Intro: SIG Cloud Provider

kubernetes

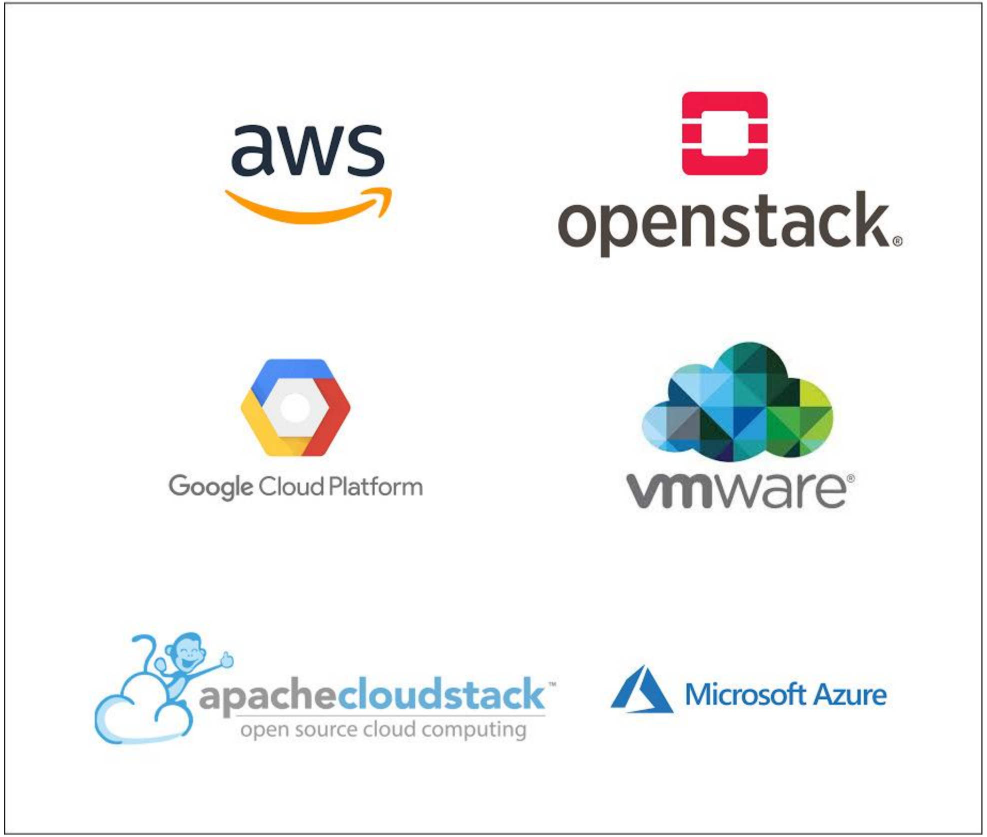
Agenda

- History & Background
- Code Ownership
- Subprojects & Working Groups
- Governance
- SIG Challenges
- Questions & Discussion

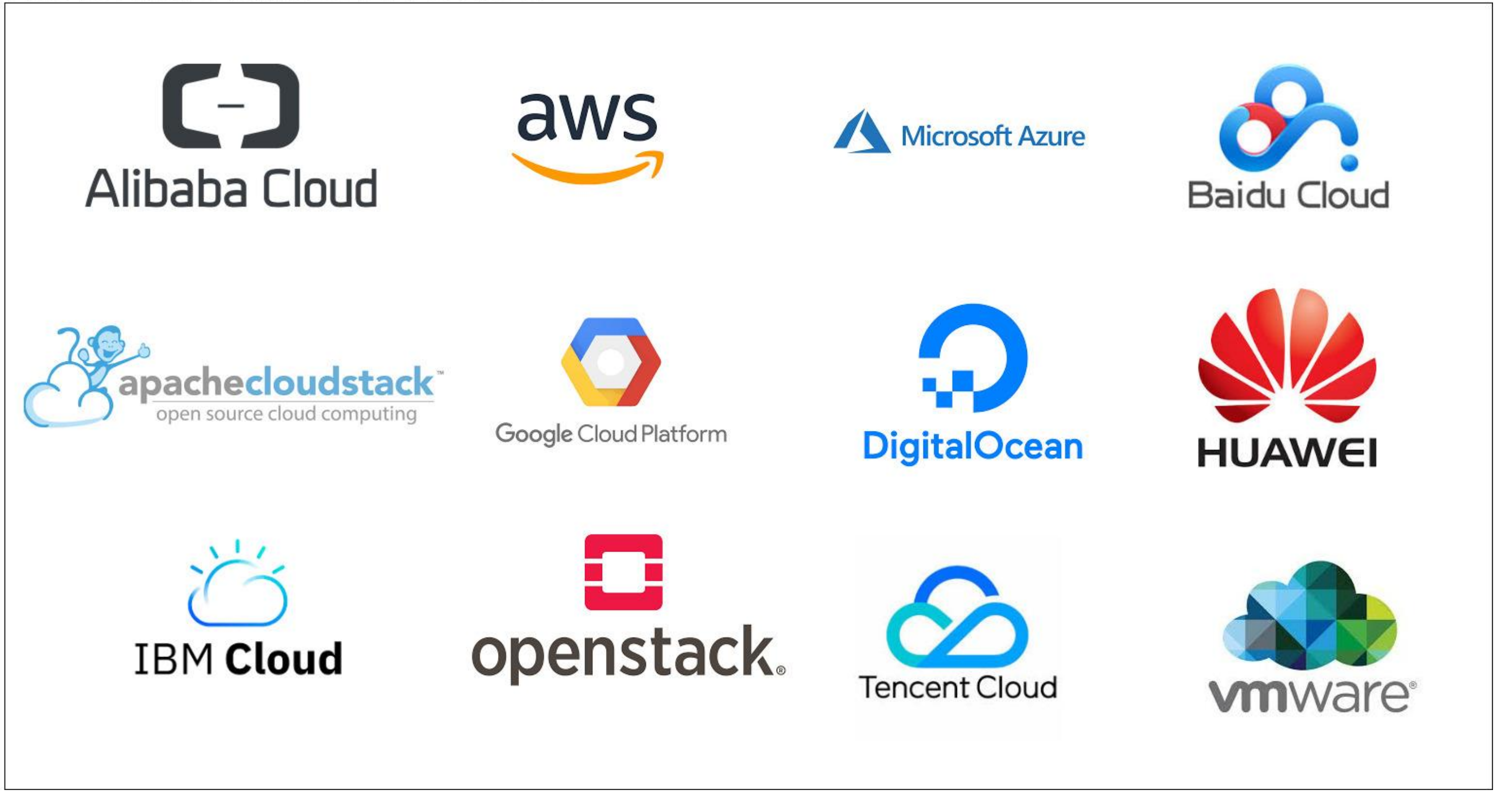
History & Background

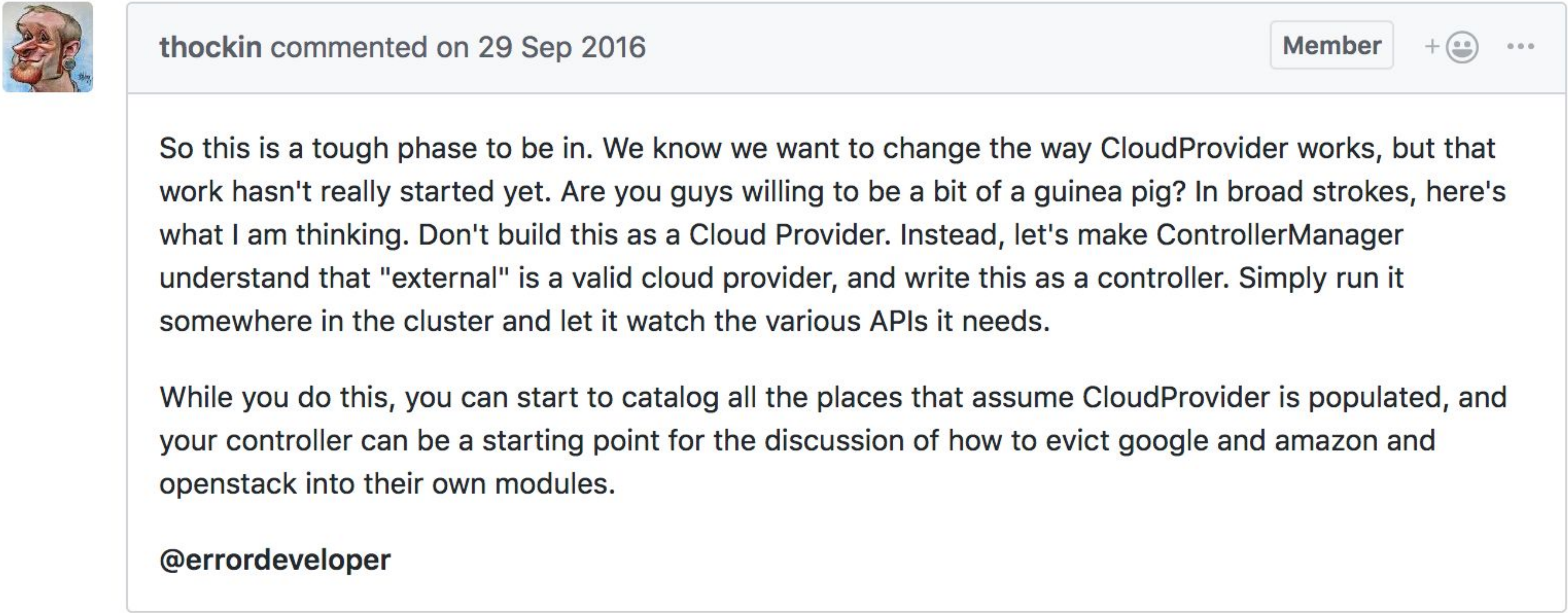
Kubernetes 2016

k8s.io/kubernetes



k8s.io/kubernetes



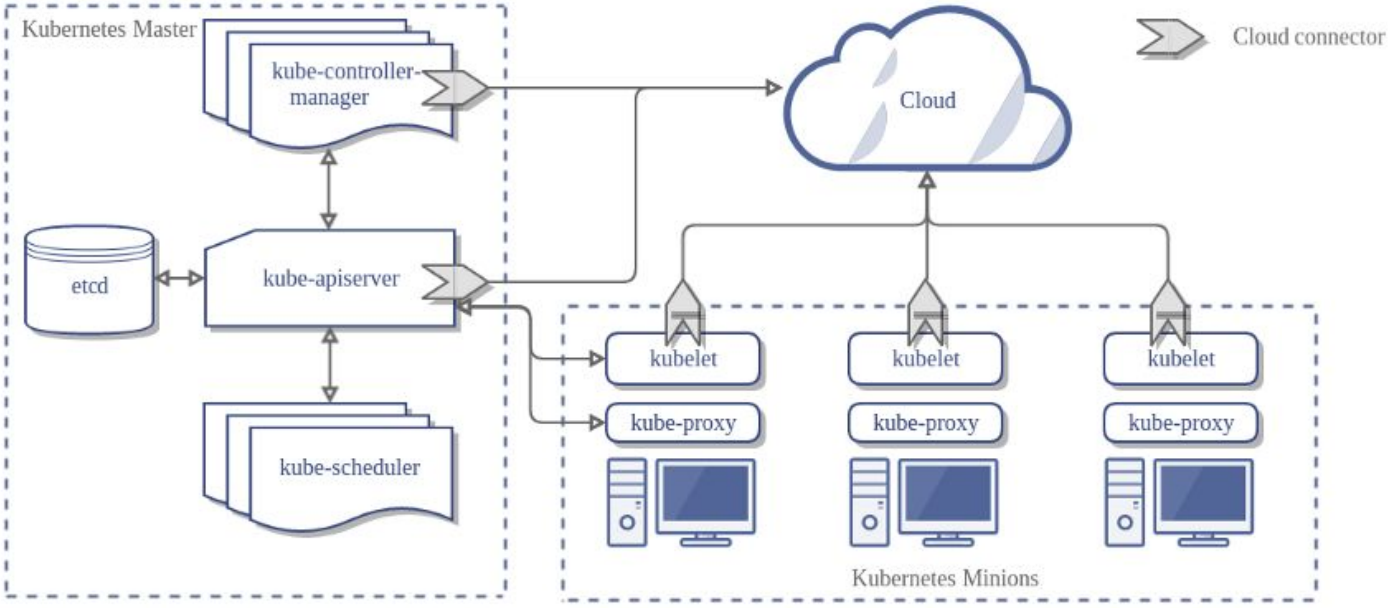


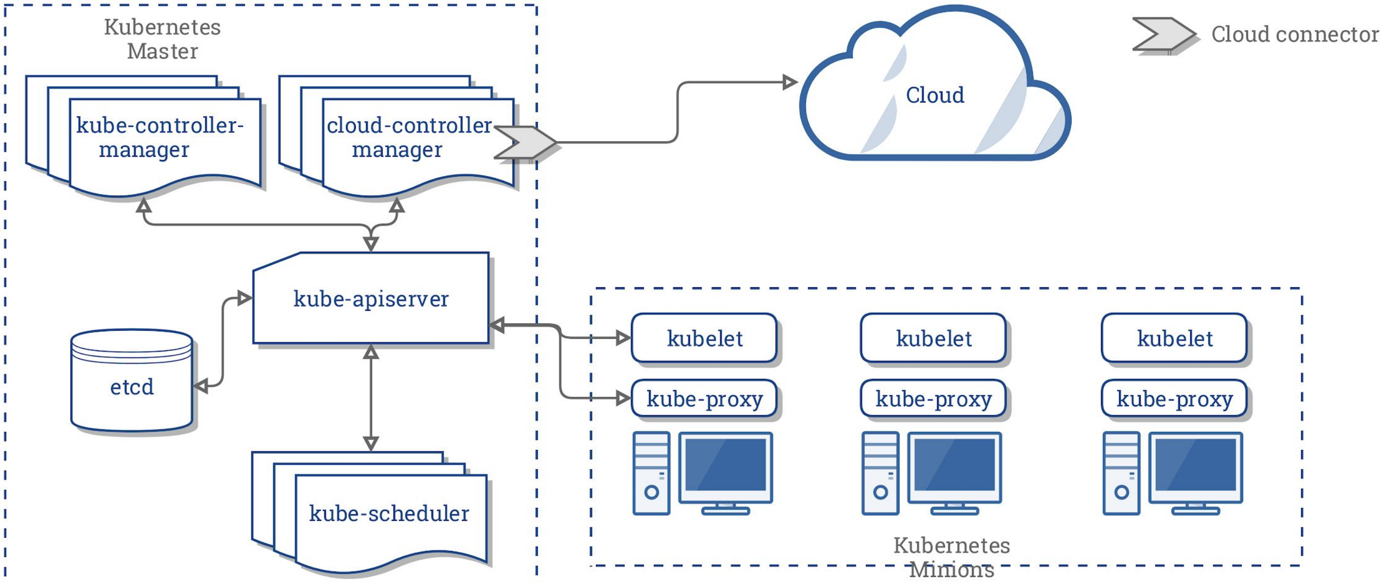
thockin commented on 29 Sep 2016

So this is a tough phase to be in. We know we want to change the way CloudProvider works, but that work hasn't really started yet. Are you guys willing to be a bit of a guinea pig? In broad strokes, here's what I am thinking. Don't build this as a Cloud Provider. Instead, let's make ControllerManager understand that "external" is a valid cloud provider, and write this as a controller. Simply run it somewhere in the cluster and let it watch the various APIs it needs.

While you do this, you can start to catalog all the places that assume CloudProvider is populated, and your controller can be a starting point for the discussion of how to evict google and amazon and openstack into their own modules.

@errordeveloper


Kubernetes Master
kube-controller-manager
etcd
kube-apiserver
kube-scheduler
Cloud
Cloud connector
kubelet
kube-proxy
kubelet
kube-proxy
kubelet
kube-proxy
Kubernetes Minions


Kubernetes Master
kube-controller-manager
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Cloud connector
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kube-proxy
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kubelet
kube-proxy
Kubernetes Minions

Cloud Provider Working Group

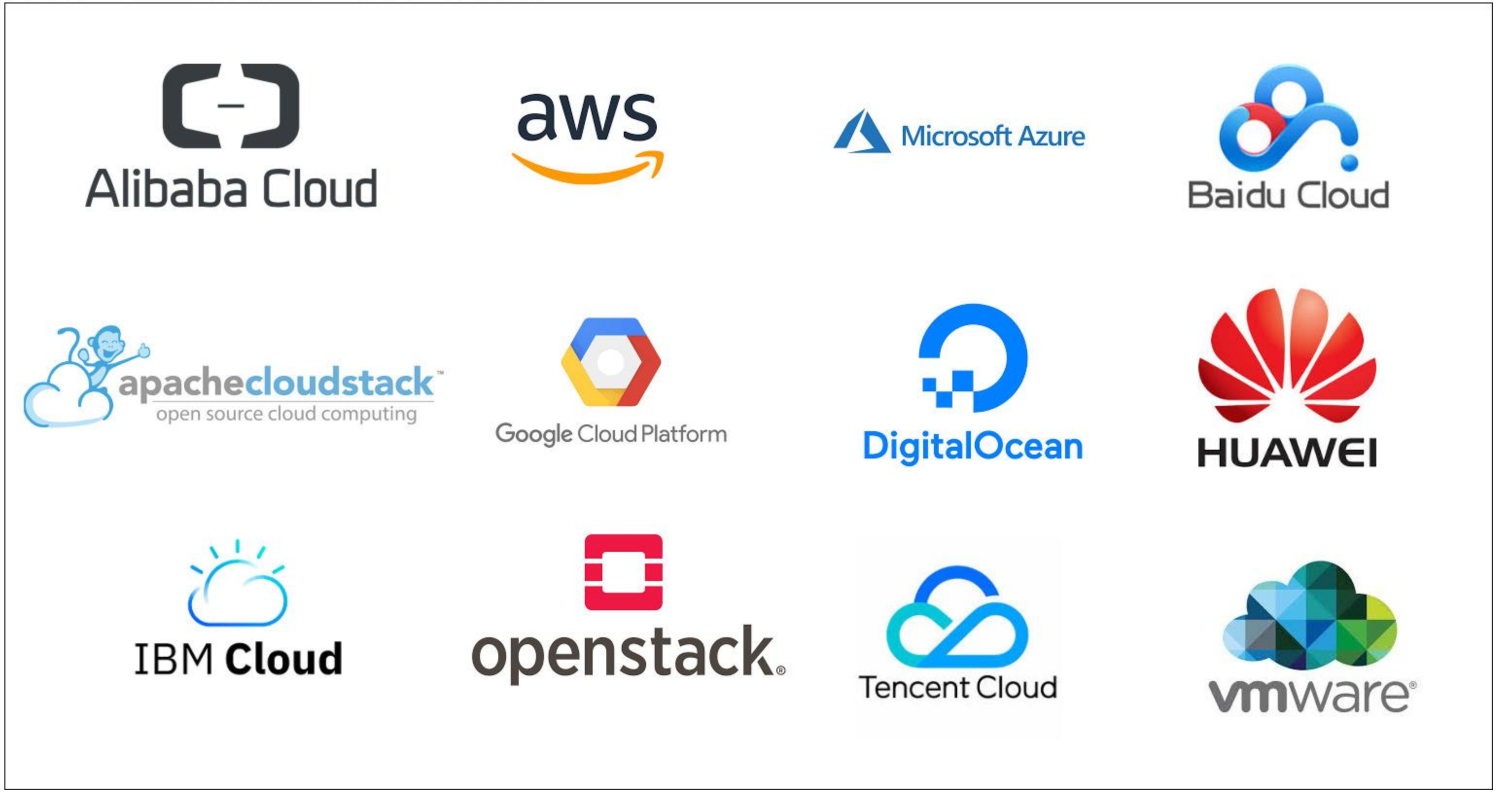
Cloud Controllers in kube-controller-manager (KCM)

- Node controller
- Service controller
- Routes/IPAM controller
- PersistentVolumeLabel Controller
- Volume Controller

cloud-controller-manager (CCM)

- Node controller
- Service controller
- Routes/IPAM controller
- PersistentVolumeLabel Controller
- Volume Controller

k8s.io/kubernetes



k8s.io/cloud-provider-alibaba

k8s.io/cloud-provider-aws

k8s.io/cloud-provider-azure

k8s.io/cloud-provider-baidu

k8s.io/cloud-provider-cloudstack

k8s.io/cloud-provider-gcp

k8s.io/cloud-provider-digitalocean

k8s.io/cloud-provider-huawei

k8s.io/cloud-provider-ibm

k8s.io/cloud-provider-openstack

k8s.io/cloud-provider-tencent

k8s.io/cloud-provider-vsphere

Building CCM was not Enough

- Migration from KCM -> CCM
- Migration from Cloud Provider Storage -> CSI
- CCM as a buildable artifact
- Code divergence between KCM and CCM
- Removing existing cloud providers from k8s.io/kubernetes
- Governance for Kubernetes cloud providers
- Ownership of “Cloud Provider” APIs/Standards

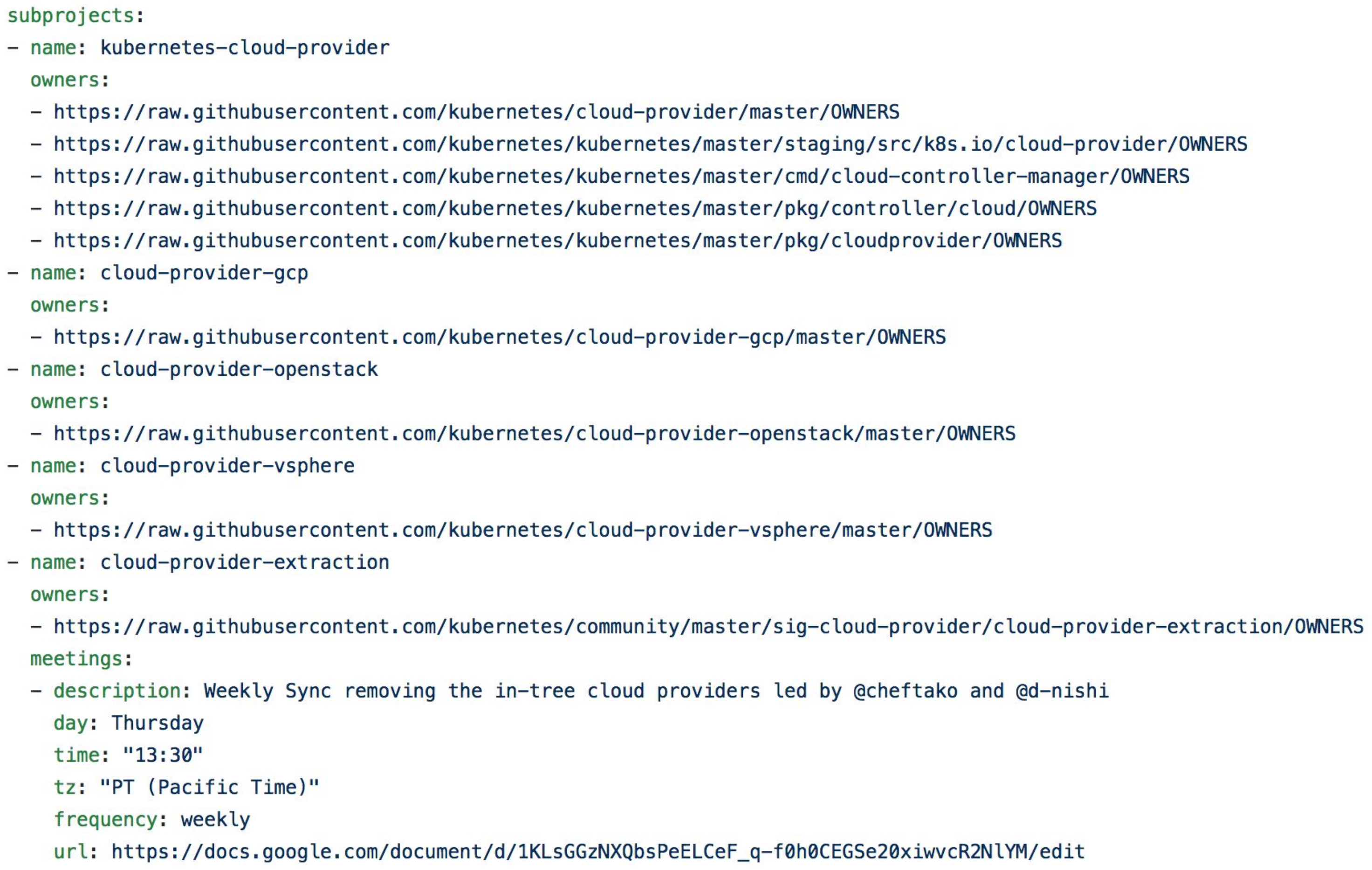
Why out-of-tree?

- Cleaner release CHANGELOG in k8s.io/kubernetes
- Only install what you need
- Smaller binary sizes (kube-apiserver, kube-controller-manager, kubelet)
- Faster development cycle for each cloud provider

SIG Cloud Provider

- Maintains the “Cloud Provider Interface”
- Overall architecture for cloud providers in the ecosystem
- Owns cloud-controller-manager
- Owns “cloud specific” controllers
- Project governance for cloud providers

Code Ownership



```yaml
subprojects:
- name: kubernetes-cloud-provider
  owners:
  - https://raw.githubusercontent.com/kubernetes/cloud-provider/master/OWNERS
  - https://raw.githubusercontent.com/kubernetes/kubernetes/master/staging/src/k8s.io/cloud-provider/OWNERS
  - https://raw.githubusercontent.com/kubernetes/kubernetes/master/cmd/cloud-controller-manager/OWNERS
  - https://raw.githubusercontent.com/kubernetes/kubernetes/master/pkg/controller/cloud/OWNERS
  - https://raw.githubusercontent.com/kubernetes/kubernetes/master/pkg/cloudprovider/OWNERS
- name: cloud-provider-gcp
  owners:
  - https://raw.githubusercontent.com/kubernetes/cloud-provider-gcp/master/OWNERS
- name: cloud-provider-openstack
  owners:
  - https://raw.githubusercontent.com/kubernetes/cloud-provider-openstack/master/OWNERS
- name: cloud-provider-vsphere
  owners:
  - https://raw.githubusercontent.com/kubernetes/cloud-provider-vsphere/master/OWNERS
- name: cloud-provider-extraction
  owners:
  - https://raw.githubusercontent.com/kubernetes/community/master/sig-cloud-provider/cloud-provider-extraction/OWNERS
  meetings:
  - description: Weekly Sync removing the in-tree cloud providers led by @cheftako and @d-nishi
    day: Thursday
    time: "13:30"
    tz: "PT (Pacific Time)"
    frequency: weekly
    url: https://docs.google.com/document/d/1KLsGGzNXQbsPeELCeF_q-f0h0CEGSe20xiwvcR2NlYM/edit
```

k8s.io/cloud-provider-alibaba

Alibaba Cloud

k8s.io/cloud-provider-aws

aws

k8s.io/cloud-provider-azure

Microsoft Azure

k8s.io/cloud-provider-baidu

Baidu Cloud

k8s.io/cloud-provider-cloudstack

apachecloudstack™
open source cloud computing

k8s.io/cloud-provider-gcp

Google Cloud Platform

k8s.io/cloud-provider-digitalocean

DigitalOcean

k8s.io/cloud-provider-huawei

HUAWEI

k8s.io/cloud-provider-ibm

IBM Cloud

k8s.io/cloud-provider-openstack

openstack®

k8s.io/cloud-provider-tencent

Tencent Cloud

k8s.io/cloud-provider-vsphere

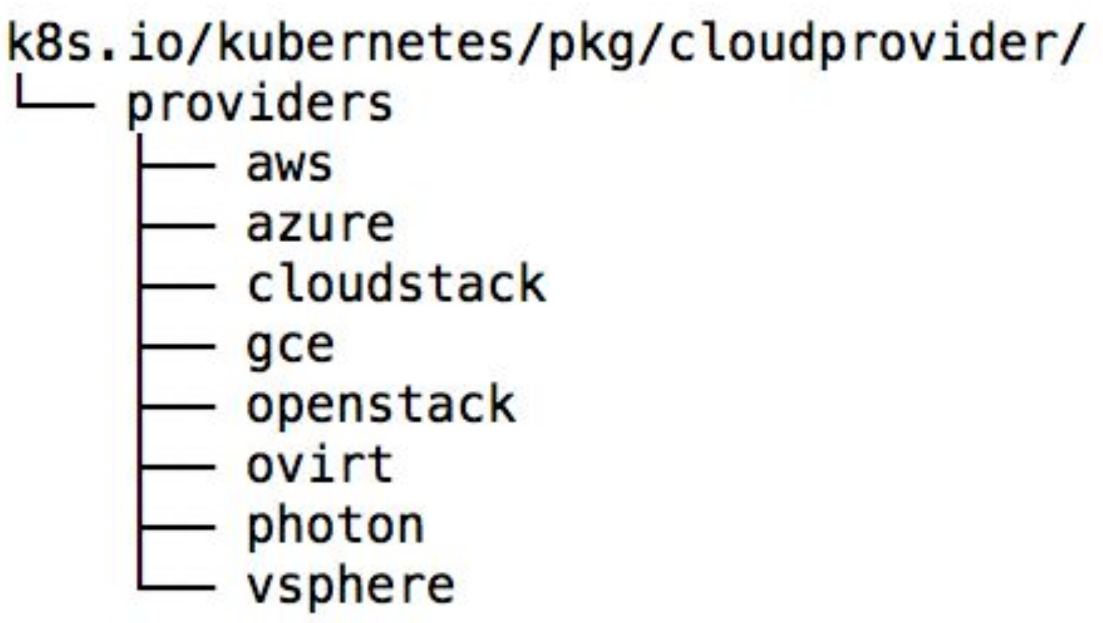
vmware®

Subprojects & Working Groups

Cloud Provider Extraction Subproject

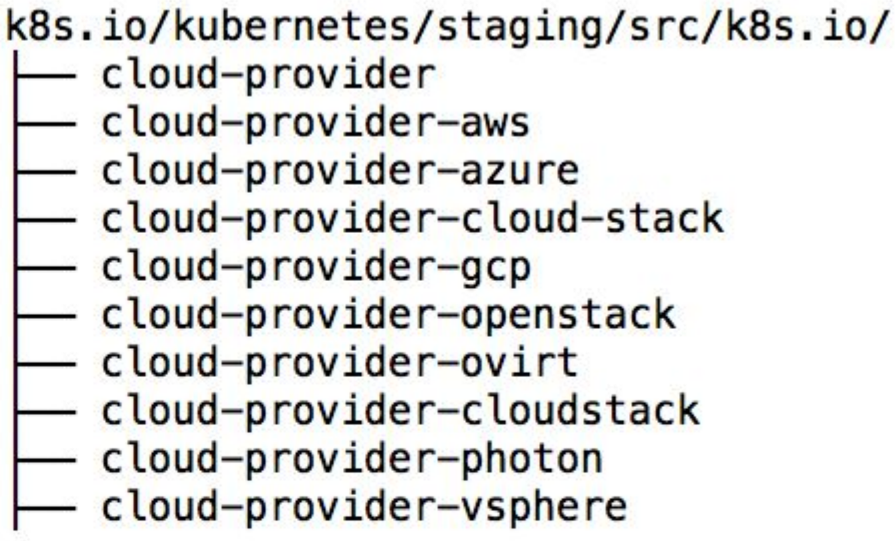
- Removing all existing cloud providers from k8s.io/kubernetes
    - Without breaking API guarantees
    - Very little divergence of behaviour from controllers
    - “Smooth Transition”
- Leads:
    - Nishi Davidson (AWS)
    - Walter Fender (Google)

Cloud Provider Extraction Subproject



```
k8s.io/kubernetes/pkg/cloudprovider/
└── providers
    ├── aws
    ├── azure
    ├── cloudstack
    ├── gce
    ├── openstack
    ├── ovirt
    ├── photon
    └── vsphere
```

Cloud Provider Extraction Subproject



```
k8s.io/kubernetes/staging/src/k8s.io/
├── cloud-provider
├── cloud-provider-aws
├── cloud-provider-azure
├── cloud-provider-cloud-stack
├── cloud-provider-gcp
├── cloud-provider-openstack
├── cloud-provider-ovirt
├── cloud-provider-cloudstack
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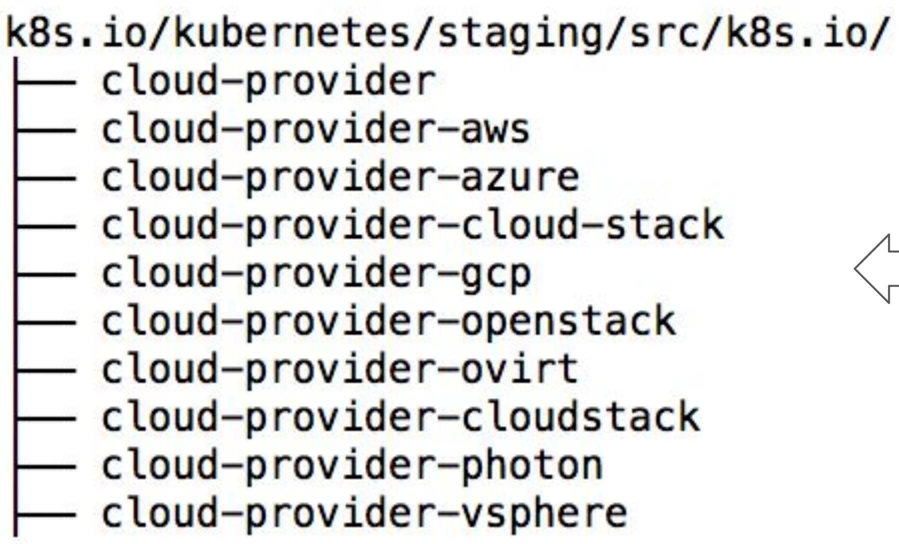
Cloud Provider Extraction Subproject



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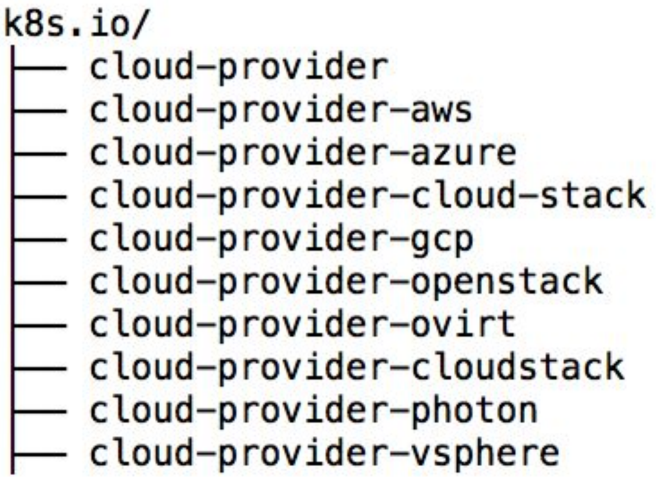

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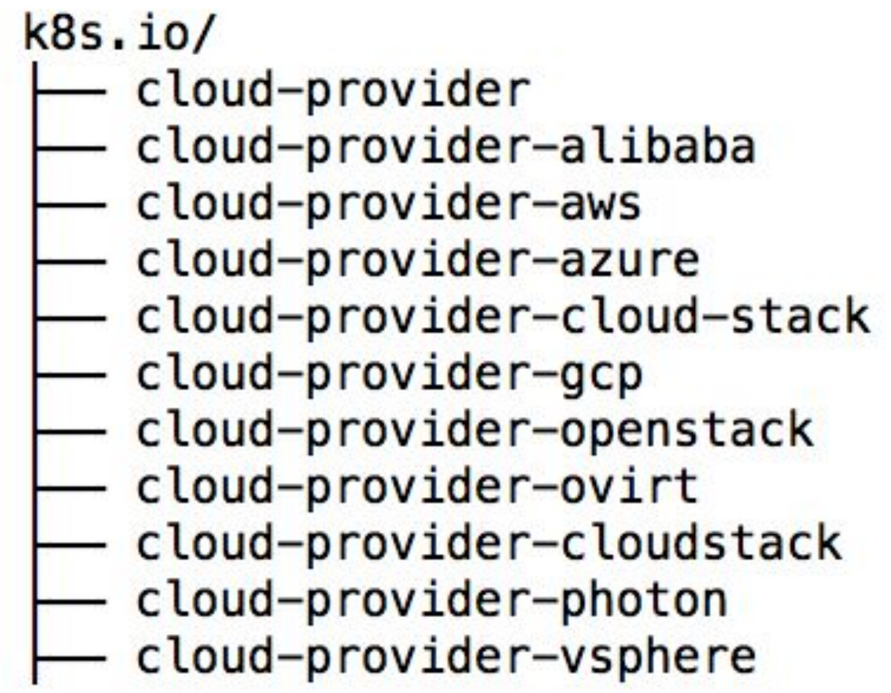

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├── cloud-provider-photon
├── cloud-provider-vsphere
```
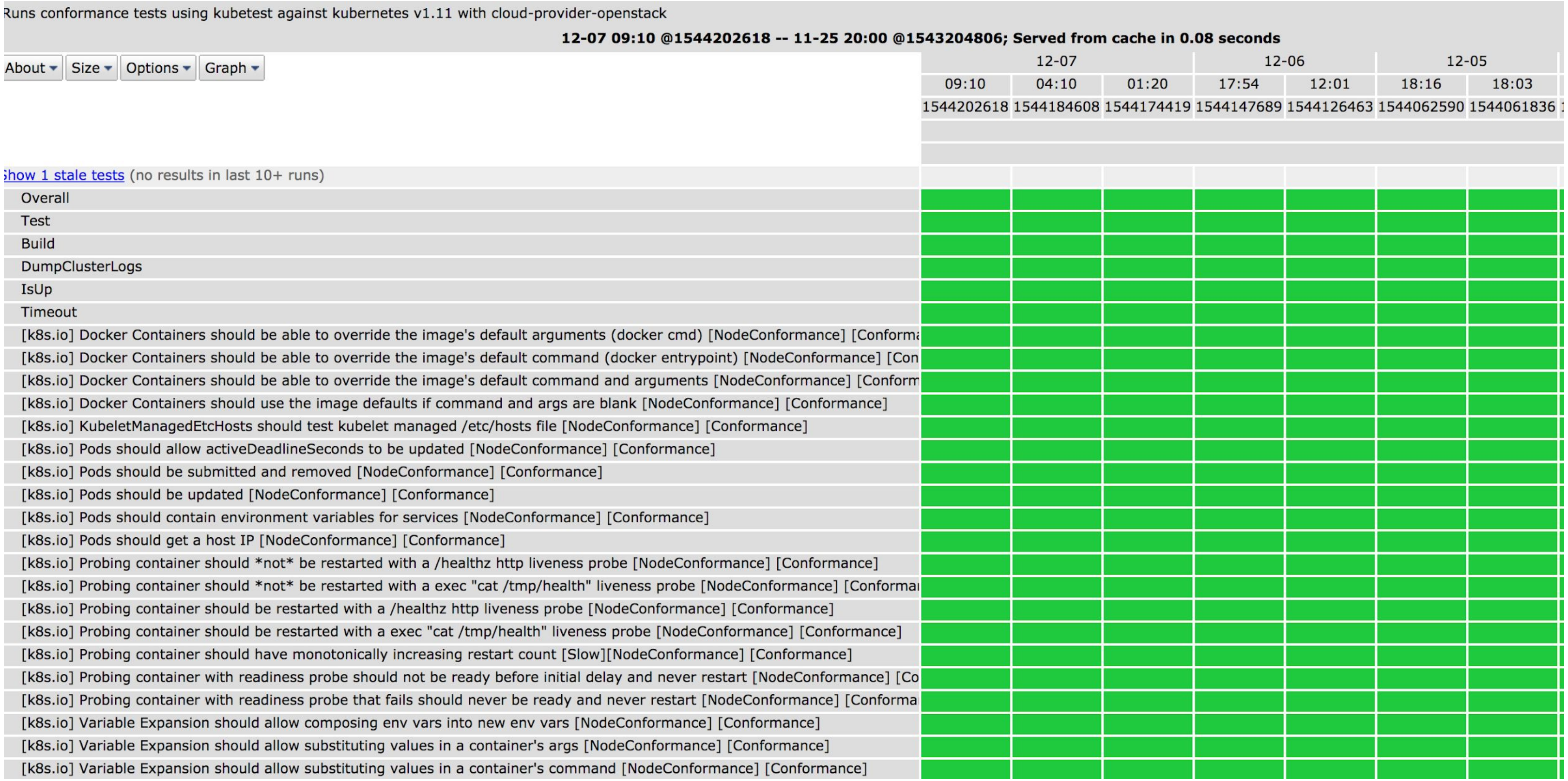

Managing change across multiple providers...



Runs conformance tests using kubetest against kubernetes v1.11 with cloud-provider-openstack

12-07 09:10 @1544202618 -- 11-25 20:00 @1543204806; Served from cache in 0.08 seconds

	12-07			12-06		12-05	
	09:10	04:10	01:20	17:54	12:01	18:16	18:03
	1544202618	1544184608	1544174419	1544147689	1544126463	1544062590	1544061836
Show 1 stale tests (no results in last 10+ runs)							
Overall	🟩	🟩	🟩	🟩	🟩	🟩	🟩
Test	🟩	🟩	🟩	🟩	🟩	🟩	🟩
Build	🟩	🟩	🟩	🟩	🟩	🟩	🟩
DumpClusterLogs	🟩	🟩	🟩	🟩	🟩	🟩	🟩
IsUp	🟩	🟩	🟩	🟩	🟩	🟩	🟩
Timeout	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Docker Containers should be able to override the image's default arguments (docker cmd) [NodeConformance] [Conforma	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Docker Containers should be able to override the image's default command (docker entrypoint) [NodeConformance] [Con	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Docker Containers should be able to override the image's default command and arguments [NodeConformance] [Conform	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Docker Containers should use the image defaults if command and args are blank [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] KubeletManagedEtcHosts should test kubelet managed /etc/hosts file [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Pods should allow activeDeadlineSeconds to be updated [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Pods should be submitted and removed [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Pods should be updated [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Pods should contain environment variables for services [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Pods should get a host IP [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container should *not* be restarted with a /healthz http liveness probe [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container should *not* be restarted with a exec "cat /tmp/health" liveness probe [NodeConformance] [Conforma	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container should be restarted with a /healthz http liveness probe [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container should be restarted with a exec "cat /tmp/health" liveness probe [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container should have monotonically increasing restart count [Slow][NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container with readiness probe should not be ready before initial delay and never restart [NodeConformance] [Co	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Probing container with readiness probe that fails should never be ready and never restart [NodeConformance] [Conforma	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Variable Expansion should allow composing env vars into new env vars [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Variable Expansion should allow substituting values in a container's args [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩
[k8s.io] Variable Expansion should allow substituting values in a container's command [NodeConformance] [Conformance]	🟩	🟩	🟩	🟩	🟩	🟩	🟩

Cross-SIG participation

- Exploring options around supporting “Long Term Support Distributions of Kubernetes”
- “Cloud Providers as a Distribution”
- https://github.com/kubernetes/community/pull/2911

Governance

Cloud Providers as Subprojects

Cloud Providers as Subprojects (proposed)

- A SIG per Cloud Provider was not sustainable
- Folding ownership of all cloud providers under 1 SIG, this is still a work in progress
  - all cloud provider repos should be subprojects of SIG Cloud Provider
    - requires “smooth” migration.
- More about subprojects: https://github.com/kubernetes/community/issues/1673

Requirements for New Cloud Providers in K8s

- Conformance certified
- Reporting conformance to testgrid
- Well documented
- User experience reports
- Well tested/used CCM
- Tech leads are members of the Kubernetes org

SIG Challenges

APIs for ALL Clouds

Migrations are Slow

kubernetes

Project Governance

kubernetes

Deep Dive: SIG Cloud Provider

- Cloud Abstractions/APIs in Kubernetes
- What do the various cloud controllers actually do?
- Migration of **KCM** to **CCM** in production clusters
- Migration of code outside of **k8s.io/kubernetes -> k8s.io/cloud-provider**
- Addressing tech debt

Questions & Discussions