LAYER5

Expect more from your infrastructure

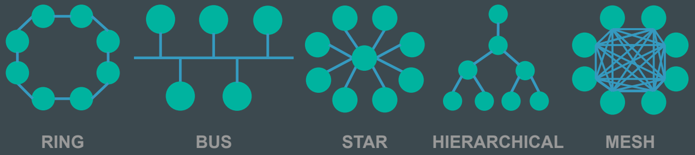
Solving the Service Mesh Adopter's Dilemma

Content

Distributed systems management is hard

Particularly without openly governed, enterprise-grade management software

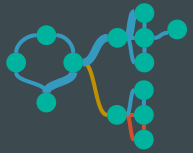
Physical networking is difficult.



Cloud native networking is even more challenging.

Networking is unfamiliar to developers and operators.

Networking has never been more significant to developers and operators.



And it's only getting more complex between cloud **and** edge infrastructure

	Containers	Orchestrators	Meshes	WebAssembly
Production-ready	6.5 years ago	5.5 years ago	3.5 years ago	1 year ago
Announced	8.5 years ago	6.5 years ago	4.5 years ago	2 years ago

LAYER5

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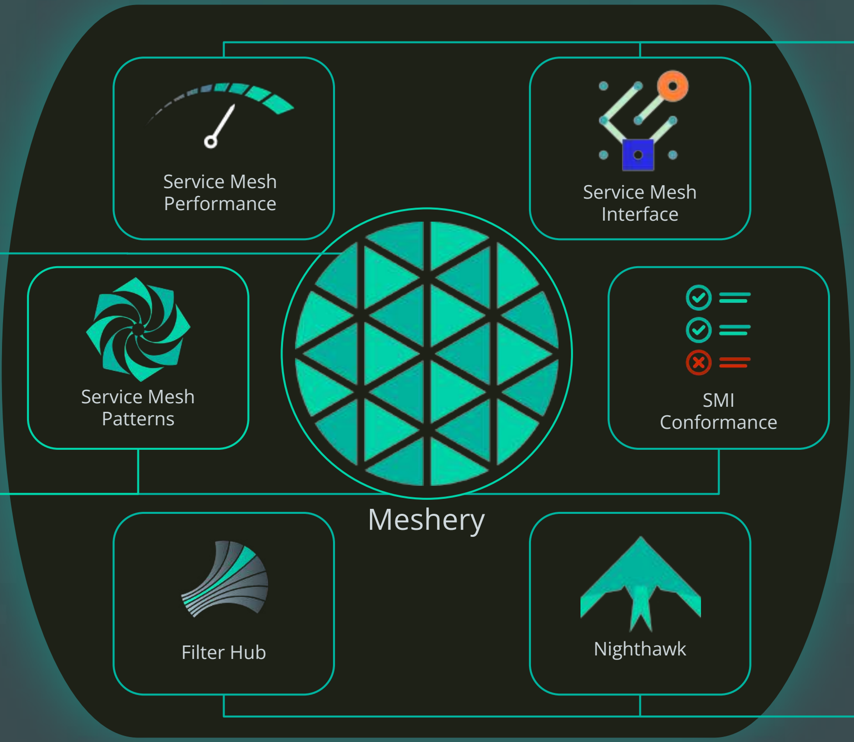


Define and Enforce Service Mesh Standards

The Only Openly Governed Service Mesh Manager

Defining Service Mesh Best Practices

Advanced Analysis and Service Mesh Intelligence

Community-first

Sustainable open governance, not just open source

Layer5 500+ contributors

all projects

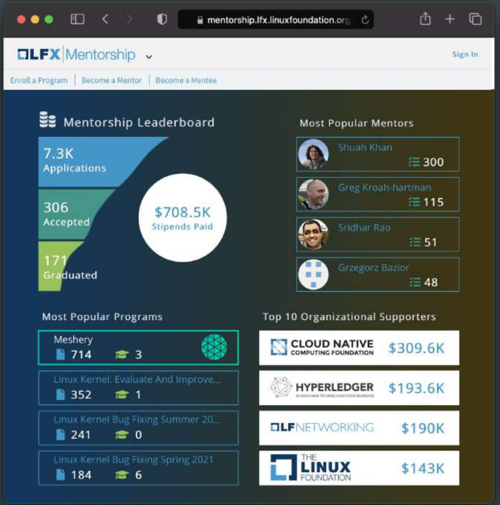
Meshery 300+ contributors

15 maintainers across different organizations:

Layer5, Red Hat, Rackspace, Intel, Quantex, Lumina Networks, VMware, Citrix, Octarine, HashiCorp, Independent, Microsoft, Google

MESHMATE

Newcomer Onboarding Program


mentorship.lfx.linuxfoundation.org

LFX Mentorship

Enroll a Program | Become a Mentor | Become a Mentee

Sign In

Mentorship Leaderboard

7.3K Applications

306 Accepted

171 Graduated

$708.5K Stipends Paid

Most Popular Mentors

Shuah Khan	300
Greg Kroah-hartman	115
Sridhar Rao	51
Grzegorz Bazior	48

Most Popular Programs

Meshery	714	3
Linux Kernel: Evaluate And Improve...	352	1
Linux Kernel Bug Fixing Summer 20...	241	0
Linux Kernel Bug Fixing Spring 2021	184	6

Top 10 Organizational Supporters

CLOUD NATIVE COMPUTING FOUNDATION	$309.6K
HYPERLEDGER	$193.6K
LF NETWORKING	$190K
THE LINUX FOUNDATION	$143K

#1 Most Popular Project
in Linux Foundation Mentorship Program

It’s meshy out there

Infrastructure diversity is reality for enterprises

In a multi-mesh world with a landscape of 20 service meshes… let’s find your best fit.

https://layer5.io/landscape

These factors drive service mesh diversity:

1. Open source governance dictates a world of multiple meshes.
2. Huge range of microservice patterns drives service mesh opportunity.
   a. Open source projects and vendors create features to serve microservice patterns (they splinter the landscape and function differently).
3. Different organizations need different scopes of service mesh functionality.
4. Hybrid drives infrastructure diversity.
   a. Accommodate hybrid workloads - non-containerized workloads need to integrate and benefit from your service mesh as well.

Service Mesh Landscape

A Multi-Mesh World

FORRESTER

With Microservices, A Service Mesh Helps Developers Focus On The Business

Why Read This Report

[illegible]

Key Takeaways

[illegible]

Forrester: Layer5 and Meshery Help Developers Focus On The Business

"Diverse microservices patterns and technologies, together with the requirements of given microservice applications, provide myriad opportunities for service mesh differentiation and specialization — including meshes native to specific cloud platforms. This will lead to a world where many enterprises use multiple service mesh products, whether separately or together."

Source: Forrester, Oct. 2019

Strengths of Service Mesh Implementations

Linkerd	Istio	Consul	NGINX	Network Service Mesh
Time to Value, Performance	Powerful Feature Set, Extensibility	Support for Non-Kubernetes Workloads	Interoperability with Existing Ingresses	Layer 2 and Layer 3 Functions

Service mesh standards to the rescue

Meshery implements and advances these standards

Service Mesh Interface (SMI)

A standard interface for service meshes on Kubernetes.

Microsoft

Meshery
the SMI Conformance Tool

Service Mesh Performance (SMP)

A format for describing and capturing service mesh performance.

Layer5

Meshery
an implementation of SMP

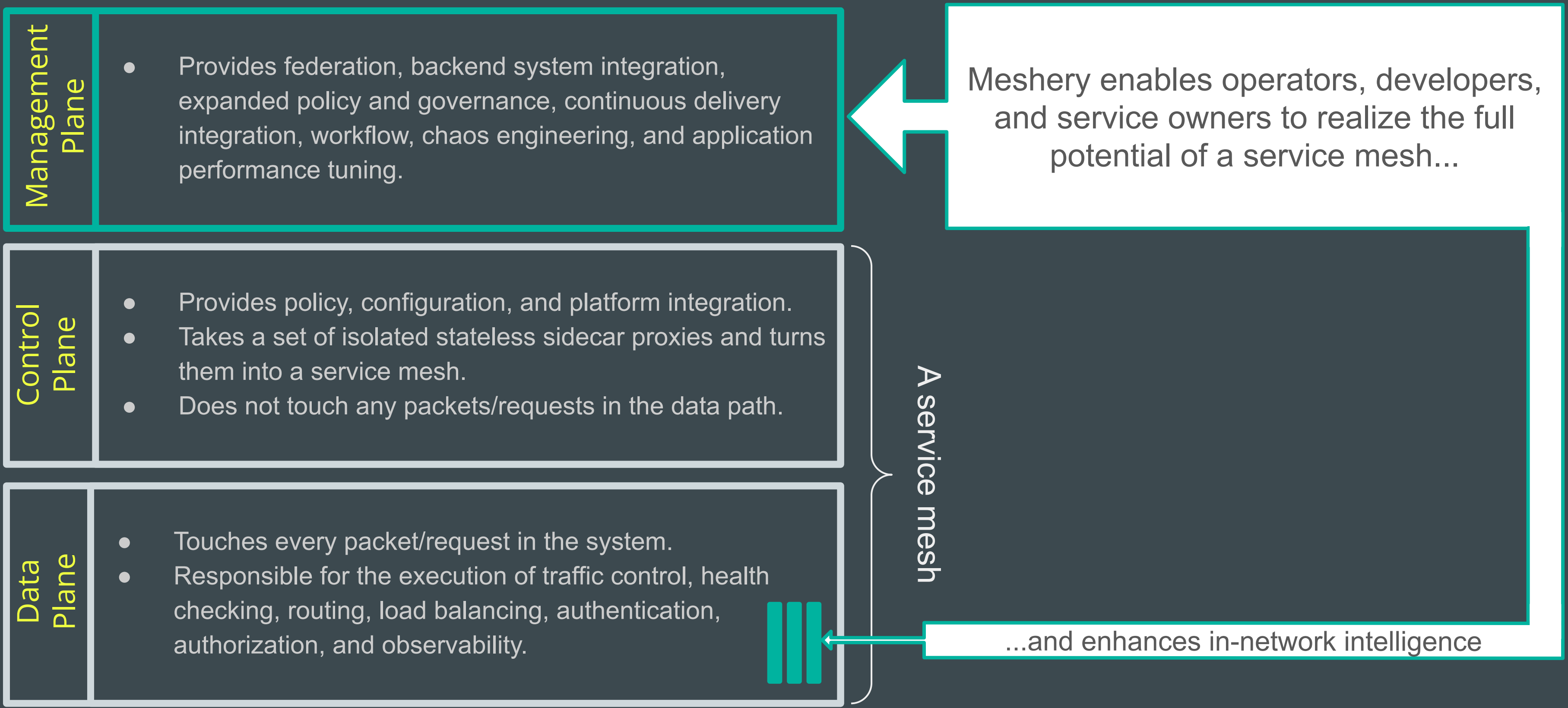
Multi-Vendor Service Mesh Interoperation

A set of API standards for enabling service mesh federation.

VMware

Service Mesh Management

The service mesh management plane



Management Plane

- Provides federation, backend system integration, expanded policy and governance, continuous delivery integration, workflow, chaos engineering, and application performance tuning.

Control Plane

- Provides policy, configuration, and platform integration.
- Takes a set of isolated stateless sidecar proxies and turns them into a service mesh.
- Does not touch any packets/requests in the data path.

Data Plane

- Touches every packet/request in the system.
- Responsible for the execution of traffic control, health checking, routing, load balancing, authentication, authorization, and observability.

A service mesh

Meshery enables operators, developers, and service owners to realize the full potential of a service mesh...

...and enhances in-network intelligence

We are the makers of

MESHERY

THE MULTI-MESH MANAGER

SMP

Core Infrastructure Initiative

CLOUD NATIVE COMPUTING FOUNDATION

Google Summer of Code

Service Mesh Interface (SMI)

COMMUNITYBRIDGE

Google Season of Docs

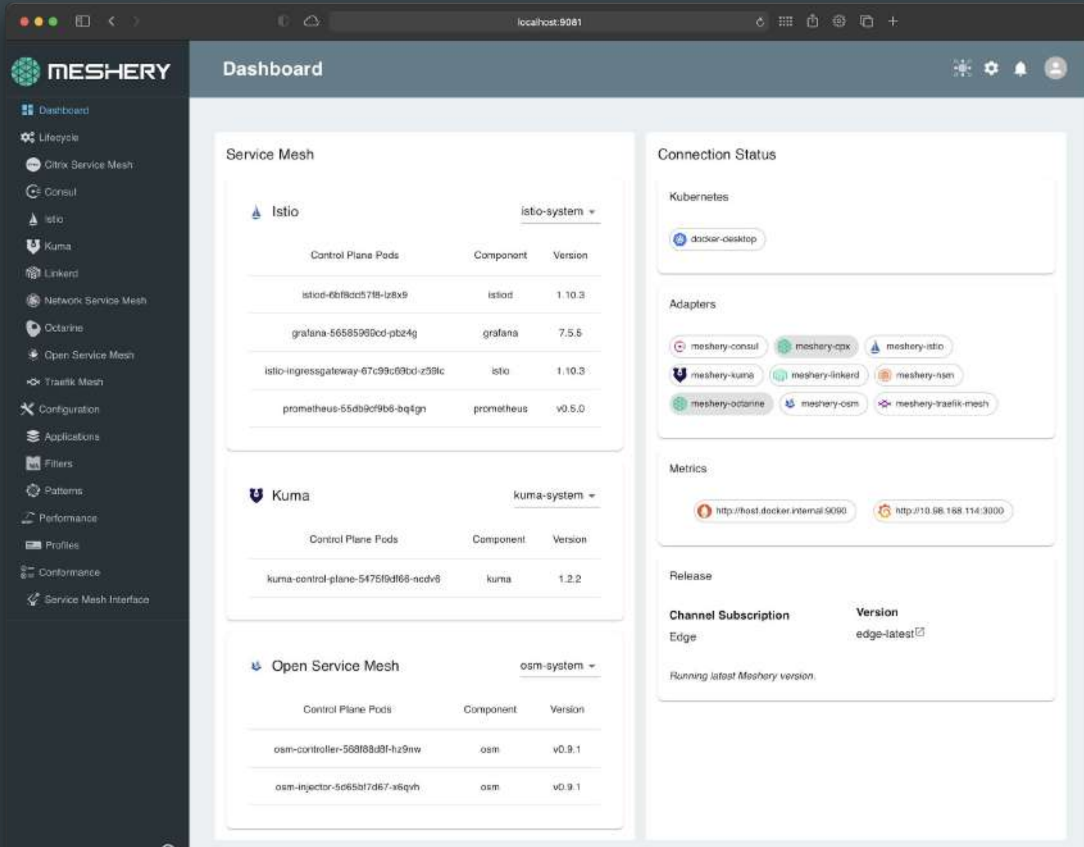
The service mesh management ~~plane~~ platform

Multi-Mesh Management

- ✔ Lifecycle
- ✔ Workload
- ✔ Performance
- ✔ Configuration
- ✔ Patterns and Practices
- ✔ Chaos and Filters

Working with each service mesh project to incorporate Meshery into their release process as the measure of their adherence to service mesh standards.

Supports:



Dashboard

Service Mesh

Istio — istio-system

Control Plane Pods	Component	Version
istiod-6bf8dd5718-lz8x9	istiod	1.10.3
grafana-56585969cd-pb24g	grafana	7.5.5
istio-ingressgateway-67c99c69bd-z59lc	istio	1.10.3
prometheus-55db9cf9b6-bq4gn	prometheus	v0.5.0

Kuma — kuma-system

Control Plane Pods	Component	Version
kuma-control-plane-5475f9df66-ncdv6	kuma	1.2.2

Open Service Mesh — osm-system

Control Plane Pods	Component	Version
osm-controller-568f88d8f-hz9nw	osm	v0.9.1
osm-injector-5d65bf7d67-x6qvh	osm	v0.9.1

Connection Status

Kubernetes

docker-desktop

Adapters

meshery-consul, meshery-cpx, meshery-istio, meshery-kuma, meshery-linkerd, meshery-nsm, meshery-octarine, meshery-osm, meshery-traefik-mesh

Metrics

http://host.docker.internal:9090, http://10.98.168.114:3000

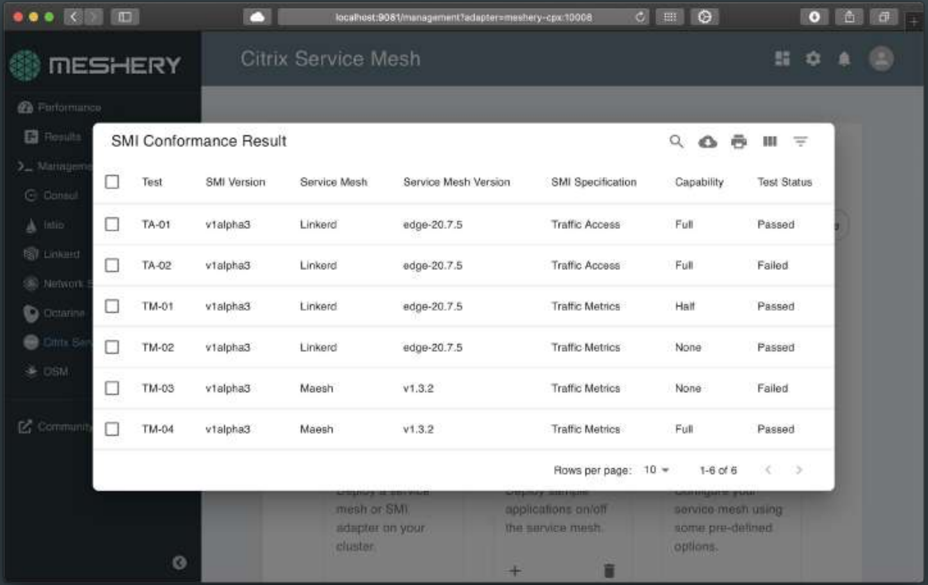
Release

Channel Subscription	Version
Edge	edge-latest

Running latest Meshery version.

Service Mesh Interface Conformance

Meshery, the service mesh compliance tool



SMI Conformance Result

Test	SMI Version	Service Mesh	Service Mesh Version	SMI Specification	Capability	Test Status
TA-01	v1alpha3	Linkerd	edge-20.7.5	Traffic Access	Full	Passed
TA-02	v1alpha3	Linkerd	edge-20.7.5	Traffic Access	Full	Failed
TM-01	v1alpha3	Linkerd	edge-20.7.5	Traffic Metrics	Half	Passed
TM-02	v1alpha3	Linkerd	edge-20.7.5	Traffic Metrics	None	Passed
TM-03	v1alpha3	Maesh	v1.3.2	Traffic Metrics	None	Failed
TM-04	v1alpha3	Maesh	v1.3.2	Traffic Metrics	Full	Passed

Rows per page: 10 1-6 of 6

Operate and upgrade with confirmation of SMI compatibility.

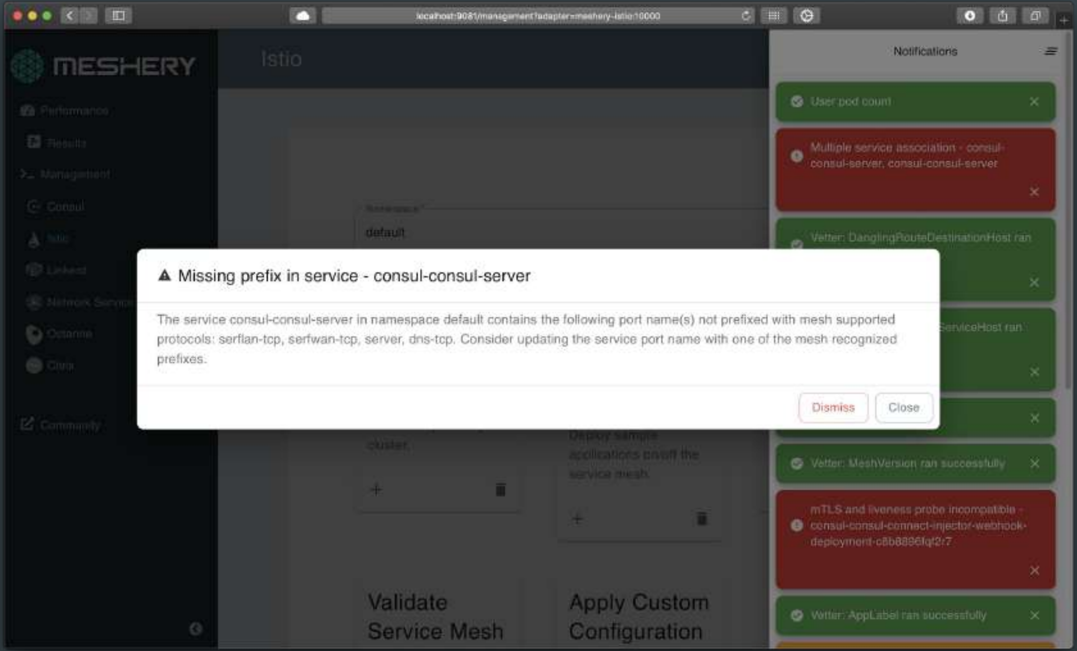
Meshery Functionality

✔ Defines compliant behavior.
✔ Produces compatibility matrix.
✔ Ensures provenance of results.
✔ Runs a set of conformance tests.
✔ Securely ensures integrity of results.
✔ Manages all SMI compatible service meshes.
✔ Built into participating service mesh's release pipeline.
✔ Common sample application for validating test assertions.

Configuration Best Practices

Operate with confidence

Assess your service mesh configuration against deployment and operational best practices with Meshery's configuration validator.



⚠ Missing prefix in service - consul-consul-server

The service consul-consul-server in namespace default contains the following port name(s) not prefixed with mesh supported protocols: serflan-tcp, serfwan-tcp, server, dns-tcp. Consider updating the service port name with one of the mesh recognized prefixes.

User pod count

Multiple service association - consul-consul-server, consul-consul-server

Vetter: DanglingRouteDestinationHost ran

ServiceHost ran

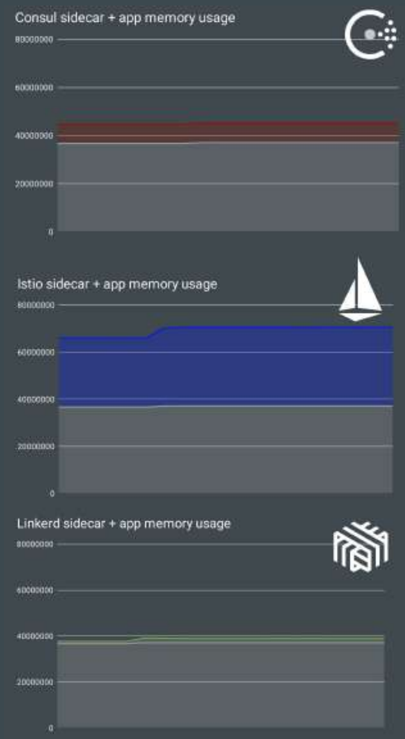
Vetter: MeshVersion ran successfully

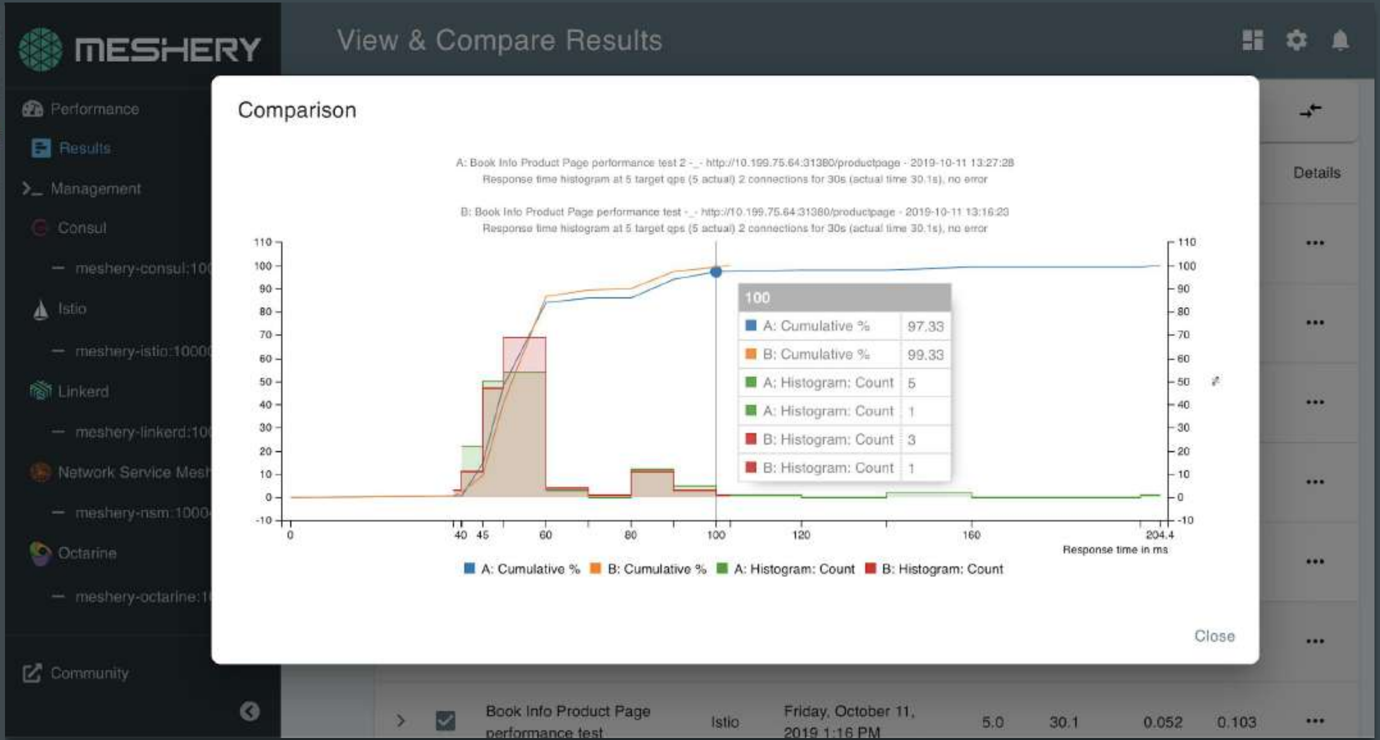
mTLS and liveness probe incompatible - consul-consul-connect-injector-webhook-deployment-c8b8896fqf2r7

Vetter: AppLabel ran successfully

Performance Management

Understand value vs Overhead





A: Book Info Product Page performance test 2 -_- http://10.199.75.64:31380/productpage - 2019-10-11 13:27:28
Response time histogram at 5 target qps (5 actual) 2 connections for 30s (actual time 30.1s), no error

B: Book Info Product Page performance test -_- http://10.199.75.64:31380/productpage - 2019-10-11 13:16:23
Response time histogram at 5 target qps (5 actual) 2 connections for 30s (actual time 30.1s), no error

100	
🟦 A: Cumulative %	97.33
🟧 B: Cumulative %	99.33
🟩 A: Histogram: Count	5
🟩 A: Histogram: Count	1
🟥 B: Histogram: Count	3
🟥 B: Histogram: Count	1

›	✓	Book Info Product Page performance test	Istio	Friday, October 11, 2019 1:16 PM	5.0	30.1	0.052	0.103

- confidential -

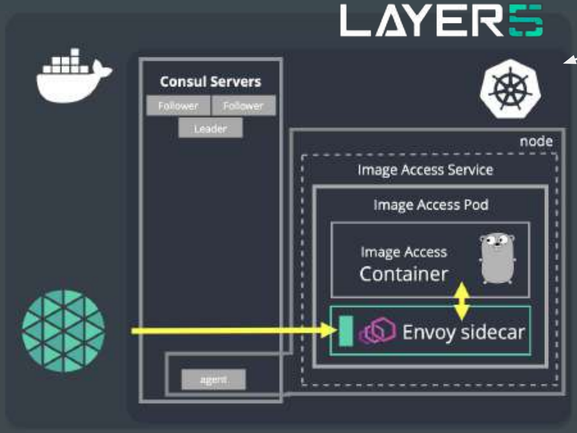
WebAssembly Filter Management

The only WASM manager for any Envoy data plane

INTELLIGENT PERFORMANCE MANAGEMENT

POLICY-BASED EMBEDDING OF SERVICE OPTIMIZERS

- Get your MeshMark and use MeshMark suggestions to make your services and data plane faster.
- Deploy filters modules that optimize your services and data plane automatically.



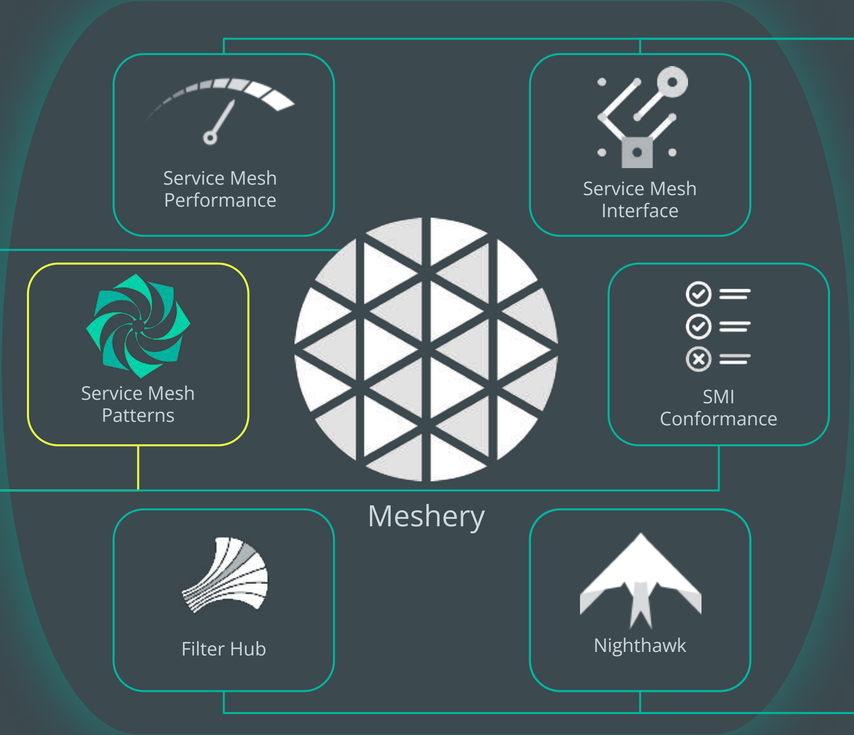
Embedding in-network intelligence to deliver business performance management and automated application performance optimization.

ENTERPRISE Networking PLANET

“Layer5 Offers Promising Solution for Cloud Native Networking”

LAYER5

Cloud Native for the rest of us



Define and Enforce Service Mesh Standards

The Only Openly Governed Service Mesh Manager

Defining Service Mesh Best Practices

Advanced Analysis and Service Mesh Intelligence

Service Mesh Patterns

Enabling use of repeatable architectural patterns

Service Mesh Patterns enable the business function in simple language.

- Patterns capture service mesh behavior in a single file and an end-user centric way.

Service Mesh Patterns are service mesh agnostic.

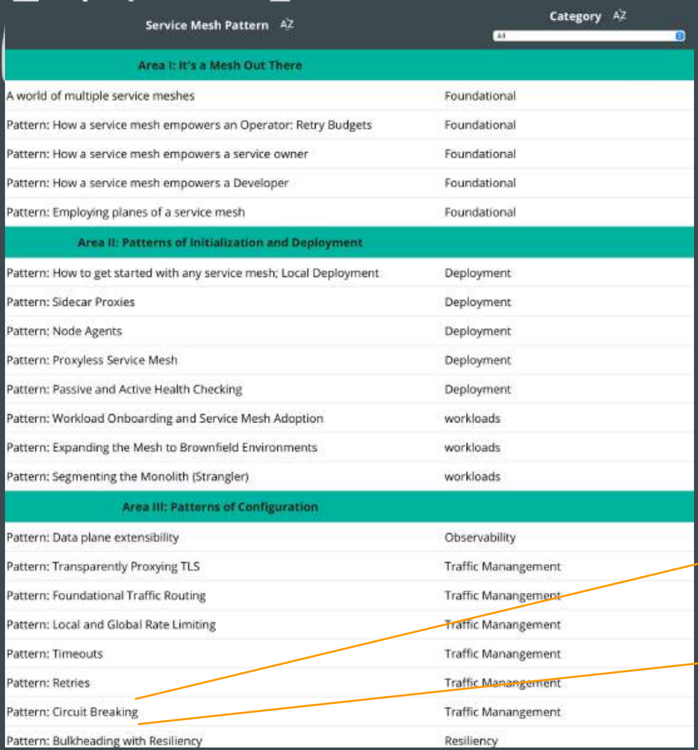
- But, still allow users access service mesh-specific features and differentiation.

Service Mesh Patterns are reusable.

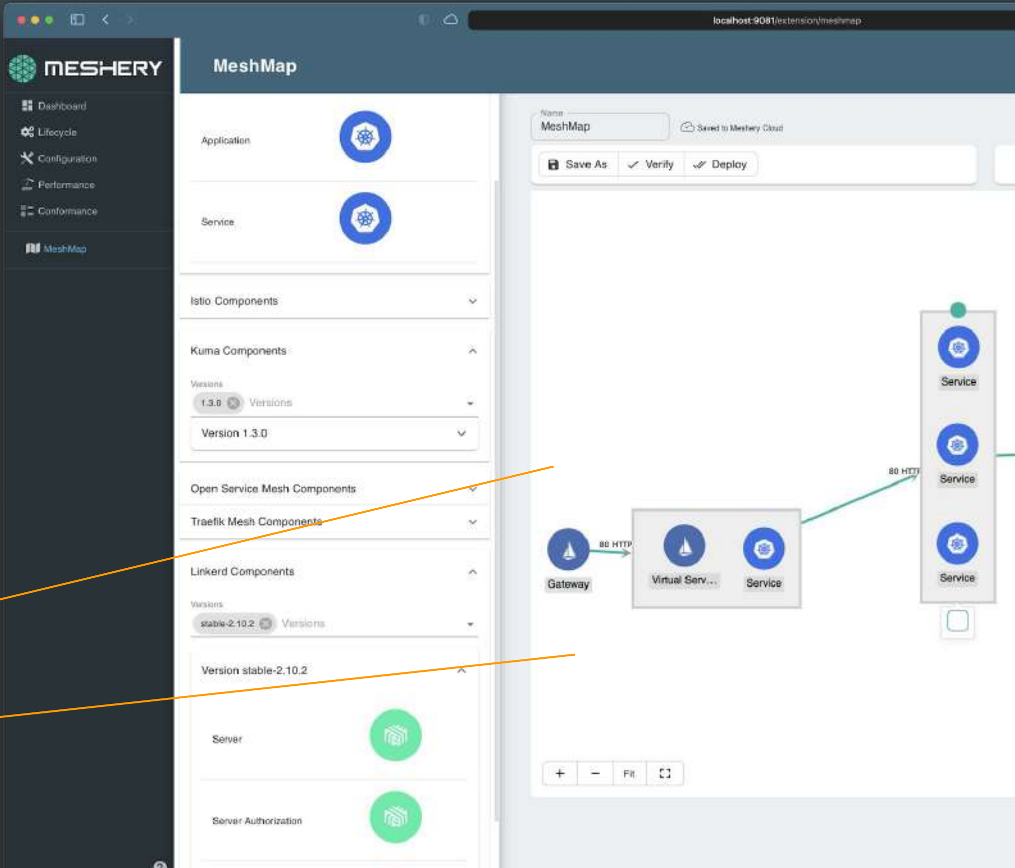
- Not only are patterns idempotent, but you can easily copy a pattern and modify to suit.

```
name: IstioSM
version: 1.0.1
services:
  istio:
    type: IstioMesh
    namespace: istio-system
    settings:
      version: 1.8.2
    traits:
      mTLS:
        policy: mutual
        namespaces:
          - istio-test
      automaticSidecarInjection:
        namespaces:
          - default
          - istio-test

  grafana:
    type: GrafanaIstioAddon
    namespace: istio-system
    dependsOn:
      - istio
      - prometheus

  prometheus:
    type: PrometheusIstioAddon
    namespace: istio-system
    dependsOn:
      - istio
```

Meshery delivers *Service Mesh Patterns*



Service Mesh Pattern	Category
Area I: It's a Mesh Out There	
A world of multiple service meshes	Foundational
Pattern: How a service mesh empowers an Operator: Retry Budgets	Foundational
Pattern: How a service mesh empowers a service owner	Foundational
Pattern: How a service mesh empowers a Developer	Foundational
Pattern: Employing planes of a service mesh	Foundational
Area II: Patterns of Initialization and Deployment	
Pattern: How to get started with any service mesh; Local Deployment	Deployment
Pattern: Sidecar Proxies	Deployment
Pattern: Node Agents	Deployment
Pattern: Proxyless Service Mesh	Deployment
Pattern: Passive and Active Health Checking	Deployment
Pattern: Workload Onboarding and Service Mesh Adoption	workloads
Pattern: Expanding the Mesh to Brownfield Environments	workloads
Pattern: Segmenting the Monolith (Strangler)	workloads
Area III: Patterns of Configuration	
Pattern: Data plane extensibility	Observability
Pattern: Transparently Proxying TLS	Traffic Manangement
Pattern: Foundational Traffic Routing	Traffic Manangement
Pattern: Local and Global Rate Limiting	Traffic Manangement
Pattern: Timeouts	Traffic Manangement
Pattern: Retries	Traffic Manangement
Pattern: Circuit Breaking	Traffic Manangement
Pattern: Bulkheading with Resiliency	Resiliency



The world's authority on *Service Mesh Patterns*

github.com/service-mesh-patterns

O'REILLY

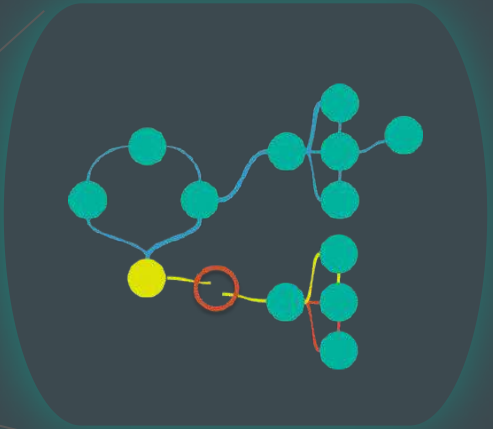
Service Mesh Patterns

Expect More From Your Infrastructure

Early Release RAW & UNEDITED

Lee Calcote & Nic Jackson

layer5.io/books/service-mesh-patterns



SMP087: Circuit breaker pattern

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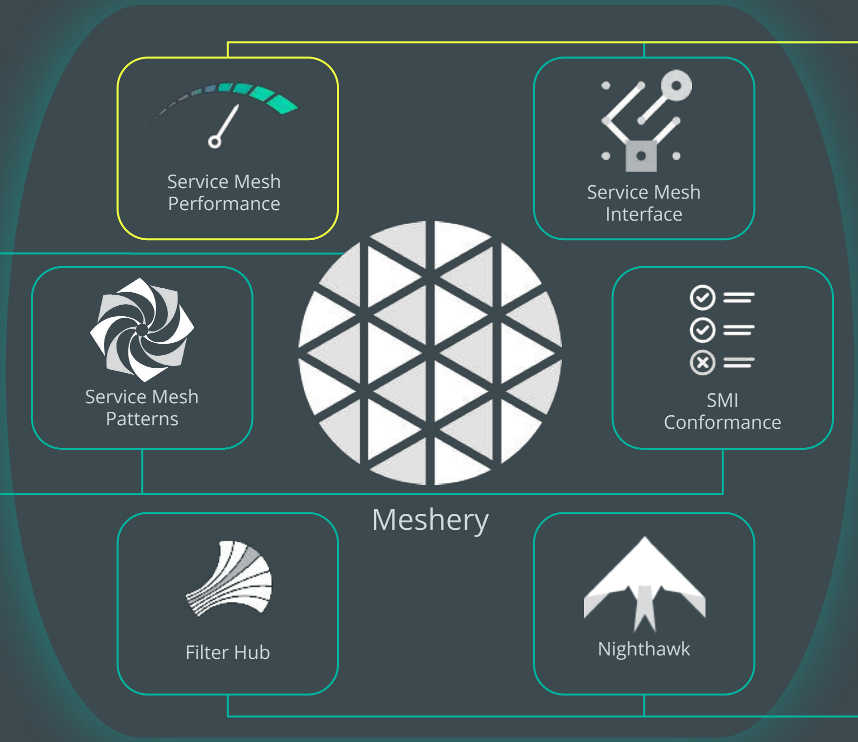
Cloud Native for the rest of us



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Service Mesh Performance

vendor neutral service mesh performance measurement standard

We are the makers of *Service Mesh Performance (SMP)*

smp-spec.io

A cloud native application networking standard.

A vendor neutral specification for capturing details of infrastructure capacity, service mesh configuration, and workload metadata.

Facilitates:

- a universal performance index to gauge a service mesh's efficiency against deployments in other organizations' environments.
- benchmarking of service mesh performance
- exchange of performance information from system-to-system / mesh-to-mesh
- apples-to-apples performance comparisons of service mesh deployments.

MeshMark

from the Service Mesh Performance Specification

An open standard for measuring performance of service meshes in context of the value they provide.

Its purpose is to convert measurements into insights about the value of functions a service mesh is providing.

It does so by specifying a uniform way to analyze and report on the degree to which measured performance provides user value.

Distilling a variety of overhead signals and key performance indicators into a simple scale. Measurement data may not provide a clear and simple picture of how well those applications are performing from a business point of view, a characteristic desired in metrics that are used as key performance indicators.

Reporting several different kinds of data can cause confusion. Reducing measurement data to a single well understood metric is a convenient way to track and report on quality of experience.

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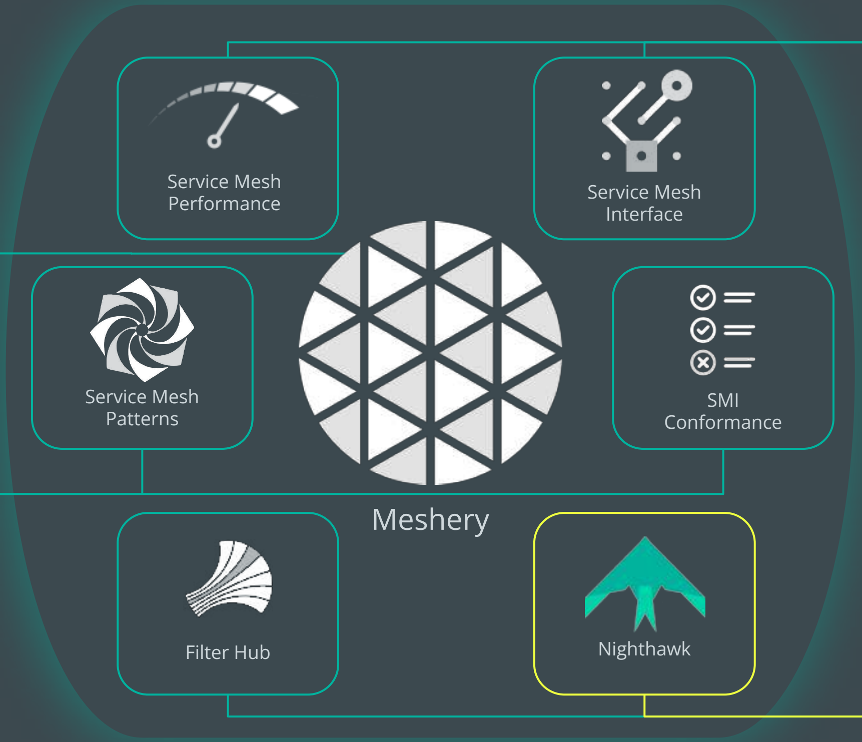
Cloud Native for the rest of us



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We are the makers of *Nighthawk*

Distributed systems require distributed analysis

Nighthawk + **Meshery**

Nighthawk

- a Layer 7 performance characterization tool created by Envoy project.
- a load generator custom-built for data plane proxy testing.

Meshery

- the service mesh management plane
- supports wrk2, fortio, and Nighthawk as single instance load generators.

=

- Recursively evaluate optimization algorithms using adaptive load controllers in Meshery for ongoing insight and automatic tuning.
- Parallelize distributed performance testing with high precision for insight into high tail percentiles. Unlock distributed systems behavioral analysis.
- Model your service mesh topology and optimize for your ideal configuration in context of how much you value properties of resiliency, performance, throughput, latency, and so on before you deploy to production.

NIGHTHAWK

getnighthawk.dev

Community Partners

RESEARCH PARTNERS

TEXAS
The University of Texas at Austin

THE LINUX FOUNDATION

UEM
UNIVERSITY OF ENGINEERING & MANAGEMENT
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CLOUD NATIVE
COMPUTING FOUNDATION

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lumina networks

Google

Microsoft

OCTARINE

CiTRIX®

vmware®

docker

HashiCorp

Our Service Mesh Training

delivered to 5,000+ students

Day 0 Workshop

What you'll learn -

Kubernetes
- Container orchestration concepts

Kubernetes architecture
- Control plane components

Kubernetes constructs
- Pods, Namespaces, Deployments, StatefulSets, DaemonSets, Services, ConfigMaps, Volumes

Cluster Management
- Monitoring strategies, Best practices
- Upgrades

Workload Management
- Rolling Updates
- Continuous Delivery, GitOps

Multi-cluster deployment models
- Identify the best-suited deployment mode for your requirements.

Day 1 Workshop

What you'll learn -

MESHMASTER

Service Mesh Expert Certification Program

applications on different service meshes.

Day 2 Workshop

What you'll learn -

Observability
- Methods for managing telemetry, monitoring, and reporting

raffic Management
- How to manage traffic through load balancing and resilient communication
    a. Request Routing and Canary Testing
    b. Fault Injection and Circuit Breaking
- How to enforce policies and rate limiting

curity
- Identity - securing communication with the mesh with identity and mTLS.
- Policy - using traffic policies to operate securely.

ervice mesh performance
- Examine and understand the tradeoffs of value delivered vs overhead incurred.

Operational Best Practices
- Running workloads on service mesh
- Troubleshooting the service mesh

Go to Market

LAYER5

THE SERVICE MESH COMPANY

Defining Service Mesh Patterns

CLOUD NATIVE COMPUTING FOUNDATION

CNCF Service Mesh Working Group

- Meet on 1st and 3rd Thursday of every month at 11am Pacific.
- Connect: Slack Channel (#tag-network).
- Join: Service Mesh WG mailing lists at lists.cncf.io

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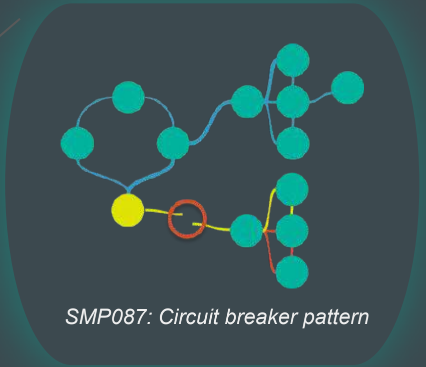
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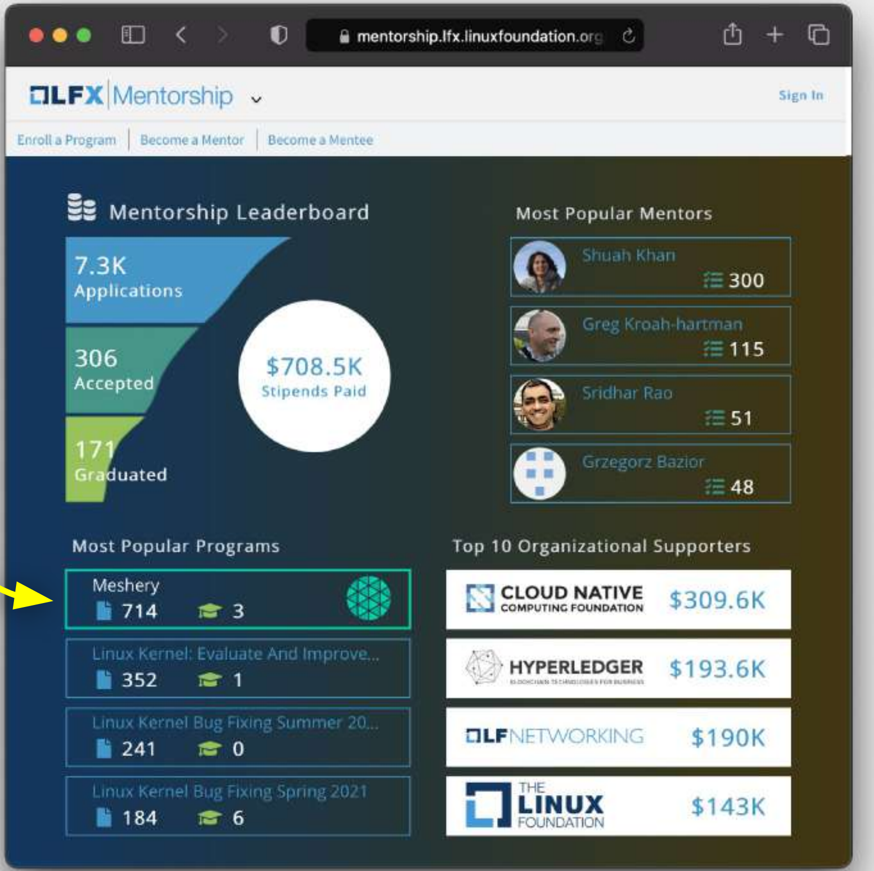
mentorship.lfx.linuxfoundation.org

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