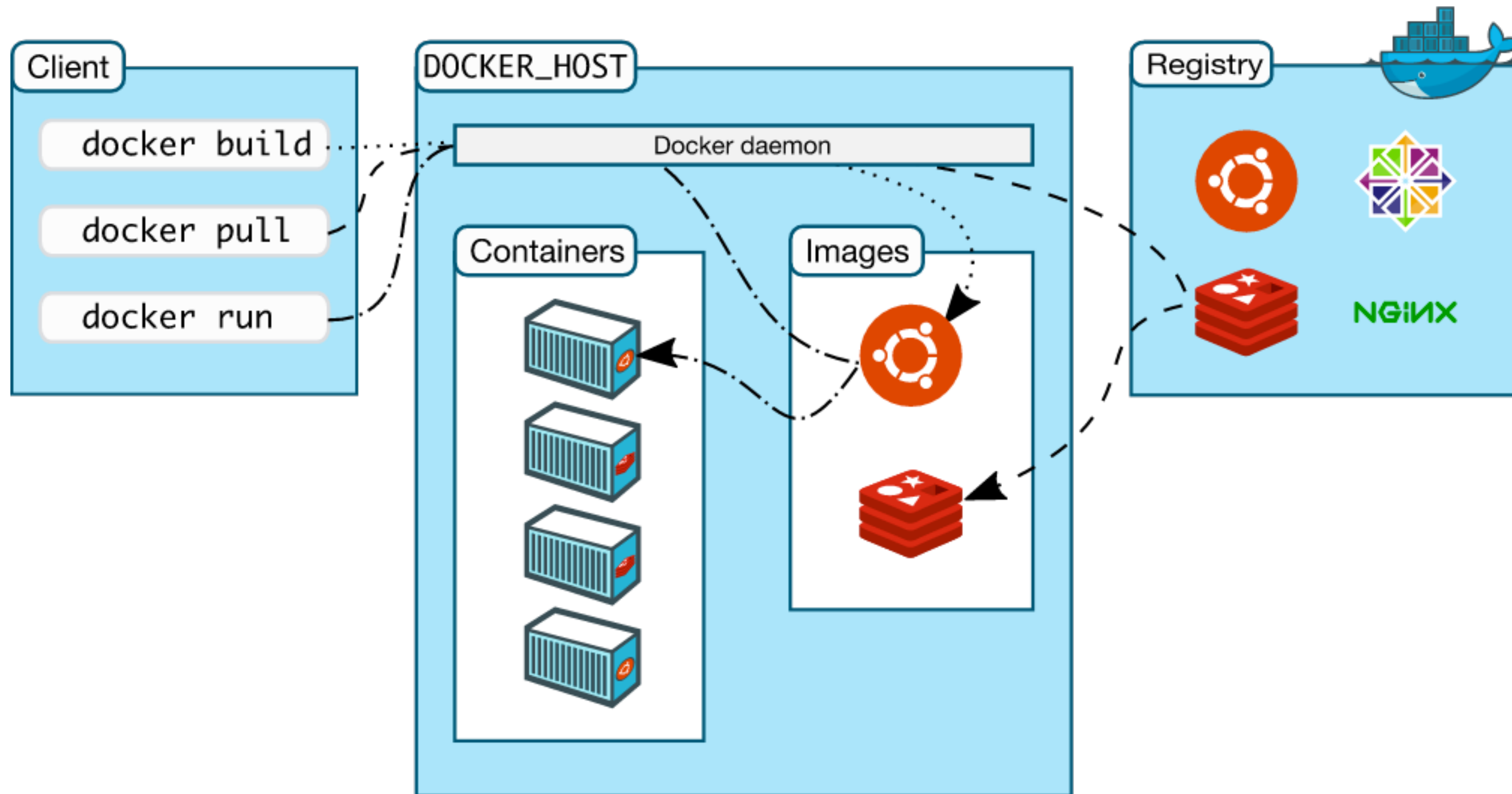
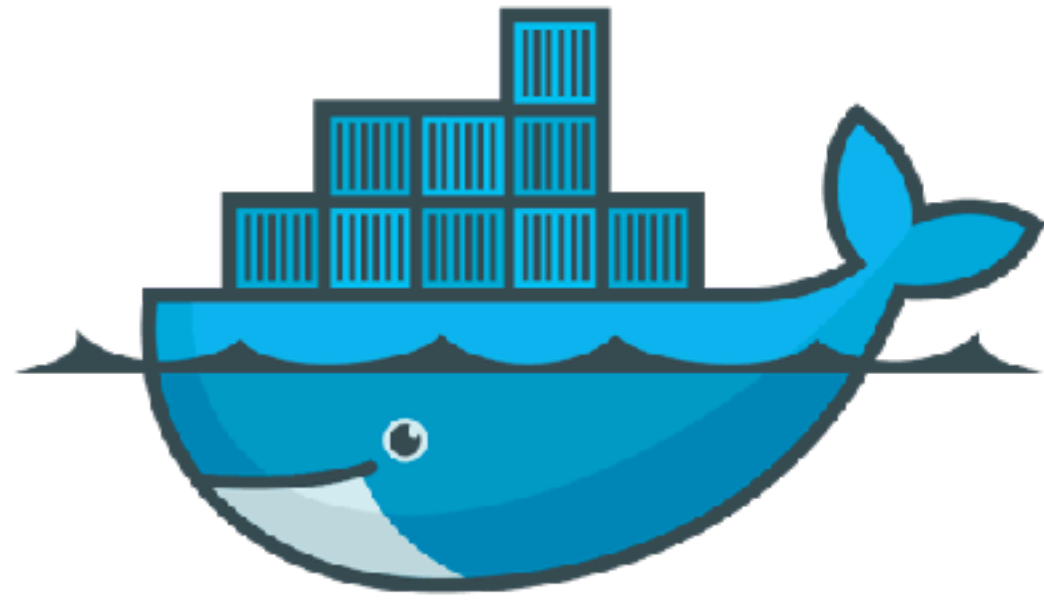


Container Orchestration on Amazon Web Services

Arun Gupta, @arungupta

Docker Workflow

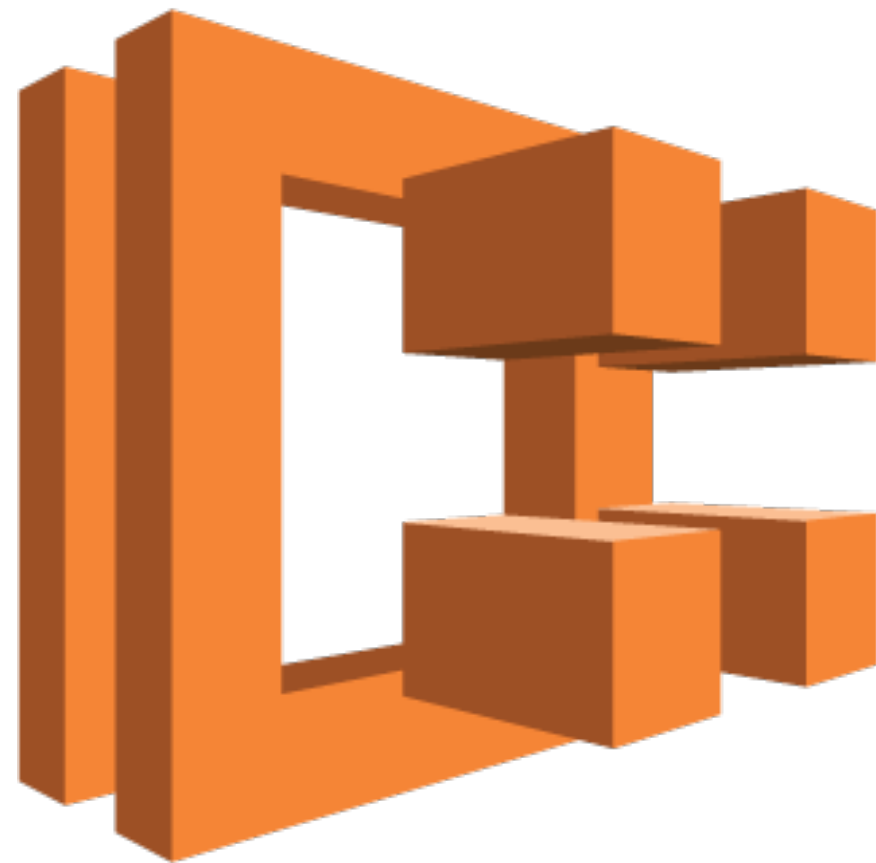




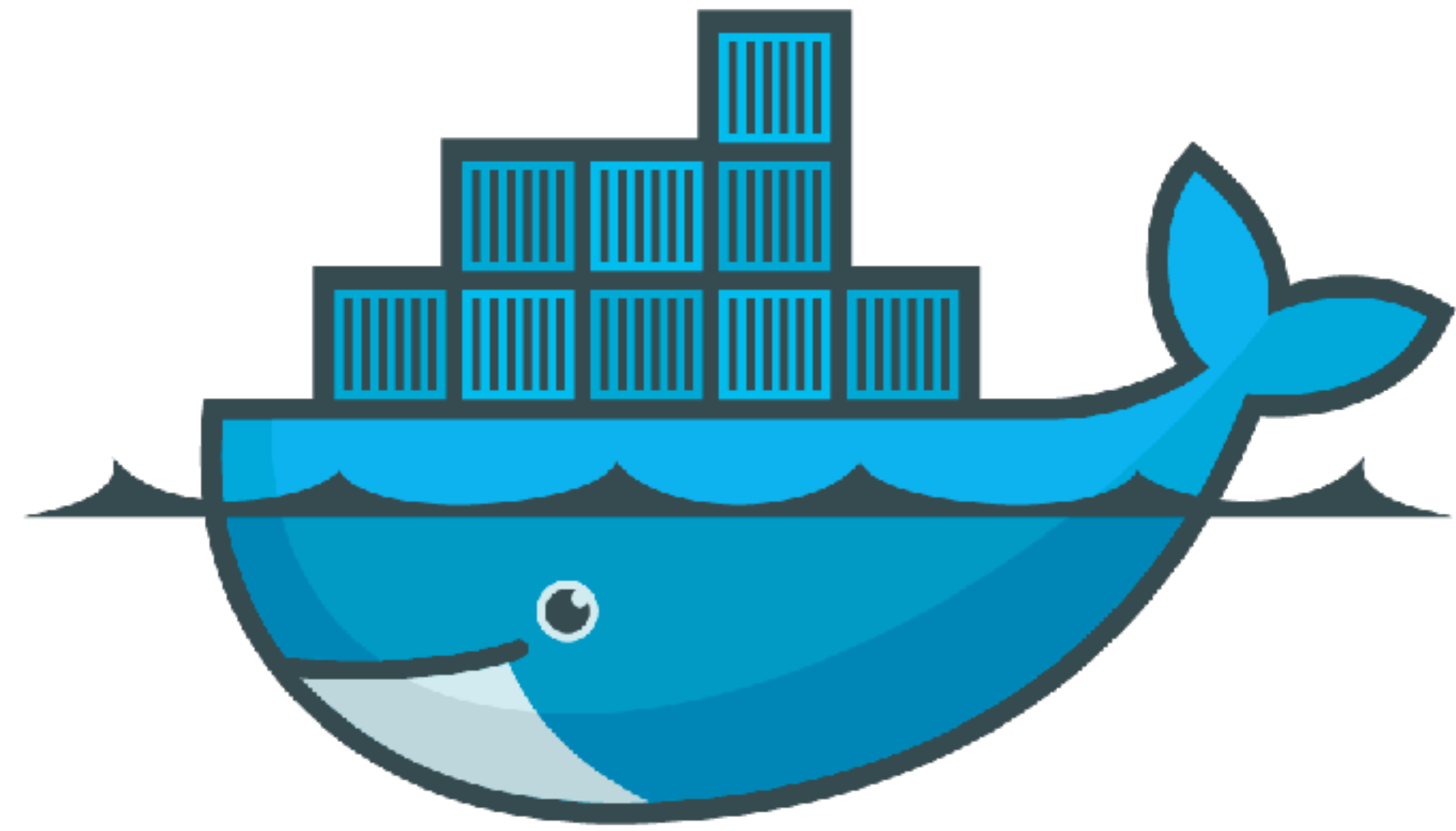
docker



kubernetes



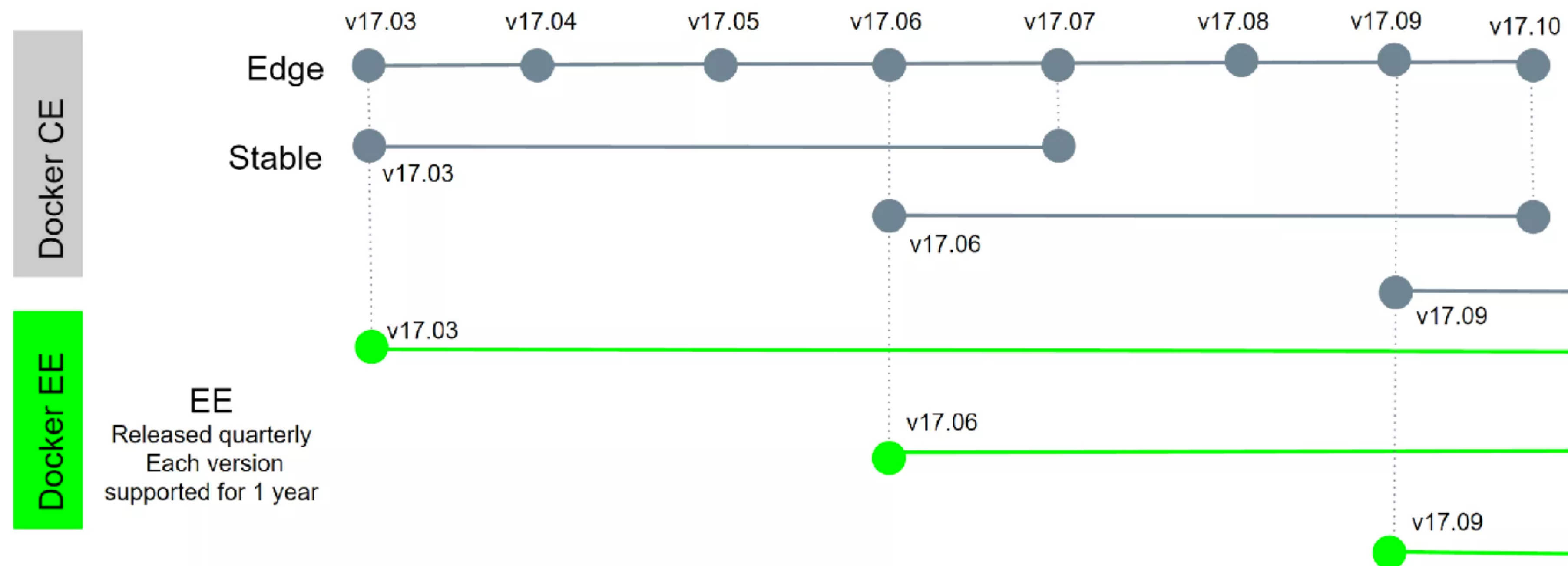
MESOSPHERE



docker

Development using Docker

- Docker Community Edition
 - Docker for Mac/Windows/Linux
 - Monthly edge and quarterly stable releases
 - Native desktop or cloud provider experience

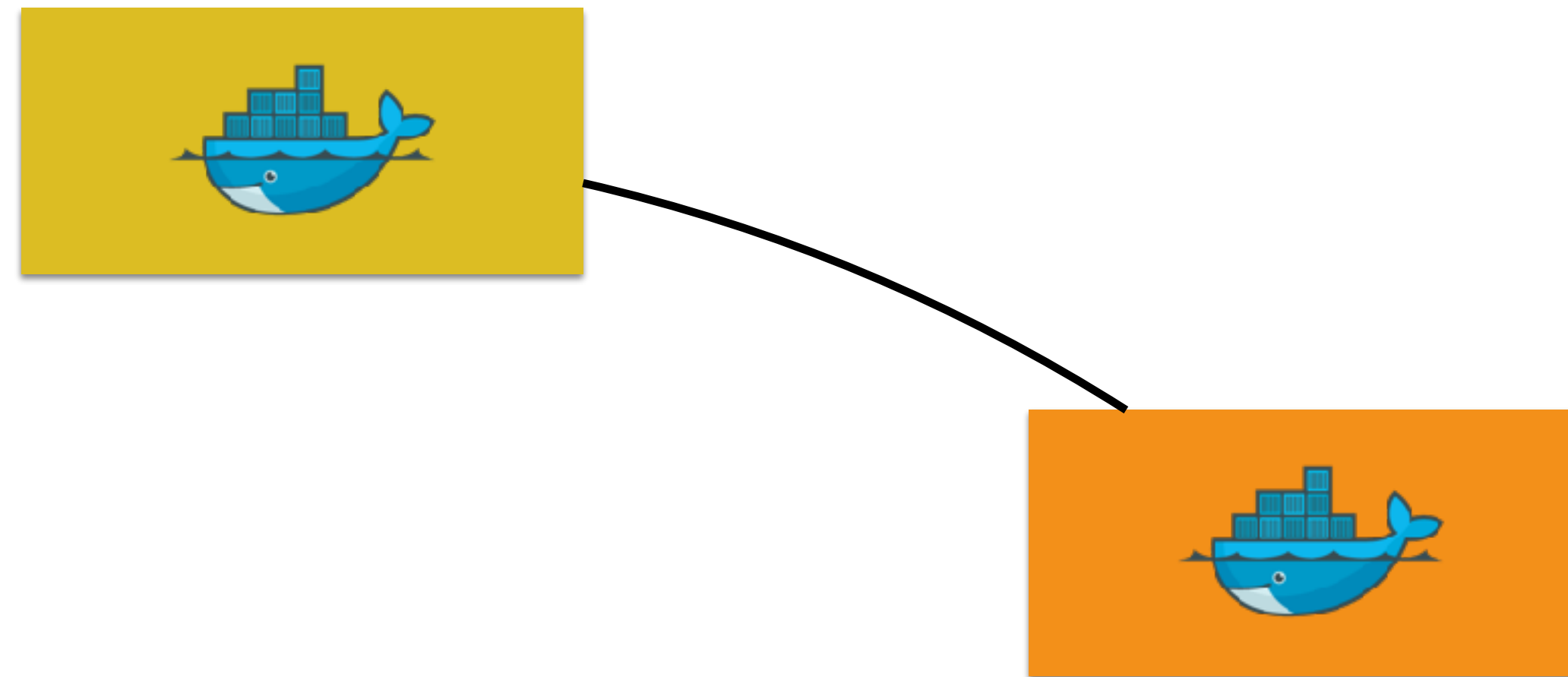


Swarm-mode: Initialize



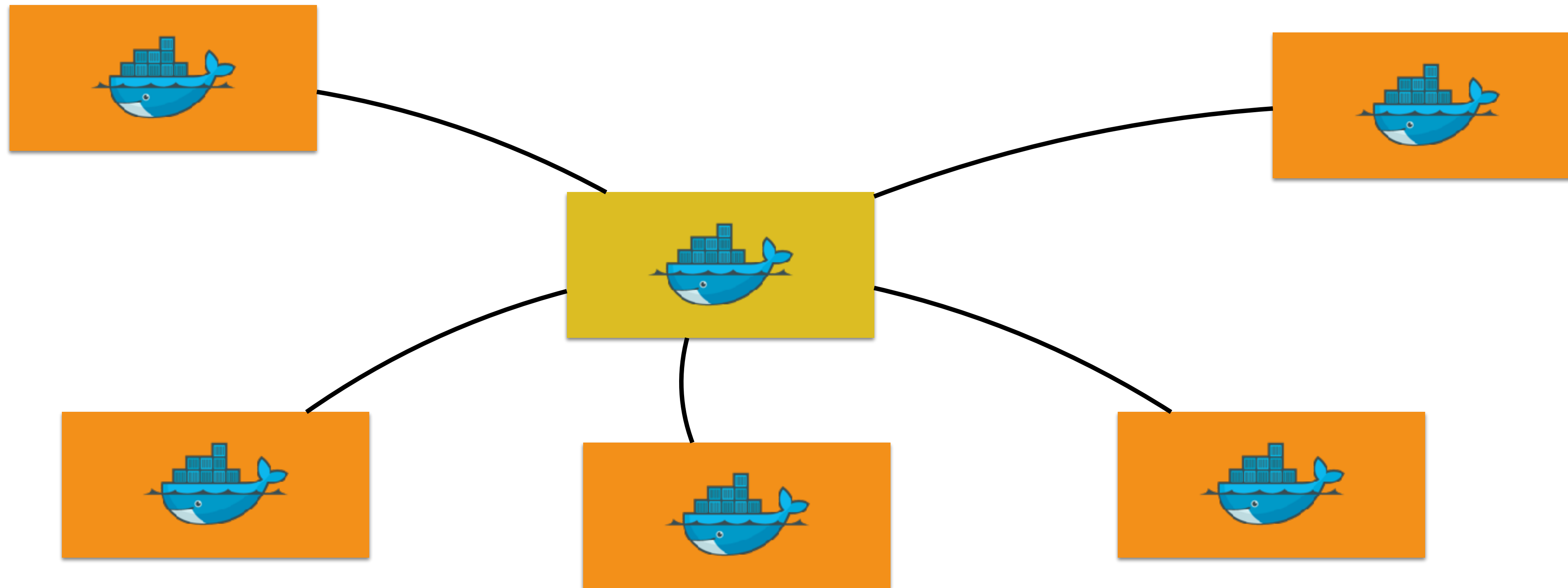
```
docker swarm init --listen-addr <ip>:2377 --secret <SECRET>
```

Swarm-mode: Add Worker



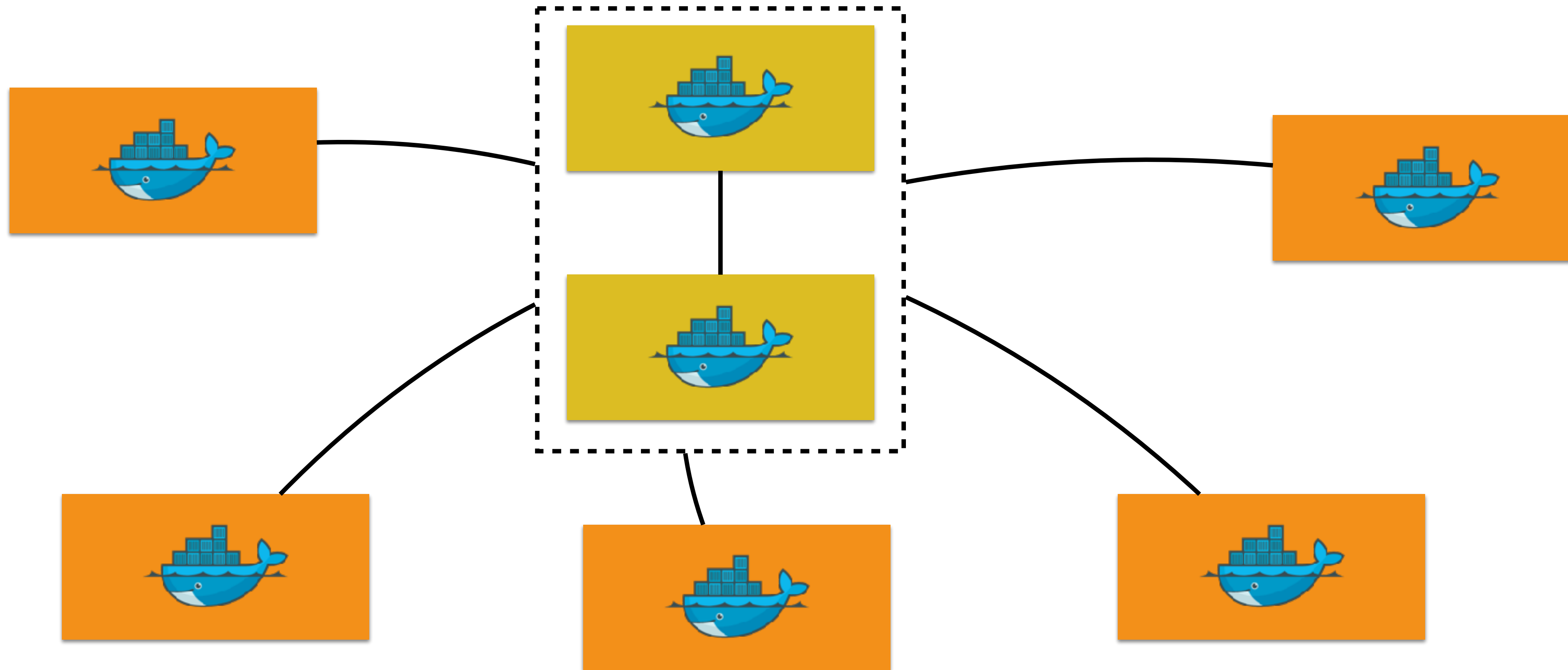
```
docker swarm join --secret <SECRET> <manager>:2377
```


Swarm-mode: Add More Workers



```
docker swarm join --secret <SECRET> <manager>:2377
```


Swarm-mode: Primary/Secondary Master



```
docker swarm join --manager --secret <SECRET> --listen-addr  
<master2>:2377 <master1>:2377
```

Docker for AWS

- CloudFormation template
- Integrated with AWS Infrastructure
 - Autoscaling Groups (ASG)
 - Elastic Load Balancer (ELB)
 - Elastic Block Store (EBS)

Deploy Docker
Community Edition (CE)
for AWS (stable)

Deploy Docker
Community Edition (CE)
for AWS (edge)

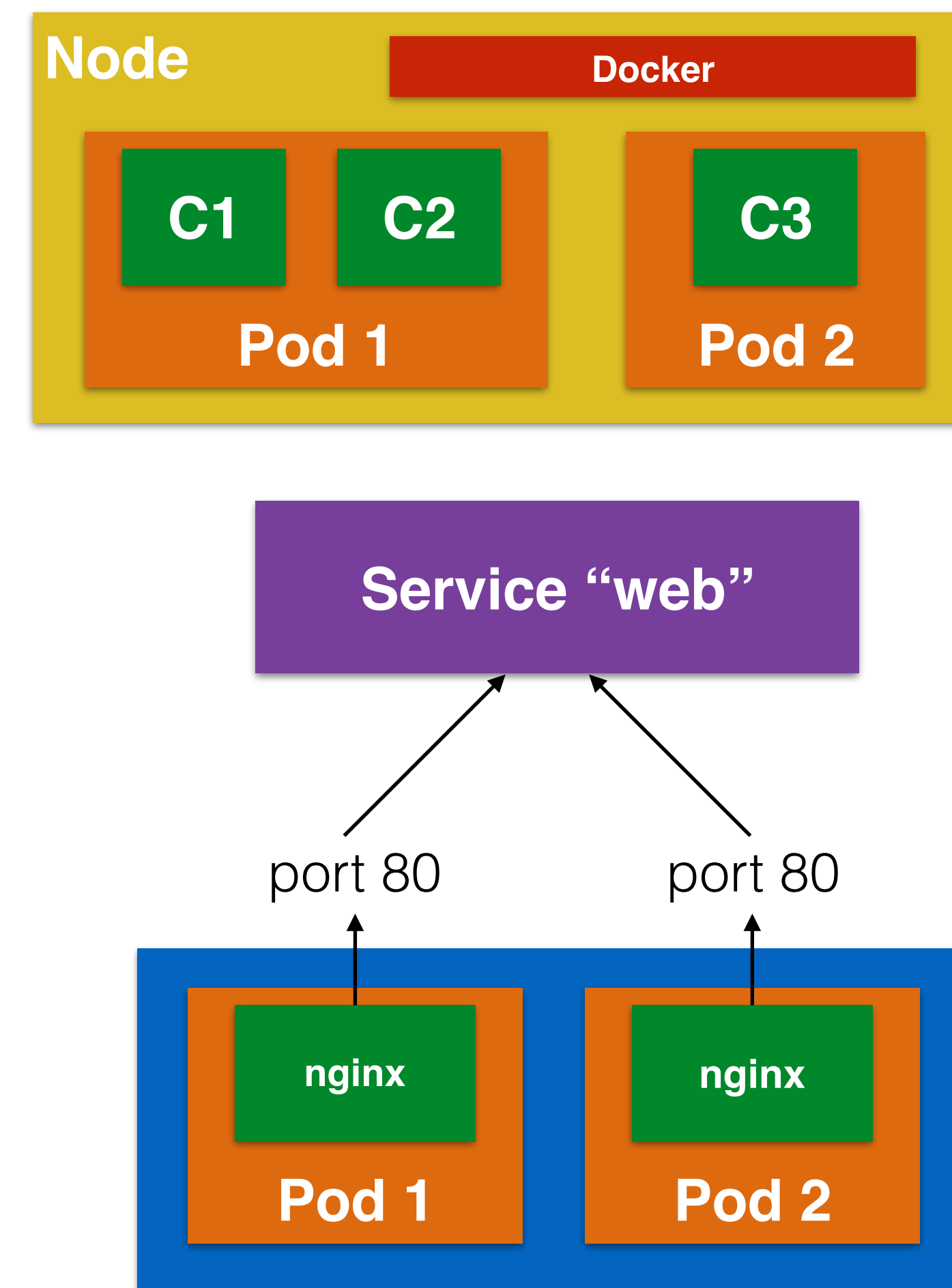
Deploy Docker
Community Edition (CE)
for AWS (edge)
uses your existing VPC



kubernetes

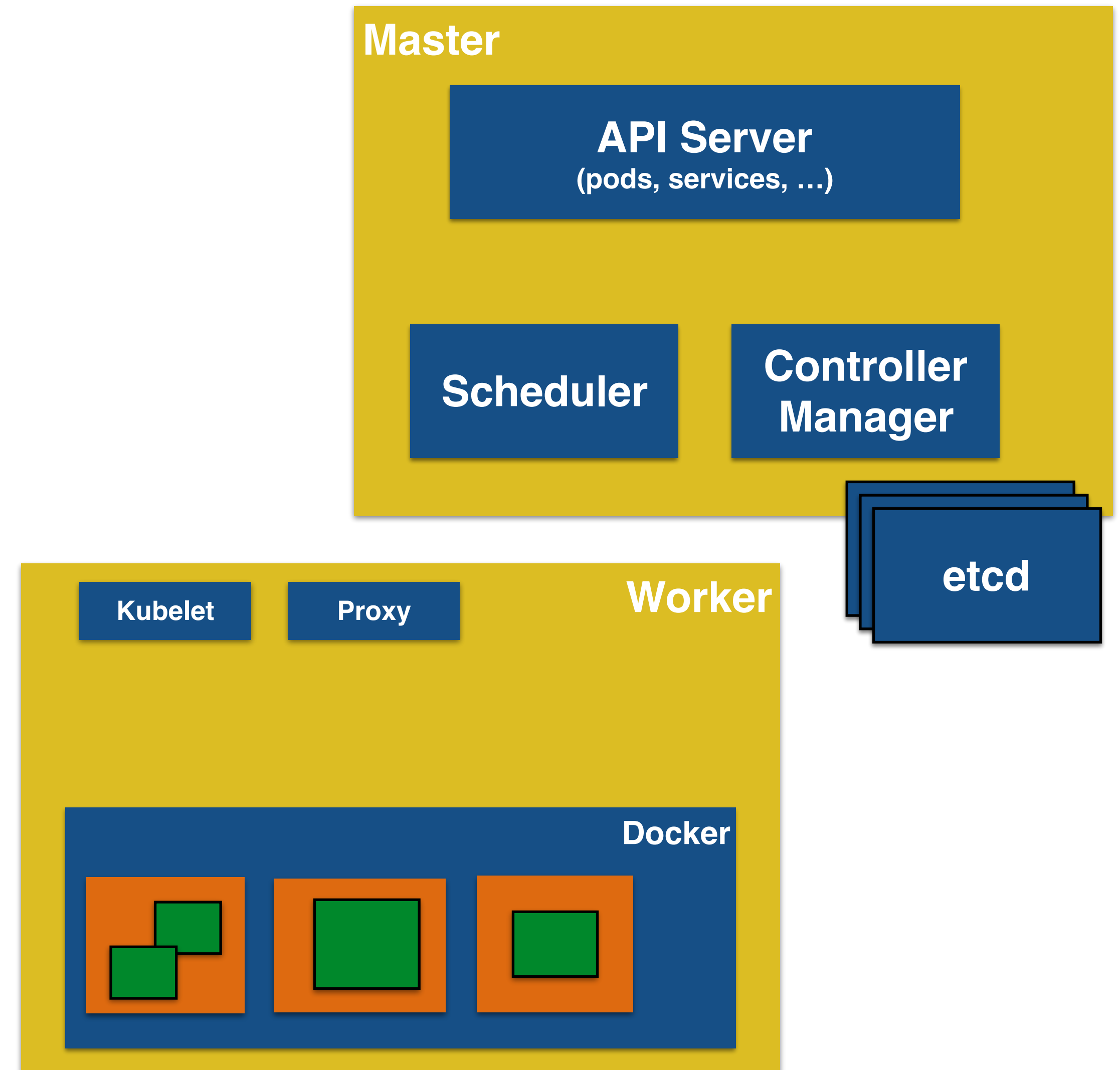
Kubernetes Concepts

- **Pods**: collocated group of Docker containers that share an IP and storage volume
- **Service**: Single, stable name for a set of pods, also acts as LB
- **Label**: used to organize and select group of objects
- **Replica Set**: manages the lifecycle of pods and ensures specified number are running

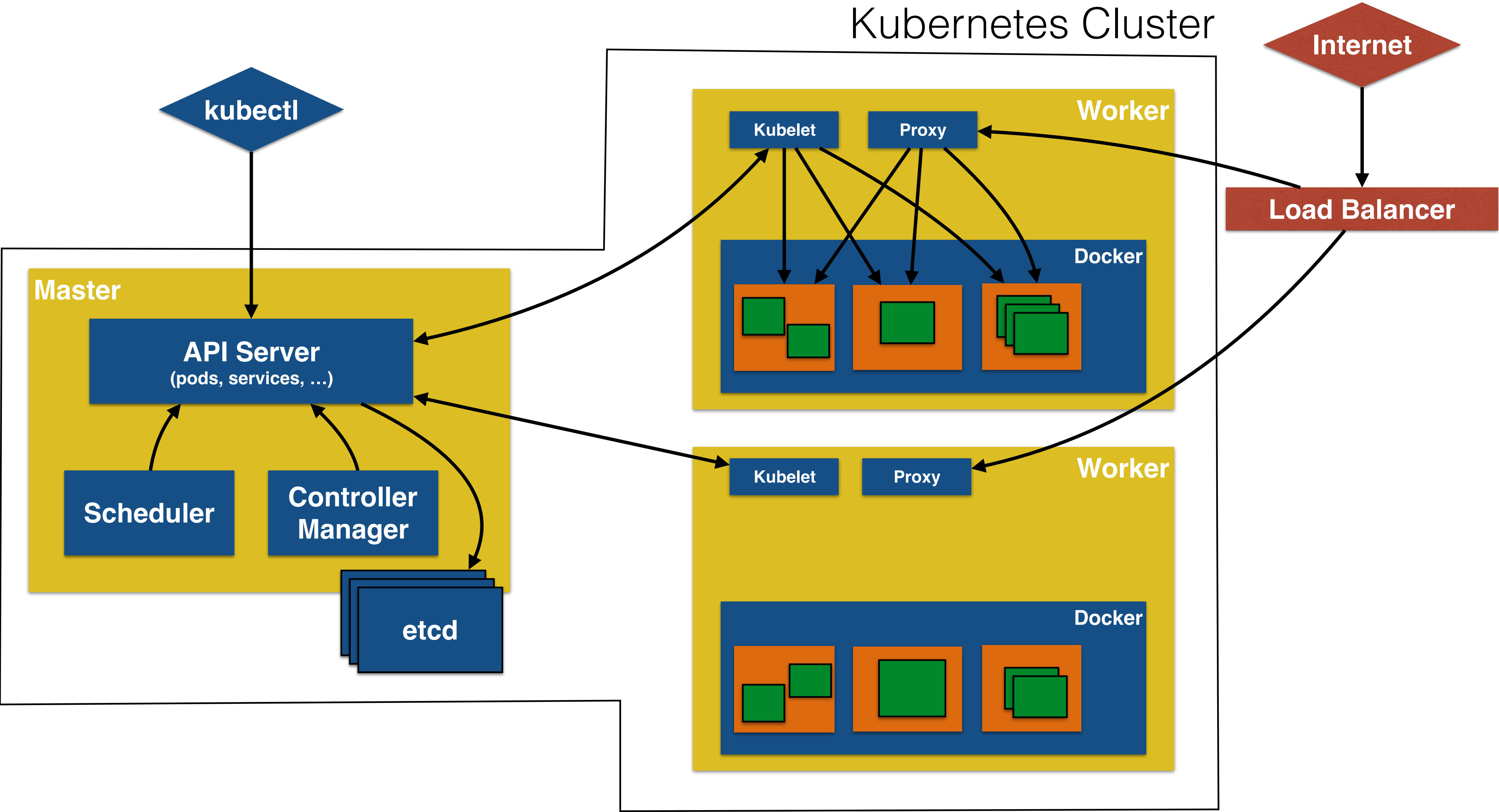


Core Concepts: Kubernetes

- **Node**: Machine or VM in the cluster
- **Master**: Central control plane, provides unified view of the cluster
 - **etcd**: distributed key-value store used to persist Kubernetes system state
- **Worker**: Docker host running *kubelet* (node agent) and *proxy* services
 - Runs pods and containers
 - Monitored by *systemd* (CentOS) or *monit* (Debian)



Kubernetes Cluster



kubectl

- Controls the Kubernetes cluster manager
- `kubectl get pods or minions`
- `kubectl create -f <filename>`
- `kubectl update or delete`
- `kubectl resize --replicas=3 replicaset <name>`

Kubernetes on AWS

- Single node cluster
 - **minikube**
- Multi-node cluster on AWS
 - **kops**: github.com/kubernetes/kops
 - **kube-aws**: github.com/kubernetes-incubator/kube-aws
 - **Heptio**: github.com/aws-quickstart/quickstart-heptio
- Google Cloud, Azure, Tectonic, OpenShift ...



Amazon EC2 Container Service



Cluster
Management

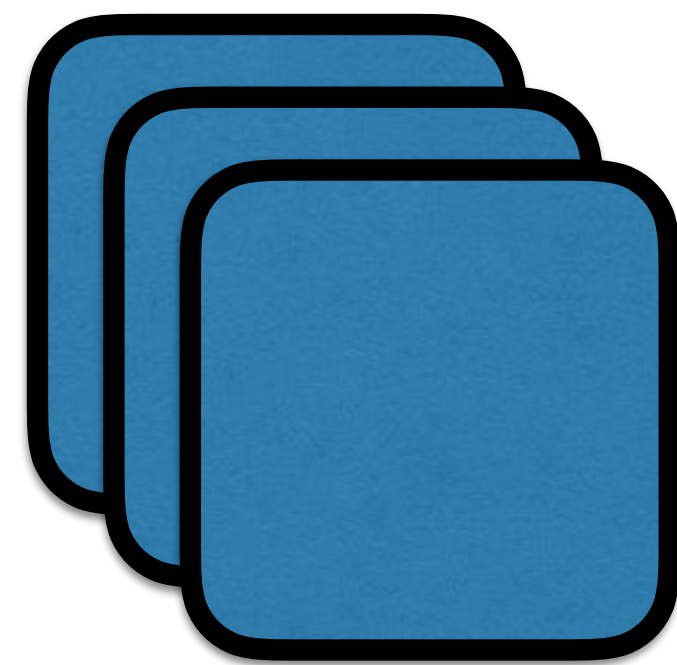


Container
Orchestration

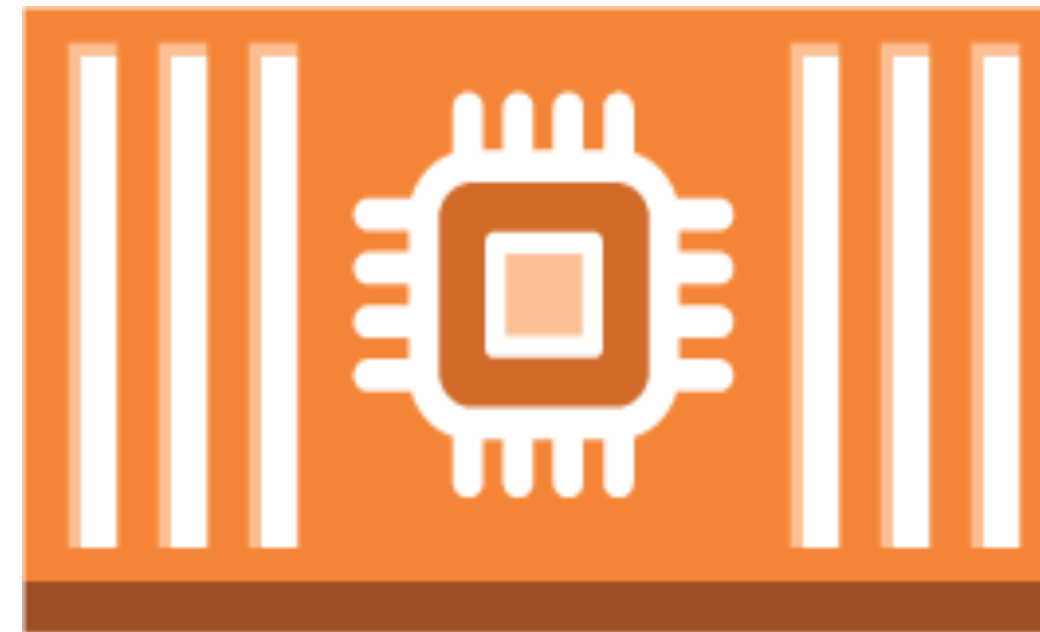
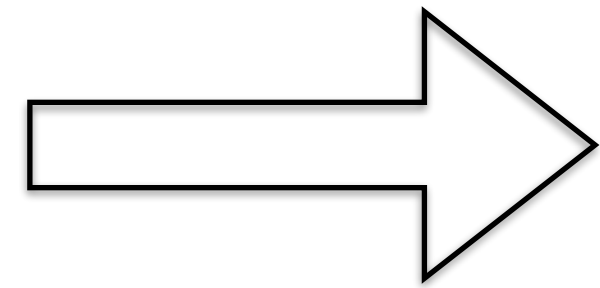


Deep AWS
Integration

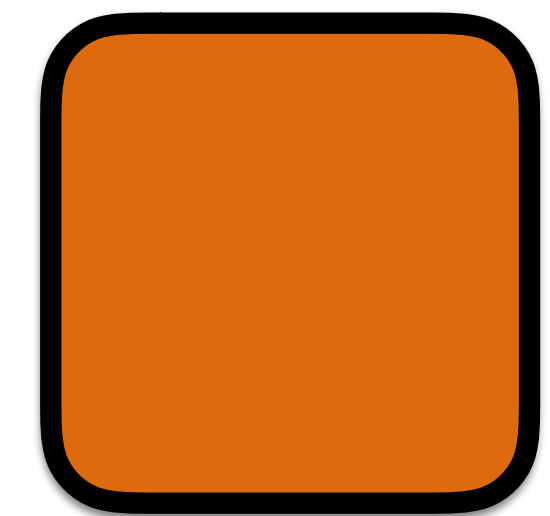
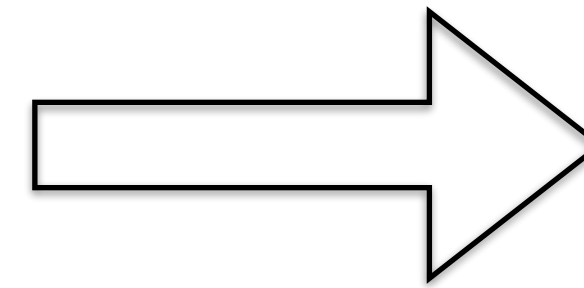
Mapping to EC2 Workloads



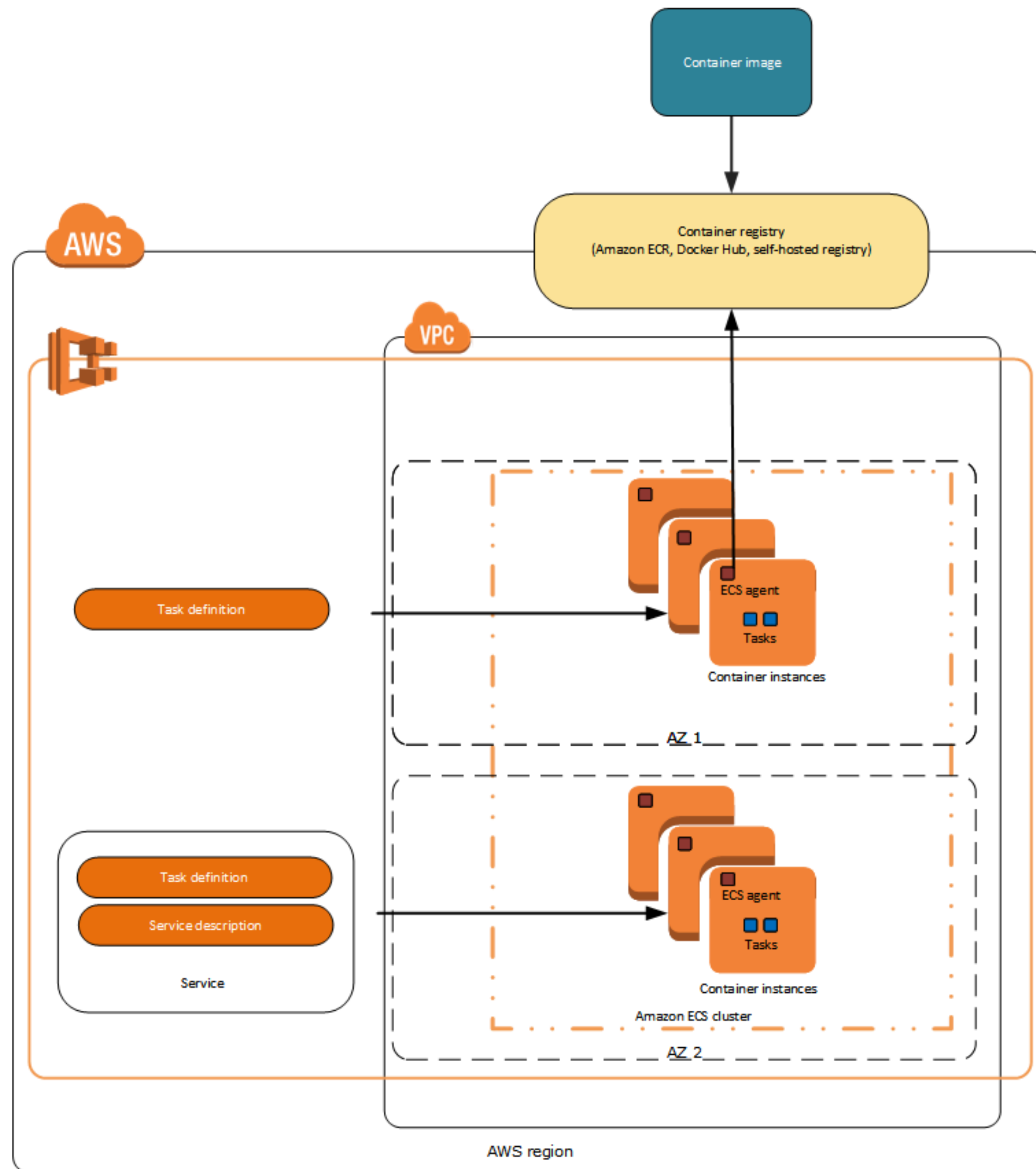
Instances



Services



Tasks



Deep Integration with AWS

- Specify IAM role used by the containers in a task
- Services deploy and scale quickly, easily extensible
 - For example, git push can trigger a deployment using CI tool
- Scale a service up or down based upon CloudWatch alarms
- Audit through CloudTrail, can track task/role association
- Application Load Balancer: Define routing rules based on content

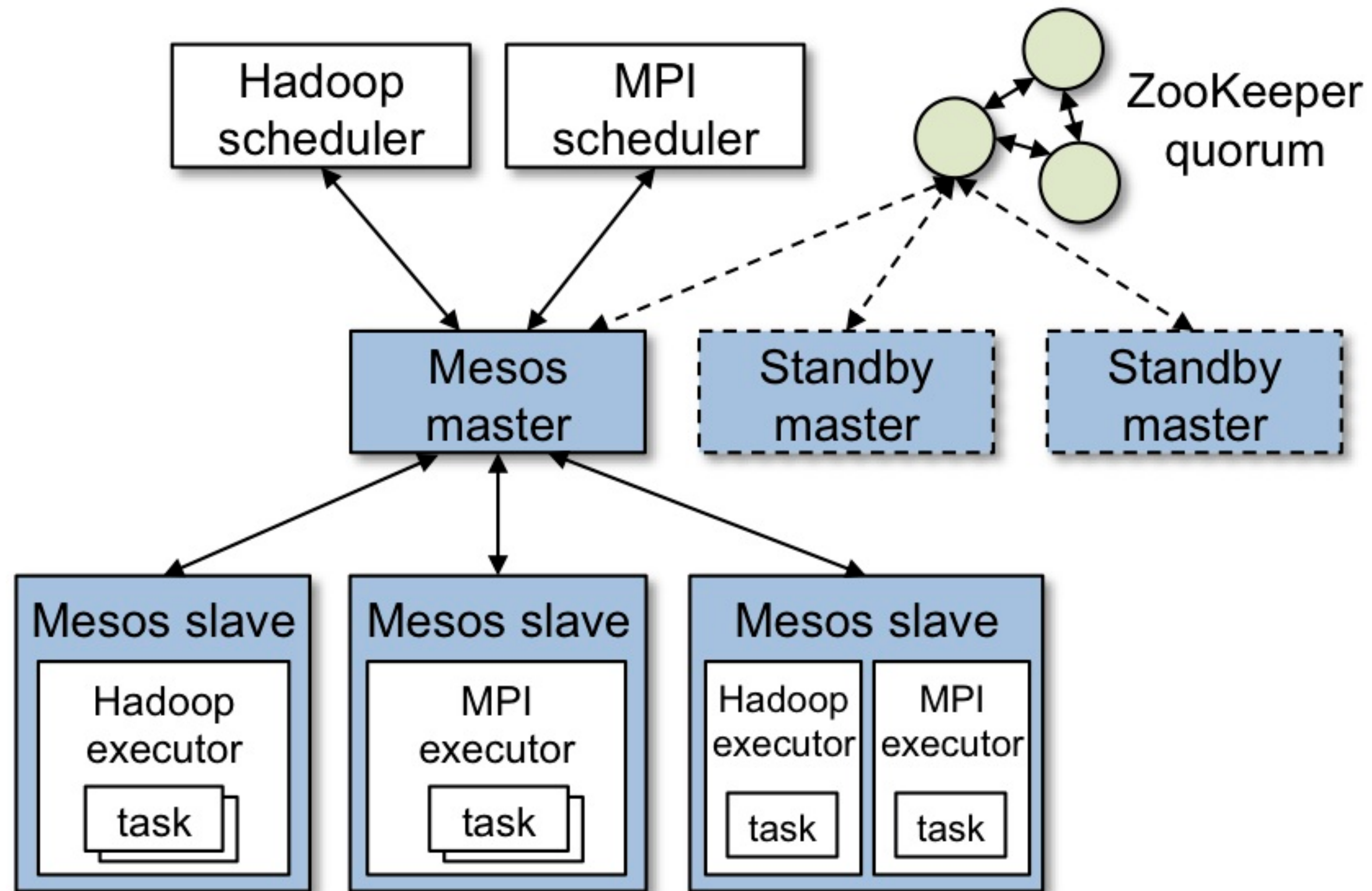


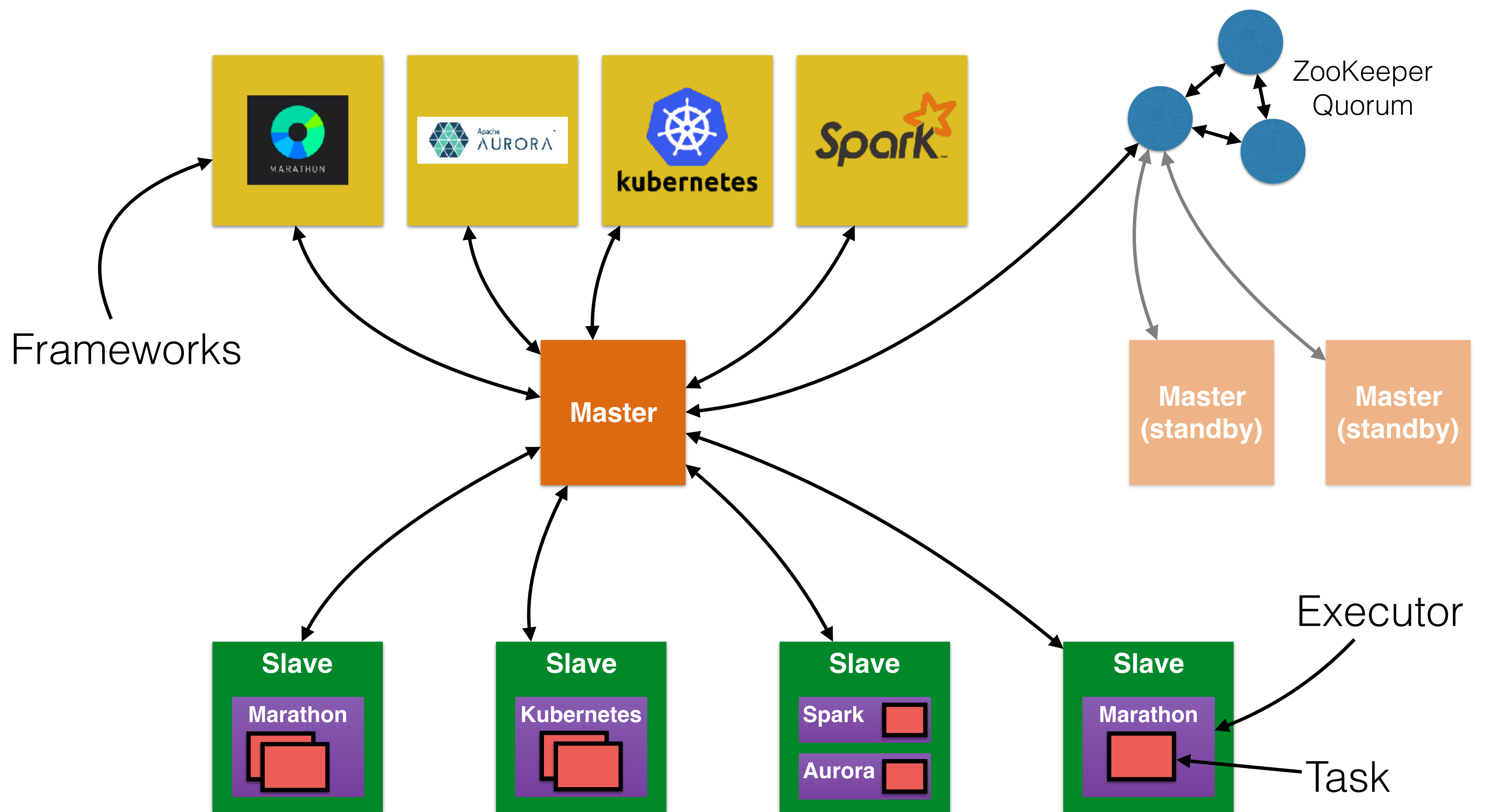
MESOSPHERE

Mesos

- Open source cluster manager
 - Developed at UC Berkeley
- Provides resource isolation and sharing across distributed applications
- Run distributed systems on the same pool of nodes
 - Hadoop, Spark, Jenkins, ...
- Cluster monitoring
- Tasks isolated via Linux containers

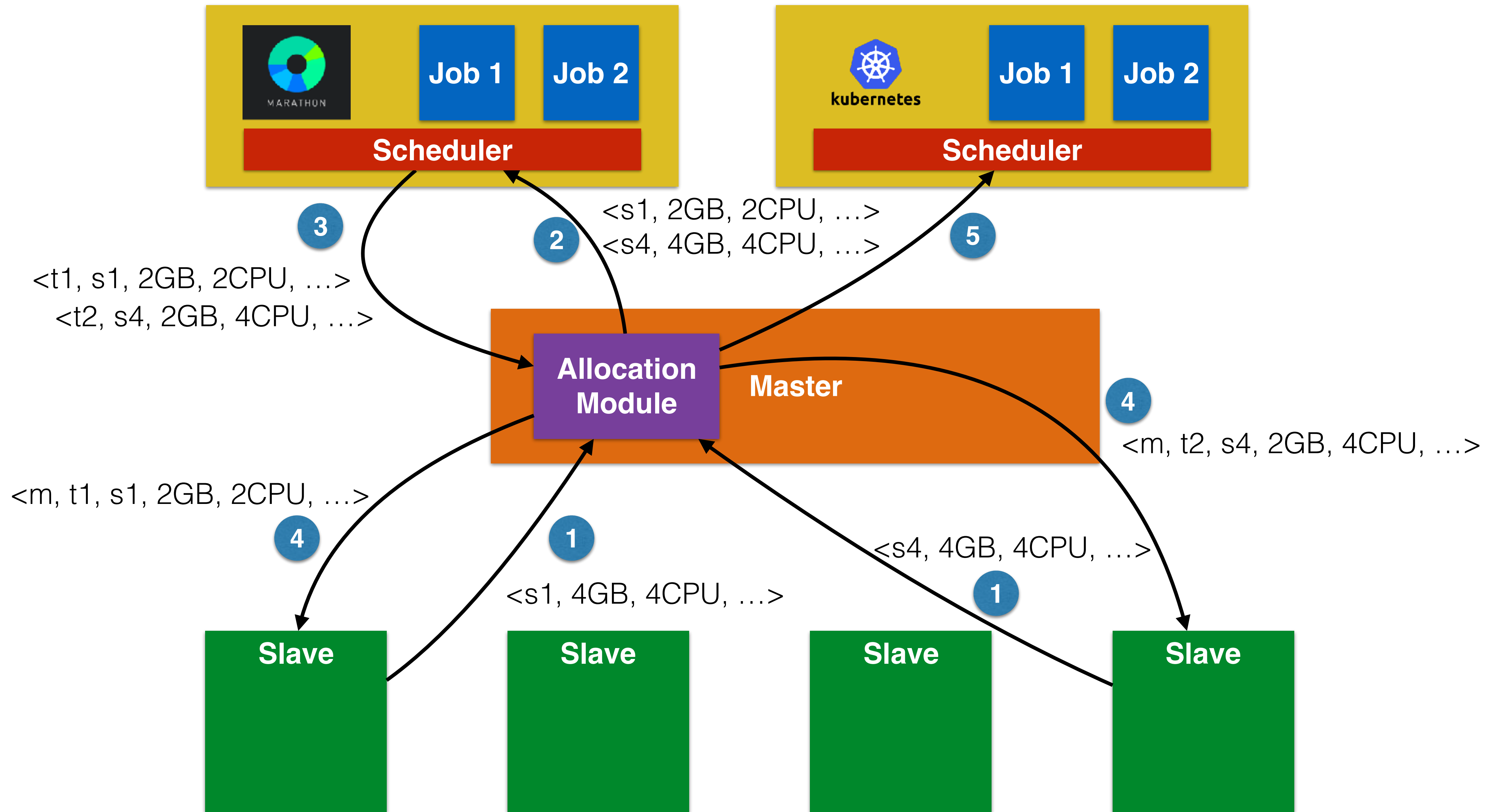
Mesos Architecture





Frameworks

- Frameworks are targeted at a use case and domain-specific
 - Master node “offers” resources to each framework
 - Framework “accepts” the offer and execute applications
- Framework has “scheduler” and “executor”
 - Scheduler registers with the master for “offer”
 - Executor launched on slave nodes to run the task
 - Passes a description of the task to run



DC/OS on AWS

- CloudFormation template
- Basic
 - Easy to get started, minimal setup required
 - Great for simple production deployment, demos and testing
 - Limited customization options
- Advanced
 - Highly customizable
 - More setup work is required

Thanks!

Arun Gupta, @arungupta

github.com/javaee-samples/docker-java/tree/master/slides