KubeCon | CloudNativeCon

China 2018

SIG Cluster Lifecycle Intro

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Who Are We?

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Kubernetes Member
Top 50 Code Contributor to K/K
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Lucas Käldström
SIG Cluster Lifecycle co-lead
CNCF Ambassador & CKA
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Alexander Kanevskiy
Kubernetes Member
Open Source Technology Center
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Our Mission

SIG Cluster Lifecycle's objective is to simplify creation, configuration, upgrade, downgrade, and teardown of Kubernetes clusters and their components.

What We Do

1. Control Plane Installation Management
   - *"How do I run the Kubernetes control plane?"*
   - Building kubeadm, cleaning up outdated getting started guides and improving docs

2. Control Plane Configuration Management
   - *"How do I configure the Kubernetes control plane?"*
   - Published guidelines for and driving the ComponentConfig standard (see KEP)

What We Do

3. Simplifying Infrastructure Management
   - *“How do I set up my network / machines?”*
   - Working on a Machines API as part of the Cluster API

4. Addon Management
   - *“How do I install things outside the core control plane?”*
   - Many different approaches used today; still working on a plan for convergence
   - Investigating on usage of Cluster Bundle

What We Do

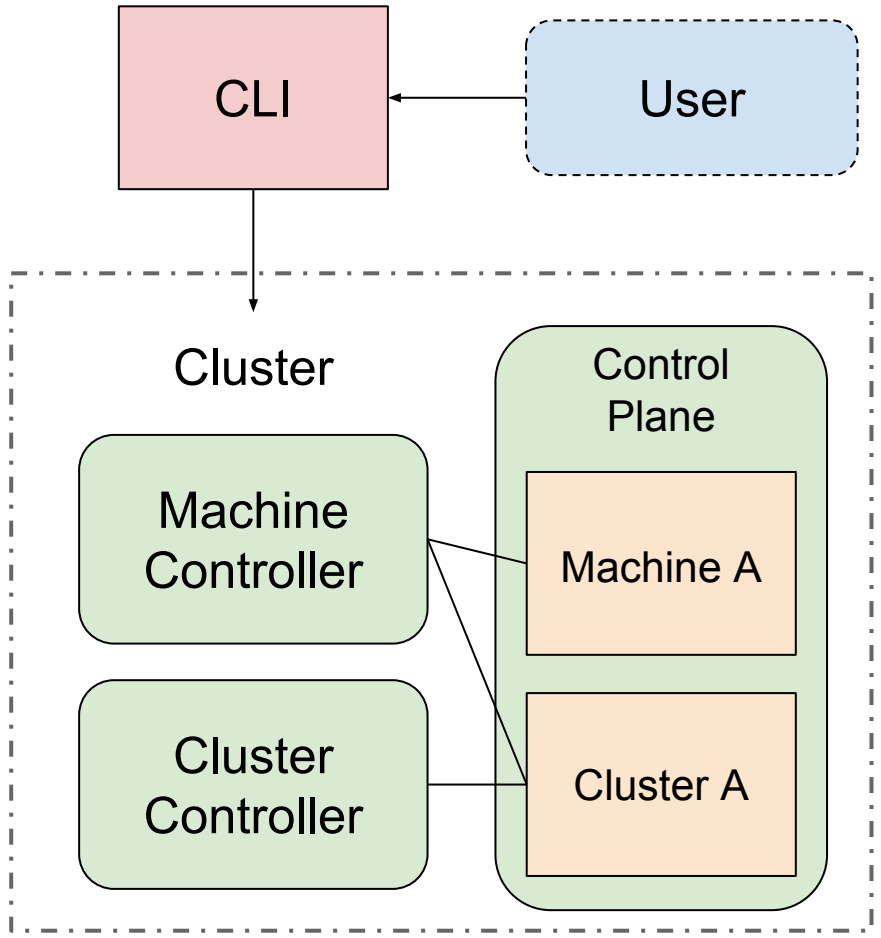
5. Etcd Management
   - *“How should we run etcd?”*
   - KEP for etcdadm

6. Other subprojects
   - *bootkube*, *kubeadm-dind-cluster*, *kubespray*, *minikube*, *cluster-api-provider-aws*, *cluster-api-provider-digitalocean*, *cluster-api-provider-gcp*, *cluster-api-provider-openstack*, *kops*, *kube-aws*, *kube-deploy*, *kubernetes-anywhere*

Cluster API

- A declarative way to create, configure, and manage a cluster
  - apiVersion: "cluster.k8s.io/v1alpha1"
  - kind: Cluster, Machine, MachineSet, MachineDeployment

- Cluster
  - General cluster configuration (e.g. networking)
- Machine
  - A physical or virtual machine running a kubelet
- MachineSet / MachineDeployment
  - Groups of similarly configured machines

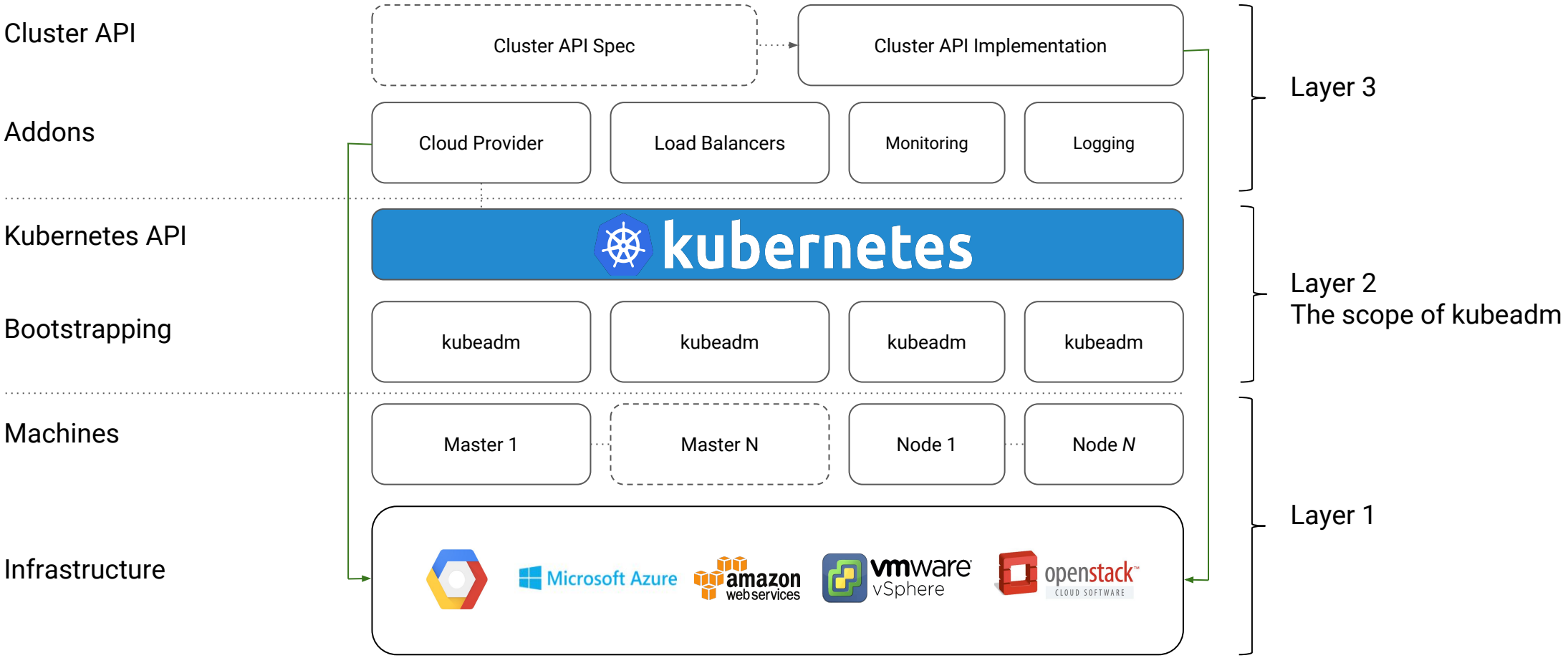


Cluster API

- Controllers will reconcile desired vs. actual state
  - These could run inside or outside the cluster
- Cloud Providers will implement support for their IaaS
  - AWS, AWS/OpenShift, Azure, DigitalOcean, GCE, OpenStack, vSphere
  - Up-to-date list of providers can be found on Cluster API project homepage
- Port existing tools to target Cluster API
  - Cluster upgrades, auto repair, cluster autoscaler

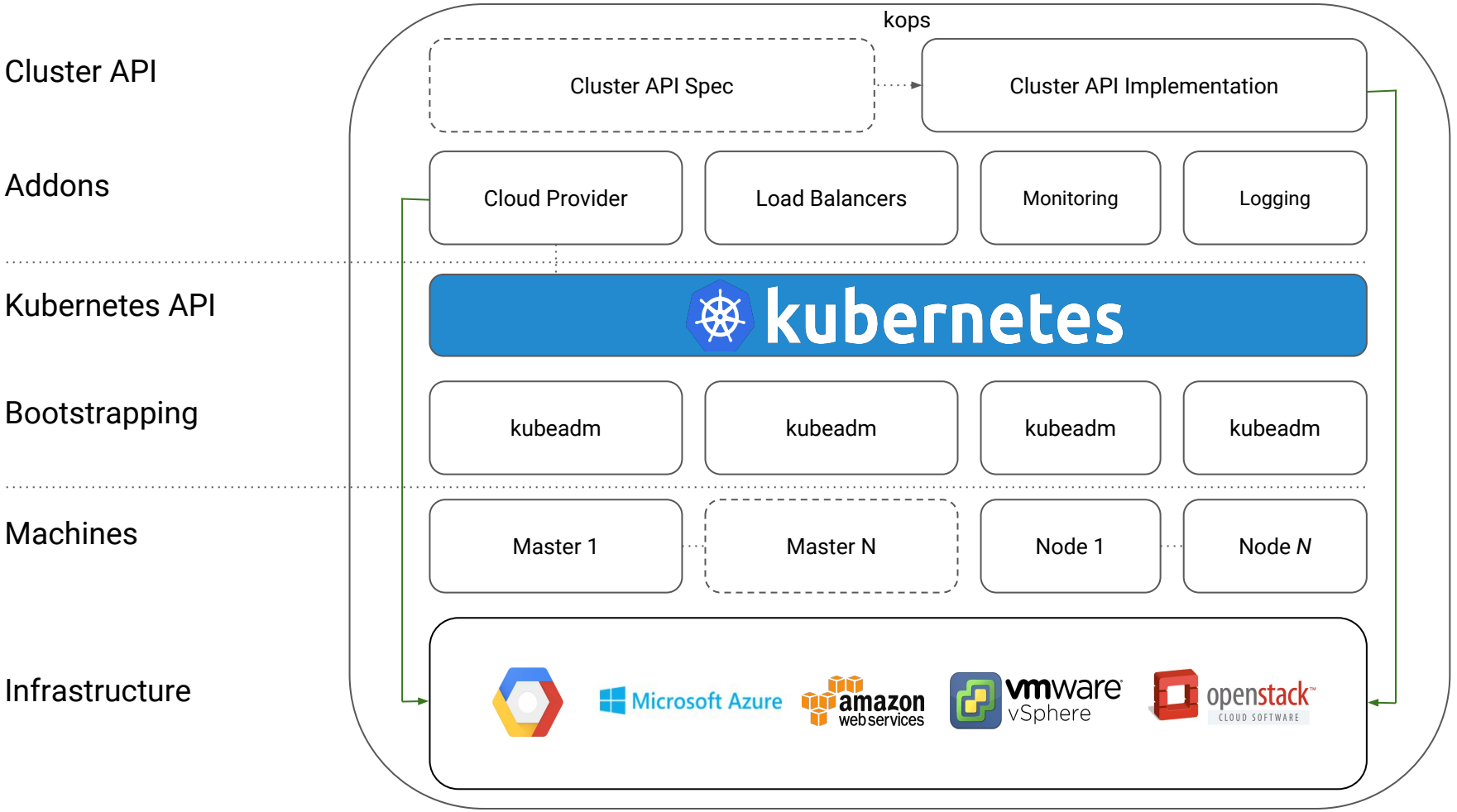
kubeadm

= A tool that sets up a minimum viable, best-practice Kubernetes cluster



kubeadm vs kops or kubespray

Two different projects, two different scopes



Key Design Takeaways

- kubeadm's task is to set up a **best-practice cluster** for each *minor version*
- The user experience should be *simple*, and the cluster reasonably *secure*
- kubeadm's scope is limited; intended to be a **building block**
  - Only ever deals with the local filesystem and the Kubernetes API
  - Agnostic to ***how exactly*** the kubelet is run
  - Setting up or favoring a specific CNI network is **out of scope**
- Composable architecture with everything divided into **phases**

Audience: build-your-first-own-cluster users & higher-level tools like *kubespray & kops*

Recent Accomplishments

- kubeadm v1.12 & v1.11
  - Better HA support with experimental control-plane join in v1.12
  - CoreDNS replaces kube-dns as the default DNS provider
  - Support for kubelet ComponentConfig, which removes the dependency on the systemd drop-in file
  - Stabilizing and improving the structure of the kubeadm configuration file
  - Improved CRI & air-gapped support, as well as the overall UX
  - ***Target to get kubeadm to GA in v1.13***

- An alpha Cluster API and prototype implementations
  - Pre-alpha API and several implementations for Cluster API providers
    - AWS, AWS/OpenShift, Azure, DigitalOcean, GCE, OpenStack, vSphere
  - Most implementations are using kubeadm for bootstrapping

kops

- What is it?
  - Easy and opinionated way to build clusters on AWS & GCE
- Recent accomplishments in 1.10 release
  - The 1.10 release brought support for a new version and stabilization fixes
- Roadmap in progress for 1.11 & 1.12
  - Support newer k8s releases (currently lagging a bit behind)

kubespray

- What is it?
  - An Ansible solution to deploy Kubernetes clusters

- Recent accomplishments in 2.7 release
  - The 2.7 release brought a lot of new features
  - ARM cluster support added (still experimental)
  - GPU nvidia workload nodes
  - Option to use CRI-O as the container-engine instead of docker

- Roadmap in progress for 2.8
  - Switching to kubeadm as the base installer by default
  - Integrating kubespray in the Kubernetes CI signal

minikube

- What is it?
  - An easy way to run Kubernetes on your local workstation for development

- Recent accomplishments in 0.28 - 0.30 releases
  - Support for Kubernetes 1.11 and 1.12
  - Using kubeadm under the hood to bootstrap k8s in the VM
  - GPU support
  - Upgraded dependencies like the Ingress controller, cri-tools and kube-dashboard

- Roadmap in progress for upcoming releases
  - Stabilisation for eventually releasing 1.0

The SIG roadmap for 2019

- Productionize tools currently under development
  - kubeadm to General Availability (GA)
  - Beta or higher Cluster API and community implementations
  - v1.0 / GA release for minikube
  - Beta or higher ComponentConfig for all k8s components
  - First working implementations of new tooling:
    i. etcdadm
    ii. Addons, a.k.a Cluster Bundles

- Better documentation & maintenance
  - Highly Available cluster deployment patterns
  - Create a tool-less starting from scratch installation guide
  - Make our docs more accessible (e.g. Chinese translations!)
  - Review subprojects’ status and maybe deprecate & cleanup (kube-up & kube-anywhere)

How can you contribute to our SIG

- Contributing to SIG Cluster Lifecycle documentation
- We’re working on growing the contributor/reviewers pool; scaling the SIG
- We have “Office Hours” for our projects: weekly for kubeadm, bi-weekly for kops and kubespray…
- Cluster API office hours weekly for both US West Coast and EMEA
- Full list of SIG meetings and links to minutes and recordings can be found on SIG page
- Attend our meetings / be around on Slack
- Look for **“good first issue”**, **”help wanted”** and **“sig/cluster-lifecycle”** labeled issues in our repositories

KubeCon talks from our SIG

- Configuring Your Kubernetes Cluster on the Next Level
  - By Lucas Käldström
  - Date: Wednesday, Nov 14 • 15:35 - 16:10
- Cluster API Deep Dive With a Tencent Case Study
  - By Feng Min and Zhiguo Hong
    Date: Thursday, Nov 15 • 14:20 - 14:55
- SIG Cluster Lifecycle: Deep Dive
  - By Alexander Kanevskiy and Di Xu
    Date: Thursday, Nov 15 • 16:45 - 17:20
- Managing Addons with Operators (Or How We Dropped Untested bash/sed for Go)
  - By Jeff Johnson & Justin Santa Barbara
    Date: Thursday, December 13 • 16:30 - 17:05. **NOTE:** In KubeCon Seattle

What now?

- Follow the SIG Cluster Lifecycle YouTube playlist
- Check out the meeting notes for our bi-weekly SIG meetings
- Join #sig-cluster-lifecycle, #kubeadm, #cluster-api, #kops-dev, #kops-users, #kubespray, #minikube, …
- Prep for and take the Certified Kubernetes Administrator exam
- Check out the kubeadm setup guide, reference doc and design doc
- Read how you can get involved and improve kubeadm!

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Thank You!

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