Kubernetes Basics

Getting Started With Google Kubernetes Engine

Version 1.5

Google Cloud

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Agenda

Clusters, nodes, and pods

Services, labels and selectors

Volumes

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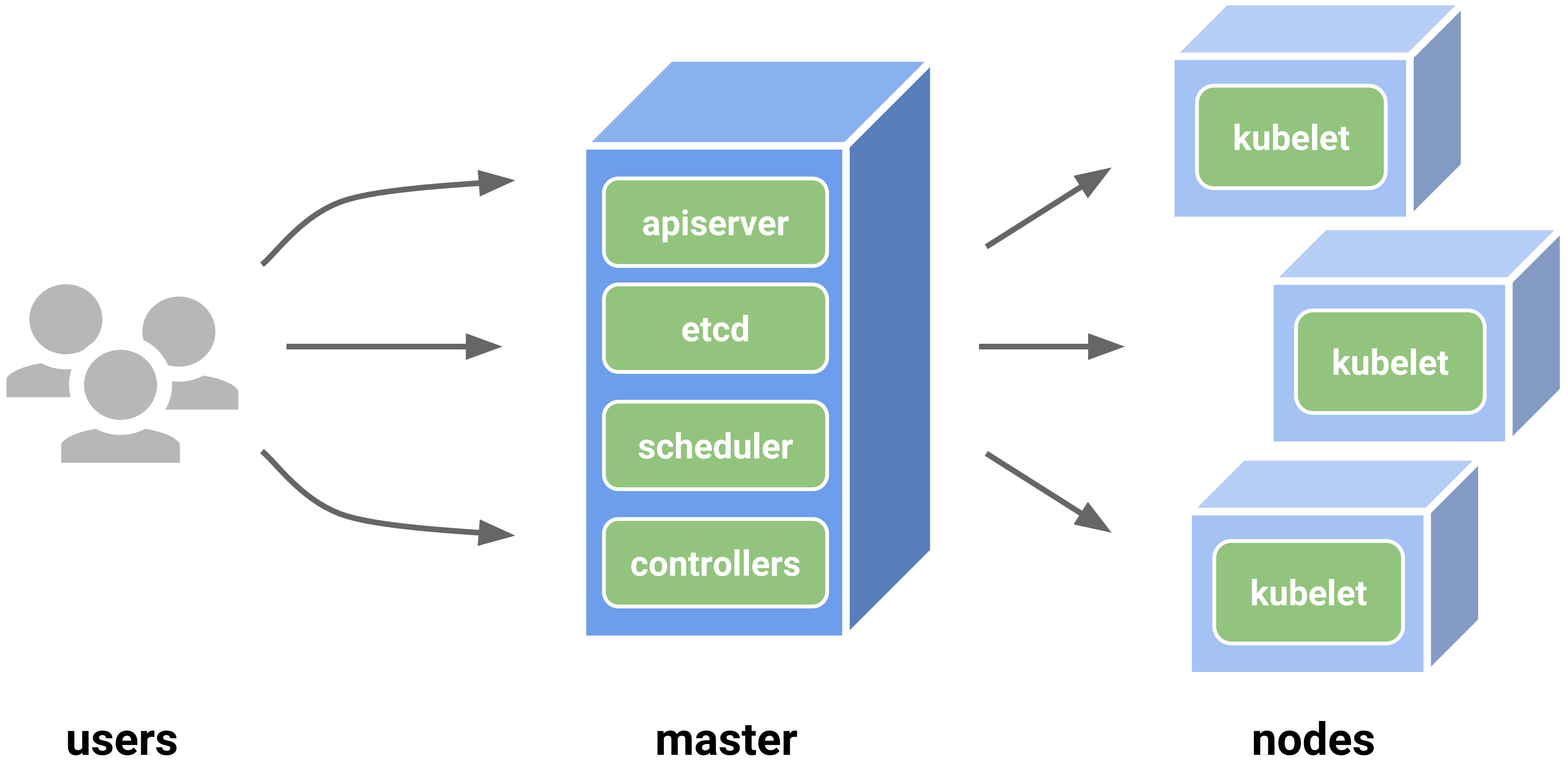
The 10,000-foot view



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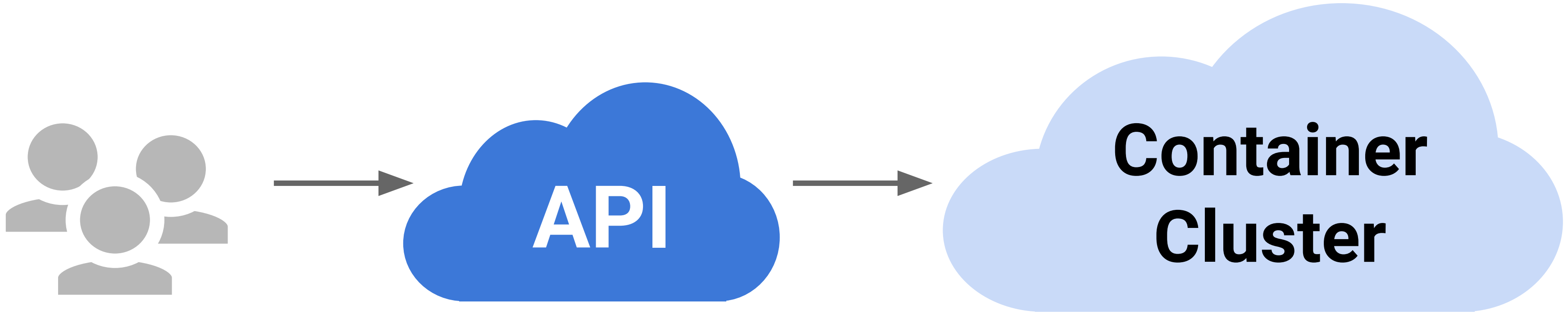
All users really care about



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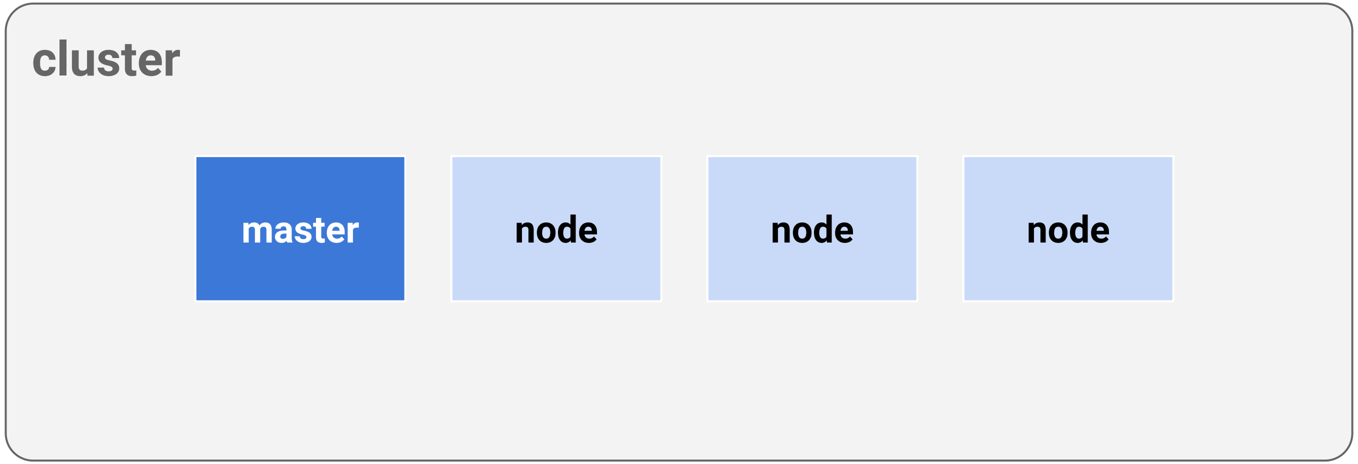
A cluster is a set of computing instances that Kubernetes manages



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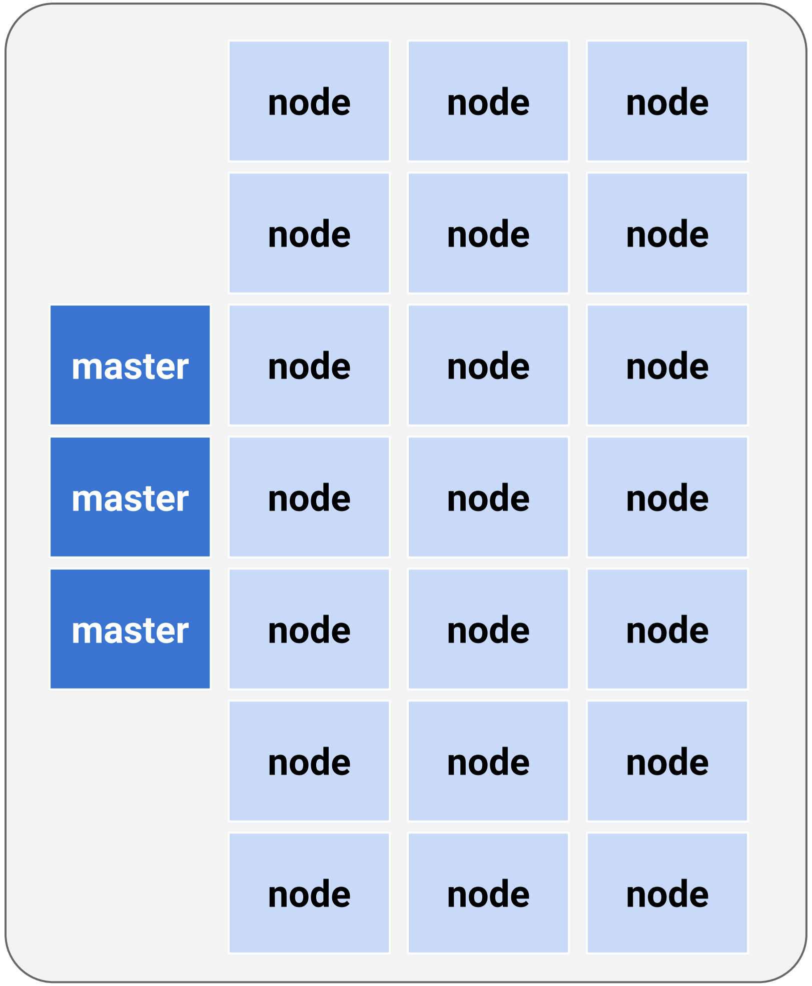
A cluster can have multiple masters and lots of nodes.

With regional clusters, masters and nodes are spread across three zones in a region for high availability.

By default, three masters are created per zone, but you can control the number.



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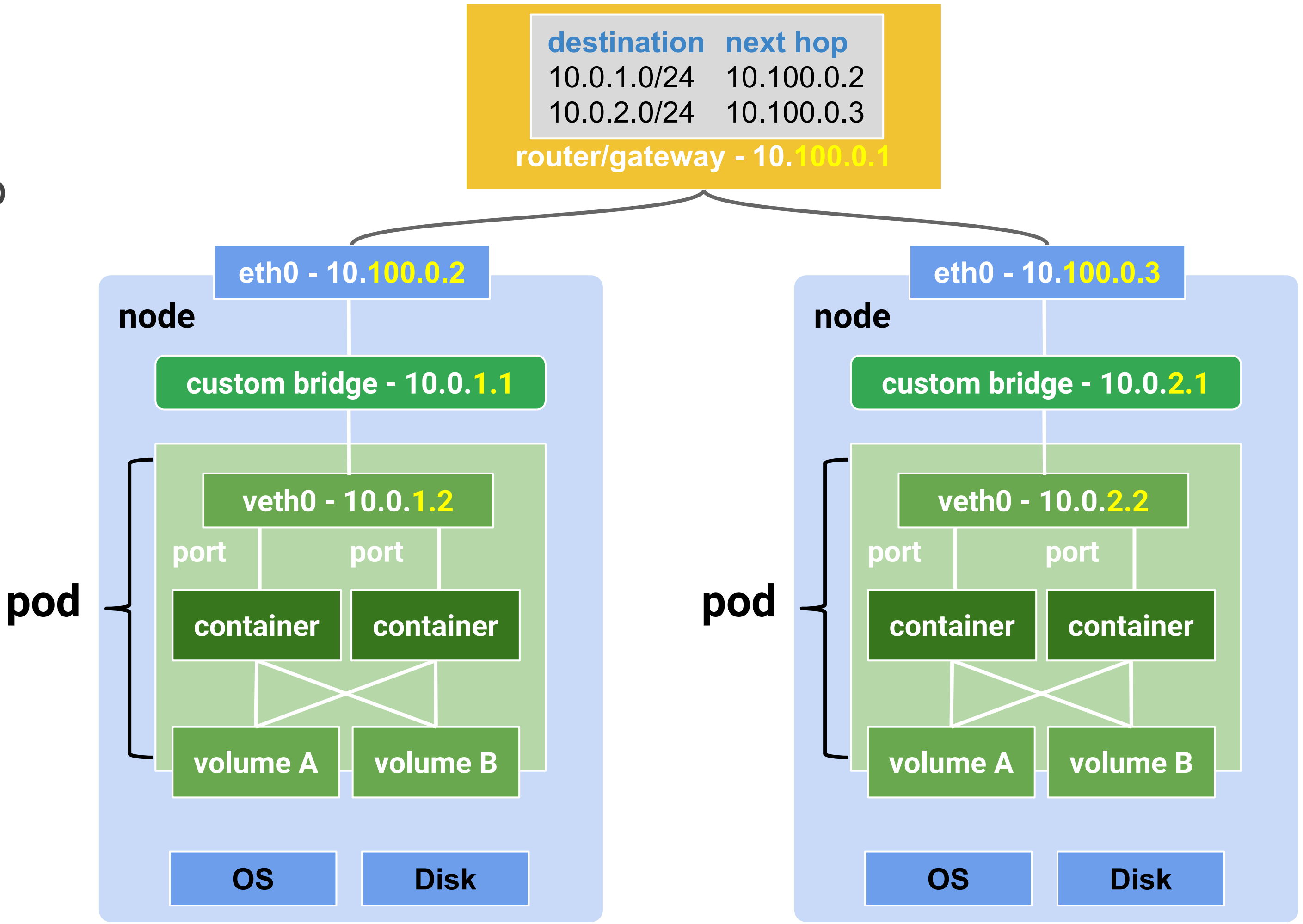
A pod is analogous to a VM with a group of containers sharing networking and storage that are separate from the node



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You define a pod with a YAML file

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: my-app
spec:
  containers:
  - name:  my-app
    image: my-app
  - name:  nginx-ssl
    image: nginx
    ports:
    - containerPort: 80
    - containerPort: 443
```

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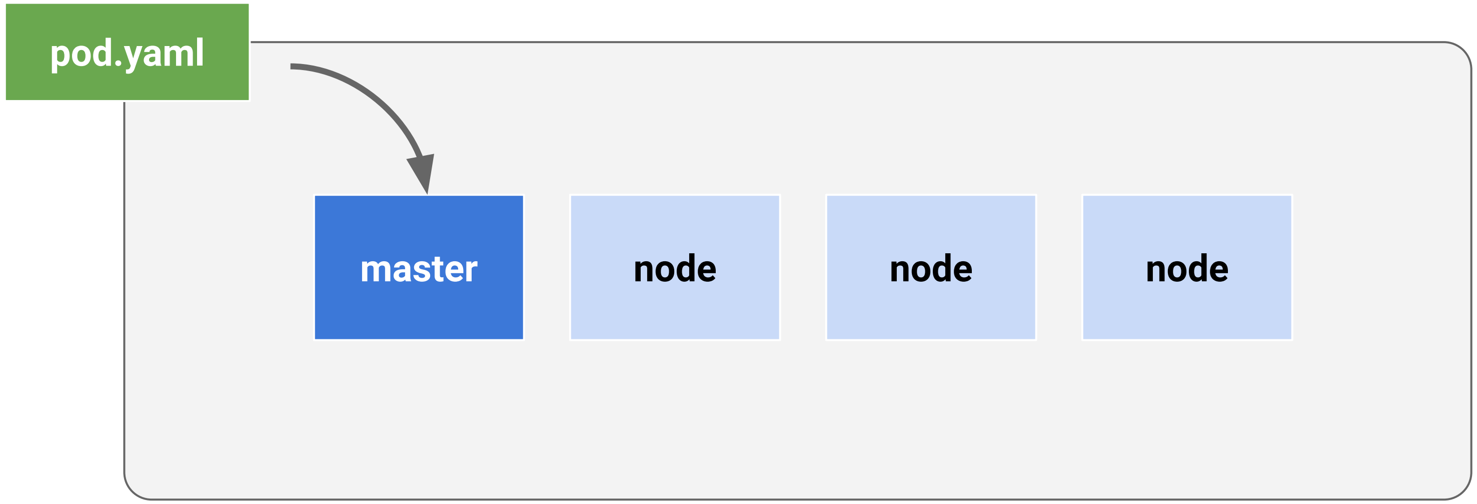
You upload the YAML file to the master



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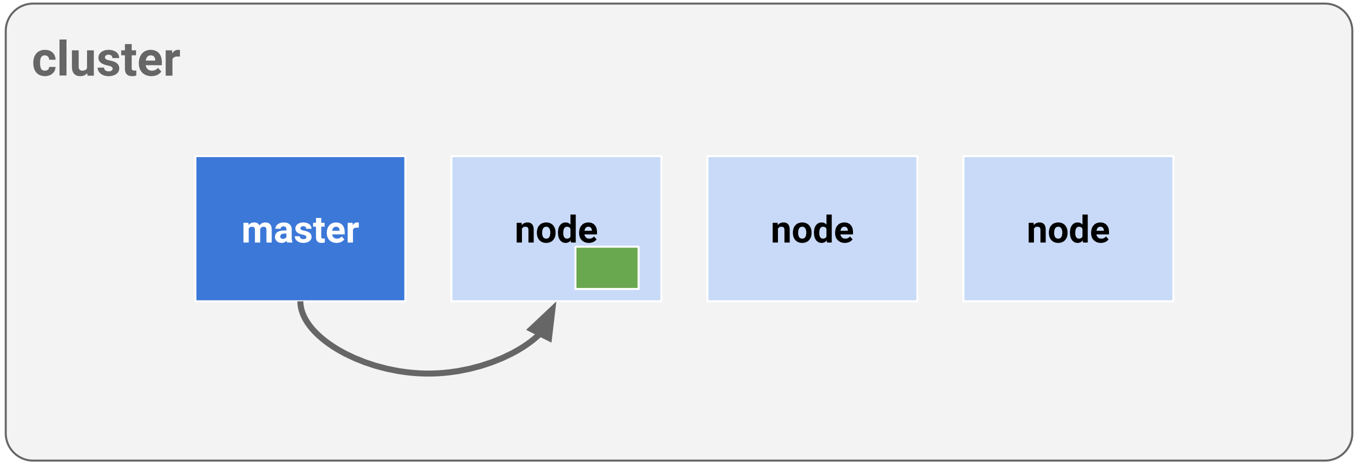
And the master creates a pod on your set of nodes



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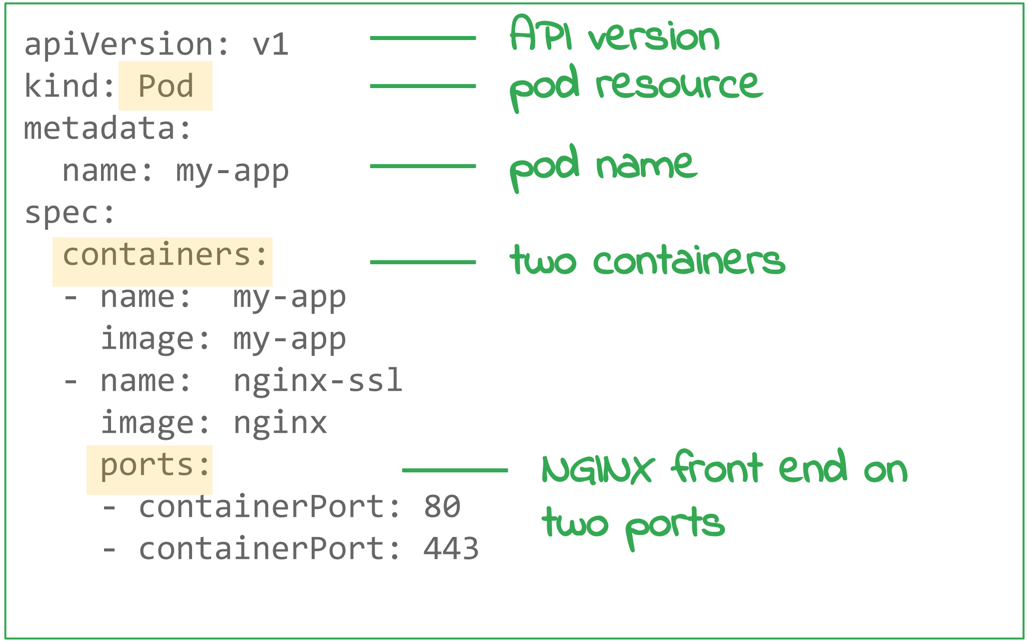
A pod file is composed of several parts; for example...



```
apiVersion: v1
kind: Pod
metadata:
  name: my-app
spec:
  containers:
  - name:  my-app
    image: my-app
  - name:  nginx-ssl
    image: nginx
    ports:
    - containerPort: 80
    - containerPort: 443
```

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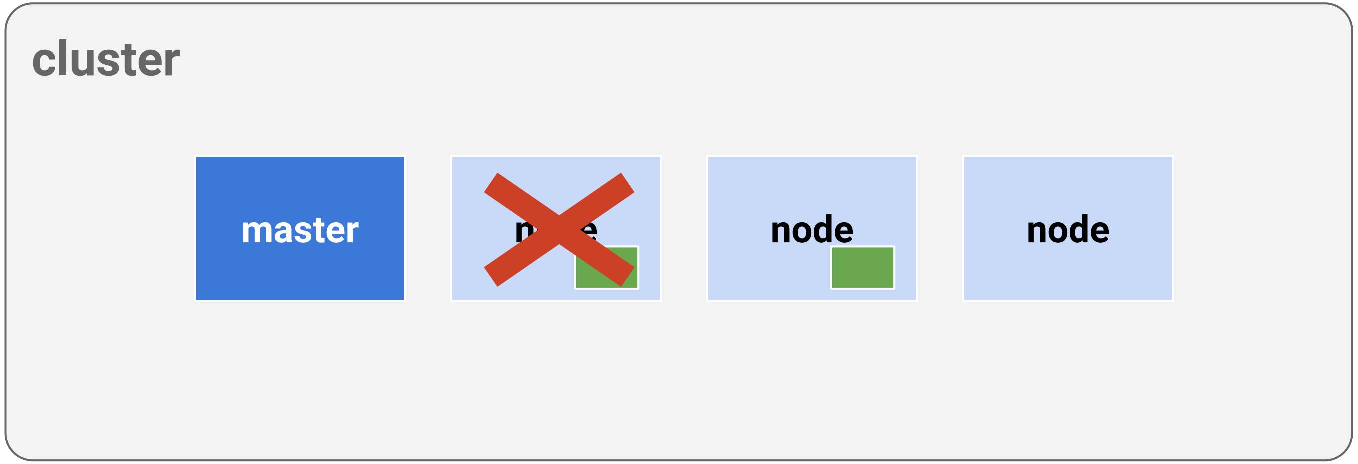
A deployment ensures that *N* pods are running in a cluster at any given time



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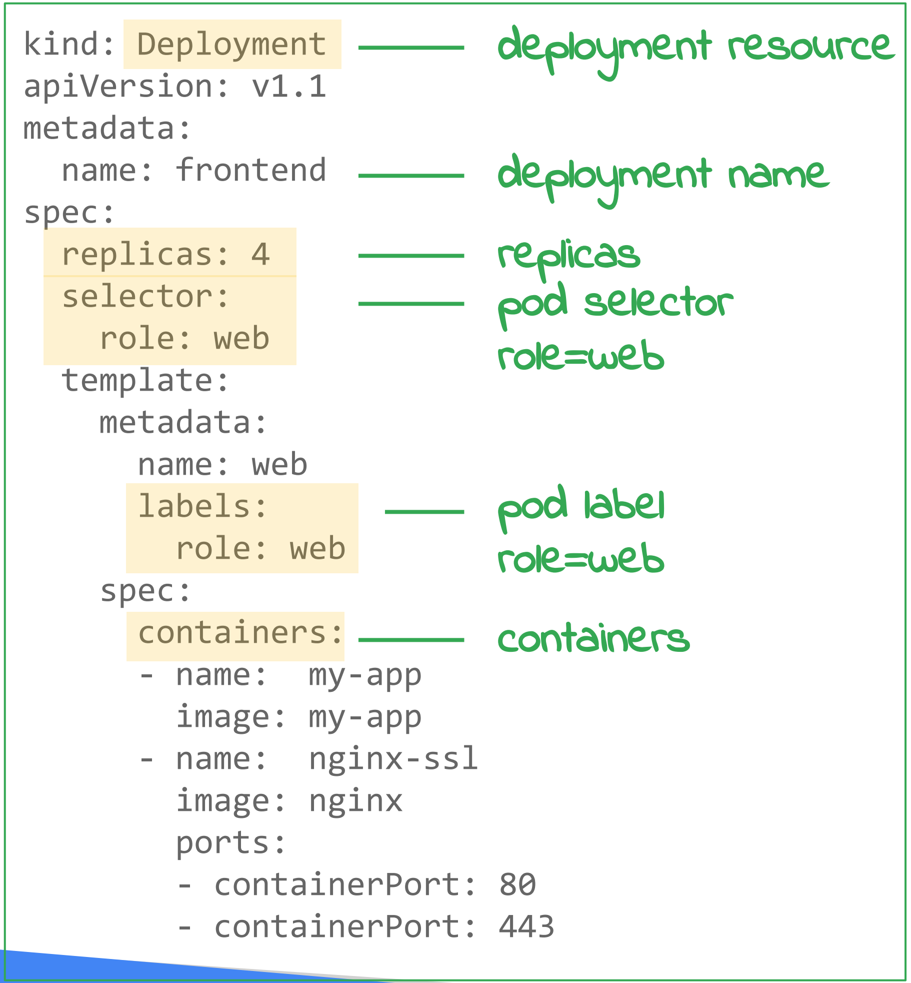
You define a deployment with a YAML file



```
kind: Deployment
apiVersion: v1.1
metadata:
  name: frontend
spec:
  replicas: 4
  selector:
    role: web
  template:
    metadata:
      name: web
      labels:
        role: web
    spec:
      containers:
      - name:  my-app
        image: my-app
      - name:  nginx-ssl
        image: nginx
        ports:
        - containerPort: 80
        - containerPort: 443
```

deployment resource
deployment name
replicas
pod selector
role=web
pod label
role=web
containers

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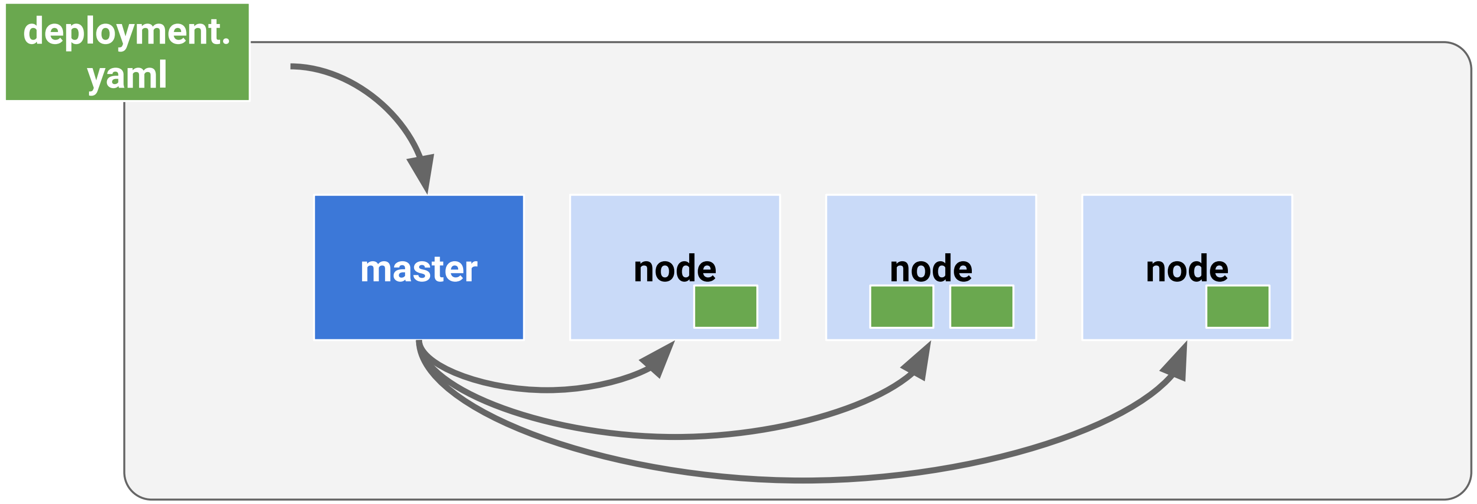
You upload the YAML file to the master, and the scheduler decides where to run the pods



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Clusters, nodes, and pods

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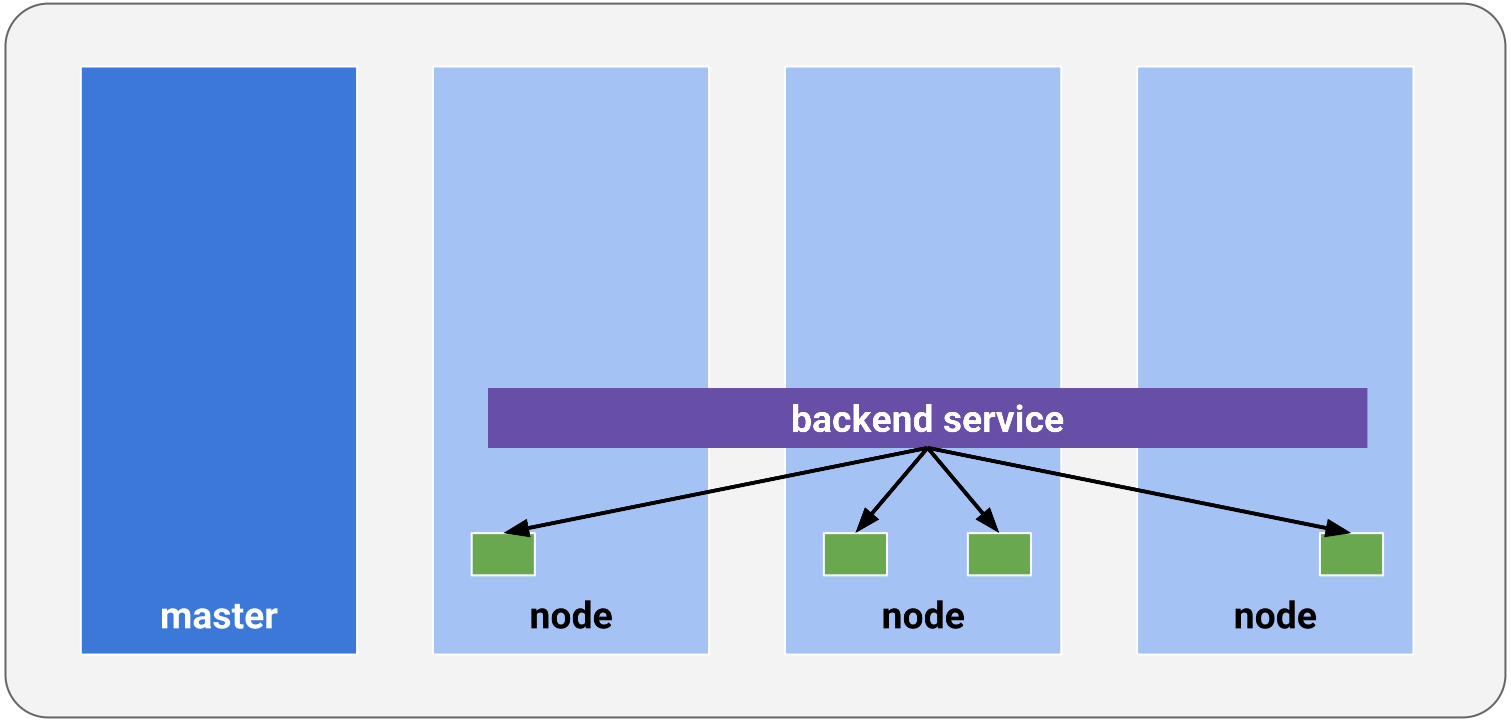
A service assigns a fixed IP to your pod replicas and allows other pods or services to communicate with them



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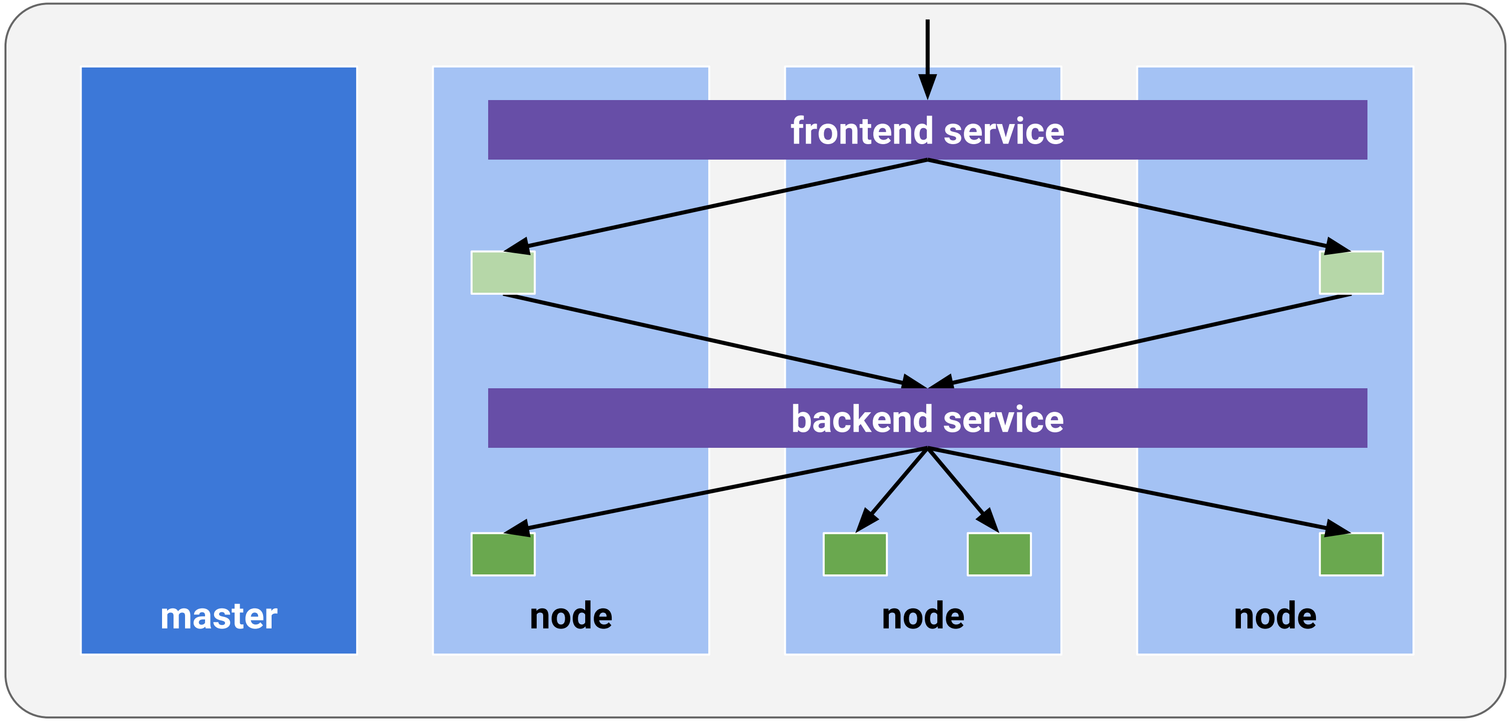
You can have multiple services with different configurations and features



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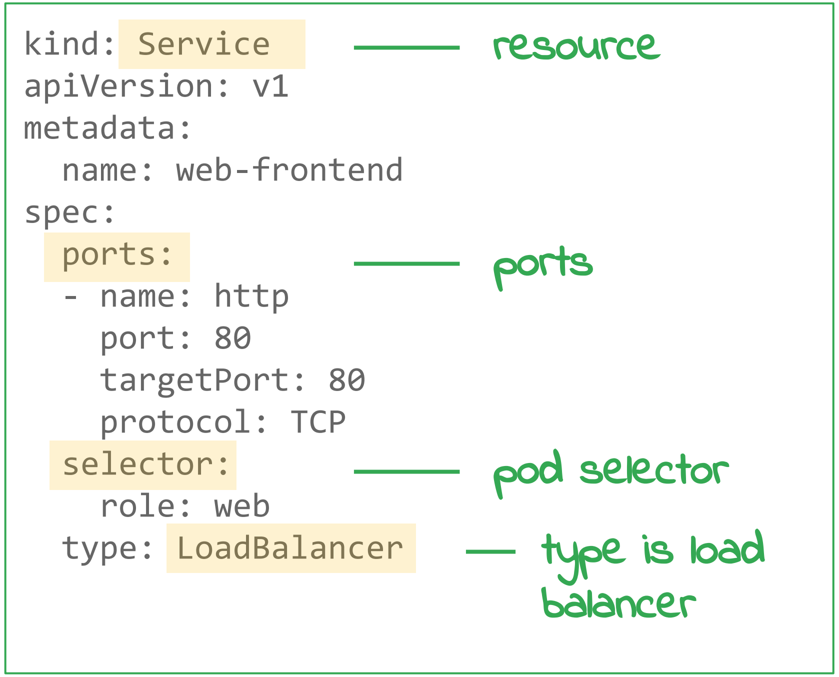
You define a service with a YAML file



```yaml
kind: Service
apiVersion: v1
metadata:
  name: web-frontend
spec:
  ports:
  - name: http
    port: 80
    targetPort: 80
    protocol: TCP
  selector:
    role: web
  type: LoadBalancer
```

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Labels are metadata you can assign to any API object and represent identity

They are

- The only grouping mechanism for pods
- Search by selectors

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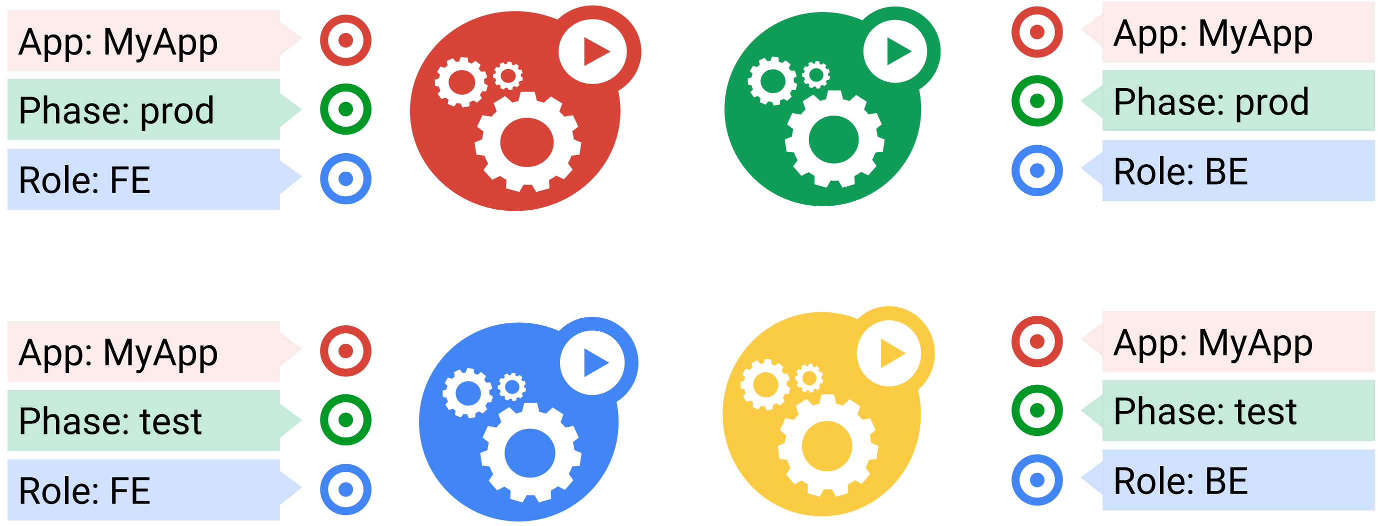
This example has four pods and three labels



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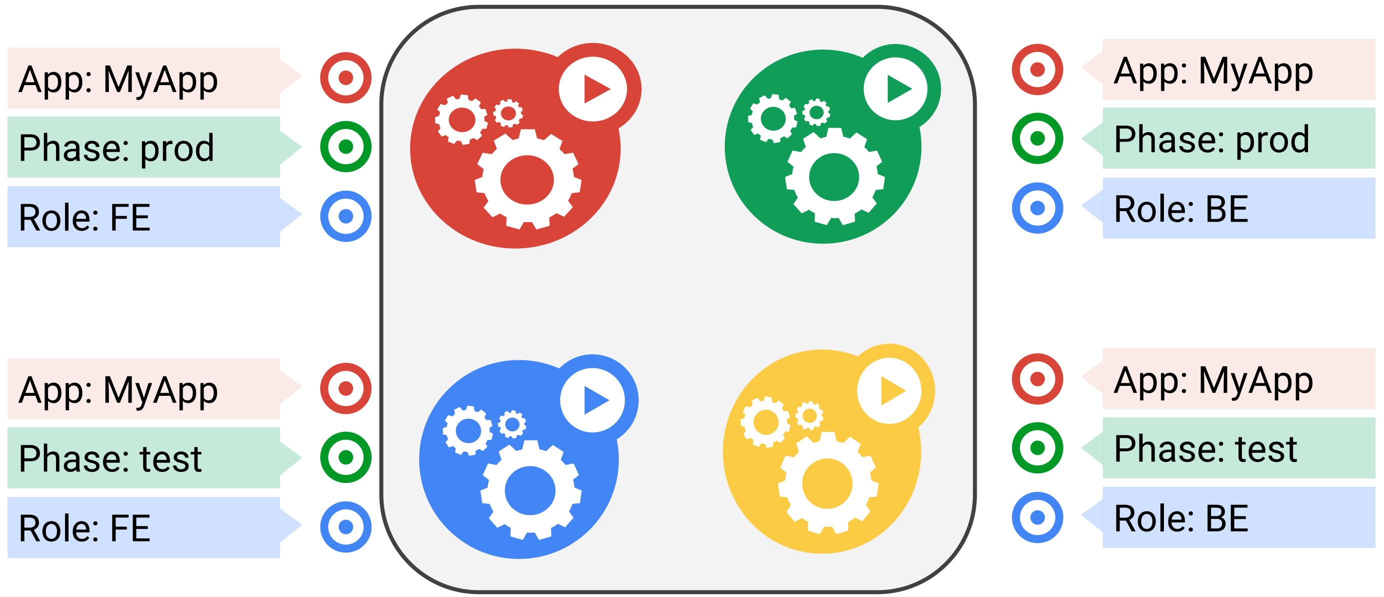
You can query for labels that map to a value like the entire app



App = MyApp

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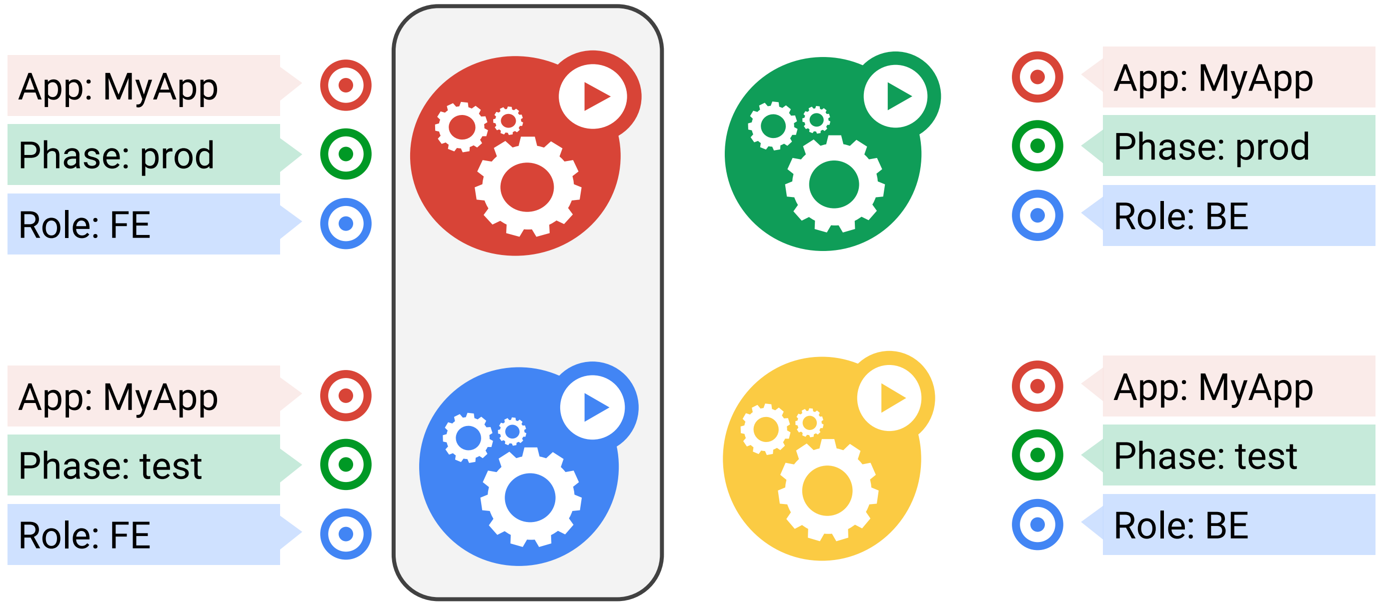
Or narrow your search with multiple labels like your app's frontend



App = MyApp, Role = FE

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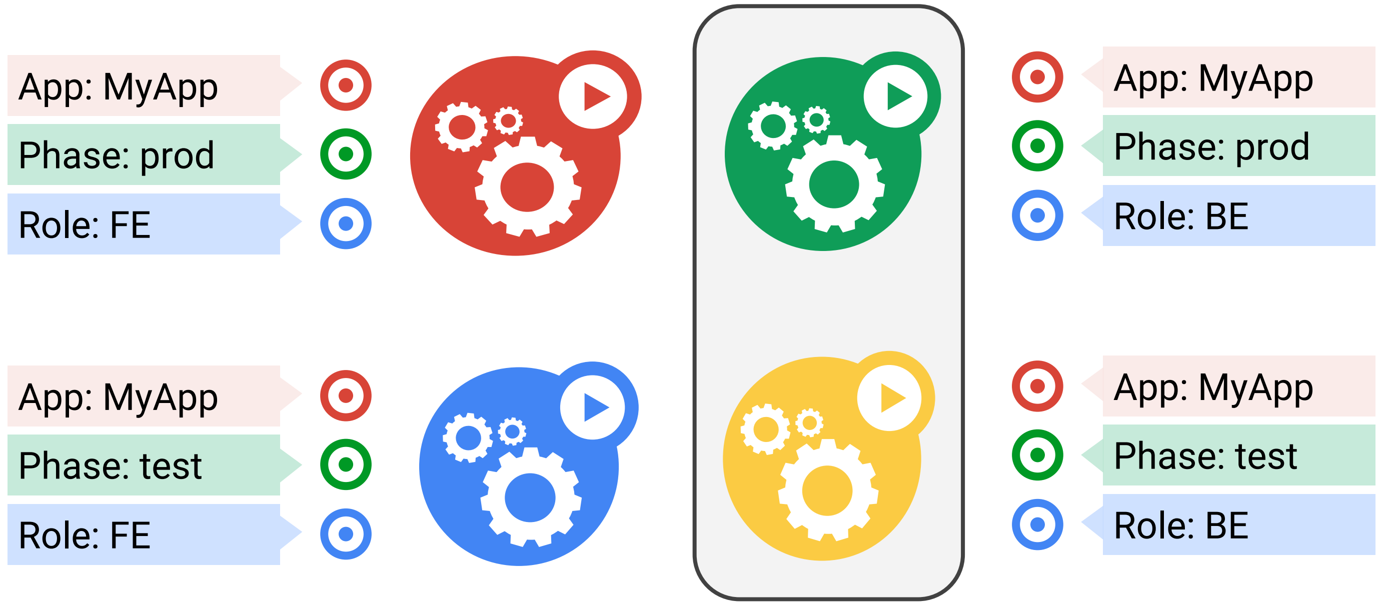
Or your app's backend



App = MyApp, Role = BE

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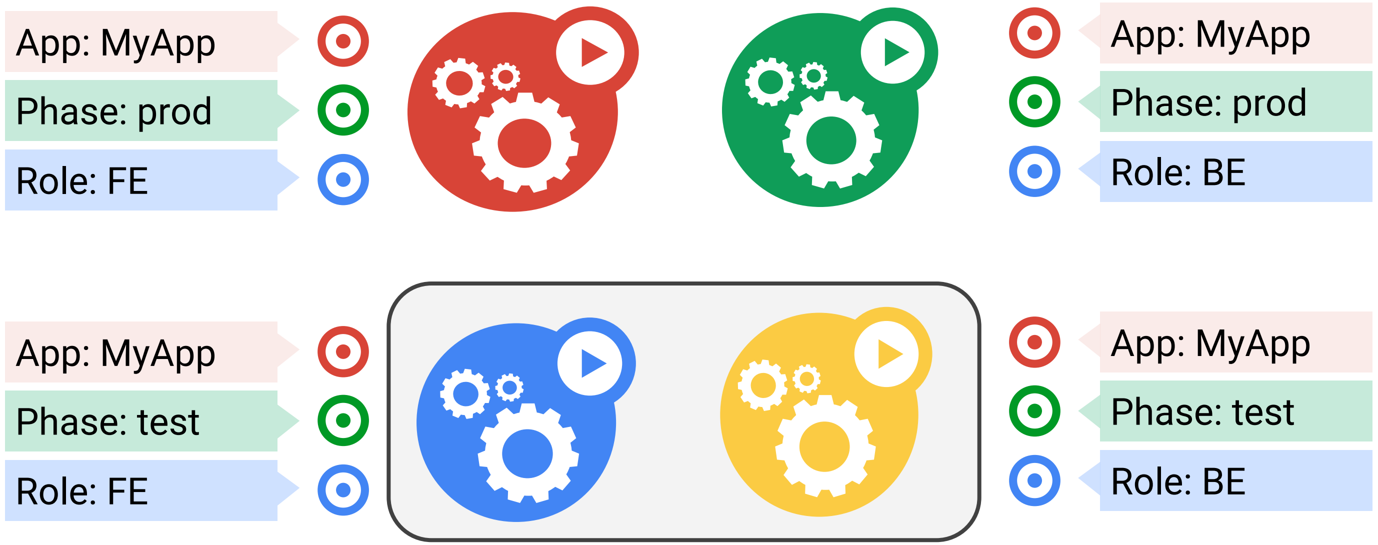
Or your app's test phase



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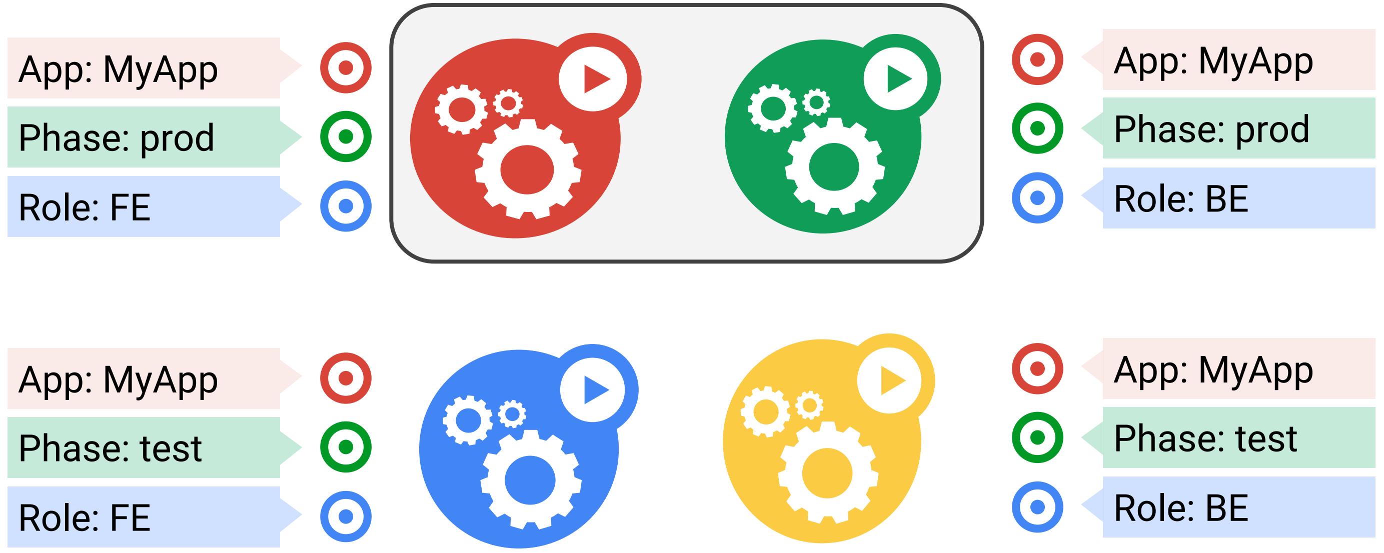
Or your app's production release



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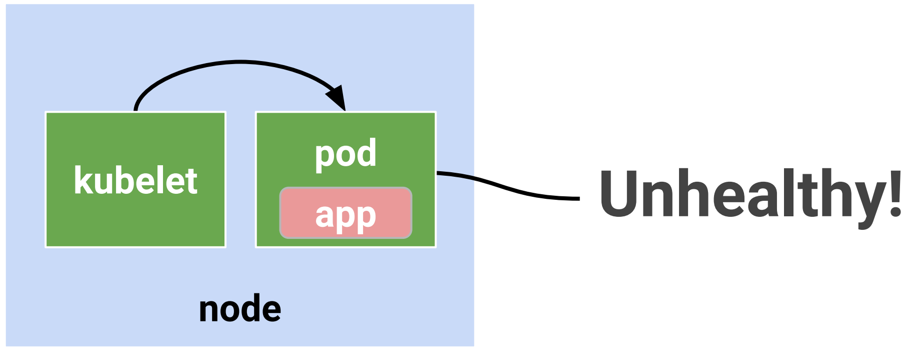
Kubelet checks whether the pod is alive and healthy; if it gets a negative response or no reply...



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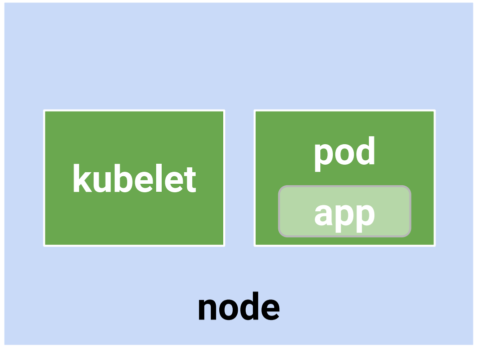
Kubelet restarts the pod



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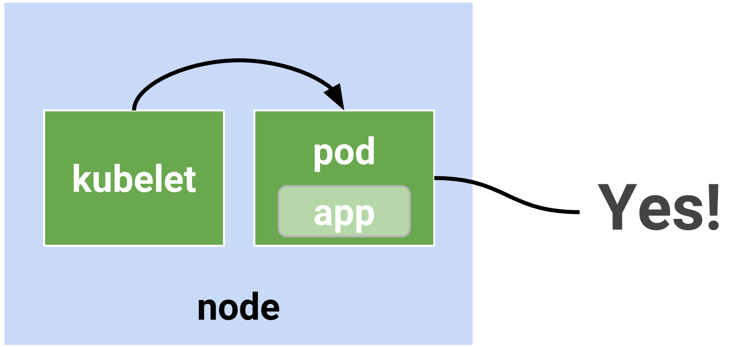
And continues until it gets a healthy reply



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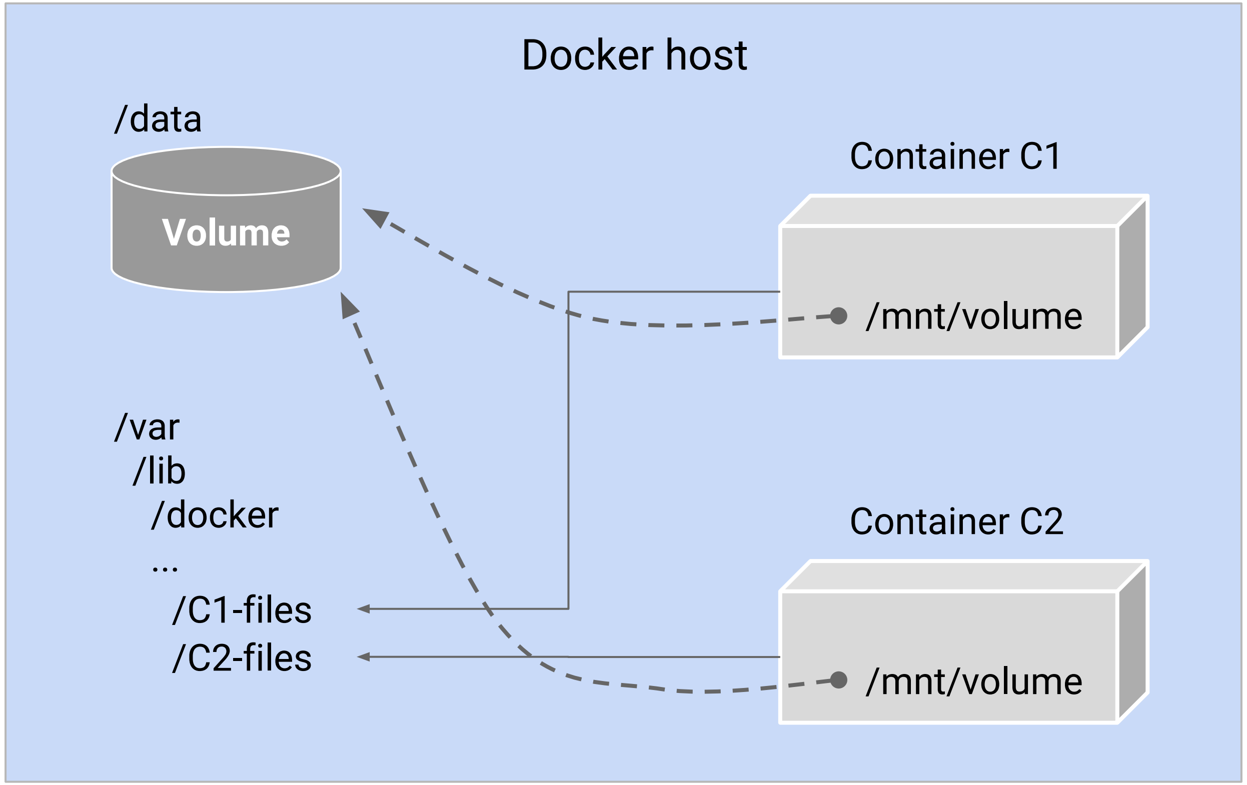
Docker provides data storage for containers, but volumes do not provide sharing between containers or lifecycle management



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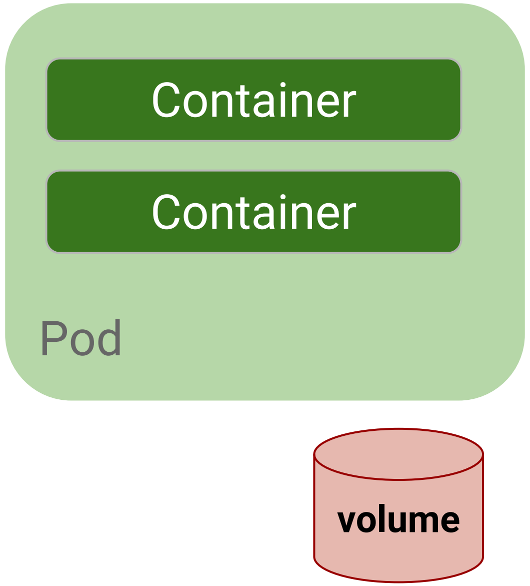
Kubernetes volumes allow containers in pods to share data and be stateful



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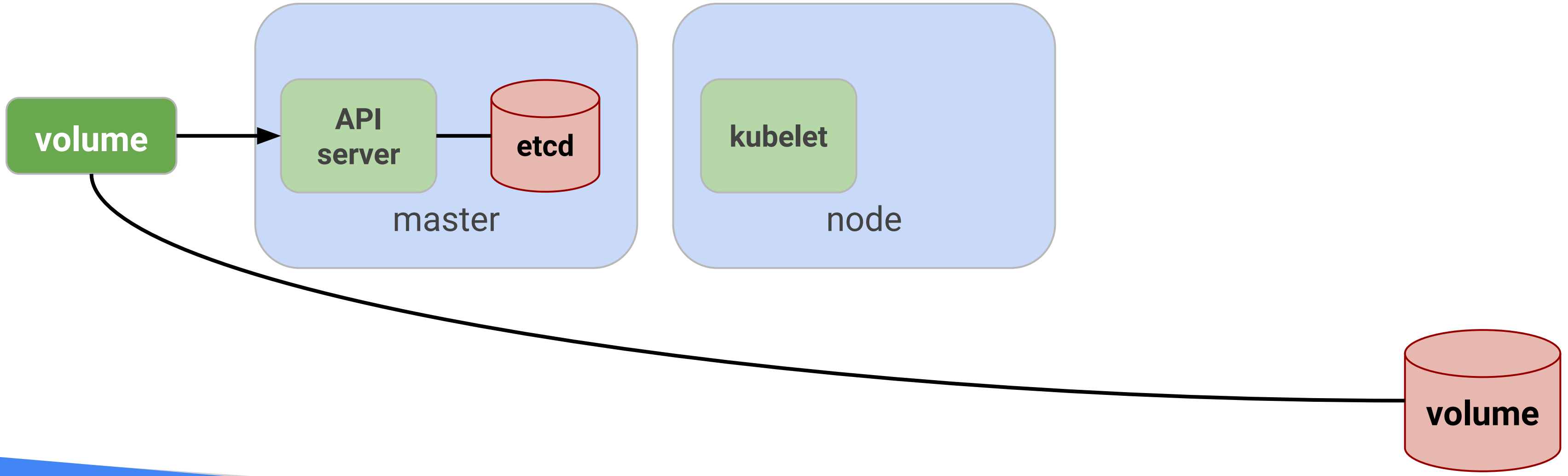
A volume is just a directory, and how it gets created depends on its type

```
$> kubectl create <volume>
```



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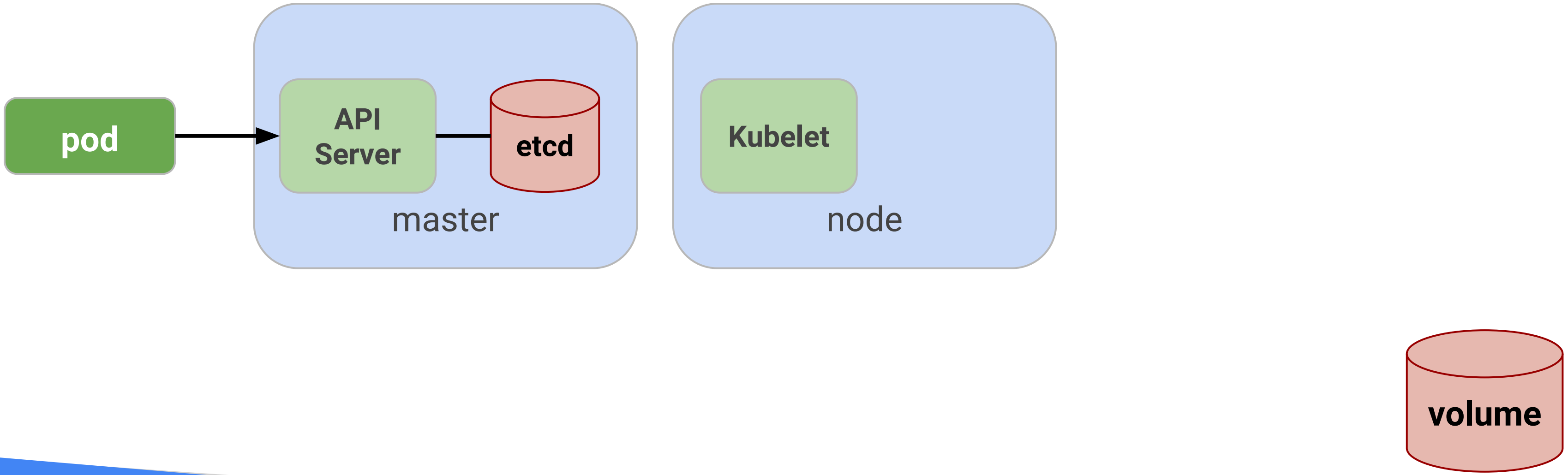
Then you create a pod that consumes that data

```
$> kubectl create -f pod.yaml
```



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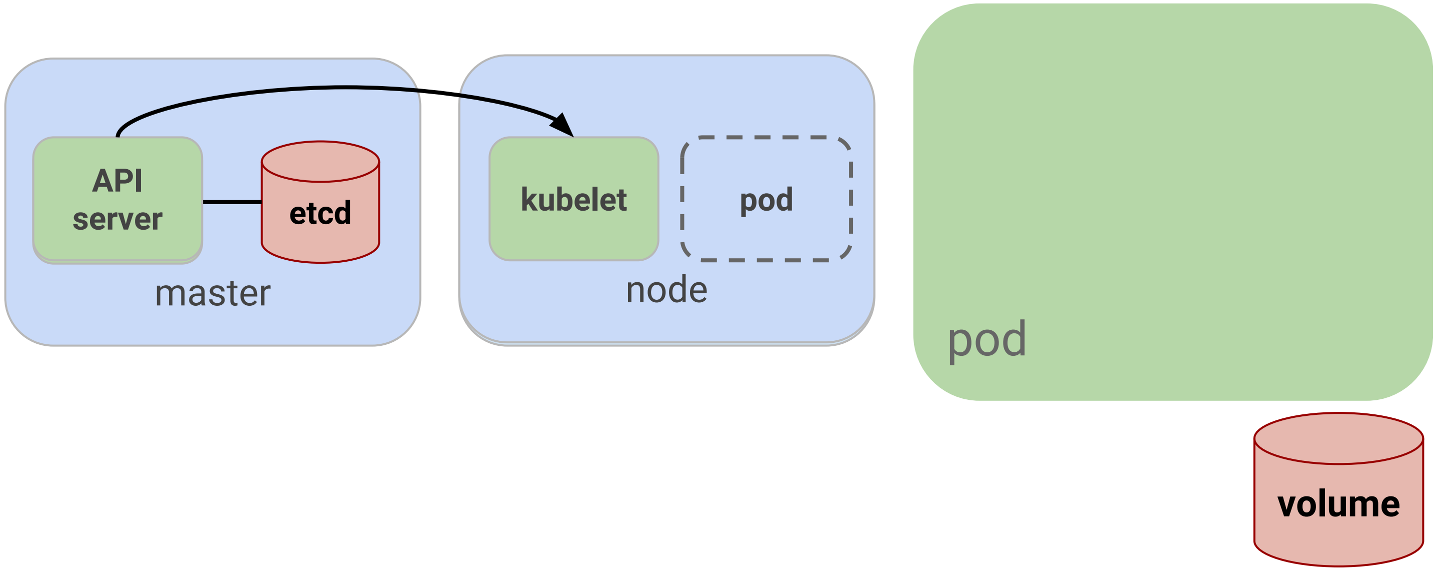
The volume is attached to the pod and made available to containers before they are brought online



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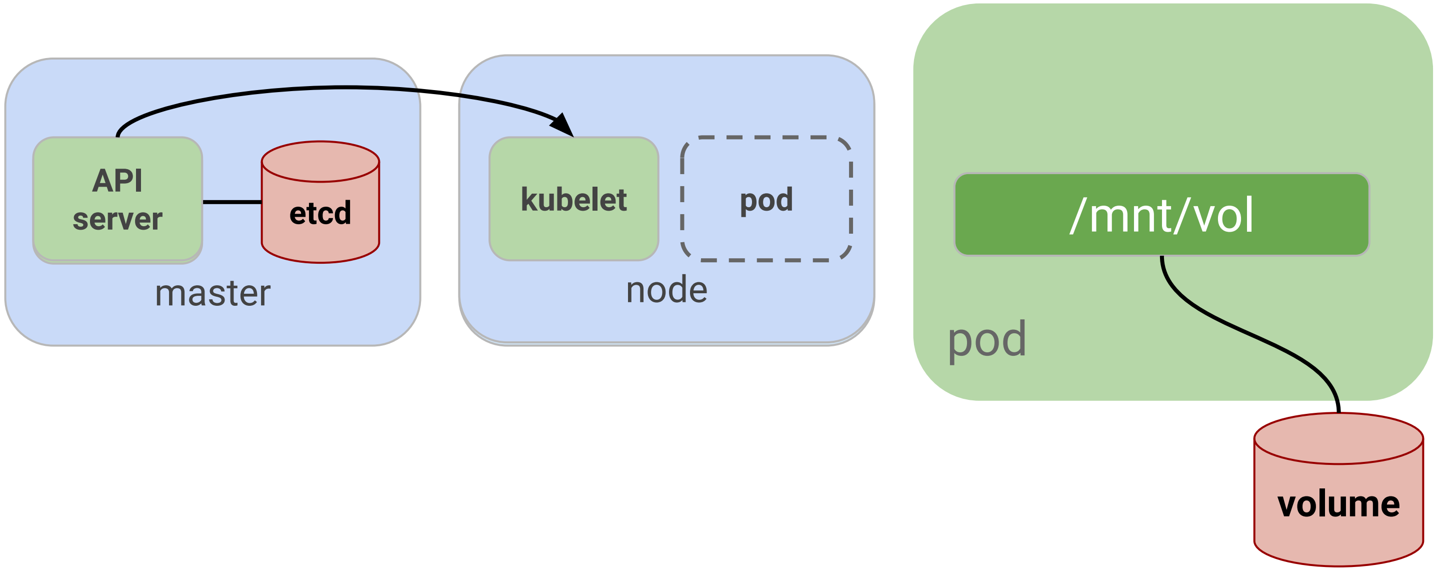
Once the volume is attached, data can be mounted into a container's file system



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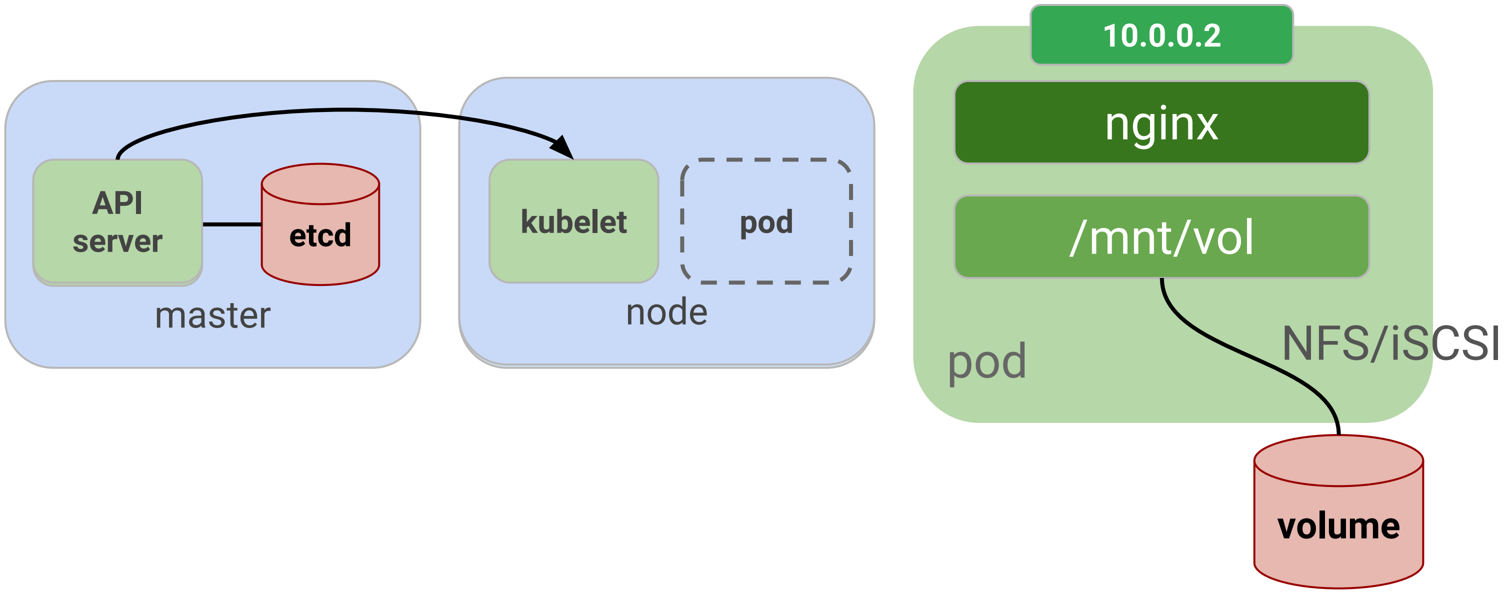
Then the container is run and can get the mounted data



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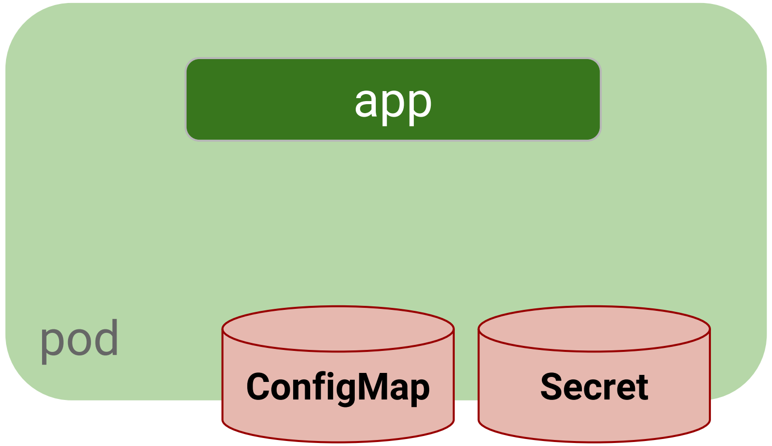
Some volumes share the lifecycle of their pod



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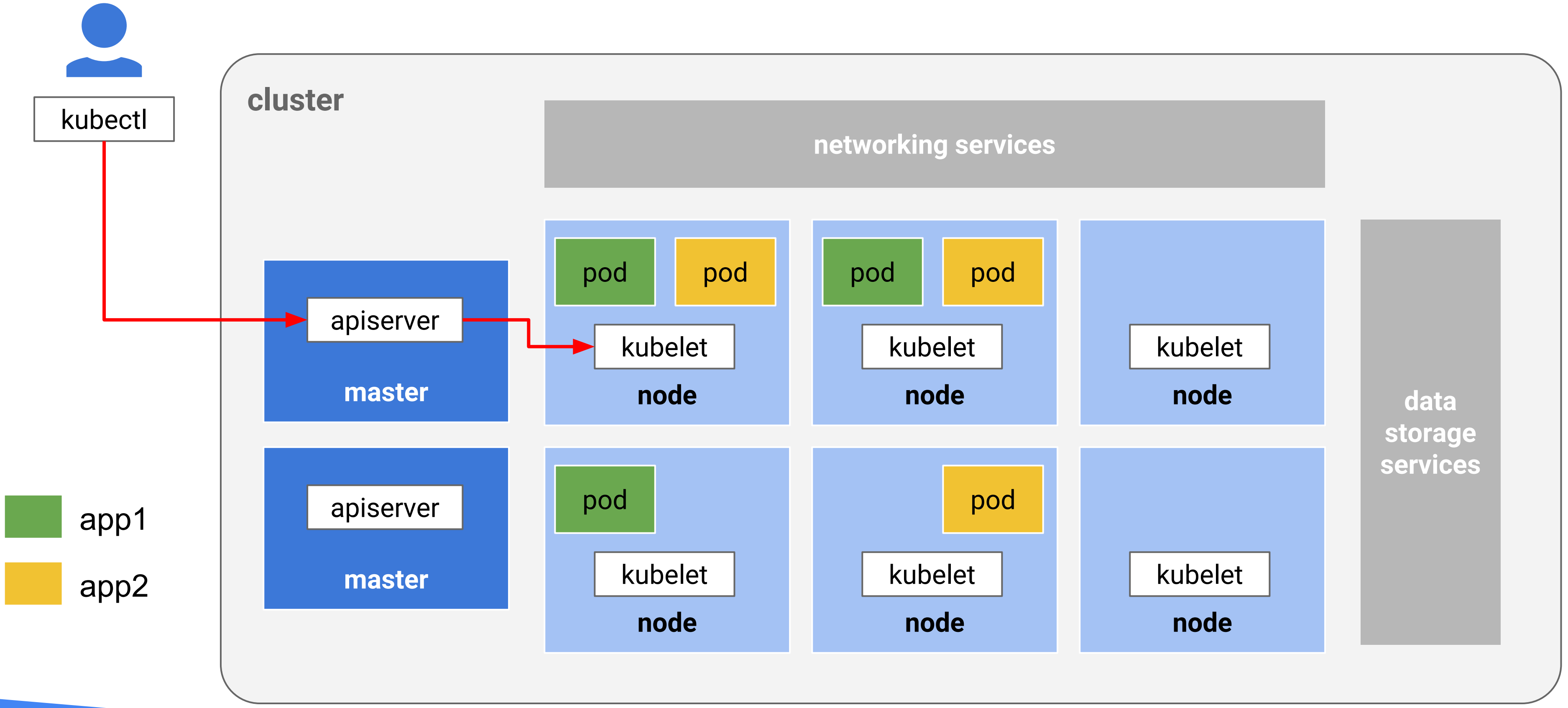
Here's a complete overview of a cluster



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