Biznet
GioCloud

Service Mesh Observability with Kiali

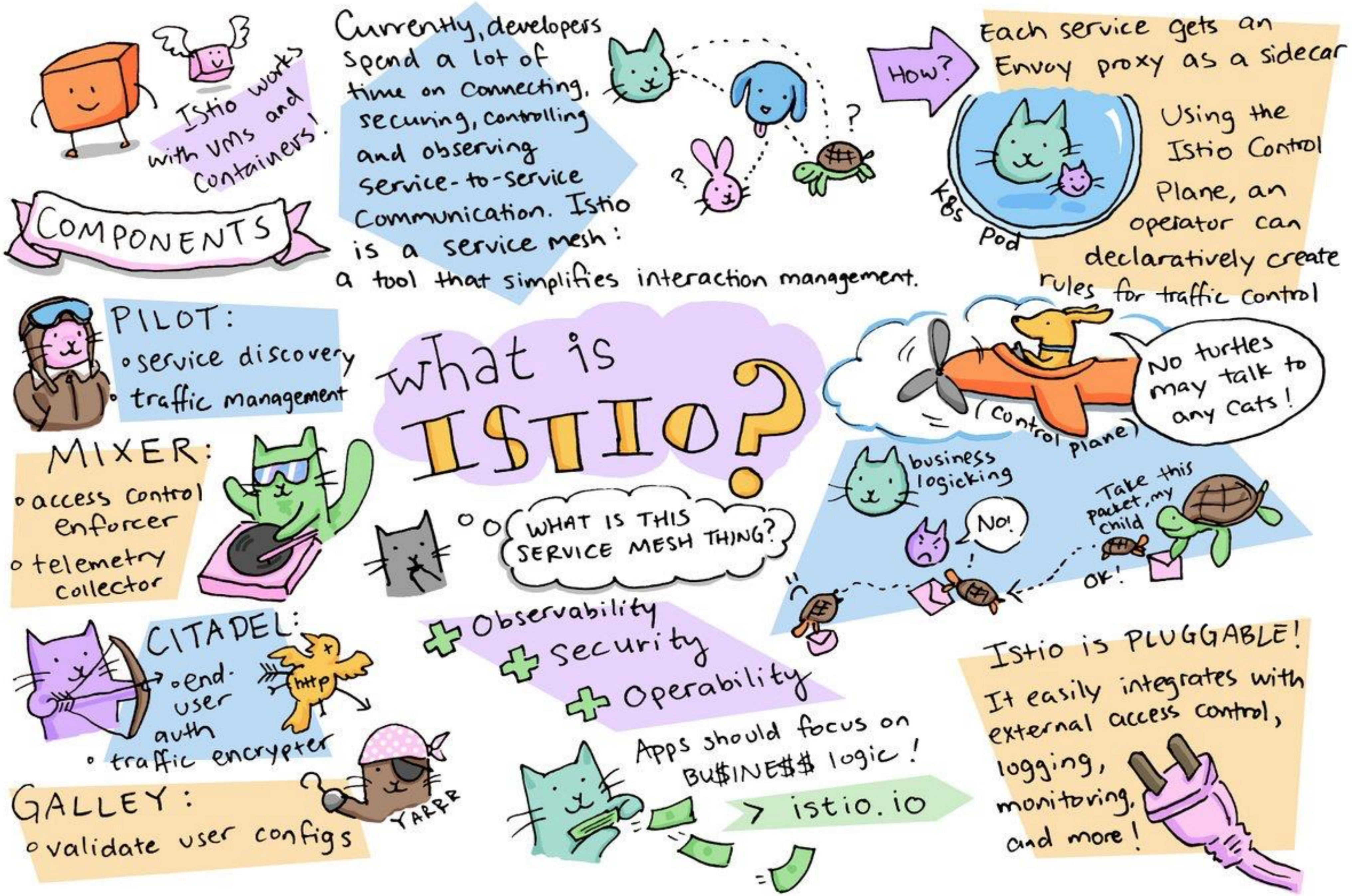
Thursday, October 3, 2019

Jakarta Kubernetes at Kalibrr

Yusuf Hadiwinata Sutandar

Linux Geek, Opensource Enthusiast, Security Hobbies
RHCT, RHCSAv5-v7, RHCEv5-v7, RHCVA, RHCI, RHCX, RHCSA-RHOS,
RHCJA, CEI, CEH, CHFI, CND, EDRP, CCNA, MCTCNA, Security+,
Network+, VCA, vExpert 2017-2018
VP Operation & Services – PT Biznet Gio Nusantara

100% Attention - Take Notes, Not Calls - Receive knowledge, Not Messages
Mute Notification for Slack, QQ, WA, Tele, Snapchat, FB, Line, SMS...


Istio works with VMs and containers!
COMPONENTS
Currently, developers spend a lot of time on connecting, securing, controlling and observing service-to-service communication. Istio is a service mesh: a tool that simplifies interaction management.
?
?
How?
Each service gets an Envoy proxy as a sidecar
K8s Pod
Using the Istio Control Plane, an operator can declaratively create rules for traffic control
PILOT:
• service discovery
• traffic management
what is ISTIO?
(Control plane)
No turtles may talk to any cats!
MIXER:
• access control enforcer
• telemetry collector
WHAT IS THIS SERVICE MESH THING?
business logicking
No!
Take this packet, my child
OK!
CITADEL:
• end-user auth
• traffic encrypter
http
+ Observability
+ Security
+ Operability
Istio is PLUGGABLE!
It easily integrates with external access control, logging, monitoring, and more!
YARRR
GALLEY:
• validate user configs
Apps should focus on BU$INE$$ logic!
> istio.io

What is Istio

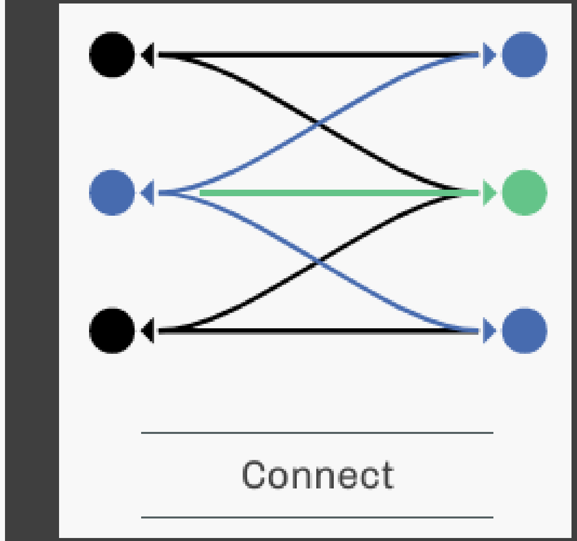
Connect, secure, control, and observe services.

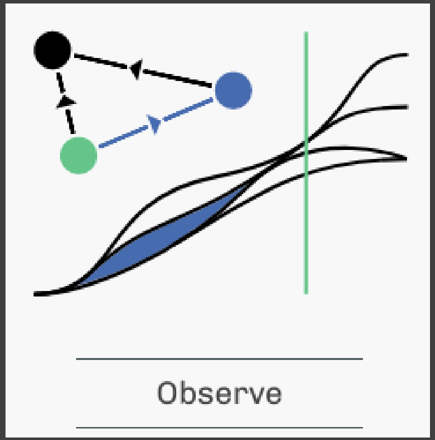
Secure - Automatically secure your services through managed authentication, authorization, and encryption of communication between services.

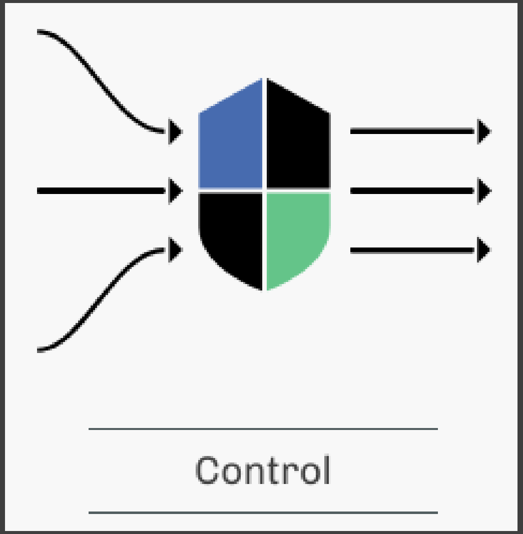
Observer - See what's happening with rich automatic tracing, monitoring, and logging of all your services.

Control - Apply policies and ensure that they’re enforced, and that resources are fairly distributed among consumers.

Connect - Intelligently control the flow of traffic and API calls between services, conduct a range of tests, and upgrade gradually with red/black deployments.







Biznet GioCloud

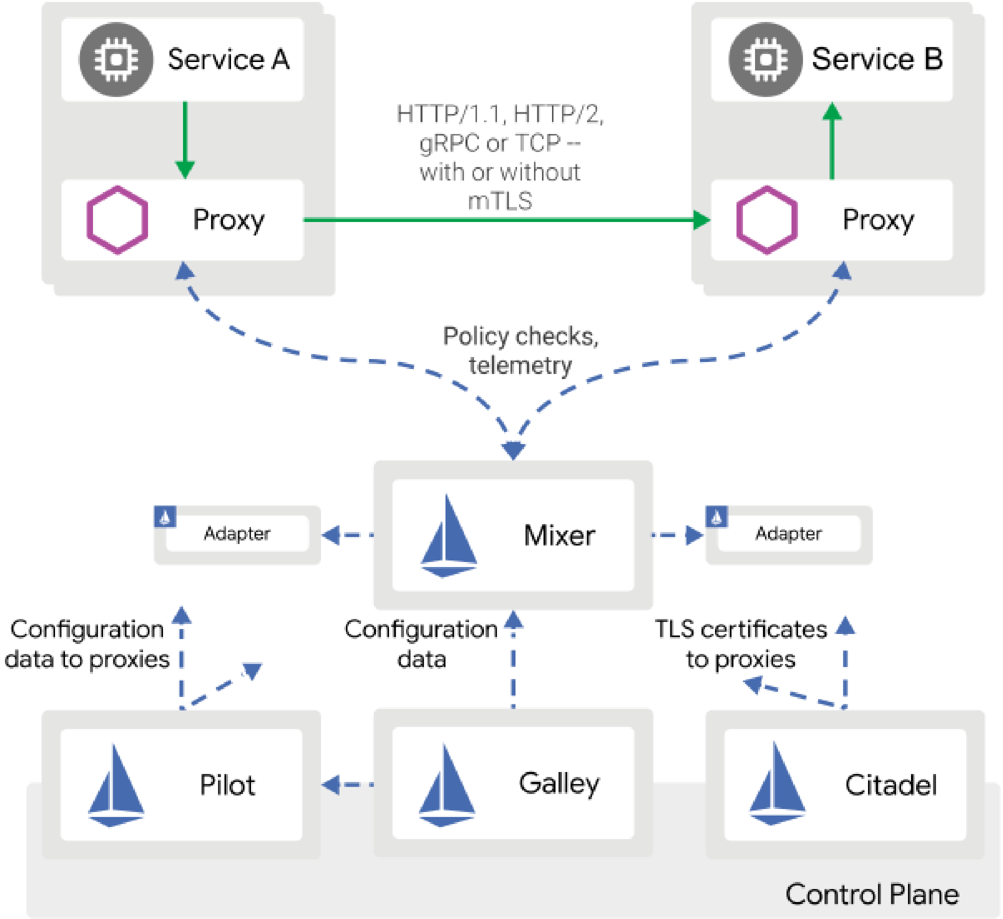
Istio Architecture

- The **data plane** is composed of a set of intelligent proxies (Envoy) deployed as sidecars. These proxies mediate and control all network communication between microservices along with Mixer, a general-purpose policy and telemetry hub.

- The **control plane** manages and configures the proxies to route traffic. Additionally, the control plane configures Mixers to enforce policies and collect telemetry.

Reff: https://istio.io/docs/concepts/what-is-istio/

An Istio service mesh is logically split into a data plane and a control plane.



Istio – Sidecar Injection

Describes the configuration of the sidecar proxy that mediates inbound an d outbound communication to the workload instance it is attached to. By default, Istio will program all sidecar proxies in the mesh with the necessary configuration required to reach every workload instance in the mesh, as well as accept traffic on all the ports associated with the workload.

https://istio.io/docs/reference/config/networking/v1alpha3/sidecar/

Introduction to Kiali & Maistra Project

Kiali - Background

A Microservice Architecture **breaks up** the **monolith** into many smaller pieces that are composed together. Patterns to secure the communication between services like fault tolerance (via timeout, retry, circuit breaking, etc.) have come up as well as distributed tracing to be able to see where calls are going.

A service mesh can now **provide these services on a platform level** and frees the application writers from those tasks. Routing decisions are done at the mesh level.

Powered by Red Hat with Love

Free, Open-Source
https://www.kiali.io/

About Kiali

Kiali is an observability console for Istio with service mesh configuration capabilities. It helps you to understand the structure of your service mesh by inferring the topology, and also provides the health of your mesh.

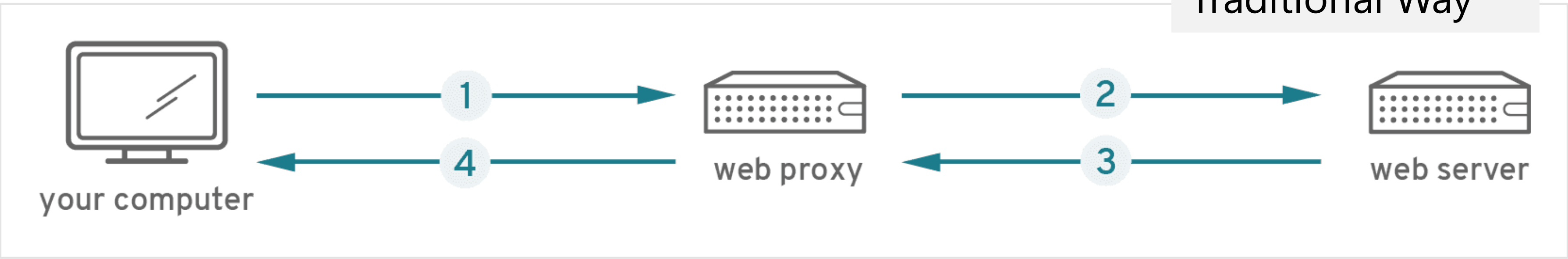
Kiali works with Istio to visualise the service mesh topology, features like circuit breakers or request rates.

Kiali also includes an integration with Jaeger Tracing to provide distributed tracing out of the box.

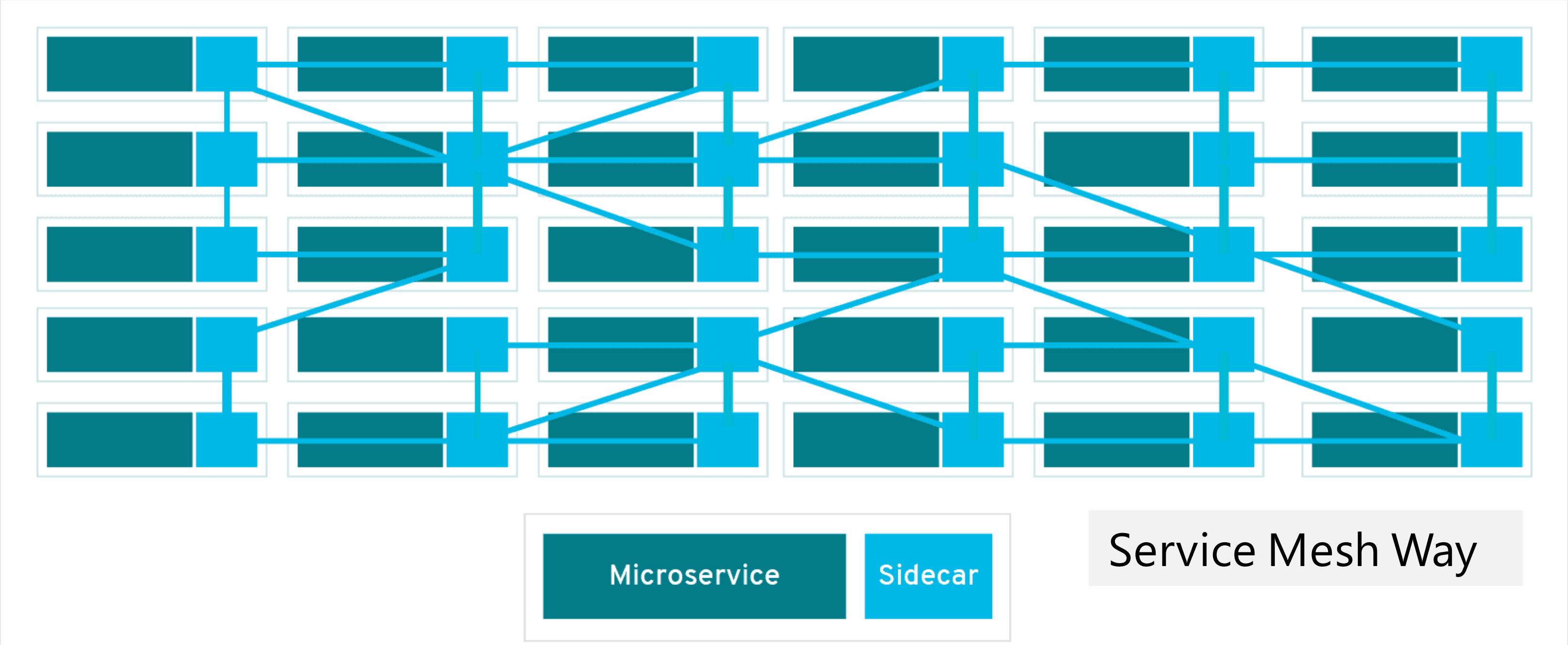
Maistra, built around Istio, integrates with Prometheus and Jaeger to give DevOps teams visibility into issues, SecOps teams the ability to secure communication between pods using mutual TLS, and QA and development teams the ability to use canaries, traffic management, and other functionality to test products. Also have Integration with Openshift authentication

Kiali – How it Work

Traditional Way

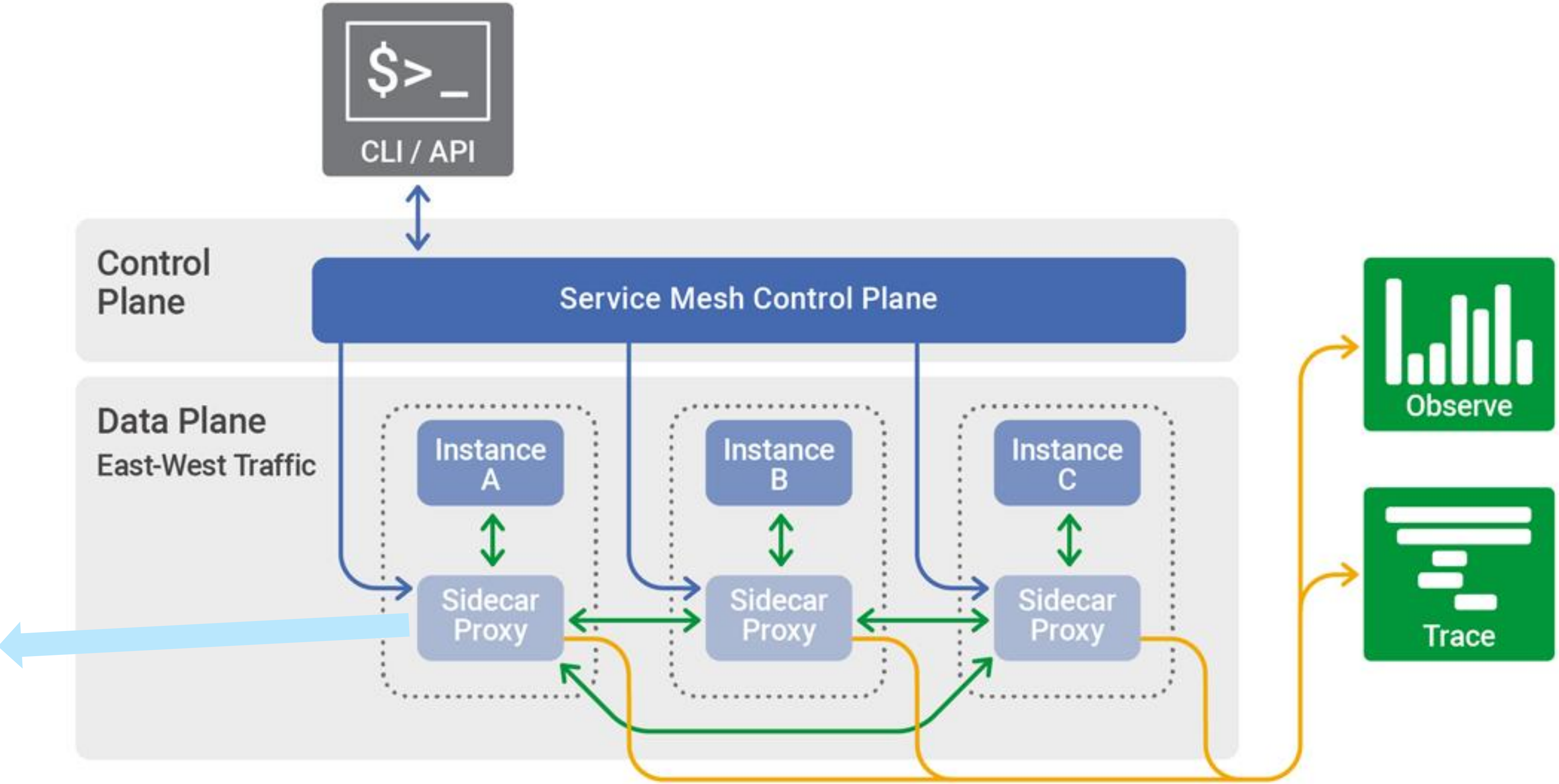


A sidecar proxy sits alongside a microservice and routes requests to other proxies. Together, these sidecars form a mesh network.



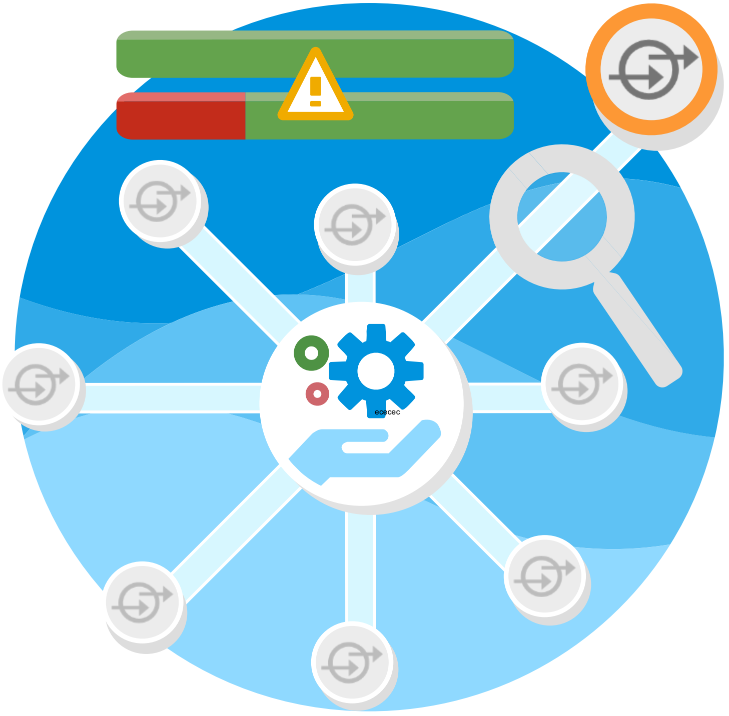
Service Mesh Way

Kiali – How it Work

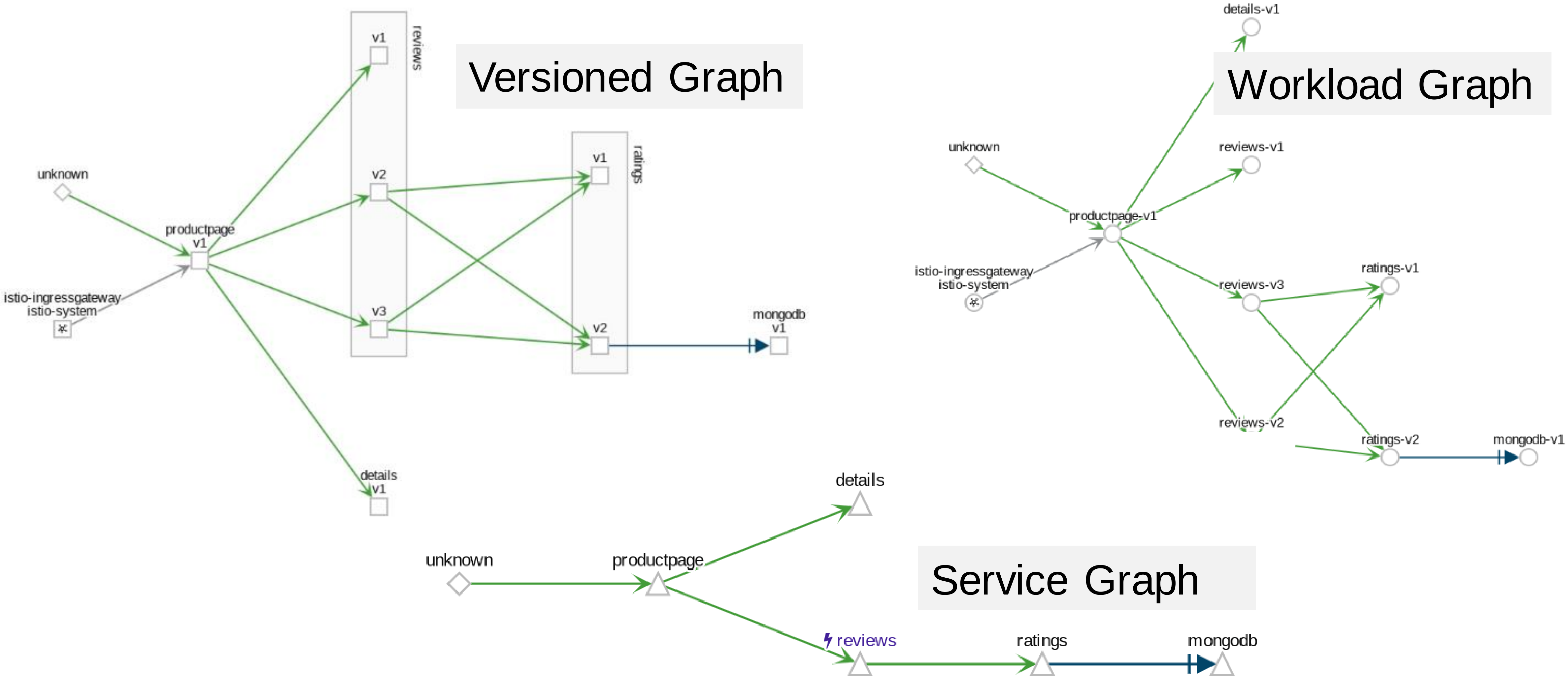


Kiali – Topology View

The graph provides a powerful way to **visualize the topology of your service mesh**. It shows you which services communicate with each other and the traffic rates and latencies between them. It lets you visually identify problem areas ane quickly pinpoint issues.



Kiali – Graph Visualization & Thread Modeling



Versioned Graph

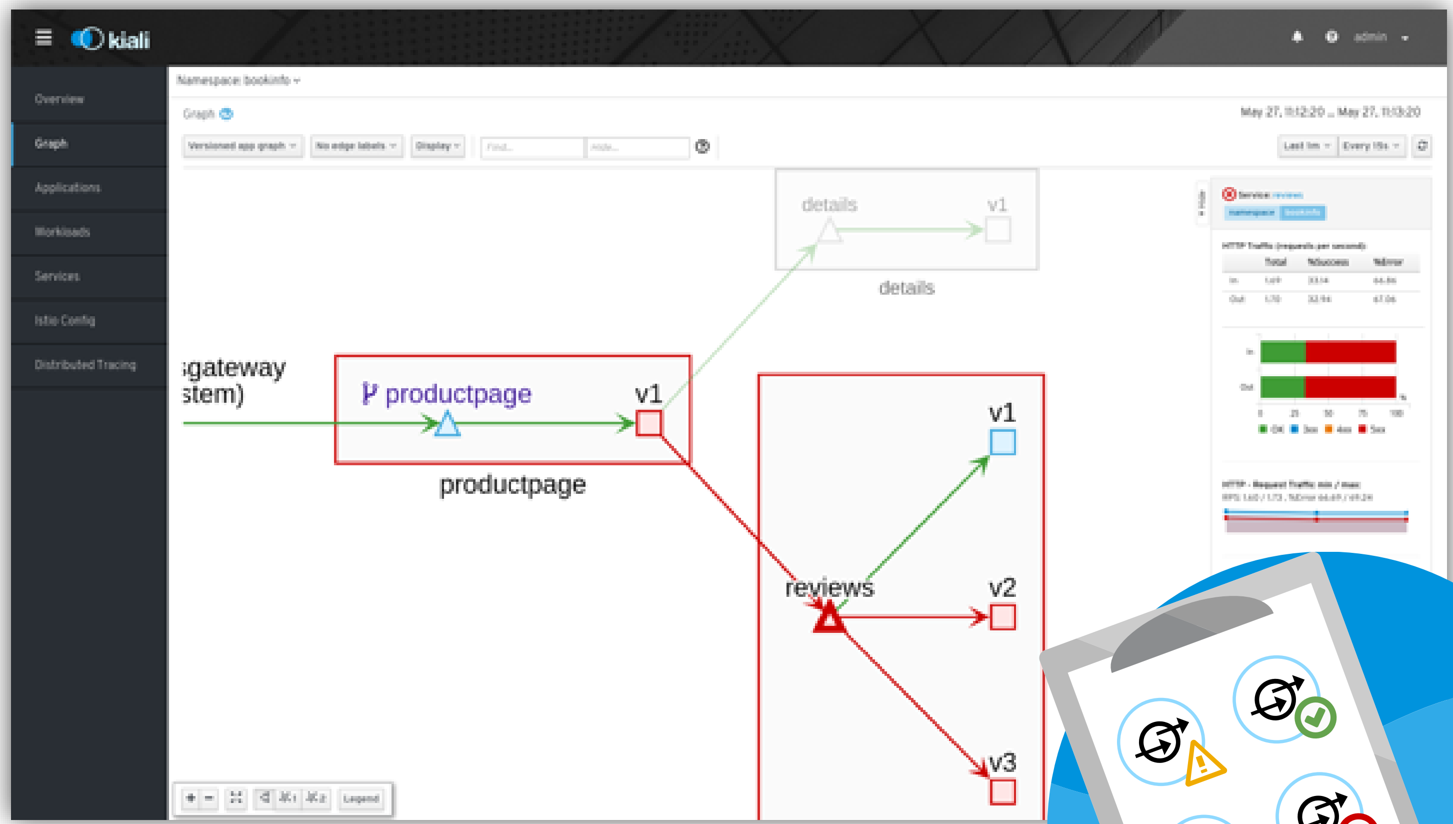
Workload Graph

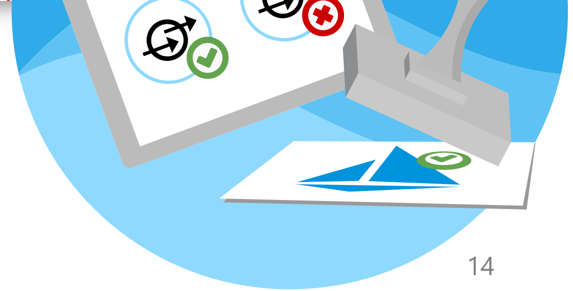
Service Graph

Visibility for Application Logic & Business Flow

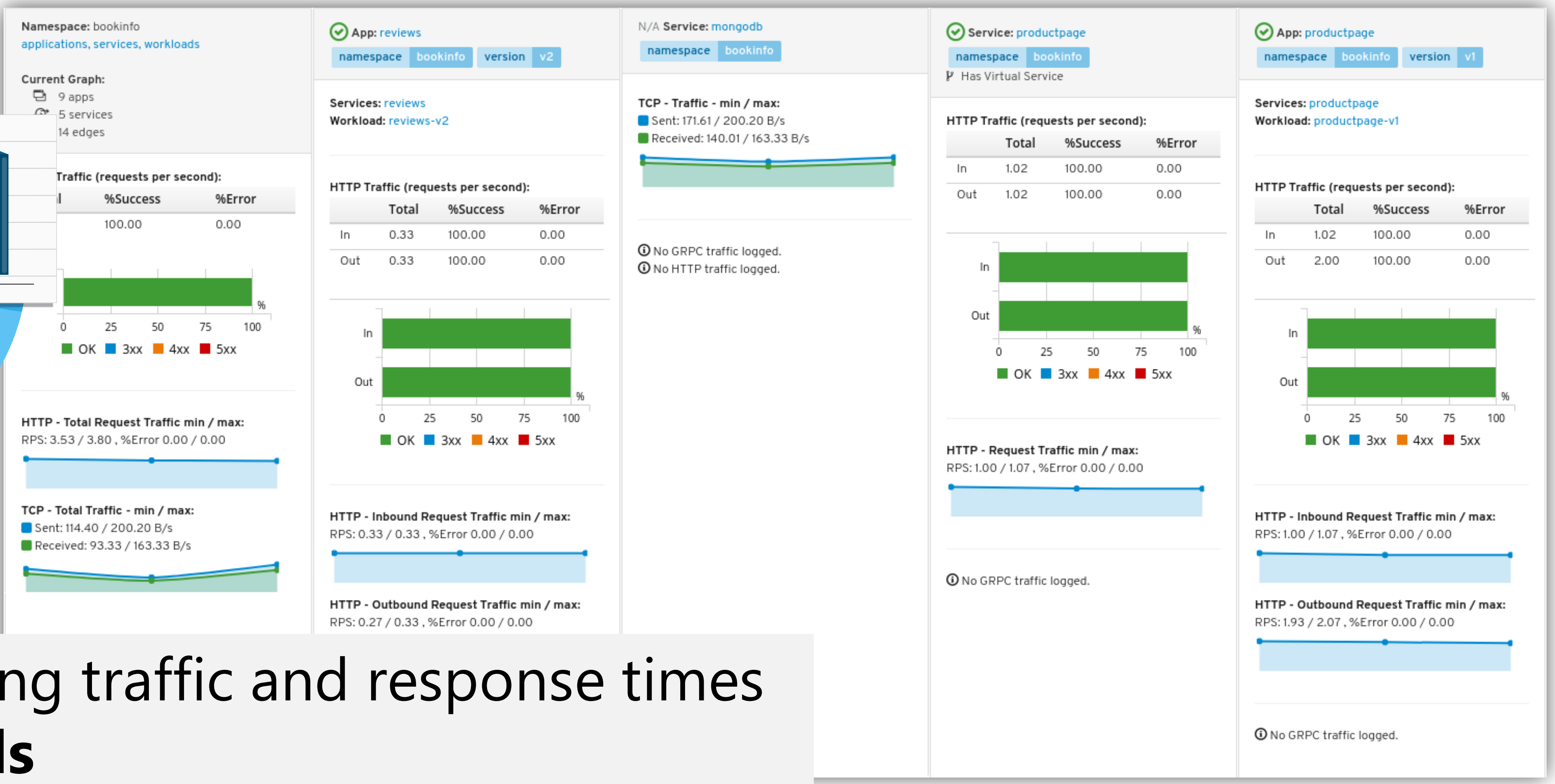
Kiali – Graph Health

Colors in the graph represent the health of your service mesh. A nodes colored as red or orange may need attention. The color of an edge between components represents the health of the requests between those components. The node shape indicates the type of component, services, workloads, apps, etc





Kiali – Graph: Side-Panel



Namespace: bookinfo
applications, services, workloads

Current Graph:
9 apps
5 services
14 edges

Traffic (requests per second):

l	%Success	%Error
	100.00	0.00

HTTP - Total Request Traffic min / max:
RPS: 3.53 / 3.80 , %Error 0.00 / 0.00

TCP - Total Traffic - min / max:
🟦 Sent: 114.40 / 200.20 B/s
🟩 Received: 93.33 / 163.33 B/s

App: reviews
namespace bookinfo version v2

Services: reviews
Workload: reviews-v2

HTTP Traffic (requests per second):

	Total	%Success	%Error
In	0.33	100.00	0.00
Out	0.33	100.00	0.00

HTTP - Inbound Request Traffic min / max:
RPS: 0.33 / 0.33 , %Error 0.00 / 0.00

HTTP - Outbound Request Traffic min / max:
RPS: 0.27 / 0.33 , %Error 0.00 / 0.00

N/A **Service:** mongodb
namespace bookinfo

TCP - Traffic - min / max:
🟦 Sent: 171.61 / 200.20 B/s
🟩 Received: 140.01 / 163.33 B/s

No GRPC traffic logged.
No HTTP traffic logged.

Service: productpage
namespace bookinfo
Has Virtual Service

HTTP Traffic (requests per second):

	Total	%Success	%Error
In	1.02	100.00	0.00
Out	1.02	100.00	0.00

HTTP - Request Traffic min / max:
RPS: 1.00 / 1.07 , %Error 0.00 / 0.00

No GRPC traffic logged.

App: productpage
namespace bookinfo version v1

Services: productpage
Workload: productpage-v1

HTTP Traffic (requests per second):

	Total	%Success	%Error
In	1.02	100.00	0.00
Out	2.00	100.00	0.00

HTTP - Inbound Request Traffic min / max:
RPS: 1.00 / 1.07 , %Error 0.00 / 0.00

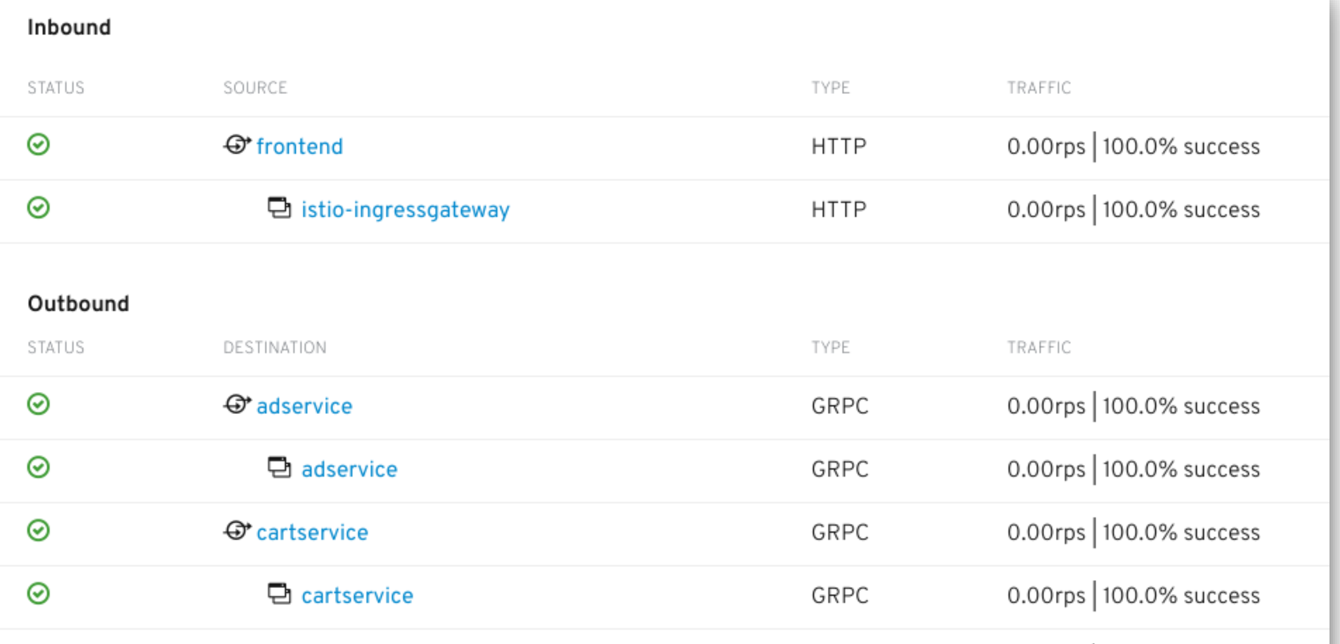
HTTP - Outbound Request Traffic min / max:
RPS: 1.93 / 2.07 , %Error 0.00 / 0.00

No GRPC traffic logged.

- **Charts** showing traffic and response times
- **Health details**
- **Links** to fully-detailed pages
- **Response Code** breakdowns.

Kiali – Application Performance Monitoring

Application and workload detail views show request and response metrics (volume, duration, size, tcp traffic). The traffic can also be viewed for either inbound or outbound traffic. The service detail view shows request and response metrics per inbound traffic.

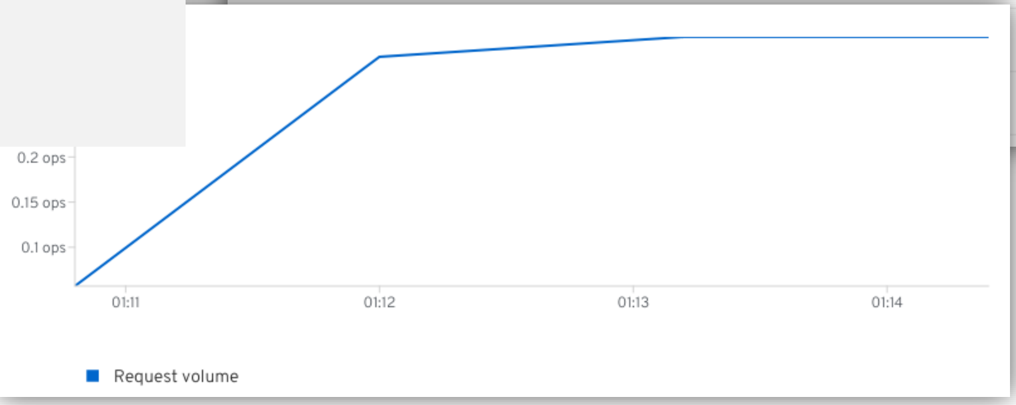


Inbound

STATUS	SOURCE	TYPE	TRAFFIC
✓	frontend	HTTP	0.00rps | 100.0% success
✓	istio-ingressgateway	HTTP	0.00rps | 100.0% success

Outbound

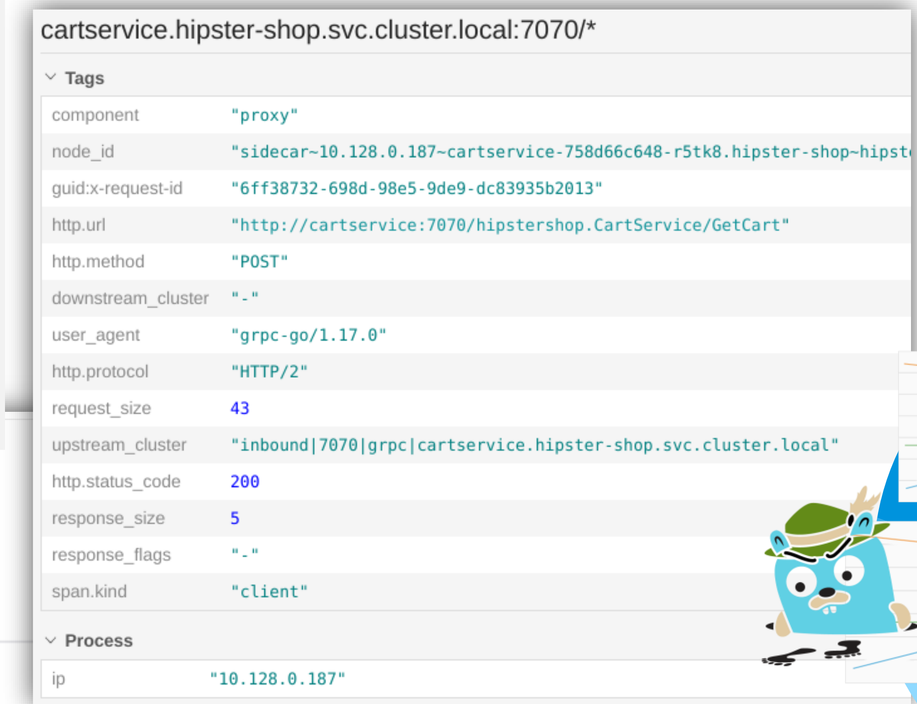
STATUS	DESTINATION	TYPE	TRAFFIC
✓	adservice	GRPC	0.00rps | 100.0% success
✓	adservice	GRPC	0.00rps | 100.0% success
✓	cartservice	GRPC	0.00rps | 100.0% success
✓	cartservice	GRPC	0.00rps | 100.0% success
✓	currencyservice	GRPC	0.04 ccess
✓	currencyservice	GRPC	
		GRPC	
		GRPC	



Kiali – Distribute Tracing

Seamless integration with **Jaeger** - an open source, end-to-end distributed tracing for monitor and troubleshoot transactions in complex distributed systems Like Services Mesh

- Distributed transaction monitoring
- Performance and latency optimization
- Root cause analysis
- Service dependency analysis

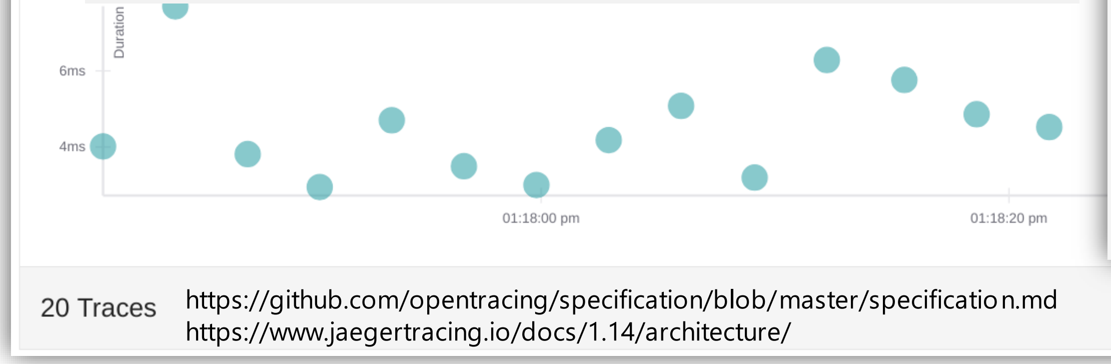

cartservice.hipster-shop.svc.cluster.local:7070/*

Tags

component	"proxy"
node_id	"sidecar~10.128.0.187~cartservice-758d66c648-r5tk8.hipster-shop~hipst
guid:x-request-id	"6ff38732-698d-98e5-9de9-dc83935b2013"
http.url	"http://cartservice:7070/hipstershop.CartService/GetCart"
http.method	"POST"
downstream_cluster	"-"
user_agent	"grpc-go/1.17.0"
http.protocol	"HTTP/2"
request_size	43
upstream_cluster	"inbound|7070|grpc|cartservice.hipster-shop.svc.cluster.local"
http.status_code	200
response_size	5
response_flags	"-"
span.kind	"client"

Process

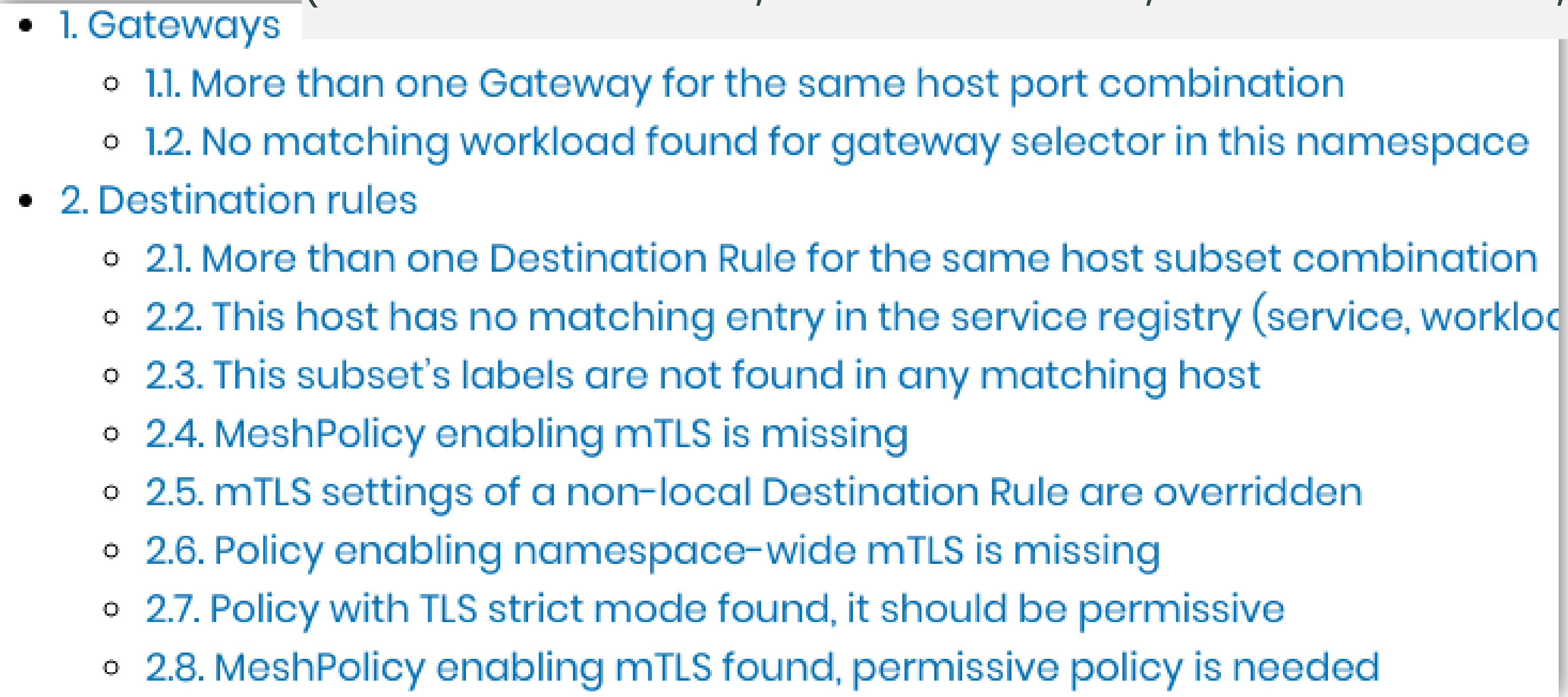
ip	"10.128.0.187"



https://github.com/opentracing/specification/blob/master/specification.md
https://www.jaegertracing.io/docs/1.14/architecture/

Kiali – Detect Missconfiguration

Kiali performs a set of validations to the most common Istio Objects (Destination Rules, Service Entries, Virtual Services, and so on).



- 1. Gateways
  - 1.1. More than one Gateway for the same host port combination
  - 1.2. No matching workload found for gateway selector in this namespace
- 2. Destination rules
  - 2.1. More than one Destination Rule for the same host subset combination
  - 2.2. This host has no matching entry in the service registry (service, workloc
  - 2.3. This subset's labels are not found in any matching host
  - 2.4. MeshPolicy enabling mTLS is missing
  - 2.5. mTLS settings of a non-local Destination Rule are overridden
  - 2.6. Policy enabling namespace-wide mTLS is missing
  - 2.7. Policy with TLS strict mode found, it should be permissive
  - 2.8. MeshPolicy enabling mTLS found, permissive policy is needed

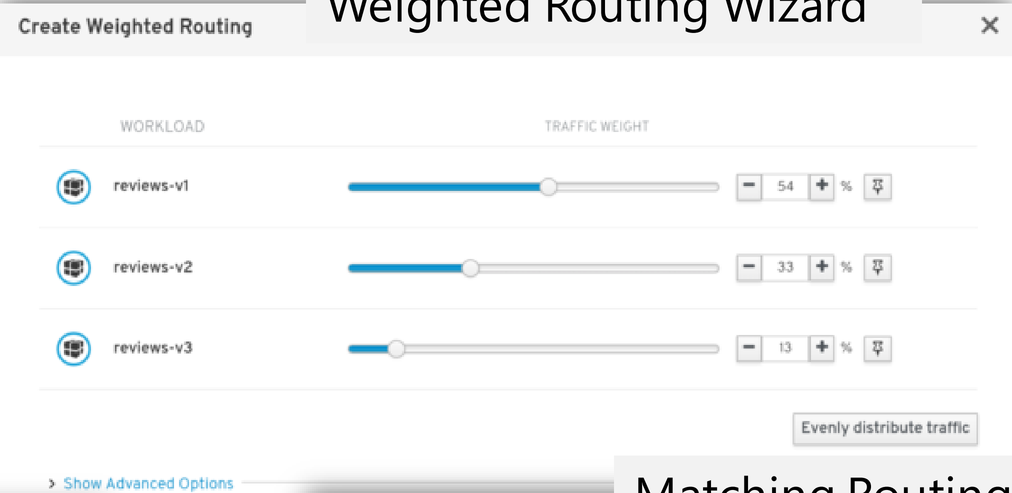
Biznet GioCloud

https://www.kiali.io/documentation/validations/

Kiali – Istio Routing Wizard

Wizard based to Configure Istio HTTP/TCP routing features

Kiali provides different actions to create, update and delete Istio configuration driven by Wizards



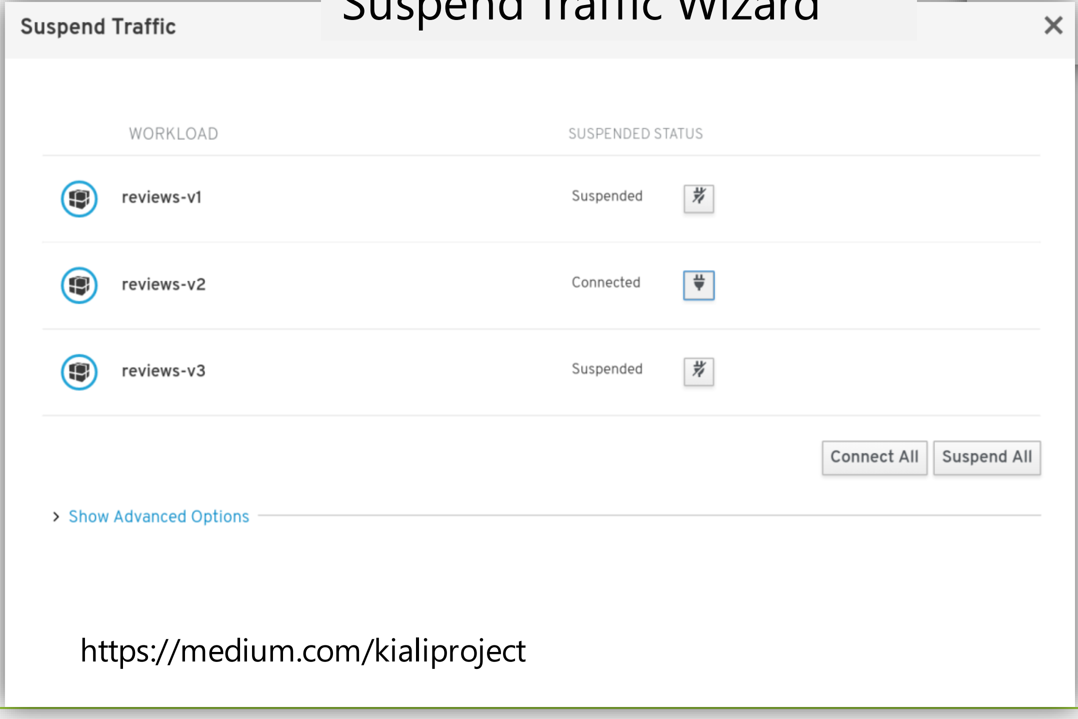
Weighted Routing Wizard

Create Weighted Routing ✕

WORKLOAD	TRAFFIC WEIGHT
reviews-v1	54 %
reviews-v2	33 %
reviews-v3	13 %

Evenly distribute traffic

› Show Advanced Options



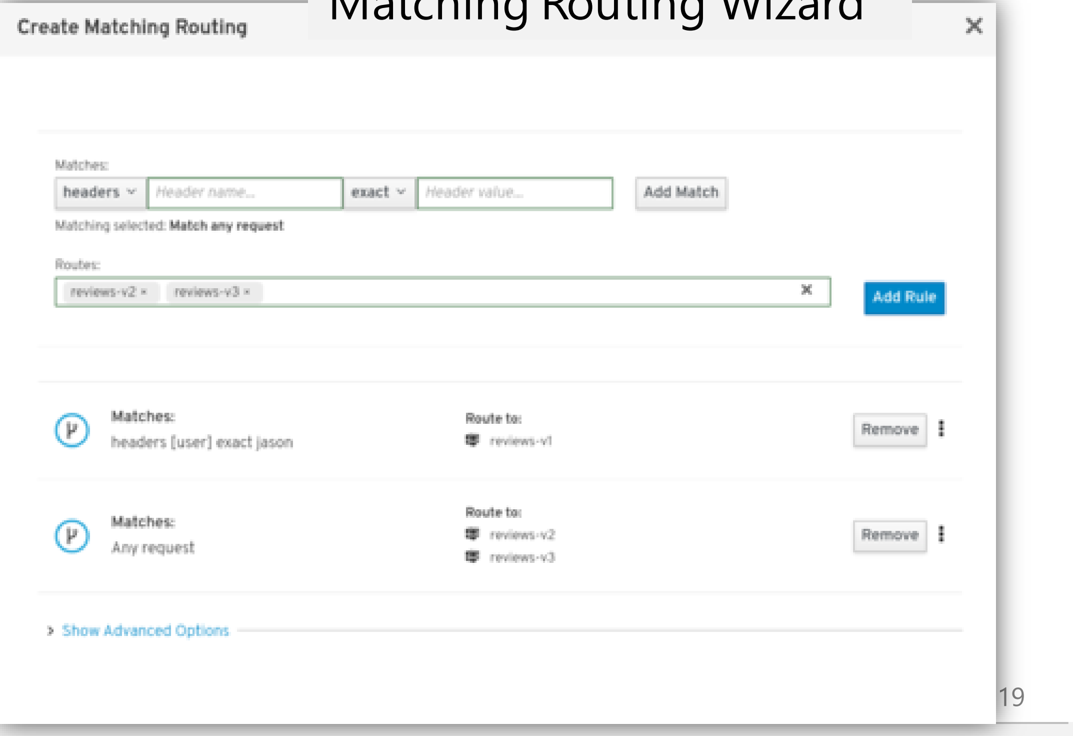
Suspend Traffic Wizard

Suspend Traffic ✕

WORKLOAD	SUSPENDED STATUS
reviews-v1	Suspended
reviews-v2	Connected
reviews-v3	Suspended

Connect All Suspend All

› Show Advanced Options



Matching Routing Wizard

Create Matching Routing ✕

Matches:

headers ⌄ | Header name... | exact ⌄ | Header value... | Add Match

Matching selected: **Match any request**

Routes:

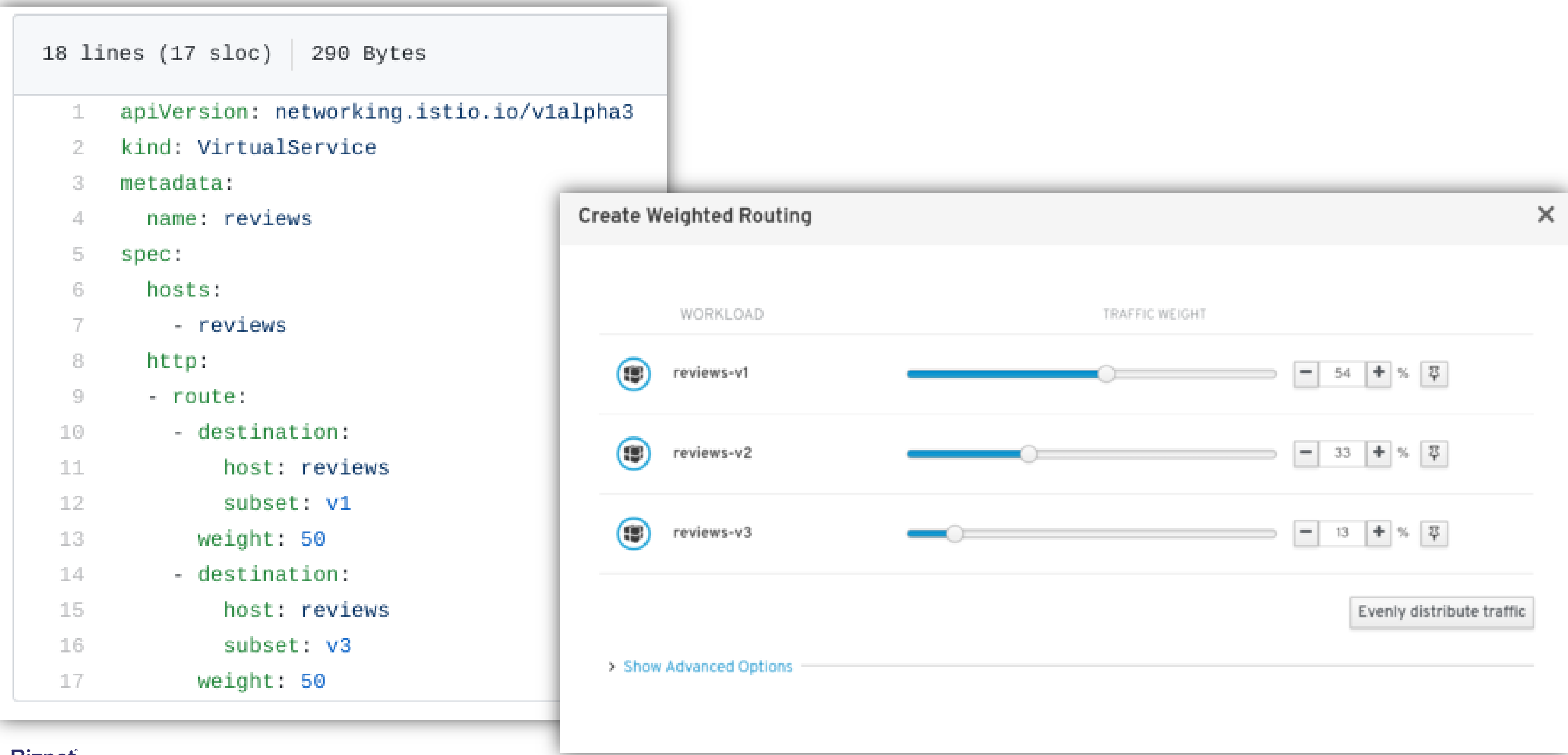
reviews-v2 × reviews-v3 × ✕ | Add Rule

Matches:	Route to:	
headers [user] exact jason	reviews-v1	Remove
Any request	reviews-v2 reviews-v3	Remove

› Show Advanced Options

https://medium.com/kialiproject

Kiali - Weighted Routing Wizard



18 lines (17 sloc) | 290 Bytes

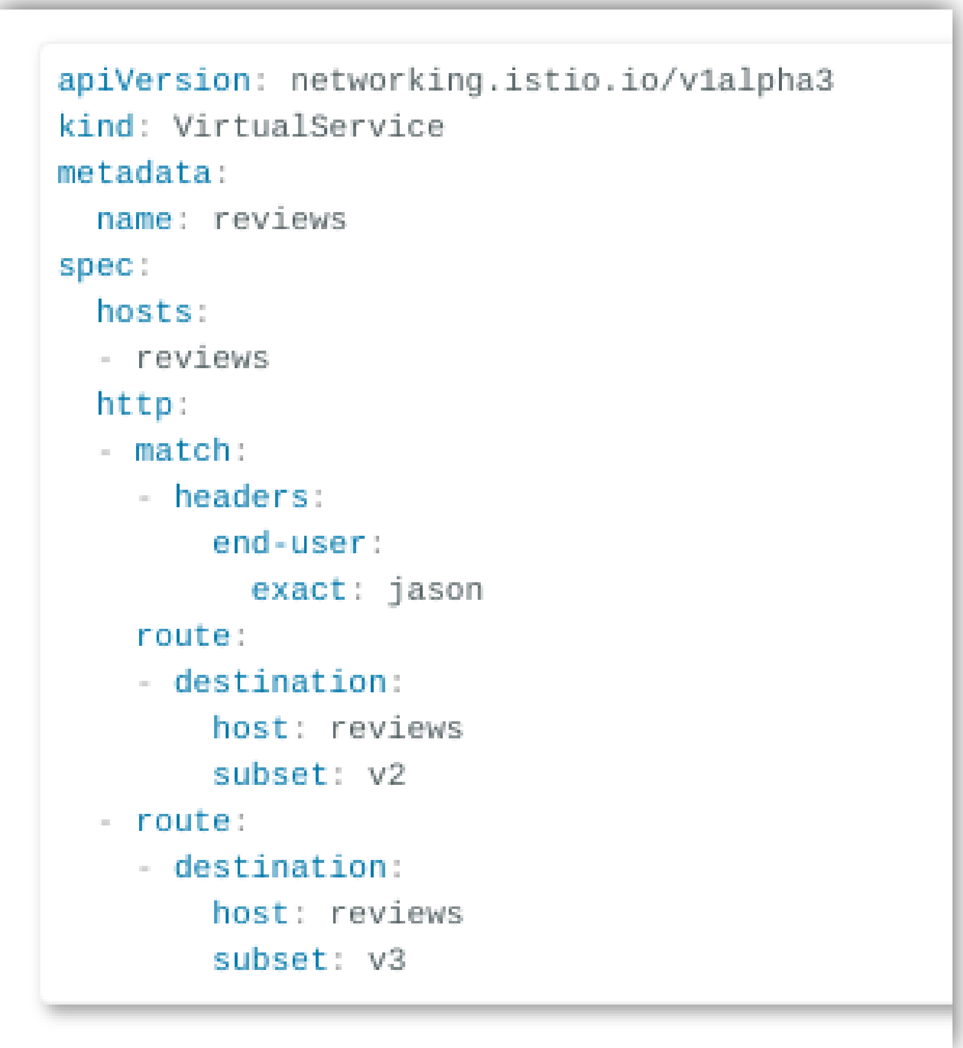
```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
  - route:
    - destination:
        host: reviews
        subset: v1
      weight: 50
    - destination:
        host: reviews
        subset: v3
      weight: 50
```

Create Weighted Routing

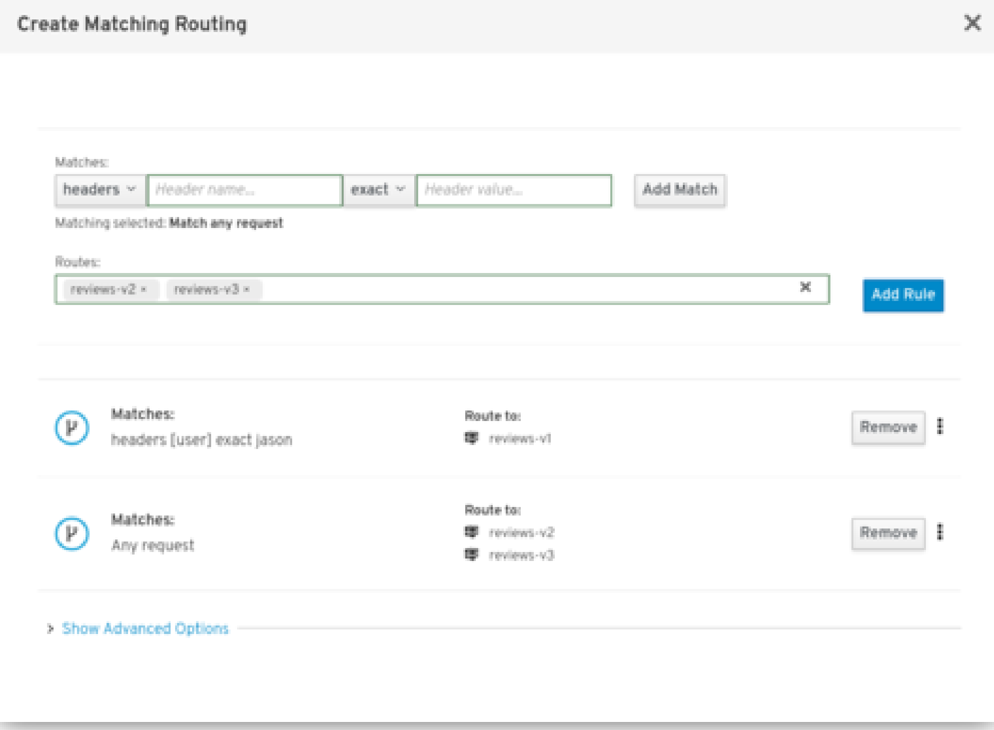
WORKLOAD	TRAFFIC WEIGHT
reviews-v1	54 %
reviews-v2	33 %
reviews-v3	13 %

Biznet GioCloud https://github.com/isnuryusuf/kubernetes-istio-cicd/blob/master/install.sh

Kiali - Matching Routing Wizard



```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
  - reviews
  http:
  - match:
    - headers:
        end-user:
          exact: jason
    route:
    - destination:
        host: reviews
        subset: v2
  - route:
    - destination:
        host: reviews
        subset: v3
```



Create Matching Routing

Matches: headers exact Header name... Header value...

Matching selected: **Match any request**

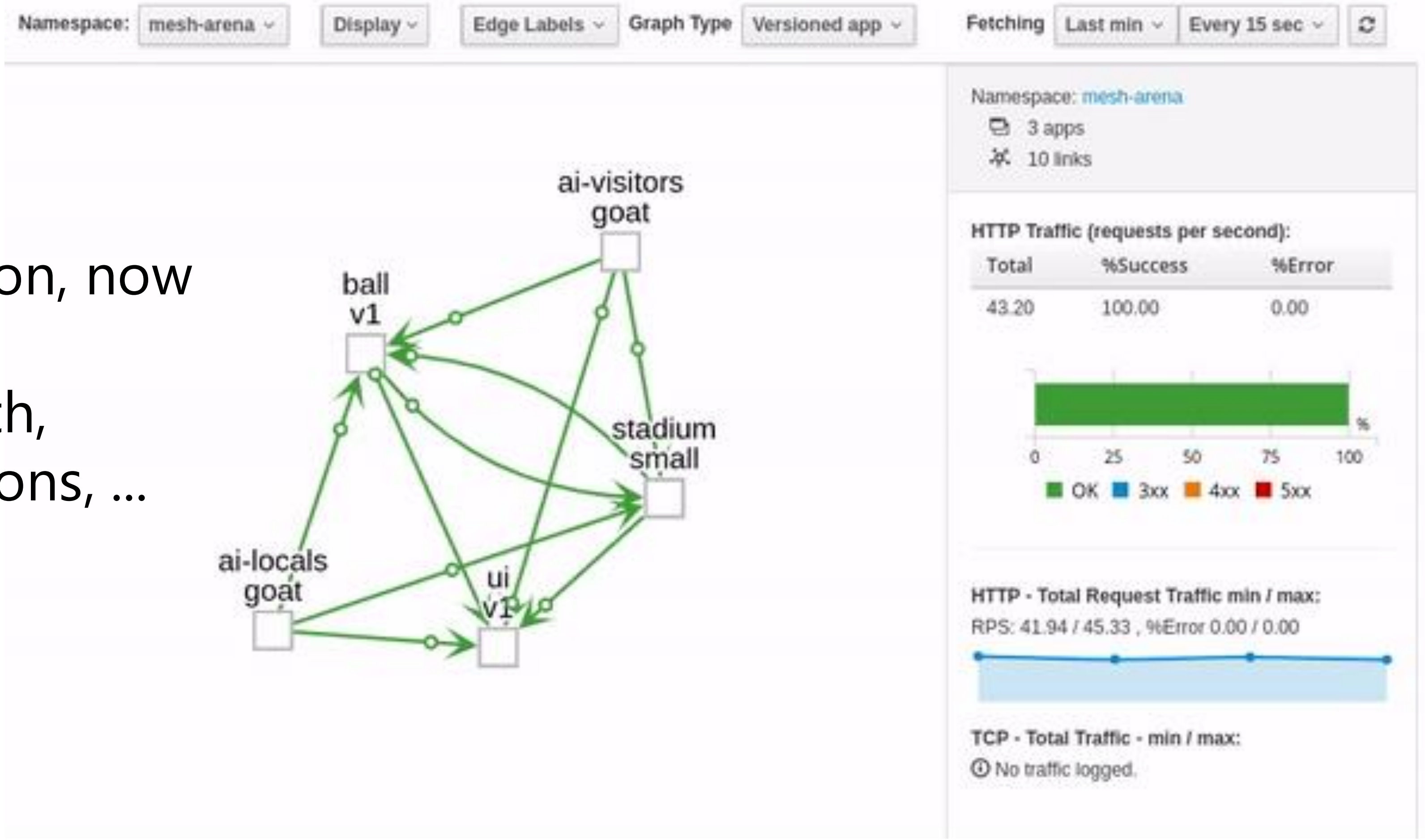
Routes: reviews-v2 × reviews-v3 ×

Matches: headers [user] exact jason — **Route to:** reviews-v1

Matches: Any request — **Route to:** reviews-v2, reviews-v3

Kiali – Traffic Animation

Mesh Service Visualization, now integrated with Istio.
=> Graph, metrics, health, validation of configurations, …



Namespace: mesh-arena | Display | Edge Labels | Graph Type: Versioned app | Fetching: Last min | Every 15 sec

Namespace: mesh-arena
3 apps
10 links

HTTP Traffic (requests per second):

Total	%Success	%Error
43.20	100.00	0.00

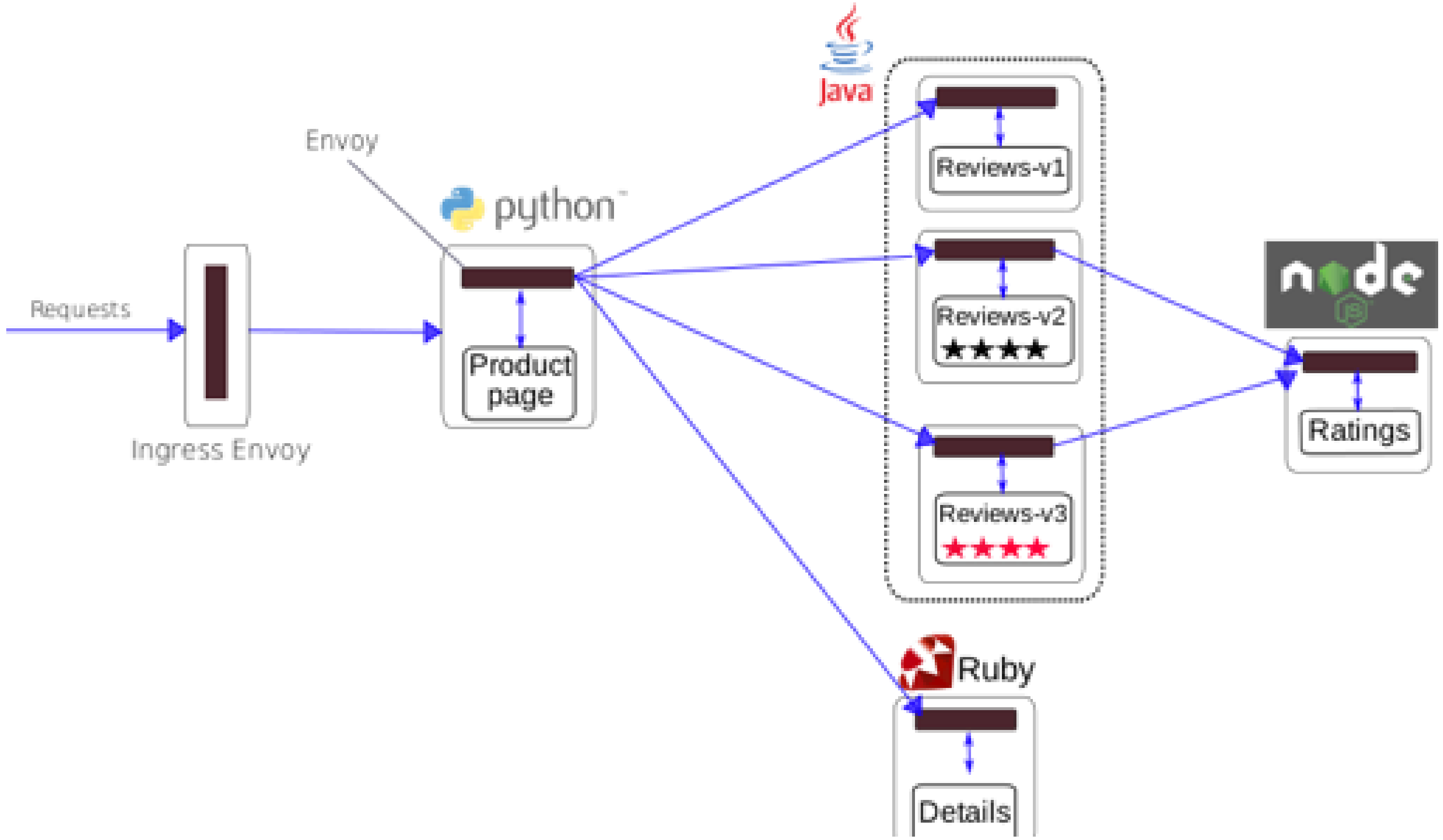
HTTP - Total Request Traffic min / max:
RPS: 41.94 / 45.33 , %Error 0.00 / 0.00

TCP - Total Traffic - min / max:
No traffic logged.

Biznet GioCloud

Lets play some Games and Demo

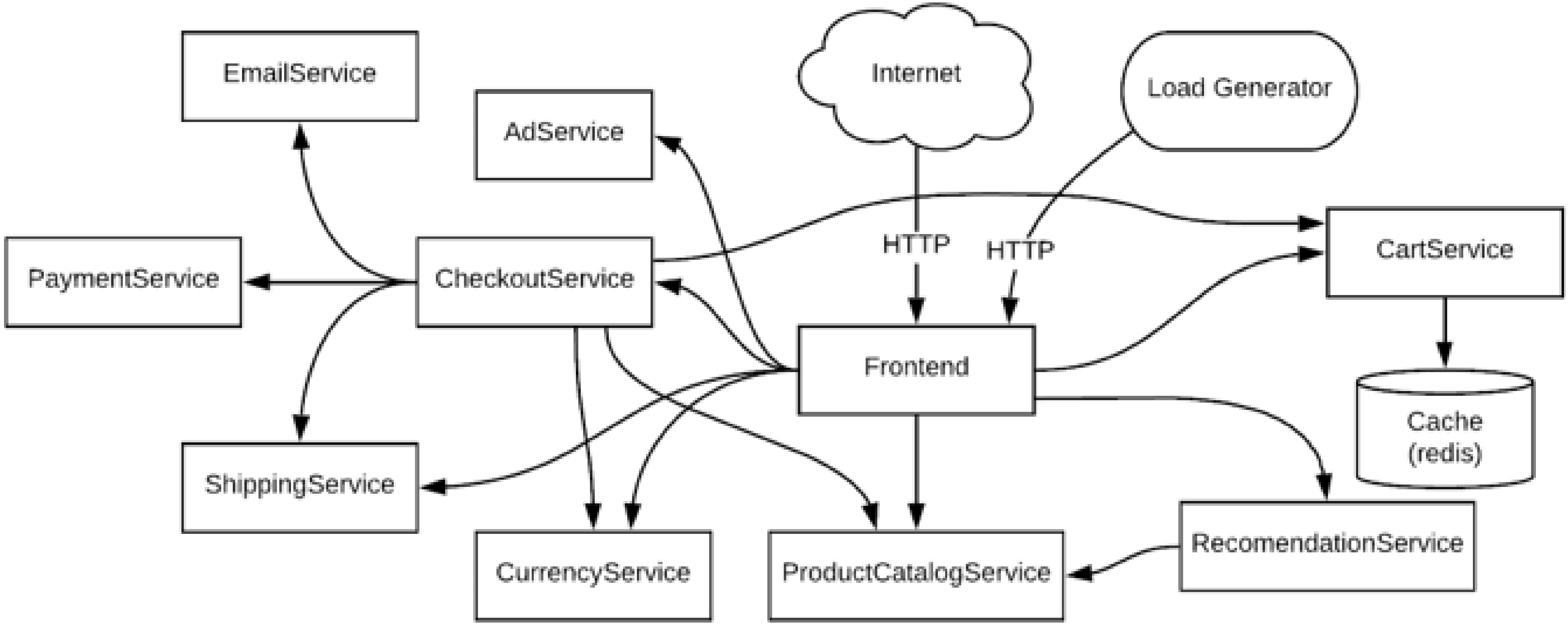
Bookinfo sample App Demo Services Mesh



- **Productpage** - Microservice calls the details and reviews microservices to populate the page.
- **Details** - Microservice contains book information.
- **Reviews** - Microservice contains book reviews. It also calls the ratings microservice.
- **Ratings** -
  ratings microservice contains book ranking information that accompanies a book review.

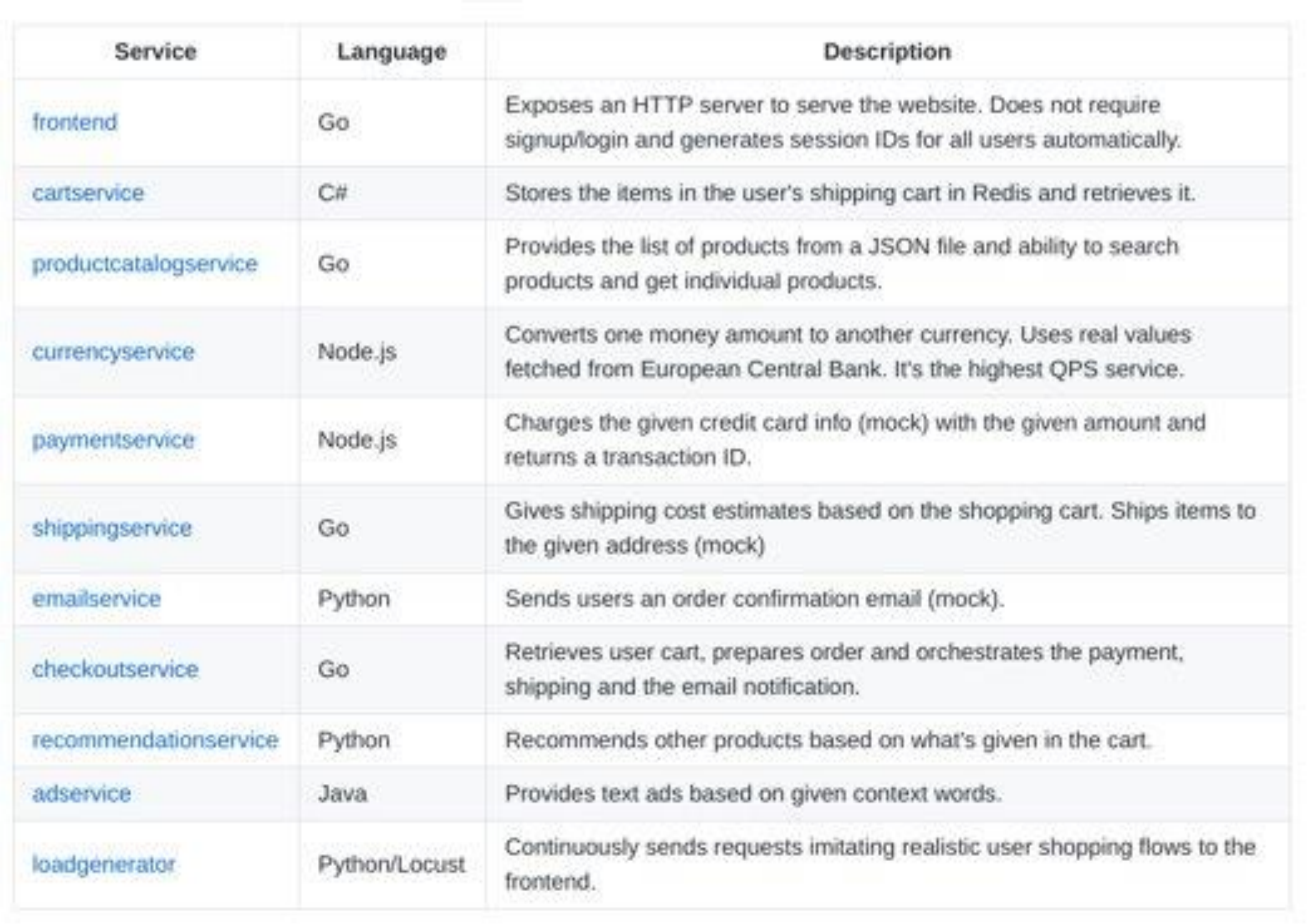
Biznet GioCloud

Example Cloud-native Microservices Demo Application



Example Cloud-native Microservices Demo Application

This project contains a 10-tier microservices application. The application is a web-based e-commerce app called “**Hipster Shop**” where users can browse items, add them to the cart, and purchase them



Service	Language	Description
frontend	Go	Exposes an HTTP server to serve the website. Does not require signup/login and generates session IDs for all users automatically.
cartservice	C#	Stores the items in the user's shipping cart in Redis and retrieves it.
productcatalogservice	Go	Provides the list of products from a JSON file and ability to search products and get individual products.
currencyservice	Node.js	Converts one money amount to another currency. Uses real values fetched from European Central Bank. It's the highest QPS service.
paymentservice	Node.js	Charges the given credit card info (mock) with the given amount and returns a transaction ID.
shippingservice	Go	Gives shipping cost estimates based on the shopping cart. Ships items to the given address (mock)
emailservice	Python	Sends users an order confirmation email (mock).
checkoutservice	Go	Retrieves user cart, prepares order and orchestrates the payment, shipping and the email notification.
recommendationservice	Python	Recommends other products based on what's given in the cart.
adservice	Java	Provides text ads based on given context words.
loadgenerator	Python/Locust	Continuously sends requests imitating realistic user shopping flows to the frontend.

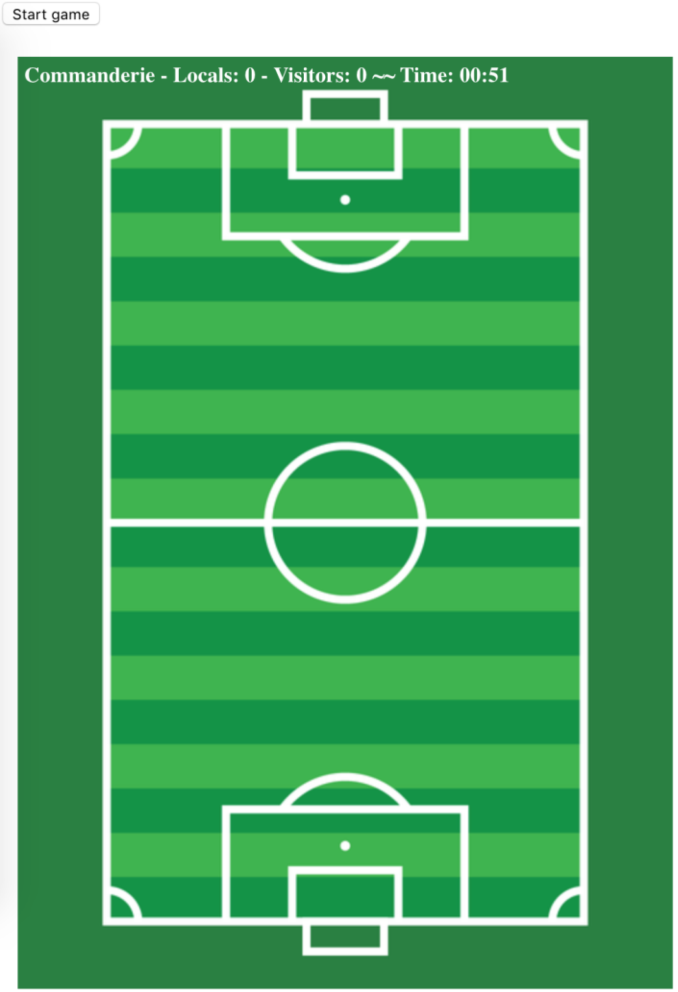
Soccess Games Microservices

Several microservices

- The stadium in different sizes
- Each player
- Each balloon

Some features of Istio will be discussed:

- Intelligent routing
- The shadowing
- Circuit breaking (outlier detection)

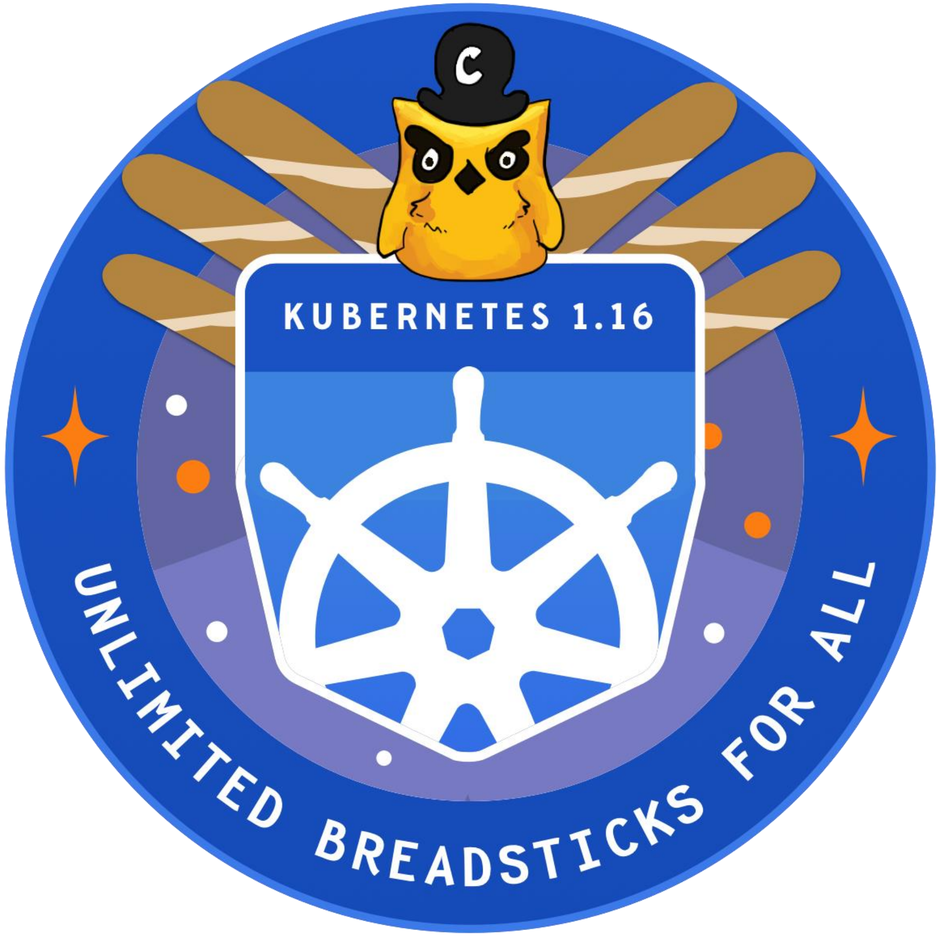


Commanderie - Locals: 0 - Visitors: 0 ~~ Time: 00:51

Kubernetes 1.16: Custom Resources, Overhauled Metrics, and Volume Extensions

Additional Enhancements

- Custom Resources Reach General Availability
- Opening Doors With Windows Enhancements
- Introducing Endpoint Slices



https://kubernetes.io/blog/2019/09/18/kubernetes-1-16-release-announcement/

Get Free Merchandize for 1st, 2nd, 3rd high scores on This Games

Go To: **https://kahoot.it** Now!! And Enter Game Pin

Mbak Admin Cantik
Online

Pagi Mas, ko aku gabisa kirim email ya?

08:09 AM

Naks Markets
Online

Cuy, besok ada flash sale nih. System jangan sampe down yak!

08:10 AM

Question & Answer

Getting Started with Kiali

- Prepare your Kubernetes/Openshift

- Prepare your Kiali

https://www.kiali.io/documentation/getting-started/

- Other Interesting Blog Post

https://medium.com/kialiproject

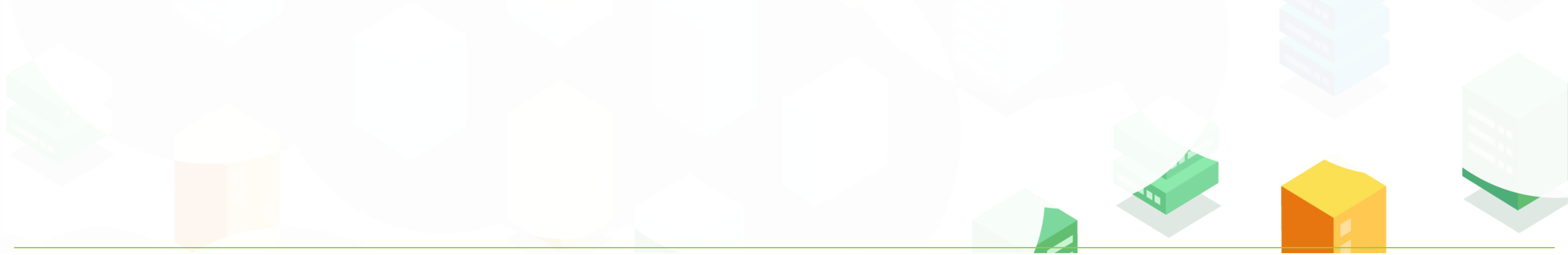
- To Busy Installing from Zero?

https://katacoda.com/kiali/scenarios/bookinfo

Are you Awesome!!?? we're hiring!!

Are you in love with monitoring and automation? We're building something here!

- **Systems Reliability Engineer**
  http://bit.ly/bgn-msre
- **Junior Systems Operations Engineer**
  bit.ly/bgn-jsoe
- **NetDev Engineer –** ask me :)



Biznet GioCloud

Key-Service
For Your Business

www.biznetgiocloud.com

PT. Biznet Gio Nusantara MidPlaza 1, 7th Floor Jl. Jend Sudirman Kav. 10-11 Jakarta 10220 – Indonesia