

# Deep Dive: SIG Cloud Provider



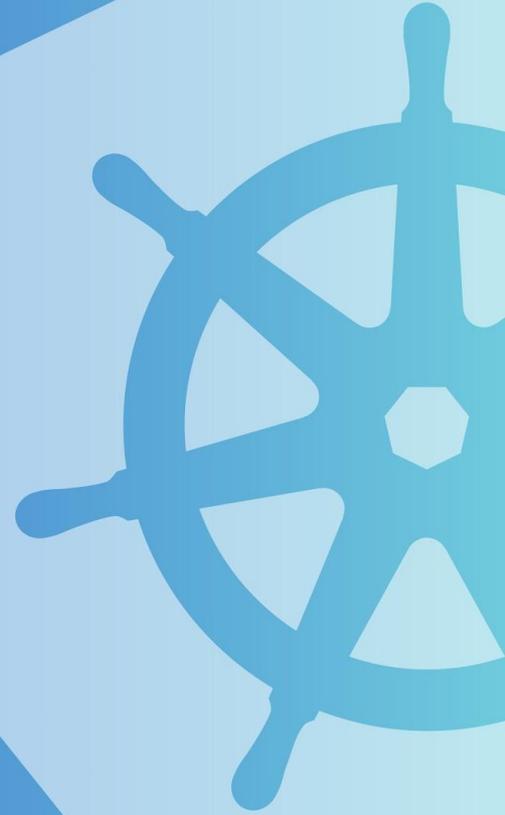
**kubernetes**

# Agenda

- 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



# Building the Right Abstractions

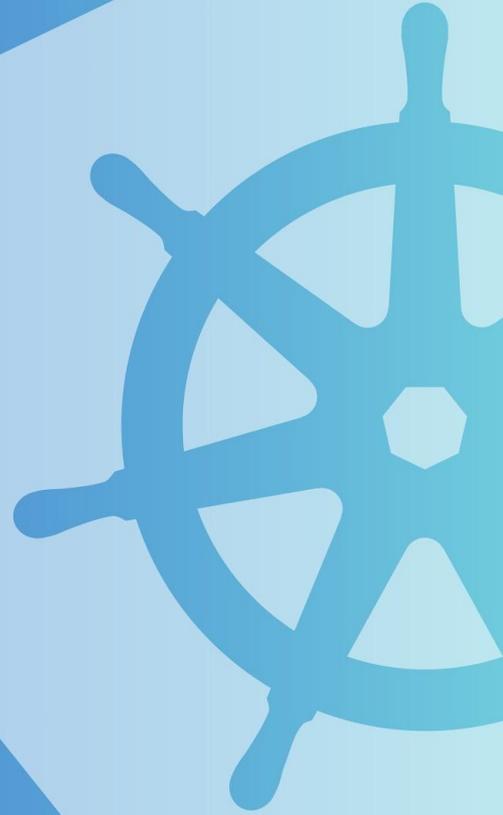


# Existing Abstractions/APIs

- Nodes
  - instance types
  - regions/zones
  - addresses
  - provider IDs
- Load Balancers
- Routes/IPAM
- Volumes



# Nodes

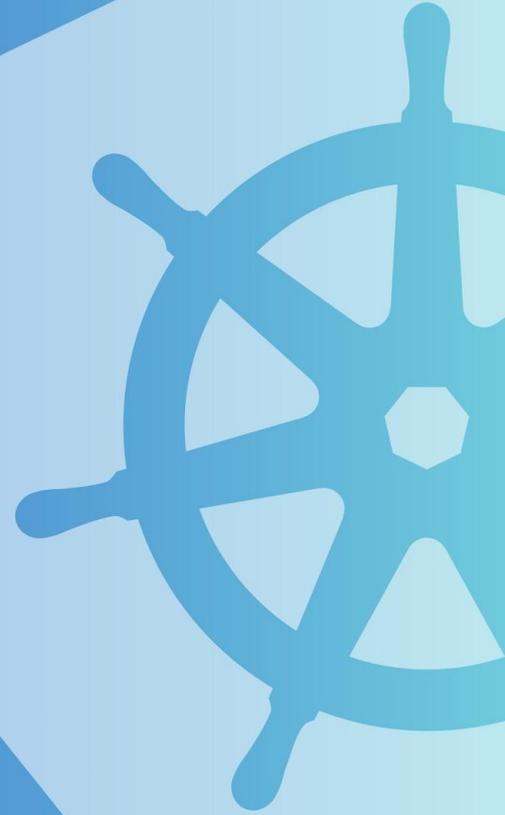


# Nodes

- Node conditions/states
- Node addresses
- Regions vs Zones
- Virtual kubelet



# Load Balancers

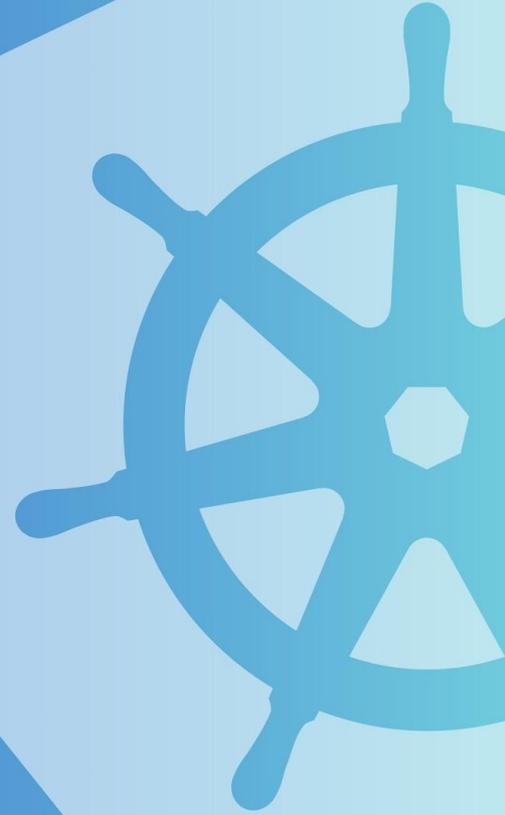


# Load Balancers

- Multiple cloud resources
  - firewalls
  - IP addresses
  - load balancer
  - DNS
- Network vs Application



# Routes/IPAM

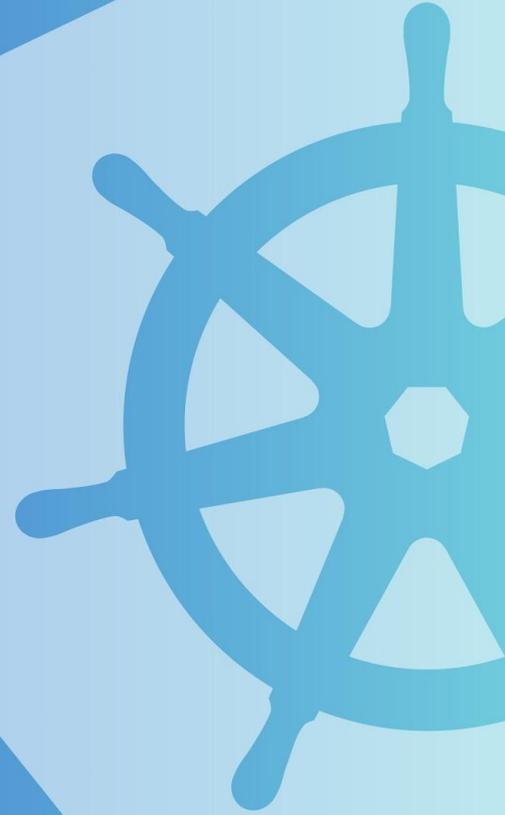


# Routes

- VPC routing tables
- Overlay or Underlay?
- IPAM from cluster or from cloud?



# Controllers

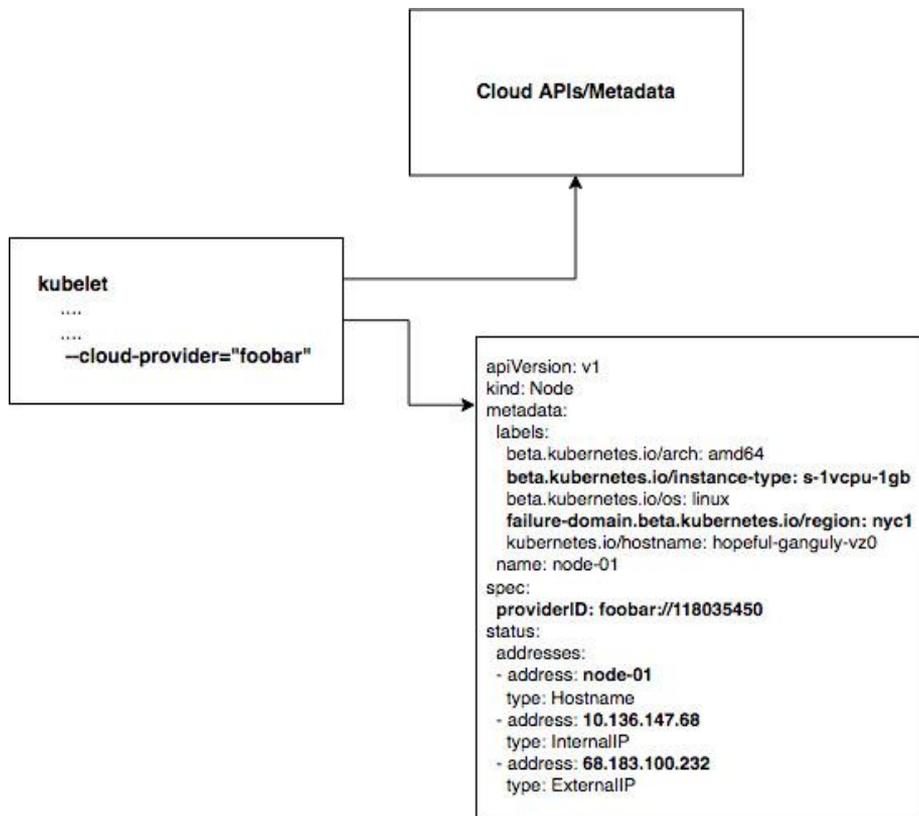


# Controllers

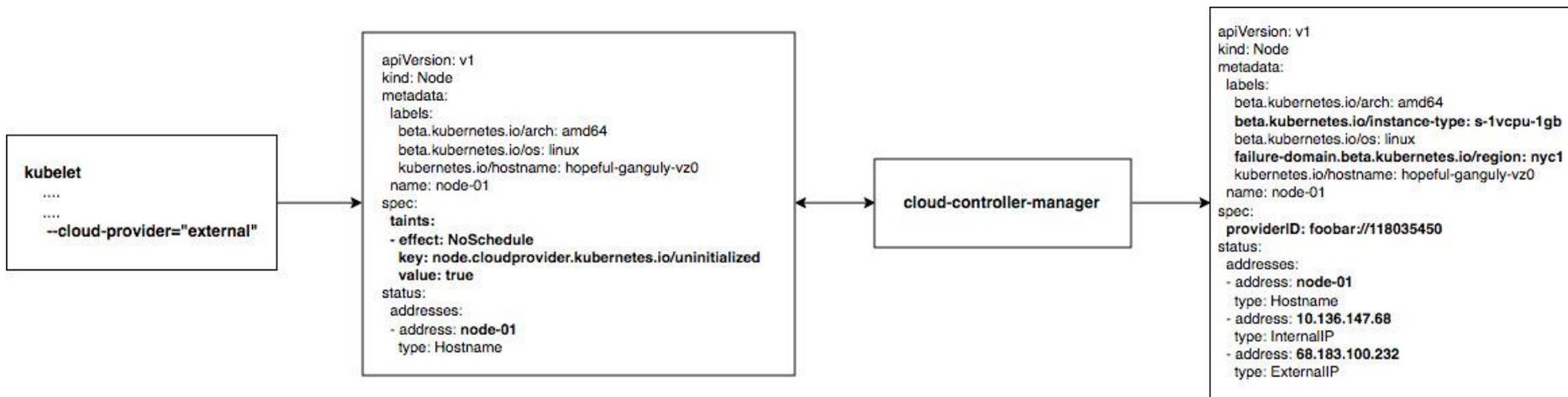
- Node Controller
  - lifecycle
  - registration
- Service Controller
- Routes Controller
- Node IPAM Controller
- PersistentVolumeLabel Controller



# Node Registration (in-tree)



# Node Registration (out-of-tree)



# Node Controller

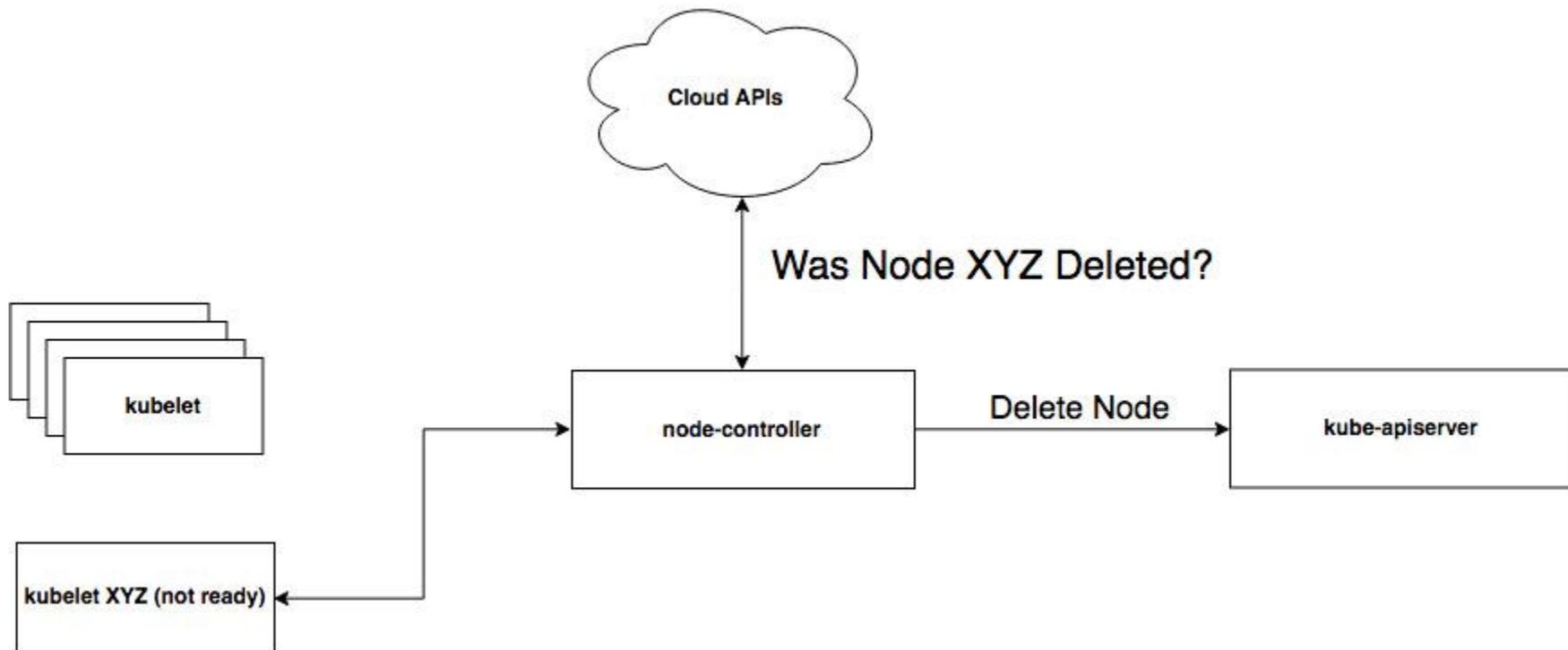
```
apiVersion: v1
kind: Node
metadata:
  labels:
    beta.kubernetes.io/arch: amd64
    beta.kubernetes.io/os: linux
    kubernetes.io/hostname: hopeful-ganguly-vz0
  name: node-01
spec:
  taints:
  - effect: NoSchedule
    key: node.cloudprovider.kubernetes.io/uninitialized
    value: true
status:
  addresses:
  - address: node-01
    type: Hostname
```

node-controller

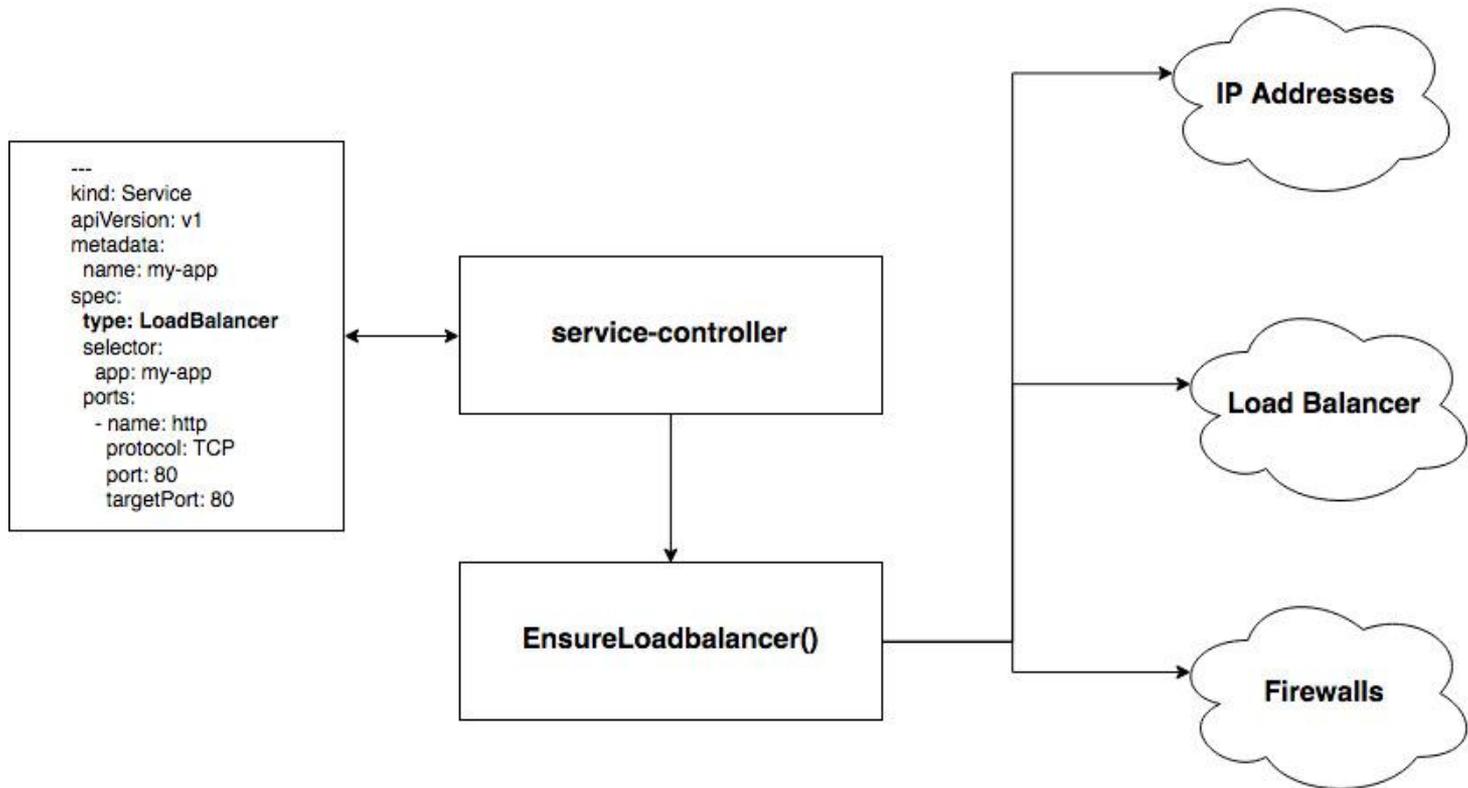
```
apiVersion: v1
kind: Node
metadata:
  labels:
    beta.kubernetes.io/arch: amd64
    beta.kubernetes.io/instance-type: s-1vcpu-1gb
    beta.kubernetes.io/os: linux
    failure-domain.beta.kubernetes.io/region: nyc1
    kubernetes.io/hostname: hopeful-ganguly-vz0
  name: node-01
spec:
  providerID: foobar://118035450
status:
  addresses:
  - address: node-01
    type: Hostname
  - address: 10.136.147.68
    type: InternalIP
  - address: 68.183.100.232
    type: ExternalIP
```



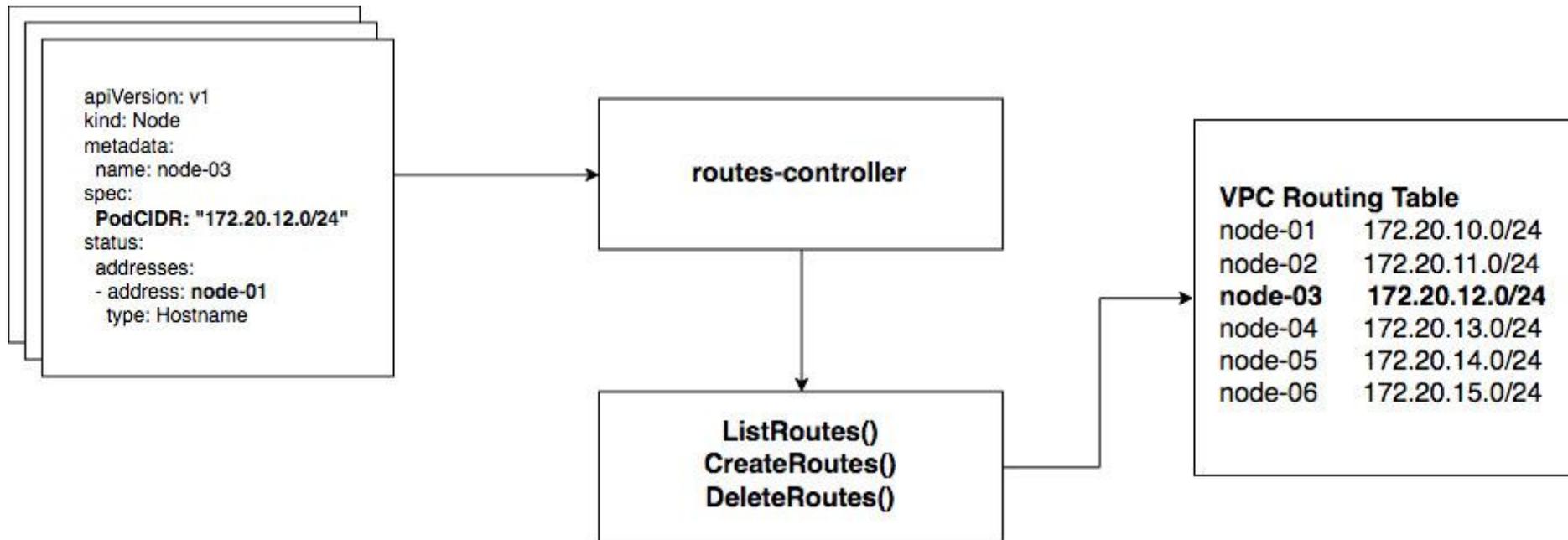
# Node Controller



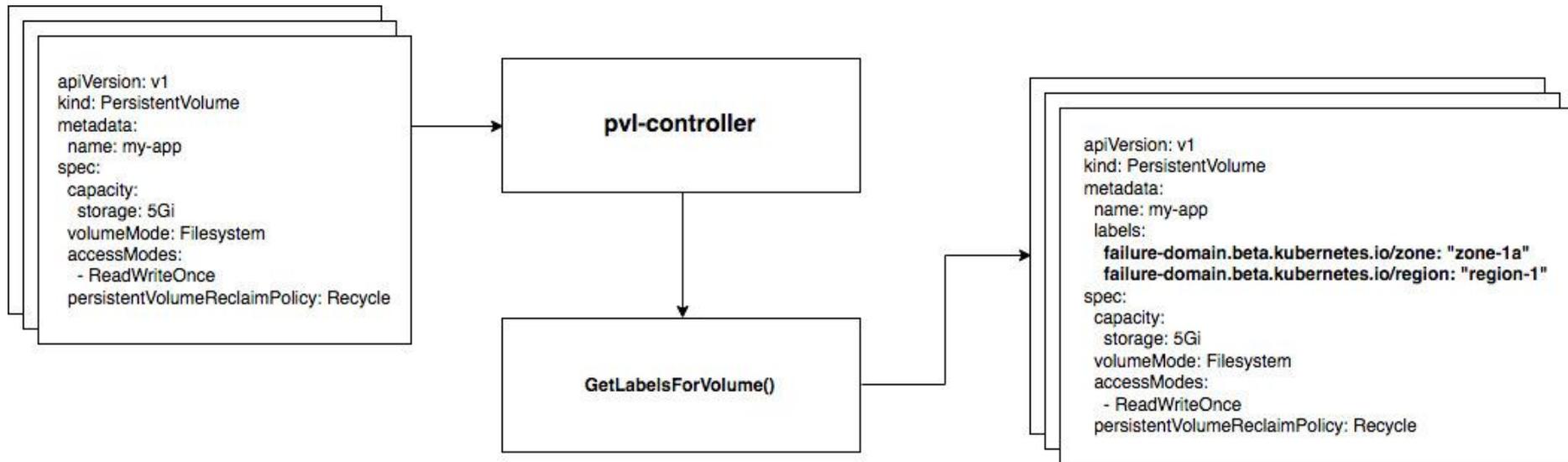
# Service Controller



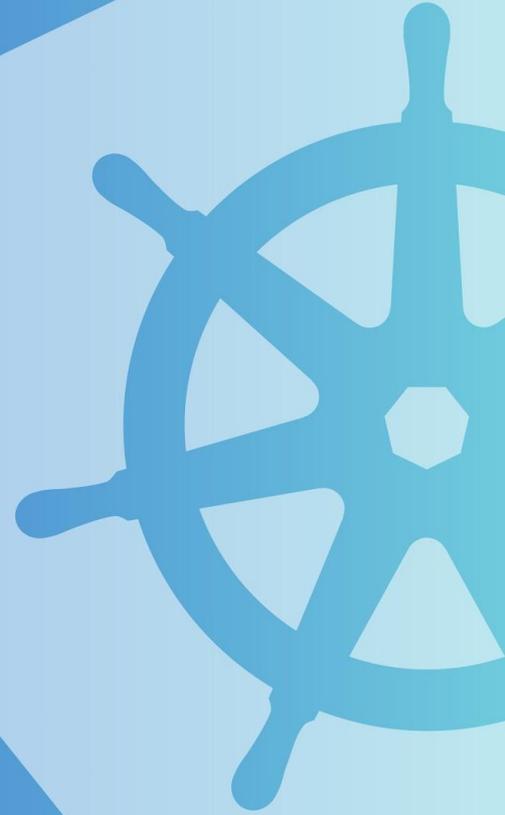
# Routes Controller

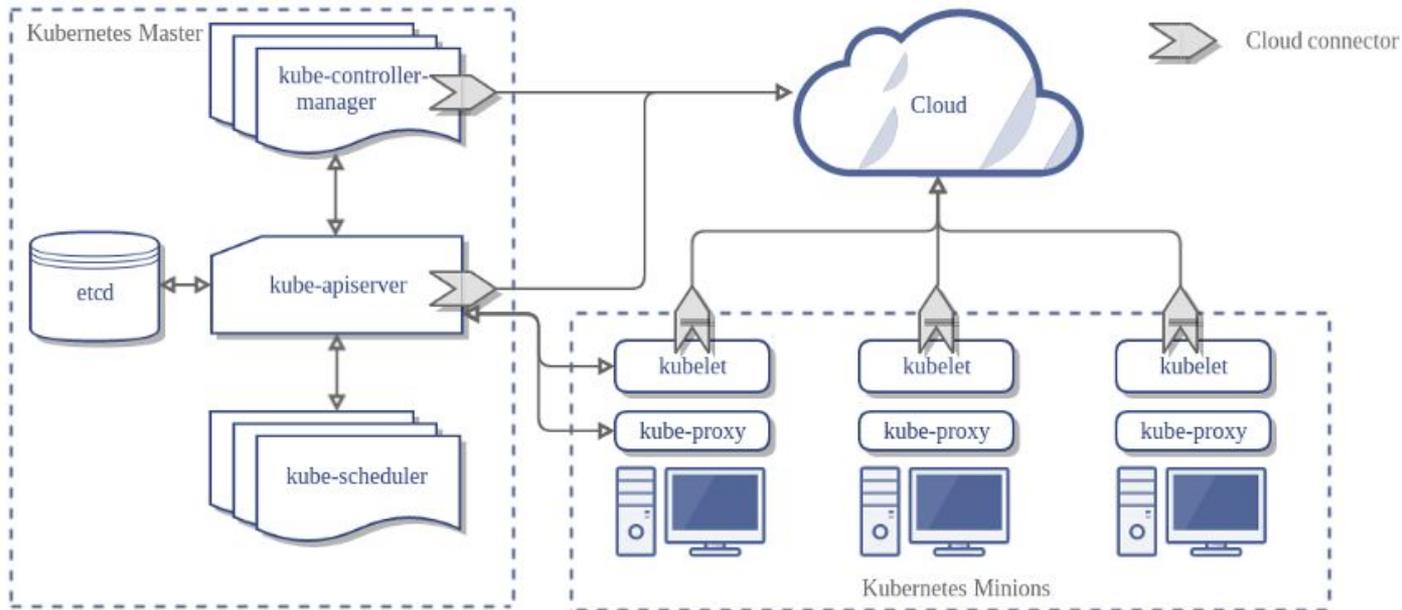


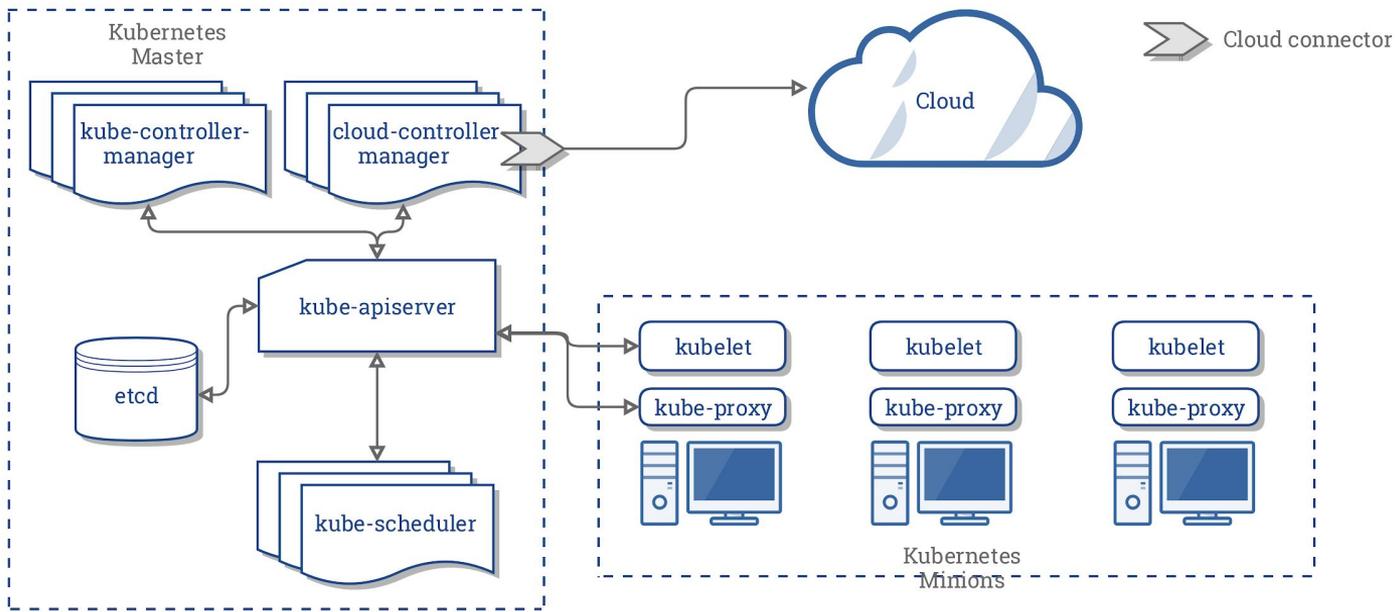
# PersistentVolumeLabel Controller

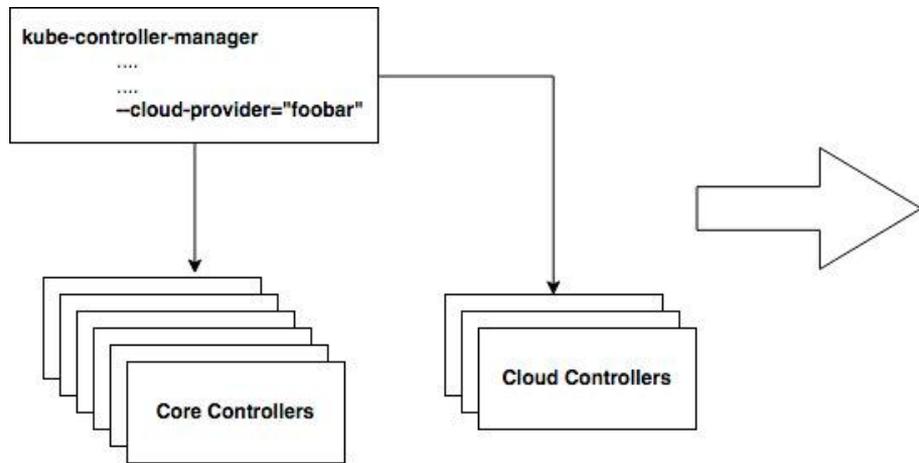


# Migration to Out-of-Tree Cloud Providers

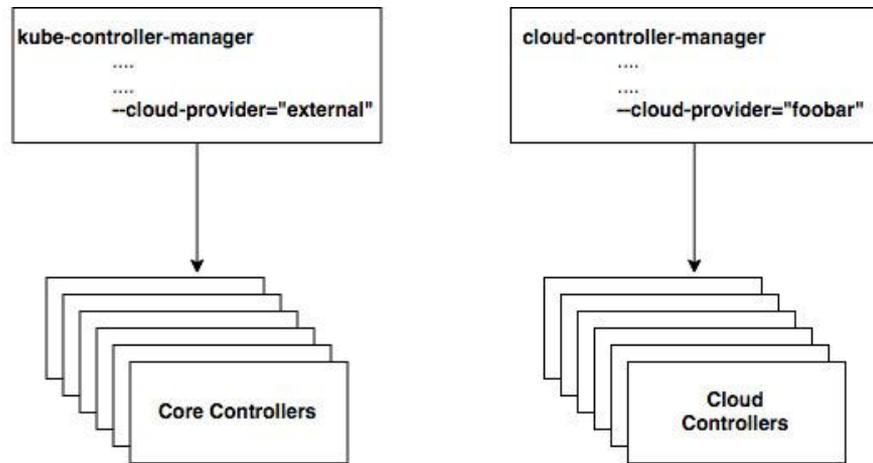






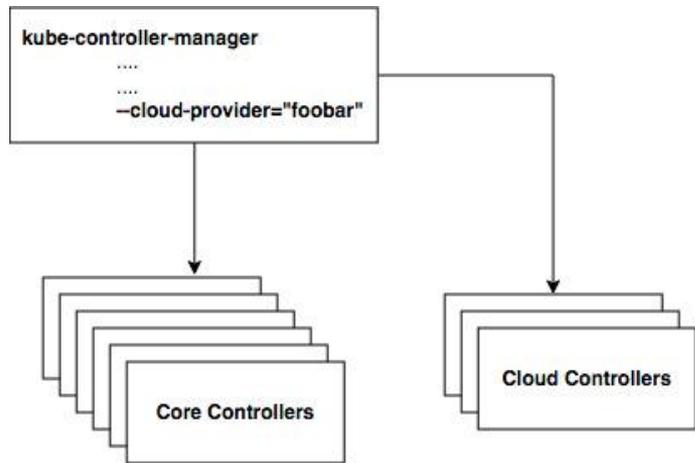


**Kubernetes v1.X**

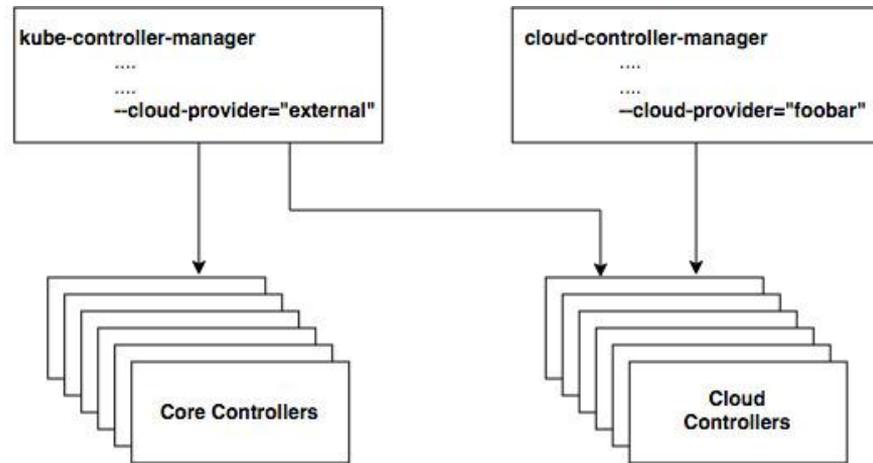
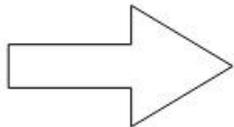


**Kubernetes v1.Y**





**Kubernetes v1.X**

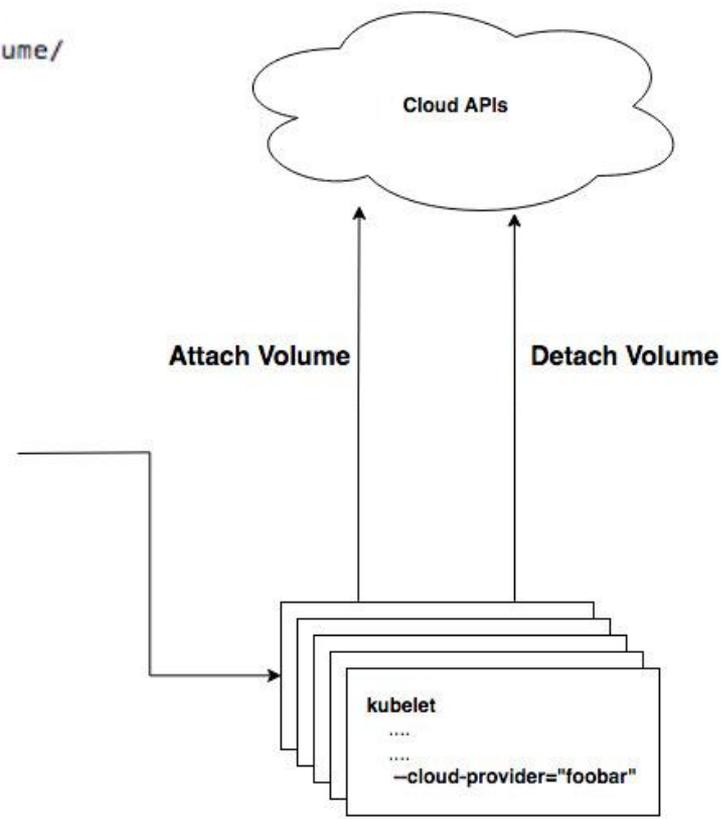


**Kubernetes v1.Y**



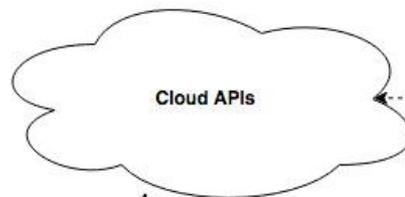
k8s.io/kubernetes/pkg/volume/

- awsebs
- azure-dd
- azure-file
- cephfs
- cinder
- configmap
- csi
- downwardapi
- emptydir
- fc
- flexvolume
- flocker
- gcepd
- git-repo
- glusterfs
- host-path
- iscsi
- local
- nfs
- photon-pd
- portworx
- projected
- quobyte
- rbd
- scaleio
- secret
- storageos
- testing
- util
- validation
- vsphere-volume



k8s.io/kubernetes/pkg/volume/

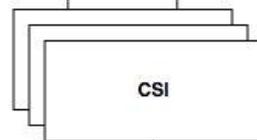
- awsebs
- azure-dd
- azure-file
- cephfs
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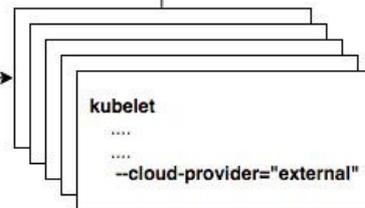
Attach Volume

Detach Volume

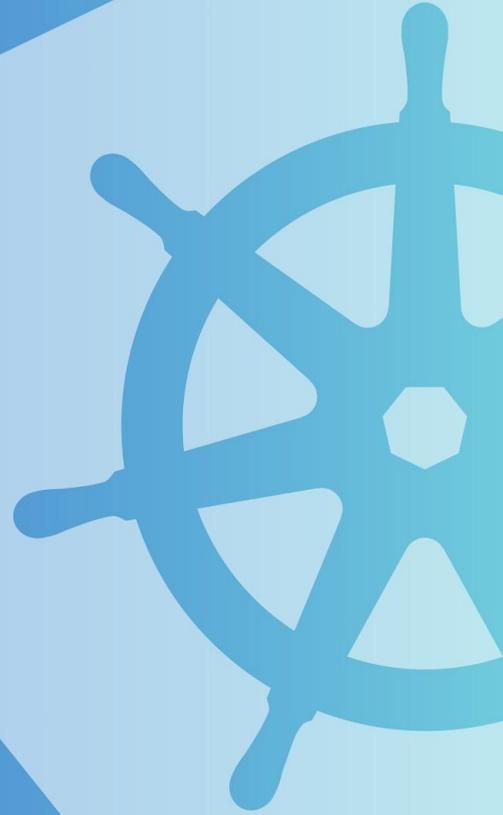
Fallback Volume Plugins



CSI Translation Library



# Code Migration



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



# Removing cloud provider dependencies to kubernetes/kubernetes #69585

 **Open** andrewsykim opened this issue on Oct 10 · 31 comments



andrewsykim commented on Oct 10 • edited ▾

Member + 🗨️ ⋮

Is this a **BUG REPORT** or **FEATURE REQUEST**?:

/kind feature

As part of a long running initiative to remove cloud providers out of kubernetes/kubernetes, it's required to remove dependencies to kubernetes/kubernetes so we can place them into a staging directory. The following dependencies need to be removed from

k8s.io/kubernetes/pkg/cloudprovider/providers :

Dependency checklist:

- pkg/api/service (@mcrute)
- pkg/api/v1/service (@mcrute)
- pkg/apis/core/v1/helper (@islinwb)
- pkg/controller (@stewart-yu)
- pkg/credentialprovider/aws (@yastij)
- pkg/master/ports (@d-nishi)
- pkg/cloudprovider (@cheftako)
- pkg/features
- pkg/kubelet/apis (@islinwb)
- pkg/util/keymutex (@dims)
- pkg/util/mount (@mcrute)
- pkg/util/net/sets (@mcrute)
- pkg/util/node (@cheftako)
- pkg/util/parsers (@cheftako)
- pkg/util/strings (@dims)
- pkg/version (@islinwb)
- pkg/volume (@islinwb)
- pkg/volume/util (@islinwb)
- pkg/volume/util/volumepathhandler

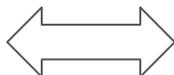
/sig cloud-provider



# 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
- cloud-provider-photon
- cloud-provider-vmware



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
- cloud-provider-photon
- cloud-provider-vmware



# Cloud Provider Extraction Subproject

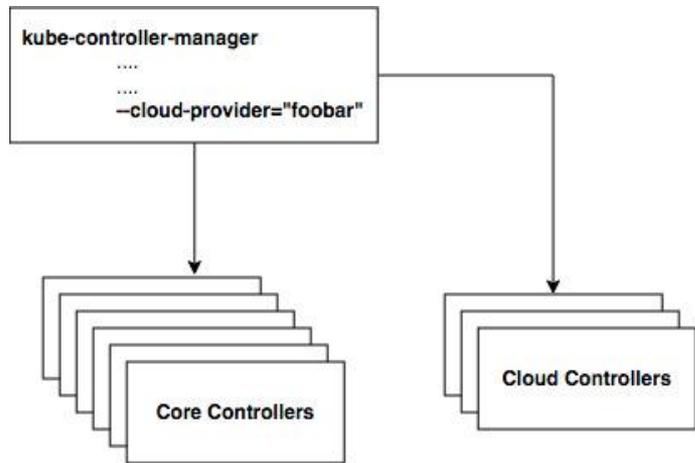
k8s.io/kubernetes/staging/src/k8s.io/

- cloud-provider
- cloud-provider-aws
- cloud-provider-azure
- cloud-provider-cloud-stack
- cloud-provider-gcp
- cloud-provider-openstack
- cloud-provider-ovirt
- cloud-provider-cloudstack
- cloud-provider-photon
- cloud-provider-vmware

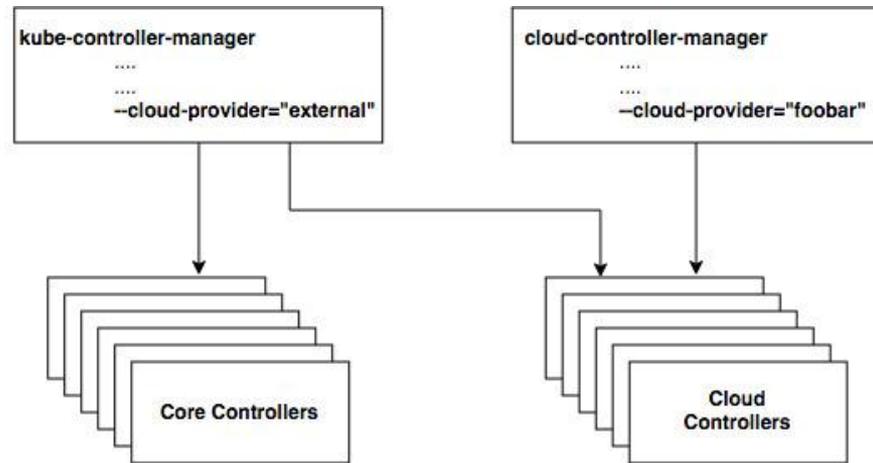
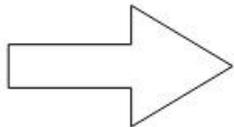
**kube-controller-manager**

**cloud-controller-manager**





**Kubernetes v1.X**



**Kubernetes v1.Y**



# Cloud Provider Extraction Subproject

k8s.io/

- cloud-provider
- cloud-provider-alibaba
- cloud-provider-aws
- cloud-provider-azure
- cloud-provider-cloud-stack
- cloud-provider-gcp
- cloud-provider-openstack
- cloud-provider-ovirt
- cloud-provider-cloudstack
- cloud-provider-photon
- cloud-provider-vmware



# Questions/Discussion

