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Github Actions CI

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Github Actions



- CI system developed by Github
- Fully hosted, including runner
- Uses yaml based configuration
- Well documented
- Community-driven plugins, so-called "actions"
 - ▶ integrated marketplace

Advantages

- Well documented
- Known by many developers
- Premade actions for almost everything
- No hosting required
- Free for non-commercial open source

Disadvantages

- Vendor lockin
 - ▶ Closed source runner
 - ▶ pre made options only available on github
- High pricing for large scale
- Requires code to be hosted on Github
- Runner runs on Github servers
 - ▶ Possible compliance problems (GDPR)
 - ▶ US Company ⇒ CLOUD Act

High Level Workflow

- 1 Create yml file
 - ▶ `mkdir -p .github/workflows`
 - ▶ `touch .github/workflows/ci.yml`
- 2 Define when to run
- 3 define jobs with different steps. Including:
 - ▶ Checking out (getting) the code
 - ▶ Setting up the Environment
 - ▶ The actual work

Config Breakdown: When to Run

```
1 name: PCST Pipeline on Github
  1 on:
    2 push:
    3   branches: [ master ]
    4 pull_request:
    5   branches: [ master ]
```

- Defined by on:
- in our case:
 - ▶ On every master commit
 - ▶ On every pull request against master
- Is a list, can contain multiple branches

Config Breakdown: Build Job

```
jobs:
  build:
    name: Build Works
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v3
      - name: Setup Maven Action
        uses: s4u/setup-maven-action@v1.13.0
      - name: Build with mvn
        run: mvn clean install
```

- Each bullet point is a step that runs one after another
- actions/checkout is a pre-made action by Github
 - ▶ git checkouts the newest version of the repo
- s4u/setup-maven-action is a community action to install maven
- run: allows for arbitrary shell code execution

Config Breakdown: Test Job

```
test:
  name: Tests
  runs-on: ubuntu-latest
  steps:
    - uses: actions/checkout@v3
    - name: Setup Maven Action
      uses: s4u/setup-maven-action@v1.13.0
    - name: Run Junit tests (including integration tests and jacoco coverage)
      run: mvn test
    - name: Upload jacoco report
      uses: actions/upload-artifact@v3
      with:
        name: jacoco
        path: target/site/jacoco
    - name: Create Mutation coverage (pit)
      run: "mvn test compile org.pitest:pitest-maven:mutationCoverage"
    - name: Upload pit report
      uses: actions/upload-artifact@v3
      with:
        name: pit
        path: target/pit-reports
```

- Again: Checkout and Maven setup
- Run unit and integration test suite
 - ▶ Like in Terminal: `mvn test`
- Run Mutation test coverage with terminal command
- `actions/upload-artifact` is official action by GitHub
 - ▶ `with:` can be used to configure actions
 - ▶ `name:` defines name of the zip file
 - ▶ `path:` defines where the to-be-zipped files are located

Artifacts

The screenshot shows the GitHub Actions interface for the repository `iquentil / PCSTProject`. The `Actions` tab is selected in the top navigation bar. On the left sidebar, under the `Actions` section, the `All workflows` link is highlighted with a red arrow labeled `1.`. The main content area displays `All workflows` with the text `Showing runs from all workflows`. A search bar `Filter workflow runs` is present. Below this, a table titled `5 workflow runs` lists the workflow runs. A red arrow labeled `2.` points to the first row of the table.

	Event	Status	Branch	Actor
<div><div></div><div>add actions for artifacts</div><div>PCST Pipeline on Github #5: Commit <code>5bad77</code> pushed by iquentil</div></div> <div>master</div> <div>33 minutes ago 2m 24s</div> <div>...</div>				
<div><div></div><div>remove "failing" test (works when you run mvn test only!)</div><div>PCST Pipeline on Github #4: Commit <code>3f81b31</code> pushed by iquentil</div></div> <div>master</div> <div>41 minutes ago 2m 18s</div> <div>...</div>				
<div><div></div><div>run test commands</div><div>PCST Pipeline on Github #3: Commit <code>8161c8a</code> pushed by iquentil</div></div> <div>master</div> <div>44 minutes ago 1m 10s</div> <div>...</div>				
<div><div></div><div>add command for mvn build</div><div>PCST Pipeline on Github #2: Commit <code>0ddc1db</code> pushed by iquentil</div></div> <div>master</div> <div>50 minutes ago 49s</div> <div>...</div>				
<div><div></div><div>initial CI pipeline</div><div>PCST Pipeline on Github #1: Commit <code>b5a2da0</code> pushed by iquentil</div></div> <div>master</div> <div>1 hour ago 28s</div> <div>...</div>				

Artifacts

The screenshot shows the GitHub Actions interface for the workflow 'add actions for artifacts #5'. The workflow is in a 'Success' state, triggered by a push to the 'master' branch. The total duration is 2m 24s, and 2 artifacts were produced. The 'build.yml' file is shown with a summary of jobs: 'Build Works' (33s) and 'Tests' (2m 15s). Below the jobs, there are annotations regarding deprecated actions and artifact versions. At the bottom, a table lists the artifacts produced during runtime: 'jacoco' (1.17 MB) and 'pit' (351 KB). A red box highlights the 'Artifacts' section, and a red arrow points from the 'Workflow file' link in the left sidebar to the 'Artifacts' section.

PCST Pipeline on Github

add actions for artifacts #5

Summary

Jobs

- Build Works
- Tests

Run details

- Usage
- Workflow file

Triggered via push 34 minutes ago

kuerni pushed → bbad77 master

Status: Success

Total duration: 2m 24s

Artifacts: 2

build.yml

on: push

Build Works 33s

Tests 2m 15s

Annotations

3 warnings

Build Works

Node.js 16 actions are deprecated. Please update the following actions to use Node.js 20: actions/checkout@v3. For more information see: <https://github.blog/changelog/2023-09-22-github-actions-transitioning-from-node-16-to-node-20/>.

Tests

Node.js 16 actions are deprecated. Please update the following actions to use Node.js 20: actions/checkout@v3, actions/upload-artifact@v3. For more information see: <https://github.blog/changelog/2023-09-22-github-actions-transitioning-from-node-16-to-node-20/>.

Deprecation notice: v1, v2, and v3 of the artifact actions

The following artifacts were uploaded using a version of actions/upload-artifact that is scheduled for deprecation: "jacoco", "pit". Please update your workflow to use v4 of the artifact actions. Learn more: <https://github.blog/changelog/2024-04-18-deprecation-notice-v->.

Show more

Artifacts

Produced during runtime

Name	Size		
jacoco	1.17 MB		
pit	351 KB		


Artifacts

Artifacts

Produced during runtime

Name

Size

 **jacoco**

1.17 MB



 **pit**

351 KB



PIT+Integration tests

```
68 <plugins>
69   <plugin>
70     <groupId>org.pitest</groupId>
71     <artifactId>pitest-maven</artifactId>
72     <version>1.8.0</version>
73     <dependencies>
74       <dependency>
75         <groupId>org.pitest</groupId>
76         <artifactId>pitest-junit5-plugin</artifactId>
77         <version>0.15</version>
78       </dependency>
79     </dependencies>
80     <configuration>
81       <excludedMethods>
82         <excludedMethod>
83           com.softagtesting.testing.customerManagement.controller.CustomerManagementControllerTest.delete
84         </excludedMethod>
85       </excludedMethods>
86     </configuration>
```

- Integration tests work with mvn test, but not with PIT
- There is allegedly a feature to exclude tests with 100% coverage and 100% passing
- It's not well-documented, so instead the tests were just commented out for now

Thanks for your attention!