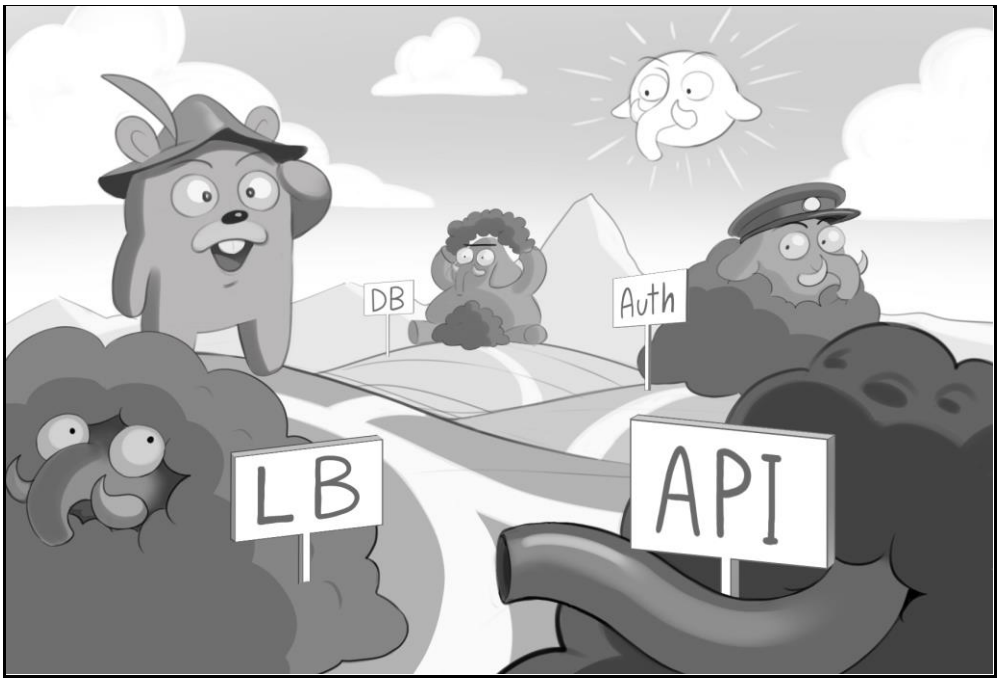
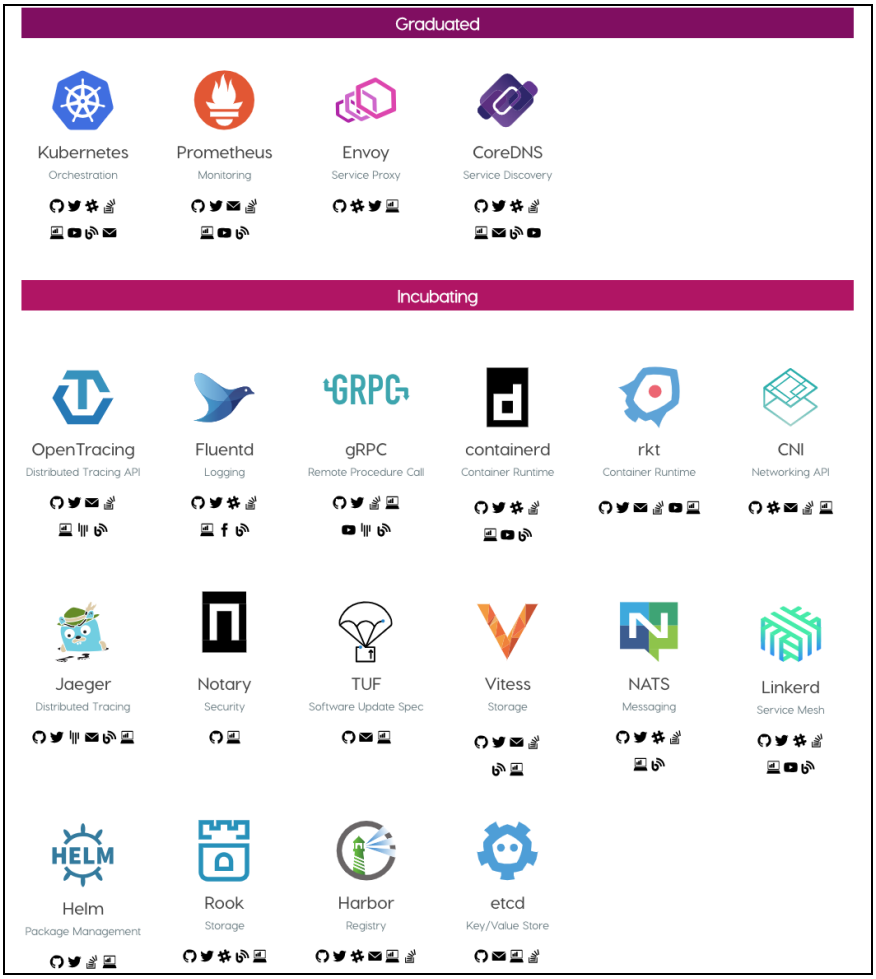
Chapter 1: Why Distributed Tracing



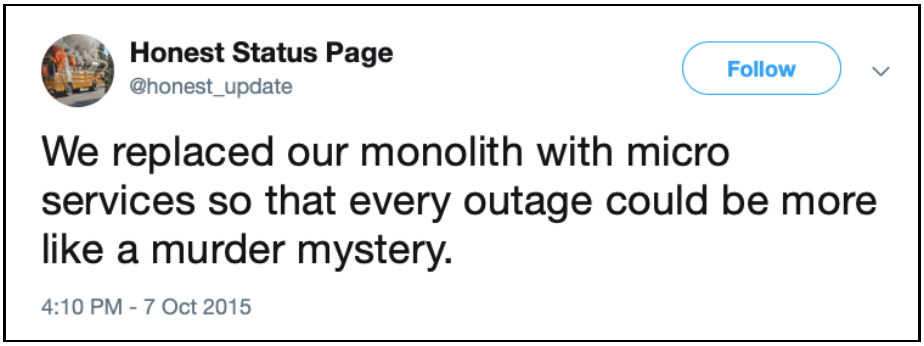


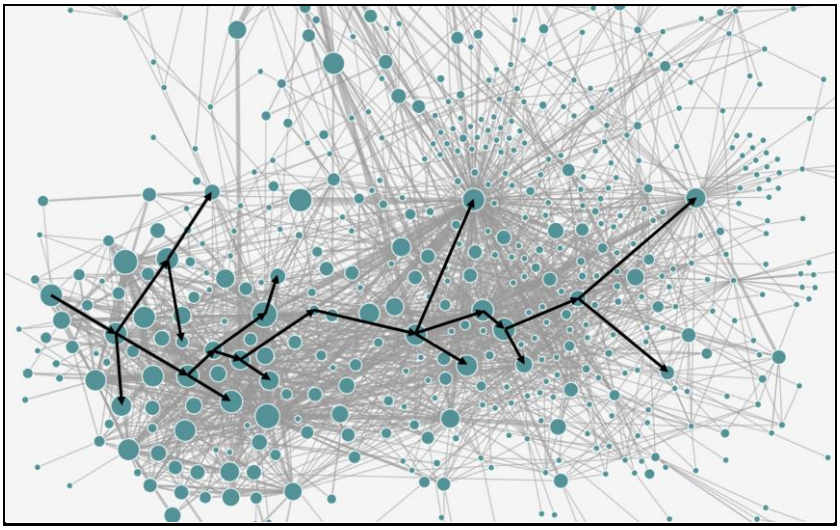
Cindy Sridharan
@copyconstruct

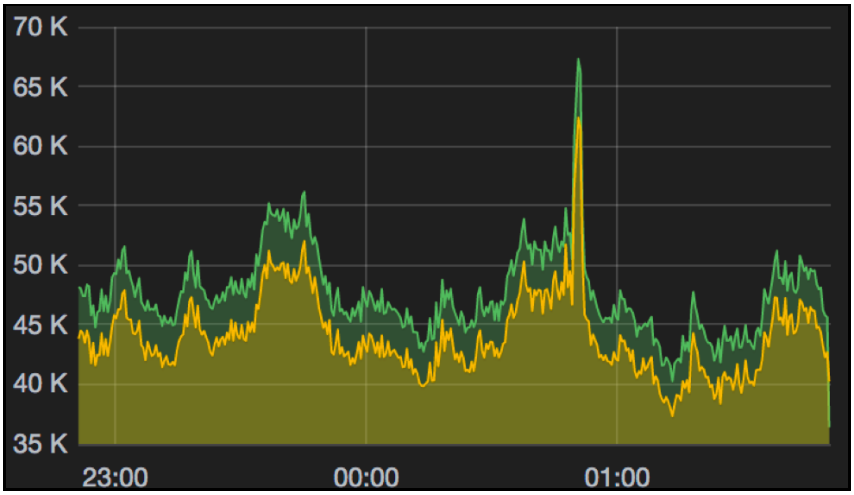
Follow

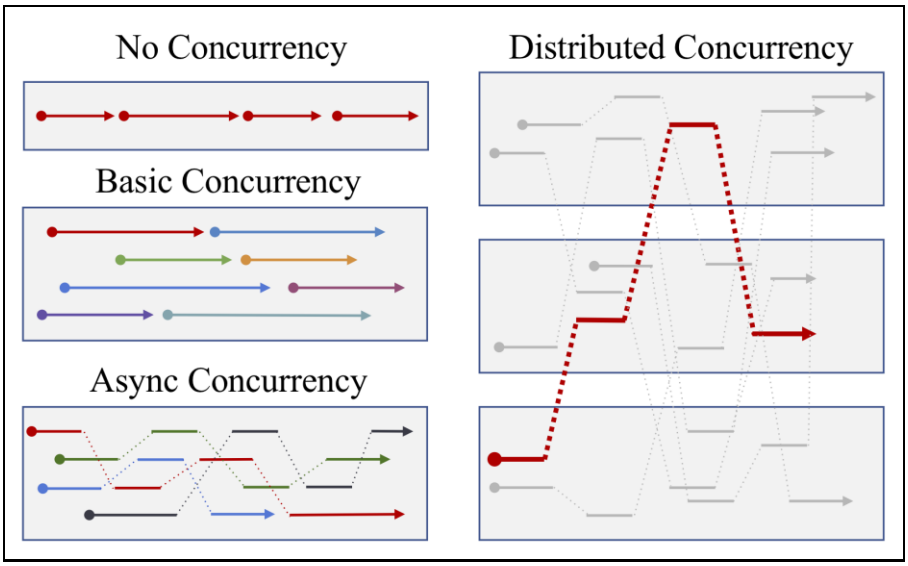
OH - "Observability - because devs don't like to do "monitoring" we need to package it in new nomenclature to make it palatable and trendy."

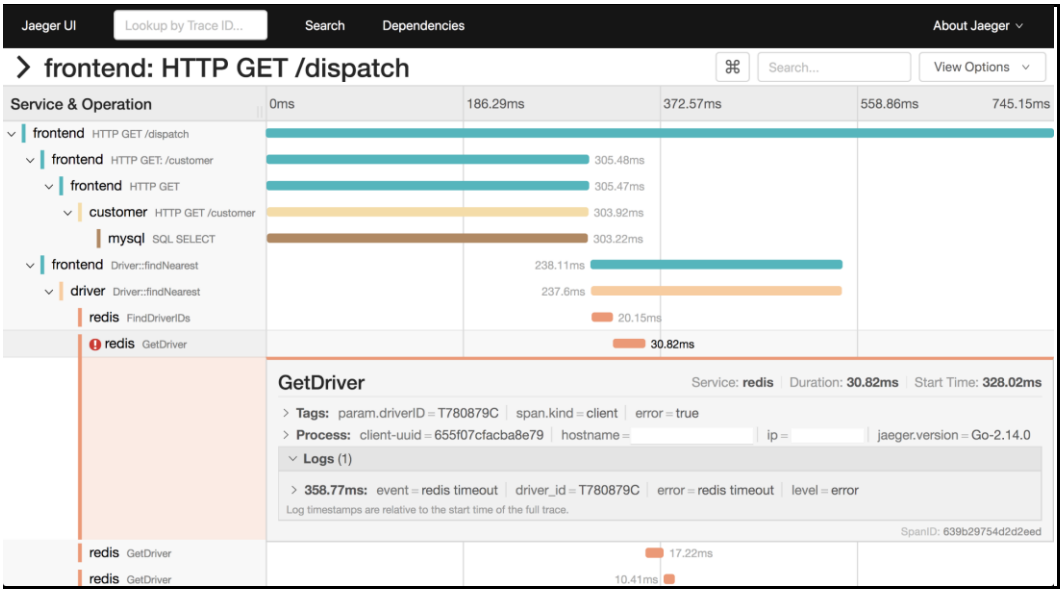
3:41 PM - 28 Jul 2017 from San Francisco, CA

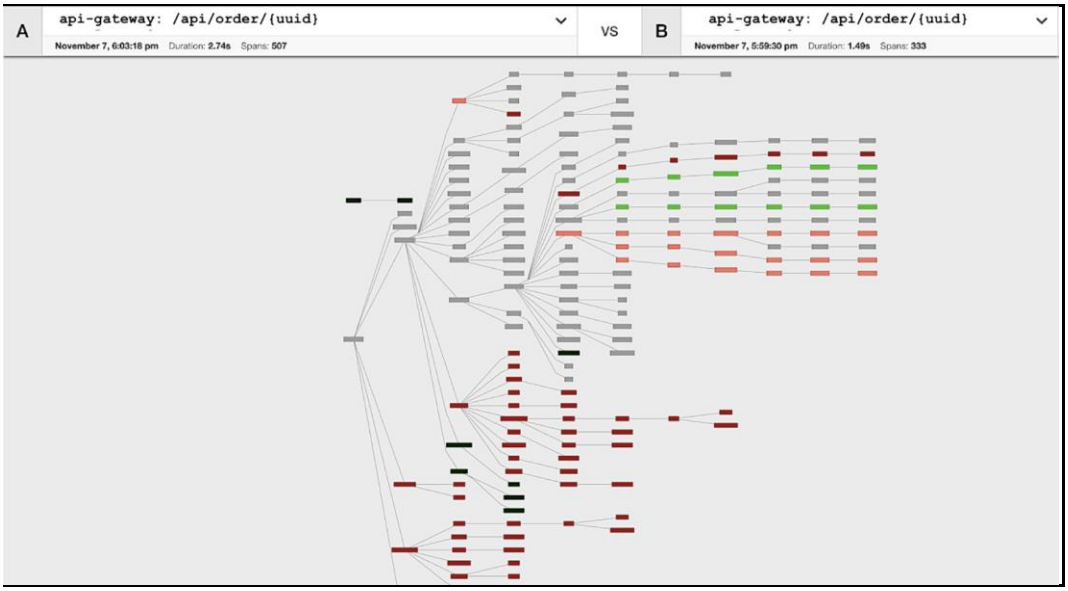

Honest Status Page
@honest_update
Follow
We replaced our monolith with micro services so that every outage could be more like a murder mystery.
4:10 PM - 7 Oct 2015




70 K
65 K
60 K
55 K
50 K
45 K
40 K
35 K
23:00
00:00
01:00

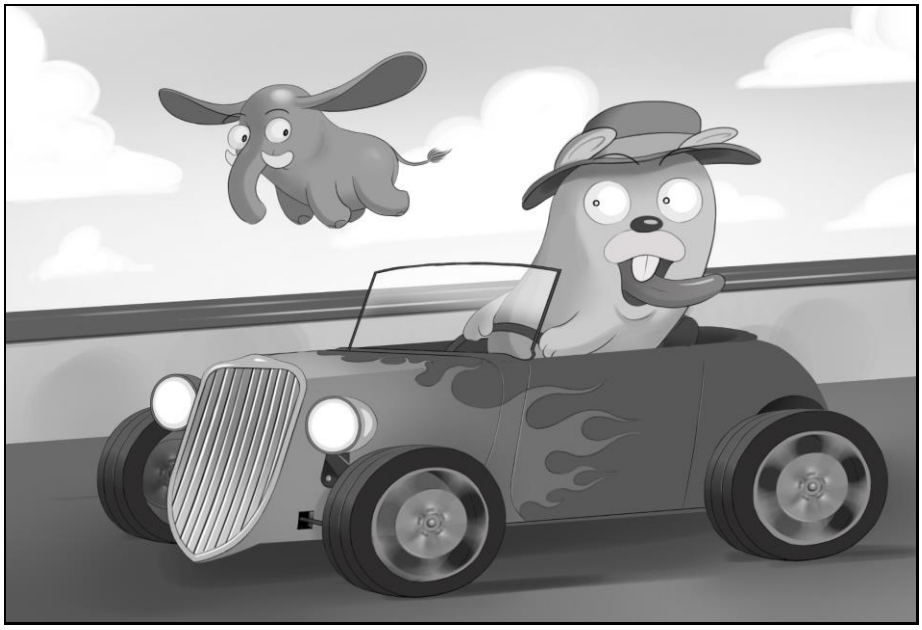

No Concurrency
Basic Concurrency
Async Concurrency
Distributed Concurrency

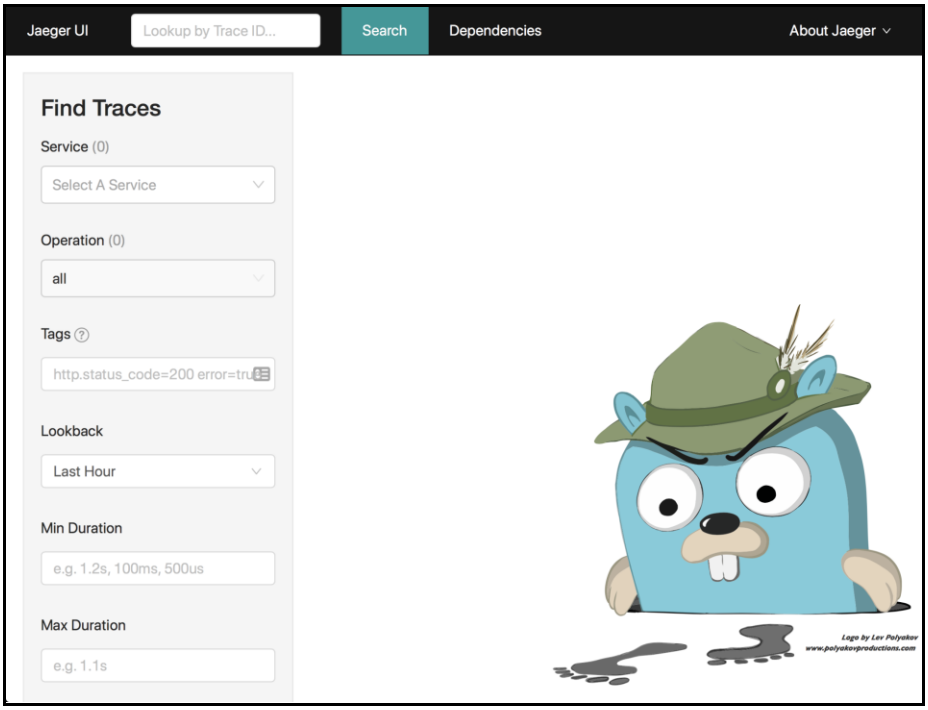

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
305.48ms
frontend HTTP GET
305.47ms
customer HTTP GET /customer
303.92ms
mysql SQL SELECT
303.22ms
frontend Driver::findNearest
238.11ms
driver Driver::findNearest
237.6ms
redis FindDriverIDs
20.15ms
redis GetDriver
30.82ms
GetDriver
Service: redis
Duration: 30.82ms
Start Time: 328.02ms
Tags: param.driverID = T780879C | span.kind = client | error = true
Process: client-uuid = 655f07cfacba8e79 | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (1)
358.77ms: event = redis timeout | driver_id = T780879C | error = redis timeout | level = error
Log timestamps are relative to the start time of the full trace.
SpanID: 639b29754d2d2eed
redis GetDriver
17.22ms
redis GetDriver
10.41ms

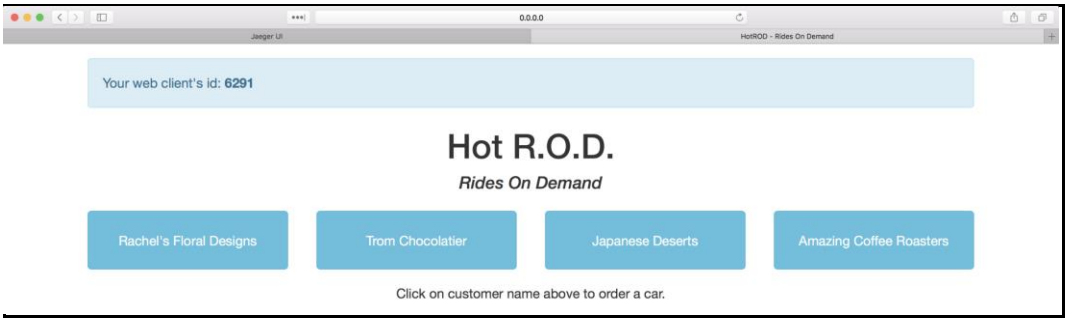

A
api-gateway: /api/order/{uuid}
November 7, 6:03:18 pm Duration: 2.74s Spans: 507
VS
B
api-gateway: /api/order/{uuid}
November 7, 5:59:30 pm Duration: 1.49s Spans: 333

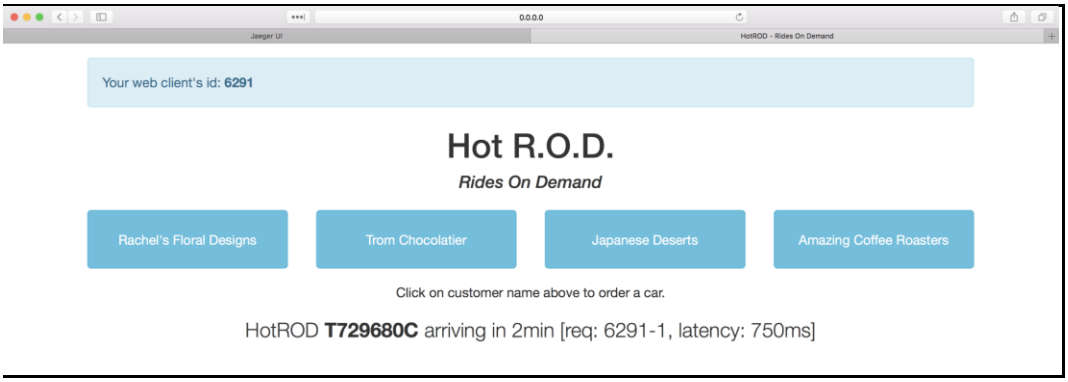

Omar Khawaja
@omitux
Follow
This intro tutorial by @YuriShkuro was super helpful in learning more about #OpenTracing
yurishkuro/opentracing-tutorial
A collection of tutorials for the OpenTracing API. Contribute to yurishkuro/opentracing-tutorial development by creating an account on GitHub.
github.com
1:45 PM - 25 Dec 2018

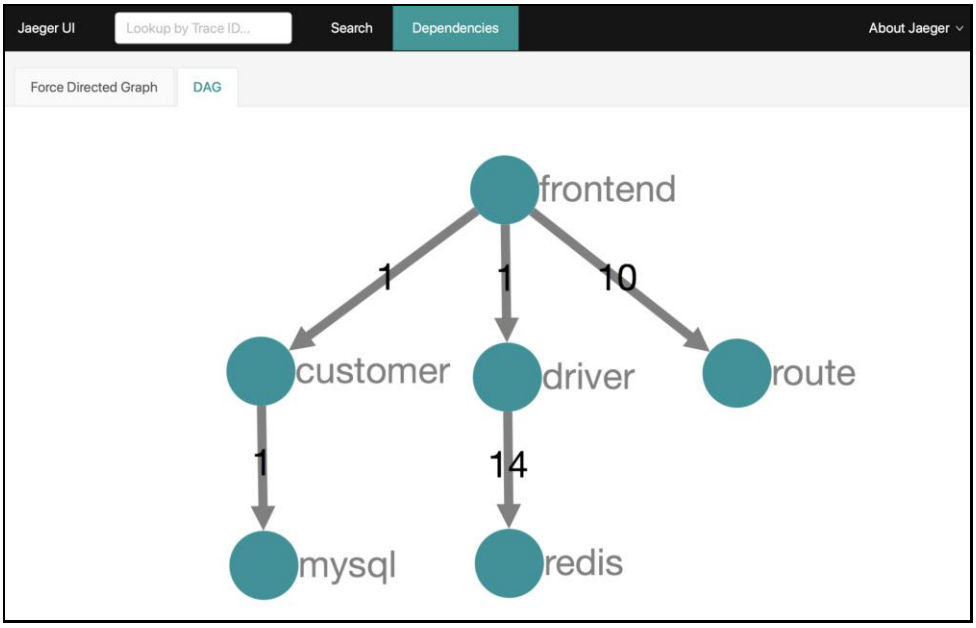
Chapter 2: Take Tracing for a HotROD Ride

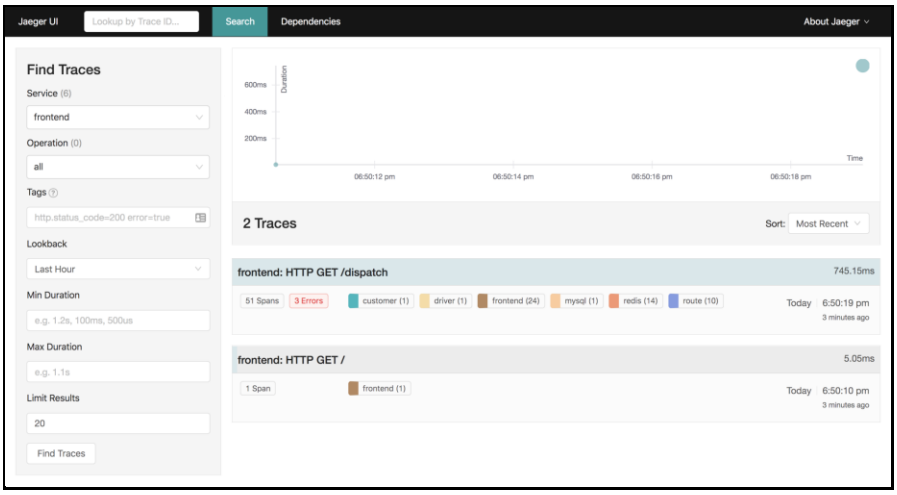


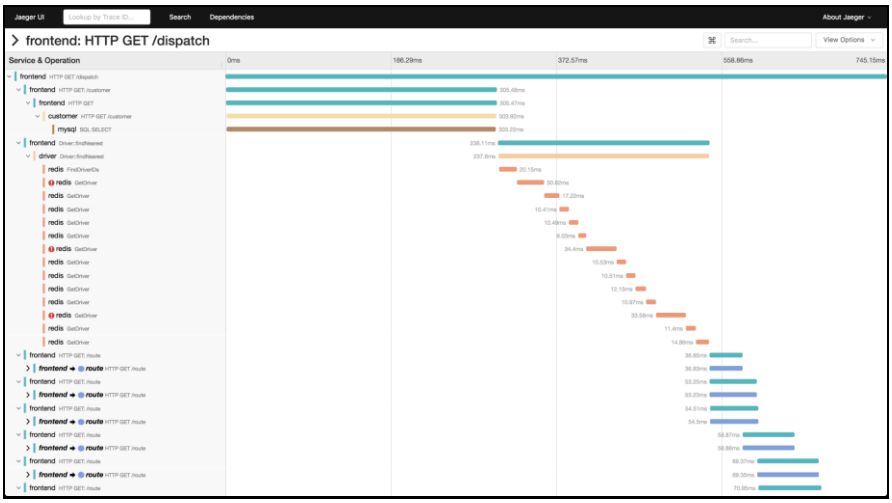



0.0.0.0
Jaeger UI
HotROD - Rides On Demand
Your web client's id: 6291
Hot R.O.D.
Rides On Demand
Rachel's Floral Designs
Trom Chocolatier
Japanese Deserts
Amazing Coffee Roasters
Click on customer name above to order a car.

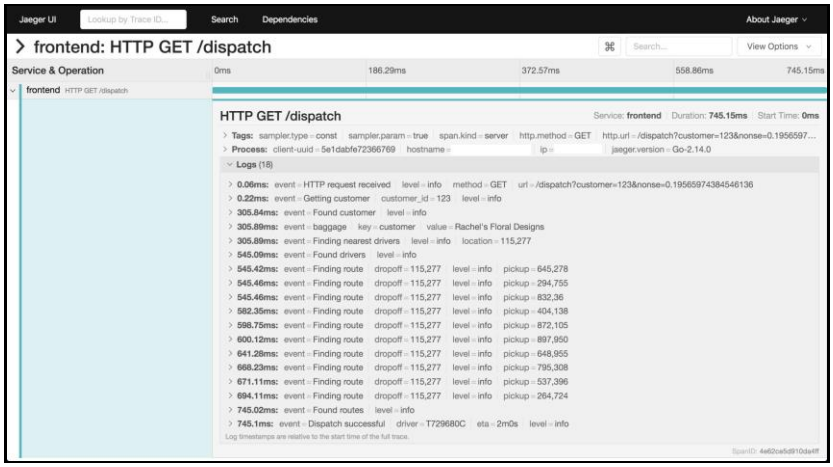

0.0.0.0
Jaeger UI
HotROD - Rides On Demand
Your web client's id: 6291
Hot R.O.D.
Rides On Demand
Rachel's Floral Designs
Trom Chocolatier
Japanese Deserts
Amazing Coffee Roasters
Click on customer name above to order a car.
HotROD T729680C arriving in 2min [req: 6291-1, latency: 750ms]

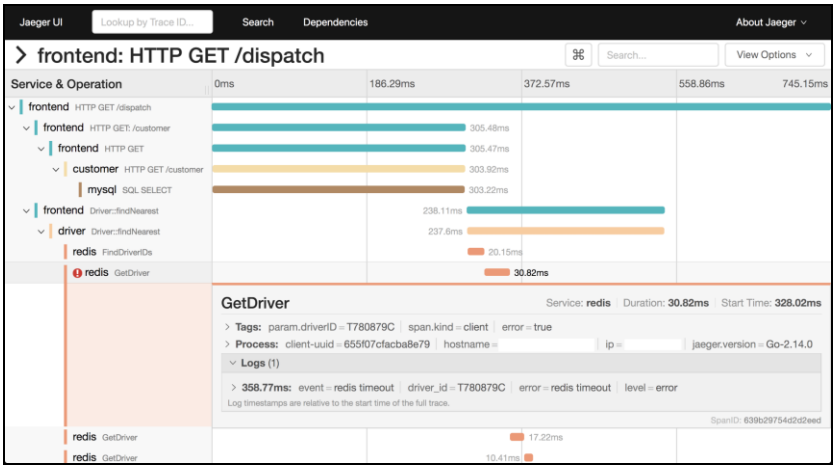

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Force Directed Graph
DAG
frontend
1
1
10
customer
driver
route
1
14
mysql
redis

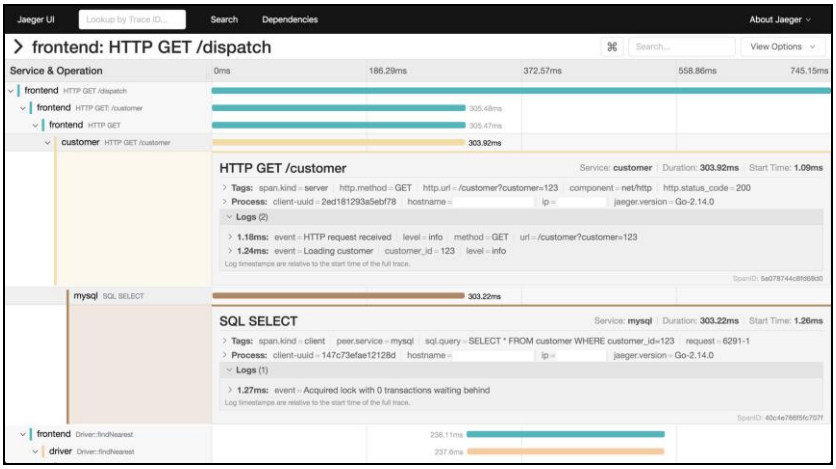


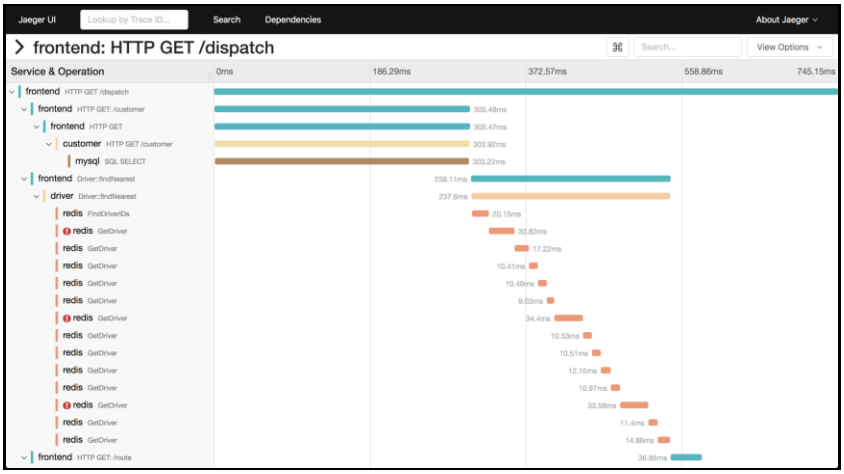


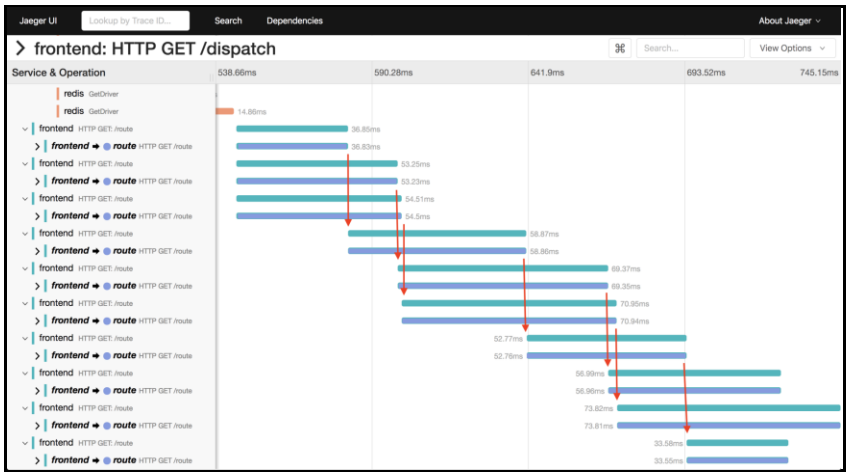

```
1531968242317134503     INFO    Finding nearest drivers {"service": "frontend", "component": "driver_client", "location": "115,277"}
1531968242317593387     INFO    Searching for nearby drivers    {"service": "driver", "location": "115,277"}
1531968242322501309     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "467,173", "dropoff": "115,277"}
1531968242322684885     INFO    HTTP request received   {"service": "route", "method": "GET", "url": "/route?dropoff=115%2C277&pickup=467%2C173"}
1531968242335023183     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "166,691", "dropoff": "115,277"}
1531968242335242627     INFO    HTTP request received   {"service": "route", "method": "GET", "url": "/route?dropoff=115%2C277&pickup=166%2C691"}
1531968242339589331     INFO    Found drivers   {"service": "driver", "drivers": ["T787415C", "T761083C", "T753790C", "T786749C", "T713050C", "T757938C
", "T767904C", "T779359C", "T767428C", "T766598C"]}
1531968242359180866     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "151,188", "dropoff": "115,277"}
1531968242359469480     INFO    HTTP request received   {"service": "route", "method": "GET", "url": "/route?dropoff=115%2C277&pickup=151%2C188"}
1531968242386831602     ERROR   redis timeout   {"service": "driver", "driver_id": "T753790C", "error": "redis timeout"}
1531968242386879546     ERROR   Retrying GetDriver after error  {"service": "driver", "retry_no": 1, "error": "redis timeout"}
1531968242388237569     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "160,975", "dropoff": "115,277"}
1531968242388446722     INFO    HTTP request received   {"service": "route", "method": "GET", "url": "/route?dropoff=115%2C277&pickup=160%2C975"}
1531968242449990791     INFO    Found routes    {"service": "frontend", "routes": [{},{},{},{},{},{},{},{},{},{}]}
1531968242450021938     INFO    Dispatch successful     {"service": "frontend", "driver": "T786068C", "eta": "2m0s"}
1531968242468210683     ERROR   redis timeout   {"service": "driver", "driver_id": "T767904C", "error": "redis timeout"}
1531968242468278207     ERROR   Retrying GetDriver after error  {"service": "driver", "retry_no": 1, "error": "redis timeout"}
1531968242512304695     INFO    Search successful       {"service": "driver", "num_drivers": 10}
1531968242512752597     INFO    Found drivers   {"service": "frontend", "drivers": [{"DriverID":"T787415C","Location":"554,320"},{"DriverID":"T761083C"
,"Location":"329,558"},{"DriverID":"T753790C","Location":"209,937"},{"DriverID":"T786749C","Location":"404,94"},{"DriverID":"T713050C","Location":"29,3
00"},{"DriverID":"T757938C","Location":"41,793"},{"DriverID":"T767904C","Location":"510,171"},{"DriverID":"T779359C","Location":"483,538"},{"DriverID":
"T767428C","Location":"921,362"},{"DriverID":"T766598C","Location":"784,170"}]}
1531968242512834524     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "554,320", "dropoff": "115,277"}
1531968242512851807     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "329,558", "dropoff": "115,277"}
1531968242512832572     INFO    Finding route   {"service": "frontend", "component": "route_client", "pickup": "209,937", "dropoff": "115,277"}
```

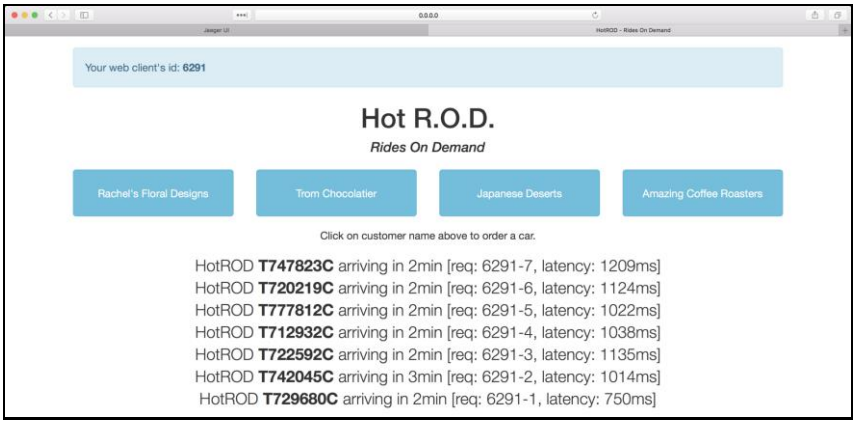

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
HTTP GET /dispatch
Service: frontend | Duration: 745.15ms | Start Time: 0ms
Tags: sampler.type = const | sampler.param = true | span.kind = server | http.method = GET | http.url = /dispatch?customer=123&nonse=0.1956597...
Process: client-uuid = 5e1dabfe72366769 | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (18)
0.06ms: event = HTTP request received | level = info | method = GET | url = /dispatch?customer=123&nonse=0.19565974384546136
0.22ms: event = Getting customer | customer_id = 123 | level = info
305.84ms: event = Found customer | level = info
305.89ms: event = baggage | key = customer | value = Rachel's Floral Designs
305.89ms: event = Finding nearest drivers | level = info | location = 115,277
545.09ms: event = Found drivers | level = info
545.42ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 645,278
545.46ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 294,755
545.46ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 832,36
582.35ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 404,138
598.75ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 872,105
600.12ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 897,950
641.28ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 648,955
668.23ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 795,308
671.11ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 537,396
694.11ms: event = Finding route | dropoff = 115,277 | level = info | pickup = 264,724
745.02ms: event = Found routes | level = info
745.1ms: event = Dispatch successful | driver = T729680C | eta = 2m0s | level = info
Log timestamps are relative to the start time of the full trace.
SpanID: 4e62ca5d910de4ff

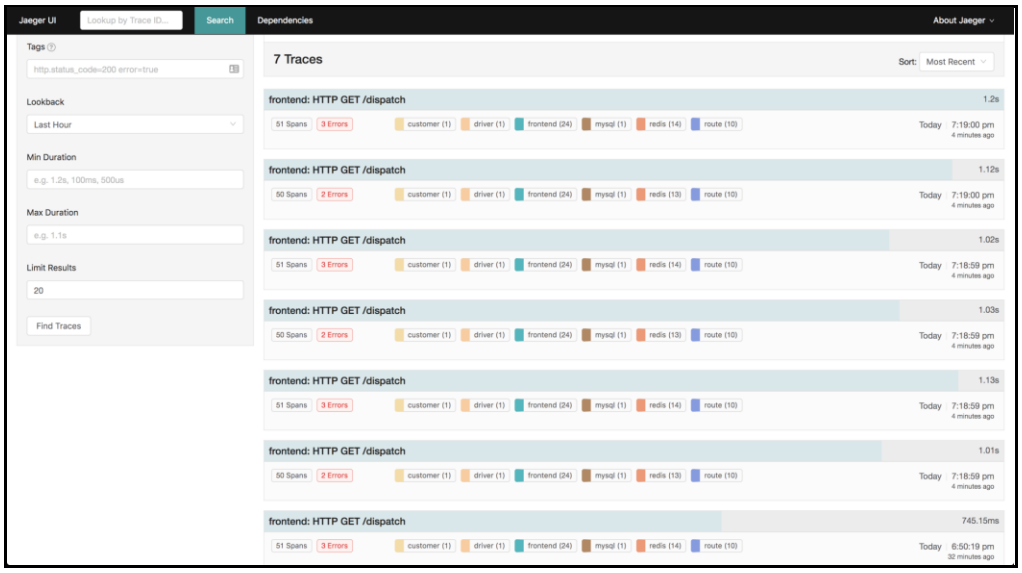

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
305.48ms
frontend HTTP GET
305.47ms
customer HTTP GET /customer
303.92ms
mysql SQL SELECT
303.22ms
frontend Driver::findNearest
238.11ms
driver Driver::findNearest
237.6ms
redis FindDriverIDs
20.15ms
redis GetDriver
30.82ms
GetDriver
Service: redis | Duration: 30.82ms | Start Time: 328.02ms
Tags: param.driverID = T780879C | span.kind = client | error = true
Process: client-uuid = 655f07cfacba8e79 | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (1)
358.77ms: event = redis timeout | driver_id = T780879C | error = redis timeout | level = error
Log timestamps are relative to the start time of the full trace.
SpanID: 639b29754d2d2eed
redis GetDriver
17.22ms
redis GetDriver
10.41ms

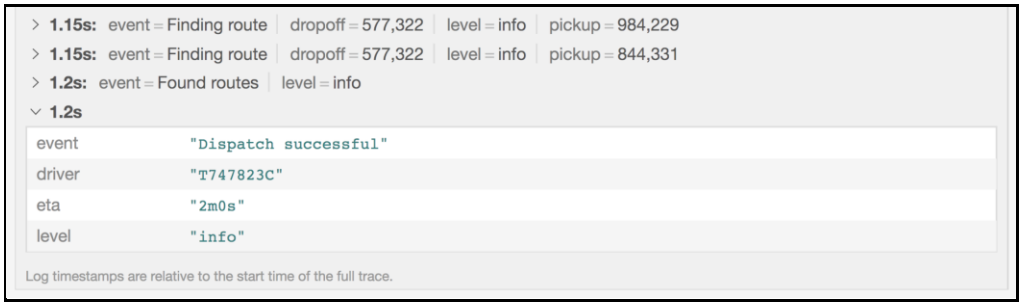

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
305.48ms
frontend HTTP GET
305.47ms
customer HTTP GET /customer
303.92ms
HTTP GET /customer
Service: customer | Duration: 303.92ms | Start Time: 1.09ms
Tags: span.kind = server | http.method = GET | http.url = /customer?customer=123 | component = net/http | http.status_code = 200
Process: client-uuid = 2ed181293a5ebf78 | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (2)
1.18ms: event = HTTP request received | level = info | method = GET | url = /customer?customer=123
1.24ms: event = Loading customer | customer_id = 123 | level = info
Log timestamps are relative to the start time of the full trace.
SpanID: 5e078744c8fd68d8
mysql SQL SELECT
303.22ms
SQL SELECT
Service: mysql | Duration: 303.22ms | Start Time: 1.26ms
Tags: span.kind = client | peer.service = mysql | sql.query = SELECT * FROM customer WHERE customer_id=123 | request = 6291-1
Process: client-uuid = 147c73efae12128d | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (1)
1.27ms: event = Acquired lock with 0 transactions waiting behind
Log timestamps are relative to the start time of the full trace.
SpanID: 40c4e766f5fc707f
frontend Driver::findNearest
238.11ms
driver Driver::findNearest
237.6ms

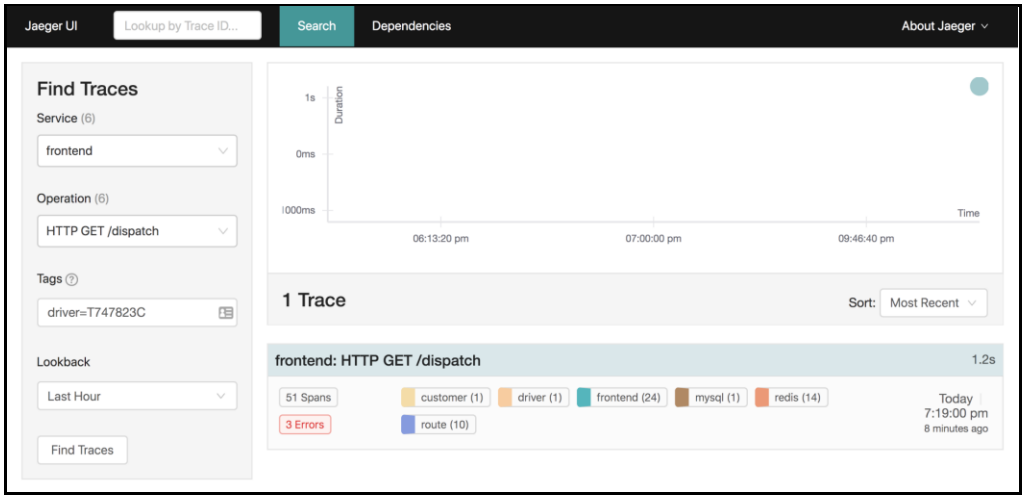

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
305.48ms
frontend HTTP GET
305.47ms
customer HTTP GET /customer
303.92ms
mysql SQL SELECT
303.22ms
frontend Driver::findNearest
238.11ms
driver Driver::findNearest
237.6ms
redis FindDriverIDs
20.15ms
redis GetDriver
30.82ms
redis GetDriver
17.22ms
redis GetDriver
10.41ms
redis GetDriver
10.49ms
redis GetDriver
9.03ms
redis GetDriver
34.4ms
redis GetDriver
10.53ms
redis GetDriver
10.51ms
redis GetDriver
12.15ms
redis GetDriver
10.97ms
redis GetDriver
33.58ms
redis GetDriver
11.4ms
redis GetDriver
14.86ms
frontend HTTP GET: /route
36.85ms

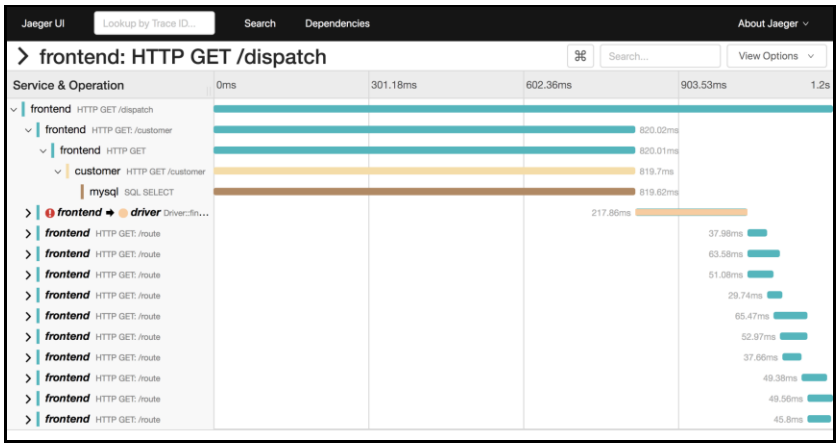

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
538.66ms
590.28ms
641.9ms
693.52ms
745.15ms
redis GetDriver
redis GetDriver
frontend HTTP GET: /route
frontend → route HTTP GET /route
14.86ms
36.85ms
36.83ms
53.25ms
53.23ms
54.51ms
54.5ms
58.87ms
58.86ms
69.37ms
69.35ms
70.95ms
70.94ms
52.77ms
52.76ms
56.99ms
56.96ms
73.82ms
73.81ms
33.58ms
33.55ms

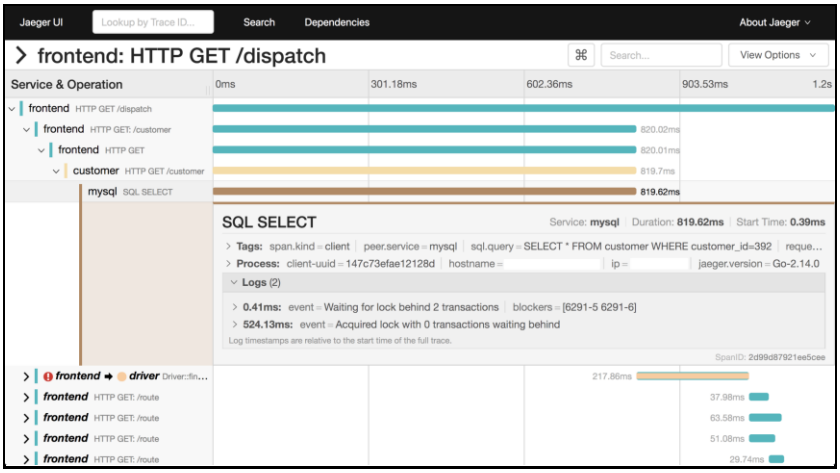

Your web client's id: 6291
Hot R.O.D.
Rides On Demand
Rachel's Floral Designs
Trom Chocolatier
Japanese Deserts
Amazing Coffee Roasters
Click on customer name above to order a car.
HotROD T747823C arriving in 2min [req: 6291-7, latency: 1209ms]
HotROD T720219C arriving in 2min [req: 6291-6, latency: 1124ms]
HotROD T777812C arriving in 2min [req: 6291-5, latency: 1022ms]
HotROD T712932C arriving in 2min [req: 6291-4, latency: 1038ms]
HotROD T722592C arriving in 2min [req: 6291-3, latency: 1135ms]
HotROD T742045C arriving in 3min [req: 6291-2, latency: 1014ms]
HotROD T729680C arriving in 2min [req: 6291-1, latency: 750ms]

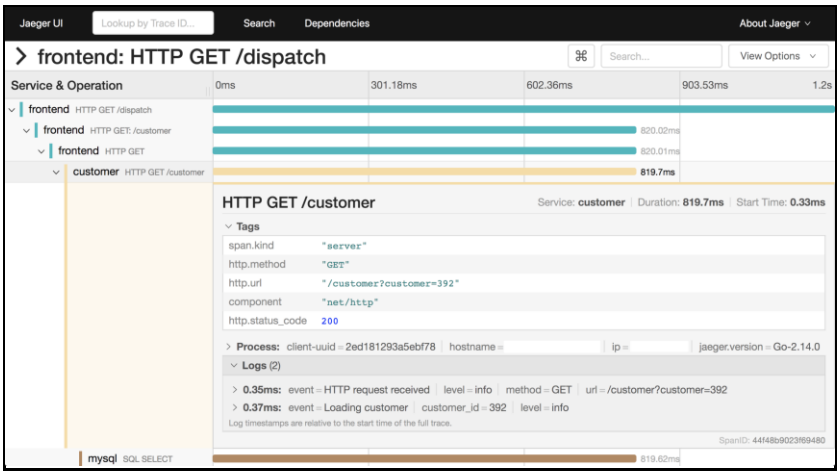

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Tags
http.status_code=200 error=true
Lookback
Last Hour
Min Duration
e.g. 1.2s, 100ms, 500us
Max Duration
e.g. 1.1s
Limit Results
20
Find Traces
7 Traces
Sort: Most Recent
frontend: HTTP GET /dispatch
1.2s
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today 7:19:00 pm
4 minutes ago
frontend: HTTP GET /dispatch
1.12s
50 Spans
2 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (13)
route (10)
Today 7:19:00 pm
4 minutes ago
frontend: HTTP GET /dispatch
1.02s
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today 7:18:59 pm
4 minutes ago
frontend: HTTP GET /dispatch
1.03s
50 Spans
2 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (13)
route (10)
Today 7:18:59 pm
4 minutes ago
frontend: HTTP GET /dispatch
1.13s
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today 7:18:59 pm
4 minutes ago
frontend: HTTP GET /dispatch
1.01s
50 Spans
2 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (13)
route (10)
Today 7:18:59 pm
4 minutes ago
frontend: HTTP GET /dispatch
745.15ms
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today 6:50:19 pm
32 minutes ago

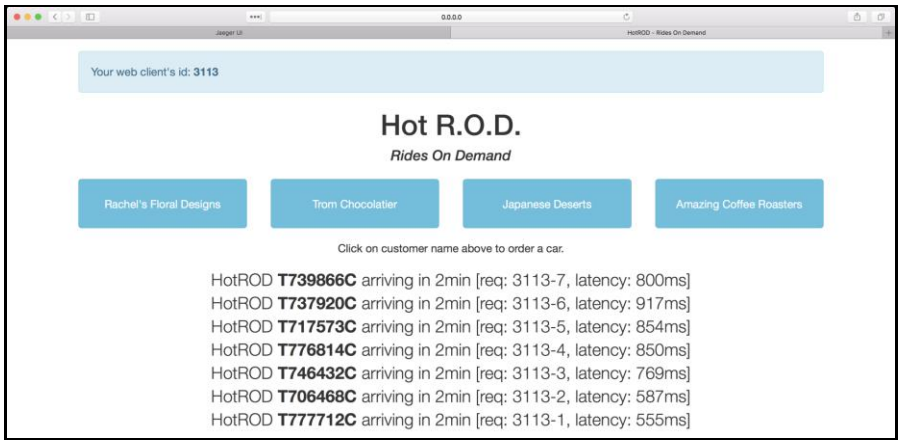

1.15s: event = Finding route | dropoff = 577,322 | level = info | pickup = 984,229
1.15s: event = Finding route | dropoff = 577,322 | level = info | pickup = 844,331
1.2s: event = Found routes | level = info
1.2s
event "Dispatch successful"
driver "T747823C"
eta "2m0s"
level "info"
Log timestamps are relative to the start time of the full trace.

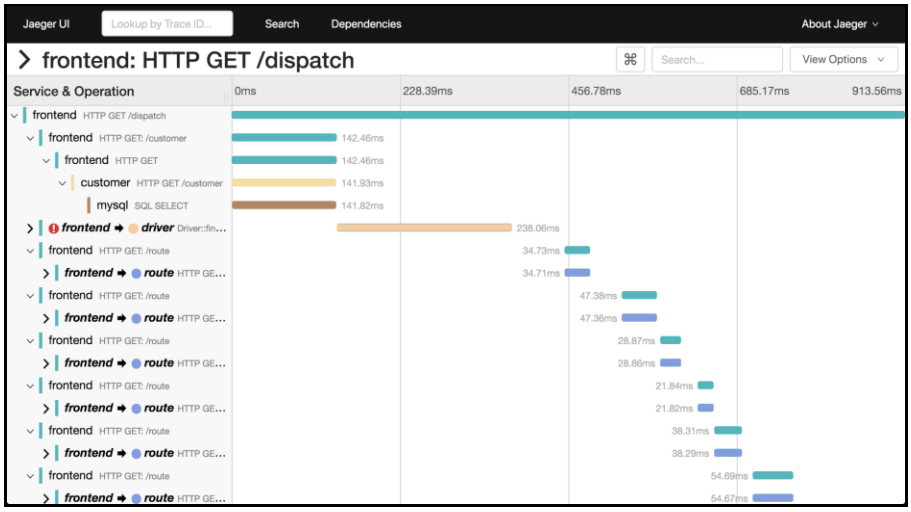

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Find Traces
Service (6)
frontend
Operation (6)
HTTP GET /dispatch
Tags
driver=T747823C
Lookback
Last Hour
Find Traces
1s
0ms
1000ms
Duration
Time
06:13:20 pm
07:00:00 pm
09:46:40 pm
1 Trace
Sort: Most Recent
frontend: HTTP GET /dispatch
1.2s
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today
7:19:00 pm
8 minutes ago

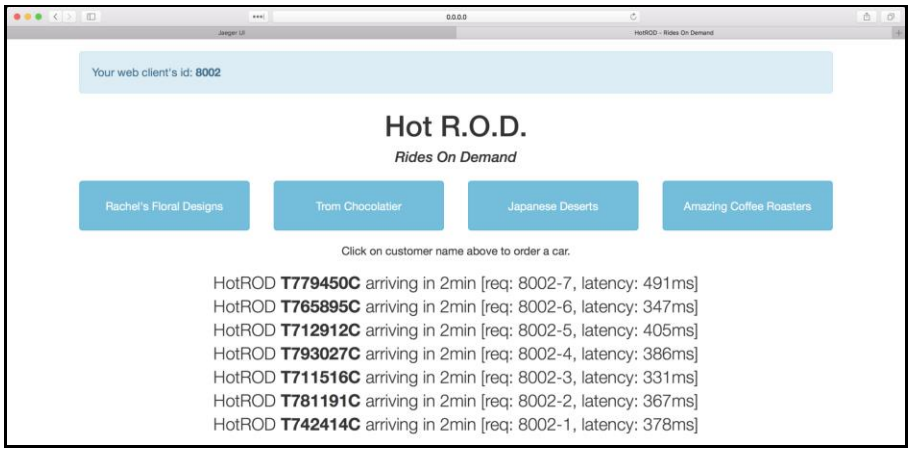

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
301.18ms
602.36ms
903.53ms
1.2s
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
frontend HTTP GET
customer HTTP GET /customer
mysql SQL SELECT
820.02ms
820.01ms
819.7ms
819.62ms
frontend driver Driver::fin...
217.86ms
frontend HTTP GET: /route
37.98ms
63.58ms
51.08ms
29.74ms
65.47ms
52.97ms
37.66ms
49.38ms
49.56ms
45.8ms

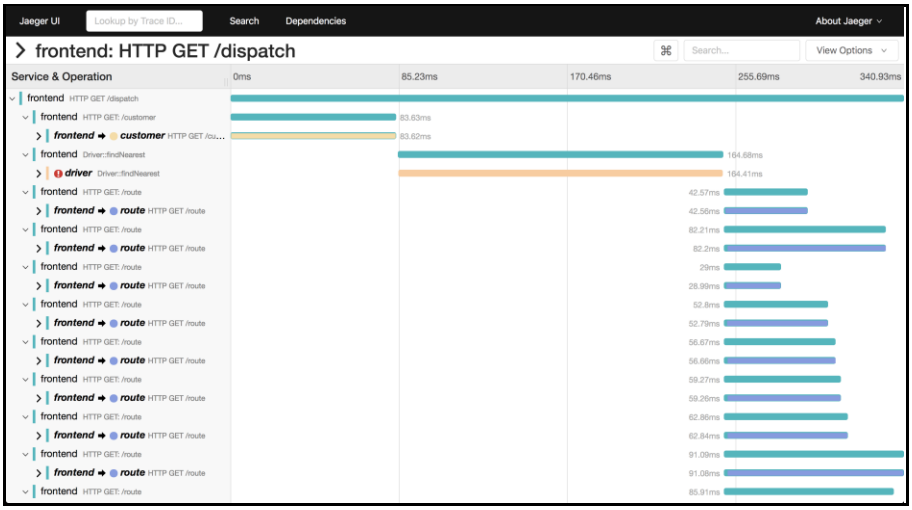

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
301.18ms
602.36ms
903.53ms
1.2s
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
frontend HTTP GET
customer HTTP GET /customer
mysql SQL SELECT
820.02ms
820.01ms
819.7ms
819.62ms
SQL SELECT
Service: mysql | Duration: 819.62ms | Start Time: 0.39ms
Tags: span.kind = client | peer.service = mysql | sql.query = SELECT * FROM customer WHERE customer_id=392 | reque...
Process: client-uuid = 147c73efae12128d | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (2)
0.41ms: event = Waiting for lock behind 2 transactions | blockers = [6291-5 6291-6]
524.13ms: event = Acquired lock with 0 transactions waiting behind
Log timestamps are relative to the start time of the full trace.
SpanID: 2d99d87921ee5cee
frontend driver Driver::fin...
217.86ms
frontend HTTP GET: /route
37.98ms
63.58ms
51.08ms
29.74ms


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
301.18ms
602.36ms
903.53ms
1.2s
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
frontend HTTP GET
customer HTTP GET /customer
mysql SQL SELECT
820.02ms
820.01ms
819.7ms
819.62ms
HTTP GET /customer
Service: customer | Duration: 819.7ms | Start Time: 0.33ms
Tags
span.kind "server"
http.method "GET"
http.url "/customer?customer=392"
component "net/http"
http.status_code 200
Process: client-uuid = 2ed181293a5ebf78 | hostname = | ip = | jaeger.version = Go-2.14.0
Logs (2)
0.35ms: event = HTTP request received | level = info | method = GET | url = /customer?customer=392
0.37ms: event = Loading customer | customer_id = 392 | level = info
Log timestamps are relative to the start time of the full trace.
SpanID: 44f48b9023f69480
mysql SQL SELECT
819.62ms

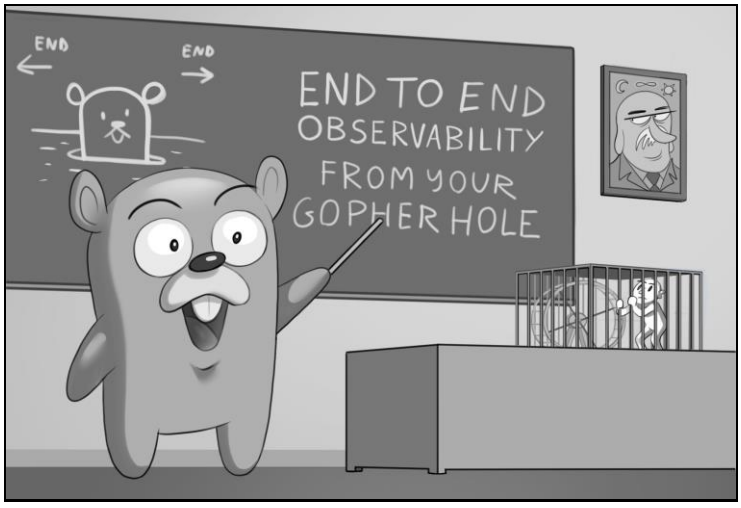

Your web client's id: 3113
Hot R.O.D.
Rides On Demand
Rachel's Floral Designs
Trom Chocolatier
Japanese Deserts
Amazing Coffee Roasters
Click on customer name above to order a car.
HotROD T739866C arriving in 2min [req: 3113-7, latency: 800ms]
HotROD T737920C arriving in 2min [req: 3113-6, latency: 917ms]
HotROD T717573C arriving in 2min [req: 3113-5, latency: 854ms]
HotROD T776814C arriving in 2min [req: 3113-4, latency: 850ms]
HotROD T746432C arriving in 2min [req: 3113-3, latency: 769ms]
HotROD T706468C arriving in 2min [req: 3113-2, latency: 587ms]
HotROD T777712C arriving in 2min [req: 3113-1, latency: 555ms]

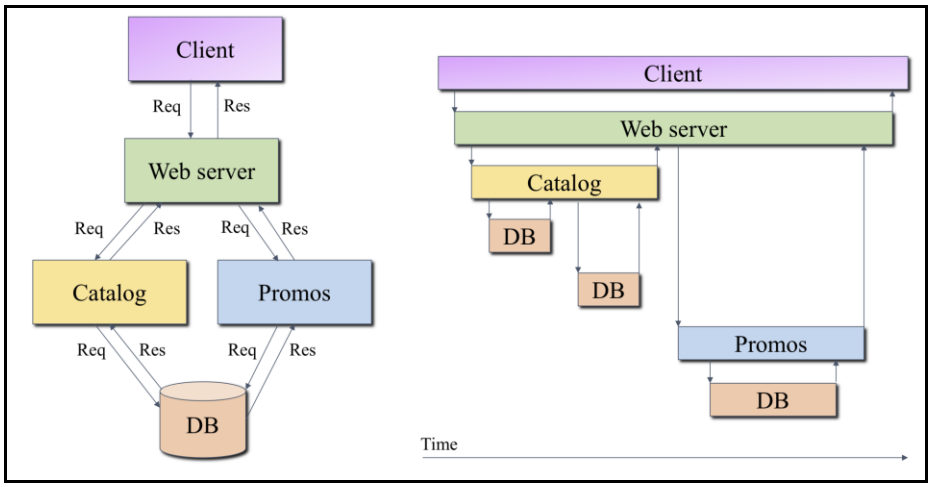

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
228.39ms
456.78ms
685.17ms
913.56ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
142.46ms
frontend HTTP GET
142.46ms
customer HTTP GET /customer
141.93ms
mysql SQL SELECT
141.82ms
frontend → driver Driver::fin...
238.06ms
frontend HTTP GET: /route
34.73ms
frontend → route HTTP GE...
34.71ms
frontend HTTP GET: /route
47.38ms
frontend → route HTTP GE...
47.36ms
frontend HTTP GET: /route
28.87ms
frontend → route HTTP GE...
28.86ms
frontend HTTP GET: /route
21.84ms
frontend → route HTTP GE...
21.82ms
frontend HTTP GET: /route
38.31ms
frontend → route HTTP GE...
38.29ms
frontend HTTP GET: /route
54.69ms
frontend → route HTTP GE...
54.67ms

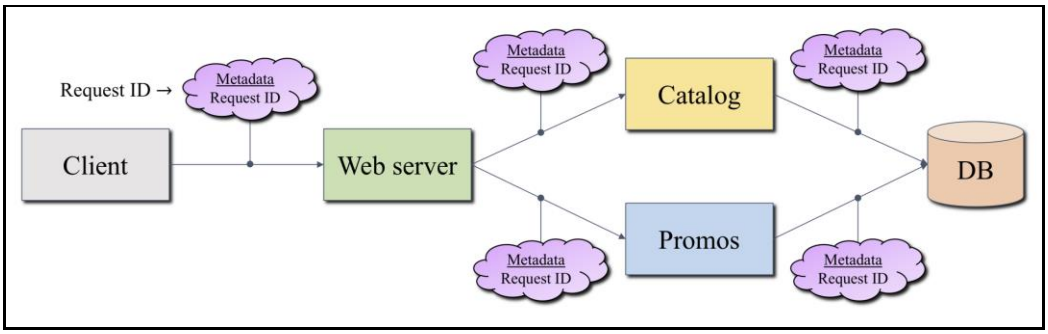

Your web client's id: 8002
Hot R.O.D.
Rides On Demand
Rachel's Floral Designs
Trom Chocolatier
Japanese Deserts
Amazing Coffee Roasters
Click on customer name above to order a car.
HotROD T779450C arriving in 2min [req: 8002-7, latency: 491ms]
HotROD T765895C arriving in 2min [req: 8002-6, latency: 347ms]
HotROD T712912C arriving in 2min [req: 8002-5, latency: 405ms]
HotROD T793027C arriving in 2min [req: 8002-4, latency: 386ms]
HotROD T711516C arriving in 2min [req: 8002-3, latency: 331ms]
HotROD T781191C arriving in 2min [req: 8002-2, latency: 367ms]
HotROD T742414C arriving in 2min [req: 8002-1, latency: 378ms]

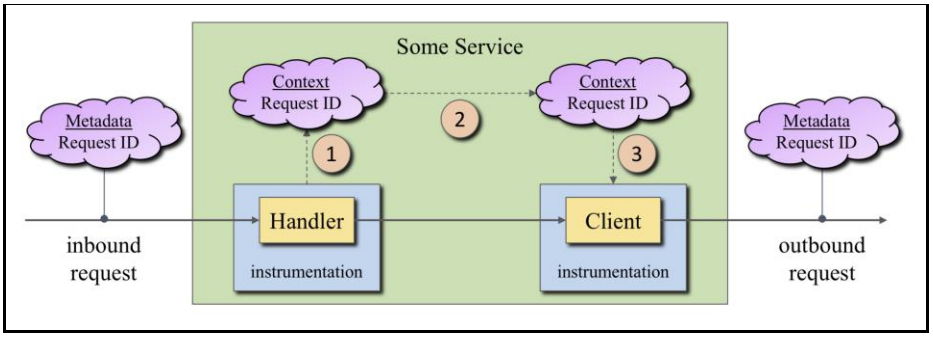

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
85.23ms
170.46ms
255.69ms
340.93ms

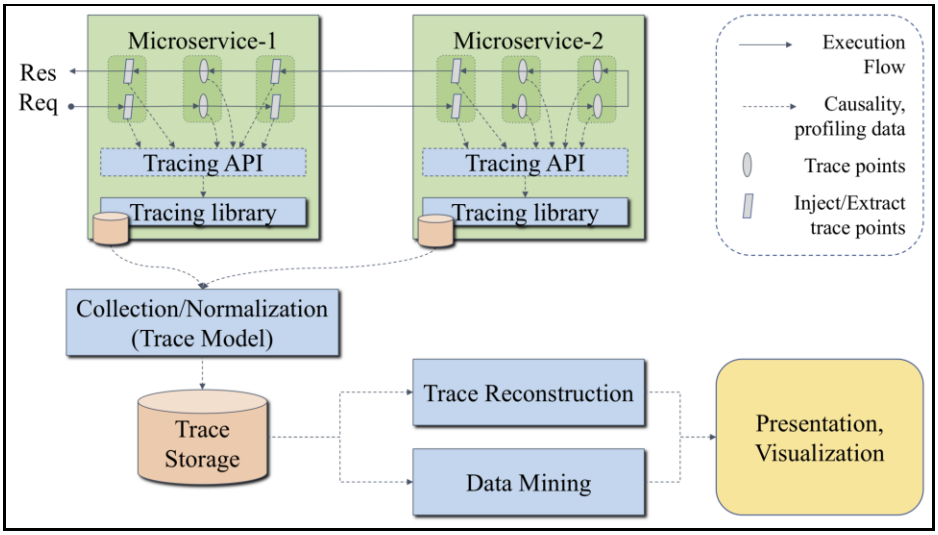
Chapter 3: Distributed Tracing Fundamentals

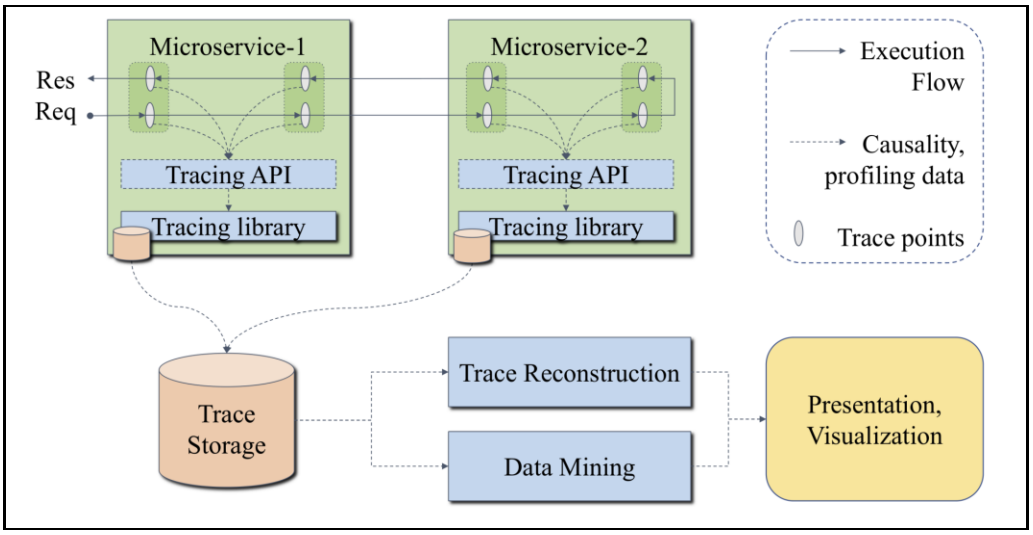


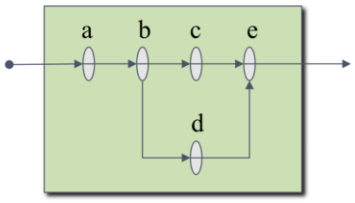



Request ID →
Metadata
Request ID
Client
Web server
Catalog
Promos
DB

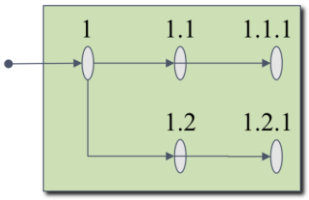

Some Service
Context
Request ID
Metadata
Request ID
1
2
3
Handler
Client
instrumentation
inbound
request
outbound
request


Microservice-1
Microservice-2
Res
Req
Tracing API
Tracing library
Execution
Flow
Causality,
profiling data
Trace points
Inject/Extract
trace points
Collection/Normalization
(Trace Model)
Trace
Storage
Trace Reconstruction
Data Mining
Presentation,
Visualization

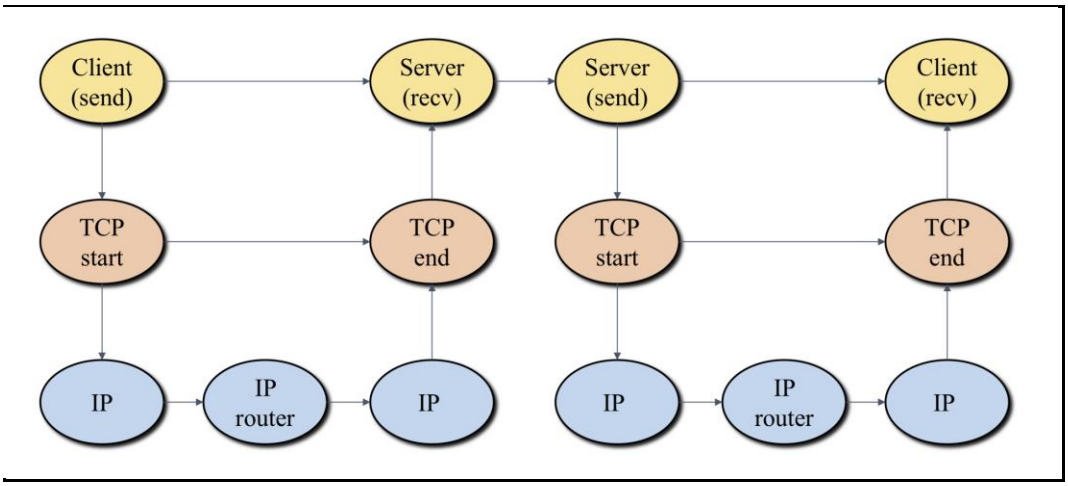


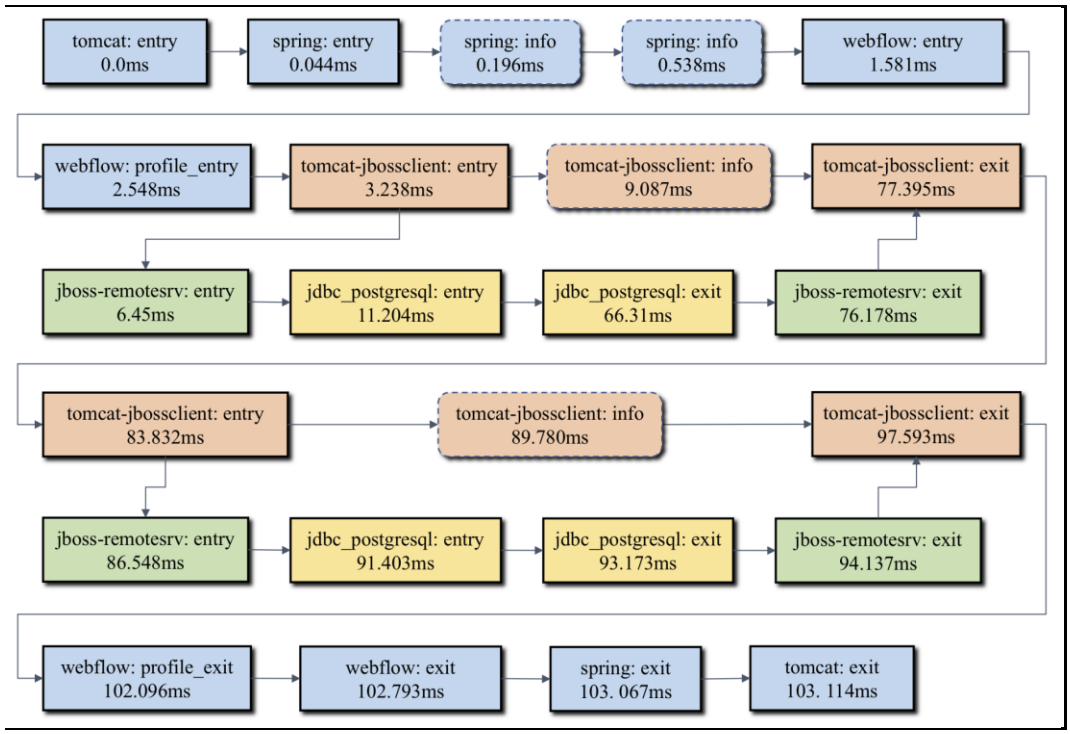


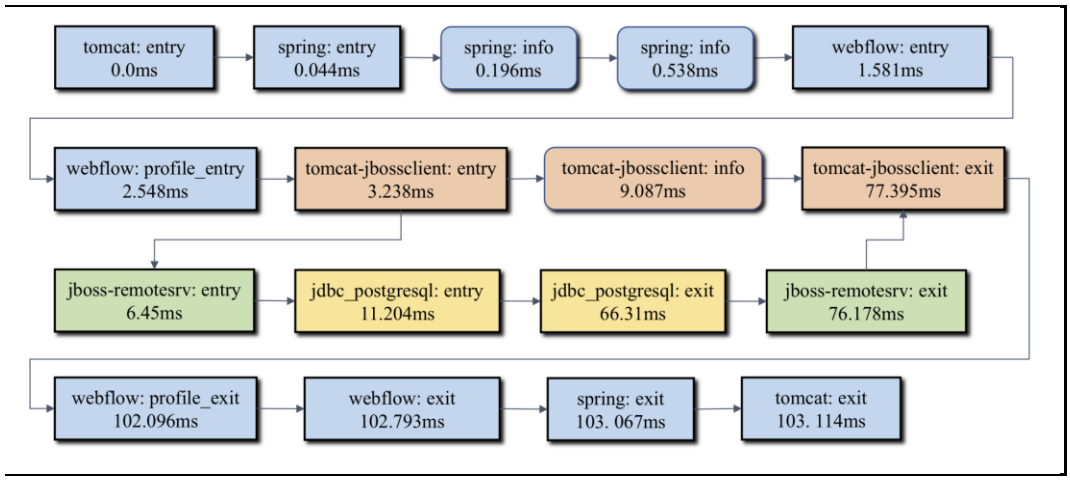
Execution ID	Event ID	Parent ID	Causality
X	a	-	
X	b	a	a → b
X	c	b	b → c
X	d	b	b → d
X	e	c, d	c → e, d → e

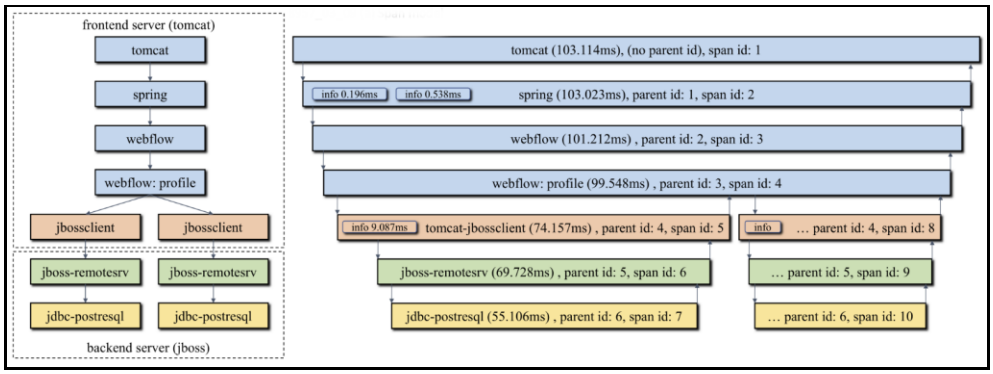


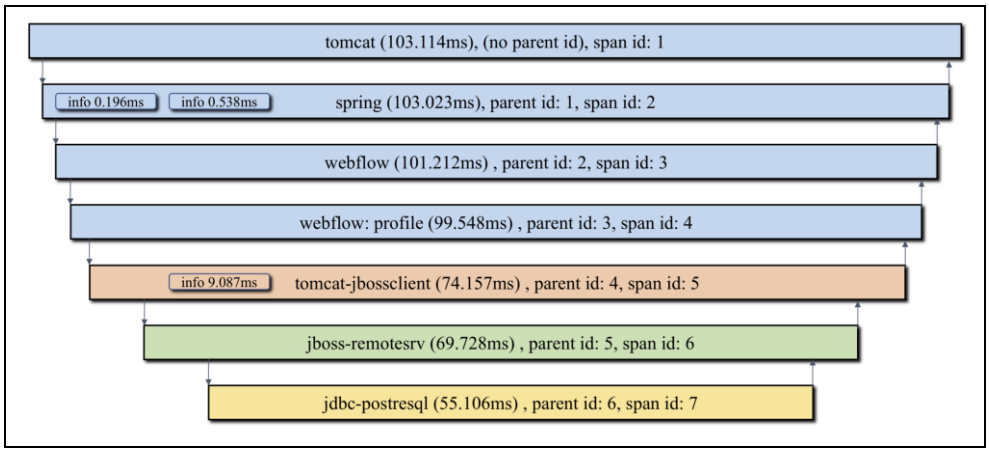
Execution ID	Event ID	Parent ID	Causality
X	1	-	
X	1.1	1	1 → 1.1
X	1.1.1	1.1	1.1 → 1.1.1
X	1.2	1	1 → 1.2
X	1.2.1	1.2	1.2 → 1.2.1

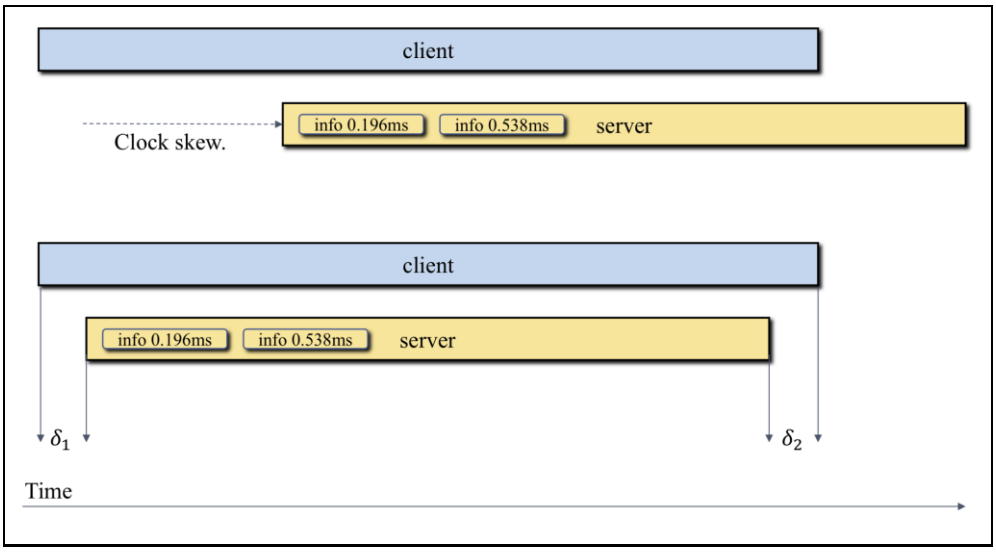

Client (send)
Server (recv)
Server (send)
Client (recv)
TCP start
TCP end
TCP start
TCP end
IP
IP router
IP
IP
IP router
IP


tomcat: entry
0.0ms
spring: entry
0.044ms
spring: info
0.196ms
spring: info
0.538ms
webflow: entry
1.581ms
webflow: profile_entry
2.548ms
tomcat-jbossclient: entry
3.238ms
tomcat-jbossclient: info
9.087ms
tomcat-jbossclient: exit
77.395ms
jboss-remotesrv: entry
6.45ms
jdbc_postgresql: entry
11.204ms
jdbc_postgresql: exit
66.31ms
jboss-remotesrv: exit
76.178ms
tomcat-jbossclient: entry
83.832ms
tomcat-jbossclient: info
89.780ms
tomcat-jbossclient: exit
97.593ms
jboss-remotesrv: entry
86.548ms
jdbc_postgresql: entry
91.403ms
jdbc_postgresql: exit
93.173ms
jboss-remotesrv: exit
94.137ms
webflow: profile_exit
102.096ms
webflow: exit
102.793ms
spring: exit
103. 067ms
tomcat: exit
103. 114ms

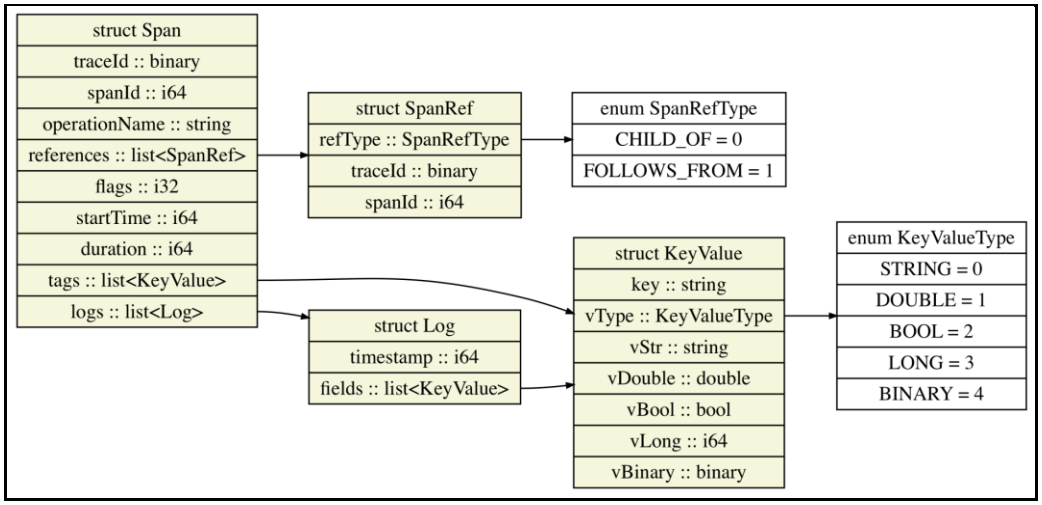

tomcat: entry
0.0ms
spring: entry
0.044ms
spring: info
0.196ms
spring: info
0.538ms
webflow: entry
1.581ms
webflow: profile_entry
2.548ms
tomcat-jbossclient: entry
3.238ms
tomcat-jbossclient: info
9.087ms
tomcat-jbossclient: exit
77.395ms
jboss-remotesrv: entry
6.45ms
jdbc_postgresql: entry
11.204ms
jdbc_postgresql: exit
66.31ms
jboss-remotesrv: exit
76.178ms
webflow: profile_exit
102.096ms
webflow: exit
102.793ms
spring: exit
103. 067ms
tomcat: exit
103. 114ms

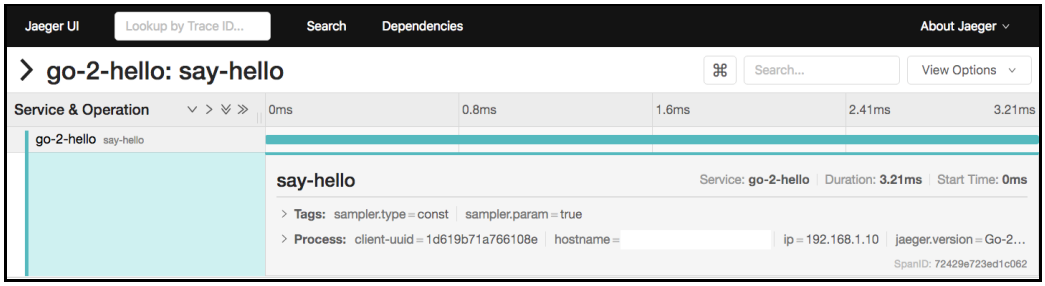

frontend server (tomcat)
tomcat
spring
webflow
webflow: profile
jbossclient
jbossclient
jboss-remotesrv
jboss-remotesrv
jdbc-postresql
jdbc-postresql
backend server (jboss)
tomcat (103.114ms), (no parent id), span id: 1
info 0.196ms
info 0.538ms
spring (103.023ms), parent id: 1, span id: 2
webflow (101.212ms) , parent id: 2, span id: 3
webflow: profile (99.548ms) , parent id: 3, span id: 4
info 9.087ms
tomcat-jbossclient (74.157ms) , parent id: 4, span id: 5
info
… parent id: 4, span id: 8
jboss-remotesrv (69.728ms) , parent id: 5, span id: 6
… parent id: 5, span id: 9
jdbc-postresql (55.106ms) , parent id: 6, span id: 7
… parent id: 6, span id: 10

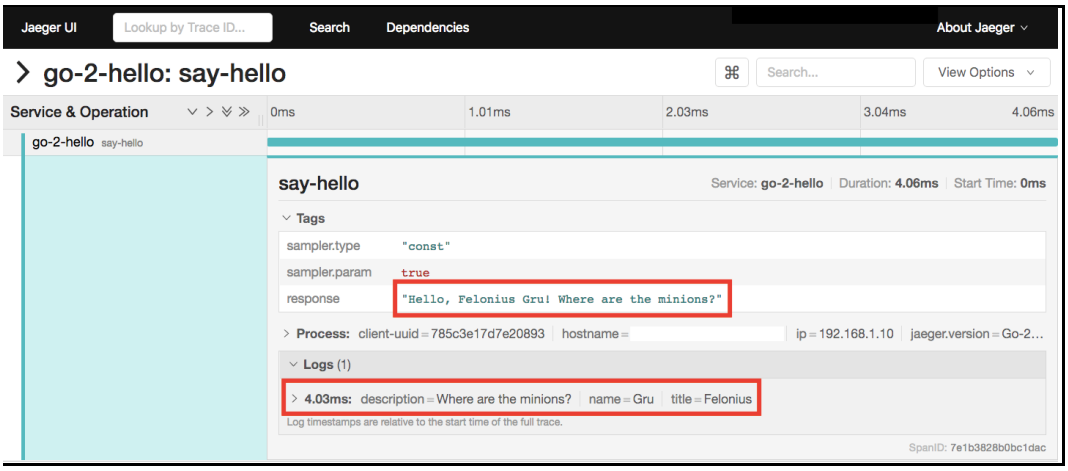

tomcat (103.114ms), (no parent id), span id: 1
info 0.196ms
info 0.538ms
spring (103.023ms), parent id: 1, span id: 2
webflow (101.212ms) , parent id: 2, span id: 3
webflow: profile (99.548ms) , parent id: 3, span id: 4
info 9.087ms
tomcat-jbossclient (74.157ms) , parent id: 4, span id: 5
jboss-remotesrv (69.728ms) , parent id: 5, span id: 6
jdbc-postresql (55.106ms) , parent id: 6, span id: 7

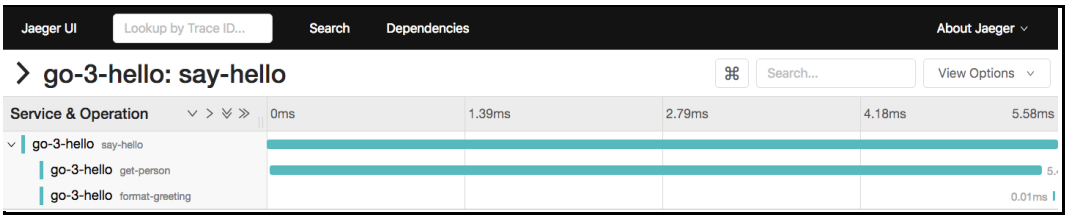

client
Clock skew.
info 0.196ms
info 0.538ms
server
client
info 0.196ms
info 0.538ms
server
δ_1
δ_2
Time

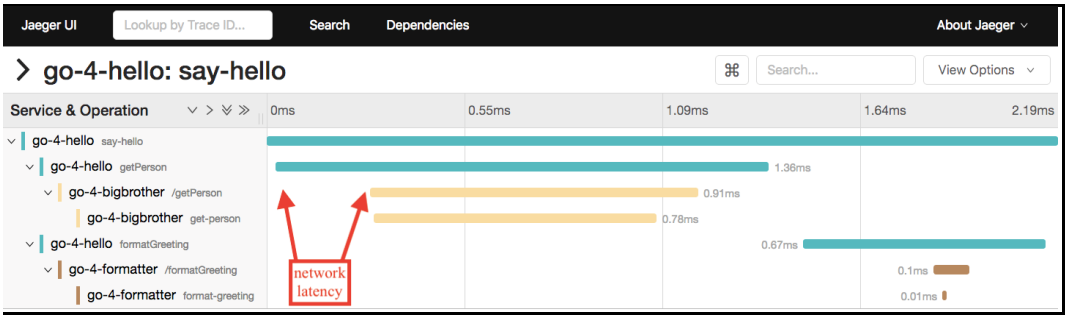
Chapter 4: Instrumentation Basics with OpenTracing

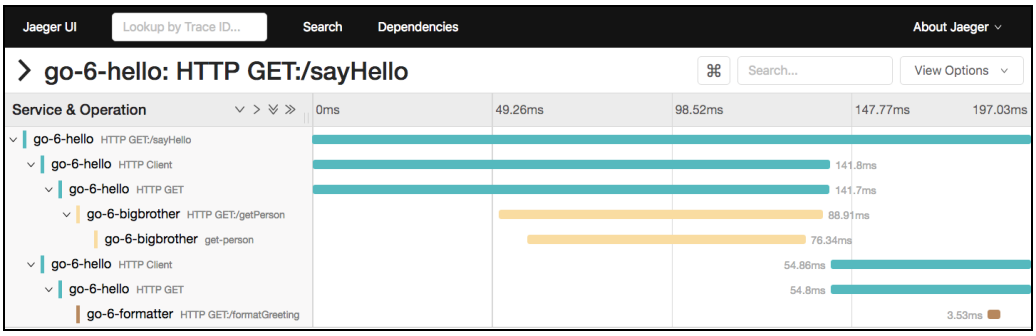


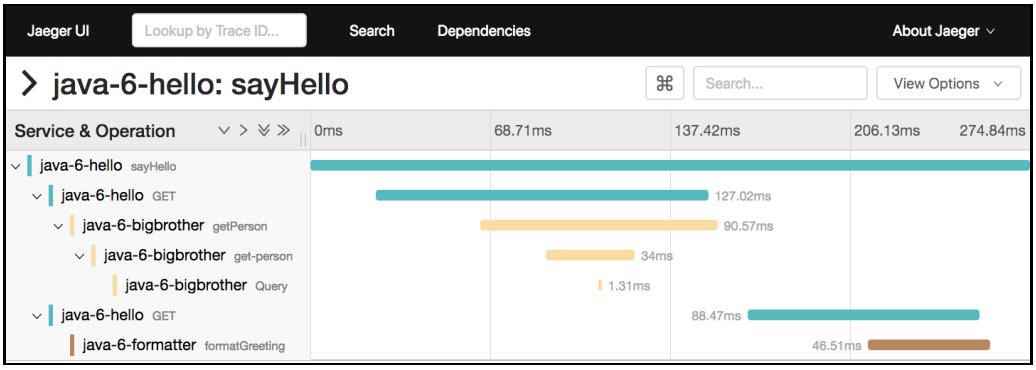


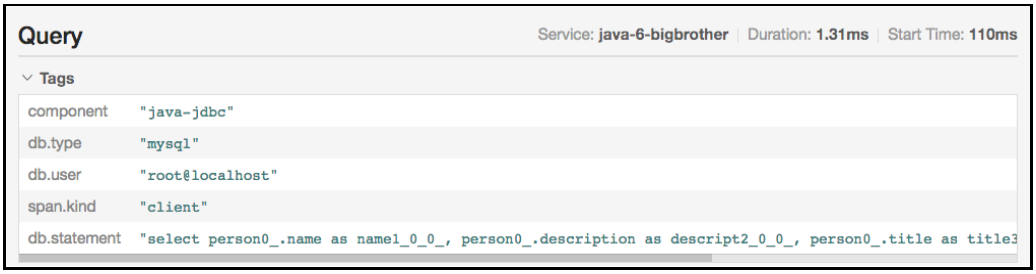

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
go-2-hello: say-hello
Search...
View Options
Service & Operation
0ms
1.01ms
2.03ms
3.04ms
4.06ms
go-2-hello say-hello
say-hello
Service: go-2-hello
Duration: 4.06ms
Start Time: 0ms
Tags
sampler.type "const"
sampler.param true
response "Hello, Felonius Gru! Where are the minions?"
Process: client-uuid = 785c3e17d7e20893 hostname = ip = 192.168.1.10 jaeger.version = Go-2...
Logs (1)
4.03ms: description = Where are the minions? name = Gru title = Felonius
Log timestamps are relative to the start time of the full trace.
SpanID: 7e1b3828b0bc1dac

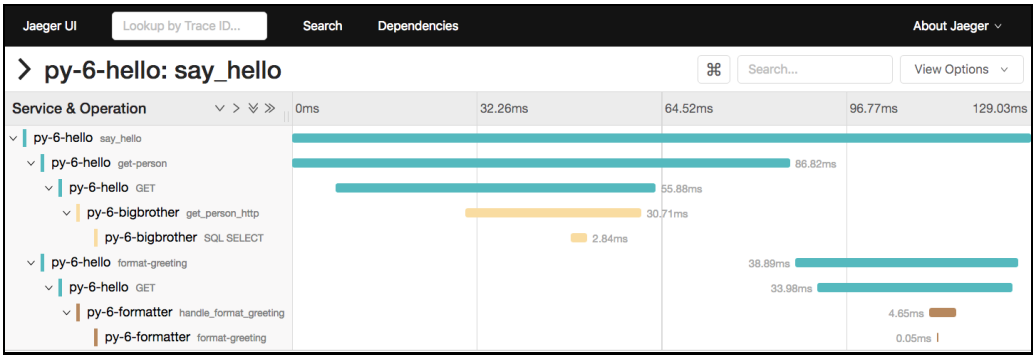

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
go-3-hello: say-hello
Search...
View Options
Service & Operation
0ms
1.39ms
2.79ms
4.18ms
5.58ms
go-3-hello say-hello
go-3-hello get-person
go-3-hello format-greeting
0.01ms


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
go-4-hello: say-hello
Search...
View Options
Service & Operation
0ms
0.55ms
1.09ms
1.64ms
2.19ms
go-4-hello say-hello
go-4-hello getPerson
go-4-bigbrother /getPerson
go-4-bigbrother get-person
go-4-hello formatGreeting
go-4-formatter /formatGreeting
go-4-formatter format-greeting
1.36ms
0.91ms
0.78ms
0.67ms
0.1ms
0.01ms
network latency

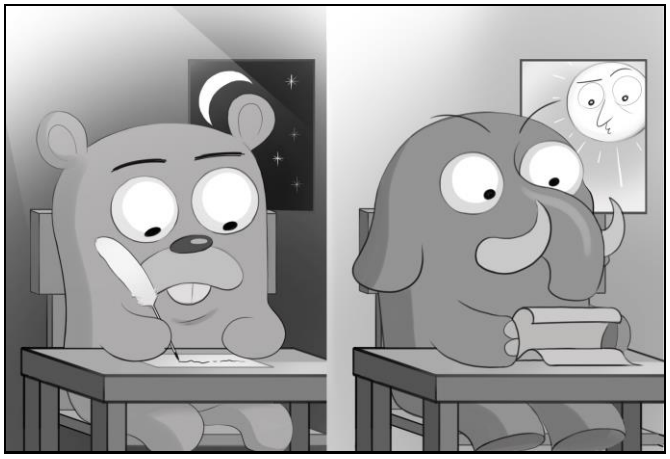

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
go-6-hello: HTTP GET:/sayHello
Search...
View Options
Service & Operation
0ms
49.26ms
98.52ms
147.77ms
197.03ms
go-6-hello HTTP GET:/sayHello
go-6-hello HTTP Client
141.8ms
go-6-hello HTTP GET
141.7ms
go-6-bigbrother HTTP GET:/getPerson
88.91ms
go-6-bigbrother get-person
76.34ms
go-6-hello HTTP Client
54.86ms
go-6-hello HTTP GET
54.8ms
go-6-formatter HTTP GET:/formatGreeting
3.53ms

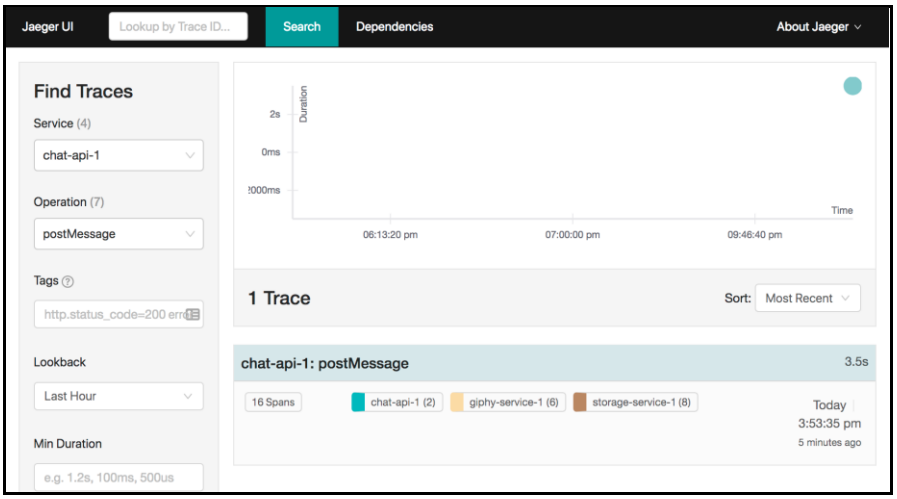

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
java-6-hello: sayHello
Search...
View Options
Service & Operation
0ms
68.71ms
137.42ms
206.13ms
274.84ms
java-6-hello sayHello
java-6-hello GET
127.02ms
java-6-bigbrother getPerson
90.57ms
java-6-bigbrother get-person
34ms
java-6-bigbrother Query
1.31ms
java-6-hello GET
88.47ms
java-6-formatter formatGreeting
46.51ms

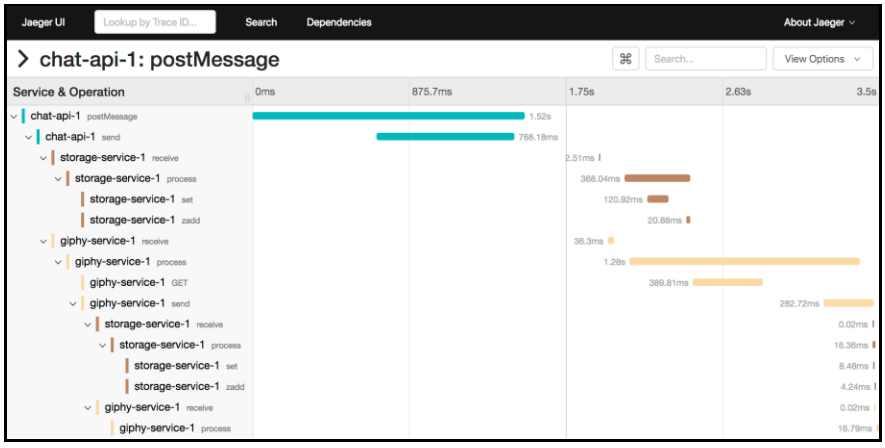

Query
Service: java-6-bigbrother | Duration: 1.31ms | Start Time: 110ms
Tags
component "java-jdbc"
db.type "mysql"
db.user "root@localhost"
span.kind "client"
db.statement "select person0_.name as name1_0_0_, person0_.description as descript2_0_0_, person0_.title as title3

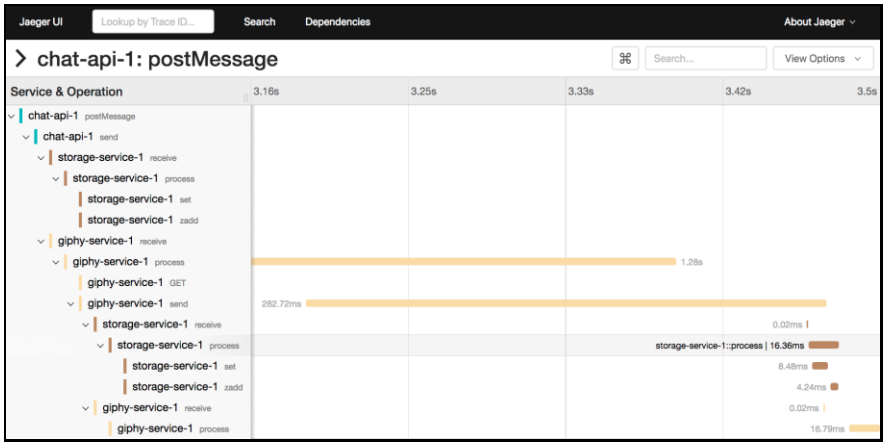

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
py-6-hello: say_hello
Search...
View Options
Service & Operation
0ms
32.26ms
64.52ms
96.77ms
129.03ms
py-6-hello say_hello
py-6-hello get-person
86.82ms
py-6-hello GET
55.88ms
py-6-bigbrother get_person_http
30.71ms
py-6-bigbrother SQL SELECT
2.84ms
py-6-hello format-greeting
38.89ms
py-6-hello GET
33.98ms
py-6-formatter handle_format_greeting
4.65ms
py-6-formatter format-greeting
0.05ms

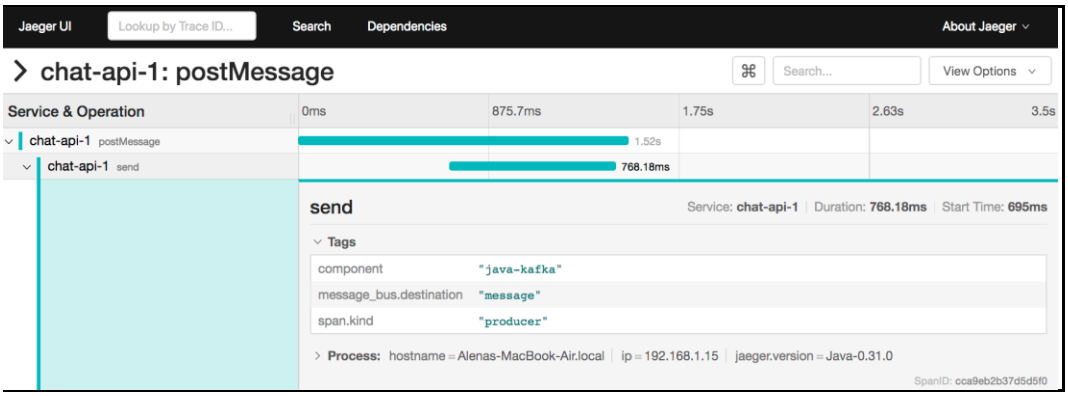
Chapter 5: Instrumentation of Asynchronous Applications

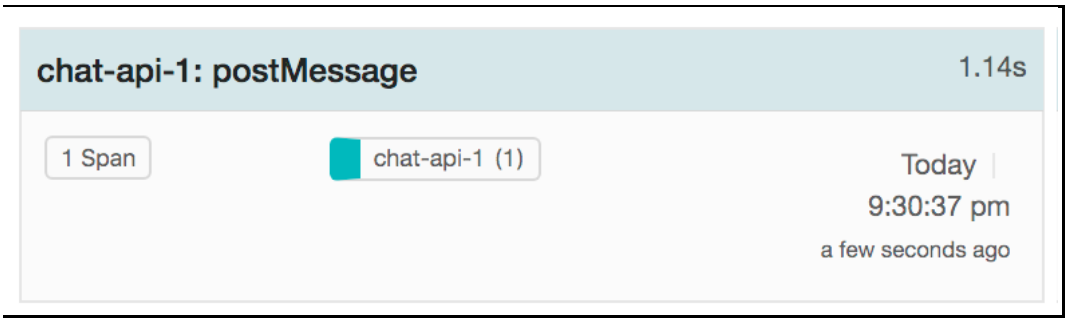


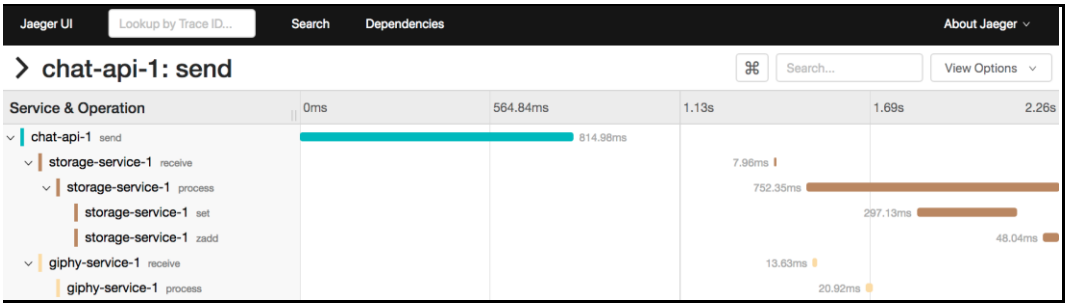

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Find Traces
Service (4)
chat-api-1
Operation (7)
postMessage
Tags
http.status_code=200 err
Lookback
Last Hour
Min Duration
e.g. 1.2s, 100ms, 500us
Duration
2s
0ms
!000ms
Time
06:13:20 pm
07:00:00 pm
09:46:40 pm
1 Trace
Sort:
Most Recent
chat-api-1: postMessage
3.5s
16 Spans
chat-api-1 (2)
giphy-service-1 (6)
storage-service-1 (8)
Today
3:53:35 pm
5 minutes ago


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
chat-api-1: postMessage
Search...
View Options
Service & Operation
0ms
875.7ms
1.75s
2.63s
3.5s
chat-api-1 postMessage
chat-api-1 send
storage-service-1 receive
storage-service-1 process
storage-service-1 set
storage-service-1 zadd
giphy-service-1 receive
giphy-service-1 process
giphy-service-1 GET
giphy-service-1 send
storage-service-1 receive
storage-service-1 process
storage-service-1 set
storage-service-1 zadd
giphy-service-1 receive
giphy-service-1 process
1.52s
768.18ms
2.51ms
368.04ms
120.92ms
20.88ms
36.3ms
1.28s
389.81ms
282.72ms
0.02ms
16.36ms
8.48ms
4.24ms
0.02ms
16.79ms

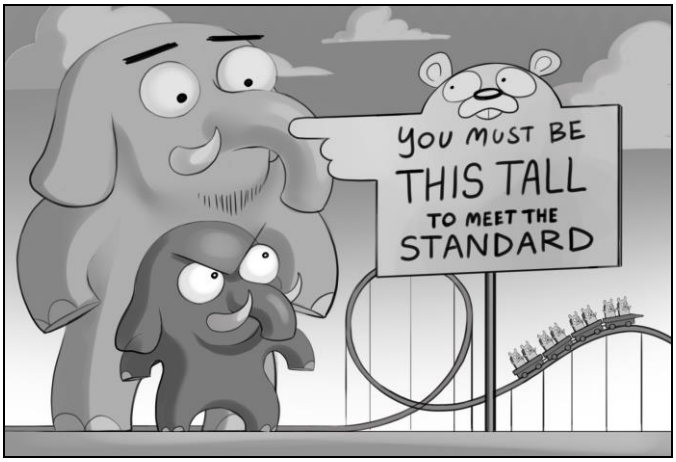

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
chat-api-1: postMessage
Search...
View Options
Service & Operation
3.16s
3.25s
3.33s
3.42s
3.5s
chat-api-1 postMessage
chat-api-1 send
storage-service-1 receive
storage-service-1 process
storage-service-1 set
storage-service-1 zadd
giphy-service-1 receive
giphy-service-1 process
giphy-service-1 GET
giphy-service-1 send
storage-service-1 receive
storage-service-1 process
storage-service-1 set
storage-service-1 zadd
giphy-service-1 receive
giphy-service-1 process
1.28s
282.72ms
0.02ms
storage-service-1::process | 16.36ms
8.48ms
4.24ms
0.02ms
16.79ms

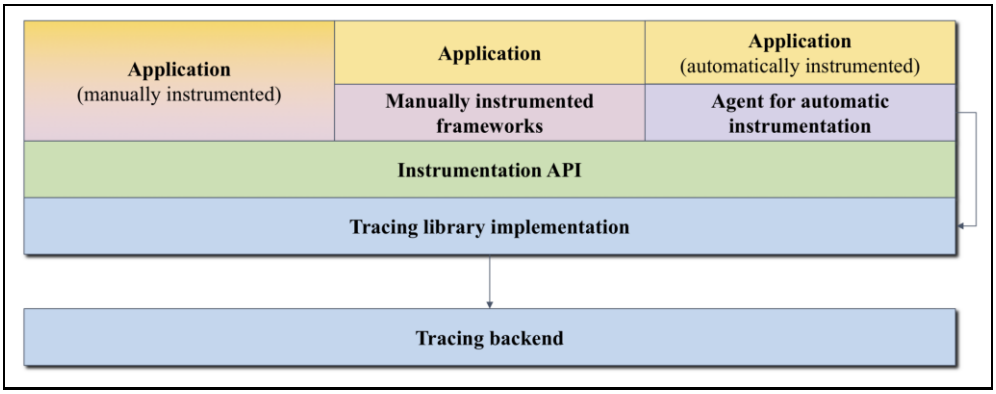

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
chat-api-1: postMessage
Search...
View Options
Service & Operation
0ms
875.7ms
1.75s
2.63s
3.5s
chat-api-1 postMessage
1.52s
chat-api-1 send
768.18ms
send
Service: chat-api-1 | Duration: 768.18ms | Start Time: 695ms
Tags
component "java-kafka"
message_bus.destination "message"
span.kind "producer"
Process: hostname = Alenas-MacBook-Air.local | ip = 192.168.1.15 | jaeger.version = Java-0.31.0
SpanID: cca9eb2b37d5d5f0

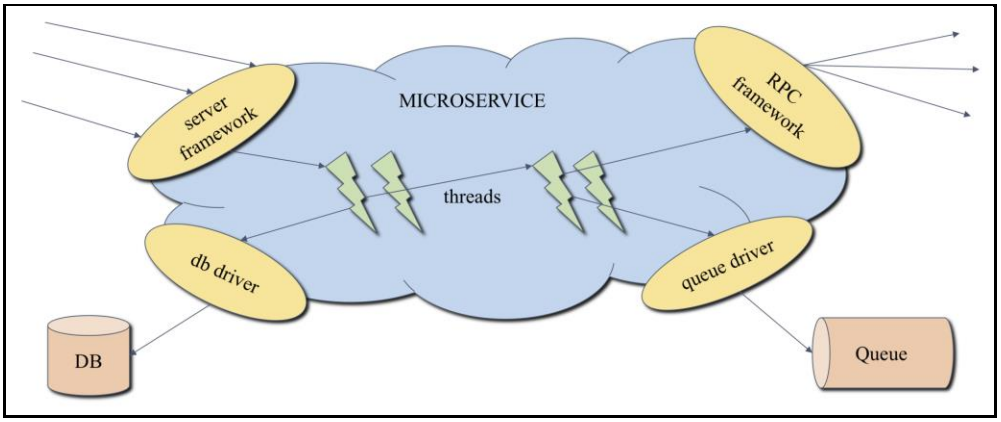

chat-api-1: postMessage
1.14s
1 Span
chat-api-1 (1)
Today
9:30:37 pm
a few seconds ago

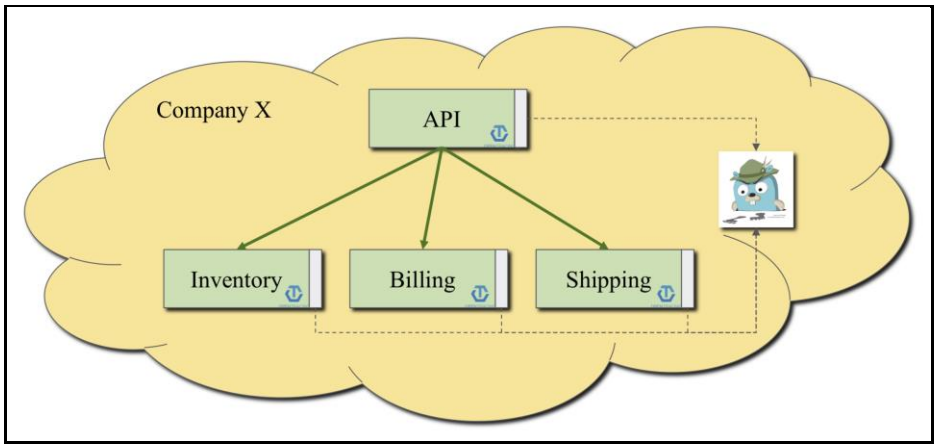

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
chat-api-1: send
Search...
View Options
Service & Operation
0ms
564.84ms
1.13s
1.69s
2.26s
chat-api-1 send
814.98ms
storage-service-1 receive
7.96ms
storage-service-1 process
752.35ms
storage-service-1 set
297.13ms
storage-service-1 zadd
48.04ms
giphy-service-1 receive
13.63ms
giphy-service-1 process
20.92ms

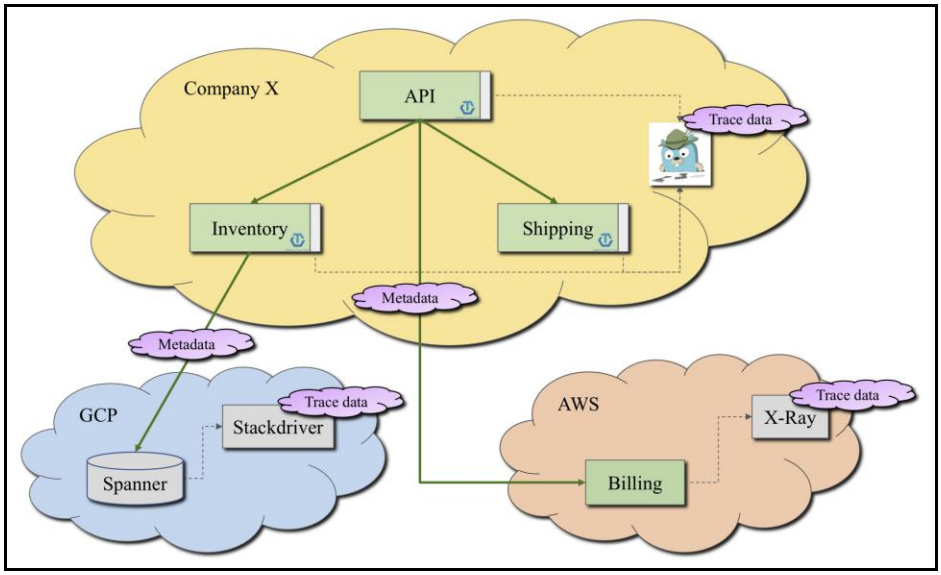
Chapter 6: Tracing Standards and Ecosystem

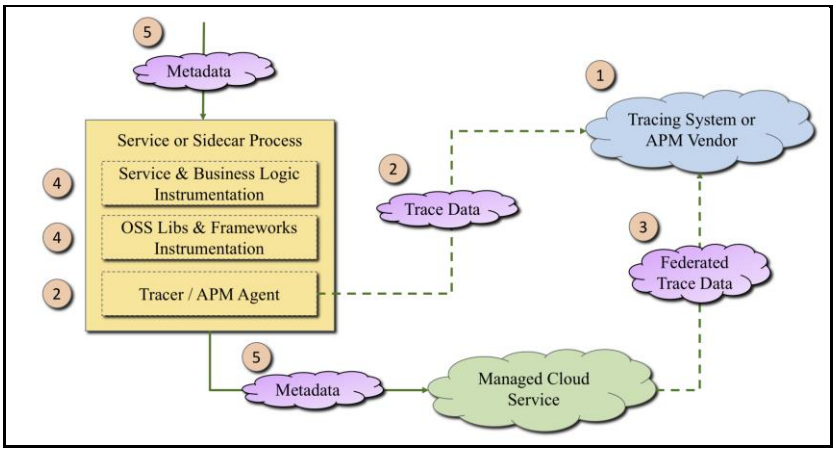


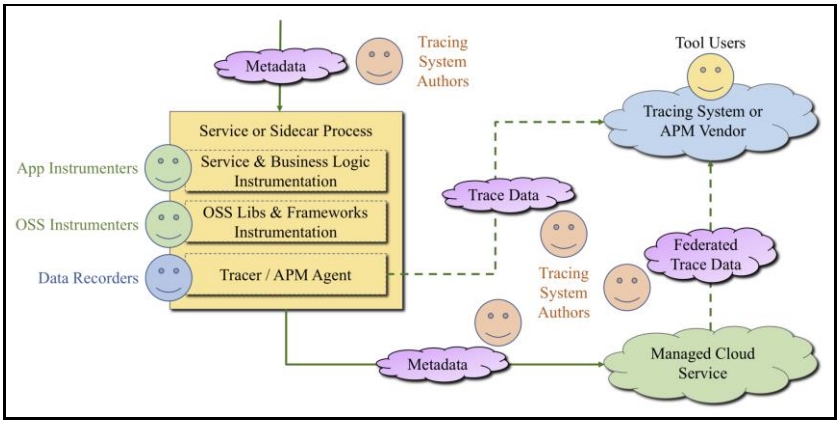


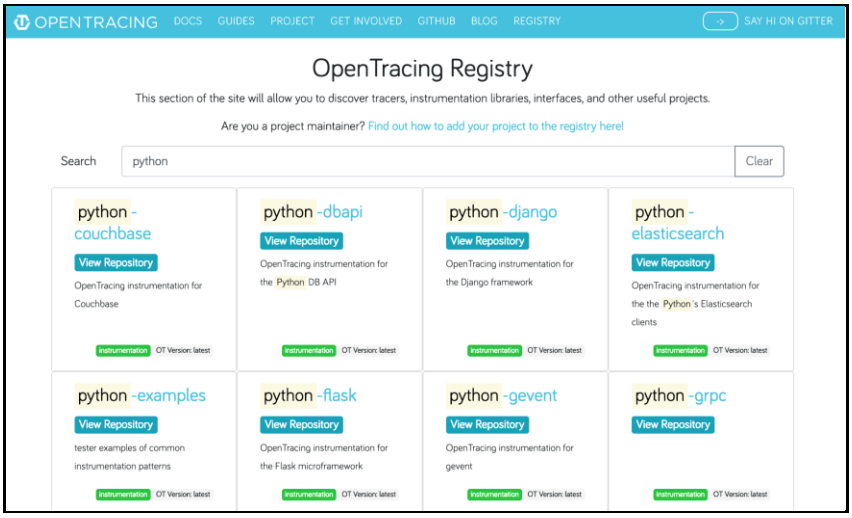



Company X
API
Inventory
Billing
Shipping

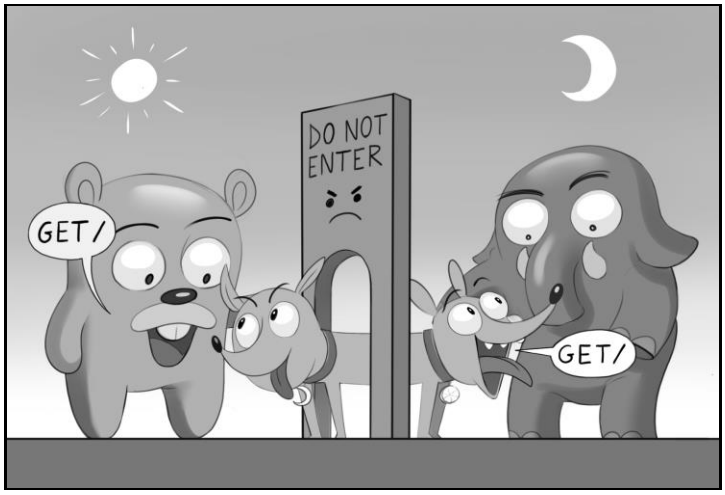

Company X
API
Trace data
Inventory
Shipping
Metadata
Metadata
GCP
Trace data
Stackdriver
Spanner
AWS
Trace data
X-Ray
Billing

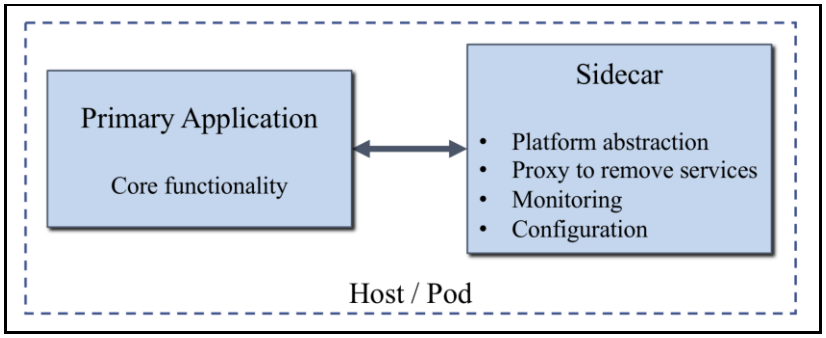

5
Metadata
1
Tracing System or APM Vendor
Service or Sidecar Process
Service & Business Logic Instrumentation
OSS Libs & Frameworks Instrumentation
Tracer / APM Agent
4
4
2
2
Trace Data
3
Federated Trace Data
5
Metadata
Managed Cloud Service

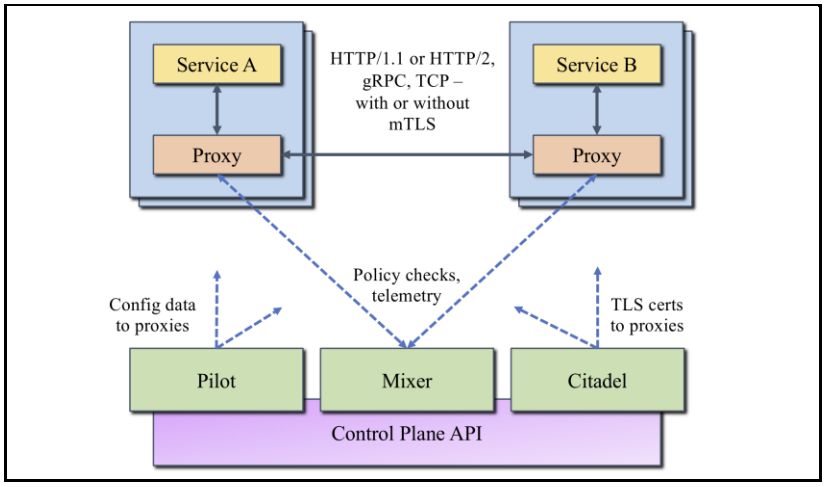

Metadata
Tracing System Authors
Tool Users
Tracing System or APM Vendor
Service or Sidecar Process
App Instrumenters
Service & Business Logic Instrumentation
OSS Instrumenters
OSS Libs & Frameworks Instrumentation
Data Recorders
Tracer / APM Agent
Trace Data
Federated Trace Data
Tracing System Authors
Metadata
Managed Cloud Service

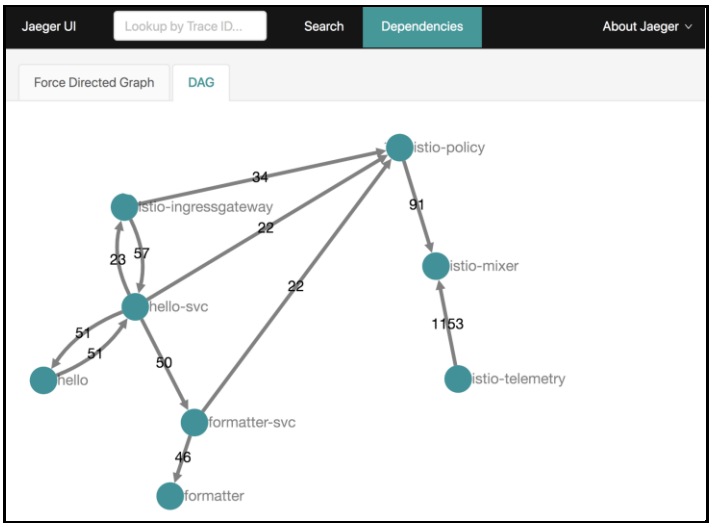

OPENTRACING
DOCS
GUIDES
PROJECT
GET INVOLVED
GITHUB
BLOG
REGISTRY
SAY HI ON GITTER
OpenTracing Registry
This section of the site will allow you to discover tracers, instrumentation libraries, interfaces, and other useful projects.
Are you a project maintainer? Find out how to add your project to the registry here!
Search
python
Clear
python-couchbase
View Repository
OpenTracing instrumentation for Couchbase
python-dbapi
View Repository
OpenTracing instrumentation for the Python DB API
python-django
View Repository
OpenTracing instrumentation for the Django framework
python-elasticsearch
View Repository
OpenTracing instrumentation for the the Python's Elasticsearch clients
python-examples
View Repository
tester examples of common instrumentation patterns
python-flask
View Repository
OpenTracing instrumentation for the Flask microframework
python-gevent
View Repository
OpenTracing instrumentation for gevent
python-grpc
View Repository

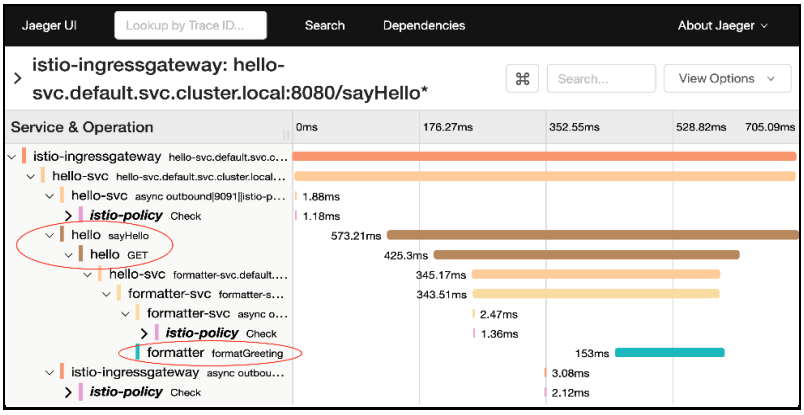
Chapter 7: Tracing with Service Mesh

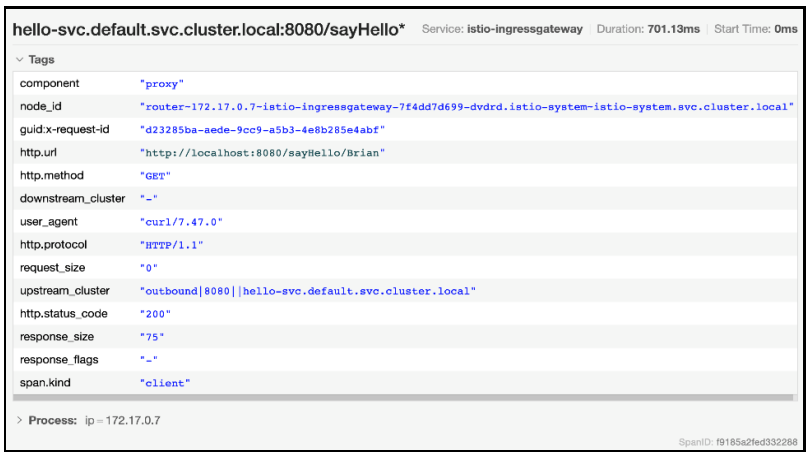


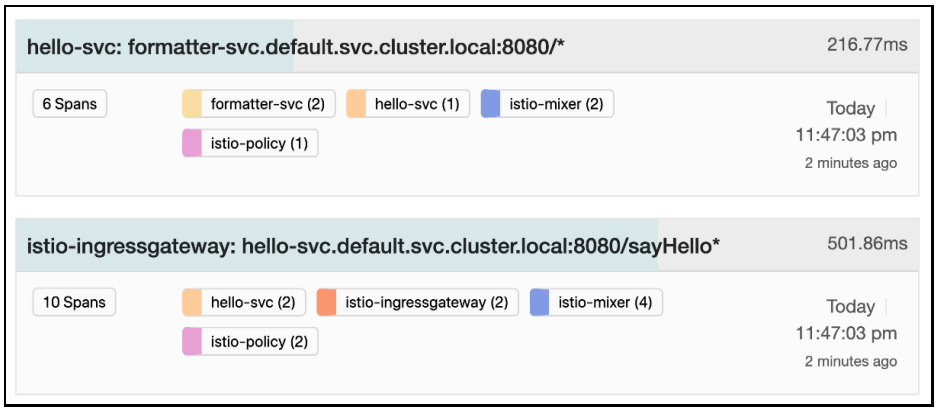


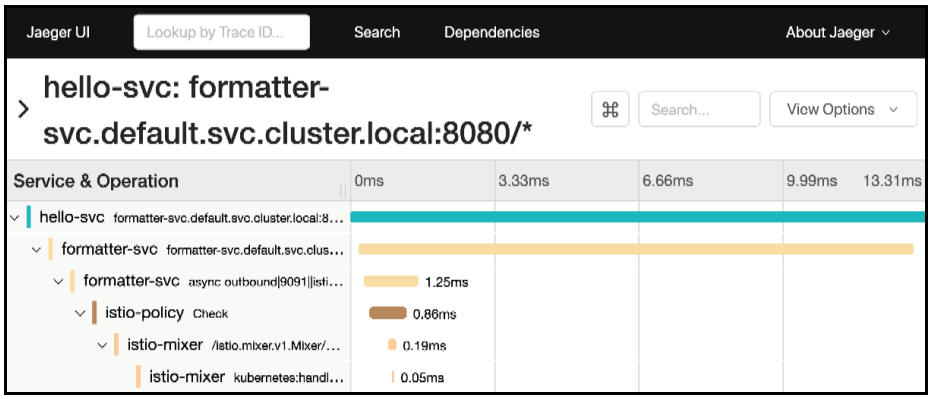


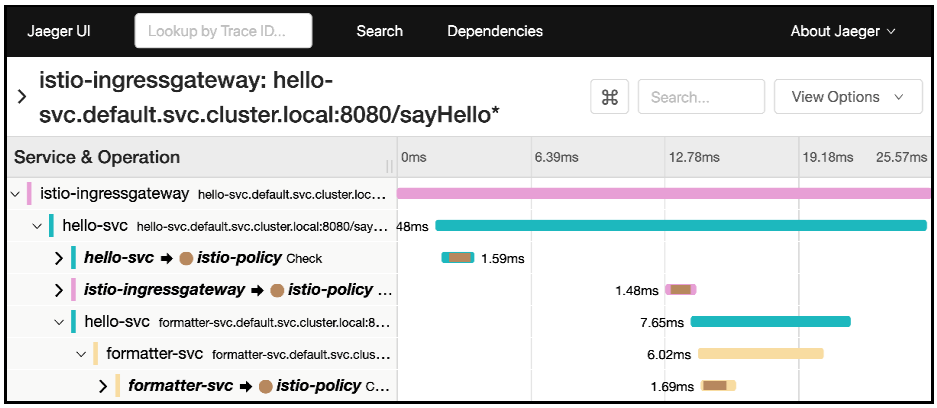

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Force Directed Graph
DAG
istio-policy
istio-ingressgateway
istio-mixer
hello-svc
hello
formatter-svc
formatter
istio-telemetry
34
91
22
23
57
22
51
51
50
1153
46

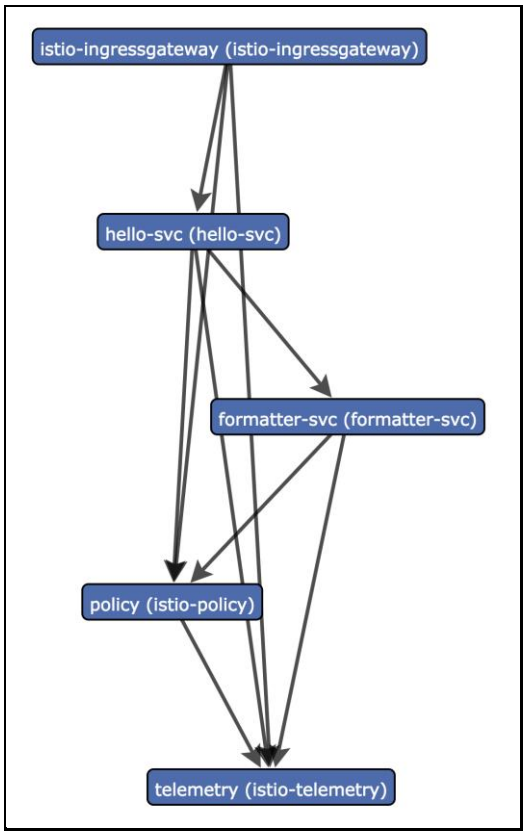

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
istio-ingressgateway: hello-svc.default.svc.cluster.local:8080/sayHello*
Search...
View Options
Service & Operation
0ms
176.27ms
352.55ms
528.82ms
705.09ms
istio-ingressgateway hello-svc.default.svc.c...
hello-svc hello-svc.default.svc.cluster.local...
hello-svc async outbound|9091||istio-p...
1.88ms
istio-policy Check
1.18ms
hello sayHello
573.21ms
hello GET
425.3ms
hello-svc formatter-svc.default....
345.17ms
formatter-svc formatter-s...
343.51ms
formatter-svc async o...
2.47ms
istio-policy Check
1.36ms
formatter formatGreeting
153ms
istio-ingressgateway async outbou...
3.08ms
istio-policy Check
2.12ms

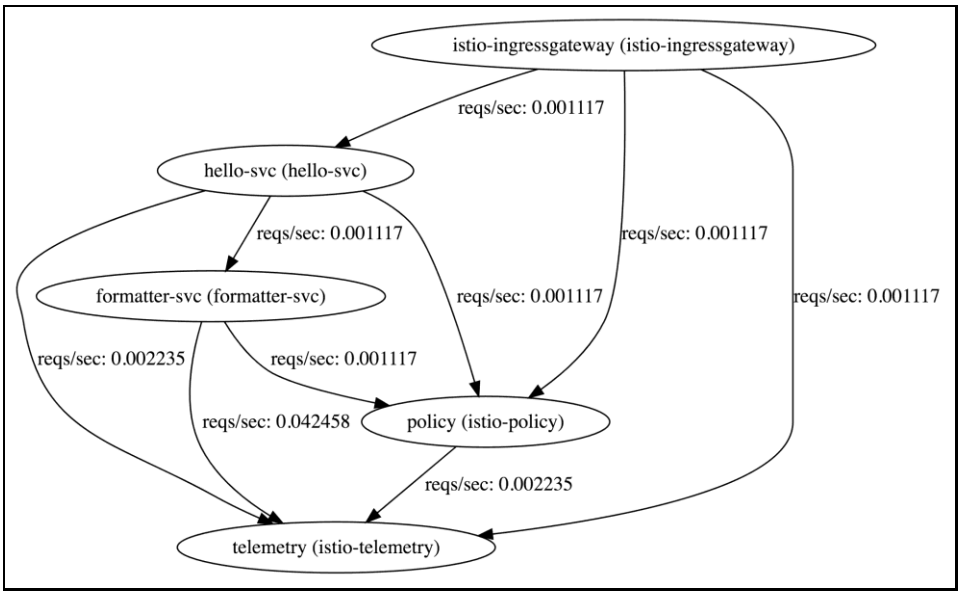

hello-svc.default.svc.cluster.local:8080/sayHello*
Service: istio-ingressgateway
Duration: 701.13ms
Start Time: 0ms
Tags
component "proxy"
node_id "router~172.17.0.7~istio-ingressgateway-7f4dd7d699-dvdrd.istio-system~istio-system.svc.cluster.local"
guid:x-request-id "d23285ba-aede-9cc9-a5b3-4e8b285e4abf"
http.url "http://localhost:8080/sayHello/Brian"
http.method "GET"
downstream_cluster "-"
user_agent "curl/7.47.0"
http.protocol "HTTP/1.1"
request_size "0"
upstream_cluster "outbound|8080||hello-svc.default.svc.cluster.local"
http.status_code "200"
response_size "75"
response_flags "-"
span.kind "client"
Process: ip = 172.17.0.7
SpanID: f9185a2fed332288

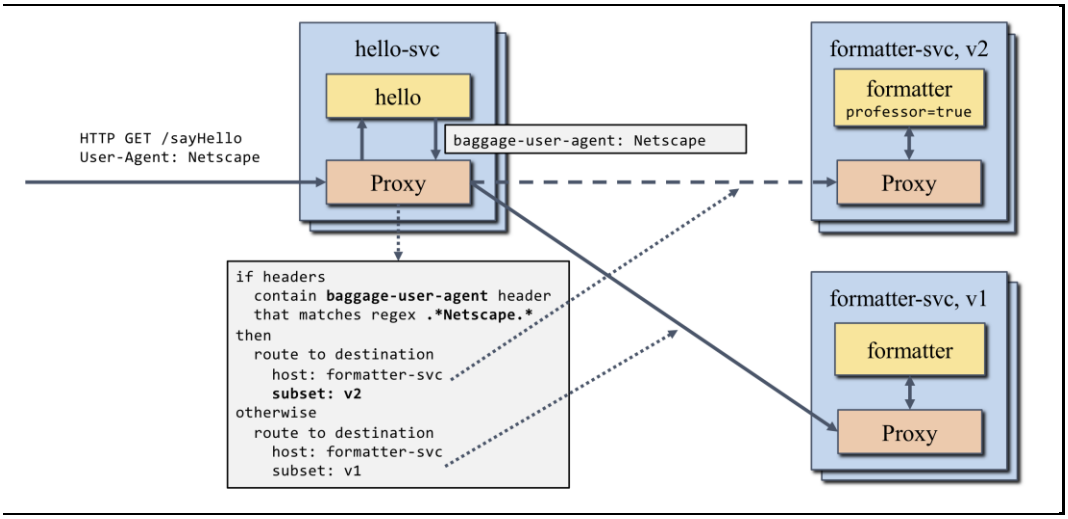

hello-svc: formatter-svc.default.svc.cluster.local:8080/*
216.77ms
6 Spans
formatter-svc (2)
hello-svc (1)
istio-mixer (2)
istio-policy (1)
Today
11:47:03 pm
2 minutes ago
istio-ingressgateway: hello-svc.default.svc.cluster.local:8080/sayHello*
501.86ms
10 Spans
hello-svc (2)
istio-ingressgateway (2)
istio-mixer (4)
istio-policy (2)
Today
11:47:03 pm
2 minutes ago


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
hello-svc: formatter-svc.default.svc.cluster.local:8080/*
Search...
View Options
Service & Operation
0ms
3.33ms
6.66ms
9.99ms
13.31ms
hello-svc formatter-svc.default.svc.cluster.local:8...
formatter-svc formatter-svc.default.svc.clus...
formatter-svc async outbound|9091||isti...
1.25ms
istio-policy Check
0.86ms
istio-mixer /istio.mixer.v1.Mixer/...
0.19ms
istio-mixer kubernetes:handl...
0.05ms

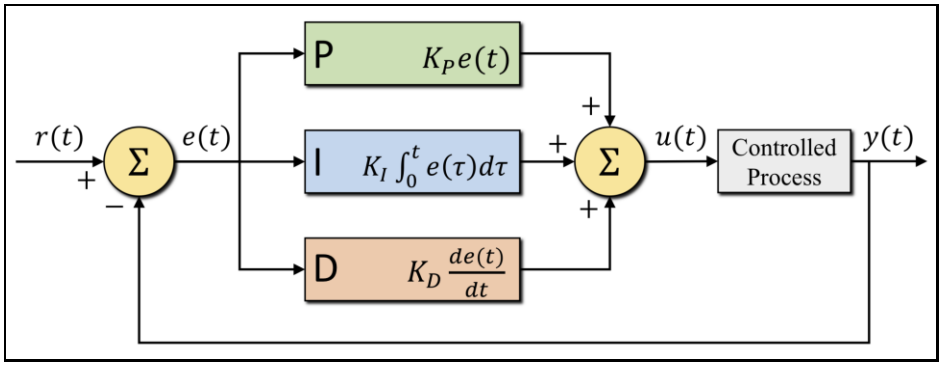

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
istio-ingressgateway: hello-svc.default.svc.cluster.local:8080/sayHello*
Search...
View Options
Service & Operation
0ms
6.39ms
12.78ms
19.18ms
25.57ms
istio-ingressgateway hello-svc.default.svc.cluster.loc...
hello-svc hello-svc.default.svc.cluster.local:8080/say...
48ms
hello-svc → istio-policy Check
1.59ms
istio-ingressgateway → istio-policy ...
1.48ms
hello-svc formatter-svc.default.svc.cluster.local:8...
7.65ms
formatter-svc formatter-svc.default.svc.clus...
6.02ms
formatter-svc → istio-policy C...
1.69ms

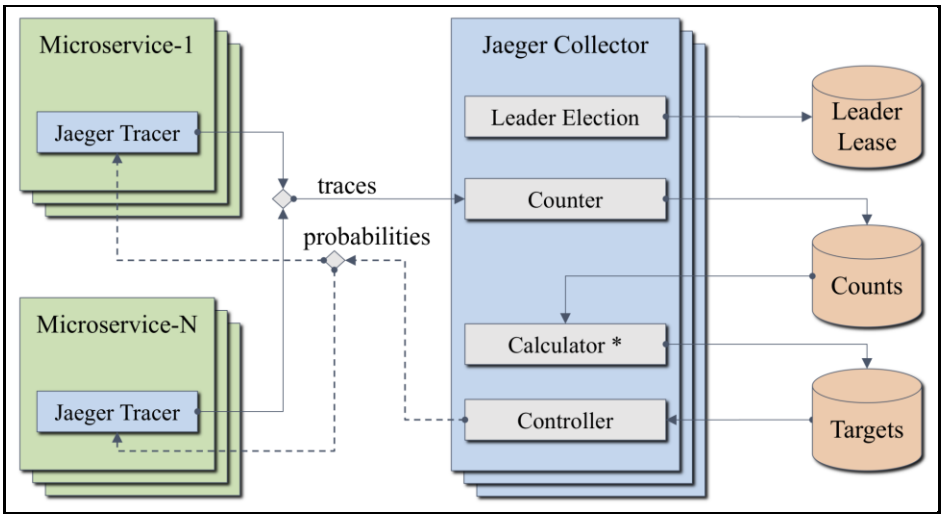

istio-ingressgateway (istio-ingressgateway)
hello-svc (hello-svc)
formatter-svc (formatter-svc)
policy (istio-policy)
telemetry (istio-telemetry)

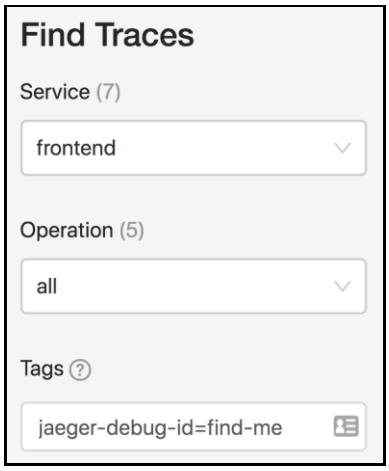

istio-ingressgateway (istio-ingressgateway)
reqs/sec: 0.001117
hello-svc (hello-svc)
reqs/sec: 0.001117
reqs/sec: 0.001117
reqs/sec: 0.001117
formatter-svc (formatter-svc)
reqs/sec: 0.002235
reqs/sec: 0.001117
reqs/sec: 0.042458
policy (istio-policy)
reqs/sec: 0.002235
telemetry (istio-telemetry)

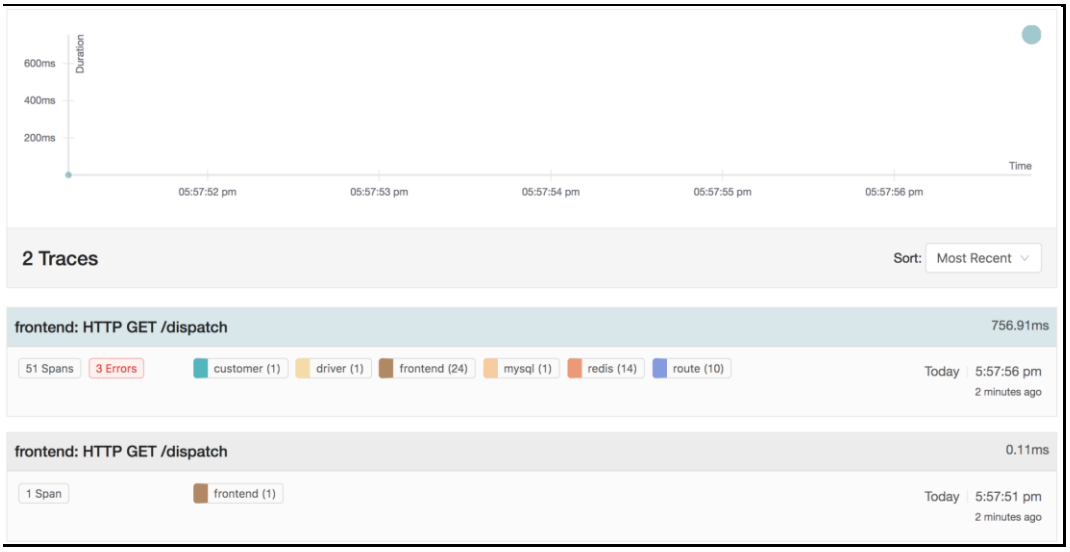

hello-svc
hello
HTTP GET /sayHello
User-Agent: Netscape
baggage-user-agent: Netscape
Proxy
formatter-svc, v2
formatter
professor=true
Proxy
if headers
contain baggage-user-agent header
that matches regex .*Netscape.*
then
route to destination
host: formatter-svc
subset: v2
otherwise
route to destination
host: formatter-svc
subset: v1
formatter-svc, v1
formatter
Proxy

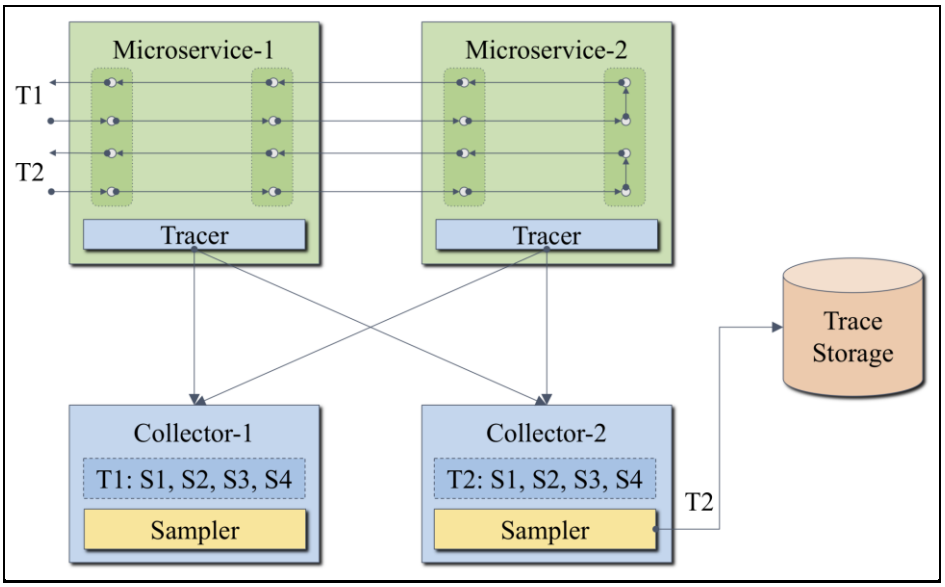
Chapter 8: All About Sampling



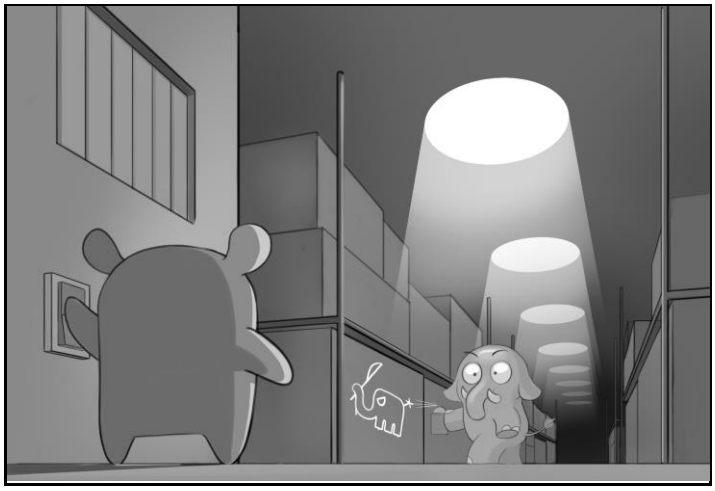


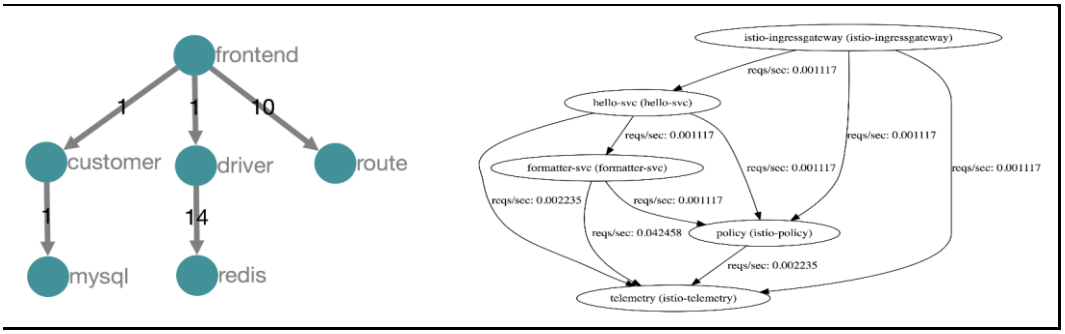

Find Traces
Service (7)
frontend
Operation (5)
all
Tags
jaeger-debug-id=find-me

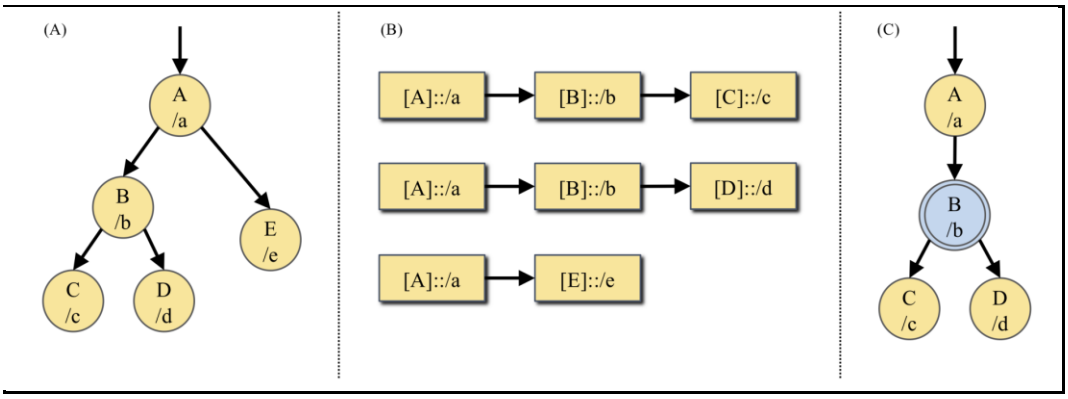

Duration
600ms
400ms
200ms
Time
05:57:52 pm
05:57:53 pm
05:57:54 pm
05:57:55 pm
05:57:56 pm
2 Traces
Sort: Most Recent
frontend: HTTP GET /dispatch
756.91ms
51 Spans
3 Errors
customer (1)
driver (1)
frontend (24)
mysql (1)
redis (14)
route (10)
Today 5:57:56 pm
2 minutes ago
frontend: HTTP GET /dispatch
0.11ms
1 Span
frontend (1)
Today 5:57:51 pm
2 minutes ago

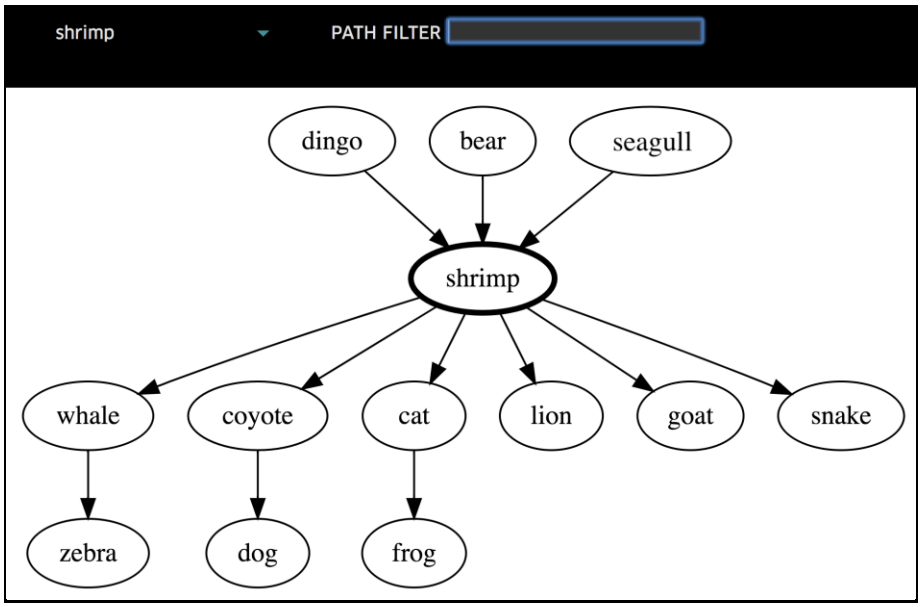

Microservice-1
Microservice-2
T1
T2
Tracer
Tracer
Trace
Storage
Collector-1
T1: S1, S2, S3, S4
Sampler
Collector-2
T2: S1, S2, S3, S4
Sampler
T2

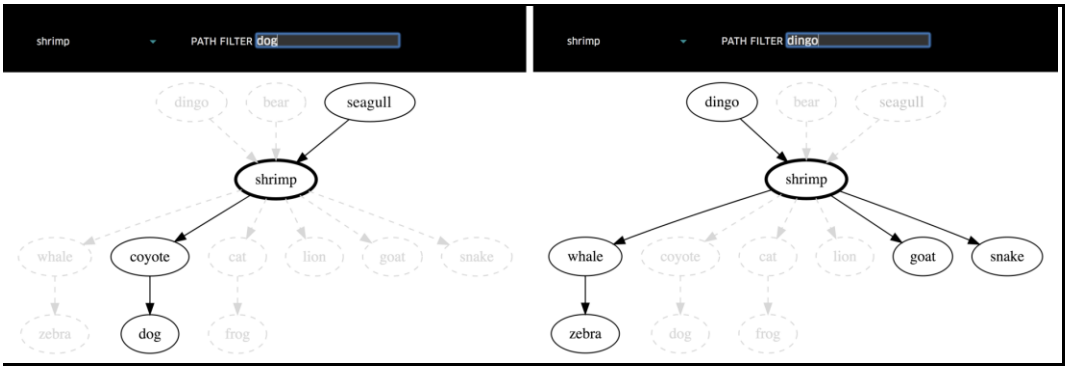
Chapter 9: Turning the Lights On

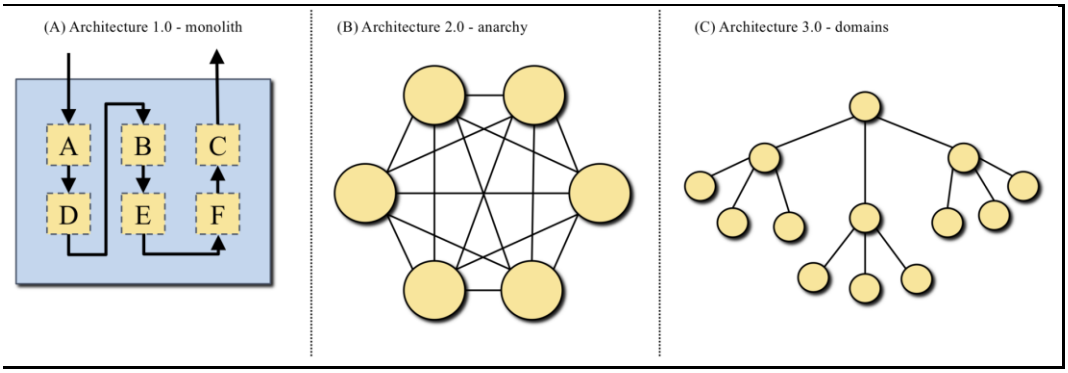


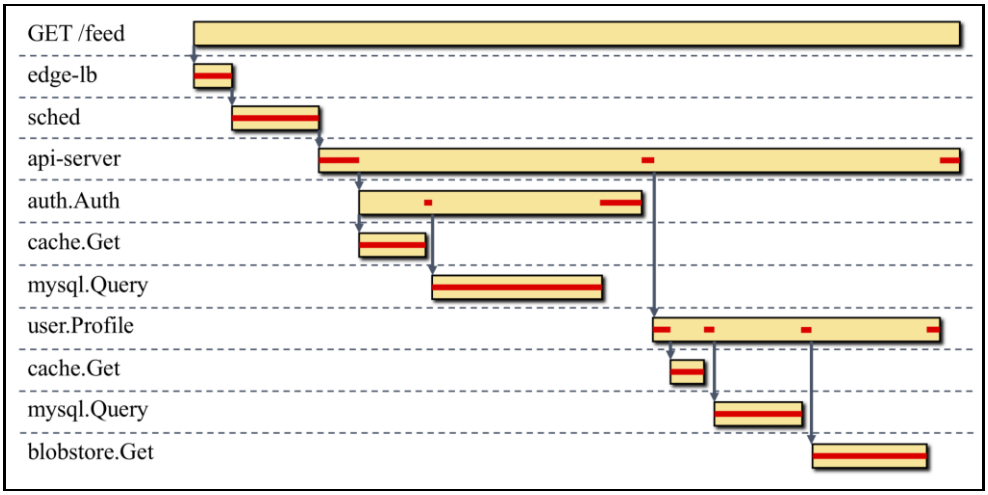


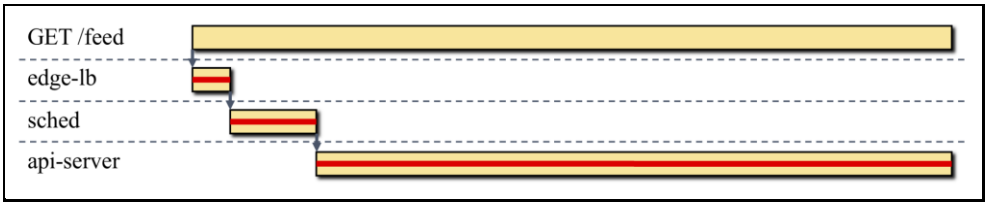


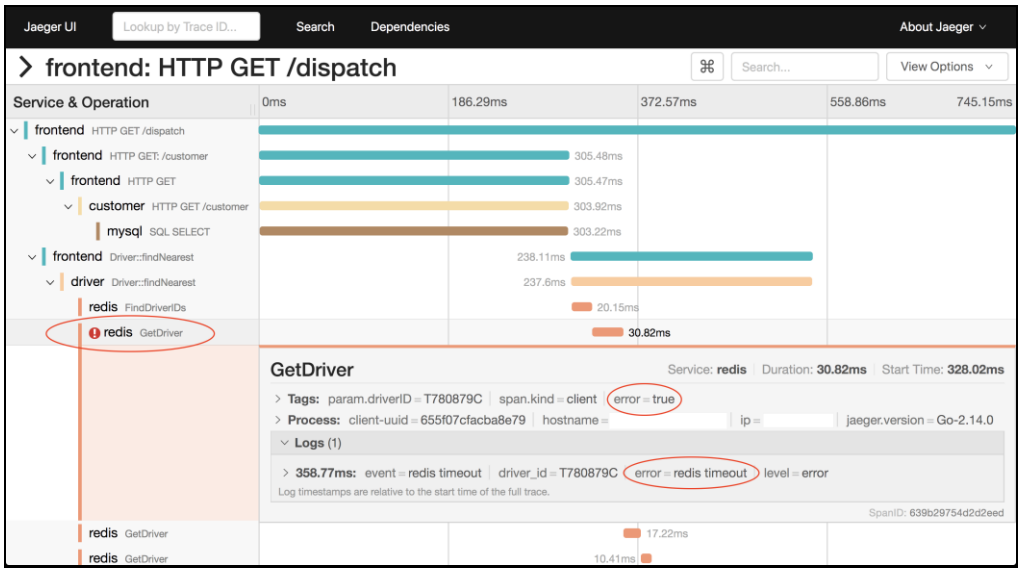

shrimp
PATH FILTER
dingo
bear
seagull
shrimp
whale
coyote
cat
lion
goat
snake
zebra
dog
frog

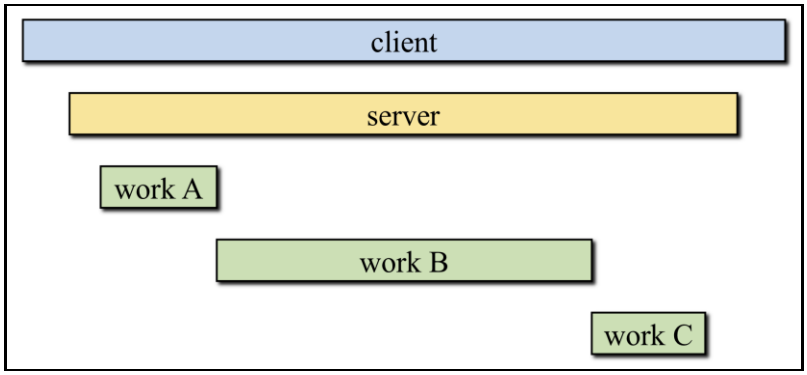

shrimp
PATH FILTER dog
dingo
bear
seagull
shrimp
whale
coyote
cat
lion
goat
snake
zebra
dog
frog
shrimp
PATH FILTER dingo
dingo
bear
seagull
shrimp
whale
coyote
cat
lion
goat
snake
zebra
dog
frog

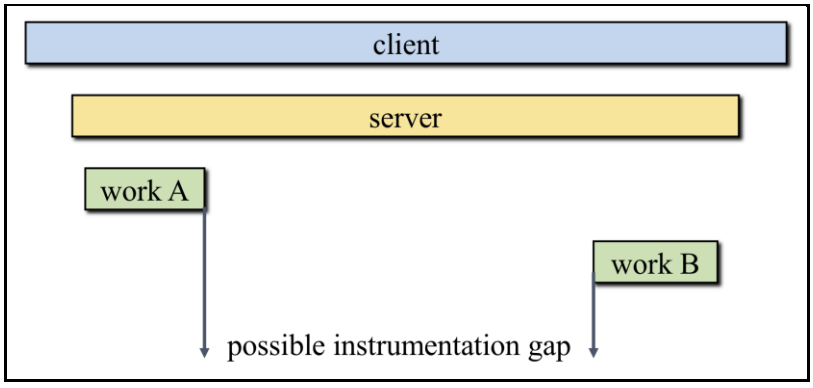

(A) Architecture 1.0 - monolith
A
B
C
D
E
F
(B) Architecture 2.0 - anarchy
(C) Architecture 3.0 - domains

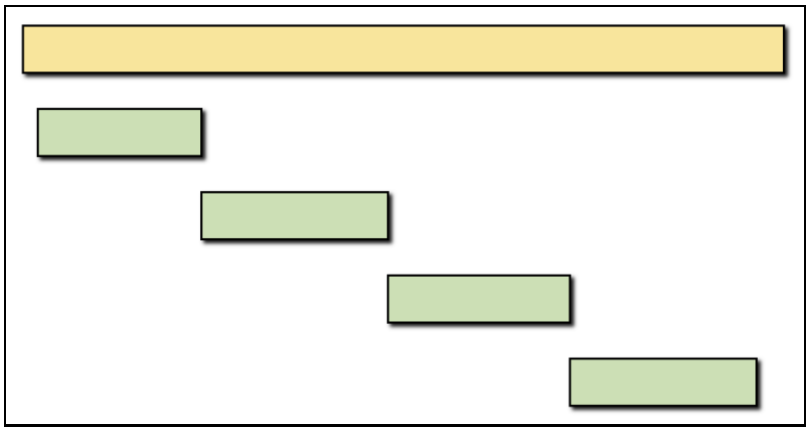

GET /feed
edge-lb
sched
api-server
auth.Auth
cache.Get
mysql.Query
user.Profile
cache.Get
mysql.Query
blobstore.Get

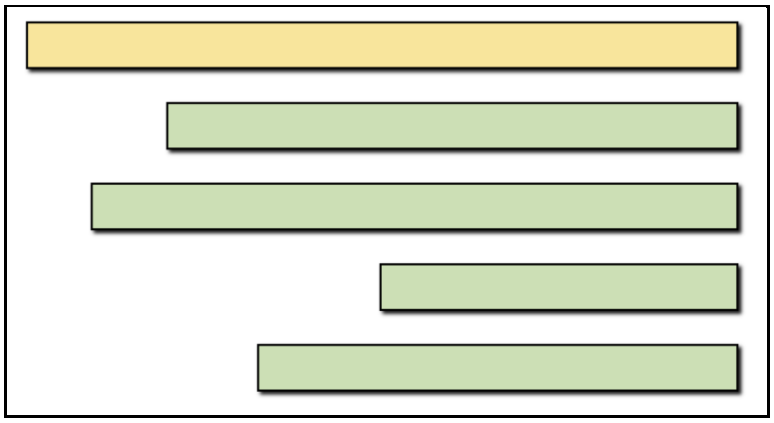

GET /feed
edge-lb
sched
api-server


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
frontend: HTTP GET /dispatch
Search...
View Options
Service & Operation
0ms
186.29ms
372.57ms
558.86ms
745.15ms
frontend HTTP GET /dispatch
frontend HTTP GET: /customer
305.48ms
frontend HTTP GET
305.47ms
customer HTTP GET /customer
303.92ms
mysql SQL SELECT
303.22ms
frontend Driver::findNearest
238.11ms
driver Driver::findNearest
237.6ms
redis FindDriverIDs
20.15ms
redis GetDriver
30.82ms
GetDriver
Service: redis
Duration: 30.82ms
Start Time: 328.02ms
Tags: param.driverID = T780879C
span.kind = client
error = true
Process: client-uuid = 655f07cfacba8e79
hostname =
ip =
jaeger.version = Go-2.14.0
Logs (1)
358.77ms: event = redis timeout
driver_id = T780879C
error = redis timeout
level = error
Log timestamps are relative to the start time of the full trace.
SpanID: 639b29754d2d2eed
redis GetDriver
17.22ms
redis GetDriver
10.41ms

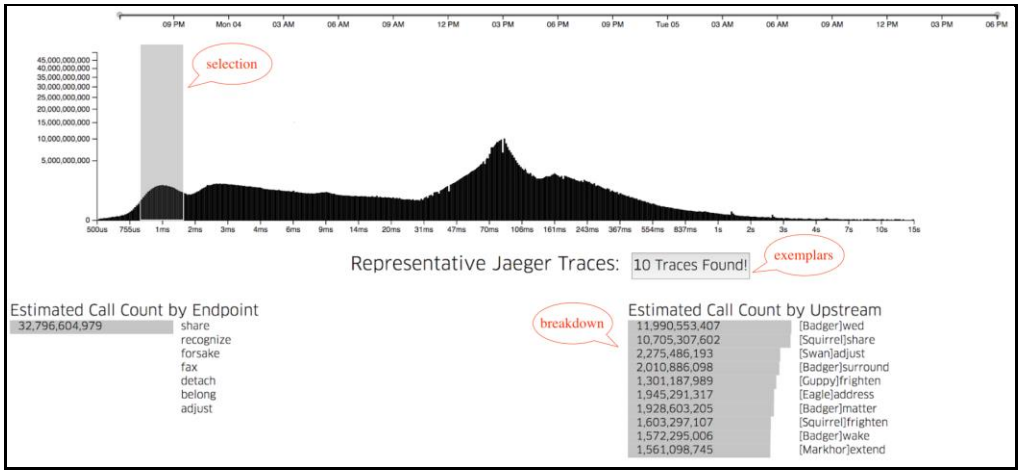

client
server
work A
work B
work C

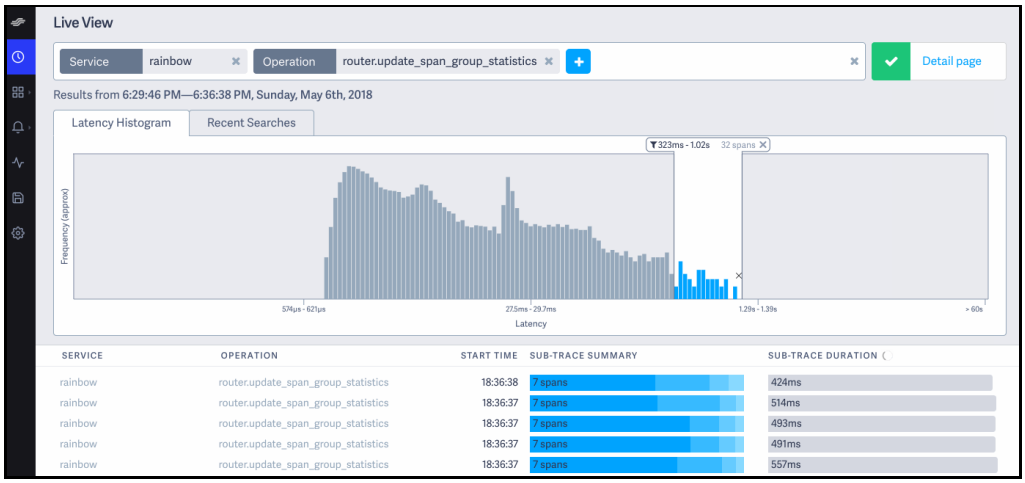

client
server
work A
work B
possible instrumentation gap



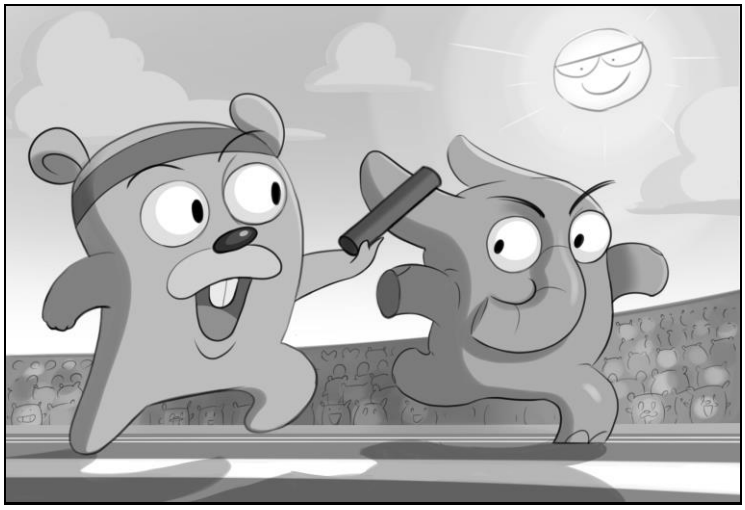


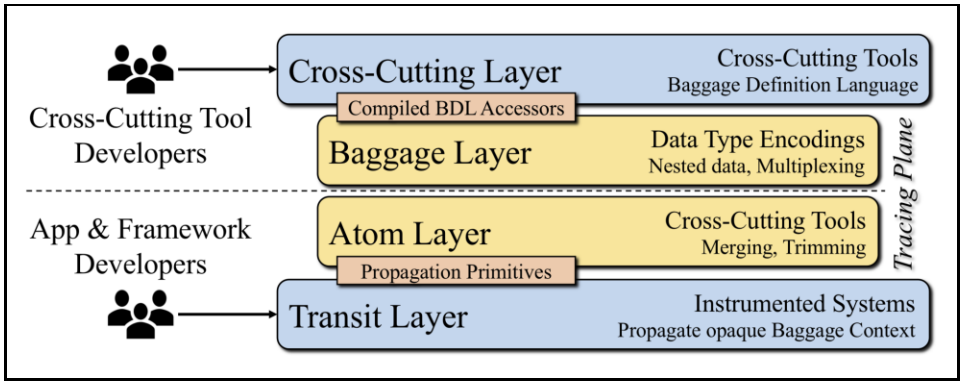

Service Dashboard
Oct 17, 2018 15:10:27 to Oct 17, 2018 17:10:27
API Proxy
API Proxy p50
API Proxy p99
API Proxy p99.9
API Proxy p99.99
API Proxy traces
Error Traces
Error Traces p95
Error Traces p99
Error Traces p99.99
Error Traces p50
Error Traces error traces
Geofencer
Geofencer p99.9
Geofencer p99.99
Geofencer p50
Geofencer p99
Geofencer traces
Charger
Charger p50
Charger p99
Charger p99.9
Charger p99.99
Charger traces

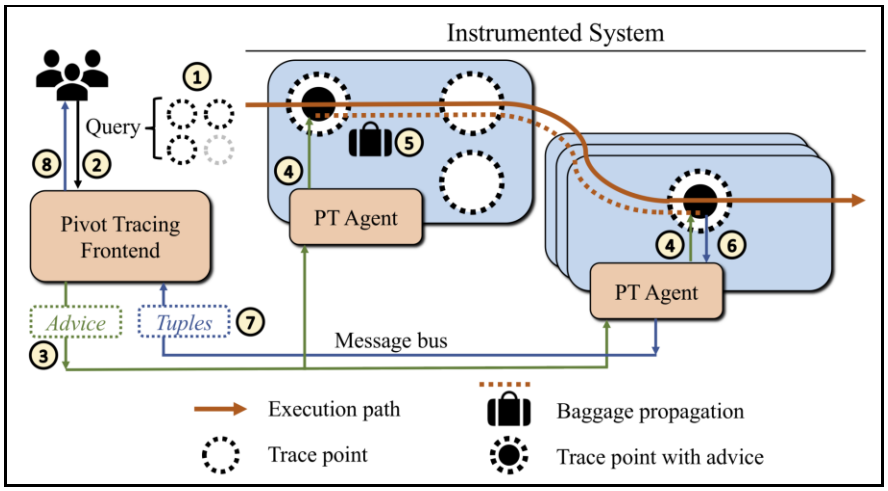

selection
Representative Jaeger Traces:
10 Traces Found!
exemplars
breakdown
Estimated Call Count by Endpoint
32,796,604,979 share
recognize
forsake
fax
detach
belong
adjust
Estimated Call Count by Upstream
11,990,553,407 [Badger]wed
10,705,307,602 [Squirrel]share
2,275,486,193 [Swan]adjust
2,010,886,098 [Badger]surround
1,301,187,989 [Guppy]frighten
1,945,291,317 [Eagle]address
1,928,603,205 [Badger]matter
1,603,297,107 [Squirrel]frighten
1,572,295,006 [Badger]wake
1,561,098,745 [Markhor]extend

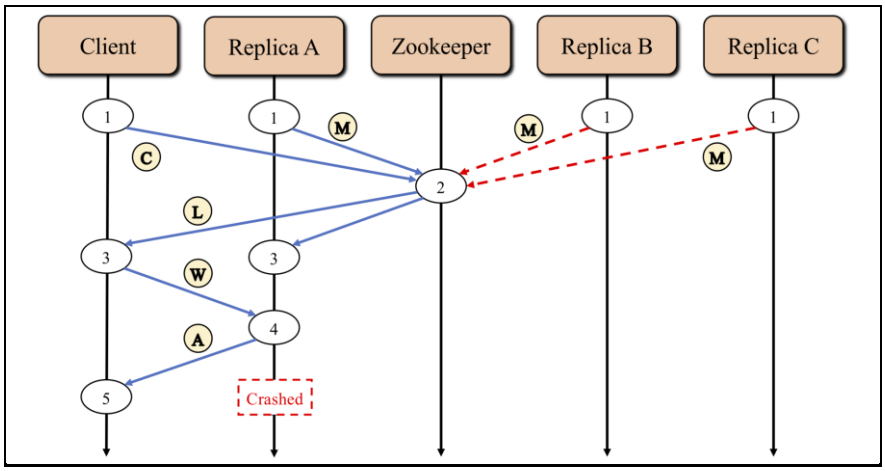

Live View
Service
rainbow
Operation
router.update_span_group_statistics
Detail page
Results from 6:29:46 PM—6:36:38 PM, Sunday, May 6th, 2018
Latency Histogram
Recent Searches
323ms - 1.02s
32 spans
Frequency (approx)
574µs - 621µs
27.5ms - 29.7ms
1.29s - 1.39s
> 60s
Latency
SERVICE
OPERATION
START TIME
SUB-TRACE SUMMARY
SUB-TRACE DURATION
rainbow router.update_span_group_statistics 18:36:38 7 spans 424ms
rainbow router.update_span_group_statistics 18:36:37 7 spans 514ms
rainbow router.update_span_group_statistics 18:36:37 7 spans 493ms
rainbow router.update_span_group_statistics 18:36:37 7 spans 491ms
rainbow router.update_span_group_statistics 18:36:37 7 spans 557ms

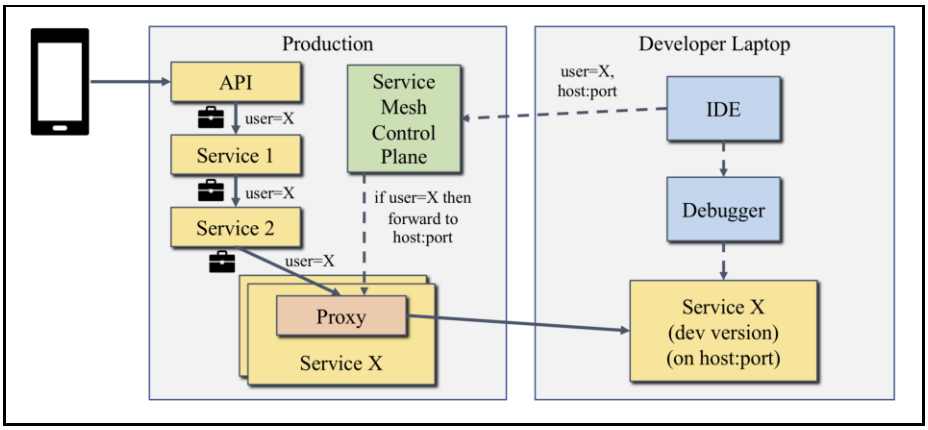
Chapter 10: Distributed Context Propagation



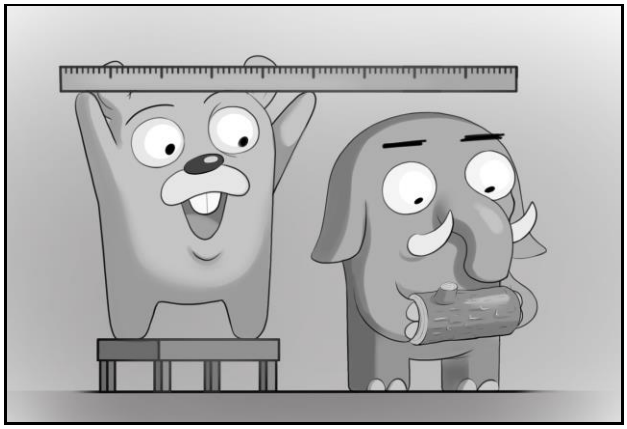



Instrumented System
Query
Pivot Tracing Frontend
PT Agent
PT Agent
Advice
Tuples
Message bus
Execution path
Trace point
Baggage propagation
Trace point with advice

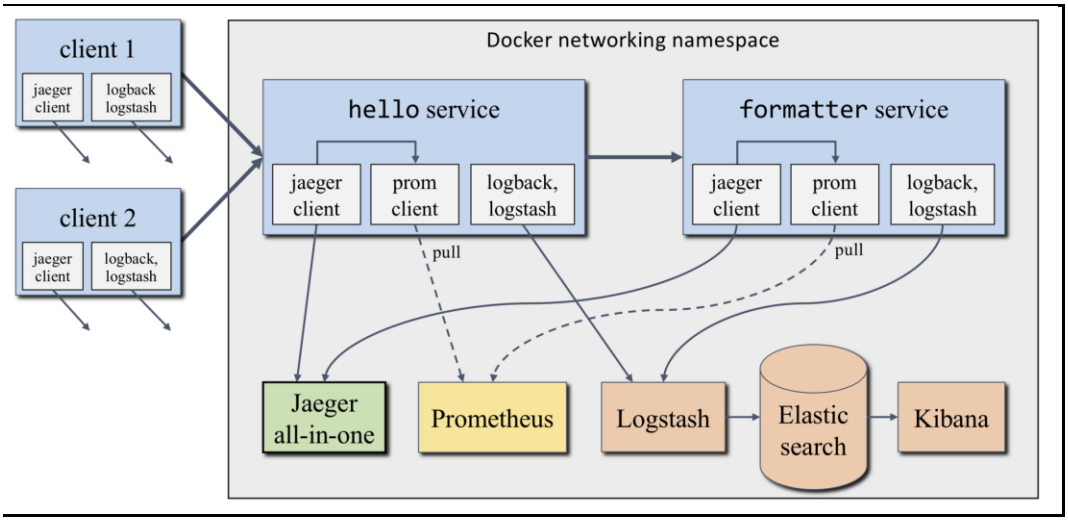

Client
Replica A
Zookeeper
Replica B
Replica C
Crashed

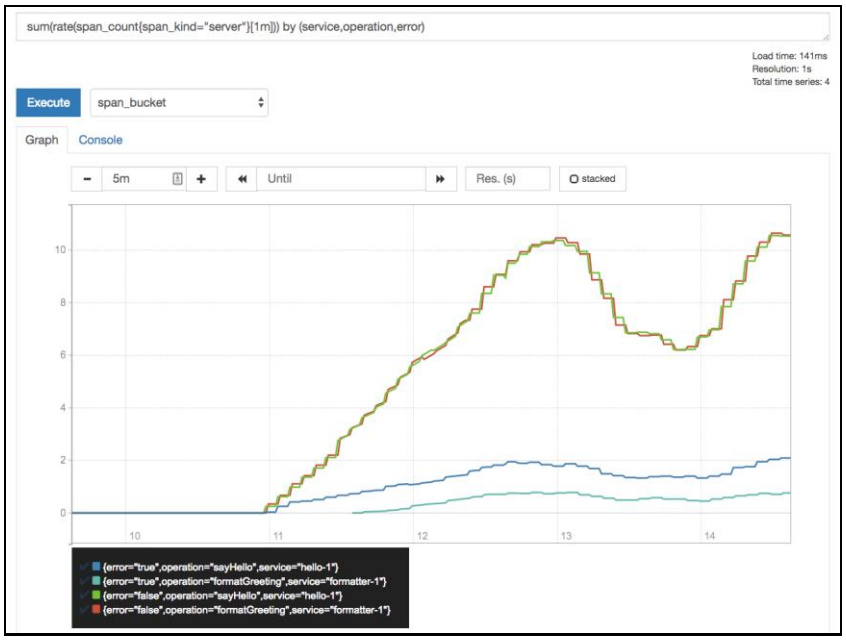

Production
Developer Laptop
API
user=X
Service 1
user=X
Service 2
user=X
Service Mesh Control Plane
if user=X then forward to host:port
Proxy
Service X
user=X, host:port
IDE
Debugger
Service X (dev version) (on host:port)

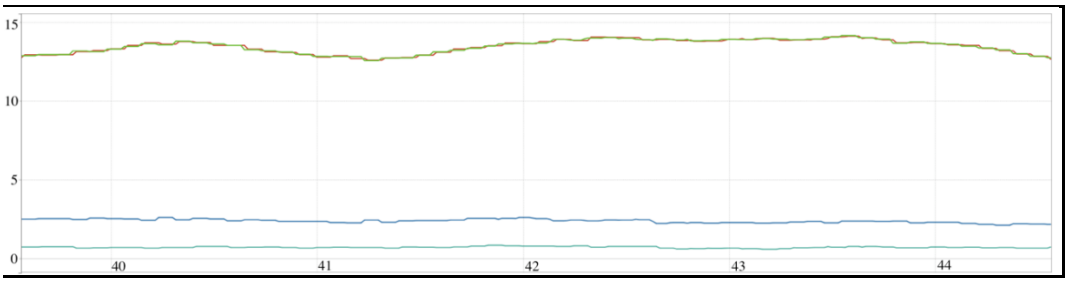
Chapter 11: Integration with Metrics and Logs

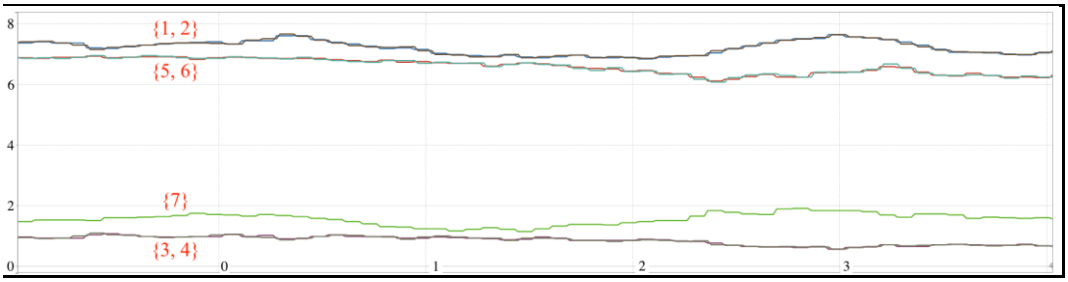


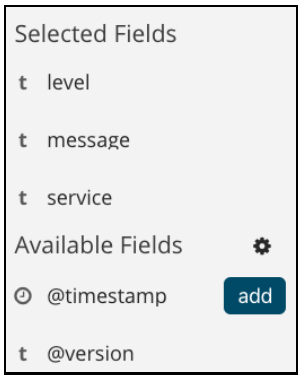
Time	_source
November 25th 2018, 14:19:36.684	@version: 1 port: 47,160 logger_name: hello.HelloController level: INFO @timestamp: November 25th 2018, 14:19:36.684 host: chapter-11_hello-1_1.chapter-11_default level_value: 20,000 thread_name: http-nio-8080-exec-8 span_id: 907ef5c42e2311b1 message: Response: Hello, Jennifer! application: hello-app trace_id: 907ef5c42e2311b1 trace_sampled: true service: hello-1 _id: X6xQTG




sum(rate(span_count{span_kind="server"}[1m])) by (service,operation,error)
Load time: 141ms
Resolution: 1s
Total time series: 4
Execute
span_bucket
Graph
Console
5m
Until
Res. (s)
stacked
10
8
6
4
2
0
10
11
12
13
14
{error="true",operation="sayHello",service="hello-1"}
{error="true",operation="formatGreeting",service="formatter-1"}
{error="false",operation="sayHello",service="hello-1"}
{error="false",operation="formatGreeting",service="formatter-1"}


15
10
5
0
40
41
42
43
44


8
6
4
2
0
{1, 2}
{5, 6}
{7}
{3, 4}
0
1
2
3

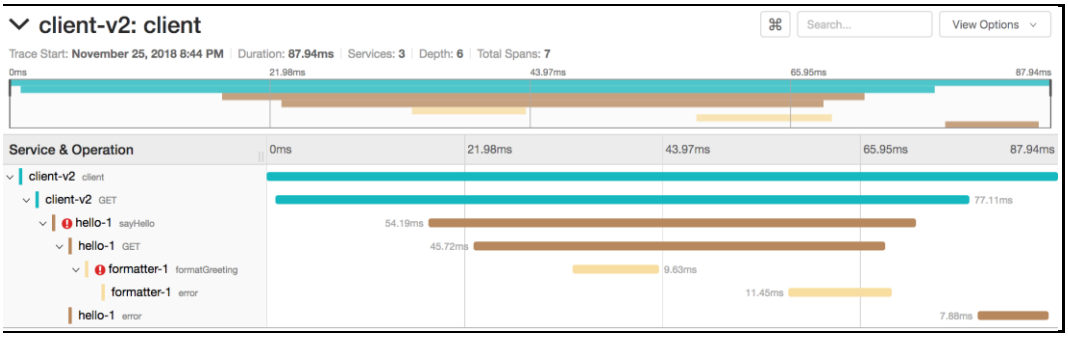


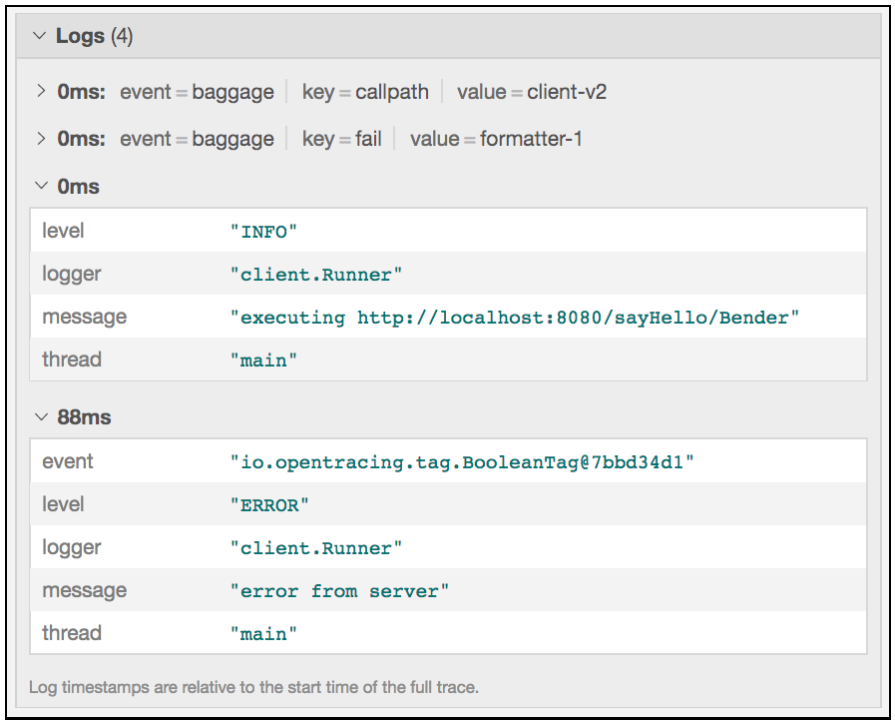
Time	service	level	message
November 25th 2018, 20:05:52.052	hello-1	INFO	Response: Hello, Bender!
November 25th 2018, 20:05:52.047	formatter-1	INFO	Name: Bender
November 25th 2018, 20:05:52.037	hello-1	INFO	Name: Bender
November 25th 2018, 20:05:52.021	hello-1	INFO	Response: Hello, Bender!
November 25th 2018, 20:05:52.019	formatter-1	INFO	Response: Hello, Bender!
November 25th 2018, 20:05:52.017	hello-1	INFO	Name: Bender
November 25th 2018, 20:05:52.017	hello-1	INFO	Calling http://formatter-1:8082/formatGreeting?name=Bender
November 25th 2018, 20:05:51.926	hello-1	INFO	Response: Hello, Bender!
November 25th 2018, 20:05:51.923	formatter-1	INFO	Response: Hello, Bender!
November 25th 2018, 20:05:51.915	hello-1	INFO	Calling http://formatter-1:8082/formatGreeting?name=Bender

Time	service	level	message
November 25th 2018, 20:44:02.733	hello-1	WARN	simulating failure
November 25th 2018, 20:44:02.231	hello-1	WARN	simulating failure
November 25th 2018, 20:44:01.921	hello-1	WARN	simulating failure
November 25th 2018, 20:44:01.271	hello-1	WARN	simulating failure
November 25th 2018, 20:44:00.989	formatter-1	WARN	simulating failure
November 25th 2018, 20:44:00.187	formatter-1	WARN	simulating failure
November 25th 2018, 20:43:59.603	formatter-1	WARN	simulating failure
November 25th 2018, 20:43:58.991	hello-1	WARN	simulating failure

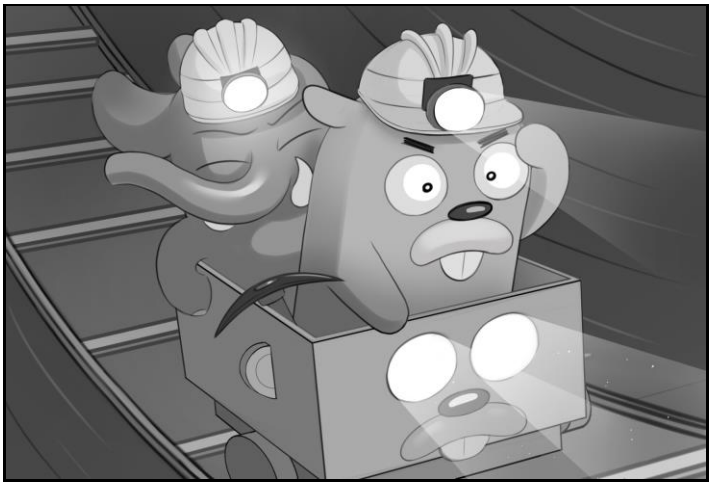
t	application	⊕ ⊖ ◫ ✱	hello-app
t	host	⊕ ⊖ ◫ ✱	chapter-11_formatter-1_1.chapter-11_default
t	level	⊕ ⊖ ◫ ✱	WARN
#	level_value	⊕ ⊖ ◫ ✱	30,000
t	logger_name	⊕ ⊖ ◫ ✱	lib.ChaosMonkey
t	message	⊕ ⊖ ◫ ✱	simulating failure
#	port	⊕ ⊖ ◫ ✱	48,534
t	service	⊕ ⊖ ◫ ✱	formatter-1
?	span_id	⊕ ⊖ ◫ ✱	⚠ b3413aade04979e4
t	thread_name	⊕ ⊖ ◫ ✱	http-nio-8082-exec-8
?	trace_id	⊕ ⊖ ◫ ✱	⚠ 610d71be913ffe7f
?	trace_sampled	⊕ ⊖ ◫ ✱	⚠ true

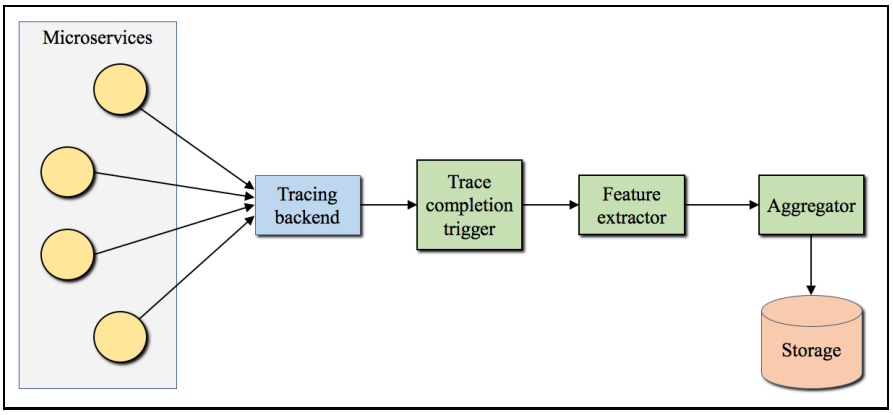
	Time	service	level	message
▸	November 25th 2018, 20:44:01.041	client-1	ERROR	error from server
▸	November 25th 2018, 20:44:00.989	formatter-1	WARN	simulating failure
▸	November 25th 2018, 20:44:00.988	formatter-1	INFO	Name: Bender
▸	November 25th 2018, 20:44:00.975	hello-1	INFO	Calling http://formatter-1:8082/formatGreeting?name=Bender
▸	November 25th 2018, 20:44:00.972	hello-1	INFO	Name: Bender
▸	November 25th 2018, 20:44:00.953	client-1	INFO	executing http://localhost:8080/sayHello/Bender

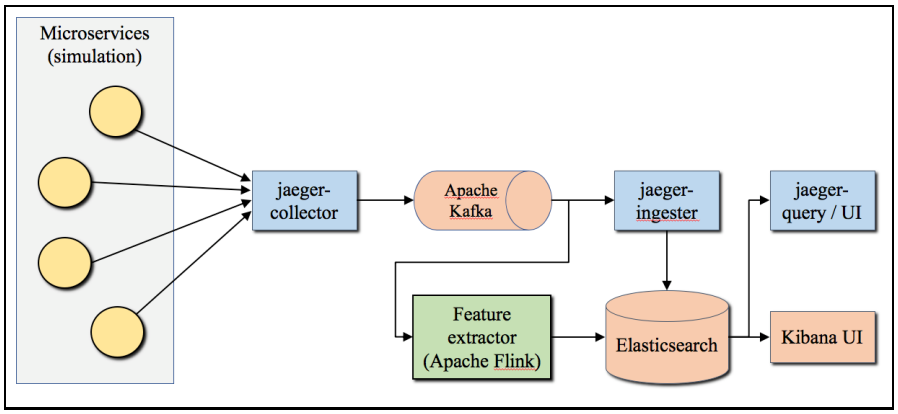


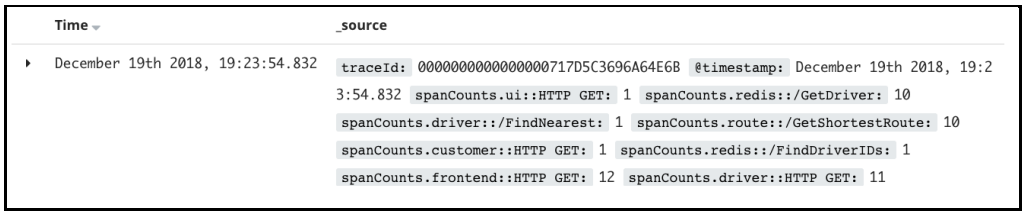

Logs (4)
0ms: event = baggage | key = callpath | value = client-v2
0ms: event = baggage | key = fail | value = formatter-1
0ms
level "INFO"
logger "client.Runner"
message "executing http://localhost:8080/sayHello/Bender"
thread "main"
88ms
event "io.opentracing.tag.BooleanTag@7bbd34d1"
level "ERROR"
logger "client.Runner"
message "error from server"
thread "main"
Log timestamps are relative to the start time of the full trace.

Chapter 12: Gathering Insights with Data Mining

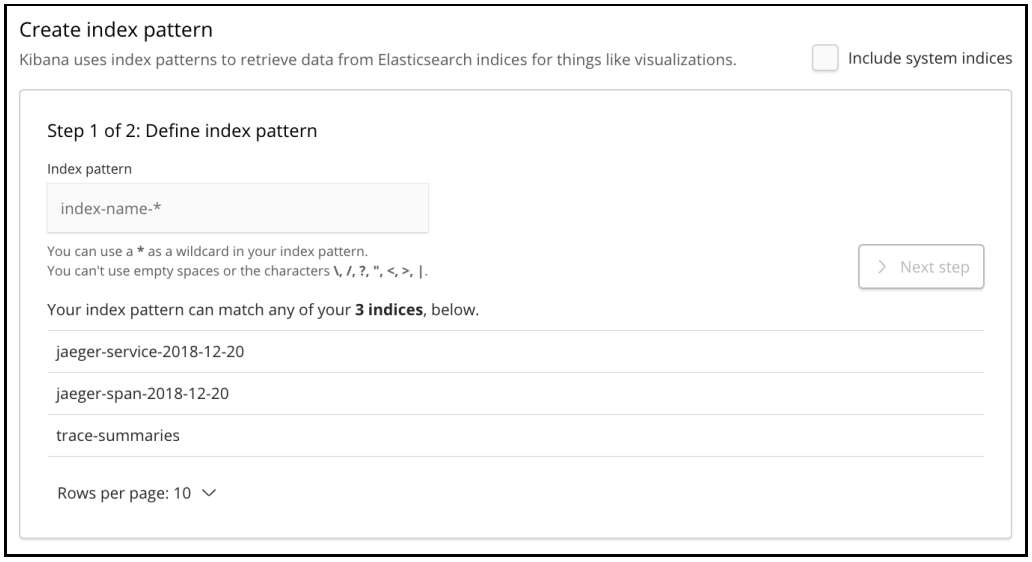


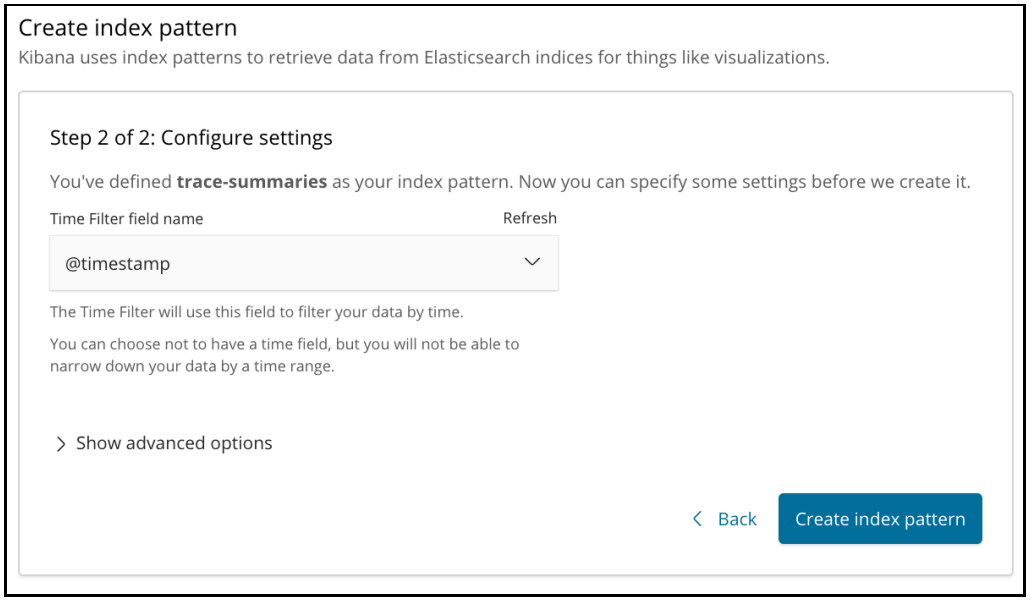




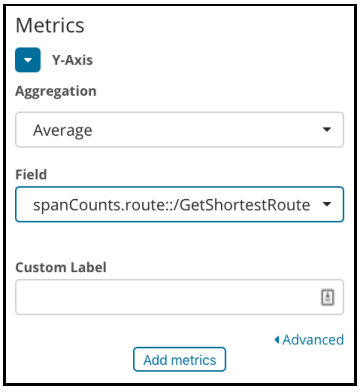


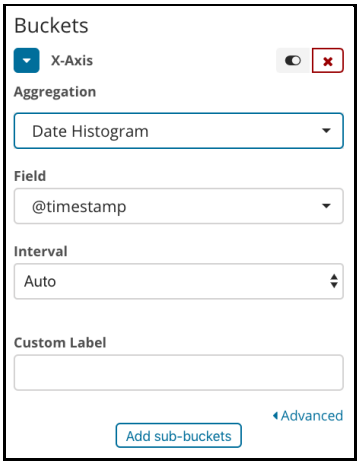
Time	_source
December 19th 2018, 19:23:54.832	traceId: 00000000000000000717D5C3696A64E6B @timestamp: December 19th 2018, 19:23:54.832 spanCounts.ui::HTTP GET: 1 spanCounts.redis::/GetDriver: 10 spanCounts.driver::/FindNearest: 1 spanCounts.route::/GetShortestRoute: 10 spanCounts.customer::HTTP GET: 1 spanCounts.redis::/FindDriverIDs: 1 spanCounts.frontend::HTTP GET: 12 spanCounts.driver::HTTP GET: 11

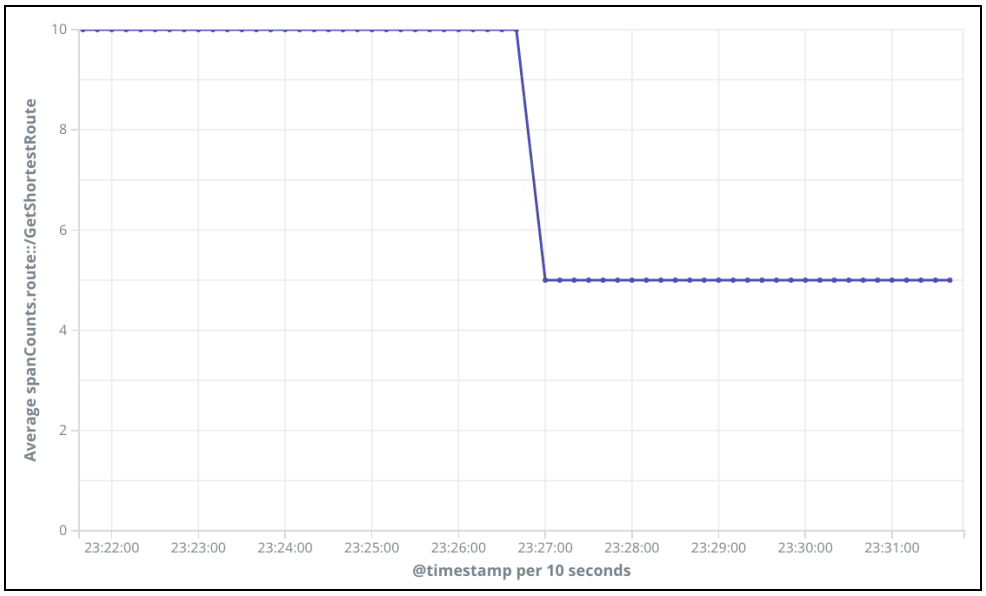


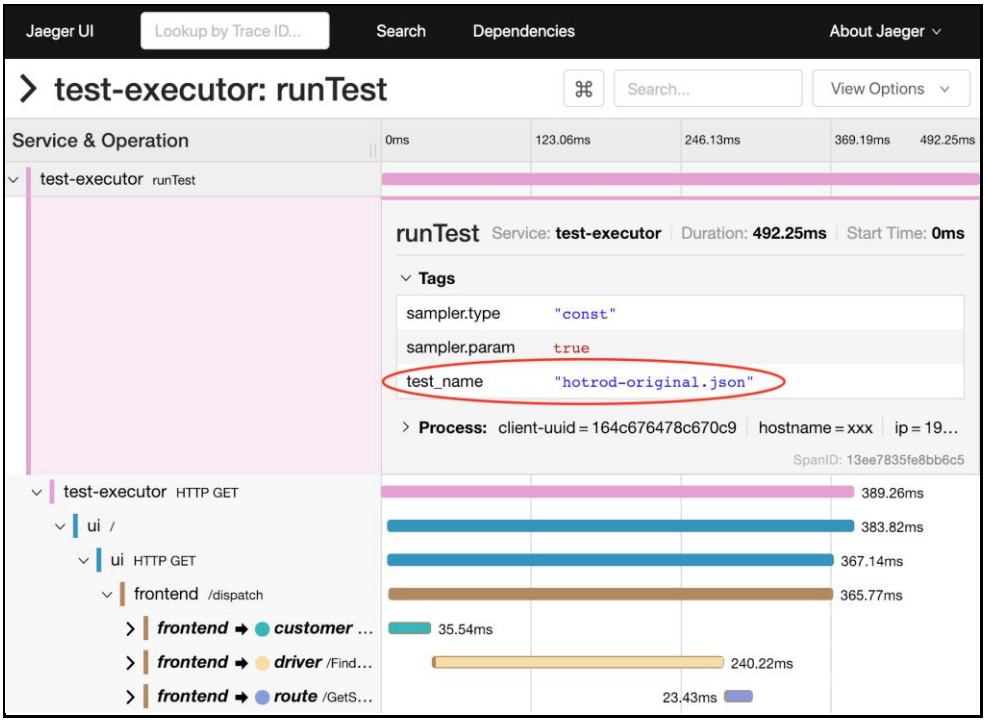


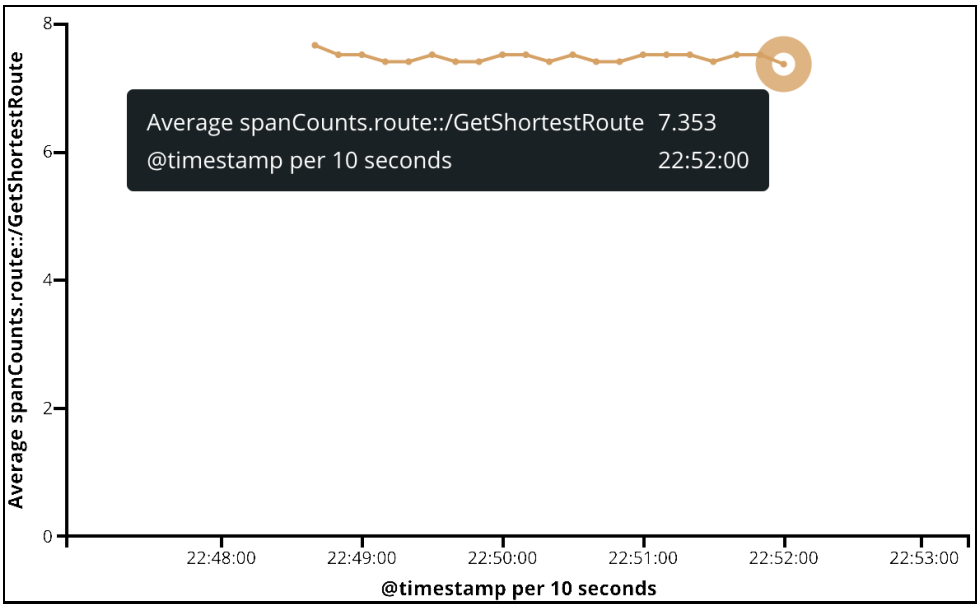
Time	_source
December 19th 2018, 23:26:39.952	traceId: 000000000000000204DE7704F5B448C @timestamp: December 19th 2018, 23:26:39.952 spanCounts.ui::HTTP GET: 1 spanCounts.redis::/GetDriver: 10 spanCounts.driver::/FindNearest: 1 spanCounts.route::/GetShortestRoute: 10 spanCounts.customer::HTTP GET: 1 spanCounts.redis::/FindDriverIDs: 1 spanCounts.frontend::HTTP GET: 12 spanCounts.driver::HTTP GET: 11 spanCounts.test-executor::HTTP GET: 1 spanCounts.customer::/customer: 1 spanCounts.ui::/: 1
December 19th 2018, 23:26:39.120	traceId: 00000000000000007E680BFD4A75F82E @timestamp: December 19th 2018, 23:26:39.120 spanCounts.ui::HTTP GET: 1 spanCounts.redis::/GetDriver: 10 spanCounts.driver::/FindNearest: 1 spanCounts.route::/GetShortestRoute: 10 spanCounts.customer::HTTP GET: 1 spanCounts.redis::/FindDriverIDs: 1 spanCounts.frontend::HTTP GET: 12 spanCounts.driver::HTTP GET: 11 spanCounts.test-executor::HTTP GET: 1 spanCounts.customer::/customer: 1 spanCounts.ui::/: 1
December 19th 2018, 23:26:38.294	traceId: 00000000000000057C63C80FF55ED6A @timestamp: December 19th 2018, 23:26:38.294 spanCounts.ui::HTTP GET: 1 spanCounts.redis::/GetDriver: 10 spanCounts.driver::/FindNearest: 1 spanCounts.route::/GetShortestRoute: 10 spanCounts.customer::HTTP GET: 1 spanCounts.redis::/FindDriverIDs: 1 spanCounts.frontend::HTTP GET: 12 spanCounts.driver::HTTP GET: 11 spanCounts.test-executor::HTTP GET: 1 spanCounts.customer::/customer: 1 spanCounts.ui::/: 1
December 19th 2018, 23:26:37.467	traceId: 0000000000000000643F0BDF98EBA0C8 @timestamp: December 19th 2018, 23:26:37.467 spanCounts.ui::HTTP GET: 1 spanCounts.redis::/GetDriver: 10 spanCounts.driver::/FindNearest: 1 spanCounts.route::/GetShortestRoute: 10 spanCounts.customer::HTTP GET: 1 spanCounts.redis::/FindDriverIDs: 1 spanCounts.frontend::HTTP GET: 12 spanCounts.driver::HTTP GET: 11 spanCounts.test-executor::HTTP GET: 1 spanCounts.customer::/customer: 1 spanCounts.ui::/: 1

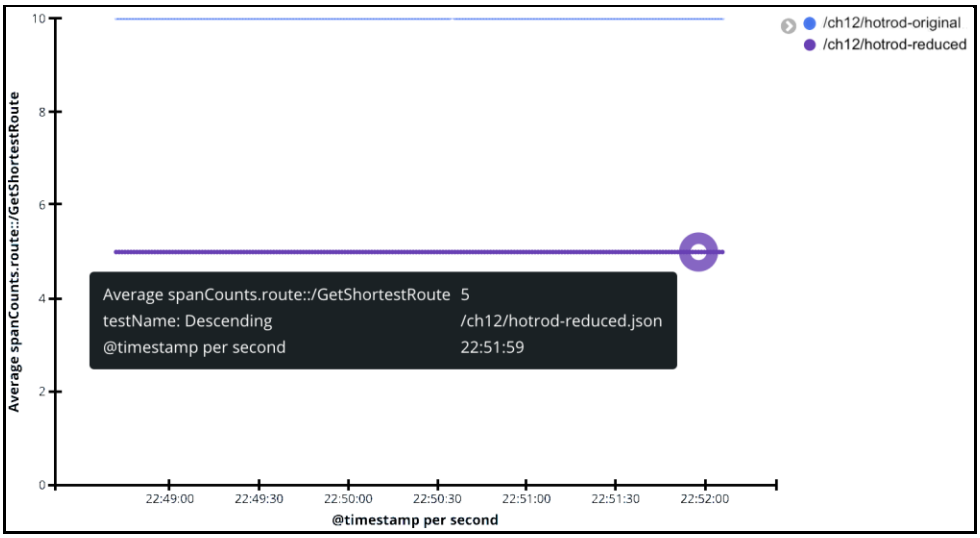




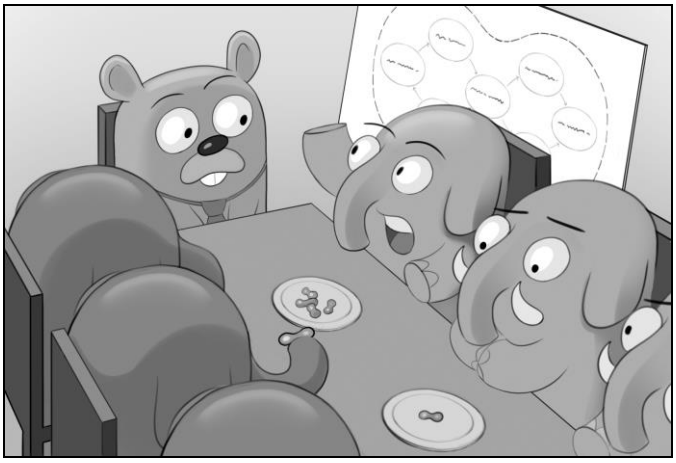

Average spanCounts.route::/GetShortestRoute
10
8
6
4
2
0
23:22:00
23:23:00
23:24:00
23:25:00
23:26:00
23:27:00
23:28:00
23:29:00
23:30:00
23:31:00
@timestamp per 10 seconds

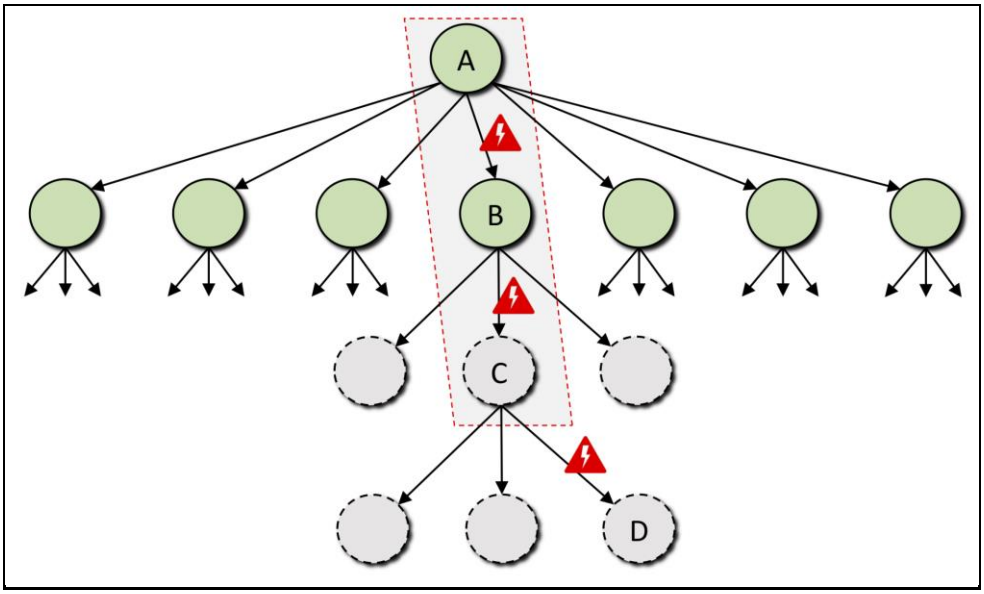

Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
test-executor: runTest
Search...
View Options
Service & Operation
0ms
123.06ms
246.13ms
369.19ms
492.25ms
test-executor runTest
runTest Service: test-executor | Duration: 492.25ms | Start Time: 0ms
Tags
sampler.type "const"
sampler.param true
test_name "hotrod-original.json"
Process: client-uuid = 164c676478c670c9 | hostname = xxx | ip = 19...
SpanID: 13ee7835fe8bb6c5
test-executor HTTP GET 389.26ms
ui / 383.82ms
ui HTTP GET 367.14ms
frontend /dispatch 365.77ms
frontend customer ... 35.54ms
frontend driver /Find... 240.22ms
frontend route /GetS... 23.43ms

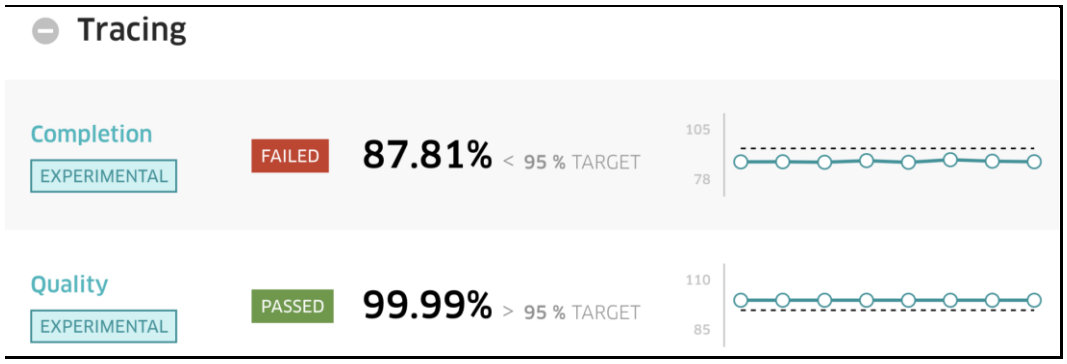

Average spanCounts.route::/GetShortestRoute
8
6
4
2
0
Average spanCounts.route::/GetShortestRoute 7.353
@timestamp per 10 seconds 22:52:00
22:48:00
22:49:00
22:50:00
22:51:00
22:52:00
22:53:00
@timestamp per 10 seconds


/ch12/hotrod-original
/ch12/hotrod-reduced
Average spanCounts.route::/GetShortestRoute
10
8
6
4
2
0
Average spanCounts.route::/GetShortestRoute 5
testName: Descending /ch12/hotrod-reduced.json
@timestamp per second 22:51:59
22:49:00
22:49:30
22:50:00
22:50:30
22:51:00
22:51:30
22:52:00
@timestamp per second

Chapter 13: Implementing Tracing in Large Organizations







Tracing Score for **api-gateway**

Completeness: **0.92** out of 1.0

Quality: **1.00** out of 1.0

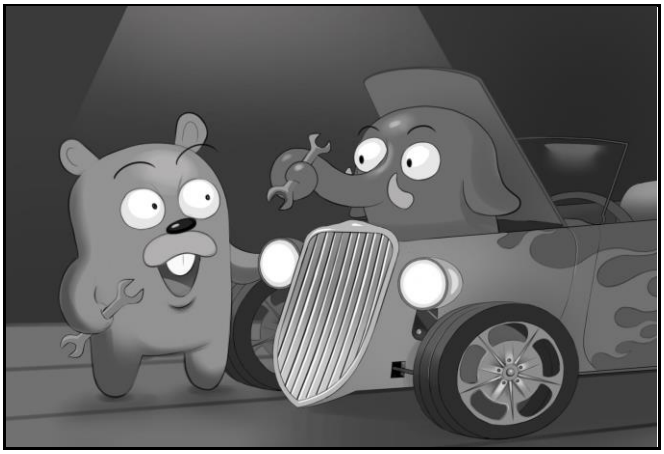
How do I improve my score?

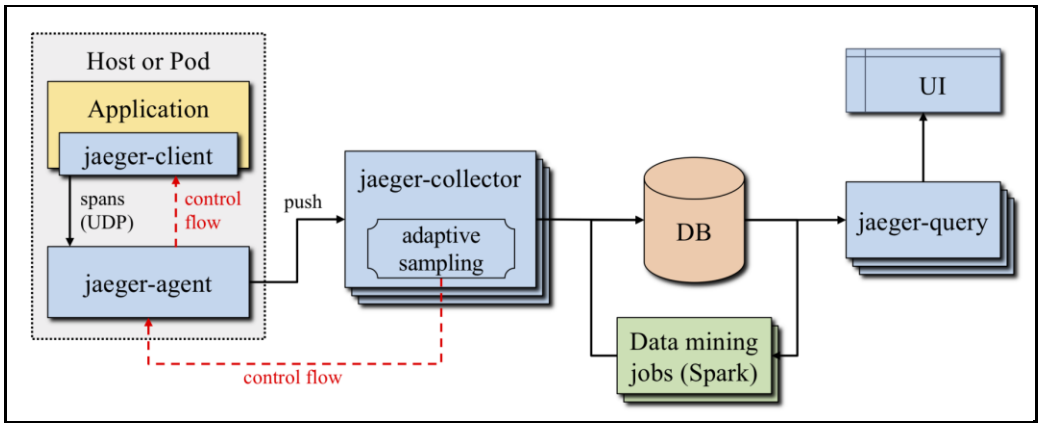
Tracing Quality Metrics for **api-gateway**

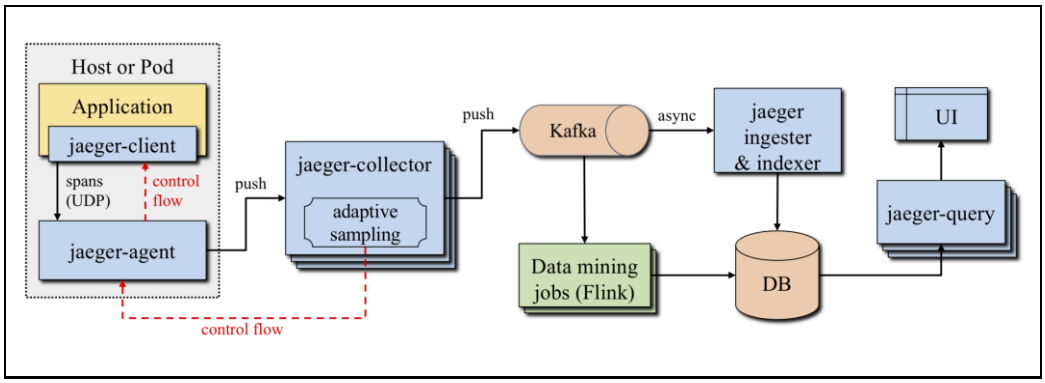
Click on pass or fail numbers to see example traces that exhibit that behavior

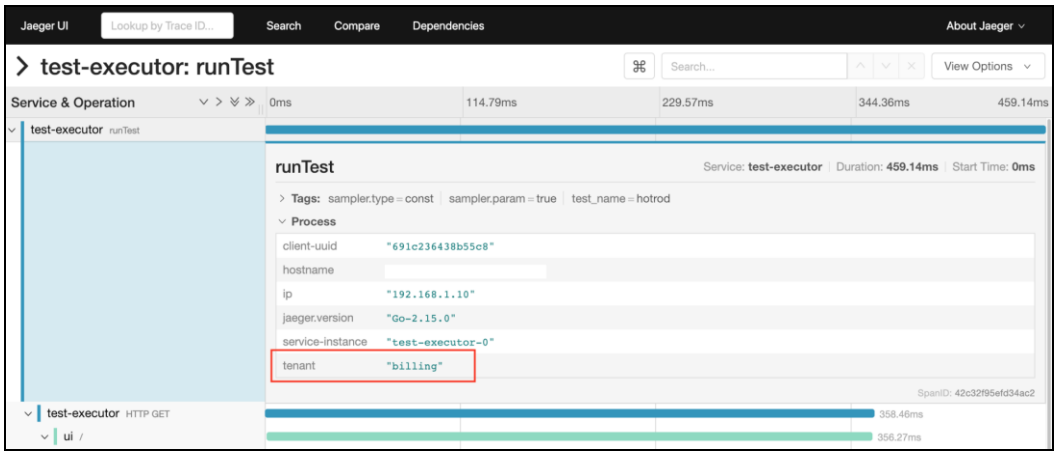
Metric	Type	Pass %	Num Passes	Num Failures	Last Failure	Description
HasClientSpans	Completeness	99	77027058	686		The service emitted spans with client span.kind
HasServerSpans	Completeness	36	10750133	18515278		The service emitted spans with server span.kind
HasUniqueSpanIds	Quality	99	84546532	1060		The service emitted spans with unique span ids
MinimumClientVersionCheck	Completeness	100	113782244	0		This service emitted a span that has an acceptable client version

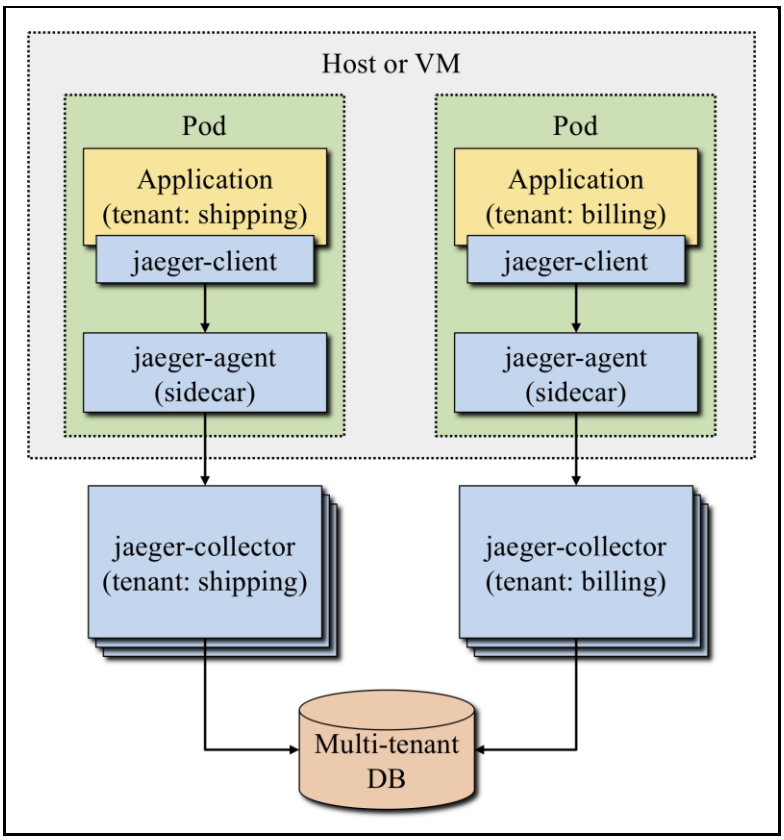
Chapter 14: Under the Hood of a Distributed Tracing System








Jaeger UI
Lookup by Trace ID...
Search
Compare
Dependencies
About Jaeger
test-executor: runTest
Search...
View Options
Service & Operation
0ms
114.79ms
229.57ms
344.36ms
459.14ms
test-executor runTest
runTest
Service: test-executor
Duration: 459.14ms
Start Time: 0ms
Tags: sampler.type = const
sampler.param = true
test_name = hotrod
Process
client-uuid
"691c236438b55c8"
hostname
ip
"192.168.1.10"
jaeger.version
"Go-2.15.0"
service-instance
"test-executor-0"
tenant
"billing"
SpanID: 42c32f95efd34ac2
test-executor HTTP GET
358.46ms
ui /
356.27ms


Host or VM
Pod
Application
(tenant: shipping)
jaeger-client
jaeger-agent
(sidecar)
Pod
Application
(tenant: billing)
jaeger-client
jaeger-agent
(sidecar)
jaeger-collector
(tenant: shipping)
jaeger-collector
(tenant: billing)
Multi-tenant
DB