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Cloud Provider OpenStack Intro & Update

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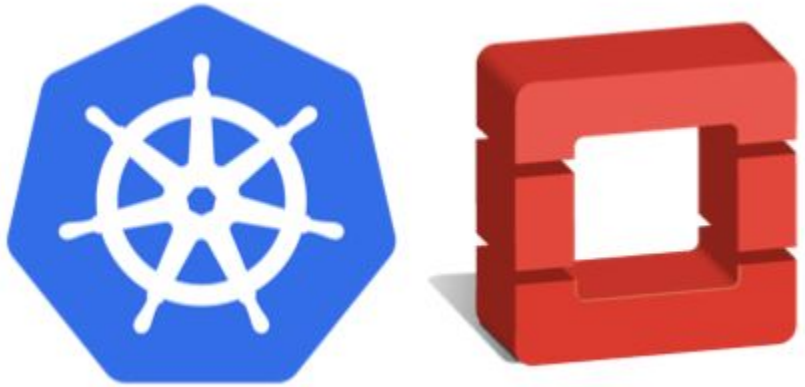
Agenda

- Provider OpenStack Overview
- Components Introduction
- Get Involved

Provider OpenStack

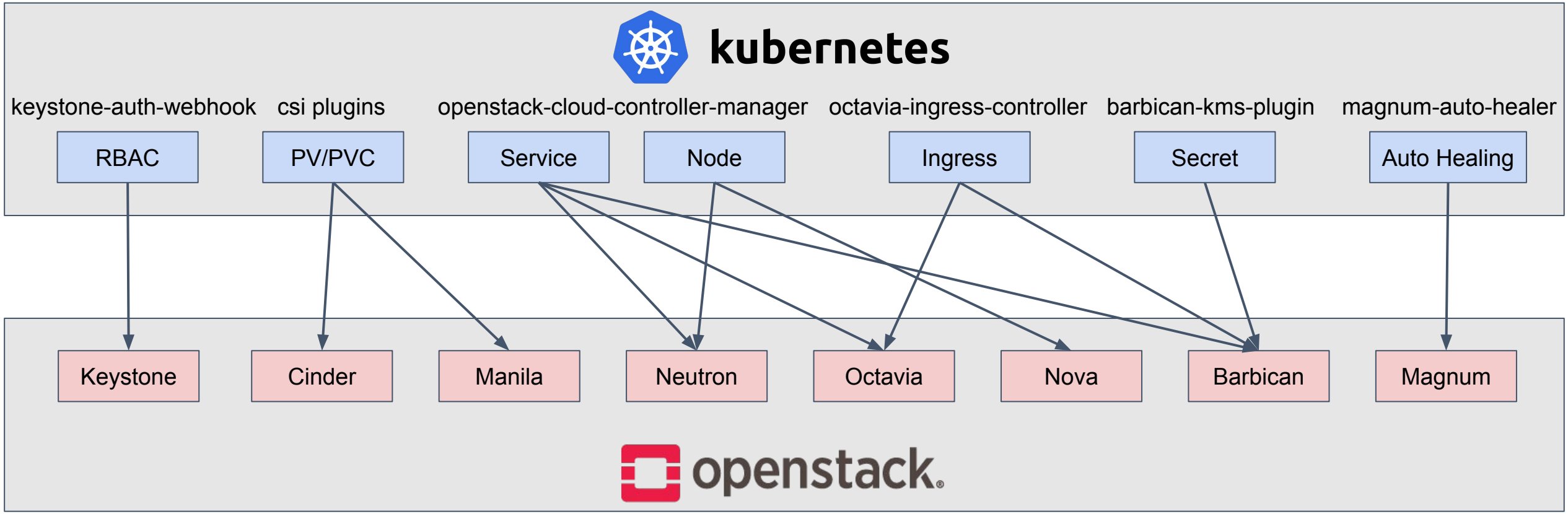
- OpenStack: Open source cloud computing platform
- provider-openstack
  - subproject of sig-cloud-provider
  - Consist of several OpenStack implementations of the Kubernetes resources/functions.



Provider OpenStack

- **Cloud Controller Manager**
  - openstack-cloud-controller-manager
- **Storage**
  - cinder-csi-plugin
  - manila-csi-plugin
- **Network**
  - octavia-ingress-controller
- **High Availability**
  - magnum-auto-healer
- **Security**
  - keystone-auth-webhook
  - barbican-kms-plugin

Provider OpenStack



Provider OpenStack

- **Release**
  - Same minor release cycle as Kubernetes, cloud-provider-openstack v1.22.x can work with kubernetes v1.22.x
  - Patch release as required, cloud-provider-openstack v1.22.1 != kubernetes v1.22.1

- **Artifacts**
  - Binary files in release page
  - Docker images in k8scloudprovider dockerhub
  - Support multiple platforms
  - Manifest examples
  - Helm charts

OpenStack Cloud Controller Manager

- An OpenStack implementation of the Kubernetes Cloud Controller Manager.
- OpenStack Loadbalancing-as-a-Service (Octavia) is required, Neutron-LBaaS support has been dropped since release v1.18
- TLS termination, OpenStack Key Manager Service (Barbican) is required
- Known issues
  - externalTrafficPolicy=Local
  - Access proxy load balancer from inside the cluster
  - Limited annotations support for Service update

OCTAVIA

an OpenStack Community Project

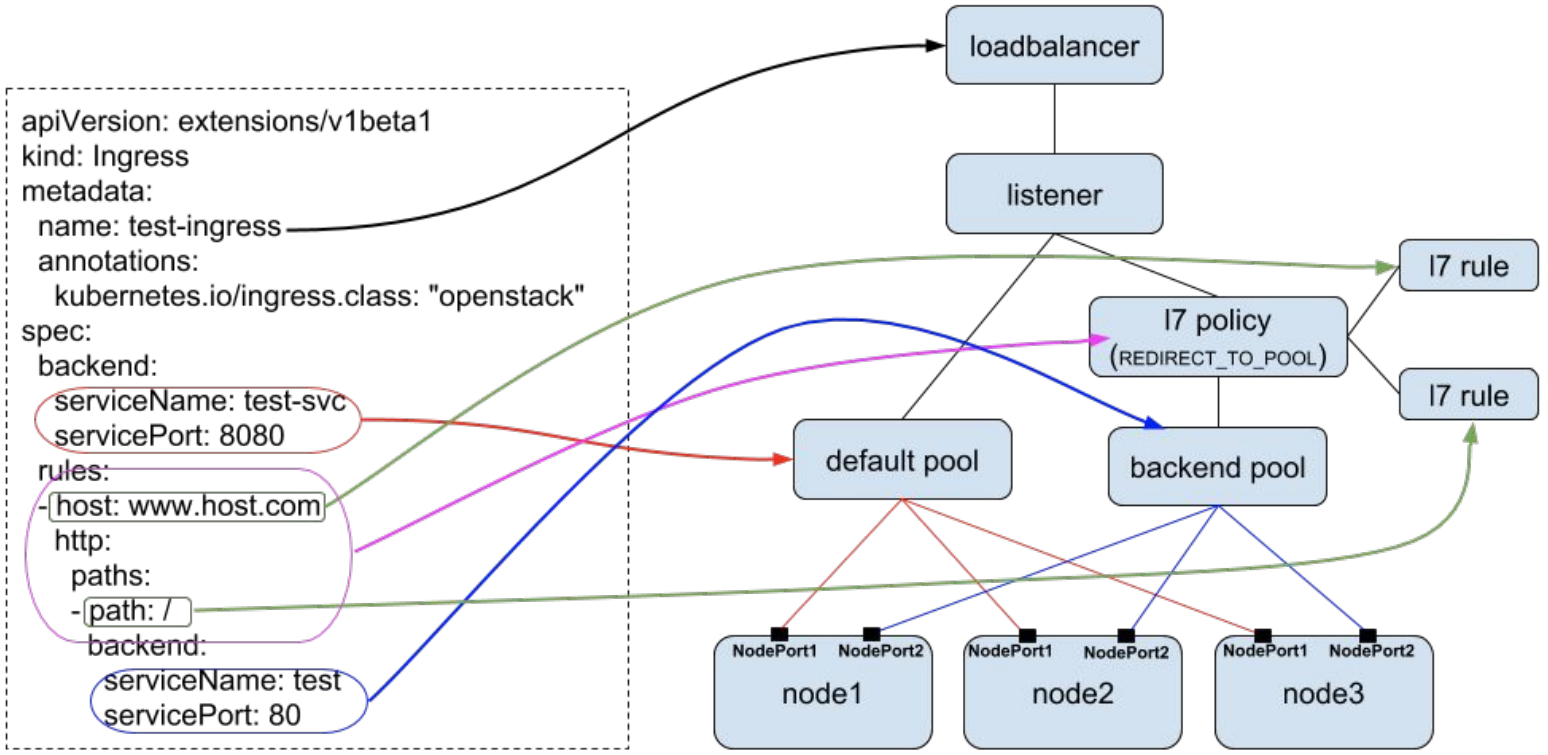
OCCM: Major Updates

- **Highlights**
  - Helm chart
  - Added support for creating TLS terminated loadbalancers
  - Metrics Support
  - Load balancer creation in one single API call
  - Octavia version check for added features

- **Planned**
  - Re-use a single load balancer for multiple Services
  - Stabilize CI

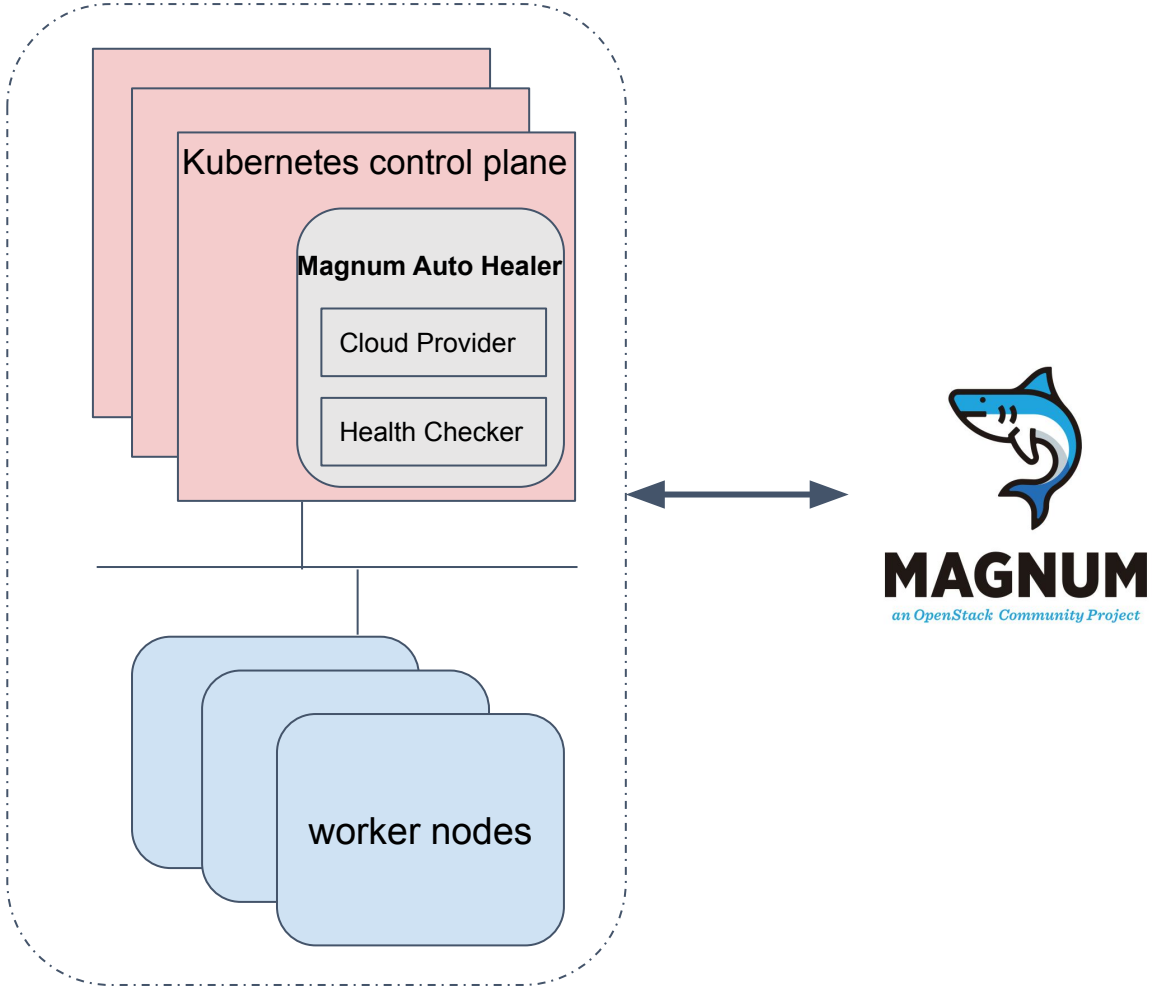
Octavia Ingress Controller

- An OpenStack implementation of the Kubernetes Ingress.
- OpenStack Loadbalancing-as-a-Service (Octavia) is required
- TLS termination, OpenStack Key Manager Service (Barbican) is required



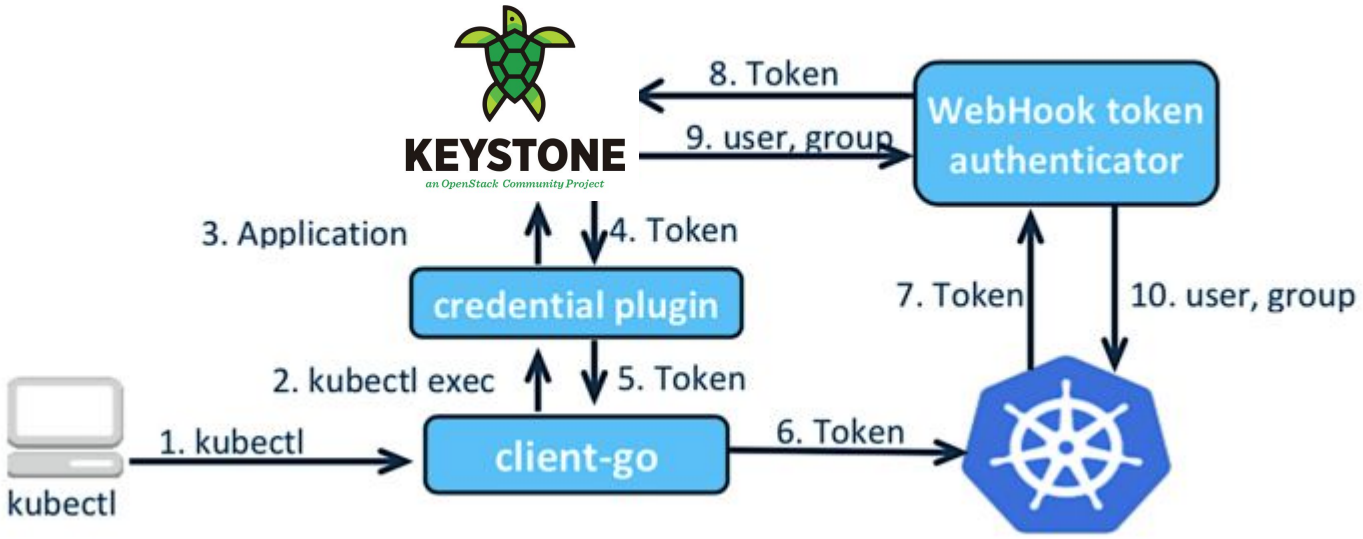
Magnum Auto Healer

- Kubernetes cluster auto-healing solution in OpenStack
- Magnum: Kubernetes-as-a-Service
- Support different cloud providers
- The health check is pluggable
- Support both master nodes and worker nodes



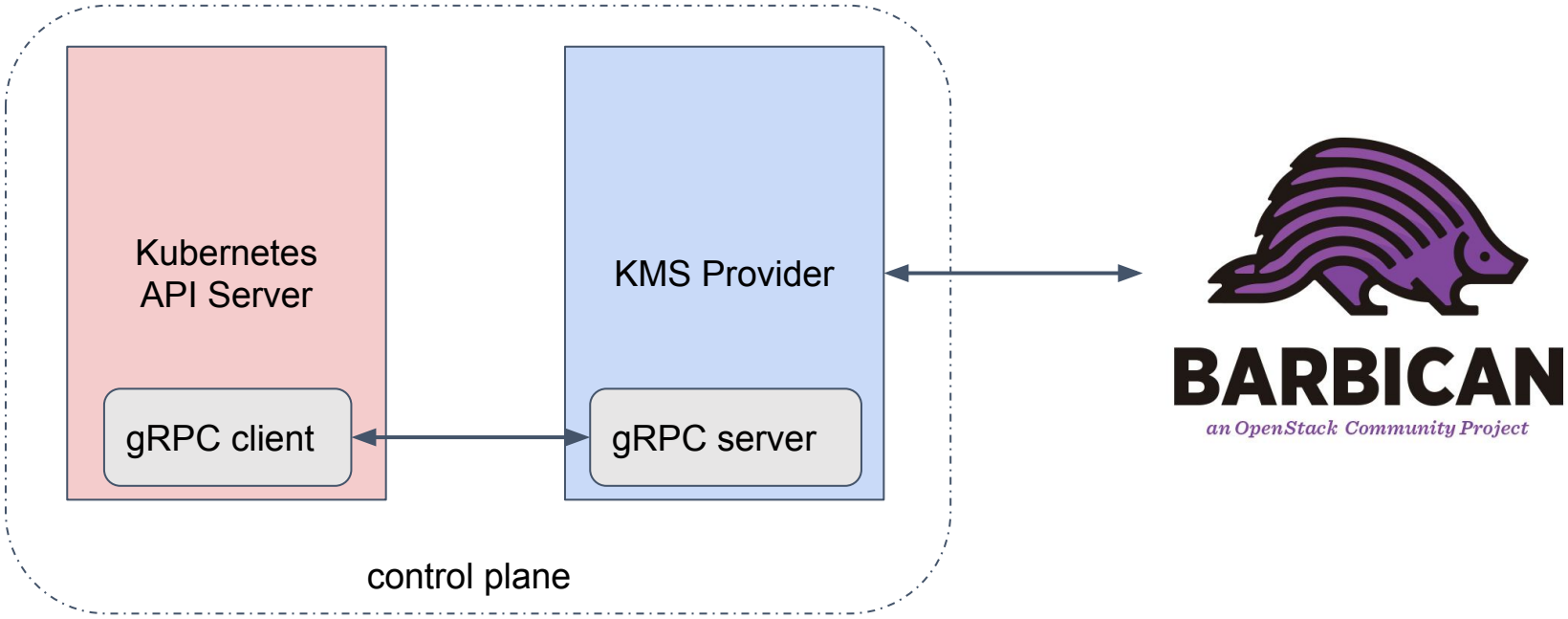
Keystone Auth Webhook

- **Authentication**
  - Allow OpenStack user to access the Kubernetes cluster without extra user management overhead
  - (Optional) Create Kubernetes namespace per OpenStack tenant automatically
  - (Optional) Mapping from OpenStack user role to Kubernetes user/group
- **Authorization**
  - More flexible RBAC policy
  - Policy change on the fly



Barbican KMS Plugin

- KMS plugin implemented with OpenStack Key Manager Service (Barbican)
- Enable encryption/decryption for Kubernetes secrets



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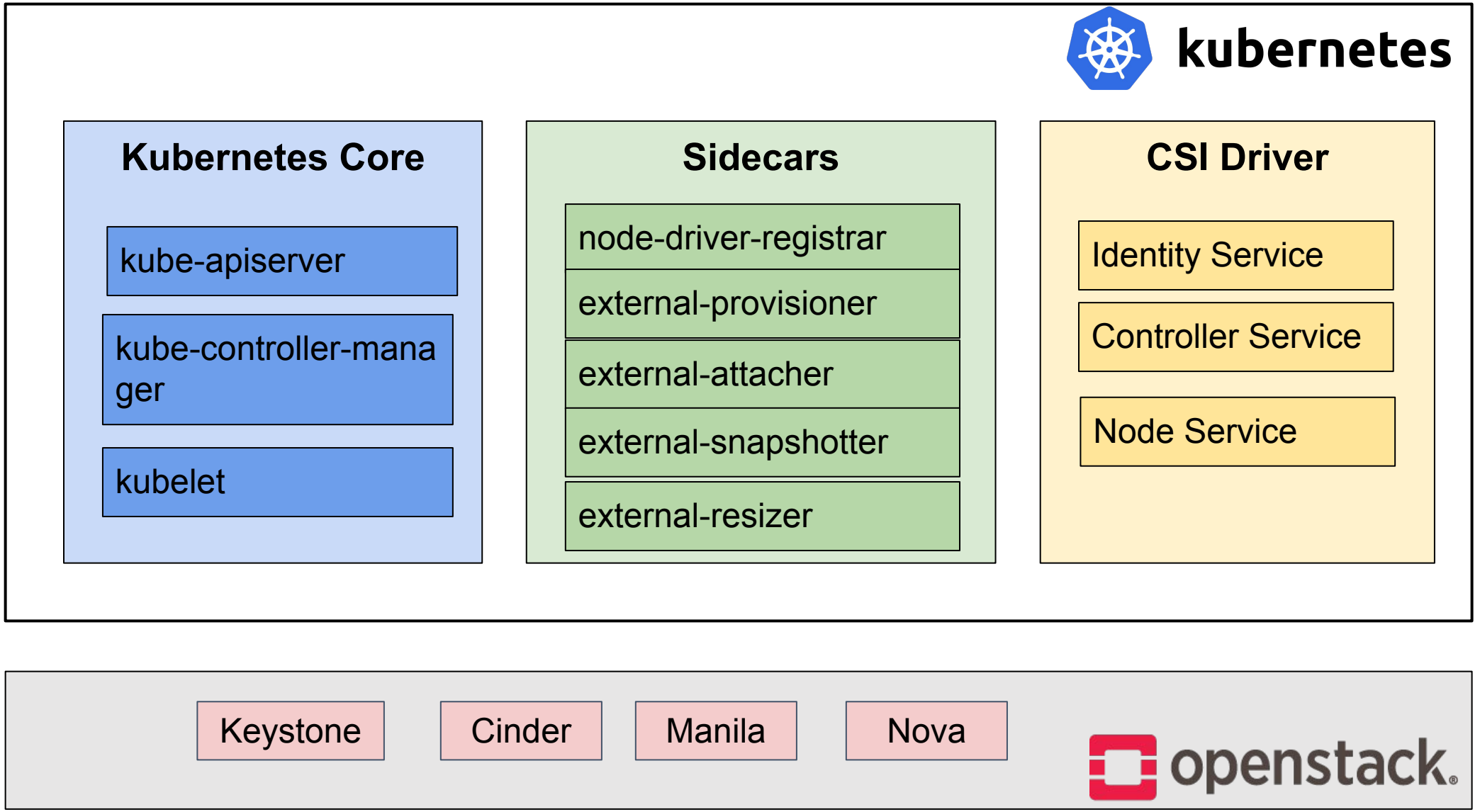
CSI Drivers

Why CSI ?

- Developed as a standard for exposing arbitrary block and file storage storage systems to containerized workloads on Container Orchestration Systems (COs).
- Replaced Kube controller manager , volume controller loops
- With the deprecations of intree volume drivers, CSI Drivers MUST be used with Kubernetes for volume management.

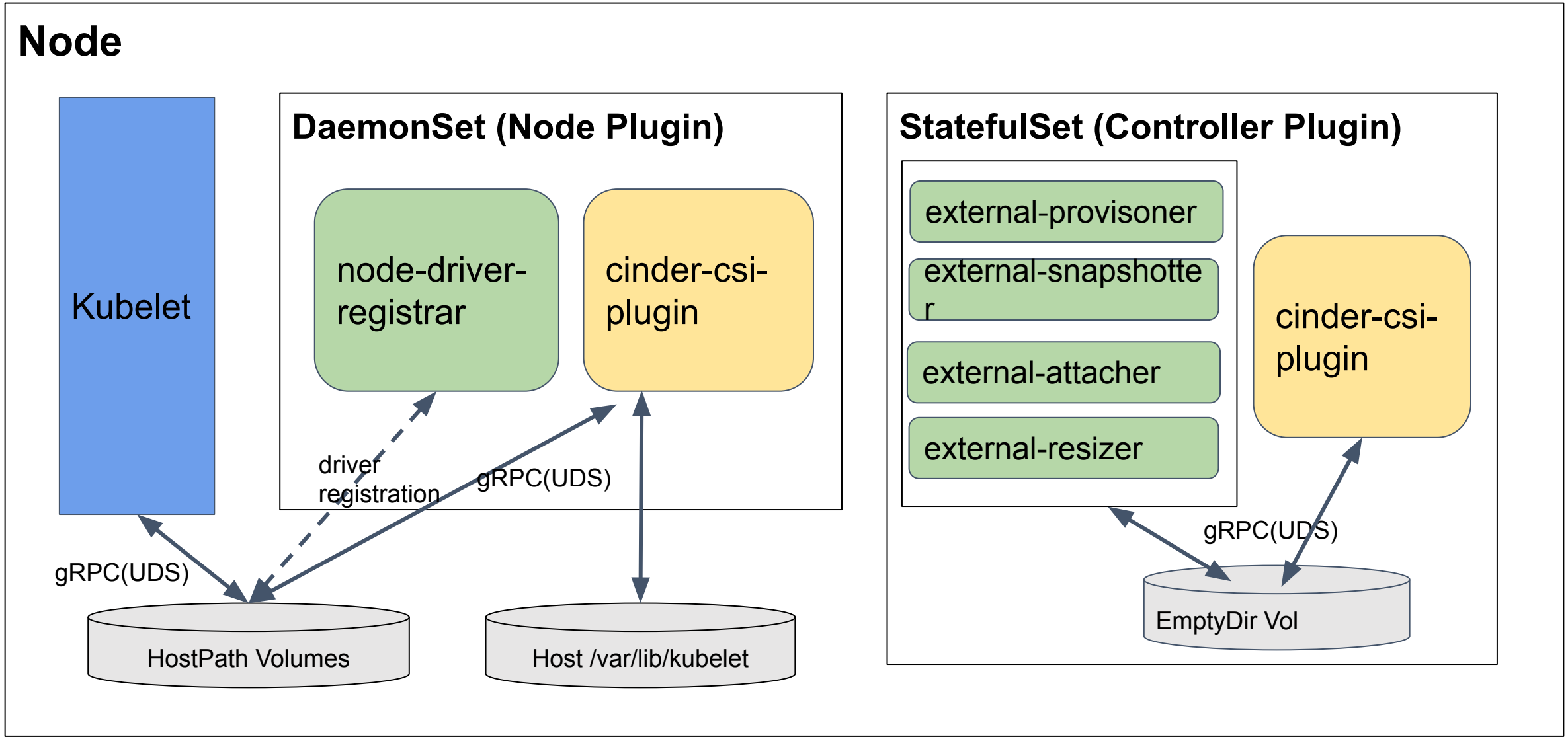
Kubernetes Cluster with CSI



Cinder CSI

- CSI Specification compliant driver used by Container Orchestrators to manage the lifecycle of OpenStack Cinder Volumes.
- This plugin is compatible with CSI spec versions v1.3.0
- Release cycle in sync with Kubernetes release.
  - Latest version of the driver is v1.3.3, compatible with kubernetes 1.22
  - Compatible with sidecars - snapshotter 4.0.0, provisioner - 2.2.0
- Driver deployment
  - Deployment using helm charts
  - Sample manifests in the repo

Driver Deployment



Cinder CSI : Feature Support

- Dynamic Provisioning
- Topology
- Raw Block Volume
- Volume Expansion
- Volume Cloning
- Volume Snapshots
- Ephemeral Volumes
- Multiattach Volumes
- Liveness probe

Cinder CSI Migration

In-tree Cinder provisioner to Cinder CSI Migration

- Starting from Kubernetes 1.21, OpenStack Cinder CSI migration is supported as ***beta*** feature and is ***ON*** by default
- shims all plugin operations from the existing in-tree plugin `kubernetes.io/cinder` to the `cinder.csi.openstack.org` CSI Driver.
- Cinder CSI driver must be installed on clusters on OpenStack for Cinder volumes to work.
- Targeted for removal expected by kubernetes v1.26

Refer detail documentation Guide for more details

Major Updates : cinder-csi-plugin

- **Highlights**
  - Generic Ephemeral Volume Support
  - Added support for multiple Config files
  - Updated support to latest sidecar versions
  - Added E2E tests
  - Move *CSIMigrationOpenStack* to beta, default *ON*
  - Improved Helm charts support
  - Support `ignore-volume-az` parameter
  - Doc Improvements
- **Planned**
  - CI Improvement
  - Stability/Increased test coverage
  - CSI VolumeHealth

Manila CSI

- The CSI Manila driver is able to create, expand, snapshot, restore and mount OpenStack Manila shares.
- Currently supported Manila backends are NFS and native CephFS.
- Latest driver version 0.9.0 , complaint with spec 1.2.0
- Driver deployment using helm, sample manifests
- Supported features include
  - Dynamic Provisioning
  - Topology
  - Volume Snapshots
  - Online Volume Expansion
- More details of driver can be found here

Major Updates : manila-csi-plugin

- **Highlights**
  - Expand volumes in "on-line" mode
  - Inject cluster ID as metadata to newly created shares
  - Inject metadata to newly created shares via storage class parameters.
  - Influence the selection of a NFS share export location by specifying desired subnet.
  - Pass mount options specific to cephfs-csi
- **Planned**
  - Improve validation and handling of different volume access modes.
  - Work on mountable snapshots where backends would allow it. This caters to workflows where it’s desired to e.g. regularly transfer snapshot data to off-site storage for backup.
  - Improve selection heuristics for NFS export locations.

Get Involved

- Getting Started Guide: https://github.com/kubernetes/cloud-provider-openstack/blob/master/docs/developers-guide.md
- Code Tour: kubernetes/cloud-provider-openstack
- Feature request/Bug report: https://github.com/kubernetes/cloud-provider-openstack/issues
- Communication
  - Slack channel: **#provider-openstack**
  - Maintainers/Contacts: @chrigl, @jichenjc, @lxkong, @ramineni
  - Manila CSI Maintainers/Contacts: @gman0, @tombarron, @gauthampacha

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Q&A