

# CI/CD and DevOps in 3 Weeks

## Week 2

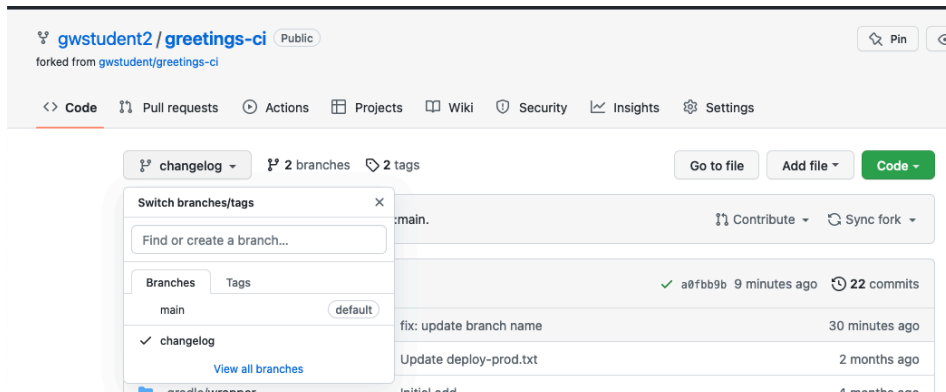
Revision 1.7 – 10/22/23

Tech Skills Transformations LLC / Brent Laster

### Lab 5 – Pull requests from other users

**Purpose:** In this lab, we'll see how to take our new code and execute a pull request from another user.

1. Starting this lab, you should be in the repository for your secondary GitHub user id - the one you added the extra actions call to in Lab 4. You also need to be on the "changelog" branch that you created in Lab 4.



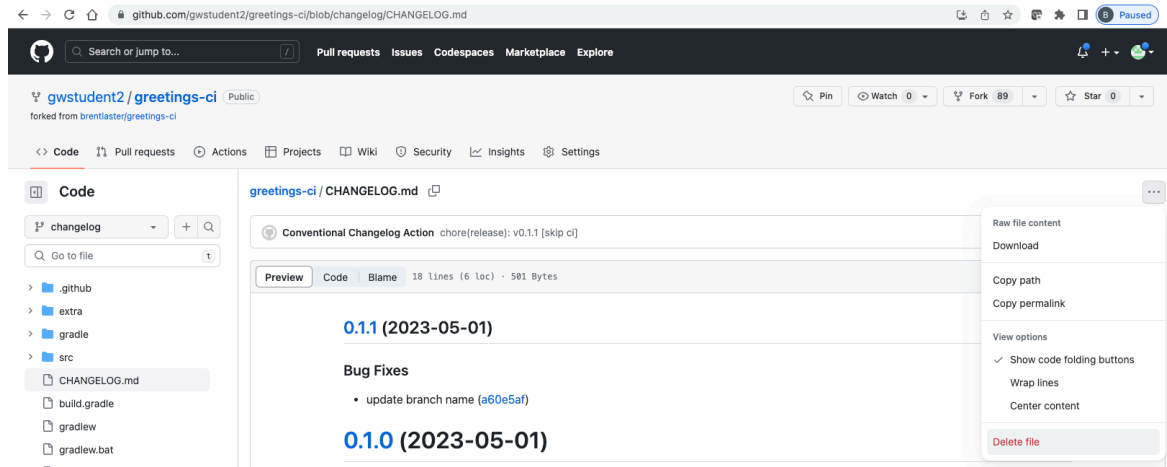
2. We need to make one code update in our workflow file due to an issue with the action that can cause the pull request merge to fail. Temporarily, we will add a parameter to the changelog action to tell it not to do a pull since that causes issue when trying to do it on a pull request. Edit the .github/workflows/pipeline.yml file and add the two lines in bold as shown below as a parameter for the action.

```
- name: Conventional Changelog Action
  uses: TriPSS/conventional-changelog-action@v4
  with:
    skip-git-pull: "true"
```

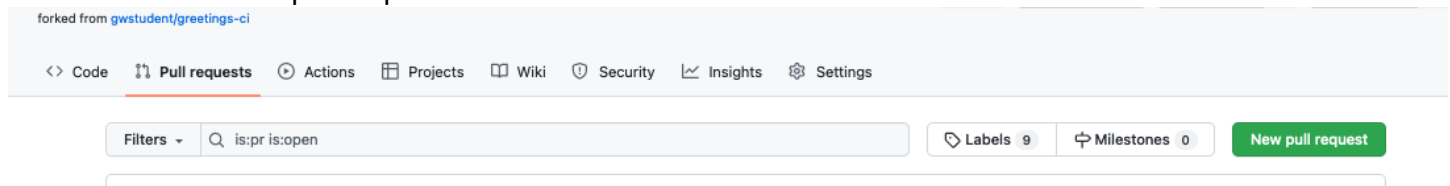
```
27     - name: Conventional Changelog Action
28       uses: TriPSS/conventional-changelog-action@v3.18.0
29       with:
30         skip-git-pull: "true"
31
```

3. Commit the changes into the repository (still in the changelog branch).
4. Now that we have our code changes for the changelog in our forked repository (under the secondary userid), let's see how to get them merged back into the original repository (primary userid) via another pull request – this time between two separate repositories (meaning between the GitHub repository for our primary and secondary userids).

5. Still in the forked repository under your secondary GitHub userid and in the “changelog” branch, in preparation for the pull request, let’s delete the CHANGELOG.md file so the target repo can create its own new one. Go back to the “Code” tab at the top of the repository and select the “CHANGELOG.md” file. With that file open, click on the three dots icon in the upper right and select “Delete file” from the dropdown. Then go ahead and commit those changes – just leave the commit message as-is.



6. Also delete the package.json file via the same process.
7. Still in the forked repository for your secondary GitHub userid, select the “Pull requests” tab and then click on the “New pull request” button.



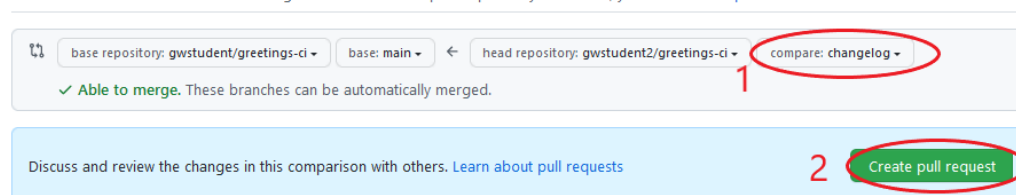
8. Note that this automatically drops you into a screen where you are comparing the main branch of your forked project from the secondary GitHub userid (referred to as the “head repository”) to the original project’s (primary userid) main branch (referred to as the “base repository”).

In this case, since we made our changes in the “changelog” branch, we want to **switch the branch** in our forked project for the secondary GitHub user id (“head repository”) to be the “changelog” branch.

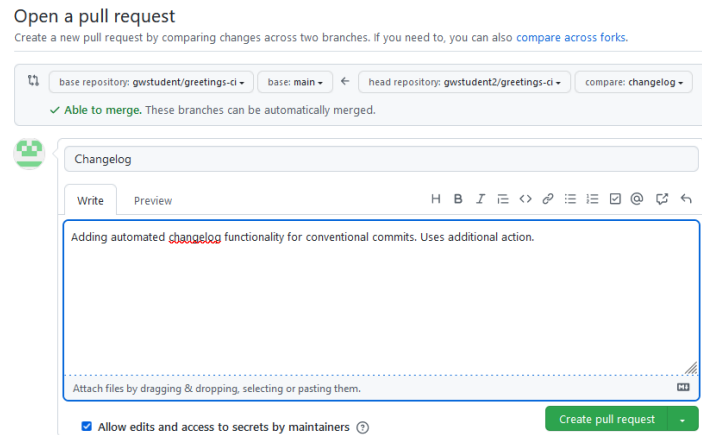
You can click on the dropdown on the far right that says “compare: main” and select “changelog” in there. Then click on the “Create pull request” button.

#### Comparing changes

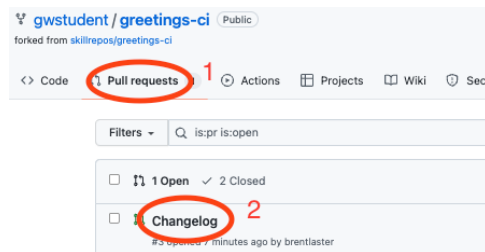
Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#).



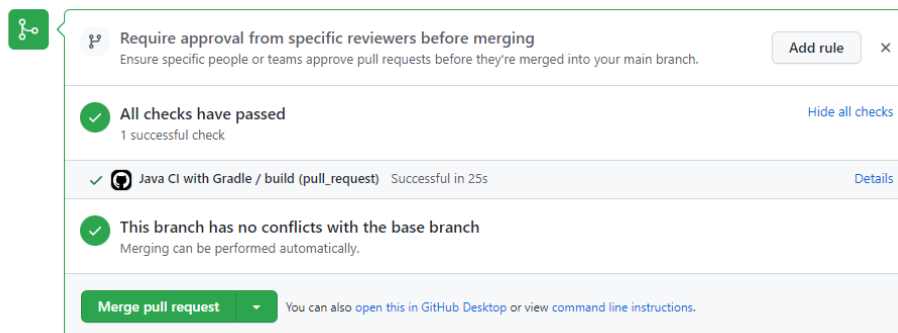
9. On the next screen, you can just enter an appropriate comment and then click the next “Create pull request” button. After this, you’ll see a screen that summarizes the pull request with tabs across the top to look at the commits, checks, and files that were changed.



10. **Now, go back to a session under your primary GitHub userid** (log out and log back in if needed or switch browsers, etc.). Then go to the original repository for greetings-ci under that userid. Click on the “Pull requests” tab at the top and you should see 1 open pull request from your secondary userid. Click on the link for that one.



9. Now you can scroll down, and eventually you should see a message that “All checks have passed”. You can click on the “See all checks” link to the right and see that the “check” here was a run of our workflow. Then you can click on the “Merge pull request” button and then click the “Confirm merge” button and the merge request should be completed.



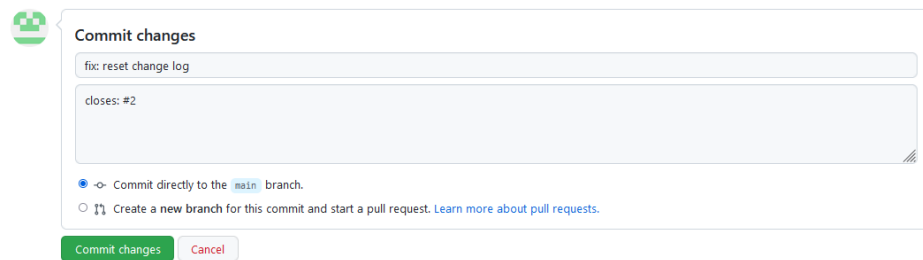
10. After the operation finishes, the workflow should have run. Now, we need to remove the extra lines we added for the changelog action. Remove the lines shown in strikethru below.

- name: Conventional Changelog Action  
uses: TriPSs/conventional-changelog-action@v4  
~~with:~~

```
skip-git-pull: "true"
```

```
26
27     - name: Conventional Changelog Action
28       uses: TriPSs/conventional-changelog-action@v3.18.0
29
30
```

11. Click on the button to commit the changes as usual. In the bottom text entry box, in the commit message area for the “Commit changes” box, enter “fix: reset change log”. And in the “Add an optional extended description...” box, add the text “closes: #x” where “x” is the number of the issue that we opened earlier in the labs.

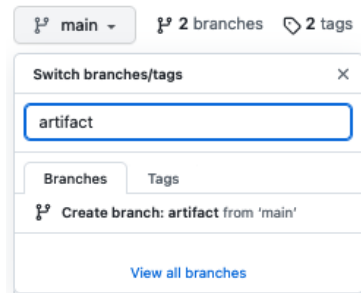


12. After that, click on the “Commit changes” button. This should run the action again and close the issue.
13. After this is done, look at the CHANGELOG.md file to see the fix increment.
14. And you can look at the issue (under the “Issues” tab) to see that it is closed.

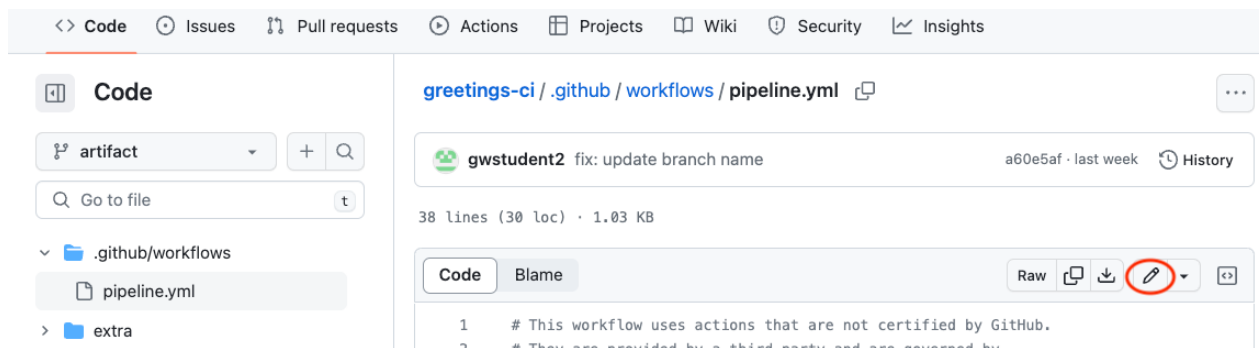
## Lab 6 – Managing Artifacts

**Purpose:** In this lab, we’ll look at how to do simple artifact management – an important part of Continuous Delivery.

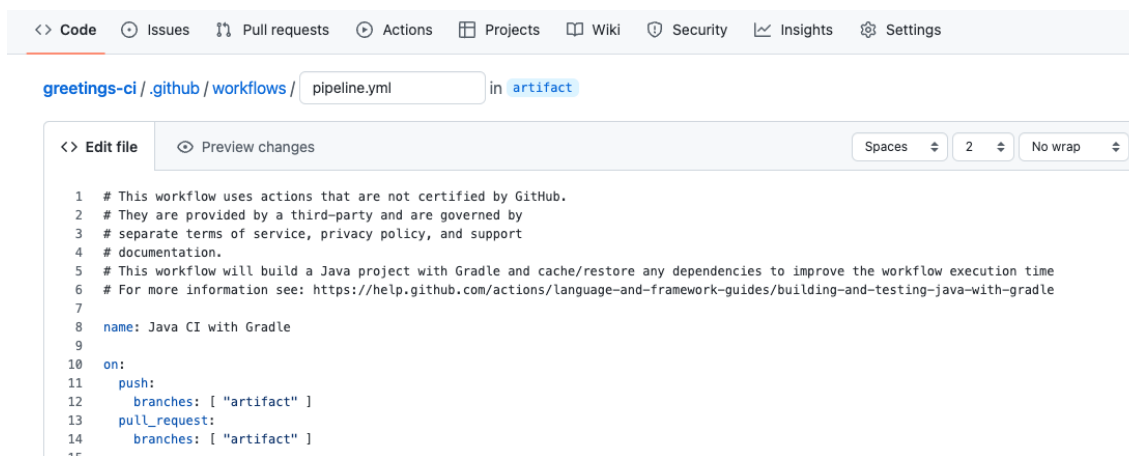
1. Ensure you are in your primary GitHub id and go to your “greetings-ci” project that we used in week 1.
2. As a best practice for building out the pipeline as a larger project, let's create a separate branch to work in for managing the versioning and storage of the artifact. We’ll call it “artifact”. In the “Code” tab, click on the branch dropdown that says “main”. Then in the text area that says “Find or create a branch...”, enter the text “artifact”. Then click on the “**Create branch: artifact from ‘main’**” link.



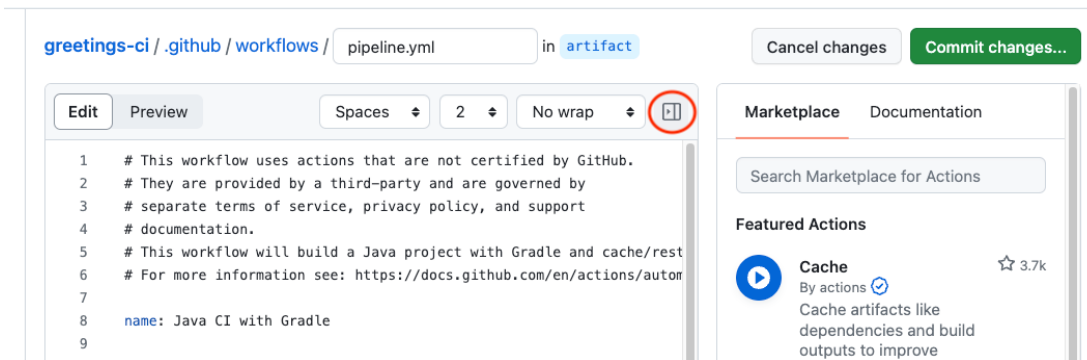
- Now you should be on the *artifact* branch. We're going to first add the code to persist the artifact that we built in our build step. We want to persist this for use with other jobs in our pipeline such as ones that might test it. Open the `.github/workflows/pipeline.yml` file (click on the name) and edit it by clicking on the pencil icon.



- Change the references in the “on:” clause to be just the “artifact” branch so we don't trigger action runs on the other branches while we are working on this one. Make sure you are on the *artifact* branch before you proceed.



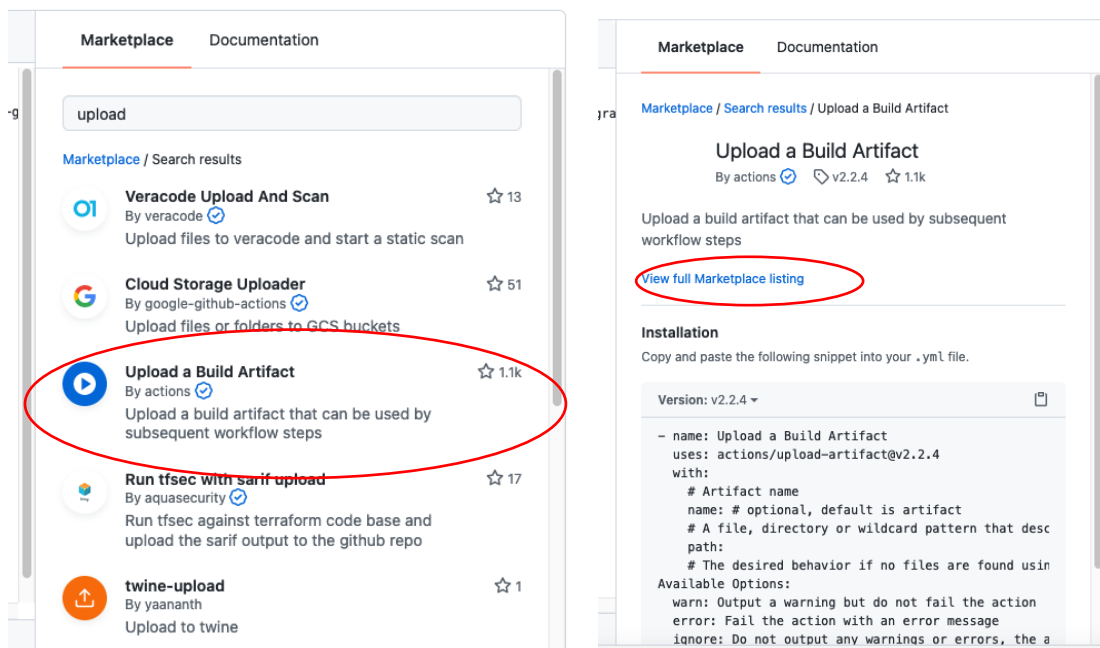
5. Click on the square to the right to show the pane to search for actions (if search pane isn't shown).



6. As before, to the right, you should see a pane with references to GitHub actions. We're going to add a job to our workflow to upload an artifact. Let's find actions related to uploading.

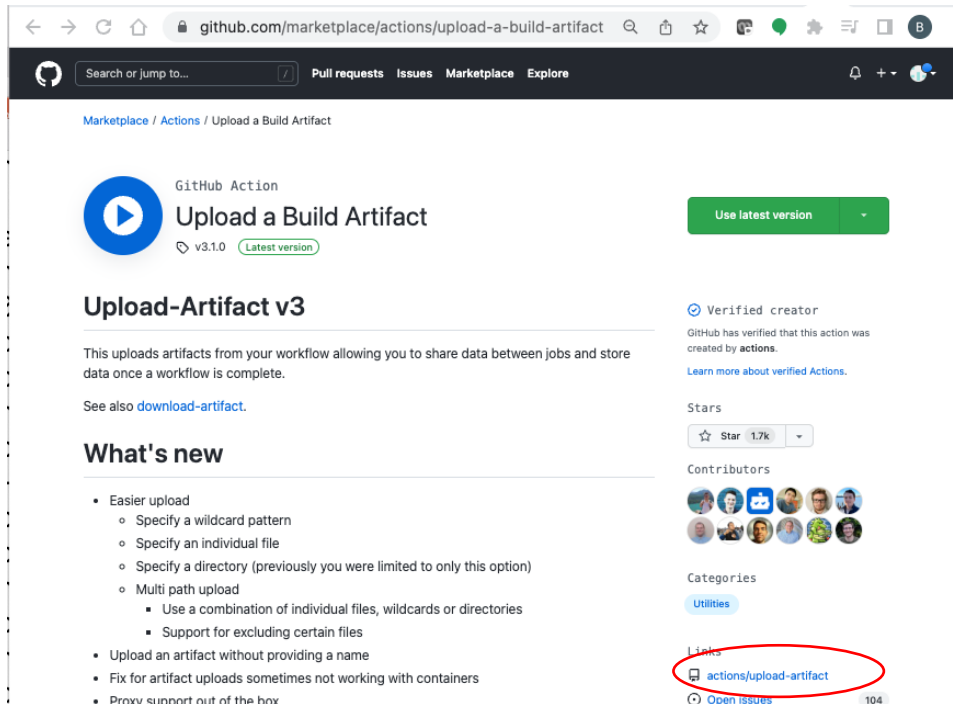
In the "Search Marketplace for Actions" box on the upper right, enter "Upload" and see what's returned.

Find the one that is named "Upload a Build Artifact By actions" and click on it. 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".

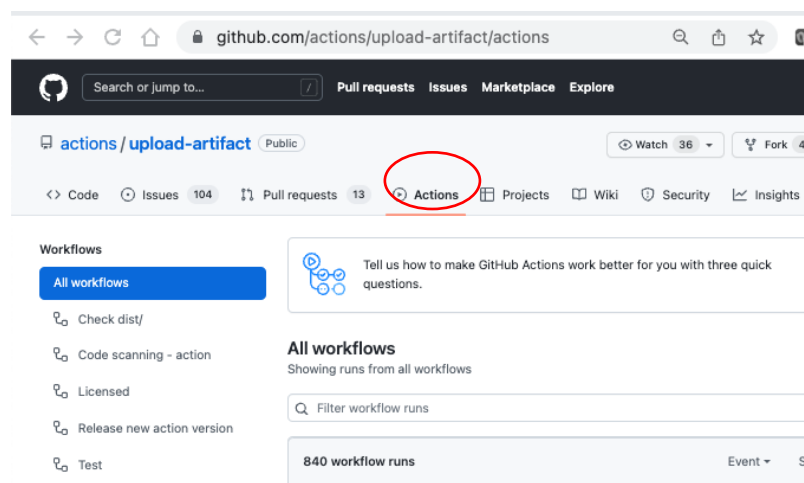


7. This should open up the full GitHub Actions Marketplace listing for this action. Notice the URL at the top - <https://github.com/marketplace/actions/upload-a-build-artifact>.

Then click on the "actions/upload-artifact" link under "Links" in the lower right.



8. 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 CI/CD themselves via GitHub Actions. Click on the Actions button to see the workflows that are in use/available



9. 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 inline with the build job steps. **Pay attention to the indenting.** See the screenshot (lines 40-44) for how this should look afterwards. (Your line numbers may be different.)

The code to add is immediately below. You can copy and paste but may need to adjust the indenting. Notice this should go after the *Build with Gradle* step.

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

```
29
30   - name: Set up JDK 11
31     uses: actions/setup-java@v3
32     with:
33       java-version: '11'
34       distribution: 'temurin'
35   - name: Build with Gradle
36     uses: gradle/gradle-build-action@v2.2.1
37     with:
38       arguments: build
39
40   - name: Upload Artifact
41     uses: actions/upload-artifact@v3
42     with:
43       name: greetings-jar
44       path: build/libs
45
```

Use Control + Space or Option + Space to trigger auto

10. Click on the green "Commit changes..." button in the upper right. In the dialog that comes up, add a conventional commit message like "feat: upload artifact", then click the green "Commit changes" button to make the commit.

Commit changes

Commit message

feat: upload artifact

Extended description

Add an optional extended description..

☒ Commit directly to the artifact branch

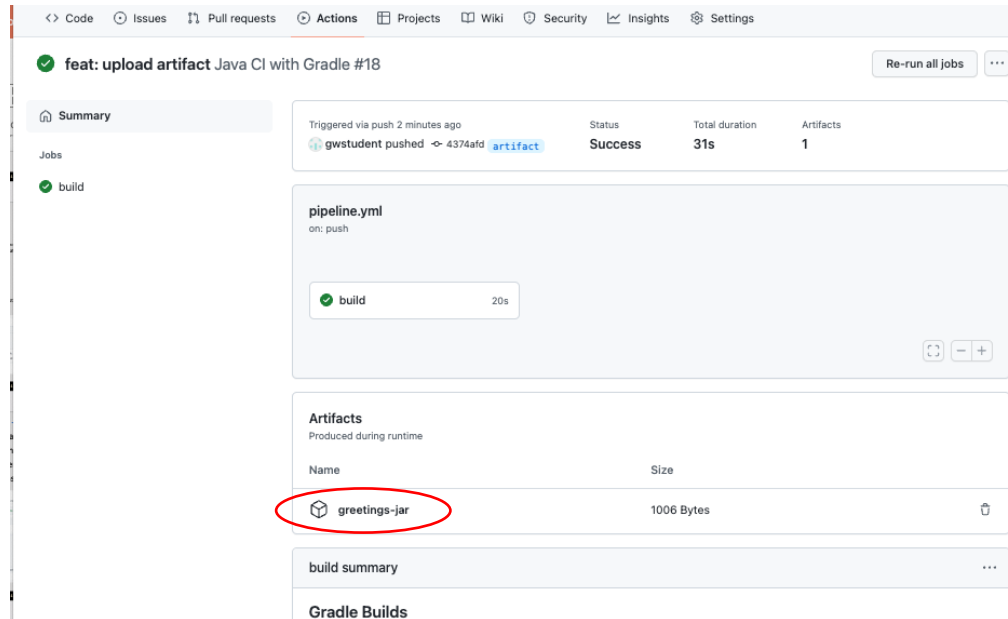
☐ Create a new branch for this commit and start a pull request

[Learn more about pull requests](#)

Cancel Commit changes



11. 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 "feat: upload artifact". On the next screen, in addition to the graph, there will be a new section called "Artifacts" around the middle of the page. (You may have to scroll past several warnings that you can ignore.) You can download the artifact from there. Click on the name of the artifact to try this.



## Lab 7 – Versioning Artifacts

**Purpose:** In this lab, we'll look at how to do simple artifact versioning to better keep track of what we produce and can use in our CI/CD processes.

1. Our artifact is being uploaded now, but we need to have each instance from a run of our pipeline clearly versioned so we can easily track changes and get back to specific versions if we need. For simplicity, we'll use the same semantic versioning scheme and value provided by our changelog generation process - specifically we'll use the "version" output from the changelog step.
  2. To reference the output from a step, we need to assign the step an "id". We can't just use the name. So, switch to the *artifact* branch and edit the pipeline.yaml file again in the usual way and add the line in **bold** below in the "Conventional Changelog Action" step. See the screen capture below for a reference of where to add this. The middle line is the only one you need to add. Make sure you are on the "artifact" branch again!
- name: Conventional Changelog Action  
**id: changelog**  
uses: [TriPSs/conventional-changelog-action@v3.14.0](https://github.com/TriPSs/conventional-changelog-action)

```

19 jobs:
20   build:
21
22     runs-on: ubuntu-latest
23
24     steps:
25     - uses: actions/checkout@v3
26
27     - name: Conventional Changelog Action
28       id: changelog
29       uses: TriPSs/conventional-changelog-action@v3.14.0
30
31     - name: Set up JDK 11
32       uses: actions/setup-java@v3

```

- Now, we need to construct the reference to get the version output from the changelog step. This is pretty straightforward. The reference looks like this (where *changelog* is the id we added in the previous step): (We're just looking at code here, we'll make the actual changes in the next step)

**`${{ steps.changelog.outputs.version }}.jar`**

- To make this simple, we'll just add a step to tag the artifact with the version by renaming it to include the version number. We'll want to add this after the build has produced the artifact and before we upload it. Add the two lines for a new step in the code after the build step and before the upload step. (Note the second line does not need to be split in your code - it just displays that way because of the length.)

```

- name: Tag artifact
  run: mv build/libs/greetings-ci.jar build/libs/greetings-ci-${{
steps.changelog.outputs.version || github.event.inputs.myVersion }}.jar

```

```

44 - name: Build with Gradle
45   uses: gradle/gradle-build-action@v2.2.1
46   with:
47     arguments: build
48
49 - name: Tag artifact
50   run: mv build/libs/greetings-ci.jar build/libs/greetings-ci-${{ steps.changelog.outputs.version || github.event.inputs.myVersion }}.jar
51
52 - name: Upload Artifact
53   uses: actions/upload-artifact@v3
54   with:
55     name: greetings-jar
56     path: |
57       build/libs
58       test-script.sh
59

```

- Now we can commit this with a commit message that will trigger a new version, for example: "feat: version artifact". Go ahead and do the commit - directly to the artifact branch - with the conventional commit msg.

Commit changes

Commit message

feat: version artifact

Extended description

Add an optional extended description..

☒ Commit directly to the artifact branch

☐ Create a new branch for this commit and start a pull request

[Learn more about pull requests](#)

Cancel Commit changes

- After this commit, there will be a new run of the workflow and the build job. If you select the build job in the workflow and expand the conventional changelog steps and the "Tag artifact" step, you'll be able to see the newly generated version and the rename that occurs.

Summary

Jobs

build

Run details

Usage

Workflow file

build

succeeded 2 minutes ago in 20s

Search logs

Set up JDK 11 0s

Build with Gradle 7s

Tag artifact 0s

```

1 Run mv build/libs/greetings-ci.jar build/libs/greetings-ci-0.3.0.jar
2 mv build/libs/greetings-ci.jar build/libs/greetings-ci-0.3.0.jar
3 shell: /usr/bin/bash -e {0}
4 env:
5   JAVA_HOME: /opt/hostedtoolcache/Java_Temurin-Hotspot_jdk/11.0.18-10/x64
6   JAVA_HOME_11_X64: /opt/hostedtoolcache/Java_Temurin-Hotspot_jdk
  /11.0.18-10/x64
7   GRADLE_BUILD_ACTION_SETUP_COMPLETED: true
8   GRADLE_BUILD_ACTION_CACHE_RESTORED: true

```

Upload Artifact 0s

(Note: If you run into an issue where a new tag is not generated, you can try editing the package.json file and updating the version in it to be higher than the highest current tag on the repo.)

- If you go to the page for the run of the action, you can see the new jar in the *Artifacts* section. You can click on it and download it and extract it to see the actual versioned artifact that was created.

fix: update package.json Java CI with Gradle #23 Re-run all jobs ...

Summary

Triggered via push 4 days ago gwstudent pushed -> 20d8f33 artifact Status: Success Total duration: 27s Artifacts: 1

Jobs

- build


pipeline.yml

```
on: push
```

```
build
```



Artifacts

Produced during runtime

Name	Size
 greetings-jar	1006 Bytes



build summary


Gradle Builds

Root Project	Requested Tasks	Gradle Version	Build Outcome	Build Scan™
greetings-ci	build	4.10		 Build Scan™ NOT PUBLISHED

Searching "This Mac"

Search: This Mac "Downloads"

Name	Kind	Date Last Opened
 greetings-ci-0.6.0.jar	Java JAR file	--
 greetings-jar.zip	ZIP archive	--

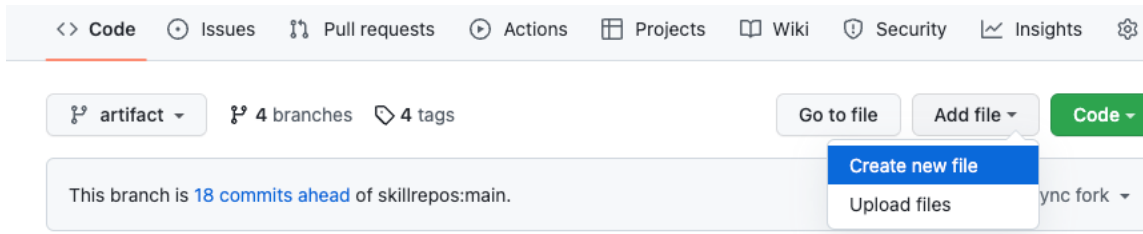


greetings-ci-0.6.0.jar

## Lab 8 – 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 new script to test our code. To create a new file via the browser, go back to the "Code" tab at the top. **You should still be in the *artifact* branch.** Click on the *Add file* button next to the green *Code* button. From the list that pops up, select *Create new file*.

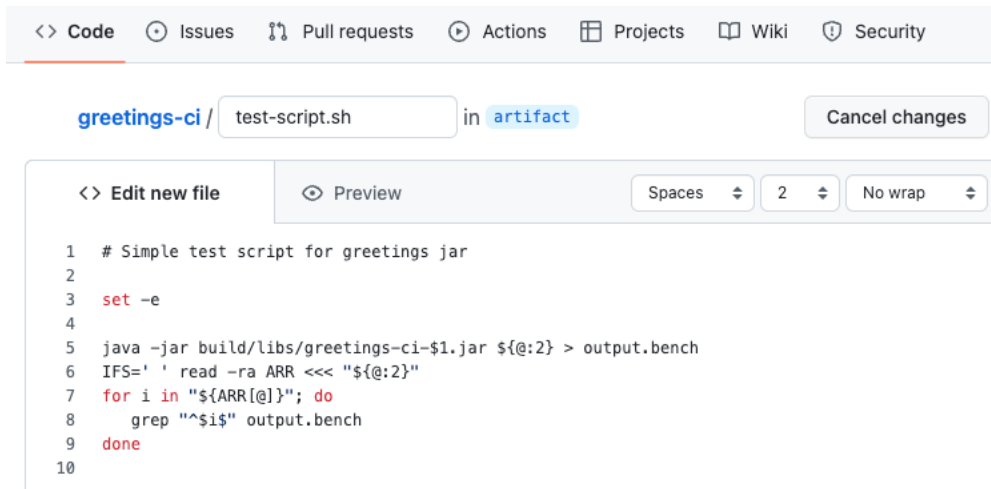


- In the new editor that pops up, you'll be at the location to type in a name. You can name this "test-script.sh". Then copy and paste the following code into the new file. (A screenshot is shown after the code so you can see how things line up.)

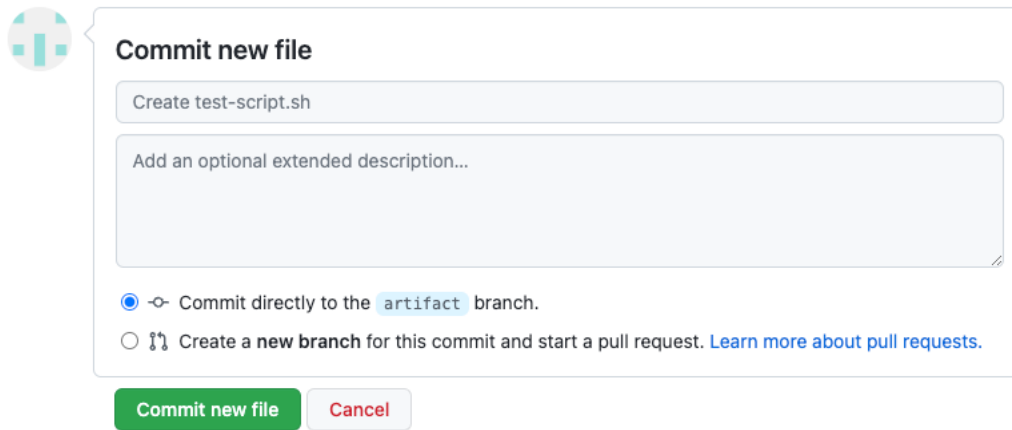
```
# Simple test script for greetings jar

set -e

java -jar build/libs/greetings-ci-$1.jar ${@:2} > output.bench
IFS=' ' read -ra ARR <<< "${@:2}"
for i in "${ARR[@]}"; do
    grep "^$i$" output.bench
done
```



- This script takes the version of 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 on the *artifact* branch.



**Commit new file**

Create test-script.sh

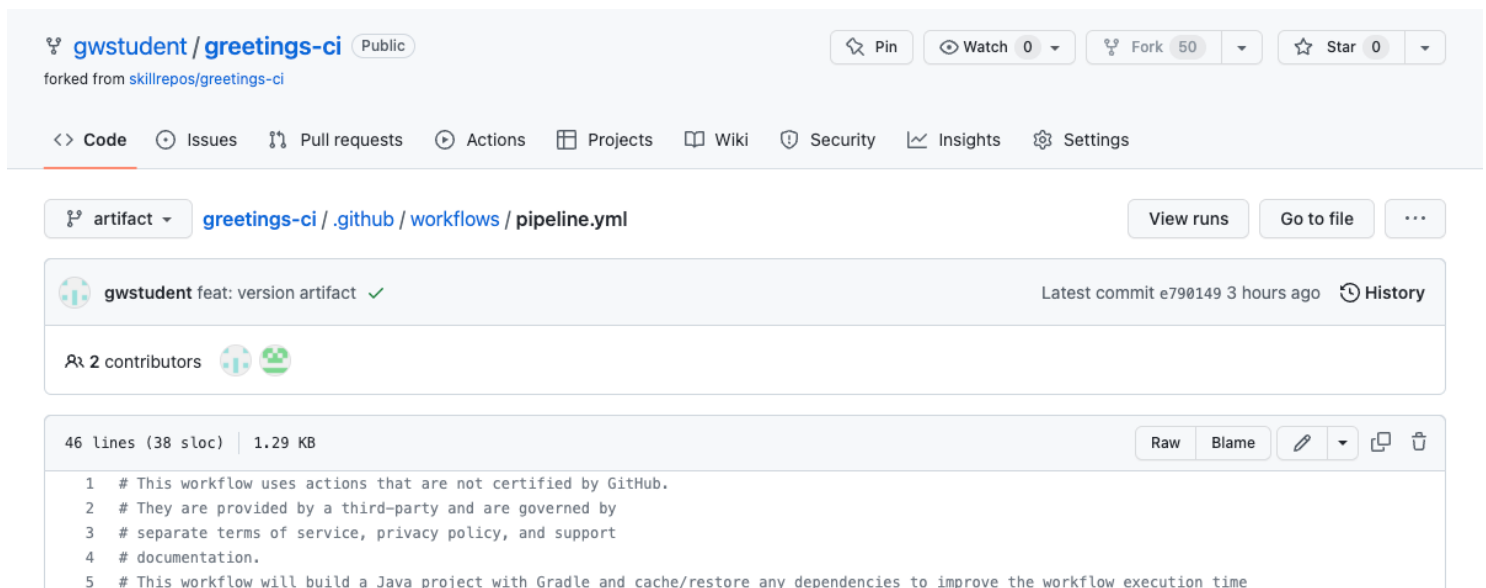
Add an optional extended description...

☒ Commit directly to the `artifact` branch.

☐ Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)

**Commit new file** **Cancel**

- Now let's add a second job to our workflow (in `pipeline.yml`) to do a simple "test". We'll continue working in the separate branch "artifact" as we build out our pipeline. As you've done before, edit the `pipeline.yml` file.



gwstudent / greetings-ci Public

forked from skillrepos/greetings-ci

Pin Watch 0 Fork 50 Star 0

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

artifact greetings-ci / .github / workflows / pipeline.yml View runs Go to file ...

gwstudent feat: version artifact ✓ Latest commit e790149 3 hours ago History

2 contributors

46 lines (38 sloc) 1.29 KB Raw Blame

```

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

```

- Add the job definition for a job called "test-run" that runs on `ubuntu-latest`. 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-tag || github.event.inputs.myVersion } \${ github.event.inputs.myValues }

```
--
47     arguments: build
48
49   - name: Tag artifact
50     run: mv build/libs/greetings-ci.jar build/libs/greetings-ci-${ steps.changelog.outputs.version || github.event.inputs.myVersion }.jar
51
52   - name: Upload Artifact
53     uses: actions/upload-artifact@v3
54     with:
55       name: greetings-jar
56       path: |
57         build/libs
58         test-script.sh
59
60   test-run:
61
62     runs-on: ubuntu-latest
63     needs: build
64
65     steps:
66     - name: Download candidate artifacts
67       uses: actions/download-artifact@v3
68       with:
69         name: greetings-jar
70
71     - name: Execute test
72       shell: bash
73       run: |
74         chmod +x ./test-script.sh
75         ./test-script.sh ${ needs.build.outputs.artifact-tag || github.event.inputs.myVersion } ${ github.event.inputs.myValues }
76
77
```

7. There are a couple of "housekeeping" tasks we need to take care of before we call our script. First, since we want to be able to identify a specific version of the script, we need to capture the version from the "build" job into a "job output" that can be accessed from another job.

Add the lines below **in the "build:" job** definition after the "runs-on" and before the "steps". This will setup a new output from the job named artifact-tag.

# Map a step output to a job output

outputs:

artifact-tag: \${ steps.changelog.outputs.version }}

```
19 jobs:
20   build:
21
22     runs-on: ubuntu-latest
23
24     # Map a step output to a job output
25     outputs:
26       artifact-tag: ${ steps.changelog.outputs.version }
27
28     steps:
29     - uses: actions/checkout@v3
30
```

8. Next, 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. Modify the **path** section of the "Upload Artifact" step in the "build" job to look like below.

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

```
45
46   - name: Tag artifact
47     run: mv build/libs/greetings-ci.jar bui
48
49   - name: Upload Artifact
50     uses: actions/upload-artifact@v3
51     with:
52       name: greetings-jar
53       path: |
54         build/libs
55         test-script.sh
56
57
58   test-run:
59
60     runs-on: ubuntu-latest
61     needs: build
62
```

9. Now, you can just commit the pipeline changes with a simple message like "feat: add testing to pipeline".



Commit changes

Commit message

feat: add testing to pipeline

Extended description

Add an optional extended description..

☒ Commit directly to the artifact branch

☐ Create a new branch for this commit and start a pull request

[Learn more about pull requests](#)

Cancel

Commit changes

10. 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.

Summary

Jobs

☒ build

☒ test-run

Triggered via push 3 minutes ago

Status

Total duration

Artifacts

gwstudent pushed -> 9afb2eb main

Success

35s

1

pipeline.yml

on: push

☒ build

14s

☒ test-run

2s

You can look at the logs from the test-run job if you want to see the downloaded script and execution. Note which version got passed in the `"/test-script.sh"` line. You'll need this later.

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feat: add testing to pipeline Java CI with Gradle #30 Re-run all jobs ...

Summary

Jobs

- build
- test-run

**test-run**  
succeeded 2 minutes ago in 4s

Search logs

- Set up job 1s
- Download candidate artifacts 1s
  - Run actions/download-artifact@v3
  - Starting download for greetings-jar
  - Directory structure has been setup for the artifact
  - Total number of files that will be downloaded: 2
  - Artifact greetings-jar was downloaded to /home/runner/work/greetings-ci/greetings-ci
  - Artifact download has finished successfully
- Execute test 0s
  - Run chmod +x ./test-script.sh
  - chmod +x ./test-script.sh
  - ./test-script.sh 0.7.0
  - shell: /usr/bin/bash --noprofile --norc -e -o pipefail {0}
- Complete job 0s

11. Now that we've proven out the changes in the *artifact* branch, let's go ahead and merge the changes back into the main branch via a pull request. In the *Pull requests* menu at the top, click on the *New pull request* button.

Change the base value to be for **your repo** and **main** (not **skillrepos/greetings-ci**) and the compare value to be for **your repo** and **artifact**. Then click on the *Create pull request* button.

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### Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#) or [learn more about diff comparisons](#).

base: main ← compare: artifact ✓ Able to merge. These branches can be automatically merged.

Discuss and review the changes in this comparison with others. [Learn about pull requests](#) Create pull request

7 commits 4 files changed 0 contributors

On the next dialog enter a conventional commit message like "chore: merge artifact to main", then click the 2<sup>nd</sup> *Create pull request* button.

## Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).

base: main ← compare: artifact ✓ **Able to merge.** These branches can be automatically merged.

chore: merge artifact to main

Write Preview

H B I ≡ <> 🔗 ≡ ≡ ≡ @ 🗨️ ↩️

Leave a comment

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

Create pull request ▾

Add more commits by pushing to the **artifact** branch on **gwstudent/greetings-ci**.

🔗

🔒 Require approval from specific reviewers before merging

Branch protection rules ensure specific people approve pull requests before they're merged.

Add rule ×

✓ All checks have passed

2 successful checks

Show all 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](#).

On the third dialog, all of the checks should be green, so just go ahead and select *Merge pull request*, then *Confirm merge*.

- Let's make one more change to make it easier to run our workflow manually to try things out, start runs, etc. **Switch to the main branch.** Then edit the pipeline.yaml file again. In the "on:" section near the top, change the branch names from "artifact" to "main" And 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.

Brent Laster

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```

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

```

Note: Don't forget to change the branch names!

81 lines (62 sloc) | 2.06 KB

```

1  # This workflow uses actions that are not certified by
2  # They are provided by a third-party and are governed b
3  # separate terms of service, privacy policy, and suppor
4  # documentation.
5  # This workflow will build a Java project with Gradle a
6  # For more information see: https://docs.github.com/en/
7
8  name: Java CI with Gradle
9
10 on:
11   push:
12     branches: [ "main" ]
13   pull_request:
14     branches: [ "main" ]
15   workflow_dispatch:
16     inputs:
17       myVersion:
18         description: 'Input Version'
19       myValues:
20         description: 'Input Values'
21

```

13. Commit your changes to the main branch.
14. Since we added the *workflow\_dispatch* event trigger in our last set of code changes, if you select the workflow from the Actions tab, you should see a blue bar that has a button that allows you to manually run the workflow.

Click on *Run workflow*. Make sure *Branch* is set to *main*.

In the *Input Version* section, put in a semantic version number such as "1.0.5".

In the *Input Values* section, enter whatever you want for arguments.

Click on the green "Run workflow" button. You can look at the output of the test-run job again to see what occurred.

<> Code

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pipeline.yml

19 workflow runs

Event Status Branch Actor

This workflow has a workflow\_dispatch event trigger.

Run workflow

Use workflow from

Branch: main

Input Version

1.0.5

Input Values

abc def ghi

Run workflow

Java CI with Gradle

Java CI with Gradle #19: Manually run by gwstudent

Update pipeline.yml

Java CI with Gradle #18: Commit 08a8676 pushed by gwstudent

Update pipeline.yml

Java CI with Gradle #17: Commit 700c5f3 pushed by gwstudent

15. If you want, you can download the artifact, extract the contents and see the versioned jar.

< > libs

Name

Date Modified

Size

Kind

greetings-ci-1.0.5.jar

Today at 8:07 PM

1 KB

Java JAR file