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Kubernetes on AWS: Advanced Networking

aws

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Special OFFERS

Free Containers Assessment
for all eligible attendees

Kubernetes on AWS: Advanced Networking

PRESENTERS

JT Giri
CEO & Co-Founder

nClouds

Curtis Rissi
Senior Solutions Architect

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Marius Ducea
VP of DevOps Practice

nClouds

Carlos Rodriguez
Senior DevOps Engineer

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Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 175 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

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Kubernetes on AWS: Advanced Networking

AGENDA

DETAILS *(All times PT)*

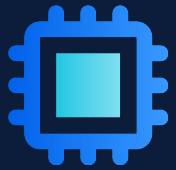
- **11:00 - 11:05 am -** Intro & Session Objectives by JT Giri, nClouds
- **11:05 - 11:20 am -** Intro to Amazon EKS on AWS by Curtis Rissi, AWS
- **11:20 - 11:35 am -** Advanced Networking on Amazon EKS by Marius Ducea, nClouds
- **11:35 - 11:50 am -** Demo: Configuring Advanced Networking Features on nCodeLibrary by Carlos Rodriguez, nClouds
- **11:50 - 12:00 noon -** Q&A by AWS and nClouds

Kubernetes on AWS: Advanced Networking

OBJECTIVES

Intro to Amazon EKS on AWS

Amazon EKS vs. Amazon ECS, Stateless vs. Stateful Workloads



Advanced Networking

How to Use Ingress, App Mesh, and Istio on Amazon EKS

nCodeLibrary Demo

Configuring Advanced Networking Features

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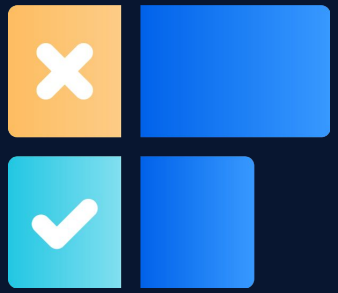

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Intro to Amazon EKS

Curtis Rissi
Senior Solutions Architect

What is Amazon EKS?

Managed Kubernetes control plane

100% open source–no significant differences from upstream

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Why Amazon EKS?

- Built-in integration with AWS IAM
- 24x7 operation and maintenance of control plane
- Built according to AWS best practices (multi-AZ etc.)
- Automated upgrading and patching
- Managed control plane scaling

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Amazon EKS vs. Amazon ECS

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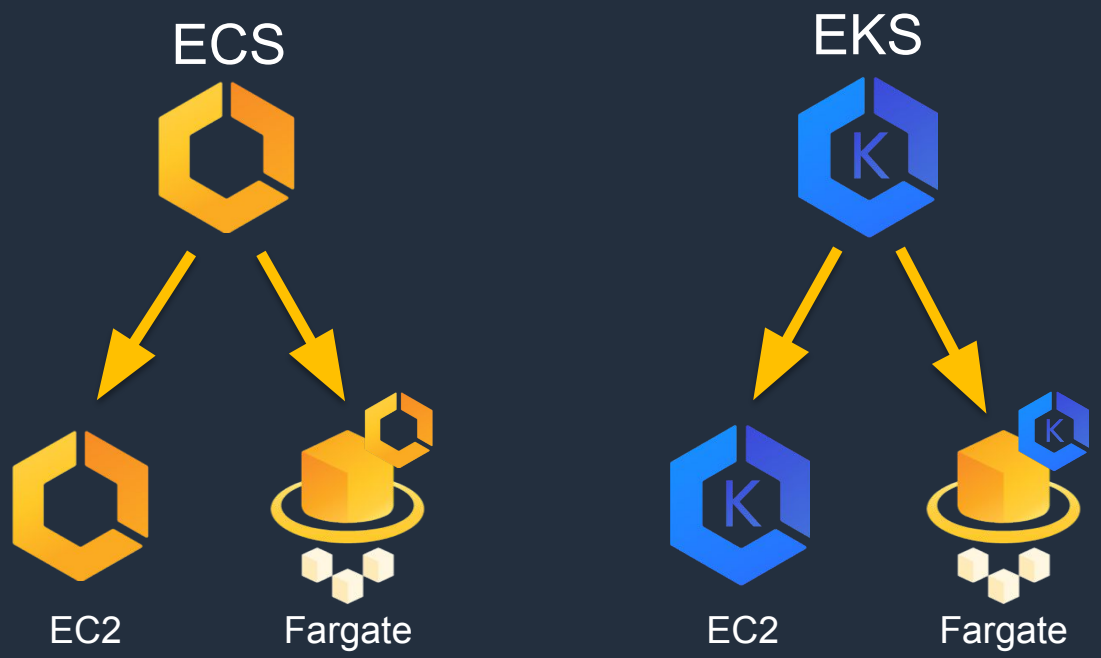
We Give You The Power To Choose:

1. Choose your orchestration tool

2. Choose your launch type



Amazon EKS vs. Self-Managed Kubernetes

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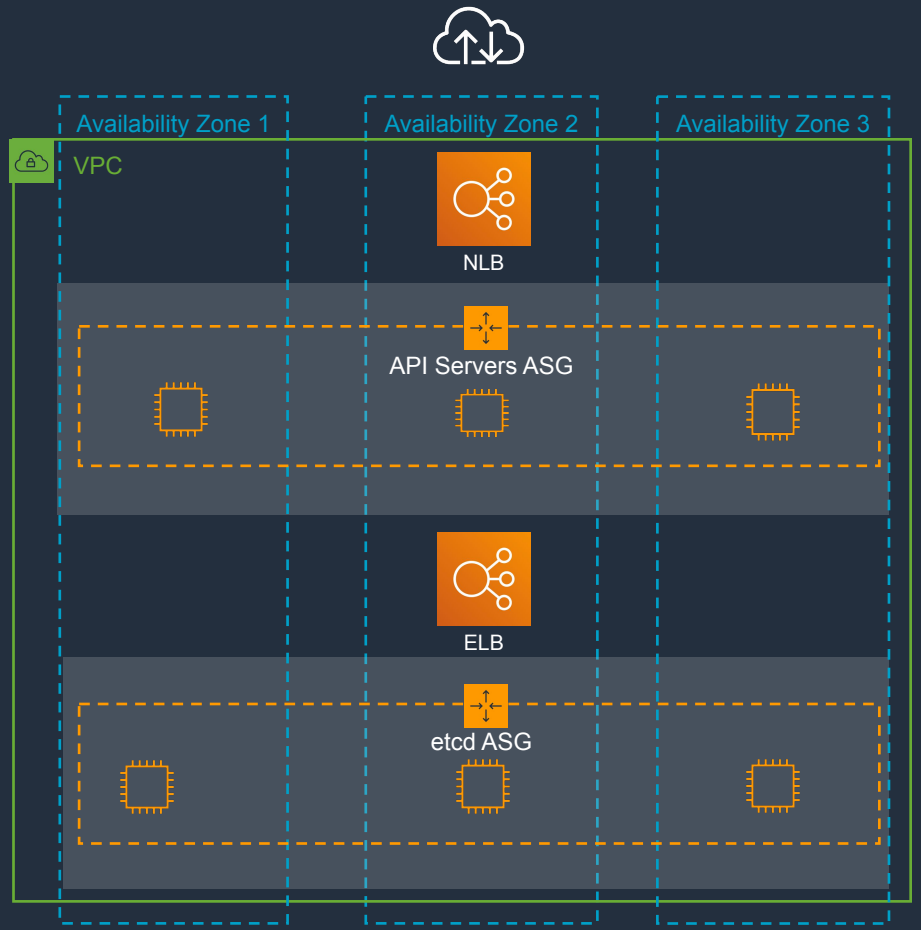
EKS Control Plane

Highly available, single-tenant infrastructure

Managed and operated by AWS

All “native AWS“ components

Use AWS Console, API clients, or command line to manage



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EKS Cluster Architecture

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Scaling

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EKS Master Scaling (Up)

Control Plane Metrics

Master Nodes (API and etcd)

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EKS Pod Auto-Scaling Concepts

- Vertical Pod Autoscaler
  - Based on CPU & Memory usage of your pods
  - Used to ”right size” your pods for the applications within them
- Horizontal Pod Autoscaler
  - Based on CPU & Memory Consumption
  - Used to scale the number of pods in a deployment

EKS Node Auto-Scaling Concepts

- Cluster Autoscaler
  - Used to adjust the number of nodes in your cluster

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Stateless vs. Stateful

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Stateless Containers

- Original Intent – allows for rapid and free scale in and out
- Ephemeral in nature and in storage
- “Pets vs. Cattle”

Stateful Containers

- Data persists throughout scale and lifecycle events
- Useful for apps that were not written to be stateless
    - Legacy Applications awaiting replacement (keeping, and sometimes turning, the lights on)
    - Stateful applications mid-stream or early in their lifecycle (not being sunset or up for replacement)
    - Databases?
        - No. Just no.

EKS Summary

- EKS enables you to run native, upstream Kubernetes while giving you the ability to:
  - Focus on your workloads and not on the masters/control plane
  - Run self-managed, managed and serverless nodes based on your needs
  - Scale quickly based on demand
  - Run both stateless and stateful workloads
  - Leverage the broader Kubernetes ecosystem

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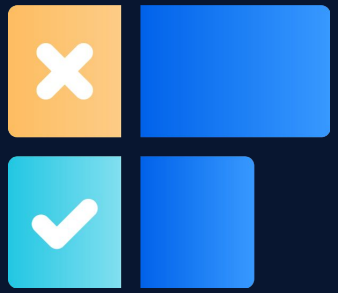

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Advanced Networking on Amazon EKS

Marius Ducea
VP of DevOps Practice
nClouds

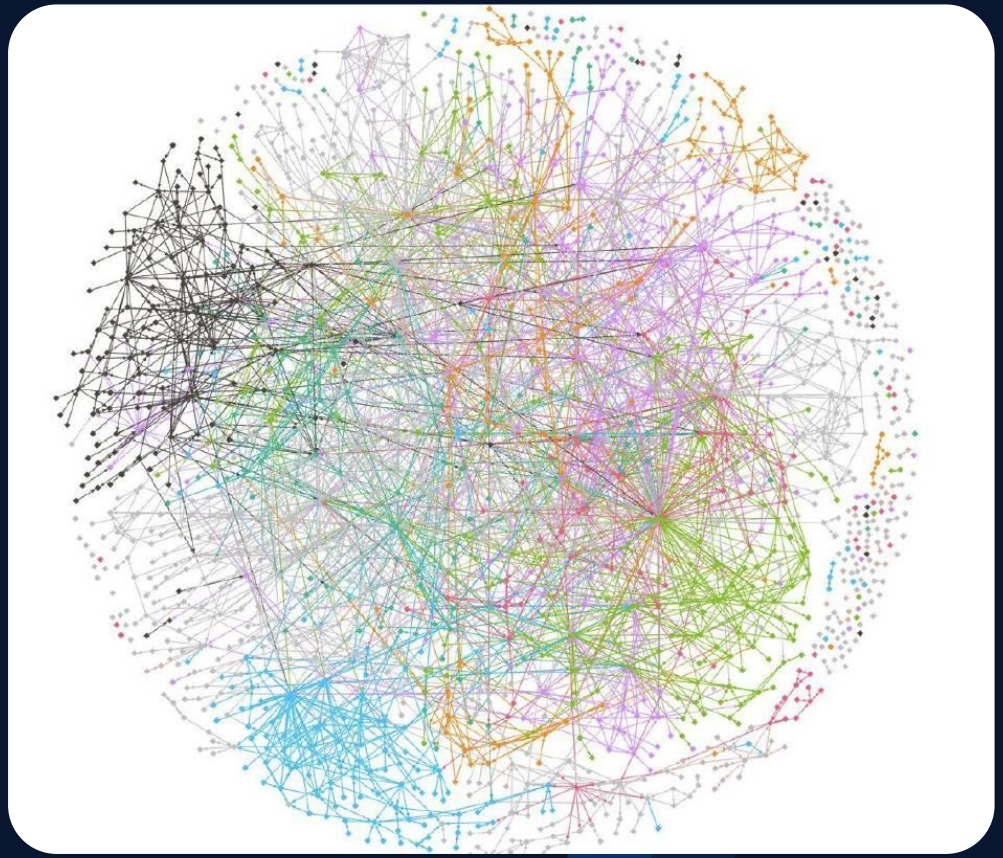
Modern Application Architectures:
Microservices

Building Blocks:

- Containers
- Serverless (AWS Lambda, etc.)
- Other AWS services (Amazon RDS, Amazon DynamoDB, etc.)
- Amazon EC2

Microservices
Challenges

- Control over service to service communication.
- Visibility into service-to-service communication, i.e. end to end observability.
- Identification and resolution of many more possible points of failure.
- Ensure trust by automating security and compliance.



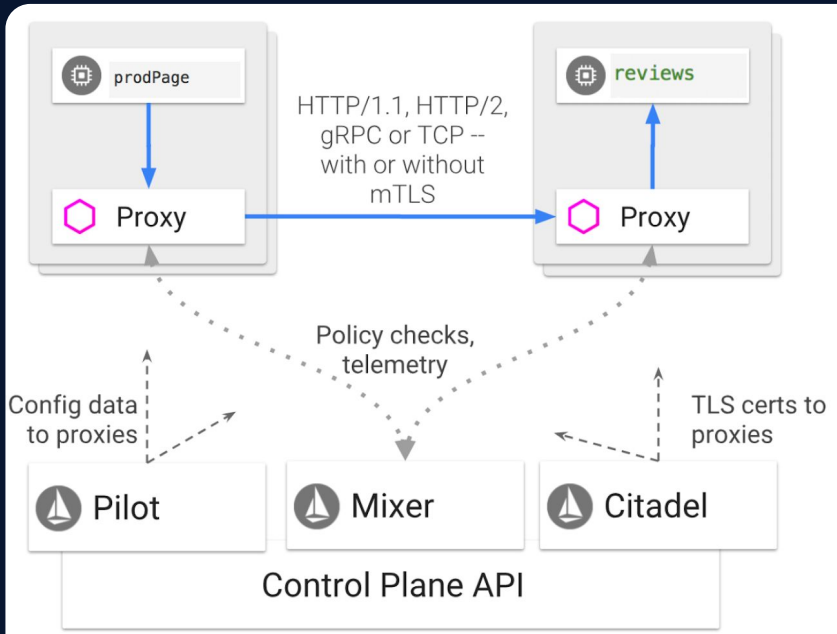
Need for a Service Mesh

What do we need?

- Reliable communication between service nodes
- Ability to control routing through policy
- React autonomously and responsively to dynamically changing state
- Uniform, dependable, noninvasive mechanism for observability

All decoupled from application code and applied in a standardized, declarative, and reliable fashion.

Istio Service Mesh with
Envoy Proxy




```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
  - route:
    - destination:
        host: reviews
        subset: v2
      weight: 97
    - destination:
        host: reviews
        subset: v3
      weight: 3
```

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Open Source:

Istio Service Mesh

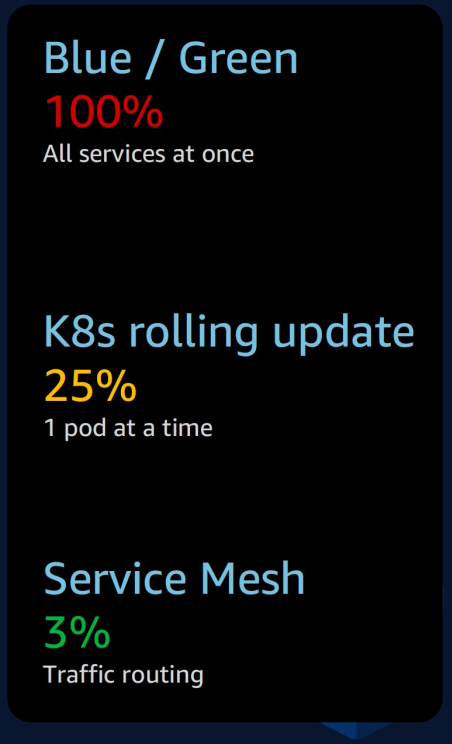
Connect, secure, and observe services

- Shift in where functionality is located
  - Control plane = Istio
  - Data plane = set of all Envoy proxies
- Envoy proxy as sidecar in K8s pod
  - Automatic or manual injection of proxy with EKS

Envoy Proxy

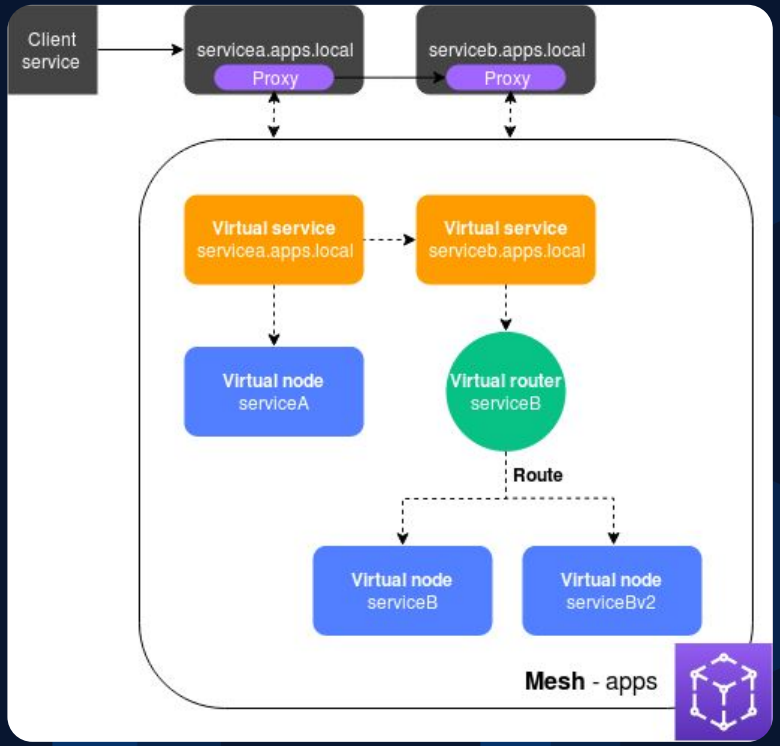
- Level 7 proxy
- HTTP, HTTP/2, gRPC, Amazon DynamoDB, MongoDB
- C++11 code base, only 8 MB (statically linked)
- No language or framework dependencies
- Requires no code changes
- Battle-proven open source, started at Lyft
- Envoy is not tightly coupled to Istio

Microservices
Update Strategies

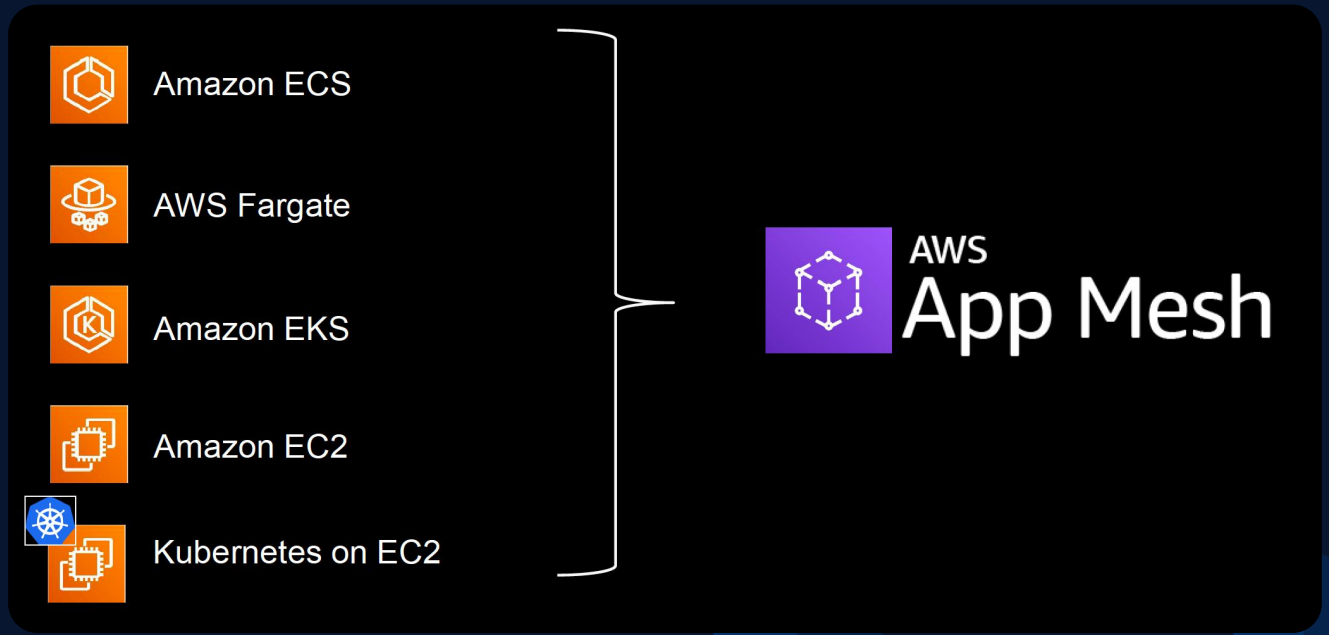


AWS App Mesh

- Consistent microservice communications
- Based on open source Envoy proxy
- Visibility
  - Amazon CloudWatch
  - AWS X-Ray, Datadog, etc.
- Fully managed
- There is no additional charge for using AWS App Mesh



App Mesh works across compute services



App Mesh constructs

Mesh
Virtual node
Virtual router and routes
Virtual service

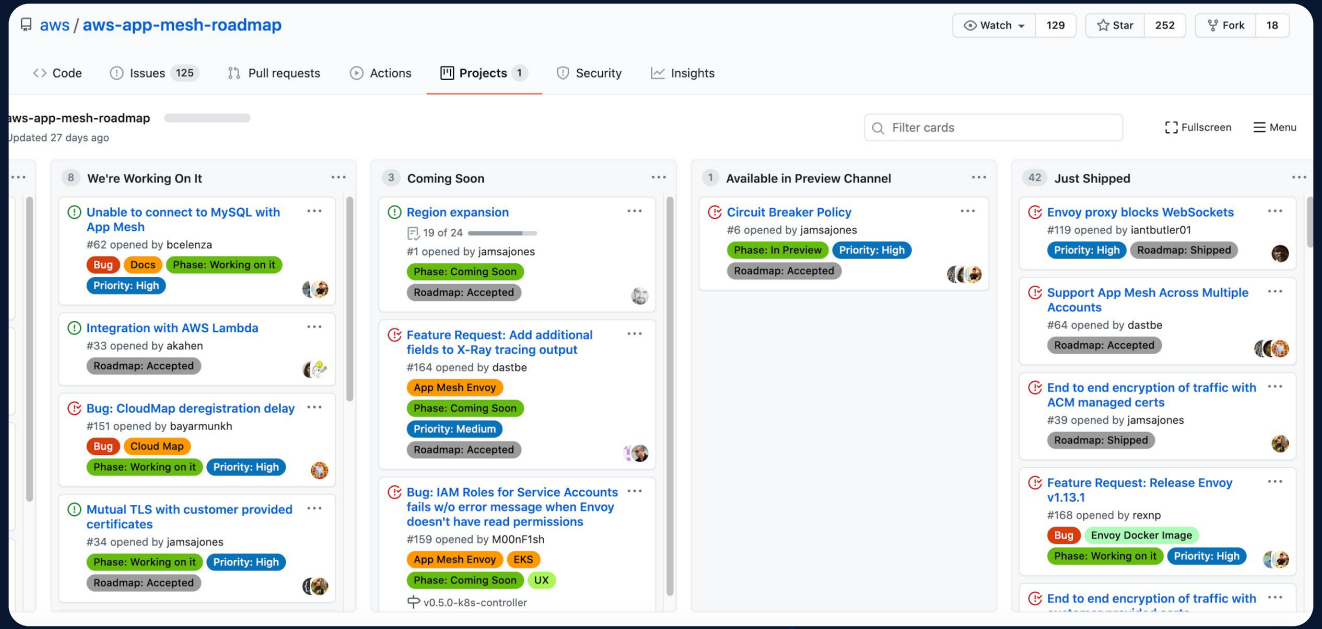
Create and manage these in App Mesh API, CLI, SDK, or AWS Management Console

Proxies
Services
Service discovery

Configure and run proxies and services on Amazon ECS, Fargate, Amazon EKS, Amazon EC2

Service discovery with AWS Cloud Map

AWS App Mesh Roadmap is Public



https://github.com/aws/aws-app-mesh-roadmap

Summary

- Running K8s is hard ... use a managed K8s service (Amazon EKS)
- A service mesh complements K8s:
  It adds observability, traffic management and security features.
- AWS App Mesh is free to use and works across compute services (not limited to EKS)

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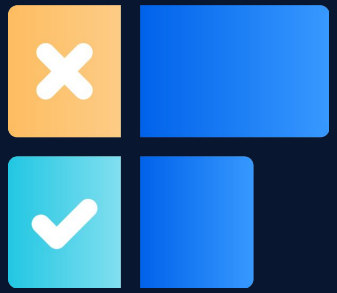

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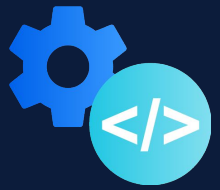
Demo: Configuring Advanced Networking on Amazon EKS Using the nCodeLibrary

Carlos Rodriguez
Senior DevOps Engineer
nClouds

How do we configure Advanced Networking on Amazon EKS

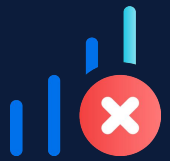
Manually create resources?



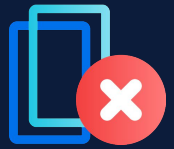
Infrastructure as Code (IaC)

...

Manual Provisioning



Inconsistent



Hard to replicate environments

Prone to errors

Who made this?

Infrastructure as Code

IaC

Consistent

Easy to replicate

Parameter-izable

….

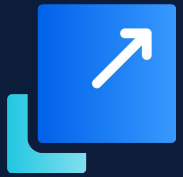
nCodeLibrary

nClouds Infrastructure as Code

Building Blocks

Bundles

Test Cases



Scale

Code Standards

Demo

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Q&A

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Kubernetes on AWS: GitOps

Tuesday, December 8, 11 am PT

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