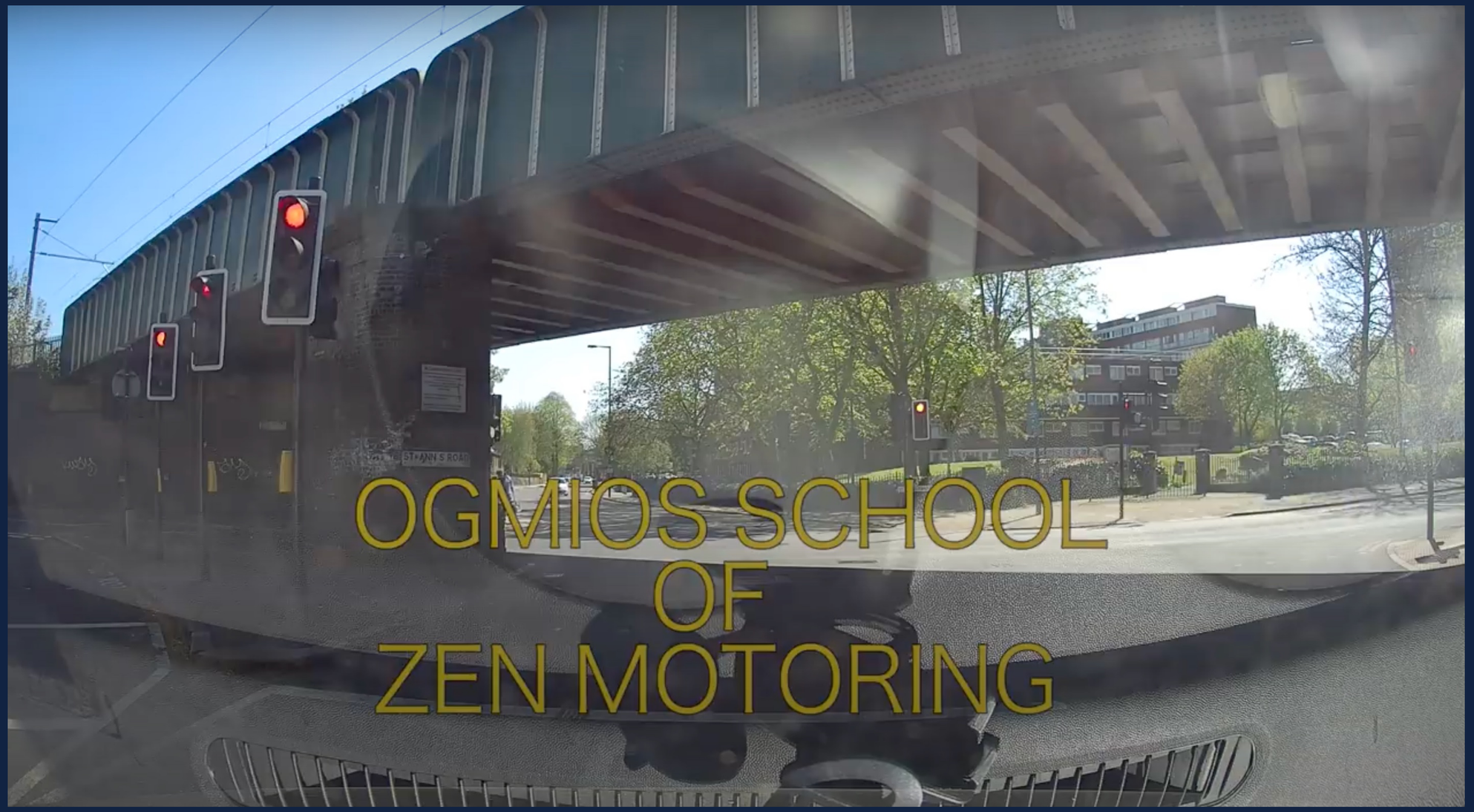
The Zen School of GitHub Actions

Jonathan Ruckwood
@jonruckwood

Lead Consultant, OpenCredo



@ogmiosmusic

“the beat-poet Attenborough”

@jonruckwood

GitHub Actions

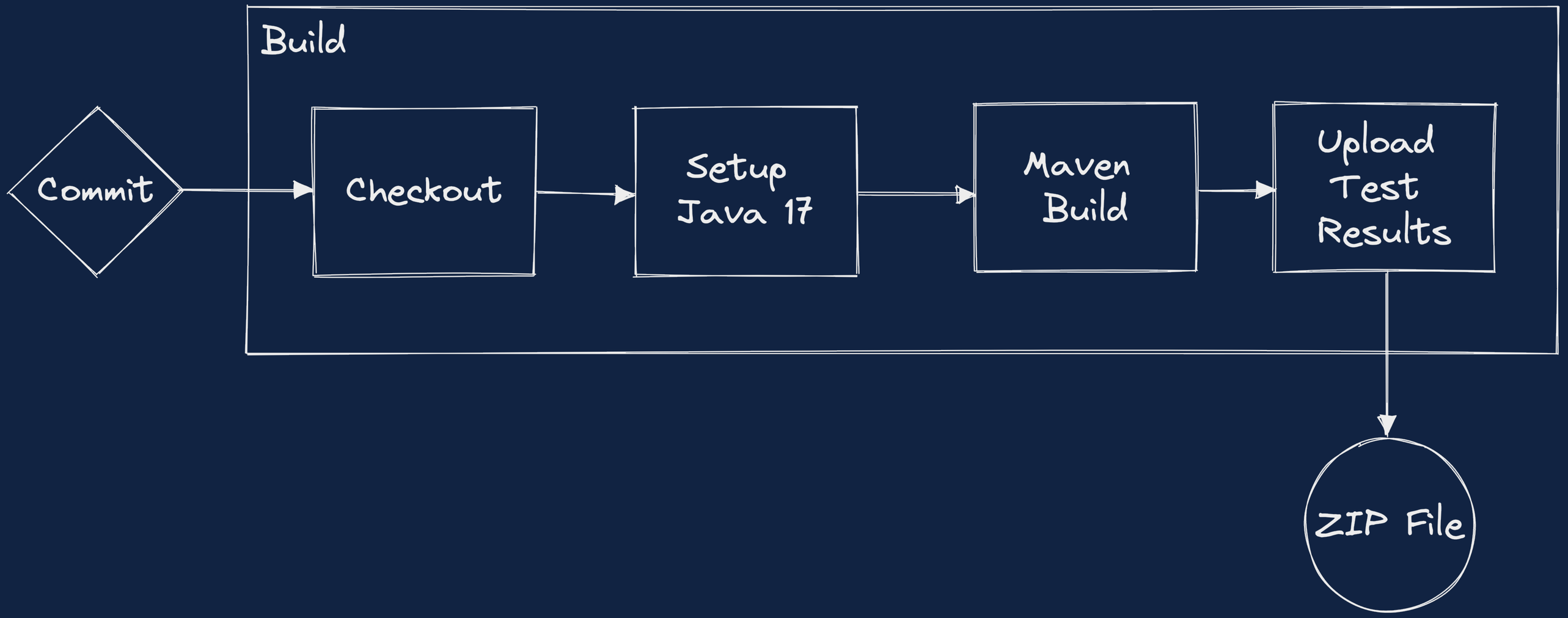
- Frustrating, unpredictable and unforgiving

A familiar experience...

Why?

- Low Friction
- Benefits smaller teams
- Thriving eco-system
- Well documented

Build a Maven Project



@jonruckwood

Triggering Events

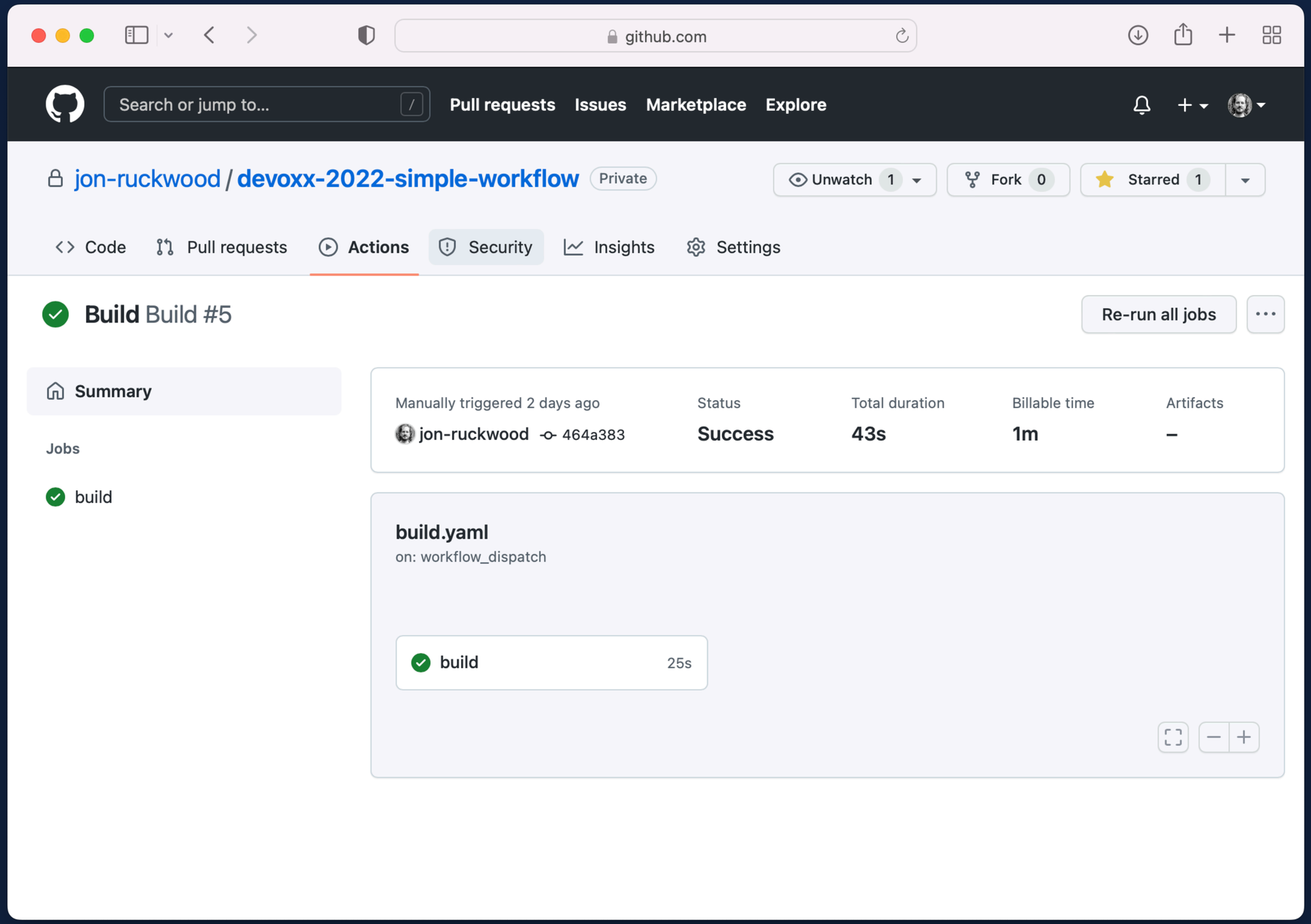
Jobs

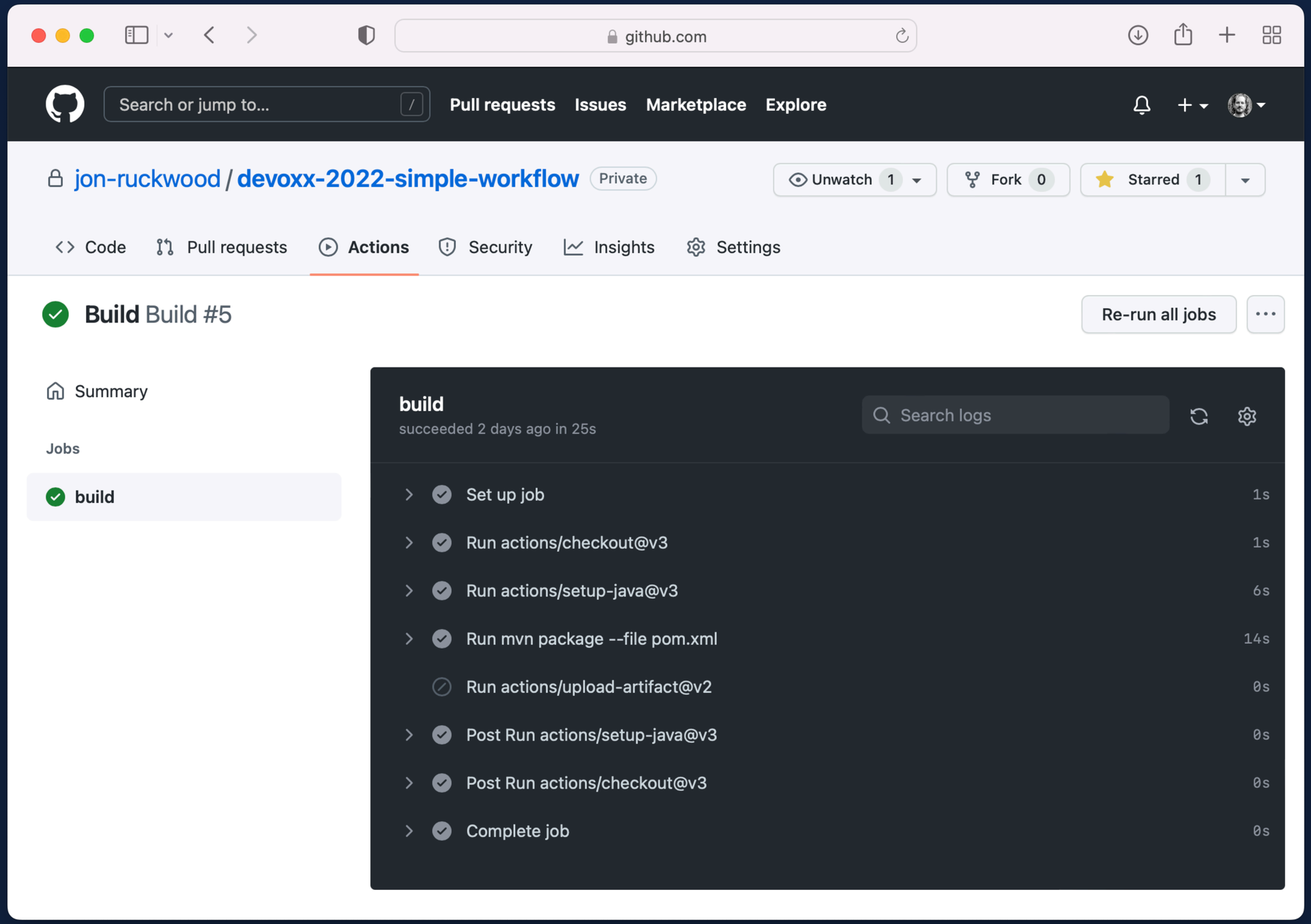
Steps

```yaml
name: Build

on:
  push:
    branches:
      - main

  workflow_dispatch:

jobs:

  build:

    runs-on: ubuntu-20.04

    steps:
      - uses: actions/checkout@v3

      - uses: actions/setup-java@v3
        with:
          java-version: 17
          distribution: 'zulu'
          cache: 'maven'

      - run: mvn package --file pom.xml

      - uses: actions/upload-artifact@v2
        if: ${{ failure() }}
        with:
          name: surefire-reports
          path: |
            **/target/surefire-reports/
```

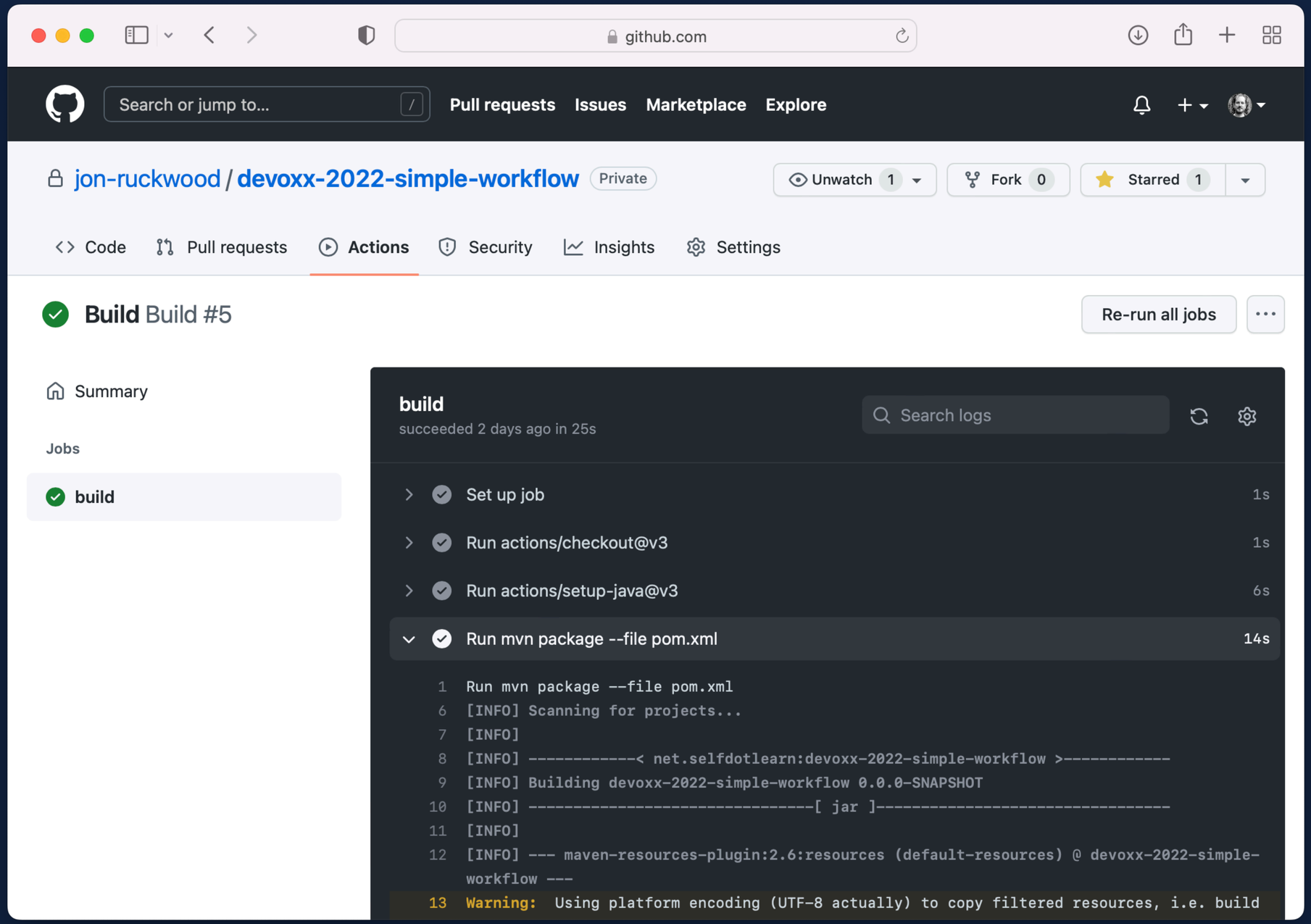
.github/workflows/build.yaml

@jonruckwood





@jonruckwood



@jonruckwood

Tips

Caching

- Save on compute and your time
- Free!
- Up to `10GB` per-repository
- Advanced usage: `actions/cache@v3`

Caching – Dependencies

```yaml
- uses: actions/setup-java@v3
  with:
    java-version: 17
    distribution: 'zulu'
    cache: 'maven'
```

Caching – Docker

```yaml
- uses: docker/setup-buildx-action@v1

# --8<--

- uses: docker/build-push-action@v2
  with:
    context: .
    push: true
    cache-from: type=gha
    cache-to: type=gha,mode=max
```

- `mode=max` – export all the layers of all intermediate steps
- Most benefit from Dockerfiles with multiple layers
  - E.g. Spring Boot Maven Plugin

Limits

- Execution time of Jobs and Steps
    - `timeout-minutes: 10`
- Concurrency
    - Fixed key – `concurrency: main`
    - Variable – `concurrency: ci-${{ github.ref }}`

Reuse & Composability

- Local action
  - `uses: .github/actions/my-first-action/action.yaml`
- Composite Action – an “action of actions”
- Reuse workflow from a different repository
  - `workflow_call`

Debug

- Add these secrets with value `true`
  - `ACTIONS_RUNNER_DEBUG`
  - `ACTIONS_STEP_DEBUG`

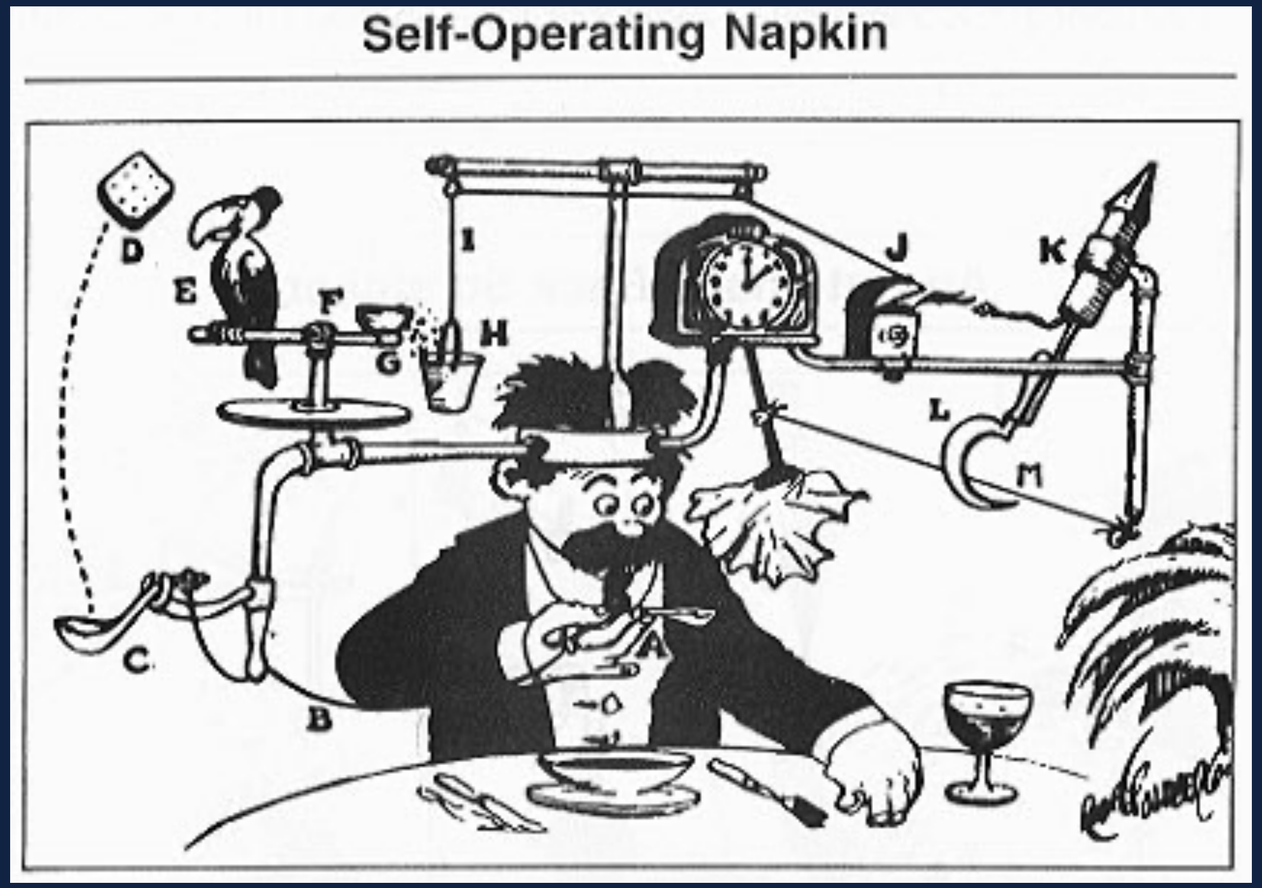
Act

- `act` – run your GitHub Actions locally
  - GitHub: nektos/act

```
# Run the default (`push`) event:
act

# Run a specific event:
act pull_request

# Run a specific job:
act -j test

# Run in dry-run mode:
act -n

# Pass in a secret:
act -s GITHUB_TOKEN=...
```

Design

Keep it simple



Keep it Lean

- Don’t bake in too much!
- Use external scripts
- Lean on build tools, e.g. Spring Boot plugin

You *need* a backup plan

Backup Plan

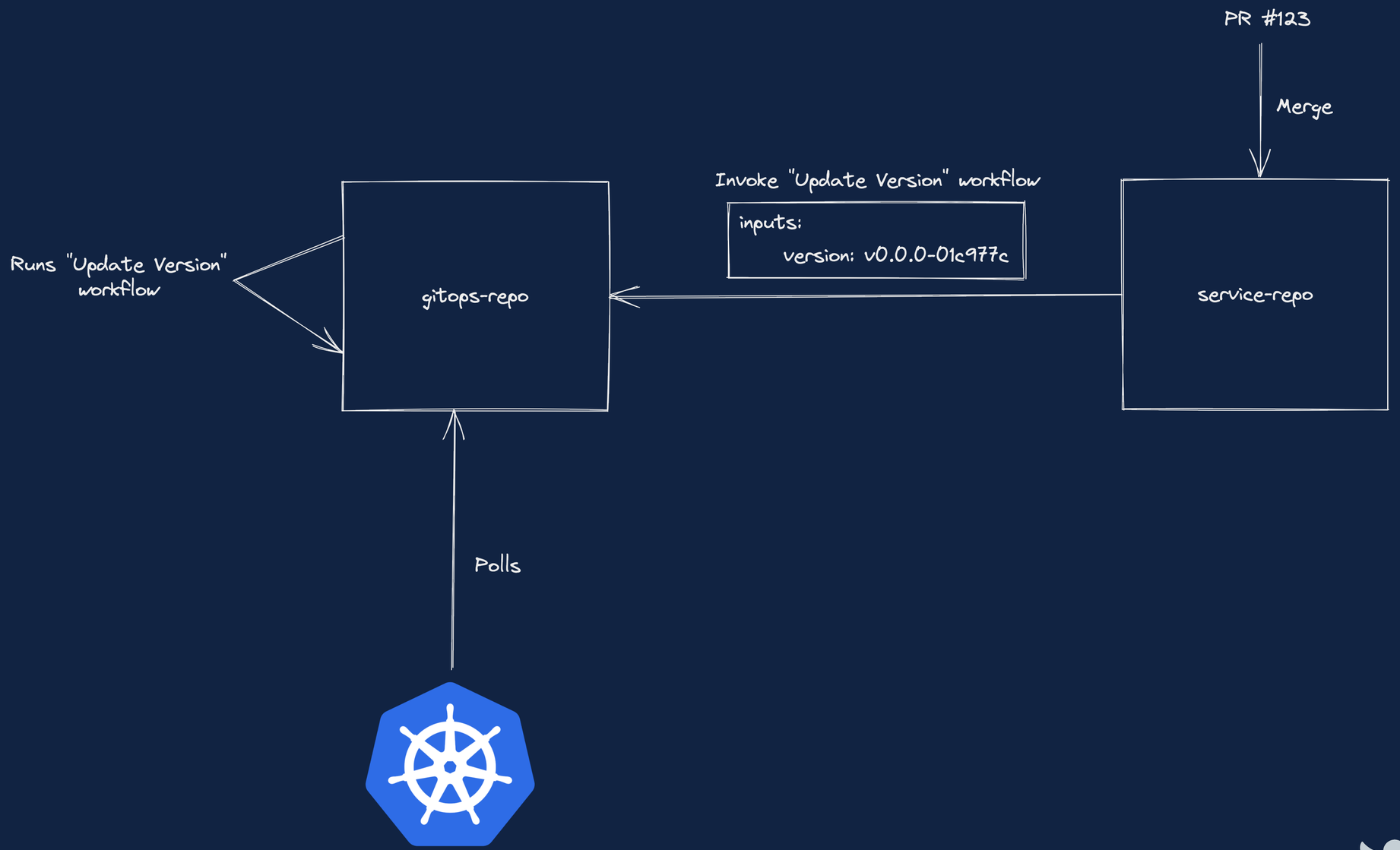
- Have a run-book for doing the essential things your workflow(s) but performed manually
- Printed out or documented on a wiki

Treat your repo as an API

Your repository as an API

- Treat the workflow as the *interface*
  - *Ask a repository to perform action – don't do it yourself!*
- Chaining workflows across repositories
  - `repository_dispatch` & `workflow_dispatch`

Example


PR #123
Merge
Invoke "Update Version" workflow
inputs:
version: v0.0.0-01c977c
Runs "Update Version" workflow
gitops-repo
service-repo
Polls

Coupling – Be aware!

- Cross-repository invocation
- Shared actions
- Shared workflows

Security

Hardening

- Do not trust the Marketplace
- You **must** follow GitHub’s security hardening guide
- Review your repository’s settings
  - Don’t allow workflows from fork PRs

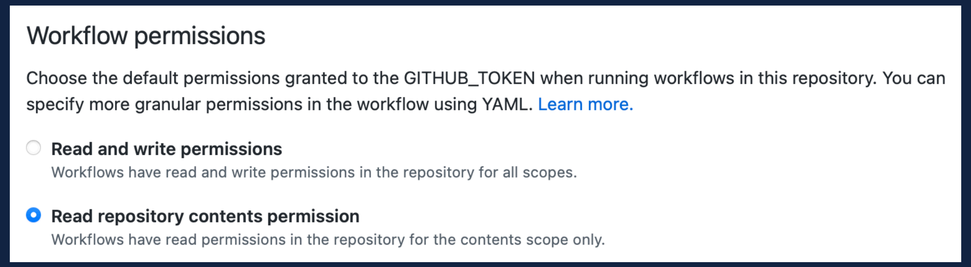
Pin to Action to SHA

```yaml
# ❌
uses: peter-evans/create-pull-request@v4.0.2

# ✅
uses: peter-evans/create-pull-request@bd72e1b7922d417764d27d30768117ad7da78a0e # => v4.0.2
```

Permissions

- Limit `GITHUB_TOKEN` permissions
- Set default for repository and GitHub organisation

```yaml
permissions:
  actions: read
  checks: read | write | none
  contents: read | write | none
  deployments: read | write | none
  id-token: read | write | none
  issues: read | write | none
  discussions: read | write | none
  packages: read | write | none
  pages: read | write | none
  pull-requests: read | write | none

# --8<--

permissions: read-all | write-all

# --8<--

permissions: {}
```



Consider

- Use a “Service Account” for things `GITHUB_TOKEN` cannot do
- Avoid long-lived secrets if interacting with things like AWS
  - OIDC provider for temporary session tokens

Security

- “How to use GitHub Actions with security in mind” – Rob Bos

Summary

- Understand there will be pain
- Don’t sweat the small stuff
- Don’t ignore security

README.md

devoxx-2022

About Me

- Twitter: `@jon-ruckwood`

The Zen School of GitHub Actions – Devoxx 2022

- Slides – The Zen School of GitHub Actions (PDF)

School of Zen Motoring

- Twitter: `@ogmiosmusic` / YouTube: `ogmiosmusic` / BBC iPlayer: Zen Motoring

Code Samples

- Simple workflow – `jon-ruckwood/devoxx-2022-simple-workflow`
- Cross-repository workflows:
  - Service repository – `jon-ruckwood/devoxx-2022-service`
  - GitOps repository – `jon-ruckwood/devoxx-2022-infrastructure`

Resources

- `act` run your GitHub Actions locally – nektos/act
- Security hardening for GitHub Actions – https://docs.github.com/en/actions/security-guides/security-hardening-for-github-actions
- How to use GitHub Actions with security in mind by Rob Bos – https://www.youtube.com/watch?v=Ers-LcA7Nmc

GitHub: jon-ruckwood/devoxx-2022

Thank you :-)

Jonathan Ruckwood
@jonruckwood

Lead Consultant, OpenCredo

GitHub: jon-ruckwood/devoxx-2022