Observability using Datadog in Serverless applications

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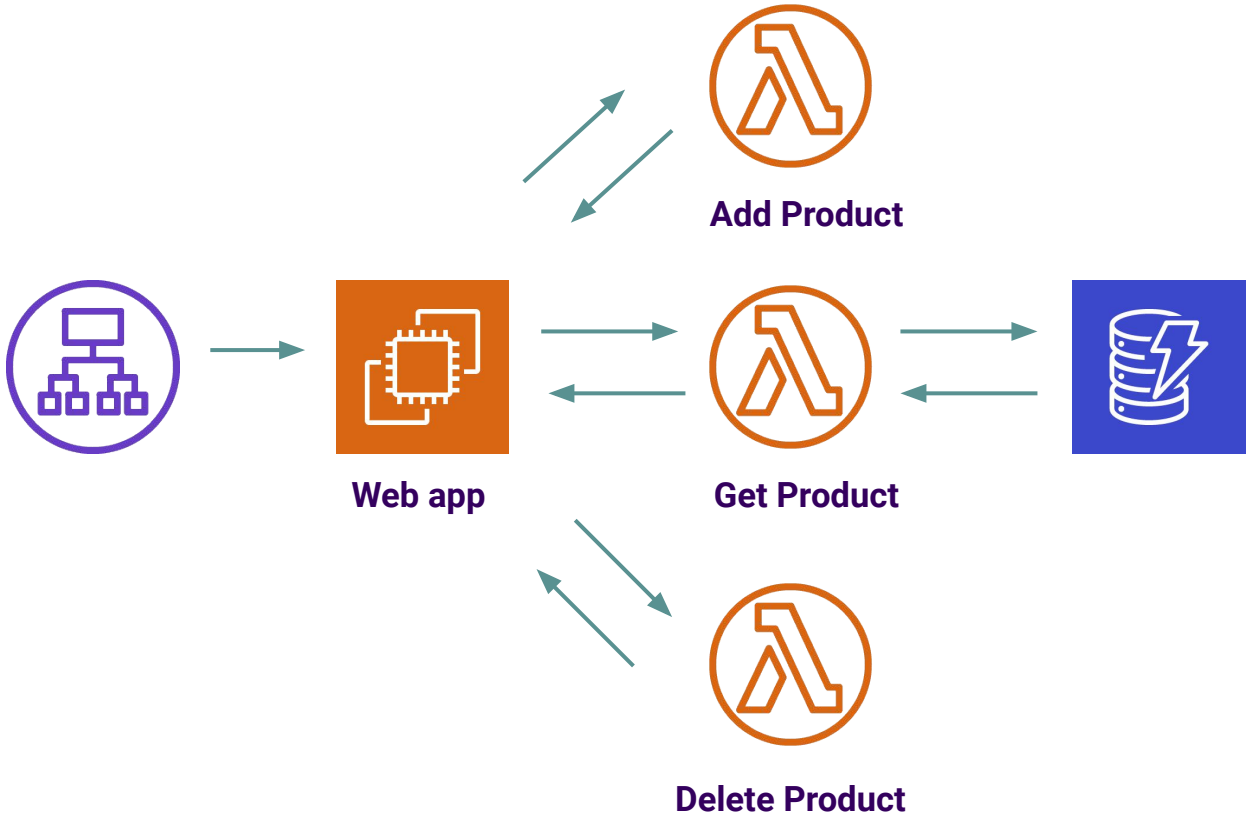
Data Engineer

Agenda

- What's Serverless?
- What's Observability?
- What's Datadog?
- Let's Build!

Serverless refers to utilising cloud provider machines to perform tasks without the customer having to maintain these machines.

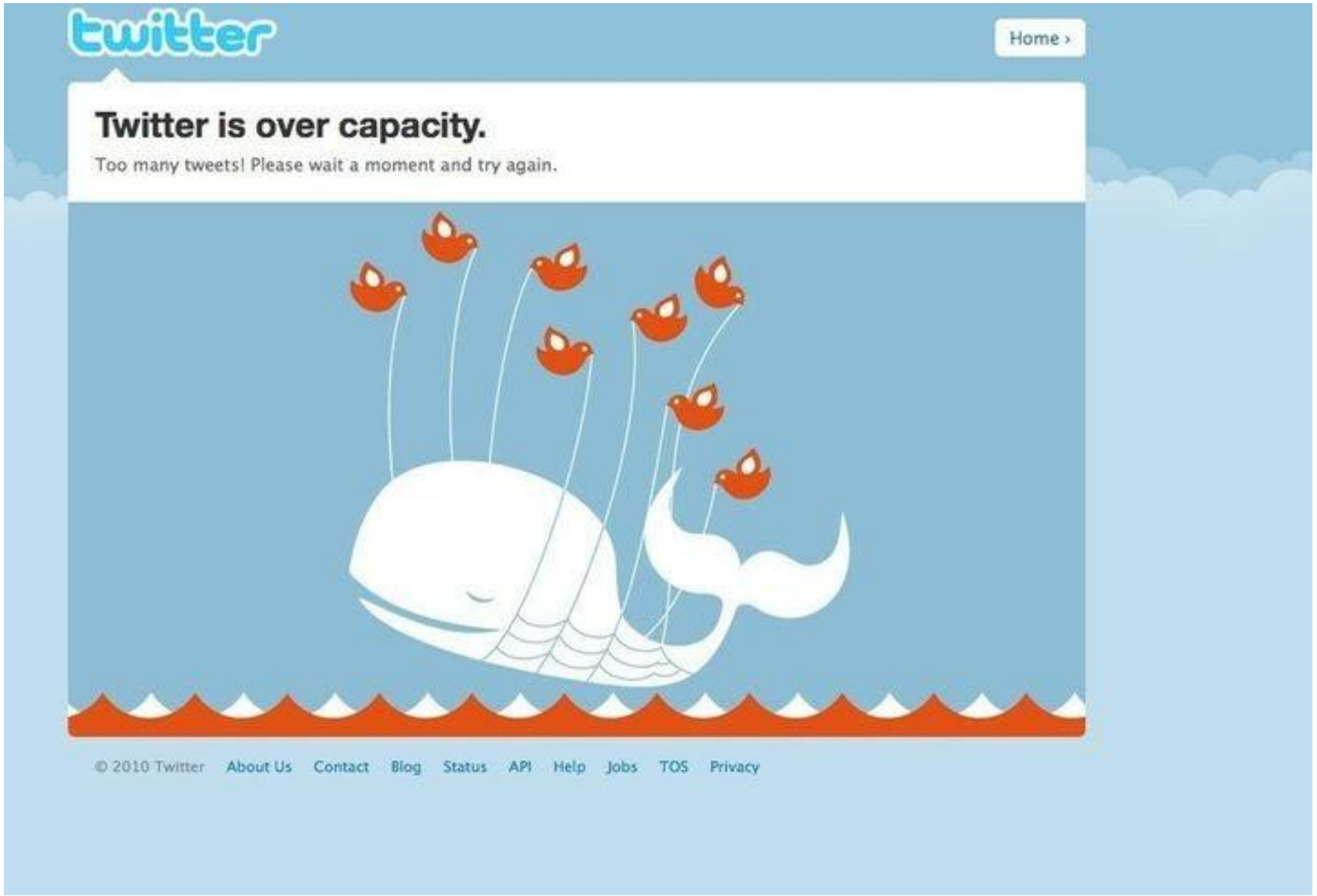
Serverless Application



Each function has a specific responsibility

Observability

A measure of how well internal states of a system can be inferred from knowledge of its external outputs


twitter
Home ›
Twitter is over capacity.
Too many tweets! Please wait a moment and try again.
© 2010 Twitter
About Us
Contact
Blog
Status
API
Help
Jobs
TOS
Privacy

DATADOG

Serverless is special

- No access to the underlying OS
- Runtimes may be a blackbox
- Charge by exec time / mem allocated

Datadog is a monitoring and analytics platform that helps companies improve observability of their infrastructure and applications

AWS Lambda (Enhanced Metrics)

Clone Dashboard

4h The Past 4 Hours

$aws_account * | $region * | $function *

This dashboard is powered by real-time enhanced AWS Lambda metrics. You need to set up these enhanced metrics before data will appear here.

To dig deeper into your user-facing AWS Lambda execution time, enable percentiles on the `aws.lambda.enhanced.duration` metric. Browse to **Metrics** > **Distribution Metrics** and click **Calculate Percentiles**.

See AWS Lambda integration documentation.

Invocations	Errors	Cold Starts	Estimated Monthly Cost 1mo
29K	1K	637	161.22$

Invocations

Top invoked functions

9.46K	post-coupon-us-ake-prod
8.62K	post-coupon-prod-us
5.02K	ddbfunction101
1.43K	lambda-laver-step-functions-dev-step-four
478.00	lambda-laver-step-functions-dev-step-five
477.00	lambda-laver-step-functions-dev-step-two
477.00	lambda-laver-step-functions-dev-step-one
477.00	lambda-laver-step-functions-dev-step-three
263.00	swf-hello-test
240.00	tian-test-dd-tracer
240.00	hello-dog-dev-hello36

Function invocations

Invoked functions per hour 2d

Most expensive functions (last month) 1mo

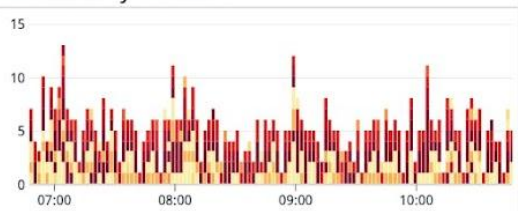
76.54	post-coupon-us-ake-prod
53.15	post-coupon-prod-us
9.01	ddbfunction101
2.91	hello-dog-node-dev-hello10x
1.62	lambda-log-test-dev-node-timeout-12
1.36	xray-step-functions-dev-acuoci-xray-step-four
1.25	xray-step-functions-dev-acuoci-xray-step-one
1.25	xray-step-functions-dev-acuoci-xray-step-two
1.25	xray-step-functions-dev-acuoci-xray-step-three
1.25	xray-step-functions-dev-acuoci-xray-step-five
1.25	gen-ad-preferences-dev-ad-server-model-combine

Cold Starts & Provisioned Concurrency

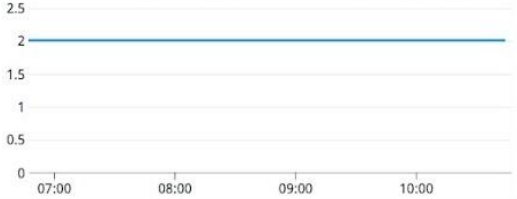
Top cold-starting functions

144.00	lambda-log-test-dev-go-timeout
144.00	lambda-log-test-dev-go-outofmemory
67.00	lambda-log-test-dev-go-raiseserror
66.00	lambda-log-test-dev-java-outofmemory
64.00	lambda-log-test-dev-java-timeout
56.00	post-coupon-us-ake-prod
46.00	post-coupon-prod-us
6.00	swf-hello-test
6.00	ddbfunction101
3.00	lambda-log-test-dev-go-normallogs
3.00	lambda-laver-step-functions-dev-step-two

Cold starts by function



Provisioned concurrent executions by function



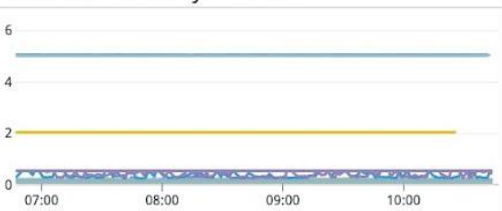
Provisioned concurrency utilization by function

Execution Time

Slowest functions

30.02	lambda-log-test-dev-node-timeout
30.02	lambda-log-test-dev-java-timeout
30.02	lambda-log-test-dev-node-timeout-12
30.02	lambda-log-test-dev-go-timeout
30.02	lambda-log-test-dev-ruby-timeout
21.95	lambda-log-test-dev-node-outofmem-12
18.93	lambda-log-test-dev-node-outofmem
5.01	xray-step-functions-dev-acuoci-xray-step-one
5.01	gen-ad-preferences-dev-ad-server-model-create-dat...
5.01	xray-step-functions-dev-acuoci-xray-step-five
5.01	xray-step-functions-dev-acuoci-xray-step-two

p95 execution time by function



Max execution time / timeout

1.00	lambda-log-test-dev-python-timeout-27
1.00	langerflowlogdemo
1.00	lambda-log-test-dev-node-timeout-12
1.00	lambda-log-test-dev-java-timeout
1.00	lambda-log-test-dev-node-timeout
1.00	lambda-log-test-dev-python-timeout
1.00	lambda-log-test-dev-ruby-timeout
1.00	lambda-log-test-dev-node-outofmem-12
1.00	lambda-log-test-dev-node-outofmem
1.00	lambda-log-test-dev-go-timeout

Total execution time (seconds)

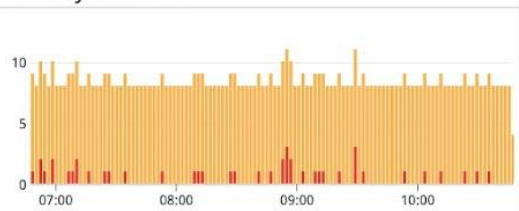
4.32K	lambda-log-test-dev-node-timeout-12
4.11K	lambda-log-test-dev-go-timeout
3.10K	lambda-log-test-dev-node-outofmem-12
2.19K	lambda-log-test-dev-python-timeout
2.13K	lambda-log-test-dev-node-timeout
1.98K	lambda-log-test-dev-python-timeout-27
1.77K	lambda-log-test-dev-java-timeout
1.47K	lambda-log-test-dev-ruby-timeout
1.44K	lambda-log-test-dev-node-outofmem
1.20K	xray-step-functions-dev-acuoci-xray-step-one
1.20K	gen-ad-preferences-dev-ad-server-model-create-dat...

Errors

Functions with most errors

956.00	lambda-layer-step-functions-...
44.00	swf-hello-test

Errors by function



Error logs by function

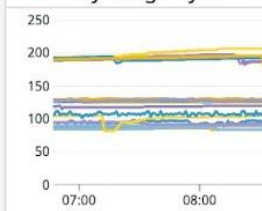
Throttled invocations by function

Me

Functions using most m

196.90	lambda-laver-step-fu
191.61	lambda-laver-step-fu
189.72	lambda-laver-step-fu
188.60	lambda-laver-step-fu
188.53	lambda-laver-step-fu
128.49	lambda-log-test-dev-n
128.35	lambda-log-test-dev-n
126.17	post-coupon-us-ake-p
126.14	post-coupon-prod-us
124.58	lambda-log-test-dev-n
123.75	lambda-log-test-dev-n

Memory usage by functi

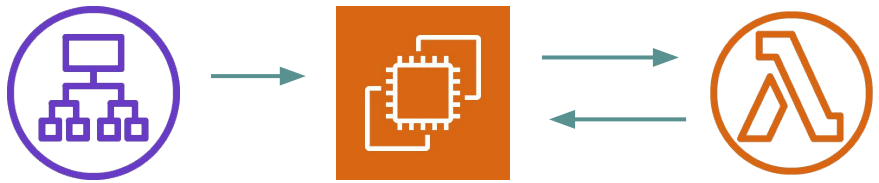


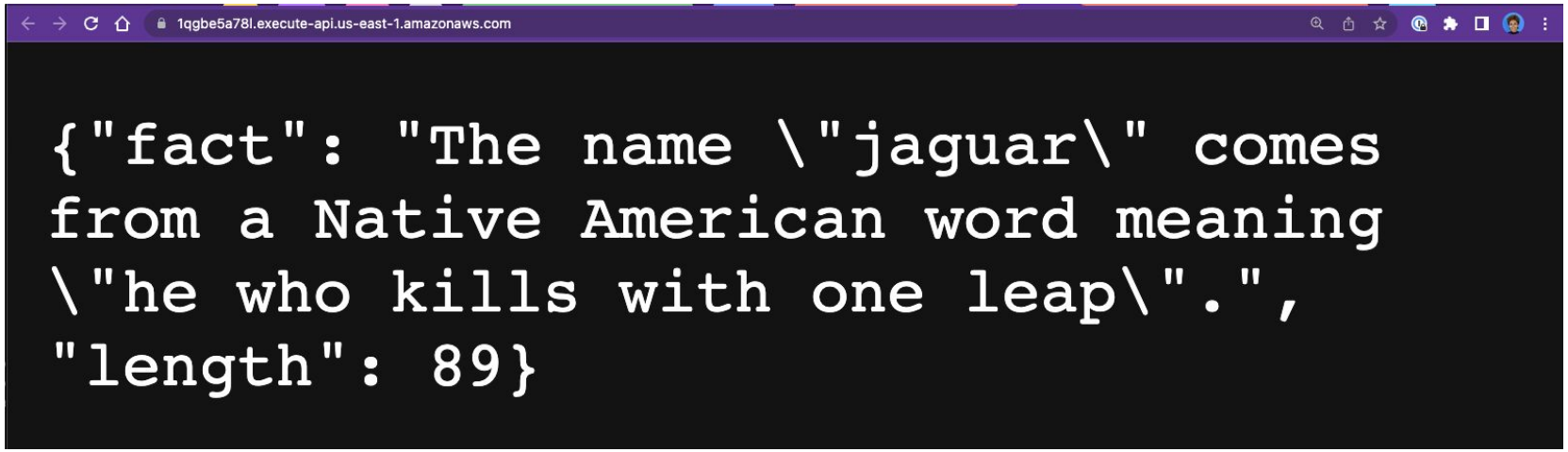
Change in memory usag

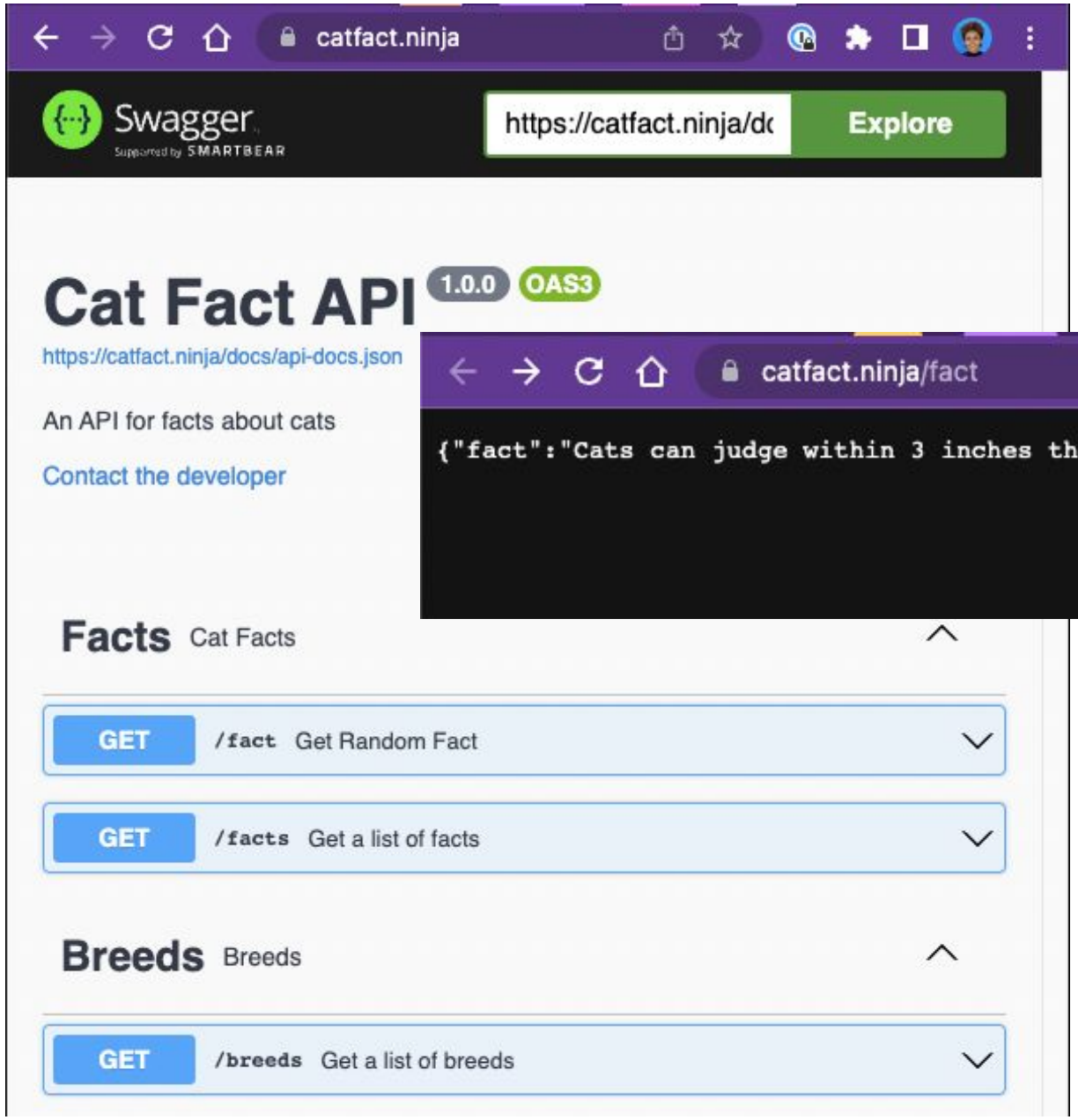
191.57	lambda-laver-ste...
188.53	lambda-laver-ste...
126.13	post-coupon-pro...
128.47	lambda-log-test-...
124.58	lambda-log-test-...
128.35	lambda-log-test-...
126.18	post-coupon-us-...
196.9	lambda-laver-ste...
189.68	lambda-laver-ste...
188.58	lambda-laver-ste...

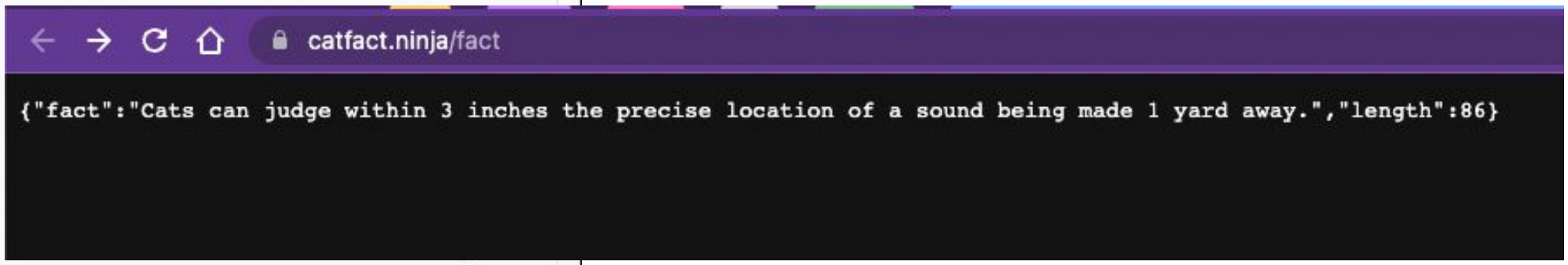
Let's Build!

Serverless Application






catfact.ninja
Swagger
Supported by SMARTBEAR
https://catfact.ninja/dc
Explore
Cat Fact API
1.0.0
OAS3
https://catfact.ninja/docs/api-docs.json
An API for facts about cats
Contact the developer
Facts
Cat Facts
GET
/fact
Get Random Fact
GET
/facts
Get a list of facts
Breeds
Breeds
GET
/breeds
Get a list of breeds


catfact.ninja/fact
{"fact":"Cats can judge within 3 inches the precise location of a sound being made 1 yard away.","length":86}

DATADOG

serverless.yml

```yaml
service: aws-python-http-api-leticia-santos
frameworkVersion: '3'

plugins:
  - serverless-python-requirements

custom:
  pythonRequirements:
    dockerizePip: non-linux

provider:
  name: aws
  runtime: python3.8
  profile: sandbox-leticia-santos  # Add your profile name
  region: us-east-1
  tags:
    datadog: true # Optional. Can be used for AWS Lambda resource exclusion
    owner: Leticia Santos # Add your name
  environment:
    DD_ENV: test
    DD_SERVICE: simple_http_api_leticia_santos
    DD_VERSION: '1.0'
```

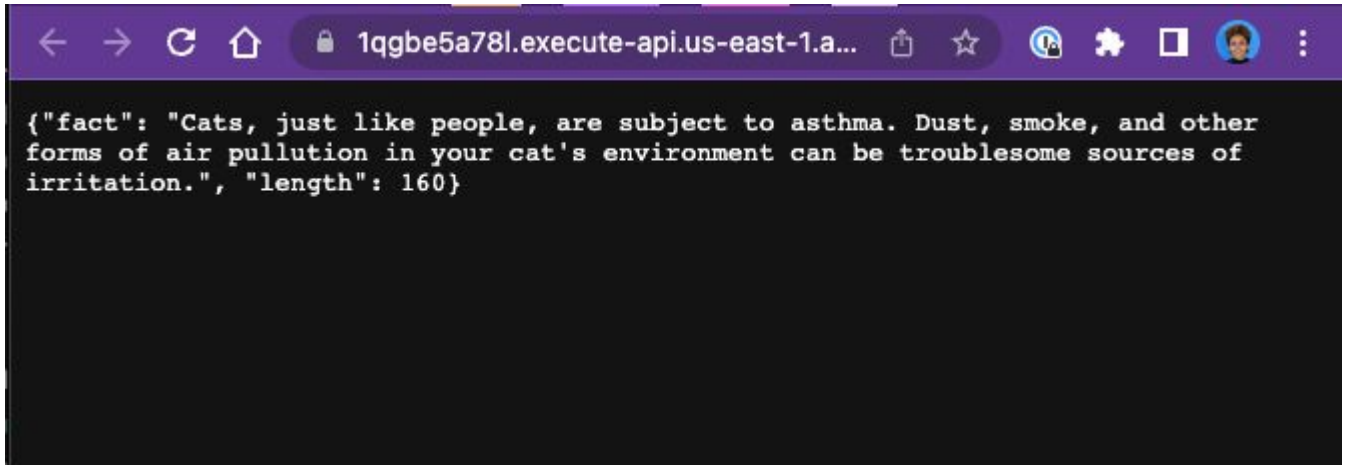
DATADOG

```python
# Using Automatic Instrumentation
def get_request_1():
    response = requests.get('https://catfact.ninja/fact')
    return response
```

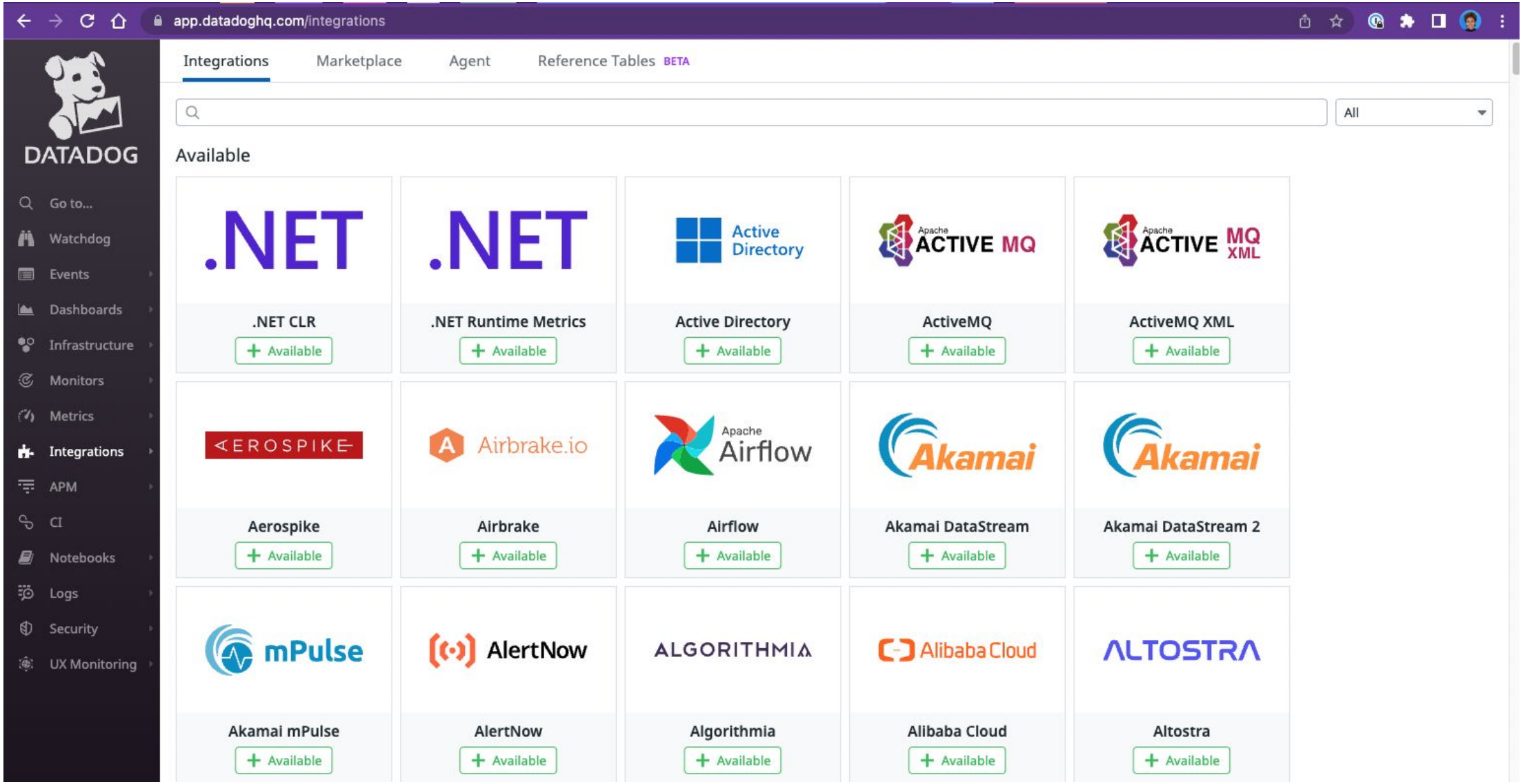
```python
def hello(event, context):
    cat_facts = get_request_1()
    cat_facts_json = cat_facts.json()

    response = {"statusCode": 200, "body": json.dumps(cat_facts_json)}

    return response
```

```
25  functions:
26    hello:
27      handler: handler.hello
28      events:
29        - httpApi:
30            path: /
31            method: get
32
```

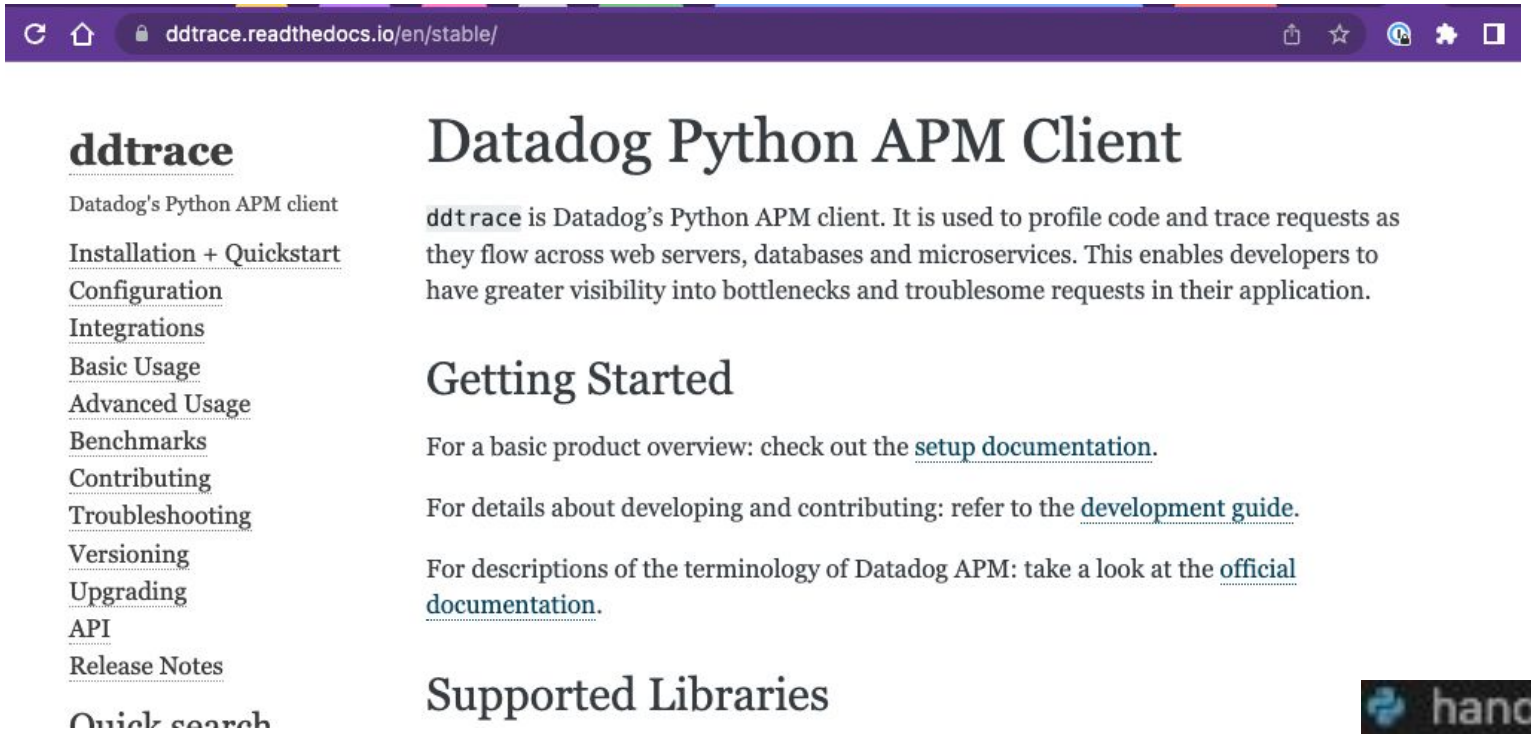
```
leticia.santos@ ~/dd/sandbox/serverless/lambda-extension/aws-python-http-api [main] $ serverless deploy
Running "serverless" from node_modules

Deploying aws-python-http-api-leticia-santos to stage dev (us-east-1)

✔ Service deployed to stack aws-python-http-api-leticia-santos-dev (133s)

endpoint: GET - https://1qgbe5a78l.execute-api.us-east-1.amazonaws.com/
functions:
  hello: aws-python-http-api-leticia-santos-dev-hello (33 MB)

Improve API performance - monitor it with the Serverless Dashboard: run "serverless"
leticia.santos@ ~/dd/sandbox/serverless/lambda-extension/aws-python-http-api [main] $
```

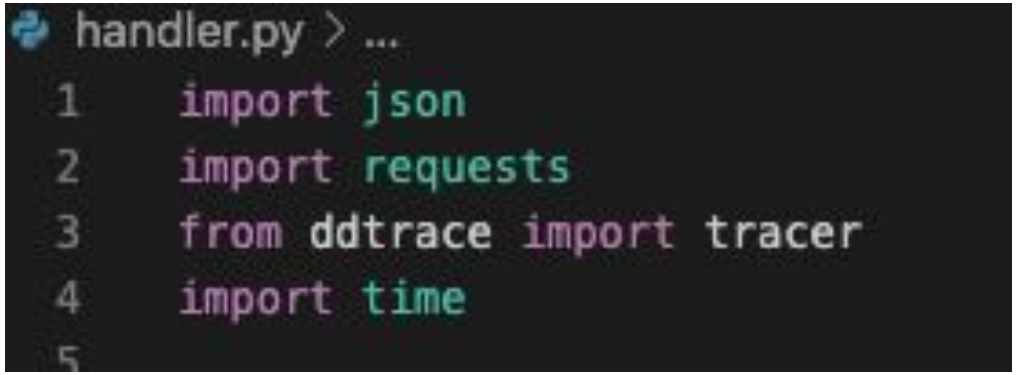


Integração com Datadog



Datadog Integration





DATADOG

Datadog Integration

```python
# Using Automatic Instrumentation
def get_request_1():
    response = requests.get('https://catfact.ninja/fact')
    return response
```

```python
# Using Decorator
@tracer.wrap(service="cat_service_2", resource="cat_facts_2")
def get_request_2():
    response = requests.get('https://catfact.ninja/fact')
    return response
```

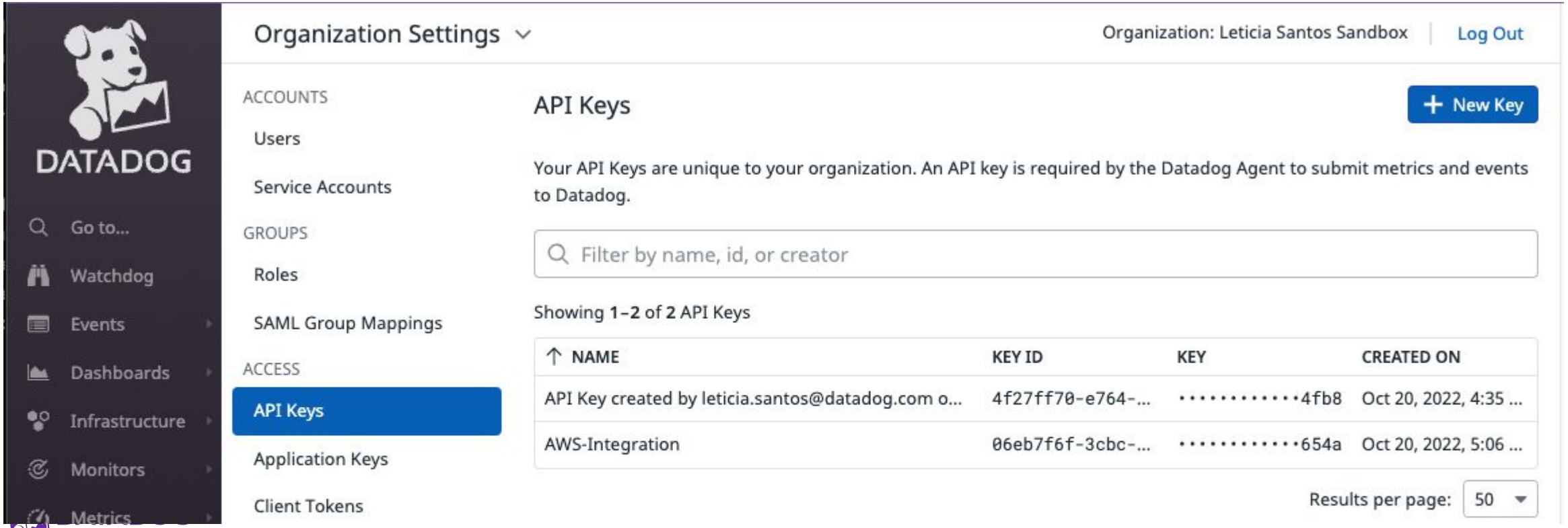
```python
# Using Context Manager
def get_request_3():
    with tracer.trace("cat_operation_3", service="cat_service_3", resource="cat_facts_3"):
        response = requests.get('https://catfact.ninja/fact')
    return response
```

```python
# Using Manual
def get_request_4():
    span = tracer.trace("cat_operation_4", service="cat_service_4", resource="cat_facts_4")
    time.sleep(.2)
    response = requests.get('https://catfact.ninja/fact')
    span.set_tag("custom_key", "custom_value") # Adding a custom span tag
    span.finish()
    return response
```

DATADOG

Datadog Integration

```
plugins:
  - serverless-python-requirements
  - serverless-plugin-datadog

custom:
  pythonRequirements:
    dockerizePip: non-linux
  datadog:
    addExtension: true
    apiKey: <YOUR_DD_API_KEY> # Add your Datadog API key
```



Datadog Integration

```
leticia.santos@ ~/dd/sandbox/serverless/lambda-extension/aws-python-http-api [main] $ serverless deploy
Running "serverless" from node_modules

Deploying aws-python-http-api-leticia-santos to stage dev (us-east-1)
Auto instrumenting functions with Datadog
Adding Lambda Library Layers to functions
Adding Datadog Lambda Extension Layer to functions
Adding Plugin Version 4.1.0 tag
Adding service and environment tags
Adding Plugin Version 4.1.0 tag
Adding service and environment tags
Datadog Monitoring
functions
  hello: https://app.datadoghq.com/functions/aws-python-http-api-leticia-santos-dev-hello:us-east-1:601427279990:aws?source=sls-plugin
View Serverless Monitors
  https://app.datadoghq.com/monitors/manage?q=tag%3A%28%22env%3Adev%22AND%22service%3Aaws-python-http-api-leticia-santos%22%29

✔ Service deployed to stack aws-python-http-api-leticia-santos-dev (166s)

endpoint: GET - https://1qgbe5a78l.execute-api.us-east-1.amazonaws.com/
functions:
  hello: aws-python-http-api-leticia-santos-dev-hello (40 MB)

Improve API performance - monitor it with the Serverless Dashboard: run "serverless"
leticia.santos@ ~/dd/sandbox/serverless/lambda-extension/aws-python-http-api [main] $
```

DATADOG

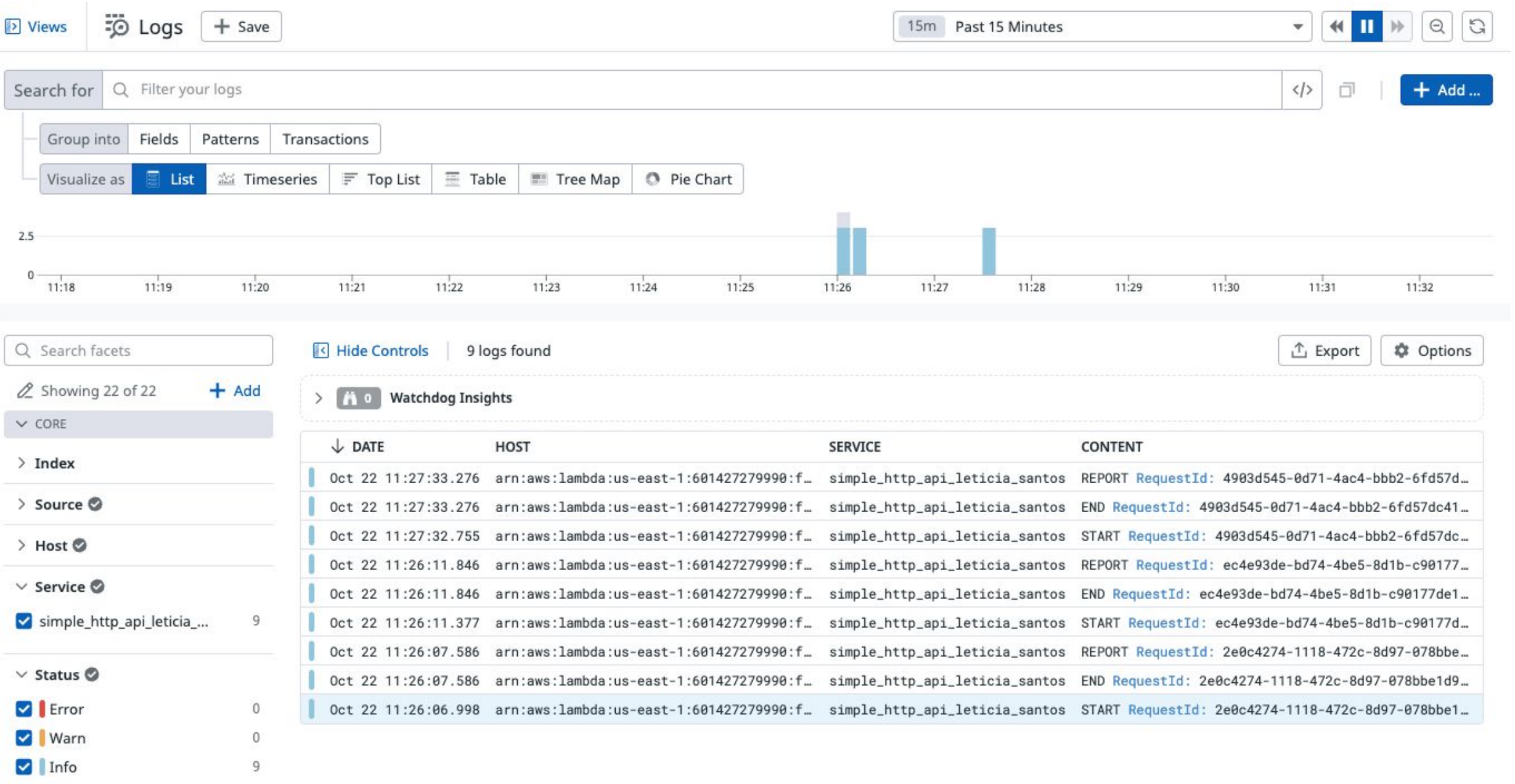
Datadog can collect from your functions:

- **Logs**
- **Traces**
- **Execution data**

Logs

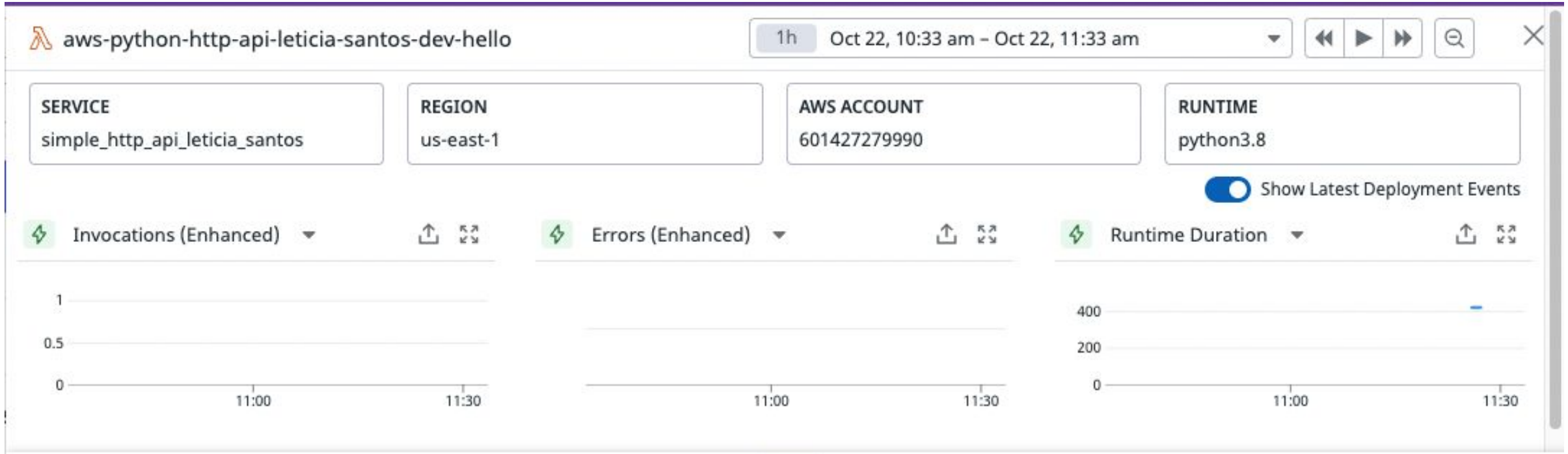
Logs

```python
import logging

# Set logger
logger = logging.getLogger()
logger.setLevel(logging.INFO)

# Using Automatic Instrumentation
def get_request_1():
    logger.info("Requesting cat ninja API")
    response = requests.get('https://catfact.ninja/fact')
    return response
```


Views
Logs
Save
15m Past 15 Minutes
Search for
Filter your logs
Add ...
Group into
Fields
Patterns
Transactions
Visualize as
List
Timeseries
Top List
Table
Tree Map
Pie Chart
2.5
0
11:18
11:19
11:20
11:21
11:22
11:23
11:24
11:25
11:26
11:27
11:28
11:29
11:30
11:31
11:32
Search facets
Showing 22 of 22
Add
CORE
Index
Source
Host
Service
simple_http_api_leticia_... 9
Status
Error 0
Warn 0
Info 9
Hide Controls
9 logs found
Export
Options
0 Watchdog Insights
DATE
HOST
SERVICE
CONTENT
Oct 22 11:27:33.276 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos REPORT RequestId: 4903d545-0d71-4ac4-bbb2-6fd57d…
Oct 22 11:27:33.276 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos END RequestId: 4903d545-0d71-4ac4-bbb2-6fd57dc41…
Oct 22 11:27:32.755 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos START RequestId: 4903d545-0d71-4ac4-bbb2-6fd57dc…
Oct 22 11:26:11.846 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos REPORT RequestId: ec4e93de-bd74-4be5-8d1b-c90177…
Oct 22 11:26:11.846 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos END RequestId: ec4e93de-bd74-4be5-8d1b-c90177de1…
Oct 22 11:26:11.377 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos START RequestId: ec4e93de-bd74-4be5-8d1b-c90177d…
Oct 22 11:26:07.586 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos REPORT RequestId: 2e0c4274-1118-472c-8d97-078bbe…
Oct 22 11:26:07.586 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos END RequestId: 2e0c4274-1118-472c-8d97-078bbe1d9…
Oct 22 11:26:06.998 arn:aws:lambda:us-east-1:601427279990:f… simple_http_api_leticia_santos START RequestId: 2e0c4274-1118-472c-8d97-078bbe1…

DATADOG

System metrics



Invocations | Error Tracking | Logs | Metrics | Deployments | Configuration

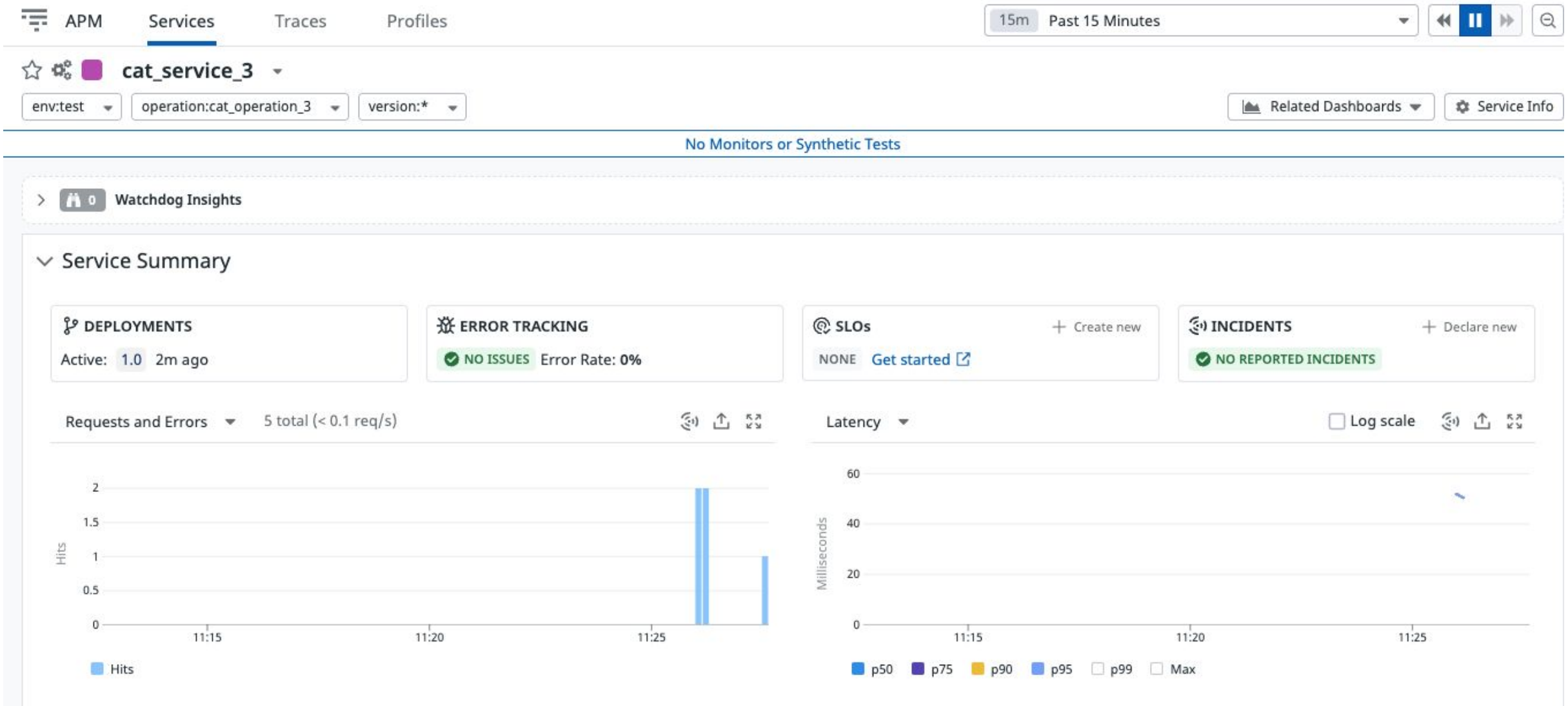
3 invocations with **traces** found

Filters (1)

DATE	DURATION	TRIGGER	ERROR	TRACE	LOGS	INSIGHTS
Oct 22 11:27:32.754	521 ms	GET /	—	Open Trace →	3	—
Oct 22 11:26:11.377	469 ms	GET /	—	Open Trace →	3	—
Oct 22 11:26:06.997	588 ms + 965 ms init	GET /	—	Open Trace →	2	COLD START

DATADOG

Trace


APM
Services
Traces
Profiles
15m
Past 15 Minutes
cat_service_3
env:test
operation:cat_operation_3
version:*
Related Dashboards
Service Info
No Monitors or Synthetic Tests
0
Watchdog Insights
Service Summary
DEPLOYMENTS
Active: 1.0 2m ago
ERROR TRACKING
NO ISSUES
Error Rate: 0%
SLOs
Create new
NONE
Get started
INCIDENTS
Declare new
NO REPORTED INCIDENTS
Requests and Errors
5 total (< 0.1 req/s)
Hits
2
1.5
1
0.5
0
11:15
11:20
11:25
Hits
Latency
Log scale
Milliseconds
60
40
20
0
11:15
11:20
11:25
p50
p75
p90
p95
p99
Max

DATADOG


qgbe5a78l.execute-api.us-east-1.amazonaws.com > GET /
Open Full Page
453 ms total duration
GET
1qgbe5a78l.execute-api.us-east-1.amazonaws.com/
200 OK
on Oct 22 11:27:32.718 (1m ago)
Trace:
Flame Graph
Span
fx simple_http_api_leticia_santos
aws.lambda
Hide Legend
145 ms
150 ms
157 ms
190 ms
195 ms
200 ms
205 ms
aws-python-http-api-leticia-santos-dev-hello
415 ms [>p99] (91.5% of total Time)
aws.httpapi GET /
453 ms
aws.lambda aws-python-http-api-leticia-santos-dev-hello
415 ms
handler.g...
cat_operation_3 cat_facts_3
51.5 ms
cat_opera...
reque...
requests.request
49.3 ms
Service
% Exec Time
simple_http_api... 45.7%
cat_service_4 44.8%
qgbe5a78l.exec... 8.53%
cat_service_2 0.59%
cat_service_3 0.47%

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