2020-03-11

CLOUD EXPO EUROPE

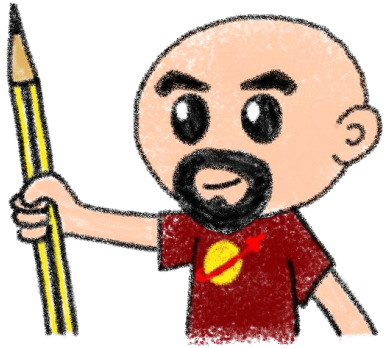
# Kubernetes in production

Horacio Gonzalez
@LostInBrittany

OVHcloud

# Who are we?

## Introducing myself and introducing ~~OVH~~ OVHcloud



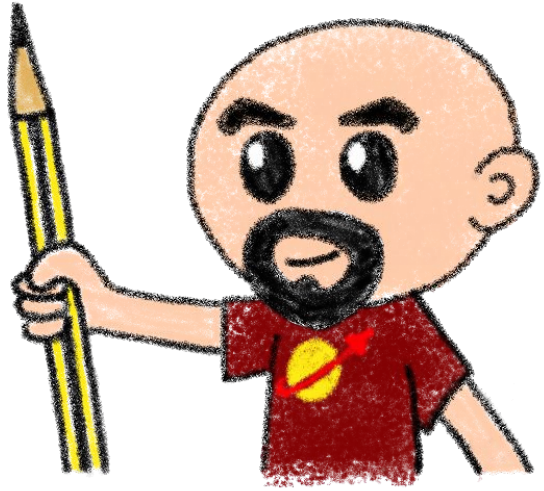
# Horacio Gonzalez

@LostInBrittany

Spaniard lost in Brittany, developer, dreamer and all-around geek

OVHcloud

DevRel Leader



DevFest du Bout du Monde

Finist Devs

Google Developers Experts 2019

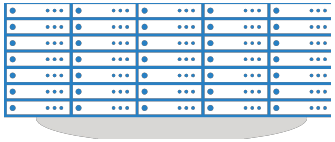
Web Technologies GDE

Flutter

# OVHcloud: A Global Leader

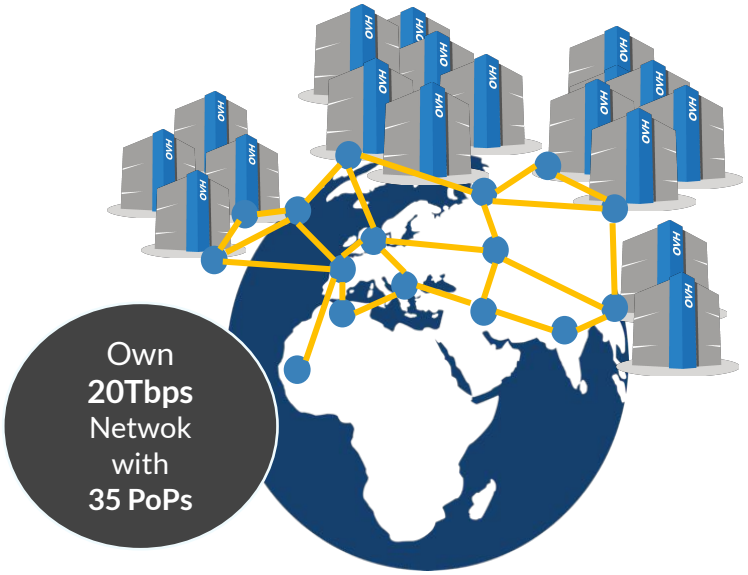
**250k** Private cloud VMs running

1 **Dedicated IaaS Europe**



Hosting capacity : **1.3M** Physical Servers

**360k** Servers already deployed

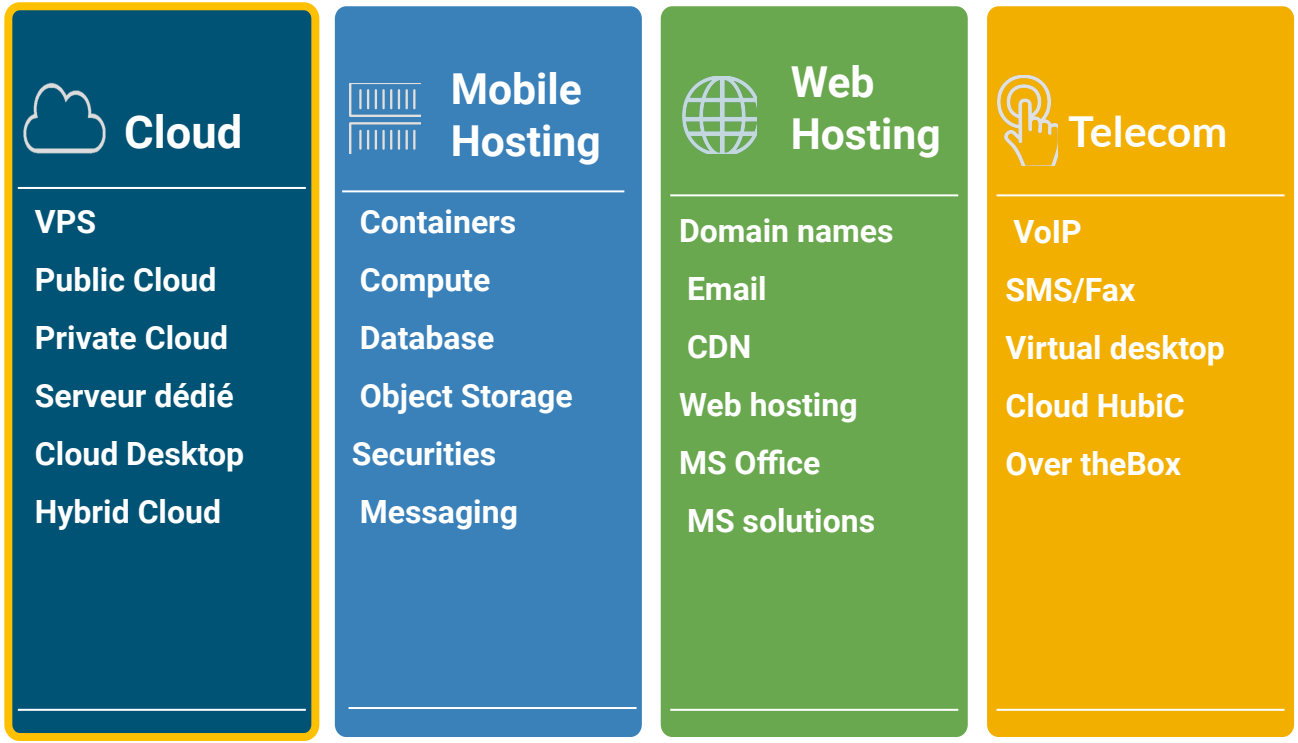



Own **20Tbps** Netwok with **35 PoPs**

**30** Datacenters

> **1.3M** Customers in **138** Countries

# OVHcloud: Our solutions



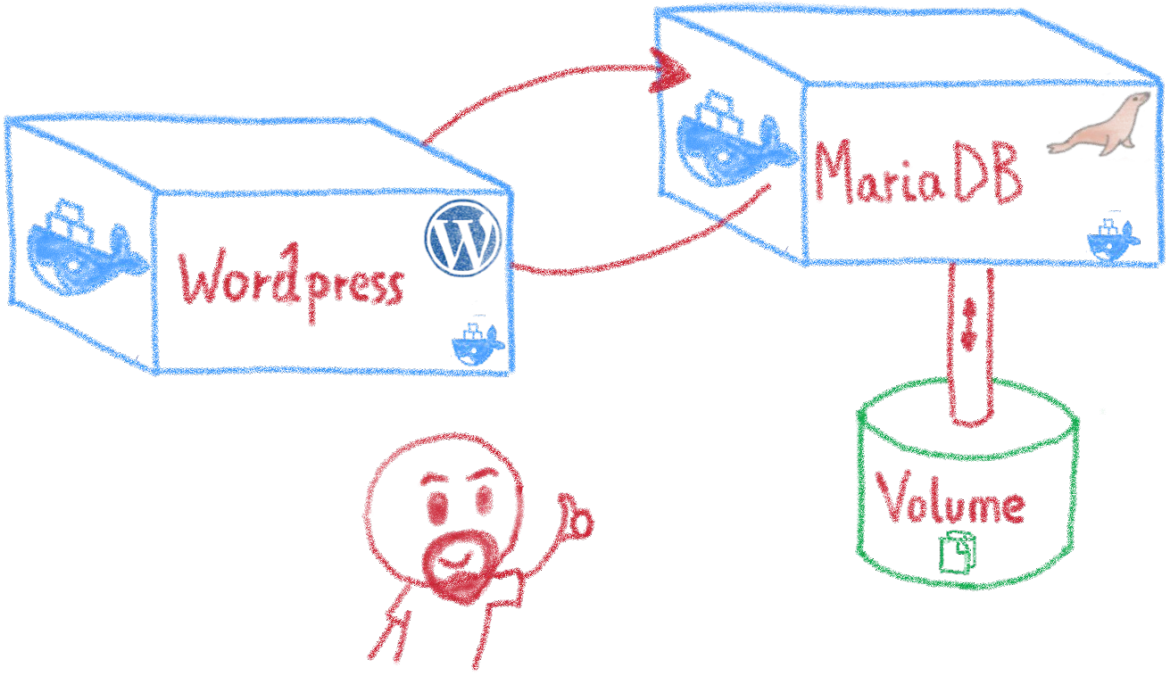
# Orchestrating containers

## Like herding cats… but in hard mode!

# From bare metal to containers

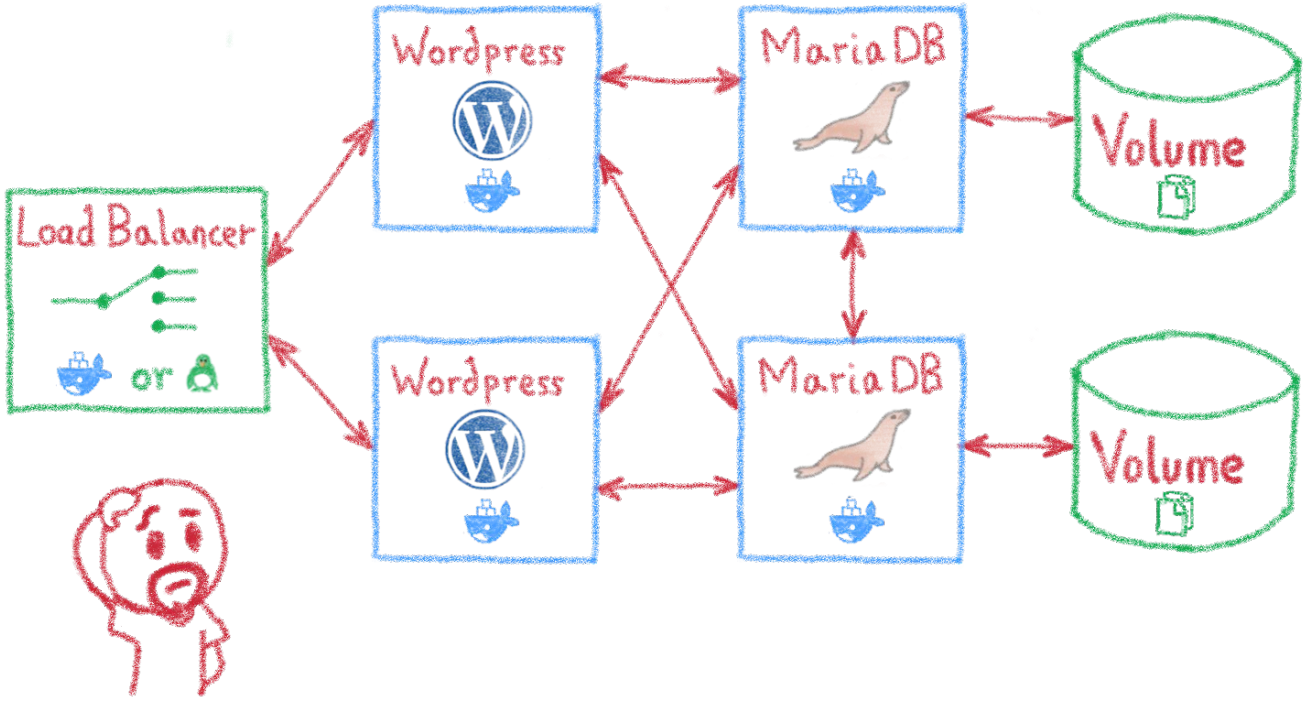

Another paradigm shift

# Containers are easy...



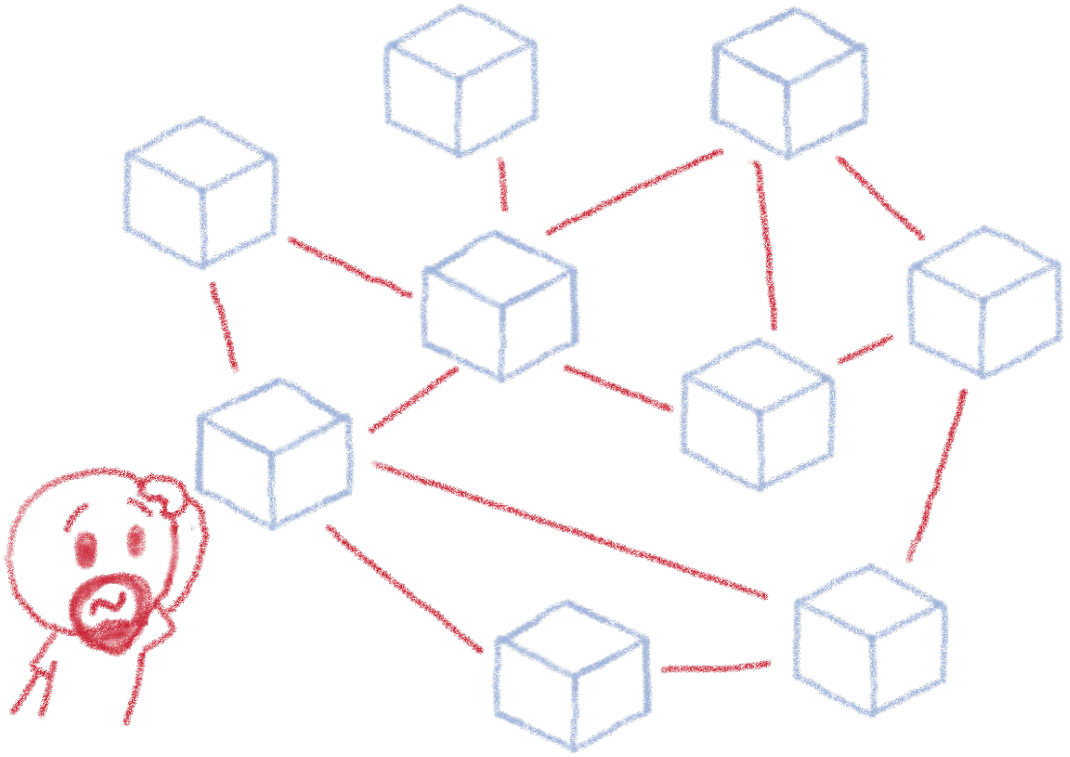

For developers

# Less simple if you must operate them



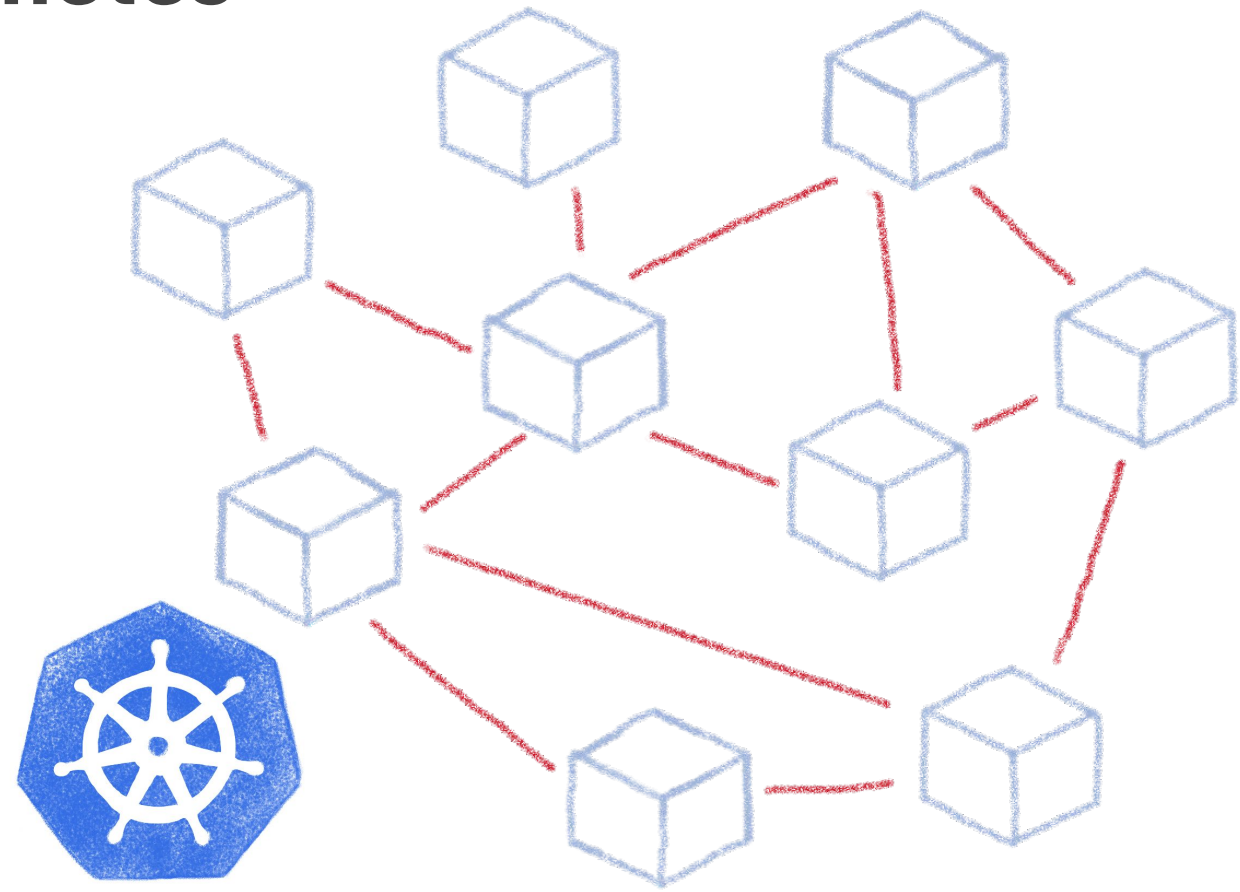

Like in a production context

# And what about microservices?



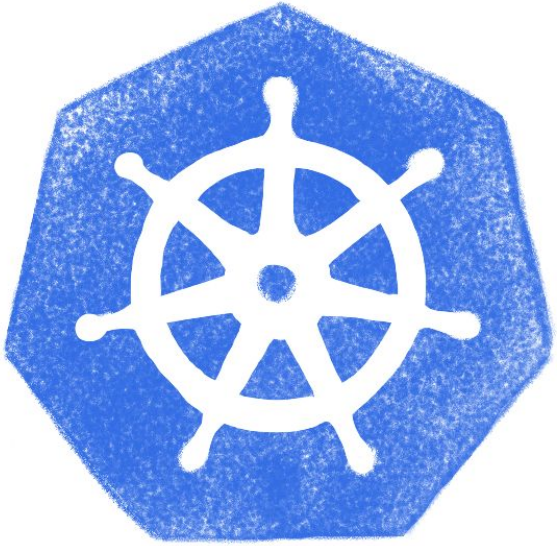
Are you sure you want to operate them by hand?

# Taming microservices with Kubernetes

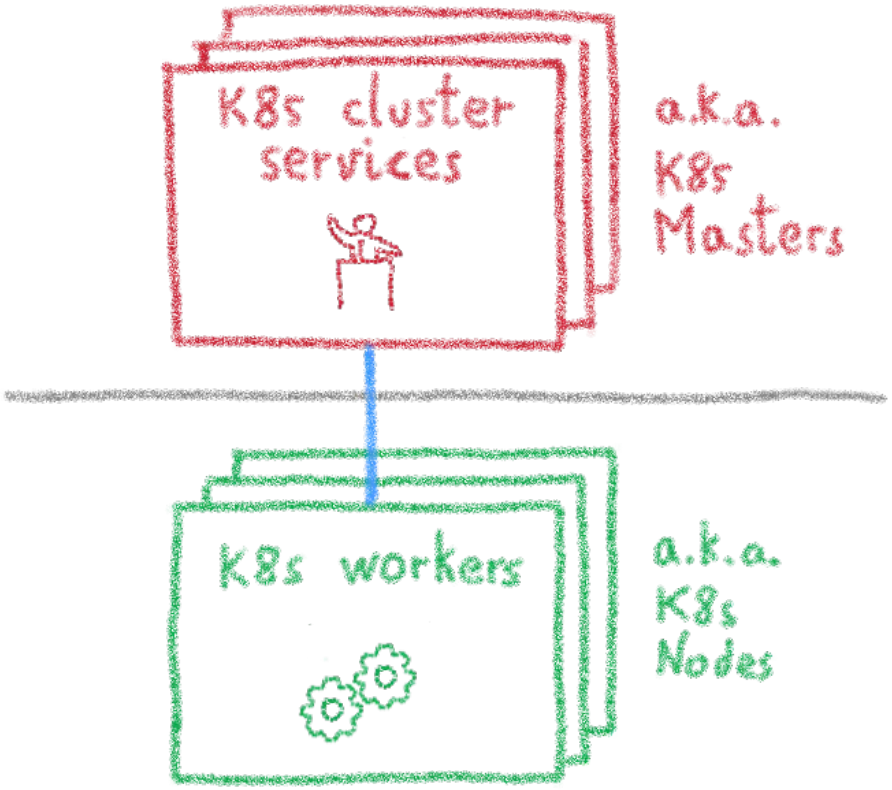


# Kubernetes

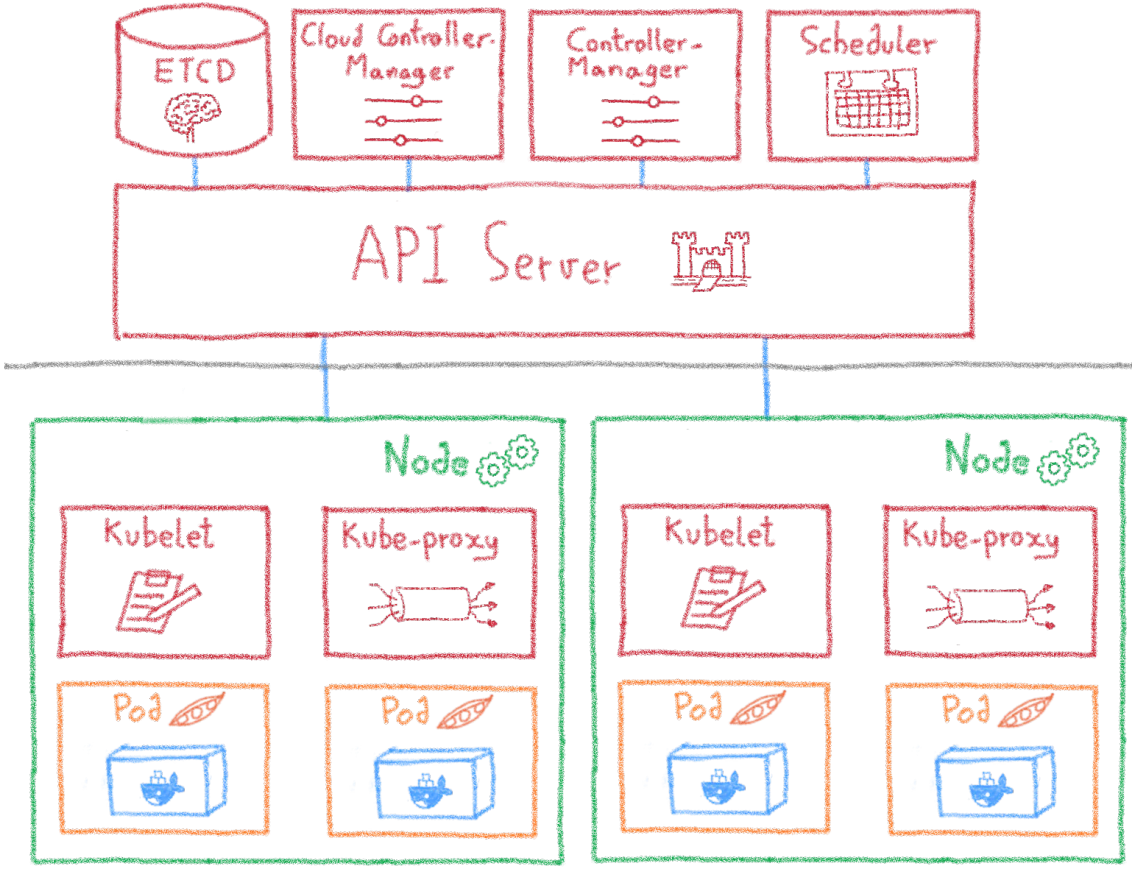
## Way more than a buzzword!



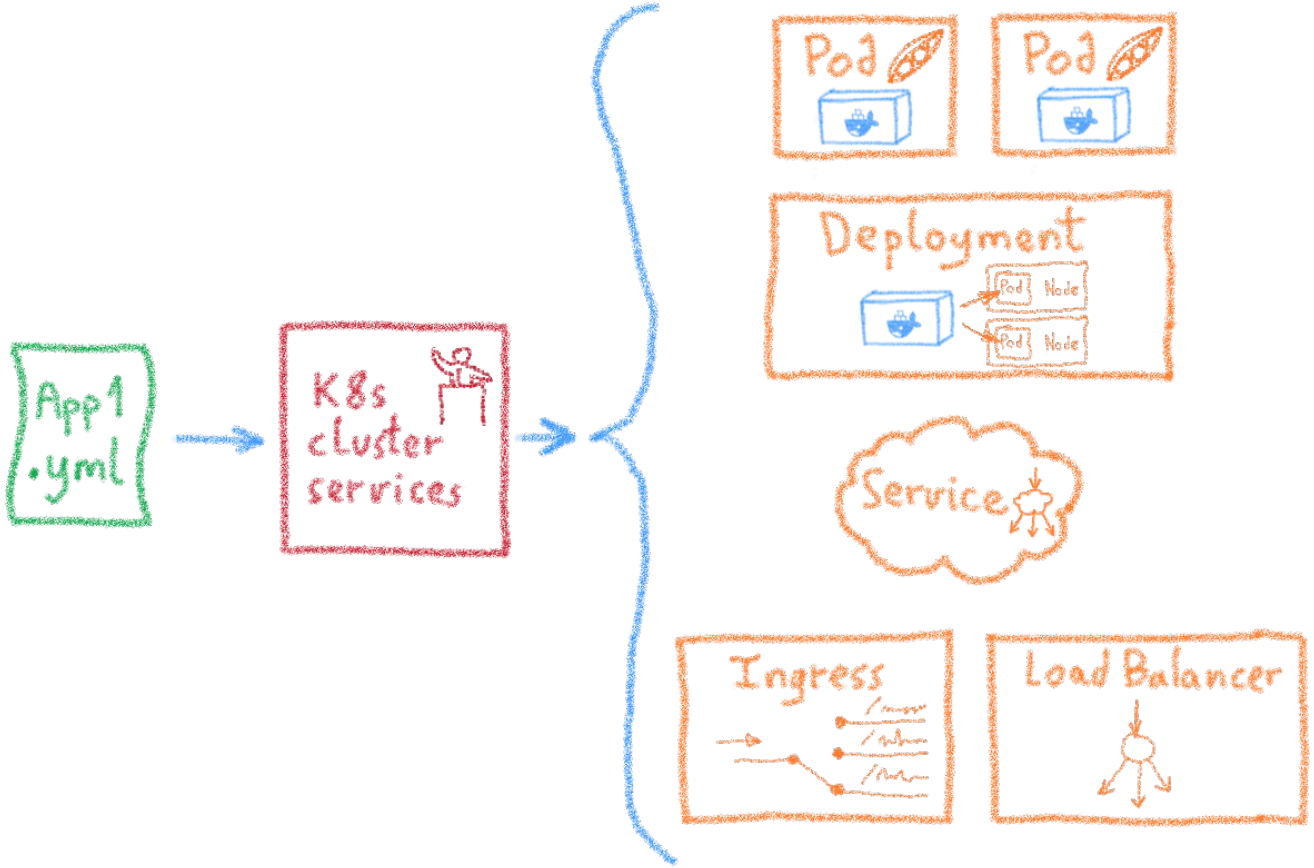
# Masters and nodes



# Some more details



# Desired State Management




Ingress

Services

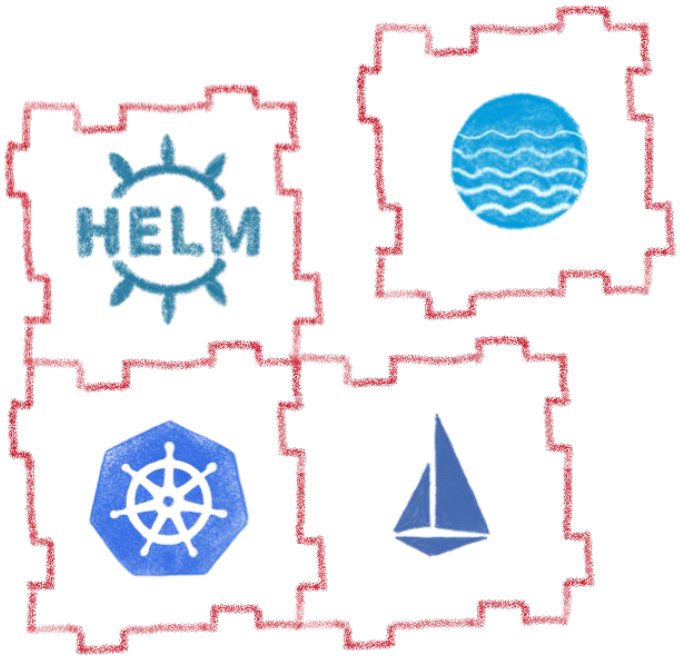
Deployments

Pods

Sidecars

Replica Sets

# Extending Kubernetes



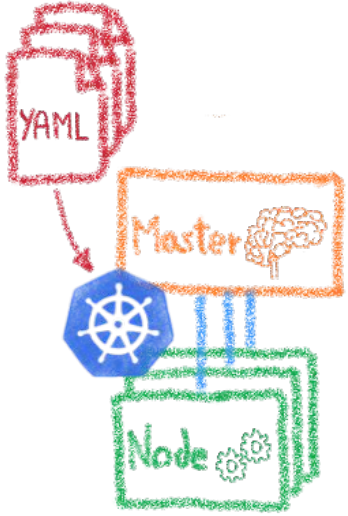

Fully extensible

- Kubernetes API
- Cluster demons
- Controllers
- Custom resources
- ...

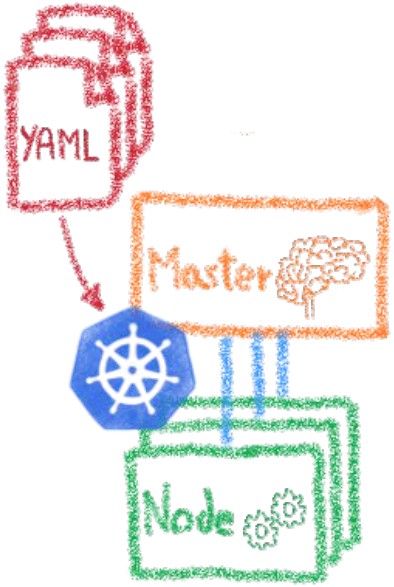
Operators

# Multi-environment made easy

## Dev, staging, prod, multi-cloud...

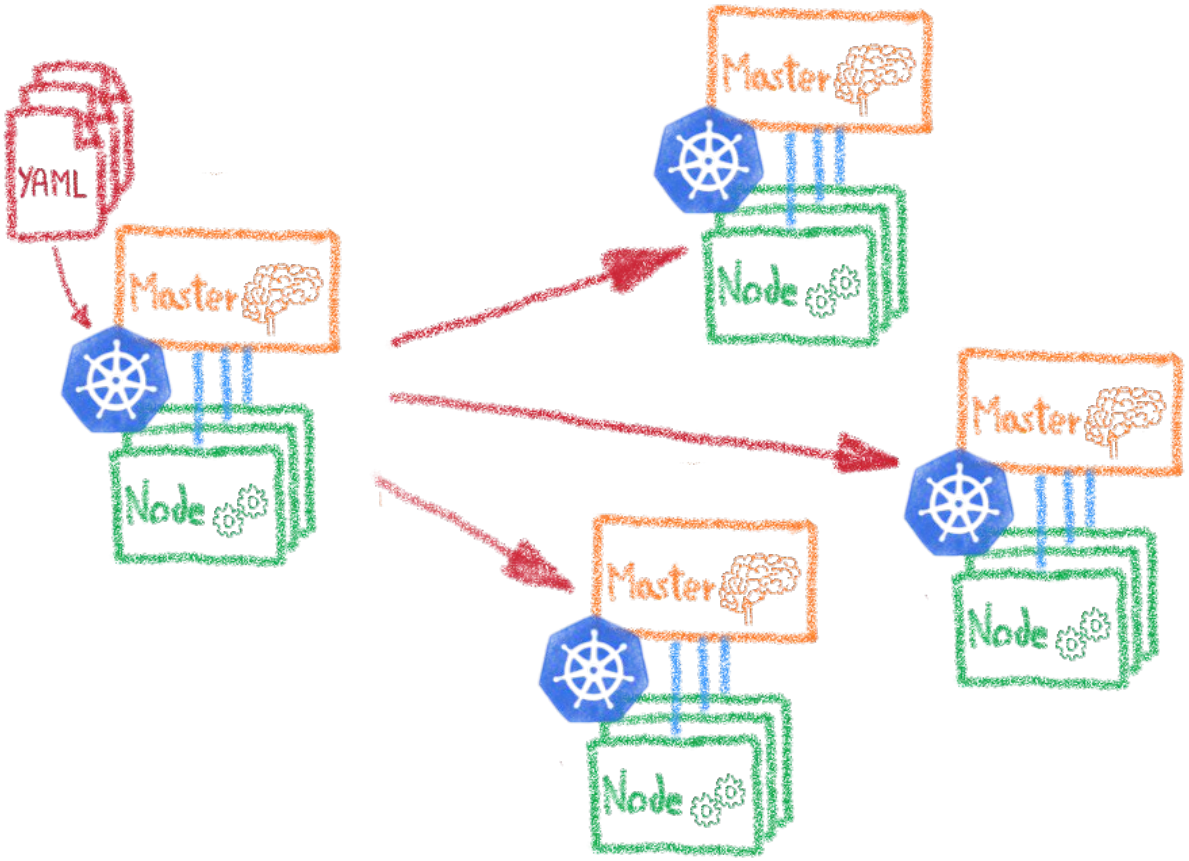


# Declarative infrastructure




Multi-environment made easy

# Having identical, software defined environments




Dev envs

Staging

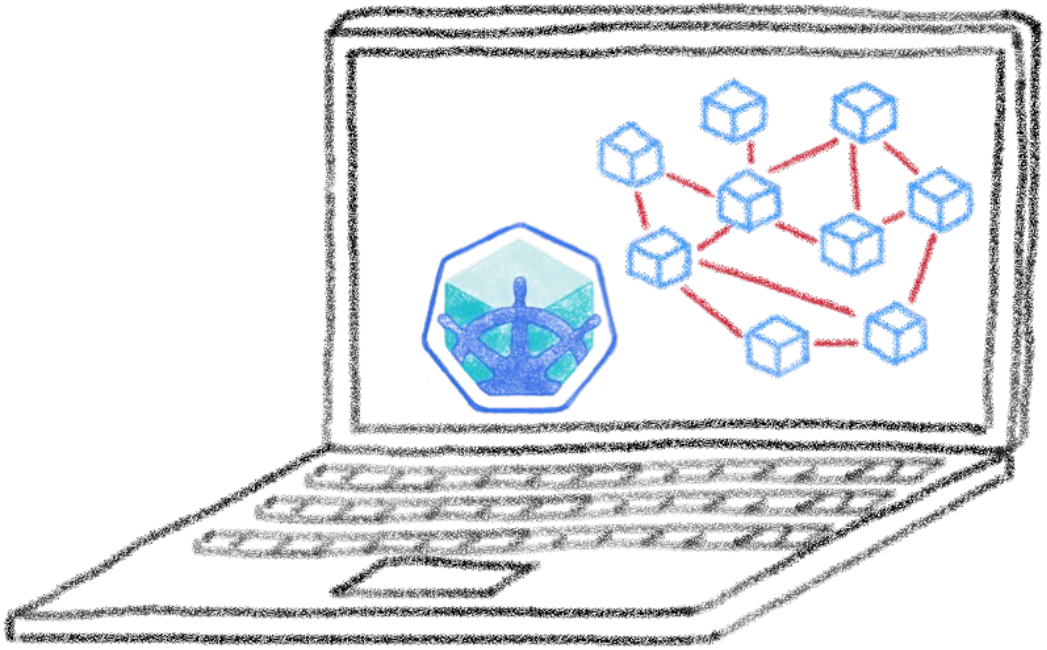
Multi-cluster

Multi-cloud

# I have deployed on Minikube, woah!

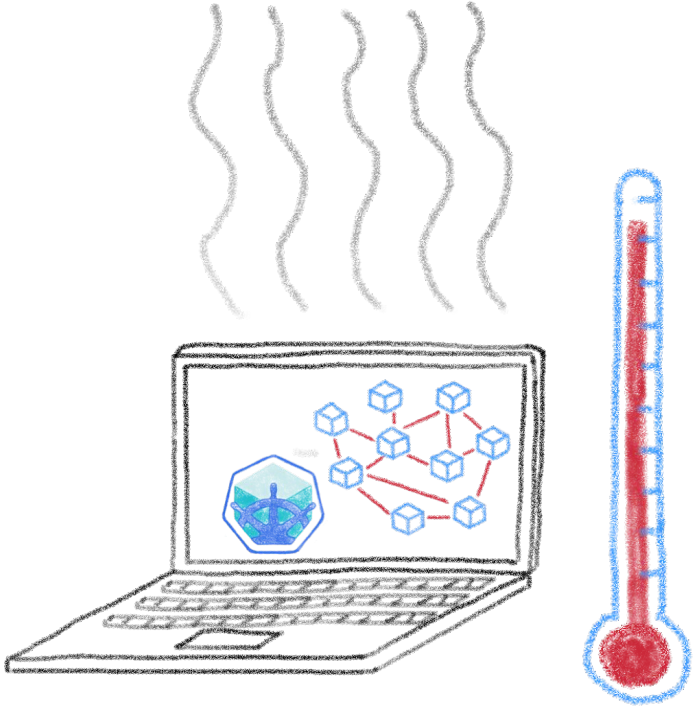
## A great fastlane into Kubernetes

# Running a full K8s in your laptop



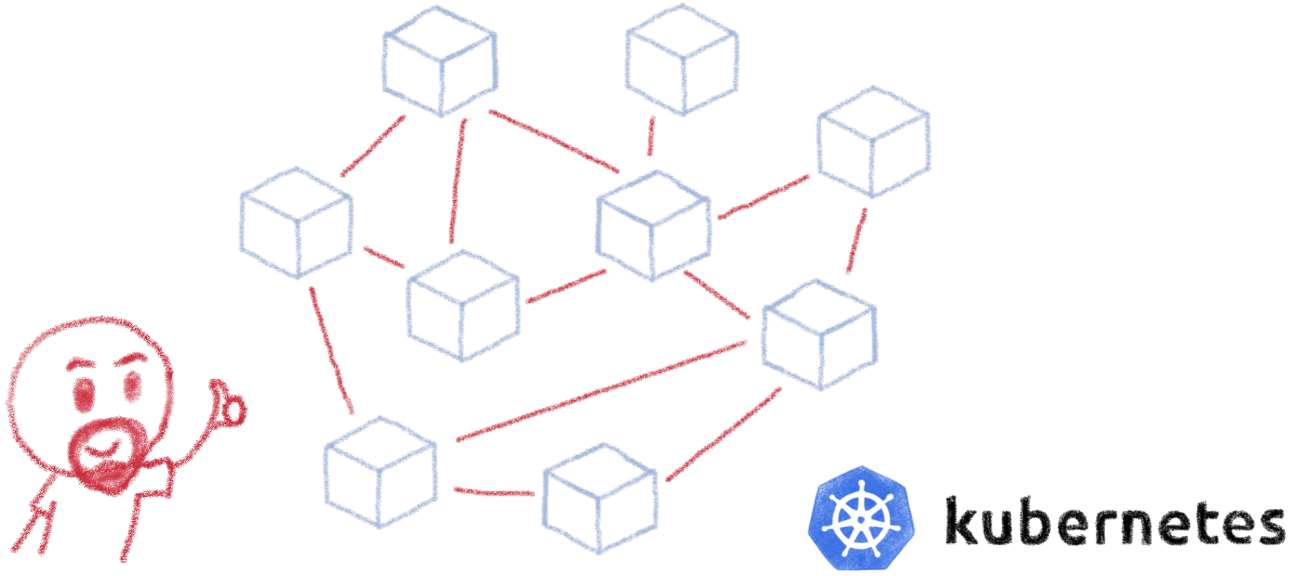
A great learning tool

# Your laptop isn't a true cluster



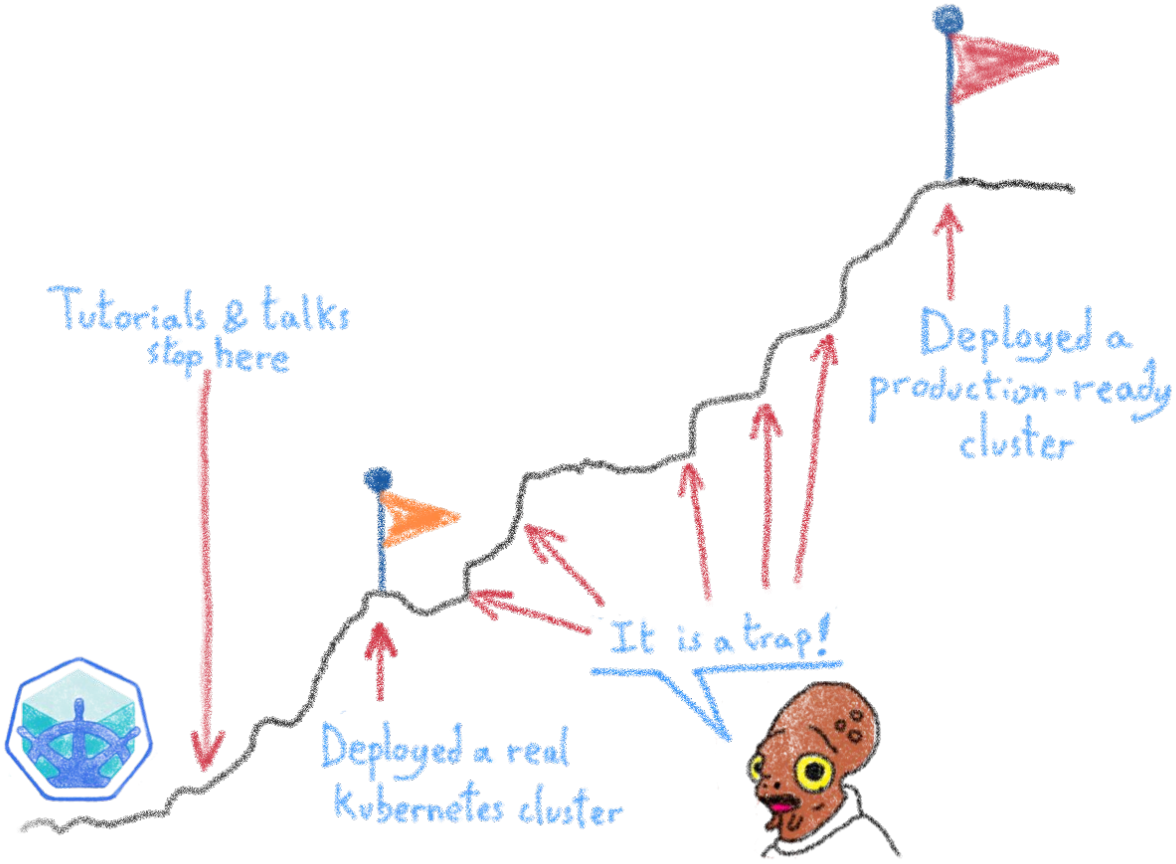
Don't expect real performances

# Beyond the first deployment




So I have deployed my distributed architecture on K8s, everything is good now, isn't it?

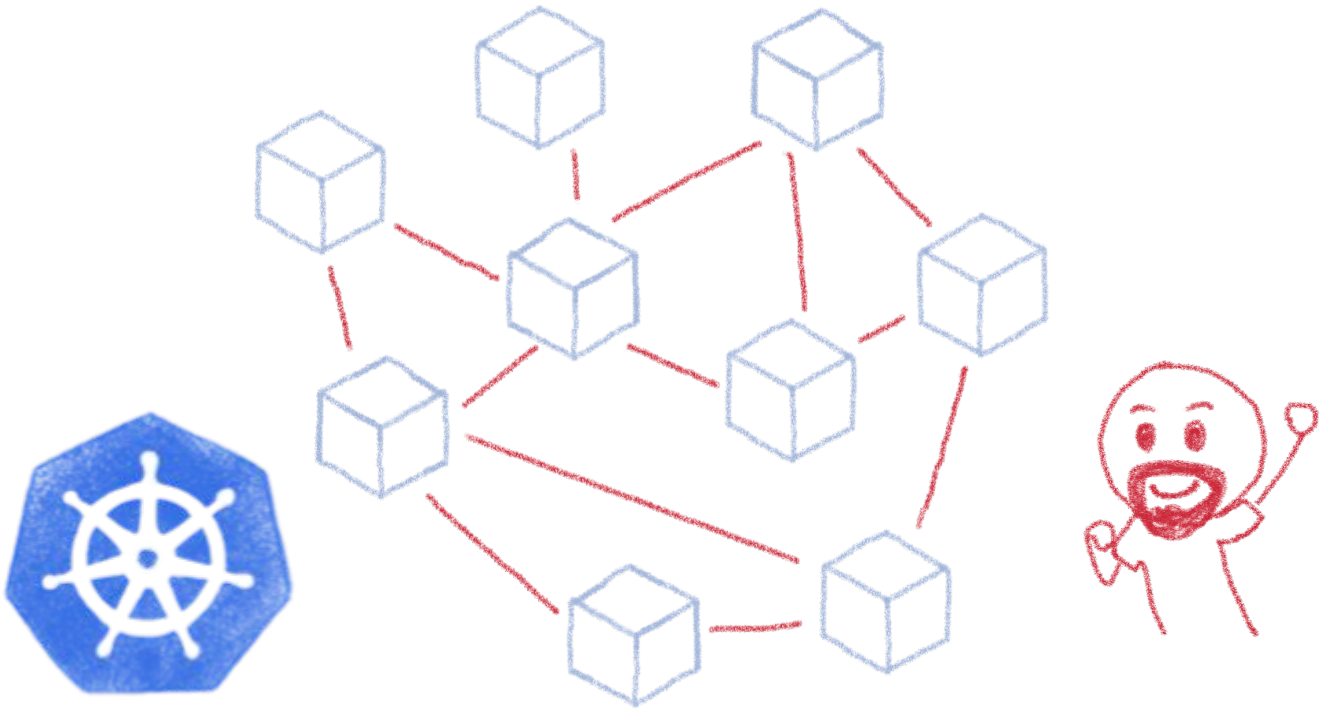
# Minikube is only the beginning



# From Minikube to prod

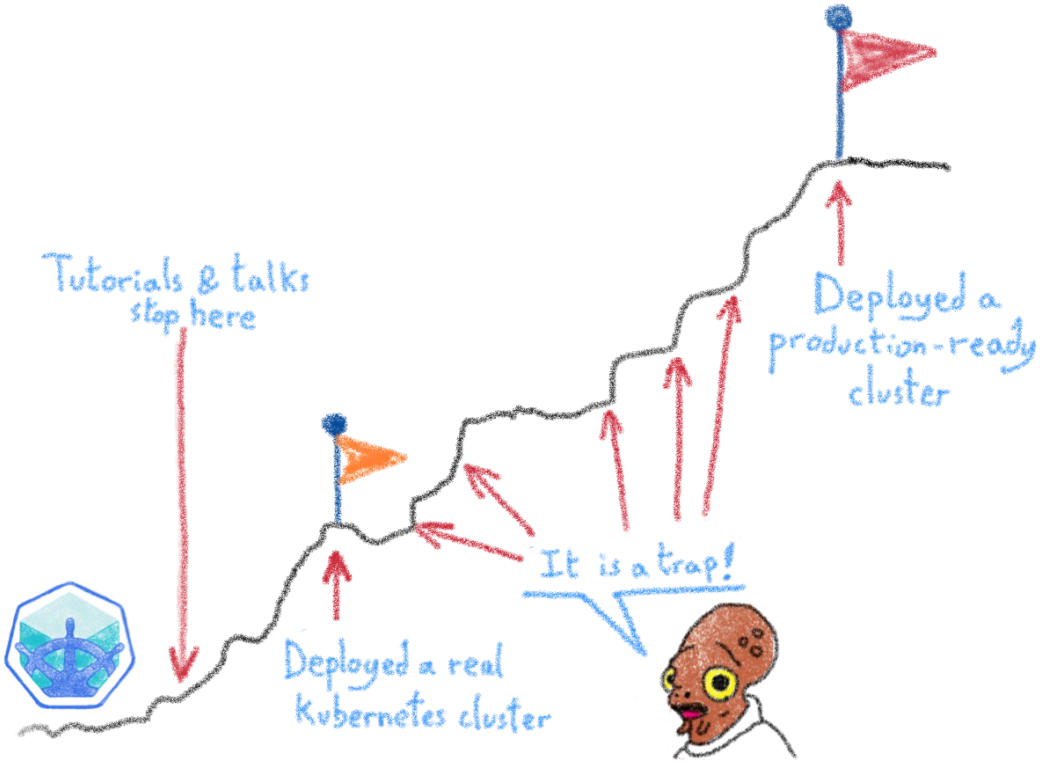
## A journey not for the faint of heart

# Kubernetes can be wonderful



For both developers and devops

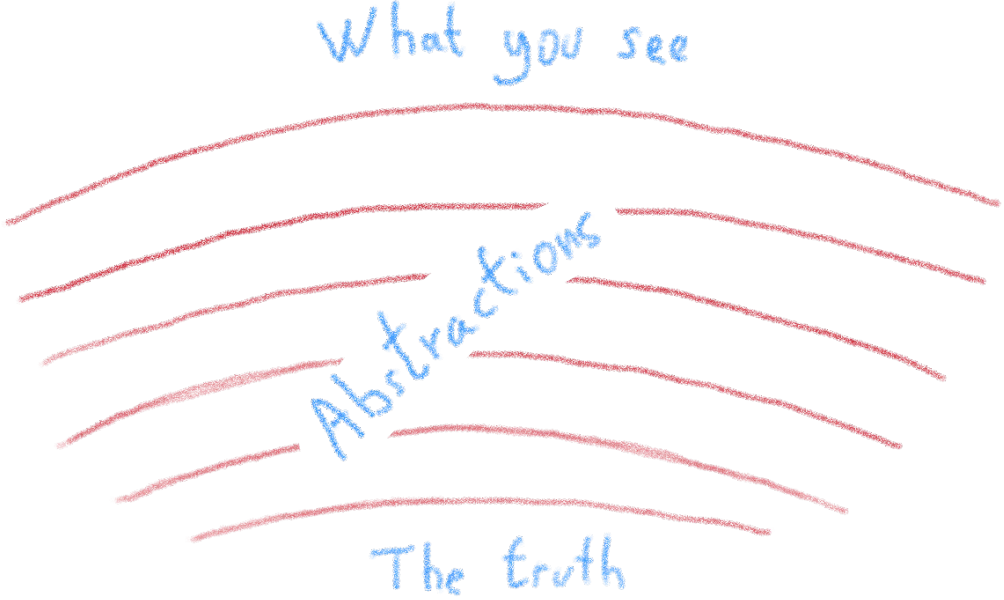
# But it comes with a price...



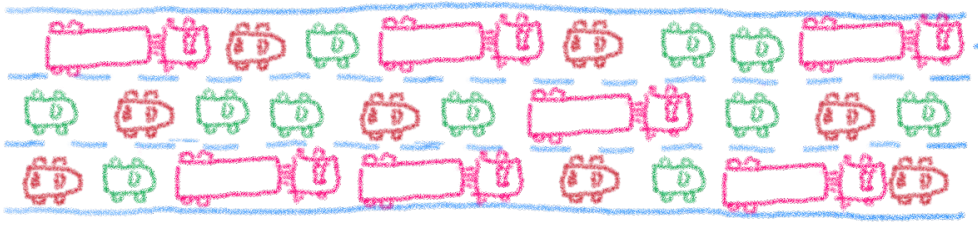
# Describing some of those traps


To ease and empower your path to production

# The truth is somewhere inside...




# The network is going to feel it...



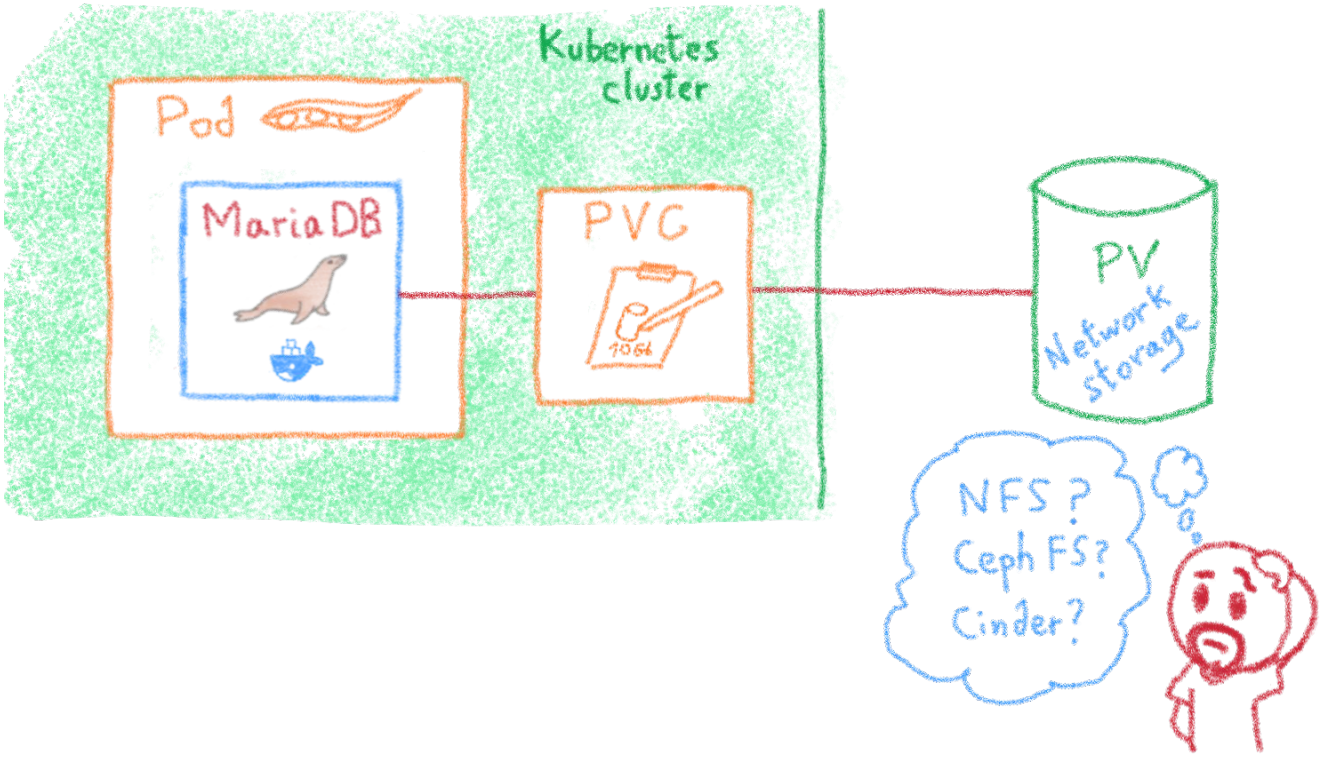

Network plugins (Flannel, Calico, Weave...)

- IPAM
- routing
- iptables
- crossnode networking

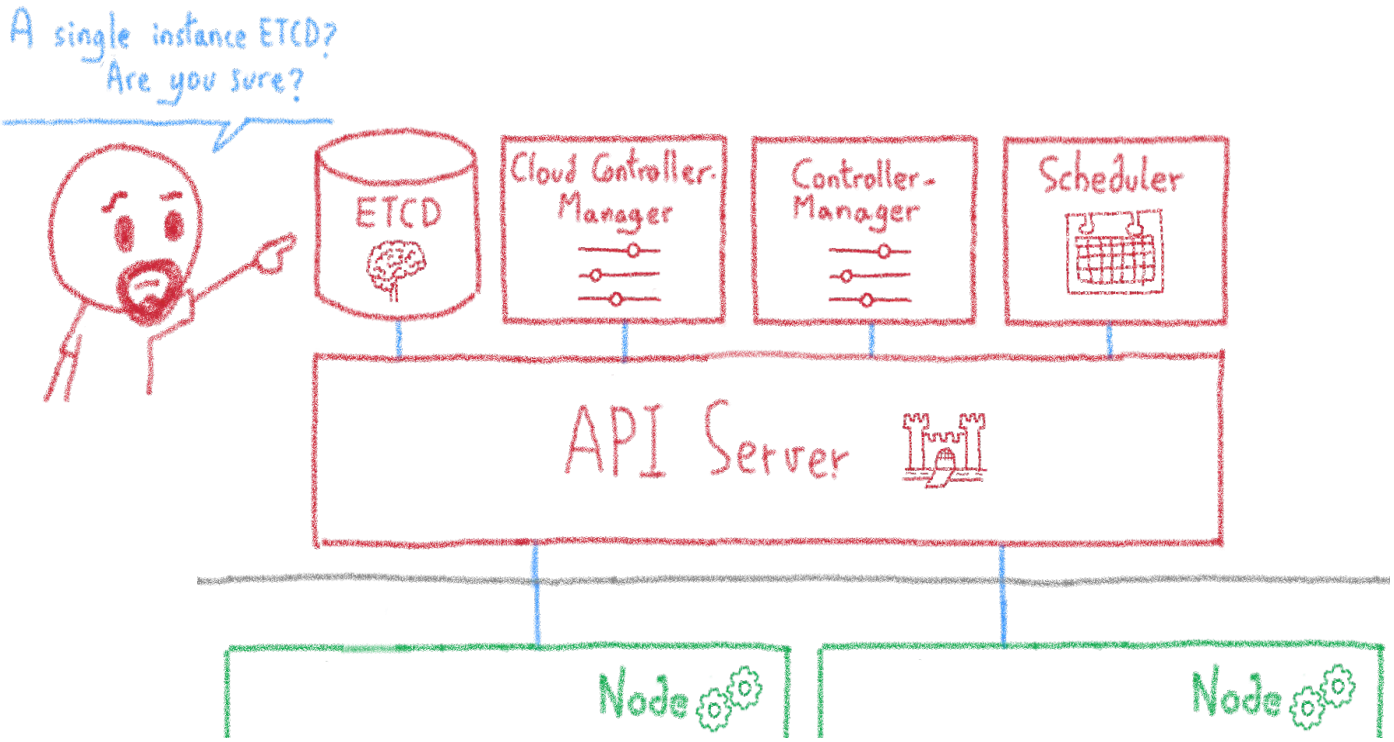
Cluster IP, NodePort, Ingress

Service Meshes, Istio

# The storage dilemma

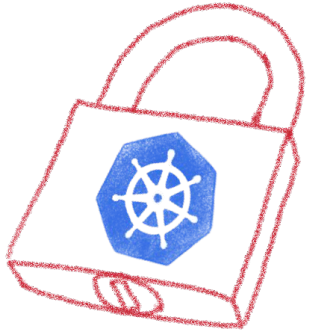


# The ETCD vulnerability



# Security

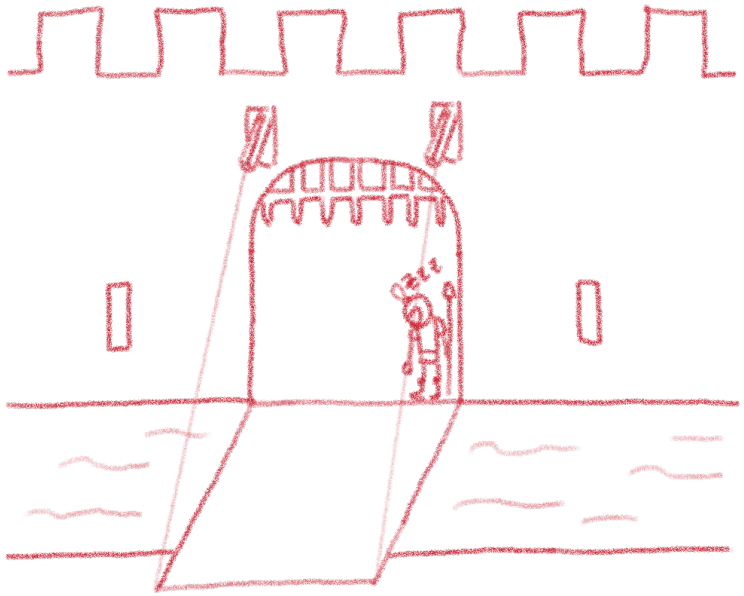
## Hardening your Kubernetes



# The security journey


Open ports (e.g. etcd 2379/TCP)
Kubernetes API (e.g. Tesla hacking)
Exploits (lots of CVEs)
RBAC (e.g. badly defined roles)

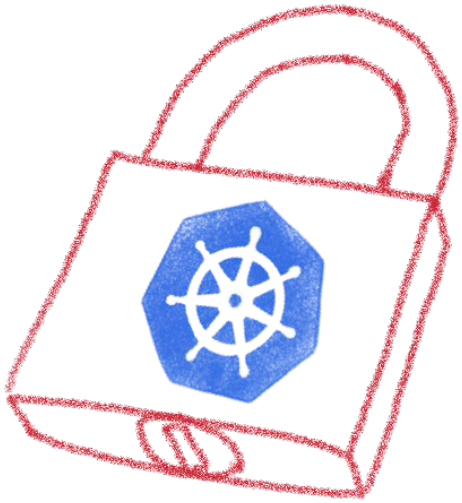
# Kubernetes is insecure by design



It's a feature, not a bug.
Up to K8s admin to secure it according to needs

# Not everybody has the same security needs

# Kubernetes allows to enforce security practices as needed



# Listing some good practices

- Close open access
- Define and implement RBAC
- Define and implement Network Policies
- Isolate sensitive workloads

# Close open access

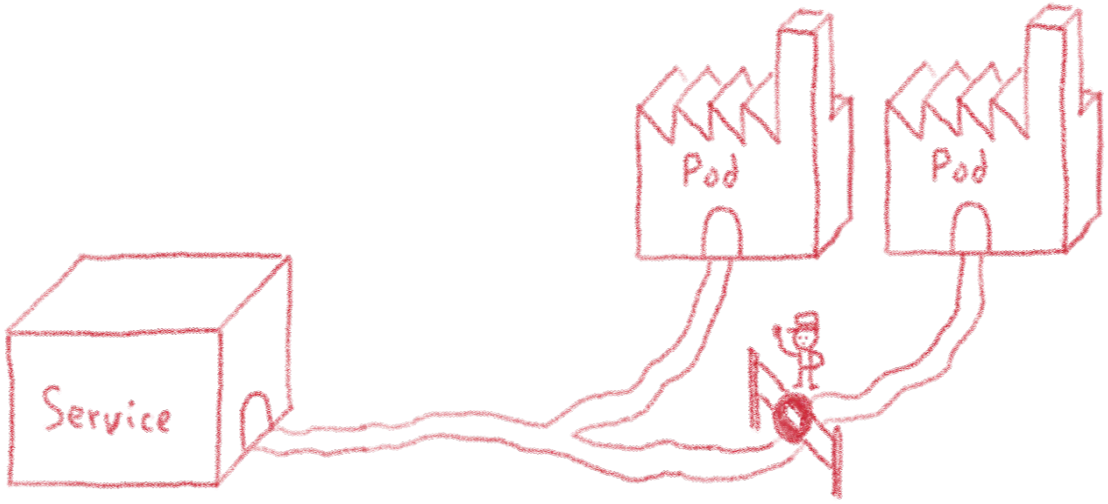
Close all by default, open only the needed ports

Follow the least privileged principle

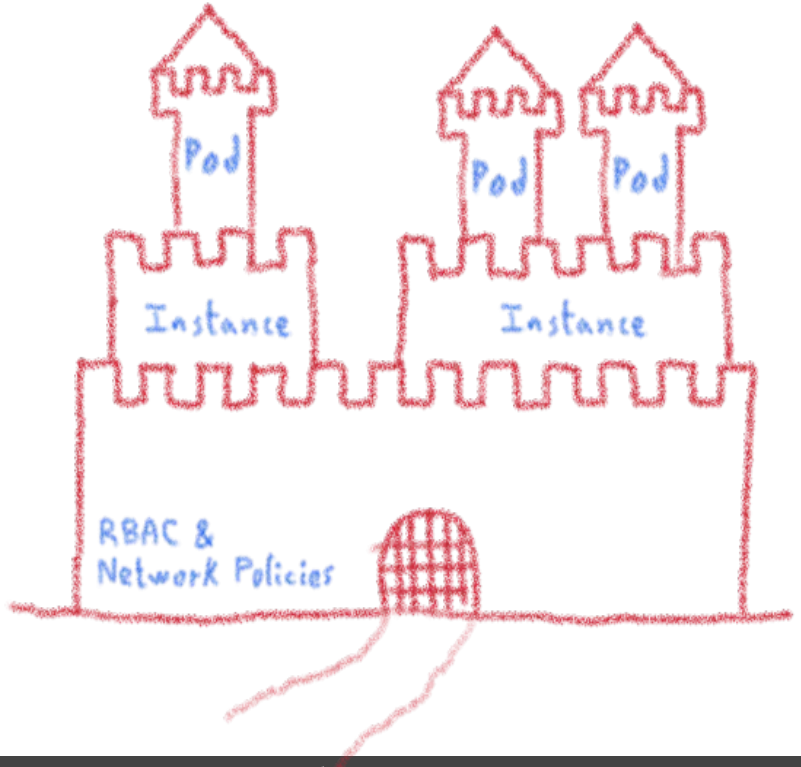
# Define and implement RBAC


According to your needs

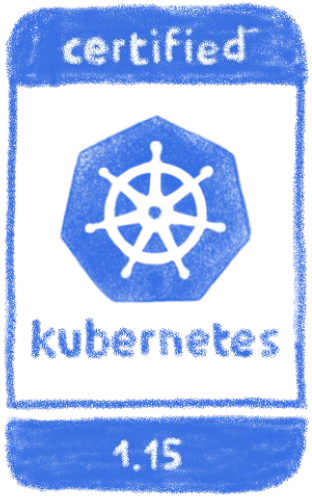
# Define and implement network policies



# Use RBAC and Network Policies to isolate your sensitive workload



# Always keep up to date




Both Kubernetes and plugins

# And remember,
# even the best can get hacked

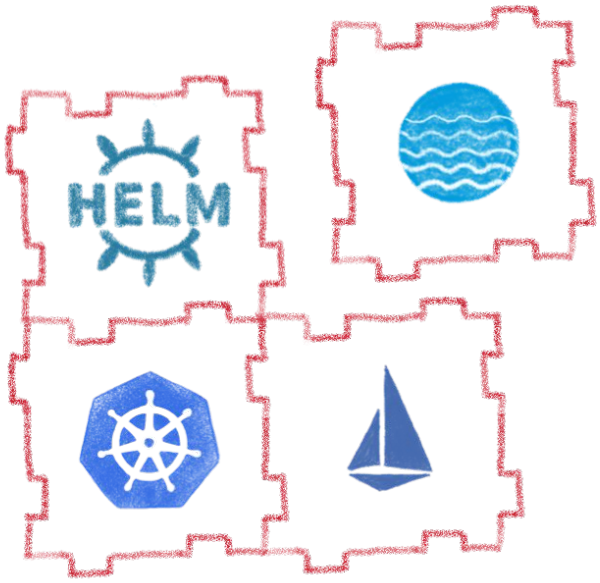

One of Tesla's cluster got hacked
via an unprotected K8s API endpoint,
and was used to mine cryptocurrency...

Remain attentive, don't get too confident

# Extensibility

## Enhance your Kubernetes

# Kubernetes is modular




Fully extensible

- Kubernetes API
- Cluster demons
- Controllers
- Custom resources
- ...

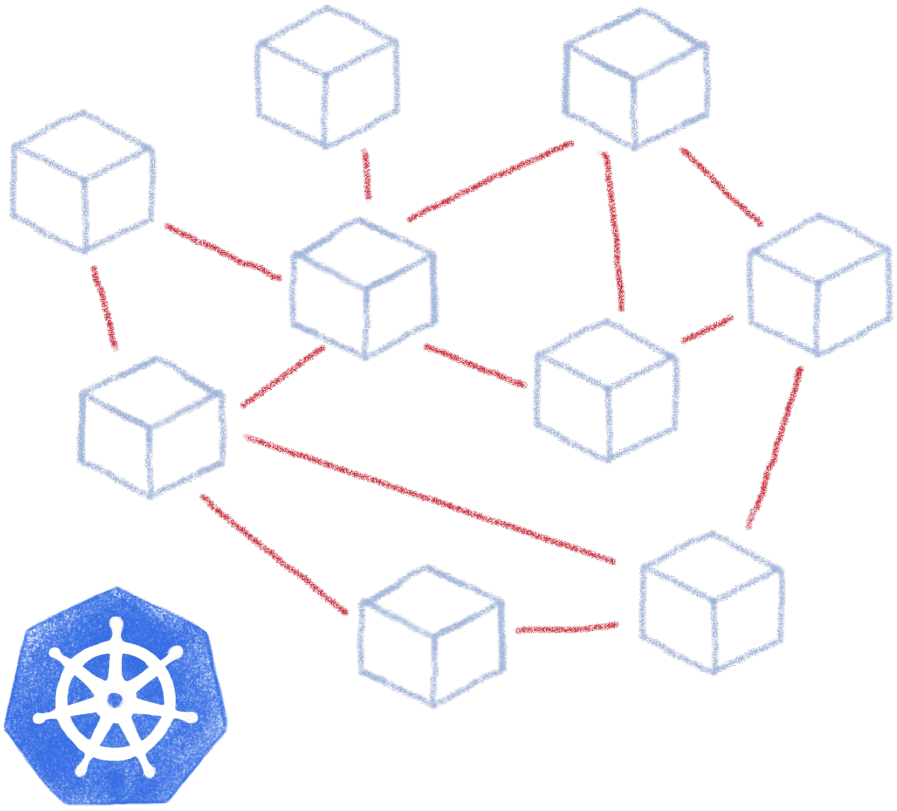
Operators

Let's see how some of those plugins can help you

# Helm

## A package management for K8s

# Complex deployments



Ingress

Services

Deployments

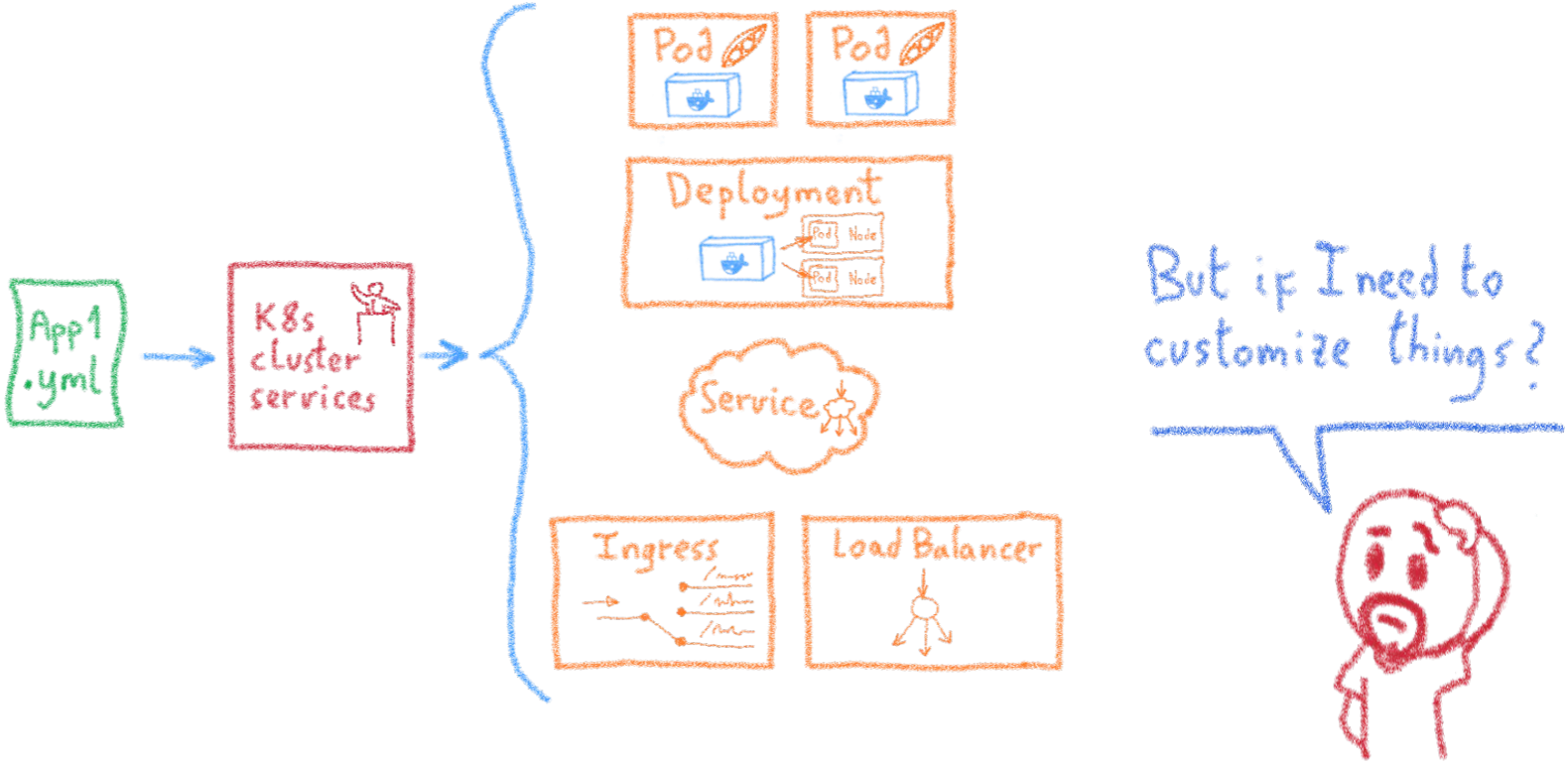
Pods

Sidecars

Replica Sets

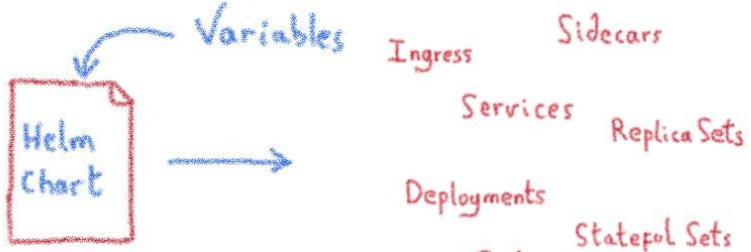
Statepul Sets

# Using static YAML files

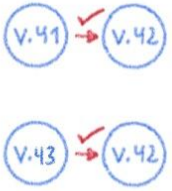


# Complex deployments


A package manager for Kubernetes

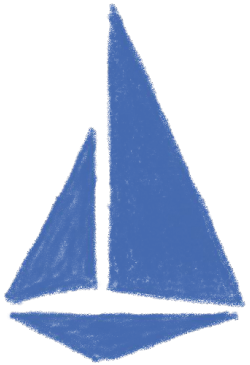



- Manage complexity
- Simple sharing
- Easy upgrades
- Easy rollbacks

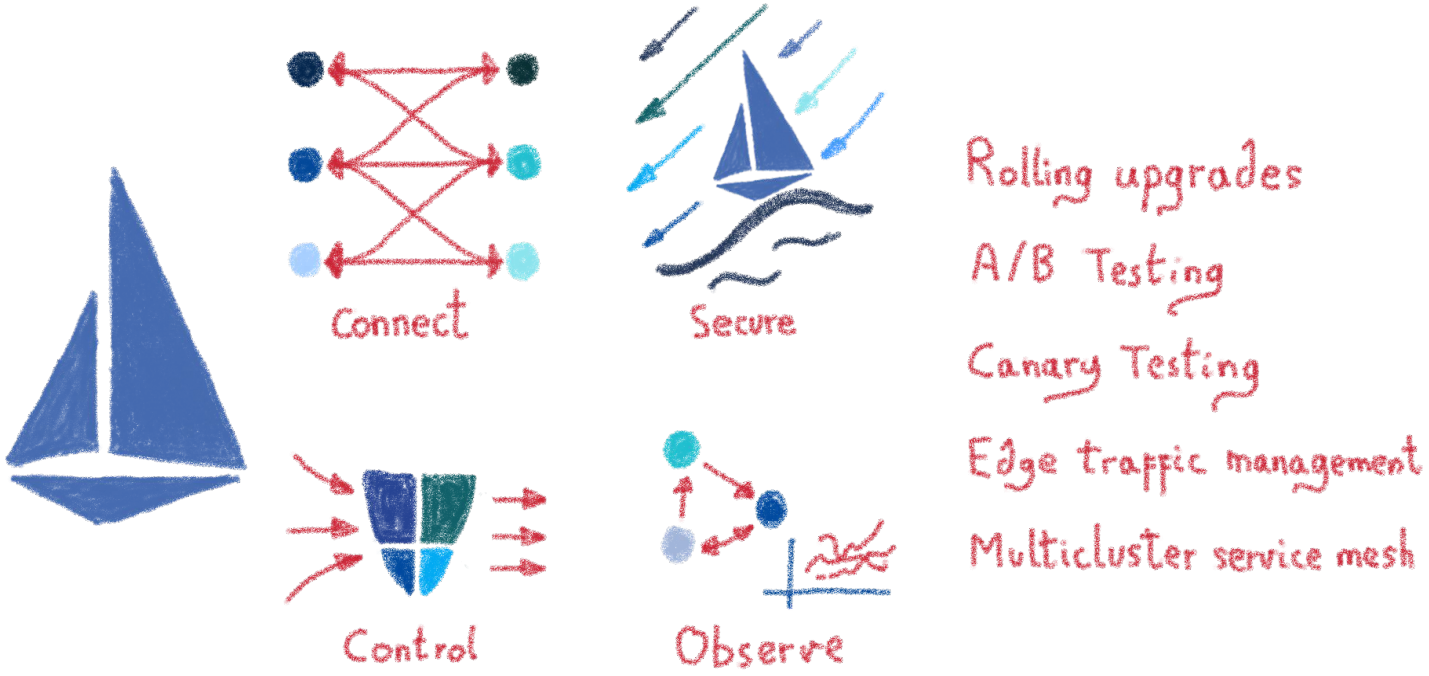


# Istio

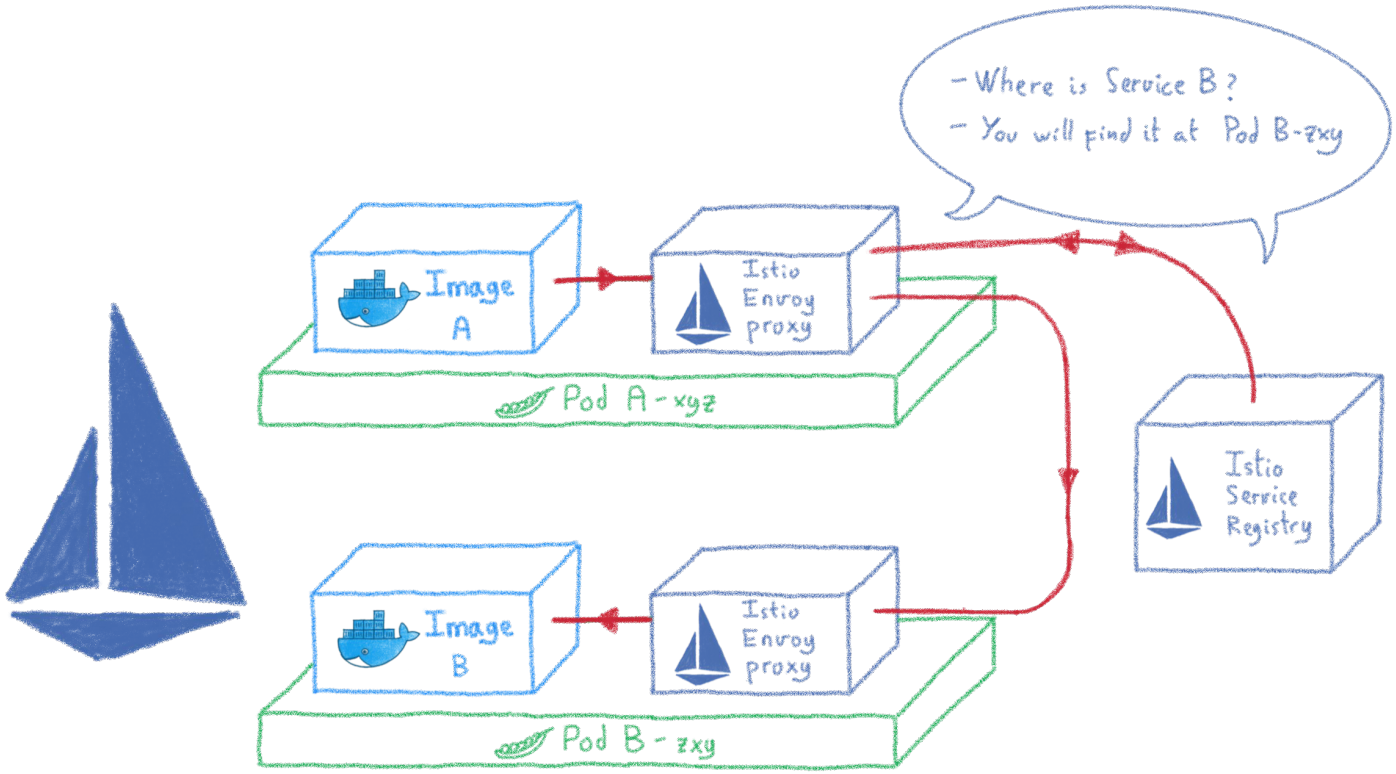
## A service mesh for Kubernetes…
## and much more!



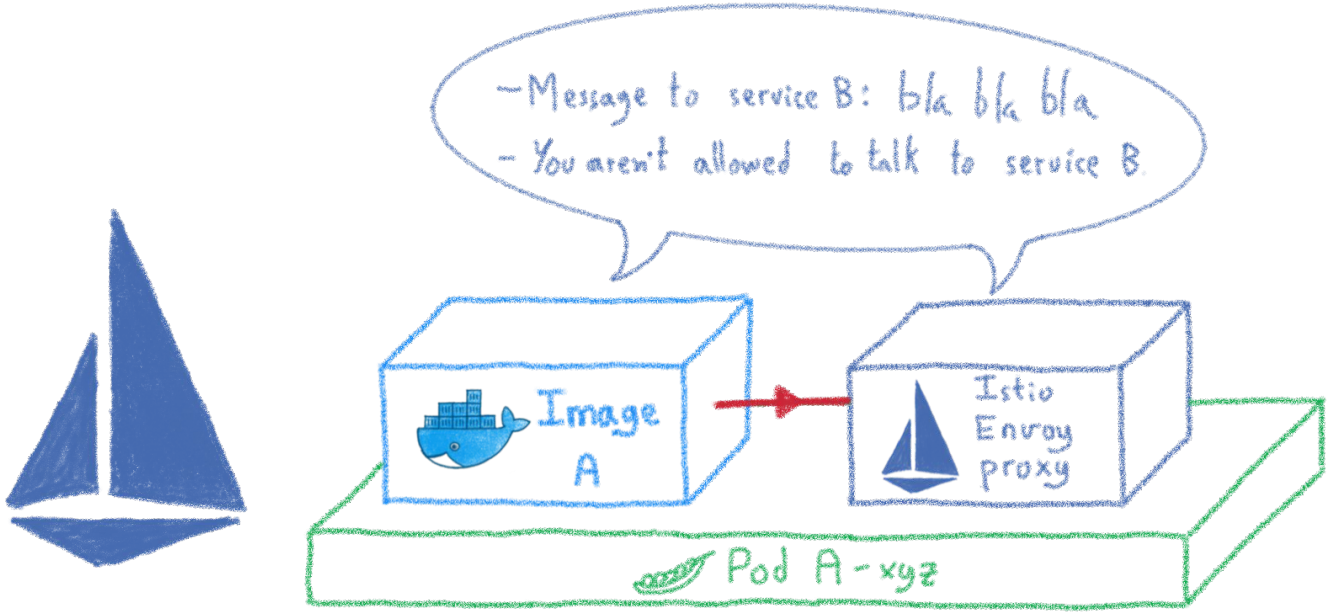
# Istio: A service mesh...
# but not only



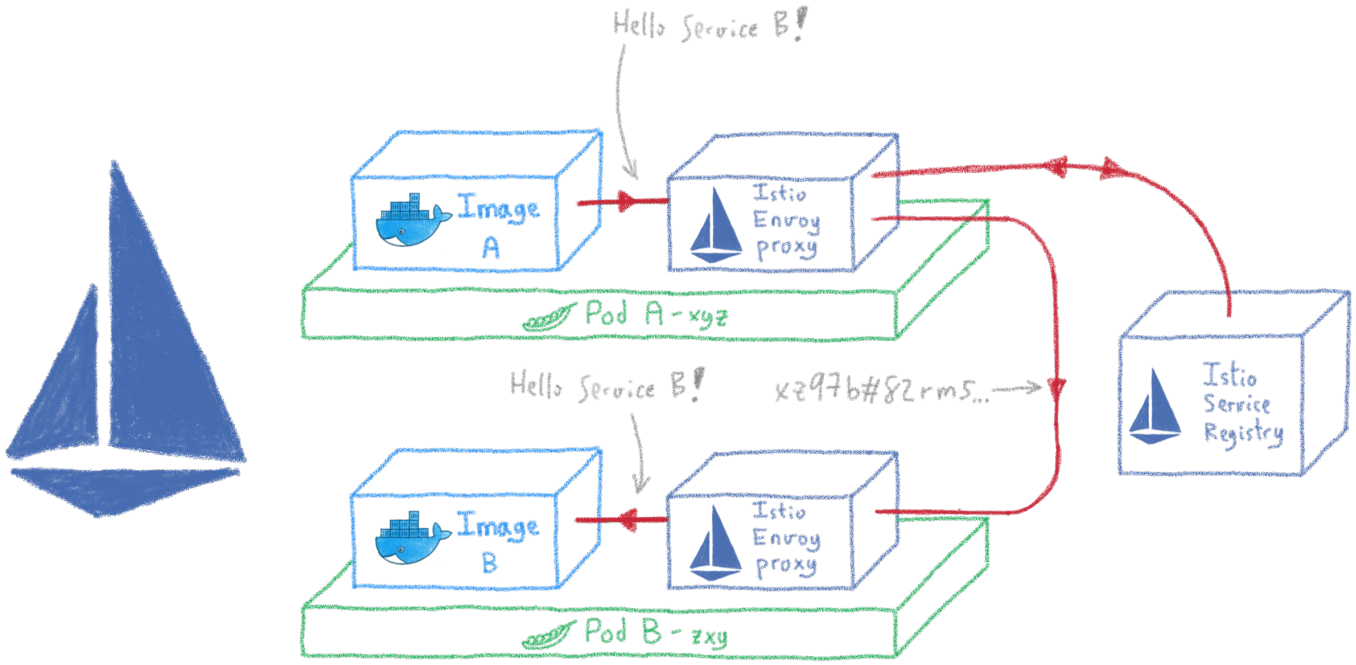
# Service discovery



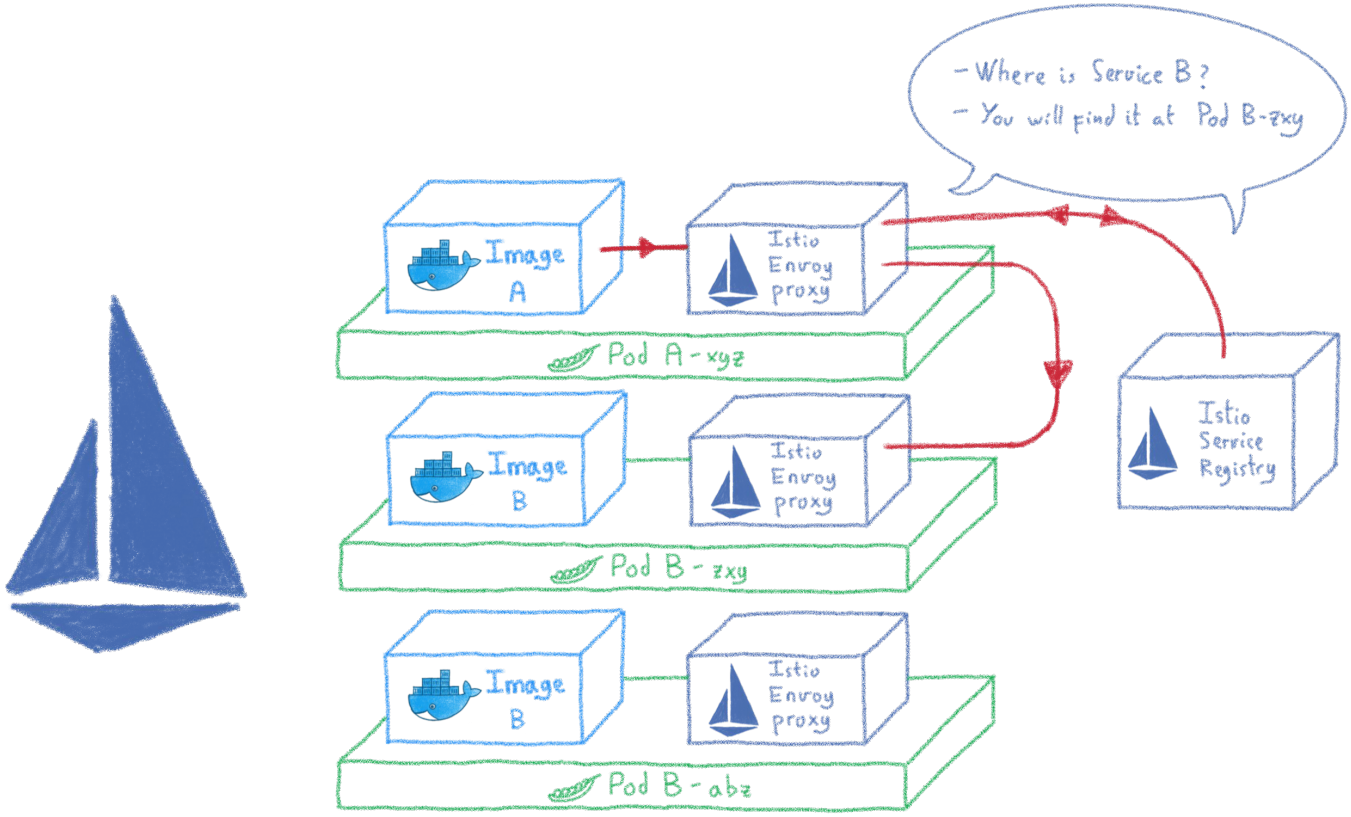
# Traffic control



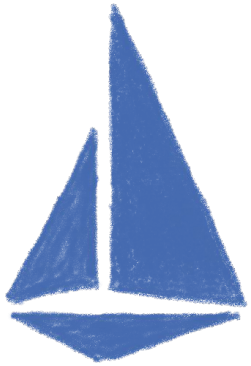
# Encrypting internal communications

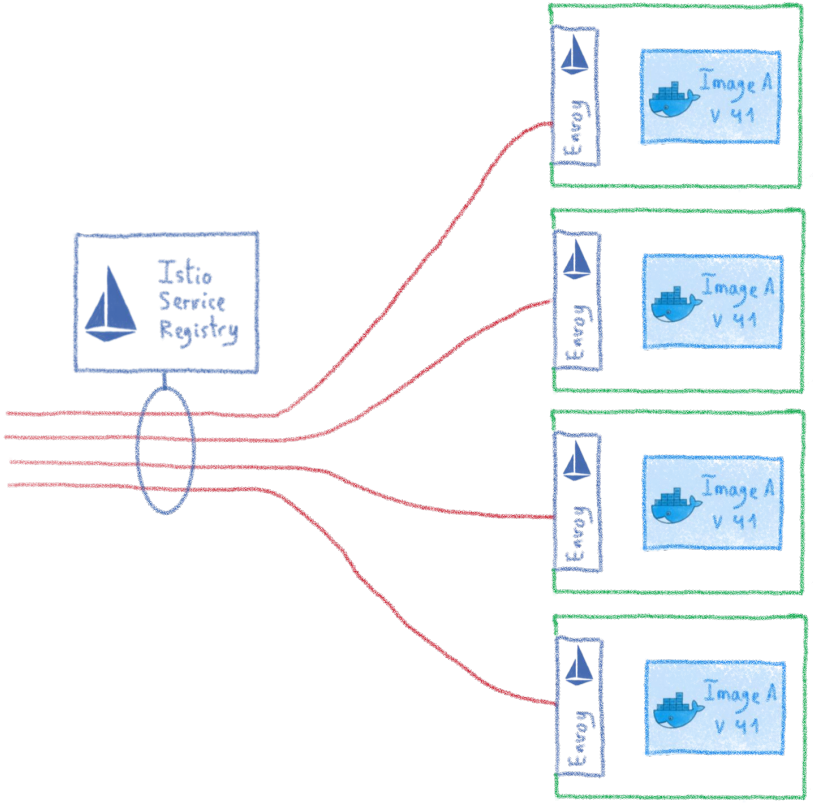


# Routing and load balancing

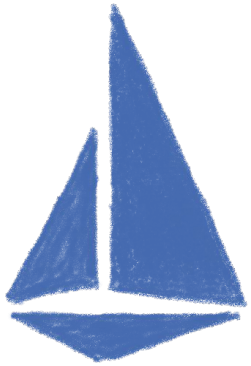


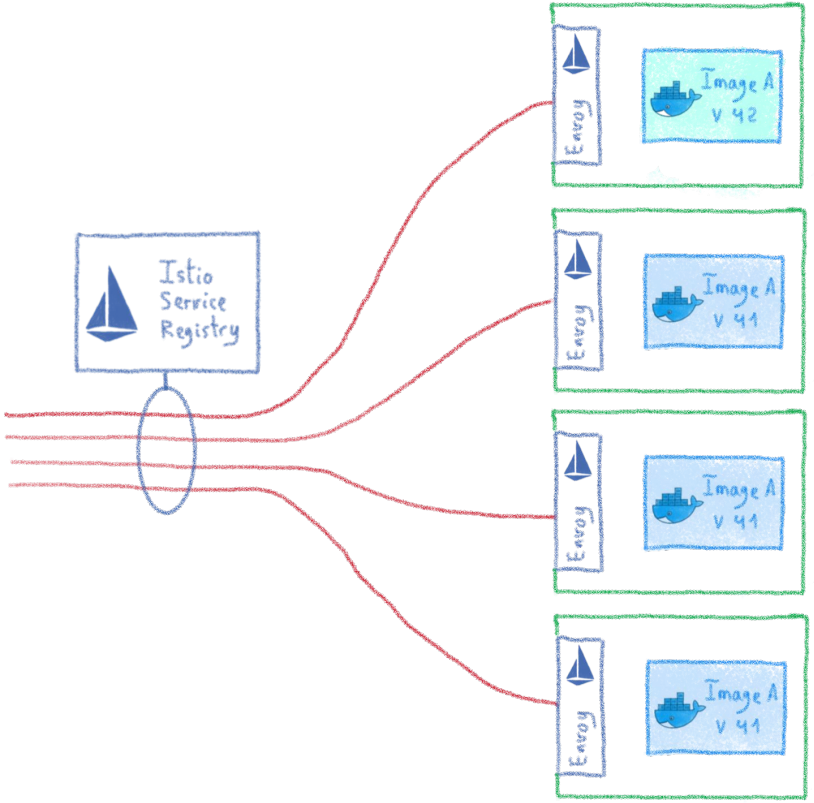
# Rolling upgrades



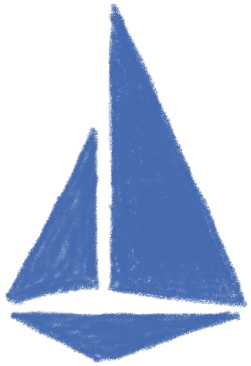


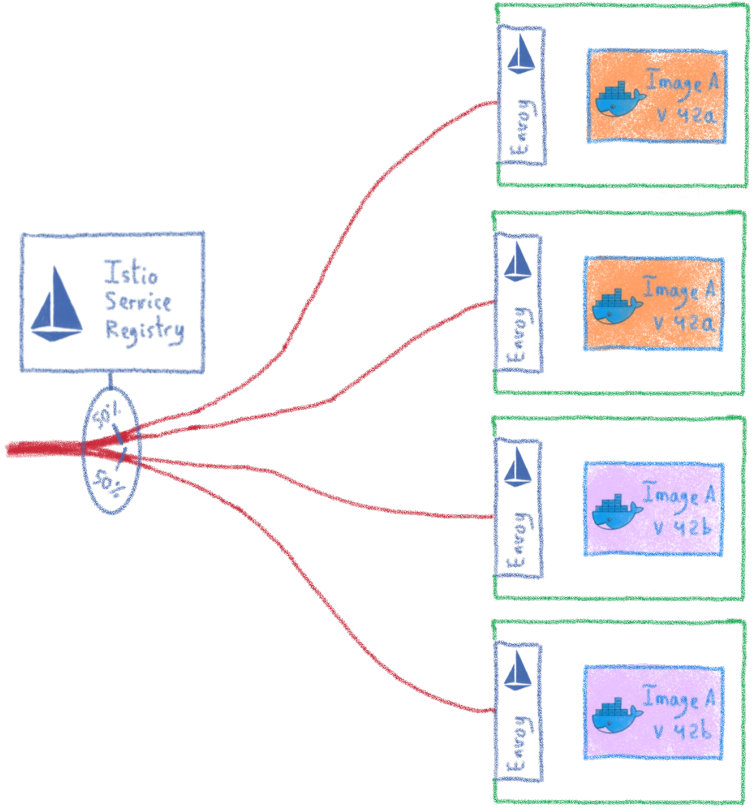
# Rolling upgrades



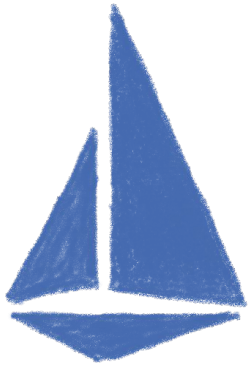


# A/B testing




Istio
Service
Registry
50%
50%
Envoy
Image A
v 42a
Envoy
Image A
v 42a
Envoy
Image A
v 42b
Envoy
Image A
v 42b

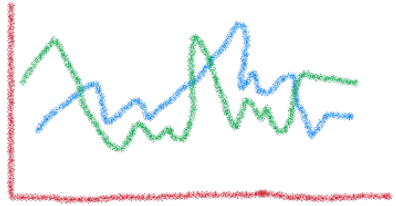
# Monitoring your cluster



- Metrics
- Logs
- Tracing

} at {

- Envoy level
- Control plane level

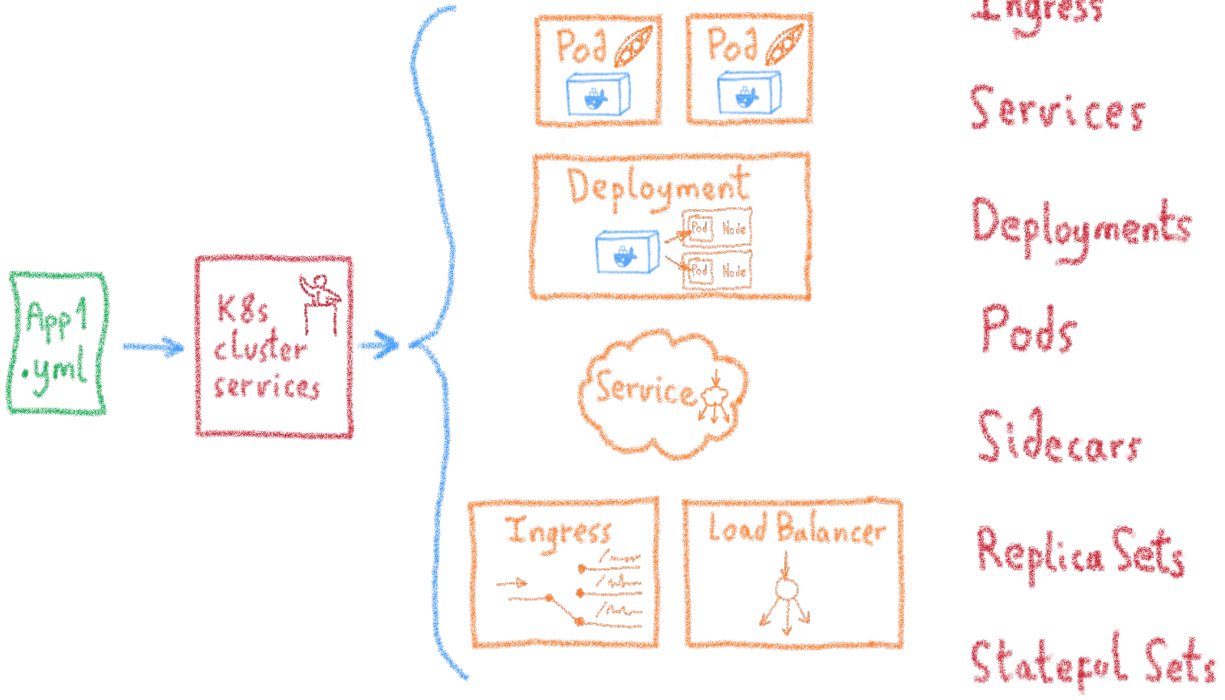


Dashboards

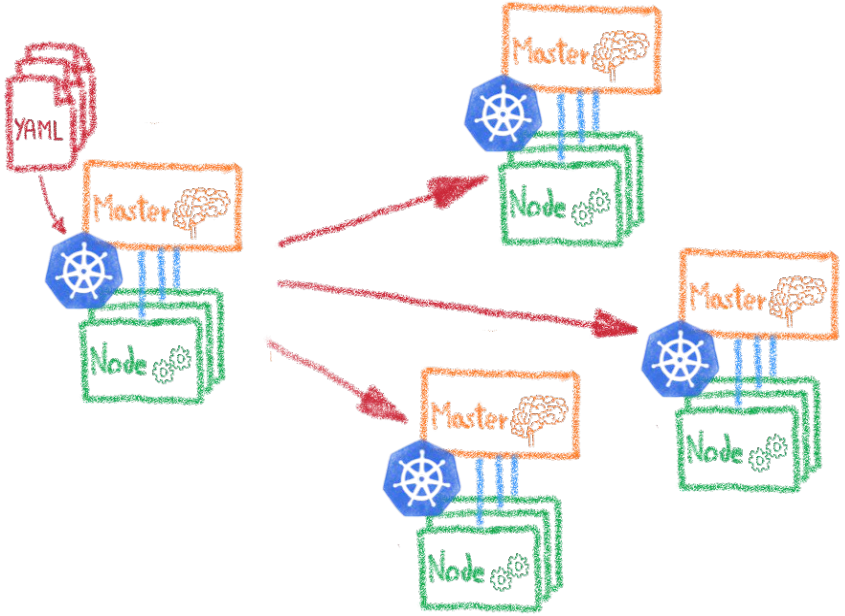
# Velero

## Backing up your Kubernetes

# Kubernetes:
# Desired State Management



# YAML files allows to clone a cluster



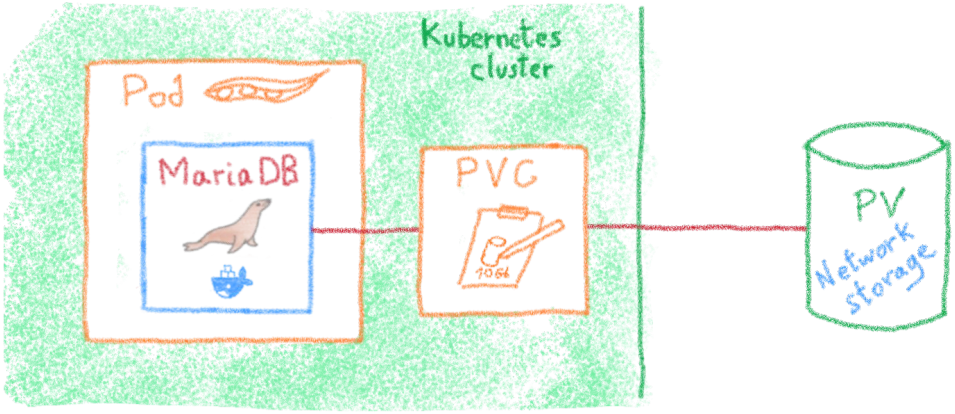

Dev envs

Staging

Multi-cluster

Multi-cloud

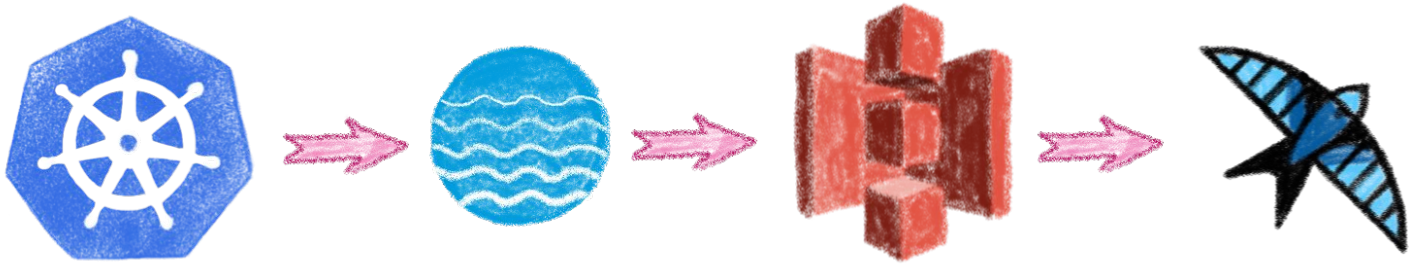
# But what about the data?




# Velero

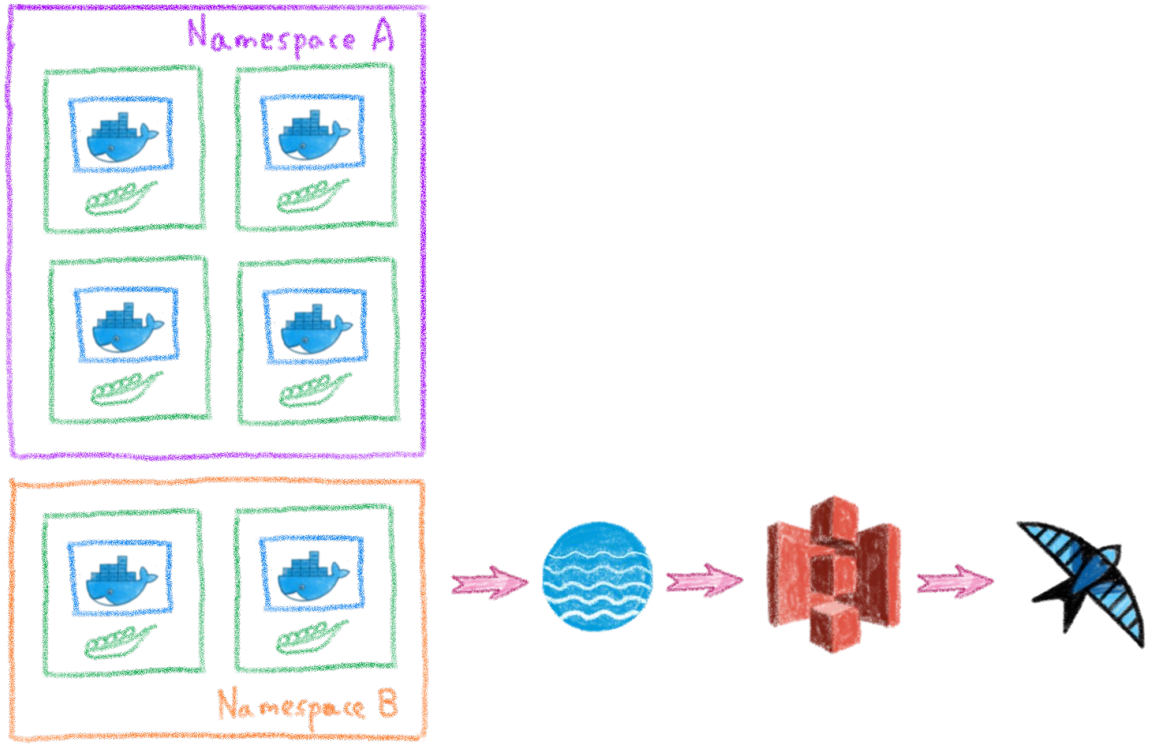

Backup and migrate Kubernetes applications
and their persistent volumes

# S3 based backup

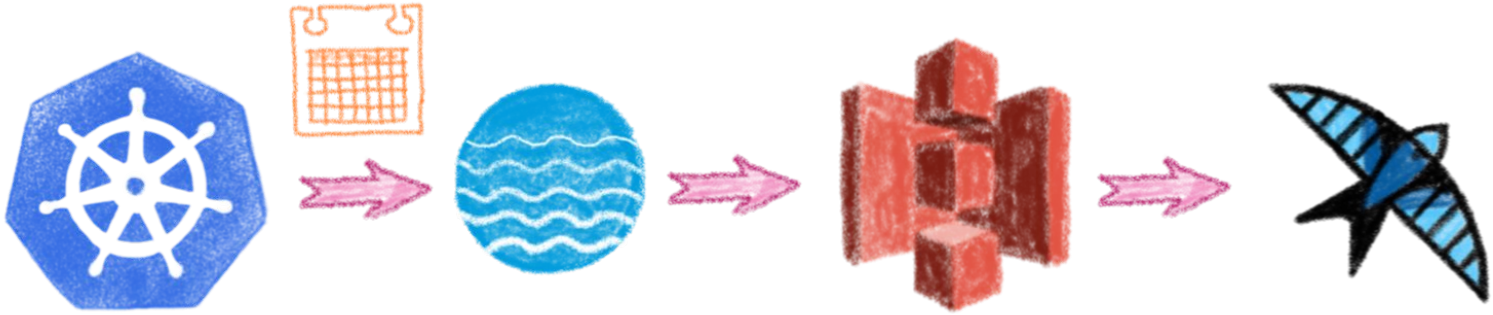


On any S3 protocol compatible store

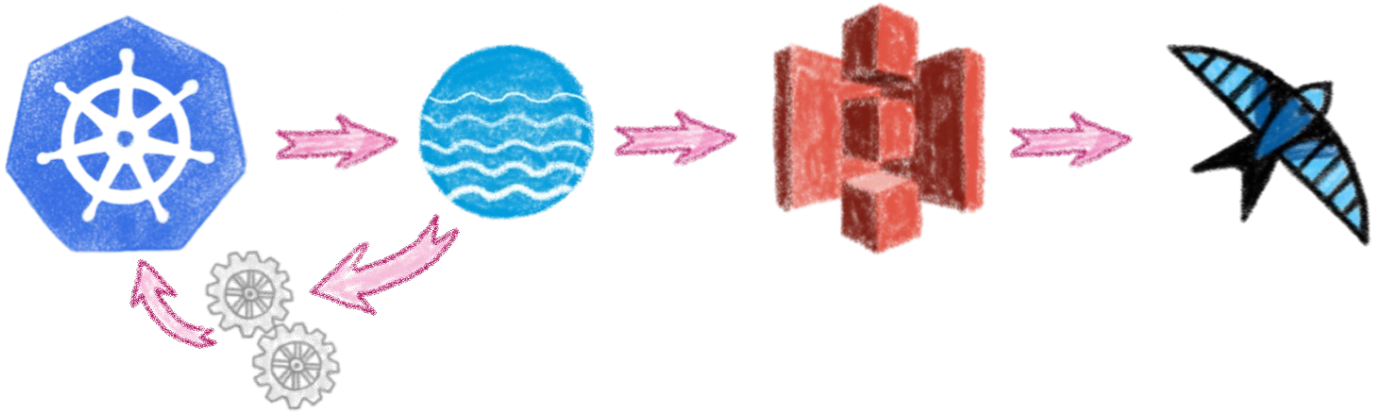
# Backup all or part of a cluster



# Schedule backups



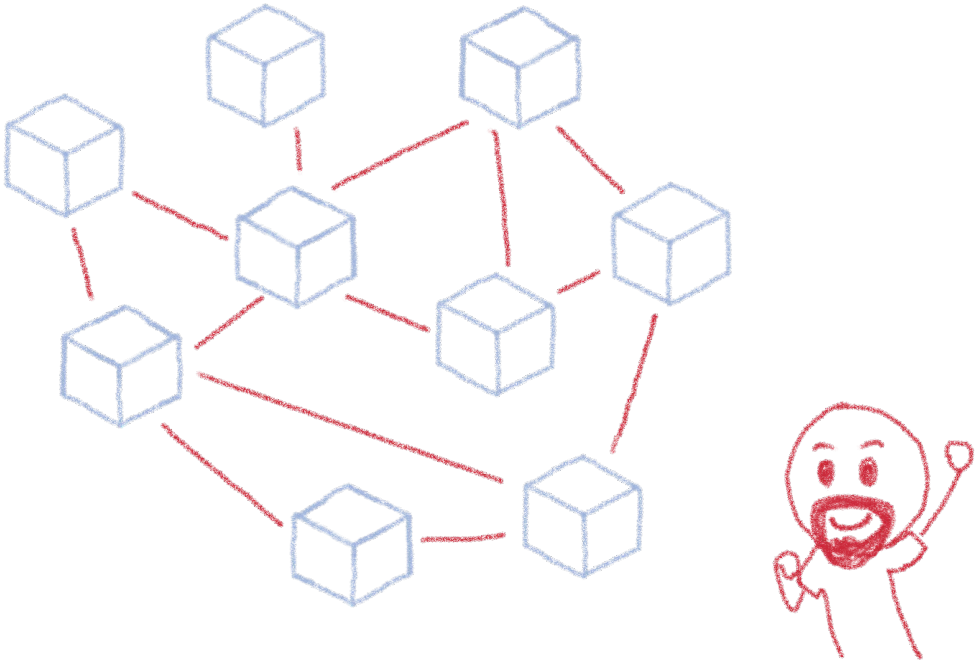
# Backups hooks



# Conclusion

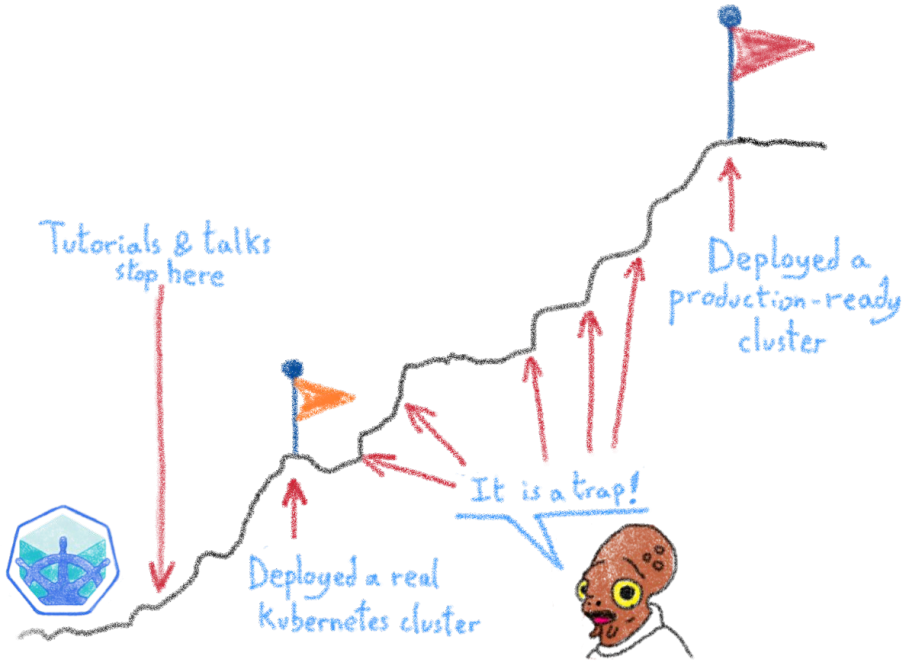
## And one more thing...

# Kubernetes is powerful



It can make Developers' and
DevOps' lives easier

# But there is a price: operating it

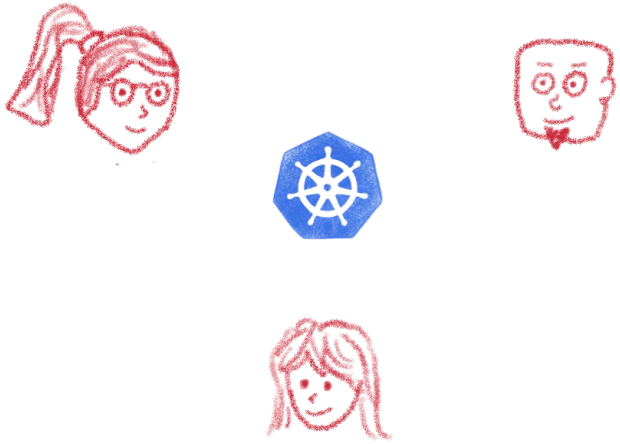



Lot of things to think about

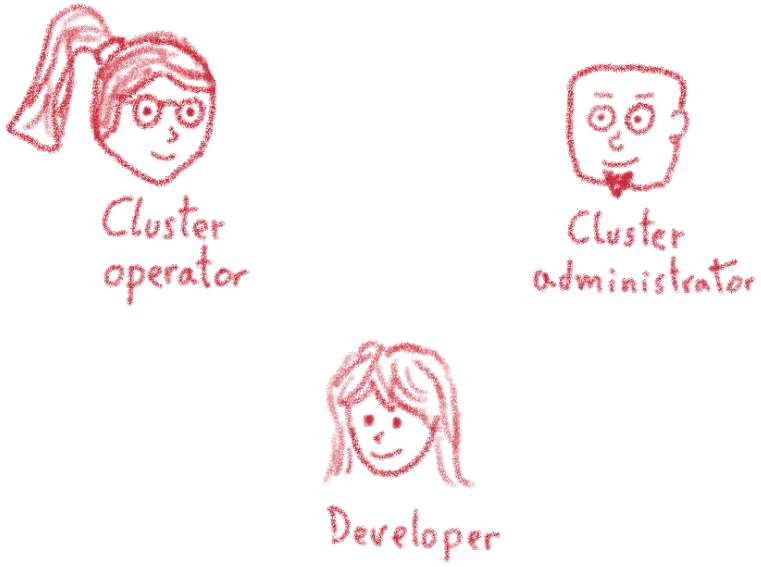
# We have seen some of them

# One more thing...

## Who should do what?

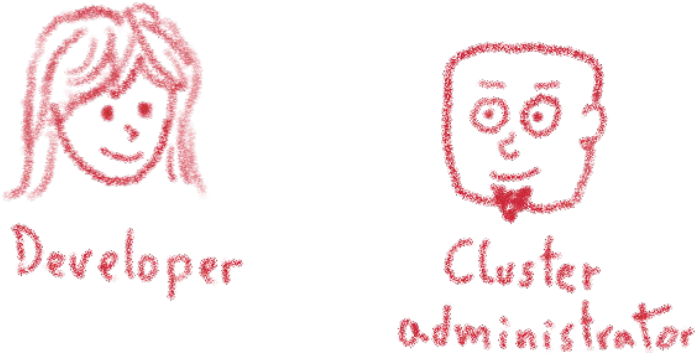


# Different roles



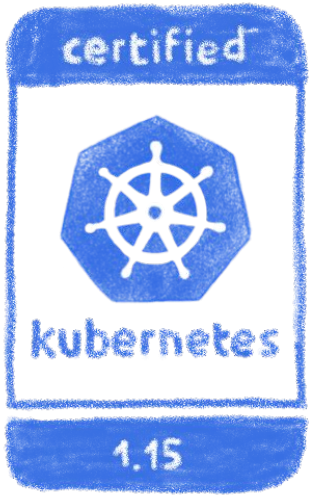

Each role asks for very different knowledge and skill sets

# Most companies don't need to operate the clusters




As they don't build and rack their own servers!

# If you don't need to build it, choose a certified managed solution



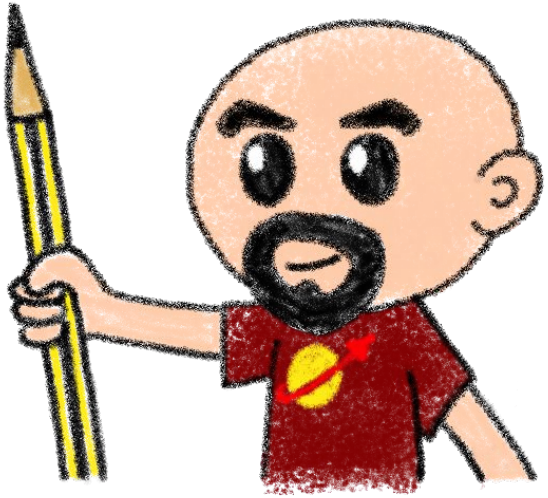

You get the cluster, the operator get the problems

# Like our OVH Managed Kubernetes

OVHcloud


Made with ❤ by the Platform team

# Do you want to try?



Send me an email to get some vouchers..

horacio.gonzalez@corp.ovh.com

# Thank you for listening