

GitHub Actions Deep Dive

Revision 2.4 – 10/29/23

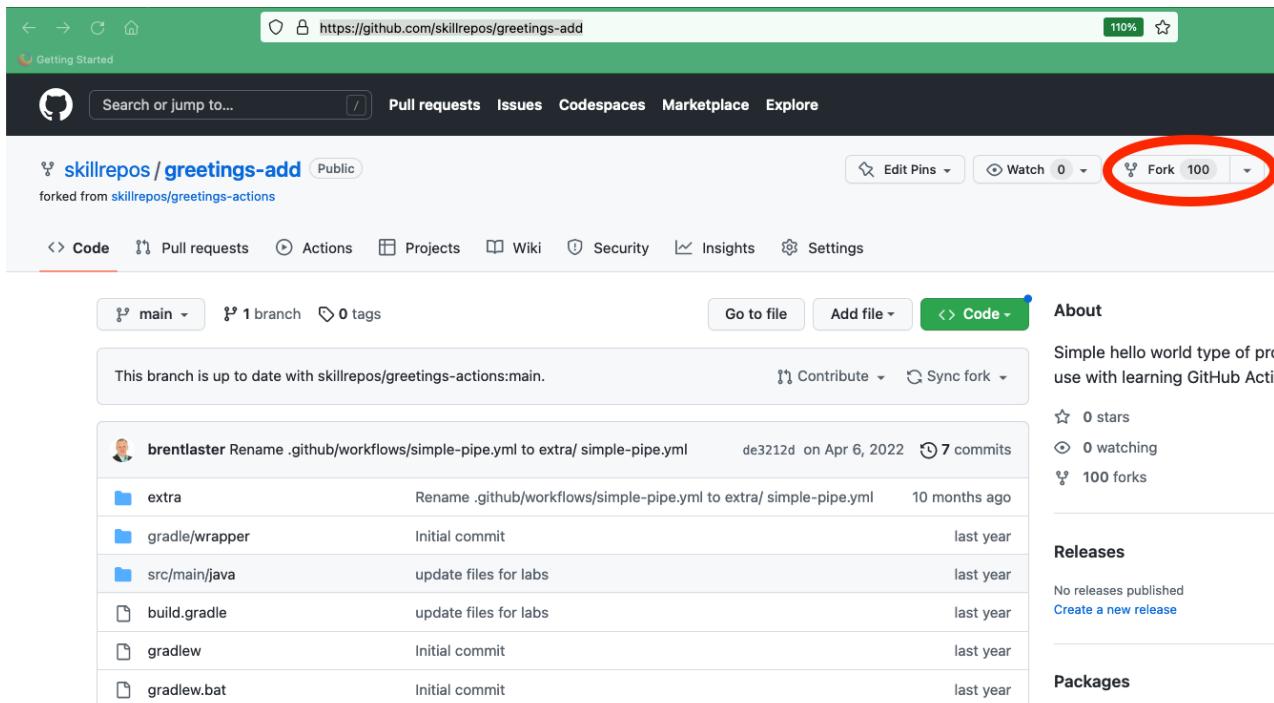
Tech Skills Transformations LLC / Brent Laster

Important Prerequisite: You will need a GitHub account for this. (Free tier is fine.)

Lab 1 – Creating a simple example

Purpose: In this lab, we'll get a quick start learning about CI with 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.

1. Log in to GitHub with your GitHub ID.
2. Go to <https://github.com/skillrepos/greetings-add> and fork that project into your own GitHub space. You can accept the default options for the fork and click the "Create fork" button.



The screenshot shows the GitHub repository page for `skillrepos/greetings-add`. The URL in the address bar is <https://github.com/skillrepos/greetings-add>. The repository is public and was forked from `skillrepos/greetings-actions`. The top navigation bar includes links for Pull requests, Issues, Codespaces, Marketplace, and Explore. The main content area shows the repository's code, which is up to date with the original branch. A list of recent commits is displayed, all made by `brentlaster`. The commit details include renaming files and updating Gradle configurations. On the right side of the page, there are sections for About, Releases, and Packages. The 'About' section notes it's a simple hello world type of project for learning GitHub Actions. The 'Releases' section indicates no releases have been published, with a link to 'Create a new release'. The 'Packages' section shows 100 forks. The 'Fork' button in the top right corner is highlighted with a red circle.

3. We have a simple java source file named `echoMsg.java` in the subdirectory `src/main/java`, a Gradle build file in the root directory named `build.gradle`, and some other supporting files. We could clone this repository and build it manually via running Gradle locally. But let's set this to build with an automatic CI process specified via a text file. Click on the *Actions* button in the top menu under the repository name.

This branch is up to date with skillrepos/greetings-actions:main.

Commit	Message	Date
brentlaster Rename .github/workflows/simple-pipe.yml to extra/ simple-pipe.yml	Rename .github/workflows/simple-pipe.yml to extra/ simple-pipe.yml	de3212d on Apr 6, 2022
extra	Initial commit	10 months ago
gradle/wrapper	update files for labs	last year
src/main/java	update files for labs	last year
build.gradle	update files for labs	last year

4. This will bring up a page with categories of starter actions that GitHub thinks might work based on the contents of the repository. We'll select a specific CI one. Scroll down to near the bottom of the page under "Browse all categories" and select "Continuous integration".

Automation

- Greetings By GitHub Actions Greets users who are first time contributors to the repo [Configure](#) [Automation](#)
- Stale By GitHub Actions Checks for stale issues and pull requests [Configure](#) [Automation](#)
- Manual workflow By GitHub Actions Simple workflow that is manually triggered. [Configure](#) [Automation](#)
- Labeler By GitHub Actions Labels pull requests based on the files changed [Configure](#) [Automation](#)

Browse all categories

- [Automation](#)
- [Continuous integration](#) **Continuous integration** (selected)
- [Deployment](#)
- [Security](#)

5. In the CI category page, let's search for one that will work with Gradle. Type "Gradle" in the search box and press Enter.

Get started with GitHub Actions

Build, test, and deploy your code. Make code reviews, branch management, and issue triaging work the way you want. Select a workflow to get started.

Skip this and set up a workflow yourself →

Categories

- Automation
- Continuous integration** (selected)
- Deployment
- Security

Q. Gradle

Found 52 workflows

Android CI	Java
Java with Ant	Java
Clojure	Clojure
Publish Java Package	
Java with Gradle	
Publish Java Package	

- From the results, select the “Java with Gradle” one and click the “Configure” button to open a predefined workflow for this.

The screenshot shows the GitHub Actions 'Get started with GitHub Actions' page. A search bar at the top has 'Gradle' typed into it. Below the search bar, there's a sidebar titled 'Categories' with 'Continuous integration' selected. The main area displays four workflow cards. The fourth card, 'Java with Gradle' by GitHub Actions, is circled in red. It has a 'Configure' button at the bottom.

- This will bring up a page with a starter workflow for CI that we can edit as needed. There are two edits we'll make - changing the name of the file and the name of the workflow. In the top section where the path is, notice that there is a text entry box around "gradle.yml". This is the current name of the workflow. Click in that box and edit the name to be "pipeline.yml". (You can just backspace over or delete the name and type the new name.)

```
# This workflow uses actions that are not certified by GitHub.
# They are provided by a third-party and are governed by
# separate terms of service, privacy policy, and support
```

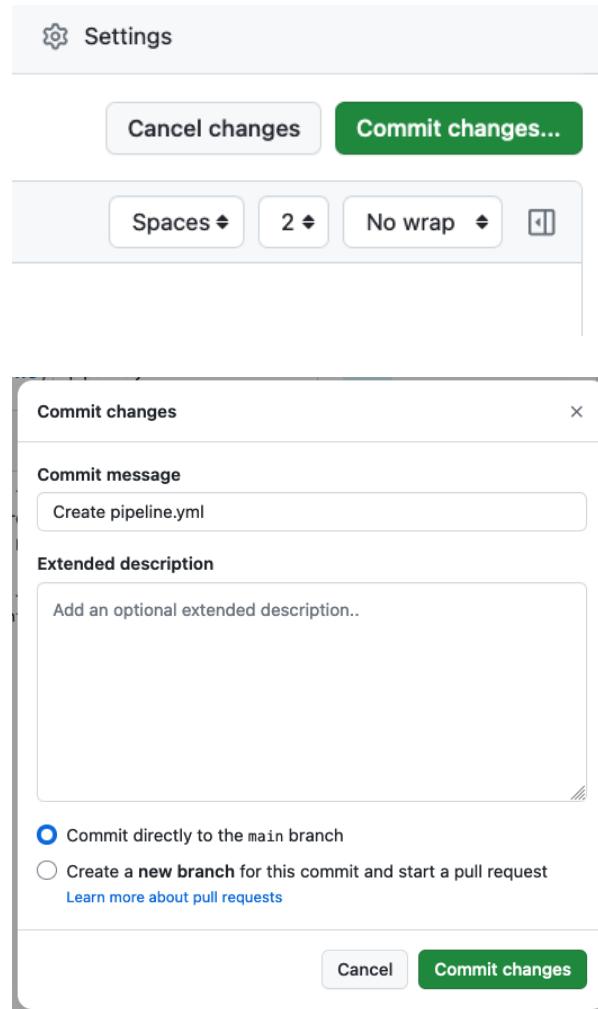
TO

```
# This workflow uses actions that are not certified by GitHub.
# They are provided by a third-party and are governed by
# separate terms of service, privacy policy, and support
```

- Now, edit the name of the workflow - change line 8 from "name: Java CI with Gradle" to "name: Simple Pipe".

```
5 # This workflow will build a Java project      5 # This workflow will build a Java project
6 # For more information see: https://docs.    6 # For more information see: https://docs.
7                                         7
8 name: Java CI with Gradle          8 name: Simple Pipe
9                                         9
10 on:                                10 on:
11   push:
```

9. Now, we can go ahead and commit the new workflow via the “Commit changes...” button in the upper right. In the dialog that comes up, you can enter an optional comment if you want. Leave the “Commit directly...” selection checked and then click on the “Commit changes” button.



10. Since we've committed a new file and this workflow is now in place, the “on: push:” event is triggered, and the CI automation kicks in. Click on the Actions menu again to see the automated processing happening.

All workflows	
Showing runs from all workflows	
1 workflow run Create pipeline.yml Simple pipe #1: Commit 2cac6a7 pushed by gwstudent	
Event ▾ Status ▾ Branch ▾ Actor ▾ main 1 minute ago ... 35s	

11. After a few moments, the workflow should succeed. (You may need to refresh your browser.) After it is done, you can click on the commit message (next to the green check) for the run to get to the details for that run.

12. From here, you can click on the build job in the graph or the “build” item in the list of jobs to get more details on what occurred on the runner system. You can expand any of the steps in the list to see more details.

* END OF LAB *

Lab 2 – Learning more about Actions

Purpose: In this lab, we'll see how to find and use additional actions as well as persist artifacts.

1. We're going to explore one way in GitHub to update a workflow and add additional actions into it. Start out by opening up the workflow file pipeline.yml. There are multiple ways to get to it but let's open it via the Actions screen.

In your GitHub repository, click the Actions button at the top if not already on the Actions screen.

Under "All workflows", select the "Simple Pipe" workflow.

After that, select the "pipeline.yml" link near the middle top.

- Once the file opens up, click on the pencil icon (1) in the top right to edit it.

The screenshot shows a GitHub Actions pipeline configuration file named `pipeline.yml`. The file contains the following YAML code:

```

1 # This workflow uses actions that are not certified by GitHub.
2 # They are provided by a third-party and are governed by
3 # separate terms of service, privacy policy, and support
4 # documentation.
5 # This workflow will build a Java project with Gradle and cache/restore any dependencies to improve the workflow execution time
6 # For more information see: https://docs.github.com/en/actions/automating-builds-and-tests/building-and-testing-java-with-gradle
7
8 name: Simple Pipe
9
10 on:
11   push:
12     branches: [ "main" ]
13   pull_request:
14     - head_branch: main

```

In the top right corner of the editor, there is a toolbar with various icons. One icon, specifically the pencil icon, is circled in red. The number '1' is also placed next to this circled icon, indicating it's the first step to click.

- You'll now see the file open up in the editor, but also to the right, you should see a new pane with references to the GitHub Actions Marketplace and Documentation. We're going to add a job to our workflow to upload an artifact. Let's find actions related to uploading.

In the "Search Marketplace for Actions" box on the upper right, enter "Upload" and see what's returned.

Next, click on the "Upload a Build Artifact" item. Take a look at the page that comes up from that. Let's look at the full listing on the Actions Marketplace. Click on the "View full Marketplace listing".

The left side of the image shows the search results for "upload" in the GitHub Actions Marketplace. It lists several actions, with the "Upload a Build Artifact" action circled in red. The right side shows the detailed listing for "Upload a Build Artifact". The "View full Marketplace listing" button is also circled in red.

Marketplace / Search results

- Veracode Upload And Scan** By veracode (13)
- Cloud Storage Uploader** By google-github-actions (51)
- Upload a Build Artifact** By actions (1.1k)

Upload a build artifact that can be used by subsequent workflow steps
- Run tfsec with sarif upload** By aquasecurity (17)
- twine-upload** By yaananth (1)

Marketplace / Search results / Upload a Build Artifact

Upload a Build Artifact

By actions (1.1k) v3.0.0 1.1k

Upload a build artifact that can be used by subsequent workflow steps

View full Marketplace listing

Installation

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

Version: v3.0.0

```

- name: Upload a Build Artifact
  uses: actions/upload-artifact@v3.0.0
  with:
    # Artifact name
    name: # optional, default is artifact
    # A file, directory or wildcard pattern
    path:

```

- This should open up the full GitHub Actions Marketplace listing for this action. Notice the URL at the top - <https://github.com/marketplace/actions/upload-a-build-artifact>. You can use this same relative URL to see

other actions that are in the marketplace. For example, let's look at the checkout one we're already using. Go to <https://github.com/marketplace/actions/checkout>

Then click on the "actions/checkout" link under "Links" in the lower right.

The screenshot shows the GitHub Marketplace page for the "Checkout" GitHub Action. The action is version v3.0.0 and is labeled as the "Latest version". It has a green status badge indicating "test-local" and "passing". The main description states: "This action checks-out your repository under \$GITHUB_WORKSPACE , so your workflow can access it." Below this, there is a note about fetch depth and a warning about persisting credentials. It also mentions that Git 2.18 or higher is required. The "What's new" section indicates an update to node16. On the right side, there are sections for Verified creator, Stars (2.5k), Contributors (a list of 10 people), Categories (Utilities), and Links (actions/checkout, Open issues 209). A red oval highlights the "actions/checkout" link in the Links section.

5. This will put you on the screen for the source code for this GitHub Action. Notice there is also an Actions button here. GitHub Actions use workflows that can use other GitHub Actions. Click on the Actions button to see the workflows that are in use/available.

The screenshot shows the GitHub Actions page for the "actions/checkout" action. The "Actions" tab is selected, indicated by a red oval. The page displays a list of workflows and their latest runs. One workflow run by user "brcrista" is shown, along with other recent runs. To the right, there is an "About" section with details like the action's purpose, URL, and license. There is also a "Releases" section showing the latest release (v2.3.4) and 16 total releases.

The screenshot shows the GitHub Actions checkout page for a repository. The left sidebar lists 'Workflows' with a 'All workflows' tab selected. The main area displays 'All workflows' with a search bar and filter. Two workflow runs are listed under '584 workflow runs':

- Create check-dist.yml (#566)**: Build and Test #532: Commit afe4af0 pushed by thboop. Status: main. Run at 14 days ago, 3m 39s.
- Create check-dist.yml (#566)**: Licensed #62: Commit afe4af0 pushed by thboop. Status: main. Run at 14 days ago, 45s.

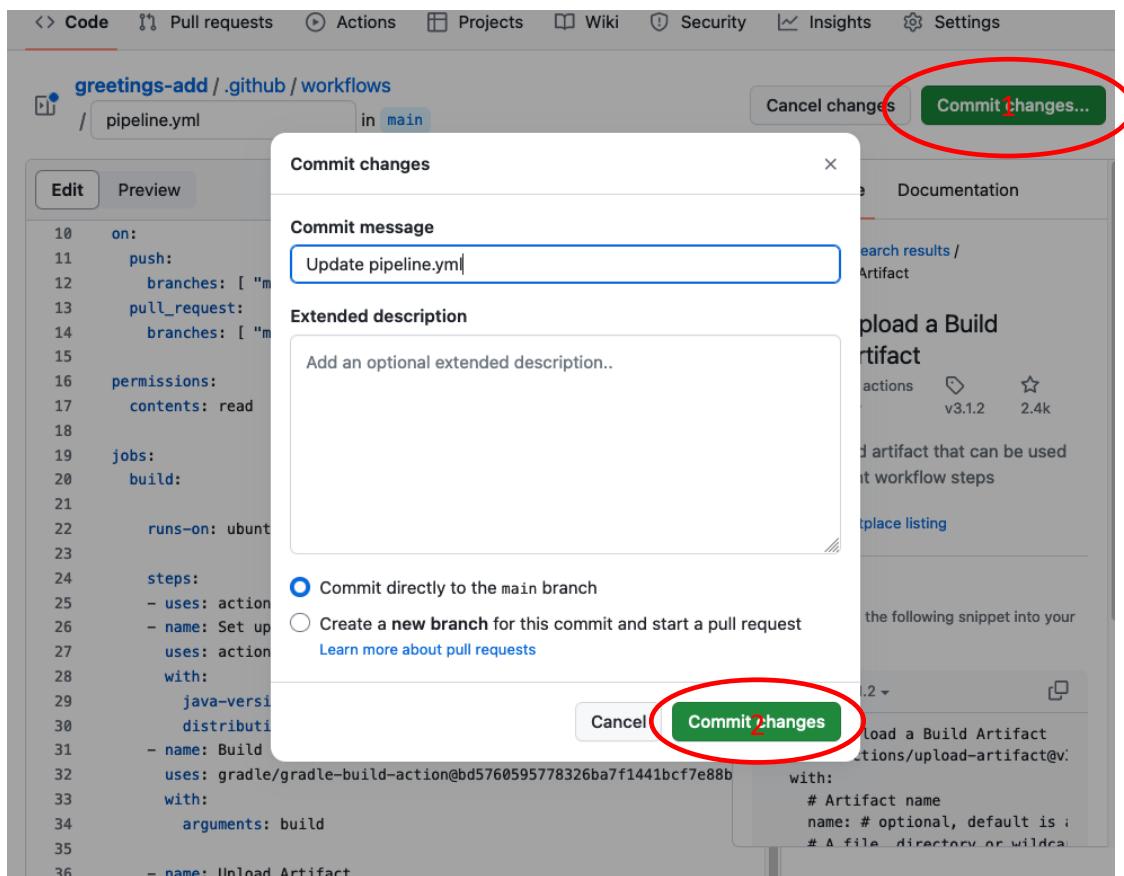
- Switch back to the browser tab where you are editing the workflow for greetings-actions. Update the build job to include a new step to use the "upload-artifact" action to upload the jar the build job creates. To do this, add the following lines after, and in line with, the build job steps. Pay attention to the indenting. If you see red wavy lines under your code, that likely means the indenting is off. See the screenshot (lines 36-40) for how this should look afterwards. (Your line numbers may be different.)

```
- name: Upload Artifact
  uses: actions/upload-artifact@v3
  with:
    name: greetings-jar
    path: build/libs
```

The screenshot shows the GitHub workflow editor with the YAML code for the workflow. Lines 36-40 are highlighted in blue, indicating they have been added or modified:

```
10  permissions:
11    contents: read
12
13  jobs:
14    build:
15      runs-on: ubuntu-latest
16
17      steps:
18        - uses: actions/checkout@v3
19        - name: Set up JDK 11
20          uses: actions/setup-java@v3
21          with:
22            java-version: '11'
23            distribution: 'temurin'
24        - name: Build with Gradle
25          uses: gradle/gradle-build-action@67421db6b
26          with:
27            arguments: build
28
29      - name: Upload Artifact
30        uses: actions/upload-artifact@v3
31        with:
32          name: greetings-jar
33          path: build/libs
```

7. Click on the green "Commit changes" button in the upper right. In the dialog that comes up, add a different commit message if you want, then click the green "Commit changes" button to make the commit.



8. Switch to the "Actions" tab in your repository to see the workflow run. After a few moments, you should see that the run was successful. Click on the title of that run "Update pipeline.yml" (or whatever your commit message was). On the next screen, in addition to the graph, there will be a new section called "Artifacts" near the bottom. You can download the artifact from there. Click on the name of the artifact to try this.

The screenshot shows a pipeline summary for a job named "build". Under the "Artifacts" section, there is a table with one row for "greetings-jar", which is highlighted with a red circle. The "Name" column shows the artifact name, and the "Size" column shows 1006 Bytes. Below this is a "Gradle Builds" table with one entry for "greetings-add". The "Requested Tasks" column shows "build", "Gradle Version" is 4.10, and "Build Outcome" has a green checkmark. A note below the table says "▶ Caching for gradle-build-action was enabled - expand for details". At the bottom, it says "Job summary generated at run-time".

* END OF LAB *

Lab 3 – Alternative ways to invoke workflows

Purpose: In this lab, we'll see how to add a different kind of event trigger that allows us to invoke the workflow manually

- Let's make a change to make it easier to run our workflow manually to try things out, start runs, etc. We are going to add two input values - one for the version of the artifact we want to create and use and one for input values to pass to a test. Edit the pipeline.yaml file again. In the "on:" section near the top, add the code below at the bottom of the "on" section. ("workflow_dispatch" should line up with "pull" and "push") and then commit the changes.

```
workflow_dispatch:
  inputs:
    myVersion:
      description: 'Input Version'
    myValues:
      description: 'Input Values'
```

The screenshot shows a GitHub repository for "greetings-add" with the "pipeline.yaml" file open. The "Workflow_dispatch" section is circled with a red oval. The code in the file is as follows:

```

# This workflow will build a Java project with Gradle and cache/restore any dependencies
# For more information see: https://docs.github.com/en/actions/automating-builds-and-tests
name: Simple pipe
on:
  push:
    branches: [ "main" ]
  pull_request:
    branches: [ "main" ]
  workflow_dispatch:
    inputs:
      myVersion:
        description: 'Input Version'
      myValues:
        description: 'Input Values'
```

- Now let's add a step to our build job to get the timestamp to use to version the artifact. Add the step below AFTER the build step and BEFORE the upload step.

```
- name: Set timestamp
  run: echo TDS=$(date +'%Y-%m-%dT%H-%M-%S') >> $GITHUB_ENV
```

- Next add another step to "tag" the artifact with the input version (if there is one) and also the timestamp. Add this step right after the previous one and BEFORE the upload step. (Note that the second and third lines here are meant to be a single line when you put them in the yaml file.)

```
- name: Tag artifact
  run: mv build/libs/greetings-add.jar build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar
```

The figure below shows the steps added in the workflow.

```
40   - name: Build with Gradle
41     uses: gradle/gradle-build-action@67421db6bd0bf253fb4bd25b31ebb98943c375e1
42     with:
43       arguments: build
44
45   - name: Set timestamp
46     run: echo TDS=$(date +'%Y-%m-%dT%H-%M-%S') >> $GITHUB_ENV
47
48   - name: Tag artifact
49     run: mv build/libs/greetings-add.jar build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.
50
51   - name: Upload Artifact
52     uses: actions/upload-artifact@v3
53     with:
54       name: greetings-jar
55       path: build/libs
56
```

- Go ahead and commit the changes. After this runs, you can look at the logs by clicking on the Actions menu, then in the workflow runs list, click on the commit message for the particular run and then on the job itself. On the right-hand side, click on the downward pointing arrows next to the "Tag artifact" and "Upload Artifact" and expand them to see the individual steps. Notice the *TDS* variable we defined as part of the environment.

```

build
succeeded 7 minutes ago in 16s
Search logs
0s

Tag artifact
1 ▶ Run mv build/libs/greetings-add.jar build/libs/greetings-add-2023-01-30T00-57-54.jar
2 mv build/libs/greetings-add.jar build/libs/greetings-add-2023-01-30T00-57-54.jar
3 shell: /usr/bin/bash -e {0}
4 env:
5 JAVA_HOME: /opt/hostedtoolcache/Java_Temurin-Hotspot_jdk/11.0.17-8/x64
6 JAVA_HOME_11_X64: /opt/hostedtoolcache/Java_Temurin-Hotspot_jdk/11.0.17-8/x64
7 GRADLE_BUILD_ACTION_SETUP_COMPLETED: true
8 GRADLE_BUILD_ACTION_CACHE_RESTORED: true
9 TDS: 2023-01-30T00-57-54
10 GRADLE_BUILD_ACTION_CACHE_RESTORED: true
11 TDS: 2023-01-30T00-57-54
12 With the provided path, there will be 1 file uploaded
13 Starting artifact upload
14 For more detailed logs during the artifact upload process, enable step-debugging: https://docs.github.com/actions/monitoring-and-troubleshooting-workflows/enabling-debug-logging#enabling-step-debug-logging
15 Artifact name is valid!
16 Container for artifact "greetings-jar" successfully created. Starting upload of file(s)
17 Total size of all the files uploaded is 871 bytes

```

- The workflow_dispatch code we added to the event trigger sections created a way to manually run the workflow and also pass in values for the parameters we defined. To see how to run the workflow manually, click on the main Actions menu (if not already there), then select the "Simple pipe" workflow on the lefthand side. At that point you should see a "Run workflow" button on the far right at the top of the runs list. Click on that button and enter any numeric value you want for the Input version and then any Input values you want to supply. Then click on "Run workflow".

Actions New workflow

All workflows

Simple pipe

`pipeline.yml`

20 workflow runs

This workflow has a `workflow_dispatch` event trigger.

Simple pipe Simple pipe #20: Manually run by gwstudent

Update pipeline.yml Simple pipe #19: Commit 2e3c0c1 pushed by gwstudent

Update pipeline.yml Simple pipe #18: Commit ac22d5e pushed by gwstudent

Update pipeline.yml Simple pipe #17: Commit 447a447 pushed by gwstudent

Run workflow

Use workflow from
Branch: main

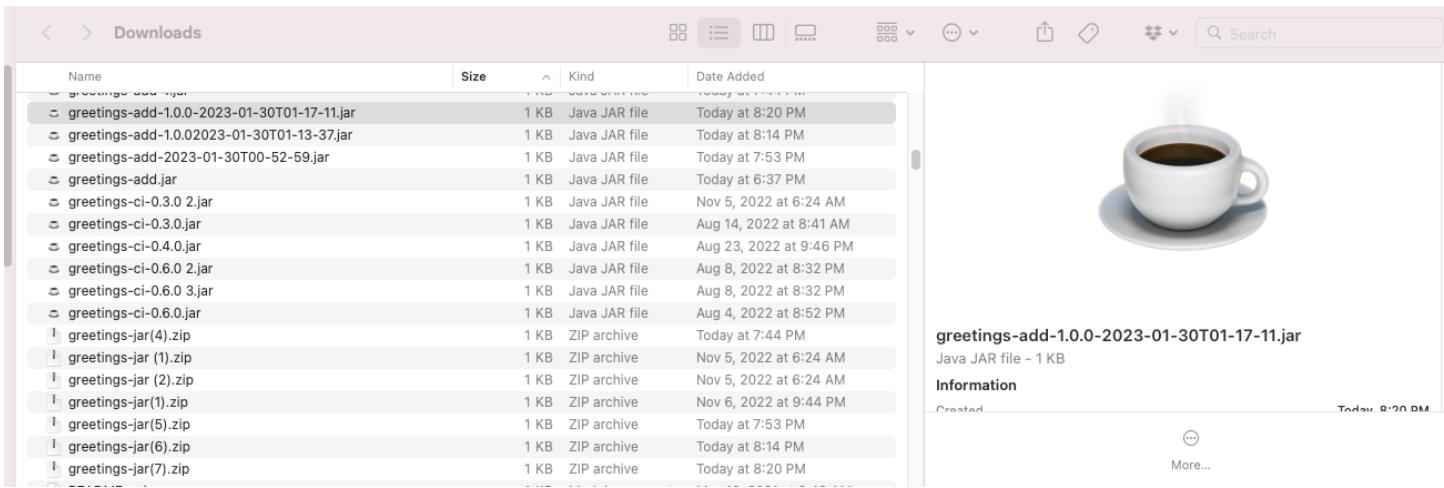
Input Version
1.0.0

Input Values
val1 val2

Run workflow

26 minutes ago

- After this run, you can select the run from the runs list, scroll down and find the greetings.jar artifact and click on it to download it. Once you have it downloaded, you can uncompress the artifact and you should see a jar file with the version you entered for "Input Version" and the time-date stamp.



Lab 4 – Sharing output between jobs

Purpose: In this lab, we'll see how to capture output from one job and share it with another one

1. Let's add one more piece to this job so we can have the path of the jar file available for other jobs. To do this, edit the workflow file and add a step at the end of the job to set the output value.

```
- name: Set output
  id: setoutput
  run: echo jarpath=build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar >> $GITHUB_OUTPUT
```

greetings-add / .github / workflows / pipeline.yml in main

```
45   uses: gradle/gradle-build-action@67421db6bd0bf253fb4bd25b31ebb98943c375e1
46   with:
47     arguments: build
48
49   - name: Set tag
50     run: echo TDS=$(date +'%Y-%m-%dT%H-%M-%S') >> $GITHUB_ENV
51
52   - name: Tag artifact
53     run: mv build/libs/greetings-add.jar build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar
54
55   - name: Upload Artifact
56     uses: actions/upload-artifact@v3
57     with:
58       name: greetings-jar
59       path: build/libs
60
61   - name: Set output
62     id: setoutput
63     run: echo jarpath=build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar >> $GITH
```

2. Now we need to add an "outputs" section BETWEEN the "runs-on:" and the "steps:" section near the top of the "build" job. This will map the variable "artifact-path" to the outputs of the previous step.

```

# Map a step output to a job output
outputs:
  artifact-path: ${{ steps.setoutput.outputs.jarpath }}

```

```

26
27   jobs:
28     build:
29
30       runs-on: ubuntu-latest
31
32       # Map a step output to a job output
33       outputs:
34         artifact-path: ${{ steps.setoutput.outputs.jarpath }}
35
36     steps:
37       - uses: actions/checkout@v3
38       - name: Set up JDK 11
39         uses: actions/setup-java@v3
40

```

- In order to verify that we can see the output from the build job, add a new, second job in the workflow file. Copy and paste the simple job below that echoes out the output value from the build job. Note that "print-build-output" should line up with the "build" title of the first job.

```

print-build-output:
  runs-on: ubuntu-latest
  needs: build
  steps:
    - run: echo ${{needs.build.outputs.artifact-path}}

```

greetings-add / .github / workflows / pipeline.yml in main

```

<> Edit file ② Preview changes  Spaces 2 No wrap
51
52   - name: Tag artifact
53     run: mv build/libs/greetings-add.jar build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar
54
55   - name: Upload Artifact
56     uses: actions/upload-artifact@v3
57     with:
58       name: greetings-jar
59       path: build/libs
60
61   - name: Set output
62     id: setoutput
63     run: echo jarpath=build/libs/greetings-add-${{ github.event.inputs.myVersion }}${{ env.TDS }}.jar >> $GITH
64
65
66   print-build-output:
67     runs-on: ubuntu-latest
68     needs: build
69     steps:
70       - run: echo ${{needs.build.outputs.artifact-path}}
71

```

Use Control + Space or Option + Space to trigger autocomplete in most situations.

- Commit the changes. After the workflow runs, you should see two jobs in the graph for the workflow run - one for "build" and one for "print-build-output". Click on the "print-build-output" one and you can see from the logs that it was able to print the output value created from the "build" job.

The screenshot shows the GitHub Actions interface. At the top, there's a navigation bar with links for Code, Pull requests, Actions (which is highlighted), Projects, Wiki, Security, Insights, and Settings. Below the navigation bar, the page title is "Simple pipe" and the subtitle is "Update pipeline.yml #28". On the left, there's a sidebar with "Summary", "Jobs" (listing "build" and "print-build-output"), "Run details", "Usage", and "Workflow file". The main area shows a table for the latest run: "Re-run triggered 1 minute ago" by "gwstudent · 1167568 · main", "Status: Success", "Total duration: 37s", and "Artifacts: 1". Below this, the "pipeline.yml" file is shown with the "on: push" trigger. A graph of the workflow shows two jobs: "build" (19s) and "print-build-output" (0s). The "print-build-output" job is circled in red. To the right of the graph, a larger window displays the logs for the "print-build-output" job, which succeeded in 2 seconds. The logs show the command "echo build/libs/greetings-add-2023-01-30T02-37-36.jar" being run.

```

print-build-output
succeeded now in 2s

> ✓ Set up job
-> ✓ Run echo build/libs/greetings-add-2023-01-30T02-37-36.jar
1   ▶ Run echo build/libs/greetings-add-2023-01-30T02-37-36.jar
2     echo build/libs/greetings-add-2023-01-30T02-37-36.jar
3     shell: /usr/bin/bash -e {0}
4     build/libs/greetings-add-2023-01-30T02-37-36.jar

> ✓ Complete job

```

Lab 5: Adding in a test case

Purpose: In this lab, we'll add a simple test case to download the artifact and verify it

- First, let's create a script to test our code. The code for the test script we'll use is already in the "extra/test-script.sh" file. Go back to the "Code" tab, open up that file (in the "extra" subdirectory) and click the pencil icon to edit it.

```

1 # Simple test script for greetings jar
2
3 set -e
4
5 java -jar build/libs/greetings-ci-$1.jar ${@:2} > output.bench
6 IFS=' ' read -ra ARR <<< "${@:2}"
7 for i in "${ARR[@]}"; do
8     grep "^\$i$" output.bench
9 done

```

- Give feedback
- In the editor, all you need to do is change the path of the file. Click in the text entry area for "test-script.sh" and backspace over the "extra" path so that the file is directly in the "greetings-add" directory (root repo directory).

```

1 # Simple test script for greetings jar
2
3 set -e
4
5 java -jar $1 ${@:2} > output.bench
6 IFS=' ' read -ra ARR <<< "${@:2}"
7 for i in "${ARR[@]}"; do
8     grep "^\$i$" output.bench
9 done
10

```

- This script takes the path to the jar to run as its first parameter and the remaining values passed in as the rest of the parameters. Then it simply cycles through all but the first parameter checking to see if they print out on a line by themselves.
- Go ahead and commit this file into the repository for the path change.
- Now let's add a second job to our workflow (in pipeline.yml) to do a simple "test". As you've done before, edit the *pipeline.yml* file.
- Add the job definition for a job called "test-run" that runs on ubuntu-latest. You can copy and paste this code from **extra/test-run.txt** or grab it from the next page.

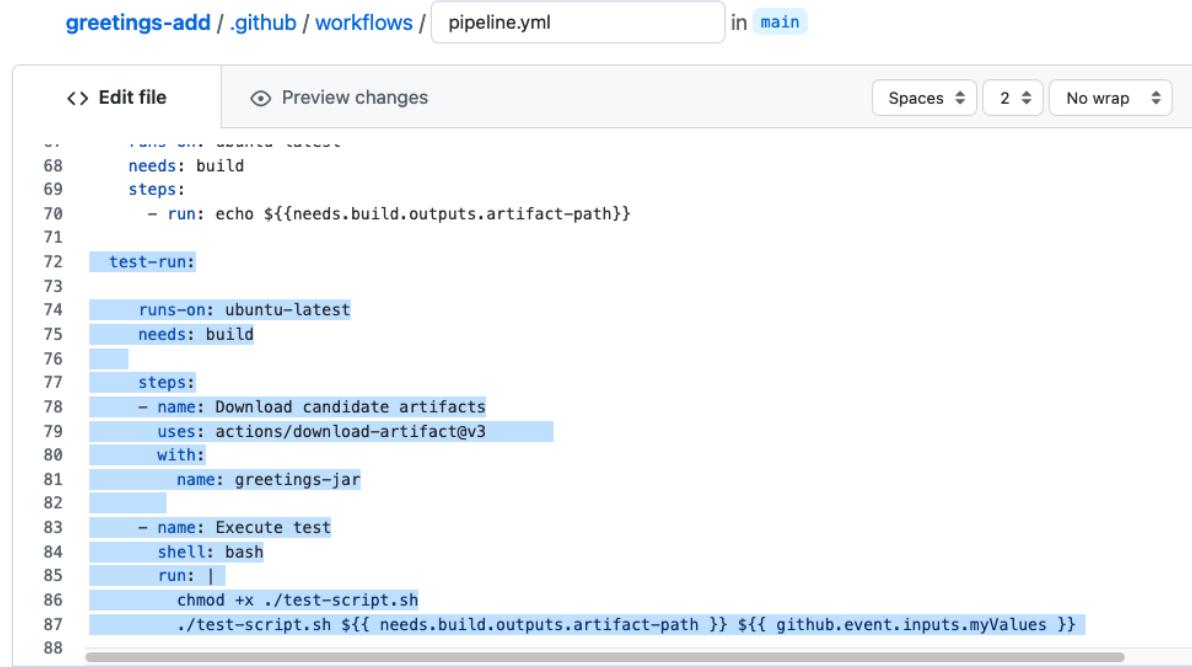
What this code does is wait for the build job to complete (the *needs: build* part), then run two steps. The first step downloads the artifacts we uploaded before to have them there for the testing script. And the second step runs the separate testing script against the downloaded artifacts, making it executable first. Since we want to test what we built, it will need to wait for the build job to be completed. That's what the "*needs: build*" part does in the code below.

The screenshot shows where it should go. Pay attention to indentation - *test-run:* should line up with *build: .* (If you see a wavy red line under part of the code, that probably means the indenting is not right.)

```
test-run:
  runs-on: ubuntu-latest
  needs: build

  steps:
    - name: Download candidate artifacts
      uses: actions/download-artifact@v3
      with:
        name: greetings-jar

    - name: Execute test
      shell: bash
      run: |
        chmod +x ./test-script.sh
        ./test-script.sh ${needs.build.outputs.artifact-path} ${github.event.inputs.myValues}
```



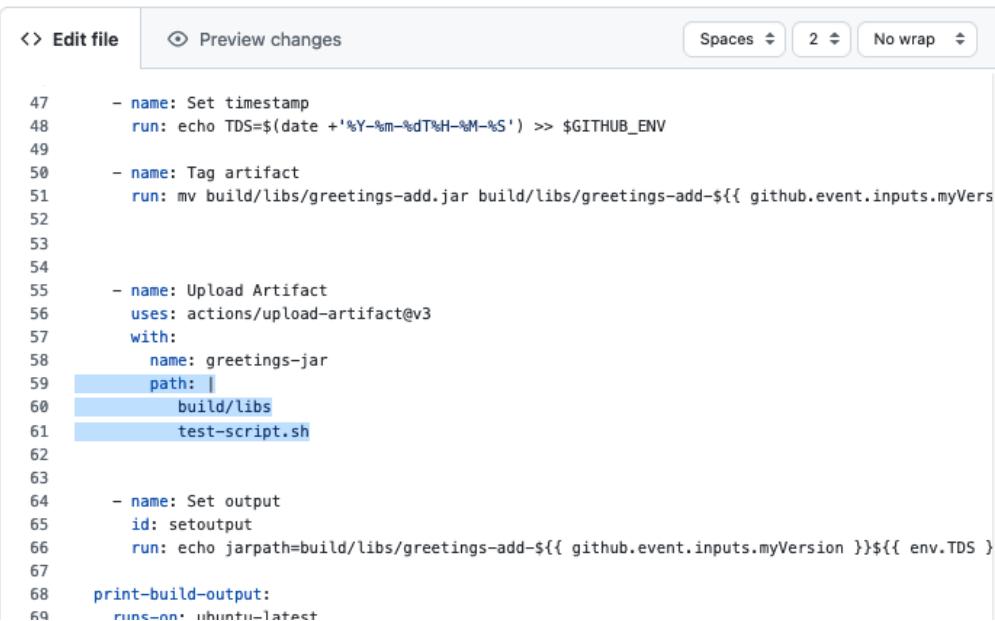
greetings-add / .github / workflows / pipeline.yml in main

```
<> Edit file ⚙ Preview changes Spaces 2 No wrap
68   needs: build
69   steps:
70     - run: echo ${needs.build.outputs.artifact-path}
71
72   test-run:
73
74     runs-on: ubuntu-latest
75     needs: build
76
77     steps:
78       - name: Download candidate artifacts
79         uses: actions/download-artifact@v3
80         with:
81           name: greetings-jar
82
83       - name: Execute test
84         shell: bash
85         run: |
86           chmod +x ./test-script.sh
87           ./test-script.sh ${needs.build.outputs.artifact-path} ${github.event.inputs.myValues}
```

7. Since each job executes on a separate runner system, we need to make sure our new test script is available on the runner that will be executing the tests. For simplicity, we can just add it to the list of items that are included

in the uploading of artifacts. Scroll back up, find the "Upload Artifact" step in the "build" job. Modify the **path** section of the "Upload Artifact" step to change from "path: build/libs" to look like below.

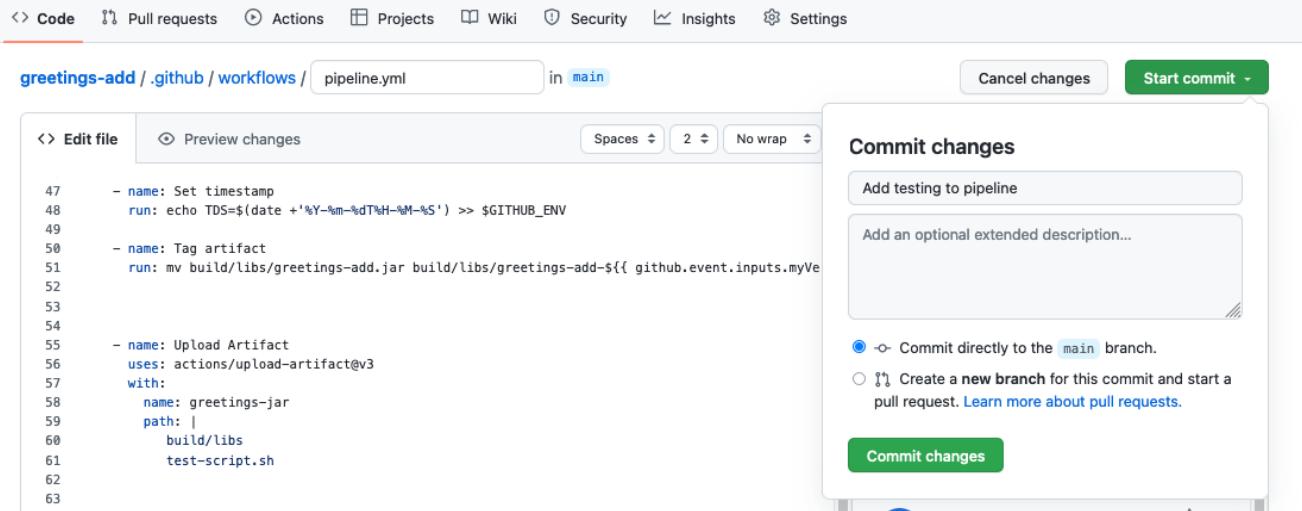
```
path: |
  build/libs
  test-script.sh
```



greetings-add / .github / workflows / pipeline.yml in main

47 - name: Set timestamp
48 run: echo TDS=\$(date +'%Y-%m-%dT%H-%M-%S') >> \$GITHUB_ENV
49
50 - name: Tag artifact
51 run: mv build/libs/greetings-add.jar build/libs/greetings-add-\${{ github.event.inputs.myVers
52
53
54
55 - name: Upload Artifact
56 uses: actions/upload-artifact@v3
57 with:
58 name: greetings-jar
59 path: |
60 build/libs
61 test-script.sh
62
63
64 - name: Set output
65 id: setoutput
66 run: echo jarpath=build/libs/greetings-add-\${{ github.event.inputs.myVersion }}\${{ env.TDS }}
67
68 print-build-output:
69 runs-on: ubuntu-latest

8. Now, you can just commit the pipeline changes with a simple message like "Add testing to pipeline".



< Code Pull requests Actions Projects Wiki Security Insights Settings

greetings-add / .github / workflows / pipeline.yml in main

Cancel changes Start commit

Commit changes

Add testing to pipeline

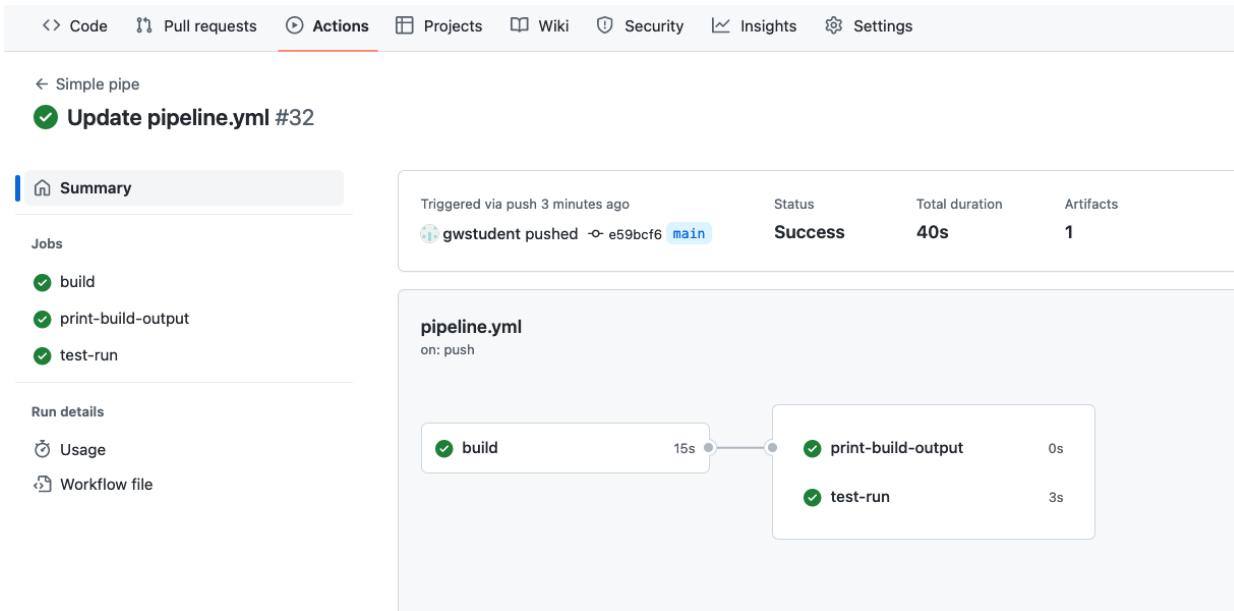
Add an optional extended description...

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

9. Afterwards, you should see a new run of the action showing multiple jobs in the action run detail. Notice that we can select and drill into each job separately.



Lab 6: Adding your own action

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

- First, we'll fork the repo for a simple action that displays a count of the arguments passed into a function. Go to <https://github.com/skillrepos/arg-count-action> and then Fork that repository into your own GitHub space. (You can just accept the default selections on the page.)

skillrepos / arg-count-action

forked from gwstudent/arg-count-action

Watch 0 Star 0 Fork 1

About

Simple GitHub Action demo

Releases

8 tags

Code

This branch is 1 commit ahead of gwstudent:main.

Go to file Add file Code

1 hour ago 16

Contribute Fetch upstream

techupskills Delete iterate-args.sh ...

action.yml Update action.yml 2 days ago

count-args.sh Initial commit 3 days ago

- In your fork of the repository, look at the files here. We have a one-line shell script (for illustration) to return the count of the arguments - "count-args.sh." And we have the primary logic for the action in the "action.yml" file.

Take a look at the action.yml file and see if you can understand what its doing. The syntax is similar to what we've seen in our workflow up to this point.

3. Switch back to the file for your original workflow (go back to the greetings-add project and edit the *pipeline.yaml* file in *.github/workflows*. Let's add the code to use this custom action to report the number of arguments passed in. Edit the file and add the code shown below (again indenting the first line to align with the other job names). (For convenience, this code is also in "greetings-add/extracount-args.txt".) **For now, just leave the text exactly as is so we can see what errors look like.**

count-args:

```
runs-on: ubuntu-latest

steps:
- id: report-count
  uses: <your github userid>/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 }}
```

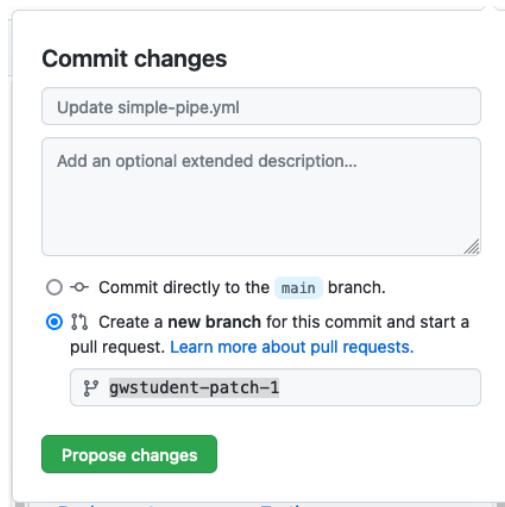
[greetings-add / .github / workflows / pipeline.yml](#) in [main](#)

The screenshot shows a GitHub code editor interface. At the top, there are buttons for 'Edit file', 'Preview changes', and settings for 'Spaces', '2', and 'No wrap'. The code editor displays a file named 'pipeline.yml' with line numbers from 81 to 103. Lines 91 through 103 define a new step named 'count-args'. The 'steps:' section is highlighted in blue, and the entire 'count-args' block is selected with a light blue background. The code within the 'count-args' block is identical to the one provided in the previous text block.

```
81      uses: actions/download-artifact@v3
82      with:
83        name: greetings-jar
84
85      - name: Execute test
86        shell: bash
87        run: |
88          chmod +x ./test-script.sh
89          ./test-script.sh ${{ needs.build.outputs.artifact-path }} ${{ github.event.inputs.myValues }}
90
91  count-args:
92
93    runs-on: ubuntu-latest
94
95  steps:
96    - id: report-count
97      uses: <your github userid>/arg-count-action@main
98      with:
99        arguments-to-count: ${{ github.event.inputs.myValues }}
100     - run: echo
101     - shell: bash
102       run: |
103         echo argument count is ${{ steps.report-count.outputs.arg-count }}
```

In this case, we call our custom action (<your github repo/arg-count-action>), using the latest from the main branch.

- Let's use a pull request to merge this change. Click on the green "Commit changes..." button, but in the "Commit changes" dialog, click on the bottom option to "Create a new branch for this commit and start a pull request." Change the proposed branch name if you want and then click on "Propose changes".



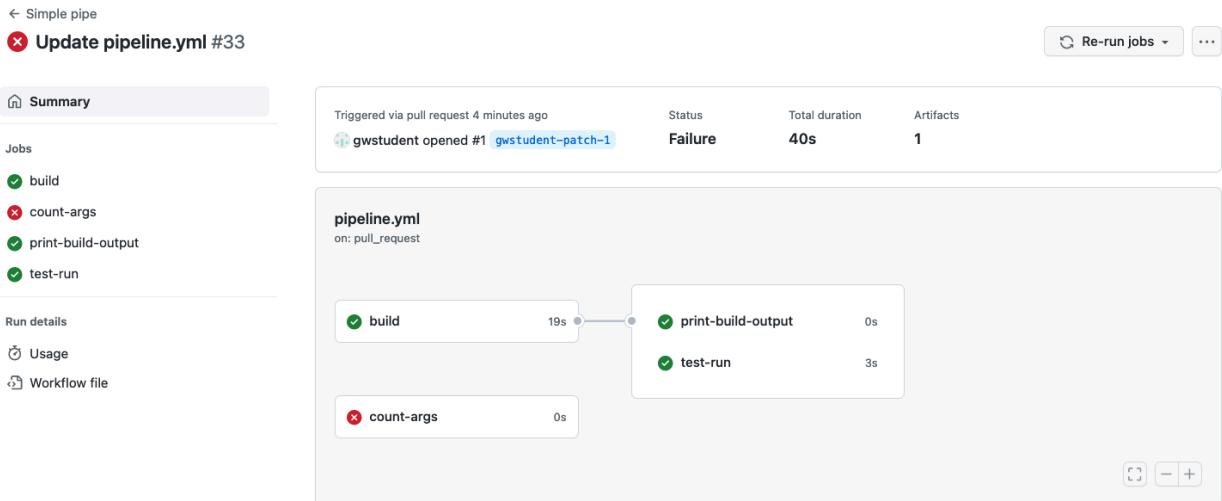
- In the next screen, click on the "Create pull request" button. In the following screen, update the comment if you want and then click on the "Create pull request" button. You'll then see it run through the jobs in our workflow as prechecks for merging.

- When the checks are done running, you'll see one with a failure. Click on the link for "Details" on the right of the line with the failure to see the logs that are available. You can then see the error at the bottom of the log.

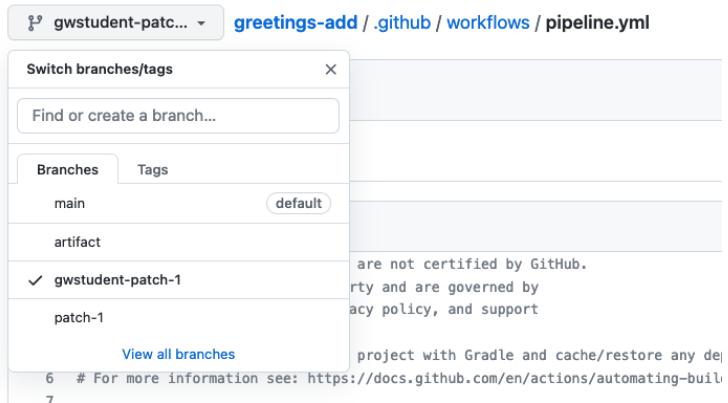
The screenshot shows a GitHub Actions pipeline status page for a pull request. At the top, it says "Update pipeline.yml #1" and "gwstudent wants to merge 1 commit into main from gwstudent-patch-1". A green "Open" button is visible. Below this, a summary box states "Some checks were not successful" with "3 successful and 1 failing checks". The failing check is "Simple pipe / count-args (pull_request)" with a red X icon. To the right of this check is a blue "Details" button, which is circled in red in the image. Other successful checks listed are "Simple pipe / build (pull_request)", "Simple pipe / print-build-output (pull_request)", and "Simple pipe / test-run (pull_request)". Below the checks, a message says "This branch has no conflicts with the base branch" and "Merging can be performed automatically". At the bottom, there's a "Merge pull request" button and a note about opening the pull request in GitHub Desktop or viewing command line instructions.

The screenshot shows the "count-args" job details page for the pull request. The left sidebar lists jobs: "build" (green checkmark), "count-args" (red X), "print-build-output" (green checkmark), and "test-run" (green checkmark). The "Summary" link is circled in red. The main area shows the "Set up job" step with a log output. The log shows steps 1 through 19, followed by step 20 which contains an error: "Error: Unable to resolve action `<your github userid>/arg-count-action@main` , repository not found".

- In the left column, click on the "Summary" link. This will take you back to the main graph page where you can also see the error.



8. So, before we can merge the PR, we need to fix the code. Go back to the "Actions" tab at the top, select the "Simple Pipe" workflow on the left, and then select the **pipeline.yaml** file (link above the list of workflow runs - if not already there) and **switch to the patch branch that you created for the pull request.** (Alternatively, you can select the file via the Code tab.)



9. Edit the pipeline.yaml file (use the pencil icon). Then update the line that has "uses : <your github userid>/arg-count-action@main" to actually have your GitHub userid in it.

```

90
91   count-args:
92
93     runs-on: ubuntu-latest
94
95     steps:
96       - id: report-count
97         uses: gwstudent/arg-count-action@main
98         with:
99           arguments-to-count: ${{ github.event.inputs.myValues }}
100      - run: echo
101      - shell: bash
102        run: |
103          echo argument count is ${{ steps.report-count.outputs.arg-count }}
104

```

10. When you're done, click on the green "Commit changes..." button, add in a comment if you want, leave the selection set to "Commit directory to the ... branch" so it will go into the same patch branch as before. Then select "Commit changes".

The screenshot shows the GitHub interface for committing changes. On the left, the code editor displays the `pipeline.yml` file with the following content:

```

82   with:
83     name: greetings-jar
84
85   - name: Execute test
86     shell: bash
87     run: |
88       chmod +x ./test-script.sh
89       ./test-script.sh ${needs.build.outputs.artifact-path} ${github.event.inputs.myValues}
90
91   count-args:
92
93   runs-on: ubuntu-latest
94
95   steps:
96     - id: report-count
97       uses: gwstudent/arg-count-action@main
98       with:
99         arguments-to-count: ${github.event.inputs.myValues}
100      - run: echo
101      - shell: bash
102        run: |
103          echo argument count is ${steps.report-count.outputs.arg-count}
104

```

On the right, the "Commit changes" dialog is open, showing fields for "Update pipeline.yml" and "Add an optional extended description...". Below these, two radio button options are shown:

- Commit directly to the `gwstudent-patch-1` branch.
- Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)

A "Commit changes" button is at the bottom of the dialog. At the very bottom of the page, there's a "Download a Build Artifact" section.

11. Now click on the "Pull requests" link at the top of the page and select the Pull Request again. Eventually all the checks should complete. You can now choose to "Merge pull request", confirm the merge and delete the branch.

Add more commits by pushing to the `gwstudent-patch-1` branch on `gwstudent/greetings-add`.

Require approval from specific reviewers before merging
 Branch protection rules ensure specific people approve pull requests before they're merged. [Add rule](#) [X](#)

All checks have passed
 4 successful checks [Show all checks](#)

This branch has no conflicts with the base branch
 Merging can be performed automatically.

Merge pull request [Y](#) You can also [open this in GitHub Desktop](#) or view [command line instructions](#).

Merge pull request #1 from gwstudent/gwstudent-patch-1

Update pipeline.yml

This commit will be authored by 30451102+gwstudent@users.noreply.github.com

Confirm merge **Cancel**

Pull request successfully merged and closed

You're all set—the `gwstudent-patch-1` branch can be safely deleted.

Delete branch

12. Afterwards, you should see that a new run of the workflows in main has been kicked off and will eventually complete.

Actions **New workflow**

All workflows

- Simple pipe
- Management
- Caches

All workflows Showing runs from all workflows **Filter workflow runs**

35 workflow runs Event ▾ Status ▾ Branch ▾ Actor ▾

Run Status	Workflow Name	Branch	Time Ago	Actor
Success	Merge pull request #1 from gwstudent/gwstudent-patch-1	main	10 minutes ago	gwstudent
Success	Simple pipe #35: Commit 04ab81b pushed by gwstudent		36s	

Lab 7: Exploring logs

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

1. If not already there, switch back to the Actions tab. To the right of the list of workflows is a search box. Let's execute a simple search - note that only certain keywords are provided and not a complete search. Let's search for the workflow runs that were done for the branch that you used for the Pull Request in the last lab. Enter "**branch:<patch-branch-name>**" (no spaces) in the search box and hit enter.

Actions **New workflow**

All workflows

- Simple pipe
- Management
- Caches

All workflows Showing runs from all workflows **Filter workflow runs** **branch:gwstudent-patch-1**

2 workflow run results Event ▾ Status ▾ Branch ▾ Actor ▾

Run Status	Workflow Name	Branch	Time Ago	Actor
Success	Simple pipe #34: Pull request #1 synchronize by gwstudent	gwstudent-patch-1	15 minutes ago	gwstudent
Success	Update pipeline.yml	gwstudent-patch-1	32 minutes ago	gwstudent

- Click on the "X" at the right end of the search box to clear the entry. You can also accomplish the same thing by clicking on the items in the "workflow run results" bar. Clicking on one of the arrows next to them will bring up a list of values to select from that will also filter the list. Try clicking on some of them. Click on the "X" again when done.

All workflows
Showing runs from all workflows

Filter workflow runs

35 workflow run results

		Event	Status	Branch	Actor
<input checked="" type="checkbox"/>	Merge pull request #1 from gwstudent/gwstudent-patch-1	main	Success	gwstudent-patch-1	... 36s ago
<input checked="" type="checkbox"/>	Update pipeline.yml	gwstudent-patch-1	Success	main	... 36s ago

Filter by branch

Find a branch

gwstudent-patch-1

main

- Make sure you are on the branch *main*. (Switch back if you need to.) Select the "Simple Pipe" workflow. You'll now have a box with "..." beside the search box that has some additional options. Click on the "..." beside the search box to see some of them. They include disabling the workflow and setting up a "badge" for the workflow. Let's go ahead and set up a badge now to show success/failure for running the workflow. Click on the entry for "Create status badge".

Code Pull requests Actions Projects Wiki Security Insights Settings

Actions New workflow

All workflows

Simple pipe

Management Caches

Simple pipe

pipeline.yml

35 workflow runs

Event Status Branch Actor

Create status badge

Disable workflow

Run workflow

This workflow has a `workflow_dispatch` event trigger.

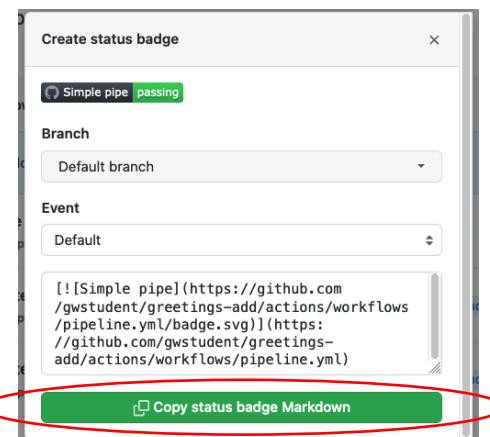
Merge pull request #1 from gwstudent/gwstudent-patch-1

Simple pipe #35: Commit 04ab81b pushed by gwstudent

main

17 minutes ago 36s ...

- In the dialog that pops up, click on the entry for "Copy status badge Markdown". Then close the dialog.



- Click on the "<> Code" tab at the top of the project. At the bottom of the file list, click on the green button to "Add a README" (or edit the README if you already have one). Paste the code you copied in the previous step into the README.md text edit window.

Help people interested in this repository understand your project by adding a README.

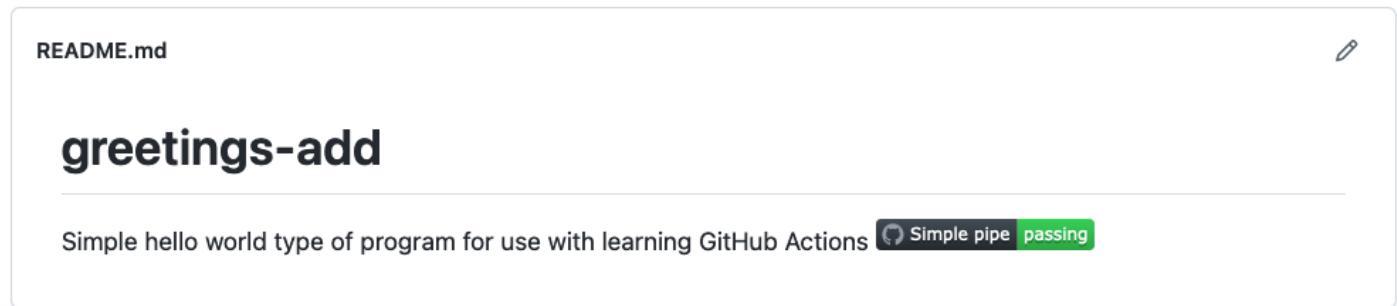
Add a README

greetings-add / README.md in main Cancel changes

<> Edit new file Preview Spaces 2 No wrap

```
1 # greetings-add
2 Simple hello world type of program for use with learning GitHub Actions
3 [![Simple pipe](https://github.com/gwstudent/greetings-add/actions/workflows/pipeline.yml/badge.svg)](https://github.com/gwstudent/greetings-add/actions/wor
```

- Scroll down and commit your changes. Then you should see the badge showing up as part of the README.md content.



- Click back on the Actions tab. Click on the name of the top run in the Workflow runs list. Notice that we have information in the large bar at the top about who initiated the change, the SHA1, the status, duration, and number of artifacts.

Code Pull requests Actions Projects Wiki Security Insights Settings

All workflows Showing runs from all workflows Filter workflow runs

All workflows

36 workflow runs Event Status Branch Actor

	Event	Status	Branch	Actor
Create README.md	main	3 minutes ago	40s	...
Merge pull request #1 from gwstudent/gwstudent-patch-1	...	29 minutes ago

- In the main part of the window, we have the job graph, showing the status and relationships between jobs. **Click on the "test-run" job**. In the screen that pops up, we can get more information about what occurred on the runner for that job.

First, let's turn on timestamps. **Click on the "gear" icon and select the "Show timestamps" entry.**

In the list of steps **click on the third item "Execute test"** to expand it. Then, in line 1 of that part, **click on the arrowhead after the timestamp** to expand the list and see all the steps executed in between.

The screenshot shows the GitHub Actions pipeline interface. On the left, there's a sidebar with a 'Summary' section and a list of jobs: build, count-args, print-build-output, and test-run (which is selected). Below that are Run details, Usage, and Workflow file. The main area shows the 'test-run' step which succeeded 4 minutes ago in 4s. The step details are as follows:

- > Set up job (1s)
- > Download candidate artifacts (1s)
- > **Execute test (0s)** (This step is circled in red)
 - 1 ✓ Run chmod +x ./test-script.sh
 - 2 chmod +x ./test-script.sh
 - 3 ./test-script.sh build/libs/greetings-add-2023-01-31T02-14-08.jar
 - 4 shell: /usr/bin/bash --noprofile --norc -e -o pipefail {0}
- > Complete job (0s)

At the top right, there are 'Re-run all jobs' and a three-dot menu button. A gear icon in the top right corner is also circled in red.

9. We can get links to share to any line. Hover over any of the line numbers and then right-click to Copy Link, Open in a New Tab, or whatever you would like to do.
10. Click on the gear icon again. Notice there is an option to "Download log archive" if we want to get a copy of the logs locally. Or we can get a full view of the raw logs by clicking on the last entry.

Click on "View raw logs". When you are done looking at them, switch back to the workflow screen.

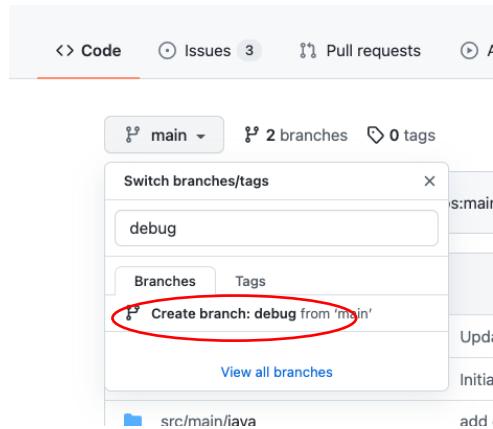
The screenshot shows a browser window displaying the raw log output for a GitHub Actions pipeline run. The URL is https://pipelines.actions.githubusercontent.com/serviceHosts/1e0ea379-fff2-4162-91e7-7225d42edb94/_apis/pipelines/1/run. The log output is as follows:

```
2023-01-31T02:14:14.4216423Z Requested labels: ubuntu-latest
2023-01-31T02:14:14.4216457Z Job defined at: gwstudent/greetings-add/.github/workflows/pipeline.yml@refs/heads/main
2023-01-31T02:14:14.4216482Z Waiting for a runner to pick up this job...
2023-01-31T02:14:14.5892733Z Job is waiting for a hosted runner to come online.
2023-01-31T02:14:17.8971699Z Job is about to start running on the hosted runner: Hosted Agent (hosted)
2023-01-31T02:14:22.3710156Z Current runner version: '2.301.1'
2023-01-31T02:14:22.3738482Z ##[group]Operating System
2023-01-31T02:14:22.3739041Z Ubuntu
2023-01-31T02:14:22.3739303Z 22.04.1
2023-01-31T02:14:22.3739591Z LTS
2023-01-31T02:14:22.3739981Z ##[endgroup]
2023-01-31T02:14:22.3740262Z ##[group]Runner Image
2023-01-31T02:14:22.3740633Z Image: ubuntu-22.04
2023-01-31T02:14:22.3740980Z Version: 20230122.1
2023-01-31T02:14:22.3741446Z Included Software: https://github.com/actions/runner-images/blob/ubuntu22/20230122.1/images/linux/Ubuntu2204-Readme.md
2023-01-31T02:14:22.3742125Z Image Release: https://github.com/actions/runner-images/releases/tag/ubuntu22%2F20230122.1
2023-01-31T02:14:22.3742575Z ##[endgroup]
2023-01-31T02:14:22.3742887Z ##[group]Runner Image Provisioner
2023-01-31T02:14:22.3743227Z 2.0.98.1
2023-01-31T02:14:22.3743523Z ##[endgroup]
2023-01-31T02:14:22.3744159Z ##[group]GITHUB_TOKEN Permissions
2023-01-31T02:14:22.3744732Z Contents: read
2023-01-31T02:14:22.3745058Z Metadata: read
2023-01-31T02:14:22.3745627Z ##[endgroup]
2023-01-31T02:14:22.3749547Z Secret source: Actions
2023-01-31T02:14:22.3750061Z Prepare workflow directory
2023-01-31T02:14:22.4575259Z Prepare all required actions
```

Lab 8: Looking at debug info

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

1. First, let's create a new branch in GitHub for the debug instances of our workflows. On the repository's Code page, click on the drop-down under "main", and enter "debug" in the "Find or create a branch..." field. Then click on the "Create branch: debug from 'main'" link in the dialog.



2. At this point you should be in the new branch - the "debug" branch. Go to the workflow file in .github/workflows and edit the pipeline.yaml file. **Change the references to "main" in the "on" section at the top to "debug".** Also, add a new job to surface some debug context. Add in the lines below after the "jobs:" line. Pay attention to indenting again. A screenshot of how everything should look and lines up is further down. (For convenience, the text for the info job is also in a file in extra/info.txt.)

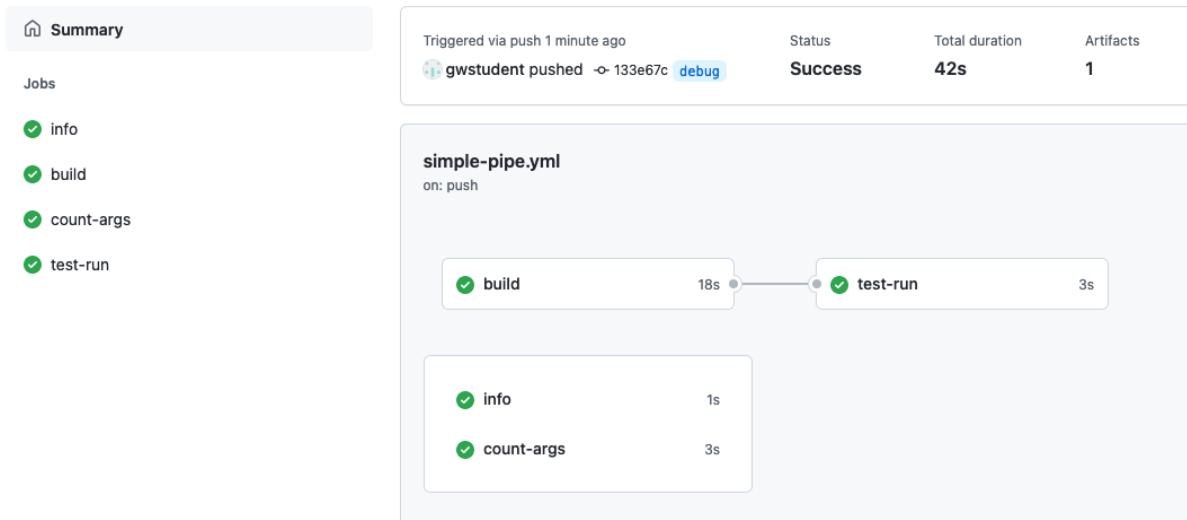
```
info:  
  runs-on: ubuntu-latest  
  
steps:  
  - name: Print warning message  
    run: |  
      echo "::warning::This version is for debugging only."  
  - name: Dump context for runner  
    env:  
      RUNNER_CONTEXT: ${{ toJSON(runner) }}  
    run:  
      echo "::debug::Runner context is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

<> Edit file Preview changes

```
5
6  on:
7    push:
8      branches: [ debug ]
9    pull_request:
10       branches: [ debug ]
11    workflow_dispatch:
12      inputs:
13        myValues:
14          description: 'Input Values'
15
16  jobs:
17
18    info:
19      runs-on: ubuntu-latest
20
21    steps:
22      - name: Print warning message
23        run: |
24          echo "::warning::This version is for debugging only."
25      - name: Dump context for runner
26        env:
27          RUNNER_CONTEXT: ${{ toJSON(runner) }}
28        run:
29          echo "::debug::Runner context is above."
```

3. When you are done making the changes, commit as usual. Switch back to the Actions tab and click on the currently running workflow. Then click on the "info" job in the graph and look at the logs.

✓ Update simple-pipe.yml Simple Pipe #11



4. Expand the entries for "Print warning message" and "Dump context for runner" to see the outputs for those.

The screenshot shows the GitHub Actions interface for a pipeline named "Simple Pipe #11". The "info" job has succeeded. The logs for this job show the following output:

```

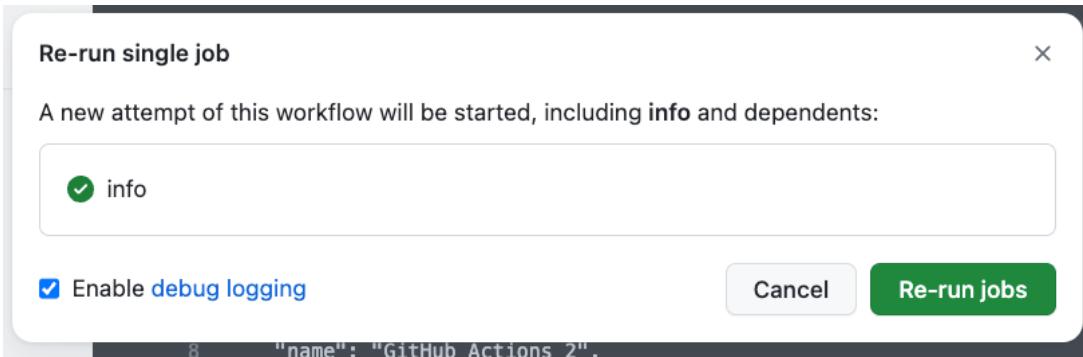
info
succeeded 2 minutes ago in 1s
Search logs
Re-run jobs ...
Summary
Jobs
info
build
count-args
test-run
info
Set up job
Print warning message
Run echo ::warning::This version is for debugging only.
Warning: This version is for debugging only.
Dump context for runner
Run echo ::debug::Runner context is above.
echo ::debug::Runner context is above.
shell: /usr/bin/bash -e {0}
env:
RUNNER_CONTEXT: {
  "os": "Linux",
  "tool_cache": "/opt/hostedtoolcache",
  "temp": "/home/runner/work/_temp",
  "workspace": "/home/runner/work/greetings-actions"
}
Complete job

```

5. Notice that while we can see both commands that echo our custom "warning" and "debug" messages - only the output of the warning message actually is displayed, not the output of the debug message. There are a couple of ways to get the debugging info.
6. The first way is to simply rerun the job. If you hover over the job name under the Summary section, you can see two curved arrows appear. Click on those. (The same arrows are also available in the upper right of the logs window - next to the gear icon.)

The screenshot shows the GitHub Actions interface. The "info" job is selected, indicated by a blue vertical bar on the left and a green checkmark icon. A set of curved arrows is visible above the "info" job, pointing towards the "info" job name. To the right is a "Search logs" bar and a set of icons for refresh and settings.

7. This will bring up a dialog to re-run that job (and any dependent jobs) - with a checkbox to click to *Enable debug logging*. Click that box and then click the "Re-run jobs" button.



8. After the job is re-run, if you look at the latest output, and expand the "Dump context for runner" step, you'll see the actual debug output.

```

1 ##[debug]Evaluating: toJSON(runner)
2 ##[debug]Evaluating toJSON:
3 ##[debug]..Evaluating runner:
4 ##[debug]..=> Object
5 ##[debug]=> '{'
6 ##[debug]  "debug": "1",
7 ##[debug]  "os": "Linux",
8 ##[debug]  "arch": "X64",
9 ##[debug]  "name": "GitHub Actions 2",
10 ##[debug]  "tool_cache": "/opt/hostedtoolcache",

```

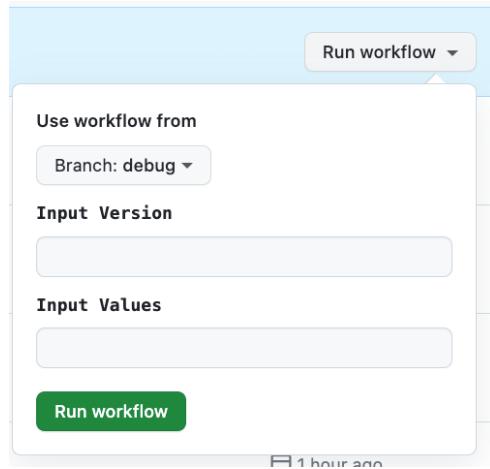
9. However, that doesn't cause debug info to show up for commits. We do that by enabling a secret or a variable for ACTIONS_STEP_DEBUG. Since this setting is not sensitive information, we'll use a variable.
10. To do this, go to the repository's top menu and select "Settings". Then on the left-hand side, under "Security", select "Secrets and variables", and then "Actions" under that. Select the "Variables" tab and "New repository variable".

The screenshot shows the GitHub repository settings page for 'Actions secrets and variables'. The top navigation bar includes 'Code', 'Pull requests', 'Actions', 'Projects', 'Wiki', 'Security', 'Insights', and 'Settings' (circled in red). The left sidebar has sections like 'General', 'Access', 'Collaborators', 'Moderation options', 'Code and automation' (with 'Branches', 'Tags', 'Actions', 'Webhooks', 'Environments', 'Codespaces', 'Pages'), 'Security' (with 'Code security and analysis', 'Deploy keys', 'Secrets and variables' (circled in red), and 'Actions'), and 'Codespaces'. The main content area is titled 'Actions secrets and variables' and contains text about secrets and variables. It shows tabs for 'Secrets' and 'Variables' (circled in red), with 'Variables' selected. A green button labeled 'New repository variable' is circled in red with the number '4'. Below the tabs are sections for 'Environment variables' (with a 'Manage environments' button) and 'Repository variables' (both sections show 'There are no variables for this repository').

11. On the next screen, enter **ACTIONS_STEP_DEBUG** for the name, set the value to *true* and click on the **Add variable** button.

The screenshot shows the 'Actions variables / New variable' screen. The left sidebar is identical to the previous one. The main area has a note about variable values being exposed as plain text. It has fields for 'Name *' (containing 'ACTIONS_STEP_DEBUG') and 'Value *' (containing 'true'). A red circle highlights the 'Add variable' button at the bottom.

12. Now, switch back to the "Actions" tab, select the "Simple Pipe" workflow, and click on the "Run workflow" button. **Select "debug" from the list for the branch.** Enter in any desired arguments. Then click the green "Run workflow" button to execute the workflow.



13. A new run will be started. Go into it and select the "info" job. In the output now, if you expand the sections, you should be able to see a lot of "##[debug]" messages including the one you added in the "Dump context for runner" section.

A screenshot of the GitHub Actions job log for the 'info' job. On the left, there's a sidebar with a 'Summary' icon and a 'Jobs' list containing 'info', 'build', 'count-args', and 'test-run', where 'info' is selected. The main area shows the 'info' job details: 'succeeded 32 seconds ago in 1s'. Below this, the logs are displayed. An expanded section titled 'Dump context for runner' shows a series of log entries. The entry at line 39, which contains the text '##[debug]Runner context is above.', is circled in red.

14. Note that the debug log info will be turned on for all runs from here on - as long as the repository variable exists and is set to "true".

Lab 9 – Securing inputs

Purpose: In this lab, we'll look at how to plug a potential security hole with our inputs.

1. Make sure you're in the "main" branch. Switch to the pipeline.yml file in the .github/workflows directory and look at the "test-run" job and in particular, this line in the "Execute test" step:

```

    ./test-script.sh ${{ needs.build.outputs.artifact-path }} ${{ github.event.inputs.myValues
}}


84
85      - name: Execute test
86        shell: bash
87        run: |
88          chmod +x ./test-script.sh
89          ./test-script.sh ${{ needs.build.outputs.artifact-path }} ${{ github.event.inputs.myValues }}
90
91 count-args:
--
```

2. When we create our pipelines that execute code based on generic inputs, we must be cognizant of potential security vulnerabilities such as injection attacks. This code is subject to such an attack. To demonstrate this, use the workflow_dispatch event for the workflow in the Actions menu, put in a version and pass in the following as the arguments in the arguments field (NOTE: That is two backquotes around ls -la) `ls -la` Then hit "Run workflow".

The screenshot shows the GitHub Actions interface. On the left, there's a sidebar with 'Actions' and several workflow names: 'All workflows', 'create-failure-issue', 'Simple pipe' (which is selected), and 'Management' with 'Caches'. The main area shows a workflow named 'Simple pipe' with 'pipeline.yml'. It lists four workflow runs:

- Update pipeline.yml** (Status: main) - Failed: Commit 0e01f1c pushed by gwstudent
- Rename extra/create-failure-issue.yml to .github...** (Status: main) - Succeeded: Commit 18eafe8 pushed by gwstudent
- Simple pipe** (Status: debug) - Succeeded: Manually run by gwstudent
- Update pipeline.yml** (Status: debug) - Failed: Commit 4c29dcb pushed by gwstudent

A sidebar on the right shows the workflow configuration with the command 'ls -la' in the input values field. The input version is set to 1.0.2.

3. After the run completes, look at the output of the "test-run" job. Select the "Execute test" step and expand the logs. Notice that the step itself ran successfully, but it has actually run the 'ls -la' command directly on the runner system. (Scroll down past the initial debug info to see it - around line 60.) The command was innocuous in this case, but this could have been a more destructive command.

The screenshot shows the GitHub Actions interface. On the left, there's a sidebar with 'Summary', 'Jobs' (listing 'build', 'count-args', 'print-build-output', 'test-run', and 'create-issue-on-failure'), 'Run details' (with 'Usage' and 'Workflow file' links), and a 'test-run' job card. The 'test-run' card has a green checkmark icon and the status 'succeeded 15 minutes ago in 3s'. It contains a log section titled 'Execute test' with the following content:

```

48 ##[debug]./test-script.sh build/libs/greetings-add-1.0.2-2023-01-31T04-50-08.jar `ls -la`
49 ##[debug]` 
50 ##[debug]Loading env
51 ▼ Run chmod +x ./test-script.sh
52 chmod +x ./test-script.sh
53 ./test-script.sh build/libs/greetings-add-1.0.2-2023-01-31T04-50-08.jar `ls -la`
54 shell: /usr/bin/bash --noprofile --norc -e -o pipefail {0}
55 ##[debug]/usr/bin/bash --noprofile --norc -e -o pipefail /home/runner/work/_temp/e5605cf6-7472-4743-9336-6c8e59b25863.sh
56 total
57 16
58 drwxr-xr-x
59 drwxr-xr-x
60 drwxr-xr-x
61 3
62 3
63 3
64 runner
65 runner
66 runner
67 runner
68 docker
69 docker

```

- Let's fix the command to not be able to execute the code in this way. We can do that by placing the output into an environment variable first and then passing that to the step. Edit the `pipeline.yaml` file and change the code for the "Execute test" step to look like the following. This code replaces the code after the "shell: bash" line - pay attention to how things line up:

```

env:
  ARGS: ${{ github.event.inputs.myValues }}
run: |
  chmod +x ./test-script.sh
  ./test-script.sh ${needs.build.outputs.artifact-path} "$ARGS"

```

The screenshot shows the GitHub Actions pipeline editor. At the top, it says 'greetings-add / .github / workflows / pipeline.yml' and 'in main'. Below is the YAML code:

```

68   print-build-output:
69     runs-on: ubuntu-latest
70     needs: build
71     steps:
72       - run: echo ${needs.build.outputs.artifact-path}
73
74
75   test-run:
76     runs-on: ubuntu-latest
77     needs: build
78
79     steps:
80       - name: Download candidate artifacts
81         uses: actions/download-artifact@v3
82         with:
83           name: greetings-jar
84
85       - name: Execute test
86         shell: bash
87         env:
88           ARGS: ${{ github.event.inputs.myValues }}
89         run: |
90           chmod +x ./test-script.sh
91           ./test-script.sh ${needs.build.outputs.artifact-path} "$ARGS"
92
93
94   count-args:
95
96     runs-on: ubuntu-latest

```

5. Commit back the changes and wait till the action run for the push completes.

6. Now, you can execute the code again with the same arguments as before.

The screenshot shows the GitHub Actions interface for a repository named 'Simple Pipe'. On the left, there's a sidebar with 'Actions', 'New workflow', 'All workflows', 'Simple Pipe' (which is selected), 'Management', and 'Caches'. The main area is titled 'Simple Pipe' and shows 'pipeline.yml'. It displays 16 workflow runs. The first three runs are successful, showing the output 'ls -la'. The fourth run is labeled 'debug' and also shows the output 'ls -la'. To the right, there are filters for 'Event', 'Status', 'Branch', and 'Actor', and a search bar for 'Filter workflow runs'. A button to 'Run workflow' is also present. On the far right, there are buttons for 'Use workflow from', 'Branch: main', 'Input Version: 1.0.2-', 'Input Values: 'ls -la'', and a 'Run workflow' button.

7. Notice that this time, the output did not run the commands, but just echoed them back out as desired.

END OF LAB

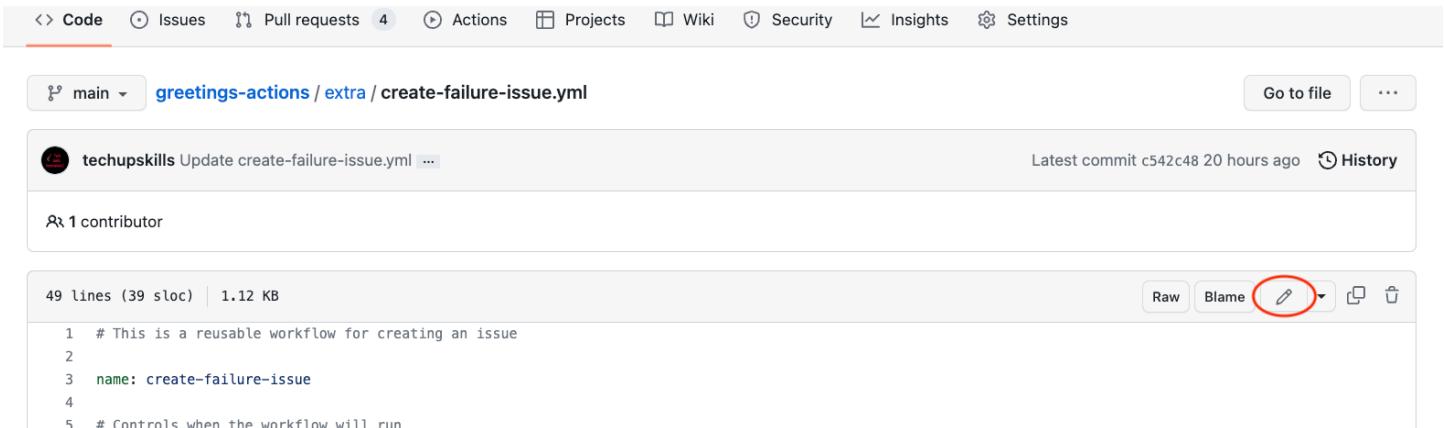
Lab 10: (Bonus/Optional) Chaining workflows, using conditionals, and working with REST APIs in workflows.

Purpose: Learning one way to drive one workflow from another.

1. We're going to leverage a reusable workflow that will be able to automatically create a GitHub issue in our repository. And then we will invoke that workflow from our current workflow. But first, we need to ensure that the "Issues" functionality is turned on for this repository. Go to the project's Settings main page, scroll down and under "Features", make sure the "Issues" selection is checked.

The screenshot shows the GitHub repository settings for 'greetstudent/greetings-actions'. In the 'Features' section, the 'Issues' checkbox is checked and highlighted with a red circle. Below it, a description states: 'Issues integrate lightweight task tracking into your repository. Keep projects on track with issue labels and milestones, and reference them in commit messages.' At the bottom of the 'Features' section, there are buttons for 'Get organized with issue templates' and 'Set up templates'.

2. The workflow to create the issue using a REST API call is already written to save time. It is in the main project under "extra/create-failure-issue.yml". You need to get this file in the .github/workflows directory. You can just move it via GitHub with the following steps.
 - a. In the repository, browse to the "extra" folder and to the "create-failure-issue.yml" file.
 - b. Take a few moments to look over the file and see what it does. Notice that:
 - i. It has a workflow_call section in the "on" area, which means it can be run from another workflow.
 - ii. It has a workflow_dispatch section in the "on" area, which means it can be run manually.
 - iii. It has two inputs - a title and body for the issue.
 - iv. The primary part of the body is simply a REST call (using the GITHUB_TOKEN) to create a new issue.
 - c. Click the pencil icon to edit it.

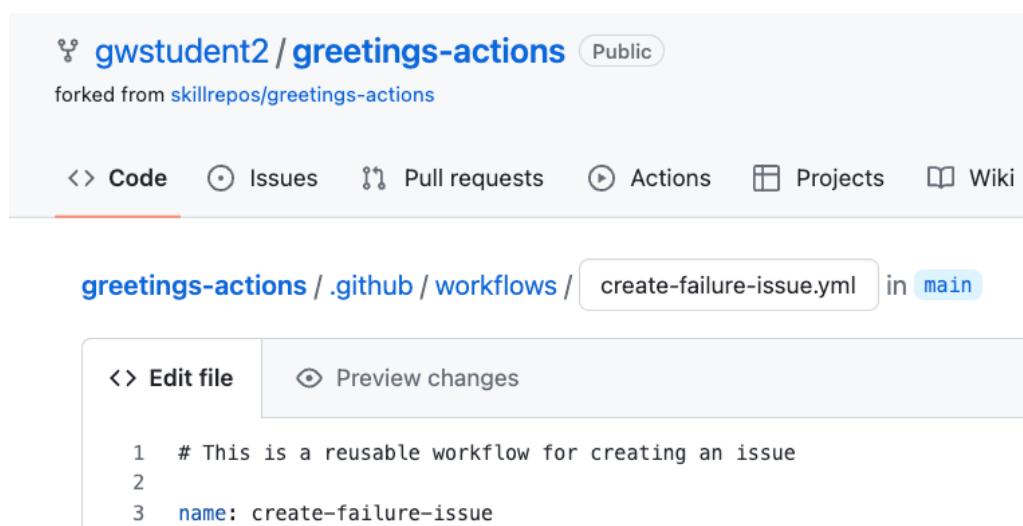


```

main > greetings-actions / extra / create-failure-issue.yml
techupskills Update create-failure-issue.yml ...
Latest commit c542c48 20 hours ago History
1 contributor
49 lines (39 sloc) | 1.12 KB
Raw Blame ⌂ ↻ 🗑
1 # This is a reusable workflow for creating an issue
2
3 name: create-failure-issue
4
5 # Controls when the workflow will run

```

- d. In the filename field at the top, change the name of file. Use the backspace key to backspace over "extra/" making sure to backspace over the word. Then type in the path to put it in the workflows ".github/workflows/create-failure-issue.yml".

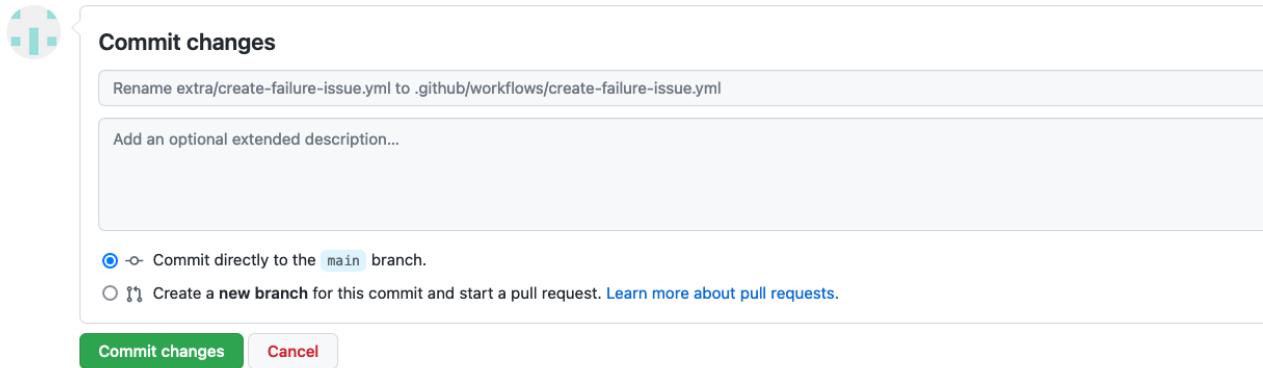


```

gwstudent2 / greetings-actions Public
forked from skillrepos/greetings-actions
Code Issues Pull requests Actions Projects Wiki
greetings-actions / .github / workflows / create-failure-issue.yml in main
Edit file Preview changes
1 # This is a reusable workflow for creating an issue
2
3 name: create-failure-issue

```

- e. To complete the change, commit as usual using the "Commit changes" button.



3. Go back to the Actions tab. You'll see a new workflow execution due to the rename. Also, in the Workflows section on the left, you should now see a new workflow titled "create-failure-issue". Click on that. Since it has a workflow_dispatch event trigger available, we can try it out. Click on the "Run workflow" button and enter in some text for the "title" and "body" fields. Then click "Run workflow".

4. After a moment, you should see the workflow run start and then complete. If you now click on the Issues tab at the top, you should see your new issue there.

- Now that we know that our new workflow works as expected, we can make the changes to the previous workflow to "call" this if we fail. Edit the pipeline.yml file and add the following lines as a new job and set of steps at the end of the workflow. (For convenience, these lines are also in the file "extra/create-issue-on-failure.txt" if you want to copy and paste from there.) Note that the last two lines are meant to be one line in your file.

create-issue-on-failure:

```
permissions:
  issues: write
needs: [test-run, count-args]
if: always() && failure()
uses: ./github/workflows/create-failure-issue.yml
with:
  title: "Automated workflow failure issue for commit ${{ github.sha }}"
  body: "This issue was automatically created by the GitHub Action workflow ** ${{
github.workflow }} **"
```

- In order to have this executed via the "if" statement, we need to force a failure. We can do that by simply adding an "exit 1" line at the end of the "count-args" job (right above the job you just added).

Make that change too. (A screenshot is below showing what the changes should look like. The "exit 1" is line 65 in the figure.)

[greetings-actions](#) / .github / workflows / simple-pipe.yml in gwstudent2:main



```
71   - shell: bash
72     run: |
73       echo argument count is ${{ steps.report-count.outputs.arg-count }}
74       exit 1
75
76   create-issue-on-failure:
77
78     permissions:
79       issues: write
80     needs: [test-run, count-args]
81     if: always() && failure()
82     uses: ./github/workflows/create-failure-issue.yml
83     with:
84       title: "Automated workflow failure issue for commit ${{ github.sha }}"
85       body: "This issue was automatically created by the GitHub Action workflow ** ${{
github.workflow }} **"
```

- After you've made the changes, commit them. At that point, you should get a run of the workflow. Click back to the Actions tab to watch it. After a few minutes, it will complete, and the "count-args" job will fail. This is expected because of the "exit 1" we added. But in a few moments, the create-issue-on-failure job should kick in and invoke the other workflow and produce a new ticket.

Workflows New workflow

All workflows

Simple Pipe

create-failure-issue

All workflow runs

15 workflow runs

Event ▾ Status ▾ Branch ▾ Actor ▾

✓ create-failure-issue
create-failure-issue #2: Manually run by gwstudent
15 seconds ago 13s ...

✗ Update simple-pipe.yml
Simple Pipe #14: Commit 1539282 pushed by gwstudent
main 1 minute ago 49s ...

8. You can look at the graphs from the runs of the two workflows if you want.

✗ **Update simple-pipe.yml** Simple Pipe #14

Re-run jobs ...

Summary

Triggered via push 3 minutes ago
gwstudent pushed -o- 1539282 main

Status Failure Total duration 49s Artifacts 1

Jobs

- ✓ build
- ✗ count-args
- ✓ test-run
- ✓ create-issue-on-failure

simple-pipe.yml
on: push

Annotations
1 error

✗ **count-args**
Process completed with exit code 1.

Artifacts
Produced during runtime

Name	Size
greetings-jar	1006 Bytes

✓ **create-failure-issue** create-failure-issue #2

Re-run jobs ...

Summary

Manually triggered 3 minutes ago
gwstudent -o- 1539282

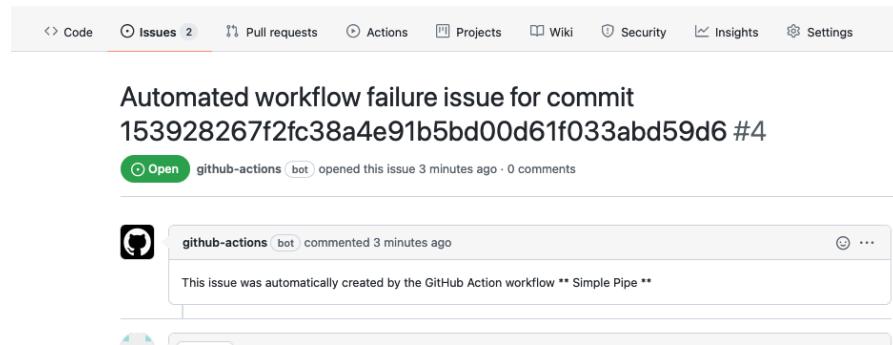
Status Success Total duration 13s Artifacts -

Jobs

- ✓ create_issue_on_failure

create-failure-issue.yml
on: workflow_dispatch

9. Under "Issues", you can also see the new ticket that was opened with the text sent to it.



THE END - THANKS!