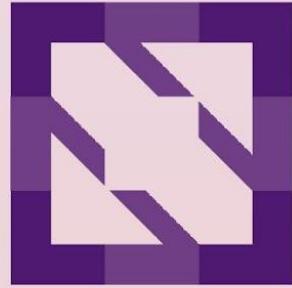


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Istio Hands-on Development and Contribution Workshop

Lin Sun, Eric Van Norman, Steven Landow, Faseela K

Lin Sun



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Head of Open Source, Solo.io

 @linsun_unc

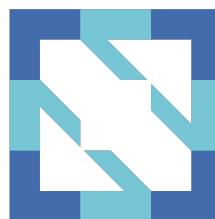
 lin.sun@solo.io

 [linkedin.com/pub/linsun/1/...](https://linkedin.com/pub/linsun/1/)

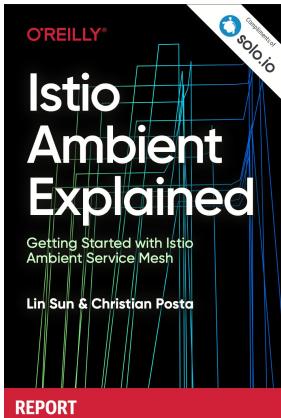
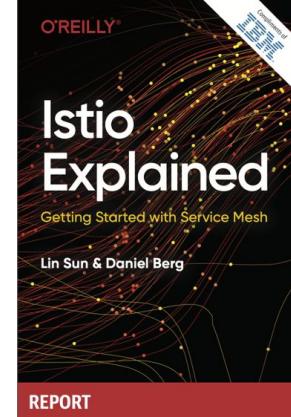


7500+ contributions

Founding TOC & Steering
Member



Ambassador



Eric Van Norman



Senior Software Engineer

IBM

ericvn@us.ibm.com

[@kf0s](https://twitter.com/kf0s)



TOC Member

Test and Release WG Lead

Doc Maintainer

Nearly 20000 contributions

Past Release Manager

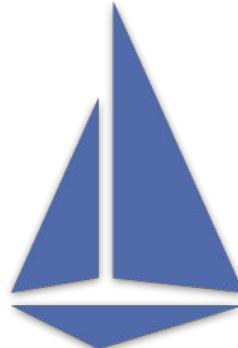
Faseela K



Cloud Native Developer



Ericsson Software Technology



Istio

Steering Committee Member



Steven Landow



Principal Engineer
Solo.io



Networking WG Lead
~270 commits
Control Plane focused

Agenda

- Service Mesh and Istio Overview
- Istio Infrastructure Overview and Workshop
- Istio Control Plane Overview and Workshop
- Istio.io Overview and Workshop

What is a Service Mesh?

A service mesh is a **programmable** framework that allows you to **observe, secure and connect** microservices.

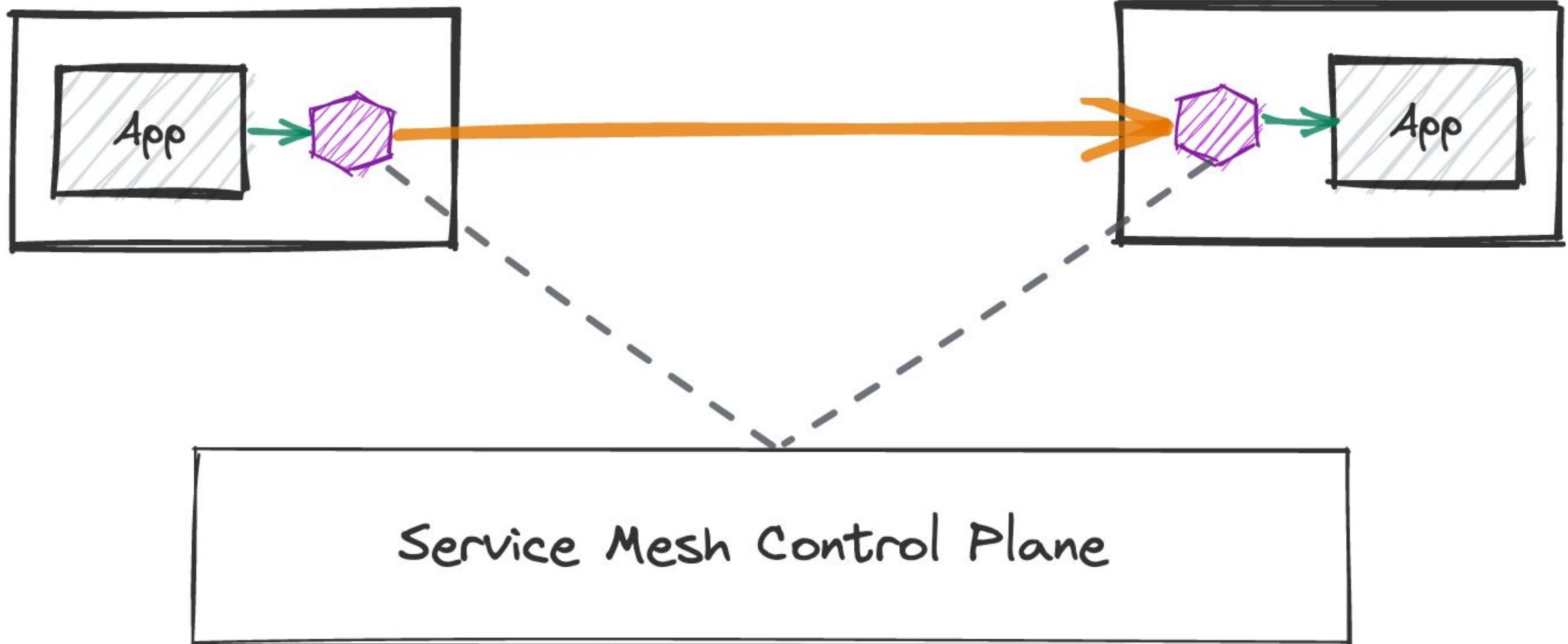
Service Mesh



Istio - The Leading Service Mesh



Service Mesh Architecture



Challenges With Sidecars

- Operation complexity & transparency
- Incremental adoption
- Overprovision resources

Introducing Ambient Mesh



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A new dataplane mode for Istio without sidecars.

Sep 7, 2022 | By John Howard - Google, Ethan J. Jackson - Google, Yuval Kohavi - Solo.io, Idit Levine - Solo.io, Justin Pettit - Google, Lin Sun - Solo.io



Simplify
Operations



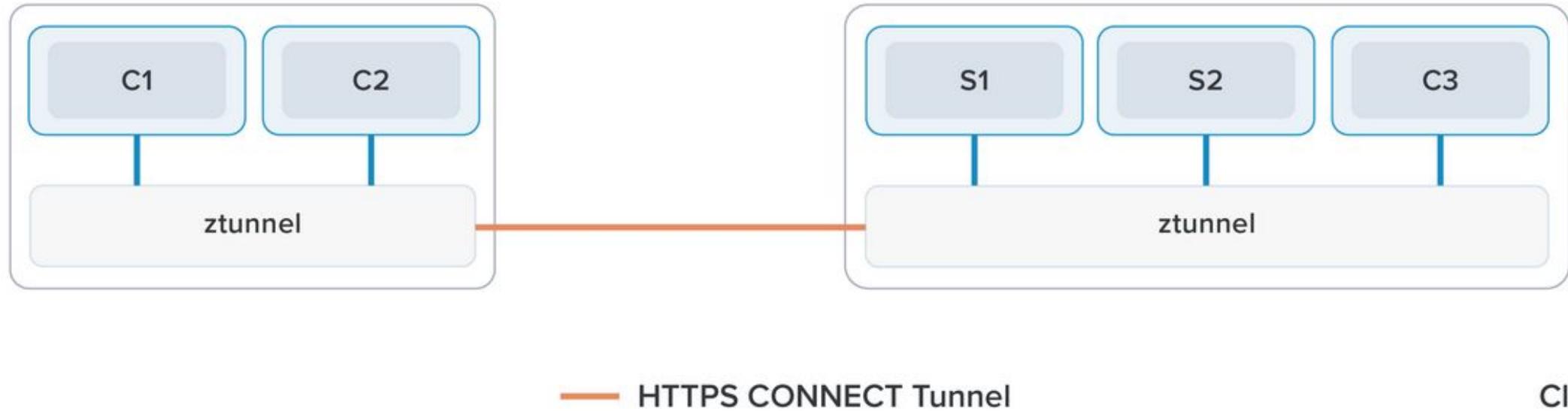
Cost
Reduction



Improve
Performance

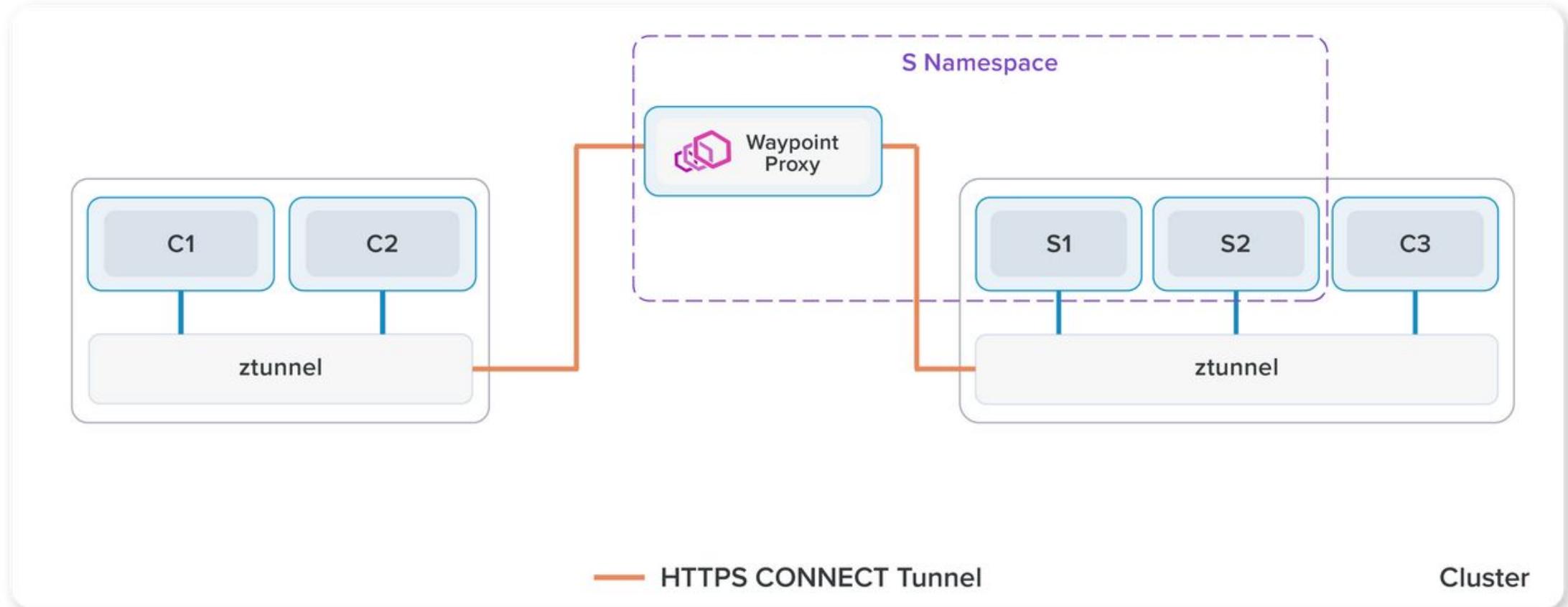
<https://istio.io/latest/blog/2022/introducing-ambient-mesh/>

Secure Overlay Layer



Ambient mesh uses a shared, per-node ztunnel to provide a zero-trust secure overlay

Layer 7 Processing Layer





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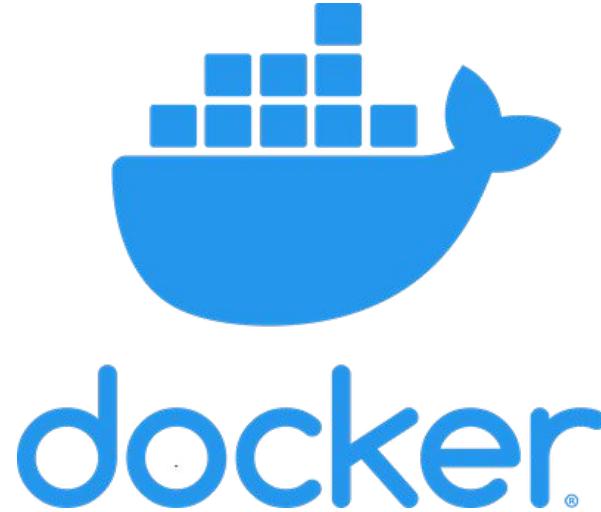


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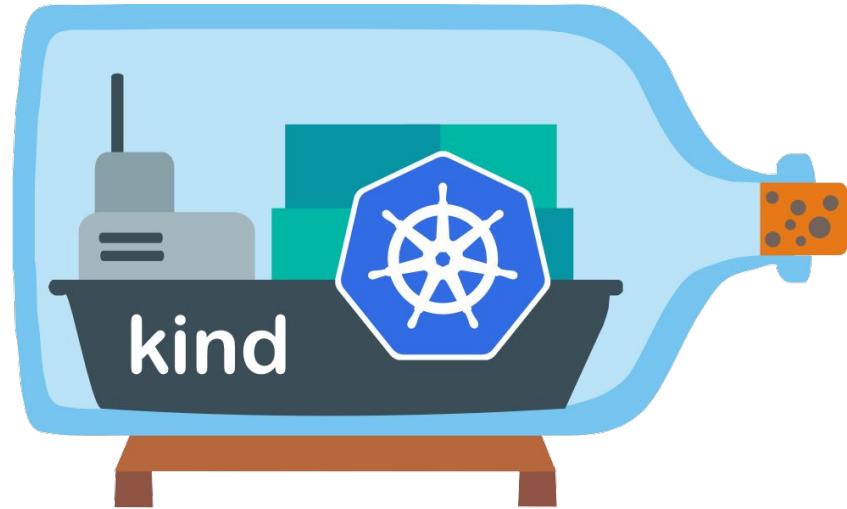
Development Workflow

Toolchain



gcr.io/istio-testing/build-tools

Contains all the software required to build Istio's various components



Run Kubernetes locally (in Docker)

Building Istio - Setting up your environment

- You can create a basic documentation PR without much more than an editor.
- You'll need a development environment to:
 - Run a local webserver
 - Lint your changes locally
- To setup your own development environment for Istio, you need:
 - make
 - docker (the command and any runtime)
 - git for cloning repos, creating PRS, etc.
 - kubectl and Kubernetes and kubectl
 - We use KinD to test locally (Kubernetes in Docker - <https://kind.sigs.k8s.io/>)

Building Istio - Setting up your environment



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Home

Edit

New page

Martin Taillefer edited this page on Feb 27, 2019 · 10 revisions

- Mac instructions recommend Docker Desktop for Mac
- Linux pages also mostly apply to macs

Welcome to the Istio wiki!

Please use the sidebar to the right to pick a fascinating document to read if you're interested in the Istio project.

The content in this wiki is intended for developers working on Istio, Istio adapters, and other low-level stuff. If you're interested in using Istio, you should take a look at [istio.io](#) where we keep our user-level documentation, guides, tutorials, etc.

Visit [istio.io](#) to learn how to use Istio.

▶ Pages 86

- [Welcome](#)
- [Dev Builds](#)
- [Project Dashboards](#)
- [Issue and PR Lifecycle Manager](#)

Dev Environment

- [Preparing for Development Mac](#)
- [Preparing for Development Linux](#)
- [Troubleshooting Development Environment](#)
- [Repository Map](#)

<https://github.com/istio/istio/wiki>

Building Istio - Some verification steps

There are a few commands you can run to verify things are set up correctly:

- Verify Docker environment. If these don't work, you cannot run docker commands in your build tools. You can attempt to run the docker commands outside the container using `BUILD_WITH_CONTAINER=0`.

- `docker run -v /var/run/docker.sock:/var/run/docker.sock -it --rm docker docker ps`, or
 - `docker run -v /var/run/docker.sock.raw:/var/run/docker.sock -it --rm docker docker ps`

Some docker installs require the `.raw`. If the first fails and the second succeeds, you can export an environment variable:

```
DOCKER_SOCKET_MOUNT=-v /var/run/docker.sock.raw:/var/run/docker.sock
```

Some users say they require `'sudo'` and then you will need to use `'sudo'` for your `'make'` commands as well.

- `docker run -v /var/run/docker.sock:/var/run/docker.sock -it -u 501: --rm docker docker ps`

This is a common failing point for non Docker Desktop users on a Mac. If you have a way to make these work on podman, rancher desktop, let us know so we can add to the wiki.

- Verify various make targets:
 - `make clean build docker.proxyv2 gen lint`
- In <https://github.com/istio/istio.io>, be able to run a test locally.
 - `kind create cluster --name istio-testing --config $ISTIO/istio/prow/config/default.yaml --image gcr.io/istio-testing/kind-node:v1.27.0`
 - `TEST_ENV=kind ADDITIONAL_CONTAINER_OPTIONS="--network host" make doc.test.profile_none`
`TEST=ops/ambient/getting-started/test.sh`

<https://github.com/istio/istio/wiki/Verify-your-Docker-Environment>

Building Istio - Downloading Istio

Fork the following repos:

- The main project repo [istio/istio](#)
- Docs site repo: [istio/istio.io](#)

```
# clone the repos
ISTIO_DIR=$HOME/go/src/istio.io
mkdir -p $ISTIO_DIR
cd $ISTIO_DIR
GITHUB_USER=<your username>
git clone git@github.com:$GITHUB_USER/istio
git clone git@github.com:$GITHUB_USER/istio.io

# add upstream as a remote
cd istio
git remote add upstream git@github.com:istio/istio
git remote set-url --push upstream no_push
cd ..
cd istio.io
git remote add upstream git@github.com:istio/istio.io
git remote set-url --push upstream no_push
cd ..
```

<https://gist.github.com/stevenctl/5a9cf2f36e84da705b7c75a38c53f74f>



Building Istio - Local builds

- Set the environment variables (mentioned on the Linux development or Using the Code Base pages)
 - HUB, TAG, ISTIO
- To build binaries (by default they will be for the host OS): *make build*
 - To build istioctl and copy to the `/usr/local/bin/` directory:
 - *make istioctl*
 - *cp {HOME}/go/src/istio.io/istio/out/darwin_amd64/istioctl /usr/local/bin* (assumes an Intel Mac)
- To build docker images: *make docker*
 - Can do specific images: *make docker.proxyv2*
- To push docker images: *make docker.push*
- To build helm charts: *make gen-charts*
- *make shell* will open a shell inside a build-tools container
- *make serve* in `istio.io` will create a local server of the `istio.io` code to view your changes

Building Istio - Running a local build

- Starting Istio:
 - `istioctl install --set profile=demo --set hub=docker.io/$HUB --set tag=$TAG`

Building Istio - Running the tests

- Running integration tests:

- `export INTEGRATION_TEST_FLAGS="--run TestTraffic"`
- `./prow/integ-suite-kind.sh test.integration.pilot.kube`
- (Optional) Add `--skip-cleanup` to inspect the cluster after tests run (or fail!)

Docker Registry
running in Docker
localhost:5000

KinD Cluster(s)

Local Machine

Building Istio - Iterating locally

```
export HUB=localhost:5000; export TAG=my-test
make docker.pilot # or another image

# OR, outside of the build-tools container
./tools/docker --builder crane --push -targets pilot

kubectl delete pod -n istio-system -lapp=istiod
```

Building Istio - Submitting a PR

- Make changes in your local branch and not the master branch
- Create a local branch
 - `git checkout -b my-branch`
- Keeping your fork in sync
 - `git fetch upstream master`
 - `git rebase upstream/master`
 - `git push -f origin`
- Committing changes to your fork
 - When you're happy with the changes, you can commit them to your repo:
 - `git add .`
 - `git commit -a OR git commit -amend` (This will allow you to add/edit a commit message for your commit)
 - `git push -f origin <local branch name>` (e.g. `git push -f origin my-branch`)
- Create the PR via the web from your branch

✓	 <code>integ-pilot-istiodremote-mc_istio</code> — Job succeeded.
✓	 <code>integ-pilot-istiodremote_istio</code> — Job succeeded.
✓	 <code>integ-pilot-multicloud_istio</code> — Job succeeded.
✓	 <code>integ-pilot_istio</code> — Job succeeded.
✓	 <code>integ-security-istiodremote_istio</code> — Job succeeded.
✓	 <code>integ-security-multicloud_istio</code> — Job succeeded.

Integration Tests - Framework



Framework abstracts:

- Installing Istio
 - Deploying test apps
 - Multi-cluster concerns
 - Sending traffic between pods
 - Applying and cleaning up config

```
func TestMain(m *testing.M) { ↗ Steven Landow +2
    framework.

func TestReachable(t *testing.T) { ↗ Steven Landow *
    framework.NewTest(t).Run(func(t framework.TestContext) {

        t.NewSubTestf(format: "with dr").Run(func(t framework.TestContext) {
            t.ConfigIstio().YAML(ns: "ns", yamlText...: `...`)
            echotest.New(t, apps).
                Run(func(t framework.TestContext, from echo.Instance, to echo.Target) {
                    from.CallOrFail(t, echo.CallOptions{To: to})
                })
        })
    })

    // more tests with different config
})
}

    }).Build()
    return err
}
}
```

Integration Tests - CI Tools

- In CI we use Prow
 - <https://prow.istio.io/>
- Test run logs are available here
- Artifacts link has valuable dumps of:
 - Cluster state
 - Pod logs
 - Proxy config

Name
..
a-v1-74c49976fc-bddp2_app.log
a-v1-74c49976fc-bddp2_istio-init.log
a-v1-74c49976fc-bddp2_istio-proxy.log
a-v1-74c49976fc-bddp2_ndsz.json
a-v1-74c49976fc-bddp2_pod-events.yaml
a-v1-74c49976fc-bddp2_pod-state.yaml
a-v1-74c49976fc-bddp2_proxy-clusters.txt
a-v1-74c49976fc-bddp2_proxy-config.json
a-v1-74c49976fc-bddp2_proxy-stats.txt
b-v1-5b67447c9b-ts4gj_app.log
b-v1-5b67447c9b-ts4gj_istio-init.log
b-v1-5b67447c9b-ts4gj_istio-proxy.log
b-v1-5b67447c9b-ts4gj_ndsz.json
b-v1-5b67447c9b-ts4gj_pod-events.yaml
b-v1-5b67447c9b-ts4gj_pod-state.yaml
b-v1-5b67447c9b-ts4gj_proxy-clusters.txt
b-v1-5b67447c9b-ts4gj_proxy-config.json
b-v1-5b67447c9b-ts4gj_proxy-stats.txt
c-v1-cb4dd7555-fl9c9_app.log



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Project Components

Components

Control Plane:

- XDS Server
- Validating Webhook
- Mutating Webhook (Injection)
- Ingress Controller
- Gateway Controller

Data Plane:

- Istio Agent
- Envoy Proxy
- iptables
- zTunnel

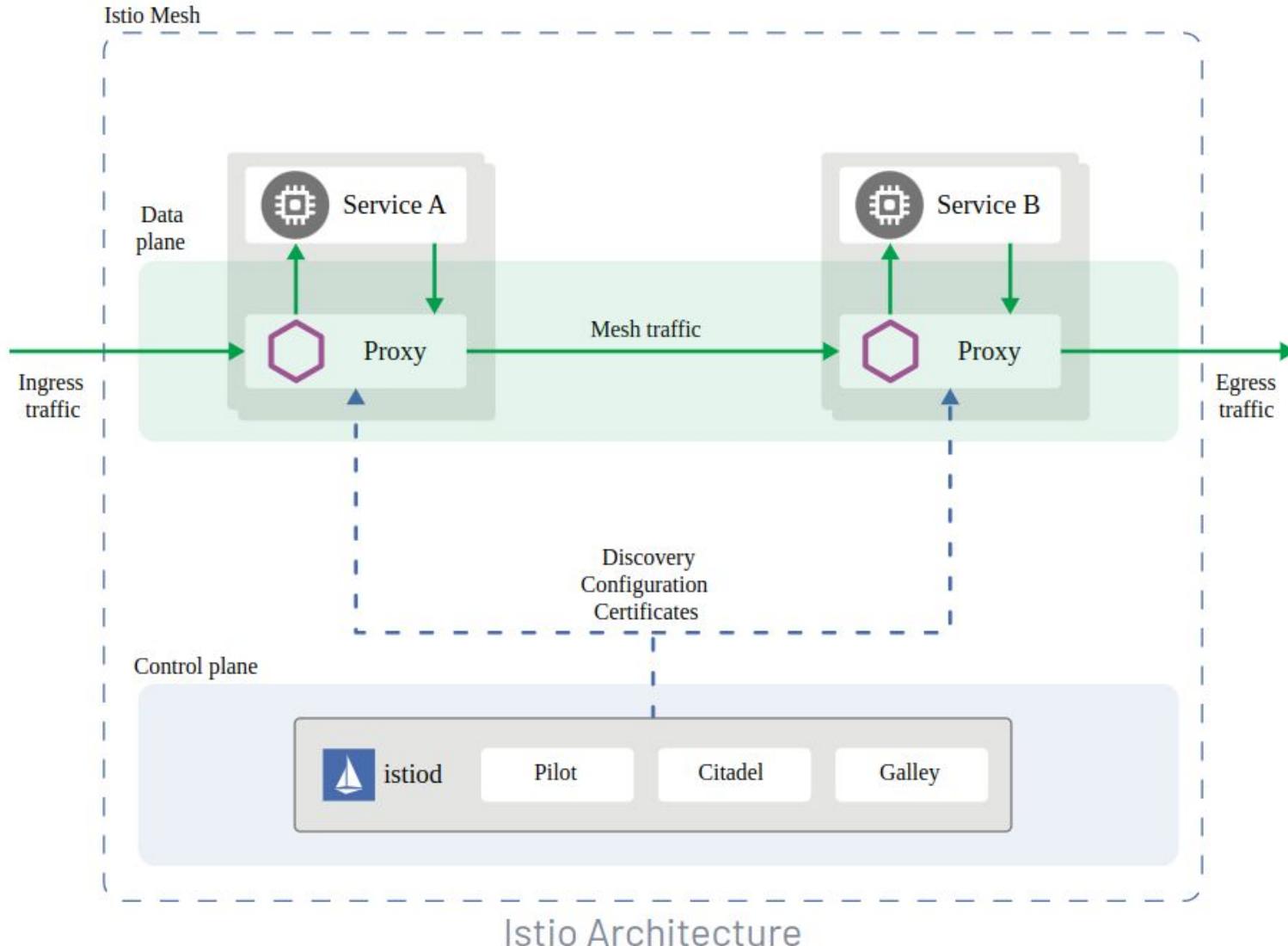
CNI:

- CNI Daemon

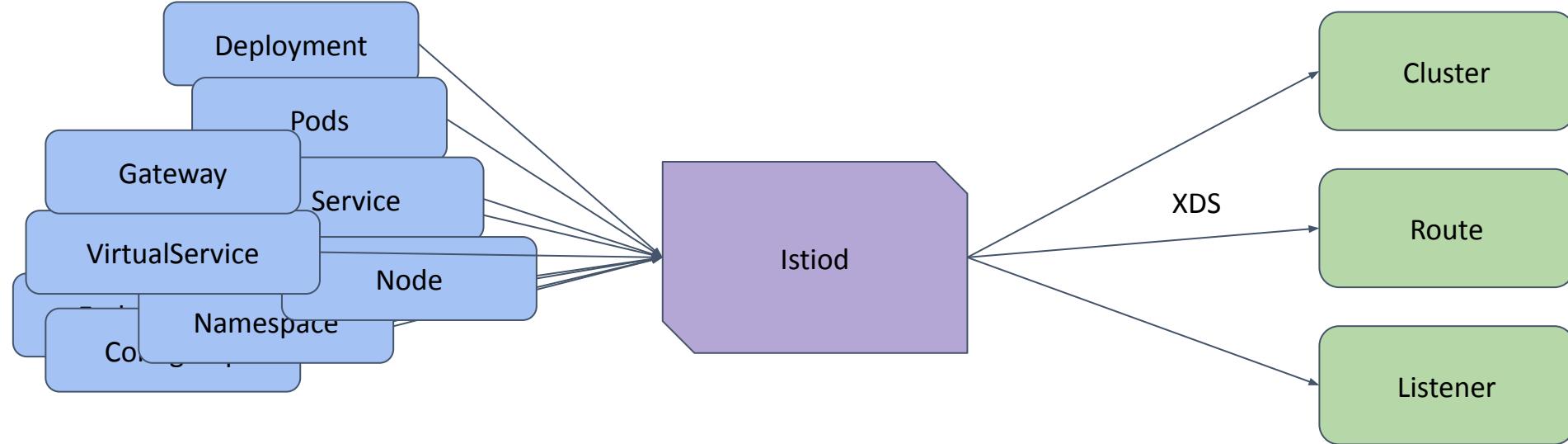
CLI:

- istioctl

Control Plane Internals - pilot

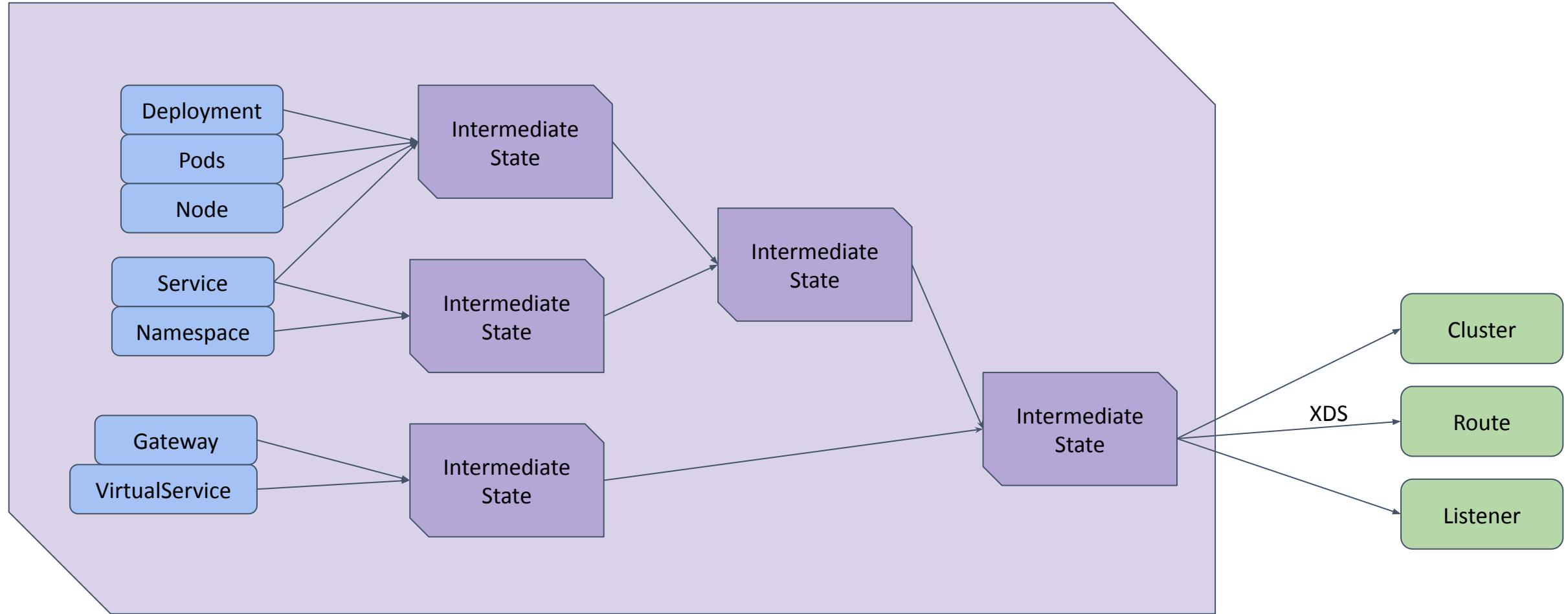


Control Plane Internals - pilot



1. Read a bunch of objects
2. Translate them into envoy (or zTunnel!) config

Control Plane Internals - pilot



... with a bunch of intermediate layers and machinery



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Istio.io website

Documentation

Learn how to deploy, use, and operate Istio.

Concepts

Learn about the different parts of the Istio system and the abstractions it uses.

Examples

A variety of fully working example uses for Istio that you can experiment with.

Reference

Detailed authoritative reference material such as command-line options, configuration options, and API calling parameters.

In addition to the above documentation links, please consider the following resources:

- [Frequently Asked Questions](#)
- [Glossary](#)
- [Documentation Archive](#), which contains snapshots of the documentation for prior releases.

Setup

Instructions for installing the Istio control plane on Kubernetes.

Operations

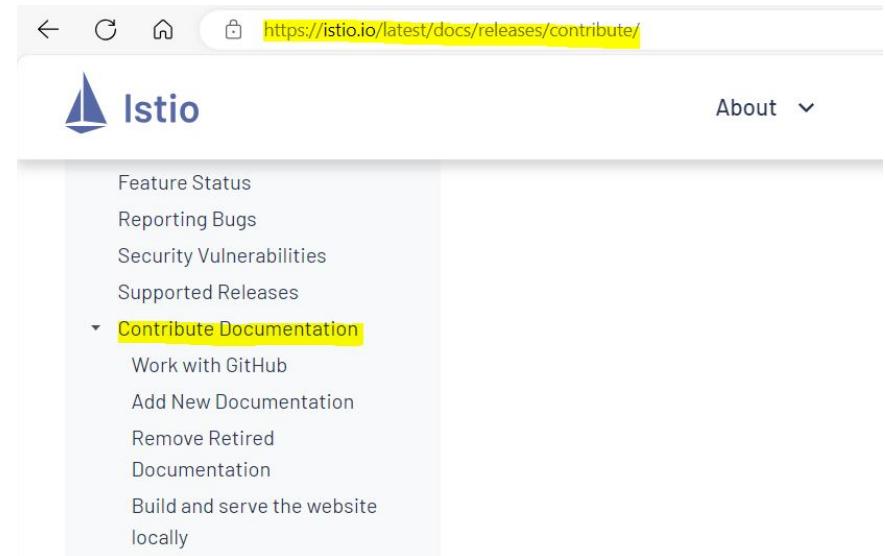
Concepts, tools, and techniques to deploy and manage an Istio mesh.

Tasks

How to do single specific targeted activities with the Istio system.

Releases

Information relating to Istio releases.



Where do I look for easy issues to fix?

- Look for bugs/issues in istio.io repo [<https://github.com/istio/istio.io/issues>]
- Look for bugs/issues in the repo with the following labels:
 - community/help wanted,
 - community/good first issue,
 - community/intern-help-wanted
- While reviewing the docs on istio.io, if you come across any bugs, you can create a [PR \(pull request\)](#) to fix it. This is the easiest way to get started.
- You can also contribute to the automated tests suite for docs on istio.io. You can find more information about this [here](#).

Contribute to Documentation

Work with GitHub

Shows you how to use GitHub to contribute to the Istio documentation.

Build and serve the website locally

Explains how to locally build, test, serve, and preview the website.

Add Code Blocks

Explains how to include code in your documentation.

Style Guide

Explains the style conventions used in the Istio documentation.

Add New Documentation

Details how to contribute new documentation to Istio.

Front matter

Explains the front matter used in our documentation and the fields available.

Use Shortcodes

Explains the shortcodes available and how to use them.

Terminology Standards

Explains the terminology standards used in the Istio documentation.

Remove Retired Documentation

Details how to contribute retired documentation to Istio.

Documentation Review Process

Shows you how changes to the Istio documentation and website are reviewed and approved.

Follow Formatting Standards

Explains the standard markup used to format Istio documentation.

Diagram Creation Guidelines

Provides assets and instructions to create diagrams for the Istio documentation.

Refer: [Istio / Contribute Documentation](#)

Add new documentation

- Identify the audience and intended use for the information.
- Choose the [type of content](#) you wish to contribute.
- [Choose a title](#).
- Write your contribution following our [documentation contribution guides](#).
- Submit your contribution to our [GitHub repository](#).
 - Fork the [Istio documentation repository](#). `git clone <https://github.com/istio/istio.io.git>`
 - Create a branch for your changes. `git checkout -b first-contribution`
 - Add commits to that branch.
 - Open a PR to share your contribution.
- Alternatively, anyone with a GitHub account who signs the CLA can contribute a quick edit to any page on the Istio website directly when you access `preliminary.istio.io`. Refer [Istio / Work with GitHub](#)
- Follow our [review process](#) until your contribution is merged.

Build and serve the website locally

To guarantee the tests you run locally use the same versions as the tests running on the Istio Continuous Integration (CI), we provide a Docker image with all the tools needed, including our site generator: [Hugo](#).

- Obtain a shell using the pre-built docker image mentioned above
 - go to the root of your fork of [istio/istio.io](#) and run `make shell`
- Preview your changes
 - To preview your changes to the site, go to the root of your fork of [istio/istio.io](#) and run `make serve`
- Test your changes
 - HTML proofing: ensures all links are valid along with other checks.
 - Spell check: ensures content is spelled correctly.
 - Markdown Style check: ensures the markup used complies with our Markdown style rules.
 - To test your changes to the site, go to the root of your fork of [istio/istio.io](#) and run `make lint`

Diagram Creation Guidelines

To create your diagrams, follow these steps:

1. Refer to the [guide](#) and copy-paste from it as needed.
2. Connect the shapes with the appropriate style of line.
3. Label the shapes and lines with descriptive yet short text.
4. Add a legend for any labels that apply multiple times.
5. [Contribute](#) your diagram to our documentation.

If you create the diagram in Google Drawings, follow these steps:

1. Put your diagram in our [shared drive](#).
2. When the diagram is complete, export it as SVG and include the SVG file in your PR.
3. Leave a comment in the Markdown file containing the diagram with the URL to the Google Drawings file.

Testing document content

ISTIO / DOCS / TASKS / TRAFFIC MANAGEMENT / REQUEST ROUTING

Request Routing

⌚ 5 MINUTE READ ✓ PAGE TEST

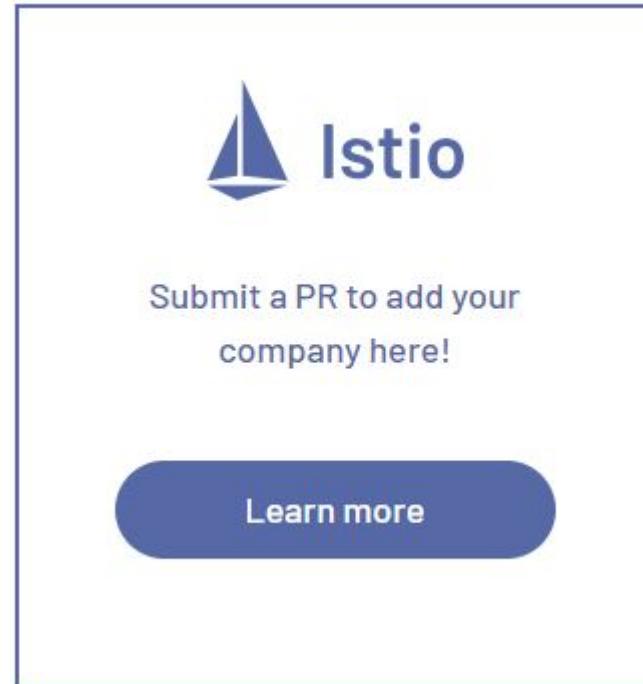
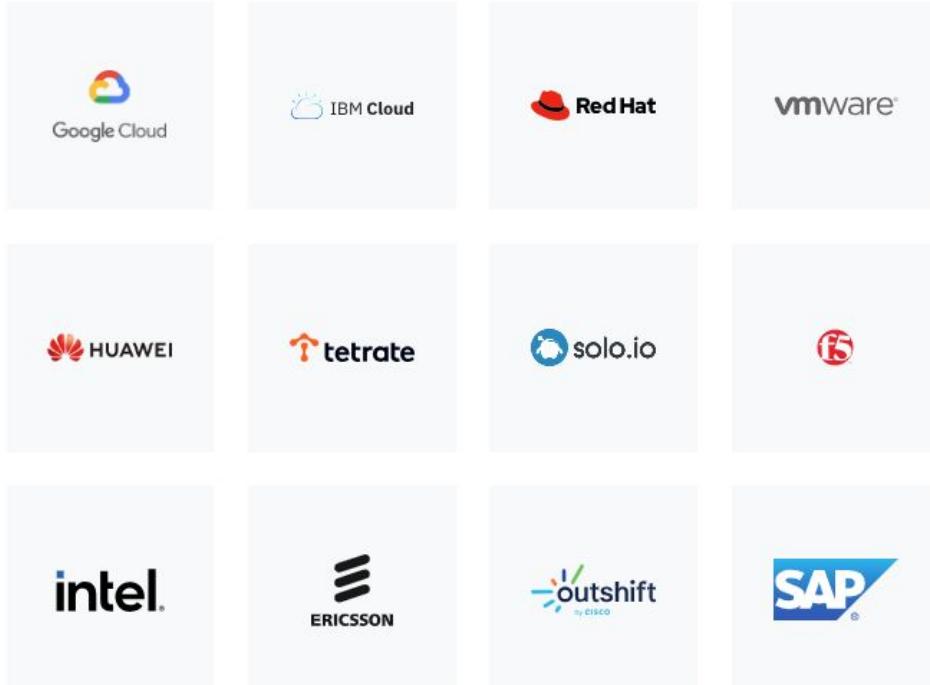
- Doc tests confirm that the example, task, and other documents, which contain instructions in the form of bash commands and expected output, are working as documented.
- Refer [istio.io/tests/README.md at master · istio/istio.io \(github.com\)](https://istio.io/tests/README.md)
- To write an istio.io test, follow these steps:
 - In the metadata at the top of the index.md file to be tested, change the field `test: no` to `test: yes`
 - Run `make snips` to generate the bash script. After the command completes, you should see a new file, snips.sh, next to the index.md file that you modified in the previous step.
 - Run `make lint-fast` to check for script errors.
 - Create a test bash script named test.sh next to the snips.sh you have just generated.
 - Your bash script will consist of a series of test steps that call the commands in your generated snips.sh file.
 - Include test setup and cleanup, and include required snips and verify functions as required
- Run the doc test using `make doc.test` or its variants as required

Istio Ecosystem

The array of providers who install and manage Istio, professional services, and integrations can help you get the most out of your service mesh.

providers pro services integrations

Many companies build platforms and services that install, manage, and implement Istio for you. In fact, Istio implementations are built in to many providers' Kubernetes services.



Add your company logo at :
<https://github.com/istio/istio.io/blob/master/data/companies.yml>

Your company will be listed at [Istio / Ecosystem](#)

A small task to get started!

- `CHECK_EXTERNAL_LINKS=true make lint`
 - [404] <https://envoyproxy.github.io/envoy/>
 - [0] <https://gateway-api.org/>
 - [404]
<https://www.tetrate.io/blog/istio-has-applied-to-join-the-cncf/>
 - [404]
<https://kubernetes-sigs.github.io/service-apis/>
 - [404]
<https://www.kiali.io/documentation/getting-started>
- Perform quick edit or push a PR the normal way

<https://preliminary.istio.io/latest/blog/2017/0.1-using-network-policy/>

Istio

About ▾ Blog News Get involved

Dec 7, 2017 Mixer and the SPOF Myth Improving availability and reducing latency. By Martin Taillefer

Nov 3, 2017 Mixer Adapter Model Provides an overview of Mixer's plug-in architecture. By Martin Taillefer

Aug 10, 2017 Using Network Policy with Istio How Kubernetes Network Policy relates to Istio policy. By Spike Curtis



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Wrap Up

Get more information

- Working Group Weekly Meetings:
<https://github.com/istio/community/blob/master/WORKING-GROUPS.md>
- Community, Code of Conduct and Processes:
<https://github.com/istio/community>
- Wiki pages: <https://github.com/istio/istio/wiki>
 - Dev Environment, Writing Code, Test, etc.
- Istio Slack: <https://istio.slack.com/>
- Istio Google Drive (Design docs, etc):
<https://drive.google.com/drive/folders/0ADmbrU7ueGOUUk9PVA>

Community and Project Structure

- Roles
 - Collaborator - Casual contributor to the project.
 - Member - Regular active contributor having merged at least 1 PR.
 - Maintainer - Experienced maintainer that can approve contributions from other members.
 - Workgroup Lead - Approves proposals and sets priority for their functional area.
 - Release Manager - Shepherd a relapse to GA. Appointed by ToC.
- Committees
 - Technical Oversight Committee - Responsible for cross-cutting product and design decisions.
 - Steering Committee - Oversees administrative aspects of the project, allowing the ToC to maintain a technical focus.

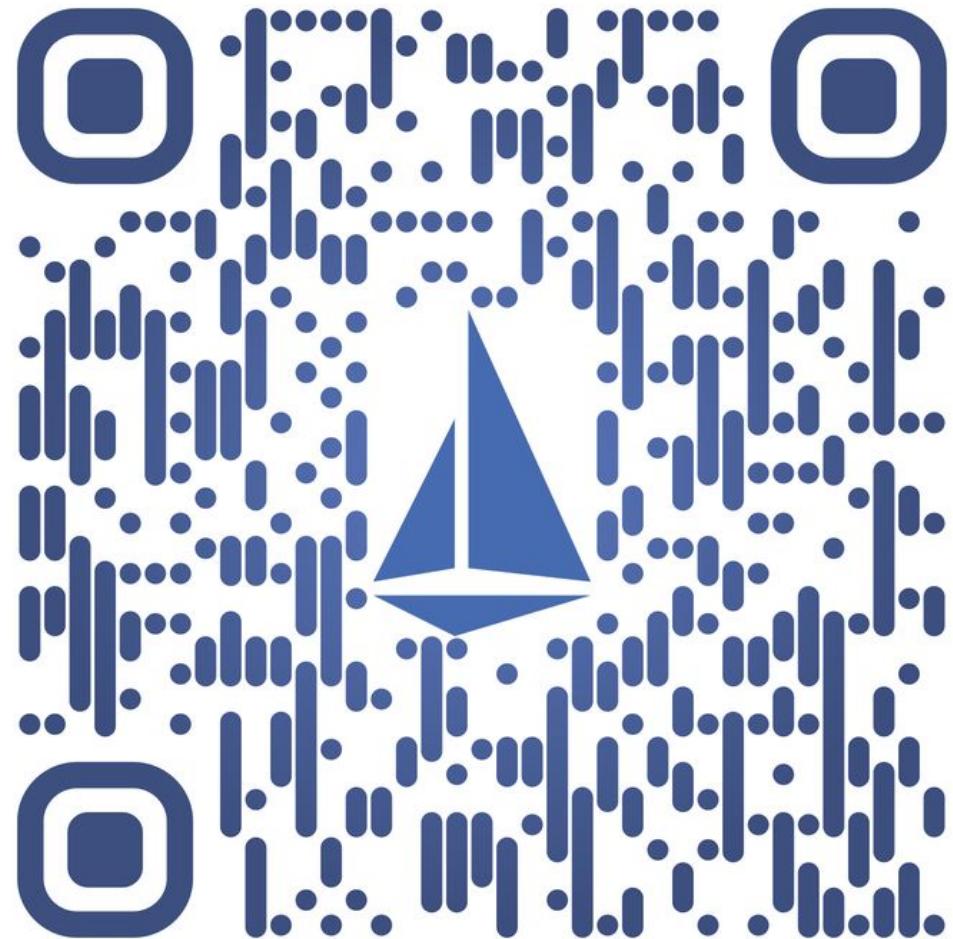
Grow your eminence

- Ask - Engage with other Istio users/members on discuss and Istio slack
- Join - Join the Istio community and help contribute
- Engage - Regularly attend and participate in WG meetings, be responsive to requests, help review PRs
- Contribute - Help contribute to Istio by fixing/triaging issues, enhancing docs and implementing new features

Reference: <https://istio.io/latest/get-involved/>



PromCon
th America 2021



Please scan the QR Code above
for Istio User Survey 2023



Please scan the QR Code above
to leave feedback on this session



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Thank You!

Squash an istioctl bug!

[istioctl bug-report include filtering logic not working with namespace and pod filtering · Issue #47522 · istio/istio · GitHub](#)

- bug-report dumps the cluster state, proxy config and other debug info
- Flags used to filter to specific pods and namespaces have a bug