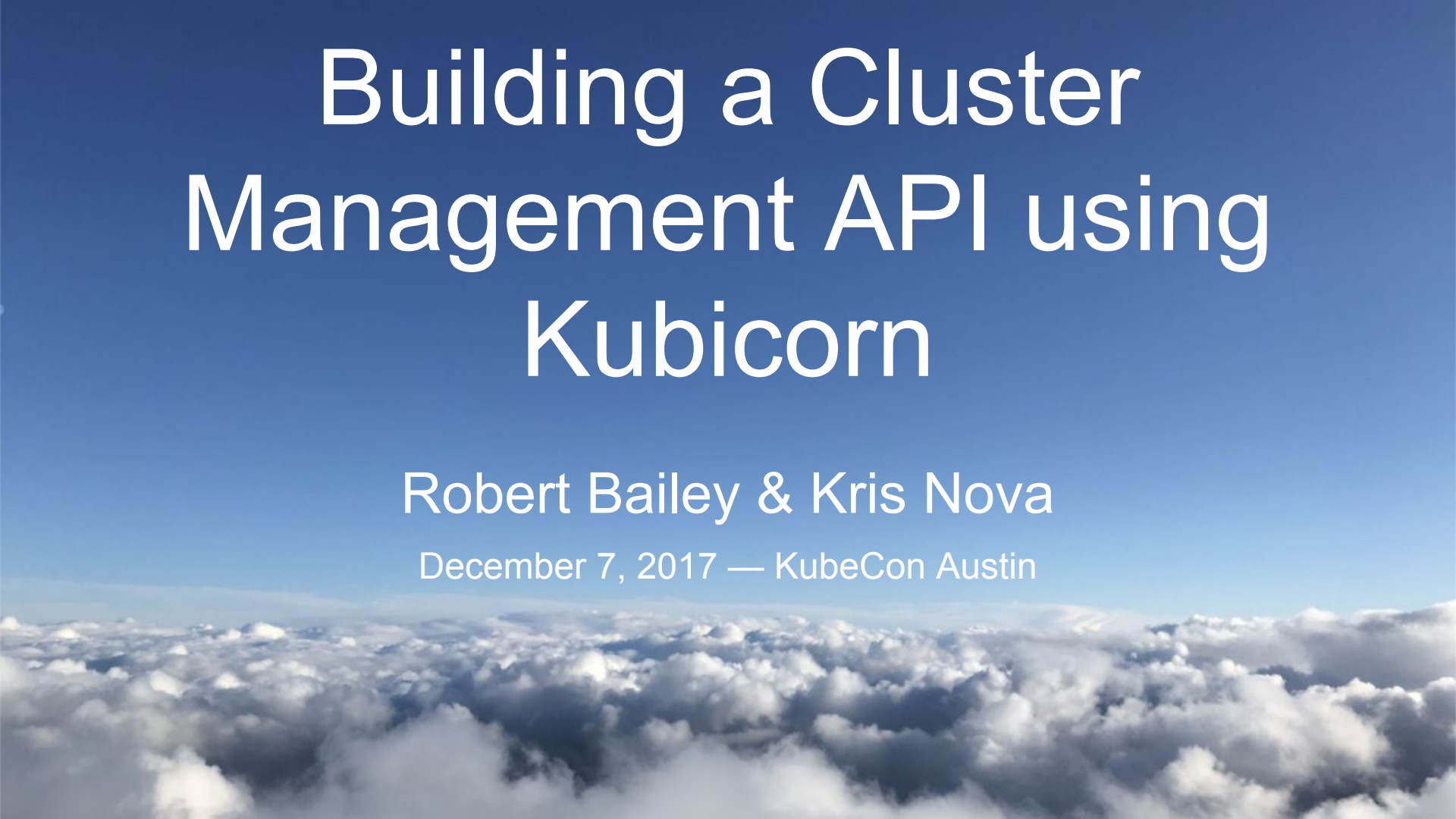
Building a Cluster Management API using Kubicorn

Robert Bailey & Kris Nova

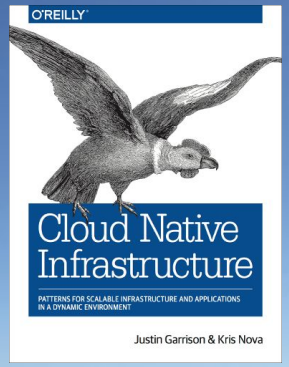
December 7, 2017 — KubeCon Austin



Kris Nova

heptio

- Author Cloud Native Infrastructure
- Gopher
- Kubernetes contributor
- Kubicorn
- Kops



Robert Bailey

- Co-lead of SIG Cluster Lifecycle
- Tech Lead for Google's Cluster Lifecycle team
- Founding member of Google Kubernetes Engine
- Reluctant owner of kube-up.sh

So you want to install K8s...

Infrastructure should be
boring

Cluster Lifecycle
~~Infrastructure~~ should be
boring

Reinventing the Wheel

- Installation
- Configuration of cluster and components
- Cluster upgrades
- Component upgrades
- Adding a Node (Pool)
- Autoscaling
- ...

And what if I want to move to another cloud?

The birth of kubeadm

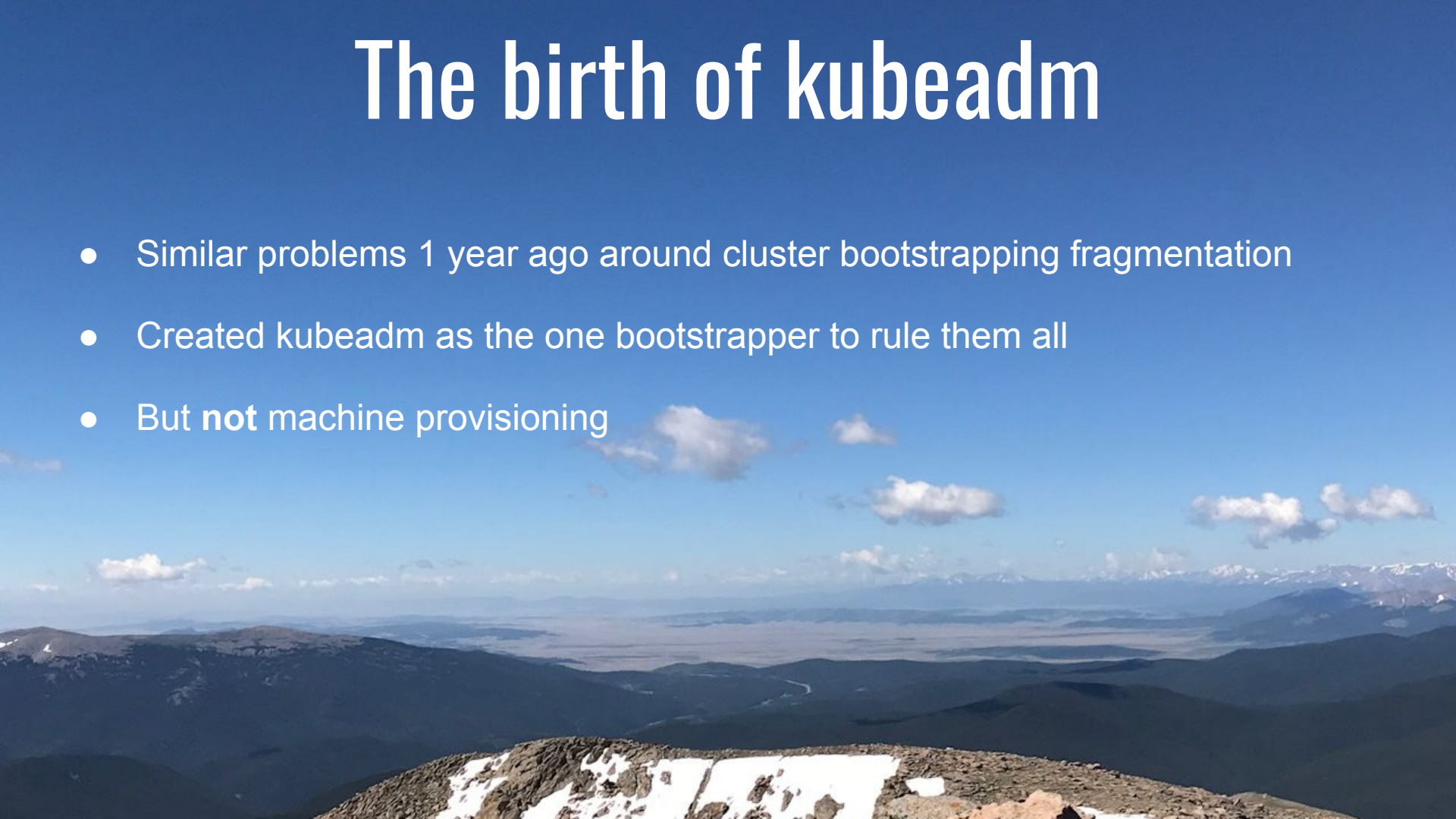
- Similar problems 1 year ago around cluster bootstrapping fragmentation

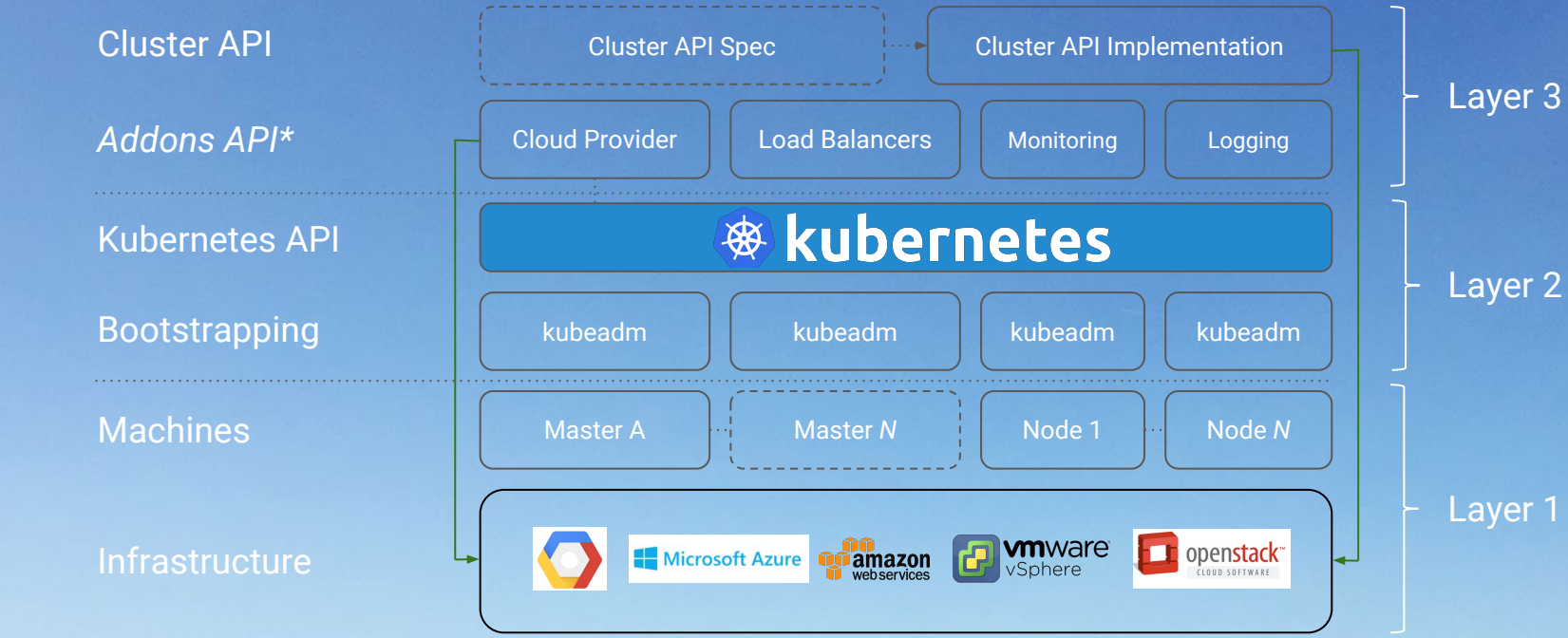
The birth of kubeadm

- Similar problems 1 year ago around cluster bootstrapping fragmentation
- Created kubeadm as the one bootstrapper to rule them all

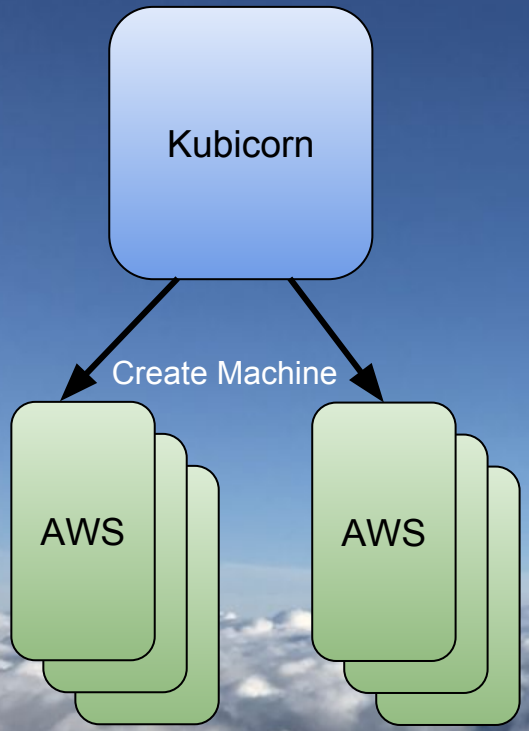
The birth of kubeadm

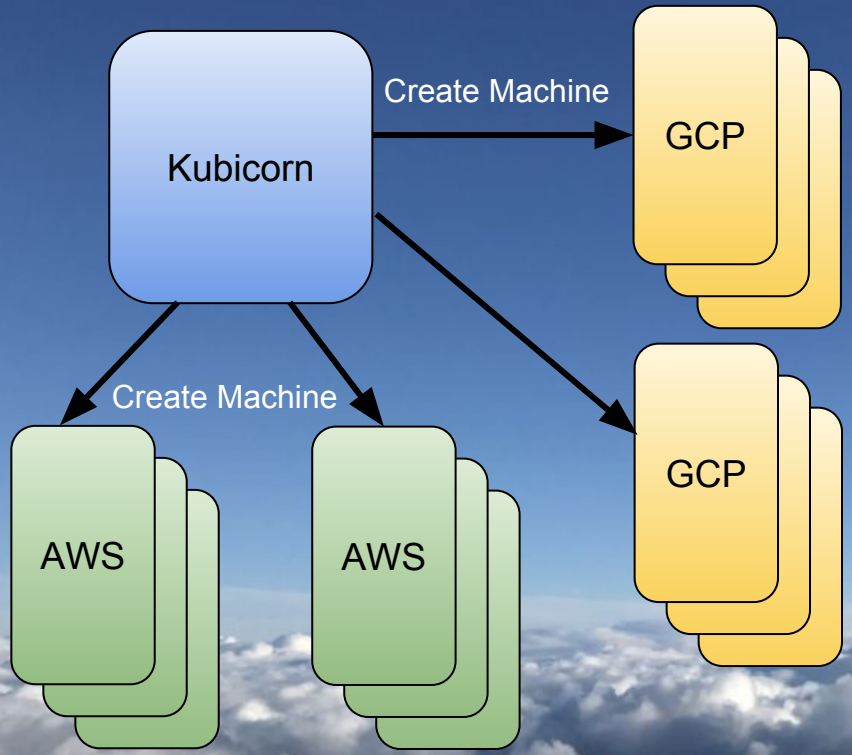
- Similar problems 1 year ago around cluster bootstrapping fragmentation
- Created kubeadm as the one bootstrapper to rule them all
- But **not** machine provisioning

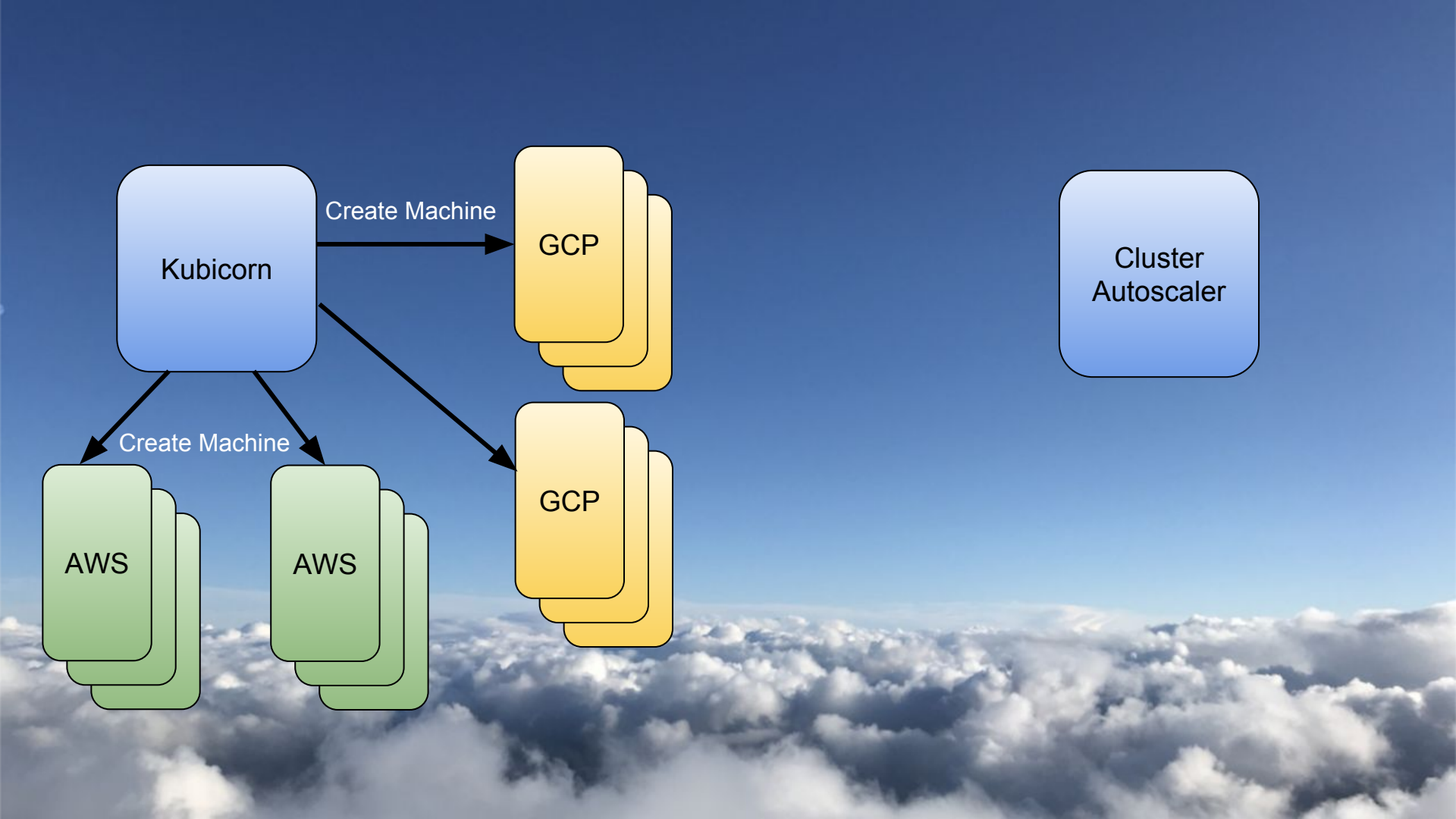


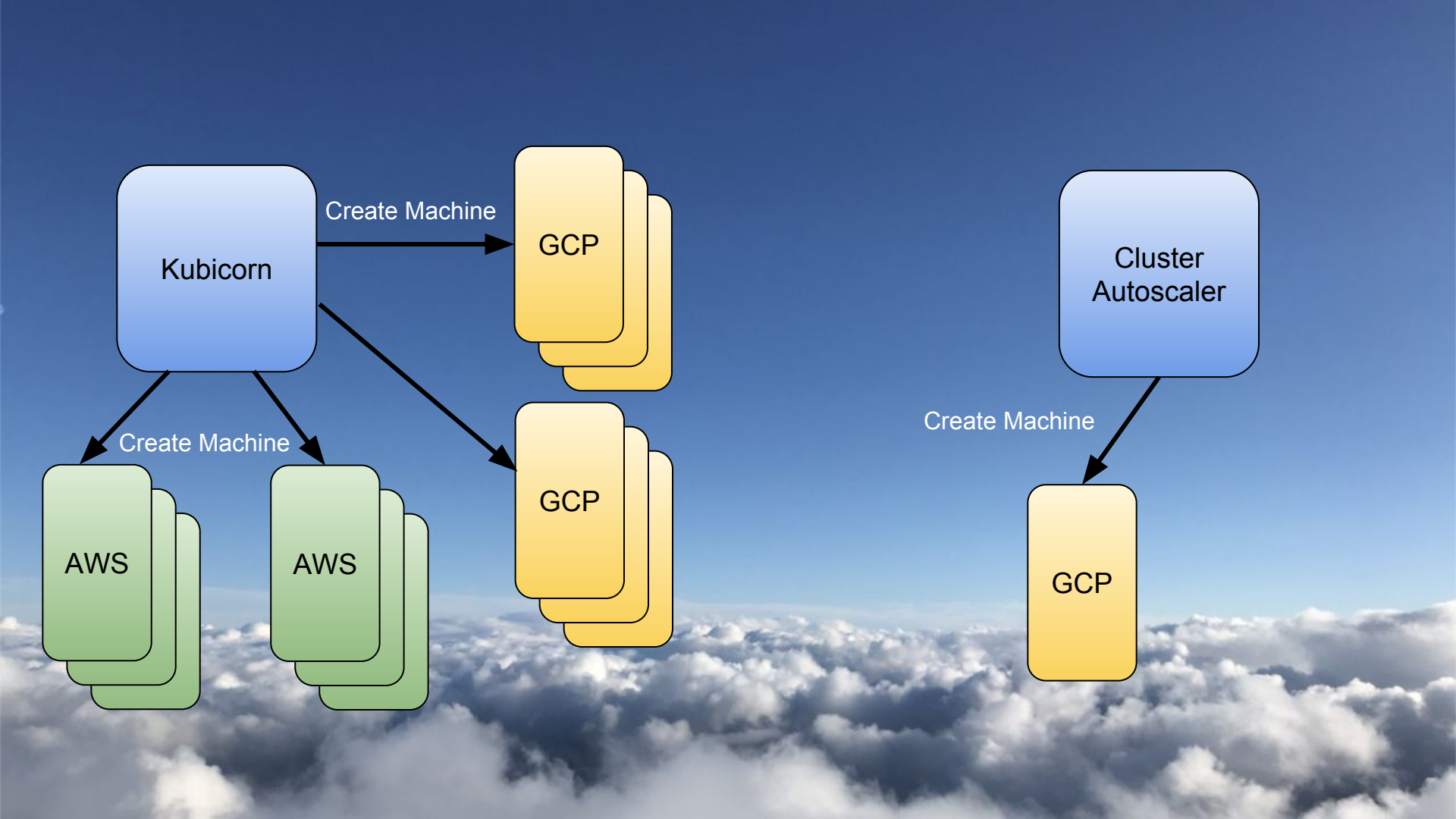

Cluster API
Cluster API Spec
Cluster API Implementation
Addons API*
Cloud Provider
Load Balancers
Monitoring
Logging
Layer 3
Kubernetes API
kubernetes
Bootstrapping
kubeadm
kubeadm
kubeadm
kubeadm
Layer 2
Machines
Master A
Master N
Node 1
Node N
Infrastructure
Microsoft Azure
amazon web services
vmware vSphere
openstack
Layer 1

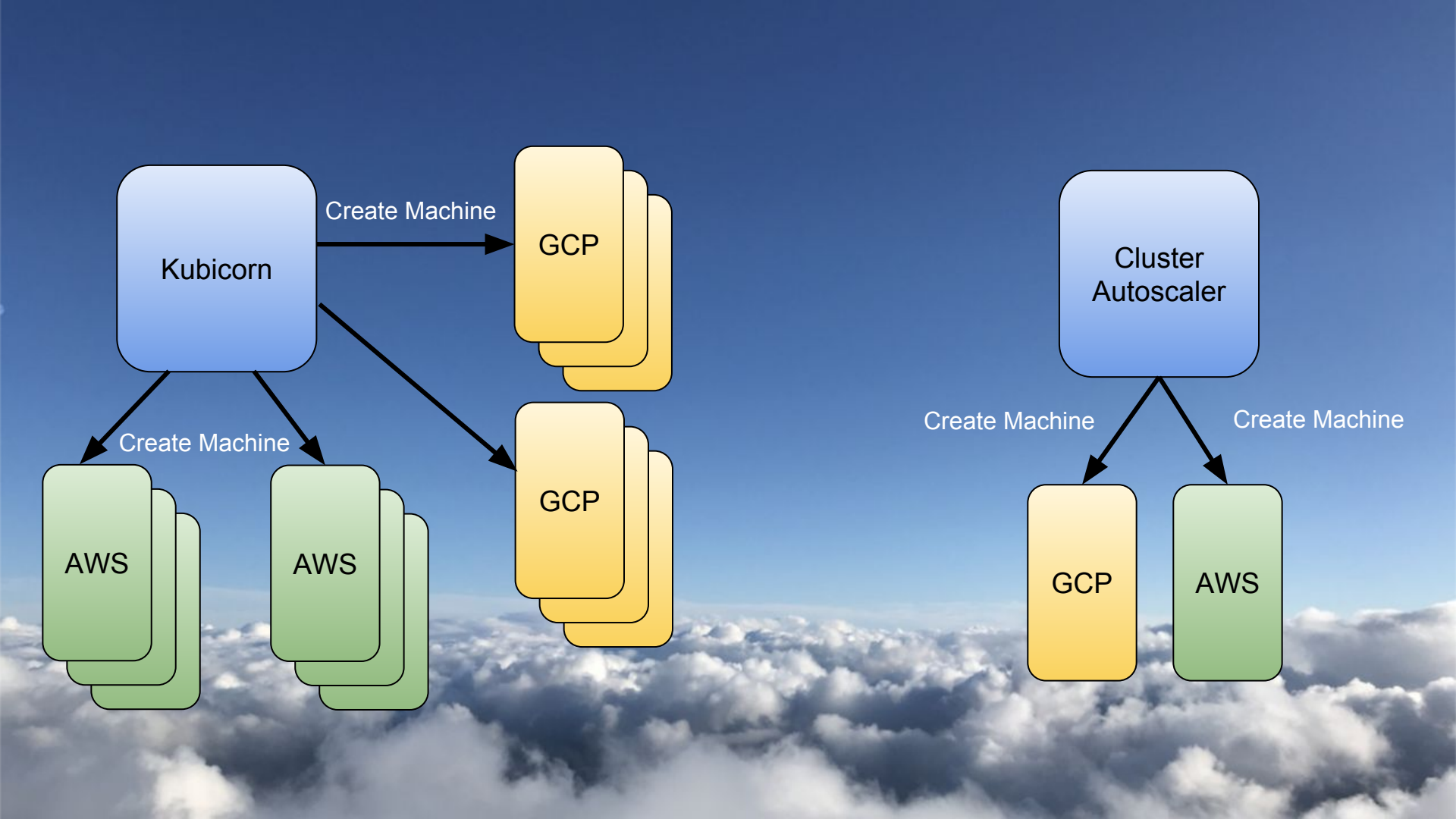
Kubicorn


Kubicorn
Create Machine
AWS
AWS


Kubicorn
Create Machine
GCP
Create Machine
AWS
AWS
GCP


Kubicorn
Create Machine
GCP
Create Machine
AWS
AWS
GCP
Cluster
Autoscaler


Kubicorn
Create Machine
GCP
Create Machine
AWS
AWS
GCP
Cluster Autoscaler
Create Machine
GCP


Kubicorn
Create Machine
GCP
Create Machine
AWS
AWS
GCP
Cluster
Autoscaler
Create Machine
Create Machine
GCP
AWS

What if we had a way to...

1. Create a declarative representation of a cluster and apply it *consistently* across multiple clouds

What if we had a way to...

1. Create a declarative representation of a cluster and apply it *consistently* across multiple clouds

2. Let Kubernetes provision infrastructure

What if we had a way to...

1. Create a declarative representation of a cluster and apply it *consistently* across multiple clouds

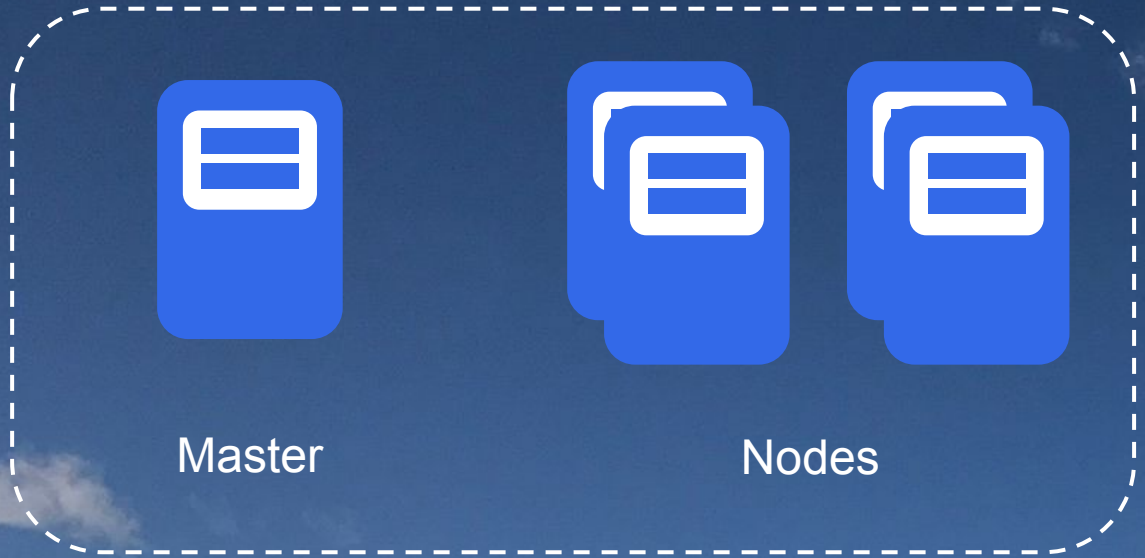
2. Let Kubernetes provision infrastructure

3. Let Kubernetes handle changes to the cluster in a kube-native way

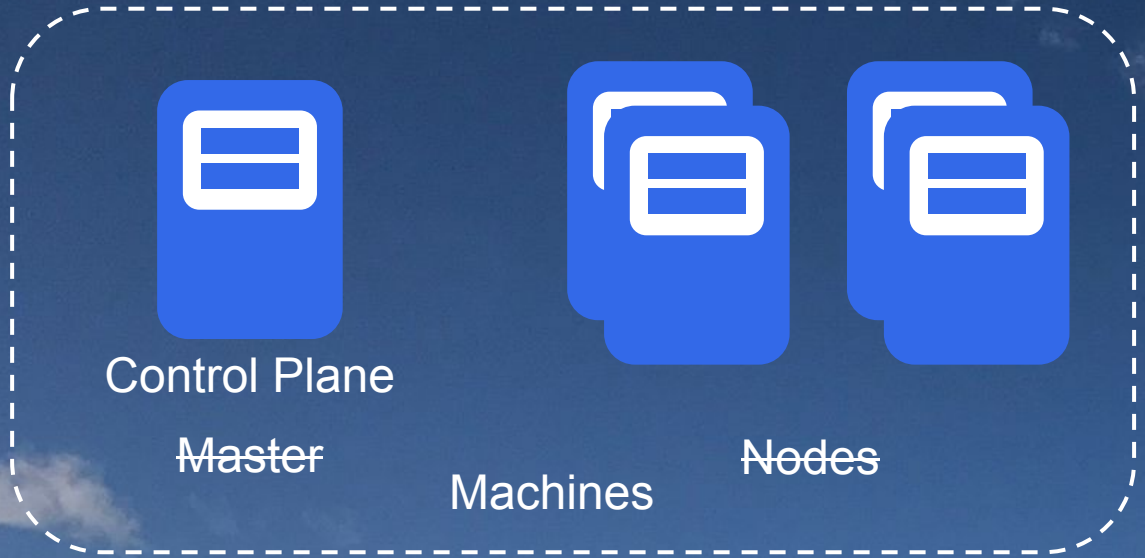
What’s next?

Cluster Management API
A declarative way to **create**, **configure**, and **manage** a cluster

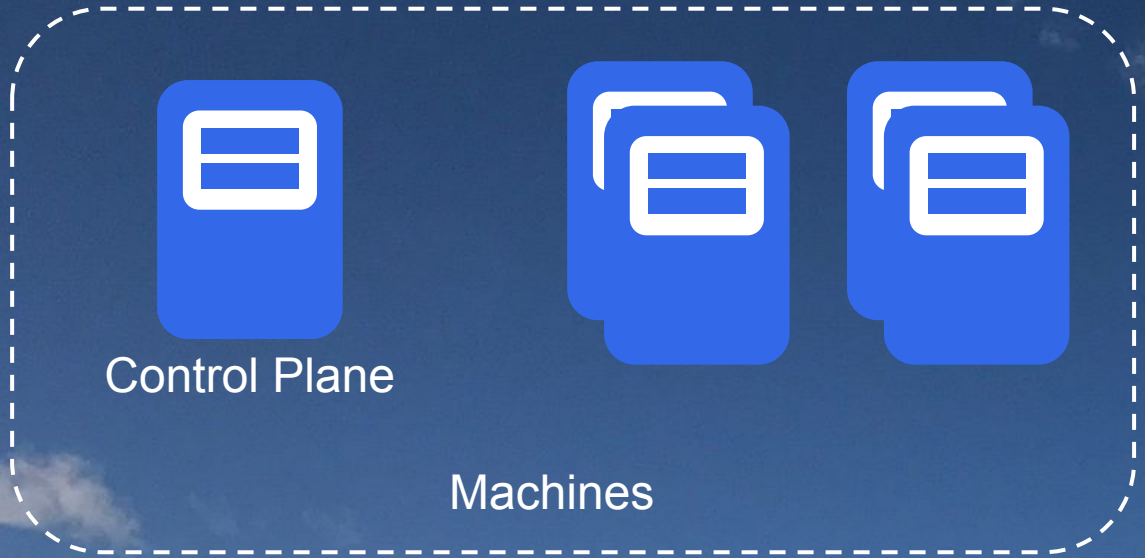
14,000 foot view



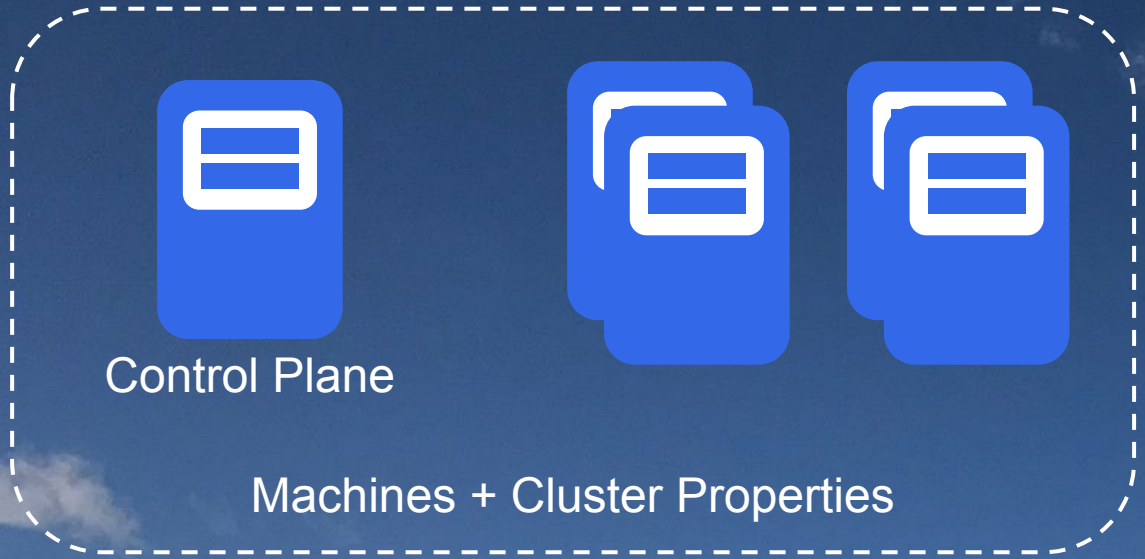
14,000 foot view



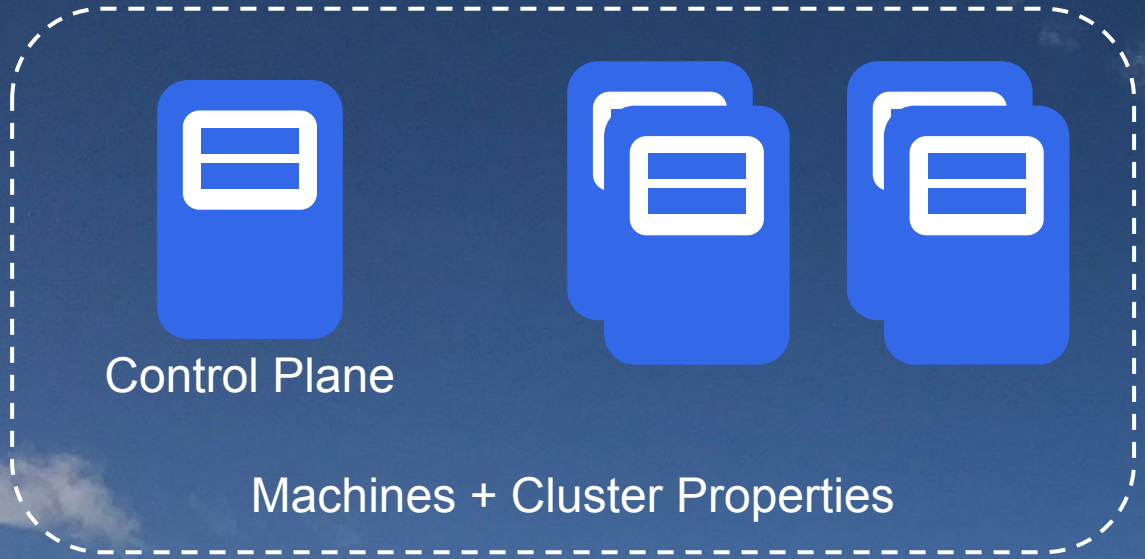
14,000 foot view



14,000 foot view



14,000 foot view



Declarative representation of a cluster applied **consistently** across environments

Declarative Cluster Definition

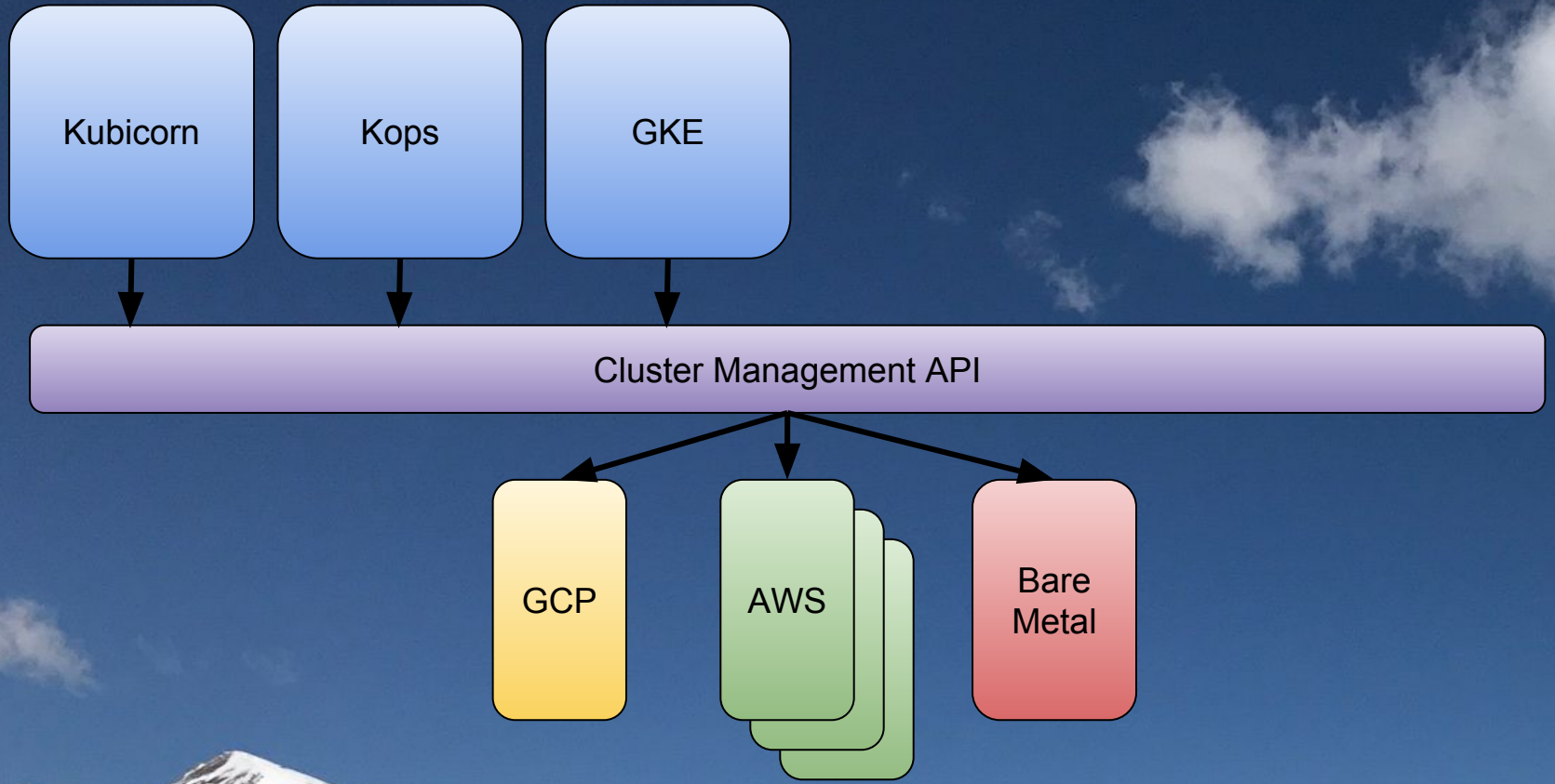
CLUSTER.YAML

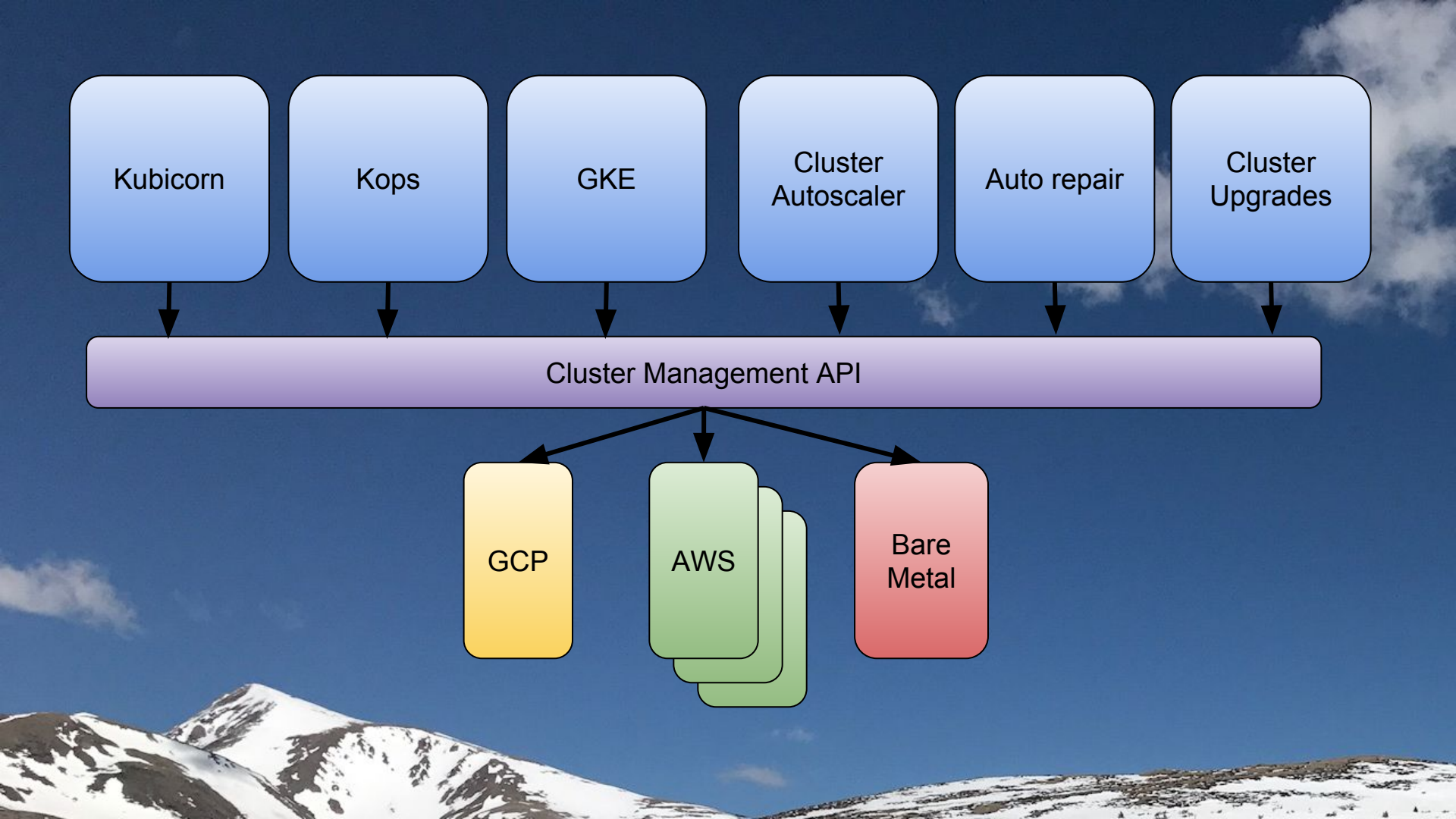
```
apiVersion: "cluster-api.k8s.io/v1alpha1"
kind: Cluster
metadata:
  name: test1
spec:
    clusterNetwork:
        serviceSubnet: "10.96.0.0/12"
        podSubnet: "192.168.0.0/16"
        dnsDomain: "cluster.local"
    providerConfig: >
      {
        "apiVersion": "gceproviderconfig/v1alpha1",
        "kind": "GCEProviderConfig"
      }
```

Machine Definition

MACHINE.YAML

```
apiVersion: "cluster-api.k8s.io/v1alpha1"
kind: Machine
metadata:
  generateName: gce-machine-
spec:
  providerConfig: >
    {
      "apiVersion": "gceproviderconfig/v1alpha1",
      "kind": "GCEProviderConfig",
      "project": "kubecon-2017-demo",
      "zone": "us-central1-f",
      "machineType": "n1-standard-1",
      "image": ".../ubuntu-os-cloud/.../ubuntu-1604-lts"
    }
  versions:
    kubelet: 1.7.5
    containerRuntime:
      name: docker
      version: 1.12.0
  roles:
  - Node
```


Kubicorn
Kops
GKE
Cluster Management API
GCP
AWS
Bare Metal


Kubicorn
Kops
GKE
Cluster Autoscaler
Auto repair
Cluster Upgrades
Cluster Management API
GCP
AWS
Bare Metal

Demo

Follow Along
go.k8s.io/cluster-api

Adoption

Kubicorn - Beta Release

Kops - Coming Soon

Thank You!
Robert Bailey @roberthbailey
Kris Nova @kris__nova
December 7, 2017 — KubeCon Austin