

Behind your PR: How we test K8s with K8s on K8s

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Why Use Kubernetes?



KubeCon



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We are already working with Kubernetes

Kubernetes is **Excellent** for CI

- Scales up to testing the Kubernetes Project
- Fault Tolerant
- Already Implements Core CI Features

Why Use Kubernetes?



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Kubernetes **Scales up to testing the Kubernetes Project**

- We run > 10000 jobs / day
- Lots of different jobs
- Lots of projects
- Lots of config

Kubernetes saves us from worrying about scale.

Why Use Kubernetes?



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Kubernetes is **Fault Tolerant**

- Reconciliation loops
- Declarative Config
- Microservices

Less time maintaining CI clusters.

More time maintaining everything else.

Why Use Kubernetes?



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Kubernetes **Already Implements Core CI Features**

- Pods - container scheduling
- Custom Resources (CRDs) - resource management
- Configmaps - config management
- Secrets - credential management

We don't need to re-implement these or learn another system.

These features are battle tested and work really well.

Your Kubernetes PR



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... has  everywhere!

Conversation 4 Commits 1 Checks 0 Files changed 6

logicalhan commented an hour ago

Contributor + 👤 ...

What this PR does / why we need it:

Fixes the linting errors in pkg/apis/abac/ directory (with the exception of latest.go, which has a interesting todo)

Release Note

NONE

k8s-ci-robot added `release-note-none` `size/M` `cncf-cla: yes` `needs-kind` `needs-sig` `needs-ok-to-test` labels an hour ago

k8s-ci-robot commented an hour ago

Member + 👤 ...

Hi @logicalhan. Thanks for your PR.

I'm waiting for a [kubernetes](#) member to verify that this patch is reasonable to test. If it is, they should reply with `/ok-to-test` on its own line. Until that is done, I will not automatically test new commits in this PR, but the usual testing commands by org members will still work. Regular contributors should [join the org](#) to skip this step.

I understand the commands that are listed [here](#).

▶ Details

k8s-ci-robot added `kind/api-change` and removed `needs-kind` labels an hour ago



k8s-ci-robot commented a day ago

Member + 👤 ...

[APPROVALNOTIFIER] This PR is **APPROVED**

This pull-request has been approved by: [ashish-amarnath](#), [BenTheElder](#), [detiber](#)

The full list of commands accepted by this bot can be found [here](#).

The pull request process is described [here](#)

▶ Details

k8s-ci-robot added the `approved` label a day ago



k8s-ci-robot merged commit `335bdd7` into `kubernetes:master` a day ago

[View details](#)

[Revert](#)

12 checks passed



k8s-ci-robot commented a day ago

Member + 👤 ...

@ashish-amarnath: Updated the `job-config` configmap using the following files:

- key `cluster-api-provider-aws-presubmits.yaml` using file `config/jobs/kubernetes-sigs/cluster-api-provider-aws/cluster-api-provider-aws-presubmits.yaml`

▶ Details

Your Kubernetes PR



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- Is built & tested on Kubernetes!
- Automated by services on Kubernetes
 - Merge robot
 - Slash commands
 - Approval
 - {Re}Running tests
 - Cat GIFs

Build & Test With Pods

We containerized our build & test

- More hermetic, reproducible - bundled dependencies
 - Removed a lot of headaches
- Everyone loves containers, right?
- Users provide a container image for building / testing their project

Build & Test With Pods



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Kubernetes loves containers!

Pods are just a bunch of containers ❤️

- Let Kubernetes schedule your containers across a cluster
- Let Kubernetes manage lifecycle
- Leverage pod functionality

Build & Test With Pods



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Leverage pod functionality

- Secrets (credentials)
- Volumes (caching)
- Init Containers (code checkout)
- Sidecar Containers (result upload)
- Pod presets (de-dupe configuration)
- Resource requests (effectively schedule)

Build & Test With Pods



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<small demo pod-utils job> <insert diagram of pod>

```
# PRs for github.com/org/repo
org/repo:
# a presubmit test job named "sample-presubmit-job"
# this will show up in the github statuses
- name: sample-presubmit-job
  # run on every PR
  always_run: true
  decorate: true
  # Kubernetes PodSpec to run the tests
  spec:
    containers:
    - image: golang
      command:
      - go
      args:
      - test
      - ./...
```

Manage CI Resources with CRDs



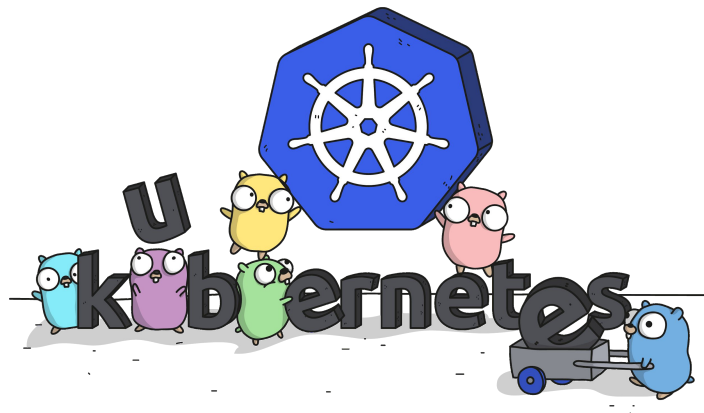
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Let's continue look into other **Kubernetes features** that can help us in CI



Manage CI Resources with CRDs



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CI is all about **{creating, testing, deleting}** resources

Manage CI Resources with CRDs



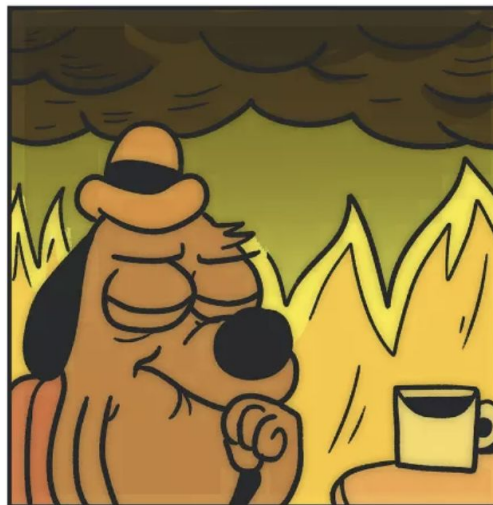
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How to manage resources in **Kubernetes** ...



Manage CI Resources with CRDs



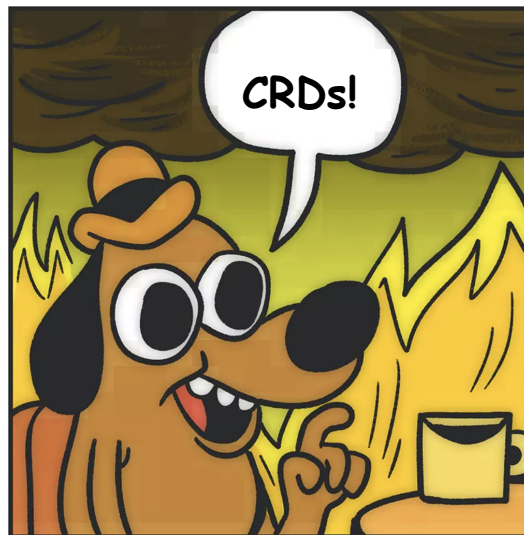
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Resources in Kubernetes  let's manage them with...



Manage CI Resources with CRDs



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Traditional solutions:

- Centralized
- Master schedule a queue of jobs to agents

With Kubernetes & CRDs:

- Distributed (let k8s handle scheduling)
- Declarative (let controllers handle states)
- Cloud Native!

Manage CI Resources with CRDs



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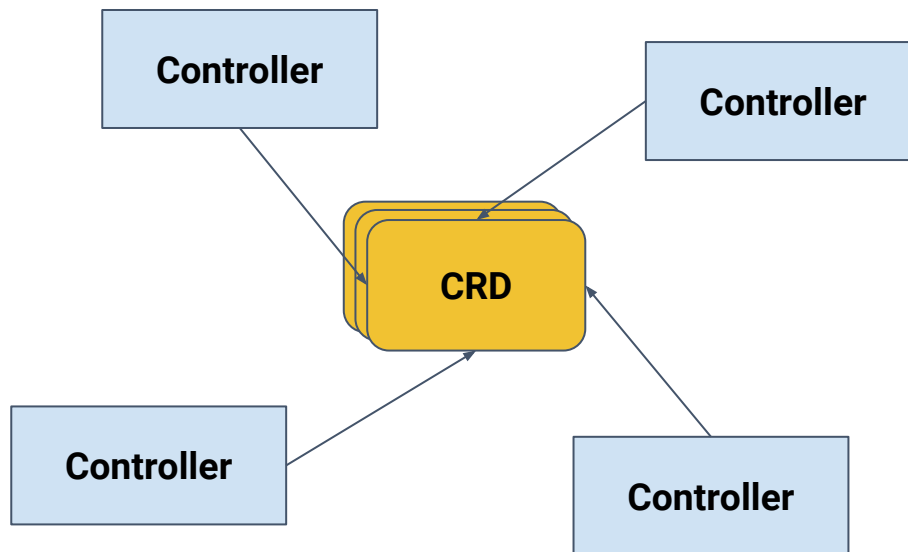


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So, test jobs can be CRDs!

Create and manage them with custom controllers!



Manage CI Resources with CRDs



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So, test jobs can be CRDs!

Create and manage them with custom controllers:

- Different kinds of triggering
- Different ways of executing jobs
- Monitoring / reporting results

Manage CI Resources with CRDs

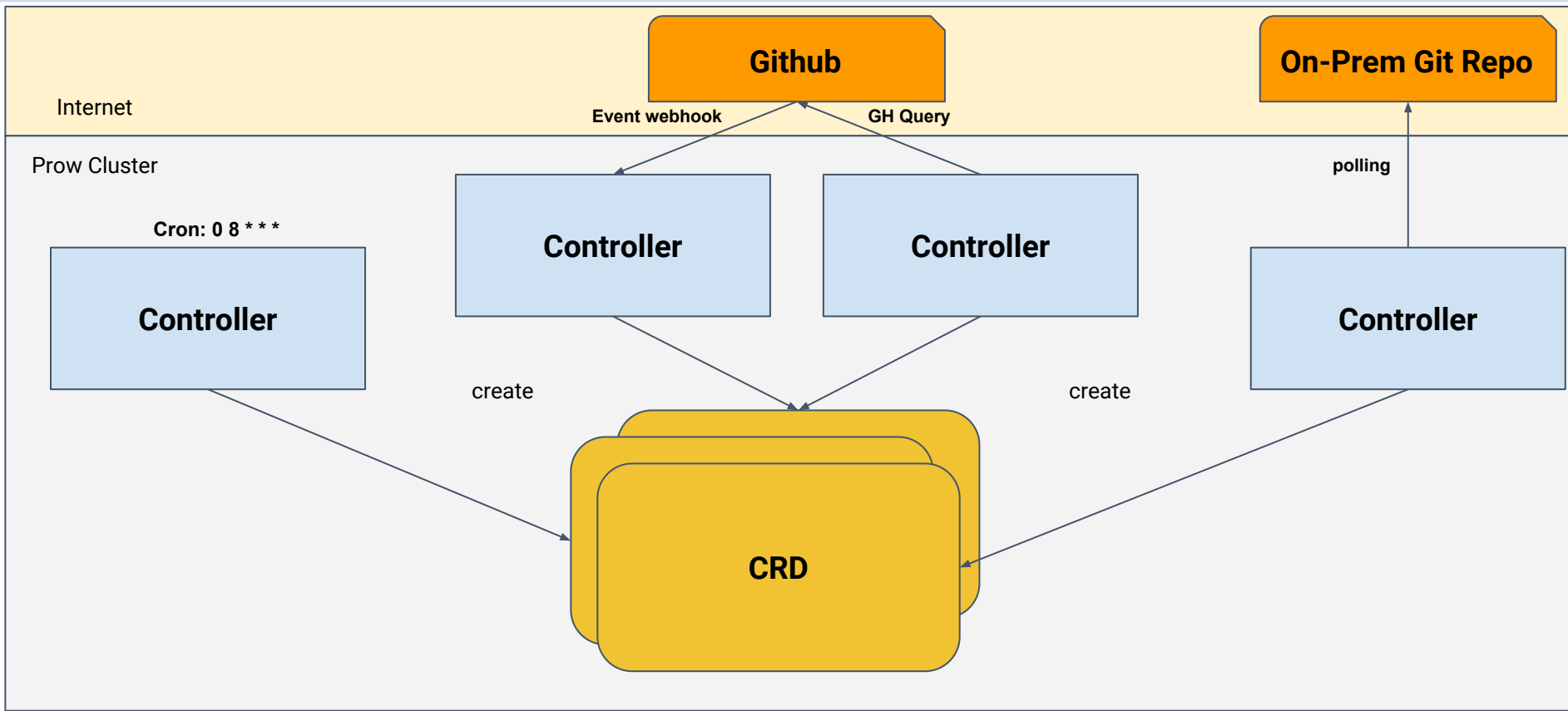


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Manage CI Resources with CRDs



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So, test jobs can be CRDs!

Create and manage them with custom controllers:

- Different kinds of triggering
- Different ways of executing jobs
- Monitoring / reporting results

Manage CI Resources with CRDs

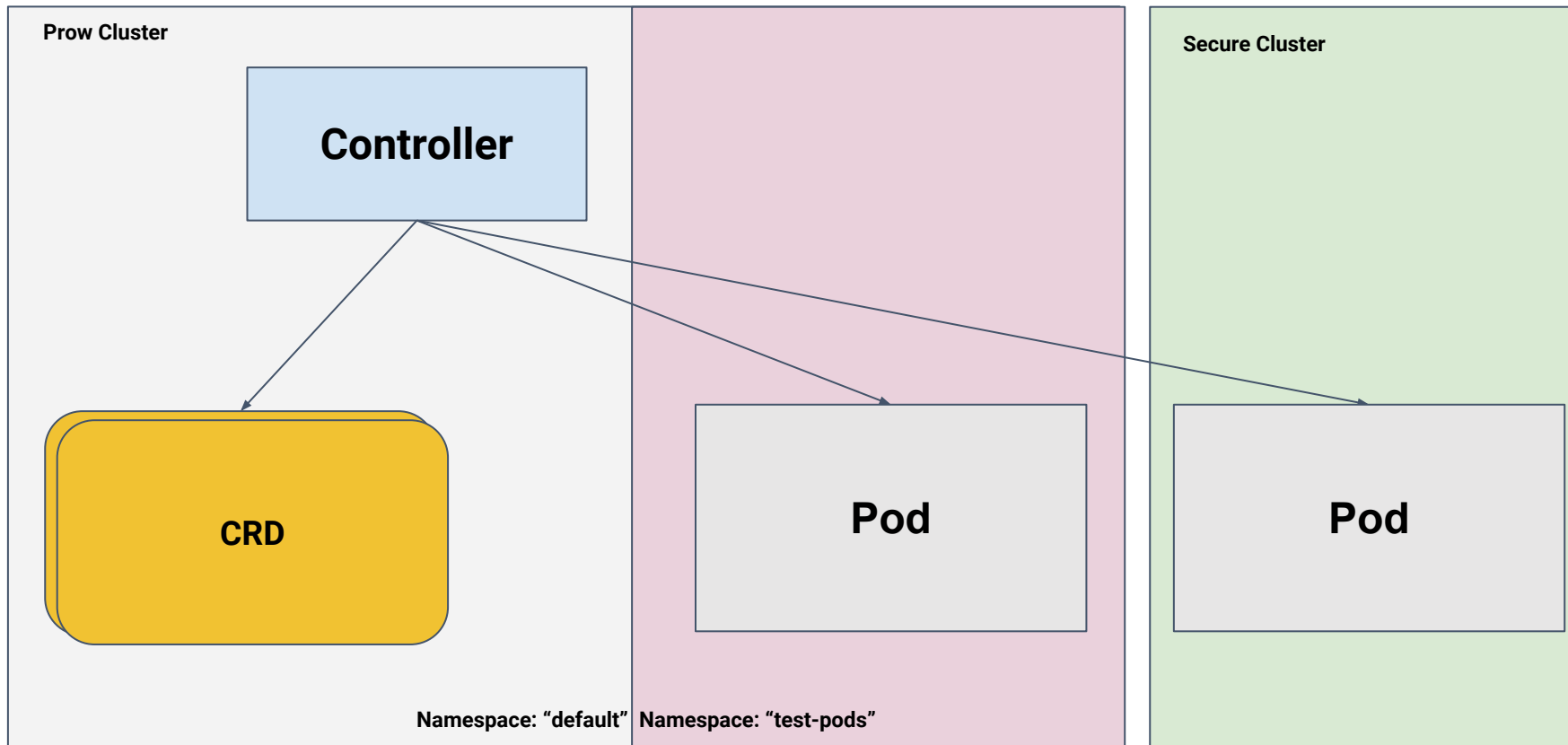


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Manage CI Resources with CRDs



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So, our test jobs can be CRDs!

Create and manage them with custom controllers:

- Different kinds of triggering
- Different ways of executing jobs
- Monitoring / reporting results

Manage CI Resources with CRDs

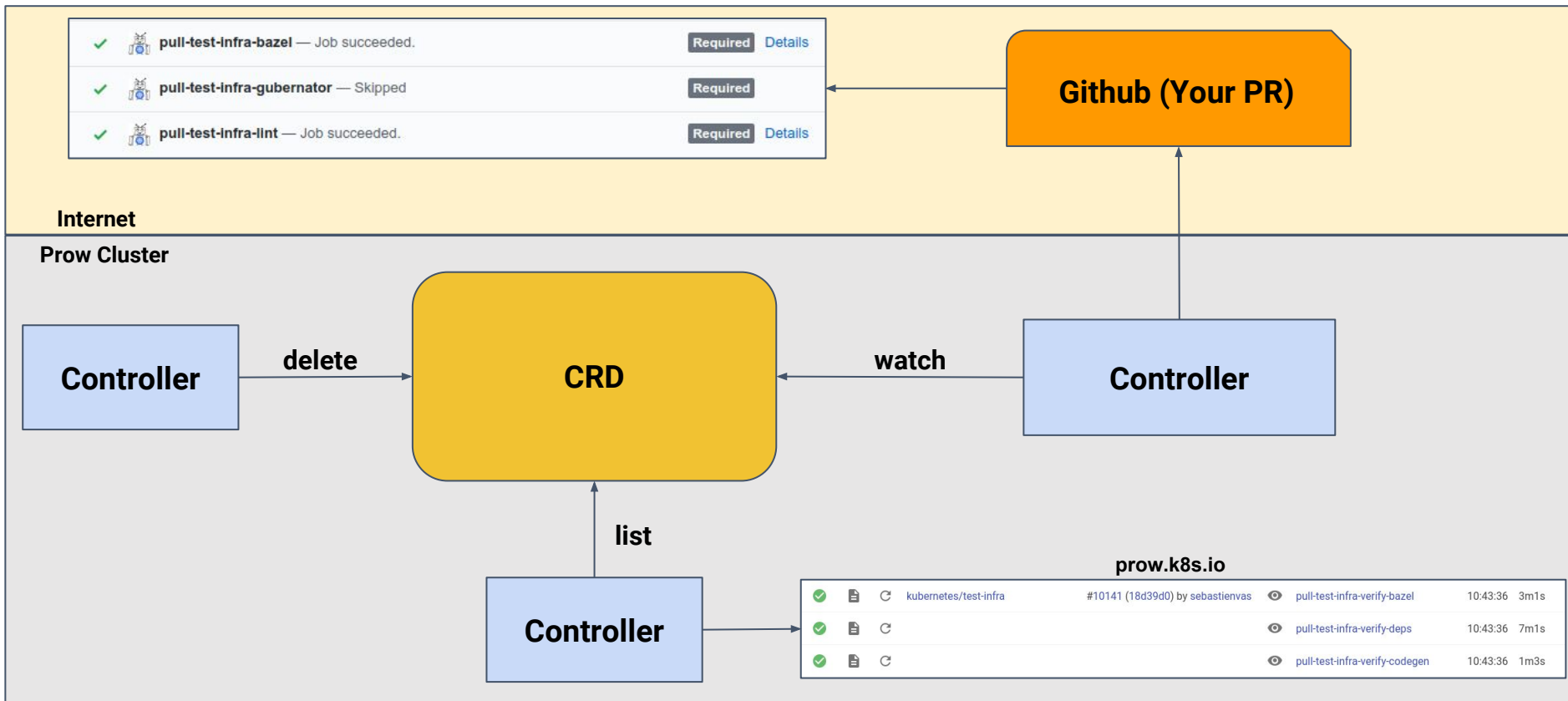


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Manage CI Resources with CRDs

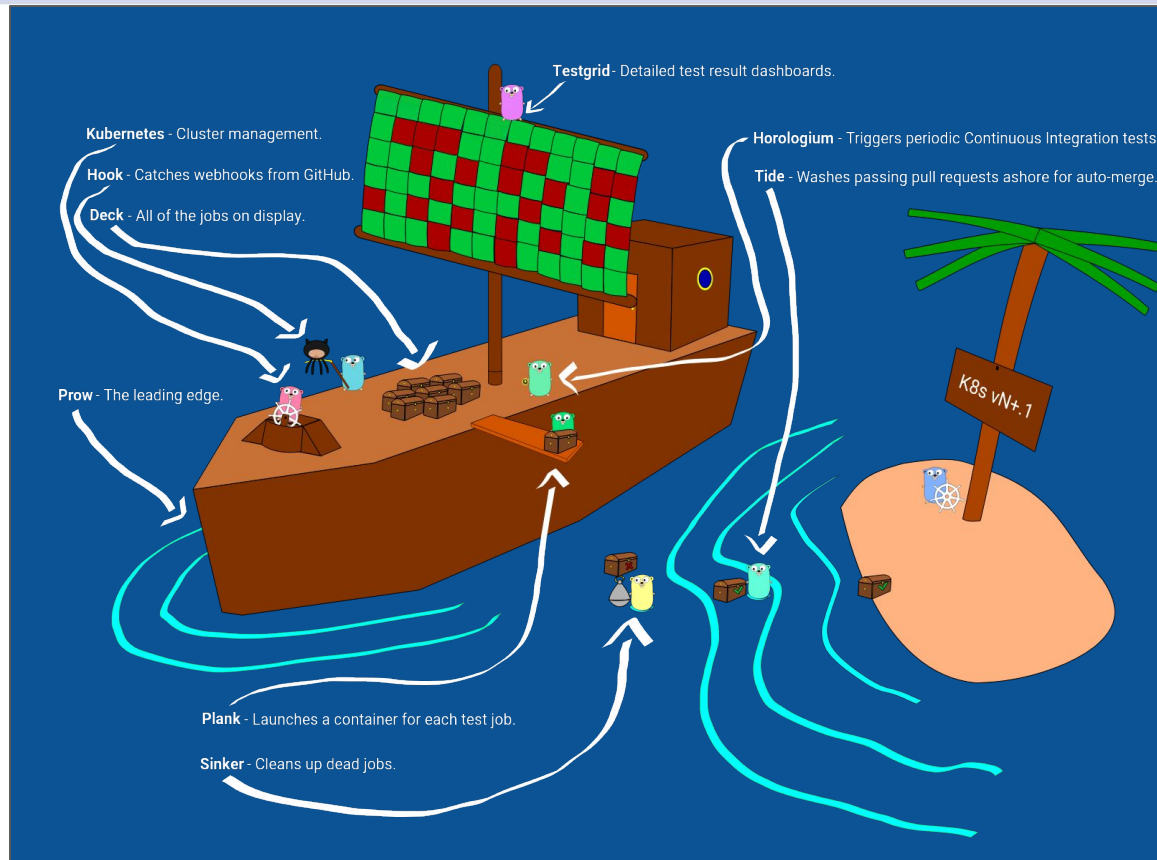


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Manage CI Resources with CRDs



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Test Resources (test projects, clusters) also need to be managed in CI

Manage CI Resources with CRDs



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How we were handle it before:

- Each job bind with a gcp project (we were mostly testing on gce/gke)
- Whenever a new k8s CI job added, a new gcp project need to be created



Manage CI Resources with CRDs



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- Test Resources can also be CRDs!
 - Easier to manage resource allocation and cleanup

Manage CI Resources with CRDs



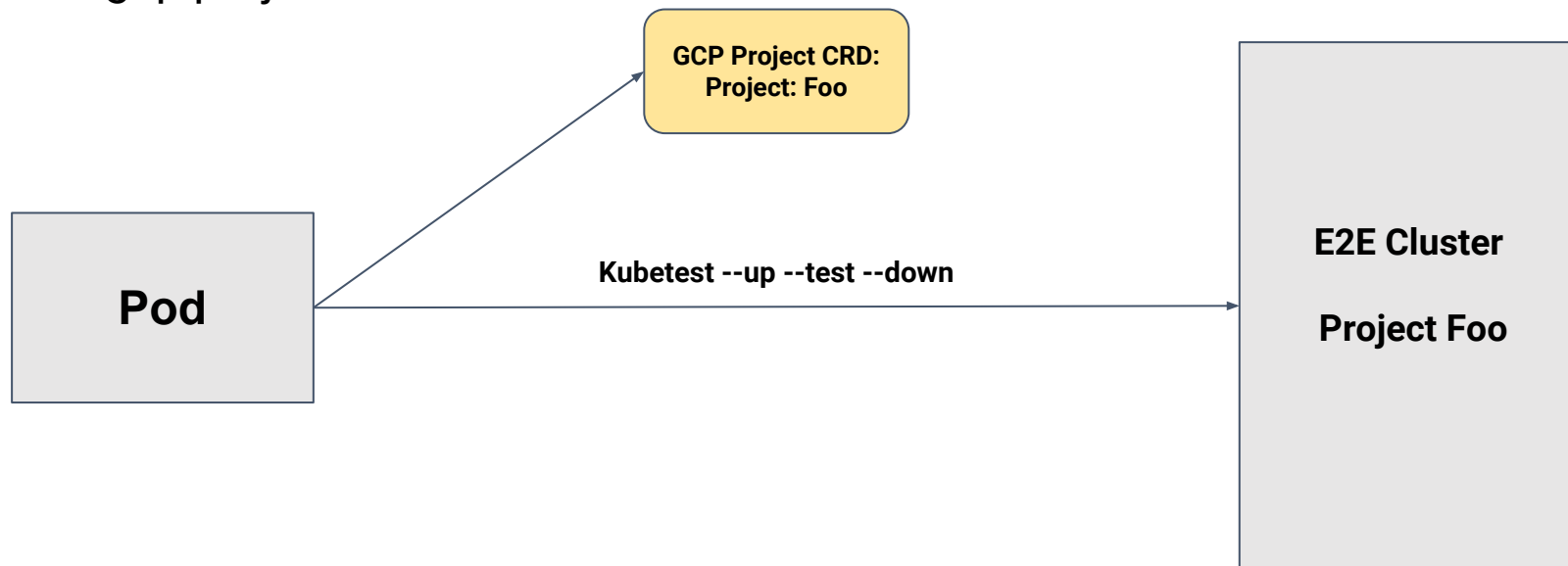
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- Kubernetes e2e tests want Kubernetes clusters
- Each gcp project can be a CRD



Manage CI Resources with CRDs



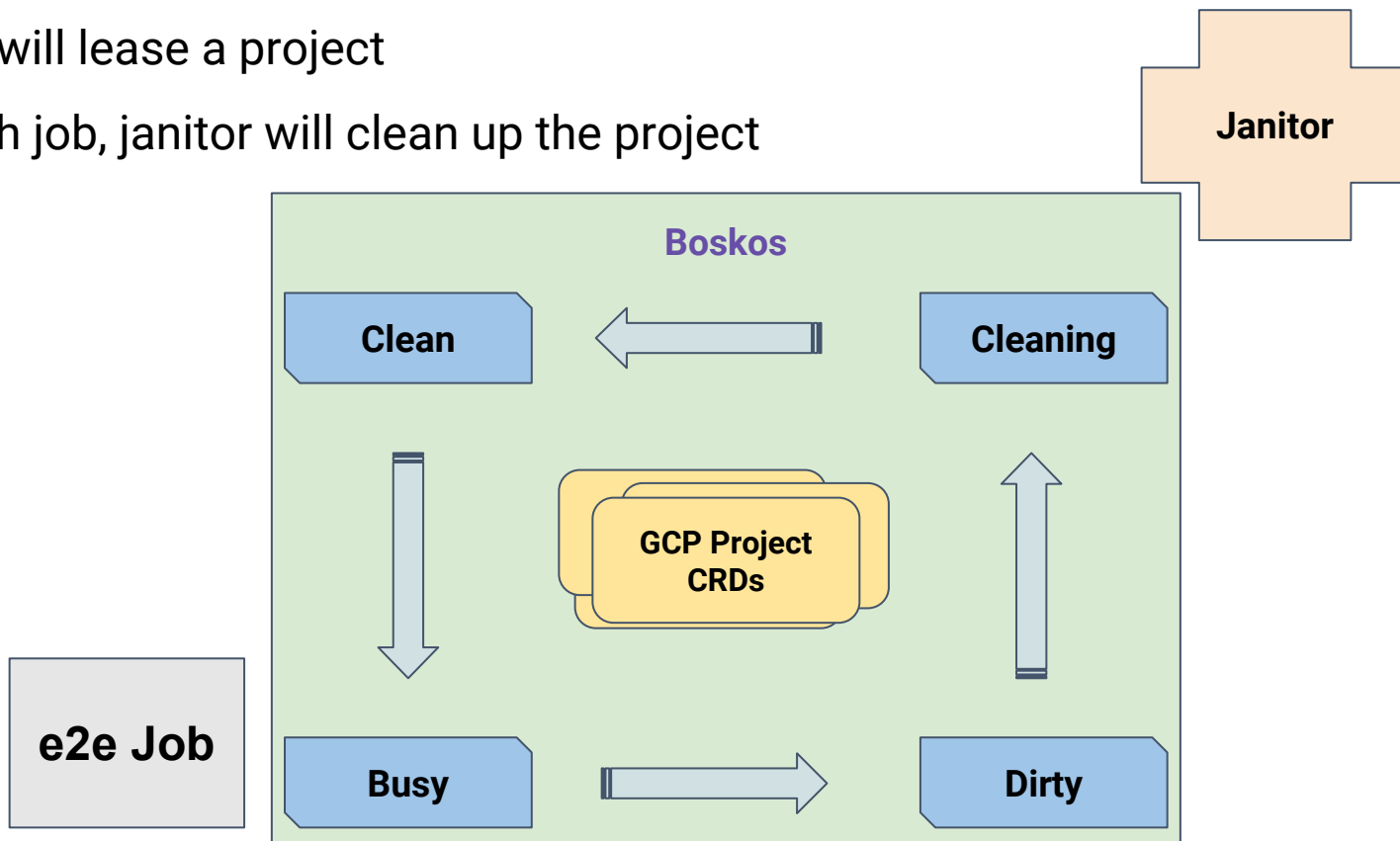
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- Each job will lease a project
- After each job, janitor will clean up the project



Manage CI Resources with CRDs



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- So what's going on with the project?
 - Kubectl describe resource project-foo

Configmaps



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CRDs are great, but CRDs come from configs

Configmaps



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- We are maintaining ~10 orgs && >100 repos && >1k different jobs
- Each repo checks in their CI job config into a subdir under test-infra/config
- We have A LOT OF configs to maintain!

Configmaps



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Previously:

- Oncalls push config from their workstations



Configmaps



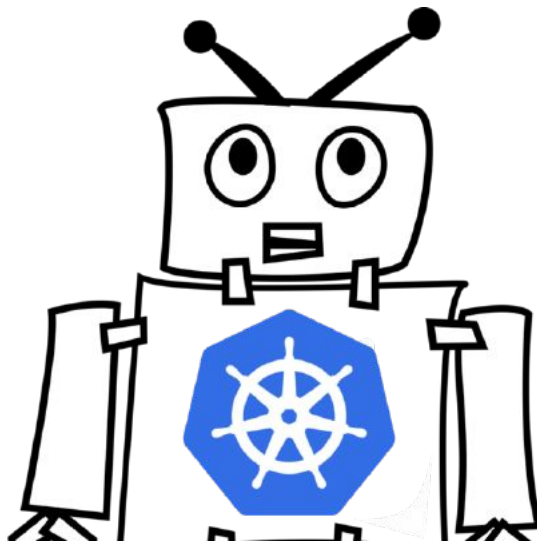
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We love our bots, so let's build automations!



Configmaps



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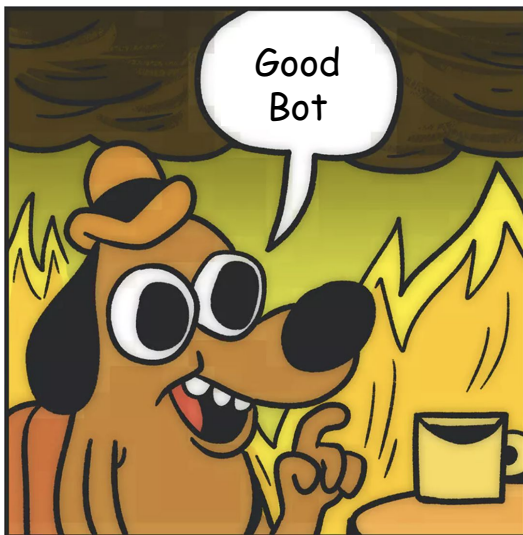



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
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We map config file(s) into configmaps!

Our robot auto update configmaps upon newly merged PRs



 **k8s-ci-robot** merged commit `8fed8ae` into `kubernetes:master` [View details](#) [Revert](#)
a day ago
12 checks passed

 **k8s-ci-robot** commented a day ago Member + 😊 ...

@gyuho: Updated the `job-config` configmap using the following files:

- key `k8s-aws-eks-1.10.yaml` using file `config/jobs/kubernetes/sig-aws/eks/k8s-aws-eks-1.10.yaml`

▶ Details

Configmaps



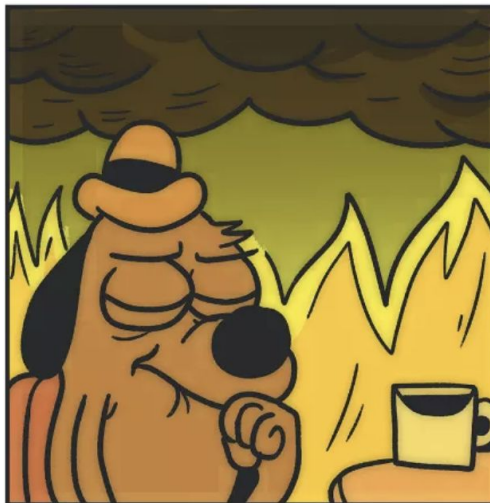
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We don't want to redeploy our controllers everytime there's a config change



Configmaps



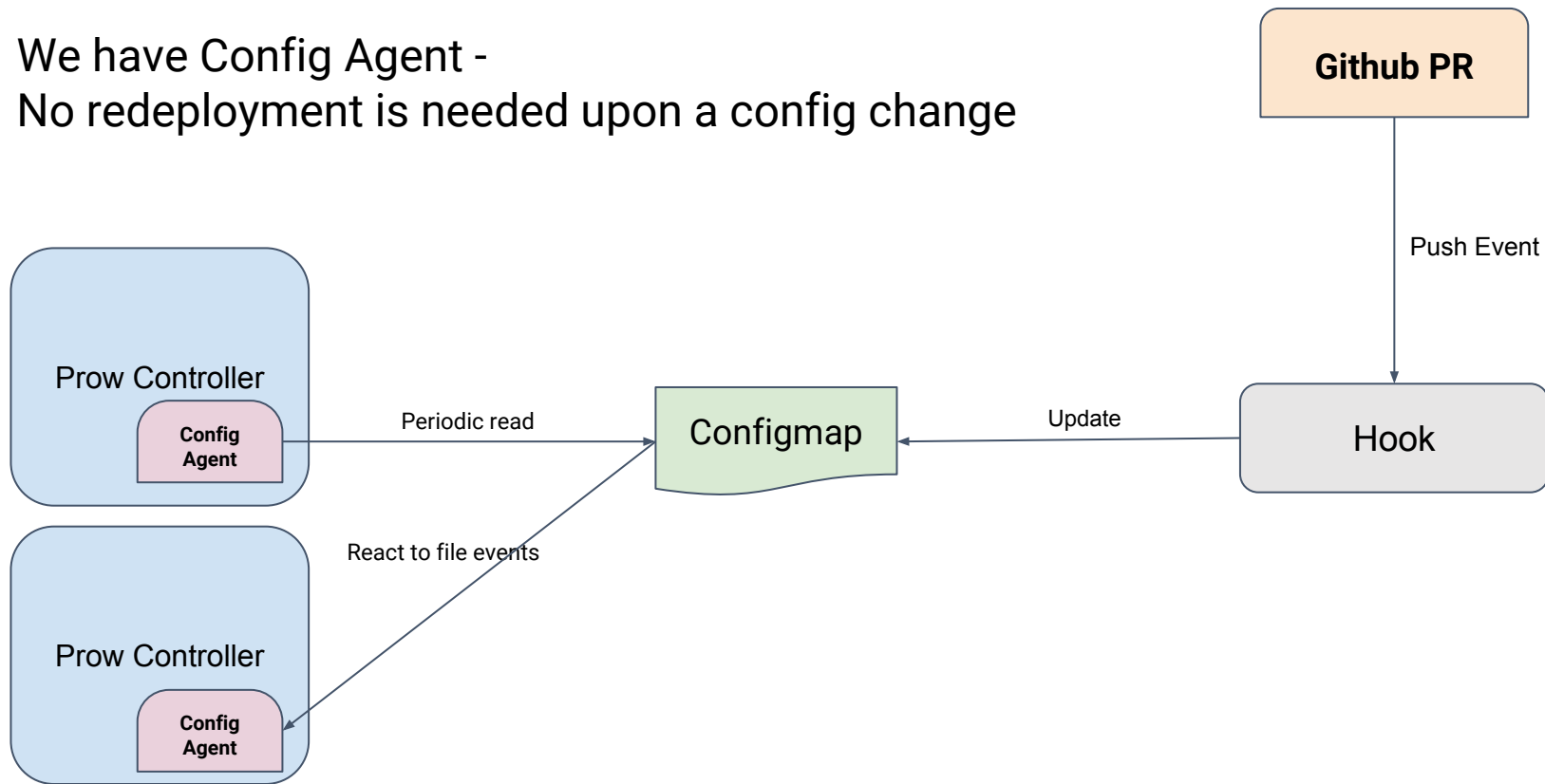
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We have Config Agent -
No redeployment is needed upon a config change



Deployment Management



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Now everything sounds great.



Deployment Management



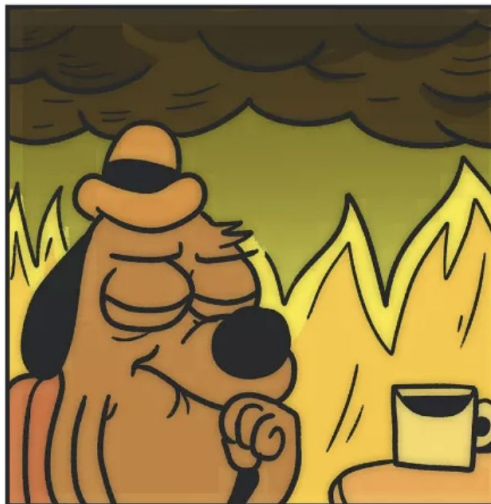
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How about we want to deploy new controllers?



Deployment Management



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@fejta would build and push all the images from workstation, or not

@fejta would deploy a latest versions every Friday pm when he's oncall

Update prow to v20180515-1f5a37805 #8033

Merged k8s-ci-robot merged 1 commit into `kubernetes:master` from `fejta:protect` on May 15

Conversation 6

Commits 1

Checks 0

Files changed 11



fejta commented on May 14

Member



/assign @BenTheElder

I used `bump.sh` on my mac... has anyone tried this before?



Deployment Management



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5pm Friday Afternoon, Seattle, before oncall embrace weekends



Deployment Management



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!	📄	↻	👁	ci-kubernetes-e2e-gce-cos2-k8sstable2-default	14:08:35	39m2s
!	📄	↻	👁	ci-kubernetes-e2e-gce-cos2-k8sbeta-default	14:08:35	43m59s
!	📄	↻	👁	ci-kubernetes-e2enode-cos1-k8sstable2-gkespec	14:08:35	8m31s
!	📄	↻	👁	ci-kubernetes-e2e-gke-cos2-k8sstable1-flaky	14:08:35	55m27s
!	📄	↻	👁	ci-kubernetes-e2e-gce-cos1-k8sbeta-default	14:08:35	44m28s
!	📄	↻	👁	ci-cri-containerd-e2e-gci-gce-es-logging	14:08:35	31m28s
!	📄	↻	👁	ci-kubernetes-e2enode-cos2-k8sstable2-gkespec	14:08:35	7m27s
!	📄	↻	👁	ci-kubernetes-e2e-gke-cos2-k8sstable1-gpu	14:08:35	26m30s
!	📄	↻	👁	ci-kubernetes-e2e-gce-ubuntu2-k8sbeta-default	14:08:35	41m27s



Deployment Management



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```
`git revert xxxxxx`
```

```
`kubectl apply -f`
```

EVENTUALLY...



Deployment Management



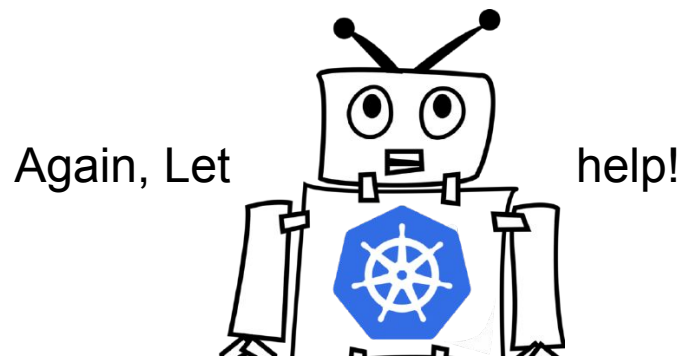
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Probably that's not what we want to see



Deployment Management

- Bot auto builds/pushes images after each merge
- Bot makes sure new changes are fine in staging
- Bot auto creates PR to bump version



kubernetes / test-infra

View Repository Unwatch 84

Code Issues 290 Pull requests 64 Insights Settings

Bump prow from v20181204-56bd217 to v20181206-da5a5e4 #10360

Open k8s-ci-robot wants to merge 1 commit into kubernetes:master from k8s-ci-robot:autobump

Conversation 4 Commits 1 Checks 0 Files changed 13

k8s-ci-robot commented 4 hours ago

Included changes: 56bd217...da5a5e4

- Bump prow from v20181204-56bd217 to v20181206-da5a5e4
- k8s-ci-robot added `cnf-cla: yes` `size/M` `area/prow` `area/prow/bump` labels 4 hours ago
- k8s-ci-robot requested review from `cjwagner` and `stevekuznetsov` 4 hours ago

Deployment Management



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Deployment Management



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Kubernetes On Kubernetes



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What if we could keep all of the resources within the CI cluster for end to end Kubernetes tests? 🤔

We'd need to run Kubernetes *on* Kubernetes 😁

Kubernetes On Kubernetes



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I heard you like containers

**So I put containers
in your containers**

Kubernetes On Kubernetes



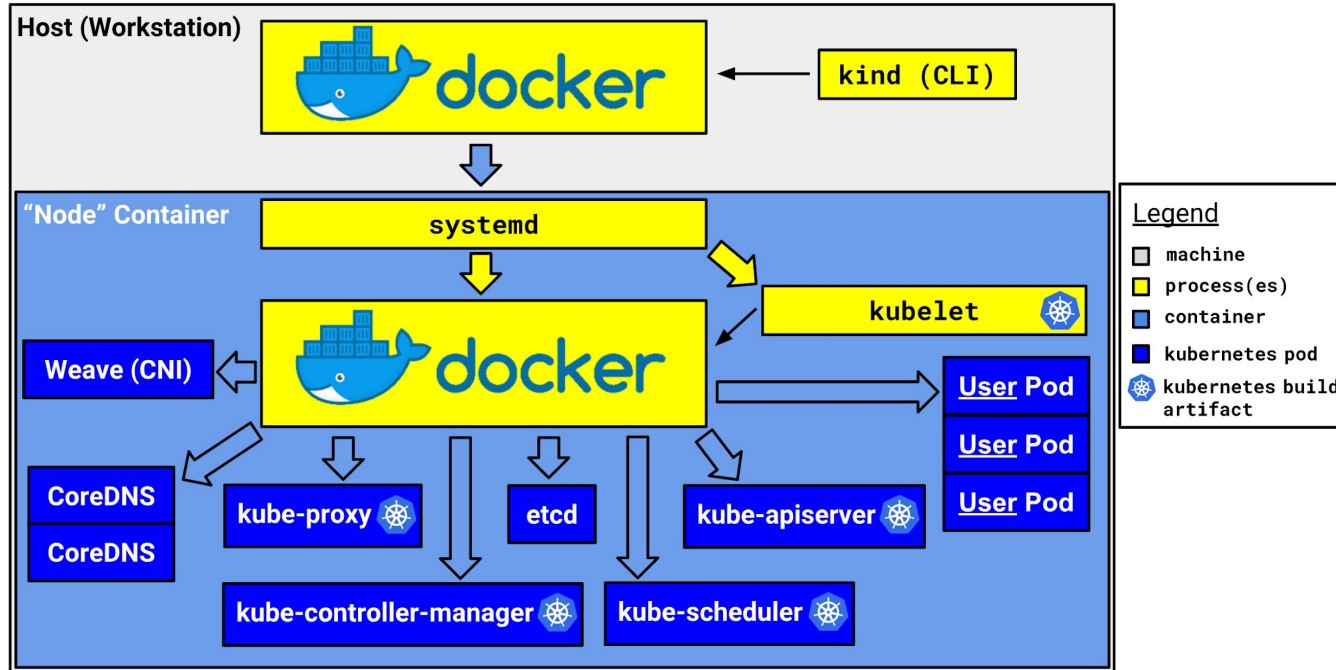
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kind - Kubernetes IN Docker



More relevant talks



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Sig Testing Intro (Aaron Crickenberger, Steve Kuznetsov) - **Wed**
1:45pm

Sig Testing Deep Dive (Cole Wagner, Katharine Berry) - **Thurs 3:40pm**

Thanks!



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Contact Us & Find more info



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Slack: <https://kubernetes.slack.com>

- #sig-testing
- #prow
- #kind
- #testing-ops

Mailing list: kubernetes-sig-testing@googlegroups.com

GitHub:

- <https://github.com/kubernetes/test-infra>
- <https://github.com/kubernetes-sigs/kind>

Zoom: Weekly SIG meeting @1pm PST

Slide link: fill me in





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