

JustInTimeout Mid Review

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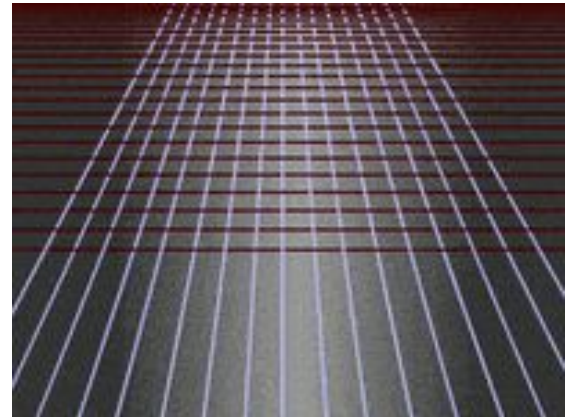
Client Shim

AOP, not OOP

- Aspects
- Advices
- Weaving

```
public aspect updater {  
    pointcut mainpoint(String args[]): execution(public static void main(..)) && args(args);  
    Object around(String args[]): mainpoint(args[]) {  
        System.out.println(args.length);  
        Object retval = proceed(args[0],args[1]);  
        System.out.println(retval);  
        return null;  
    }  
}
```

Weaving



- Compile-time, binary, load-time weaving
- Weaving the JRE

Where's the...

dependency?

```
<configuration>
  <weaveDependencies>
    <weaveDependency>
      <groupId>org.agroup</groupId>
      <artifactId>to-weave</artifactId>
    </weaveDependency>
    <weaveDependency>
      <groupId>org.anothergroup</groupId>
      <artifactId>gen</artifactId>
    </weaveDependency>
  </weaveDependencies>
</configuration>
```

Java Networking

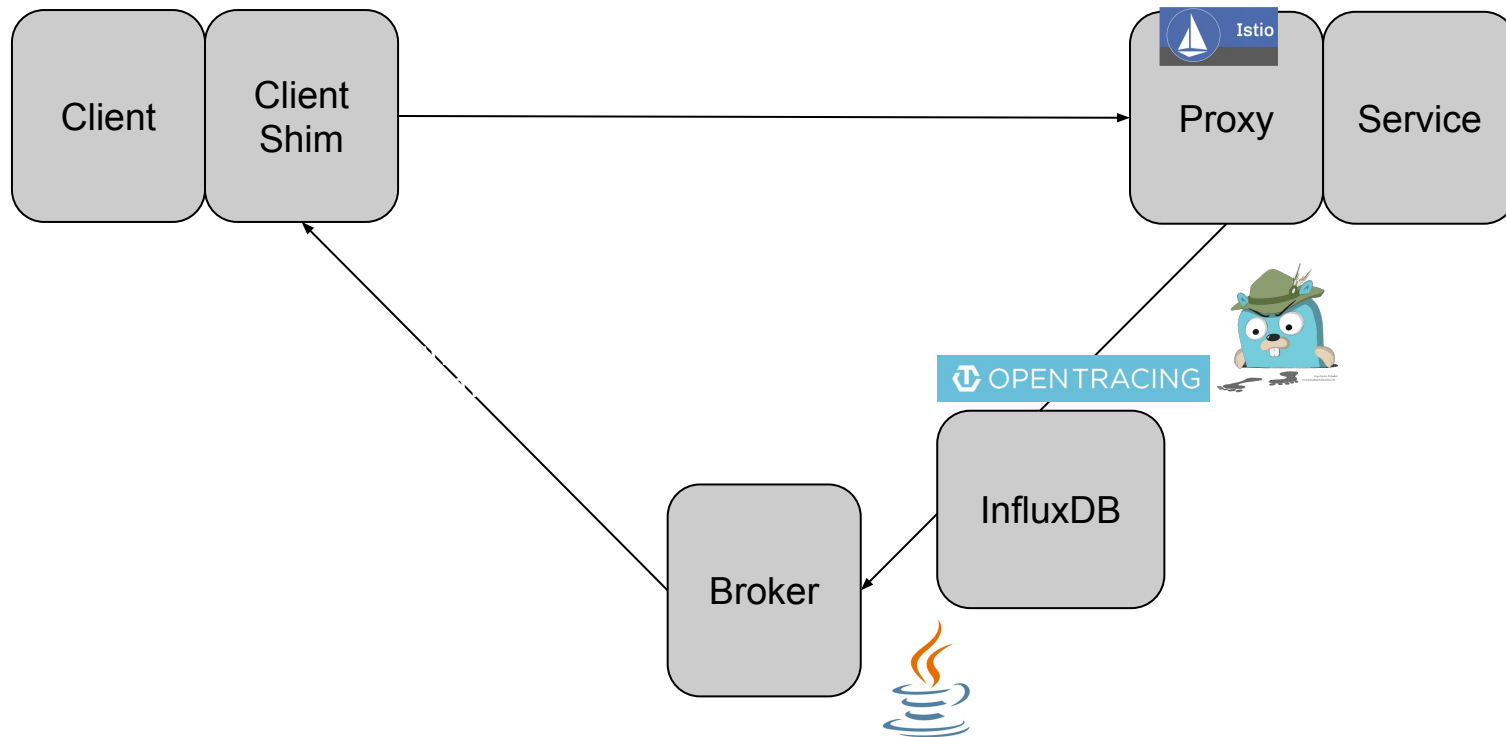
- HttpURLConnection
- Socket

Remaining work


- Better injection point/process
- Writing a java client for the system
- Caching the timeout
- If time permits - eliminate additional network call

Collector / System Dylan

JustInTimeout: Logical View



Kubernetes + Istio: microk8s Rocks!

 **kubernetes**

Search

+ 🔔 👤

Overview

Cluster

Cluster Roles

Namespaces

Nodes

Persistent Volumes

Storage Classes

Namespace

istio-system

Overview

Workloads

Cron Jobs

Daemon Sets

Deployments

Jobs

Pods

Replica Sets

Replication Controllers

Stateful Sets

Discovery and Load Balancing

Ingresses

Services

Workloads

Deployments

Name	Labels	Pods	Age ↑	Images
✔ istio-citadel	app: security chart: security Show all	1 / 1	14 days	docker.io/istio/citadel:1.3.4
✔ istio-tracing	app: jaeger chart: tracing Show all	1 / 1	14 days	quay.io/influxdb/jaeger-all-in-one-influxdb:latest
✔ istio-pilot	app: pilot chart: pilot Show all	1 / 1	14 days	docker.io/istio/pilot:1.3.4 docker.io/istio/proxyv2:1.3.4
✔ istio-sidecar-injector	app: sidecarInjectorWebhook chart: sidecarInjectorWebhook Show all	1 / 1	14 days	docker.io/istio/sidecar_injector:1.3.4
✔ prometheus	app: prometheus chart: prometheus Show all	1 / 1	14 days	docker.io/prom/prometheus:v2.8.0
✔ grafana	app: grafana chart: grafana Show all	1 / 1	14 days	grafana/grafana:6.1.6
✔ istio-egressgateway	app: istio-egressgateway chart: gateways Show all	1 / 1	14 days	docker.io/istio/proxyv2:1.3.4
✔ istio-ingressgateway	app: istio-ingressgateway chart: gateways Show all	1 / 1	14 days	docker.io/istio/proxyv2:1.3.4
✔ istio-policy	app: istio-mixer chart: mixer Show all	1 / 1	14 days	docker.io/istio/mixer:1.3.4 docker.io/istio/proxyv2:1.3.4
✔ istio-telemetry	app: istio-mixer chart: mixer Show all	1 / 1	14 days	docker.io/istio/mixer:1.3.4 docker.io/istio/proxyv2:1.3.4

Acme Air

- Clone Repos
- Create CI/CD Builds
- Deploy to K8s

kubernetes

Search

Overview

Cluster

- Cluster Roles
- Namespaces
- Nodes
- Persistent Volumes
- Storage Classes

Namespace

default

Overview

Workloads

- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods
- Replica Sets
- Replication Controllers

Workloads

Deployments

Name	Namespace	Labels	Pods	Age ↑	Images
auth	default	-	1 / 1	11 days	registry.gitlab.com/justintimeout/justintimeout-proxy/acme-auth:latest
booking	default	-	1 / 1	11 days	registry.gitlab.com/justintimeout/justintimeout-proxy/acme-booking-service:latest
booking-db	default	-	1 / 1	11 days	mongo
customer	default	-	1 / 1	11 days	registry.gitlab.com/justintimeout/justintimeout-proxy/acme-customerservice:latest
customer-db	default	-	1 / 1	11 days	mongo
flight	default	-	1 / 1	11 days	registry.gitlab.com/justintimeout/justintimeout-proxy/acme-flight:latest
flight-db	default	-	1 / 1	11 days	mongo
main	default	-	1 / 1	11 days	registry.gitlab.com/justintimeout/justintimeout-proxy/acme-main:latest

1 - 8 of 8

JustinTimeOut > JustinTimeOutProxy > Pipelines

All 28 Pending 0 Running 1 Finished 27 Branches Tags

Run Pipeline Clear Runner Caches

Status	Pipeline	Triggerer	Commit	Stages
running	#13125451 latest	Dylan Wilson	master - 8cd8dad0 still trying to unbreak mongo	✓
passed	#131248504		master - c24d37cf Unbreak flight - turn off my att...	✓ ✓ 00:18:41 11 minutes ago
passed	#131237118		master - aa09827e second attempt to Trace Mong...	✓ ✓ 00:19:24 34 minutes ago
passed	#130860425		master - c0a822ae attempt to manually add opent...	✓ ✓ 00:21:55 23 hours ago
passed	#127994826		master - f3fd7aff fixes to get istio going	✓ ✓ 00:14:43 1 week ago
passed	#127478366		master - 503dddca fix artifact paths	✓ ✓ 00:15:36 1 week ago
failed	#127456852		master - 7a7ced11 add booking and customer	✓ ✗ 00:09:13 1 week ago
canceled	#127454838		master - 5ae932a8 customer	✗ ✗ 00:00:14 1 week ago

Acme Air



Flights, Baggage, and Loyalty all with a Smile

Welcome Back uid0@email.com

Actions: [Home](#) [Flights](#) [Checkin](#) [Login](#) [Logout](#) [Account](#) [Support](#)

Outbound flights from London to New York

Flight	Departure Time	Arrival Time	First Class Cost	Economy Cost	Reward Miles	Select Flight
AA186	March 30, 2020 - 01:00 AM	March 30, 2020 - 06:45 AM	\$500.00	\$200.00	3456	select ...

Return flights from New York to London

Flight	Departure Time	Arrival Time	First Class Cost	Economy Cost	Reward Miles	Select Flight
AA265	March 31, 2020 - 01:00 AM	March 31, 2020 - 06:45 AM	\$500.00	\$200.00	3456	select ...

[Redo Search](#)

[Book Selected Flights](#)

Acme Air

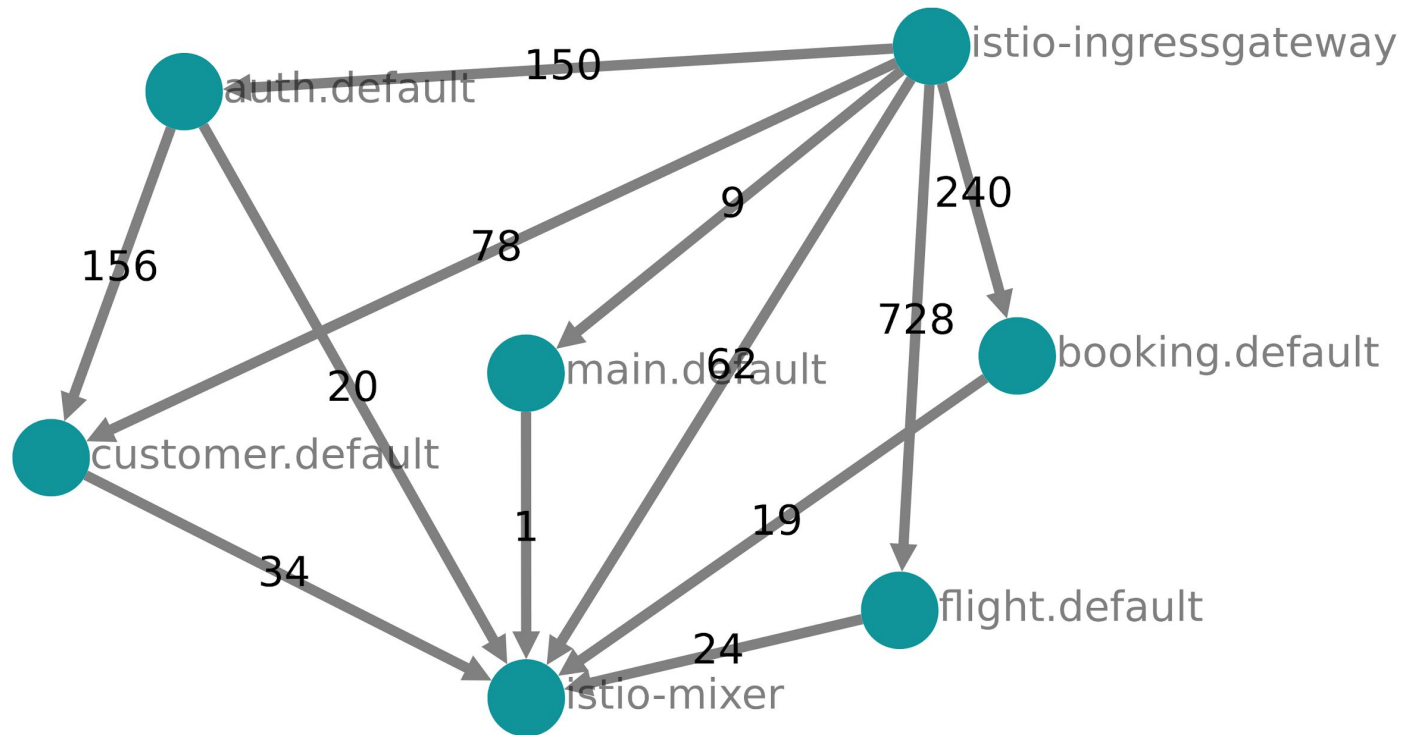
Load Creation: JMeter Driver

```
wilsondy@de115510:~/Downloads/acmeair-driver-master/acmeair-jmeter/scripts$ ~/Downloads/apache-jmeter-5.2.1/bin/jmeter -n -t AcmeA
alhost -JPORT=9080 -j jMeter-logName -JTHREAD=10 -JUSER=999 -JDURATION=${DURATION} -JRAMPE=0 -JDELAY=0
Warning: Nashorn engine is planned to be removed from a future JDK release
Creating summariser <summary>
Created the tree successfully using AcmeAir-microservices.jmx
Starting standalone test @ Sun Mar 29 00:56:10 GMT 2020 (1585443370810)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
usePureIDs property was set.
Warning: Nashorn engine is planned to be removed from a future JDK release
summary + 24 in 00:00:21 = 1.1/s Avg: 2022 Min: 12 Max: 6054 Err: 3 (12.50%) Active: 10 Started: 10 Finished: 0
summary + 60 in 00:00:30 = 2.0/s Avg: 28 Min: 8 Max: 82 Err: 17 (28.33%) Active: 10 Started: 10 Finished: 0
summary = 84 in 00:00:51 = 1.6/s Avg: 597 Min: 8 Max: 6054 Err: 20 (23.81%)
summary + 60 in 00:00:30 = 2.0/s Avg: 38 Min: 8 Max: 83 Err: 11 (18.33%) Active: 10 Started: 10 Finished: 0
summary = 144 in 00:01:21 = 1.8/s Avg: 364 Min: 8 Max: 6054 Err: 31 (21.53%)
summary + 60 in 00:00:30 = 2.0/s Avg: 36 Min: 9 Max: 125 Err: 20 (33.33%) Active: 10 Started: 10 Finished: 0
summary = 204 in 00:01:52 = 1.8/s Avg: 268 Min: 8 Max: 6054 Err: 51 (25.00%)
summary + 60 in 00:00:30 = 2.0/s Avg: 37 Min: 7 Max: 125 Err: 21 (35.00%) Active: 10 Started: 10 Finished: 0
summary = 264 in 00:02:22 = 1.9/s Avg: 215 Min: 7 Max: 6054 Err: 72 (27.27%)
summary + 60 in 00:00:30 = 2.0/s Avg: 41 Min: 9 Max: 137 Err: 13 (21.67%) Active: 10 Started: 10 Finished: 0
summary = 324 in 00:02:52 = 1.9/s Avg: 183 Min: 7 Max: 6054 Err: 85 (26.23%)
summary + 59 in 00:00:27 = 2.2/s Avg: 32 Min: 7 Max: 127 Err: 11 (18.64%) Active: 10 Started: 10 Finished: 0
summary = 383 in 00:03:19 = 1.9/s Avg: 160 Min: 7 Max: 6054 Err: 96 (25.07%)
summary + 59 in 00:00:30 = 2.0/s Avg: 29 Min: 7 Max: 86 Err: 20 (33.90%) Active: 10 Started: 10 Finished: 0
summary = 442 in 00:03:49 = 1.9/s Avg: 142 Min: 7 Max: 6054 Err: 116 (26.24%)
summary + 59 in 00:00:30 = 2.0/s Avg: 34 Min: 7 Max: 139 Err: 16 (27.12%) Active: 10 Started: 10 Finished: 0
summary = 501 in 00:04:19 = 1.9/s Avg: 130 Min: 7 Max: 6054 Err: 132 (26.35%)
summary + 60 in 00:00:30 = 2.0/s Avg: 34 Min: 10 Max: 142 Err: 14 (23.33%) Active: 10 Started: 10 Finished: 0
summary = 561 in 00:04:49 = 1.9/s Avg: 119 Min: 7 Max: 6054 Err: 146 (26.02%)
summary + 60 in 00:00:30 = 2.0/s Avg: 37 Min: 7 Max: 117 Err: 14 (23.33%) Active: 10 Started: 10 Finished: 0
summary = 621 in 00:05:19 = 1.9/s Avg: 111 Min: 7 Max: 6054 Err: 160 (25.76%)
summary + 60 in 00:00:30 = 2.0/s Avg: 26 Min: 7 Max: 119 Err: 20 (33.33%) Active: 10 Started: 10 Finished: 0
summary = 681 in 00:05:49 = 1.9/s Avg: 104 Min: 7 Max: 6054 Err: 180 (26.43%)
summary + 58 in 00:00:30 = 2.0/s Avg: 27 Min: 7 Max: 100 Err: 16 (27.59%) Active: 10 Started: 10 Finished: 0
summary = 739 in 00:06:19 = 2.0/s Avg: 98 Min: 7 Max: 6054 Err: 196 (26.52%)
summary + 59 in 00:00:30 = 2.0/s Avg: 20 Min: 7 Max: 78 Err: 16 (27.12%) Active: 10 Started: 10 Finished: 0
summary = 798 in 00:06:49 = 2.0/s Avg: 92 Min: 7 Max: 6054 Err: 212 (26.57%)
summary + 56 in 00:00:30 = 1.9/s Avg: 21 Min: 7 Max: 70 Err: 14 (25.00%) Active: 10 Started: 10 Finished: 0
summary = 854 in 00:07:19 = 1.9/s Avg: 87 Min: 7 Max: 6054 Err: 226 (26.46%)
summary + 60 in 00:00:30 = 2.0/s Avg: 21 Min: 7 Max: 68 Err: 15 (25.00%) Active: 10 Started: 10 Finished: 0
summary = 914 in 00:07:49 = 1.9/s Avg: 83 Min: 7 Max: 6054 Err: 241 (26.37%)
summary + 60 in 00:00:30 = 2.0/s Avg: 23 Min: 6 Max: 88 Err: 16 (26.67%) Active: 10 Started: 10 Finished: 0
summary = 974 in 00:08:19 = 2.0/s Avg: 79 Min: 6 Max: 6054 Err: 257 (26.39%)
summary + 60 in 00:00:30 = 2.0/s Avg: 28 Min: 6 Max: 81 Err: 15 (25.00%) Active: 10 Started: 10 Finished: 0
summary = 1034 in 00:08:49 = 2.0/s Avg: 76 Min: 6 Max: 6054 Err: 272 (26.31%)
summary + 60 in 00:00:30 = 2.0/s Avg: 26 Min: 5 Max: 91 Err: 16 (26.67%) Active: 10 Started: 10 Finished: 0
summary = 1094 in 00:09:20 = 2.0/s Avg: 74 Min: 5 Max: 6054 Err: 288 (26.33%)
summary + 60 in 00:00:30 = 2.0/s Avg: 23 Min: 6 Max: 91 Err: 16 (26.67%) Active: 10 Started: 10 Finished: 0
summary = 1154 in 00:09:50 = 2.0/s Avg: 71 Min: 5 Max: 6054 Err: 304 (26.34%)
summary + 25 in 00:00:10 = 2.4/s Avg: 24 Min: 8 Max: 71 Err: 5 (20.00%) Active: 0 Started: 10 Finished: 10
```

Jaeger UI

Jaeger UI Lookup by Trace ID... Search Compare **Dependencies** About Jaeger ▾

Force Directed Graph **DAG**



Jaeger UI Lookup by Trace ID...

Search JS

Service (8)

booking.default

Operation (5)

all

Tags

About Jaeger ▾

Sort: Most Recent ▾

Redirect Jaeger Tracing Data to InfluxDB

```
35         defaultMode: 420
36     containers:
37     - name: jaeger
38       image: 'quay.io/influxdb/jaeger-all-in-one-influxdb:latest'
39     ports:
40     - containerPort: 8086
41       protocol: TCP
```

```
65         fieldPath: metadata.namespace
66     - name: BADGER_EPHEMERAL
67       value: 'false'
68     - name: SPAN_STORAGE_TYPE
69       value: grpc-plugin
70     - name: BADGER_DIRECTORY_VALUE
```

Remaining work

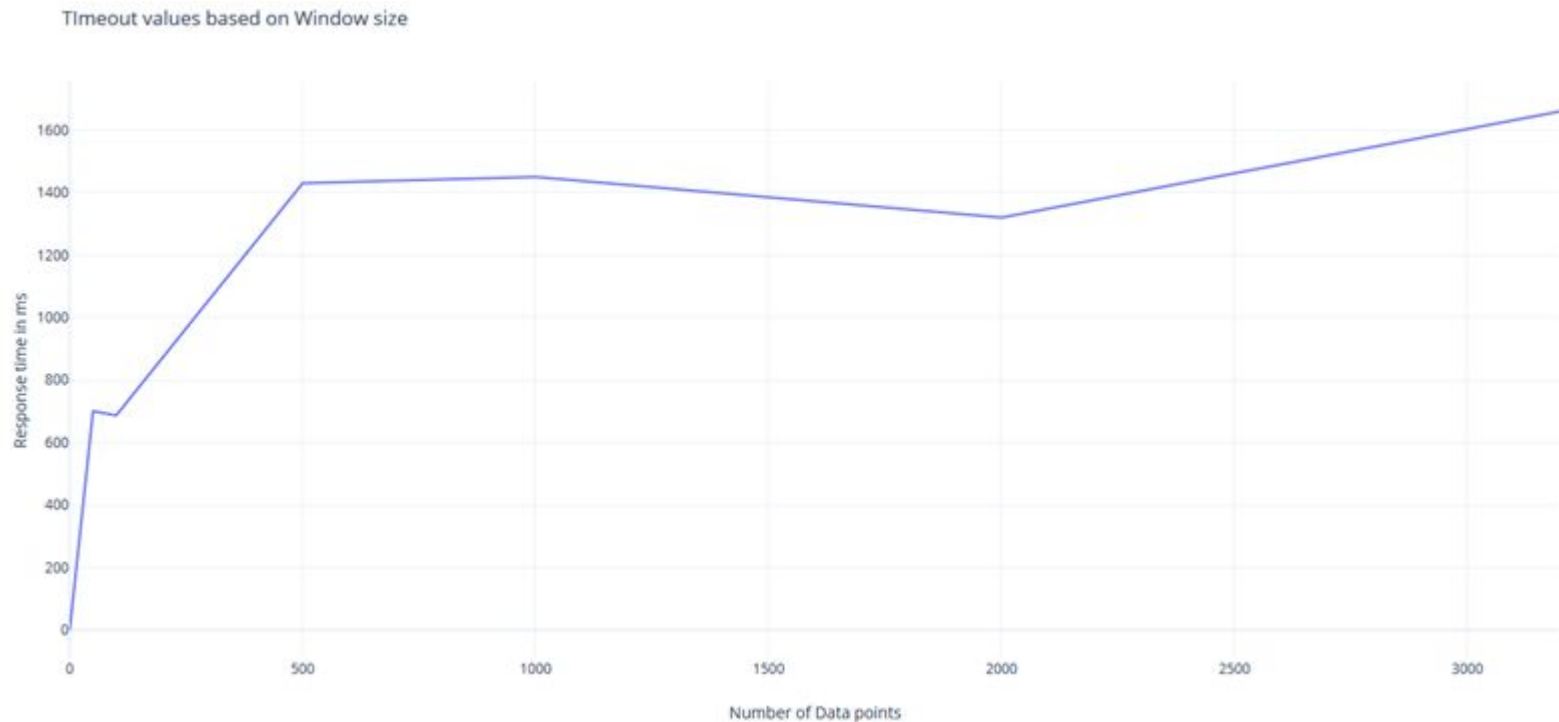
- Get Client shim working in Auth service
- Mongo Tracing?
- Load and use timeouts in the web client?
- Try a different model system with more microservice interactions?
- Drop the full system on GKE and run tests / gather metrics with/without our system in place

Timeout Broker

- Nisarg Chokshi

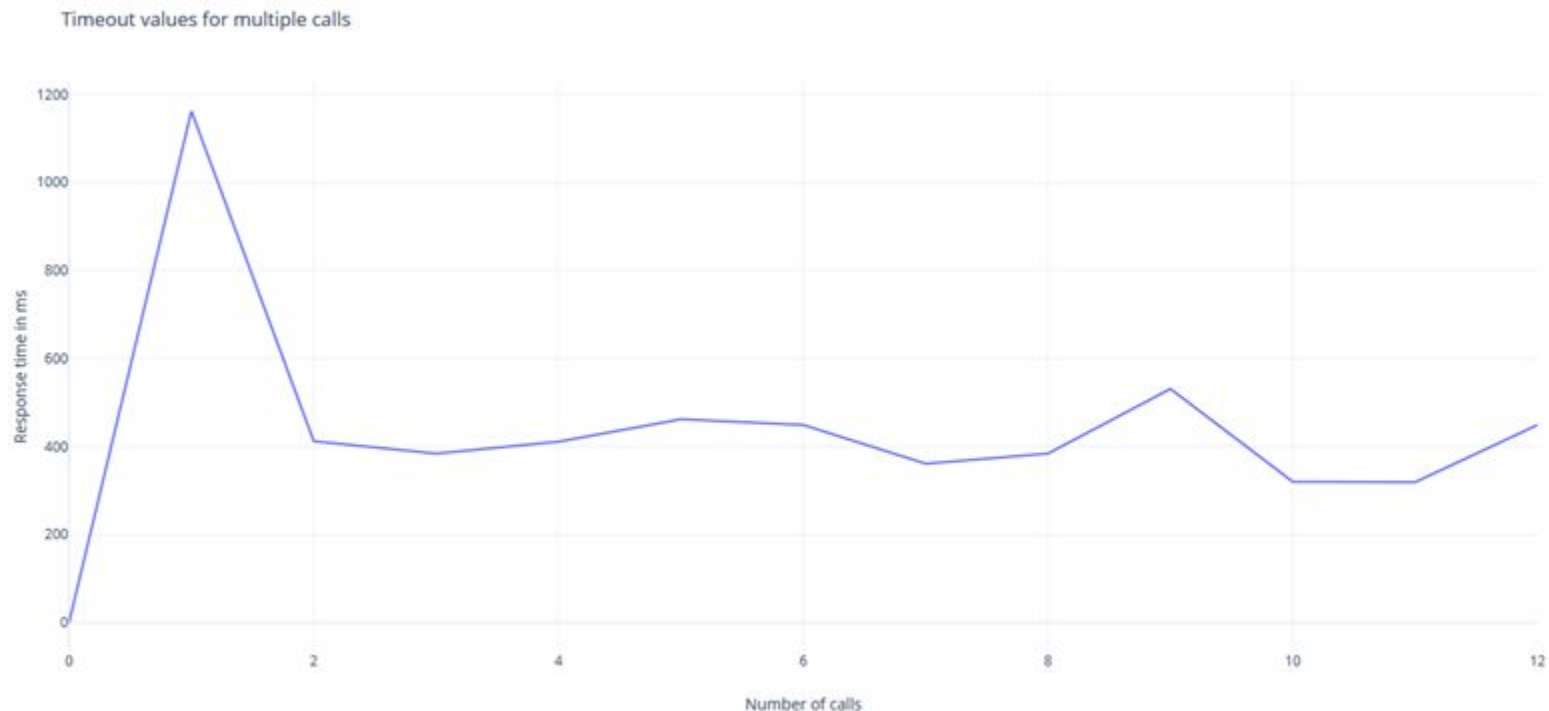
Primary Goal

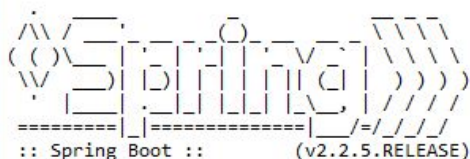
- Compute timeout based on data passed by Istio
- Reply quick, low overhead



Spring Boot

- Multiple calls have reduced runtime due to caching.
- Easy to setup production grade servers with lots of config options

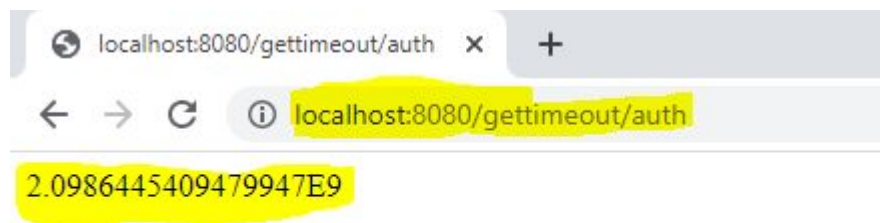




```

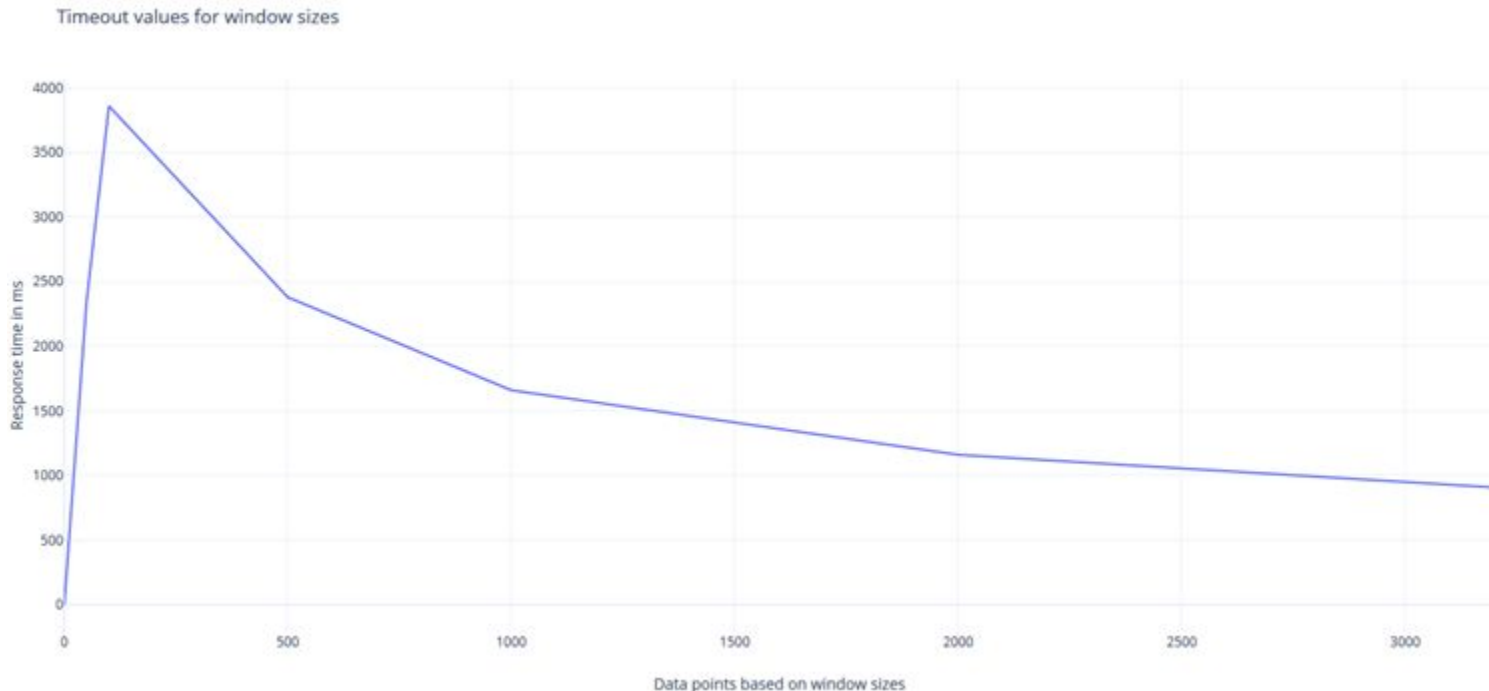
2020-03-31 10:48:21.573 INFO 6500 --- [main] com.broker.App : Starting App on NisargC with PID 6500 (D:\Data\724\Project\justinti
2020-03-31 10:48:21.592 INFO 6500 --- [main] com.broker.App : No active profile set, falling back to default profiles: default
2020-03-31 10:48:23.209 INFO 6500 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2020-03-31 10:48:23.218 INFO 6500 --- [main] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-03-31 10:48:23.218 INFO 6500 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.31]
2020-03-31 10:48:23.313 INFO 6500 --- [main] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2020-03-31 10:48:23.313 INFO 6500 --- [main] o.s.web.context.ContextLoader : Root WebApplicationContext: initialization completed in 1622 ms
2020-03-31 10:48:23.528 INFO 6500 --- [main] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2020-03-31 10:48:23.695 INFO 6500 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2020-03-31 10:48:23.698 INFO 6500 --- [main] com.broker.App : Started App in 2.815 seconds (JVM running for 4.477)
2020-03-31 10:48:38.220 INFO 6500 --- [nio-8080-exec-1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring DispatcherServlet 'dispatcherServlet'
2020-03-31 10:48:38.220 INFO 6500 --- [nio-8080-exec-1] o.s.web.servlet.DispatcherServlet : Initializing Servlet 'dispatcherServlet'
2020-03-31 10:48:38.226 INFO 6500 --- [nio-8080-exec-1] o.s.web.servlet.DispatcherServlet : Completed initialization in 6 ms
4
2020-03-31 10:48:39.418 INFO 6500 --- [nio-8080-exec-1] com.broker.controller.BrokerController : Runtime is: 1160ms

```



Timeout Computation

- Used 99th percentile to get a healthy timeout value (Variant of Welford's algorithm)
- Sliding Window to avoid stale conditions



Remaining work

- Compare this model with more complex ones to get better response (RNN?)
- Find ways to use continuous query of InfluxDB to reduce latency (Currently 80% runtime in db fetching)