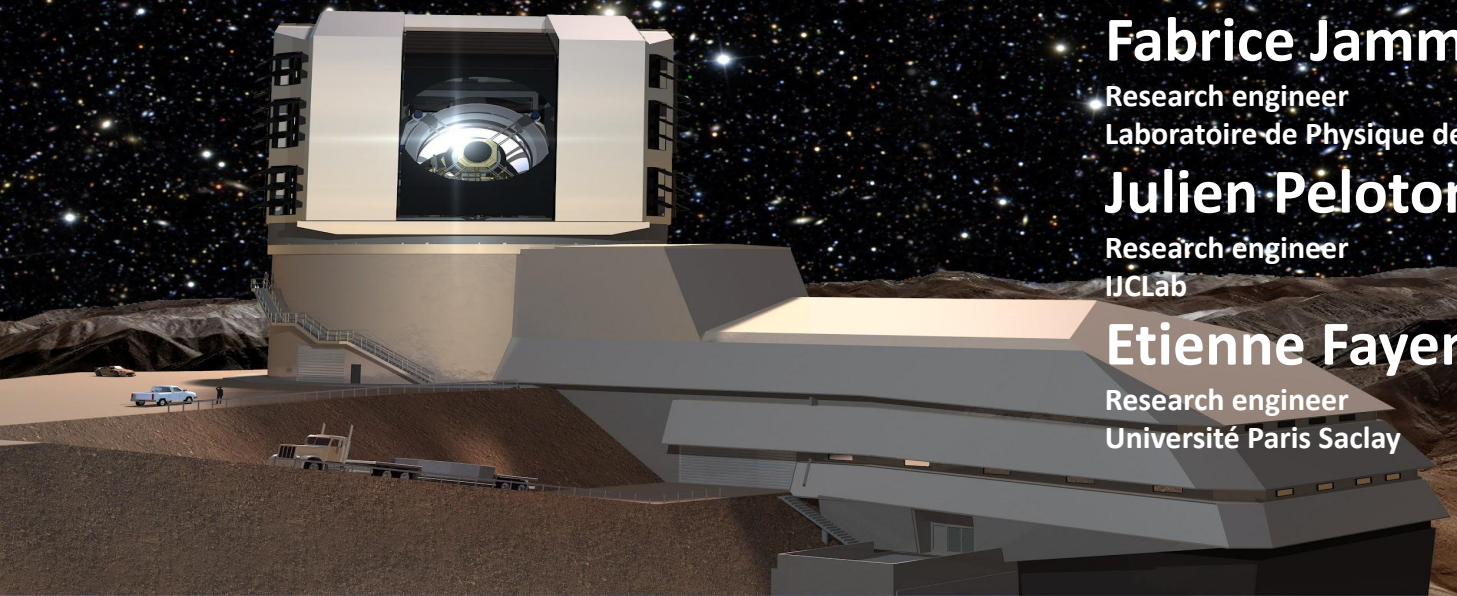
Exploring fink-broker on Kubernetes



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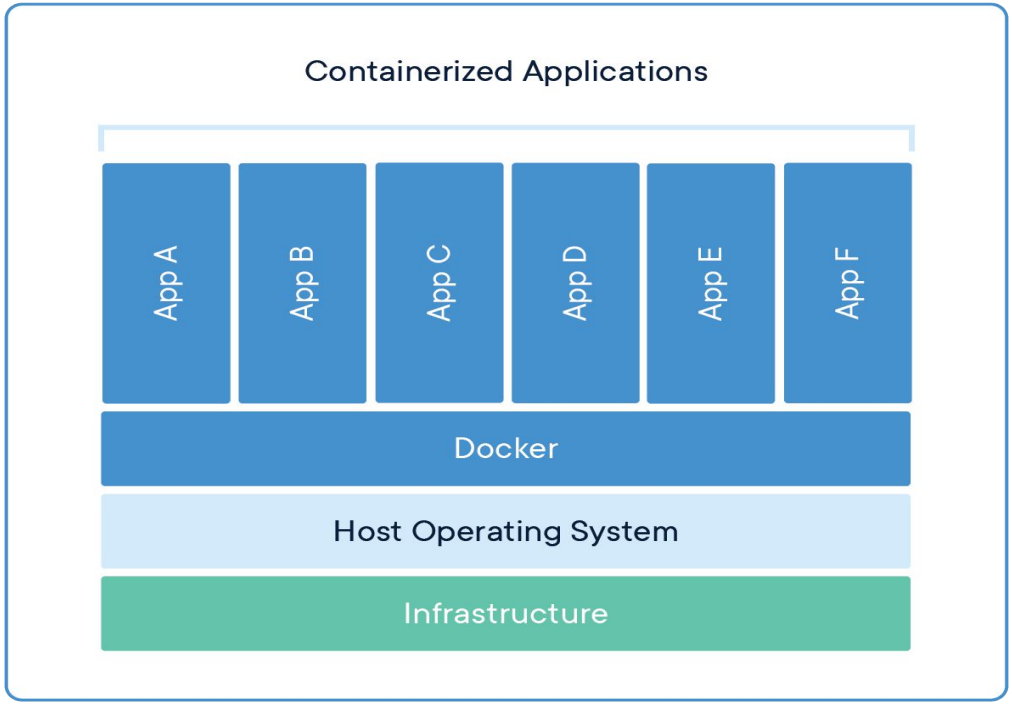
1. Containers
2. Kubernetes
3. Fink broker overview
4. Devops essentials and CI/CD
5. Toolbox: ktbx, finkctl, ciux

Linux Container: the Docker example

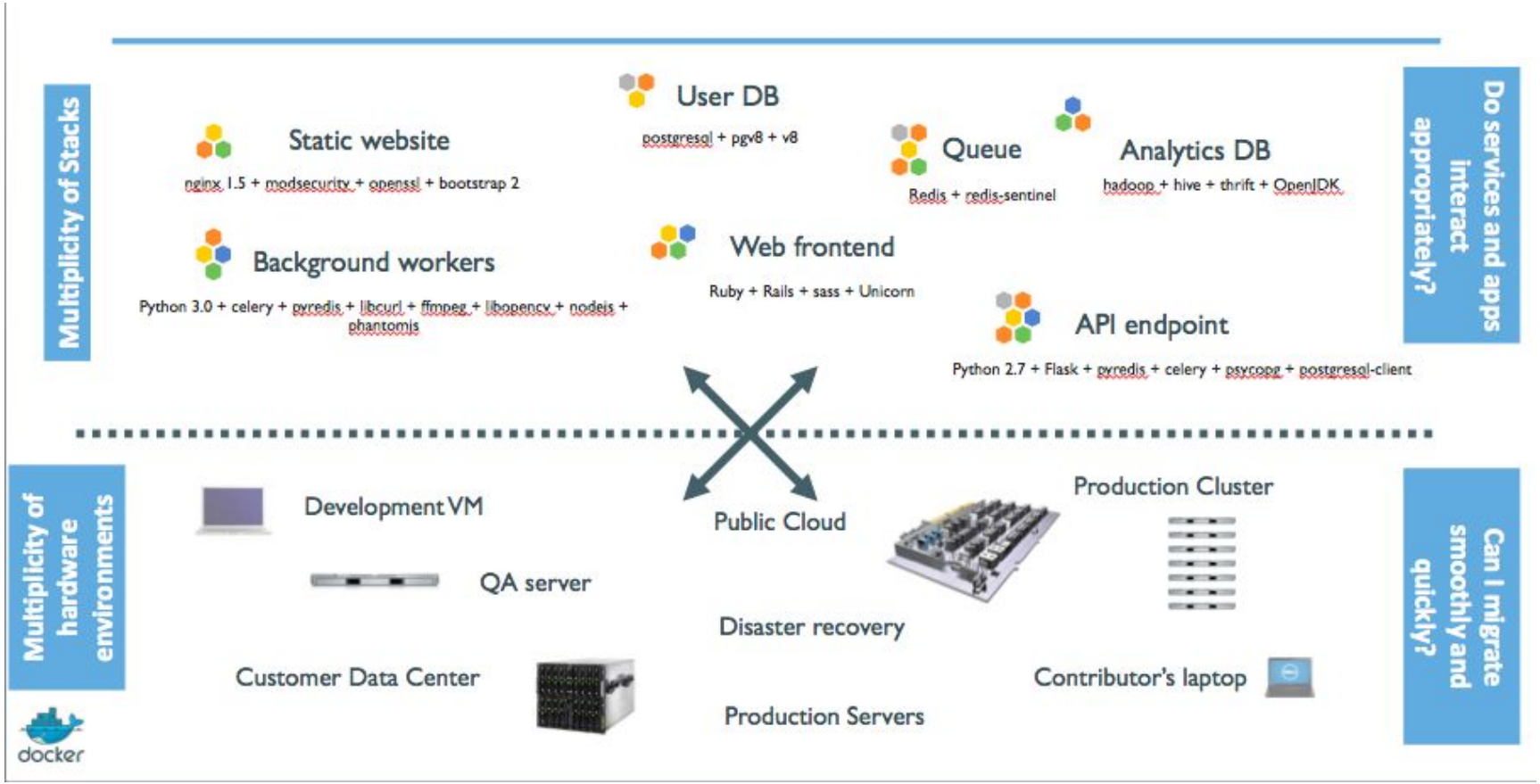
Definition

Docker is a tool that can package an application and its dependencies in an isolated container, which can be run on any server.

[Source: fr.wikipedia.org]



Deployment: target applications and infrastructures



Matrix from hell

	Development VM	QA Server	Single Prod Server	Onsite Cluster	Public Cloud	Contributor's laptop	Customer Servers
Static website	?	?	?	?	?	?	?
Web frontend	?	?	?	?	?	?	?
Background workers	?	?	?	?	?	?	?
User DB	?	?	?	?	?	?	?
Analytics DB	?	?	?	?	?	?	?
Queue	?	?	?	?	?	?	?

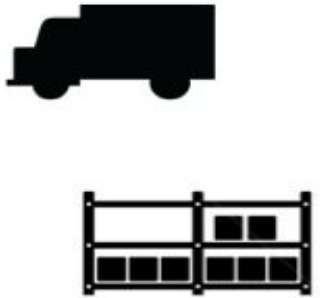
docker

Similarity with maritime transport

Multiplicity of Goods

Do I worry about how goods interact (e.g. coffee beans next to spices)

Multiplicity of methods for transporting/storing

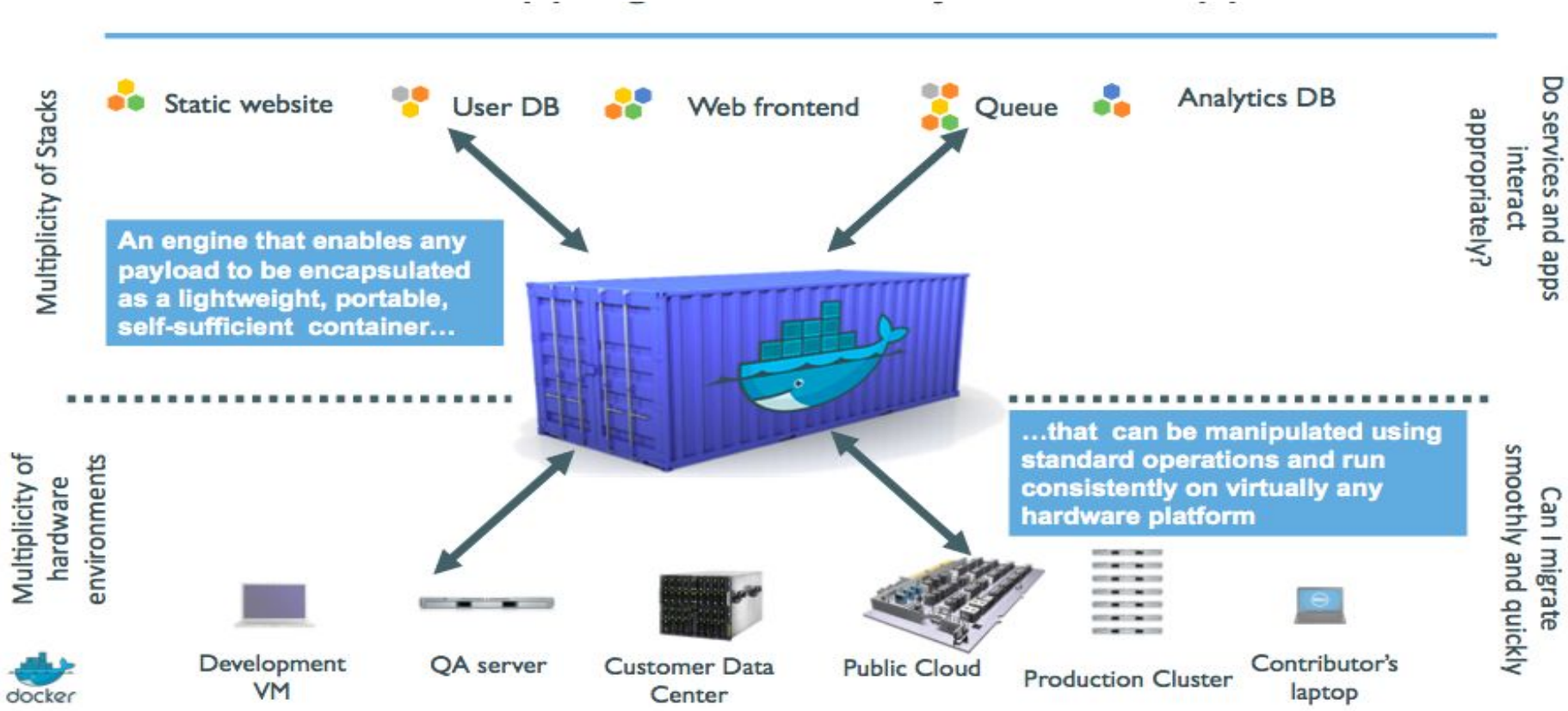


Can I transport quickly and smoothly (e.g. from boat to train to truck)

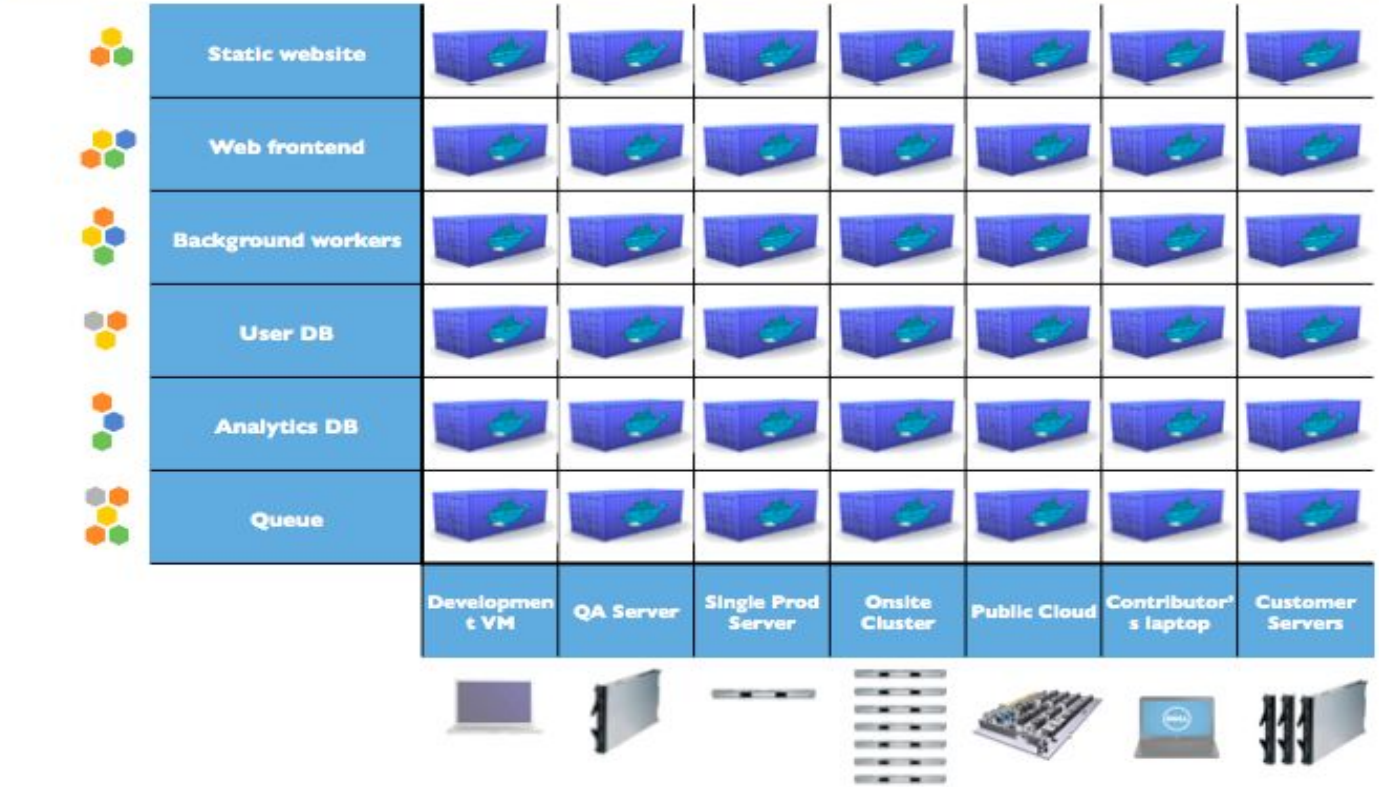
docker

Intermodal containers

A container system for applications



Exit matrix from hell!



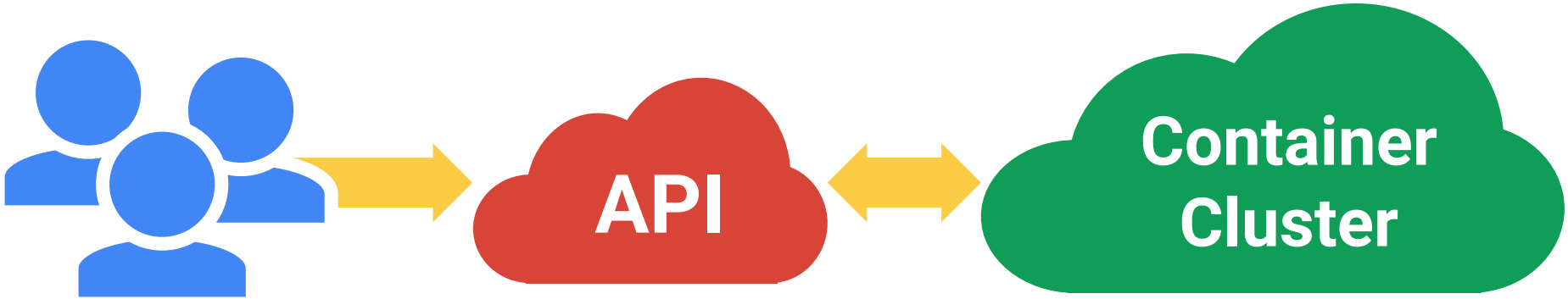
docker

Kubernetes (*shortname: k8s*)

Operating containerized applications at scale

http://k8s-school.fr

All you really care about



Many containers running on many servers

Workload Portability

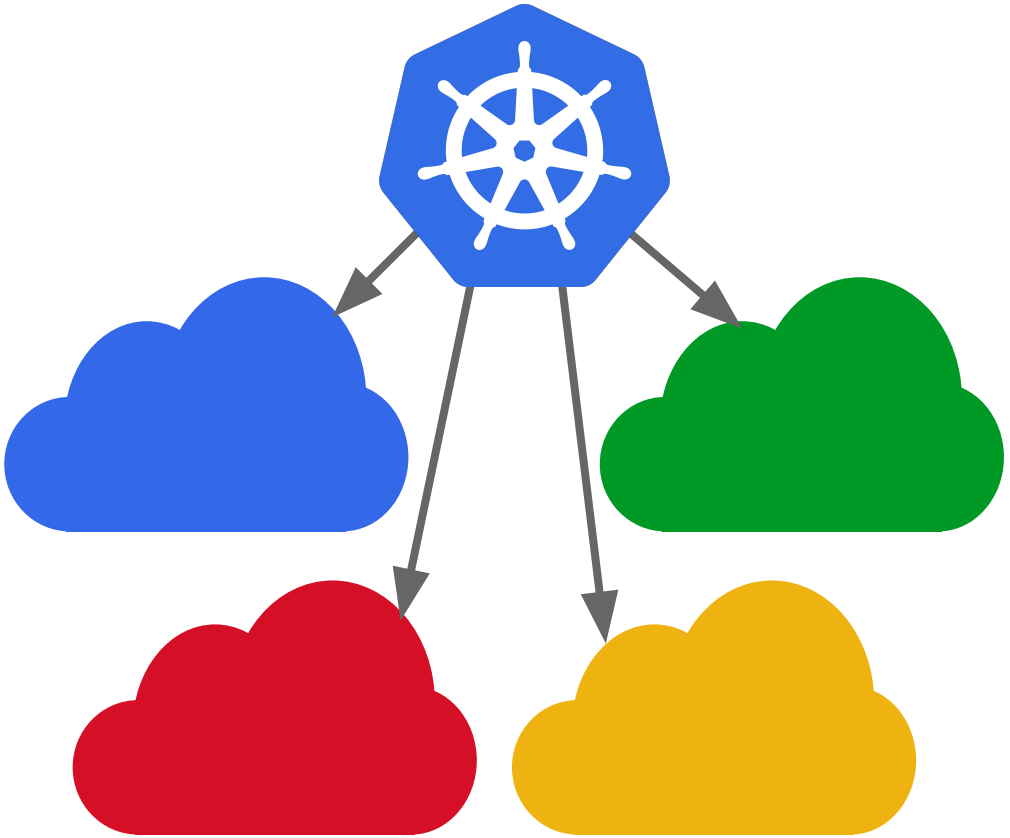
Workload portability

Goal: Avoid vendor lock-in

Runs in many environments, including “**the cloud**”, “**bare metal**”, and “**your laptop**”

The API and the implementation are 100% open

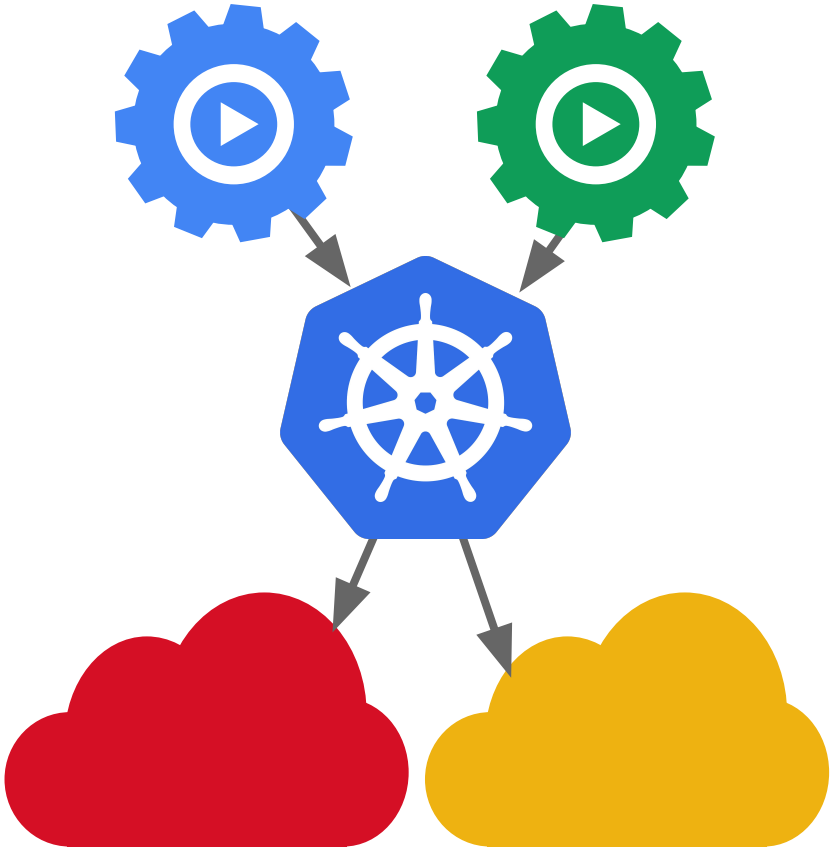
The whole system is modular and replaceable



Workload portability

Goal: Write once, run anywhere*

Don’t force apps to know about concepts that are cloud-provider/infrastructure-specific



http://k8s-school.fr

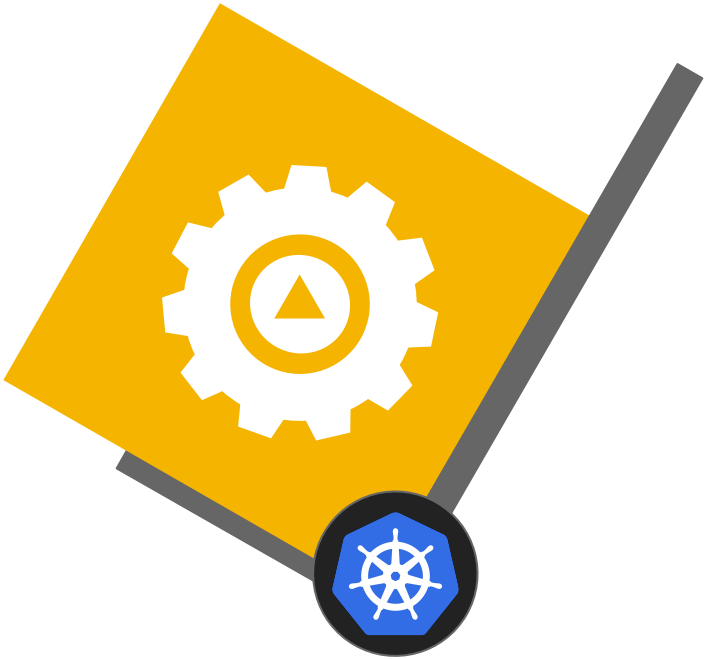
Workload portability

Result: Portability

Build your apps on-prem, lift-and-shift into cloud when you are ready

Don’t get stuck with a platform that doesn’t work for you

Put your app on wheels and move it whenever and wherever you need



Devops Essential

Combination of cultural philosophies, practices, and tools that increases an organization's ability to **deliver applications and services at high velocity**

CI / CD

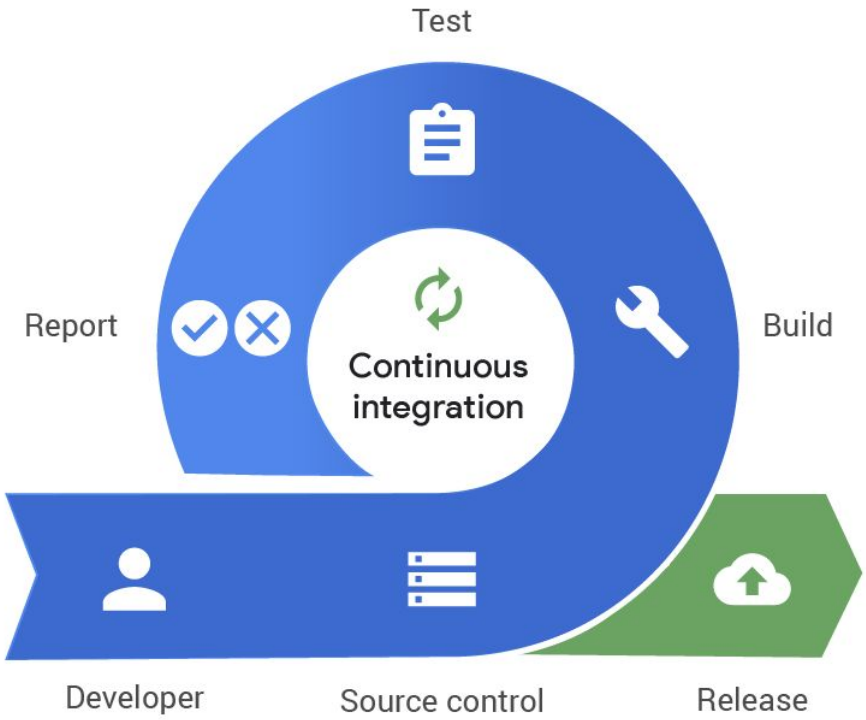
CI and CD stand for continuous integration and continuous delivery.

Continuous integration

Modern software development practice

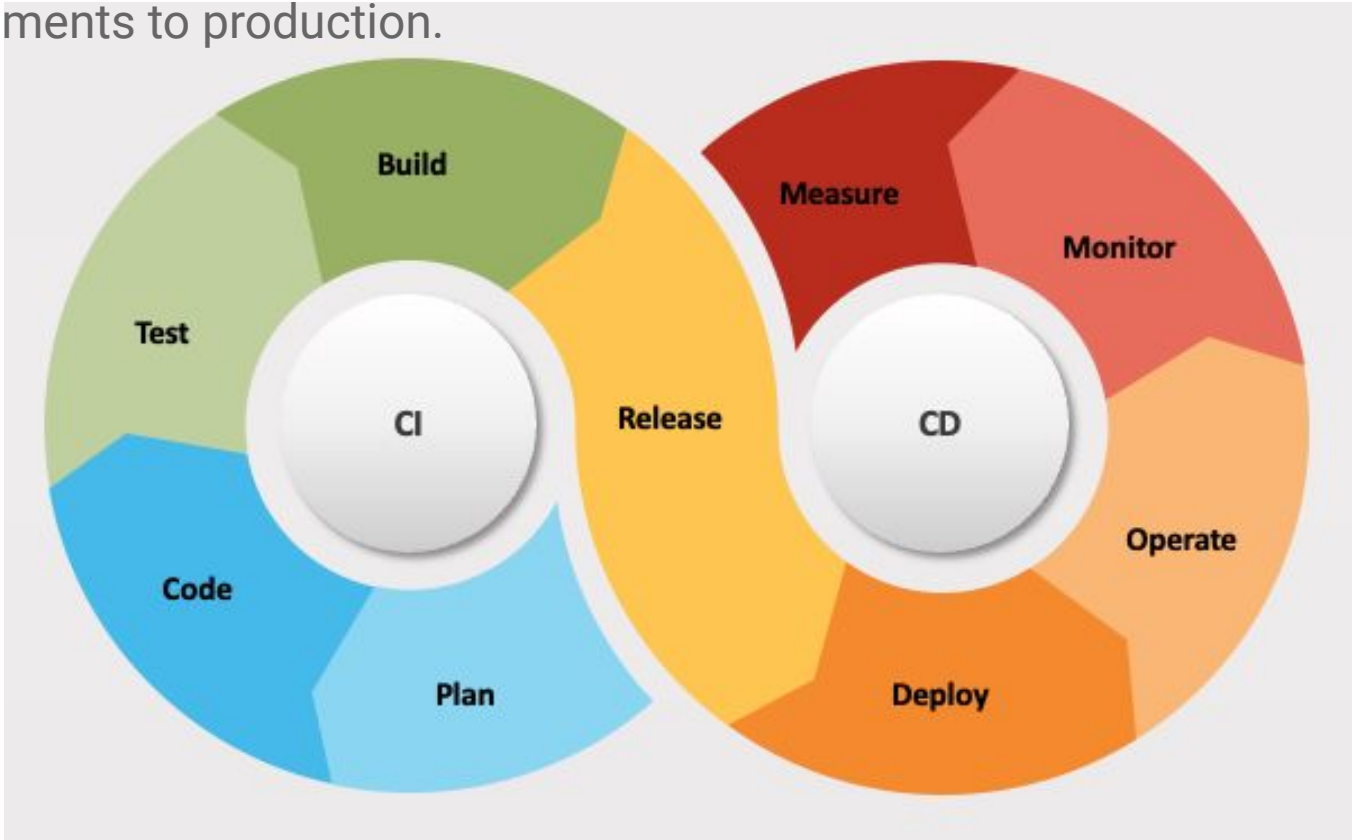
Incremental code changes are made frequently and reliably

Automated build-and-test steps ensure that code changes being merged into the repository are reliable



The CI/CD Pipeline

Automates the delivery of incremental code changes from developers' local environments to production.



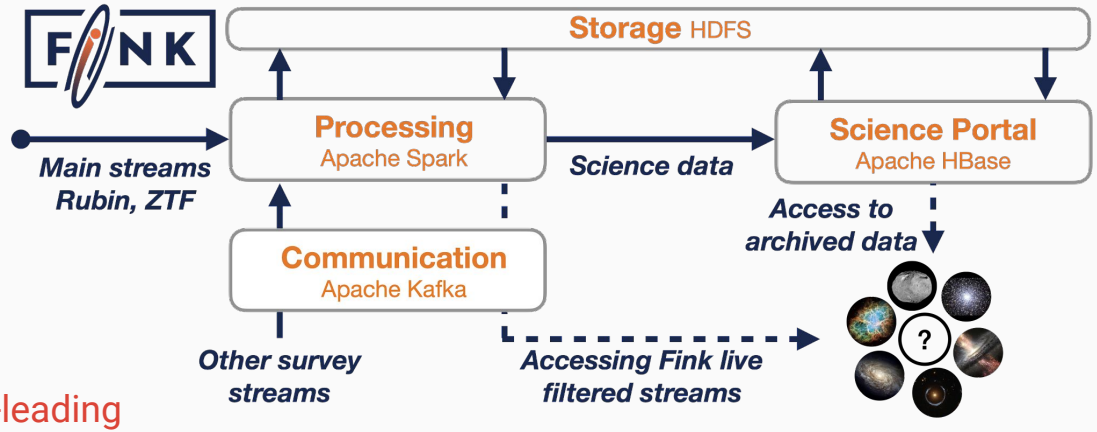
Fink-broker on k8s

Fink: at scale, 100+ processes

Kafka
A data streaming technology and
a complex distributed computing system.

Spark
Distributed processing system used
for big data workloads

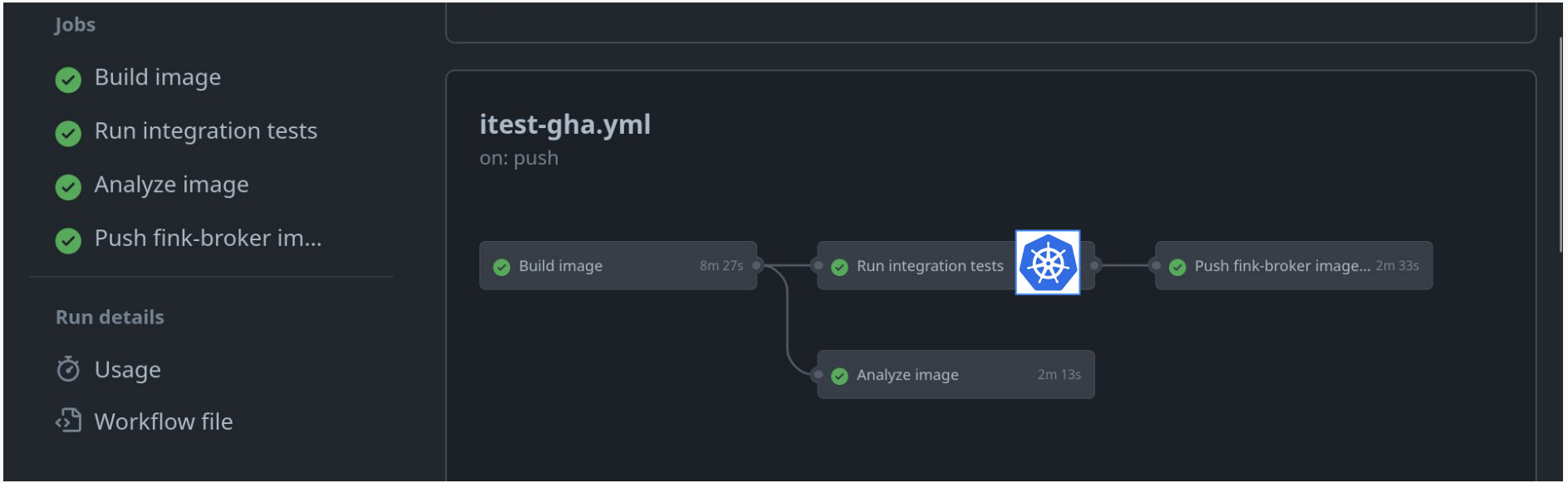
S3 Storage
Object storage service that offers industry-leading
scalability, data availability, security, and performance



Objective:
Ease Fink-broker deployment and management at scale

Fully automated deployment

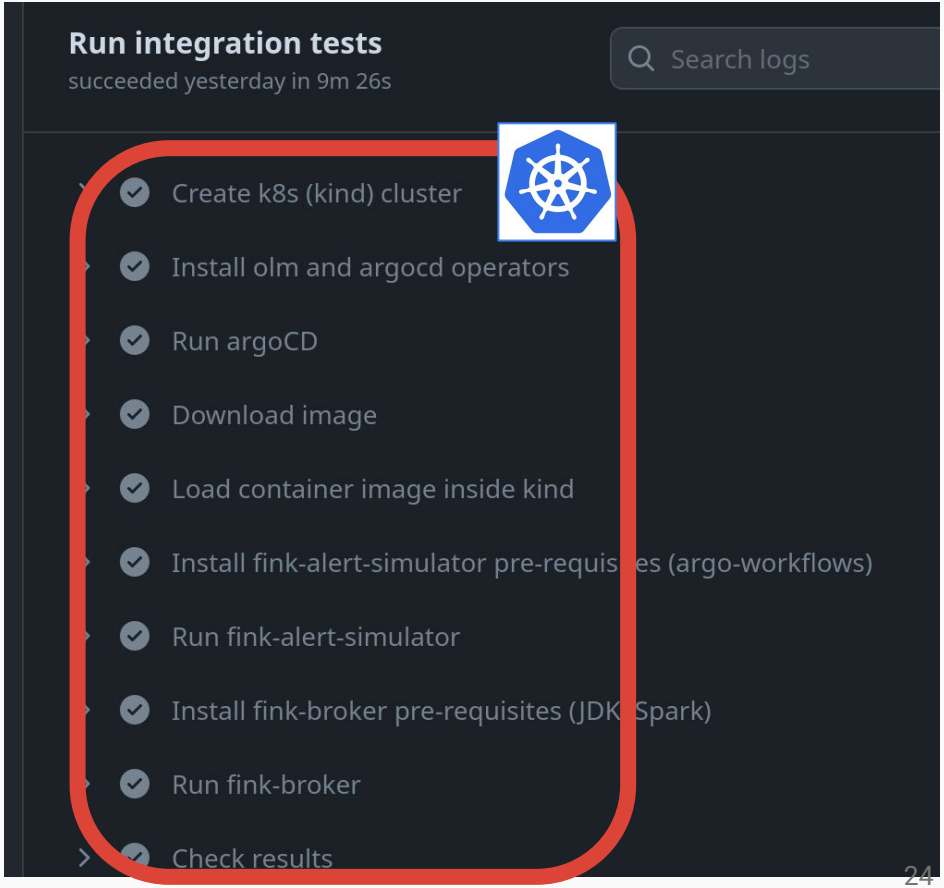
For each git commit, the fink stack is automatically deployed and tested on k8s



A generic, push-button, install procedure

The very same procedure to install fink on:

- production/integration/qualification platforms
- developer workstations
- In the cloud
- On premise/Bare-metal



CI Setup with KIND

For each commit
- Build Fink image
- Start Kubernetes
- Start Fink stack
- Launch integration tests
- Push image to registry

KIND

kind-control-plane (master)

Container Runtime

kind-worker

Fink-broker

Kafka

Container Runtime

kind-worker2

Minio (S3)

Fink-broker

Container Runtime

Docker runtime

Github Action VM

https://kind.sigs.k8s.io/

Easy Kubernetes: https://github.com/k8s-school/ktbx

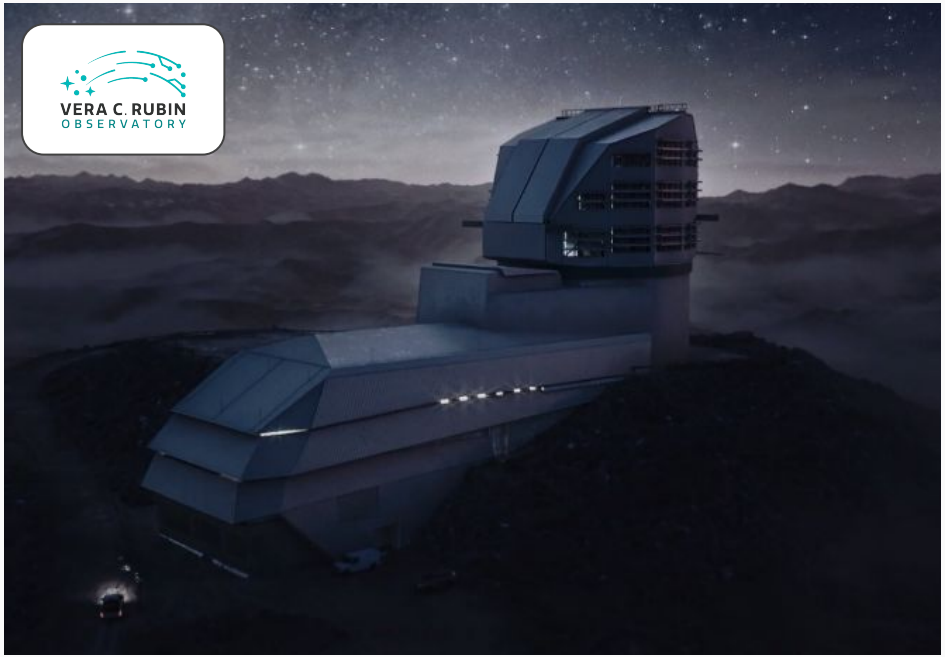
Toolbox, written in golang

ktbx
Kubernetes install and management

ciux
Software stack versioning, release management

finkctl
Fink command line interface

Objective:
Manage a k8s-based multi-project software stack



Ciux will be proposed to Qserv team when more mature

Conclusion

1. Fink is running in a Kubernetes POC
2. Production platform coming at CC-IN2P3
3. TODO Security, monitoring, automation++
4. TODO Scalability test for LSST data deluge?

Q&A

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