

Inside Kubernetes

An Architectural Deep Dive

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Anthony E. Nocentino

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 - Specialize in system architecture and performance
 - Masters Computer Science
 - Microsoft MVP - Data Platform - 2017 - 2018
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Agenda

- What is Kubernetes
- Kubernetes API Objects
- Exploring Kubernetes Architecture
- Deploying Applications
- Production Ready Clusters

What is Kubernetes?

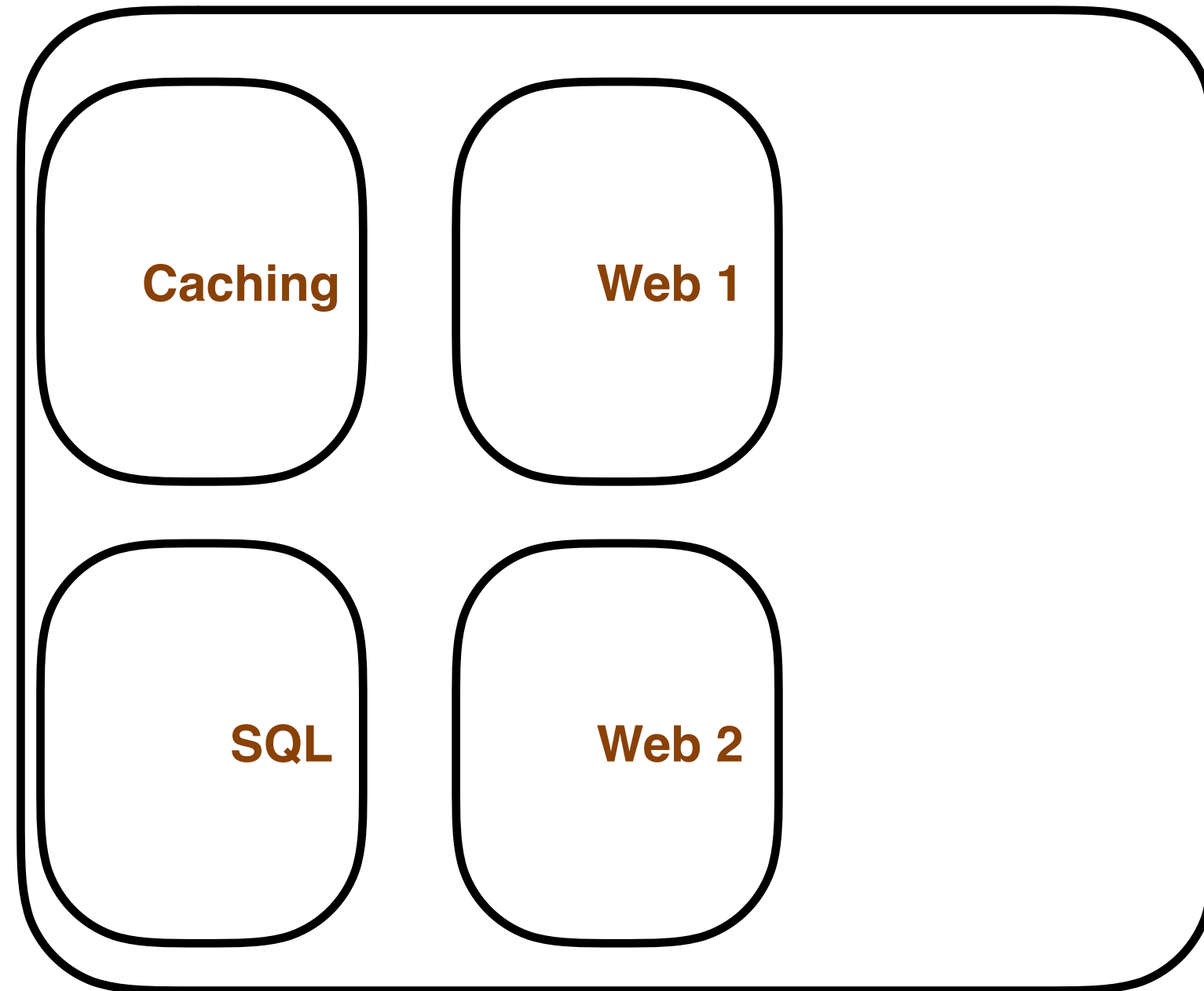
- Container Orchestrator
- Infrastructure Abstraction
- Desired State



Kubernetes API

- **API Objects** - Represent resources in your system
 - Pods - your container based applications
 - Controllers - maintain desired state
 - Services - persistent access to your apps
 - Storage - persistent storage for your data
 - ...and more

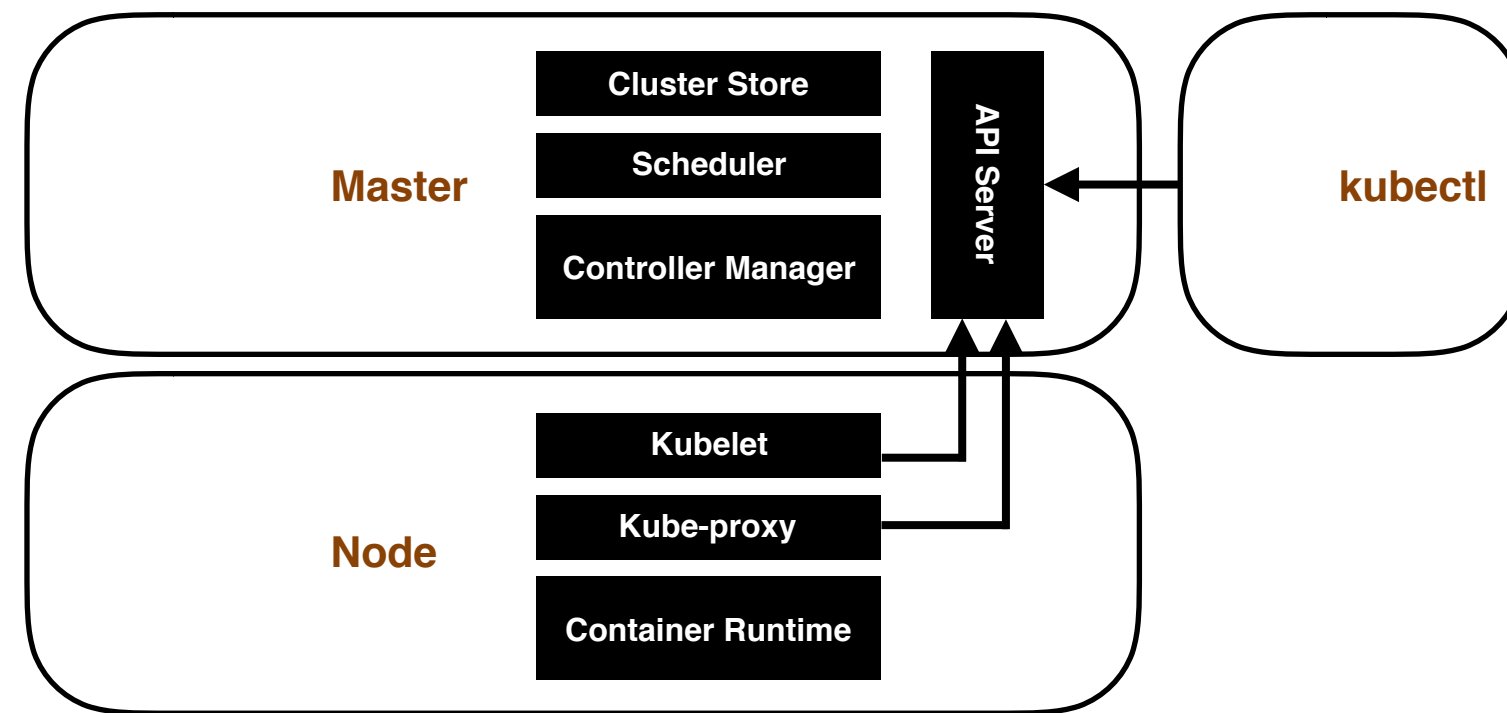
Kubernetes Cluster



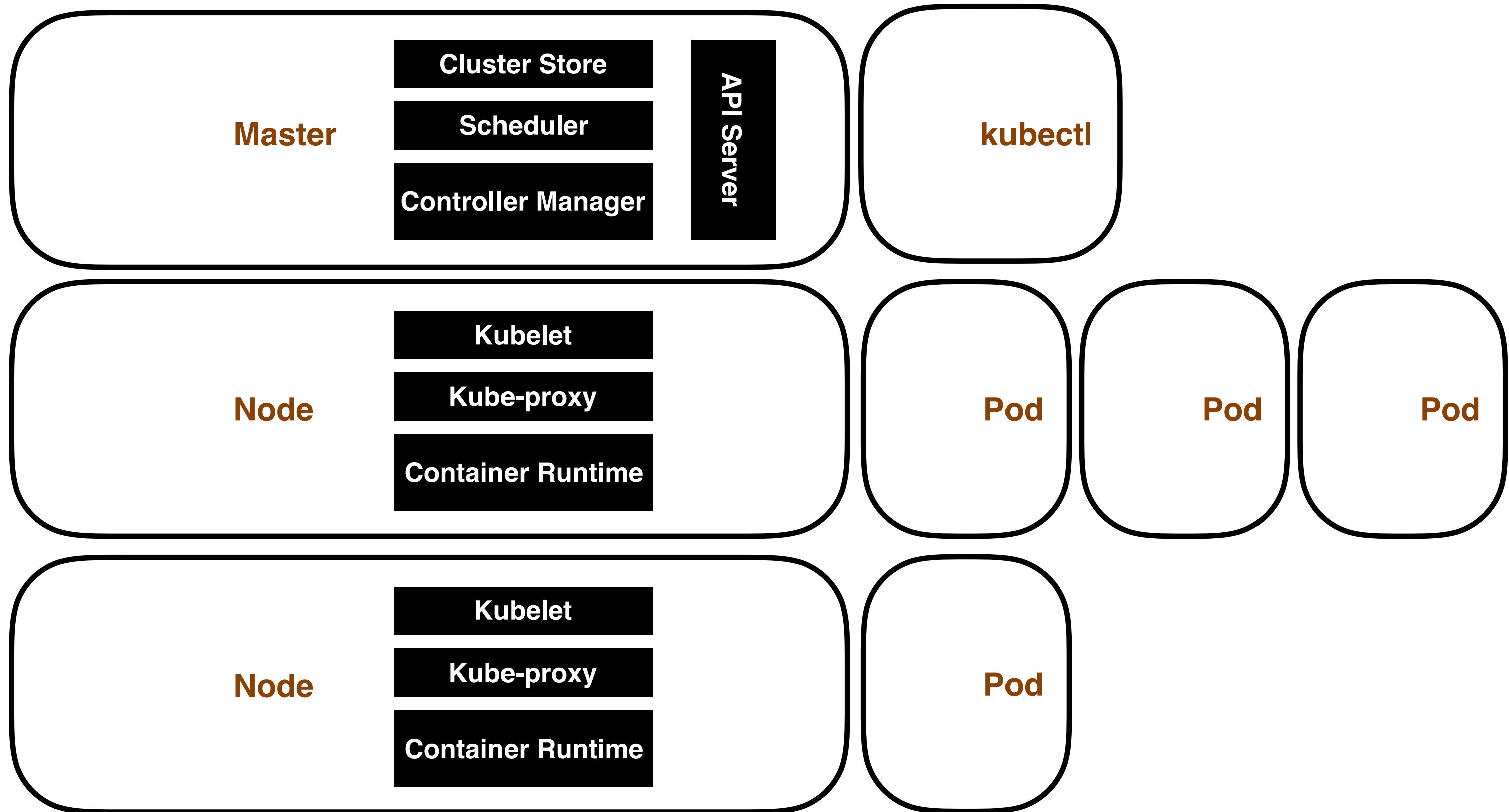
Cluster



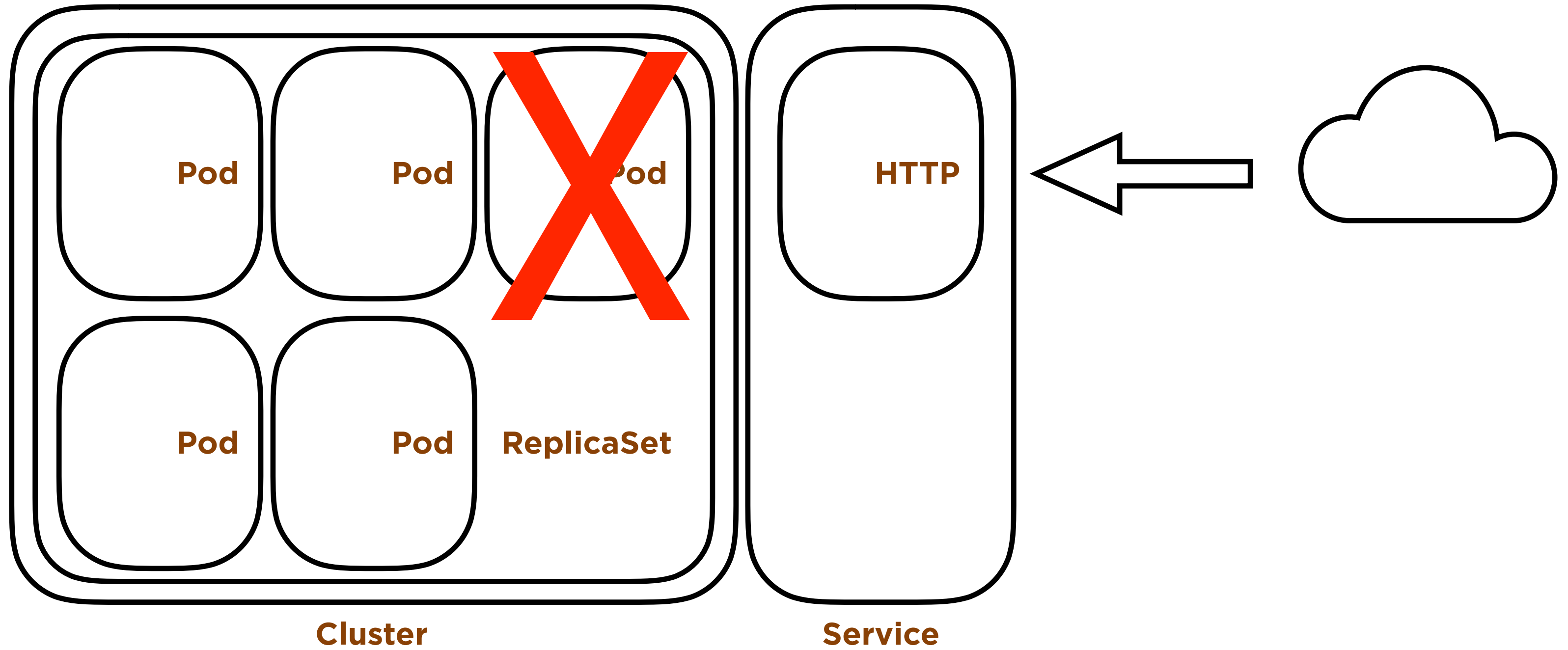
Exploring Kubernetes Architecture



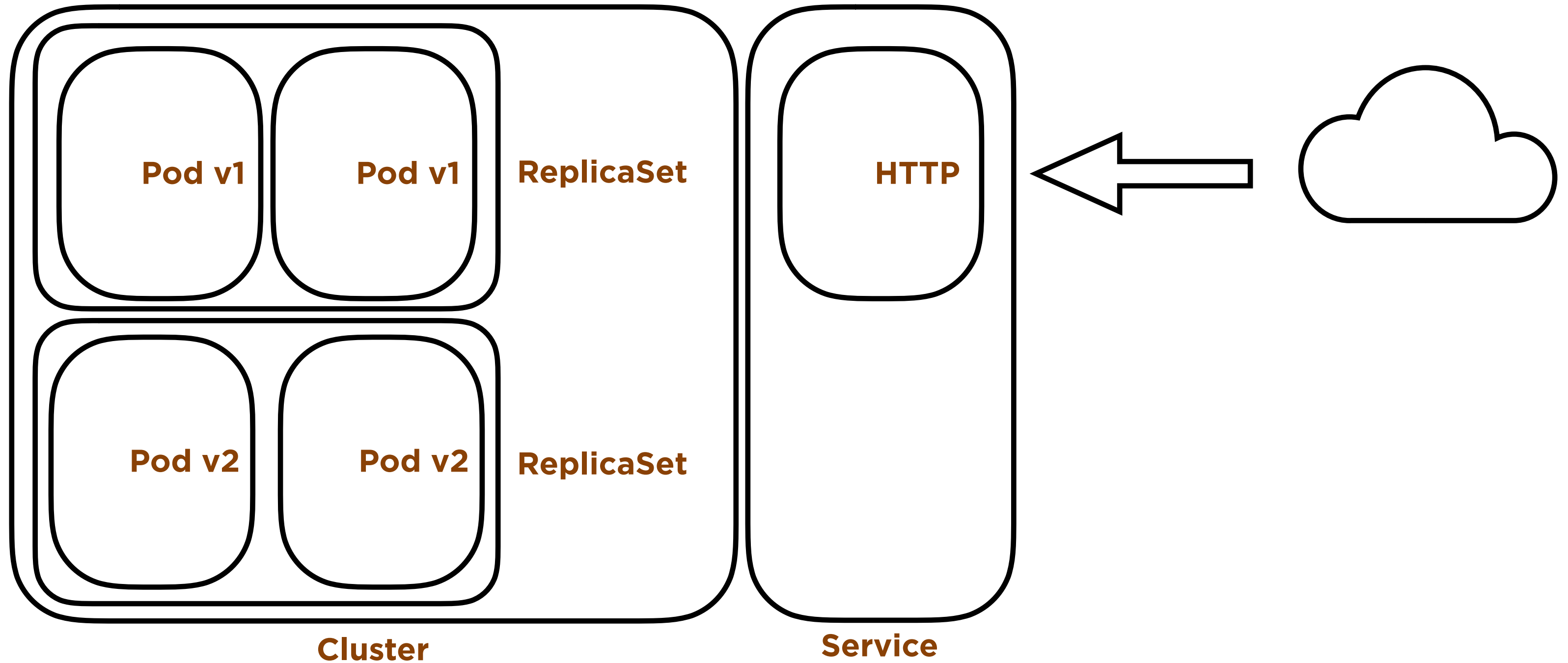
Controller Operations - ReplicaSet



Services



Controller Operations - Deployment



Deploying Applications

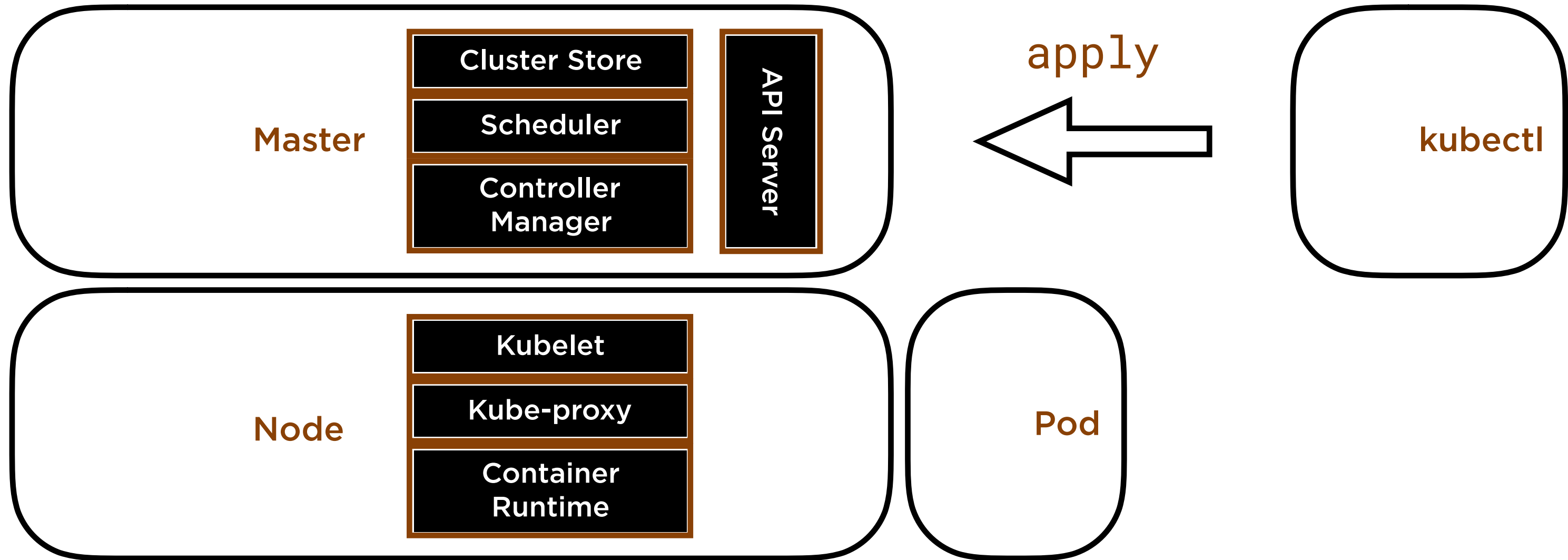
- Imperative
- Declarative
- YAML and JSON

Declarative Deployment - Manifests

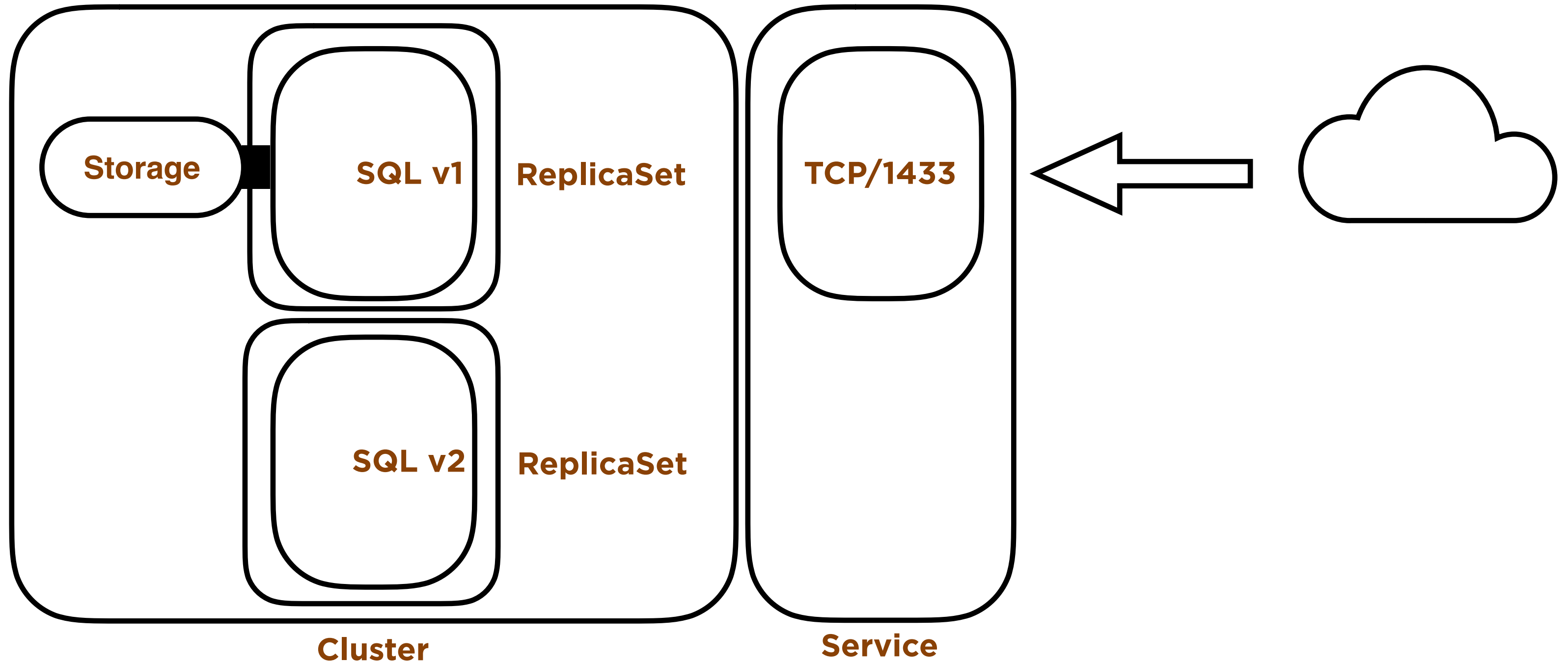
```
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx
    ports:
    - containerPort: 80
```

```
kubectl apply -f nginx.yaml
```

Application Deployment Process

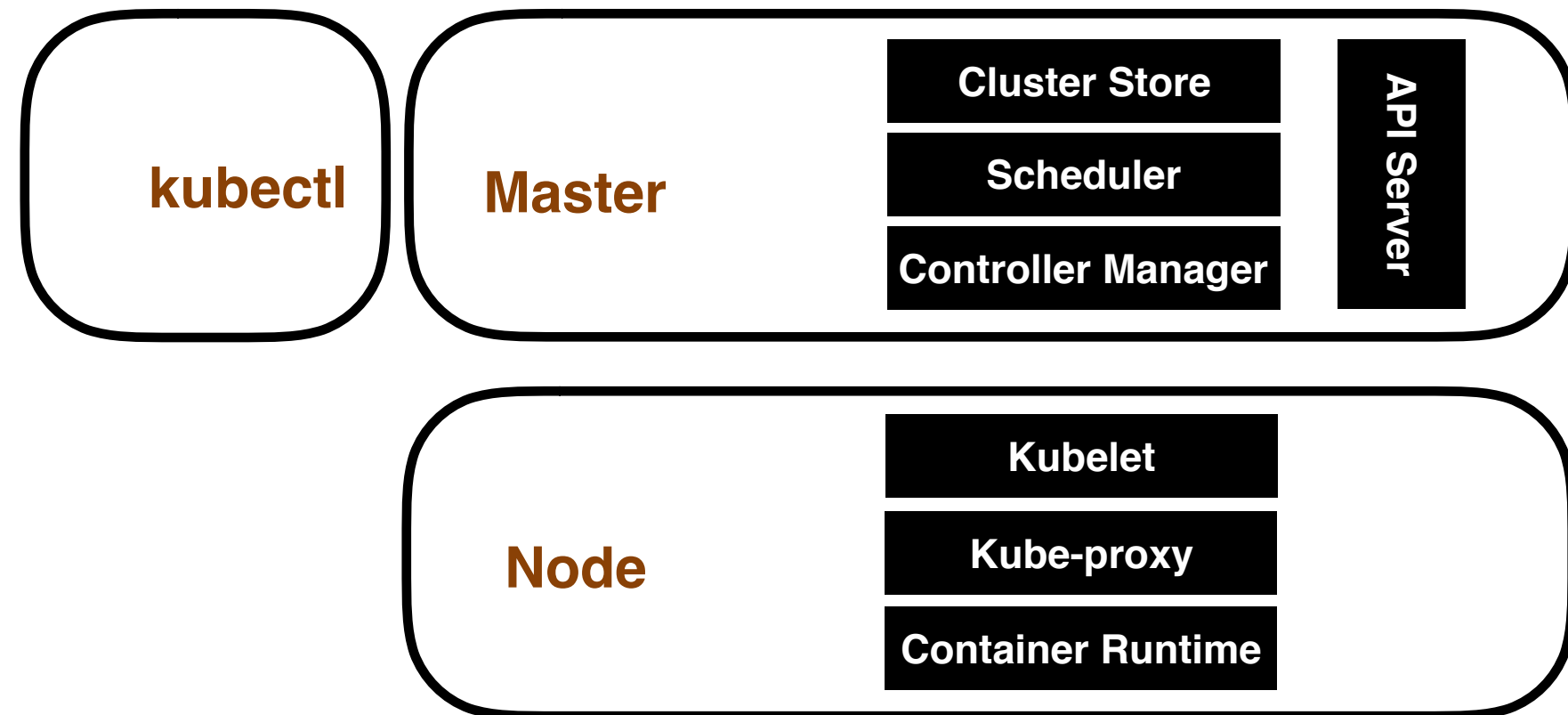


Decoupling Data and Computation



Demo!

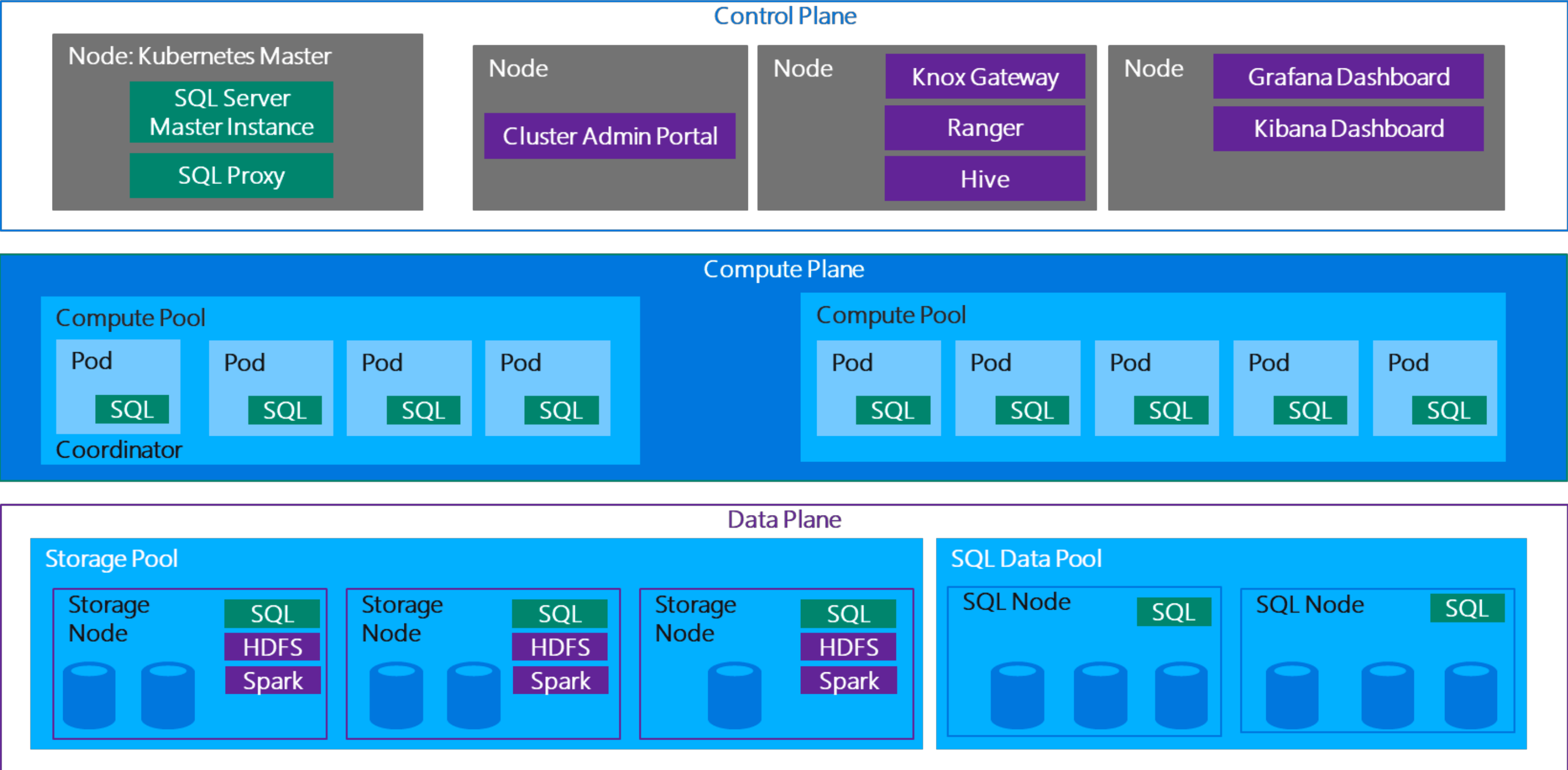
- Deploying SQL Server in a **Deployment** with Persistent Storage
 - Recovery Scenario
 - Upgrading SQL Server



Building Production Ready Clusters

- Scalability - number of Nodes
- Intra-cluster communication patterns (Network connectivity)
- High Availability
 - API Server - Load Balanced
 - etcd - Multiple Replicas
- Disaster Recovery
 - etcd Backups
- Persistent Volumes

Kubernetes Cluster



From: <https://docs.microsoft.com/en-us/sql/big-data-cluster/big-data-cluster-overview?view=sqlallproducts-allversions>

Review

- What is Kubernetes
- Kubernetes API Objects
- Exploring Kubernetes Architecture
- Deploying Applications
- Production Ready Clusters

More Resources

- **Docker for Windows/Mac**
- **Minikube**
- **Managed Service Providers**
 - Azure Kubernetes Service (**AKS**)
 - <https://docs.microsoft.com/en-us/azure/aks/kubernetes-walkthrough>
 - **Elastic Container Service for Kubernetes (EKS)**
 - <https://aws.amazon.com/getting-started/projects/deploy-kubernetes-app-amazon-eks/>
 - **Google Kubernetes Engine (GKE)**
 - <https://cloud.google.com/kubernetes-engine/docs/how-to/>
- **Pluralsight! - Kubernetes Installation and Configuration Fundamentals**
 - <https://app.pluralsight.com/profile/author/anthony-nocentino>

Need more data or help?

<http://www.centinosystems.com/blog/talks/>

Links to resources

Demos

Presentation

Pluralsight

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Thank You!