

A photograph of a stack of shipping containers. The containers are primarily blue, with two green ones interspersed. The word "Clocker" is written in large, white, sans-serif font across the center of the image. Below it, the subtitle "Deploying Complex Applications on Docker using Apache Brooklyn" is written in a smaller, white, sans-serif font. The containers have various markings, including "UACU" and "CAUTION 9'6\"/>

Clocker

Deploying Complex Applications
on Docker using Apache Brooklyn

Deploying Complex Applications on Docker using Apache Brooklyn

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Budapest, Hungary

Introduction

- Andrew Kennedy
 - Software Engineer
 - Open Source
 - github.com/grkvlt
- Cloudsoft Corporation
 - Scottish (British? European!) Company
 - We're Hiring...

Introduction

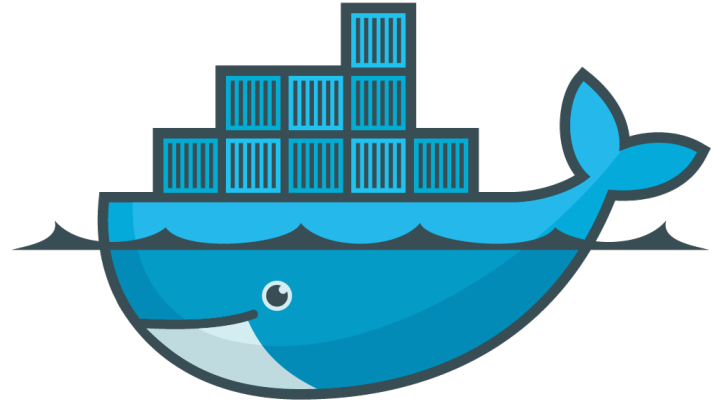
- Clocker
 - Docker
 - Apache Brooklyn
 - Apache Jclouds
 - Weave
- Demonstration
- Roadmap

Clocker Project

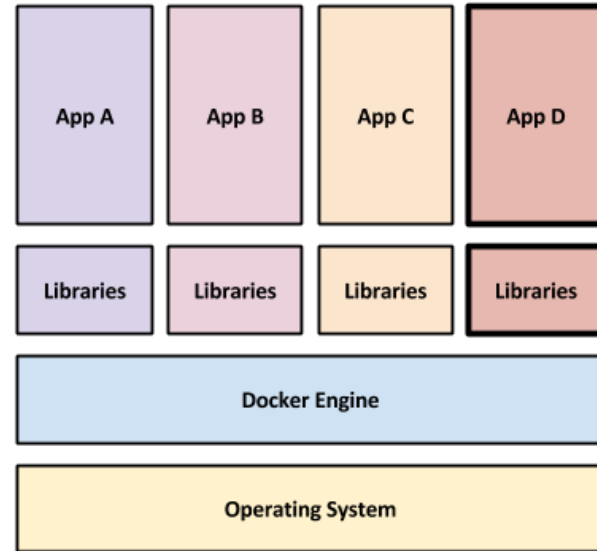
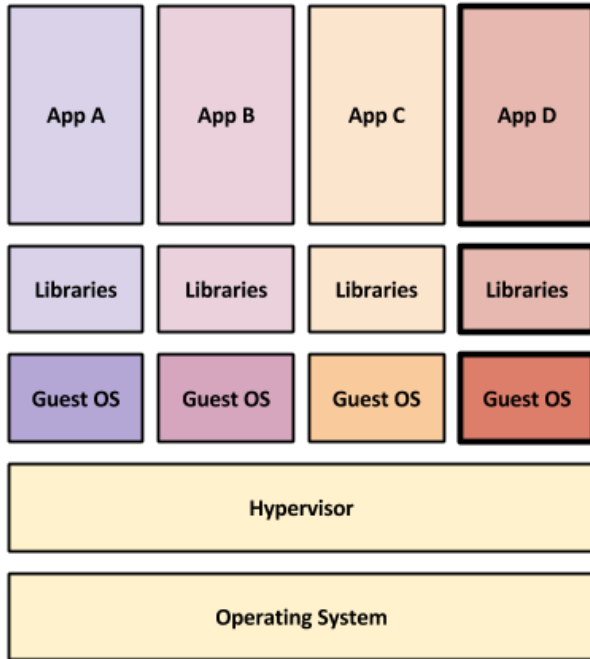
- What does it do?
 - Manages Docker Infrastructure
 - Deploys Blueprints to Docker
- What is it?
 - Brooklyn Application
 - Brooklyn Location

Docker

- Popular
 - Huge Ecosystem
 - Growing
 - Complex
- Containers
 - Isolation
 - Performance
 - Composable



Docker



Docker Limitations



Docker Limitations

- Multiple Hosts
- Networking
 - Same Issue
 - Communication Between Services
- Orchestration and Clustering
 - Control of Containers
 - Container Management

Docker Limitations

- Plugin API will Help
 - Not standardized yet
 - Working on it...
- Need to avoid lock-in
- One size fits all is never good enough

Clocker Project

- GitHub
- Open Source
- Java
- Recently Developed
- Still Beta Status
 - 0.7.0-SNAPSHOT
 - Release 0.7.0 Tomorrow

Why Clocker

- Docker Popularity
 - Solve Some Limitations
- Best of Breed Components
- Brooklyn Integration
 - Virtual Machines too Coarse
 - Container to Entity Mapping

Clocker Components

- Apache Brooklyn
 - Cloudsoft Product
 - Open Source Java
 - Donated to the ASF
 - Incubator Status

apache brooklyn

Apache Brooklyn

- Application Management Platform
- Autonomic Computing Principles
- Deploy, Manage and Monitor Blueprints
 - Services (Entities)
 - State (Sensors)
 - Actions (Effectors)

Brooklyn Blueprint

```
id: nodejs-hello-world-application
name: "Node.JS Hello World Application"
origin: "https://github.com/grkvlt/node-hello-world.git/"
locations:
- jclouds:softlayer:ams01
services:
- serviceType: brooklyn.entity.webapp.nodejs.NodeJsWebAppService
  id: nodejs
  name: "Node.JS"
  brooklyn.config:
    gitRepoUrl:
      "https://github.com/grkvlt/node-hello-world.git"
    appFileName: app.js
    appName: node-hello-world
```

Apache Brooklyn

- Deployment
 - Provisioning
 - Locations
 - Installation and Customization
 - Packages, Scripts, Chef, SaltStack
- Management
 - Policies
 - AutoScaling, Resilience, Performance, Access

Apache Jclouds

- Java Cloud Library
- API Agnostic
 - CloudStack, OpenStack, AWS EC2, GCE...
- Create Virtual Machines
 - Return SSH Endpoint
 - Manage Properties

The logo for Apache Jclouds, featuring the word "jclouds" in a white, lowercase, sans-serif font centered on a blue rectangular background with a subtle, darker blue cloud-like pattern.

jclouds

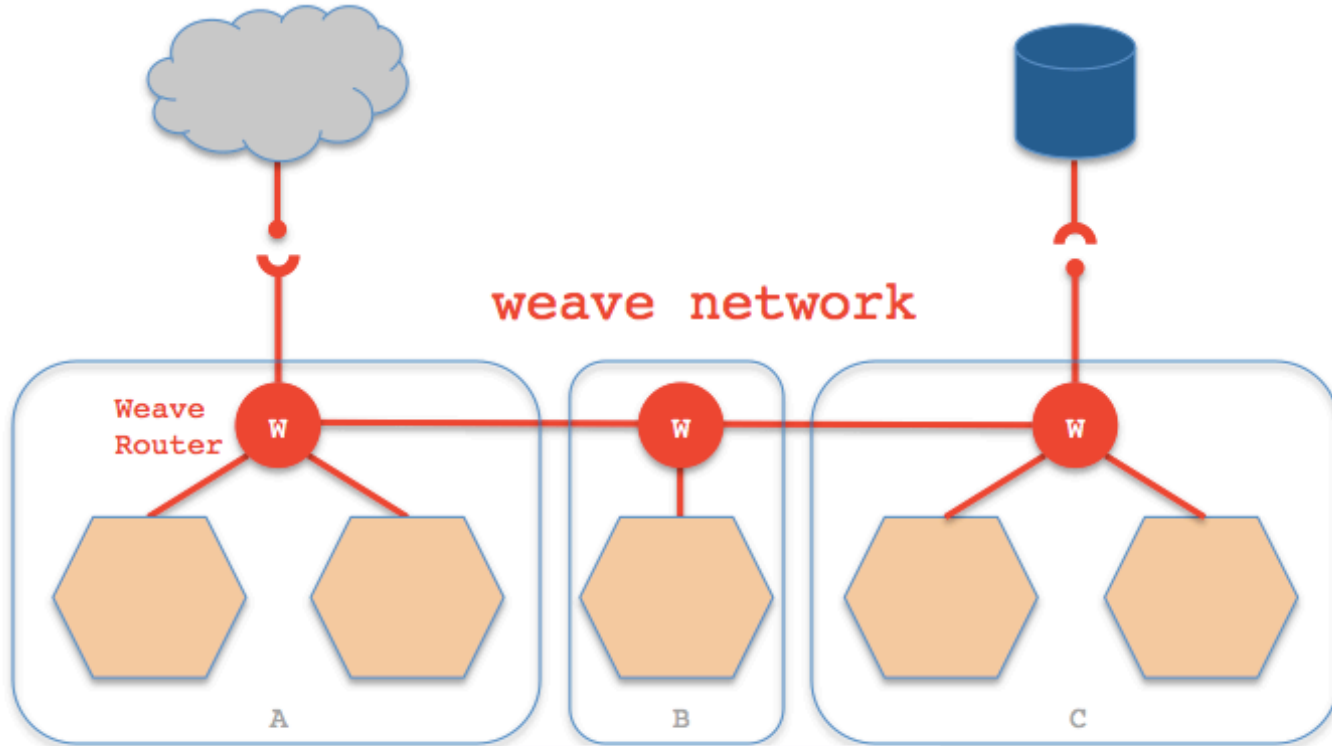
Apache Jclouds

- Drivers for REST APIs
- Docker Driver
 - Written by @turlinux
- Virtual Container
 - Using SSH Daemon
 - Same Endpoint Type as VM
 - Composition on any Image or Dockerfile

Weave

- Software Defined Networking
 - Ethernet Switch
 - User Space
 - Docker Container
- Sniffs Traffic on Host
- Forwards over TCP

Weave



What is Clocker?



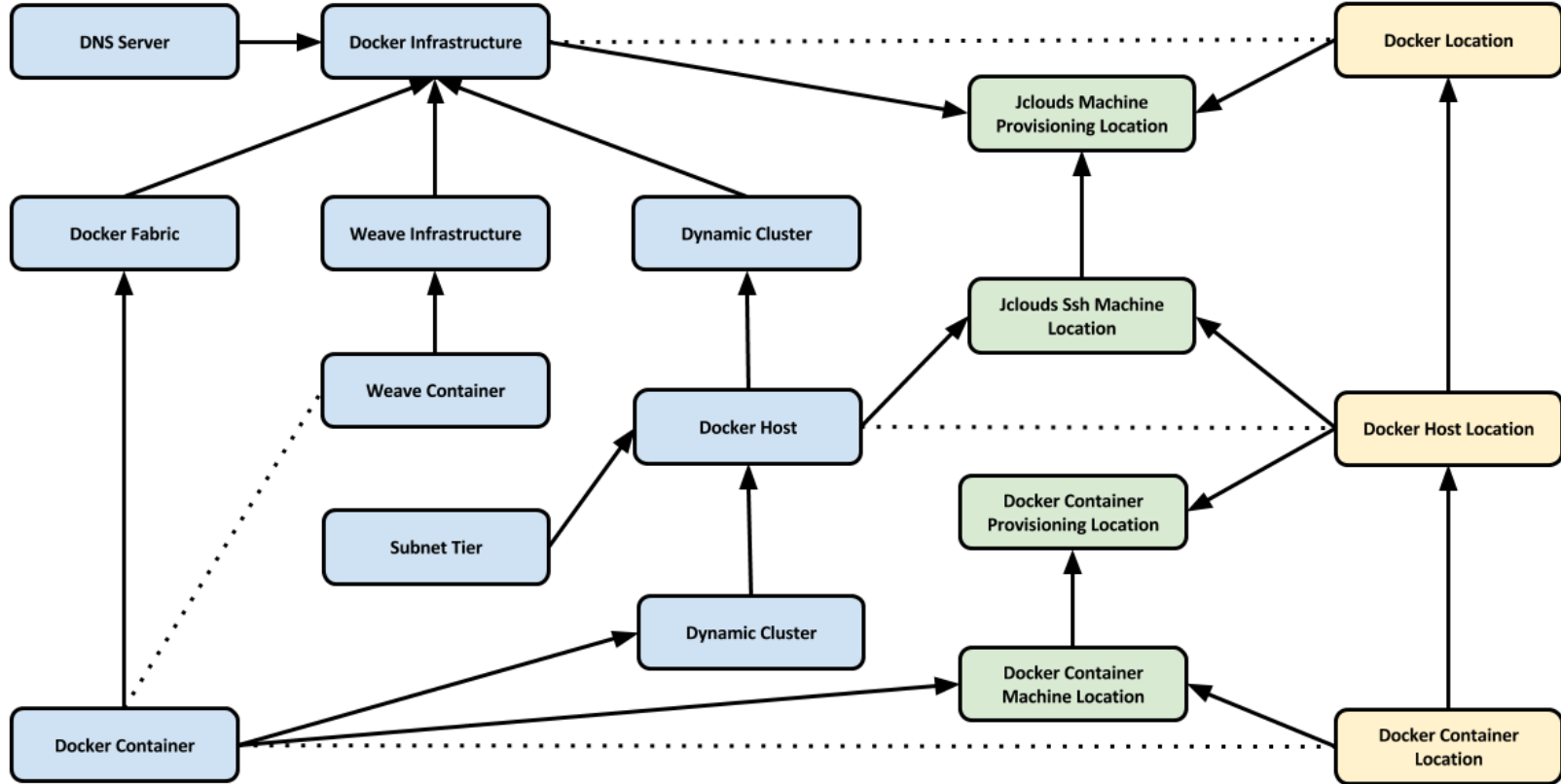
What is Clocker?

- Brooklyn Application
 - Docker Infrastructure
 - Docker Engine
 - Docker Containers
 - Weave Infrastructure
 - Weave Container

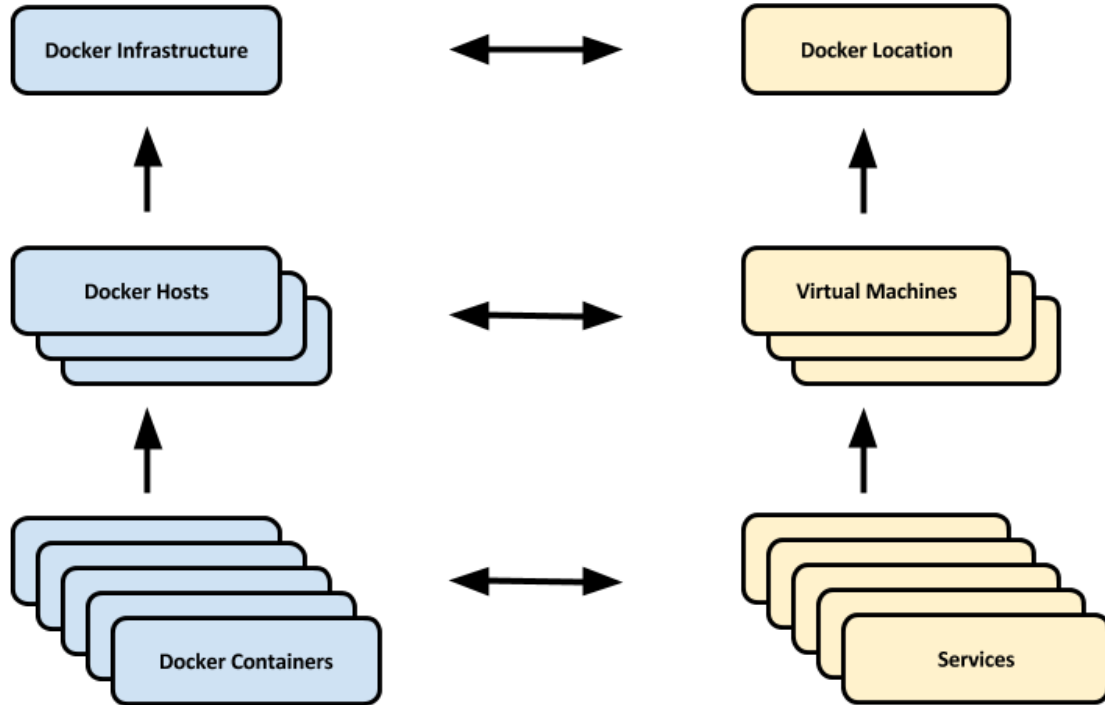
What is Clocker?

- Brooklyn Location
 - Destination for Blueprints
- Added Features
 - Create Containers
 - Provision Docker Hosts
 - Attach to Weave Network
 - Manage Application

Clocker Architecture



Clocker Architecture



Clocker Features

- Application Deployment
 - Oasis CAMP Blueprint
 - Same as Core Brooklyn
- Mixed Destinations
 - Some Virtual Machines
 - Some Bare Metal
 - Some Containers

Clocker Features

- Application Deployment
 - Oasis CAMP Blueprint
 - Same as Core Brooklyn
- Docker Extensions
 - Container or Image
 - Placement Strategy
 - Dockerfile URL

Clocker Placement

- Demand Side
 - New Container
- Supply Side
 - Where?
 - Placement Strategy
 - Provisioning Strategy

Clocker Placement

- Placement Strategies
 - Depth First
 - Breadth First
 - CPU Usage
 - Affinity or Anti Affinity
 - Memory or CPU Core Availability

Clocker Placement

- Provisioning Strategy
 - New Docker Host Location
- Constraints
 - Docker Infrastructure Constraints
 - Entity or Application Constraints
- User Defined Strategies
- Intelligent Container Orchestration

Clocker Placement

- Deterministic
- Simple
 - Predicate and Comparator

```
docker.container.strategies:
```

- \$brooklyn:object:
 - type: "brooklyn.location.docker.strategy.MaxContainersPlacementStrategy"
 - brooklyn.config:
 - maxContainers: 16
- \$brooklyn:object:
 - type: "brooklyn.location.docker.strategy.CpuUsagePlacementStrategy"
 - brooklyn.config:
 - maxCpu: 0.75

Container Management

- Sources
 - Docker Image Definition
 - Docker Hub
 - Dockerfile
 - Brooklyn Entity Definition
- Create Image Automatically

Container Management

```
id: dockerfile-mysql
name: "Docker Hub MySQL Application"
origin: "https://registry.hub.docker.com/_/mysql/"
locations:
- my-docker-cloud
services:
- serviceType:
    brooklyn.entity.container.docker.application.DockerfileApplication
  id: mysql
  name: "MySQL"
  brooklyn.config:
    docker.dockerfile.url:
      file:///Users/grkvlt/Git/docker-library/mysql/5.6/
  env:
    MYSQL_ROOT_PASSWORD: "s3cr3t"
```

Container Management

- Installation of Services
 - Defined by Brooklyn or Dockerfile
 - Common to all Entity Instances
- Commit Image
 - Available for next Entity
- Push Image
 - Available for all Hosts

Networking

- Shared Weave LAN
 - Common to All Containers
 - Private (Link Local) Addresses
- Clocker Controls IP Allocation
 - Applications Segmented by CIDR
- Docker Port Forwarding Access

Networking

- Still First Steps...
- Name Resolution
 - BIND and DNSmasq
 - Needed for JMX et al
- Enables Many More Entities
- But Needs Tested!



한진 수호
HANJIN SOOHO
DOUGLAS
IMO 9801238

Demonstration

HANJIN

Applications



Docker Cloud Infrastructure



DockerInfrastructure:z6AG



All Docker Containers

Docker Applications



Docker Hosts



docker-cls1RCWk



Docker Containers



docker-r2TSQn5w



Docker Containers

quarantine

Summary

Sensors

Effectors

Policies

Activity

Advanced

Docker Cloud Infrastructure

Status



Status

STARTING

Service Up

false



URL

/clocker

Type

brooklyn.entity.basic.BasicApplication

ID

ezq2RlyY

Blueprint



Config



Docker Cloud Infrastructure ezq2RlyY

docker-kls1RCWk**kls1RCWk****STARTING****docker-r2TSQn5w****r2TSQn5w****STARTING**

Docker Cloud Infrastructure ezq2RlyY

docker-kls1RCWk**kls1RCWk****RUNNING**

159.8.152.151 / 159.8.152.151 / gyVO9dbo

3

6.7%

IP 10.112.164.111

Up 18m 42s

Load 0.64

8.21 GB Total

6.94 GB Free

1276 MB Used

**NHOLCaxo**

zettio/weave

**TlyBQzOo**169.254.0.11
Tomcat Server**xcCv1wWw**169.254.0.10
ActiveMQ Broker**docker-r2TSQn5w****r2TSQn5w****RUNNING**

Roadmap Now

- Improvements To Networking
 - DNS and DNSmasq Integration
 - Work in Progress
- Better Getting Started
 - Self Hosting on Localhost
 - Brooklyn Dockerfile

Roadmap Soon

- Better Integration with Repositories
 - Docker Hub, Artifactory, Quay.io
 - Private Repositories
- Easier Application Definition
 - Open Standard?
 - Kubernetes Pods?

Roadmap Next

- Integration
 - Google Kubernetes
 - ClusterHQ Flocker
 - Artifactory
- Improvements
 - Bootstrapping

Summary

- Clocker
 - Brooklyn + Docker + Jclouds + Weave
- Solves
 - Docker Networking
 - Container Placement
 - Application Definition

Audience Questions?

1. Where do you see Docker networking going?
2. What about orchestration?
3. What features would be most useful to enhance Docker usability?

Thanks!
Questions?

Web Resources

<http://clocker.io/>

<http://brooklyn.io/>

<http://docker.io/>

<http://github.com/zettio/weave/>

<http://abstractvisitorpattern.co.uk/>