

Docker

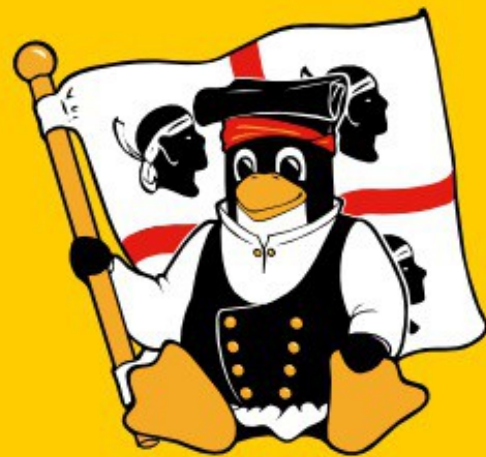
Massimiliano Dessi

@desmax74



GULCh

Gruppo Utenti Linux Cagliari h...?



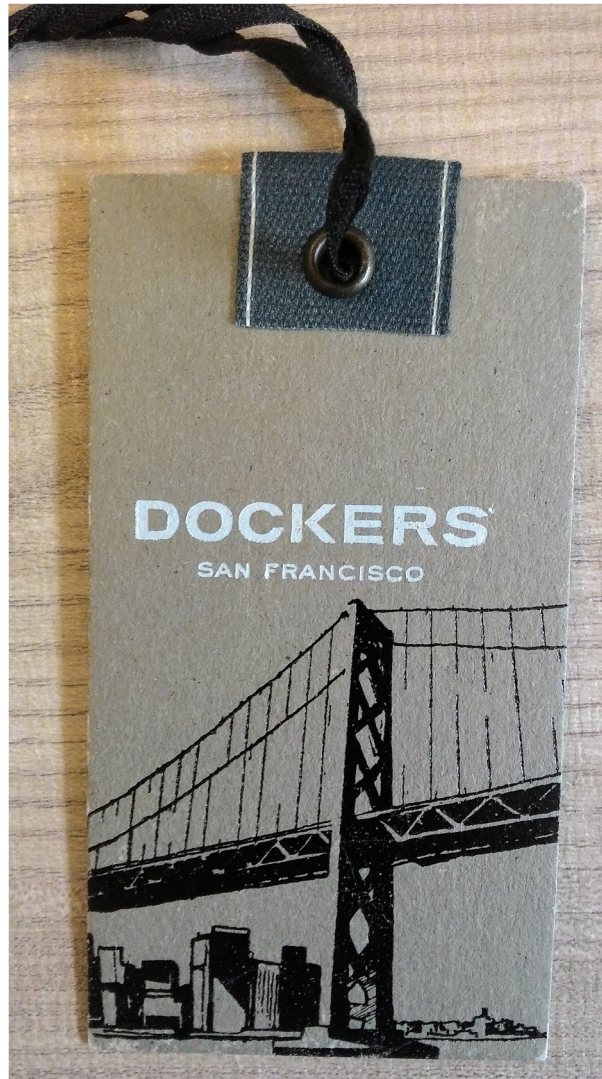
Speaker @desmax74



Massimiliano Dessi has more than 14 years of experience In programming,
Works in the Cloud Computing area with DevOps methods.
He's a proud father of three, Manager of GDG Sardegna,
Co-founder of JugSardegna, Author of Spring 2.5.AOP.



Dockers ?!???



Not this



Docker

[illegible]



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Build, Ship, Run

An open platform for distributed applications
for developers and sysadmins

[Get Started with Docker](#)

Docker acquires Tutum

The best way to deploy and manage Dockerized apps in production

[Learn more about Tutum](#)

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Docker Webinar Series: [Sign up for a Webinar](#)

Topics include Docker technology, DevOps and customer case studies.

Announcing Docker 1.8: [Read the Docker 1.8 blog post](#)

Docker Content Trust and Toolbox Installer

Announcing DockerCon EU 2015: [Register now](#)

Join us November 16-17th in Barcelona, Spain

What is Docker?

Docker is an open platform for building, shipping and running distributed applications. It gives programmers, development teams and operations engineers the common toolbox they need to take advantage of the distributed and networked nature of modern applications.



Container != Virtual Machine

- Container run at kernel level (≥ 3.10)
- Virtual Machine use HW with a emulation layer
- Container -> Lower overhead than VMs



Virtualization

One or more independent
machines
run virtually
on physical hardware
via an intermediation layer

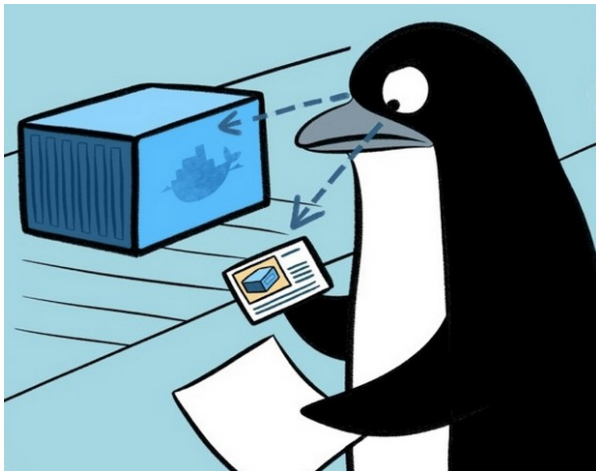
VirtualBox, VmWare, Xen



Container

containers run in user space on top of an
operating system's kernel
Cgroups & Namespaces

Docker, OpenVZ, Solaris Zones, and
Linux containers (lxc)



Containers

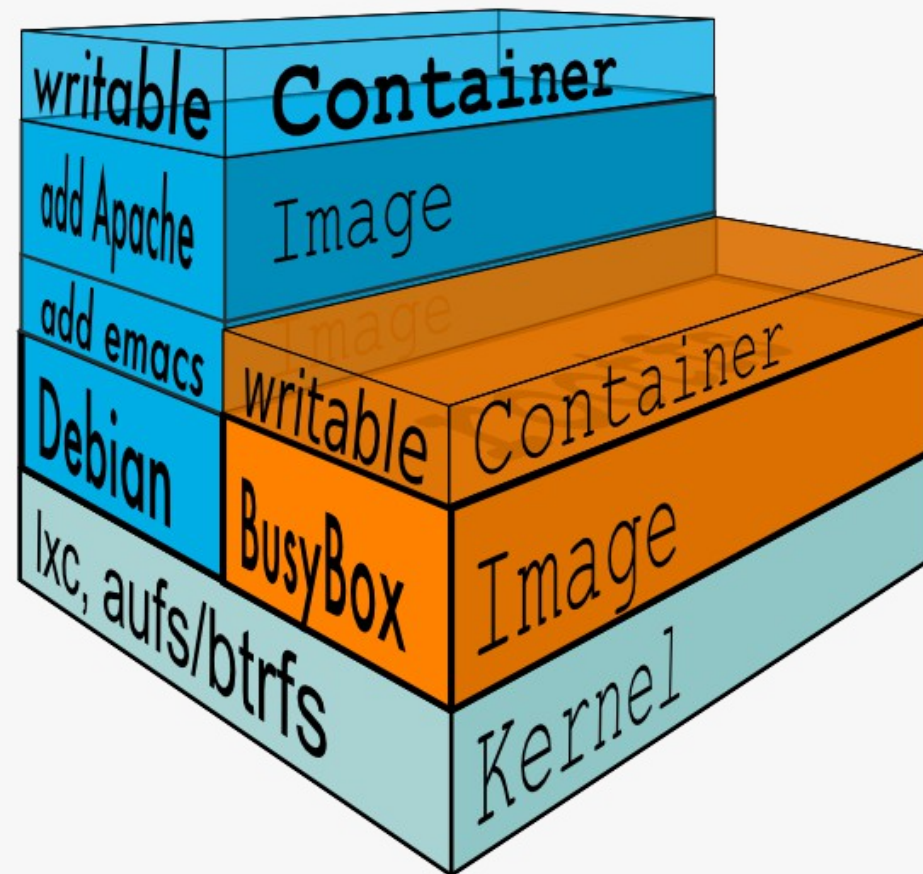
They require limited overhead and can allow a greater density of containers to run on a host.

Fast, containers start in seconds



Containers

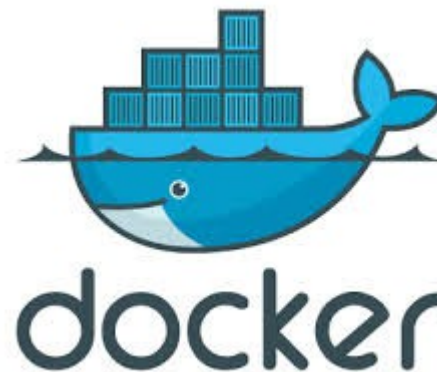
- Copy on write model
- Layered and immutable structure (snapshot)
to build one image on top of another



- A Docker image is a snapshot of a filesystem
- Repository Git-like for the images (repos)



- Docker is an open-source engine that automates the deployment of applications into containers released by them under the Apache 2.0 license.
- <https://github.com/docker/docker/>



Docker => Golang



Components

Docker client and server

Docker Images

Registries

Docker Containers



Client and Server (daemon)

```
jaiku@jaiku:~$ docker version
Client:
 Version:      1.8.3
 API version:  1.20
 Go version:   go1.4.2
 Git commit:   f4bf5c7
 Built:        Mon Oct 12 05:39:44 UTC 2015
 OS/Arch:      linux/amd64

Server:
 Version:      1.8.3
 API version:  1.20
 Go version:   go1.4.2
 Git commit:   f4bf5c7
 Built:        Mon Oct 12 05:39:44 UTC 2015
 OS/Arch:      linux/amd64
jaiku@jaiku:~$
```



Client CLI

Commands:

attach	Attach to a running container
build	Build an image from a Dockerfile
commit	Create a new image from a container's changes
cp	Copy files/folders from a container to a HOSTDIR or to STDOUT
create	Create a new container
diff	Inspect changes on a container's filesystem
events	Get real time events from the server
exec	Run a command in a running container
export	Export a container's filesystem as a tar archive
history	Show the history of an image
images	List images
import	Import the contents from a tarball to create a filesystem image
info	Display system-wide information
inspect	Return low-level information on a container or image
kill	Kill a running container
load	Load an image from a tar archive or STDIN
login	Register or log in to a Docker registry
logout	Log out from a Docker registry
logs	Fetch the logs of a container
pause	Pause all processes within a container
port	List port mappings or a specific mapping for the CONTAINER
ps	List containers
pull	Pull an image or a repository from a registry
push	Push an image or a repository to a registry
rename	Rename a container
restart	Restart a running container
rm	Remove one or more containers
rmi	Remove one or more images
run	Run a command in a new container
save	Save an image(s) to a tar archive
search	Search the Docker Hub for images
start	Start one or more stopped containers
stats	Display a live stream of container(s) resource usage statistics
stop	Stop a running container
tag	Tag an image into a repository
top	Display the running processes of a container
unpause	Unpause all processes within a container
version	Show the Docker version information
wait	Block until a container stops, then print its exit code

Run 'docker COMMAND --help' for more information on a command.



Server

```
jaiku@jaiku:~$ docker info
Containers: 23
Images: 106
Storage Driver: aufs
  Root Dir: /var/lib/docker/aufs
  Backing Filesystem: extfs
  Dirs: 152
  Dirperm1 Supported: true
Execution Driver: native-0.2
Logging Driver: json-file
Kernel Version: 4.2.0-16-generic
Operating System: Ubuntu 15.10
CPUs: 8
Total Memory: 15.58 GiB
Name: jaiku
ID: W7YU:6XFB:IFQZ:XX0K:2FXE:X35K:JSAF:2QWV:Y4H0:G3ID:RHQN:35MU
WARNING: No swap limit support
```



Client Ui

DockerUI

Dashboard	Containers	Images	Info
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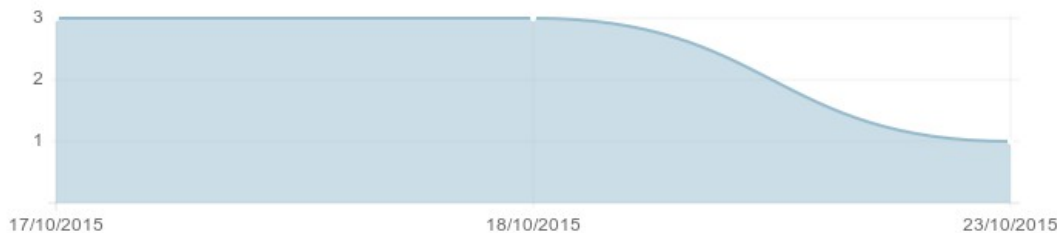
Running Containers

- gloomy_lalande Up 4 seconds
- shipyard-controller Up About an hour
- shipyard-swarm-agent Up About an hour
- shipyard-controller/swarm Up About an hour
- shipyard-proxy Up About an hour
- shipyard-certs Up About an hour
- shipyard-discovery Up About an hour
- shipyard-controller/rethinkdb Up About an hour
- condescending_archimedes Created

Status



Containers created



Images created



Client UI

shipyard

0.0.0.0:8080/#/containers

Cerca

shipyard CONTAINERS IMAGES NODES REGISTRIES ACCOUNTS EVENTS ADMIN

Refresh Deploy Container

Search containers...

		Id	Node	Name	Image	Status	Created	Actions
<input type="checkbox"/>	●	db7447be2177	jaiku	shipyard-controller	shipyard/shipyard:latest	Up 27 minutes	2015-10-23 21:35:50 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	c530357731ee	jaiku	shipyard-swarm-agent	swarm:latest	Up 27 minutes	2015-10-23 21:35:50 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	47b79c4d8552	jaiku	shipyard-controller	swarm:latest	Up 27 minutes	2015-10-23 21:35:49 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	088636bbf9cd	jaiku	shipyard-proxy	ehazlett/docker-proxy:latest	Up 27 minutes	2015-10-23 21:35:49 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	40c1633b4fa3	jaiku	shipyard-certs	alpine	Up 27 minutes	2015-10-23 21:35:49 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	7fdd1f17e56f	jaiku	shipyard-discovery	microbox/etcd:latest	Up 27 minutes	2015-10-23 21:35:48 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	d84eb1a741e3	jaiku	shipyard-controller	rethinkdb	Up 27 minutes	2015-10-23 21:35:48 +0200	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	●	f904f38e5666	jaiku	sick_wright	dockerui/dockerui	Up About an hour	2015-10-23 20:50:47 +0200	<input type="checkbox"/> <input type="checkbox"/>



Image

- A native Linux container format (libcontainer)
- Linux kernel namespaces, => isolation for filesystems, processes, and networks.
- Filesystem isolation: each container is its own root filesystem
- Process isolation: each container runs in its own process environment
- Network isolation: separate virtual interfaces and IP addressing between containers.



```
FROM desmax74/ubuntu-ansible.14.04
```

```
RUN apt-get update && apt-get install -y g++ gcc libc6-dev make curl ca-certificates net-  
tools
```

```
&& rm -rf /var/lib/apt/lists/* && apt-get clean
```

```
ENV GOLANG_VERSION 1.5.1
```

```
ENV GOLANG_DOWNLOAD_URL https://golang.org/dl/go$GOLANG_VERSION.src.tar.gz
```

```
ENV GOLANG_DOWNLOAD_SHA1 0df564746d105f4180c2b576a1553ebca9d9a124
```

```
RUN curl -fsSL "$GOLANG_DOWNLOAD_URL" -o golang.tar.gz \  
&& echo "$GOLANG_DOWNLOAD_SHA1 golang.tar.gz" | shasum -c - tar -C /usr/src -xzf golang.tar.gz  
&& rm golang.tar.gz && cd /usr/src/go/src && ./make.bash --no-clean 2>&1
```

```
ENV GOPATH /go
```

```
ENV PATH $GOPATH/bin:/usr/src/go/bin:$PATH
```

```
RUN mkdir -p "$GOPATH/src" "$GOPATH/bin" && chmod -R 777 "$GOPATH"
```

```
WORKDIR $GOPATH
```

```
COPY go-wrapper /usr/local/bin/
```

```
VOLUME ["/gopath/app/","/data"]
```

```
WORKDIR /gopath/app/
```

```
...
```



- Resource isolation and grouping: resources like CPU and memory are allocated individually to each Docker container using the cgroups, or controlgroups, kernel feature.
- Copy-on-write: filesystems are created with copy-on-write, meaning they are layered and fast and require limited disk usage.
- Logging
- Interactive shell



Container idea

- A container sandboxed processes that share the same kernel as the host.
- The idea is that you can ship containers from your development environment to the deployment environment



Use Cases

- Application Development
- Test
- Packaging
- Deployment
- Application isolation
- Microservices
- Paas/Saas cloud infrastructure
- Google Cloud, Openshift, Bluemix, Amazon ECS, Cloud Foundry ...



Repos




Docker Hub

https://hub.docker.com/explore/

Explore Help

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Explore Official Repositories

 centos official	1.5 K STARS	2.4 M PULLS	> DETAILS
 busybox official	325 STARS	40.3 M PULLS	> DETAILS
 ubuntu official	2.5 K STARS	27.9 M PULLS	> DETAILS
 scratch official	118 STARS	224.8 K PULLS	> DETAILS
 fedora official	227 STARS	244.3 K PULLS	> DETAILS
 registry official	445 STARS	7.5 M PULLS	> DETAILS
 hipache official	46 STARS	48.5 K PULLS	> DETAILS
 docker-dev official	27 STARS	86.7 K PULLS	> DETAILS



Demo



Q & A



Contacts

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Thanks for your attention !

