



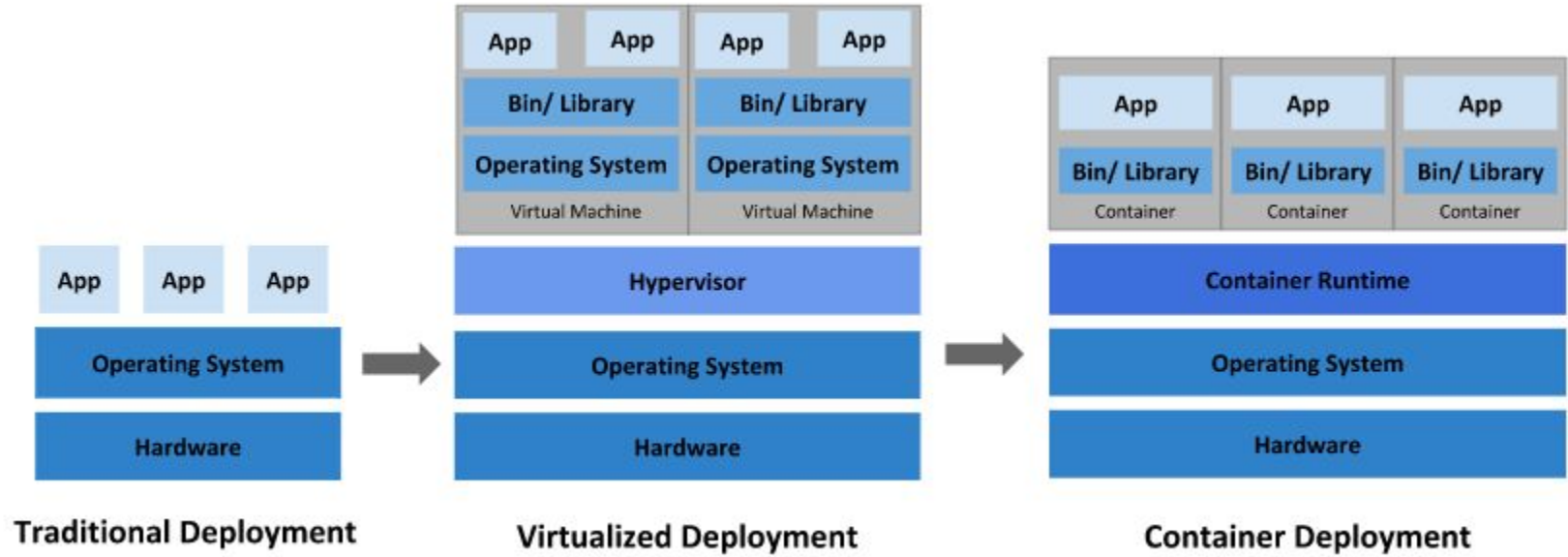
Kubernetes: Container Orchestration

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Outline

- Motivation
- Kubernetes Cluster
- Kubernetes Object
- Demo via Minikube





Container Orchestration

Tools of Container Orchestration



Amazon ECS
FROM AMAZON



Azure Container Services
FROM MICROSOFT



Docker Swarm
DOCKER OPENSOURCE TOOLS



Google Container Engine
FROM GOOGLE CLOUD PLATFORM



Kubernetes
DOCKER OPENSOURCE TOOLS



CoreOS Fleet
FROM COREOS

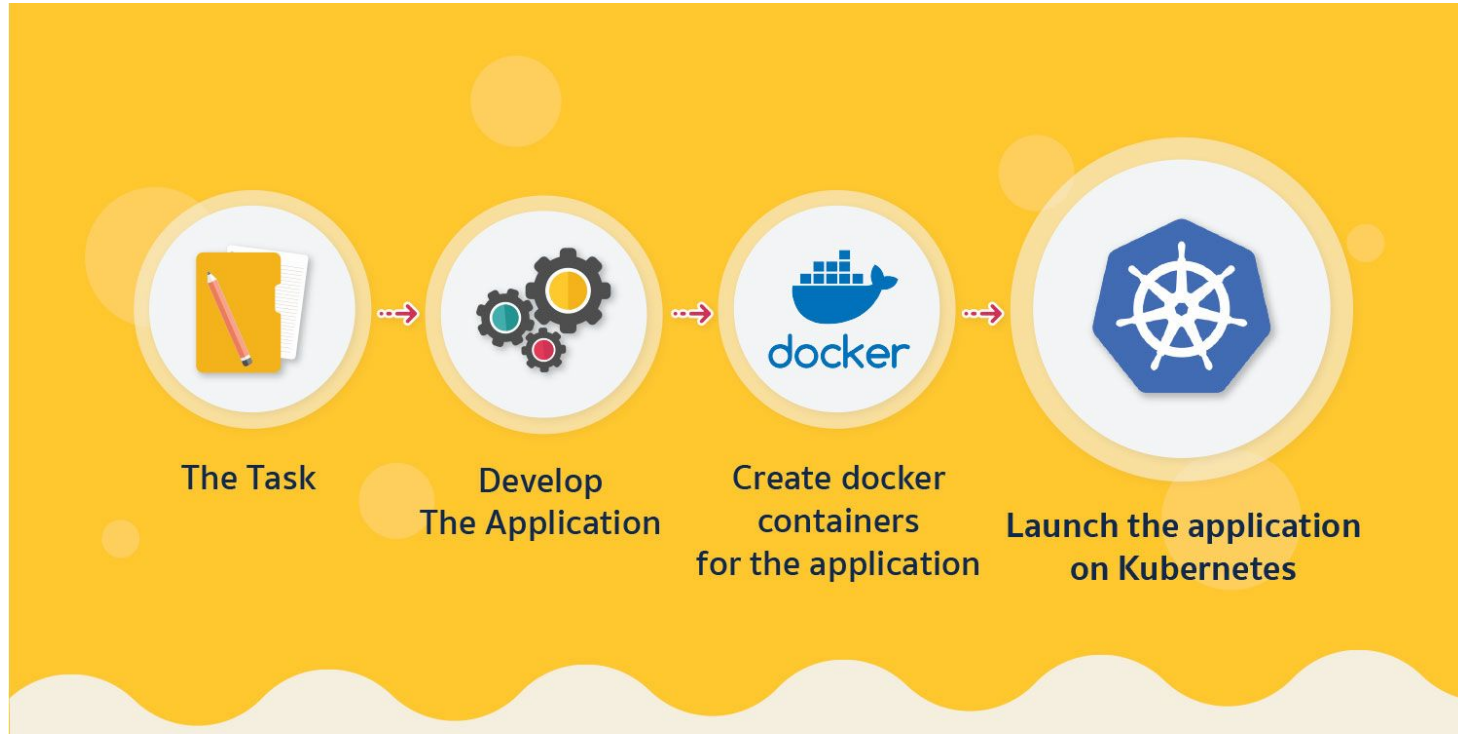


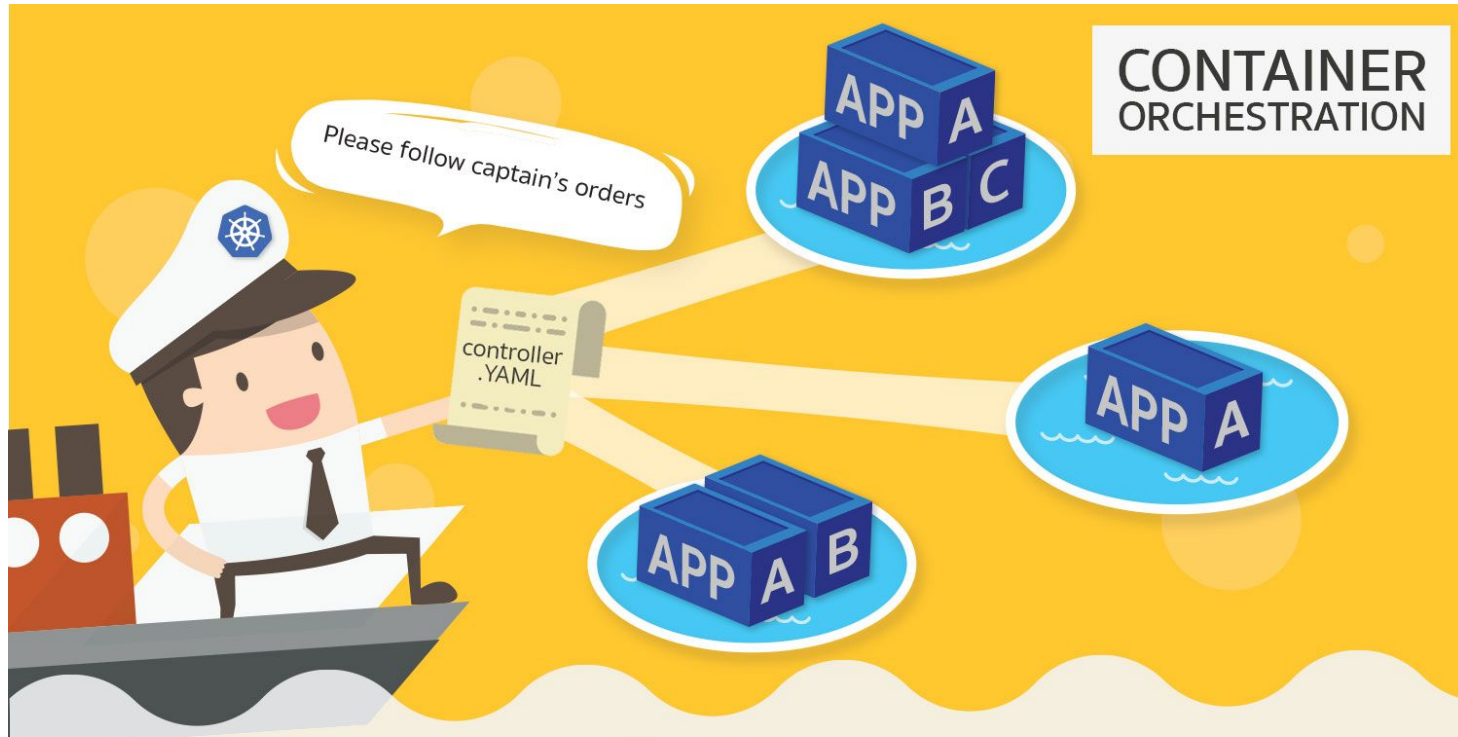
Mesosphere Marathon
FROM MARATHON



Cloud Foundry's Diego
FROM CLOUD FOUNDRY

- Provisioning and deployments of containers
- Health monitoring of containers
- Allocation of resources between containers





Kubernetes

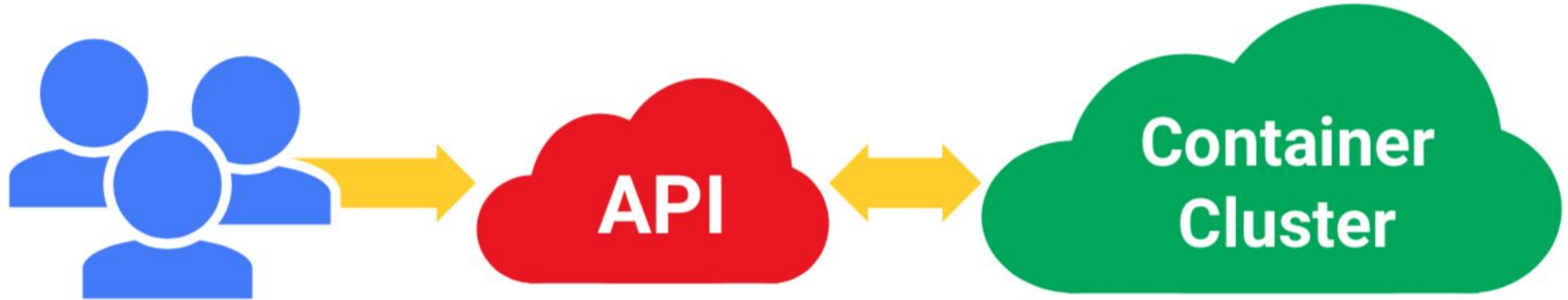
- Manages container clusters
- Supports multiple cloud and bare-metal environments
- Supports multiple container runtimes
- **100% Open source**

Manage applications, not machines !!

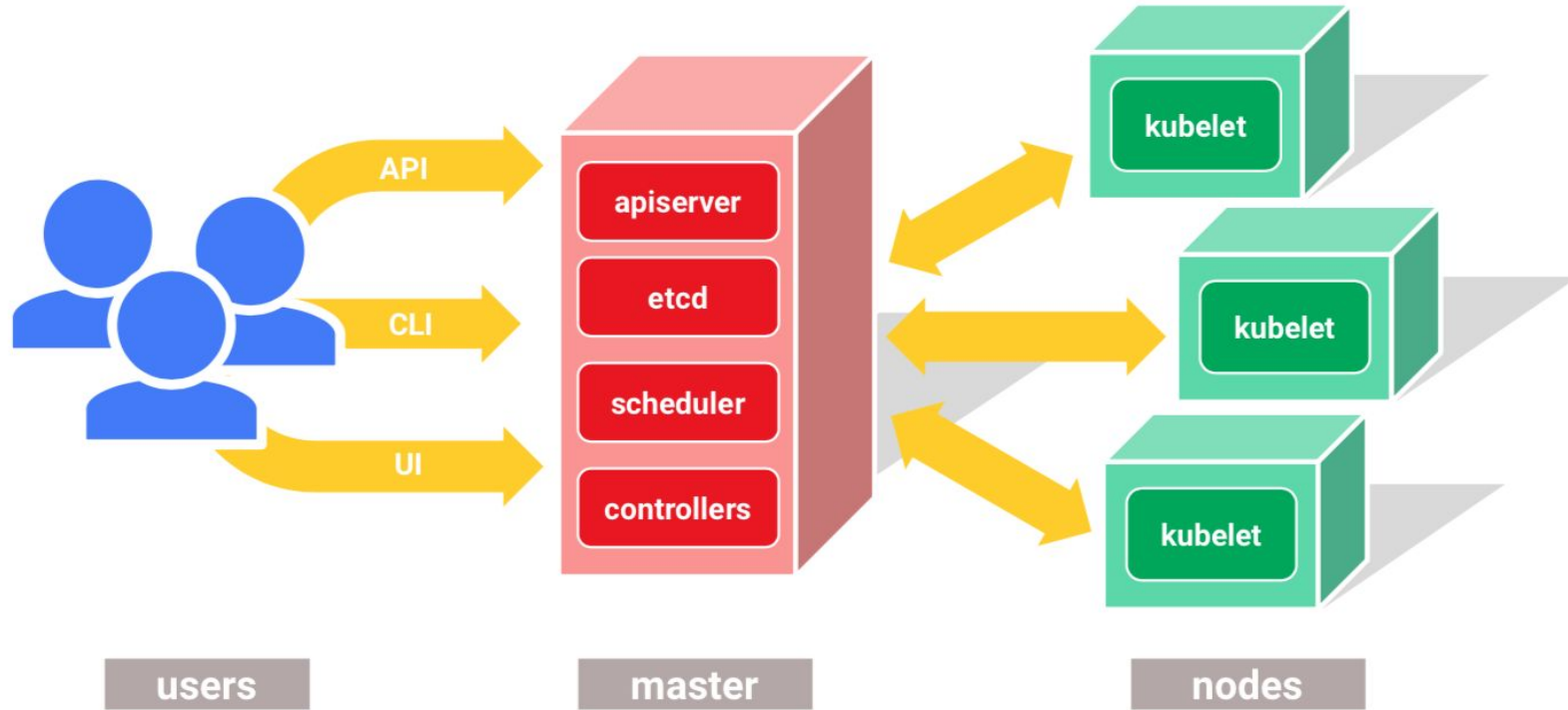
Kubernetes features

- **Horizontal scaling:** Scale your application up and down with a simple command, with a UI, or automatically based on CPU usage.
- **Self-healing:** Restarts containers that fail, replaces and reschedules containers when nodes die, kills containers that don't respond to your user-defined health check, and doesn't advertise them to clients until they are ready to serve.
- **Service discovery and load balancing:** No need to modify your application to use an unfamiliar service discovery mechanism. Kubernetes gives containers their own IP addresses and a single DNS name for a set of containers, and can load-balance across them.
- **Storage Orchestration:** Automatically mount the storage system of your choice, whether from local storage, a public cloud provider

Kubernetes: Overview



Kubernetes: Overview

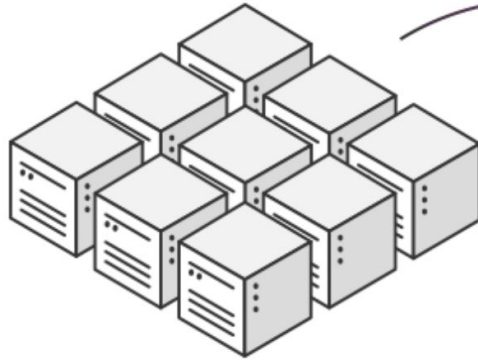


Container clusters (Admin)

1. Setting up the cluster

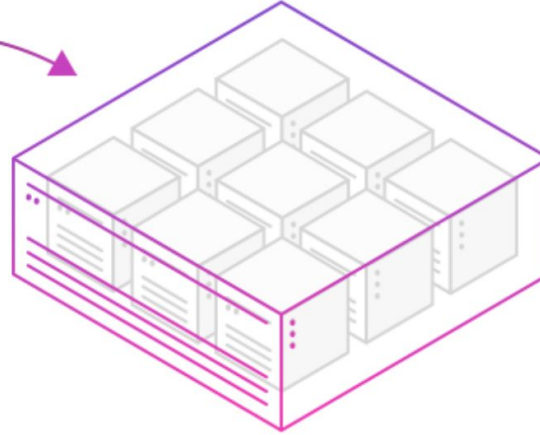
- Choose a cloud: GCE, AWS, Azure, on-premises, ...
- Choose a node OS: Debian, CentOS, Ubuntu, ...
- Provision machines: install and run Kubernetes components, ...
- Configure networking: IP for machines, Pods, Services, ...
- Start cluster services: DNS, logging, ...
- Manage node: kernel upgrades, OS updates, ...

Cluster



Datacenter or Cloud

Gone are the days where writing and deploying new applications means managing individual machines and static partitions.

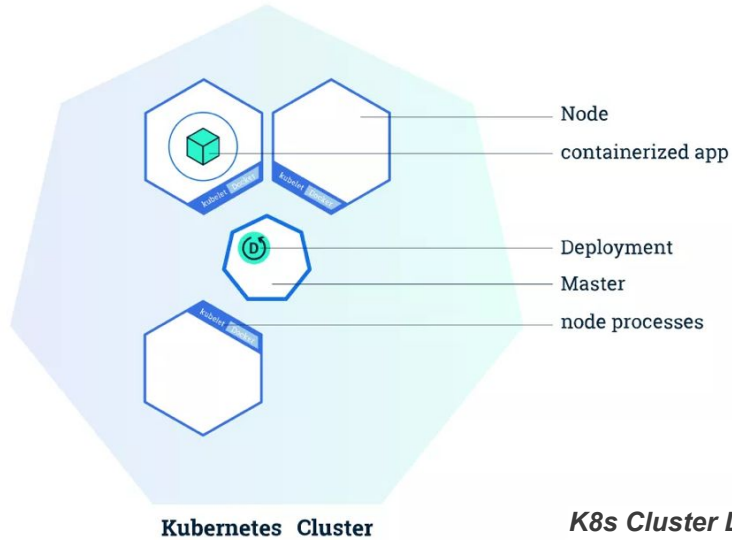


With Kubernetes

Pool your datacenter and cloud resources, so all your apps run together on the same machines —reducing complexity and waste.

what is kubernetes to datacenter
(source : Mesosphere)

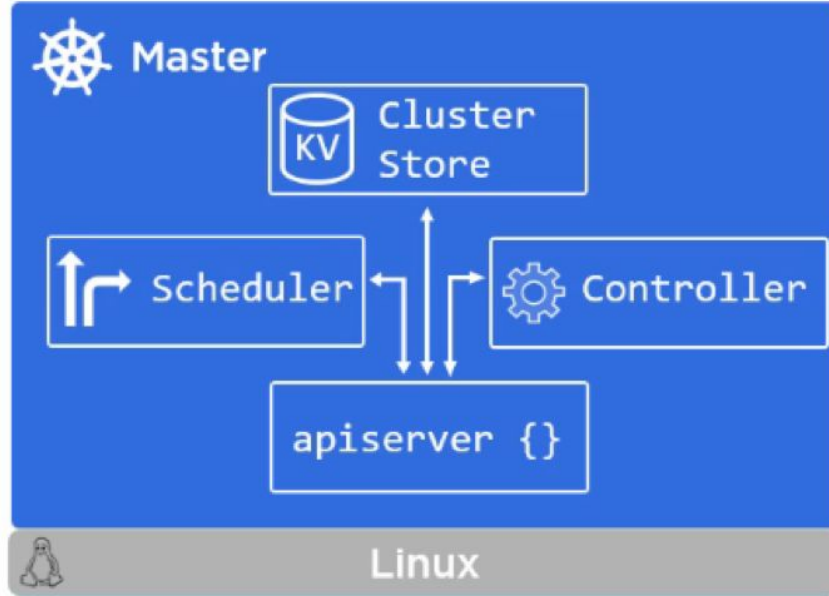
Cluster



K8s Cluster Diagram
(source:kubernetes.io)

- Master node
- Worker node

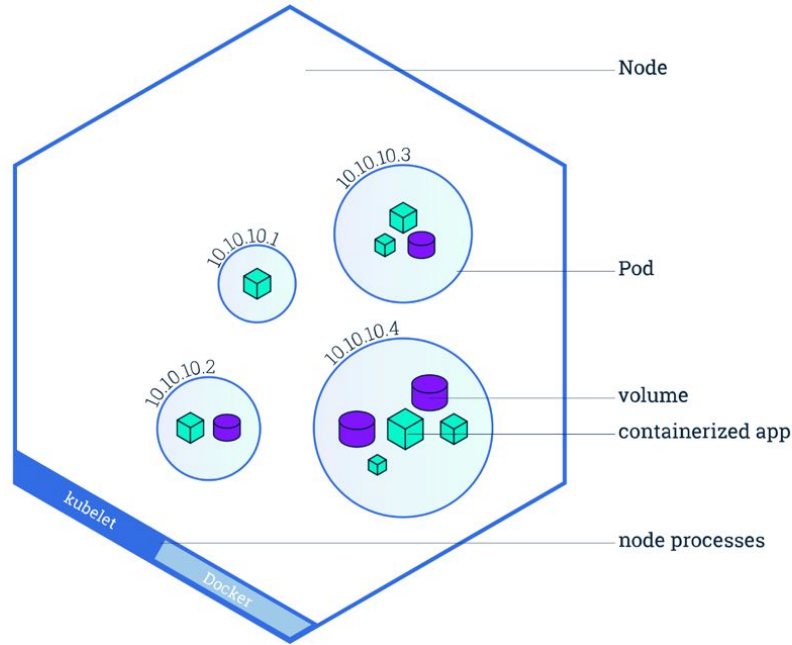
Master



- Controls Kubernetes nodes
- Maintains the desired state for your cluster
- Interacts with Master via kubectl command

K8s Cluster Diagram
(source:kubernetes.io)

Worker



- VM or physical machine
- Contain services to run pods

K8s Cluster Diagram
(source:kubernetes.io)

Container clusters (Developer)

2. Using the cluster

- Run Pods & Containers
- ReplicaSets & Deployments & DaemonSets & StatefulSets
- Services & Volumes & Secrets & Autoscalers

This is the fun part!

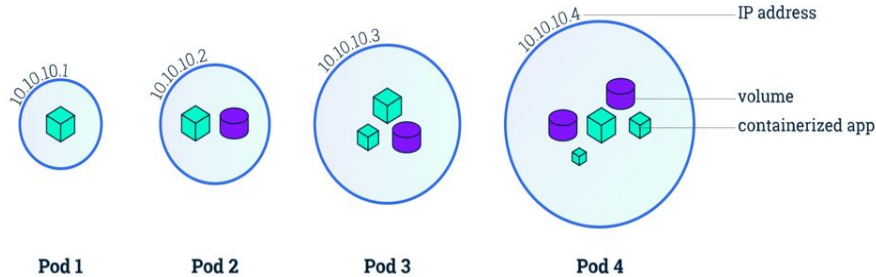
Don't make developers deal with cluster administration!

Accelerate development by focusing on the applications, not the cluster

Kubernetes Object

- Pod
- Service
- Volume
- Namespace
- Deployment
- ReplicationSet

Pod

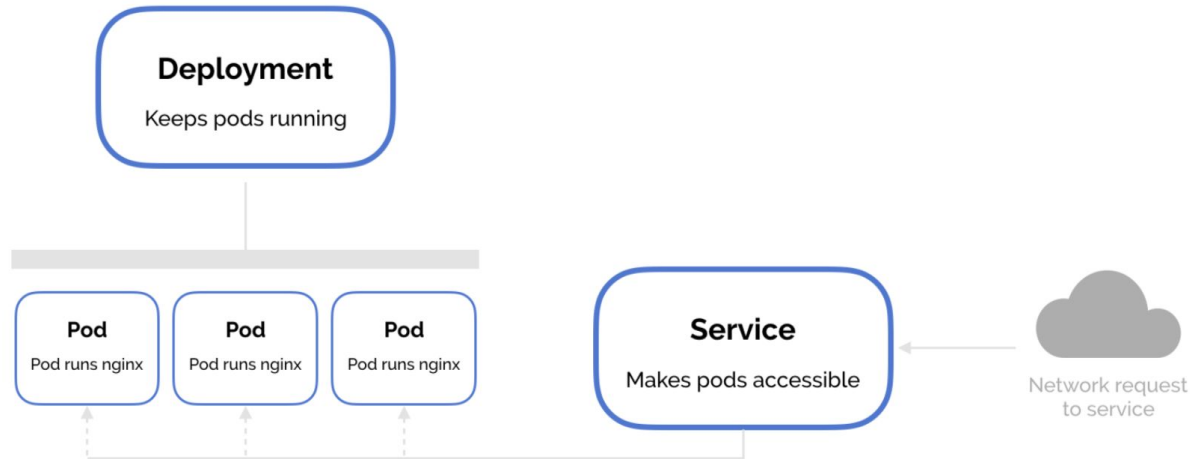


K8s Cluster Diagram
(source:kubernetes.io)

- Basic execution unit of Kubernetes
- Small group of container
- Contains container (or multiple containers), storage resources and a unique network IP

Service

- Use to allow network access to a set of pods



Volume

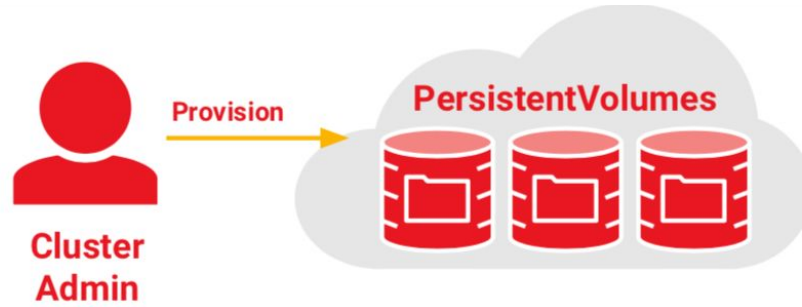
Kubernetes supports several types of Volumes:

- azureDisk
- azureFile
- persistentVolumeClaim
-

Persistence Volume



Persistence Volume



Persistence Volume

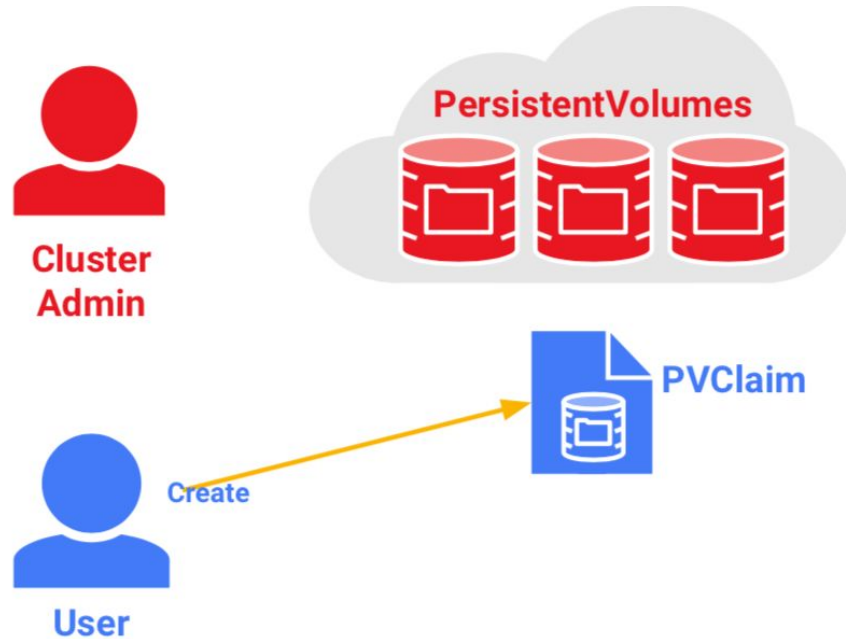


Cluster
Admin

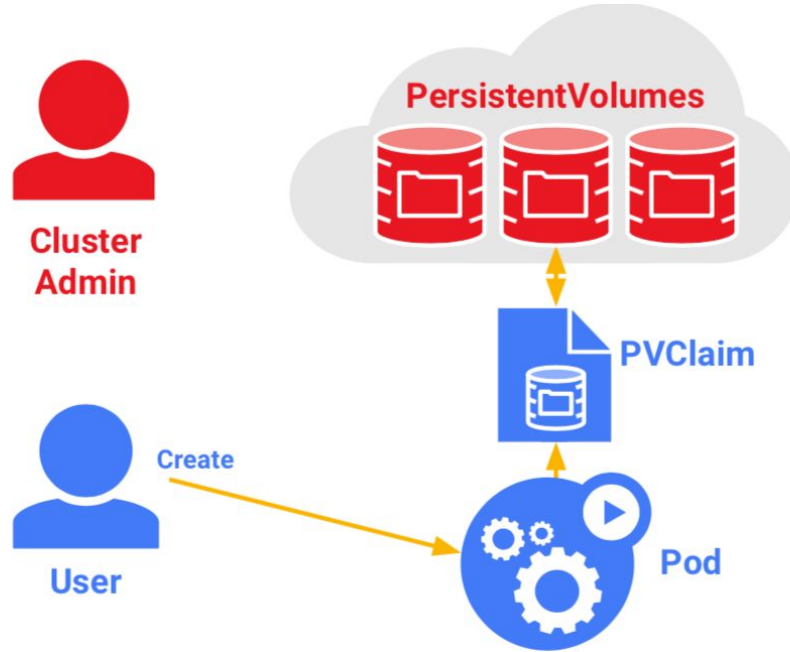


User

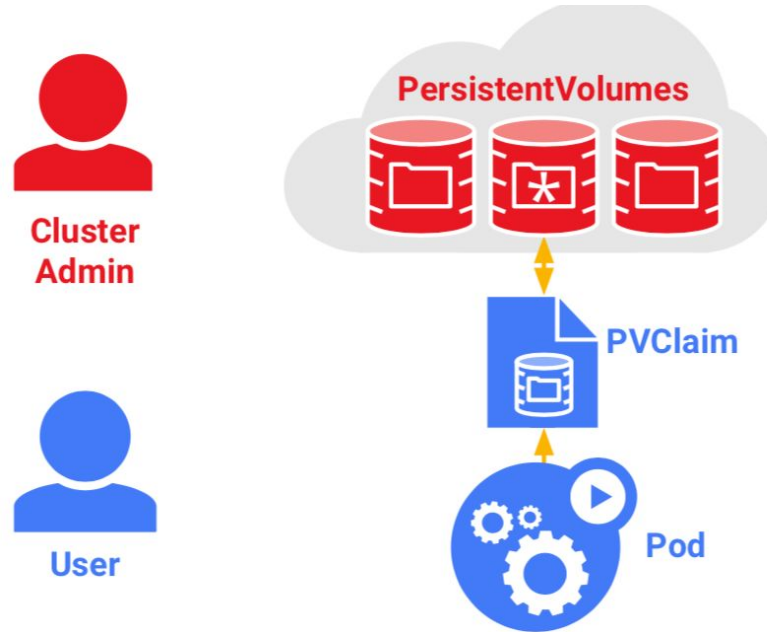
Persistence Volume



Persistence Volume



Persistence Volume

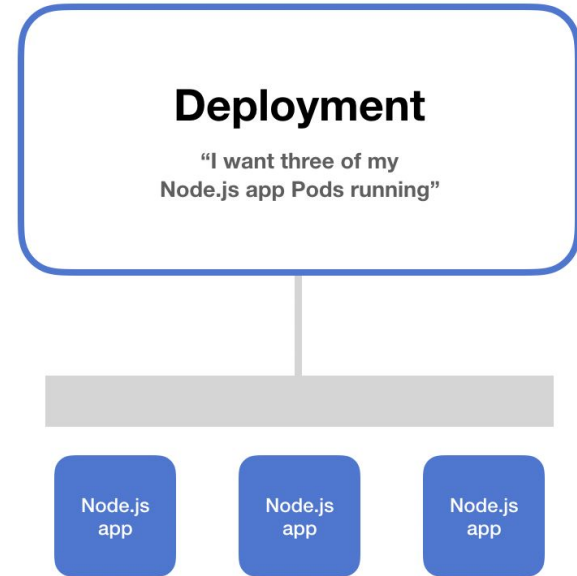


Namespace

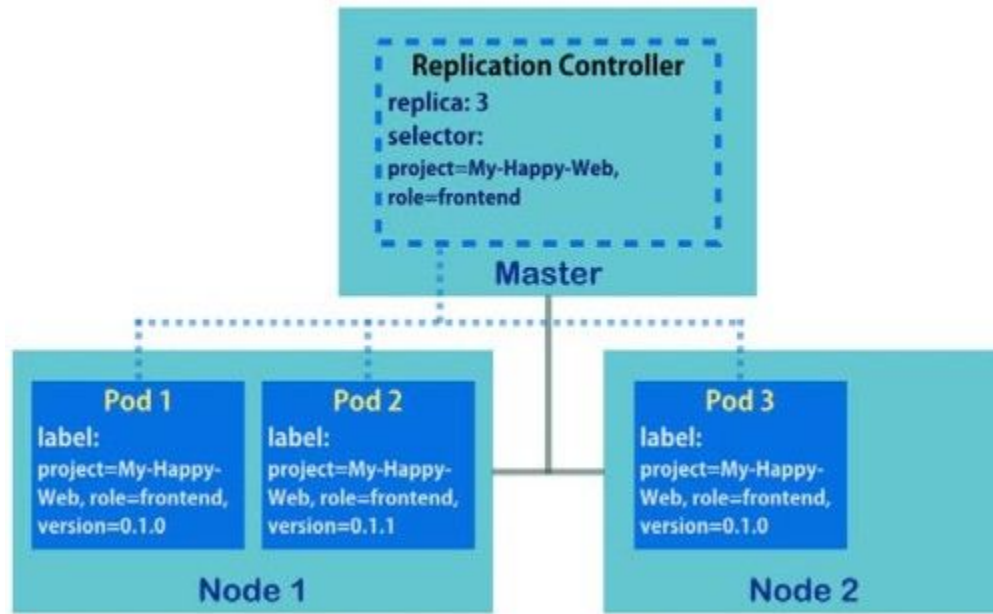
- A scop of name
- A way to divide cluster resources between multiple users
- Help different projects, teams, or customers to share a Kubernetes cluster

Deployment

- easiest and most used resource for deploying your application
- used for stateless applications



ReplicationSet



K8s Cluster Diagram
(source:kubernetes.io)

Notes on Kubernetes

- Use kubectl command for (almost) everything
 - `kubectl get pods`
 - `kubectl get nodes`
 - ...