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Migrating a Monolith to Kubernetes with Istio: Our Journey at Adobe

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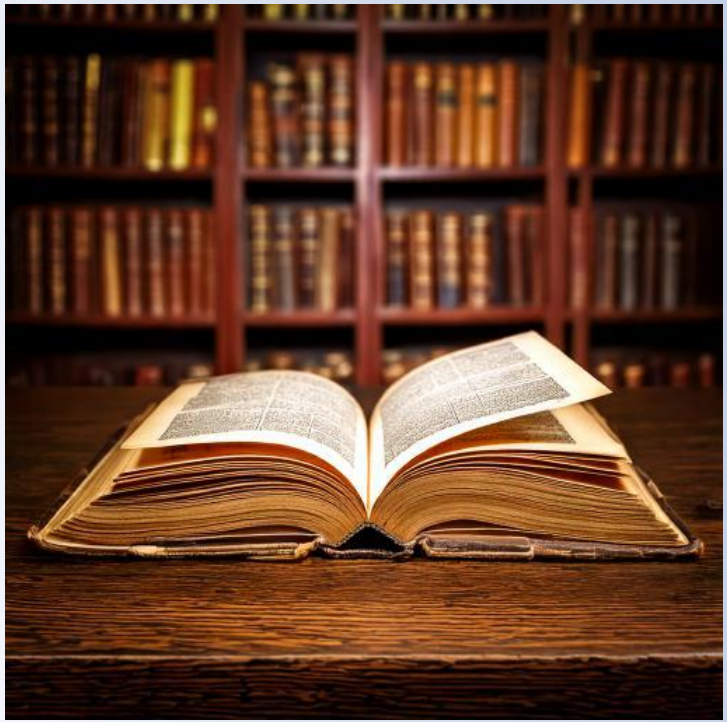
Edward Adasiak
Lead Cloud Engineer
Adobe

Rahul Tripathi
Senior Engineer
Adobe

James Ilse
Principal SE
Solo.io



Prologue

Adobe Acrobat Sign

- Offered as part of Adobe Document Cloud
- E-sign service
- Document management workflow engine
  - Tracking
  - Bulk Sending
  - Integrations
- Commercial and Government offerings
- https://www.adobe.com/documentcloud.html

Multi-

- Tiered architecture
- Shard
- Cloud
- Region
- Availability Zone

Failover regions for disaster recovery

Virtual Machines

80+ clusters worldwide

Monolithic Middleware

Historical Context

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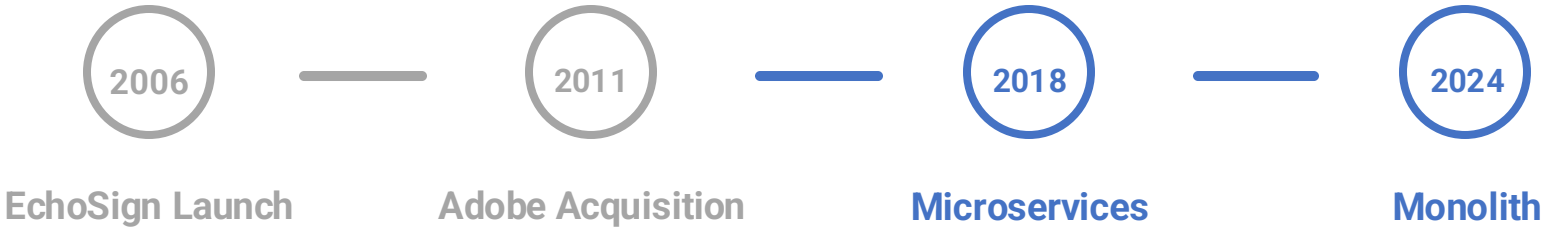

Paying Interest on Technical Debt

Problems hit critical mass:

- Lowered developer velocity
- Inflexible scaling, cost inefficient
- Support overhead for different architectures
- New cluster spin up takes weeks

Proposed Solution

- Monolith VMs → 

- Monolith + Microservices → 
-  = Ethos

The Ethos Platform

Ethos: Adobe's Global Kubernetes Platform

- Multi-cloud + on-prem
- Multitenant
- 10+ Compliance Standards
  - SOC2, PCI, HIPAA, FedRAMP, etc.
- Cilium CNI
- Custom API Gateways + Ingress

The Challenge

Run Istio on Ethos:

- Compliance
- Ingress
- FIPS certification
- SPIFFE for AuthN

Deploy Istio with ArgoCD

Zero downtime cluster migrations

< 1 year to execute

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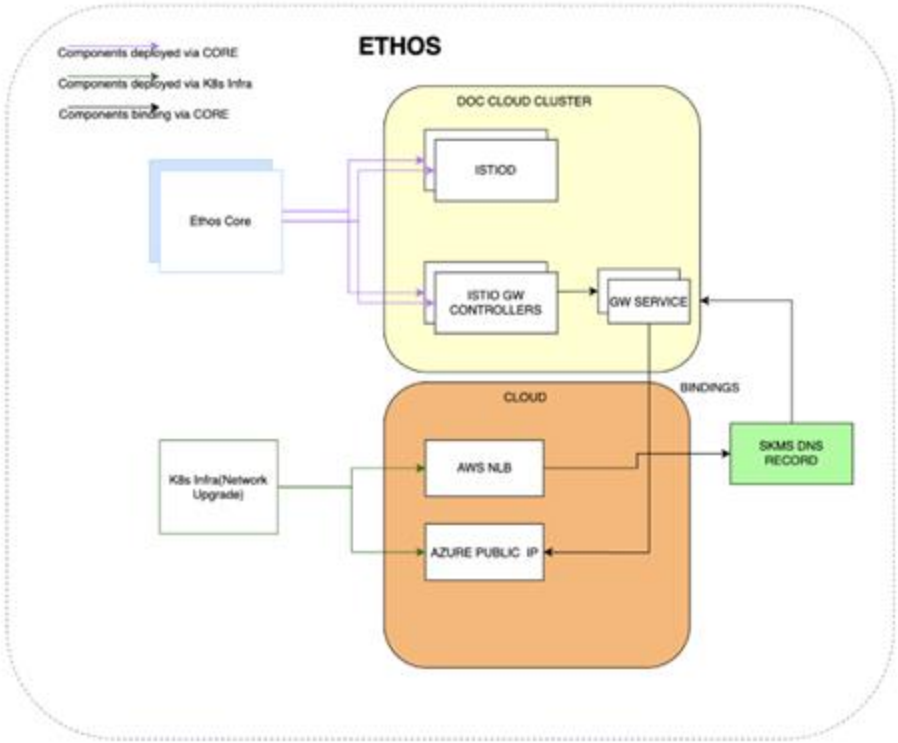
Implementation & Research

Exposing Gateways

Creating and Exposing an Ingress Gateway to the Service Team Without Using the Kubernetes In-Tree Controller



Heterogeneous Deployment Mode

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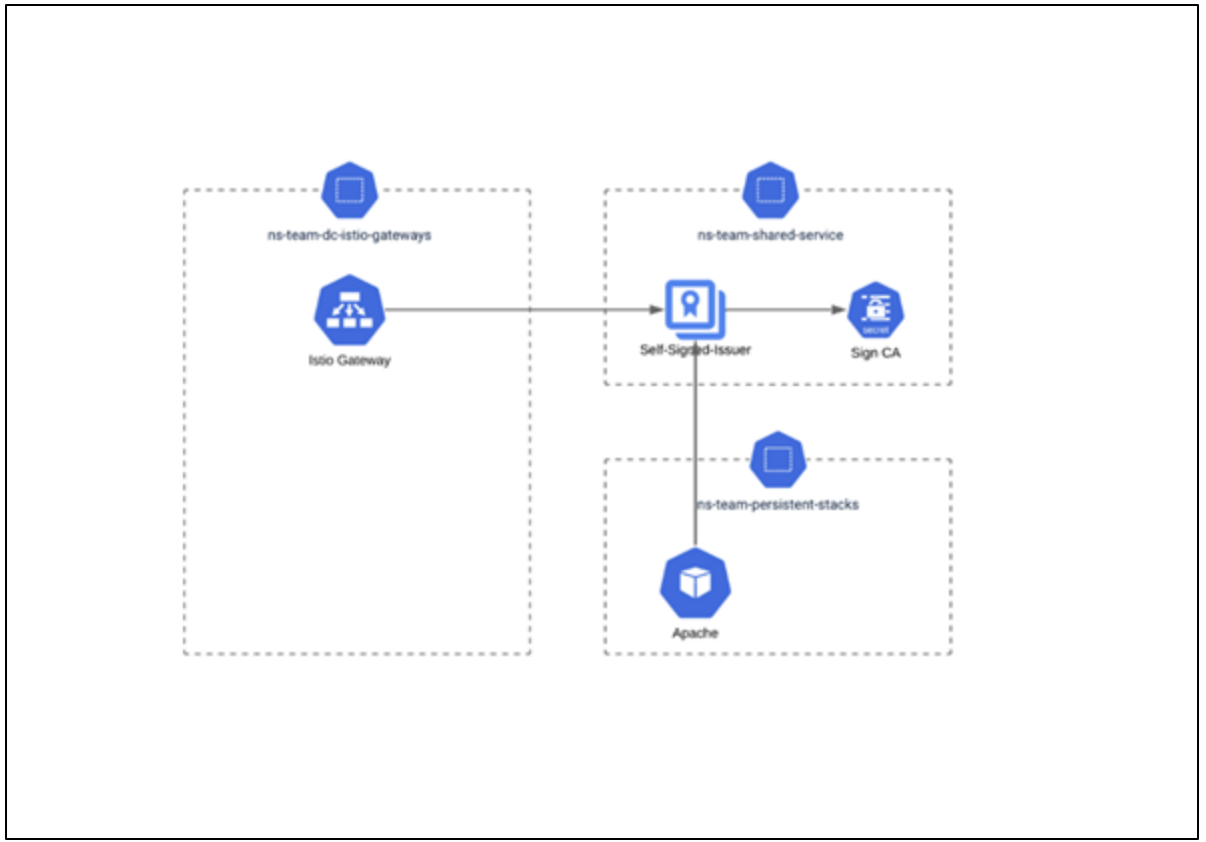
Self Signed Certs
with Cert Manager



Heterogeneous Deployment Mode

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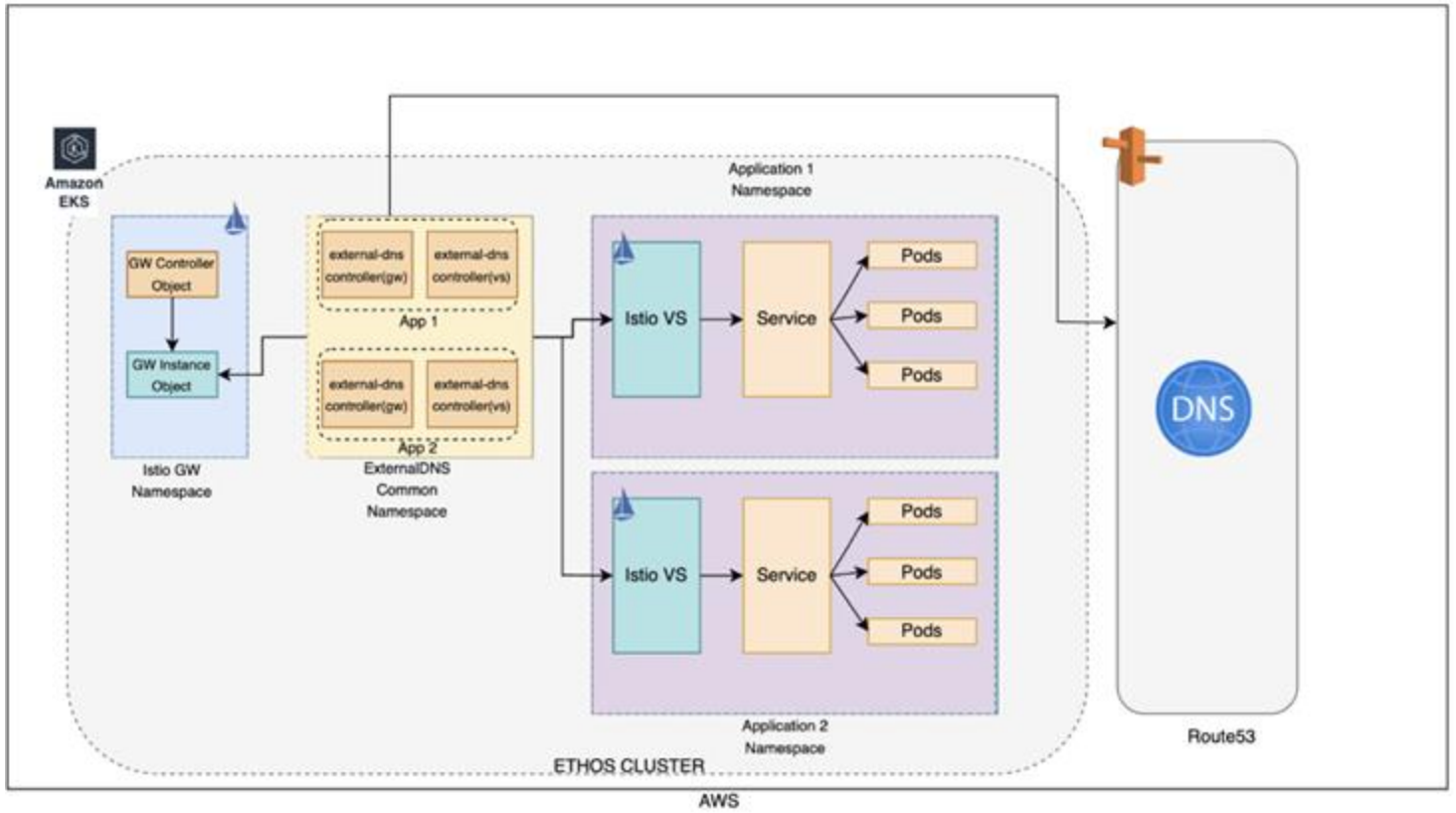
External DNS with Istio - Using Adobe Fork



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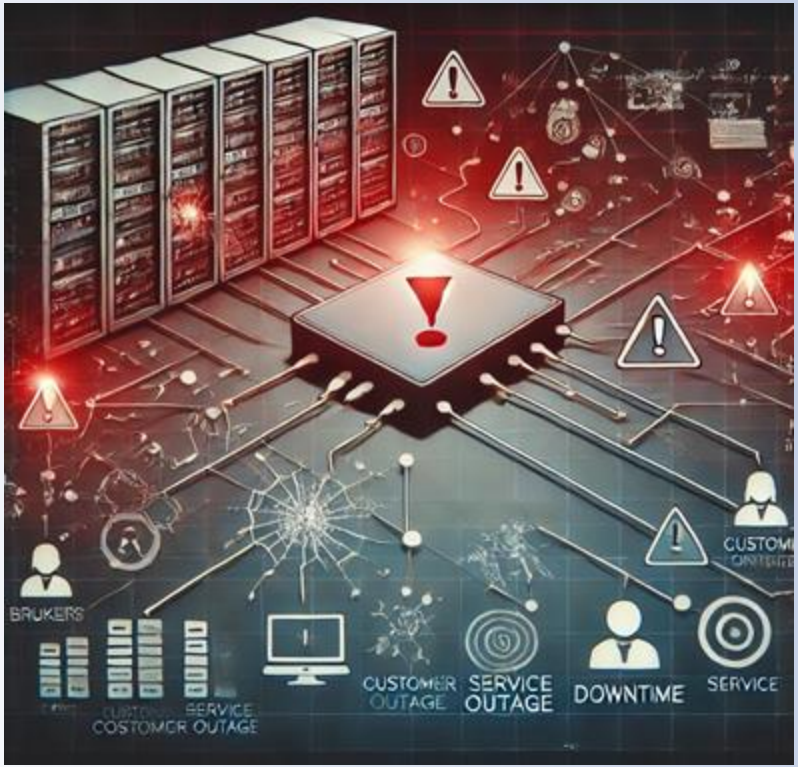

From Configuration Miss to a Customer Service Outage

Scaling Considerations

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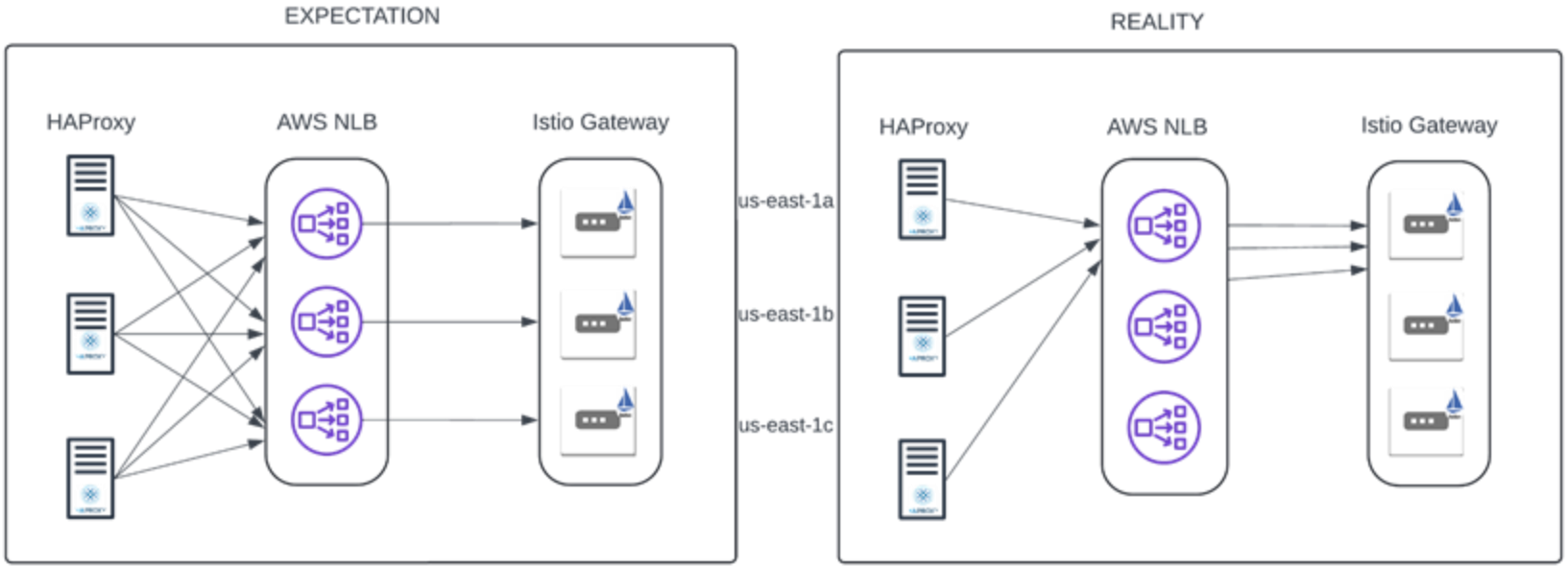
Protecting against Misconfiguration - GW Pods OOM



HTTP 1.0 Support

< HTTP/1.1 426 Upgrade Required HTTP/1.1 426 Upgrade Required < content-length: 16 content-length: 16 < content-type: text/plain content-type: text/plain < date: Fri, 17 May 2024 10:03:24 GMT date: Fri, 17 May 2024 10:03:24 GMT < server: istio-envoy server: istio-envoy < connection: close connection: close

Cilium breaks Istio

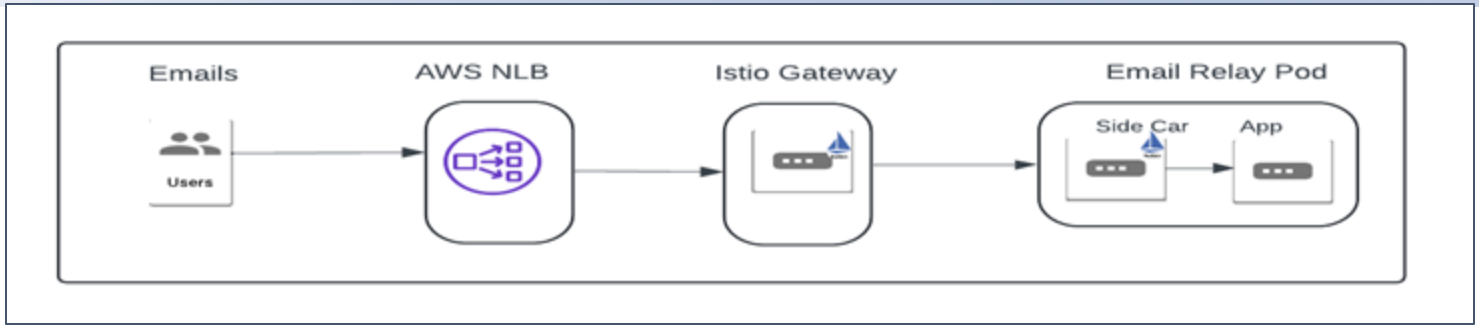
Since Cilium 1.14, Cilium defaults to proactively deleting other CNI plugins and their config.

To avoid issues, it **must be configured with** `cni.exclusive = false` to properly support chaining with other CNI plugins like Istio.

Always establish a **release cadence** and stay up-to-date with **Cilium** releases to assess their impact on **Istio** or other **external dependencies**.

Know Your Requirements Ahead of Time

SMTP Gateway with IP Preservation



AWS NLB	GW	SideCar	Application
Enable PP	None	None	Enable PP
Enable PP	Enable PP	None	Enable PP
Enable PP	Enable PP	None	None
Enable PP	None	None	None
Enable PP	Enable PP	Bypass	None
Enable PP	None	Bypass	None

Disable HTTP header Casing

Request sent by client:

```
curl https://adobesign-example.com/elb/cluster.html -sI | grep -i etag
eTag: "2-60ea089e14aaa"
```

Request received by the application:

```
curl https://adobesign-example.com/elb/cluster.html -sI | grep -i etag
etag: "2-60ea089e14aaa"
```

Istio normalizes headers to comply with HTTP/2 standards.

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Don’t overlook observability

Creating Grafana Dashboard

Where we are now

- Microservices traffic shifted with no downtime
- Istio deployed everywhere via CI/CD

Benefits:

- Predictive, aggressive scale-in/-out
- Deployment risk and time drastically reduced
- Significantly lowered support overhead
- Developer velocity increased

  - New ”cluster” for testing every PR

Where to next?

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Advocating for wider adoption of service mesh

Ambient makes the pitch easier to make

- Scalability and cost-efficiency
- Zero-trust security
- Compatible with multitenancy

Increasing automation around upgrades

Improving the observability single pane of glass

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