

Using Istio

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Background

This document captures my notes on understanding what exactly Istio does and why should I want it in my k8s application architecture.

Walkthrough

What is a service mesh?

- Helps "load balance", enable service to service authentication and monitoring.

	Notes	Link
1	Istio service mesh	https://istio.io/latest/about/service-mesh/
2	Istio observability	https://istio.io/latest/docs/tasks/observability/
3	Istio security	https://istio.io/latest/docs/tasks/security/
4	Istio policy enforcement	https://istio.io/latest/docs/tasks/policy-enforcement/
5	Istio traffic management	https://istio.io/latest/docs/tasks/traffic-management/

Istio case studies and docs

	Company	Case study
1	Airbnb	Security for enterprise applications: Slides: https://events.istio.io/istiocn-2021/slides/f1s-AirbnbIstioJourney.pdf

Download Istio

Download Istio

```
# to control the version and target arch
# curl -L https://istio.io/downloadIstio | ISTIO_VERSION=1.14.1 TARGET_ARCH=x86_64 sh -

curl -L https://istio.io/downloadIstio | sh -

# a folder will be downloaded of the latest release version
cd istio-1.14.1

# move the istioctl client binary to folder in PATH
mv bin/istioctl /usr/local/bin/

# application samples are found in the samples folder
ls -m samples
```

Setup Istio on k8s cluster and deploy a sample app

```
# configuration profiles can be found here https://istio.io/latest/docs/setup/additional-setup/config-profiles/
istioctl install --set profile=demo -y

# add namespace label to allow Istio to inject Envoy sidecar proxies when apps are deployed:
kubectl label namespace default istio-injection=enabled
```

```
kubectl apply -f samples/bookinfo/platform/kube/bookinfo.yaml

kubectl get services
kubectl get pods

# verify that the app is running
kubectl exec "$(kubectl get pod -l app=ratings -o jsonpath='{.items[0].metadata.name}')" -c ratings -- curl -sS
productpage:9080/productpage | grep -o "<title>.*</title>"

#
# open the app to outside k8s cluster traffic
kubectl apply -f samples/bookinfo/networking/bookinfo-gateway.yaml

# ensure no issues with config
istioctl analyze
```

Understanding the Istio Architecture

The Istio architecture is documented on this page: <https://istio.io/latest/docs/ops/deployment/architecture/>

	Notes
1	<p>Istio service mesh is split into two layers, the data plane and the control plane.</p> <p>The data plane consists of Envoy proxies deployed as sidecars.</p> <ul style="list-style-type: none"> ▪ The proxies mediate and control all network communication between microservices. ▪ They collect and report telemetry on all mesh traffic. <p>The control plane manages and configures these proxies to route traffic.</p>
2	 <p>Then general diagram found from the Istio Architecture document.</p> <p>https://istio.io/latest/docs/ops/deployment/architecture/</p>
3	<p>Envoy proxies are the only Istio components that interact with the data plane.</p> <p>These proxies are deployed as sidecars to services and augment the services with Envoy's features.</p> <p>Envoy helps with:</p> <ul style="list-style-type: none"> ▪ Dynamic service discovery ▪ Load balancing ▪ TLS termination ▪ HTTP/2 and gRPC proxies ▪ Circuit breakers ▪ Health checks ▪ Staged rollouts with %-based traffic split ▪ Fault injection ▪ Rich metrics
4	<p>The <code>istiod</code> process provides service discovery, configuration and certificate management.</p> <ul style="list-style-type: none"> ▪ Converts high level routing rules that control traffic behavior into Envoy specific configuration. ▪ Propagates Envoy configuration to the sidecars at runtime. ▪ A Certificate Authority and can generate certificates that allow secure mTLS communication in the data plane.

5	DNS sidecar proxy is needed <i>DNS sidecar proxy support is available for preview in Istio 1.8.</i> <i>This provides DNS interception for all workloads with a sidecar, allowing Istio to perform DNS lookup on behalf of the application.</i>
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Appendix

	Document	Link
1	Istio docs	https://istio.io/latest/docs/
2	Istio releases	https://github.com/istio/istio/releases
3	DNS sidecar proxy	https://istio.io/latest/blog/2020/dns-proxy/