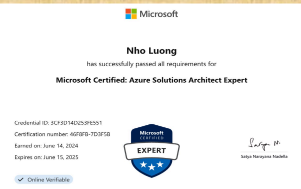
# Introduction to GitHub Actions

Author: Nho Luong

Skill: DevOps Engineer Lea



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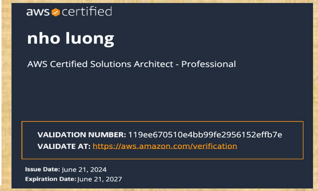

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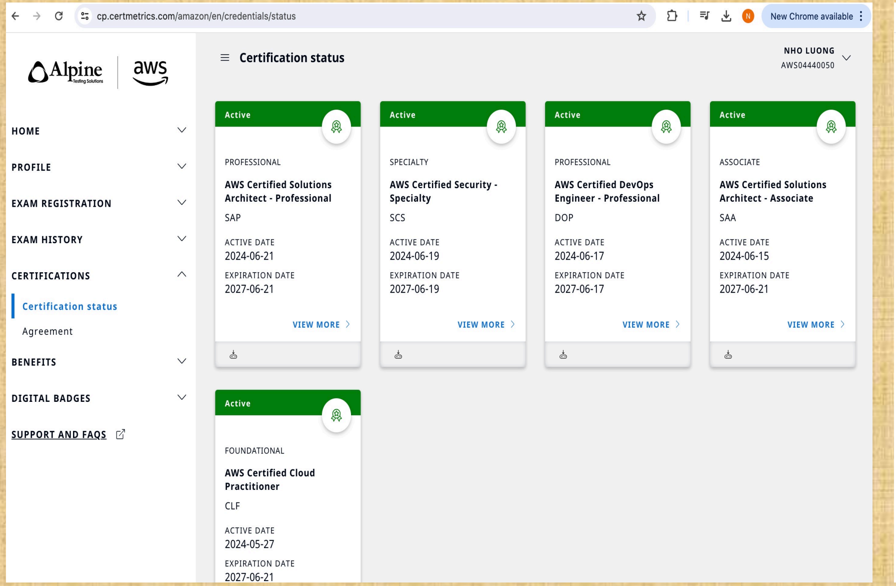

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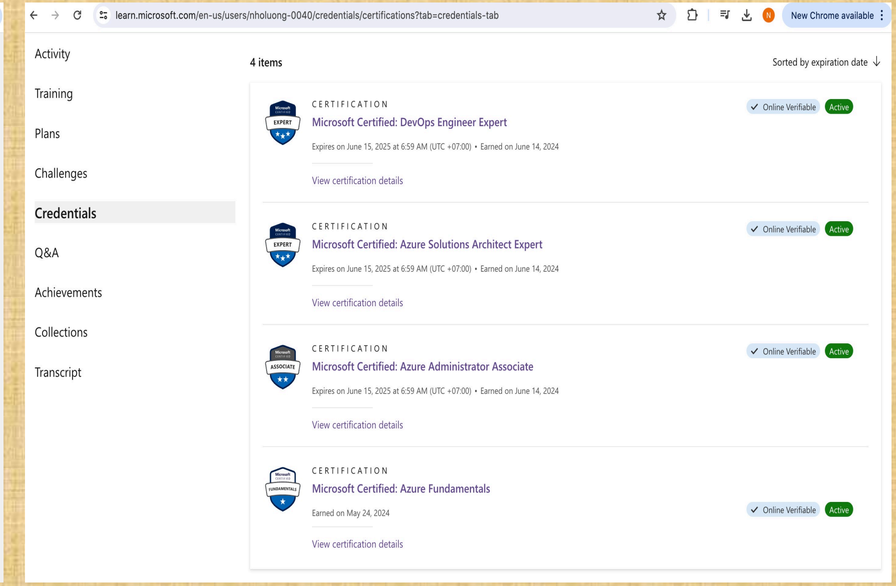

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How did we do CI/CD for GitHub?

What are GitHub Actions?

How do I write my own Custom Action?

Author: Nho Luong
Skill: DevOps Engineer Lead

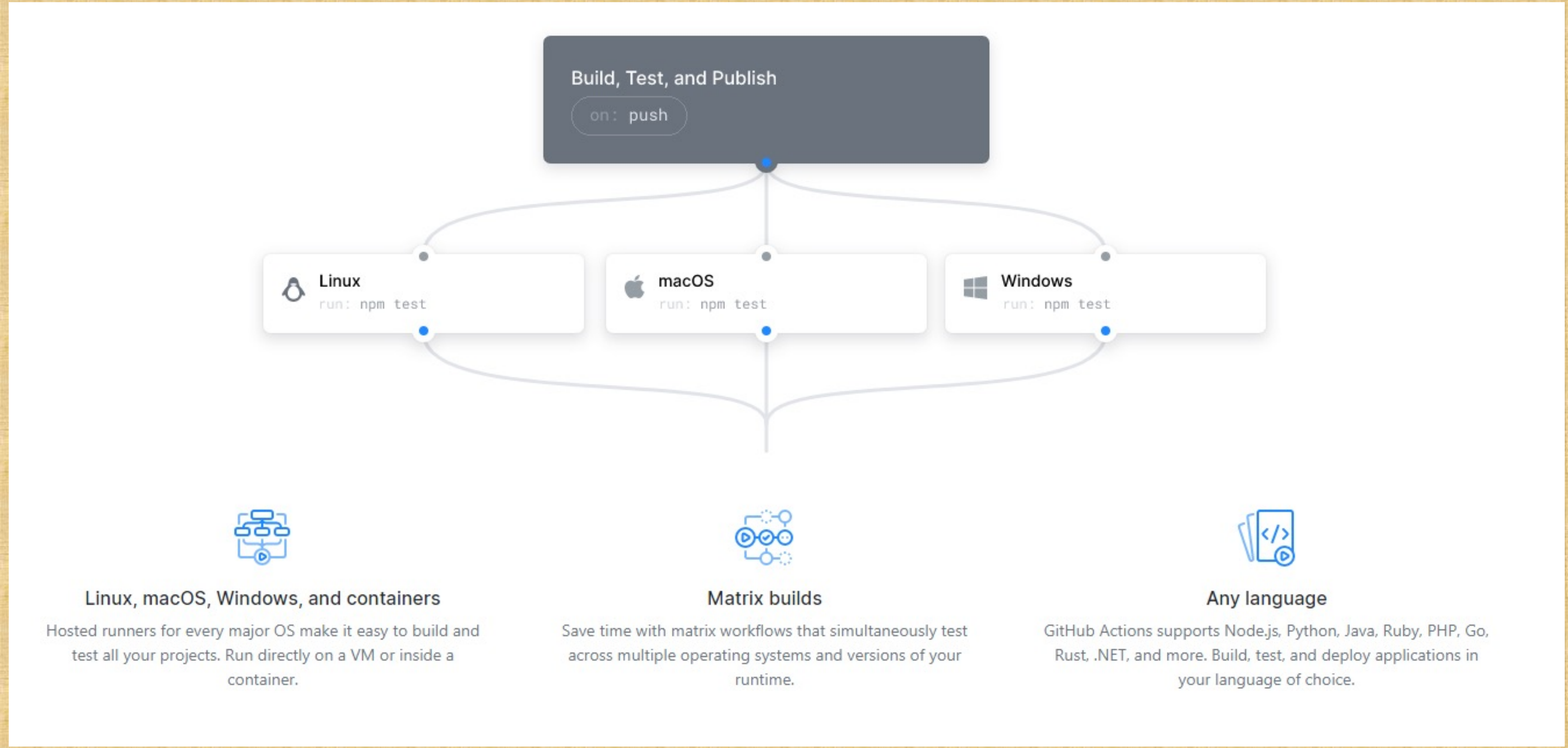
# How did we do CI/CD for GitHub?

Author: Nho Luong
Skill: DevOps Engineer Lead

# What are GitHub Actions?

Author: Nho Luong
Skill: DevOps Engineer Lead

# Run a workflow on any GitHub event



Build, Test, and Publish

on: push

Linux
run: npm test

macOS
run: npm test

Windows
run: npm test

### Linux, macOS, Windows, and containers

Hosted runners for every major OS make it easy to build and test all your projects. Run directly on a VM or inside a container.

### Matrix builds

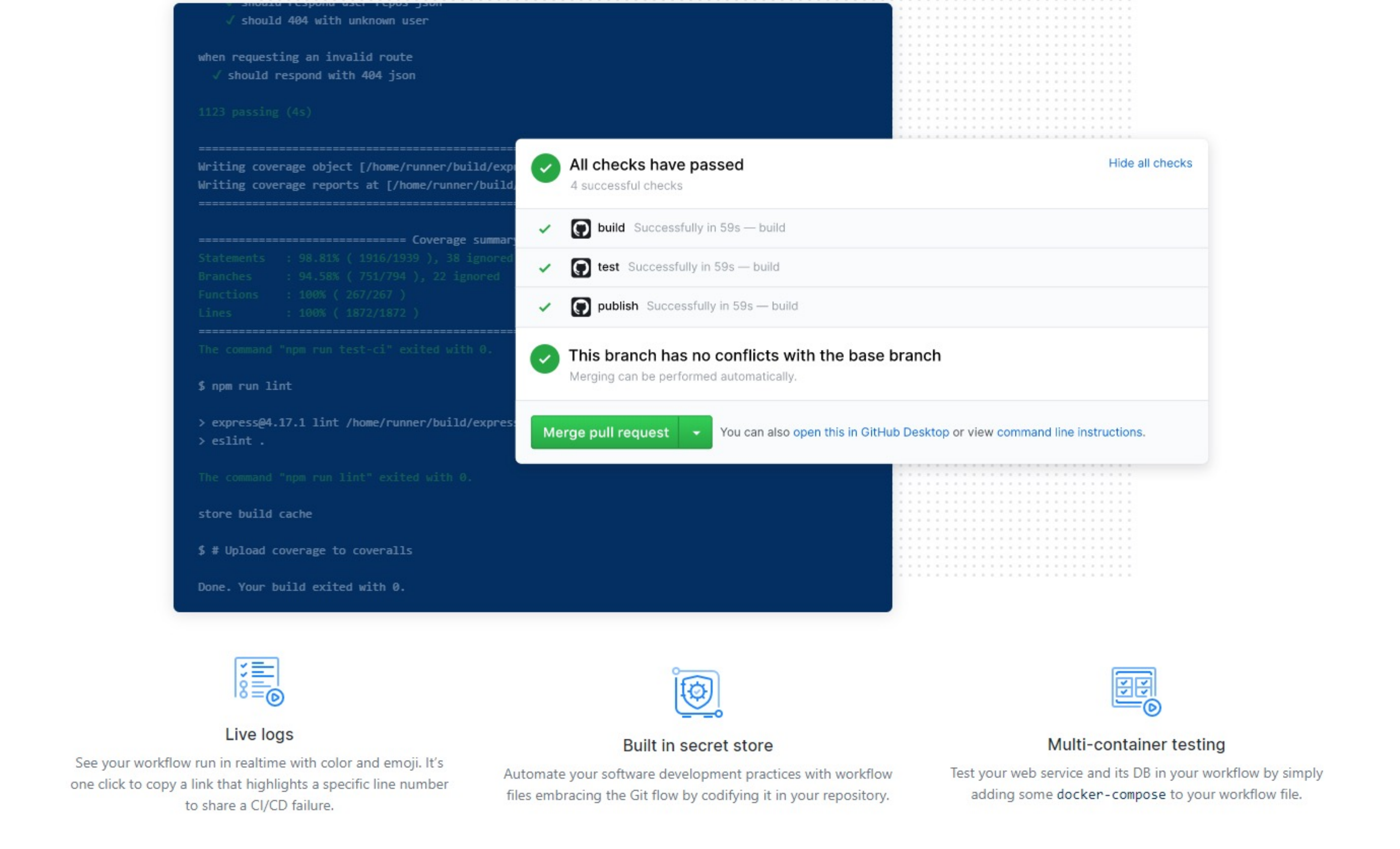
Save time with matrix workflows that simultaneously test across multiple operating systems and versions of your runtime.

### Any language

GitHub Actions supports Node.js, Python, Java, Ruby, PHP, Go, Rust, .NET, and more. Build, test, and deploy applications in your language of choice.

Author: Nho Luong
Skill: DevOps Engineer Lead

# Built to Scale



```
    ✓ should respond user repos json
    ✓ should 404 with unknown user

  when requesting an invalid route
    ✓ should respond with 404 json

  1123 passing (4s)

=============================================
Writing coverage object [/home/runner/build/exp
Writing coverage reports at [/home/runner/build/
=============================================

============================== Coverage summar
Statements   : 98.81% ( 1916/1939 ), 38 ignored
Branches     : 94.58% ( 751/794 ), 22 ignored
Functions    : 100% ( 267/267 )
Lines        : 100% ( 1872/1872 )
=============================================
The command "npm run test-ci" exited with 0.

$ npm run lint

> express@4.17.1 lint /home/runner/build/expres
> eslint .

The command "npm run lint" exited with 0.

store build cache

$ # Upload coverage to coveralls

Done. Your build exited with 0.
```

All checks have passed

4 successful checks

✓ build Successfully in 59s — build

✓ test Successfully in 59s — build

✓ publish Successfully in 59s — build

This branch has no conflicts with the base branch

Merging can be performed automatically.

You can also open this in GitHub Desktop or view command line instructions.

### Live logs

See your workflow run in realtime with color and emoji. It's one click to copy a link that highlights a specific line number to share a CI/CD failure.

### Built in secret store

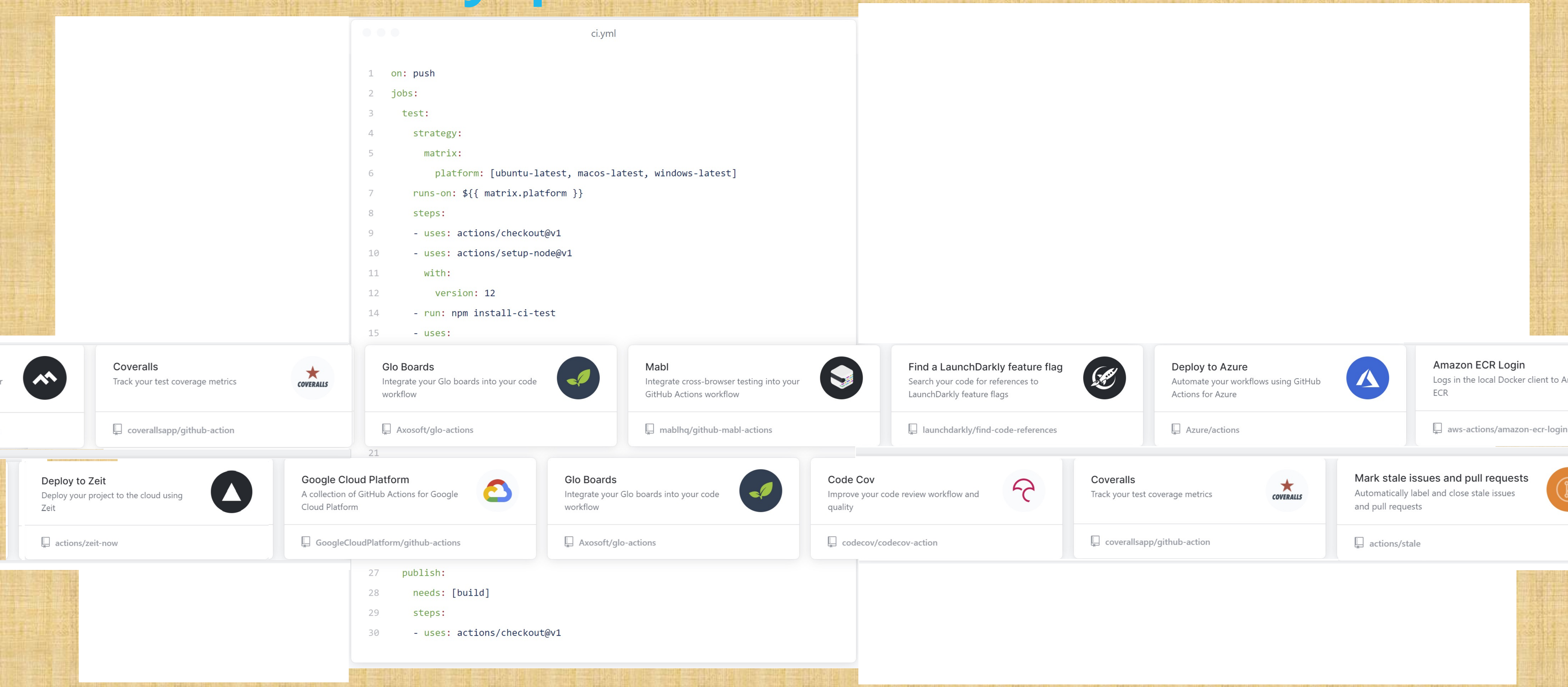
Automate your software development practices with workflow files embracing the Git flow by codifying it in your repository.

### Multi-container testing

Test your web service and its DB in your workflow by simply adding some `docker-compose` to your workflow file.

Author: Nho Luong
Skill: DevOps Engineer Lead

# Community-powered workflows



ci.yml

```yaml
on: push
jobs:
  test:
    strategy:
      matrix:
        platform: [ubuntu-latest, macos-latest, windows-latest]
    runs-on: ${{ matrix.platform }}
    steps:
    - uses: actions/checkout@v1
    - uses: actions/setup-node@v1
      with:
        version: 12
    - run: npm install-ci-test
    - uses:
```

```yaml
  publish:
    needs: [build]
    steps:
    - uses: actions/checkout@v1
```

**Coveralls**
Track your test coverage metrics
coverallsapp/github-action

**Glo Boards**
Integrate your Glo boards into your code workflow
Axosoft/glo-actions

**Mabl**
Integrate cross-browser testing into your GitHub Actions workflow
mablhq/github-mabl-actions

**Find a LaunchDarkly feature flag**
Search your code for references to LaunchDarkly feature flags
launchdarkly/find-code-references

**Deploy to Azure**
Automate your workflows using GitHub Actions for Azure
Azure/actions

**Amazon ECR Login**
Logs in the local Docker client to A
ECR
aws-actions/amazon-ecr-login

**Deploy to Zeit**
Deploy your project to the cloud using Zeit
actions/zeit-now

**Google Cloud Platform**
A collection of GitHub Actions for Google Cloud Platform
GoogleCloudPlatform/github-actions

**Glo Boards**
Integrate your Glo boards into your code workflow
Axosoft/glo-actions

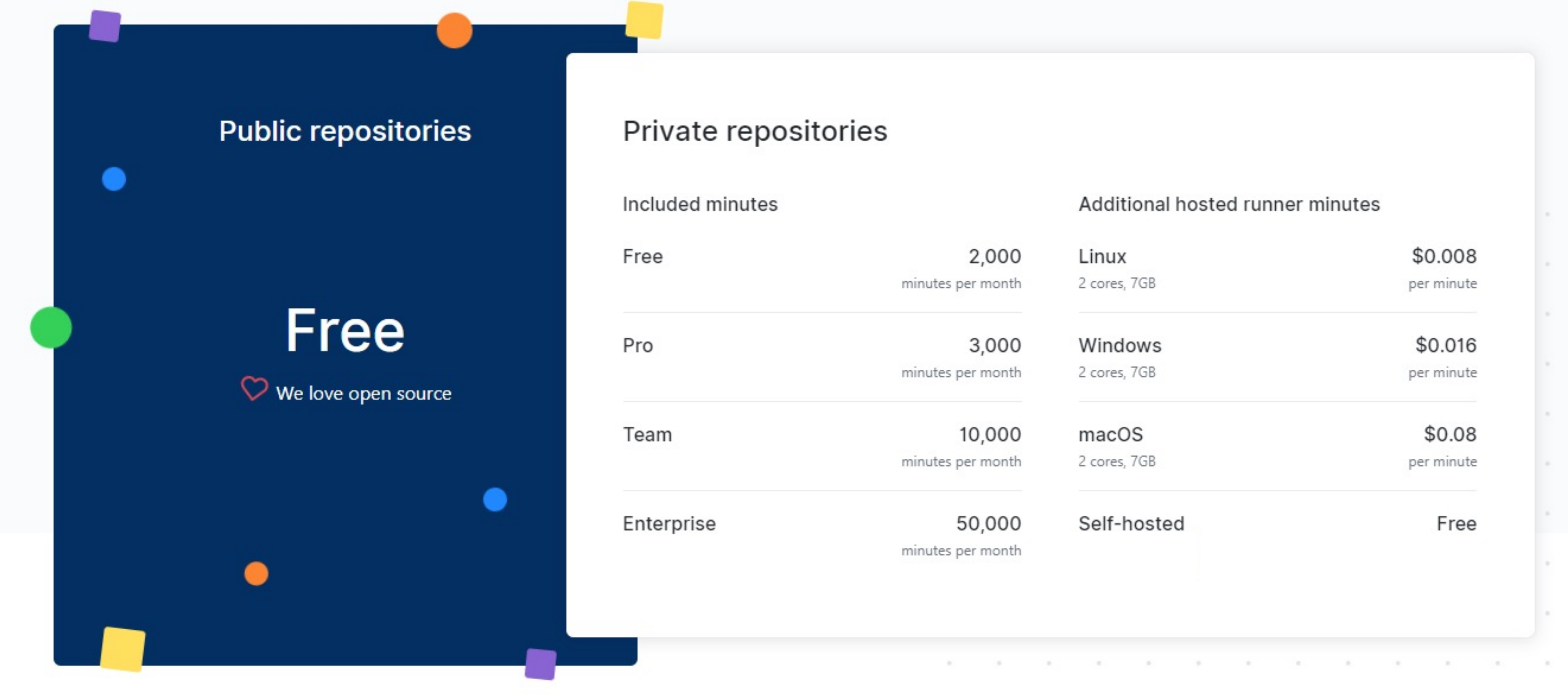
**Code Cov**
Improve your code review workflow and quality
codecov/codecov-action

**Coveralls**
Track your test coverage metrics
coverallsapp/github-action

**Mark stale issues and pull requests**
Automatically label and close stale issues and pull requests
actions/stale

Author: Nho Luong
Skill: DevOps Engineer Lead

# Simple, pay-as-you-go pricing



## Public repositories

Free

♡ We love open source

## Private repositories

| Included minutes | | Additional hosted runner minutes | |
|---|---|---|---|
| Free | 2,000<br>minutes per month | Linux<br>2 cores, 7GB | $0.008<br>per minute |
| Pro | 3,000<br>minutes per month | Windows<br>2 cores, 7GB | $0.016<br>per minute |
| Team | 10,000<br>minutes per month | macOS<br>2 cores, 7GB | $0.08<br>per minute |
| Enterprise | 50,000<br>minutes per month | Self-hosted | Free |

# Demo: Your first Workflow

# A Sample Workflow

```
on:
        push:
                branches:
                        - master
jobs:
        build-and-deploy:
        name: Build and Deploy
        runs-on: ${{ matrix.os }}
        strategy:
                matrix:
                        node_version: ['8', '10', '12']
                        os: [ubuntu-latest, windows-latest, macOS-latest]
steps:
        - uses: actions/checkout@v2
        - name: Use Node.js ${{ env.NODE_VERSION }}
          uses: actions/setup-node@v1
          with:
                node-version: ${{ env.NODE_VERSION }}
        - name: npm install, build, and test
          run: |
                npm install
                npm run build --if-present
                npm run test --if-present
```

What event triggers the workflow?

Where does it run?

What gets run?

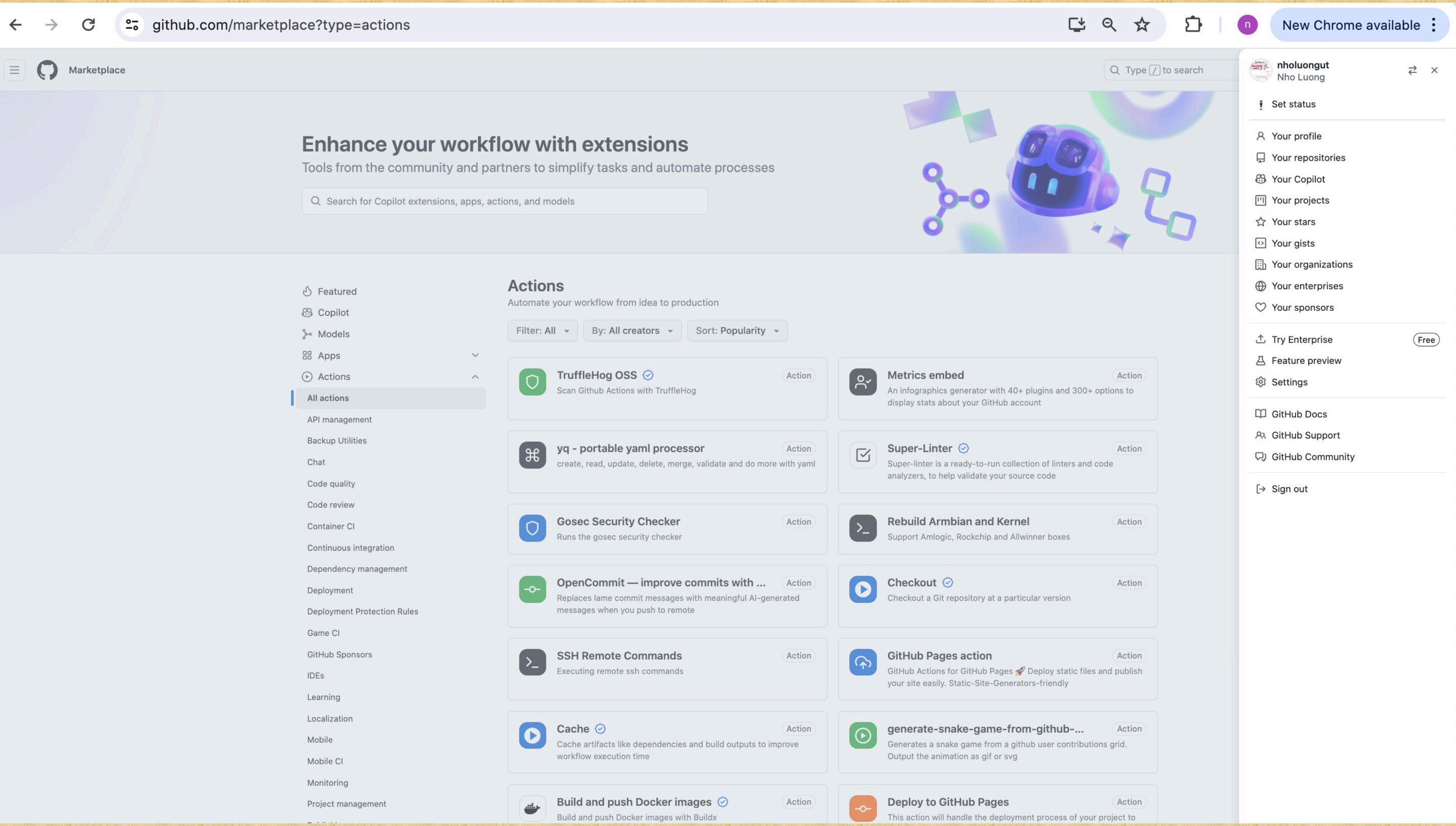
# How do I write my own Custom Action?

Author: Nho Luong
Skill: DevOps Engineer Lead

# Why might you want a custom action?

- Control over logical flow
- Use of custom tools not present on the agent
- Aid management of complexity
- Code reuse

# Before you start, remember the Marketplace



github.com/marketplace?type=actions

## Enhance your workflow with extensions

Tools from the community and partners to simplify tasks and automate processes

Search for Copilot extensions, apps, actions, and models

### Actions

Automate your workflow from idea to production

Filter: All | By: All creators | Sort: Popularity

- **TruffleHog OSS** — Action — Scan Github Actions with TruffleHog
- **Metrics embed** — Action — An infographics generator with 40+ plugins and 300+ options to display stats about your GitHub account
- **yq - portable yaml processor** — Action — create, read, update, delete, merge, validate and do more with yaml
- **Super-Linter** — Action — Super-linter is a ready-to-run collection of linters and code analyzers, to help validate your source code
- **Gosec Security Checker** — Action — Runs the gosec security checker
- **Rebuild Armbian and Kernel** — Action — Support Amlogic, Rockchip and Allwinner boxes
- **OpenCommit — improve commits with ...** — Action — Replaces lame commit messages with meaningful AI-generated messages when you push to remote
- **Checkout** — Action — Checkout a Git repository at a particular version
- **SSH Remote Commands** — Action — Executing remote ssh commands
- **GitHub Pages action** — Action — GitHub Actions for GitHub Pages 🚀 Deploy static files and publish your site easily. Static-Site-Generators-friendly
- **Cache** — Action — Cache artifacts like dependencies and build outputs to improve workflow execution time
- **generate-snake-game-from-github-...** — Action — Generates a snake game from a github user contributions grid. Output the animation as gif or svg
- **Build and push Docker images** — Action — Build and push Docker images with Buildx
- **Deploy to GitHub Pages** — Action — This action will handle the deployment process of your project to

Author: Nho Luong
Skill: DevOps Engineer Lead

# What do I write my action in?

## JavaScript

- Fast to load
- Runs directly on Agent
- SDK for Workflows API
- Templates available
- But requires correct setup

## Docker

- Flexible, any tools any language
- Built at runtime or loaded from Docker Registry
- Consistent results
- Slower to start

Author: Nho Luong
Skill: DevOps Engineer Lead

# Anatomy of an Action.yaml file

```
name: 'Apply Version to JSON file'
description: 'Adds a version number to a field in a JSON file'
author: 'Richard Fennell'
inputs:
        Path:
                description: 'Source folder Filter (folder under GITHUB_WORKSPACE)'
                default: ''
                required: false
        VersionNumber:
                 description: 'Version Number'
                 default: ''
                 required: true
outputs:
        FileUpdated:
                description: 'The name of the file updated'
runs:
        using: ’docker'
        main: ’docker://image:tag'
branding:
        icon: 'file-text'
        color: 'green'
```

# But I have some custom Azure DevOps Pipeline Tasks.

# Can I reuse them?

Author: Nho Luong
Skill: DevOps Engineer Lead

# What is a good candidate?

- Should be written in Node.JS
- Can’t make use of Azure DevOps specific APIs
- Must do something that is useful in GitHub workflows

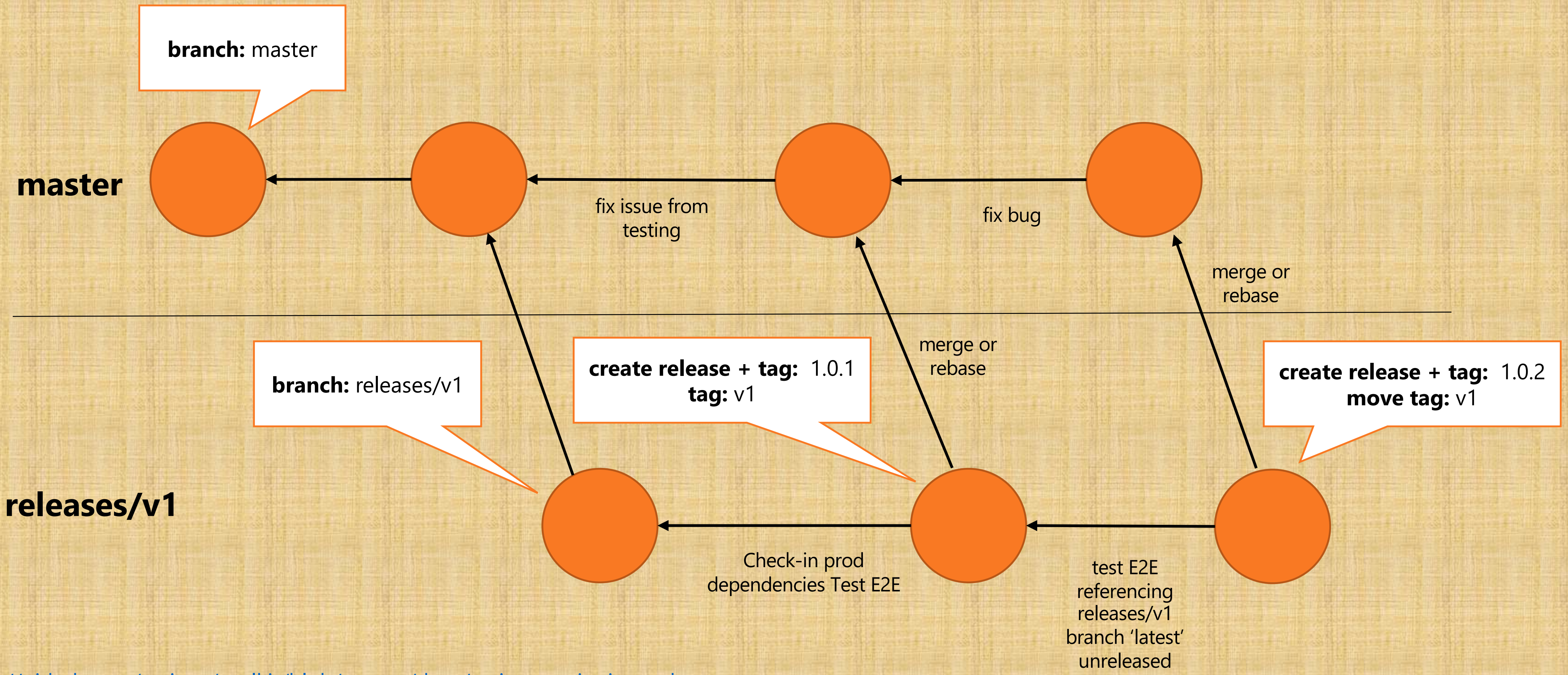
# How did I write my own Custom Action?

- Create a new repo from the template generator
  https://github.com/actions/typescript-action
- Copied in my task code into the repo bit by bit
  - Removed any Azure DevOps specific code that was not needed
  - Swapped the references to “vsts-task-lib/task” to “@actions/core”
  - Swapped tests from Mocha/Chai to Jest
  - Added running of TSLint to the build process
- Updated the action manifest to expose parameters

# Adding a Release Branch

```
# comment out in distribution branches
# node_modules/
$ git checkout -b releases/v1
$ npm prune --production
$ git add node_modules
$ git commit -a -m "prod dependencies"
$ git push origin releases/v1
```

# Versioning your Action Updates



**branch:** master

master

fix issue from testing

fix bug

merge or rebase

merge or rebase

**branch:** releases/v1

**create release + tag:** 1.0.1
**tag:** v1

**create release + tag:** 1.0.2
**move tag:** v1

releases/v1

Check-in prod dependencies Test E2E

test E2E referencing releases/v1 branch 'latest' unreleased

Based on https://github.com/actions/toolkit/blob/master/docs/action-versioning.md

Author: Nho Luong
Skill: DevOps Engineer Lead

# How to use your action in a workflow?

```
steps:
    - uses: ./ # Uses a private action in the root directory of workflow repo
    - uses: rfennell/JSONFileVersioner@74bc508 # a specific commit of a public action
    - uses: rfennell/JSONFileVersioner@master # a branch of a public action
    - uses: rfennell/JSONFileVersioner@v1.0.1 # the version of a release  of a public action
    - uses: rfennell/JSONFileVersioner@v1 # the major version of a release  of a public action
```

# Finally add it to the GitHub Marketplace

- In your GitHub repo create a new draft release
- Select ‘Publish to Marketplace’
- Fix any errors, usually by checking in or editing files
- Choose categories
- Pick the tag that points to version to release
- Click Publish release

# Demo: A look at a Custom Action

Author: Nho Luong
Skill: DevOps Engineer Lead

# Summary

- GitHub Actions are a new alternative for CI/CD
- You now don’t have to leave GitHub or provision other resources
- They are free for OSS and pay-per-minute for private repo
- They are not as rich in features as Azure DevOps Pipelines, yet…

- Also, remember they are not limited to CI/CD
- They can trigger a workflow on any GitHub event

# Resources

- There is an active community

  https://github.community/t5/GitHub-Actions/bd-p/actions

- And documentation at

  https://help.github.com/en/categories/automating-your-workflow-with-github-actions

# Thank You

Author: Nho Luong
Skill: DevOps Engineer Lead