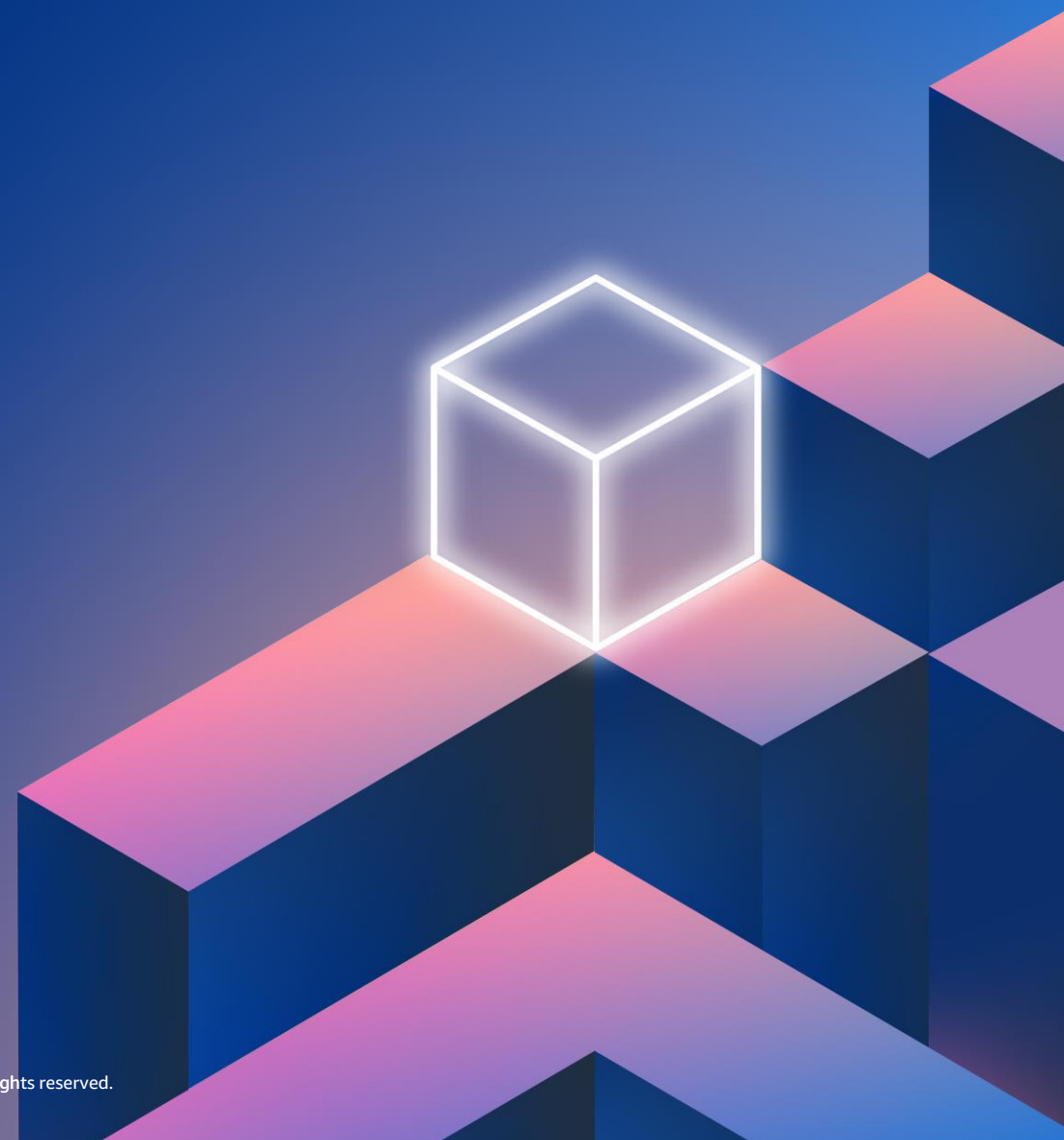


AWS Builders Online Series

Observability for Builders

Abhishek Gupta

Principal Developer Advocate
AWS India



Agenda

1. Observability for builders: What and why

2. AWS tools for observability

3. Practical perspectives

- **Demo:** Improve observability using AWS Lambda Powertools
- **Demo:** Deep dive with Amazon CloudWatch Log Insights query language
- **Demo:** AIOps for observability with Amazon CloudWatch Anomaly Detection

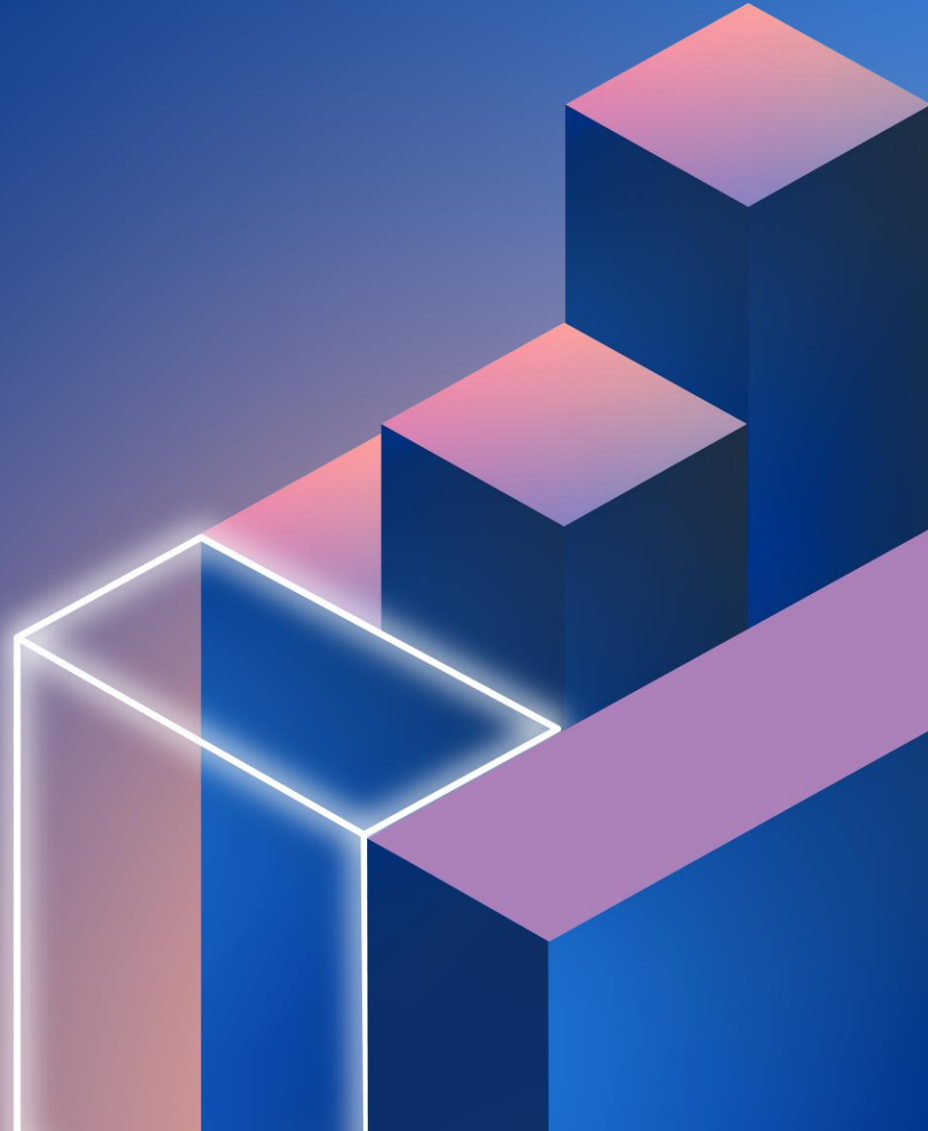
4. Hands-on: Next steps and resources



“Everything fails, all the time.”

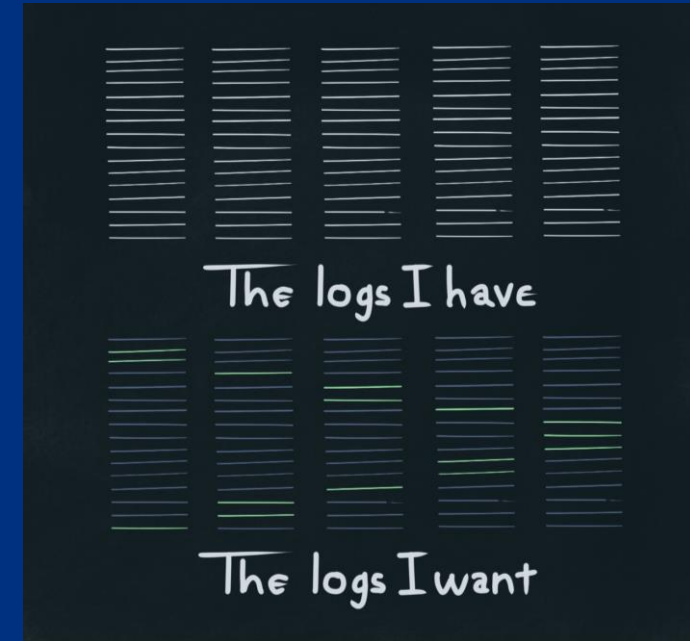
Dr. Werner Vogels

Amazon CTO



Troubleshooting is like finding a “needle in the haystack”

```
199.72.81.55 -- [01/Jul/1995:00:00:01 -0400] "GET /history/apollo/ HTTP/1.0" 200 6245
unicomp6.unicomp.net -- [01/Jul/1995:00:00:06 -0400] "GET /shuttle/countdown/ HTTP/1.0" 200 3985
199.120.110.21 -- [01/Jul/1995:00:00:09 -0400] "GET /shuttle/missions/sts-73/mission-sts-73.html HTTP/1.0" 200 4085
burger.letters.com -- [01/Jul/1995:00:00:11 -0400] "GET /shuttle/countdown/liftoff.html HTTP/1.0" 304 0
199.120.110.21 -- [01/Jul/1995:00:00:11 -0400] "GET /shuttle/missions/sts-73/sts-73-patch-small.gif HTTP/1.0" 200 4179
burger.letters.com -- [01/Jul/1995:00:00:12 -0400] "GET /images/NASA-logosmall.gif HTTP/1.0" 304 0
burger.letters.com -- [01/Jul/1995:00:00:12 -0400] "GET /shuttle/countdown/video/livevideo.gif HTTP/1.0" 200 0
205.212.115.106 -- [01/Jul/1995:00:00:12 -0400] "GET /shuttle/countdown/countdown.html HTTP/1.0" 200 3985
d104.aa.net -- [01/Jul/1995:00:00:13 -0400] "GET /shuttle/countdown/ HTTP/1.0" 200 3985
129.94.144.152 -- [01/Jul/1995:00:00:13 -0400] "GET / HTTP/1.0" 200 7074
unicomp6.unicomp.net -- [01/Jul/1995:00:00:14 -0400] "GET /shuttle/countdown/count.gif HTTP/1.0" 200 40310
unicomp6.unicomp.net -- [01/Jul/1995:00:00:14 -0400] "GET /images/NASA-logosmall.gif HTTP/1.0" 200 786
unicomp6.unicomp.net -- [01/Jul/1995:00:00:14 -0400] "GET /images/KSC-logosmall.gif HTTP/1.0" 200 1204
d104.aa.net -- [01/Jul/1995:00:00:15 -0400] "GET /shuttle/countdown/count.gif HTTP/1.0" 200 40310
d104.aa.net -- [01/Jul/1995:00:00:15 -0400] "GET /images/NASA-logosmall.gif HTTP/1.0" 200 786
d104.aa.net -- [01/Jul/1995:00:00:15 -0400] "GET /images/KSC-logosmall.gif HTTP/1.0" 200 1204
129.94.144.152 -- [01/Jul/1995:00:00:17 -0400] "GET /images/ksclogo-medium.gif HTTP/1.0" 304 0
199.120.110.21 -- [01/Jul/1995:00:00:17 -0400] "GET /images/launch-logo.gif HTTP/1.0" 200 1713
ppptky391.asahi-net.or.jp -- [01/Jul/1995:00:00:18 -0400] "GET /facts/about_ksc.html HTTP/1.0" 200 3977
net-1-141.eden.com -- [01/Jul/1995:00:00:19 -0400] "GET /shuttle/missions/sts-71/images/KSC-95EC-0916.jpg HTTP/1.0" 200 34029
ppptky391.asahi-net.or.jp -- [01/Jul/1995:00:00:19 -0400] "GET /images/launchpals-small.gif HTTP/1.0" 200 11473
205.189.154.54 -- [01/Jul/1995:00:00:24 -0400] "GET /shuttle/countdown/ HTTP/1.0" 200 3985
waters-gw.starway.net.au -- [01/Jul/1995:00:00:25 -0400] "GET /shuttle/missions/51-l/mission-51-l.html HTTP/1.0" 200 6723
ppp-mia-30.shadow.net -- [01/Jul/1995:00:00:27 -0400] "GET / HTTP/1.0" 200 7074
205.189.154.54 -- [01/Jul/1995:00:00:29 -0400] "GET /shuttle/countdown/count.gif HTTP/1.0" 200 40310
alyssa.prodigy.com -- [01/Jul/1995:00:00:33 -0400] "GET /shuttle/missions/sts-71/sts-71-patch-small.gif HTTP/1.0" 200 12054
ppp-mia-30.shadow.net -- [01/Jul/1995:00:00:35 -0400] "GET /images/ksclogo-medium.gif HTTP/1.0" 200 5866
dial22.lloyd.com -- [01/Jul/1995:00:00:37 -0400] "GET /shuttle/missions/sts-71/images/KSC-95EC-0613.jpg HTTP/1.0" 200 61716
smyth-pc.moorecap.com -- [01/Jul/1995:00:00:38 -0400] "GET /history/apollo/apollo-13/images/70HC314.GIF HTTP/1.0" 200 101267
205.189.154.54 -- [01/Jul/1995:00:00:40 -0400] "GET /images/NASA-logosmall.gif HTTP/1.0" 200 786
ix-orl2-01.ix.netcom.com -- [01/Jul/1995:00:00:41 -0400] "GET /shuttle/countdown/ HTTP/1.0" 200 3985
```



What is observability?



A measure of how well we can understand a system from the work it does

"0.1% of the methods in this service fail with HTTP 500"

"90% of the methods in this service complete in under 200 milliseconds"

"This service is handling 2000 requests per second"

"CPU utilization for this service is at 85%"

Observability for builders



Get visibility



Troubleshoot
in real time



Improve customer
experience



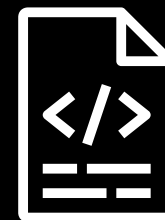
Build highly-
resilient apps

Operational

Business

The “three pillars of observability”

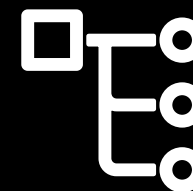
Logs



Metrics



Traces



The “three pillars of observability”

**Amazon
CloudWatch Logs**



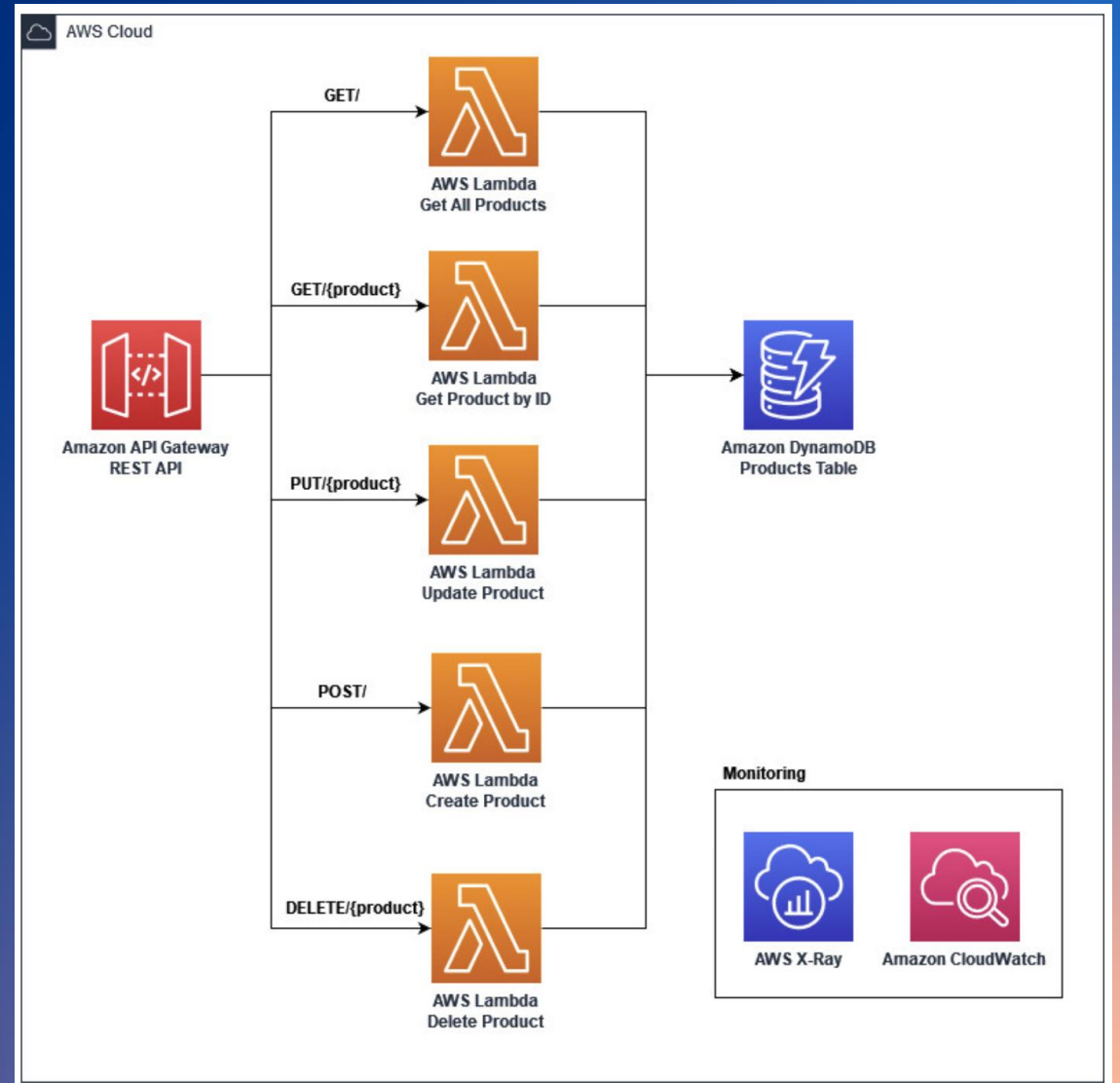
**Amazon
CloudWatch
Metrics**



**AWS
X-Ray Traces**



Demo: Logs, metrics, traces

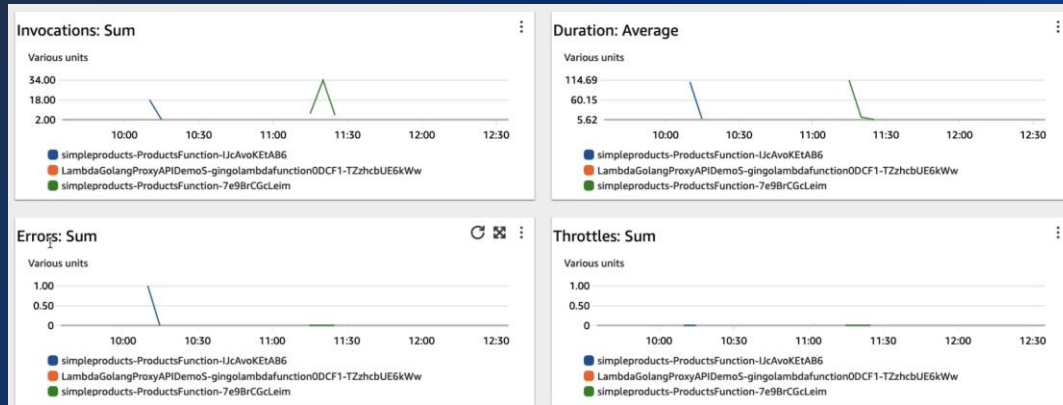


Recap

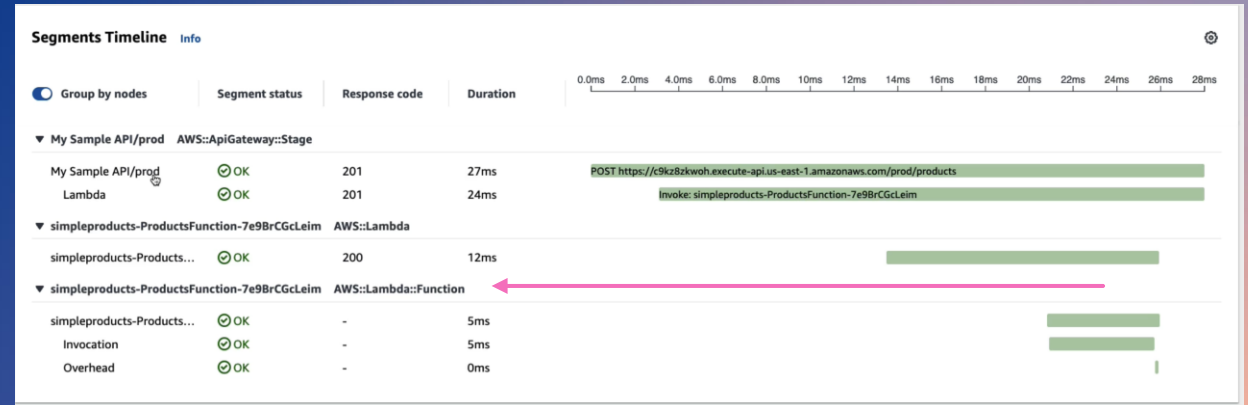
Logs

Log events
You can use the filter bar below to search for and match terms, phrases, or values in your log events. [Learn more about filter patterns](#)

Timestamp	Message
2023-07-13T16:52:00.877+05:30	START RequestId: e00b7ab4-43c5-459c-804a-9383a3bd4887 Version: \$LATEST
2023-07-13T16:52:00.921+05:30	END RequestId: e00b7ab4-43c5-459c-804a-9383a3bd4887
2023-07-13T16:52:00.921+05:30	REPORT RequestId: e00b7ab4-43c5-459c-804a-9383a3bd4887 Duration: 44.05 ms Billed Duration: 45 ms Memory Size: 1024 MB...

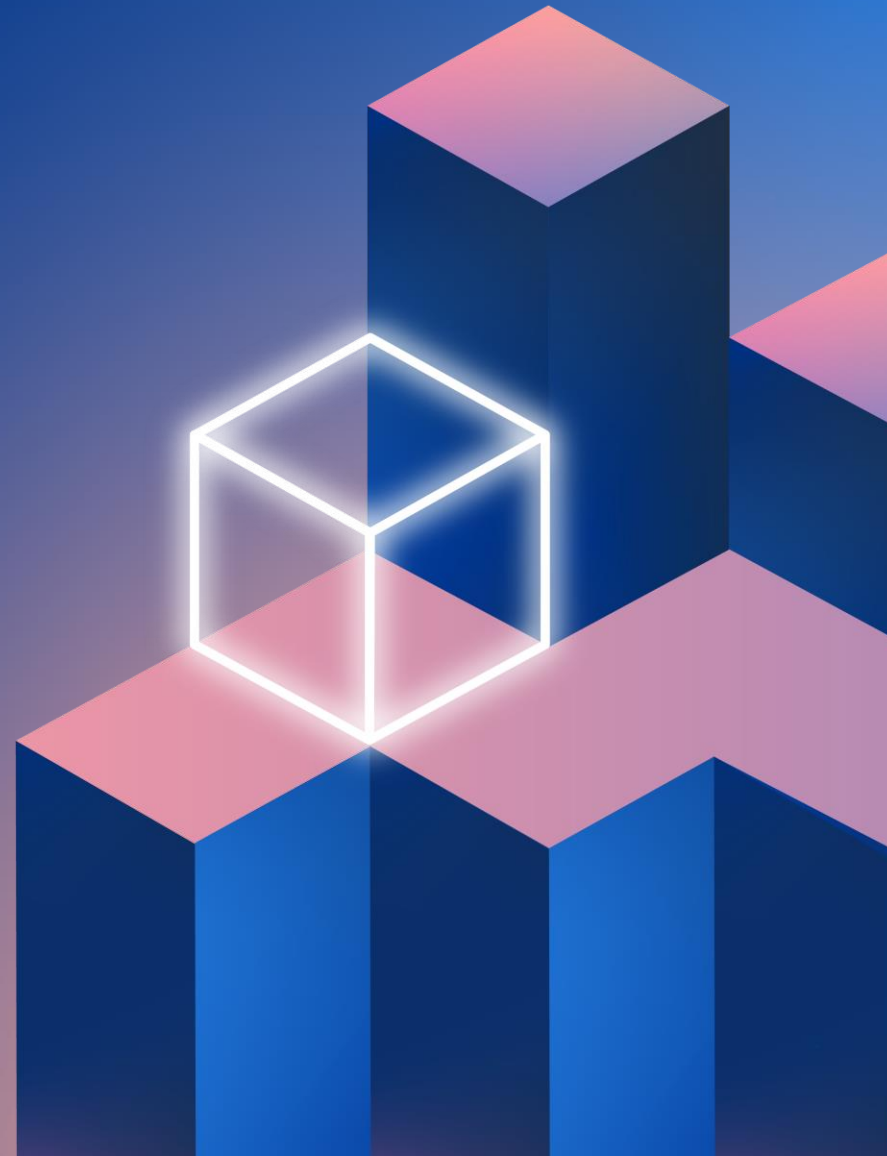


Metrics



Traces

AWS Lambda Powertools



AWS Lambda Powertools

aws Powertools for AWS Lambda (Java) Search GitHub v1.16.0 247 62

Powertools for AWS Lambda (Java)

- Homepage
- Changelog
- FAQs
- Core utilities
- Logging
- Tracing
- Metrics
- Utilities
- Idempotency
- Parameters
- SQS Large Message Handling
- SQS Batch Processing
- Validation
- Custom Resources
- Serialization Utilities

Homepage

aws provider AWS Build passing maven-central v1.16.0

Powertools for AWS Lambda (Java) is a suite of utilities for AWS Lambda Functions that makes tracing with AWS X-Ray, structured logging and creating custom metrics asynchronously easier.

Tip

Powertools for AWS Lambda is also available for [Python](#), [TypeScript](#), and [.NET](#)

Looking for a quick run through of the core utilities?

Check out [this detailed blog post](#) with a practical example. To dive deeper, the [Powertools for AWS Lambda \(Java\) workshop](#) is a great next step.

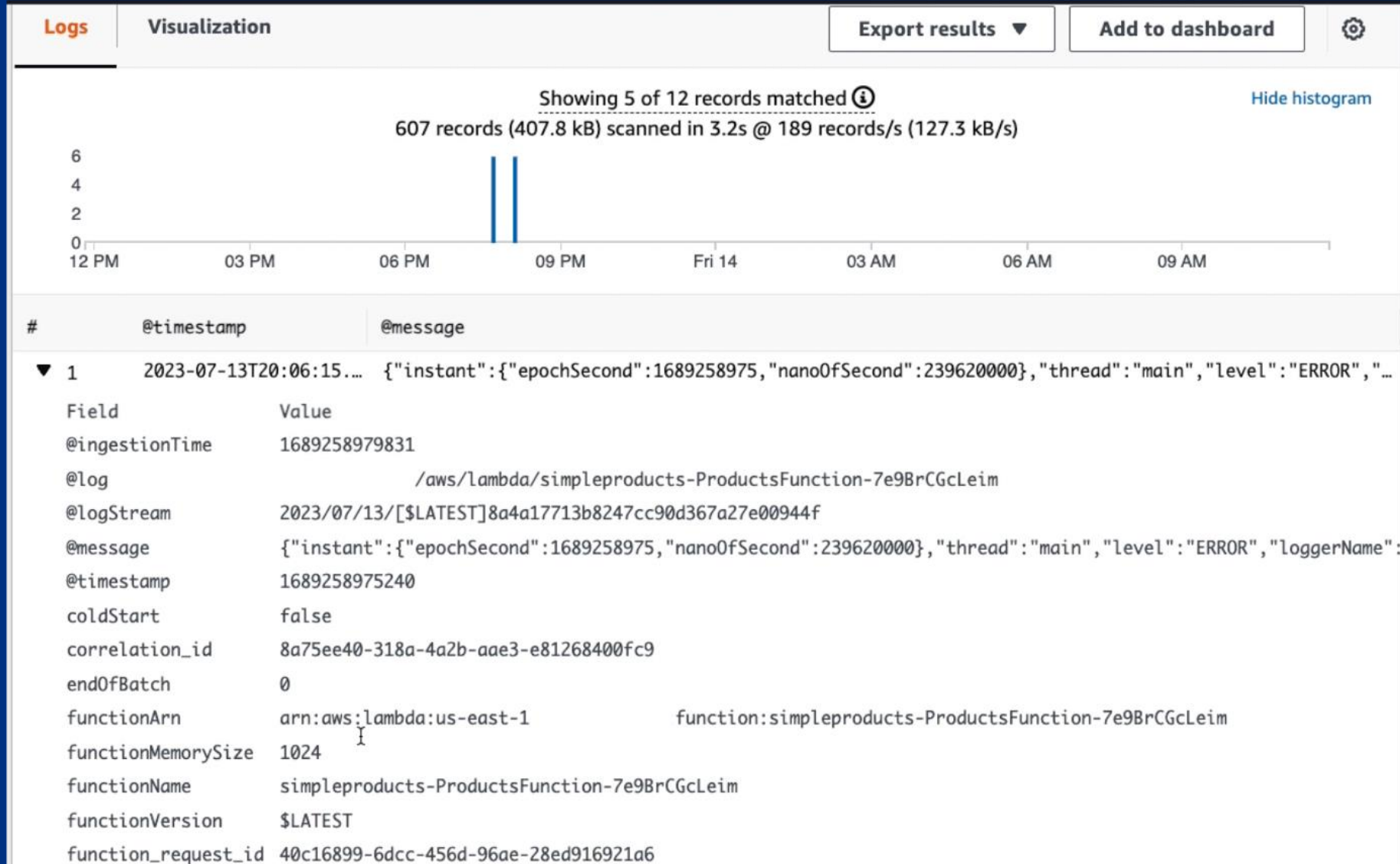
Table of contents

- Tenets
- Install
- Environment variables

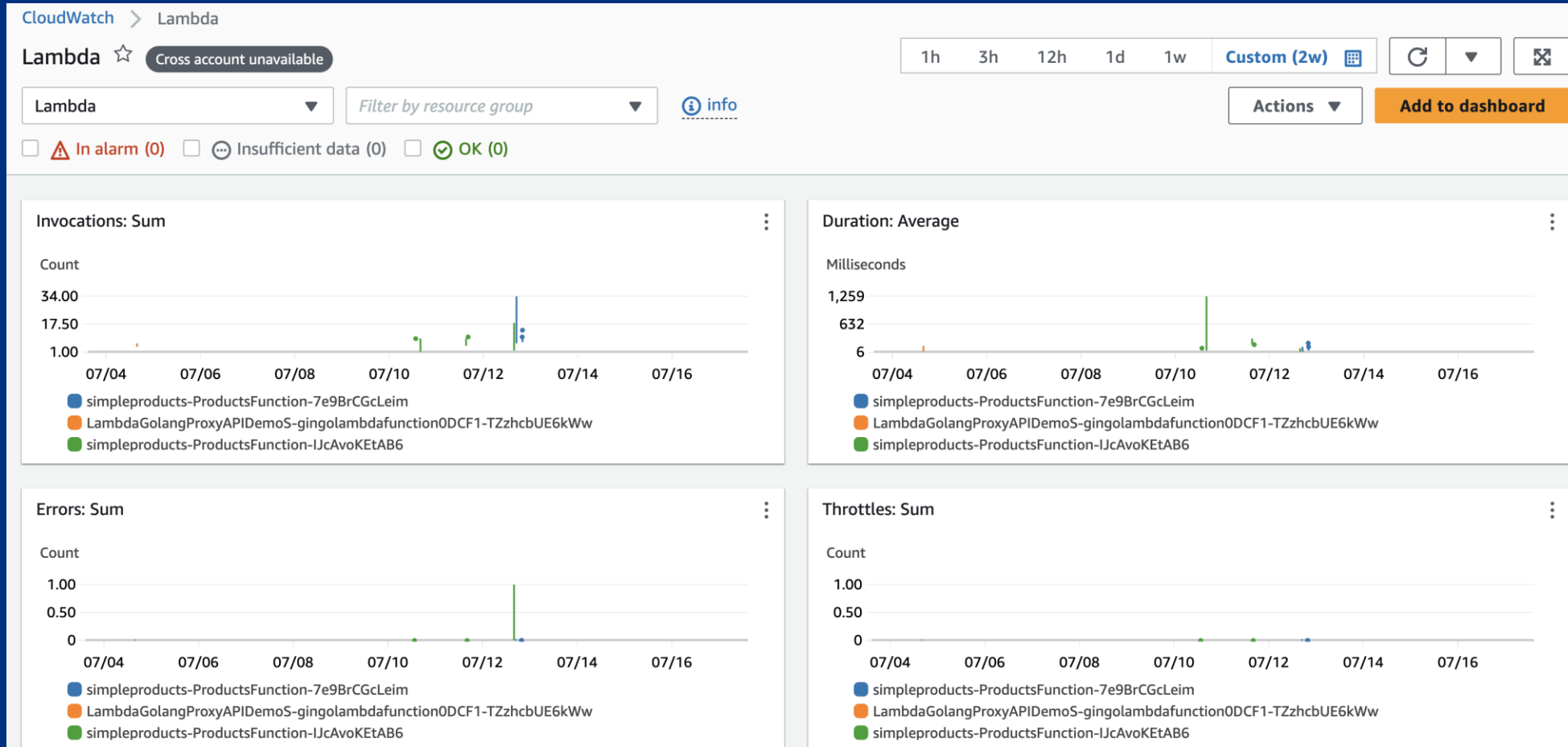


[Powertools for AWS Lambda](#)

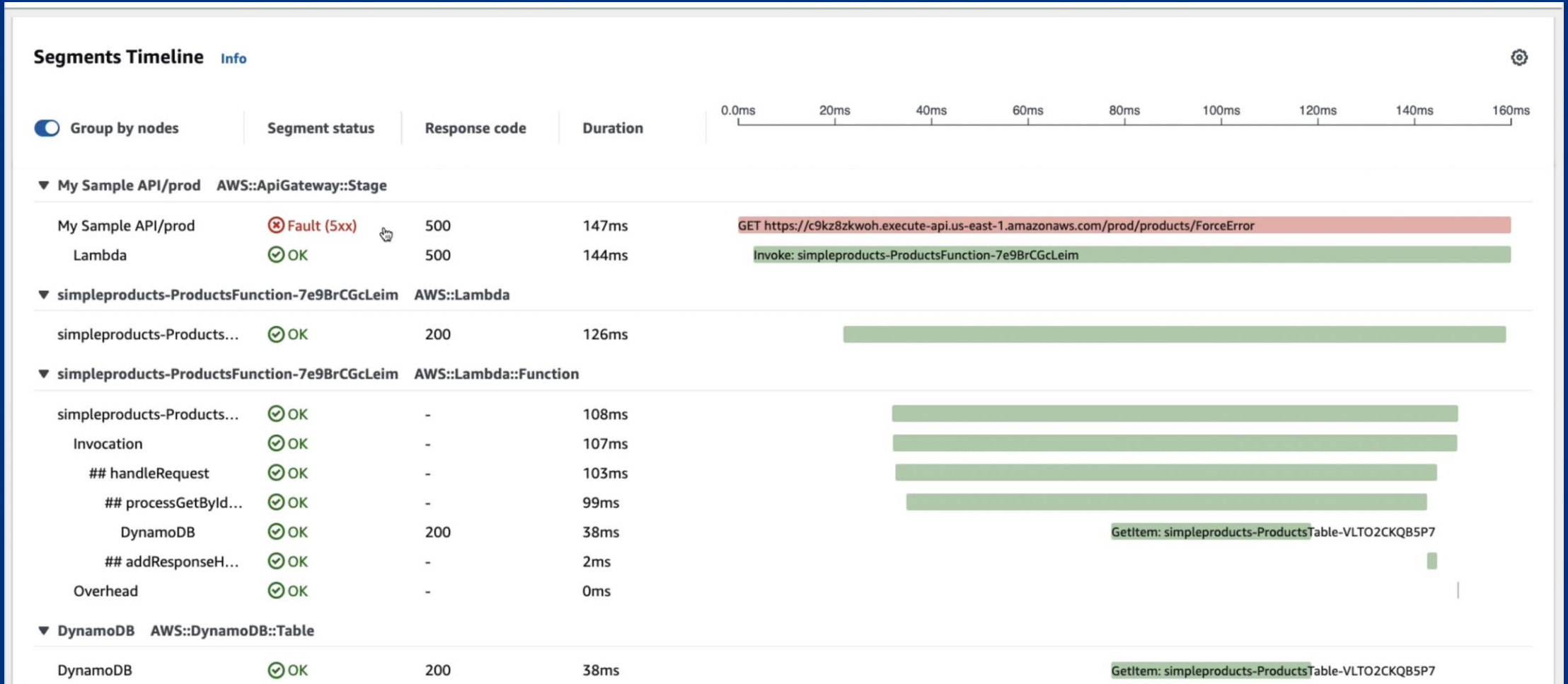
Core utilities – Logger



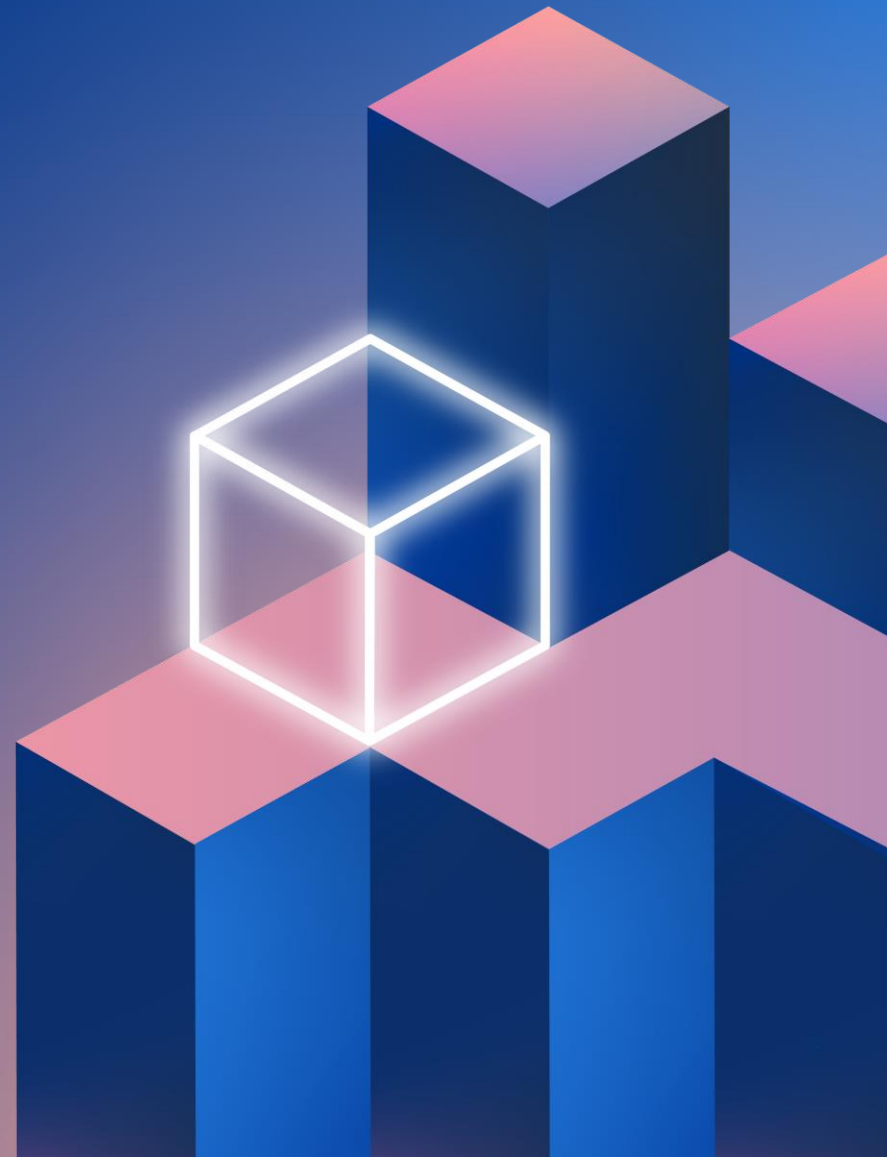
Core utilities – Metrics



Core utilities – Tracing



Demo: **AWS Lambda** **Powertools**

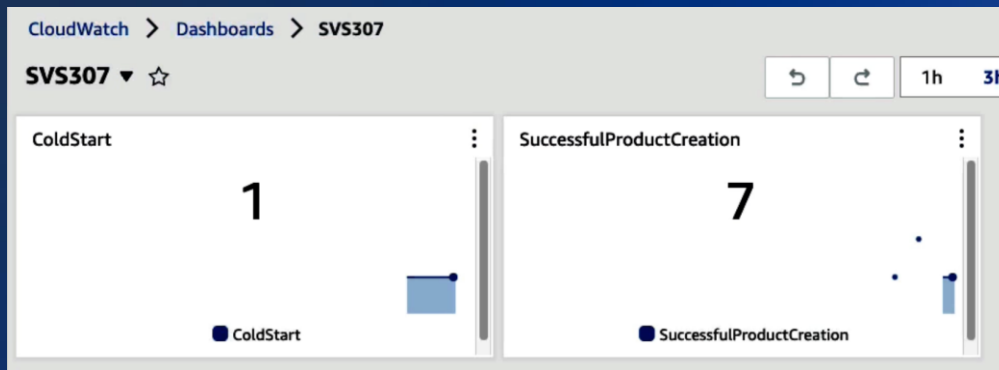


Recap

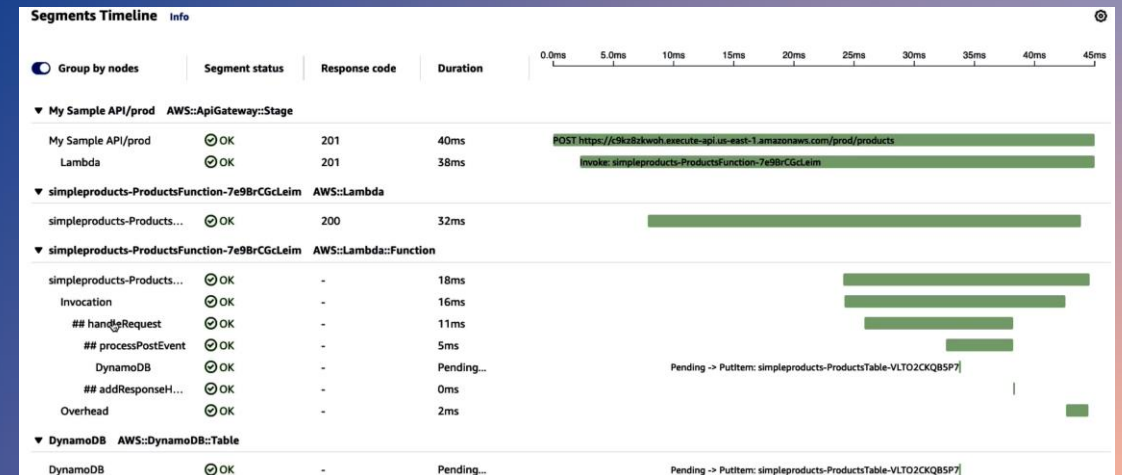
Logs

Log events
You can use the filter bar below to search for and match terms, phrases, or values in your log events. [Learn more about filter patterns](#)

Timestamp	Message
2023-07-13T20:03:12.829+05:30	{"instant":{"epochSecond":1689258792,"nanoOfSecond":687008000},"thread":"main","level":"INFO","loggerName":"software..."}
2023-07-13T20:03:12.849+05:30	{"instant":{"epochSecond":1689258792,"nanoOfSecond":849327000},"thread":"main","level":"INFO","loggerName":"software..."}
2023-07-13T20:03:13.350+05:30	{"instant":{"epochSecond":1689258793,"nanoOfSecond":350385000},"thread":"main","level":"INFO","loggerName":"software..."}
2023-07-13T20:03:13.368+05:30	{"instant":{"epochSecond":1689258793,"nanoOfSecond":368086000},"thread":"main","level":"INFO","loggerName":"software..."}
2023-07-13T20:03:13.412+05:30	{"_aws":{"Timestamp":1689258792126,"CloudWatchMetrics":[{"Namespace":"ServerlessProductApp","Metrics":[{"Name":"Succ...



Metrics



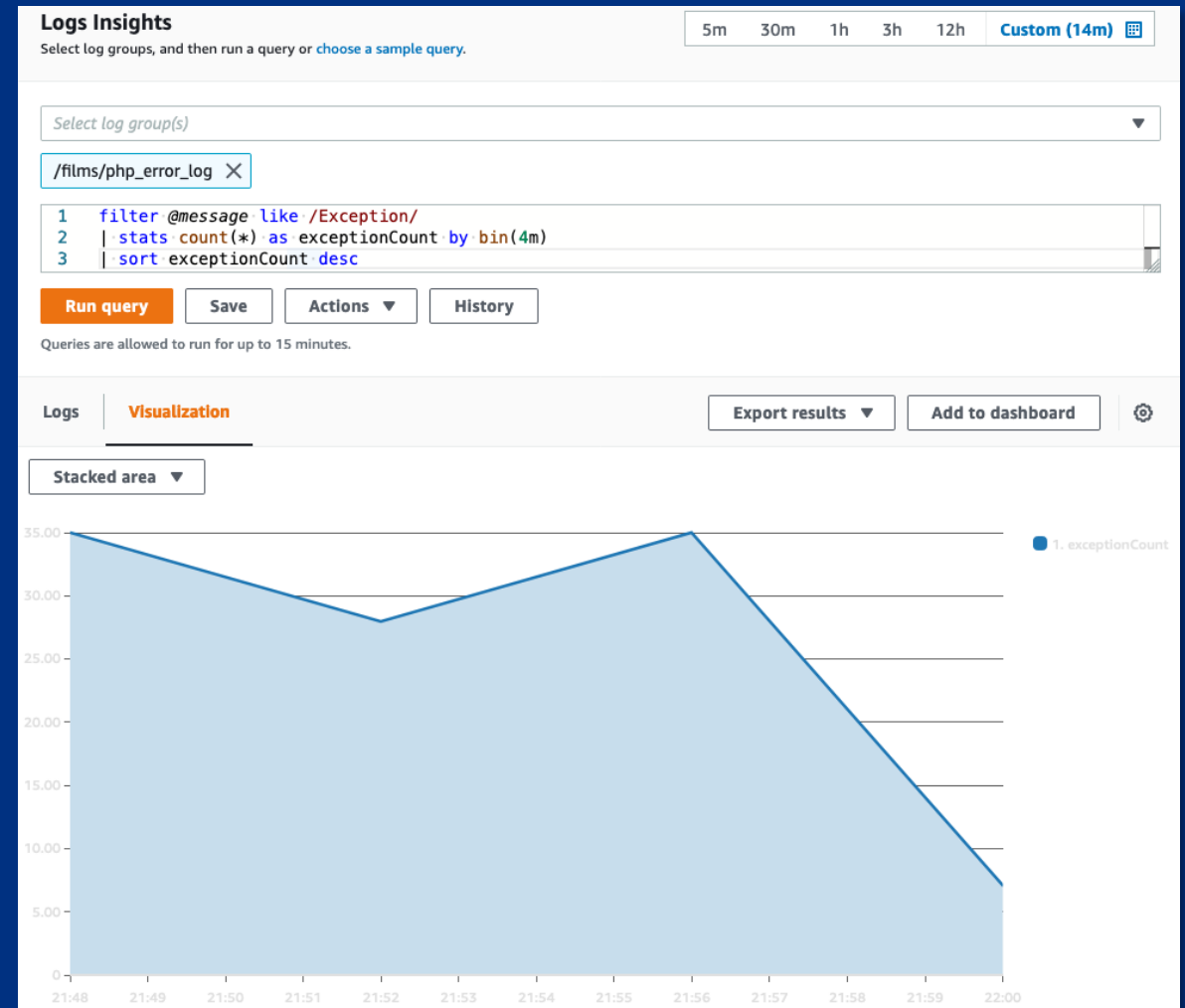
Traces

Query log data with Amazon CloudWatch Logs Insights



Amazon CloudWatch Log Insights

- Sample queries, command descriptions, query autocomplete, and log field discovery
- Automatically discovers fields in logs:
 - Amazon Route 53
 - AWS Lambda
 - AWS CloudTrail
 - Amazon VPC

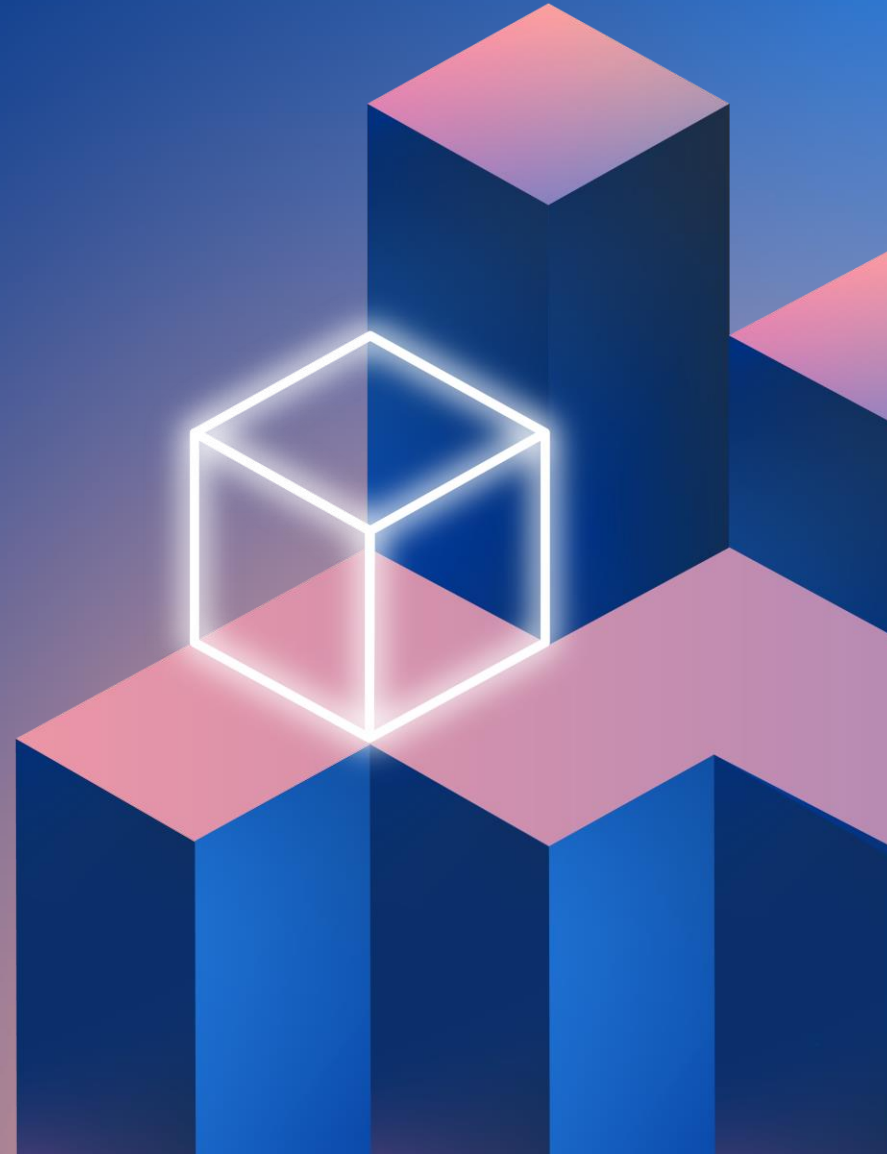


Amazon CloudWatch Log Insights Query Language

Basic functions	Other categories
filter	Arithmetic
display	Boolean
fields	Numeric
dedup	Comparison
limit	String
stats	Datetime
pattern	IP address
parse	General



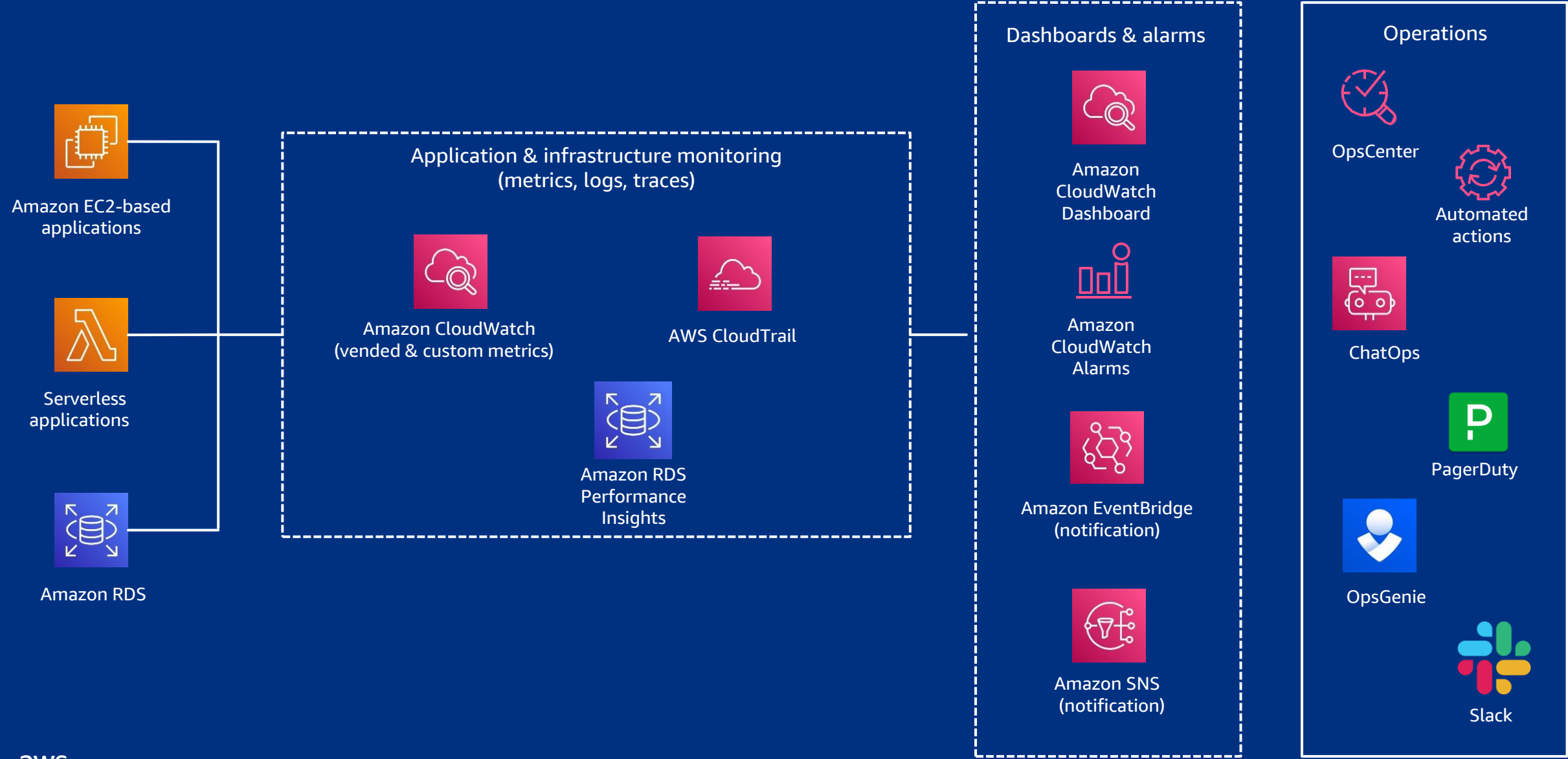
Demo: **Amazon CloudWatch** **Log Insights**



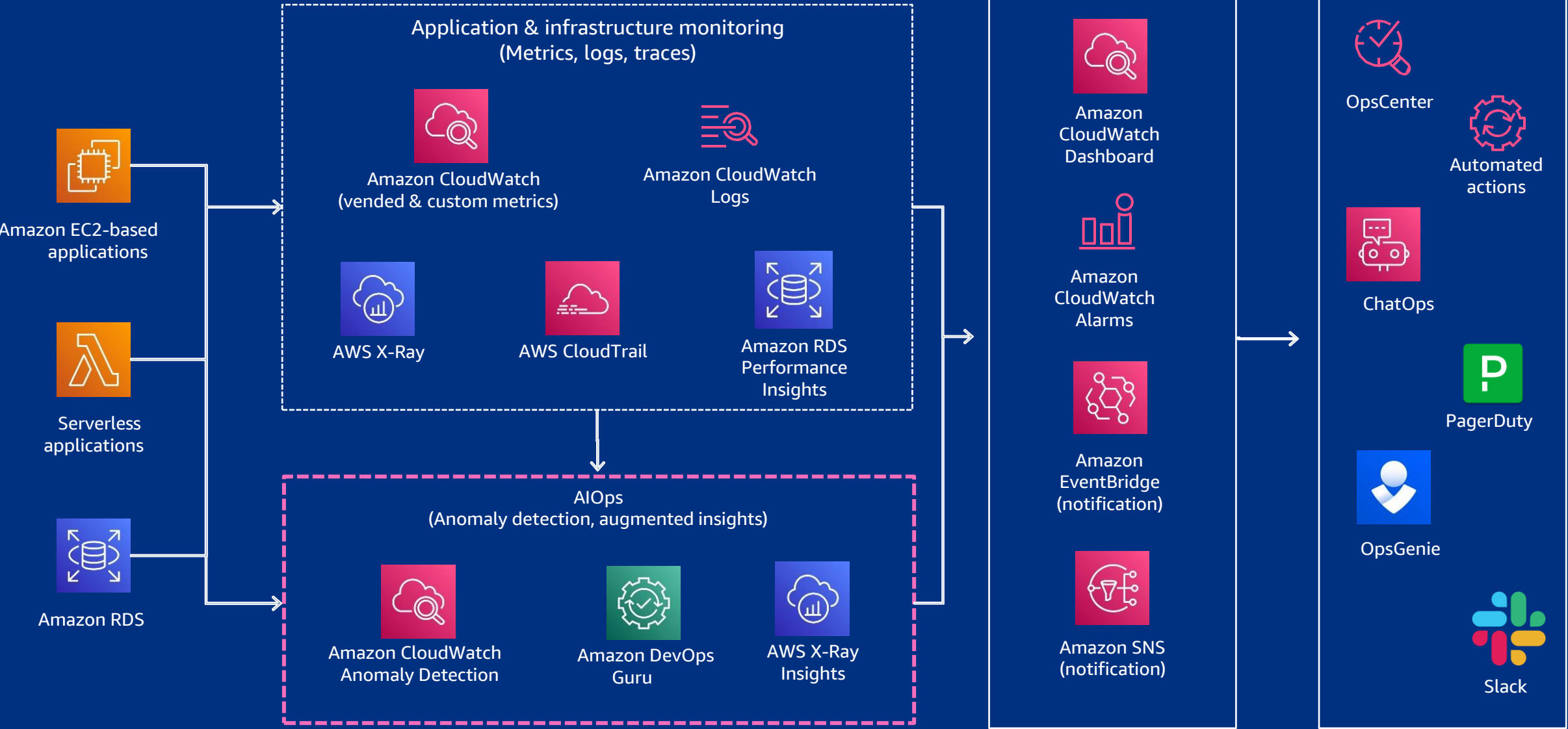
Elevating observability with AIOps



Standard workload observability

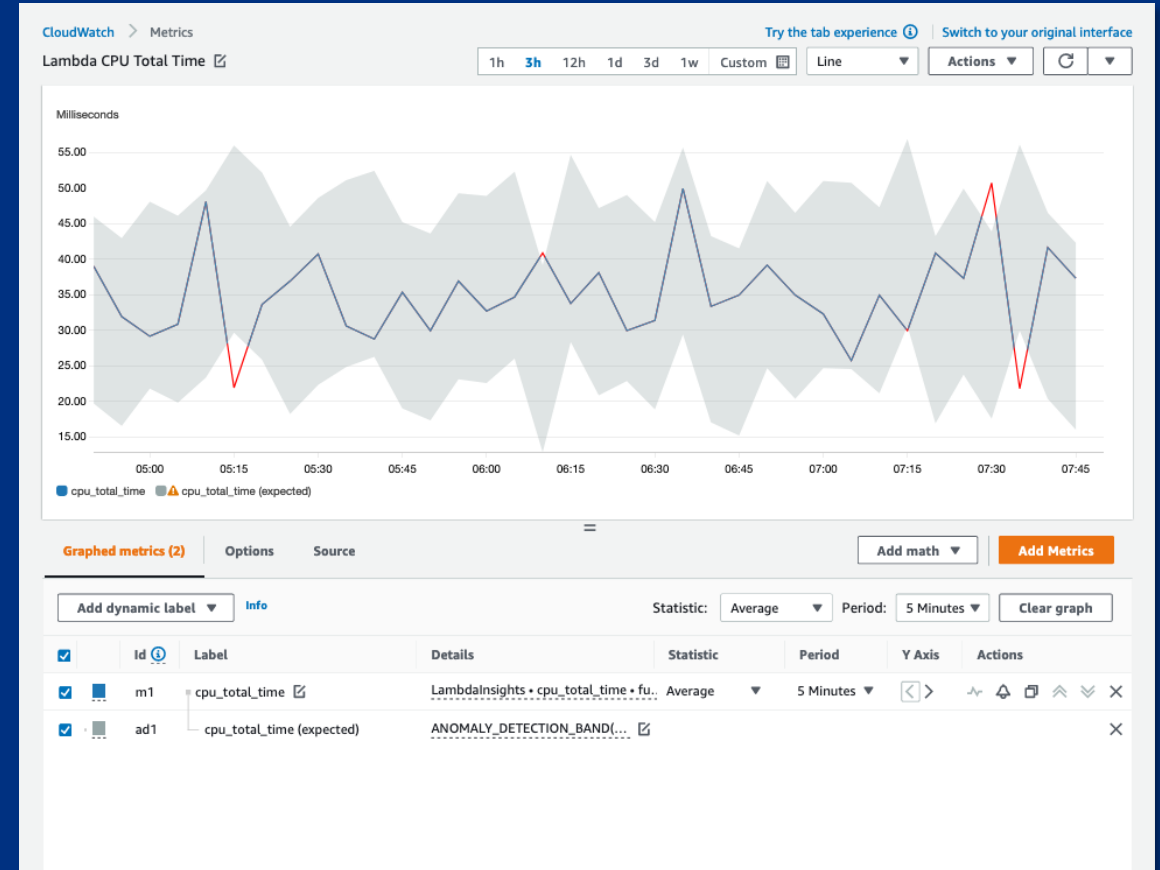


Observability with AIOps in AWS

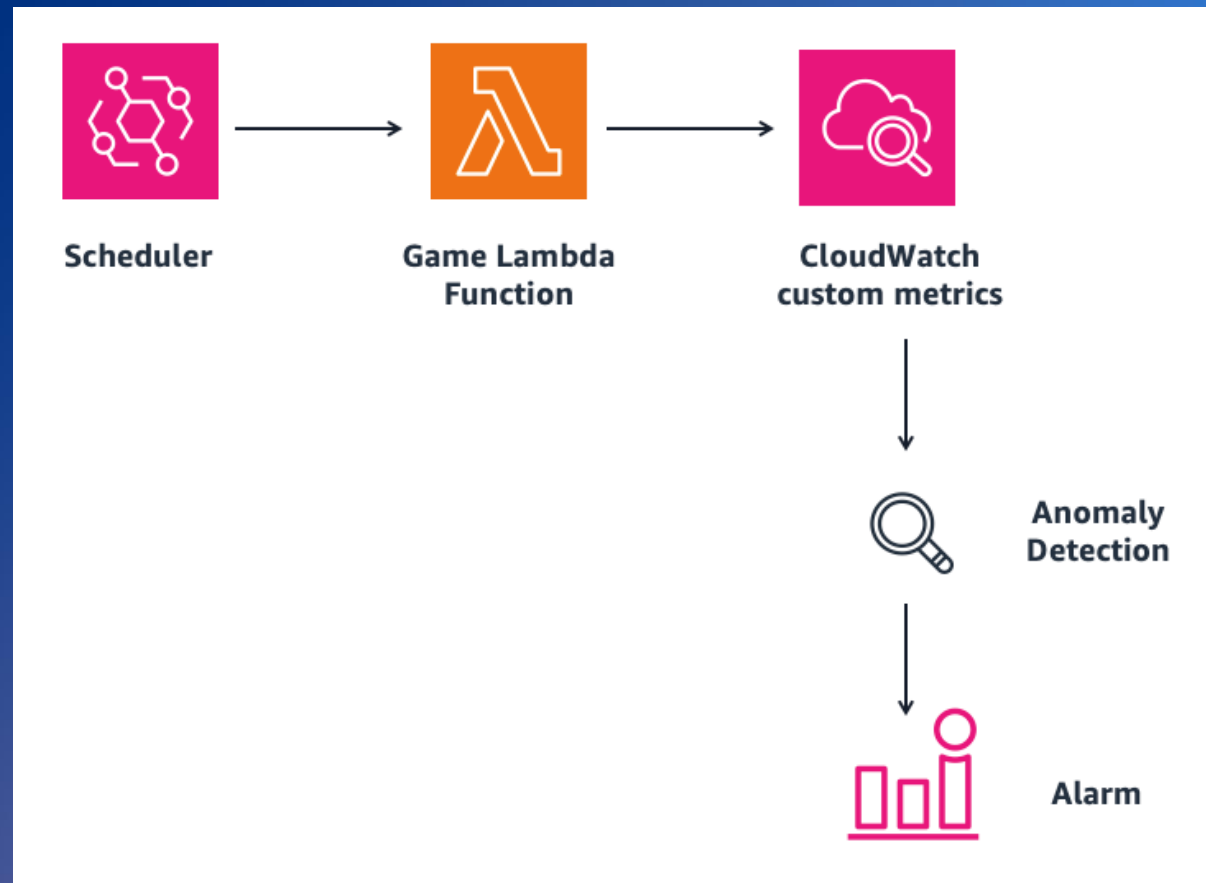


Amazon CloudWatch Anomaly Detection

- Applies statistical and machine learning algorithms
- Determine normal baselines, and surface anomalies with minimal user intervention
- Anomaly detection algorithms account for the seasonality and trend changes of metrics



Demo: Amazon CloudWatch Anomaly Detection



Amazon DevOps Guru



Easy to use

No configuration or ML experience required



Auto-detect operational issues

Amazon DevOps Guru continuously analyzes streams of disparate data and metrics to determine application behavior



Quick resolution

Helps to resolve issues quickly with ML-powered insights and recommendations



Scalable

Easily scales and maintains availability as new AWS workloads are added



Reduce noise

Helps overcome alarm fatigue by automatically correlating and grouping related anomalies

Amazon DevOps Guru Insights

Amazon DevOps Guru > Insights > Lambda Duration Anomalous In Stack ApiLambdaCrudDynamoDBExample

Lambda Duration Anomalous In Stack

ApiLambdaCrudDynamoDBExample High severity

Insight overview

Description

The Duration metric in AWS::Lambda::Function breached a high threshold.

Status

Closed

Affected stacks

1 ApiLambdaCrudDynamoDBExample

Start time

November 24, 2020 22:50 UTC

Last update time

November 24, 2020 22:59 UTC

End time

November 24, 2020 22:59 UTC

Opsitem ID

-

View recommendations

Aggregated metrics (4) November 24, 22:50–November 24, 22:59 UTC

Metrics in your AWS account are analyzed to find anomalies. Amazon DevOps Guru Insight Detail

Group by No grouping

Find metric by metric name, stack, resource type

Metrics	22:50 11/24	22:55 11/24	23:00 11/24
Duration p50 ApiLambdaCrudDynamoDBExample Multiple resources	<div></div>		
5XXError Average ApiLambdaCrudDynamoDBExample Multiple resources	<div></div>		
IntegrationLatency p50 ApiLambdaCrudDynamoDBExample Multiple resources	<div></div>		
Latency p50 ApiLambdaCrudDynamoDBExample Multiple resources	<div></div>		

Aggregated metrics

Graphed anomalies

Graphed anomalies (4) November 24, 22:50–November 24, 22:59 UTC

Amazon DevOps Guru captures and can display the occurrence of anomalies over time.

Find metric by metric name, stack, resource type

1H 3H 12H 1D 3D 1W 2W

Duration

AWS/Lambda:Duration

Milliseconds

6.0 K 3.0 K 0.00

22:21 22:30 22:45 23:00 23:15 23:28

Duration

1H 3H 12H 1D 3D 1W 2W

IntegrationLatency

AWS/ApiGateway:IntegrationLatency

Milliseconds

6.0 K 3.0 K 0.00

22:22 22:30 22:45 23:00 23:15 23:29

IntegrationLatency

Resource type

AWS/Lambda

Resource names

FunctionName:ApiLambdaCrudDynamoDBExam-getAllItemsFunction0B7A9-C9BFLFV55WMP

Stack

ApiLambdaCrudDynamoDBExample

Dimensions

FunctionName:ApiLambdaCrudDynamoDBExam-getAllItemsFunction0B7A9-C9BFLFV55WMP

Statistics

p50

View all statistics and dimensions

Resource type

AWS/ApiGateway

Resource names

ApiName:Items Service

Stack

ApiLambdaCrudDynamoDBExample

Dimensions

ApiName:Items Service

Statistics

p50

View all statistics and dimensions

Recommendations (3)

Info

Your updates we recommend you implement to address the anomalies in this insight.

Configure provisioned concurrency for AWS Lambda

Your Lambda function is having trouble scaling. To learn how to enable provisioned concurrency, which allows your function to scale without fluctuations in latency, see Configure provisioned concurrency for AWS Lambda.

Why is DevOps Guru recommending this?

The Duration metric in AWS::Lambda::Function breached a high threshold.

Related metrics (3)

Duration

AWS::Lambda:Function

ApiLambdaCrudDynamoDBExam-getAllItemsFunction0B7A9-C9BFLFV55WMP

Latency

AWS::ApiGateway:Stage

prod

IntegrationLatency

AWS::ApiGateway:Method

Items Service, Items Service, Items Service, Items Service, Items Service

Troubleshoot latency in Amazon API Gateway

Your API Gateway requests are experiencing high latency. To learn common sources of latency in API Gateway and how to resolve them, see Troubleshoot latency in Amazon API Gateway.

Why is DevOps Guru recommending this?

The IntegrationLatency metric in AWS::ApiGateway:Method breached a high threshold.

Related metrics (2)

Latency

AWS::ApiGateway:Method

Items Service, Items Service, Items Service, Items Service, Items Service

IntegrationLatency

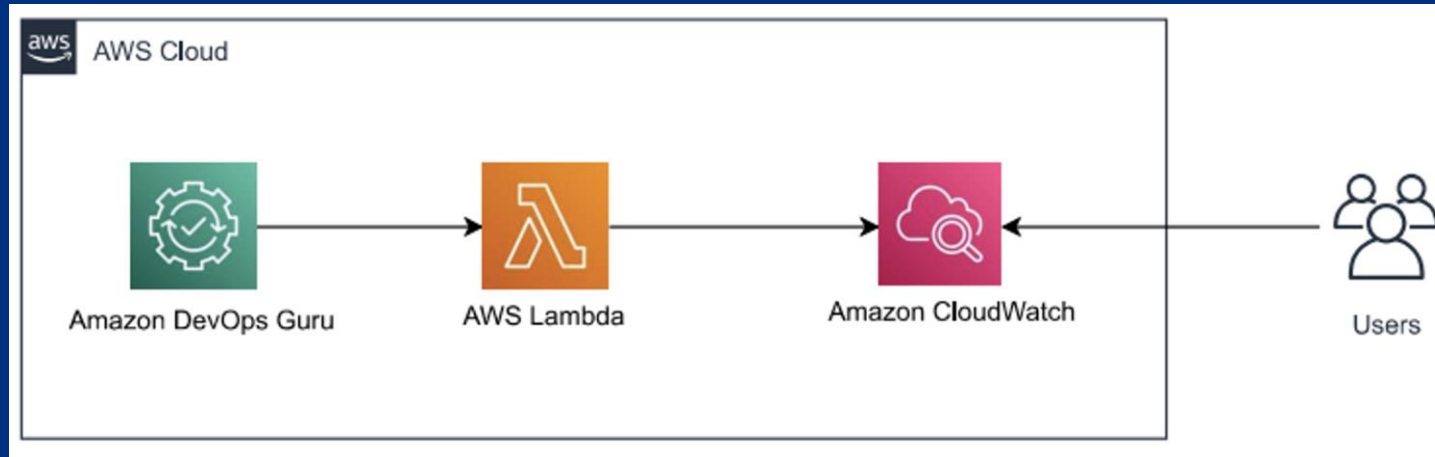
AWS::ApiGateway:Method

Items Service, Items Service, Items Service, Items Service, Items Service

Amazon DevOps Guru Recommendations

© 2024, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Amazon DevOps Guru and CloudWatch



[Integrating Amazon DevOps Guru Insights with Amazon CloudWatch Dashboard](#)



Hands-on experience



[Observability with
AWS Lambda Powertools
for Java](#)



[Modernizing ITOps
with AI/ML on AWS](#)



[One observability
workshop](#)

Visit the AWS Modern Applications Resource Hub

Dive deeper with these resources to help you innovate fast, reduce risk, and accelerate time to market

- Build modern applications on AWS
 - Building event-driven architectures on AWS
 - Seamless Kubernetes on premises and in the cloud
 - Unlock digital transformation by modernizing with containers
 - Unleash the power of modern apps with generative AI on AWS
 - Accelerate full-stack web and mobile app development on AWS
 - Determining the total cost of ownership: Comparing serverless and server-based technologies
- ... and more!



<https://tinyurl.com/modern-apps-aws>

Visit resource hub



AWS Training & Certification

Access 600+ free digital courses with AWS Skill Builder

Focus on the cloud skills and services that are most relevant to you across 30+ AWS solutions, including digital self-paced learning plans and ramp-up guides

- Build your future in the AWS Cloud at your own pace
- Advance your skills and knowledge with learning plans
- Validate your cloud expertise with AWS Certification



BUILD IN-DEMAND CLOUD SKILLS



Thank you for attending AWS Builders Online Series

We hope you found it interesting! A kind reminder to **complete the survey**.
Let us know what you thought of today's event and how we can improve the event
experience for you in the future.



aws-apj-marketing@amazon.com



twitter.com/AWSCloud



facebook.com/AmazonWebServices



youtube.com/user/AmazonWebServices



linkedin.com/company/amazon-web-services



twitch.tv/aws



Thank you!

Abhishek Gupta
Principal Developer Advocate
AWS India

