



# Introduction to Consul Enterprise

*Connect and secure services across any platform.*

# Agenda

- Workshop & Instruqt Introduction
- A brief history of enterprise networking
- Consul Enterprise Overview
- Consul Use Cases
- Consul Architecture
- Workshop Labs
  - Consul Enterprise Basics
  - Service Discovery with Consul Enterprise
  - Service Mesh with Consul

# Workshop Details

# Instruqt Introduction

This workshop leverages the *Instruqt* Platform to provide temporary lab environments for our workshop

Your instructor should already have sent out instructions on getting a free Instruqt account, as well as the invite to this workshop

For more information about Instruqt, see:

<https://instruqt.com/instruqt/tracks/getting-started-with-instruqt>

# Workshop Introduction

This workshop is designed to provide a foundational understanding of Consul Enterprise.

Specifically regarding:

Consul Enterprise Architecture  
Consul Enterprise Primary Use-Cases

Consul Enterprise Instruqt workshop home:  
<https://play.instruqt.com/hashicorp/topics/consul-workshops>

# Workshop Introduction

This workshop is designed to provide a 101 foundational understanding of Consul Enterprise.

It is ***not*** a comprehensive tutorial on how to run Consul Enterprise.

Although we will be walking through some of the installation and configuration of Consul Enterprise.

The intended audience are those who may or may not have previously heard of or used Consul.

General service networking and DevOps knowledge is a plus, but absolutely not a requirement to benefit from this workshop.

# Zero Trust - Defense in Depth

## Universal Principles of Zero Trust

- Identity driven
- Mutually authenticated
- Authorized
- Time-bound
- Encrypted Data & Transit
- Audited & logged

## To be applied to:

- Access
- Communication

# What is Consul Enterprise?

HashiCorp Consul Enterprise is an API-driven service networking solution.

It provides the underlying platform to discover services, automate network configurations, and enable zero-trust connectivity across any cloud, environment, or application runtime.

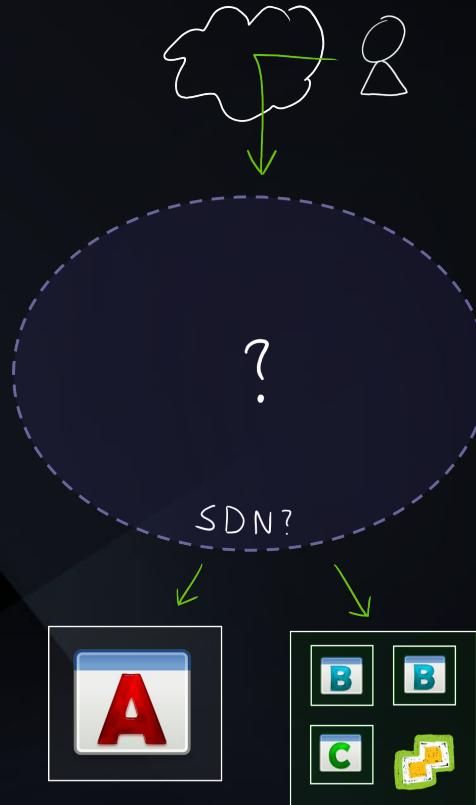
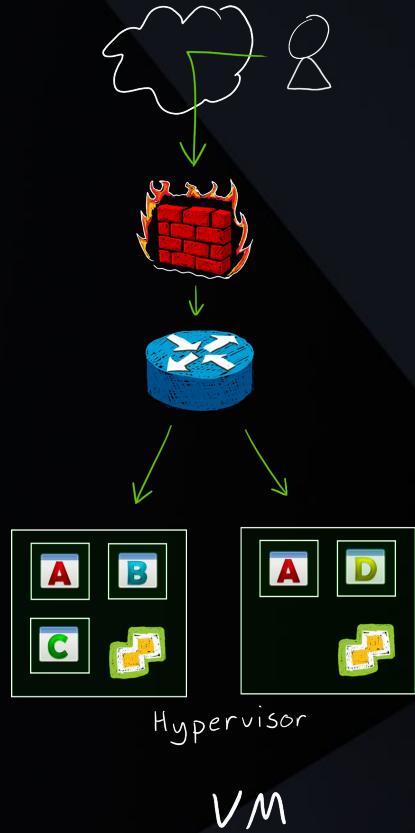
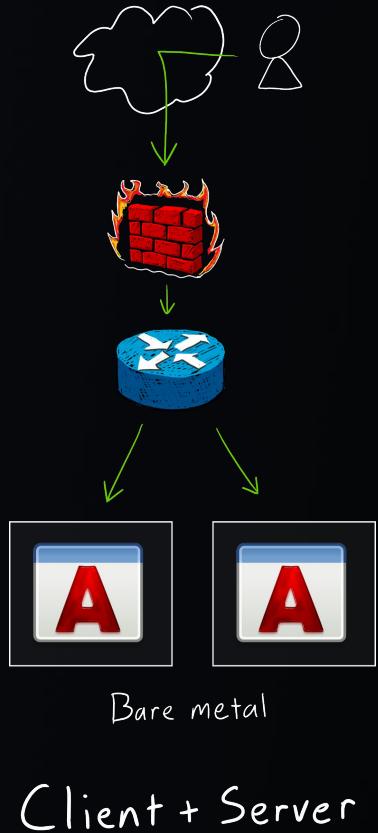
For additional descriptions or instructions that expand on this workshop, please see the docs, API guide, and learning site:

- <https://www.consul.io/docs/>
- <https://www.consul.io/api/>
- <https://learn.hashicorp.com/consul/>

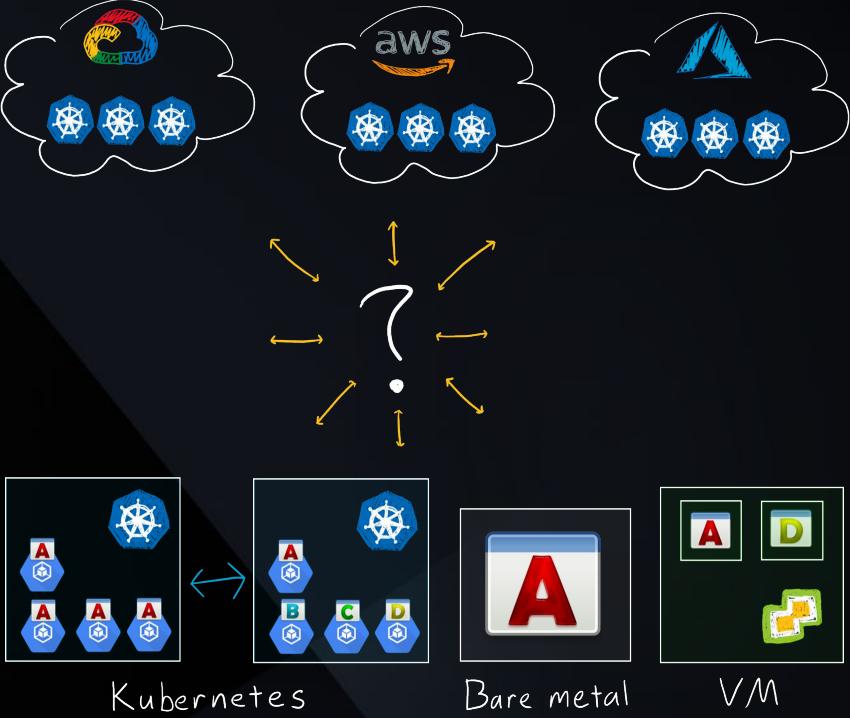
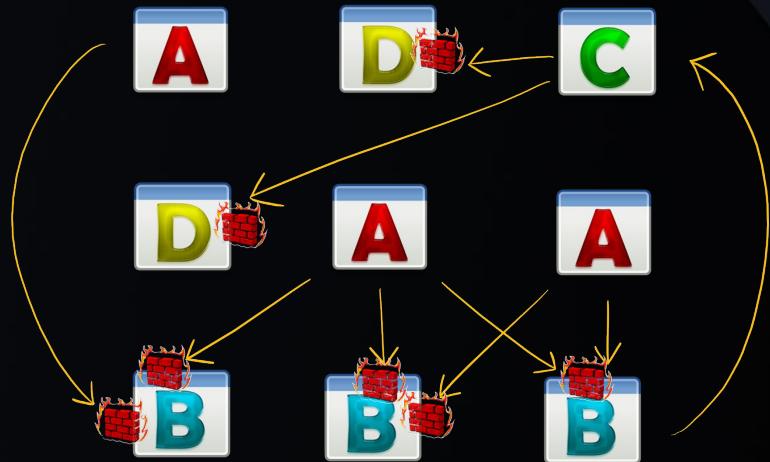


# A Brief History of Enterprise Networking

# A Brief History



# A Brief History

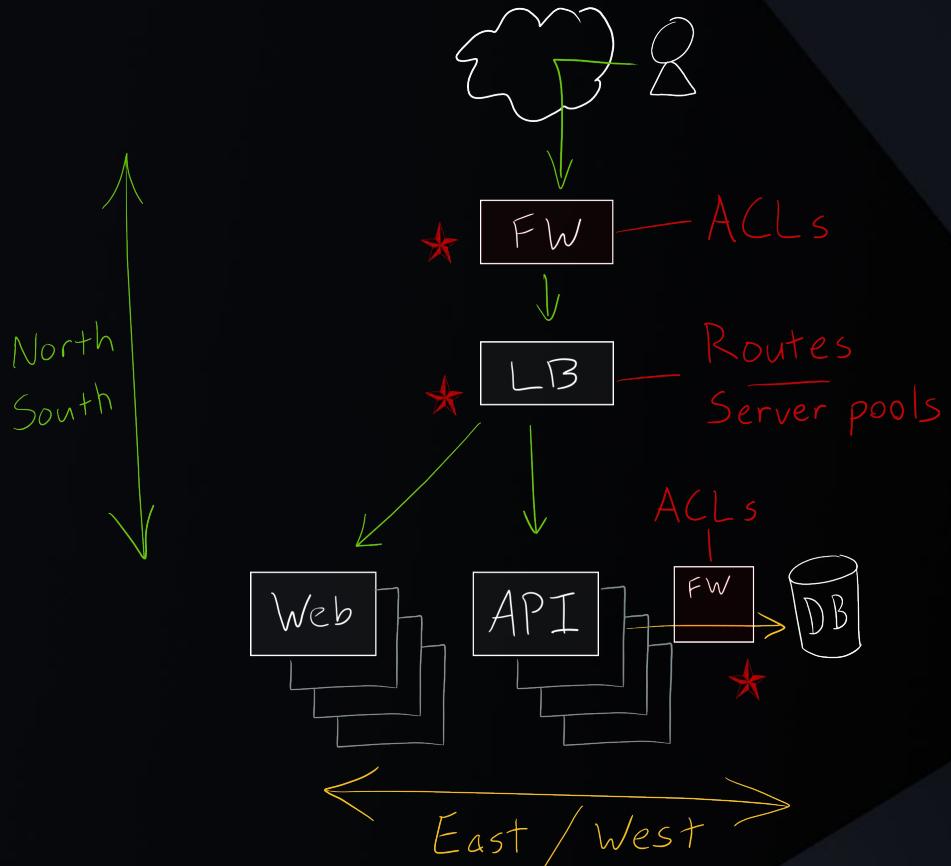


Containers

Monolith → microservices

Schedulers  
+  
Perimeter?

# Translating Network Constructs to Functions



FW ★ Auth Z

LB ★ Naming + Traffic Mgmt

API ★ Ingress + Route filtering

VLAN  
and/or  
Subnet ★ Auth N - Identity

# Modern Networking Challenges

What do we really want?

- Reduce burden on security and network teams
  - While accelerating and providing flexibility for Developers

Challenges:

- Lack of a controlled perimeter
- Diverse multi-everything
  - Clouds
  - Regions / AZs
  - Runtime platforms
- Disparity in managing Identities
  - Cloud native vs JWT vs “...”
- Manual & complex processes in application delivery
- Secure networking is hard

Consul Enterprise accelerates traditional network infrastructure with a foundation of zero-trust, regardless of where infrastructure exists, today or in the future.

# Introduction to Consul Enterprise

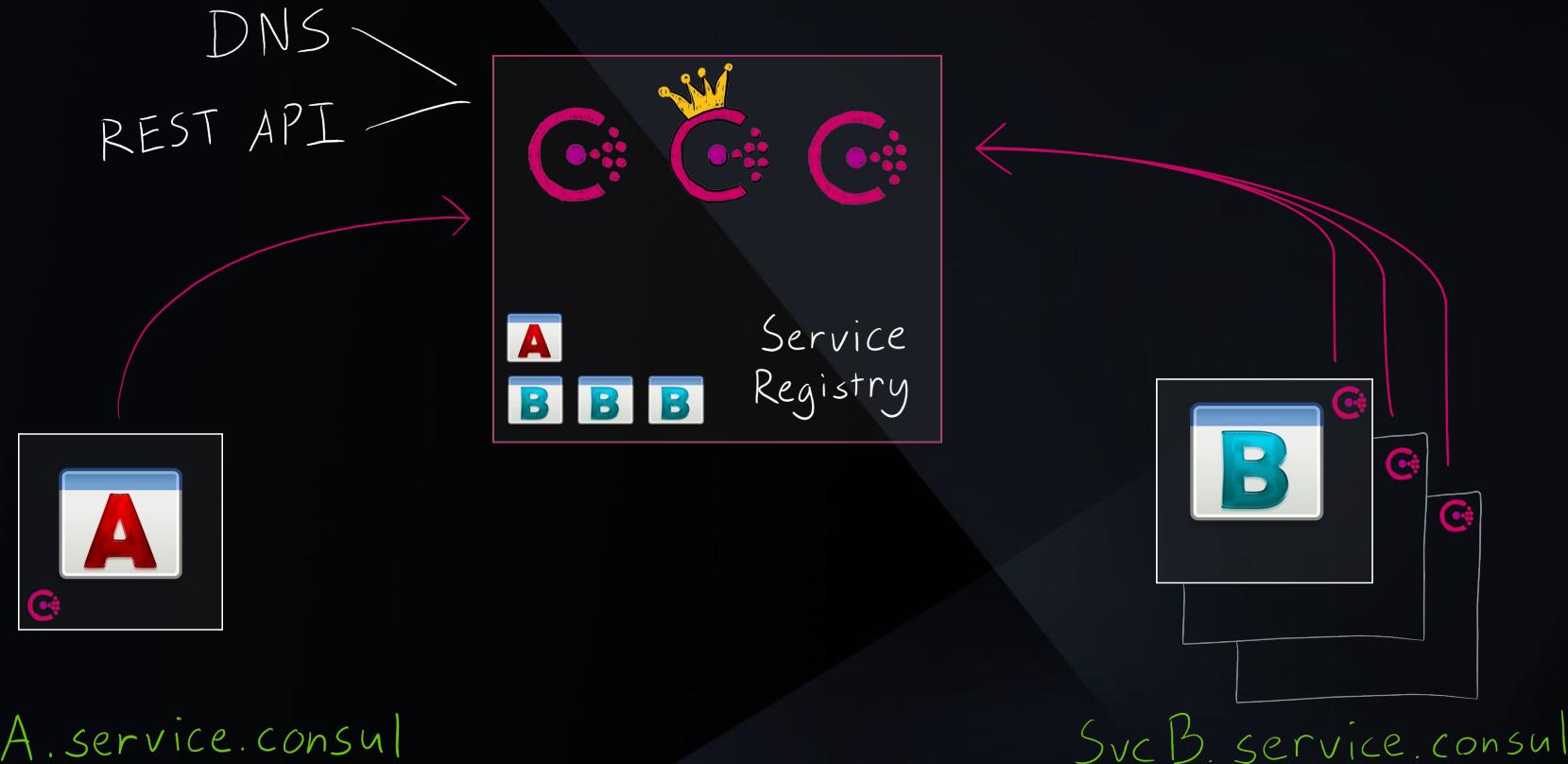
# Consul Enterprise primary use-cases

Global Service Registry & Service Discovery

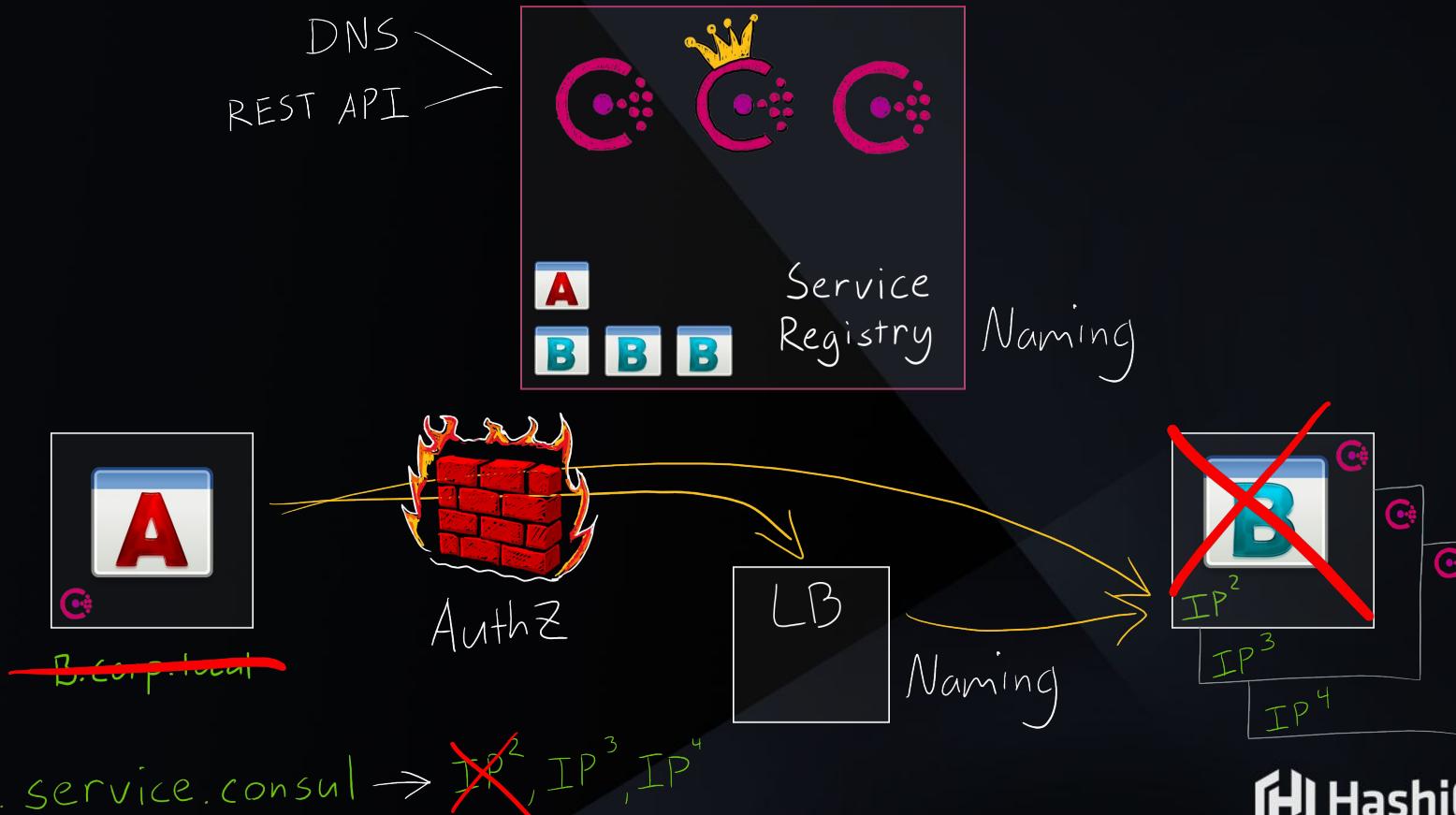
Network Infrastructure Automation

Service - Service communication (Mesh)

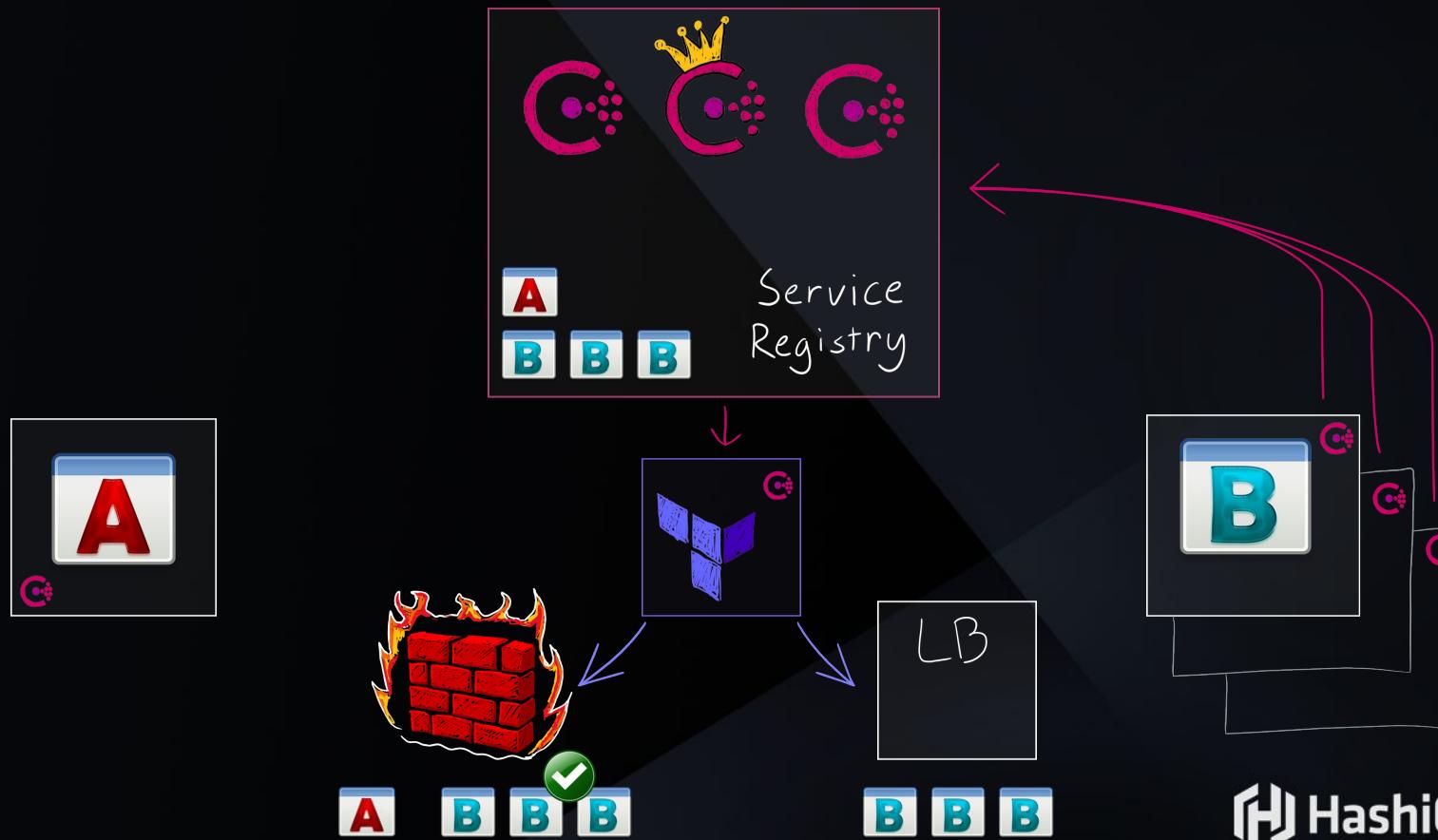
# Consul Enterprise Service Discovery & Registry



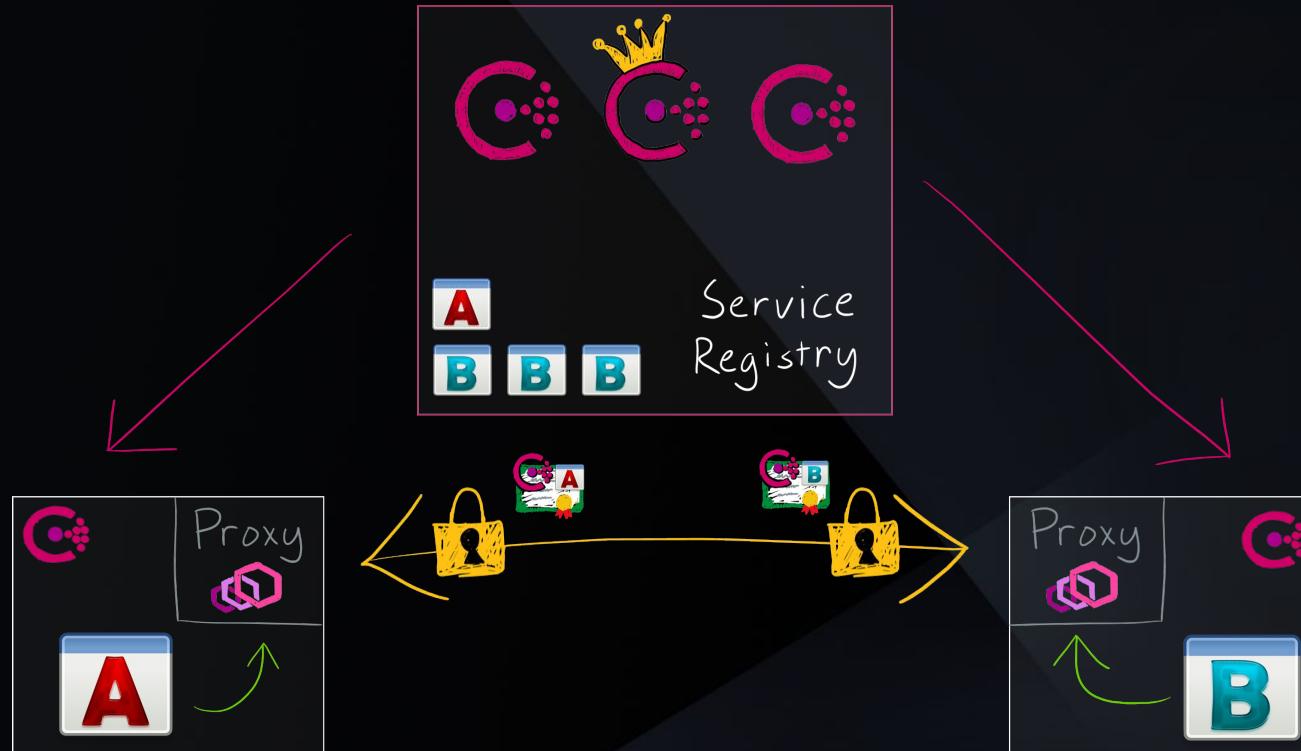
# Consul Enterprise Service Discovery & Registry



# Consul Enterprise Network Infrastructure Automation



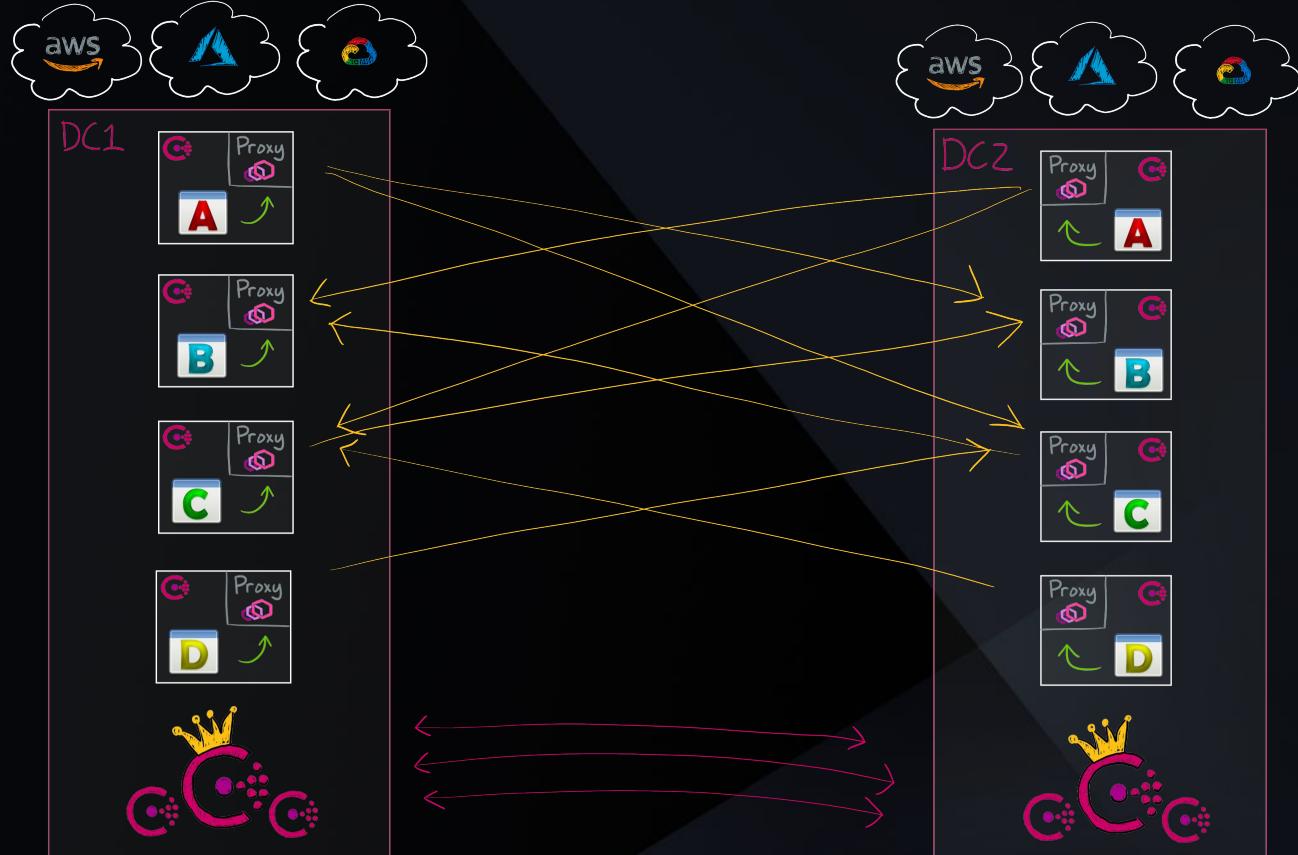
# Consul Enterprise Service Mesh



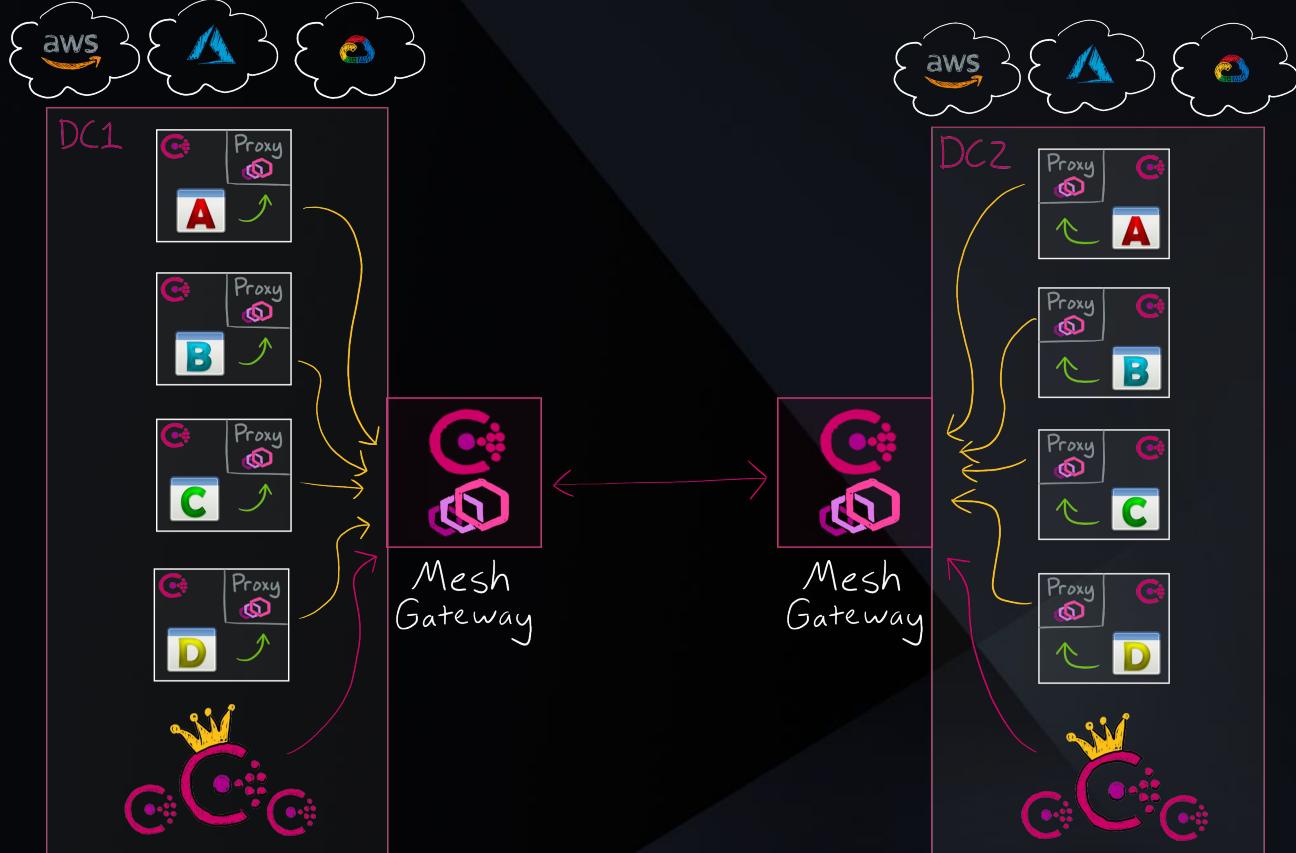
# Consul Enterprise Service Mesh Config

```
services {
  name = "SVC-A"
  port = 9090
  connect {
    sidecar_service {
      port = 20000
      proxy {
        local_service_address = "127.0.0.1"
        local_service_port = 9090
        upstreams {
          destination_name = "SVC-B"
          local_bind_port = 8003
        }
      }
    }
  }
}
```

# Connecting Disparate Networks

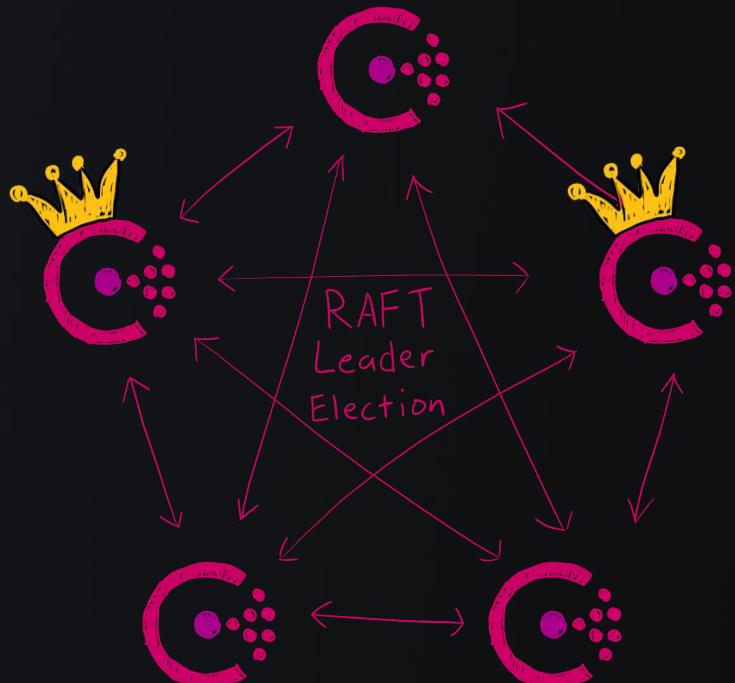


# Connecting Disparate Networks



# Consul Enterprise Server Architecture

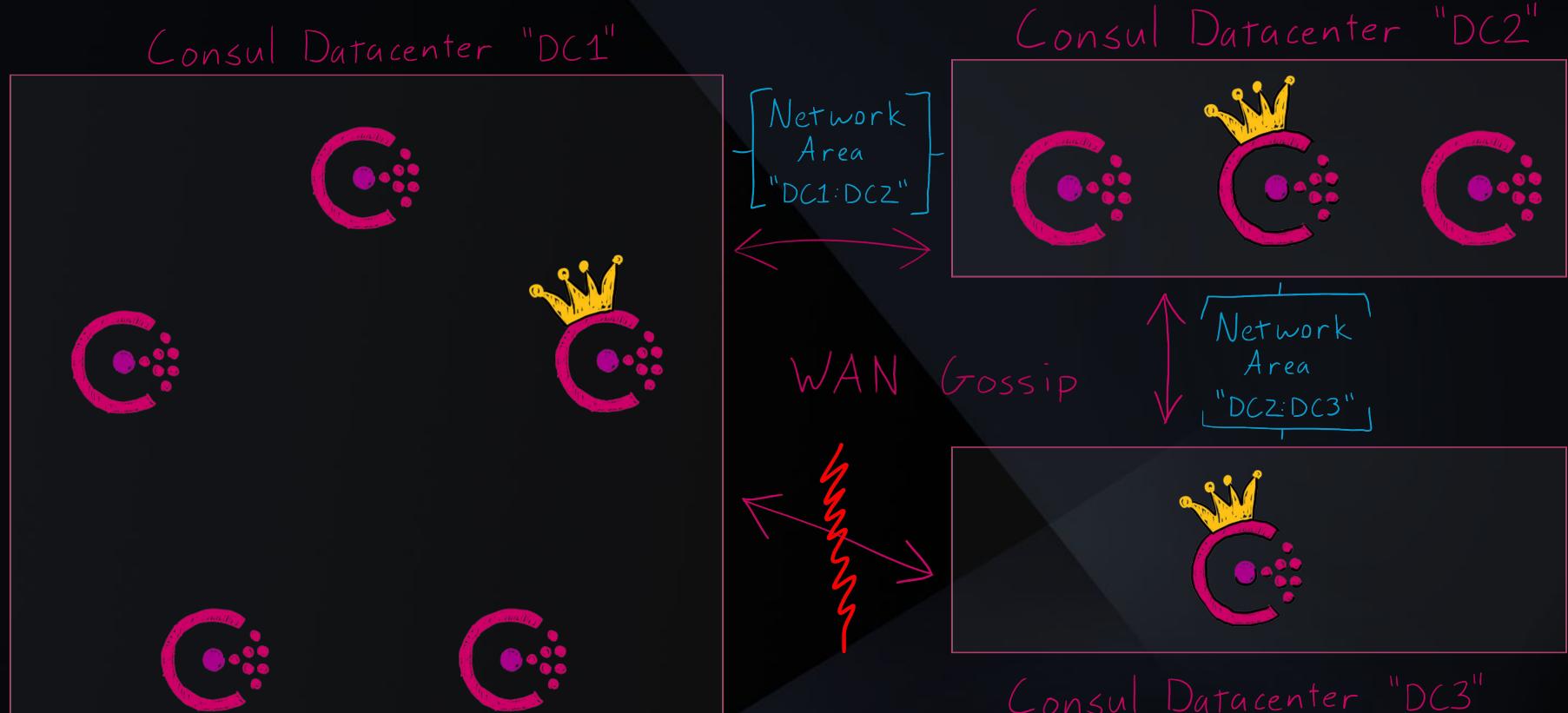
Consul Datacenter "DC1"



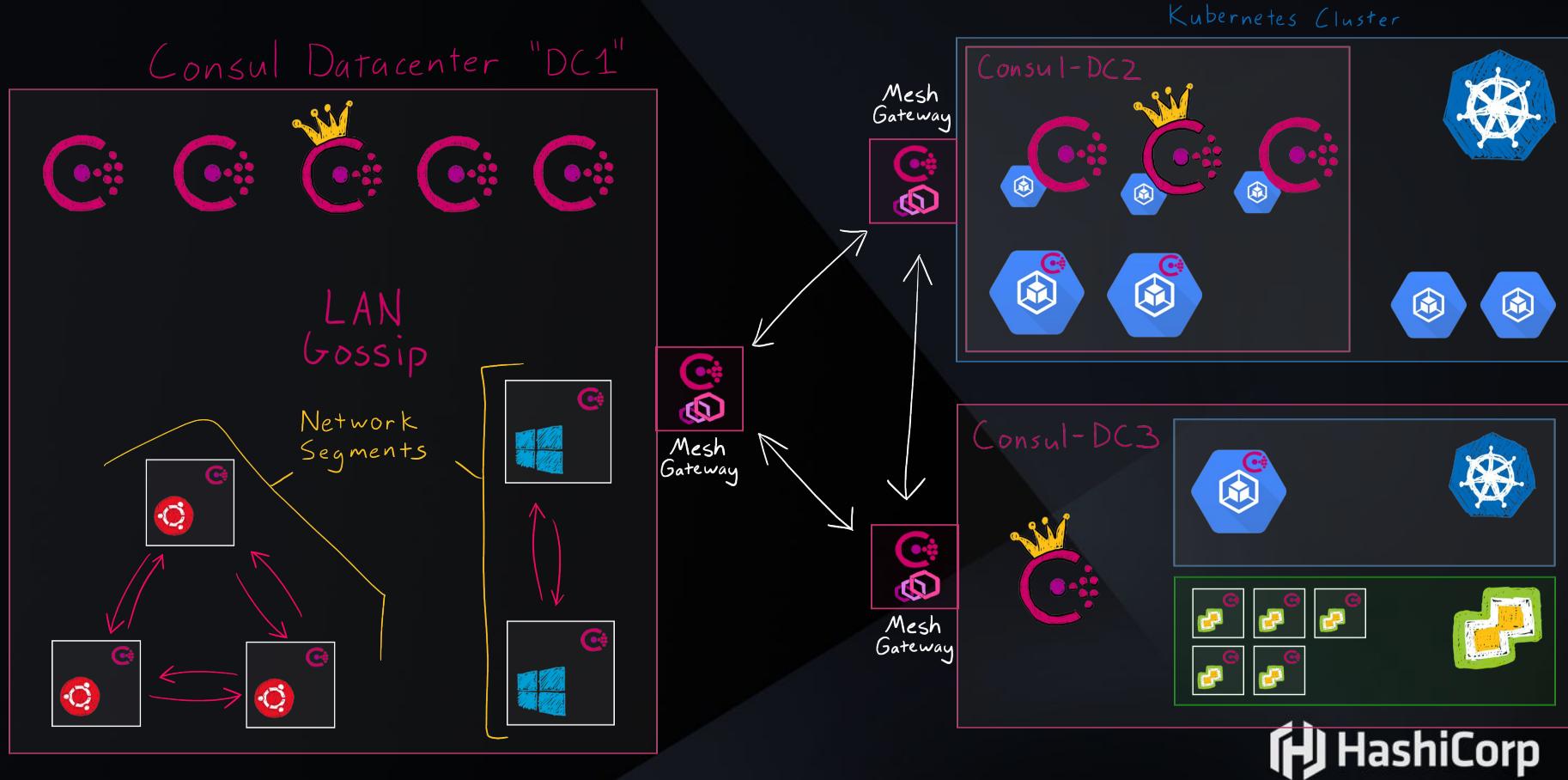
- A Consul cluster is called a “data center”.
- A Consul DC is made up of client nodes and server nodes.
- 3 to 5 server nodes per data center.
- A leader is elected amongst the servers.
- Consensus requires having a majority of servers.

<http://thesecretlivesofdata.com/raft/>

# Consul Enterprise Cluster Federation



# Consul Enterprise Client + Server Architecture



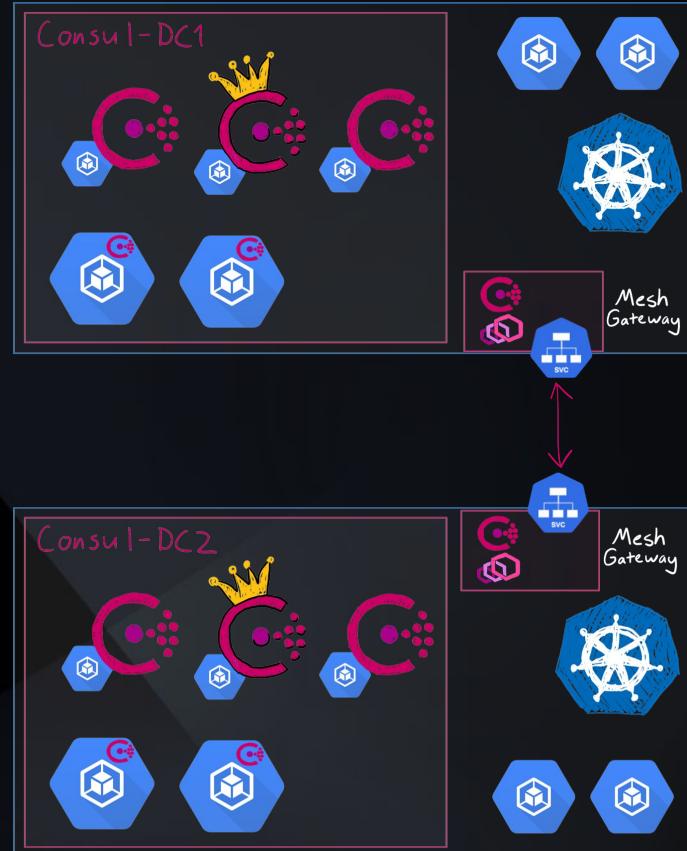
# Consul Enterprise + Kubernetes

Helm

```
global:
  name: consul
  image: hashicorp/consul-enterprise:1.9.0-ent-beta1
  imageEnvoy: "envoyproxy/envoy-alpine:v1.15.0"
  enableConsulNamespaces: true
  datacenter: aks1
  ...

apiVersion: consul.hashicorp.com/v1alpha1
kind: ServiceDefaults
metadata:
  name: api
  namespace: default
spec:
  protocol: grpc
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: api
  labels:
    app: api
spec:
  replicas: 1
  selector:
    matchLabels:
      app: api
  template:
    metadata:
      labels:
        app: api
    annotations:
      "consul.hashicorp.com/connect-inject": "true"
      "consul.hashicorp.com/connect-service-upstreams": "cache:9092,payments:9093"
  spec:
    serviceAccountName: api
    containers:
      - name: api
        image: "nicholasjackson/fake-service:v0.18.1"
        imagePullPolicy: Always
        ports:
          - containerPort: 9091
```

CRD



## Lab Exercises:

1. Consul Basics
2. Service Discovery with Consul Enterprise

# Lab Exercise: Consul Enterprise Basics

You will accomplish the following in this lab:

- Setup up a 3 server Consul Enterprise Cluster (DC)
- Use the Consul Enterprise UI
- Use the Consul Enterprise CLI
- Use the Consul Enterprise API
- Add an Application node to your Cluster
- Test Consul's High Availability
- Provide security using Consul Intentions (Service-based ACLs)

Your instructor will provide the URL for the lab environment.

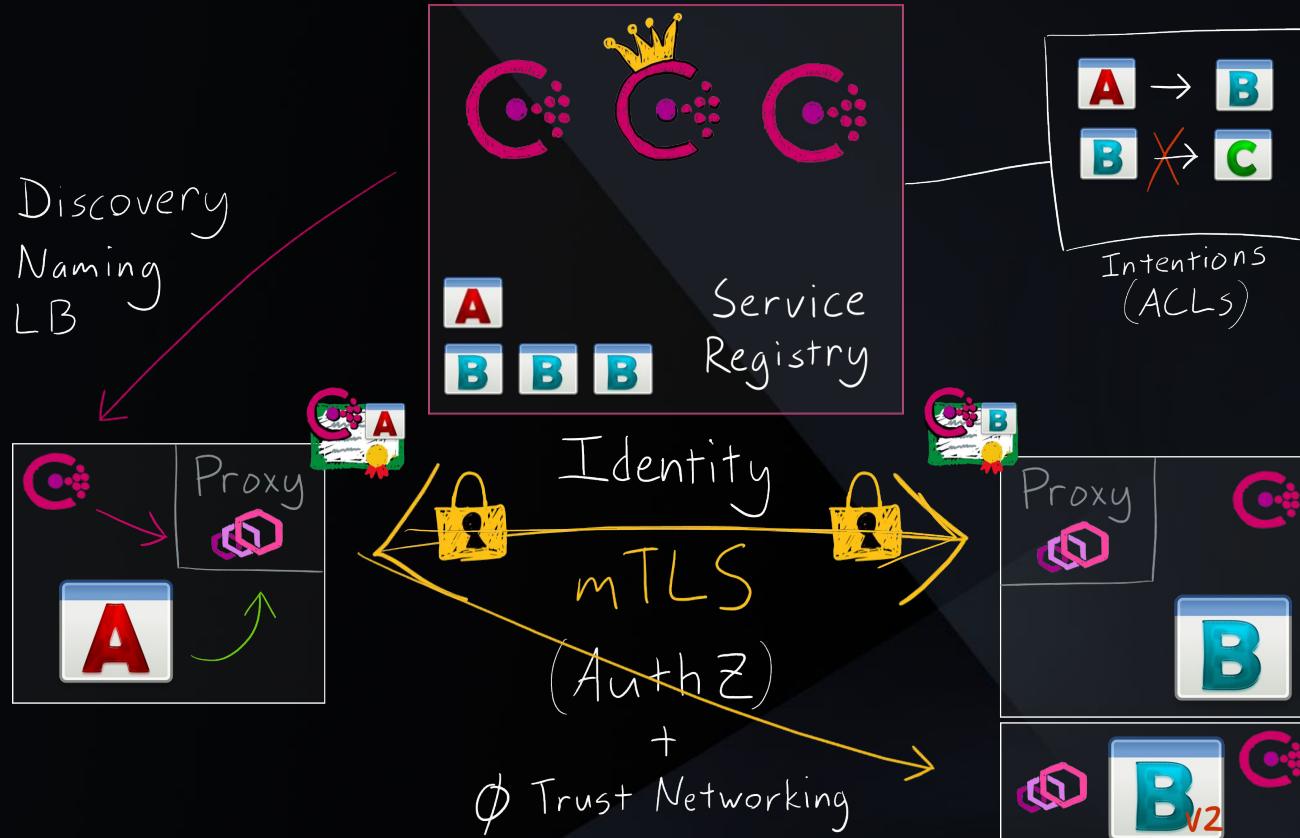
# Lab Exercise: Service Discovery with Consul Enterprise

You will accomplish the following in this lab:

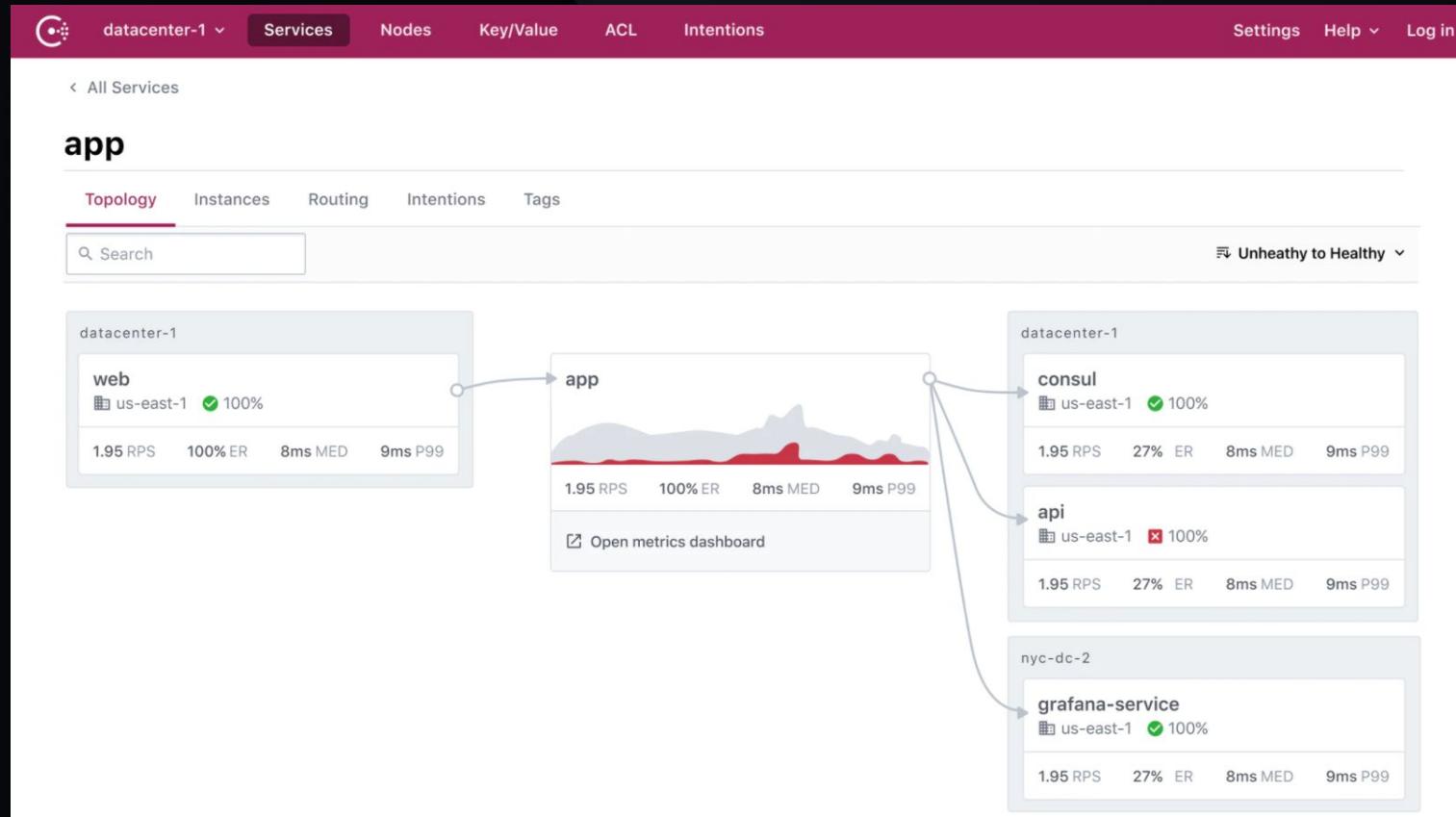
- Service Registration
- Health Checks
- Service Discovery
- Automated Config Management
- Seamless DNS integration

Your instructor will provide the URL for the lab environment.

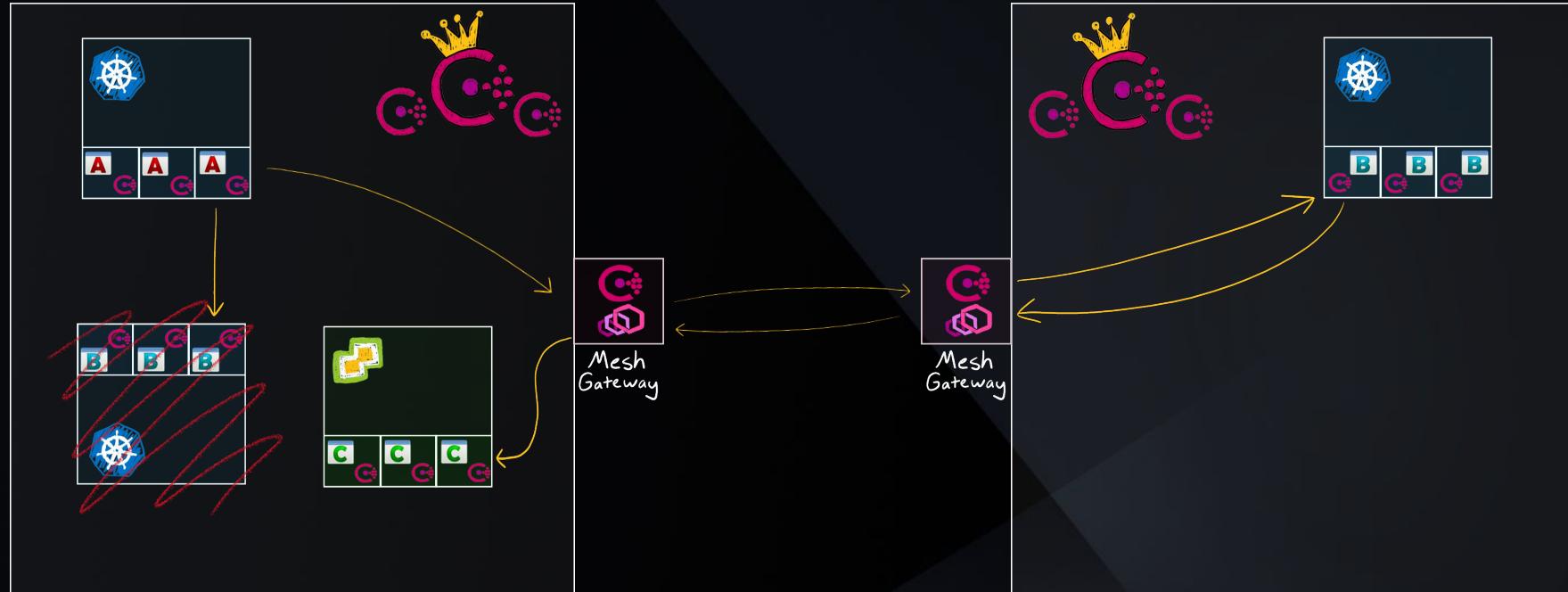
# Consul Enterprise Service Mesh



# Consul Service Visualizations



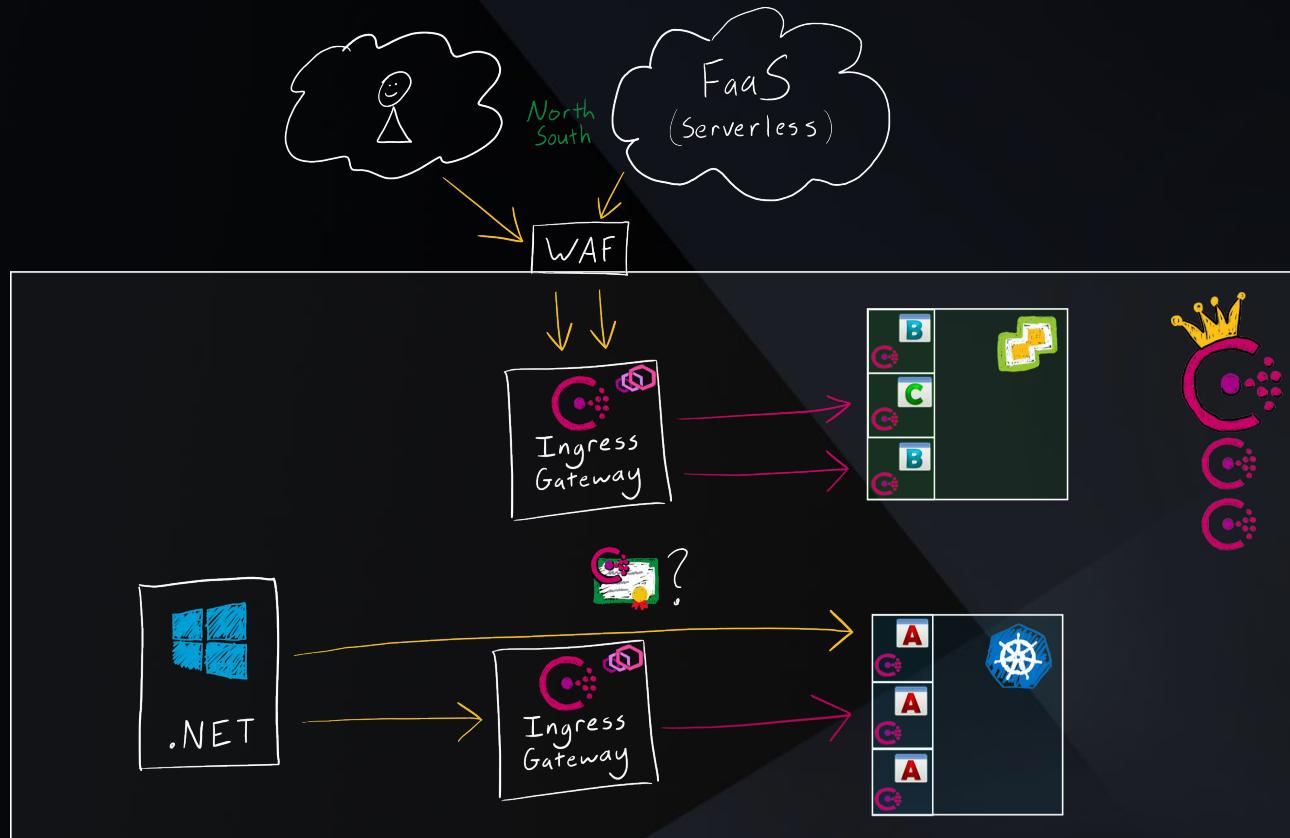
# Consul Enterprise Service Mesh (Connect)



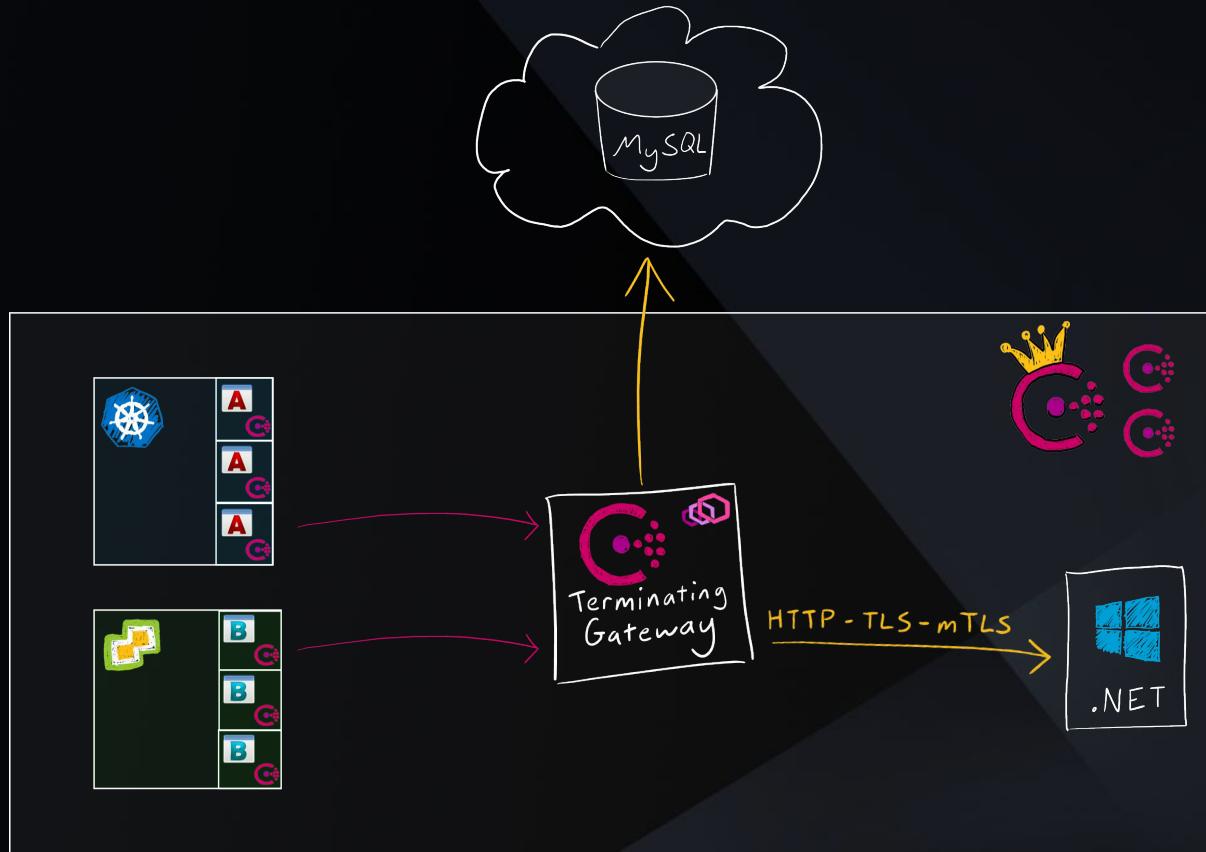
On-Prem DC



# Consul Enterprise Ingress Gateways



# Consul Enterprise Terminating (Egress) Gateways



# Lab Exercise: Service Mesh with Consul Enterprise

You will accomplish the following in this lab:

- Deploy a Sidecar
- Learn about the Envoy Proxy
- Deploy and configure a Proxy
- Use Consul to connect and secure traffic

Your instructor will provide the URL for the lab environment.

## Bonus Lab Exercises:

# Service Mesh with Consul Enterprise on Kubernetes

# Lab Exercise: Service Mesh with Consul Enterprise on K8s

You will accomplish the following in this lab:

- Deploy Consul Connect on Kubernetes
- Connect microservices together
- Scale your application
- Observe application performance

Your instructor will provide the URL for the lab environment.

# Final Review

# Final Review

In this workshop we learned about some of the challenges we face with modern application development and connecting our applications together.

We learned about the 3 core Consul Enterprise use-cases:

*Service Discovery*  
*Network Infrastructure Automation*  
*Service Mesh*

We had some hands on experience configuring Consul Enterprise and deploying an application that uses Consul.

# Final Review

## **What does Consul Connect accomplish?**

After deploying Consul, we have an automatic mapping of all services and their health, with automatic discovery, across the entire fleet of applications, across all locations.

Consul automates manual and risky processes within the application delivery lifecycle, accelerating deployments.

Automatically provides zero-trust networking with audit trails.

Provides the core tenants of a “service mesh”.

Agnostically provides these things for all workloads on all environments.

# Recommended Next Steps

## HashiCorp Learn Modules

- Duration: Self-paced web-based modules: <https://learn.hashicorp.com/consul>
- Learn:
  - Guides you through many of the Consul configurations, providing demonstration configurations.
  - Provides examples beyond the information found in the Consul documentation.
- Value: Gain valuable insight into various Consul configurations.

# Recommended Next Steps

## **Consul Multi-cloud Networking: Hands-on Lab Workshop**

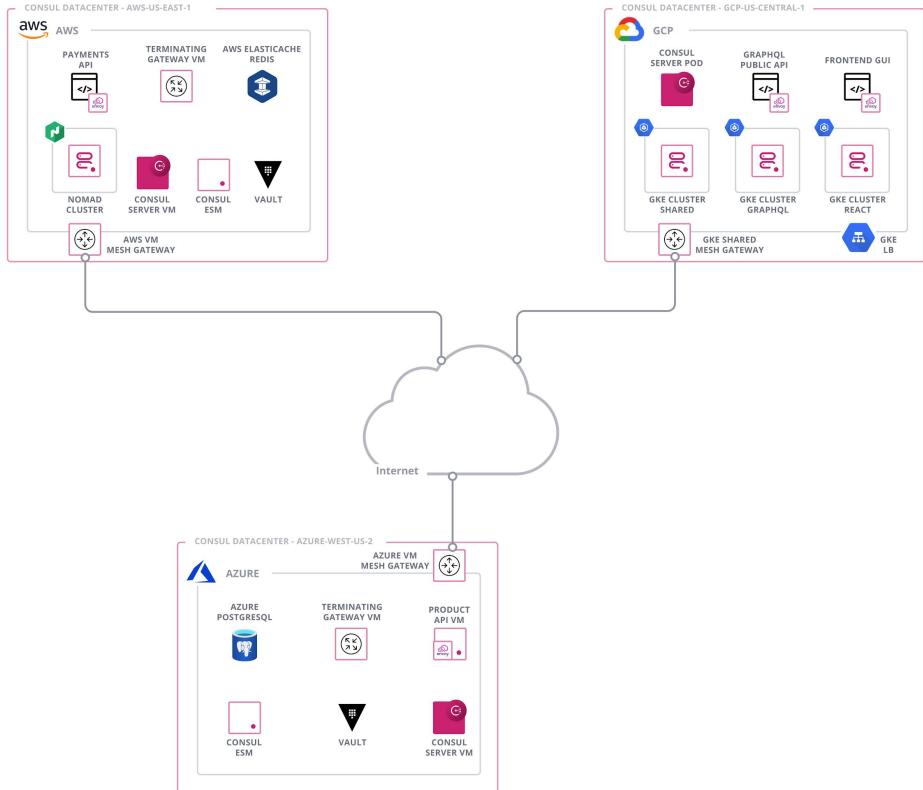
- Duration: ½ Day
- Learn:
  - The Art of the Possible with Consul
  - A good comprehension of self-service workflows, operational readiness and common network topologies across the runtime platforms
  - Building blocks that will help understand common Consul enterprise architectures for service discovery, service mesh and network infrastructure automation.
- Value: Gain valuable insight into how you would deploy Consul Enterprise

## **Architecture Review following Hands-on Lab Workshop**

- High level architecture design - Simplify and scale
- Software requirements

# The Art of the Possible with Consul Enterprise

## Workshop



Screenshot of the Consul Enterprise UI interface, showing the service catalog and configuration.

**Services:**

- aws-us-east-1 (selected):
  - DATACENTERS: aws-us-east-1 (checked), azure-west-us-2, gcp-us-central-1
  - aws-us-east-1-terminating-gateway: Mesh Gateway, 1 instance
  - consul: 1 instance
  - consul-esm: 1 instance
  - mesh-gateway: Mesh Gateway, 1 instance
  - nomad: Registered via Nomad, 3 instances (http, rpc, serf)
  - nomad-client: Registered via Nomad, 1 instance (http)
  - redis: Registered via Terraform, 1 instance
  - vault: 1 instance (active, initialized)
- Search: Search bar and search icon.
- Help, Settings, Log In: Navigation links.

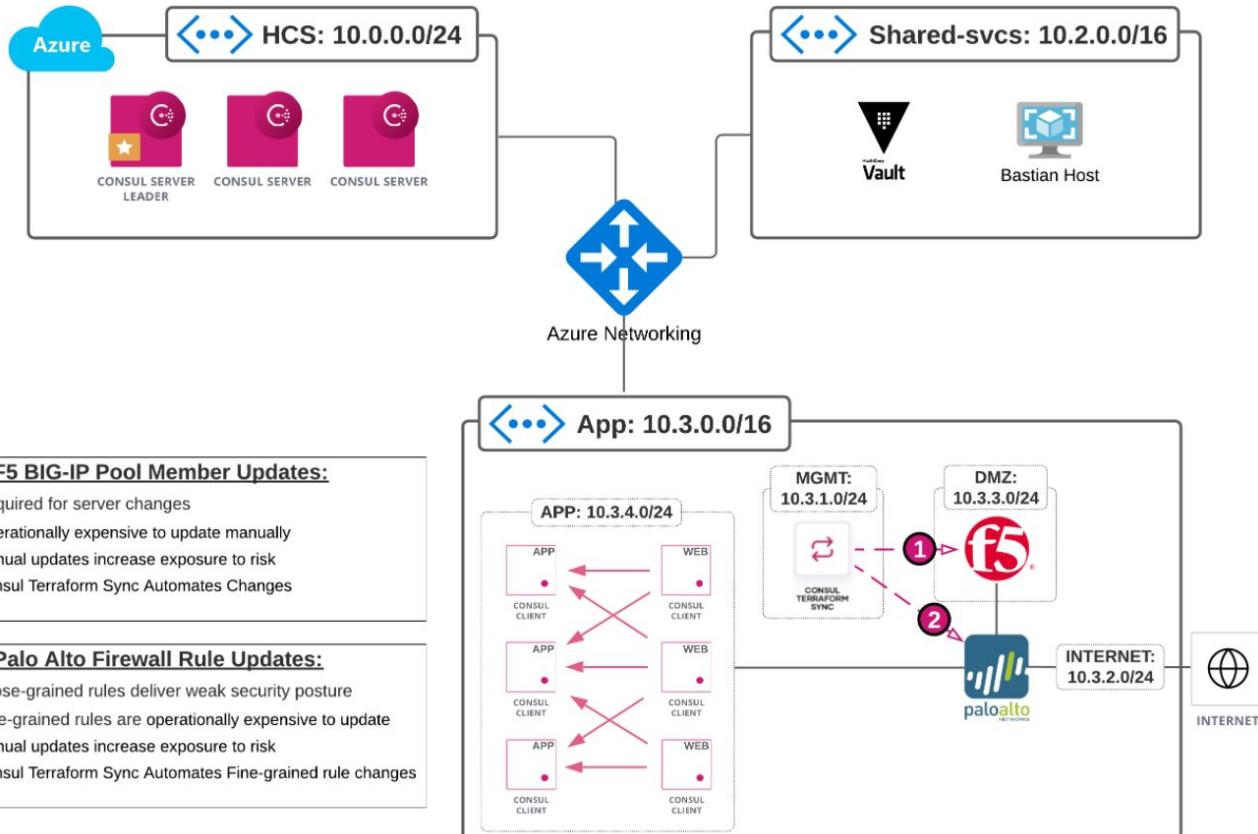
# Recommended Next Steps

## **Consul Network Infrastructure Automation: Hands-on Lab Workshop**

- Duration: ½ Day
- Learn:
  - How Consul integrates with existing network infrastructure to decrease risk and the time it takes to deploy network changes.
  - Building blocks that will help understand common Consul enterprise architectures for service discovery where service mesh may not be the preferred option.
- Value: Gain valuable insight into how Consul can update network infrastructure.

# Network Infrastructure Automation

## Workshop





# Thank You

[hello@hashicorp.com](mailto:hello@hashicorp.com)  
[www.hashicorp.com](http://www.hashicorp.com)