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CloudNativeCon

Europe 2024



Intro and Deep Dive

CNCF TAG Network & CNCF Service Mesh WG

Lee Calcote, Layer5

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Mission Statement

With an ever steady eye to the needs of workloads and developers who create them and operators who run them, TAG 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 TAG Network

Chairs and Technical Leads



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Co-chair



Lee Calcote

Layer5

@lcalcote

Co-chair



Nic Jackson

HashiCorp

@sherifjackson

Co-chair

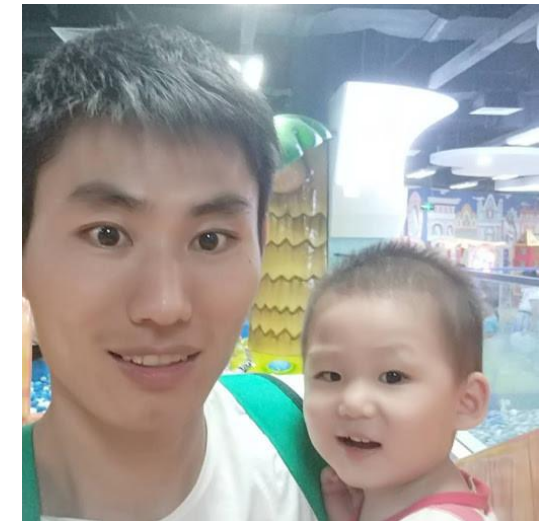


Zack Butcher

Tetrade

@zackbutcher

Technical Lead



Zhonghu Xu

Huawei

@zhonghuxu

CNCF TAG Network Projects

KubeCon NA 2019

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

KubeCon EU 2020

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

KubeCon NA 2020

- Chaos Mesh
- Open Service Mesh

KubeCon EU 2021

- Emissary Ingress
- k8gb
- MetalLB
- Kube-OVN
- OpenELB

KubeCon NA 2021

- Service Mesh Performance
- Submariner
- Cilium
- Meshery

KubeCon China 2021

- FabEdge
- Aeraki Mesh
- Antrea

KubeCon EU 2022

- Istio
- Merbridge

KubeCon NA 2023

- Easegress

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- Proposed: Slime
- Spiderpool

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- Proposed: Connect
- Proposed: KubeSlice

Service Mesh Working Group

CNCF TAG Network

Service Mesh Patterns

Enabling use of repeatable architectural patterns



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PATTERNS

github.com/service-mesh-patterns



meshery.io/catalog

Design patterns enable the business function in simple language.

- Design patterns capture service mesh behavior in an end-user centric way.

Design patterns are service mesh agnostic.

- But, still allow users access service mesh-specific features and **differentiation**.
 - User ability to filter on service mesh compatibility..

Design patterns are reusable.

- Not only are patterns idempotent, but you can easily copy a pattern and modify to suit.
- Imbued with **best practices**.
- Pattern components can be interchanged and used as building blocks, combining multiple components into a new, integrated pattern.

Service Mesh Catalog

Discover and publish reusable resources



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meshery.io/catalog



WASM Filters



Design Patterns



Coming Soon

eBPF Programs



Coming Soon

OPA Policies

TRAFFIC MGMT

Singleton Queue

WA

WEBASSEMBLY

MESHERY023

SECURITY

Sesion Authorizer

WA

WEBASSEMBLY

MESHERY019

TRAFFIC MGMT

Circuit Breaker

MESHERY003

RESILIENCY

Retries

MESHERY012

OBSERVABILITY

L7 Traces

MESHERY045

SECURITY

L7 Denial

MESHERY046

OBSERVABILITY

Correlate Event

MESHERY055

SECURITY

Single Tenant

MESHERY059

TRAFFIC MGMT

JWT Transformer

WA

WEBASSEMBLY

MESHERY034

OBSERVABILITY

HTTP Metrics

WA

WEBASSEMBLY

MESHERY028

SECURITY

Mutual TLS

MESHERY014

DEPLOYMENT

Multi-Cluster

MESHERY013

RESILIENCY

Retry Deadline

MESHERY044

DEPLOYMENT

Node Agent

MESHERY043

RESILIENCY

Only w/Agent

MESHERY057

DEPLOYMENT

Pre-provision

MESHERY056

Nighthawk: Distributed Performance Analysis

Distributed systems require distributed analysis

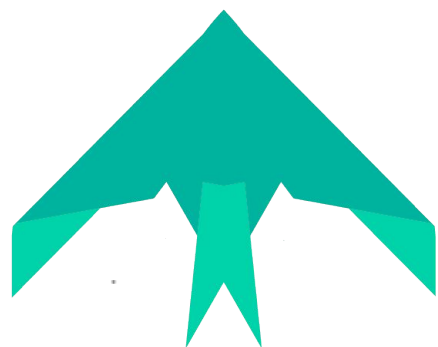


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NIGHTHAWK

getnighthawk.dev

Problem:

- Many performance benchmarks are limited to single instance load generation. 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.

Nighthawk

- L7 performance characterization tool.
- a load generator custom-built for data plane proxy testing.



Meshery

- the cloud native manager.
- supports Nighthawk, wrk2, and fortio, and as single instance load generators.



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.

[Design Specification](#), [Working Group Objectives](#)

Service Mesh Performance

vendor neutral service mesh performance measurement standard



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SMP

smp-spec.io

 +  = 140,000 Tests

smp-spec.io/dashboard

Initiative:

- test, and report performance of various service mesh deployments under various configurations.

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

smp-spec.io/meshmark

An open index for measuring performance of cloud native infrastructure in context of the value provided to your business.

A Cloud Native TCO

- MeshMark distills a variety of overhead signals and key performance indicators into a simple index.
- MeshMark's purpose is to convert measurements into insights about the value of functions your cloud native infrastructure is providing.
- MeshMark specifies a uniform way to analyze and report on the degree to which measured performance provides business value.

$$\text{MeshMark} = \frac{[\text{Utilization Class1 (MUE1 x weight)} \dots + (\text{MUE}_n \text{ x weight})]}{\# \text{ of MUEs]} \dots + \dots}{[\text{Utilization ClassN (MUE1 x weight)} \dots + (\text{MUE}_n \text{ x weight})]}{\# \text{ of MUEs]}$$

$$\# \text{ of Utilization Classes}$$

where weight in range -50% : +50%

Utilization Classes group MUEs by similarity of resource being measured.

Learn more: <https://smp-spec.io/meshmark>

Call for Participation

- Meet on 1st and 3rd Thursday of every month at 11am Pacific.
- Read: meeting minutes.
- Connect: Slack Channel (#tag-network).
- Join: cncf-sig-network-servicemesh-wg mailer