RESILIENCE

REALIZED

KubeCon | CloudNativeCon

North America 2021

Taking your database beyond the border of a single Kubernetes cluster

Ty Morton, Google
Christopher Bradford, DataStax

Who are we?

Ty Morton, Google
Customer Engineer
@tymorton

Christopher Bradford, DataStax
K8ssandra Project Lead
@bradfordcp

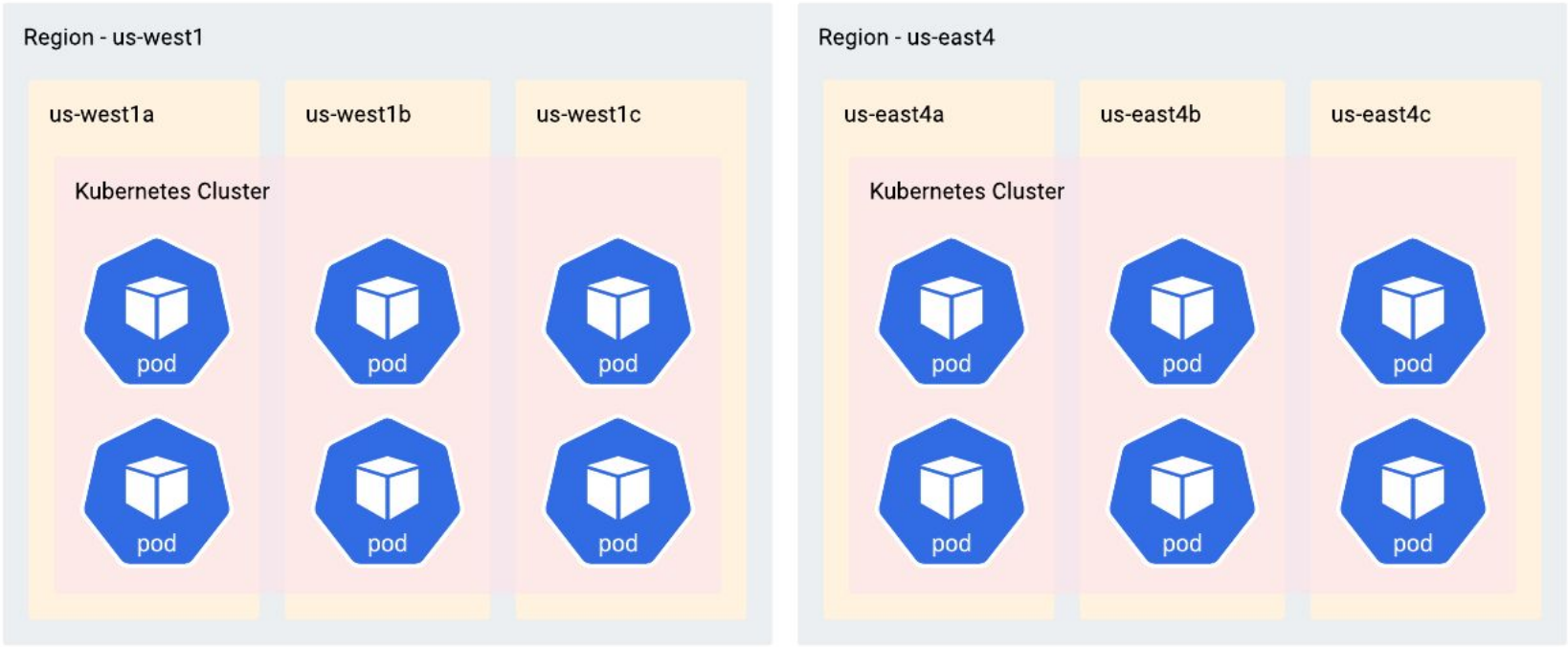
What are we trying to do?

Expand a single-region Apache Cassandra cluster from one Kubernetes environment to two.

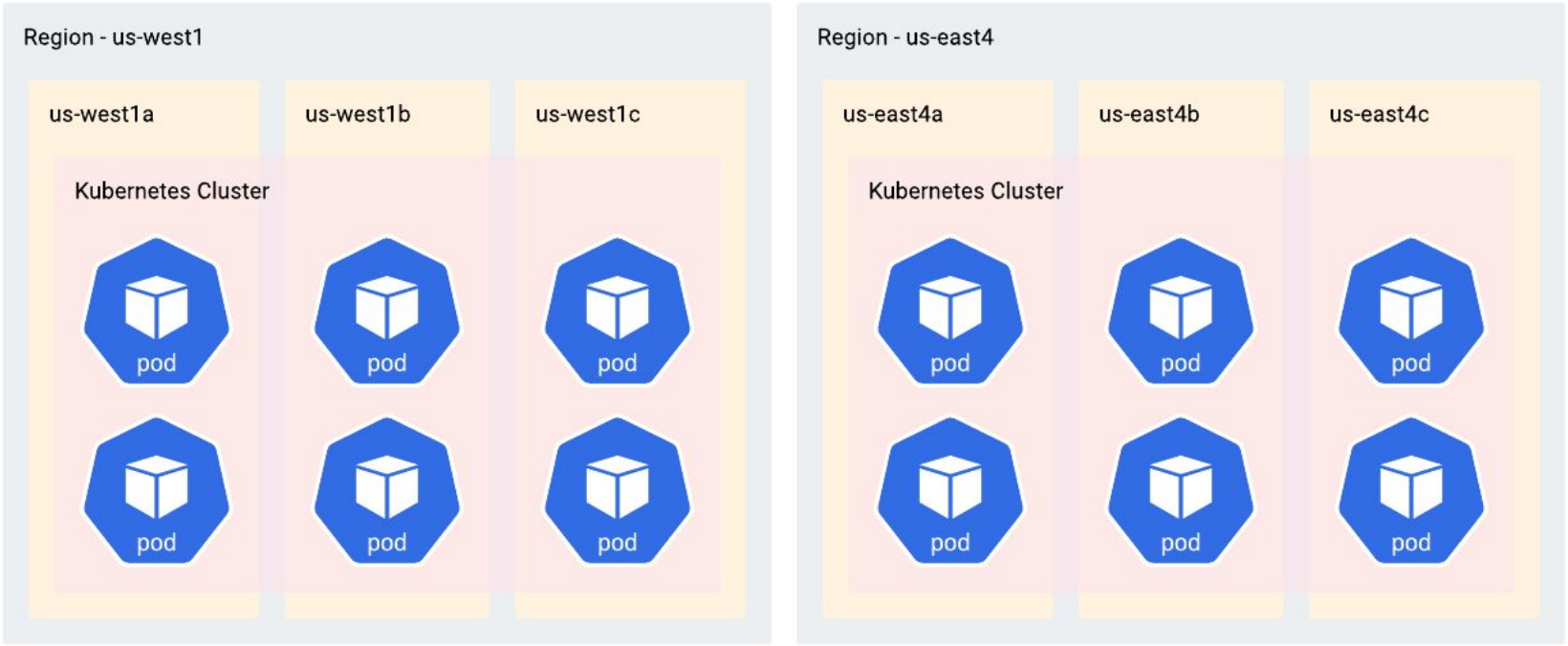
Existing deployment:

- 1x region
- 3x zones
- 6x K8s workers
- 6x C* pods

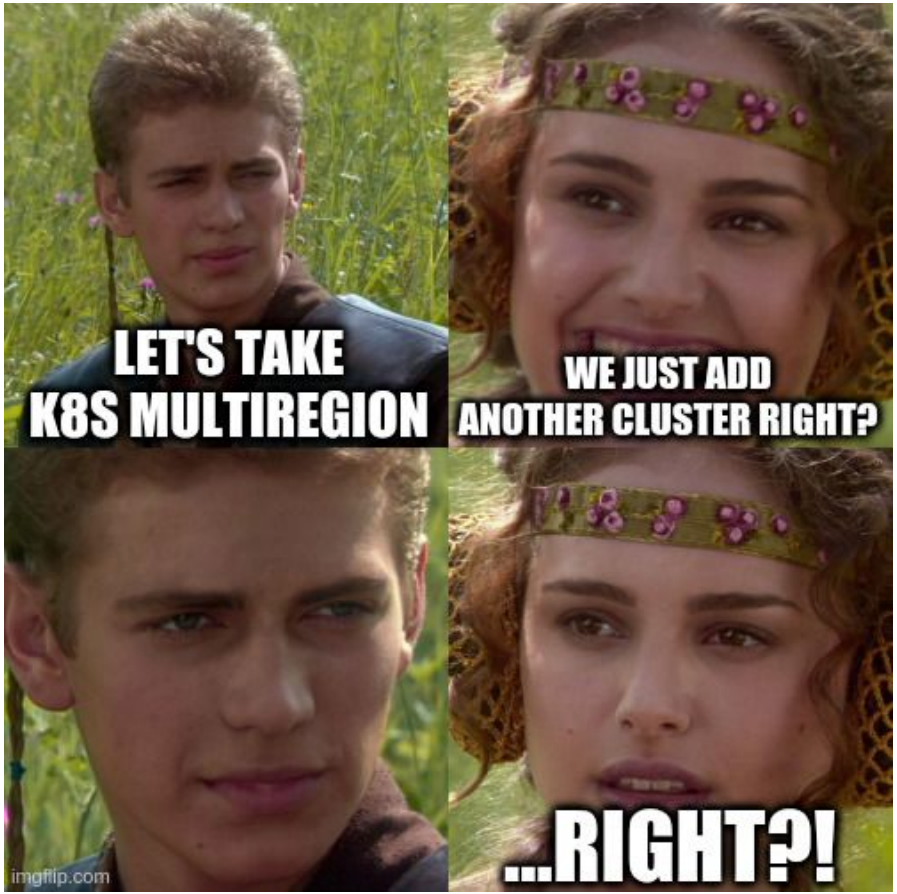
What are we trying to do?



Seems simple...

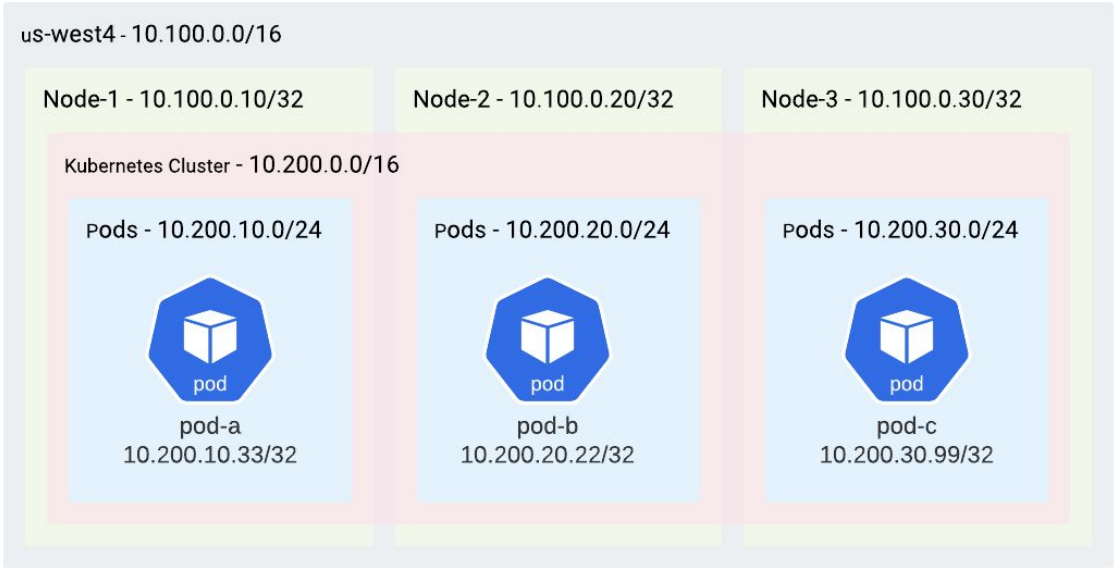


Right?


LET'S TAKE
K8S MULTIREGION
WE JUST ADD
ANOTHER CLUSTER RIGHT?
...RIGHT?!
imgflip.com

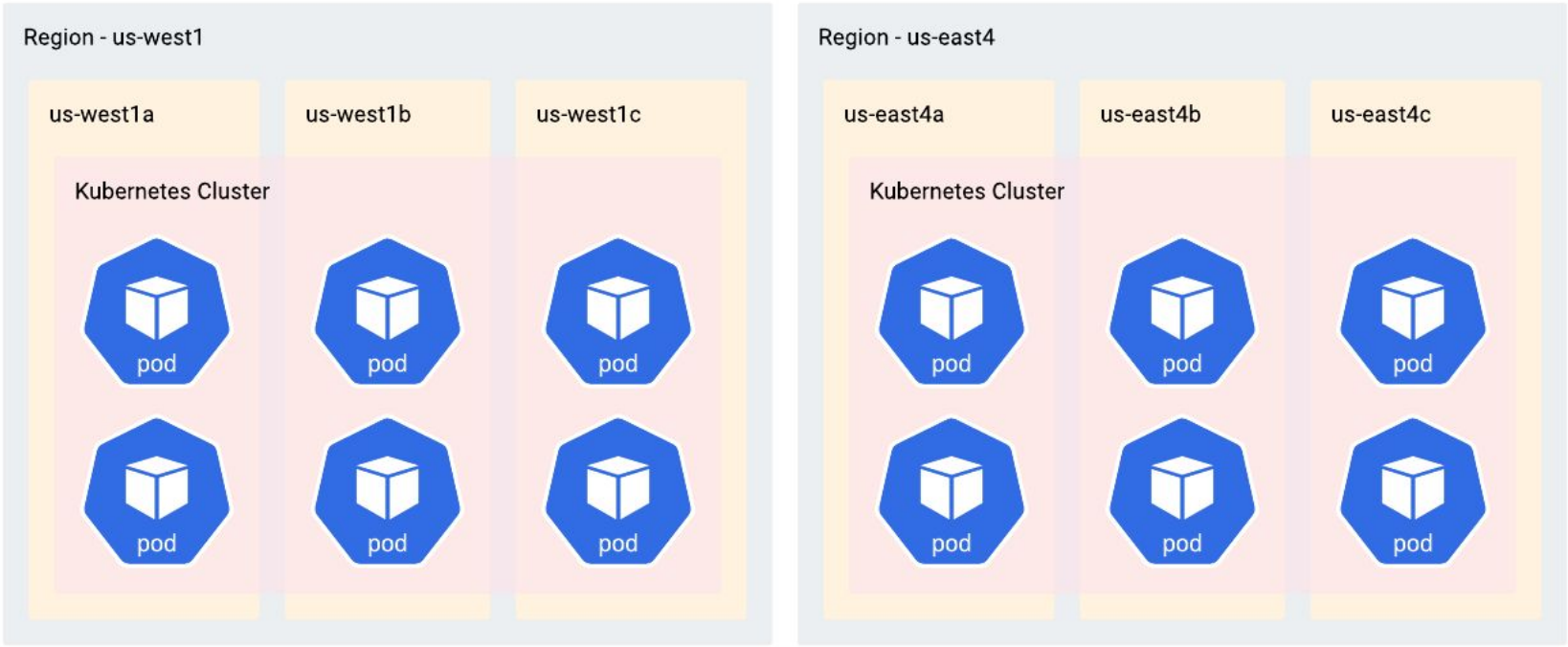
Wait a minute...

Networking

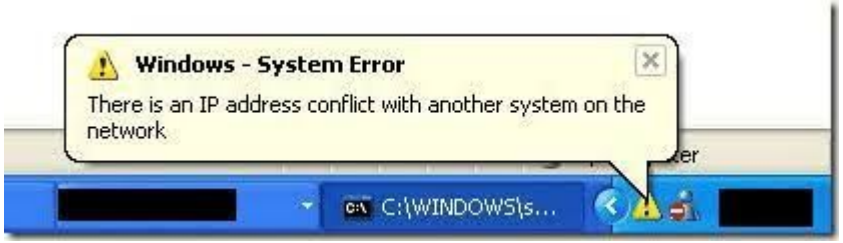

us-west4 - 10.100.0.0/16
Node-1 - 10.100.0.10/32
Node-2 - 10.100.0.20/32
Node-3 - 10.100.0.30/32
Kubernetes Cluster - 10.200.0.0/16
Pods - 10.200.10.0/24
pod
pod-a
10.200.10.33/32
Pods - 10.200.20.0/24
pod
pod-b
10.200.20.22/32
Pods - 10.200.30.0/24
pod
pod-c
10.200.30.99/32

NETWORKING
IT'S KIND OF A BIG DEAL!
memegenerator.net

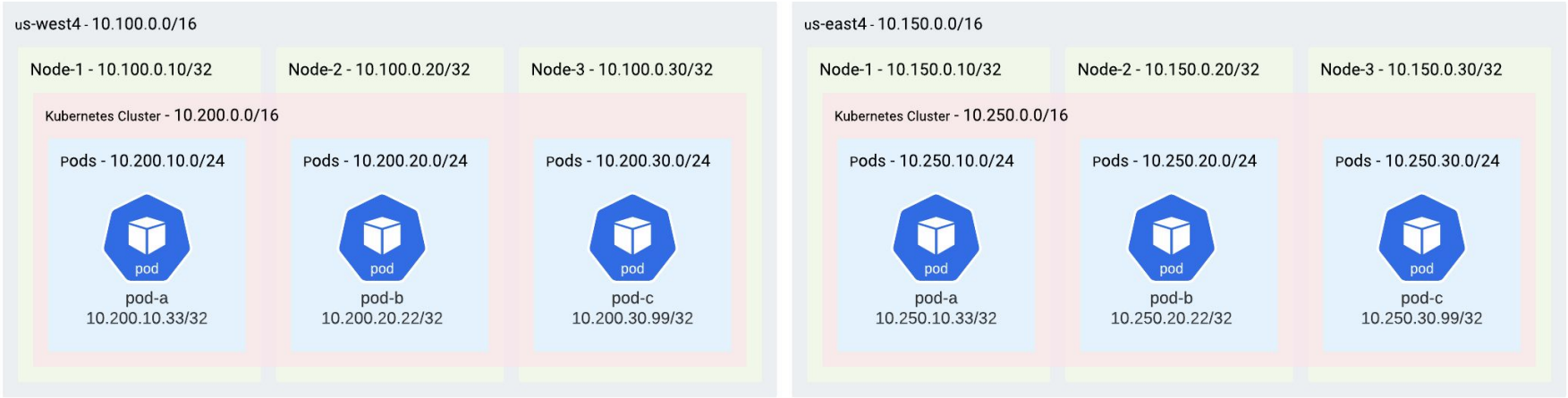
What are we trying to do?



Address Collisions



Flatten It Out



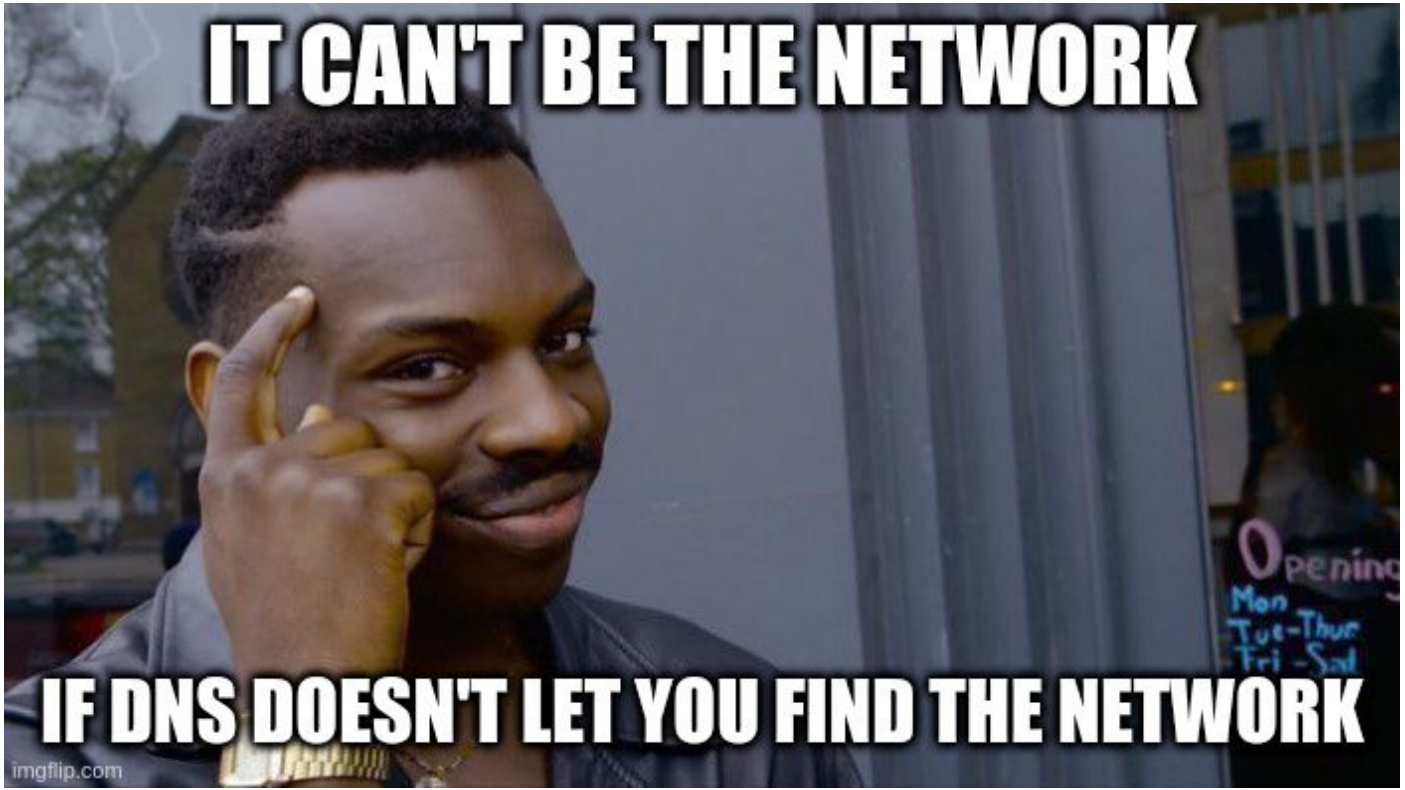
It depends...

MAGIC
quickmeme.com

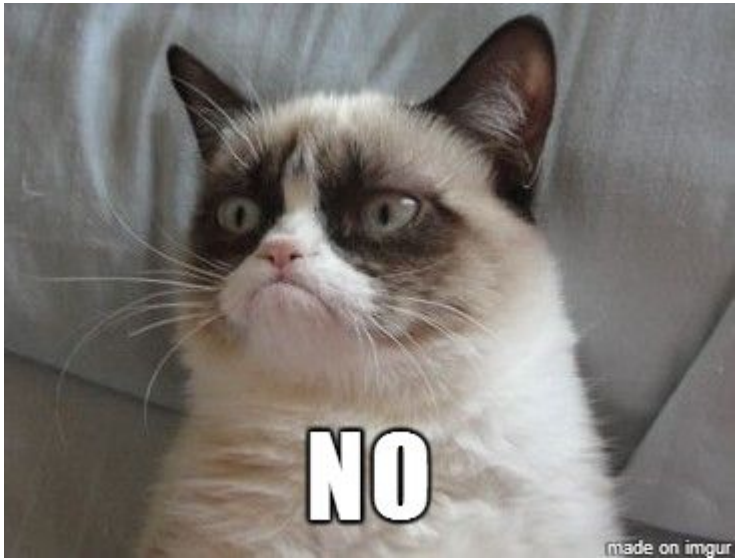
fish /home/bradfordcp
~ $ ping 1.1.1.1
ping: connect: Network is unreachable
~ [2] $

Overlay Networks

Service Discovery



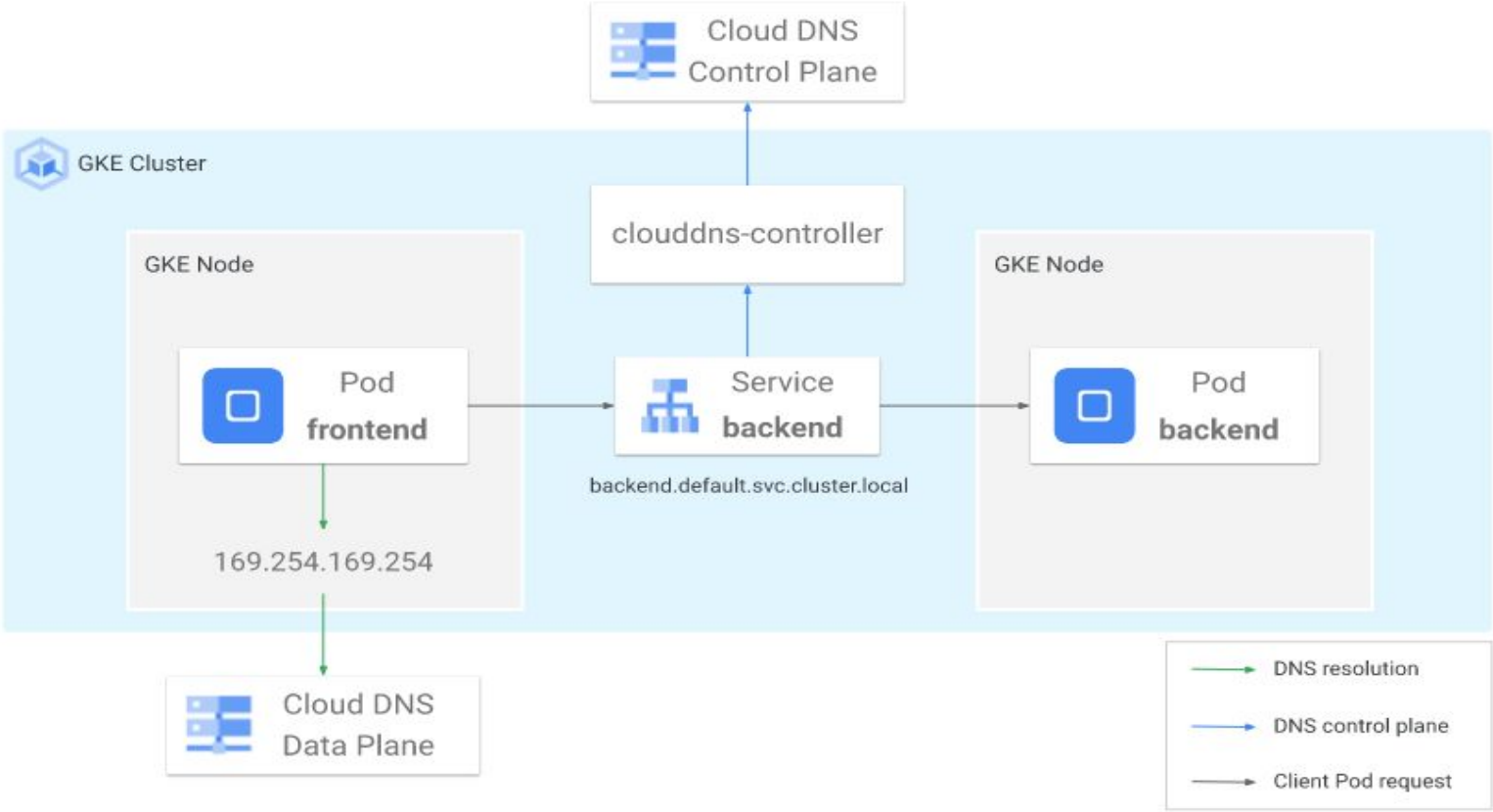
DNS Stubs



Kubernetes has support for DNS stubs

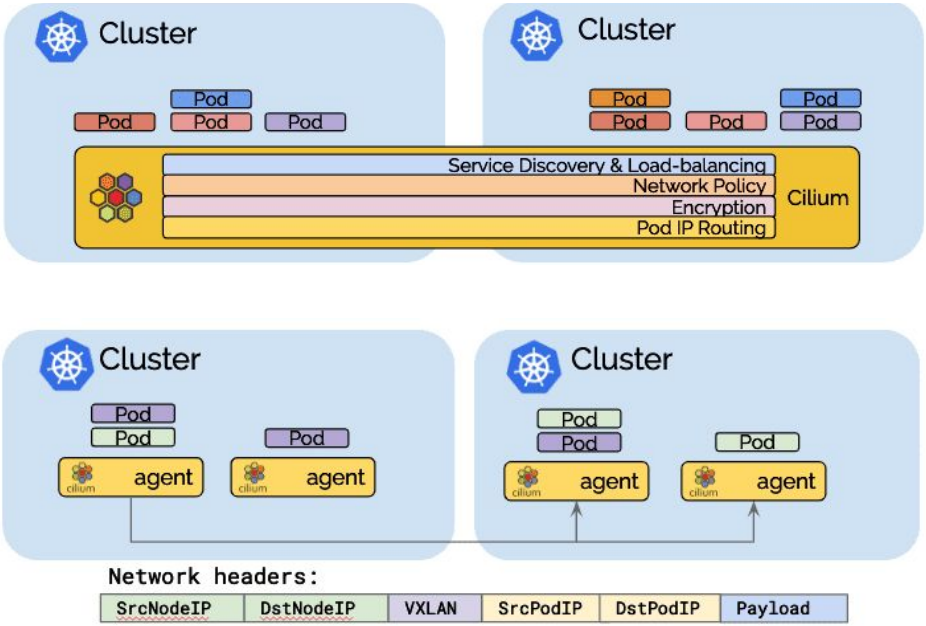
```
us-west4.cluster.local:53 {
  errors
  cache 30
  forward . 10.150.0.1
}
```

Managed DNS


Cloud DNS
Control Plane
GKE Cluster
clouddns-controller
GKE Node
GKE Node
Pod
frontend
Service
backend
Pod
backend
backend.default.svc.cluster.local
169.254.169.254
Cloud DNS
Data Plane
DNS resolution
DNS control plane
Client Pod request

Strong Alternatives

Cilium



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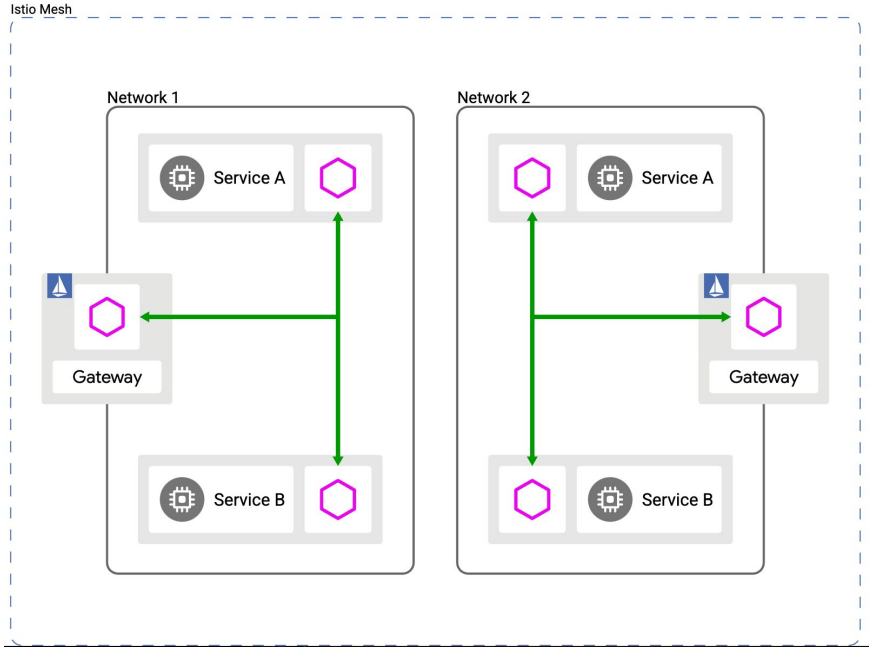
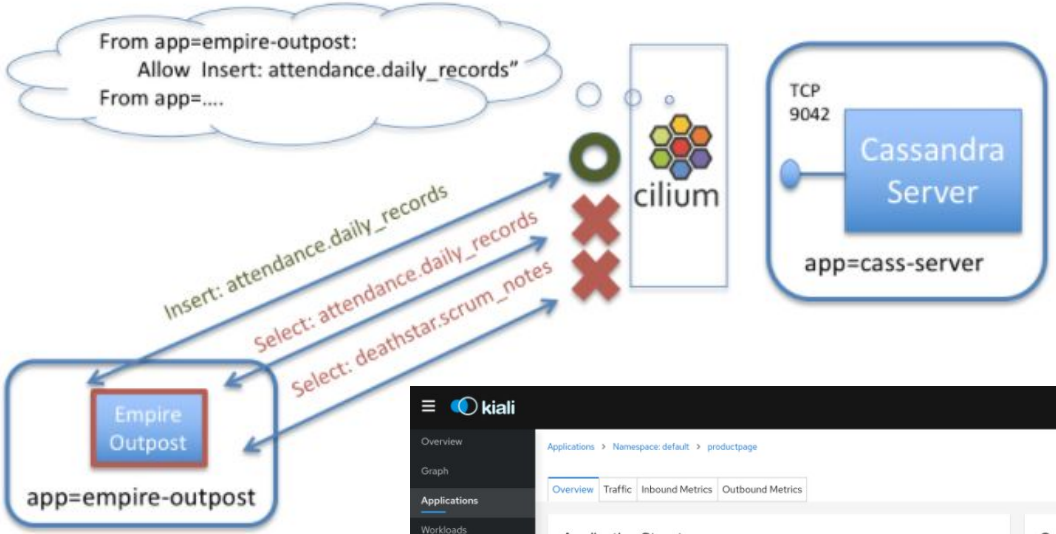
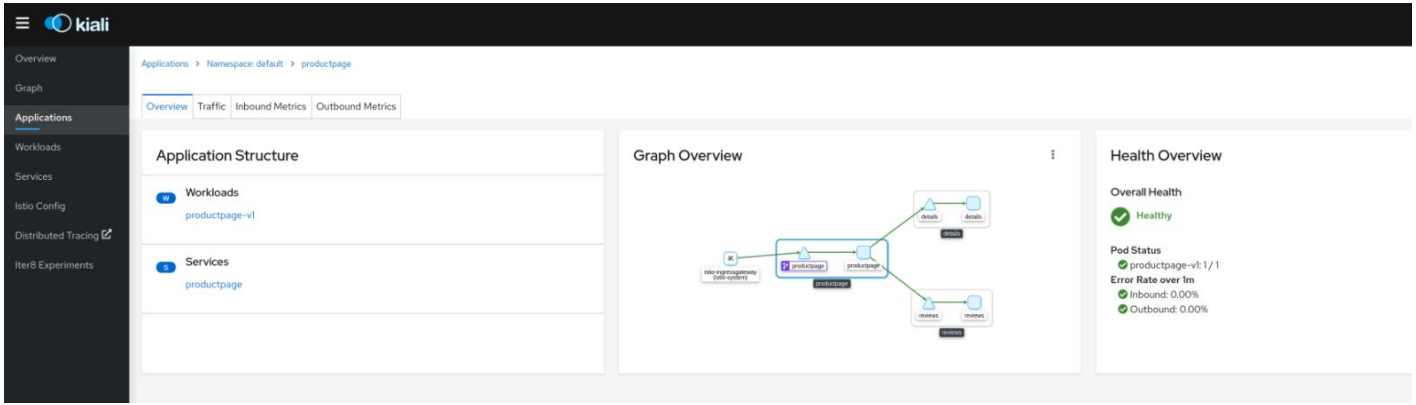


Added Benefits





Deployment

OPERATOR FRAMEWORK

So what you're saying is...

References

[CIDR Wikipedia]

[Istio Multicluster Guide]

[LinkerD Multicluster Guide]

[Google GKE Cloud DNS]

[Cilium Cluster Mesh]

[Cilium Cassandra Secure Access]

[Kubernetes Docs - Customize DNS]

[Yahoo! Japan Blog Post - Discusses BGP and K8s for easy routing]

[DataStax Overlay Network Blog Post]

[K8ssandra Multicluster Operator]

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Questions?