



# From HAR to OpenTelemetry Trace: Redefining Browser Observability



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# Monitor, debug, and optimize web applications

# Agenda



- 01 Introduction
- 02 OpenTelemetry
- 03 HAR files
- 04 ThousandEyes
- 05 HAR to OTel traces
- 06 Architecture
- 07 Demo
- 08 Lesson learned

# Introduction

# What comes to mind when you hear OpenTelemetry?



Join at

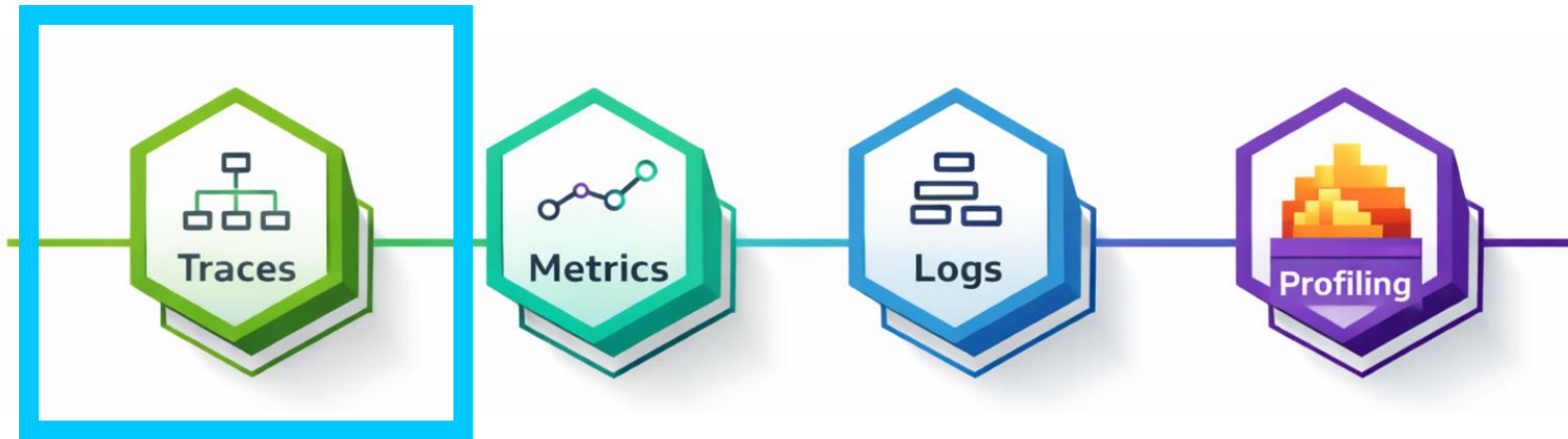
[slido.com](https://slido.com)

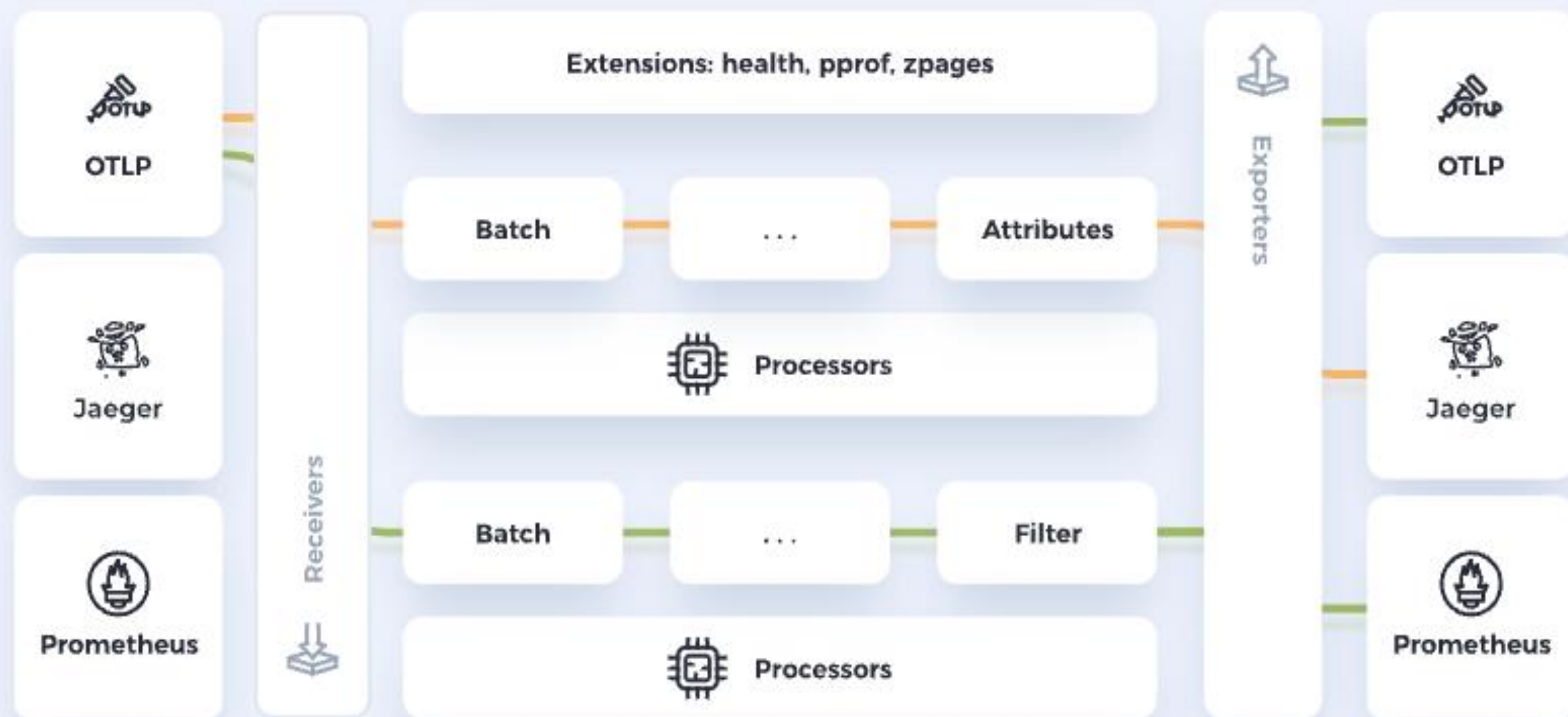
#2345678

# OpenTelemetry (OTel)



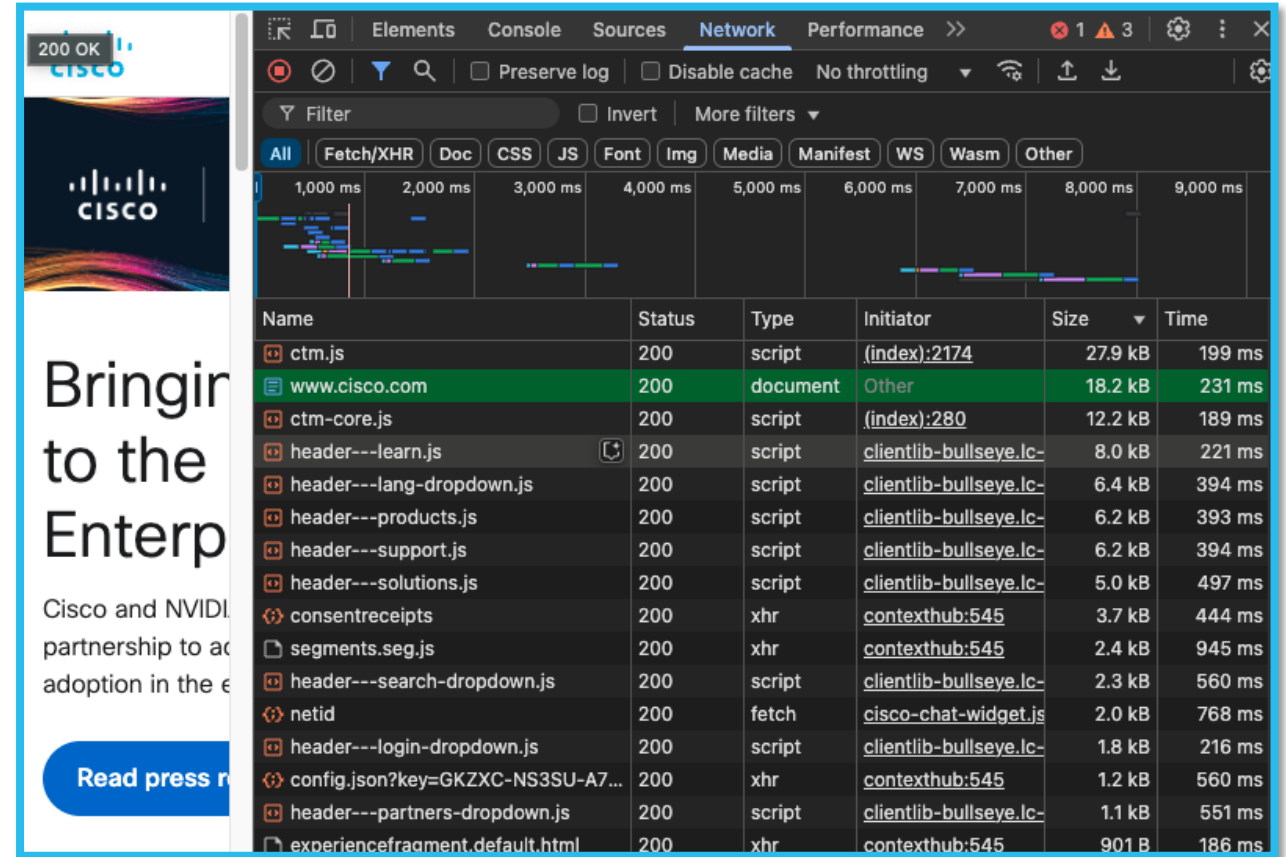
- Open-source observability framework
- Tools, APIs, and SDKs
- Management of telemetry data





# HAR (HTTP Archive)

- Web browser's interaction
- JSON
- Contains sensitive data
- Debug

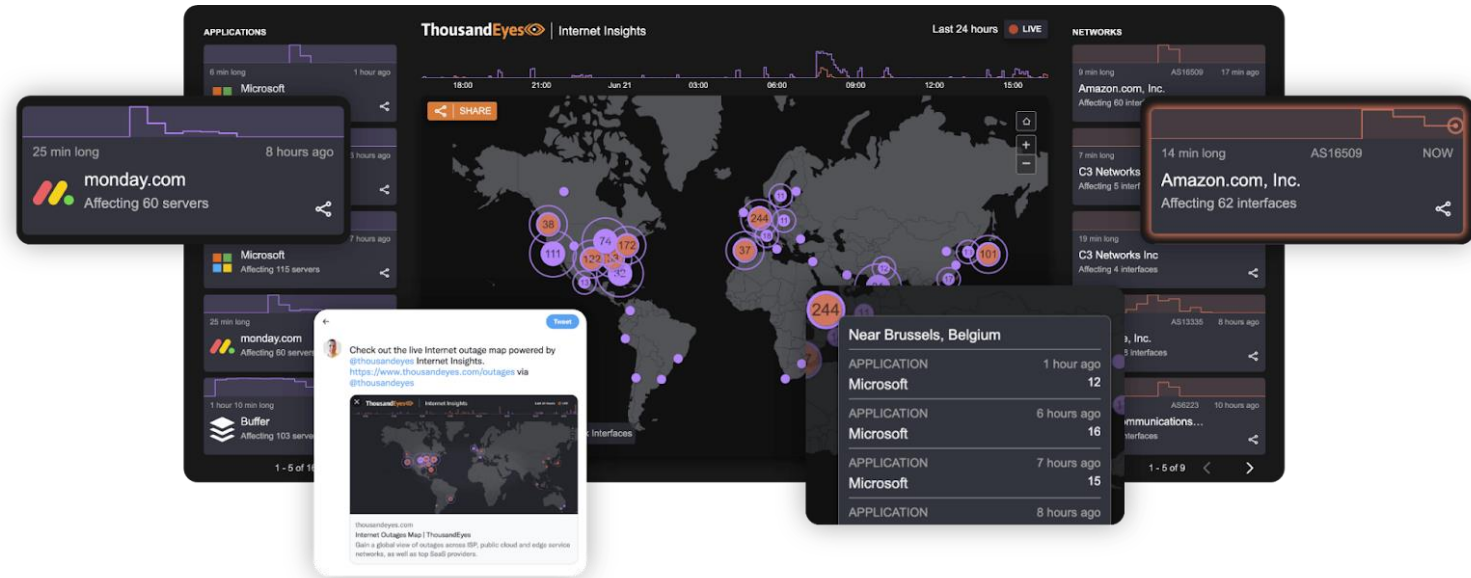




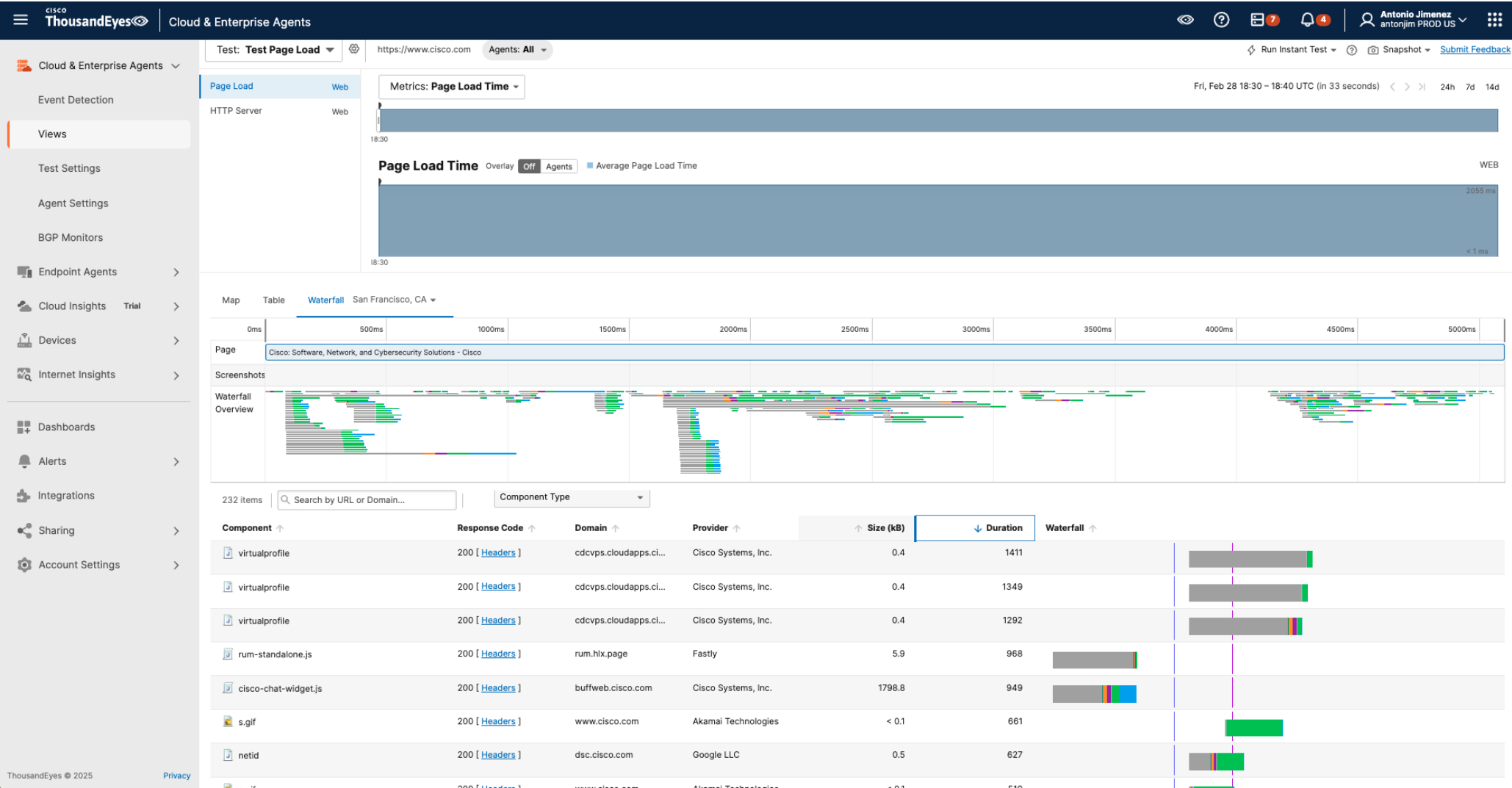
# HAR (HTTP Archive) – Format

```
{
  "log": {
    "version": "1.2",
    "creator": {
      "name": "WebInspector",
      "version": "537.36"
    },
    "pages": [
      {
        "startedDateTime": "2025-02-28T17:52:59.157Z",
        "id": "page_1",
        "title": "https://www.cisco.com/",
        "pageTimings": {
          "onContentLoaded": 852.1480000345036,
          "onLoad": 857.499000034295
        }
      }
    ],
    "entries": [
      {
        "_connectionId": "335189",
        "_fromCache": "memory",
        "_initiator": {
          "type": "parser",
          "url": "https://www.cisco.com/",
          "lineNumber": 129
        },
        "_priority": "Low",
        "_resourceType": "script",
        "cache": {},
        "connection": "443",
        "pageref": "page_1",
        "request": {
          "method": "GET",
          "url": "https://rum.hlx.page/.rum/@adobe/helix-rum-js@5E2/dist/rum-standalone.js",
          "httpVersion": "http/2.0"
```

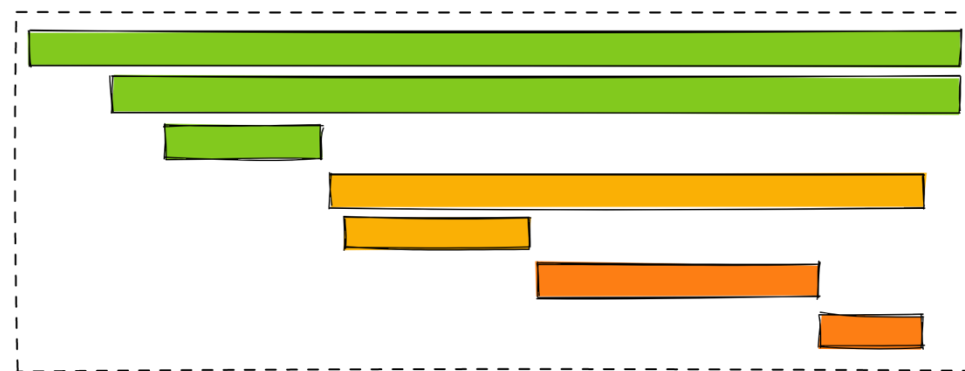
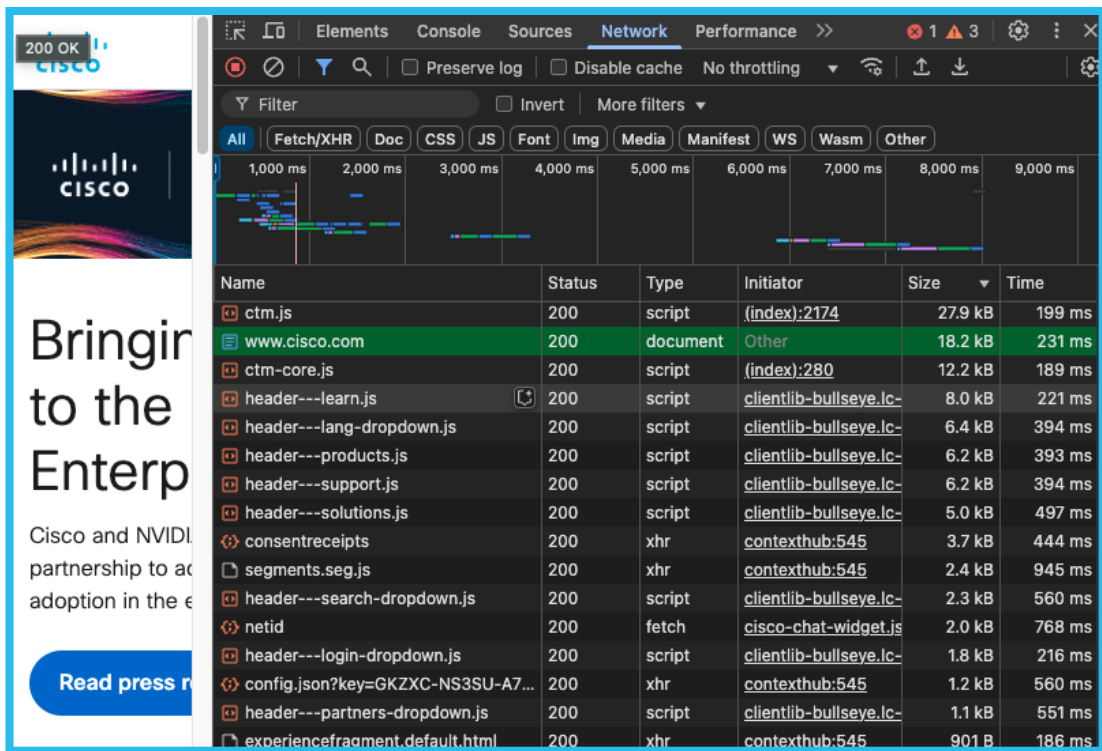
- Network monitoring
- Monitoring agents
- Real-time

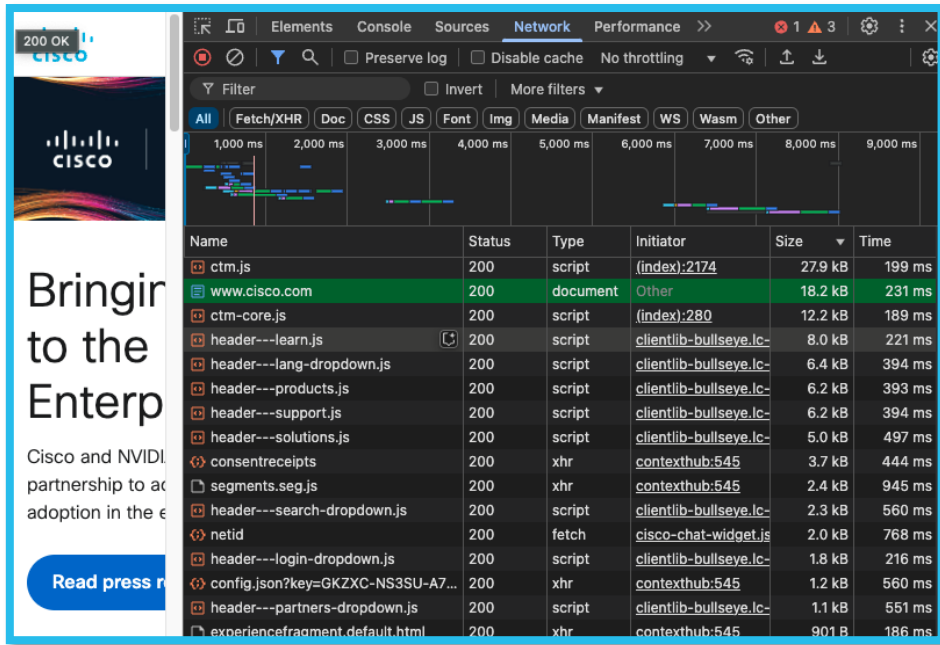


# ThousandEyes Page load Test



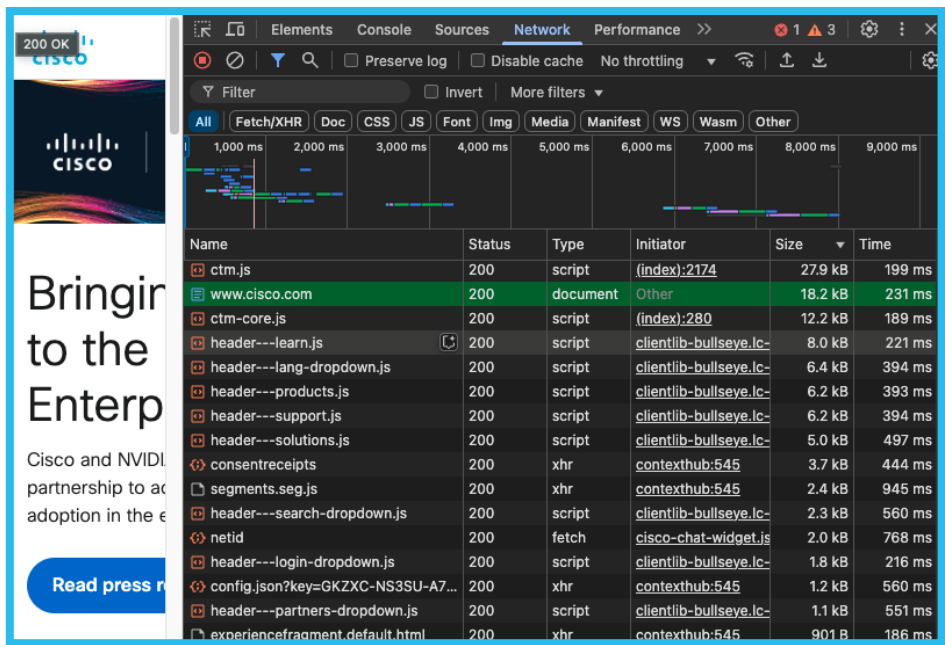
# HAR to OTel traces





## Root Span

- Name: HTTP <url>
- Capture total time of the page load



For each request in the HAR -> a child span

- Name: Get <resource>
- HTTP attributes
- URL of the resource

# OTel trace – Span

---

Name: <Method> <target>

kind: *SPAN\_KIND\_CLIENT*

---

start\_time\_unix\_nano

end\_time\_unix\_nano

---

status: *STATUS\_CODE\_OK* or  
*STATUS\_CODE\_ERROR*

trace\_id /span\_id

---

More info:

<https://docs.thousandeyes.com/product-documentation/integration-guides/opentelemetry/data-model/data-model-v2/traces>

<https://opentelemetry.io/docs/specs/semconv/http/http-spans>



# OTel trace - Span - Attributes Semantic convention

Attribute	Type	Description	Examples	Requirement Level	Stability
<a href="#">http.request.method</a>	string	HTTP request method. [1]	GET ; POST ; HEAD	Required	stable
<a href="#">server.address</a>	string	Host identifier of the <a href="#">"URI origin"</a> HTTP request is sent to. [2]	example.com ; 10.1.2.80 ; /tmp/my.sock	Required	stable
<a href="#">server.port</a>	int	Port identifier of the <a href="#">"URI origin"</a> HTTP request is sent to. [3]	80 ; 8080 ; 443	Required	stable
<a href="#">url.full</a>	string	Absolute URL describing a network resource according to <a href="#">RFC3986</a> [4]	https://www.foo.bar/search?q=OpenTelemetry#SemConv ; //localhost	Required	stable
<a href="#">http.response.status_code</a>	int	<a href="#">HTTP response status code</a> .	200	Conditionally Required If and only if one was received/sent.	stable

More info: <https://opentelemetry.io/docs/specs/semconv/http/http-spans/>

# OTel trace - Span - Attributes Semantic convention

- We are **not** streaming the headers

**[11] `http.request.header`** : Instrumentations SHOULD require an explicit configuration of which headers are to be captured. Including all request **headers can be a security risk** - explicit configuration helps avoid leaking sensitive information. The `User-Agent` header is already captured in the `user_agent.original` attribute. Users MAY explicitly configure instrumentations to capture them even though it is not recommended. The attribute value MUST consist of either multiple header values as an array of strings or a single-item array containing a possibly comma-concatenated string, depending on the way the HTTP library provides access to headers.

**[12] `http.response.header`** : Instrumentations SHOULD require an explicit configuration of which headers are to be captured. Including all response **headers can be a security risk** - explicit configuration helps avoid leaking sensitive information. Users MAY explicitly configure instrumentations to capture them even though it is not recommended. The attribute value MUST consist of either multiple header values as an array of strings or a single-item array containing a possibly comma-concatenated string, depending on the way the HTTP library provides access to headers.

More info: <https://opentelemetry.io/docs/specs/semconv/http/http-spans/>

# OTel trace – Resource Attributes

---

thousandeyes.account.id

thousandeyes.test.type

thousandeyes.test.id

thousandeyes.test.name

thousandeyes.source.agent.id

thousandeyes.source.agent.name

thousandeyes.source.agent.location

thousandeyes.permalink

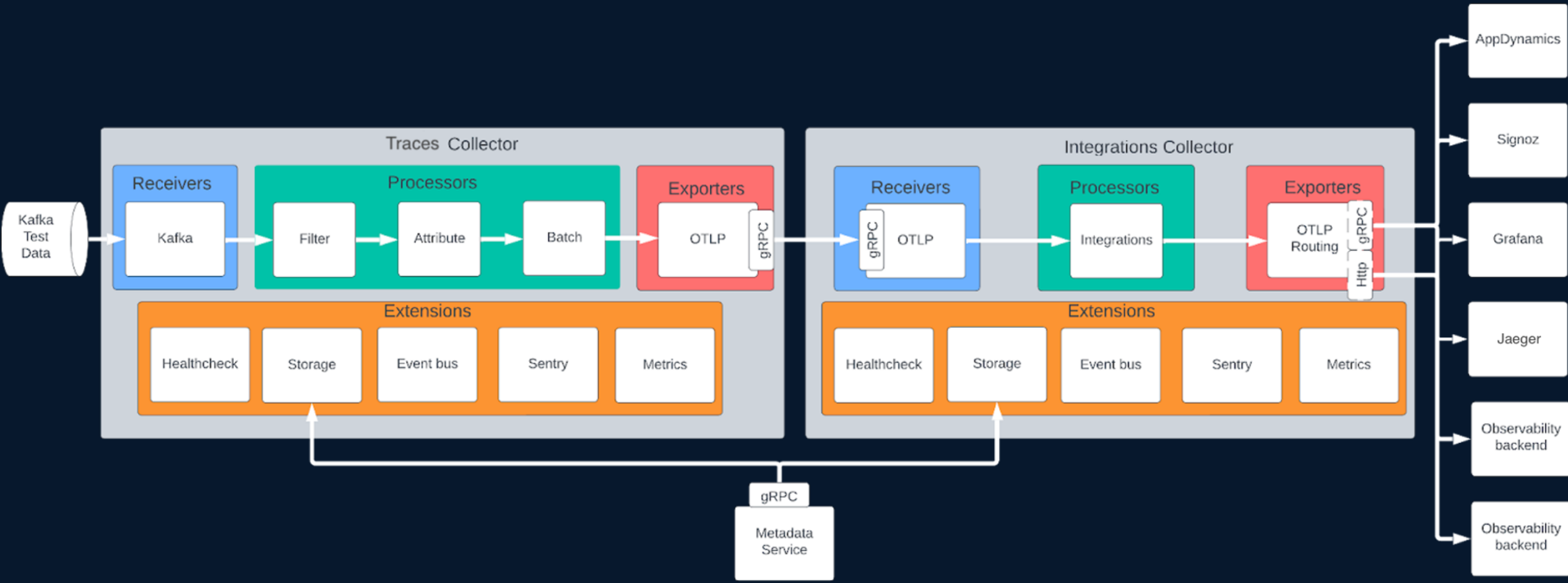
---

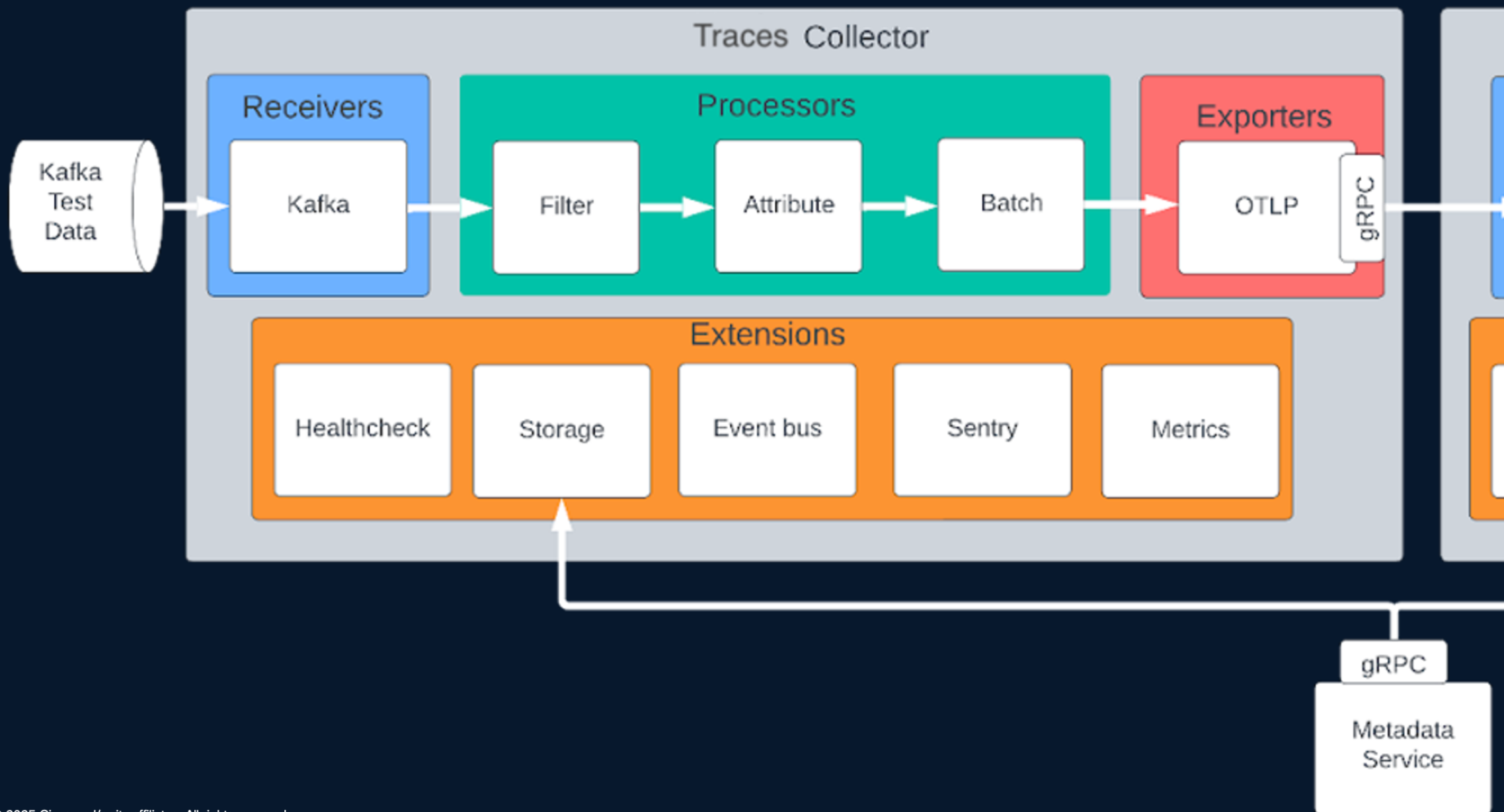
More info: <https://docs.thousandeyes.com/product-documentation/integration-guides/opentelemetry/data-model/data-model-v2/traces>

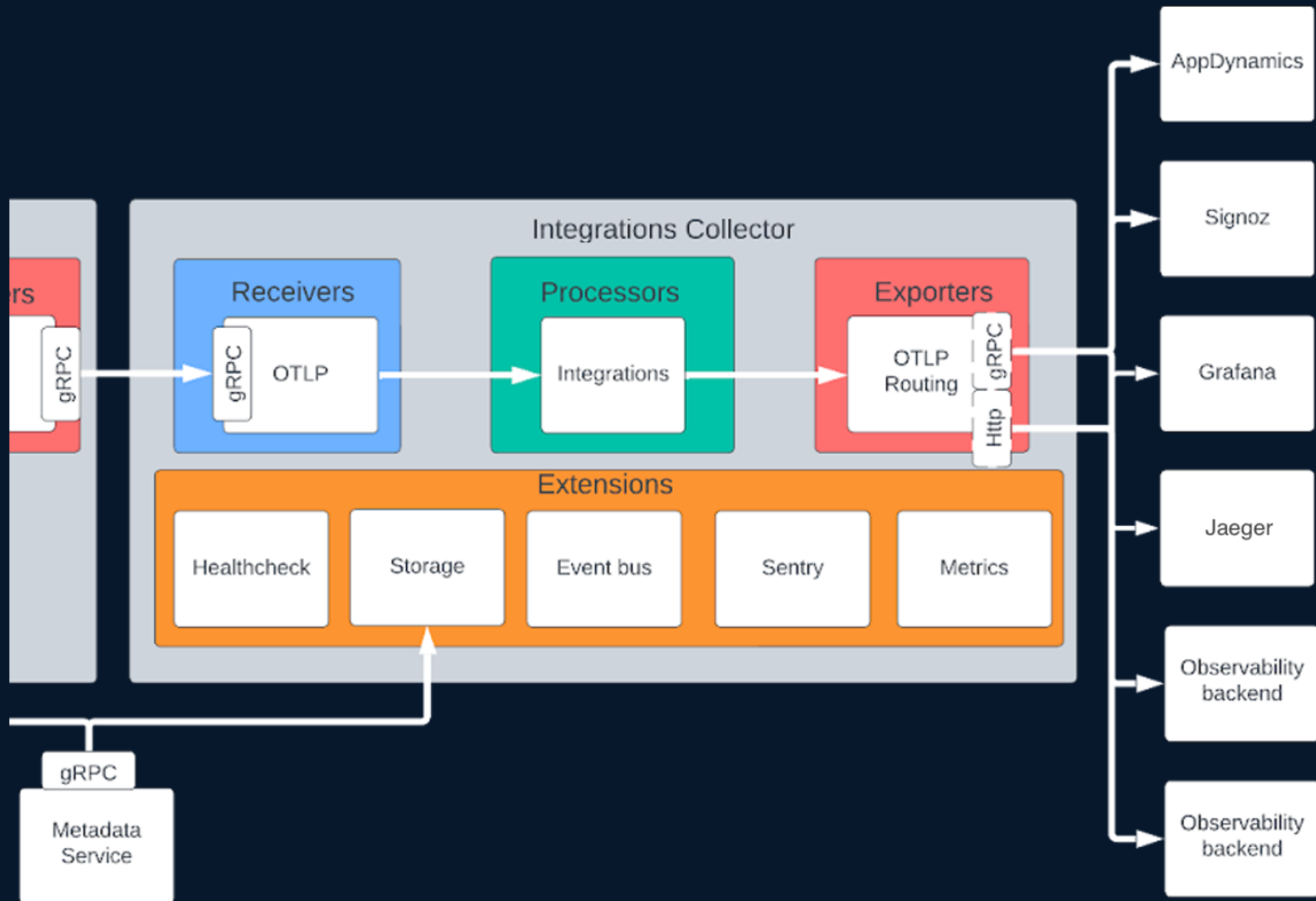
# OTel trace

```
{
  resource_spans {
    resource {
      attributes {
        key: "meta.signal_type"
        value {
          string_value: "trace"
        }
      }
    }
    attributes {
      key: "service.name"
      value {
        string_value: "www.thousandeyes.com"
      }
    }
    attributes {
      key: "thousandeyes.stream.id"
      value {
        string_value: "16fedf53-93d6-4f32-a3b6-4e3dd90eb5c5d"
      }
    }
  }
}
```

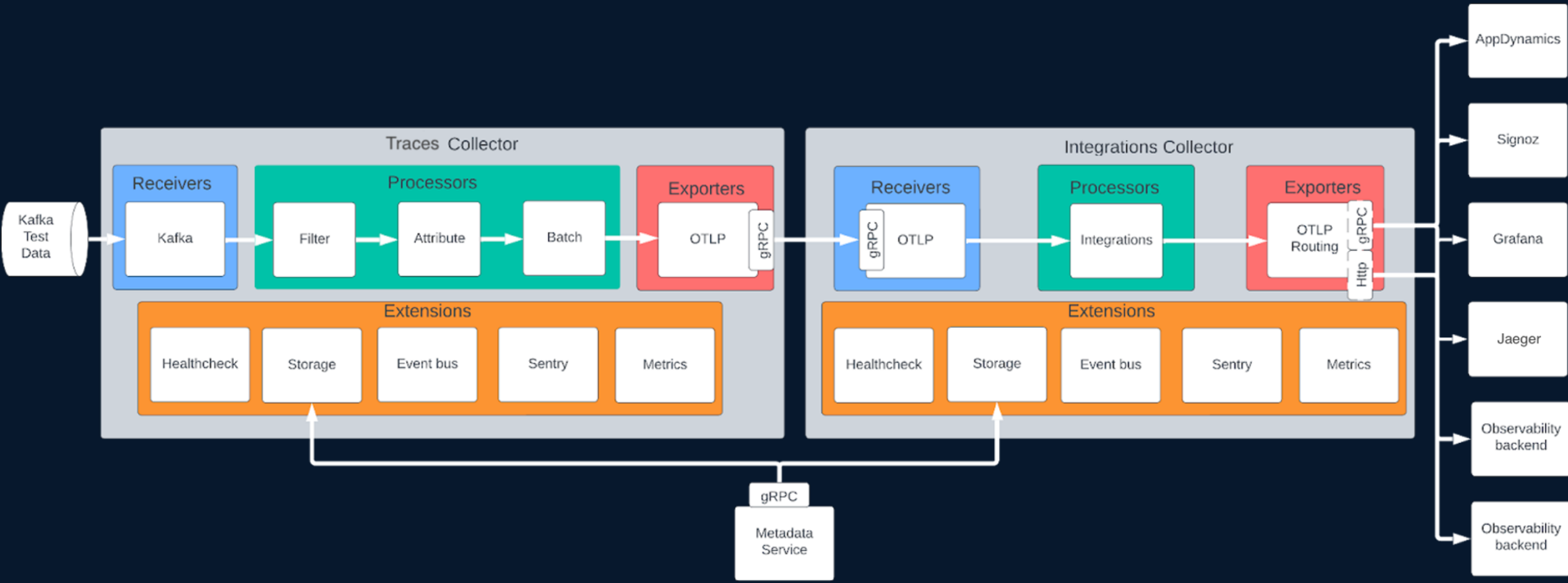
**Architecture**












**Demo**

 Cloud & Enterprise Agents

&lt; Test Settings

## Start with a single test

### New Test

Layer

Routing

Network

DNS

Web

Voice

Test Type

HTTP Server

Page Load

Transaction

API

FTP Server

Test Name

Demo

Test Description

Optional

### Basic Configuration

### Advanced Settings

URL

www.cisco.com

Schedule

Default

Round-Robin

Interval

1 minute

Agents

Select agent(s)

Alerts

☐ Enable

4 of 4 alert rules selected

[Edit Alert Rules](#)

Cancel

Run Once

Create New Test

Cloud & Enterprise Agents

Event Detection

Views

Test Settings

Agent Settings

BGP Monitors

Endpoint Agents

Cloud Insights Trial

Devices

Internet Insights

Dashboards

Alerts

Integrations

Sharing

Account Settings

Test: Demo

https://www.cisco.com

Agents: San Francisco, CA

Reset

Run Instant Test

Snapshot

Submit Feedback

Page Load

Web

HTTP Server

Web

Metrics: Page Load Time (Primary) + 2

Sat, Mar 1 12:20 – 12:30 UTC (in 17 seconds)

24h 7d 14d

Page Load Time

Primary Overlay Off Agents

Average Page Load Time

3520 ms

< 1 ms

Timeouts

1

0

Completion

100%

0%

Map

Table

Waterfall

San Francisco, CA

Metrics

DOM Load Time 1488 ms

Page Load Time 2091 ms

Page Breakdown 45 resources (2705 kB)

Domain Provider Type

www.cisco.com

ww.googletagmanager.com

cdn.cookiecutter.org

cdn.appdynamics.com

cdnssl.clicktale.net

connect.facebook.net

s.go-mpulse.net

j.6sc.co

Others

Agent San Francisco, CA

Page Load Time (ms) 0 12000

Cloud & Enterprise Agents

Endpoint Agents

Cloud Insights

Trial

Devices

Internet Insights

Dashboards

Alerts

Integrations

Sharing

Account Settings

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Privacy

Integrations 1.0

Integrations 2.0

New

1 item

Search...

+ New Integration

Name ↑	Type ↑	Status ↑	Target ↑	Supported Services ↑
Grafana	OpenTelemetry	Connected	https://otlp-gateway-prod-eu-west-2.g...	Streaming

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CISCO

Cisco Confidential

Search Upload

Service (51)

www.cisco.com ▾

Operation (67)

all ▾

Tags ⓘ

http.status\_code=200 error=true

Lookback

Last Hour ▾

Max Duration

e.g. 1.2s, 100ms, 500us

Min Duration

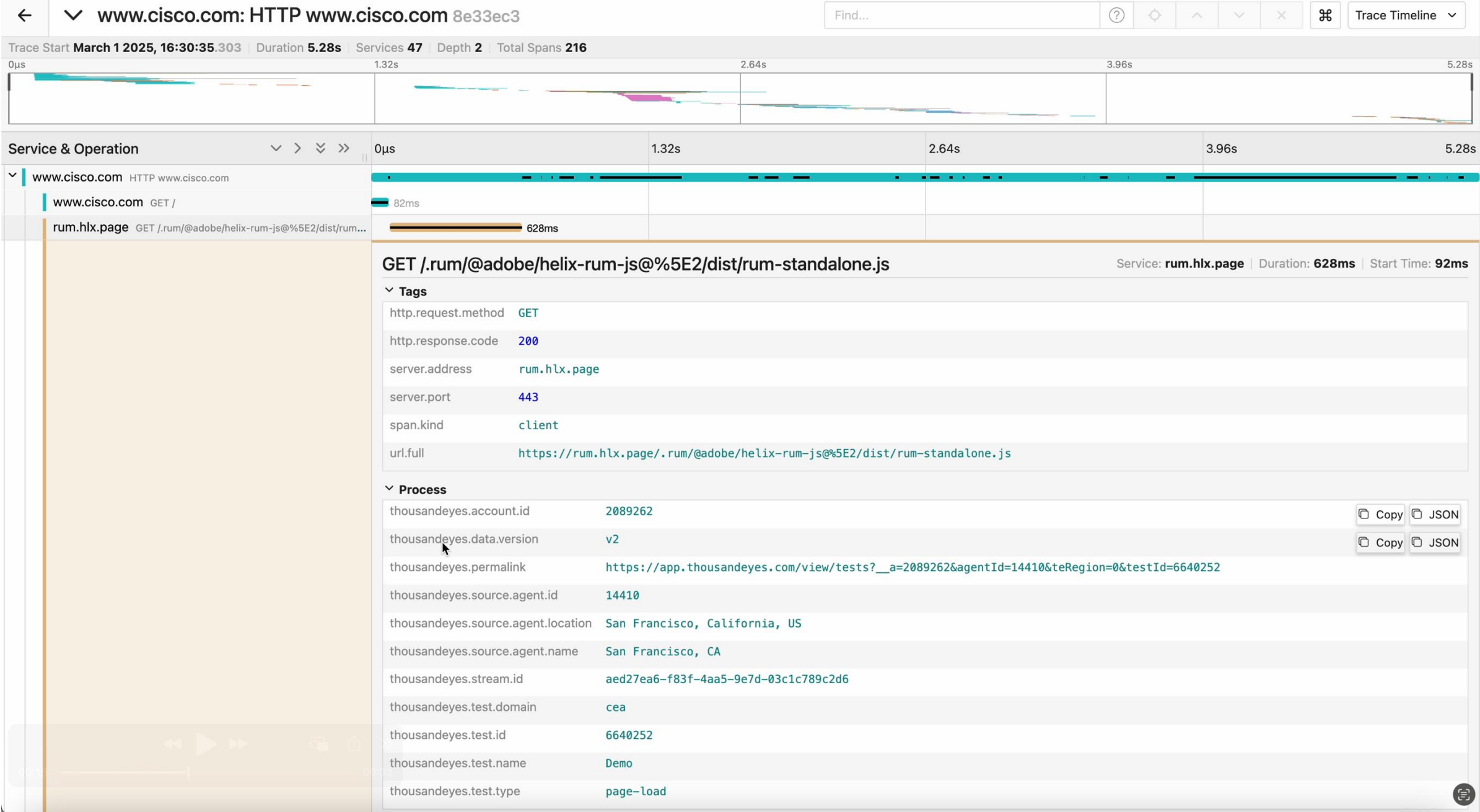
e.g. 1.2s, 100ms, 500us

Limit Results

20

Find Traces





Search

Upload

Service (58)

cisco-tags.cisco.com

Operation (2)

all

Tags ?

http.status\_code=200 error=true

Lookback

Last Hour

Max Duration

e.g. 1.2s, 100ms, 500us

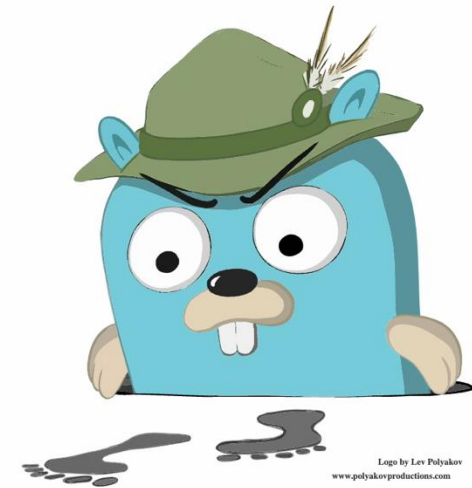
Min Duration

e.g. 1.2s, 100ms, 500us

Limit Results

20

Find Traces





Search Upload

Service (61)

www.cisco.com

Operation (67)

all

Tags ?

http.status\_code=200 error=true

Lookback

Last Hour

Max Duration

e.g. 1.2s, 100ms, 500us

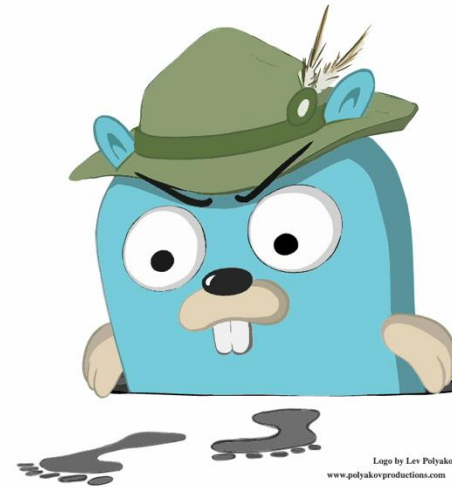
Min Duration

e.g. 1.2s, 100ms, 500us

Limit Results

20

Find Traces



**Lesson learned**



## Tracing

- New use cases for trace



## OTel

- OTel community is very helpful
- Semantic convention well defined
- otel-collector mature



## Performance

- insights into web applications
- Improving monitoring
- Identify performance issues

