

Ian Truslove :: Boulder Linux User Group :: 2014-03-13

# First:

the end...

#### Devs:



#### DevOps:



#### http://xkcd.com/303/

http://xkcd.com/149/

#### Devs:

Docker gives you a really easy way to find and use pre-packaged system components to use in conjunction with your app code. DevOps:

Docker gives the Devs a straightforward way to declaratively package deployable, repeatable, selfcontained system components.

#### About me





# Context

building and deploying highly scalable app infrastructures

#### **Methodology: The Twelve-Factor App**

#### I. Codebase

One codebase tracked in revision control, many deploys

#### **II. Dependencies**

Explicitly declare and isolate dependencies

**III. Config** Store config in the environment

#### **IV. Backing Services**

Treat backing services as attached resources

#### **V. Build, release, run** Strictly separate build and run stages

**VI. Processes** Execute the app as one or more stateless processes

#### VII. Port binding

Export services via port binding

VIII. Concurrency Scale out via the process model

#### IX. Disposability

Maximize robustness with fast startup and graceful shutdown

**X. Dev/prod parity** Keep development, staging, and production as similar as possible

**XI. Logs** Treat logs as event streams

#### XII. Admin processes

Run admin/management tasks as one-off processes

http://12factor.net/



#### **About Docker**

From <u>www.docker.io/the\_whole\_story</u>:

"Docker is an open-source engine that automates the deployment of any application as a lightweight, portable, self-sufficient container that will run virtually anywhere."

#### Docker is a shipping container system for code



https://www.docker.io/static/img/about/docker\_container.jpg

## **Docker is built on LXC**

From linuxcontainers.org:

"LXC is often considered as something in the middle between a chroot on steroids and a full fledged virtual machine. The goal of LXC is to create an environment as close as possible as a standard Linux installation but without the need for a separate kernel."

#### Containers vs. VMs



Containers are isolated, but share OS and, where appropriate, bins/libraries



https://www.docker.io/static/img/about/docker\_vm.jpg

### What does Docker provide?

Again, from <a href="http://www.docker.io/the\_whole\_story">www.docker.io/the\_whole\_story</a>:

*"Docker runs three ways:* 

- as a daemon to manage LXC containers on your Linux host
- as a CLI which talks to the daemon's REST API
- as a client of Repositories that let you share what you've built"

## Supported platforms

See <a href="https://www.docker.io/gettingstarted/#h\_installation">www.docker.io/gettingstarted/#h\_installation</a>

#### Directly:

- Ubuntu
- Arch Linux
- Gentoo
- Fedora
- OpenSuse
- FrugalWare
- Binaries\*

#### Virtualized:

- OSX
- Windows
- EC2
- Rackspace
- Google

## **Binary requirements**

- iproute2 version 3.5 or later (build after 2012-05-21), and specifically the "ip" utility
- iptables version 1.4 or later
- The LXC utility scripts (http://lxc.sourceforge. net) version 0.8 or later
- Git version 1.7 or later
- XZ Utils 4.9 or later

## Not (yet) ready for production



https://pbs.twimg.com/profile\_images/1263403750/riverscuomo-mustache.jpg

# **Docker ecosystem**

## Base image catalog

#### Official

- Ubuntu
- Centos 6.4
- Busybox

#### Unofficial

- Gentoo
- Arch
- OpenSUSE
- Debian
- etc...

#### Images: 3rd party software

#### > docker search database

NAME	DESCRIPTION	STARS	OFFICIAL	TRUSTED
deis/database	Database server for the Deis open source P	2		[OK]
mminke/mongodb-x86-64-2.4.8	This is a mongo db image which downloads t	1		[OK]
bradrydzewski/neo4j	Neo4j graph database running on Ubuntu Pre	1		
bbytes/orientdb	Image with orient db . The database and ba	1		[ОК]
kamui/postgresql	PostgreSQL 9.3 with configurable login/dat	1		[ОК]
luisarmando/docker-postgresql	Postgresql 9.3 docker repository This can	1		[ОК]
tpires/neo4j	Neo4j is a highly scalable, robust (fully	1		[OK]
mhansen/sequelize-contribution	Docker image containing a MySQL and Postgr	0		
skardan/cassandra	Cassandra Database	0		
erasche/chado	A Chado database container. Contains a ful	0		
tpires/sonar-mysql	SonarQube is an open platform to manage co	0		[ОК]
sminot/database		0		
hwuethrich/bamboo-agent	Easily scale your Atlassian Bamboo infrast	0		[ОК]
<pre>stephendl/releasemetrics_postgres93</pre>	A postgres database with and empty release	0		
turnkeylinux/mysql-13.0	TurnKey MySQL - Relational Database Manage	0		
dharmamike/dc-pgsql	This container runs a PostgreSQL database	0		[ОК]

<truncated>

## Further afield...

A little searching yields:

- Container hosting: <u>Stackdock</u>, <u>Orchard</u>, <u>dotCloud</u> (aka "Docker, Inc")
- Image hosting: <u>Quay.io</u>
- DIY PaaS: <u>Dokku</u>, <u>Deis</u>, <u>Flynn</u>, <u>Tsuru</u>, ...

**Basic Usage** 

## Setup: Vagrant VM Vagrantfile

Vagrant.configure(VAGRANTFILE\_API\_VERSION) do |config| config.vm.box = "precise64"

# System provisioning shell script - git, dev tools config.vm.provision "shell", path: "bin/provision.sh"

# Basic docker provisioning
config.vm.provision "docker", images: ["ubuntu"]

#... end

#### **Docker basics: curl a URL**

> docker pull ubuntu
Pulling repository ubuntu

... Download complete

> docker run ubuntu uname -a

Linux 03faf5dbff1e 3.2.0-23-generic #36-Ubuntu SMP Tue Apr 10 20:39:51 UTC 2012 x86\_64 x86\_64 x86\_64 GNU/Linux

> docker run ubuntu curl

2014/03/07 05:15:55 Unable to locate curl

#### **Docker basics: install software**

#### > docker run ubuntu apt-get update

... get:12 http://archive.ubuntu.com precise-security/universe i386 Packages [95.9 kB] Fetched 3068 kB in 3s (920 kB/s) Reading package lists...

#### > docker ps -1

CONTAINER ID IMAGE COMMAND CREATED ce6f4a44dec7 ubuntu:12.04 apt-get update About a minute ago

#### **Docker basics: commit an image**

#### > docker commit ce6f iant/basics-1

4011ace0088fe9389044505e85ed1b03e6c47d3e14856df<snip>

#### > docker images

REPOSITORYTAGIMAGE IDCREATEDVIRTUAL SIZEian/basics-1latest4113cd2b3e076 seconds ago224.5 MB

#### **Docker basics: more installs**

> docker run iant/basics-1 apt-get install -y curl Reading package lists... Building dependency tree... The following extra packages will be installed: ca-certificates krb5-locales libasn1-8-heimdal ...

> docker commit `docker ps -l -q` iant/basics-2
34490e7469d5b5b24ab74e4af300ffe0f17a0a31ab8549<snip>

#### Docker basics: using the image

> docker run iant/basics-2 curl -is www.google.com HTTP/1.1 200 OK Expires: -1 Cache-Control: private, max-age=0 X-Frame-Options: SAMEORIGIN Alternate-Protocol: 80:quic Transfer-Encoding: chunked

<!doctype html><html ...

#### **Docker basics: Dockerfiles**

FROM ubuntu:12.04

RUN apt-get update

# Install curl
RUN apt-get install -y curl

#### **Docker basics: Building Dockerfiles**

> docker build -t iant/basics-3 .
Uploading context 2.56 kB
Uploading context
Step 0 : FROM ubuntu:12.04
---> 9cd978db300e
Step 1 : RUN apt-get update
---> Running in 3f898a80705a

> docker run iant/basics-3 curl -is www.google.com HTTP/1.1 200 OK Expires: -1

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#### Docker basics: publishing the image

> docker login
Username (iant):
Password: \*\*\*\*\*\*

> docker push iant/basics-2 The push refers to a repository [ian/basics-2] (len: 1) Sending image list Pushing repository ian/basics-2 (1 tags) 511136ea3c5a: Image already pushed, skipping 4011ace0088f: Image successfully pushed 34490e7469d5: Image successfully pushed Pushing tag for rev [d55c21891493] on {https://registry-1. docker.io/v1/repositories/iant/demo2/tags/latest}

## **Use Cases**

real and perceived

#### Use case: homegrown PaaS

"Build your own Heroku"

Extant tools: <u>Deis</u>, <u>Tsuru</u>, etc.

...but is this really a good idea? Perhaps for internal use.

### Baidu

Heard of them? They did ~\$4Bn in 2013...

Announced on 12/10/13 they're building Baidu App Engine using Docker

# Use case: easy provisioning of dependencies

"How do I install BlingoDB?"

...quickly starting up a database server, or any other dependencies required by the app

### Use case: easy provisioning of ElasticSearch



- \$ vagrant up && vagrant ssh
- > docker pull dockerfile/elasticsearch
- > docker run -p 9201:9200 -p 9301:9300
  dockerfile/elasticsearch

# Use case: easy provisioning of dependencies

Also easy to re-package site-specific customizations of dependencies

# Use case: build a component for a scalable system

"How do I deploy my app into production the same way it runs on my machine?"

# Use case: build a component for a scalable system



# Use case: build a component for a scalable system

- Built around tcp://ipaddress:port interconnectivity
- Binary images: self contained with all dependencies, efficient with image layering
- Fast tear down and restart / redeploy and start
- Easy to maximise hardware utilization

# So What?

Devs:

Docker gives you a really easy way to find and use pre-packaged system components to use in conjunction with your app code.

Devs:

- Quick start-up
- Declarative
- Convenient
- Agnostic
- Easy to create
- Easy to consume

DevOps:

Docker gives the Devs a straightforward way to declaratively package deployable, repeatable, self-contained system components.

DevOps:

- Declarative Dockerfile
- Self-contained dependencies binary distribution of images
- Quick start-up
- Easy testing of topologies
- Easy enough for devs

System Architect:

- Aligned with the Twelve-Factor App philosophy
- Easy to bootstrap a sophisticated infrastructure
- Easy to deploy Docker into an architecture
- Easy to remove Docker from an architecture

## Why not?

- "Please note Docker is currently under heavy development. It should not be used in production (yet)."
- CLI is functional, but not brilliant
- Additional (unnecessary) layer of abstraction
  - Additional security concerns, complexity, failure modes, learning

# **Demo time**

#### **Demo Scenarios**

- Pulling in dependencies (ES) and using them for code
- Packaging an app up into a container
- Using packaged containers to test, e.g. ES clustering

## Thank you

Docker! docker.com

Slides: <u>bit.ly/Ngb8H1</u> or <u>brownsofa.</u> org/presentations/files/Docker\_whats\_in\_it\_for me.pdf

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