



# Two years in production with Kubernetes

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an experience report

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way®**

Container Days 2019, Hamburg  
Kasper Nissen (@phennex)



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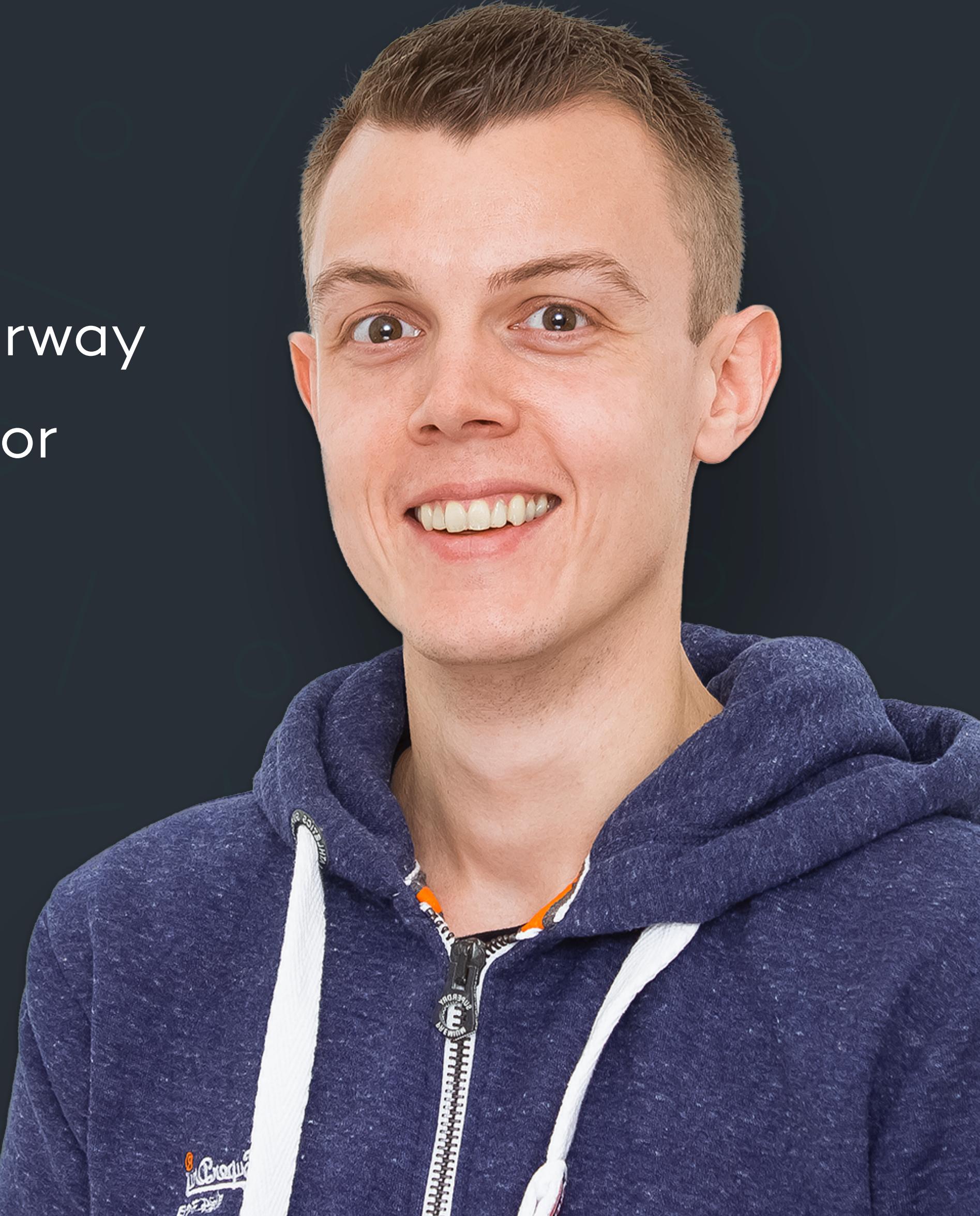
**lunar  
way®**

Container Days 2019, Hamburg  
Kasper Nissen (@phennex)

# \$ whoami

Kasper Nissen (@phennex)

- Site Reliability Engineer / Cloud Architect @lunarway
- Cloud Native Computing Foundation Ambassador
- #CloudNativeAarhus #CloudNativeNordics
- [kubecloud.io](http://kubecloud.io)



# kubecloud.io

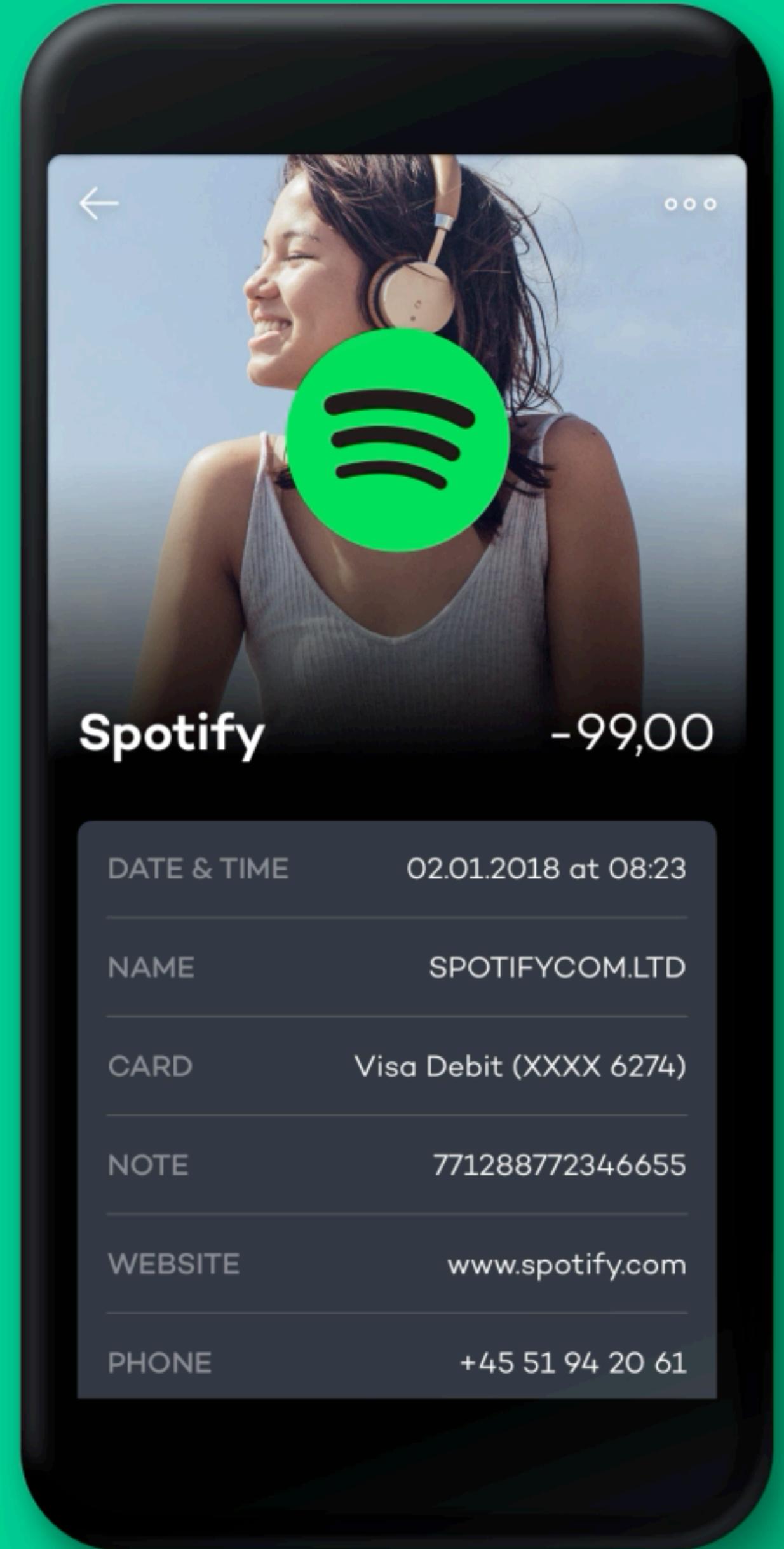
Foto credits: Lars Kruse, Aarhus University

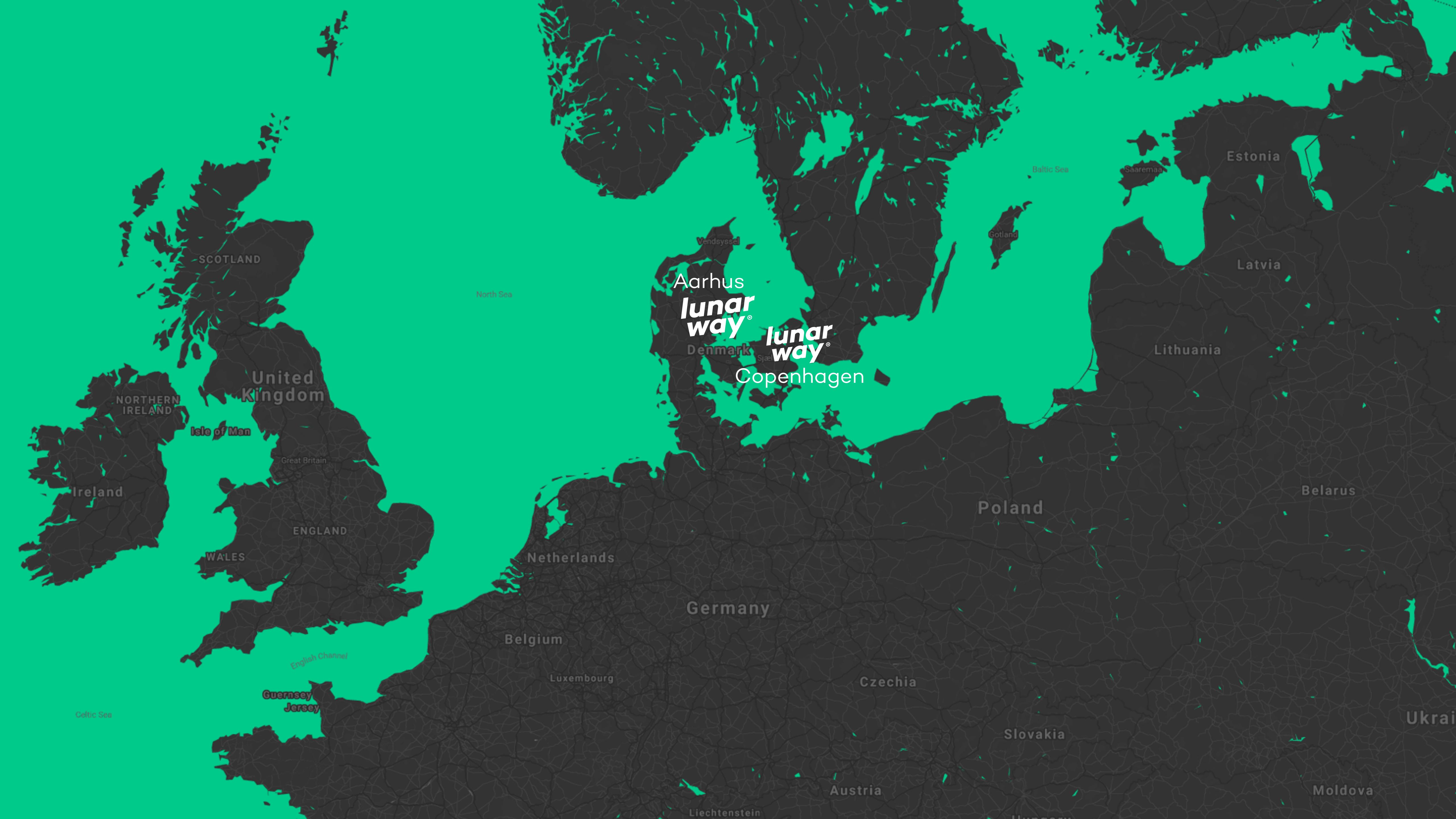
Credits: Pervasive Systems group, Section of Electrical and Computer Engineering, Department of Engineering, Aarhus University





What is *lunar  
way*<sup>®</sup>?

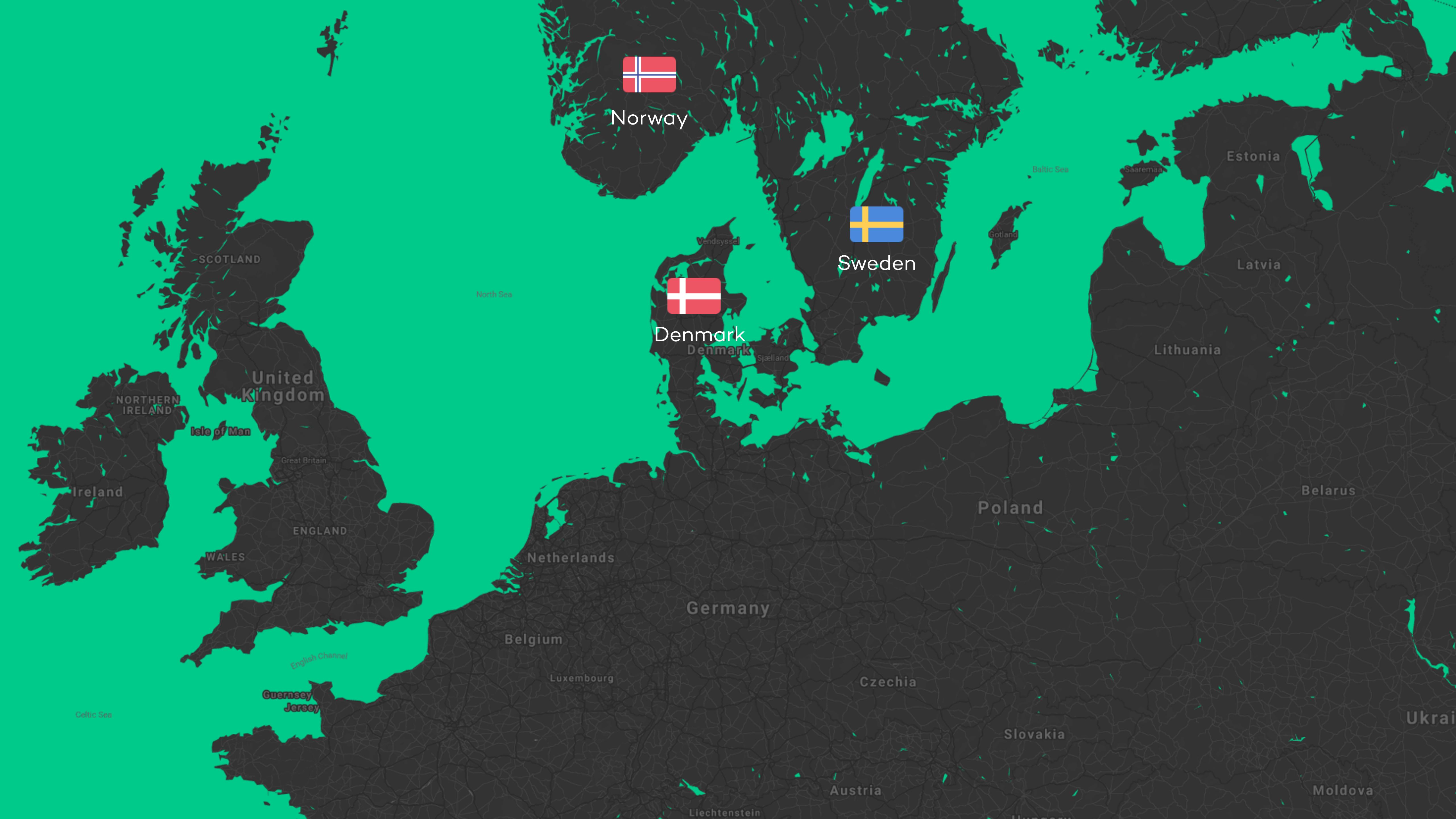




Aarhus  
***lunar***  
***way***<sup>®</sup>

***lunar***  
***way***<sup>®</sup>

Copenhagen



Norway



Sweden



Denmark

Baltic Sea

Gotland

Estonia

Latvia

Lithuania

Belarus

Ukraine

Moldova

SCOTLAND

United Kingdom

NORTHERN IRELAND

Isle of Man

Ireland

WALES

ENGLAND

English Channel

Guernsey  
Jersey

Celtic Sea

North Sea

Vendsyssel

Sjælland

Netherlands

Belgium

Luxembourg

Germany

Czechia

Poland

Slovakia

Austria

Liechtenstein



in numbers

**85K+**

Users

**1M+**

Transactions  
(per month)

**80+**

Microservices

**90+**

Employees

**100M+**

€ Volume  
(per month)

**3**

k8s clusters

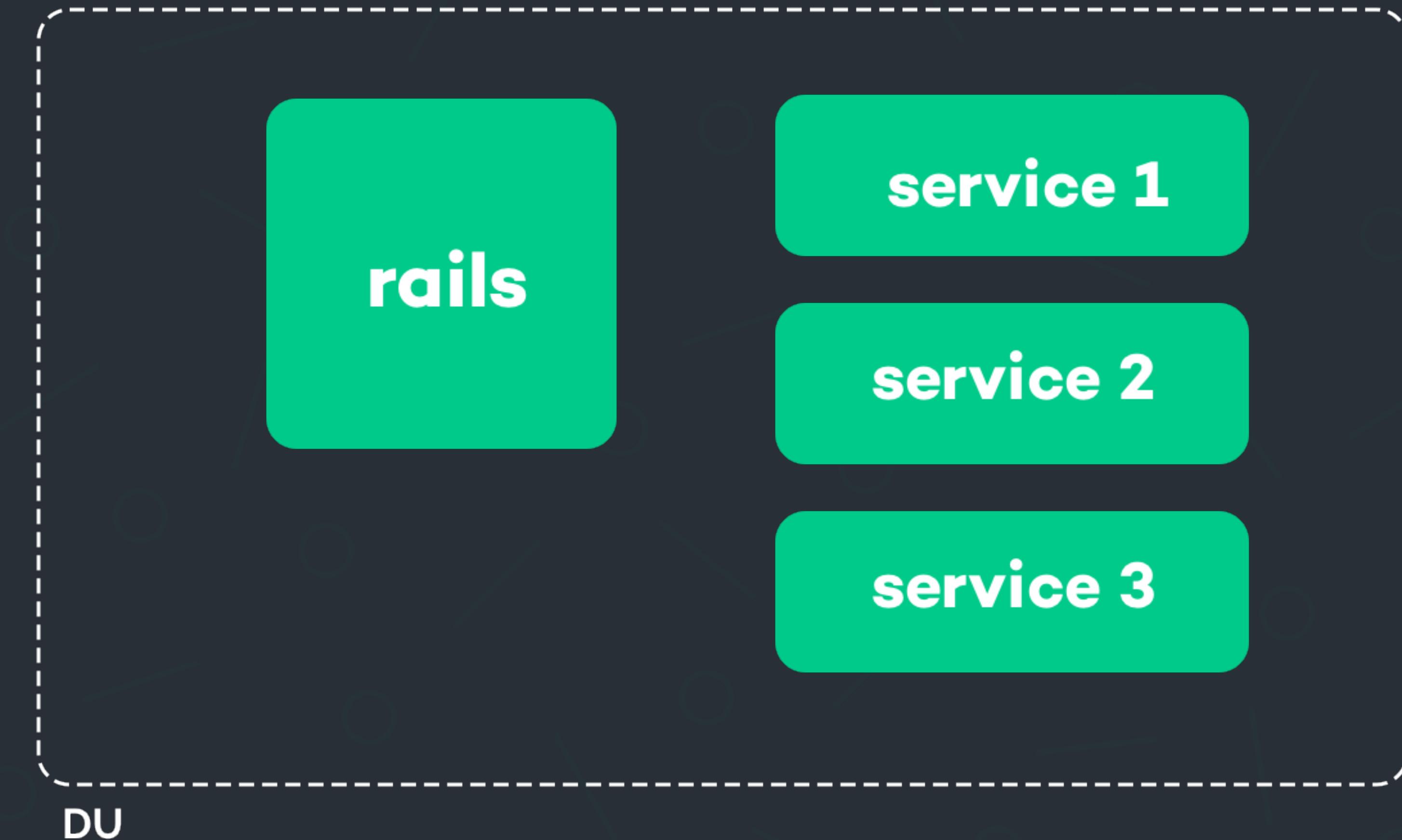
**So, where did we start our  
cloud native journey?**



**rails**

**DU**

Deployable Unit (DU)



Deployable Unit (DU)

**application-oriented**

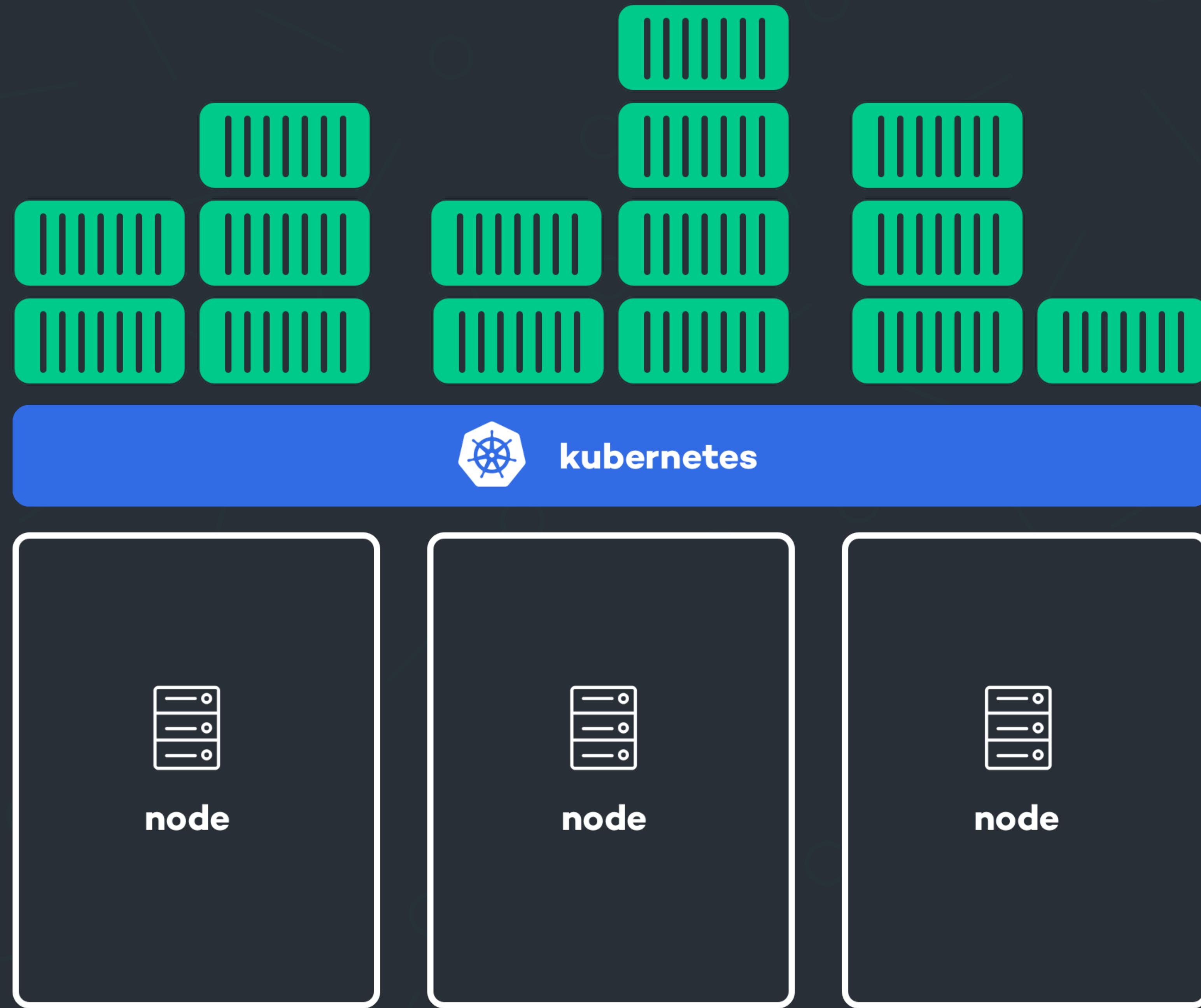
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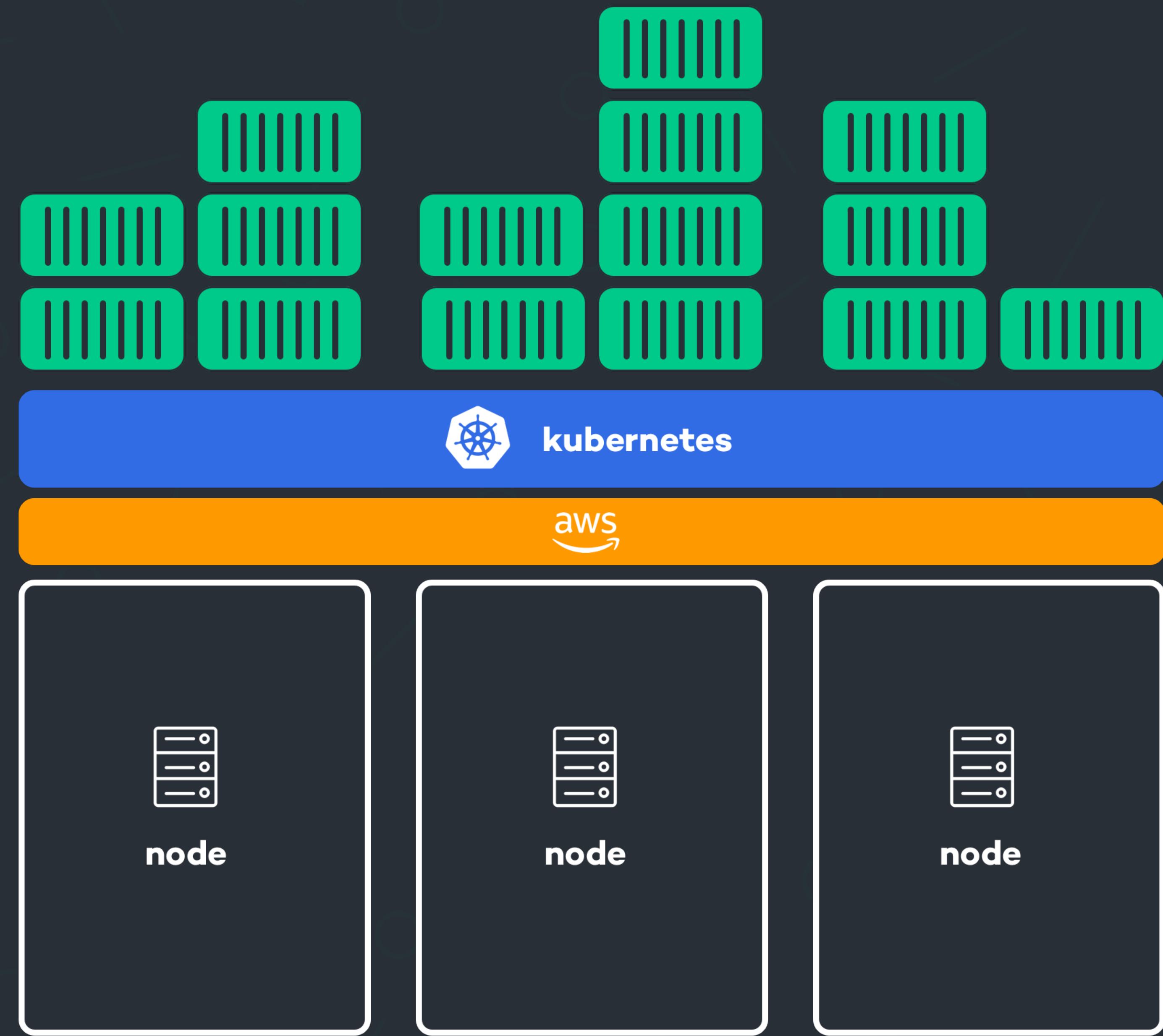
**machine-oriented**

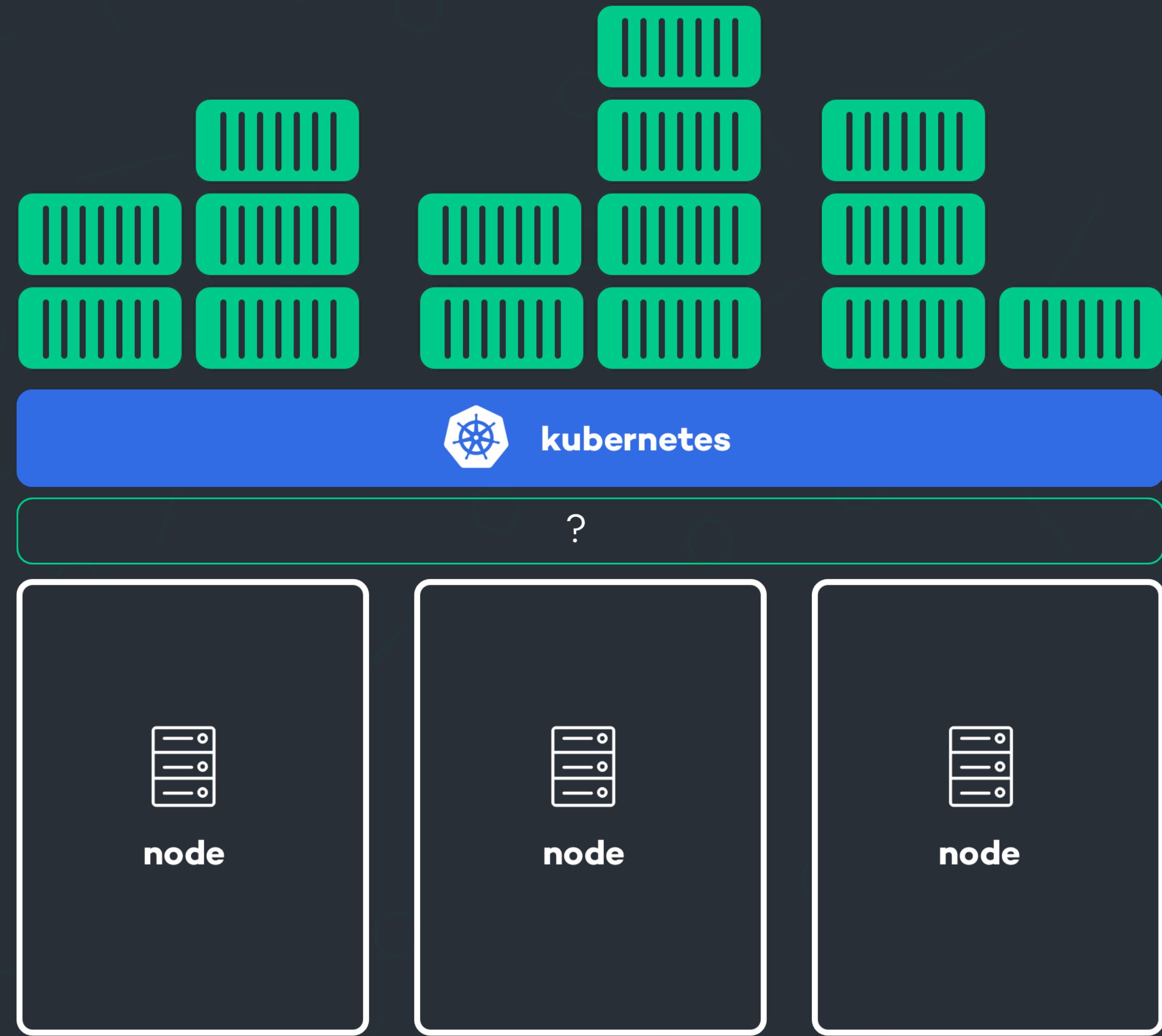
**“Unlock velocity by shifting  
the focus of deployment  
from being machine-oriented  
to be application-oriented”**

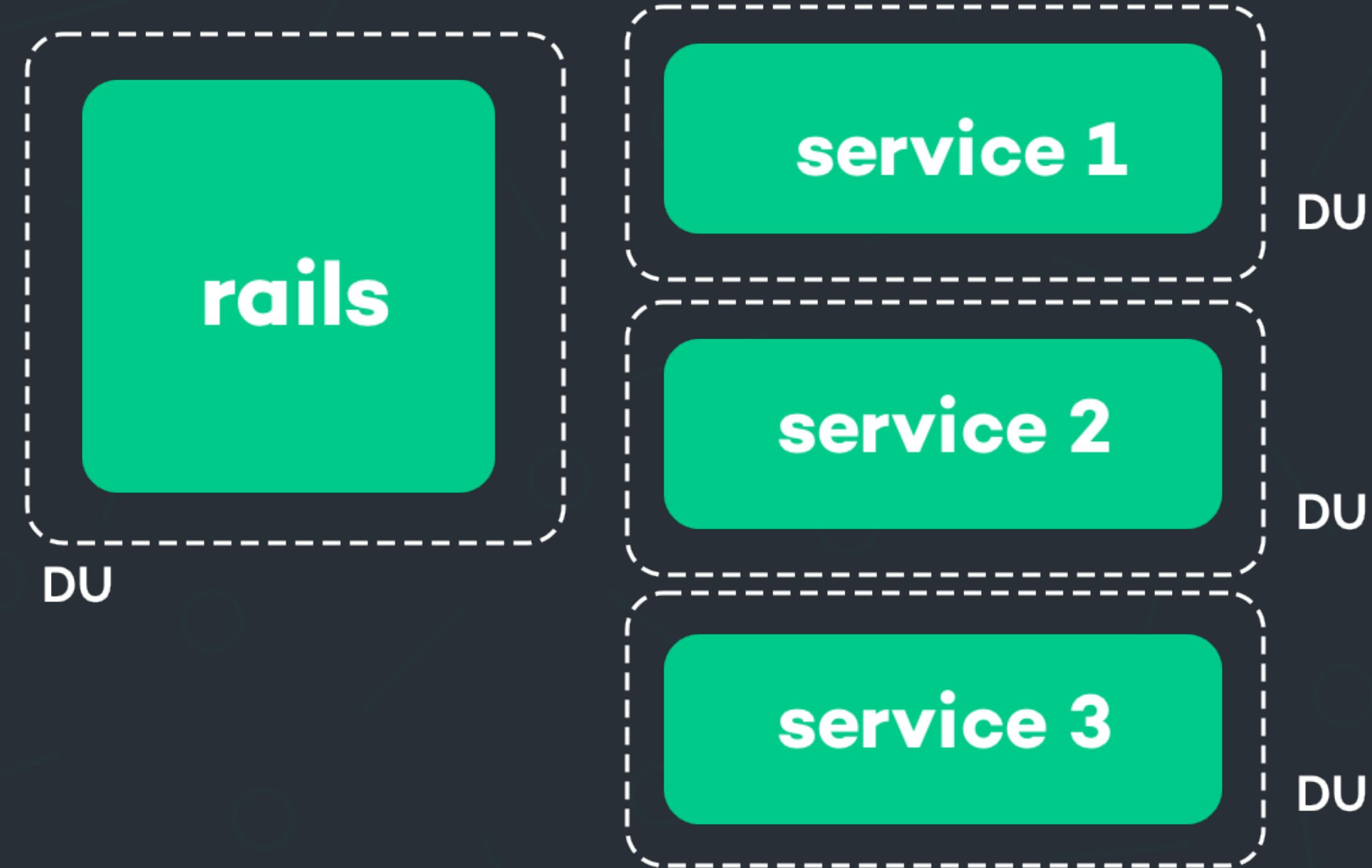
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Inspired by "Borg, Omega, and Kubernetes" by Brendan Burns et. al.

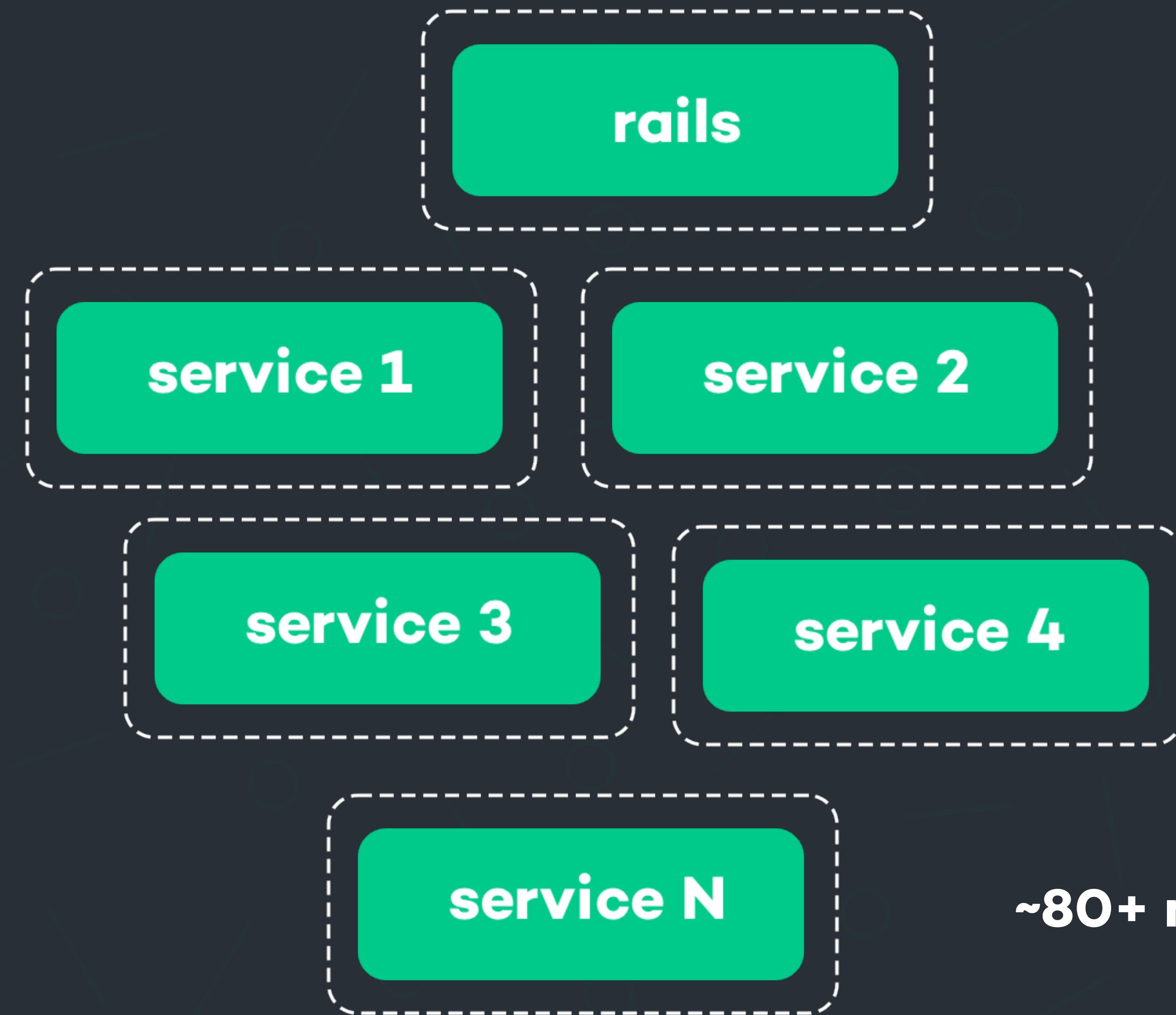








Deployable Unit (DU)



**“Kubernetes is the **foundation**  
on which we **build**”**

**“Kubernetes is a platform  
for creating platforms”**

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Bryan Liles, CloudNativeCon+KubeCon Europe 2019

**”Kubernetes is not a destination. It’s part of the journey”**

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Bryan Liles, CloudNativeCon+KubeCon Europe 2019

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# Todays topics

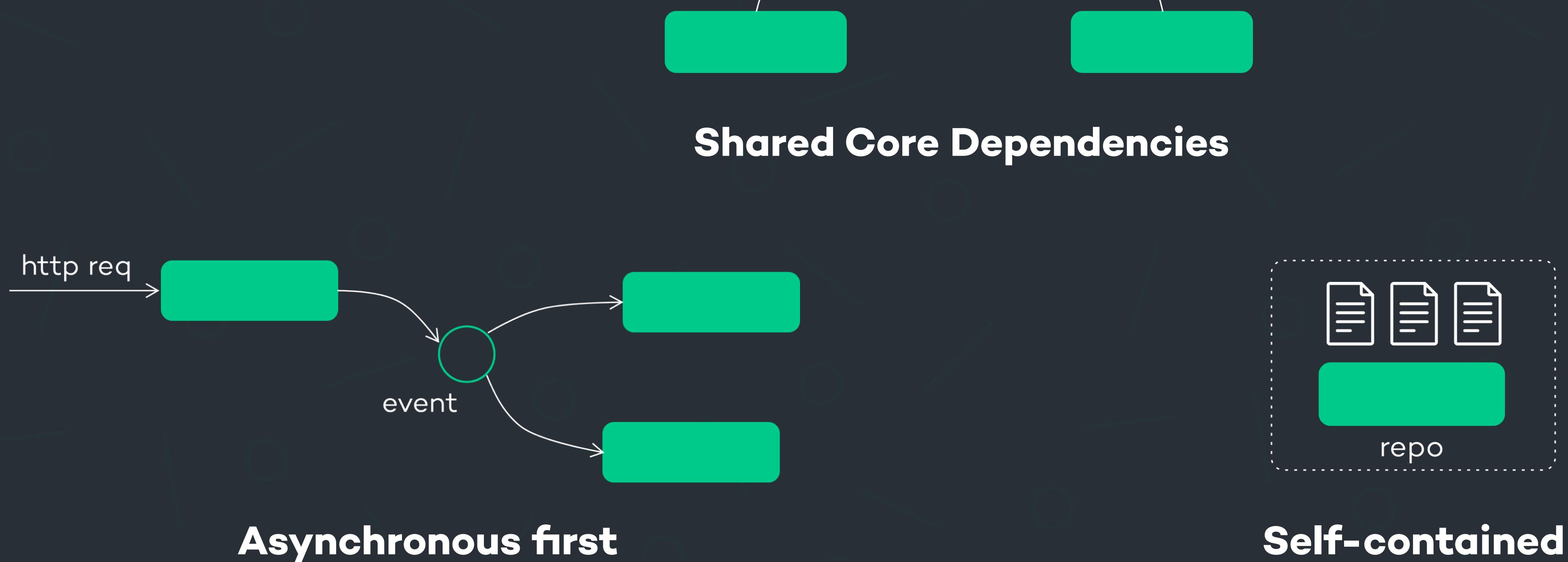
1. Finding the right abstraction
2. Release Management
3. Operations/Maintenance

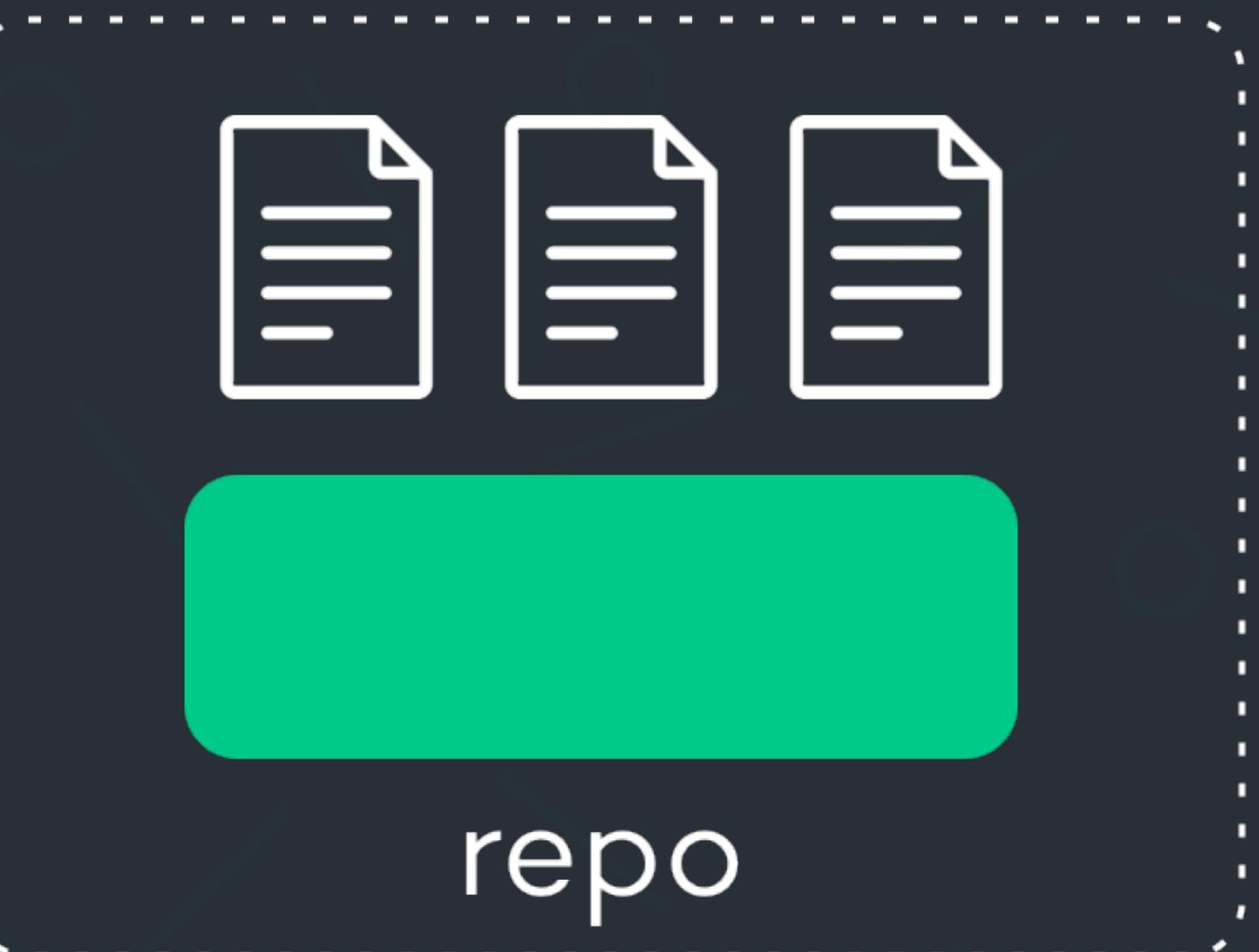
**“Good decisions come from experience, and experience comes from bad decisions.”**

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Anonymous quote from the Internet

# GOTO Copenhagen 2017





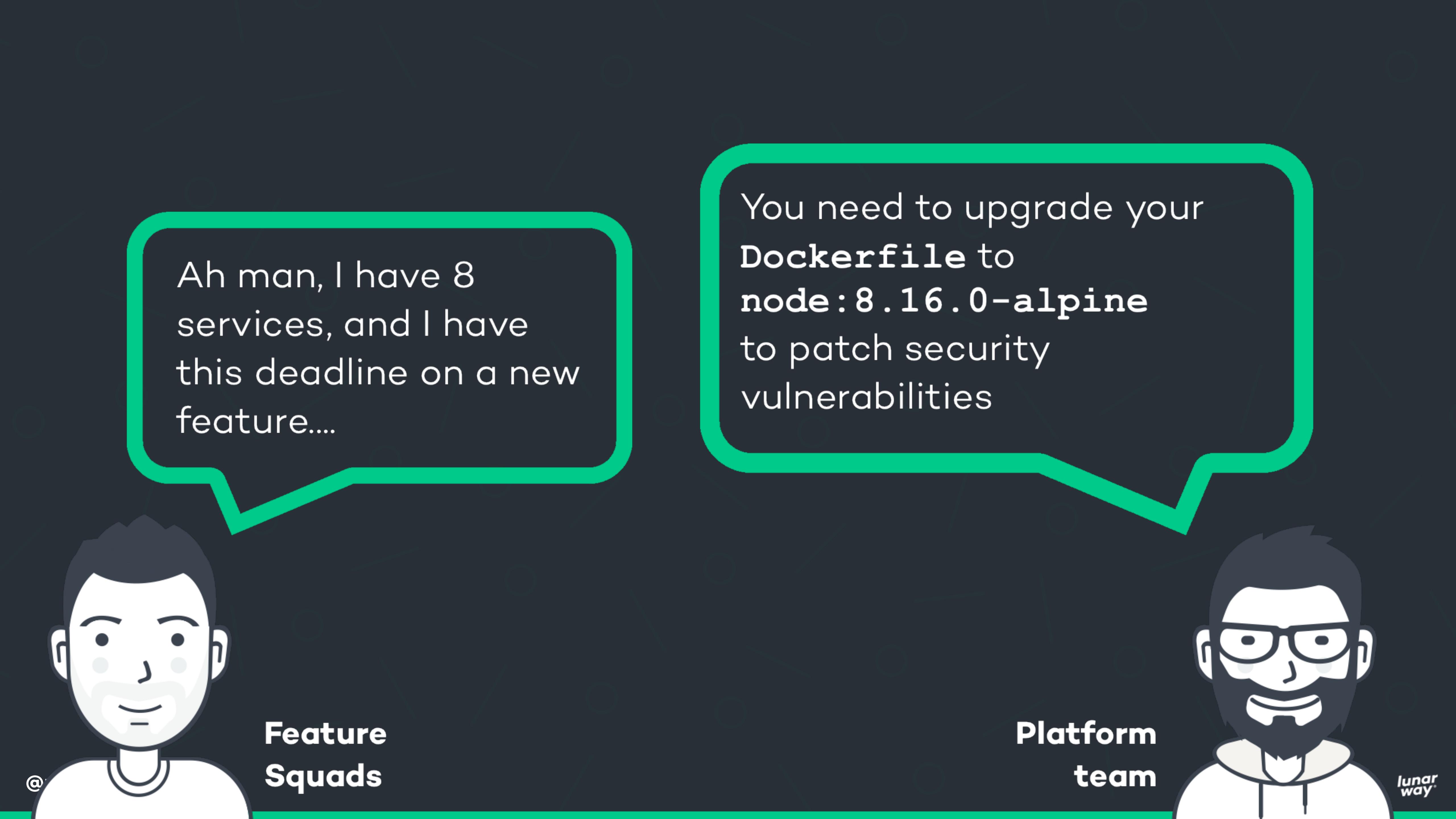
Scripts

Kubernetes resources

Dockerfiles

Jenkins pipeline





Ah man, I have 8 services, and I have this deadline on a new feature...

You need to upgrade your **Dockerfile** to **node:8.16.0-alpine** to patch security vulnerabilities

@

**Feature  
Squads**

**Platform  
team**

We needed to find the **right**  
abstraction...

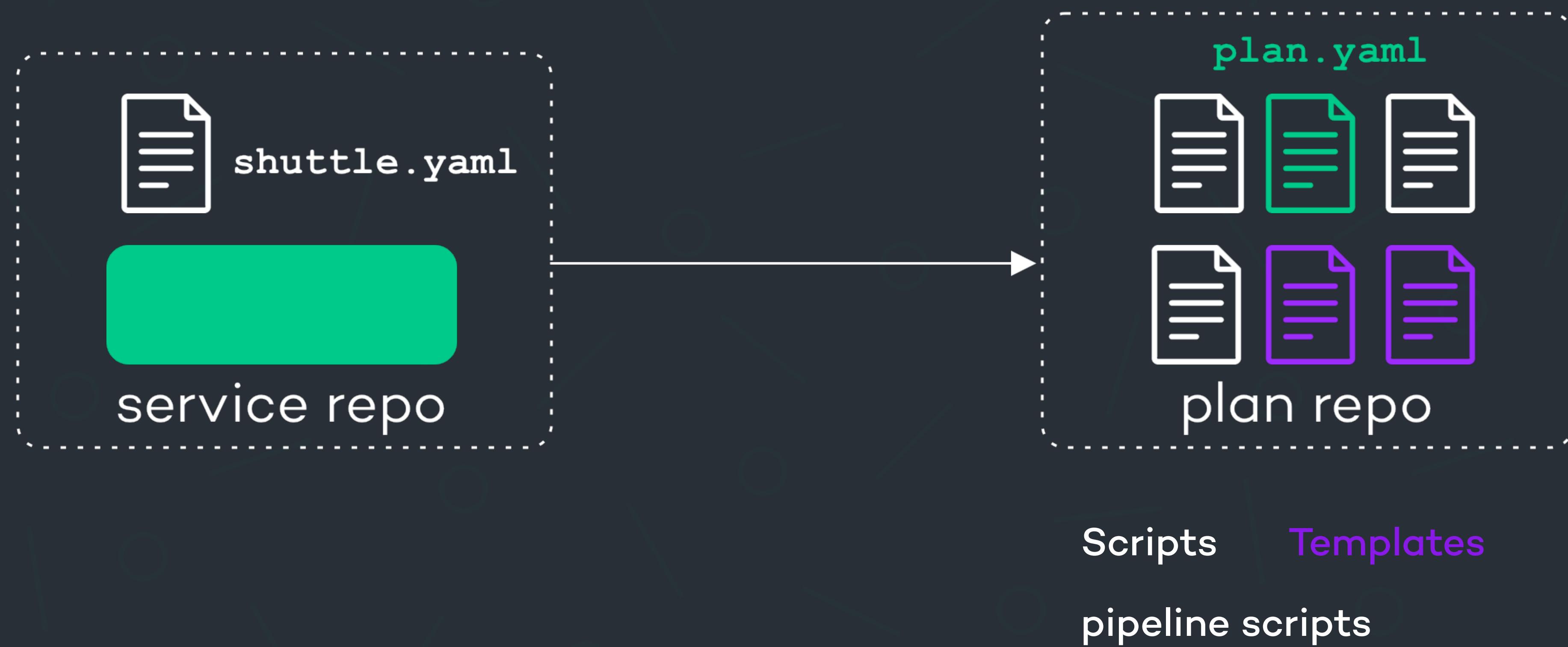
**”Developers shouldn’t really  
care about Dockerfiles and  
Kubernetes resources”**



# Introducing shuttle

A **CLI** for handling shared **build** and **deploy** tools between many projects **no matter what technologies** the project is using.

<https://github.com/lunarway/shuttle>



**shuttle template deployment.yaml**

**shuttle run build**

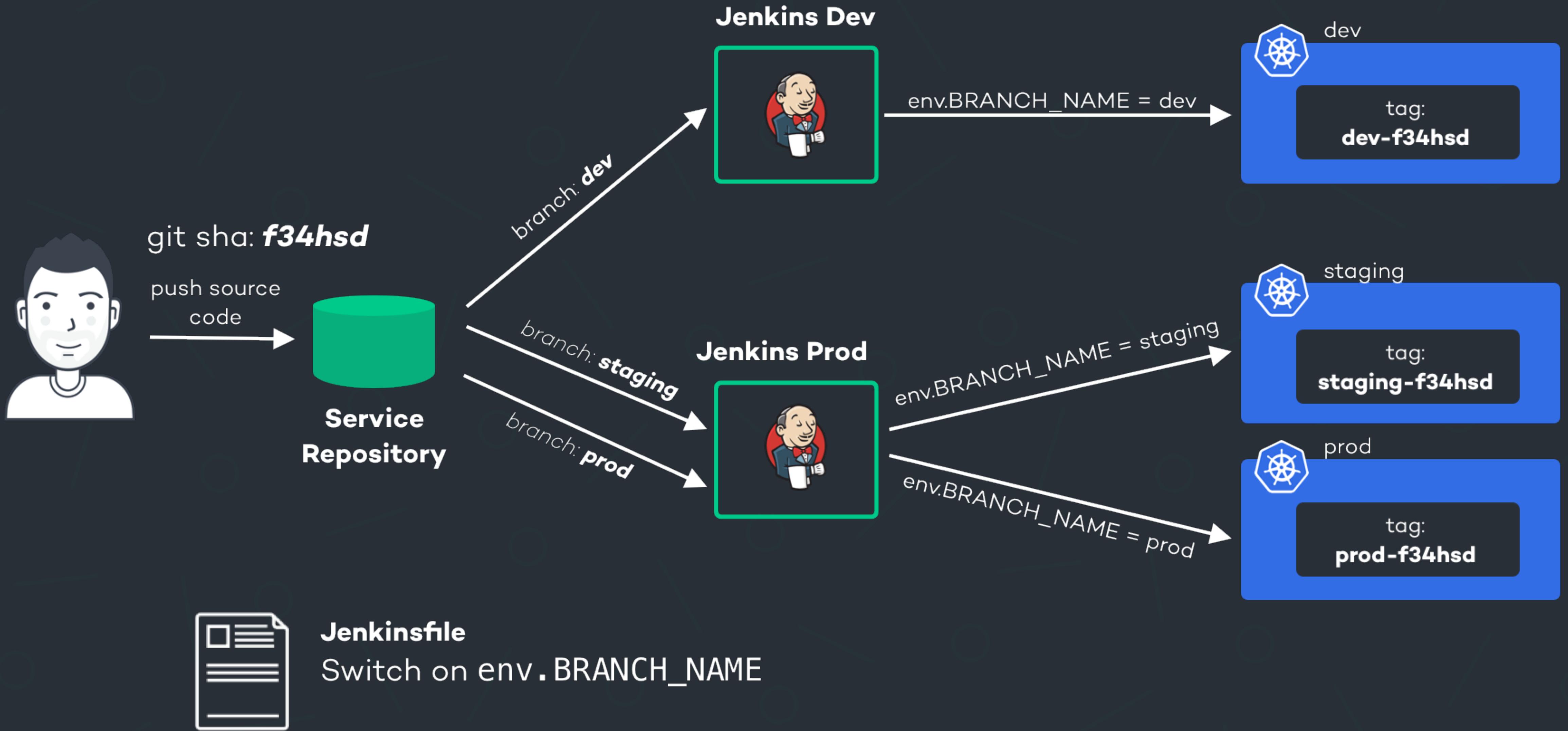
**shuttle run generate\_config**

**shuttle run secrets**

**shuttle run test**

**“Centralization of Dockerfiles,  
Pipelines, and Kubernetes  
resources was the key to  
unlock velocity for the  
platform team”**

**Next order of business.  
Release Management.**



# Problems?

Dynamic generation of k8s resources, resulted in **no audit trail**

...

No single source of truth for a **disaster recovery situation**

...

A lot of wasted time because of **duplicate builds**

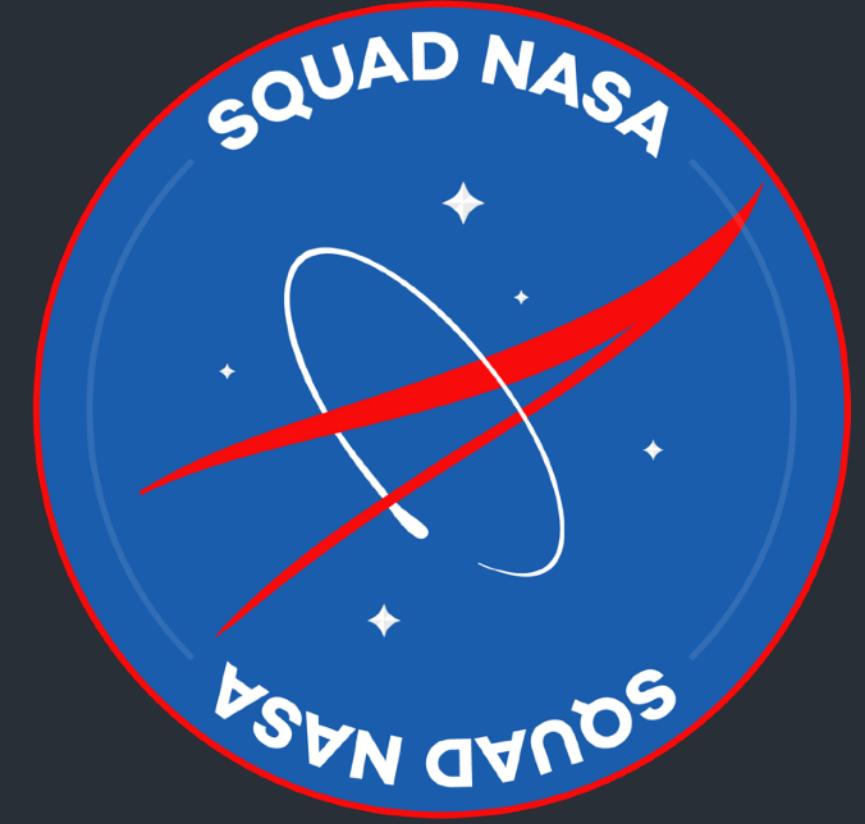


This guy looks really **innocent**



But, do you really **trust** him to have  
**the keys to your house?**

**“Continuous Integration (CI)  
and  
Continuous Deployment (CD)  
are two different concerns.”**

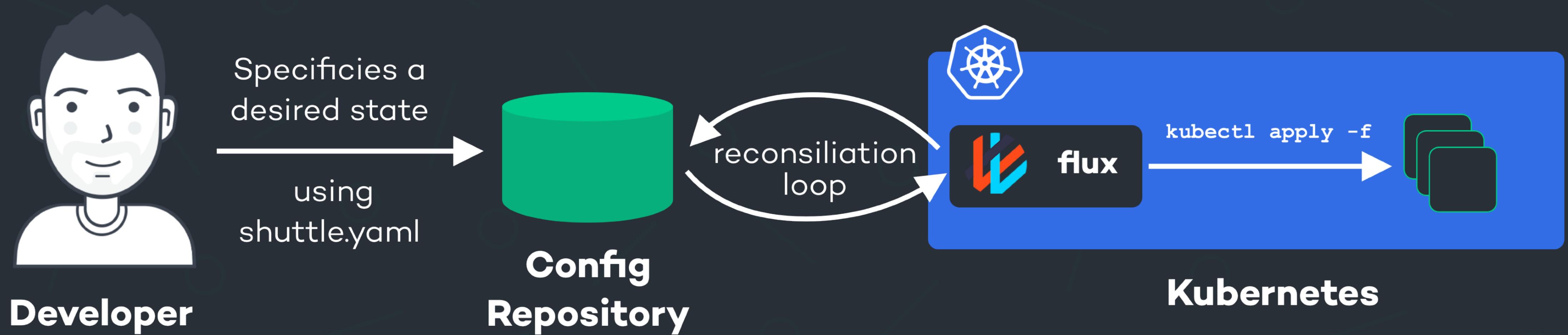


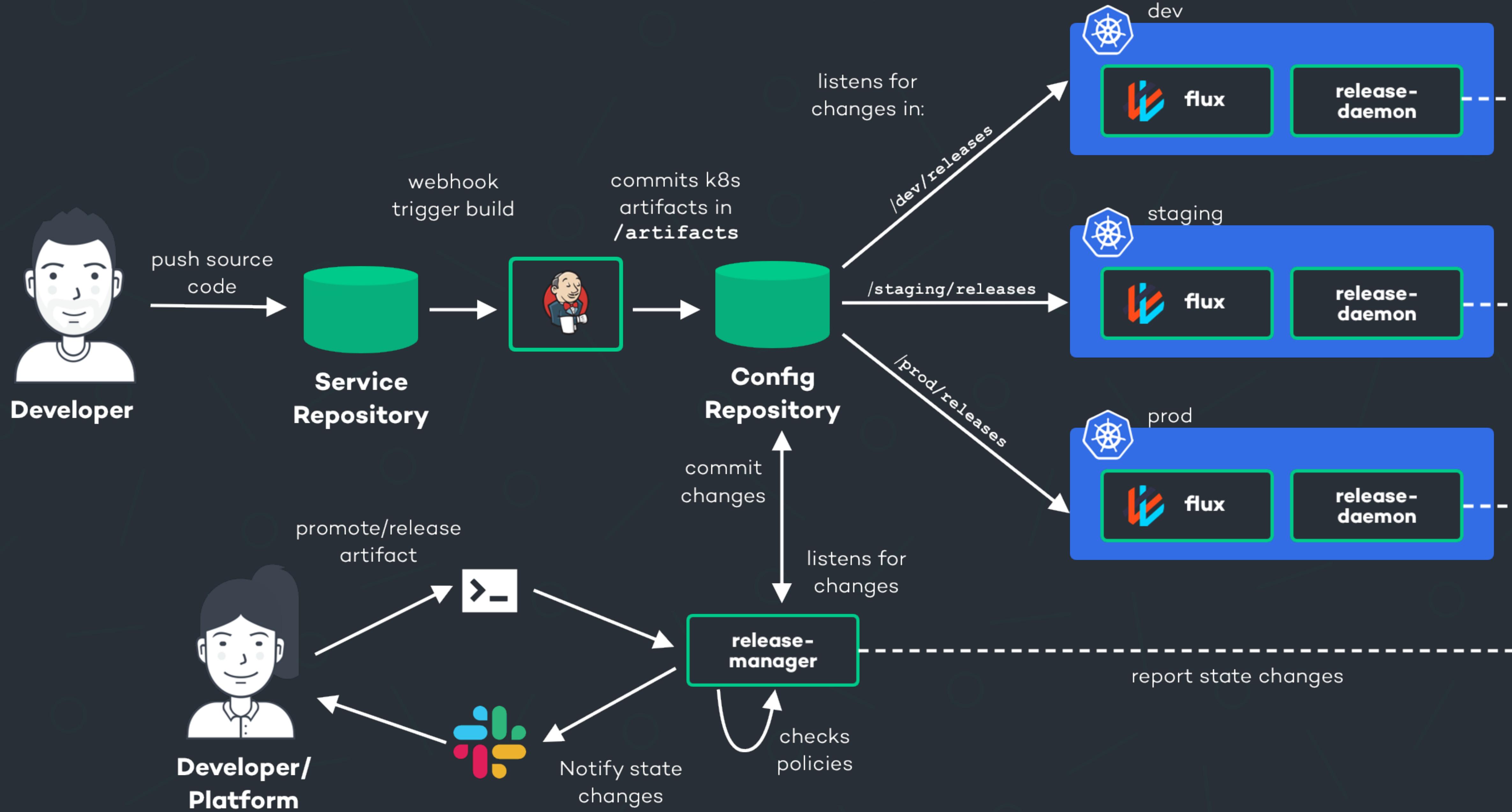
# Release Management

Meet Ham



# Using Git as the source of truth





# hamctl

(ham cuddle or ham c-t-l or ham control)

`hamctl promote --env dev`

`hamctl release --branch master --env dev`

`hamctl status`

`hamctl policy apply auto-release --branch master --env prod`



# Did it solve the problems?

Dynamic generation of k8s resources, resulted in no audit trail ✓

...

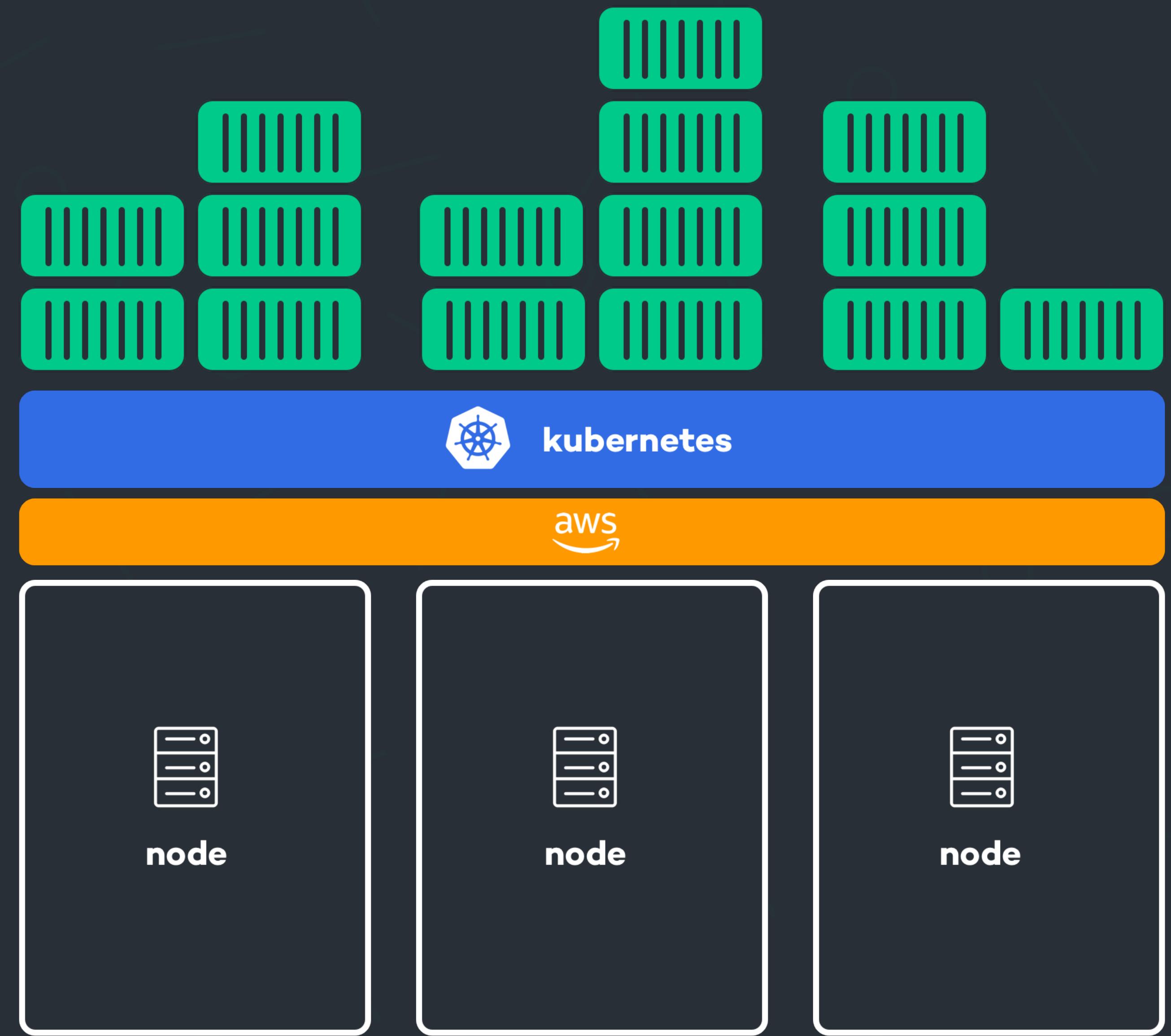
No single source of truth for a disaster recovery situation ✓

...

A lot of wasted time because of duplicate builds ✓

# Operations & Maintenance

Setup, and how to keep everything updated

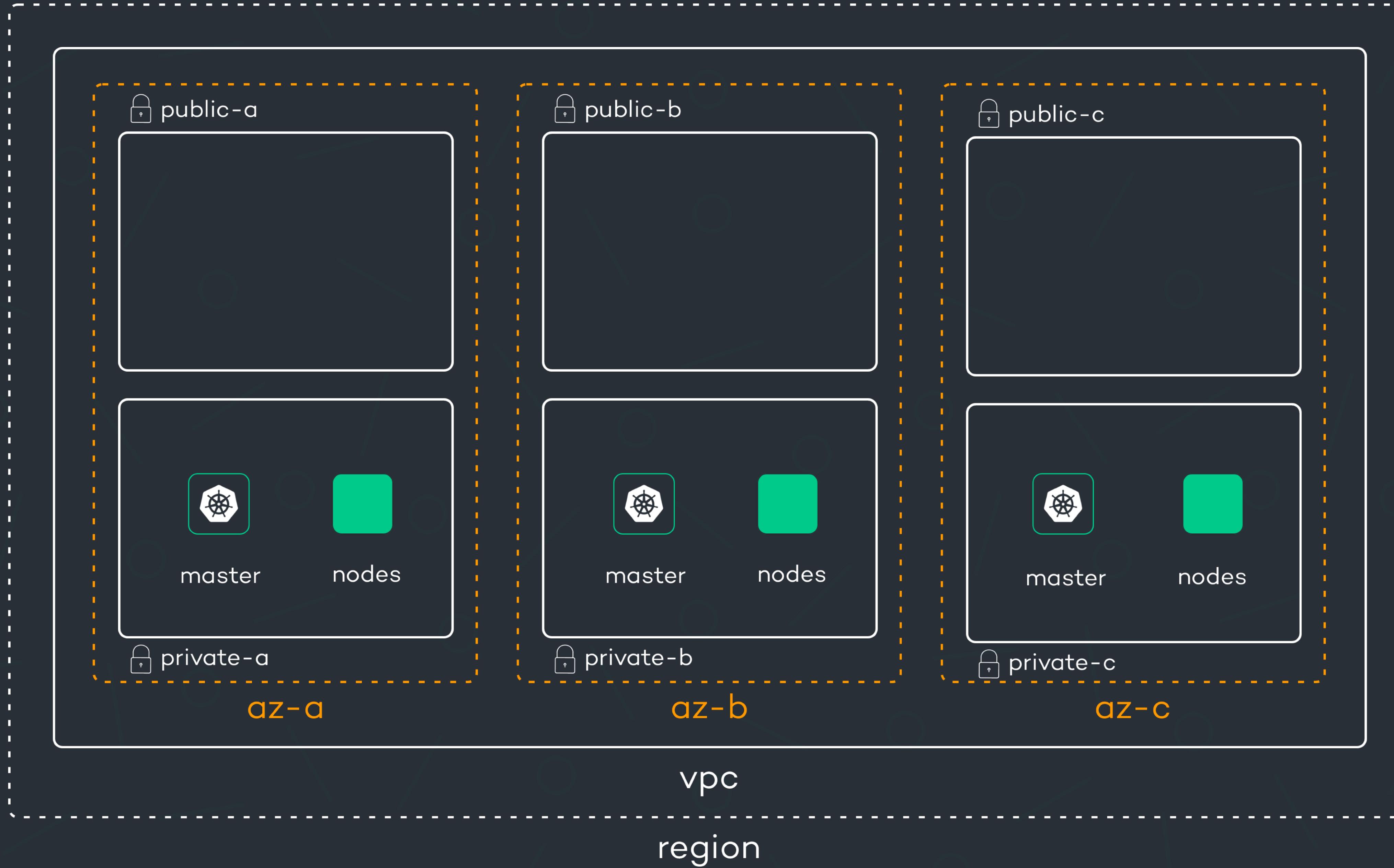


 **kops**

# kops is basically, kubectl for clusters

kops is a semi-managed solution primarily for AWS

```
$ export ZONES=${ZONES:-"eu-west-1a,eu-west-1b,eu-west-1c"}  
$ export KOPS_STATE_STORE="s3://my-state-store"  
  
$ kops create cluster k8s-clusters.example.com \  
  --node-count 3 \  
  --zones $ZONES \  
  --master-zones $ZONES \  
  --networking weave \  
  --topology private \  
  --bastion="true" \  
  --yes
```

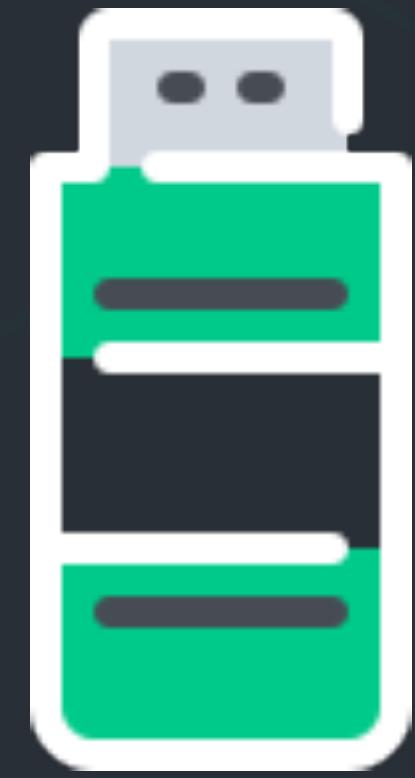


# kops

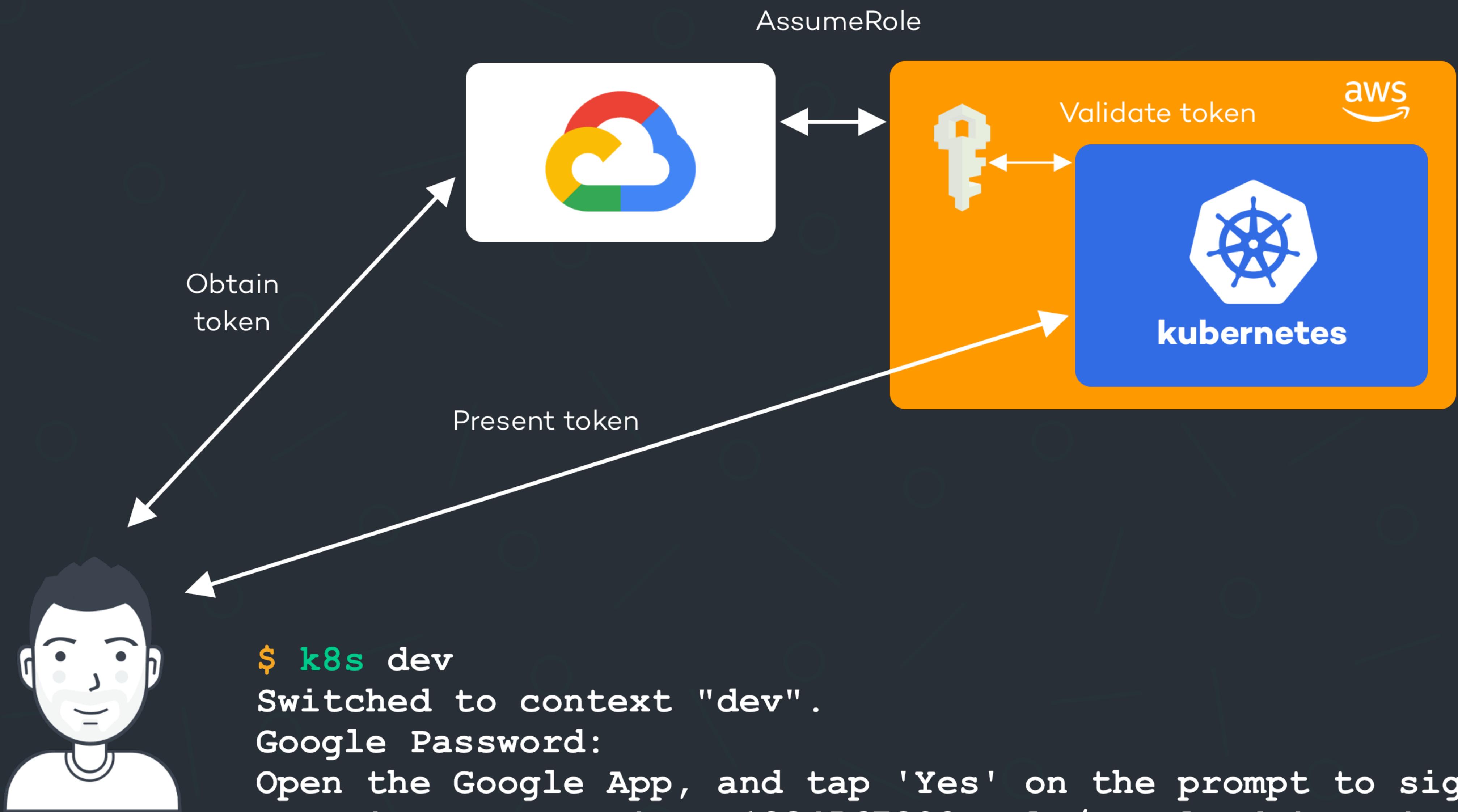
```
apiVersion: kops/v1alpha2
kind: InstanceGroup
metadata:
  creationTimestamp: 2019-06-13T10:17:11Z
  labels:
    kops.k8s.io/cluster: k8s.test.lunarway.com
  name: nodes
spec:
  image: kope.io/k8s-1.12-debian-stretch-amd64-hvm-ebs-2019-05-13
  machineType: m4.large
  maxSize: 3
  minSize: 3
  nodeLabels:
    kops.k8s.io/instancegroup: nodes
  role: Node
  subnets:
    - eu-west-1a
    - eu-west-1b
    - eu-west-1c
```

# cluster-api

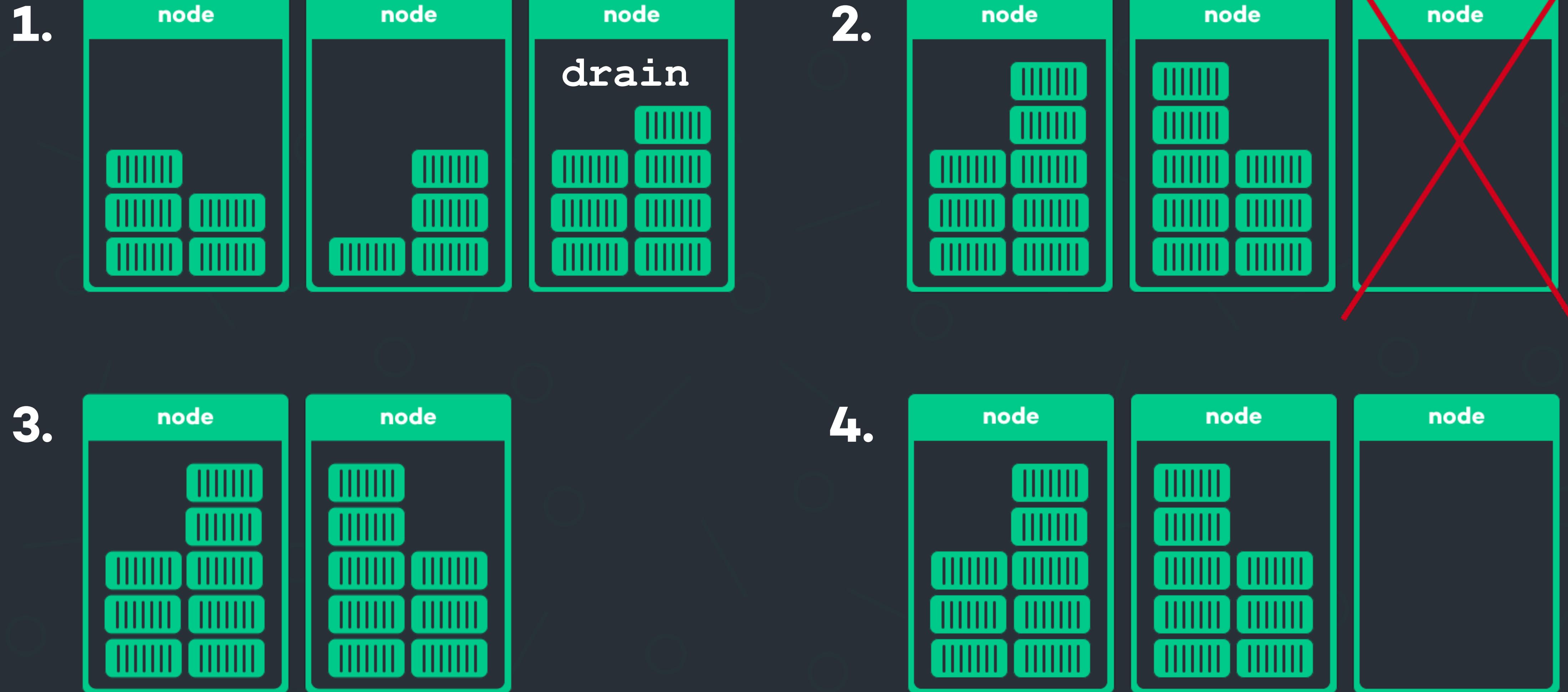
```
apiVersion: "cluster.k8s.io/v1alpha1"
kind: MachineDeployment
metadata:
  name: sample-machinedeployment
spec:
  replicas: 3
  selector:
    matchLabels:
      foo: bar
  template:
    metadata:
      labels:
        foo: bar
    spec:
      providerSpec:
        value:
          apiVersion: "gceproviderconfig/v1alpha1"
          kind: "GCEProviderConfig"
          roles:
            - Node
          project: "${GCLOUD_PROJECT}"
          zone: "us-central1-c"
          machineType: "n1-standard-2"
          os: "ubuntu-1604-lts"
      versions:
        kubelet: 1.9.4
```



# Accessing the clusters?



# kops rolling-update cluster



# Problems?

Congestion on nodes because of **docker pull**

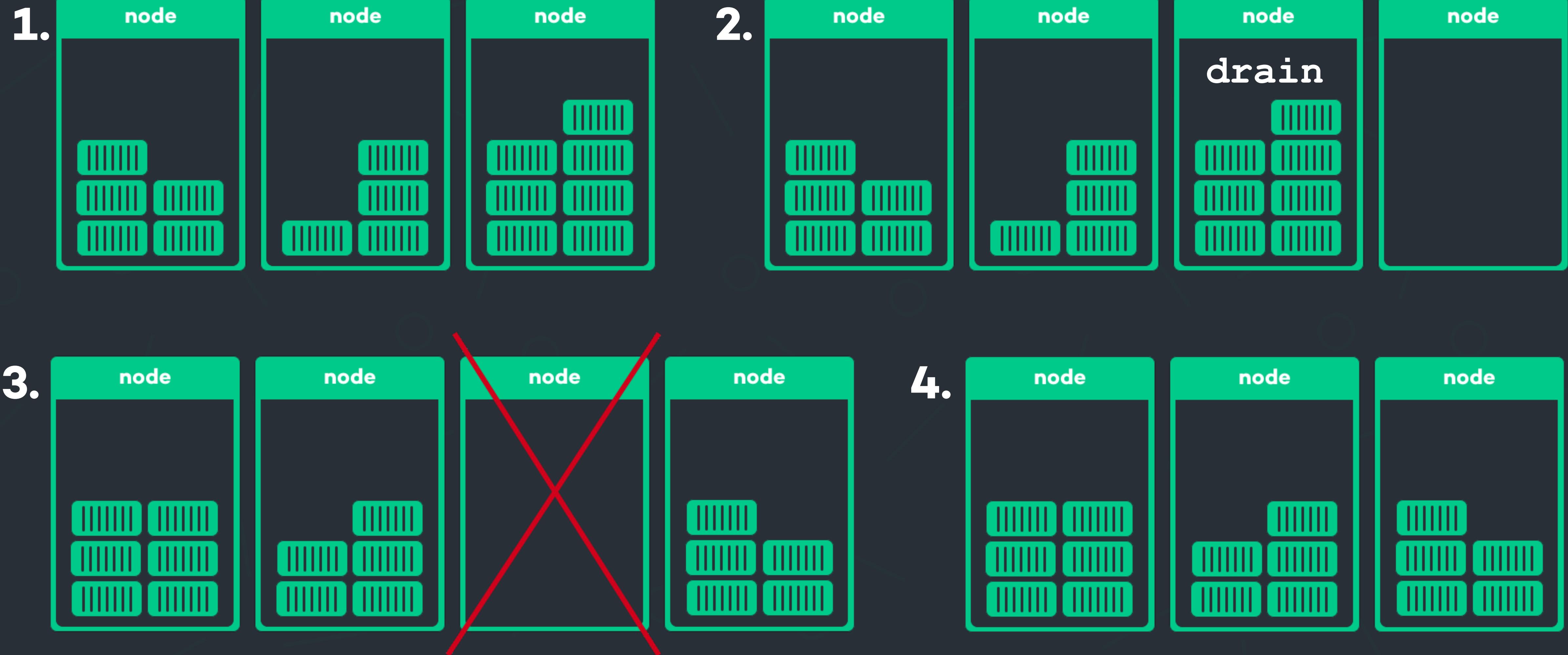
...

Under **provisioned** cluster

...

**Rebalancing** needed after roll, to spread and fill empty node

# dextre roll nodes



# Did it solve the problems?

Congestion on nodes because of `docker pull` ✓

...

Under provisioned cluster ✓

...

Rebalancing needed after roll, to spread and fill empty node ✓

# **So, was Kubernetes the right decision, despite our size?**

Yes, we wouldn't have been able to manage all those services without it.

**“Adopting **Kubernetes** is not just adopting another piece of software, it’s **introducing a new culture**”**

**”Kubernetes is the **foundation**  
on which we build”**

**”Kubernetes is not a destination. It’s part of the journey”**

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Bryan Liles, CloudNativeCon+KubeCon Europe 2019

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Thank you!  
Questions?

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[jobs.lunarway.com](http://jobs.lunarway.com)