2019 IAC Instructor Knowledge Program

# New Paradigm of the Virtualization Technology

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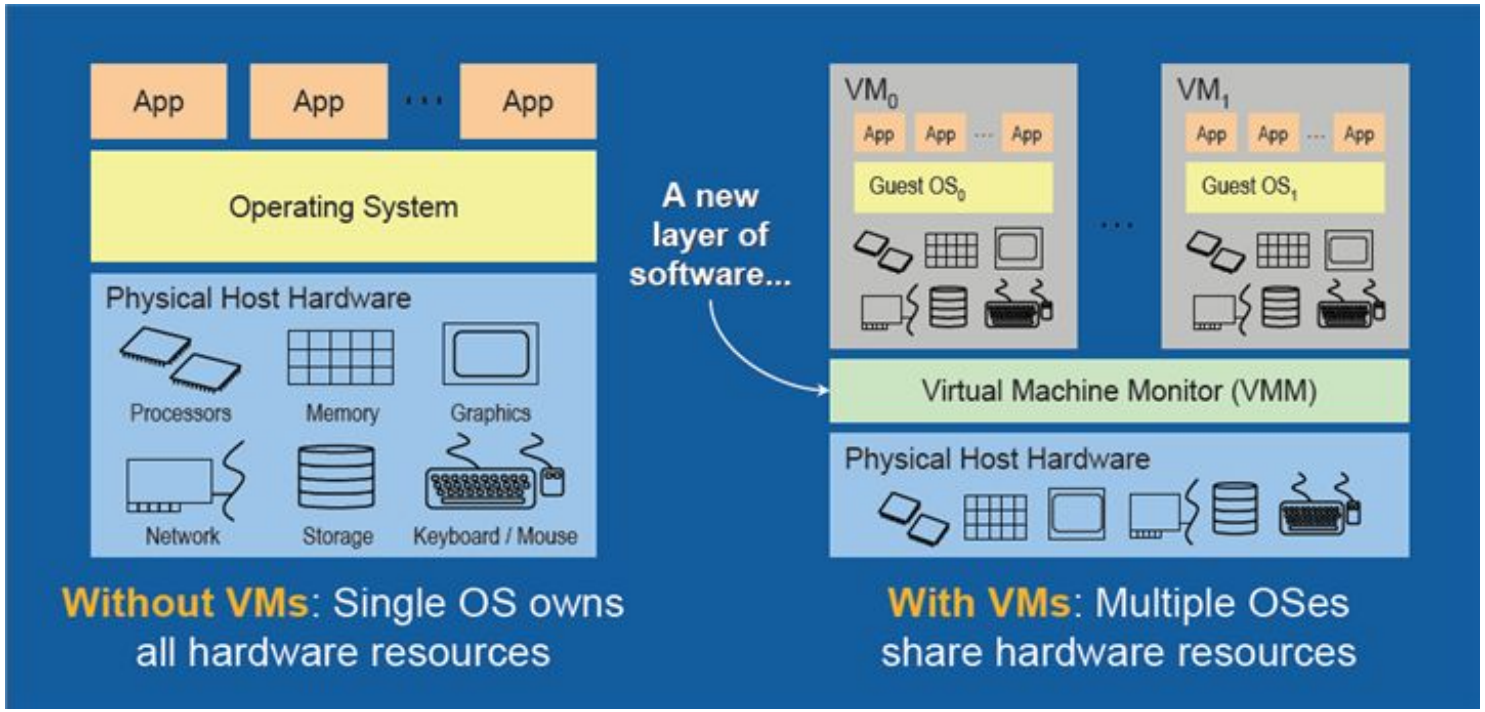
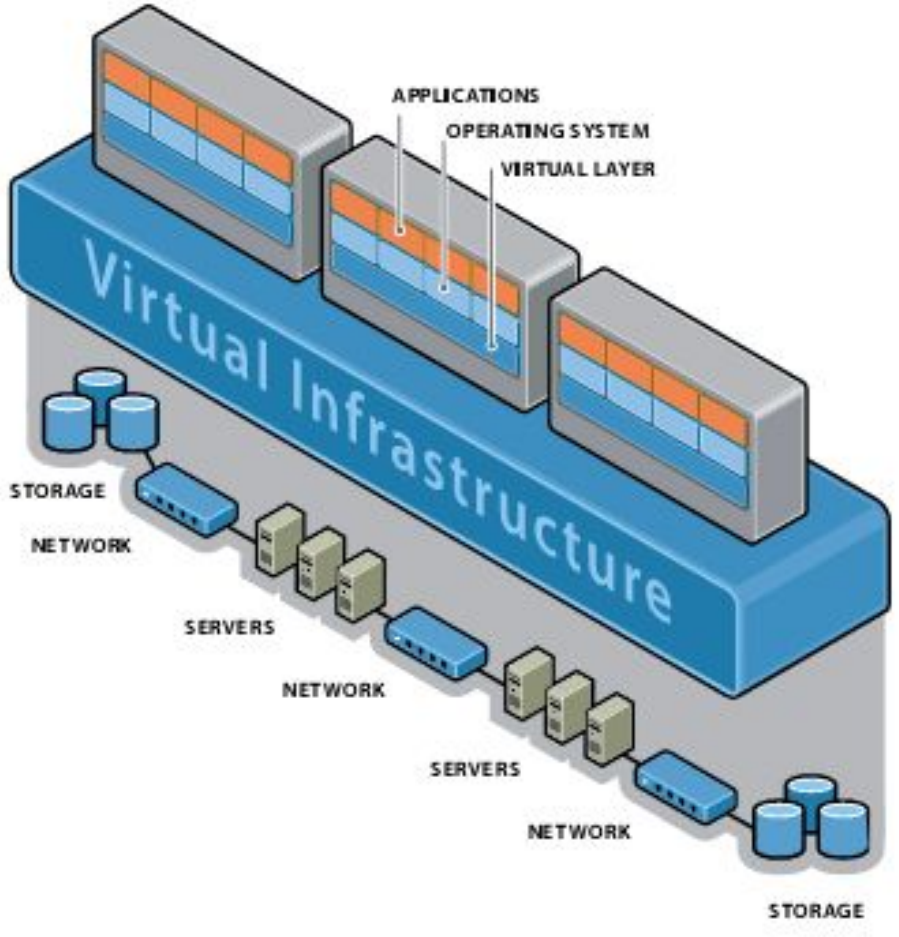
# What is Virtualization ?

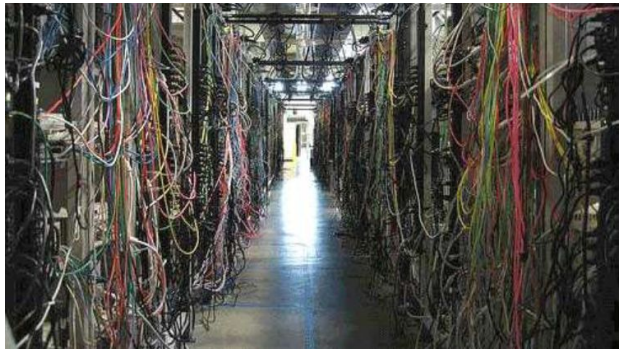
**Virtualization means the creation of a virtual version of computing resources such as virtual computer hardware platforms, storage devices, computer network resources and etc.**

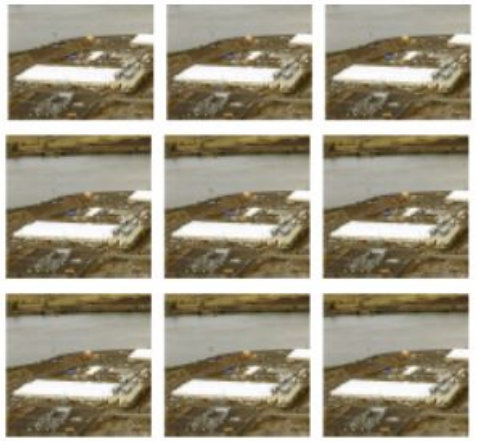



*Intel, Capitalhead and Wikipedia*

# Benefits of the Virtualization





**1. Reduce the Complexity**

*to simplify operations and maintenance*

**2. Dramatically Lower Costs**

*to redirect investment into value-add opportunities*

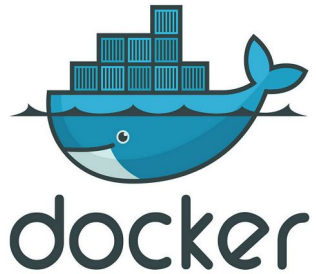
**3. Enable Flexible, Agile IT Service Delivery**

*to meet and anticipate the needs of the business*

*VMWare*

# History of Virtualization





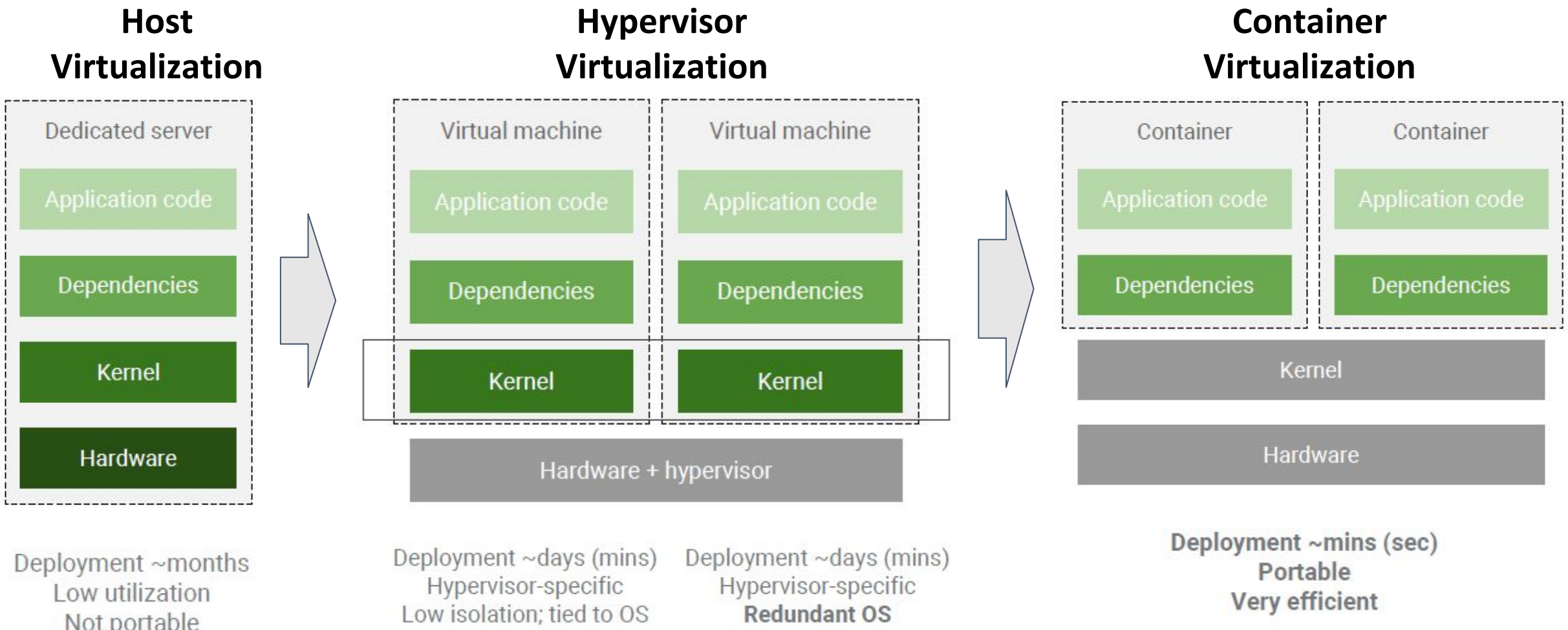







1960's 2001 2003 2006 2007 2008 2010 2013 2014

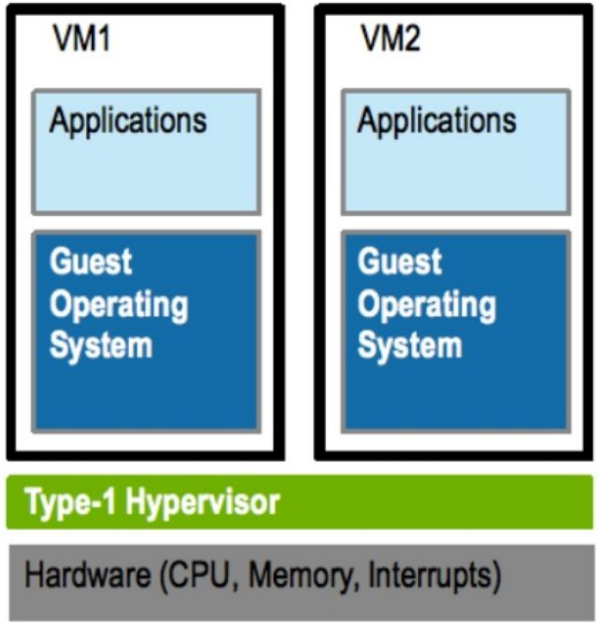
# Development of Virtualization Technology



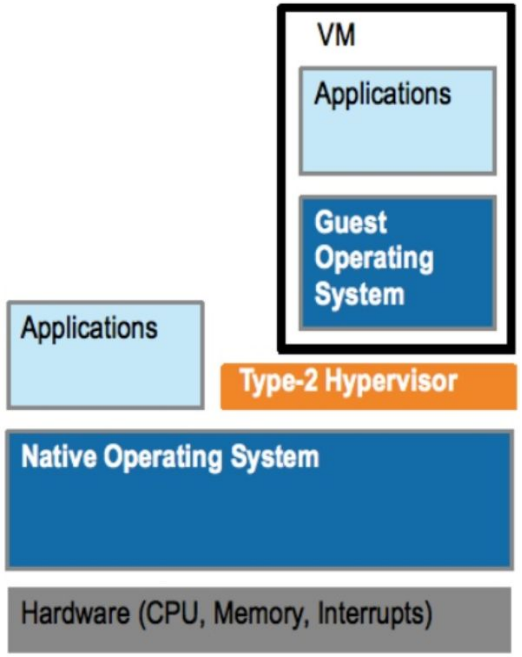

*Reorganized from Google & Coursera*

# Types of Hypervisor Virtualization

- Classification by Architecture Types

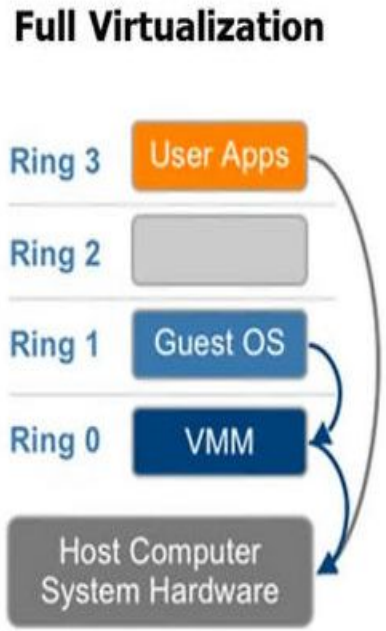



Type 1: Bare Metal Architecture
Virtual Machine Monitor

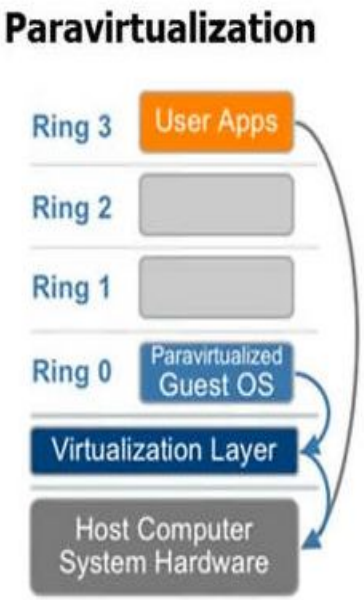



Type 2: Hosted Architecture

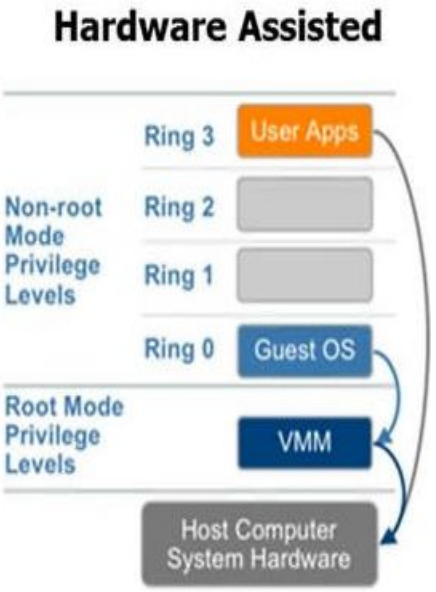
- Sub-Classification of Type 1 Virtualization




VMM's CPU Emulation




Modified Guest OS

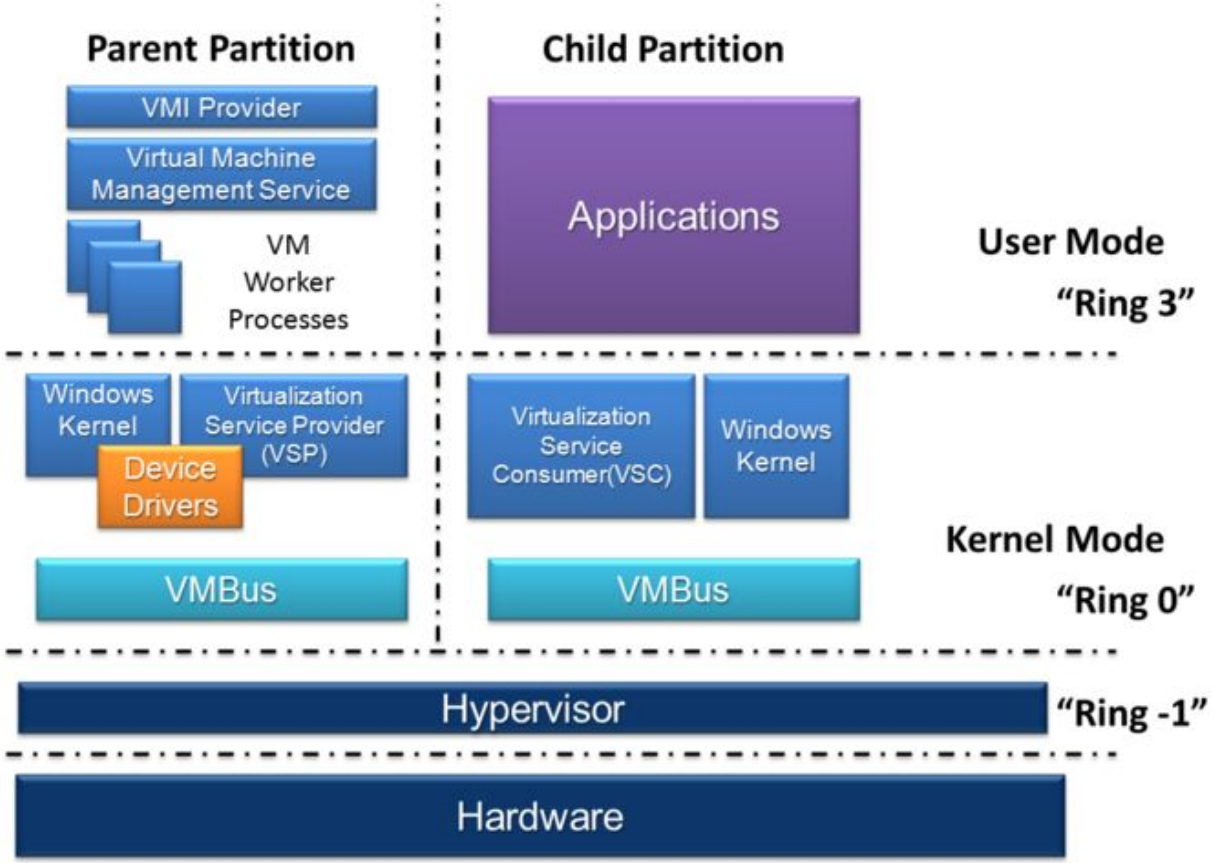



Intel-VT AMD-V

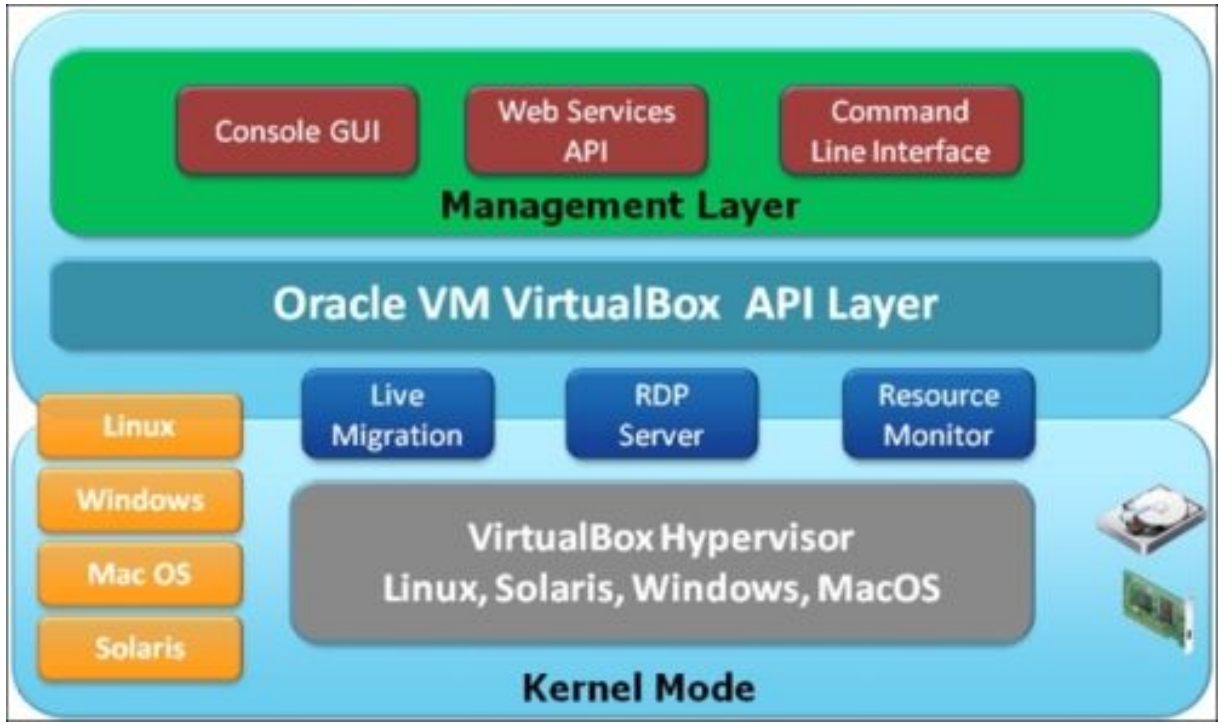
*www.virtuatopia.com*

# Hypervisor Examples

- **MS Hyper-V Architecture**



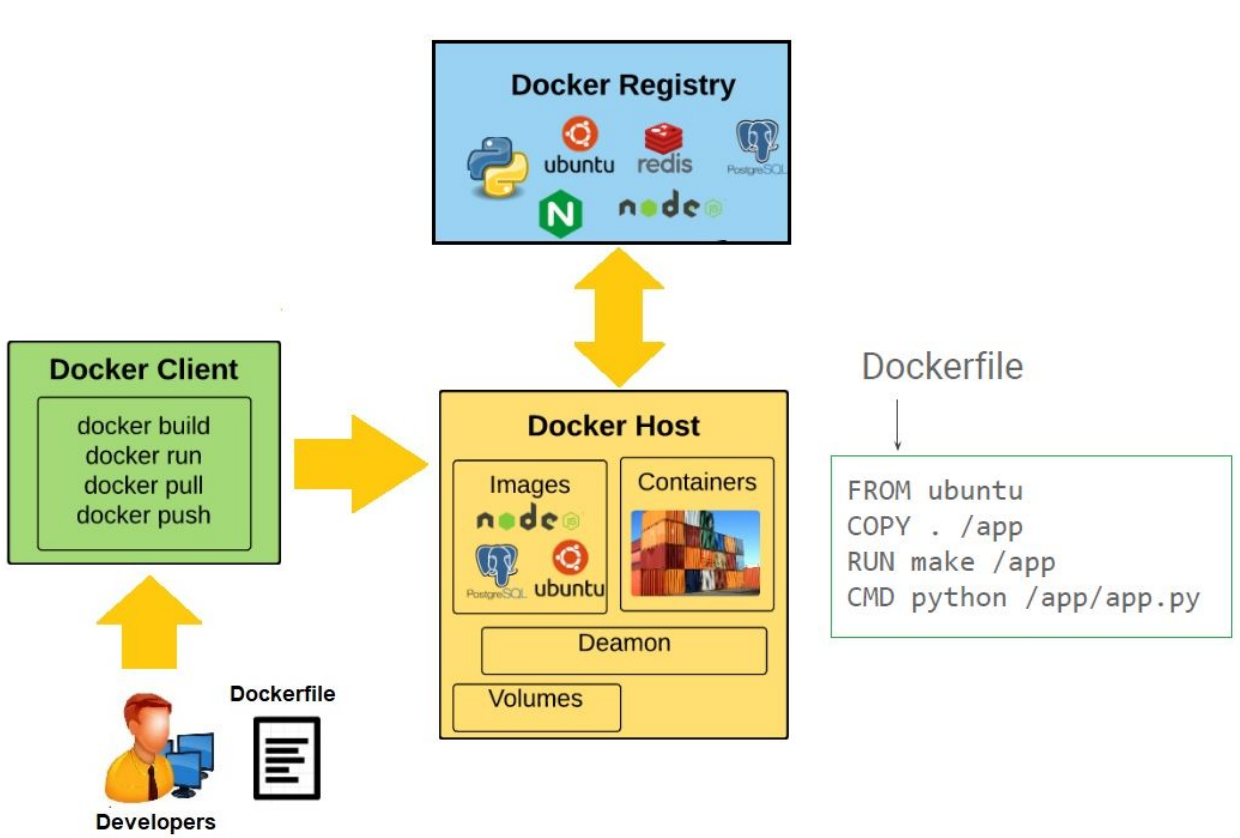

- **Oracle Virtualbox Architecture**




*Wikipedia & Microsoft & Oracle*

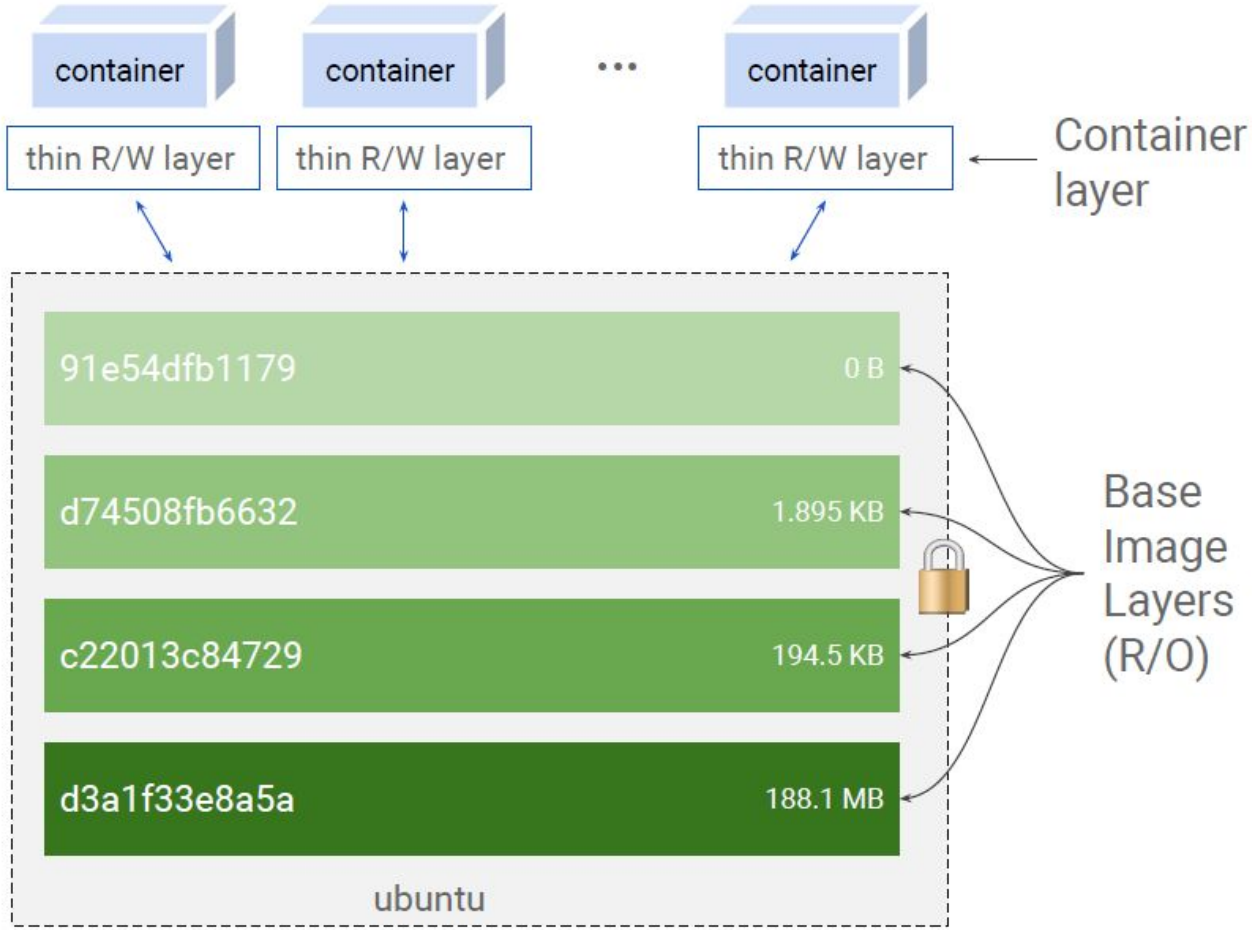
# Docker Container

**Containers use a layered file system with only the top layer writable, and promote smaller shared images.**




Dockerfile

```
FROM ubuntu
COPY . /app
RUN make /app
CMD python /app/app.py
```




*Reorganized from DZone, Google & Coursera*

# Docker Container Example

- **Install Docker Engine - Community (Ubuntu Case)**
  - https://docs.docker.com/install/linux/docker-ce/ubuntu/

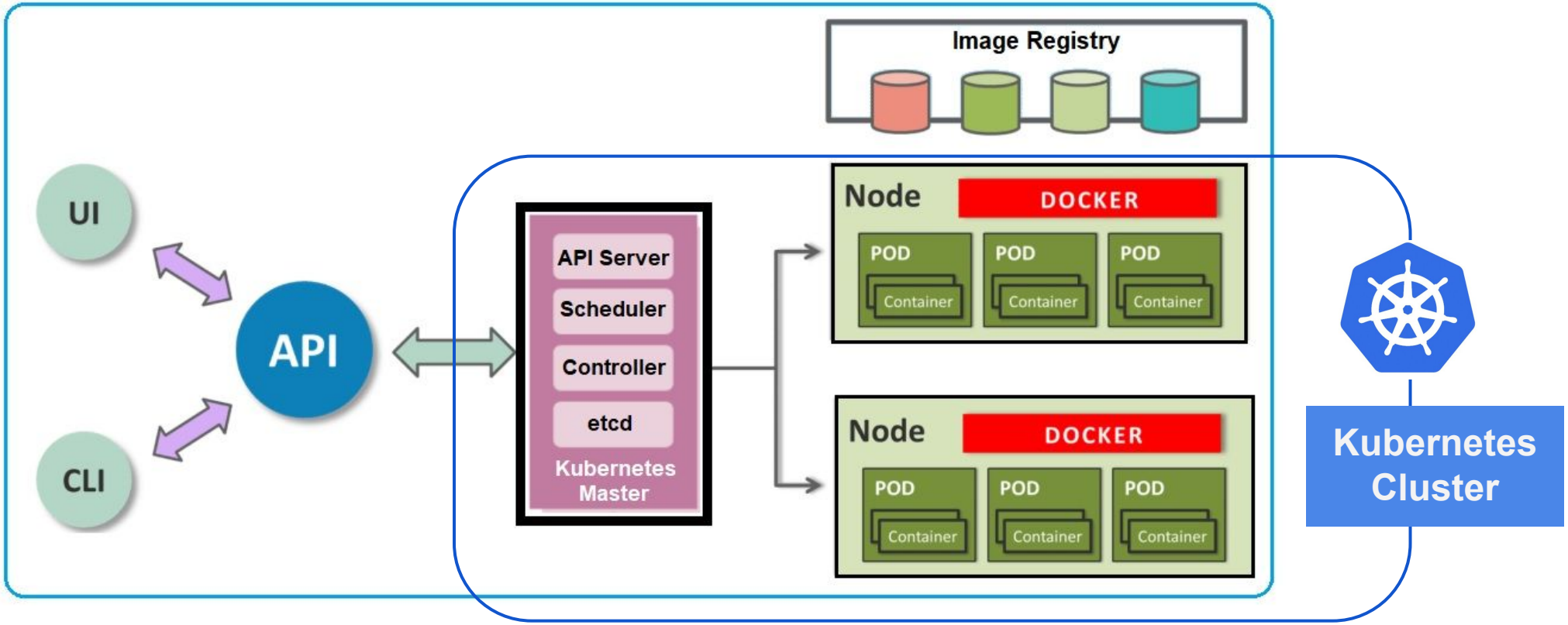
```
$ sudo apt-get update
$ sudo apt-get install docker-ce docker-ce-cli containerd.io
$ sudo docker run hello-world
```

- **Build & Run a Docker Image**
  - https://docs.docker.com/get-started/

```
$ docker build --tag=imagename
$ docker image ls
$ docker push username/repository:tag
$ docker run -p 4000:80 username/repository:tag
```

# Kubernetes

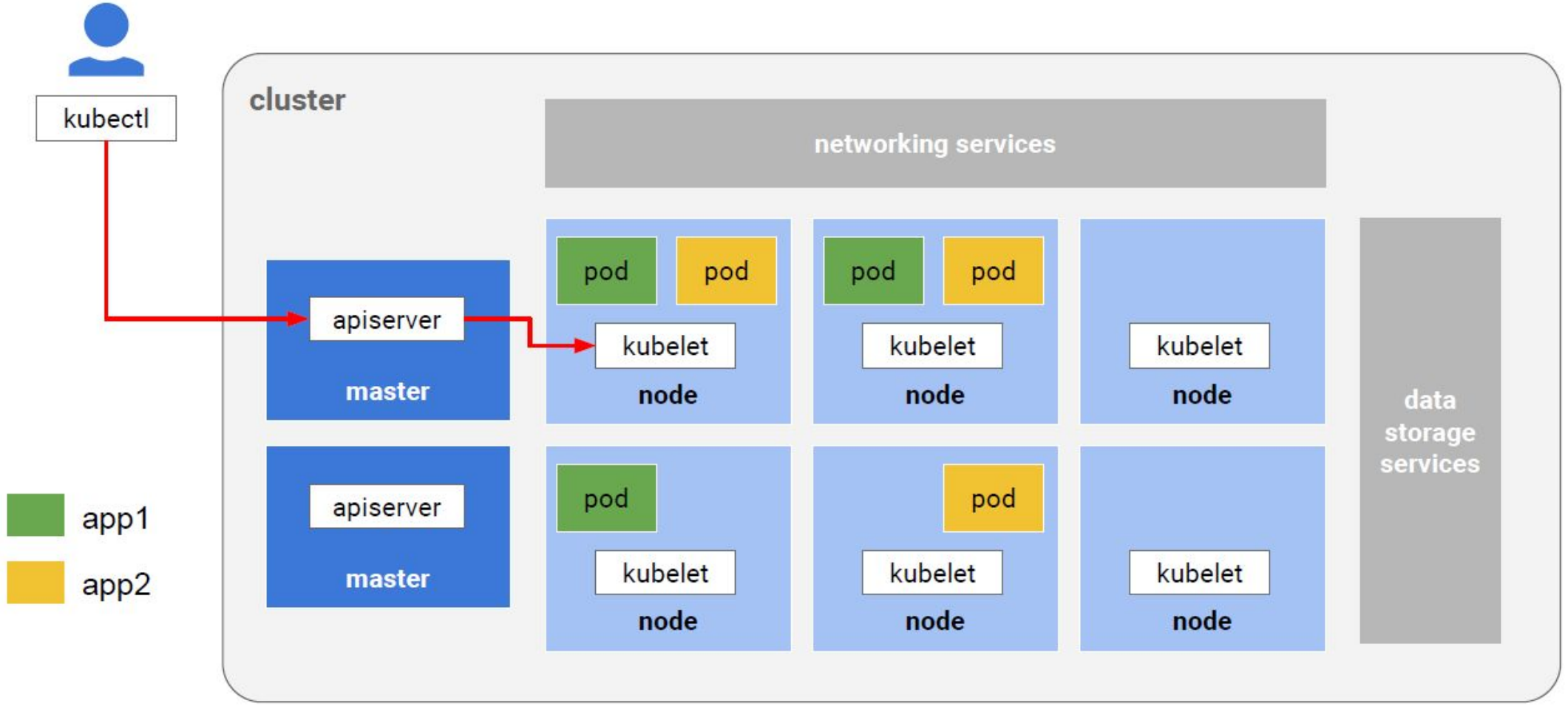
**Kubernetes is an open-source container orchestration tool, which manages container deployment, scaling, and descaling of containers and container load balancing.**




*Reorganized from DZone (* https://dzone.com/articles/docker-containers-and-kubernetes-an-architectural *)*

# Kubernetes Architecture

**Kubernetes provide a control tool 'kubectl' to manage workloads inside the cluster.**

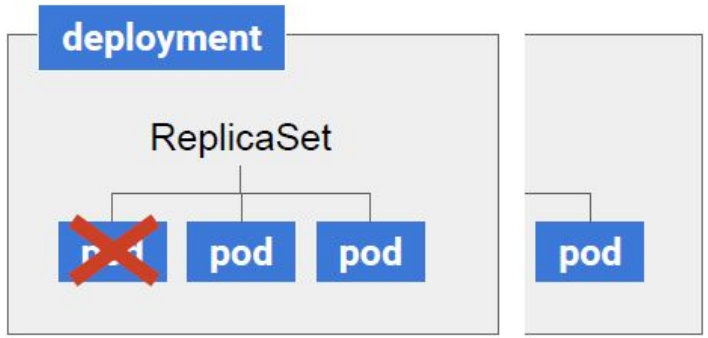



*Google & Coursera ;* https://kubernetes.io/docs/tasks/administer-cluster/cluster-management/

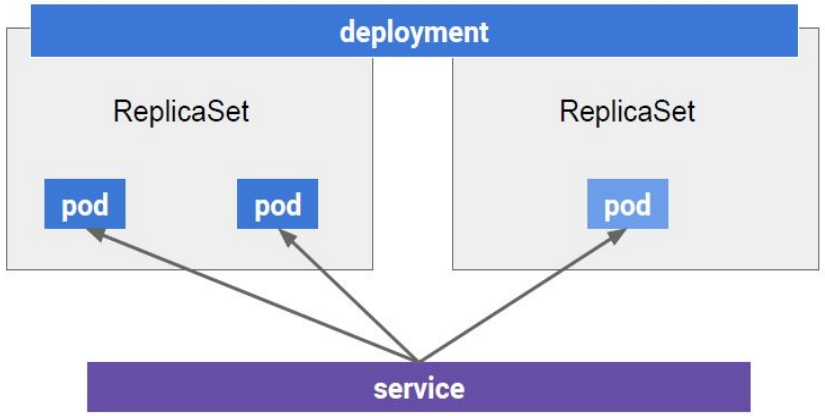
# Kubernetes Engines in Cloud Computing

**Kubernetes supports many features to minimize downtime such as auto-scaling, rolling updates and blue/green deployment.**

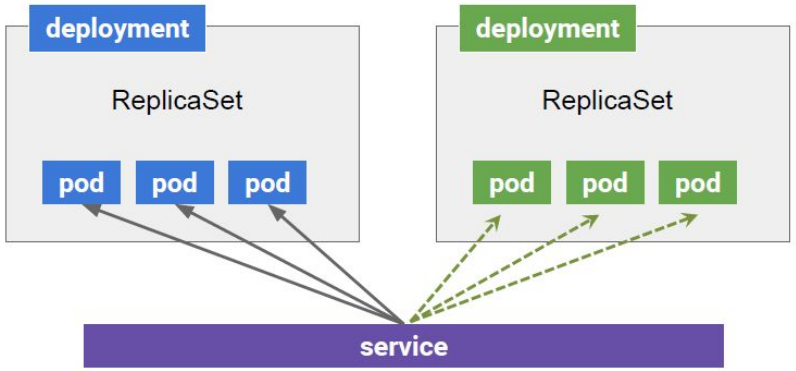
### Auto-Scaling




### Rolling Updates



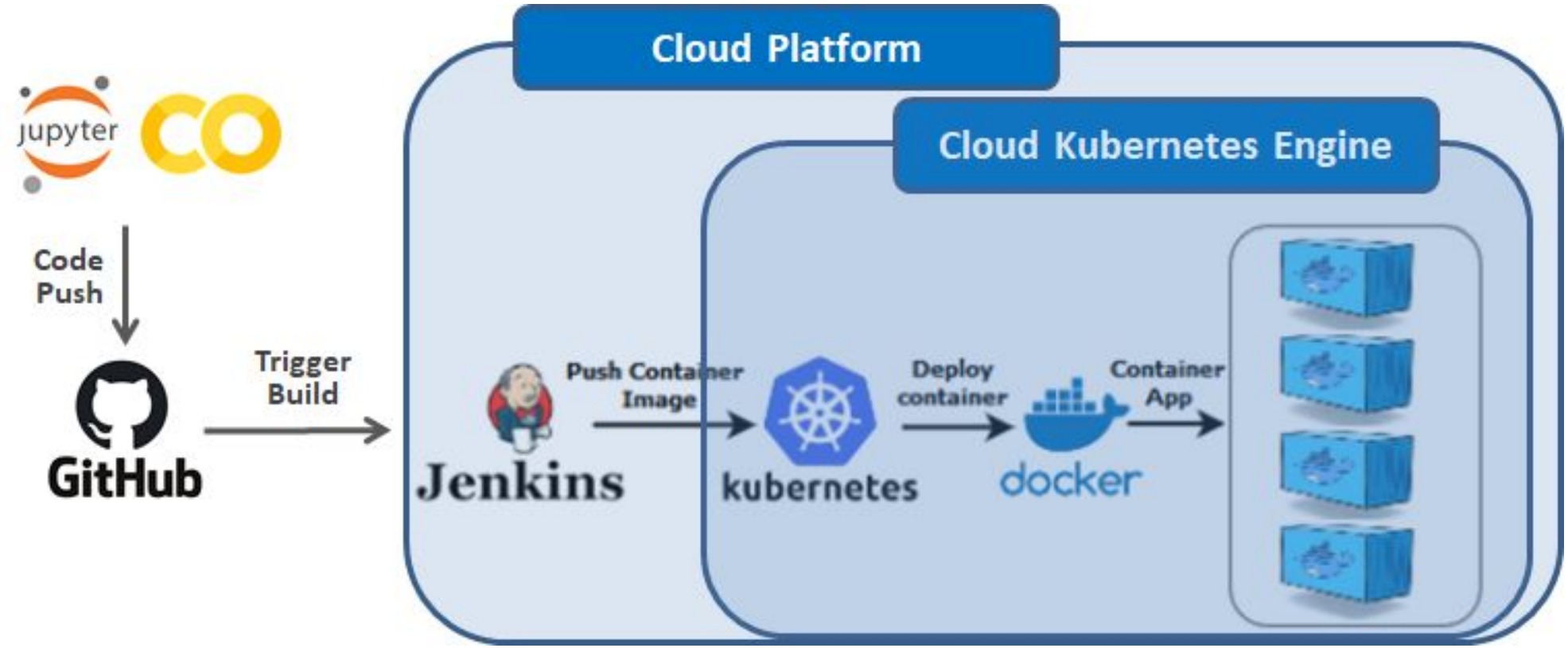

### Blue Green Deployment




*Reorganized from Google & Coursera*

# Continuous Deployment in Cloud Computing

**With the help of open source programs and public cloud providers, the continuous integration and continuous deployment would easily be fulfilled without downtime.**




*Modified image from https://medium.com/swlh/kubernetes-ci-cd-using-jenkins-on-google-cloud-5b10da6147a6*

# Question & Answer