



CONFERENCES WEBINARS VIRTUAL WORKSHOPS ON-DEMAND ⓖ

INTRODUCTION TO GITHUB ACTIONS - HOW TO EASILY AUTOMATE AND INTEGRATE WITH GITHUB

VIRTUAL WORKSHOP

LIVE HANDS-ON 1/2 DAY TRAINING
STAY ENGAGED & STAY CURRENT

FRIDAY, DECEMBER
11:00 AM EST / 8:00 AM PST



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WORKSHOP STARTS
06 01 31 13
DAYS HOURS MIN SEC

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@BRENTCLASTER

WORKSHOP STARTS
33 01 29 30
DAYS HOURS MIN SEC

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VIRTUAL WORKSHOP

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STAY ENGAGED & STAY CURRENT

FRIDAY, JANUARY 7
11:00 AM EST / 8:00 AM PST



BRENT LASTER
@BRENTCLASTER

WORKSHOP STARTS
34 01 30 08
DAYS HOURS MIN SEC

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O'Reilly Training

LIVE ONLINE TRAINING

Containers A-Z

An overview of containers, Docker, Kubernetes, Istio, Helm, Kubernetes Operators, and GitOps

Topic: System Administration



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LIVE ONLINE TRAINING

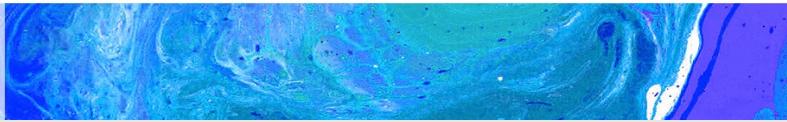
Building a Kubernetes Operator: Extending Kubernetes to Fit Your Applications

Extending Kubernetes to Fit Your Applications

Topic: System Administration



BRENT LASTER



LIVE ONLINE TRAINING

Getting started with continuous delivery (CD)

Move beyond CI to build, manage, and deploy a working pipeline

Topic: System Administration



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LIVE ONLINE TRAINING

Building a deployment pipeline with Jenkins 2

Manage continuous integration and continuous delivery to release software

Topic: System Administration



BRENT LASTER



LIVE ONLINE TRAINING

Helm Fundamentals

Deploying, upgrading, and rolling back your applications

Topic: System Administration



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LIVE ONLINE TRAINING

Continuous Delivery in Kubernetes with ArgoCD

Automating deployment and lifecycle management

Topic: System Administration



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LIVE ONLINE TRAINING

Git Fundamentals

Simplify and speed up management of your source code

Topic: Software Development



BRENT LASTER



January 13, 2022

Getting Started with Prometheus

Join expert Brent Laster to explore the mechanics of Prometheus and see what it can do for you and your Kubernetes environments. You'll discover key aspects of Prometheus's wide functionality and ...



LIVE ONLINE TRAINING

Next Level Git - Master your content

Use powerful tools in Git to simplify merges, rewrite history, and...

Topic: Software Development



BRENT LASTER

LIVE ONLINE TRAINING

Git Troubleshooting

How to solve practically any problem that comes your way

Topic: Software Development



BRENT LASTER

LIVE ONLINE TRAINING

Next Level Git - Master your workflow

Use Git to find problems, simplify working with multiple branches and repositories, and customize behavior with hooks

Topic: Software Development



BRENT LASTER





Agenda

9

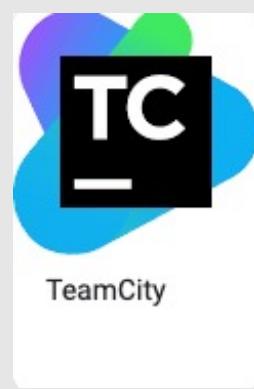
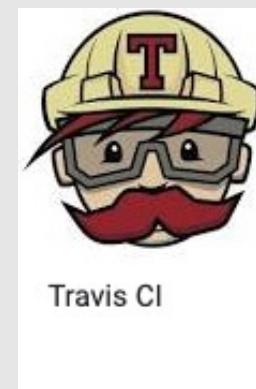
- What are GitHub Actions?
- How do they work?
- The GitHub interface to Actions
- About Actions Runners and Virtual Environments
- Using public Actions
- Workflow runs
- Custom Actions
- Manually running workflows
- Monitoring and Troubleshooting
- Creating secrets for Actions
- Chaining workflows together
- Using GitHub API calls with Actions



What are GitHub Actions?

10

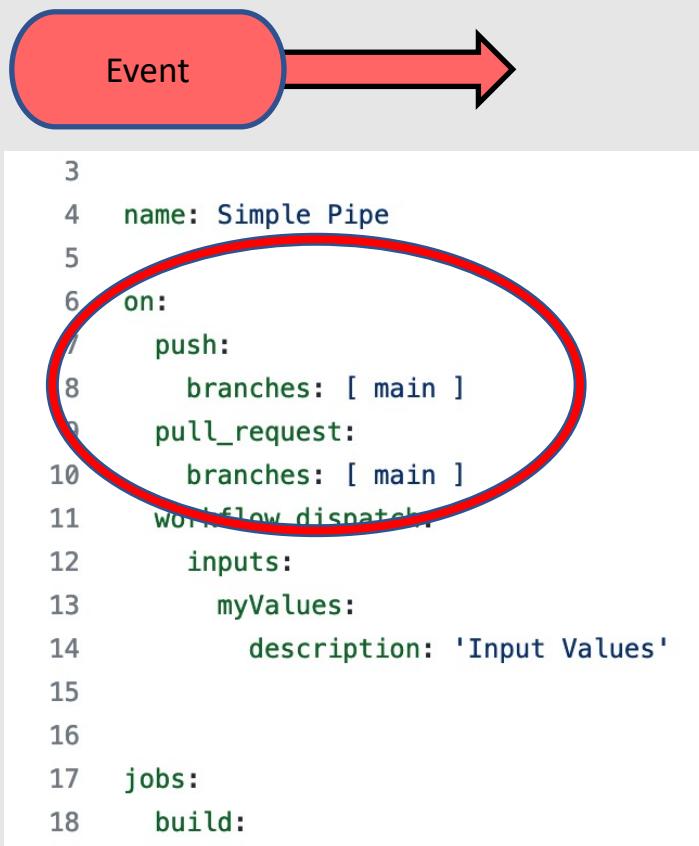
- Way to create custom, automated workflows
- Executed based on repository operations
- Building blocks - can be combined & shared
- Used for usual SDLC tasks
- Can be used for CI/CD as alternatives to other apps





How do they work?

- Events occur
 - Example: pull request triggers build for validation
 - Example: push for commit
- Repository Dispatch Events
 - Endpoint that can be used to trigger webhook event
 - Can be used for activity that is not in GitHub
 - Can trigger a GitHub Actions workflow or GitHub App webhook
- ref
 <https://docs.github.com/en/rest/reference/repos#create-a-repository-dispatch-event>

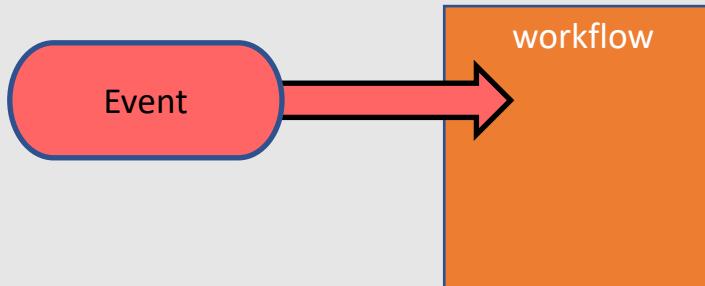


Scheduled events	schedule
Manual events	workflow_dispatch
	repository_dispatch
Webhook events	check_run
	check_suite
	create
	delete
	deployment
	deployment_status
	fork
	gollum
	issue_comment
	issues
	label
	milestone
	page_build
	project
	project_card
	project_column
	public
	pull_request
	pull_request_review
	pull_request_review_comment
	pull_request_target
	push
	registry_package
	release
	status
	watch
	workflow_run



How do they work?

- Events trigger workflows
 - Procedure to run automatically
 - Added to your repository
 - Composed of one+ jobs
 - Can be triggered/scheduled by event
 - Useful for doing CI/CD actions such as building, testing, packaging, etc.



Code Pull requests Actions Projects Wiki Security Insights Settings

Workflows New workflow

All workflows

Simple Pipe

Filter workflow runs

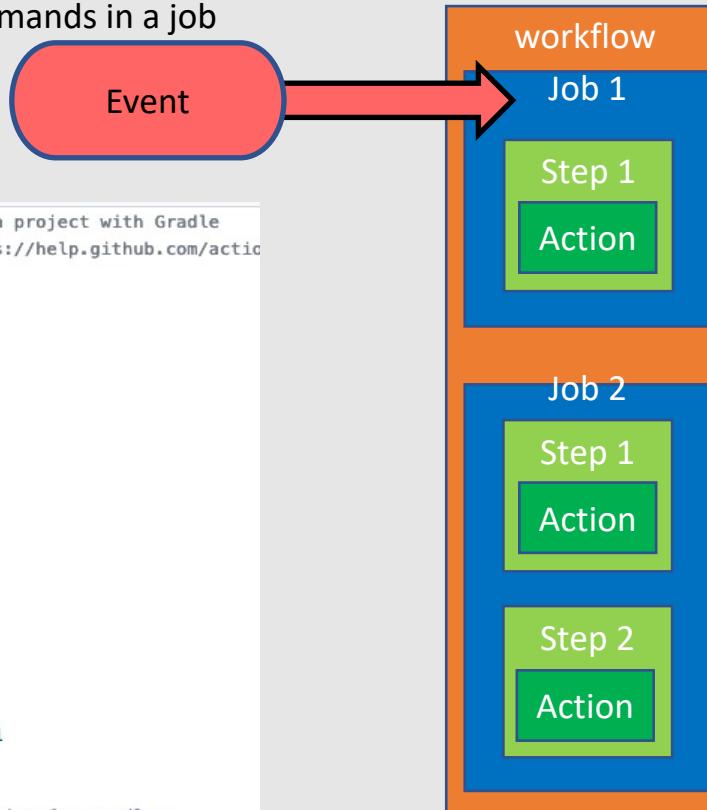
1 workflow run Event Status Branch Actor

Rename extra/simple-pipe.yml to .github/w...
Simple Pipe #1: Commit 2393804 pushed by gwstudent main
23 seconds ago ...
In progress



How do they work?

- Workflows contain jobs
 - Set of steps
 - Workflow with multiple jobs runs them in parallel
- Jobs contain steps
 - A task that can execute commands in a job
 - Can be either
 - » action
 - » shell command



```

1  # This workflow will build a Java project with Gradle
2  # For more information see: https://help.github.com/actions
3
4  name: Java CI with Gradle
5
6  on:
7    push:
8      branches: [ main ]
9    pull_request:
10   branches: [ main ]
11
12 jobs:
13   build:
14
15     runs-on: ubuntu-latest
16
17     steps:
18       - uses: actions/checkout@v2
19       - name: Set up JDK 1.8
20         uses: actions/setup-java@v1
21         with:
22           java-version: 1.8
23       - name: Grant execute permission for gradlew
24         run: chmod +x gradlew
25       - name: Build with Gradle
26         run: ./gradlew build

```



How do they work?

Workflows contain jobs

- Set of steps
- Workflow with multiple jobs runs them in parallel

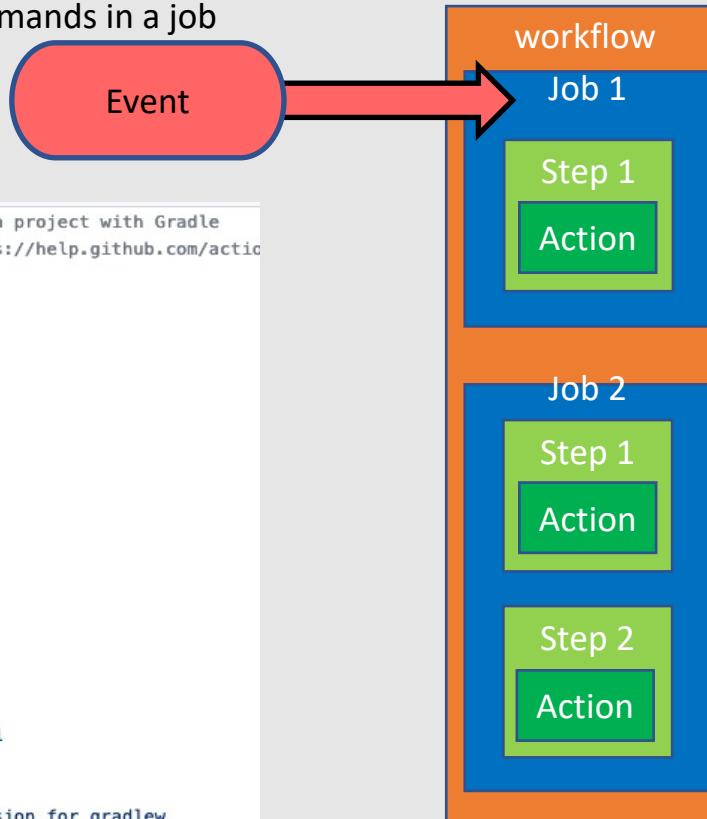
Jobs contain steps

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- Can be either
 - » action
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```

1  # This workflow will build a Java project with Gradle
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22           java-version: 1.8
23       - name: Grant execute permission for gradlew
24         run: chmod +x gradlew
25       - name: Build with Gradle
26         run: ./gradlew build

```



Action

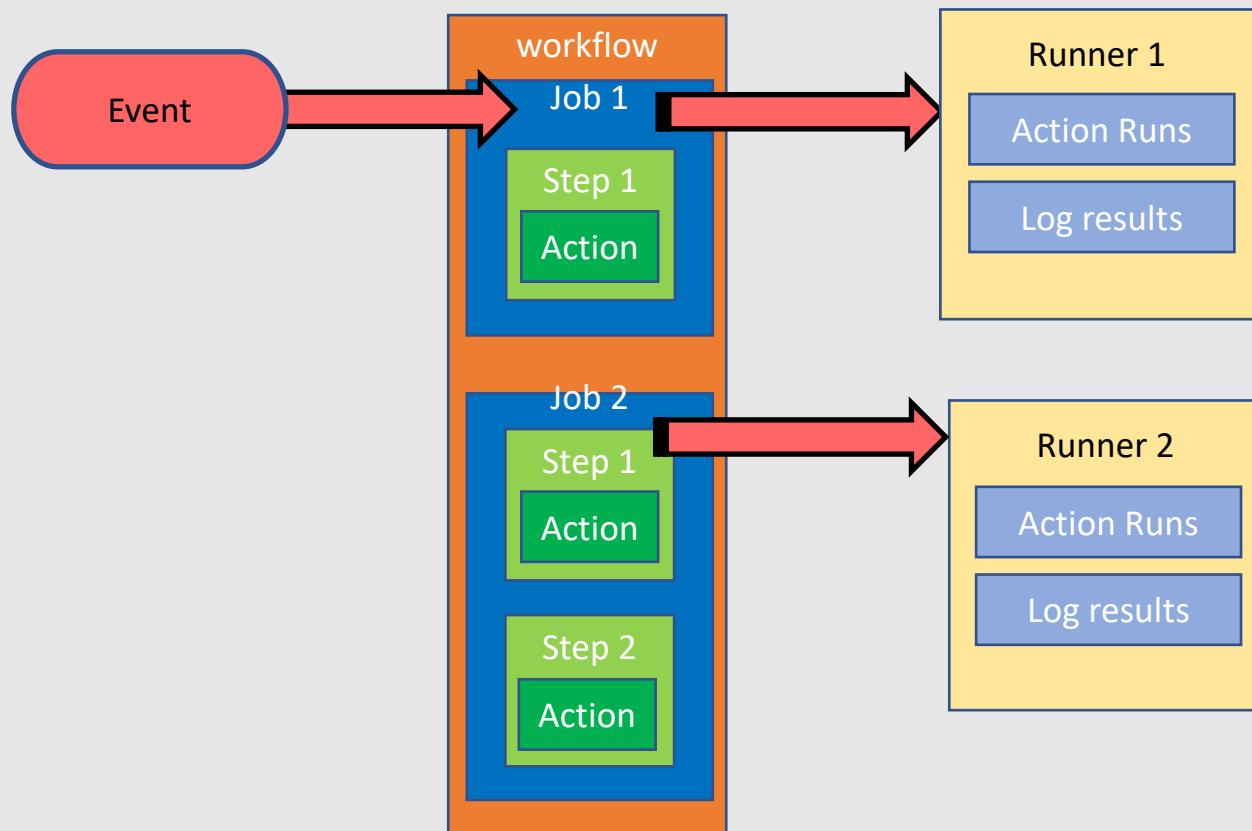
- Independent commands
- Combined into steps to form a job
- Smallest unit in a workflow
- Can be created or pulled in from the community
- Only usable if included as a step



How do they work?

Runner

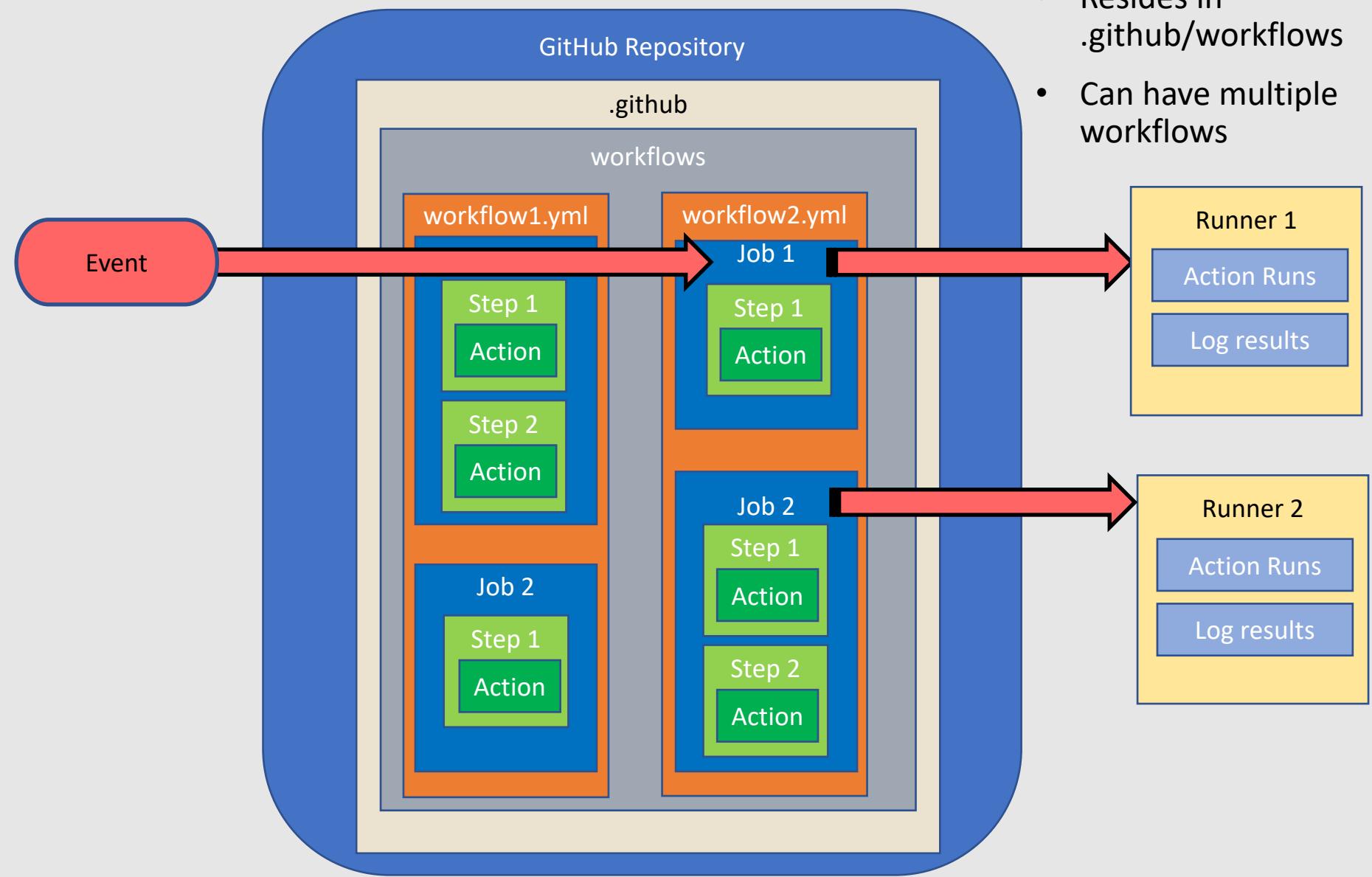
- A server with GitHub Actions runner app on it
- Can use runner provided by/hosted via GitHub or use your own
- Runner listens for available jobs
- Steps in a job execute on the same runner





How do they work?

- Resides in .github/workflows
- Can have multiple workflows





Actions in GitHub Interface

The screenshot shows two views of the GitHub Actions interface for the repository `gwstudent/greetings-actions`.

Top View: This view shows the main repository page. The `Actions` tab is highlighted with a red circle. The page displays basic repository information: `main`, `1 branch`, `0 tags`. It also shows a commit history from `Brent Laster` with three commits: `Add workflow` (36 minutes ago), `.github/workflows` (36 minutes ago), and `gradle/wrapper` (18 hours ago).

Bottom View: This view shows the detailed Actions tab. It includes a sidebar with `Workflows` and `New workflow` buttons, and a link to `All workflows`. A feedback survey box is present. The main area shows the `All workflows` section with a heading `All workflows` and a sub-section `Showing runs from all workflows`. A search bar for `Filter workflow runs` is available. Below this, a table lists `1 workflow run` with the following details:

	Event	Status	Branch	Actor
<code>Added workflow</code>	main	11 minutes ago	...	Java CI with Gradle #1: Commit 19bd09f pushed by gwstudent



Viewing Logs

All workflows
Showing runs from all workflows

Filter workflow runs

1 workflow run

Added workflow (Java CI with Gradle #1: Commit 19bd09f pushed by gwstudent)

https://github.com/gwstudent/greetings-actions/runs/3478059147?check_suite_focus=true

Getting Started Relaxing Music ...

Search or jump to... Pull requests Issues Marketplace Explore

gwstudent / greetings-actions forked from skillrepos/greetings-actions

Code Pull requests Actions Projects Wiki Security Insights Settings

Added workflow Java CI with Gradle #1

Summary

build succeeded 22 minutes ago in 17s

- > Set up job
- > Run actions/checkout@v2
- > Set up JDK 1.8
- > Grant execute permission for gradlew

Build with Gradle

```

1  ➔ Run ./gradlew build
8  Downloading https://services.gradle.org/distributions/gradle-4.10-bin
9  ...
10
11  Welcome to Gradle 4.10!
12
13  Here are the highlights of this release:
14  - Incremental Java compilation by default
15  - Periodic Gradle caches cleanup
16  - Gradle Kotlin DSL 1.0-RC3
17  - Nested included builds
18  - SNAPSHOT plugin versions in the `plugins {}` block
19

```

https://github.com/gwstudent/greetings-actions/runs/3478059147?check_suite_focus=true

Getting Started Relaxing Music ...

Search or jump to... Pull requests Issues Marketplace

gwstudent / greetings-actions forked from skillrepos/greetings-actions

Code Pull requests Actions Projects Wiki Security

Added workflow Java CI with Gradle #1

Summary

Triggered via push 18 minutes ago
gwstudent pushed ~ 19bd09f

Jobs

build

gradle.yml on: push

build

Lab 1 – Creating a simple example

Purpose: In this lab, we'll get a quick start learning about GitHub Actions by creating a simple project that uses them. We'll also see what a first run of a workflow with actions looks like.



GitHub Actions Runner

The screenshot shows the GitHub Actions Runner README page. At the top, there's a header bar with a shield icon, a lock icon, and the URL <https://github.com/actions/runner>. Below the header, there's some truncated text starting with "lusic ...". A sidebar on the left shows a tree icon and the file name "README.md". The main content area has a large heading "GitHub Actions Runner". Below it are two green status badges: "Runner CI" (passing) and "Runner E2E Test" (passing). A paragraph explains that the runner is the application that runs a job from a GitHub Actions workflow, available in hosted virtual environments or self-hosted environments. There's a "Get Started" section with links to "Adding self-hosted runners" and "Using self-hosted runners in a workflow". It also lists "Runner releases" for Windows, macOS, and Linux, each with a download link. Finally, there's a "Contribute" section with a note about accepting contributions via issues and pull requests, and a link to more information.

Runner CI passing Runner E2E Test passing

The runner is the application that runs a job from a GitHub Actions workflow. It is used by GitHub Actions in the [hosted virtual environments](#), or you can [self-host the runner](#) in your own environment.

Get Started

For more information about installing and using self-hosted runners, see [Adding self-hosted runners](#) and [Using self-hosted runners in a workflow](#)

Runner releases:

- [Pre-reqs | Download](#)
- [Pre-reqs | Download](#)
- [Pre-reqs | Download](#)

Contribute

We accept contributions in the form of issues and pull requests. [Read more here](#) before contributing.



GitHub Actions Virtual Environments

- Virtual environments for GitHub actions hosted runners
- VM images of Microsoft-hosted agents used for Azure Pipelines

The screenshot shows a browser window displaying the GitHub Actions Virtual Environments README.md page. The URL in the address bar is <https://github.com/actions/virtual-environments>. The page title is "Available Environments". A table lists the environments, their YAML labels, included software, and latest release & rollout progress.

Environment	YAML Label	Included Software	Latest Release & Rollout Progress
Ubuntu 20.04	ubuntu-latest or ubuntu-20.04	ubuntu-20.04	ubuntu20 20210816.1 (99.99%)
Ubuntu 18.04	ubuntu-18.04	ubuntu-18.04	ubuntu18 20210816.1 (99.99%)
macOS 11	macos-11	macOS-11	macos-11 20210814.QYCS9D (2.62%)
macOS 10.15	macos-latest or macos-10.15	macOS-10.15	macos-10.15 20210814.QYO9X7 (3.74%)
Windows Server 2022[beta]	windows-2022	windows-2022	windows-2022 20210819.7 (100.00%)
Windows Server 2019	windows-latest or windows-2019	windows-2019	windows-2019 20210815.1 (100.00%)
Windows Server 2016	windows-2016	windows-2016	windows-2016 20210815.1 (100.00%)



Self-hosted Runners

- Useful when you need more configurability and control
- Allows you to choose and customize configuration, system resources, available software, etc.
- Can be physical systems, VMs, containers, on-prem or cloud
- Can be mapped in at different levels
 - Repository-level - intended for a single repo
 - Organization-level - intended for a GitHub organization
 - » processing of multiple jobs across multiple repositories
 - Enterprise-level - assigned to multiple organizations for an enterprise account
- Runner system connects to GitHub via GitHub Actions self-hosted runner
- Automatically kicked off of GitHub if no connection to GitHub Actions after 30 days



Self-hosted Runners Reqs

- System must be able to
 - Have self-hosted runner application installed
 - Run self-hosted runner application
 - Communicate with GitHub Actions
 - » Must be able to connect to known set of GitHub URLs
 - » Opens connections to GitHub for 50 seconds at a time
 - » Can use proxy server
 - Provide sufficient resources for intended workflows
 - Have appropriate software installed for workflow needs (Docker etc.)
-
- Recommended to use only with private repos
 - Forks of repos could run dangerous code on self-hosted runner machine (via PR that executes code in workflow)

Supported architectures and operating systems for self-hosted runners

Linux

- Red Hat Enterprise Linux 7 or later
- CentOS 7 or later
- Oracle Linux 7
- Fedora 29 or later
- Debian 9 or later
- Ubuntu 16.04 or later
- Linux Mint 18 or later
- openSUSE 15 or later
- SUSE Enterprise Linux (SLES) 12 SP2 or later

Windows

- Windows 7 64-bit
- Windows 8.1 64-bit
- Windows 10 64-bit
- Windows Server 2012 R2 64-bit
- Windows Server 2016 64-bit
- Windows Server 2019 64-bit

macOS

- macOS 10.13 (High Sierra) or later

Architectures

The following processor architectures are supported for the self-hosted runner application.

- x64 - Linux, macOS, Windows.
- ARM64 - Linux only.
- ARM32 - Linux only.



Usage limits for Actions on Self-hosted Runners

- Workflow run time - max 72 hours; afterwards cancelled
- Job queue time - max 24 hours; if self-hosted runner does not start executing job, gets terminated
- API requests - up to 1000 API requests/hour across all actions in a repo
- Job matrix - limit of 256 jobs per workflow run
- Workflow run queue - max of 500 runs queued in 10 second interval
- Availability issues - if Actions are temporarily unavailable, run is discarded if not queued within 30 minutes of being triggered

Editing Actions



gwstudent/greetings-actions Public
forked from skillrepos/greetings-actions

Code Issues 2 Pull requests Actions Projects Wiki Security Insights

main greetings-actions/.github/workflows/simple-pipe.yml

gwstudent Update simple-pipe.yml X Latest commit 1539282 on Sep 6 History

1 contributor

greetings-actions/.github/workflows/simple-pipe.yml in gwstudent:main Cancel changes Start commit

<> Edit file Preview changes Spaces 2 No wrap

```

1 # This workflow will build a Java project with Gradle initially
2 # For more information see: https://help.github.com/actions/language-and-framework-guides/building-and-testing-java-with-gradle
3
4 name: Simple Pipe
5
6 on:
7   push:
8     branches: [ main ]
9   pull_request:
10    branches: [ main ]
11   workflow_dispatch:
12     inputs:
13       myValues:
14         description: 'Input Values'
15
16 jobs:
17   build:
18     runs-on: ubuntu-latest
19
20     steps:
21       - uses: actions/checkout@v2
22       - name: Set up JDK 1.8
23         uses: actions/setup-java@v1
24         with:
25           java-version: 1.8
26       - name: Grant execute permission for gradlew
27         run: chmod +x gradlew
28       - name: Build with Gradle
29         run: ./gradlew build
30       - name: Upload Artifact
31         uses: actions/upload-artifact@v2
32         with:
33           ...
34
35

```

Use Control + Space to trigger autocomplete in most situations.

Marketplace Documentation

Search Marketplace for Actions

Featured Actions

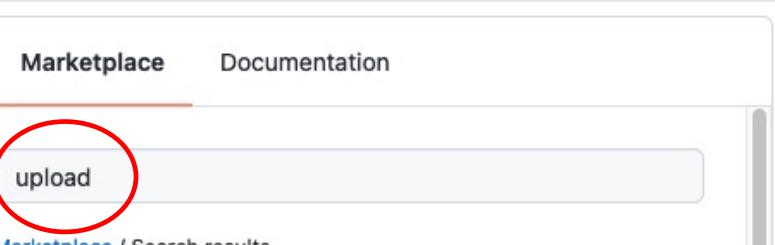
- Upload a Build Artifact** By actions 1.2k
Upload a build artifact that can be used by subsequent workflow steps
- Setup Go environment** By actions 542
Setup a Go environment and add it to the PATH
- Download a Build Artifact** By actions 420
Download a build artifact that was previously uploaded in the workflow by the upload-artifact action
- Setup .NET Core SDK** By actions 350
Used to build and publish .NET source. Set up a specific version of the .NET and authentication to private NuGet repository
- First interaction** By actions 146
Greet new contributors when they create their first issue or open their first pull request

Featured categories

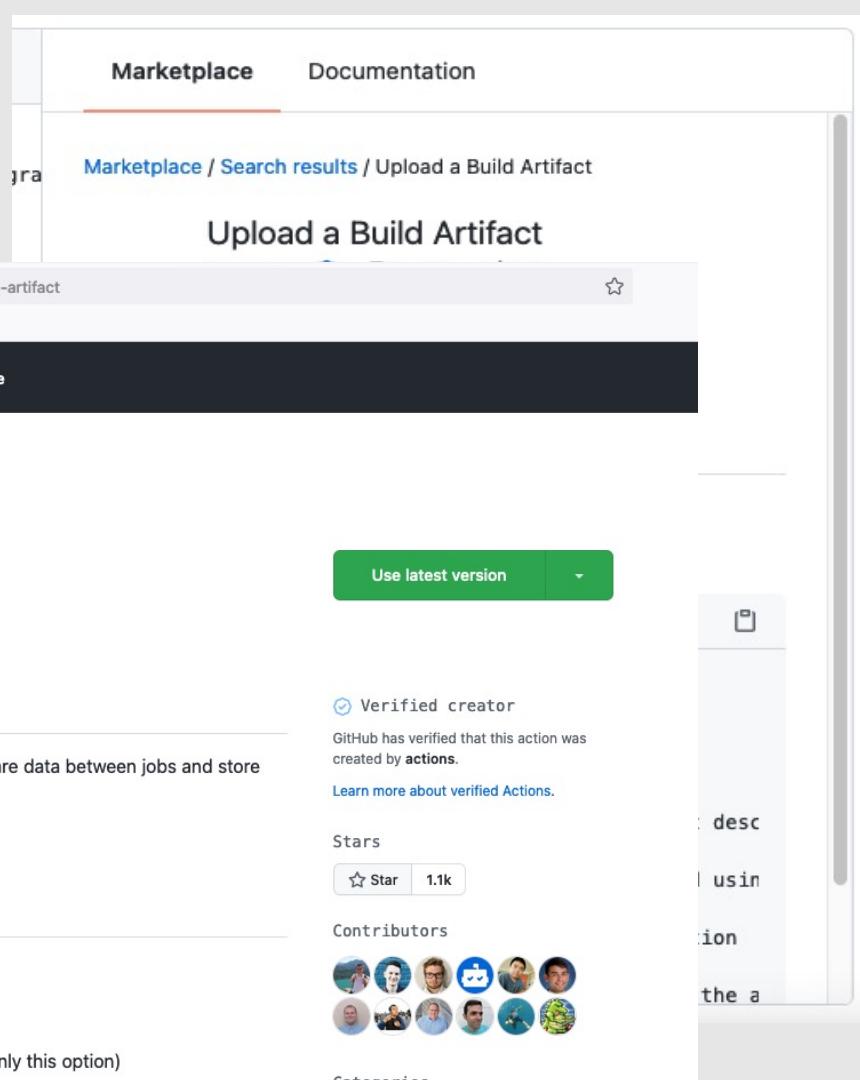
Code quality	Monitoring
Continuous integration	Project management
...	...



Searching for a Public Action



The screenshot shows the GitHub Marketplace search results for the term "upload". A red circle highlights the search input field containing "upload". Below the search bar, the URL https://github.com/marketplace/actions/upload-a-build-artifact is visible.



The screenshot shows the GitHub Marketplace action details page for the "Upload a Build Artifact" action. The title is "Upload a Build Artifact" (v2.2.4). A green button labeled "Use latest version" is prominent. To the left, there's a sidebar with various icons and labels like "Marketplace", "Documentation", "Getting Started", "Relaxing Music", "Search or jump to...", "Pull requests", "Issues", "Marketplace", and "Explore". The main content area includes sections for "What's new" (listing easier upload options), "Upload-Artifact v2" (description), "Contributors" (a grid of profile pictures), and "Categories" (a list of categories on the right).



Actions use Actions

The screenshot shows three browser tabs illustrating GitHub Actions:

- Top Tab:** https://github.com/marketplace/actions/checkout. This page shows the "Checkout" GitHub Action. It includes a preview showing a green "test-local" status with "pending". Below it, the "Checkout V2" section details how it checks out your repository under `$GITHUB_WORKSPACE`. It also mentions a single commit is fetched by default, and the auth token is persisted in the local git config.
- Middle Tab:** https://github.com/actions/checkout. This is the main repository for the "actions/checkout" action. The "Actions" tab is highlighted with a red circle. The repository has 41 stars, 1.8k forks, and 613 issues. It features a "Use this GitHub Action with your project" section and a list of workflow runs.
- Bottom Tab:** https://github.com/actions/checkout/actions. This page lists all workflow runs for the repository. It shows two runs for "Create check-dist.yml (#566)" on the "main" branch, both occurring 14 days ago. The first run took 3m 39s, and the second took 45s.



Making a change

gwstudent/greetings-actions (Public) forked from skillrepos/greetings-actions

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

greetings-actions/.github/workflows/simple-pipe.yml in main

Cancel changes Start commit

Edit file Preview changes Spaces 2 No wrap

```

1 # This workflow will build a Java project with Gradle initially
2 # For more information see: https://help.github.com/actions/language-and-framework-guides/building-and-testing-java-with-gradle
3
4 name: Simple Pipe
5
6 on:
7   push:
8     branches: [ main ]
9   pull_request:
10    branches: [ main ]
11   workflow_dispatch:
12     inputs:
13       myValues:
14         description: 'Input Values'
15
16 jobs:
17   build:
18     runs-on: ubuntu-latest
19
20     steps:
21       - uses: actions/checkout@v2
22       - name: Set up JDK 1.8
23         uses: actions/setup-java@v1
24         with:
25           java-version: 1.8
26       - name: Grant execute permission for gradlew
27         run: chmod +x gradlew
28       - name: Build with Gradle
29         run: ./gradlew build
30       - name: Upload Artifact
31         uses: actions/upload-artifact@v2
32         with:
33           name: greetings-jar
34           path: build/libs
35
36 test-run:
37
38
39

```

Use Control + Space to trigger autocomplete in most situations.

Marketplace Document

Commit changes

Update simple-pipe.yml Add an optional extended description...

Commit directly to the main branch. Create a new branch for this commit and start a pull request. Learn more about pull requests.

Commit changes

Featured Actions

- Cache By actions Cache artifacts like dependencies or environment variables between workflow execution steps.
- Upload a Build Artifact By actions Upload a build artifact to a public or private repository.
- Setup Go environment By actions Setup a Go environment and add it to the PATH.
- Close Stale Issues By actions Close issues and pull requests with no recent activity.
- Setup .NET Core SDK By actions Used to build and publish .NET source. Set up a specific version of the .NET and authentication to private NuGet repository.

Featured categories

Code quality	Monitoring
Continuous integration	Project management
Deployment	Testing

Browse all actions on the GitHub Marketplace



Viewing a Specific Workflow Run

The screenshot shows a GitHub Actions workflow run details page. The URL in the browser is <https://github.com/gwstudent/greetings-actions/actions/runs/1206092451>. The title of the run is "Update simple-pipe.yml Simple Pipe #2". The status is "Success" with a duration of "26s". There is one artifact named "greetings-jar".

Summary

Triggered via push 2 minutes ago

gwstudent pushed -o f3f62e3 main

Status: Success | Total duration: 26s | Artifacts: 1

simple-pipe.yml
on: push

build 13s

Artifacts
Produced during runtime

Name	Size
greetings-jar	1006 Bytes



Viewing the Workflow Run history

The image displays two screenshots of GitHub Actions workflow history pages.

Screenshot 1: Workflow Configuration

This screenshot shows the GitHub Actions configuration page for the `gradle.yml` workflow in the `roar-min-actions2` repository. The URL is github.com/brentlaster/roar-min-actions2/blob/brentlaster-patch-1/github/workflows/gradle.yml. The configuration file contains the following code:

```

1 # This workflow will build a Java project with Gradle
2 # For more information see: https://help.github.com/actions/language-and-framework-guides/building-and-testing-java-with-gradle
3
4 name: Java CI with Gradle
5
6 on:

```

A red circle highlights the "View runs" button in the top right corner of the workflow card.

Screenshot 2: Workflow Runs History

This screenshot shows the GitHub Actions workflow runs history for the `Java CI with Gradle` workflow in the `roar-min-actions2` repository. The URL is github.com/brentlaster/roar-min-actions2/actions/workflows/gradle.yml. The page lists 27 workflow runs, with the most recent ones at the top:

- Update gradle.yml** (Success) - 5 months ago, brentlaster-patch-3, 1m 49s
- Update gradle.yml** (Failure) - 5 months ago, brentlaster-patch-3, Startup failure
- Update gradle.yml** (Success) - 5 months ago, brentlaster-patch-3, 38s
- Update gradle.yml** (Failure) - 5 months ago, brentlaster-patch-3, Failure
- Merge pull request #5 from brentlaster/docker** (Success) - 5 months ago, master, 49s

Lab 2 – Learning more about Actions

Purpose: In this lab, we'll see how to get more information about Actions and how to update our workflow to use others.



Custom Actions

- Can be created by you
- Can result from customizing community actions
- Can be put on Marketplace and shared
 - repository must be public
- Can integrate with any public API
- Can run directly on a machine or in Docker container
- Can define inputs, outputs, and environment variables
- Require metadata file
 - defines inputs, outputs, and entrypoint
 - must be named either action.yaml or action.yml
- Should be tagged with a label and then pushed to GitHub
- To use:
 - In file in .github/workflows/main.yml
 - In steps
 - "uses: <github path to action>@<label>"

```
$ <create GitHub repo>
$ <clone repo>
$ <create files>

$ git add action.yml <other files>
$ git commit -m "action files"
$ git tag -a -m "first release of action" v1
$ git push --follow-tags
```

.github/workflows/example.yml

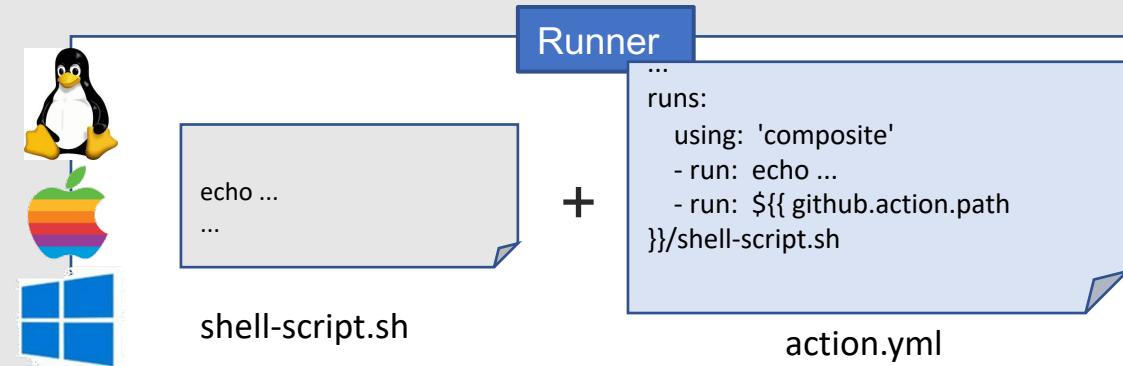
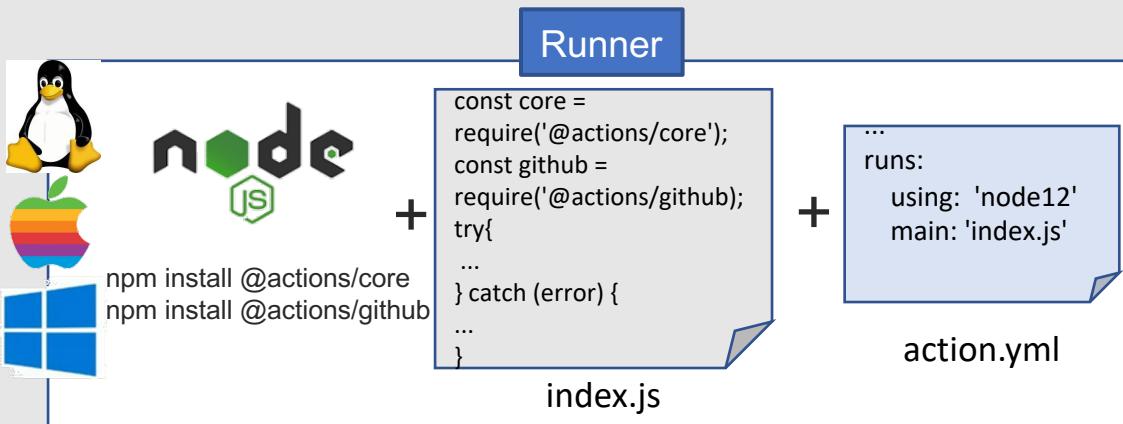
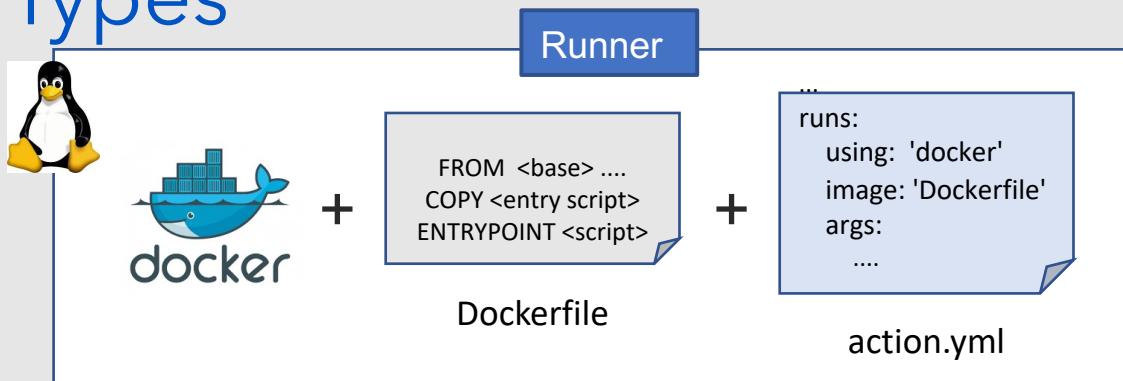
```
on: [push]

jobs:
  example_job:
    runs on: ubuntu-latest
    name: An example job
    steps:
      - name: Example step
        id: example_step
        uses: <repo name>/<action name>@<tag>
      ...
```



Custom Action Types

- Docker
 - Packages env with actions code
 - Env can include specific OS versions, config, tools, etc.
 - Well suited for specific env needs
 - Runs only on Linux runners with Docker installed
 - Slower due to cost of building and retrieving container
 - GitHub builds image from Dockerfile and runs commands in a new container based on image
- Javascript
 - Run directly on runner for any of macOS, Linux, or Windows
 - Separates action from env
 - Fast than Docker
 - Needs to be pure JavaScript (no other binaries)
 - Can use binaries already on runner
- Composite
 - Combines multiple workflow steps in one action





Updating workflows with Pull Requests #1

The change you just made was written to a new branch named `gwstudent-patch-1`. Create a pull request below to propose these changes.

Commit changes

- Commit directly to the `main` branch.
- Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)

`gwstudent-patch-1`

Propose changes

Update simple-pipe.yml

Leave a comment

Attach files by dragging & dropping, selecting or pasting them.

Create pull request

Update simple-pipe.yml #2

gwstudent wants to merge 1 commit into `main` from `gwstudent-patch-2`

Add more commits by pushing to the `gwstudent-patch-2` branch on `gwstudent/greet`

Some checks were not successful

2 successful and 1 failing checks

- ✓ **Simple Pipe / build (pull_request)** Successful in 14s
- ✗ **Simple Pipe / count-args (pull_request)** Failing after 33s — count-args
- ✓ **Simple Pipe / test-run (pull_request)** Successful in 5s

This branch has no conflicts with the base branch

Merging can be performed automatically.

Merge pull request

You can also open this in GitHub Desktop or view command

Open gwstudent wants to merge 1 commit into main from gwstudent-patch-2

Conversation 0 Commits 1 Checks 3 Files changed 1 +14 -0

Update simple-pipe.yml a382375

Simple Pipe on: pull_request

build

count-args failed 9 minutes ago in 33s

Set up job

- 1 Current runner version: '2.280.3'
- 2 ▶ Operating System
- 6 ▶ Virtual Environment
- 11 ▶ Virtual Environment Provisioner
- 13 ▶ GITHUB_TOKEN Permissions
- 26 Prepare workflow directory
- 27 Prepare all required actions
- 28 Getting action download info
- 29 Failed to resolve action download info. Error: Unable to resolve action `<your github userid>/arg-count-action@main` , repository not found
- 30 Retrying in 21.833 seconds
- 31 Failed to resolve action download info. Error: Unable to resolve action `<your github userid>/arg-count-action@main` , repository not found
- 32 Retrying in 10.161 seconds
- 33 Error: Unable to resolve action `<your github userid>/arg-count-action@main` , repository not found



Fixing errors

✖ Update simple-pipe.yml Simple Pipe #5

Summary

Triggered via pull request 14 minutes ago
gwstudent opened #2 gwstudent-patch-2

Status

Total duration
Failure

45s

Artifacts
1

simple-pipe.yml
on: pull_request

build 14s → test-run 5s

✖ count-args 33s

Re-run jobs ...

Jobs

build

count-args

test-run

greetings-actions/.github/workflows/simple-pipe.yml in gwstudent-patch-2

Cancel changes Start commit

< Edit file Preview changes Spaces 2 No wrap

```

41   with:
42     name: greetings-jar
43   - shell: bash
44   run: |
45     java -jar greetings-actions.jar ${{ github.event.inputs.myValues }}
46
47 count-args:
48
49 runs-on: ubuntu-latest
50
51 steps:
52   - id: report-count
53     uses: gwstudent/arg-count-action@main
54     with:
55       arguments-to-count: ${{ github.event.inputs.myValues }}
56   - run: echo
57   - shell: bash
58   run: |
59     echo argument count is ${{ steps.report-count.outputs.arg-count }}
```

Use Control + Space to trigger autocomplete in most situations.

Commit changes

Update simple-pipe.yml

Fix GitHub user Id

Commit directly to the gwstudent-patch-2 branch.

Create a new branch for this commit and start a pull request. Learn more about pull requests.

Commit changes

By actions Close issues and pull requests with no recent activity

count-args:

runs-on: ubuntu-latest

steps:

- id: report-count

uses: gwstudent/arg-count-action@main

with:

arguments-to-count: \${{ github.event.inputs.myValues }}

- run: echo

- shell: bash

run: |

echo argument count is \${{ steps.report-count.outputs.arg-count }}

Add more commits by pushing to the gwstudent-patch-2 branch on gwstudent/greetings-actions.

All checks have passed 3 successful checks

This branch has no conflicts with the base branch

Merging can be performed automatically.

Merge pull request

You can also open this in GitHub Desktop or view command line instructions.

Merge pull request #2 from gwstudent/gwstudent-patch-2

Update simple-pipe.yml

Confirm merge Cancel

Pull request successfully merged and closed

You're all set—the gwstudent-patch-2 branch can be safely deleted.

Delete branch

Workflows

New workflow

All workflows

All workflows

Showing runs from all workflows

Filter workflow runs

7 workflow runs

Event Status Branch Actor

✖ Merge pull request #2 from gwstudent/gwstudent-patch-2

Simple Pipe #7: Commit 274fa3a pushed by gwstudent

main

43 seconds ago ...

40s

Lab 3 – Adding your own action

Purpose: In this lab, we'll see how to create how to add and use a custom GitHub Action.



Filtering workflows

- Enter text in search bar
- Click on "x" at end to clear
- Click on category in "workflow run results" bar
- Select from the list

All workflows

Showing runs from all workflows

Q branch:gwstudent

3 workflow run results

Event	Status	Branch	Actor
✓ Update simple-pipe.yml	gwstudent-patch-2	22 minutes ago	...
✗ Update simple-pipe.yml	gwstudent-patch-2	1 hour ago	...
Simple Pipe #6: Pull request #2 synchronize by gwstudent	gwstudent	37s	

All workflows

Showing runs from all workflows

Q Filter workflow runs

7 workflow runs

Event	Status	Branch	Actor
✓ Merge pull request #2 from gwstudent/gwstudent-...	main	3 ago	...
Simple Pipe #7: Commit 274fa3a pushed by gwstudent	gwstud		
✓ Update simple-pipe.yml	gwstudent-patch-1	3 ago	...
Simple Pipe #6: Pull request #2 synchronize by gwstudent	gwstudent-patch-2		

Filter by branch

Find a branch



Creating a status badge

- Adds status information displayed in README file
- Click on "..." at end of selected line in workflow

The screenshot shows a GitHub interface. At the top, there's a navigation bar with 'Workflows' and 'New workflow' buttons, followed by a 'Simple Pipe' workflow card. The card displays 'simple-pipe.yml', '7 workflow runs', and a recent run from 'Merge pull request #2 from gwstudent/gwstudent-...'. A context menu is open over the run, with the 'Create status badge' option highlighted and circled in red. Below this, the 'README.md' file is shown, featuring the heading 'greetings-actions'. A status badge is present in the file, indicating 'Java CI w/ Gradle and test-run' is 'passing'. A large red arrow points from the 'Create status badge' menu option down to the line of code in the README.md file that generates this badge.

Workflows New workflow

Simple Pipe
simple-pipe.yml

All workflows

Simple Pipe

2 days ago

4 days ago

4 days ago

Q Filter workflow runs

7 workflow runs Event Status ...

Create status badge

Disable workflow

22 minutes ago

Merge pull request #2 from gwstudent/gwstudent-...

README.md

greetings-actions

Simple hello world type of program for use with learning GitHub Actions

Java CI w/ Gradle and test-run passing

greetings-actions / README.md in main

Edit new file Preview

Cancel changes

Spaces 2 No wrap

```
1 # greetings-actions
2 Simple hello world type of program for use with learning GitHub Actions
3 [![Java CI w/ Gradle and test-run](https://github.com/gwstudent/greetings-actions/actions/workflows/gradle2.yml/badge.svg)](https://github.com/gwstudent/greetings-ac
```



Drilling into logs

- Click on workflow in list
- Click on step
- Step log is shown
- Gear icon can be used for options - such as timestamps
- Can also view raw logs

```

2021-09-06T18:33:17.0628773Z Found online and idle hosted runner in the current repository's
organization account that matches the required labels: 'ubuntu-latest'
2021-09-06T18:33:17.1255435Z Waiting for a Hosted runner in the 'organization' to pick this job...
2021-09-06T18:33:17.3095859Z Job is waiting for a hosted runner to come online.
2021-09-06T18:33:21.1279591Z Job is about to start running on the hosted runner: GitHub Actions 2
(hosted)
2021-09-06T18:33:25.4113252Z ##[debug]Starting: count-args
2021-09-06T18:33:25.4138039Z ##[debug]Cleaning runner temp folder: /home/runner/work/_temp
2021-09-06T18:33:25.4197200Z ##[debug]Starting: Set up job
2021-09-06T18:33:25.4198014Z Current runner version: '2.280.3'
2021-09-06T18:33:25.4225816Z ##[group]Operating System
2021-09-06T18:33:25.4226725Z Ubuntu
2021-09-06T18:33:25.4227238Z 20.04.3
2021-09-06T18:33:25.4227715Z LTS
2021-09-06T18:33:25.4228271Z ##[endgroup]
2021-09-06T18:33:25.4228856Z ##[group]Virtual Environment
2021-09-06T18:33:25.4229628Z Environment: ubuntu-20.04
2021-09-06T18:33:25.4230213Z Version: 20210831.9
2021-09-06T18:33:25.4231326Z Included Software: https://github.com/actions/virtual-environments
/blob/ubuntu20/20210831.9/images/linux/Ubuntu2004-README.md
2021-09-06T18:33:25.4232837Z Image Release: https://github.com/actions/virtual-environments/releases
/tag/ubuntu20%2F20210831.9
2021-09-06T18:33:25.4233759Z ##[endgroup]
2021-09-06T18:33:25.4234487Z ##[group]Virtual Environment Provisioner
2021-09-06T18:33:25.4235335Z 1.0.0.0-master-20210816-1
2021-09-06T18:33:25.4235915Z ##[endgroup]
2021-09-06T18:33:25.4238317Z ##[group]GITHUB_TOKEN Permissions
2021-09-06T18:33:25.4239779Z Actions: write
2021-09-06T18:33:25.4240380Z Checks: write
2021-09-06T18:33:25.4240931Z Contents: write
2021-09-06T18:33:25.4241549Z Deployments: write
2021-09-06T18:33:25.4242131Z Discussions: write
2021-09-06T18:33:25.4242778Z Issues: write
2021-09-06T18:33:25.4243302Z Metadata: read
2021-09-06T18:33:25.4243943Z Packages: write
2021-09-06T18:33:25.4244520Z PullRequests: write
2021-09-06T18:33:25.4245228Z RepositoryProjects: write
2021-09-06T18:33:25.4245982Z SecurityEvents: write
2021-09-06T18:33:25.4246562Z Statuses: write
2021-09-06T18:33:25.4247307Z ##[endgroup]
2021-09-06T18:33:25.4250636Z ##[debug]Primary repository: gwstudent/greetings-actions
2021-09-06T18:33:25.4252005Z Prepare workflow directory
2021-09-06T18:33:25.4316900Z ##[debug]Creating pipeline directory: '/home/runner/work/greetings-actions'
2021-09-06T18:33:25.4320948Z ##[debug]Creating workspace directory: '/home/runner/work/greetings-action
/greetings-actions'
2021-09-06T18:33:25.4322917Z ##[debug]Update context data
2021-09-06T18:33:25.4325536Z ##[debug]Evaluating job-level environment variables
2021-09-06T18:33:25.4942897Z ##[debug]Evaluating job container
2021-09-06T18:33:25.4947161Z ##[debug]Evaluating job service containers

```



Running your workflow manually

- Add a "workflow dispatch event" trigger
- Merge changes
- Afterwards will have "Run workflow" button in workflow list

The screenshot shows the GitHub Actions Workflows page for a repository. The top navigation bar includes links for Code, Pull requests, Actions (which is the active tab), Projects, Wiki, Security, Insights, and Settings.

The main area displays a workflow named "Simple Pipe" (simple-pipe.yml). A blue button labeled "Simple Pipe" is highlighted. Below the workflow name, there is a search bar for "Filter workflow runs".

A message states: "9 workflow runs" and "This workflow has a workflow_dispatch event trigger." To the right of this message is a red circle highlighting a "Run workflow" button.

The workflow runs listed are:

- Update simple-pipe.yml (main branch) - Simple Pipe #9: Commit 6b4d7c8 pushed by gwstudent
- Create README.md (main branch) - Simple Pipe #8: Commit 05235e3 pushed by gwstudent
- Merge pull request #2 from gwstudent/gwstudent-p...

On the right side, there is a sidebar with "Use workflow from" (Branch: main), "Input Values" (abc def ghi), and another "Run workflow" button.

Lab 4 – Exploring logs

Purpose: In this lab, we'll take a closer look at the different options for getting information from logs.



Workflow commands

- Used to communicate with the runner machine to
 - Set environment variables
 - Set output values used by other actions
 - Add debug messages to logs
- Typically use "echo" command with certain format

```
echo ":::workflow-command parameter1={data},parameter2={data}::{command value}"
```

- Also can be used to execute some commands in Actions Toolkit



Actions Toolkit

- Provides packages for more easily creating/working with actions
- Functions in packages can be run in code as in

```
core.setOutput('SELECTED_COLOR', 'red');
```

or (in many cases)

- run as workflow commands
- ```
- name: Set selected color
 run:
 echo '::set-output
 name=SELECTED_COLOR::green'
```

https://github.com/actions/toolkit

README.md



toolkit-unit-tests passing toolkit-audit failing

## GitHub Actions Toolkit

The GitHub Actions ToolKit provides a set of packages to make creating actions easier.

[Get started with the javascript-action template!](#)

### Packages

✓ [@actions/core](#)

Provides functions for inputs, outputs, results, logging, secrets and variables. Read more [here](#)

```
$ npm install @actions/core
```

⭐ [@actions/exec](#)



# Actions Toolkit packages

- Collections of related functions
- Can be imported into code for actions

The screenshot shows a GitHub repository page for `actions/toolkit`. The main navigation bar includes links for Pull requests, Issues, Marketplace, and Explore. Below the navigation, there are buttons for Watch (84), Star (2.8k), Fork (960), and Insights.

The repository has 118 issues and 33 pull requests. The `Code` tab is selected, showing a list of files and their commit history:

| File                           | Description                                                  | Last Commit   |
|--------------------------------|--------------------------------------------------------------|---------------|
| <code>__tests__</code>         | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>src</code>               | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>LICENSE.md</code>        | Add License.md to all npm packages (#548)                    | 14 months ago |
| <code>README.md</code>         | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>RELEASES.md</code>       | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>package-lock.json</code> | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>package.json</code>      | Full release of actions/core 1.6.0 with oidc behavior (#919) | 16 days ago   |
| <code>tsconfig.json</code>     | Add Bryan's core code                                        | 2 years ago   |

The `README.md` file contains the following content:

```

@actions/core

Core functions for setting results, logging, registering secrets and exporting variables across actions

Usage

Import the package

```
// javascript
const core = require('@actions/core');

// typescript
import * as core from '@actions/core';
```


```



# Monitoring and Troubleshooting

- Use "default" information

- Visualization graph of a workflow
- Workflow run history
- Workflow logs
- Dump out the runner context
- Enable debug logging
  - » can use core.debug or "echo ::debug:: <message>"
  - » must be enabled via setting up secrets
    - » ACTIONS\_RUNNER\_DEBUG
    - » ACTIONS\_STEP\_DEBUG

```
info:
 runs-on: ubuntu-latest

steps:
- name: Print warning message
 run: |
 echo "::warning::This version is for debugging only."
- name: Dump context for runner
 env:
 RUNNER_CONTEXT: ${{ toJSON(runner) }}
 run:
 echo "::debug::Runner context is above."
```

info  
succeeded 32 seconds ago in 1s Search logs

▼  Dump context for runner

```
15 ##[debug] "tool_cache": "/opt/hostedtoolcache",
16 ##[debug] "temp": "/home/runner/work/_temp",
17 ##[debug] "workspace": "/home/runner/work/greetings-actions"
18 ##[debug]}
19 ##[debug]Evaluating condition for step: 'Dump context for runner'
20 ##[debug]Evaluating: success()
21 ##[debug]Evaluating success:
22 ##[debug]=> true
23 ##[debug]Result: true
24 ##[debug]Starting: Dump context for runner
25 ##[debug]Loading inputs
26 ##[debug]Loading env
27 > Run echo ::debug::Runner context is above.
28 ##[debug]/usr/bin/bash -e /home/runner/work/_temp/4282ca63-108c-4656-8c6a-4a05c1ff90b3.sh
29 ##[debug]Runner context is above.
30 ##[debug]Finishing: Dump context for runner
```



# Enabling/Creating Secrets for Actions

- Create in same repo, so same permissions needed

The screenshot shows the GitHub repository settings page for `gwstudent/greetings-actions`. The top navigation bar includes options for Watch (0), Star (0), Fork (2), and Settings (1). The left sidebar lists various settings categories: Options, Manage access, Security & analysis, Branches, Webhooks, Notifications, Integrations, Deploy keys, Actions, Environments, and Secrets (2). The main content area is titled "Actions secrets". It explains that secrets are encrypted environment variables used by Actions. A red box highlights the "New repository secret" button (3). Below this, the "Environment secrets" section states "There are no secrets for this repository's environments." and provides a link to "Manage your environments and add environment secrets". The "Repository secrets" section also states "There are no secrets for this repository.".



# Defining Secrets for Actions

- Provide secret name
- Provide value
- Add secret

gwstudent / greetings-actions  
forked from skillrepos/greetings-actions

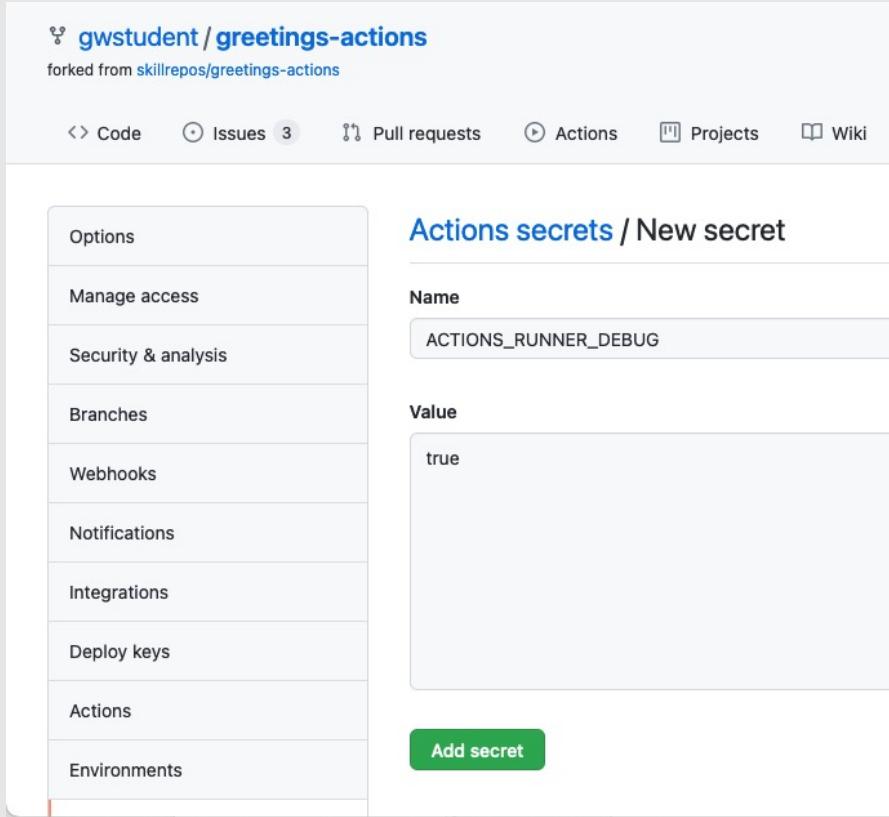
Code Issues 3 Pull requests Actions Projects Wiki

Options  
Manage access  
Security & analysis  
Branches  
Webhooks  
Notifications  
Integrations  
Deploy keys  
Actions  
Environments

Actions secrets / New secret

Name: ACTIONS\_RUNNER\_DEBUG  
Value: true

Add secret

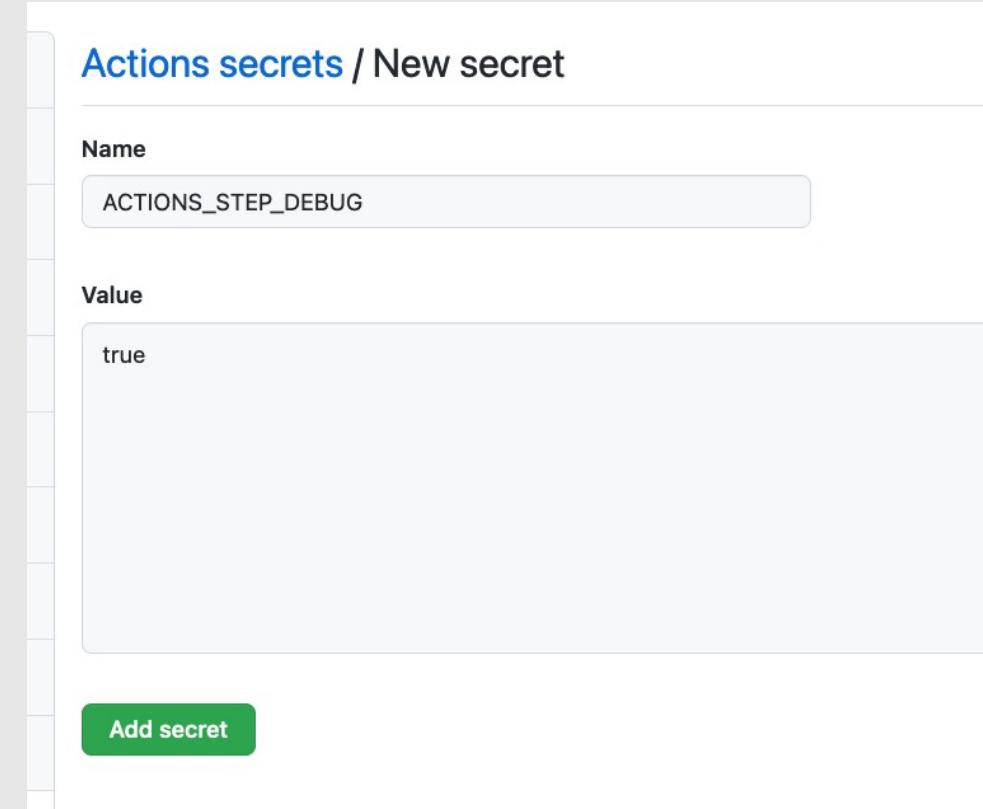


Actions secrets / New secret

Name: ACTIONS\_STEP\_DEBUG

Value: true

Add secret



## Lab 5 – Looking at debug info

Purpose: In this lab, we'll look at some ways to get more debugging info from our workflows.



# GitHub Personal Access Token

49

- Provides specific accesses
- Replaces passwords
- Can be done through <https://github.com/settings/tokens>
- Or can be setup via Settings->Profile->Developer Settings->Personal Access Tokens
- Generate new token and save it

GitHub Apps

OAuth Apps

Personal access tokens

### New personal access token

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

Note

workflows

What's this token for?

Expiration \*

30 days      The token will expire on Tue, Oct 5 2021

Select scopes

Scopes define the access for personal tokens. [Read more about OAuth scopes.](#)

|                                                     |                                            |
|-----------------------------------------------------|--------------------------------------------|
| <input checked="" type="checkbox"/> repo            | Full control of private repositories       |
| <input checked="" type="checkbox"/> repo:status     | Access commit status                       |
| <input checked="" type="checkbox"/> repo_deployment | Access deployment status                   |
| <input checked="" type="checkbox"/> public_repo     | Access public repositories                 |
| <input checked="" type="checkbox"/> repo:invite     | Access repository invitations              |
| <input checked="" type="checkbox"/> security_events | Read and write security events             |
| <input checked="" type="checkbox"/> workflow        | Update GitHub Action workflows             |
| <input type="checkbox"/> write:packages             | Upload packages to GitHub Package Registry |

tokens

Generate new token

erated that can be used to access the [GitHub API](#).

your personal access token now. You won't be able to see it again!

FtQwNXWU9u2mXYJNVa3Ksu4IzQig 



# Workflows invoking GitHub

- Workflows can invoke GitHub or other functionality via techniques such as curl

```
This is a basic workflow to help you get started with Actions

name: create-failure-issue

Controls when the workflow will run
on:
 # Allows you to run this workflow manually from the Actions tab

workflow_dispatch:
 inputs:
 title:
 description: 'Issue title'
 required: true
 body:
 description: 'Issue body'
 required: true

A workflow run is made up of one or more jobs that can run sequentially or in parallel
jobs:

 create_issue_on_failure:
 runs-on: ubuntu-latest

 permissions:
 issues: write
 steps:
 - name: Create issue using REST API
 run: |
 curl --request POST \
 --url https://api.github.com/repos/${{ github.repository }}/issues \
 --header 'authorization: Bearer ${{ secrets.GITHUB_TOKEN }}' \
 --header 'content-type: application/json' \
 --data '{
 "title": "${{ github.event.inputs.title }}",
 "body": "${{ github.event.inputs.body }}"
 }' \
 --fail
```

- Can be done via GitHub API calls
- Requires API Token saved as a secret
- One workflow then invokes the other via API call

```
create-issue-on-failure:
```

```
runs-on: ubuntu-latest
needs: [test-run, count-args]
if: always() && failure()
steps:
 - name: invoke workflow to create issue
 run: >
 curl -X POST
 -H "authorization: Bearer ${{ secrets.WORKFLOW_USE }}"
 -H "Accept: application/vnd.github.v3+json"
 "https://api.github.com/repos/${{ github.repository }}/actions/workflows/create-failure-issue.yml/dispatches"
 -d '{"ref":"main",
 "inputs":
 {"title":"Automated workflow failure issue for commit ${{ github.sha }}",
 "body":"This issue was automatically created by the GitHub Action workflow ** ${{ github.workflow }} **"}'
 }
```



## Lab 6 – Chaining workflows, using conditionals, and working with REST APIs in workflows.

Purpose: In this lab, we'll learn one way to drive one workflow from another.

# That's all - thanks!



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