SkillAssure

Kubernetes Overview

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Who is this for ?

Developers

System Admins

Managers

Prerequisites

- Knowledge on Containers – Docker
- Oracle VirtualBox with Ubuntu VM

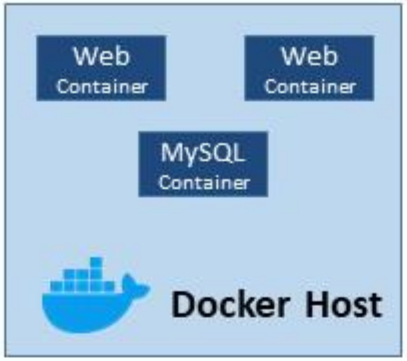
Objectives

- Kubernetes Overview
- Containers – Docker
- Container Orchestration?
- Demo – Setup Kubernetes
- Kubernetes Concepts – PODs | ReplicaSets | Deployment | Services
- Networking in Kubernetes
- Kubernetes Management – Kubectl
- Kubernetes Definition Files - YAML
- Kubernetes on Cloud – AWS/GCP

Kubernetes Overview

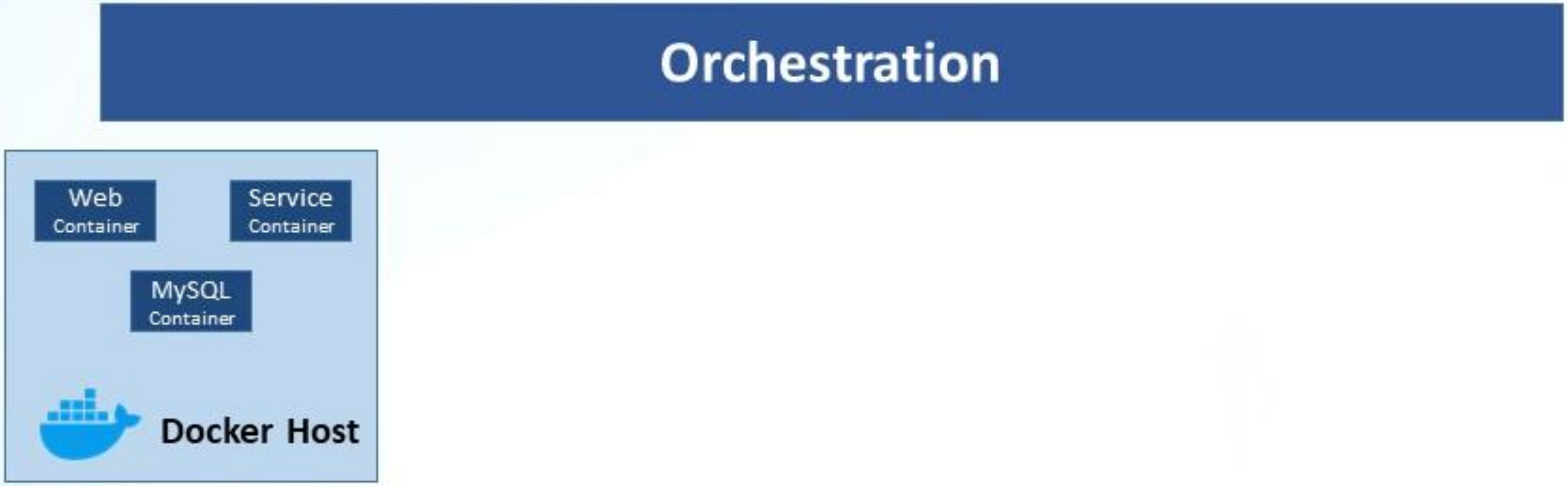
Container Orchestration

- We learned about containers.
- Now we have our application packaged into a Docker container
- But how do we run it in Production environment?
- What if my application depends on other services like
  - Database
  - Backend Services



Container Orchestration

- When the number of users increases, we need to scale up our application
- Scale down when the load decreases
- We need an underlying platform to orchestrate the connectivity between the containers and automatically scale up or down based on the load.
- The Orchestration Platform

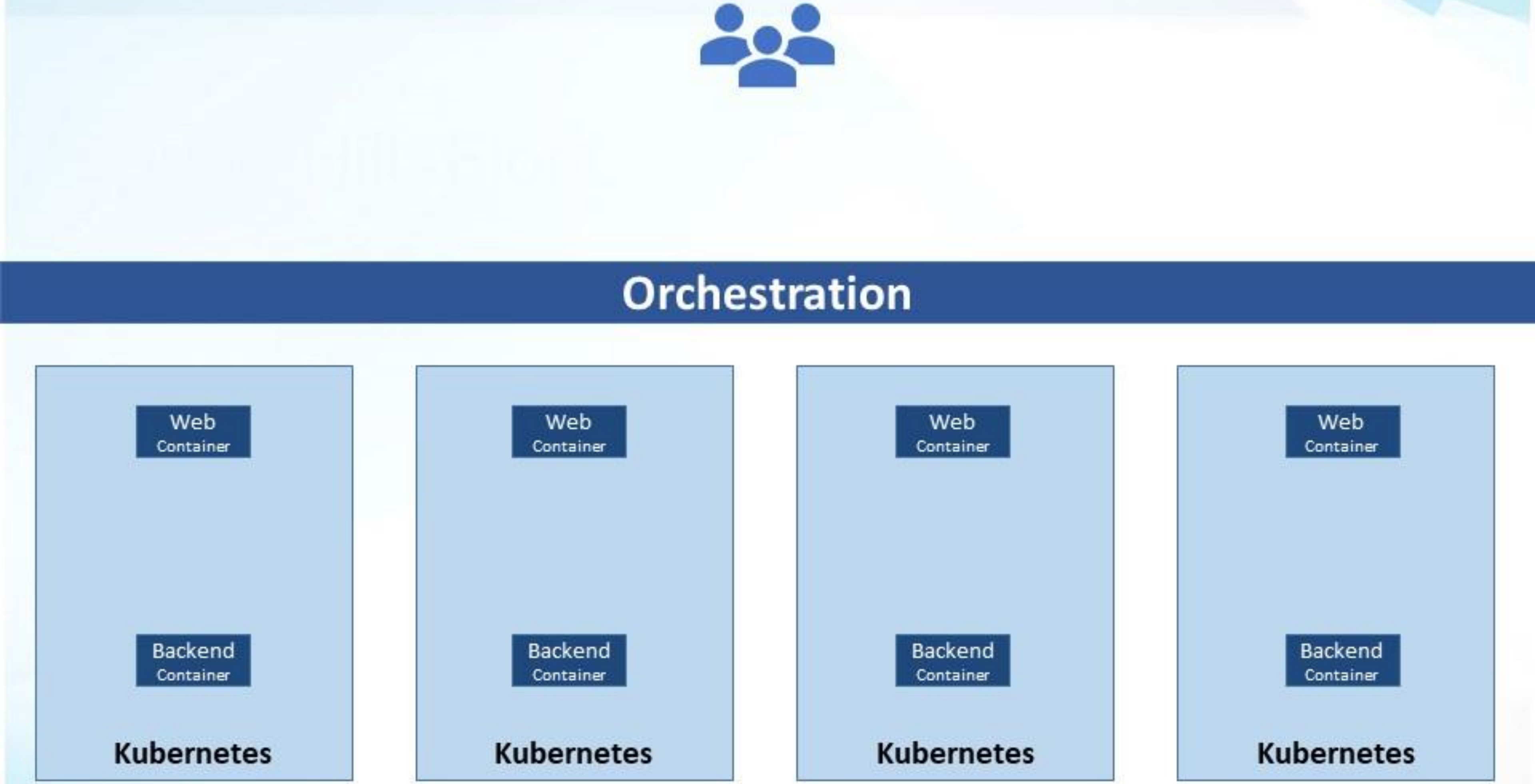


Process of automatically deploying and managing containers is known as Container Orchestration

Orchestration Technologies

Docker Swarm
kubernetes
MESOS

Kubernetes Advantages



Orchestration

Web Container

Backend Container

Kubernetes

Web Container

Backend Container

Kubernetes

Web Container

Backend Container

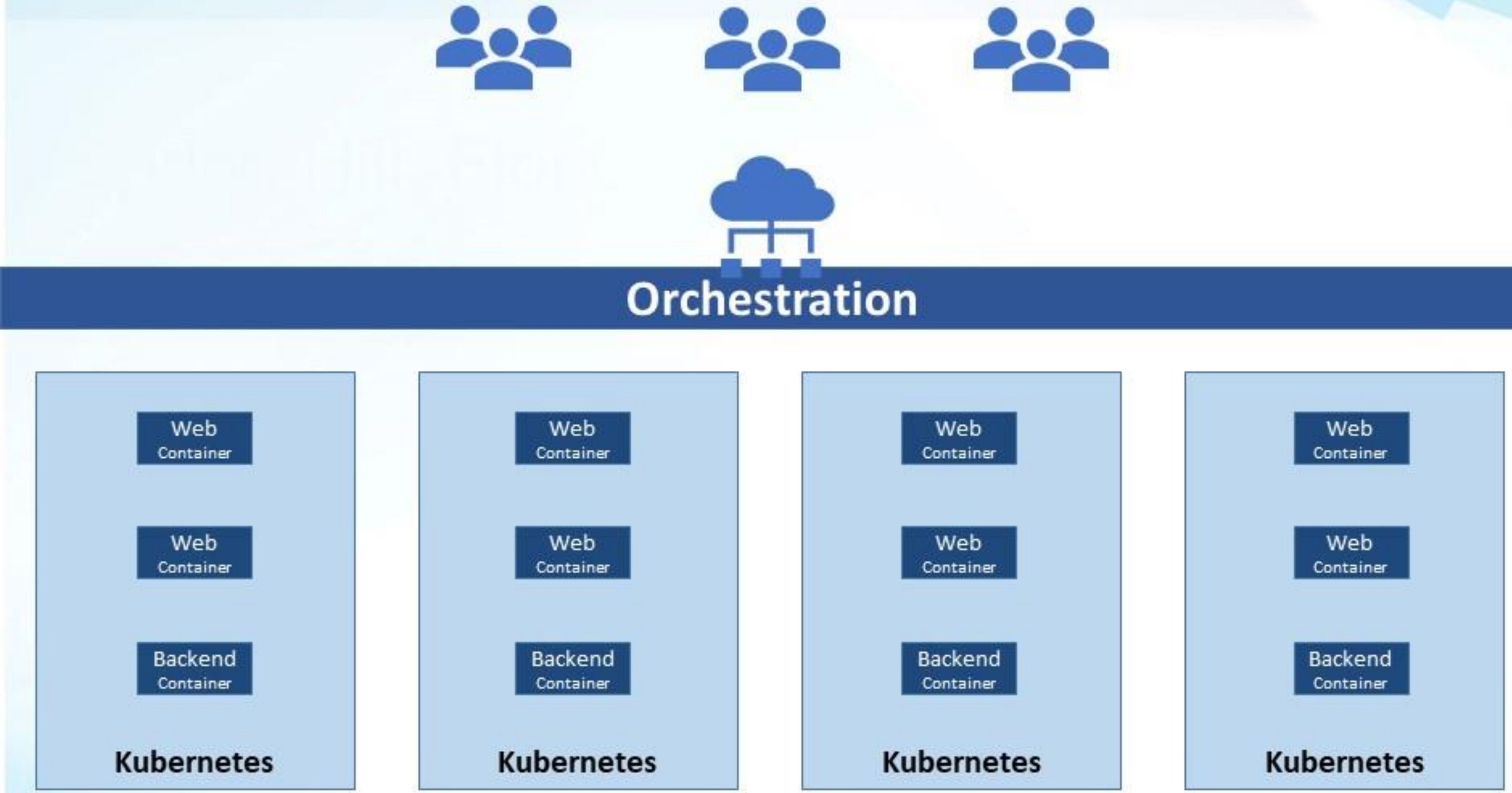
Kubernetes

Web Container

Backend Container

Kubernetes

Kubernetes Advantages



Orchestration

Web Container

Web Container

Backend Container

Kubernetes

Web Container

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Kubernetes

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Web Container

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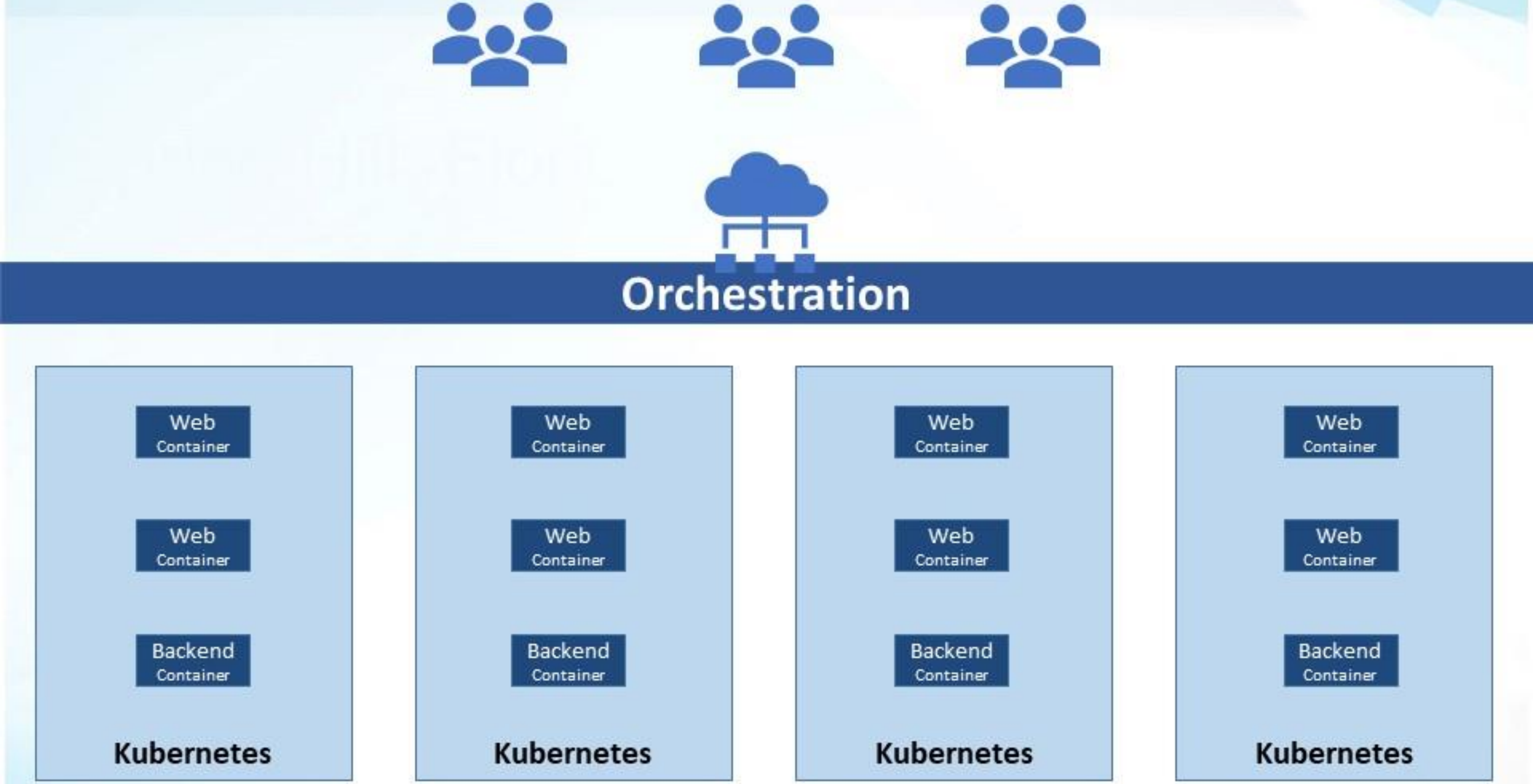
Web Container

Web Container

Backend Container

Kubernetes

Kubernetes Advantages



Orchestration

Web Container

Web Container

Backend Container

Kubernetes

Web Container

Web Container

Backend Container

Kubernetes

Web Container

Web Container

Backend Container

Kubernetes

Web Container

Web Container

Backend Container

Kubernetes

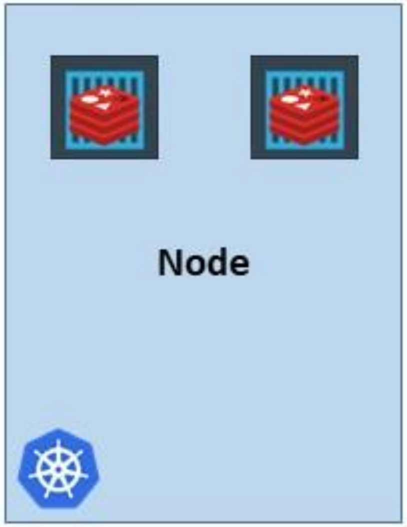
Kubernetes

Kubernetes is a container orchestration technology used to orchestrate the deployment and management of hundreds and thousands of containers in a clustered environment.

Kubernetes Architecture

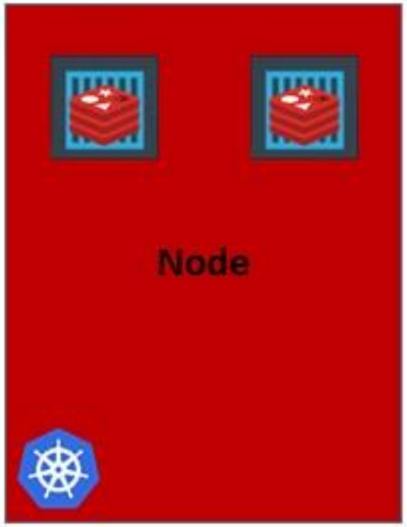
Nodes(minions)

- A node is a machine, physical or virtual on which Kubernetes is installed
- It is a worker machine where containers will be launched by Kubernetes
- It was also known as minions in the past



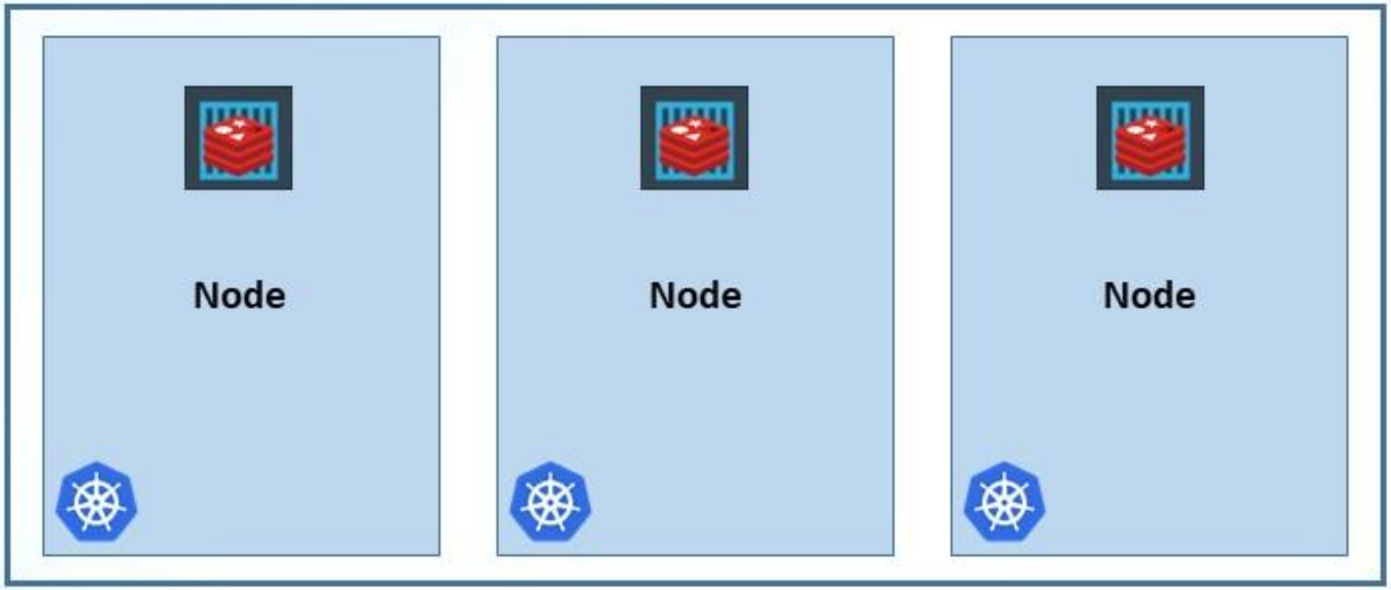
Nodes(minions)

- If the node on which your application is running fails, our application goes down.
- So we need to have more than one nodes.



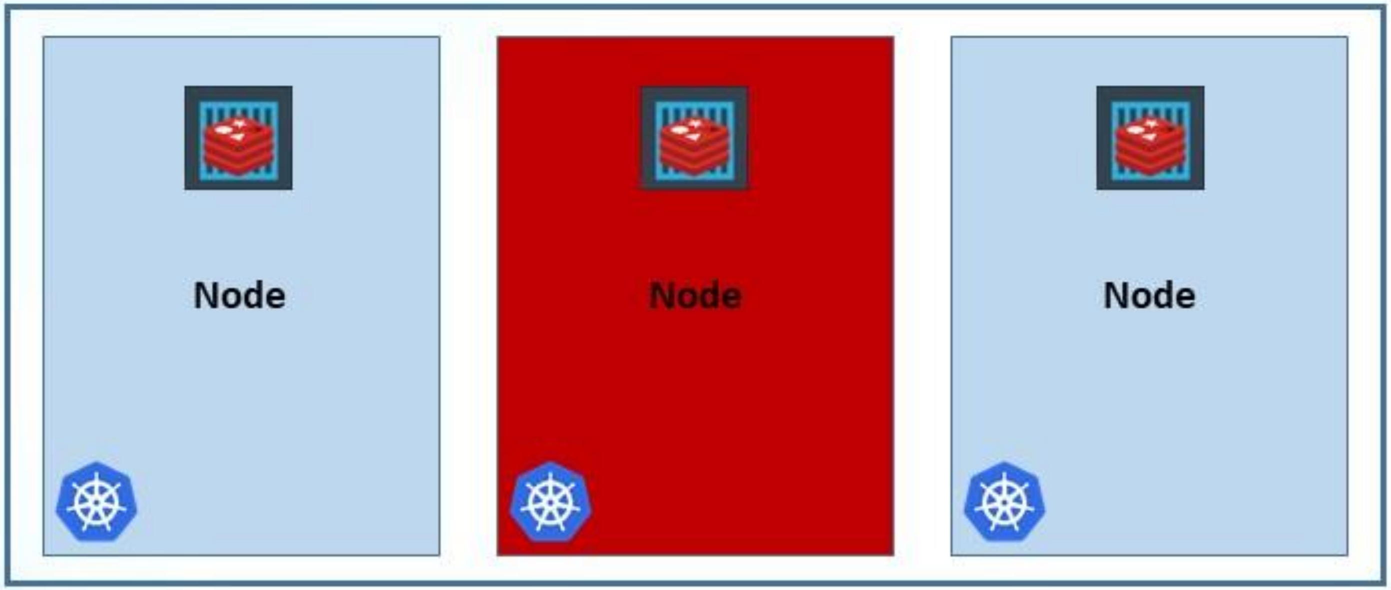
Cluster

- A Cluster is a set of nodes grouped together.



Cluster

- A Cluster is a set of nodes grouped together.
- Even if one node fails, our application will still be accessible from the other nodes
- Multiple nodes helps in sharing load as well



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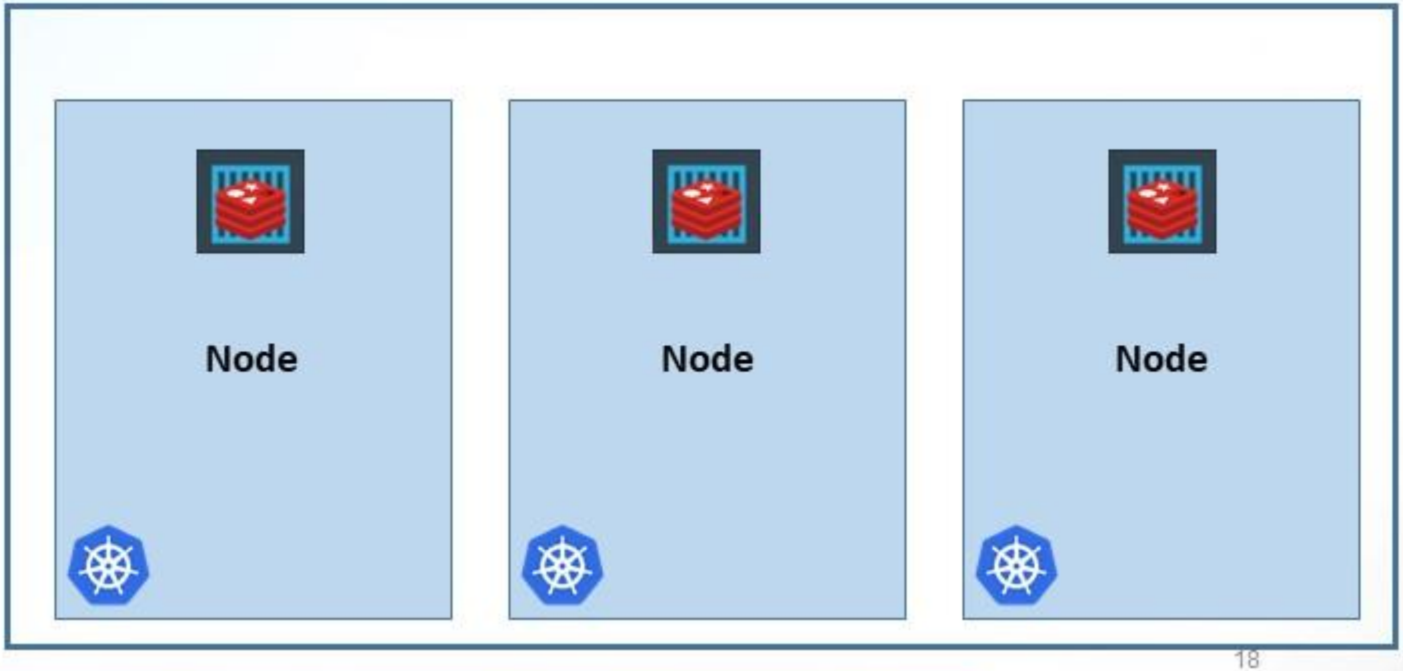
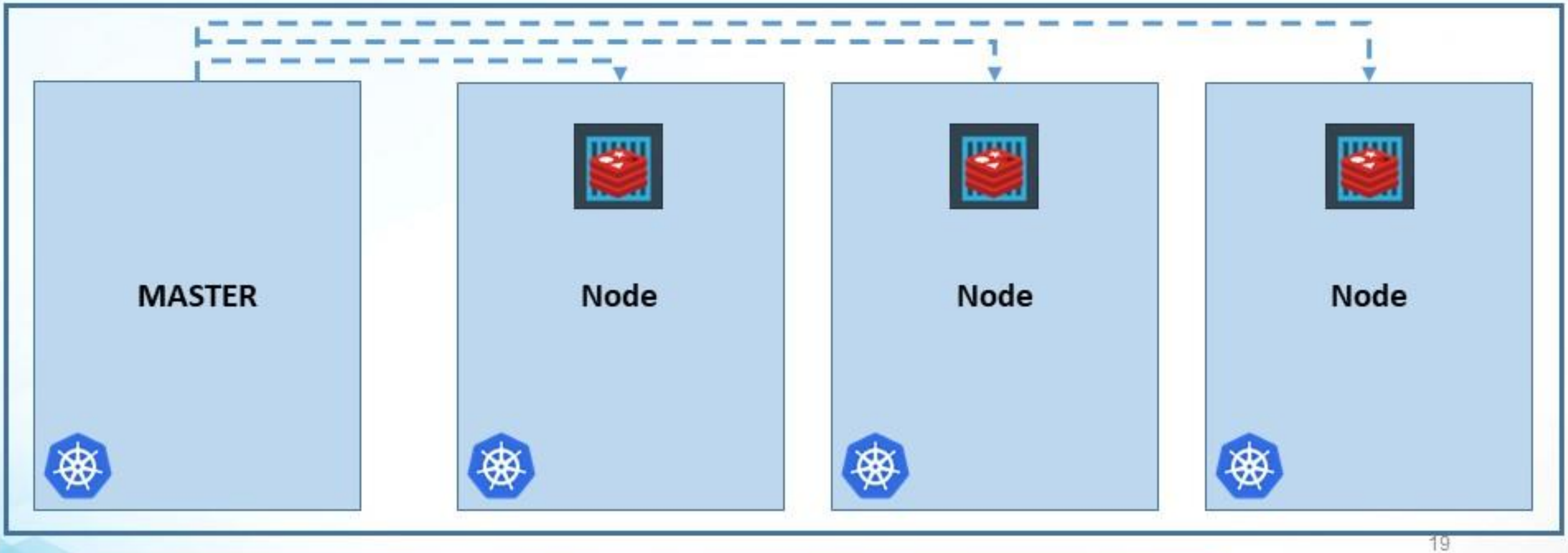
Cluster

- Who is responsible for managing the cluster?
- Where are the information about members of the cluster stored?
- How are the nodes monitored?
- When a node fails how do you move the workload of the failed node to another worker node?



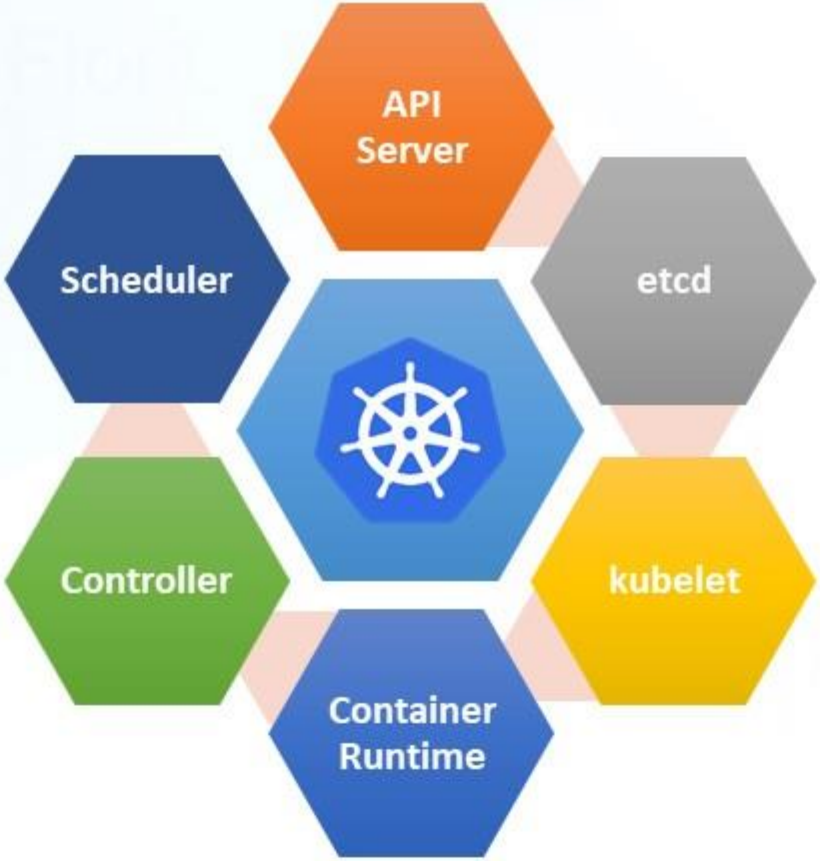
Master

- Master is another node with Kubernetes installed in it and is configured as a Master.
- The master watches over the nodes in the cluster
- It is responsible for the actual orchestration of containers on the worker nodes.



Components

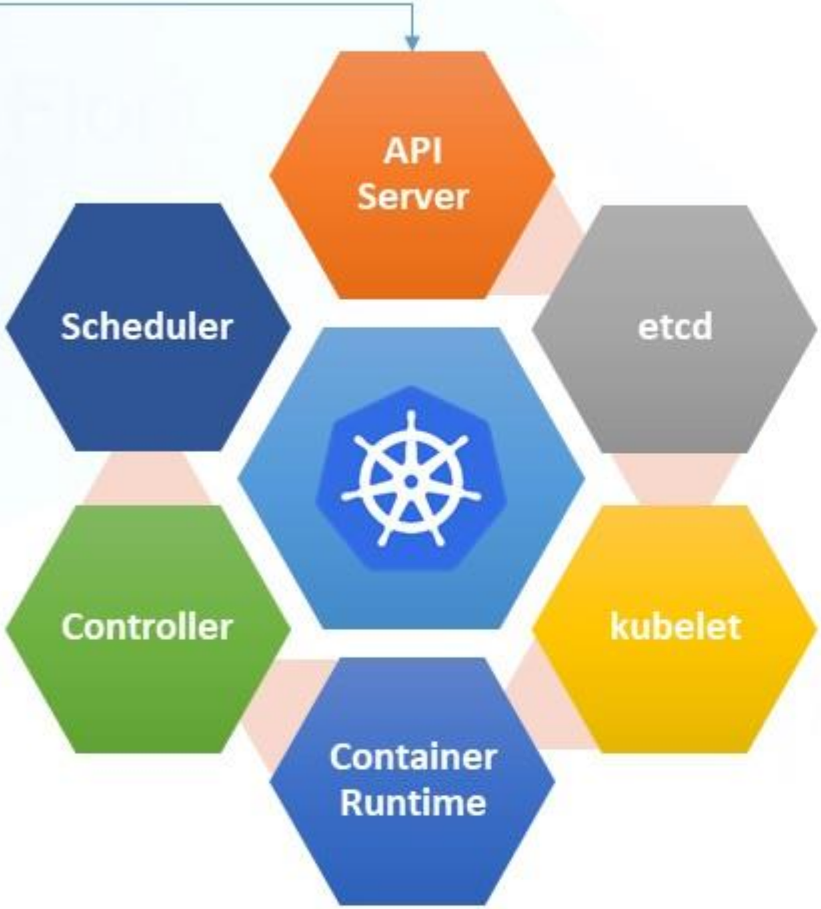
- When you install Kubernetes on a system, you're actually installing the following components.



Components - API Server

API server acts as the front end for Kubernetes

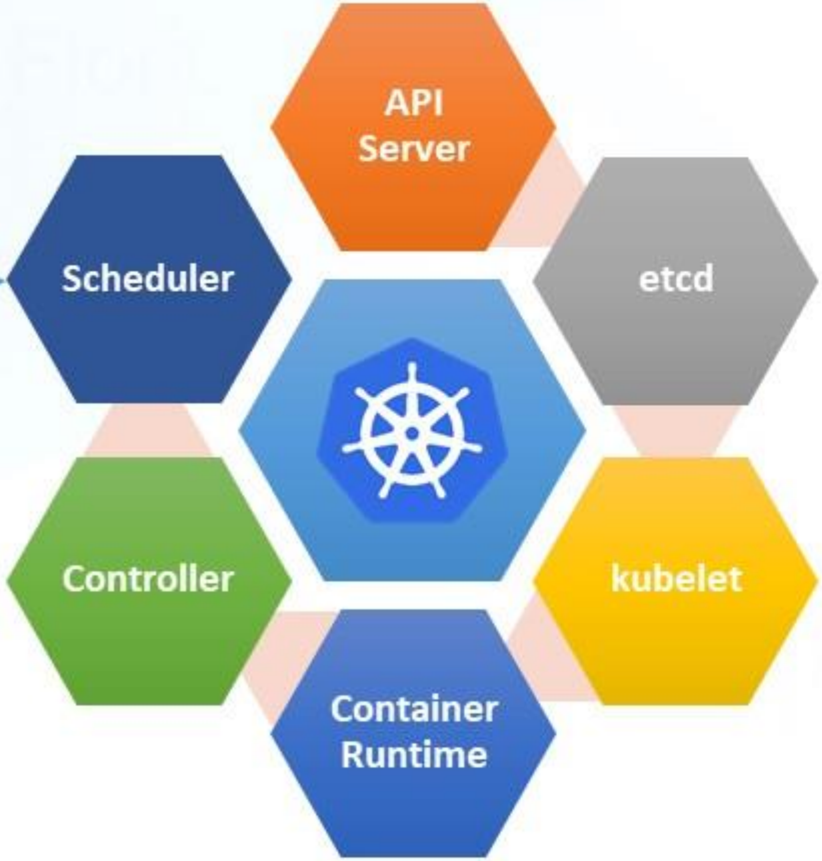
The users, management devices, command line interfaces, all talk to the API server to interact with Kubernetes cluster.



Components - Scheduler

The Scheduler distributes work or containers across multiple nodes.

It looks for newly created containers and assigns them to nodes.

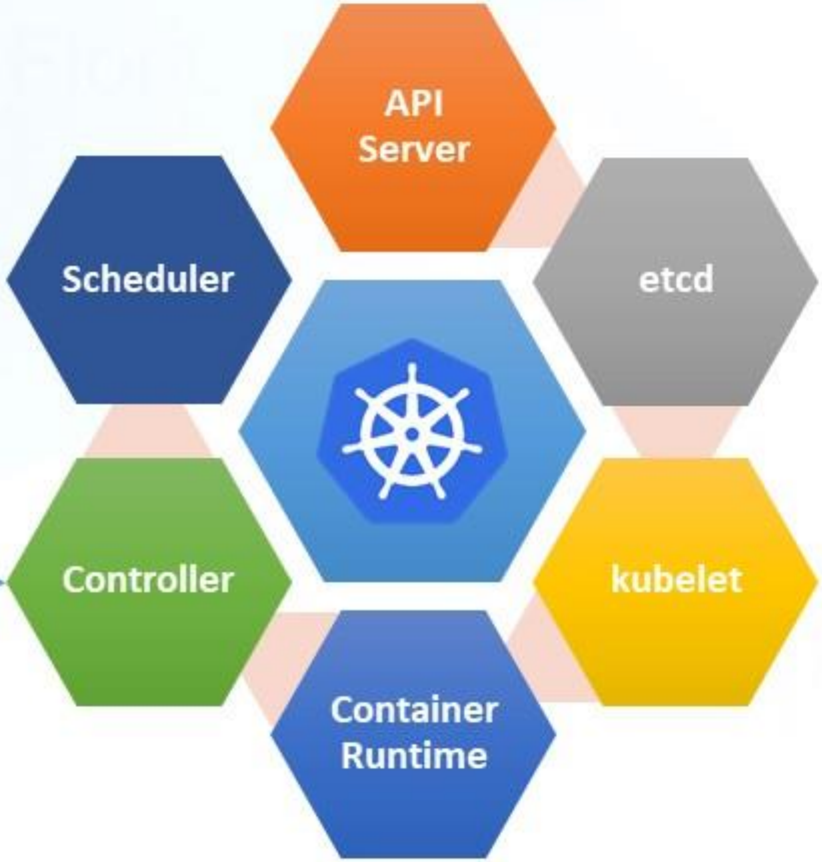


Components - Controller

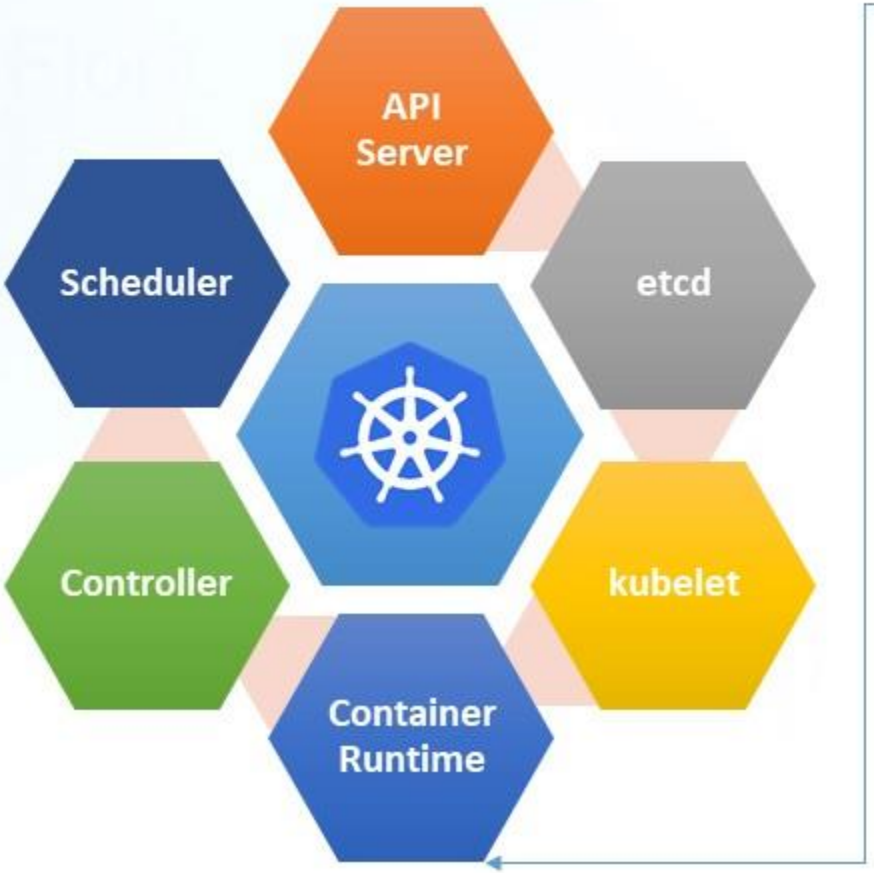
The controllers are the brain behind orchestration

They are responsible for noticing and responding when nodes, containers or end points goes down.

The controllers make decisions to bring up new containers in such cases.



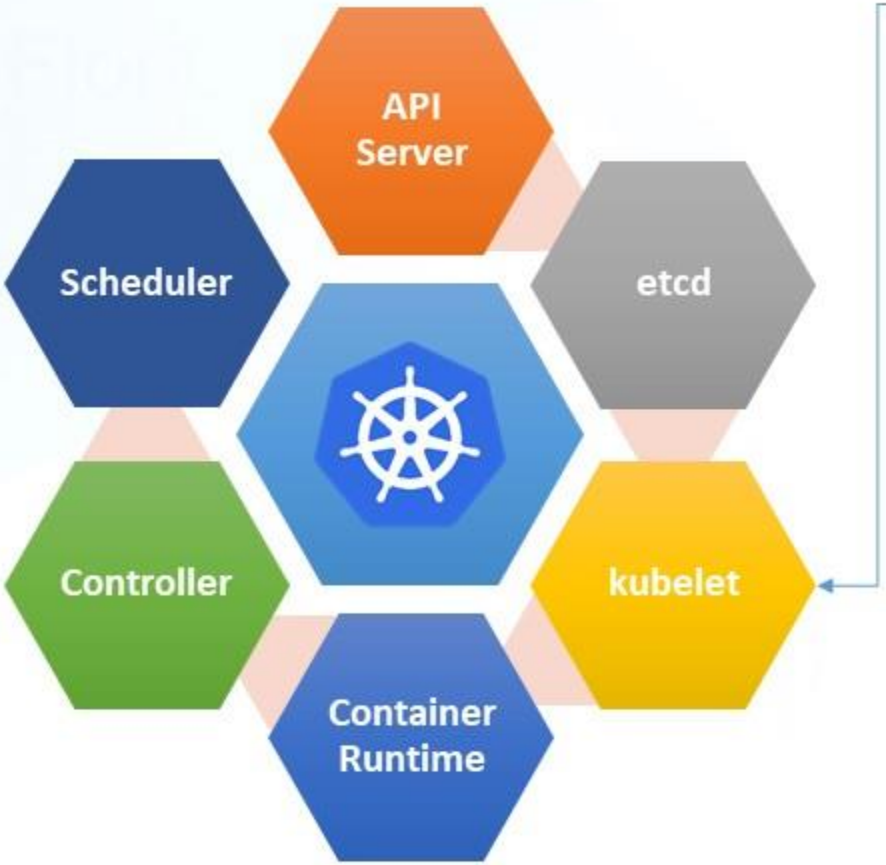
Components - Container Runtime



The Container Runtime is the underlying software that is used to run containers

In our case it is Docker. But there are other options as well.

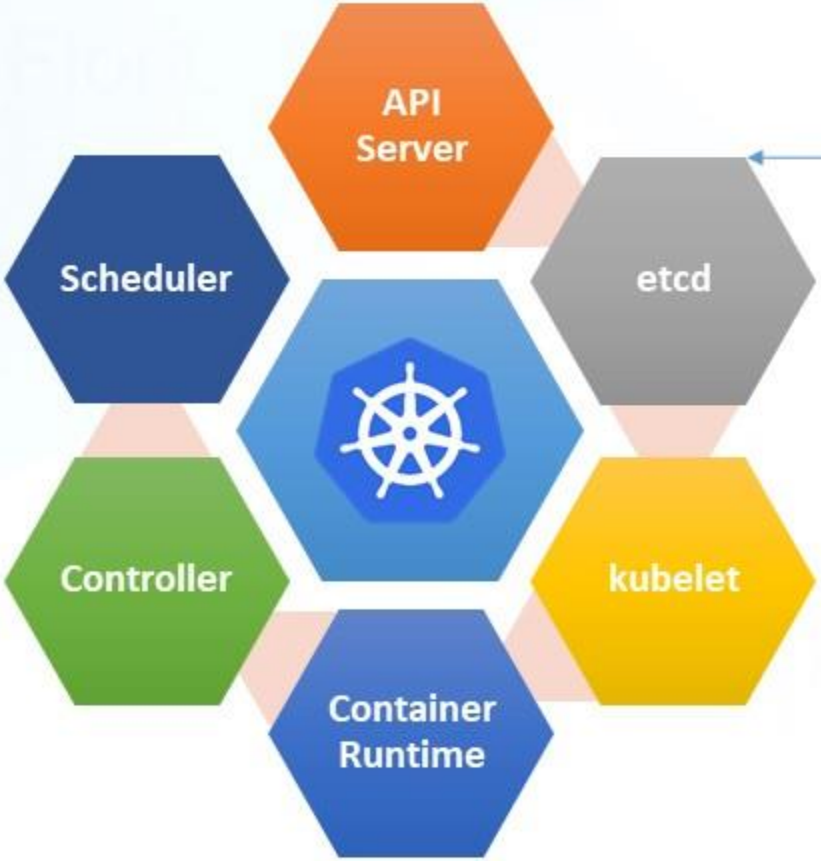
Components - kubelet



Kubelet is the agent that runs on each node in the cluster

The agent is responsible for making sure that the containers are running on the nodes as expected.

Components - etcd

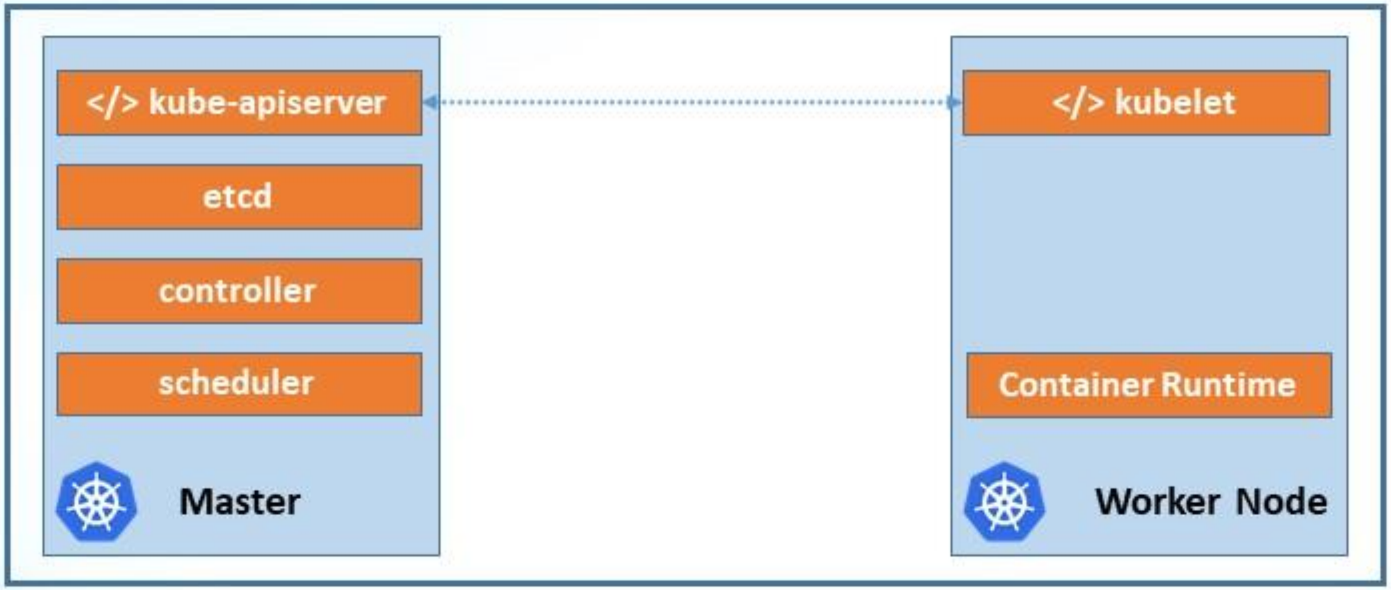


etcd is a distributed reliable key value store. It is used by Kubernetes to store all data used to manage the cluster.

etcd is responsible for implementing locks within the cluster to ensure that there are no conflicts between the Masters.

Master Vs Worker Nodes

- How are these components distributed across different types of servers?
- How does one server become a master and other the slave
- This will help us install and configure the right components on different systems when we set up our infrastructure



kubectl

- It is also know as
  - kube command line tool
  - kube control

```
kubectl run hello-minikube
```

```
kubectl cluster-info
```

```
kubectl get nodes
```

Quiz

Quiz

What is a worker machine in Kubernetes known as?

- Cluster
- Node
- Minion
- ✓ Node or Minion

Quiz

A Node in Kubernetes can only be a physical machine and can never be a virtual machine.

- True
- [✓ False]

Quiz

Multiple Nodes together form a

- POD
- Group
- [✓ Cluster]
- Swarm

Quiz

Which of the following processes runs on Kubernetes Master Node

- Kubelet
- [✓ Kube - apiserver]
- Kube – proxy

Quiz

Which of the following processes runs on Kubernetes Master Node

- Kubelet
- ✓ Kube - apiserver
- Kube – proxy

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Quiz

Which of the following services is responsible for distributing work or containers across multiple nodes.

- Kube - api-server
- Kubelet
- [✓ Scheduler]
- Etcd
- controller

Quiz

Which of the following is the underlying framework that is responsible for running application in containers like Docker?

- Kube - api-server
- Kubelet
- ✓ Container runtime
- Scheduler
- controller

Quiz

Which is the command line utility used to manage a kubernetes cluster?

- Kube - api
- Kubelet
- Kubectrl
- ✓ kubectl
- docker

Quiz

Which is the command line utility used to manage a kubernetes cluster?

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Thank You