TECH TALENT FACTORY
ISTITUTO TECNICO SUPERIORE

ISTITUTI TECNICI SUPERIORI
IT'S MY FUTURE

Cloud Administrator & Security Engineer

SCRIPTING & DEVOPS

INTRODUCTION

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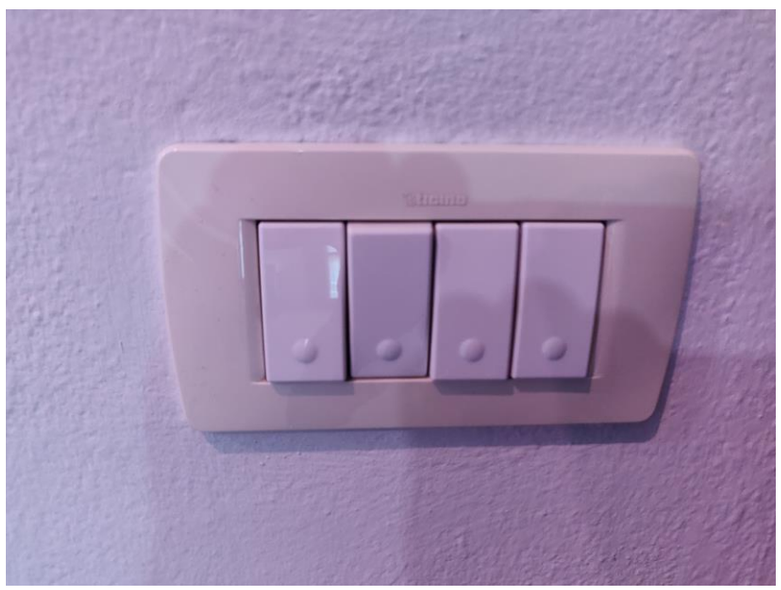
Andrea Scrivanti

Gen-Mar 2023

Conosciamoci

- Andrea Scrivanti andrea.scrivanti@gmail.com
- Laureato in Informatica presso Università degli Studi di Milano – Bicocca con una tesi su piattaforme security-aware
- Mi occupo di Software Engineering e Data Engineering
- Progettazione e sviluppo di sistemi security-aware
- Progettazione e sviluppo di sistemi automatizzati di scraping per costruire knowledge base
- Sistemi di data processing su piattaforma AWS
- Interessi: software engineering, agile, devops, IoT, domotica

Conosciamoci



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Programma

- 6 days x 4 hours, topics:
  - Cloud Introduction / Virtualization
  - Scripting
  - Git
  - CI/CD pipeline

Programma

- 4+4 ore di laboratorio
- Presentazione dei progetti e discussione

- Perchè parliamo di devops, cloud, scripting?

Cloud Job Postings - Milan

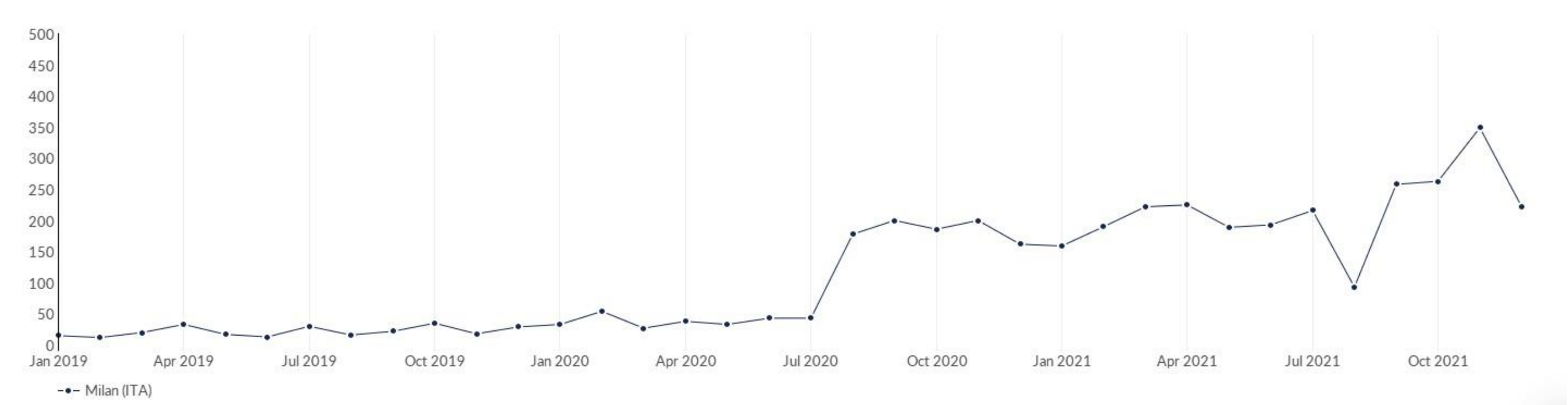
From Jan 2021 to Dec 2021

2,579
Unique Postings

685
Companies Posting

40%
Postings Increase

Unique Postings Trend



Lightcast data (2022)

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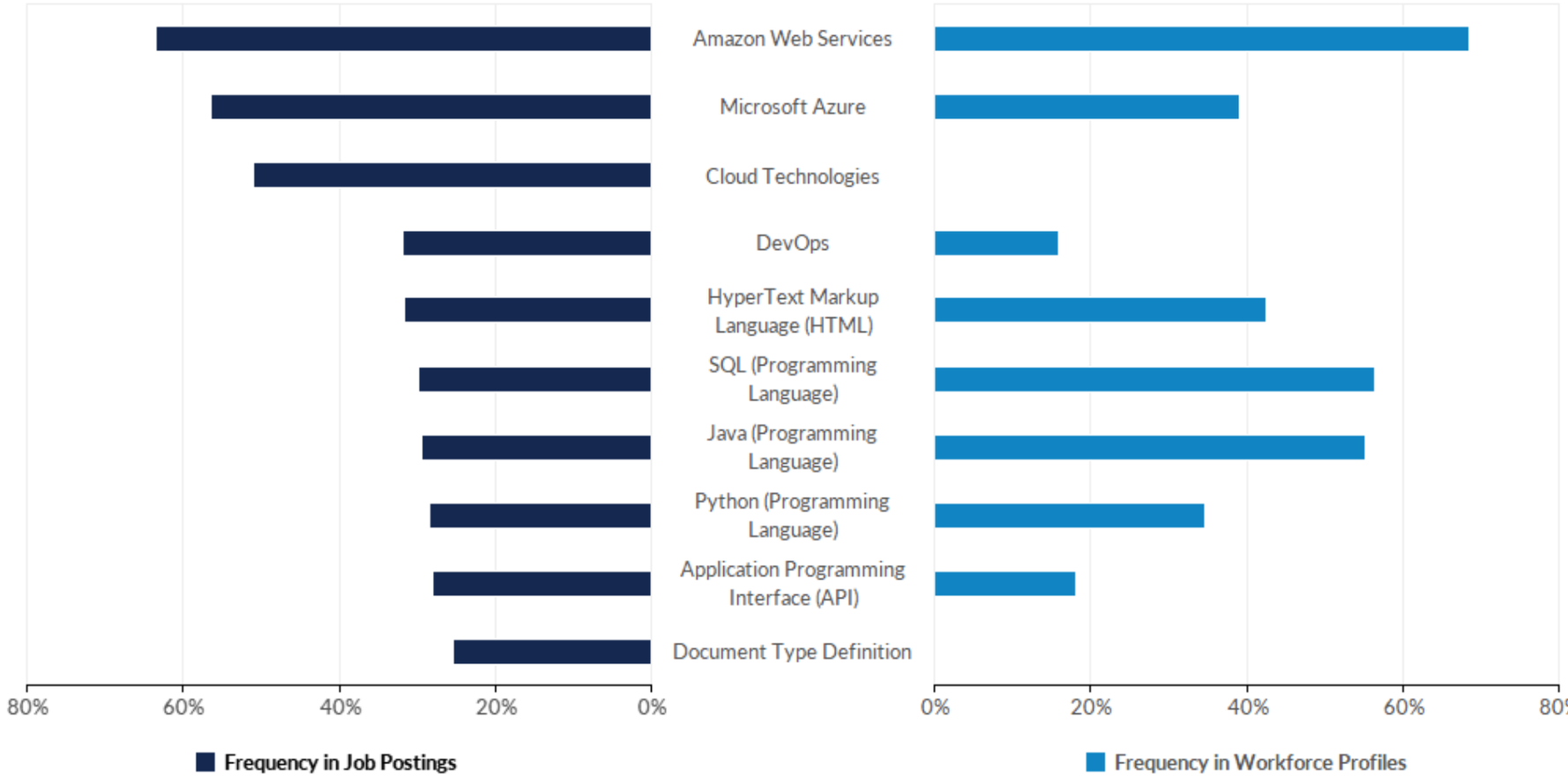
Cloud Job Postings - Milan

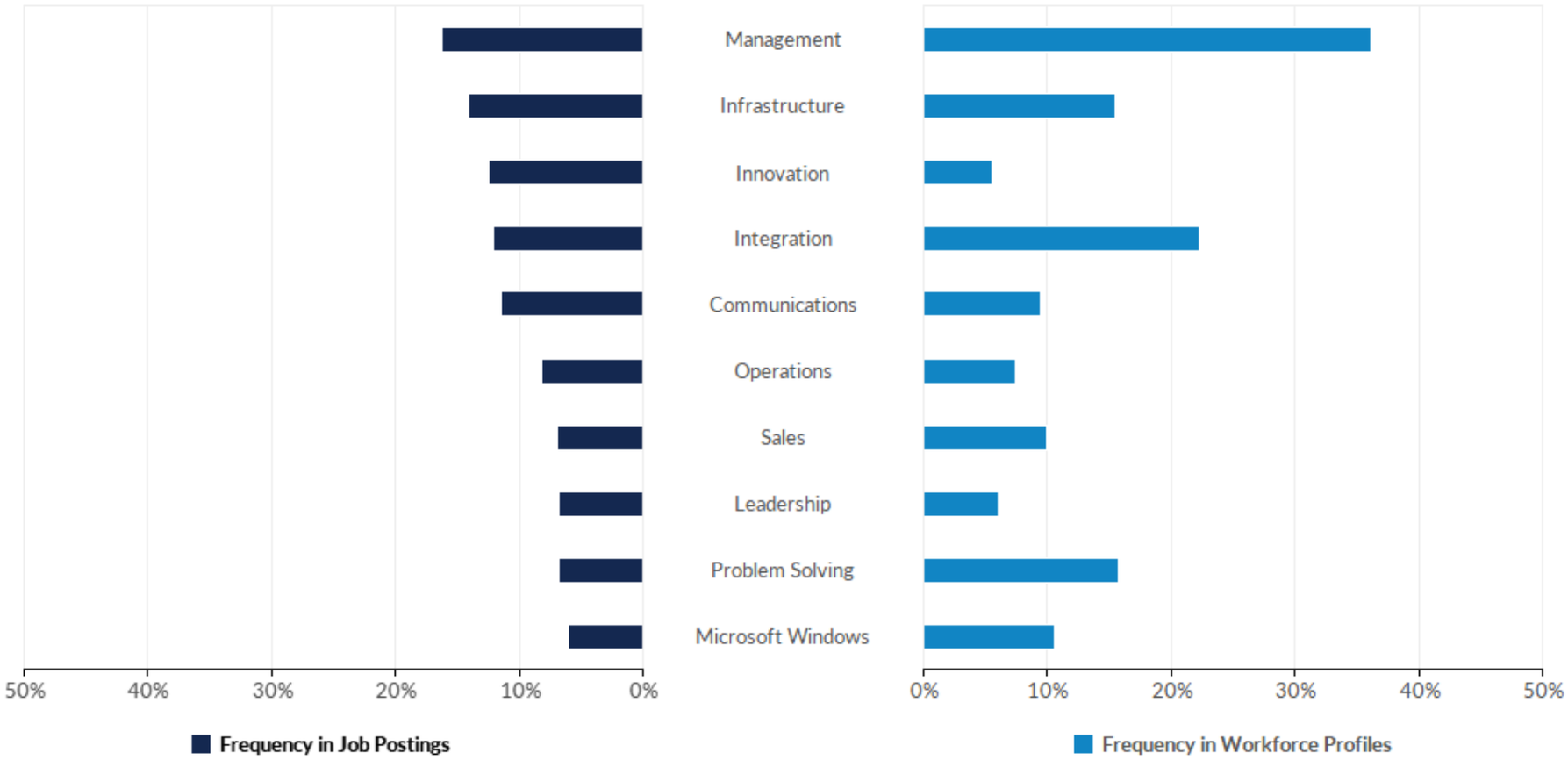
Top Hard Skills



Lightcast data (2022)

Cloud Job Postings - Milan

Top Soft Skills



Lightcast data (2022)

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Cloud computing

“the dark world”

```
MAIN                                i5/OS Main Menu
                                                          System:   OSYS1
Select one of the following:

     1. User tasks
     2. Office tasks
     3. General system tasks
     4. Files, libraries, and folders
     5. Programming
     6. Communications
     7. Define or change the system
     8. Problem handling
     9. Display a menu
    10. Information Assistant options
    11. iSeries Access tasks

    90. Sign off

Selection or command
===>
F3=Exit    F4=Prompt    F9=Retrieve    F12=Cancel    F13=Information Assistant
F23=Set initial menu
(C) COPYRIGHT IBM CORP. 1980, 2005.
```

-La mia consulente finanziaria dopo il passaggio UBI Banca a BPER (fine 2021)

Computing paradigms

Mainframe computing
1 computer / molti utenti

"The network is the computer"
(John Gage, Sun Microsystems, 1984)

Client-server computing
molti computer / molti utenti

"The cloud is the computer"

Cloud computing

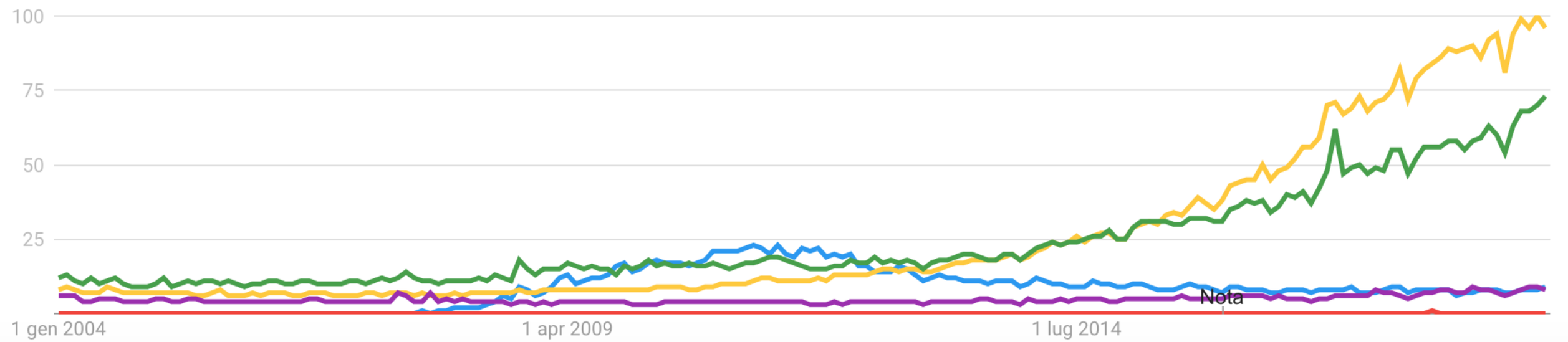
cloud computing
Termine di ricerca

big data cloud
Termine di ricerca

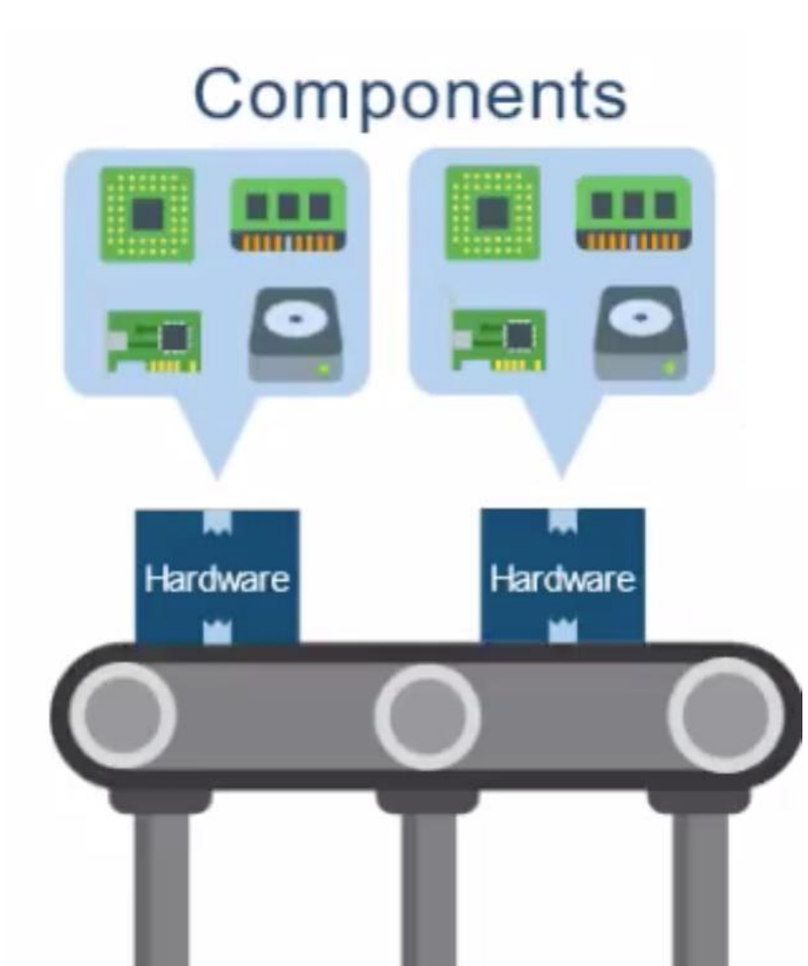
aws
Termine di ricerca

azure
Termine di ricerca

gpc
Termine di ricerca



Primo passo…
la virtualizzazione….



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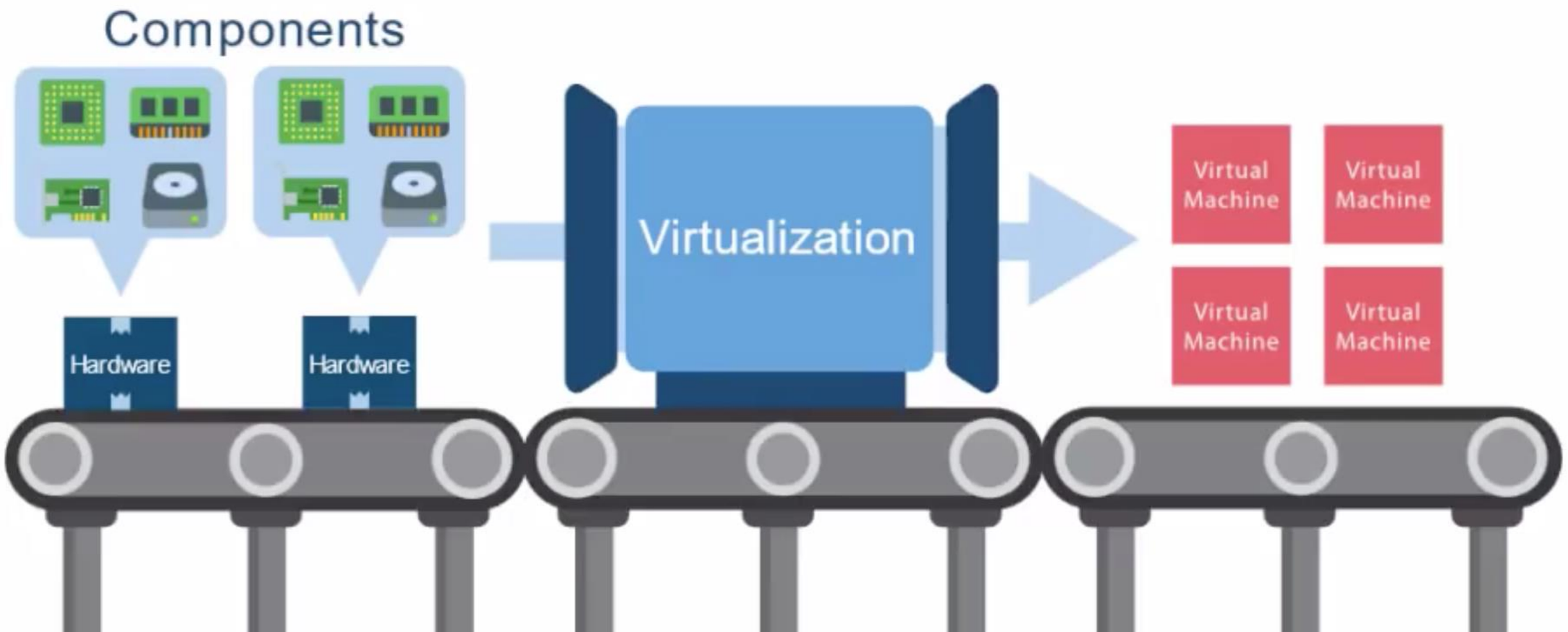
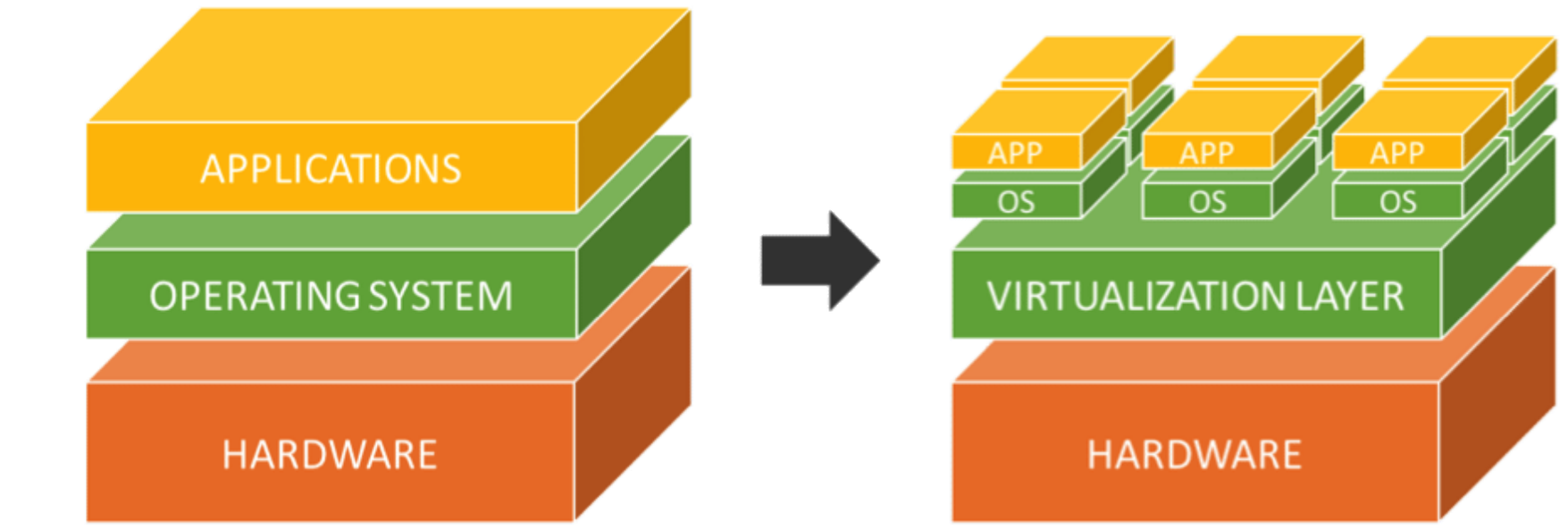


Virtualizzazione

Attraverso la virtualizzazione vado a scomporre un grosso server fisico in tanti server virtuali.
Ciascun server virtuale è dedicato ad un componente del mio sistema.

In altre parole, vado ad astrarre un servizio IT.

Poche grosse macchine fisiche ospitano tante piccole macchine virtuali indipendenti (diverso sistema operativo, diverse applicazioni, ….).



A Business Model

- Pay as you go
- Virtualized resources
- On-demand
- Multi-tenancy
- Scalability, etc.

An Architectural Platform and a Business Model

A Delivery Platform

Enable users to access IP services and on-demand applications

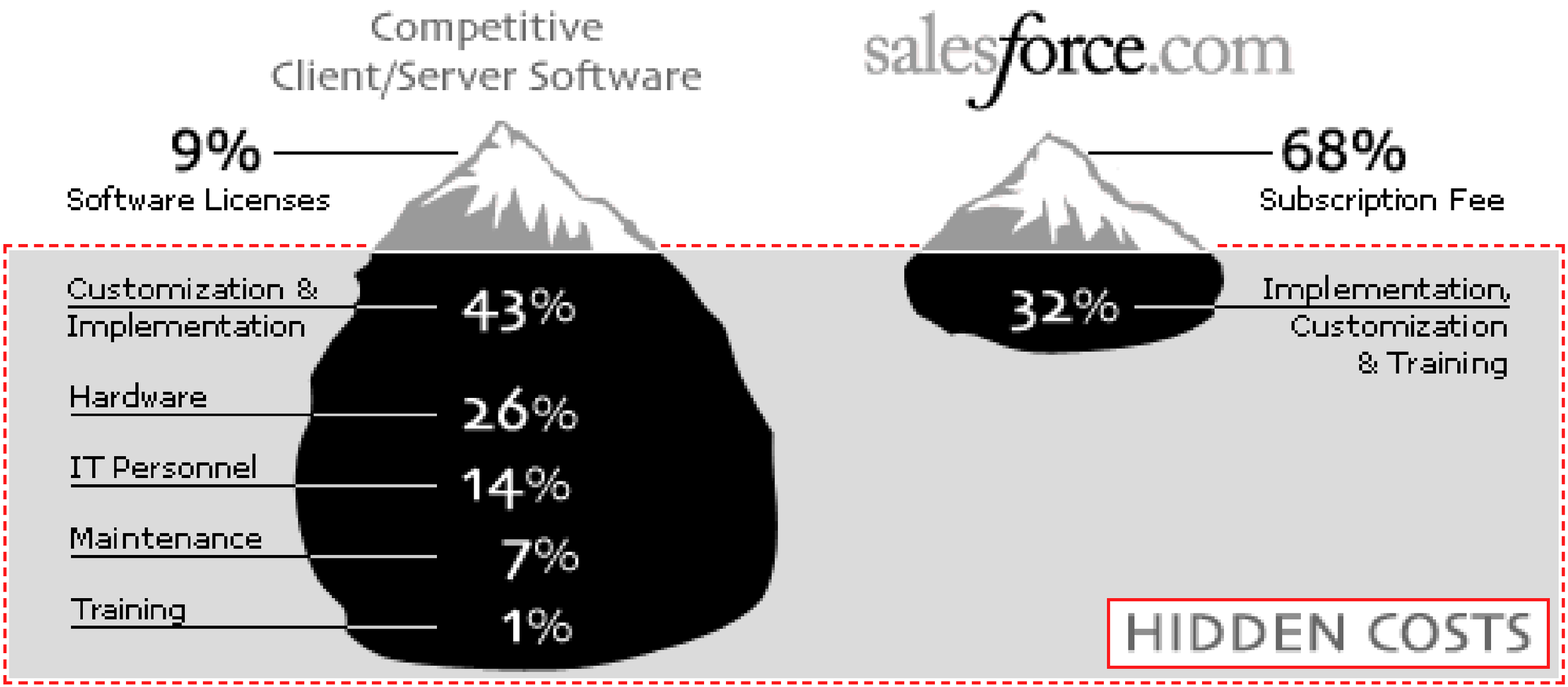
Yankee Group, 2010

A style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet.

[Wikipedia]

Perché?

Avoid the hidden costs of traditional CRM software



Cloud computing

Il cloud computing fornisce tramite WEB risorse di elaborazione che spaziano dei server e lo storage fino ad intere applicazioni
di livello enterprise (email, security, backup ecc.)

Il Cloud è in grado di effettuare provisioning di risorse IT ‘as a service’.

5 Caratteristiche fondamentali

- Servizi su richiesta
- Accesso di rete
- Pooling di risorse
- Elasticità rapida
- Misura dei servizi

Benefici e sfide cloud computing

Pay per Use	Risorse infinite	Sicurezza (Compliance)	Service Assurance
Scalabilità	Servizi gestiti	Trasparenza	Integrazione con IT
Complessità gestita	Innovazione continua	Portabilità	Licenze
Riduce il time to market	Updated	Confronto dei costi	

Modelli di servizio

SaaS

Software as a Service

Il cliente utilizza applicazioni su una infrastruttura accessibile da vari dispositivi client attraverso un'interfaccia (API, interfaccia web, client dedicato)

PaaS

Platform as a Service

Permette di sviluppare e distribuire applicazioni create utilizzando linguaggi di programmazione supportati dal fornitore

IaaS

Infrastructure as a Service

Noleggio capacità di CPU, storage, network e altre risorse come i sistemi operativi e le applicazioni

Docker

Docker tries to solve the "run anywhere" problem using (easily) Linux containers.

Perchè?

Development environment

Your script / program

python3	Lib1 v2	Lib2 v2

Production environment

Your script / program

python3	Lib1 v2	Lib2 v2

My script / program

python2	Lib1 v1	Lib2 v1

Development environment

Your script / program

Production environment

Your script / program

My script / program

Conflict!!!

Development environment

Your script / program

python3 | Lib1 v2 | Lib2 v2

Production environment

Your script / program

python3 | Lib1 v2 | Lib2 v2

Docker container

My script / program

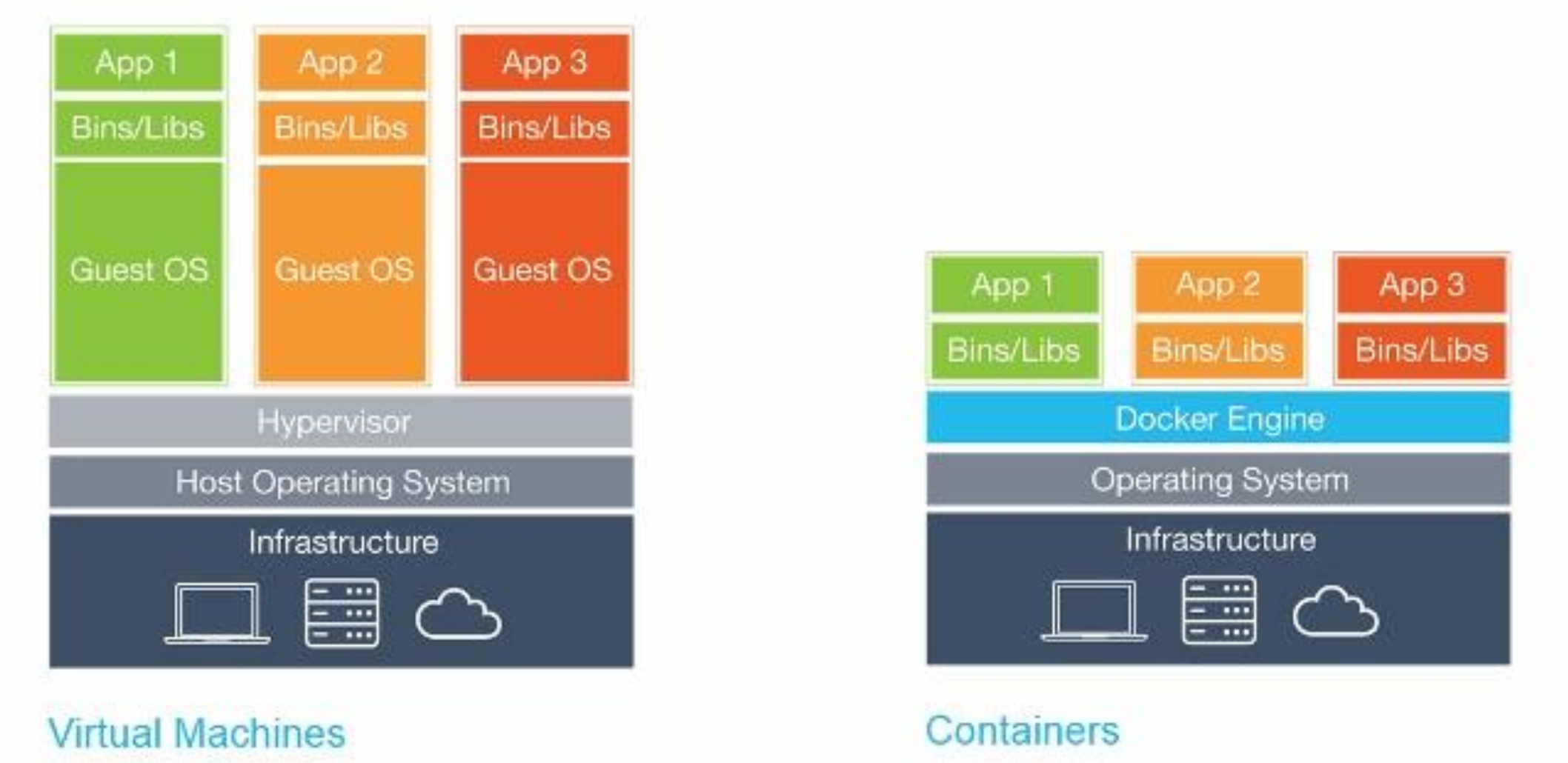
python2 | Lib1 v1 | Lib2 v1

Docker container

Docker Engine

Efficienza

Perché è diverso da una virtual machine?
(VMware, Xen, …)



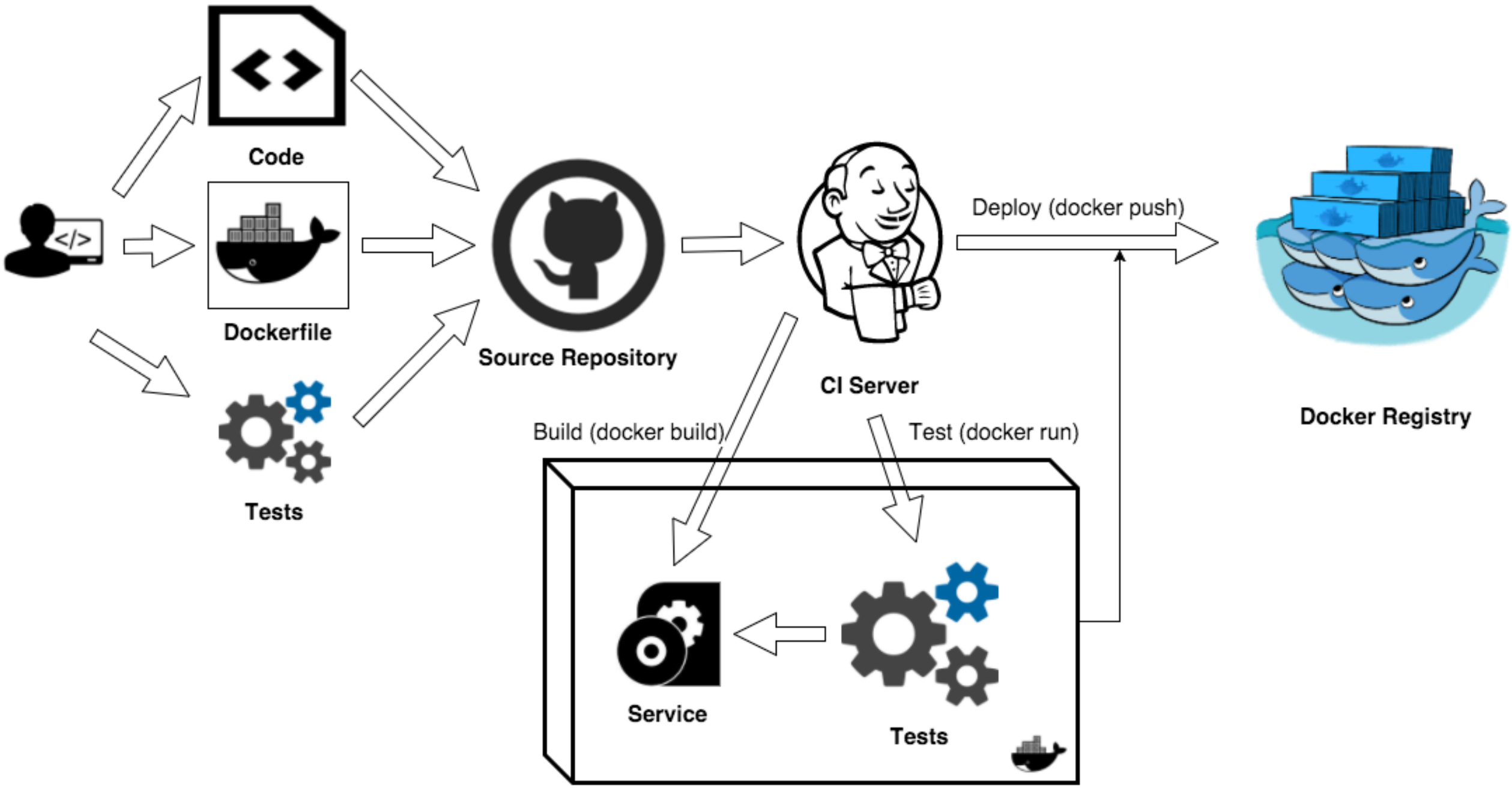
https://blog.jayway.com/2015/03/21/a-not-very-short-introduction-to-docker/

Portabilità

	?	?	?	?	?	?
	?	?	?	?	?	?
	?	?	?	?	?	?
	?	?	?	?	?	?
	?	?	?	?	?	?
	?	?	?	?	?	?
						

The matrix from hell

Flessibilità



Build, ship and run any app, anyware

Sicurezza

Sicurezza

- Don't give root
- If the application needs root, give looks-like-root
- If that's not sufficient, give root, but build another wall

Docker
Immagini e container

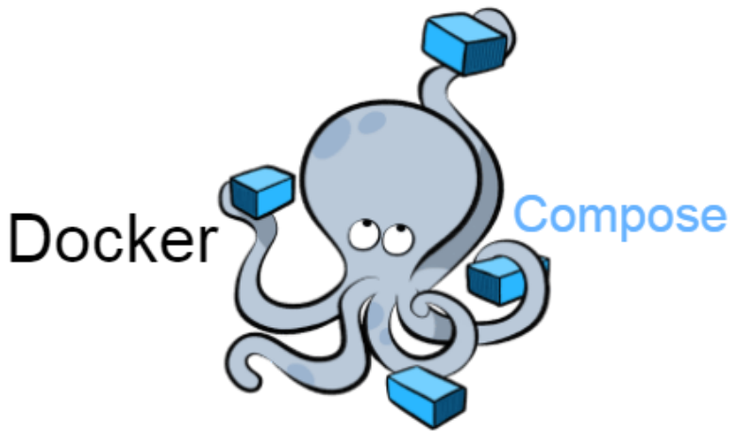
An image is an inert, immutable, file that's essentially a snapshot of a container.

Images are created with the build command, and they'll produce a container when started with run.

Images are stored in a Docker registry

https://stackoverflow.com/questions/23735149/what-is-the-difference-between-a-docker-image-and-a-container

Immagini



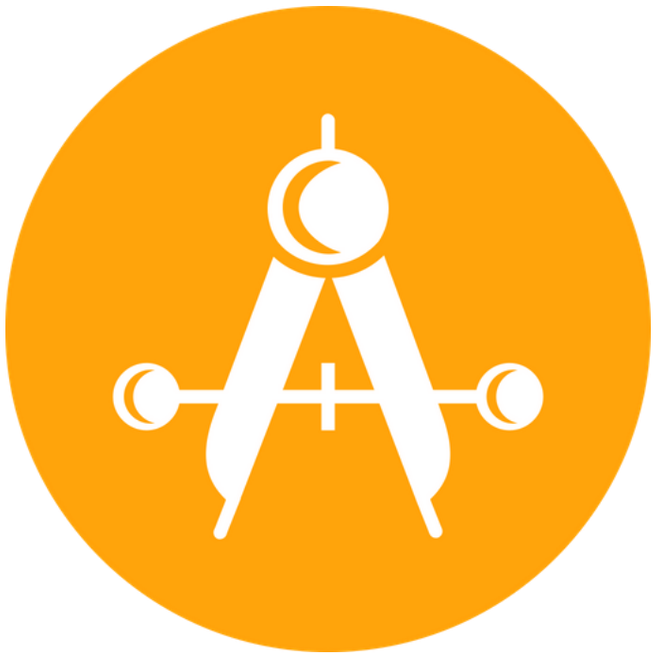
Immagini private (Dockerfile)

Docker Hub

Registri privati

https://github.com/docker/distribution

Come definire un’immagine e avviarla?

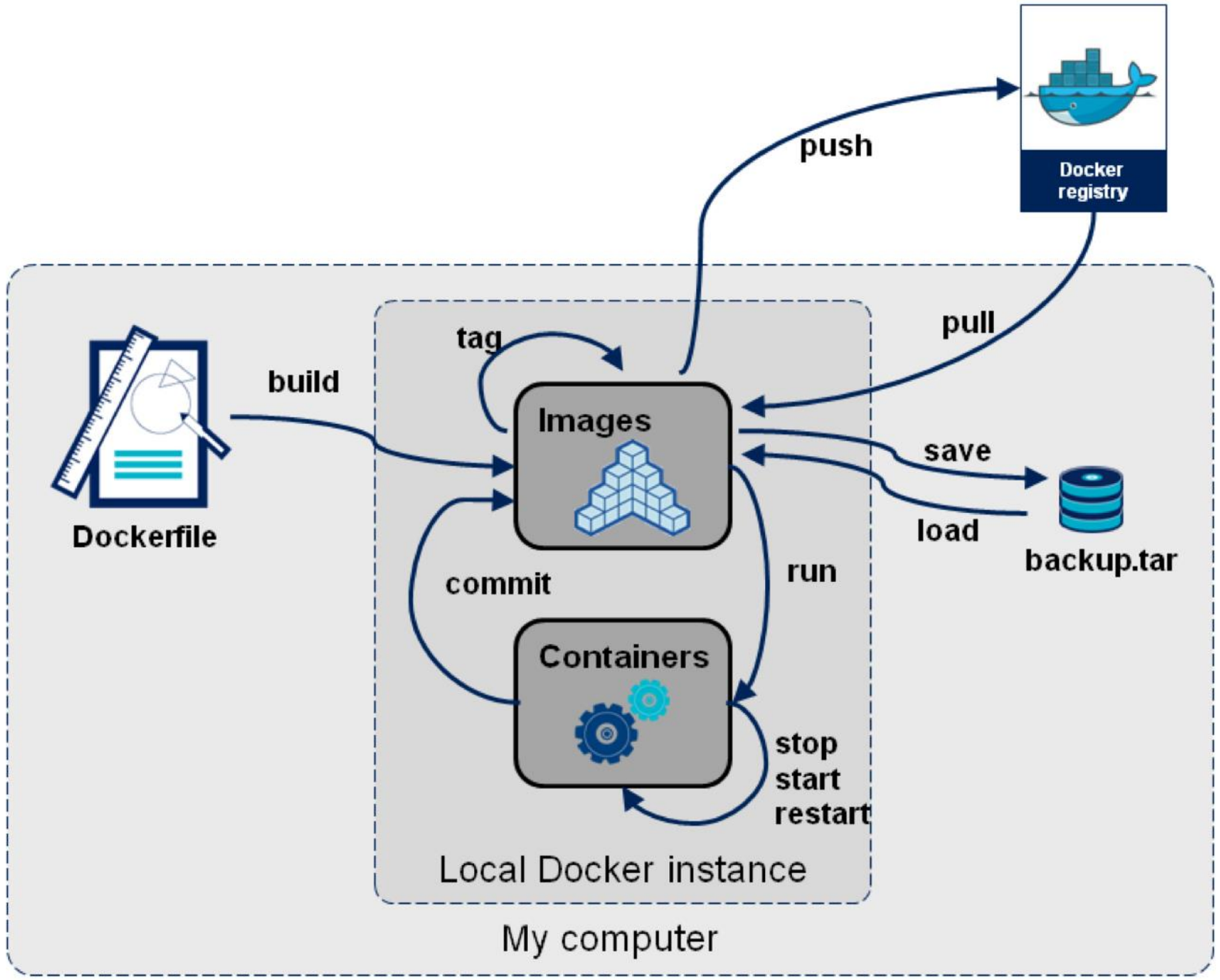


Scrivere un dockerfile

Fare il built dell’immagine

Avviare il container

Come definire un'immagine e avviarla?



http://blog.octo.com/en/docker-registry-first-steps/

Container programming
Dockerfile

```
# Version: 0.0.1
FROM sequenceiq/hadoop-docker:2.7.1

LABEL maintainer="alessandrov87 (https://github.com/AlessandroVaccarino)"

# Download Pig

RUN curl http://apache.mirror.anlx.net/pig/latest/pig-0.17.0.tar.gz  | tar -zx -C /usr/local

ENV PATH /usr/local/pig-0.16.0/bin:$PATH

ENV PATH /usr/local/hadoop/bin:$PATH

# Download and Init Hive

RUN curl http://apache.mirror.anlx.net/hive/stable/apache-hive-1.2.2-bin.tar.gz  | tar -zx -C /usr/local

ENV PATH /usr/local/apache-hive-1.2.1-bin/bin:$PATH

# Downlaod Zookeeper (for HBase)

RUN curl http://apache.mirror.anlx.net/zookeeper/stable/zookeeper-3.4.12.tar.gz  | tar -zx -C /usr/local

ENV PATH /usr/local/zookeeper-3.4.12/bin:$PATH

# Download HBase

RUN curl http://apache.mirror.anlx.net/hbase/stable/hbase-1.2.6-bin.tar.gz  | tar -zx -C /usr/local

ENV PATH /usr/local/hbase-1.2.6/bin:$PATH

# Configure HBase

RUN rm /usr/local/hbase-1.2.6/conf/hbase-site.xml

COPY hbase-site.xml /usr/local/hbase-1.2.6/conf/

# Configure boostrap file

RUN rm /etc/bootstrap.sh
```

Dockerfile

FROM	Sets the base image for subsequent instructions
ENV	Set environment variable in container
RUN	Execute command in the image and commit results
ADD	Add file from host/URL to container
VOLUME	Specify directory that lives outside union fs
EXPOSE	Specify ports to open between containers
CMD	Default command when executing container

Docker
Gestione

docker ps	Mostra l'elenco dei container attivi
docker stop ubuntu	Ferma un container
docker rm ubuntu	Rimuove un container
docker run ubuntu …	Avvia un container

Docker
Hello World

```
sudo apt install docker.io

sudo docker run ubuntu:14.04 /bin/echo 'Hello world'
```

```
master@master-pc:~$ sudo docker run ubuntu:14.04 /bin/echo 'Hello world'
Unable to find image 'ubuntu:14.04' locally
14.04: Pulling from library/ubuntu
d6fdcbe24ed5: Downloading [==========================================>     ]  61.77MB/67.19MB
1115217119d4: Download complete
8180a23d2c44: Download complete
ceab6b3c2a5e: Download complete
```

Docker
Hello World

```
docker run ubuntu:14.04 /bin/echo 'Hello world'
Unable to find image 'ubuntu:14.04' locally
Pulling repository ubuntu
6b4e8a7373fe: Download complete
511136ea3c5a: Download complete
b18d0a2076a1: Download complete
67b66f26d423: Download complete
25c4824a5268: Download complete
8b1c48305638: Download complete
c900195dcbf3: Download complete
Hello world
```

Recap

- Docker permette di costruire sistemi modulari e portabili
- Possiamo distribuirlo ovunque: on premises o in cloud
- Dobbiamo orchestrare i container: Kubernetes
- Iniziate ad usare Docker e Kubernetes!!!
  - Google ha introdotto i container più di 10 anni fa

Scripting

A cosa serve?

- Automatizzare compiti
- Diverse tipologie
  - Bash
  - Web based (javascript)
- Linguaggio interpretato

Scripting & Cloud

- Utilità dello scripting nel cloud
- Coltellino svizzero
- Utile in tantissimi casi, fra cui:
  - Analisi log
  - Batch processing
  - CI/CD

Shell

- Punto di accesso e di gestione del sistema operativo
- Permette di eseguire comandi e avviare programmi
- Diverse tipologie:
  - Sh (Bourne shell)
  - Bash (Bourne Again Shell)
  - Zsh
  - Prompt dei comandi (Windows)

A cosa serve?

- Automatizzare compiti del sistema operativo
- Diverse tipologie
  - Bash
  - Web based (javascript)
- Linguaggio interpretato