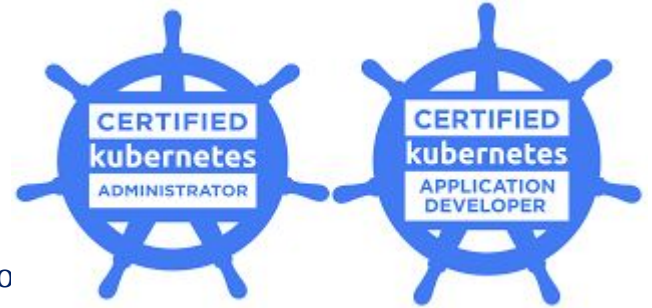


Who am I ?

11 years of comprehensive experience in the areas of **Docker, Kubernetes ,Cloud (AWS & Azure), automation with Ansible , ELK Stack (Elasticsearch, Logstash, Kibana), Grafana, Cloud Watch, Prometheus , Splunk.**



Certifications

- ❖ Agile - Certified Scrum Master (CSM) – Certification ID : 000832020
- ❖ Certified Kubernetes Administrator - CKA-1900-003992-0100
- ❖ Certified Kubernetes Application Developer (CKAD)- CKAD-2000-003341-0100
- ❖ Red Hat Certified Specialist in Ansible Automation Certification ID: 170-006-431
- ❖ Red Hat Certified Engineer in (RHEL) 7.0 Certification ID: 170-006-431
- ❖ Red Hat Certified System Administrator Certification ID: 170-006-431
- ❖ AWS Certified Solutions Architect– Professional (SAP) Validation Number YKS7E5FCKE44Q09T
- ❖ AWS Certified Solutions Architect - Associate (SAA) Validation Number MCRKHLEKCBB4QY9P
- ❖ AWS Certified Developer - Associate (DVA) Validation Number CoRGWMFCC2QQ1J3V
- ❖ 1Z0-851 Java Standard Edition 6 Programmer Certified Professional

Kubernetes

Course Content

Module 1: Kubernetes Concepts

Labs

Module 2: Installation, Configuration, Validation & Cluster Maintenance

Labs

Module 3: Application LifeCycle Management

Labs

Module 4: Scheduling

Labs

Module 5: Networking

Labs

Module 6: Storage

Labs

Module 7: Security

Labs

Module 8: Logging and Monitoring

Labs

Module 9: Troubleshooting

Labs

Introducing Kubernetes

Automate container deployment, scaling & management

What this session cover ?

This session aimed at individual who have Zero knowledge of Kubernetes and would like to gain real time of experience of Kubernetes.

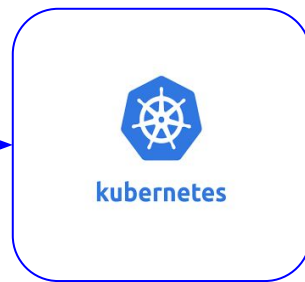


Prerequisite for k8s

Although i will start this Kubernetes session from scratch , a prior Docker knowledge is required.



Docker Certified Associate (DCA)



Certified Kubernetes Administrator (CKA)

This certification is scenario based exam not multi choice questions, so if you are appearing for exam then Practice is very very important.

CKA exam details

The Certification focuses on the skills required to be a successful Kubernetes Administrator in industry today. This includes these general domains and their weights on the exam:

- Application Lifecycle Management 8%
- Installation, Configuration & Validation 12%
- Core Concepts 19%
- Networking 11%
- Scheduling 5%
- Security 12%
- Cluster Maintenance 11%
- Logging / Monitoring 5%
- Storage 7%
- Troubleshooting 10%



<https://www.cncf.io/certification/cka/>

https://github.com/cncf/curriculum/blob/master/CKA_Curriculum_V1.18.pdf

<https://training.linuxfoundation.org/wp-content/uploads/2020/04/CKA-CKAD-Candidate-Handbook-v1.10.pdf>

My Lab Codes

My workspace:

<https://github.com/shivamjhalabfiles/kubernetes-lab>

Kubernetes Introduction

Introducing Kubernetes

Automate container deployment, scaling & management

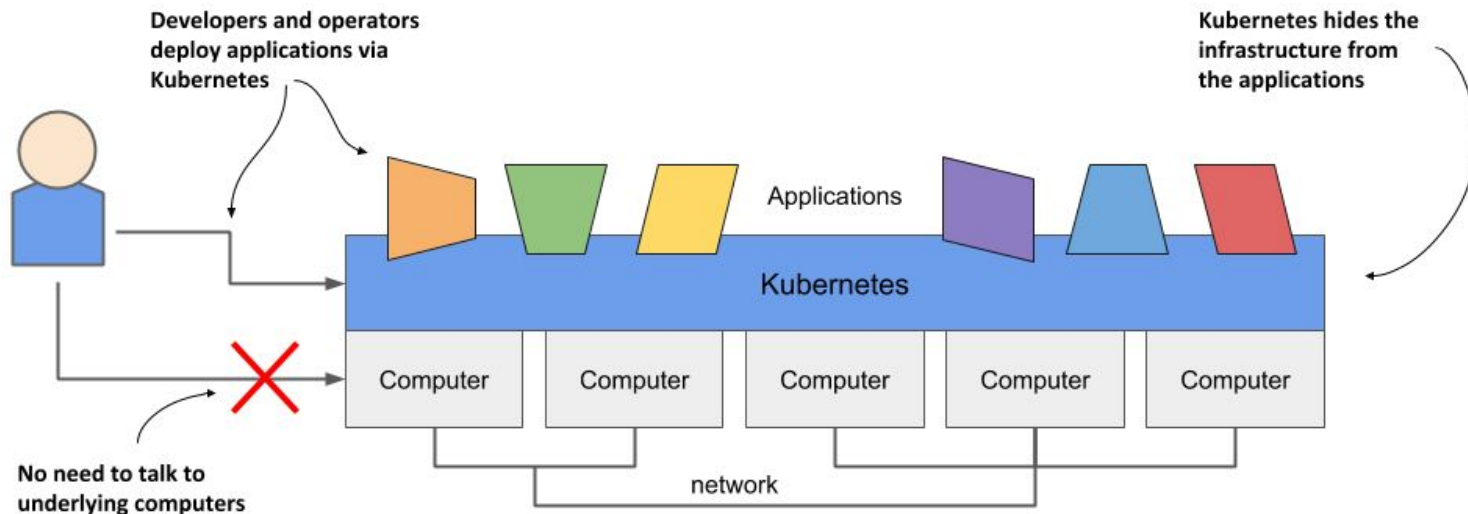
Getting Started

- The word Kubernetes is Greek for pilot or helmsman, the person who steers the ship - the person standing at the helm (the ship's wheel). This theme is reflected in the logo.
- It's also referred to as Kube or K8s, pronounced Kates, where the 8 signifies the number of letters omitted between the first and last letter.
- Kubernetes is a software system for automating the deployment and management of complex, large-scale application systems.



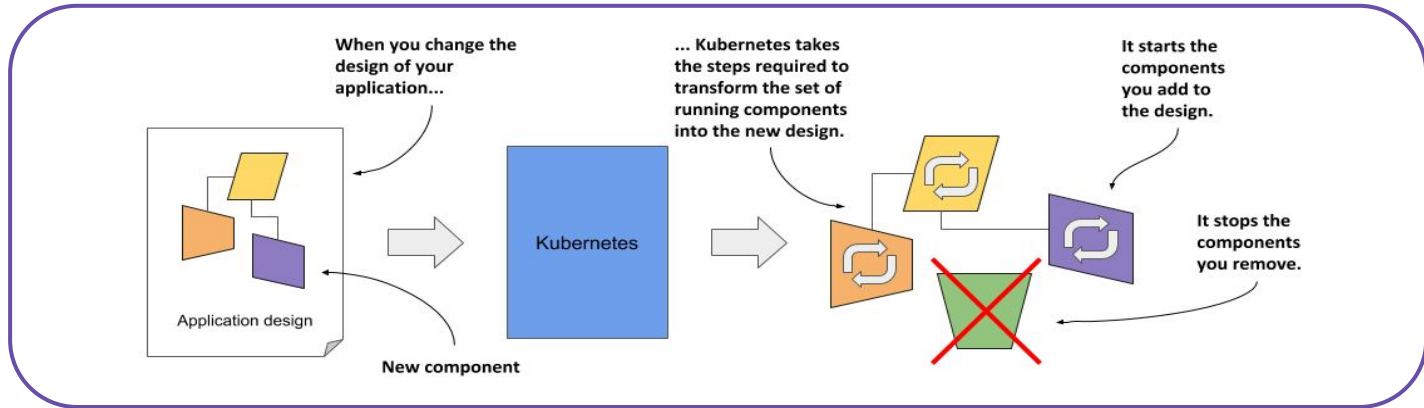
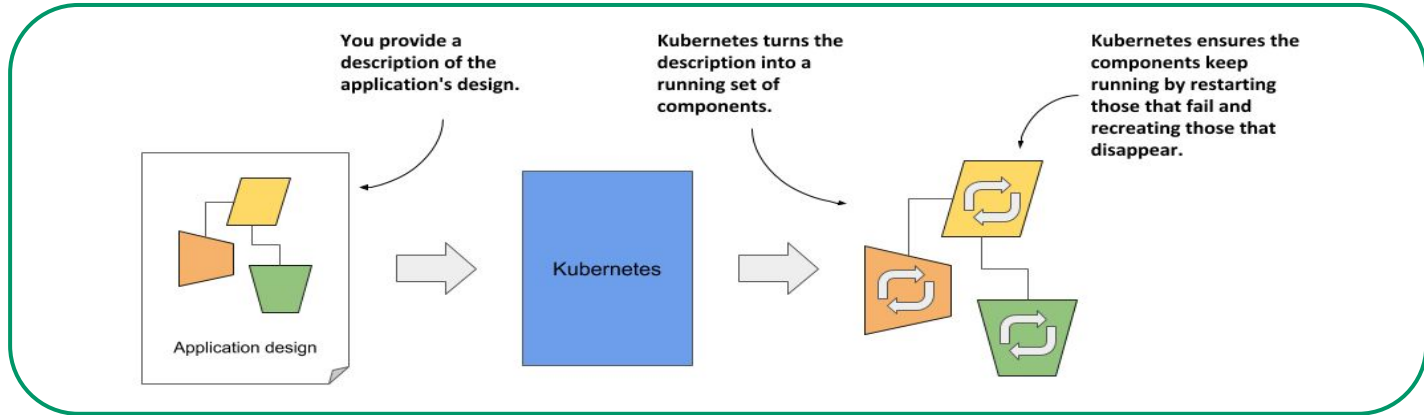
Kubernetes logo

What it does ?



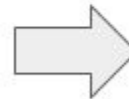
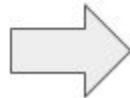
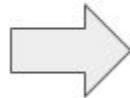
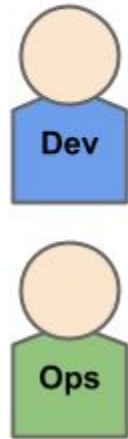
How it does ?

Declarative way of application deployment

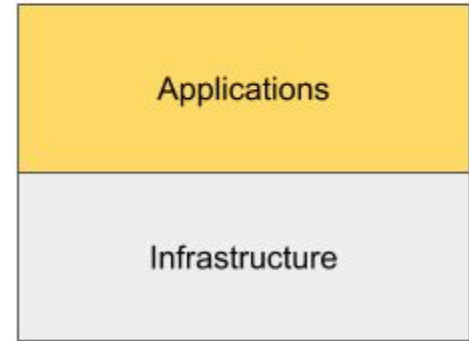


What is role of Dev & Ops Engineer?

Development and operations engineers tell Kubernetes what they want to achieve.



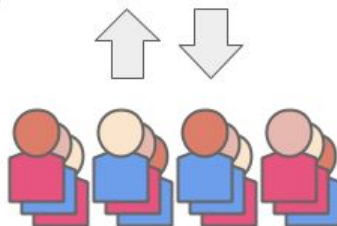
Kubernetes performs the actions necessary to achieve the desired objective, taking into account the state of the environment at every moment.



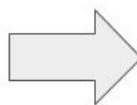
How it Originated ?

- Kubernetes was originally developed by Google.
- Kubernetes is not an open-sourced version of Borg or Omega. It's more like Kubernetes shares its DNA and family history with Borg and Omega.
- Kubernetes is an open-source project donated to the CNCF in 2014, it's licensed under the Apache 2.0 license, version 1.0 shipped way back in July 2015

Google built Kubernetes based on its own internal systems



Kubernetes is an open-source project with thousands of contributors and users



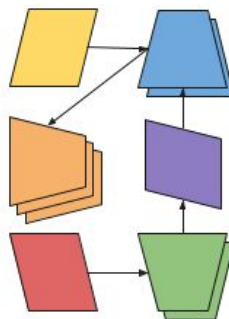
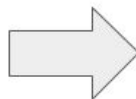
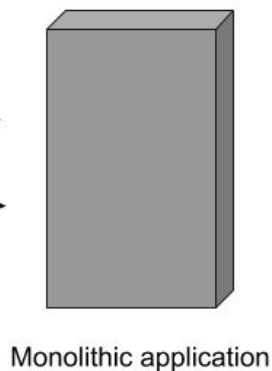
Several commercial distributions of Kubernetes are provided by different vendors

Why K8s is popular ?

- Horizontally scaling the monolithic application was rarely possible
- Kubernetes automate the management of Microservices , the features it offers make the task of managing hundreds of microservices are very small
- Bridging the Dev and Ops conflict

A monolithic application consists of one or a very small number of applications.

Monolithic applications can be managed manually.

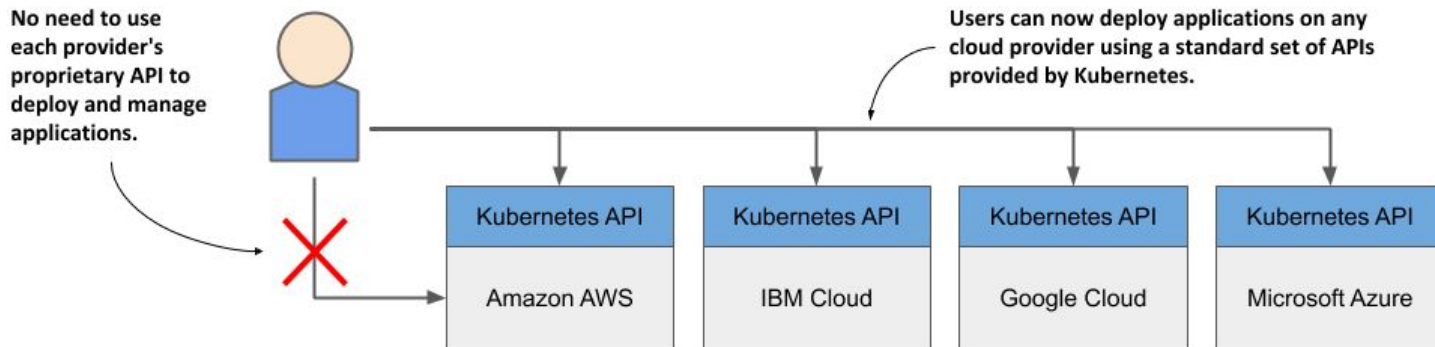


Each microservice is an application in its own right. It must be installed, configured and managed separately.

Microservices require automated management due to their multiplicity and distributed nature.

Managed Kubernetes

- Managed Kubernetes is when third-party providers take over responsibility for some or all of the work necessary for the successful set-up and operation of K8s.
- With managed Kubernetes, get easy access to a Kubernetes cluster without having to set up and maintain it themselves.



THANK YOU.....



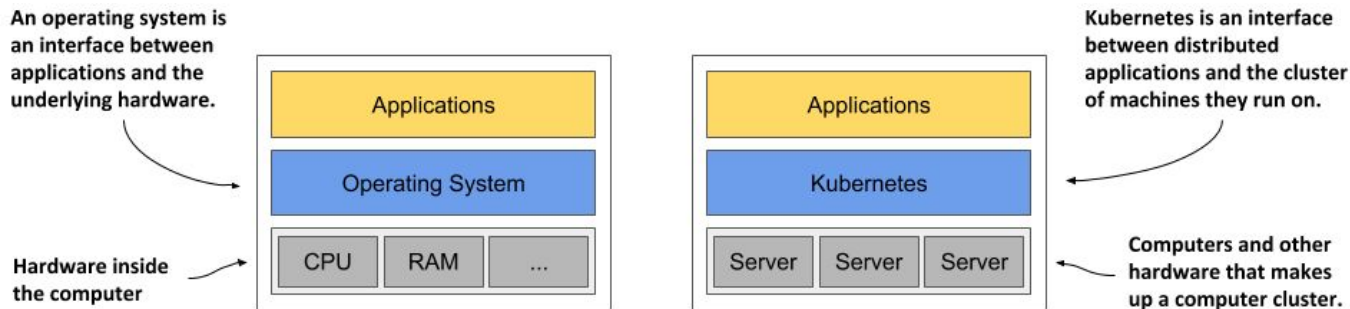
DO YOU HAVE ANY QUESTIONS ?

Understanding Kubernetes

Automate container deployment, scaling & management

What exactly Kubernetes looks like ?

- Kubernetes is like an Operating System for computer clusters
- Just as an operating system supports the basic functions of a computer, like scheduling processes on its CPUs and acting as an interface between the application and the computer's hardware
- Kubernetes schedules the components of a distributed application onto individual computers in the computer cluster and acts as an interface between the application and the cluster.

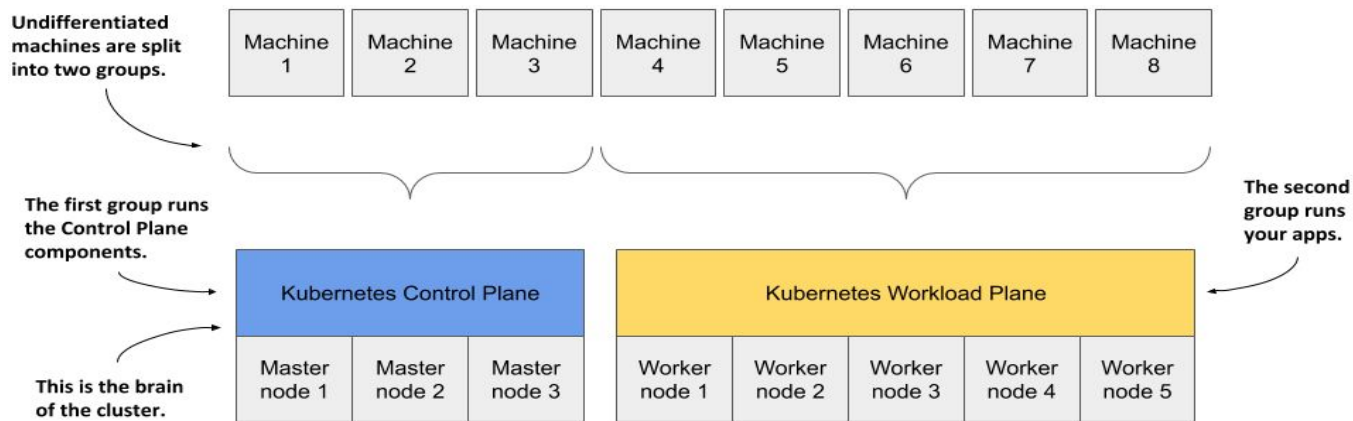


What Kubernetes do ?

- service discovery - a mechanism that allows applications to find other applications and use the services they provide
- horizontal scaling - replicating your application to adjust to fluctuations in load
- load-balancing - distributing load across all the application replicas
- self-healing - keeping the system healthy by automatically restarting failed applications and moving them to healthy nodes after their nodes fail
- leader election - a mechanism that decides which instance of the application should be active while the others remain idle but ready to take over if the active instance fails.

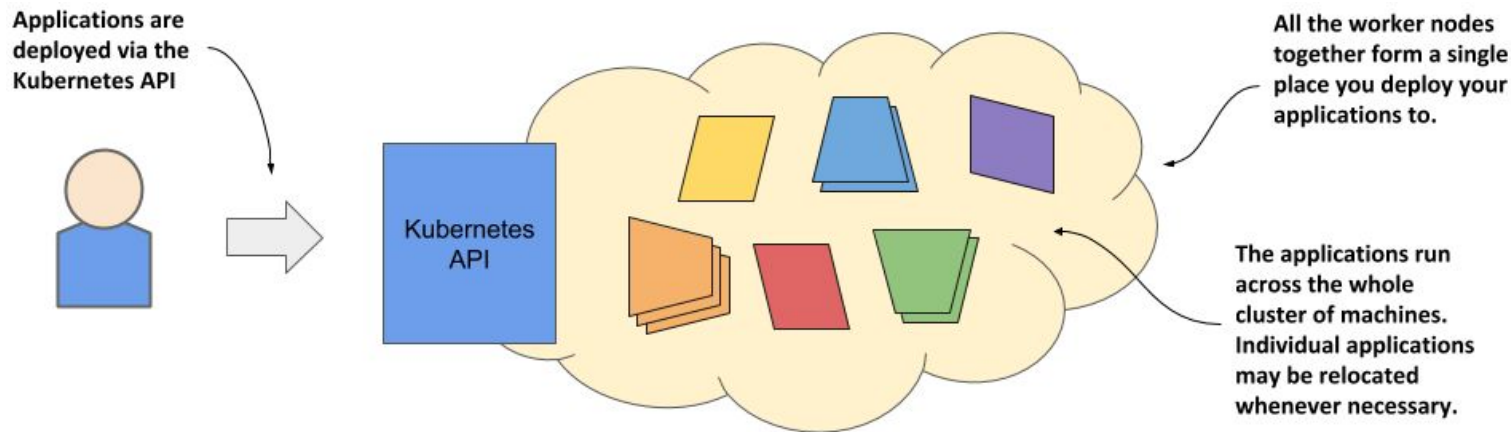
How K8s deployed on cluster of computer ?

- Kubernetes Cluster is divided into two groups - the master and the worker nodes.
- The master node will run the Kubernetes Control Plane
- Applications- your workloads run on worker nodes.



Where your application is deployed ?

- When you deploy applications, Kubernetes decide which worker node application should be deployed .
- Kubernetes may later even move the application from one node to another. You may not even notice when that happens, and you shouldn't care.



Benefits of Kubernetes

- Self-Service deployment of Applications
- Reducing costs via better infrastructure utilization
- Automatically adjusting to changing load
- Keep application running smoothly
- Simplifying application development

THANK YOU.....



DO YOU HAVE ANY QUESTIONS ?

Kubernetes Architecture

Automate container deployment, scaling & management

Getting Started

- A Kubernetes cluster consists of nodes divided into two groups
- A set of master nodes that host the **Control Plane** components, which are the brains of the system, since they control the entire cluster.
- A set of worker nodes that form the **Workload Plane**, which is where your workloads (or applications) run.

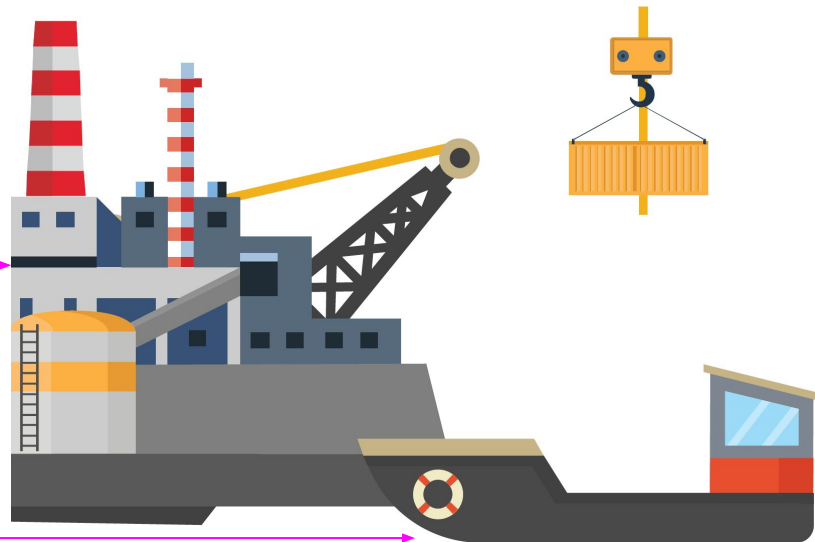
Ship analogy

Control Ship

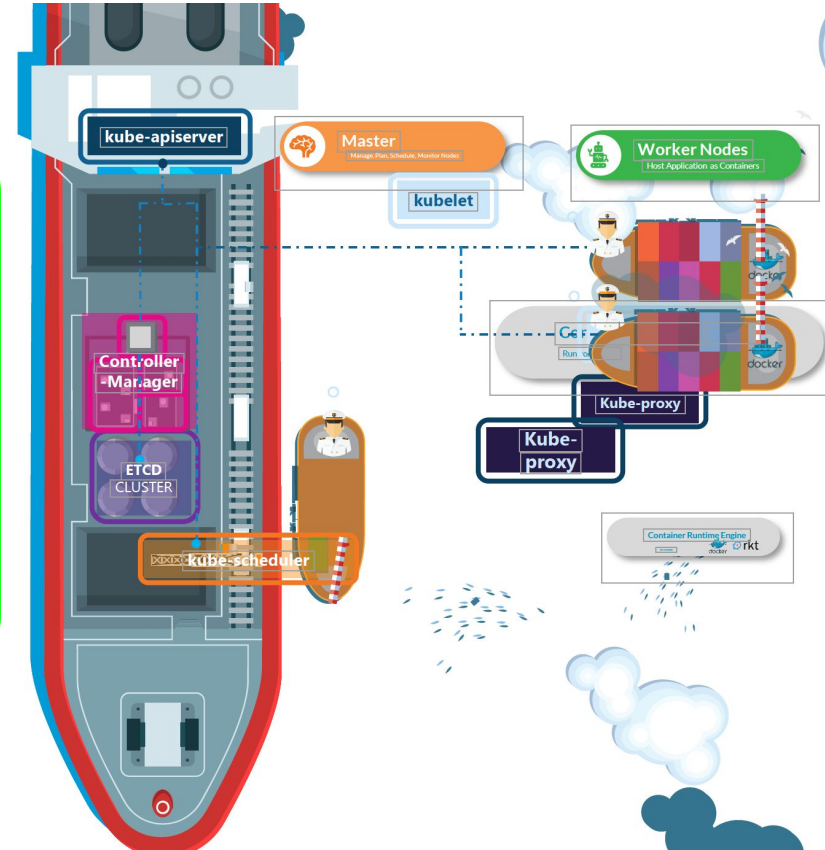
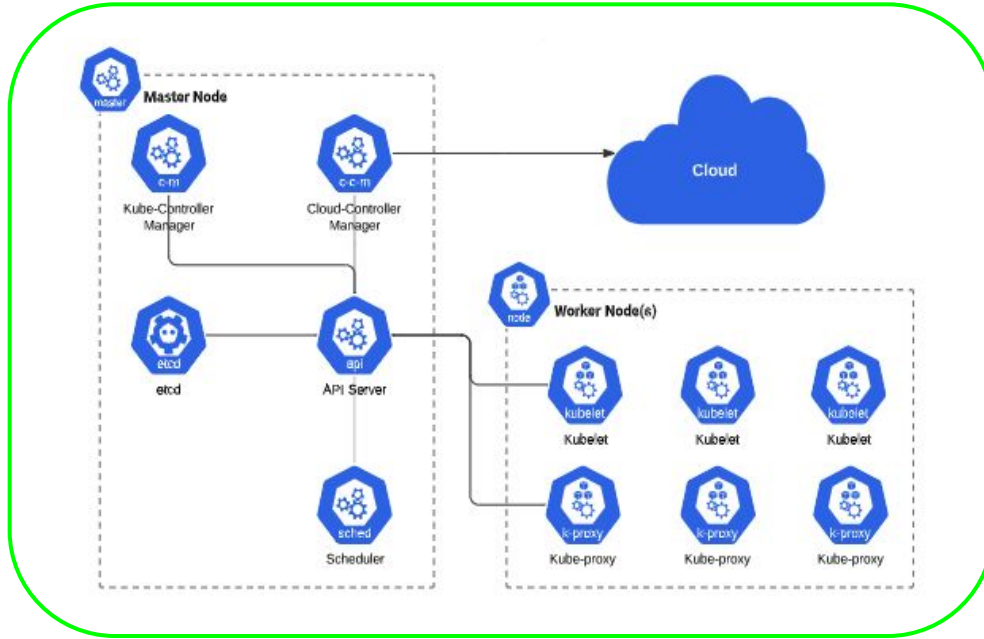
- Managing & Monitoring of the cargo ships
- Manage, Plan, Schedule, Monitor - Master node

Cargo Ship

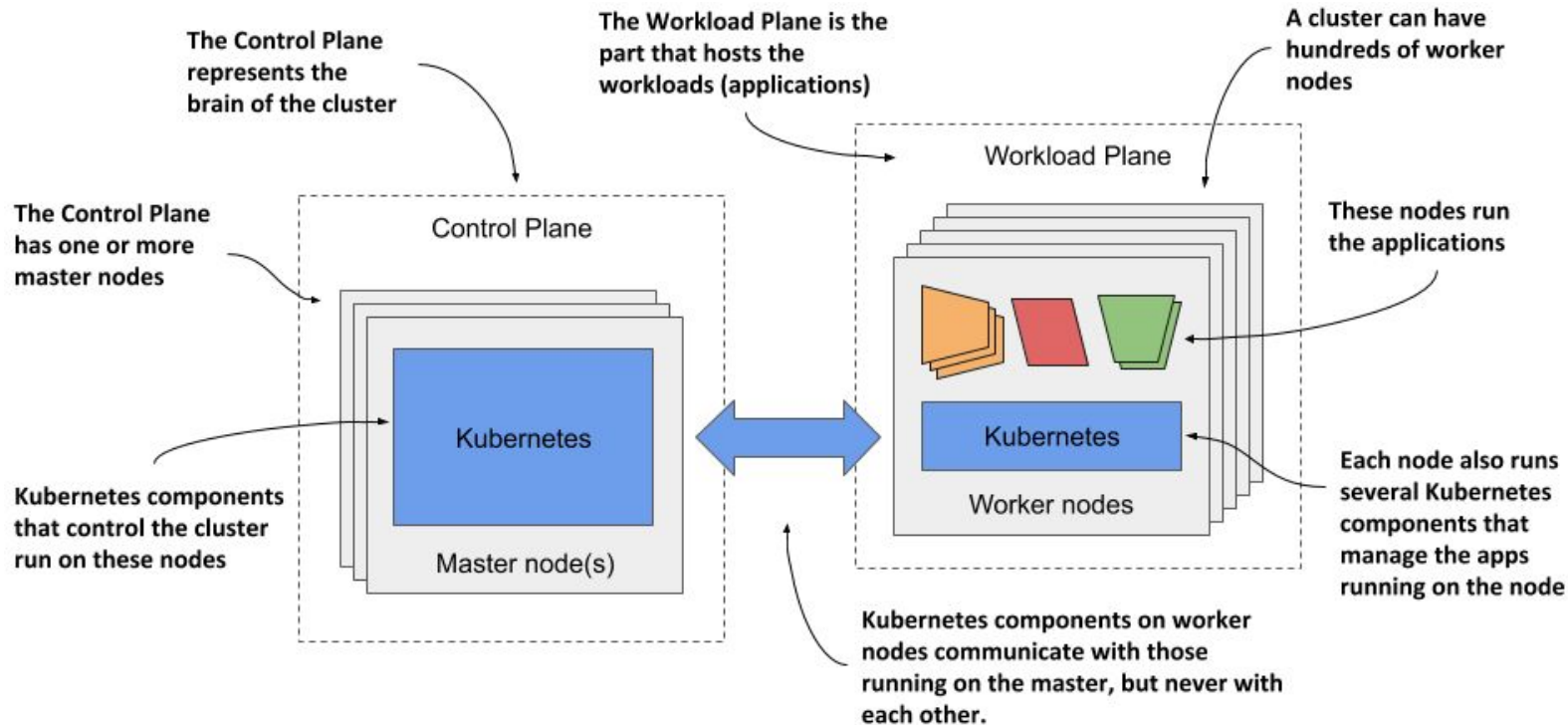
- Carries containers across the sea
- Host Application as Containers ~ Worker Nodes



Analogy of Ship with Kubernetes



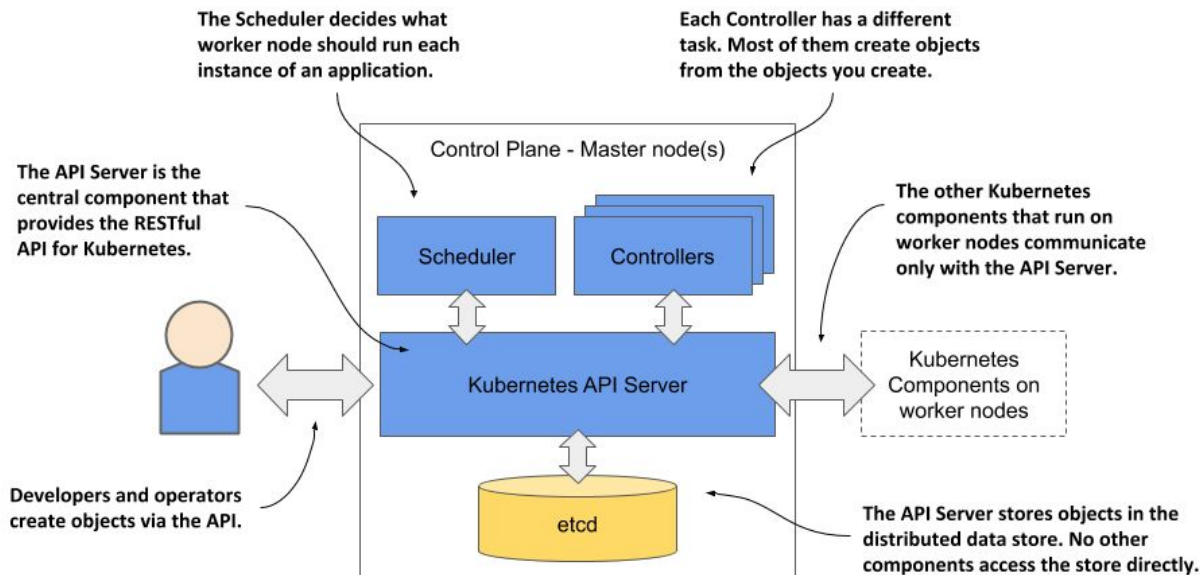
K8s Architecture



Master (Control Plane) Components

Control Plane Componentes

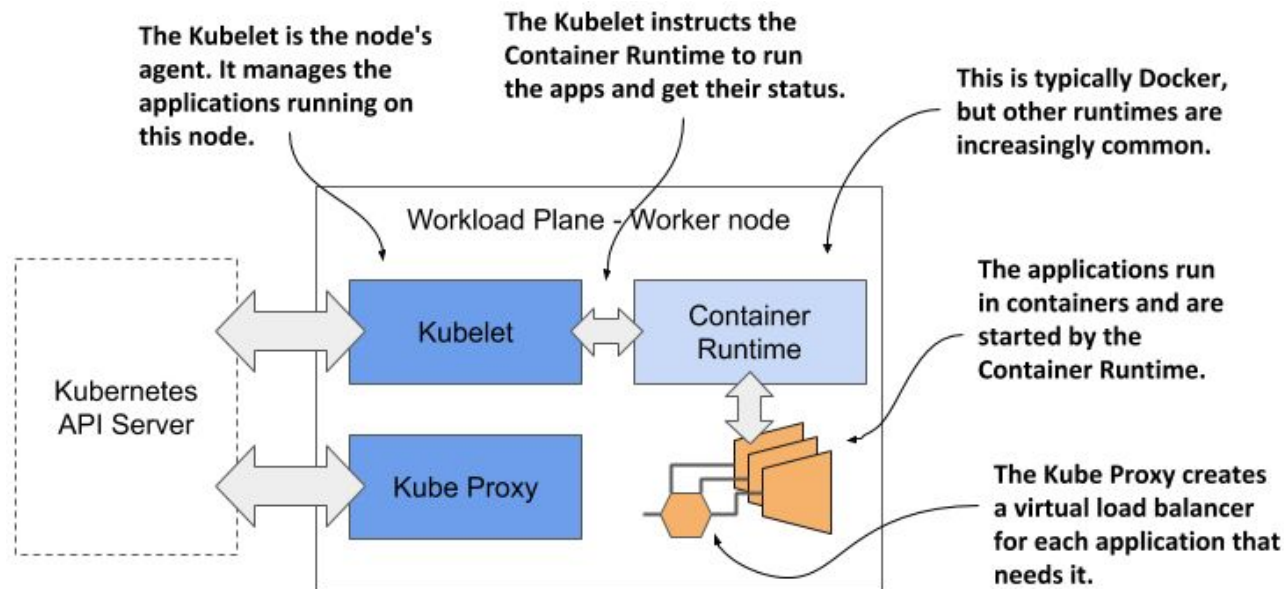
- Kube API server
- The cluster store (etcd)
- Kube controller manager
- Kube scheduler
- The cloud controller manager



Worker Node Components

Worker Node Componentes

- Kubelet
- Container Runtime
- Kube Proxy



Ship Cranes (Kube-Scheduler)

- Identifies the placement of containers
- Identifies the right node to place a containers



Cargo Ship Profiles(ETCD Cluster)

- HA database ~ Which containers on which ships? When was it loaded?
- HA database ~ Which containers on which ships? When was it loaded?



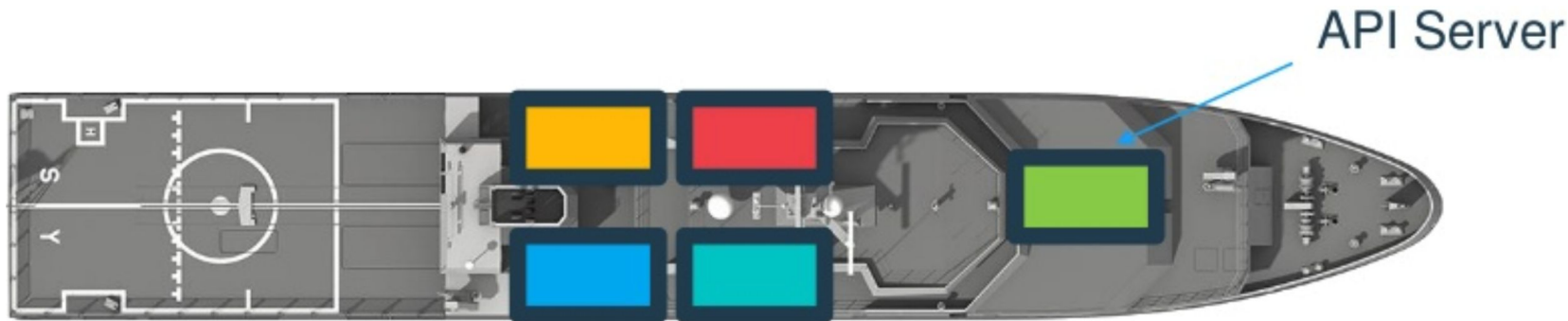
Offices in Dock (Kube-Controller)

- Operation Team Office ~ Ship Handling, Control
- Cargo Team Office ~ verify if containers are damaged, ensure that new containers are rebuilt
- IT & Communication Office – Communication in between various ships
- Controllers - Node Controllers – Takes care of Nodes | Responsible for onboarding new nodes in a cluster | Availability of Nodes
- Replicas Controller – Ensures that desired number of containers are running at all times
- Controller Manager - Manages all these controllers in place



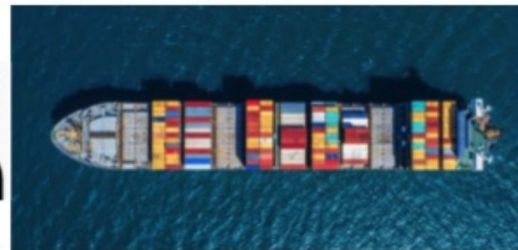
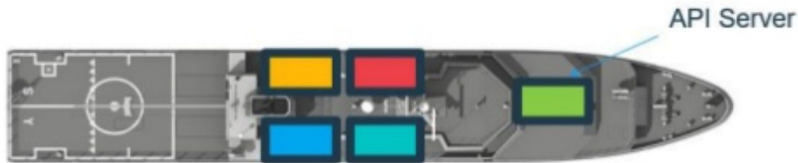
Communicator (Kube API Server)

- How does each of these service communicate with each other?
- A primary management component of k8s
- Responsible for orchestrating all operations within a cluster
- Exposes K8s API ,used by external users to perform management operation in the cluster and number of controller to monitor the state of the cluster



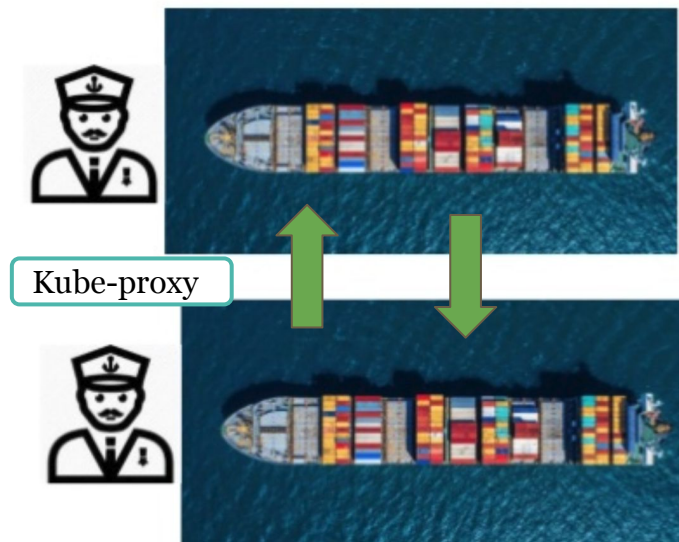
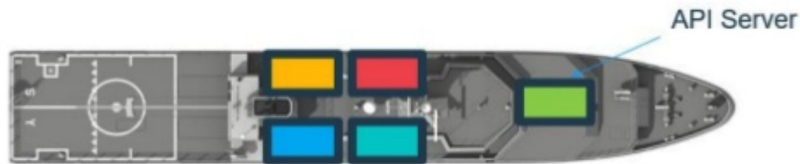
Captain of the Ship (Kubelet)

- Manages all sort of activity on the ship
- Let master ship knows they are interested to join
- Sending reports back to master about the status of the ship
- Sending reports about the status of the containers
- Agent which runs on each nodes of the container

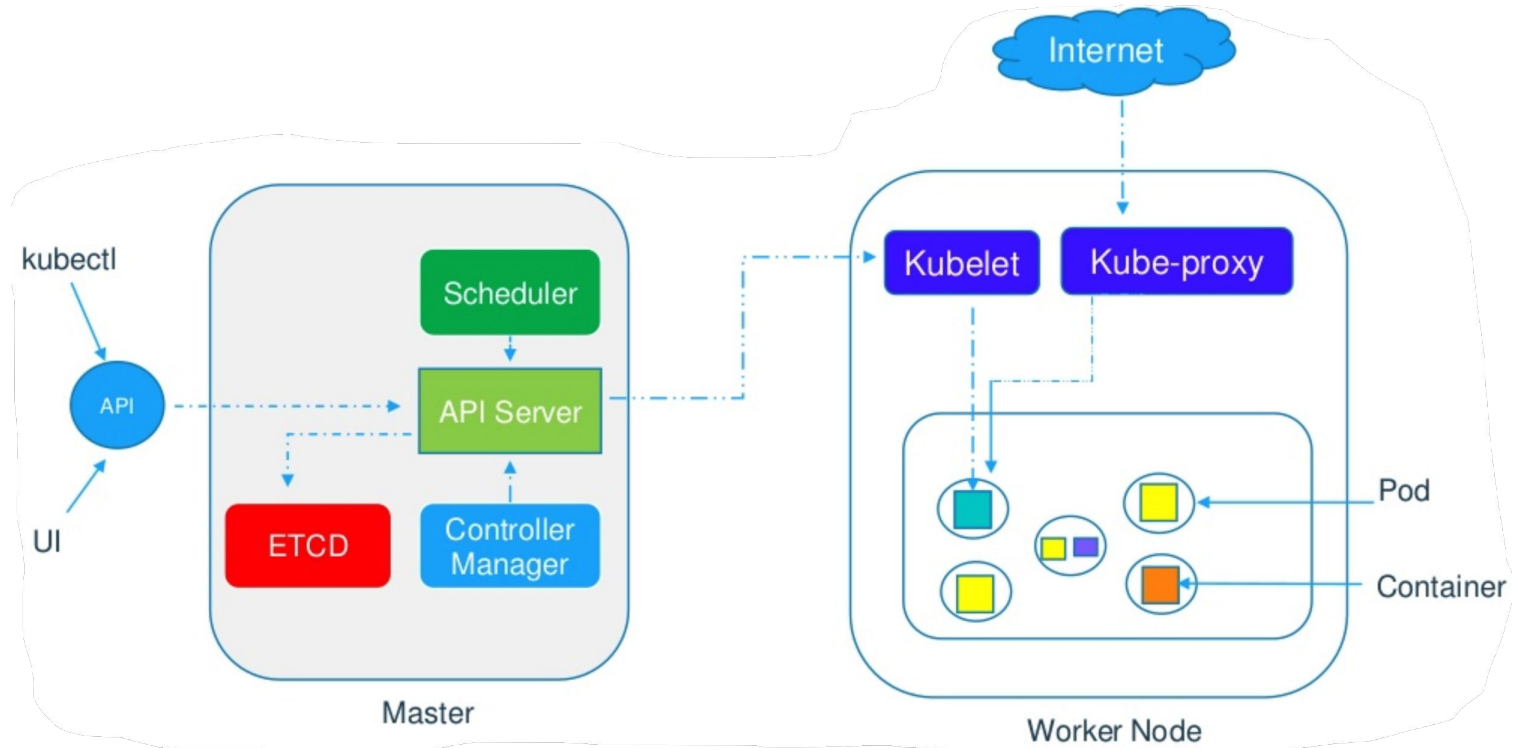


Communication between Cargo Ships (Kube-proxy)

- How does two cargo ships communicate with each other?
- How will web server running on one worker node reach out to DB server on another worker node?
- Kube-proxy helps communication between worker nodes



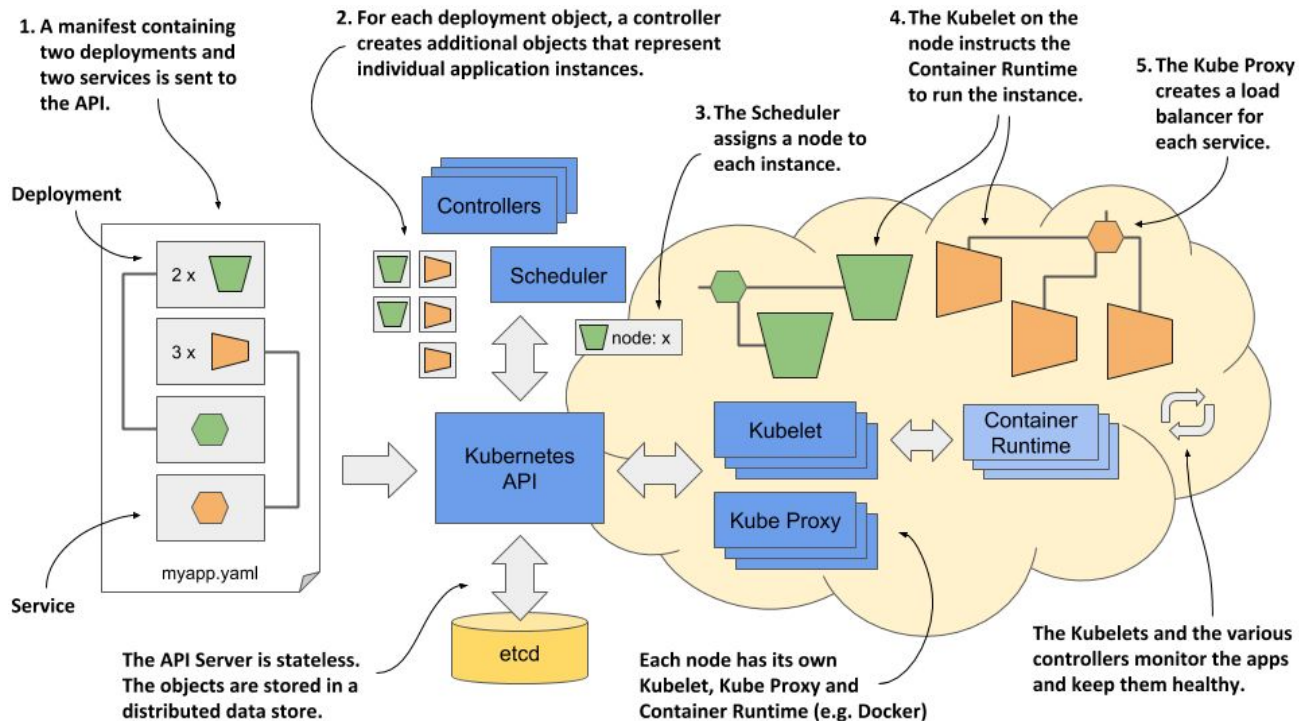
Overall Kubernetes Architecture



How to deploy an Application on K8s ?

Everything in Kubernetes is represented by an object. You create and retrieve these objects via the Kubernetes API

These objects are usually defined in one or more manifest files in either YAML or JSON format.



THANK YOU.....



DO YOU HAVE ANY QUESTIONS ?