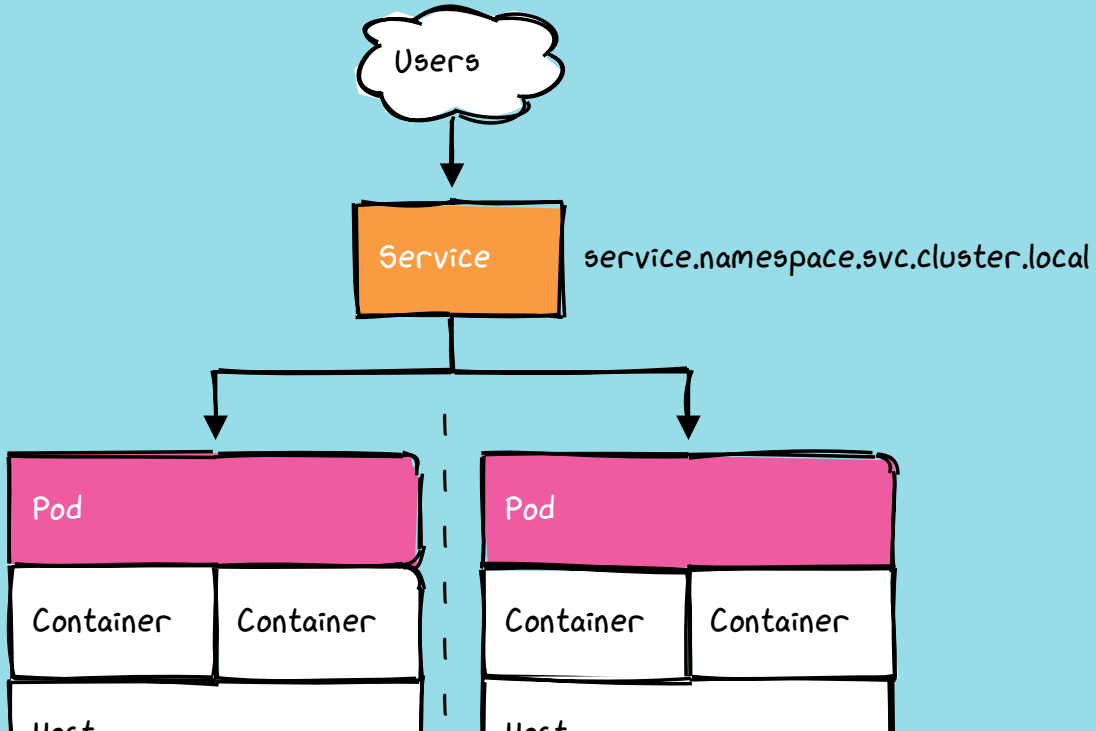
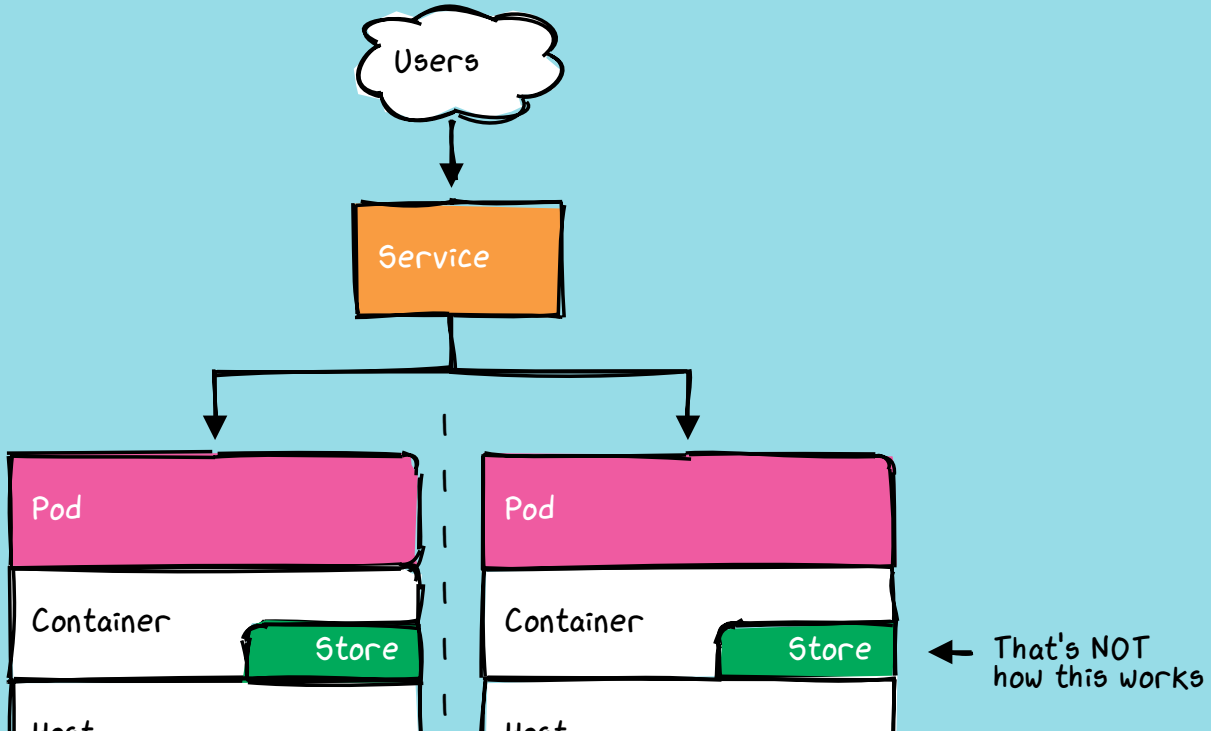
STATEFUL KUBERNETES

PAST, PRESENT, FUTURE

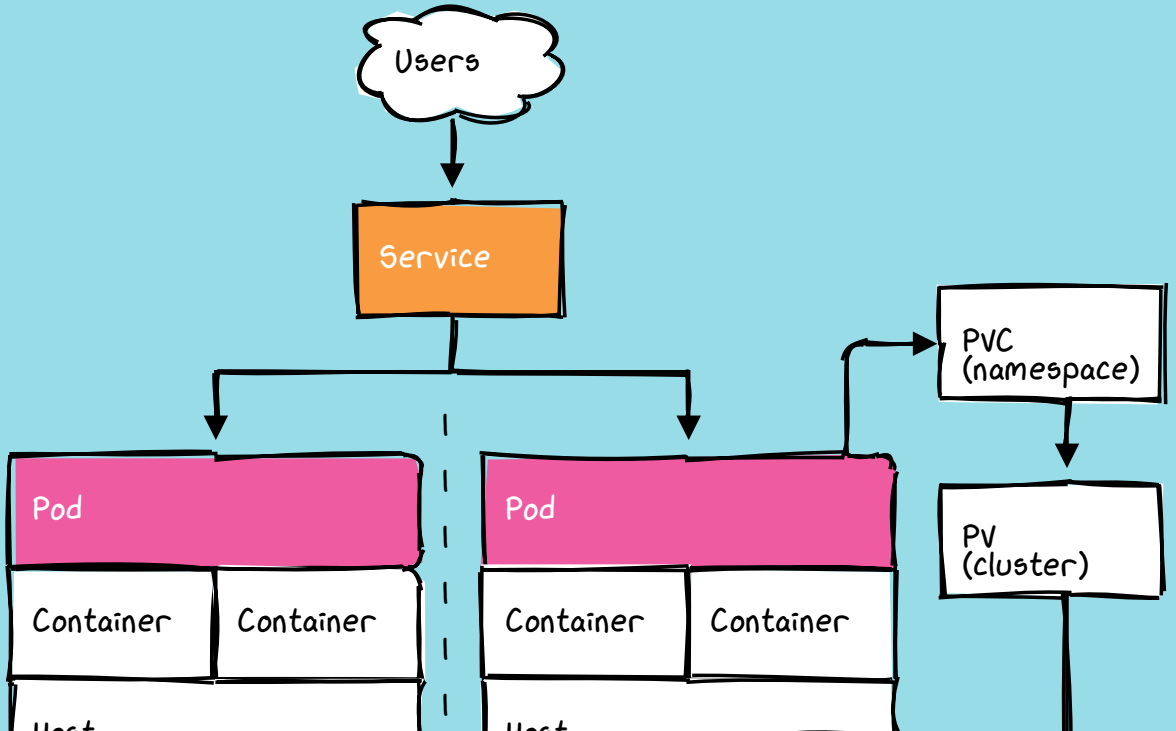
STATELESS KUBERNETES



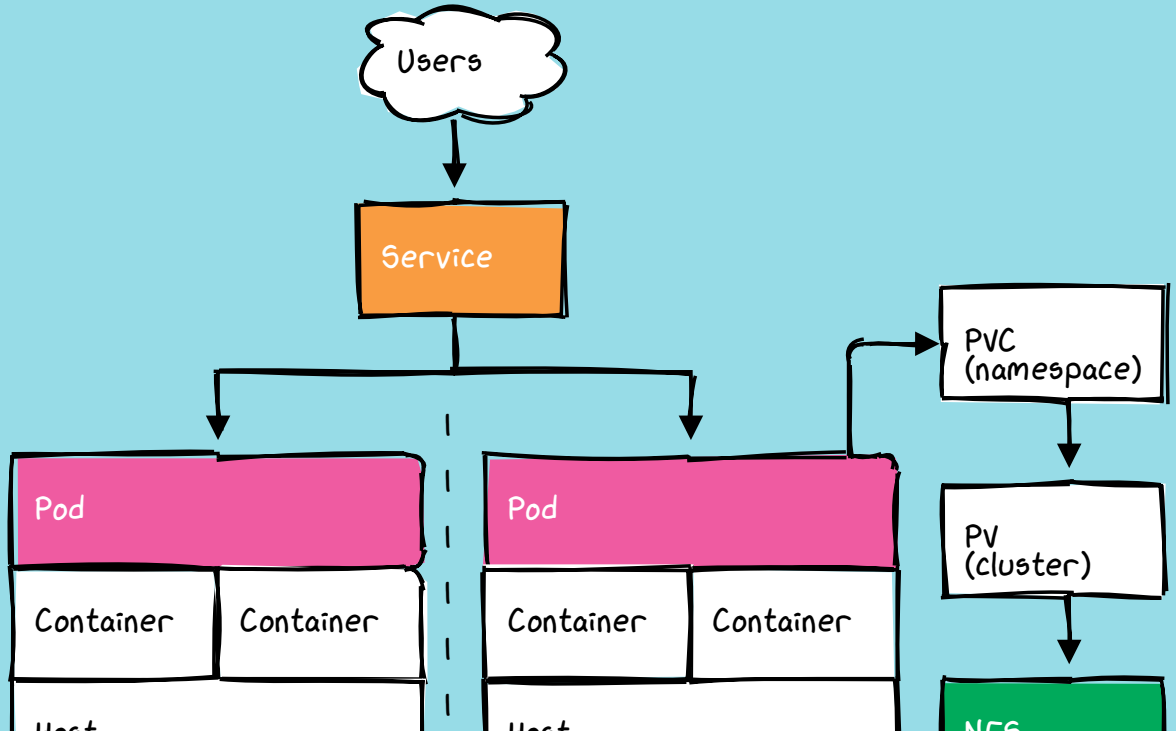
CONTAINER STORAGE FABLE



CONTAINER BLOCK STORAGE



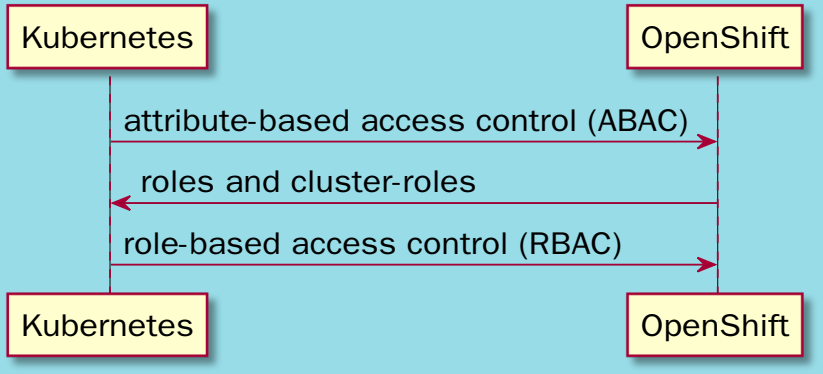
CONTAINER NETWORK FILE STORAGE



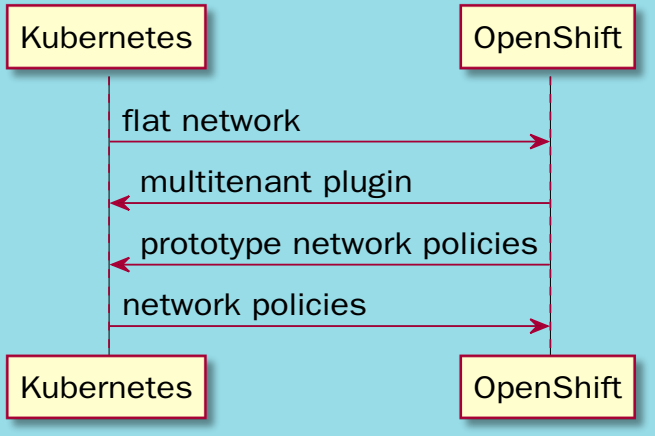
TIMELINES

IDENTITY, NETWORK, STORAGE AND STATE

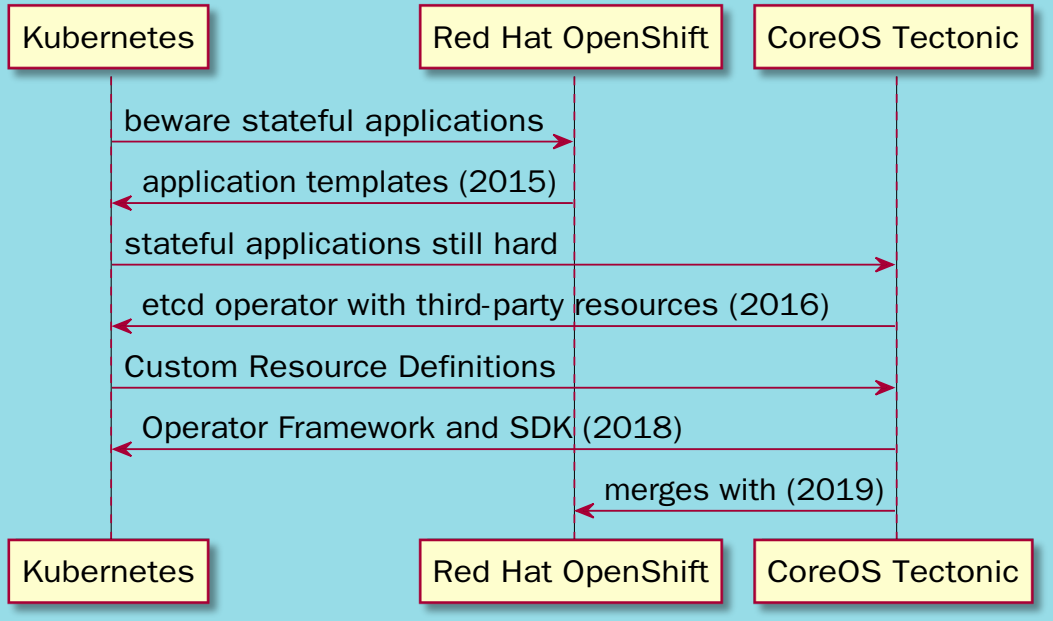
IDENTITY


Kubernetes
OpenShift
attribute-based access control (ABAC)
roles and cluster-roles
role-based access control (RBAC)
Kubernetes
OpenShift

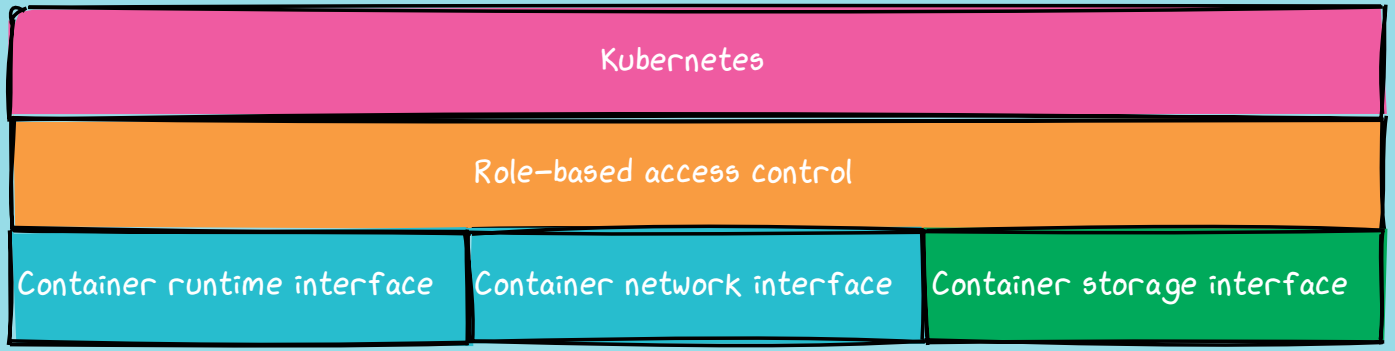
NETWORK


Kubernetes
OpenShift
flat network
multitenant plugin
prototype network policies
network policies
Kubernetes
OpenShift

STORAGE AND STATE

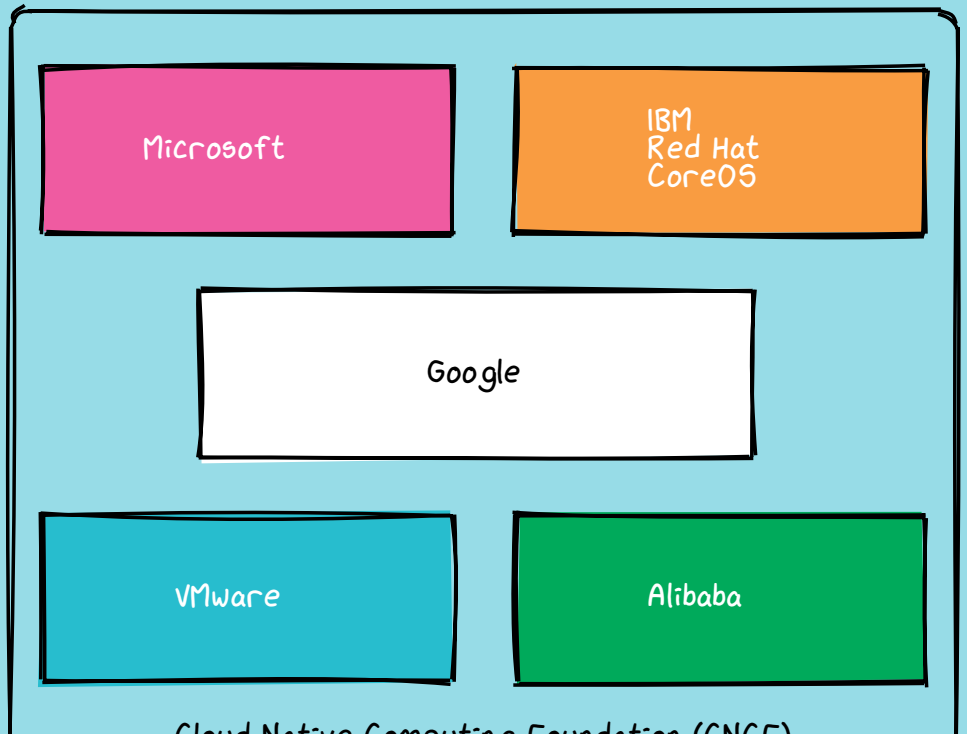


REBUILDING THE DATACENTRE

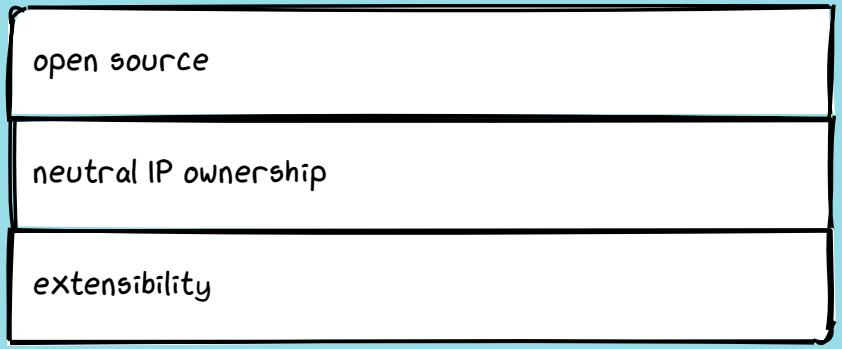


ECOSYSTEM RESILIENCE

SHARED OWNERSHIP



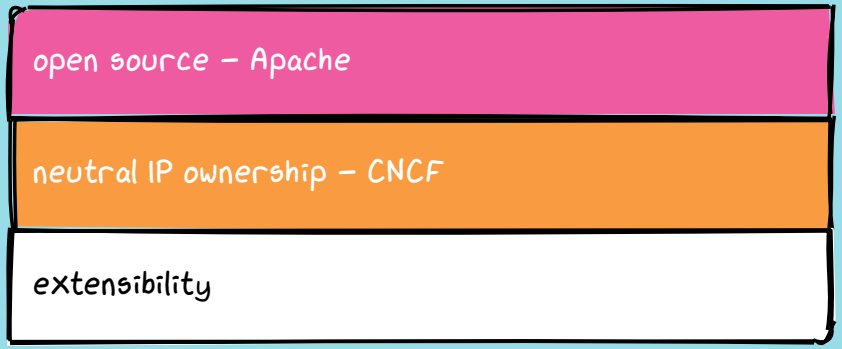
PRECONDITIONS



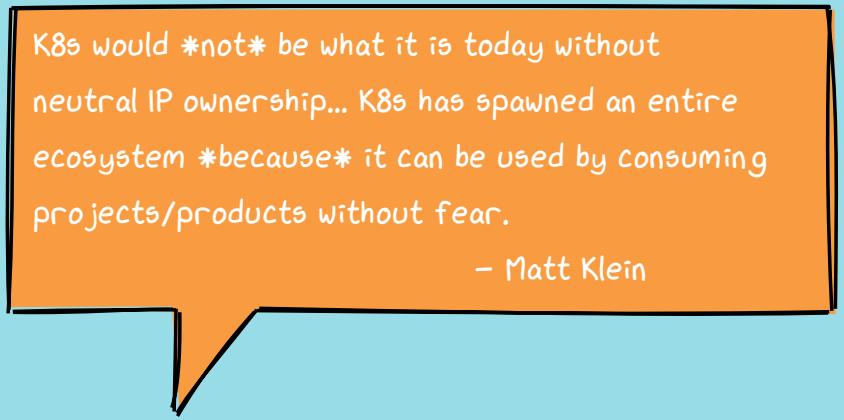
PRECONDITIONS

A suitably permissive license is a necessary but not sufficient precondition.

PRECONDITIONS

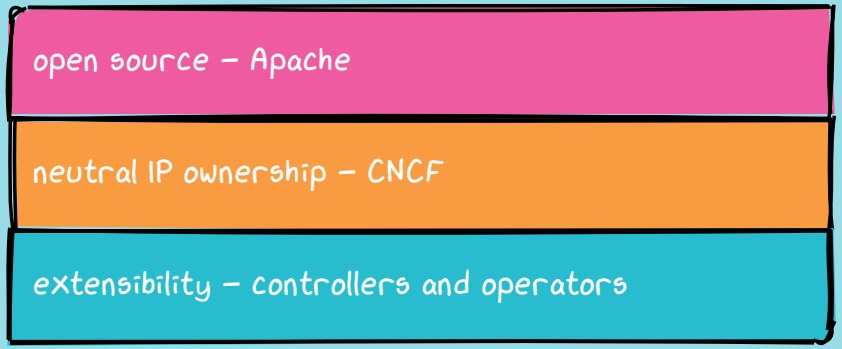


PRECONDITIONS



Source: @mattklein123 on Twitter, 17 February 2020.

PRECONDITIONS

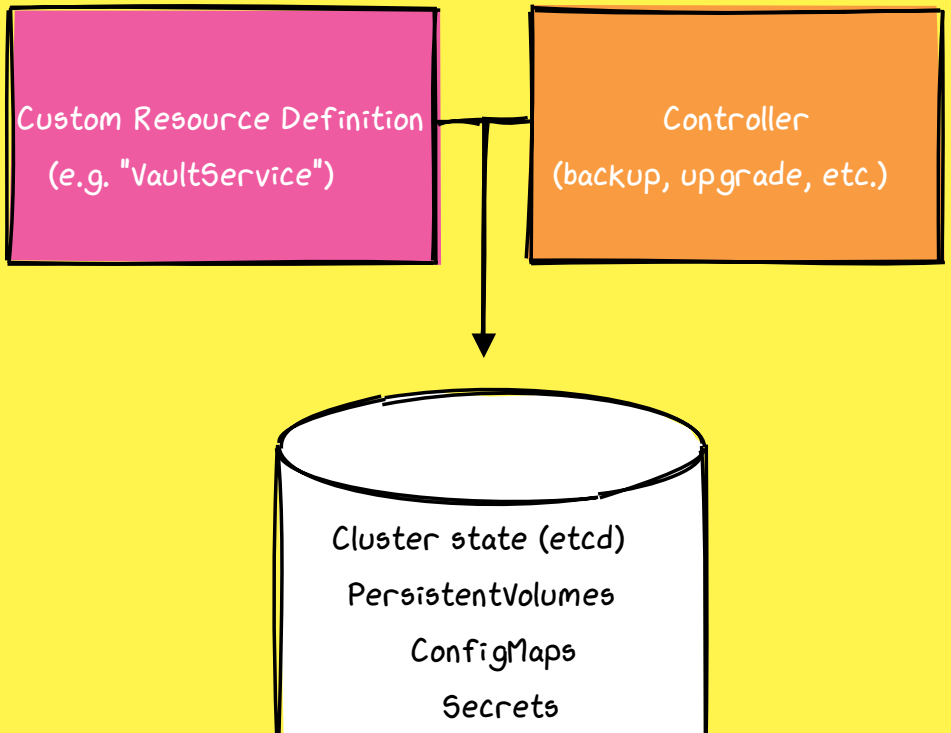


Controllers add custom processing to the core reconciliation loop.

When paired with custom resource definitions, they are known as **operators**.

THE OPERATOR LIFE

OPERATORS


Custom Resource Definition
(e.g. "VaultService")
Controller
(backup, upgrade, etc.)
Cluster state (etcd)
PersistentVolumes
ConfigMaps
Secrets

CORPORATE SPONSORS

Vault operator

MySQL operator

PostgreSQL operator

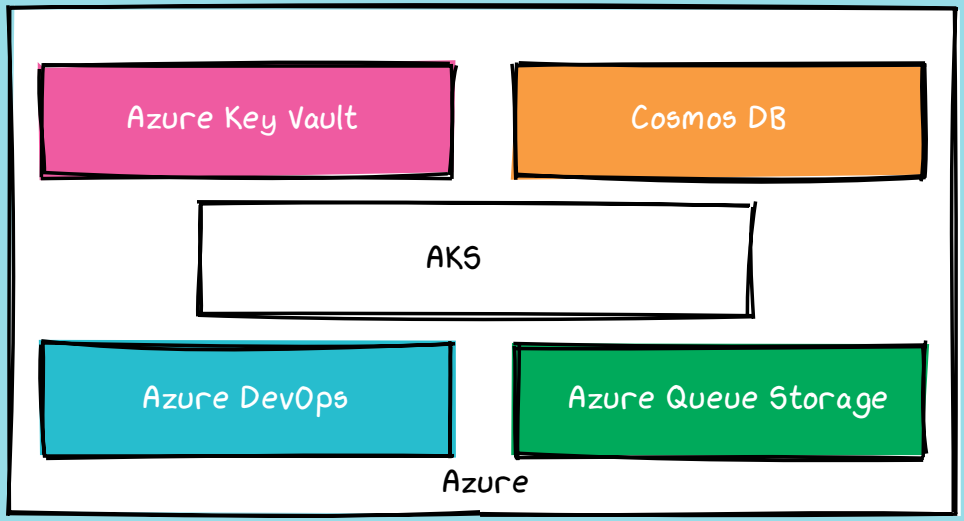
STATEFUL WORKLOADS

> Stateless is Easy, Stateful is Hard.
>
> – Brandon Philips (2016)

Source: coreos.com/blog/introducing-operators.html

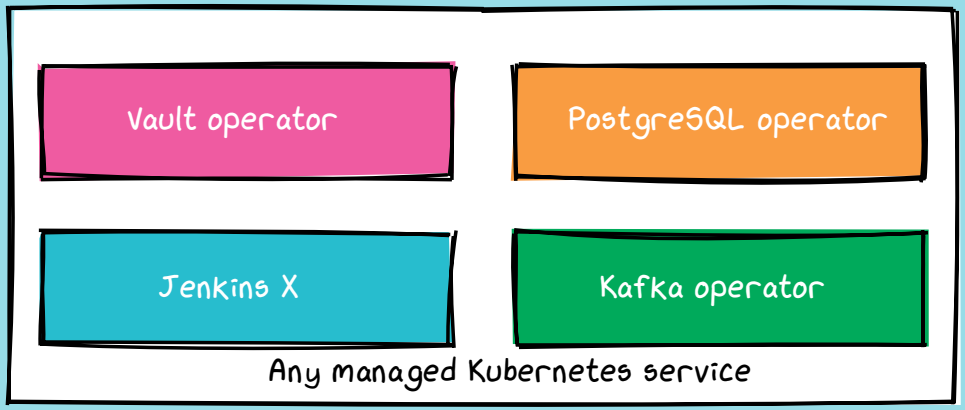
SOUL-SEARCHING AT THE BAZAAR

FALLING OUT OVER STATE MANAGEMENT



Cloud vendors perfected the use of proprietary services based on open source products, putting companies creating those products on notice.

A PORTABLE STACK

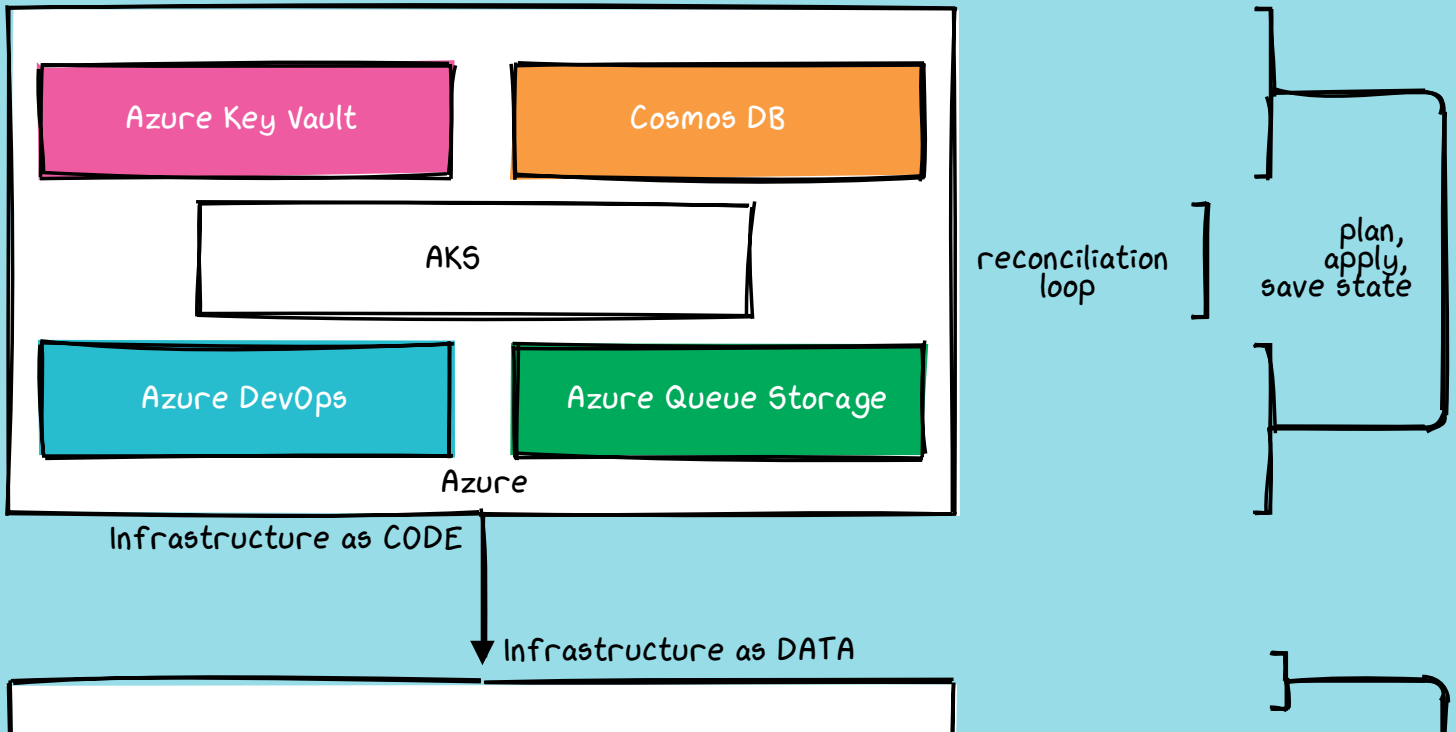


INFRASTRUCTURE AS ~~CODE~~DATA

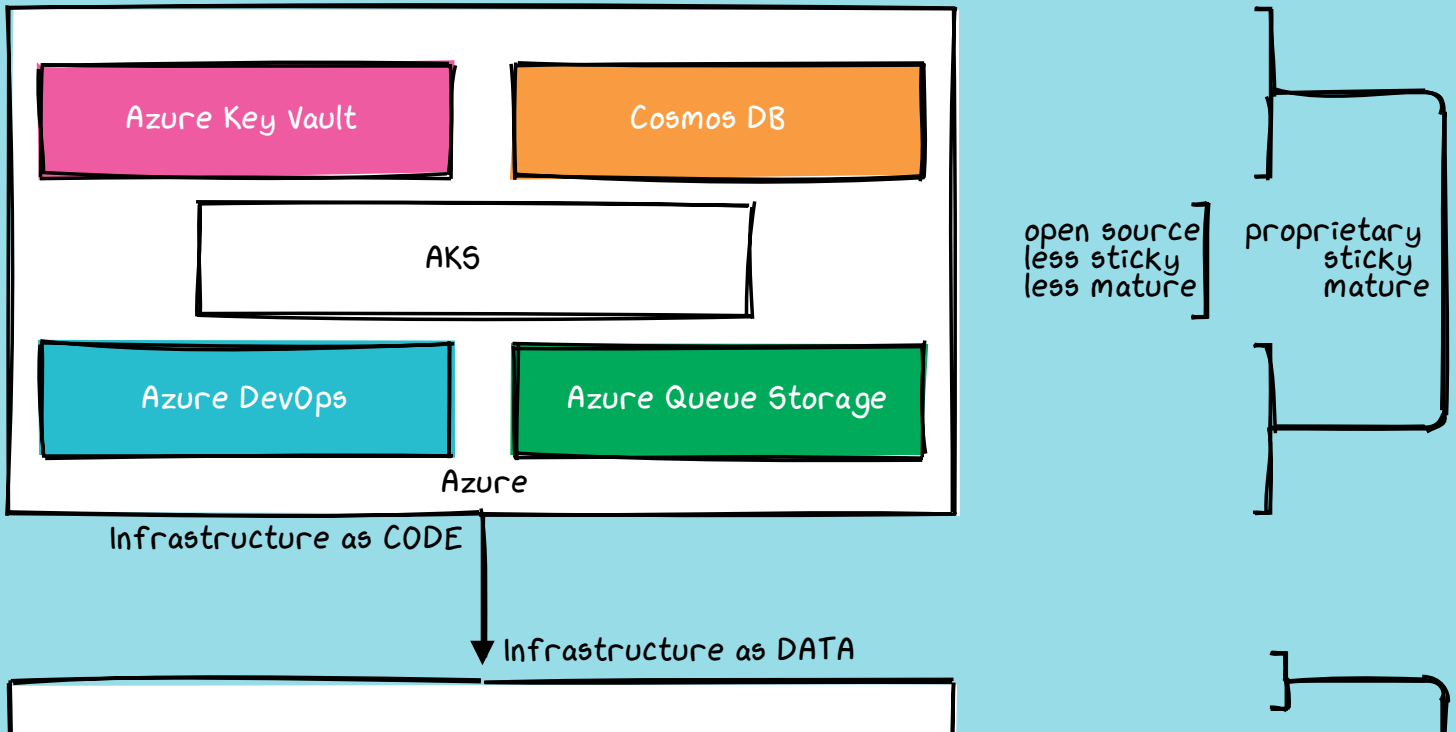
> Declarative configuration is about treating infrastructure as data, which is more portable than code, and enables workflows that manipulate desired state based on policy.
>
> – Kelsey Hightower (2019)

Source: @kelseyhightower on Twitter, 21 August 2019.

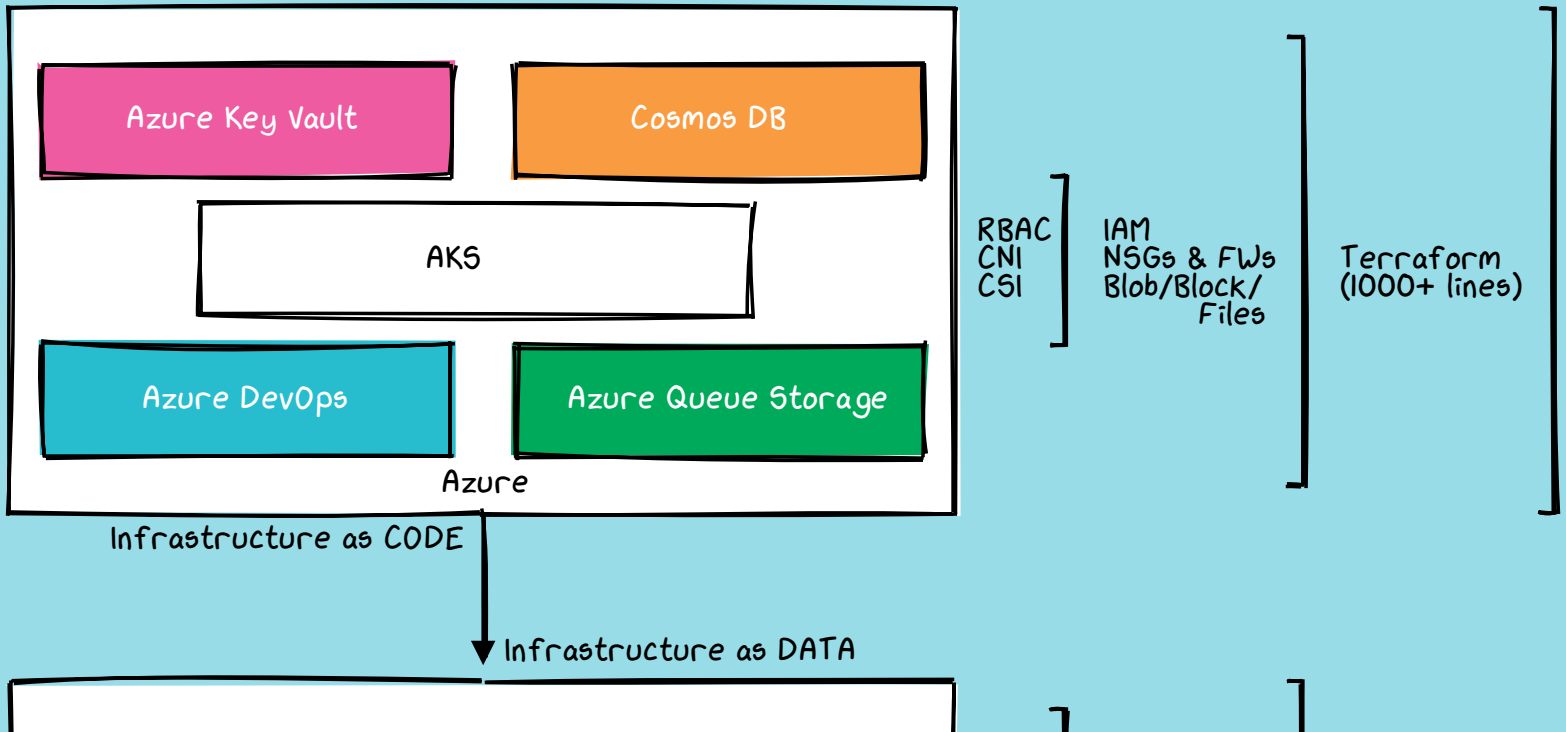
DESIRED STATE



TRADE-OFFS


Azure Key Vault
Cosmos DB
AKS
Azure DevOps
Azure Queue Storage
Azure
Infrastructure as CODE
Infrastructure as DATA
open source
less sticky
less mature
proprietary
sticky
mature

CONFIGURATION



NATIVE RESOURCES

Can I trust custom resources to create and manage the lifecycle of objects native to the platform?

Yes, this is something resources like PersistentVolumeClaim and Service have done for a long time, dynamically creating storage volumes and load balancers respectively.

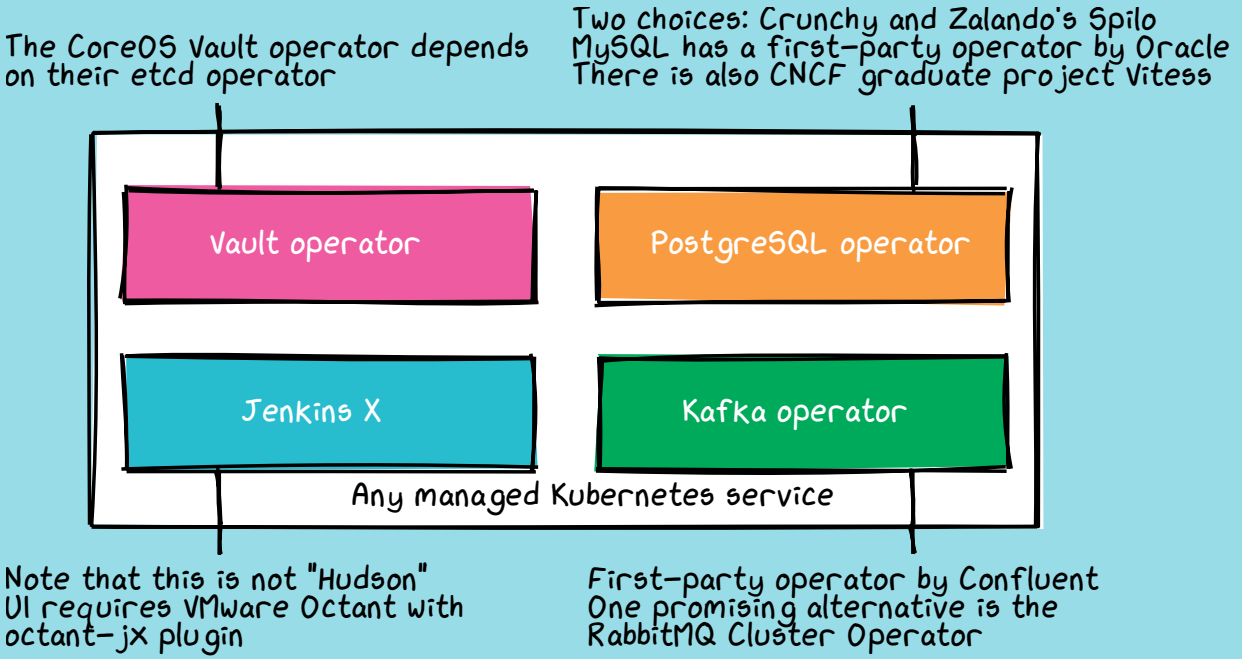
SERVICE LEVEL

Can the PostgreSQL operator match the availability and durability guarantees of managed SQL Server DBs?

Not today, no. It is worth considering, though, that:

* RDS and the operator use the same Azure storage primitives
* Until this improves, there's Microsoft's Azure Service Operator for Kubernetes (EventHub, Azure SQL, CosmosDB, Storage Accounts)

A PLAUSIBLE FUTURE, BUT NOT A DONE DEAL



WHAT'S IN IT FOR US?

As with multicloud, the value proposition for the consumer can seem lacklustre, but there are tangible benefits

Create one path to production for all workloads (not three separate ones for containers, functions and VMs)

Enabling zero trust and mutual TLS is much easier, and again you only do it once

Continuous reconciliation based on policies you define beats defining desired state at the start and hoping for the best

SUMMARY

Persistent cloud storage is just as reliable when claimed by a pod

The core Kuberenetes interfaces will continue to mature because everyone in the industry has a stake in it

The operator pattern is set to thrive because software companies and second-tier cloud vendors depend on it

Of all the large, distributed systems found in modern application architectures, only Kubernetes promises a significant reduction in complexity in return

THANK YOU

Slides built with Markdeck
GitHub gerald1248/stateful-kubernetes-slides
Twitter @03spirit

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