KUBERNETES AND OPEN SOURCE IN THE CLOUD

Gerald Schmidt
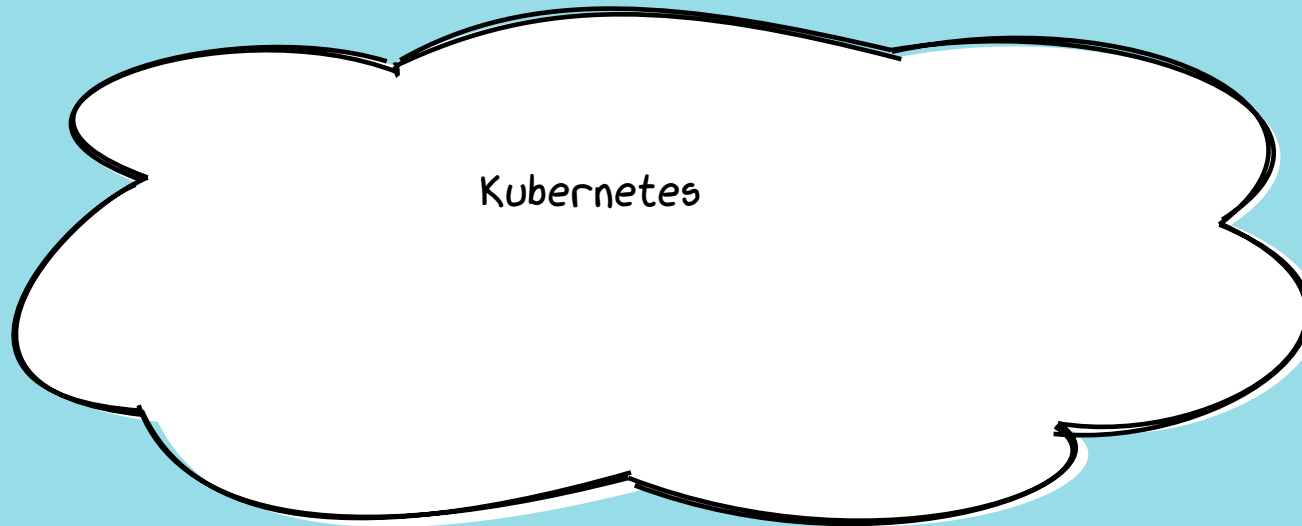
THE COMPETITION

ALL HAPPY FAMILIES

Fleet

Docker Swarm

OpenShift (1-2)

Kubernetes

Apache Mesos

Elastic Container Service

Heroku

Cloud Foundry

Panamax

Shipyard

Portainer
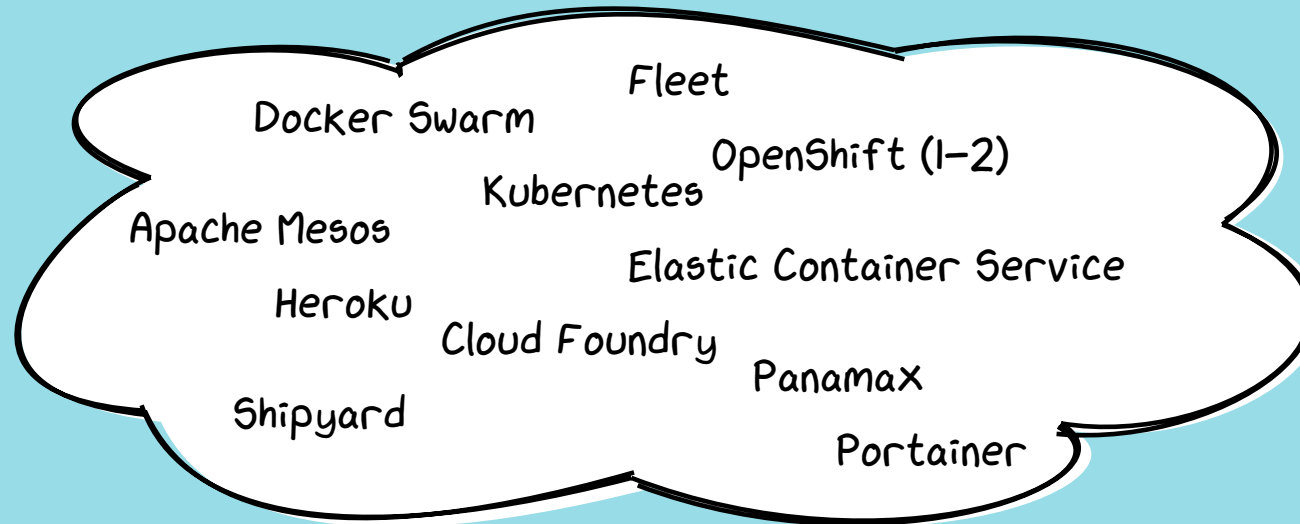
The 'orchestration wars' saw a large variety of proprietary and open source offerings.
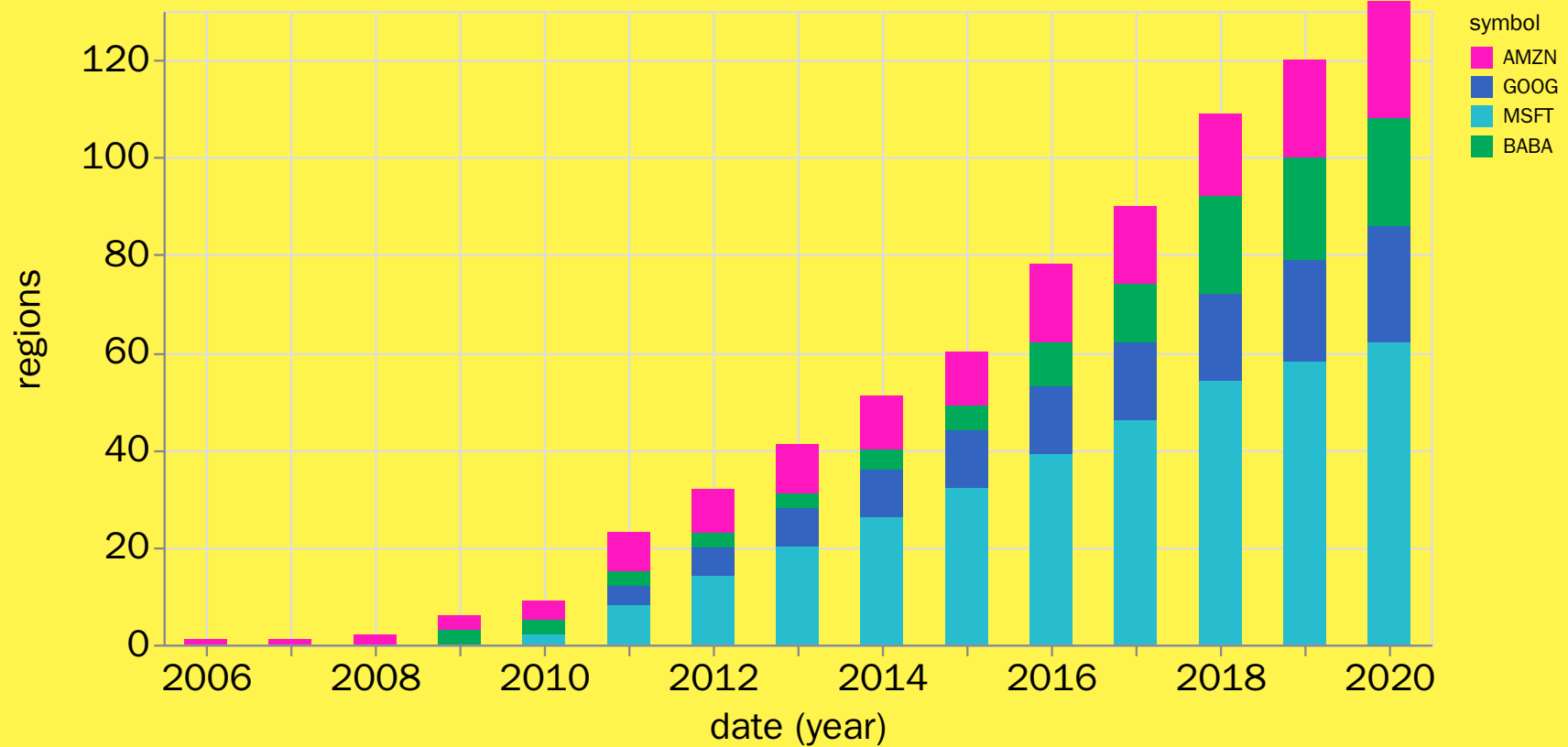
SPLENDID ISOLATION

Kubernetes

When the dust settled, only one of them was left standing.

MEANWHILE IN THE PUBLIC CLOUD

FIRST MOVER ADVANTAGE

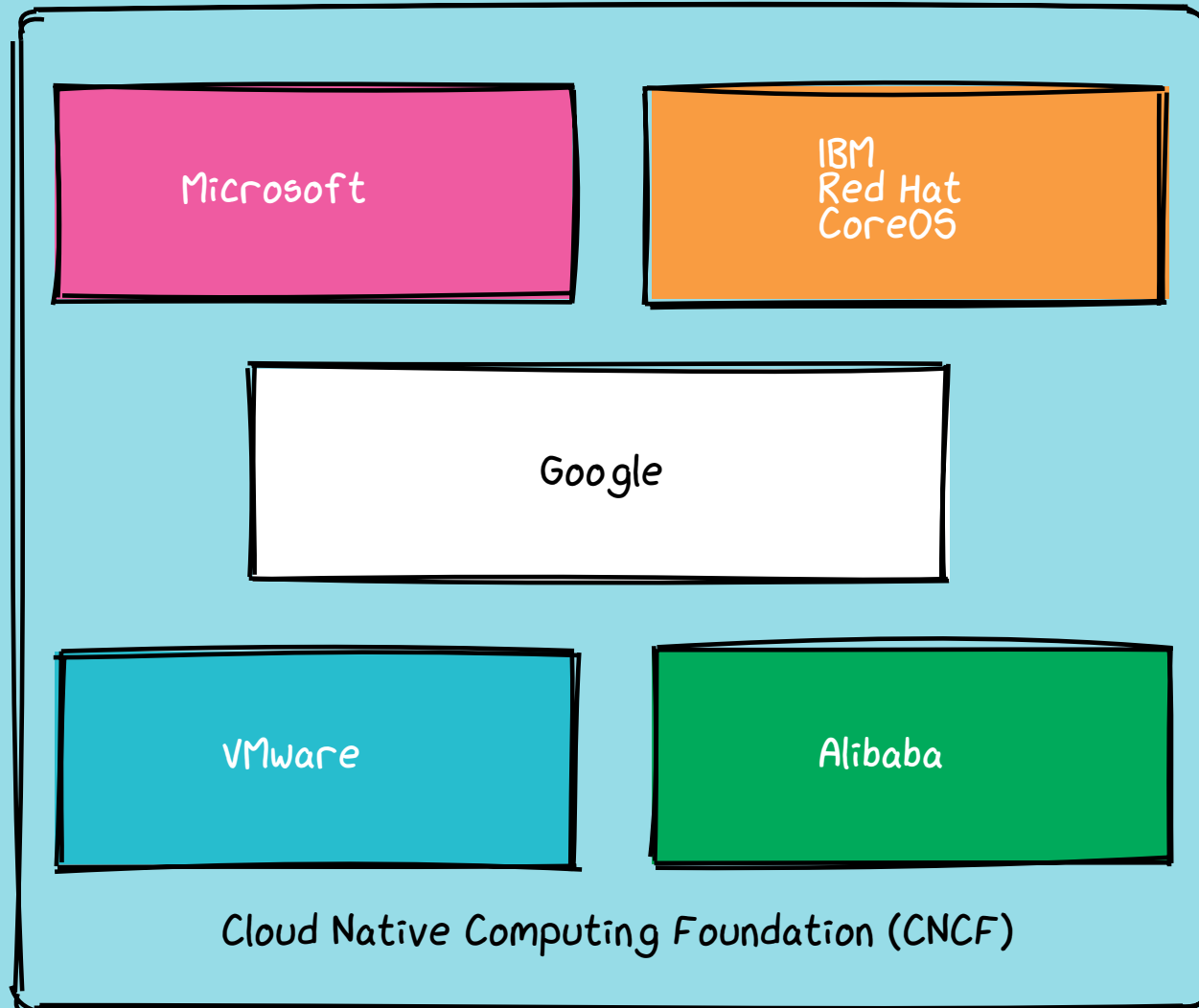Regions vary significantly in size. Some values have been interpolated.

FOLLOW FAST, BUT HOW FAST IS FAST ENOUGH?

Alexa for Business, Amazon AppFlow, Amazon Augmented AI, Amazon Braket, Amazon Chime, Amazon CodeGuru, Amazon Comprehend, Amazon Connect, Amazon DocumentDB, Amazon EventBridge, Amazon Forecast, Amazon Fraud Detector, Amazon GameLift, Amazon Honeycode, Amazon Interactive Video Service, Amazon Kendra, Amazon Keyspaces, Amazon Lex, Amazon Macie, Amazon Managed Blockchain, Amazon MQ, Amazon Personalize, Amazon Polly, Amazon QLDB, Amazon Redshift, Amazon Rekognition, Amazon SageMaker, Amazon Sumerian, Amazon Textract, Amazon Transcribe, Amazon Translate, API Gateway, Application Discovery Service, AppStream 2.0, Artifact, Athena, AWS Amplify, AWS App Mesh, AWS AppConfig, AWS AppSync, AWS Auto Scaling, AWS Backup, AWS Budgets, AWS Chatbot, AWS Cloud Map, AWS Compute Optimizer, AWS Cost Explorer, AWS Data Exchange, AWS DeepComposer, AWS DeepLens, AWS DeepRacer, AWS Firewall Manager, AWS Glue, AWS IQ, AWS Lake Formation, AWS License Manager, AWS Marketplace Subscriptions, AWS Migration Hub, AWS Organizations, AWS Outposts, AWS RoboMaker, AWS Single Sign-On, AWS Snow Family, AWS Transfer Family, AWS Well-Architected Tool, Batch, Certificate Manager, Cloud9, CloudFormation, CloudFront, CloudHSM, CloudSearch, CloudTrail, CloudWatch, CodeArtifact, CodeBuild, CodeCommit, CodeDeploy, CodePipeline, CodeStar, Cognito, Config, Control Tower, Data Pipeline, Database Migration Service, DataSync, Detective, Device Farm, Direct Connect, Directory Service, DynamoDB, EC2, EC2 Image Builder, EFS, Elastic Beanstalk, Elastic Container Registry, Elastic Container Service, Elastic Kubernetes Service, Elastic Transcoder, ElastiCache, Elasticsearch Service, Elemental Appliances & Software, EMR, FreeRTOS, FSx, Global Accelerator, Ground Station, GuardDuty, IAM, Inspector, IoT 1-Click, IoT Analytics, IoT Core, IoT Device Defender, IoT Device Management, IoT Events, IoT Greengrass, IoT SiteWise, IoT Things Graph, Key Management Service, Kinesis, Kinesis Video Streams, Lambda, Launch Wizard, Lightsail, Managed Services, MediaConnect, MediaConvert, MediaLive, MediaPackage, MediaStore, MediaTailor, Mobile Hub, MSK, Neptune, OpsWorks, Personal Health Dashboard, Pinpoint, QuickSight, RDS, Resource Access Manager, Route 53, S3, S3 Glacier, Secrets Manager, Security Hub, Server Migration Service, Serverless Application Repository, Service Catalog, Simple Email Service, Simple Notification Service, Simple Queue Service, Step Functions, Storage Gateway, Support, SWF, Systems Manager, Trusted Advisor, VPC, WAF & Shield, WorkDocs, WorkLink, WorkMail, WorkSpaces, X-Ray

Snapshot taken in July 2020.

THE HORCRUX PATTERN

VENDOR SHARDING

Microsoft

IBM
Red Hat
CoreOS

Google

VMware

Alibaba

Cloud Native Computing Foundation (CNCF)

PRECONDITIONS

open source

neutral IP ownership

extensibility

PRECONDITIONS

open source – MIT
neutral IP ownership
extensibility

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

PRECONDITIONS

open source – MIT

neutral IP ownership – CNCF

extensibility

K8s would *not* be what it is today without neutral IP ownership… K8s has spawned an entire ecosystem *because* it can be used by consuming projects/products without fear.

– Matt Klein

Source: @mattklein123 on Twitter, 17 February 2020.

PRECONDITIONS

open source — MIT
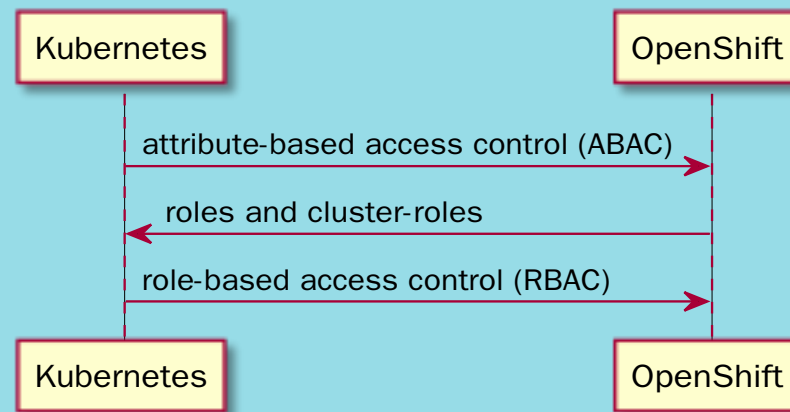
neutral IP ownership — CNCF

extensibility — controllers and operators

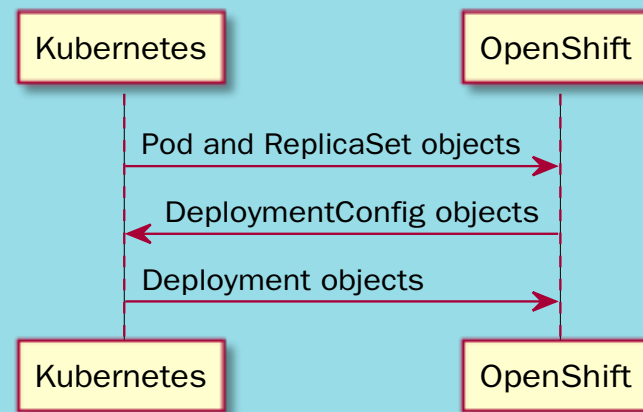**Controllers** add custom processing to the core reconciliation loop.

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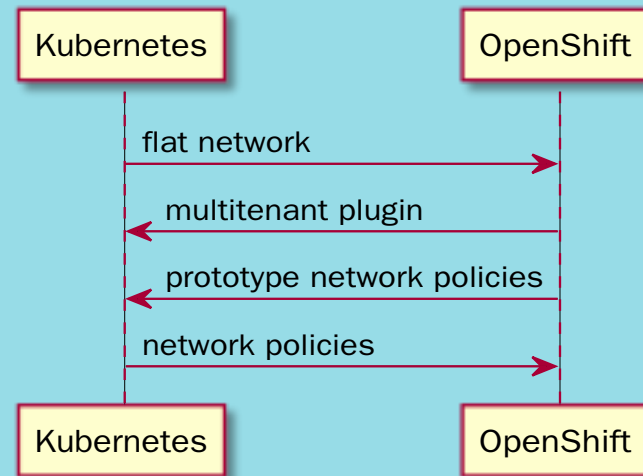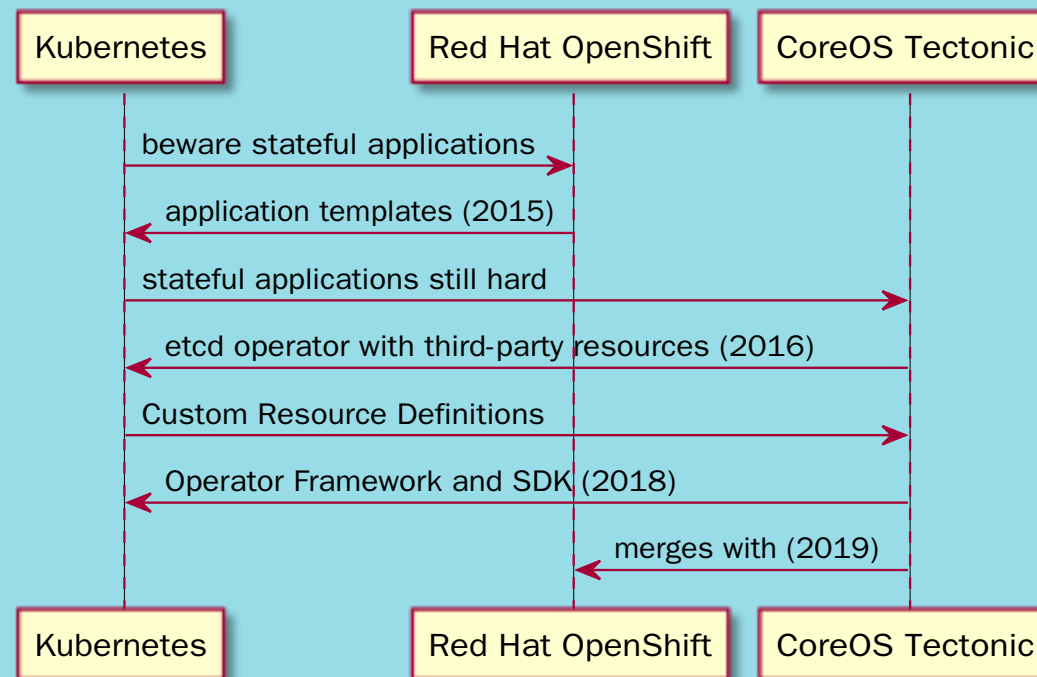
PIZZA EFFECTS

IDENTITY

DEPLOYMENTS

NETWORKING

STATE

THE OPERATOR LIFE

OPERATORS

Custom Resource Definition
(e.g. "VaultService")

Controller
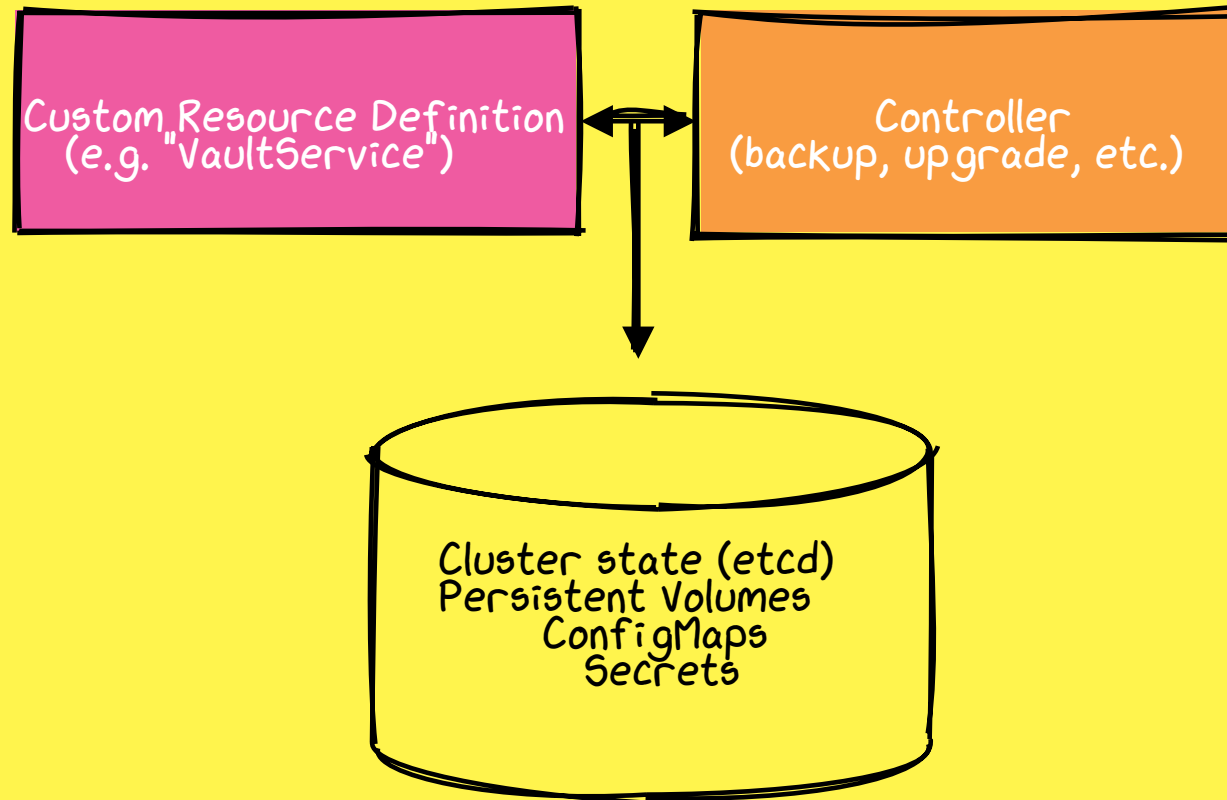(backup, upgrade, etc.)

Cluster state (etcd)
Persistent Volumes
ConfigMaps
Secrets

STATEFUL WORKLOADS

Stateless is Easy, Stateful is Hard.

— Brandon Philips (2016)

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

CORPORATE SPONSORS

Vault operator

MySQL operator

PostgreSQL operator

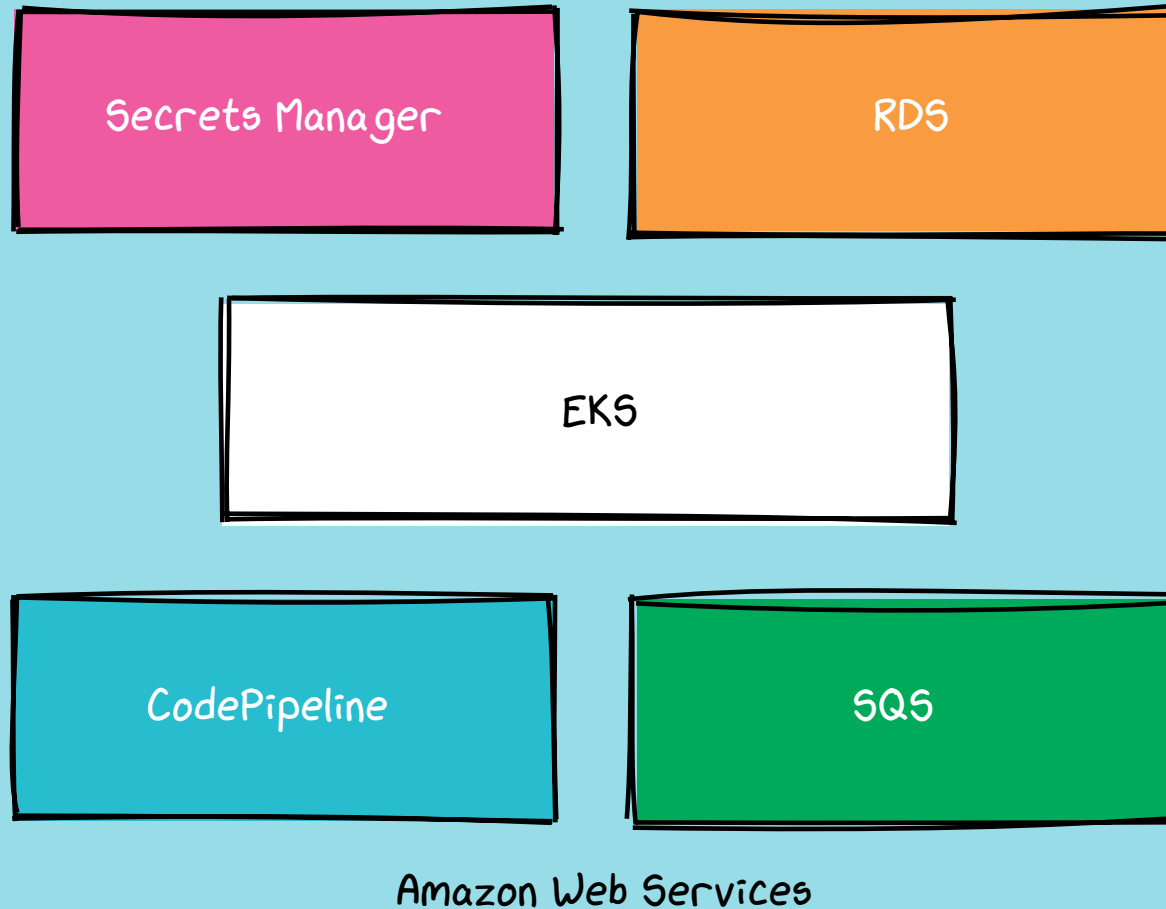# SOUL-SEARCHING AT THE BAZAAR

A VERY PUBLIC BREAKUP

Secrets Manager

RDS

EKS

CodePipeline

SQS

Amazon Web Services
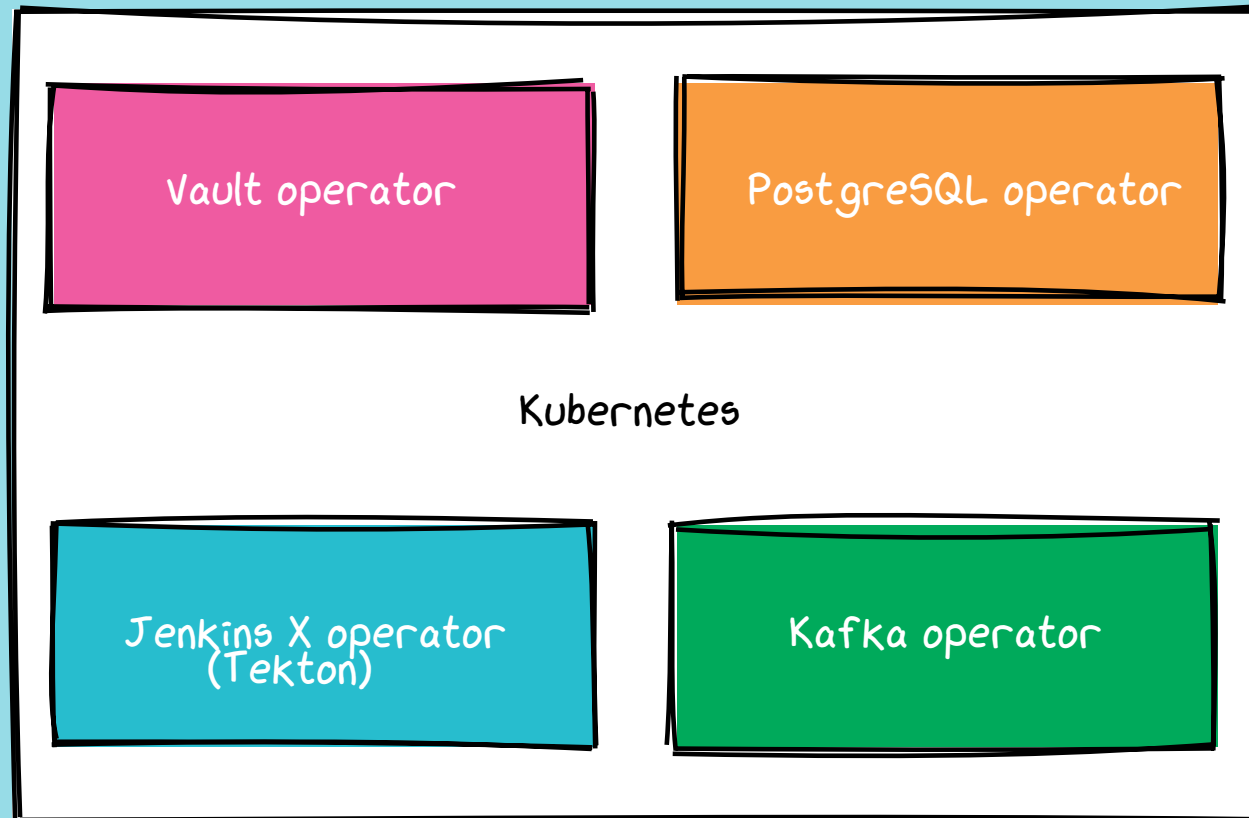
AWS perfected the use of services based on open source products.

In 2016 MongoDB responded with the Server Side Public License.

A PORTABLE STACK

Vault operator

PostgreSQL operator

Kubernetes

Jenkins X operator
(Tekton)

Kafka operator

Any cloud offering a managed Kubernetes service

REMEMBER THESE?

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Imagine replacing them with supported open source products.

On AWS or any other cloud.

QUIZ FOR ASPIRING CLOUD VENDORS

IS THE OPERATOR LIFE FOR ME?

Did AWS steal a multi-year march on you?

Are you at risk of US trade sanctions?

Are you a bazaar kind of company?

YES!	NOPE
✓	X
✓	?
✓	?

THANK YOU

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