

**Trueeverit.**



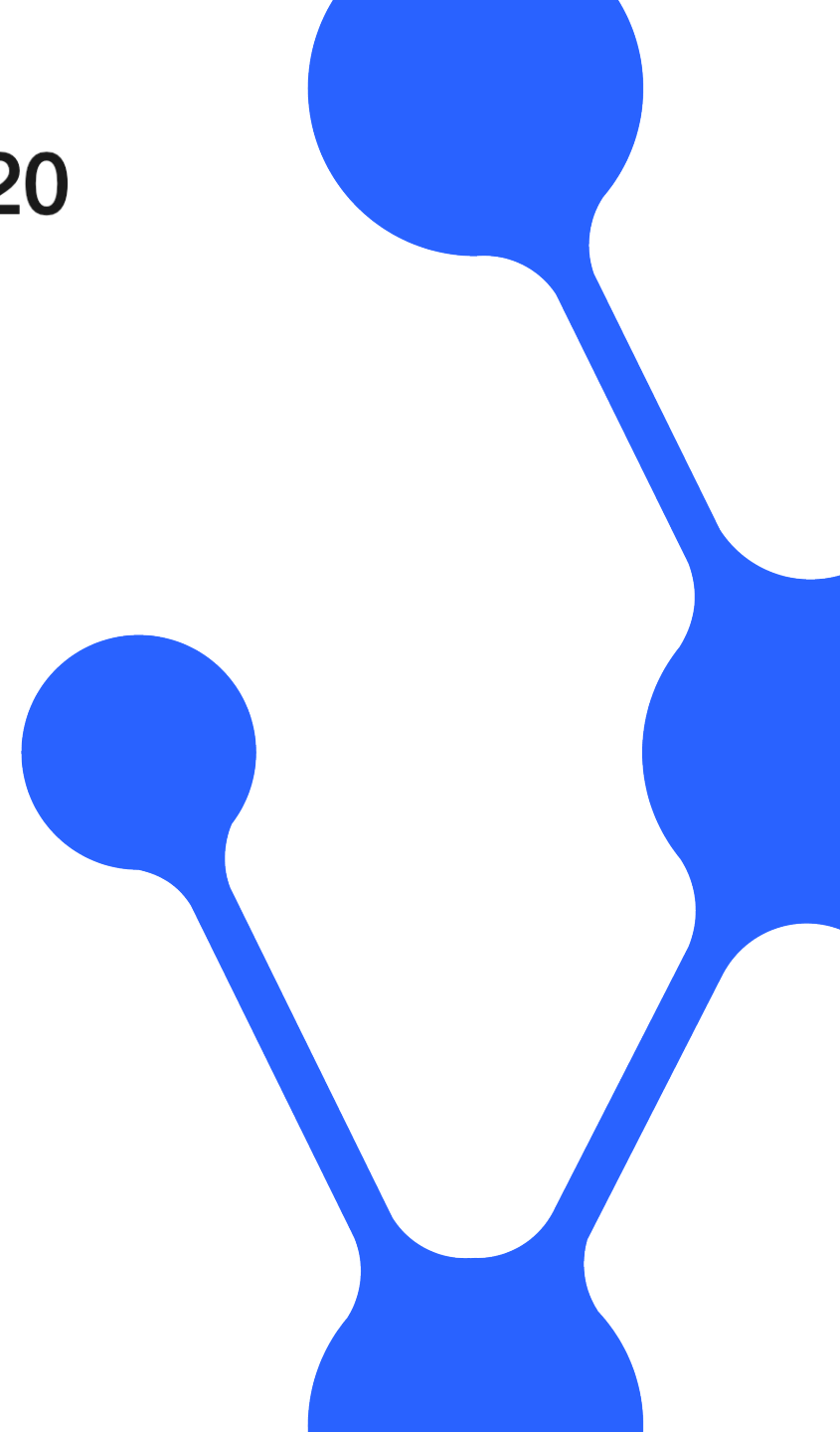
**Microservices 2020**

Bologna, September 8-10, 2020

# **DISMANTLING THE MONOLITH**

A TRUE STORY ABOUT MICROSERVICES IN IOT BUSINESS

Bologna, 10 Settembre 2020

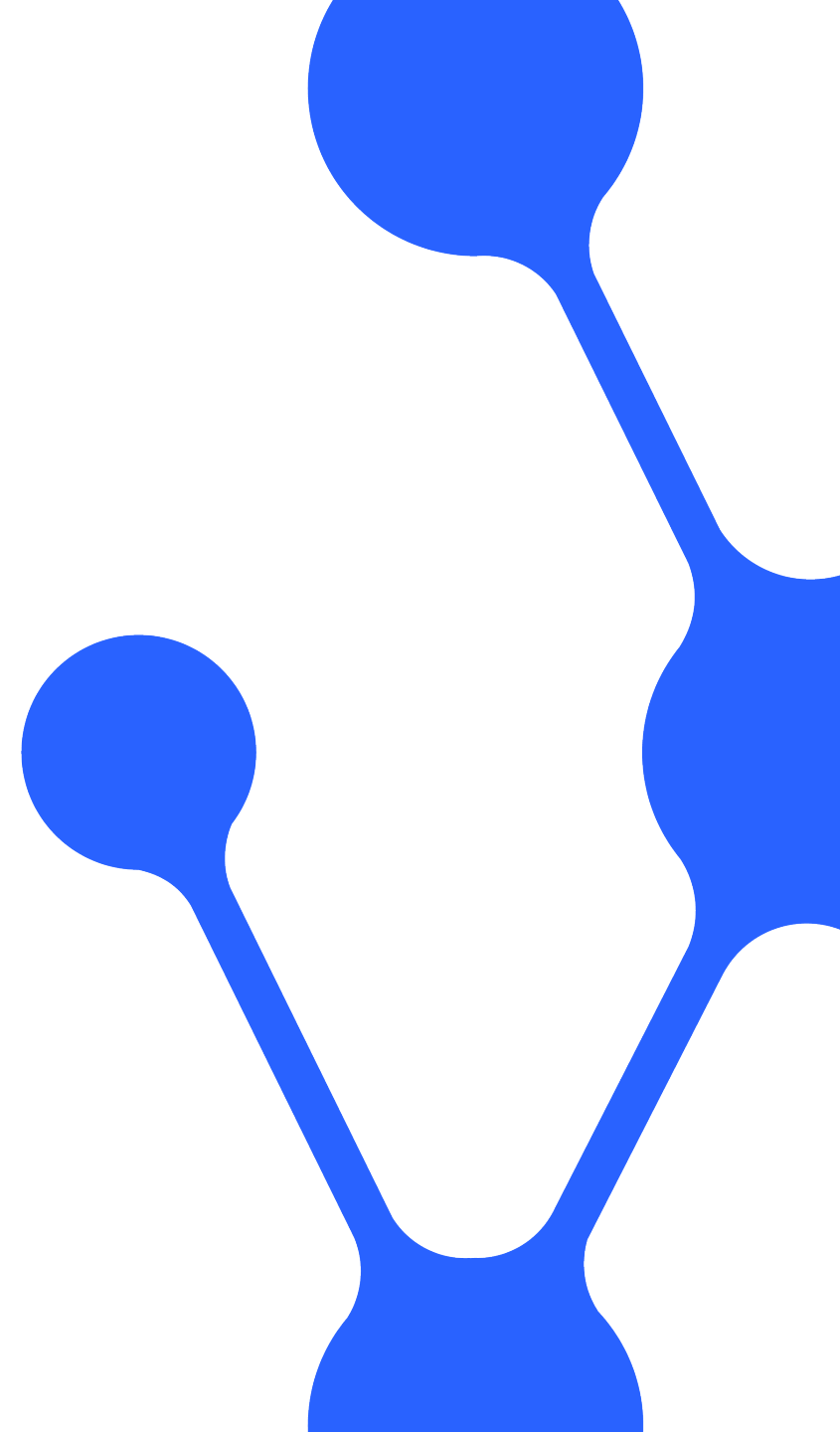




# Simone Fardella

Co-Founder & CTO @ Trueverit

- Open hardware lover
- Open source addicted
- Tech Enthusiast



WHO WE ARE

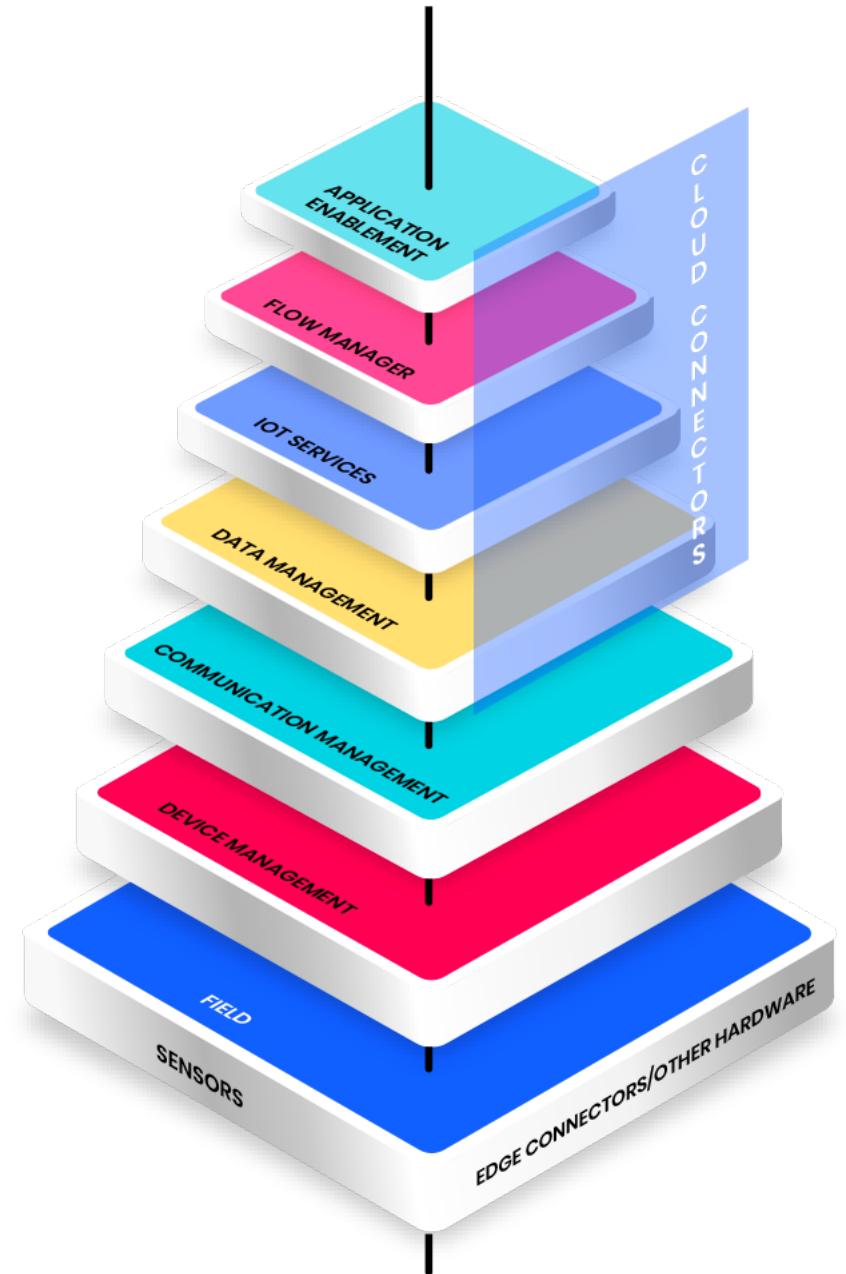
# INDUSTRIAL IOT INTEGRATION PLATFORM

Agnostic approach (HW & Infrastructure)

Open Protocol

API based

Full stack VS Single Layer

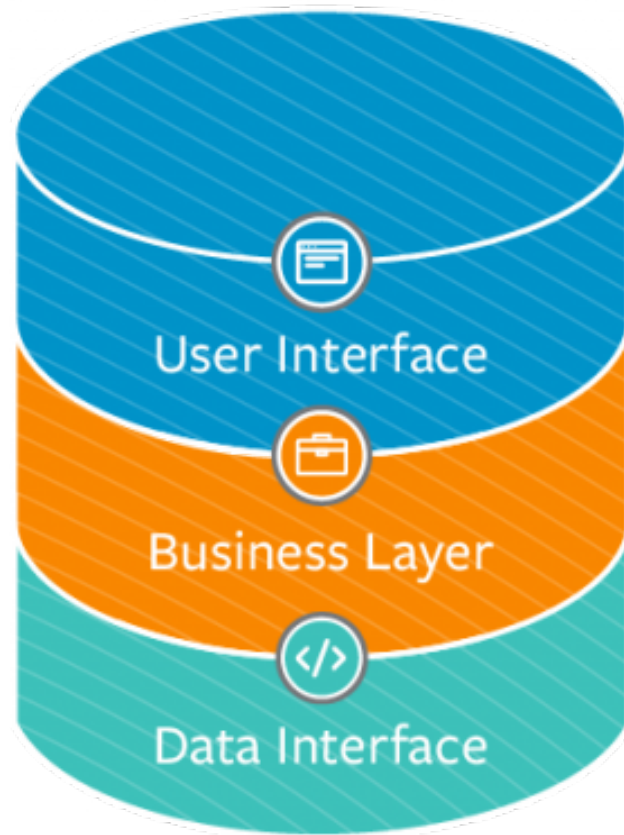


# 2014



# STARTING POSITION

## Monolithic Architecture



## WEAKNESSES

- Single frontend and backend for each customer
- Services load balance difficult to implement
- HA was a distant dream
- Whole instances compromised with each update/refactoring
- Versioning was managed R/W mount

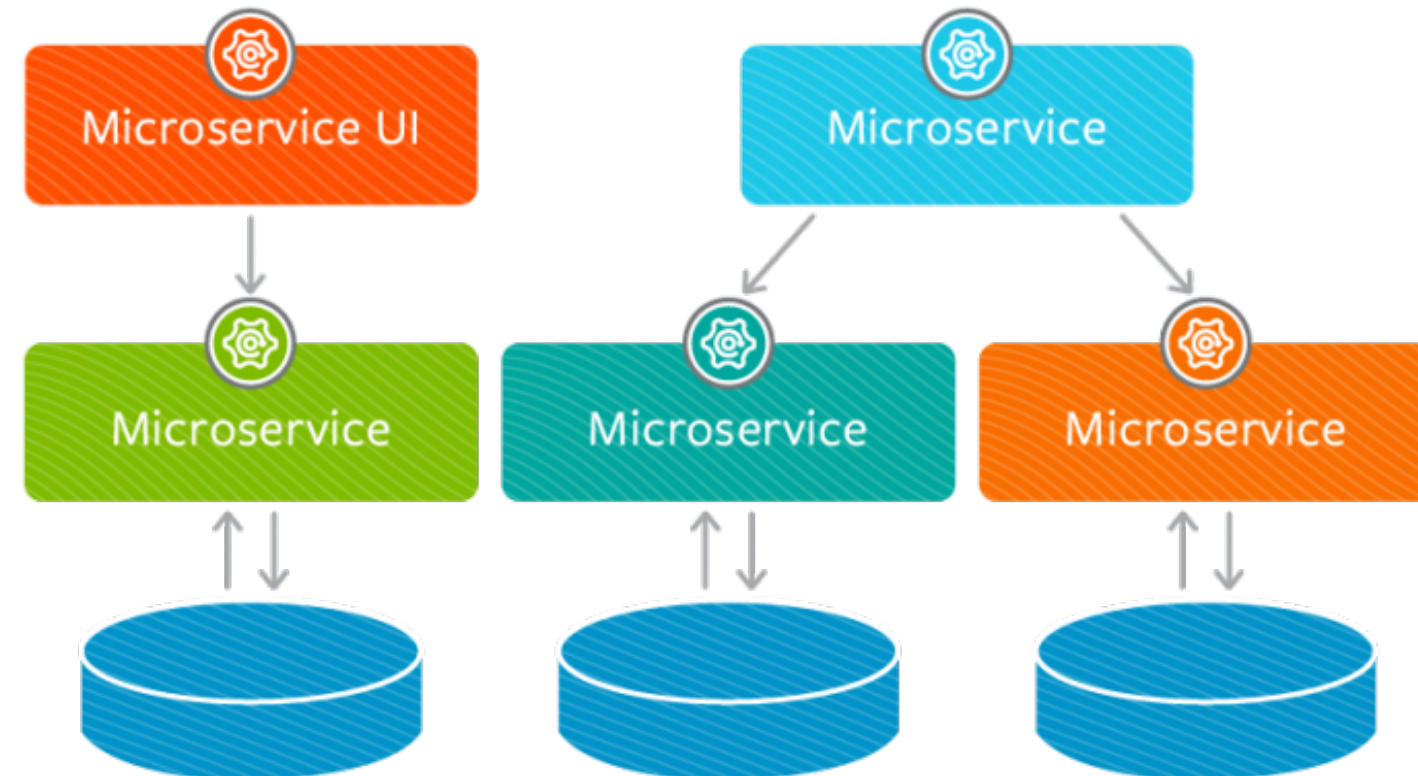


# 2017



# INTERMEDIATE STAGE

## Microservices Architecture



## WEAKNESSES

- Difficult to scale a single microservice
- Not so easy to deploy and maintain in production
- Volumes? Data persistency represents problem
- How we can scale FE/DB?
- Versioning?
- Security between containers?
- Docker compose for ever?



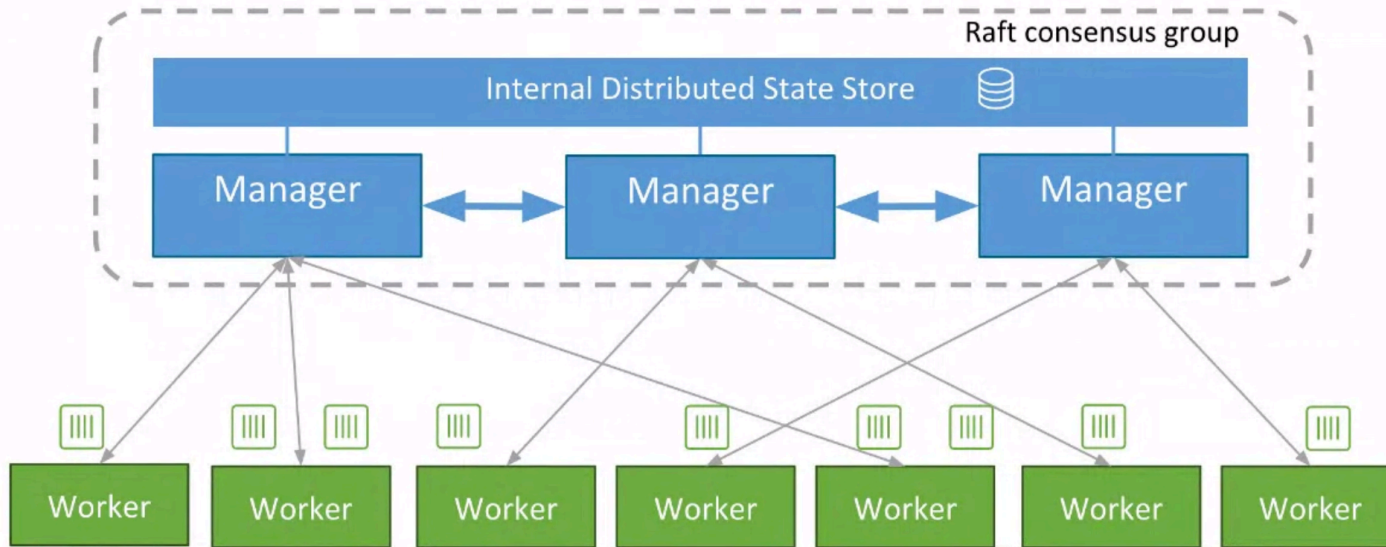
# 2020



# FINAL ARCHITECTURE – PRODUCTION GRADE

## ADVANTAGES

### Swarm Architecture



- Quite well scalable
- Workload can be distributed between hosts and nodes
- Native TLS Encryption between Manager and Workers
- Every service represent a microservice: 18 microservices in production
- Versioning based on image hash
- Quite simple to deploy and manage



# FINAL ARCHITECTURE – PRODUCTION GRADE PT II

## Container Registry

With the Docker Container Registry integrated into GitLab, every

[simone.fardella>trueverit\\_cloud/cloud](#)

[simone.fardella>trueverit\\_cloud/edge](#)

[simone.fardella>trueverit\\_cloud>trueverit\\_iot\\_flow](#)

[simone.fardella>trueverit\\_cloud/business\\_analytics](#)

[simone.fardella>trueverit\\_cloud/backup-engine](#)

[simone.fardella>trueverit\\_cloud/cloud\\_wsgi](#)

[simone.fardella>trueverit\\_cloud/edge\\_wsgi](#)

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[simone.fardella>trueverit\\_cloud>trueverit\\_nginx\\_edge](#)

### simone.fardella>trueverit\_cloud/cloud tags

<input type="checkbox"/>	Tag	Image ID	Compressed Size	Last Updated	
<input type="checkbox"/>	024d5365	f024cd6a9	197.34 MiB	1 day ago	
<input type="checkbox"/>	48da7a3e	7f601df8a	197.33 MiB	2 days ago	
<input type="checkbox"/>	5365a9d2	649959ed6	197.33 MiB	2 days ago	
<input type="checkbox"/>	5d515f77	cac78672d	197.33 MiB	1 day ago	
<input type="checkbox"/>	c8930a99	91280b78c	197.33 MiB	3 days ago	
<input type="checkbox"/>	latest	5c993e086	128.86 MiB	2 weeks ago	



# FINAL ARCHITECTURE – PRODUCTION GRADE PT III

The screenshot displays the Portainer.io Swarm management interface. On the left is a dark blue sidebar with navigation links: Home, AGENT2, Dashboard, App Templates, Stacks, Services, Containers, Images, Networks, Volumes, Secrets, Swarm, SETTINGS, Users, Endpoints, Registries, and Settings. The main content area is divided into two sections: 'Cluster information' and 'Cluster visualizer'.

**Cluster information**

Nodes	4
Services	4
Tasks	78

Filters

Only display running tasks ☒

Refresh

Rate

**Cluster visualizer**

The visualizer shows four nodes in a 2x2 grid:

- worker1.localdomain** (worker, CPU: 1, Memory: 511.41 MB, ready)
  - portainer\_agent2 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:57)
  - portainer\_agent (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:56)
  - portainer\_agent\_worker1 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:58)
- worker2.localdomain** (worker, CPU: 1, Memory: 511.41 MB, ready)
  - portainer\_agent\_worker1 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:58)
  - portainer\_agent (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:58)
  - portainer\_agent\_worker2 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:56)
- manager1.localdomain** (manager, CPU: 1, Memory: 1.04 GB, ready)
  - portainer\_agent (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:55)
  - portainer\_agent\_worker1 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:58)
  - portainer\_agent2 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:44:58)
- manager2.localdomain** (manager, CPU: 1, Memory: 775.64 MB, ready)
  - portainer\_agent\_worker1 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:55:04)
  - portainer\_agent2 (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:55:04)
  - portainer\_agent (Image: portainer/agent:latest, Status: running, Update: 2018-09-11 21:55:04)




# USE CASE – TRUEVERIT INTO A MILITARY IT ENVIRONMENT

## THE CHALLENGE

- Deploy Trueverit in a high security military environment
- Create a cluster of resources based on microservices
- Manage in simple and time effective solution updates and hotfix
- Obtain and maintain flexibility and high performance data collecting services maintaining security levels
- Deliver a system that can scale geographically

## THE RESULTS

- Created single VM's on Vmware hosts, vm were inspected and validated by IT Security dept. -> Installed Docker Hypervisor -> deployed Stack Trueverit
- Cluster Swarm based
- Updates and versioning image based
- Each Docker swarm node communicates using TLS Encryptions
- Scalability guaranteed with simple network segment 

# KEY TAKEAWAY

## DIFFICULTIES

- Many microservices
- Security e Vulnerability
- Cluster Management
- Image Dimensions

## BEST PRACTICE

- Deploy compose or swarm stack
- Base images slim, few users privileged and expose limited to services
- Use of orchestration tools like (K8S, Portainer, etc...)
- Minimal dependencies, only what is needed!



# Thanks.





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