Using DC/OS for Continuous Delivery

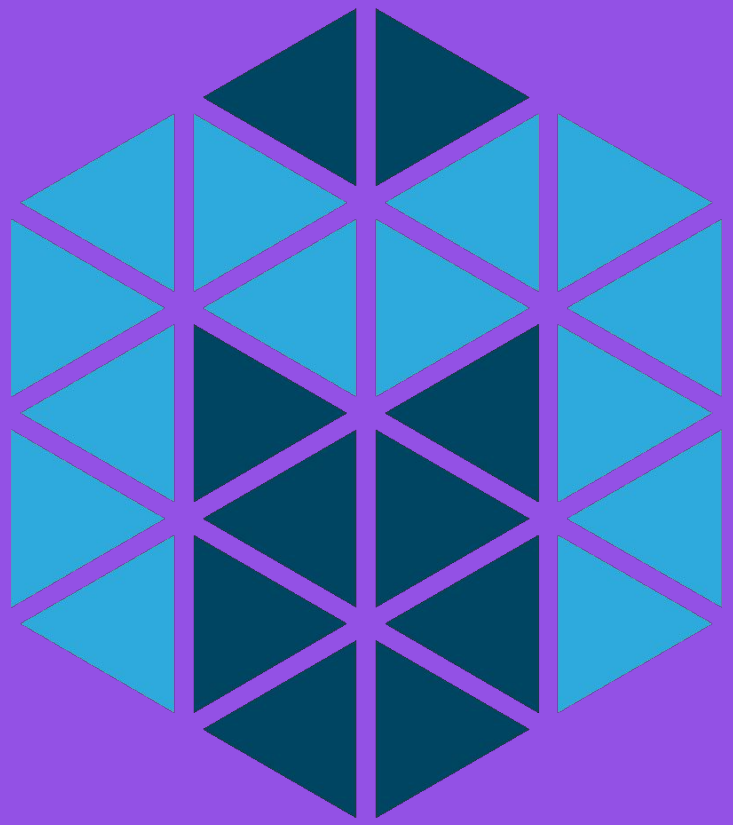
DevPulseCon 2017

Elizabeth K. Joseph, @pleia2
Mesosphere

MESOSPHERE

Elizabeth K. Joseph, Developer Advocate, Mesosphere

- 15+ years working in open source communities
- 10+ years in Linux systems administration and engineering roles
- 4 years working on CI/CD for the OpenStack project
- Founder of OpenSourceInfra.org
- Author of The Official Ubuntu Book and Common OpenStack Deployments

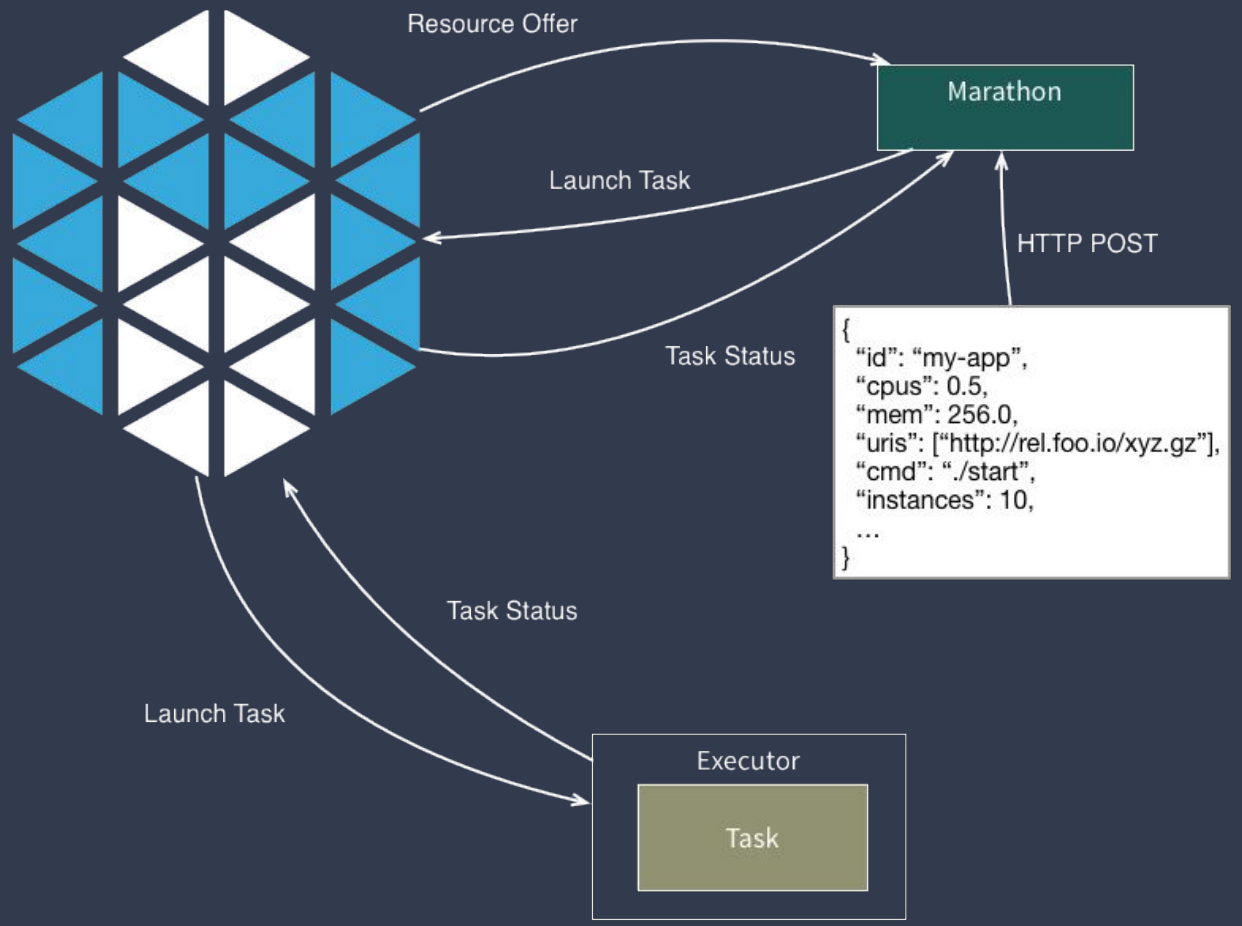


Apache Mesos:
The datacenter kernel

http://mesos.apache.org/

Marathon

- Mesos can’t run applications on its own.
- A Mesos framework is a distributed system that has a scheduler.
- Schedulers like Marathon start and keep your applications running. A bit like a distributed init system.
- Mesos mechanics are fair and HA
- Learn more at https://mesosphere.github.io/marathon/



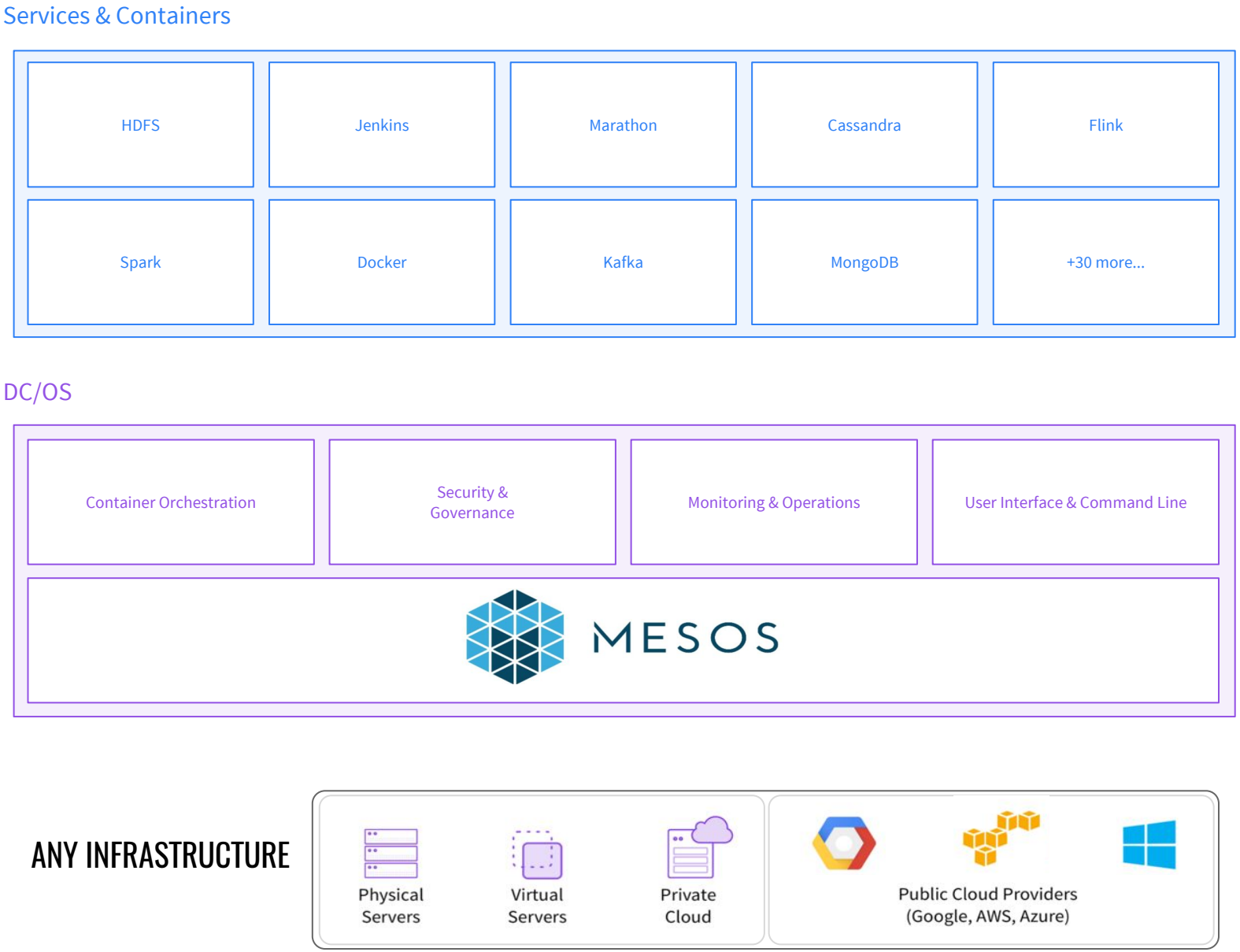
Introducing DC/OS

Solving common problems, including:

- Container orchestration
- Resource and network management
- Task scheduling
- Unified logging and metrics
- “Universe” of pre-configured services (including Jenkins, Cassandra, Kafka…)

Learn more and contribute at https://dcos.io/

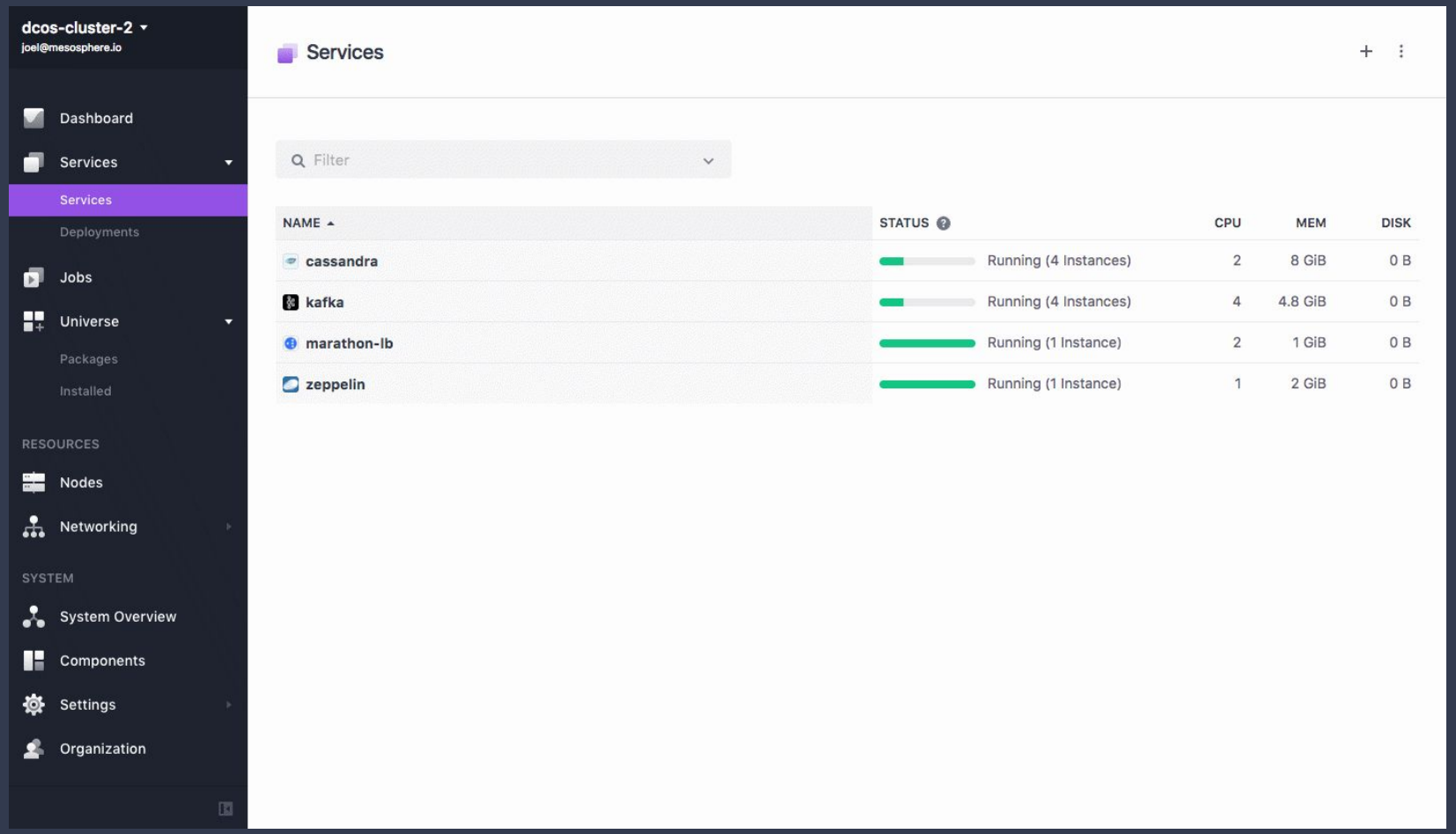
DC/OS Architecture Overview



Interact with DC/OS (1/2)

Web-based GUI

https://dcos.io/docs/latest/usage/webinterface/



Interact with DC/OS (2/2)

CLI tool

https://dcos.io/docs/latest/usage/cli/

API

https://dcos.io/docs/latest/api/

Jenkins + Mesos

The Mesos plugin for Jenkins allows Jenkins to dynamically launch Jenkins slaves on a Mesos cluster.

> “Put simply, whenever the Jenkins Build Queue starts getting bigger, this plugin automatically spins up additional Jenkins slave(s) on Mesos so that jobs can be immediately scheduled! Similarly, when a Jenkins slave is idle for a long time it is automatically shut down.”

Source: https://github.com/jenkinsci/mesos-plugin

Demo: Continuous Deployment

1. Spin up a new Jenkins agent using the Mesos plugin. This agent runs inside a Docker container on one of our DC/OS agents.
2. Clone the git repository
3. Build a Docker container based off the Jekyll Docker image that includes the content stored in /site and push it to DockerHub.
4. Run the newly created container and a Linkchecker container that runs a basic integration test against the container, checking that the web server comes up correctly and that all links being served are valid (i.e. no 404s).
5. Manually trigger a Marathon deployment of the newly created container to the DC/OS base Marathon instance. If the application already exists, Marathon will simply upgrade it.
6. Make the application available on a public agent at port 80 using Marathon-lb.

Demo: Spin up 50 jobs!

Creates 50 build jobs that take a random amount of time between 1 and 2 minutes. These jobs will randomly fail.

- The Mesos plugin will spin up build agents on demand for these jobs, using as much capacity as your cluster has available.
- When these jobs are finished, the Jenkins tasks will terminate and the resources will be relinquished back to other users of your cluster.

DC/OS

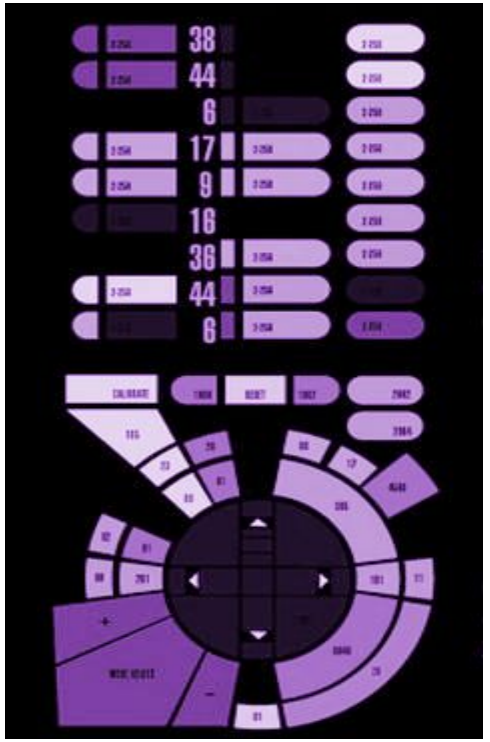
1.9 Features

DC/OS 1.9 - Data Services Ecosystem

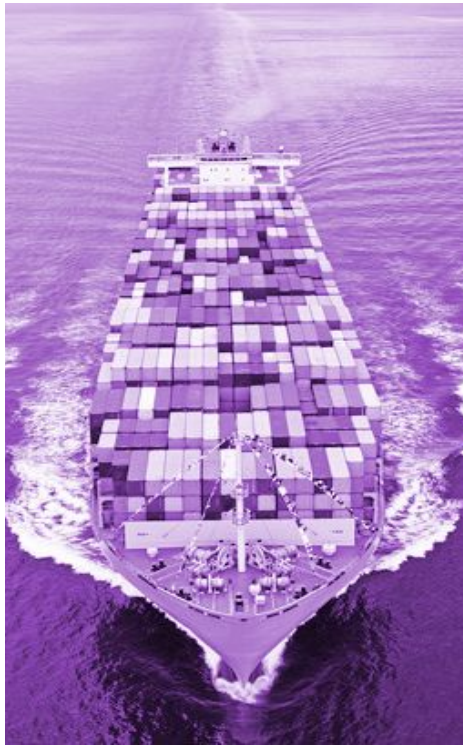
DATA SERVICES ECOSYSTEM

- *Alluxio*
- *Couchbase*
- *Datastax DSE*
- *Elastic (ELK)*
- *Redis*
- *Apache Flink*

OPERATIONS

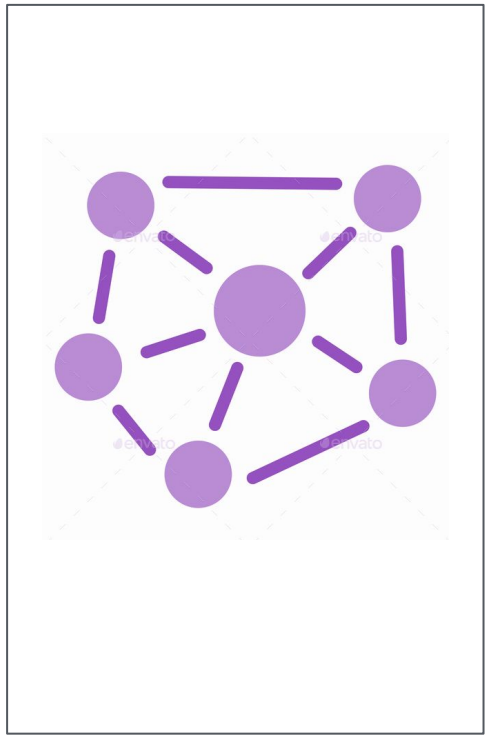


WORKLOADS



DC/OS 1.9 - Operations

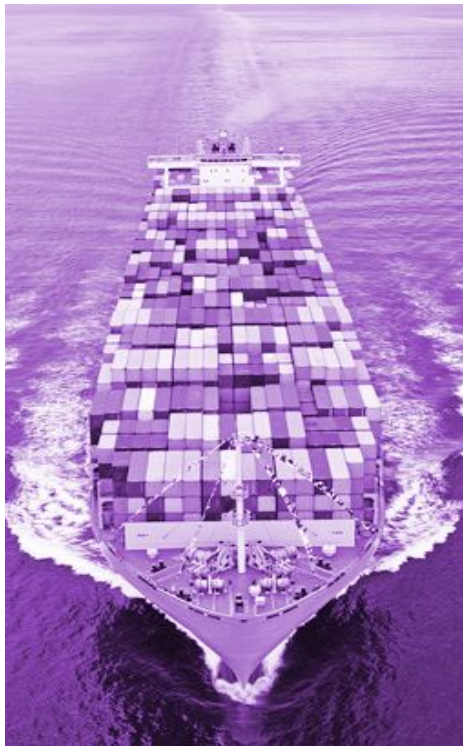
DATA SERVICES ECOSYSTEM



OPERATIONS

- Remote Container Shell
- Unified Metrics
- Unified Logging
- Deployment Failure Debugging
- Upgrades & Configuration updates

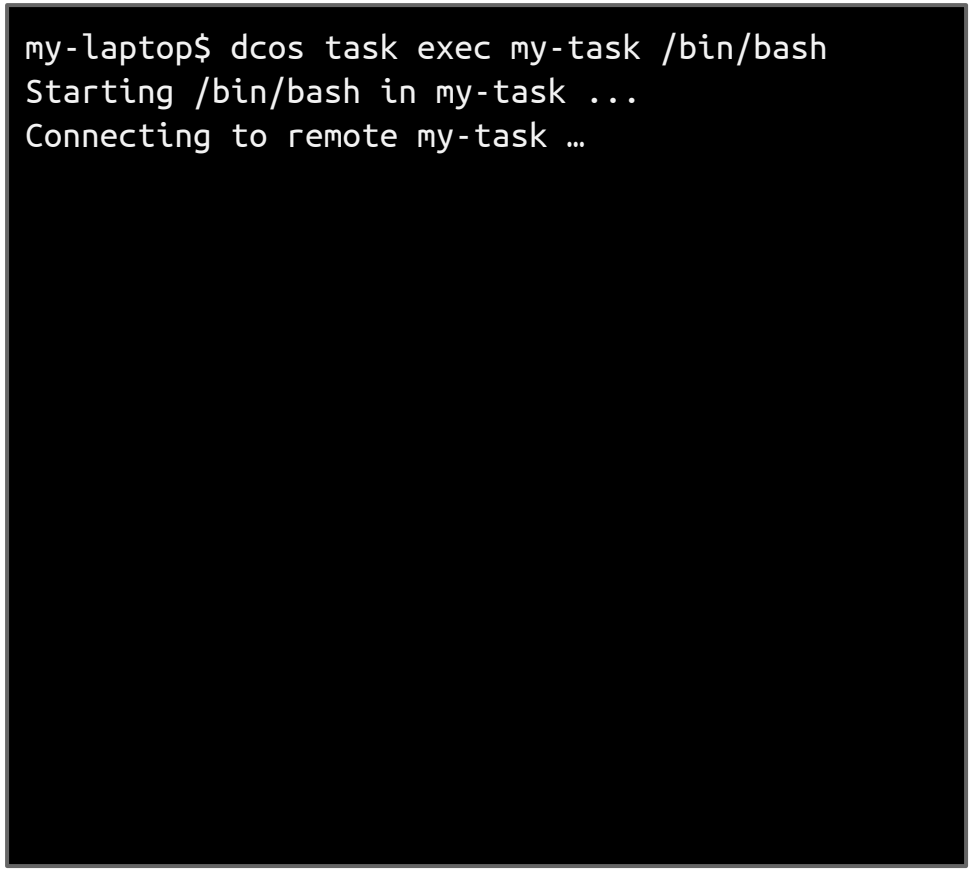
WORKLOADS



DC/OS: OPERATIONS

REMOTE CONTAINER SHELL

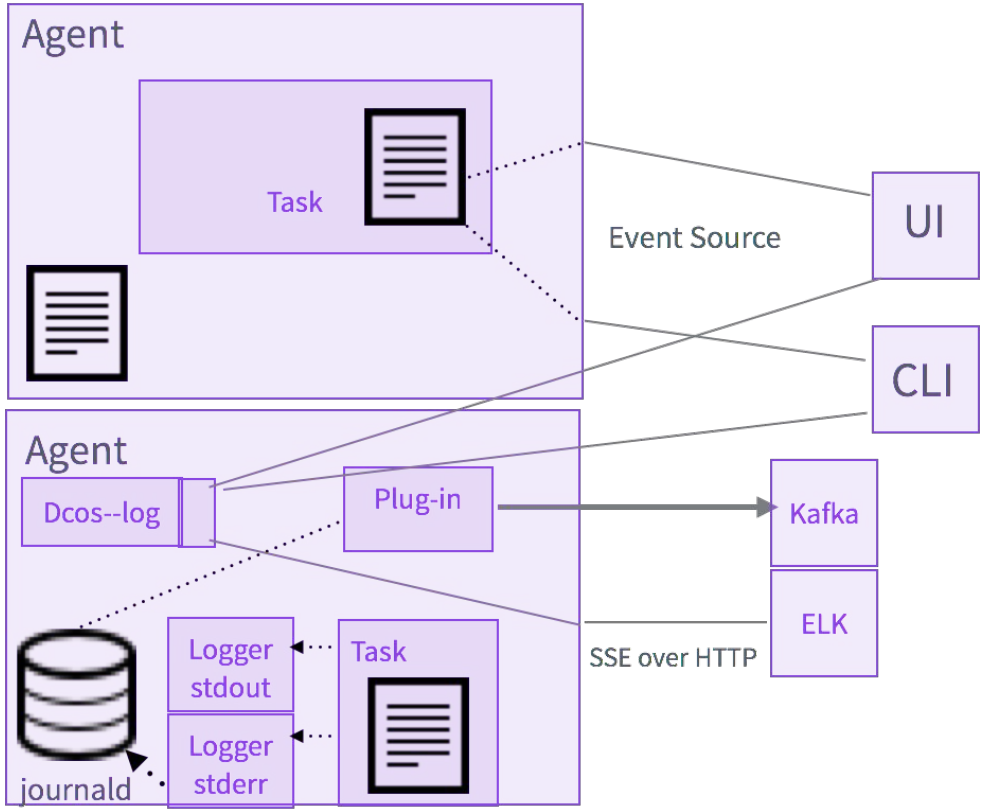
- Open encrypted, interactive, remote session to your containers
- Remotely execute commands for real time app troubleshooting
- Provide developers access to their own applications, not the entire host or cluster



DC/OS: OPERATIONS

UNIFIED LOGGING

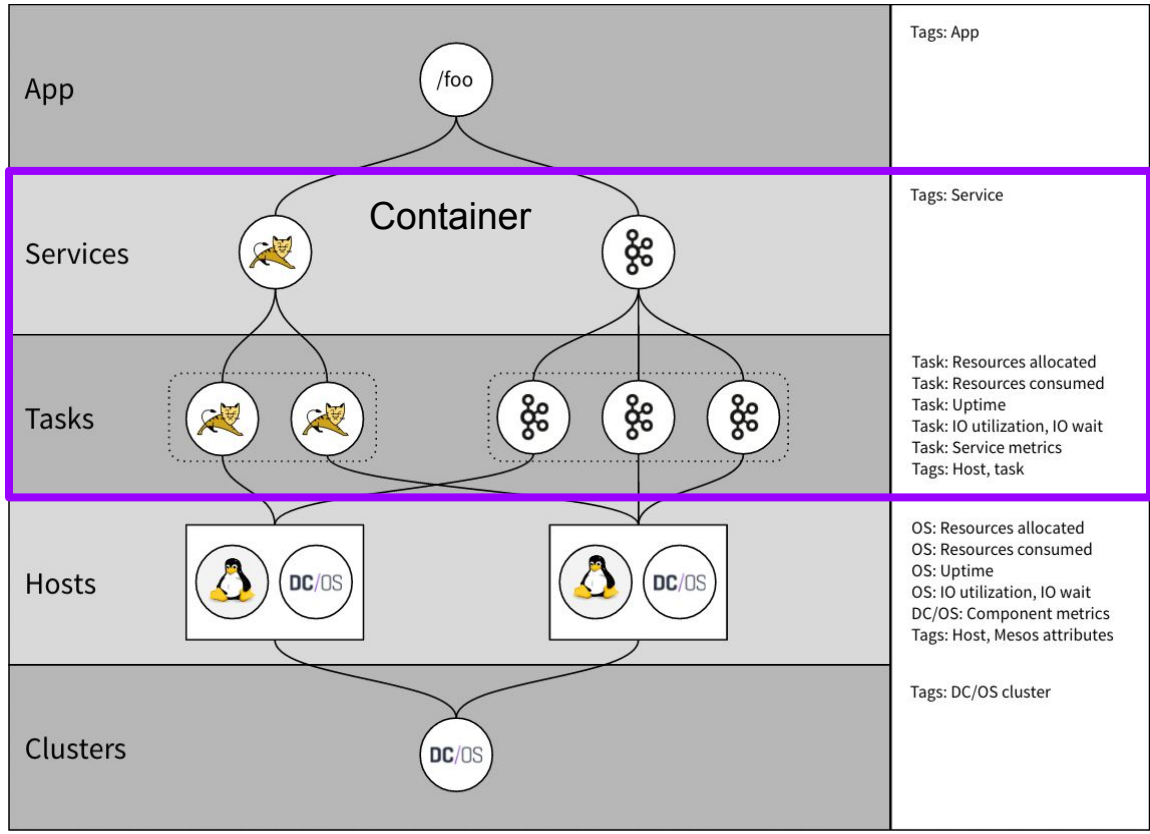
- Access application, DC/OS and OS logs
- Easily troubleshoot applications with critical metadata such as container id and app id
- Integrate easily with existing logging systems



DC/OS: OPERATIONS

UNIFIED METRICS

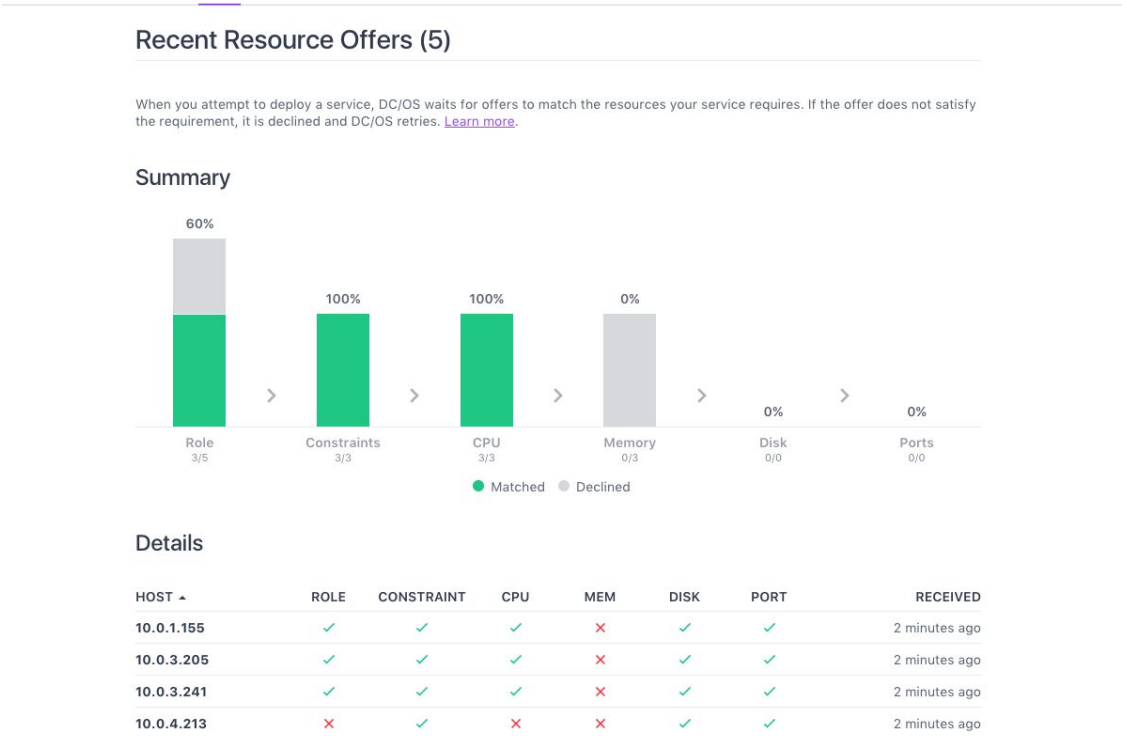
- Single API for system, container and application metrics
- Metadata such as host id and container id are automatically added to assist in debugging
- Integrate easily with existing metrics systems



DC/OS: OPERATIONS

DEPLOYMENT FAILURE DEBUGGING

- Understand why your application is not deploying
- Understand which nodes in the cluster can accommodate the role, constraints, cpu, mem, disk and port requirements for your app



DC/OS: OPERATIONS

UPGRADES AND CONFIG UPDATES

- Generate new config for cluster nodes

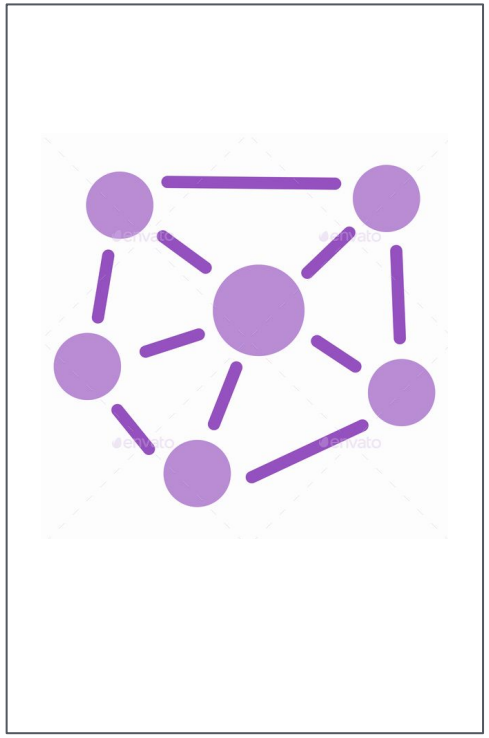
```
$ dcos_generate_config.sh --generate-node-upgrade-script
<installed_cluster_version>
```

- Single command upgrade script for individual nodes

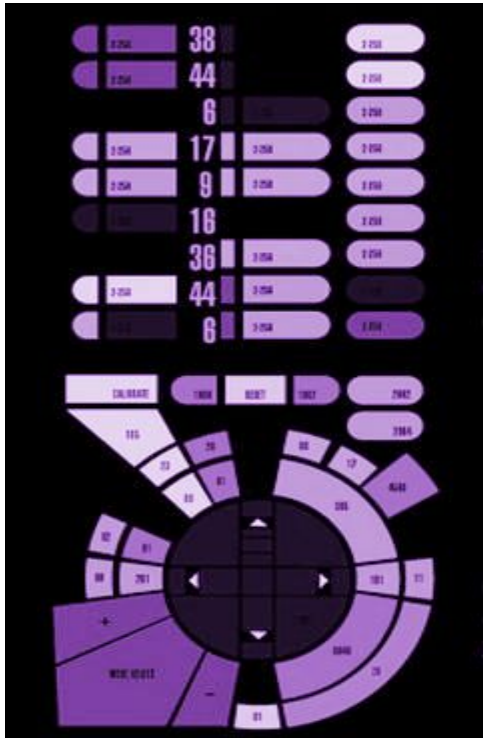
```
$ curl -O <Node upgrade script URL>
$ sudo bash ./dcos_node_upgrade.sh
```

DC/OS 1.9 - Workloads

DATA SERVICES ECOSYSTEM



OPERATIONS



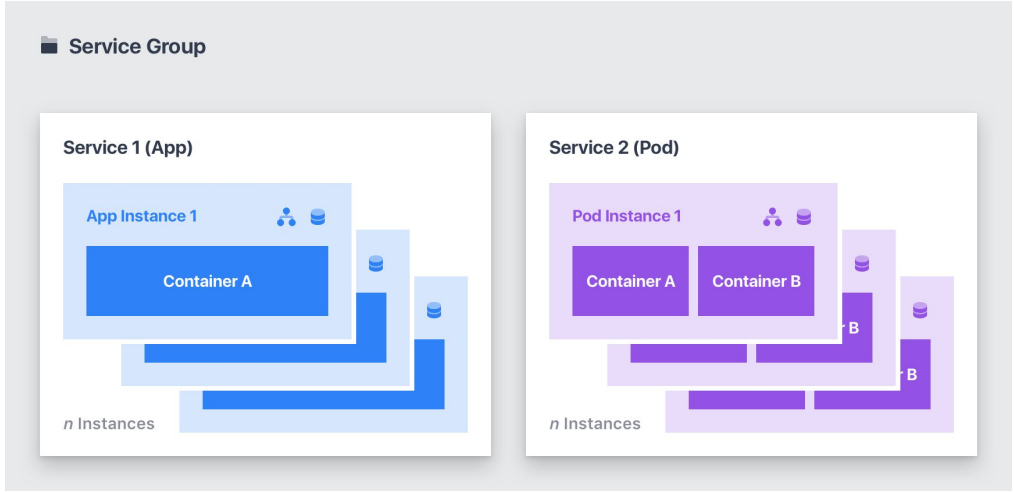
WORKLOADS

- Pods
- GPU based scheduling

DC/OS: WORKLOADS

PODS

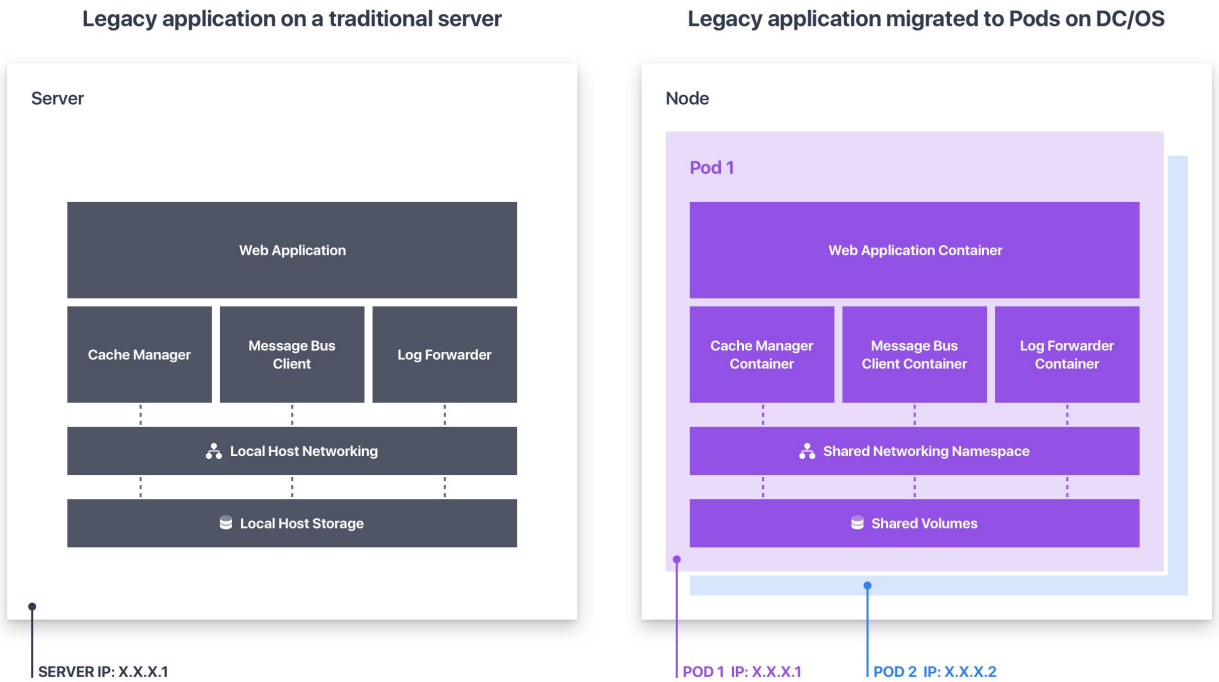
- Schedule, deploy and scale multiple containers on the same host(s) while sharing IP address and storage volumes
- All containers in a pod instance run as if they are running on a single host in pre-container world
- Useful for migrating legacy applications or building advanced micro services (side car containers)



DC/OS: WORKLOADS

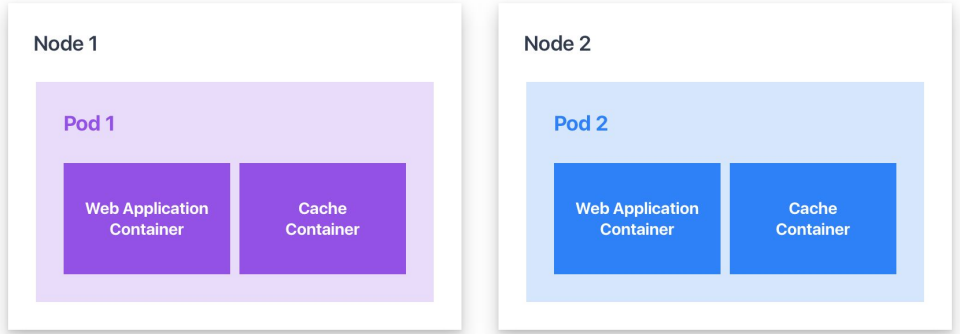
PODS: MIGRATING LEGACY APPS TO CONTAINERS

- Traditional monolithic apps on VMs usually have support services such as log shipper, message queuing clients
- Many support services assume col-location on same host, and local-host access to networking and storage
- Pods simplify moving legacy monolithic apps to containers, reducing risk and accelerating migrations



PODS: SUPPORT SERVICES (SIDE-CAR CONTAINERS)

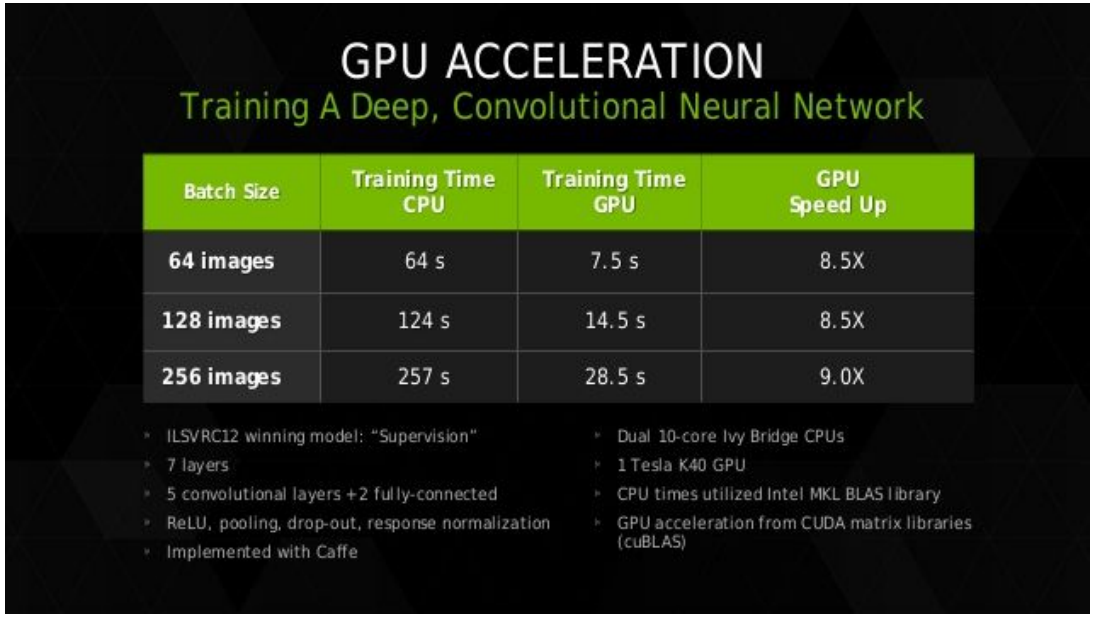
- Advanced Micro Services patterns require colocating containers together
- Support services include for example:
  - Logging or monitoring agents,
  - Backup tooling & Proxies
  - Data change watchers & Event publishers
- Pods simplify the building and maintenance of complex such microservices



DC/OS: WORKLOADS

GPU: WHY GPU?

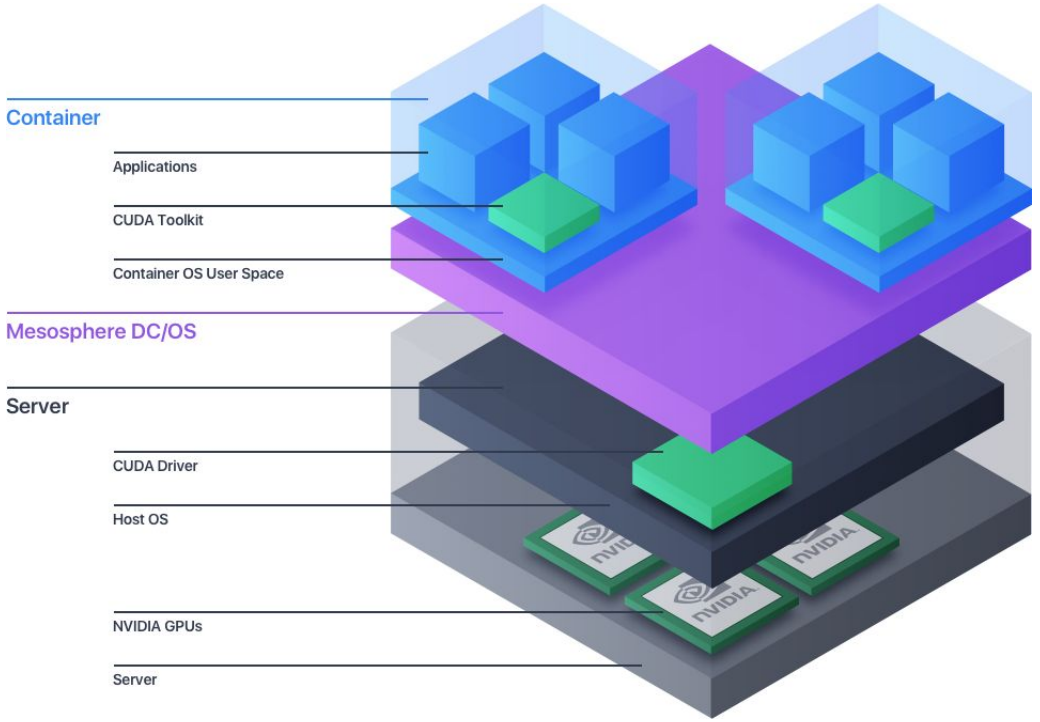
- GPUs are needed for many machine learning and deep learning applications
- GPUs are essential for real-time or near real time machine learning models
- GPUs deliver from 10X to 100X performance for some applications, resulting lower $$$/IOPS and more productivity to data science teams
- GPU applications include real time fraud detection, genome sequencing, cohort analysis and many others



DC/OS: WORKLOADS

GPU BASED SCHEDULING

- Test Locally with Nvidia-Docker, deploy to production with DC/OS
- Isolate GPU instances and schedule workloads just like CPU and memory, guaranteeing performance
- Efficiently Share GPU resources across data science team
- Simplify migrating machine learning models across from dev to production, and across clouds



DC/OS

OTHER IMPROVEMENTS

- Mesos 1.2
- Marathon 1.4
- Docker 1.12 and 1.13 (17.03-ce) support
- Centos 7.3 and CoreOS 1235.12.0 support
- Performance improvements across all networking features.
- CNI support for 3rd party CNI plugins.
- 100s of additional bugfixes and tests

Contact and Learn More

Elizabeth K. Joseph

Twitter: @pleia2 **&** @dcos

Email: ejoseph@dcos.io

Web: https://dcos.io

Source: https://github.com/dcos

Demo: https://github.com/mesosphere/cd-demo