

Docker at scale with Kubernetes

Everything at Google
runs in containers

Launch over **2 billion**
containers **per week.**



Shipping Containers At Clyde, by Steve Gibson

Enter Kubernetes

Greek for “*Helmsman*”; also the root of the word “*Governor*”

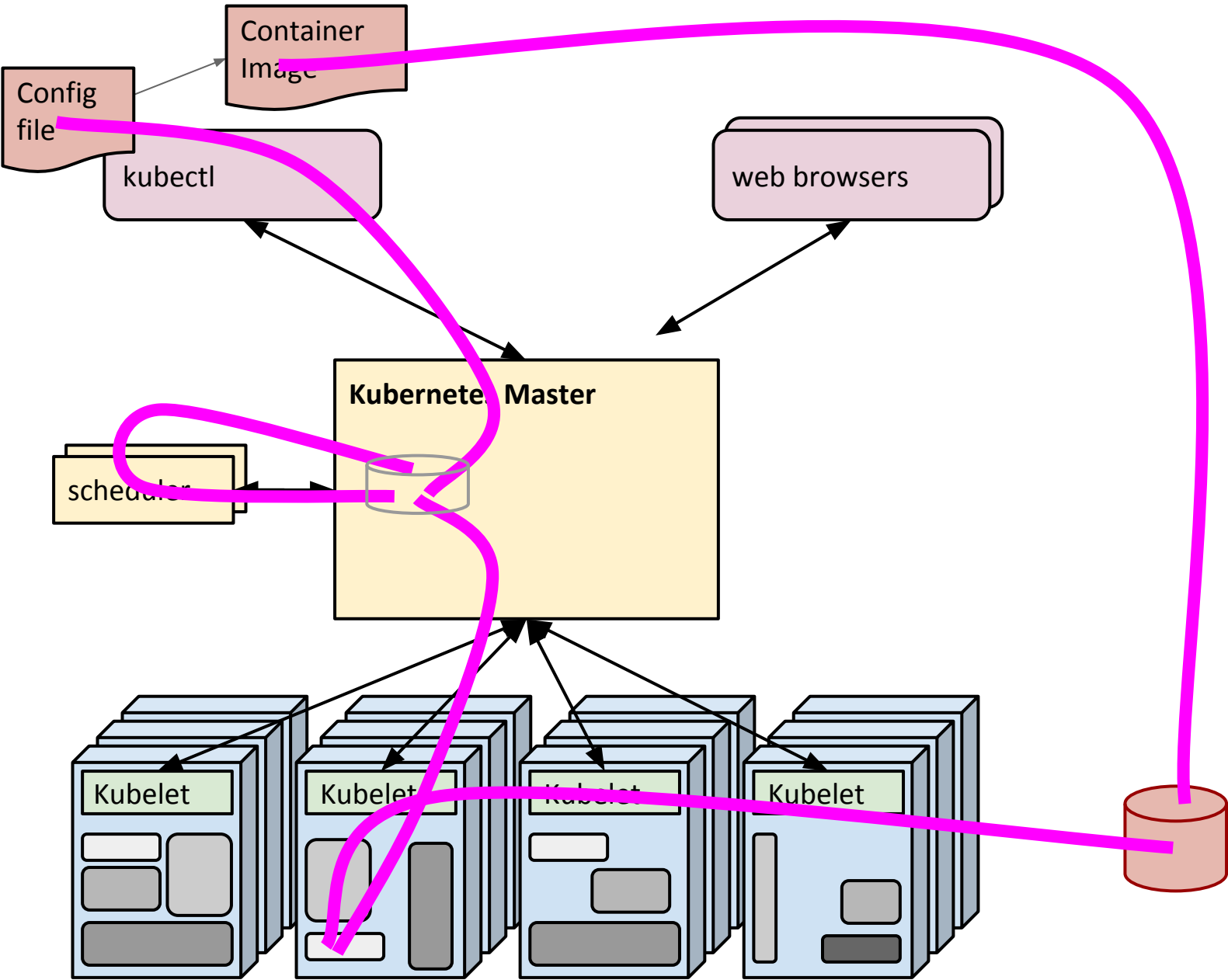
- Container **orchestrator**
- Runs containers
- Supports **multiple cloud** and **bare-metal** environments
- Inspired and informed by Google’s experiences and internal systems
- **Open source**, written in **Go**

Manage applications, not machines

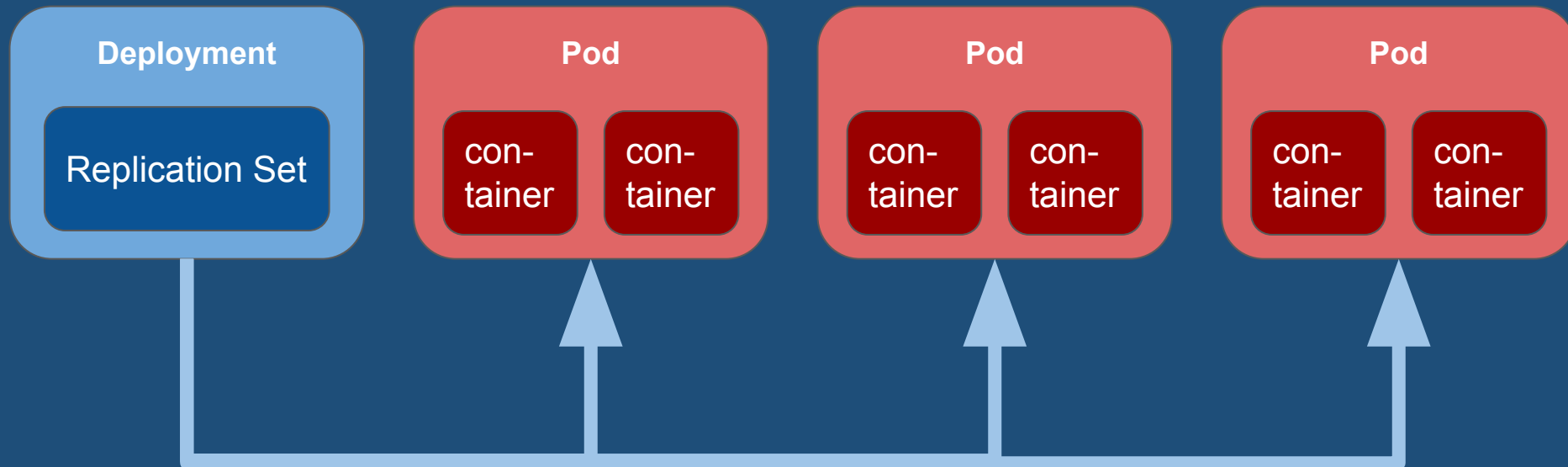


Developer View

What just happened?



Pods, Deployments, Replication sets & scaling



Deployments

- Create a Deployment to bring up a Replica Set and Pods.
- Check the status of a Deployment to see if it succeeds or not.
- Later, update that Deployment to recreate the Pods
 - Rolling update to a new image version
 - Rolling update strategy definition
- Rollback to an earlier Deployment revision if the current Deployment isn't stable.
- Pause and resume a Deployment.

Namespaces

A Namespace is a mechanism to partition resources created by users into a logically named group.

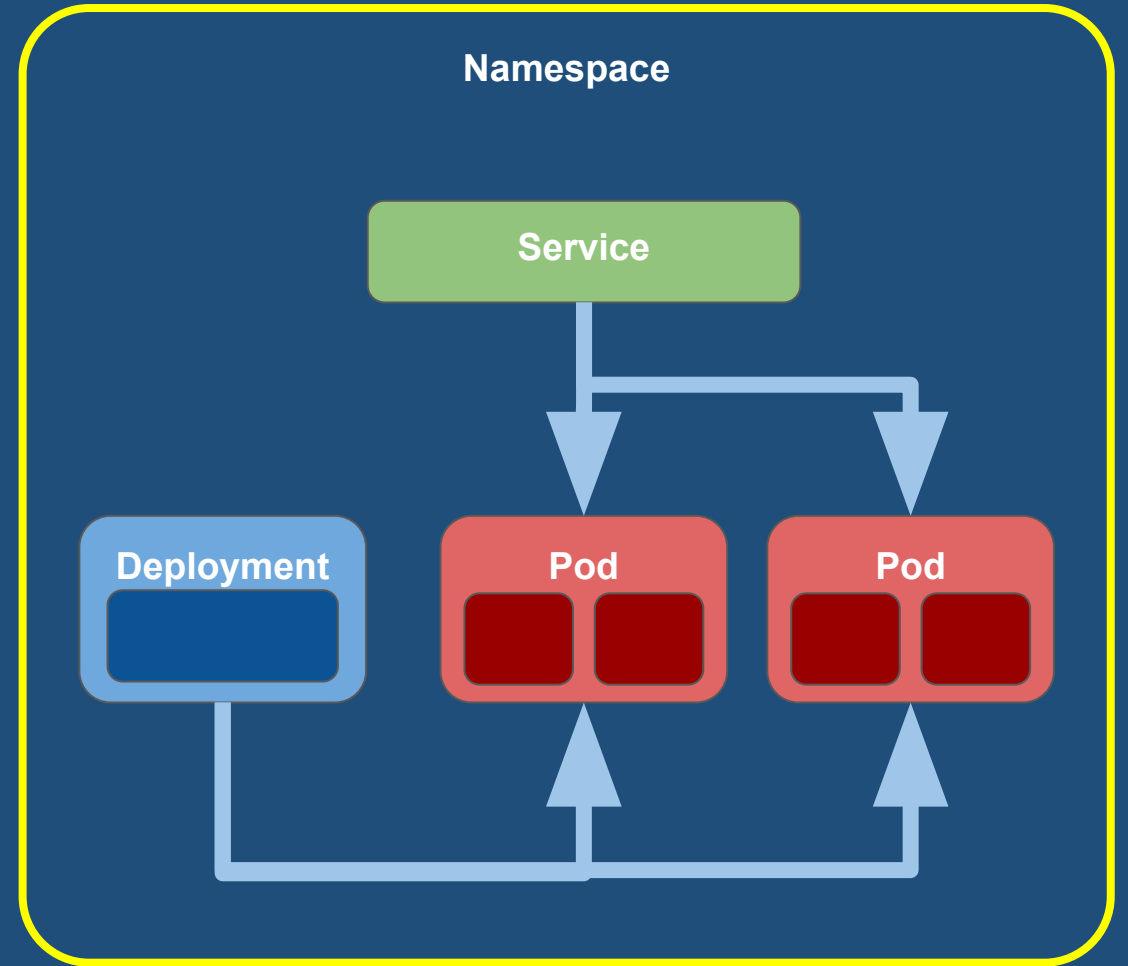
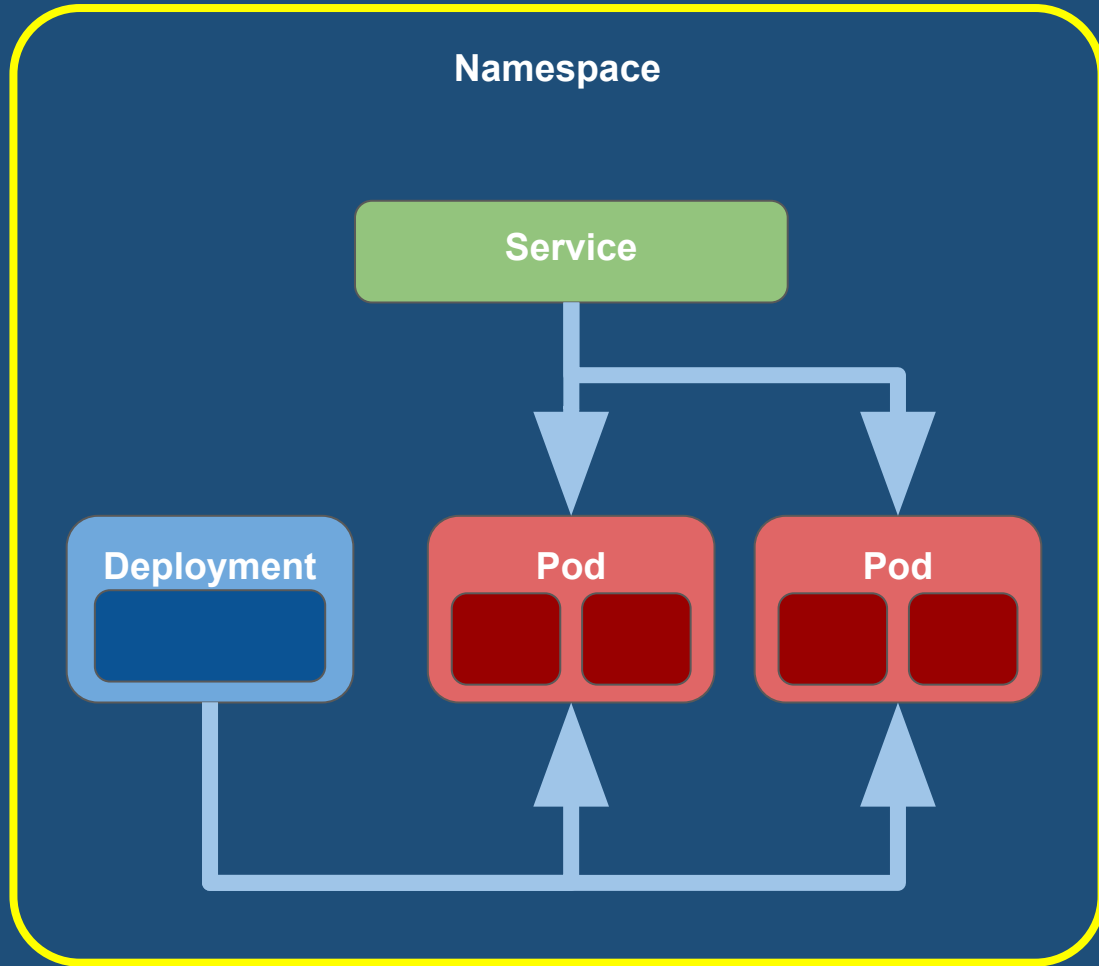
- A single cluster should be able to satisfy the needs of multiple user groups
- Each user group wants to be able to work in isolation
 - Own resources (pods, services, replication controllers, etc.)
 - Own policies (who can or cannot perform actions in their group)
 - Own constraints (this user group is allowed this much quota, etc.)

Namespaces

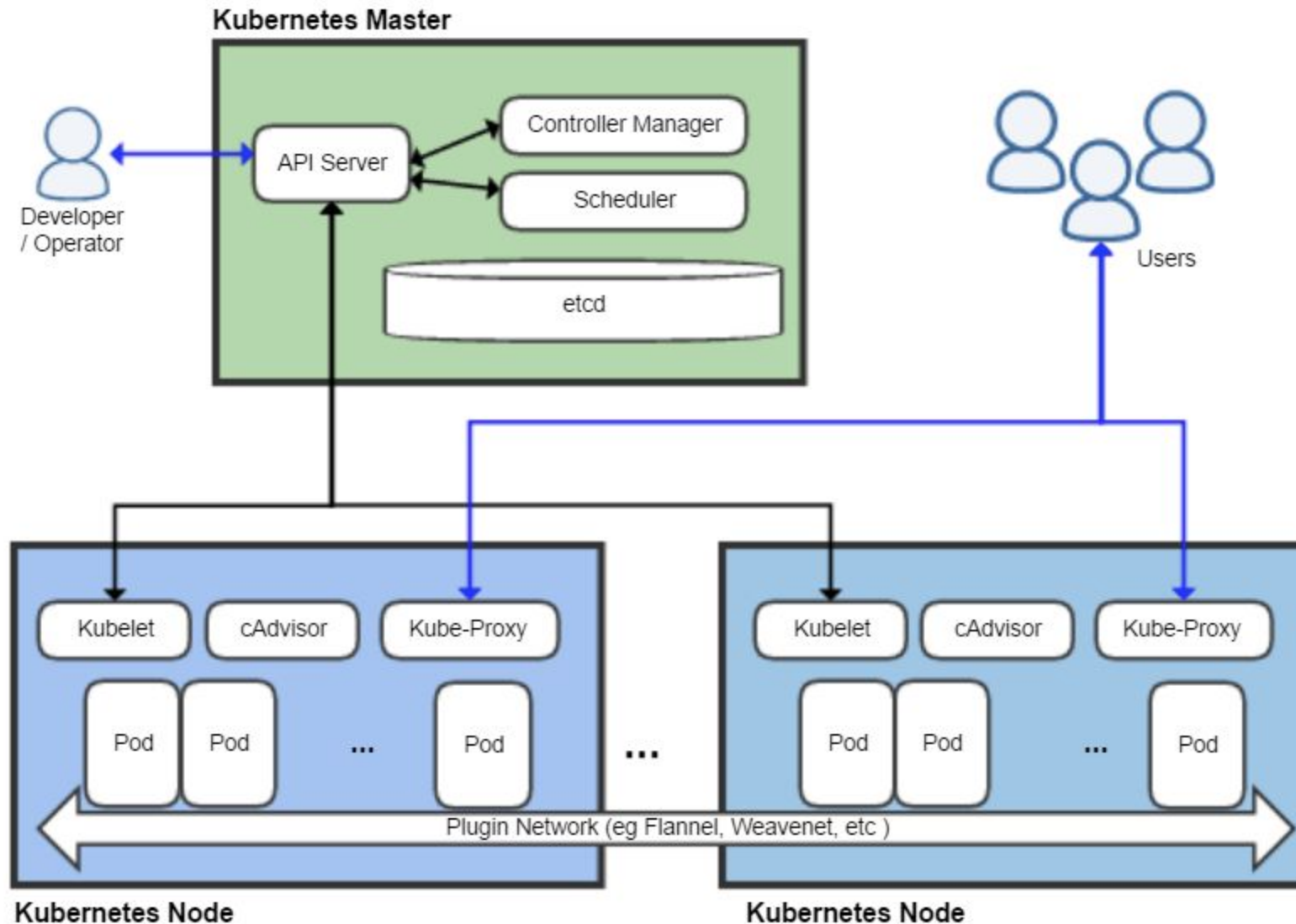
A Namespace is a mechanism to partition resources created by users into a logically named group.

- The Namespace provides a unique scope for:
 - named resources (to avoid basic naming collisions)
 - delegated management authority to trusted users
 - ability to limit community resource consumption

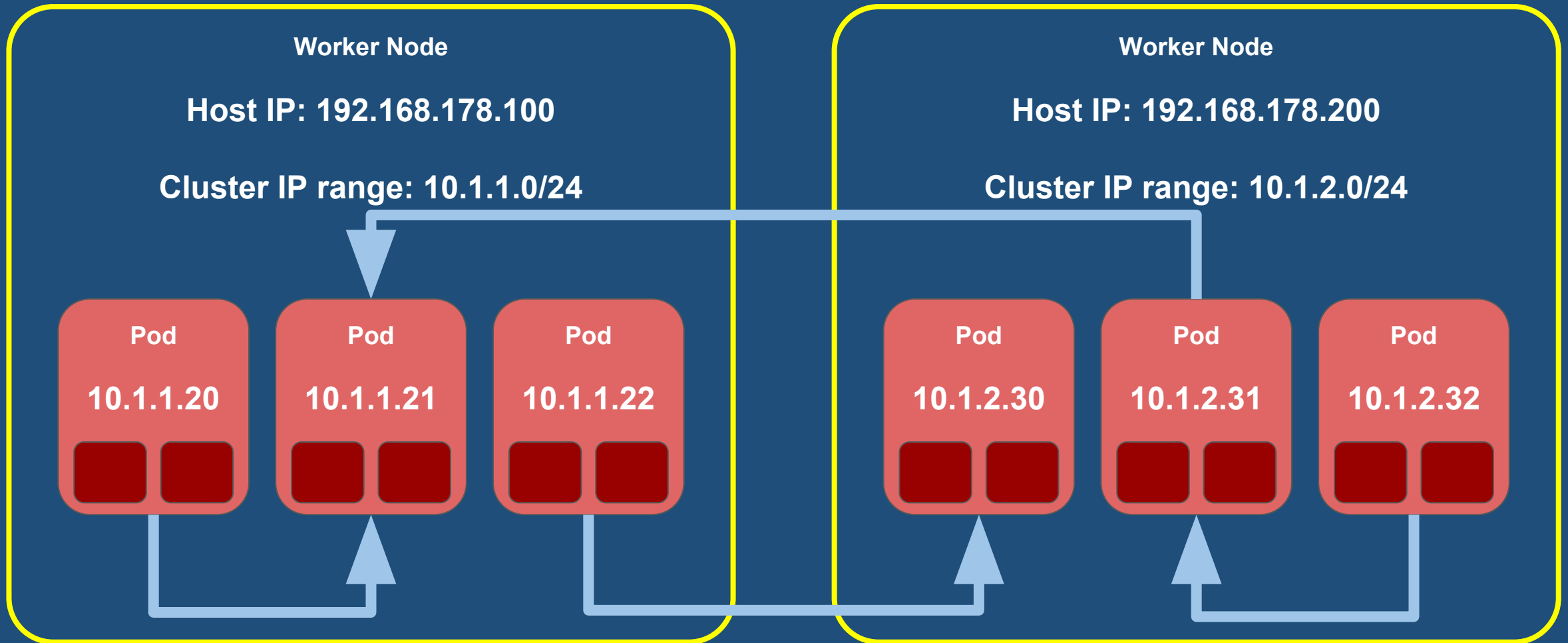
Namespaces



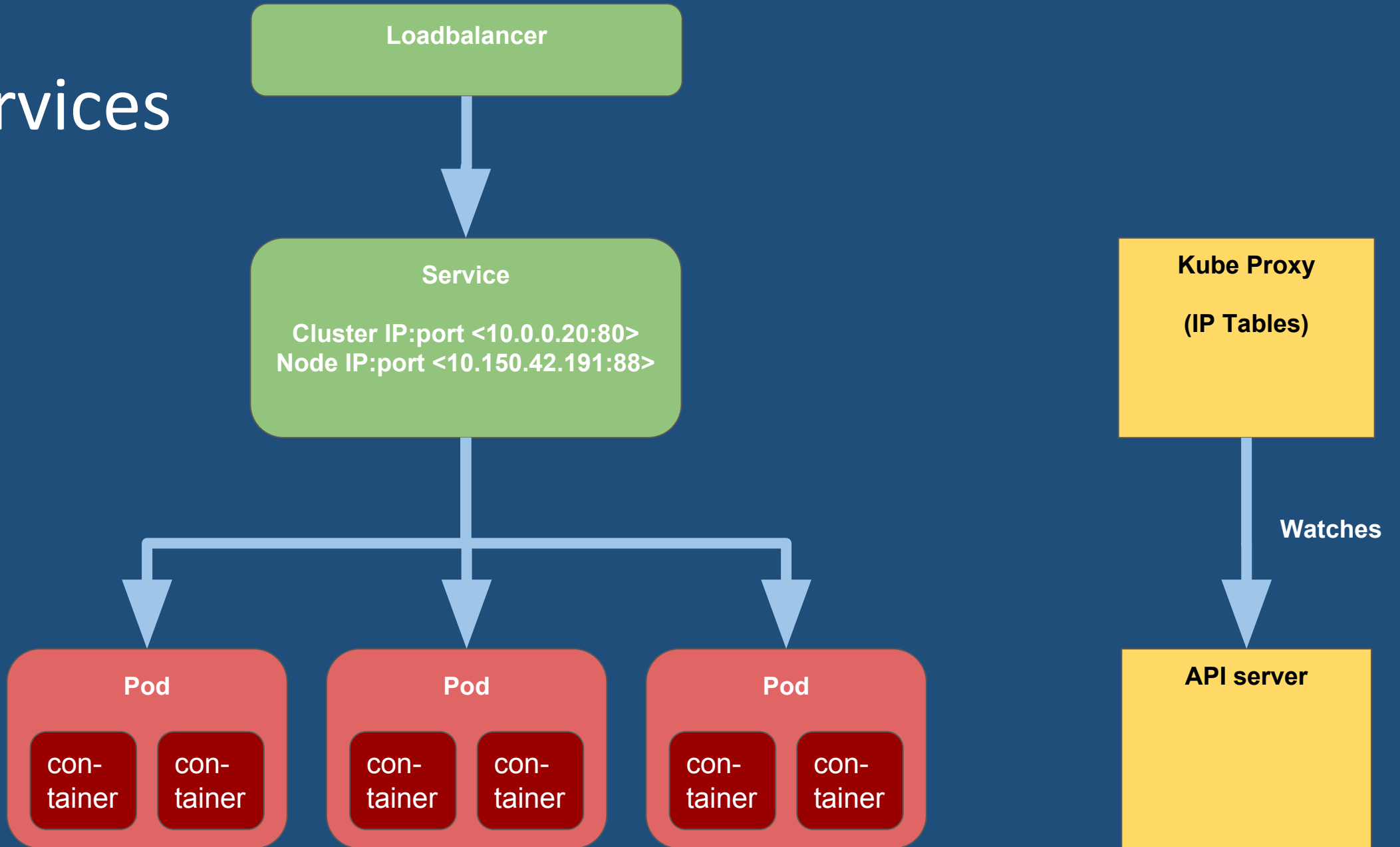
Kubernetes - Architecture



Cluster networking



Services



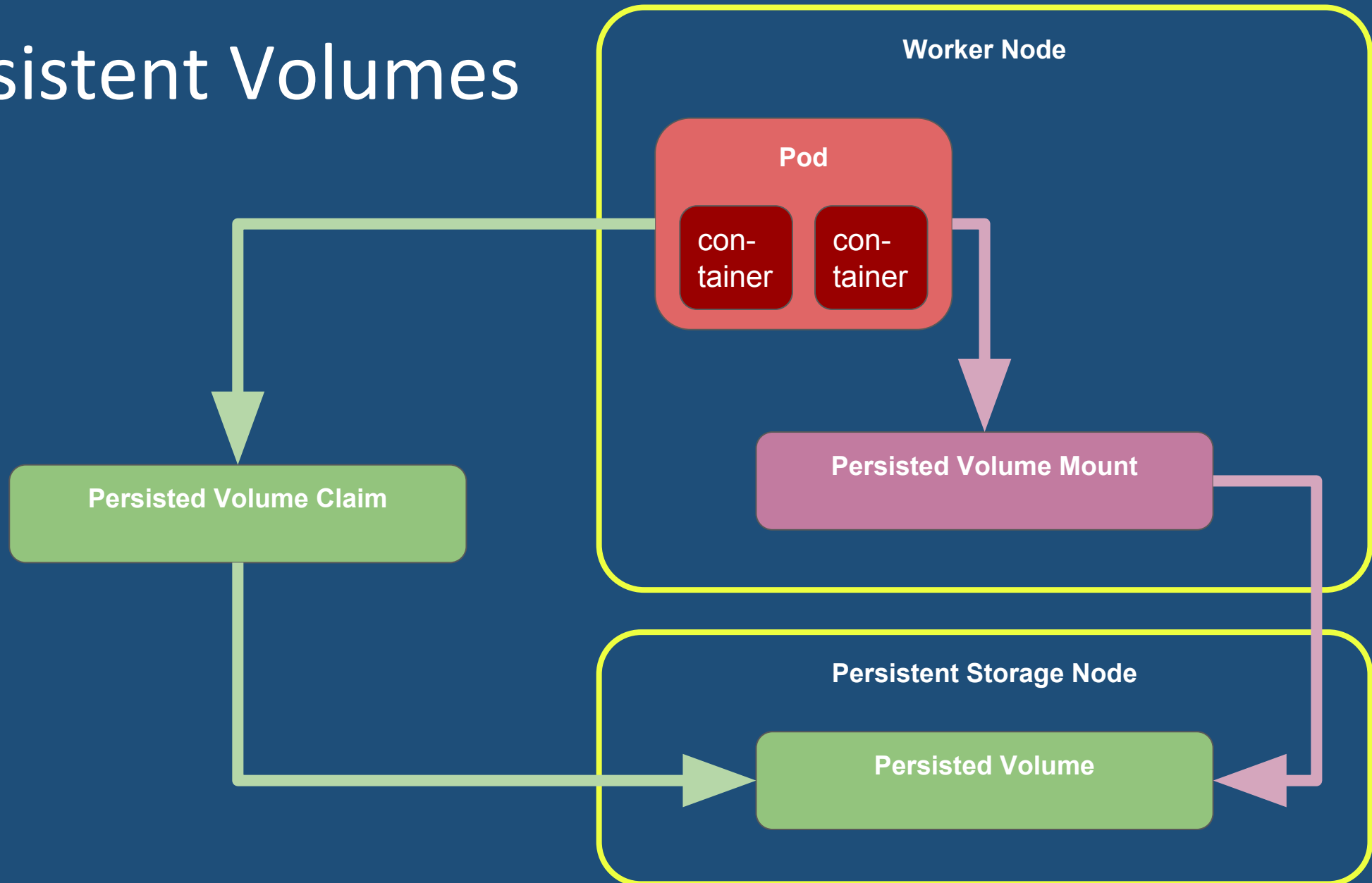
Service discovery

- Kubernetes utilises DNS for service discovery
 - DNS is a built-in service (DNS Pod and Service)
- Every Service defined in the cluster is assigned a DNS name
- Services are assigned a DNS A record for a name of the form:
 - `<my-svc>.<my-namespace>.svc.<cluster-domain>`
 - `mysql.default.svc.cluster.local`
 - `mysql.default`
 - `mysql`

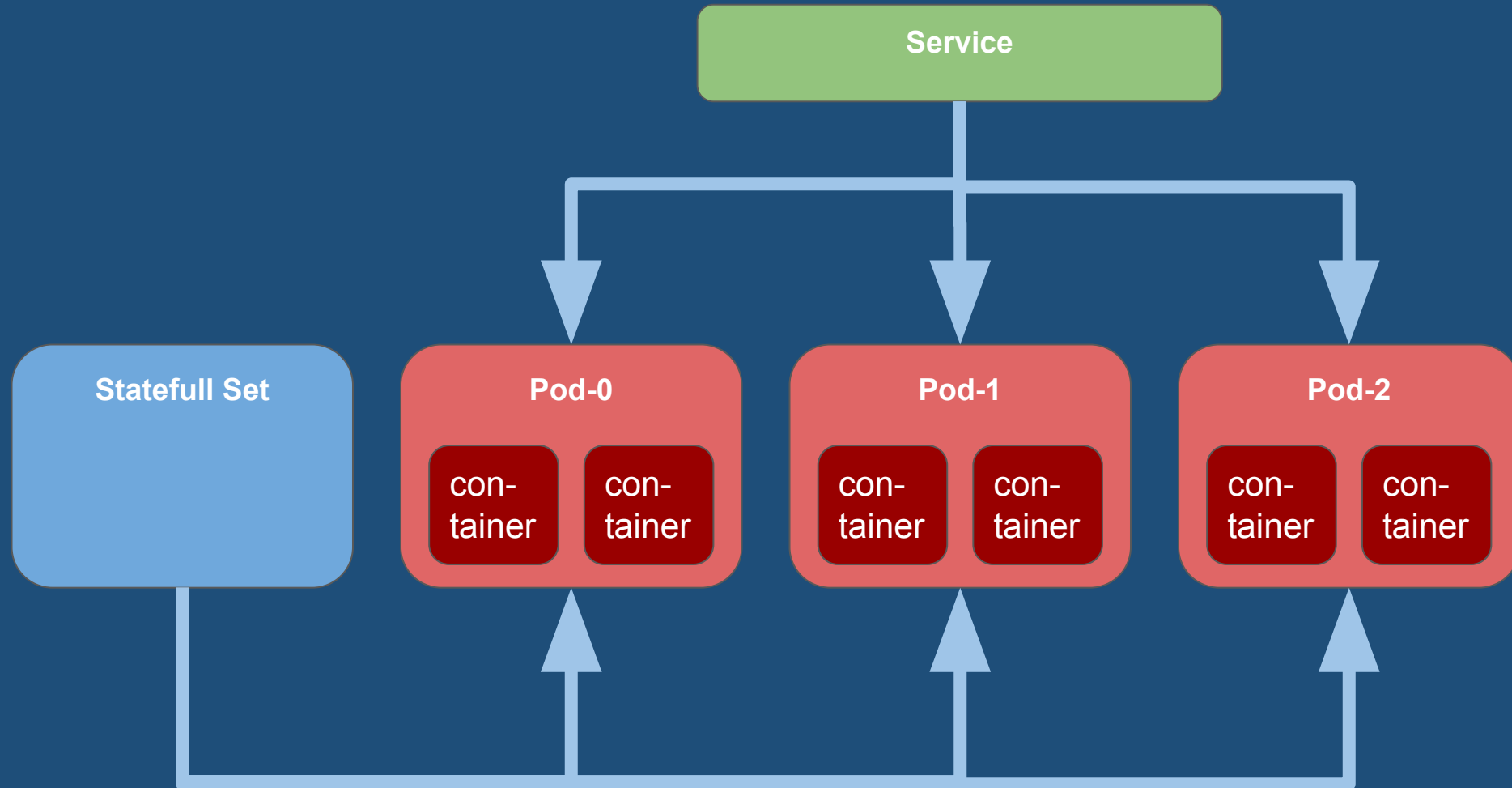
Exercise 1 - Deployment of a web application

- <https://github.com/awassink/kubernetes-workshop>

Persistent Volumes



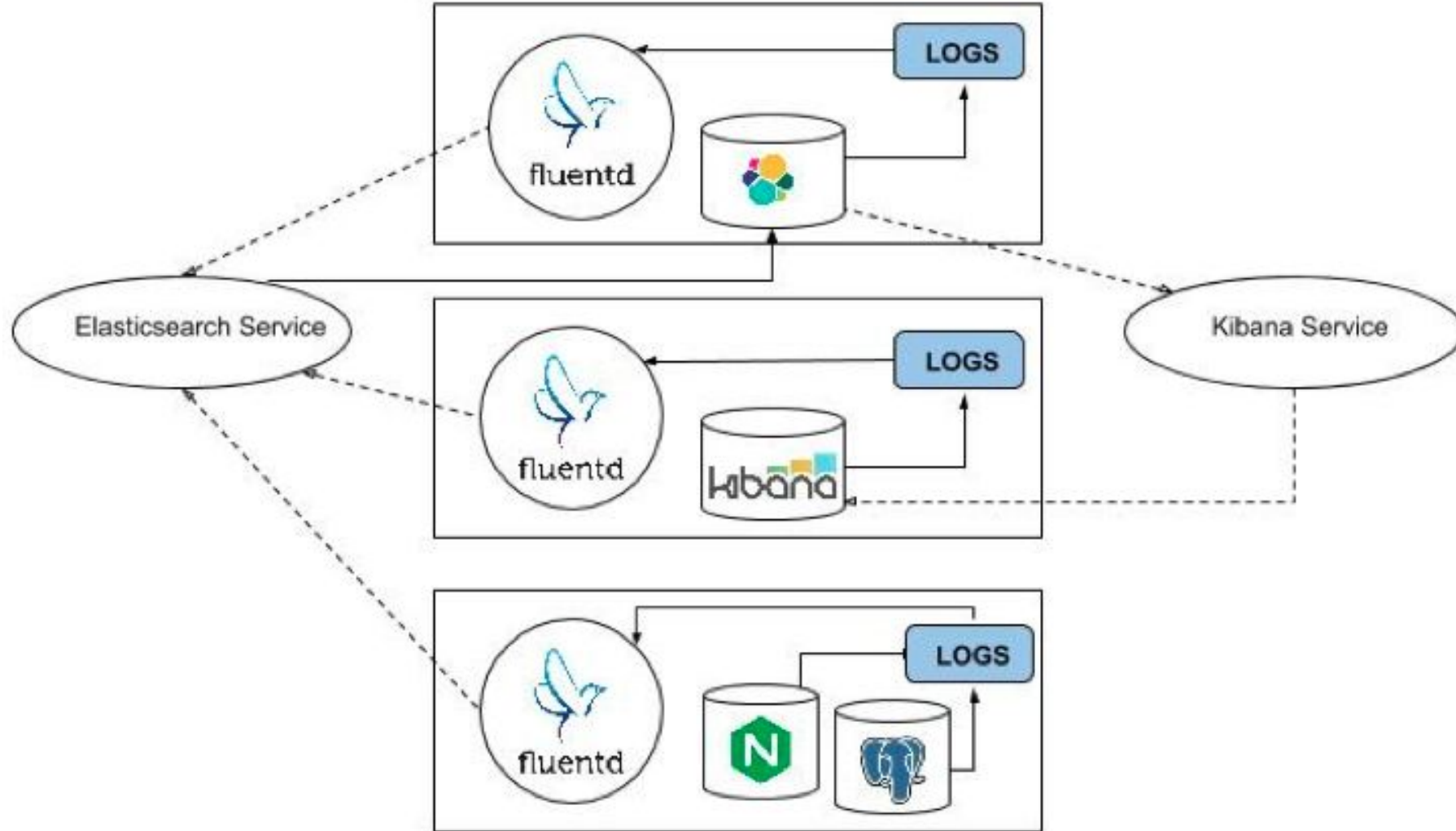
Stateful Set



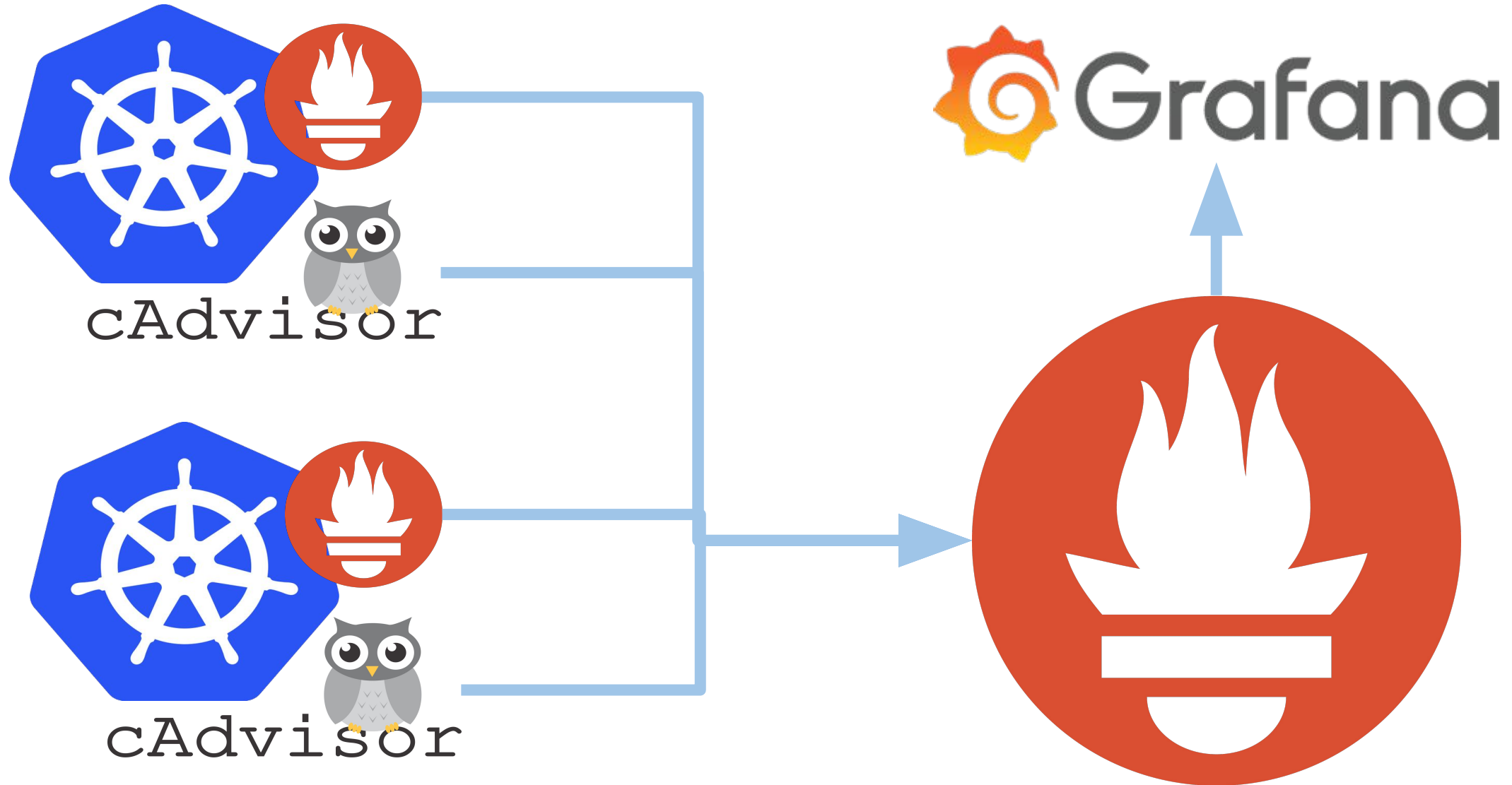
Deploying without downtime

- Rolling updates
- Rollback
- Readiness Probes

Kubernetes - Centralized Logging



Kubernetes - Centralized Monitoring



Exercise 2 - Deployment of a three tier app

Resources

- Docker - Build, Ship, and Run Any App, Anywhere – www.docker.com
- Kubernetes - Accelerate Your Delivery – kubernetes.io
- Creating a Raspberry Pi cluster running Kubernetes – tinyurl.com/rpi-k8s-cluster