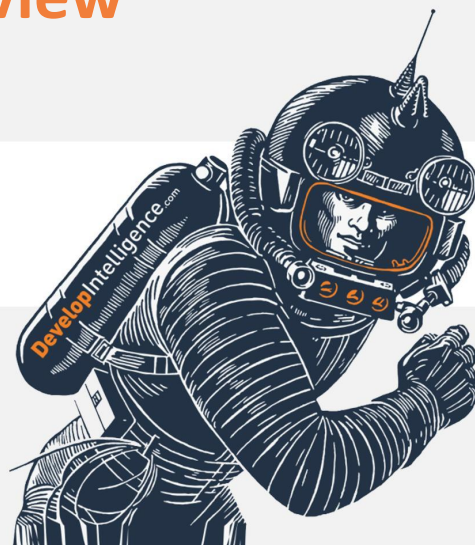


Kubernetes Overview





- Kubernetes Origins
- Kubernetes Architecture
- Kubernetes API
- Demo: Kubectl
- Lab: Kubernetes Basics



Kubernetes (k8s)



Open-source platform for automating deployment, scaling, and management of containerized applications

Greek for 'Captain' or 'Helmsman' (it's driving the container ship!)

Created inside Google and open-sourced, now managed by CNCF



CLOUD NATIVE
COMPUTING FOUNDATION

3

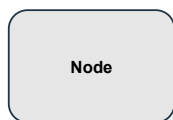
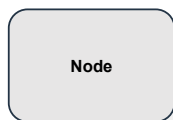
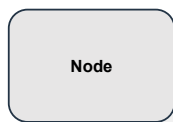
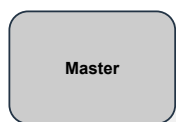
<https://kubernetes.io/>

<https://www.cncf.io/>

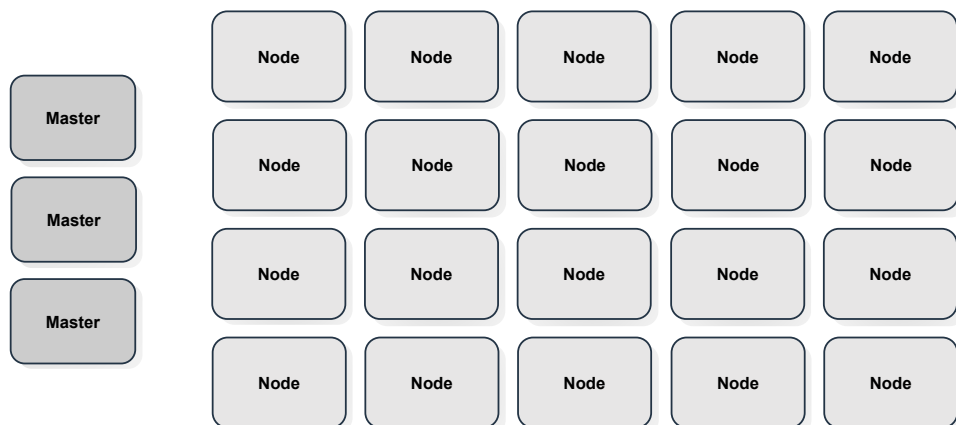
<https://github.com/kubernetes/kubernetes>

<https://github.com/kubernetes/kubernetes/blob/master/logo/logo.png>

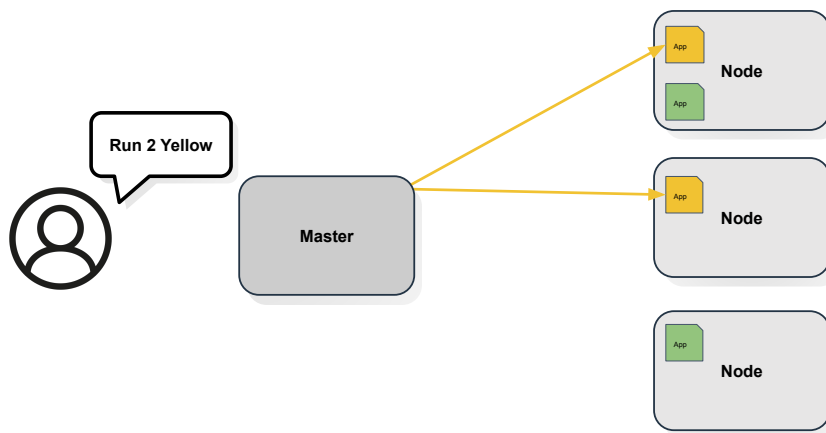
<https://github.com/cncf/artwork>



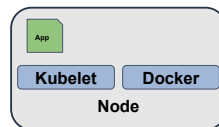
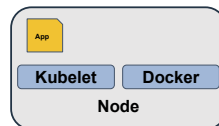
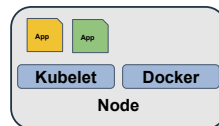
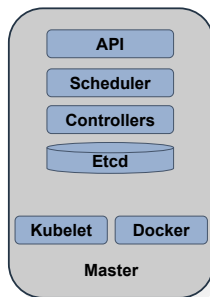
Clusters consist of master and application nodes



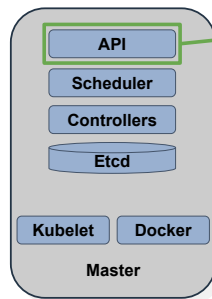
Clusters can be Huge! Pokemon GO runs lots of clusters with 1000's of nodes in each.



The Master nodes handle the scheduling of apps onto application nodes



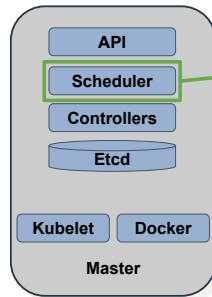
The plumbing of Kubernetes consists of many parts.



kube-apiserver

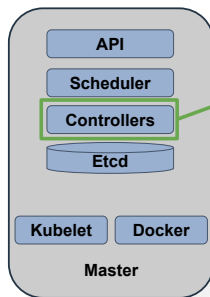
- Exposes a REST API
- JSON request format
- Only piece a user should talk to

<https://kubernetes.io/docs/reference/generated/kubernetes-api/v1.14/>



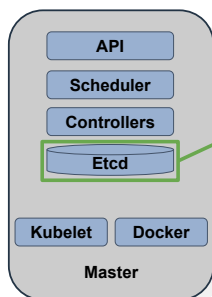
kube-scheduler

- Selects node for an app to run based on many factors



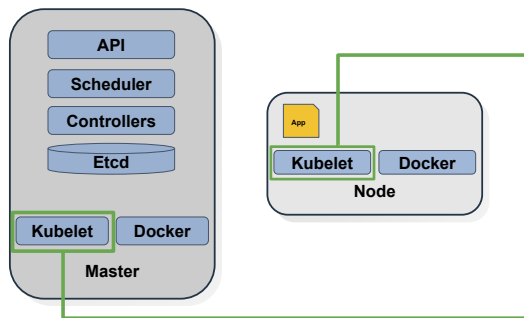
kube-controller-manager

- Components that watch for changes
- Attempt to maintain desired state



etcd

- Backing store for cluster data
- Open-source, distributed key-value store

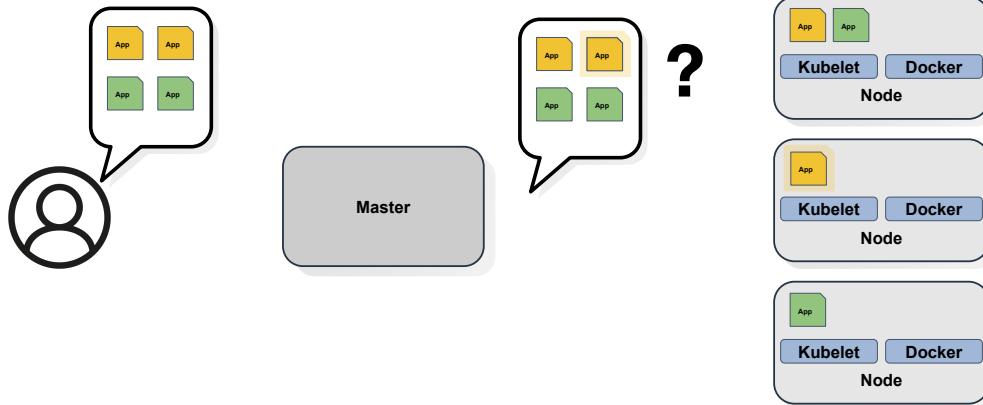


Kubelet

- Agent running on each node
- Runs containers on the node
- Reports status back to Master



Desired vs Actual State

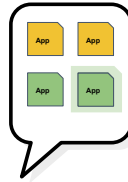
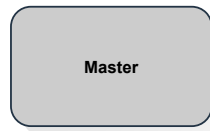


So we know the pieces, how do we use it?

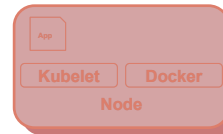
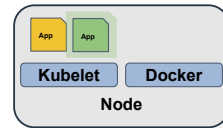
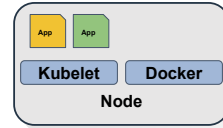
The job of the master is to continuously reconcile the desired state and actual state.
As a user, we just simply declare the desired state.

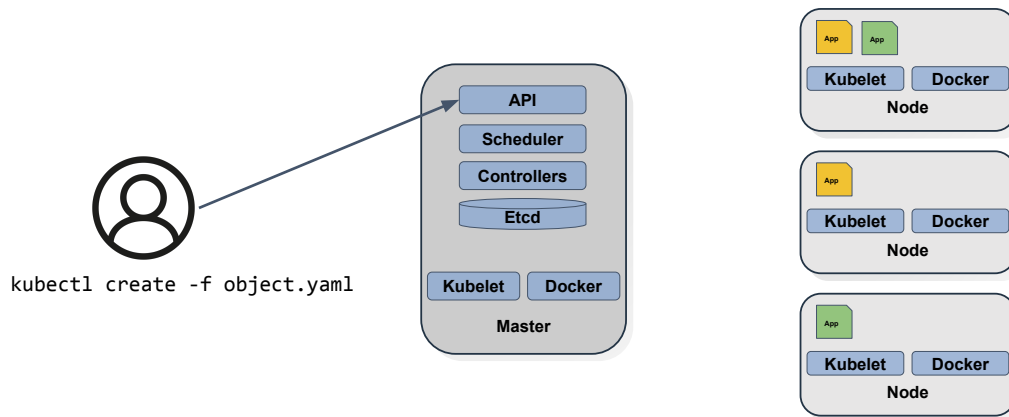


Desired vs Actual State

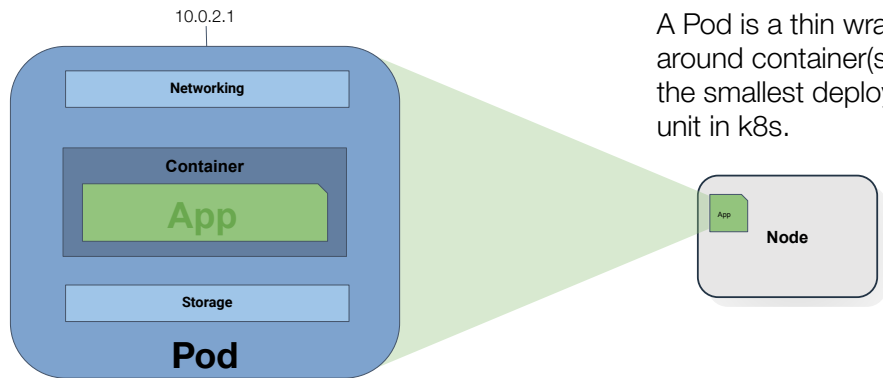


?



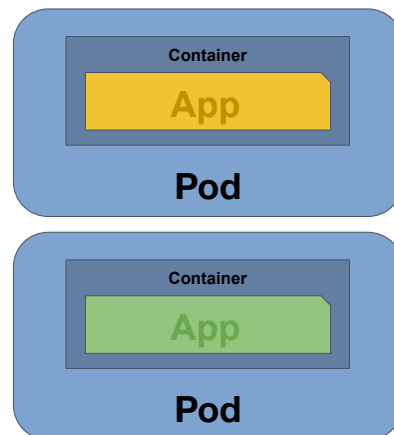
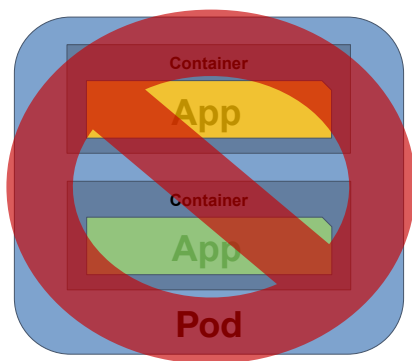


The user declares their desired state for their app via the API. The desired state is described by a set of Object Manifests written in YAML that are uploaded to the K8s API, more on this in the next module. The user does not have to care about what steps must be taken to reach their desired state.

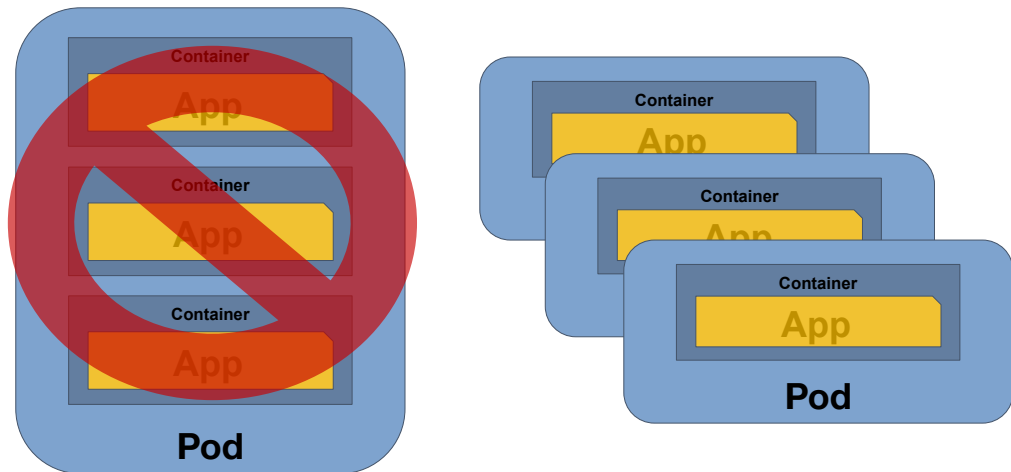


A Pod is a thin wrapper around container(s). It is the smallest deployable unit in k8s.

"Pods" are the most fundamental kubernetes object. We package up our app, put it inside a container, and deploy it on kubernetes inside of a pod. A pod has its own storage and IP address.



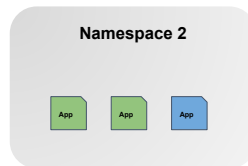
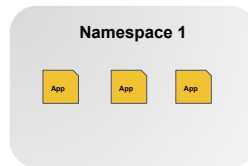
A Pod should only contain a single application. There are a couple exceptions to this which we will cover later. This is critical because the isolation of the application is at the pod level, so two containers in the same pod could disturb each other.



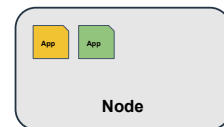
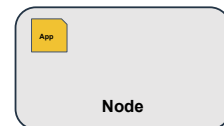
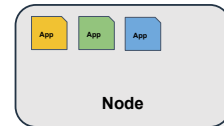
If we want to scale-out our application, we must create more pods that run it. If we had the application running multiple times in a pod, we are not actually giving it any more resources. If we had different apps in a single pod, we would have to scale them together.



- Logical construct to group resources
- Most objects live in a namespace
- Does not affect physical topology



Logical



Physical

<https://kubernetes.io/docs/concepts/overview/working-with-objects/namespaces/>

You may use namespaces to separate resources for different teams or maybe environments such as dev, test, and prod. Kubernetes actually runs its internal objects in a namespace called *kube-system*.



Kubernetes Basics



How do you pronounce Kubectl



1. Cube Cuddle
2. Cube Control
3. Cube See Tee El
4. It doesn't matter



What is Kubelet?

1. An agent that runs on the node and communicates information to the master(s)
2. A lightweight Kubernetes distribution
3. Backend storage service for cluster information
4. A shakespearean tale about a container seeking revenge against the one who killed Kubelet's father



Additional Resources



- Kubernetes - <https://kubernetes.io>
- Kubectl Overview
<https://kubernetes.io/docs/reference/kubectl/overview/>