



Monitoring and Observability on AWS

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Amazon Web Services (AWS)

Agenda

- Introduction
- Amazon CloudWatch
- AWS X-Ray
- Managed Open Source Tools for Observability
- Cost Monitoring

Observability describes how well you can **understand what is happening in a system**, often by instrumenting it to collect metrics, logs, and traces.

To **achieve operational excellence and meet business objectives**, you need to understand how your systems are performing.

What is Observability?



Business Goals

- WHY DO YOU NEED OBSERVABILITY?



Create new
revenue streams



Improve Operational
and Financial
efficiency



Lower
Business Risk

AWS Observability

Sources & Workloads

- Cloud environment
- Consume multiple data sources from third parties
- On-premises, hybrid and, containerized systems
- Open source systems



Data Collection

- Open source or AWS native, via AWS Distro for OpenTelemetry and Amazon CloudWatch
- Traces, metrics, logs



Event Analysis

- Monitoring
- Alarms
- Insights
- Anomaly Detection
- Root cause analysis


















End-to-end Observability

- Infrastructure Monitoring
- Network Monitoring
- Application Performance Monitoring
- Cost monitoring & optimization

AWS Services for Observability

• CUSTOMER CHOICES

	AWS NATIVE	OPEN SOURCE	PARTNER
 INFRASTRUCTURE <i>VMs, Containers, OS</i>	 Amazon CloudWatch	 Amazon Managed Service for Prometheus  Amazon Managed Service for Grafana	APN
 AWS SERVICES <i>Vended Monitoring</i>	 Amazon CloudWatch  AWS X-Ray	 Amazon Distro for Open Telemetry	X
 APPLICATION PERFORMANCE <i>Tracing and Profiling</i>	 Amazon CloudWatch  AWS X-Ray  Amazon CodeGuru	 Amazon Distro for Open Telemetry	APN
 END-USER <i>Synthetic Monitoring</i>	 Amazon CloudWatch	X	APN



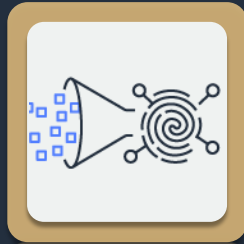
Amazon CloudWatch

Amazon CloudWatch

• OBSERVABILITY OF YOUR AWS RESOURCES AND APPLICATIONS



Observability
on a single
platform
across
accounts,
applications
and
infrastructure



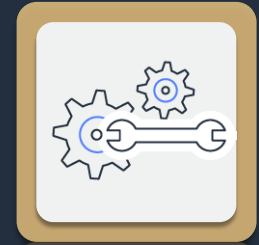
Easiest way to
collect metrics
in AWS and on-
premises



Improve
operational
performance
and resource
optimization



Get
operational
visibility and
insight



Derive
actionable
insights
from logs

CloudWatch Logs

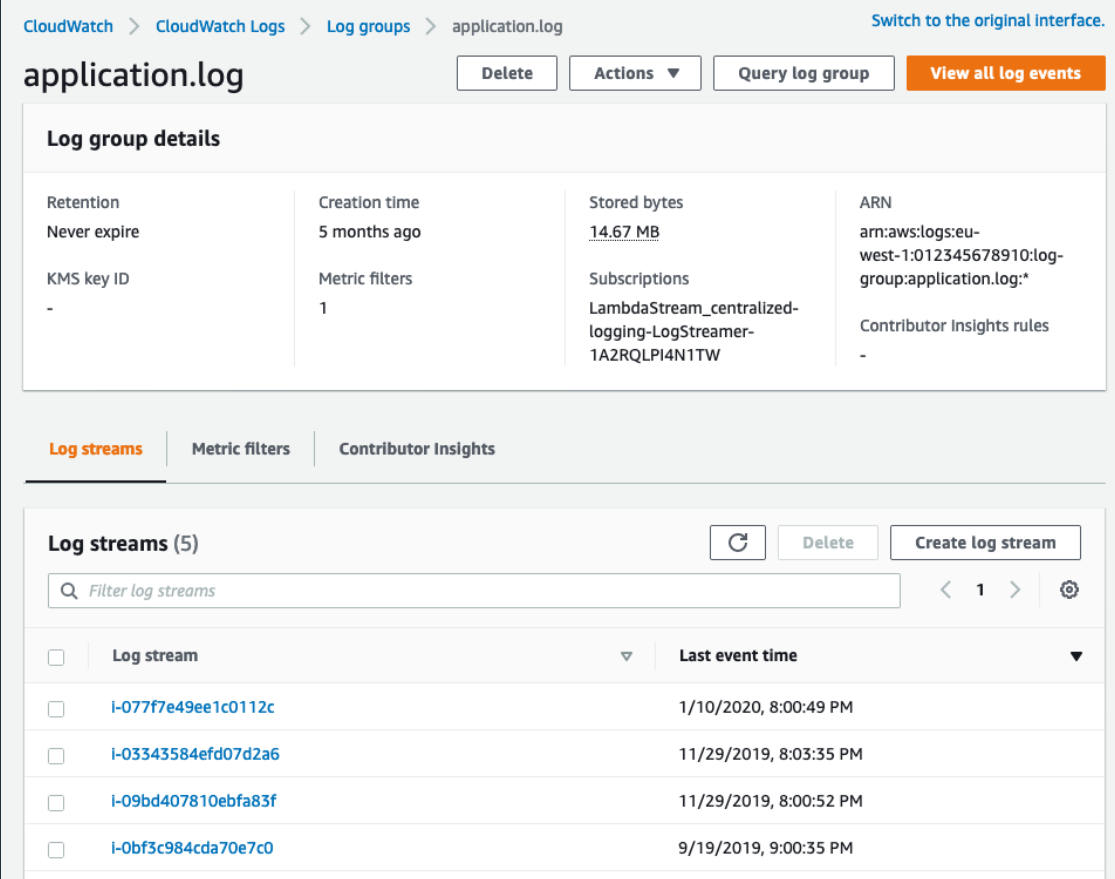
- STORE LOGS IN NEAR REAL-TIME

Collect logs from:

- Amazon EC2 instances
- On-premises servers
- VPC Flow Logs
- Other AWS Services

Log data can be stored and accessed indefinitely in highly durable, low-cost storage so you don't have to worry about filling up hard drives.

New: AI Powered NLQ generation



The screenshot displays the AWS CloudWatch Logs console interface. At the top, the breadcrumb navigation shows 'CloudWatch > CloudWatch Logs > Log groups > application.log'. A 'Switch to the original interface.' link is in the top right. Below the breadcrumb, the page title is 'application.log', followed by buttons for 'Delete', 'Actions', 'Query log group', and 'View all log events'. The 'Log group details' section contains a table with the following information:

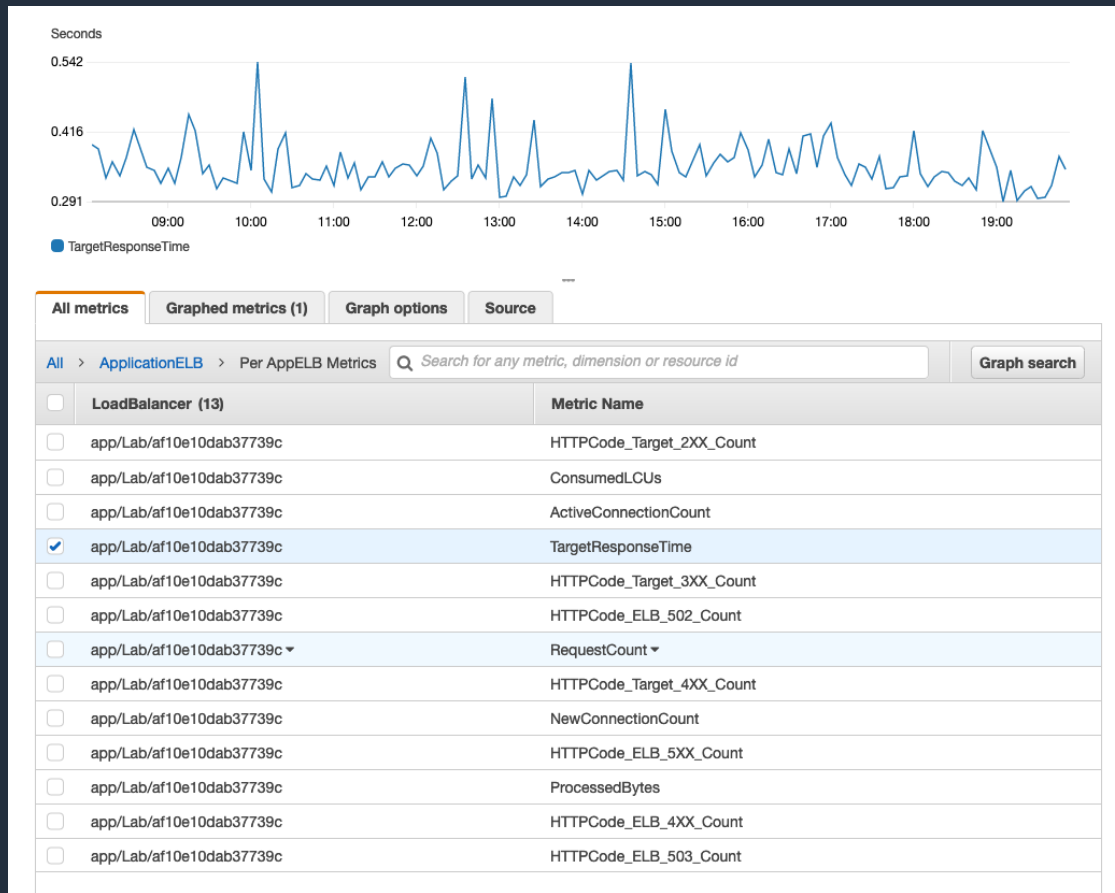
Retention	Creation time	Stored bytes	ARN
Never expire	5 months ago	14.67 MB	arn:aws:logs:eu-west-1:012345678910:log-group:application.log:*
KMS key ID	Metric filters	Subscriptions	Contributor Insights rules
-	1	LambdaStream_centralized-logging-LogStreamer-1A2RQLPI4N1TW	-

Below the details, there are tabs for 'Log streams', 'Metric filters', and 'Contributor Insights'. The 'Log streams' tab is active, showing a list of 5 log streams. At the top of the list are buttons for 'Filter log streams', 'Delete', and 'Create log stream'. The list table has columns for 'Log stream' and 'Last event time'.

Log stream	Last event time
i-077f7e49ee1c0112c	1/10/2020, 8:00:49 PM
i-03343584efd07d2a6	11/29/2019, 8:03:35 PM
i-09bd407810ebfa83f	11/29/2019, 8:00:52 PM
i-0bf3c984cda70e7c0	9/19/2019, 9:00:35 PM

CloudWatch Metrics

Built-in metrics



Custom metrics



CloudWatch Alarms

Amazon CloudWatch alarms allow you to set a threshold on metrics and trigger an action.

- Perform actions based on the value of metrics
- Add alarms to dashboards to visualize them
- Apply to hybrid and multi-cloud infrastructure

CloudWatch > Alarms [Switch to your original interface](#)

Alarms (11)

☐ Hide Auto Scaling alarms [Clear selection](#) [Refresh](#) [Add to dashboard](#) [Create composite alarm](#)

Action [Create alarm](#)

Any state Any type < 1 > ⚙️

<input type="checkbox"/>	Name	State	Conditions	Actions
<input type="checkbox"/>	ImageErrorAlarm	⚠️ In alarm	ImageError > 0 for 1 datapoints within 10 seconds	-
<input type="checkbox"/>	centralized-logging-StatusYellowAlarm-L8VNTMW93IP8	✅ OK	ClusterStatus.yellow >= 1 for 1 datapoints within 1 minute	-
<input type="checkbox"/>	centralized-logging-MasterNotReachableFromNodeAlarm-12NUZCERB15HI	✅ OK	MasterReachableFromNode < 1 for 1 datapoints within 1 minute	-
<input type="checkbox"/>	centralized-logging-IndexWritesBlockedTooHighAlarm-SJ3CQWU5T2RS	✅ OK	ClusterIndexWritesBlocked >= 1 for 1 datapoints within 5 minutes	-
<input type="checkbox"/>	centralized-logging-JVMMemoryPressureTooHighAlarm-145XRI40EMJAP	✅ OK	JVMMemoryPressure >= 80 for 1 datapoints within 15 minutes	-
<input type="checkbox"/>	centralized-logging-MasterCPUUtilizationTooHighAlarm-VQQ5ZWZ5ZUV9	✅ OK	MasterCPUUtilization >= 50 for 3 datapoints within 45 minutes	-
<input type="checkbox"/>	centralized-logging-StatusRedAlarm-1C0IBPKOSI8GJ	✅ OK	ClusterStatus.red >= 1 for 1 datapoints within 1 minute	-

CloudWatch Events

Provides a near real-time stream of system events that describe changes to your AWS resources.

Write rules to indicate which events are of interest to your application and what automated actions to take when a rule matches an event.

Rules > **ChangeInstanceSize** Actions ▾

Summary

ARN ⓘ `arn:aws:events:eu-west-1:180304385487:rule/ChangeInstanceSize`

Schedule Cron expression `0 6 ? * 6L *`

Next 10 Trigger Date(s)

1. Fri, 28 Feb 2020 06:00:00 GMT
2. Fri, 27 Mar 2020 06:00:00 GMT
3. Fri, 24 Apr 2020 06:00:00 GMT
4. Fri, 29 May 2020 06:00:00 GMT
5. Fri, 26 Jun 2020 06:00:00 GMT
6. Fri, 31 Jul 2020 06:00:00 GMT
7. Fri, 28 Aug 2020 06:00:00 GMT
8. Fri, 25 Sep 2020 06:00:00 GMT
9. Fri, 30 Oct 2020 06:00:00 GMT
10. Fri, 27 Nov 2020 06:00:00 GMT

Status Enabled

Description

Monitoring [Show metrics for the rule](#)

Targets

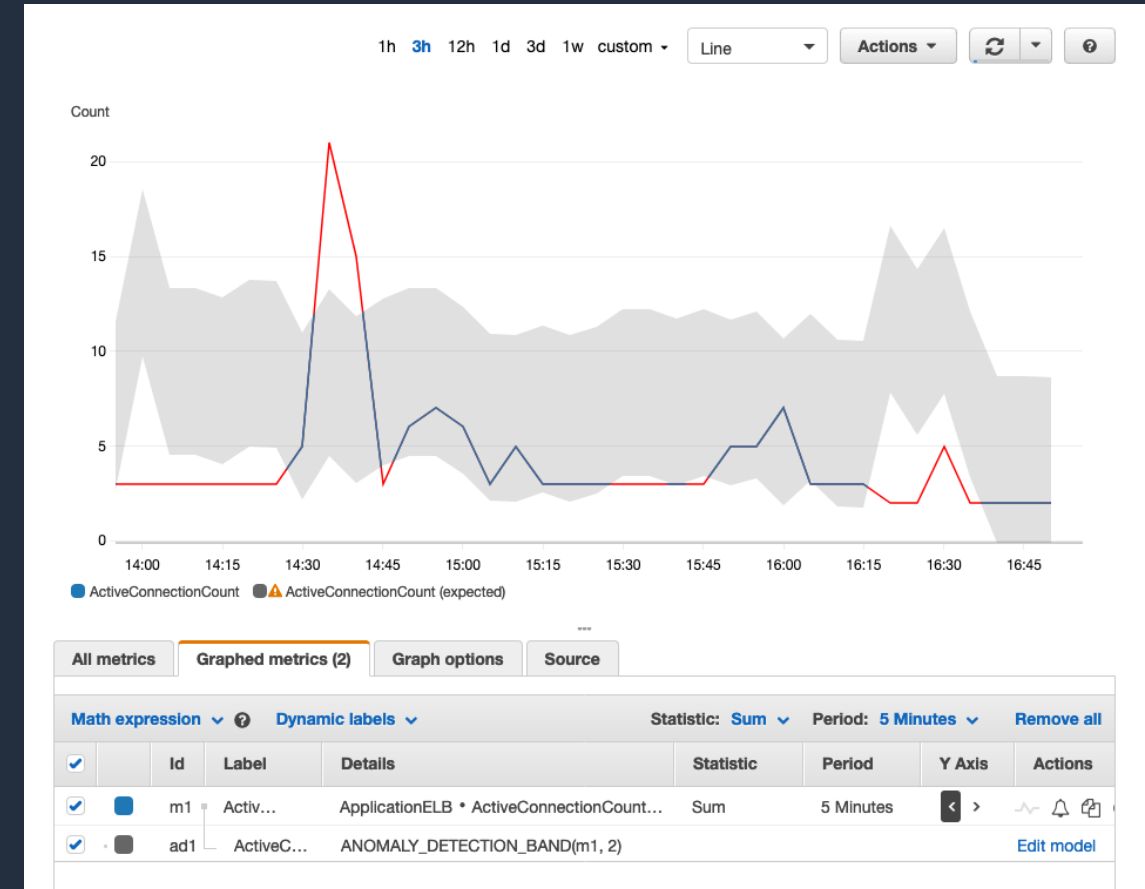
Filter:

Type	Name	Input
SSM Automation	ChangeInstanceSize (version \$DEFAULT)	Constant: <code>{"InstanceId":["i-0cb0104ddf22a"]}</code>

Anomaly Detection

When you enable anomaly detection for a metric, CloudWatch applies machine learning algorithms to the metric's past data to create a model of the metric's expected values.

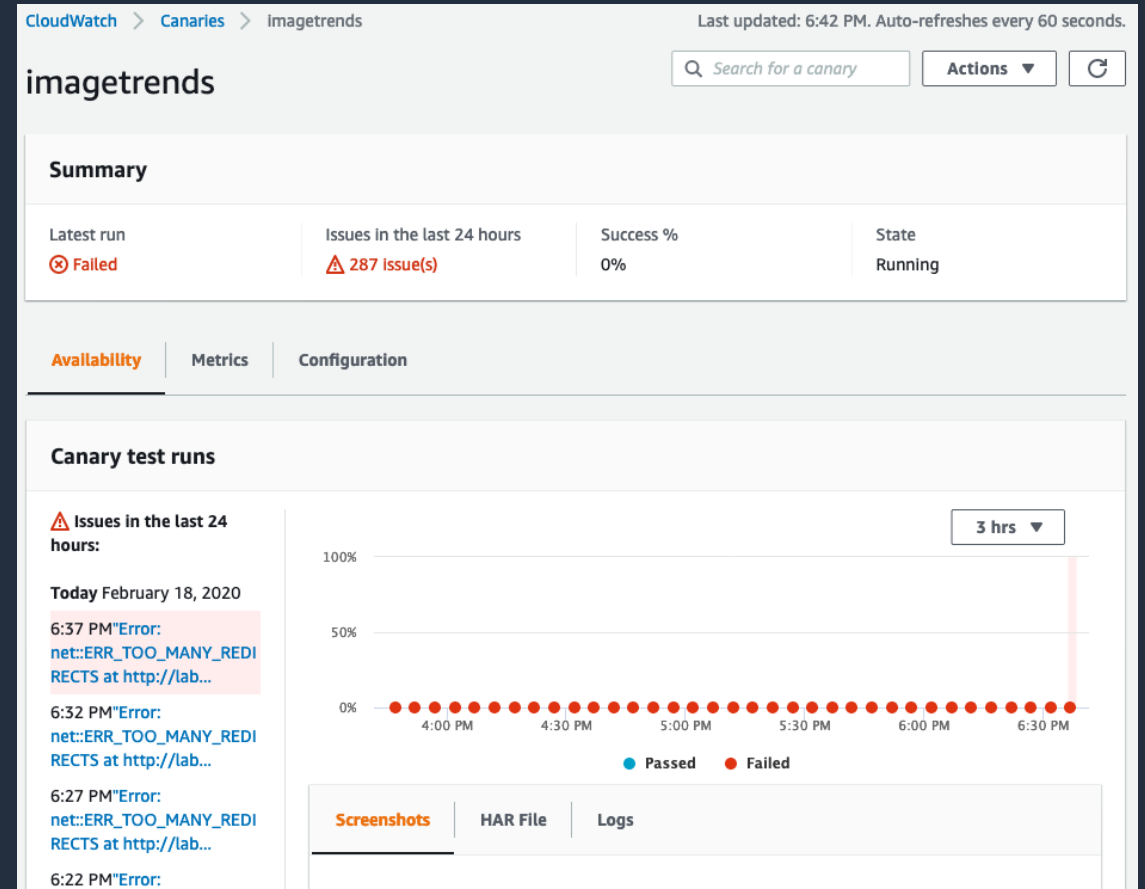
- Create alarms that auto-adjust thresholds based on natural metric patterns
- Alarm when the metric value is above or below the band, or both
- Visualize metrics with anomaly detection bands on dashboards
- Cross-account support



CloudWatch Synthetics

Runs tests on your endpoints every minute, 24x7, and alerts you as soon as your application endpoints don't behave as expected.

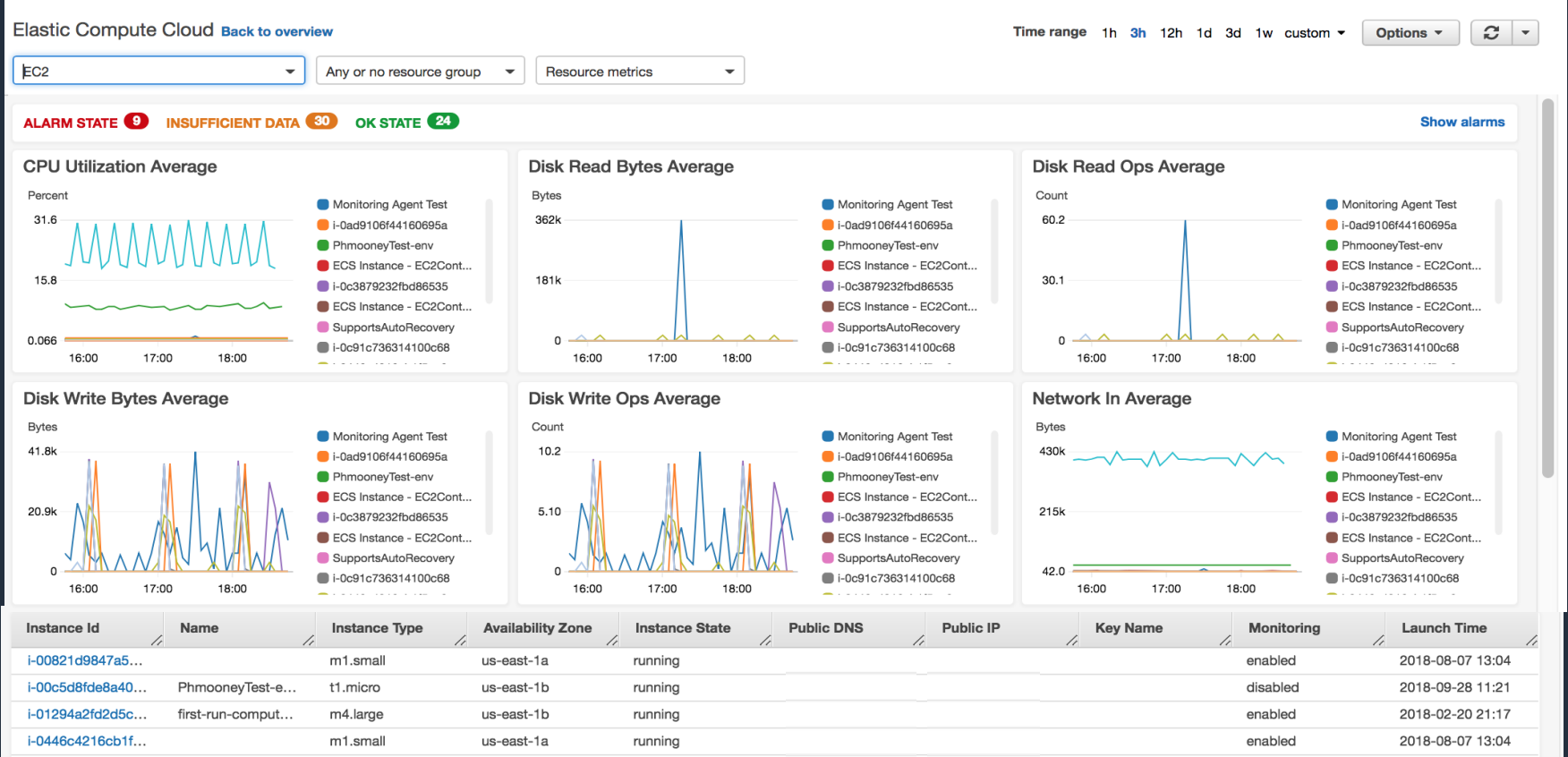
- View of your customers' experiences
- Configurable scripts
- Run on a schedule
- Check availability and latency
- Store load time data



CloudWatch Automatic Dashboards

- CloudWatch simplifies infrastructure monitoring with a default, getting started experience.

Dynamic, self-updating AWS infrastructure dashboards



CloudWatchAI-powered natural language query generation

Natural language query generation powered by generative AI for Logs Insights and Metrics Insights.

Easily and quickly generate queries in context of your logs and metrics data using plain language.

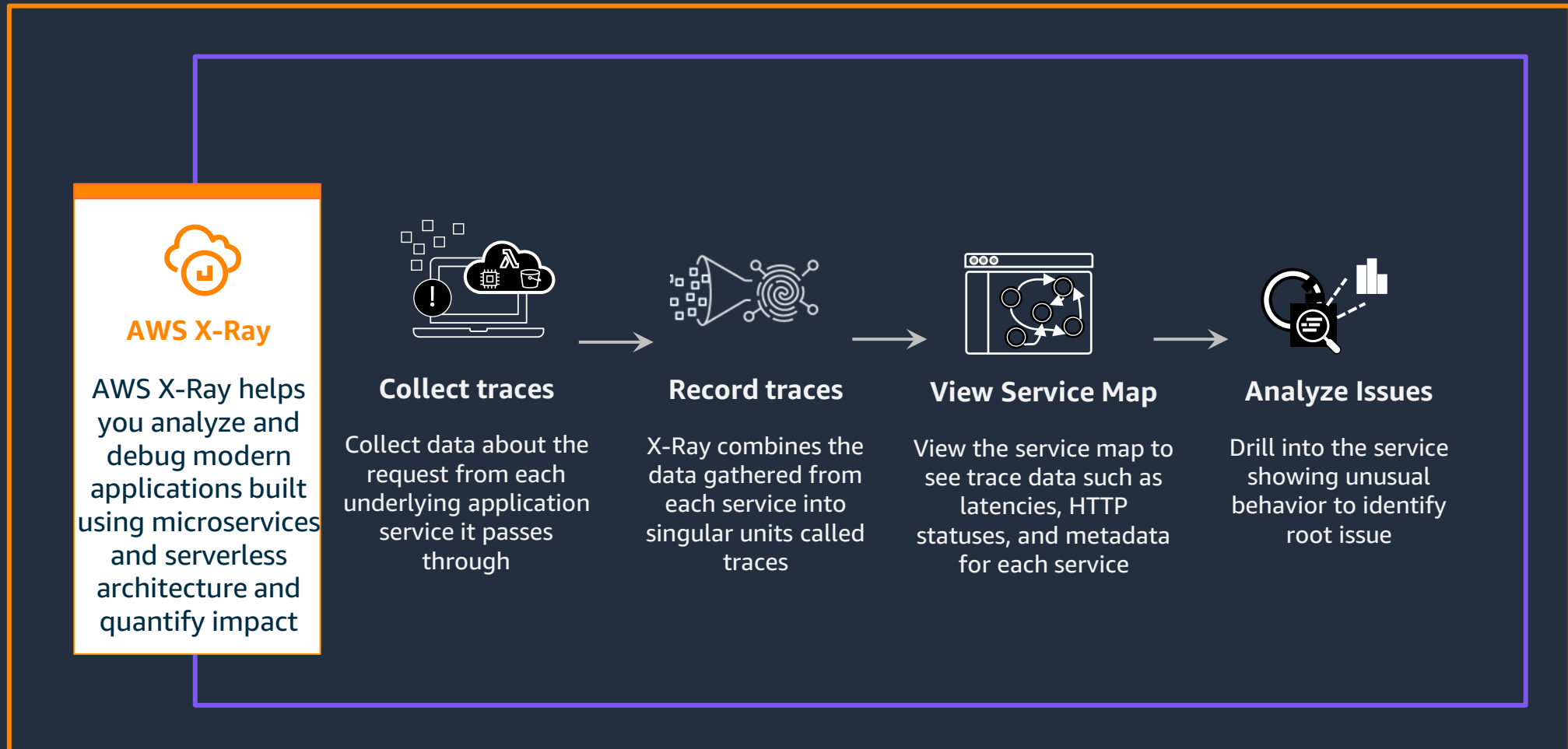
Accelerate insights from observability data without needing extensive knowledge of the query language.



AWS X-Ray

AWS X-Ray

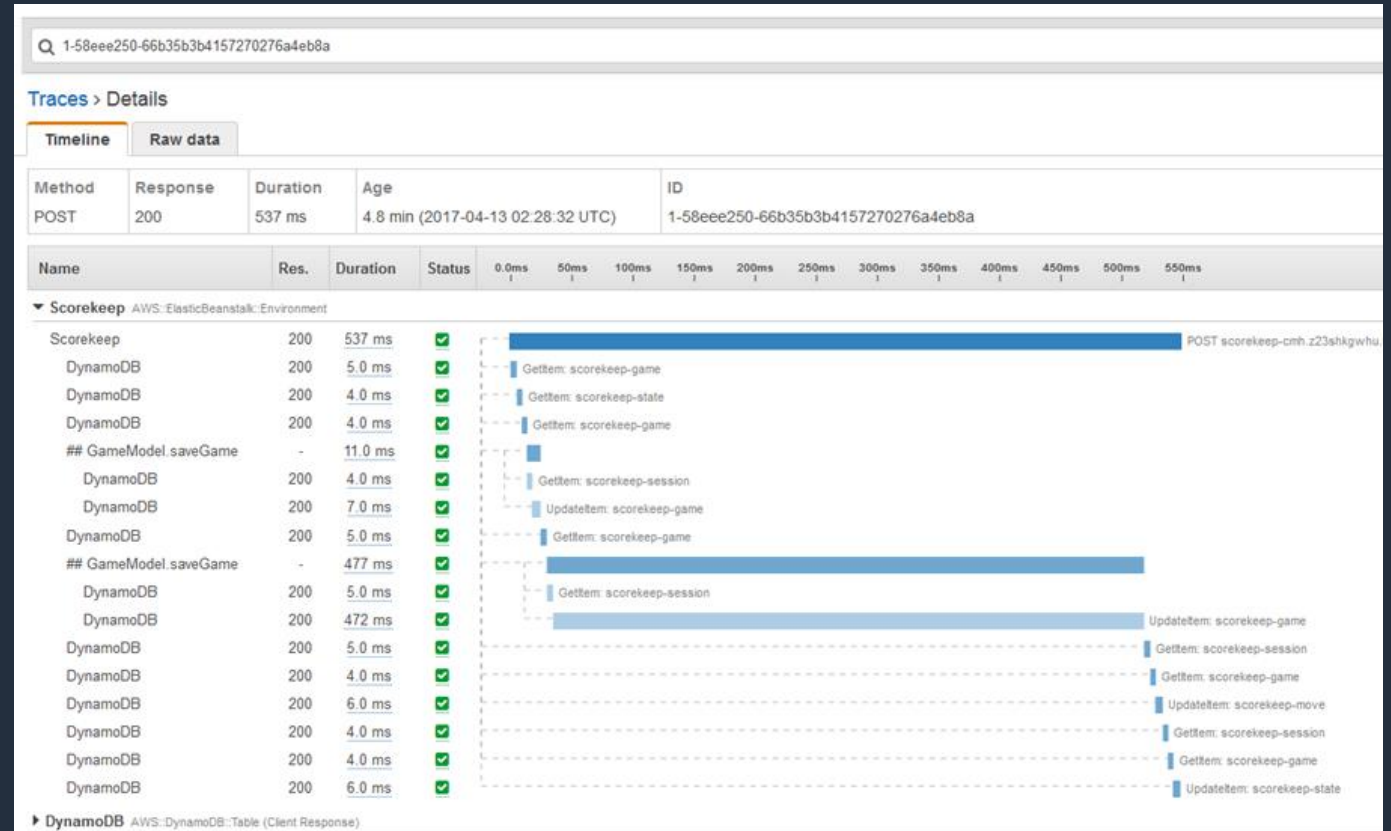
- ANALYZE AND DEBUG PRODUCTION, DISTRIBUTED APPLICATIONS



End to End Tracing

Analyse the behaviour of your applications.

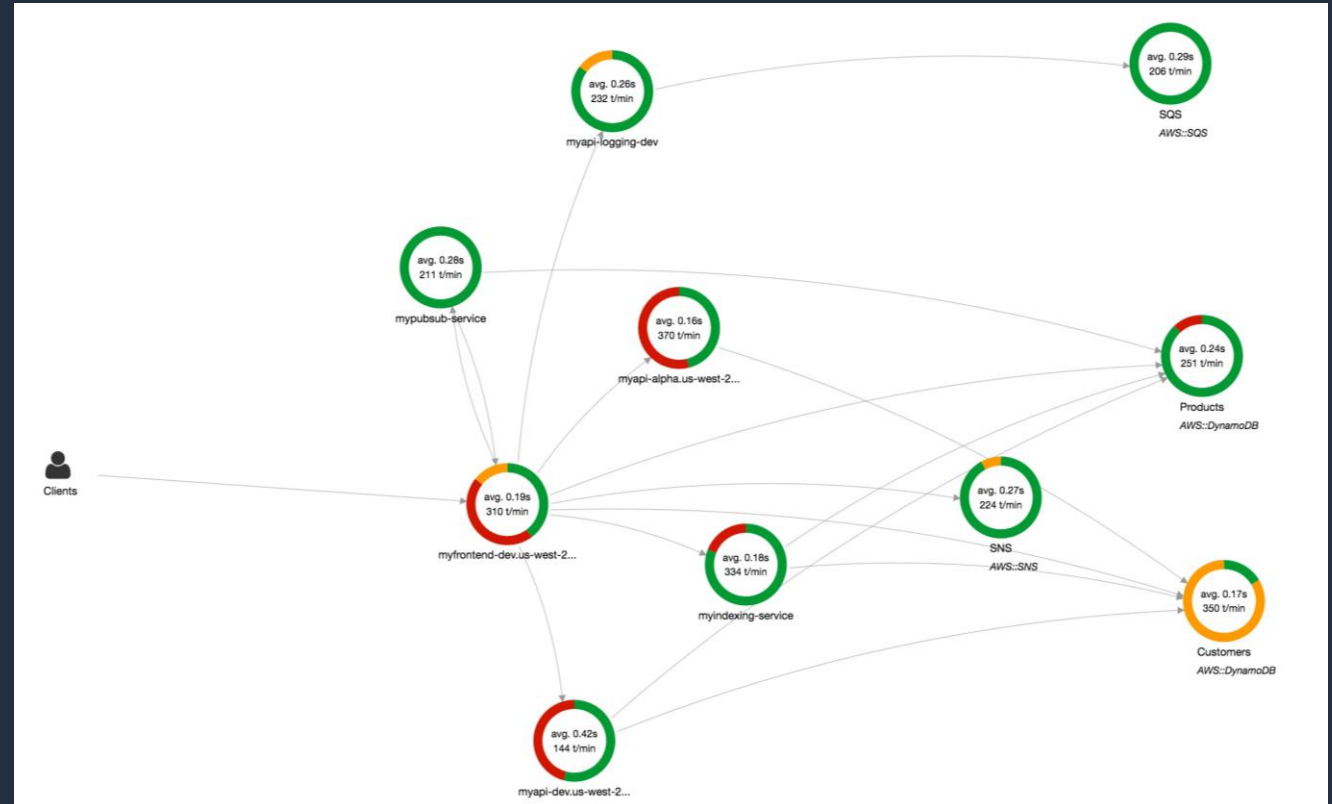
- Identify performance bottlenecks, edge case errors, and other hard to detect issues.
- Use this trace to follow the path of an individual request as it passes through each service in your application to pinpoint where issues are occurring.



Service Map

A map of services used by your application with trace data.

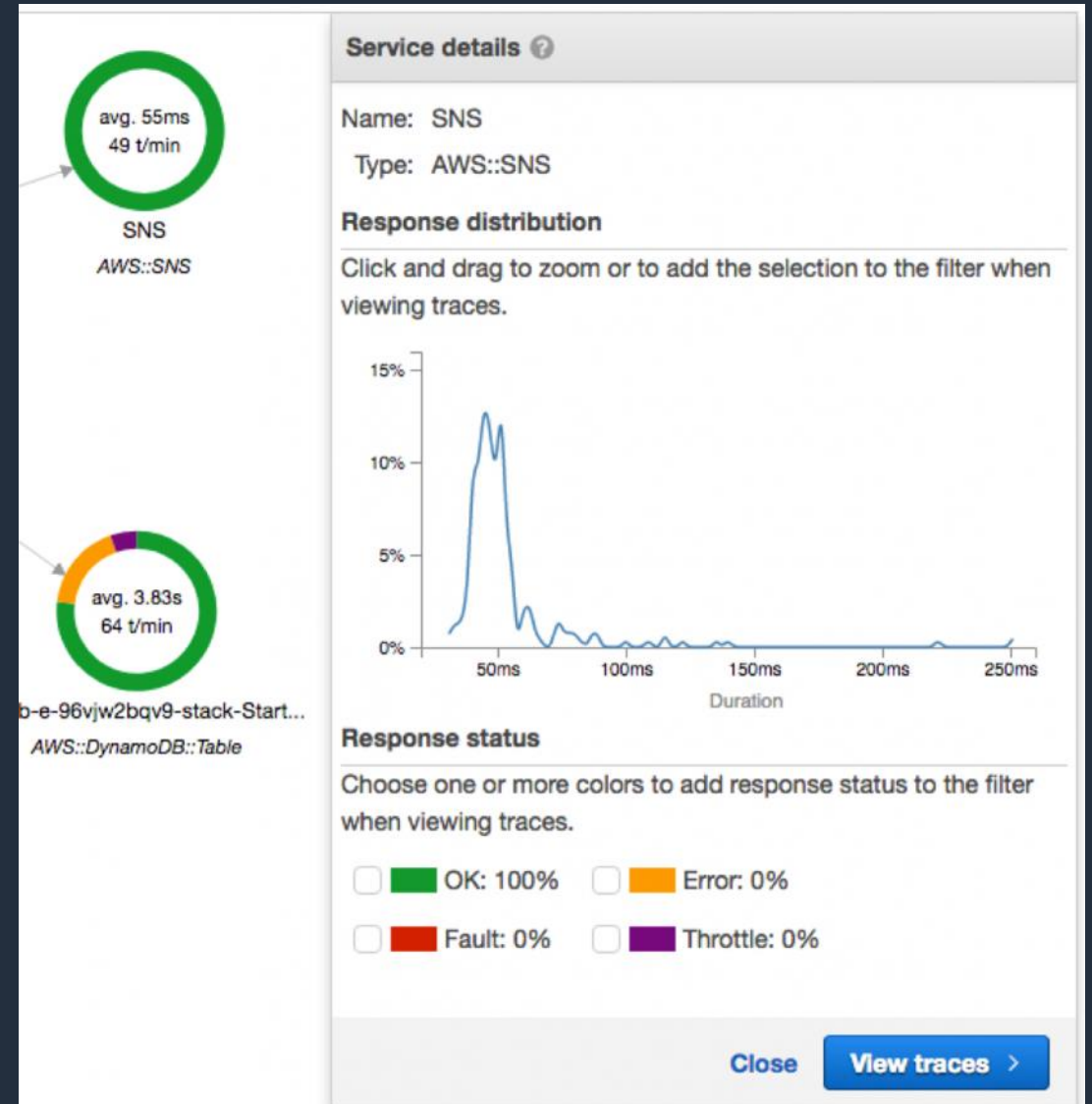
- This provides a view of connections between services in your application and aggregated data for each service, including average latency and failure rates.
- You can create dependency trees, perform cross-availability zone or region call detections, and more



Server and Client-Side Latency Detection

Visually detect node and edge latency distribution directly from the service map.

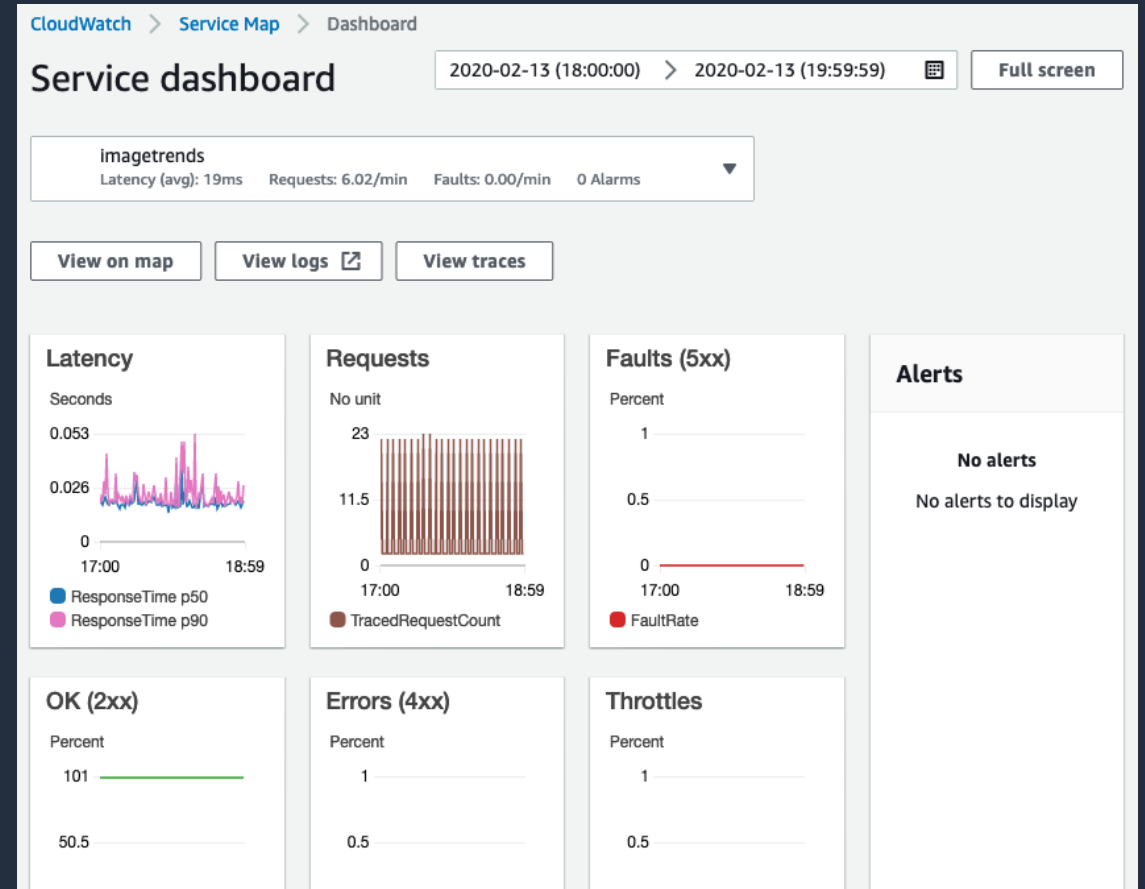
- Quickly isolate outliers, graph pattern and trends, drill into traces and filter by built-in keys and custom annotations to better understand performance issues impacting your application and end users.



CloudWatch ServiceLens

Visualize and analyze the health, performance, and availability of your applications in a single place.

- Integrates CloudWatch with AWS X-Ray to provide an end-to-end view of your application
- You can choose a node to see detailed insights about the correlated metrics, logs, and traces associated with that part of the service

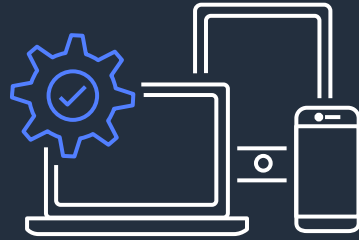


Managed Open Source Tools for Observability

Why AWS Managed OpenSource?



**Security
First**



**Scale as-you-
grow**



**Seamless
integrations**



**Open Source
Contribution**

AWS Distro for OpenTelemetry

COLLECT DISTRIBUTED TRACES AND METRICS FOR APPLICATION MONITORING



- › **Send metrics and traces to multiple AWS monitoring solutions**
- › **Speed up performance troubleshooting**
- › **Automatic trace collection**
- › **Collect metadata on application resources**
- › **Integrate with Amazon CloudWatch**

Amazon Managed Grafana

SCALABLE, SECURE AND HIGHLY AVAILABLE DATA VISUALIZATION FOR YOUR OPERATIONAL METRICS



- › **Analyze, monitor, and alarm across multiple data sources; native AWS as well as third-party**
- › **Access to Grafana Enterprise data source via AWS marketplace directly from the console**
- › **Automatic scaling**
- › **Native integration with multiple AWS Services**

Amazon Managed Service for Prometheus

HIGHLY AVAILABLE, SECURE, AND MANAGED MONITORING



- › **A serverless Prometheus-compatible monitoring service**
- › **Use the same open source Prometheus data model and query language**
- › **Fully managed, secure, and highly available using multi-AZ deployments**
- › **Improved scalability, availability, and security without having to manage the underlying infrastructure**

Cost Monitoring

AWS Cost Explorer

• CONSOLE-BASED COST AND USAGE REPORTING



Filter/Group your data



Save your progress



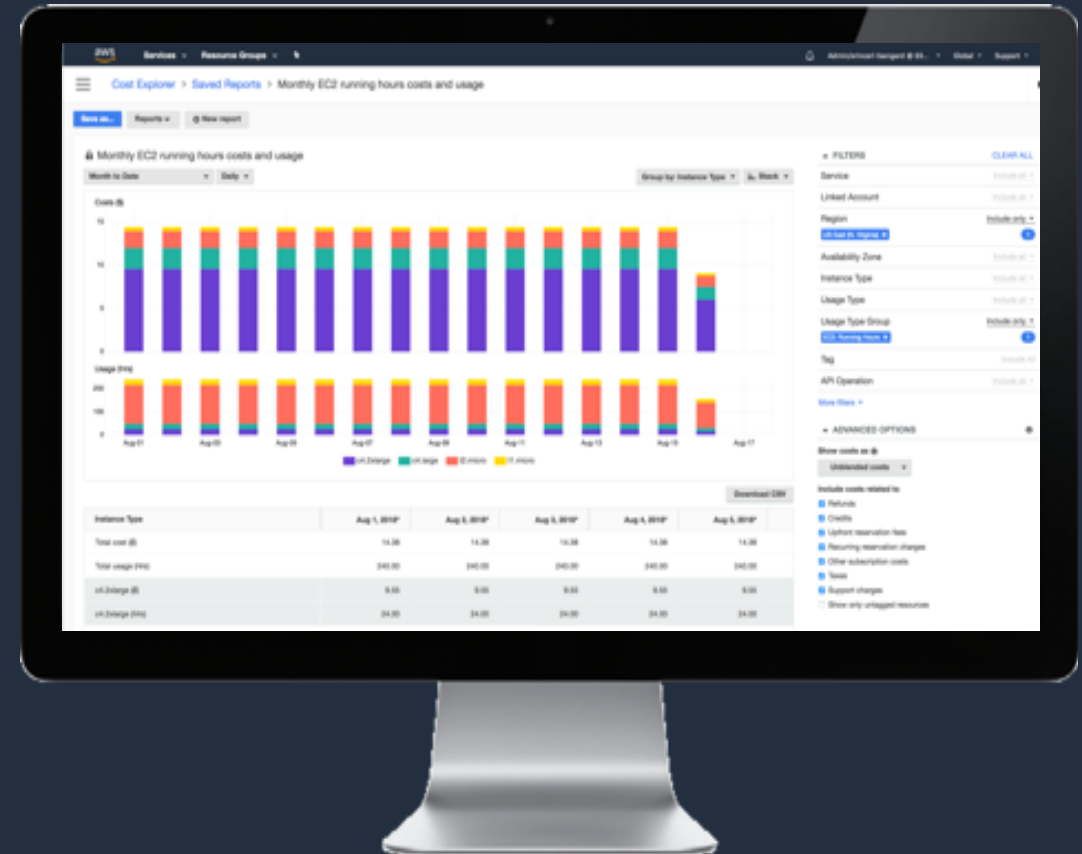
Set time interval and granularity



Forecast future costs and usage



Build custom applications

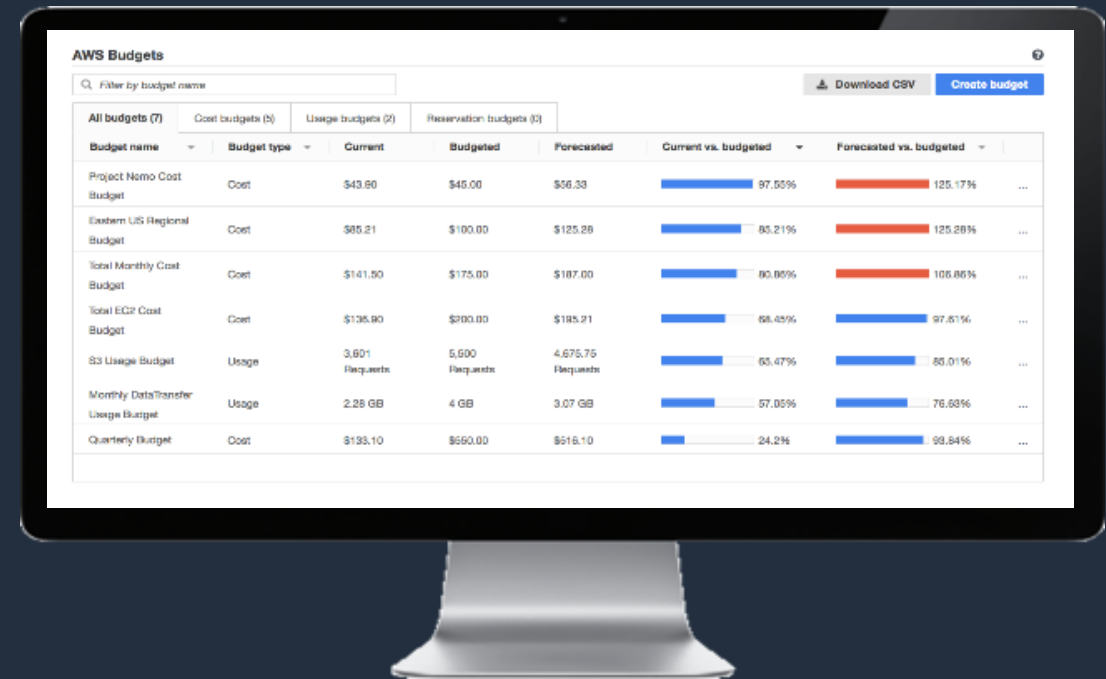


AWS Budgets

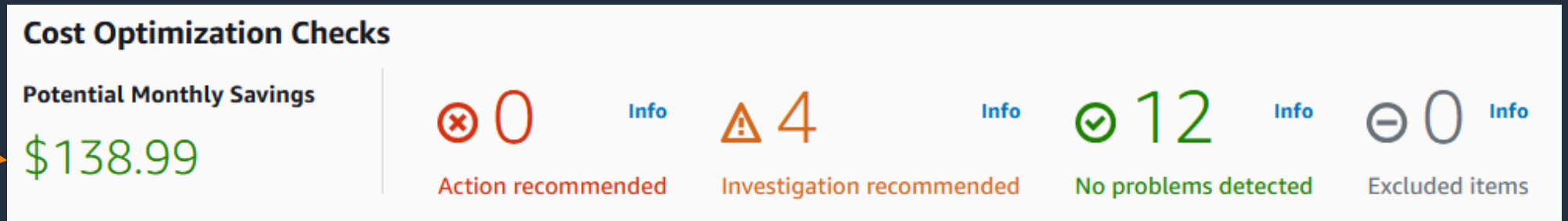
Get alerted when your cost or usage exceed (or are forecasted to exceed) your budget amount.

Benefits

- Customizable budgets
- Ongoing monitoring and alert notification
- Flexible Automation
- Set up AWS Budgets Reports on a cadence to stakeholders with no AWS access.

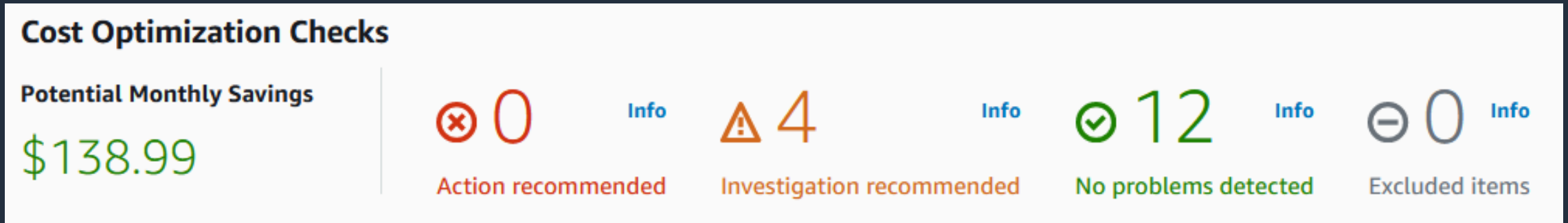


AWS Trusted Advisor



- A tool that provides guidance following AWS best practices
- All customers have access to Core checks
- Enterprise Support and Business Support customers have access to the full set of checks including Cost Optimization

AWS Trusted Advisor Cost Optimization Checks



- Underutilized resources
- Idle resources
- Savings Plans Recommendations

Summary

- Maximize the value of cloud by moving at **speed combined with cost control and efficiency**; control and efficiency starts with **cost visibility**
- Use **AWS Cost Explorer** to create cost and usage visibility
- Use **AWS Budgets** to alert you when cost, usage, Reserved Instance, and Savings Plans coverage and utilization deviate from plan
- Use **AWS Cost Anomaly Detection** to detect and address anomalous spend by leveraging root cause analysis



Thank you!

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