INTRODUCTION FOR BUSY PEOPLE

DOCKER FOR THE BRAVE

AGENDA

- The need for containers
- Overview: Docker and the Docker Ecosystem
- Basic Docker Workflows

“Well, it worked on my machine!”

TRADITIONAL SOFTWARE DELIVERY SUFFERS FROM GAP BETWEEN DEV AND PROD

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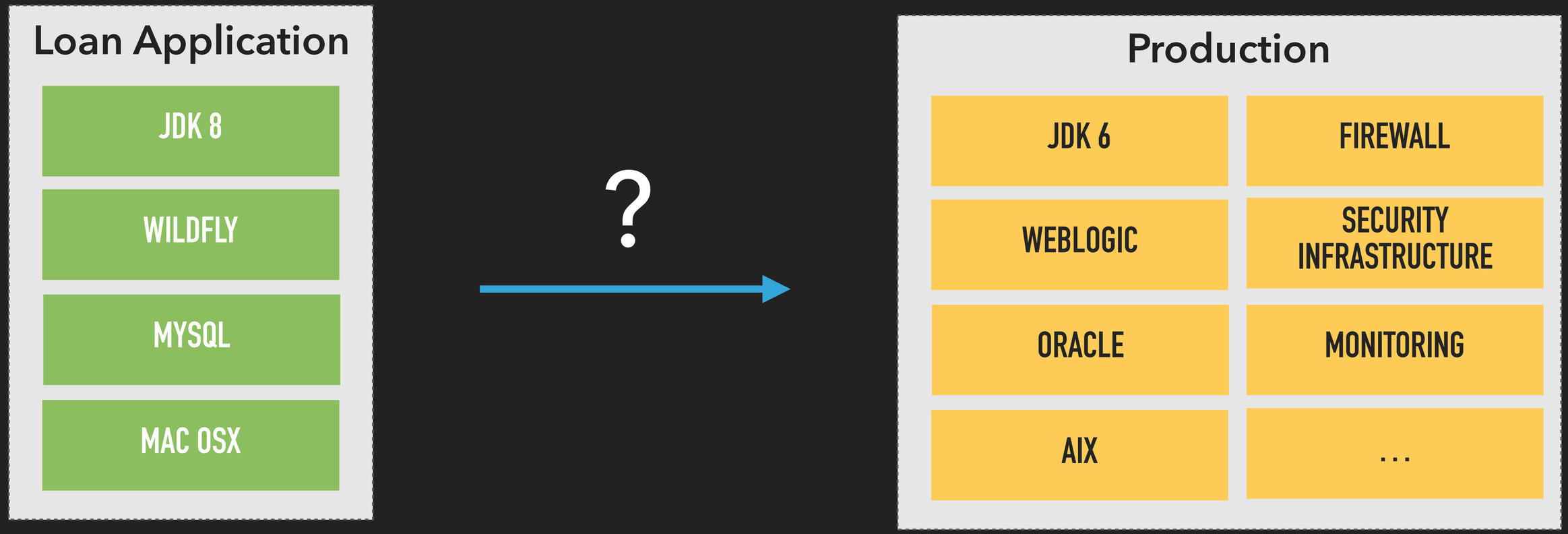


Magic Operations Guide Template

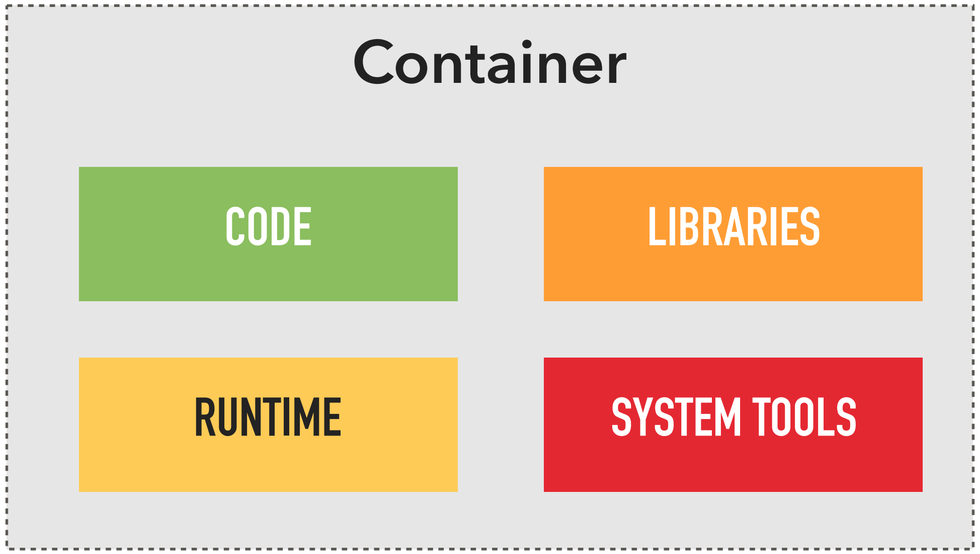

GOOD JOB
GOOD JOB
GOOD JOB

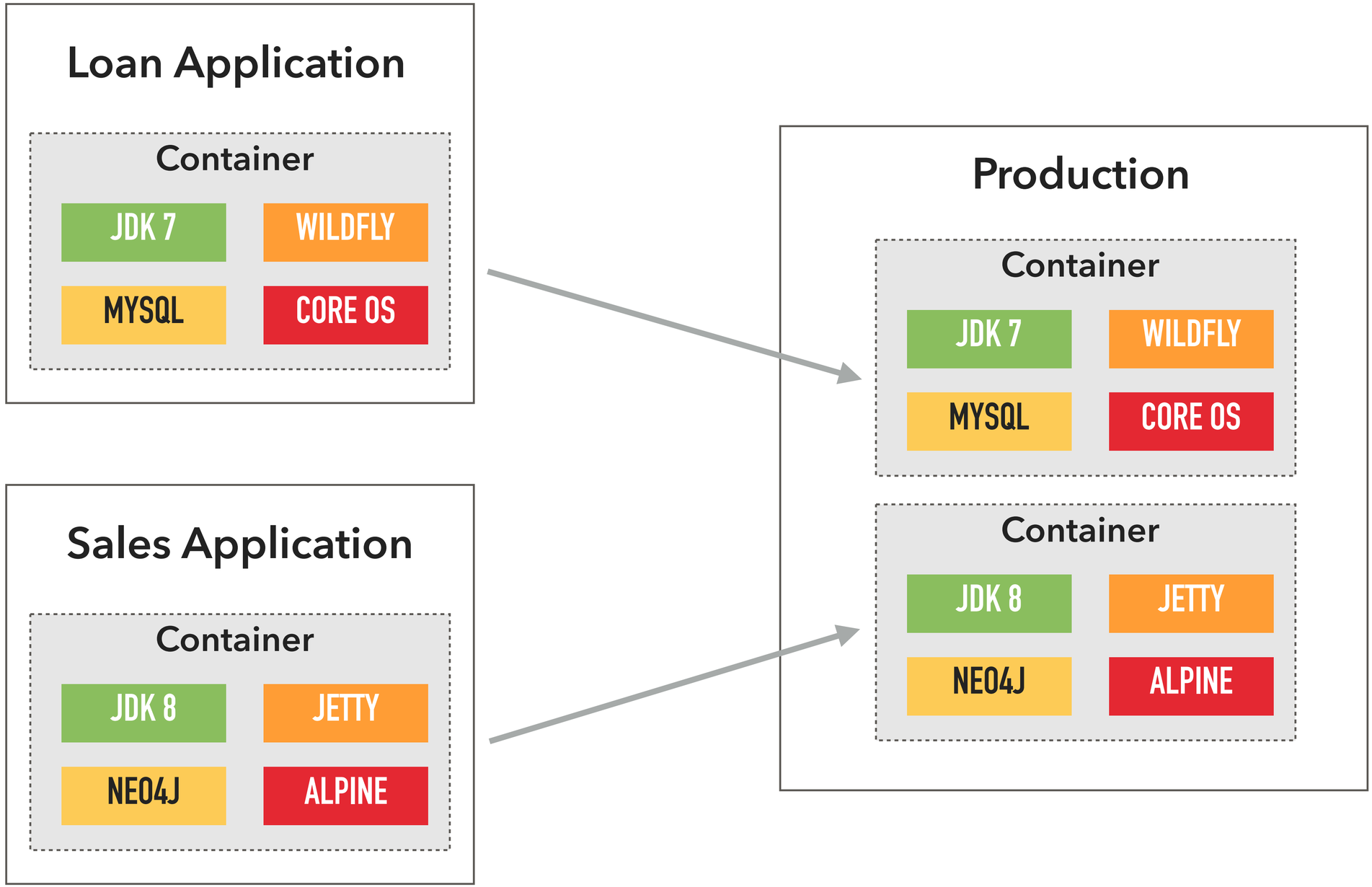
Unicorns do not exist!

CONTAINERIZED APPLICATIONS OFFER A WAY TO NARROW THE GAP

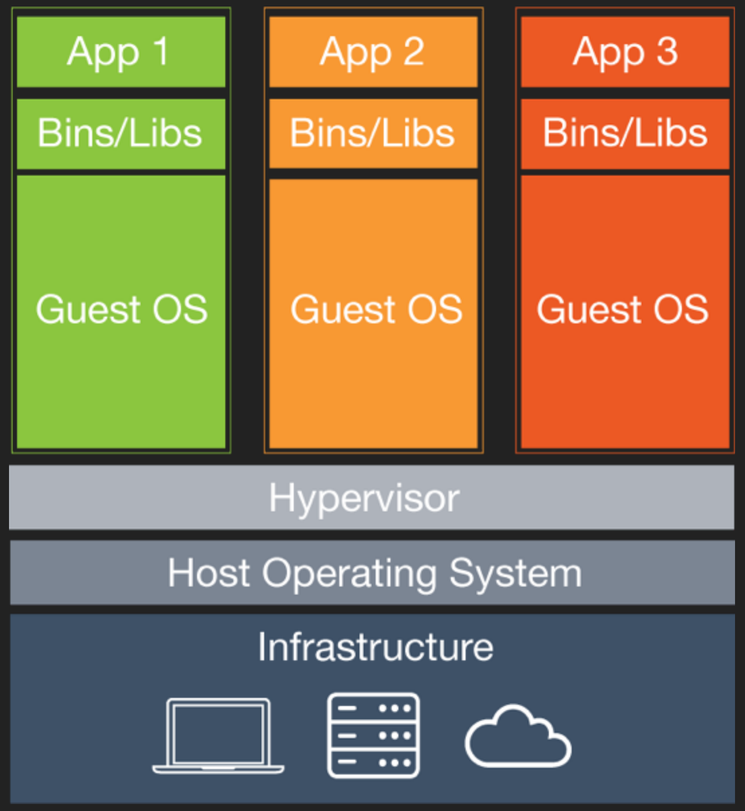
- Immutable containers reduce human errors
- Instead of “works on my machine” you deploy the machine
- Think diapers

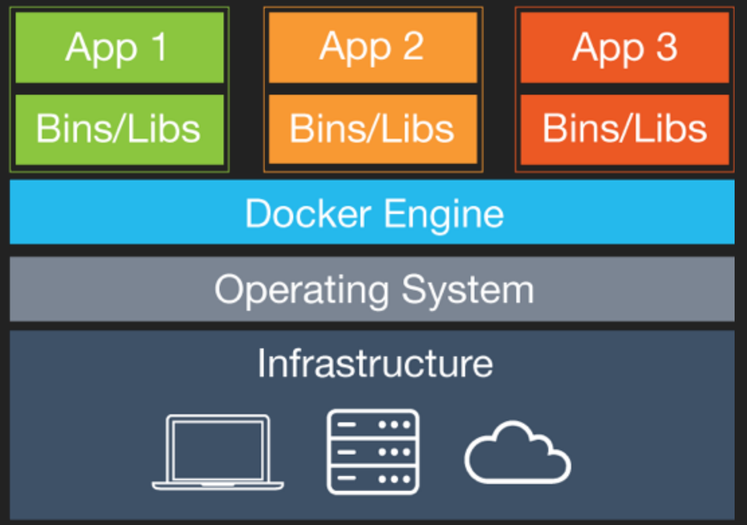
PACKAGE ONCE
DEPLOY ANYWHERE




Loan Application
Container
JDK 7
WILDFLY
MYSQL
CORE OS
Sales Application
Container
JDK 8
JETTY
NEO4J
ALPINE
Production
Container
JDK 7
WILDFLY
MYSQL
CORE OS
Container
JDK 8
JETTY
NEO4J
ALPINE

VIRTUALIZATION VS. CONTAINERS





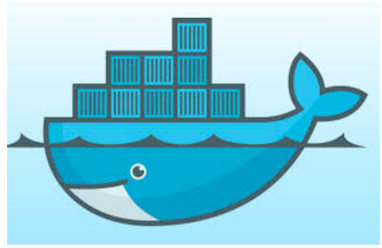
SPEED

FOOTPRINT

SIMPLICITY

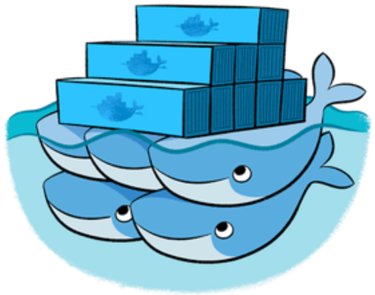
DOCKER BOOTCAMP

THE DOCKER ECOSYSTEM CONSISTS OF FIVE ESSENTIAL PARTS

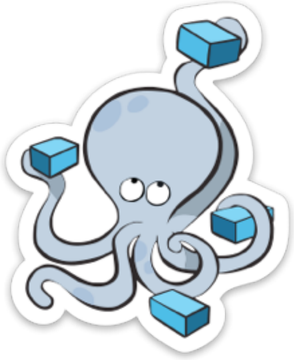


Docker

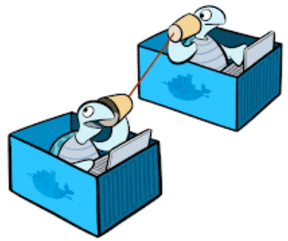
Machine



Swarm



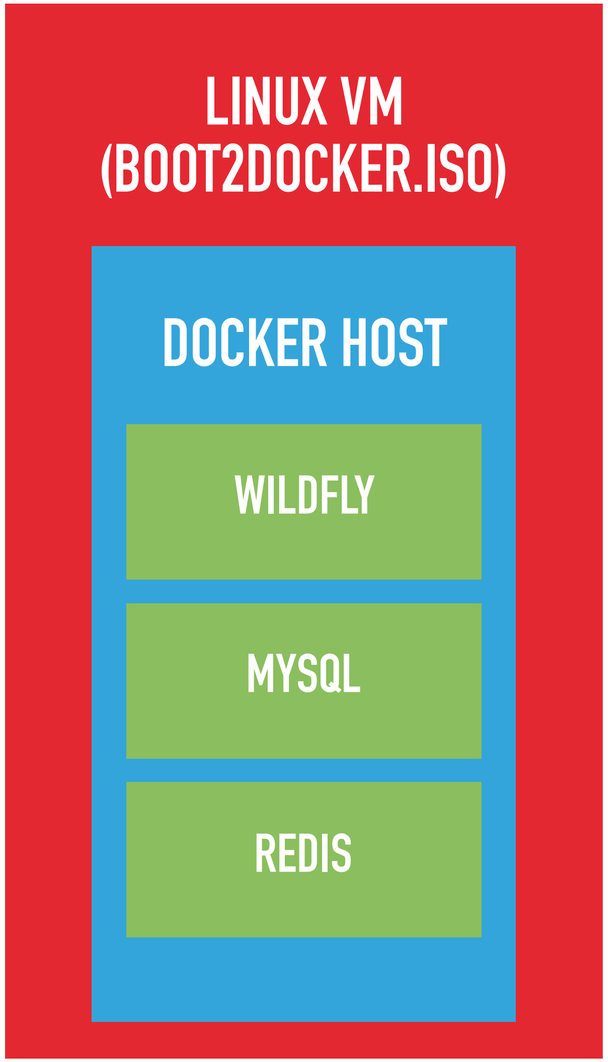
Compose



Network

DOCKER-MACHINE HELPS GETTING STARTED ON NON LINUX BOXES

```
$ docker-machine create --driver=virtualbox test
$ eval $(docker-machine env test)
```

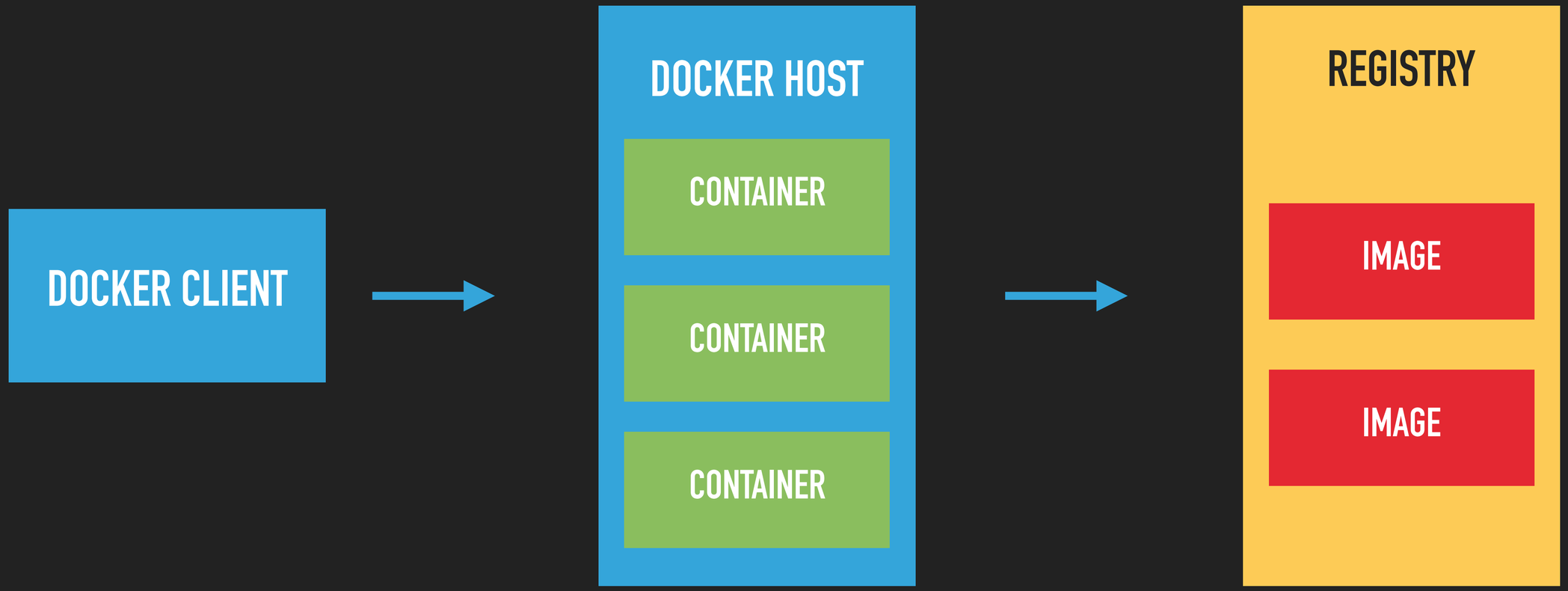


DOCKER TOOLBOX TO THE RESCUE

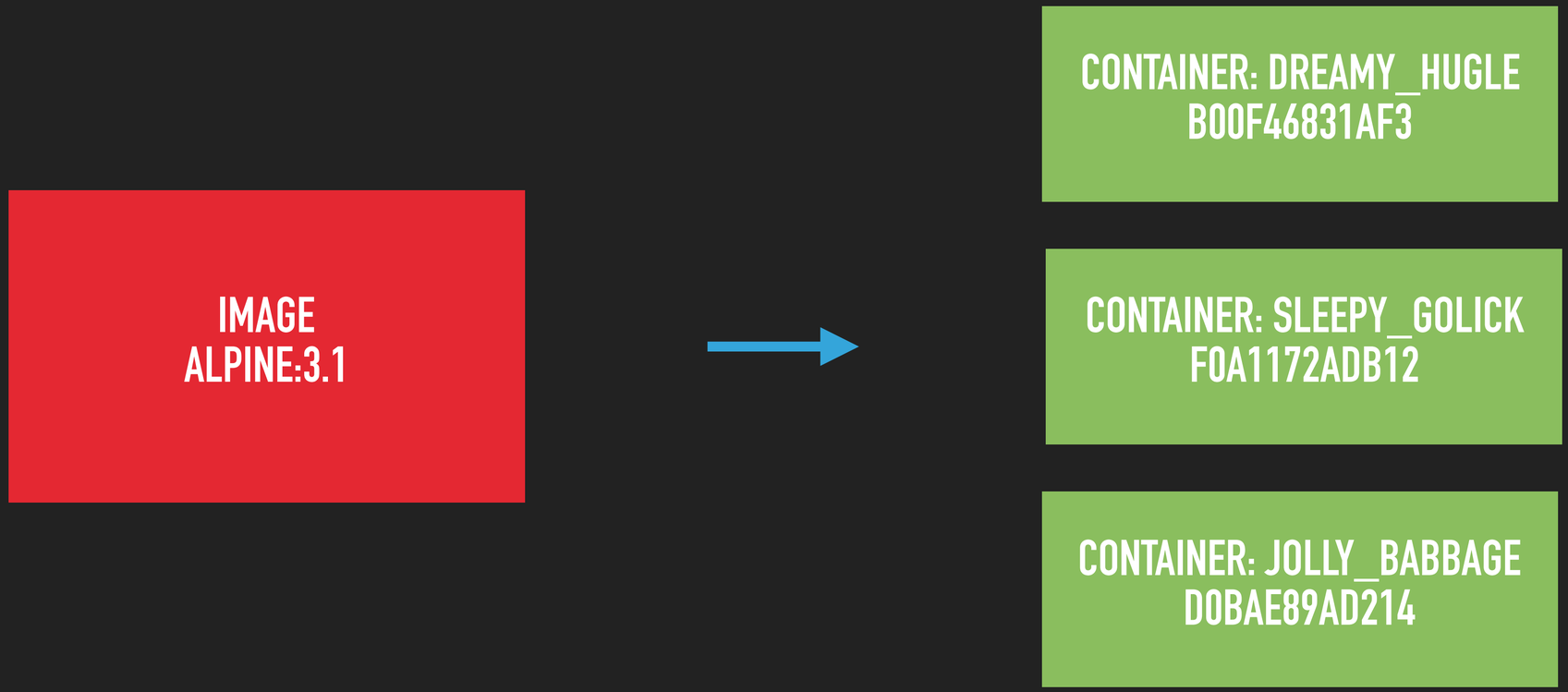
- Offers a one stop Docker setup for non-Linux machines
- Easiest way to get started on Mac and Windows
- Includes everything covered in theses slides

https://www.docker.com/docker-toolbox

DOCKER IN A NUTSHELL

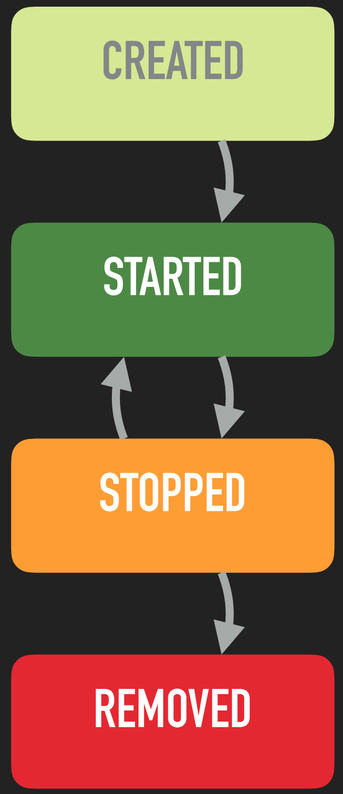


IMAGES AND CONTAINERS




```
$ docker run alpine:3.1 echo "Hello World"
Hello World
```

CONTAINER LIFECYCLE




```
$ docker run -ti --name mycontainer alpine:3.1 sh
```

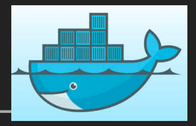
```
$ docker start mycontainer
```

```
$ docker stop mycontainer
```

```
$ docker rm  mycontainer
```

BUILDING A LOCAL TWITTER

- Bootstrap demo
- Basic container usage



EXPOSING SERVICES

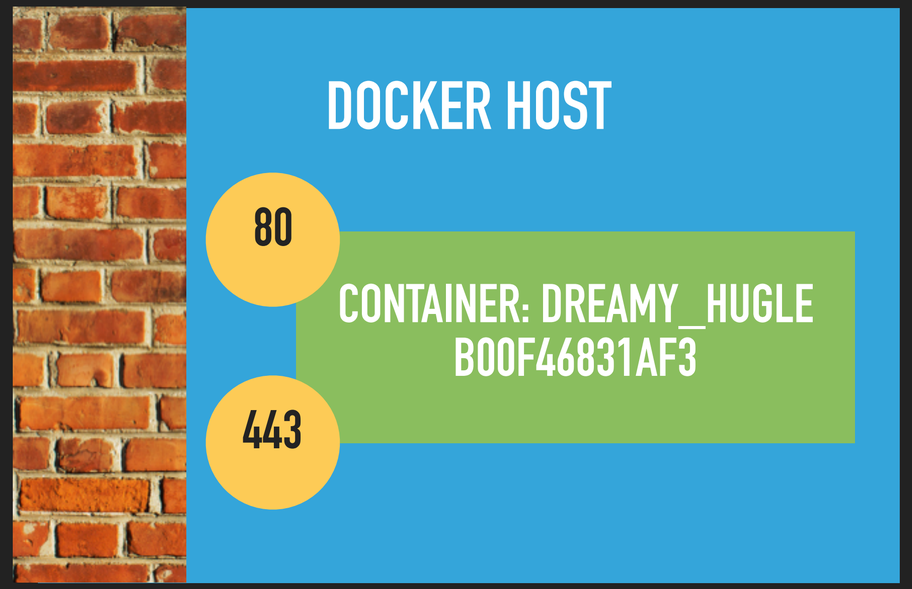
```
$ docker run -ti --rm=true nginx

$ curl http://$(docker-machine ip default)
Gateway Timeout: can't connect to remote host
```

CONTAINER PORTS ARE NOT VISIBLE OUTSIDE OF THE DOCKER HOST

```
$ docker ps
CONTAINER ID IMAGE COMMAND                  CREATED   STATUS   PORTS
b5344700e038 nginx "nginx -g 'daemon off"   ...       ...      80/tcp, 443/tcp
```

CONTAINER PORTS ARE NOT VISIBLE OUTSIDE OF THE DOCKER HOST

```
$ docker ps
CONTAINER ID IMAGE COMMAND                  CREATED   STATUS   PORTS
b5344700e038 nginx "nginx -g 'daemon off"   ...       ...      80/tcp, 443/tcp
```

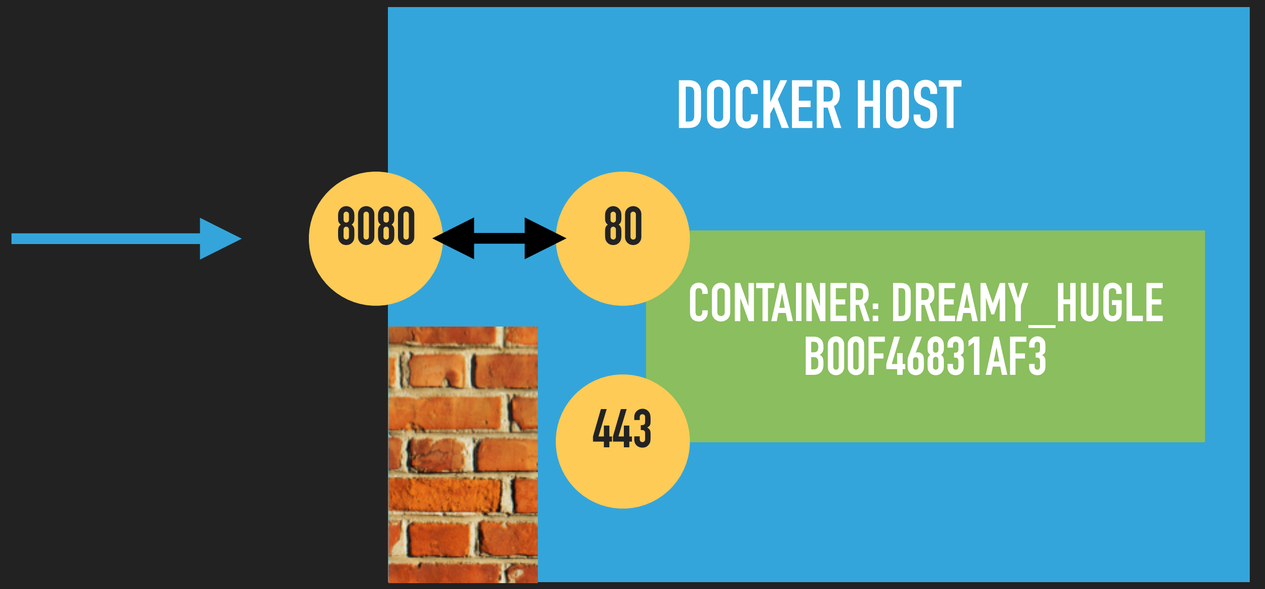


CONTAINER PORTS MUST BE MAPPED TO EXTERNALLY VISIBLE PORTS

```
$ docker run -ti --rm=true -p 8080:80 nginx
```

CONTAINER PORTS MUST BE MAPPED TO EXTERNALLY VISIBLE PORTS

```
$ docker run -ti --rm=true -p 8080:80 nginx
```

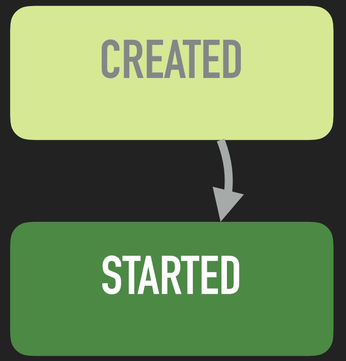


BUILDING A LOCAL TWITTER

- ~~Bootstrap demo~~
- ~~Basic container usage~~
- Running ngnix
- Exposing ports

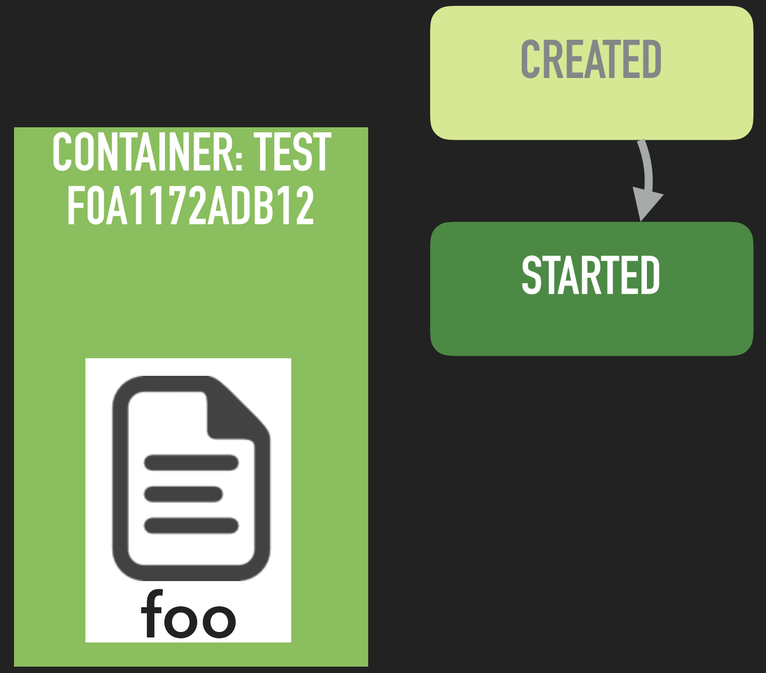
THE CONTAINER FILESYSTEM IS VERSIONED

```
$ docker run -ti  --name=test alpine:3.1 sh
```



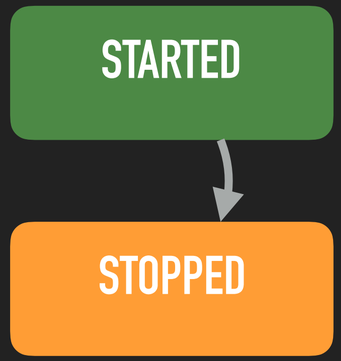
THE CONTAINER FILESYSTEM IS VERSIONED

```
/ # echo I was here > foo
/ # cat foo
I was here
```



THE CONTAINER FILESYSTEM IS VERSIONED

```
$ docker diff test
A /foo
C /root
A /root/.ash_history
```



THE CONTAINER FILESYSTEM SURVIVES RESTARTS

```
$ docker start test
$ docker attach test
```

THE CONTAINER FILESYSTEM SURVIVES RESTARTS

```
/ # cat foo
I was here
```

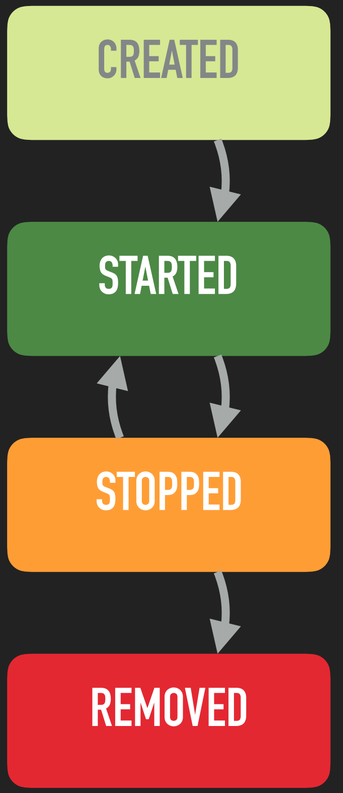
STARTED

THE CONTAINER FILESYSTEM IS VERSIONED

```
$ docker run -ti  --name=test alpine:3.1 sh
```

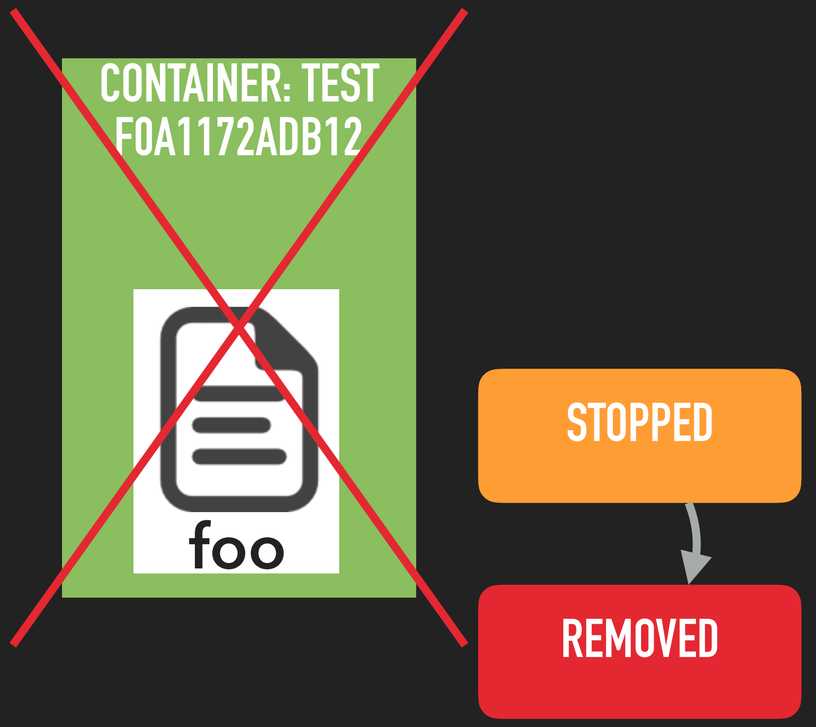
```
/ # echo I was here > foo
/ # cat foo
I was here
```

```
$ docker diff test
A /foo
C /root
A /root/.ash_history
```



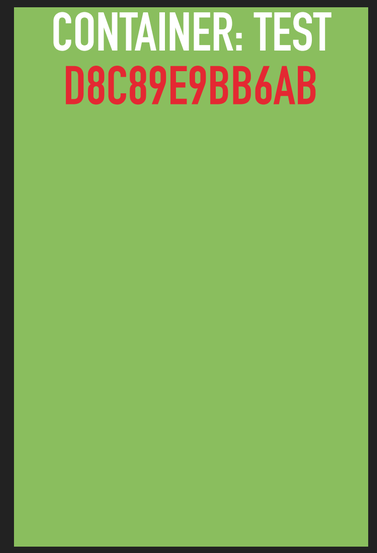
THE CONTAINER FILESYSTEM IS TRANSIENT

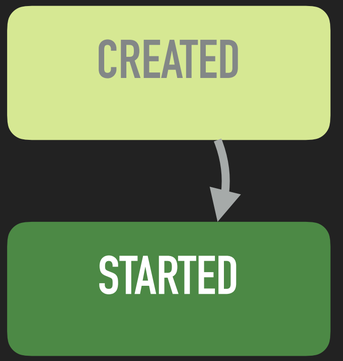
```
$ docker rm test
```



THE CONTAINER FILESYSTEM IS TRANSIENT

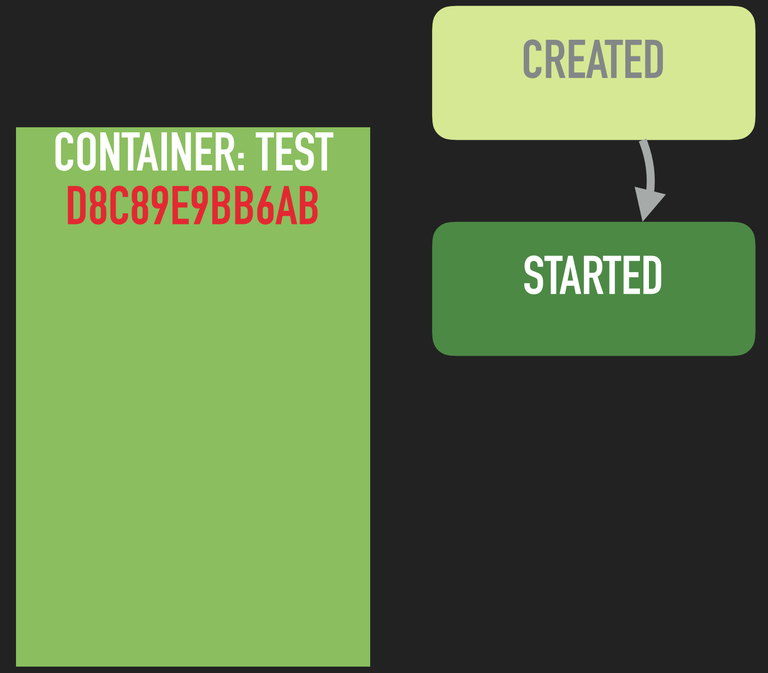
```
$ docker run -ti  --name=test alpine:3.1 sh
```





THE CONTAINER FILESYSTEM IS TRANSIENT

```
/ # cat foo
cat: can't open 'foo': No such file or directory
```



THE CONTAINER FILESYSTEM IS SEPARATED FROM THE HOST ENVIRONMENT

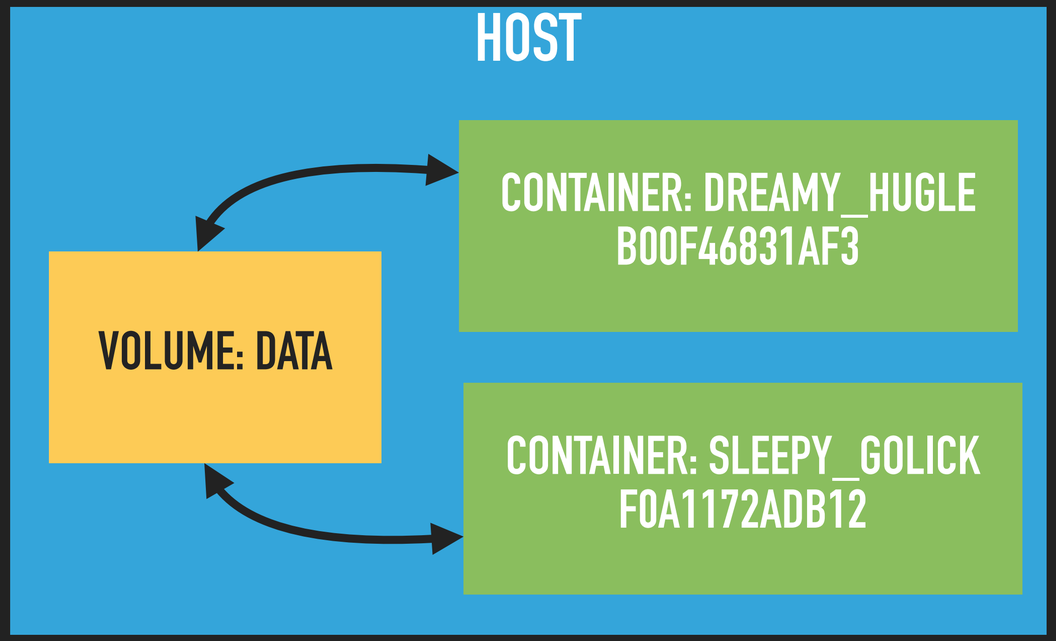
HOST

```
$ ls /usr/
X11
X11R6
bin
include
lib
libexec
local
sbin
share
standalone
```

CONTAINER: DREAMY_HUGLE
B00F46831AF3

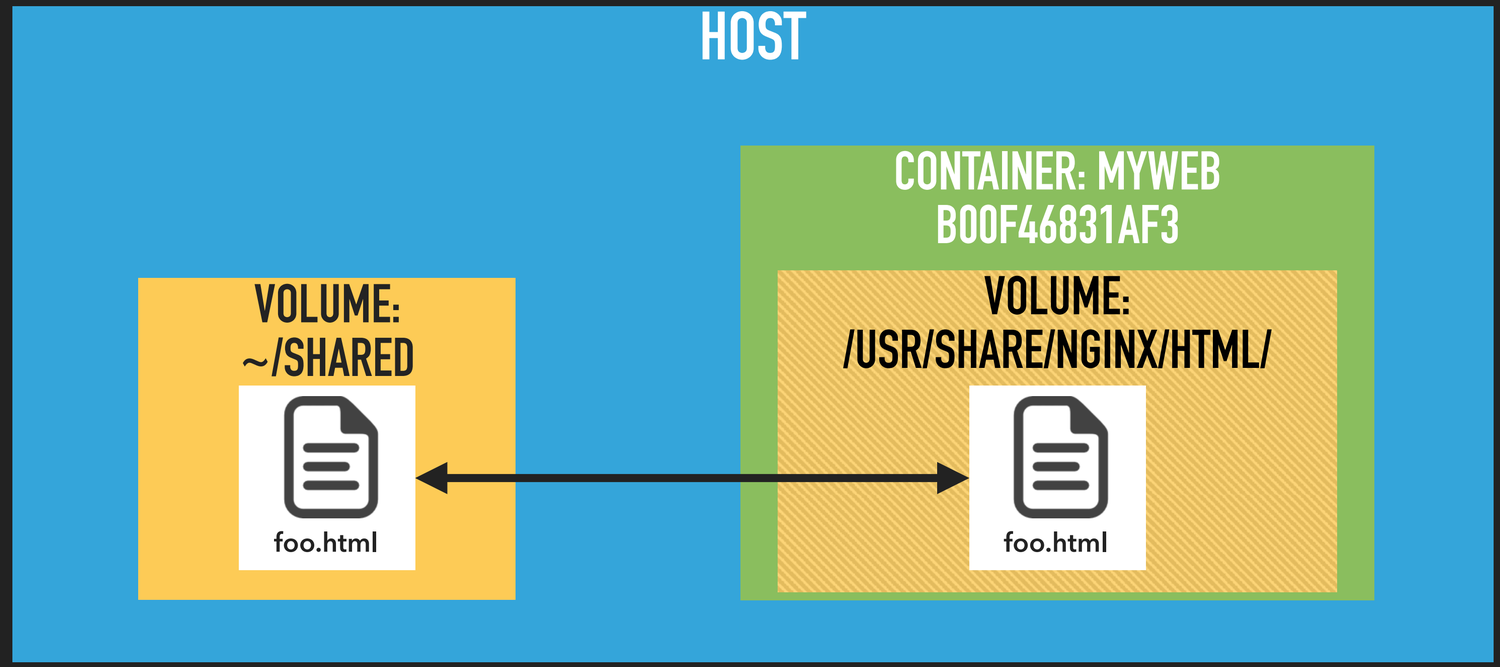
```
/ # ls /usr/
bin
lib
local
sbin
share
```

PERSISTENT VOLUMES ARE USED TO SHARE DATA BETWEEN HOST AND CONTAINER



PERSISTENT VOLUMES ARE USED TO SHARE DATA BETWEEN HOST AND CONTAINER

```
$ mkdir ~/shared/
$ docker run --name=myweb  --rm=true -p 8080:80 \
      -v ~/shared/:/usr/share/nginx/html/ nginx
$ echo Hello World > ~/shared/foo.html
```



BUILDING A LOCAL TWITTER

- ~~Bootstrap demo~~
- ~~Basic container usage~~
- ~~Running ngnix~~
- ~~Exposing ports~~
- Sharing volumes and data
- Monitoring

THE DOCKERFILE IS THE RECIPE FOR AN IMAGE

```
$ docker build -t koenighotze/jdk8 .
```

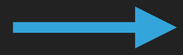
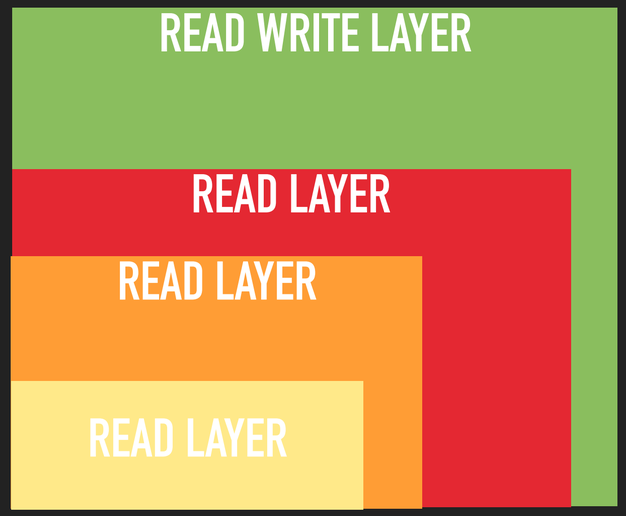


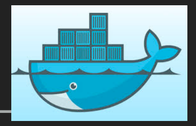
IMAGE
KOENIGHOTZE/JDK8

Dockerfile

```
FROM gliderlabs/alpine:3.3
MAINTAINER David Schmitz <koenighotze@yahoo.com>

ENV REFRESHED_AT 2015-12-27

ENV LANG en_US.UTF-8
ENV LANGUAGE en_US:en
ENV LC_ALL en_US.UTF-8

RUN apk-install bash \
                ca-certificates \
                openjdk8

COPY prompt.sh /etc/profile.d/

ENV JAVA_HOME /usr/lib/jvm/default-jvm

ENV SRC_VOLUME /volumes/share
VOLUME [$SRC_VOLUME]

CMD ["bash", "-l"]
```



OVERVIEW: DOCKER AND THE DOCKER ECOSYSTEM



```
FROM gliderlabs/alpine:3.3
MAINTAINER David Schmitz <koenighotze@yahoo.com>

ENV REFRESHED_AT 2015-12-27

ENV LANG en_US.UTF-8
ENV LANGUAGE en_US:en
ENV LC_ALL en_US.UTF-8

RUN apk-install bash \
                ca-certificates \
                openjdk8

COPY prompt.sh /etc/profile.d/

ENV JAVA_HOME /usr/lib/jvm/default-jvm

ENV SRC_VOLUME /volumes/share
VOLUME [$SRC_VOLUME]

CMD ["bash", "-l"]
```

IMAGES ARE LAYERED; EACH LAYER IS CACHED OR FETCHED INDIVIDUALLY

```
$ docker history koenighotze/jdk8

IMAGE          CREATED          CREATED BY                                      SIZE
790ba5309f26   12 minutes ago   /bin/sh -c #(nop) CMD ["bash" "-l"]             0 B
82f472fb0916   12 minutes ago   /bin/sh -c #(nop) VOLUME [[/volumes/share]]     0 B
ec3034064c9e   12 minutes ago   /bin/sh -c #(nop) ENV SRC_VOLUME=/volumes/sha   0 B
0b53191f161a   12 minutes ago   /bin/sh -c #(nop) ENV JAVA_HOME=/usr/lib/jvm/   0 B
cf5edd73df14   12 minutes ago   /bin/sh -c #(nop) COPY file:7a1d0aabc19cb9513   116 B
f9648e9584d7   12 days ago      /bin/sh -c apk-install bash  c                  142.9 MB
aaf60f9e582d   2 weeks ago      /bin/sh -c #(nop) ENV LC_ALL=en_US.UTF-8        0 B
95f75268c863   2 weeks ago      /bin/sh -c #(nop) ENV LANGUAGE=en_US:en         0 B
bb224f27eb36   2 weeks ago      /bin/sh -c #(nop) ENV LANG=en_US.UTF-8          0 B
ba17a33dd7dd   2 weeks ago      /bin/sh -c #(nop) ENV REFRESHED_AT=2015-12-27   0 B
f79be35aabda   2 weeks ago      /bin/sh -c #(nop) MAINTAINER David Schmitz <k   0 B
24e7cde1dbe9   3 weeks ago      /bin/sh -c #(nop) ADD file:78d479146973ebc076   4.794 MB
```

KOENIGHOTZE/JDK8

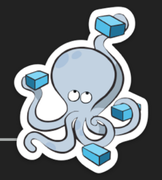
- CMD ["BASH", "-L"]
- VOLUME [$SRC_VOLUME]
- ...
- MAINTAINER DAVID SCHMITZ
- FROM GLIDERLABS/ALPINE:3.3

BUILDING SECURE DOCKER IMAGES

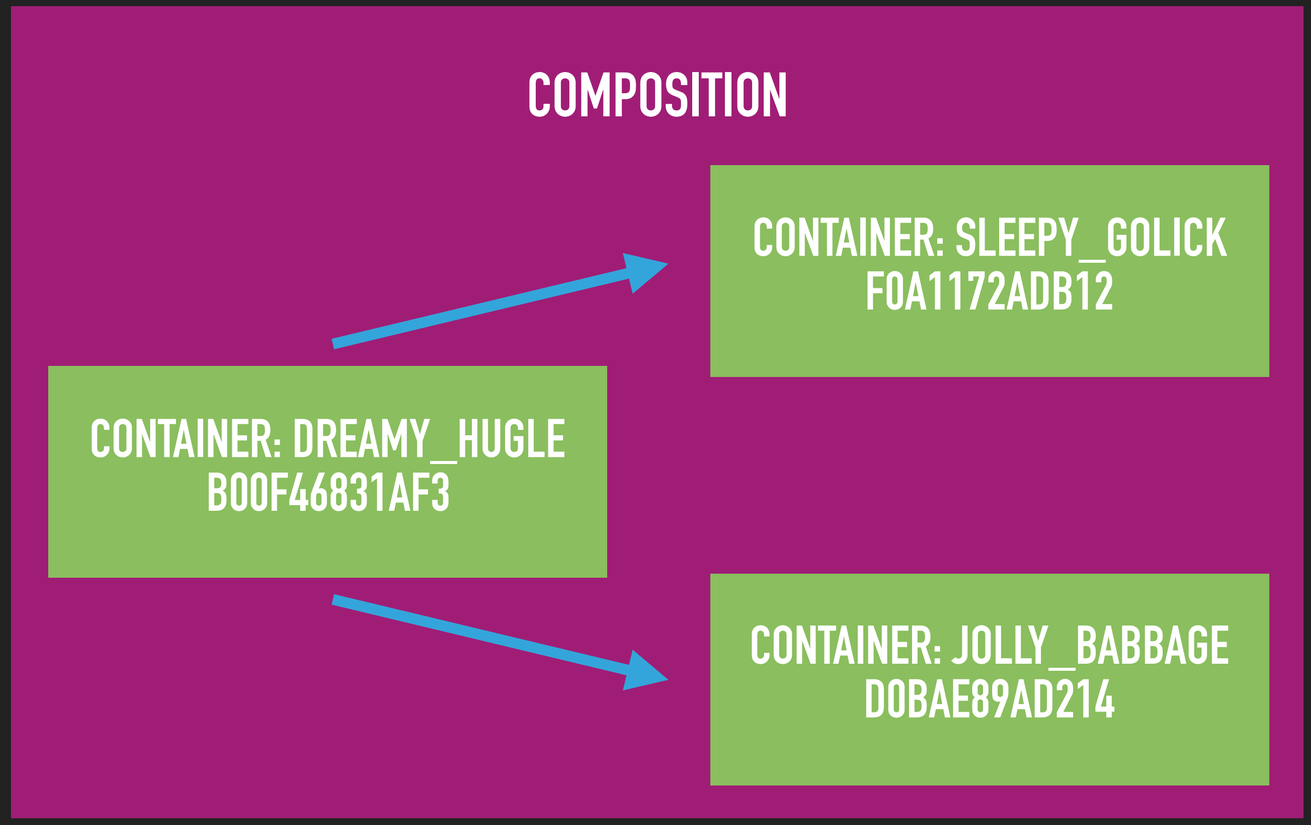
SIDENOTE

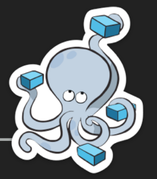
! TO DO !

COMPLEX SCENARIOS USING COMPOSE



MANAGING DEPENDENCIES WITH DOCKER-COMPOSE

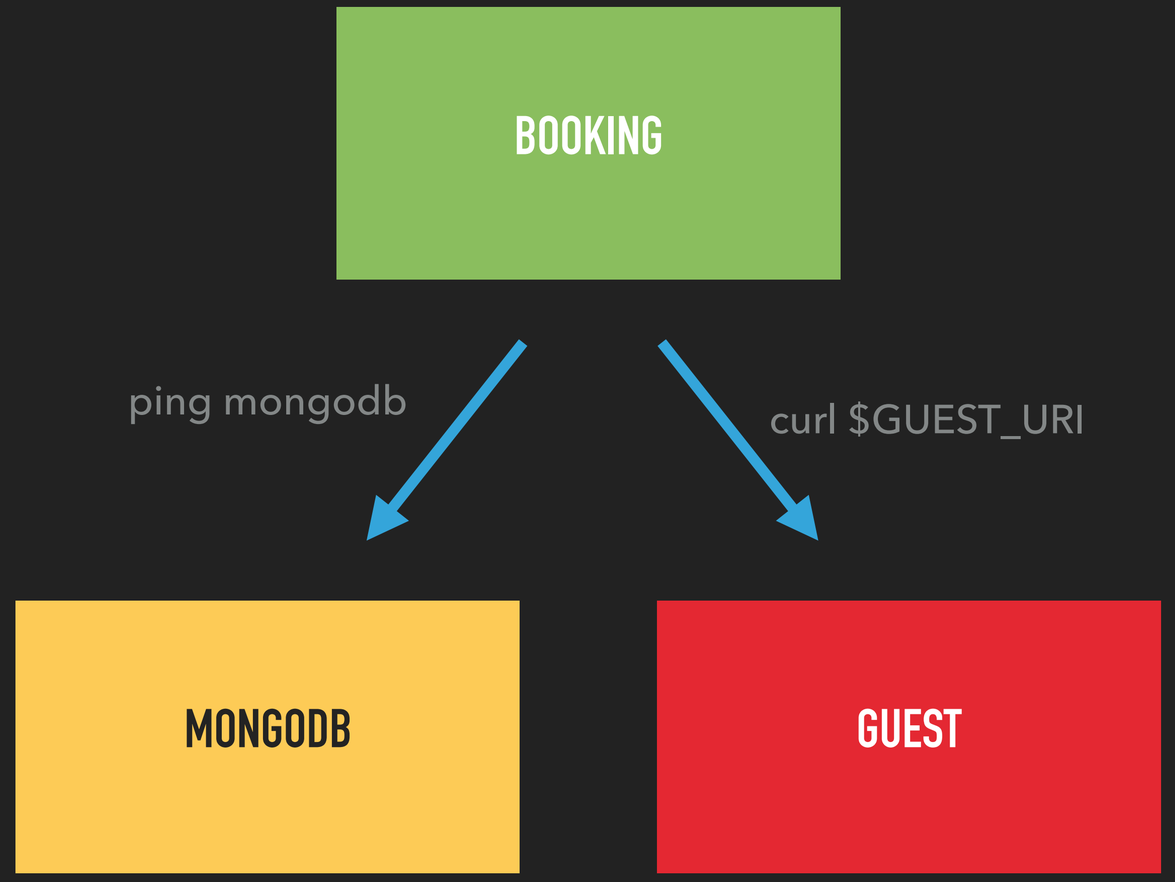




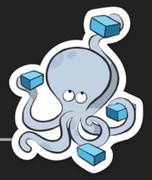
USING DOCKER-COMPOSE FOR DEPENDENCIES*

```
booking:
  image: koenighotze/jee7hotelbooking
  ports:
    - 8080:
    - 9990:
  links:
    - mongo
    - guest
  environme
    - MONGO
    - GUEST_
guest:
  image: koenighotze/jee7hotelguest
  ports:
    - 8081:8080
  expose:
    - 8080
mongodb:
  container_name: jee7hotelmongo
  image: mongo:3.1.9
  expose:
    - "27017"
```

ANPASSEN



*Note: Compose V1 Syntax



DOCKER SINGLE HOST NETWORKING USING LINKS

```
movie:
  image: demo/movie
  ports:
    - 8082:8080
  links:
    - actor
actor:
  image: demo/a
  ports:
    - 8081:8080
  links:
    - movie
cinema:
  image: demo/cinema
  ports:
    - 8080:8080
  links:
    - movie
```

ANPASSEN

MOVIE CONTAINER

MOVIE.WAR

```
newClient();
 = client.target(new URI("http://actor:8080/actor"));
nse = target.request(APPLICATION_JSON)
                .get(JsonObject.class);
```

ACTOR CONTAINER

ACTOR.WAR

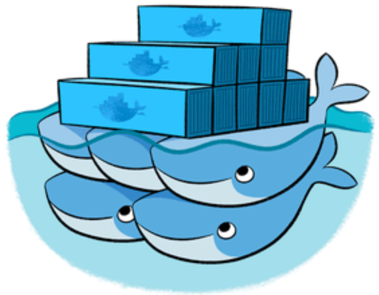
```
@Named
@Path("actor")
@Transactional
public class ActorService {
```

CREATING A SIMPLE COMPOSITION

- Create simple web application
- Add database as container
- Create compositions file
- Add volumes

WHAT IS NEXT?

- CoreOs and rkt
- Docker Swarm and Kubernetes
- Unikernels (!)



SUMMARY

- Docker is production ready
- Docker-Compose is targeted towards developers and should ***not*** be used for production
- Might have some issues with regards to networking and clustering
- Multi-Cloud deployments possible
- Community is vital and eager to help

TRY ONE OF THESE GREAT VAULTS OF WISDOM

- Docker Home Page: https://www.docker.com/
- Docker Cheat Sheet: https://github.com/wsargent/docker-cheat-sheet
- James Turnbull, Dockerbook: http//www.dockerbook.com/

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THANK YOU!

<>

BACKUP

Loan Application