Intro to Kubernetes Workshop

Richard Irving

Agenda

What is Docker?

What is Kubernetes?

Deploy some containers

Ask some questions

The Objective

Get enough information and insight to begin experimenting with your own containerized workloads...

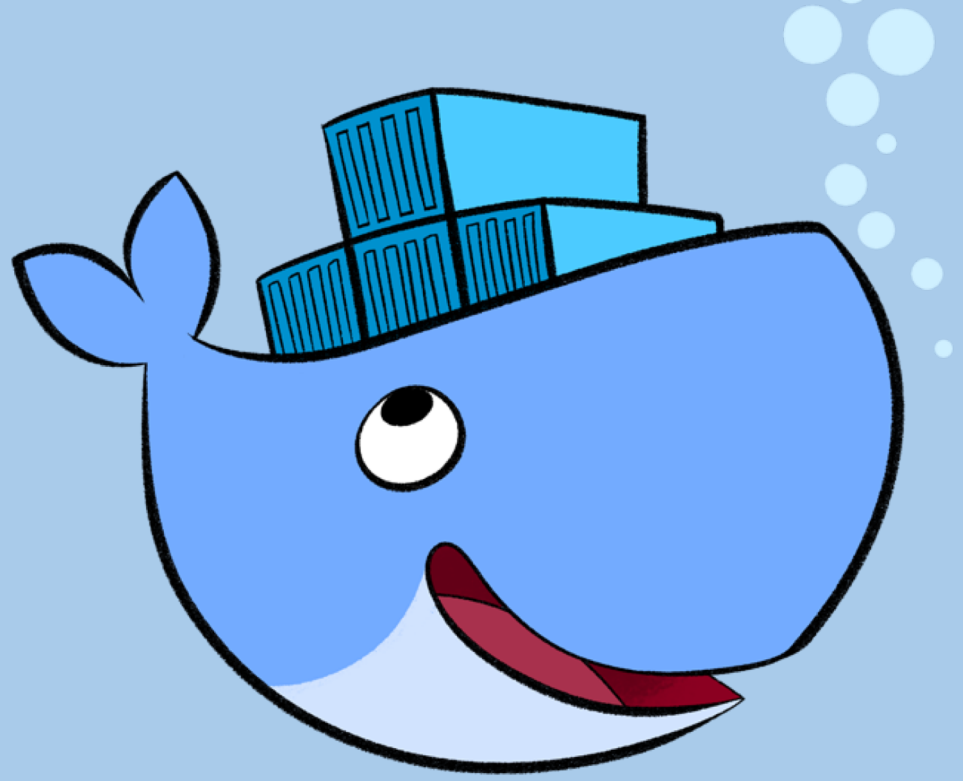
Getting Started...

1. *Cluster URL*
2. *Username & password*
3. *Download and configure the kubectl client*
4. *Create an account at https://hub.docker.com*

Where are the labs?

https://github.com/kriersd/ICP_Meetup_Workshop

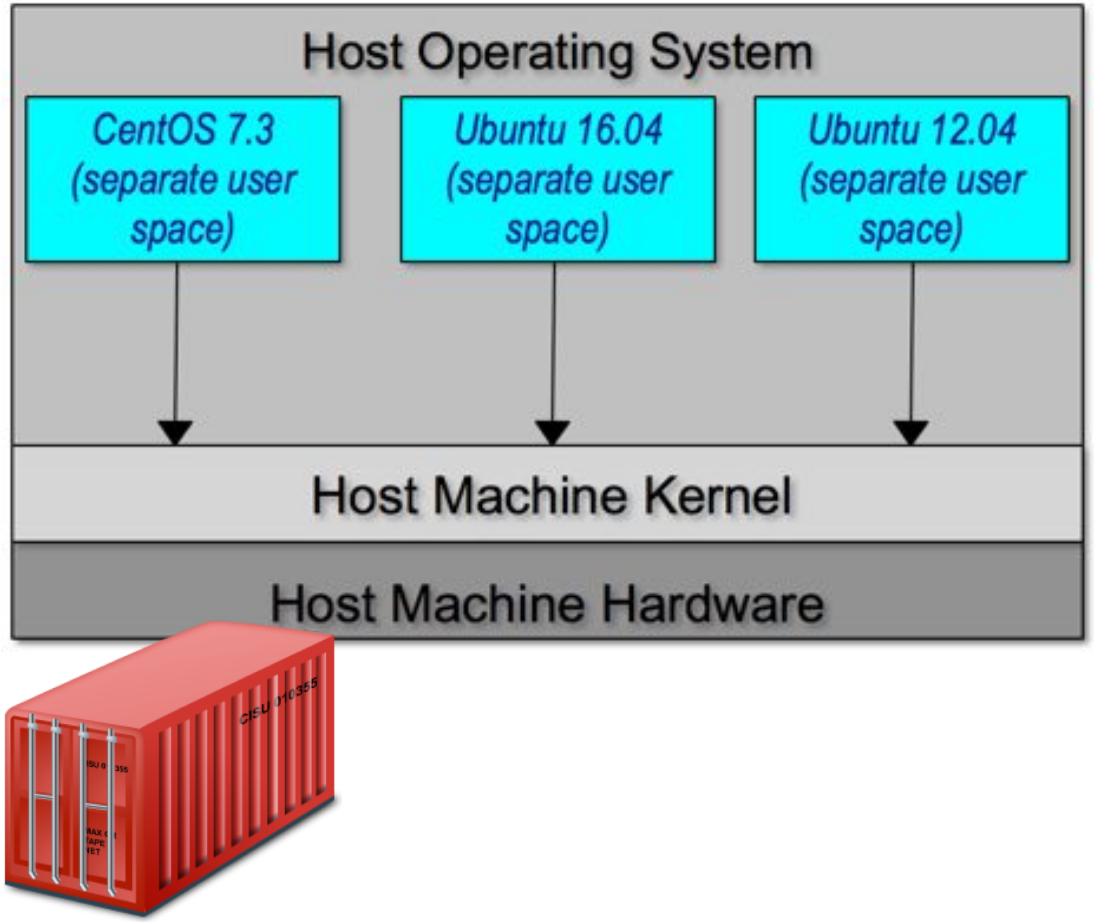
What is Docker?



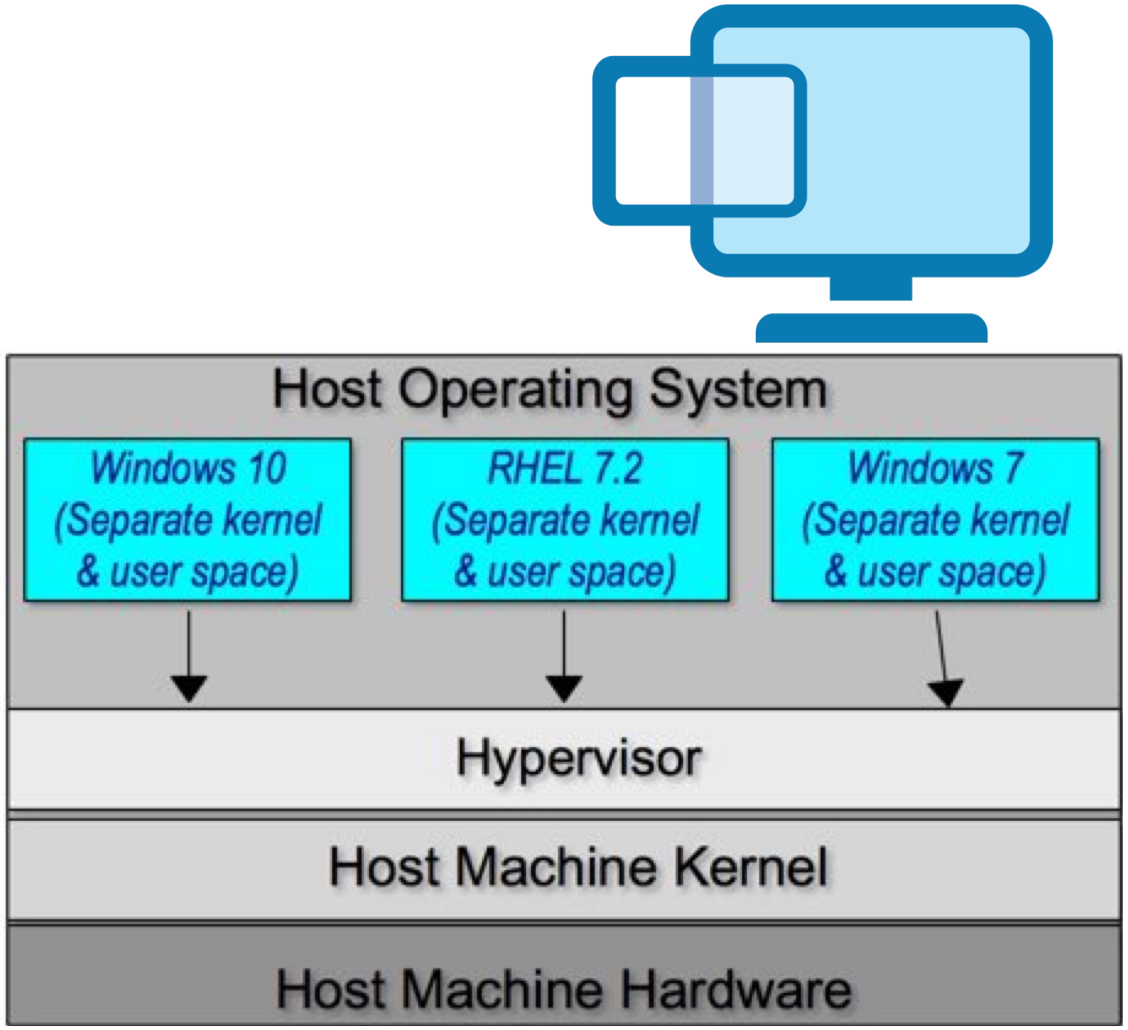
Containers VS Virtual machines

VS

Containers VS Virtual machines

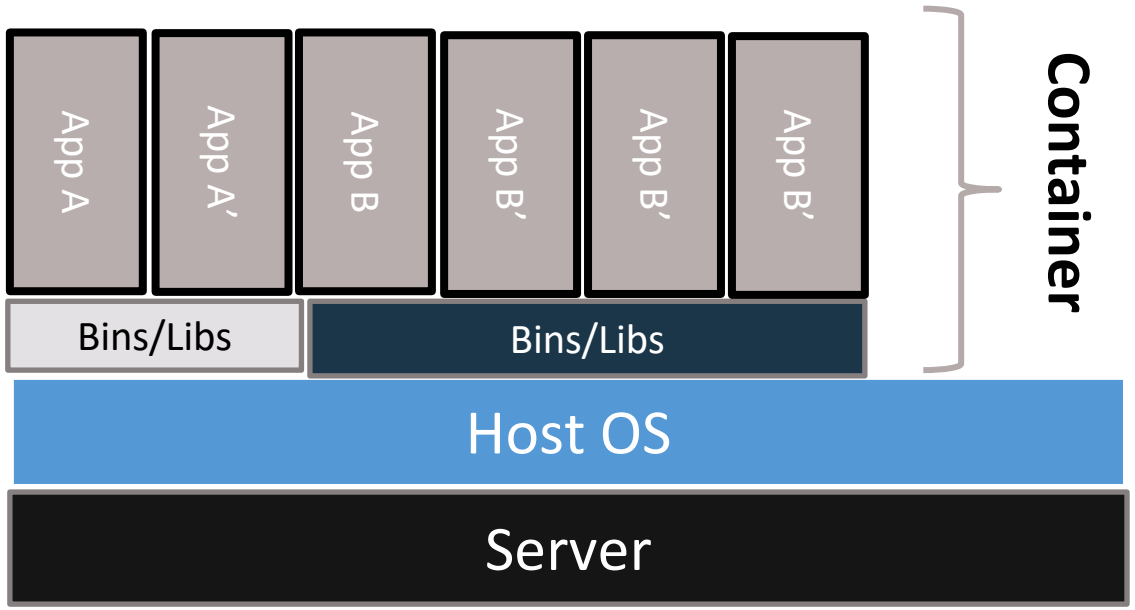


VS



What's a container anyway?

- Isolated userspace within a running linux OS
- Shared linux kernel across containers
- All packages and data in an isolated runtime saved as a filesystem
- Works on all the major linux platforms
- Looks like a vm from inside, like a normal process from outside
- Standardized packaging for applications and their dependencies that runs on any docker-enabled machine



Separation of Concerns

Debbie: The Developer

Handles what's "**inside**" the container

- Her code
- Her Libraries
- Her Package Manager
- Her Apps
- Her Data

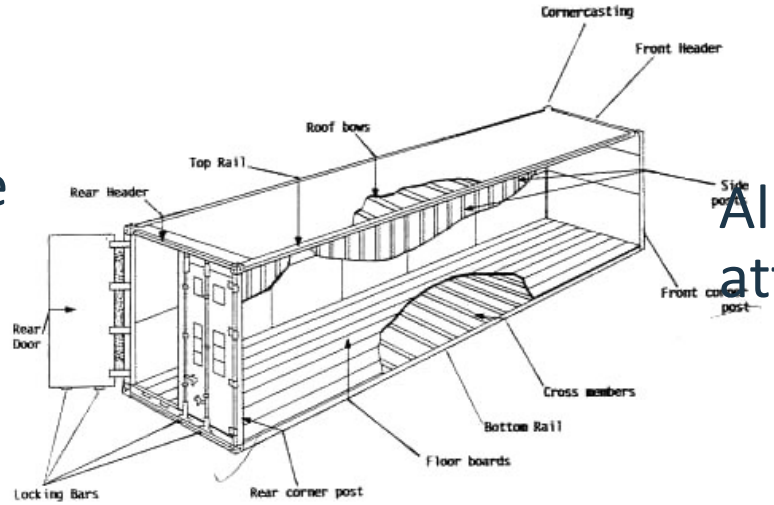
Linux servers all look the same

Oswaldo: The Ops Guy

Handles what's "**outside**" the container

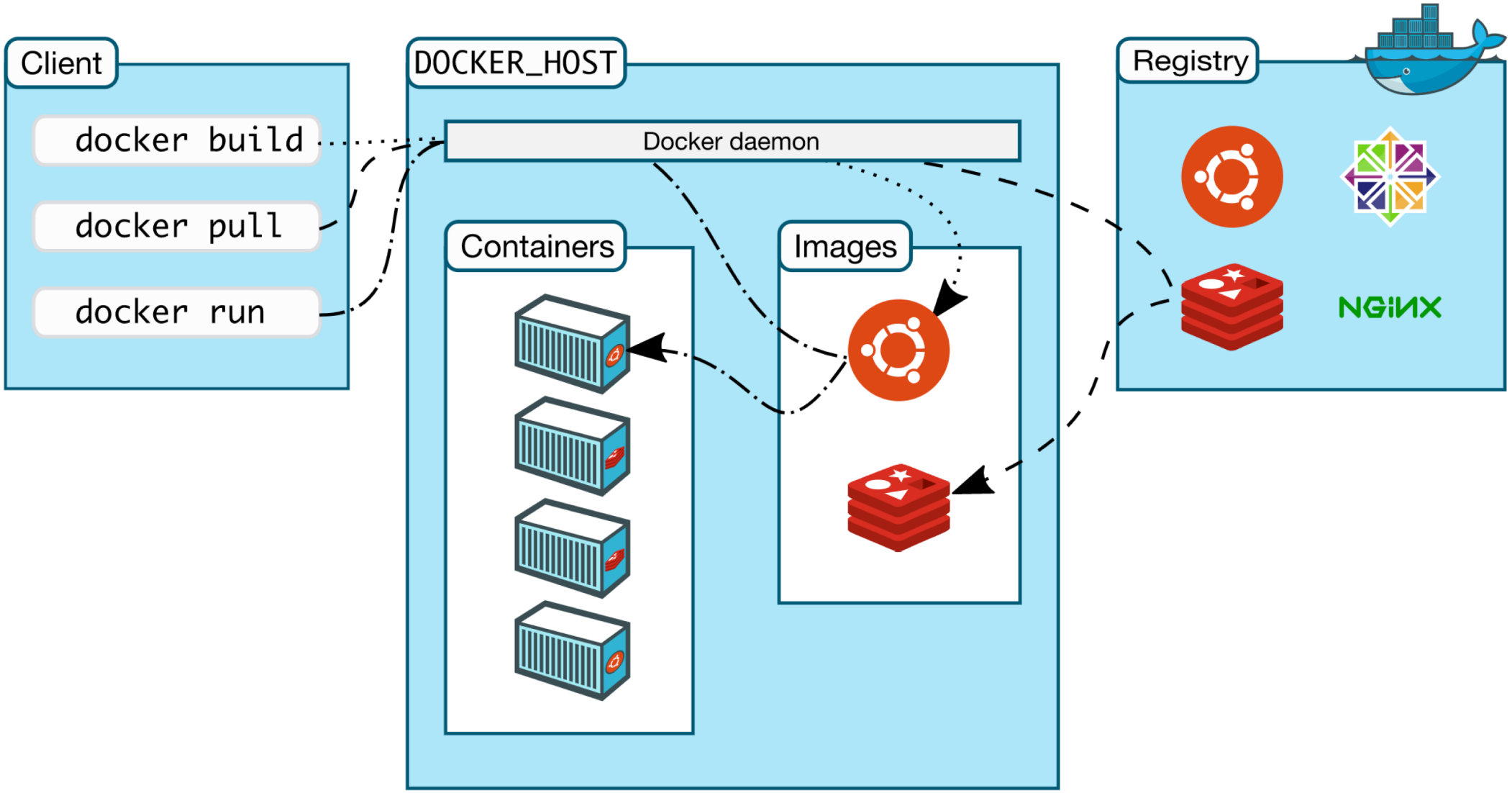
- Logging
- Remote access
- Monitoring
- Network configuration

All containers start, stop, copy, attach, migrate, etc. the same way



Major components of the container:

Docker Architecture



Images vs Containers

Image

An inert, **immutable**, file that's essentially a snapshot of a container.
Are created with the build command, and they'll produce a container when started with run.
Images are stored in a Docker registry such as registry.hub.docker.com.
Are designed to be composed of layers of other images, allowing a minimal amount of data to be sent when transferring images over the network.
To list images

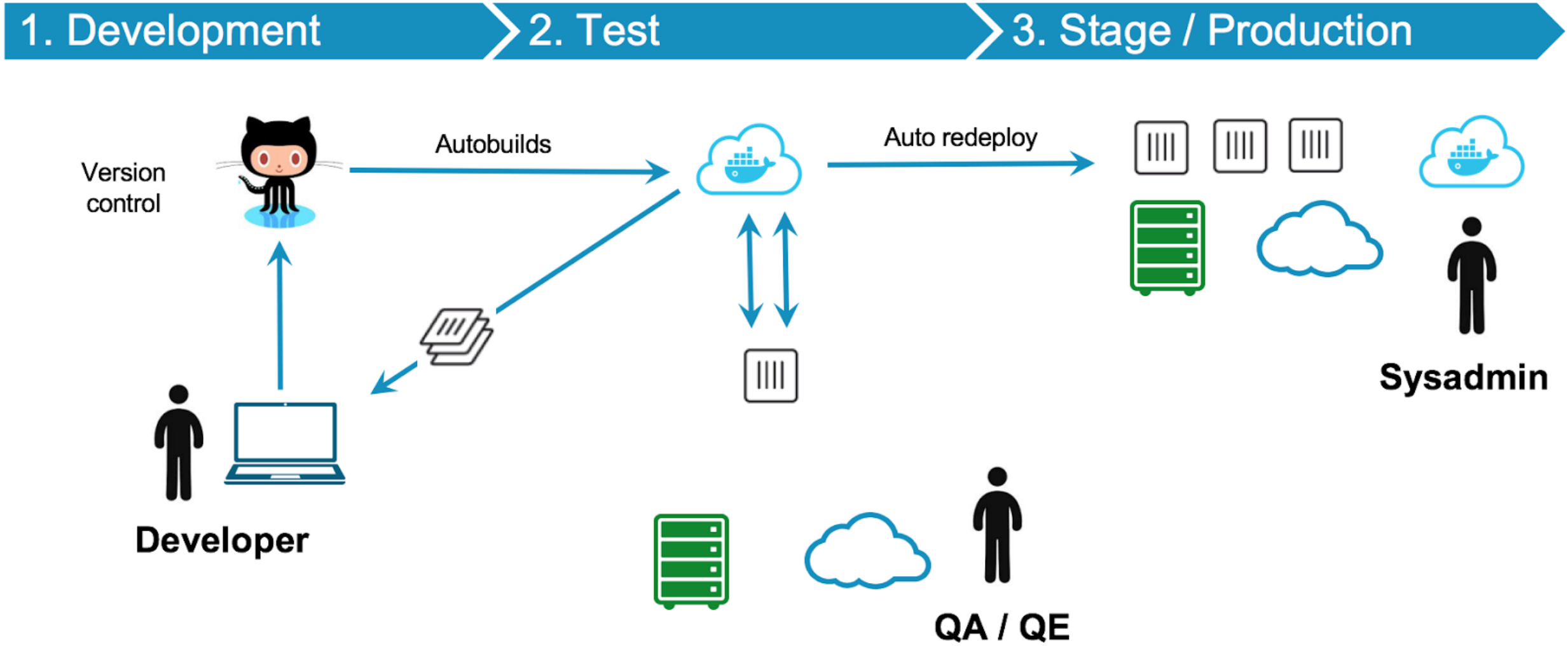
```
# docker images
```

Containers are mortal, live and die

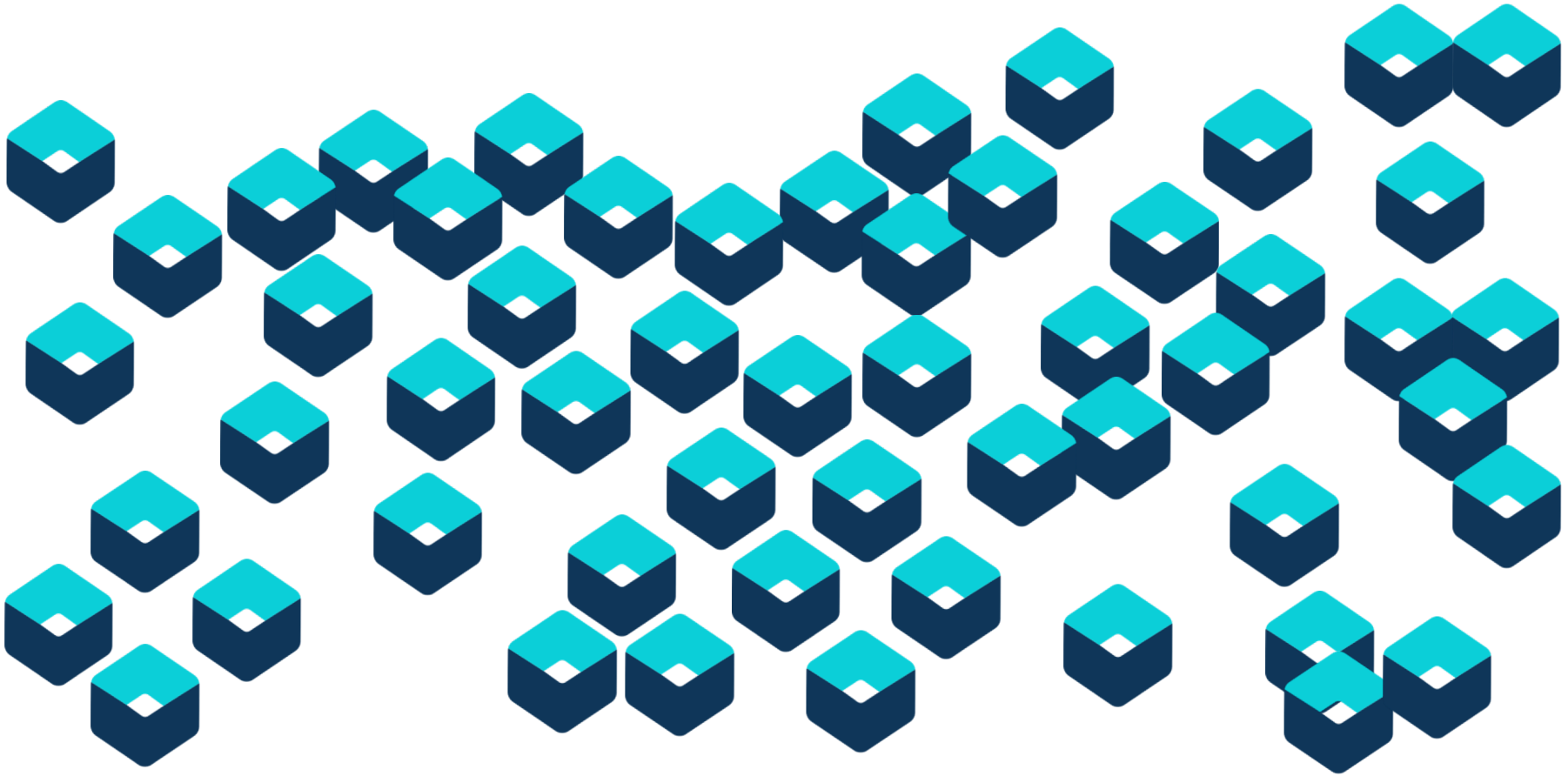
Not restarted
New container instance started using image
If persistence is required external storage is employed
To list containers

```
# docker ps  (Running)
# docker ps –a  (All)
```

Docker Workflow



Containers are great but … can lead into lack of control & chaos



What is Kubernetes?

What is Kubernetes?

- Project started by Google
- platform for hosting containers in a clustered environment with multiple Docker hosts
- Provides container grouping, load balancing, auto-healing, scaling features
- Contributors == Google, CodeOS, Redhat, Mesosphere, Microsoft, HP, IBM, VMWare, Pivotal, SaltStack, etc

What is Container Orchestration?

Container orchestration

- Manages the deployment, placement, and lifecycle of workload containers

Cluster management

- Federates multiple hosts into one target

Scheduling

- Distributes containers across node

Service discovery

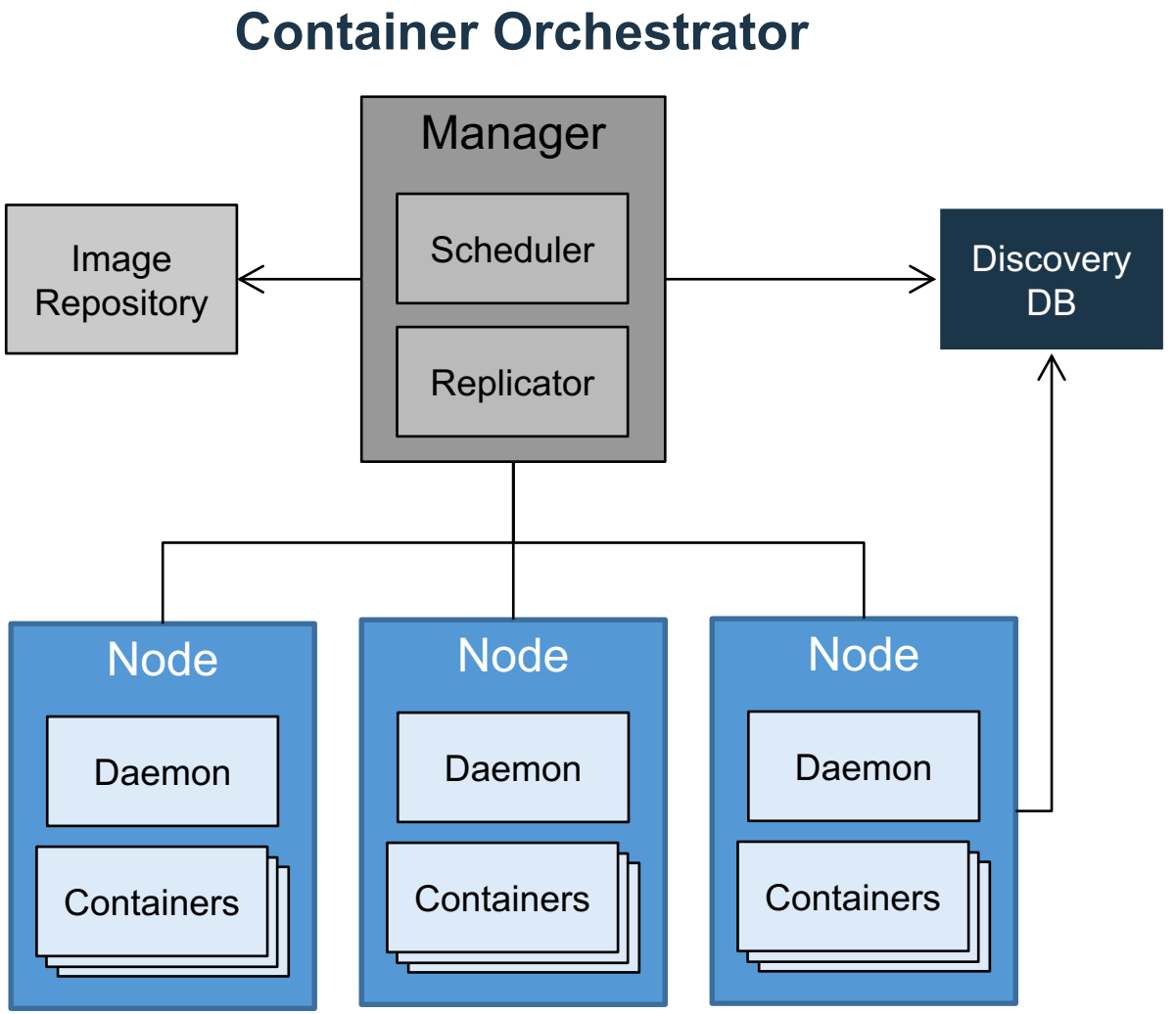
- Knows where the containers are located
- Distributes client requests across the containers

Replication

- Ensures the right number of nodes and containers

Health management

- Replaces unhealthy containers and nodes



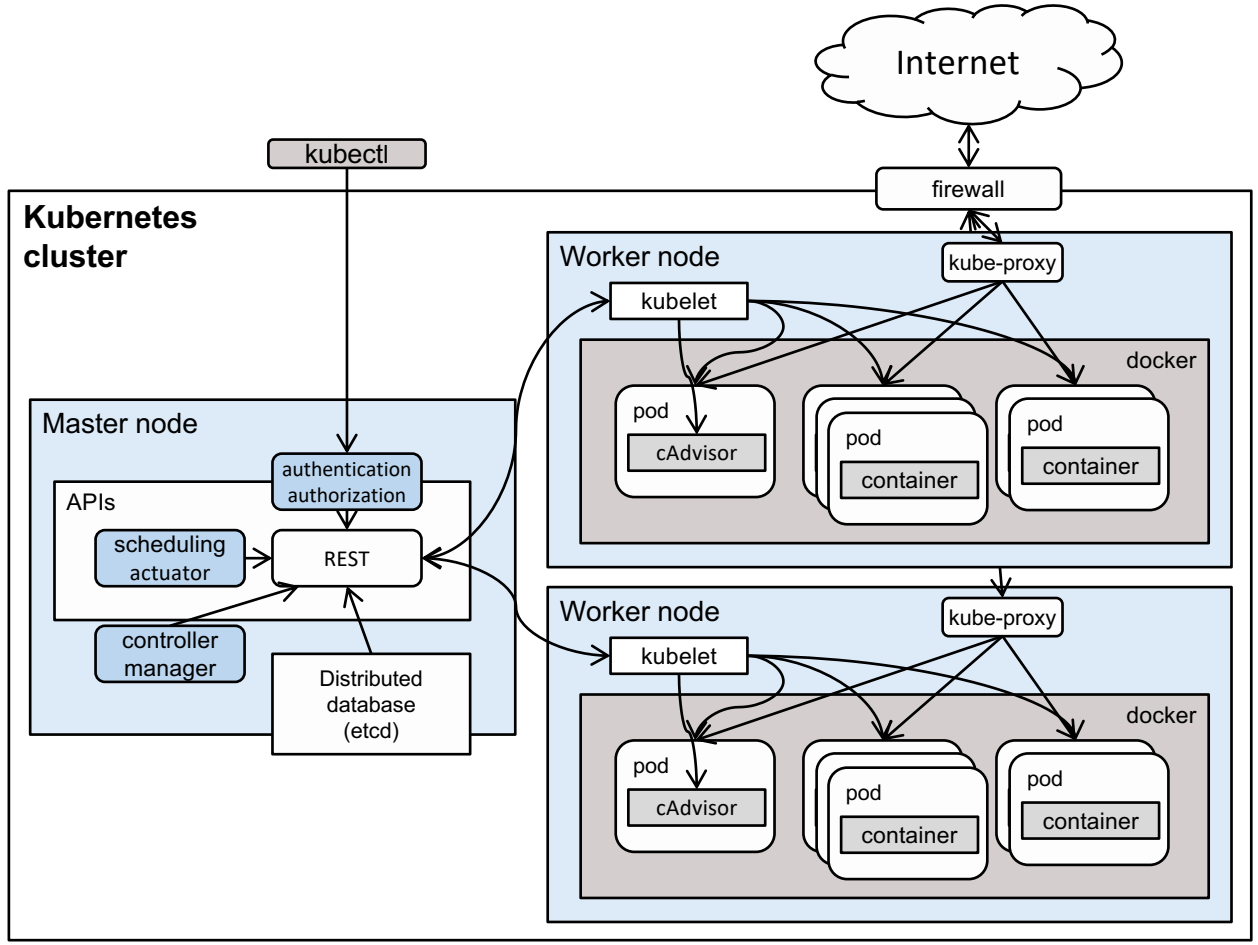
Kubernetes Cluster Architecture

Master node

- Node that manages the cluster
- Scheduling, replication & control
- Multiple nodes for HA

Worker nodes

- Node where pods are run
- Docker engine
- kubelet agent accepts & executes commands from the master to manage pods
- cAdvisor – Container Advisor provides resource usage and performance statistics
- kube-proxy – routes inbound or ingress traffic



Kubernetes Objects…

- ***Pod*** *- represents a unit of deployment: a single instance of an application in Kubernetes*
- ***Service*** *- abstraction which defines a logical set of Pods and a policy by which to access*
- ***Volume*** *- makes data persistent though pods are not…*
- ***Namespace*** *- A scope for names, and a mechanism to attach authorization and policy to a subsection of the cluster.*

- ***Deployment*** *- describe a desired state in a Deployment object, and the Deployment controller changes the actual state at a controlled rate*
- ***ReplicaSet*** *- ensures that a specified number of pod replicas are running at any given time.*
- ***StatefulSet*** *- maintains a sticky identity for each of their Pods. Pods are from the same spec, but each has a persistent identifier that maintains across any rescheduling.*
- ***Job*** *- A job is a supervisor for pods carrying out batch processes*

Hey… psst!

Wanna see some docker stuff?

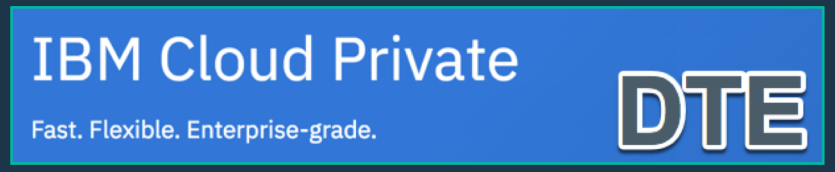
Time to go do labs…

https://github.com/kriersd/ICP_Meetup_Workshop

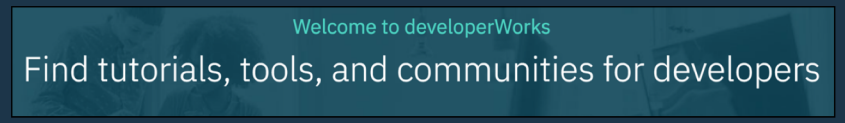
IBM Cloud

Additional Resources

https://www.ibm.com/cloud/garage/tutorials/ibm-cloud-private-trial/ibm-cloud-private-hosted-trial#accessing-the-environment



https://ibm-dte.mybluemix.net/ibm-cloud-private



https://www.ibm.com/developerworks/

https://developer.ibm.com/callforcode/?cm_sp=dw-callforcode-_-homepage-_-overlay

Thank you