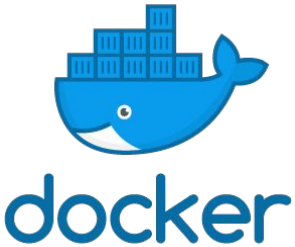


# Docker

Diego Pacheco

# About Me

- Cat's Father
- Principal Software Architect
- Agile Coach
- SOA/Microservices Expert
- DevOps Practitioner
- Speaker
- Author

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# Virtual Machines & Virtualization

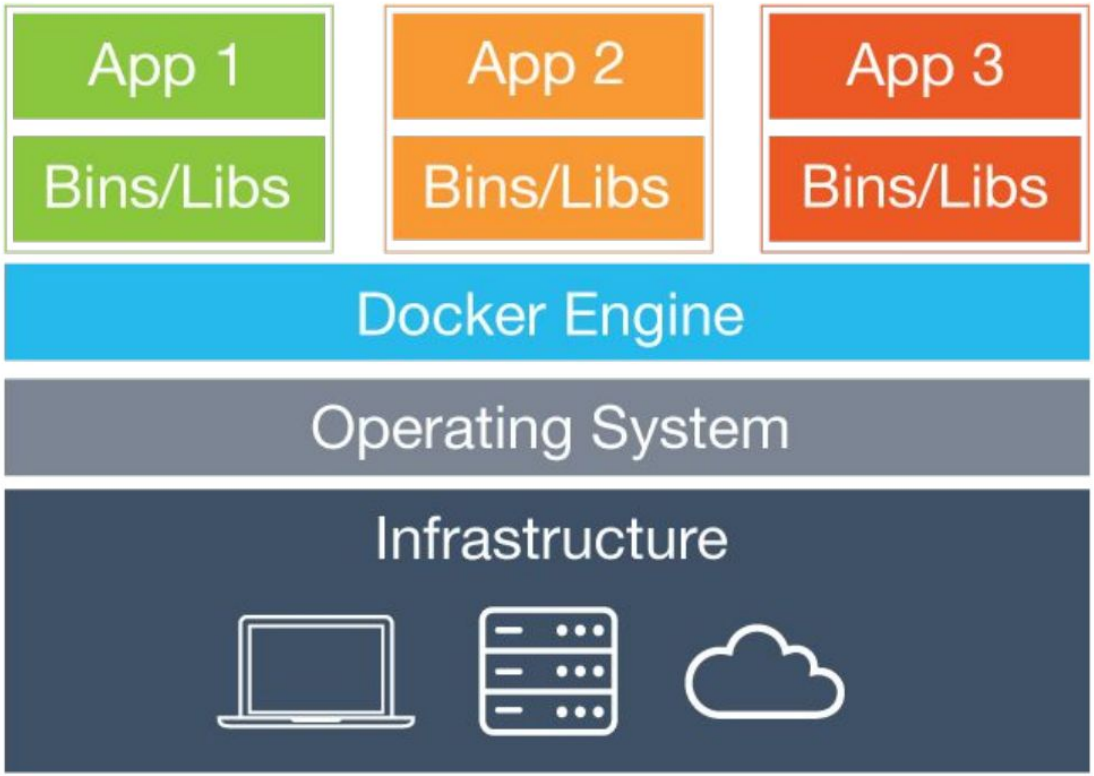

- Great Isolation
- Awesome for tests
- Easy to use
- You have to install the OS on the BOX
- But there are issues:
  - Very, very Slow ….
  - Too Large(lots of disk space)

https://www.virtualbox.org/

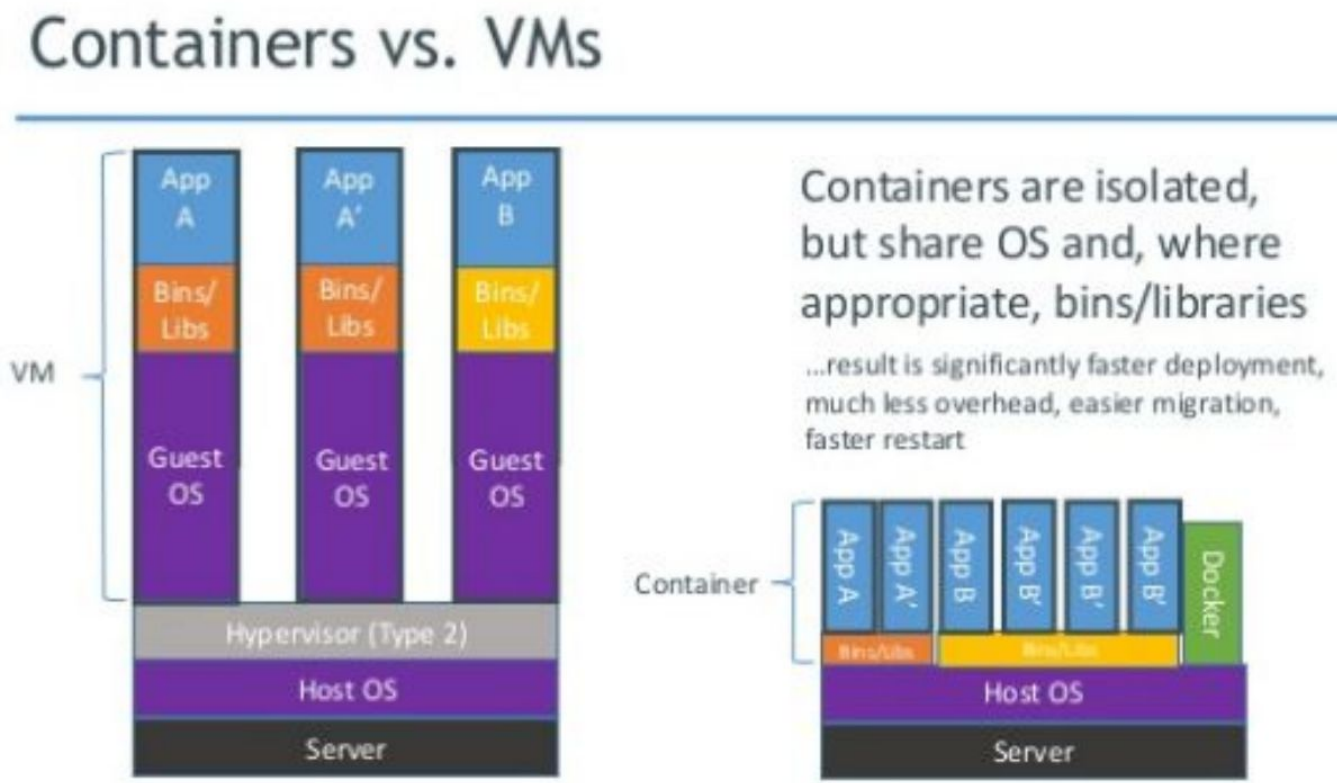
# Docker

- Containers
- Level of Abstraction
- Easy to Deploy
- Isolation
- "Same" as production * -- terms apply
- Portability
- It's not a free lunch - you need a cluster / RM
- Ephemeral / Stateless nature
- There are issues…
  - Networking is tricky
  - Overhead

# Docker


App 1
Bins/Libs
App 2
Bins/Libs
App 3
Bins/Libs
Docker Engine
Operating System
Infrastructure

# Containers VS VMs



# Getting Started

docker run --name redis redis **or** docker run redis

```
diego@4winds:~/bin/wildfly-10.1.0.Final$ docker run redis
1:C 17 May 21:20:19.105 # Warning: no config file specified, using the default config. In order to specify a config file use redis-server /pa
                _._
           _.-``__ ''-._
      _.-``    `.  `_.  ''-._           Redis 3.2.8 (00000000/0) 64 bit
  .-`` .-```.  ```\/    _.,_ ''-._
 (    '      ,       .-`  | `,    )     Running in standalone mode
 |`-._`-...-` __...-.``-._|'` _.-'|     Port: 6379
 |    `-._   `._    /     _.-'    |     PID: 1
  `-._    `-._  `-./  _.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |           http://redis.io
  `-._    `-._`-.__.-'_.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |
  `-._    `-._`-.__.-'_.-'    _.-'
      `-._    `-.__.-'    _.-'
          `-._        _.-'
              `-.__.-'

1:M 17 May 21:20:19.119 # WARNING: The TCP backlog setting of 511 cannot be enforced because /proc/sys/net/core/somaxconn is set to the lowe
1:M 17 May 21:20:19.119 # Server started, Redis version 3.2.8
1:M 17 May 21:20:19.119 # WARNING overcommit_memory is set to 0! Background save may fail under low memory condition. To fix this issue add
1:M 17 May 21:20:19.119 # WARNING you have Transparent Huge Pages (THP) support enabled in your kernel. This will create latency and memory
1:M 17 May 21:20:19.119 * The server is now ready to accept connections on port 6379
```

# Useful commands

docker ps

```
diego@4winds:~$ docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS               NAMES
3d15352ee2c3        redis               "docker-entrypoint..."   About a minute ago   Up About a minute   6379/tcp            nifty_hopper
diego@4winds:~$
```

docker stop $ID_or_NAME && docker rm $ID_or_NAME

```
diego@4winds:~$ docker stop 3d15352ee2c3
3d15352ee2c3

diego@4winds:~$ docker rm 3d15352ee2c3
3d15352ee2c3
```

# Useful commands

docker images

```
diego@4winds:~$ docker images
REPOSITORY                                    TAG                 IMAGE ID            CREATED             SIZE
diegopacheco/hello                            0.0.1               59f5644032b1        6 days ago          12.6MB
tarantool/tarantool                           1.7                 c881f655afc2        7 days ago          155MB
diegopacheco/dynomitedocker                   latest              eed9bb599ce4        12 days ago         1.22GB
<none>                                        <none>              e31e775a54ea        13 days ago         1.2GB
<none>                                        <none>              14a9e096a4b8        13 days ago         1.2GB
diegopacheco/dynomite-docker                  latest              dc3fb248531f        13 days ago         1.2GB
<none>                                        <none>              8925b0ea410c        13 days ago         902MB
diegopacheco/dynomite-v0.5.9-2_proxyclosefix  latest              776e6fe97528        2 weeks ago         997MB
diegopacheco/dynomite-v0.5.7-14               latest              a2e8118e8549        4 weeks ago         995MB
iron/functions                                latest              fe8b22f9a278        5 weeks ago         124MB
<none>                                        <none>              108de8c004e8        6 weeks ago         995MB
diegopacheco/dynomite                         latest              8e599f9beb9c        6 weeks ago         993MB
jenkins                                       latest              04c1dd56a3d8        6 weeks ago         713MB
redis                                         latest              83d6014ac5c8        8 weeks ago         184MB
memcached                                     latest              a5cffa71b5af        8 weeks ago         83.7MB
buoyantio/linkerd                             0.9.1               e6804cd22c60        2 months ago        392MB
ubuntu                                        latest              0ef2e08ed3fa        2 months ago        130MB
iron/go                                       dev                 3d25645a73f8        2 months ago        857MB
iron/functions-ui                             latest              76ca2d326019        3 months ago        308MB
minio/minio                                   latest              afc48fe78745        3 months ago        280MB
java                                          8-jdk               d23bdf5b1b1b        4 months ago        643MB
hello-world                                   latest              48b5124b2768        4 months ago        1.84kB
portainer/portainer                           latest              0f6293c0231a        4 months ago        9.14MB
openzipkin/zipkin                             latest              682a745dfc2a        4 months ago        188MB
gcr.io/tensorflow/tensorflow                  latest              e3f7f02f1c66        4 months ago        981MB
gcr.io/tensorflow/tensorflow                  latest-gpu          ede52c2645b2        4 months ago        2.62GB
diego/kafka                                   latest              68076fd4f444        4 months ago        390MB
nvidia/cuda                                   latest              d189f42bc63e        5 months ago        1.62GB
postgres                                      latest              0e24dd8079dc        5 months ago        265MB
mysql/mysql-server                            latest              25e3e626a6c0        5 months ago        318MB
node                                          0.12                0bf1dd8a8f69        5 months ago        640MB
```

# SSH

```
diego@4winds:~$ docker exec -i -t 454d71cf659d bash
root@454d71cf659d:/data# exit

diego@4winds:~$ docker exec -i -t redis bash
root@454d71cf659d:/data#
```

```
root@454d71cf659d:/data# redis-cli
127.0.0.1:6379>
```

# Volumes

- Slow
- But you can "save" data.
- Requires mapping.
- Sample:

```
docker run --network=host --name jenkins -p 8282:8080 -p
50000:50000 -v /var/jenkins/ jenkins
```

Jenkins

# Dockerfile

```
#
# Oracle Java 8 Dockerfile
#
#

# Pull base image.
FROM ubuntu

# Install java
RUN echo "deb http://ppa.launchpad.net/webupd8team/java/ubuntu trusty main"\
    > /etc/apt/sources.list.d/webupd8team-java.list \
    && echo "deb-src http://ppa.launchpad.net/webupd8team/java/ubuntu trusty main"\
    >> /etc/apt/sources.list.d/webupd8team-java.list \
    && apt-key adv --keyserver keyserver.ubuntu.com --recv-keys EEA14886 \
    && apt-get update -y \
    && echo oracle-java8-installer shared/accepted-oracle-license-v1-1 select true | /usr/bin/debconf-set-selections \
    && apt-get install -y --no-install-recommends oracle-java8-installer=8u131-1~webupd8~2 \
    && apt-get autoremove \
    && apt-get clean \
    && rm -rf /var/lib/apt/lists/* /tmp/* /var/tmp/* /var/cache/oracle-jdk8-installer

# set environment
ENV JAVA_HOME /usr/lib/jvm/java-8-oracle

# Define default command.
CMD ["bash"]
```

# Bake

docker build -t dev/java8 .

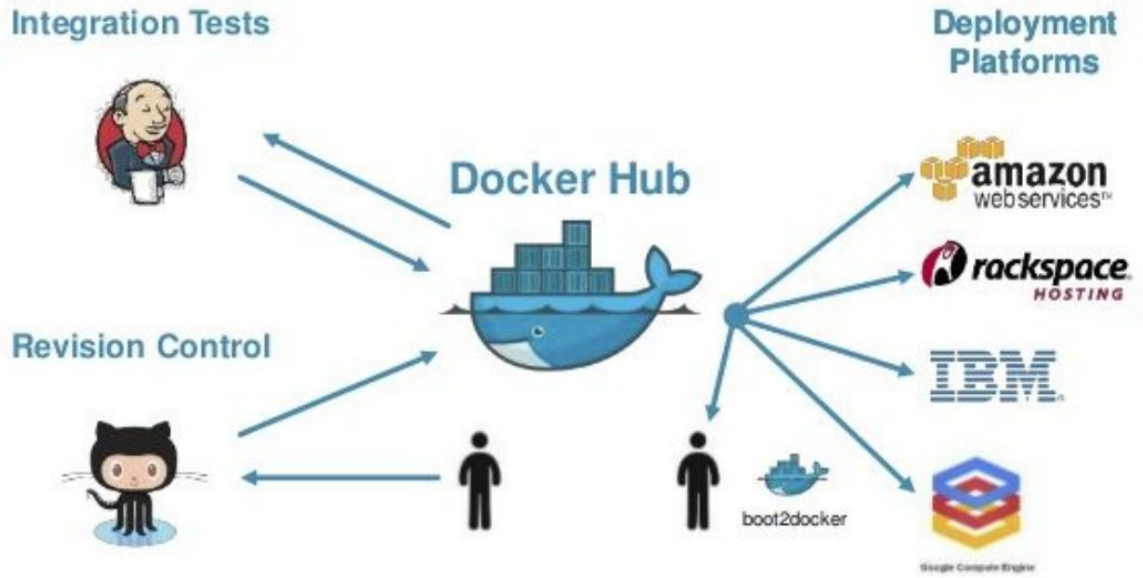
```
diego@4winds:/tmp/java-docker-file$ docker build -t dev/java8 .
Sending build context to Docker daemon   2.56kB
Step 1/4 : FROM ubuntu
 ---> 0ef2e08ed3fa
Step 2/4 : RUN echo "deb http://ppa.launchpad.net/webupd8team/java/ubuntu trusty main"    > /etc/apt/sources.list.d/webupd8t
apt-get install -y --no-install-recommends oracle-java8-installer=8u131-1~webupd8~2     && apt-get autoremove     && apt-get
 ---> Using cache
 ---> 1cbf63bf0179
Step 3/4 : ENV JAVA_HOME /usr/lib/jvm/java-8-oracle
 ---> Using cache
 ---> 6153e8b03720
Step 4/4 : CMD bash
 ---> Using cache
 ---> da4cfc9fbde3
Successfully built da4cfc9fbde3
Successfully tagged dev/java8:latest
```

# Testing

docker run -it --rm dev/java8

```
diego@4winds:/tmp/java-docker-file$ docker run -it --rm dev/java8
root@4f416e799f6b:/# java -version
java version "1.8.0_131"
Java(TM) SE Runtime Environment (build 1.8.0_131-b11)
Java HotSpot(TM) 64-Bit Server VM (build 25.131-b11, mixed mode)
root@4f416e799f6b:/#
```

# Docker Hub




https://hub.docker.com/

# Docker Compose

- Compose multiple docker containers
- You can link containers to each other
- Great for development of distributed apps
- Easy to use
- Requires to install: docker-compose
  - `pip install docker-compose`
  - `pip install --upgrade docker-py`

# Sample

```
diego@4winds:/tmp/composetest$ tree -L 1
.
├── app.py
├── docker-compose.yml
├── Dockerfile
└── requirements.txt

0 directories, 4 files
```

Dockerfile

```
FROM python:3.4-alpine
ADD . /code
WORKDIR /code
RUN pip install -r requirements.txt
CMD ["python", "app.py"]
```

```
from flask import Flask
from redis import Redis

app = Flask(__name__)
redis = Redis(host='redis', port=6379)

@app.route('/')
def hello():
    count = redis.incr('hits')
    return 'Hello World! I have been seen {} times.\n'.format(count)

if __name__ == "__main__":
    app.run(host="0.0.0.0", debug=True)
```

requirements.txt

```
flask
redis
```

# Sample

docker-compose.yml

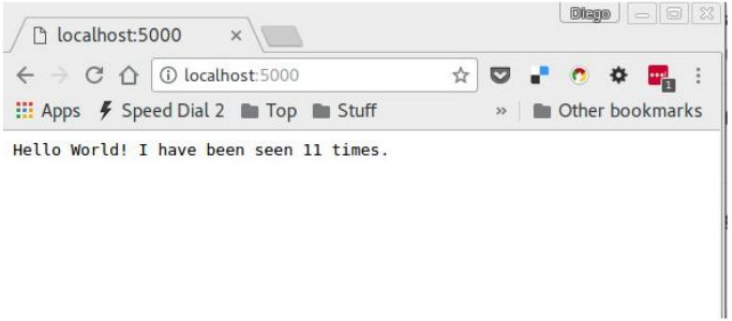
```yaml
version: '2'
services:
  web:
    build: .
    ports:
     - "5000:5000"
    volumes:
     - .:/code
  redis:
    image: "redis:alpine"

```

# Sample

docker-compose up

```
diego@4winds:/tmp/composetest$ docker-compose up
Creating network "composetest_default" with the default driver
Building web
Step 1/5 : FROM python:3.4-alpine
3.4-alpine: Pulling from library/python
79650cf9cc01: Pull complete
581a2604819e: Pull complete
cbecf1ae8c88: Pull complete
61e46b909d80: Pull complete
bb7832cbe509: Pull complete
Digest: sha256:18dc69c99d5341142b93d7c961dd384c7ab2815106352bb2d9c0594df4d0a8d2
Status: Downloaded newer image for python:3.4-alpine
 ---> 8214d6de194b
Step 2/5 : ADD . /code
 ---> aa8653c58a35
Removing intermediate container 3d02b52d6459
Step 3/5 : WORKDIR /code
 ---> 892d4940c9f5
Removing intermediate container 91d2f9be1062
Step 4/5 : RUN pip install -r requirements.txt
 ---> Running in 21759a6a8471
Collecting flask (from -r requirements.txt (line 1))
  Downloading Flask-0.12.2-py2.py3-none-any.whl (83kB)
Collecting redis (from -r requirements.txt (line 2))
  Downloading redis-2.10.5-py2.py3-none-any.whl (60kB)
Collecting Werkzeug>=0.7 (from flask->-r requirements.txt (line 1))
  Downloading Werkzeug-0.12.2-py2.py3-none-any.whl (312kB)
Collecting itsdangerous>=0.21 (from flask->-r requirements.txt (line 1))
  Downloading itsdangerous-0.24.tar.gz (46kB)
Collecting click>=2.0 (from flask->-r requirements.txt (line 1))
  Downloading click-6.7-py2.py3-none-any.whl (71kB)
Collecting Jinja2>=2.4 (from flask->-r requirements.txt (line 1))
  Downloading Jinja2-2.9.6-py2.py3-none-any.whl (340kB)
Collecting MarkupSafe>=0.23 (from Jinja2>=2.4->flask->-r requirements.txt (line 1))
  Downloading MarkupSafe-1.0.tar.gz
Building wheels for collected packages: itsdangerous, MarkupSafe
```

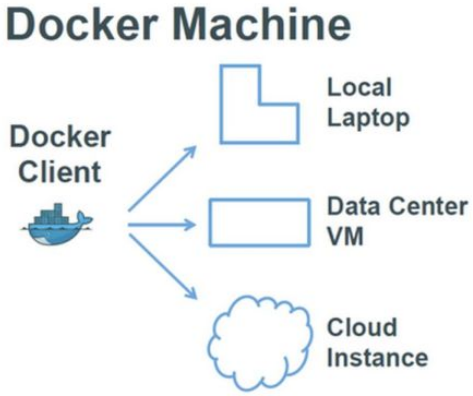
http://localhost:5000/



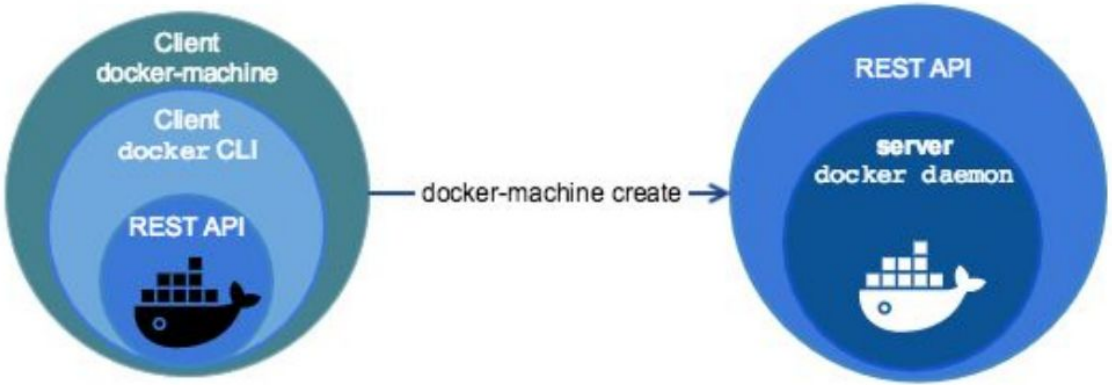

https://github.com/diegopacheco/Diego-Pacheco-Sandbox/tree/master/DevOps/docker-compose

# Docker-machine

- Docker
- Running some place else like:
  - VirtualBox
  - Amazon

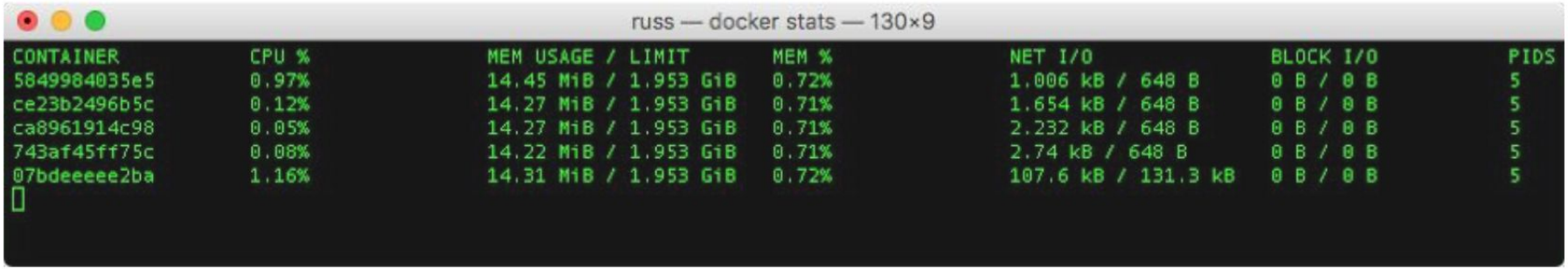



# Docker-machine



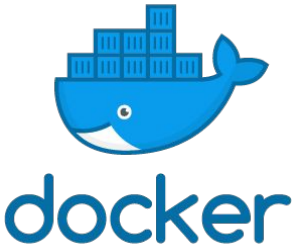

# Monitoring

docker stats



# Monitoring

cAdvisor


# Docker

Diego Pacheco