DOCKER, KUBERNETES, AND MESOS: COMPARED.

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COORDINATOR, DOCKER LOS ANGELES MEETUP
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
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?
OpenPOWER and Open Compute

3.1-4.1 GHz CPU

~200 GiB/sec Memory Bandwidth

>200 MiB Cache

128-192 CPU Threads

Up to 2 TiB of RAM

BARRELEYE
Bigger hardware allows for bigger software
APPLICATION
CONTAINERS
CONTAINERS ARE DISRUPTIVE
An easy-to-use and instant-on native container environment.
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 Clusters

DOCKER SWARM CLUSTER

foo

SEGMENTS
AUTOSCALE
STATUS 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.

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
Adrians-MacBook-Pro:foo aotto$ ls
README.md   ca.pem   docker.cmd   docker.ps1
cert.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
Free Beta available today.
getcarina.com
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2010: OpenStack is Born
5 openstack

- 27422 openstack members
- 167 countries with registered community members
- 523 organizations involved
OPENSTACK MAGNUM
Infrastructure + Containers
MAGNUM OVERVIEW
Understanding Magnum Resources (1/2)
Understanding Magnum Resources (2/2)

Kubernetes Bays

- 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
15144 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?
**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 Node
  - Docker Daemon
- Swarm Node
  - Docker Daemon
- Swarm Node
  - Docker Daemon
- Discovery Service
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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Why Choose 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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Why Choose Apache 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!

Start

1. **You == badass?**
   - Yes
   - No
   - Legacy Apps?
     - Yes
     - No
     - Love docker CLI?
       - Yes
       - No

2. **Big Data Shop?**
   - No
   - Yes
   - Cluster > 1000?
     - Yes
     - No
     - Cluster > 200?
       - Yes
       - No
       - Big IT Team?
         - Yes
         - No

3. **Apache Mesos?**
   - No
   - Yes
   - Cluster > 10000?
     - Yes
     - No

4. **Big Data Shop?**
   - No
   - Yes
   - Love docker CLI?
     - Yes
     - No
     - Big IT Team?
       - Yes
       - No

5. **Cluster > 200?**
   - Yes
   - No
   - Big IT Team?
     - Yes
     - No

6. **Cluster > 1000?**
   - Yes
   - No
   - Big IT Team?
     - Yes
     - No

7. **Love docker CLI?**
   - Yes
   - No
   - Big IT Team?
     - Yes
     - No

8. **Big IT Team?**
   - Yes
   - No

9. **Cluster > 10000?**
   - Yes
   - No

10. **Apache Mesos?**
    - No
    - Yes

11. **Choose Your Own Adventure!**
    
    - You == badass?
    - Legacy Apps?
    - Love docker CLI?
    - Big Data Shop?
    - Cluster > 1000?
    - Cluster > 200?
    - Apache Mesos?
    - Big IT Team?
Review

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Thank you