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the #1 managed cloud company

DOCKER, KUBERNETES, AND MESOS: COMPARED.

Adrian Otto, Distinguished Architect

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DISTINGUISHED ARCHITECT, RACKSPACE
PTL, OPENSTACK MAGNUM
COORDINATOR, DOCKER LOS ANGELES MEETUP

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Outline

Liquids, Carina, and OpenStack Magnum

Why Magnum has a perspective of different container software

Docker Swarm

The native Docker clustering solution

Kubernetes

Google's point of view on container orchestration

Apache Mesos

Multi-Framework orchestration solution for containers

PROPERTIES OF MATTER: LIQUIDS

LIQUIDS TAKE ON THE SHAPE OF THEIR CONTAINER. THE LIQUID STATE OF MATTER IS AN INTERMEDIATE PHASE BETWEEN SOLID AND GAS. LIKE THE PARTICLES OF A SOLID, PARTICLES IN A LIQUID ARE SUBJECT TO INTERMOLECULAR ATTRACTION; HOWEVER, LIQUID PARTICLES HAVE MORE SPACE BETWEEN THEM, SO THEY ARE NOT FIXED IN POSITION.

MAKE A BIGGER CONTAINER?

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root@IBM-Power8: ~

```
top - 18:48:51 up  1:05,  2 users,  load average: 0.00, 0.01, 0.05
Tasks: 1031 total,   1 running, 1030 sleeping,   0 stopped,   0 zombie
%Cpu0  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu1  :  0.0 us,  0.0 sy,  0.0 ni, 99.7 id,  0.0 wa,  0.3 hi,  0.0 si,  0.0 st
%Cpu2  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu3  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu4  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu5  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu6  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu7  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu8  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu9  :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu10 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu11 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu12 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu13 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu14 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu15 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu16 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu17 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu18 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu19 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu20 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu21 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu22 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu23 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu24 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu25 :  0.0 us,  0.0 sy,  0.0 ni,100.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
```

Bigger hardware allows for bigger software

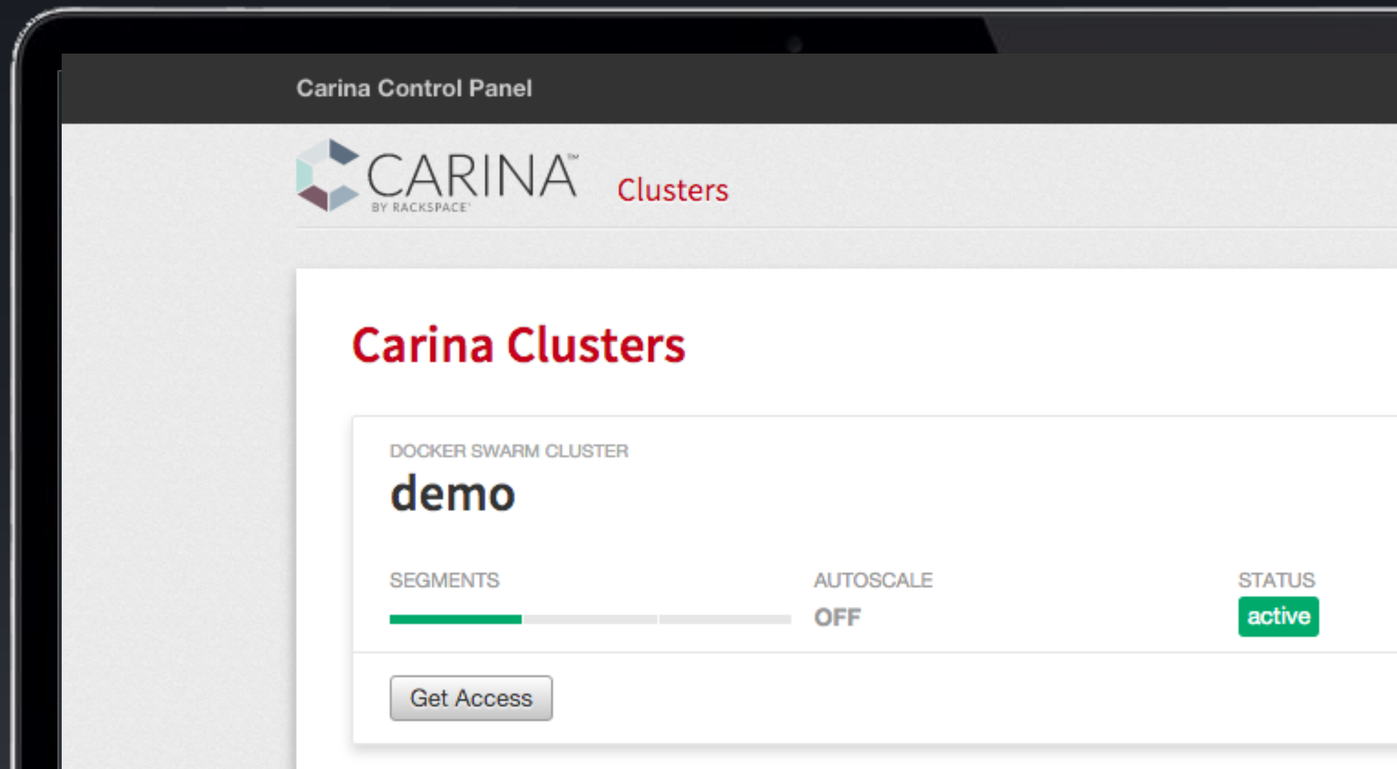
APPLICATION CONTAINERS

CONTAINERS ARE DISRUPTIVE

CARINA™

BY RACKSPACE®

An easy-to-use and instant-on native container environment.



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Carina by Rackspace - BETA

Rackspace US, Inc. (US) https://app.getcarina.com/app/clusters/new

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CARINA BY RACKSPACE Clusters

Back to Clusters List

Create Cluster

Cluster Name: foo

Enable Autoscale:

Create Cluster Cancel

Creating a Cluster

DOCKER SWARM CLUSTER

Docker Swarm is a management system for Docker. It enables an application to be containerized and run across multiple segments in a cluster. Carina offers one segment by default and is scalable up to 3 segments during beta.

Introduction to Docker Swarm

CARINA & DOCKER SWARM GUIDES

- Getting Started on Carina
- Docker Swarm & Carina
- Running interlock on Carina

Carina by Rackspace - BETA

Rackspace US, Inc. (US) https://app.getcarina.com/app/clusters

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CARINA BY RACKSPACE Clusters

Carina Clusters

DOCKER SWARM CLUSTER

foo

SEGMENTS	AUTOSCALE	STATUS
	OFF	active

Get Access

1. Click **Download File** to download a .zip file containing configuration information for this cluster.
2. Unzip the file to a location of your choice, and note the name of the folder it creates.
3. In a terminal window, type `source $UNZIP_PATH/docker.env`, replacing `$UNZIP_PATH` with the actual path to the file on your system.

Download File Cancel

Opening foo.zip

You have chosen to open:

foo.zip

which is: ZIP archive (10.0 KB)

from: **https://app.getcarina.com**

What should Firefox do with this file?

Open with Archive Utility (default)

Save File

Do this automatically for files like this from now on.

Cancel OK

Default

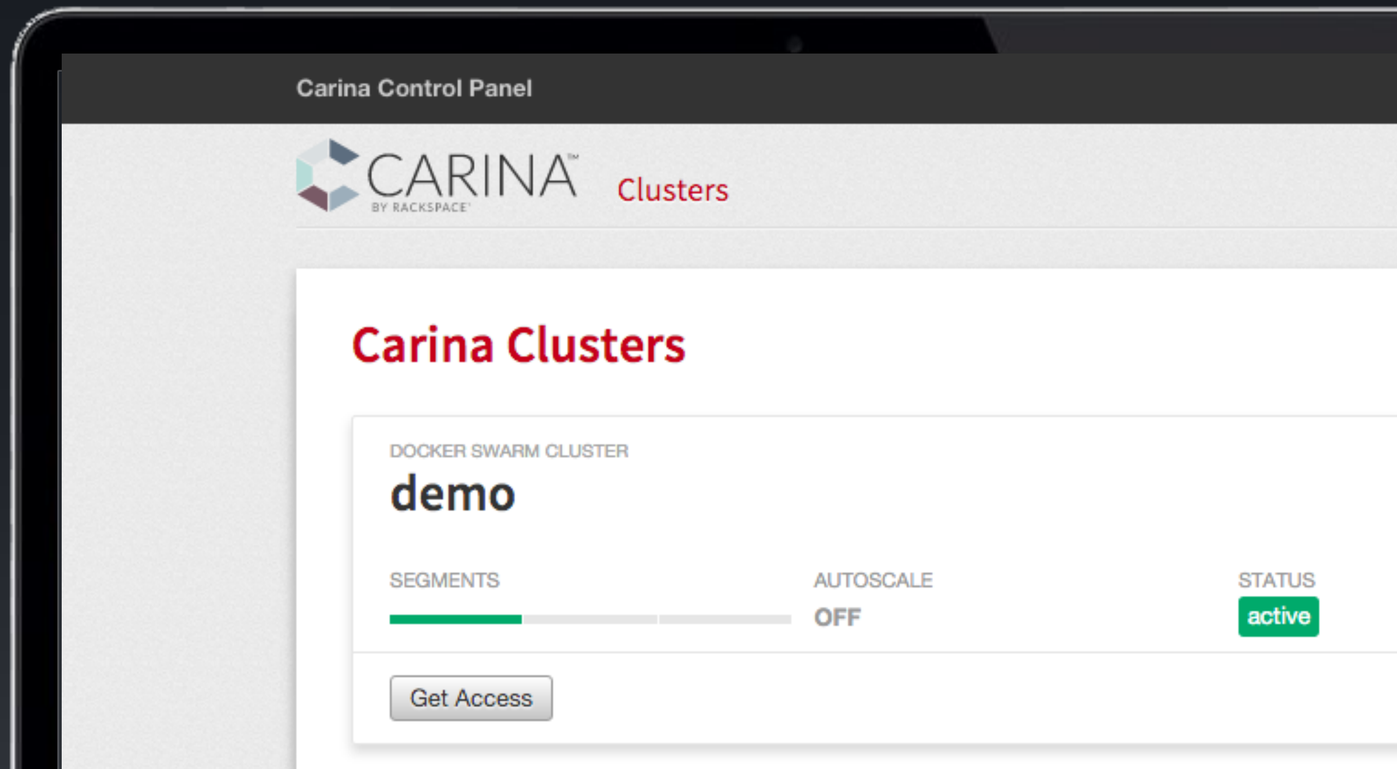
```
Adrians-MacBook-Pro:foo aotto$ ls
README.md       ca.pem          docker.cmd      docker.ps1
ca-key.pem      cert.pem        docker.env      key.pem
Adrians-MacBook-Pro:foo aotto$ source docker.env
Adrians-MacBook-Pro:foo aotto$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS
         PORTS               NAMES
Adrians-MacBook-Pro:foo aotto$ docker run -it busybox
/ # top
```

CARINA™

BY RACKSPACE®

Free Beta available today.

getcarina.com



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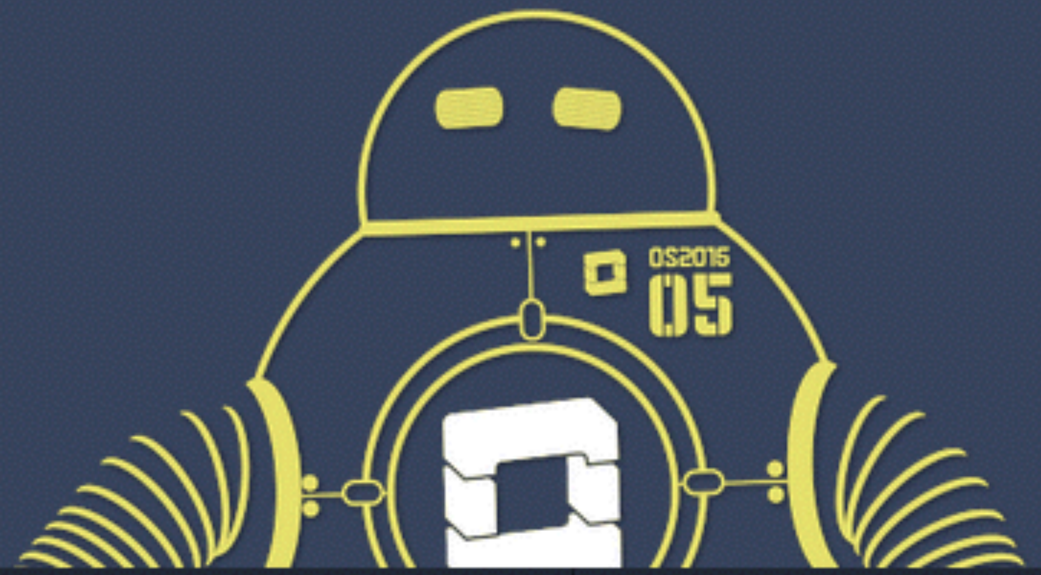
2010: OpenStack is Born

NASA + rackspace® the #1 managed cloud company = openstack™

5

openstack



27422
openstack members

167
countries with registered community members

523
organizations involved

OPENSTACK SERVICES

Layer 4: Consumption Services

- Heat
- **Magnum**
- Marconi
- Murano
- Trove
- Sahara
- Solum

Layer 3: Optional Enhancements

- Ceilometer
- Barbican
- Horizon

Layer 2: Extended Infrastructure

- Cinder
- Swift
- Neutron
- Designate
- Ironic

Layer 1: Base Compute Infrastructure

- Nova
- Glance
- Keystone

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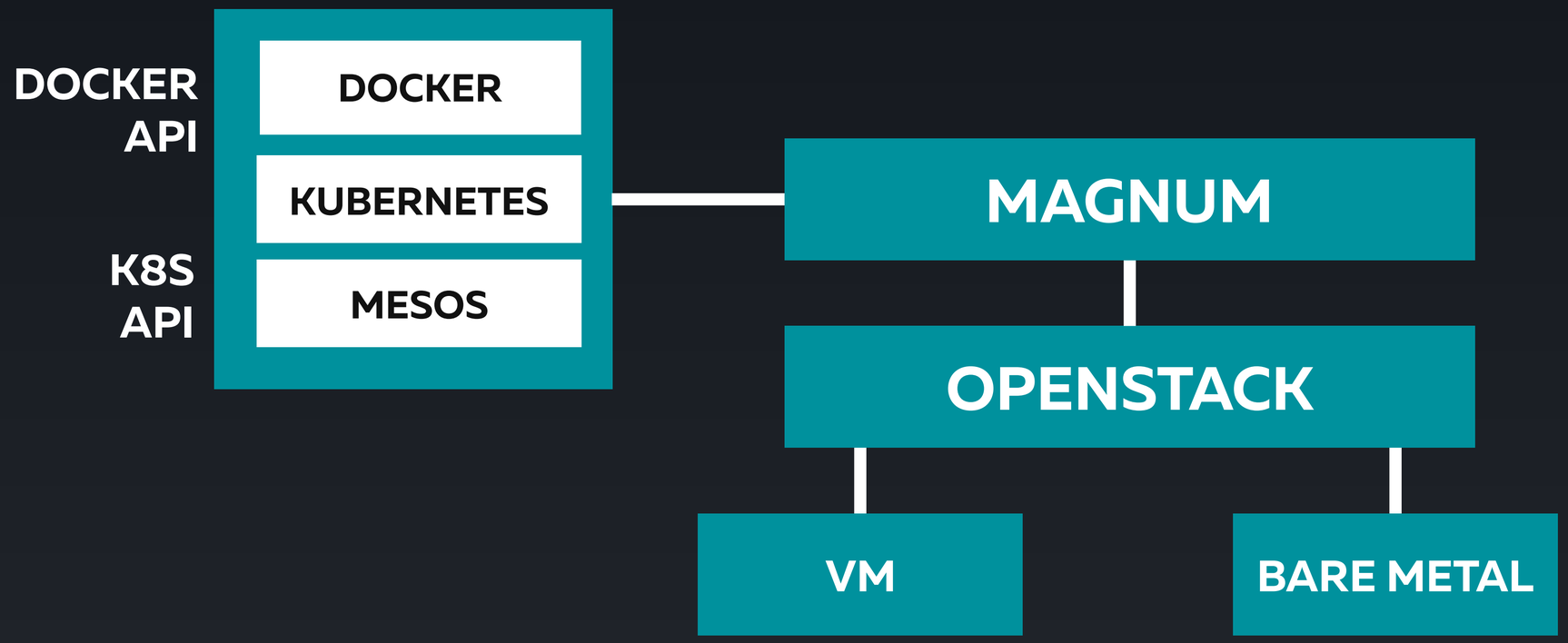
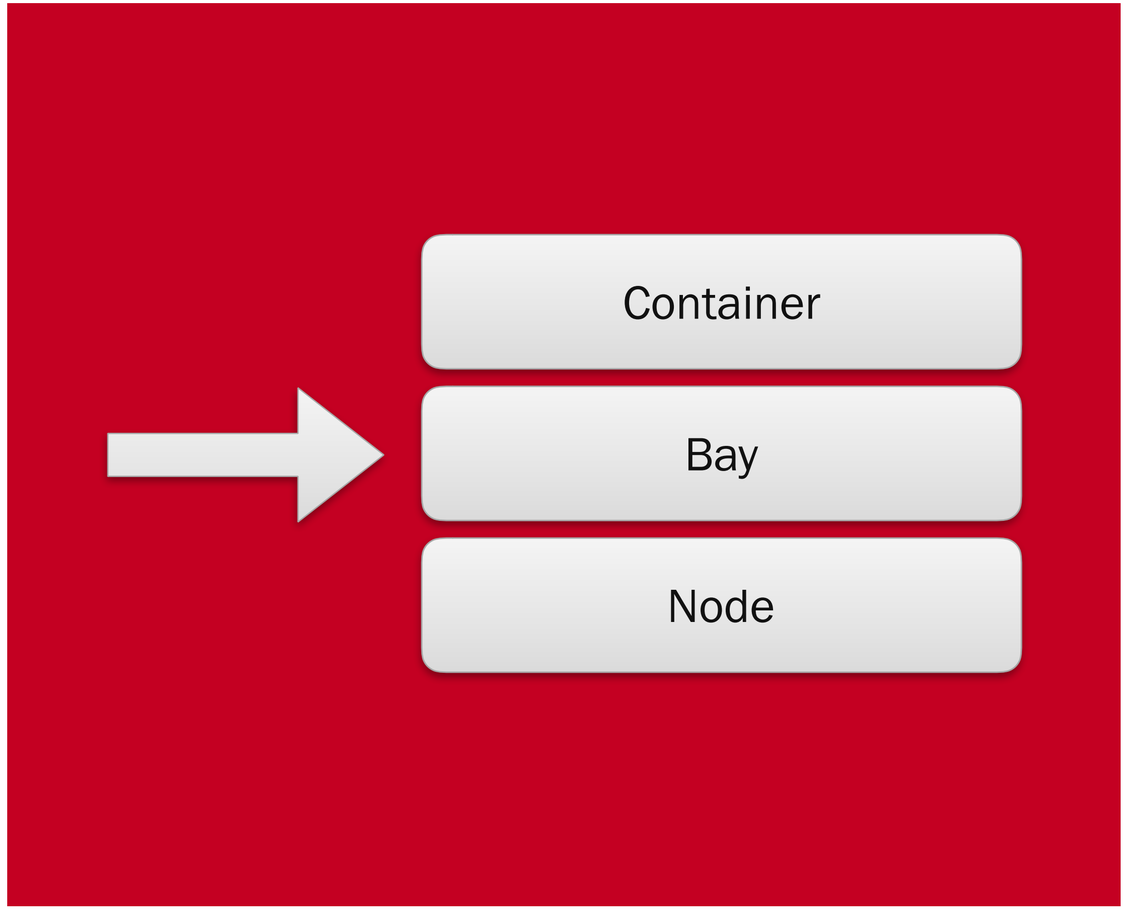
OPENSTACK MAGNUM

Infrastructure + Containers

MAGNUM OVERVIEW



Understanding Magnum Resources (1/2)



Understanding Magnum Resources (2/2)

- Container
- Pod
- Service
- Bay
- Node

What OpenStack Magnum Offers

Choice of COE

- Docker Swarm
- Kubernetes
  - Multi-Master
- Apache Mesos
  - Marathon

Secure Bays (TLS)

- TLS Between Client and Magnum API
- TLS Between Bay Master and Minion/ Slave/Worker
- Certificate generation/signing
- docker / kubectl TLS interoperability

Load Balancer Integration

- Neutron LBaaS Integration
- Automatically add or remove nodes from Neutron LB when Kubernetes bay is scaled

Choice of Compute Type

- Virtual Machines
- Bare Metal

5777
patch sets

1514
commits

267,623
lines of code

1
year

122
engineers

34
affiliations

2015-01-20
released

Magnum Statistics, Status, and Diversity

WHICH COE?

DOCKER SWARM?

KUBERNETES?

APACHE MESOS?

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CHOOSE YOUR OWN ADVENTURE

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IMPERATIVE

- Explicit Instructions
- The system is stupid, you are smart
- Ultimate Flexibility

DECLARATIVE

- Describe the Outcome
- The system is smart, you don’t care
- Limited Flexibility

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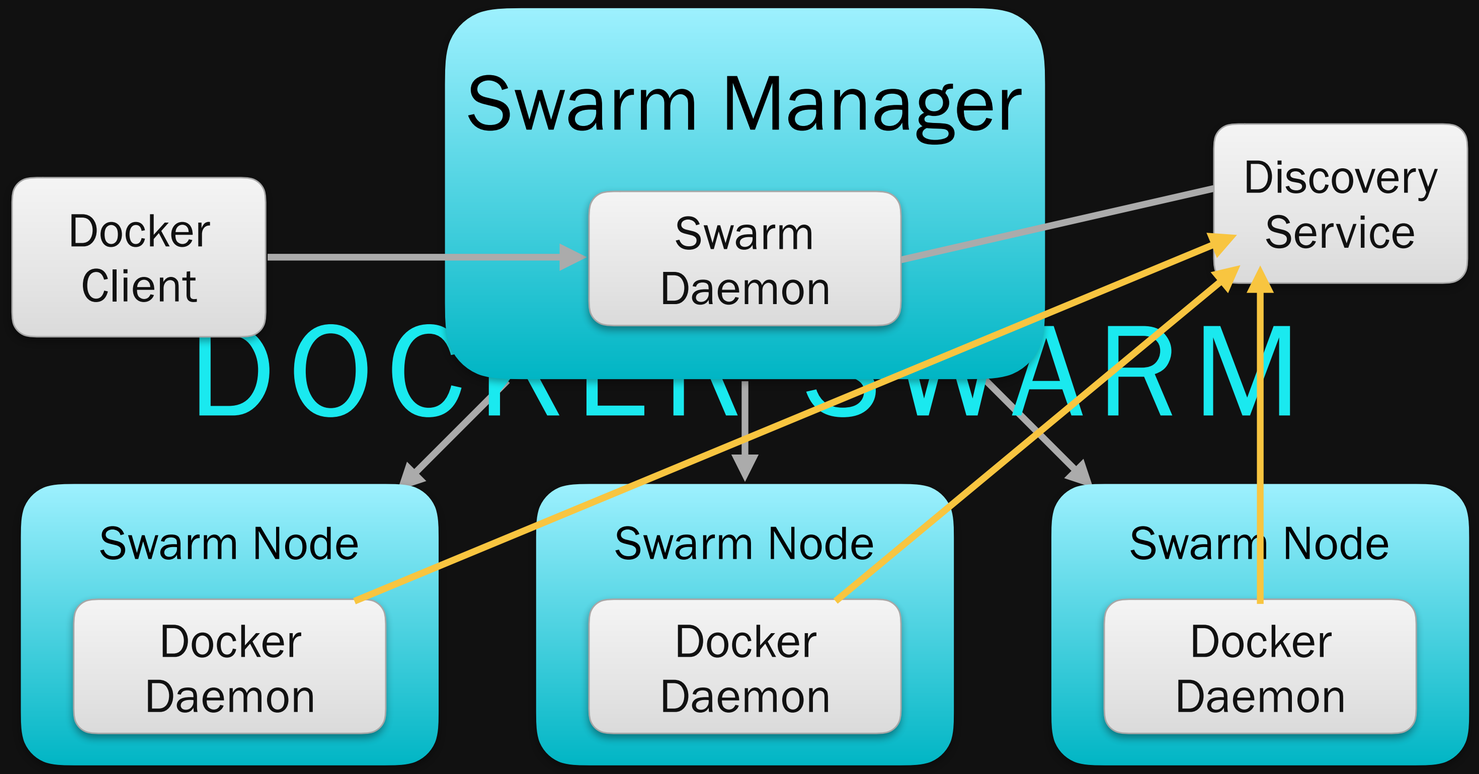
Swarm Manager
Docker Client
Swarm Daemon
Discovery Service
DOCKER SWARM
Swarm Node
Docker Daemon
Swarm Node
Docker Daemon
Swarm Node
Docker Daemon

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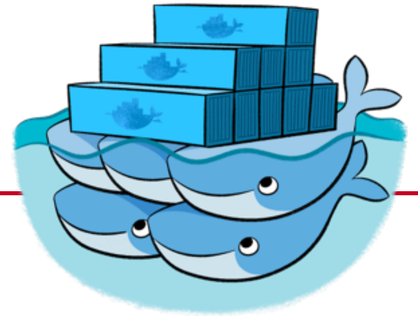
Why Choose Swarm?



You like using the docker CLI, and ecosystem tools

Get the native Docker API experience and compatibility

You prefer an imperative system (along with declarative tools)

You are a badass and want to tweak what happens in your orchestration process

Mix cloud native and legacy apps in containers

Run both applications designed for the cloud, and legacy apps that were not

You have a giant cluster

Cluster design is extremely scalable, and easily supports thousands of nodes

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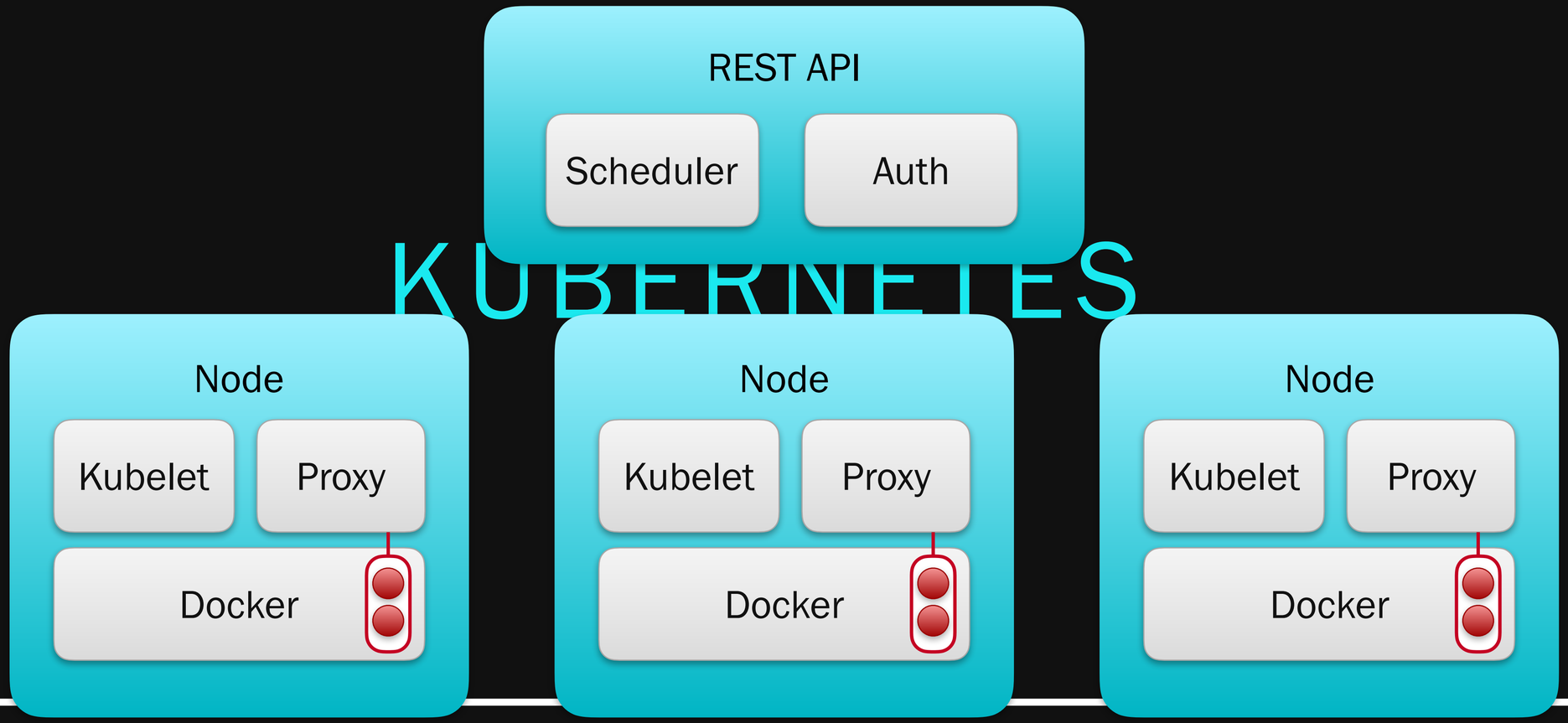
KUBERNETES


REST API
Scheduler
Auth
Node
Kubelet
Proxy
Docker
Node
Kubelet
Proxy
Docker
Node
Kubelet
Proxy
Docker

Why Choose Kubernetes?

kubernetes

You are a Google fan

Google knows WTF they are doing with containers. Why second guess it?

You prefer an declarative system

You don't want to change what happens in your orchestration process.

You only care about cloud native applications

Your web and mobile app workloads were built for the cloud.

You have a pretty big cluster

If you have about 200 hosts or so, Kubernetes will work great for you.

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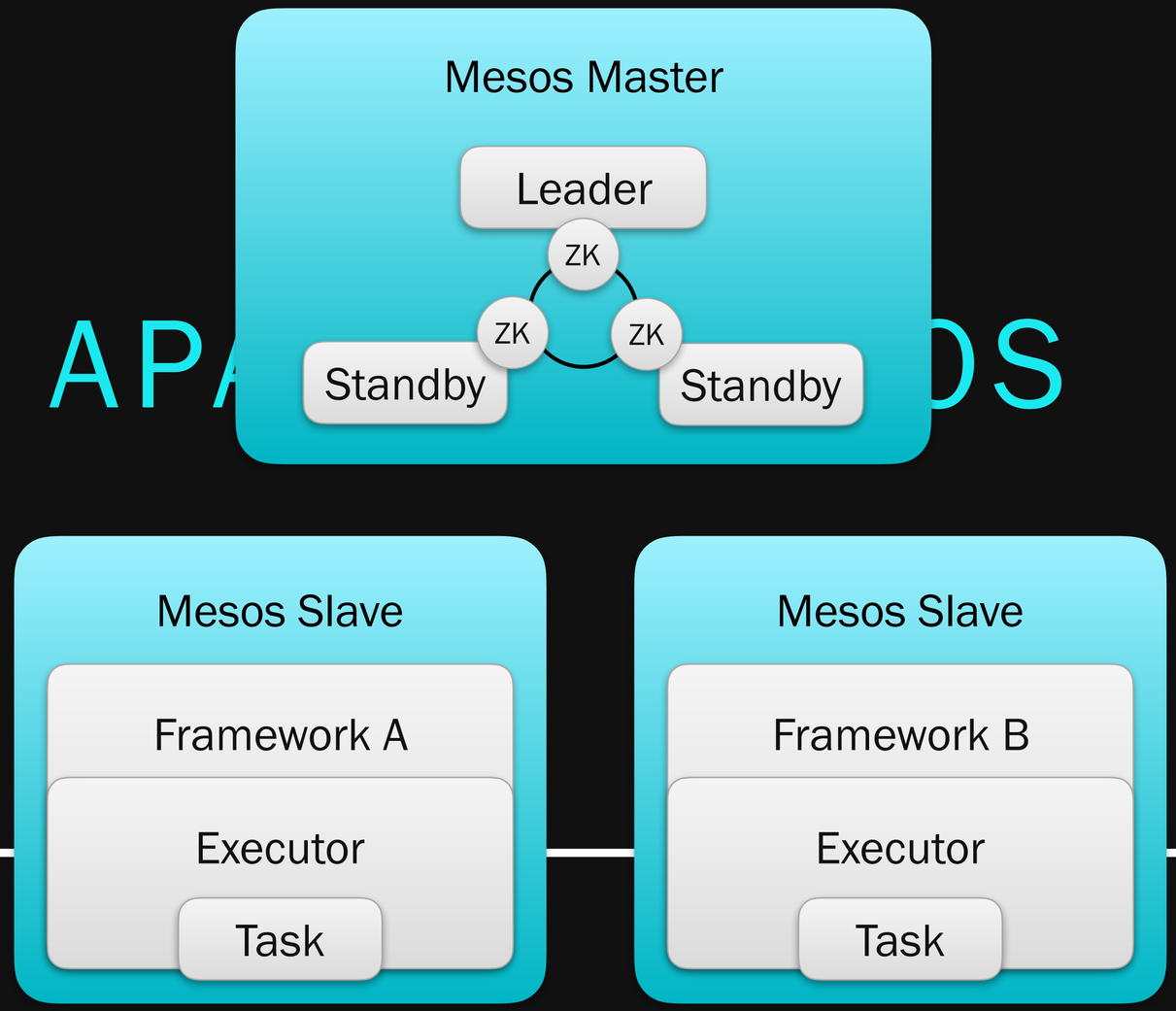

Mesos Master
Leader
ZK
ZK
ZK
Standby
Standby
Mesos Slave
Framework A
Executor
Task
Mesos Slave
Framework B
Executor
Task

Why Choose Apache Mesos?

MESOS

You are a Big Data house

You have a lot of job oriented or task oriented workloads.

You have an infrastructure team

Your IT department employs a team of distributed systems specialists.

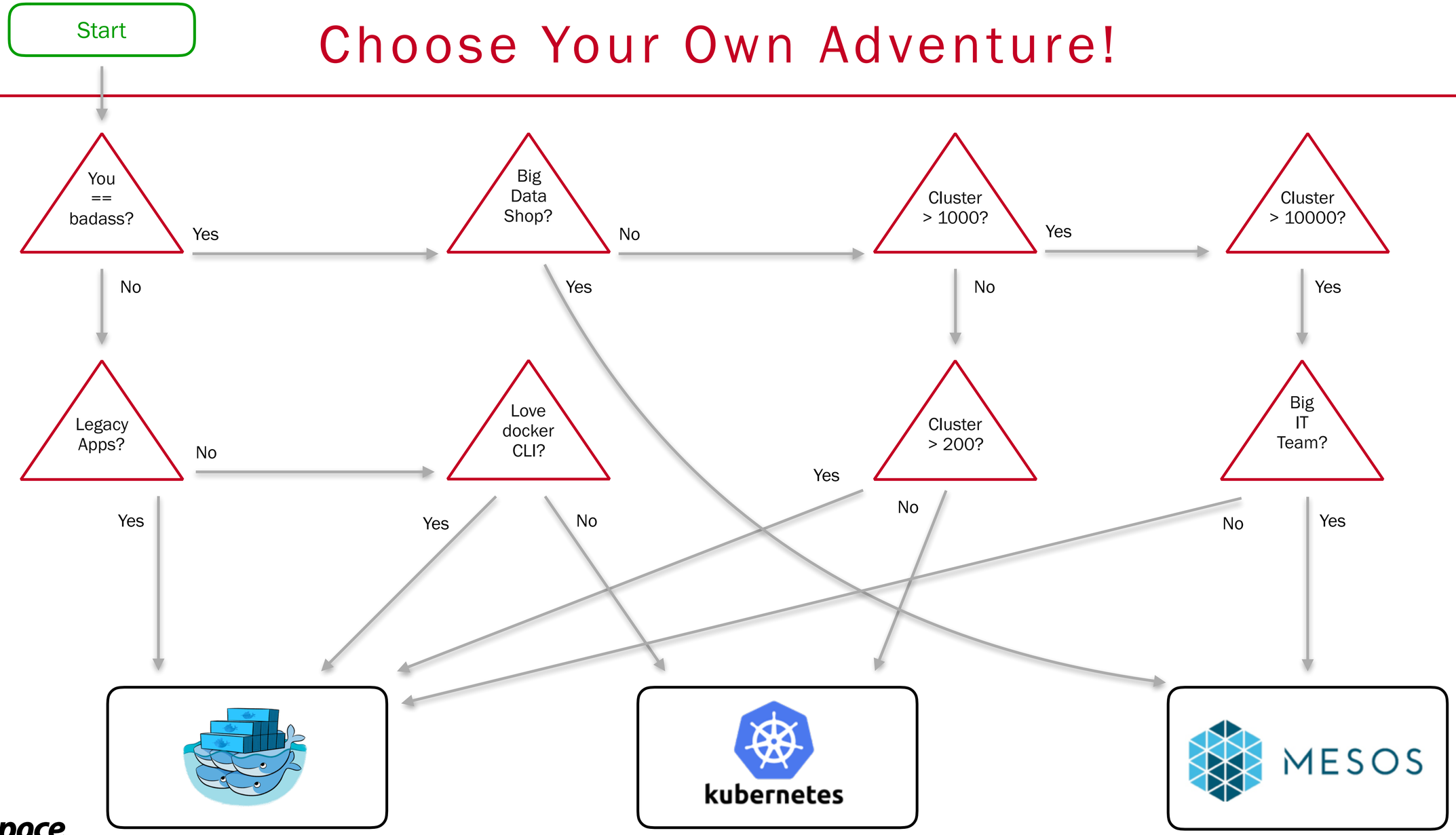
You want to schedule multiple giant workload types concurrently

You will run Hadoop, and Marathon, and Chronos, and maybe Kubernetes all together.

You have a 10,000+ node cluster

Cluster design is extremely scalable, and easily supports thousands of nodes

Choose Your Own Adventure!



Review

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Thank you

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