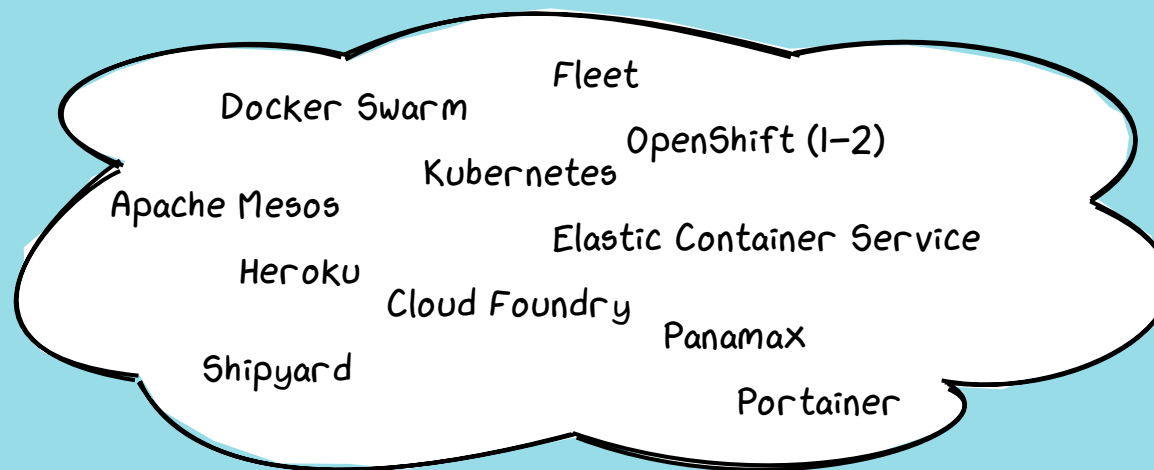


# KUBERNETES AND OPEN SOURCE IN THE CLOUD

Gerald Schmidt

# THE COMPETITION

# ALL HAPPY FAMILIES



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

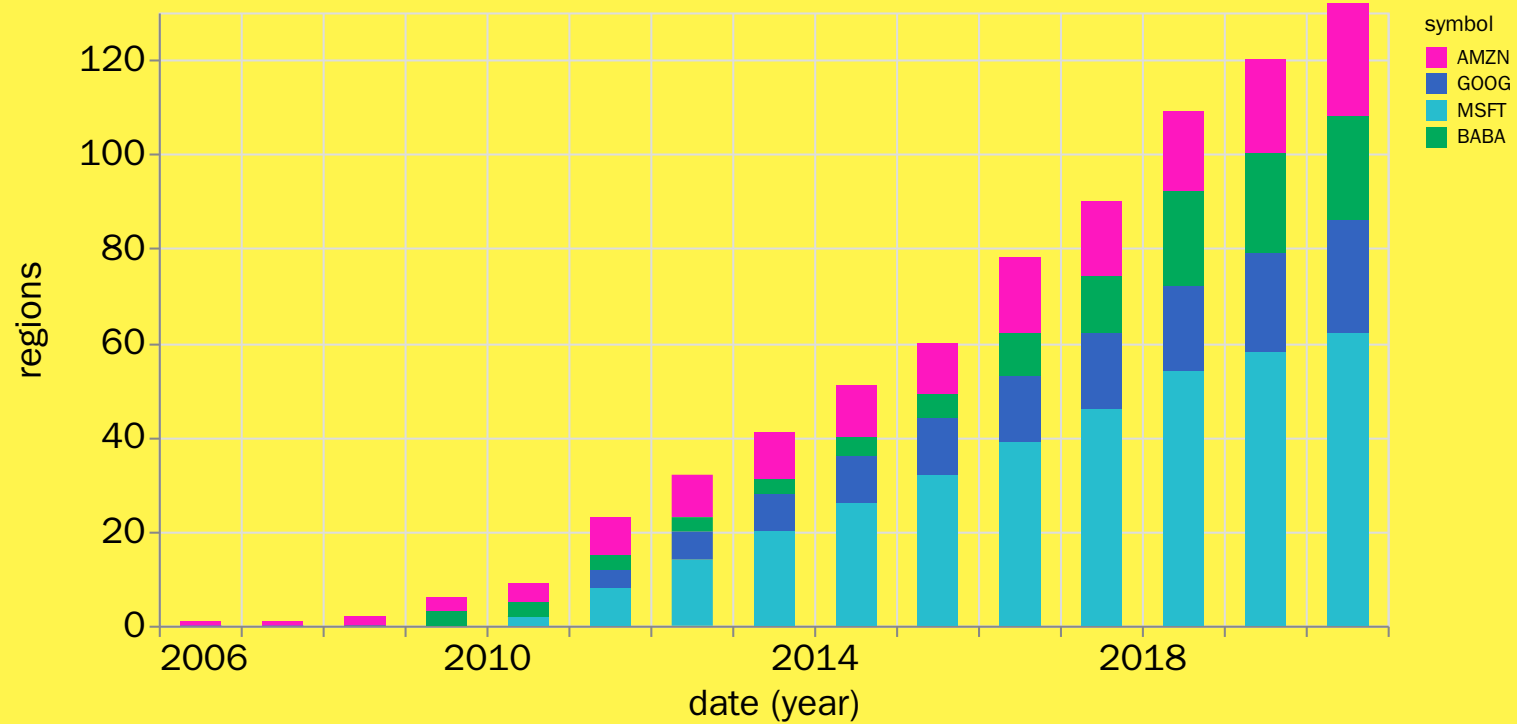
# SPLENDID ISOLATION



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?

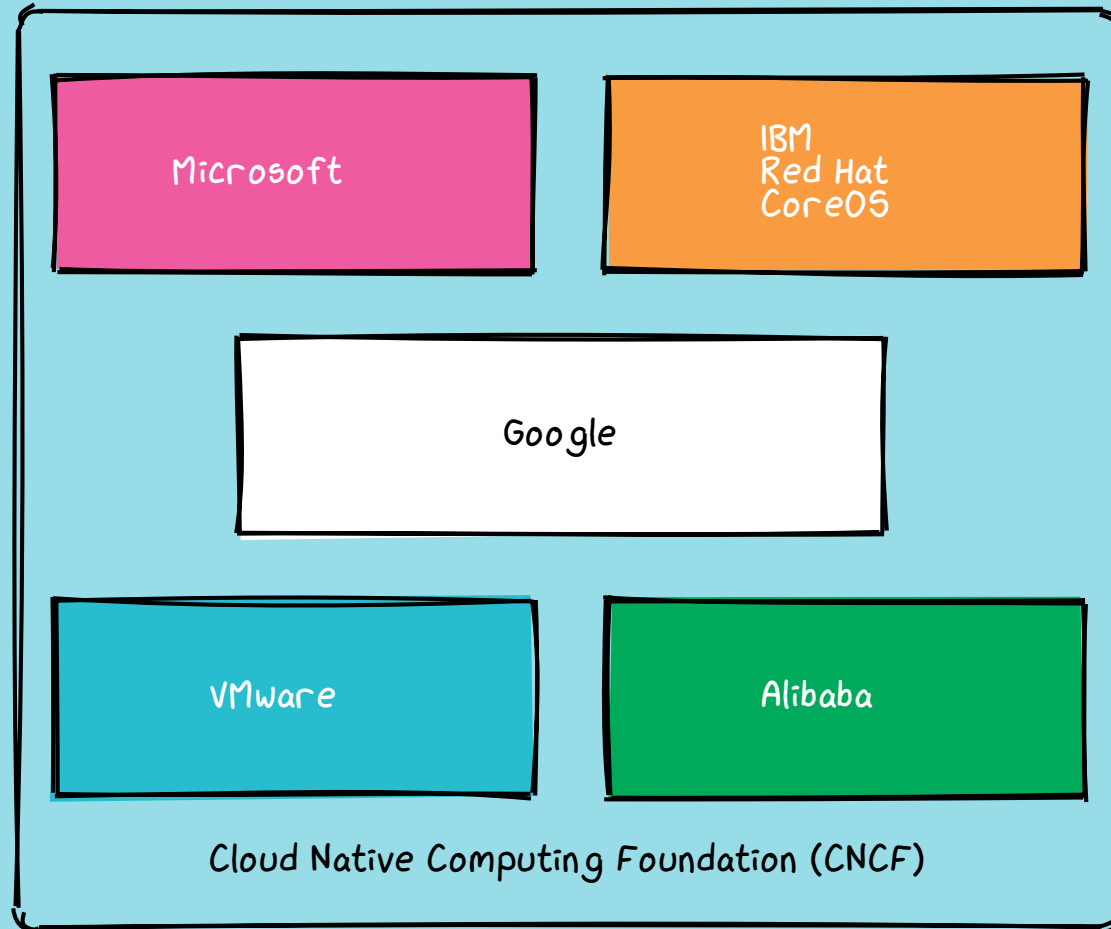
Alexa for Business, Amazon AppFlow, Amazon Augmented AI, Amazon Braket, Amazon Chime, Amazon CodeGuru, Amazon Comprehend, Amazon Connect, Amazon DocumentDB, Amazon EventBridge, Amazon Forecast, Amazon Fraud Detector, Amazon GameLift, Amazon Honeycode, Amazon Interactive Video Service, Amazon Kendra, 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

List of AWS services (July 2020).

# THE HORCRUX PATTERN



# SHARED OWNERSHIP



# PRECONDITIONS

open source

neutral IP ownership

extensibility

# PRECONDITIONS

open source – Apache
neutral IP ownership
extensibility

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

# PRECONDITIONS

open source – Apache

neutral IP ownership – CNCF

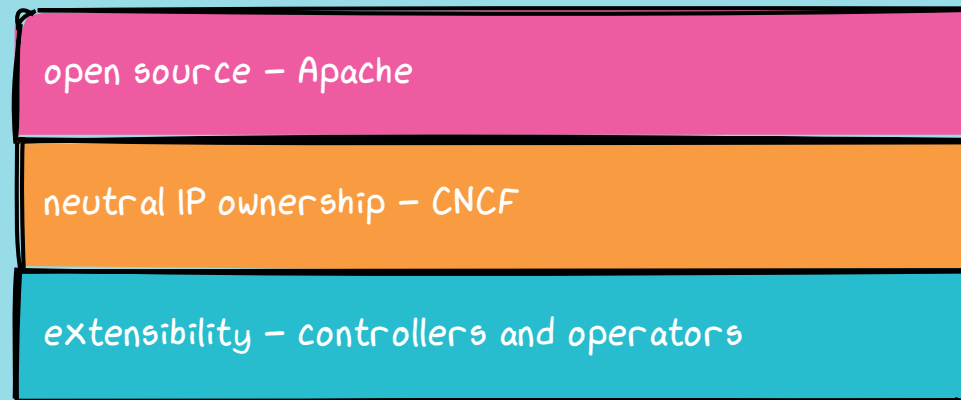
extensibility

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

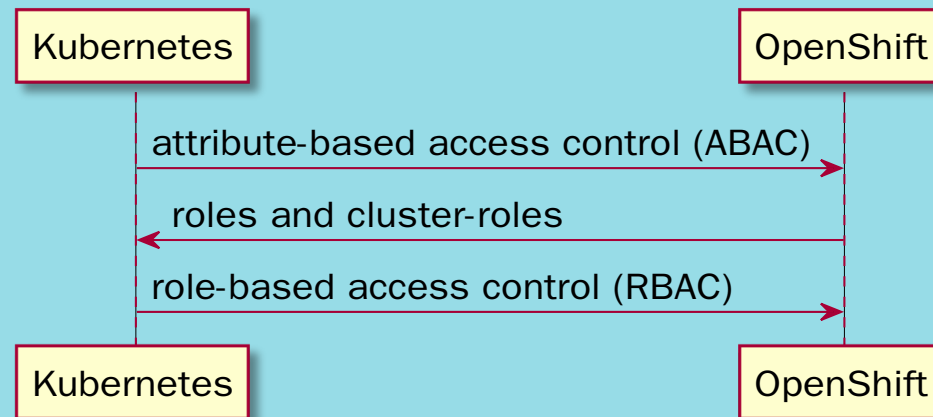


**Controllers** add custom processing to the core reconciliation loop.

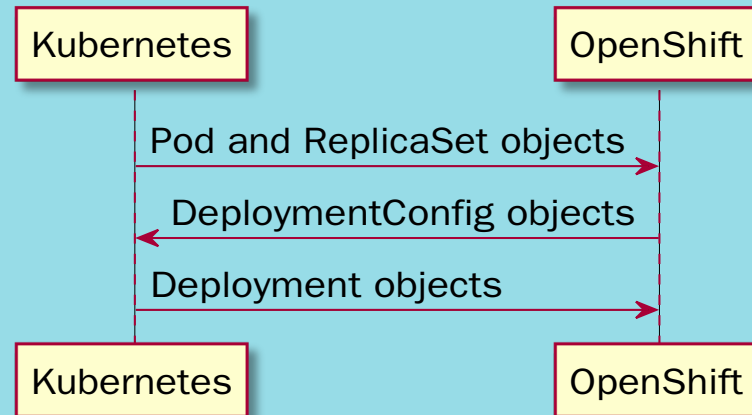
When paired with custom resource definitions, they are known as **operators**.

# PIZZA EFFECTS

# IDENTITY

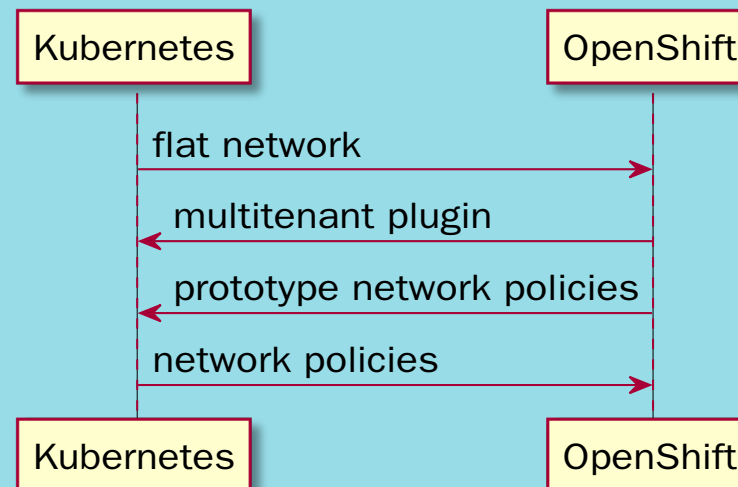


# DEPLOYMENTS

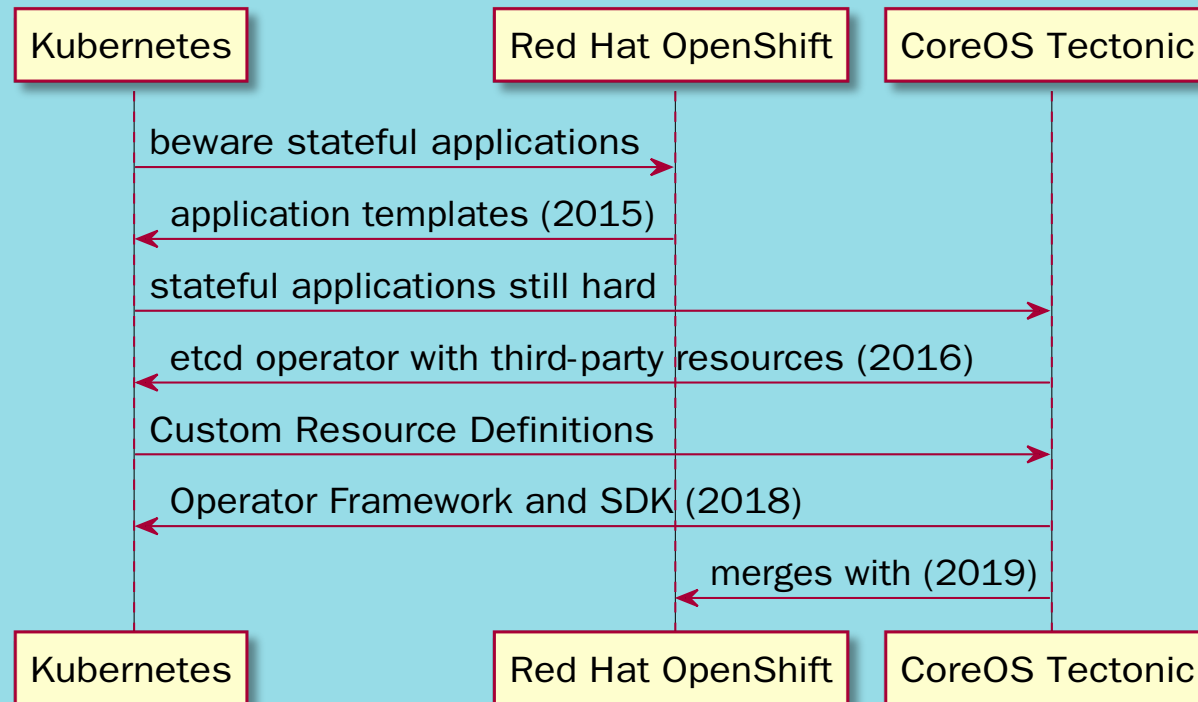




# NETWORKING

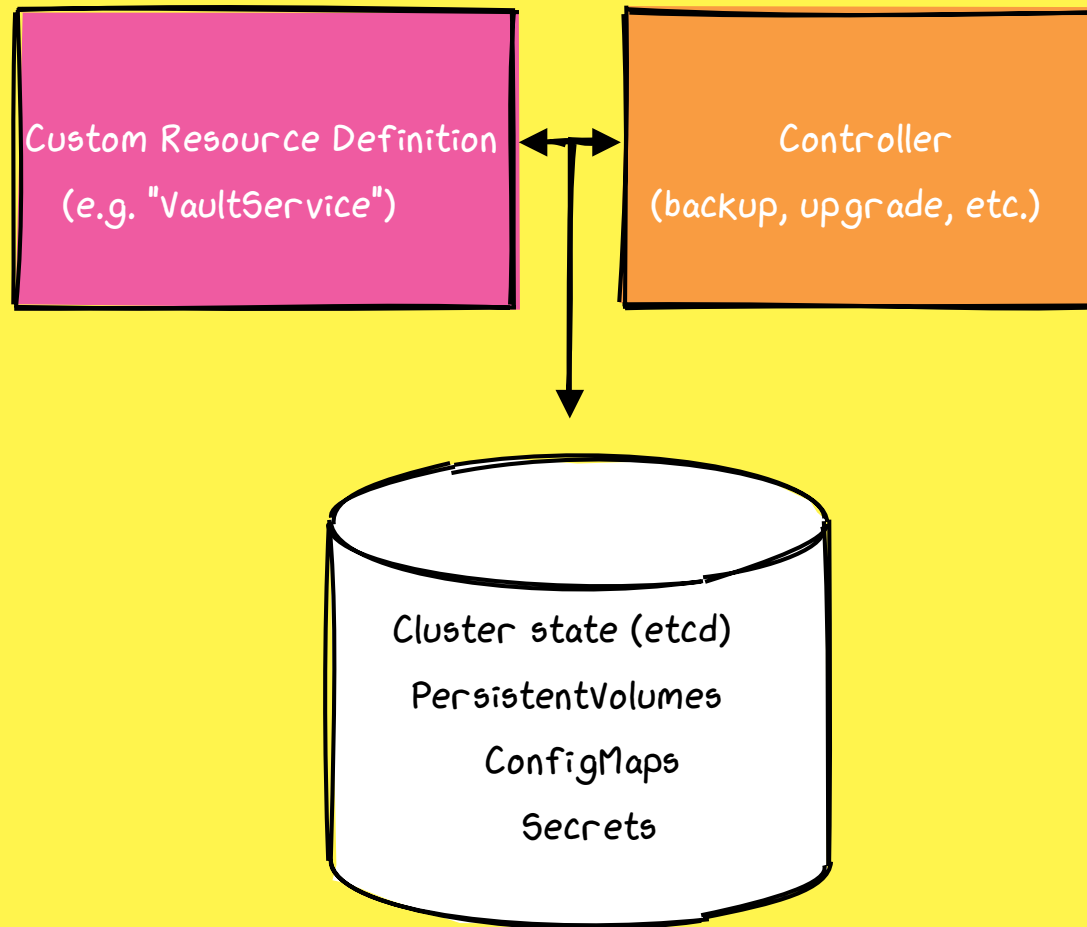


# STATE



# THE OPERATOR LIFE

# OPERATORS



# STATEFUL WORKLOADS



*Stateless is Easy, Stateful is Hard.*

– Brandon Philips (2016)

Source: [coreos.com/blog/introducing-operators.html](https://coreos.com/blog/introducing-operators.html)

# CORPORATE SPONSORS

Vault operator



MySQL operator

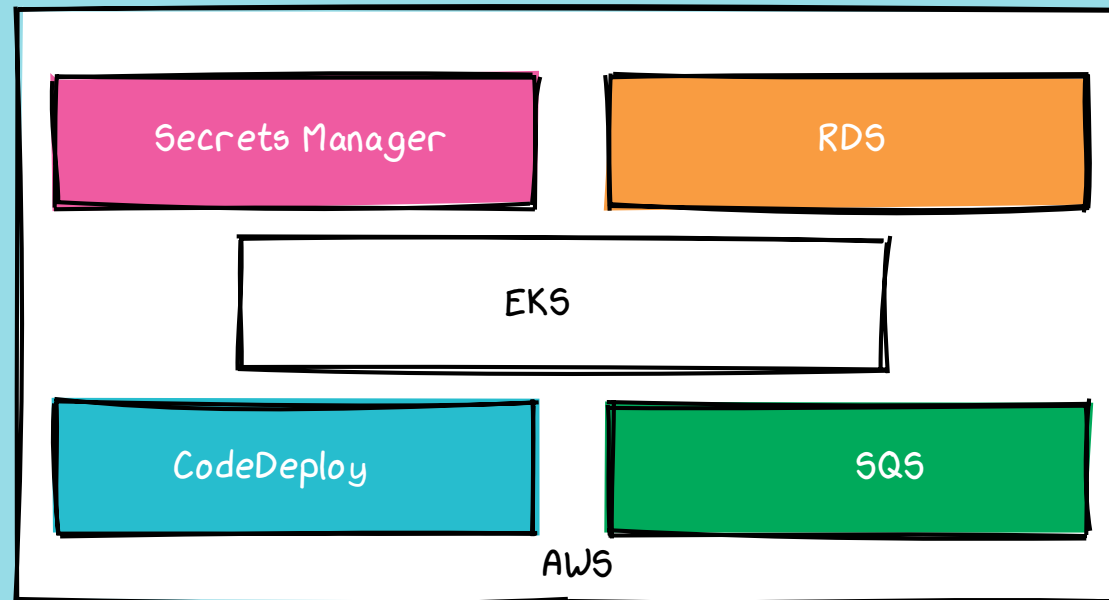


PostgreSQL operator



SOUL-SEARCHING AT THE BAZAAR

# A VERY PUBLIC BREAKUP

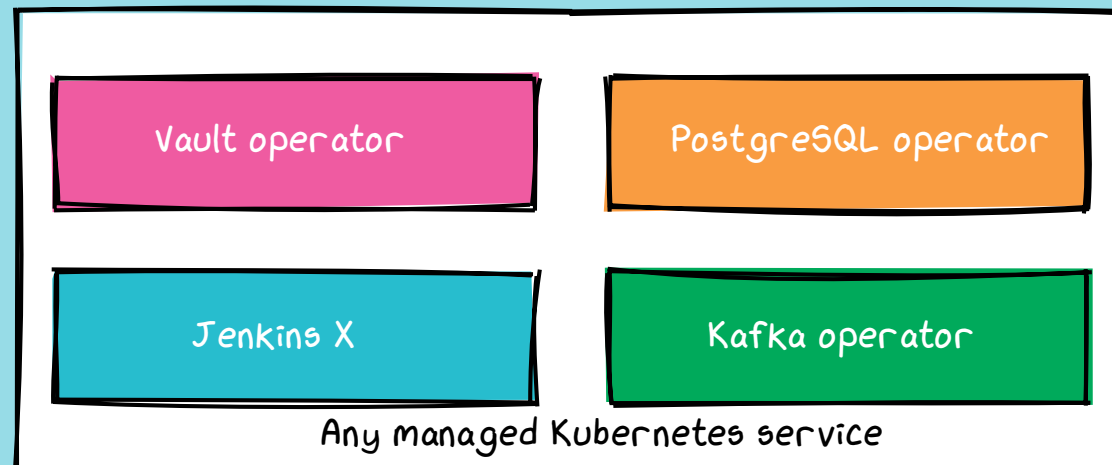


AWS perfected the use of proprietary services based on open source products, putting commercial vendors creating and supporting those products on notice.

In 2016 MongoDB Inc. responded with the Server Side Public License.



# A PORTABLE STACK



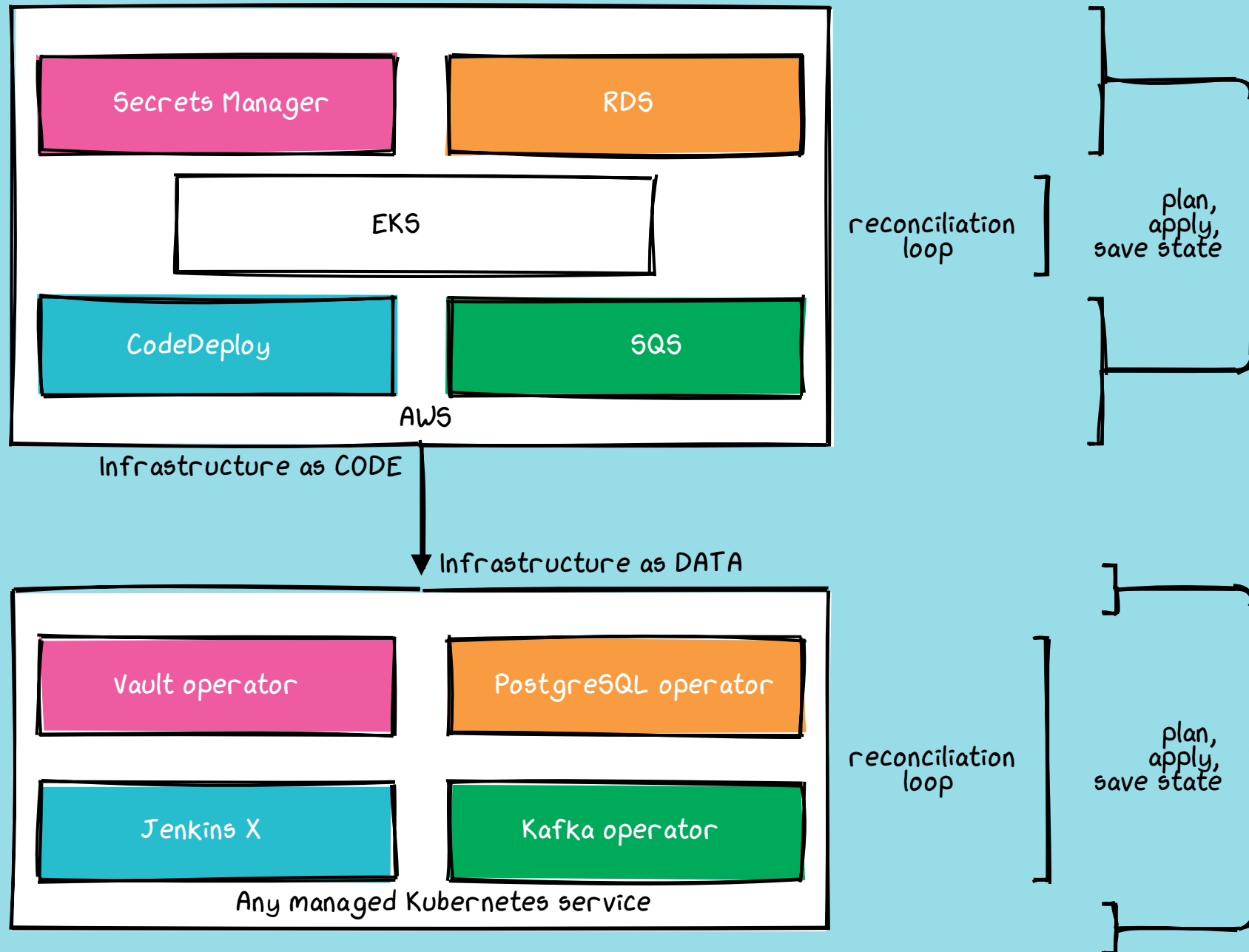
# INFRASTRUCTURE AS ~~CODE~~ DATA

Declarative configuration is about treating infrastructure as data, which is more portable than code, and enables workflows that manipulate desired state based on policy.

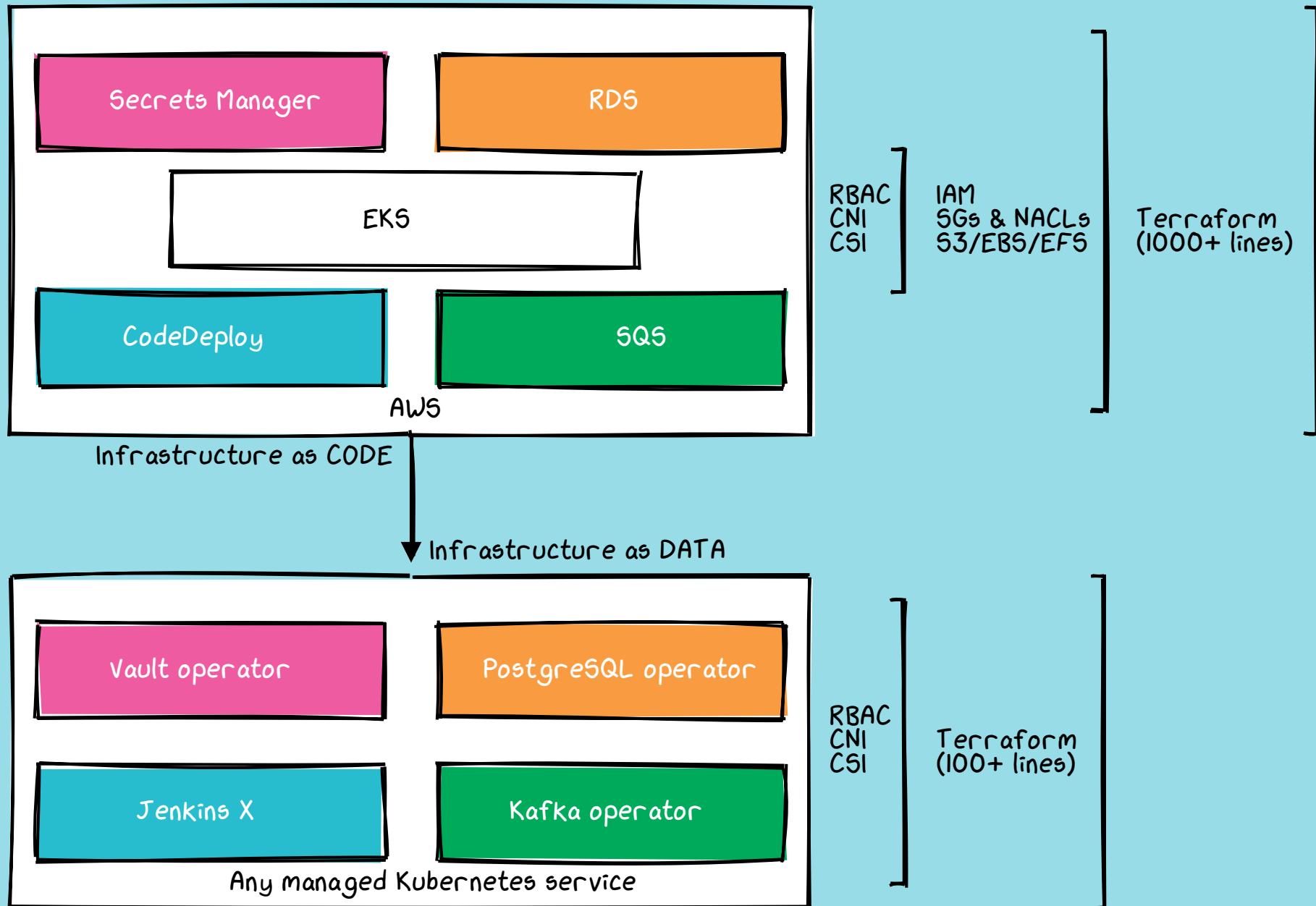
– Kelsey Hightower (2019)

Source: @kelseyhightower on Twitter, 21 August 2019.

# DESIRED STATE



# 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 RDS?

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

- \* RDS and the operator use the same AWS storage primitives
- \* Until this improves, the operator could manage RDS on AWS

# WHAT'S IN IT FOR CLOUD VENDORS?

Remember these?

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

Imagine **not** having to compete with this wall of products, offering a catalog of managed open source products with first-party support instead.

# THANK YOU

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