How to create a Docker Cloud with Brooklyn, jclouds and Clocker.io
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Agenda

Clocker Introduction
What is a Docker Cloud?
Demos
Advanced features
What’s Clocker.io?
What does it do?

Clocker supports **single-click deployment** and **runtime management** of multi-node applications that run on **Docker containers** that can be distributed across multiple **Docker engines**.
Open Source

Apache 2.0 Licensed

java

http://clocker.io @clockercentral

Status

Started by @grkvlt and @turlinux

~500 total commits

~10 contributors

+37 forks on GitHub

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On the shoulder of the giants

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Clocker and Apache Brooklyn

Brooklyn Blueprint

Brooklyn Location

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Demo: Building a Docker Cloud
On the shoulder of the giants

apache brooklyn
jclouds

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Application Management Platform

Apache 2.0 Licensed
Donated to ASF - Incubator Project
http://brooklyn.io @brooklyncentral

Status
Founded by Alex Heneveld and Aled Sage
~11K total commits
~40 contributors
+50 forks on GitHub
Hierarchical autonomic management
MAPE-K control loop for self-adaptive systems

Deploy, Manage and Monitor autonomic Blueprints
Blueprint
Capture an application’s initial topology plus policies

Topology
Component wiring, groupings and management hierarchy

Policy
Governs an app’s behavior (Cluster Mgmt, Failover …)

Location
Target environment for blueprint instantiation
name: My Web Cluster
location: localhost
services:

- type: brooklyn.entity.webapp.ControlledDynamicWebAppCluster
  name: My Web
  brooklyn.config:
  - wars.root: https://bit.ly/brooklyn-example-hello-world-sql-webapp-0.6.0.war
  - java.sysprops:
    - brooklyn.formatString("jdbc:KsKs?user=Ks\&password=Ks",
                             component("db"),attributeWhenReady("datastore.url"),
                             "visitors",
                             "brooklyn",
                             "br0K11n")

- type: brooklyn.entity.database.mysql.MySQLNode
  id: db
  name: My DB
  brooklyn.config:
jclouds
A multi-cloud toolkit for the Java platform
Apache 2.0 Licensed - Top Level Project
http://jclouds.org
Status
Started on April 2009 by Adrian Cole
+12K total commits
~200 contributors (65 last year)
+200 forks on GitHub
latest stable release 1.9.0
Portable abstractions: Compute, BlobStore, LoadBalancer
jclouds-docker @turlinux

https://github.com/jclouds/jclouds-labs in 1.9.0

This initial work kicked off Clocker

```java
// get a context with docker that offers the portable ComputeService api
ComputeServiceContext context = ContextBuilder.newBuilder("docker")
  .credentials(email, password)
  .modules(ImmutableSet.<Module> of(new Log4JLoggingModule(),
      new SshjSshClientModule()))
  .buildView(ComputeServiceContext.class);
ComputeService client = context.getComputeService();

String sshableImageId = "your-sshable-image-id"; // this can be obtained using 'docker images --no-trunc' command
Template template = client.templateBuilder().imageId(sshableImageId).build();

// run a couple nodes accessible via group container
Set< ? extends NodeMetadata> nodes = client.runNodesInGroup("container", 2, template);

// release resources
context.close();
```
Docker is a cloud provider which spins up containers up instead of VMs.
Docker REST API

Docker REST API v1.17
Docker Remote API <- supported by jclouds-docker
  ContainerAPI
  ImageAPI
  MiscAPI
Docker Hub API
Docker Registry API

@turlinux
A platform to pack, ship and run any application as a lightweight container.

Apache 2.0 Licensed
https://www.docker.com/

Status

Started on March 2015
+14K total commits
~840 contributors
+4300 forks on GitHub

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Docker Networking 101

Natively, each container runs isolated
A bridged network is provided by Docker

Exposing ports
Port Forwarding (mapping port) to “external interface”
what if I have a cluster of nodes wants to use the same port?
Software Defined Networking

**Host to Host Communication**
Same LAN Segment
No Port Forwarding

**Natural Application Configuration**
Initial Driver was Erlang Distributed Protocol and EPMD based Applications

**Uses Available Provider**
Currently Weave, Metaswitch Calico

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Weave

Ethernet Switch
User Space
Weave agent is a Docker Container
Routes TCP Traffic
Forwards over TCP

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Demo: Deploying an application on a Docker Cloud
Debrief

Orchestrated Docker 1.5.0 deployment with Weave

Automated application deployment over containers provisioned on multiple Docker Hosts

Automated attachment of containers to multiple dynamic networks created on-the-fly by the SDN provider
Deep dive

Container Management
Container Placement
Provisioning
Headroom
Networking

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Deep dive: Container Mgmt

Sources

Docker Image Definition
Docker Hub
Dockerfile
Brooklyn Entity Definition

Create Image Automatically

```
type: brooklyn.entity.proxy.haproxy.HAPProxyController
brooklyn.config:
  docker.image.name: haproxy
docker.image.tag: 1.5.9
install.dir: /usr/local/sbin/
run.dir: /usr/local/etc/haproxy/
```
Deep dive: Container Placement

Placement Strategies and Headroom

Random, Depth or Breadth First
CPU or Memory Usage
Memory, CPU or Container Limits
Geographic Constraints

docker.container.strategies:
- $brooklyn:object:
  type: brooklyn.location.docker.strategy.MaxContainersPlacementStrategy
  brooklyn.config:
    maxContainers: 12
- $brooklyn:object:
  type: brooklyn.location.docker.strategy.BreadthFirstPlacementStrategy

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Deep dive: Networking

Pluggable Providers
Weave, Metaswitch Calico

Multiple Networks provisioning
Single Application or Shared, Private Addresses, Segmented by CIDR

- type: brooklyn.networking.VirtualNetwork
  networkId: my-application
  cidr: 192.168.12.0/24
  gateway: 192.168.12.1
  dnsServers:
  - 8.8.8.8
  brooklyn.config:
    sdn.example.securityGroup: "my-security-group"
Summary

**Clocker.io**

Brooklyn + jclouds + Docker + Weave / Calico solves

Composite Application Management
Docker Cloud Networking
Container Placement and Provisioning

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Where to find it

Releases

0.8.0 Developer Preview [http://git.io/jGhs](http://git.io/jGhs)
0.8.0 final - to be announced at Docker Meetup

Where to find us

@clockercentral
#brooklyncentral on IRC freenode
Questions?