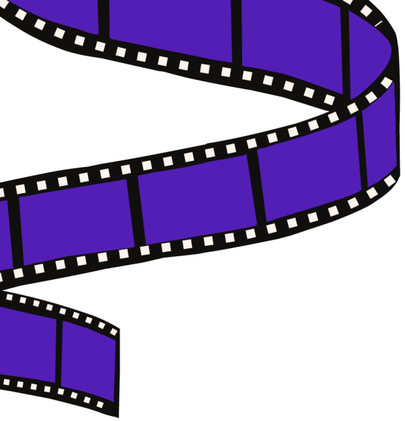
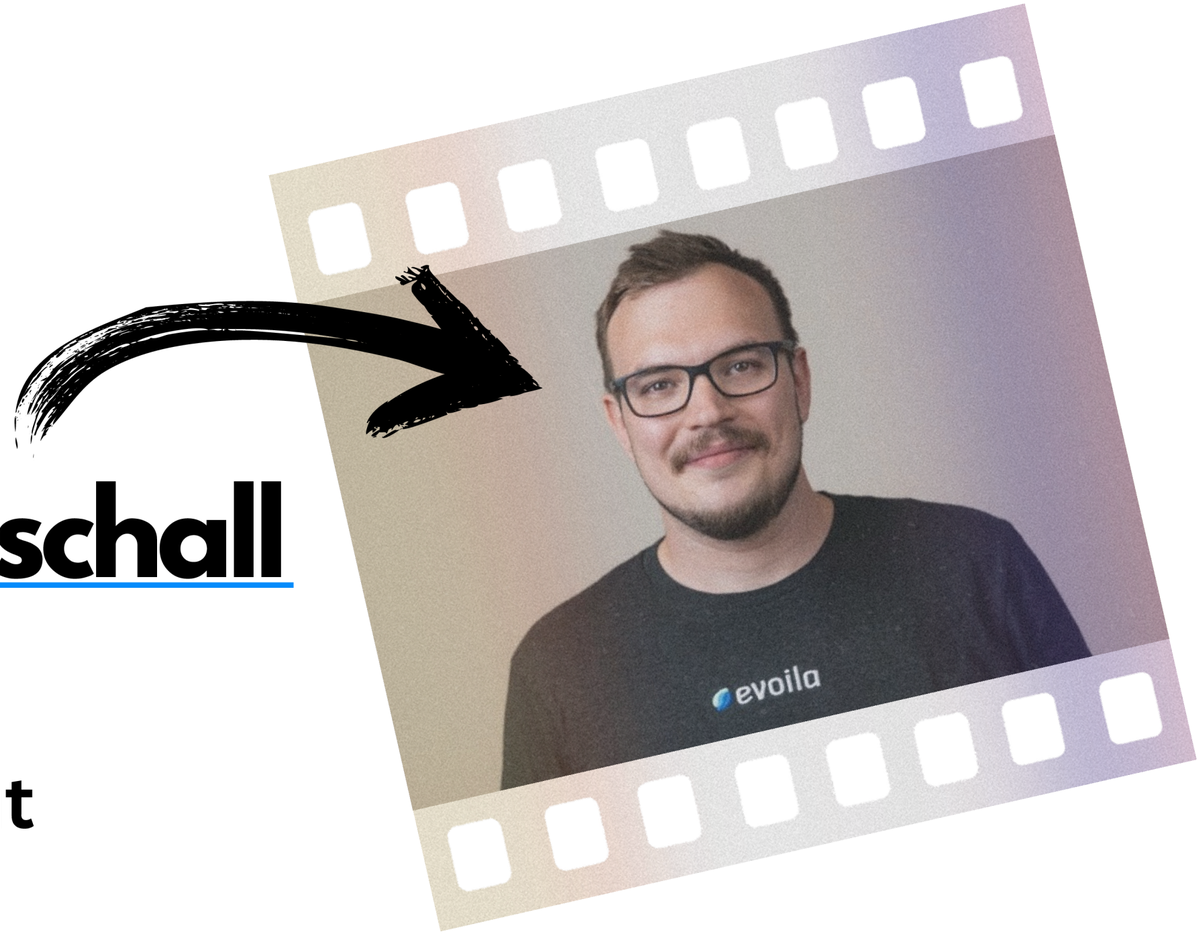
Reverse-Engineering a Kubernetes Platform: From UI to GitOps

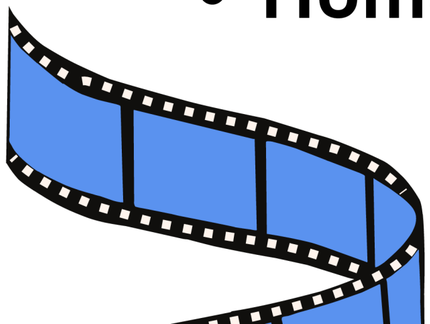


Maximilian Marschall



- Unit Lead
- CNCF Kubestronaut
- Development Lead

  Charity Work
- Homelab Warrior



Homelab

- 24 HE
- 4 Switches
- 6 Hosts
- 156 cores / 312 threads
- 2752 GB Memory
- 384 TB HDD
- 57 TB Flash

Artem Lajko

- Platform Engineer and Squad Lead
- CNCF Kubestronaut
- Ambassador
- Published Author

Target

- Why Internal Developer Platforms and Platform Engineering Matter
- From Layers to Planes
- Provide a Platform at Scale
- Deep Dives into the Planes
- Choreo | OpenChore by WSO2 - it’s already built
- Demo 🔥
- Recap & Learnings

Terminology

- Internal Developer Platform (IDP)
- Platform Engineering
- Planes
- Agentless vs. Agents
- Add-ons == Helm Charts
- CI/CD (Push based)

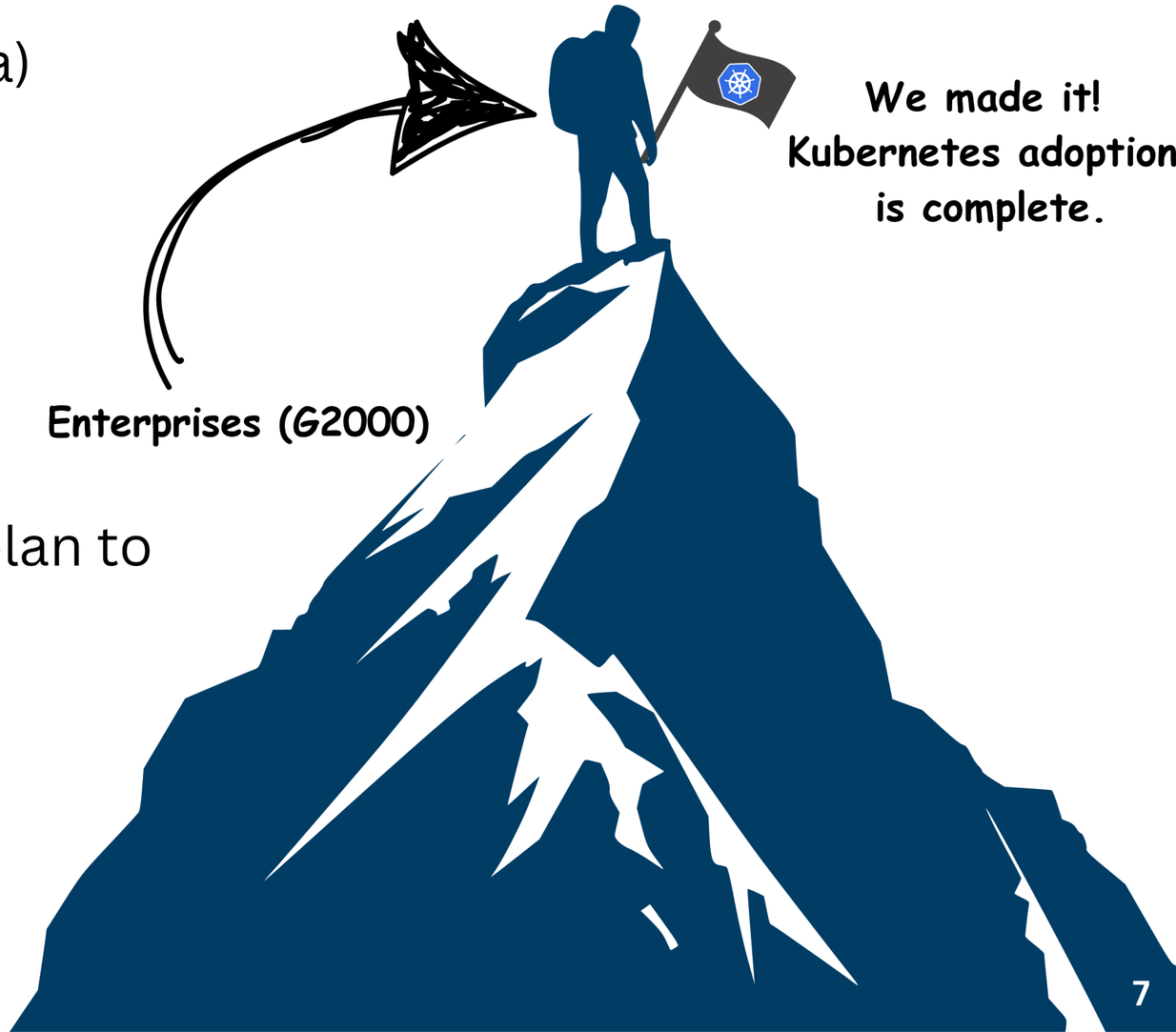
- GitOps (Pull based)

Why IDP matters!

- **Kubernetes** has become the standard for containerization since 2014 (June 6, Joe Beda)
- **By 2027, 90%** of G2000 companies will use container management tools (Gartner).
  In 2023, adoption was below 20% (Gartner)
- **55%** already use platform engineering; **90%** plan to expand it (Google Report)

Gartner

Google Report

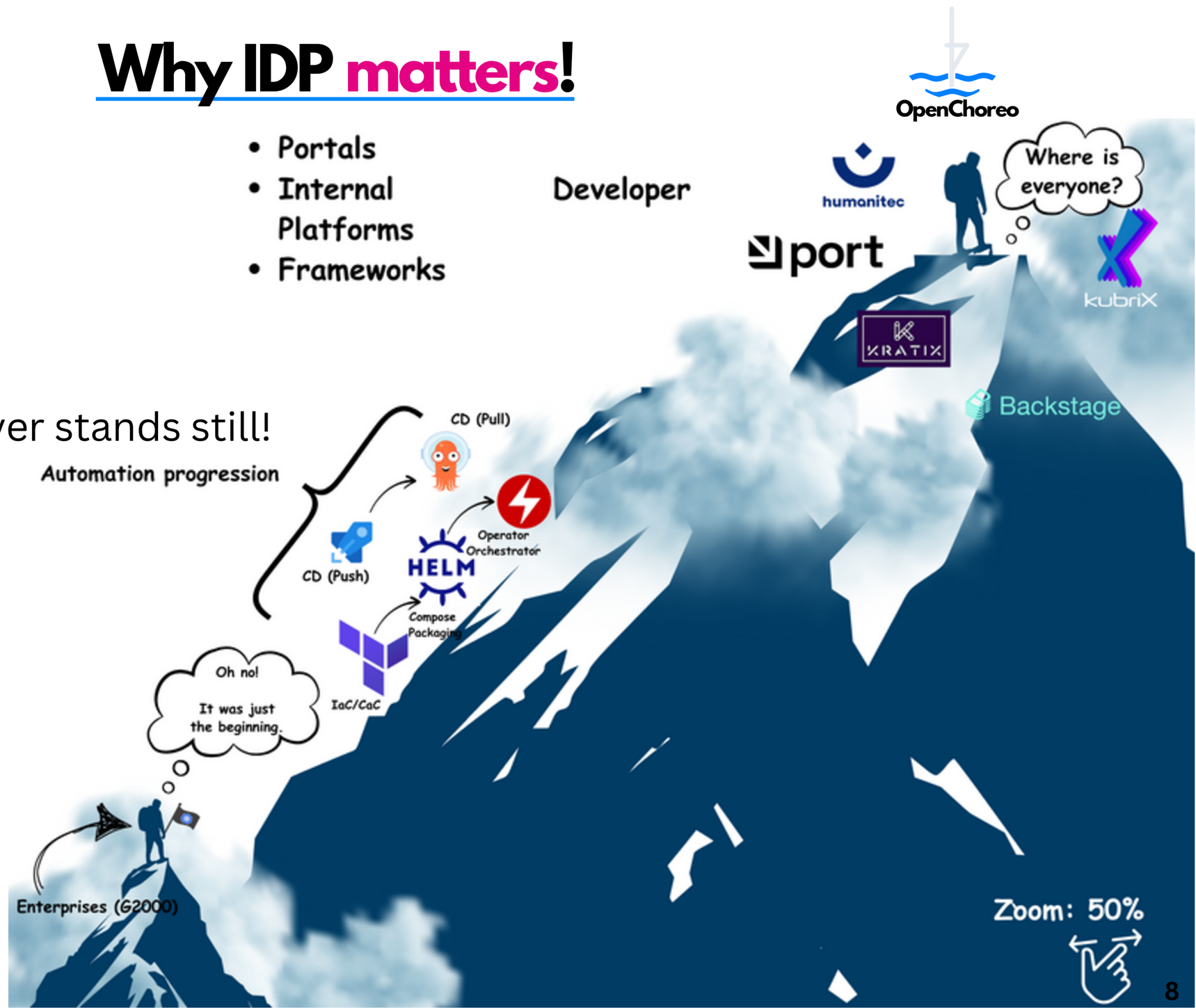


Why IDP matters!

- Portals
- Internal Platforms
- Frameworks

Congrats!

But remember — the world never stands still!



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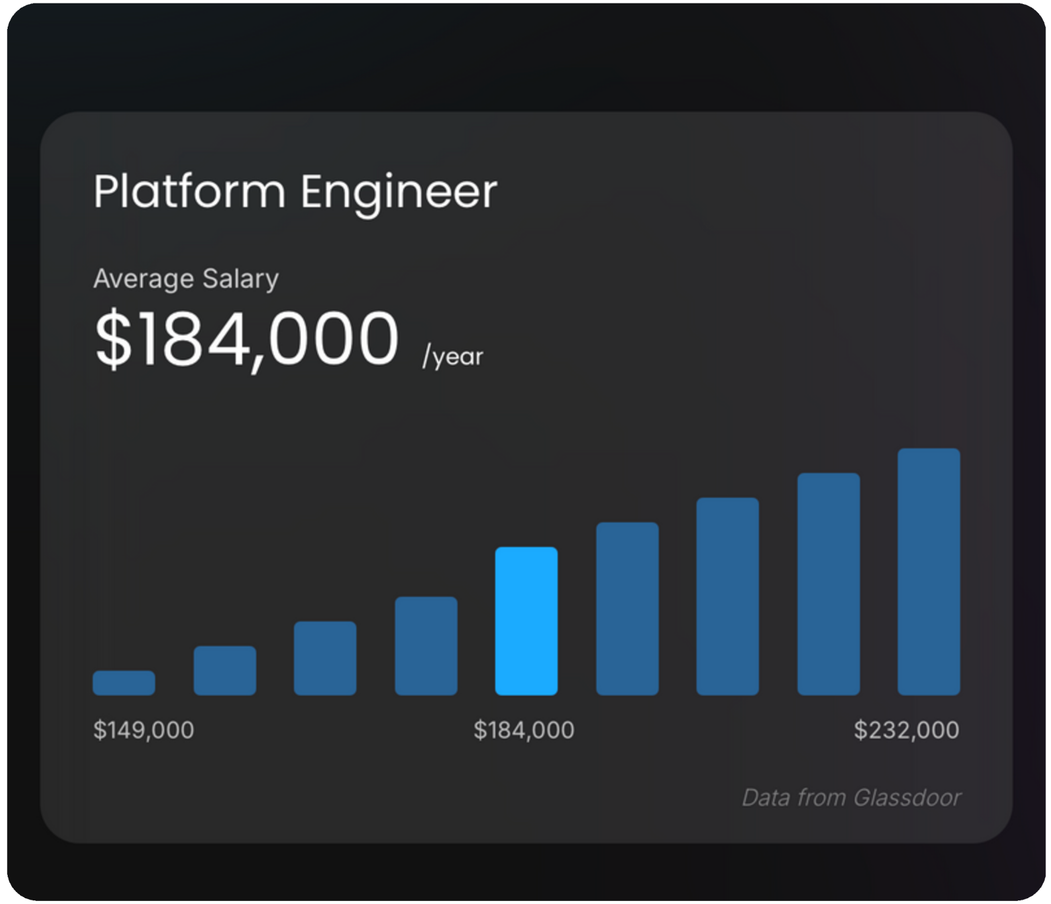
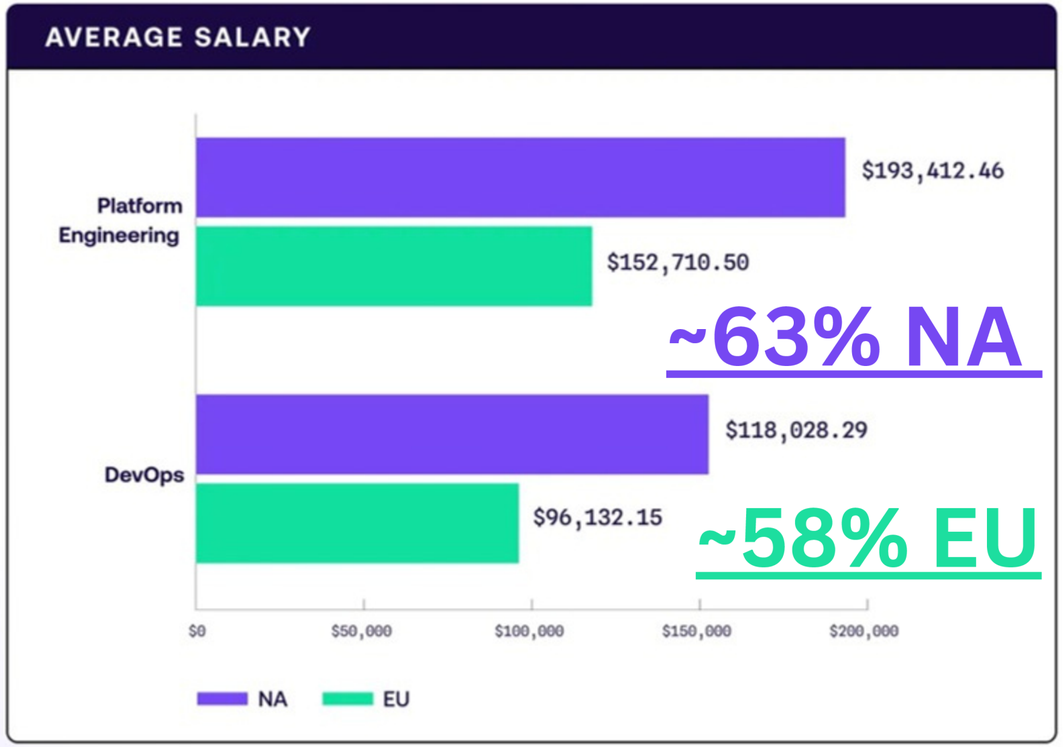


Platform Engineering vs DevOps salary

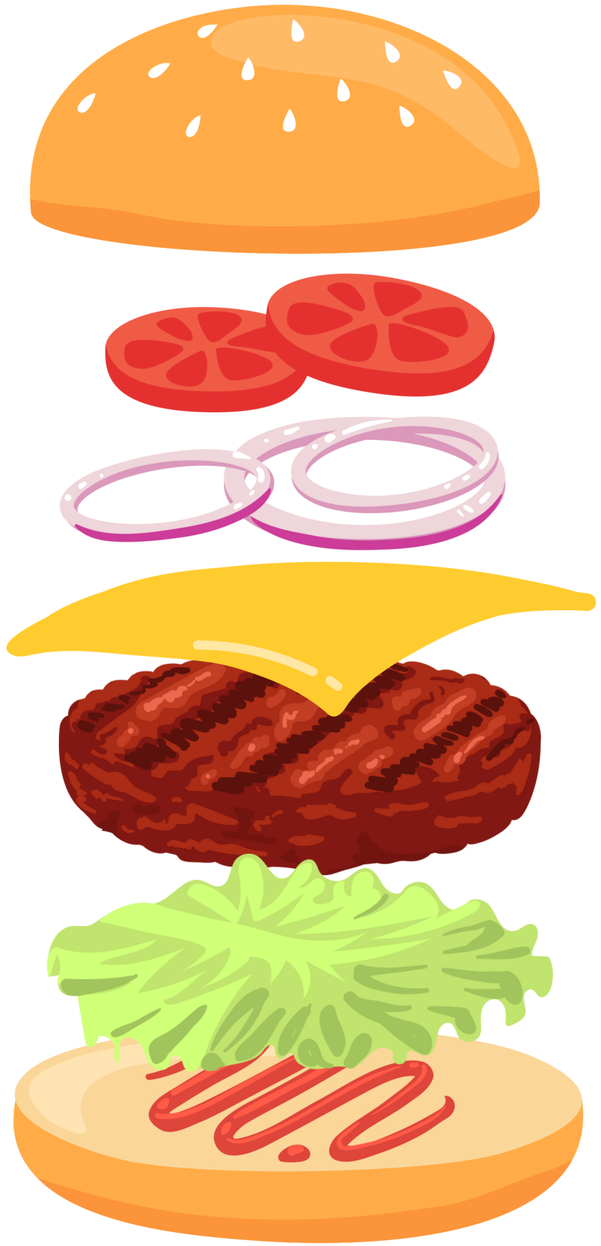
We spoke to 450+ platform engineering and DevOps professionals in Europe and the USA about their salaries.



Platform team maturity

More than 55.84% of platform teams are between 0 and 2years old.

From Layers to Planes: N-Layers View



Pods Deployments Secrets

API etcd CNI CSI

kubelet cAdvisor kube-proxy

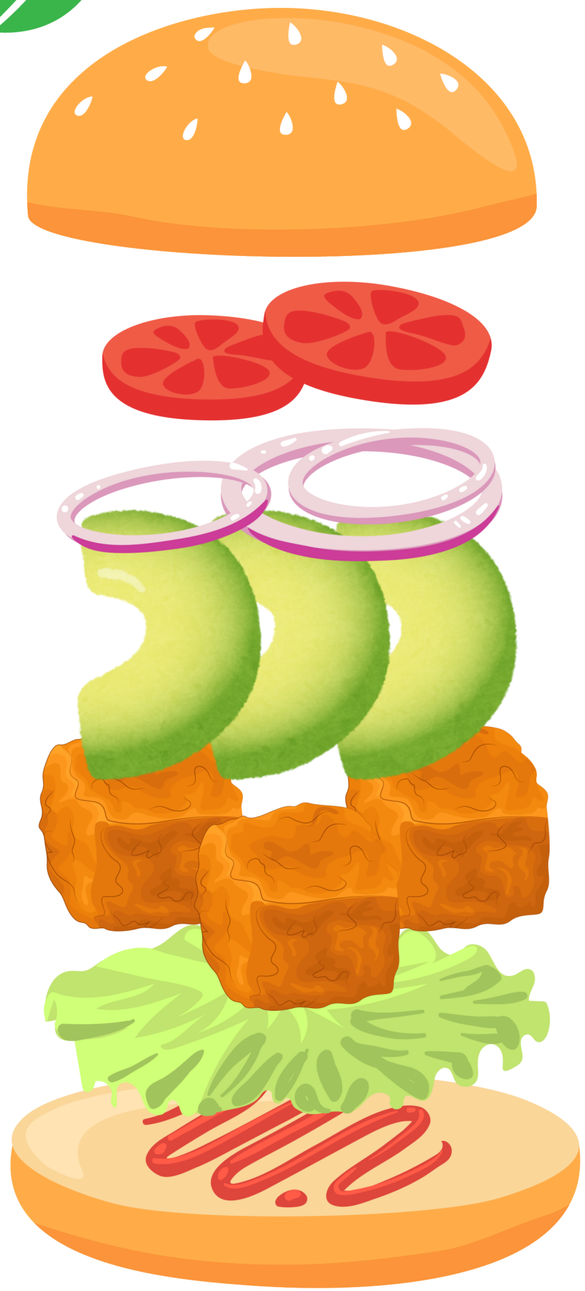
containerd CRI-O runc

Talos Ubuntu Flatcar

VMware ESX Hypervisor Bare Metal

Storage Network RAM CPU

From Layers to Planes: N-Layers View



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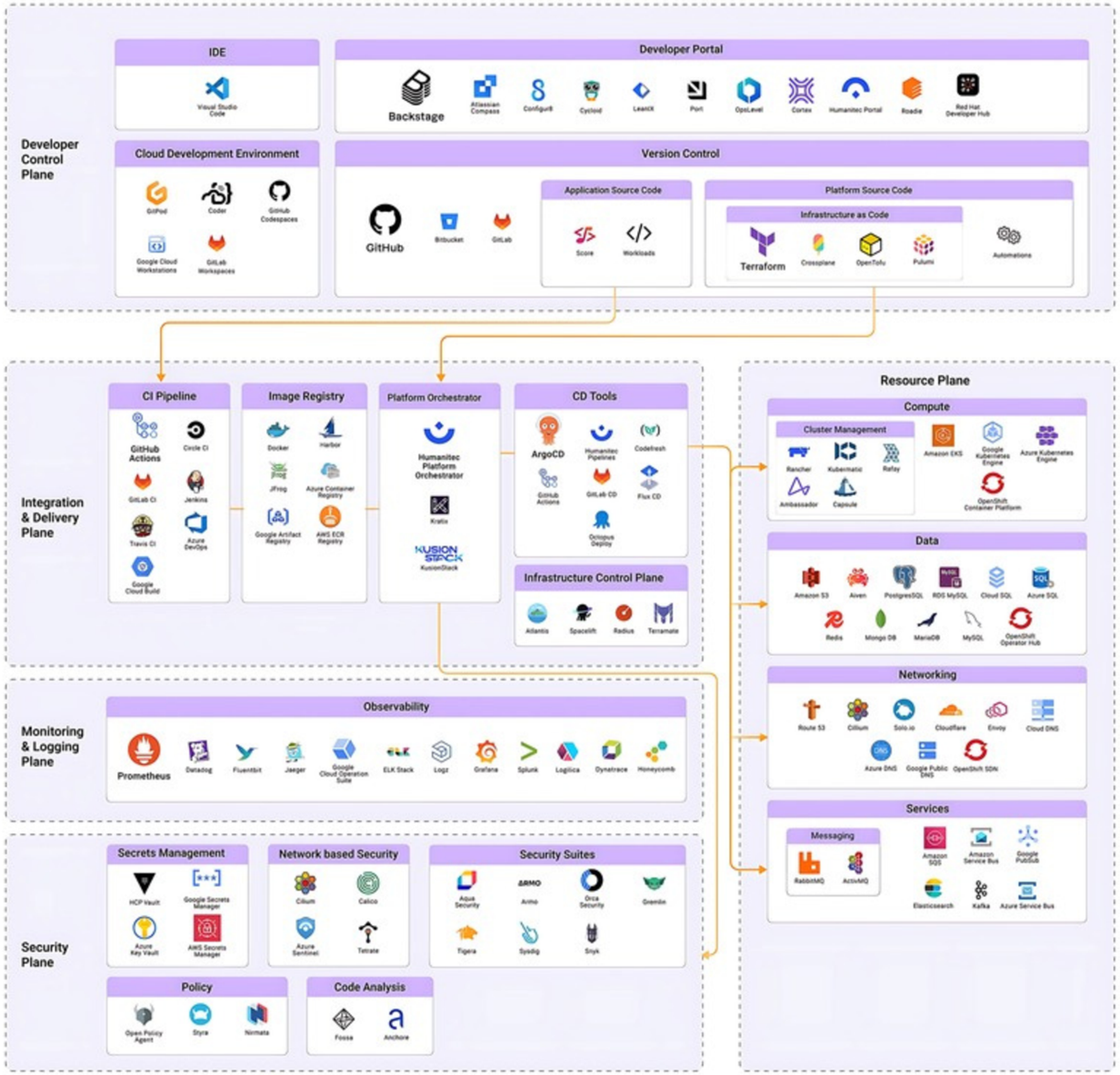
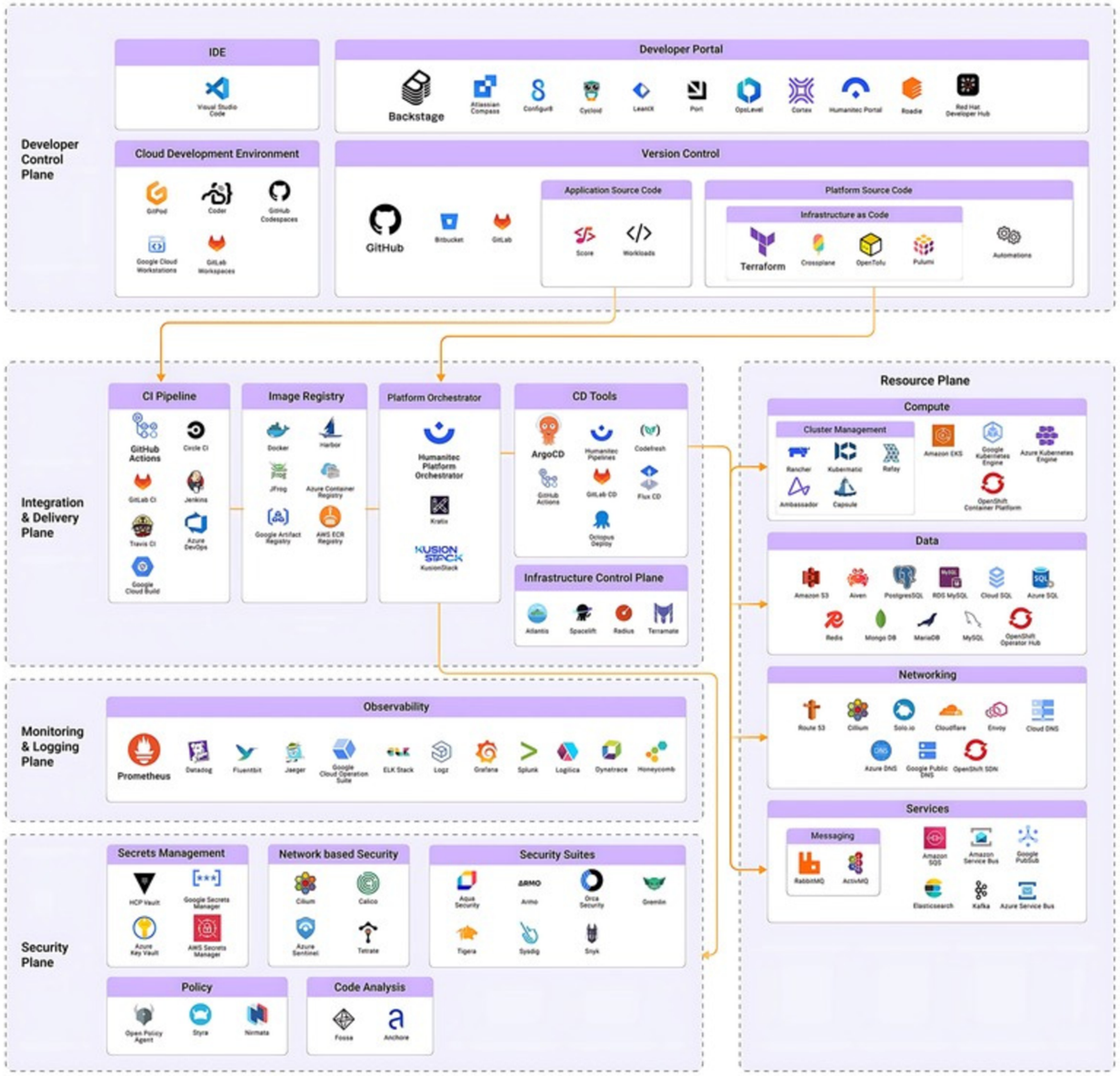
Not Layers - But Planes



Platform tooling landscape by Platform Engineering

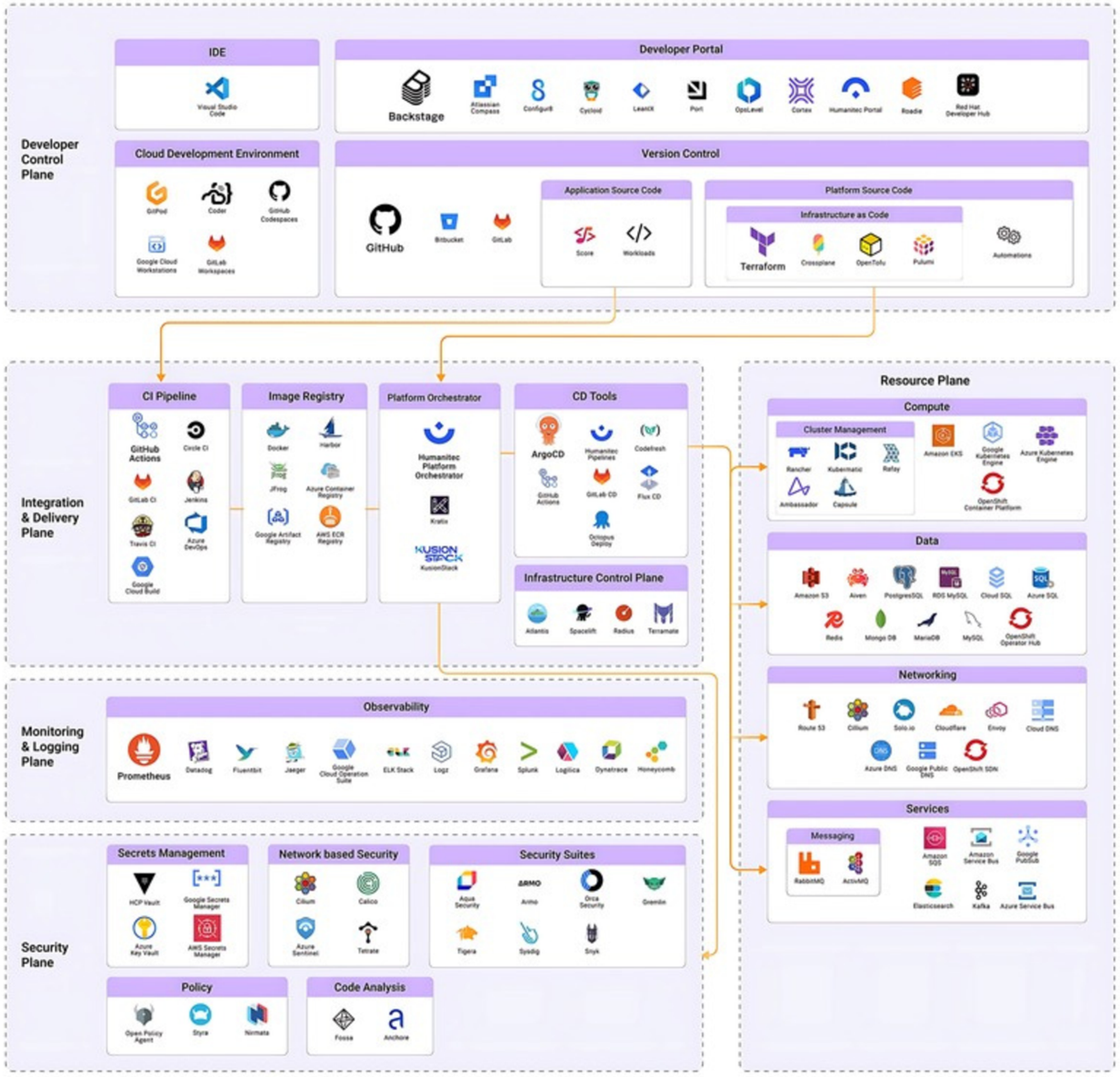
Ask Your Platform Team to Build This



Platform tooling landscape by Platform Engineering

The
WHAT

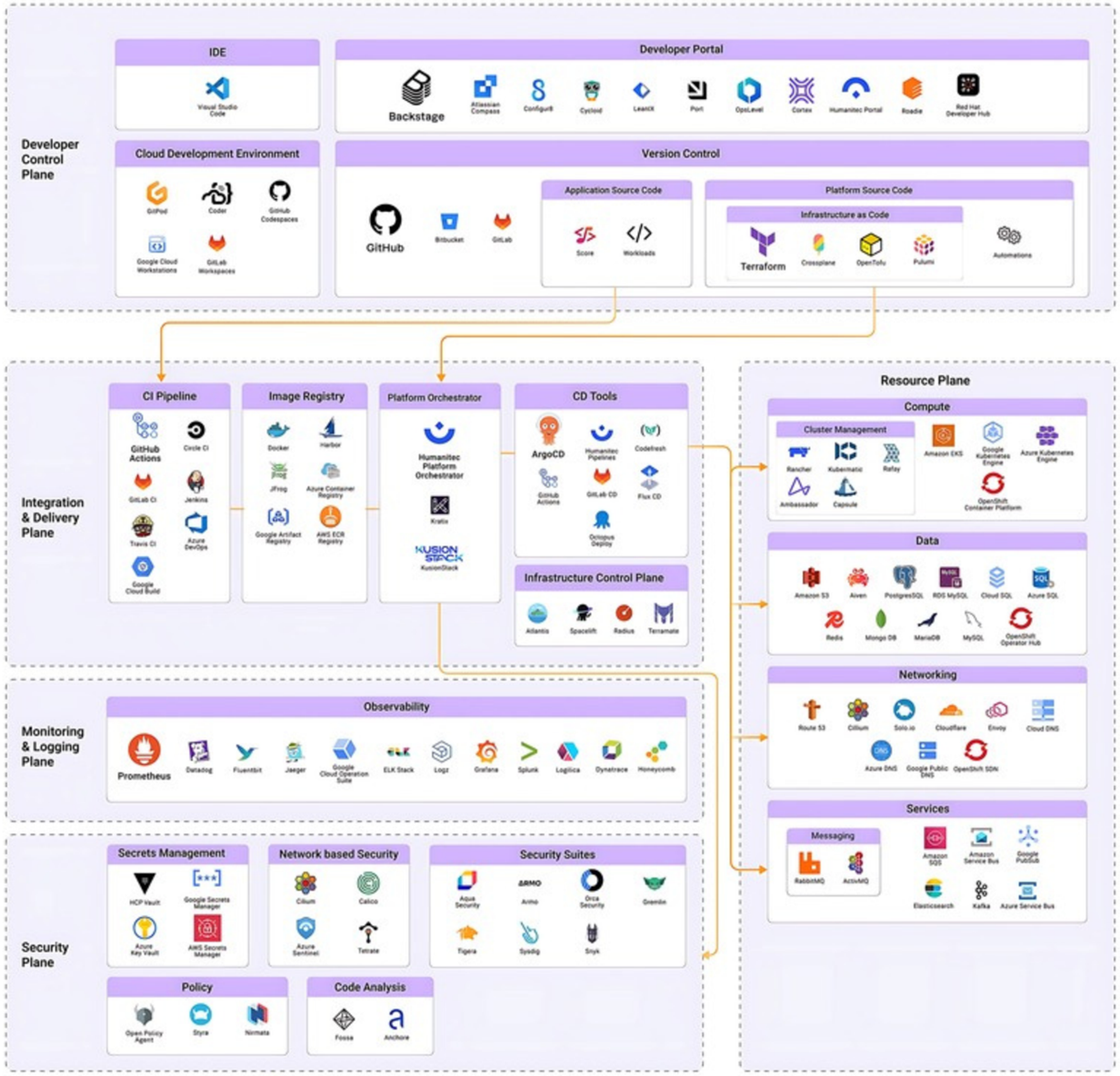
Just Build This



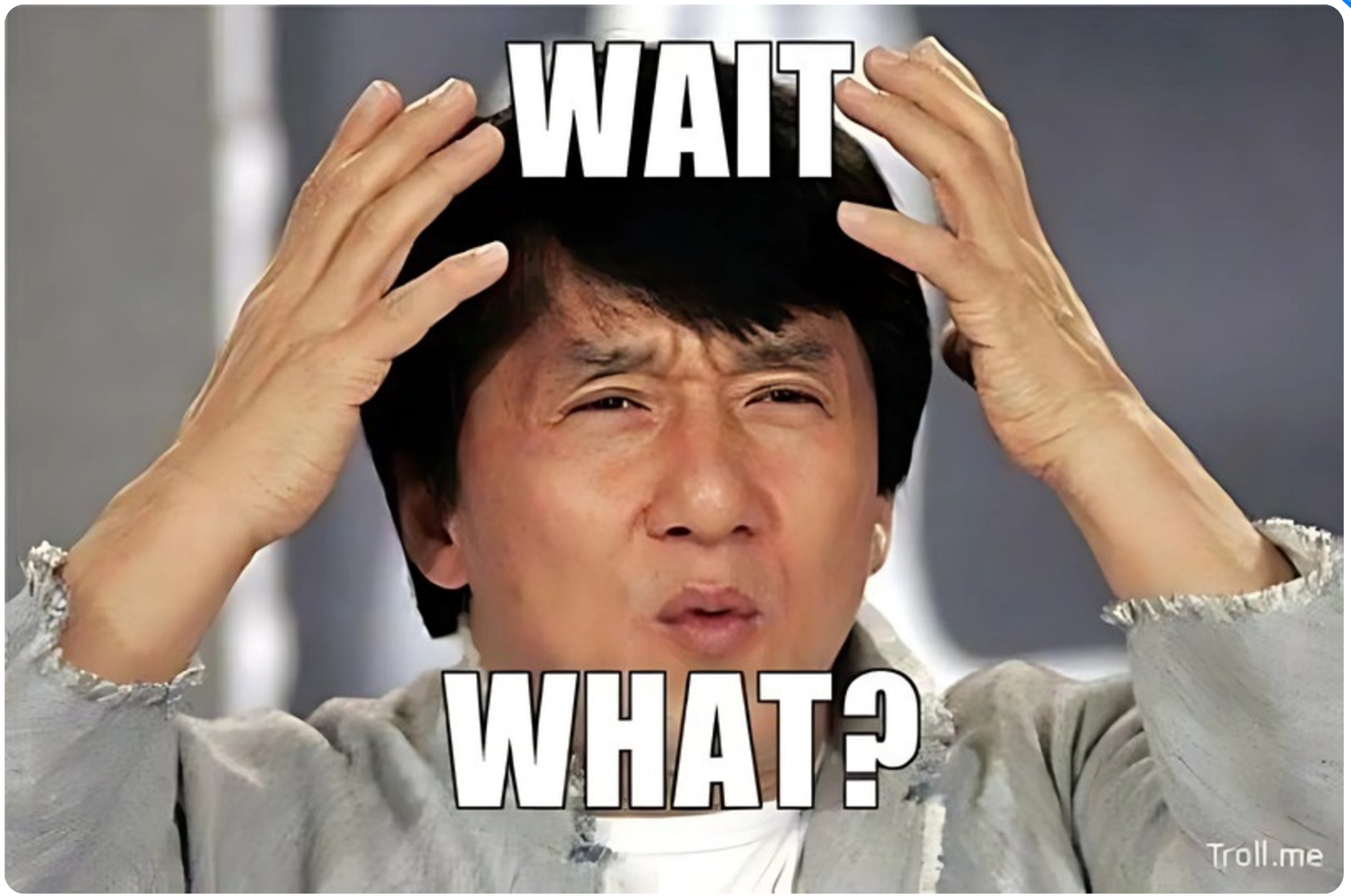
Platform tooling landscape by Platform Engineering

WAIT...
WHAT?

Simply Build It!!

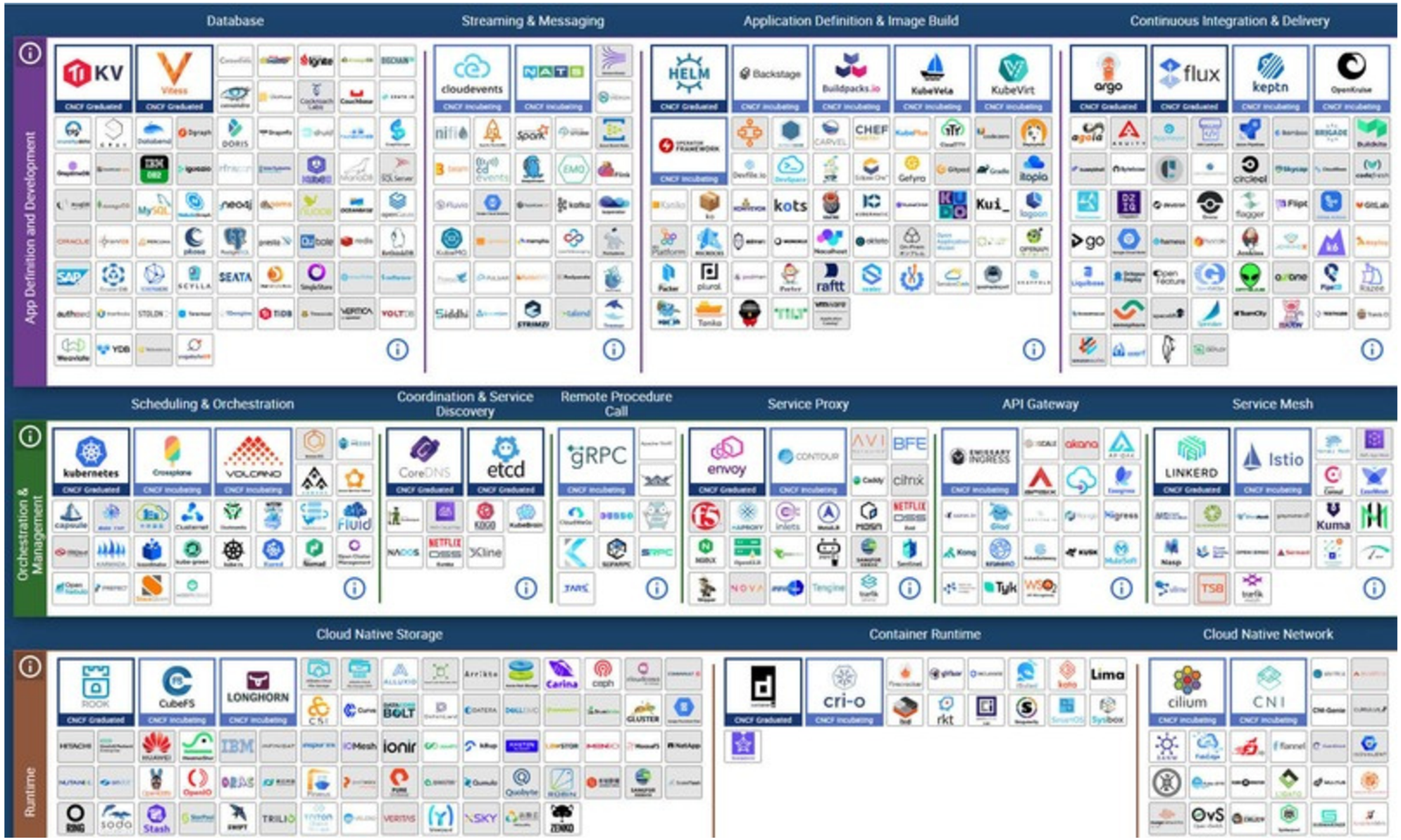


Platform tooling landscape by Platform Engineering

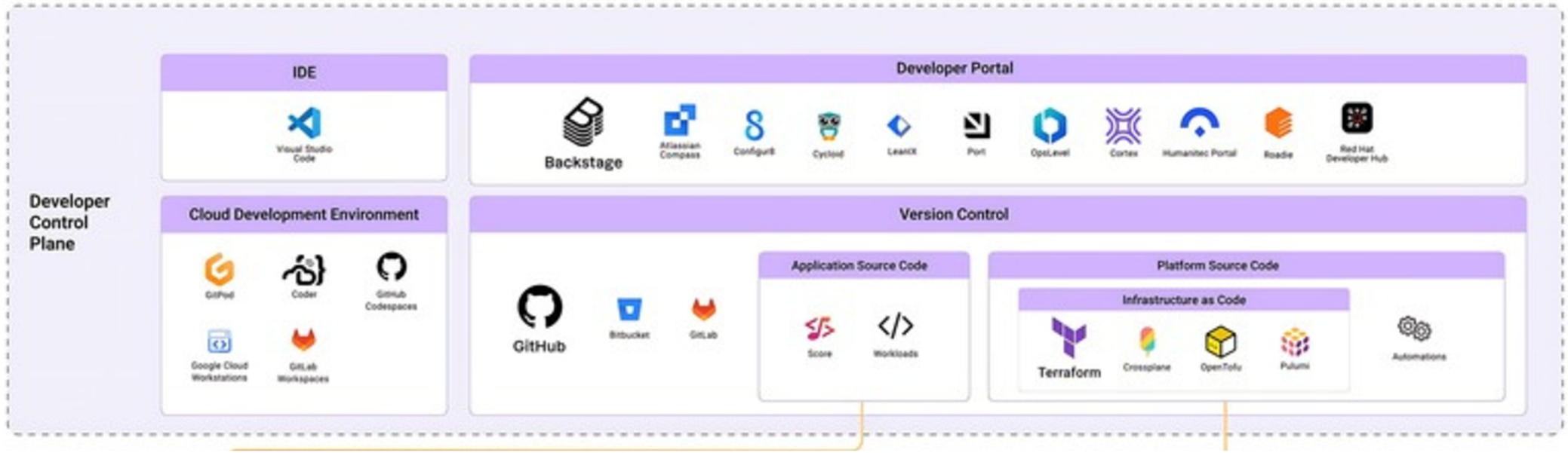

WAIT
WHAT?
Troll.me

Why Is It So Difficult to Understand?

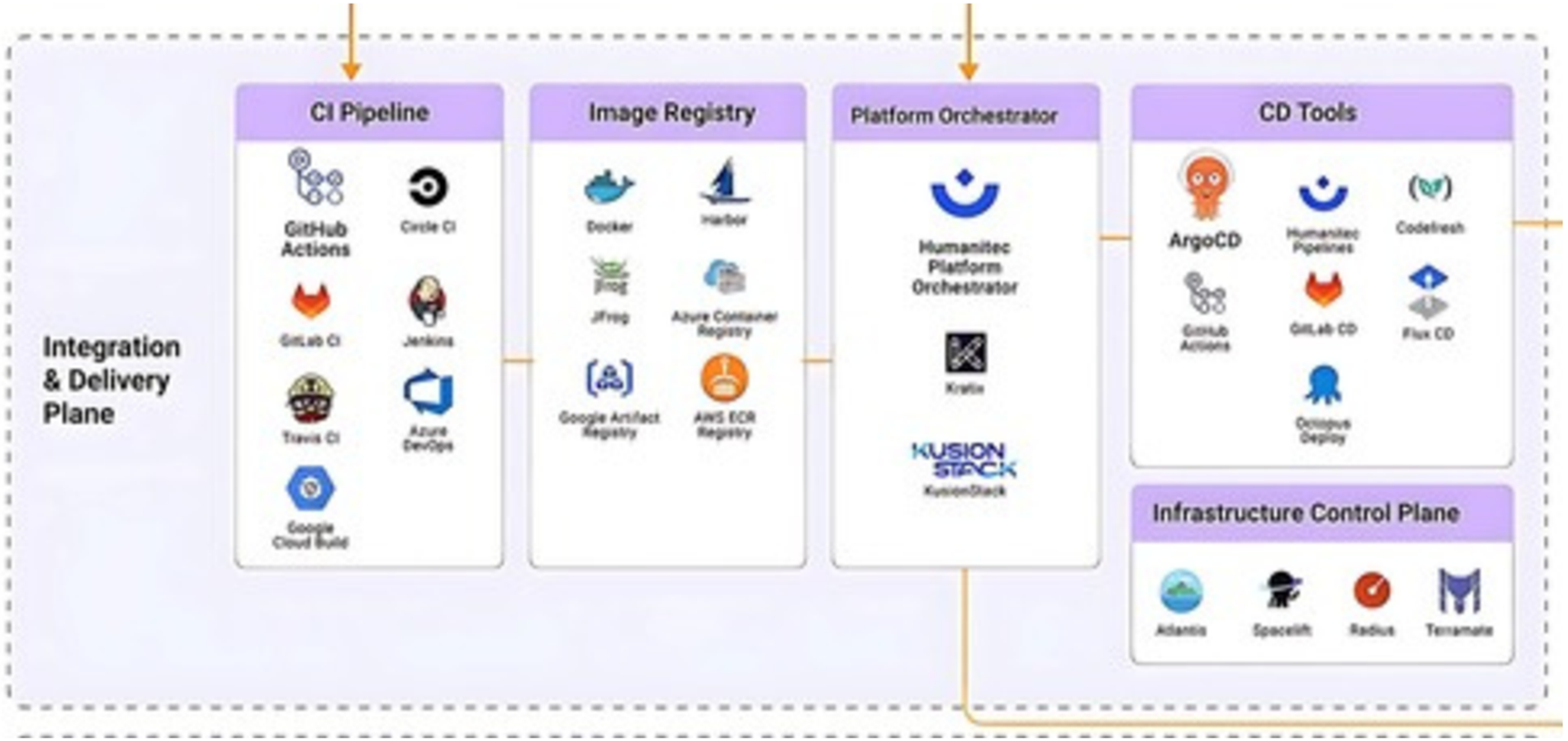
CNCF Landscape



Developer Control Plane

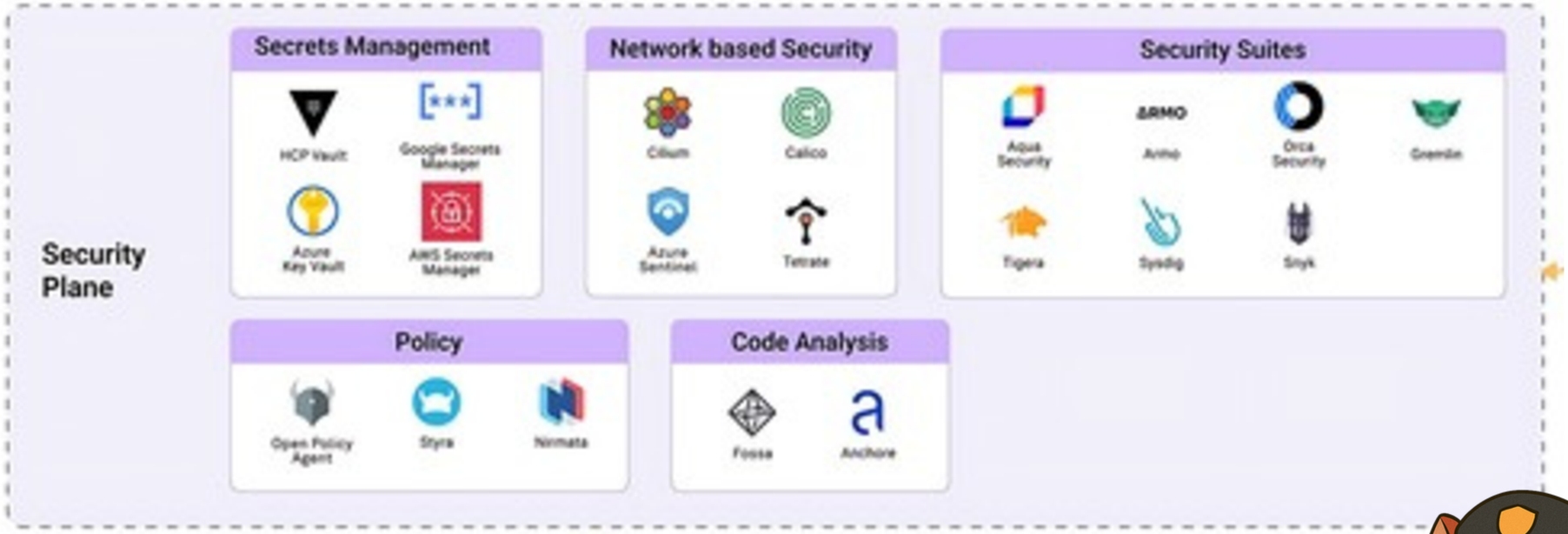


Integration and Delivery Plane

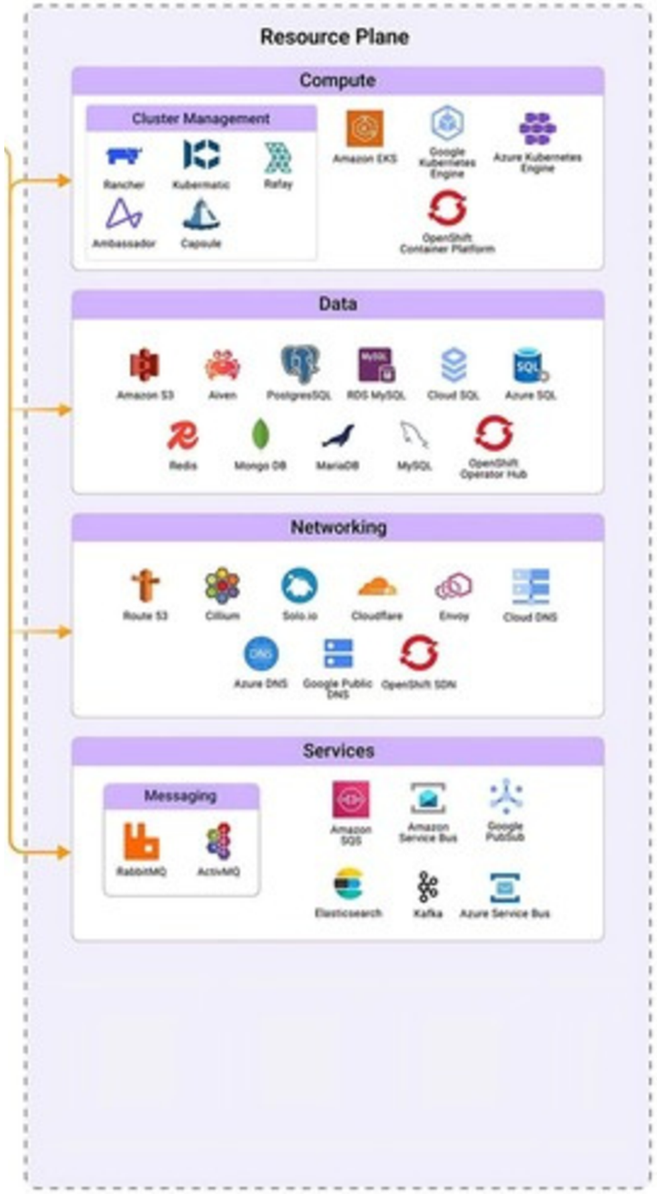


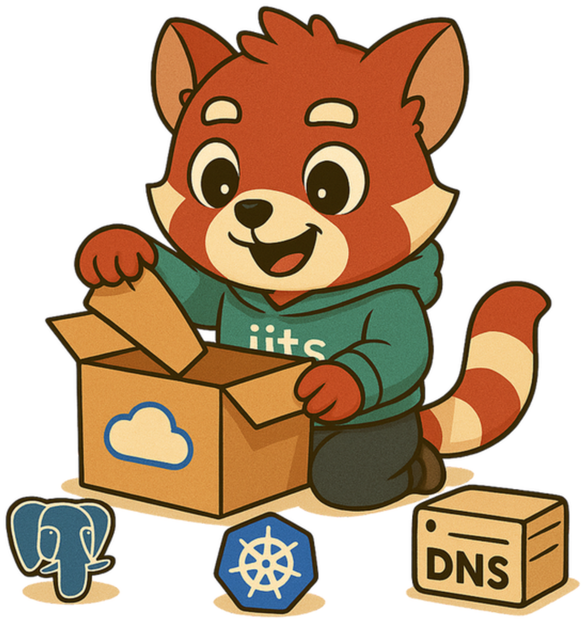
Monitoring and Logging Plane

Security Plane

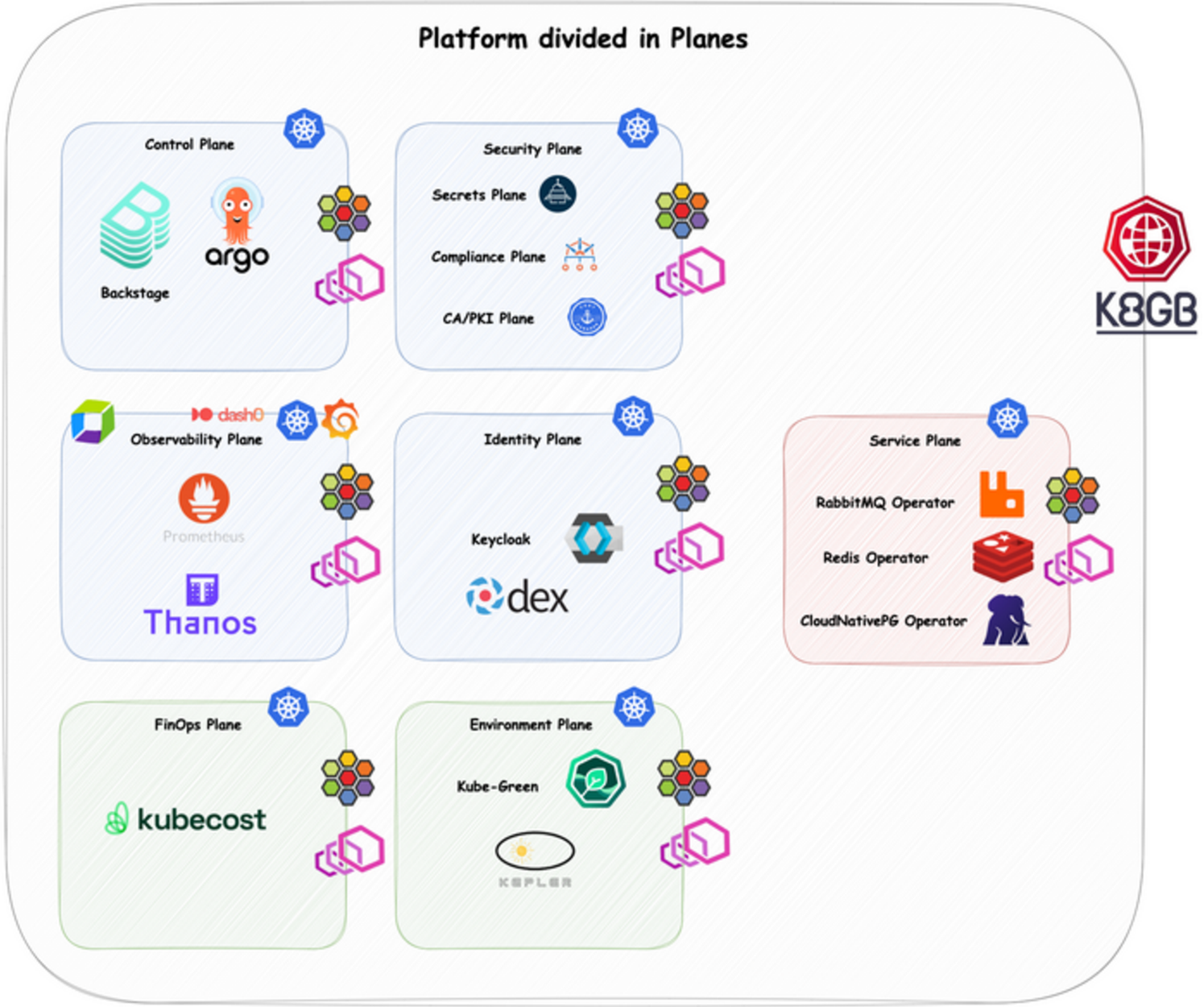


Resource Plane(s)

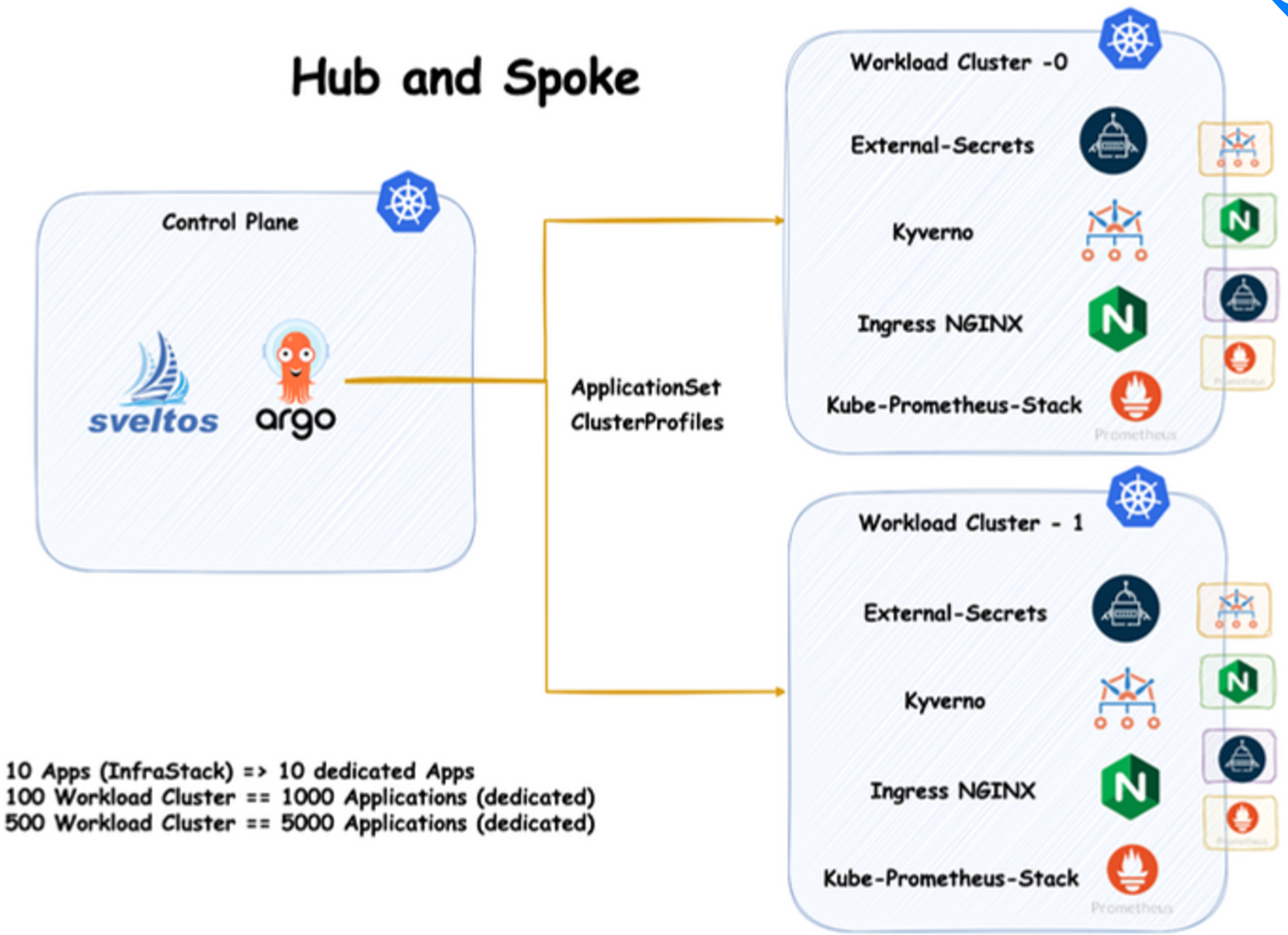




Why Should We Think in Terms of Planes?

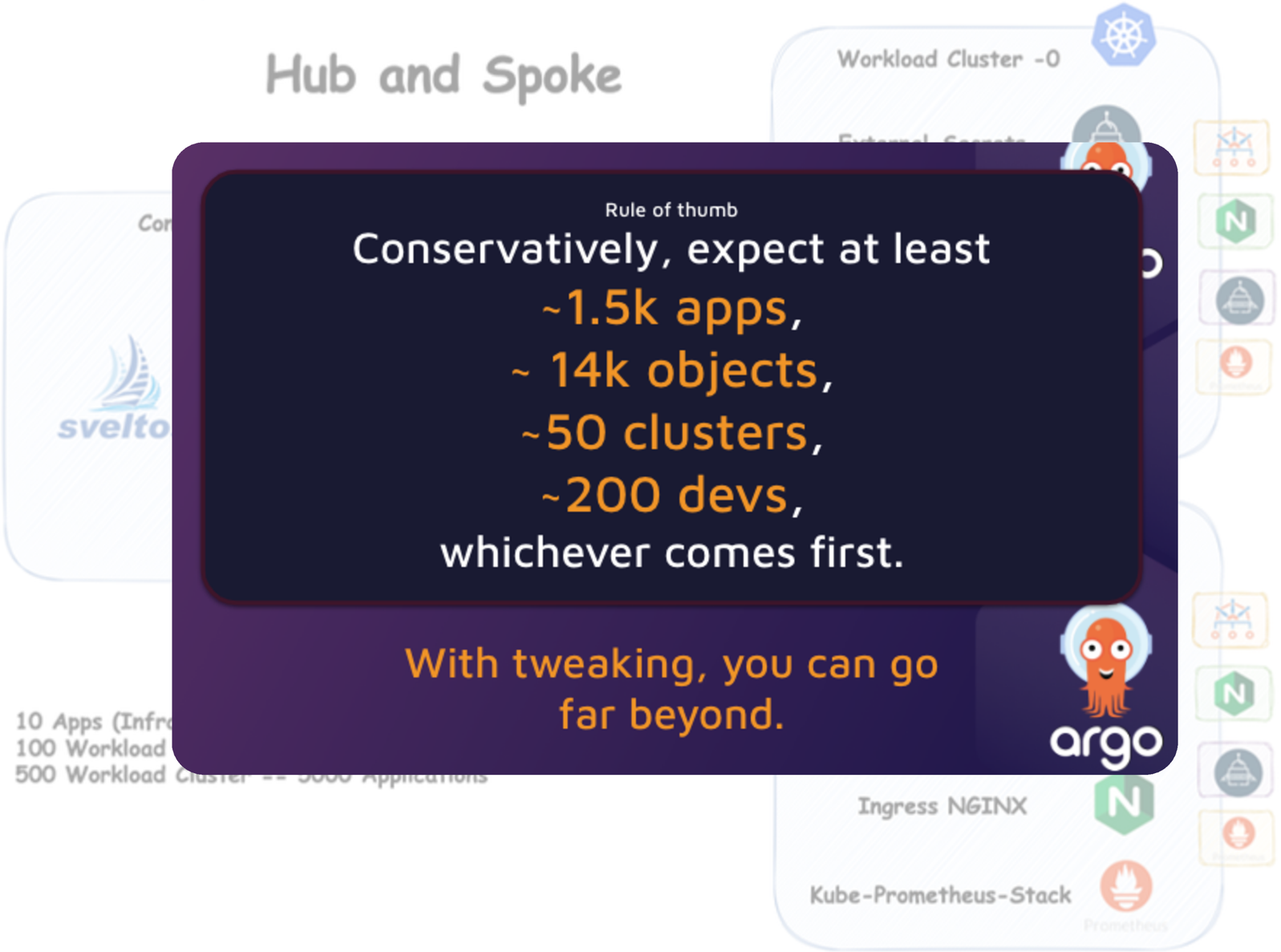


Provide Platform at Scale

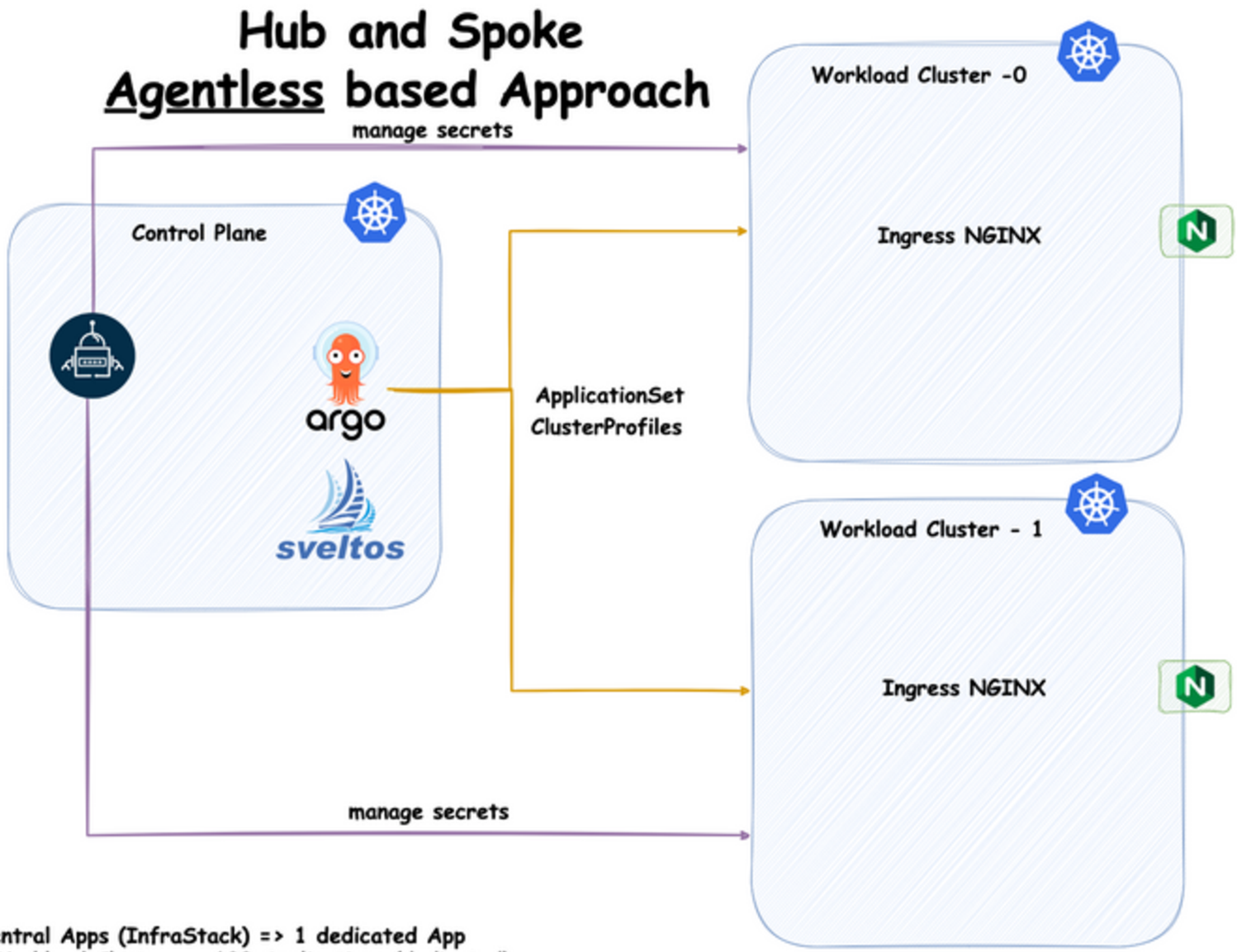


10 Apps (InfraStack) => 10 dedicated Apps
100 Workload Cluster == 1000 Applications (dedicated)
500 Workload Cluster == 5000 Applications (dedicated)

Provide Platform at Scale

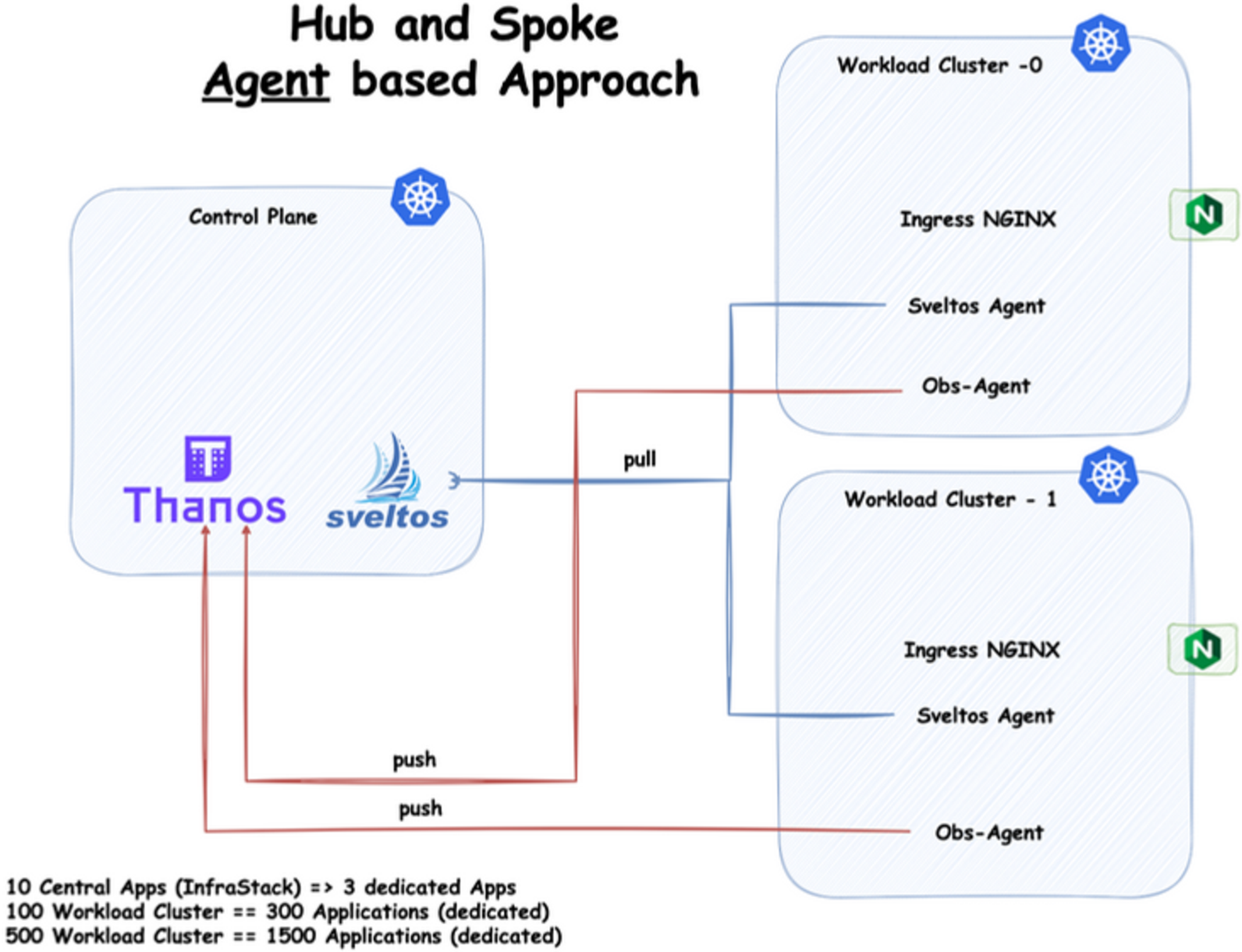


Not Layer - But Planes Agentsless



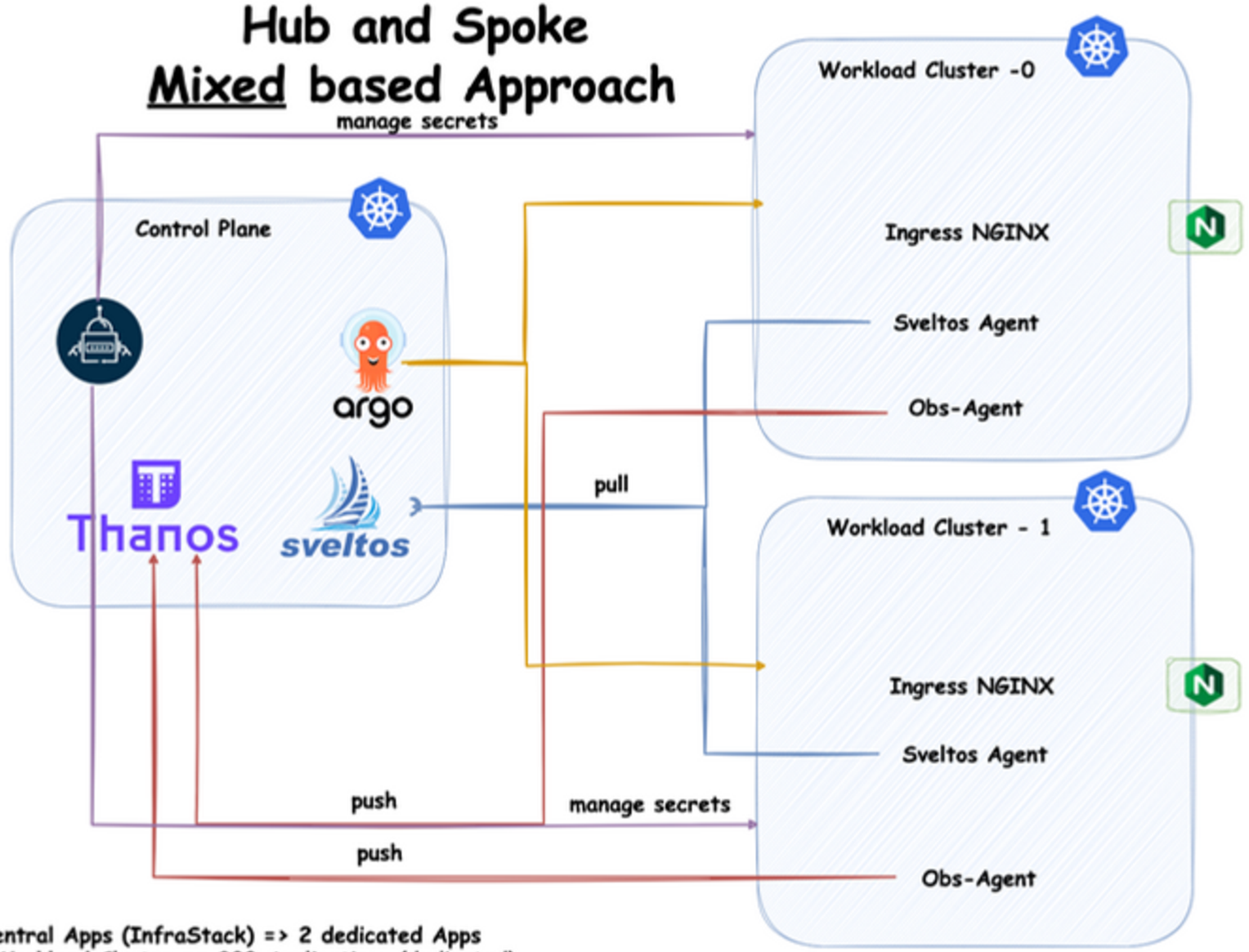
10 Central Apps (InfraStack) => 1 dedicated App
100 Workload Cluster == 100 Applications (dedicated)
500 Workload Cluster == 500 Applications (dedicated)

Not Layer - But Planes Agents



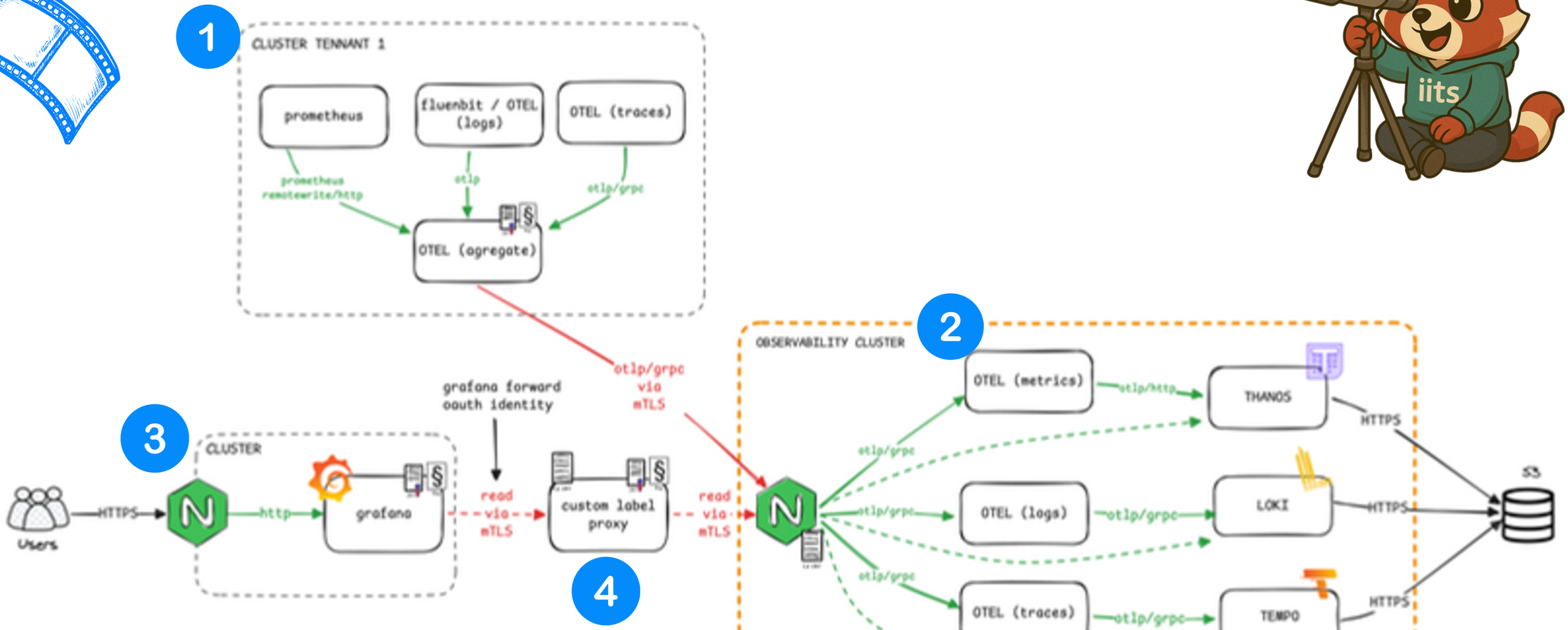
10 Central Apps (InfraStack) => 3 dedicated Apps
100 Workload Cluster == 300 Applications (dedicated)
500 Workload Cluster == 1500 Applications (dedicated)

Not Layer - But Planes - Mixed



10 Central Apps (InfraStack) => 2 dedicated Apps
100 Workload Cluster == 200 Applications (dedicated)
500 Workload Cluster == 1000 Applications (dedicated)

Deep Dive - Observability Plane



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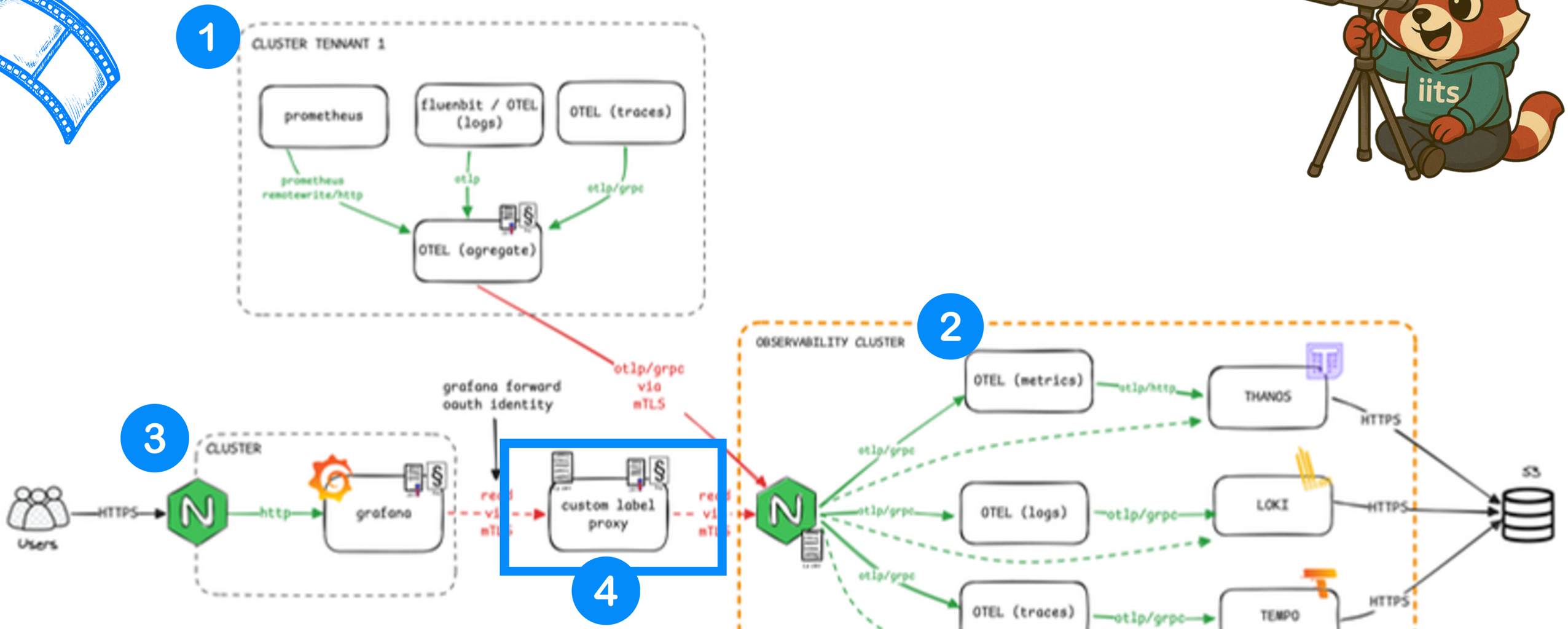


Sounds Like a Miracle?
Not at All!

Choreo | OpenChoreo by WSO2

- 20+ years of experience building API management platforms at scale for diverse systems
- Trusted by enterprises like **BNY Mellon**, which manages $50T in assets (custody & administration)
- **Choreo** a secure-by-default SaaS platform built with an API-first mindset
- **OpenChoreo** the open-source version, released this year

Reverse Engineering a Kubernetes Platform From Vine Gifs

OpenChoreo

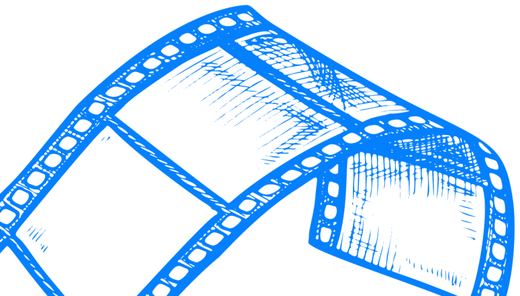
Data Plane
Cert Manager
envoy-gateway
fluent-bit
vault
registry
redis
gateway-external
gateway-internal

Build Plane
Argo Workflows

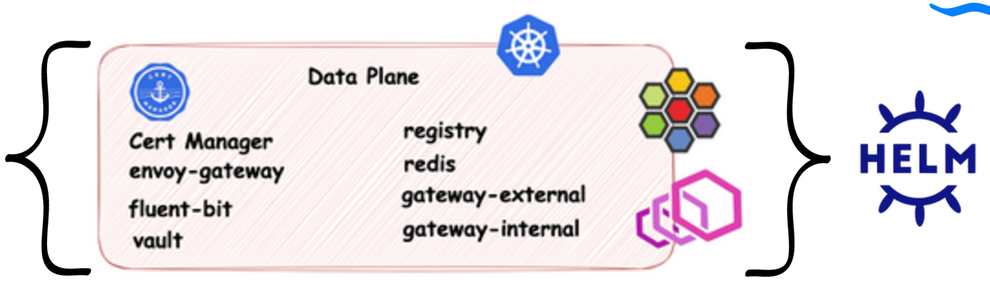
Control Plane
Cert Manager
OpenChoreo Controller Manager
OpenChoreo API-Server
Backstage

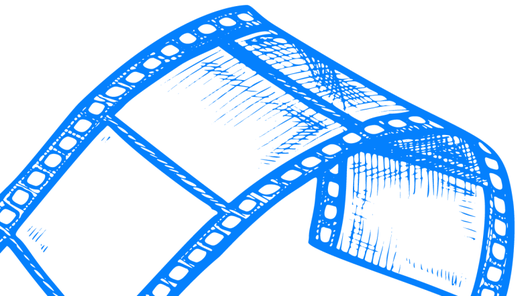
Observability Plane
Opensearch
Opensearch Dashboard

Identity System
identity provider



OpenChoreo - GitOps





Reverse Engineering a Kubernetes Platform From Ure Glitz

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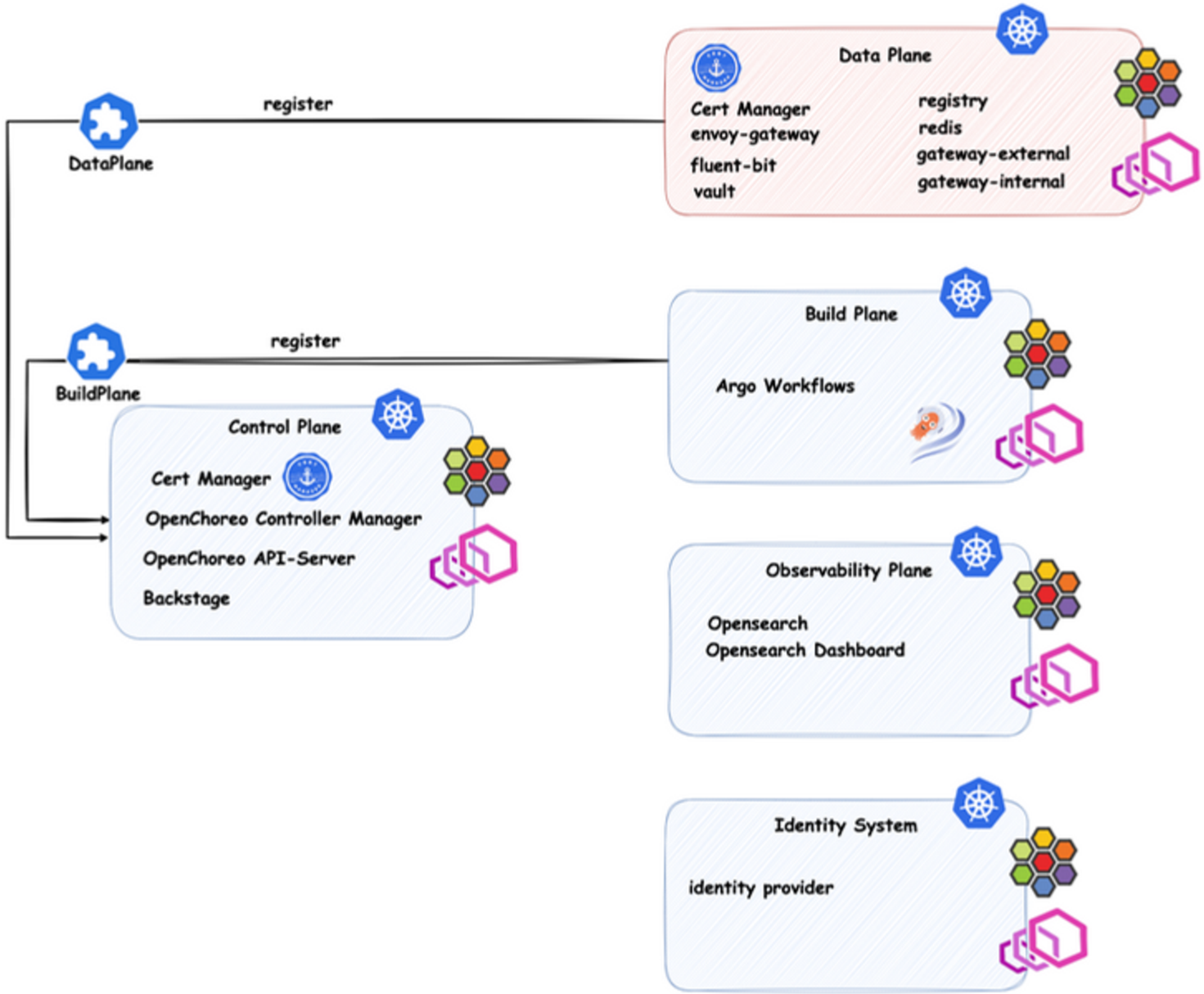
register
DataPlane
Data Plane
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Reverse Engineering a Kubernetes Platform From Urns Glitz

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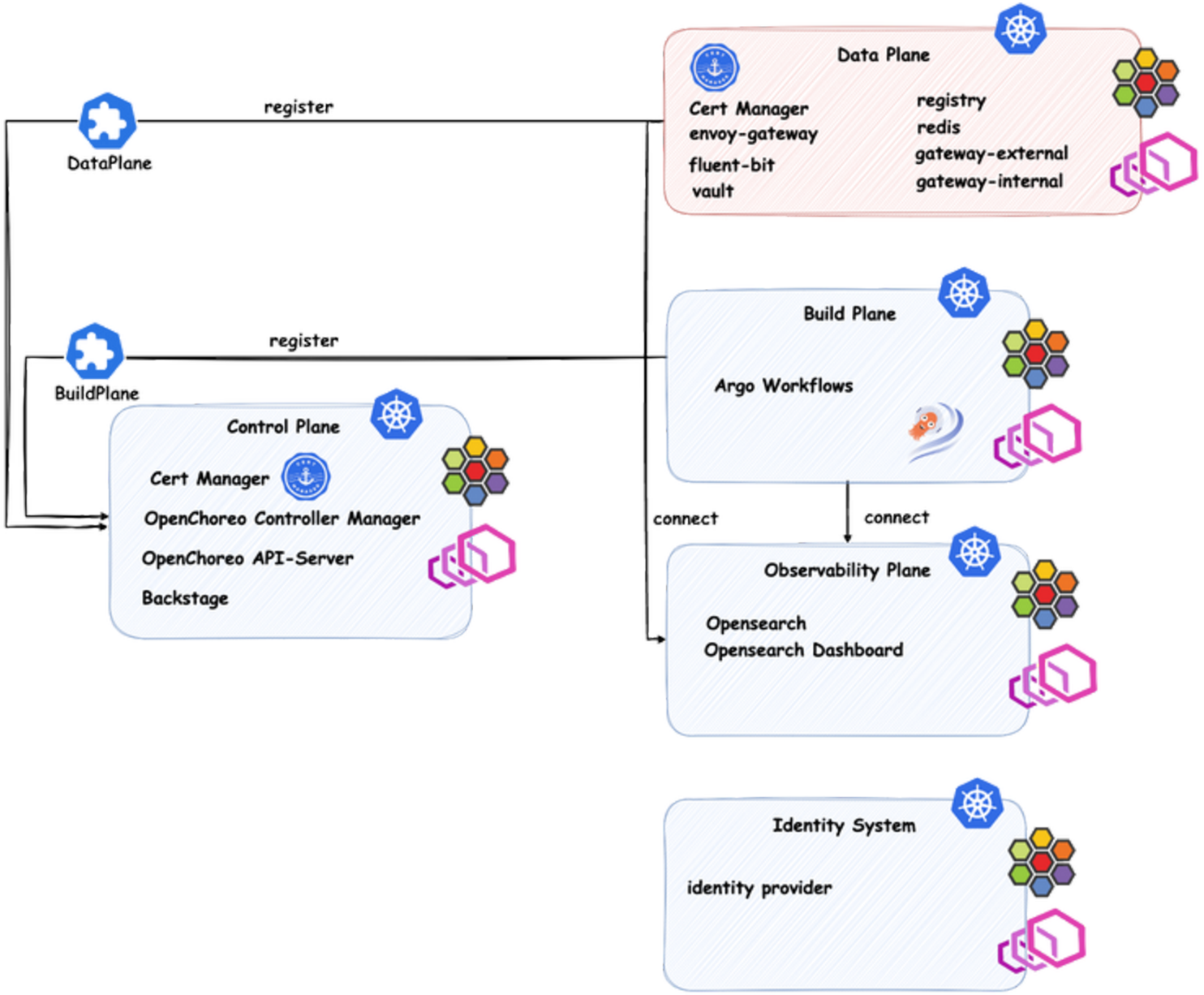
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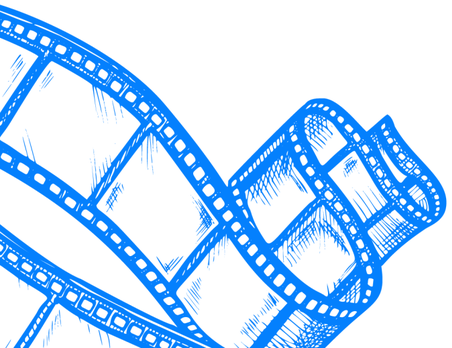

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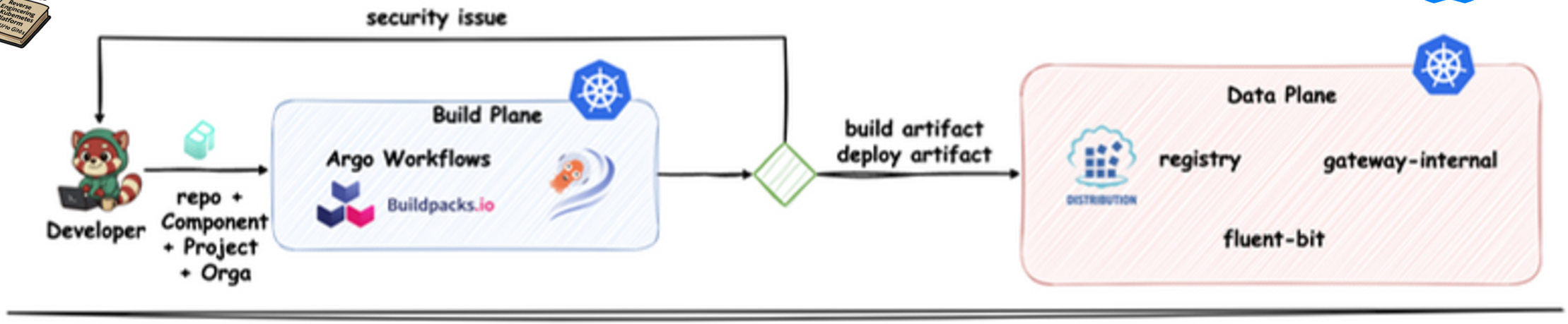
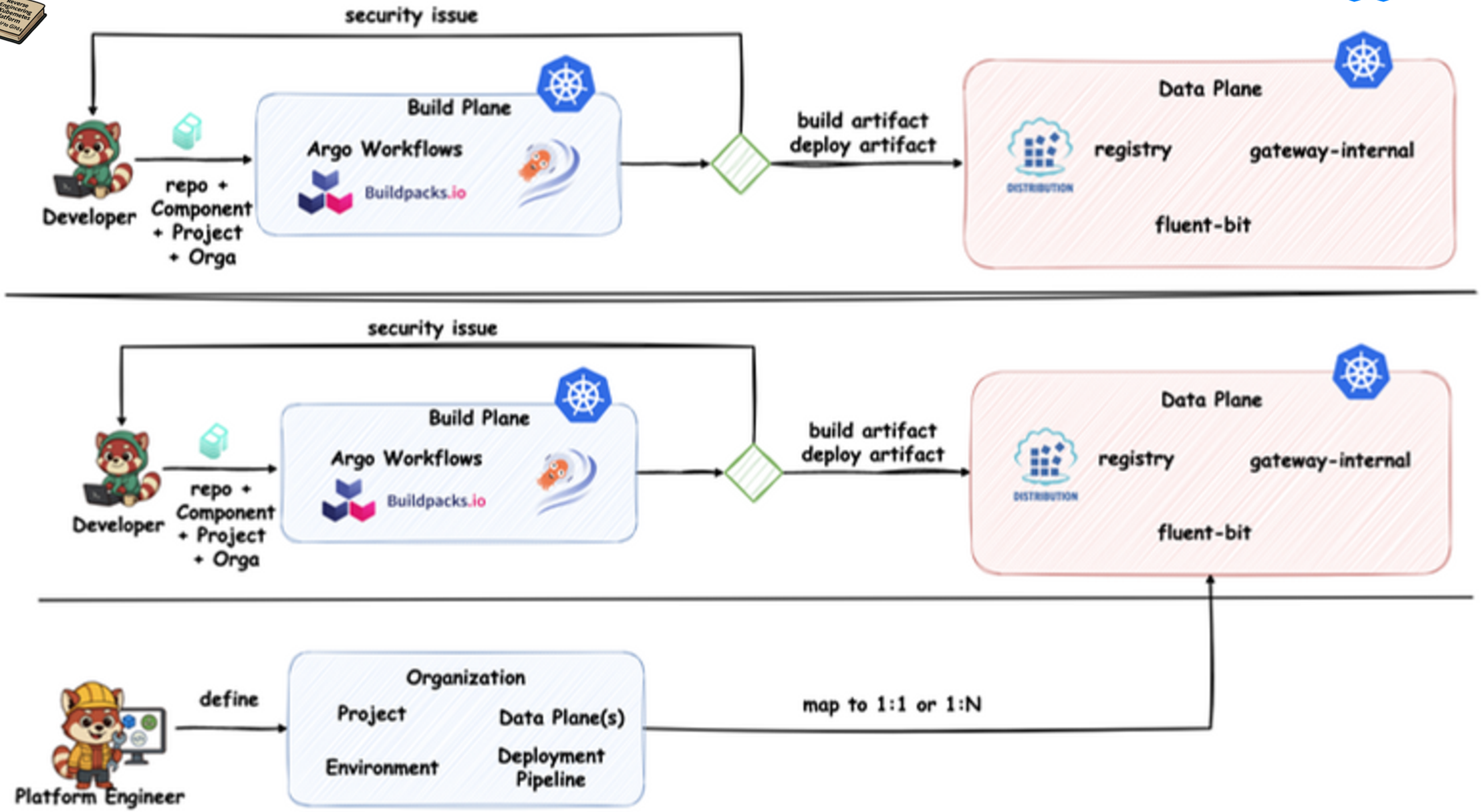

security issue
Developer
repo + Component + Project + Orga
Build Plane
Argo Workflows
Buildpacks.io
build artifact
deploy artifact
Data Plane
DISTRIBUTION
registry
gateway-internal
fluent-bit

Reverse Engineering a Kubernetes Platform From Urns Gilks

OpenChoreo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Platform Engineer
define
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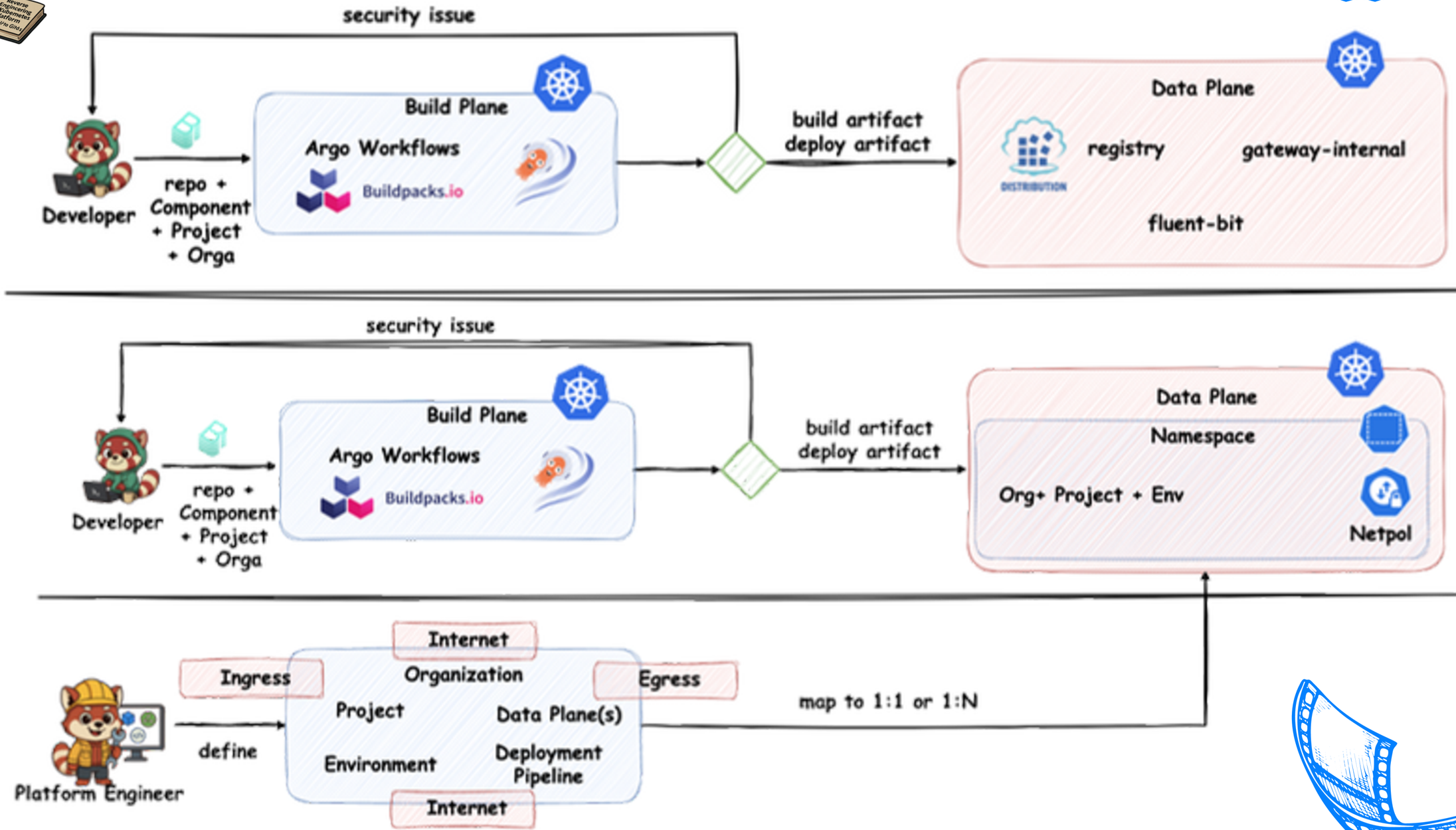
Data Plane(s)
Environment
Deployment Pipeline
map to 1:1 or 1:N

Reverse Engineering a Kubernetes Platform From Urns Glass

OpenChoreo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build artifact
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Data Plane
Namespace
Org+ Project + Env
Netpol
Internet
Ingress
Organization
Egress
Project
Data Plane(s)
Environment
Deployment Pipeline
Internet
define
Platform Engineer
map to 1:1 or 1:N

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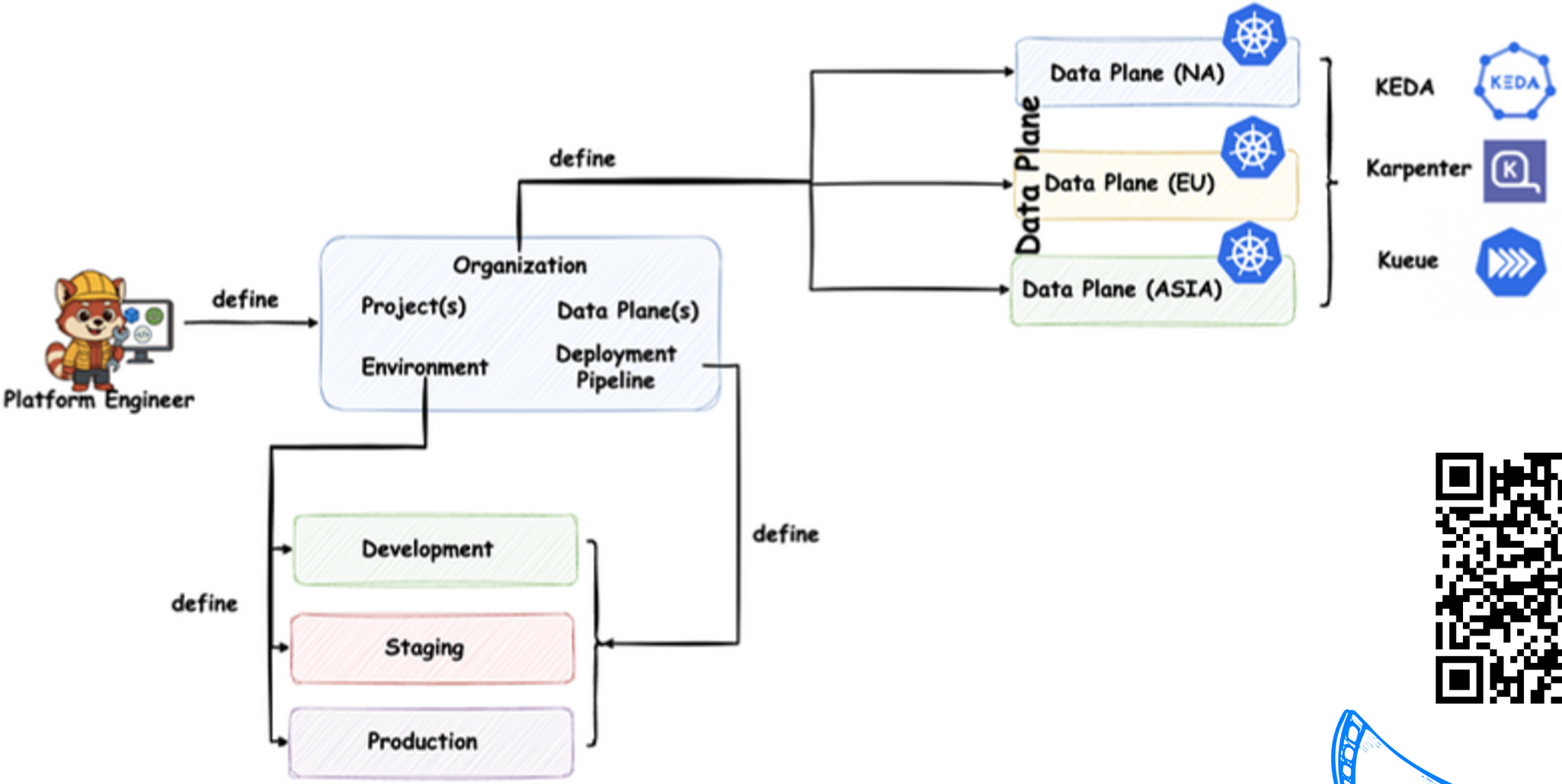
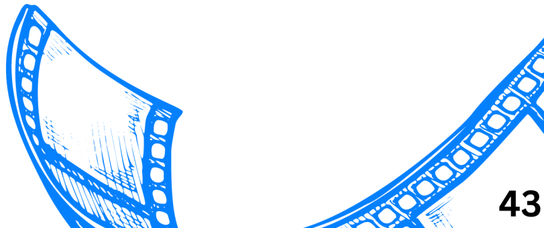
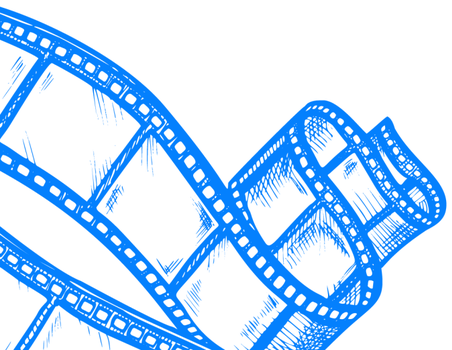
OpenChoreo


Data Plane (NA)
Data Plane (EU)
Data Plane (ASIA)
Data Plane
KEDA
Karpenter
Kueue
define
Organization
Project(s)
Data Plane(s)
Environment
Deployment Pipeline
define
Platform Engineer
define
Development
Staging
Production
define



OpenChoreo Benefits

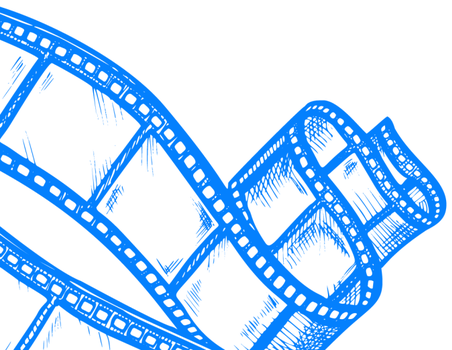
- **Scale seamlessly** – Dataplanes
- Treat clusters as a **herd** and distribute deployments smartly
- Optimize utilization without replicating stacks unnecessarily
- **Security by default**, powered by standards (netpol, mTLS)
- **Single Pane of Glass** for unified visibility and control
- DeveloperExp focused
- Domain-Driven (Orga + Projects) with a Cell bases approach
- Easy to integrate into **GitOps**

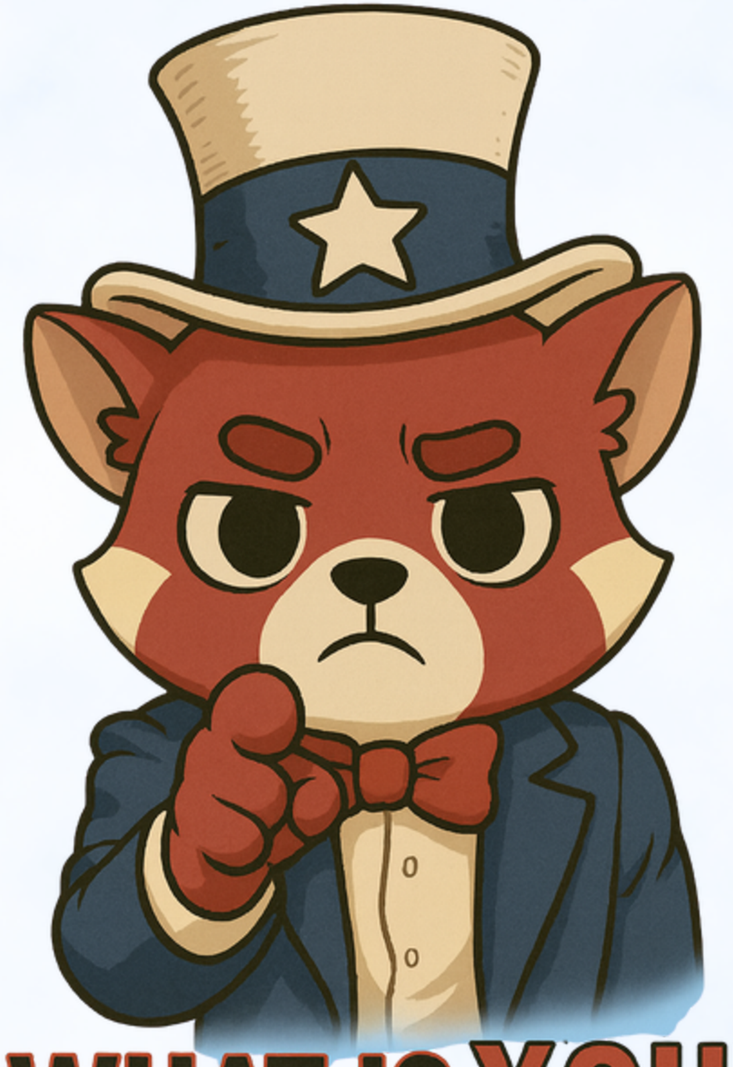


Demo!

Recap

- **Internal Developer Platforms** and **Platform Engineering** are here to stay — remaining key in 2026/2027 and beyond.
- **Building platforms requires rethinking** – simply scaling your current setup won't be enough.
- **Cost perspective:** A Platform Engineering team can easily exceed $1M per year. The platform itself must scale to justify the investment.
- **True goal:** not building a platform for its own sake, but enabling the business to scale. The platform must flex across resources and requirements – security, compliance, observability, and operations.
- **Thinking in Planes:** Observability already works this way; applying the planes concept to platforms creates clarity and scalability.





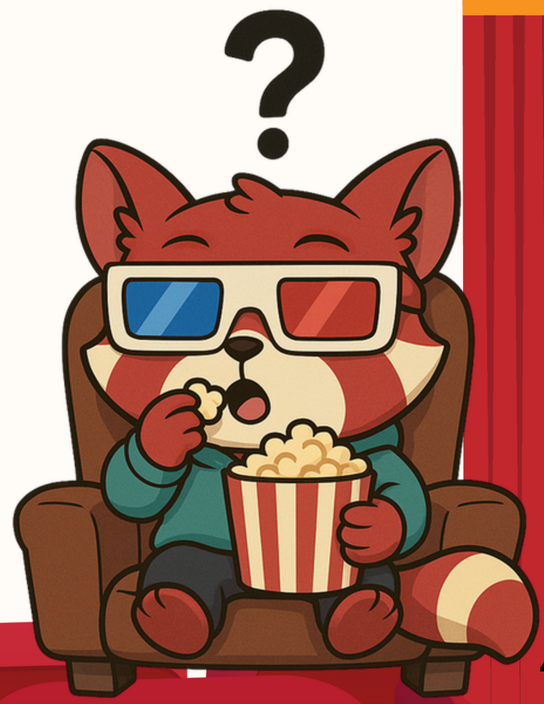
WHAT IS YOUR OPINION ON PLANES

Outlook...Q&A?

Upcoming in November

- Cloud Native Vienna: 10 Years of CNCF in Vienna
- Book Signing & Giveaway - KubeCon NA

LinkedIn

WE WANT YOUR FEEDBACK

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