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DevOps Guru for the Serverless applications
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COMMUNITY DAY
NL
Vadym Kazulkin, ip.labs, AWS Community Day NL, October 3 2022

Contact

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Co-Organizer of the Java User Group Bonn

AWS community builders

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@VKazulkin

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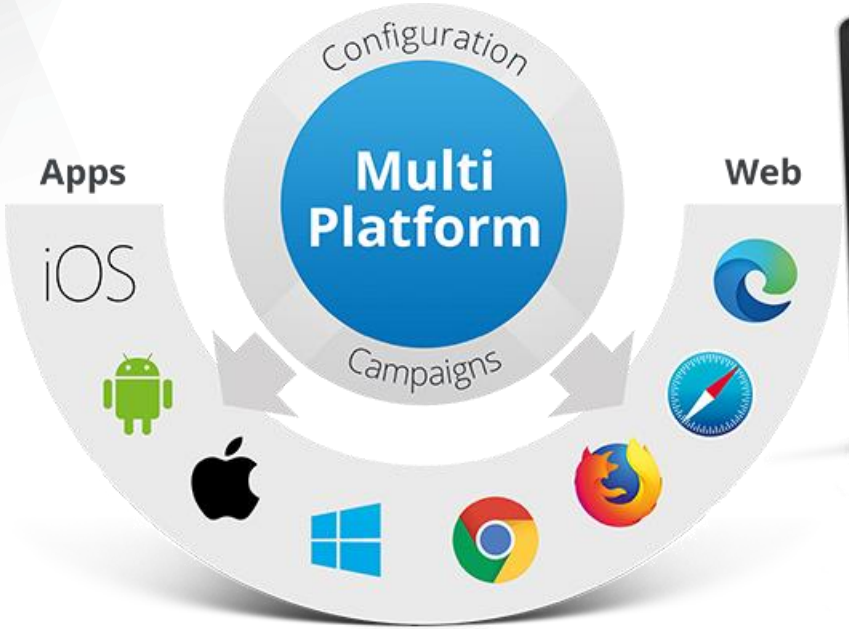


https://www.iplabs.de/

AWS DevOps Guru

What is AWS DevOps Guru

Amazon DevOps Guru is a service powered by machine learning (ML) that is designed to make it easy to improve an application's operational performance and availability

DevOps Guru helps detect behaviors that deviate from normal operating patterns so you can identify operational issues long before they impact your customers

- increased latency
- error rates (timeouts, throttles)
- resource constraints (exceeding AWS account limits)

https://aws.amazon.com/devops-guru

Benefits of DevOps Guru

Automatically detect operational issues

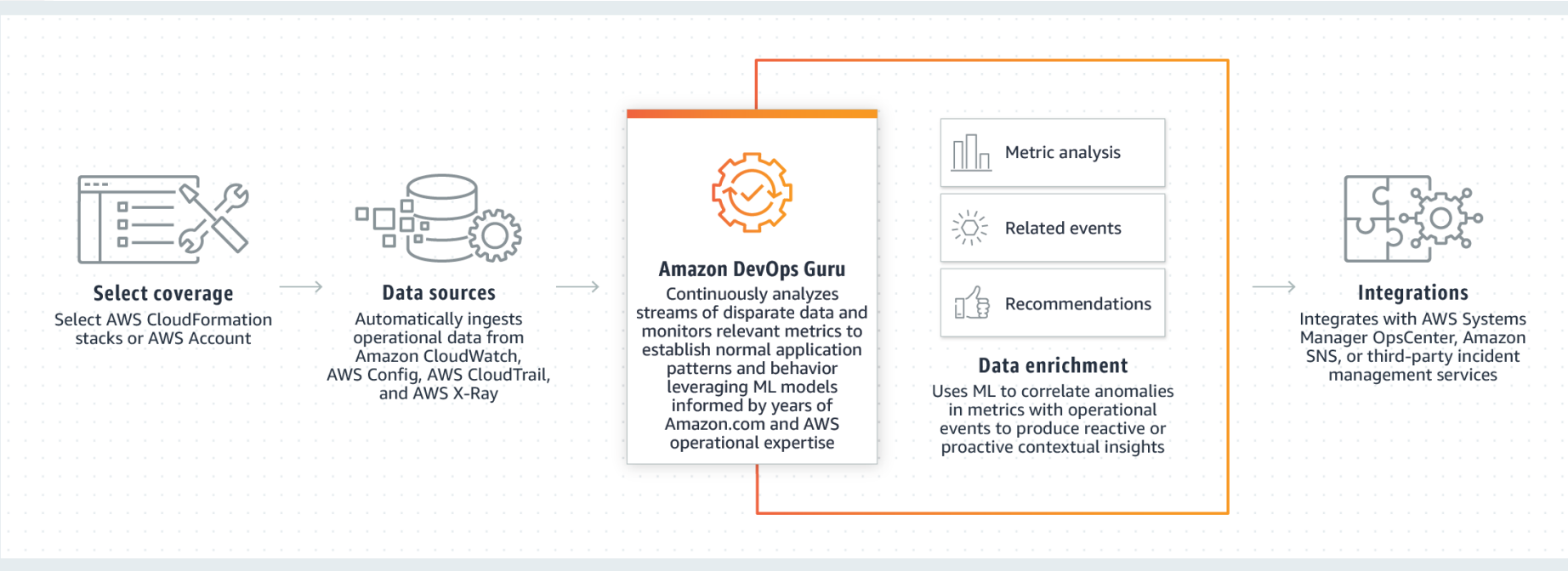
Resolve issues quickly with ML-powered insights

Easily scale and maintain availability

Reduce noise and alarm fatigue

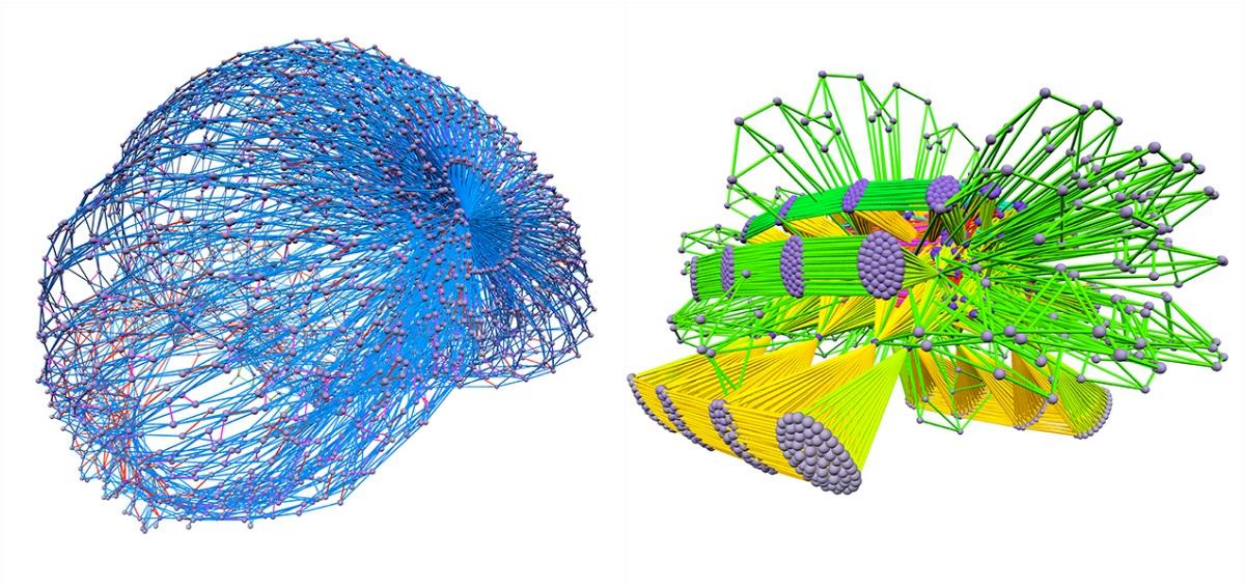
https://aws.amazon.com/devops-guru

How DevOps Guru work



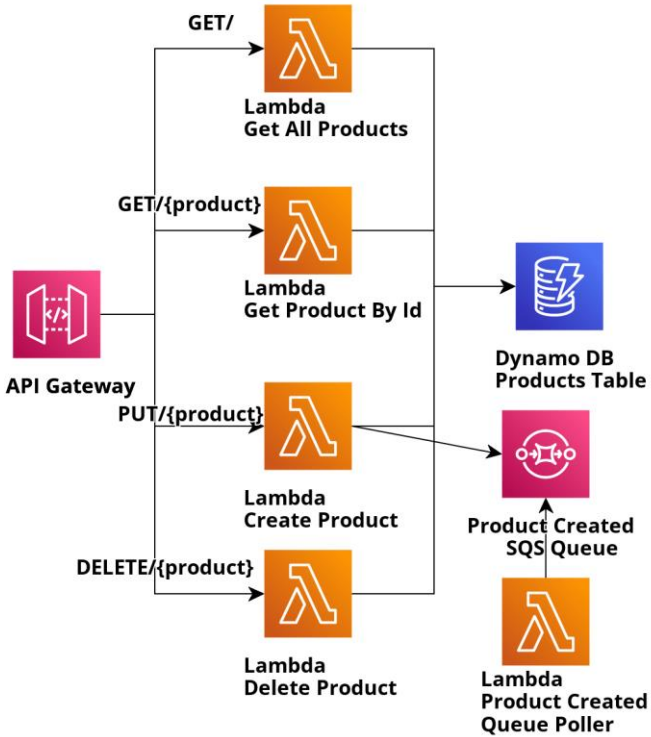
https://aws.amazon.com/devops-guru

Automated reasoning's scientific frontiers



https://www.amazon.science/blog/automated-reasonings-scientific-frontiers

DevOps Guru Example Application



https://github.com/Vadym79/DevOpsGuruWorkshopDemo inspired by https://github.com/aws-samples/serverless-java-frameworks-samples

DevOps Guru Live Demo of Your Choice

DevOps Guru Live Demo of Your Choice at AWS Community Day NL

Asked by Vadym Kazulkin about a minute ago

Choose one or more options:

- DynamoDB Throttling
- Lambda Timeout and SQS Visibility Timeout
- Lambda Throttling
- API Gateway HTTP 404 Error (Not Found)

Submit your vote

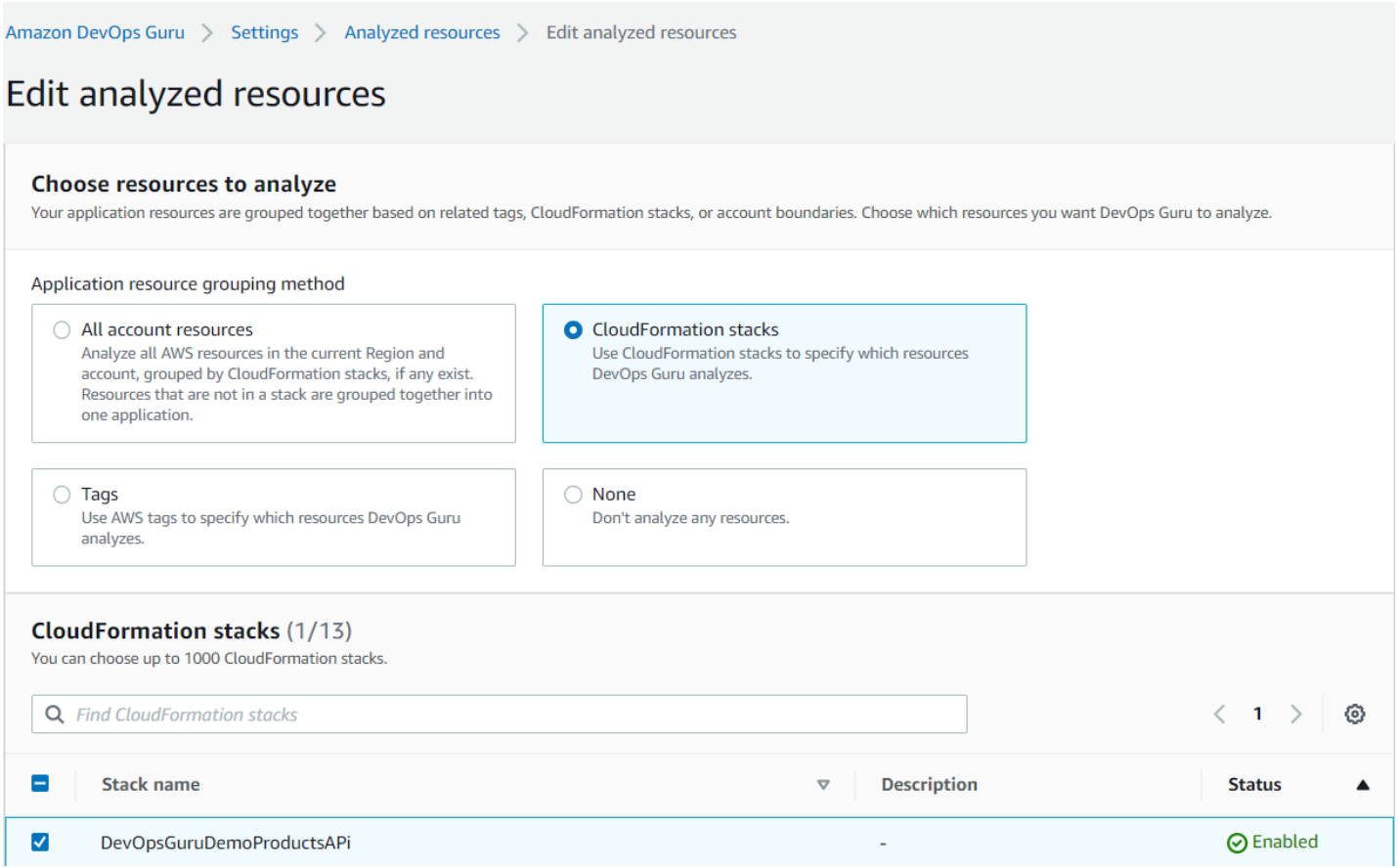
Jump to results >

QR Code

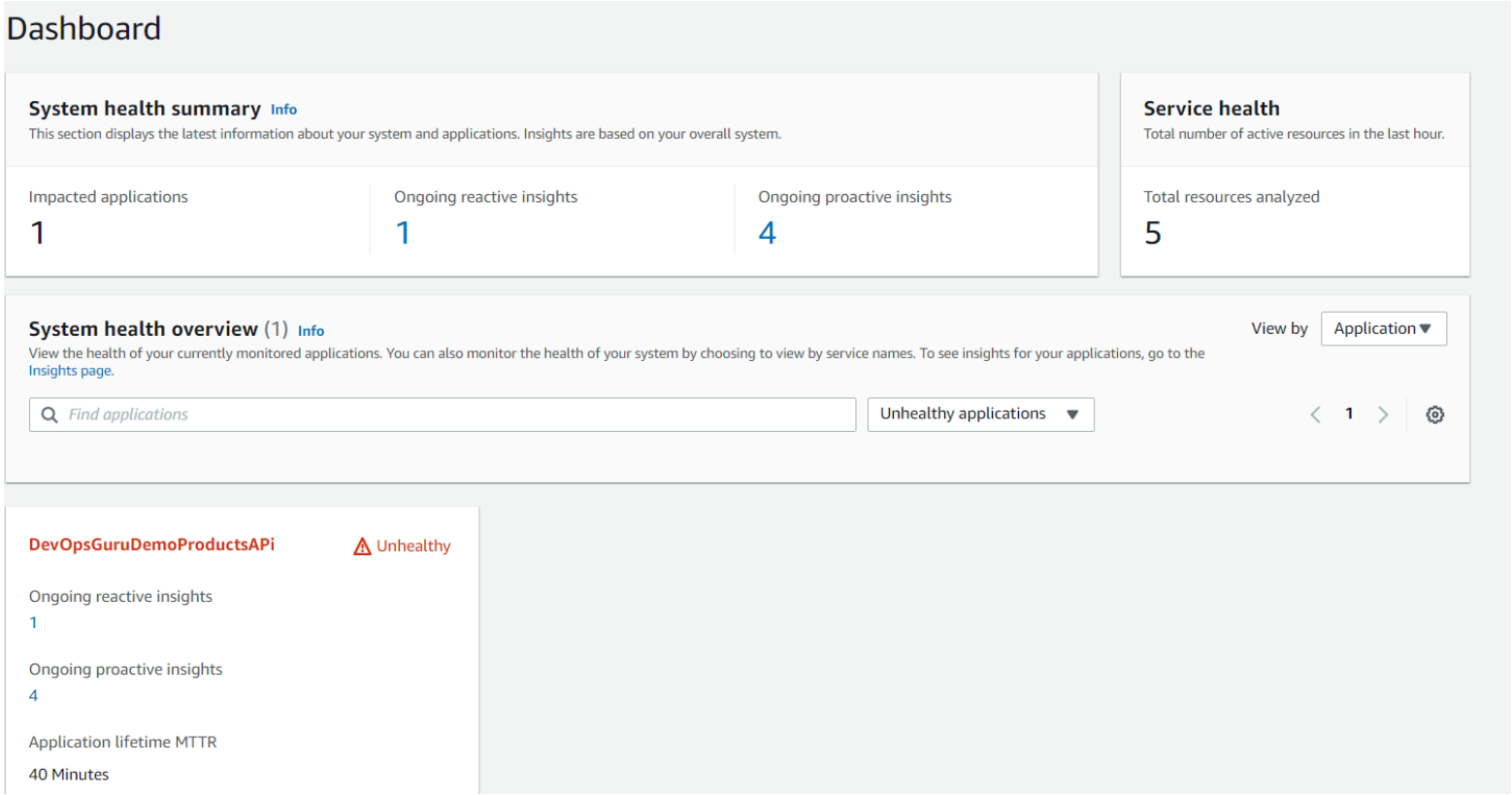
Use this at a public event or confrenece to allow large groups of people to access the poll url easily. The QR code is unique to this poll.

Poll Results Page

DevOps Guru Set Up



DevOps Guru Dashboard



DevOps Guru Reactive Insights

Reactive | Proactive

Reactive insights (34) Info

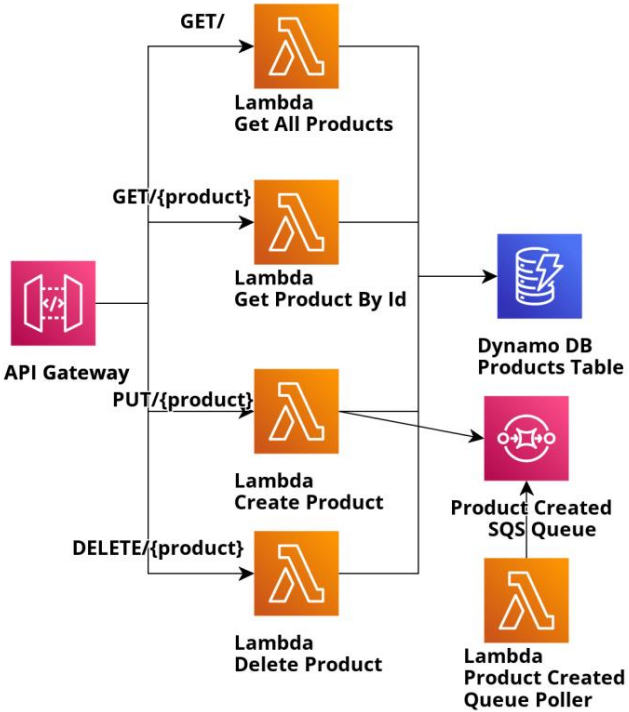
A reactive insight lets you know about recommendations to improve the performance of your application now.

Filter insights | Last 1 month | 1 2 3

Name	Status	Severity	Created time	Affected applications
ApiGateway 5XXError Anomalous In Application DevOpsGuruDemoPr…	Ongoing	High	Sep 11, 2022 12:42 U1	1
ApiGateway 4XXError Anomalous In Application DevOpsGuruDemoPr…	Closed	Medium	Sep 10, 2022 11:26 U1	1
ApiGateway 4XXError Anomalous In Application DevOpsGuruDemoPr…	Closed	Medium	Sep 10, 2022 09:13 U1	1
Lambda Errors Anomalous In Application DevOpsGuruDemoProductsAPi	Closed	High	Sep 09, 2022 18:00 U1	1
DynamoDB ThrottledRequests Anomalous In Application DevOpsGuru…	Closed	High	Sep 09, 2022 15:50 U1	1
Lambda Errors Anomalous In Application DevOpsGuruDemoProductsAPi	Closed	High	Sep 09, 2022 11:29 U1	1
Lambda Throttles Anomalous In Application DevOpsGuruDemoProduc…	Closed	High	Sep 08, 2022 17:51 U1	1
DynamoDB ReadThrottleEvents Anomalous In Application DevOpsGur…	Closed	High	Sep 08, 2022 11:25 U1	1
Lambda Duration Anomalous In Application DevOpsGuruDemoProduc…	Closed	Medium	Sep 08, 2022 07:55 U1	1

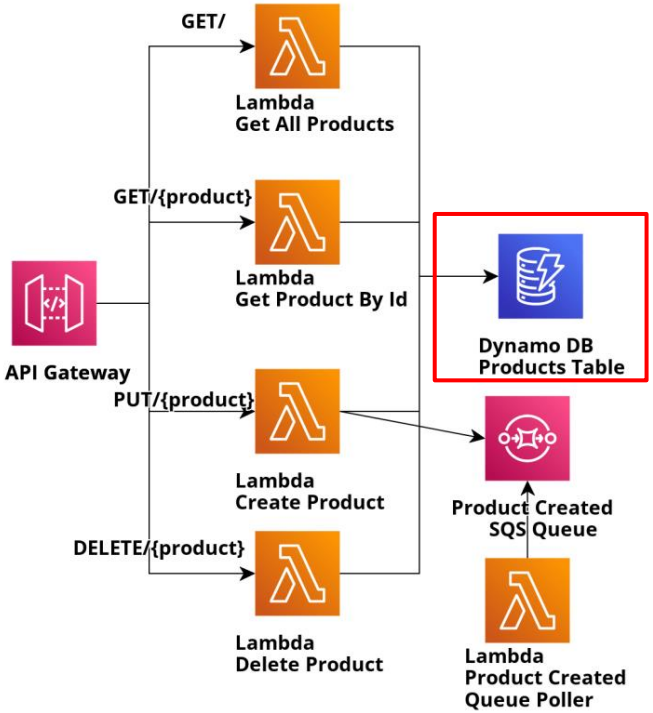
DevOps Guru Examples

- Warm up the application (takes between 1 and 24 hours) to create a base line
- Design test experiment to provoke errors and latency increase
  - Reduce the service quote of the AWS service (API Gateway, Lambda, DynamoDB)
    - Set very low service quotas for the sake of reducing AWS costs
  - Add latency artificially
- Stress test with Hey Tool to run into the operational issues
- See if the DevOps Guru recognized the operational issues
- Remediate the operational issues by increasing service quote, removing the artificial latency or stopping the stress test
- See whether DevOps Guru closes the incident when it's resolved

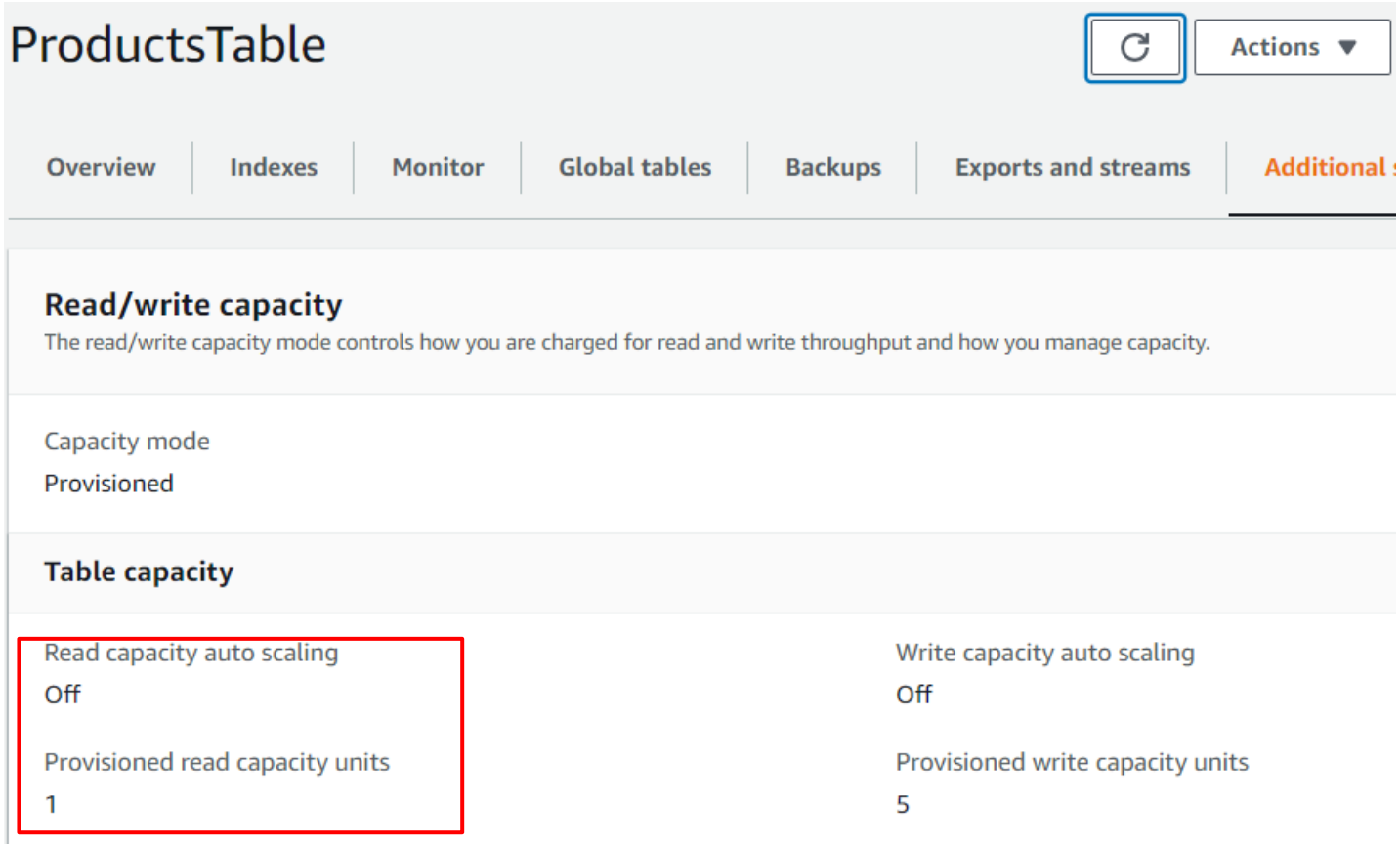


https://github.com/rakyll/hey

DevOps Guru: Recognize operational issues in DynamoDB



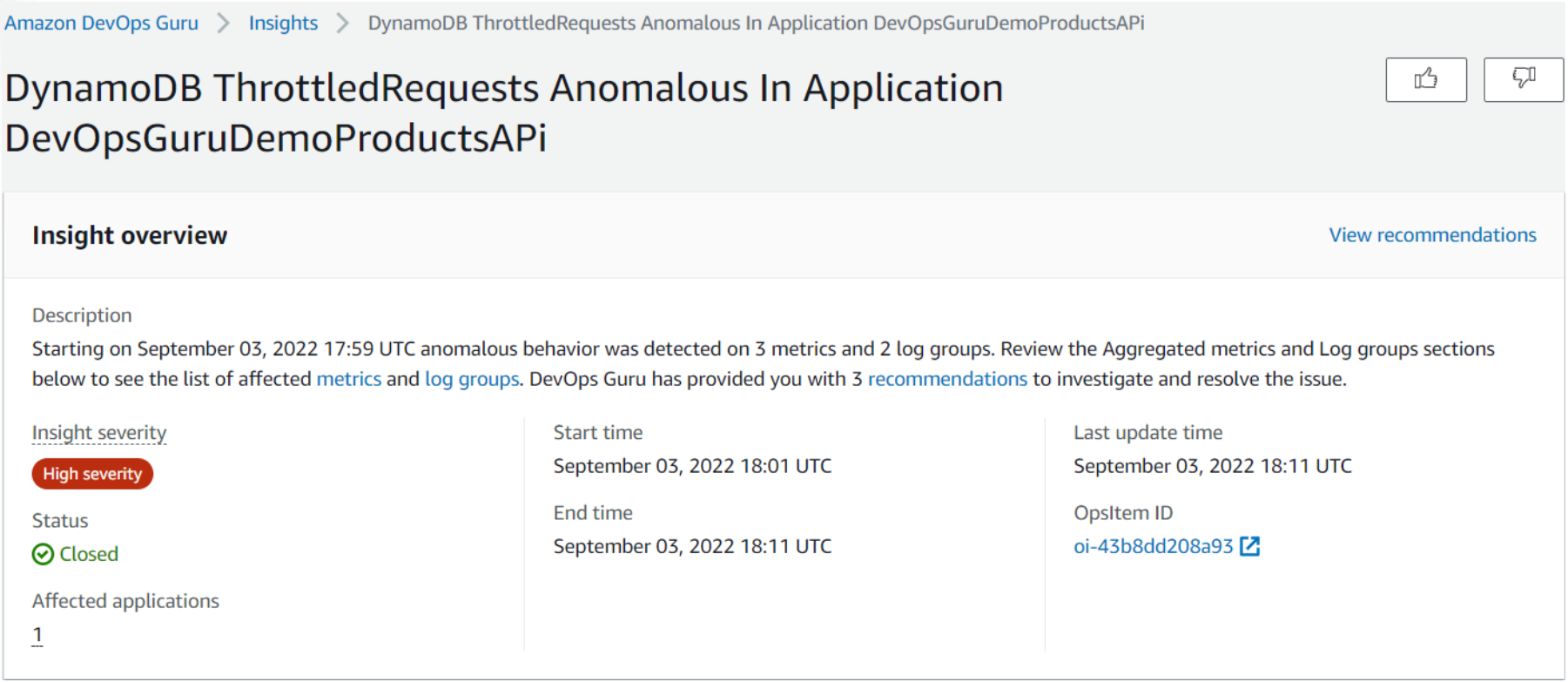
DevOps Guru Examples: DynamoDB Throttling



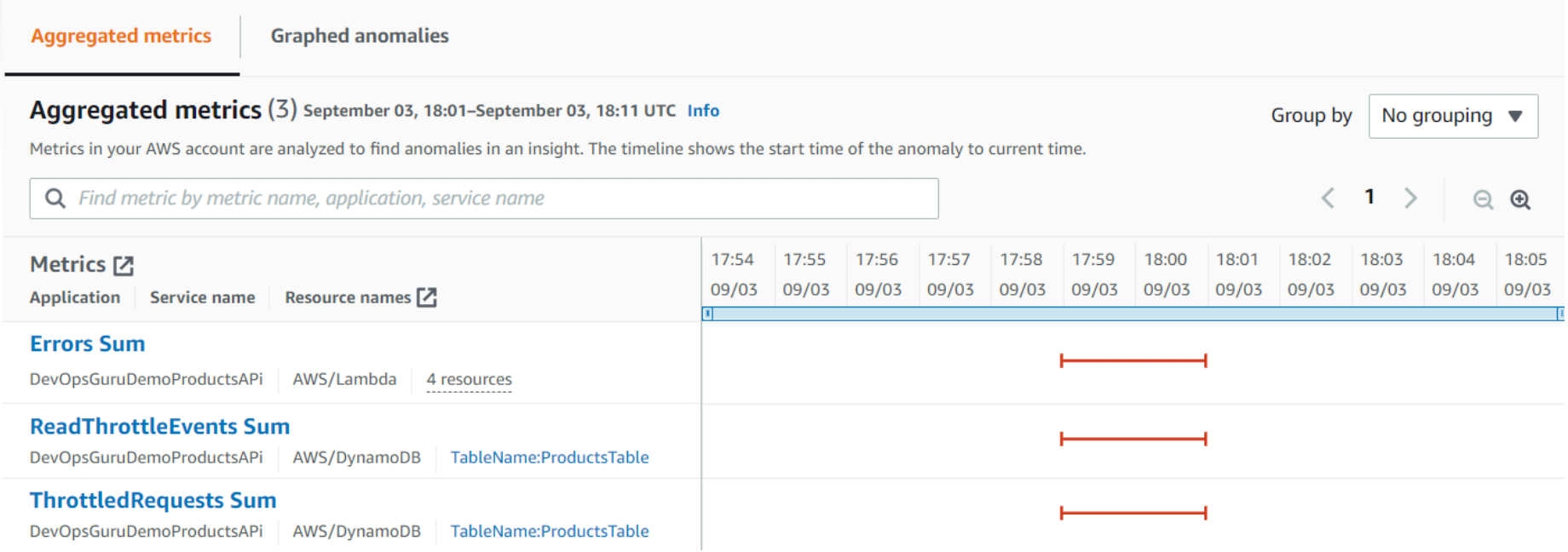
DevOps Guru Examples: DynamoDB Throttling stress test and empty burst credits

```
hey -q 20 -z 15m -c 20 -H "X-API-Key: XXXa6XXXX "
https://XXX.execute-api.eu-central
1.amazonaws.com/prod/products/1
```

DevOps Guru Examples: DynamoDB Throttling



DevOps Guru Examples: DynamoDB Throttling



DevOps Guru Examples: DynamoDB Throttling

Graphed anomalies (3) September 03, 18:01–September 03, 18:11 UTC Info

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

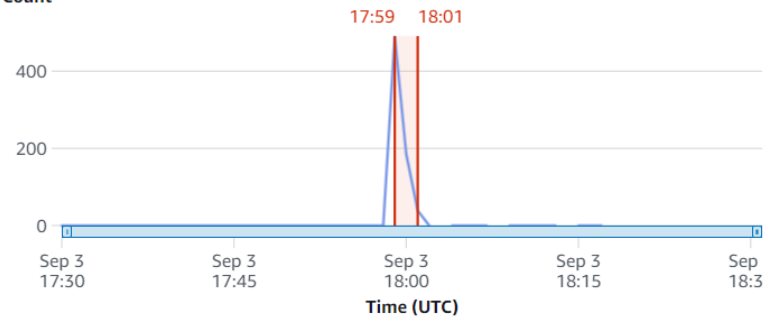
Find metric by metric name, application, service name

1

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

AWS/Lambda:Errors

Count



Errors Anomaly

Service name
AWS/Lambda

Resource names
FunctionName:GetProductById

Application
DevOpsGuruDemoProductsAPi

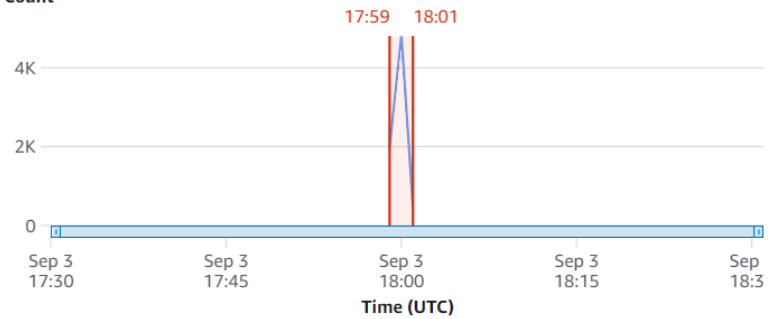
Dimensions
FunctionName:GetProductById, Resource:GetProductById

Statistics
Sum

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

AWS/DynamoDB:ReadThrottleEvents

Count



ReadThrottleEvents Anomaly

Service name
AWS/DynamoDB

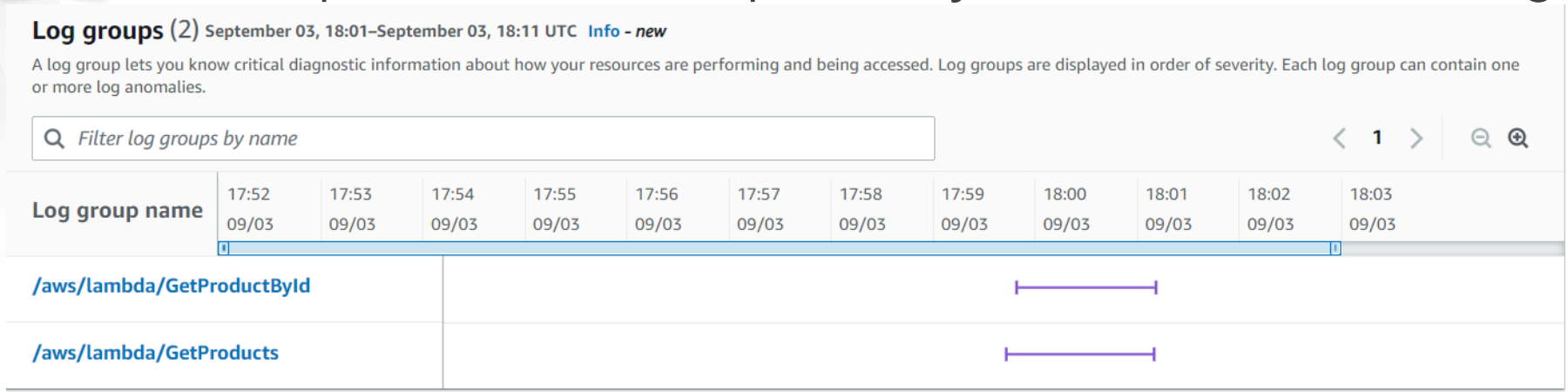
Resource names
TableName:ProductsTable

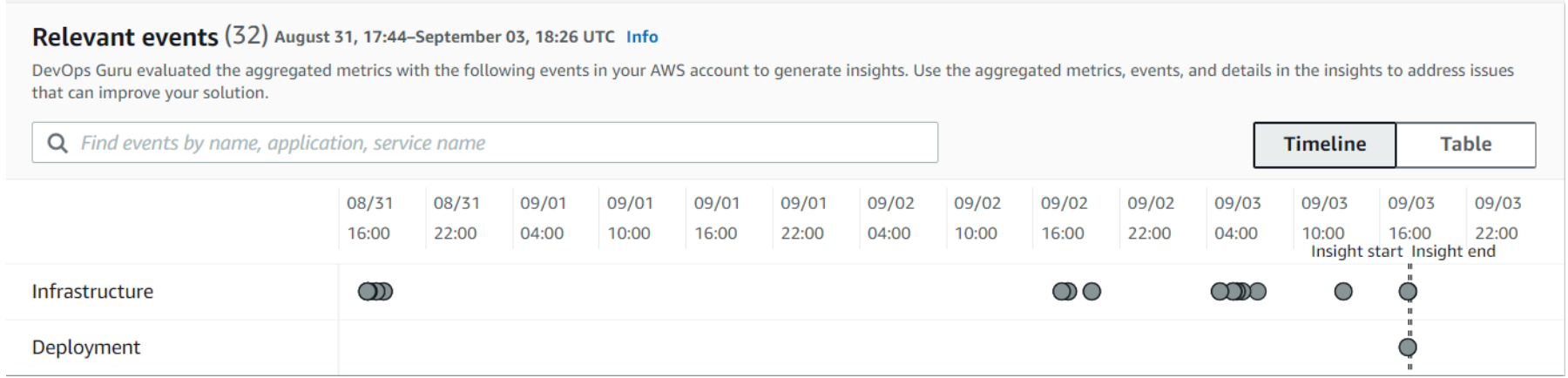
Application
DevOpsGuruDemoProductsAPi

Dimensions
TableName:ProductsTable

Statistics
Sum

DevOps Guru Examples: DynamoDB Throttling





DevOps Guru Examples: DynamoDB Throttling

Recommendations (3) Info

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

Rollback the Amazon Dynamo DB table update

An update to your DynamoDB table was detected and it is now experiencing read throttling events. Review the recent update to help you determine if you need to rollback the changes.

Why is DevOps Guru recommending this?

The UpdateTable event was detected for AWS::DynamoDB::Table. The ThrottledRequests metric in AWS::DynamoDB::TableName breached a high threshold.

Related metrics (2)

ReadThrottleEvents
AWS::DynamoDB::TableName ProductsTable

ThrottledRequests
AWS::DynamoDB::TableName ProductsTable

Related event (1)

UpdateTable
AWS::DynamoDB::Table arn:aws:dynamodb:eu-central-1:265634257610:table/ProductsTable

Troubleshoot throttling in Amazon DynamoDB

Read operations, write operations, or both on your DynamoDB table are being throttled. To learn how to fix throttle events, see Troubleshoot throttling in Amazon DynamoDB .

Why is DevOps Guru recommending this?

The ThrottledRequests metric in DynamoDB breached a high threshold.

Related metrics (2)

ReadThrottleEvents
DynamoDB ProductsTable

ThrottledRequests
DynamoDB ProductsTable

Troubleshoot errors and set up automatic retries in AWS Lambda

Your Lambda function is throwing a high number of errors. To learn about common Lambda errors, their causes, and mitigation strategies, see Troubleshoot errors and set up automatic retries in AWS Lambda .

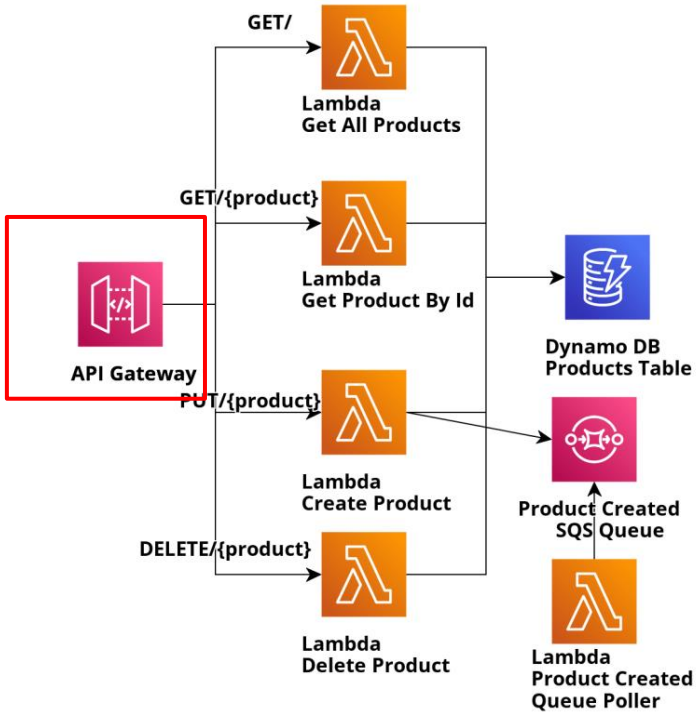
Why is DevOps Guru recommending this?

The Errors metric in Lambda breached a high threshold.

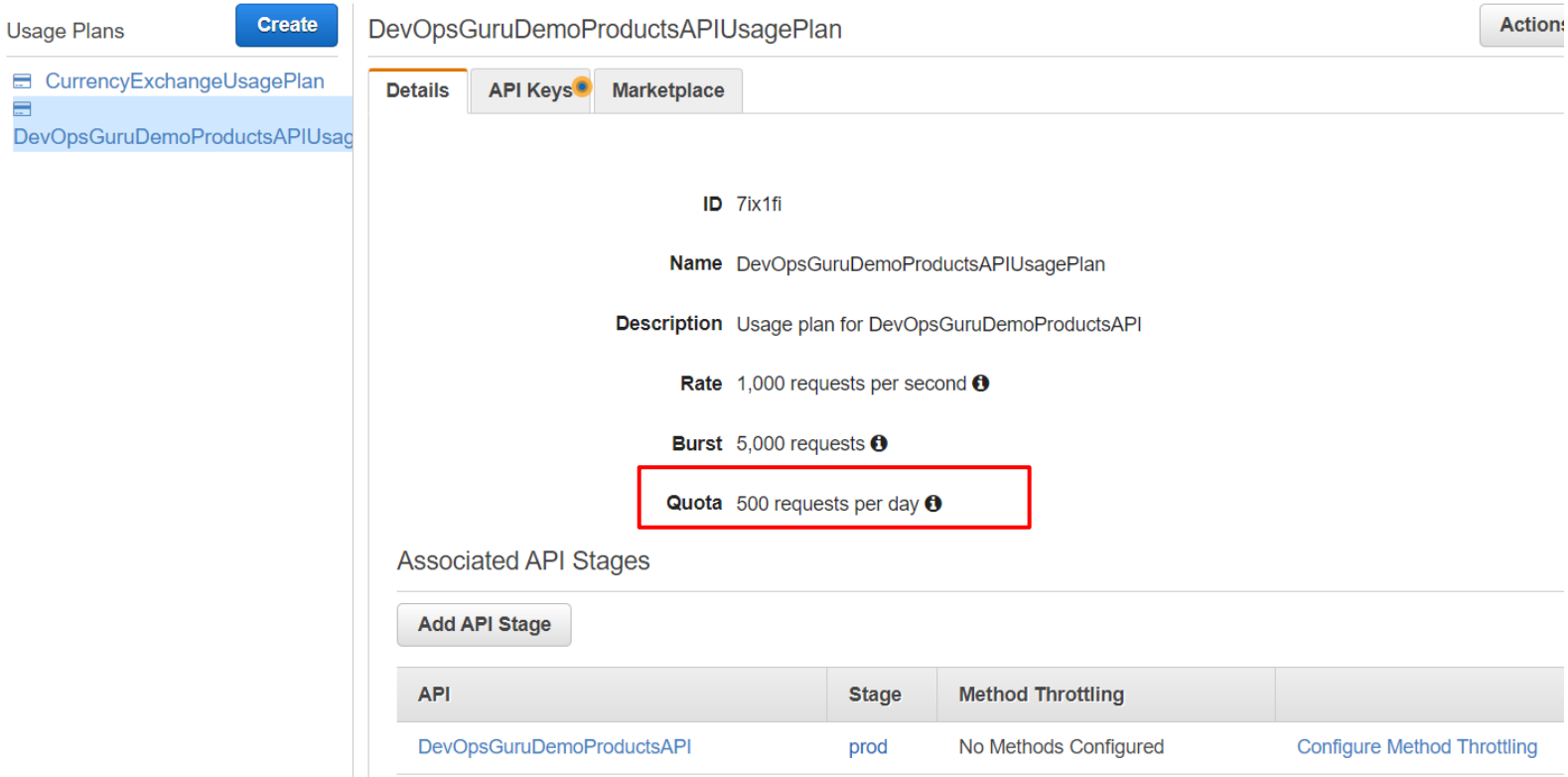
Related metric (1)

Errors
Lambda GetProductById

DevOps Guru: Recognize operational issues in API Gateway



DevOps Guru Examples: API Gateway HTTP 429 „too many requests“ Error

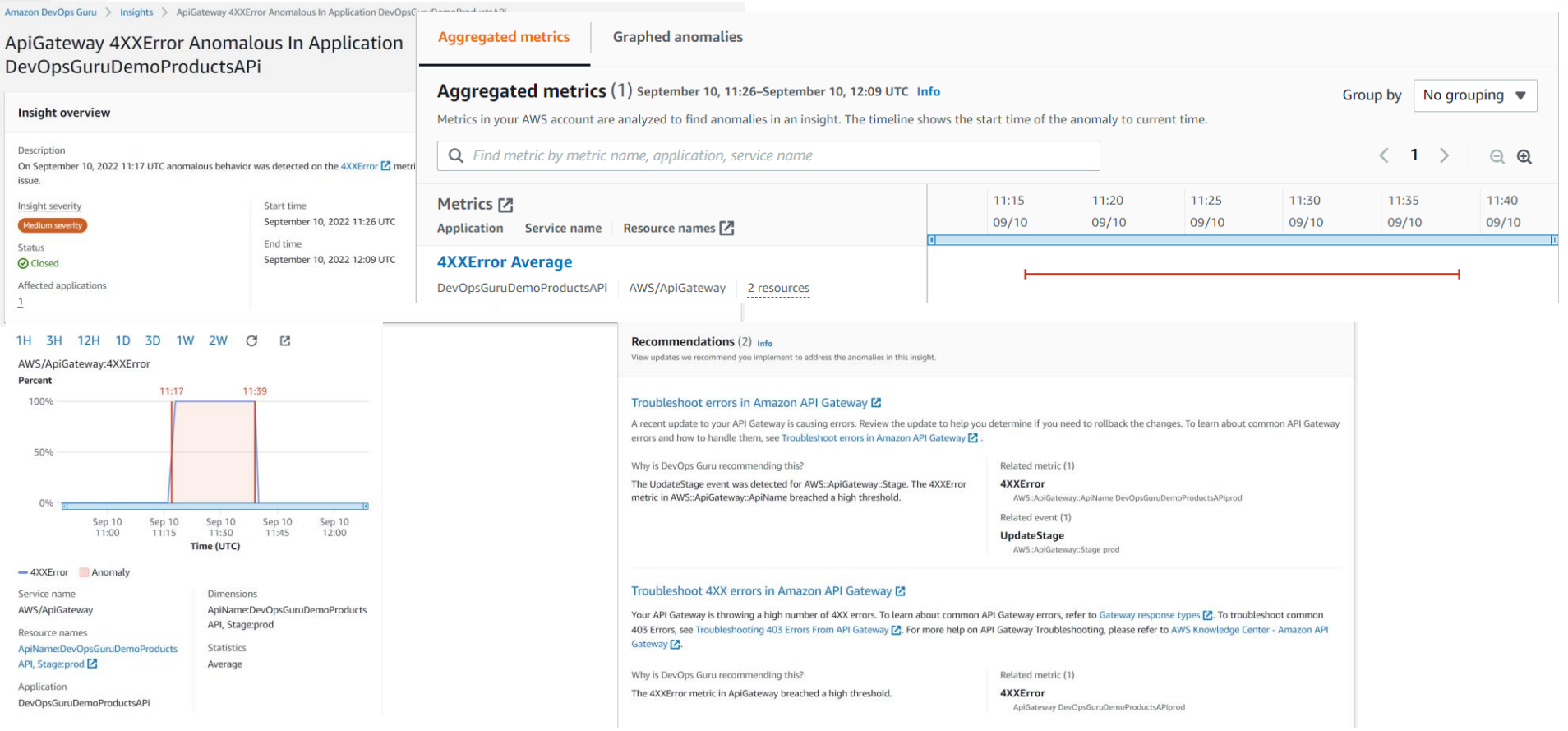


DevOps Guru Examples: API Gateway HTTP 404 „Not Found“ Error

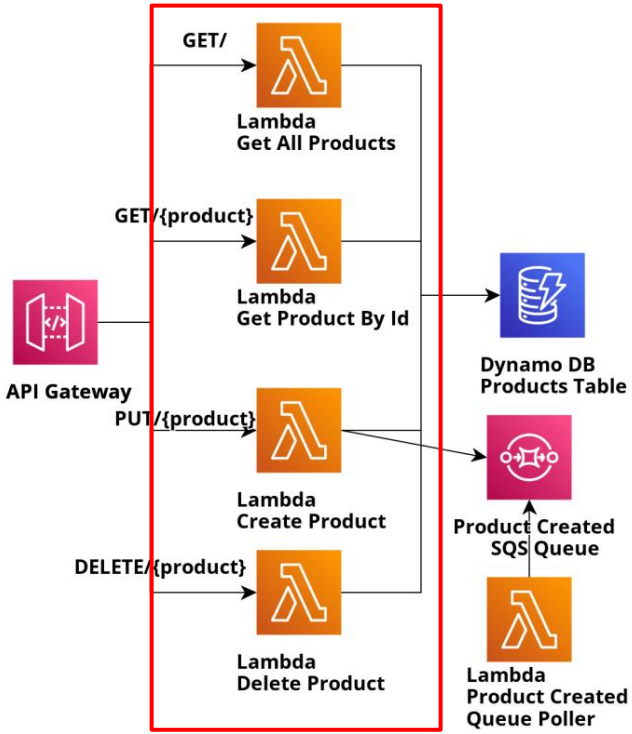
Query for not existing product id ,e.g. 200

```
hey -q 1 -z 15m -c 1 -H "X-API-Key: XXXa6XXXX"
https://XXX.execute-api.eu-central-
1.amazonaws.com/prod/products/200
```

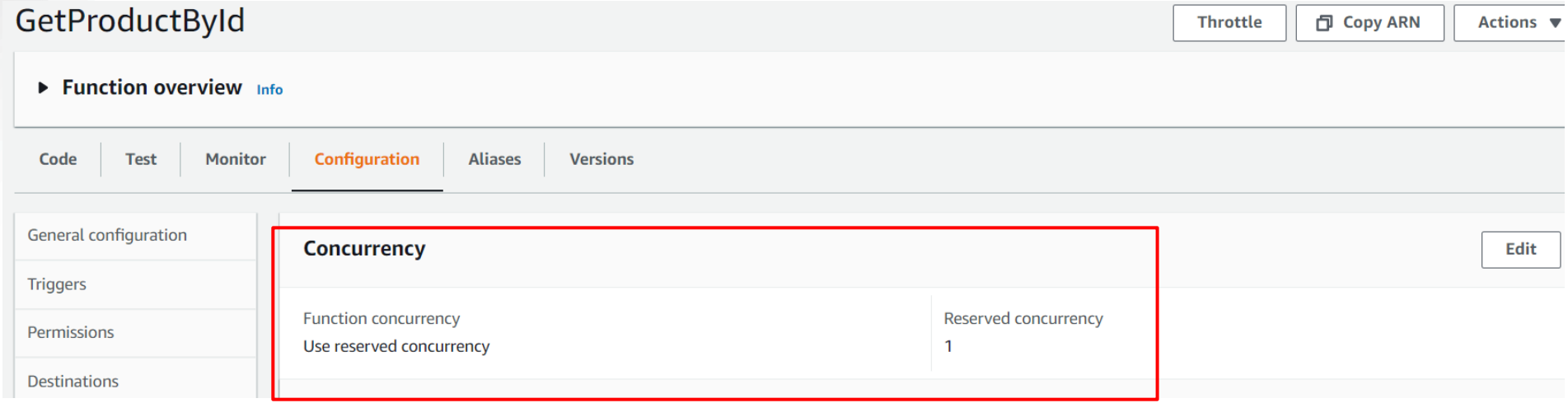
DevOps Guru Examples: API Gateway 4XX Error



DevOps Guru: Recognize operational issues in Lambda

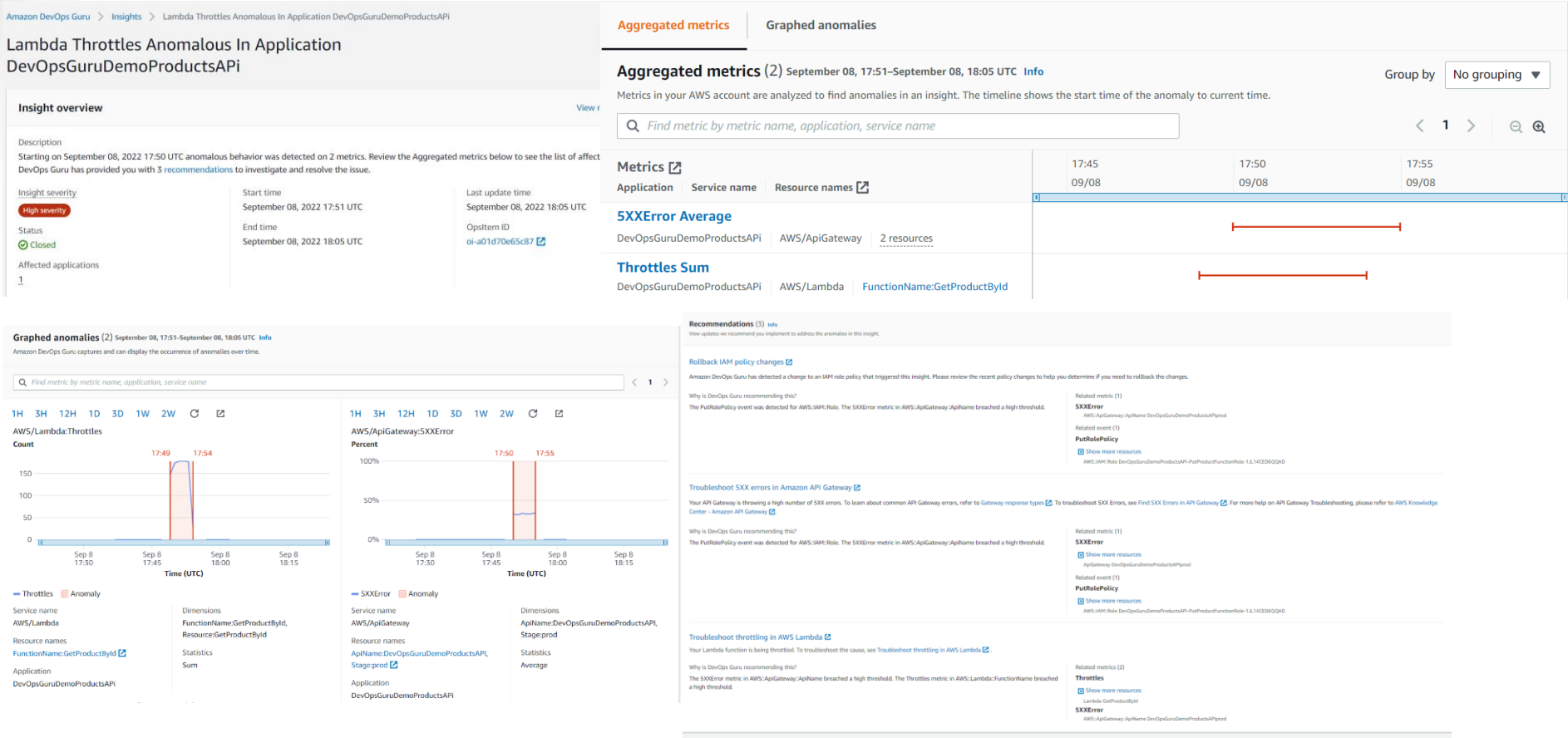


DevOps Guru Examples: Lambda Throttling 1

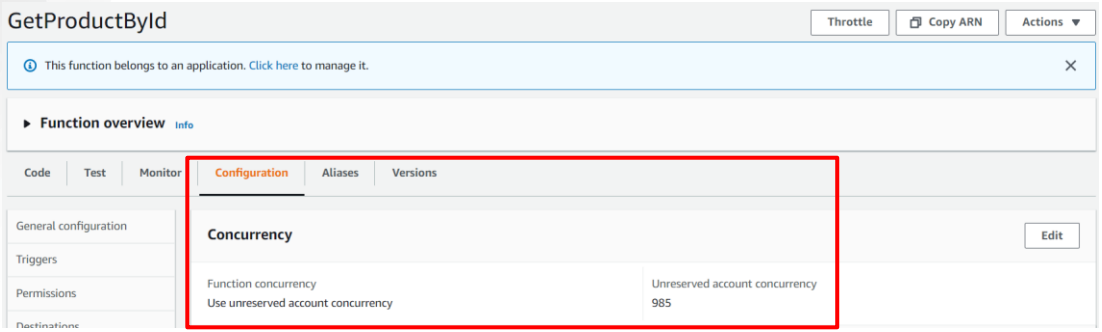


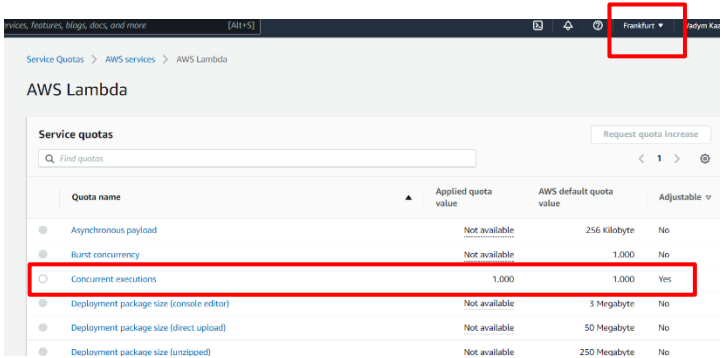
hey -q 5 -z 15m -c 5 -H "X-API-Key: XXXa6XXXX" https://XXX.execute-api.eu-central-1.amazonaws.com/prod/products/2

DevOps Guru Examples: Lambda Throttling 1



DevOps Guru Examples: Lambda Throttling 2



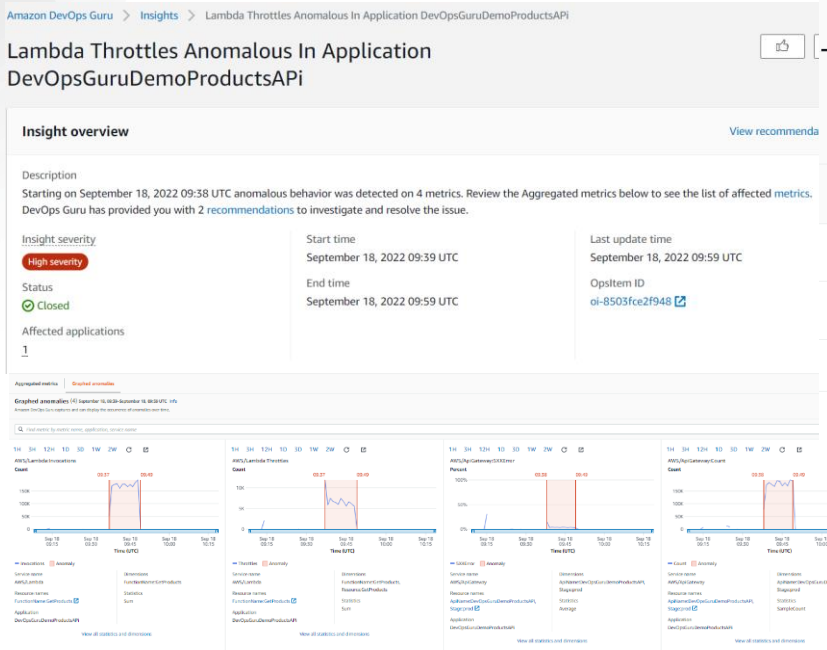


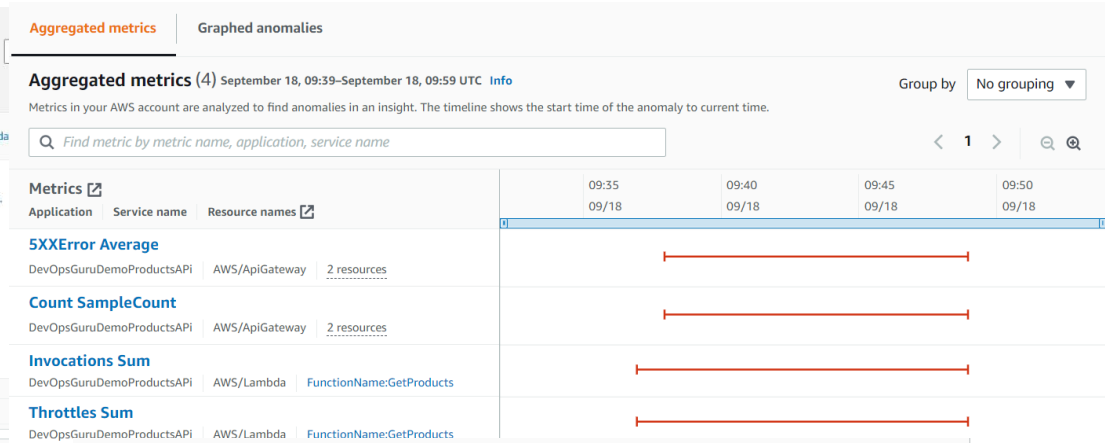
hey -q 1 -z 15m -c 5000 -H "X-API-Key: XXXa6XXXX" https://XXX.execute-api.eu-central-1.amazonaws.com/prod/products/2

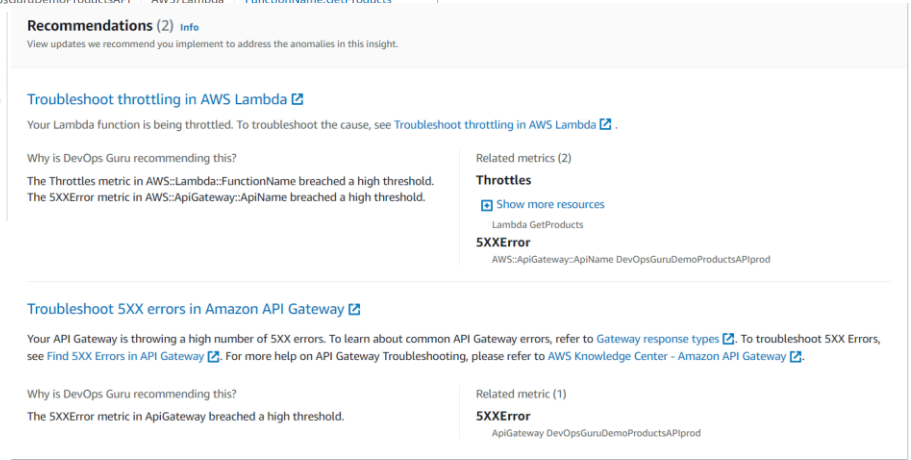
or reach Lambda concurrency execution account limit (without reaching function concurrency limit)

hey -q 1 -z 15m -c 950 https://AAA.execute-api.eu-central amazonaws.com/prod/func1 ... until
hey -q 1 -z 15m -c 950 https://BBB.execute-api.eu-central amazonaws.com/prod/func10
hey -q 1 -z 15m -c 950 -H "X-API-Key: XXXa6XXXX" https://XXX.execute-api.eu-central-1.amazonaws.com/prod/products/2

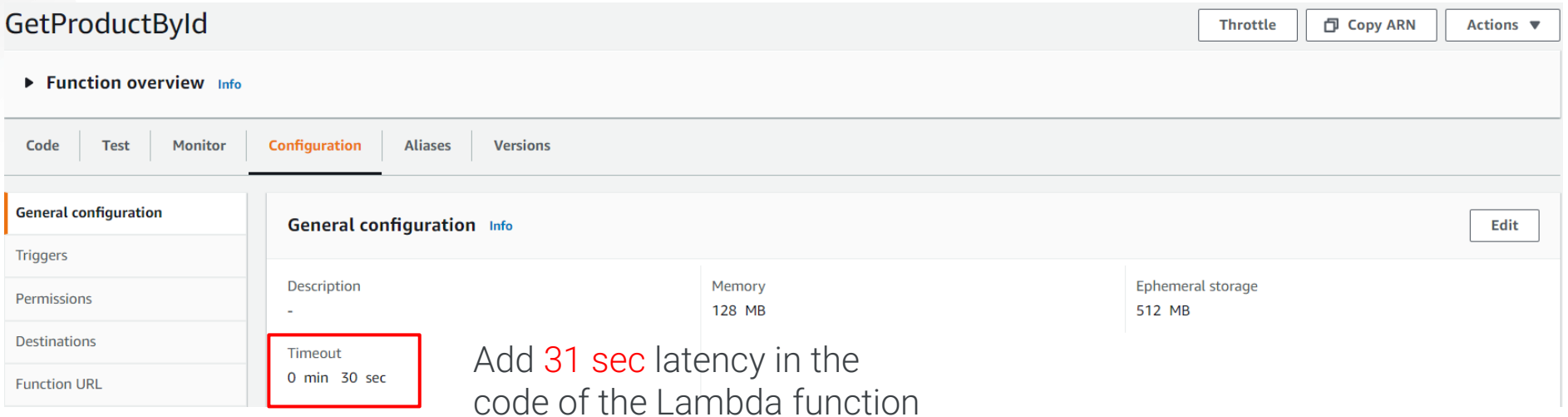
DevOps Guru Examples: Lambda Throttling 2





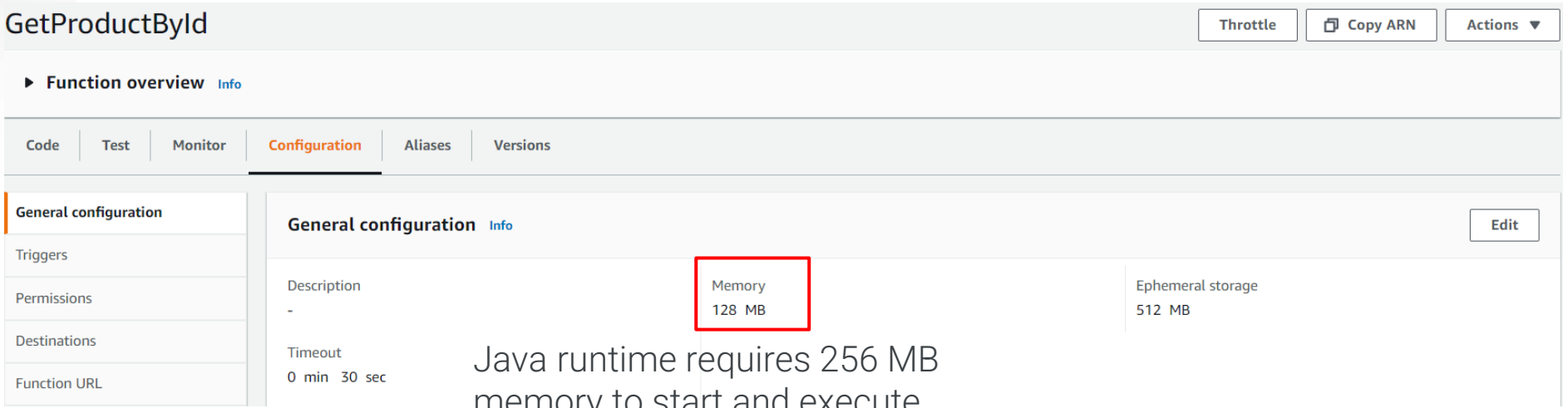


DevOps Guru Examples: Lambda Timeout Error

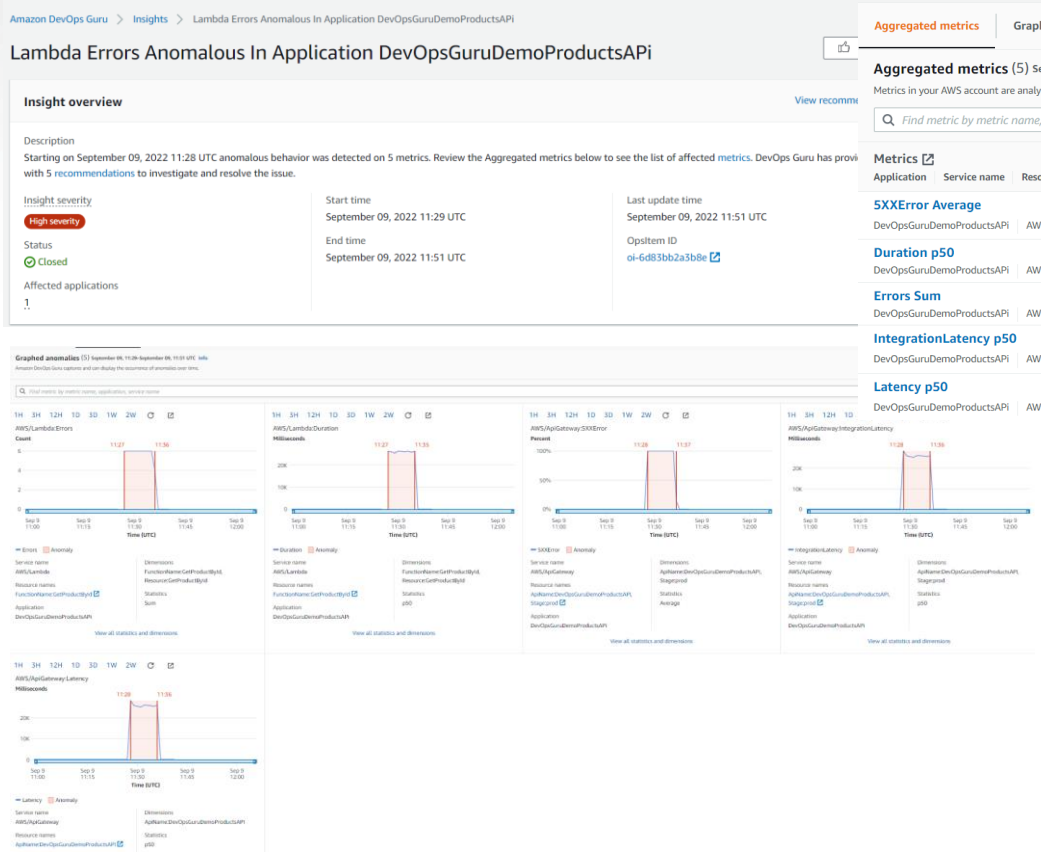


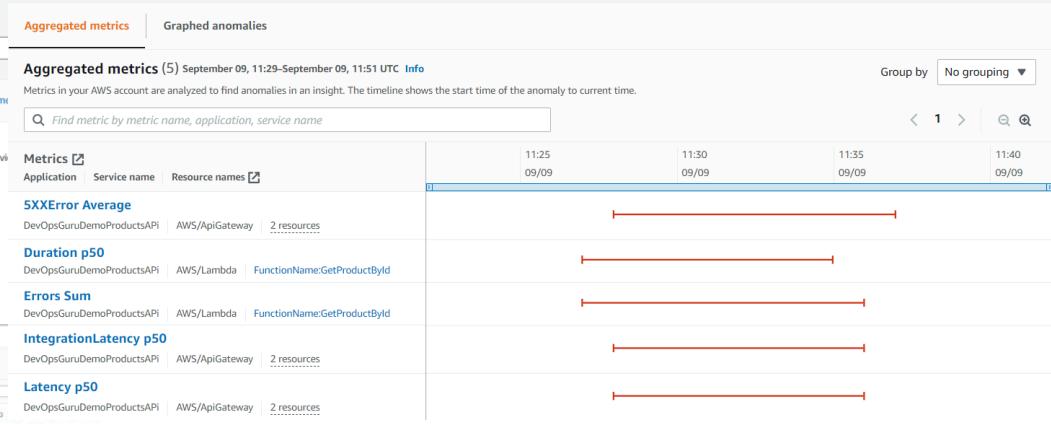
Add 31 sec latency in the code of the Lambda function

DevOps Guru Examples: Lambda Timeout Error

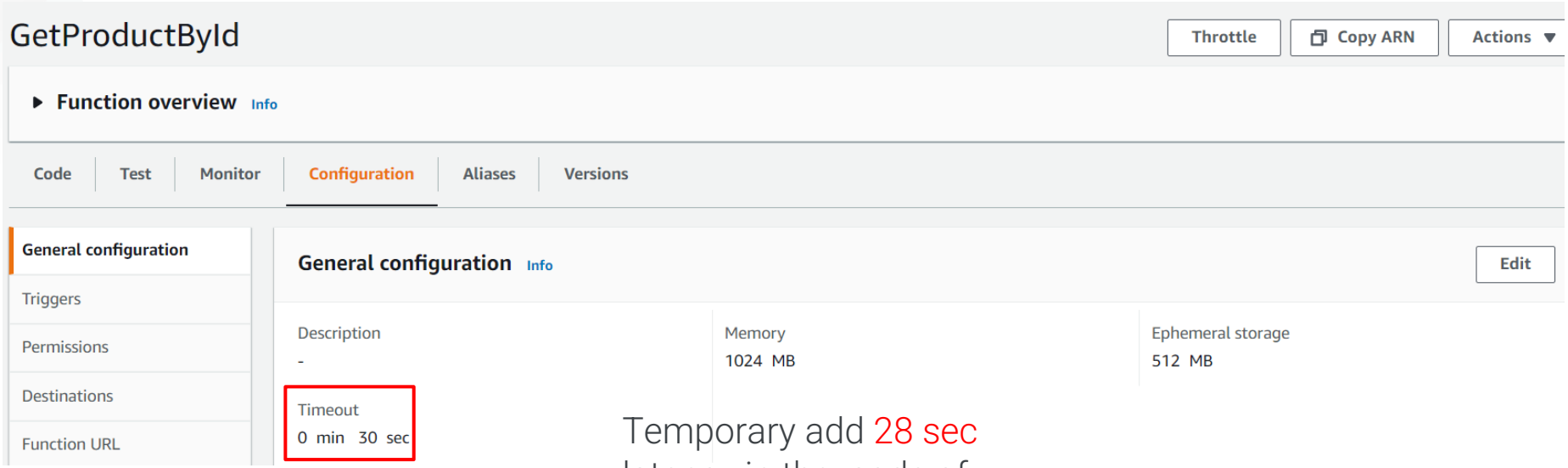


DevOps Guru Examples: Lambda Timeout Error



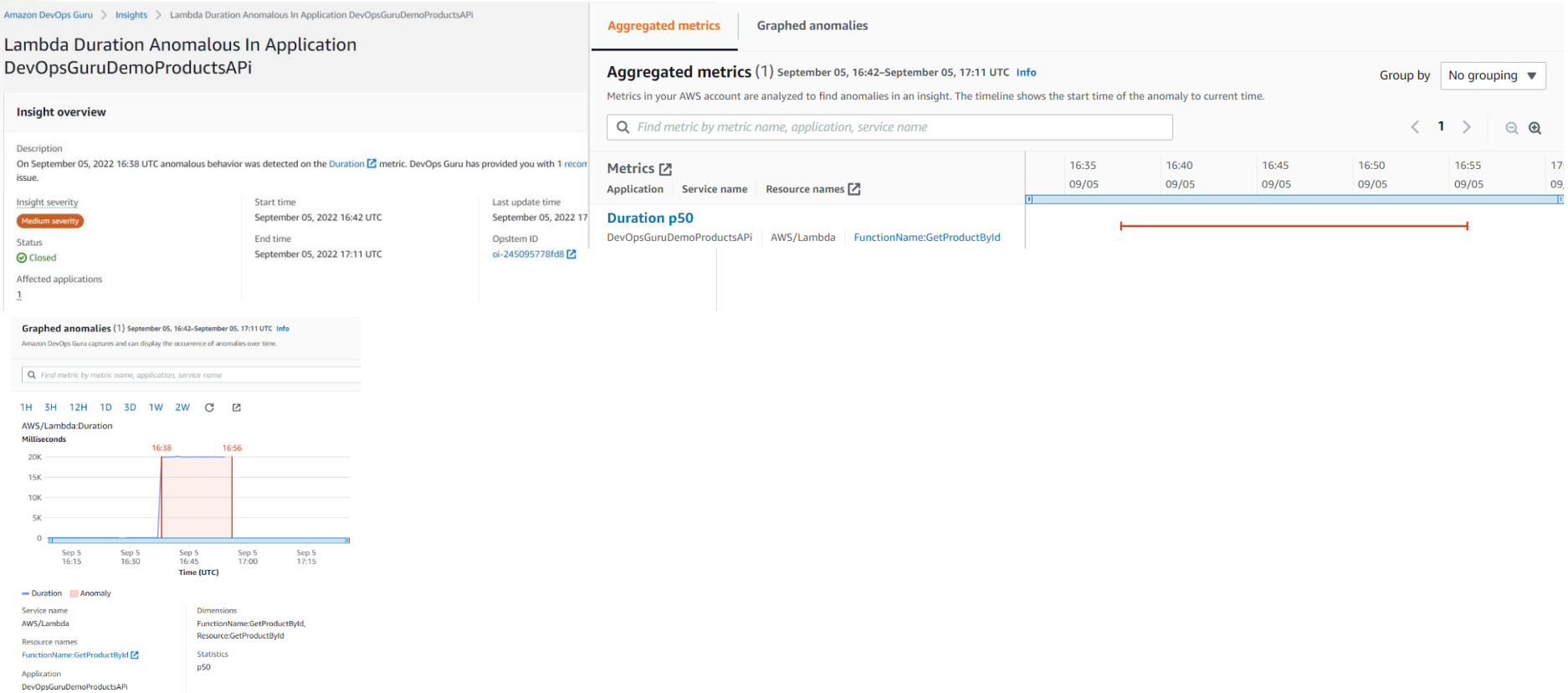


DevOps Guru Examples: Lambda Increased Latency

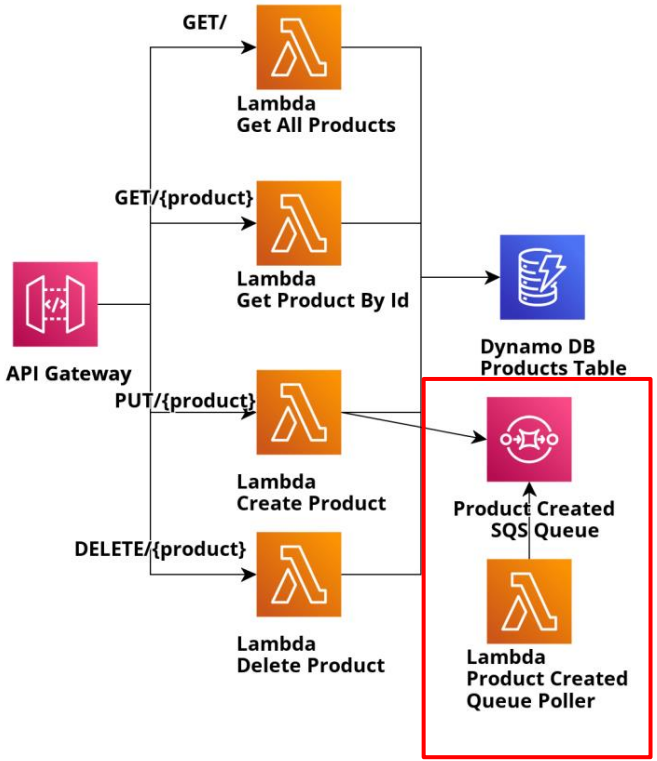


Temporary add 28 sec latency in the code of the Lambda function

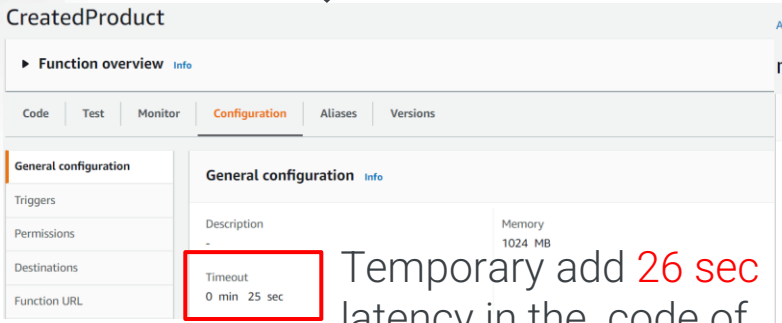
DevOps Guru Examples: Lambda Increased Latency



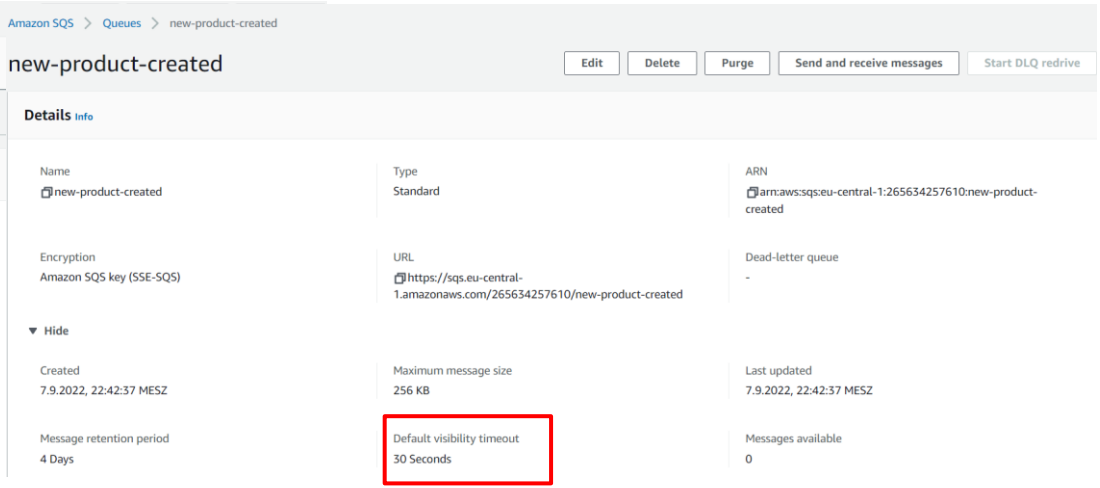
DevOps Guru: Recognize operational issues in SQS

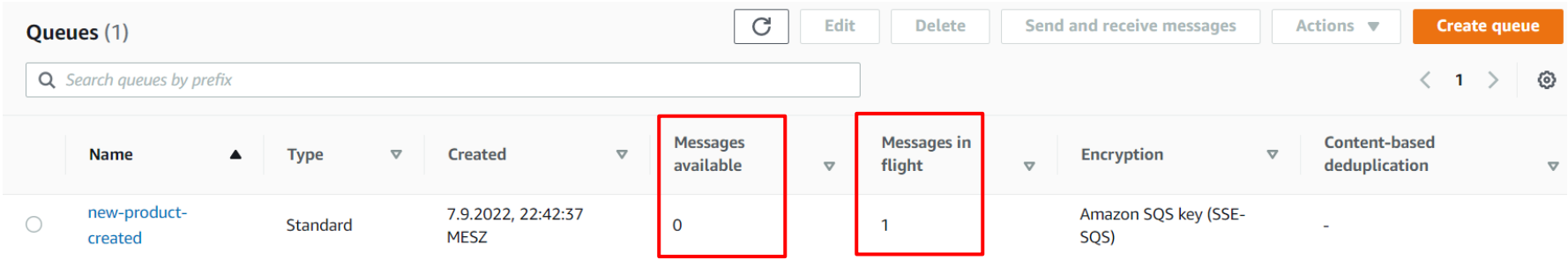


DevOps Guru Examples: Operational Issues in SQS

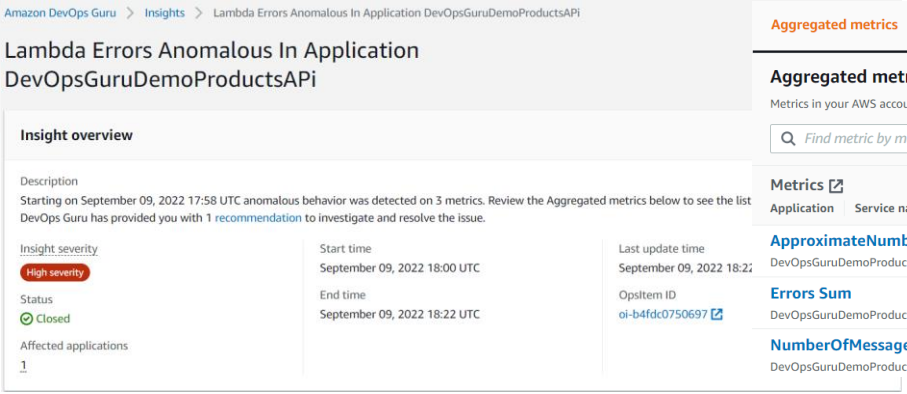


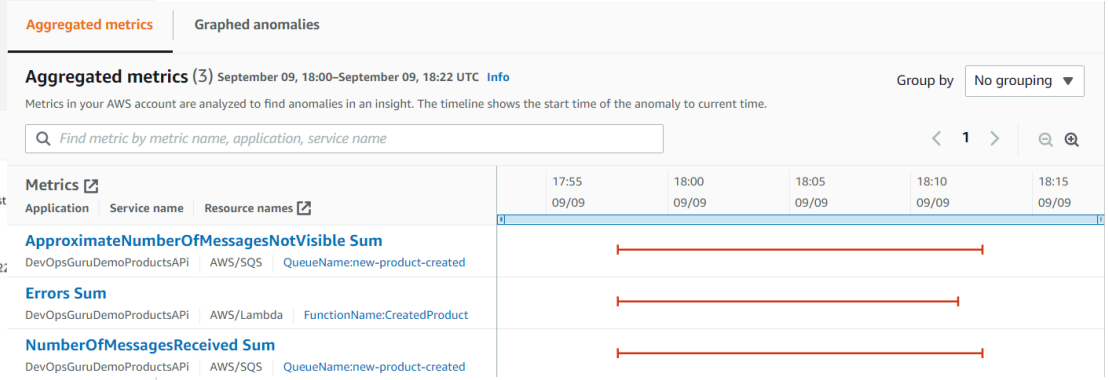
Temporary add 26 sec latency in the code of the Lambda function

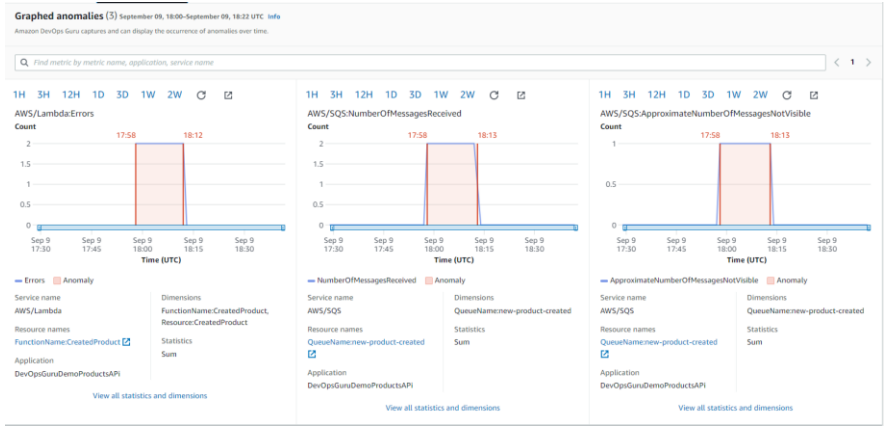




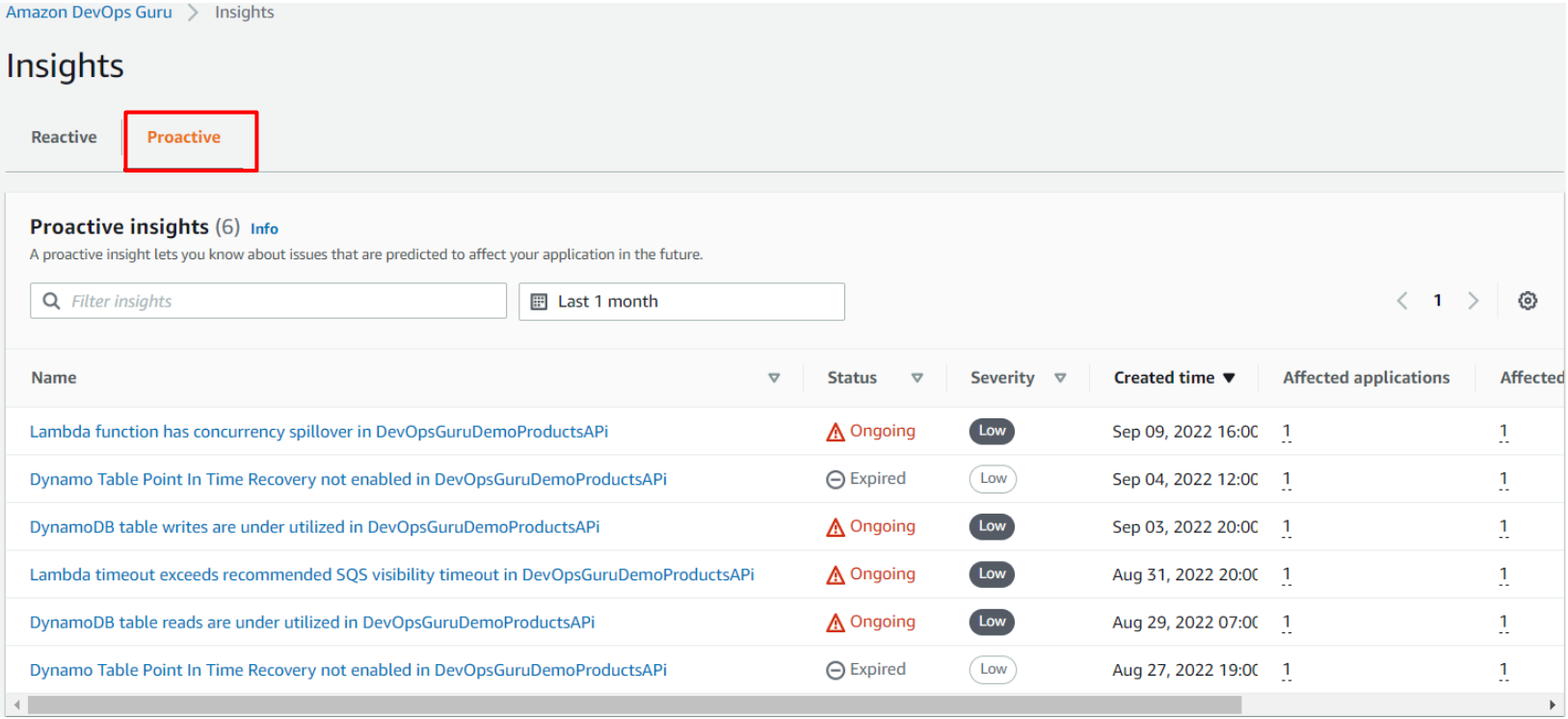
DevOps Guru Examples: Operational Issues in SQS



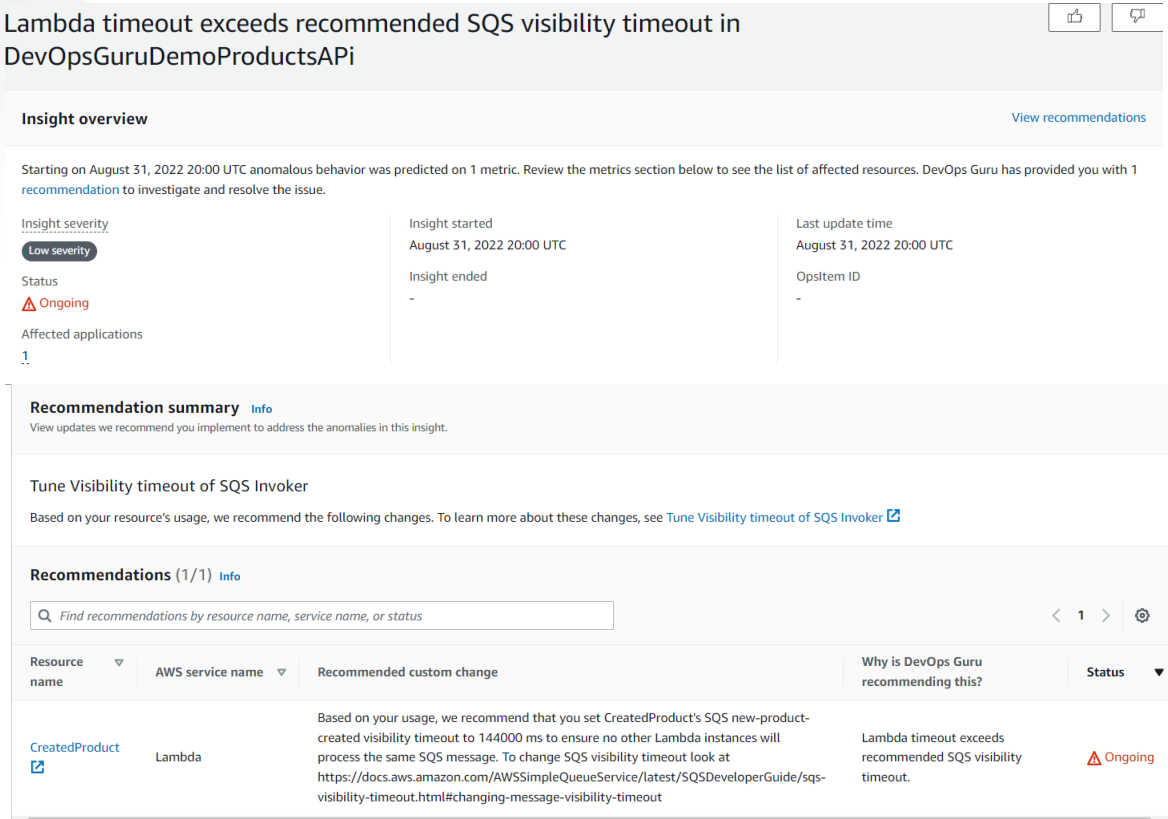




DevOps Guru Proactive Insights



DevOps Guru Proactive Examples: Lambda timeout exceeds recommended SQS visibility



Lambda timeout exceeds recommended SQS visibility timeout in DevOpsGuruDemoProductsAPi

Insight overview View recommendations

Starting on August 31, 2022 20:00 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: Low severity
Status: Ongoing
Affected applications: 1

Insight started: August 31, 2022 20:00 UTC
Insight ended: -

Last update time: August 31, 2022 20:00 UTC
OpsItem ID: -

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

Tune Visibility timeout of SQS Invoker

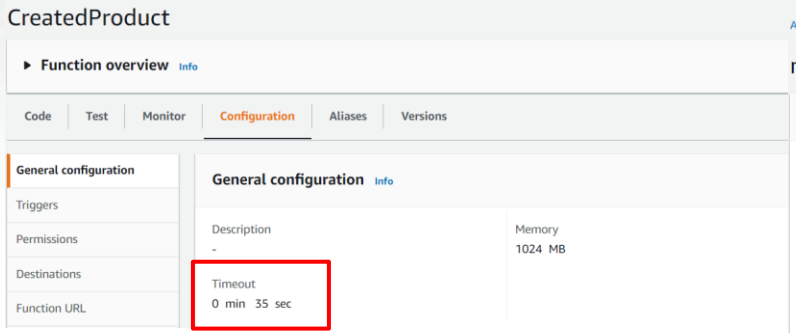
Based on your resource's usage, we recommend the following changes. To learn more about these changes, see Tune Visibility timeout of SQS Invoker

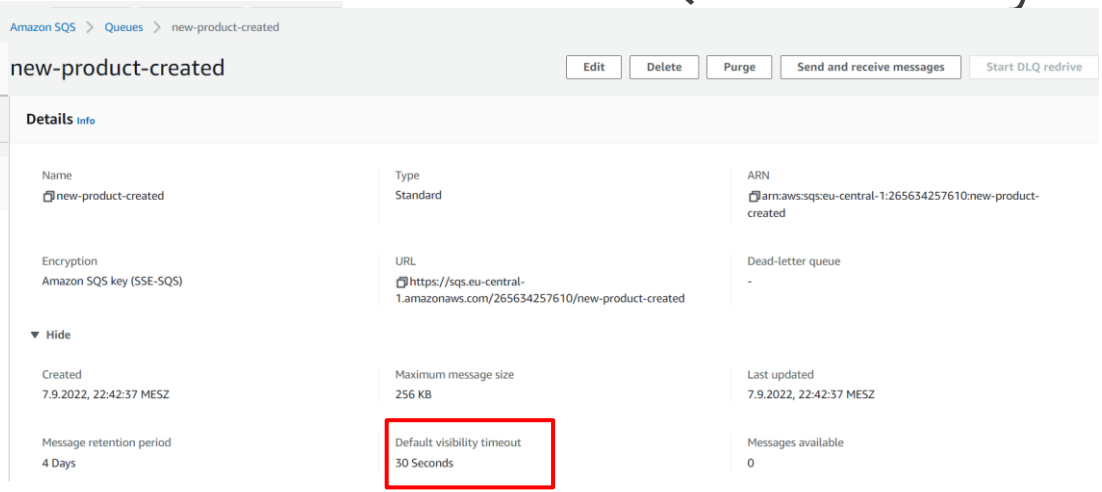
Recommendations (1/1) Info

Find recommendations by resource name, service name, or status

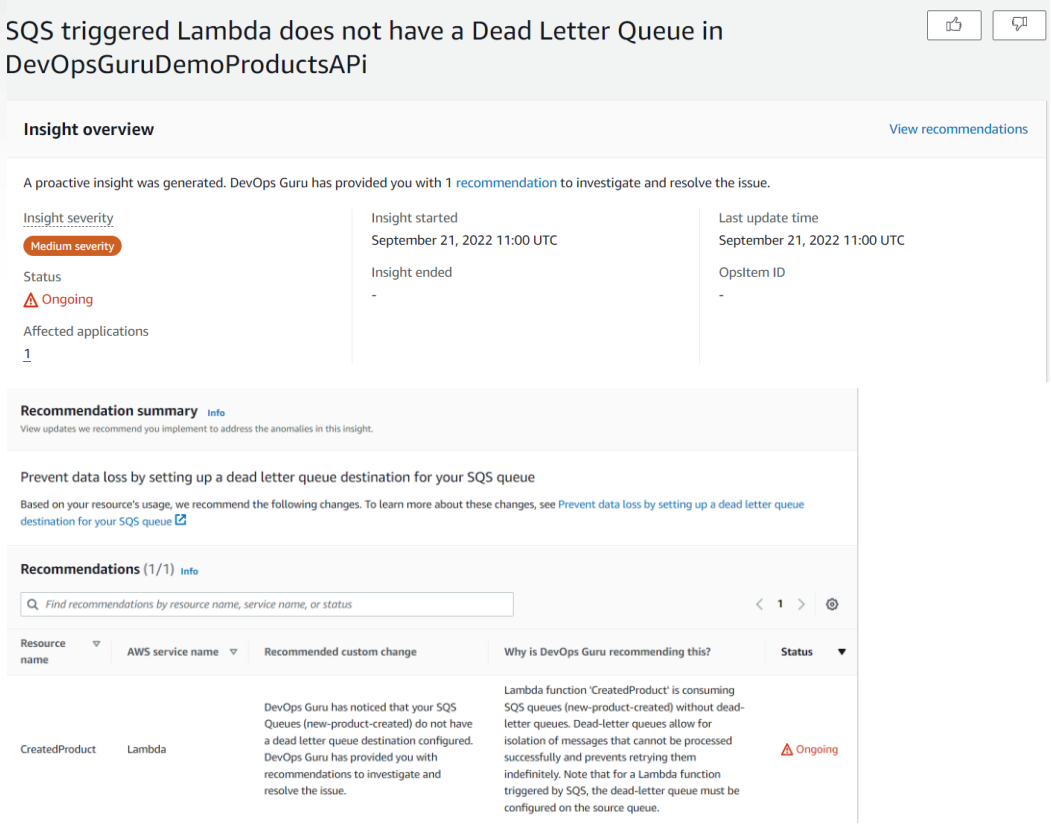
Resource name	AWS service name	Recommended custom change	Why is DevOps Guru recommending this?	Status
CreatedProduct	Lambda	Based on your usage, we recommend that you set CreatedProduct's SQS new-product-created visibility timeout to 144000 ms to ensure no other Lambda instances will process the same SQS message. To change SQS visibility timeout look at https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-visibility-timeout.html#changing-message-visibility-timeout	Lambda timeout exceeds recommended SQS visibility timeout.	Ongoing

DevOps Guru Proactive Examples: Lambda timeout exceeds recommended SQS visibility

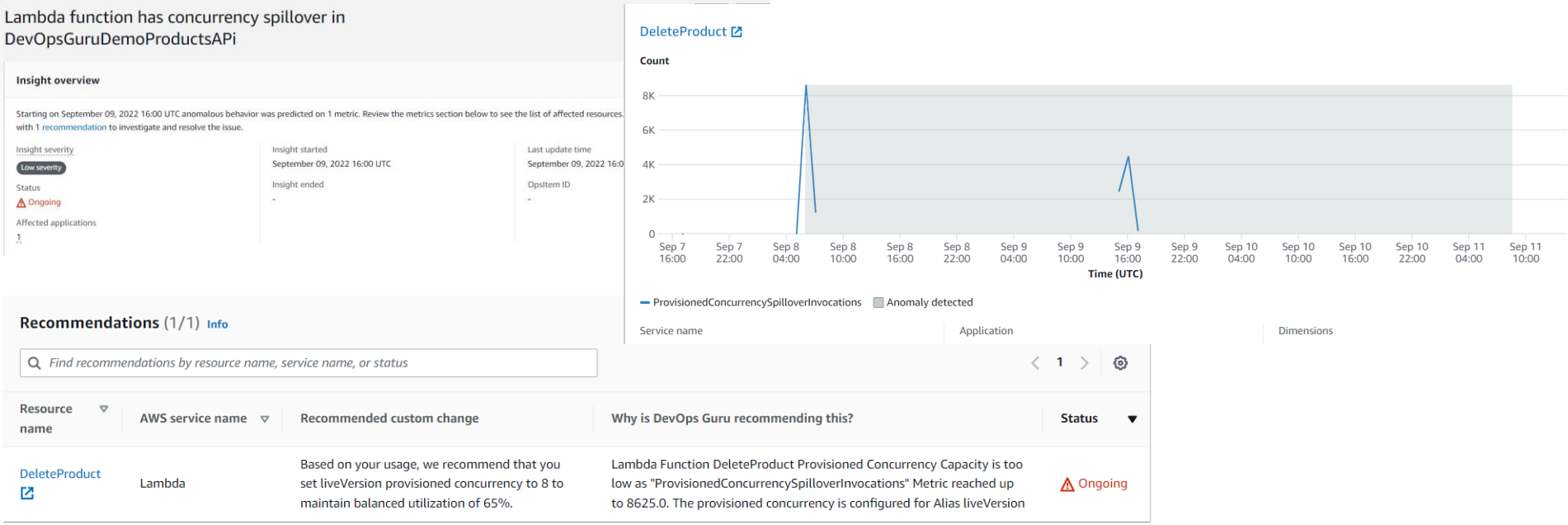




DevOps Guru Proactive Examples: SQS triggered Lambda does not have a DLQ



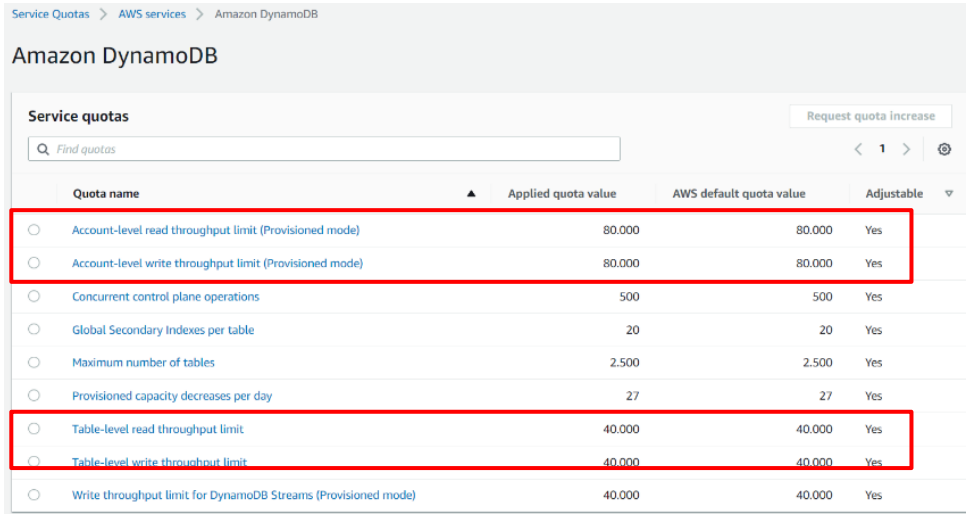
DevOps Guru Proactive Examples: Lambda function has concurrency spillover



hey -q 1 -z 30m -c 9 -m DELETE -H "X-API-Key: XXXa6XXXX" -H "Content-Type: application/json;charset=utf-8" https://XXX.execute-api.eu-central-1.amazonaws.com/prod/products/11

Other operational issues and the proactive insights 1/2

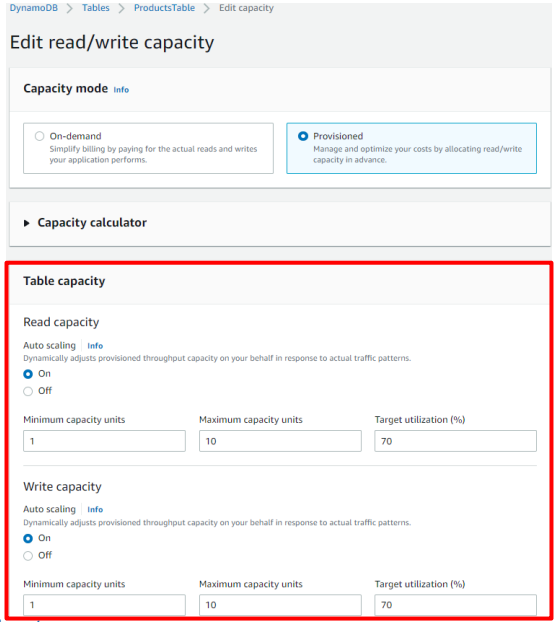
- Table or Account Level read/write capacity for DynamoDB consumption reaching account limit
  - Triggered when the account consumed capacity is approaching table or account-level limits during a period of time



https://aws.amazon.com/de/blogs/aws/automatically-detect-operational-issues-in-lambda-functions-with-amazon-devops-guru-for-serverless/

Other operational issues and the proactive insights 2/2

- DynamoDB table consumed capacity reaching AutoScaling Maximum parameter limit
  - Triggered when table consumed capacity is reaching AutoScaling Max parameters limit over a period.



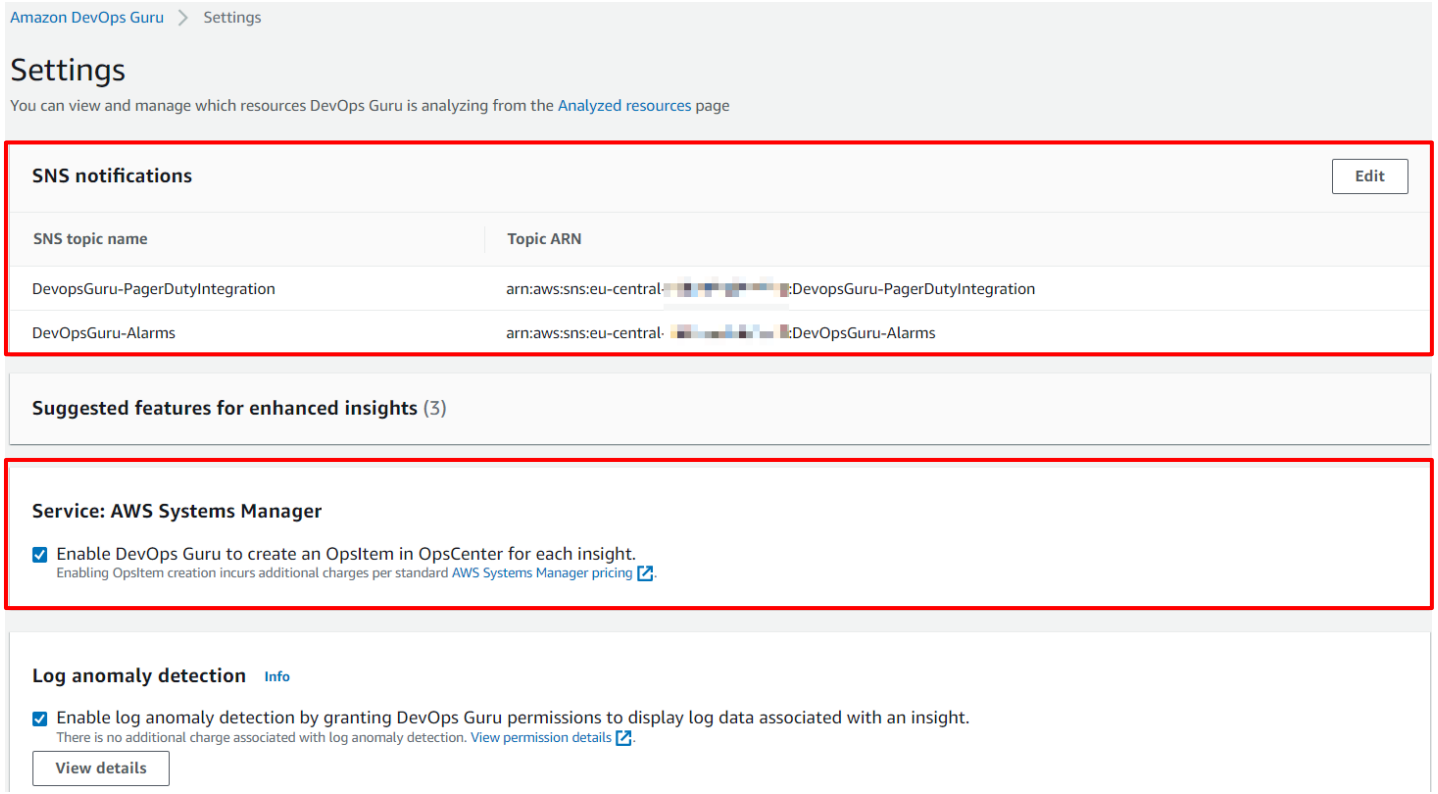
https://aws.amazon.com/de/blogs/aws/automatically-detect-operational-issues-in-lambda-functions-with-amazon-devops-guru-for-serverless/

DevOps Guru integration in incident management tools

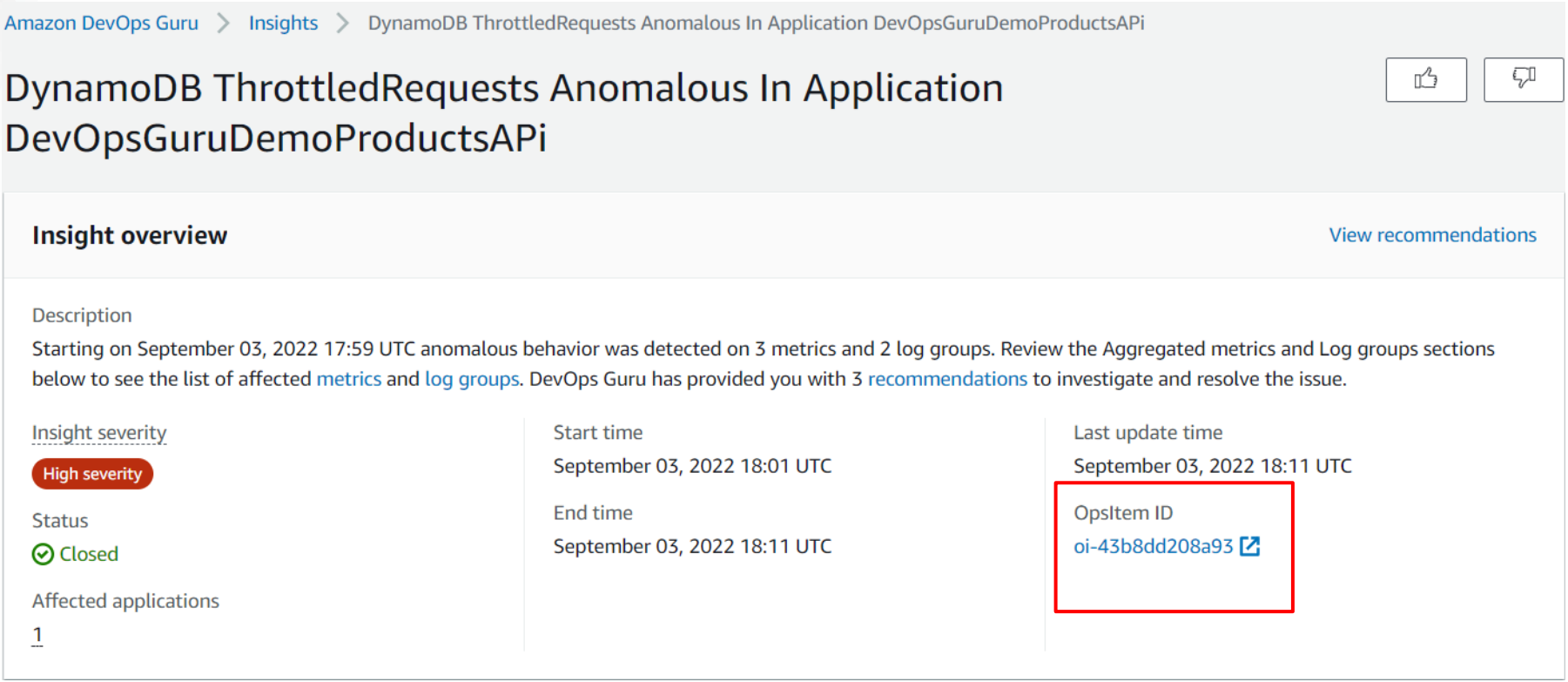
- OPsCenter
- PagerDuty
- Atlassian Opsgenie

https://aws.amazon.com/devops-guru

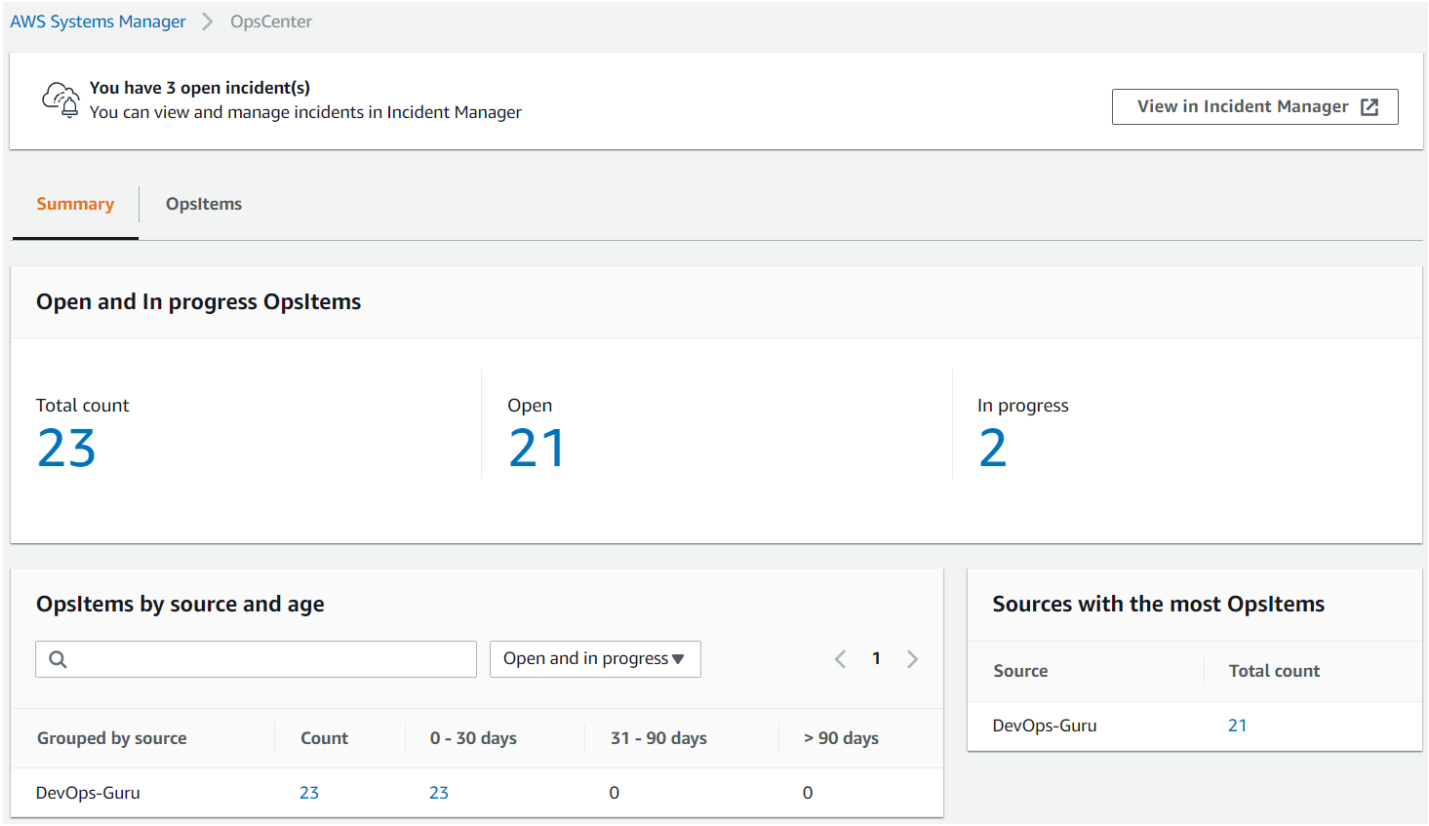
DevOps Guru Integration Settings



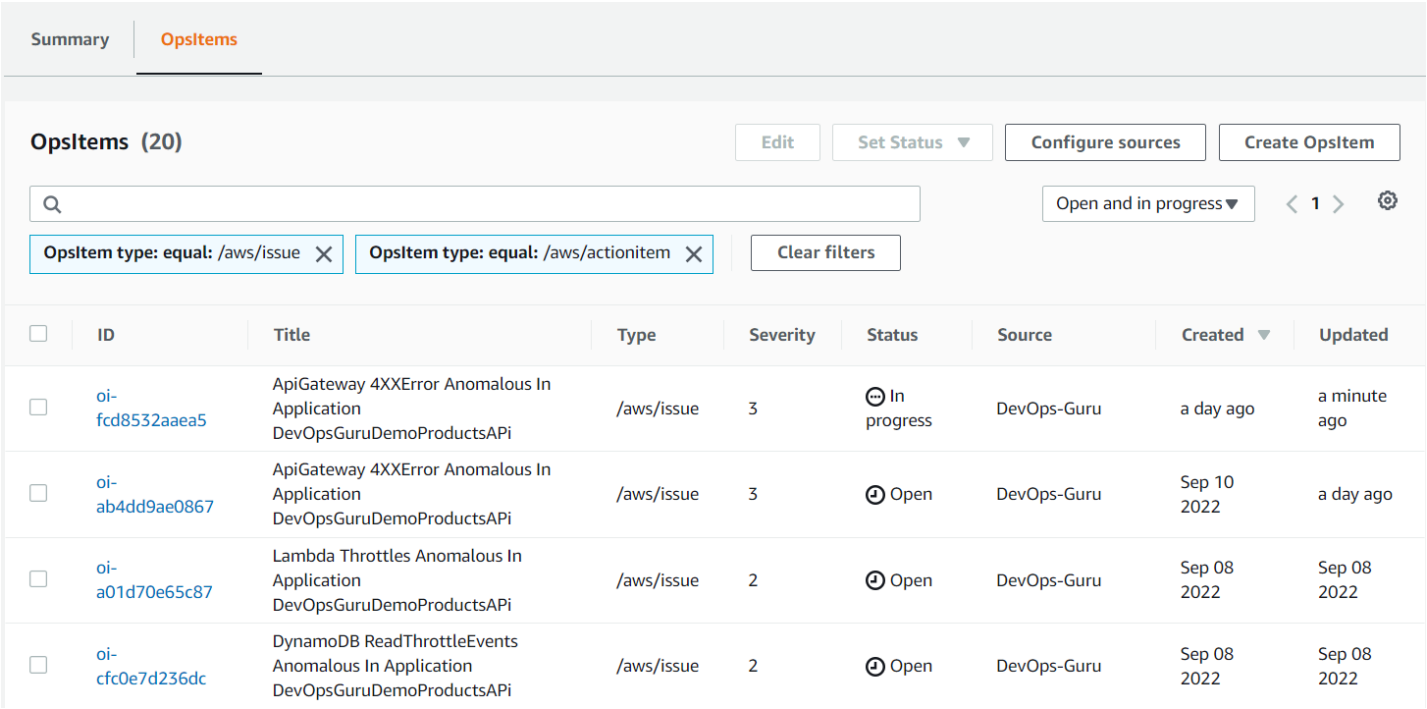
DevOps Guru Examples: DynamoDB Throttling



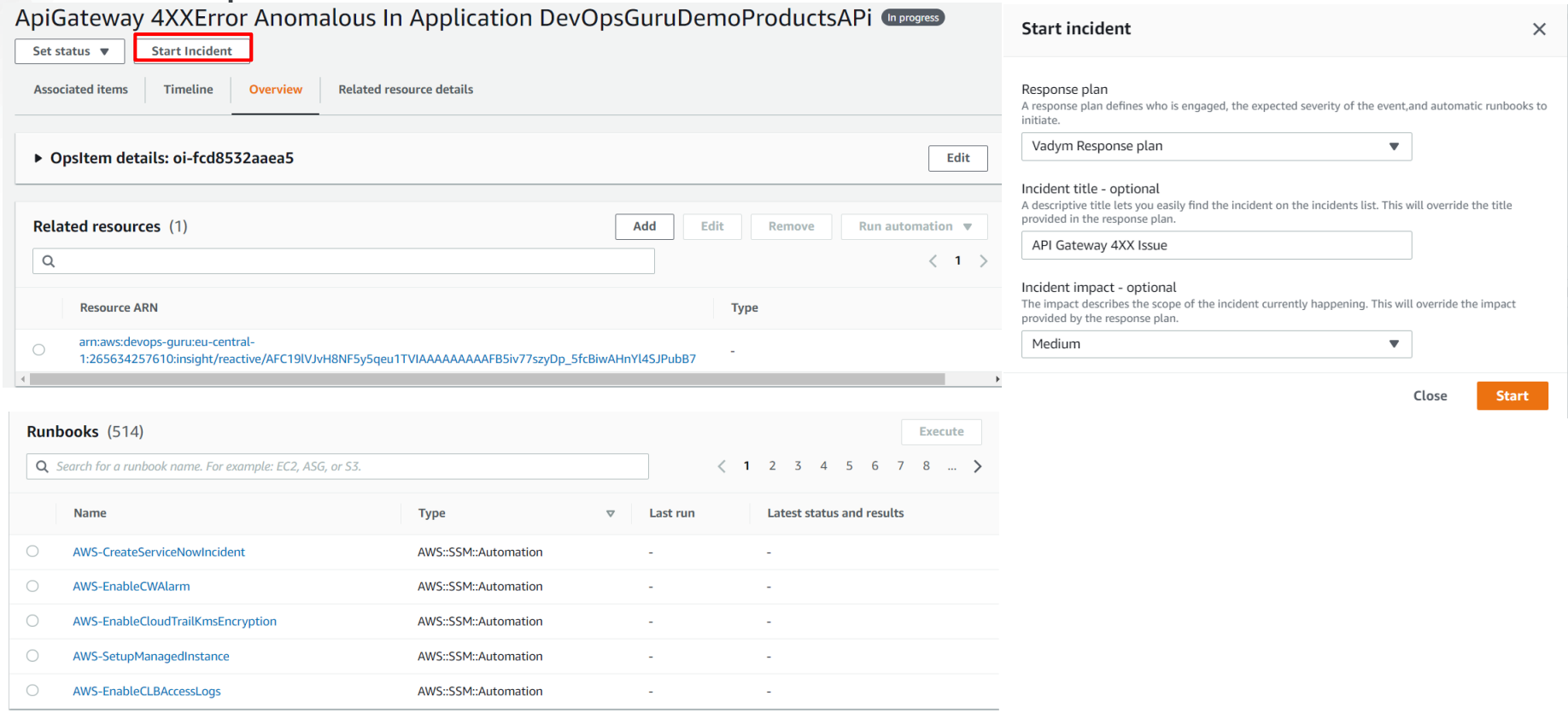
DevOps Guru Integration with OpsCenter



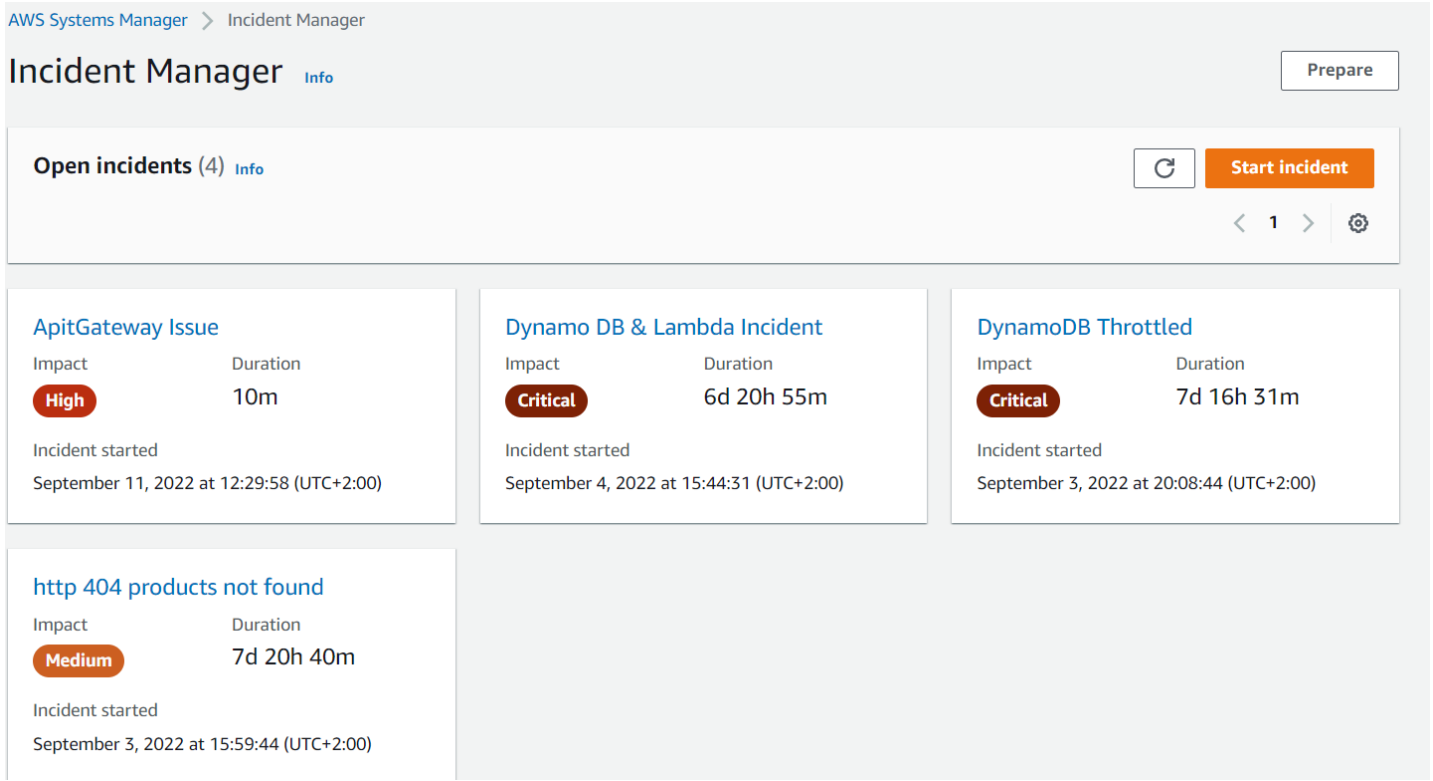
DevOps Guru Integration with OpsCenter



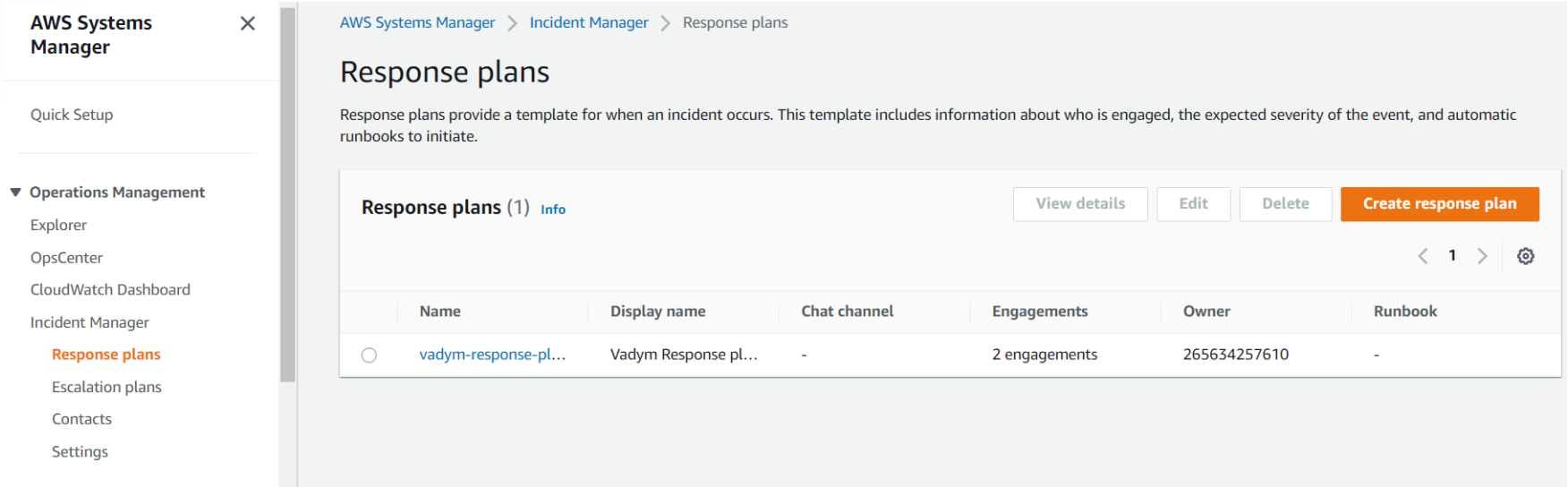
DevOps Guru Integration with OpsCenter OpsItem View



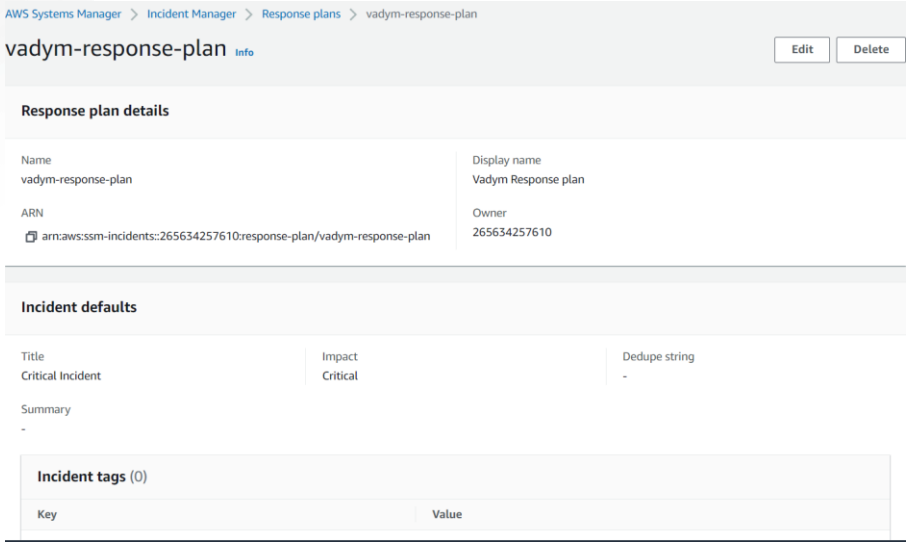
DevOps Guru Integration with OpCenter Incident Manager View

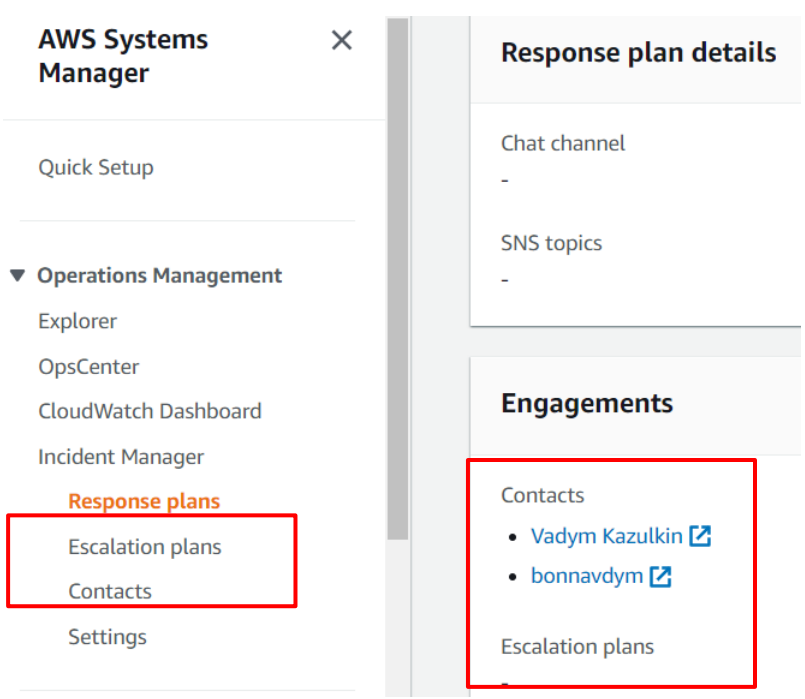


DevOps Guru Integration with OpCenter Incident Manager View

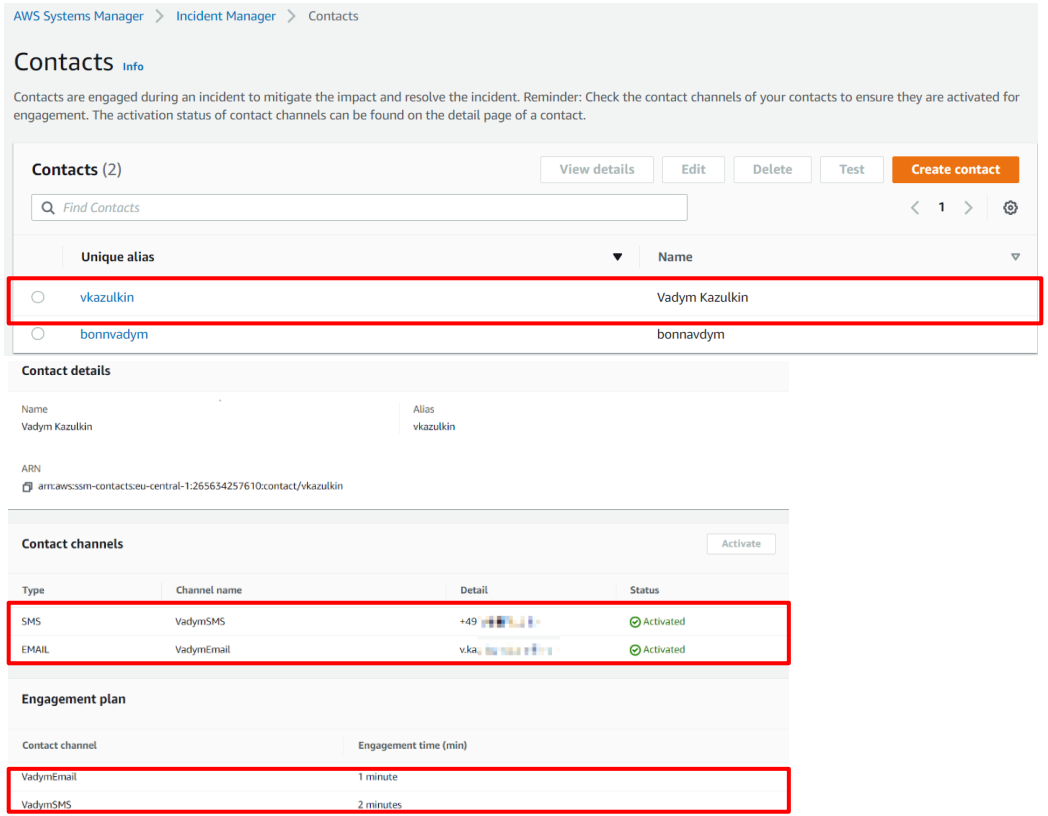


DevOps Guru Integration with OpCenter Incident Confugration

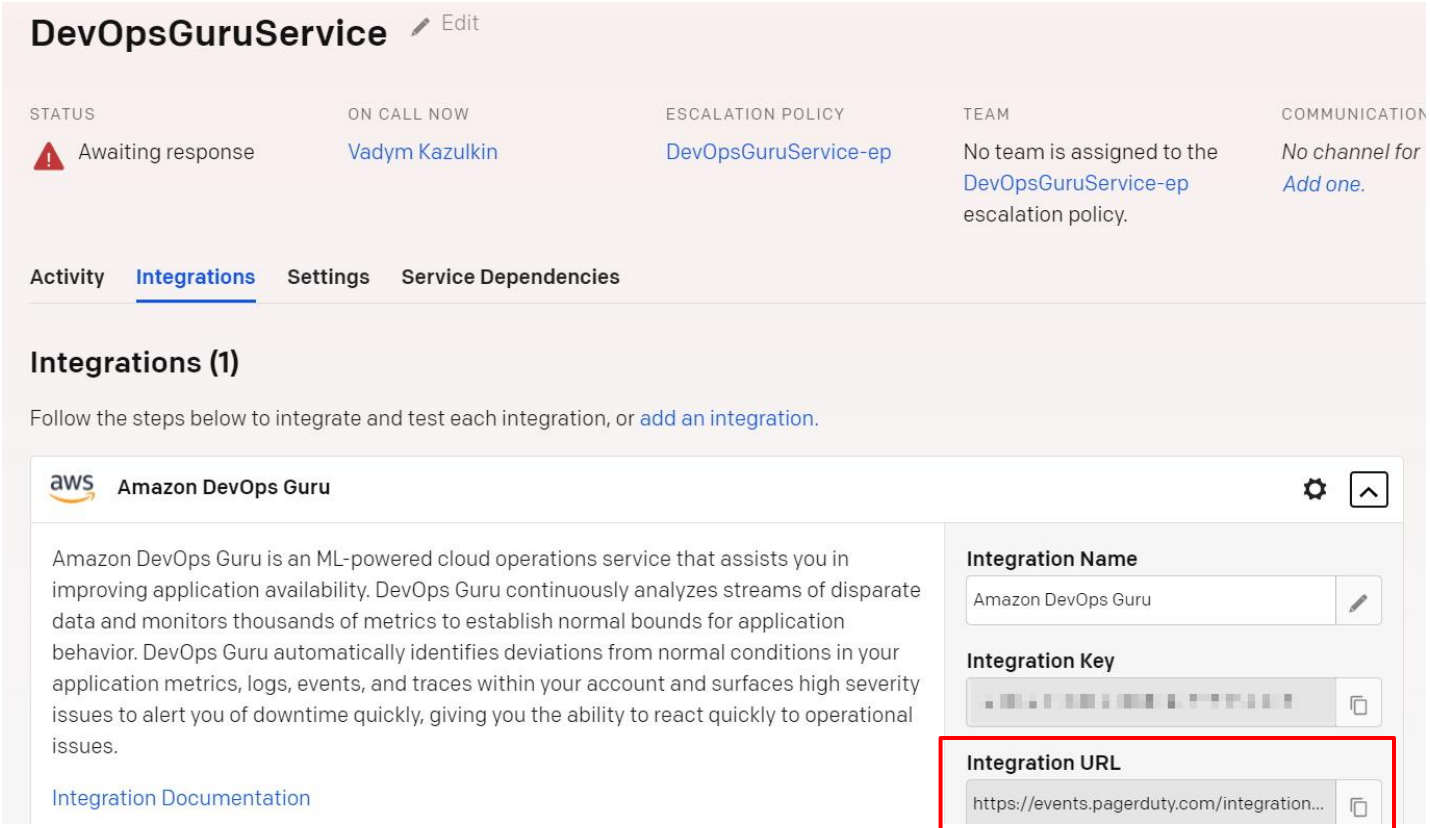




DevOps Guru Integration with OpCenter Incident Contacts

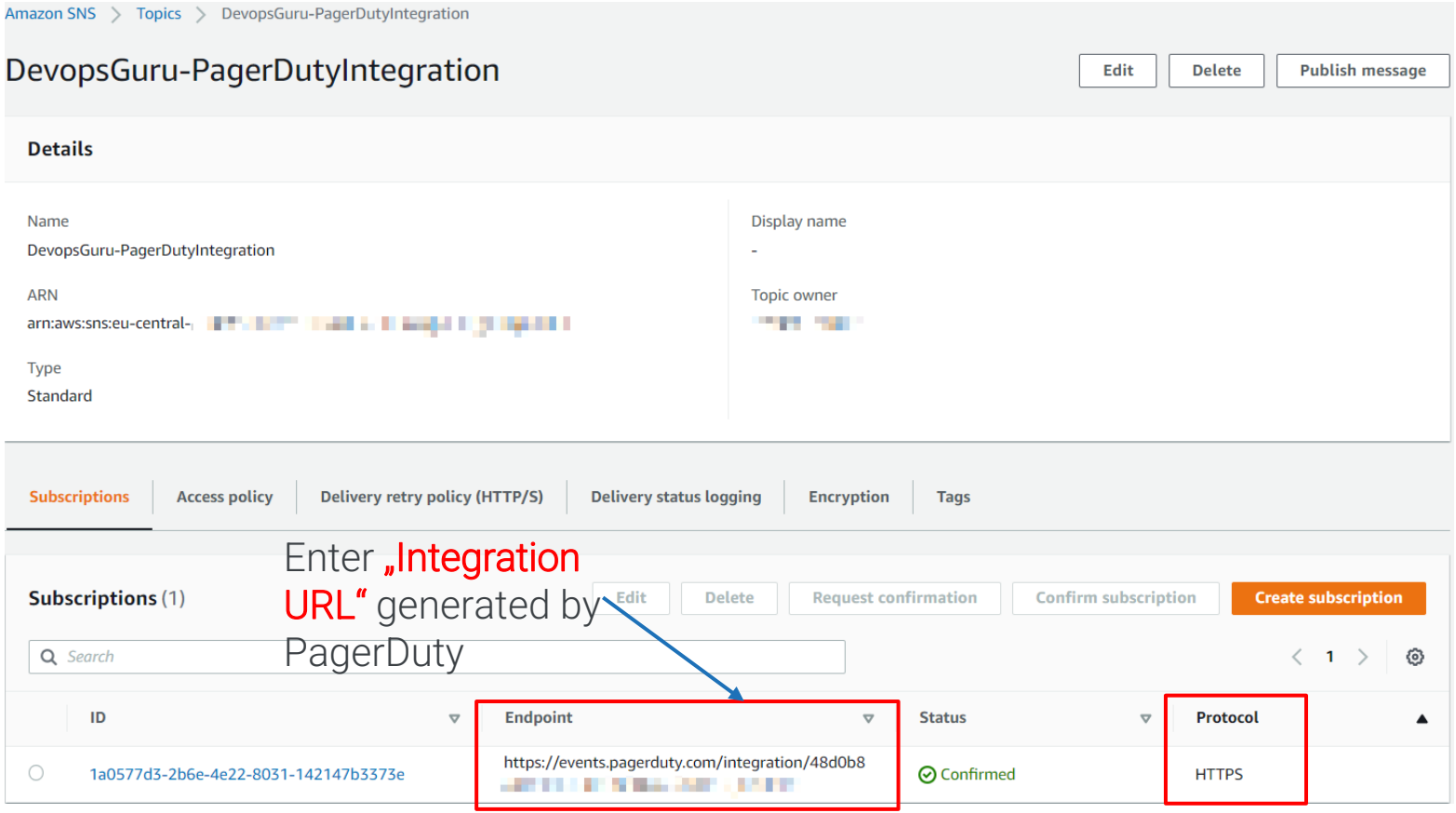


DevOps Guru Integration with PagerDuty

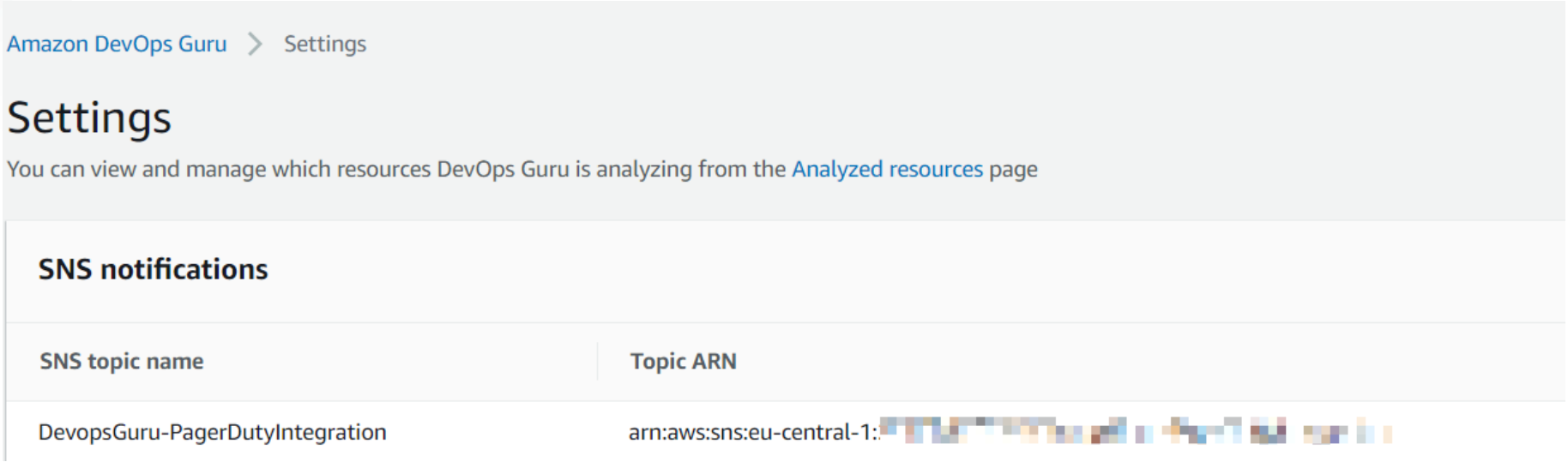


https://www.pagerduty.com/docs/guides/amazon-devops-guru-integration-guide/

DevOps Guru Integration with PagerDuty



DevOps Guru Integration with PagerDuty



DevOps Guru PagerDuty Incidents

Open | Triggered | Acknowledged | Resolved | Any Status

Assigned to me | All

Status	Urgency	Title	Created	Service	Assigned To
Triggered	High	4XXError ⊞ SHOW DETAILS (1 triggered alert) #134	on Sep 10, 2022 at 1:32 PM	DevOpsGuruService	Vadym Kazulkin
Triggered	High	4XXError ⊞ SHOW DETAILS (1 triggered alert) #132	on Sep 10, 2022 at 12:07 PM	DevOpsGuruService	Vadym Kazulkin
Triggered	High	4XXError ⊞ SHOW DETAILS (1 triggered alert) #131	on Sep 10, 2022 at 11:19 AM	DevOpsGuruService	Vadym Kazulkin
Acknowledged	High	Errors ⊞ SHOW DETAILS (1 triggered alert) #129	on Sep 9, 2022 at 8:06 PM	DevOpsGuruService	Vadym Kazulkin
Acknowledged	High	ThrottledRequests ⊞ SHOW DETAILS (1 triggered alert) #127	on Sep 9, 2022 at 5:55 PM	DevOpsGuruService	Vadym Kazulkin
Acknowledged	High	Latency ⊞ SHOW DETAILS (1 triggered alert) #125	on Sep 9, 2022 at 1:41 PM	DevOpsGuruService	Vadym Kazulkin

DevOps Guru Supported Services

Resource Price Group A	$0.0028 per Resource per Hour

AWS Service : Resource
Lambda : Function
S3 : Bucket

Resource Price Group B	$0.0042 per Resource per Hour
AWS Service : Resource	**AWS Service : Resource**
API Gateway : API Path/Route	Kinesis : Stream
Application ELB : LoadBalancer	NATGateway (VPC) : NatGateway
CloudFront : Distribution	Network ELB : LoadBalancer
DynamoDB Streams : Stream	RDS : DBInstance
DynamoDB : Table	Redshift : Cluster, Node
EC2(ASG):Instance*	Route 53 : HostedZone
ECS : Service**	SageMaker : InvocationEndpoint
EKS : Service**	SNS : Topic
Elastic Beanstalk : Environment	SQS : Queue
ElastiCache : Node	Step Functions : Activity, StateMachine
OpenSearch Service : Node	SWF : Workflow, Task
ELB : LoadBalancer	

https://aws.amazon.com/de/devops-guru/pricing/

DevOps Guru Cost Estimator

Cost estimator Info

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
  Create an estimate using the AWS resources defined by a CloudFormation stack in your Region.
- ( ) Tags on AWS resources in the current Region
  Create an estimate using AWS resources in your AWS account and Region that are specified by tags.
- ( ) AWS account in the current Region
  Create an estimate using the AWS resources in the current AWS account and Region.

CloudFormation stack name

To find the name of the stacks in your Region, go to AWS CloudFormation

DevOpsGuruDemoProductsAPi

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

Cost estimate : $11.088 September 08, 2022 08:33 UTC

DevOps Guru generates an estimate for DevOpsGuruDemoProductsAPi 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
ApiGateway::RESTApi	1	$0.0042	100	$3.024
DynamoDB::Table	1	$0.0042	100	$3.024
Lambda::Function	1	$0.0028	100	$2.016
SQS::Queue	1	$0.0042	100	$3.024

https://aws.amazon.com/de/devops-guru/pricing/

DevOps Guru Conclusions, Obeservations, Suggestions 1/4

- All errors have been correctly recognized so far
  - It took several (at least 7) minutes to create an incident after anomaly appeared
- Correctly no insights created for the temporary incidents
  - Short time Lambda, DynamoDB and API Gateway Throttling
- Recommendations for the insight reason could be more precise
  - No differentiation between Lambda throttling because of reaching individual function concurrency limit or the total AWS account concurrency limit

DevOps Guru Conclusions, Obeservations, Suggestions 2/4

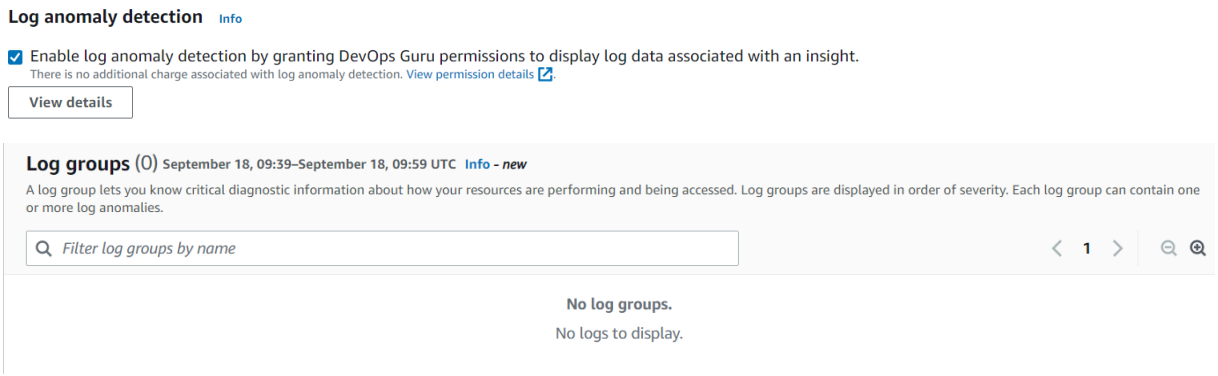
- HTTP 4XX Errors
  - Time to create DevOps Guru insight is relatively big (more than 10 minutes). Maybe because of the medium severity
  - Are not fine granular splitted between different error codes (404, 429) which have totally different meaning and cause
  - No reference which Lambda function behind the API Gateway cause these errors (important for 404 error)

DevOps Guru Conclusions, Obeservations, Suggestions 3/4

- Lambda duration anomalous insights (Duration p90)
  - took huge time to create (sometimes more than 30 minutes). Maybe because of the medium severity
- DevOps Guru Proactive Insights
  - Stay ongoing long time after the insight occurred only once
  - Not always expire quickly after being fixed
  - Missed some important ones, like not used Lambda Provisioned Concurrency for a long period of time

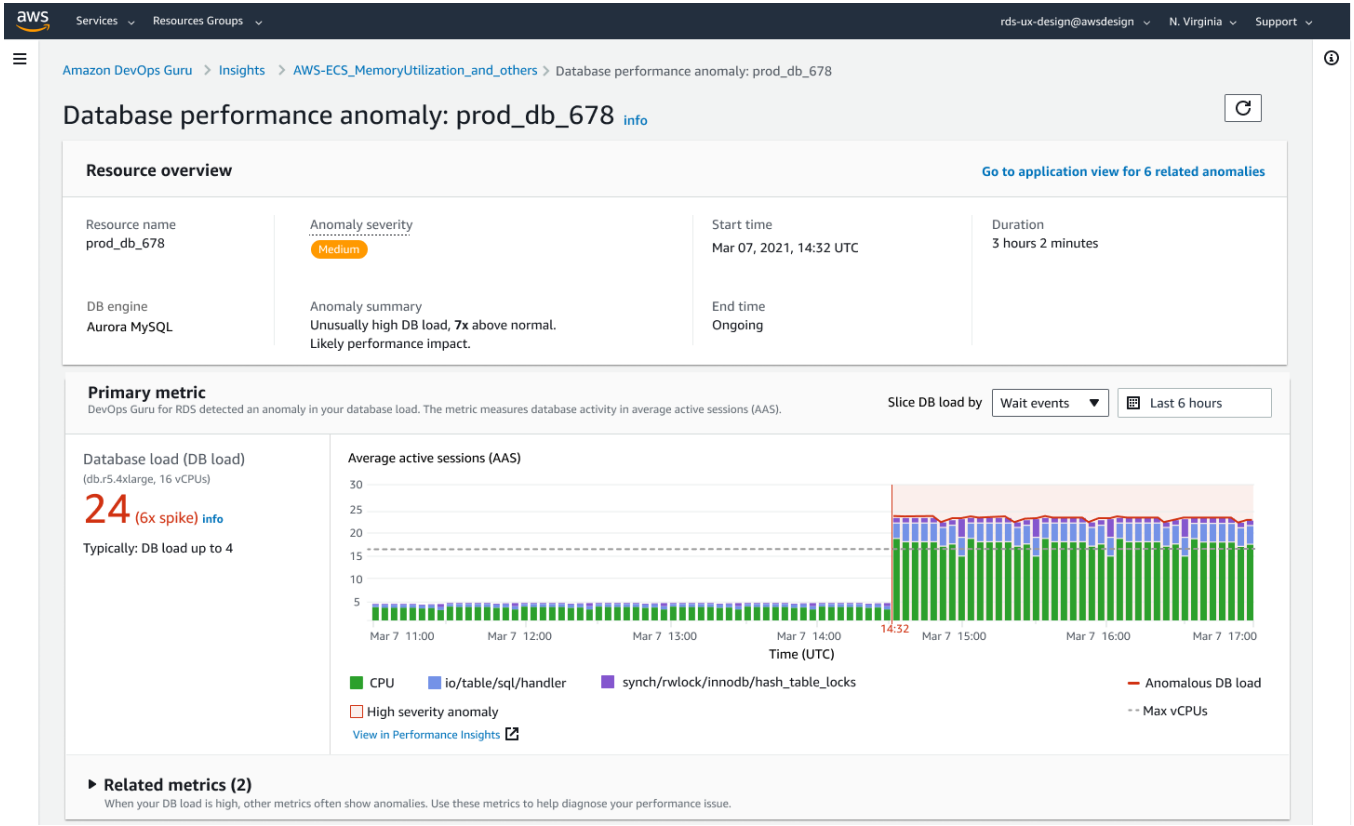
DevOps Guru Conclusions, Obeservations, Suggestions 4/4

- Log Groups haven't always been displayed within DevOps Guru Insight



- Missing Link to Tracing (e.g. AWS X-Ray)
- Easier integration into AWS Systems Manager Incident Manager

DevOps Guru for RDS



https://aws.amazon.com/devops-guru/features/devops-guru-for-rds/ https://aws.amazon.com/de/blogs/devops/leverage-devops-guru-for-rds-to-detect-anomalies-and-resolve-operational-issues/

Accelerate Your Photo Business

Get in Touch