Booting ~~5~~ 8 K8s Clusters on Every git push: How Linkerd Leveled Up Its CI

Andrew Seigner

/ @siggy

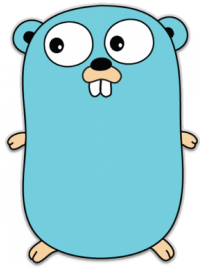
Linkerd Maintainer

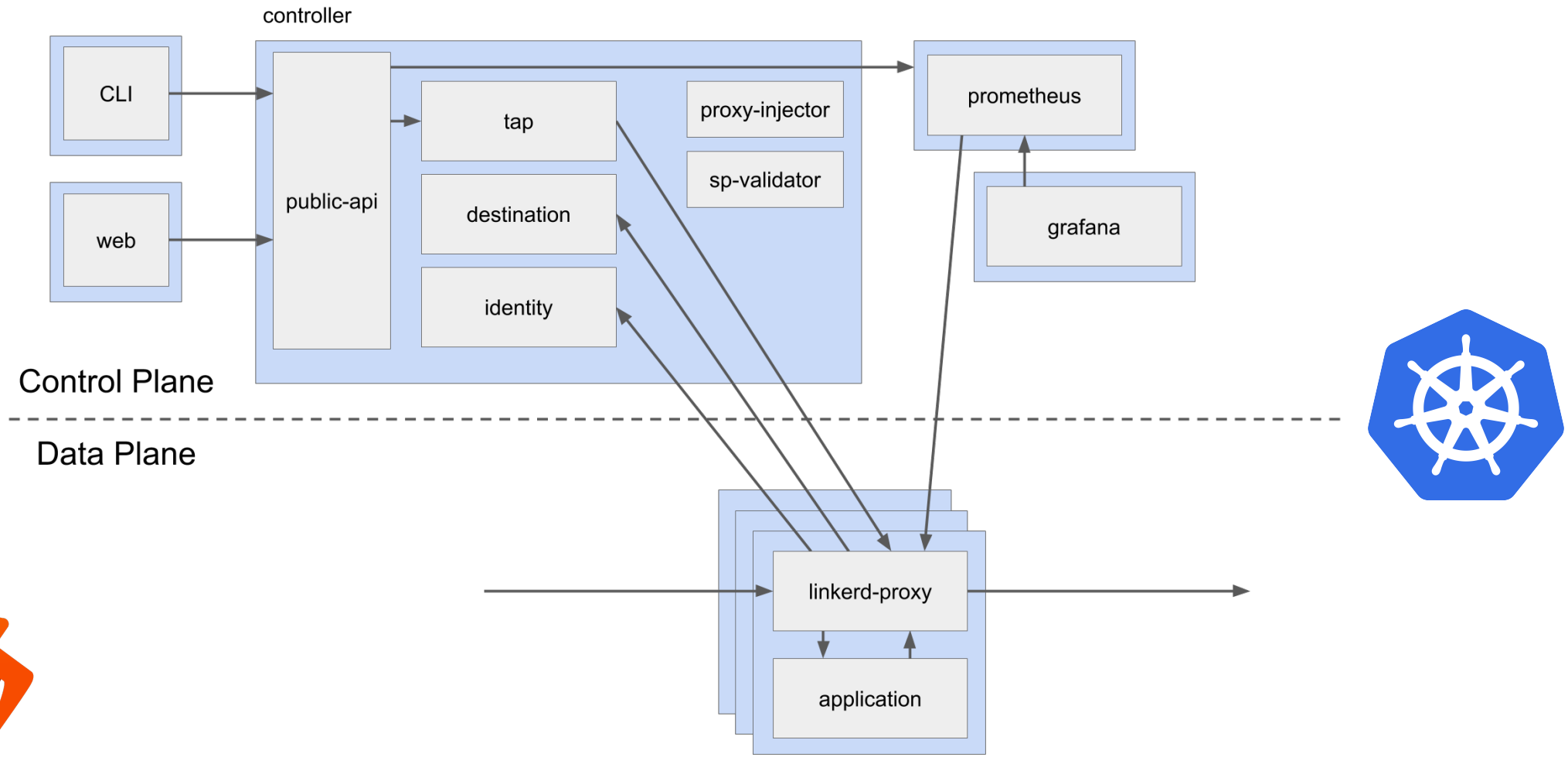
Software Engineer, Buoyant

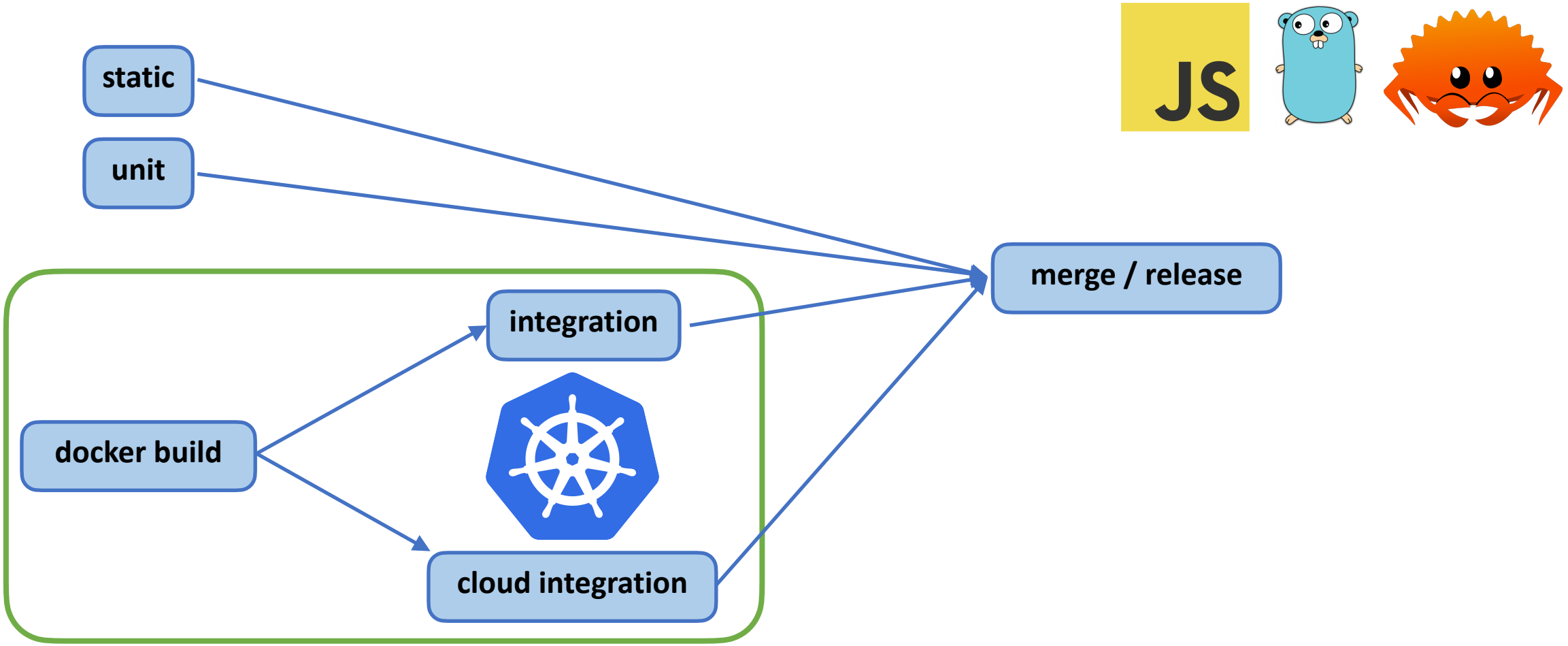
Agenda

- What is Linkerd?
- Testing Linkerd
- **Take 1**: GKE + Travis
- Prioritized Requirements
- Tech Eval
- **Take 2**: kind + Packet + GitHub Actions
  - Demo: DOCKER_SSH + kind
- **Take 3**: kind + buildx + GitHub Actions
  - Demo: Booting 8 k8s clusters on a git push
- Lessons learned

What is LINKERD ?

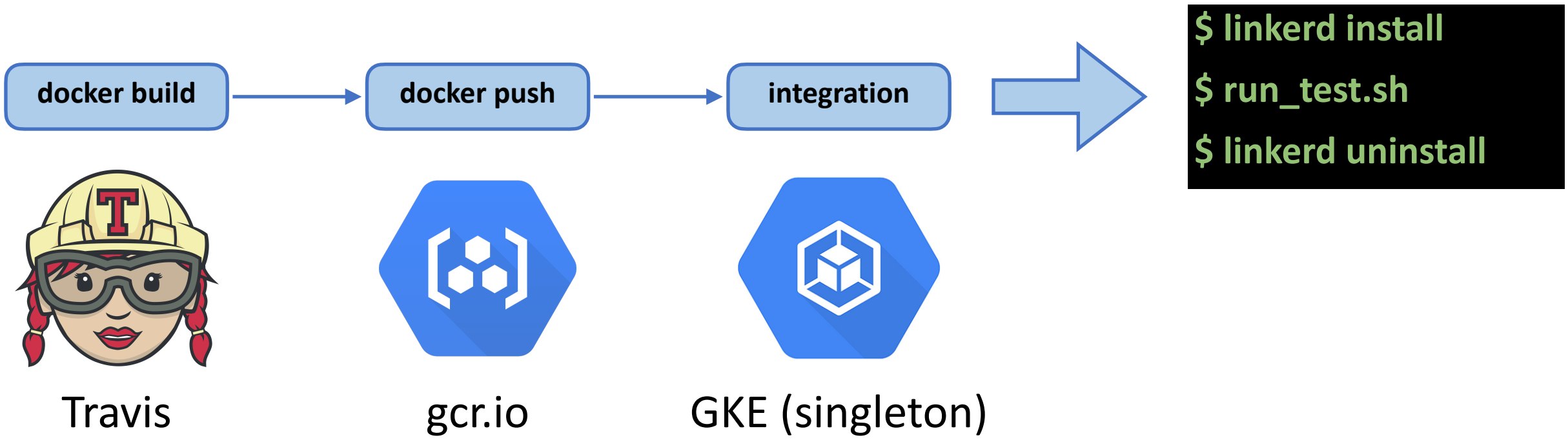






https://github.com/linkerd/linkerd2/tree/main/.github/workflows

Take 1: GKE + Travis



https://travis-ci.org/github/linkerd/linkerd2

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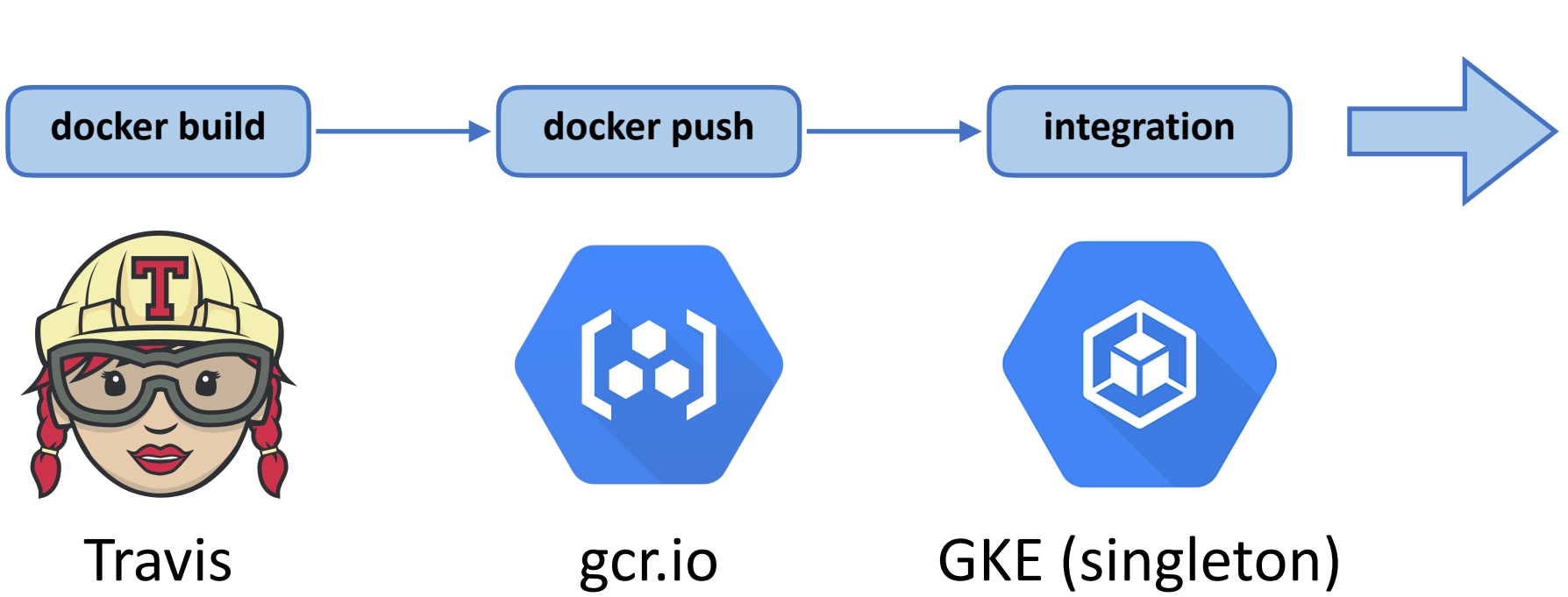


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$ run_test.sh
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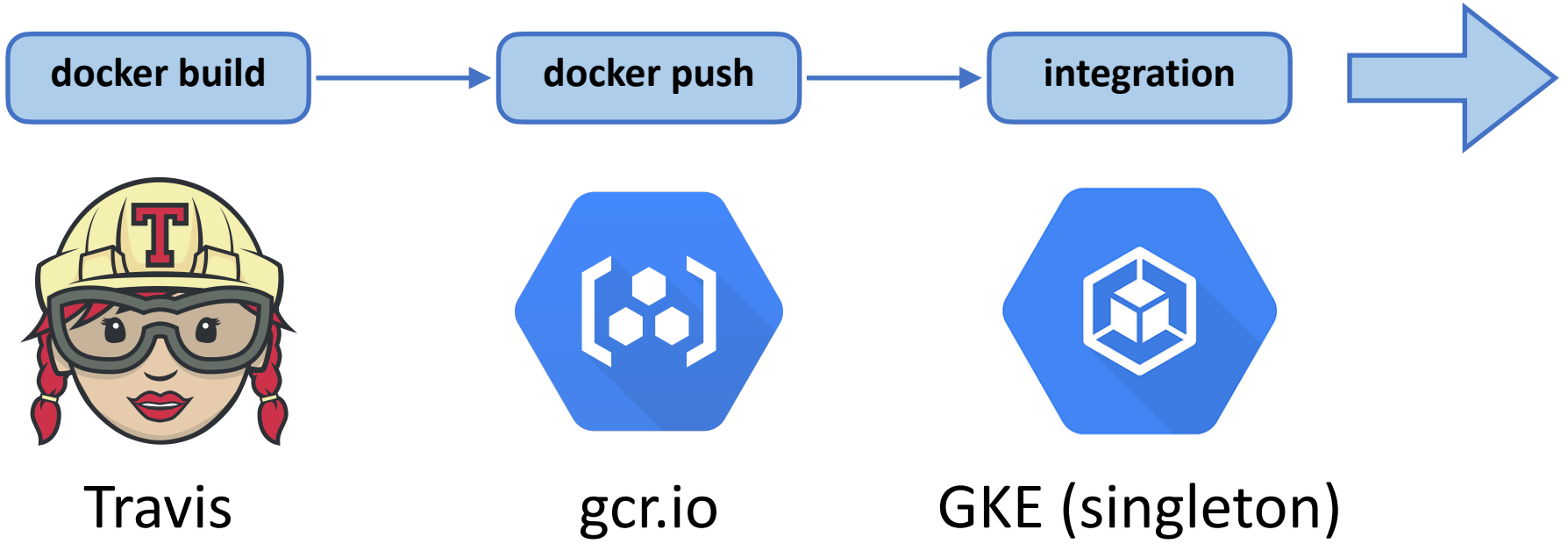


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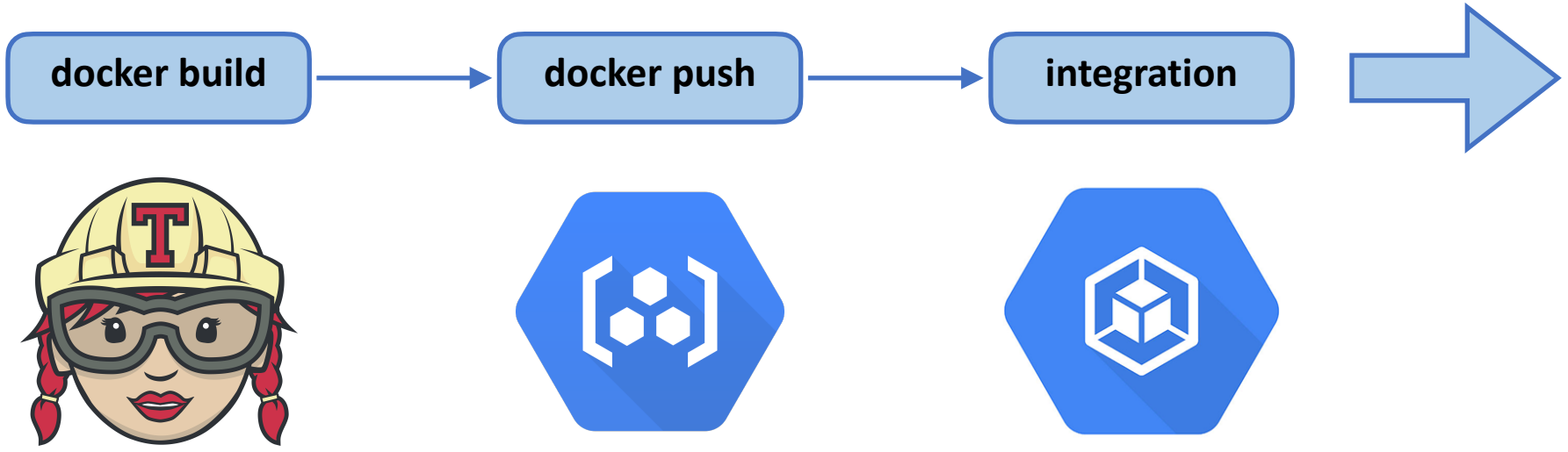


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Prioritized Requirements

- Reproducible build and test (dev x ci)
- UI to browse build and test history
- Github/PR integration
- Hermetically sealed build and test, particularly for user-submitted PRs, no bots
- Fast (no docker push, incremental rebuilds, remote builds)
- Cheap or free?
- OSS?

Tech Eval (with disclaimer)

k8s Distributions

- kind
- k3d
- k3s
- GKE
- AKS
- EKS
- DigitalOcean K8s

Compute

- Packet

Build

- skaffold
- Bazel

Job Management

- GitHub Actions
- Prow
- Travis
- CircleCI
- Azure Pipelines
- Jenkins X
- Gitlab CI
- garden.io

Release/CD

- Kubernetes Release
- werf.io

Tech Eval (Prow)

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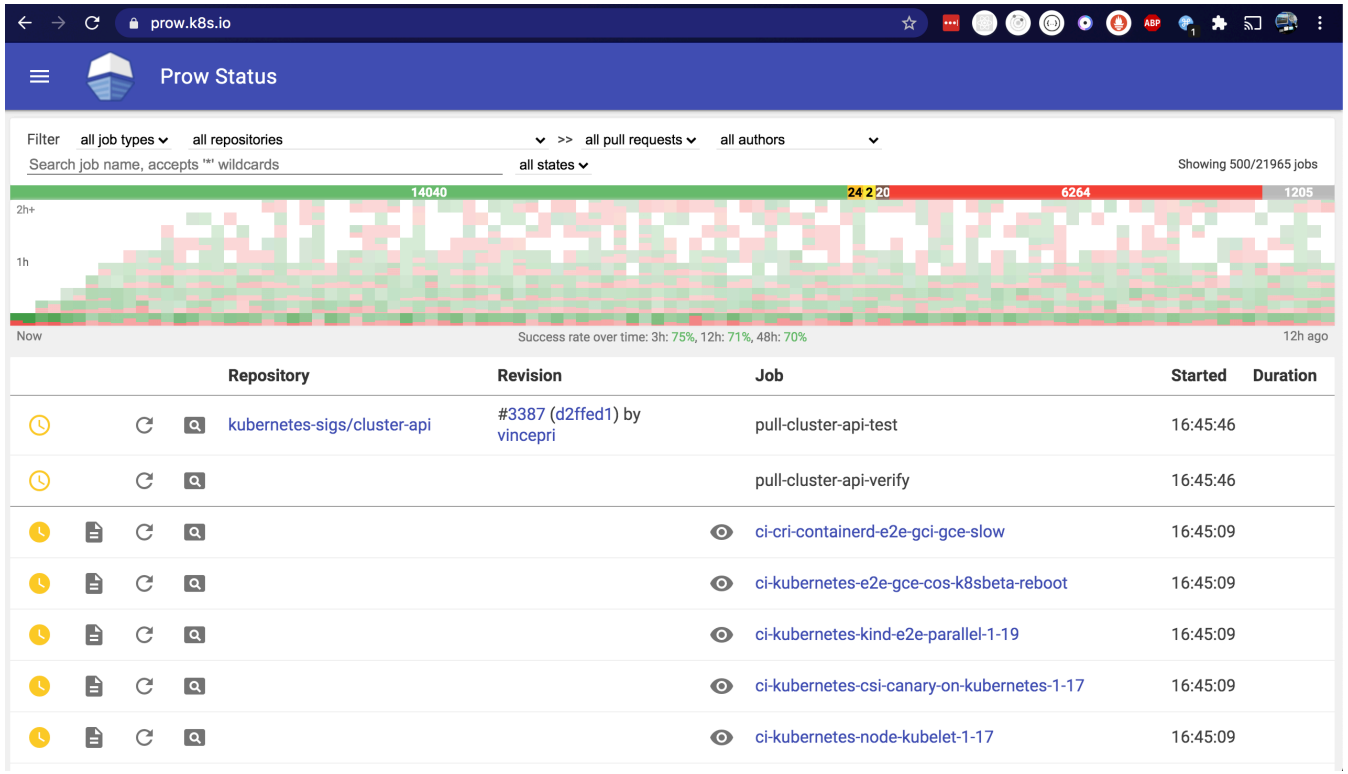

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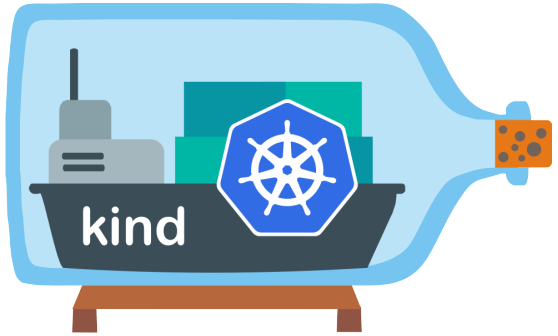
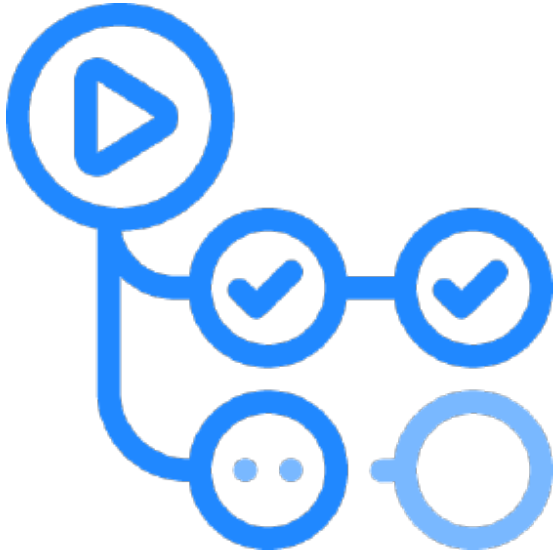
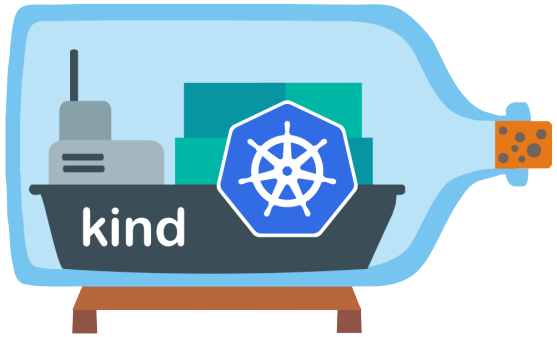




Tech Eval (kind)

- Used by kubernetes/kubernetes
- Fast create/delete clusters
- Easy for local dev
- No more docker push
- OSS



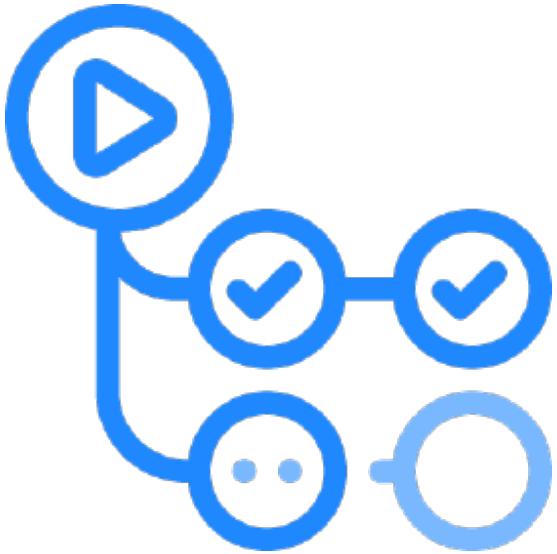
Tech Eval (Packet)

- Free hardware! (for OSS through partnership with CNCF)
- Large bare metal servers
- Fast, cached Docker builds

https://www.cncf.io/announcement/2017/08/08/cloud-native-computing-foundation-expands-developer-access-demand-hardware-new-infrastructure-lab/

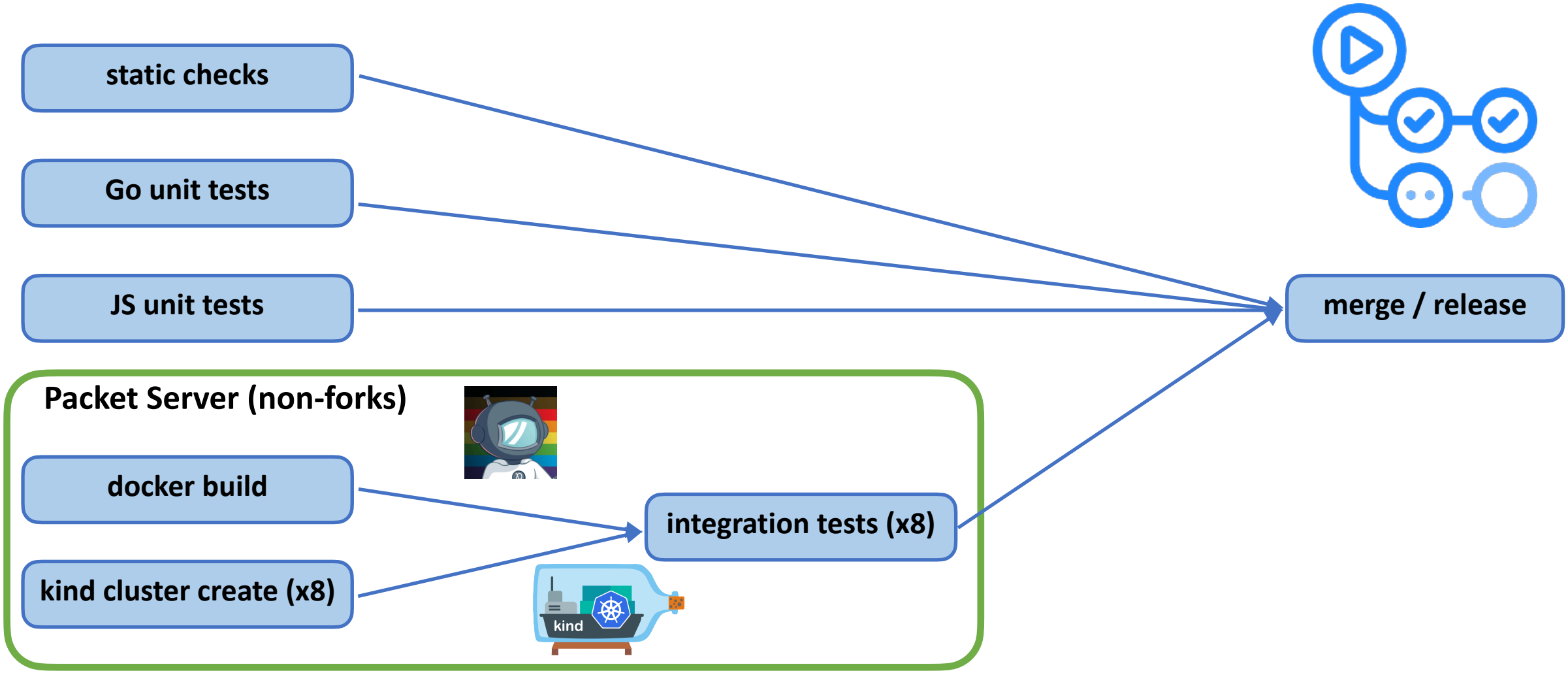
Tech Eval (GitHub Actions)

- Integrated with existing repo / PRs
- Matrix builds
- Flexible task dependencies
- Free for OSS projects



https://github.com/linkerd/linkerd2/blob/ae7d98b4fe42569ab5293821fefba7d2b11f42ec/.github/workflows/workflow.yml#L11-L37

Take 2: kind + Packet + GitHub Actions



https://github.com/linkerd/linkerd2/commit/3be2b41a794237edddfdc5c503d5b986b86145e5

Integration Tests (x8)

KubeCon CloudNativeCon Europe 2020 Virtual

```
kind_integration_tests:
  strategy:
    matrix:
      integration_test:
        - cluster-domain
        - deep
        - external-issuer
        - helm-deep
        - helm-upgrade
        - uninstall
        - upgrade-edge
        - upgrade-stable
  needs: [docker_build]
  name: Integration tests (${{ matrix.integration_test }})
```

https://github.com/linkerd/linkerd2/blob/8773416496801fbf25c38a7545973afdf37b21ba/.github/workflows/kind_integration.yml#L96-L107

Demo: DOCKER_SSH + kind

#kind

KubeCon CloudNativeCon Europe 2020 Virtual

kind

bentheelder and you

siggy 3 months ago

greetings folks. we're creating kind clusters on remote hosts, via `DOCKER_HOST=ssh://x.x.x.x`. once we've created the kind cluster, we're opening an ssh tunnel to enable kubectl to connect to it, like so:

```
export KUBECONFIG=$(kind get kubeconfig-path --name=$KIND_CLUSTER)
KIND_PORT=$(kubectl config view -o jsonpath="{.clusters[?(@.name=='$KIND_CLUSTER')].cluster.server}" | cut -d':' -f3)
ssh -4 -N -L $KIND_PORT:localhost:$KIND_PORT $USER@$REMOTE_DOCKER
```

... my question is... is this crazy? is there a better pattern? also, thank you for building kind it's so great! (edited)

🙂 1

bentheelder 3 months ago

thanks for the feedback!

I'm not sure if there's a better pattern, we didn't really expect remote hosts, and I at least haven't used docker like that 😅

bentheelder 3 months ago

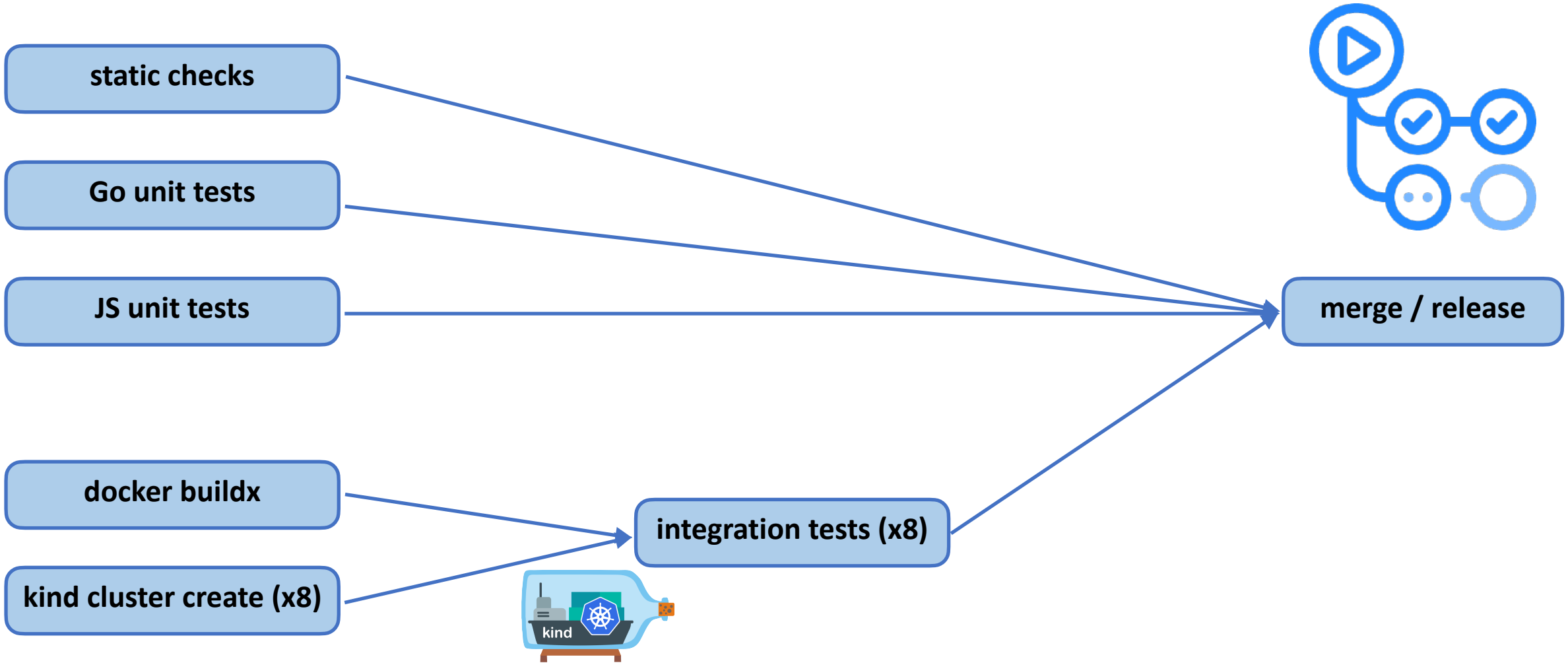
that looks relatively sane to me

siggy 3 months ago

cool thanks Ben, just wanted to check in. yeah, `DOCKER_HOST=ssh://` is pretty handy.

https://github.com/linkerd/linkerd2/commit/4f71b522dce5356e4a4fdbd95e52bc5dde364834#diff-f09ce9d24f2aeb928cee946c13324a06R196-R200

Take 3: kind + buildx + GitHub Actions



https://github.com/linkerd/linkerd2/commit/5e789ba152509df821f212a04be44a18ab5a0da1

Demo: Booting 8 k8s clusters on a git push

Lessons Learned

- Use kind (shoutout to #kind in k8s Slack)
- Cache your [docker] builds
- DOCKER_HOST=ssh://
- docker buildx for caching and multiarch
- Shoutouts to Packet and GitHub Actions for supporting OSS

One More Thing: Linkerd CI Metrics

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Linkerd2 Integration Tests — 12 Apr 20 15:40 -05 ⇨ 12 May 20 15:40 -05

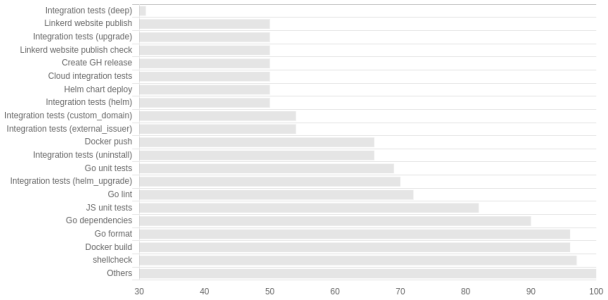
Global Success Rate

77%

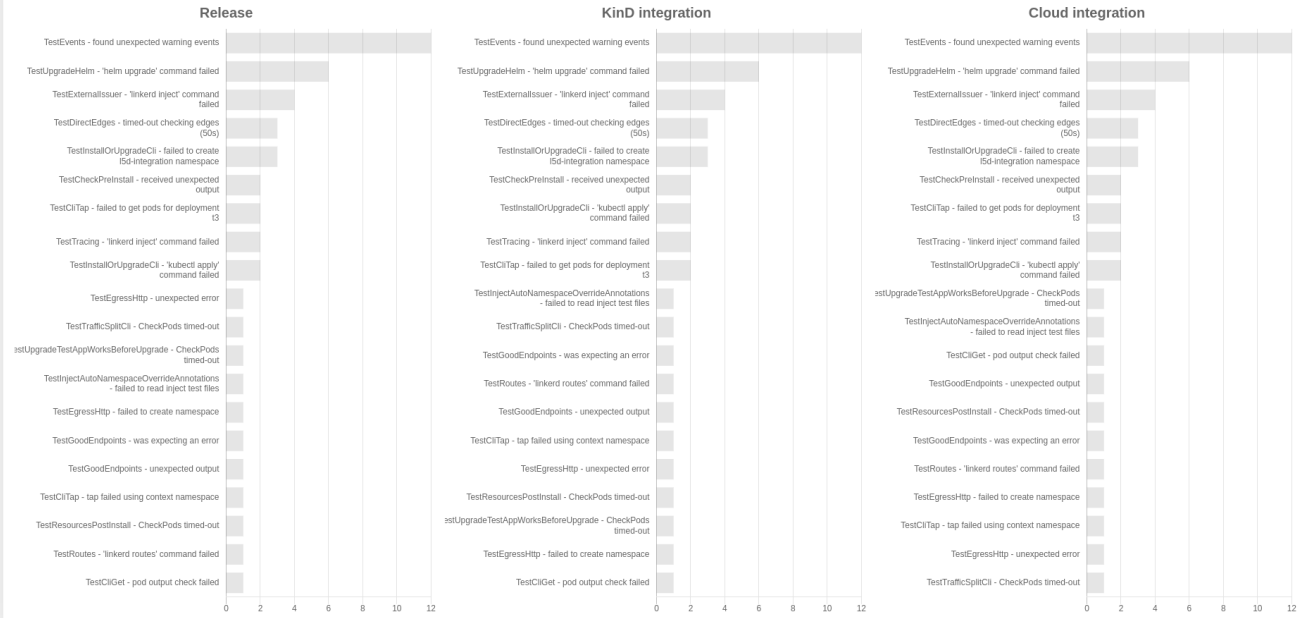
Success Rates per Workflow

KinD integration:	60%
Unit tests:	75%
Release:	77%
Static checks:	89%
Cloud integration:	100%

Jobs Success Rates



Failed Tests per Workflow



https://github.com/linkerd/linkerd2-ci-metrics

An open source *service mesh* and CNCF member project.

- 🔥 36+ months in production
- 🔥 3,500+ Slack channel members
- 🔥 10,000+ GitHub stars
- 🔥 100+ contributors

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Live now: https://github.com/linkerd/linkerd2/actions

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