Inside Kubernetes
An Architectural Deep Dive

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Centino systems

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Agenda

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

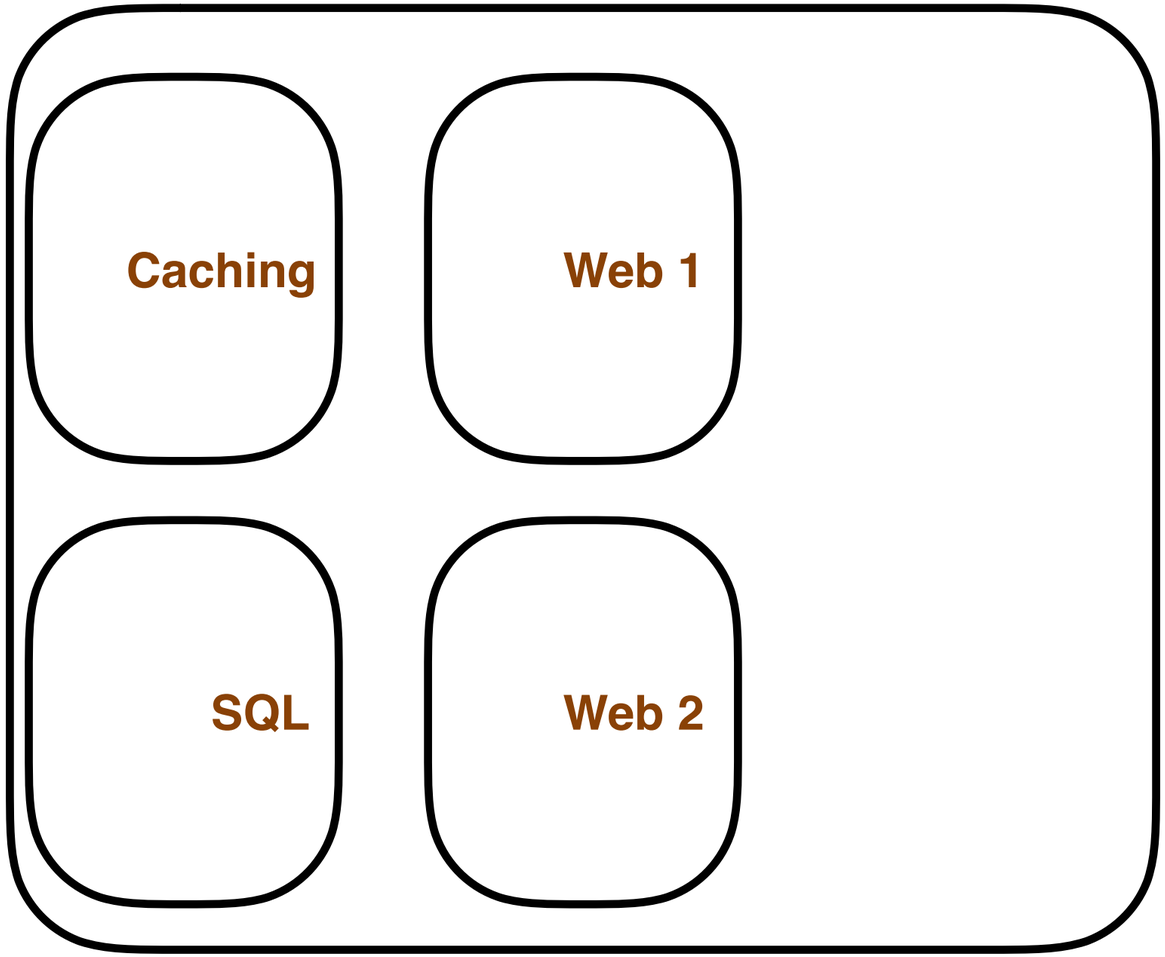
What is Kubernetes?

- Container Orchestrator
- Infrastructure Abstraction
- Desired State

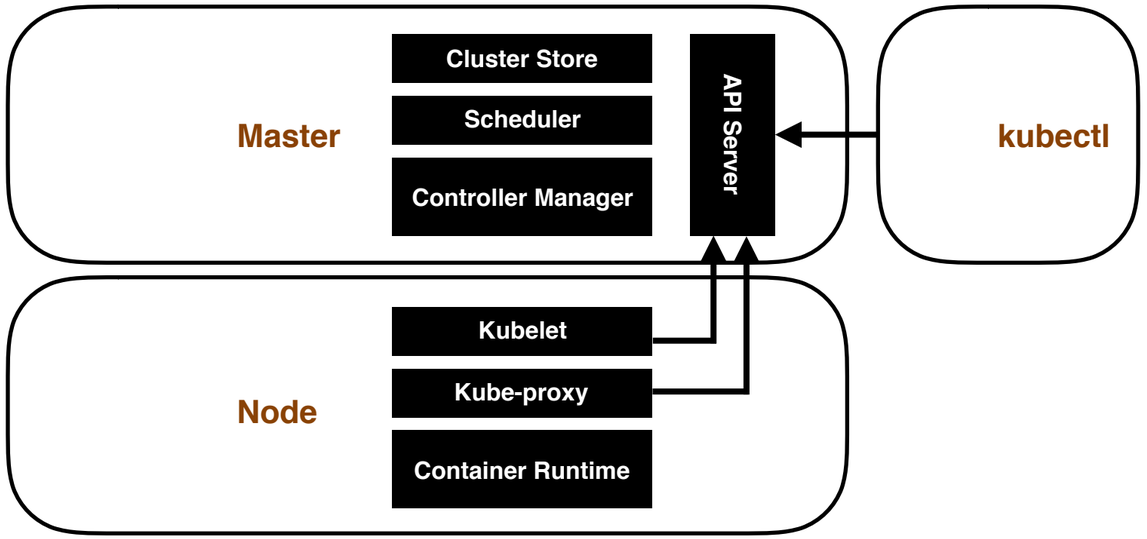
Kubernetes API

- **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

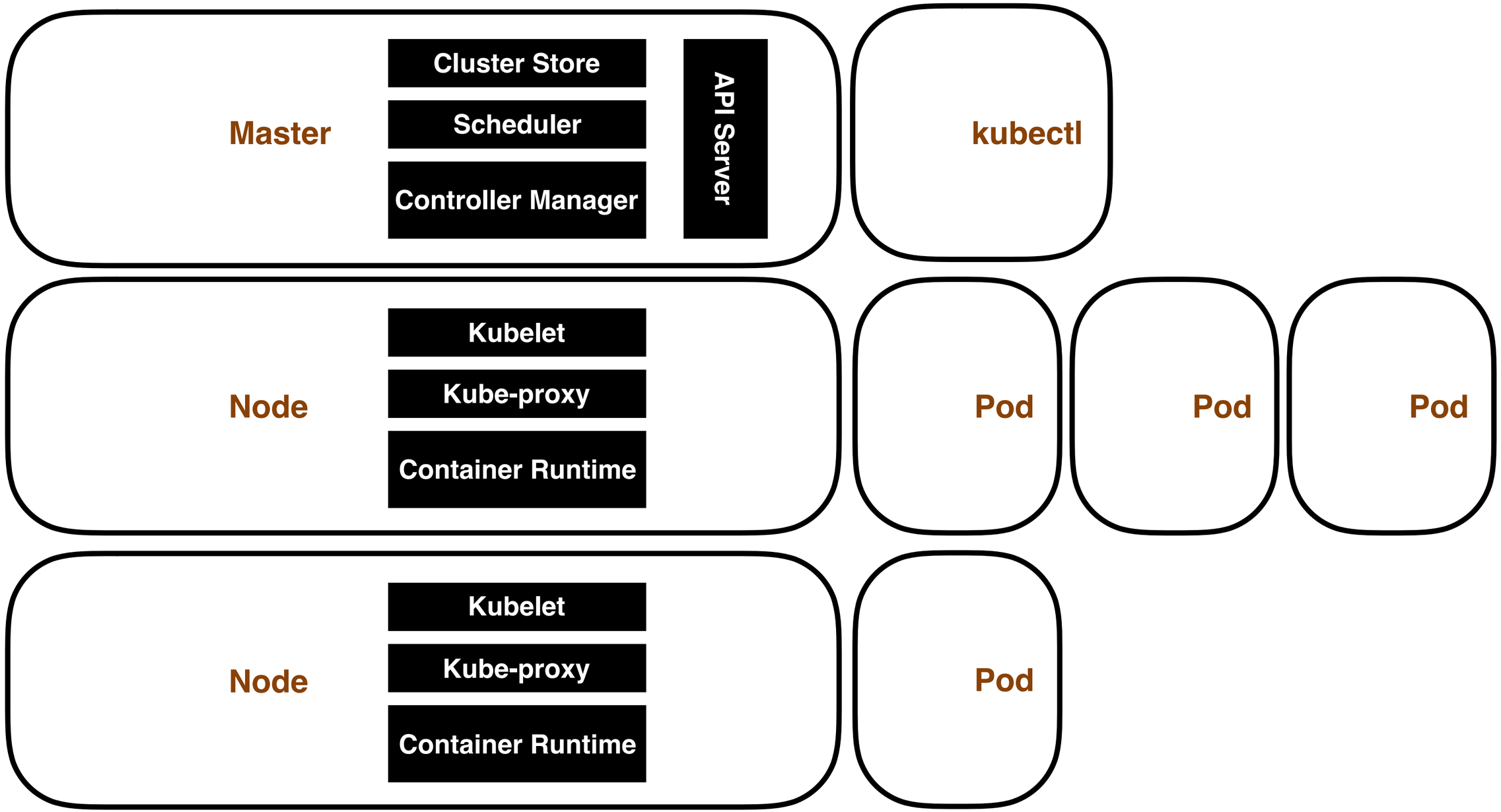
Kubernetes Cluster



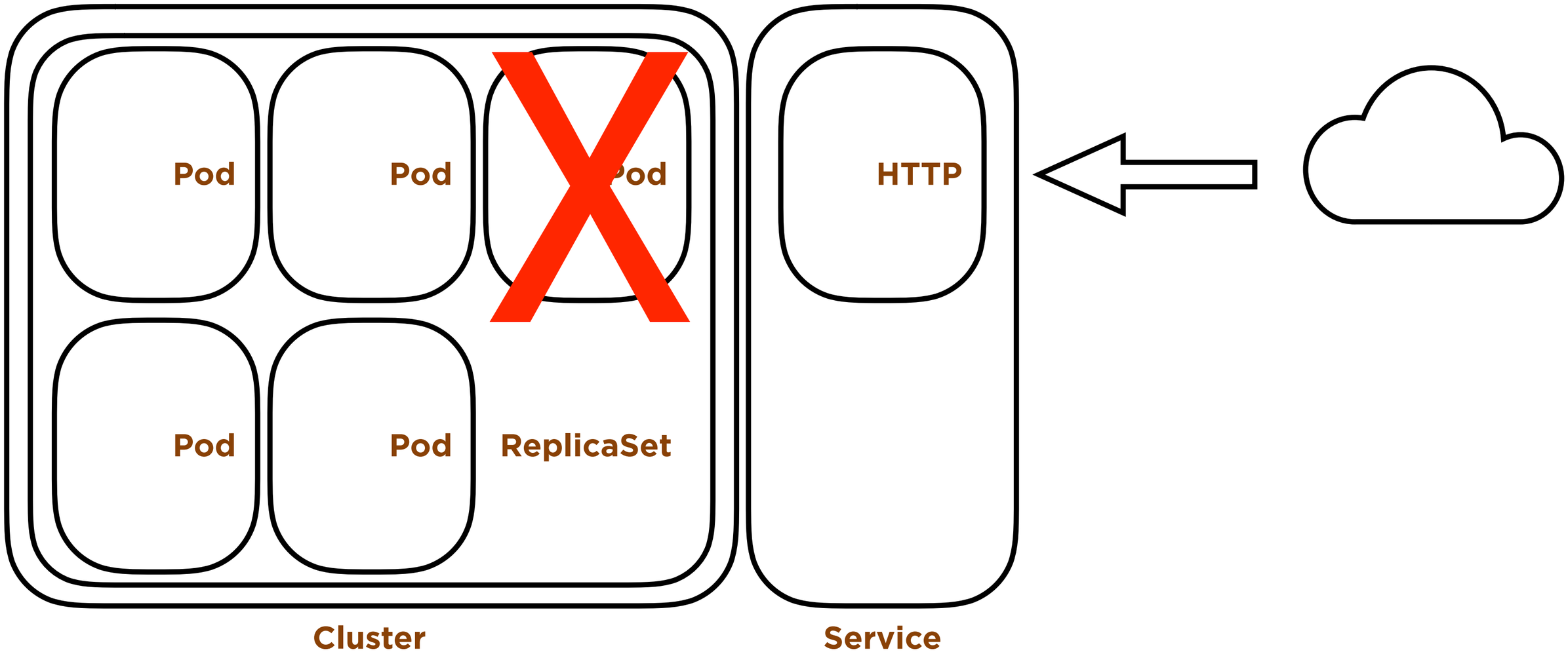
Exploring Kubernetes Architecture



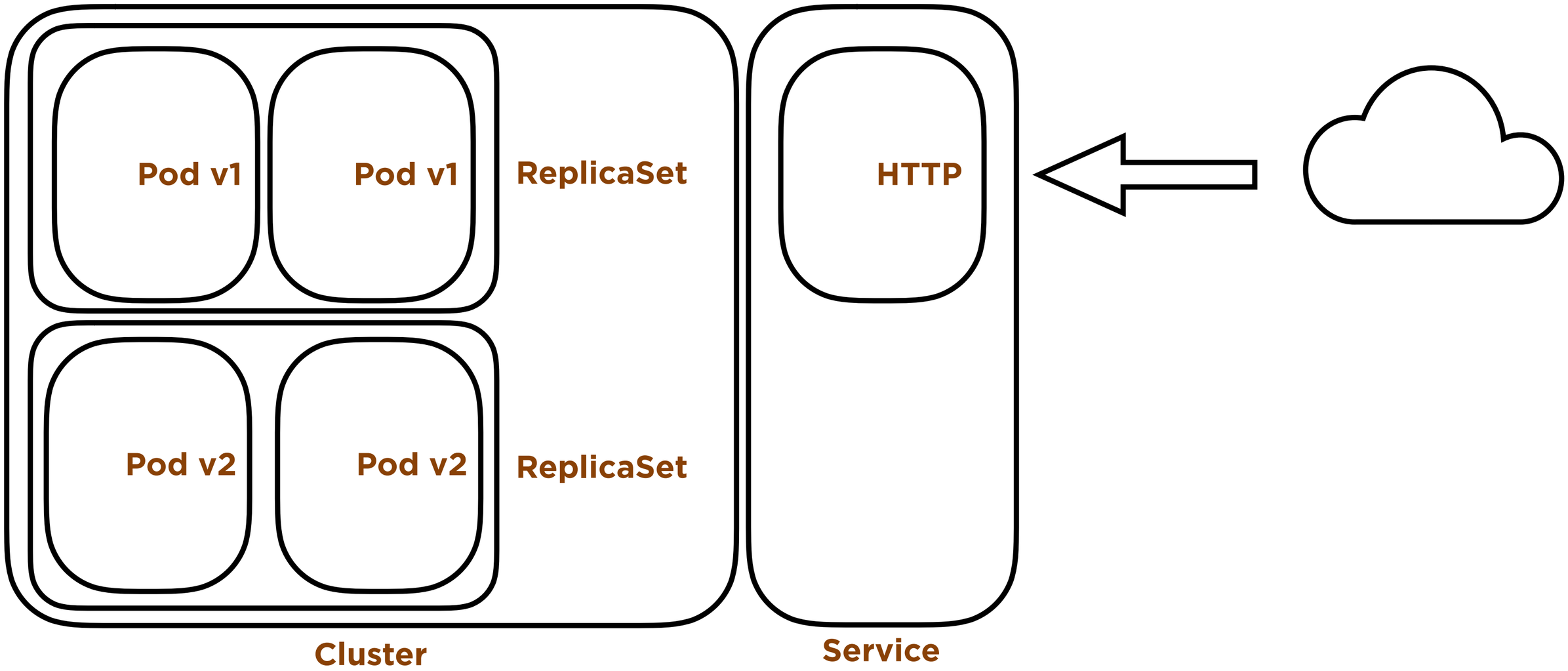
Controller Operations - `ReplicaSet`



Services



Controller Operations - `Deployment`



Deploying Applications

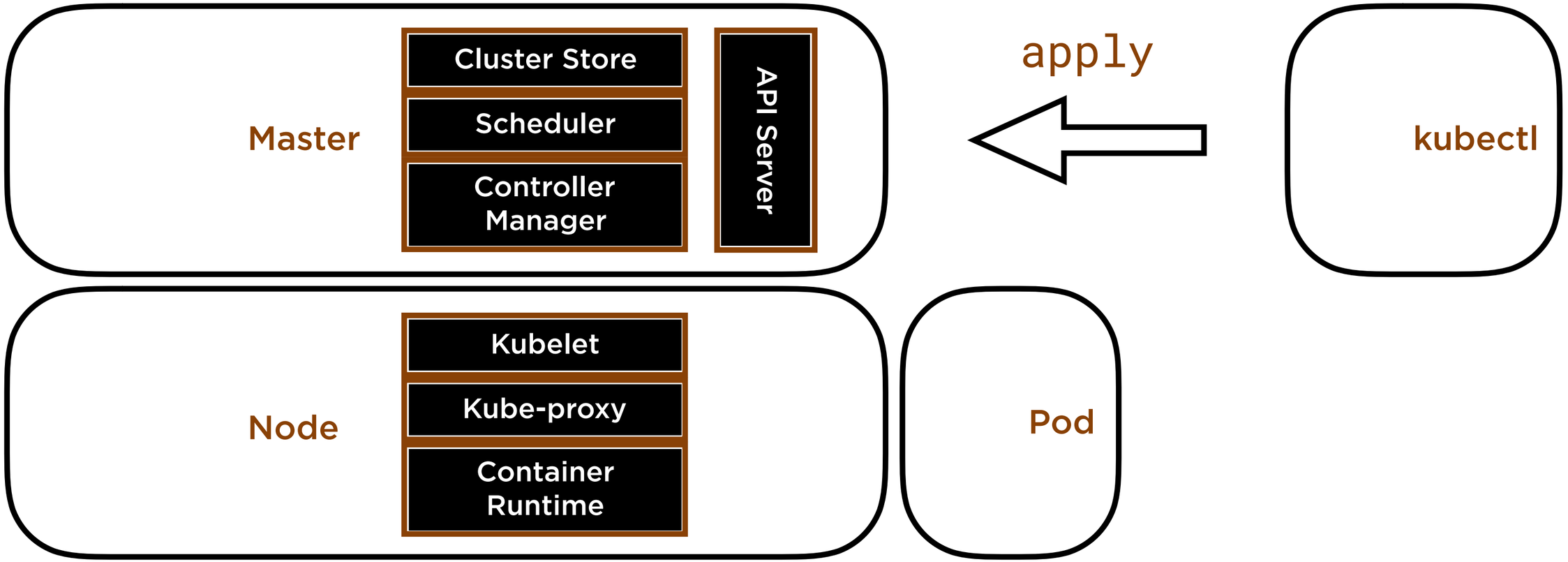
- Imperative
- Declarative
- YAML and JSON

Declarative Deployment - Manifests

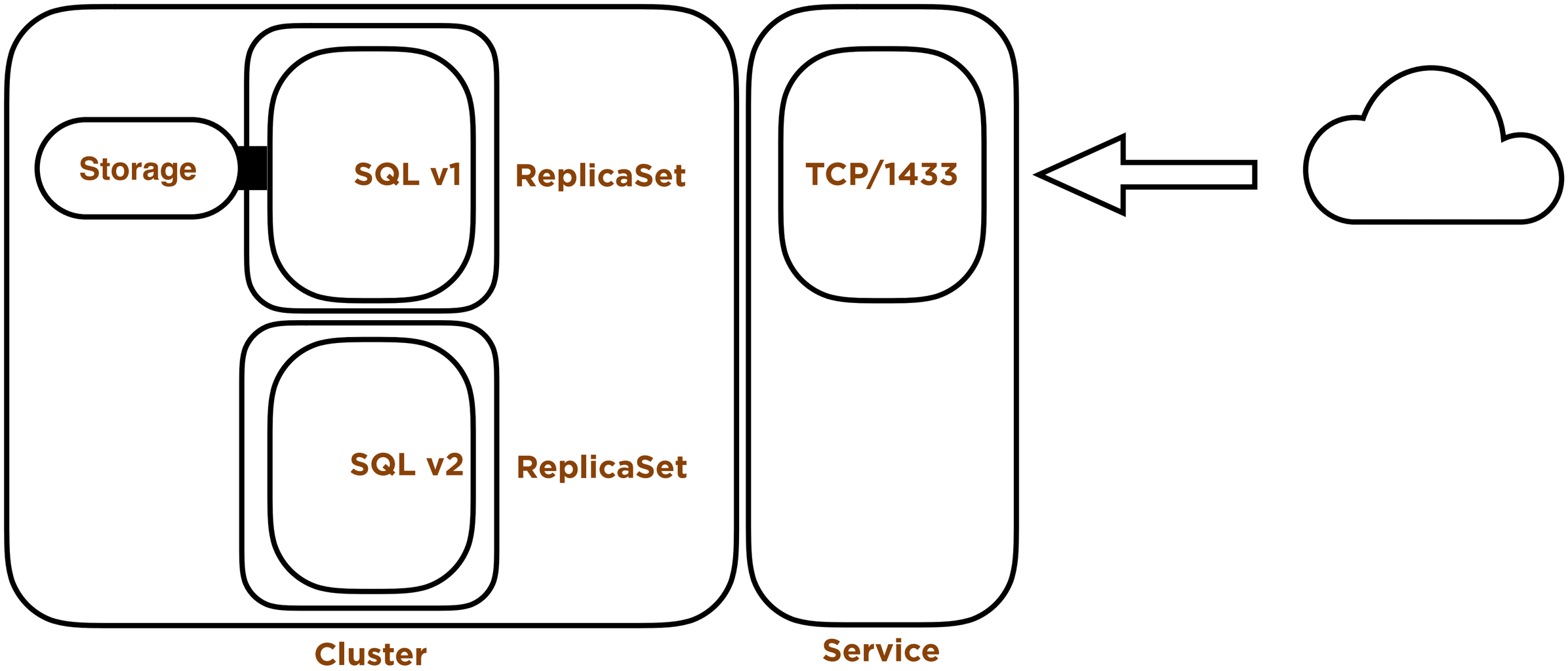
```
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx
    ports:
    - containerPort: 80
```

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

Application Deployment Process

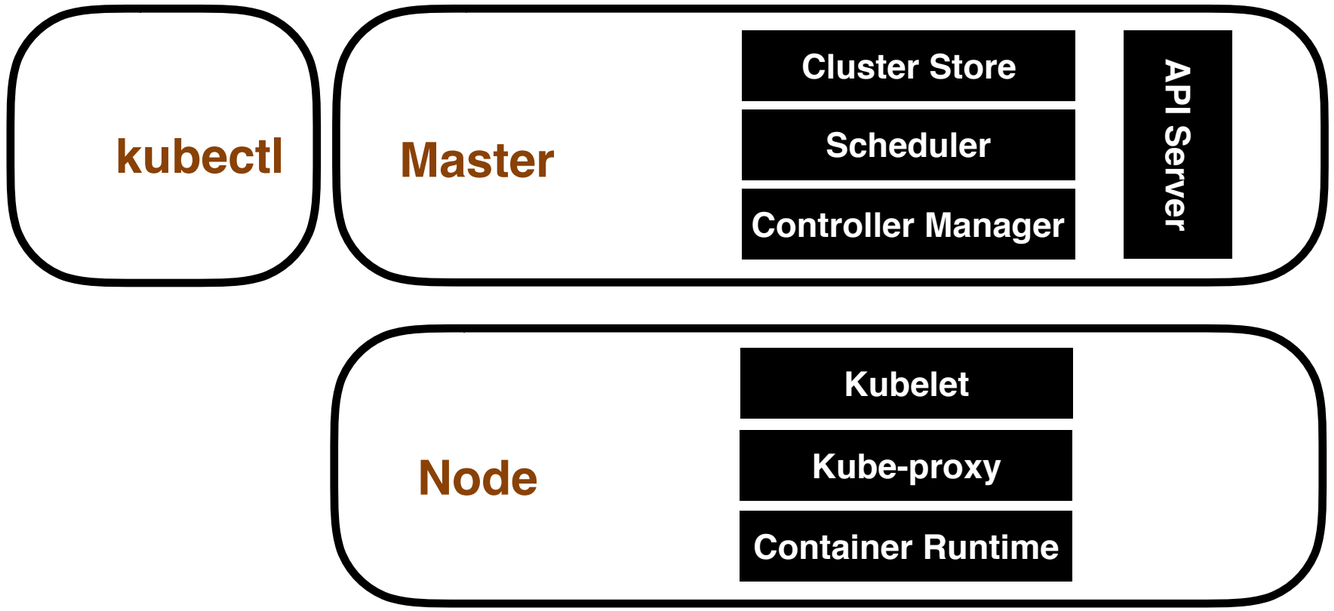


Decoupling Data and Computation



Demo!

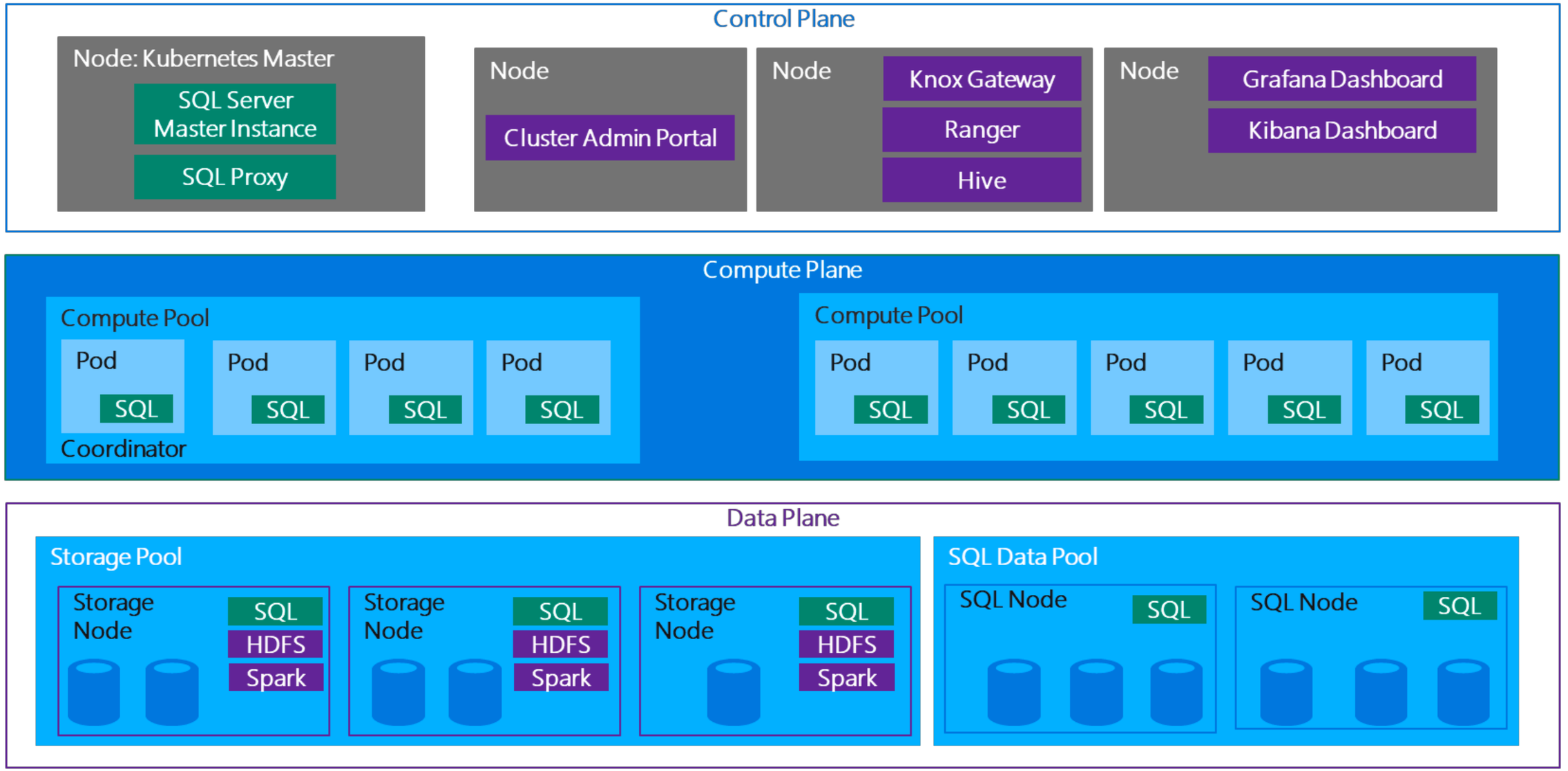
- Deploying SQL Server in a **`Deployment`** with Persistent Storage
  - Recovery Scenario
  - Upgrading SQL Server



Building Production Ready Clusters

- Scalability - number of Nodes
- Inter-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
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Thank You!