ubuntu

Config Management and Containers

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CANONICAL

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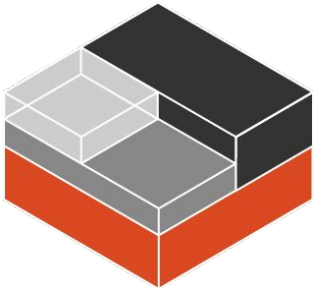
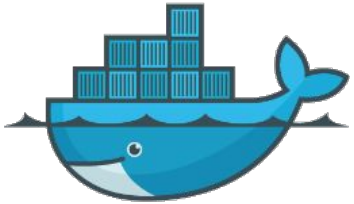
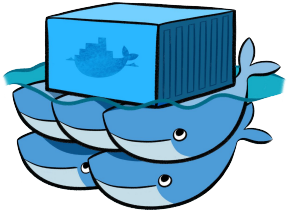
We are the company behind Ubuntu.







juju

kubernetes

Genesis

“Operational pain can neither be created nor destroyed - only moved to someone else”

- Nick Galbreath


Well… You can create it… :)
- Joshua Corman

System Management Patterns

Divergence

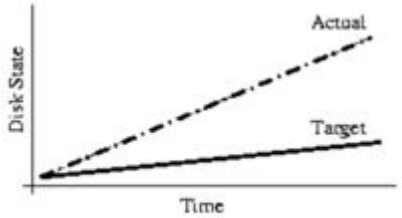


Figure 1: Divergence.

Convergence

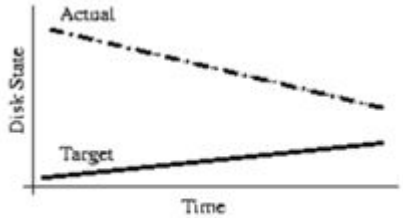


Figure 2: Convergence.

Congruence

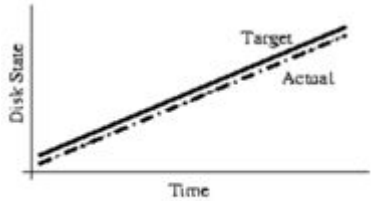


Figure 3: Congruence.

cited: http://usenix.org/legacy/publications/library/proceedings/lisa02/tech/full_papers/traugott/traugott_html/index.html

Config Management Solved Problems

1. Stopped divergent delivery patterns from a pre-virtualized world
2. Best Attempt to eliminate snowflakes
3. Frameworks to describe machine state
4. Support upstream packaging (or from source deployments)
5. resource abstraction

Emergent issues w/ Config Management

1. Domain specific configuration managers

2. Context Sensitive Knowledge barriers.

3. 10% technological—the rest is improved management, process, and user training. [1]

[1] cited: ftp://ftp.sei.cmu.edu/pub/case-env/config_mgt/papers/PastPresentFuture.pdf

Enter Containers

The New Stack

Containers offer a way to virtualize an operating system.

This virtualization isolates processes, providing limited visibility and resource utilization to each, such that the processes appear to be running on separate machines.

Flavors

Application Containers

- Single Process
- No init
- No amenities like cron
- No SSH
- typically run/handled as immutable objects

System Containers

- Many processes
- runs /sbin/init
- Has amenities like cron
- SSH’able
- Can be treated as immutable or mutable. But designed to be mutable

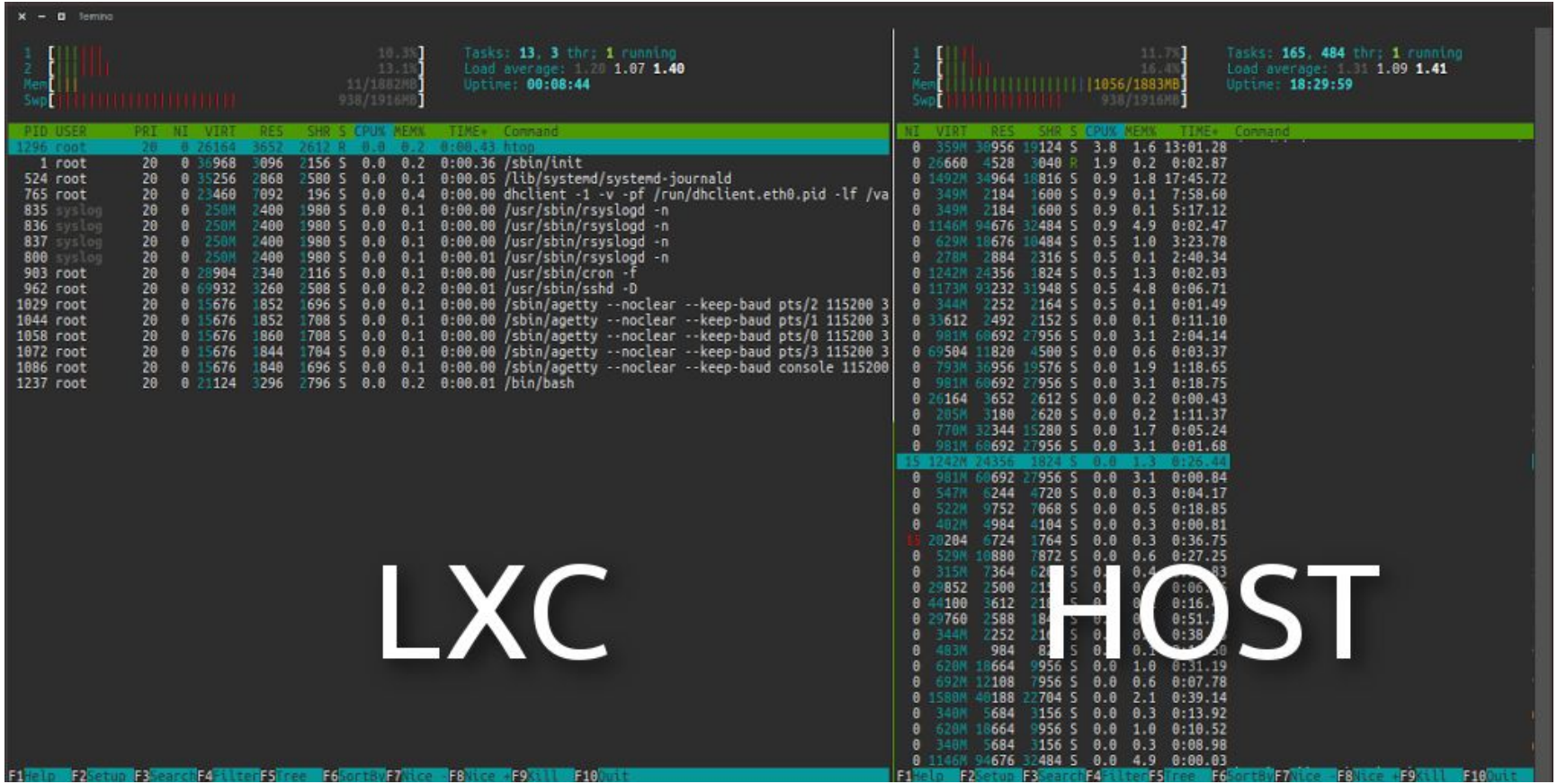


image credit: https://www.howtoforge.com/tutorial/how-to-use-docker-introduction/

Benefits of “the new stack”

1. Resource Constraints
2. Density
3. Super Fast (often sub second)
4. No VM Overhead

Why Config Management & Containers

A critical look

Model Everything

Model containers and non-containers

manage not only the containers, but the environments around the containers

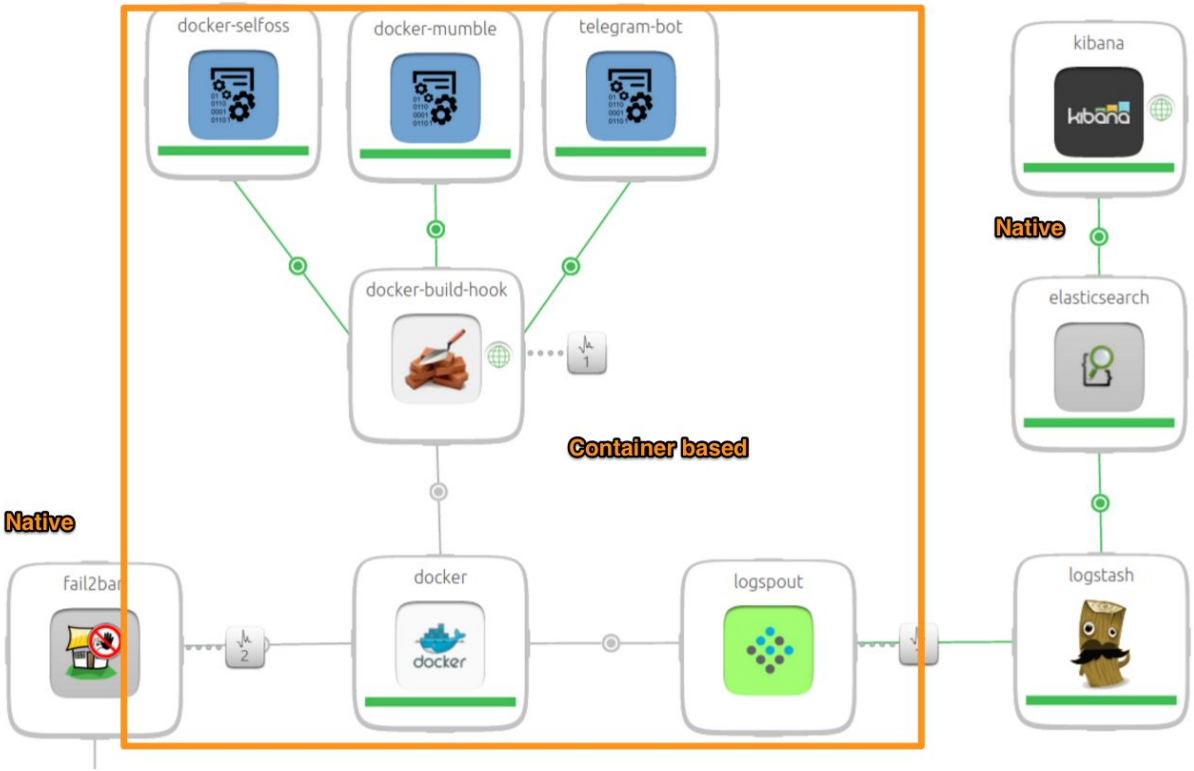
This is especially important, as containerized applications are nearly always talking to components

- storage
- database
- networking

that are not in containers, and in some (rare) cases: unable to be placed in a container.

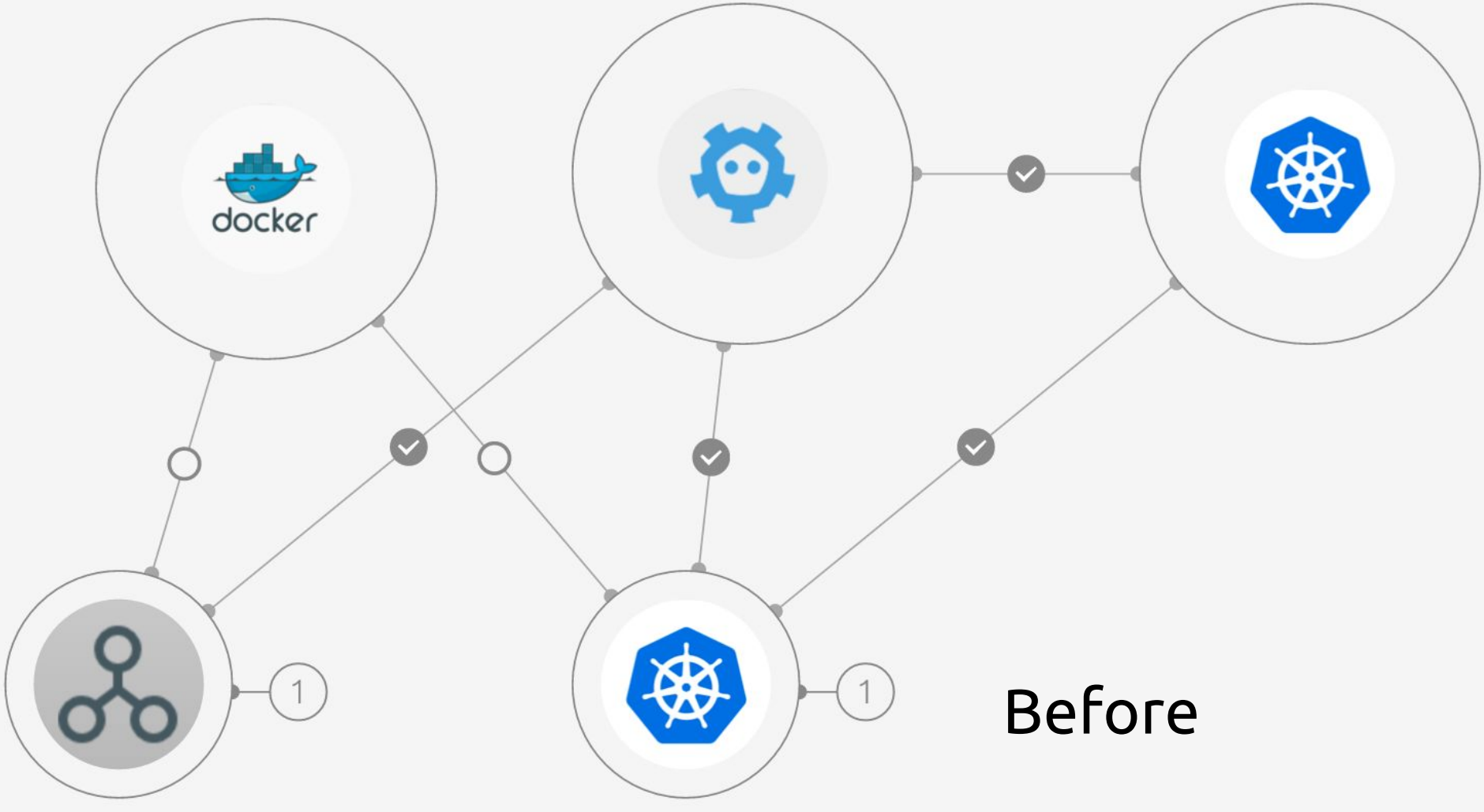
Chuck’s Adventure

Chuck’s Adventure



Delivery Patterns

Application containers vs uncontained delivery


docker
1
1
Before

Kubernetes Charm as a Case Study

uncontained Delivery

5317 total LOC

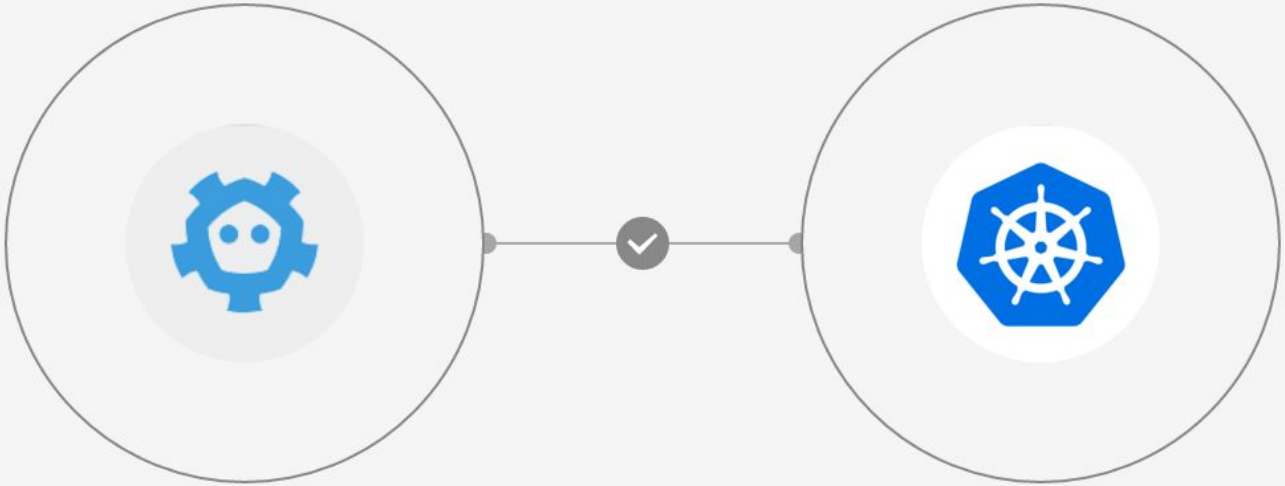
- Required a Build Env
- 15 Min Delivery
- 8 min upgrade cycle
- Different model than suggested by google

containerized Delivery

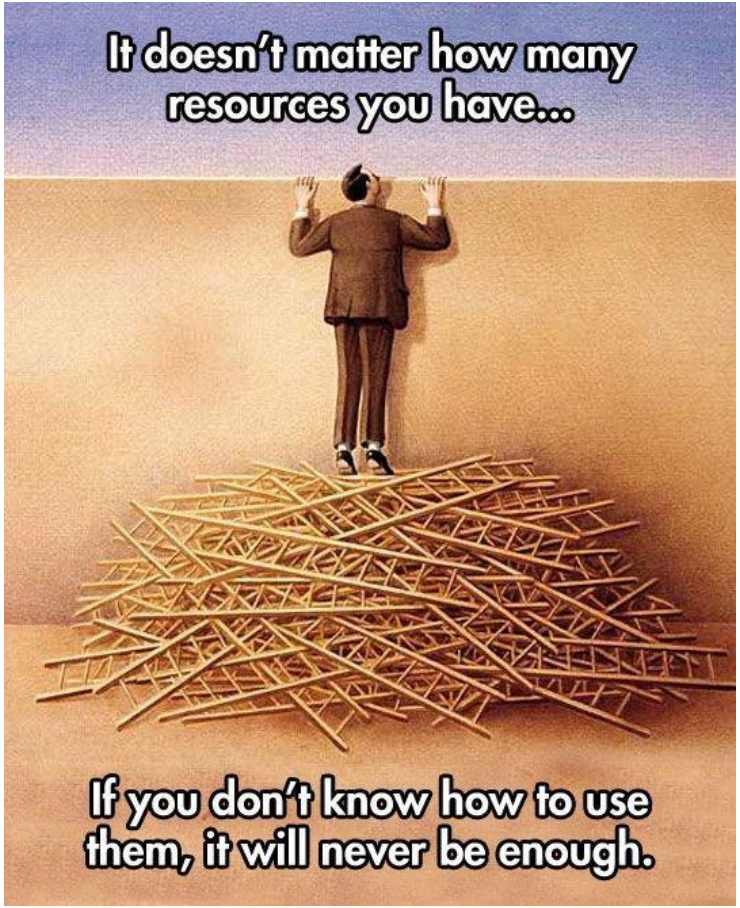
2283 total LOC

- No Build Env
- 8 Min Delivery
- ~ 1 min upgrade cycle
- Same model suggested by google

3,034 LOC reduction in cost of ownership



After (mid flight)


It doesn't matter how many resources you have...
If you don't know how to use them, it will never be enough.

Take a closer look @ the Kubernetes Example

layer-docker

- Delivers the latest -Stable engine from Docker's PPA
- Provides a consistent interface to work with charming application containers.
- meaningful synthetic states - `@when('docker.ready')`
- Includes charms.docker

http://github.com/juju-solutions/layer-docker

charms.docker

- Configure and interact with a Docker Daemon
  - Manage DOCKEROPTS

```
opts = DockerOpts()

opts.add('allow-insecure-registry', True)

opts.to_string()
```

http://github.com/juju-solutions/charms.docker

charms.docker

- Interact with a docker-engine

```
from charms.docker import Docker
d = Docker()
pid = d.up('lazypower/idlerpg:latest',
           dirs={"files/idlerpg":"/files/idlerpg"},
           ports=["8000:8000"])
```

http://github.com/juju-solutions/charms.docker

charms.docker

- Manage docker-compose templates

```
from charms.docker.compose import Compose

compose = Compose('files/tikiwiki')

compose.up('mysql')

compose.kill()

compose.rm()
```

http://github.com/juju-solutions/charms.docker

Containers as Payloads

Containers as Payloads

- System Containers can be delivered in a similar fashion
  - Pack in a quick-configuration script to carry your CM configuration values into the environment
  - `lxd run /opt/configure_my_service foo=bar baz=bam`

- `Generate the pre-configured containers with CM tooling`
  - `Juju, Chef, Puppet, Ansible, Saltstack, Foreman, CFEngine, or whatever strikes your fancy`

LXD ships with everything you need

LXD can act as a hosting image server

- Warehouse base images
- Push container snapshots for migration / distribution
- Trusted Registry by default, they’re all your containers

Where is charms.lxd then?

Simply stated:

LXC/LXD is natively supported in Juju. These “primitives” are exposed as a native “machine” to create units for an Application.

These principles work in every CM toolkit

Ansible Modules

https://github.com/kbrebanov/ansible-lxd

http://docs.ansible.com/ansible/lxc_container_module.html

Deliver and manage System Containers

http://docs.ansible.com/ansible/docker_module.html

Deliver and manage Application Containers

Chef Cookbooks

https://supermarket.chef.io/cookbooks/container

Deliver and manage System Containers

https://supermarket.chef.io/cookbooks/docker

Deliver and manage Application Containers

Puppet Modules

https://github.com/tripledes/sjimenez-lxc

Deliver and manage System Containers

https://forge.puppetlabs.com/garethr/docker

Deliver and manage Application Containers

Salt Stack

https://docs.saltstack.com/en/latest/topics/cloud/lxc.html

Create / Manage System Containers

https://docs.saltstack.com/en/latest/ref/states/all/salt.states.dockerng.html

Create / Manage Application Containers

Thanks for your time

Come see us @ CFGMGMTCAMP 2016 in Gent

http://summit.juju.solutions