VMware SIG
Moving Cloud Provider out of tree + CSI: what is means to users

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Abstract

Hidden slide during presentation – included for those finding deck online later

Kubernetes cloud providers and volume plugins used to be "in-tree" meaning that their source code is included in the main Kubernetes repo. They were compiled in, and shipped only in a Kubernetes release.

The drawbacks of this monolithic approach were that Kubernetes was larger than needed, and feature + patch activity was locked to Kubernetes release schedules.

Going forward, new features are exclusive to the new replacements: an out-of-tree vSphere cloud provider + a CSI storage plugin. Legacy implementations remain for the short term but destined are for deprecation.

Agenda:

- Deep Dive : Install and configure of out-of-tree cloud provider + CSI storage

- Migration options for current users

This session will be useful to:

- Users running Kubernetes on VMware infrastructure

- Authors of installers and Kubernetes distributions which target the vSphere platform

Presenters

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Open Source Community Relations Engineer,
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Active in Kubernetes community since 2015 – storage, IoT+Edge, running K8s on VMware infrastructure.

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Agenda

Background: Why Kubernetes Cloud Provider are moving out of tree

Deep Dive - Install and configure of out-of-tree cloud provider + CSI storage

Migration options for current users

Original Kubernetes Cloud Providers

Legacy in tree

As of Kubernetes 1.14, there are several in-tree cloud providers. When you download Kubernetes, you run these by default through direct configuration.

AWS

Azure

Cloudstack

GCE

OpenStack

OVirt

Photon

vSphere

Why is in tree code a problem

If it works now, Why change it?

Legacy cloud providers and storage plugins were built directly into the Kubernetes release

- Could not be patched or enhanced independent of a full Kubernetes release
- Resulted in undesirable bloat of Kubernetes itself – any particular deployment needs only a subset, yet irrelevant code is part of the release.
- Runs as a privileged component of Kubernetes itself – security and stability risk
- Kubernetes should be an orchestration kernel, with drivers maintained independently by domain experts

This isn't urgent – Kubernetes deprecation policy applies, granting at least a year of notice

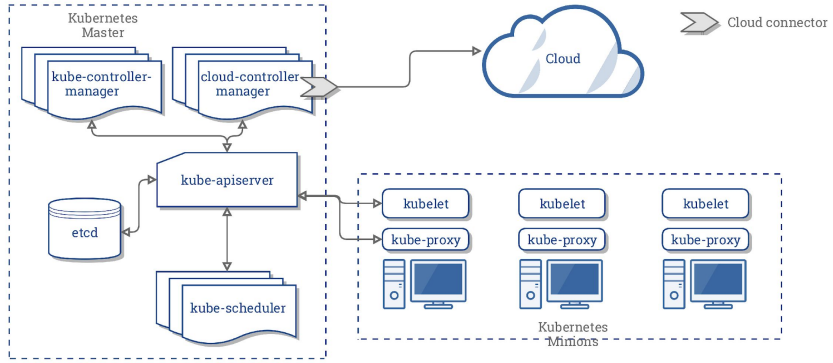
- However: new features are already exclusive to out of tree cloud provider and storage

How the move to out of tree is structured

Two elements – cloud provider and storage

A new Cloud Controller Manager Interface was developed, replacing control loops that were in kube-controller-manager

- Out of tree plan and architecture KEP link
- Cloud Controller Manager KEP link
- vSphere out of tree cloud provider KEP link



In tree volume plugins are being replaced by a Kubernetes interface using CSI, a cross orchestrator standard for using storage with containers. CSI drivers are out of the Kubernetes tree.

- Kubernetes CSI KEP link
- Migration KEP link

CONTAINER STORAGE INTERFACE

CSI for vSphere 1st release

- Beta - available now (version 0.?.0)
- GA - July 2019

Features

- VM independent volume management (FCD)
- Kubernetes clusters can straddle mutli-vCenter, multi-Datacenter
- Provision from multiple datastores or datastore clusters
- Conventional + “raw” mounts
- Zone support

https://github.com/kubernetes-sigs/vsphere-csi-driver

Photo by Jonathan Chng on Unsplash

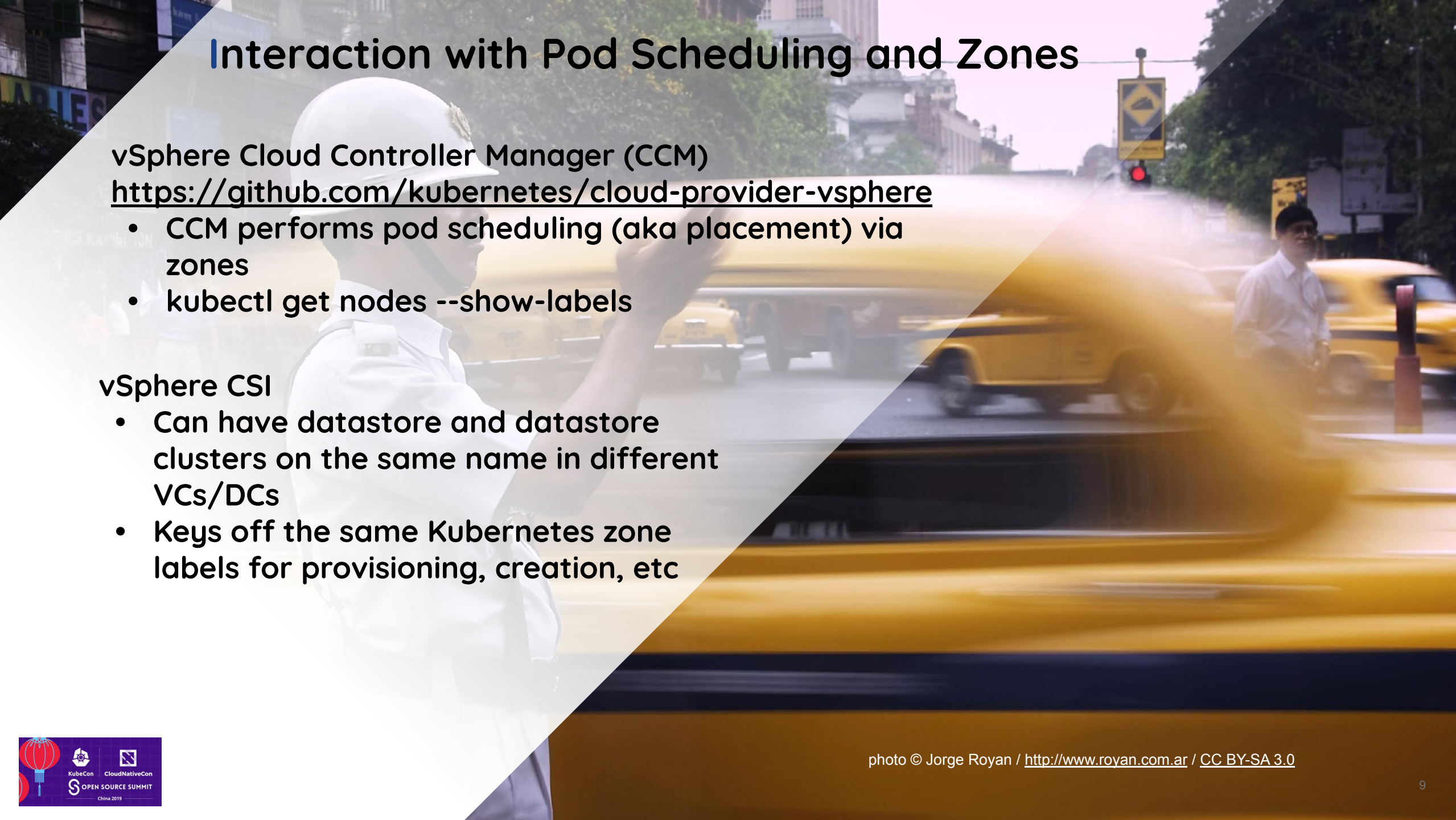
Interaction with Pod Scheduling and Zones

vSphere Cloud Controller Manager (CCM)
https://github.com/kubernetes/cloud-provider-vsphere

- CCM performs pod scheduling (aka placement) via zones
- kubectl get nodes --show-labels

vSphere CSI

- Can have datastore and datastore clusters on the same name in different VCs/DCs
- Keys off the same Kubernetes zone labels for provisioning, creation, etc



Migration – in tree to out of tree

Recorded Demo

Photo by Jan-Niclas Aberle on Unsplash

References

vSphere Installation, Configuration, Best Practices

Install
https://github.com/kubernetes-sigs/vsphere-csi-driver/blob/master/docs/deploying_csi_vsphere_with_rbac.md

Configuration

- Requires vsphere.conf identical format to in-tree
- Example conf and yaml files: https://github.com/kubernetes-sigs/vsphere-csi-driver/tree/master/manifests

Kubernetes Zone Support (single cluster backed resilient resources)

- Requires vSphere Cloud Controller Manager
- https://github.com/kubernetes-sigs/vsphere-csi-driver/blob/master/docs/deploying_ccm_and_csi_with_multi_dc_vc_aka_zones.md
- KubeCon NA 2018 presentation https://sched.co/Grd6

Pending doc upgrade staged for review here:
https://mylesagray.github.io/vsphere-storage-for-kubernetes/documentation/index.html

Thank You

Q&A

Contacts

This deck: link tbd

Join SIG VMware

- Slack channel: https://kubernetes.slack.com/messages/sig-vmware
- List: https://groups.google.com/forum/#!forum/kubernetes-sig-vmware
- Zoom meetings (join mailing list group for schedule)

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