Continuous Integration & Delivery with GitHub Actions

Auto Code EU

Lothar Schulz
2019 11 28

MOOVEL BECOMES

REACHNOW

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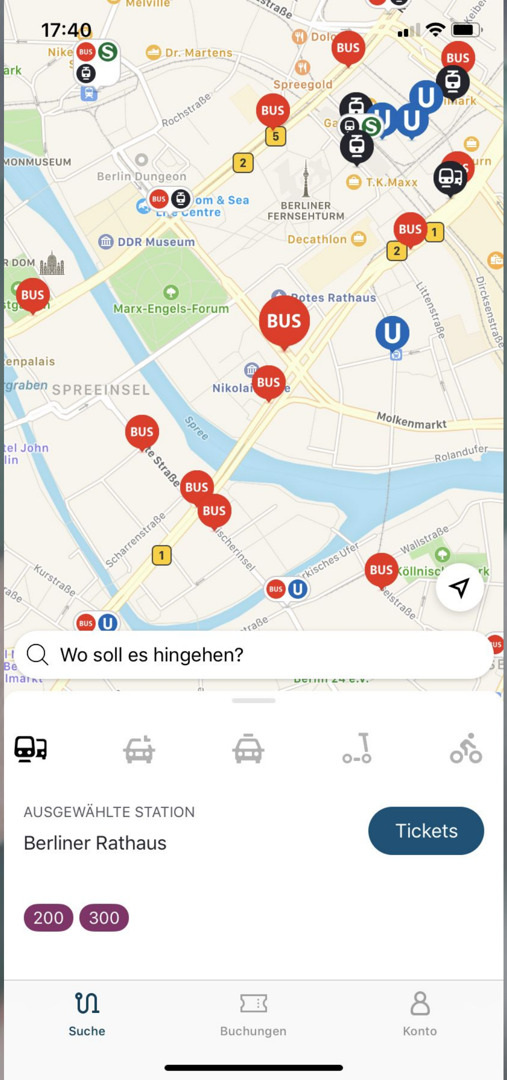
MOOVEL BECOMES

REACHNOW



Wo soll es hingehen?

AUSGEWÄHLTE STATION

Berliner Rathaus

Tickets

200 300

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Me

Engineering Manager

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GitHub Actions

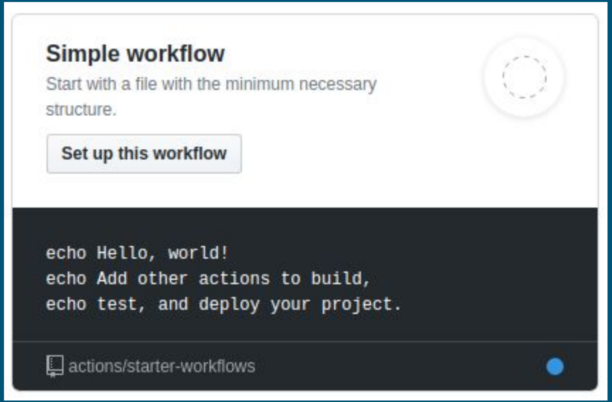
Workflow Automation

GitHub Actions

Built-in CI/CD

What are GitHub Actions?

Orchestrate any workflow, based on any event, while GitHub manages the execution, provides rich feedback, and secures every step along the way.



Simple workflow

Start with a file with the minimum necessary structure.

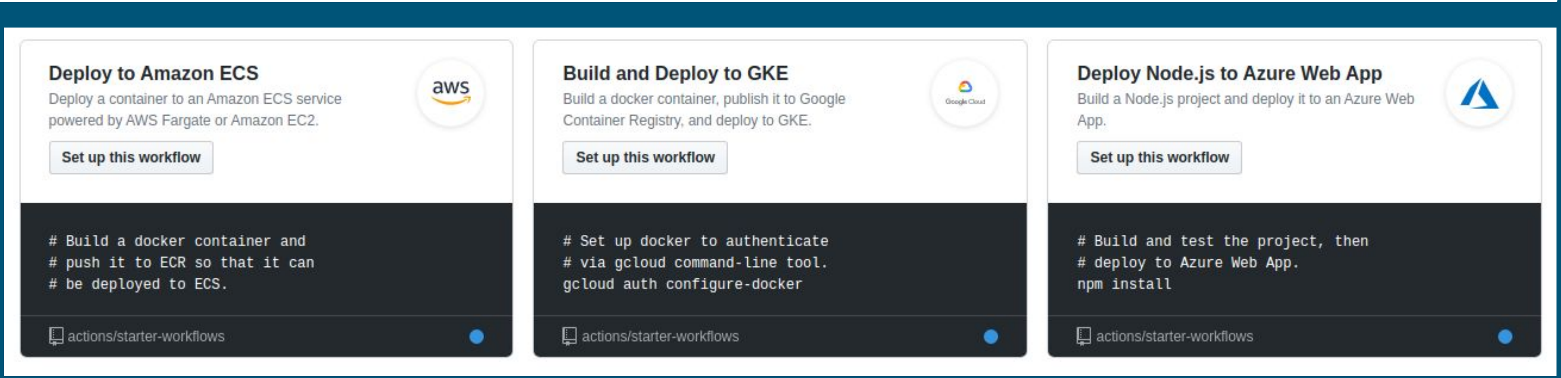
```
echo Hello, world!
echo Add other actions to build,
echo test, and deploy your project.
```

actions/starter-workflows

https://github.blog/2019-08-08-github-actions-now-supports-ci-cd/

What are GitHub Actions?

With GitHub Actions, workflows and steps are just code in a repository, so you can create, share, reuse, and fork your software development practices.



Deploy to Amazon ECS

Deploy a container to an Amazon ECS service powered by AWS Fargate or Amazon EC2.

```
# Build a docker container and
# push it to ECR so that it can
# be deployed to ECS.
```

Build and Deploy to GKE

Build a docker container, publish it to Google Container Registry, and deploy to GKE.

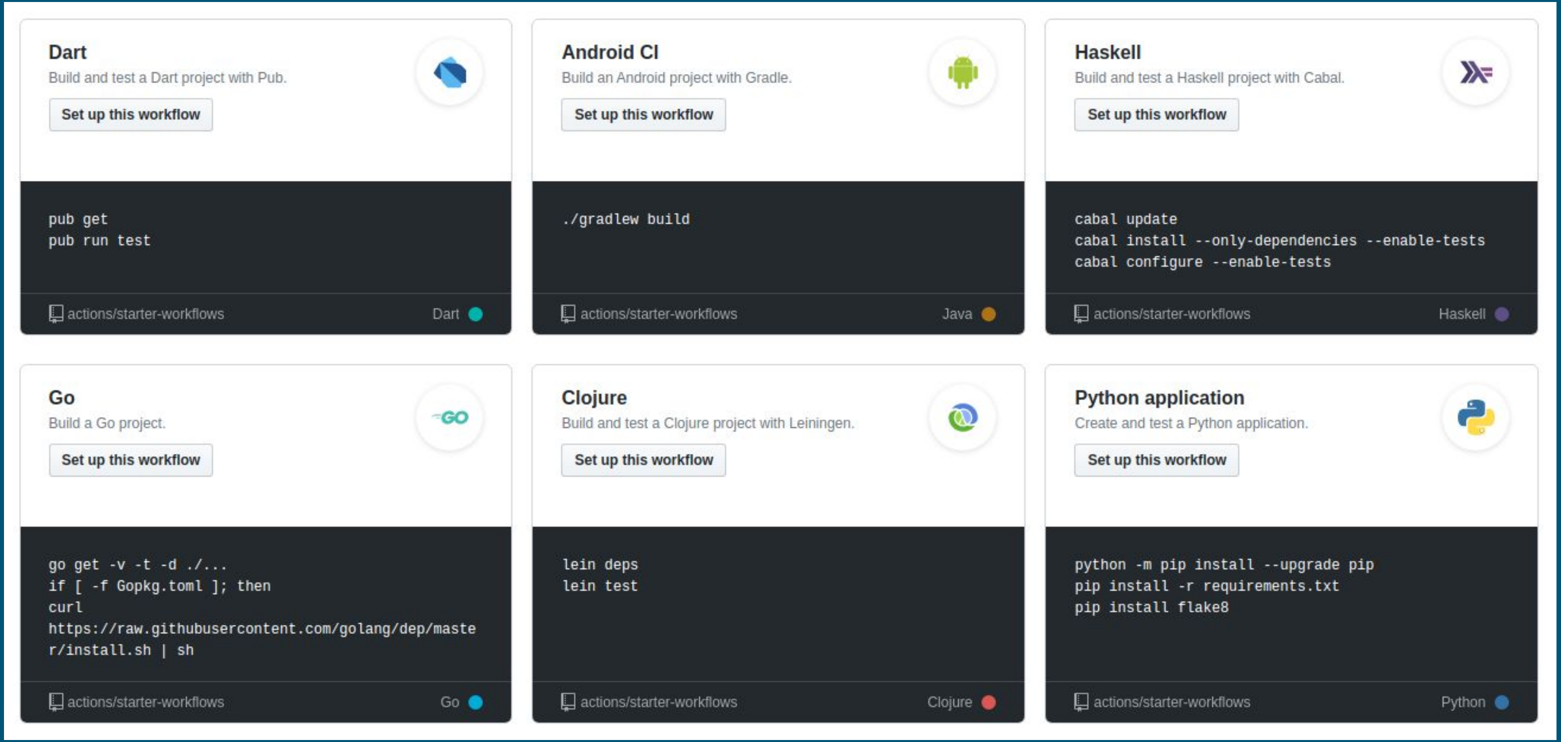
```
# Set up docker to authenticate
# via gcloud command-line tool.
gcloud auth configure-docker
```

Deploy Node.js to Azure Web App

Build a Node.js project and deploy it to an Azure Web App.

```
# Build and test the project, then
# deploy to Azure Web App.
npm install
```

https://github.blog/2019-08-08-github-actions-now-supports-ci-cd/



Dart

Build and test a Dart project with Pub.

```
pub get
pub run test
```

Android CI

Build an Android project with Gradle.

```
./gradlew build
```

Haskell

Build and test a Haskell project with Cabal.

```
cabal update
cabal install --only-dependencies --enable-tests
cabal configure --enable-tests
```

Go

Build a Go project.

```
go get -v -t -d ./...
if [ -f Gopkg.toml ]; then
curl
https://raw.githubusercontent.com/golang/dep/maste
r/install.sh | sh
```

Clojure

Build and test a Clojure project with Leiningen.

```
lein deps
lein test
```

Python application

Create and test a Python application.

```
python -m pip install --upgrade pip
pip install -r requirements.txt
pip install flake8
```

Use Cases

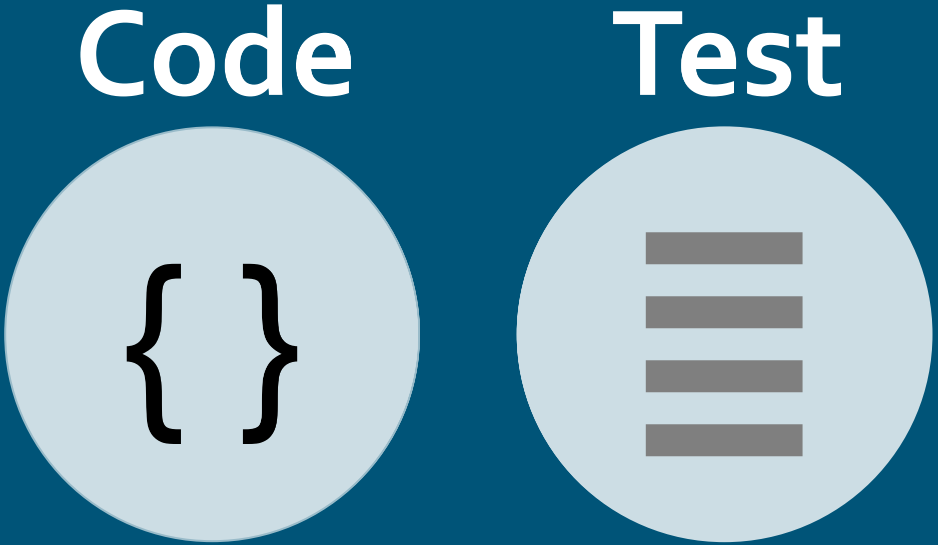
pic: © moovel

Use cases - Continuous Delivery

Code

{ }

Use cases - Continuous Delivery



Code

Test

Use cases - Continuous Delivery

Code

Test

Deploy

Use cases - Library publish

Test

Use cases - Library publish

Test

Package

Use cases - Library publish

Test

Package

Publish

Use cases - Self Hosted Runners

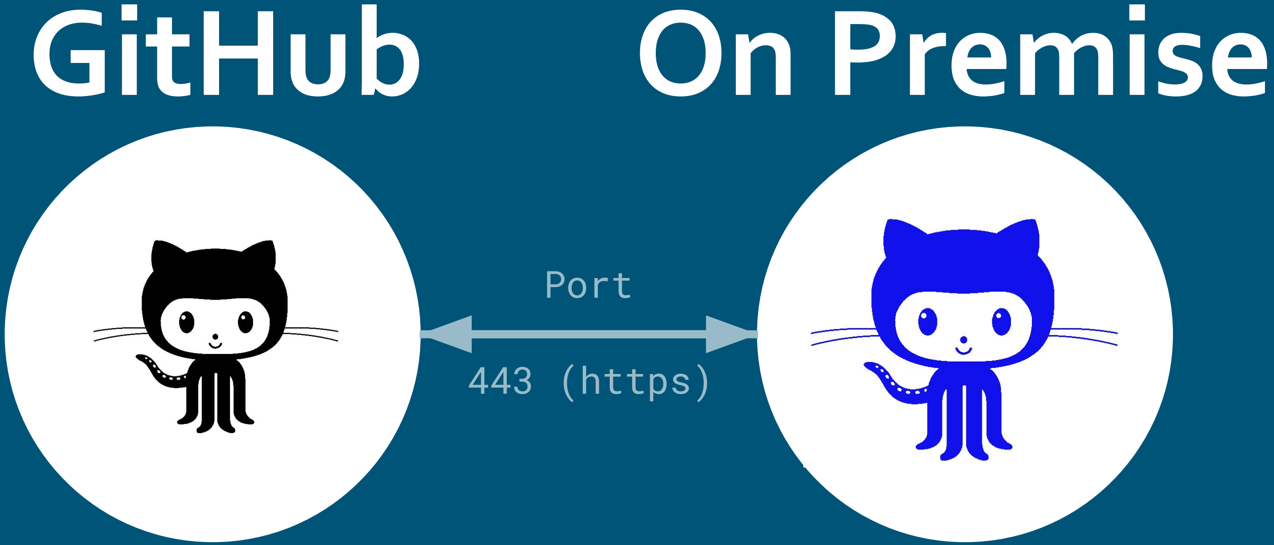
GitHub

Use cases - Self Hosted Runners

GitHub

On Premise

Use cases - Self Hosted Runners

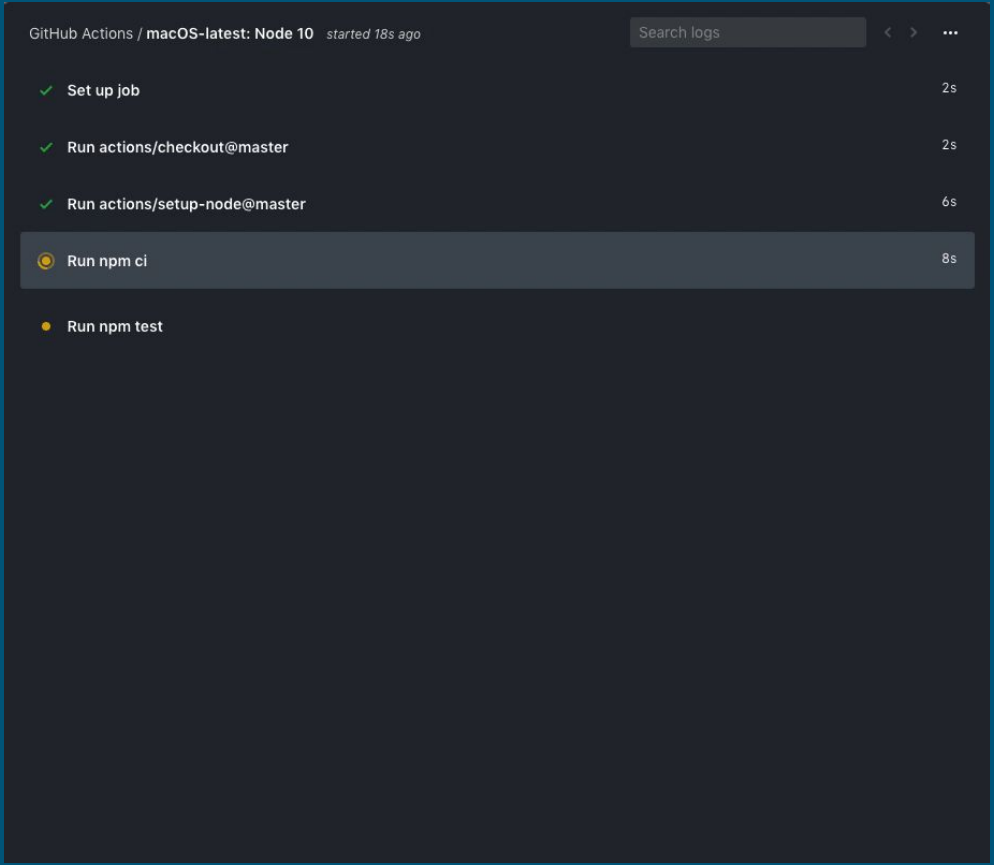


How To's

pic: © moovel

Logging

- Live Logs
- Terminal like feedback
- Searchable



GitHub Actions / **macOS-latest: Node 10** *started 18s ago*

✓ Set up job 2s

✓ Run actions/checkout@master 2s

✓ Run actions/setup-node@master 6s

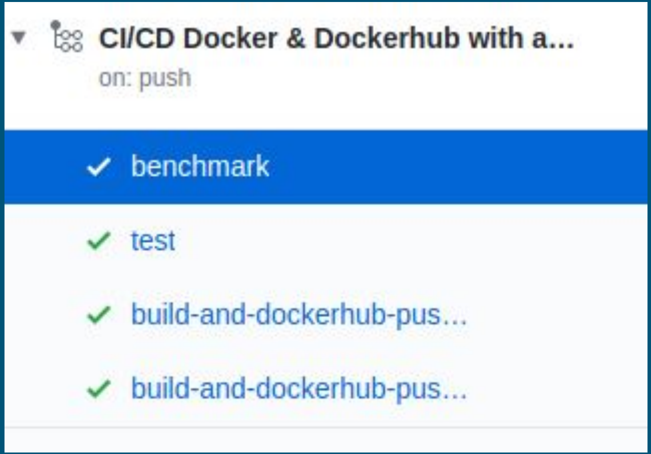
● Run npm ci 8s

● Run npm test

Jobs

Jobs can run at the same time in parallel or be dependent on the status of a previous job and run sequentially.

```
build-and-dockerhub-push-if-linux:
  needs: [benchmark, test]
```



▾ CI/CD Docker & Dockerhub with a...
on: push

✓ benchmark

✓ test

✓ build-and-dockerhub-pus...

✓ build-and-dockerhub-pus...

Conditionals

```
if: matrix.os == 'ubuntu-18.04'
```

Conditionals

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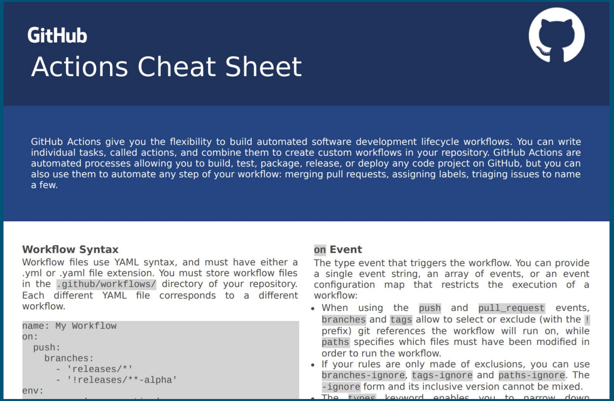
if: matrix.os == 'ubuntu-18.04'
```

Syntax anyone ?

Conditionals

```
if: matrix.os == 'ubuntu-18.04'
```

Syntax anyone ? You are covered: actions-cheat-sheet



GitHub
Actions Cheat Sheet

GitHub Actions give you the flexibility to build automated software development lifecycle workflows. You can write individual tasks, called actions, and combine them to create custom workflows in your repository. GitHub Actions are automated processes allowing you to build, test, package, release, or deploy any code project on GitHub, but you can also use them to automate any step of your workflow: merging pull requests, assigning labels, triaging issues to name a few.

Workflow Syntax

Workflow files use YAML syntax, and must have either a .yml or .yaml file extension. You must store workflow files in the `.github/workflows/` directory of your repository. Each different YAML file corresponds to a different workflow.

```
name: My Workflow
on:
  push:
    branches:
      - 'releases/*'
      - '!releases/**-alpha'
env:
```

`on` Event

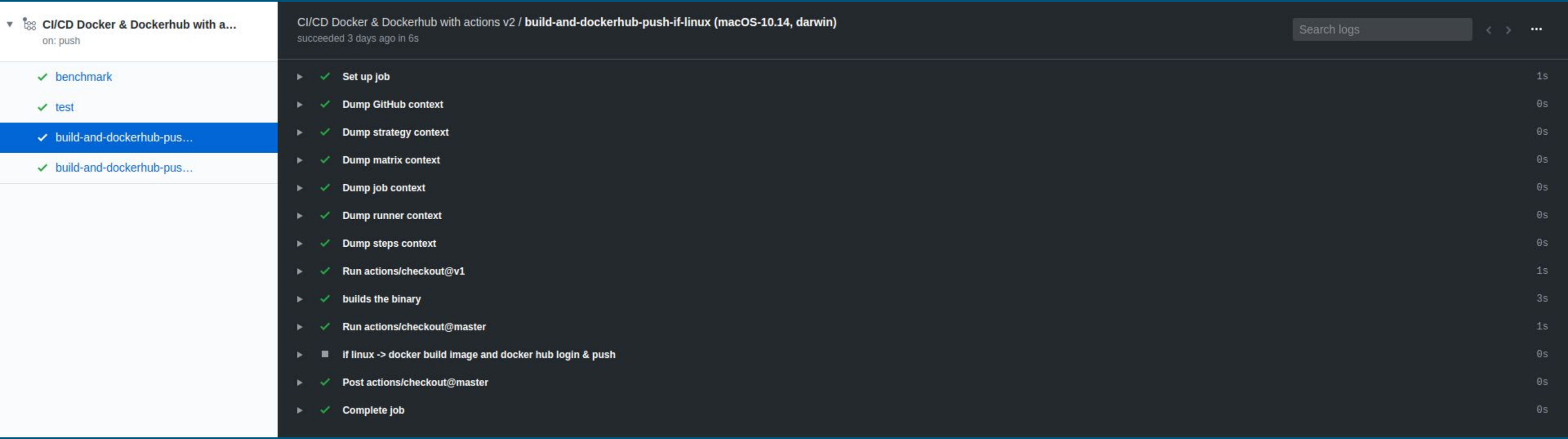
The type event that triggers the workflow. You can provide a single event string, an array of events, or an event configuration map that restricts the execution of a workflow:

- When using the `push` and `pull_request` events, `branches` and `tags` allow to select or exclude (with the `!` prefix) git references the workflow will run on, while `paths` specifies which files must have been modified in order to run the workflow.
- If your rules are only made of exclusions, you can use `branches-ignore`, `tags-ignore` and `paths-ignore`. The `-ignore` form and its inclusive version cannot be mixed.
- The `types` keyword enables you to narrow down

Matrix - Builds on Linux, macOS, Windows

```
strategy:
  fail-fast: false
  matrix:
    os: [macOS-10.14, ubuntu-18.04, windows-2019]
runs-on: ${{ matrix.os }}
```

Matrix



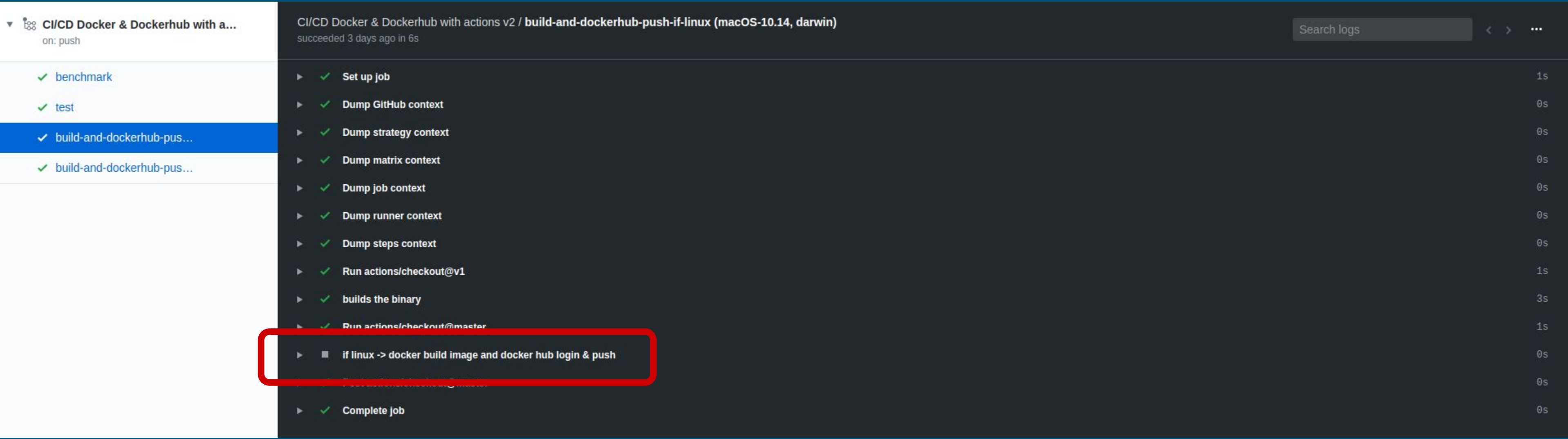
▾ CI/CD Docker & Dockerhub with a...
on: push

- ✓ benchmark
- ✓ test
- ✓ build-and-dockerhub-pus...
- ✓ build-and-dockerhub-pus...

CI/CD Docker & Dockerhub with actions v2 / **build-and-dockerhub-push-if-linux (macOS-10.14, darwin)**
succeeded 3 days ago in 6s

```
▸ ✓ Set up job                                                        1s
▸ ✓ Dump GitHub context                                               0s
▸ ✓ Dump strategy context                                             0s
▸ ✓ Dump matrix context                                               0s
▸ ✓ Dump job context                                                  0s
▸ ✓ Dump runner context                                               0s
▸ ✓ Dump steps context                                                0s
▸ ✓ Run actions/checkout@v1                                           1s
▸ ✓ builds the binary                                                 3s
▸ ✓ Run actions/checkout@master                                       1s
▸ ■ if linux -> docker build image and docker hub login & push        0s
▸ ✓ Post actions/checkout@master                                      0s
▸ ✓ Complete job                                                      0s
```

Matrix



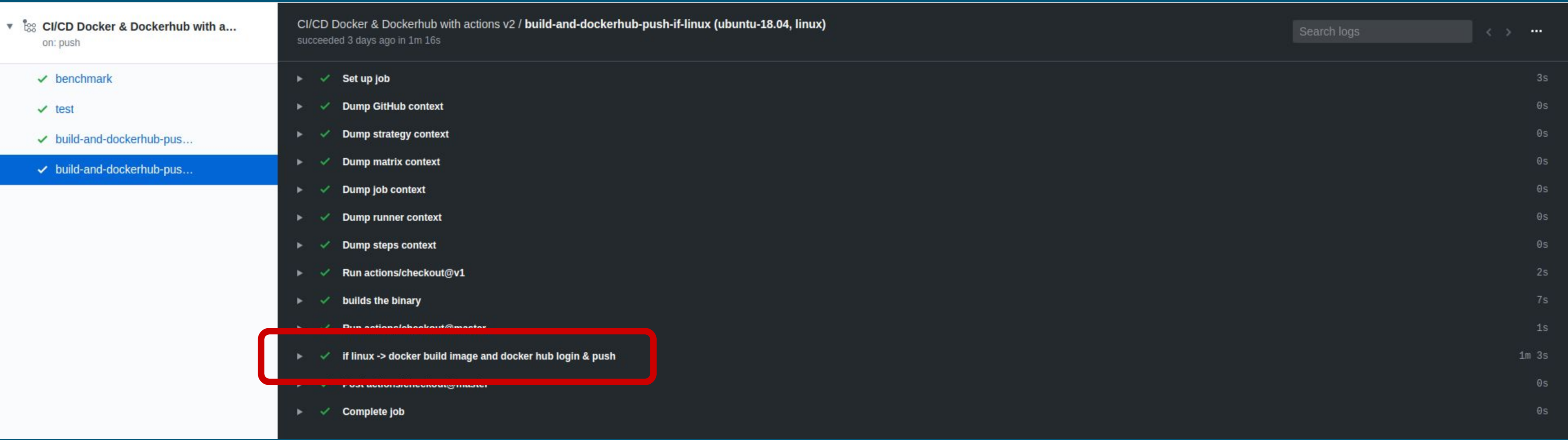
CI/CD Docker & Dockerhub with a...
on: push

✓ benchmark
✓ test
✓ build-and-dockerhub-pus...
✓ build-and-dockerhub-pus...

CI/CD Docker & Dockerhub with actions v2 / **build-and-dockerhub-push-if-linux (macOS-10.14, darwin)**
succeeded 3 days ago in 6s

```
▸ ✓ Set up job                                                  1s
▸ ✓ Dump GitHub context                                         0s
▸ ✓ Dump strategy context                                       0s
▸ ✓ Dump matrix context                                         0s
▸ ✓ Dump job context                                            0s
▸ ✓ Dump runner context                                         0s
▸ ✓ Dump steps context                                          0s
▸ ✓ Run actions/checkout@v1                                     1s
▸ ✓ builds the binary                                           3s
▸ ✓ Run actions/checkout@master                                 1s
▸ ■ if linux -> docker build image and docker hub login & push  0s
▸ ✓ Post actions/checkout@master                                0s
▸ ✓ Complete job                                                0s
```

Matrix



CI/CD Docker & Dockerhub with a...
on: push

- ✓ benchmark
- ✓ test
- ✓ build-and-dockerhub-pus...
- ✓ build-and-dockerhub-pus...

CI/CD Docker & Dockerhub with actions v2 / **build-and-dockerhub-push-if-linux (ubuntu-18.04, linux)**
succeeded 3 days ago in 1m 16s

```
▶ ✓ Set up job                                                      3s
▶ ✓ Dump GitHub context                                             0s
▶ ✓ Dump strategy context                                           0s
▶ ✓ Dump matrix context                                             0s
▶ ✓ Dump job context                                                0s
▶ ✓ Dump runner context                                             0s
▶ ✓ Dump steps context                                              0s
▶ ✓ Run actions/checkout@v1                                         2s
▶ ✓ builds the binary                                               7s
▶ ✓ Run actions/checkout@master                                     1s
▶ ✓ if linux -> docker build image and docker hub login & push   1m 3s
▶ ✓ Post actions/checkout@master                                    0s
▶ ✓ Complete job                                                    0s
```

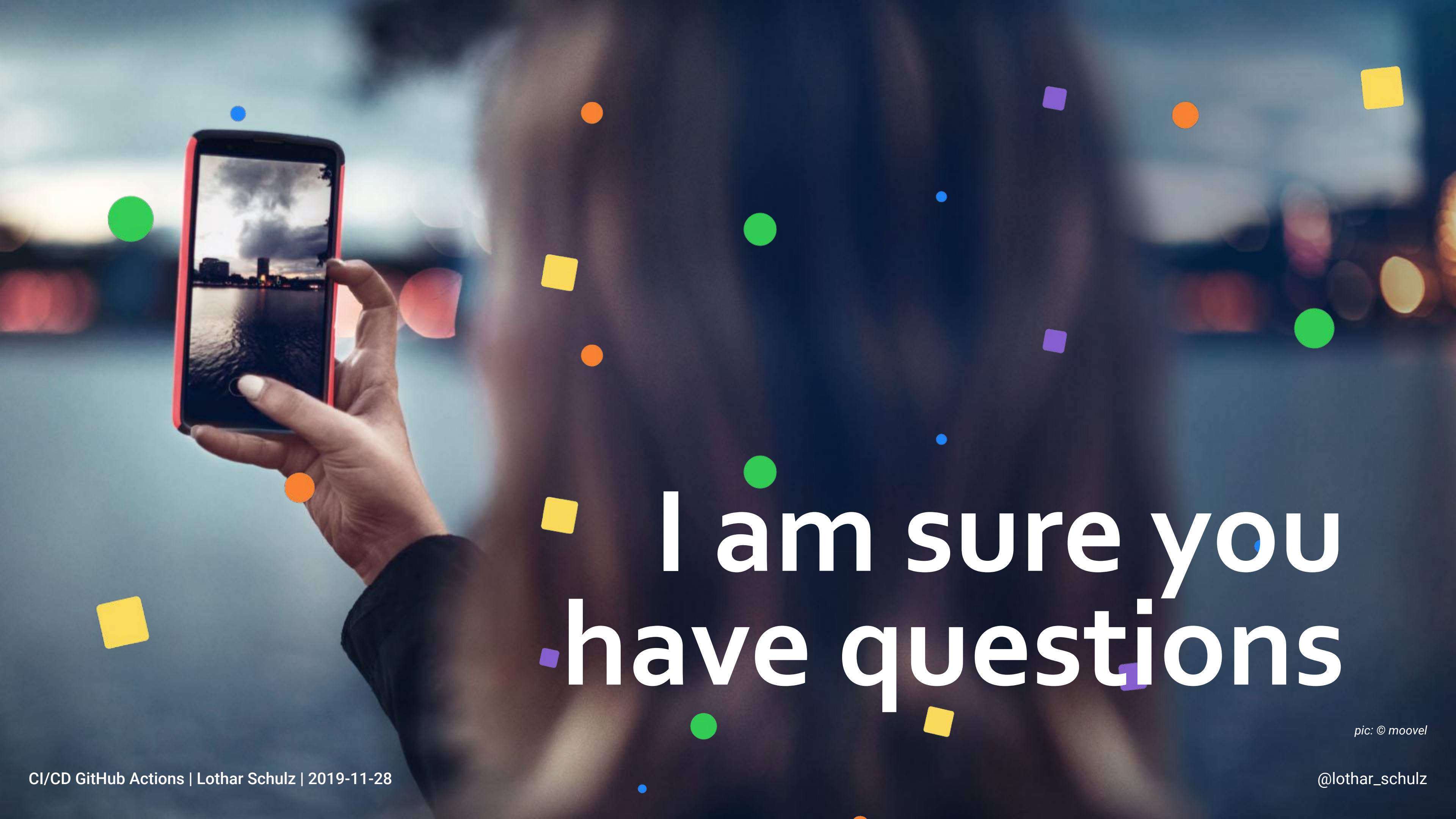
Demo

There is more

- Contexts available on run time
- Triggered by own events
- Package manager and gh docker registry integrated

There is even more

- Encrypted secrets
- Core concepts
- Self hosted runners for free (beta)



I am sure you have questions

pic: © moovel

THANK YOU.

pic: © moovel

More

https://www.lotharschulz.info/2019/08/26/ci-cd-with-github-actions-v2/

https://www.lotharschulz.info/2019/05/09/ci-cd-with-github-actions/

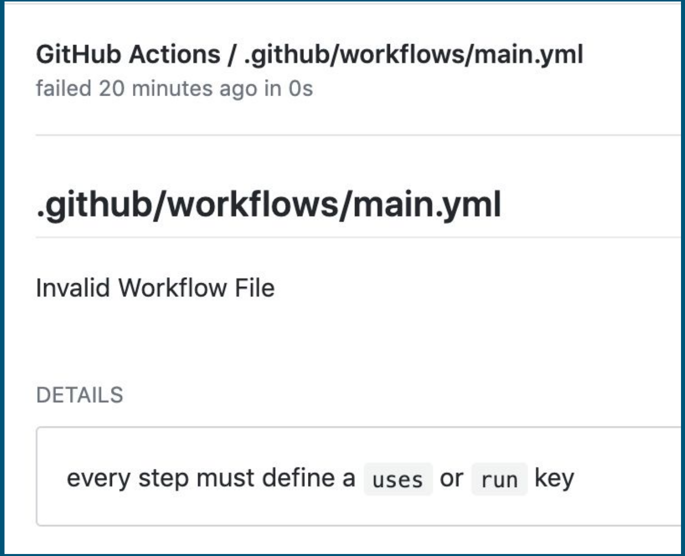
pic: © moovel

Backup

pic: © moovel

Surprise

```
test:
  runs-on: ubuntu-18.04
  steps:
  - uses: actions/checkout@v1
  - uses: actions/setup-java@v1
    with:
      java-version: 11
  - uses: eskatos/gradle-command-action@v1
    with:
      arguments: test
  - name: test the code
```



GitHub Actions / .github/workflows/main.yml

failed 20 minutes ago in 0s

.github/workflows/main.yml

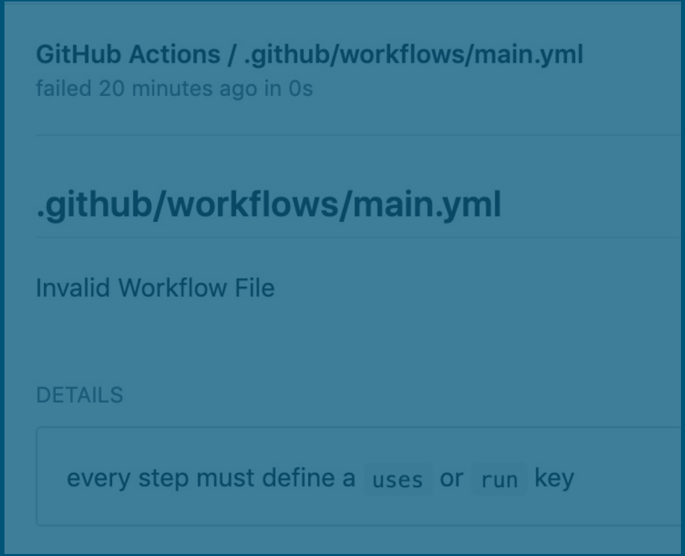
Invalid Workflow File

DETAILS

every step must define a `uses` or `run` key

Fix

```
  test:
    runs-on: ubuntu-18.04
    steps:
    - uses: actions/checkout@v1
    - uses: actions/setup-java@v1
      with:
        java-version: 11
    - uses: eskatos/gradle-command-action@v1
      with:
        arguments: test
#     - name: test the code
```



GitHub Actions / .github/workflows/main.yml

failed 20 minutes ago in 0s

.github/workflows/main.yml

Invalid Workflow File

DETAILS

every step must define a `uses` or `run` key

Matrix - Builds on Linux, macOS, Windows

```
    strategy:
      fail-fast: false
      matrix:
        os: [macOS-10.14,
ubuntu-18.04]
        goos: [linux, darwin]
        exclude:
          - os: macOS-10.14
            goos: linux
          - os: ubuntu-18.04
            goos: darwin
    runs-on: ${{ matrix.os }}
```

Matrix - Excludes

```
    strategy:
      fail-fast: false
      matrix:
        os: [macOS-10.14,
ubuntu-18.04]
        goos: [linux, darwin]
        exclude:
          - os: macOS-10.14
            goos: linux
          - os: ubuntu-18.04
            goos: darwin
    runs-on: ${{ matrix.os }}
```

```
exclude:
   - os: macOS-10.14
     goos: linux
   - os: ubuntu-18.04
      goos: darwin
```

Matrix - Includes & Excludes

```
    strategy:
      fail-fast: false
      matrix:
        os: [macOS-10.14,
ubuntu-18.04]
        goos: [linux, darwin]
        exclude:
          - os: macOS-10.14
            goos: linux
          - os: ubuntu-18.04
            goos: darwin
    runs-on: ${{ matrix.os }}
```

```
exclude:
   - os: macOS-10.14
     goos: linux
   - os: ubuntu-18.04
      goos: darwin
```

```
include:
  - os: macOS-10.14
    goos: darwin
  - os: ubuntu-18.04
    goos: linux
```

Matrix - Includes & Excludes

```
    strategy:
      fail-fast: false
      matrix:
        os: [macOS-10.14,
ubuntu-18.04]
        goos: [linux, darwin]
        exclude:
          - os: macOS-10.14
            goos: linux
          - os: ubuntu-18.04
            goos: darwin
    runs-on: ${{ matrix.os }}
```

```
exclude:
   - os: macOS-10.14
     goos: linux
   - os: ubuntu-18.04
      goos: darwin
```

```
include:
  - os: macOS-10.14
    goos: darwin
  - os: ubuntu-18.04
    goos: linux
```

!