

머신러닝 기반 클라우드 인프라 이상 감지 서비스

Amazon DevOps Guru 맛보기

LG CNS

AWS Launch센터 AWS데브옵스팀

안준영 선임

Contents

- Amazon DevOps Guru란?
- 주요 기능
- 사용 사례
- 구성 및 통합
- 비용 최적화

Amazon DevOps Guru란?



- Amazon DevOps Guru는 ML을 사용하여 이상 운영 패턴을 감지합니다.
따라서 고객에게 영향을 미치기 전에 운영 문제를 식별하고 예방할 수 있습니다.
- 자동 이상 징후 탐지, 추천 사항 제공, 리소스 의존성 분석, AWS 서비스 통합 및 향상된 인텔리전스를
통해 애플리케이션 및 인프라스트럭처의 취약점에 대한 분석과 알람을 제공합니다.

The screenshot shows the Amazon DevOps Guru console. On the left is a navigation sidebar with the following items: 'Amazon DevOps Guru' (with a close icon), 'Dashboard', 'Insights', 'Settings', 'Analyzed resources', 'Cost estimator', and 'Provide feedback and join our customer panel' (with an external link icon). The main content area has a dark blue background. At the top, it says 'Machine Learning'. The main heading is 'Amazon DevOps Guru' followed by 'ML-powered cloud operations service to improve application availability'. Below this, a smaller text says 'Improve application availability with ML-powered insights and recommendations to facilitate faster remediation of operational issues and reduce expensive downtime.' On the right side, there are two white boxes. The top box is titled 'Configure' and contains the text 'Enable DevOps Guru to analyze operational data of your AWS resources.' Below this text is a yellow 'Get started' button with a red border, and to its right is the Korean word '시작' (Start) in red. The bottom box is titled 'Pricing (US)' and contains the text 'With DevOps Guru, you only pay for what you use. There is no up-front commitment or minimum fee. You pay'.

Amazon DevOps Guru ✕

Machine Learning

Amazon DevOps Guru

ML-powered cloud operations service to improve application availability

Improve application availability with ML-powered insights and recommendations to facilitate faster remediation of operational issues and reduce expensive downtime.

Configure

Enable DevOps Guru to analyze operational data of your AWS resources.

Get started 시작

Pricing (US)

With DevOps Guru, you only pay for what you use. There is no up-front commitment or minimum fee. You pay

DevOps Guru Start !

Amazon DevOps Guru > Get started

Get started [Info](#)

▶ How Amazon DevOps Guru works

IAM role permissions

The IAM role you use determines which AWS resources Amazon DevOps Guru has permission to access. Operational data and metrics from AWS resources are ingested to generate insights and recommendations.

IAM role	Description
Amazon DevOps Guru_Role	The IAM role created grants Amazon DevOps Guru permission to evaluate your AWS resources.
View role policy	View permission details

Amazon DevOps Guru analysis coverage

DevOps Guru analyzes the operational data for your AWS resources based on your selection. You pay for the number of AWS resource hours analyzed, for each active resource. A resource is only active if it produces metrics, events, or log entries within an hour. See the [pricing page](#) for complete details.

Choose which AWS resources to analyze by specifying the coverage boundary

☒ Analyze all AWS resources in the current AWS account in this Region

☐ Choose later

You can specify specific AWS resources to analyze AWS CloudFormation stacks or AWS Tags as your coverage boundary.

Notifications - optional

Amazon DevOps Guru uses a SNS topic to notify you about important DevOps Guru events.

No SNS topics set up for Amazon DevOps Guru.

Add SNS topic

You can add 2 more topics.

Enable



Amazon DevOps Guru란?


Amazon DevOps Guru is in the process of collecting and analyzing your data. This page will automatically refresh and update with the latest information.

✔ Amazon DevOps Guru has been successfully enabled for this account

Amazon DevOps Guru > Dashboard

Dashboard

Setting up DevOps Guru [Setup notifications](#)




Step 1: Discovering applications and resources

DevOps Guru works to discover the applications and resources in your account. Time to complete: 15 - 90 minutes

Discovering applications and resources

View analyzed resources



Step 2: Baselining your resources

DevOps Guru determines baseline metrics for your resources. DevOps Guru uses these baselines to establish thresholds and provide insights for future metrics. Time to complete: 2 to 24 hours

0%

Dashboard

Amazon DevOps Guru란?

Amazon DevOps Guru > Dashboard

Dashboard

System health summary [Info](#)

This section displays the latest information about your system and applications. Insights are based on your overall system.

Impacted applications

0

Ongoing reactive insights

0

Ongoing proactive insights

5

Resource summary

Resources analyzed in this account

Resources analyzed

34

System health overview (2) [Info](#)

View the health of your currently monitored applications. You can also monitor the health of your system by choosing to view by service names. To see insights for your applications, go to the [Insights page](#).

Find applications

All applications

View by

Application

prd-mop-fe

Healthy

Ongoing reactive insights

0

Ongoing proactive insights

0

Application lifetime MTTR

-

Resources analyzed

0

prd-mop-fe-admin

Healthy

Ongoing reactive insights

0

Ongoing proactive insights

0

Application lifetime MTTR

-

Resources analyzed

0

Latest proactive insight

Amazon DevOps Guru creates proactive insights about issues that might impact the health of your applications.

DynamoDB table writes are under utilized

Top recommendation

[Tune Provisioned Write Throughput of your Dynamo Table](#)

Based on your usage, we recommend that you set terraform-state-892020468025-ap-northeast-2 write provisioned throughput to 2 to maintain ideal consumed capacity of 65% or consider enabling on-demand mode.

[View all proactive insights](#)

Predicted impact time

-

Account overview history

Last 1 month

Total reactive insights

14

MTTR

1 Hours

Total proactive insights

5

Account overview history

Last 1 month

Total reactive insights

14

MTTR

1 Hours

Total proactive insights

5

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Launch Center

주요 기능

이상 감지 기능 : 자동화된 이상 감지 및 분석을 통해 장애를 예방하고 시스템 안정성을 향상시킵니다.

사전 예방 분석(Proactive Insights) : 지표의 변화 경향 및 아키텍처 취약점 분석을 통한 사전 권고사항 제공

사후 대응 분석(Reactive Insights) : 로그 분석을 통해 발생한 사건에 대한 원인 분석 및 조치 방안 제공

사전 예방 분석(Proactive Insights)

주요 기능

Amazon DevOps Guru > Insights

Insights [Info](#)

Reactive | **Proactive**

Proactive insights (5) [Info](#)

A proactive insight lets you know about issues that are predicted to affect your application in the future.

< 1 > ⚙

Name	Status	Severity	Created time	Affected applications	Affected services	Predicted impact ti...
DynamoDB table writes are under utilized	⚠ Ongoing	Medium	May 03, 2023 08:00 UTC	0	1	-
Lambda timeout exceeds recommended SQS visibility timeout	⚠ Ongoing	Medium	May 03, 2023 08:00 UTC	0	1	-
Lambda function does not have enough subnets	⚠ Ongoing	Medium	May 03, 2023 08:00 UTC	0	1	-
SQS triggered Lambda does not have a Dead Letter Queue	⚠ Ongoing	Medium	May 03, 2023 08:00 UTC	0	1	-
DynamoDB table reads are under utilized	⚠ Ongoing	Medium	May 03, 2023 08:00 UTC	0	1	-

사전 예방 분석(Proactive Insights)

Starting on May 03, 2023 08:00 UTC anomalous behavior was predicted on 1 metric. Review the metrics section below to see the list of affected resources. DevOps Guru has provided you with 1 [recommendation](#) to investigate and resolve the issue.

Amazon DevOps Guru > Insights: Proactive > DynamoDB table writes are under utilized

DynamoDB table writes are under utilized

Insight overview

Starting on May 03, 2023 08:00 UTC anomalous behavior was predicted on 1 metric. Review the metrics section below to see the list of affected resources. DevOps Guru has provided you with 1 recommendation to investigate and resolve the issue.

Insight severity

Medium

Status

Ongoing

Affected applications

0

Insight started

May 03, 2023 08:00 UTC

Insight ended

-

Last update time

May 03, 2023 08:00 UTC

Opsitem ID

-

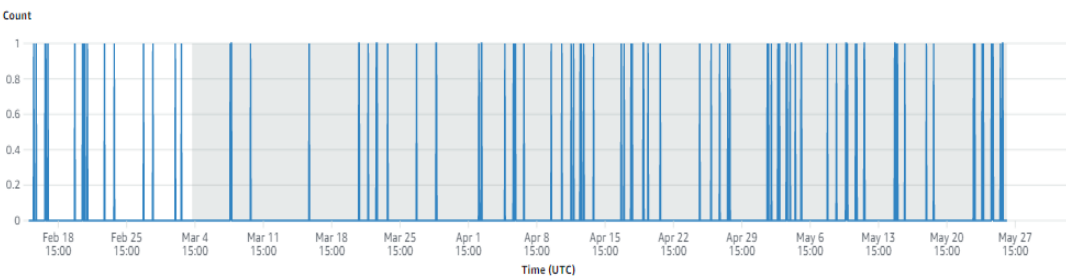
View recommendations

Metrics (1) Info

Metrics in your AWS account are analyzed to predict anomalies. View CloudWatch metrics below to understand and address the predicted anomalous behavior before it occurs.

Find metrics by resource name, service name, or statistic

Count



ConsumedWriteCapacityUnits

Anomaly detected

Service name

AWS/DynamoDB

Application

-

Dimensions

Statistics

Maximum

Anomaly reported

May 03, 2023 08:00 UTC

Predicted impact time

-

Relevant events timeline (20) May 03, 07:45-May 26, 08:36 UTC Info

DevOps Guru evaluated the aggregated metrics with the following events in your AWS account to generate insights. Use the aggregated metrics, events, and details in the insights to address issues that can improve your solution.

Find events by name, service name and resource name

	05/02 15:00	05/04 15:00	05/06 15:00	05/08 15:00	05/10 15:00	05/12 15:00	05/14 15:00	05/16 15:00	05/18 15:00	05/20 15:00	05/22 15:00	05/24 15:00	05/26 15:00
Insight start													
Deployment													

Recommendation summary Info

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

Tune Provisioned Write Throughput of your Dynamo Table

Based on your resource's usage, we recommend the following changes. To learn more about these changes, see [Tune Provisioned Write Throughput of your Dynamo Table](#)

Recommendations (1) Info

Find recommendations by resource name, service name, or status

Resource name

AWS service

Recommended custom change

Why is DevOps Guru recommending this?

Status

terraform-state-northeast-2	DynamoDB	Based on your usage, we recommend that you set terraform-state- write provisioned throughput to 2 to maintain ideal consumed capacity of 65% or consider enabling on-demand mode.	DynamoDB Table Provisioned Write Throughput is under utilized as "ConsumedWriteCapacityUnits" Metric did not exceed 20% for 59 days. The current write limit is set at 5.	Ongoing
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Launch Center

사후 대응 분석(Reactive Insights)

주요 기능

Amazon DevOps Guru > Insights

Insights [Info](#)

Reactive | Proactive

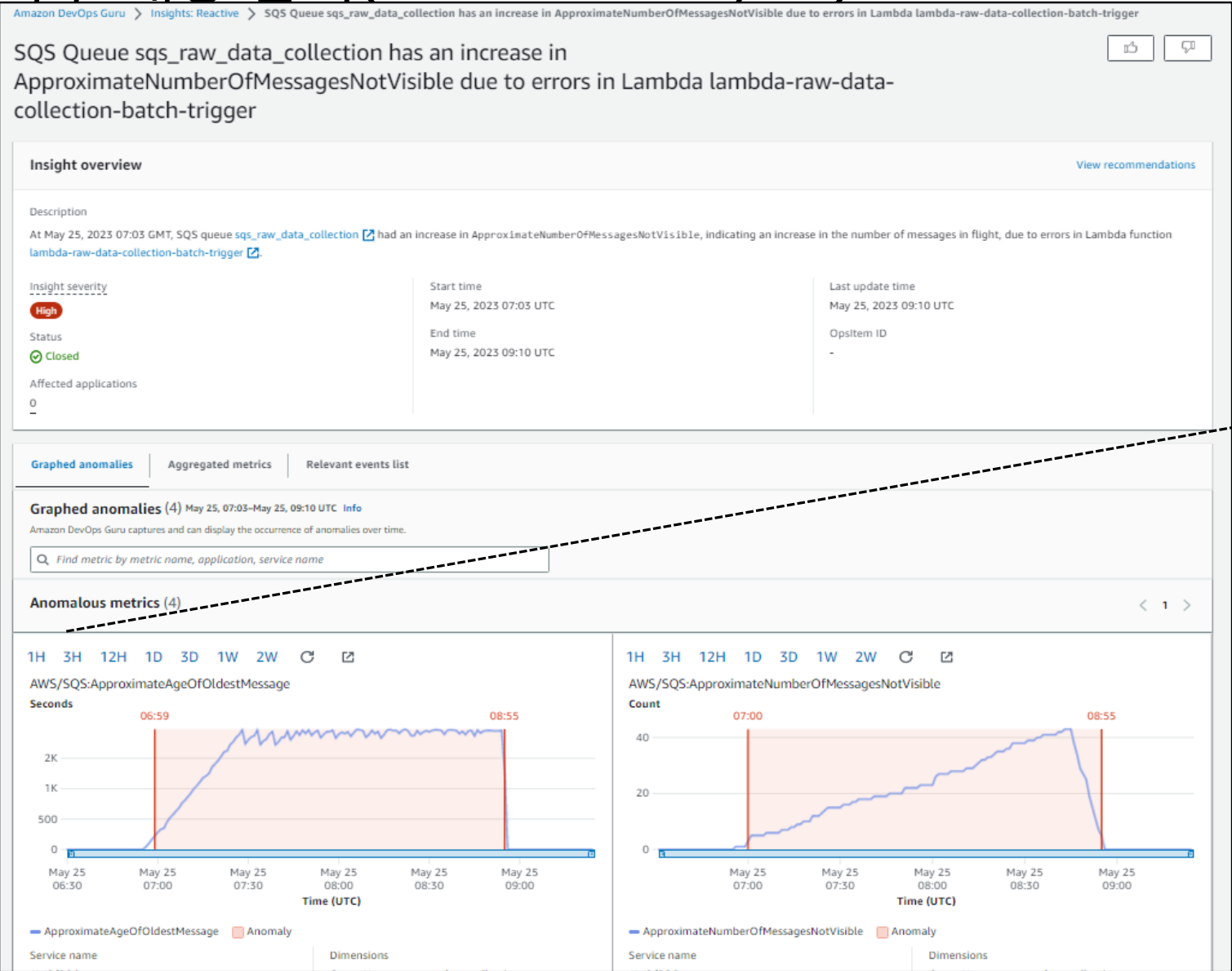
Reactive insights (13) [Info](#)

A reactive insight lets you know about recommendations to improve the performance of your application now.

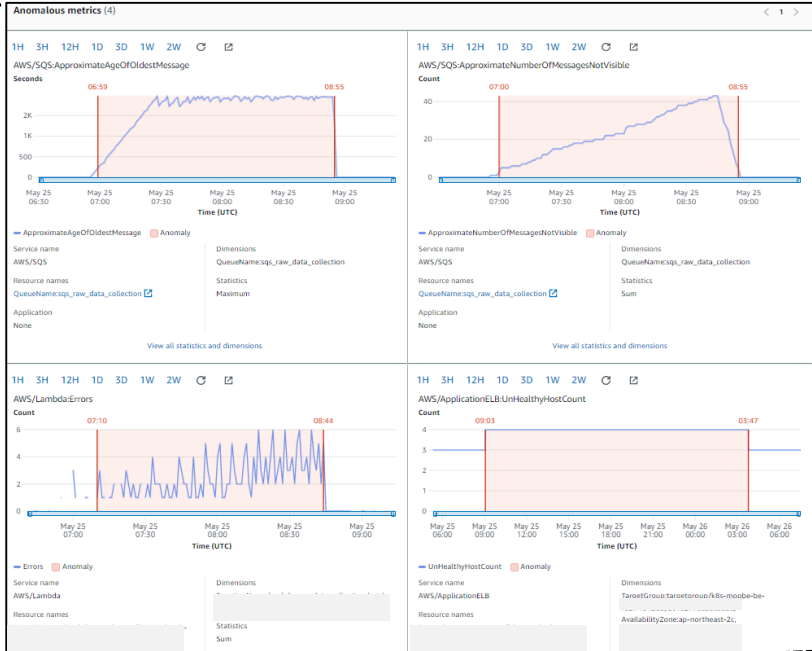
< 1 2 > ⚙

Name	Status	Severity	Created time	Affected applications	Affected services
ApplicationELB TargetResponseTime Anomalous	✔ Closed	High	May 25, 2023 23:44 UTC	0	<u>2</u>
SQS Queue sqs_raw_data_collection has an increase in ApproximateN...	✔ Closed	High	May 25, 2023 07:03 UTC	0	<u>3</u>
Repeated Insight: SQS ApproximateAgeOfOldestMessage Anomalous	✔ Closed	Medium	May 25, 2023 11:26 UTC	0	<u>1</u>
Increased ApproximateAgeOfOldestMessage in SQS queue sqs_raw_d...	✔ Closed	Medium	May 24, 2023 23:48 UTC	0	<u>1</u>
Increased ApproximateAgeOfOldestMessage in SQS queue sqs_raw_d...	✔ Closed	Medium	May 23, 2023 23:48 UTC	0	<u>1</u>
Increased ApproximateAgeOfOldestMessage in SQS queue sqs_keywo...	✔ Closed	Medium	May 11, 2023 17:13 UTC	0	<u>1</u>
ApplicationELB UnHealthyHostCount Anomalous	✔ Closed	Medium	May 05, 2023 03:29 UTC	0	<u>2</u>
Increased ApproximateAgeOfOldestMessage in SQS queue sqs_opt_sa...	✔ Closed	Medium	May 04, 2023 03:35 UTC	0	<u>2</u>
Increased ApproximateAgeOfOldestMessage in SQS queue sqs_raw_d...	✔ Closed	Medium	May 03, 2023 12:00 UTC	0	<u>1</u>
ApplicationELB HTTPCode_ELB_5XX_Count Anomalous	✔ Closed	Low	May 26, 2023 01:40 UTC	0	<u>1</u>

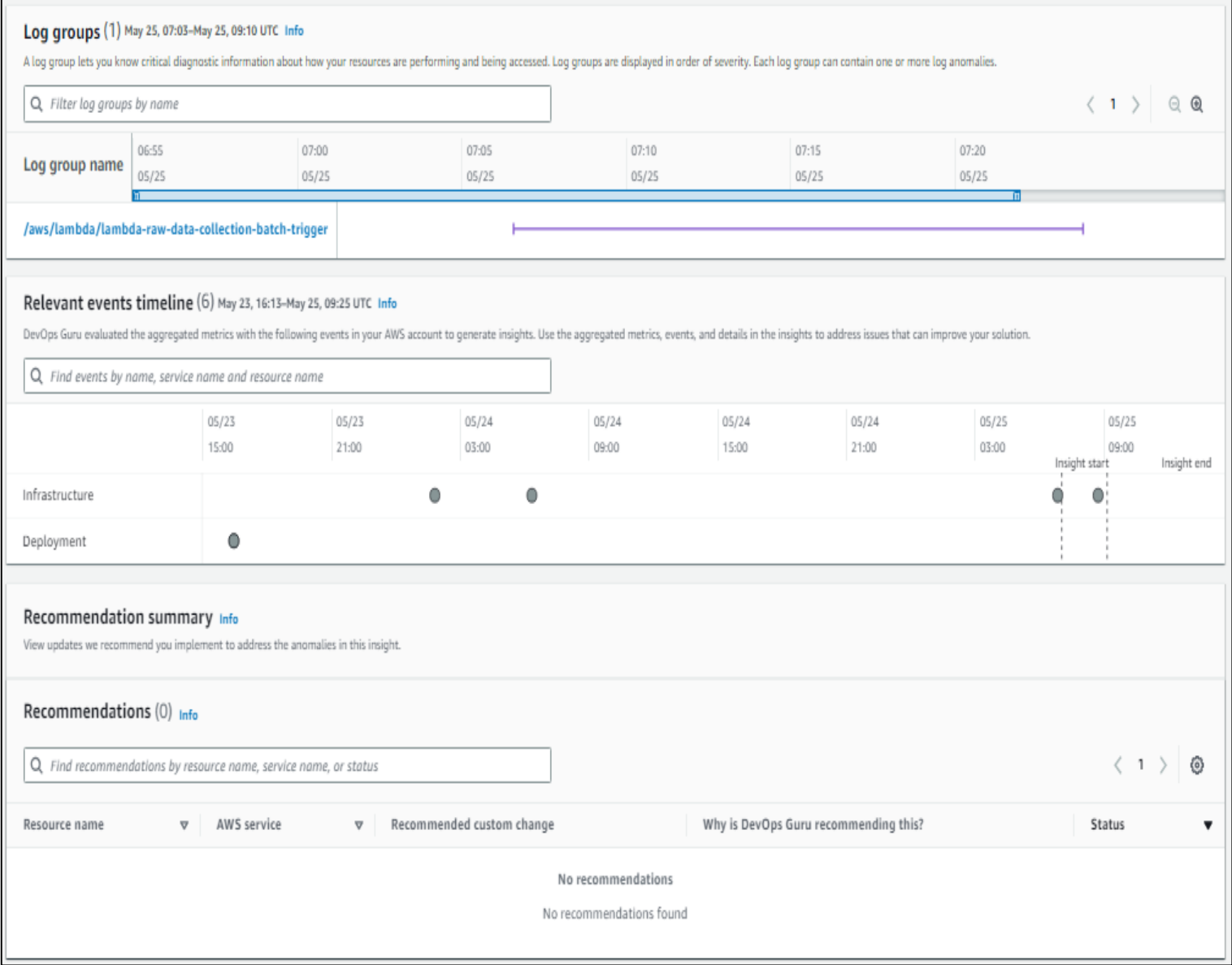
사후 대응 분석(Reactive Insights)



At May 25, 2023 07:03 GMT, SQS queue sqs_raw_data_collection had an increase in ApproximateNumberOfMessagesNotVisible, indicating an increase in the number of messages in flight, due to errors in Lambda function lambda-raw-data-collection-batch-trigger.



사후 대응 분석(Reactive Insights)

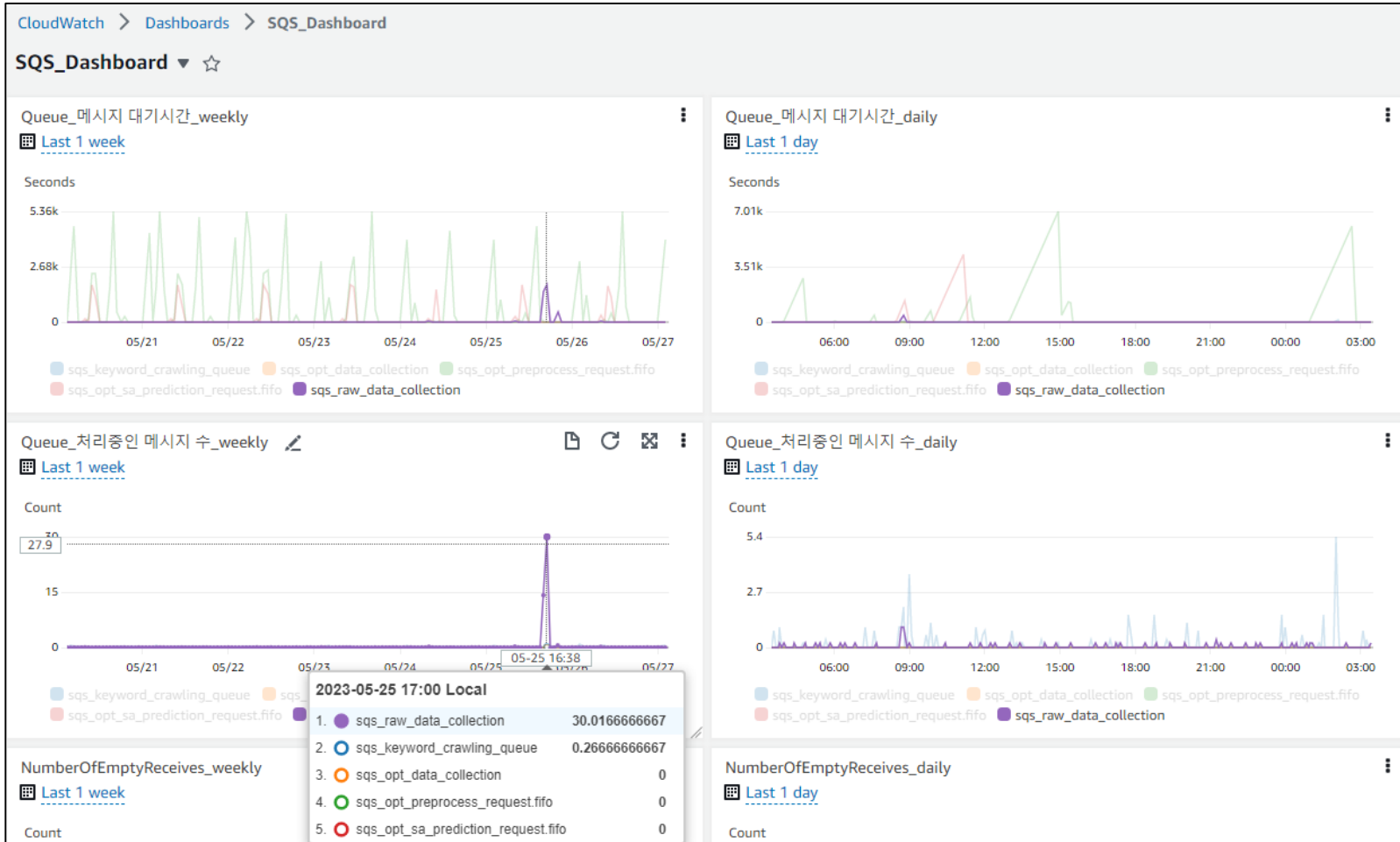


At May 25, 2023 07:03 GMT, SQS queue [sqs_raw_data_collection](#) had an increase in `ApproximateNumberOfMessagesNotVisible`, indicating an increase in the number of messages in flight, due to errors in Lambda function [lambda-raw-data-collection-batch-trigger](#).

사용 사례

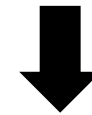
Monitoring Dashboard

최초 Alert 발생으로부터 에러 인지까지
약 **40분** 소요..

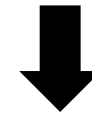


회의를 막 종료한 운영자의 핸드폰으로

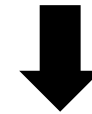
SQS Alert 메시지 확인



SQS Monitoring Dashboard 확인

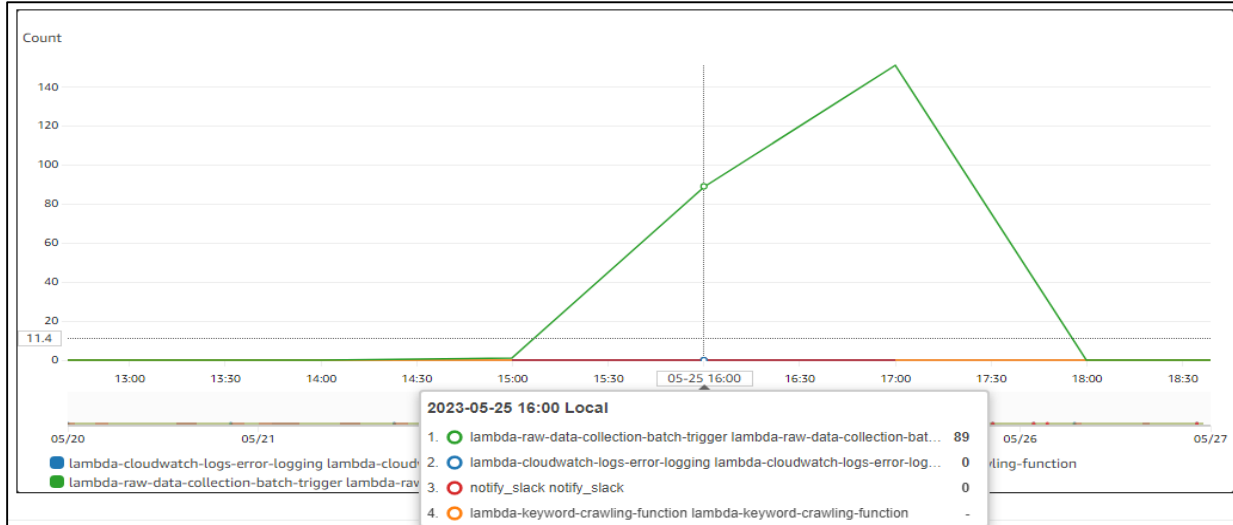


Raw_data_collection Lambda 확인



Lambda Error 확인

사용 사례



Alert를 설정했음에도 인지가 늦은 원인

- 서비스 특성 상 평소 반복적으로 발생하던 Lambda Error Alert
- 따라서 운영 및 개발자도 특별히 Alert를 신경쓰지 않음
- 이러한 일상적 **Alert Noise**에 섞여 필요한 Alert를 놓치는 경우 발생

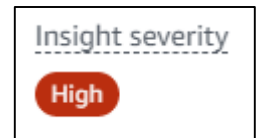
Insight overview [View recommendations](#)

Description

At May 25, 2023 07:03 GMT, SQS queue [sqs_raw_data_collection](#) had an increase in ApproximateNumberOfMessagesNotVisible, indicating an increase in the number of messages in flight, due to errors in Lambda function [lambda-raw-data-collection-batch-trigger](#).

Insight severity	Start time	Last update time
High	May 25, 2023 07:03 UTC	May 25, 2023 09:10 UTC
Status	End time	OpsItem ID
Closed	May 25, 2023 09:10 UTC	-
Affected applications		
0		

DevOps Guru Alert 단 한가지



- 심각도(Severity) High / Medium / Low
- Alert LifeCycle Status 관리로 같은 종류의 Alert를 반복하지 않음 (Ongoing – Closed)
- 16시에 Guru Alert & Report 생성 (운영자는 17시 30분 인지)

Monitoring vs DevOps Guru

기능	CloudWatch Monitoring	DevOps Guru
이상 징후 탐지	수동 구성이 필요	자동화된 기계 학습을 통한 자동 이상 징후 탐지
추천 사항 제공	수동으로 설정해야 함	자동화된 추천 사항 제공
리소스 의존성 분석	수동으로 설정해야 함	자동화된 리소스 의존성 분석
AWS 서비스 통합	다양한 AWS 서비스와 통합됨	다양한 AWS 서비스와 긴밀한 통합
향상된 인텔리전스	일반적인 지표 기반 모니터링	기계 학습 알고리즘을 사용한 향상된 인텔리전스
조직 규모에 유연한 적용	모든 규모의 조직에 적용 가능	모든 규모의 조직에 적용 가능

수많은 Metrics를 설정 해놓았지만..

서비스의 현재 상황에 따라 주의깊게 봐야하는 Metrics는 수시로 변한다.

매일 새로운 Trouble Shooting의 연속으로 점점 Metrics는 쌓여만 간다..

Monitoring vs DevOps Guru



어떤 운영자가 바라보는 대시보드

수많은 Metrics를 설정 해놓았지만..

서비스의 현재 상황에 따라 주의깊게 봐야하는 Metrics는 수시로 변한다.

매일 새로운 Trouble Shooting의 연속으로 점점 Metrics는 쌓여만 간다..

Monitoring vs DevOps Guru

Reactive insights (2) [Info](#)

A reactive insight lets you know about recommendations to improve the performance of your application now.

Filter insights

Severity = High

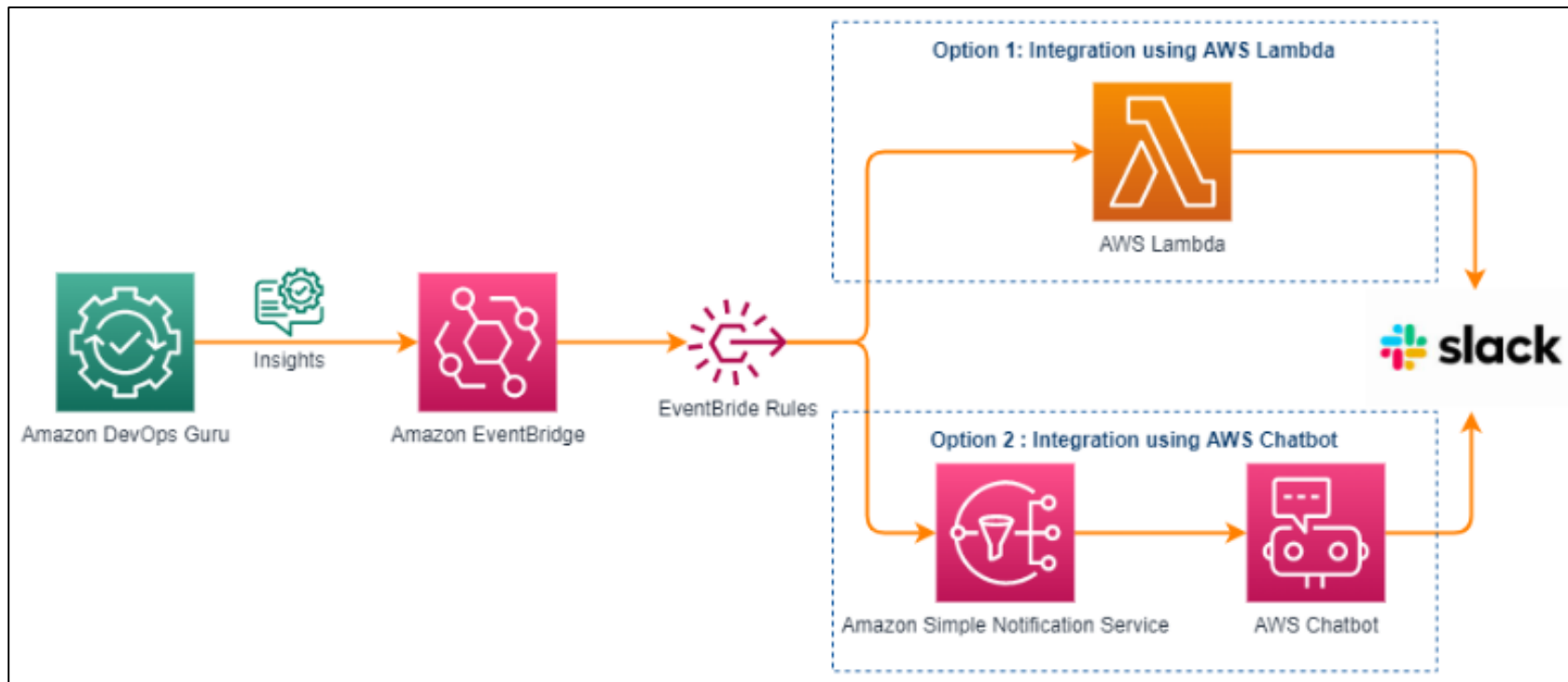
Name	Status	Severity	Created time	Affected
ApplicationELB TargetResponseTime Anomalous	Closed	High	May 25, 2023 23:44 UTC	0
SQS Queue sqs_raw_data_collection has an increase in ApproximateN...	Closed	High	May 25, 2023 07:03 UTC	0

1개월 간 중요한 Alert **단 2건**

DevOps Guru로 얻는 필요한 Alert
차단되는 Noise Alert

높은 사용자 만족도

구성 및 통합



<https://aws.amazon.com/ko/blogs/devops/publish-amazon-devops-guru-insights-to-slack-channel/>

비용 최적화

Amazon DevOps Guru

Dashboard

Insights

Settings

Analyzed resources

Cost estimator

Provide feedback and join our customer panel

Amazon DevOps Guru > Cost Estimator

Cost estimator

Get a free estimate of the cost for DevOps Guru to analyze AWS resources in the current AWS account and Region or AWS resources that are defined by an Application. For more details, please review the list of updated AWS service names on the DevOps Guru pricing page

Resource analysis estimation coverage

Choose the AWS resource coverage for your free cost estimate in your current Region

☐ CloudFormation stack in the current Region

☐ Tags on AWS resources in the current Region

☒ AWS account in the current Region

Estimate monthly cost

This cost estimator provides only an estimate of your Amazon DevOps Guru resources analysis fees and doesn't include any taxes that might apply. Your actual fees depend on a variety of factors, including your actual usage of AWS services. Learn more

DevOps Guru 서비스를 시작하기 전,
계정 내 자원을 시뮬레이션하여
한 달 동안 비용을 산정

비용 최적화

Cost estimate : \$105.84 May 03, 2023 09:26 UTC

DevOps Guru generates an estimate based on a one-hour time period between the time you start the cost estimator and when it completes. The cost to analyze resources for one hour is calculated, then extrapolated over 30 days for an estimated cost of analyzing resources for 720 hours. For best results, start your cost estimate during a time that is typical of your AWS usage. [Learn more](#)

AWS service::resource ▲	Resources analyzed ▼	Price per hour ▼	Active resource utilization %	Estimated monthly charges ▼
ApplicationELB::LoadBalancer	2	\$0.0042	100	\$6.048
DynamoDB::Table	1	\$0.0042	100	\$3.024
EC2::Instance	7	\$0.0042	100	\$21.168
EKS::Service	12	\$0.0042	100	\$36.288
ElastiCache::Node	2	\$0.0042	100	\$6.048
Lambda::Function	3	\$0.0028	100	\$6.048
RDS::DBInstance	2	\$0.0042	100	\$6.048
SNS::Topic	2	\$0.0042	100	\$6.048
SQS::Queue	5	\$0.0042	100	\$15.12

DevOps Guru 서비스를 시작하기 전,
계정 내 자원을 시뮬레이션하여
한 달 동안 비용을 산정

Q & A

감사합니다.