



No Shame, Just Pain

How We Migrated Away From Kubernetes 1.16

Jannis Relakis, Platform Engineer, Celonis

Michael Seiwald-McCarty, Platform Engineer, Celonis

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The team



Jannis Relakis

Senior Platform Engineer



Michael Seiwald-McCarty

Staff Platform Engineer

We're Celonis.

We help companies find and capture business value in their processes, enabling them to perform at levels they never thought possible.



..... 1,350+ customers



..... 250+ partners

Leader

Gartner Magic Quadrant

2011

From leader in

Process Mining

"Celonis has helped put the process mining market on the map"

Gartner

2023

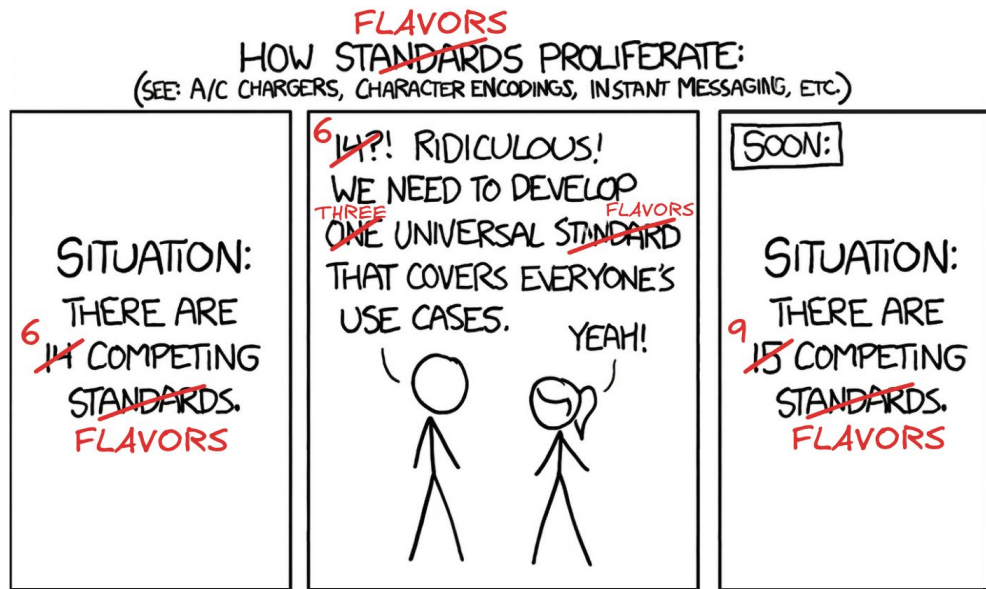
To world's first

Process Intelligence Platform

"Celonis is the clear market leader in Process Mining"

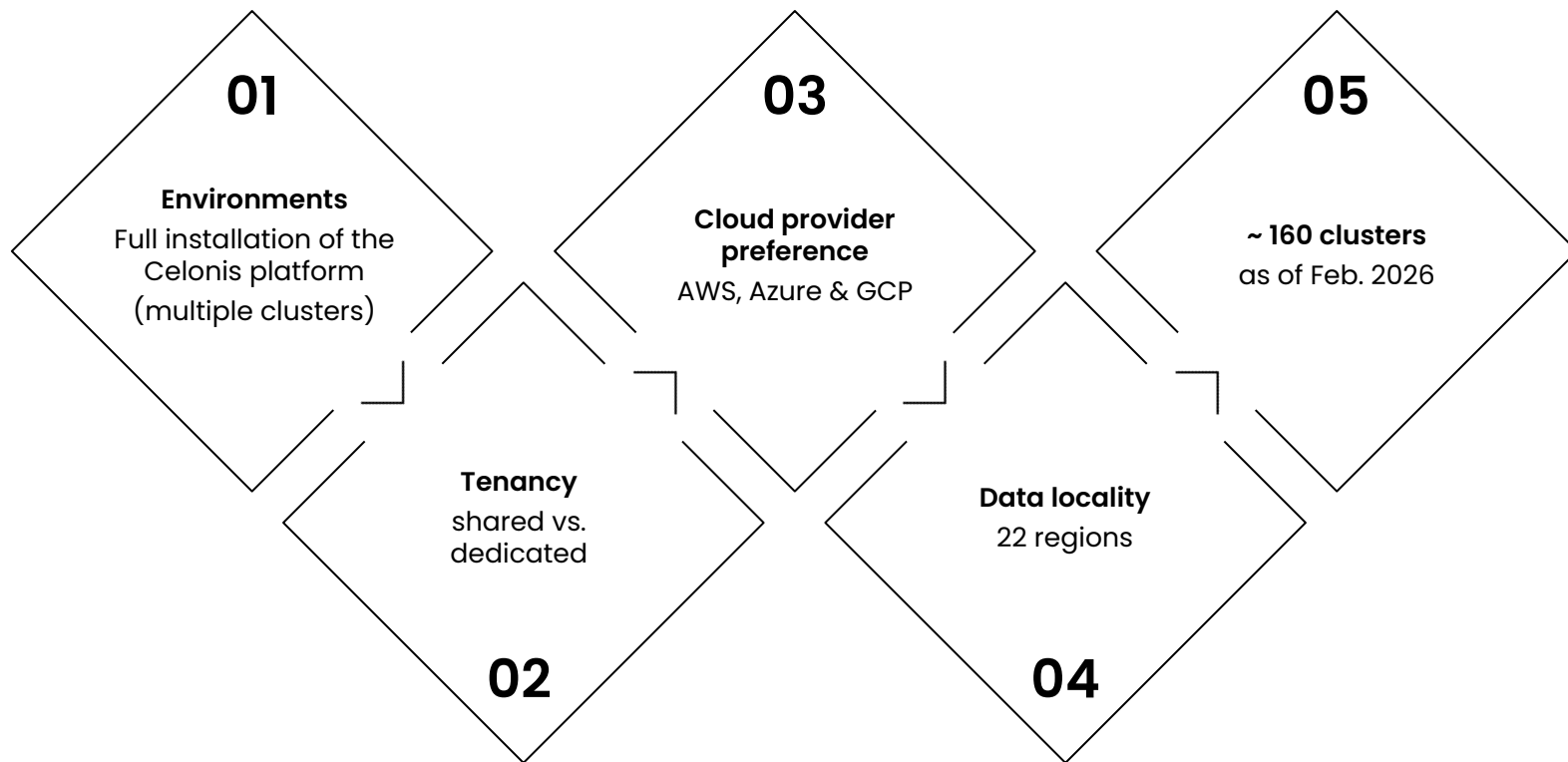
Gartner

Why?



adapted from <https://xkcd.com/927>

Celonis Kubernetes setup



Celonis Kubernetes history



GKE



EKS



AKS



2017

kOps

- AWS only
- First staging environment
- First two customer environments in two regions



2018

Gardener

- AWS & Azure
- Added 11 more environments
- Kubeception (seed & shoot clusters)



2021

OpenShift

- AWS & Azure
- Added 15 more environments
- Custom operators and focus on security



2023

Before



High cognitive load

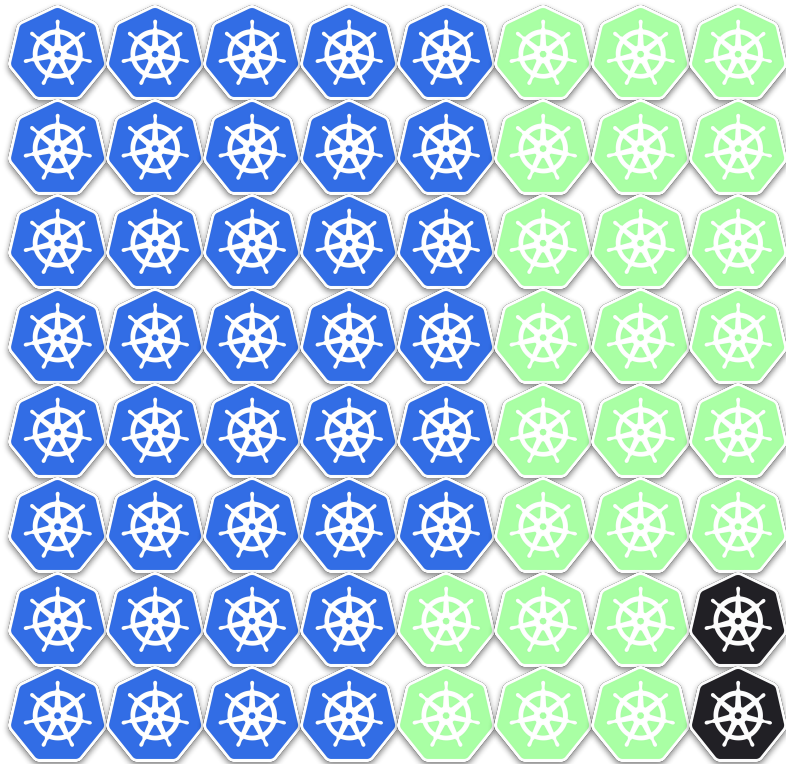
Making changes is complicated and slow

Newest features are not supported

Security concerns

Out of support

After



One flavor per cloud (EKS, AKS, GKE)

High level concepts are the same among flavors

Modern

Secure

Easy to maintain

Target platform

Development started in early 2023



Requirements

Multi-cloud support

No application changes

Uniformity

Automation



Building blocks

Managed Kubernetes



Infrastructure as Code

Features

ArgoCD AppSets

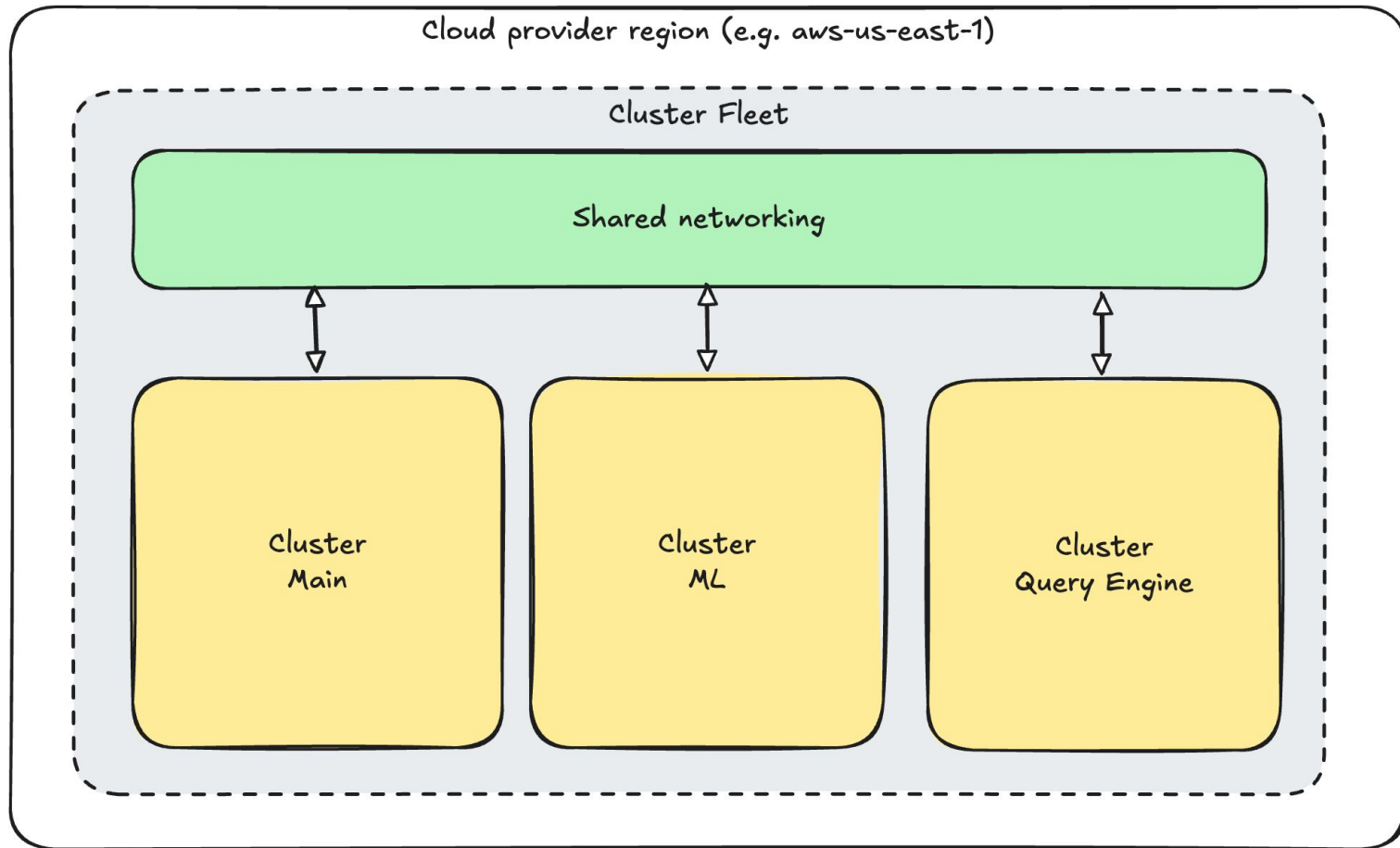
Cluster Upgrades

Karpenter



Cluster fleet

C



Wormhole

Minimalist DIY cross-cluster service mesh



Why?

Service can be migrated independently

Services can seamlessly talk to each other across clusters

Off-the-shelf solutions not feasible

Customizable to our needs

How?

Statically configured Envoy proxies

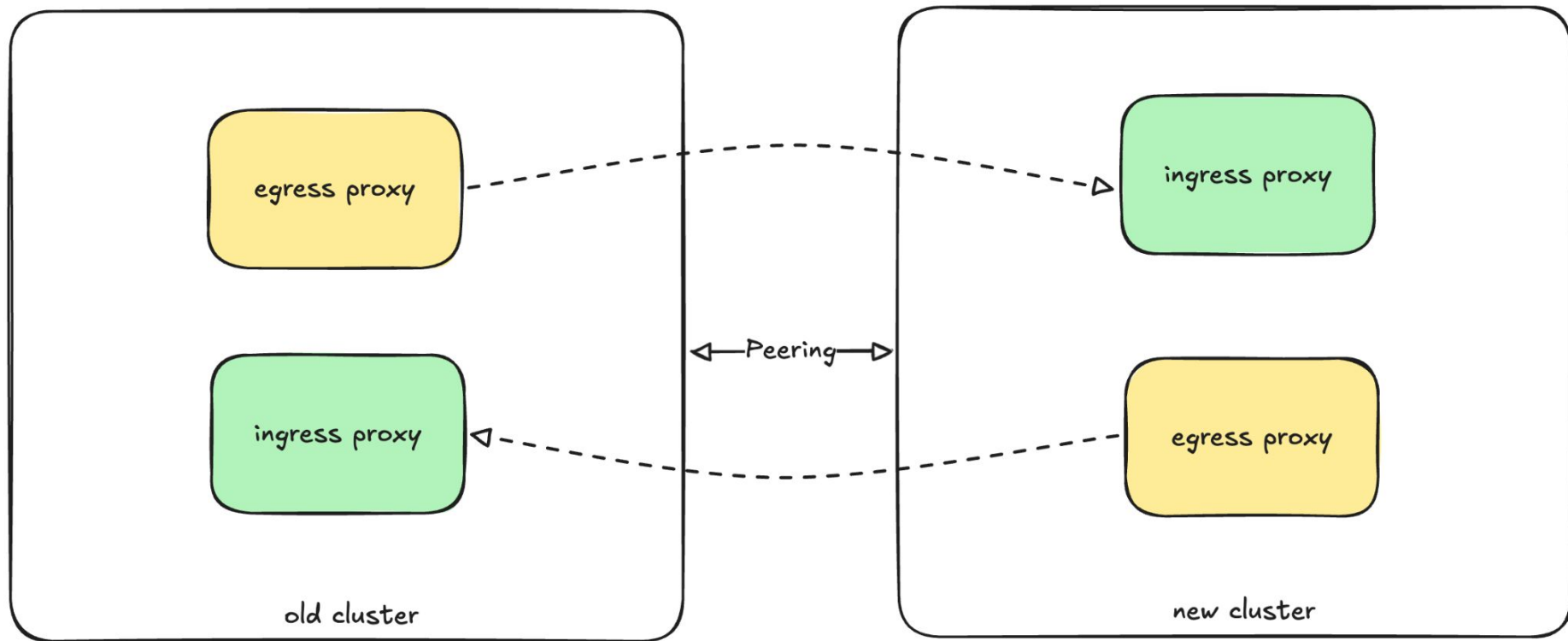
Proxy HTTP traffic bidirectionally between clusters

Relies on Kubernetes DNS and kube-proxy

Dynamic forward proxying based on Host header

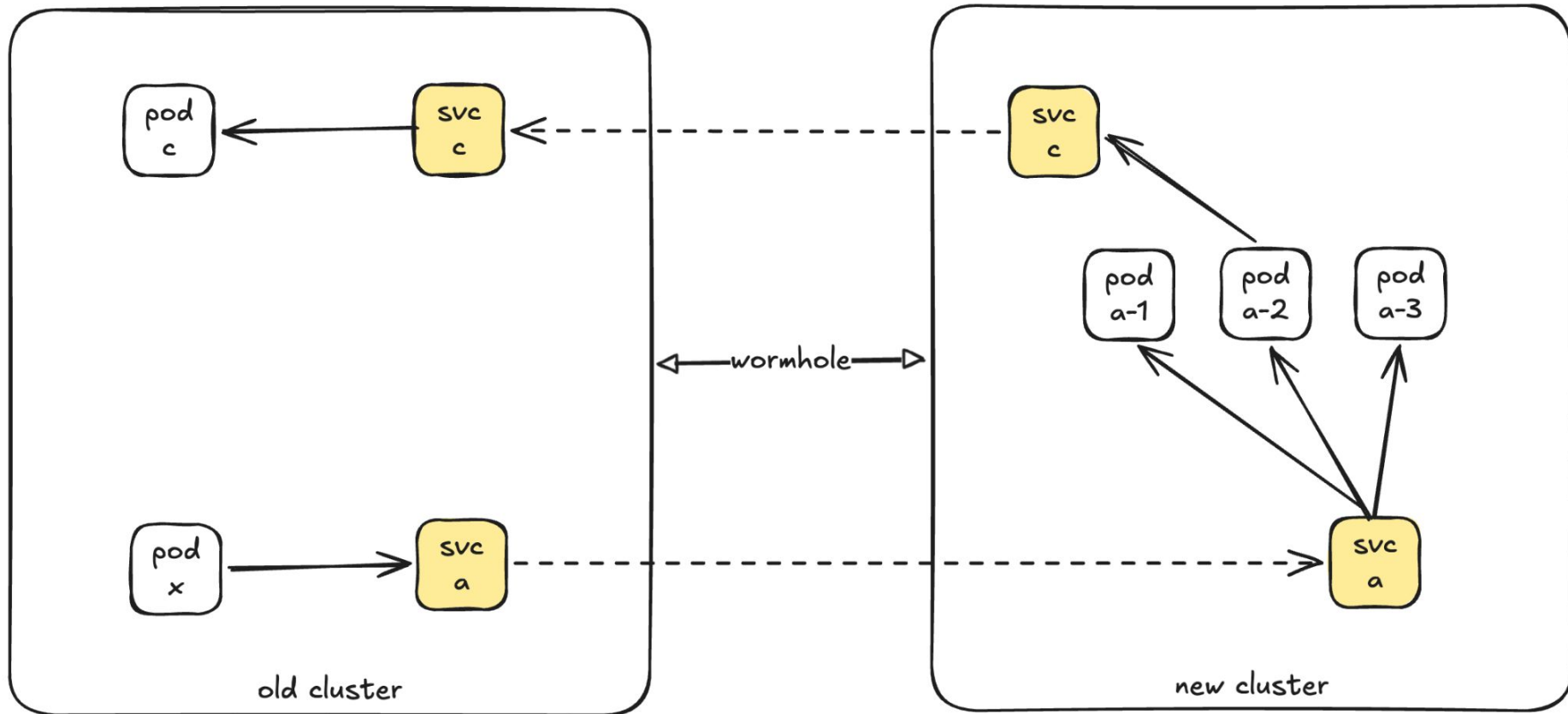
Wormhole overview

C

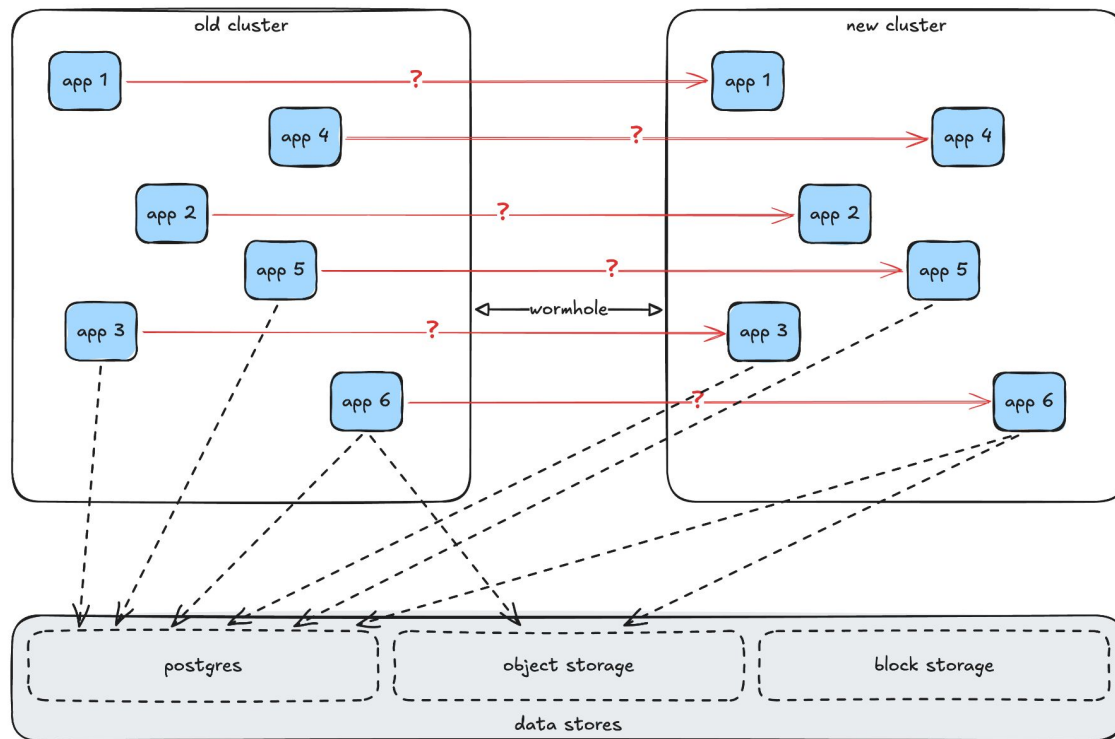


Wormhole traffic flow

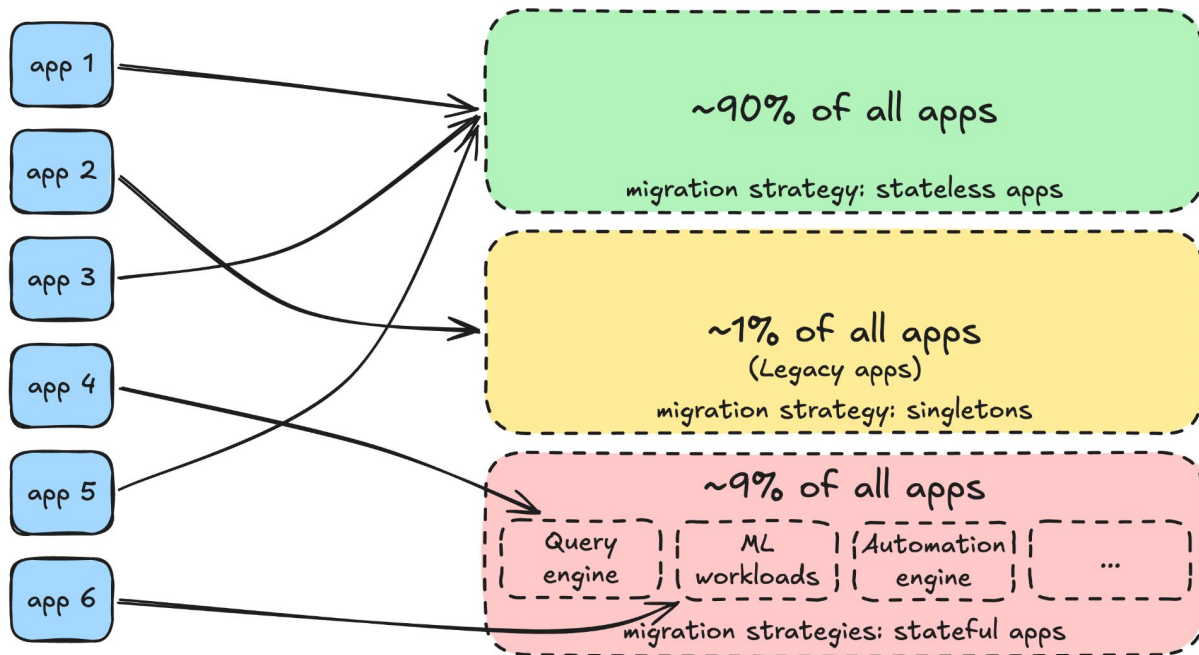
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Migration master plan



Migration master plan



-
1. Scale up
 2. Cut traffic over
 3. Scale down

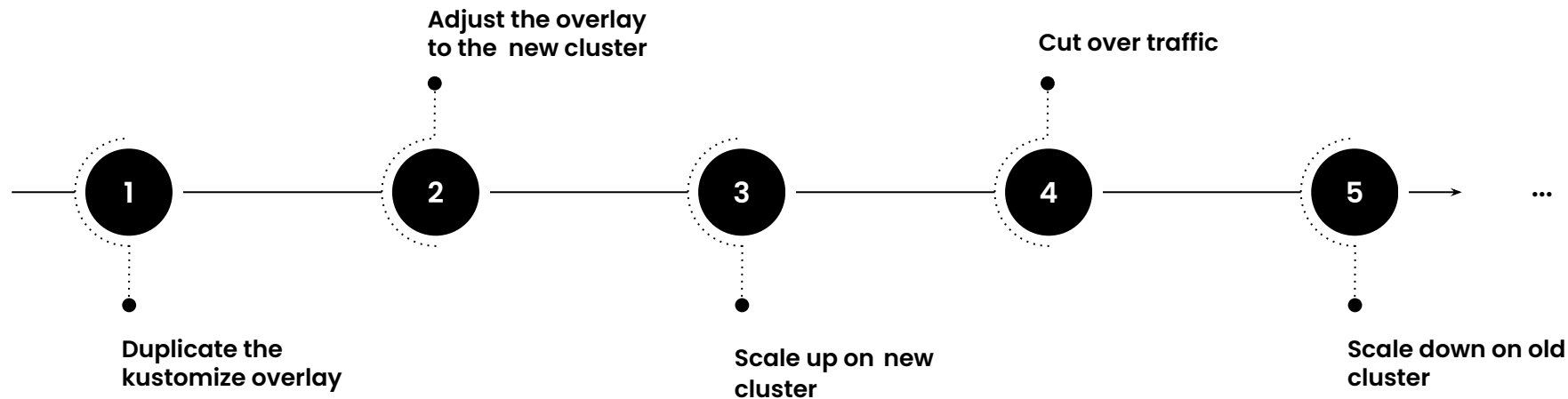
-
1. Scale down
 2. Cut traffic over
 3. Scale up

Special one-off procedures

Migration master plan



Typical migration operations



All operations result in one or more PRs



10 operations/app *
100 apps/environment *
40 environments

40000

operations in total



Migration tooling

Actions
Scaling up/down, traffic cut-over, adjusting overlays, decommissioning etc.

Output
Creates PRs to be reviewed by a human

CLI

Automates migration operations for batches of apps

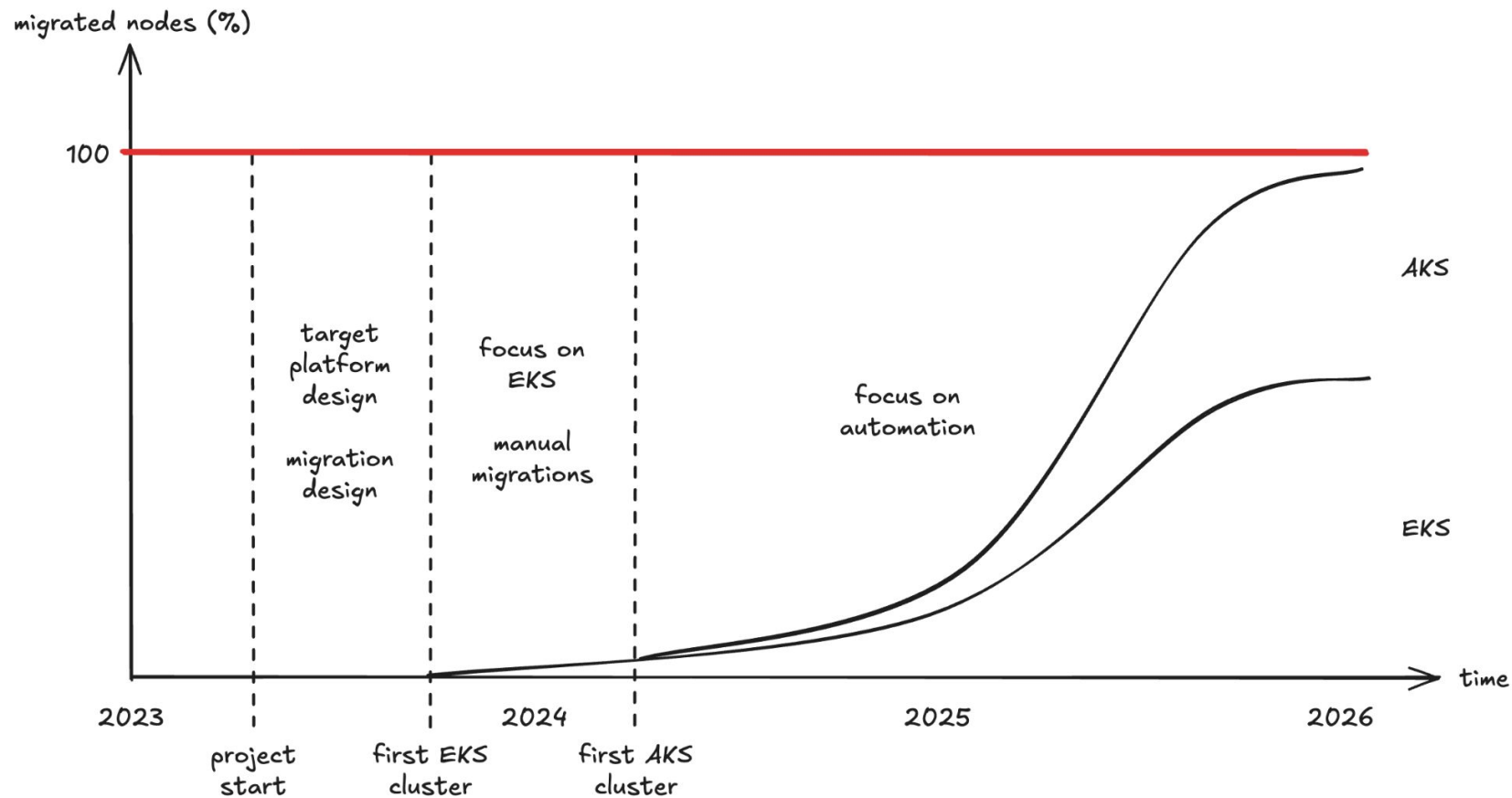
Input

Accesses clusters, fetches info from cloud APIs and ArgoCD

Result

Documented, repeatable, consistent, fast way for migrating Celonis platform apps

Migration timeline





Don't change
too many things
at once



Beware of
scope creep



**Snowflakes will
slow you down**



Keep up with the
changing environment



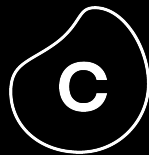
Iterate and **improve**



Minimize handovers



Don't cause the
same incident twice



Thank you.



Please ~~like~~ ^{rate}
and ~~subscribe~~ ^{leave feedback}

