



/daquinoaldo/pier

# PIER

## DOCKER ORCHESTRATOR PER WEB HOSTING

**UNIVERSITÀ DI PISA**  
Corso di Laurea in Informatica



**RELAZIONE DI TIROCINIO**

Candidato: Aldo D'Aquino  
Relatore: prof. Antonio Brogi

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# AIM OF THE INTERNSHIP

Automatize the creation of web spaces through Docker containers by providing a specific orchestrator for site hosting.



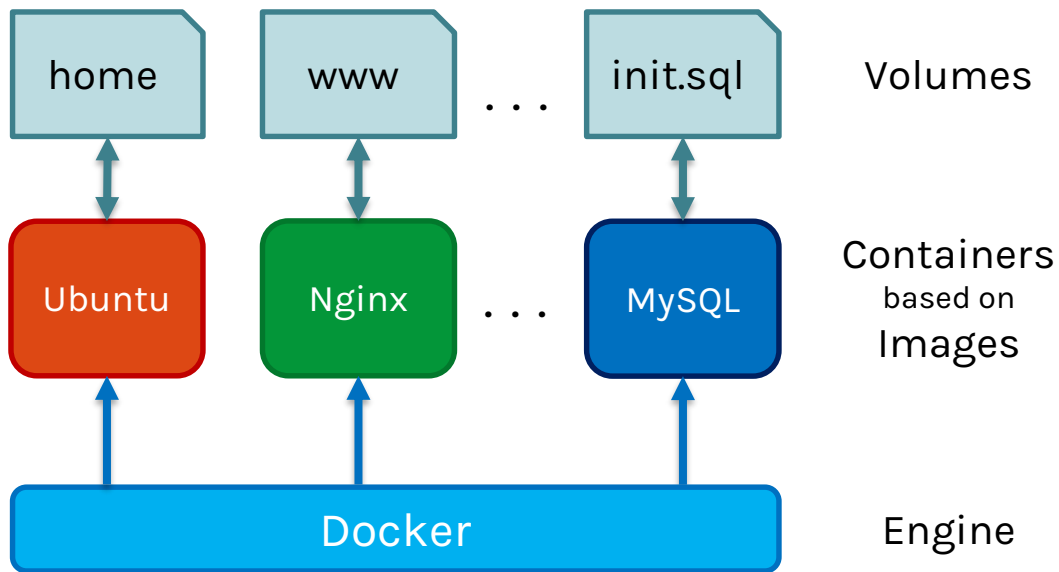
# AIM OF THE INTERNSHIP

The orchestrator must:

- have a simple and useful interface
- create and manage all the necessary containers
- offer FTP and database



# ABOUT DOCKER



# ABOUT DOCKER

## Secure

thanks to containers isolation

## Scalable and Reusable

with different containers running the same image and snapshots

## Extensible and Customizable

with custom images, container interconnections, volumes and ports

Nginx • Httpd • MySQL

Among the most  
used images

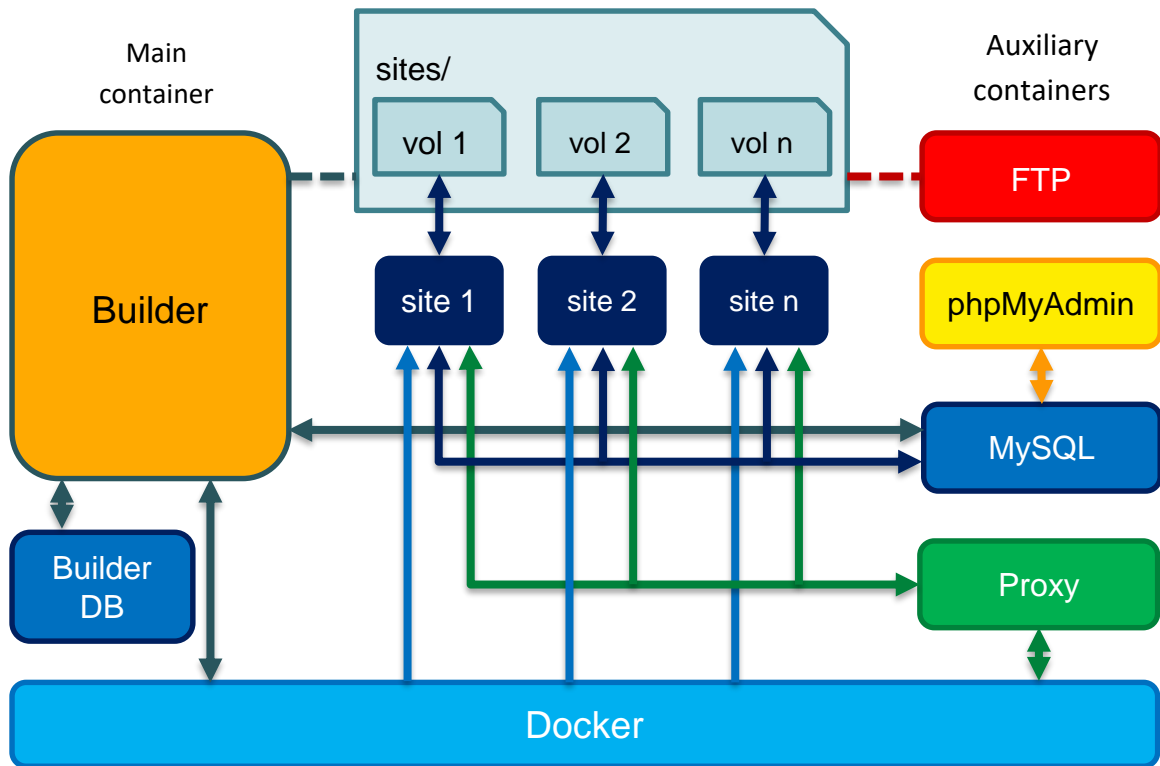
40%

Growth of Docker  
in the last year

15%

Hosts use  
Docker

# THE ARCHITECTURE

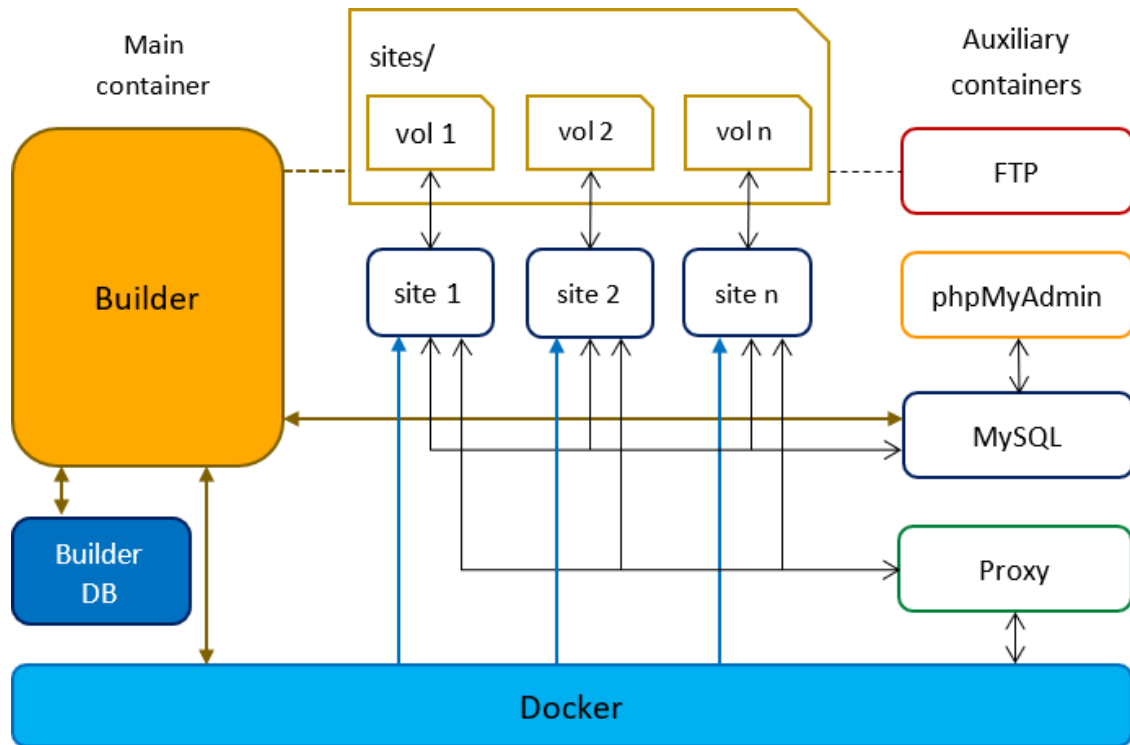


# PIER ARCHITECTURE

## WEBSITE CREATION

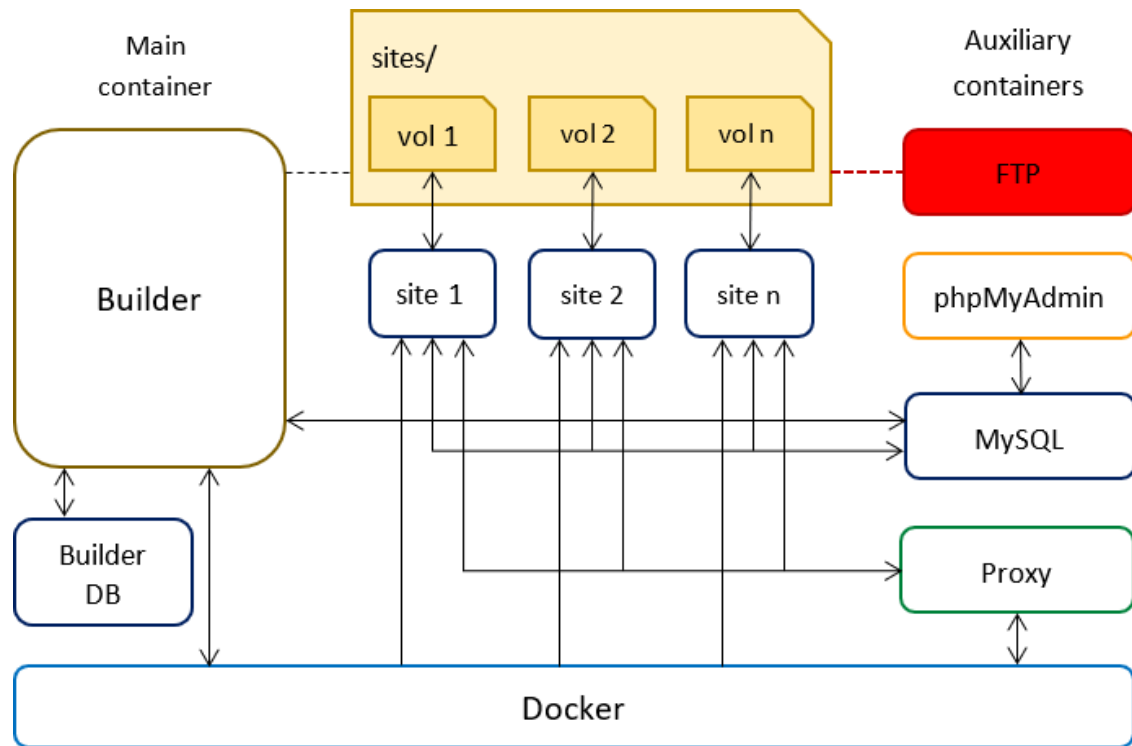
### The Builder

- Creates the site folder (volume)
- Creates the database on MySQL container if required
- Runs the website through Docker



# FILE MANAGING

Here the user can see the files of his sites and modify them.

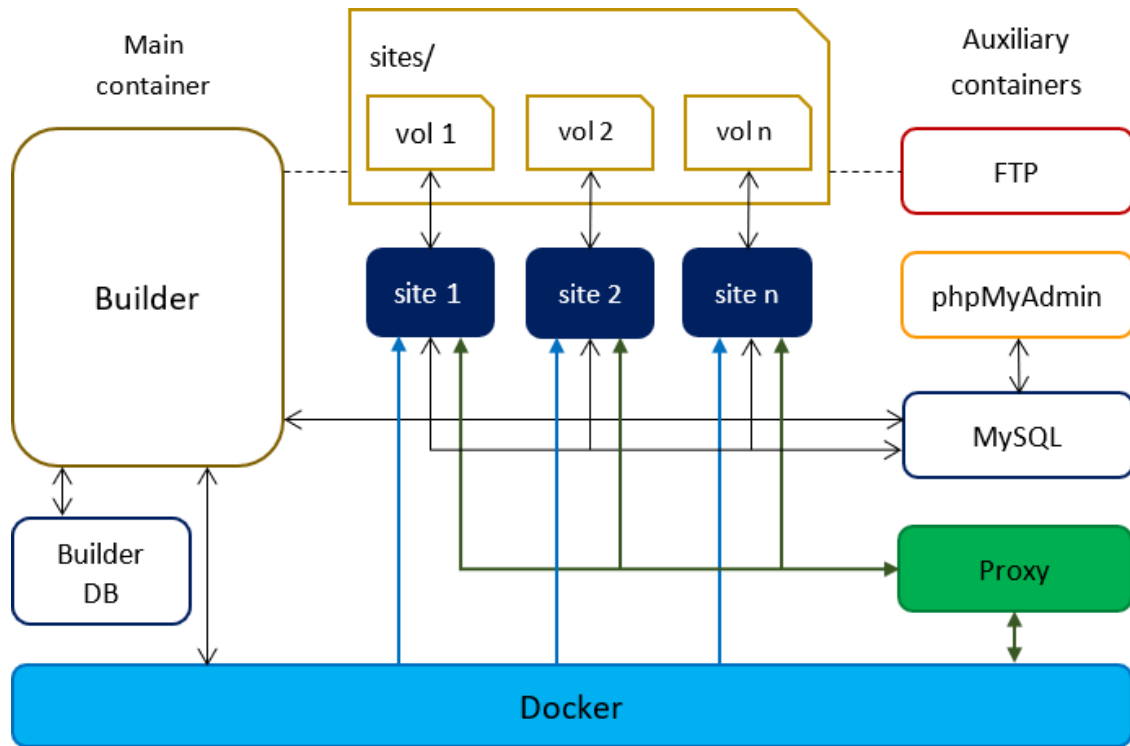




# PIER ARCHITECTURE

## PROXY

All sites are accessible at the same IP address. The proxy takes care to check which site is associated with a given domain and redirects the user to the right container.

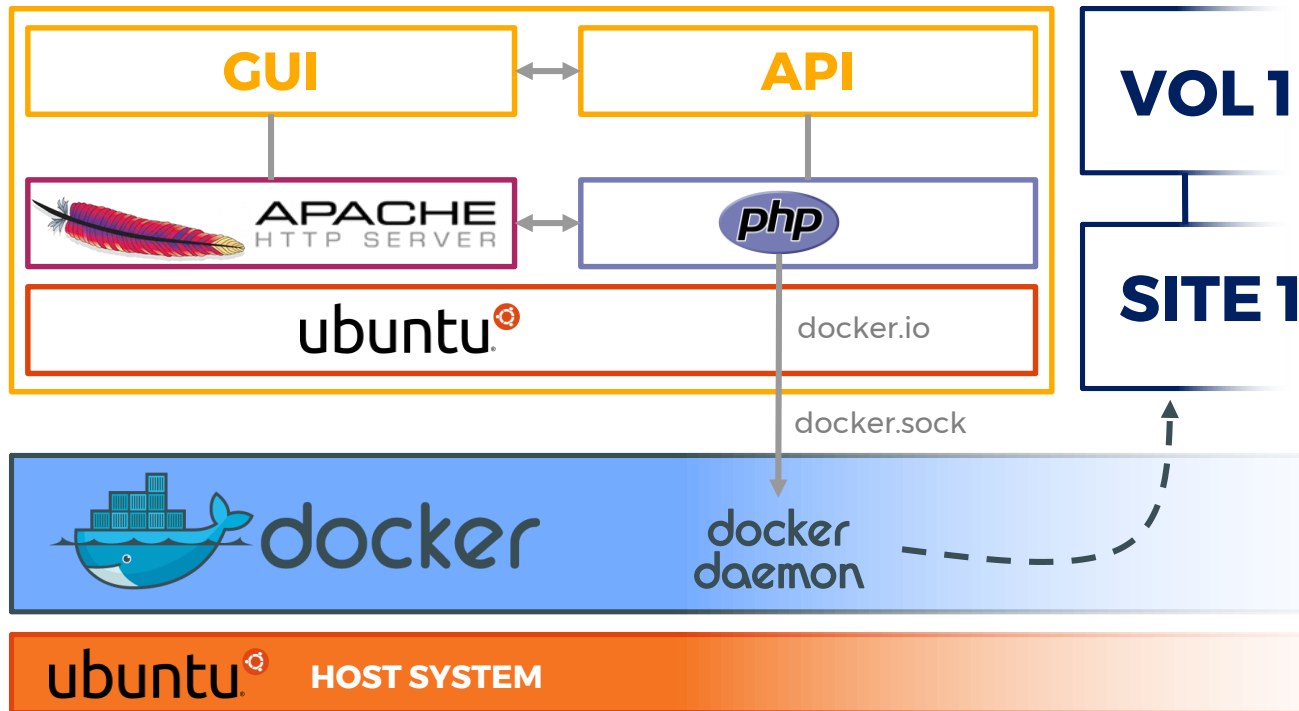


# DATABASE

The diagram illustrates a multi-site container architecture. At the base is a blue bar labeled "Docker". Above it, on the left, is a large yellow rounded rectangle labeled "Main container". Inside the main container is a blue rounded rectangle labeled "Builder" and a smaller blue rounded rectangle labeled "Builder DB". To the right of the main container is a yellow rectangle labeled "sites/". Inside "sites/" are three smaller yellow rectangles labeled "vol 1", "vol 2", and "vol n". Below "sites/" are three dark blue rounded rectangles labeled "site 1", "site 2", and "site n". To the right of the sites are three auxiliary containers: a red rounded rectangle labeled "FTP", a yellow rounded rectangle labeled "phpMyAdmin", and a blue rounded rectangle labeled "MySQL". Below these is a green rounded rectangle labeled "Proxy". Arrows indicate the following connections: "Builder" has a bidirectional arrow to "Builder DB" and a dashed line to "vol 1". "vol 1" has a bidirectional arrow to "site 1". "vol 2" has a bidirectional arrow to "site 2". "vol n" has a bidirectional arrow to "site n". "site 1", "site 2", and "site n" each have three arrows pointing to "MySQL". "site 1" and "site 2" each have one arrow pointing to "Proxy". "site n" has two arrows pointing to "Proxy". "MySQL" has a bidirectional arrow to "phpMyAdmin". "Proxy" has a bidirectional arrow to "Docker". "FTP" has a dashed line to "vol 1".

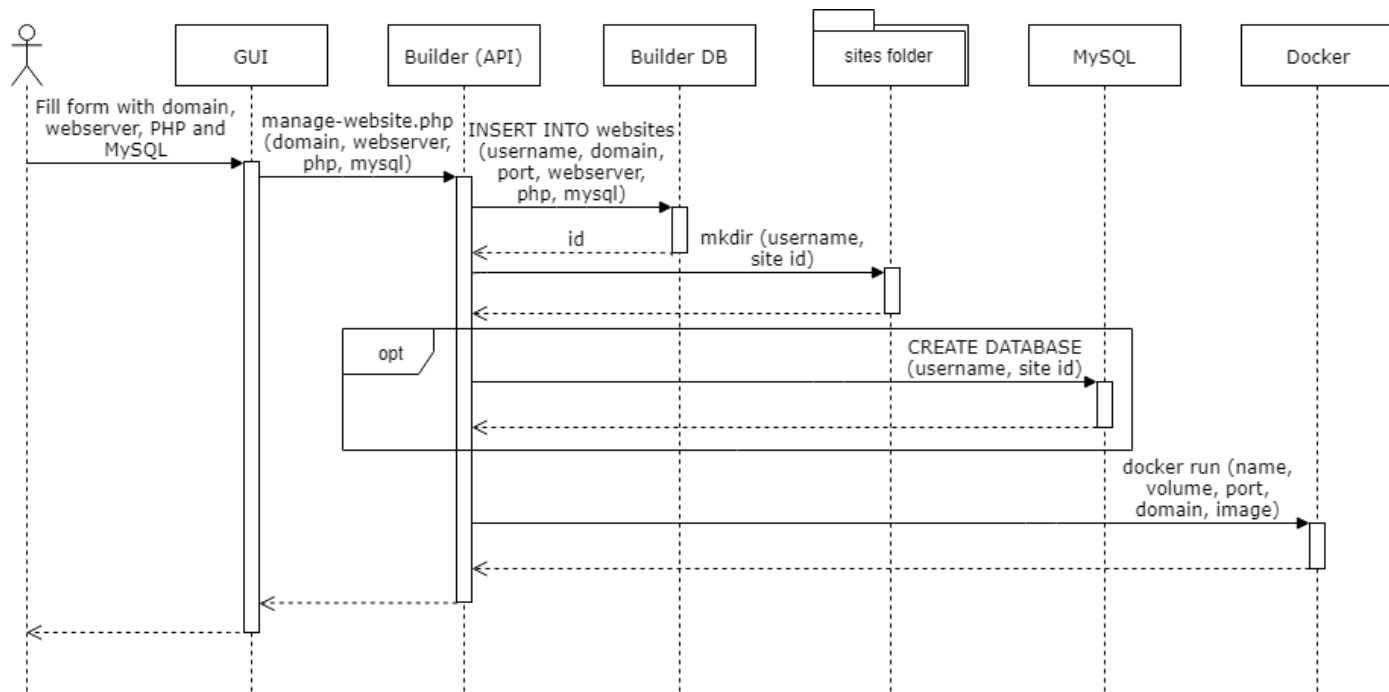
# FOCUS ON THE BUILDER

Builder



# SEQUENCE DIAGRAM

CREATING  
A  
WEBSITE



[Logout](#)

# Welcome back aldodaquino!

## Your websites

ID Domain Webserver PHP MySQL Manage

[Add new website](#)

## Important notice

In order for your site to be visible with the associated domain you need to point your domain at ip address 123.456.78.90 or set pier.aldodaquino.com as CNAME

## FTP access

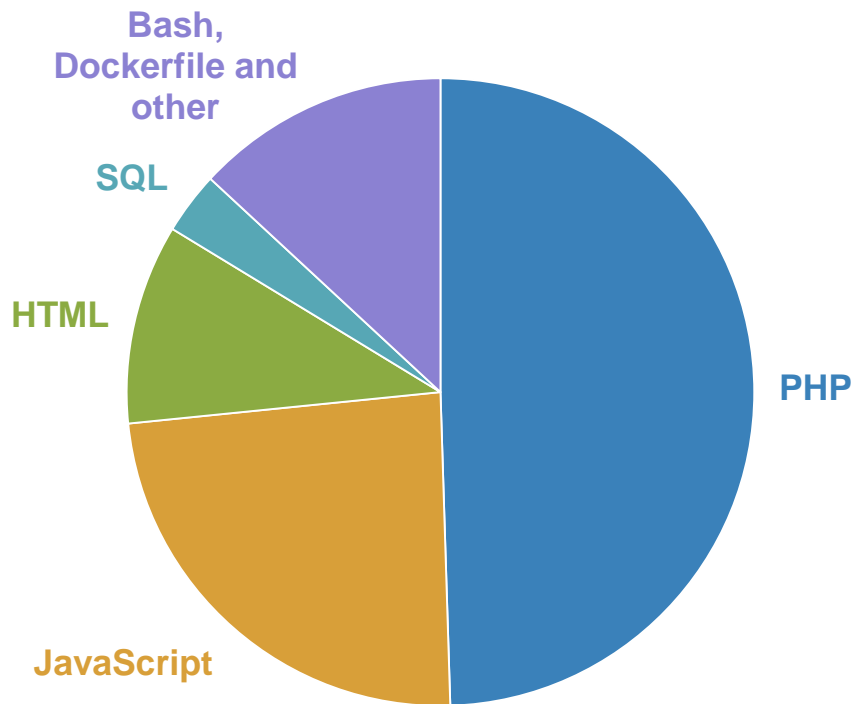
You can manage the files of your sites on your FTP account. You can access it on ftp.pier.aldodaquino.com on the default port 21. Username and password are the same ones you use to access this control panel.

## MySQL

You can to your database at mysql.pier.aldodaquino.com on the default port 3306. Username and password are the same ones you use to access this control panel. Database name is the same of the site name and is "site" followed by the site ID, like site123.

DEMO

# LANGUAGES USED



# CONCLUSIONS

- ▶ Easy to use thanks to the GUI
- ▶ Easy to extend thanks to the APIs
- ▶ Site creation and configuration completely automatized
- ▶ Possibility to modify the sites previously created
- ▶ Lightweight and clean code



# LESSON LEARNED

- ▶ Problems in communicating with Docker from a container
- ▶ Impossibility of packaging everything inside one container
- ▶ Difficulties in make a zero configuration system





# **FUTURE EXTENSIONS**

and what is  
missing

SSL  
HTTPS

Backup

More  
images

More  
databases  
and users  
for each  
site

NoSQL  
Database  
engines



# PIER

## DOCKER ORCHESTRATOR PER WEB HOSTING



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D'AQUINO**