KubeCon CloudNativeCon Europe 2021

Virtual

Intro and Deep Dive

CNCF SIG Network & CNCF Service Mesh WG

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CNCF SIG Network

Introduction

Mission Statement

With an ever steady eye to the needs of workloads and developers who create them and operators who run them, SIG Network's mission is to enable widespread and successful development, deployment and operation of resilient and intelligent network systems in cloud native environments.

In this endeavor, we seek to:

1. Clarify and inform.
2. Collaborate and interrelate.
3. Assist and attract projects.
4. Afford impartial stewardship.

CNCF SIG Network Projects

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As of KubeCon NA 2019

- CNI
- CoreDNS
- Envoy
- gRPC
- Linkerd
- NATS
- Network Service Mesh

As of KubeCon EU 2020

- BFE
- CNI-Genie
- Contour
- Kuma
- Service Mesh Interface

As of KubeCon NA 2020

- Chaos Mesh
- Open Service Mesh

As of KubeCon EU 2021

- Emissary Ingress (Ambassador)
- k8gb
- Meshery
- Service Mesh Performance

On the horizon:

- Submariner

Working Groups and Papers

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Working Groups

- Universal Data Plane API
- Service Mesh Working Group

Whitepapers

- Cloud Native Networking Principles proposed for incorporation into SIG Network.
- Patterns and Reference Architecture

Presentations:

- Moving beyond HTTP: Surveying the State of L7 protocols in the Cloud Native ecosystem

Service Mesh Working Group

Deep-Dive

Common Goals Across Initiatives

- CNCF labs for at-scale testing
  - Ongoing publication of results

- Service Mesh Patterns
  - A curated collection of best practices and common methodologies.
  - User survey

Service Mesh Patterns

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List of service mesh patterns

Authors: Lee Calcote, Nic Jackson	CNCF Service Mesh WG
Area I: It's a Mesh Out There	**Category**
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 Management
Pattern: Foundational Traffic Routing	Traffic Management
Pattern: Local and Global Rate Limiting	Traffic Management
Pattern: Timeouts	Traffic Management
Pattern: Retries	Traffic Management
Pattern: Circuit Breaking	Traffic Management
Pattern: Bulkheading with Resiliency	Resiliency

Service Mesh Specifications

It's a multi-mesh world

Service Mesh Interface (SMI)

A standard **interface** for service meshes on Kubernetes.

Service Mesh Performance (SMP)

A standard for describing and capturing service mesh **performance**.

Multi-Vendor Service Mesh Interoperation (Hamlet)

A set of API standards for enabling service mesh **federation**.

Service Mesh Interface Conformance

Validating compliance

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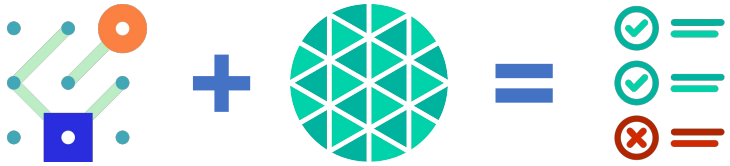

meshery.io/smi

Purpose and Scope

- Provide an easy-to-use, service mesh and SMI-specific tool to give service mesh projects and users a suite of repeatable conformance tests.
- All service mesh projects participating in the Service Mesh Interface specification.

Project Goals

- Provide users with a compatibility matrix identifying the SMI features that are supported per service mesh.

Project Objectives

- Define a set of conformance tests and what behavior is expected of a conforming service mesh implementation.
- Built into each participating service mesh project's release tooling.

Validating Conformance

- Conformance to SMI specifications will be done through use of a service mesh's workload.
- A sample application is used as the workload to test: Learn Layer5

Reference: Design spec and Overview

Service Mesh Performance

vendor neutral service mesh performance measurement standard

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smp-spec.io

Directly enables:

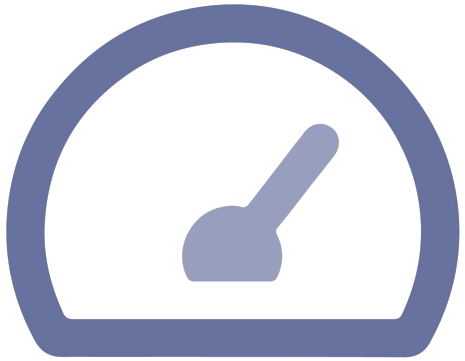
- capturing details of infrastructure capacity, service mesh configuration, and workload metadata.

Facilitates:

- 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.
- a universal performance index to gauge a service mesh's efficiency against deployments in other organizations' environments.

MeshMark

from Service Mesh Performance



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

Problem:

- 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.

MeshMark:

- Distills a variety of overhead signals and key performance indicators into a simple scale. Reducing measurement data to a single well understood metric is a convenient way to track and report on quality of experience.
- 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.

Project: GetNighthawk

the easiest way to get started with Nighthawk on any cloud or platform

getnighthawk.dev

Directly delivers:

- a number of distributions of Nighthawk
- compatibility of Nighthawk with Service Mesh Performance (SMP)
- integration of Nighthawk with Meshery

Facilitates:

- distributed performance analysis (see next slide)

Distributed Performance Analysis

Distributed systems require distributed analysis

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getnighthawk.dev

Problem:

- Many performance characterizing tools are limited to single instance load generator. This limits the amount of traffic and the variety of behavioral analysis.
- Distributed load testing in parallel poses a challenge when merging results without losing the precision we need to gain insight into the high tail percentiles.
- How to 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

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

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Meshery

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

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Distributed load testing offers insight into system behaviors that arguably more accurately represent real world behaviors of services under load as that load comes from any number of sources.

Explore how Nighthawk adaptive load controllers in the service mesh management plane, Meshery, offer ongoing insight and optimization.

Related: layer5.io/projects/distributed-performance-testing

ENGAGE

CALL FOR PARTICIPATION

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


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