

How to migrate from vanilla Kubernetes to Istio service mesh?

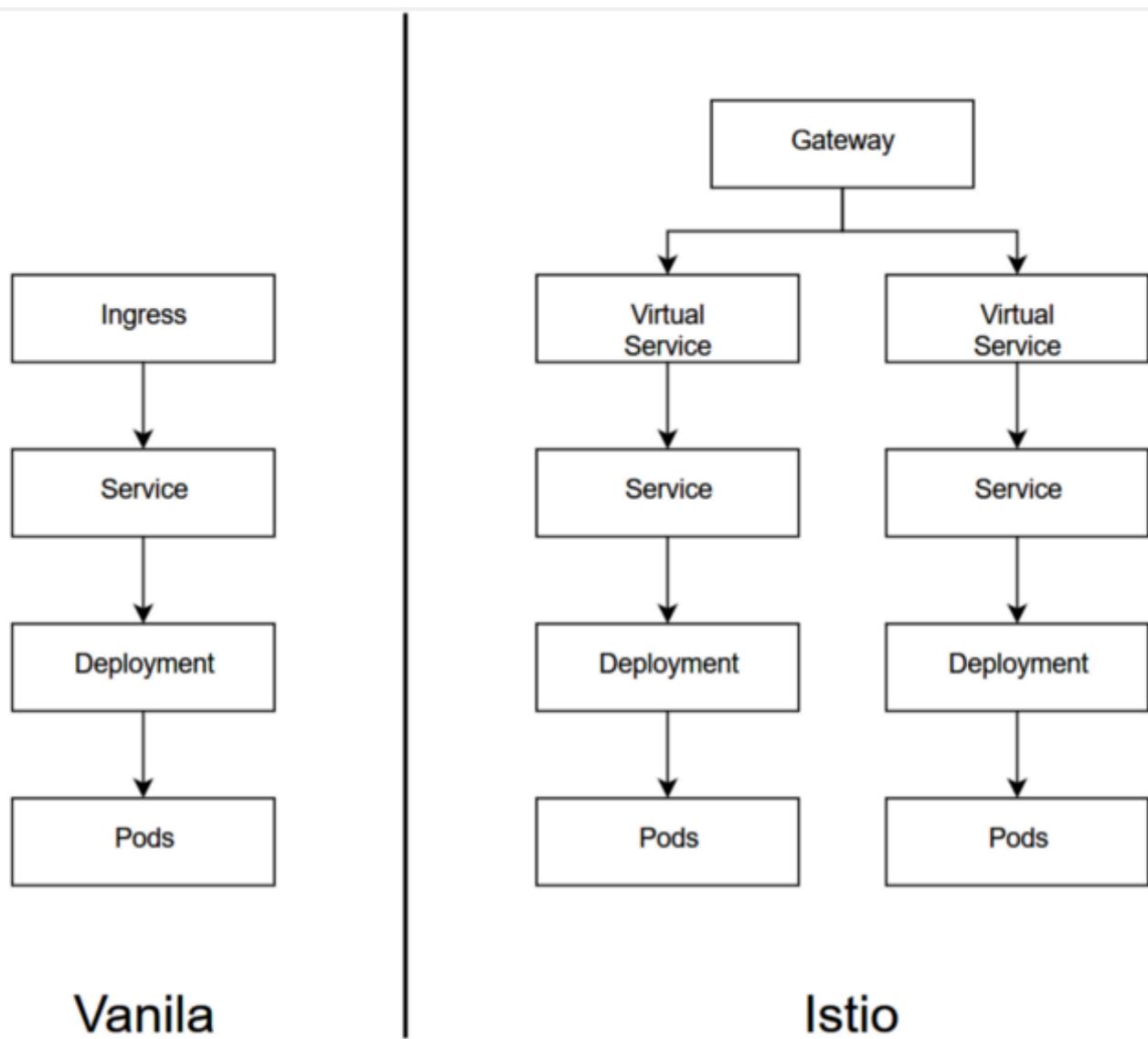
14 Oct 2019

The goal of this guide is to give the reader the most concise and non-intimidating introduction to istio while simultaneously providing further reading material if it piques his interest.

Before we start with the installation, let us compare it with vanilla Kubernetes.

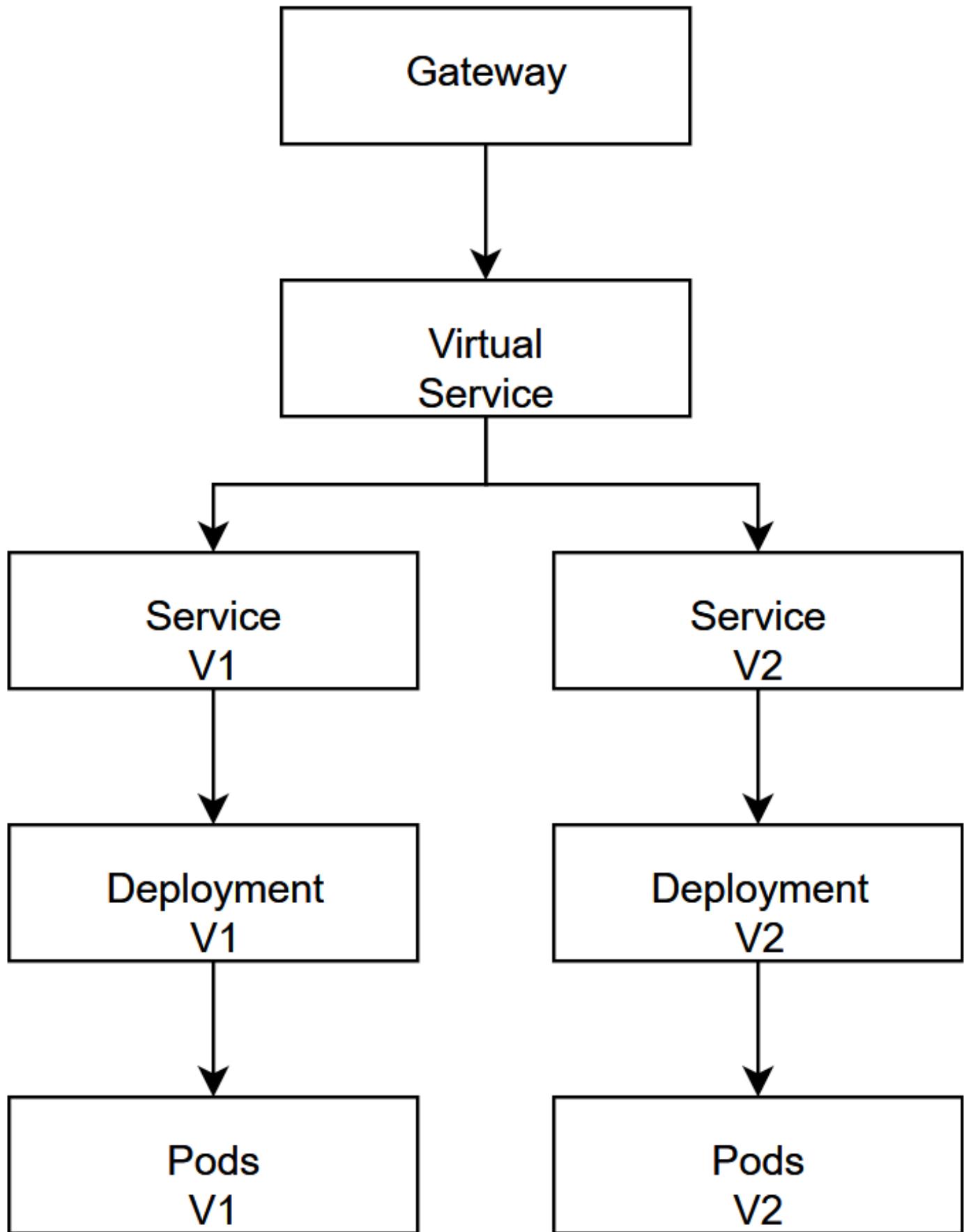
Template flow vanilla vs istio

Instead of ingress, we have gateways which connect to virtual services. Everything else downstream remains the same.



Why virtual services?

Virtual services provide many features like [infra level AB testing](#), [fault injection](#), [circuit breaking](#) and a [lot more](#).

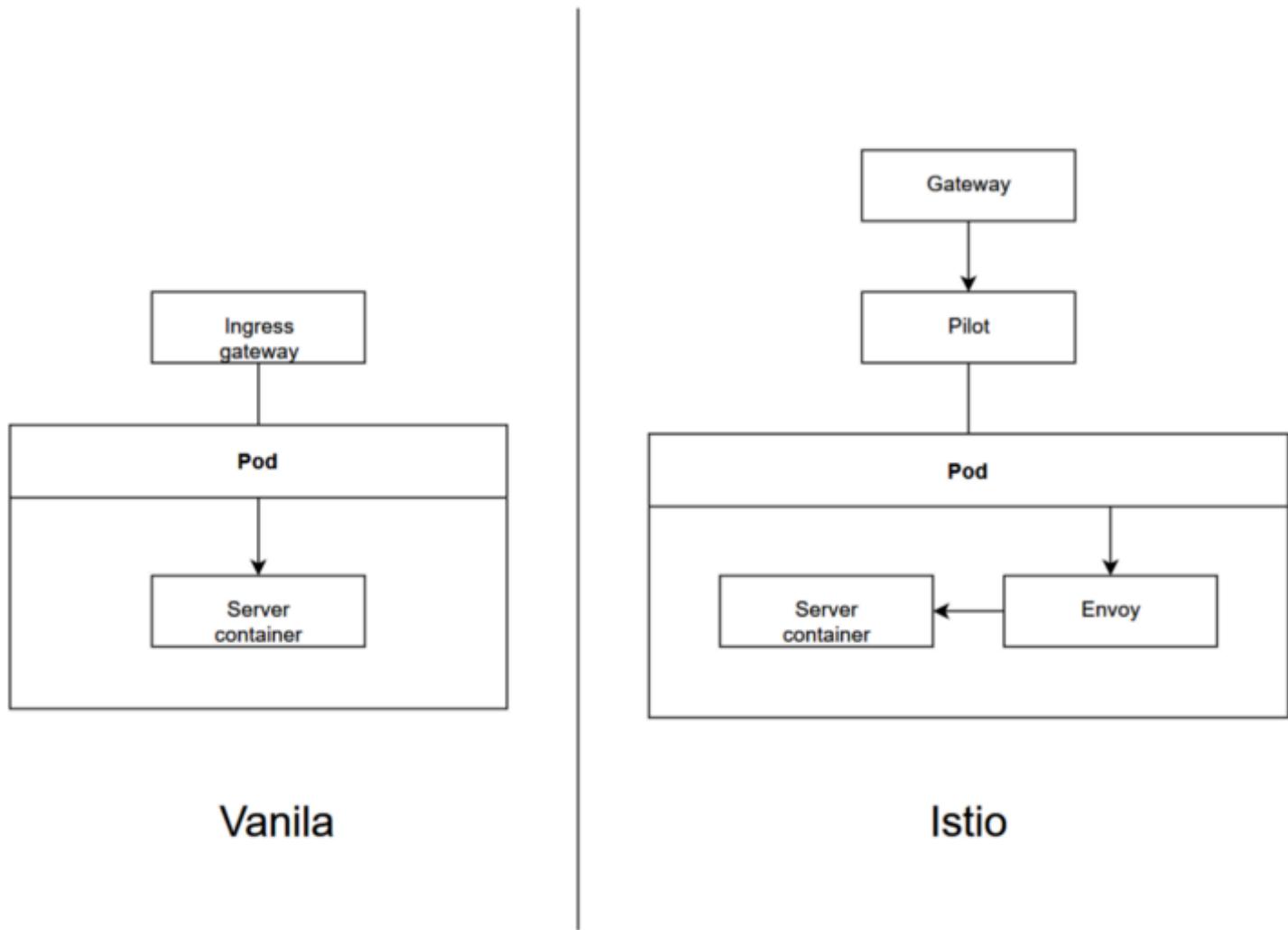


Packet flow

Out to in

Whenever a new deployment is created in an [istio-injected namespace](#) an [envoy container](#) is inserted into the pod. It is widely referred to as sidecar. It automatically intercepts all incoming and outgoing requests. The application does not need to worry about this abstraction.

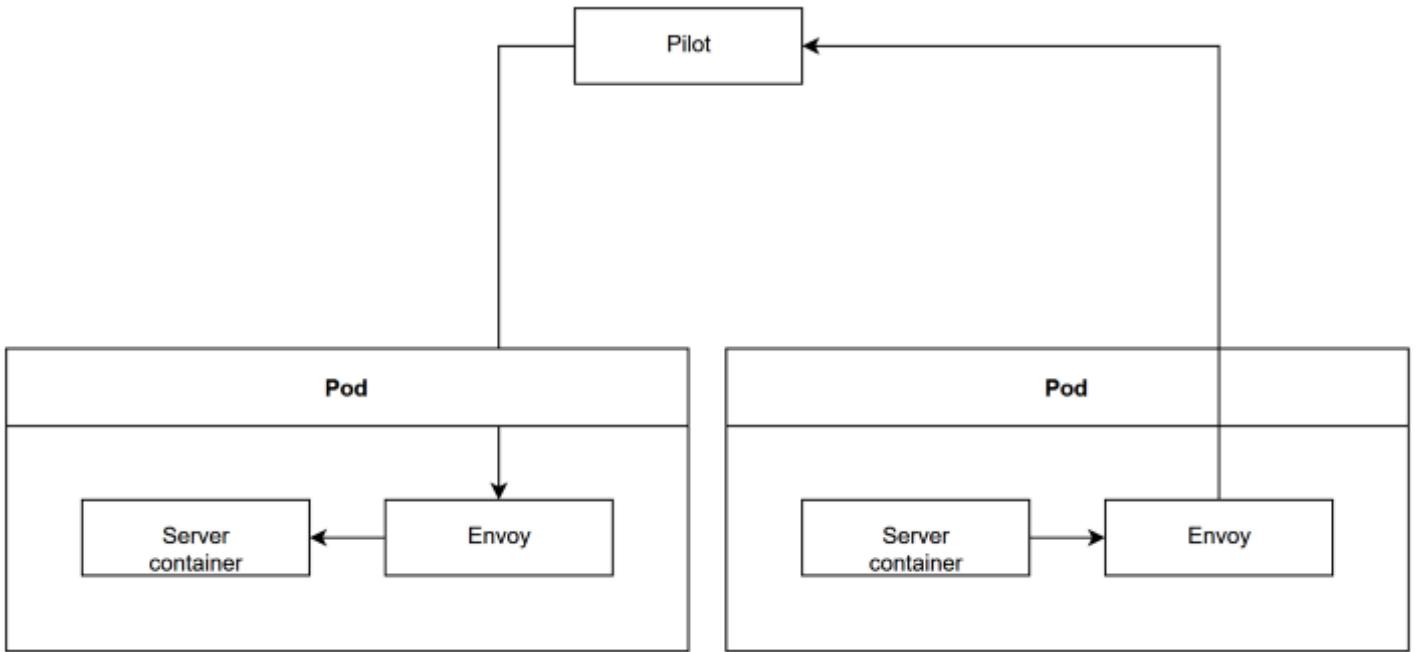
TIP: Reading the logs of the envoy is useful for debugging



Intra cluster

One of the benefits of having the envoy is that we can have [mutual TLS](#) secured connections inside the cluster. It helps in the realization of [zero-trust networks](#).

One of the functions of the [pilot](#) is being a [service discovery service](#).



Installation

This guide was written during istio 1.3.x, if things have changed too much in the future, consider consulting the official documentation.

We will be installing istio for Kubernetes cluster using helm charts.

You can find the detailed process in [istio official website](#), but here is a quick version.

First, make sure helm and helm tiler is installed. For more details on helm, refer to the [official guide](#).

```
brew install helm
helm init
```

In case you are unable to install helm tiler for some reason, you can just [export the helm charts as k8s templates](#).

Next, we install istio

```
# First we create the namespace for istio
kubectl create namespace istio-system

# Add the helm repo
helm repo add istio.io https://storage.googleapis.com/istio-release/releases/1.3.1/charts/

# Istio bootstrapper
# (make sure this process finishes, the pods should be in "finished" state)
helm install istio.io/istio-init --name istio-init --namespace istio-system

# Should be 23 (at time of writing this guide)
# kubectl get crds | grep 'istio.io' | wc -l
```

```
# Actual istio
# You can read about SDS over here (https://preliminary.istio.io/docs/tasks/traffic-management/ingress/enable-sds/)
helm install istio.io/istio --name istio --set gateways.istio-ingressgateway.sds.enabled=true --set

# Verify the installation
# kubectl get svc -n istio-system
# kubectl get deployment -n istio-system
```

In order for deployments in your namespace to use istio, we need to enable istio injection.

IMPORTANT: You have to delete and recreate your existing deployments.

IMPORTANT: You don't have to inject `istio-system`.

```
# The following command enables injection in the potato namespace
kubectl label namespace potato istio-injection=enabled

# To verify
kubectl get namespace -L istio-injection
```

Next, you need to create a gateway. Use this one as a sample.

```
apiVersion: networking.istio.io/v1alpha3
kind: Gateway
metadata:
  name: my-gateway
  namespace: istio-system
spec:
  selector:
    istio: ingressgateway # use Istio default gateway implementation
  servers:
    - port:
        number: 80
        name: http
        protocol: HTTP
      hosts:
        # - yourdomain.com
        - '*' # Allow everything
      # Uncomment next two lines if you dont want any insecure connections
      # to your website
      # tls:
      #   httpsRedirect: true # sends 301 redirect for http requests
  # Uncomment next block if you want HTTPS
  # - port:
  #   number: 443
  #   name: https
  #   protocol: HTTPS
  #   hosts:
  #     - yourdomain.com
  #   tls:
```

```
#     mode: SIMPLE
#     credentialName: your.secret
```

You would also need virtual services to bridge gateways to services. Use this one as a sample.

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: tomato-virtual-service
  namespace: potato
spec:
  gateways:
    - istio-system/my-gateway # namespace-where-gateway-is/gateway-name
  hosts:
    # - mydomain.com
    - '*' # Allow everything
  http:
    - match:
        - uri:
            prefix: /tomato
      rewrite:
        uri: /
      route:
        - destination:
            # Name of the service we want to connect to
            host: tomato.potato.svc.cluster.local # service-name.namespace.svc.cluster.local
            port:
              number: 8080 # Port forwarded by the service
            weight: 100
```

Everything from service and below is the same as vanilla Kubernetes.

TROUBLESHOOTING: The `ingress-gateway` in `istio-system` pod is the load balancer. If you are unable to find the external IP of the cluster, try the external IP of the node running this pod. You can read more [here](#).

Installing `istioctl` (optional)

```
cd ~/
curl -L https://git.io/getLatestIstio
export PATH="$PATH:~/istio-1.3.0-rc.3/bin" # Assuming the version is 1.3.0
```

Troubleshooting

1. Read the pod logs (Start with `ingress-gateway`, `pilot`, `envoys`). [Further reading](#).
2. Kill all the pods in `istio-system`
3. Delete and create the gateway again

4. Install [kiali bash <\(curl -L https://git.io/getLatestKialiOperator> --accessible-namespaces '**'](https://git.io/getLatestKialiOperator)
5. Run [this](#) to get a dump of all routes connected to the gateway. (requires istioctl)
6. Watch these two videos. [#1](#) [#2](#)

If all fails you can [helm delete-purge istio](#), then `kubectl delete namespace istio-system` and start over again.

Good luck.

Jargon

- Envoy - Proxy inside your pods which intercepts all network traffic
- Sidecar - The injected envoy container in your pods
- Mixer - Collects telemetry and enforces usage policies.
- Pilot - Service discovery service
- Citadel - Key management service
- Galley - Configuration validation

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