SUMMIT

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KUB302

Increase resiliency using cell-based Amazon EKS architecture

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Life360

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Agenda

Amazon EKS

How things work in Amazon EKS

Life360 Amazon EKS journey

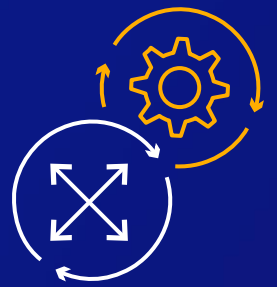
Cell-based Amazon EKS architecture

What is Amazon EKS?

What do our customers want?

Get to
market faster

Lower total cost
of ownership



High performance
and scalability

Security and
isolation by design

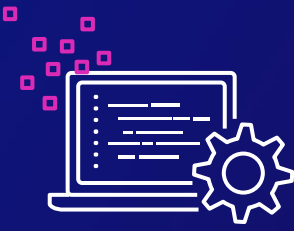
What is Amazon EKS?

Security first

Built for production

Seamless cloud integrations

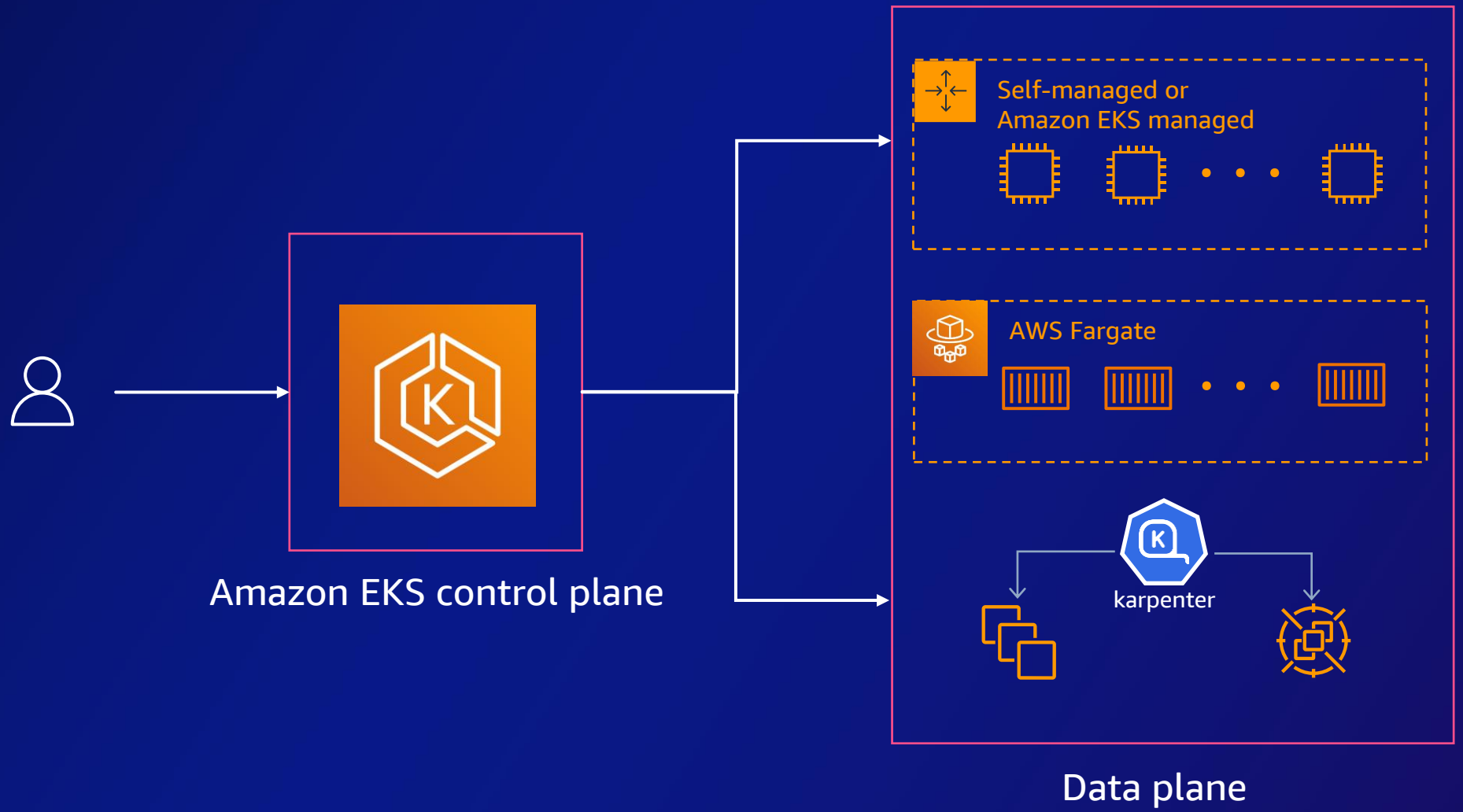
Native and upstream



Committed to open source

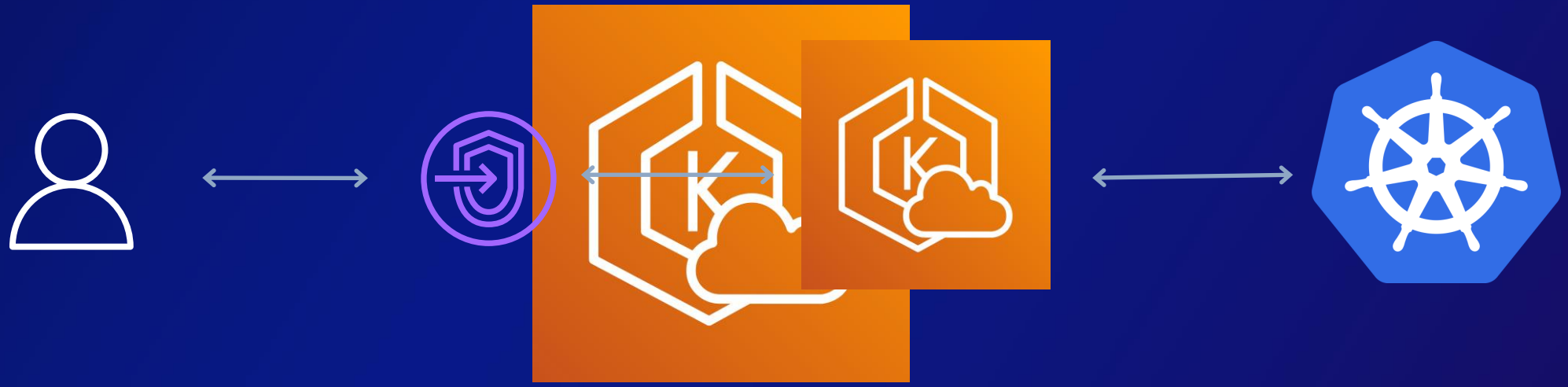
AWS **makes it easy to run Kubernetes**; with Amazon EKS, you can build **reliable**, **stable**, and **secure** applications in any environment.

Amazon EKS architecture

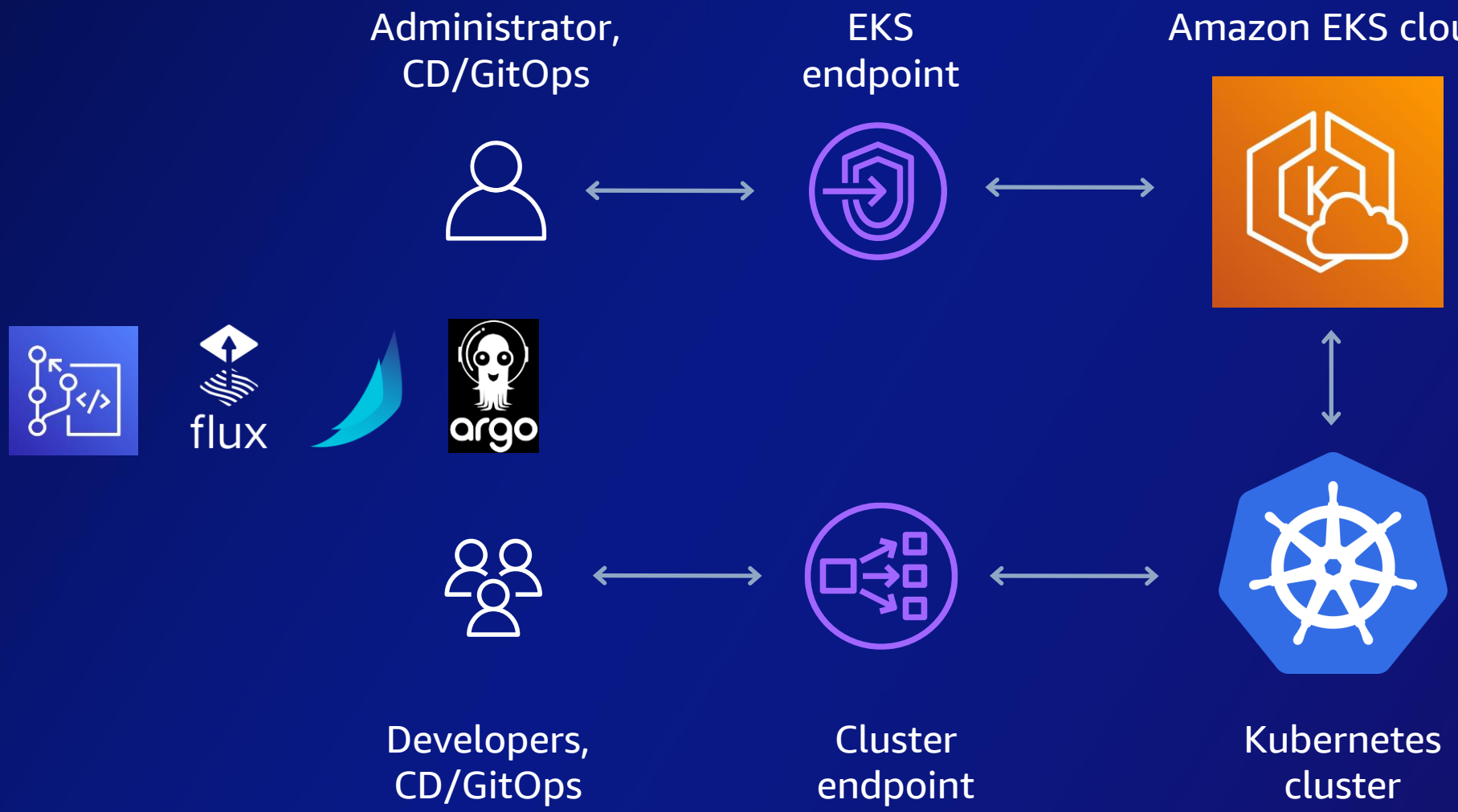


How things work in Amazon EKS

Amazon EKS and Kubernetes overview



Amazon EKS and Kubernetes overview



Amazon EKS and Kubernetes overview

EKS regional endpoint
eks.us-west-2.amazonaws.com

- $ aws eks list-clusters
- $ aws eks create-cluster --name prod <…>
- $ aws eks describe-cluster --name prod
- $ aws eks get-token --cluster-name prod
- $ aws eks create-nodegroup --cluster-name prod --nodegroup-name frontend <…>

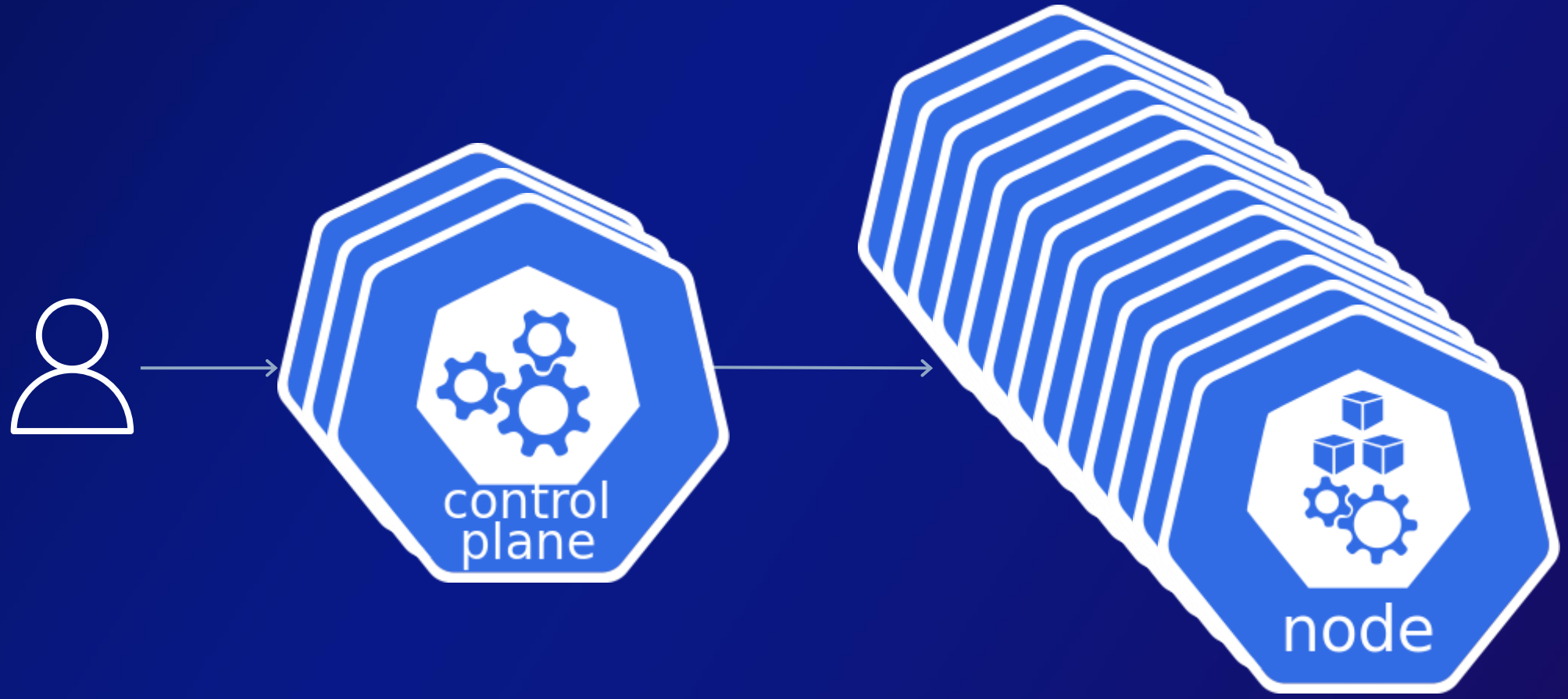
Single-cluster API server NLB endpoint
https://1122334455667788OOAABB.gr7.us-west-2.eks.amazonaws.com

```
$ kubectl apply -f my_application.yml
$ kubectl describe nodes my-node
$ kubectl get pods --all-namespaces
$ kubectl exec --stdin --tty my-pod -- /bin/sh
$ kubectl create deployment nginx --image=nginx
$ kubectl rollout restart deployment/frontend
```

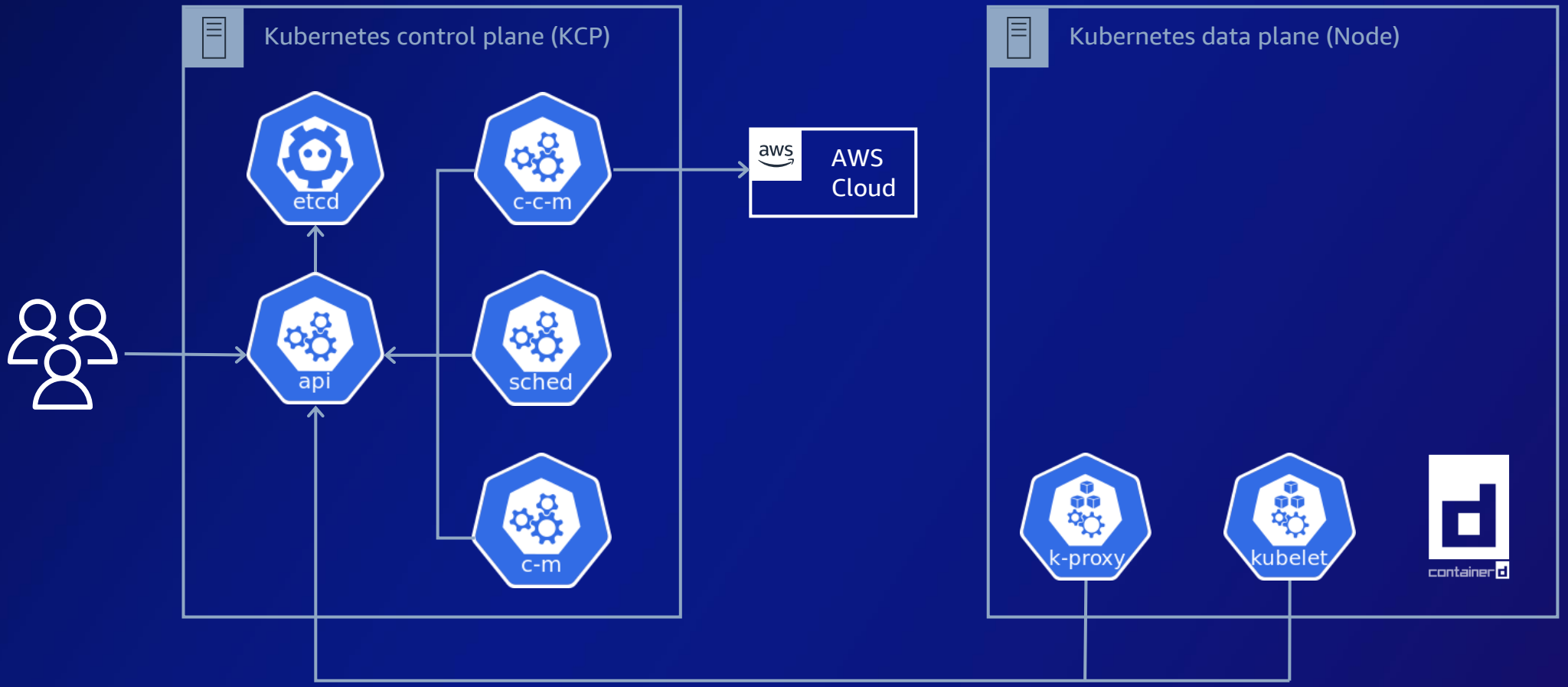
Amazon EKS cluster control plane

Kubernetes high-level overview

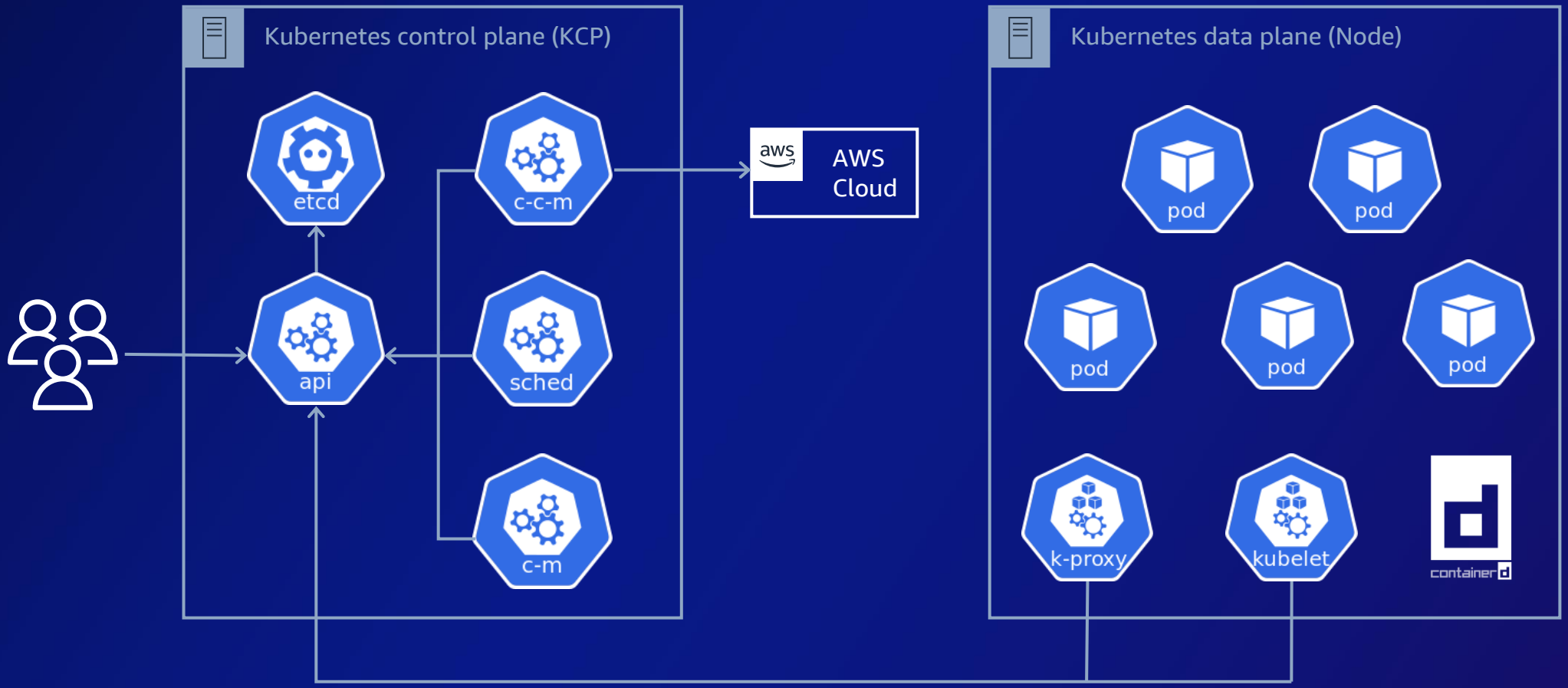
Kubernetes high-level overview



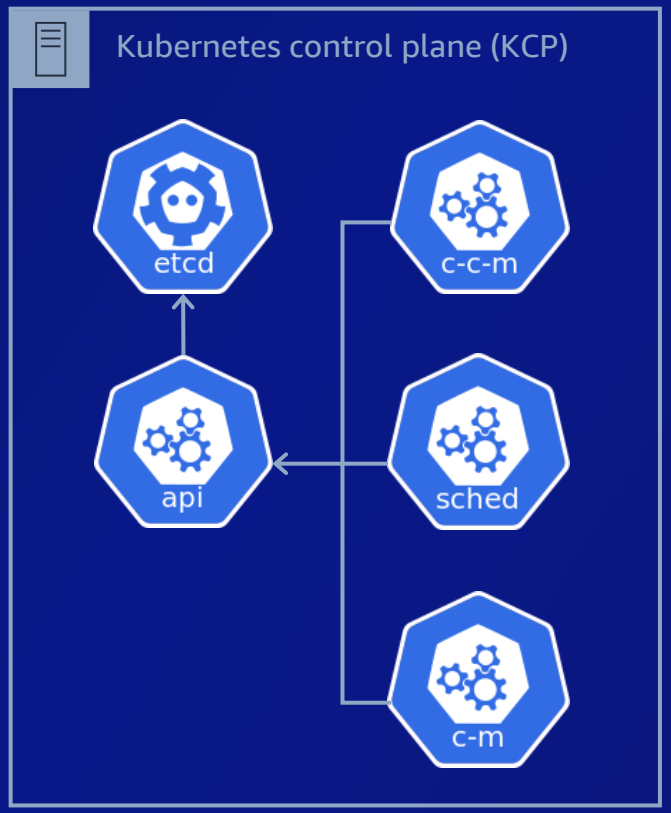
Kubernetes high-level overview



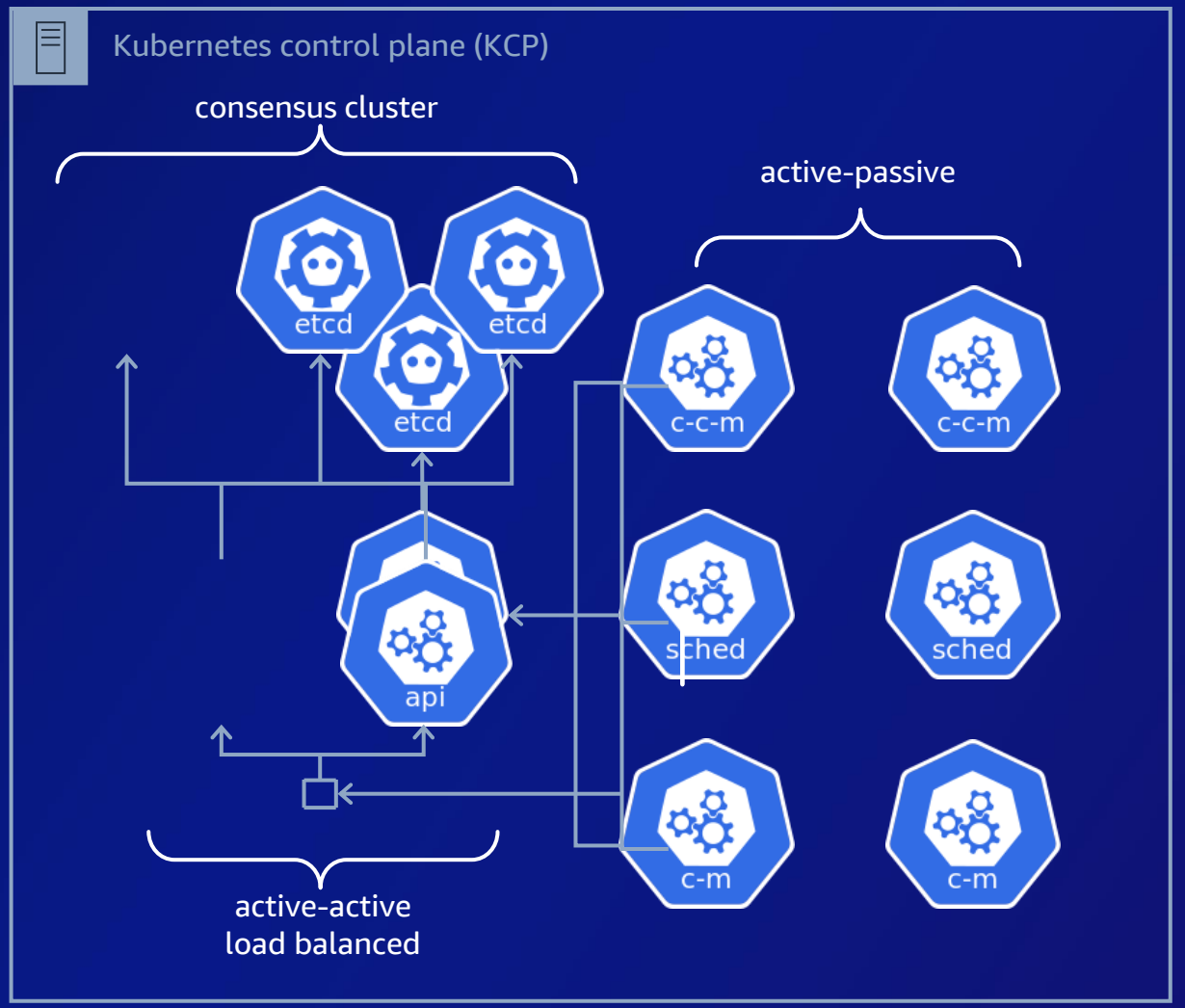
Kubernetes high-level overview



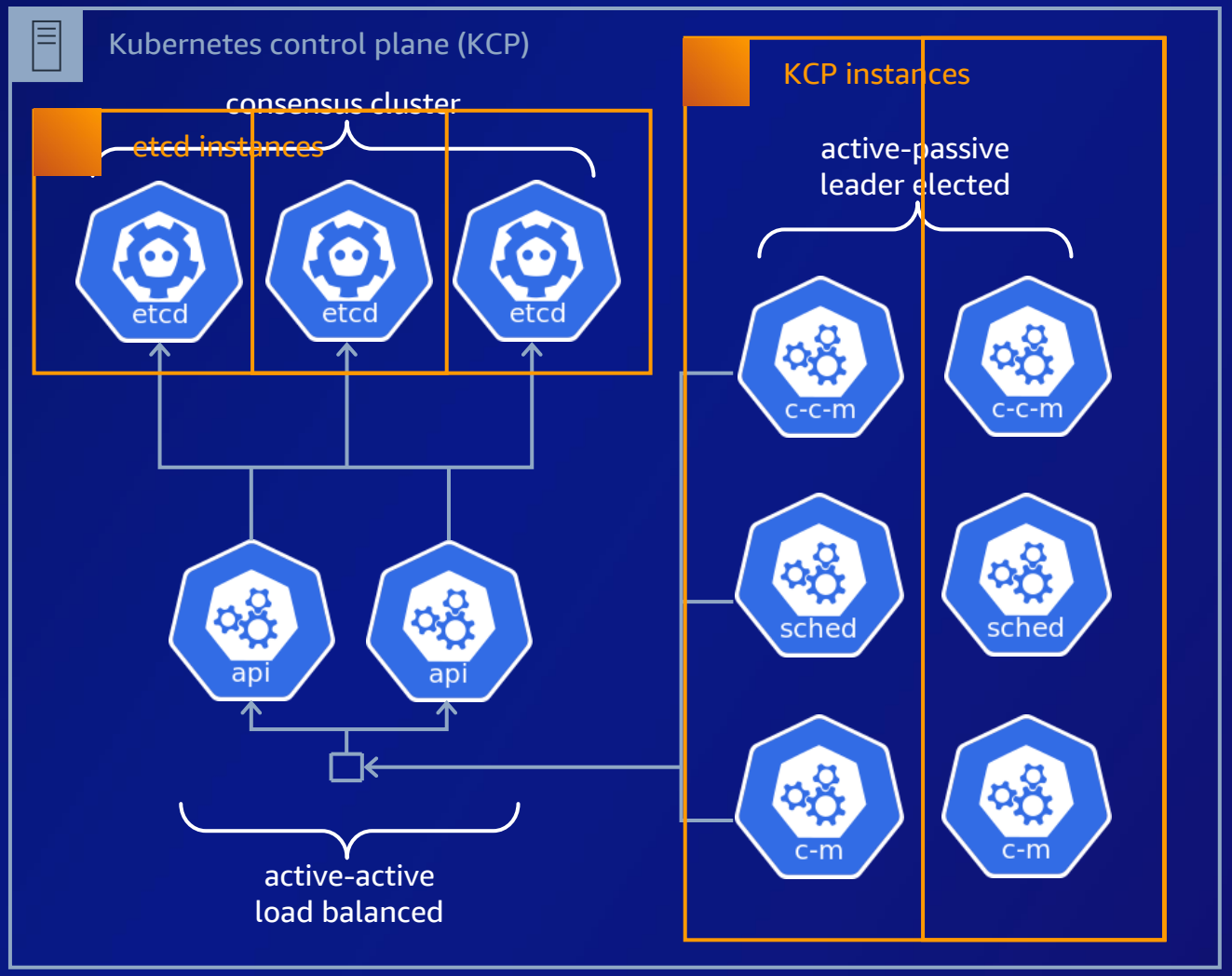
Kubernetes high-level overview



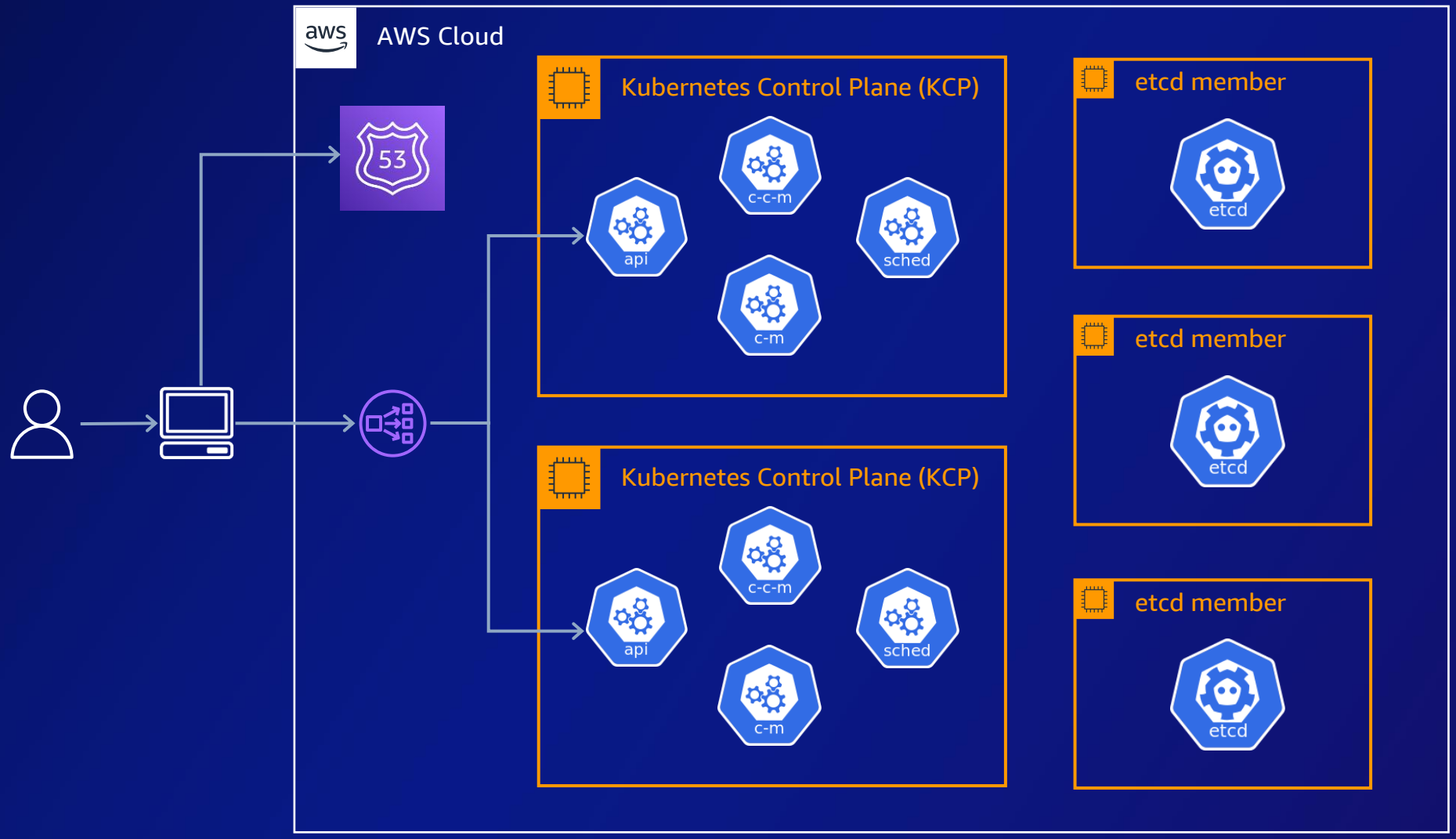
Kubernetes high-level overview



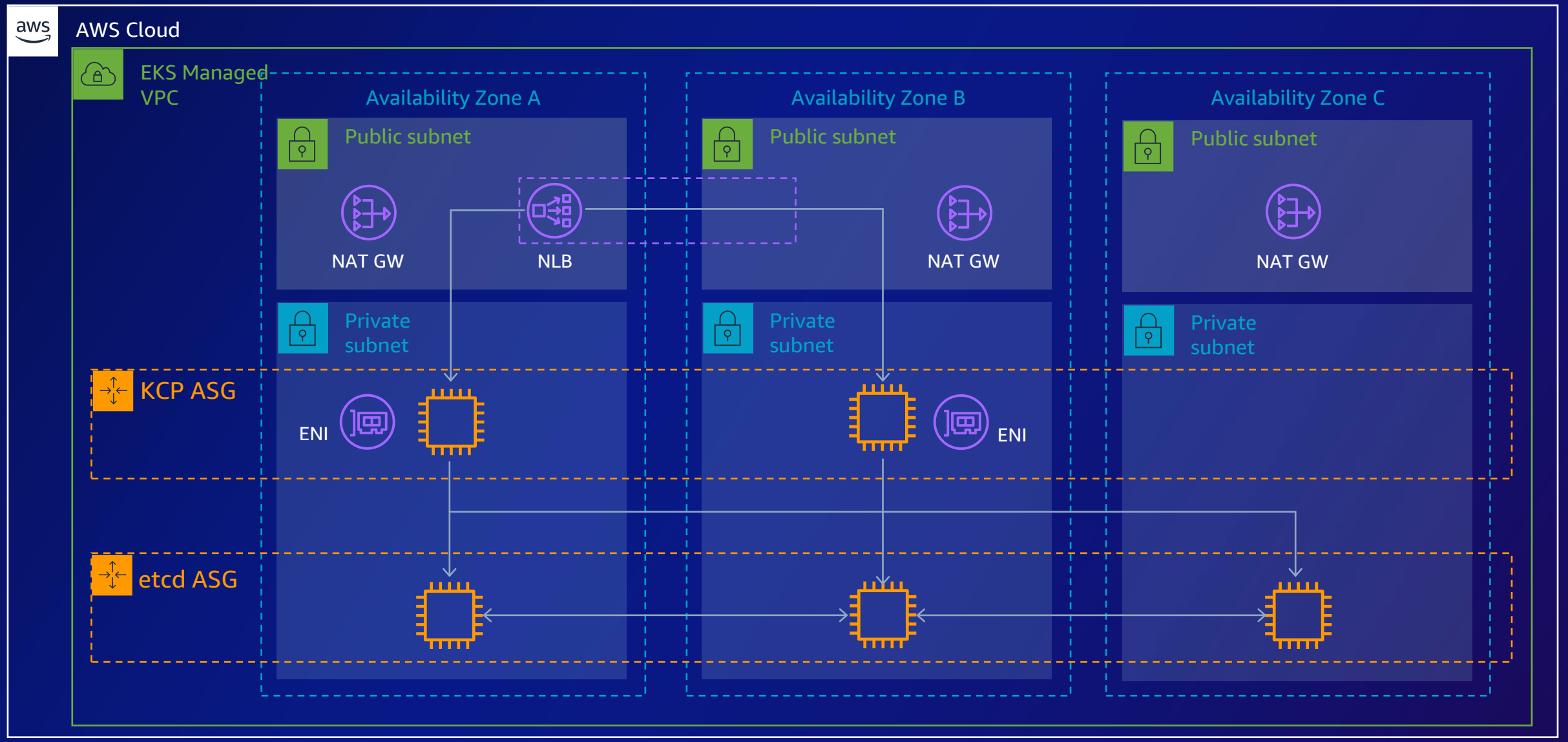
Kubernetes high-level architecture in EKS



EKS high-level architecture – Control Plane

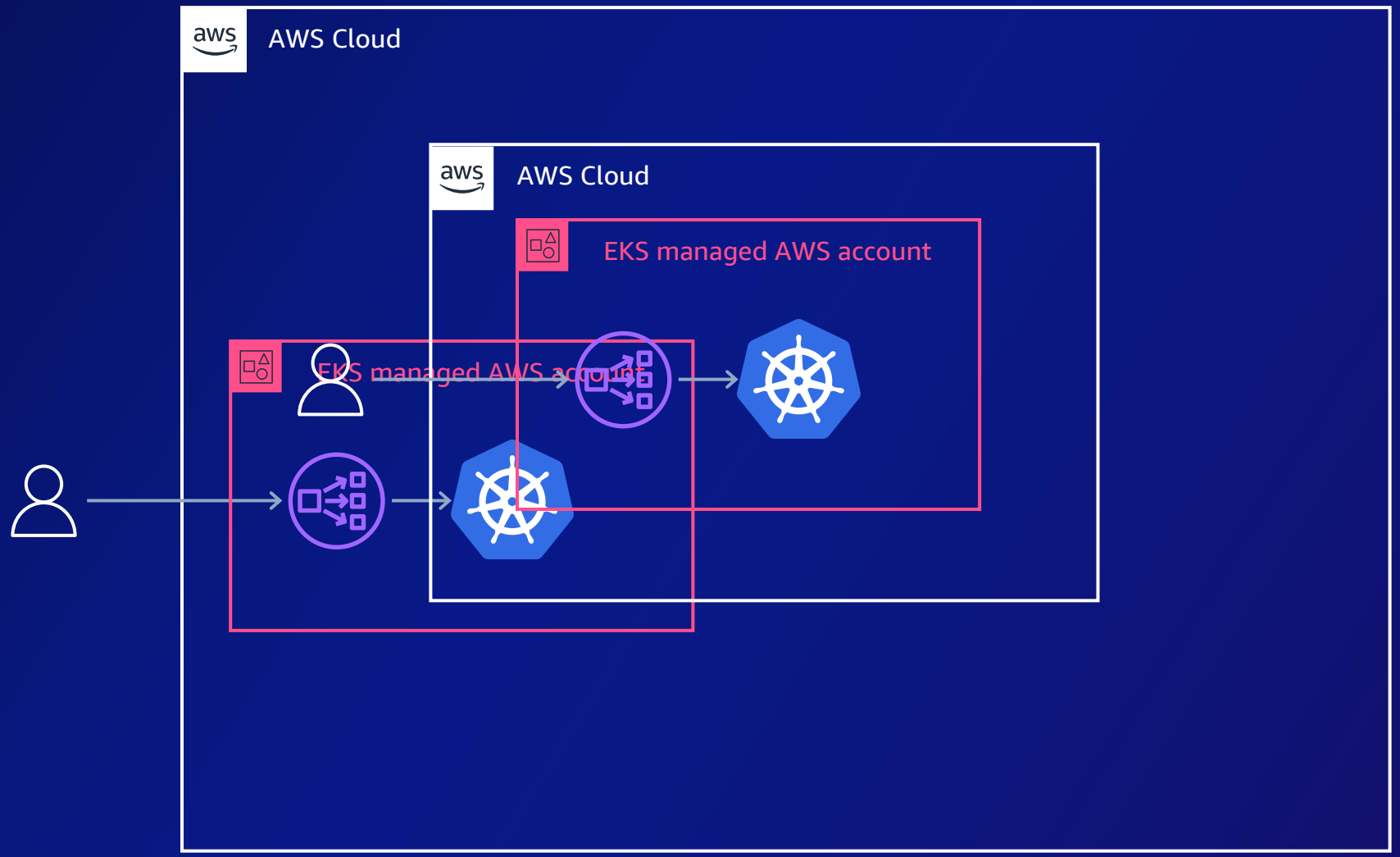


EKS architecture – Control plane

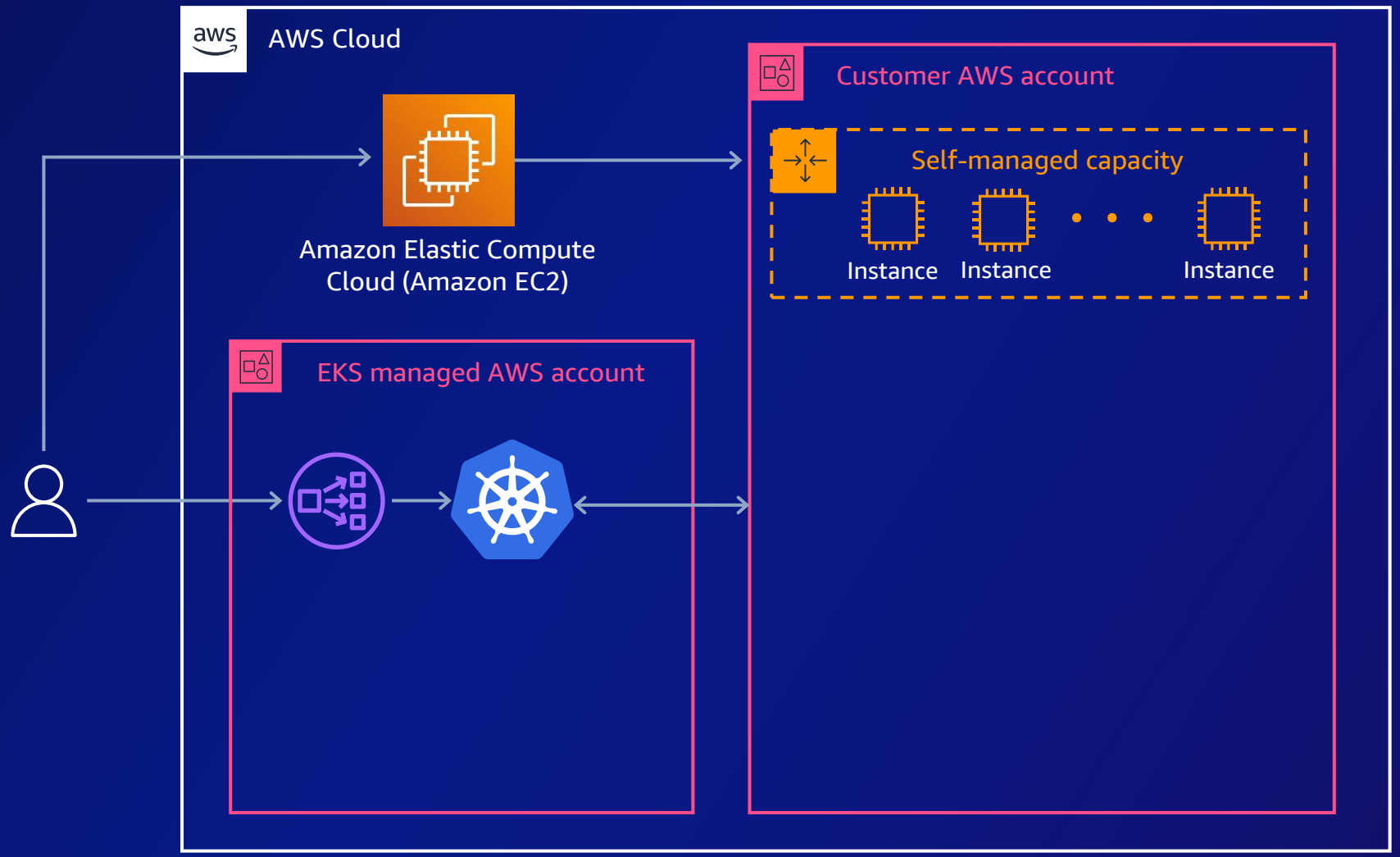


Amazon EKS data plane

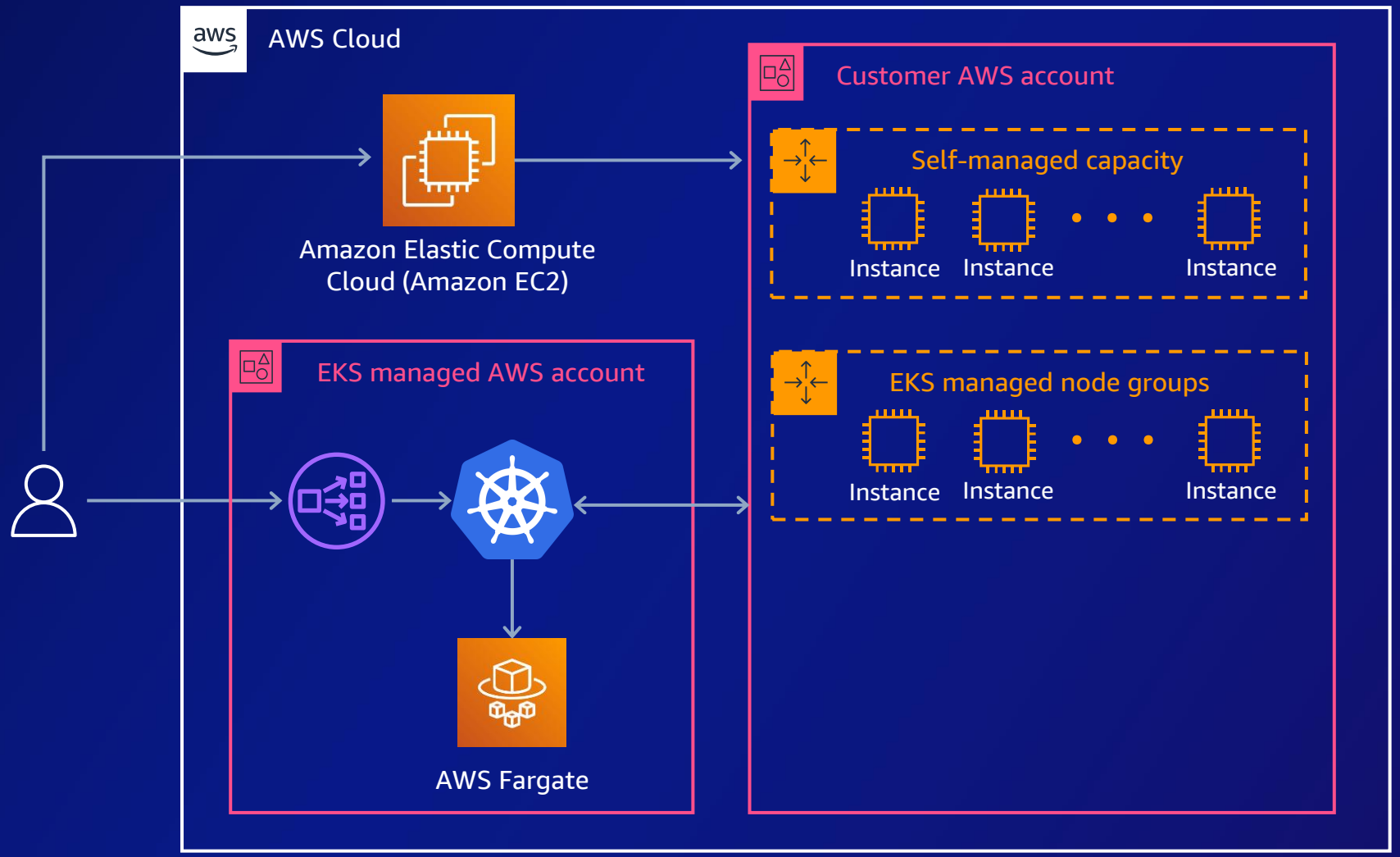
EKS high-level architecture – Control plane



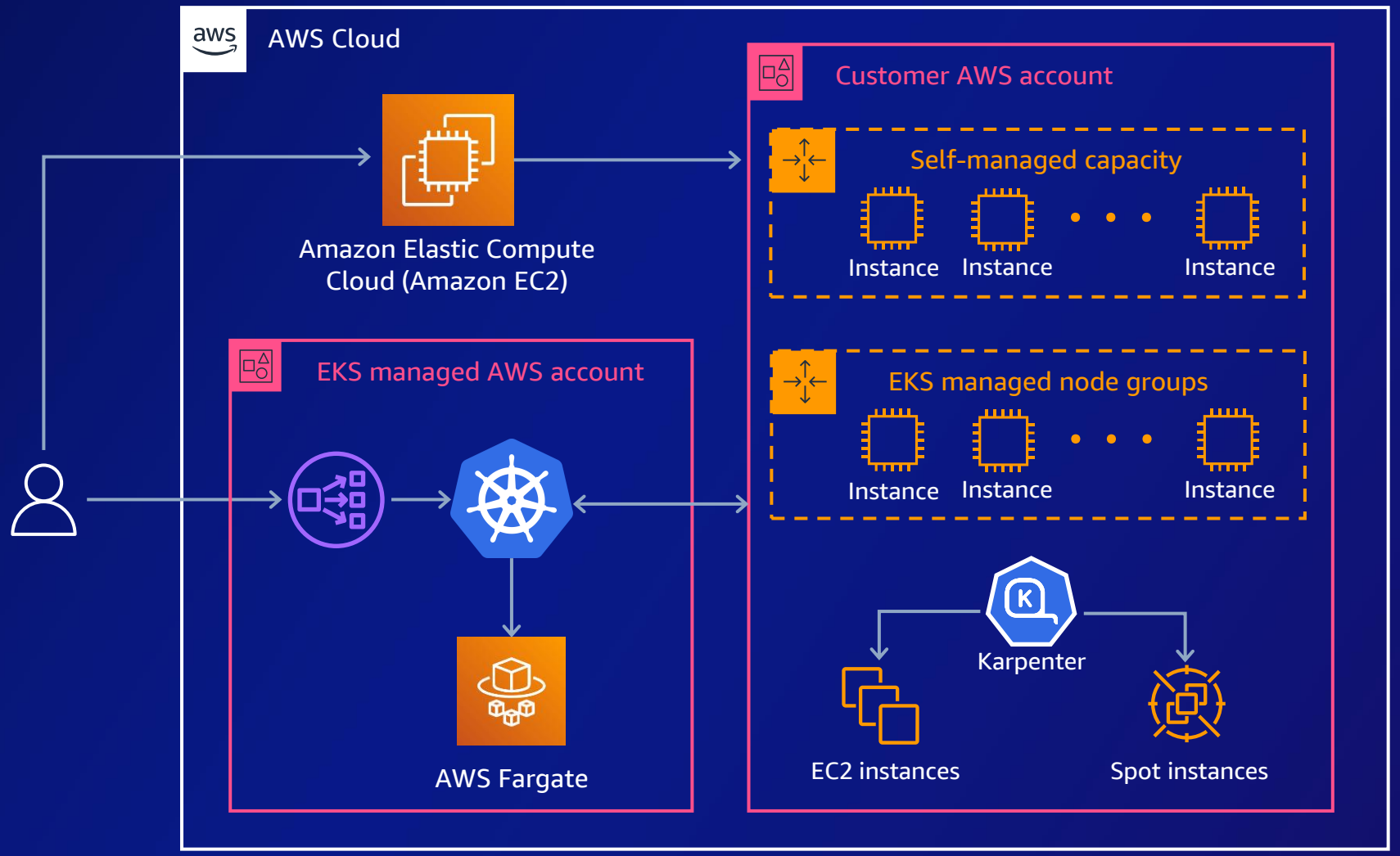
EKS high-level architecture – Data plane



EKS high-level architecture – Data plane

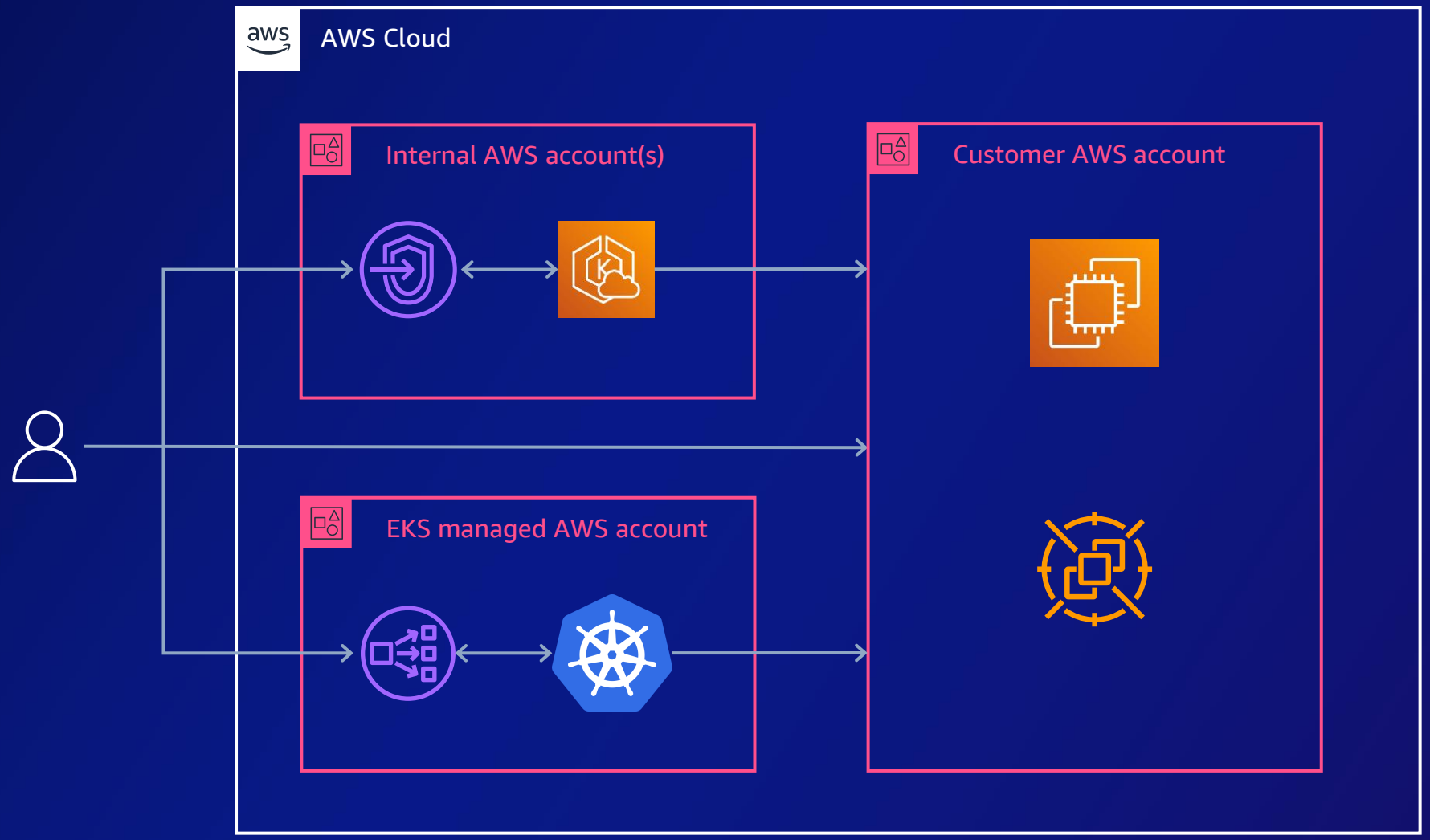


EKS high-level architecture – Data plane



Amazon EKS failure domains with statically stable pattern

Independent failure domains



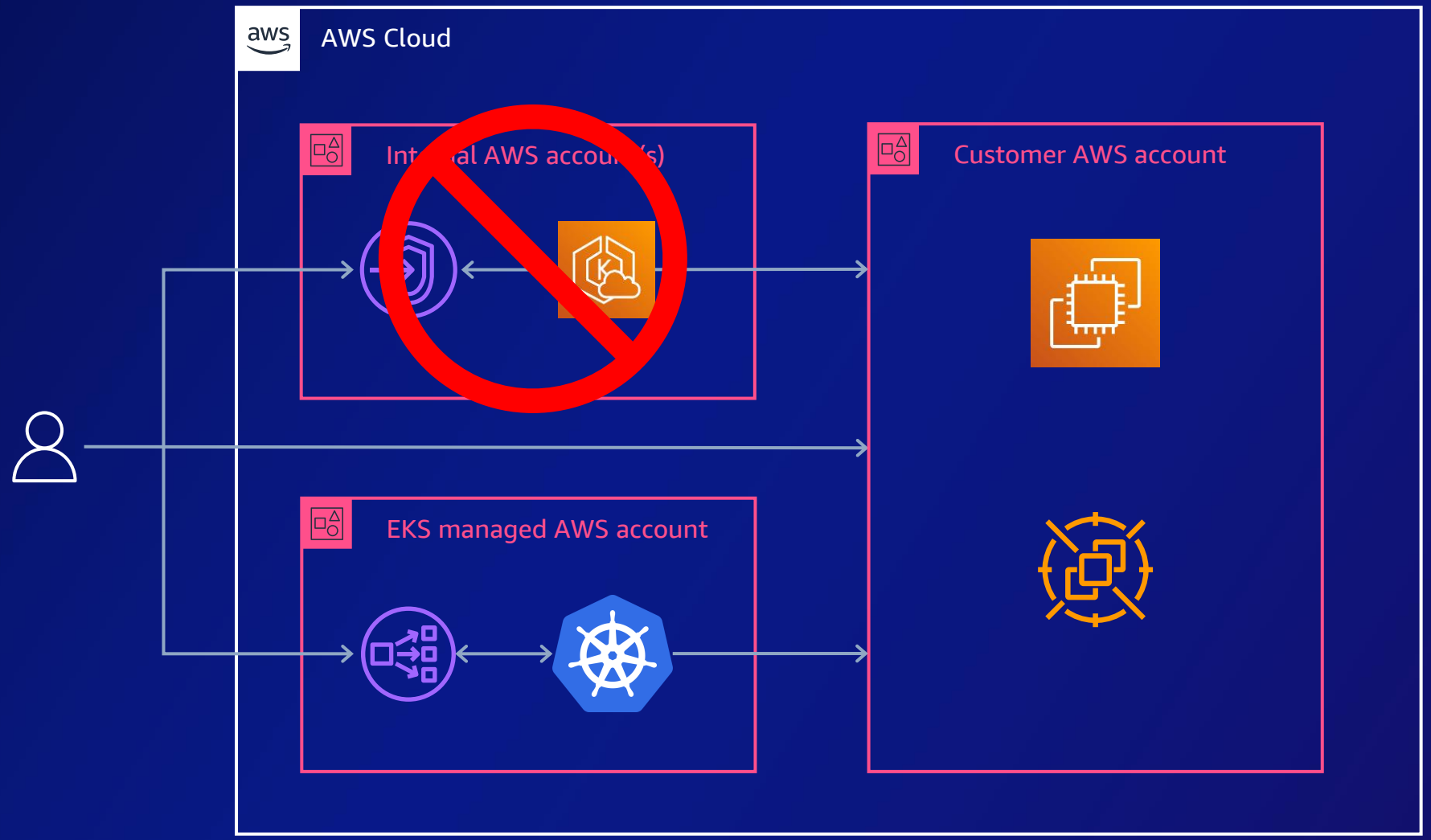
Statically stable design pattern

> "In a statically stable design, the overall system keeps working when a dependency becomes impaired."

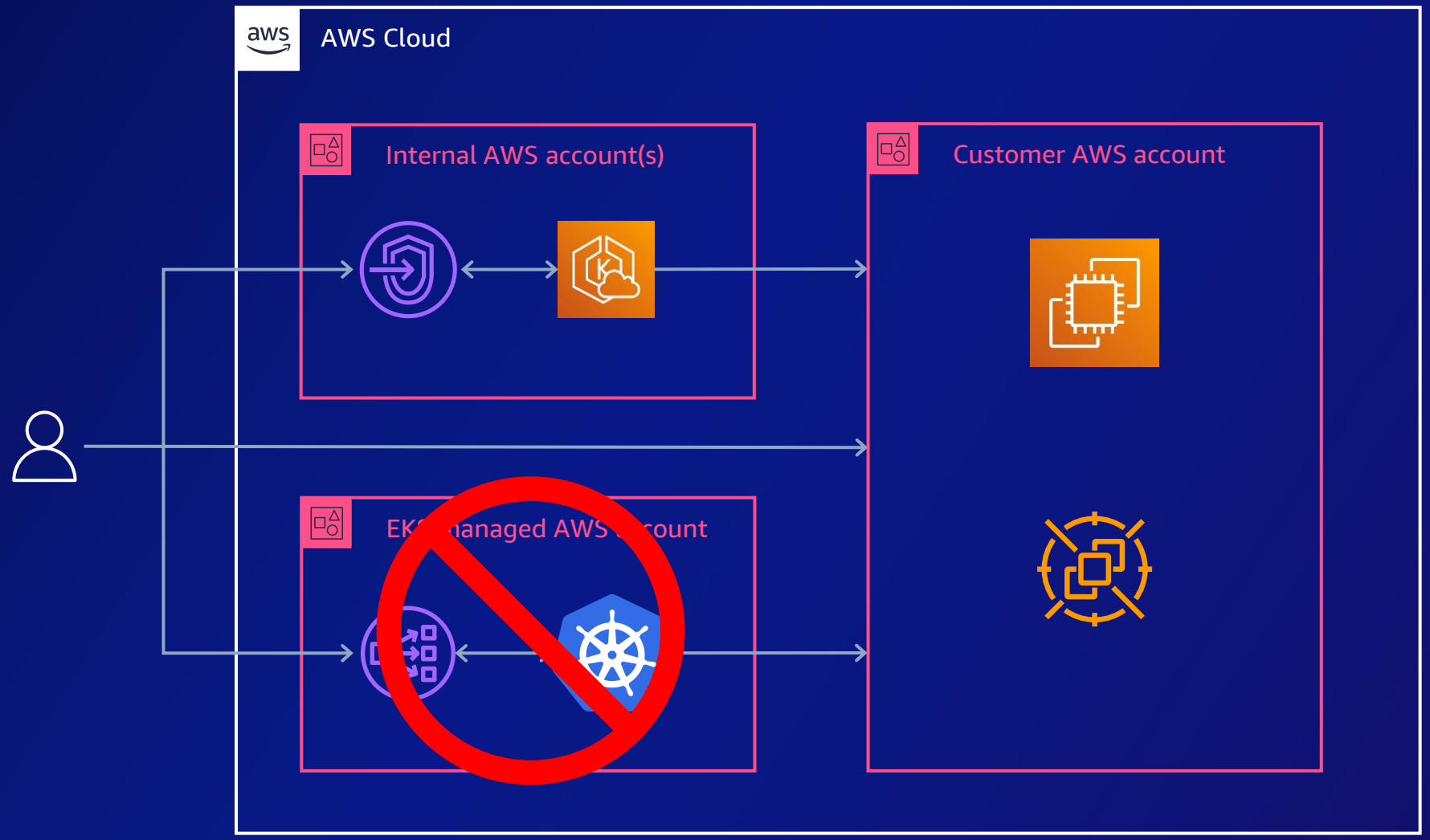
Mike Furr and Becky Weiss

AWS Sr. Principal Engineers

Independent failure domains



Independent failure domains



Life360 Amazon EKS journey

Life360

Life360 is on a mission to simplify safety so families can live fully

Our features and services protect and connect

- Loved ones
- Pets
- Important belongings

- Life360 family of apps

- Life360 mobile app
- Jiobit GPS trackers
- Tile Bluetooth trackers

Life360

Largest family social network

- 1 in 9 US families use Life360
- 50.8+ million MAU global
- Families in 195+ countries use Life360
- Top charts of Apple App Store and Google Play store – Top 50

Reach and impact to our members

Life360 tracked **469 billion** miles driven worldwide in 2022 – almost half of those miles were protected with Crash Detection!

90 billion locations collected each week – Life360 sent over **50 billion** place alerts

26 billion safe arrival notifications

13.6 million tiles sent **700 billion** location updates

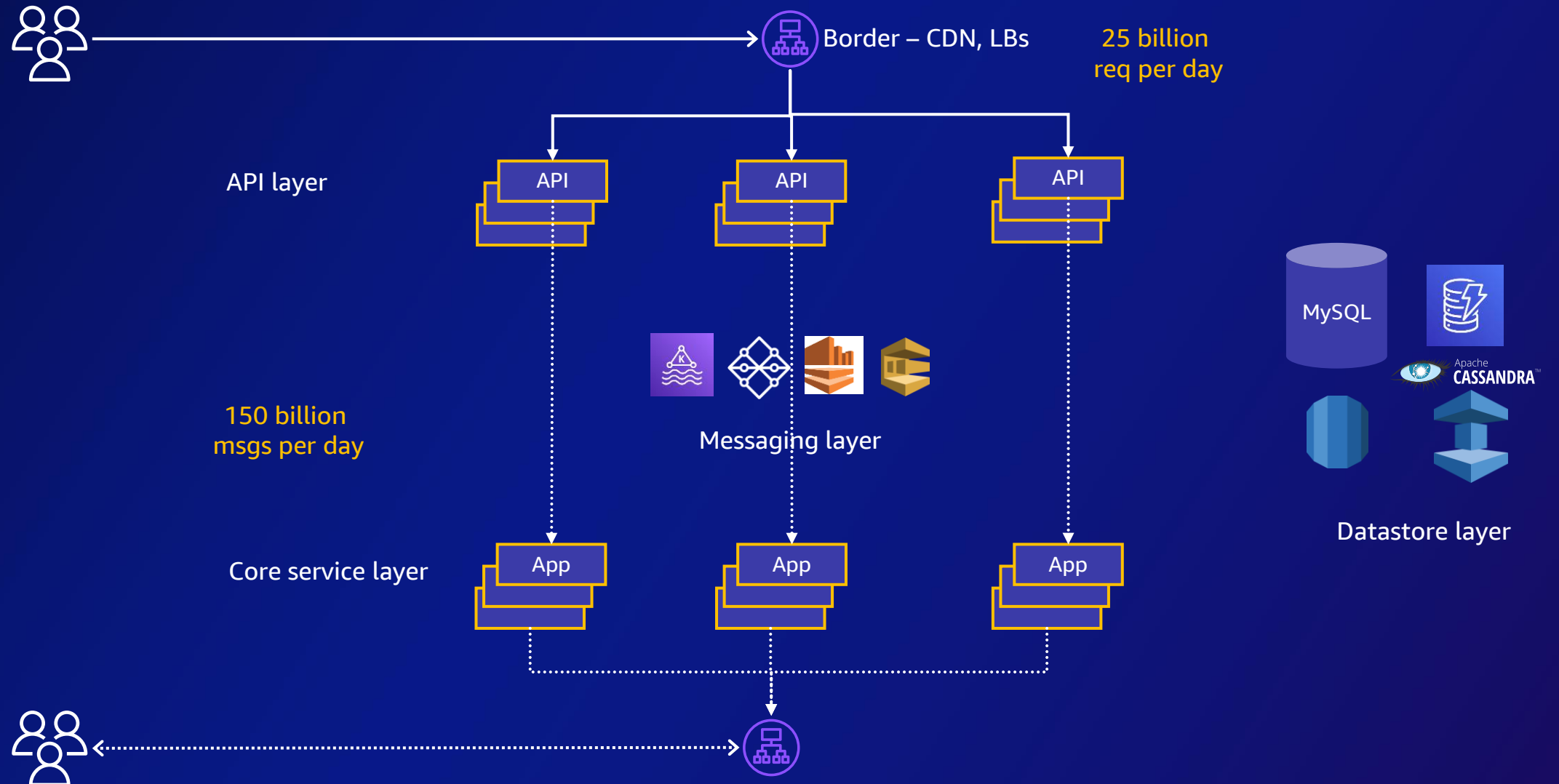
17 million tile “items left behind” smart alerts

Reach and impact to our members

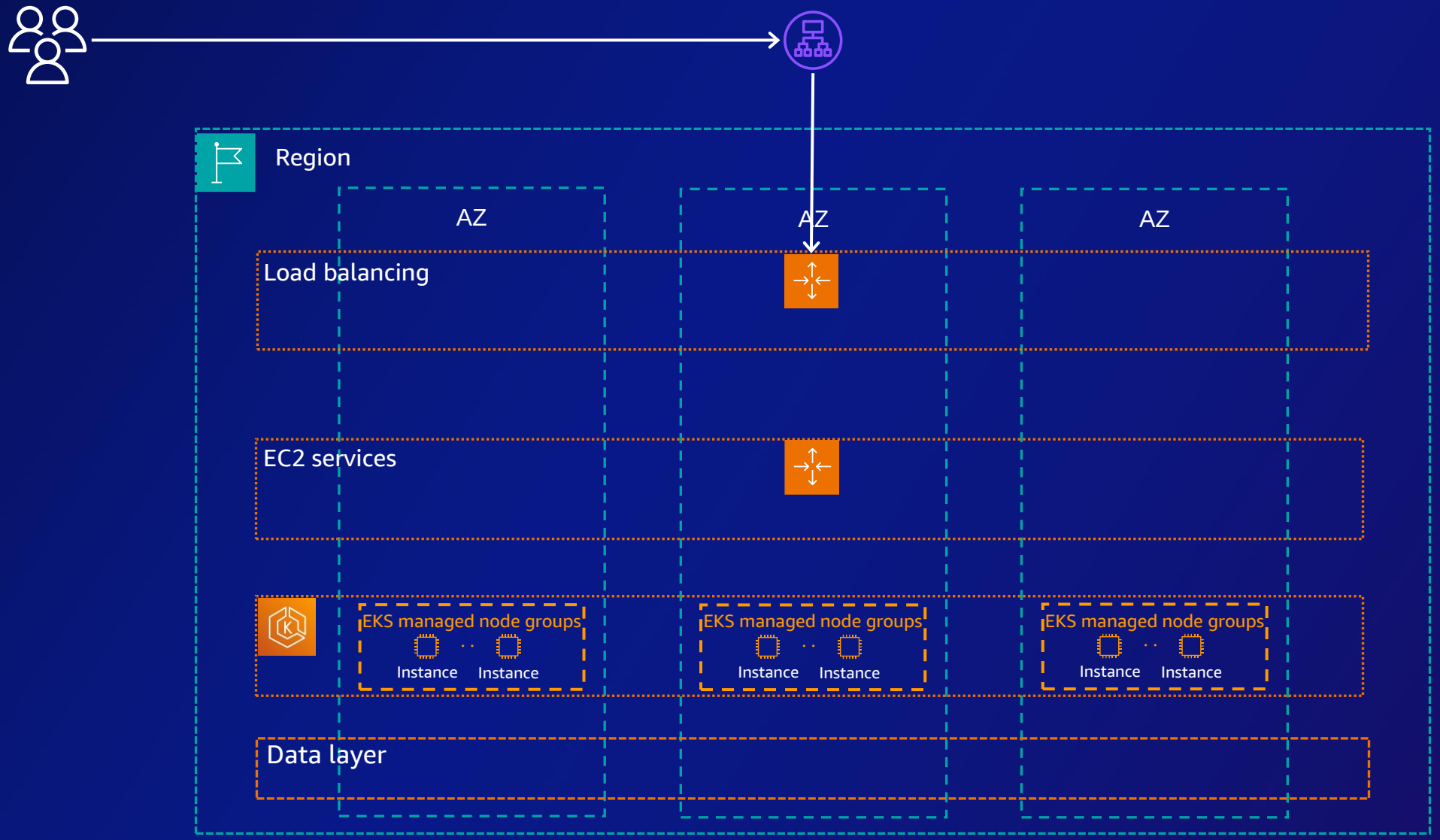
100 roadside assists per day
totaling close to 40,000/year

34,461 ambulances dispatched in 2022
2.2 million help alerts sent

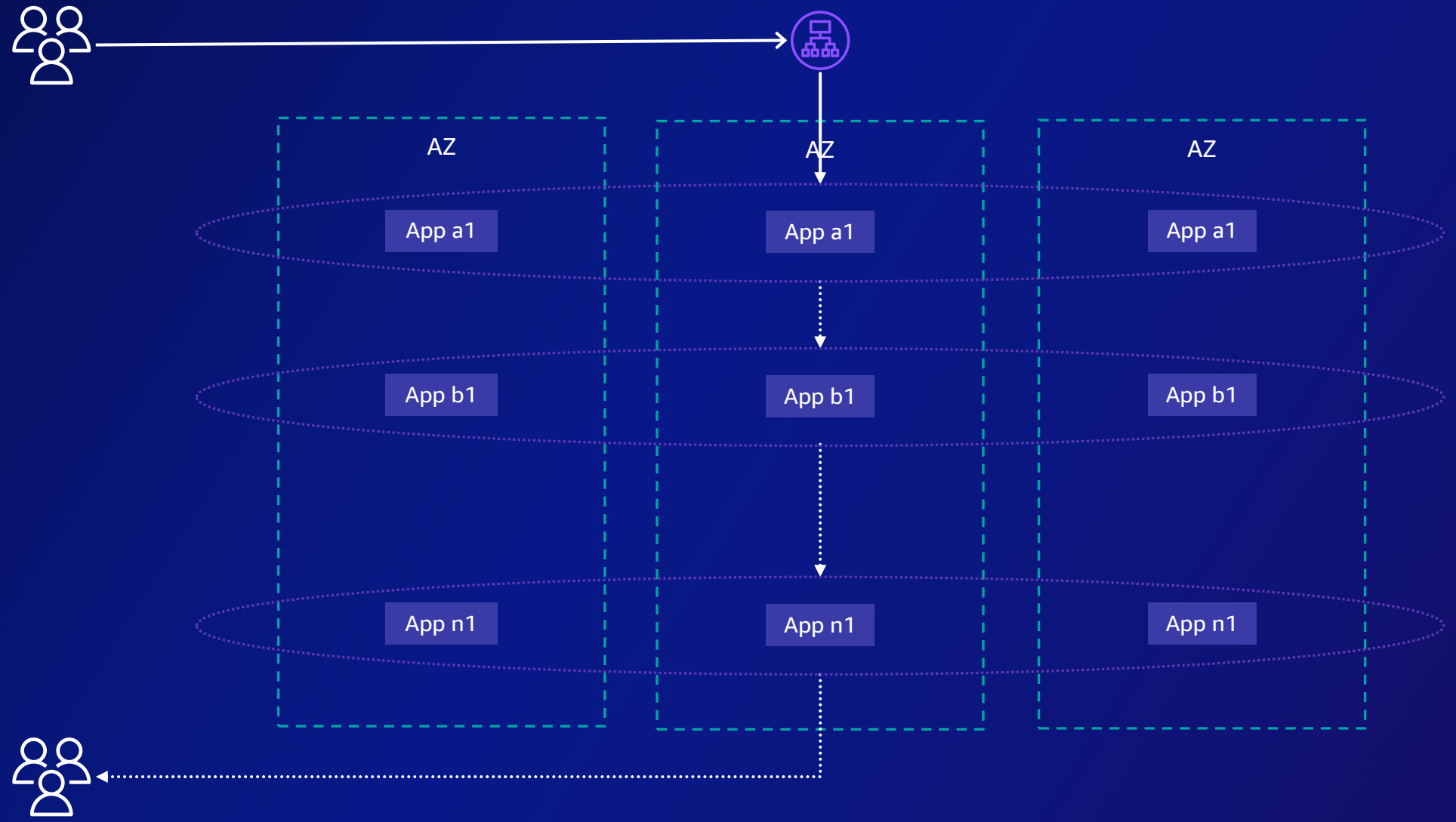
Cloud architecture



Infra layers (previously)



Application point of view



Compute: EC2 or EKS

A brief history of AZ degradation at Life360

A brief history of AZ degradation at Life360

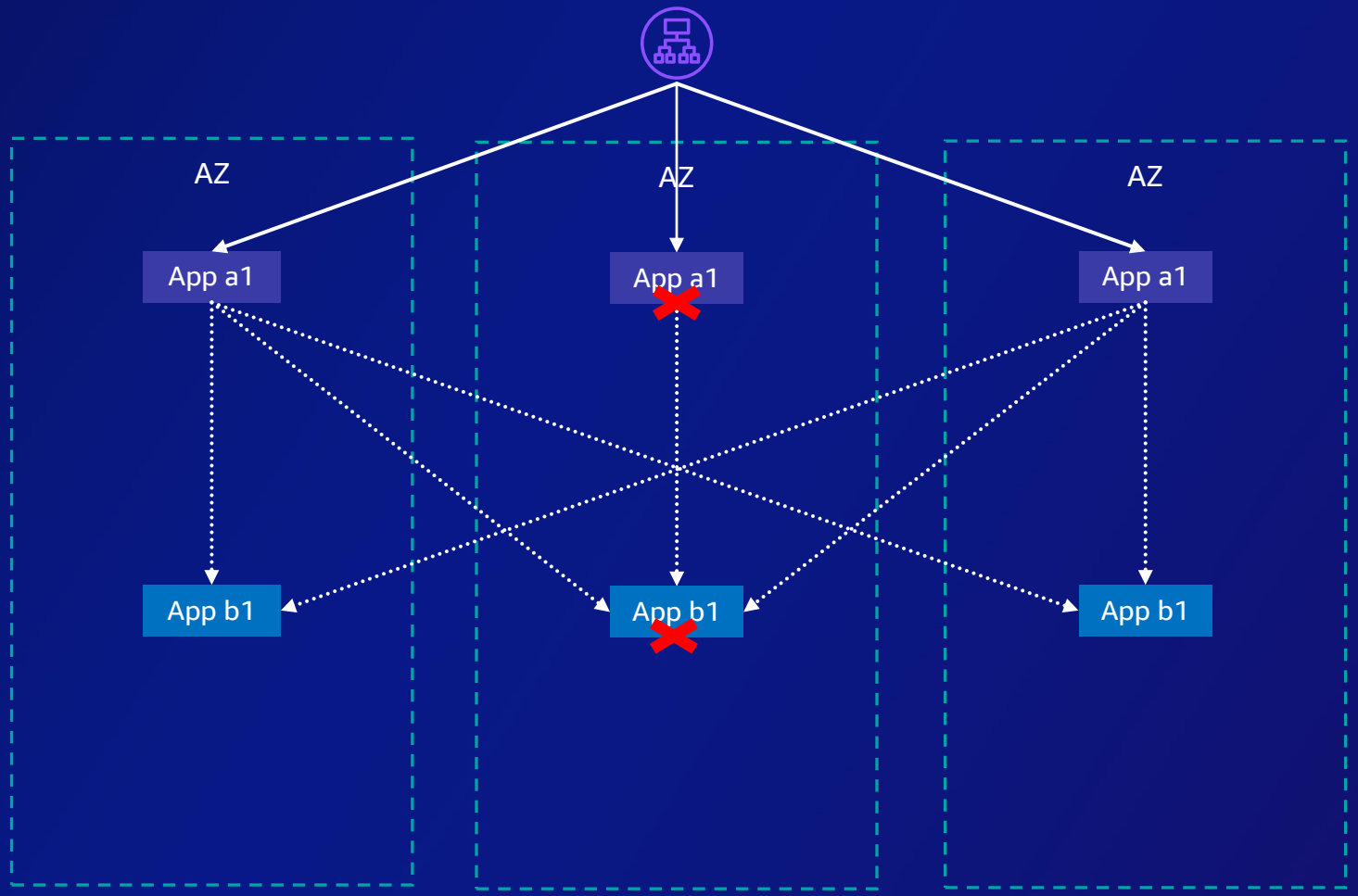
Core learning

- Can no longer guarantee dispatching ambulances in timely manner
- Real lives at stake

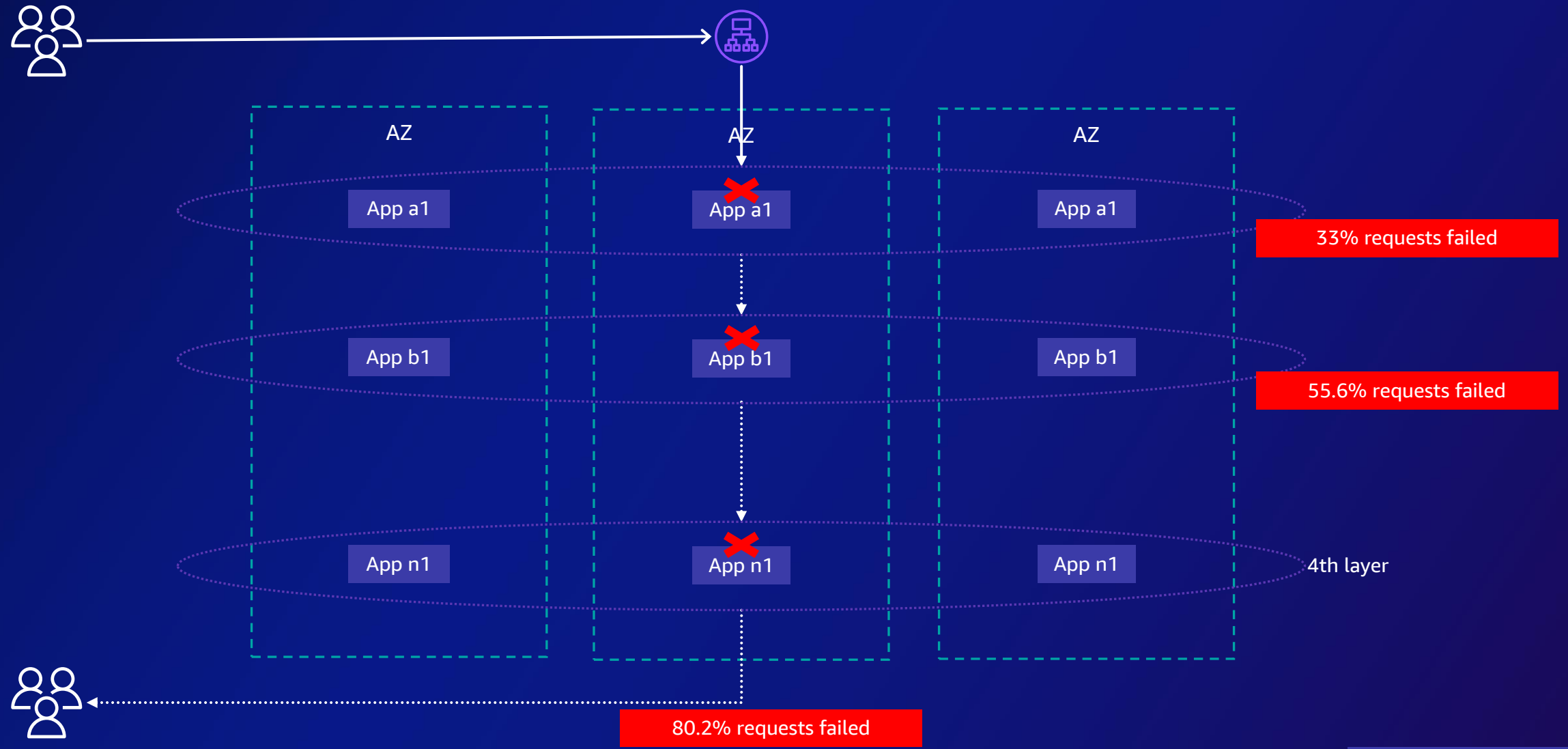
Other observations

- Architecture can quickly get behind if no adjustments
- User growth
- Tech stack evolution
- Organization reliability need shifts (more 9s)
- Addition of more life-critical features
- More complex service mesh

Service interaction



Impact to our customers



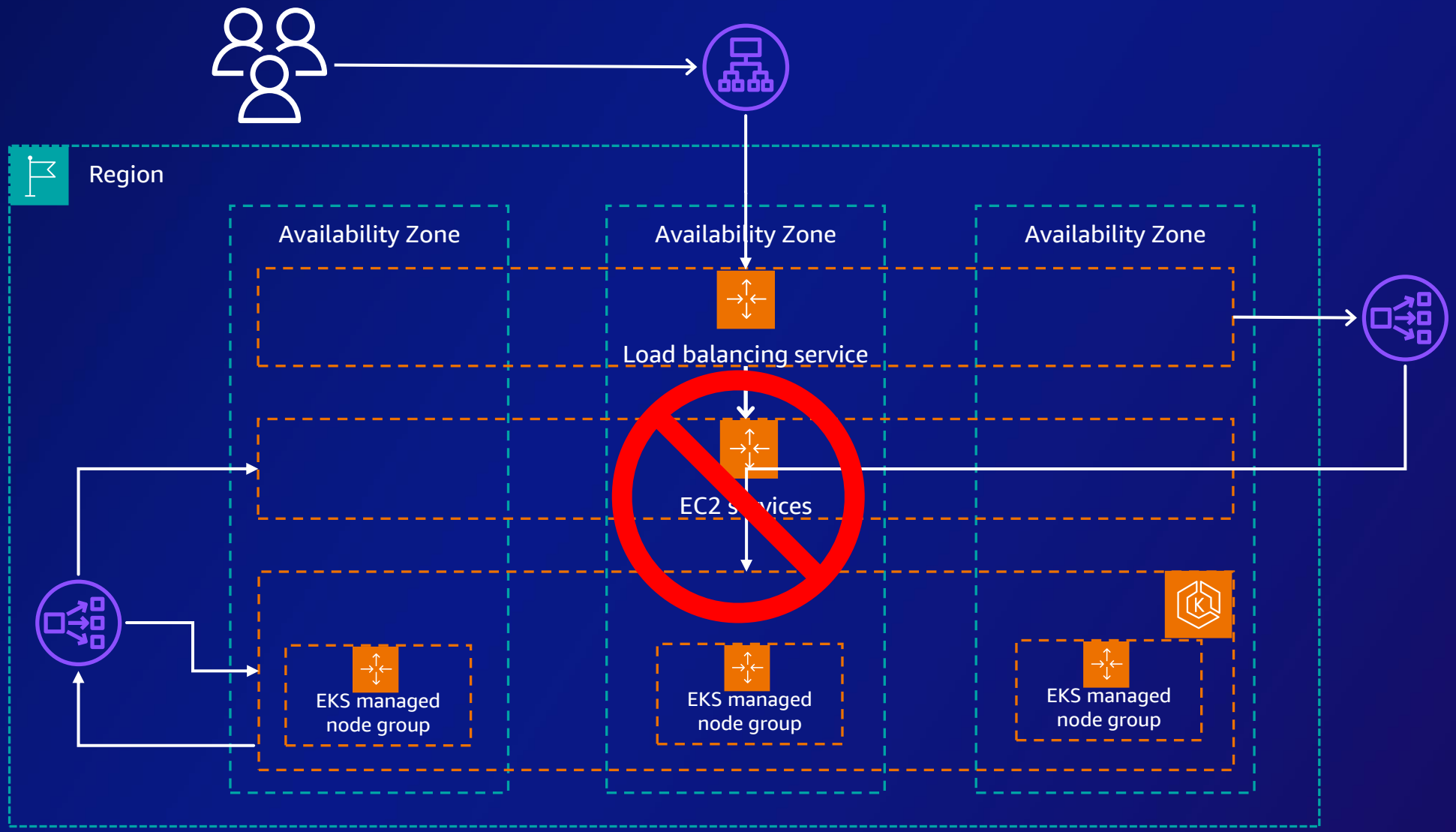
Compute: EC2 or EKS

Hold my coffee

Wrong way, go back

Efficient solution, wrong problem

What we need to solve



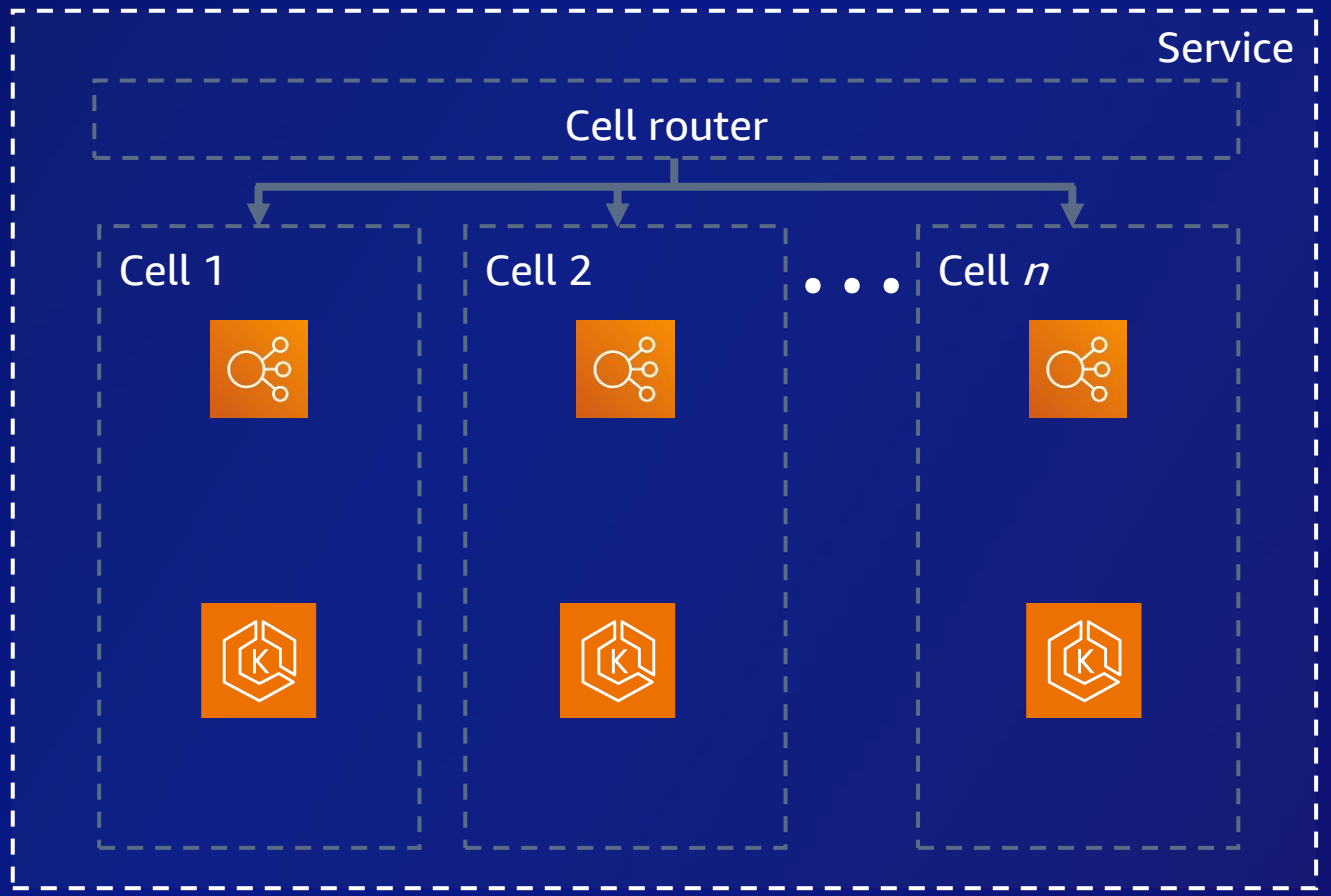
An introduction to cells: Life360 Amazon EKS architecture 3.0

Core tenets of cell-based Amazon EKS

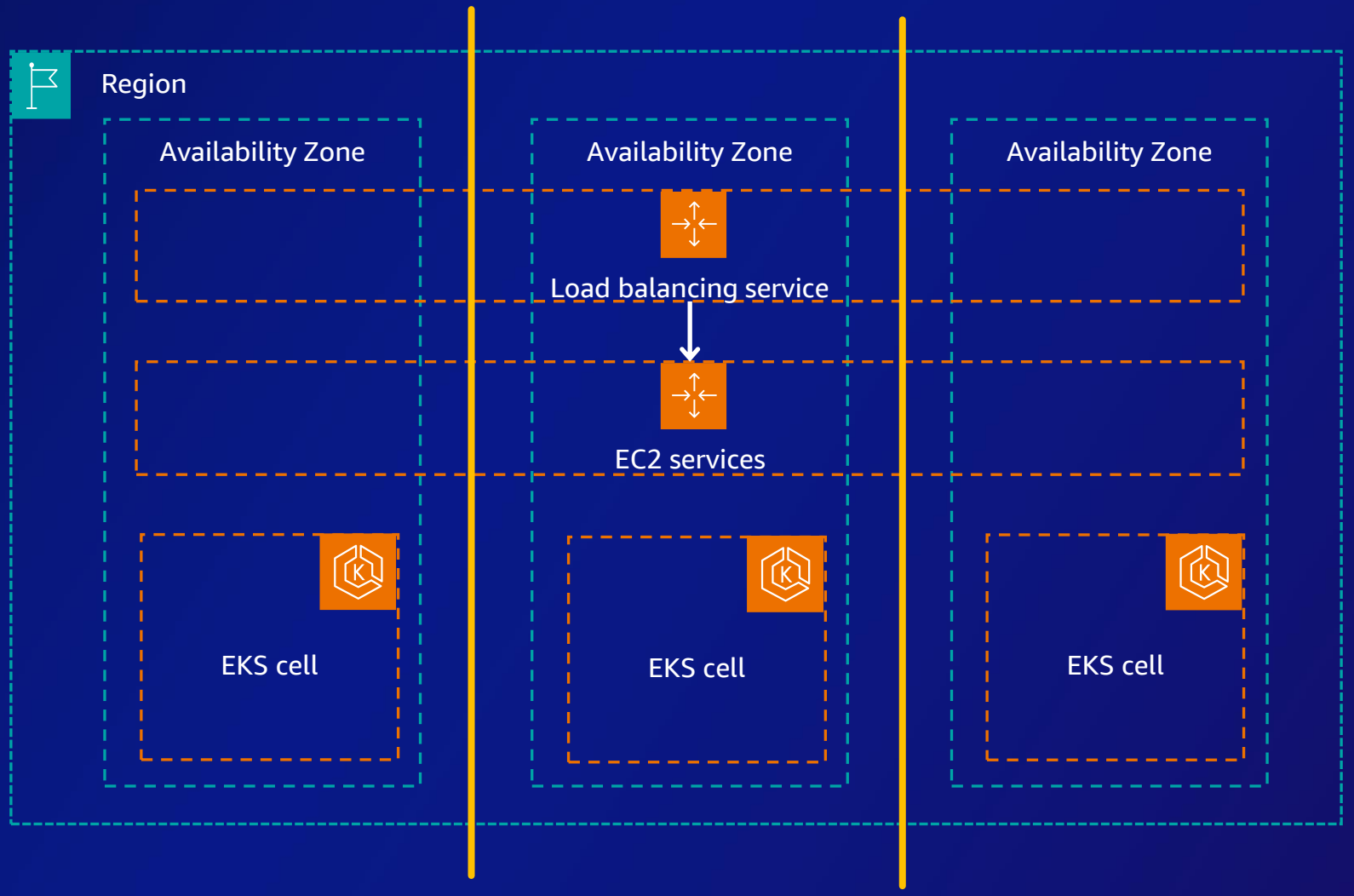
Stop failure propagation

Traffic control

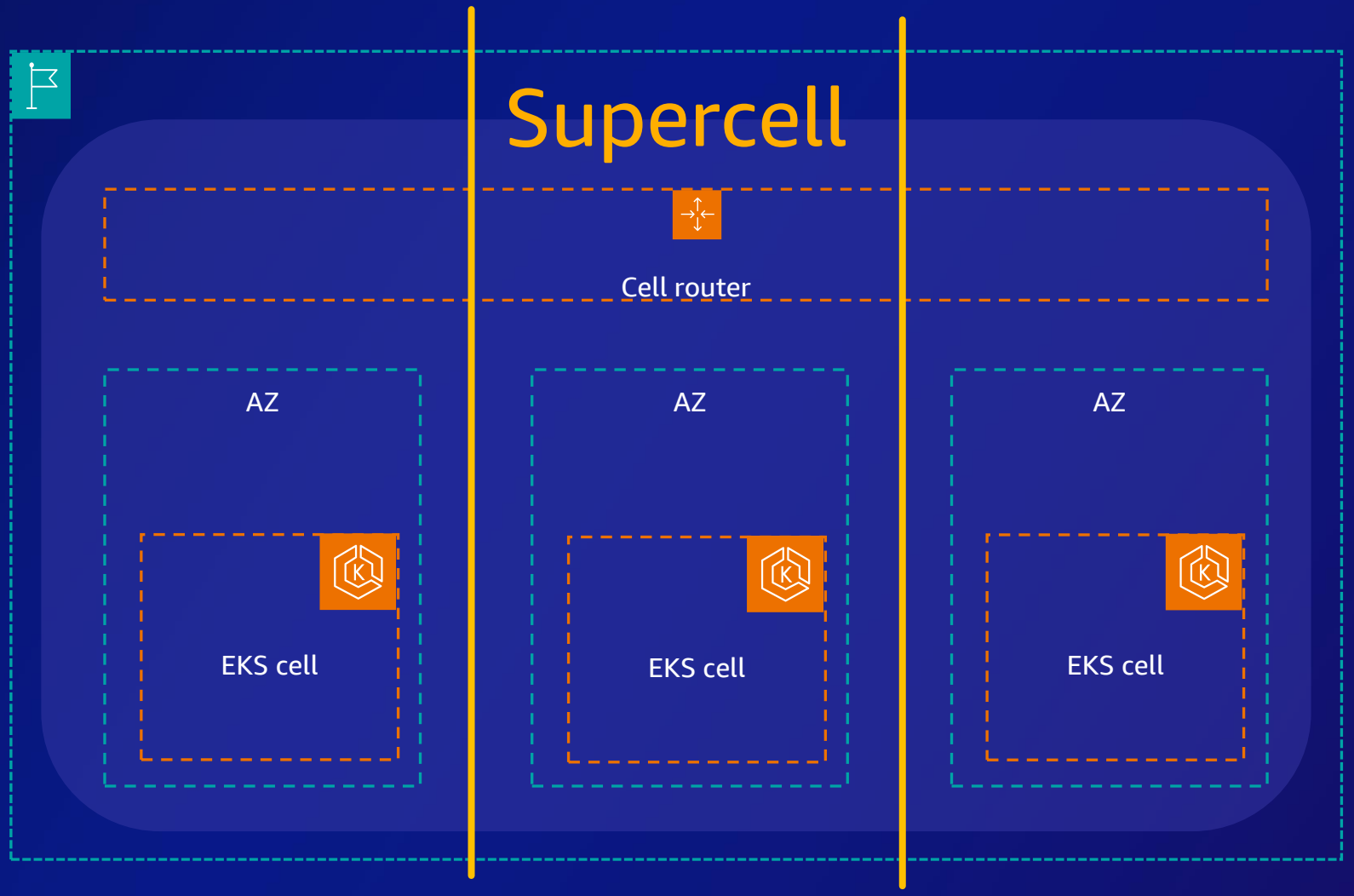
Cell-based architecture pattern



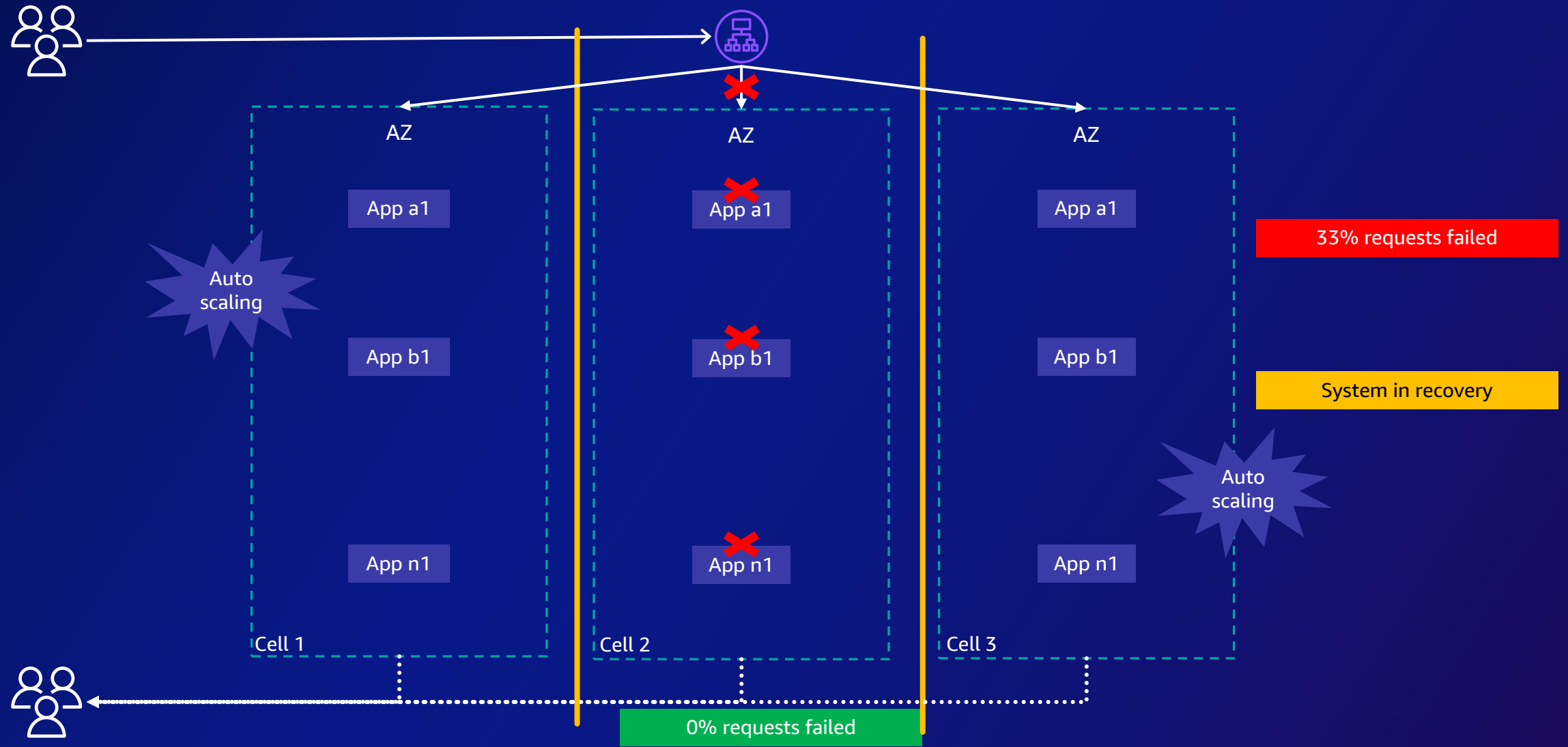
Like a bulkhead on a ship . . .



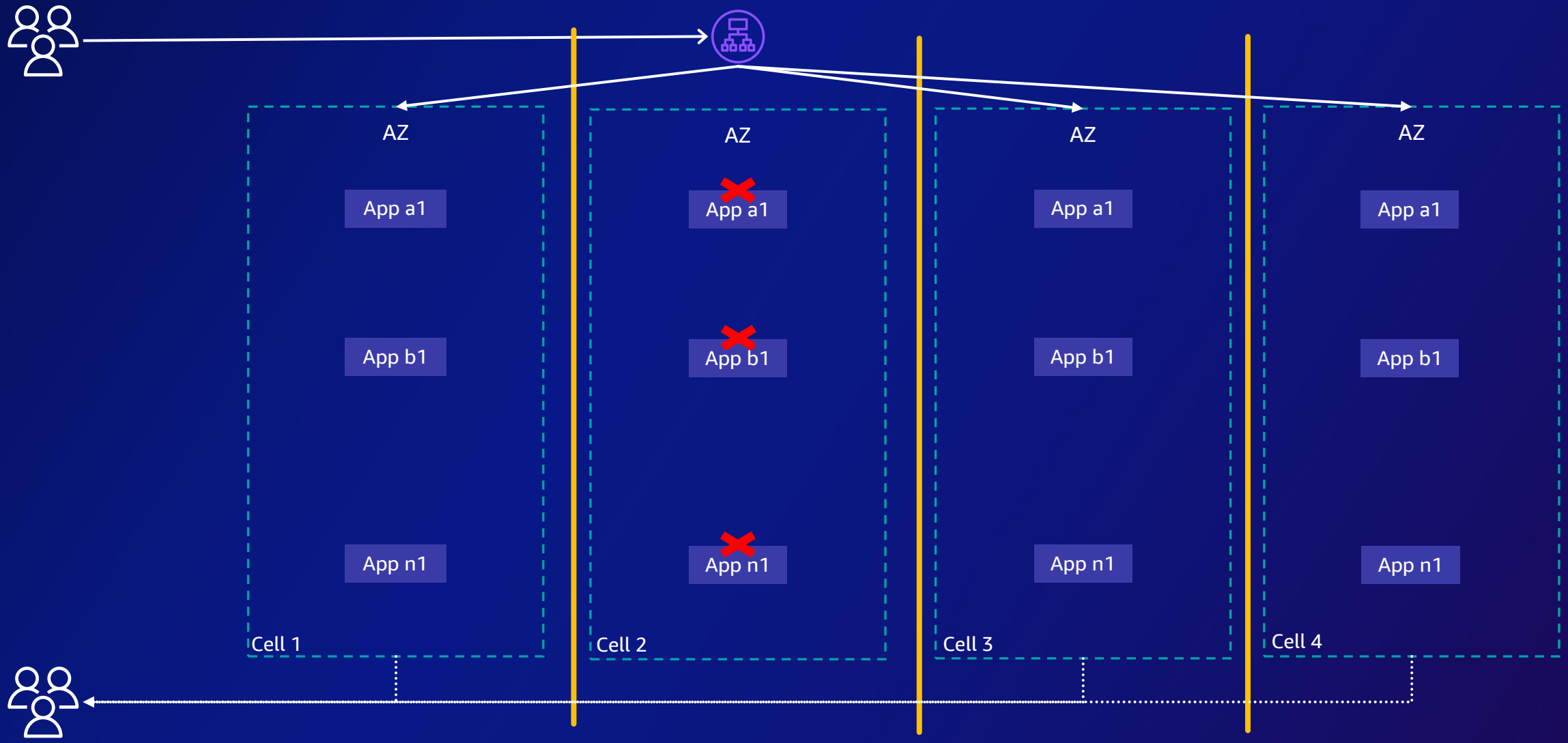
Supercell



Better resiliency



Better resiliency



With plan in hand, time to implement

I get a cluster, you get a cluster, we all get a cluster

How will we manage our cluster workloads now?

Kubernetes native

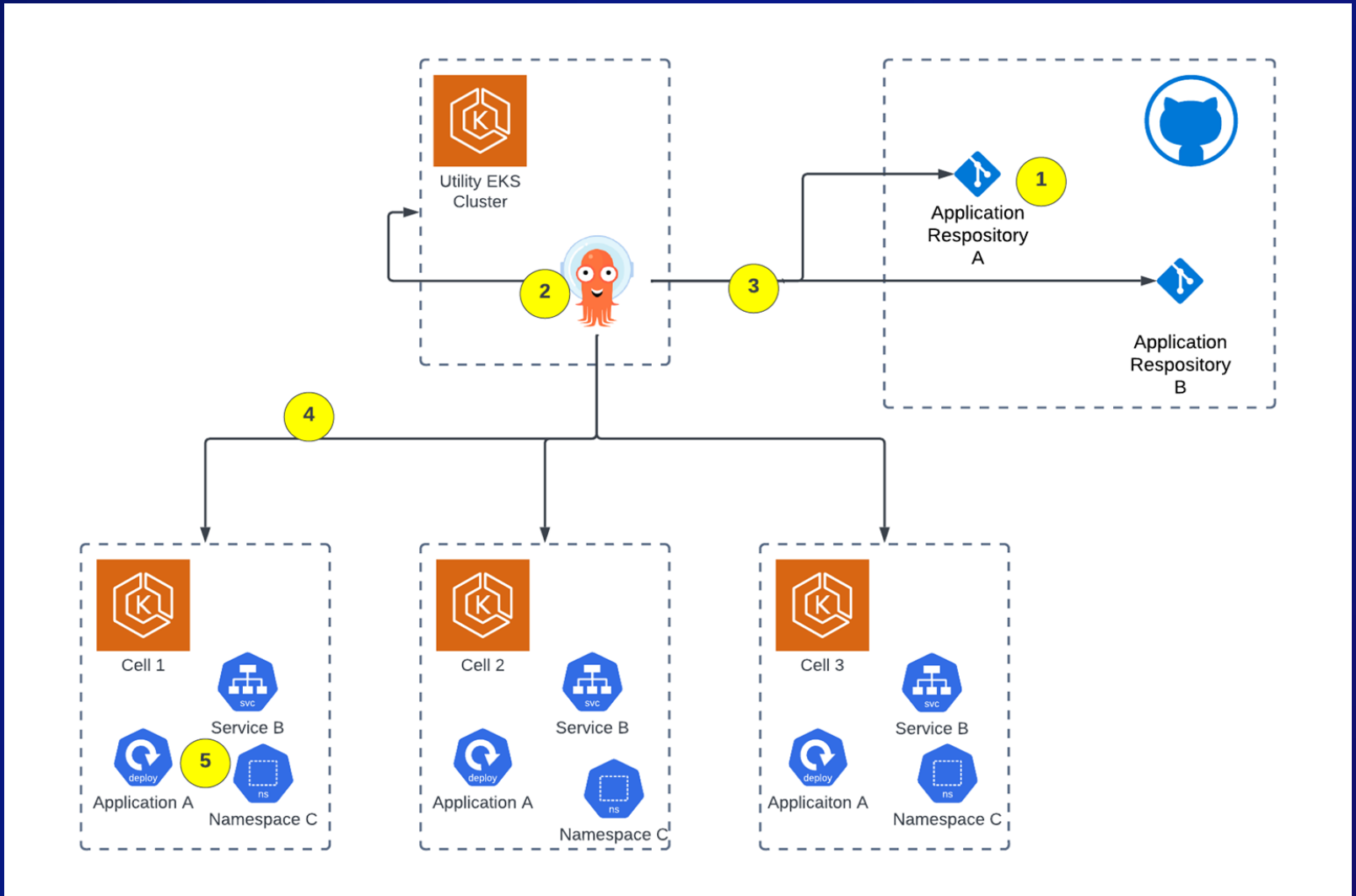
Efficient

Git-based

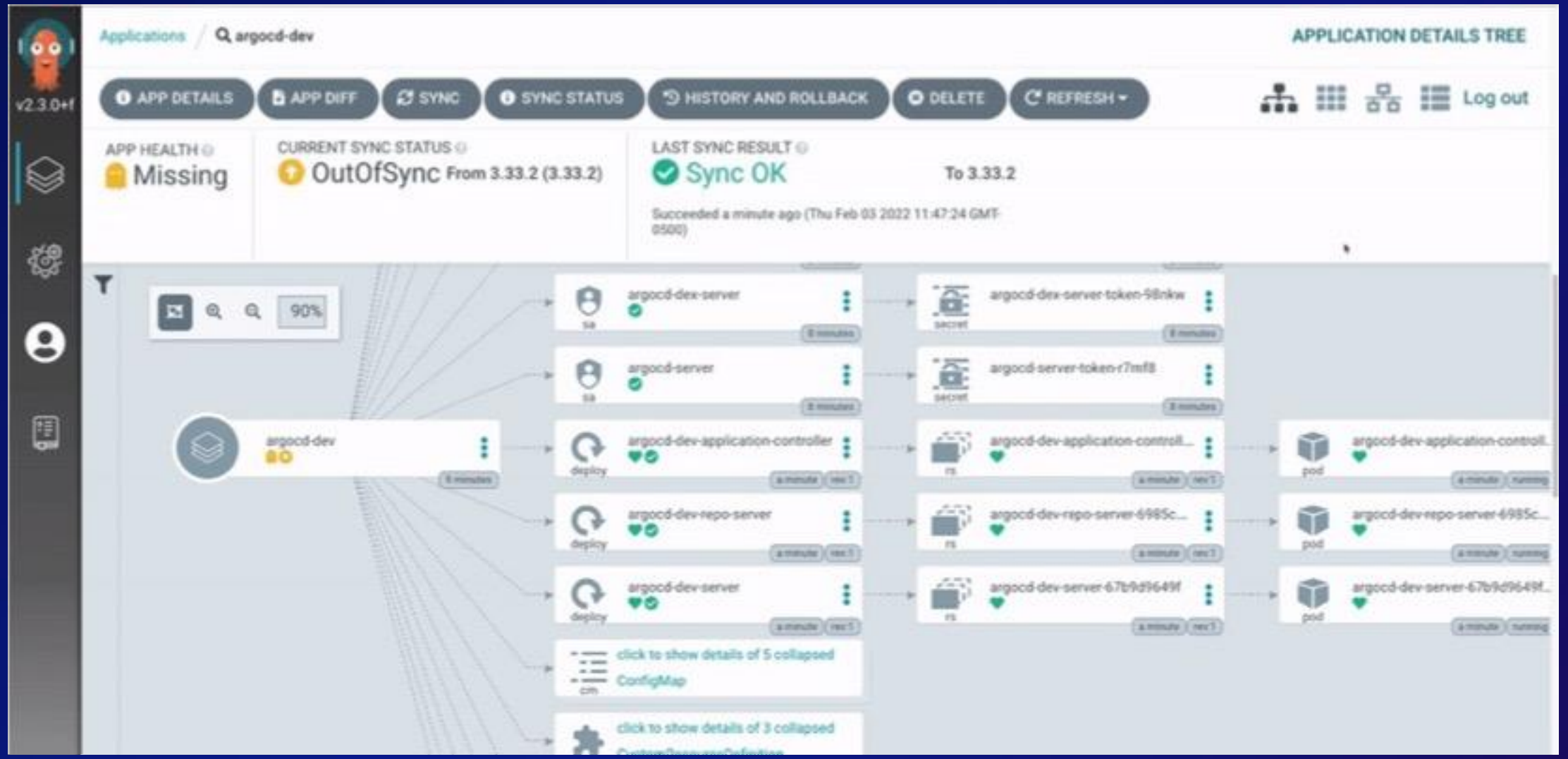
Support for multiple Kubernetes deployment types

Argo CD: Declarative, GitOps continuous delivery tool for Kubernetes

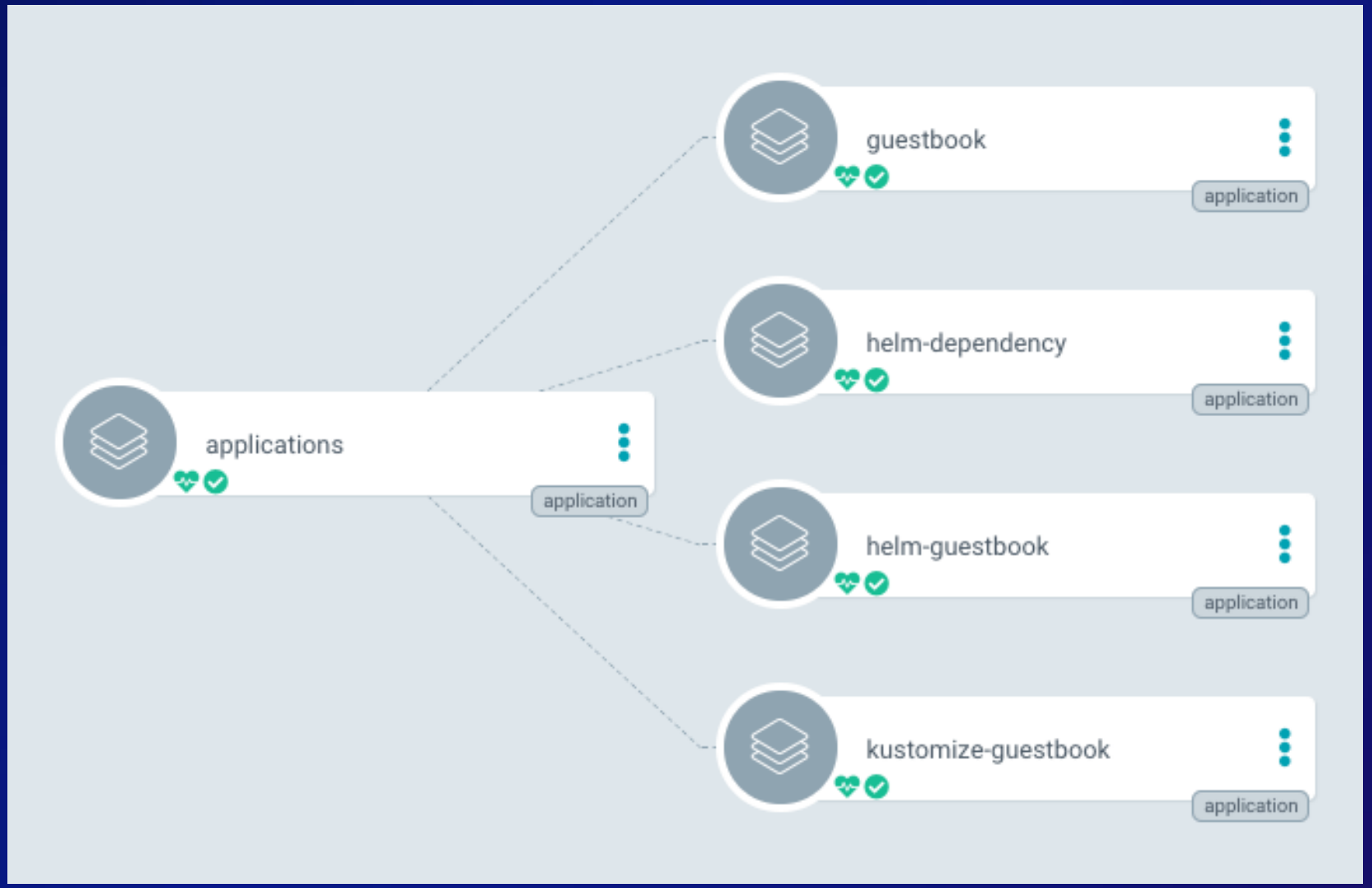
Argo CD workflow



Argo CD applications in a nutshell



The application of applications pattern



YAML, YAML, everywhere

```
apiVersion: argoproj.io/v1alpha1
kind: ApplicationSet
metadata:
  name: guestbook
spec:
  generators:
  - list:
      elements:
      - cluster: engineering-dev
        url: https://1.2.3.4
      - cluster: engineering-prod
        url: https://2.4.6.8
      - cluster: finance-preprod
        url: https://9.8.7.6
  template:
    metadata:
      name: '{{cluster}}-guestbook’
    spec:
      project: default
      source:
        repoURL: https://github.com/argoproj/argocd.git
        targetRevision: HEAD
        path: applicationset/examples/list-generator/guestbook/{{cluster}}
      destination:
        server: '{{url}}’
        namespace: guestbook
```

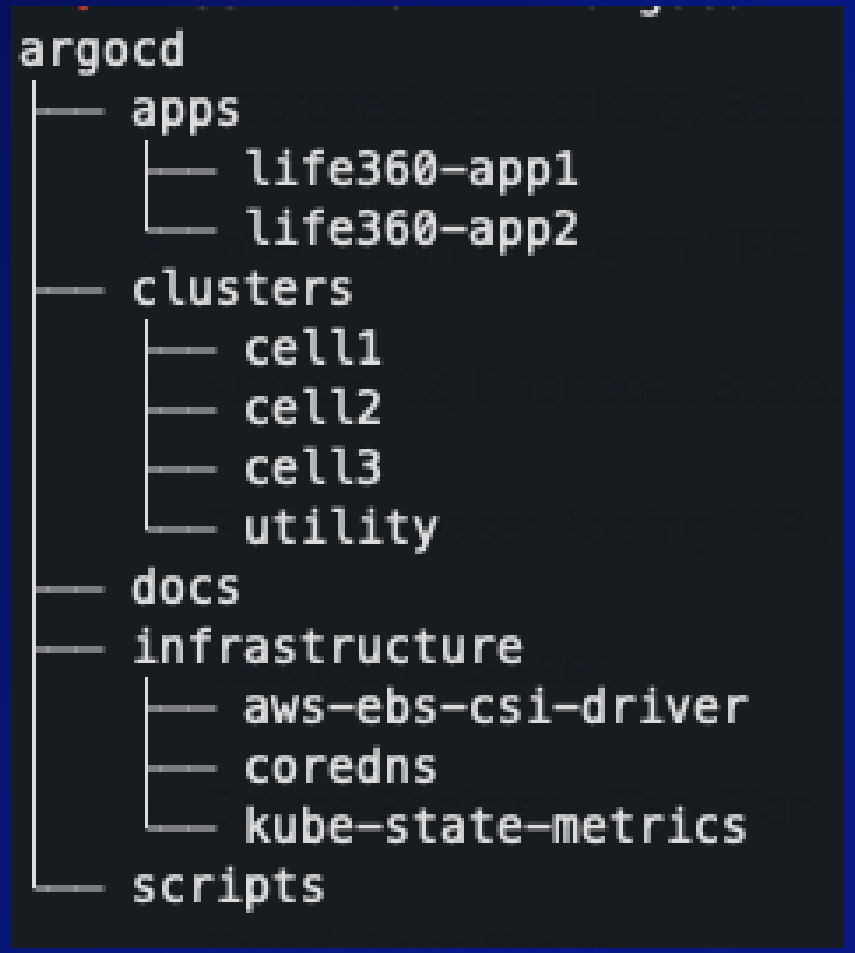
Could we do more?

```
defaults:
  accountNumber: &accountNumber "1234567890"
  superCellName: env-use1
  valuesFile: values-env-use1.yaml
  argoRepoURL: https://git/path/to/argocd/repo.git
  environment: env

clusterCell:
  - cluster: env-use1-az2
    url: https://eks-cluster1-url-az2
    accountNumber: *accountNumber
  - cluster: env-use1-az4
    url: https://eks-cluster1-url-az2
    accountNumber: *accountNumber
  - cluster: env-use1-az6
    url : https://eks-cluster1-url-az2
    accountNumber: *accountNumber
```

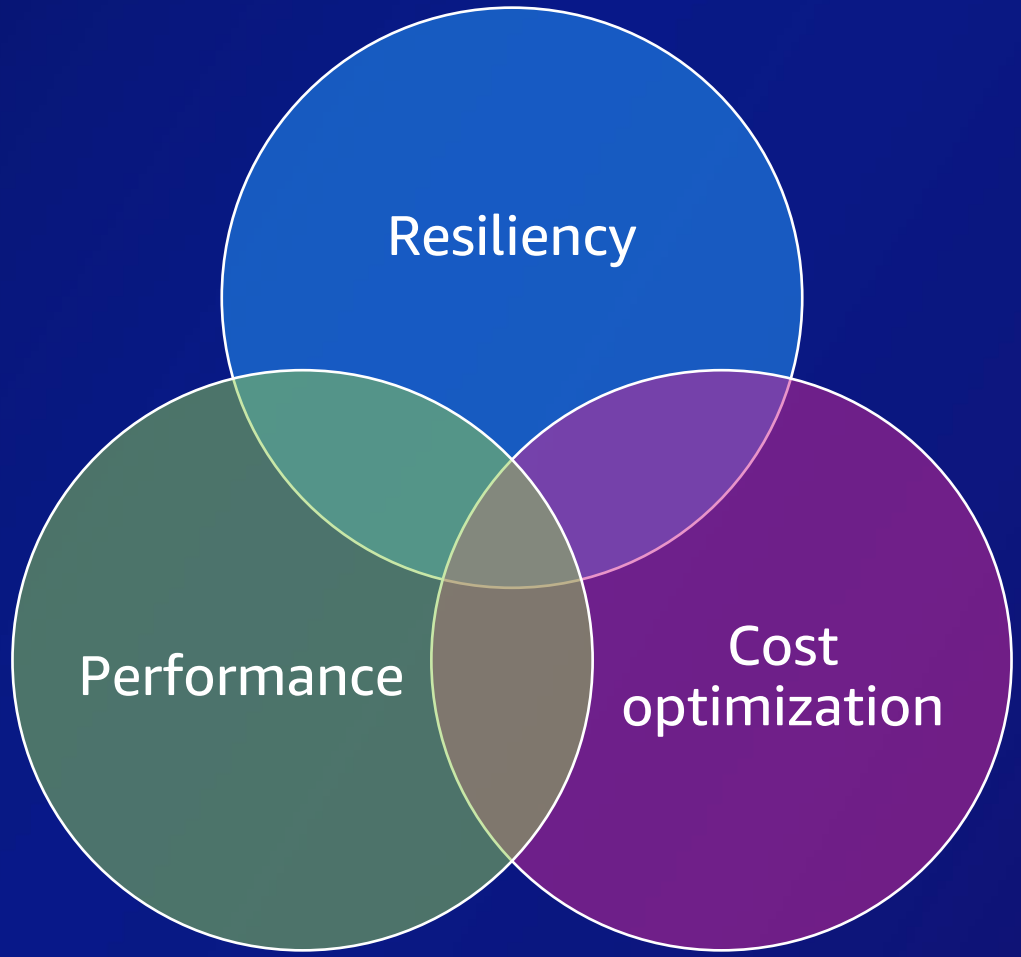
```
deployed_applications:
  - name: app
    repoURL: https://git/path/to/custom/app.git
    path: deploy/chart/
    extraHelmParameters:
    - name: app.serviceAccount.annotations.eks\.amazonaws\.com/role-arn
    value: arn:aws:iam::{{ accountNumber }}:role/{{ cluster }}-app-sa-irsa
    clusterOverrides:
      env-use1-az4:
        targetRevision: "feature/the-latest-hotness"
```

Key takeaways from Argo CD



But wait, there's more!
Secondary benefits

One more thing



Additional benefits of cell-based pattern

Environments

- Canary an environment
- Can create ephemeral environments effortlessly, not just nodes

Once in AZ, stay in AZ

- Cost
- Latency

Cluster upgrades

- We never have to upgrade a live cluster again

Additional capacity

Additional resources

Static stability at AWS
Static stability using Availability Zones

Amazon EKS
Getting started with Amazon EKS

EKS workshop
Practical exercises to learn about Amazon EKS

Amazon EKS best practices
Best practices for day 2 operations for Amazon EKS

Thank you!

Please complete the session survey in the mobile app

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jgonzalez@life360.com