Extending Istio – Develop a New Mixer Adapter for Your Monitoring Solution
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Compiled-in vs. gRPC mode

Deploy gRPC adapter into k8s

Performance

Use case: micro service availability based on istio telemetry data

Resources
About US

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Why Istio?

Core Components
- component specific
  - eg:
    - database — db2, redis
    - cf component — router
    - web server

Infrastructure
- CPU, memory, disk
- process
- usage
- ...

Micro-service governance
- telemetry — monitoring
- traffic management — governance
- security — TLS termination, certificate management

Services, Runtime & Apps
- availability
- performance
- ...

Network
- network usage
- abnormal traffic detect
- firewall
- device specific
- ...

Istio
Brief intro of Istio

- **Istio** lets you connect, secure, control, and observe services
- Heavy investments from industry-leading companies such as Google, IBM, and Lyft
- Release 1.0
- Active community

Core Features

- Telemetry
- Fine-grained traffic management
- Rich load balancing
- Circuit breaking, timeouts, retries
- Request Tracing
- Fault Injection
- Rate limits
- Load shedding

Control Plane API

- **Pilot**: service discovery, traffic management capabilities for intelligent routing, resiliency (timeouts, retries, circuit breakers, etc.)
- **Mixer**: Precondition Checking, Quota Management, Telemetry Reporting
- **Citadel**

Istio features:

- **Service discovery**
- **Traffic management capabilities for intelligent routing**
- **Resiliency (timeouts, retries, circuit breakers, etc.)**
- Dynamic service discovery
- Load balancing
- TLS termination
- HTTP/2 & gRPC proxying
- Circuit breakers
- Health checks
- Staged rollouts & weighted traffic split
- Fault injection
- Rich metrics

HTTP/1.1, HTTP/2, gRPC or TCP — with or without mTLS
Compiled-in vs. gRPC mode

Compiled-in vs. gRPC mode.
## Compiled-in vs. gRPC mode

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<tr>
<td>• As a part of mixer it is easy to deploy</td>
<td>• Updates of custom adapter is hard to be merged into istio code base.</td>
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<td>• Stuff of building customized mixer is probable.</td>
<td>• Adapter’s activity would impact the performance of mixer</td>
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<table>
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<th>gRPC mode adapter</th>
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<td>• User can control the modification of adapter freely</td>
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<td>• Never pollute the core of mixer source code</td>
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<td>• As a individual process it never impact mixer’s performance</td>
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<td>• need to be deployed individually</td>
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Deploy gRPC adapter into k8s

- Build docker image for adapter
- Deploy related k8s resources
  - metrictemplate.yaml
  - adapter.yaml (eg. newrelic.yaml)
- Deployment and service of adapter
- Telemetry configuration: handler/instance/rule

```yaml
apiVersion: "config.istio.io/v1alpha2"
kind: handler
metadata:
  name: newrelic
namespace: istio-system
spec:
  adapter: newrelic
  connection:
    address: "nristio.default.svc.cluster.local:8888"
```
Performance

- Test case
  - worker node: 4 Core 8 GB
  - target: bookinfo sample product page
  - load test: from 100 qps to 1000 qps lasted 10 minutes
  - stress test: 5000 qps lasted 10 minutes
Performance - resource usage

1000 qps

Memory Usage

CPU Usage

5000 qps

Memory Usage

CPU Usage
Use case: micro-service availability based on istio telemetry data
- **NewRelic adapter repo:** [https://github.com/IBM/newrelic-istio-adapter](https://github.com/IBM/newrelic-istio-adapter)
- Istio official website: [https://istio.io](https://istio.io)
- IBM Istio 101: [https://github.com/ibm/istio101](https://github.com/ibm/istio101)

**Technical blogs we (will) post:**
- Case Study: Enable Istio to your service — take CFEE as an example (under review, will be published soon): [https://admin.blogs.prd.ibm.event.ibm.com/blogs/bluemix/?p=150384&preview=1&_ppp=bd20ed7fa3](https://admin.blogs.prd.ibm.event.ibm.com/blogs/bluemix/?p=150384&preview=1&_ppp=bd20ed7fa3)