

Portal para Mesh de Serviços em Ambientes Virtualizados



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Introduction



Introduction

- ▶ We've been working on a project that involves acquiring knowledge about massively complex toolchain environment, involving prominent solutions such as Kubernetes and Service Mesh.

- ▶ We have simulated a real-world use-case where a central office manages multiple factories in different countries.

- ▶ Our solution enables scalability, high availability, and a robust intercommunication system.

► Introduction - Kubernetes

- An open-source container orchestration platform designed to automate the deployment, scaling, and management of containerized applications.
- Simplifies deployment and management of containerized applications.



kubernetes

- A traffic controller in a bustling city. In this analogy, containerized applications are like vehicles on the roads, and Kubernetes takes on the role of managing and optimizing the flow of traffic.

Introduction - Service Mesh

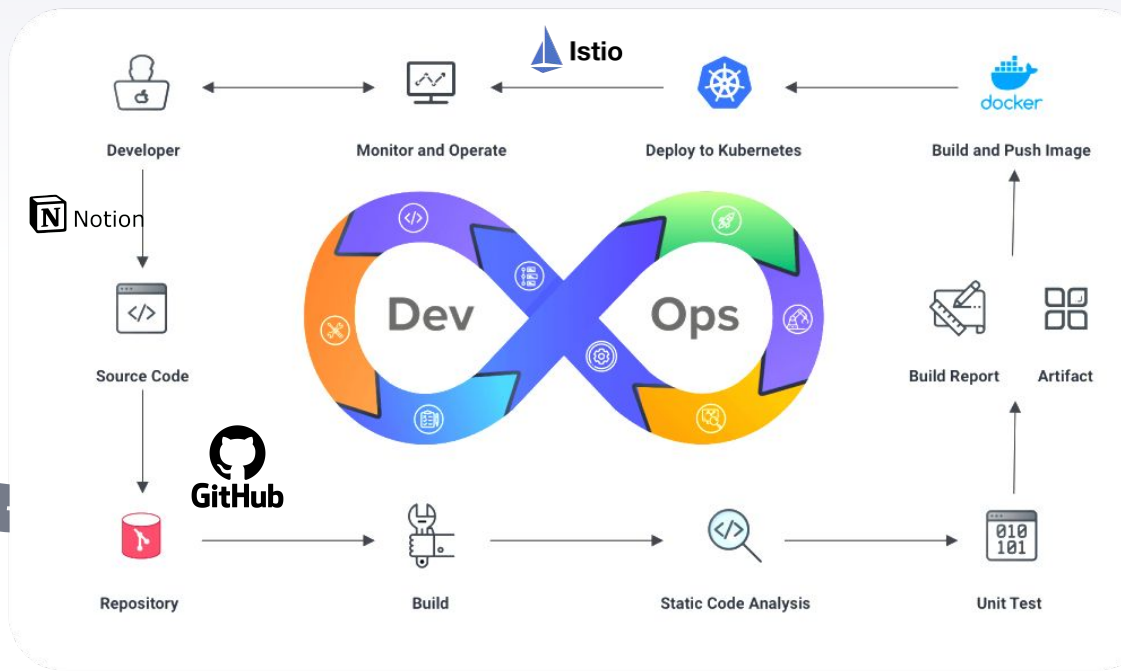
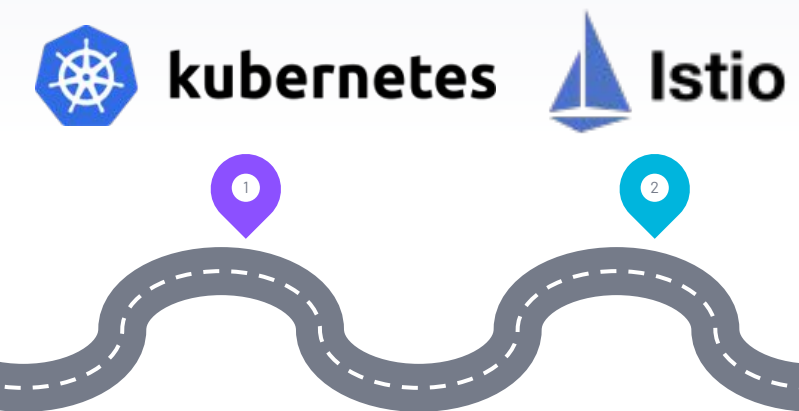
- ▶ A Service Mesh is a dedicated infrastructure layer for facilitating service-to-service communications between microservices.
- ▶ It provides observability, security, and traffic management capabilities.



- ▶ It's like a post office for our microservices. Imagine if Netflix had to deliver DVDs to all its users manually. It would be nearly impossible to track and manage. Service Mesh automates this.



Introduction - Roadmap



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Project's Context



Project's Context

Digital Shift

Adopting microservice architectures for agility, scalability, resilience.



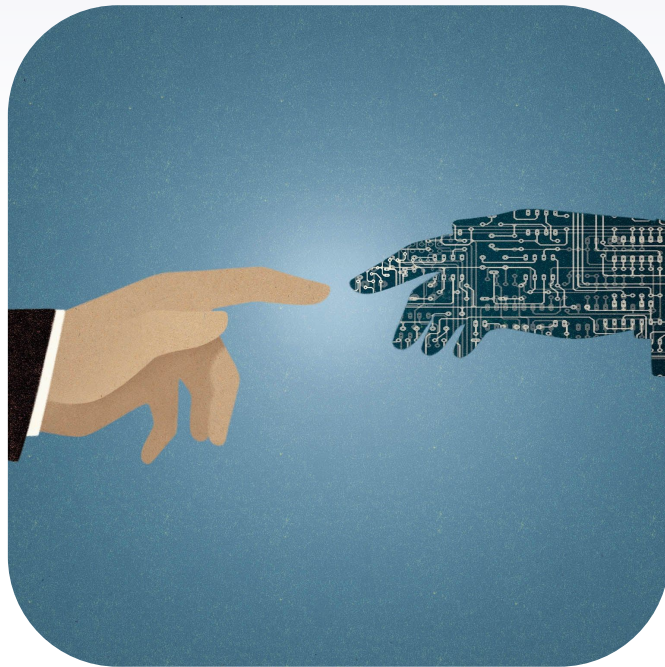
► Project's Context

Digital Shift

Adopting microservice architectures for agility, scalability, resilience.

Challenge

Managing increasing complexity of orchestration with growth in microservices.



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Digital Shift

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Solution

'Portal for Service Mesh in Virtualized Environments' simplifies Kubernetes and Service Mesh usage.

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Objectives



► Objectives

Understand the workings of Kubernetes and Service Mesh.

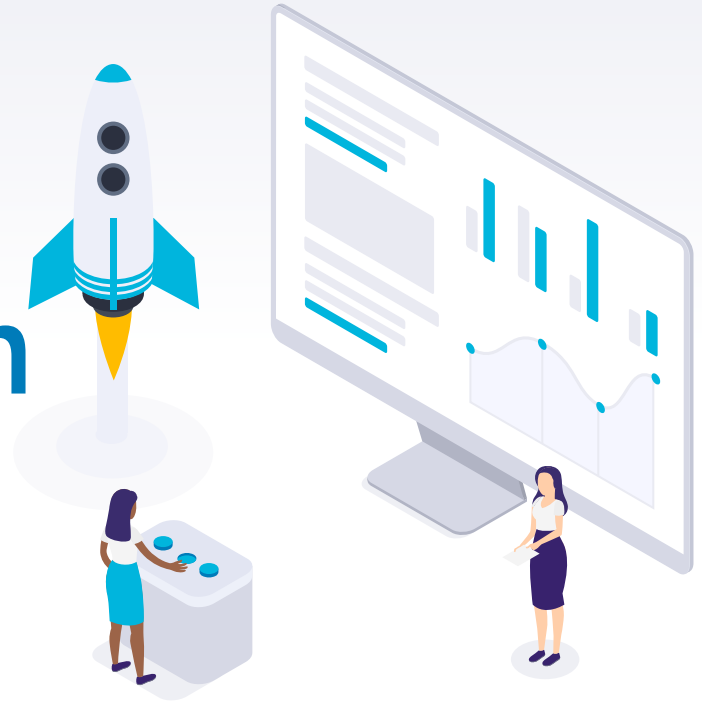
Implement a multi-cluster Kubernetes architecture.

Implement a central office factory management implemented in Kubernetes.

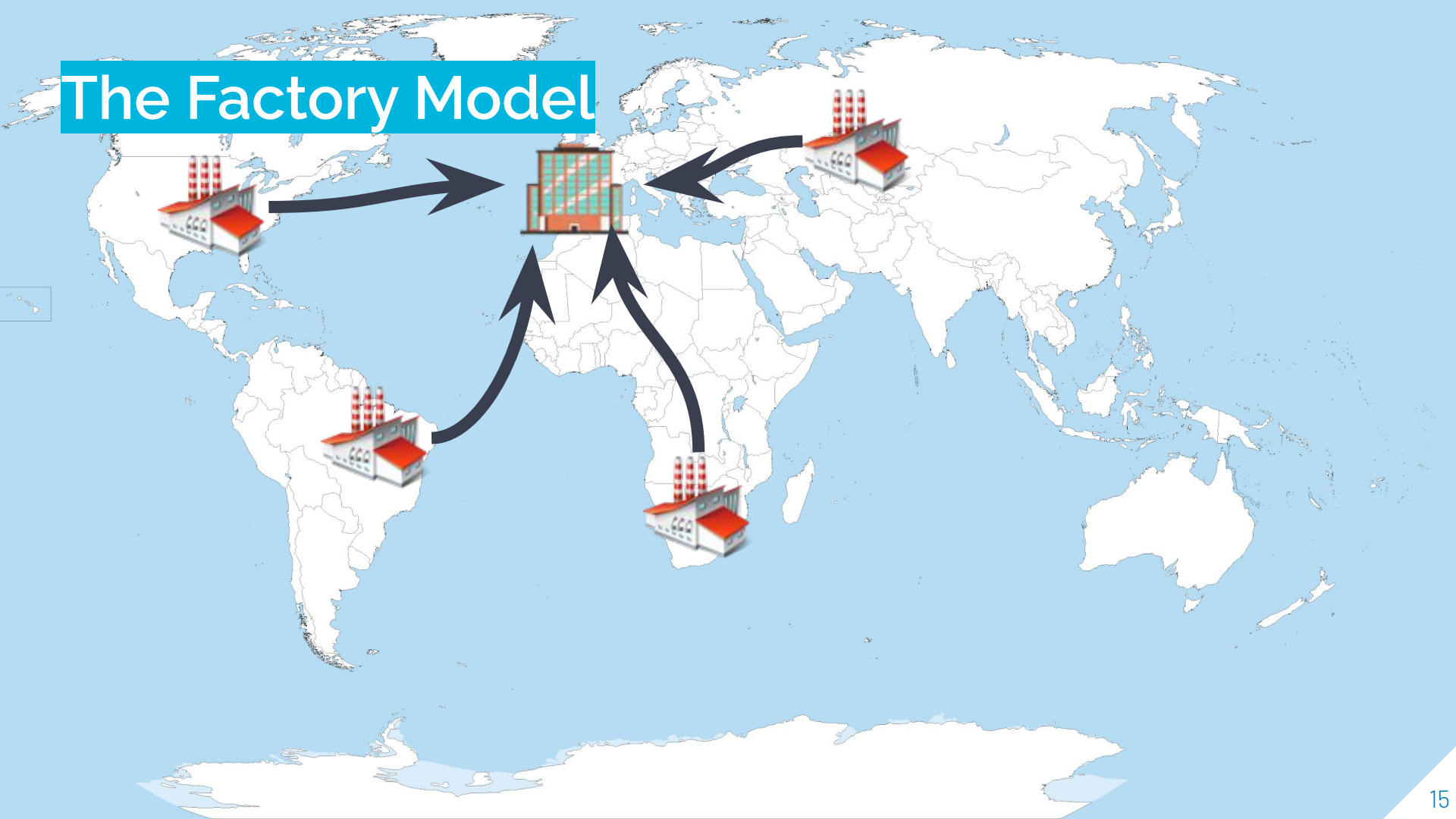
Simulate the interaction of different factories with the central office of management.

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Implementation



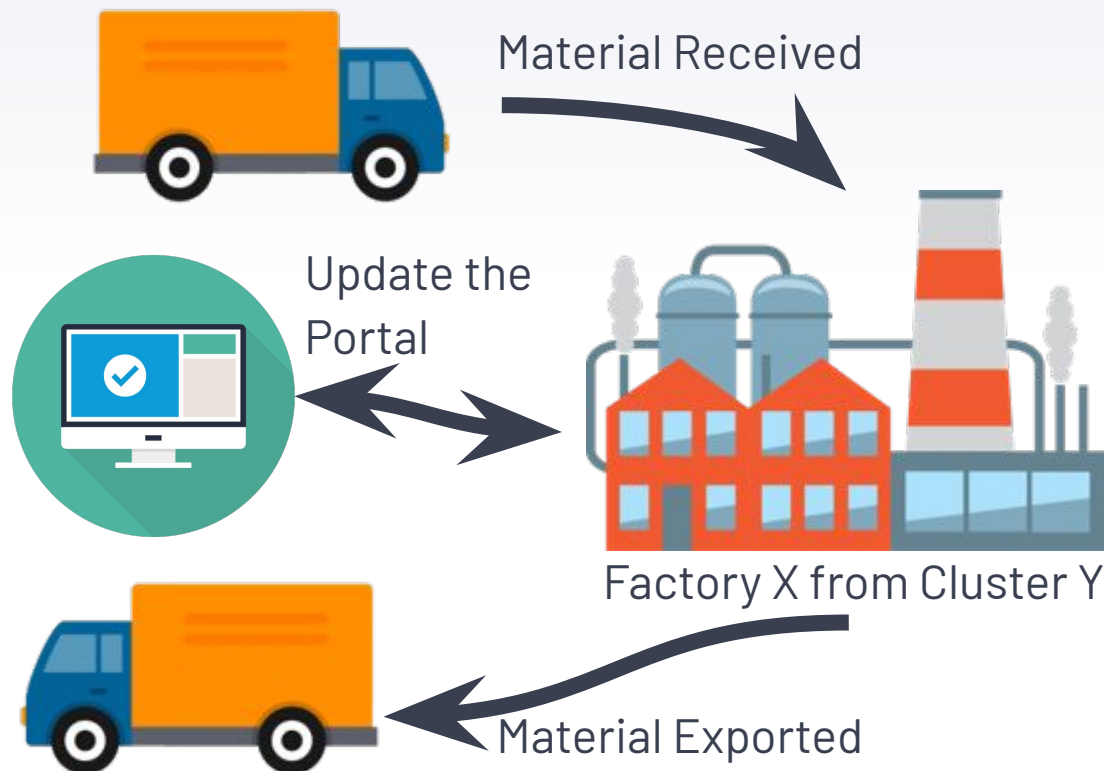
The Factory Model



Implementation

Factory - Material In/Out

- ▶ Receives/Exports Material;
- ▶ While simulated, this could be connected to sensors, or others that automatically track live quantities;
- ▶ Each factory manager can track it's own factory input/output values.



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Project Timeline



INITIAL PHASE

MILESTONE 1



MILESTONE 2

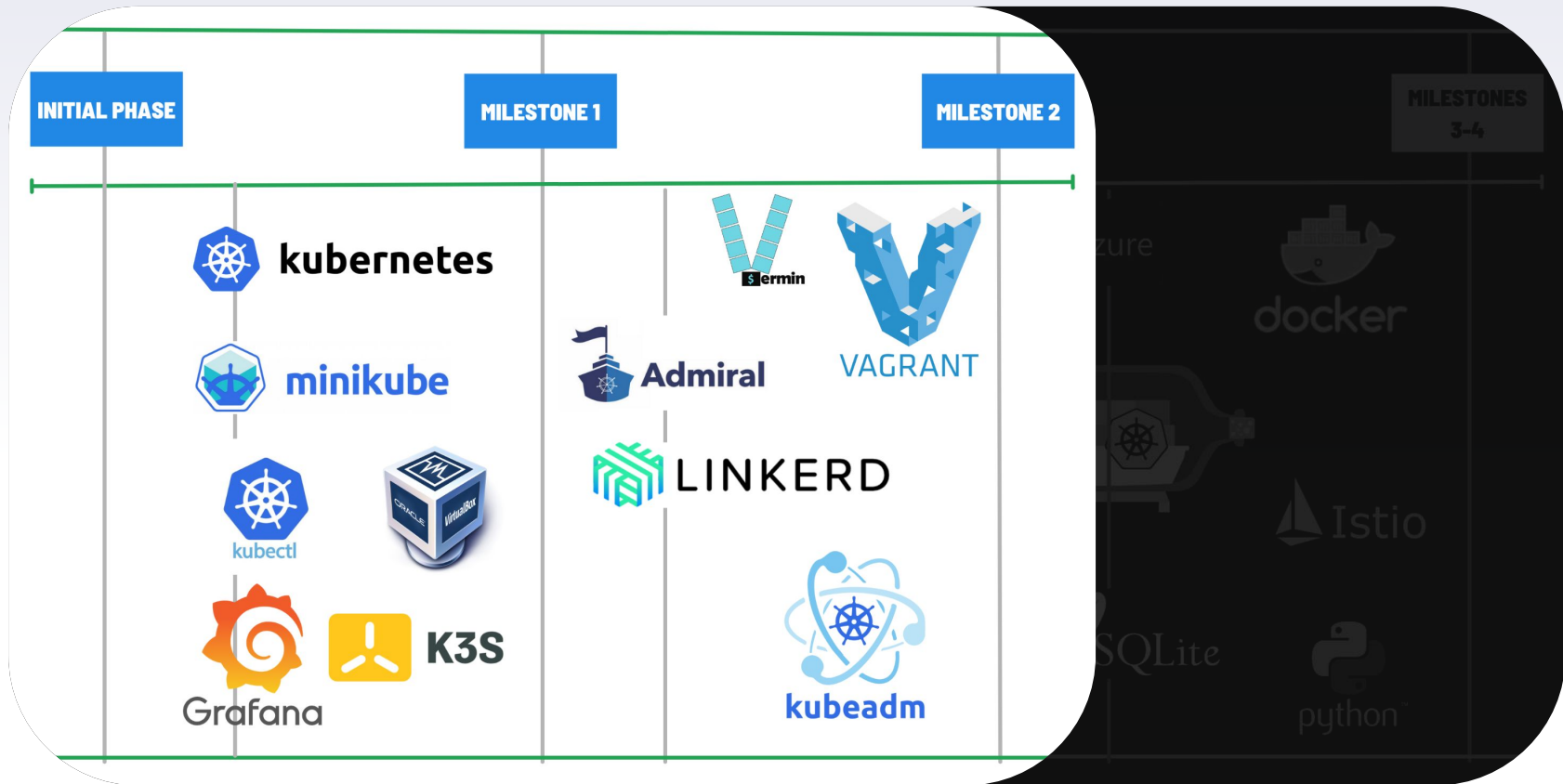
MILESTONES 3-4



Milestone 1

Milestone 2

Milestone 3/4



Milestone 1

Milestone 2

Milestone 3/4

INITIAL PHASE

MILESTONE 1

MILESTONE 2

MILESTONES
3-4



kubernetes



minikube



kubectl



K3S



Admiral



LINKERD



kubeadm



Vermin



VAGRANT



Azure



kind



SQLite



docker



Istio



python

Milestone 1

Milestone 2

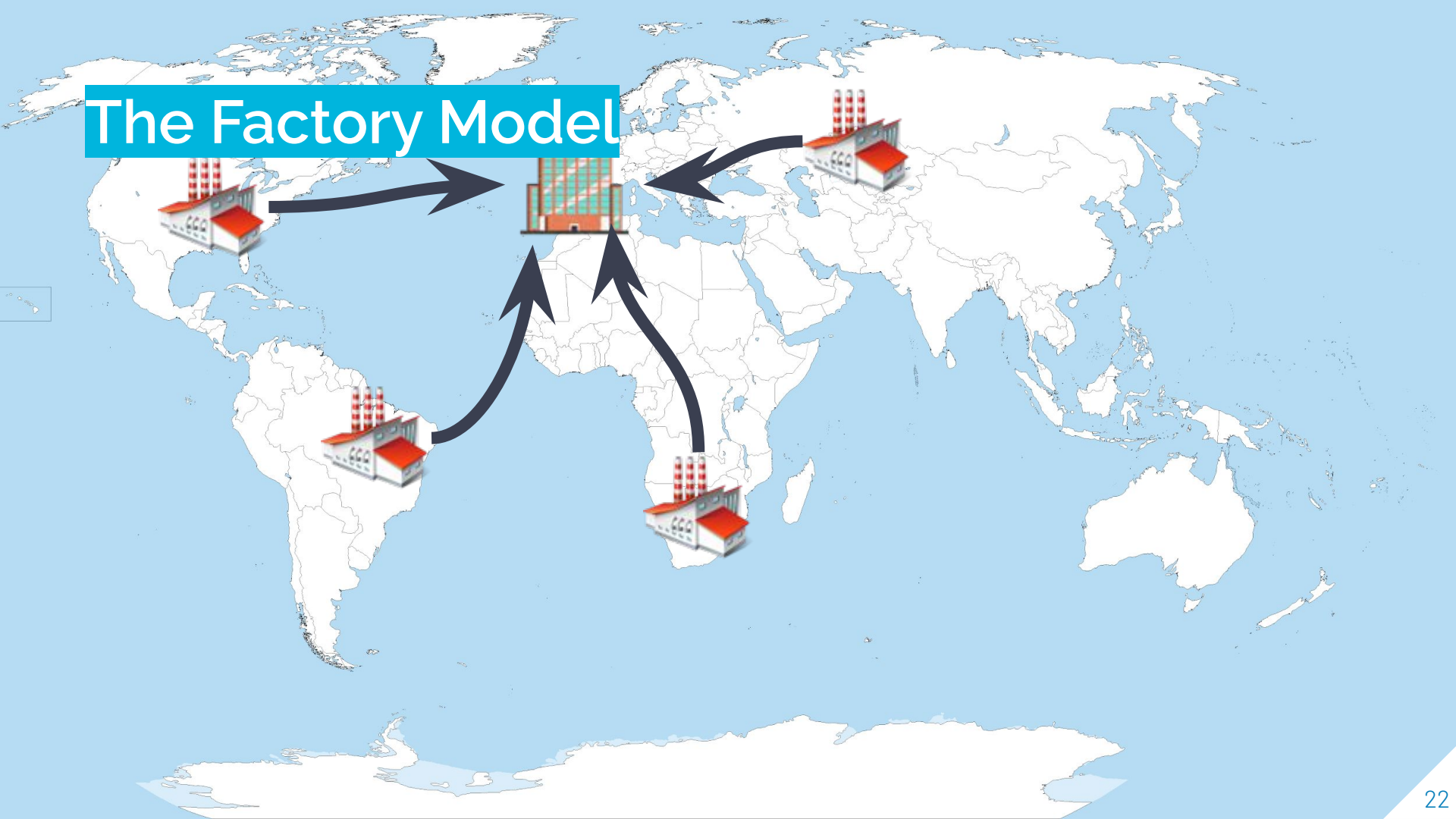
Milestone 3/4

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Final Architecture



The Factory Model

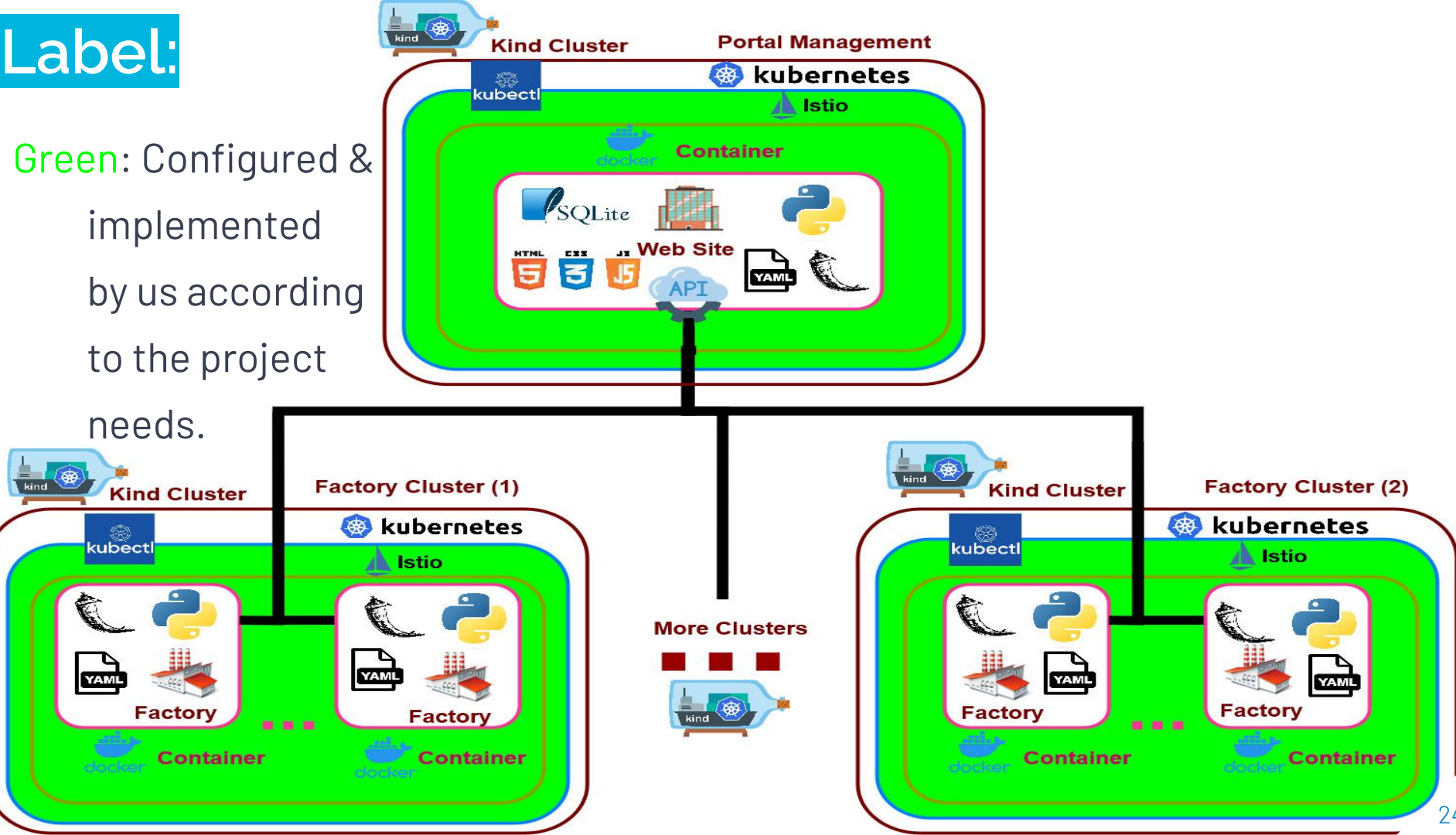


Grey: Developed
by us from
scratch.



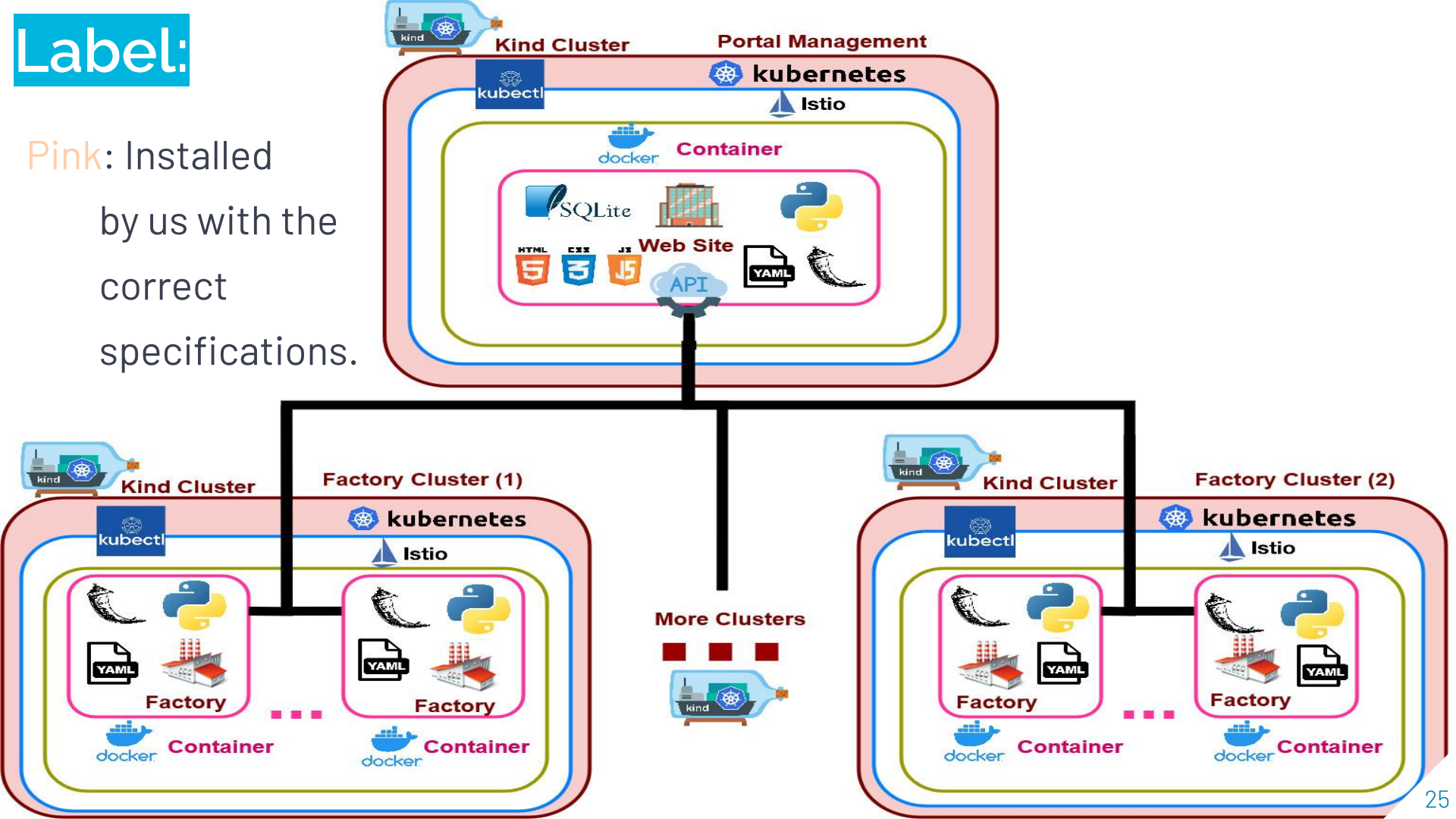
Label:

Green: Configured & implemented by us according to the project needs.



Label:

Pink: Installed by us with the correct specifications.



DEMO

Showcase how the
creation is done and
how the website works



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Future Work



► Future Work

- ▶ Implement more Cluster creation/checks to be accessible from the portal;
- ▶ Allow the office employees to create and manage factory managers accounts, to allow more accounts per factory;
- ▶ Change the portal perspective from low control and high information to high control and high information.



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Conclusion



Conclusion

Addressing Challenges

Our project addresses the complexities associated with managing and orchestrating microservices.

User-friendly Interface

Our project develops an effective management platform with an intuitive user interface to simplify interaction with Kubernetes and Istio.

Monitoring and Resource Optimization

The portal includes advanced monitoring capabilities, troubleshooting tools, and efficient management to optimize resource utilization.

- ▶ Our project successfully implemented a multi-cluster architecture using Kubernetes and Istio.
- ▶ The simulation of a real-world use-case made the project more engaging and relatable.
- ▶ We have effectively acquired a comprehensive array of essential tools pertinent to the field of engineering.

Special Thanks

We wanted to thank Prof. Daniel Corujo for his invaluable accessibility and motivation.



THANKS!

Any questions?

