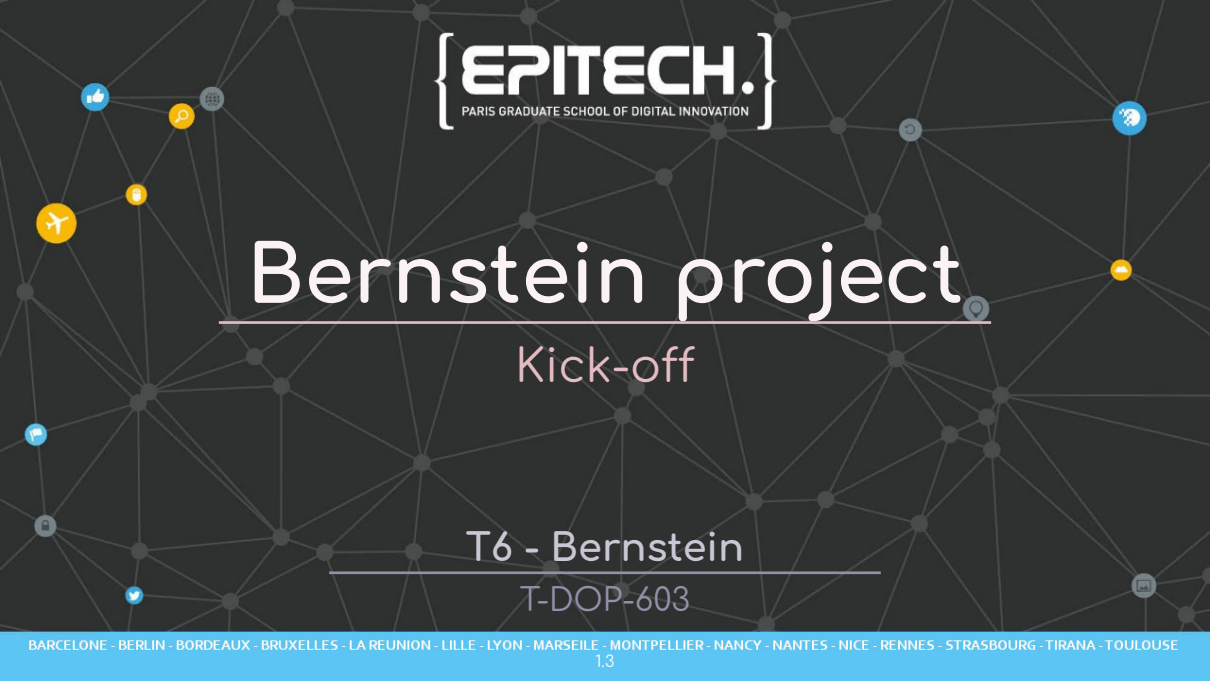


Bernstein project

Kick-off

T6 - Bernstein

T-DOP-603

From Docker to Cloud

- Docker is a good abstraction between OS and application runtime.
- But we can do better: abstraction between physical layer (VM or bare-metal) and Docker containers.

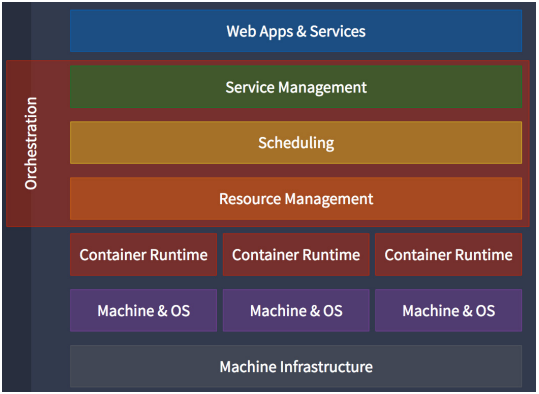
What is a container orchestrator?

- An orchestrator is on top of a cluster of multiple machines (VM or bare-metal).

- A system administrator build it…
- … then developers deploy Docker containers into orchestrator.

- No matter where they are scheduled and started…
- … if a node (host) crashes, Docker containers are moved to a different node.

What is a container orchestrator?



Some cool features

- Restarts container when it crashes.
- Internal DNS.
- Auto-scaling policies.
- Health checks.
- Rolling updates (deploy 1 instance at a time).
- 1-click rollbacks.
- Keep secrets… secrets (such as API tokens, database passwords, etc.).
- Multi-cloud/cross-region.
- …

Adding constraints to services

- Always 5 instances of a service.
- Each instance of a service must run on different host.
- Reserve 1 GB of memory, up to 4 GB, for a database container.
- Assign a compute-intensive service to a node with GPU.
- …

Some container orchestrators

- Kubernetes (very popular!)
- Rancher (v2 based on Kubernetes)
- Hashicorp Nomad (not only for containers)
- Apache Mesos + Marathon (not only for containers)
- Docker Swarm (RIP Nov. 2019)

Best practices

- Stateless architecture guarantees not breaking anything if a data center burns down.
- Read 12-Factor again, for designing stateless apps.
- Think about zero downtime deployment (rolling-update or blue-green).

About Kubernetes (k8s)

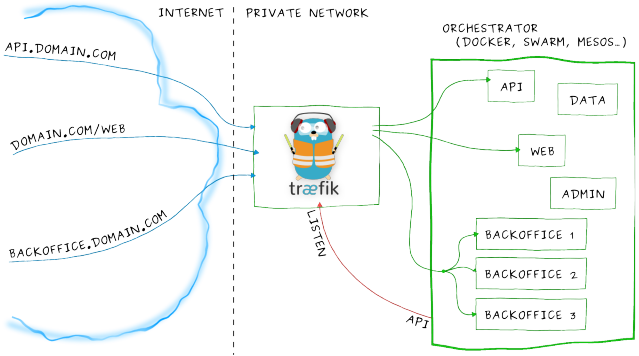
- Made at Google.
- Based on Borg architecture, the large scale Google Cloud infrastructure.
- Like any distributed system, setting up and maintaining a Kubernetes cluster is hard (lot of components needed).
- But, most cloud providers offer Kubernetes as a service. You get a Kubernetes cluster on demand: *Google Kubernetes Engine* (GKE), *Amazon Elastic Kubernetes Service* (EKS)…

About Kubernetes (k8s)

In a container orchestrator, services have a short lifecycle:

- Services and hosts can die more often (not important at all).
- We deploy often (up to many times a day).
- New container == new IP/port(s).

About Traefik



- It is a reverse proxy and load balancer (like NGINX, Apache, HAProxy…).
- It offers dynamic routing configuration (no restart needed).

About the project

- Groups of 2 to 3.
- You will not have to install an entire Kubernetes cluster.
- You can start locally with Minikube or K3s. These tools help you build local clusters.
- However, **the project expects at least 2 nodes**. Go to cloud!

About the project

Deploy into Kubernetes the *Poll* application with:

- 2 databases (Redis, PostgreSQL) ;
- 3 apps (*Poll*, *Worker*, *Result*) ;
- a load balancer (Traefik) distributing traffic across many instances of Poll and Result ;
- a monitoring tool (cAdvisor) ;

- Docker images are provided ;
- Fully evaluated with Automated Tests, by analyzing your configuration files.

Any questions

?