Kubernetes

A Deep Dive

Contact Info

www.mikenewswanger.com

Terminology

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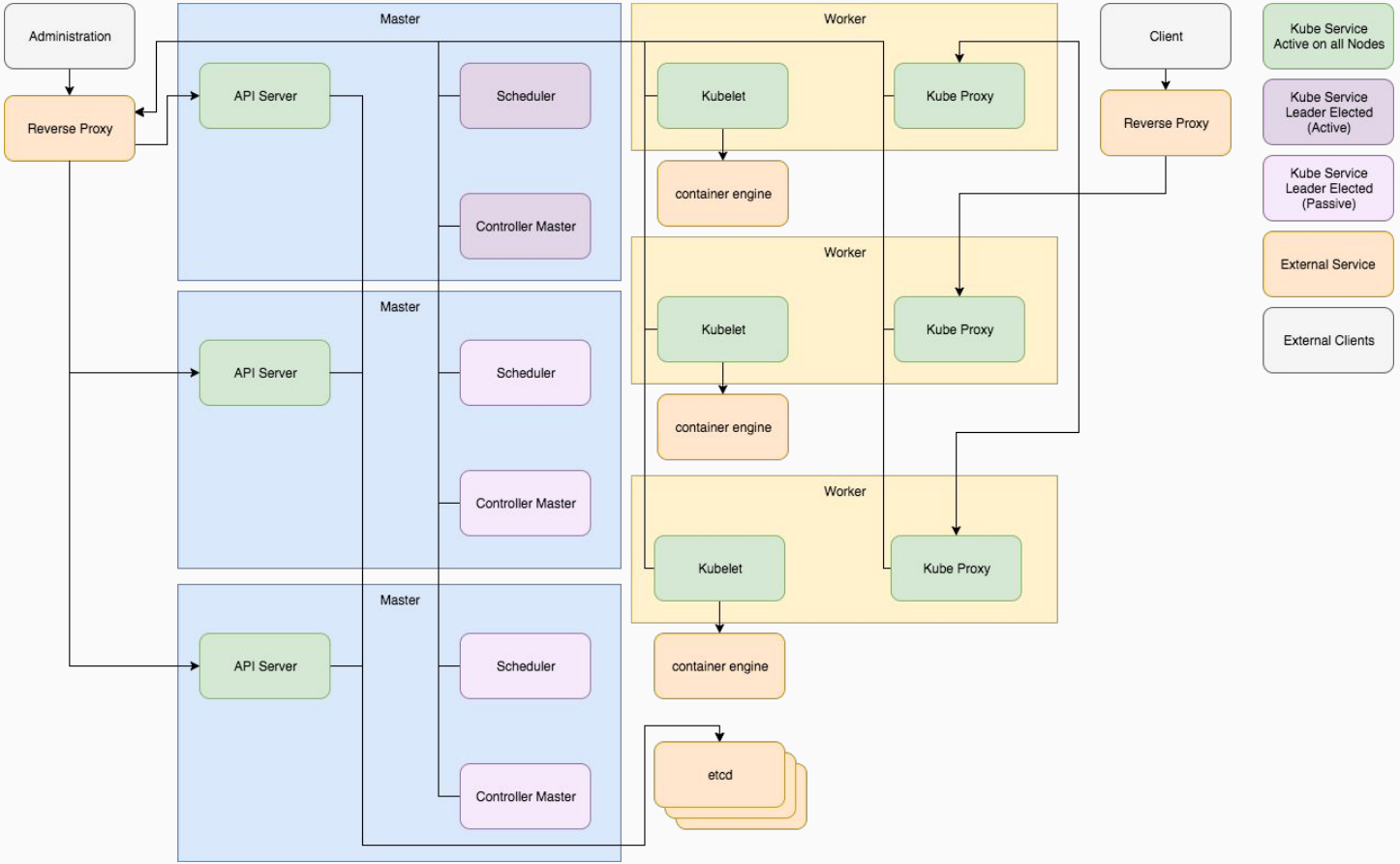
- Pod
  - Set of one or more containers
- Deployment
  - Desired state object for creation of pods
- Service
  - Logical abstraction for sets of pods
- Labels
  - Key - values properties - indexed
- Annotations
  - Key - value properties - not indexed

Components

Components


Administration
Reverse Proxy
Master
API Server
Scheduler
Controller Master
Master
API Server
Scheduler
Controller Master
Master
API Server
Scheduler
Controller Master
Worker
Kubelet
Kube Proxy
container engine
Worker
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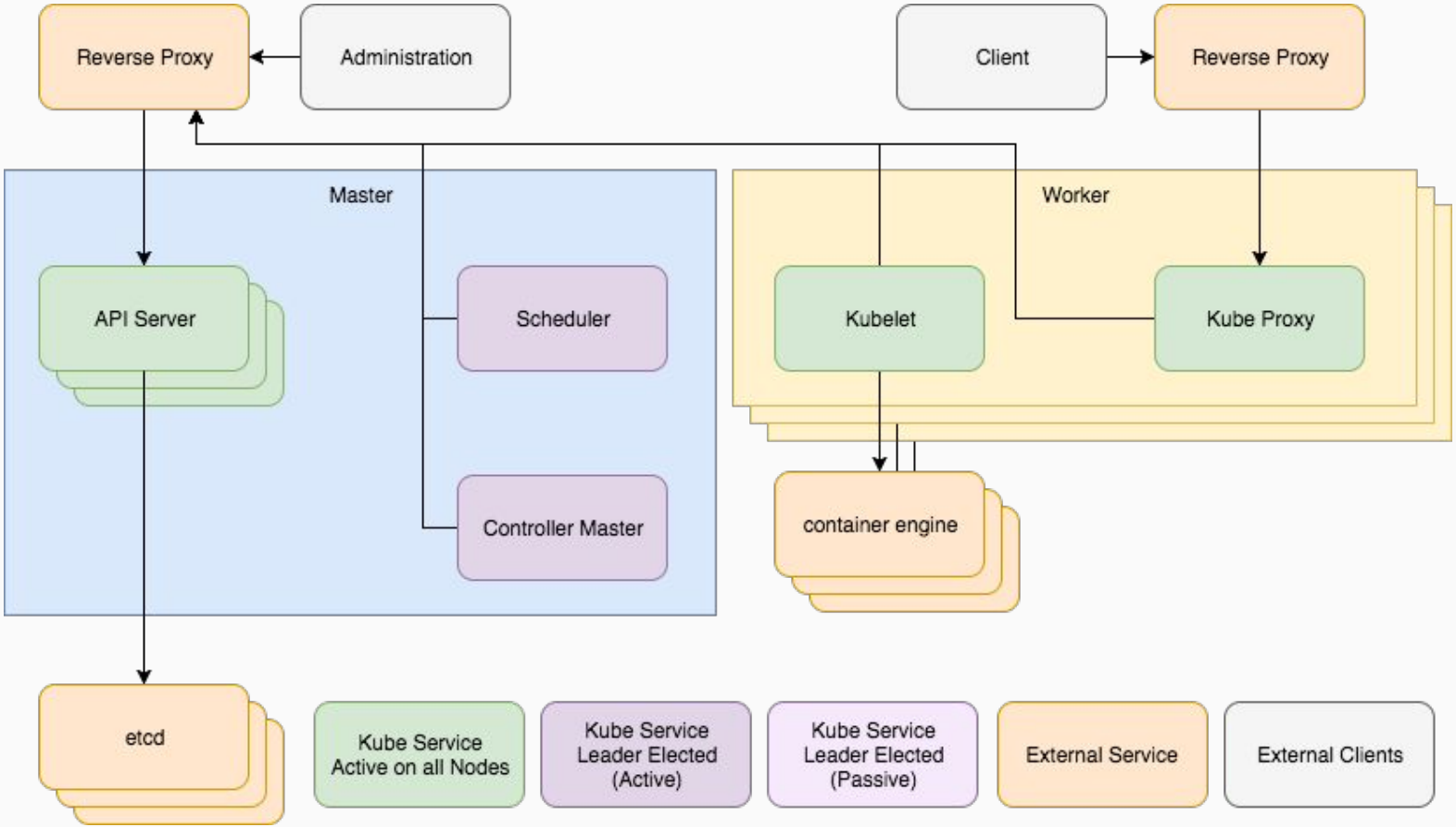
container engine
Worker
Kubelet
Kube Proxy
container engine
etcd
Client
Reverse Proxy
Kube Service Active on all Nodes
Kube Service Leader Elected (Active)
Kube Service Leader Elected (Passive)
External Service
External Clients

Components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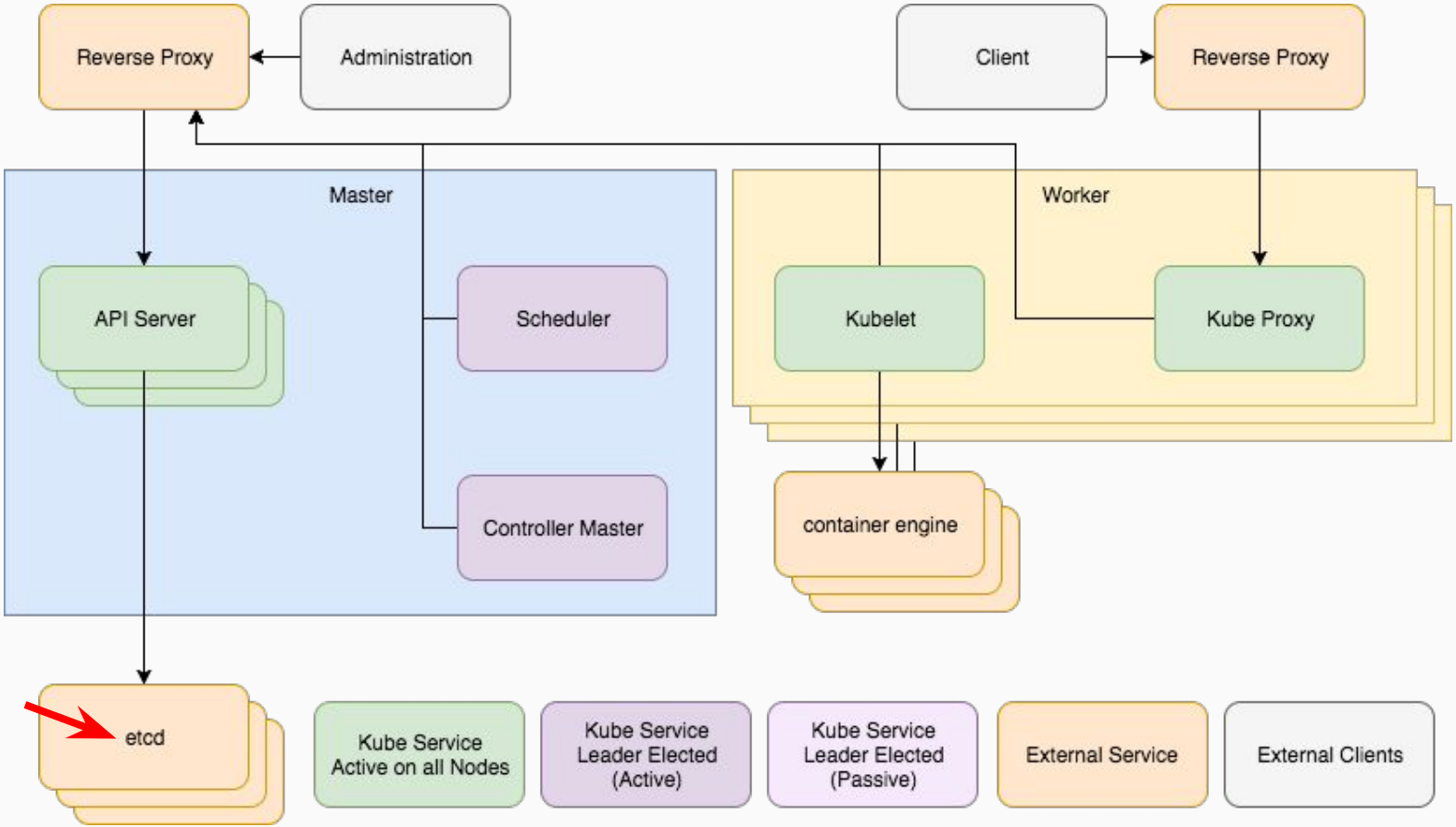
Master Nodes

etcd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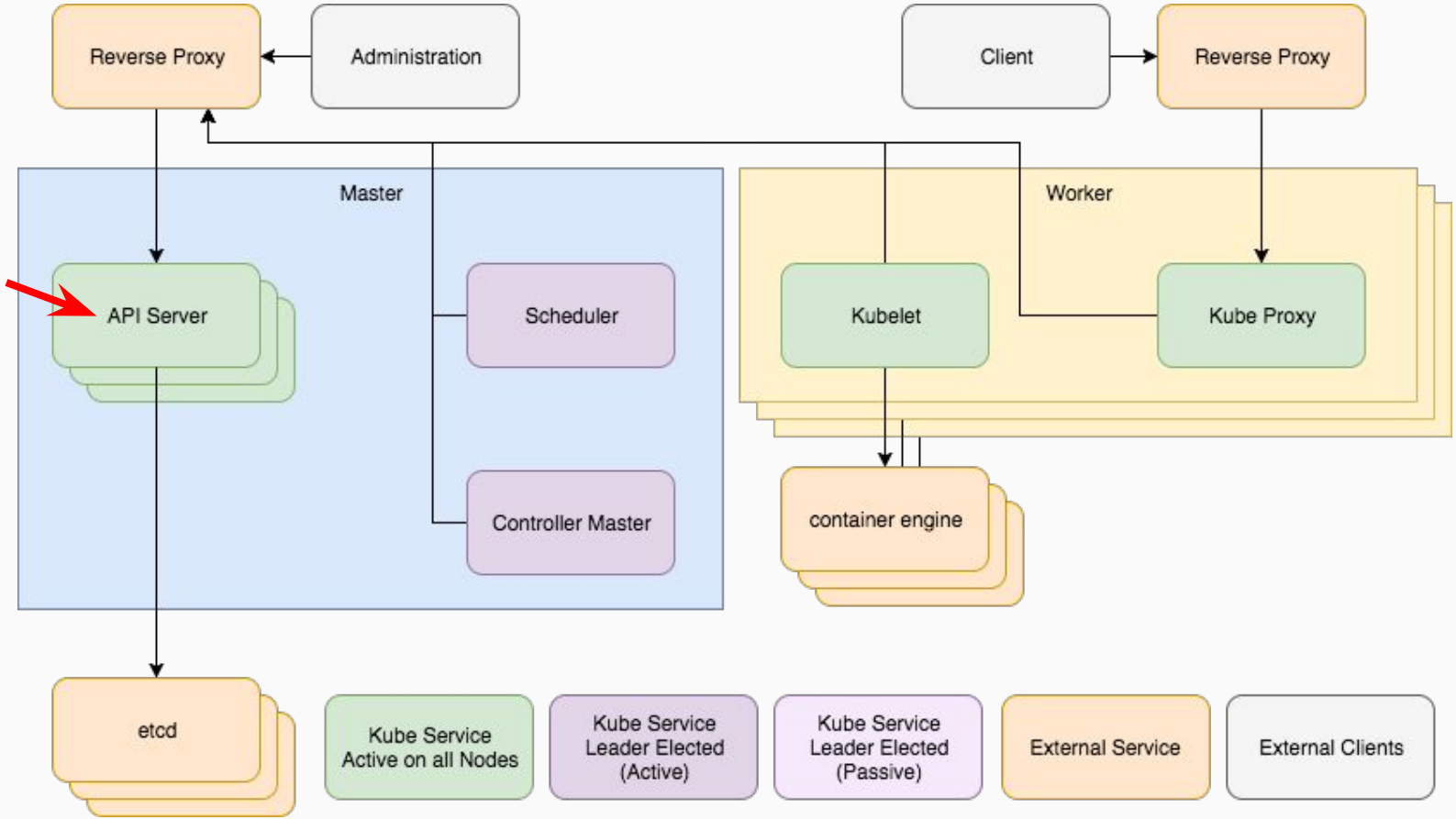
Datastore

- Persists state and objects
- Distributed key / value store
  - High-Availability Achieved via horizontal scaling
    - Leader elected for master operations
  - Communicates via common protocols
- Uses raft consensus algorithm for master election
- Why use etcd?
  - Replicates quickly
  - Solid Go client libraries
  - Watch functionality
- github.com/coreos/etcd

APIServer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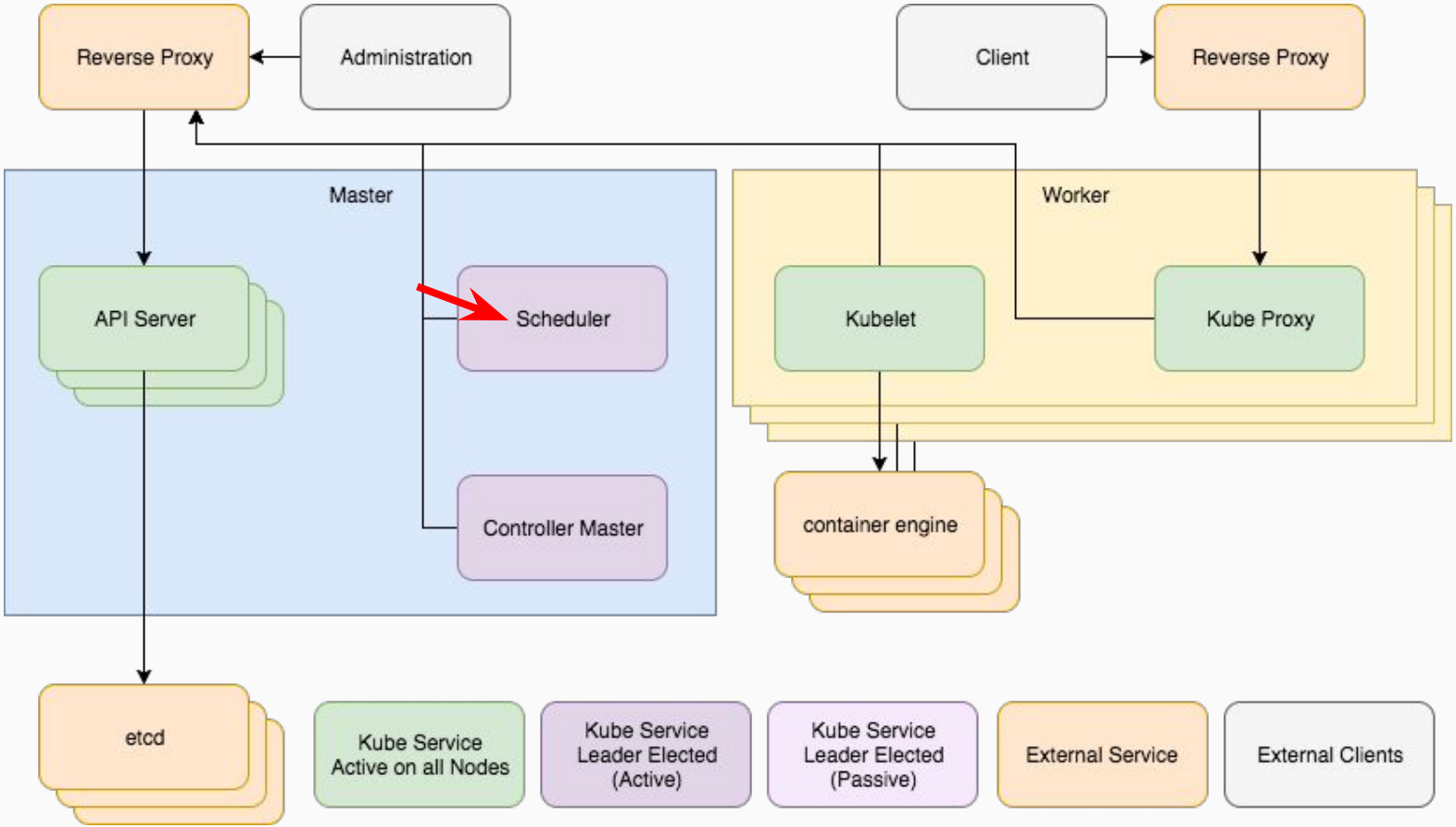
Component Interaction

- Actions processed via HTTP requests
  - Used by kubectl and internal components
- Interacts with etcd
- Multiple instances can be active simultaneously
  - Reverse-Proxy / VIP for high availability

Scheduler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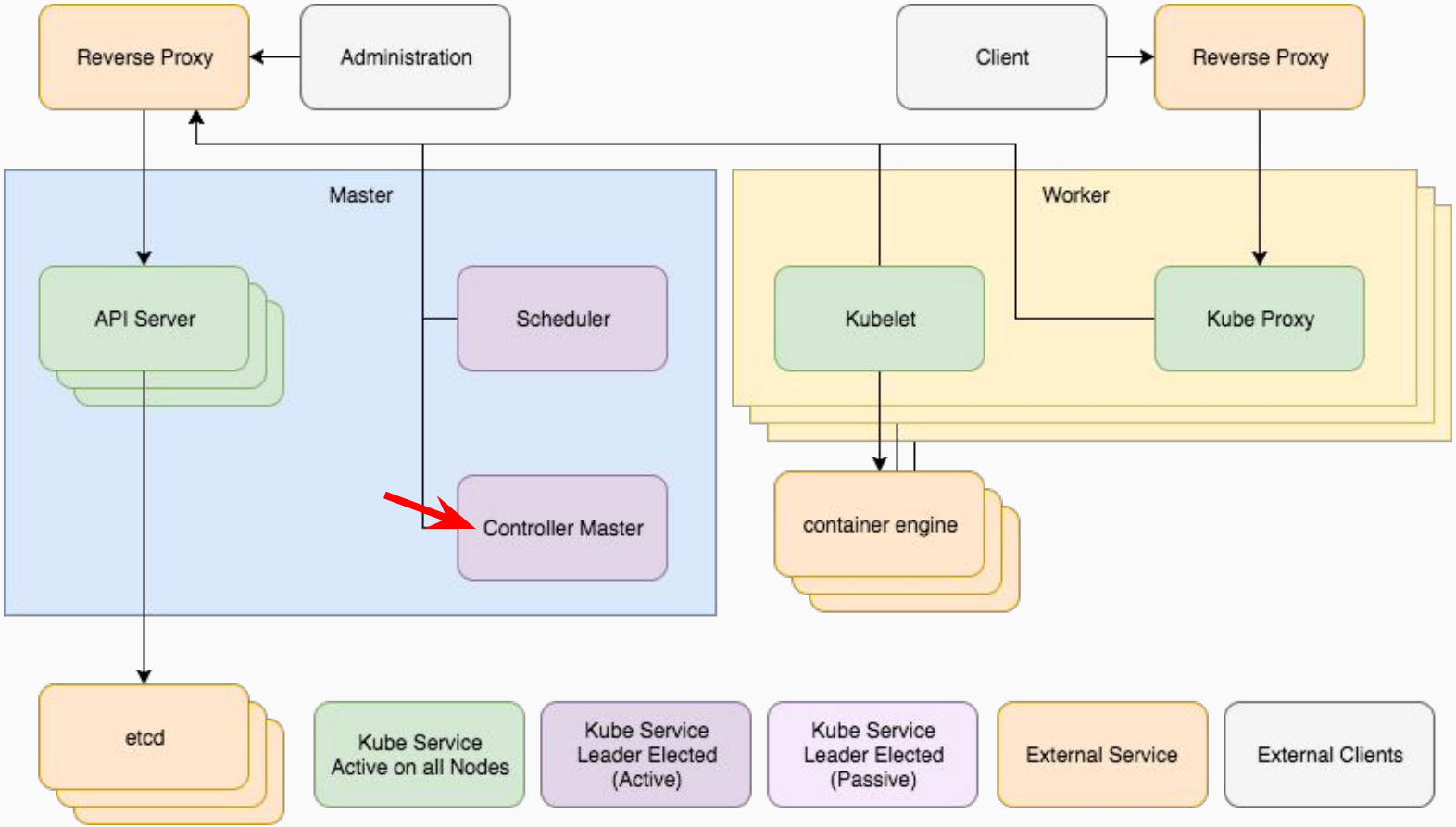
Work Coordination

- Sets resource allocation
  - Worker allocation
  - Processes affinity rules
  - Customizable / Replacable
- Master elected

Controller Master

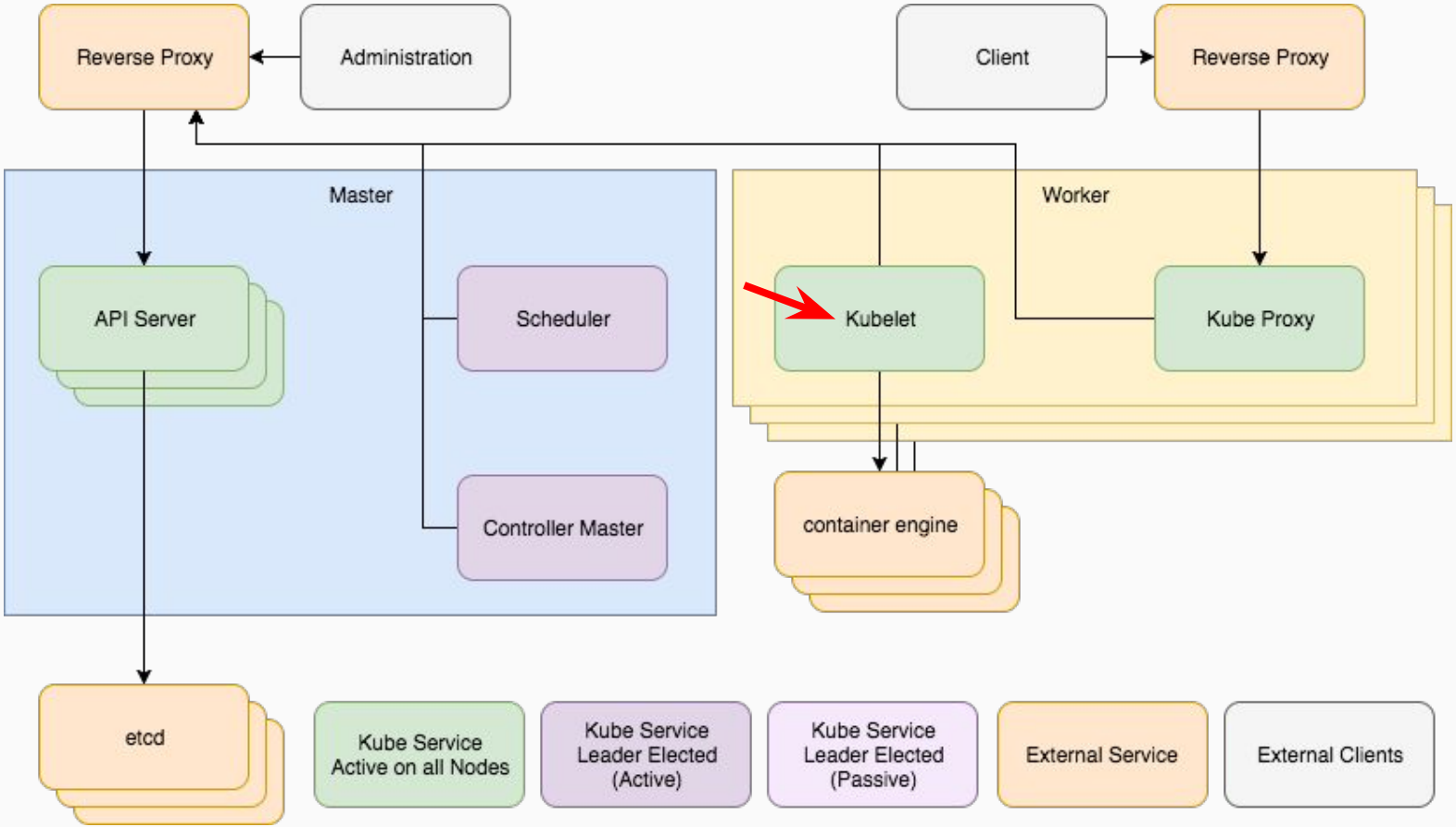


Internal Decision Making

- Aggregate of multiple controllers
  - Replication
  - Endpoints
  - Services
  - Namespaces
- Master elected

Worker Nodes

Kubelet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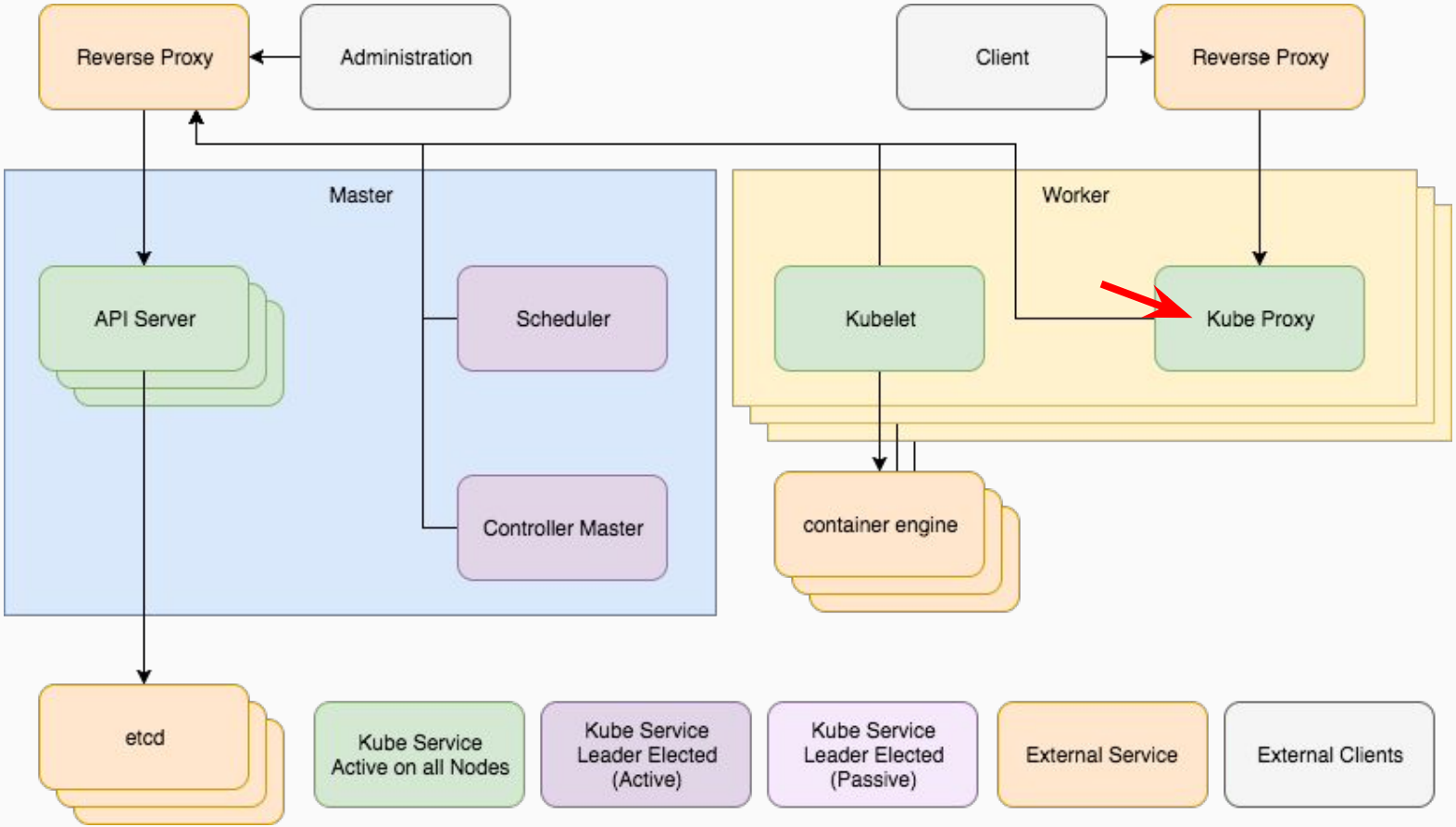
Container Management

- Runs containers
  - Interacts with container runtime
- Communicates worker status to cluster
- One instance per worker node

Kube Proxy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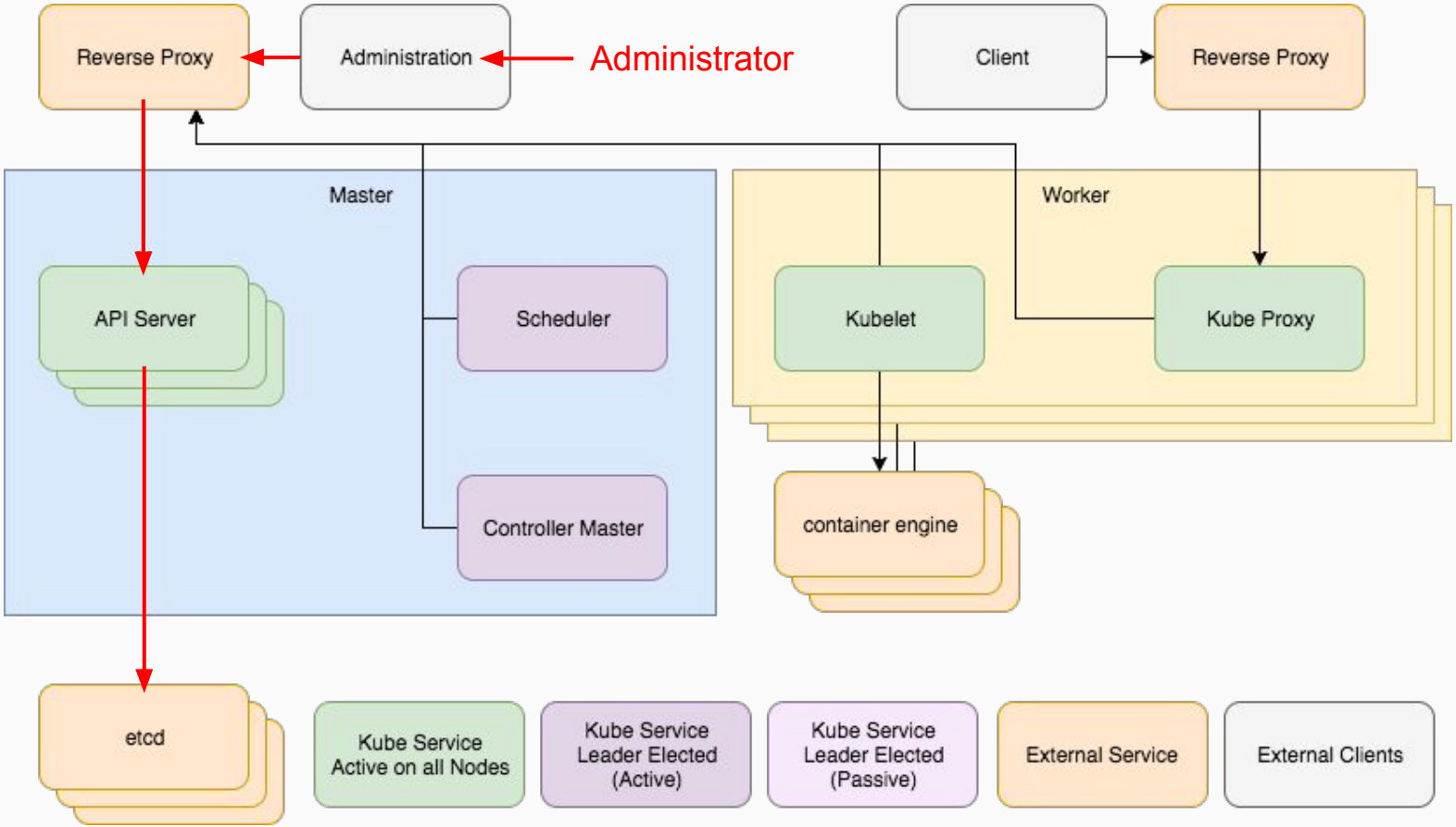
Network Proxy

- Provides external access to services
  - Supports TCP & UDP
- One instance per worker node

Application

Deploying a Service



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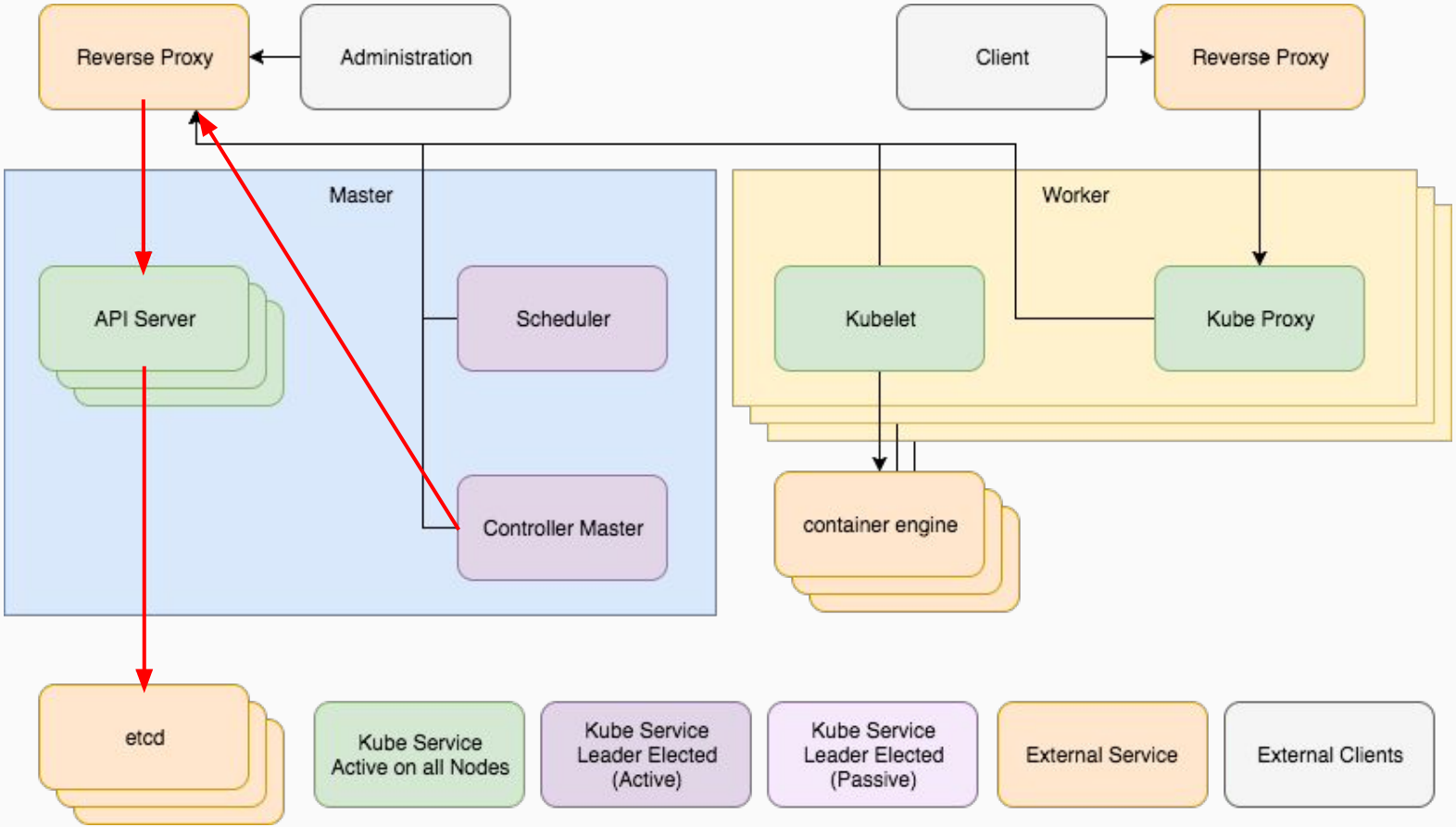

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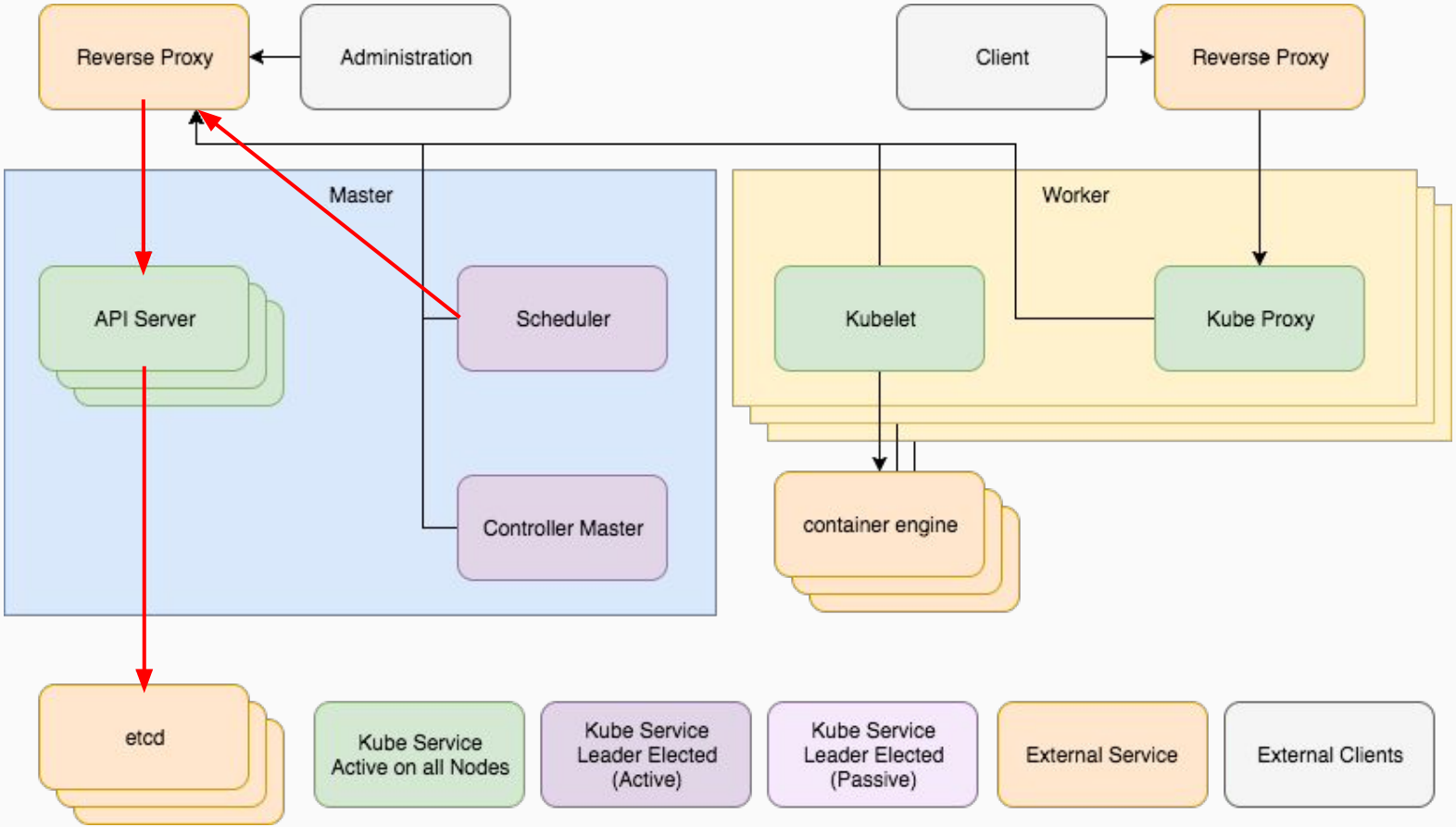

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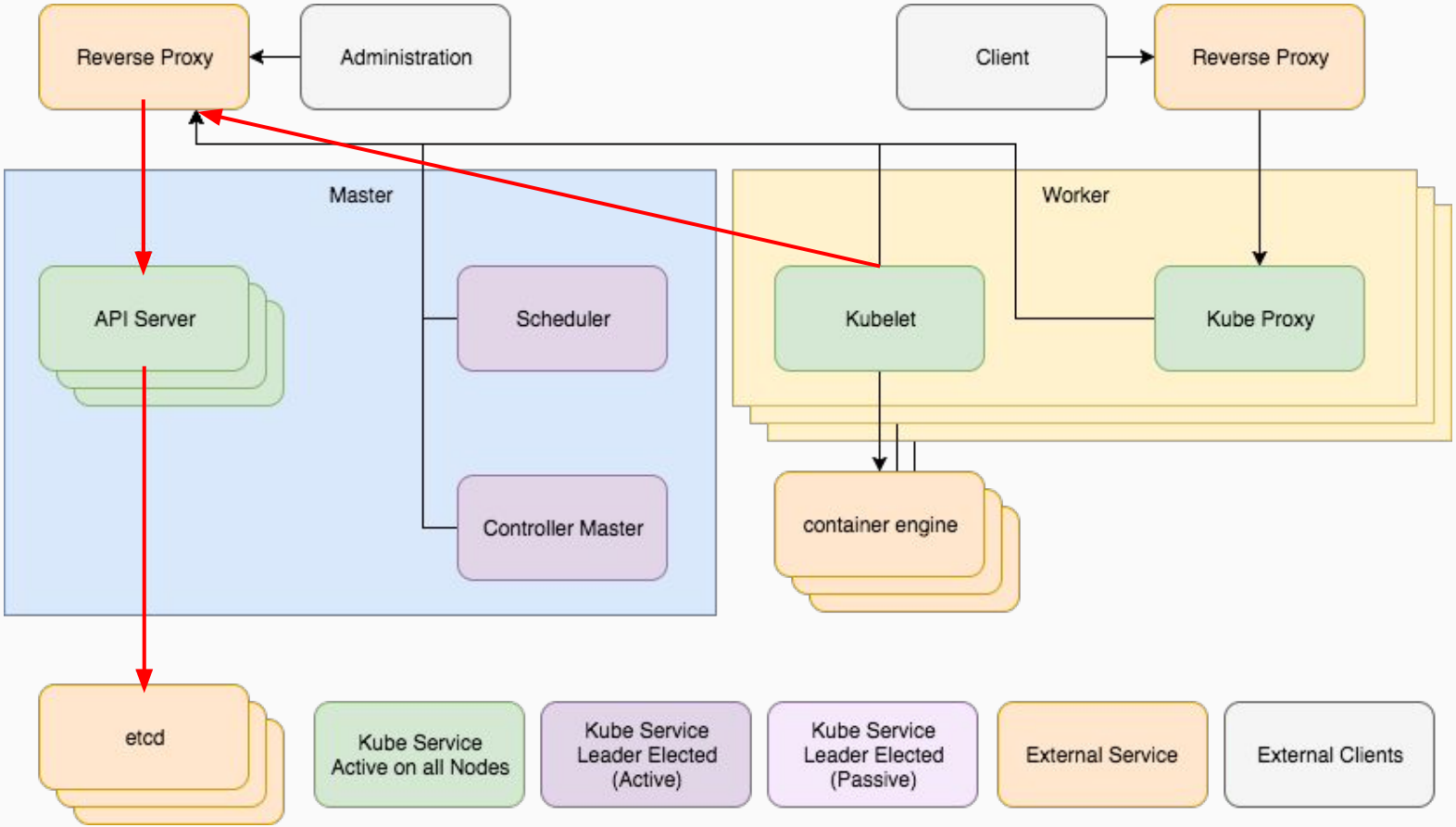

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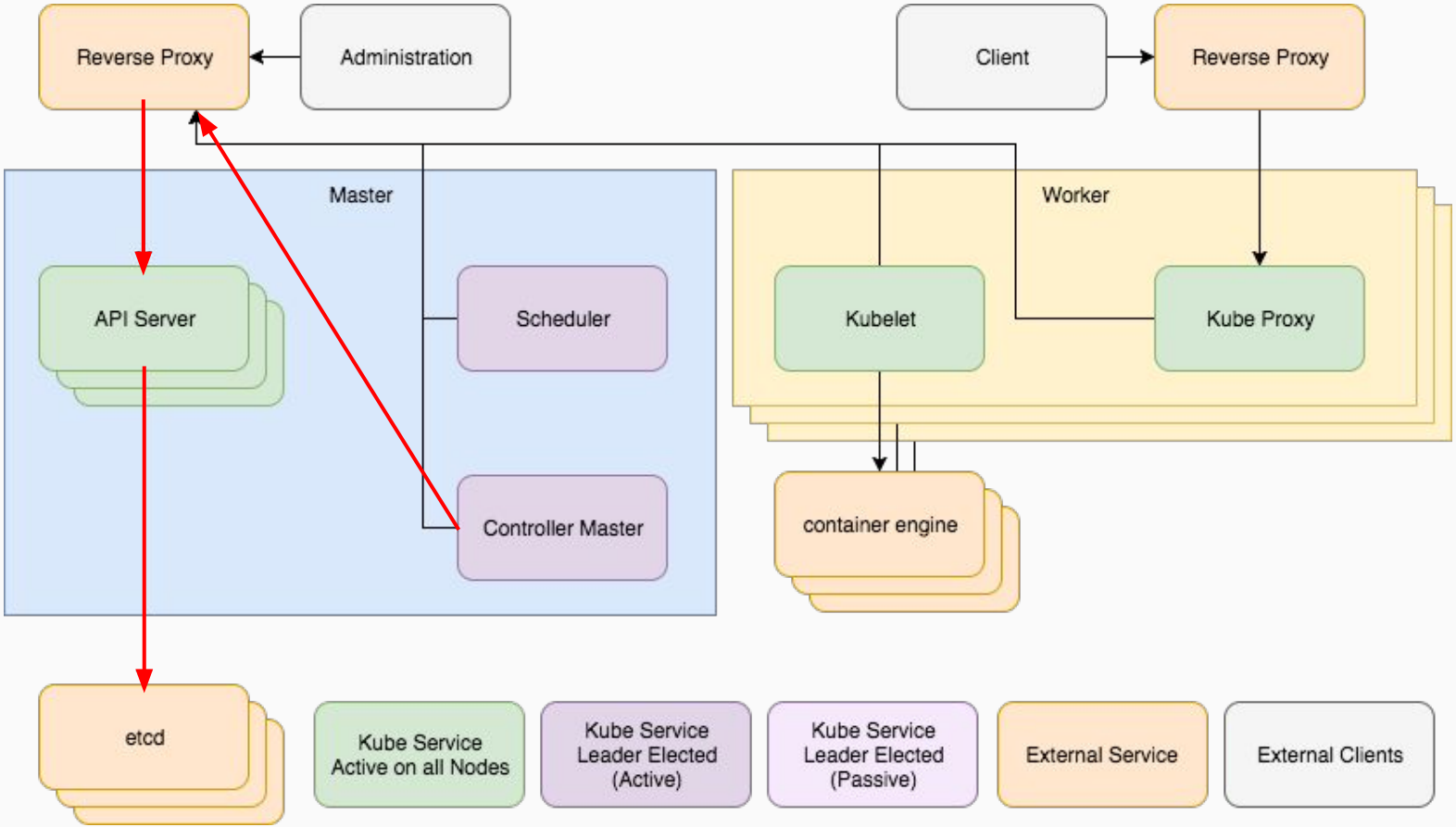

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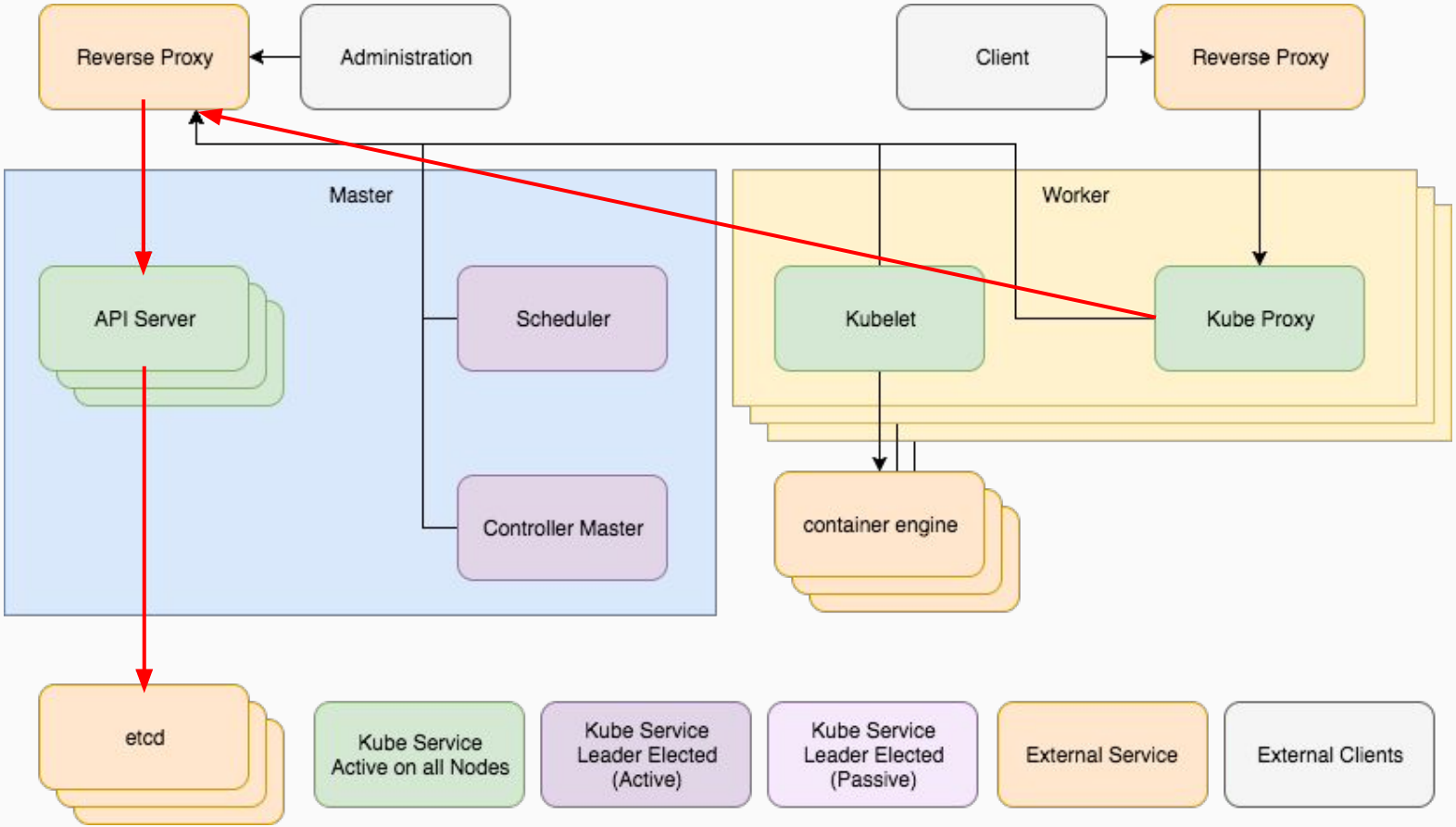

Additional Resources

https://github.com/kelseyhightower/kubernetes-the-hard-way

https://github.com/kubernetes/minikube

https://kubernetes.io/