Introduction Cloud Provider Openstack

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Who Am I

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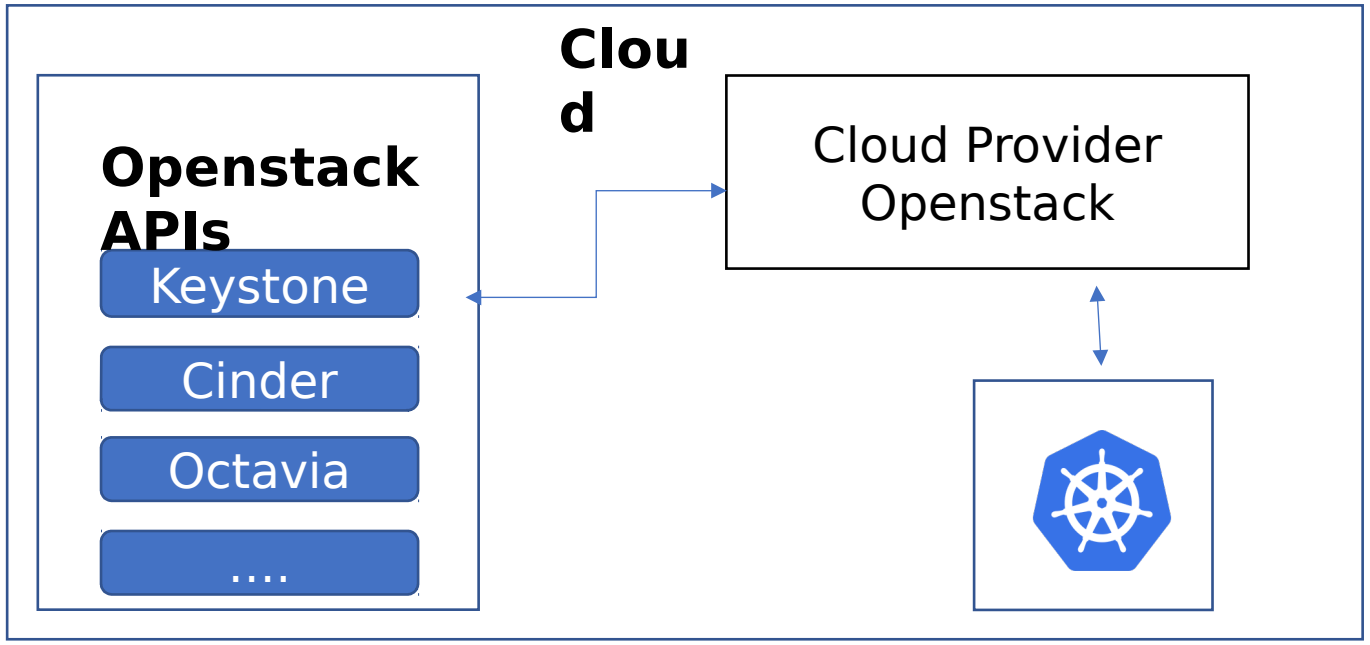
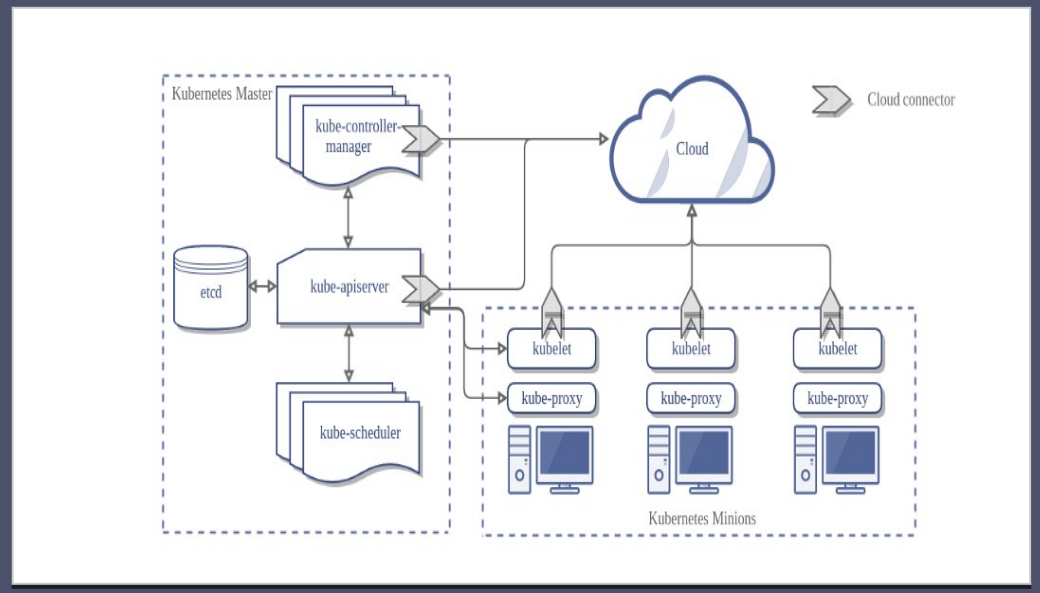
Agenda

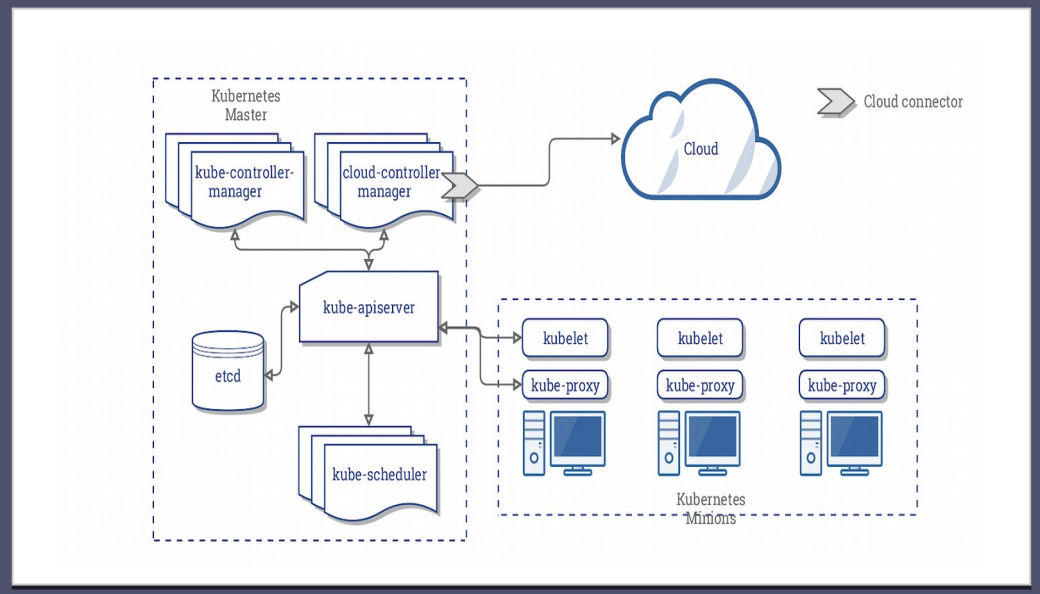
- Overview
- Hosted Plugins
- CSI Drivers
- What's New
- Deprecations
- Get Involved

Cloud Provider Openstack

- Enables Kubernetes to talk to underlying Openstack cloud API's, to get the underlying infrastructure information and leveraging its services for various purposes.
- Subproject of SIG-CloudProvider
- Out of tree provider







Intree vs Out-Of-Tree

- Intree Provider (**deprecated**) :
  - code inside core kubernetes repo
  - Kubernetes and the cloud provider are integrated through several different components, kubelet, kube-apiserver, kube-controller-manager
  - Intree Provider Openstack removal - v1.21
- Out of Tree Provider :
  - code located in separate repository under kubernetes org.
  - Kubernetes and cloud provider are integrated through a single component called cloud-controller-manager .

Hosted Plugins

- Openstack Cloud Controller Manager
- Octavia Ingress Controller
- Cinder CSI Plugin
- Manila CSI Plugin
- Barbican KMS Plugin
- Keystone Authentication, Authorization
- Magnum Auto healer

Openstack Cloud Controller Manager

- Implementation of external cloud provider for OpenStack clusters
- Runs Node Controller, Service controller, Routes controller
- Does not implement any of the volume controllers, Volume Management is done using CSI

Deployment

- Specify --cloud-provider=external for Kubelets.
- **kube-apiserver** and **kube-controller-manager** MUST NOT specify the --cloud-provider flag
- Deploy Cloud Controller manager as into your cluster.
- Sample Kubeadm config file, Cloud Controller Manager and CSI Deployment manifests are available here.
- https://github.com/kubernetes/cloud-provider-openstack/tree/master/manifests

Octavia Ingress Controller

- In the OpenStack cloud, Octavia(LBaaS v2) is the default implementation of LoadBalancer type service

Octavia Ingress Controller implementation relies on load balancer management by OpenStack Octavia service, so:

- Communication between octavia-ingress-controller and Octavia is needed.
- Octavia stable/queens or higher version is required because of some needed features such as bulk pool members operation.
- OpenStack Key Manager(Barbican) service is required for TLS Ingress, otherwise Ingress creation will fail.

CSI Drivers

- Developed as a standard for exposing arbitrary block and file storage storage systems to containerized workloads on Container Orchestration Systems (COs).
- cinder-csi-plugin & manila-csi-plugin:
  - Cinder is the Storage Driver in OpenStack, Manila is the Shared Filesystem Service. Cinder and Manila CSI Drivers implements container storage Interface for the underlying services
- With the deprecations of intree volume drivers, CSI Drivers must be used with Kubernetes for volume management.
- Users should enable CSIMigration + CSIMigrationOpenStack flags and install the OpenStack Cinder CSI Driver to avoid disruption to existing Pod and PVC objects at that time.
- Users should start using the OpenStack Cinder CSI Driver directly for any new volumes.
- https://github.com/kubernetes/cloud-provider-openstack/blob/master/docs/migrate-to-ccm-with-csimigration.md

Other Plugins

Keystone-auth & Client-Keystone-Auth:

- K8s-keystone-auth Implements kubernetes webhook authentication and authorization.
- Client keystone allows client-side integrations with authentication using Keystone API, it allows exchange of user credentials with bearer token via kubectl.

Barbican KMS Plugin:

- Kubernetes supports encrypting secret data at REST with various providers one of which is Key Manager Service.
- Enables encrypts/decrypt the data with the key from Barbican Service running in an OpenStack Cloud.

Magnum Autohealer:

- Self-healing cluster management service that will automatically recover a failed master or worker node within your Magnum cluster
- Ensures the running Kubernetes nodes are healthy by monitoring the nodes' status periodically, searching for unhealthy instances and triggering replacements when needed
- Maximizes your cluster's high availability and reliability

Major Updates: OCCM

- OpenStack Cloud Controller Manager
  - Support for UDP Loadbalancing with Octavia
  - Better logging
  - Better handling of created resources (e.g. Floating IPs)

- Octavia Ingress Controller supports TLS by using Barbican
- Multi Architecture Support

- Next Steps :
  - Refactoring the reconciler implementation to make the code more maintainable.
  - Support reusing load balancer for different Services.

Major Updates : cinder-csi-plugin

Latest driver version – 1.2.0
Conformance with CSI spec: 1.2.0

New features added-

- Added sanity testing
- Volume Cloning
- Support installation using helm
- CSIMigrationOpenStack promoted to beta in v1.18 (default off, since it requires installation of the OpenStack Cinder CSI Driver)

Ongoing / Planned:

- Stability and increased test coverage
- CI Improvement
- E2e tests with k/k storage test suite (On going)
- Multi-node attachments

Other Supported Features include : Raw Block Volume support, Topology Support, Volume Expansion , Volume Snapshot , Inline Volume Support

Major Updates : manila-csi-plugin

The CSI Manila driver can create and mount OpenStack Manila shares
Latest release v0.9.0

Supported features:

- Snapshots & Restoring shares from snapshots (NFS-only)
- Topology and Manila availability zones
- Installation using Helm

Planned features:

- Volume Expansion
- Monitoring support with Prometheus
- High Availability

Deprecations

- standalone-cinder-provisioner, manila-provisioner , cinder-flexvolume-plugin are deprecated in v1.18
- Neutron-LBaaS has been deprecated in OpenStack since Queens release and no longer maintained in openstack-cloud-controller-manager. Default load balancer implementation uses Octavia from 1.18
- Openstack intree provider is deprecated.

Get Involved

KubeCon CloudNativeCon Europe 2020 Virtual

- Here’s a Getting Started guide h ttps://github.com/kubernetes/cloud-provider-openstack/blob/master/docs/getting-started-provider-dev.md
- Code Tour: https://github.com/kubernetes/cloud-provider-openstack
- Request/Report any feature/bug here https://github.com/kubernetes/cloud-provider-openstack/issues
- CI: https://github.com/theopenlab/openlab-zuul-jobs

Reach out to us on Slack, **#provider-openstack**
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