Day 4: Deployment: Front-end, Kubernetes and AWS

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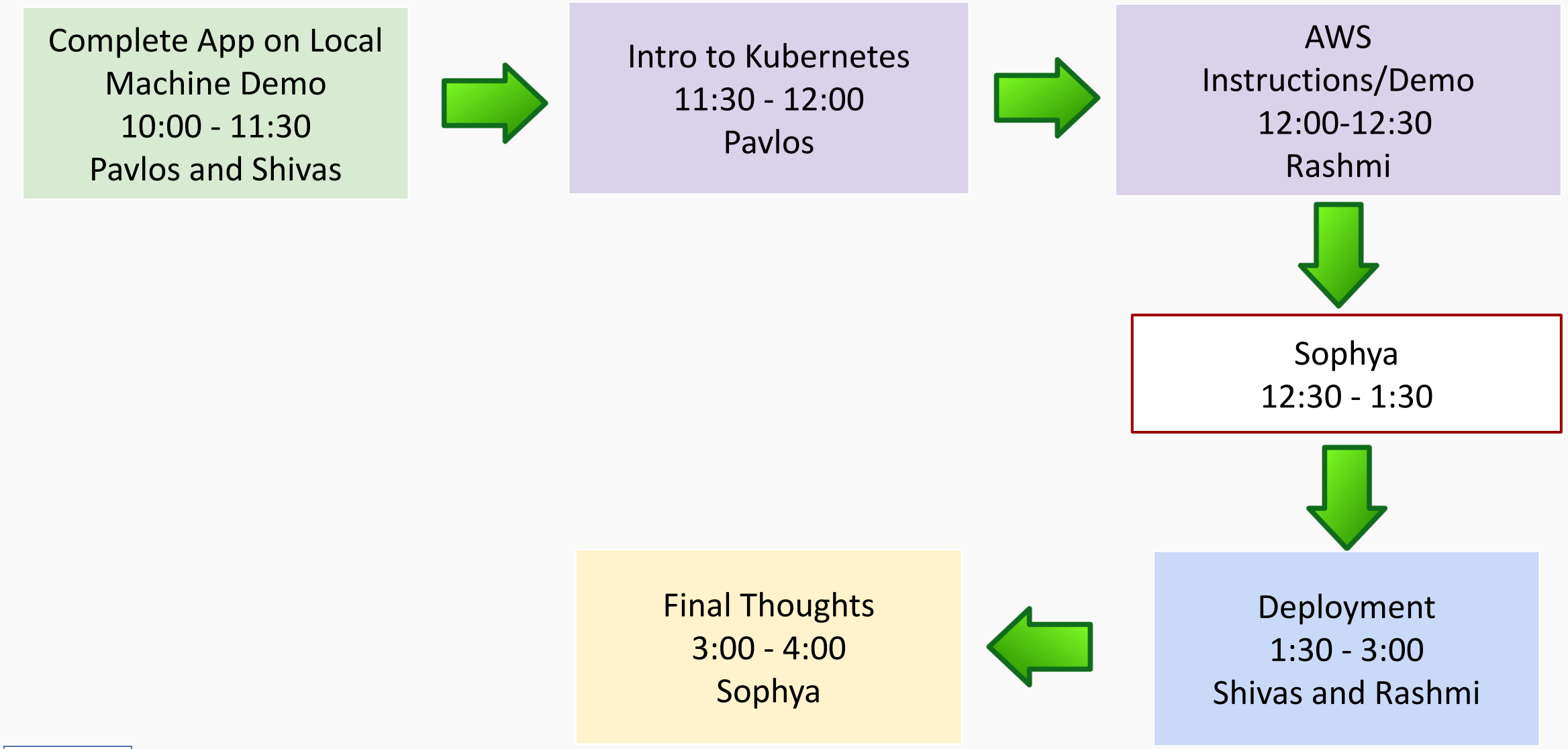
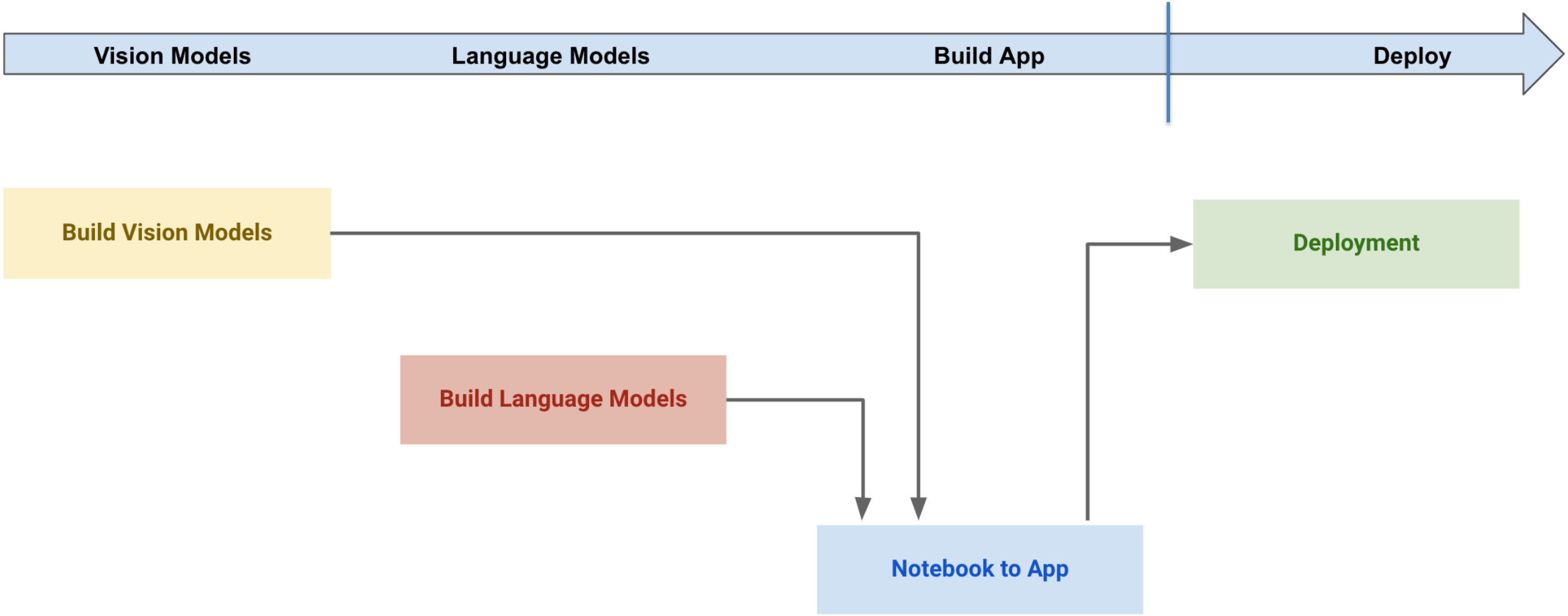
Workshop Overview for Day 1



Outline

1. Review of Day 1-3
2. Front End
3. Motivation for Kubernetes

Outline


Vision Models
Language Models
Build App
Deploy
Build Vision Models
Build Language Models
Deployment
Notebook to App

Virtual Environment

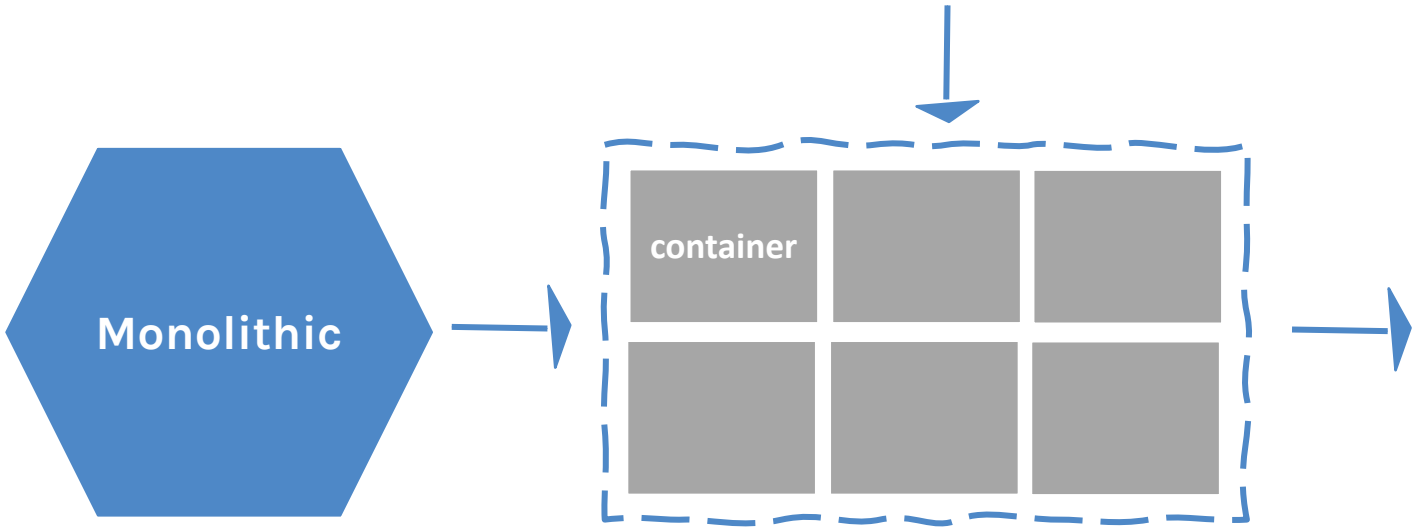
Pros: remove complexity
Cons: does not isolate from OS

Containers

Pros: lightweight
Cons: issues with security, scalability, and control

Virtual Machines

Pros: isolate OS guest from the host
Cons: intensive use of hardware



How to manage microservices?

Recap

We talked about pros/cons of

environments:

remove complexity but does not isolate from OS

virtual machines:

isolate OS guest from host but intensive use of the hardware

containers

lightweight but issue with security, scalability, and control

Recap

Goal:

find effective ways to deploy our apps

and to **break down a complex application** into smaller ones (*i.e. microservices*)

Issues we have fixed so far:

- Conflicting of different operating system
- different dependencies
- "inexplicable" strange behavior

Outline

1. Review of Day 1-3
2. **Complete the app/Front End**
3. Motivation for Kubernetes

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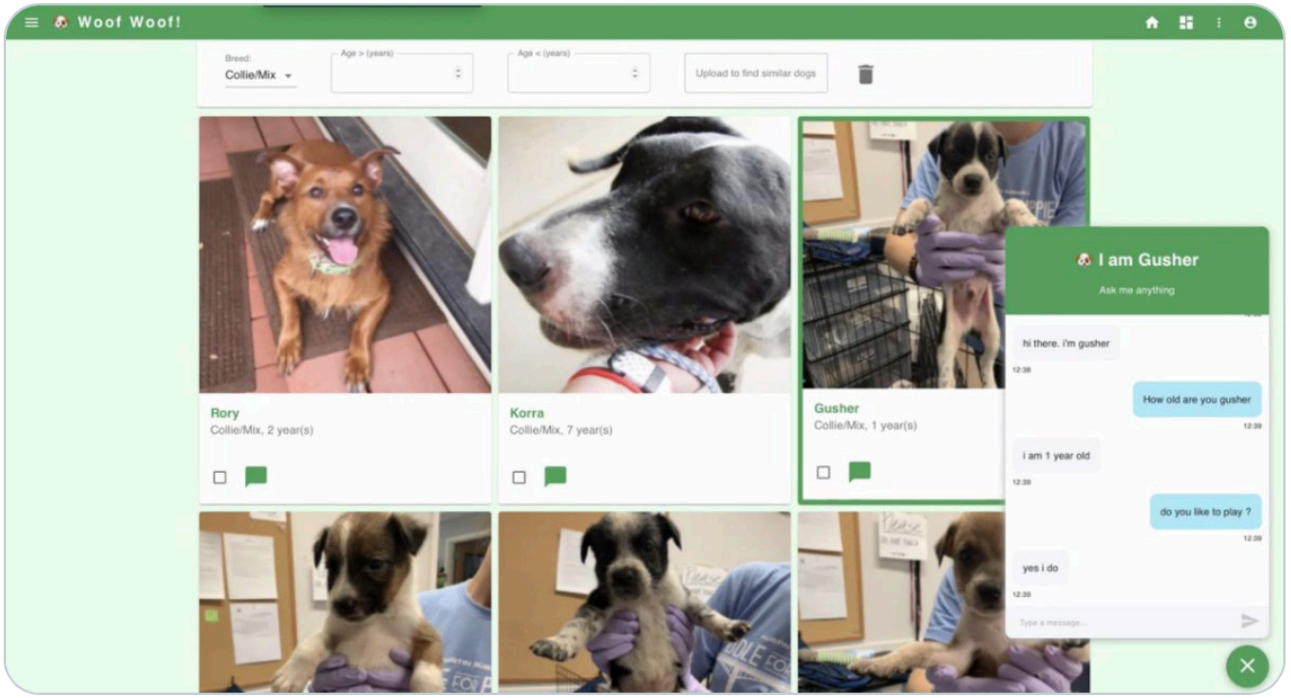

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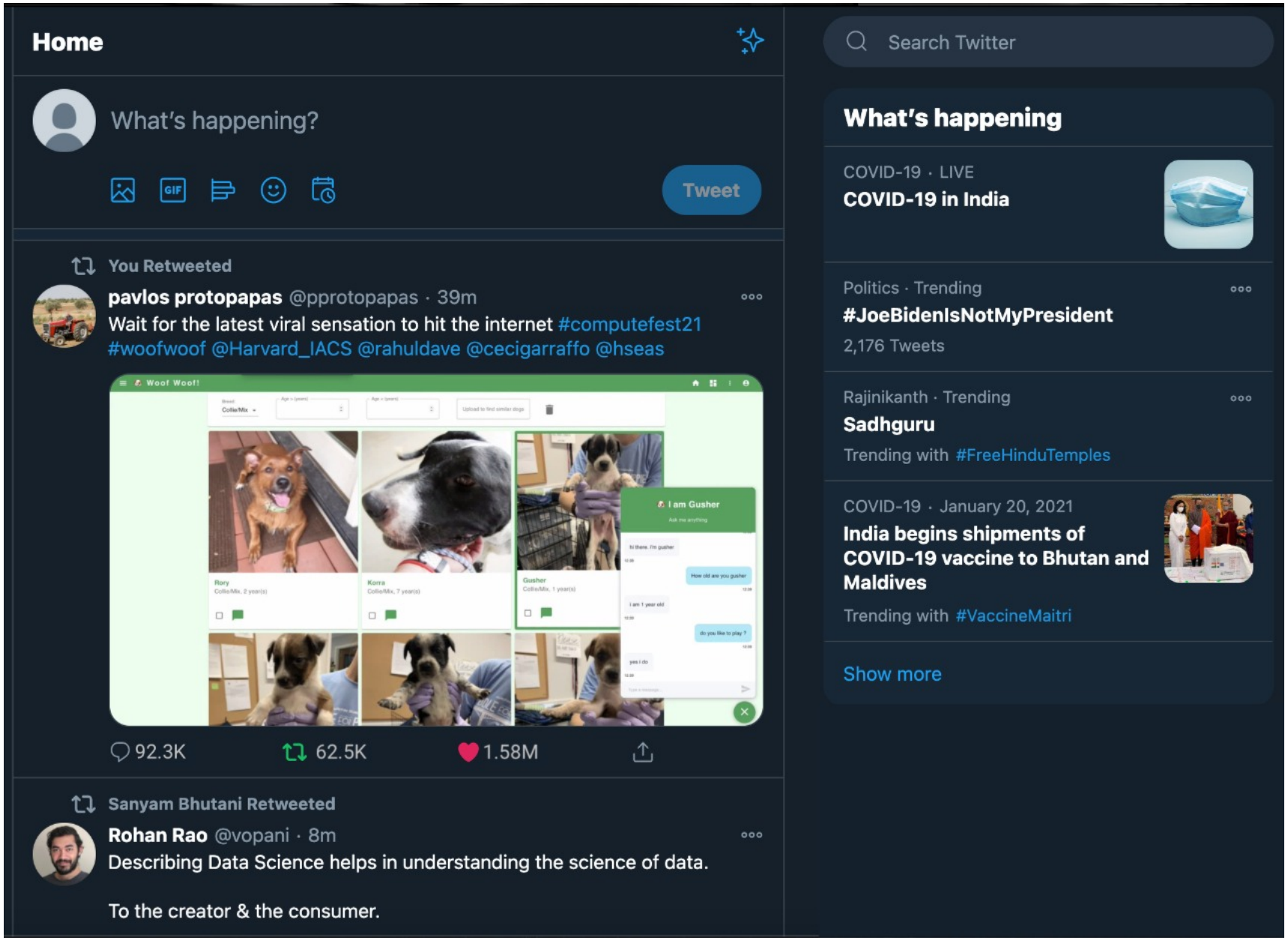
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Introduction to Kubernetes <K8s>

K8s manages containers

K8s is an open-source platform for container management developed by Google and introduced in 2014. It has become the standard API for building cloud-native applications, present in nearly every public cloud.

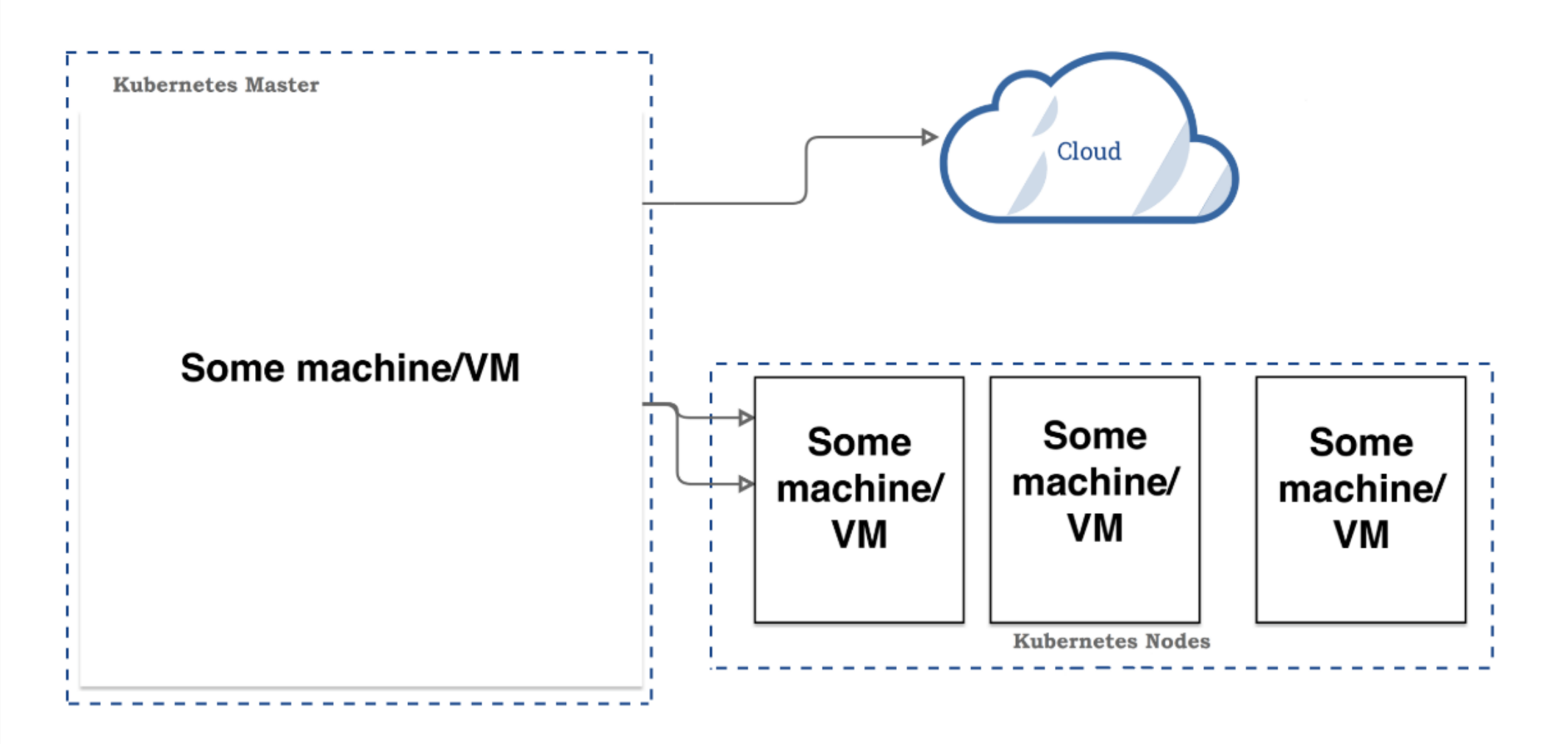
K8s users define rules for how container management should occur, and then K8s handles the rest!

> link to website <

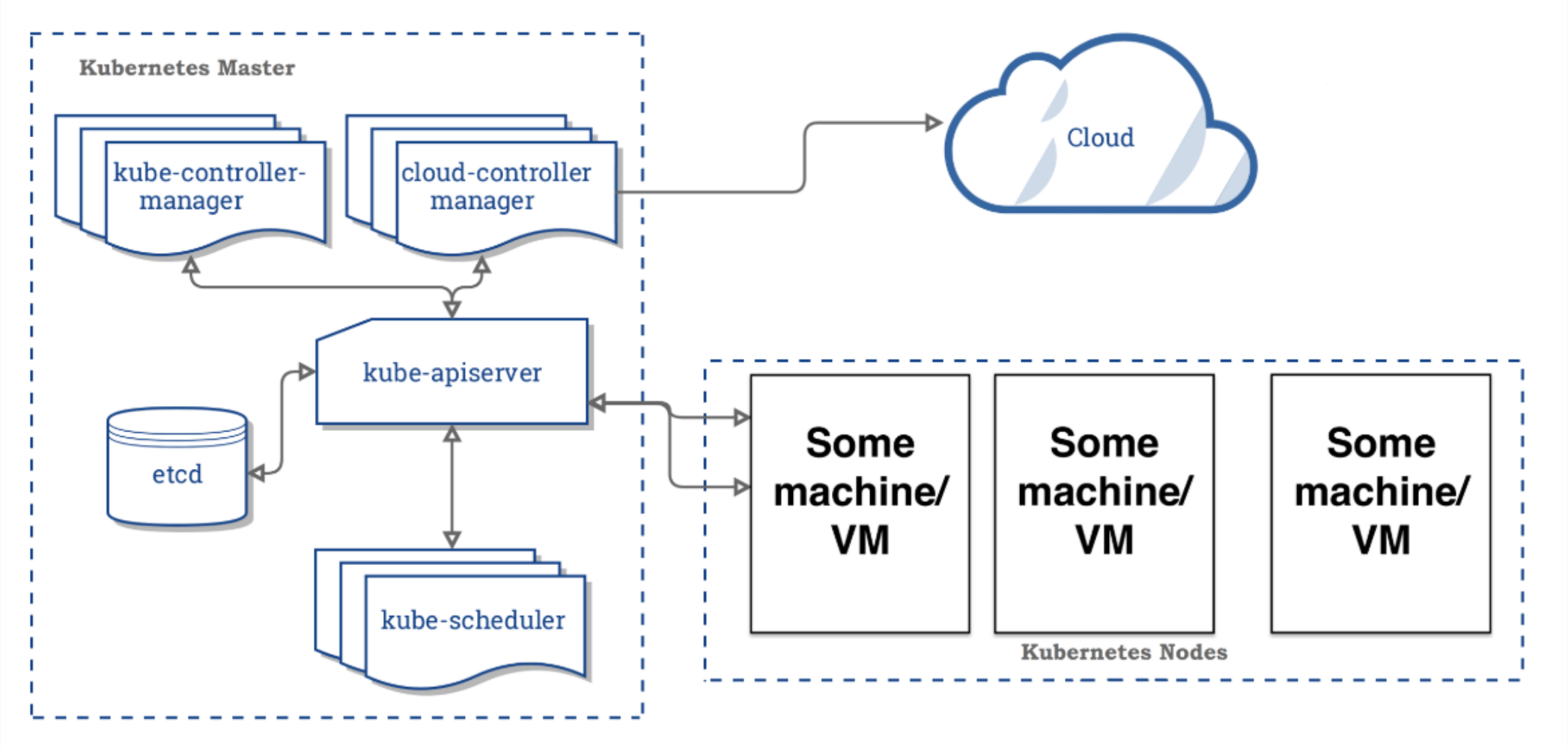
Anatomy of Kubernetes Cluster

- K8s works on a cluster of machines/nodes
- This could be VMs on your local machine or a group of machines through a cloud provider
- The cluster includes one master node and at least one worker node

Anatomy of Kubernetes Cluster <cont>



Anatomy of Kubernetes Cluster | Master Node



> to learn more on etcd <

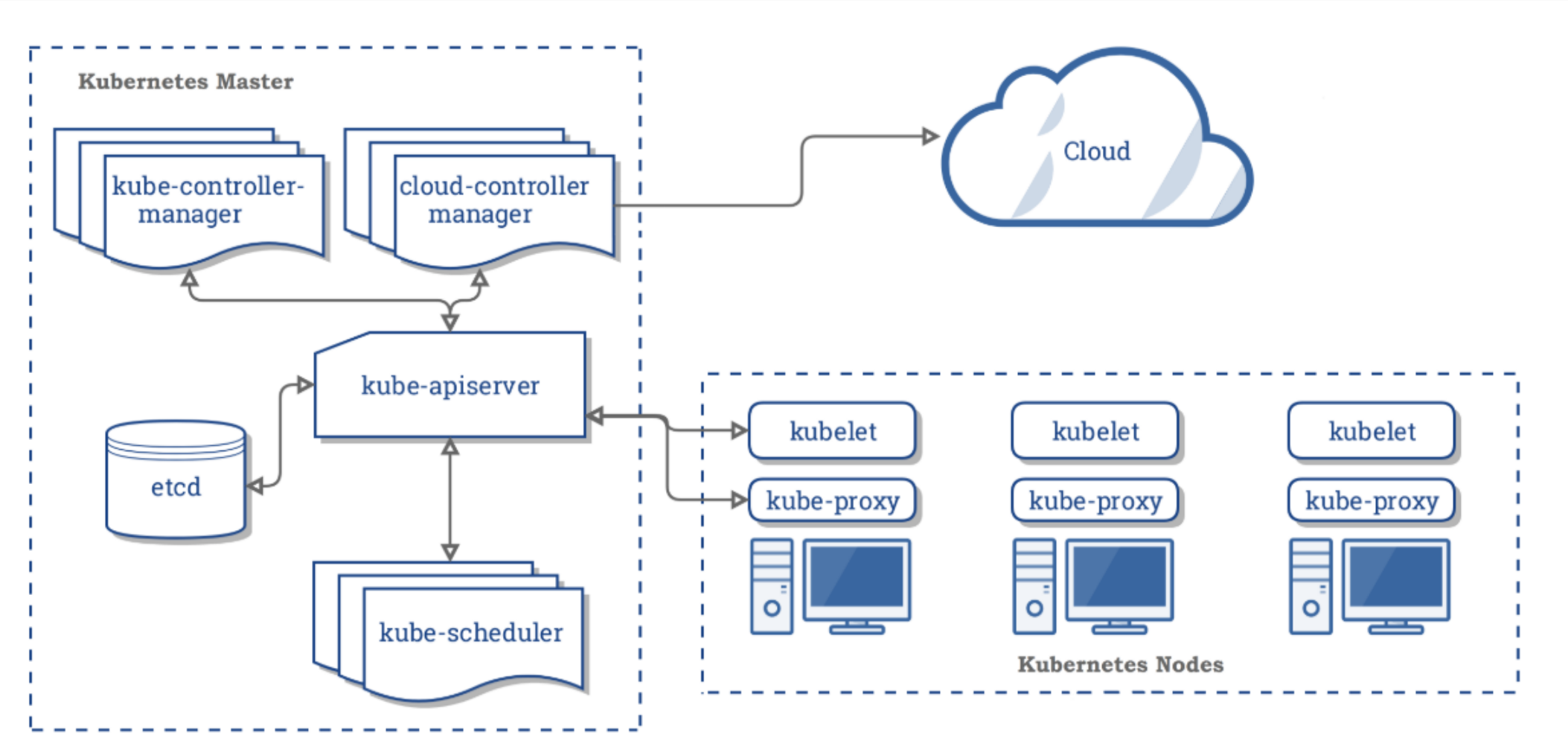
Anatomy of Kubernetes Cluster | Master Node

Master node main task is to manage the worker node(s) to run an application

The master node consists of:

1) **API server** contains various methods to directly access the Kubernetes
2) **Scheduler** assigns to each worker node an application
3) **Controller manager**
   - 3a) Keeps track of worker nodes
   - 3b) Handles node failures and replicates if needed
   - 3c) Provide endpoints to access the application from the outside world
4) **Cloud controller** communicates with cloud provide regarding resources such as nodes and IP addresses
5) **Etcd** works as backend for service discovery that stores the cluster's state and its configuration

Anatomy of Kubernetes Cluster | Worker Nodes



Anatomy of Kubernetes Cluster | Worker Nodes

A worker node consists of:

1) **Container runtime** that pulls a specified Docker image and deploys it on a worker node

2) **Kubelet** talks to the API server and manages containers on its node

3) **Kube-proxy** load-balances network traffic between application components and the outside world

Common kubectl Commands

- Useful commands to complete the exercise:

```
$ kubectl create -f app-db-deploymnet.yaml
$ kubectl get deployment
$ kubectl get pods
$ kubectl get pods /
  -o=custom-columns=NAME:.metadata.name,IP:.status.podIP
$ kubectl create -f app-server-deploymnet.yaml
$ kubectl expose deployment /
app-deployment --type=LoadBalancer --port=8080
$ kubectl get services
$ kubectl delete service app-deployment
$ kubectl delete deployment app-server-deployment
$ kubectl delete deployment app-db-deployment
```

Common kubectl Commands

Practice Kubernetes! Access the exercise using the link below:

> LINK TO EXERCISE <

> LINK TO RESOURCES <

Workshop Overview for Day 1