Intro

Isaiah Snell-Feikema
Staff Software Engineer @
IBM
@isaiahsf

Douglas Reid
Senior Software Engineer @
Google
@jdouglasreid

Istio

Open platform to connect, **monitor**, **manage**, and secure microservices

Provides a network for **services**:
- Security
- Policy Enforcement
- Resiliency
- **Traffic Control**
- **Observability**

Requires **zero*** code changes

Adopt functionality as needed

Key Features:
- Service authn and identity
- Authorization
- Rate limiting
- Load balancing / shedding
- Retries and circuit breaking
- Fine-grained routing
- **Metrics and logs generation**
- **Request tracing**
- **Fault Injection**

What is Istio?

A modular set of services/components:

- **Sidecar Proxies (Envoy)**: Handles ingress/egress traffic between services in the cluster and from a service to external services transparently
- **Pilot**: Configures the proxies at runtime
- **Mixer**: Enforces ACLs, rate limits, quotas, authentication, request tracing, and telemetry collection
- **Citadel (CA)**: Issues and rotates certs for service identities
- **Initializer**: Injects sidecar proxies
- **Ingress**: Manages external access to the services
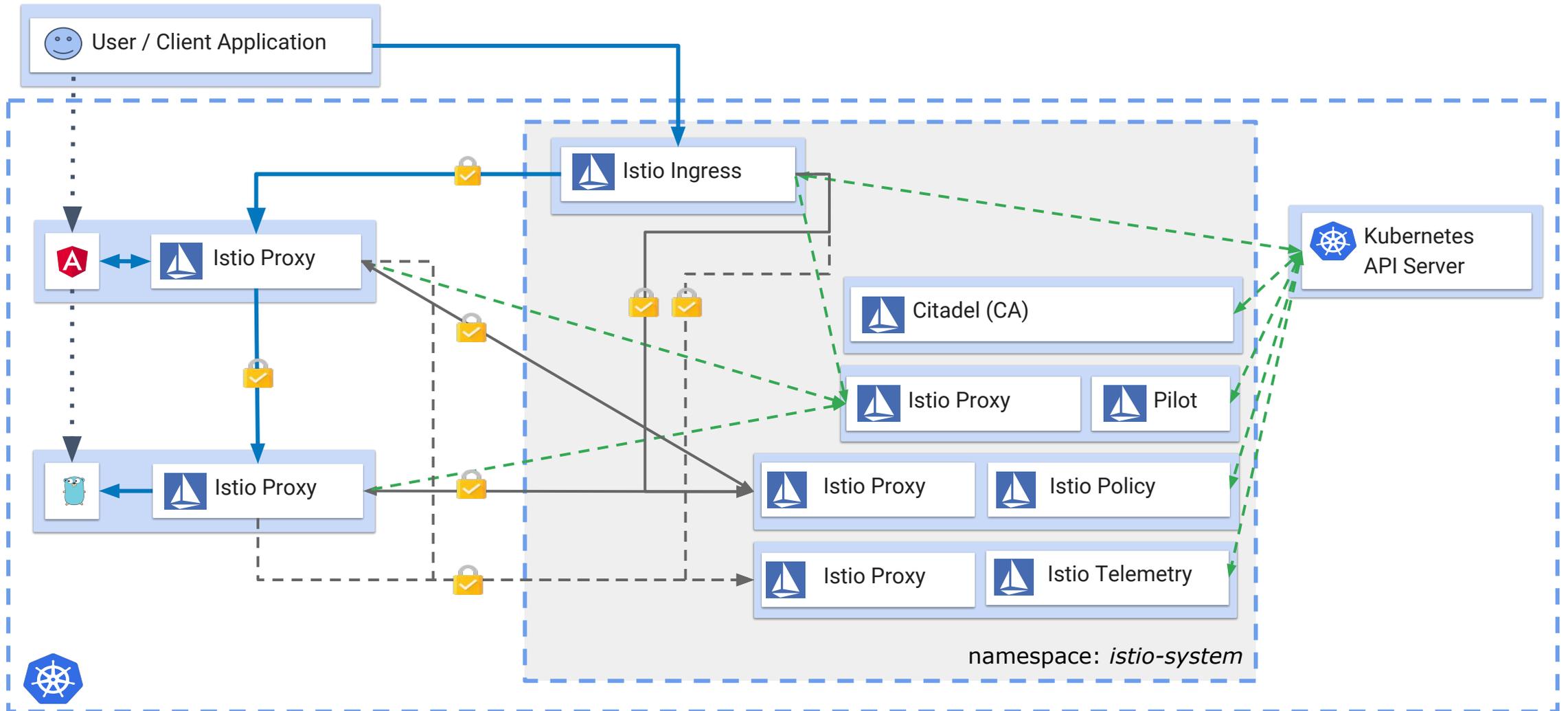
Istio, Visually

Proxy tools

Command	Description
/	Admin home page
/certs	print certs on machine
/clusters	upstream cluster status
/config_dump	dump current Envoy configs
/cpuprofiler	enable/disable the CPU profiler
/healthcheck/fail	cause the server to fail health checks
/healthcheck/ok	cause the server to pass health checks
/help	print out list of admin commands
/hot_restart_version	print the hot restart compatability version
/listeners	print listener addresses
/logging	query/change logging levels
/quitquitquit	exit the server
/reset_counters	reset all counters to zero
/runtime	print runtime values
/runtime_modify	modify runtime values
/server_info	print server version/status information
/stats	print server stats
/stats/prometheus	print server stats in prometheus format

- Envoy admin interfaces ([docs](#))
- Access logs

```
$ kubectl -n istio-system logs istio-ingress-b885b689b-n622h

[2018-05-03T17:19:36.030Z] "GET /typo3/phpmyadmin/index.php HTTP/1.1" 404 NR 0 0...
[2018-05-03T17:19:36.188Z] "GET /phpma/index.php HTTP/1.1" 404 NR 0 0 0 - "10.138...
[2018-05-03T17:19:37.297Z] "GET /phpmyadmin/phpmyadmin/index.php HTTP/1.1" 404 NR...
[2018-05-03T17:19:39.557Z] "GET /phpMyAdmin/phpMyAdmin/index.php HTTP/1.1" 404 NR...
[2018-05-03T17:44:26.394Z] "GET / HTTP/1.1" 404 NR 0 0 1 - "10.28.0.1" "Mozilla...
...
```
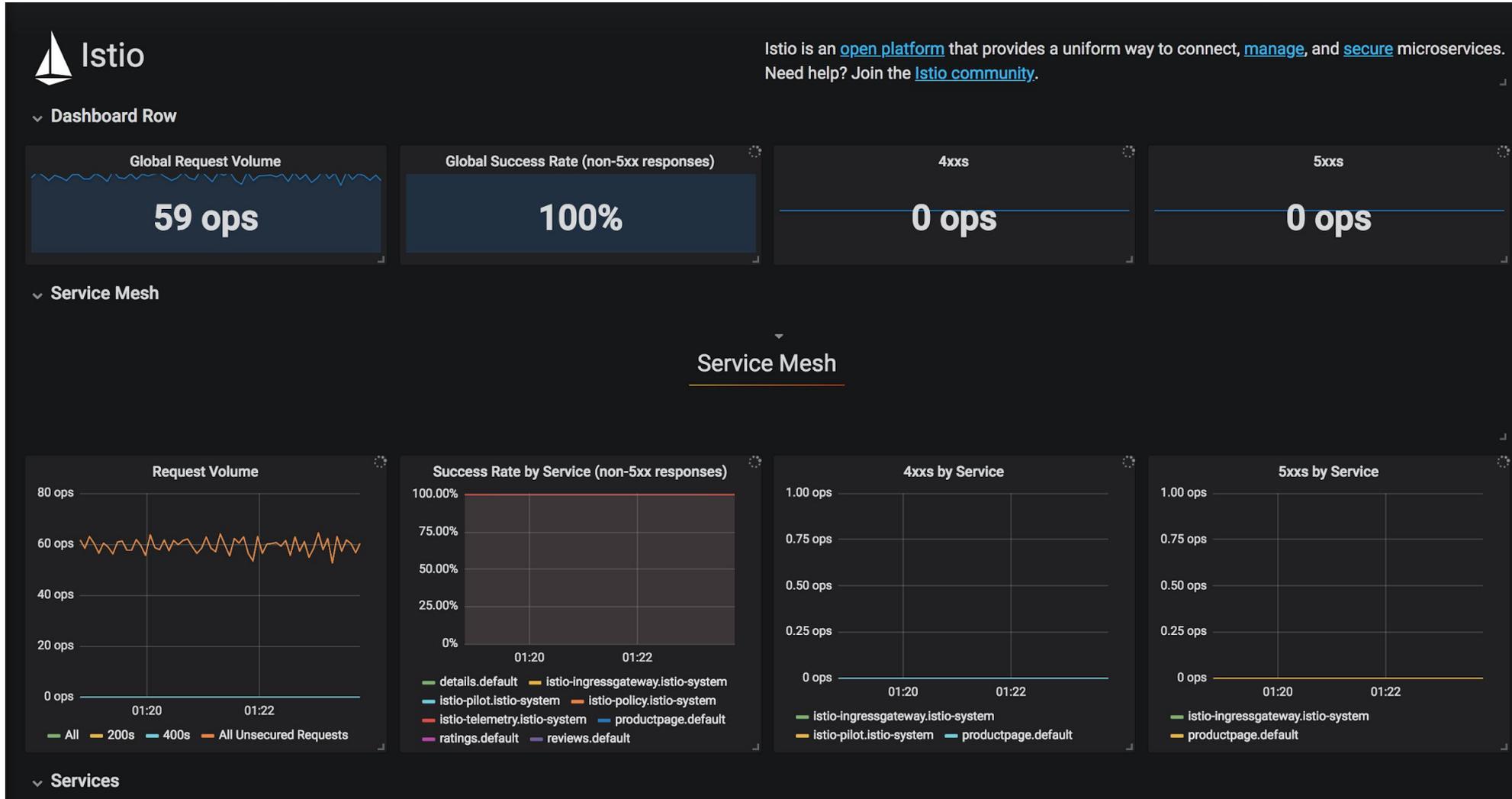
Dashboards

Mesh

Services

Mixer, Pilot

Metrics

Query Mixer-generated, Envoy-generated, and Istio Component metrics

Distributed Traces

Services			15.601ms	31.202ms	46.802ms	62.403ms	78.004ms
productpage		78.004ms : default-route	.	.	.	.	.
istio-policy		3.875ms : check	.	.	.	.	.
istio-policy		3.376ms : check	.	.	.	.	.
details			10.005ms : default-route	.	.	.	.
istio-policy			4.101ms : check	.	.	.	.
reviews				45.372ms : default-route	.	.	.
istio-policy				3.611ms : check	.	.	.
ratings				.	.	10.205ms : default-route	.
istio-policy				.	.	3.833ms : check	.

Insight into service dependencies and performance / latency

Logs

kubectl

- View pod logs for processes
  - `kubectl logs ...`
- View configuration
  - `kubectl get routerules.config.istio.io --all-namespaces`
  - `kubectl get metrics.config.istio.io --all-namespaces`
- Turn up logging for a deployment
  - `kubectl -n istio-system edit deployment istio-policy`

Demystifying Istio

- A lot of Istio's features can seem like magic
- And magic is AWESOME —as long as everything works perfectly
- If you are having a problem, magic isn't good enough

The Rainbow Analogy

- Is a rainbow any less beautiful because you know how it works?

Image credit: Eric Rolph at English Wikipedia
https://commons.wikimedia.org/wiki/File:Double-alaskan-rainbow.jpg

Envoy - Istio's workhorse
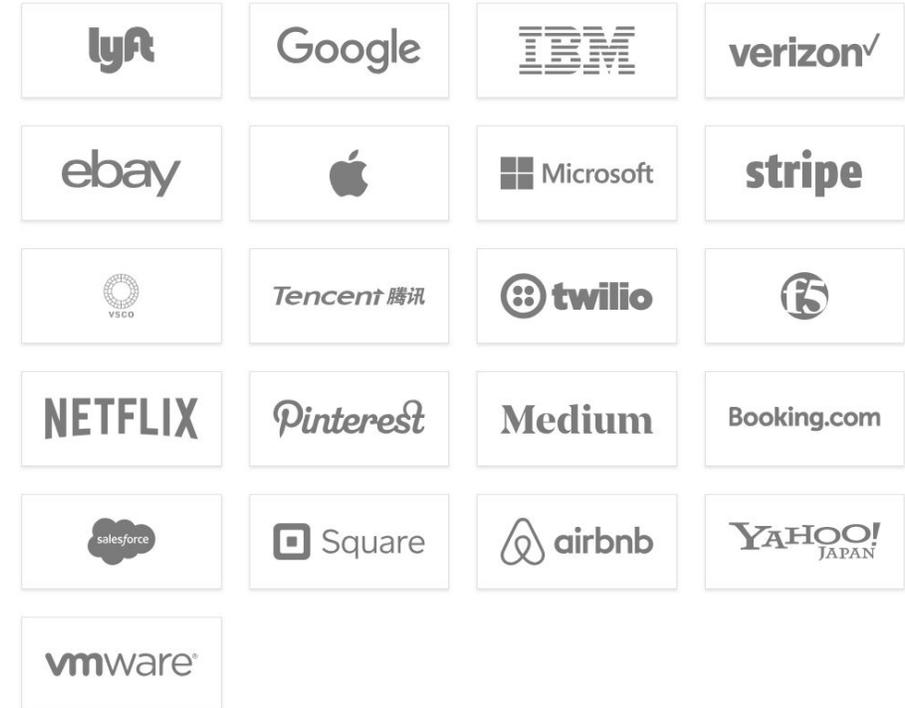
- Battle-tested
- Lightweight
- Performant
- Dynamically configurable

- Used by

What is a service mesh anyway?

- Proxies talking to proxies
- Envoys talking to Envoys
- Config driven from a control plane

Life of a request

```yaml
apiVersion: config.istio.io/v1alpha2
kind: RouteRule
metadata:
 name: test-latency
spec:
 destination:
  name: messages
 precedence: 2
 match:
  source:
   name: inboxui
  request:
   headers:
    test-header:
     exact: "test-value"
 httpFault:
  delay:
   percent: 100
   fixedDelay: 5s
```

Kubeapi

Pilot

HTTP 1.1 GET /messages/42

envoy

Inbox UI

HTTP 1.1
RESPONSE
Content-type:
application/json
{"message": ...}

envoy

Messages
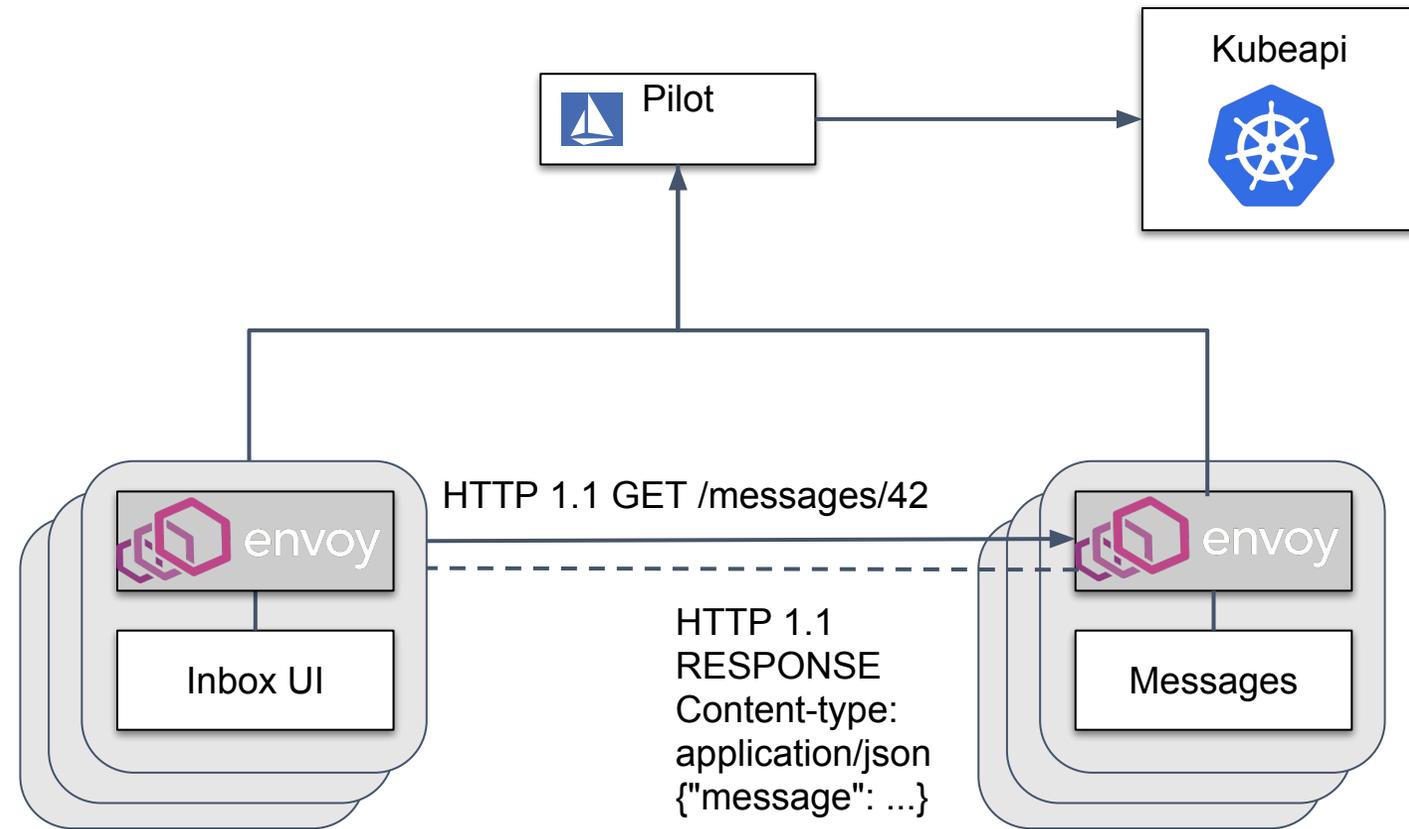
Let's do it live!

- The previous example was fun, but it didn't depend on conference WiFi

The plan
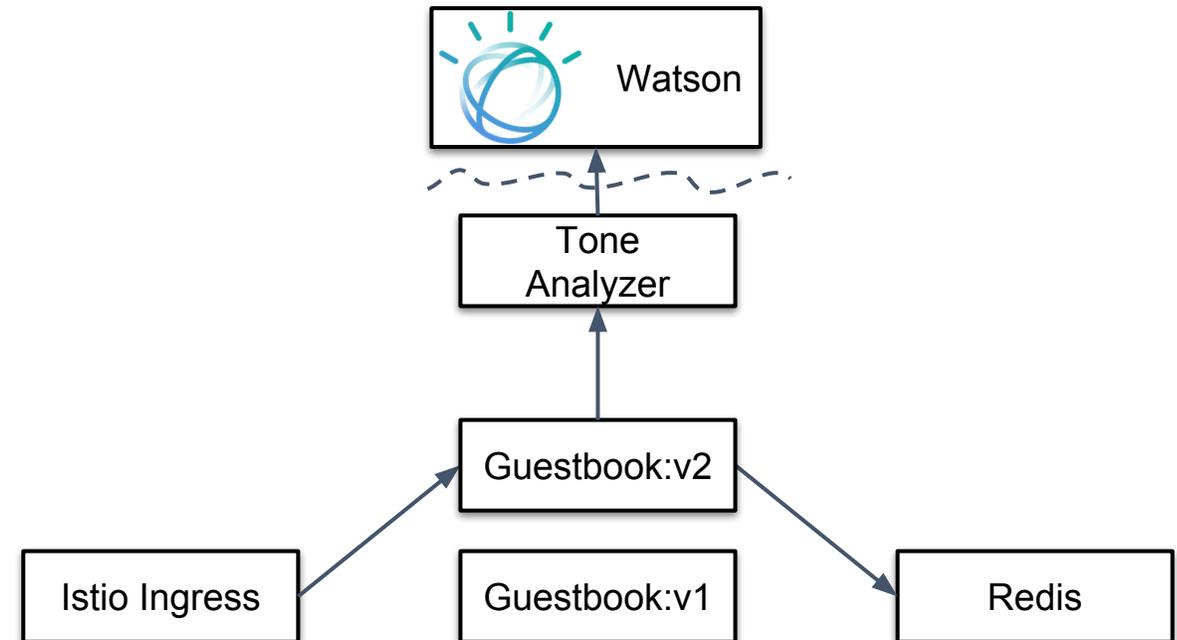
Before:

```
Istio
Ingress  ──→  Guestbook  ──→  Redis
```

After:

```
                         Watson
                           ↑
                       Tone
                       Analyzer
                           ↑
                       Guestbook:v2
Istio Ingress ──→      Guestbook:v1      ──→  Redis
```

Recap

- Your service mesh: Envoys talking to Envoys
- Sometimes it is about seeing things from your service's perspective
- Magic is awesome when things work, but a little knowledge can go a long way

The Future: 0.8

- Changes coming:
  - No more simple REST APIs
  - Push instead of pull
- What does it mean?
  - The Bad News
  - The Good News

GRPC

envoy

Final Thoughts

- ## Better visibility is coming

  - ### Command-line debugging tools - `istioctl` (v0.8)

    - `proxy-config <service>` (dump entire Envoy config for a service)

    - `metrics <services>` (retrieve metrics for services)

  - ### New debug-oriented UIs

    - `/ctrlz` pages

  - ### Enhanced signals collection and export

    - Client-side telemetry

    - More infrastructure adapters

Preview: coming soon...

Istio ControlZ [/Users/dougreid/work/go/out/darwin_amd64/release/mixs - 10.242.102.160]

ControlZ

- Logging Scopes
- Memory Usage
- Environment Variables
- Process Info
- Command-Line Arguments
- Version Info
- Metrics

Istio ControlZ

Make a selection in the left sidebar to inspect & control aspects of this process.

Process Name	mixs
Heap Size	7,314,488 bytes
Num Garbage Collections	11
Current Time	5/3/2018, 1:35:17 PM
Hostname	
IP Address	

Terminate Process

Last refreshed: 5/3/2018, 1:35:17 PM

```
$ istioctl experimental metrics productpage details reviews ratings istio-pilot

    SERVICE      TOTAL RPS      ERROR RPS    P50 LATENCY    P90 LATENCY    P99 LATENCY
 productpage      19.655          0.018          23ms           75ms           97ms
     details      19.945          0.000           3ms           37ms           48ms
     reviews      19.836          0.000           3ms            7ms           15ms
     ratings       4.036          0.000           2ms            4ms            8ms
 istio-pilot      55.891          0.000           2ms            4ms            4ms
```

Thanks!

Contact us:
istio-user@googlegroups.com
istio-dev@googlegroups.com
@IstioMesh
More information: istio.io