Scaling Kubernetes with Karpenter: Meeting Advanced Scheduling Requirements

By Lukonde Mwila

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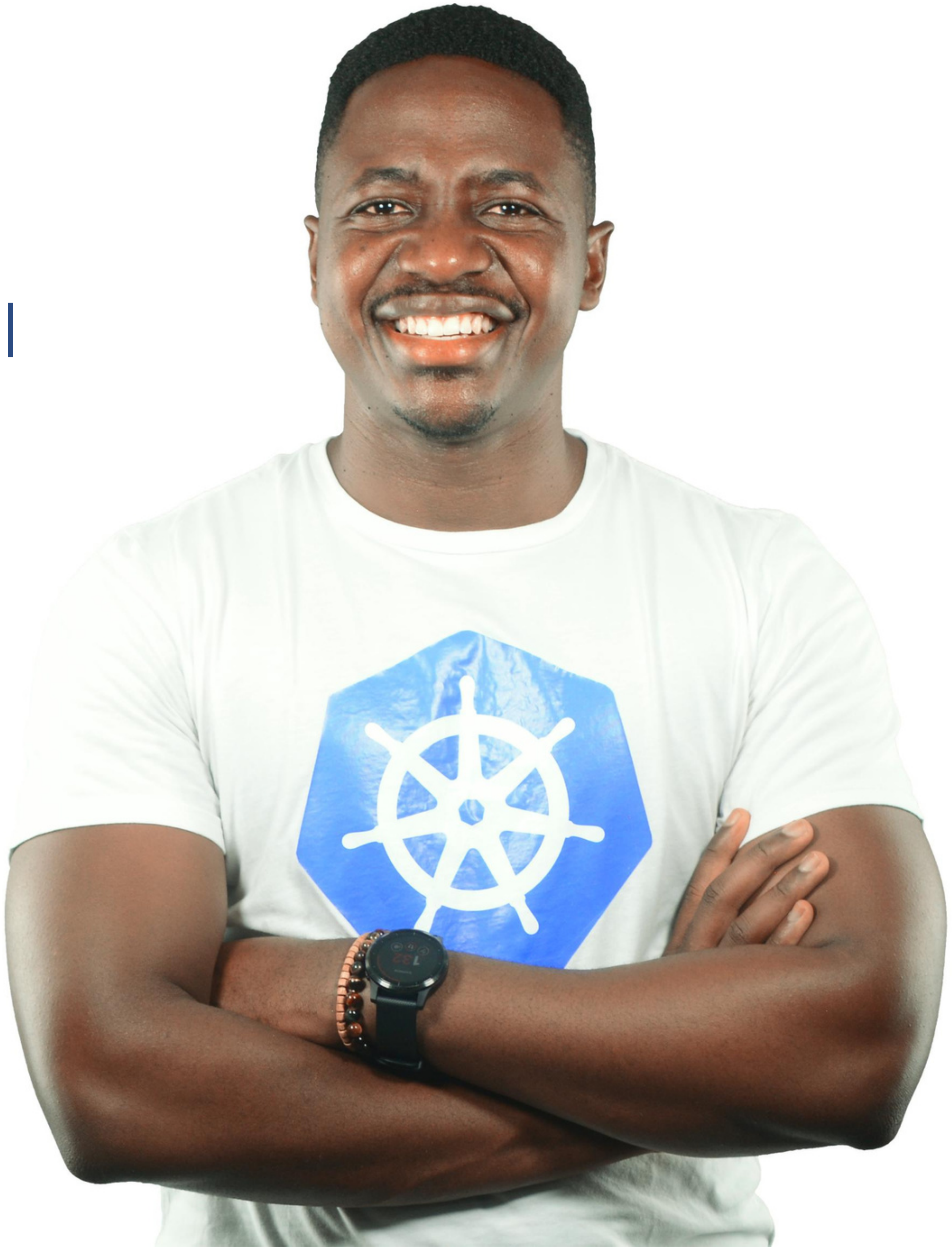
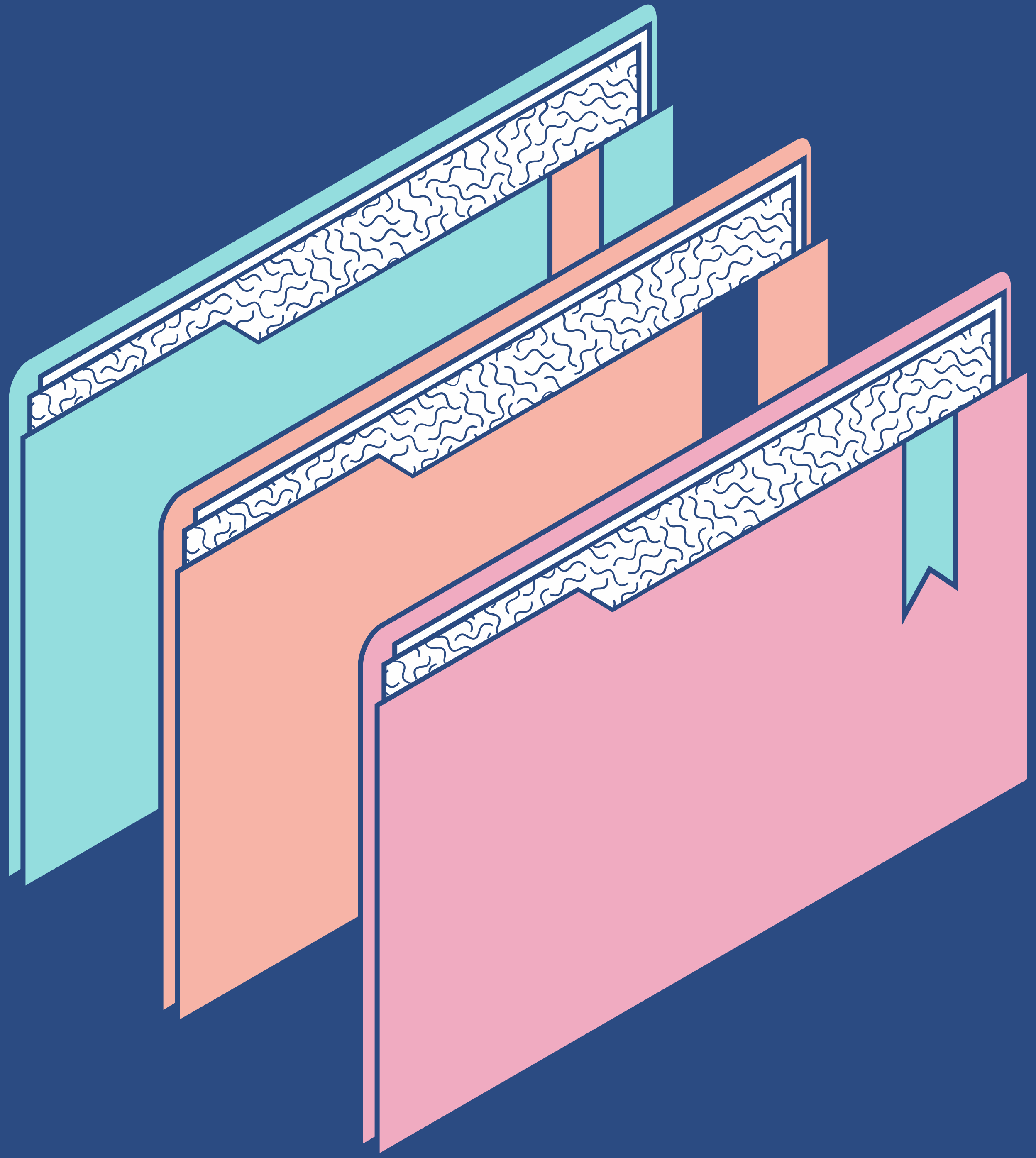
@Luke9ine



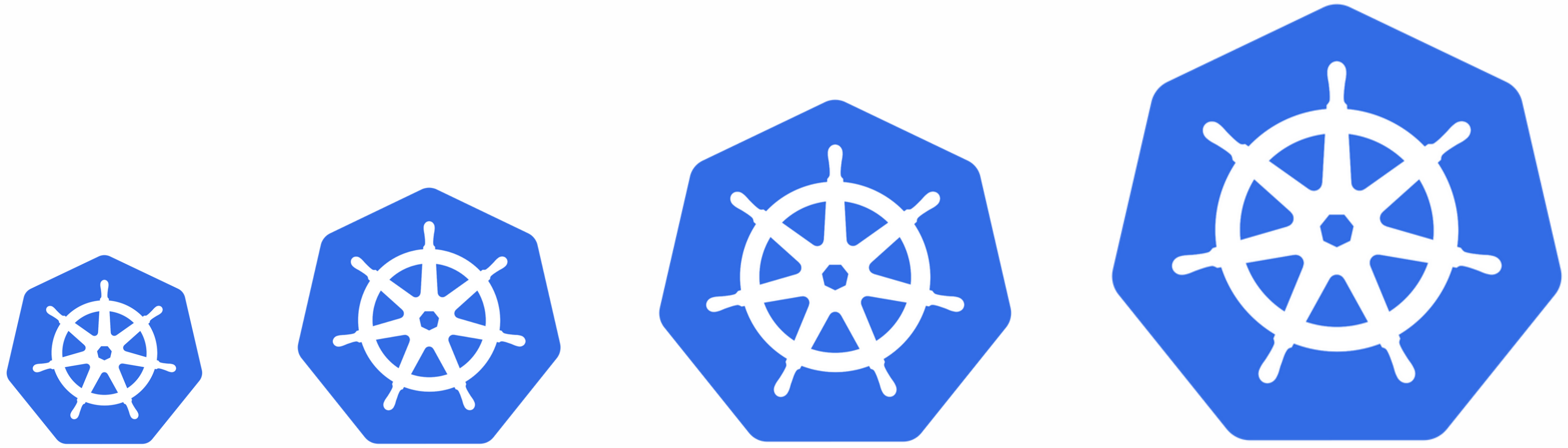


In This Talk...

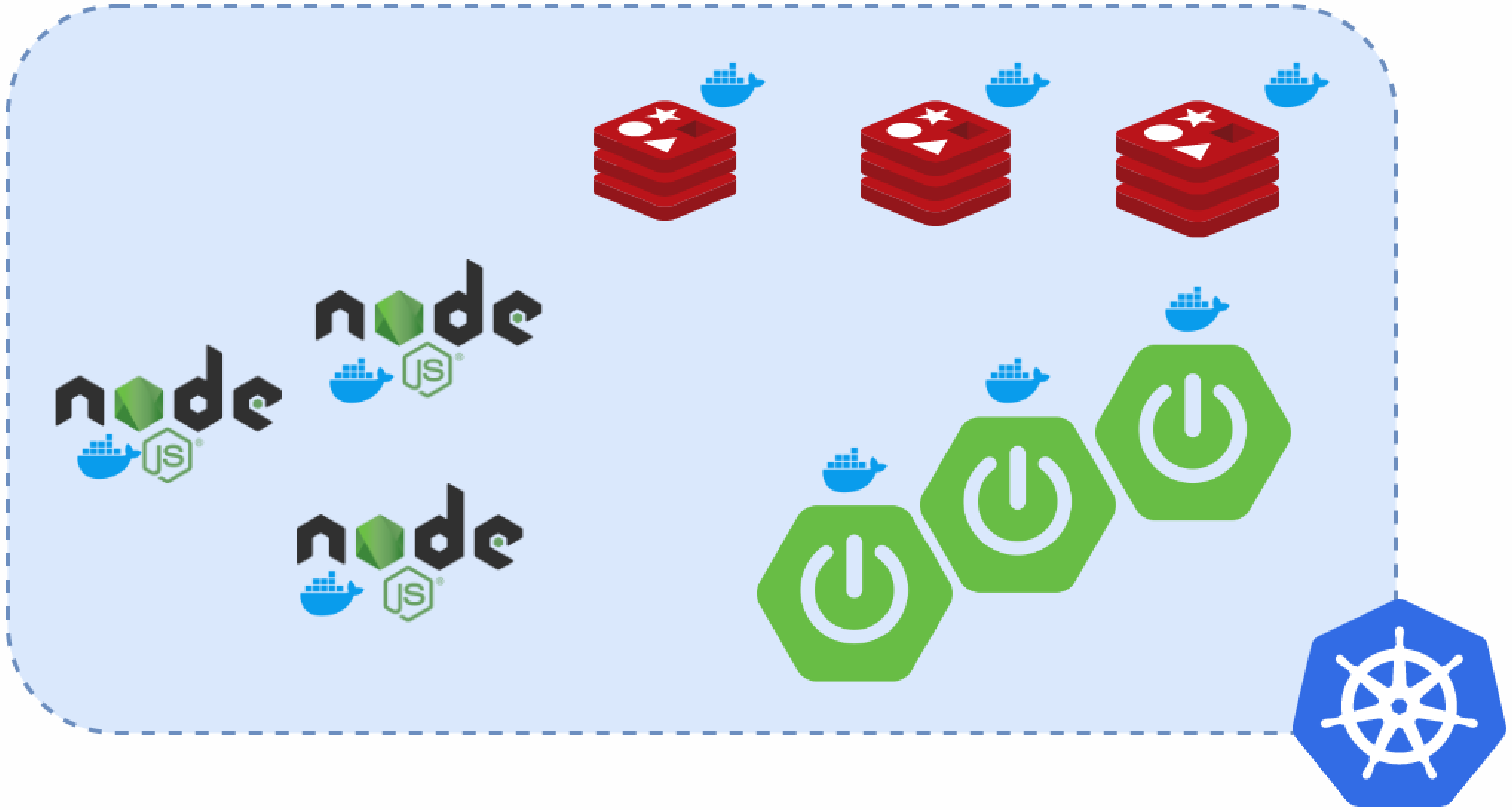
404 - Nothing to see here

Scaling in Kubernetes

- Popular concept and feature for obvious reasons
- K8s allows us to scale the workloads and the cluster

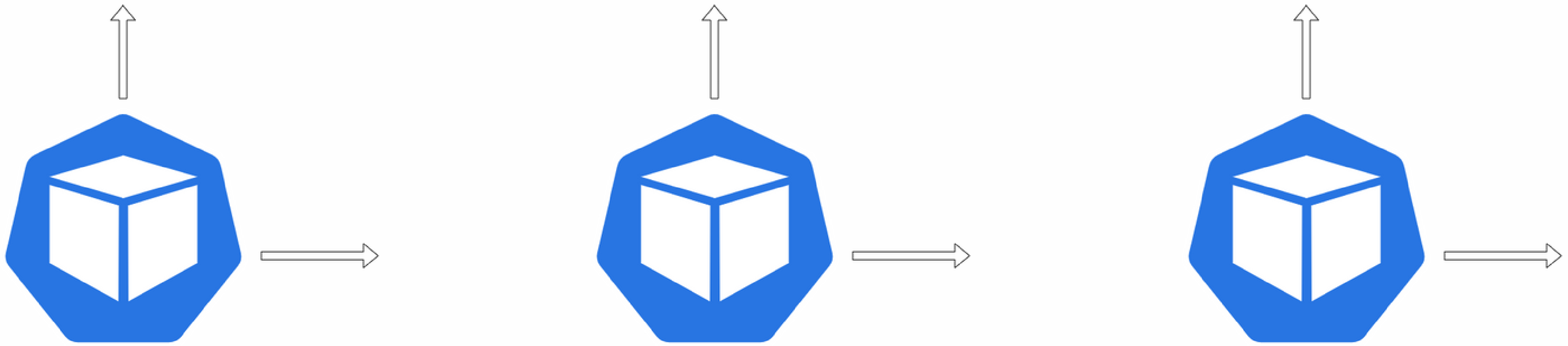


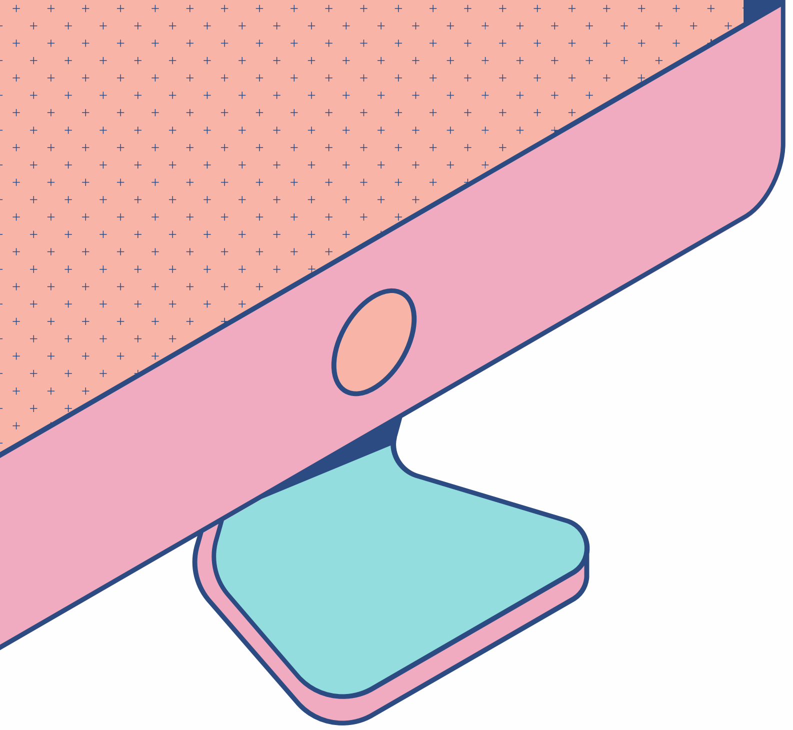
Scaling in Kubernetes



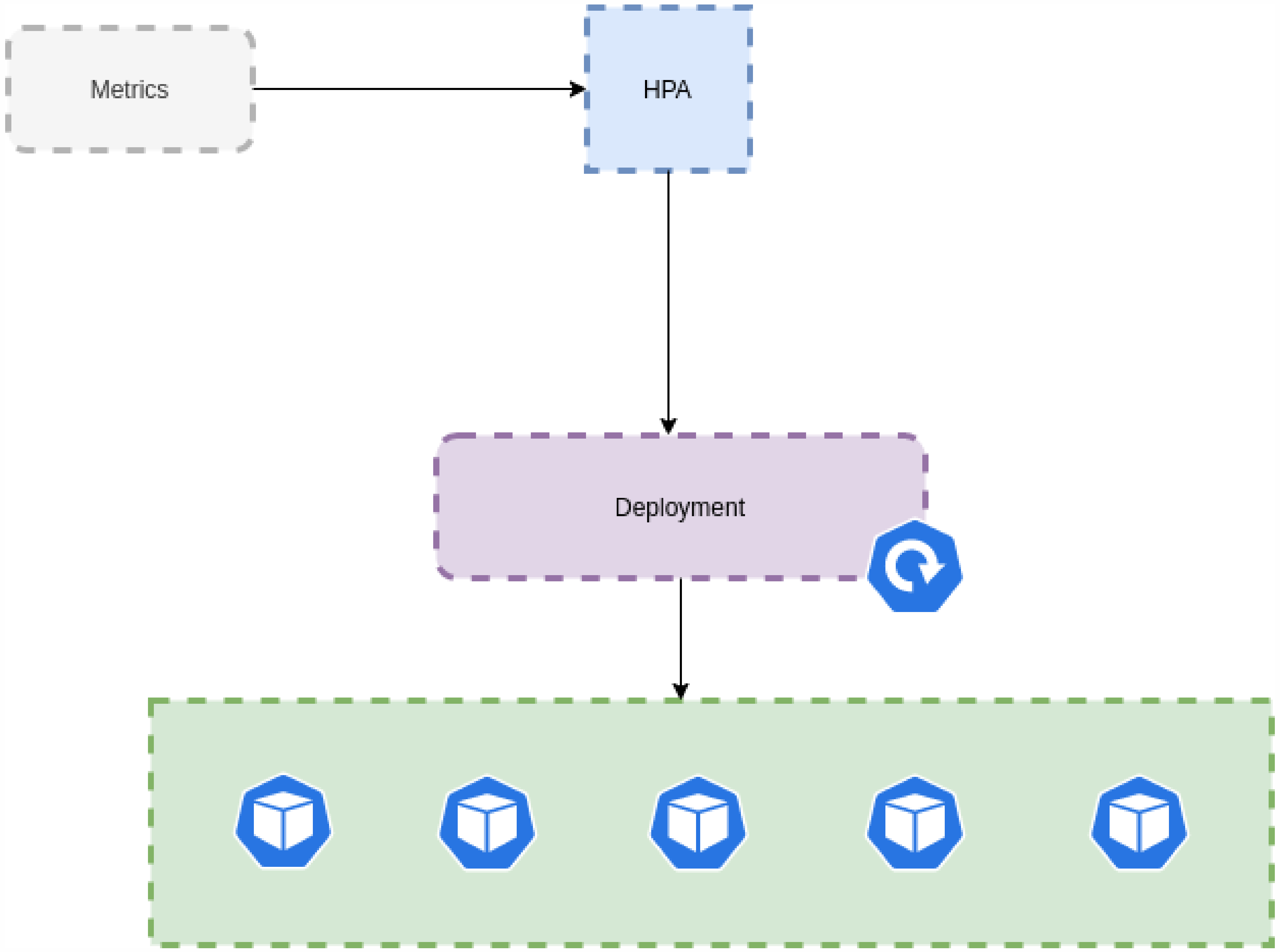
Scaling Workloads

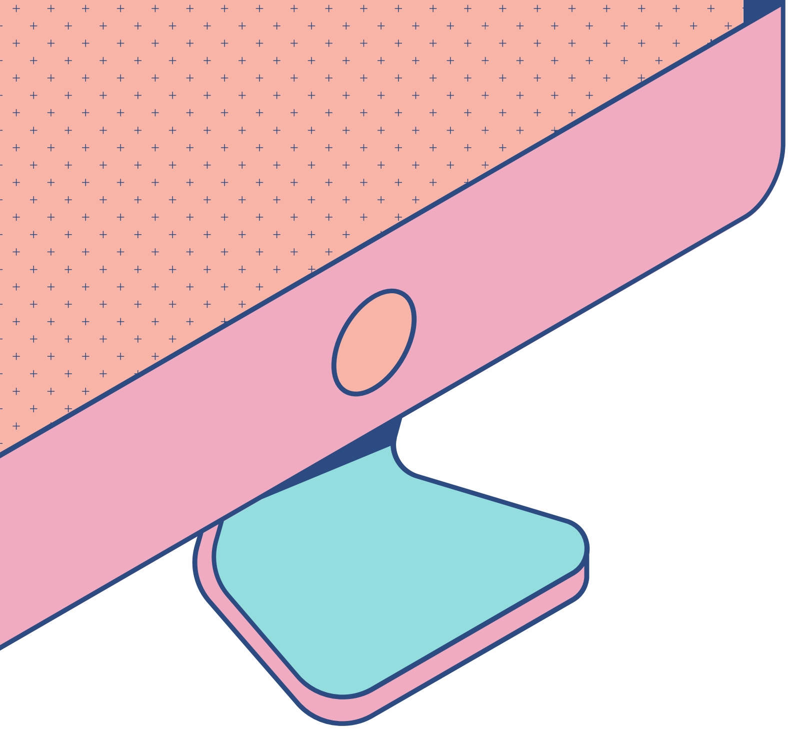
We can use native K8s resources like VPA and HPA

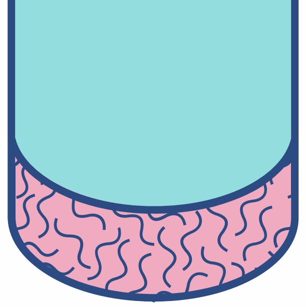


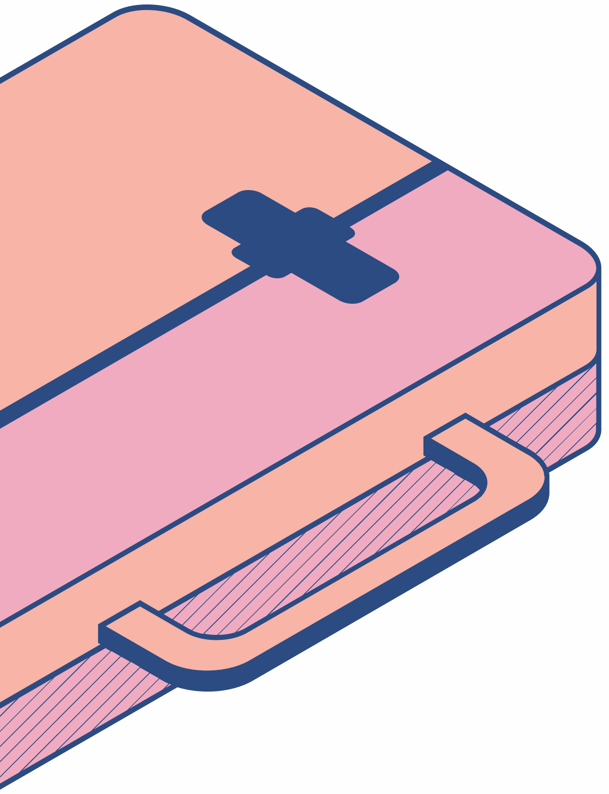


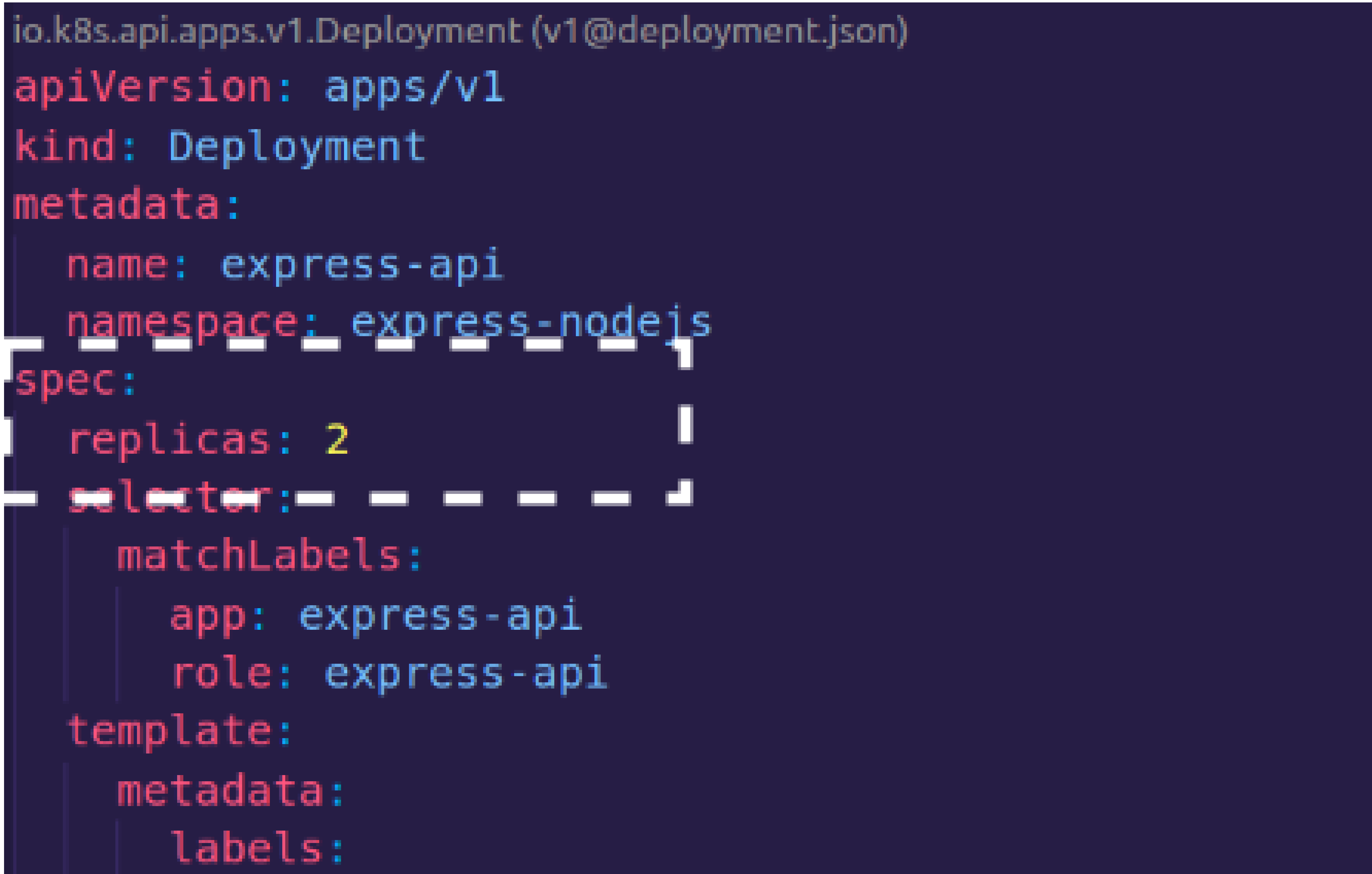
HPA Example







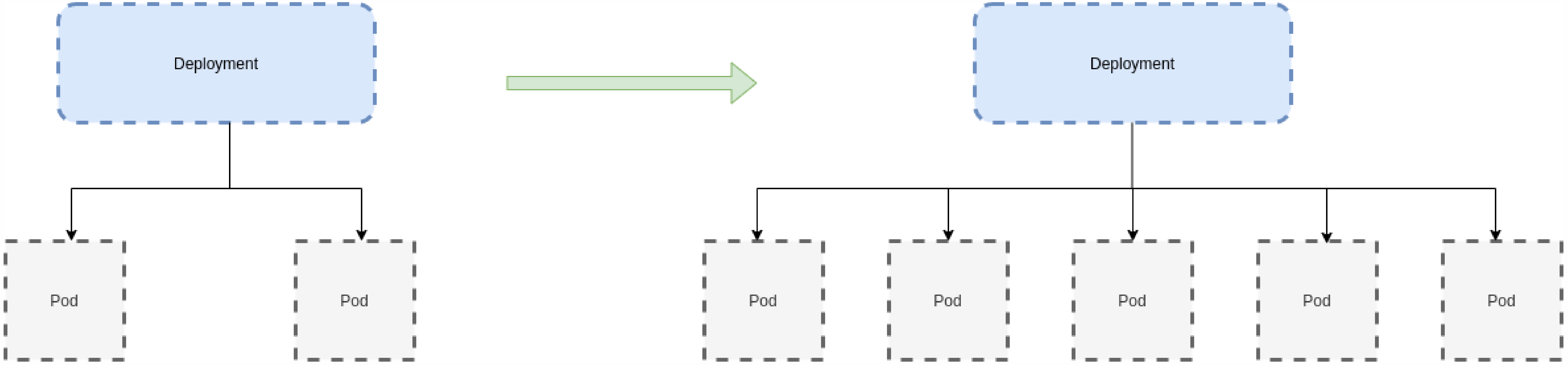




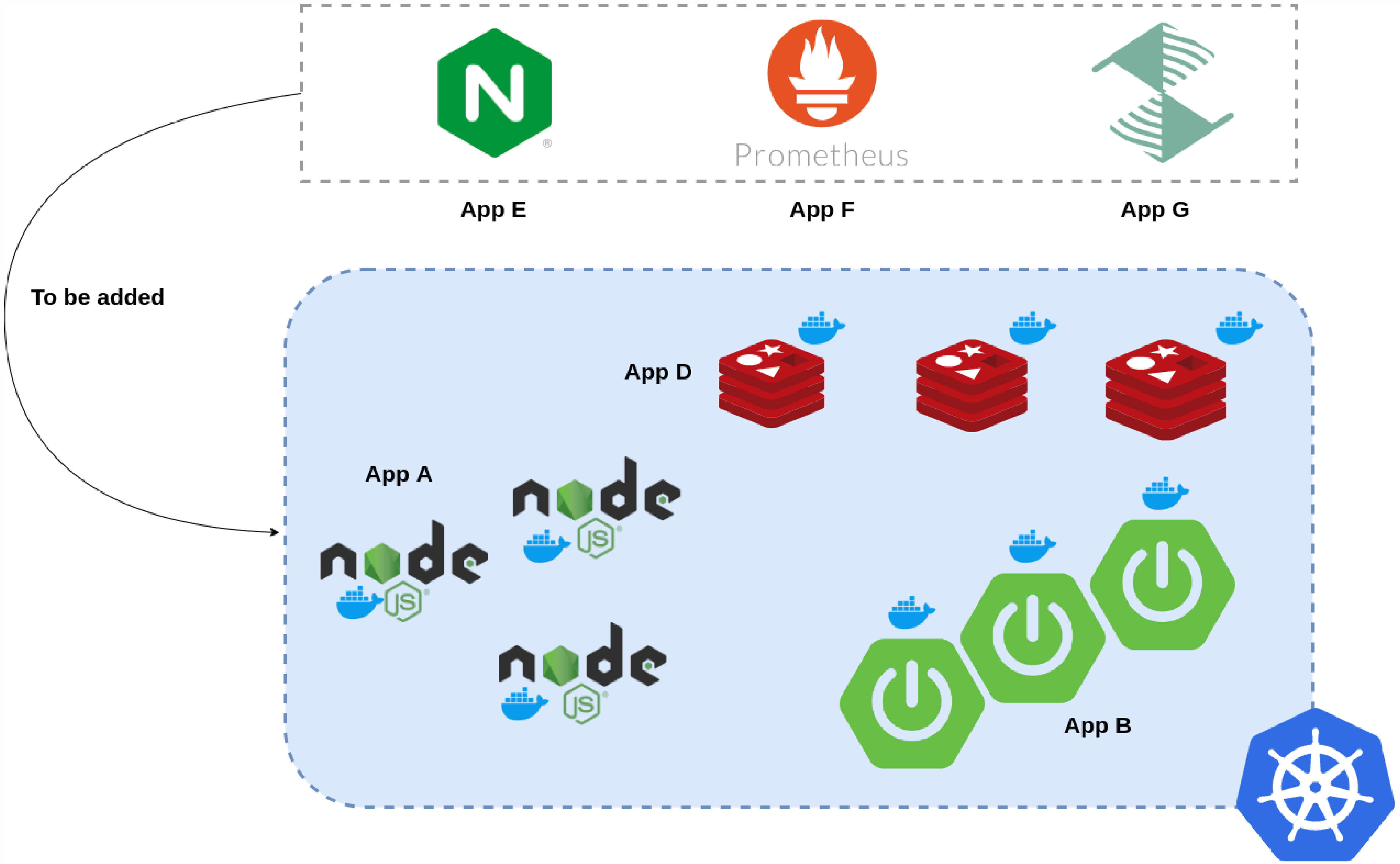
io.k8s.api.apps.v1.Deployment (v1@deployment.json)

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: express-api
  namespace: express-nodejs
spec:
  replicas: 2
  selector:
    matchLabels:
      app: express-api
      role: express-api
  template:
    metadata:
      labels:
```

HPA Example



Additional Apps Example



Hello Karpenter

Karpenter

- Open source cluster autoscaler built with AWS team
- Designed to work with any Kubernetes cluster
- Considers pod requirements for compute resources
- Join the Slack #channel in the Kubernetes workspace

Inter-Pod Affinity

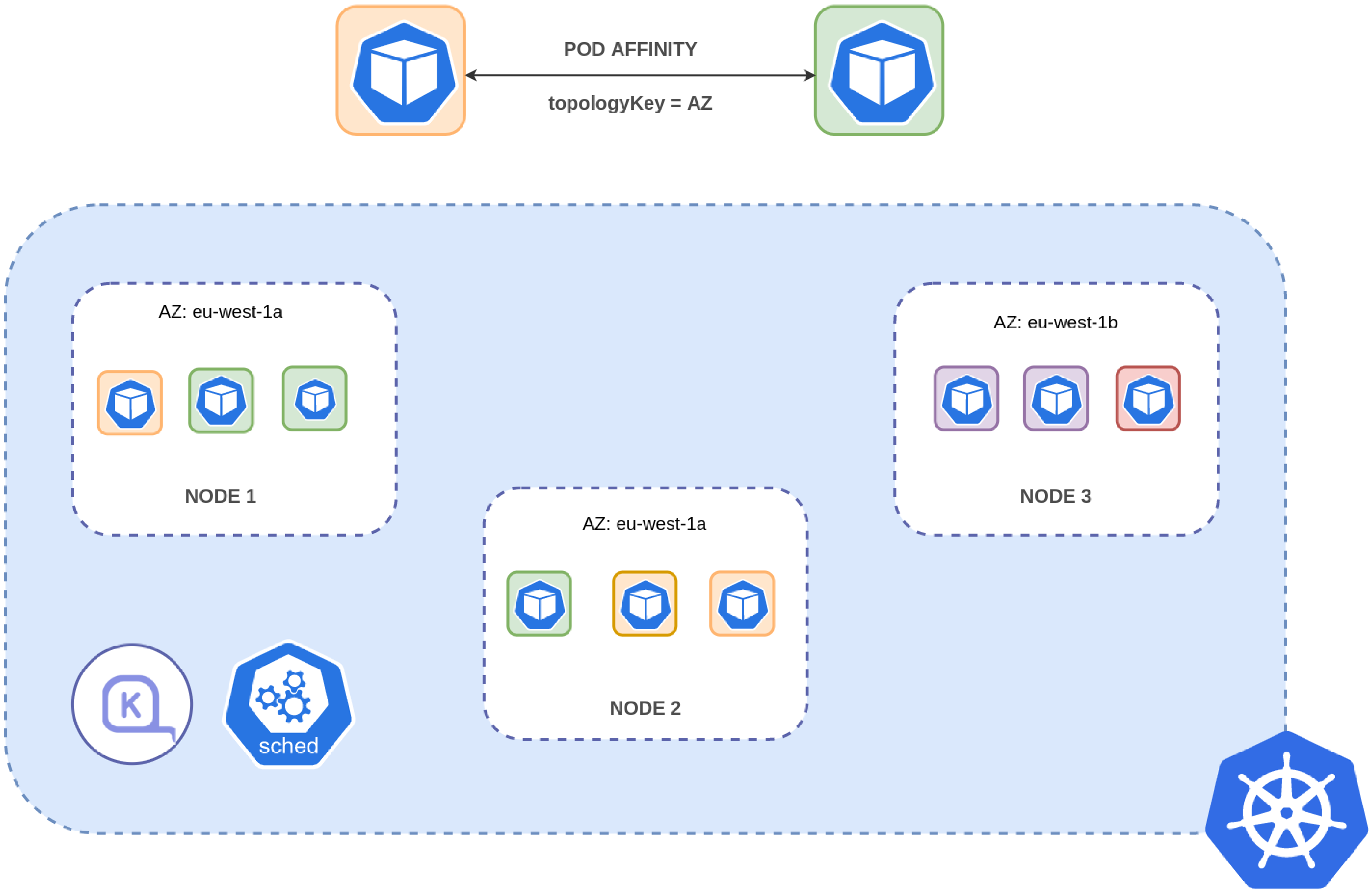
Applying scheduling constraints to pods is implemented by establishing relationships between pods and specific nodes or between pods themselves.

- *requiredDuringSchedulingIgnoredDuringExecution*
- *preferredDuringSchedulingIgnoredDuringExecution*

Pod Affinity

The podAffinity rule informs the scheduler to match pods that relate to each other based on their labels.

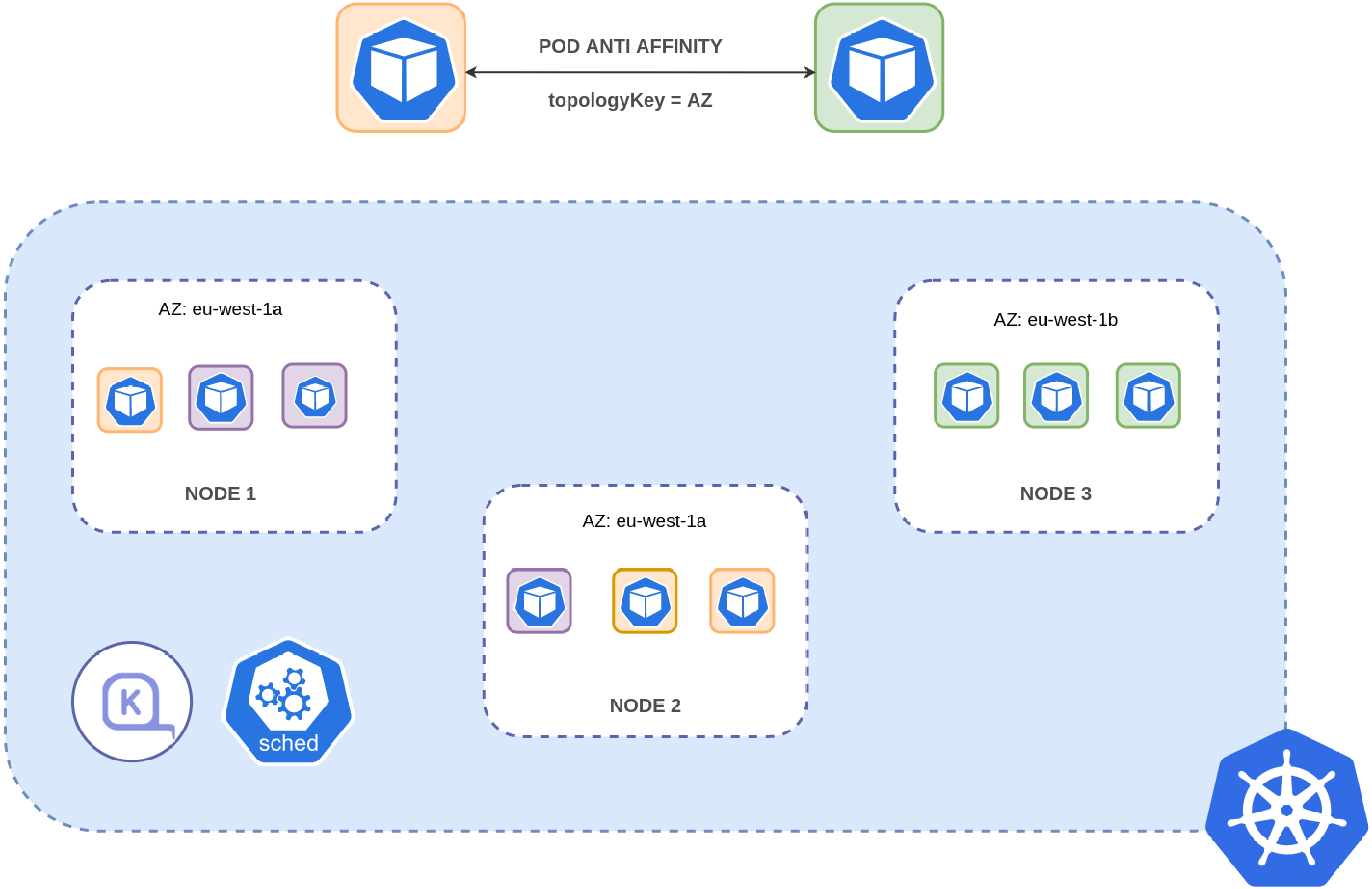
Pod Affinity

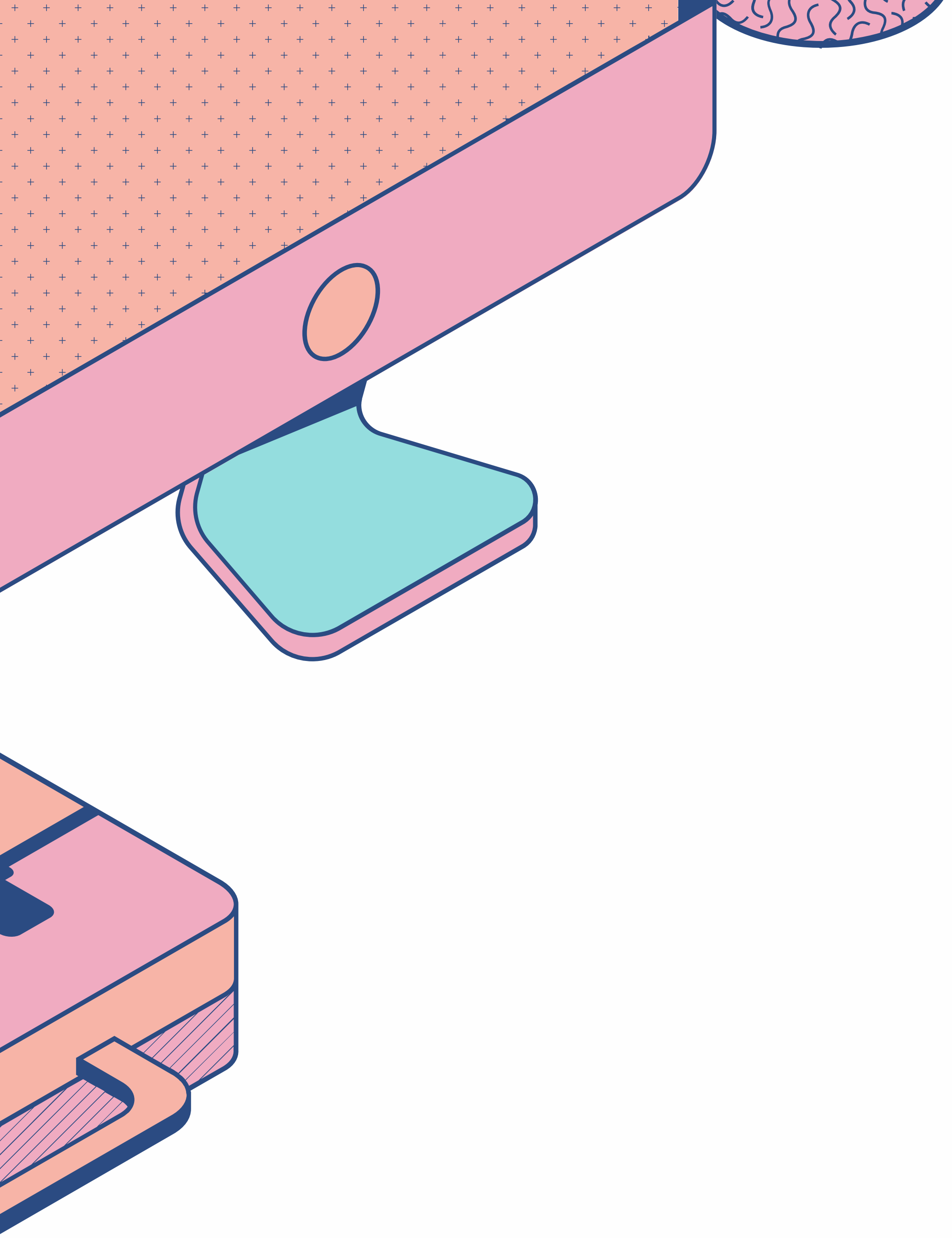


Pod Anti Affinity

The podAntiAffinity rule allows you to prevent certain pods from running on the same node if the matching label criteria are met.

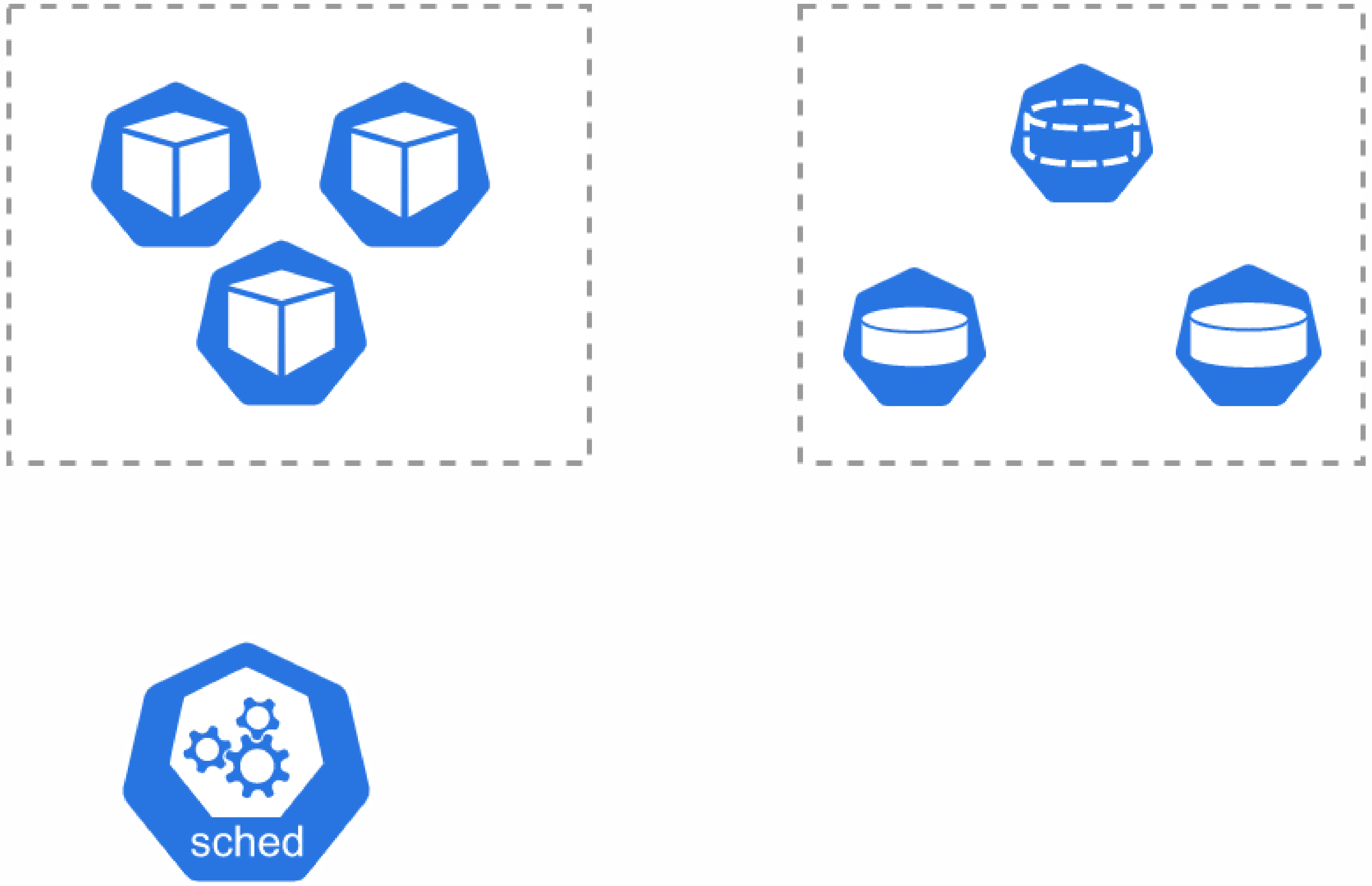
Pod Anti Affinity

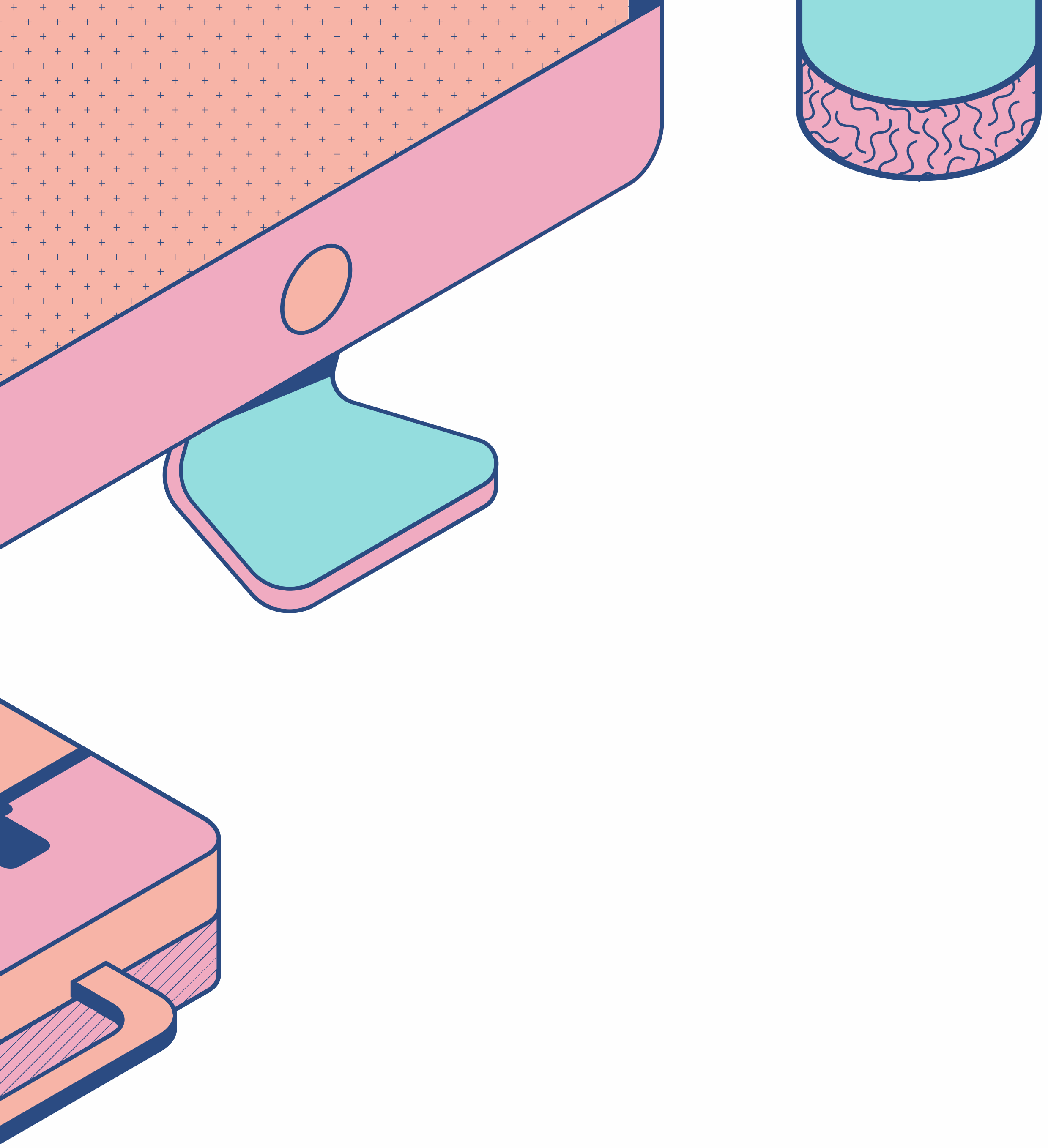




The Dark Past

Scheduling and dynamic provisioning of volumes were independent



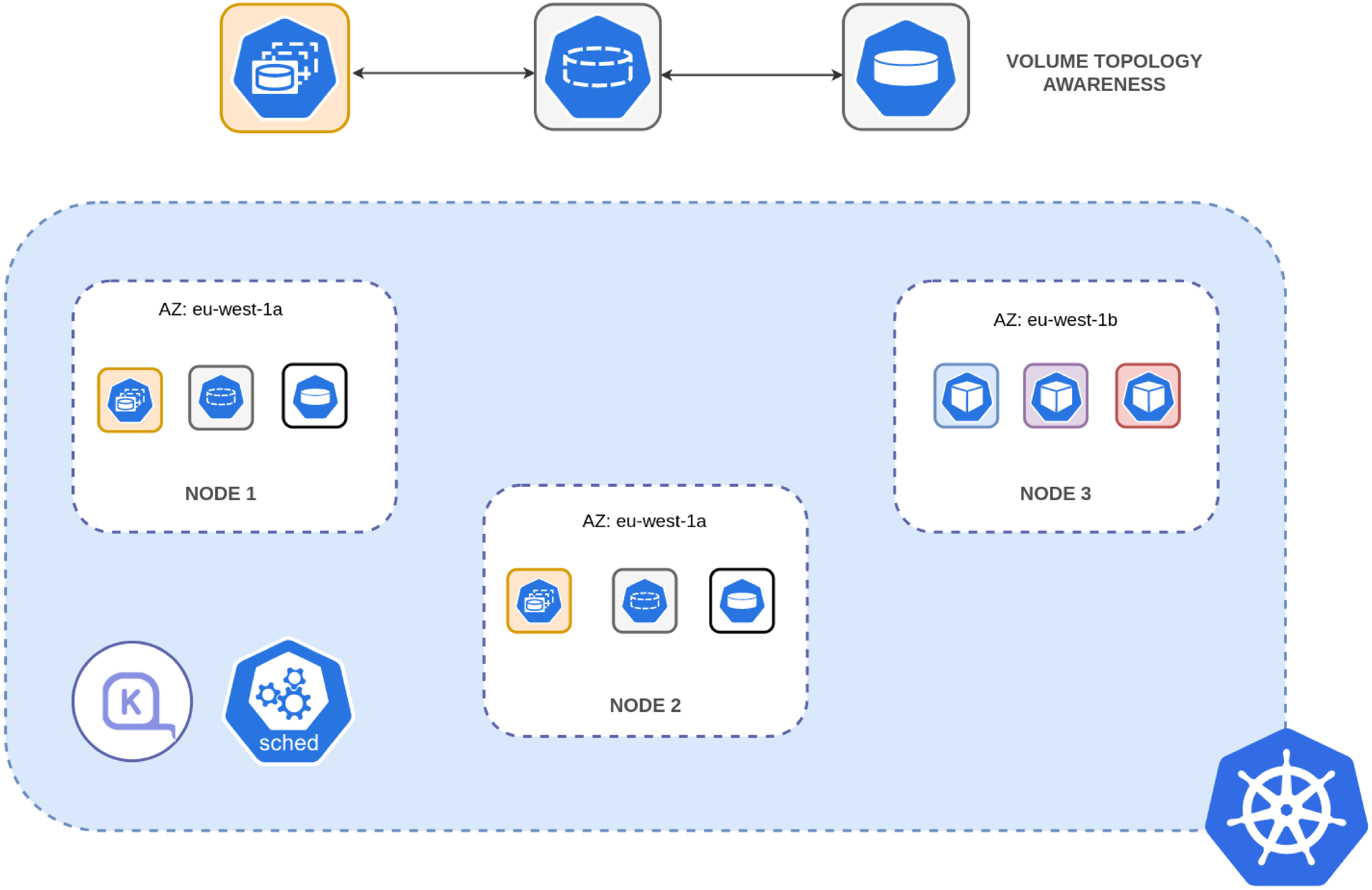


Volume Topology Awareness

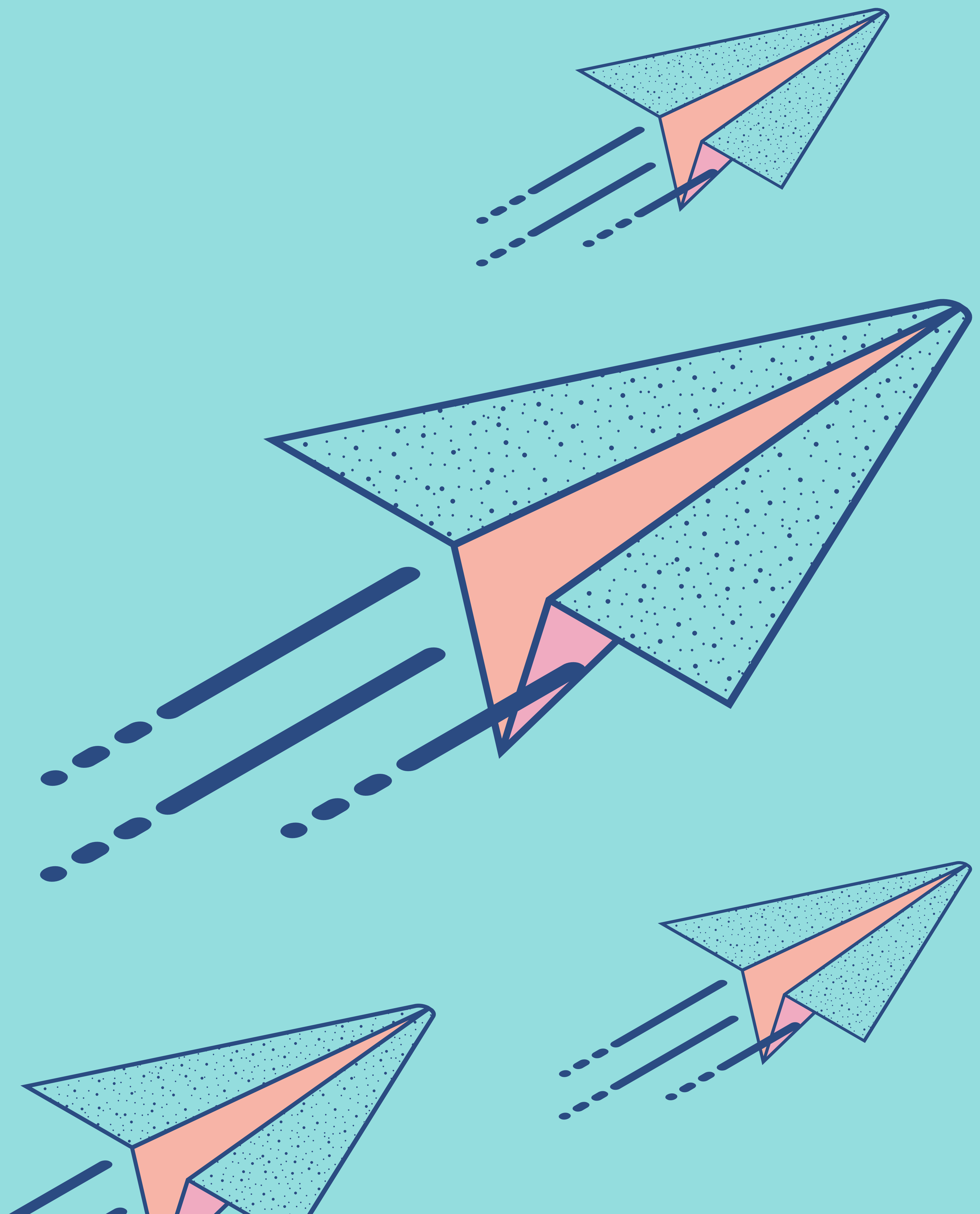
- Topology awareness ensures that pods are placed on nodes that meet their topology requirements (storage volumes)
- The goal is to provide alignment between topology resources and your workloads.

Topology manager (kubelet) + scheduler + Karpenter = Optimized scaling for stateful workloads

Volume Topology Awareness



Demo time...



Thank You Very Much!

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