Interconnecting cloud applications with

SKUPPER

https://skupper.io/

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Three words to remember

Skupper is a new approach to connect heterogeneous applications through
high level multi-routing capabilities.

The drivers for xxx cloud

Productivity

Cloud services for data analysis and resources for deployment/development at the same time

Keeping data on-site

Retaining sensitive information within the organization's premises with low latency

Efficient resource access

Expand capacity on demand and scale down

Availability & Reliability

Distributing workloads and disaster recovery processes.

Heterogeneous apps

Diverse applications integrate smoothly across multiple providers, optimizing performance and resource use.

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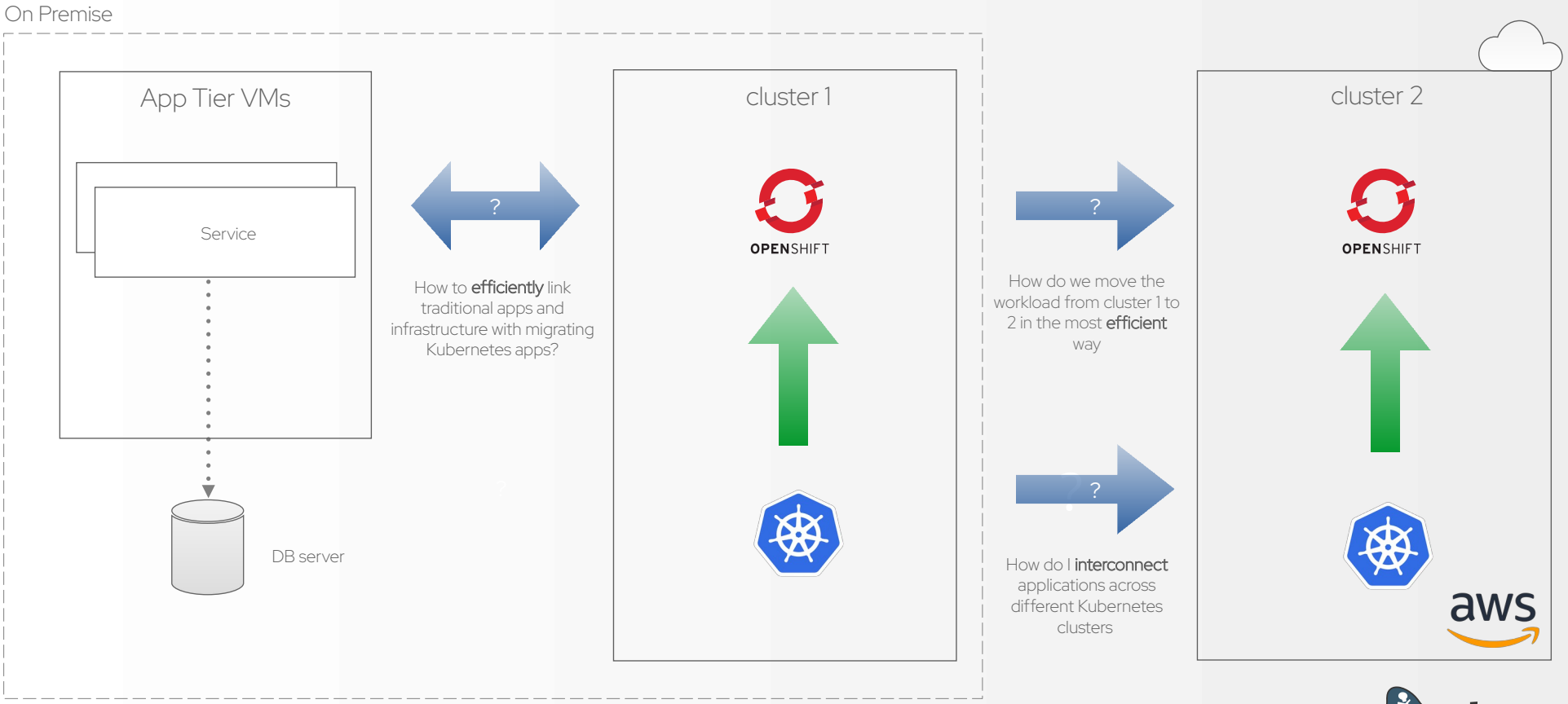
The Challenge



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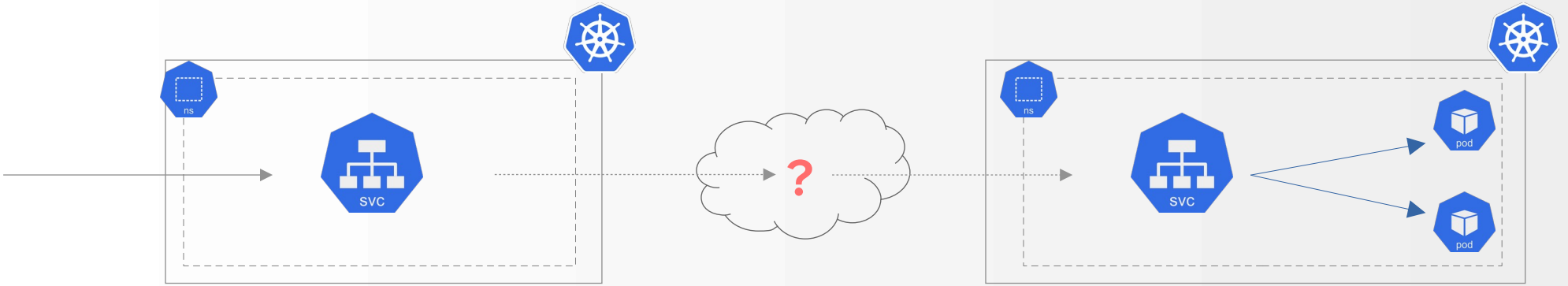
Do we have solutions?

Services across different clouds



Public IP addresses

- Directly accessible from internet
- No connectivity behind NAT
- Each IP is a co$t

Larger Provider Networks

- Network isolation
- Vendor lock in
- Requires cluster privs
- Each connection is a co$t

VPN

- Network isolation
- Iptables & firewall config
- Admin privs

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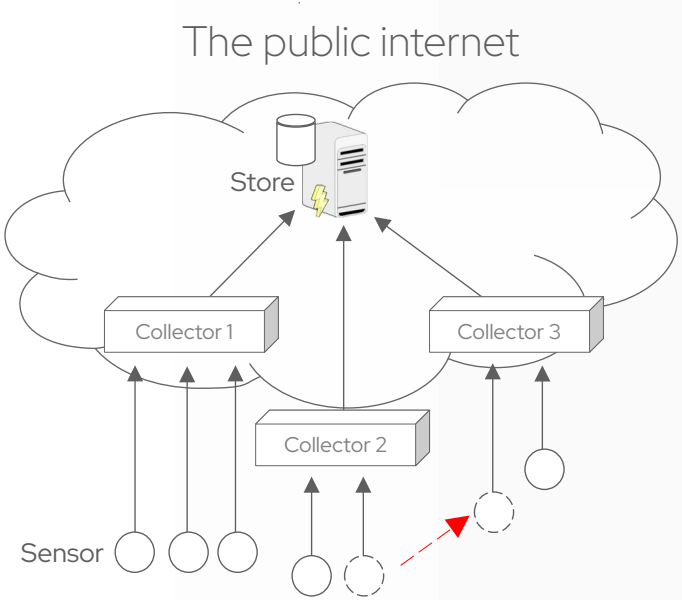
Edge connectivity



Configure each sensor to connect to its corresponding collector

Collector can be outside the public internet

Mobility issue

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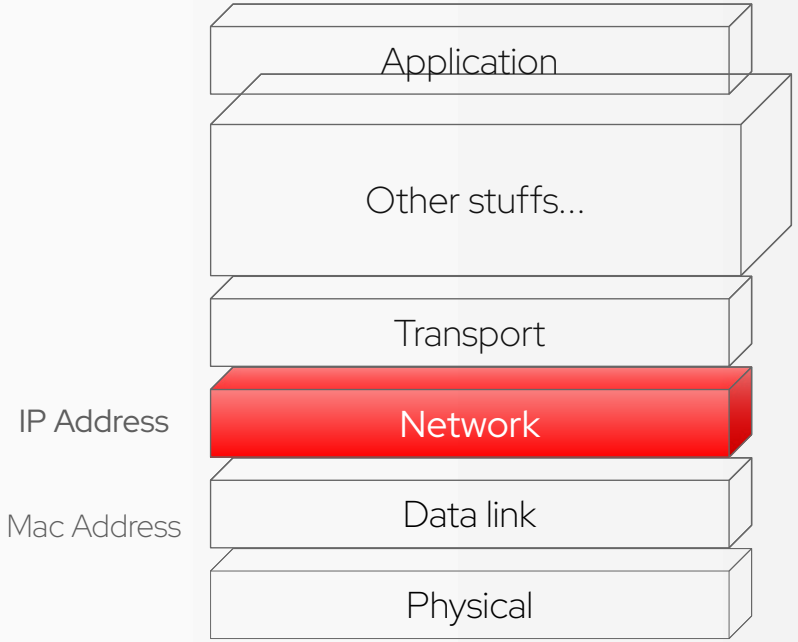
IP addressing constrains



The Internet protocol is not well suited for XXX cloud interconnect

We are trying to adapt our architecture with the network infrastructure

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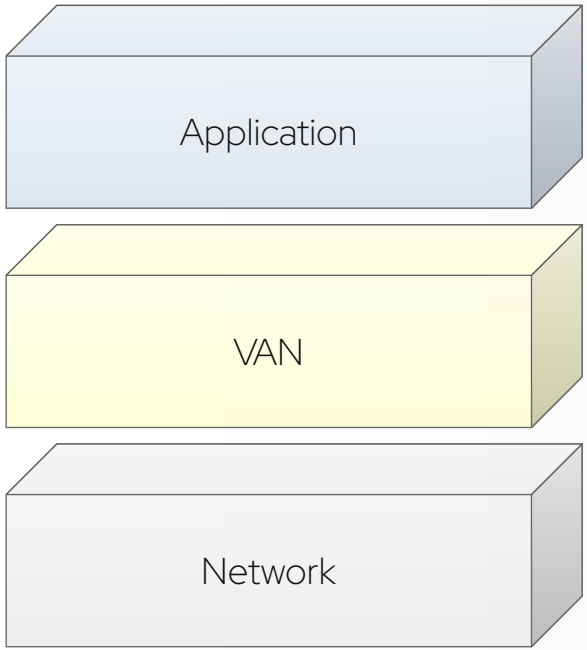
A different approach

Virtual application network



Connect services not hosts

Multiple services with the same address

Application doesn't need to be modified

Natural fit into container platforms

Lightweight

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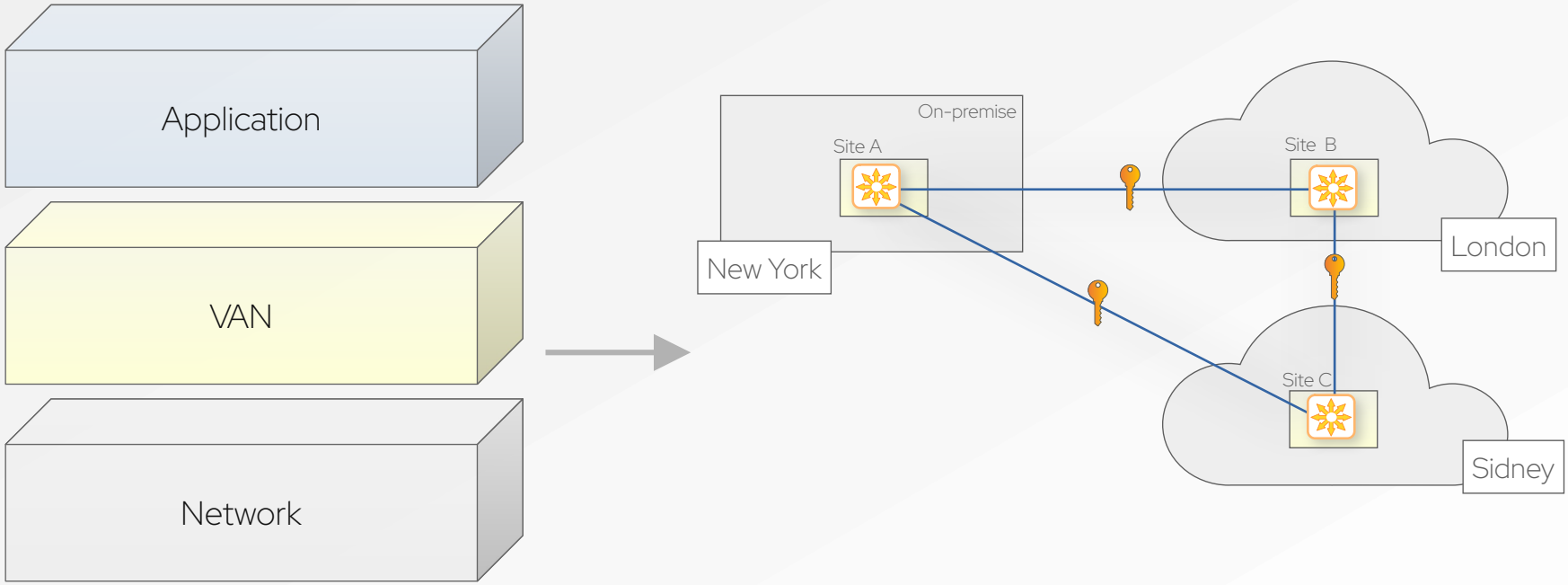
Network topology



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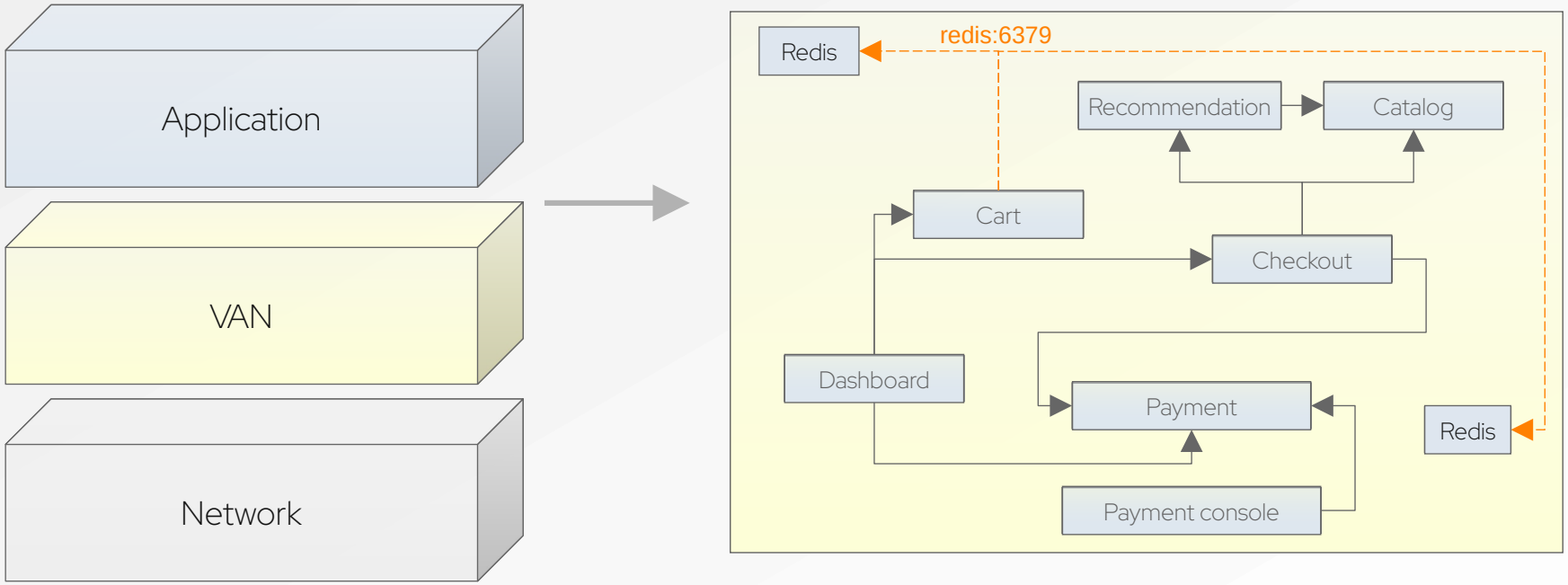
Application topology



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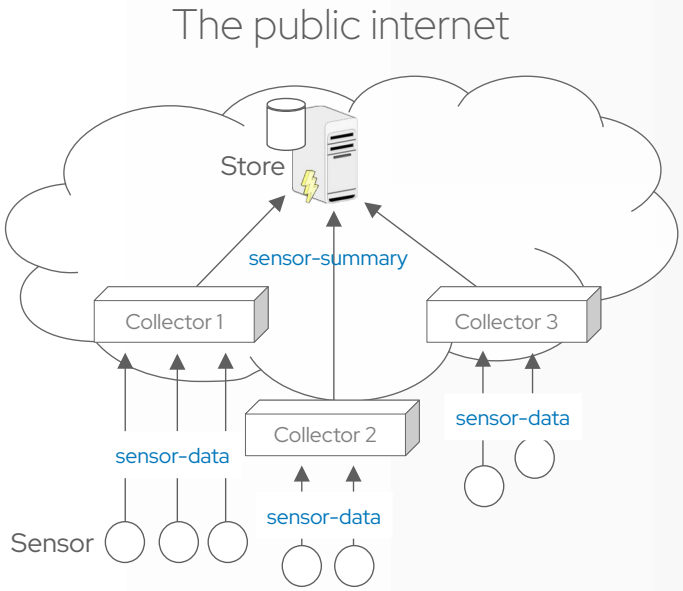
...back to edge connectivity case



curl -X POST http://sensor-data:8080/sensor-id

The VAN selects the most capable collector based on the sensor-data address

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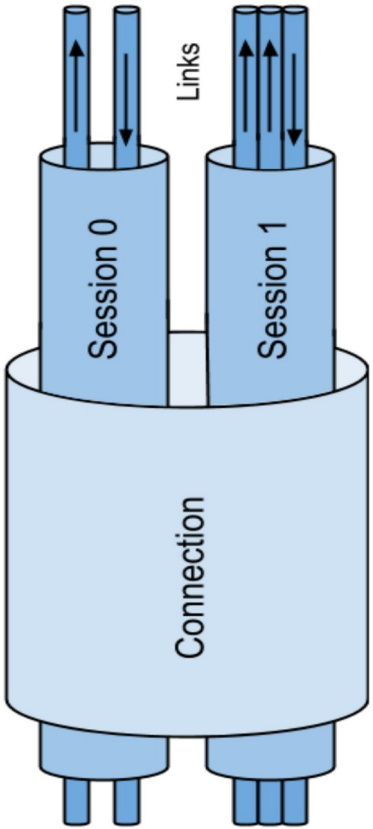
Service delivery and distributed systems



Multiplexing

Flow Control

Delivery guarantees

Asynchronous, full-duplex communication

mTLS

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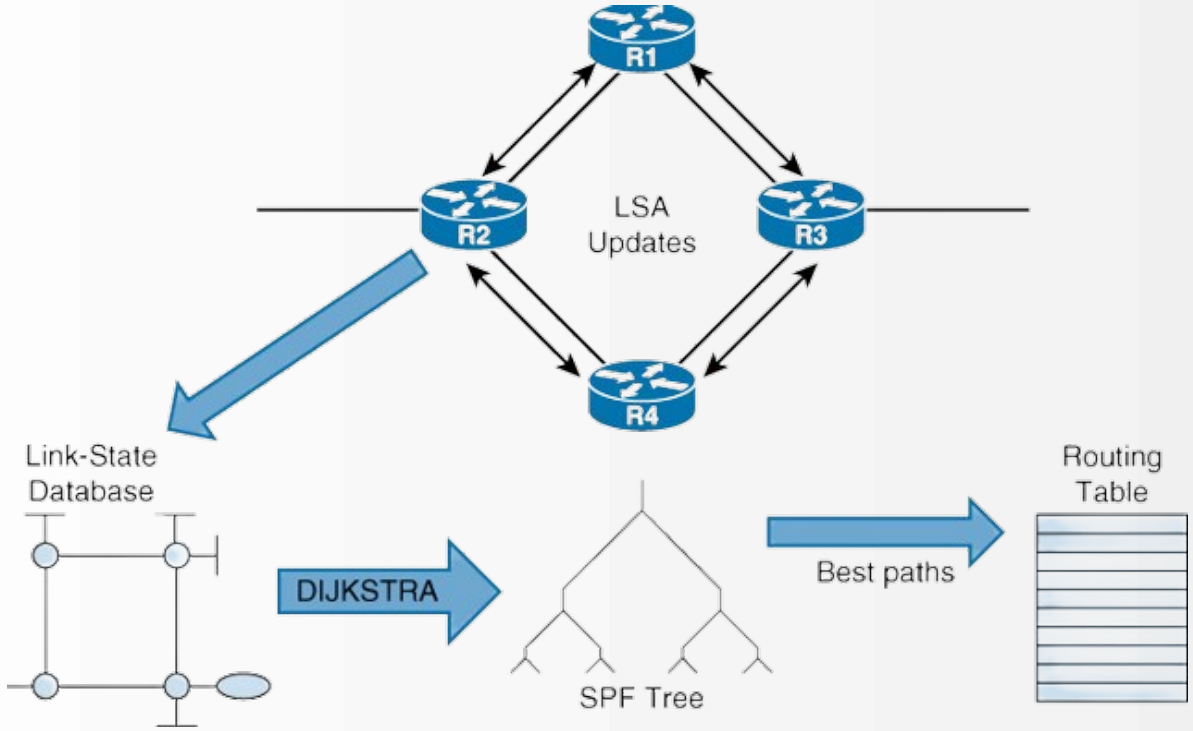
Optimizing Network Pathways and Mobile addressing



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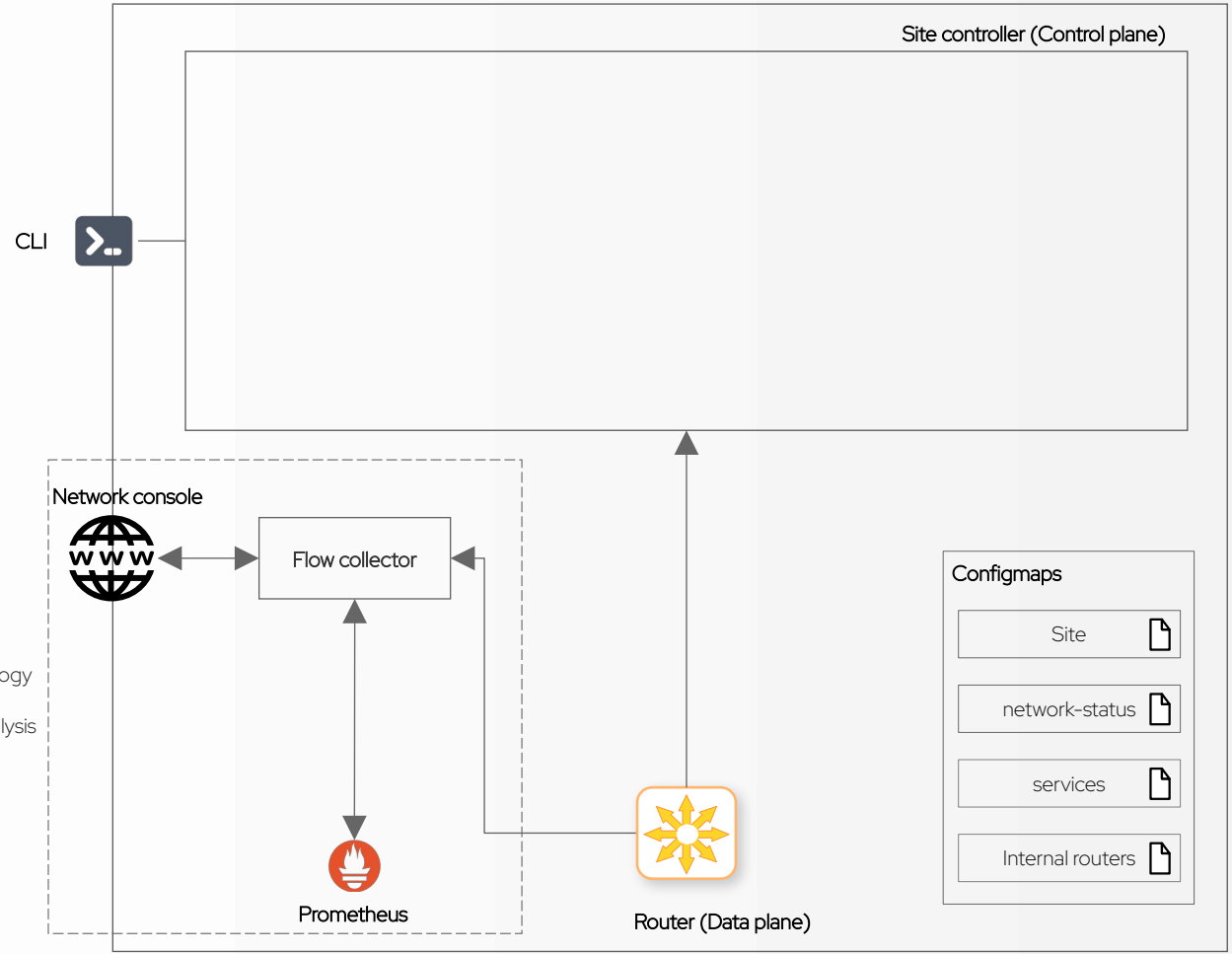
Architecture



Handle the communication between routers

Integration for: xKS, Docker/Podman, VMs, bare metal...

Creates a distributed application running across namespaces

Handle the policies

Real time Topology

Flow Metric analysis

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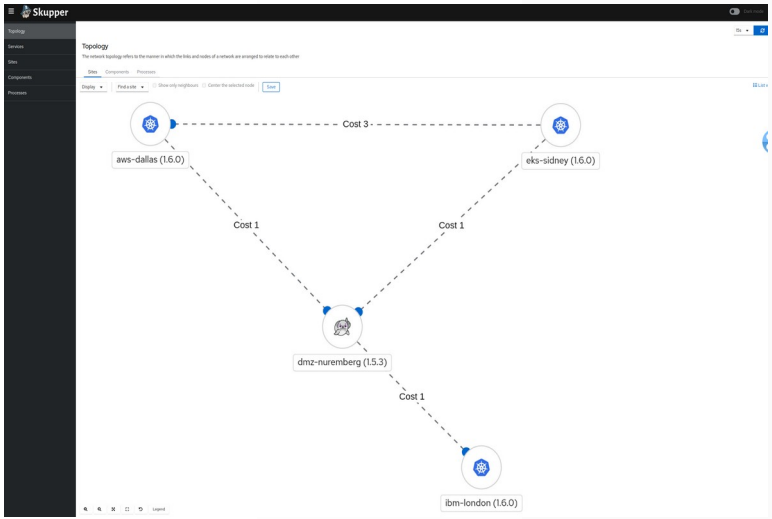
Console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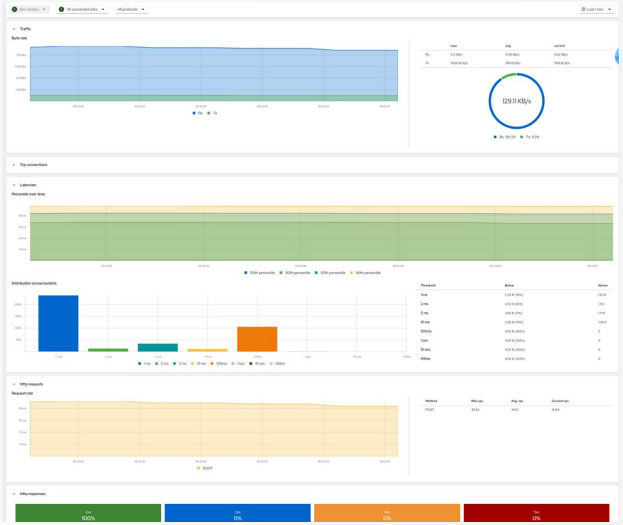
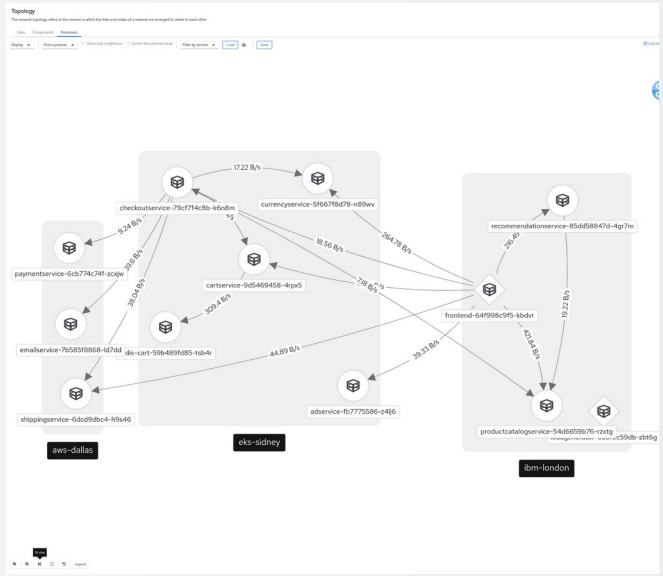
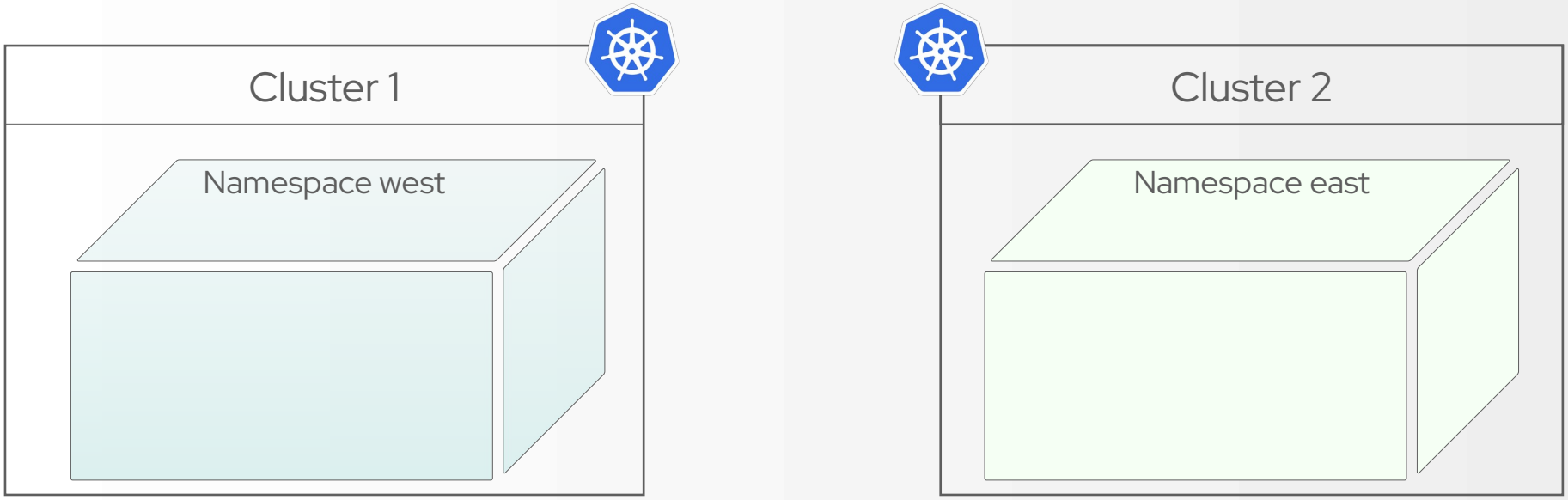
Topology
Cost 3
aws-dallas (1.6.0)
eks-sidney (1.6.0)
Cost 1
Cost 1
dmz-nuremberg (1.5.3)
Cost 1
ibm-london (1.6.0)




Topology
17.22 B/s
checkoutservice-79cf7f4c8b-k6n8m
currencyservice-5f667f8d78-n89wv
recommendationservice-85dd58847d-4gr7m
paymentservice-6cb774c74f-zcxjw
cartservice-9d5469458-4rpx5
frontend-64f998c9f5-kbdvr
emailservice-7b585f8868-ld7dd
dis-cart-59b489fd85-tsb4r
shippingservice-6dcd9dbc4-h9s46
adservice-fb7775586-z4lj6
productcatalogservice-54d6659b76-rzxtg
aws-dallas
eks-sidney
ibm-london

Create a Skupper network (I)



kubectl create namespace west

kubectl create namespace east

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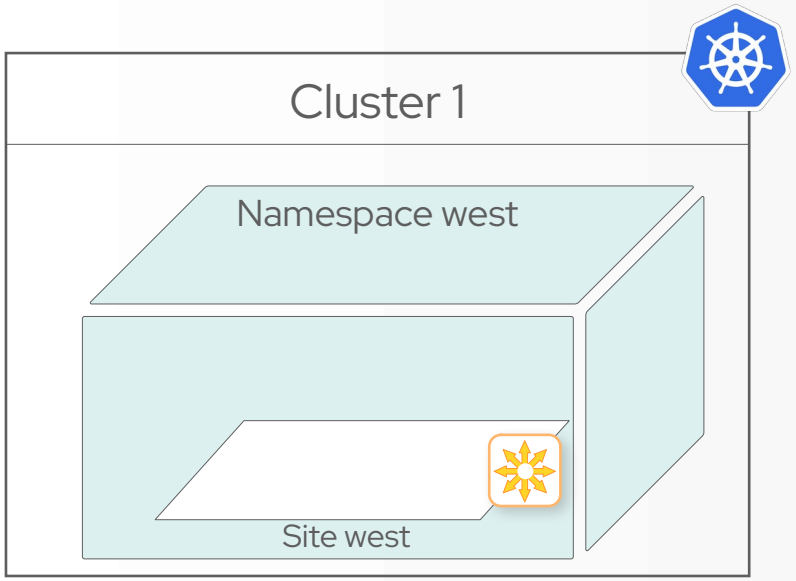
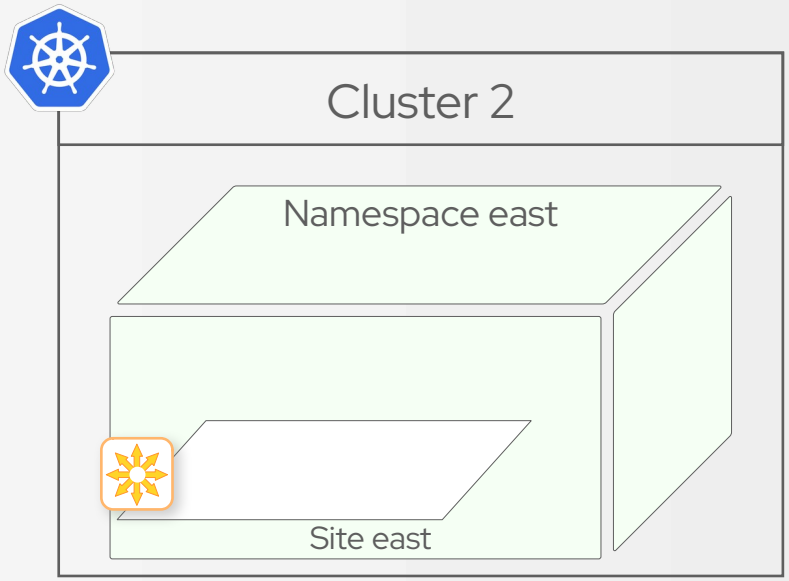
Create a Skupper network (II)





skupper init

skupper init

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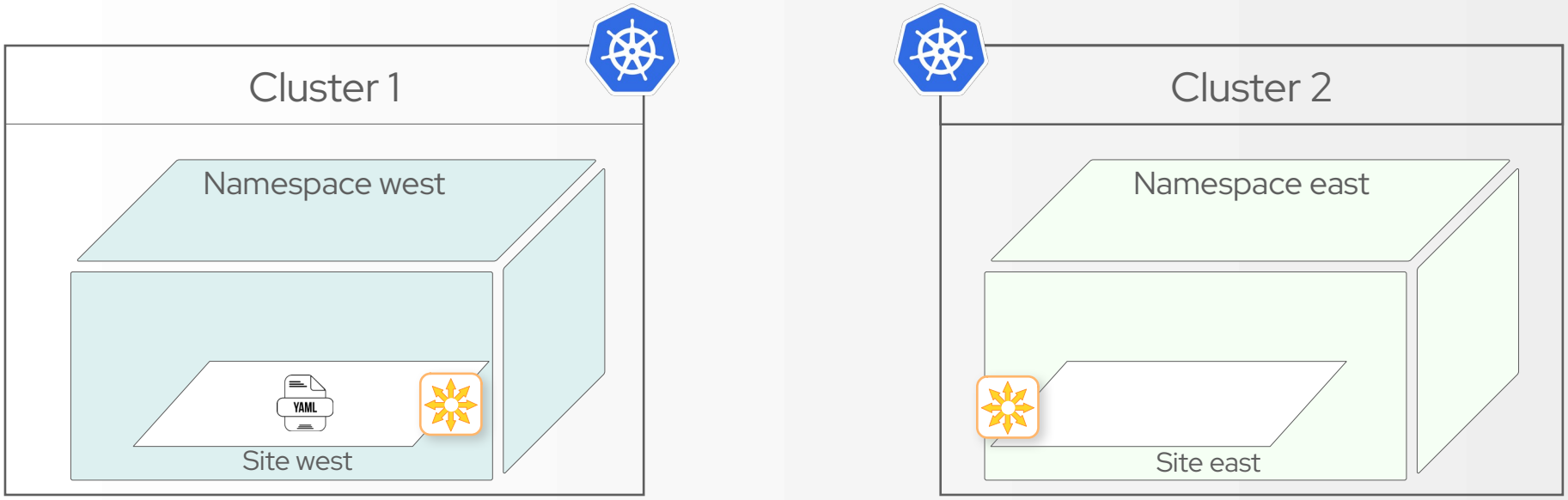
Create a Skupper network (III)



skupper token create my-token.yaml

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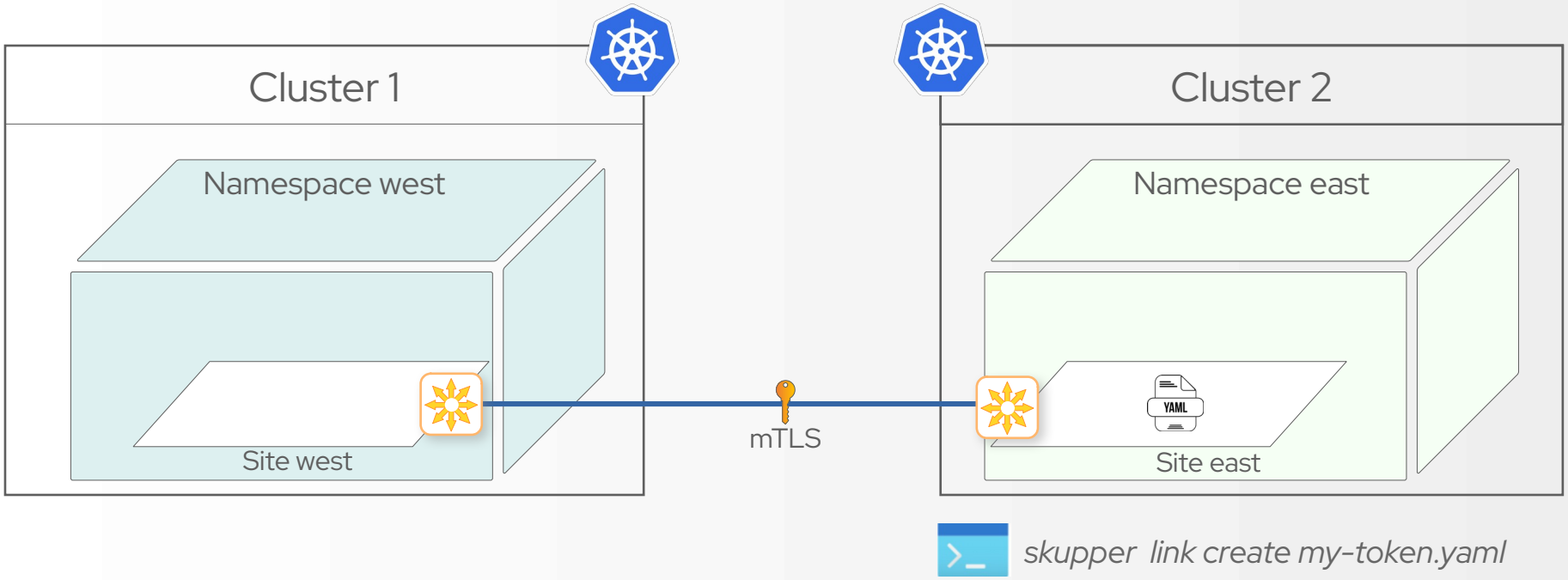
Create a Skupper network (IV)



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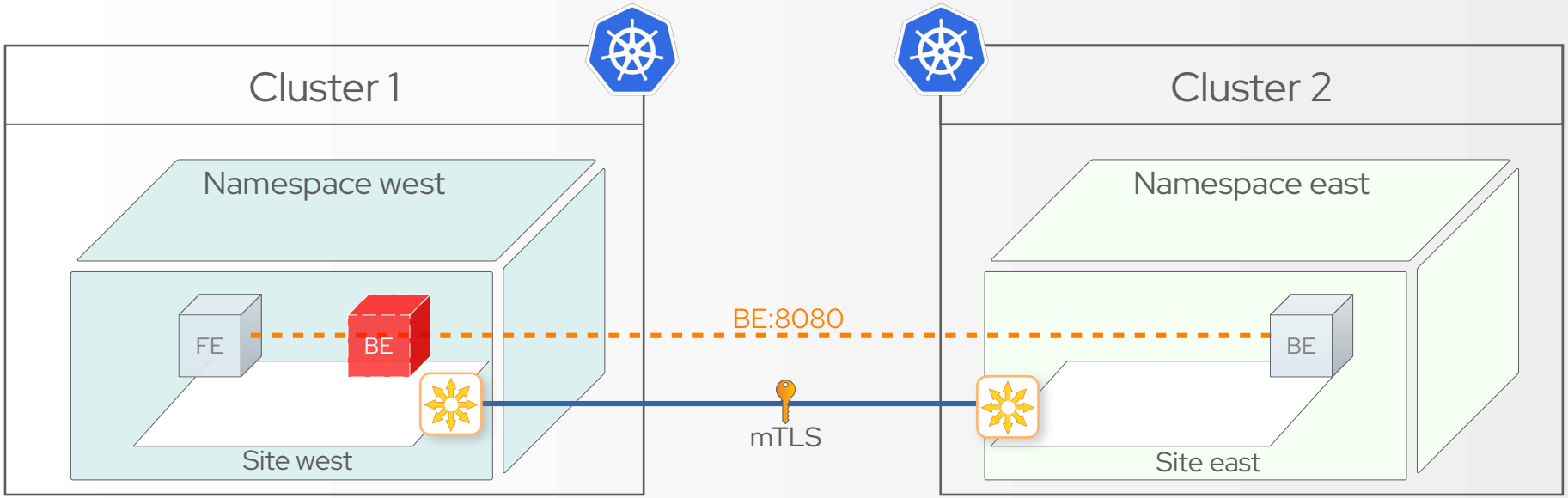
Create a Skupper network (IV)



kubectl create deployment FE –image /FE

kubectl create deployment BE –image /BE

skupper expose deployment/BE –port 8080

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```
└─ oc get pod,svc
NAME                                          READY   STATUS    RESTARTS   AGE
pod/frontend-67c6b84d49-446jh                 1/1     Running   0          53d
pod/skupper-router-78847cc997-lt84p           2/2     Running   0          38d
pod/skupper-service-controller-ffcd985c4-9wslr   1/1     Running   0          39d

NAME                          TYPE           CLUSTER-IP       EXTERNAL-IP                                PORT(S)
service/backend               ClusterIP      172.21.144.214   <none>                                     8080/TCP
service/frontend              LoadBalancer   172.21.144.173   b8071065-us-east.lb.appdomain.cloud        8080:32182/TCP
service/skupper               ClusterIP      172.21.152.116   <none>                                     8081/TCP
service/skupper-router        ClusterIP      172.21.185.106   <none>                                     55671/TCP,45671/TCP
service/skupper-router-local  ClusterIP      172.21.236.24    <none>                                     5671/TCP
```

```
└─ oc get svc/backend -o yaml
apiVersion: v1
kind: Service
metadata:
  annotations:
    internal.skupper.io/controlled: "true"
  creationTimestamp: "2024-02-27T15:00:55Z"
  name: backend
  namespace: vb-hello-west
  ownerReferences:
  - apiVersion: apps/v1
    kind: Deployment
    name: skupper-router
    uid: 9733e510-1eeb-4408-908d-ee1686ee5a02
  resourceVersion: "55134134"
  uid: 0b66ba6c-31c9-4dbf-9831-fb31cdd2c43a
spec:
  clusterIP: 172.21.144.214
  clusterIPs:
  - 172.21.144.214
  internalTrafficPolicy: Cluster
  ipFamilies:
  - IPv4
  ipFamilyPolicy: SingleStack
  ports:
  - name: port8080
    port: 8080
    protocol: TCP
    targetPort: 1024
  selector:
    application: skupper-router
    skupper.io/component: router
  sessionAffinity: None
  type: ClusterIP
status:
  loadBalancer: {}
```

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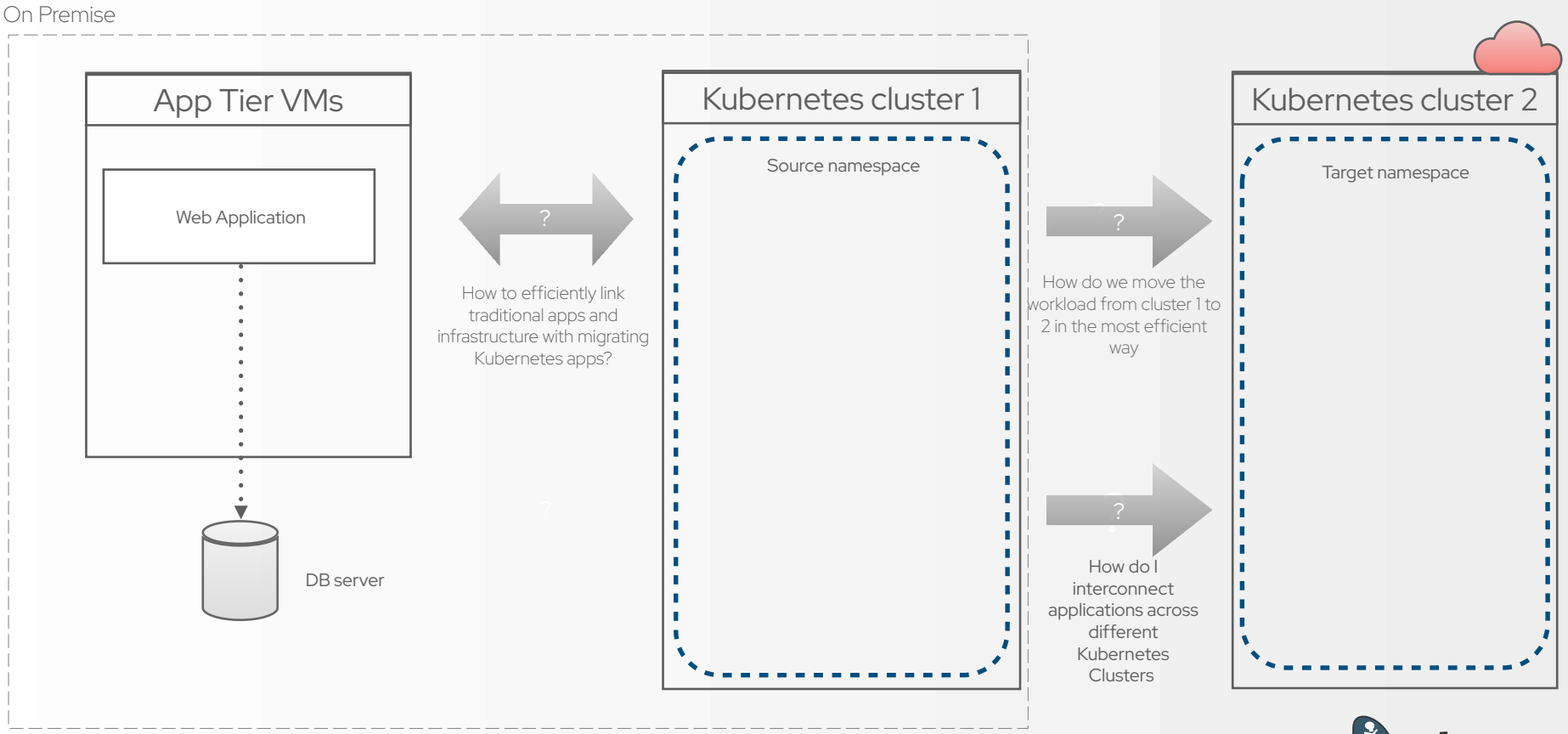
Back to the original problems

Dynamic migration (I)



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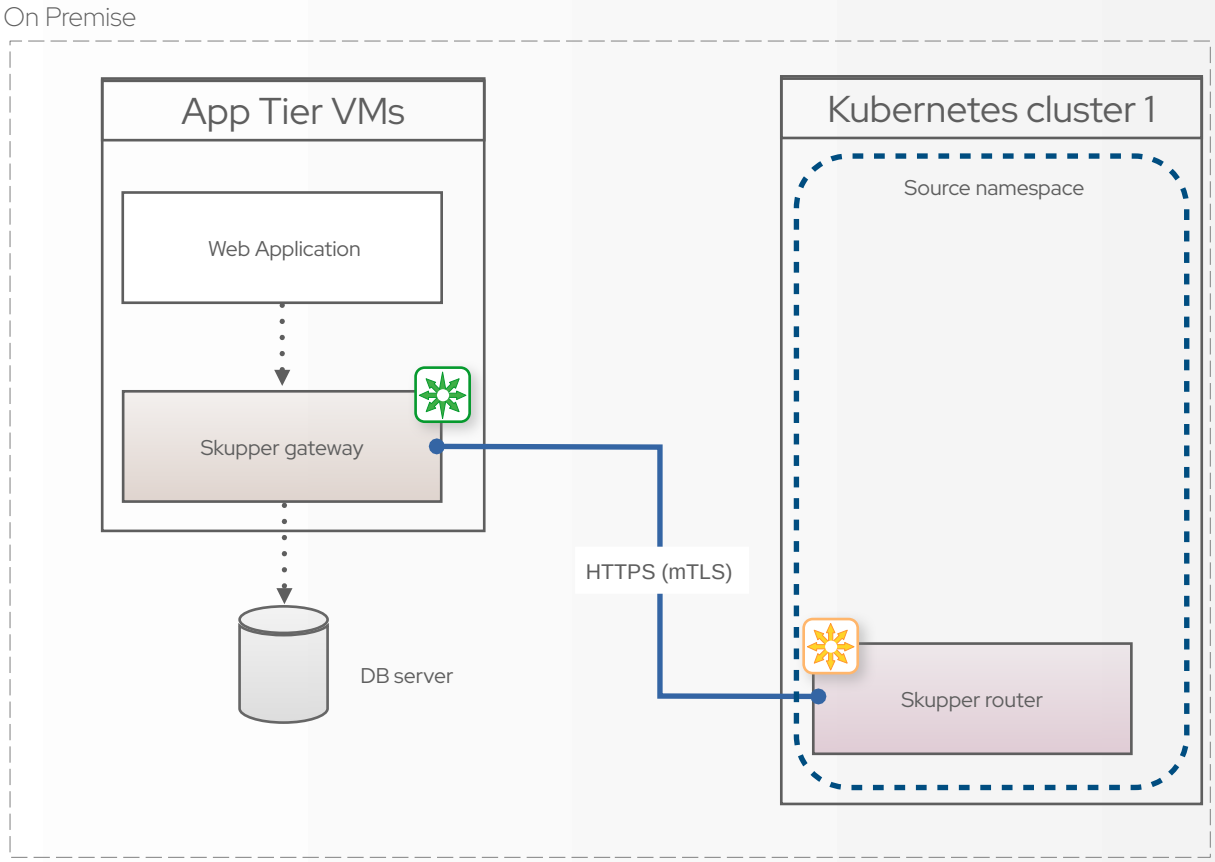
Dynamic migration (II)



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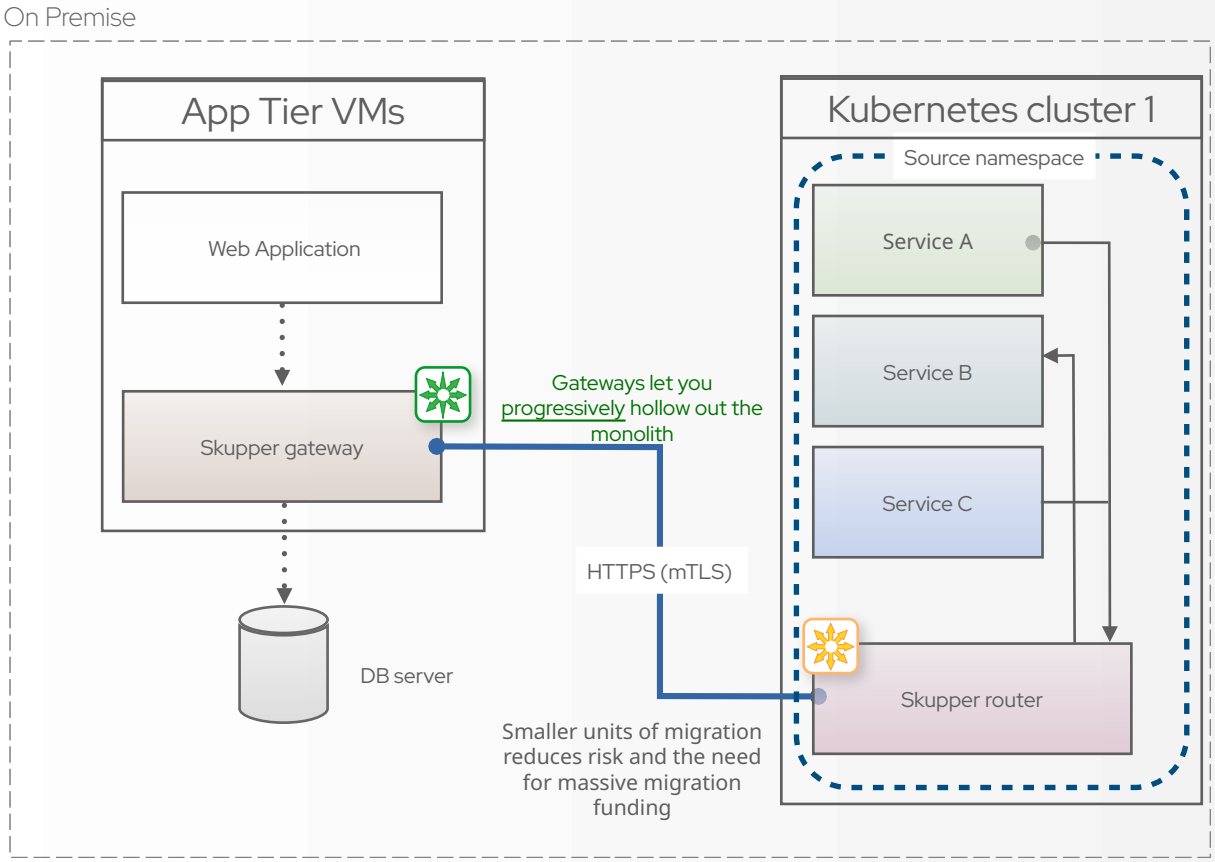
Dynamic migration (III)



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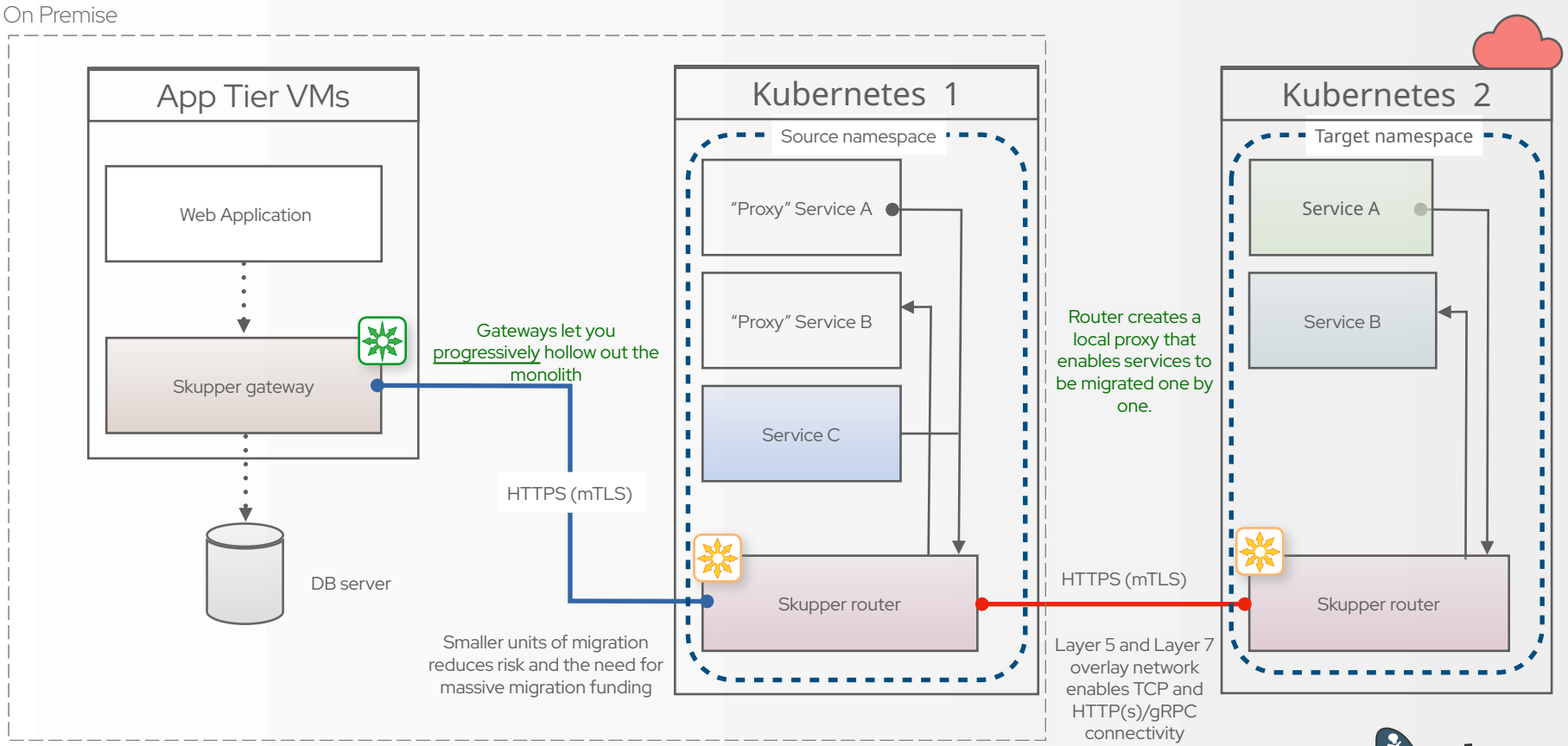
Dynamic migration (IV)



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Objectives

Declarative Model

Multi-tenancy (Skupper-X project)

Thank you