#devopsdaysaarhus

BREAKING THE MULTI-CLOUD BARRIER IN A REGULATED INDUSTRY

Kasper Borg Nissen - Lead Platform Architect @lunarmoney
@phennex

LUNAR®

WHO?

KASPER BORG NISSEN

LEAD PLATFORM ARCHITECT

@phennex

Cloud Native Computing Foundation Ambassador

Community lead at Cloud Native Nordics

Cloud Native Aarhus Organizer

Community Advocate at Ambassador Labs

Occasional speaker at Meetups, Conferences

New hobby this year: Sailing ⛵

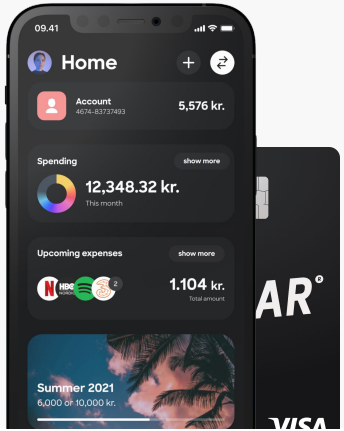
15,000

Total number of Business Customers

650

Employees

European Banking License issued in Denmark



500,000

Customers in total

We have offices in these locations

Company founded in 2015

€345m

Total amount raised

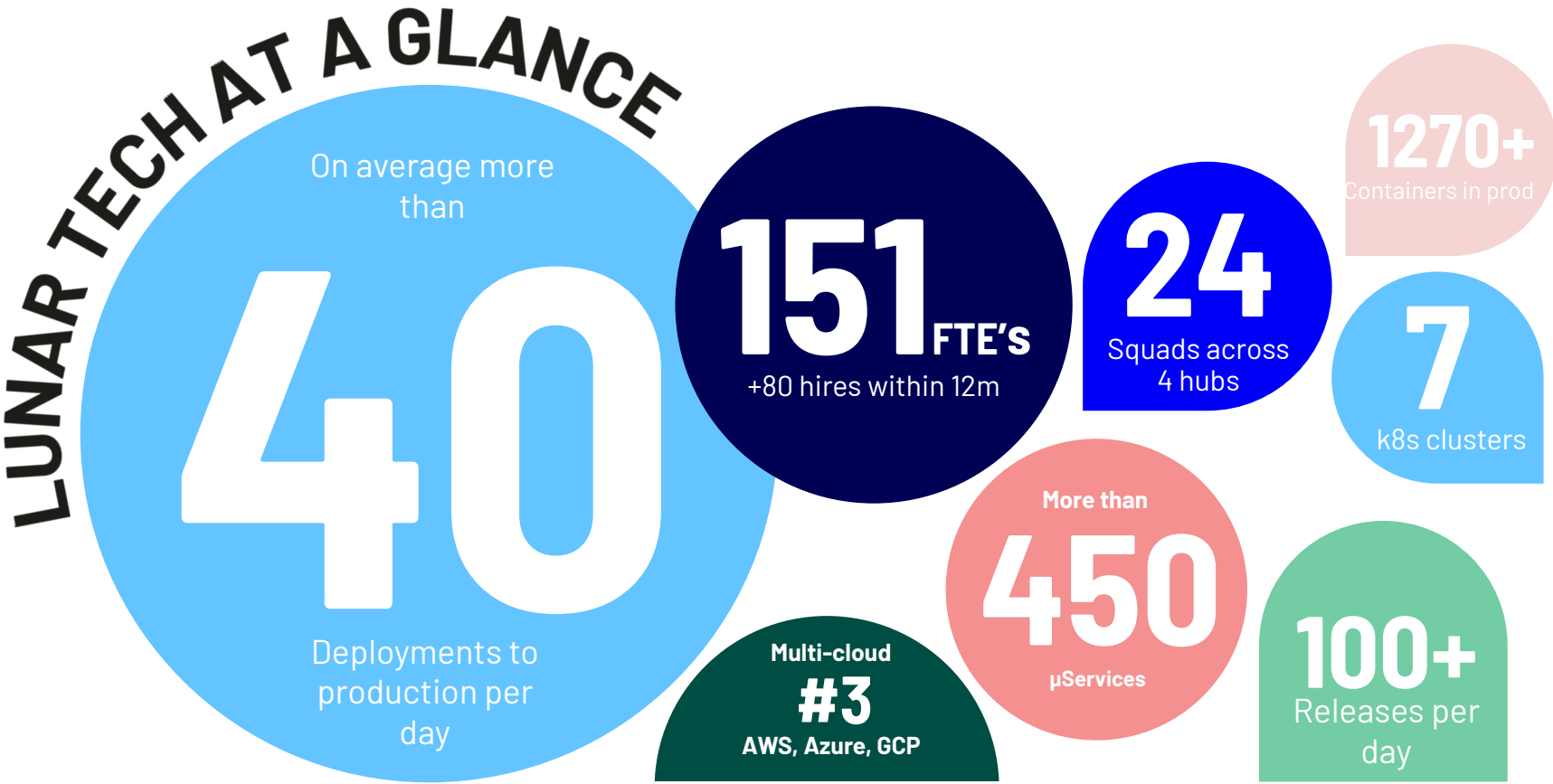
Series D ✓

Recently closed our Series D of €210m

UNICORN

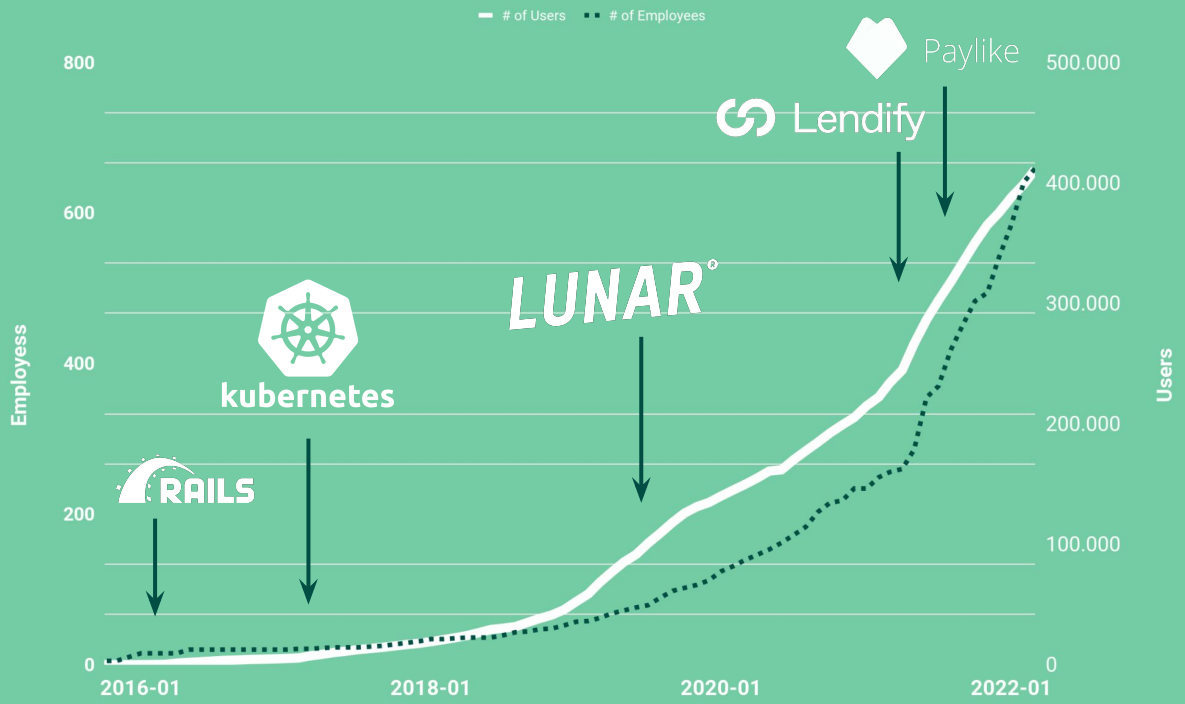
APPARENTLY WE ARE NOW A UNICORN

Photo by mark glancy: https://www.pexels.com/photo/boston-terrier-wearing-unicorn-pet-costume-1564506/


LUNAR TECH AT A GLANCE
On average more than
40
Deployments to production per day
151 FTE's
+80 hires within 12m
24
Squads across 4 hubs
1270+
Containers in prod
7
k8s clusters
More than
450
µServices
Multi-cloud
#3
AWS, Azure, GCP
100+
Releases per day

HYPER

SCALE & GROWTH HISTORY



LUNAR WAY

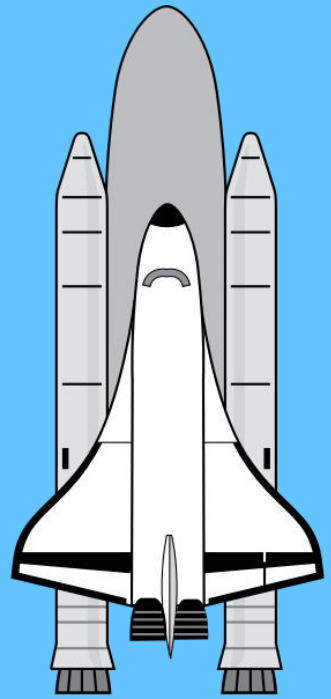
lunar way

THE

PLATFORM MISSION

Continuously accelerating our ability to deliver value to our customers with technology.

We do this by building and maintaining a trusted self-service platform that empowers Lunar developers to move fast, easy, efficiently, compliant, and secure focusing on high quality, self-service access to enabling technology.



HOW

WE BUILD

Self-service platform

Reconciliation and agents

Cloud agnostic and open source

Managed solutions where it makes sense

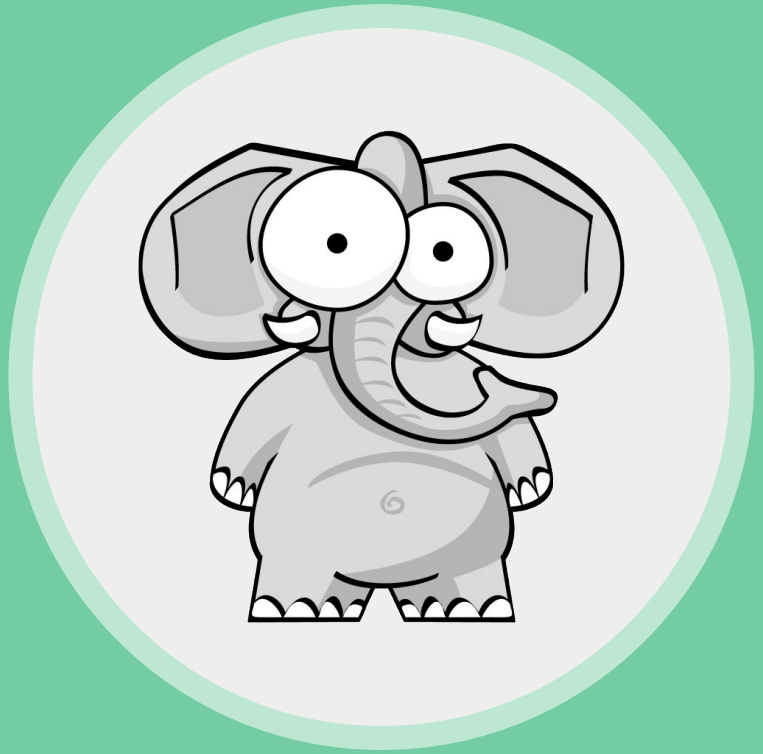
Managed solutions where it makes sense

Managed solutions where it makes sense

Treat developers as customers by applying a product mindset to the engineering platform and tooling.

ELEPHANT IN THE ROOM

MULTI-CLOUD, WHY?



LendTech

Danish neobank Lunar acquires Swedish lender Lendify

Written by Ruby Hinchliffe 22nd April 2021

Lunar, the Nordic neobank with offices across D
Swedish lending and savings platform.

The deal, the sum of which remains undisclosed, is per

The Danish challenger intends to grow its consumer credit offering through Lendify, having launched its ow credit buy now, pay later product back in December.

Lendify's loan book is worth some €300 million, bringir with it 40,000 active savings and loan customers.

Lunar, which has acquired 250,000 customers of its ow will also use Lendify's customer base to sure up its position in the Swedish market as part of a wider pan-Nordic expansion play.

"Lendify has for several years been considered one of

News

Lunar set to acquire Norwegian digital bank Instabank for €132m

Written by Alex Pugh 29th March 2022

Danish neobank Lunar looks set to continue its Nordic expansion with the acquisition of Norwegian digital bank Instabank.

Lunar has offered €132 million in cash to buy Instabank, representing NOK 3.75 (€0.39) per share.

Instabank's board has voted unanimously to approve the deal, as have shareholders representing 73% of the remaining share capital.

Lunar says the deal will "significantly increase" its footprint in Norway and "additionally open the door to the Finnish market ahead of launching its full product offering".

Instabank's chair of the board of directors, Cathrin Nylander, says the combination of Instabank and Lunar will create "a strong Nordic fintech attractively positioned to compete with the Nordic banking leaders".

Founded in 2016, Instabank claims more than 60,000 customers in Norway, Finland and Germany, providing both secured and unsecured loans and savings.

Lunar has offered €132m in cash to buy Instabank

News

payments

ylike for an undisclosed sum.

Paylike was founded in 2015 and operates across Europe

g its banking licence in August 2019.

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MULTI-CLOUD GIVES ACCESS TO FIT FOR PURPOSE TECHNOLOGY

Utilize the best offerings of each cloud provider.

Avoid vendor lock-in for leaner exit strategies.

MULTI-CLOUD SUPPORT THE LUNAR GROWTH STRATEGY

Ensure a cloud agnostic platform to support acquisitions and mergers.

HOW TO
CONNECT CLUSTERS ACROSS PROVIDERS?

HOW TO

CONNECT CLUSTERS ACROSS PROVIDERS?

VPC Peering

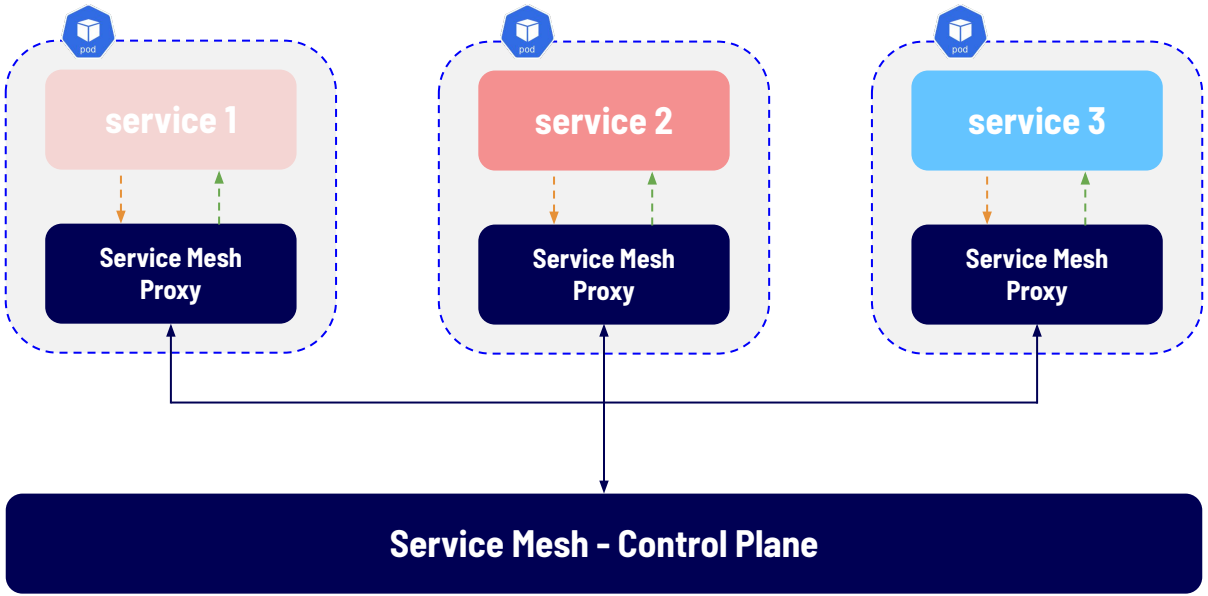
VPN

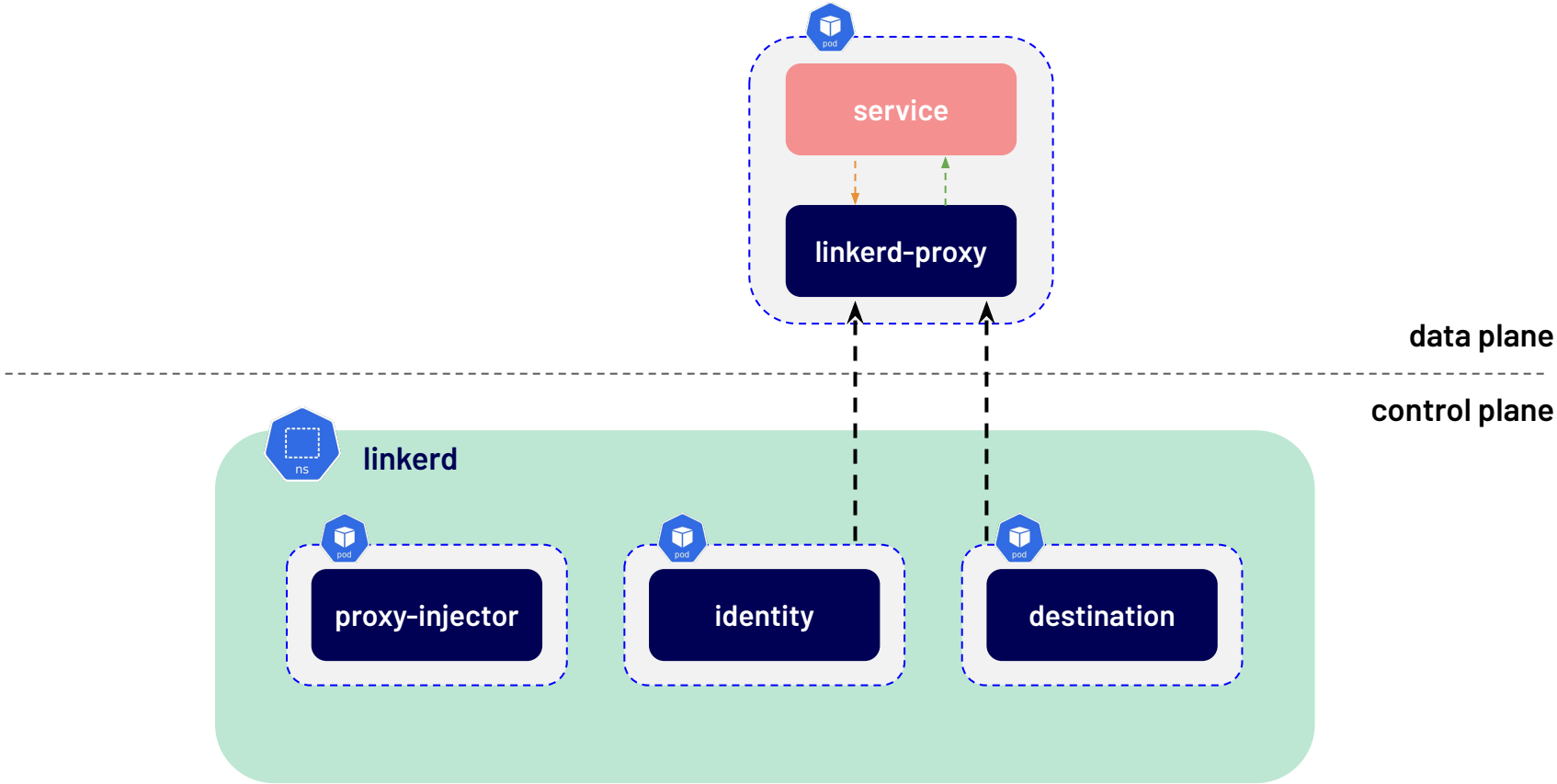
mTLS

We have been “evaluating” Service Mesh since 2017.

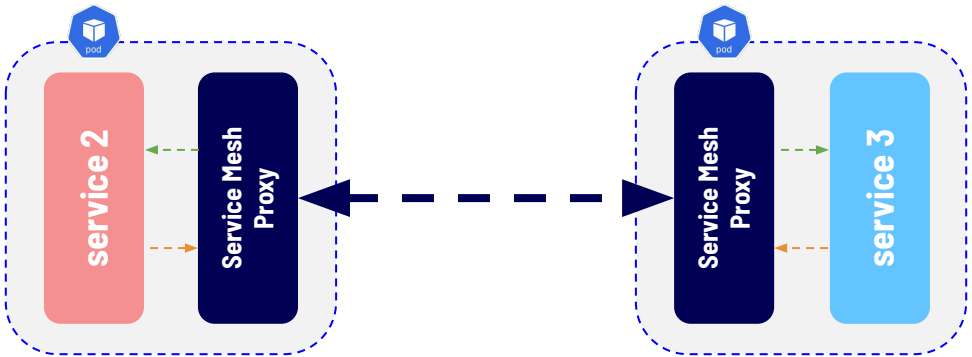
tl;dr:

Service meshes like Linkerd **and** Istio **are tools for adding** observability**, and** security**, and** reliability **features to applications by inserting them at the** platform **layer rather than the** application **layer.**


pod
service 1
Service Mesh Proxy
pod
service 2
Service Mesh Proxy
pod
service 3
Service Mesh Proxy
Service Mesh - Control Plane

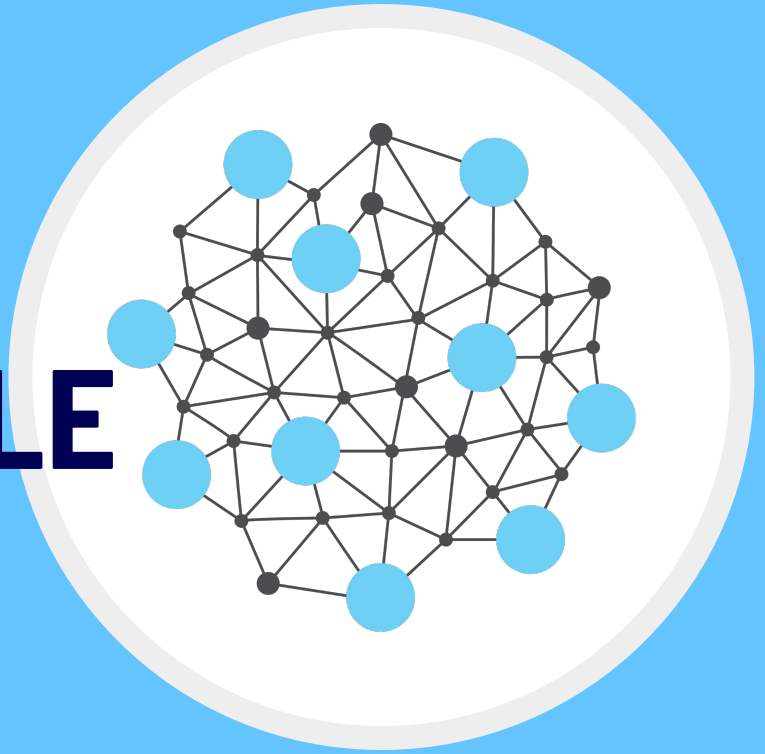

pod
service
linkerd-proxy
data plane
control plane
ns
linkerd
pod
proxy-injector
pod
identity
pod
destination

All communication is transparently mutually encrypted (mTLS)



NEXT LEVEL

EXTENDING THE MESH TO MULTIPLE CLUSTERS



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CORE

MULTI-CLUSTER COMPONENTS

The ***service mirror*** component watches a target cluster for updates to services and mirrors those service updates locally on a source cluster. This provides visibility into the service names of the target cluster so that applications can address them directly.

The ***multi-cluster gateway*** component provides target clusters a way to receive requests from source clusters.

Source: https://linkerd.io/2.11/features/multicluster/

DIY

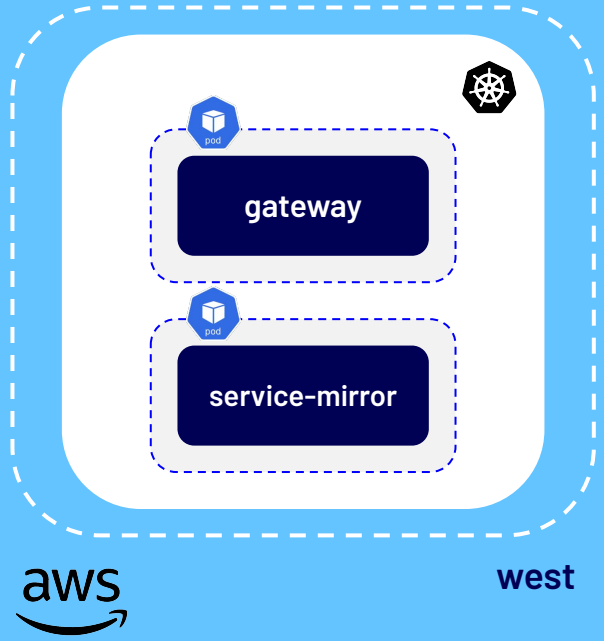
LINKING TWO CLUSTERS

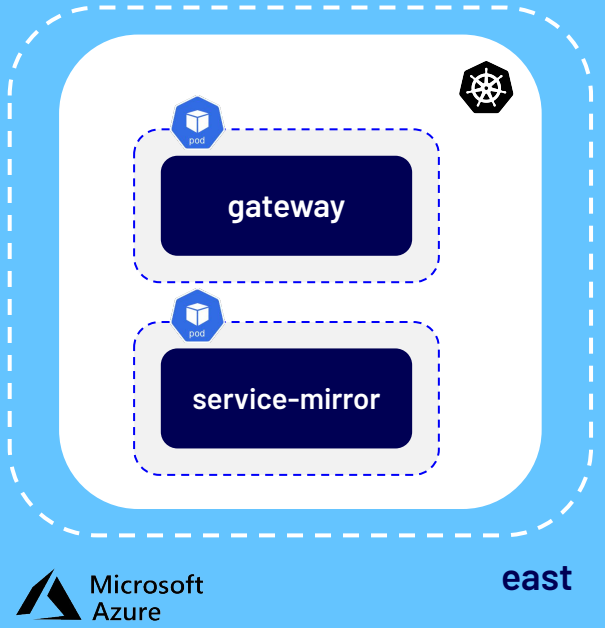
```
// Install linkerd-multicluster in both clusters
$ linkerd multicluster install | kubectl apply -f -


//Generate a link that allows services in east to be mirrored to west
$ linkerd --context=east multicluster link --cluster-name east |
  kubectl --context=west apply -f -

//Generate a link that allows services in west to be mirrored to east
$ linkerd --context=west multicluster link --cluster-name west |
  kubectl --context=east apply -f -
```

Source: https://linkerd.io/2.11/tasks/installing-multicluster/

CORE

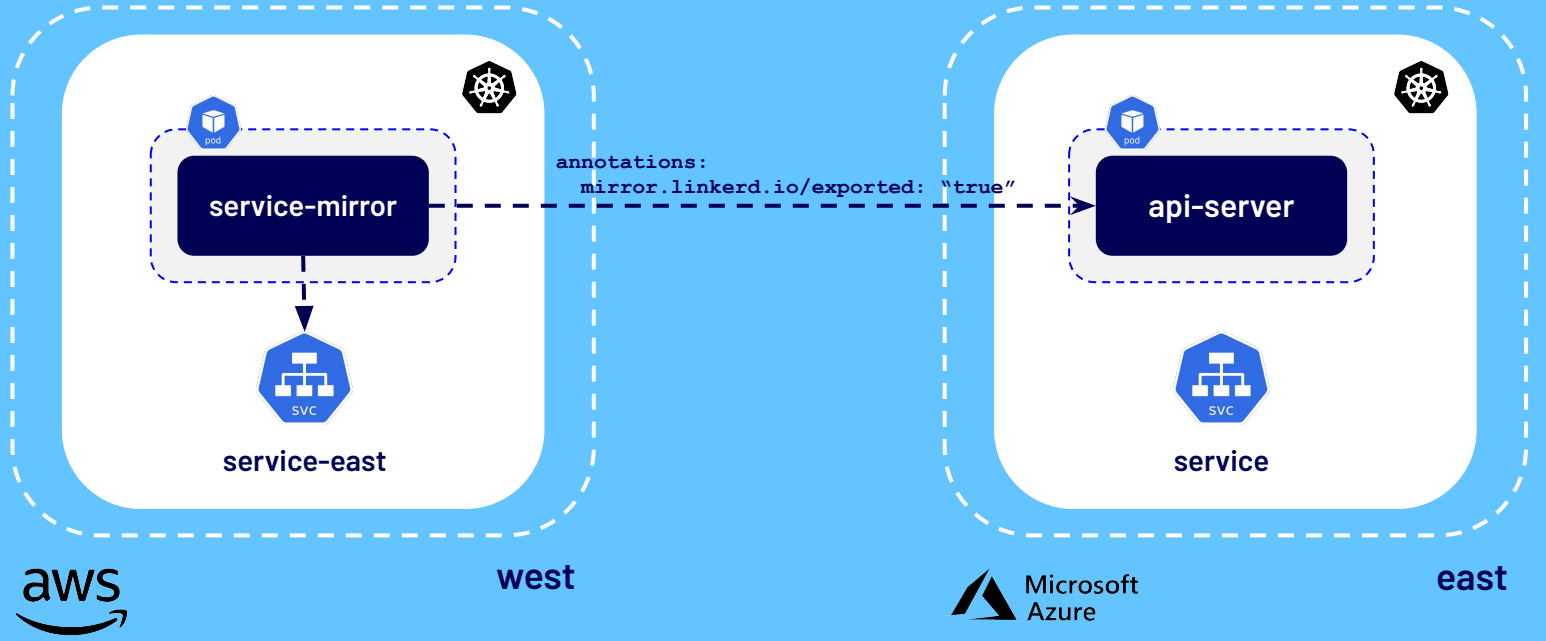
MULTI-CLUSTER COMPONENTS





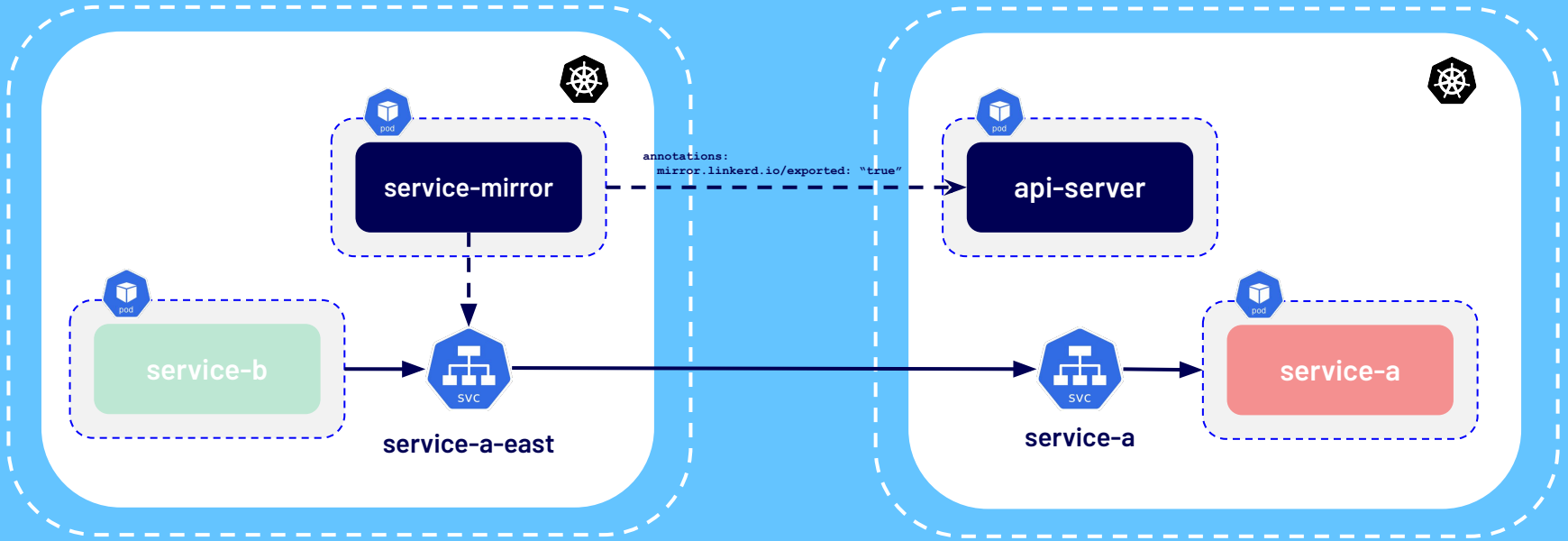
HOW

SERVICE MIRROR



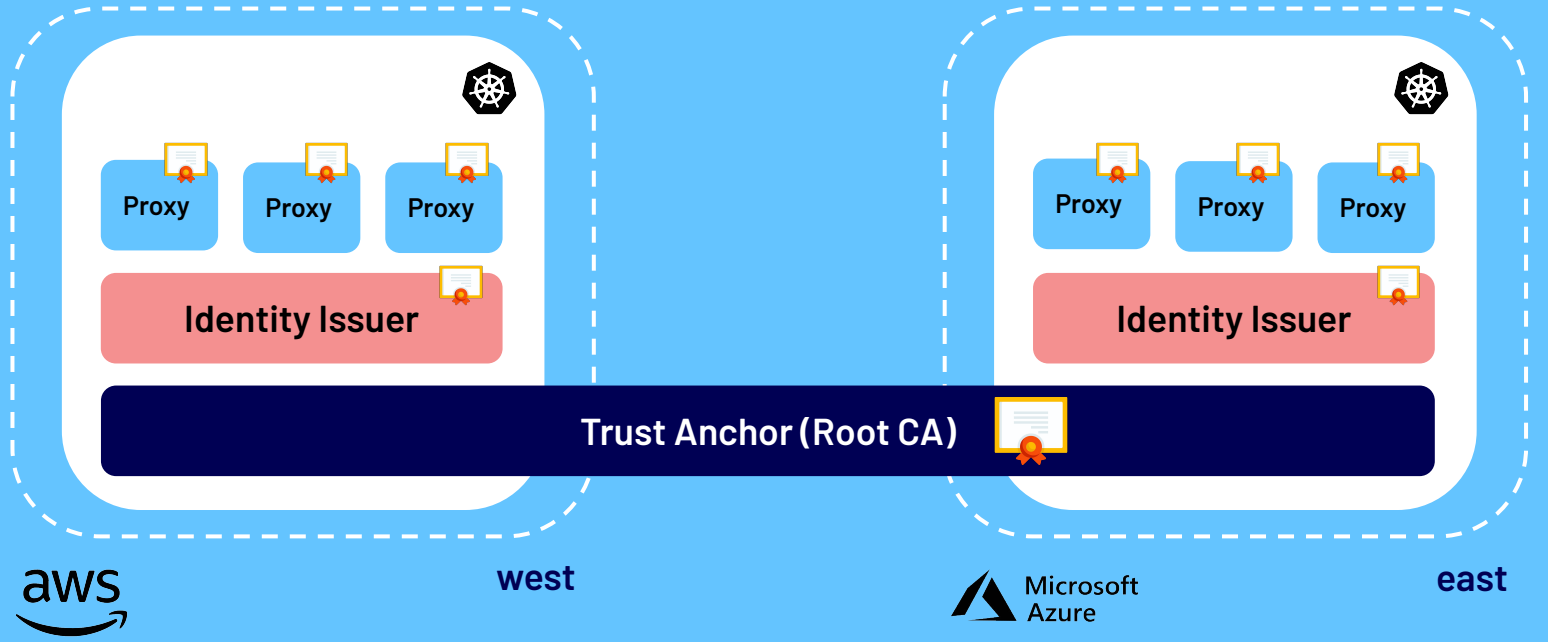
HOW

TRANSPARENT COMMUNICATION



HOW

SECURE COMMUNICATION

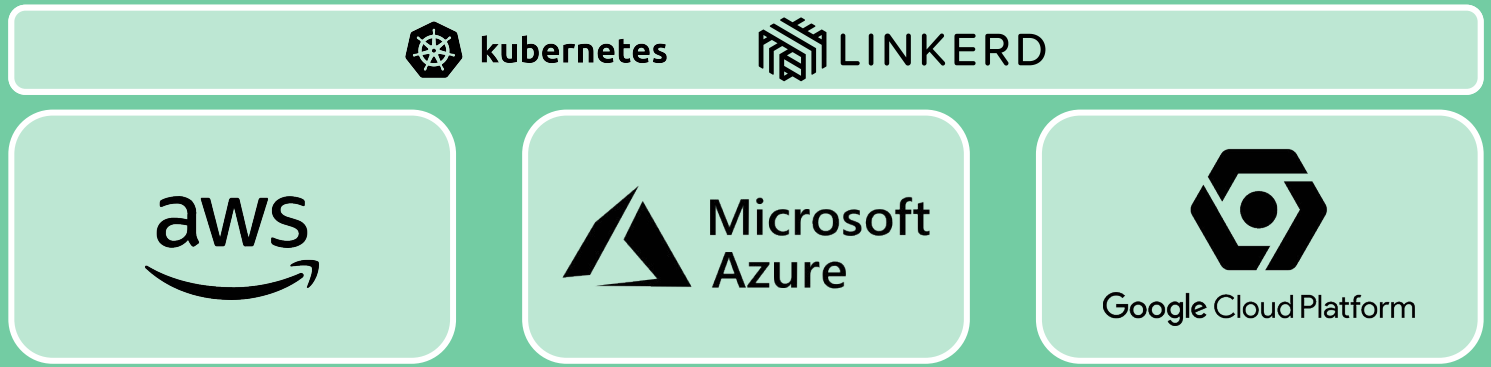


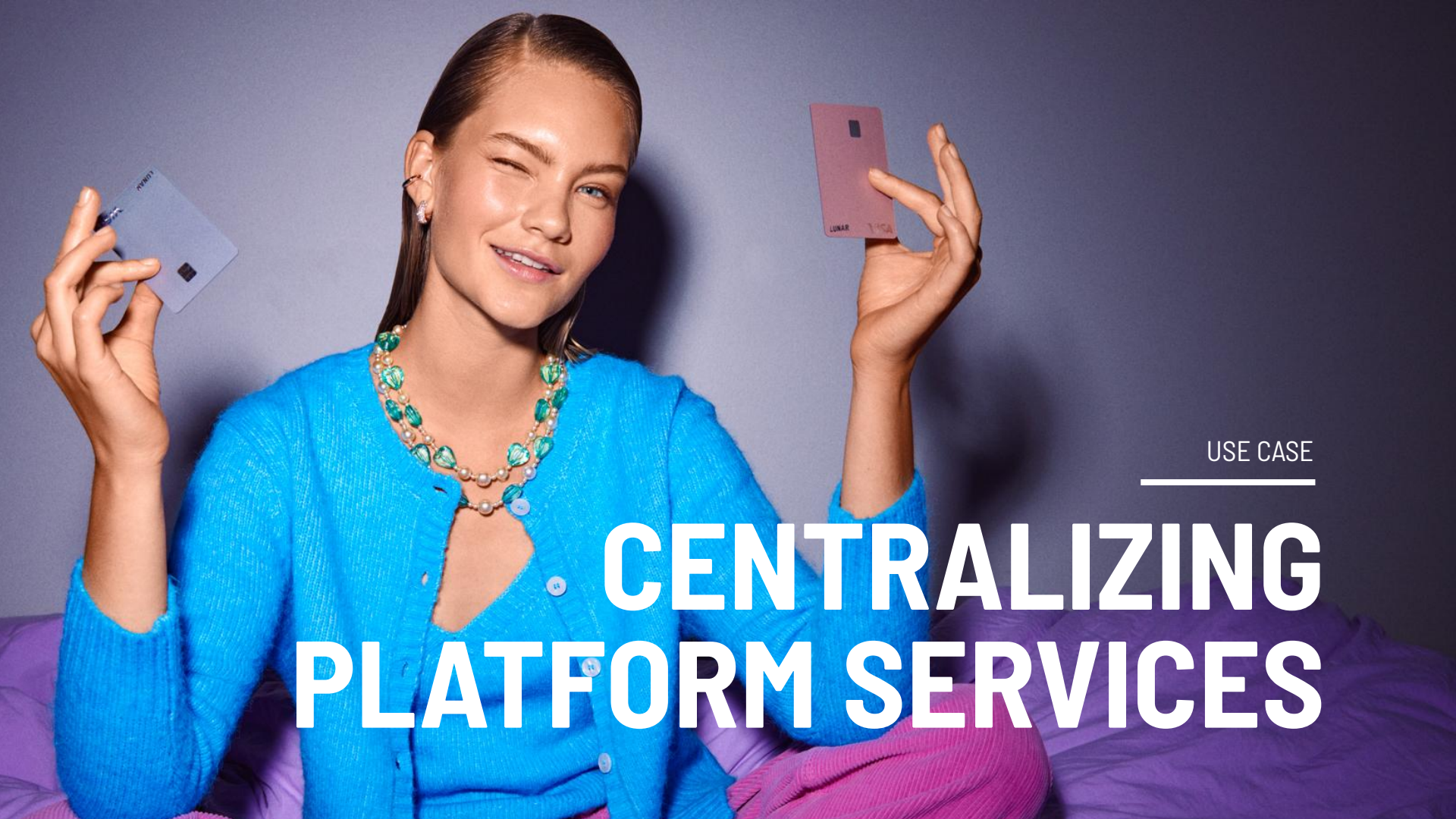
HOW

WE BUILD

Kubernetes is the foundation on which we built

Linkerd to transparently connect clusters





USE CASE

CENTRALIZING PLATFORM SERVICES

BEFORE

REPLICATED OBSERVABILITY STACK

Replicated complex stateful services for each environment.

NOW

CENTRALIZED PLATFORM TOOLING

Log Management

Continuous Integration

Developer Portal

Developer Productivity

Monitoring

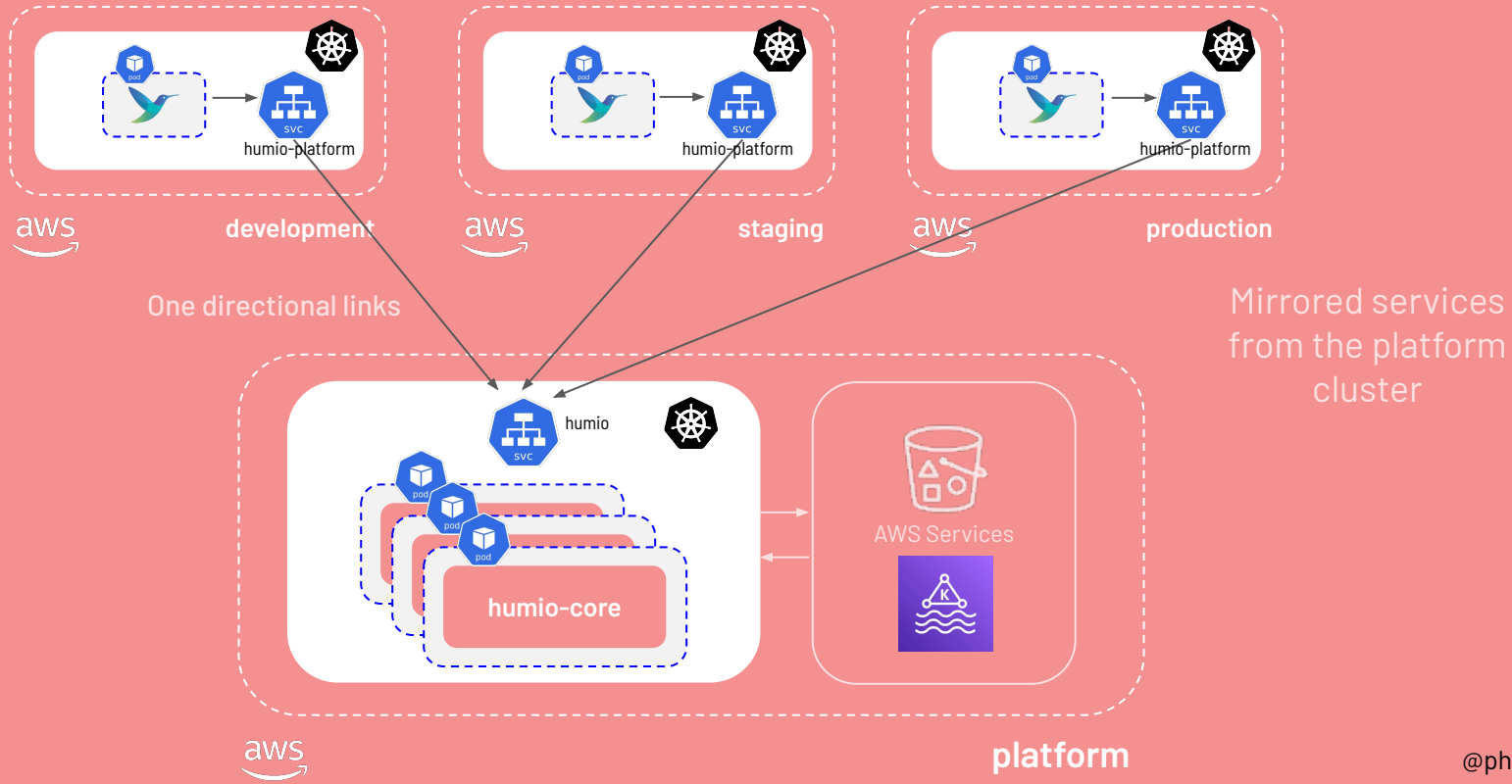
Tracing

Cluster Management

Release Management

NOW

CENTRALIZED LOG MANAGEMENT



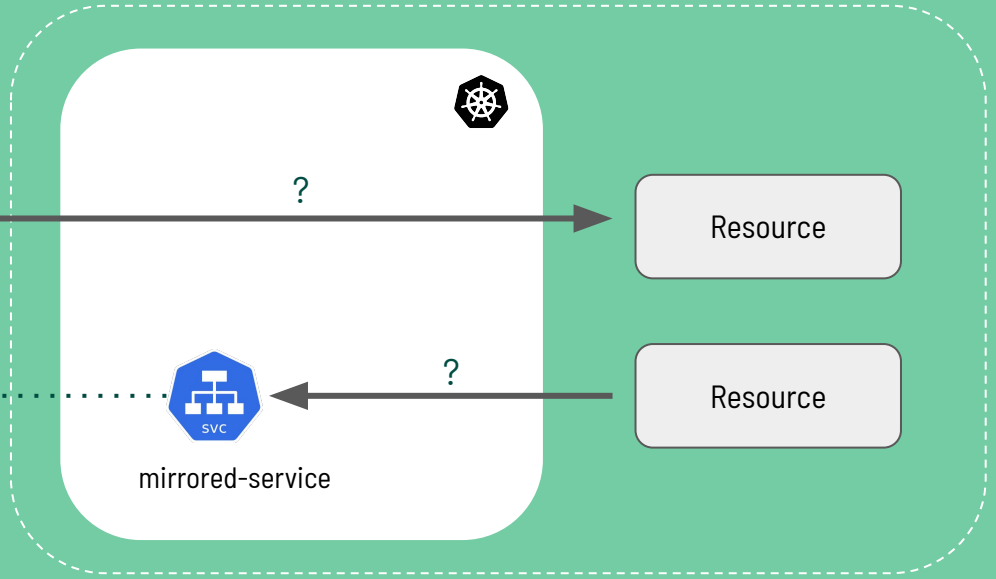
PROBLEM

WHAT ABOUT SERVICES RUNNING OUTSIDE THE CLUSTER?

EDGE

INGRESS/EGRESS

How to request a resources from another cluster?



How to request a mirrored service?

Microsoft Azure

east

HOW

INTRODUCING THE BACKBONE GATEWAY

The responsibility of the backbone-gateway proxy is to provide a simple abstraction that allows exposing services running in cloud providers for services in a cluster or outside a cluster on a different provider.

EDGE

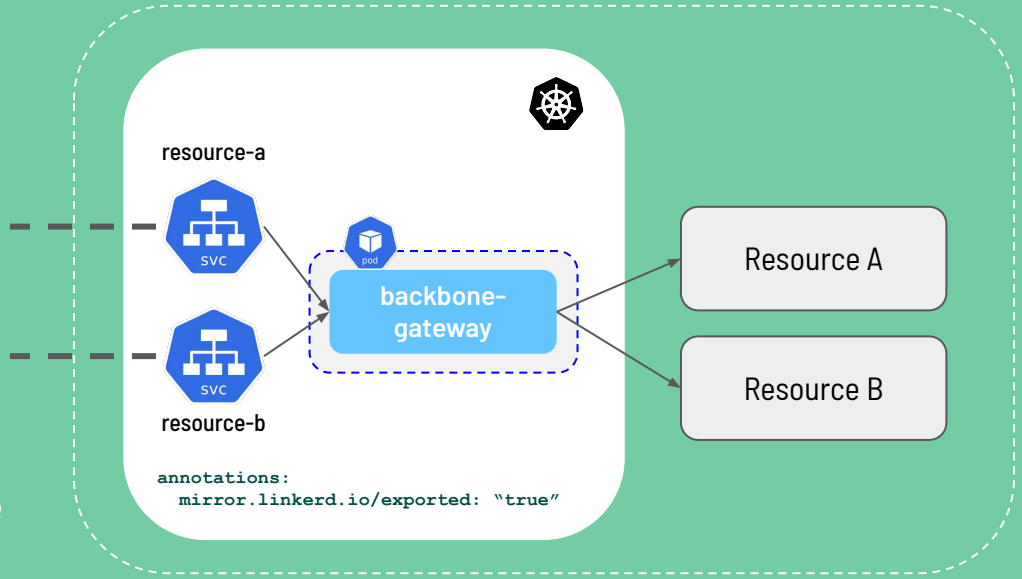
EGRESS

shuttle.yaml

```
targets:
  - hostName: resource-a
    dnsName: resource-a.azurewebsites.net
    environment: east
    squad: maxus

  - hostName: resource-b
    dnsName: resource-b.azurewebsites.net
    environment: east
    squad: maxus
```

Services will be mirrored to the opposite cluster and be available as e.g.

http://resource-a-east.namespace.svc.cluster.local



Microsoft Azure

east

EDGE

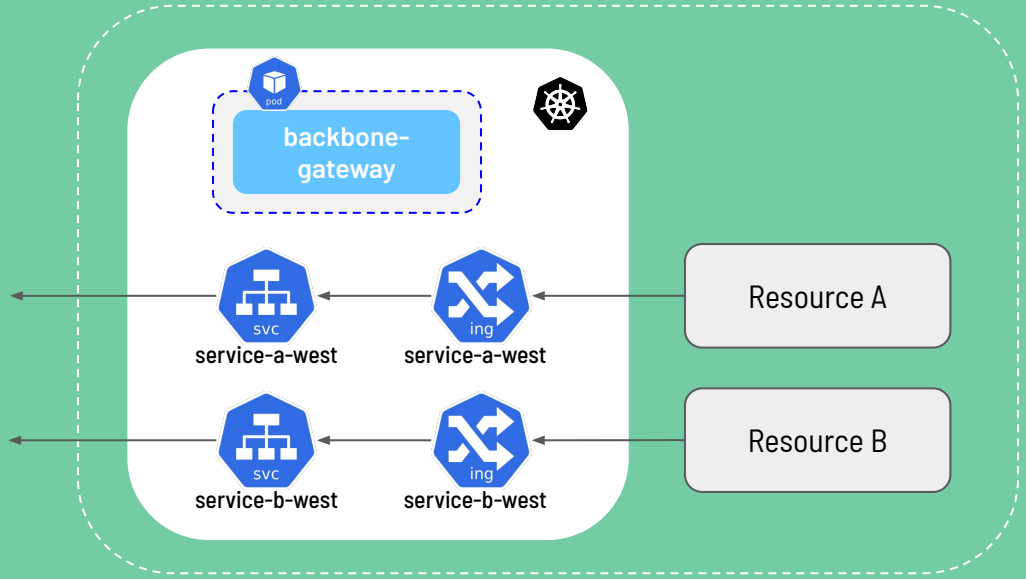
INGRESS

shuttle.yaml

```
ingress:
  - service: service-a
    namespace: services
    cluster: west
    squad: nasa
    port: 3000

  - service: service-b
    namespace: services
    cluster: platform
    squad: nasa
    port: 3000
```

The backbone-gateway is responsible for creating ingress objects.

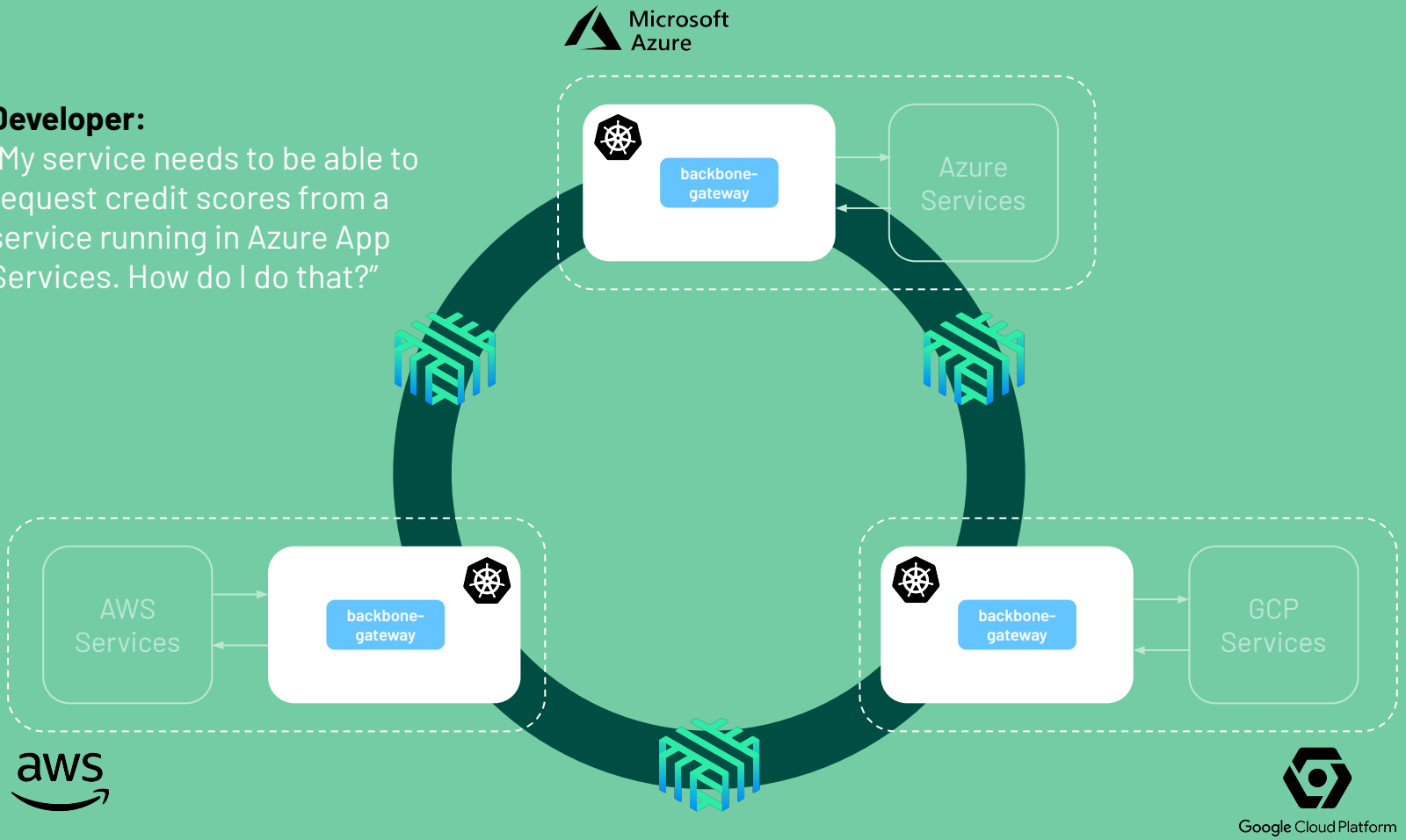
nginx-ingress-controller, external-dns, and cert-manager ensures networking



Microsoft Azure

east

Developer:
“My service needs to be able to request credit scores from a service running in Azure App Services. How do I do that?”



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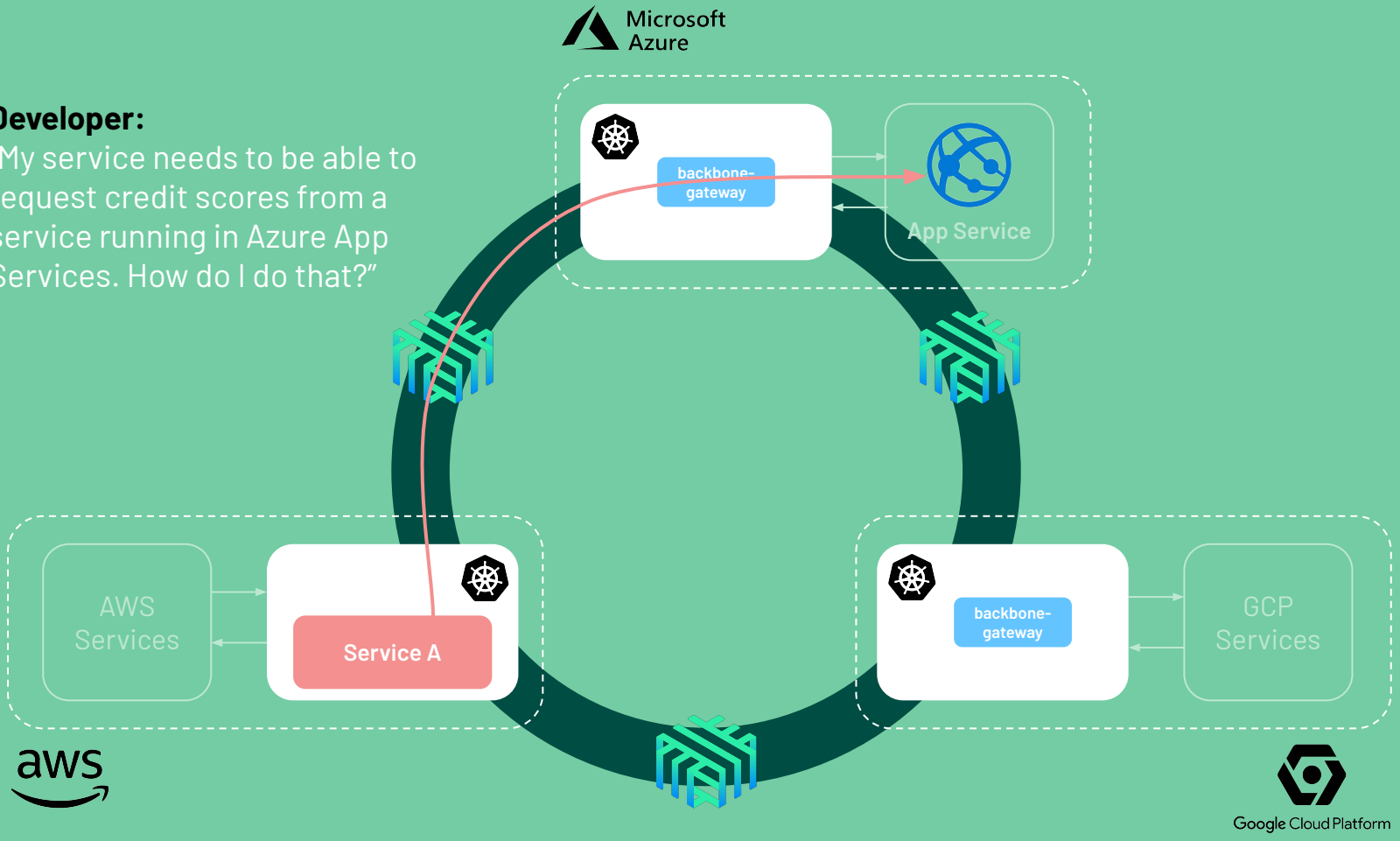


BACKBONE-GATEWAY-PROBE

MONITOR THE LINKS

From AWS to GCP/Azure

AWS -> AWS: 10 ms
AWS -> GCP: 30 ms
AWS -> Azure: 25 ms

From Azure to GCP/AWS

Azure -> AWS: 60 ms
Azure -> GCP: 20 ms

From GCP to Azure/AWS

GCP -> AWS: 60 ms
GCP -> Azure: 20 ms

AWS (eu-west-1), **Azure** (westeurope), **GCP** (europe-west-1)

LAST PIECE OF THE PUZZLE

MANAGING CLUSTERS ACROSS CLOUDS

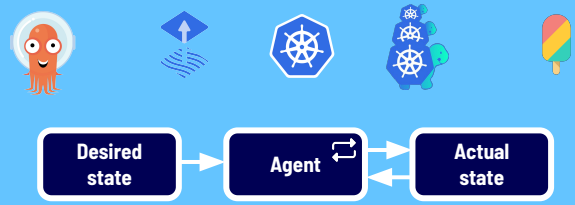
PRINCIPLES OF

GITOPS

all changes are **audited** and no access to production systems is needed (ideally)

desired state expressed **declaratively**

stored in a way that supports **versioning**, **immutability** of versions, and retains a complete **version history**



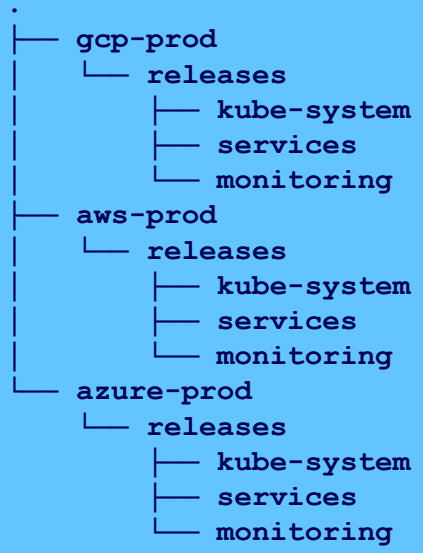
software agents continuously, and automatically, compare a systems **actual state** to its **desired state**

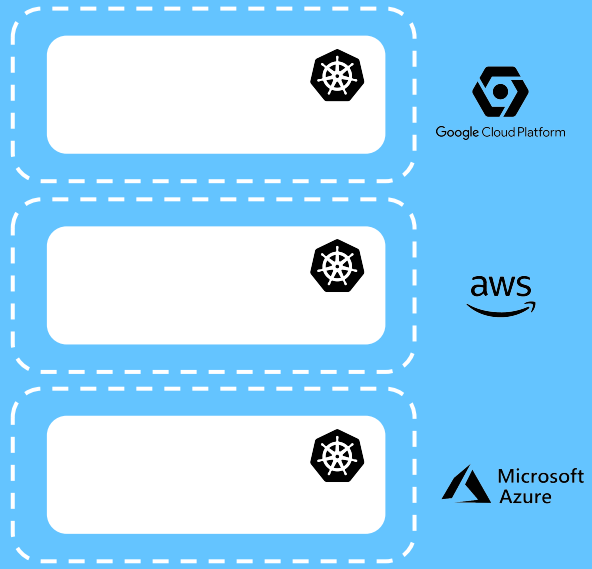
“Compare the running state of our system with the desired state - continually - and whenever these get out of sync, force the running state to converge to the desired state.”

- Alexis Richardson, CEO at Weaveworks

MANAGING CLUSTERS WITH A

CONFIG REPOSITORY





Desired state **Software Agents** **Actual State**

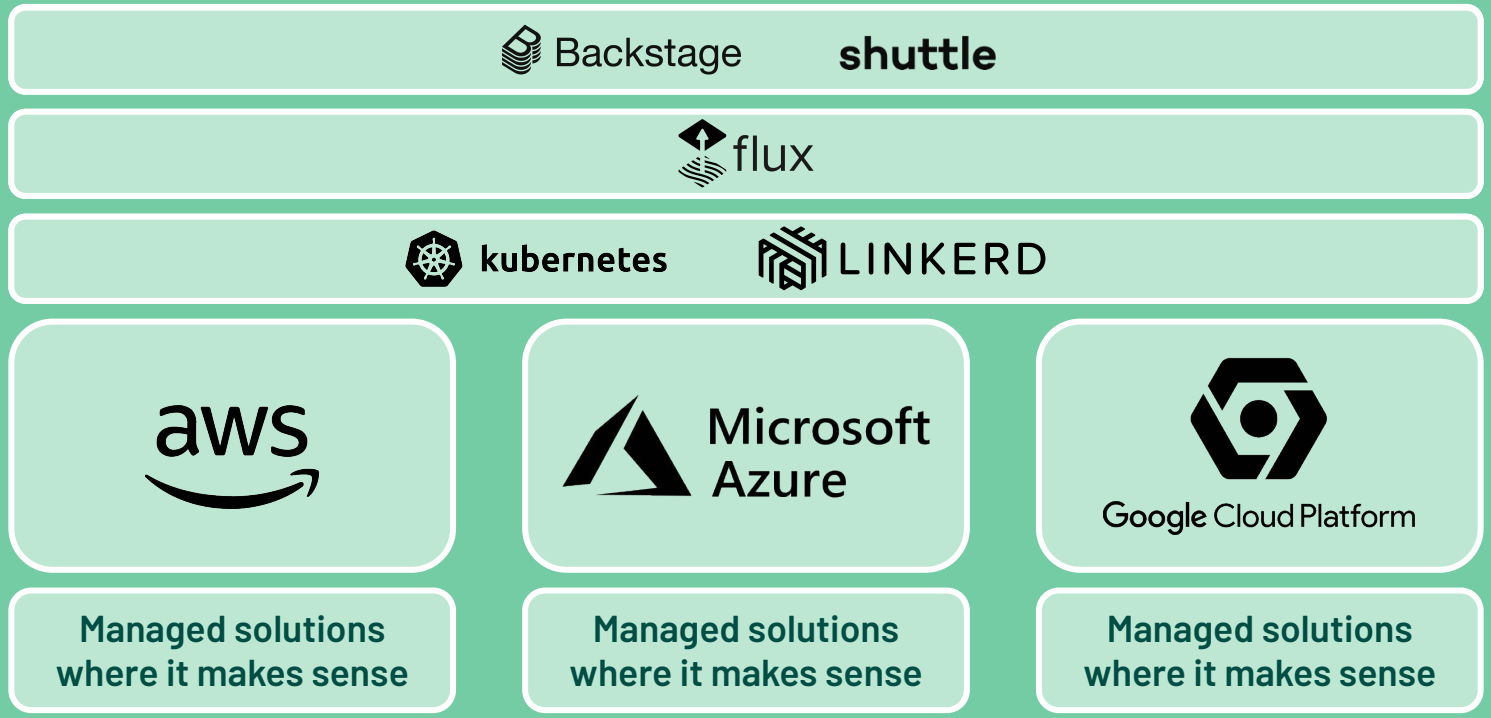
GITOPS AS A TOOL FOR

MULTI-CLOUD MANAGEMENT

- ★ GitOps gives us an audit trail across changes to all cloud providers
- ★ GitOps allow us to enforce least privileged access
- ★ GitOps allow us to treat clusters as cattle (to some extent)
- ★ GitOps ensures that process for release is the same across cloud providers

HOW

WE BUILD


Backstage
shuttle
flux
kubernetes
LINKERD
aws
Microsoft Azure
Google Cloud Platform
Managed solutions where it makes sense
Managed solutions where it makes sense
Managed solutions where it makes sense

WRAPPING UP

WHAT'S THE END GOAL?

Should developers be able to just use the cloud they see fit?

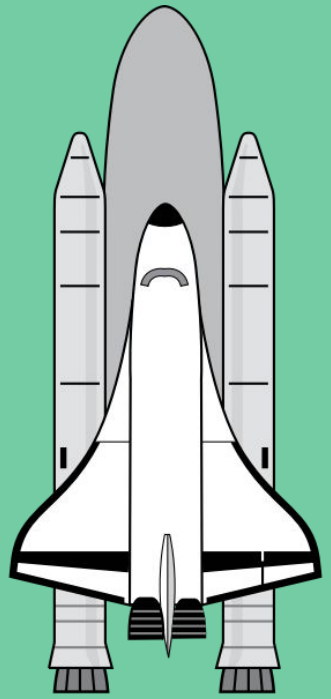
- No, there's a lot of considerations, like latency etc.

What about asynchronous messaging across clouds?

- We currently are looking into how we can provide a way to utilize our event driven model beyond a single cloud.

Will you at some point consolidate and move everything into one provider?

- Maybe, at least, now we have a strategy.



THAT'S ALL FOLKS

QUESTIONS?

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@phennex

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