KUBERNETES ADMINISTRATION

Hi There !!

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What we are going learn ??

> **Pods**

> **Replication**

> **Services**

> **Storage**

> **Environment Settings**

> **Deployment**

> **Kubernetes internal**

> **A & A**

> **Security**

> **Scaling**

> **Scheduling**

Training Materials

The training materials which includes slides, lab modules and additional learning is available on

https://www.github.com/vsaini44/KubernetesRepo

P 2 V 2 C

Any application, web or otherwise, will need to be hosted on a system for it to function. These systems are often called as servers. for example, web applications have to be hosted on a powerful web server and made available over internet to serve web pages.
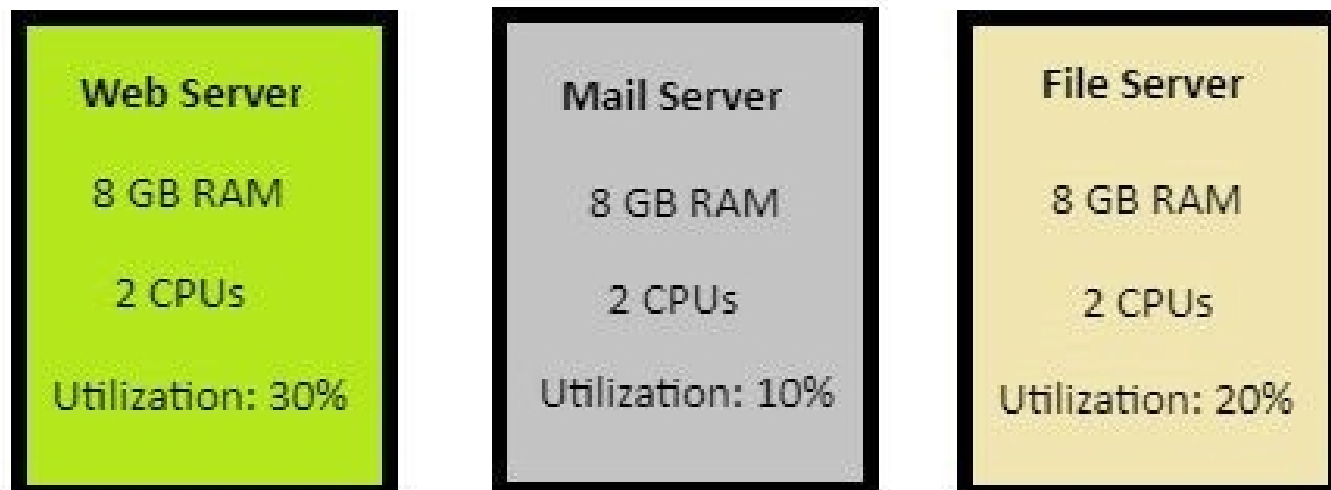
How these servers/systems have evolved over time and what physical systems, virtual machines and containers bring into the table?

Physical Systems / Servers:

Earlier days, Individual physical systems were used to host individual applications. Say, you need a web server to cater your web application, you will have to buy a dedicated physical machine with so and so configuration to power it up.

Again if you need a mail server to cater your mailboxes, you have to buy a new physical system. Your physical infrastructure keeps growing as your need grows.

Physical System

Web Server

8 GB RAM

2 CPUs

Utilization: 30%

Mail Server

8 GB RAM

2 CPUs

Utilization: 10%

File Server

8 GB RAM

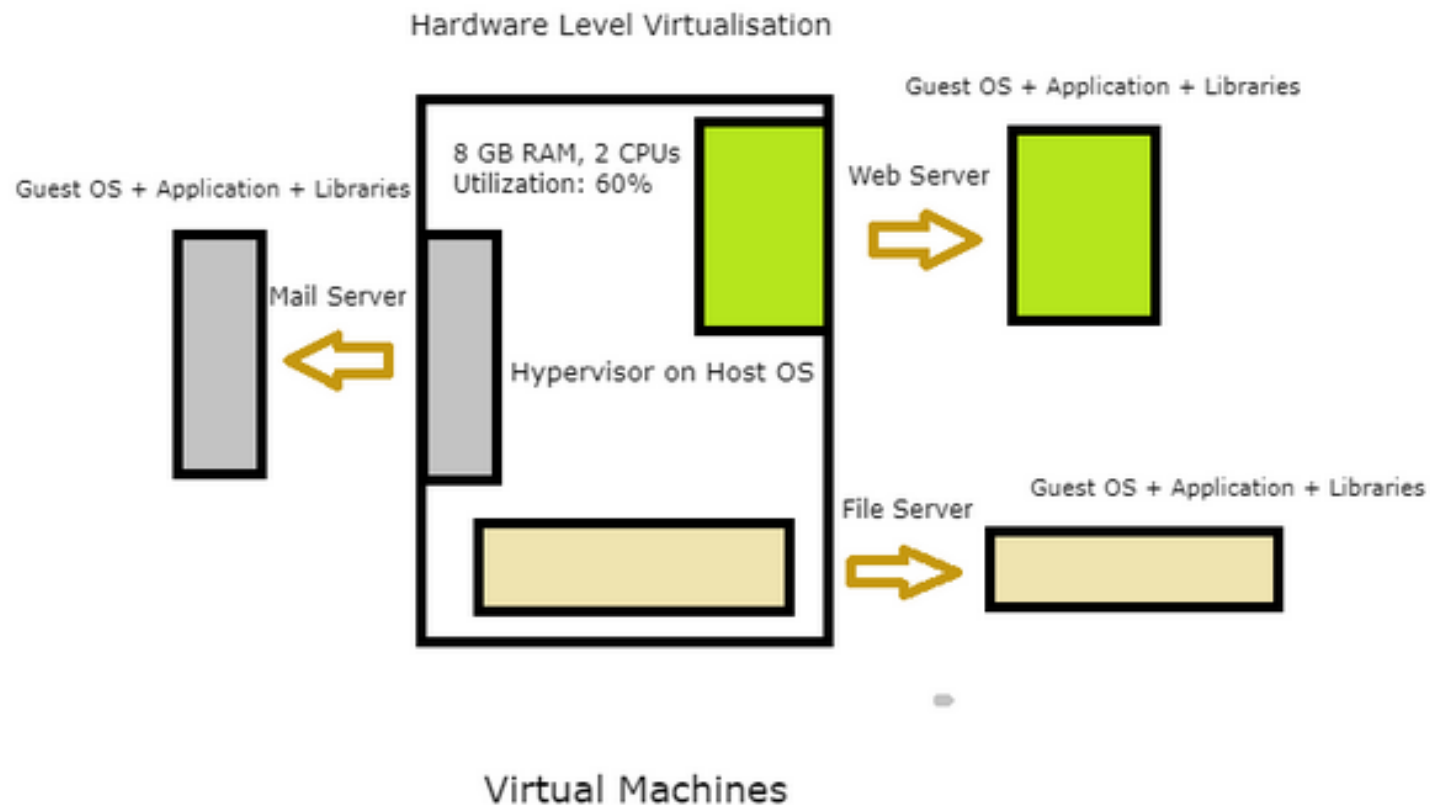2 CPUs

Utilization: 20%

Individual Physical Servers

Virtual Machine ?

A Virtual machine provides a way to make a single physical system work as multiple isolated systems, resulting in higher infrastructure usage and reduced physical hardware infrastructure overhead.

How is it achieved?

Using hypervisor that runs on your host system, you can effectively split your underlying physical infrastructure into multiple smaller units that can run multiple isolated systems.

Virtual Machine

Hardware Level Virtualisation

Guest OS + Application + Libraries

8 GB RAM, 2 CPUs
Utilization: 60%

Web Server

Guest OS + Application + Libraries

Mail Server

Hypervisor on Host OS

File Server

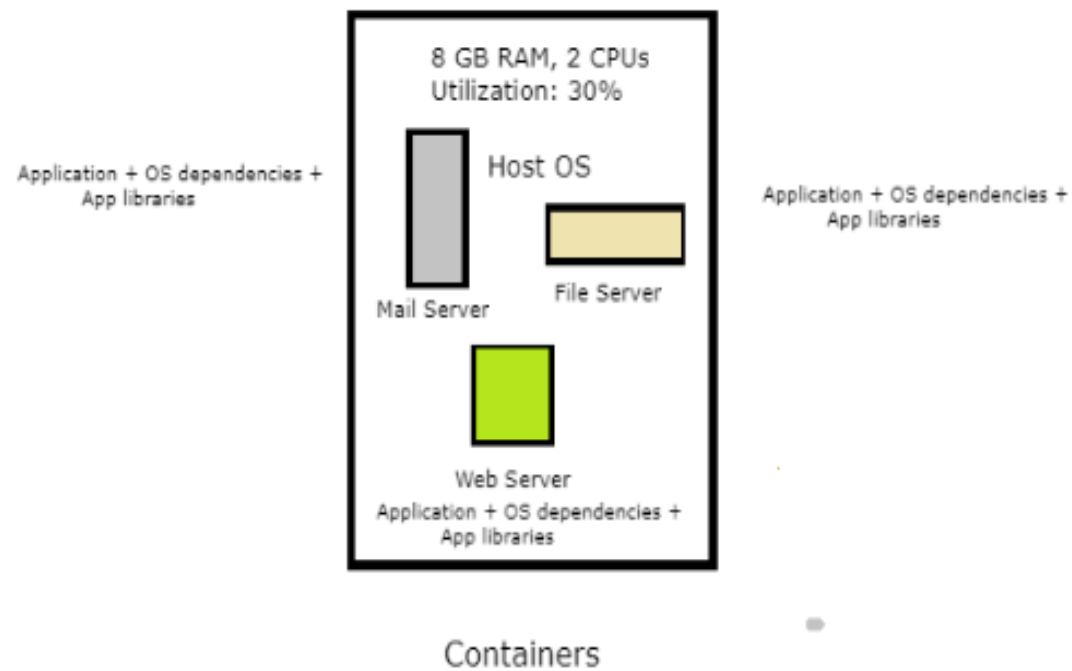Guest OS + Application + Libraries

Virtual Machines

Containers?

Containers enable virtualization in the sub-system level rather than hardware/OS level.

While hypervisors achieve virtualization by splitting hardware resources and running a separate set of OS on the virtualized hardware, containers utilize isolation at the subsystem level using namespaces and cgroups.

Subsystem level Virtualization

8 GB RAM, 2 CPUs
Utilization: 30%

Host OS

Application + OS dependencies +
App libraries

Mail Server

File Server

Application + OS dependencies +
App libraries

Web Server
Application + OS dependencies +
App libraries

Containers

Advantages of Containers ?

> **Portable**

> **Extremely small footprint**

> **Reduced IT management resources**

> **Quicker spinning of apps**

What is Docker ?

Docker is a tool designed to make it easier to create, deploy, and run applications by using containers.

Docker is currently the most popular container platform. Docker appeared on the market at the right time, and was open source from the beginning, which likely led to its current market domination.

The Need for Orchestration Systems

While Docker provided an open standard for packaging and distributing containerized applications, there arose a new problem.

> How would all of these containers be coordinated and scheduled?

>How do you seamlessly upgrade an application without any interruption of service?

> How do you monitor the health of an application, know when something goes wrong and seamlessly restart it?

Life of an application

Container Orchestration tools ?

Kubernetes ?

Kubernetes is the container orchestrator that was developed at Google which has been donated to the CNCF and is now open source.

It has the advantage of leveraging Google's years of expertise in container management.

It is a comprehensive system for automating deployment, scheduling and scaling of containerized applications, and supports many containerization tools such as Docker.

Setting up Kubernetes Cluster

Different Kubernetes solutions meet different requirements: ease of maintenance, security, control, available resources, and expertise required to operate and manage a cluster.

You can deploy a Kubernetes cluster on a local machine, cloud, on-prem datacenter, or choose a managed Kubernetes cluster. You can also create custom solutions across a wide range of cloud providers, or bare metal environments.

Architecture of Kubernetes
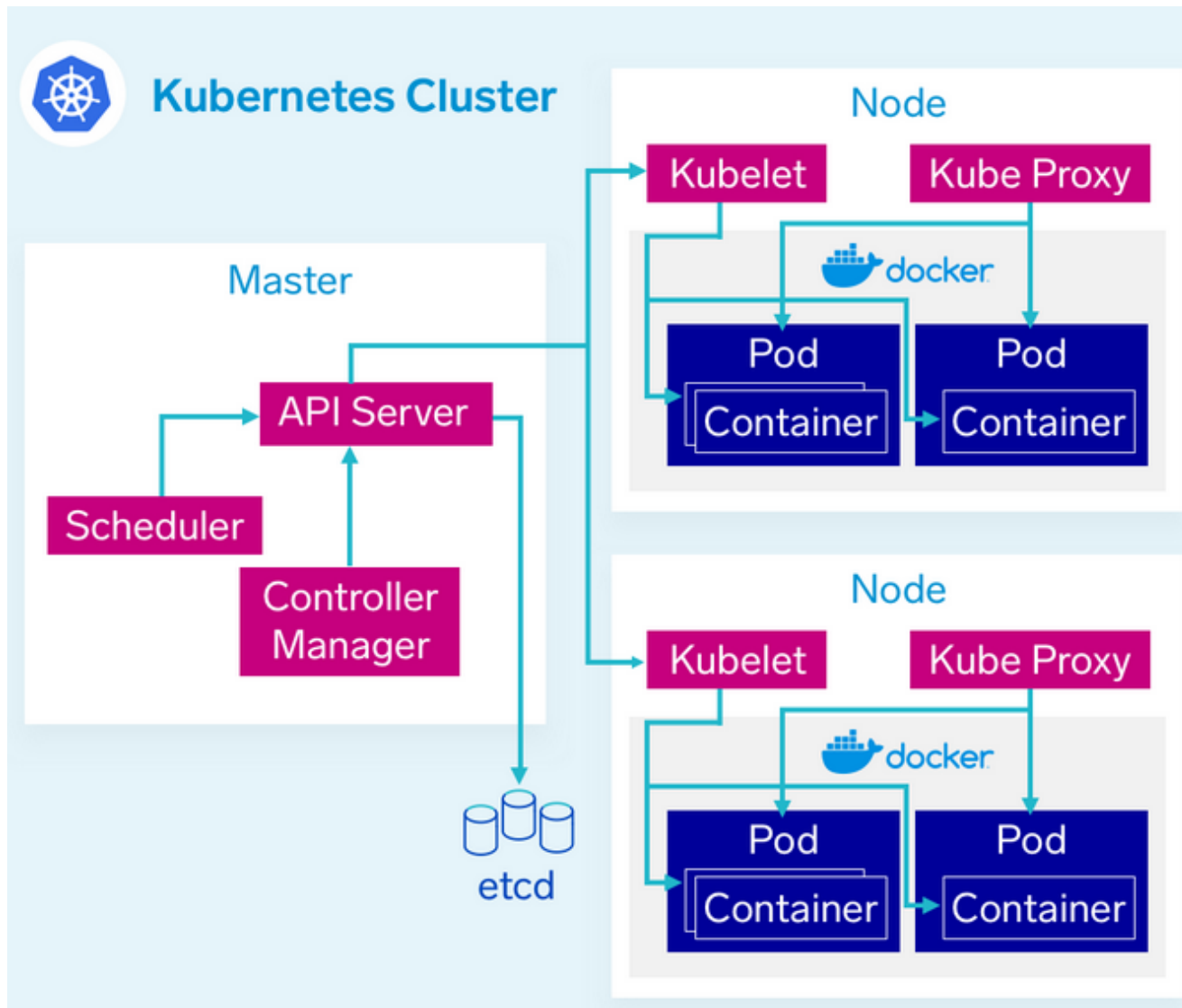
Hardware Requirements

- **Master node's minimal required memory is 2GB and the worker node needs minimum is 1GB**

- **The master node needs at least 1.5 and the worker node need at least 0.7 cores.**

Installation Step on all nodes

Follow the steps mentioned on

https://github.com/vsaini44/KubernetesRepo.git

> You can clone the repo or copy paste the contents of the files.