Distributed Tracing:

With a micro-services architecture, observability becomes highly important. There are many things under observability:

- Monitoring
- Alerting
- Centralised Logging
- Distributed Tracing

Here we will talk about distributed tracing.

Distributed tracing is a method used to profile and monitor applications, especially those built using a microservices architecture. Distributed tracing helps pinpoint where failures occur and what causes poor performance.

IT and DevOps teams can use distributed tracing to monitor applications.

Developers can use distributed tracing to help debug and optimize their code.

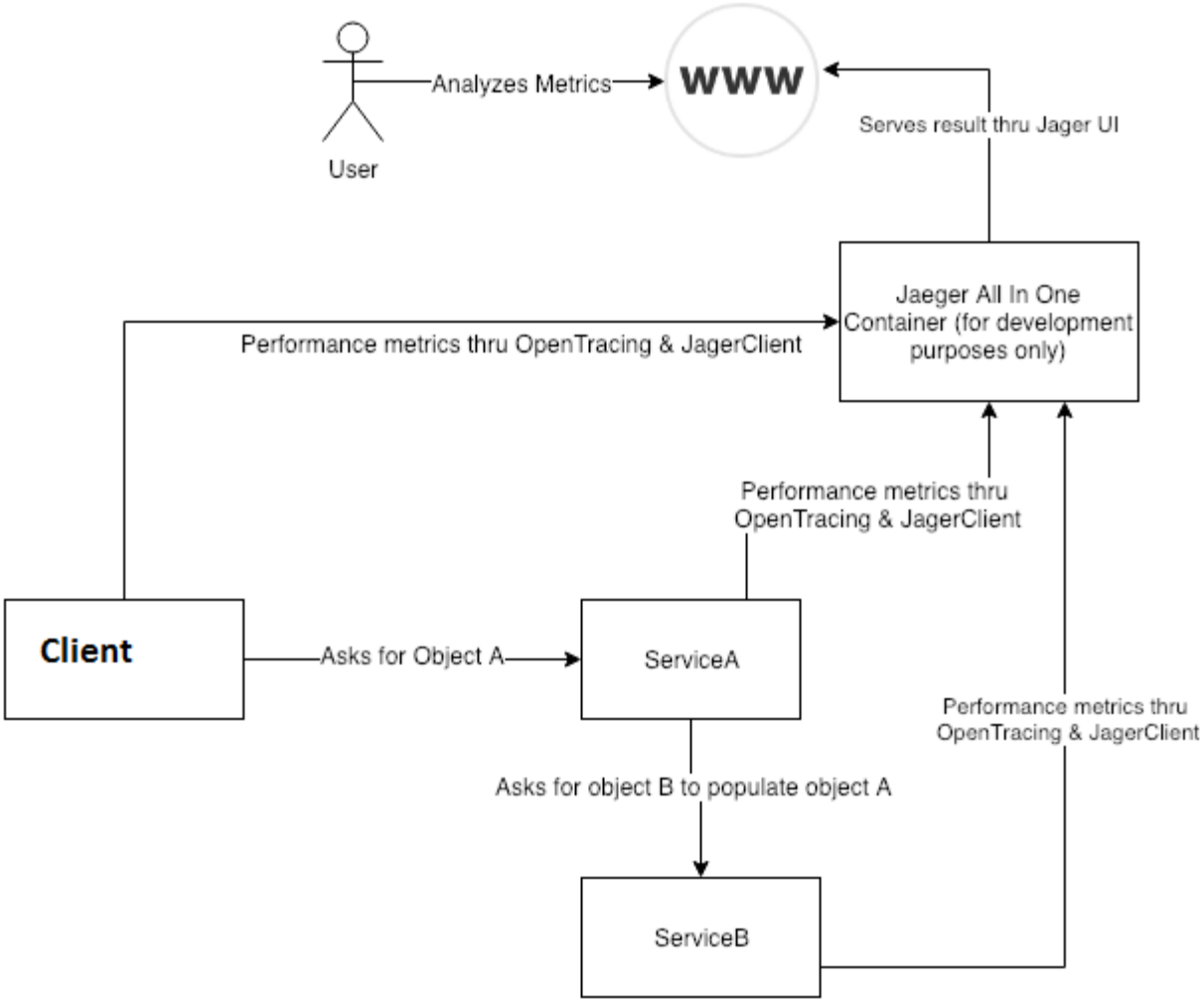
The sample Bookinfo application is configured to collect trace spans using Zipkin or Jaeger. Although Istio proxies are able to automatically send spans, it needs help from the application to tie together the entire trace. To do this, applications need to propagate the appropriate HTTP headers so that when the proxies send span information to Zipkin or Jaeger, the spans can be correlated correctly into a single trace.

To do this the application collects and propagates the following headers from the incoming request to any outgoing requests:

- `x-request-id`
- `x-b3-traceid`
- `x-b3-spanid`
- `x-b3-parentspanid`
- `x-b3-sampled`
- `x-b3-flags`
- `x-ot-span-context`

Jaeger:

Jaeger is an open-source distributed tracing system that implements the OpenTracing specification. Jaeger includes components to store, visualize and filter traces.



View Traces:

let us generate a small load on the sample app by using fortio:

```
docker run istio/fortio load -t 5m -qps 5
http://$INGRESS_HOST/productpage
```

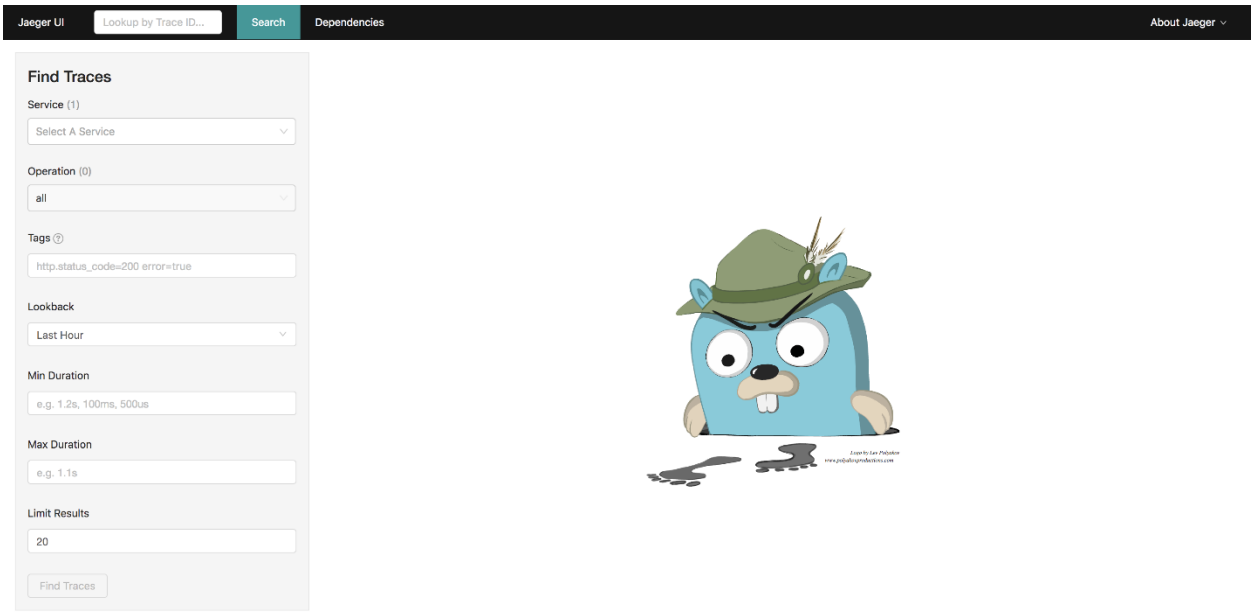
Let us find the port Jaeger is exposed on by running the following command:

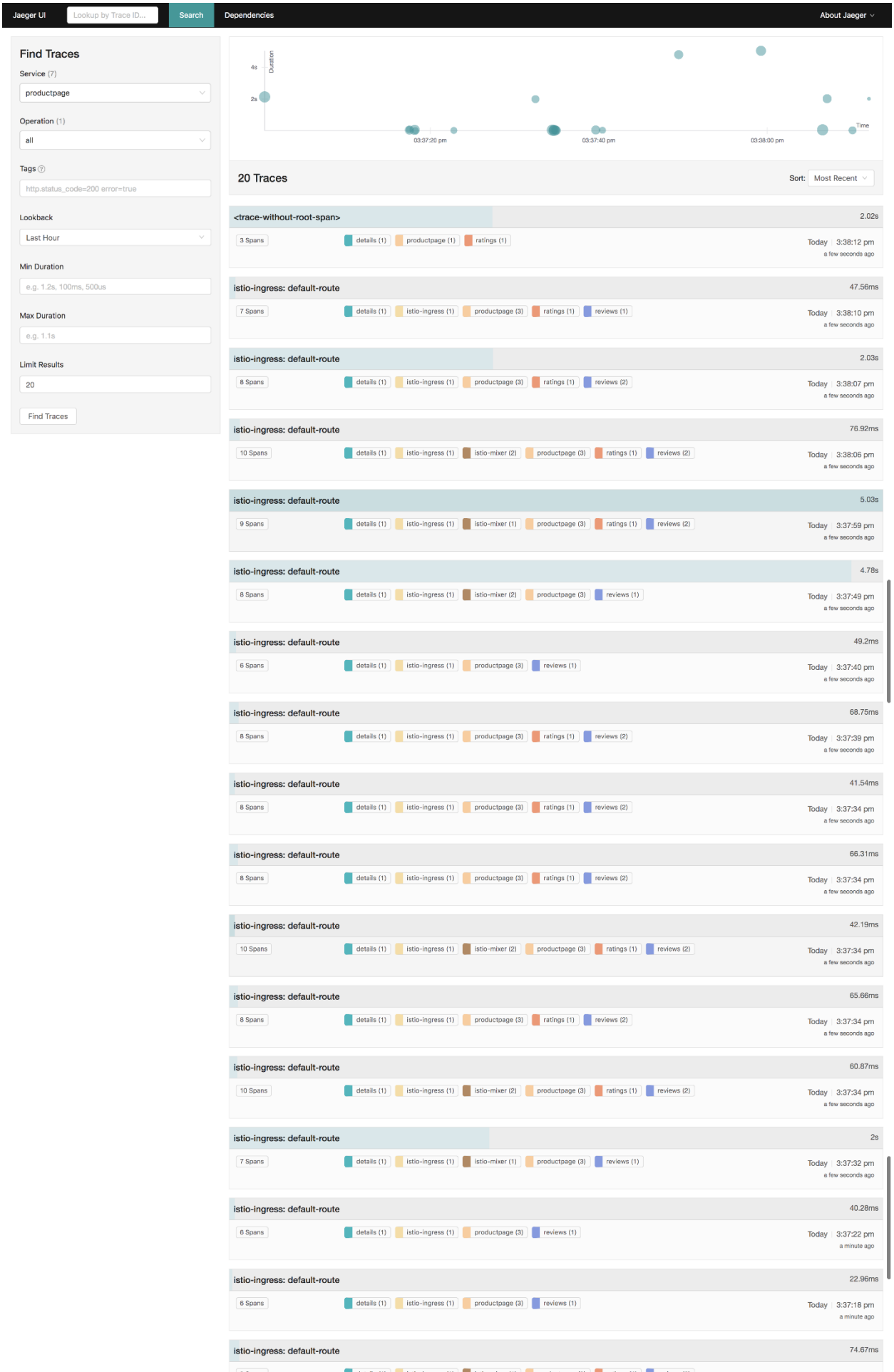
```
kubectl -n istio-system get svc tracing
```

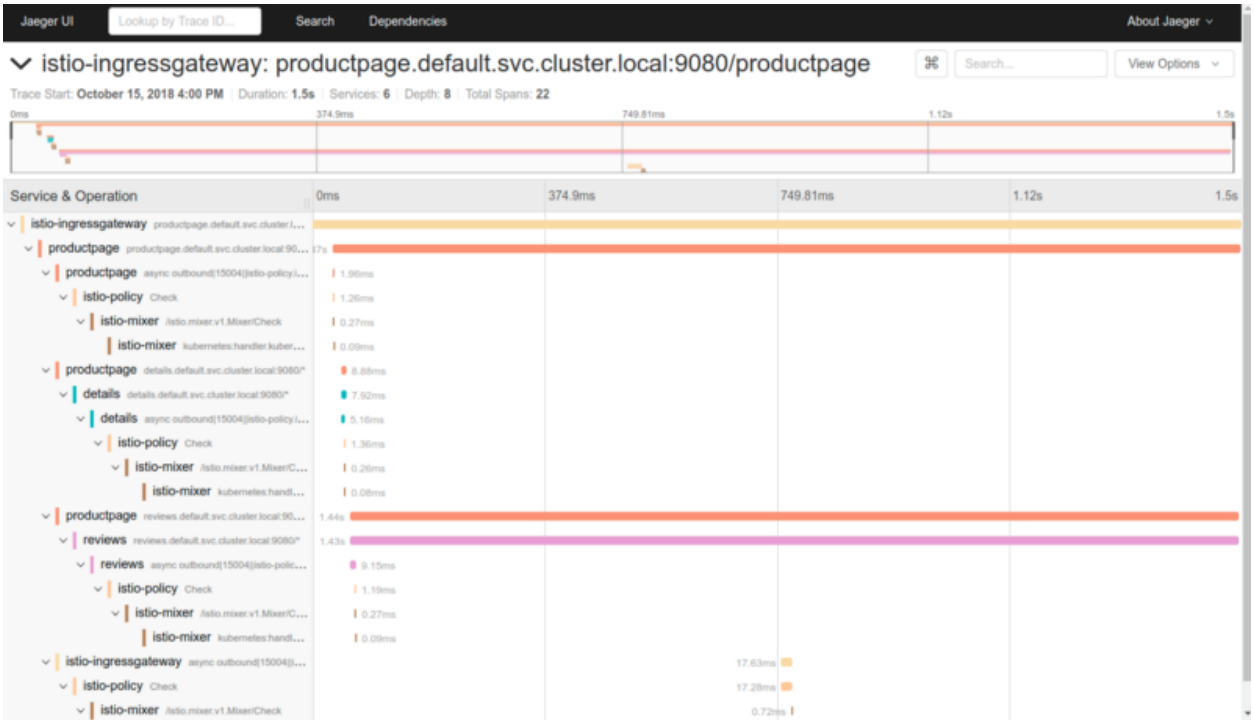
```
$ microk8s.kubectl -n istio-system get service/jaeger-query
NAME            TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)     AGE
jaeger-query    ClusterIP   10.152.183.73    <none>        16686/TCP   6d11h
```

If you have exposed Jaeger service as LoadBalancer then use ingress host IP and Jaeger service port to access Jaeger webUI.

If you have exposed Jaeger service as ClusterIP then use Jaeger service IP and port to access Jaeger webUI.




Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
Find Traces
Service (7)
productpage
Operation (1)
all
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
Duration
4s
2s
Time
03:37:20 pm
03:37:40 pm
03:38:00 pm
20 Traces
Sort: Most Recent
<trace-without-root-span> 2.02s
3 Spans details (1) productpage (1) ratings (1) Today 3:38:12 pm a few seconds ago
istio-ingress: default-route 47.56ms
7 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (1) Today 3:38:10 pm a few seconds ago
istio-ingress: default-route 2.03s
8 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (2) Today 3:38:07 pm a few seconds ago
istio-ingress: default-route 76.92ms
10 Spans details (1) istio-ingress (1) istio-mixer (2) productpage (3) ratings (1) reviews (2) Today 3:38:06 pm a few seconds ago
istio-ingress: default-route 5.03s
9 Spans details (1) istio-ingress (1) istio-mixer (1) productpage (3) ratings (1) reviews (2) Today 3:37:59 pm a few seconds ago
istio-ingress: default-route 4.78s
8 Spans details (1) istio-ingress (1) istio-mixer (2) productpage (3) reviews (1) Today 3:37:49 pm a few seconds ago
istio-ingress: default-route 49.2ms
6 Spans details (1) istio-ingress (1) productpage (3) reviews (1) Today 3:37:40 pm a few seconds ago
istio-ingress: default-route 68.75ms
8 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (2) Today 3:37:39 pm a few seconds ago
istio-ingress: default-route 41.54ms
8 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (2) Today 3:37:34 pm a few seconds ago
istio-ingress: default-route 66.31ms
8 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (2) Today 3:37:34 pm a few seconds ago
istio-ingress: default-route 42.19ms
10 Spans details (1) istio-ingress (1) istio-mixer (2) productpage (3) ratings (1) reviews (2) Today 3:37:34 pm a few seconds ago
istio-ingress: default-route 65.66ms
8 Spans details (1) istio-ingress (1) productpage (3) ratings (1) reviews (2) Today 3:37:34 pm a few seconds ago
istio-ingress: default-route 60.87ms
10 Spans details (1) istio-ingress (1) istio-mixer (2) productpage (3) ratings (1) reviews (2) Today 3:37:34 pm a few seconds ago
istio-ingress: default-route 2s
7 Spans details (1) istio-ingress (1) istio-mixer (1) productpage (3) reviews (1) Today 3:37:32 pm a few seconds ago
istio-ingress: default-route 40.28ms
6 Spans details (1) istio-ingress (1) productpage (3) reviews (1) Today 3:37:22 pm a minute ago
istio-ingress: default-route 22.96ms
6 Spans details (1) istio-ingress (1) productpage (3) reviews (1) Today 3:37:18 pm a minute ago
istio-ingress: default-route 74.67ms


Jaeger UI
Lookup by Trace ID...
Search
Dependencies
About Jaeger
istio-ingressgateway: productpage.default.svc.cluster.local:9080/productpage
Search...
View Options
Trace Start: October 15, 2018 4:00 PM | Duration: 1.5s | Services: 6 | Depth: 8 | Total Spans: 22
0ms
374.9ms
749.81ms
1.12s
1.5s
Service & Operation
istio-ingressgateway productpage.default.svc.cluster.l...
productpage productpage.default.svc.cluster.local:90... 17s
productpage async outbound|15004|istio-policy.i... 1.96ms
istio-policy Check 1.26ms
istio-mixer /istio.mixer.v1.Mixer/Check 0.27ms
istio-mixer kubernetes:handler.kuber... 0.09ms
productpage details.default.svc.cluster.local:9080/* 8.88ms
details details.default.svc.cluster.local:9080/* 7.92ms
details async outbound|15004|istio-policy.i... 5.16ms
istio-policy Check 1.36ms
istio-mixer /istio.mixer.v1.Mixer/C... 0.26ms
istio-mixer kubernetes:handl... 0.08ms
productpage reviews.default.svc.cluster.local:90... 1.44s
reviews reviews.default.svc.cluster.local:9080/* 1.43s
reviews async outbound|15004|istio-polic... 9.15ms
istio-policy Check 1.19ms
istio-mixer /istio.mixer.v1.Mixer/C... 0.27ms
istio-mixer kubernetes:handl... 0.09ms
istio-ingressgateway async outbound|15004|i... 17.63ms
istio-policy Check 17.28ms
istio-mixer /istio.mixer.v1.Mixer/Check 0.72ms