Serverless Architectures with Amazon DynamoDB and Amazon Kinesis Streams with AWS Lambda

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Associate Analyst

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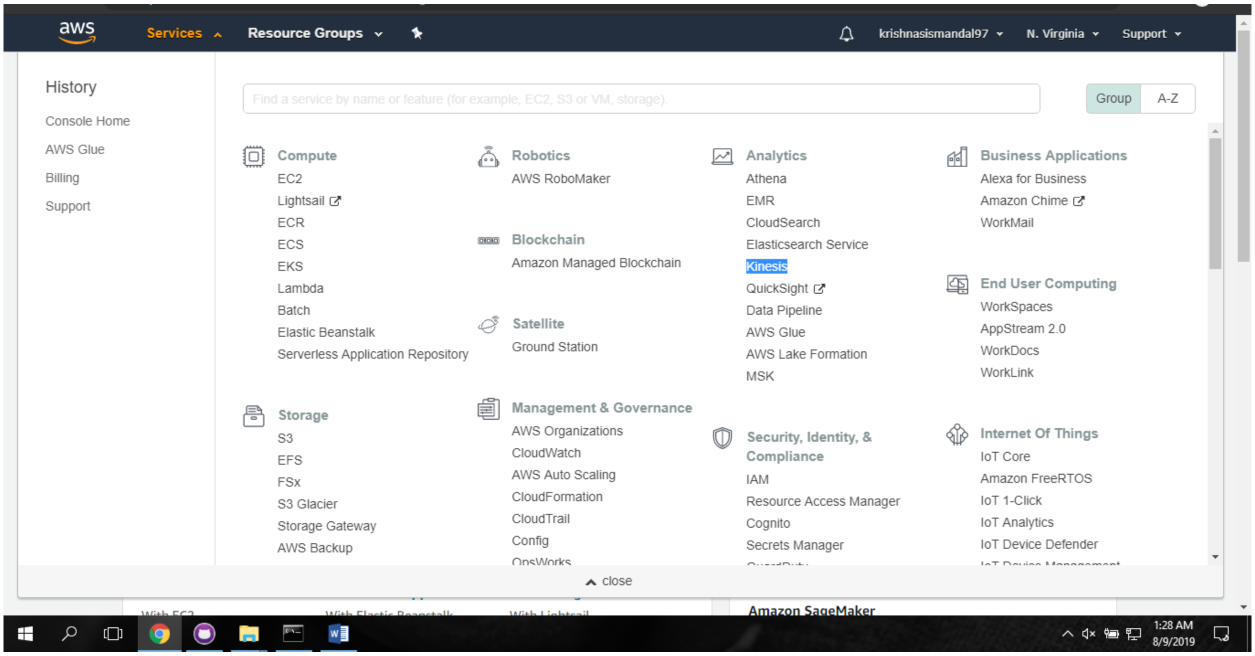
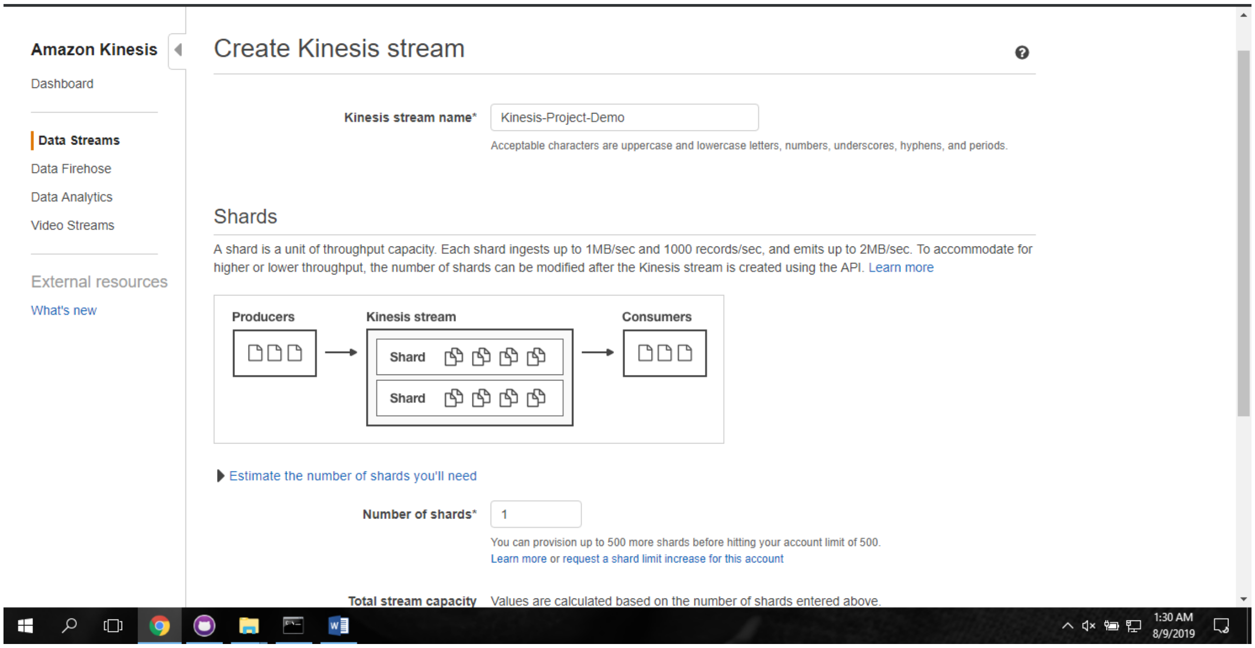
Creating an Amazon Kinesis Stream

Navigate to Kinesis Service from the AWS Management Console



Click on Get Started
Click on Create Data Stream



Create Kinesis stream

Kinesis stream name* Kinesis-Project-Demo

Acceptable characters are uppercase and lowercase letters, numbers, underscores, hyphens, and periods.

Shards

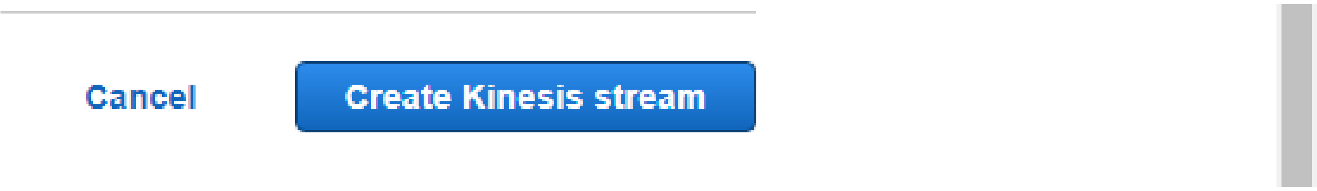
A shard is a unit of throughput capacity. Each shard ingests up to 1MB/sec and 1000 records/sec, and emits up to 2MB/sec. To accommodate for higher or lower throughput, the number of shards can be modified after the Kinesis stream is created using the API. Learn more

Estimate the number of shards you'll need

Number of shards* 1

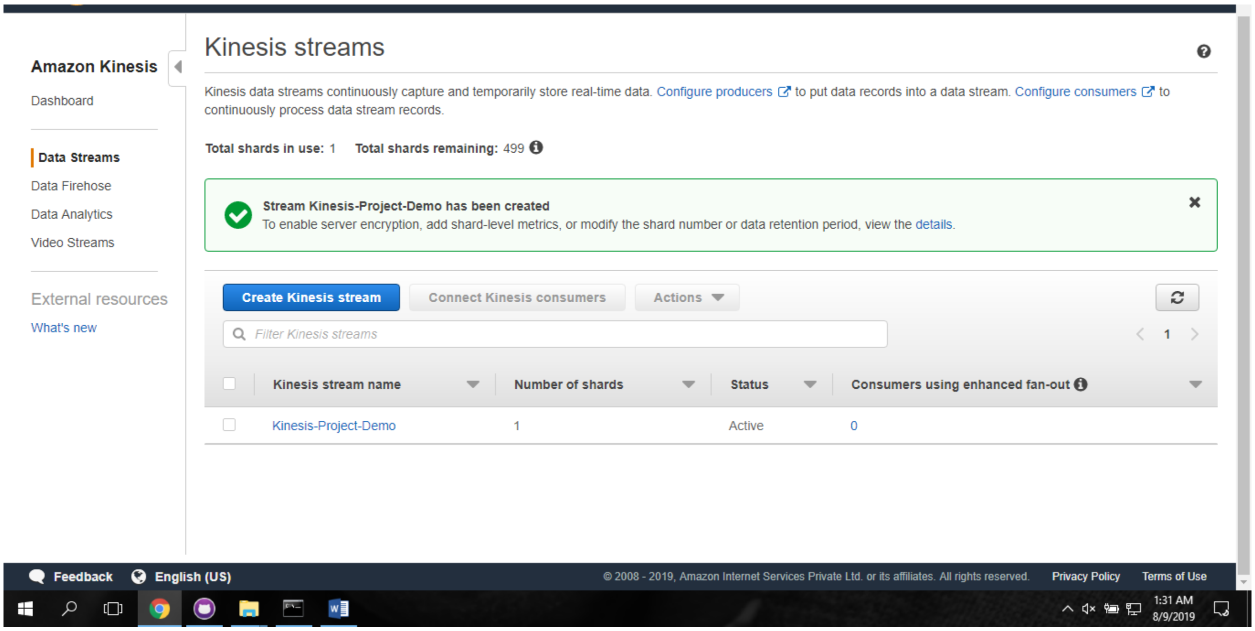
You can provision up to 500 more shards before hitting your account limit of 500.
Learn more or request a shard limit increase for this account

Total stream capacity Values are calculated based on the number of shards entered above.



Click on Create Kinesis Stream

The Kinesis Stream will be created.



Kinesis streams

Kinesis data streams continuously capture and temporarily store real-time data. Configure producers to put data records into a data stream. Configure consumers to continuously process data stream records.

Total shards in use: 1 **Total shards remaining:** 499

Stream Kinesis-Project-Demo has been created
To enable server encryption, add shard-level metrics, or modify the shard number or data retention period, view the details.

	Kinesis stream name	Number of shards	Status	Consumers using enhanced fan-out
□	Kinesis-Project-Demo	1	Active	0

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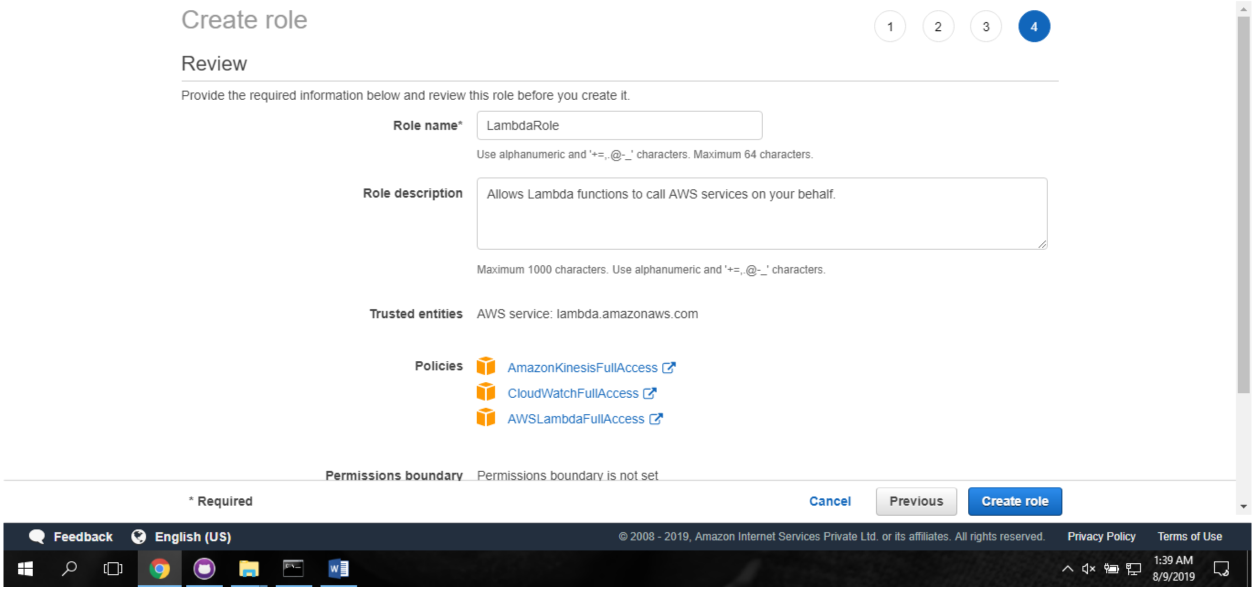
Creating a Lambda Function

Create a IAM Role for Lambda with the Policies – AmazonKinesisFullAccess, CloudWatchFullAcess, AWSLambdaFullAcess, selected.



Create role

Review

Provide the required information below and review this role before you create it.

Role name* LambdaRole

Use alphanumeric and '+=,.@-_' characters. Maximum 64 characters.

Role description Allows Lambda functions to call AWS services on your behalf.

Maximum 1000 characters. Use alphanumeric and '+=,.@-_' characters.

Trusted entities AWS service: lambda.amazonaws.com

Policies AmazonKinesisFullAccess, CloudWatchFullAccess, AWSLambdaFullAccess

Permissions boundary Permissions boundary is not set

* Required

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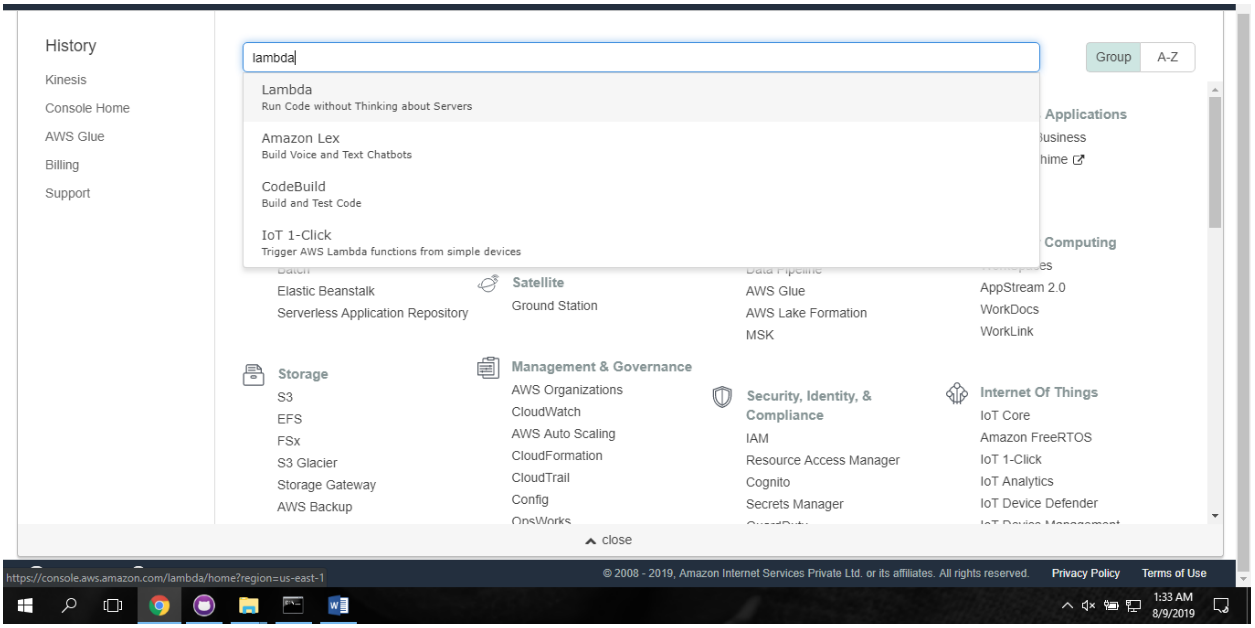
Navigate to AWS Lambda from the Services menu of the AWS Management Console.



lambda

Lambda
Run Code without Thinking about Servers

Amazon Lex
Build Voice and Text Chatbots

CodeBuild
Build and Test Code

IoT 1-Click
Trigger AWS Lambda functions from simple devices

https://console.aws.amazon.com/lambda/home?region=us-east-1

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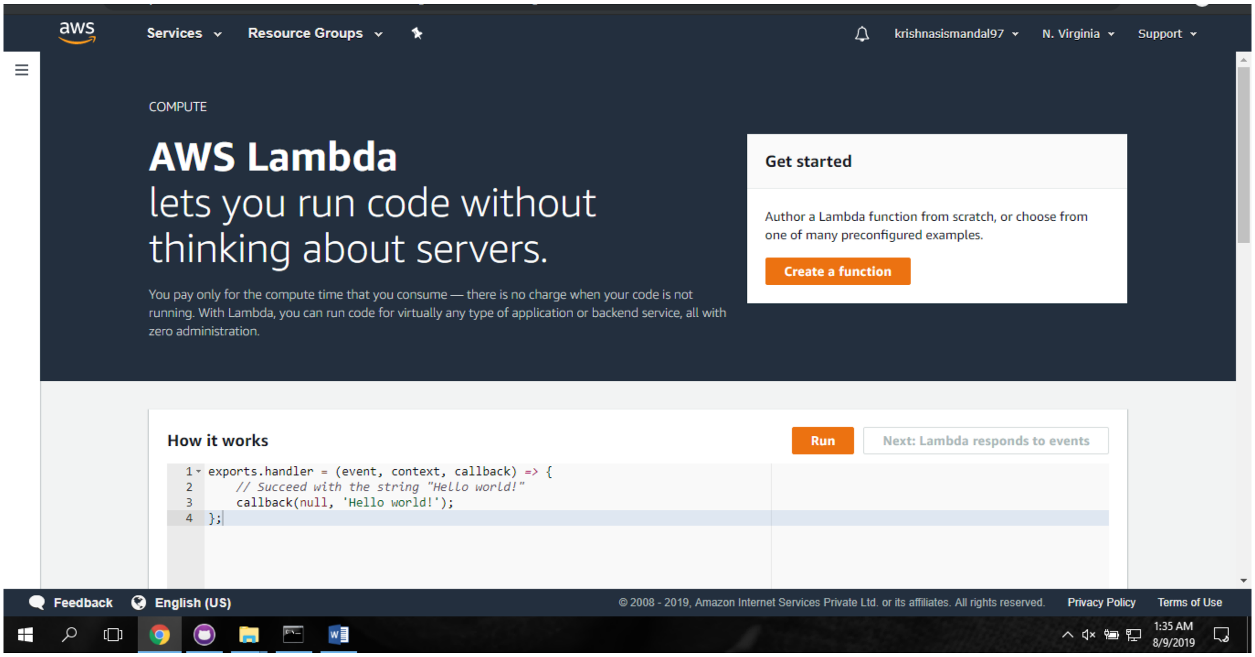
Click on Create a Function



COMPUTE

AWS Lambda
lets you run code without thinking about servers.

You pay only for the compute time that you consume — there is no charge when your code is not running. With Lambda, you can run code for virtually any type of application or backend service, all with zero administration.

Get started

Author a Lambda function from scratch, or choose from one of many preconfigured examples.

Create a function

How it works

Run   Next: Lambda responds to events

```
exports.handler = (event, context, callback) => {
    // Succeed with the string "Hello world!"
    callback(null, 'Hello world!');
};
```

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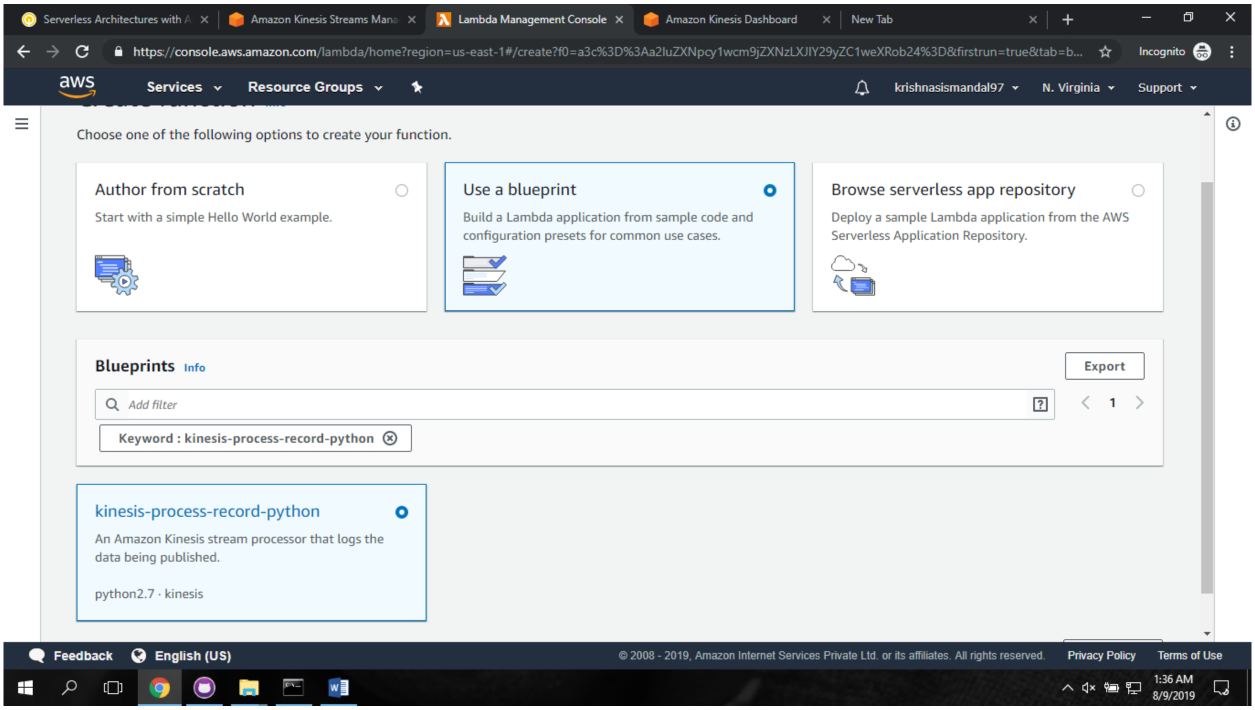
Click on Use a blueprint, and then search for kinesis-process-record-python.


Serverless Architectures with A
Amazon Kinesis Streams Mana
Lambda Management Console
Amazon Kinesis Dashboard
New Tab
https://console.aws.amazon.com/lambda/home?region=us-east-1#/create?f0=a3c%3D%3Aa2luZXNpcy1wcm9jZXNzLXJlY29yZC1weXRob24%3D&firstrun=true&tab=b...
Incognito
aws
Services
Resource Groups
krishnasismandal97
N. Virginia
Support

Choose one of the following options to create your function.

Author from scratch ○
Start with a simple Hello World example.

Use a blueprint ●
Build a Lambda application from sample code and configuration presets for common use cases.

Browse serverless app repository ○
Deploy a sample Lambda application from the AWS Serverless Application Repository.

Blueprints Info   Export

Add filter

Keyword : kinesis-process-record-python ⓧ

kinesis-process-record-python ●
An Amazon Kinesis stream processor that logs the data being published.
python2.7 · kinesis

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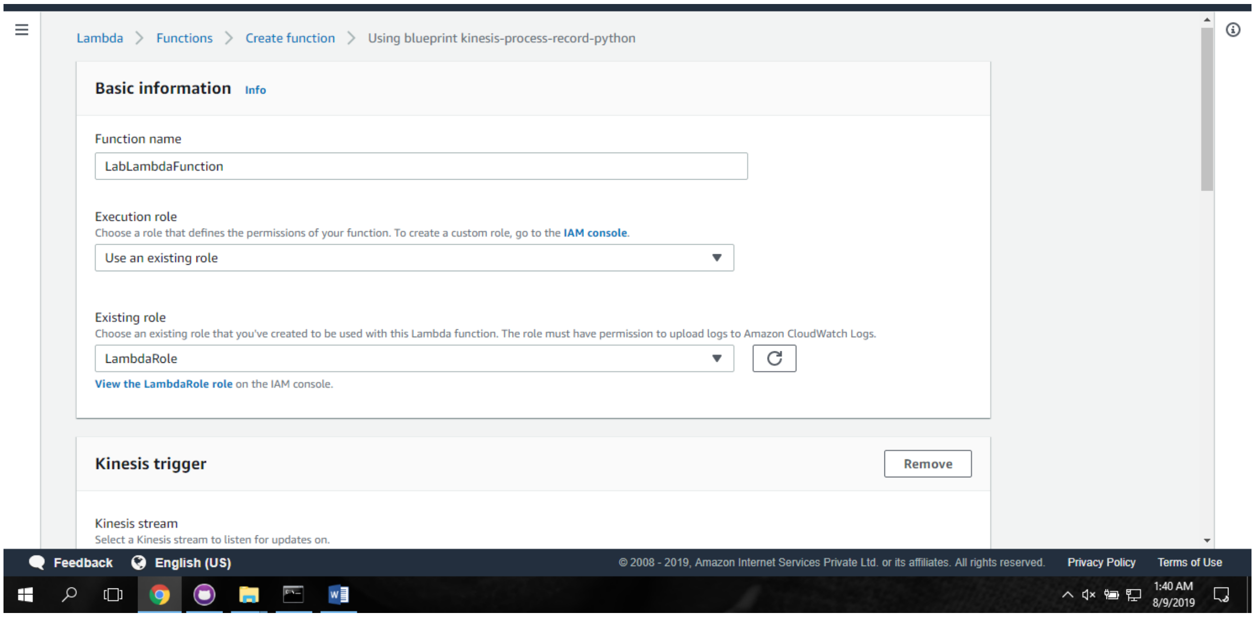
Scroll down and click on Configure.



Lambda > Functions > Create function > Using blueprint kinesis-process-record-python

Basic information Info

Function name

LabLambdaFunction

Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the IAM console.

Use an existing role

Existing role

Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.

LambdaRole

View the LambdaRole role on the IAM console.

Kinesis trigger

Kinesis stream

Select a Kinesis stream to listen for updates on.

Remove
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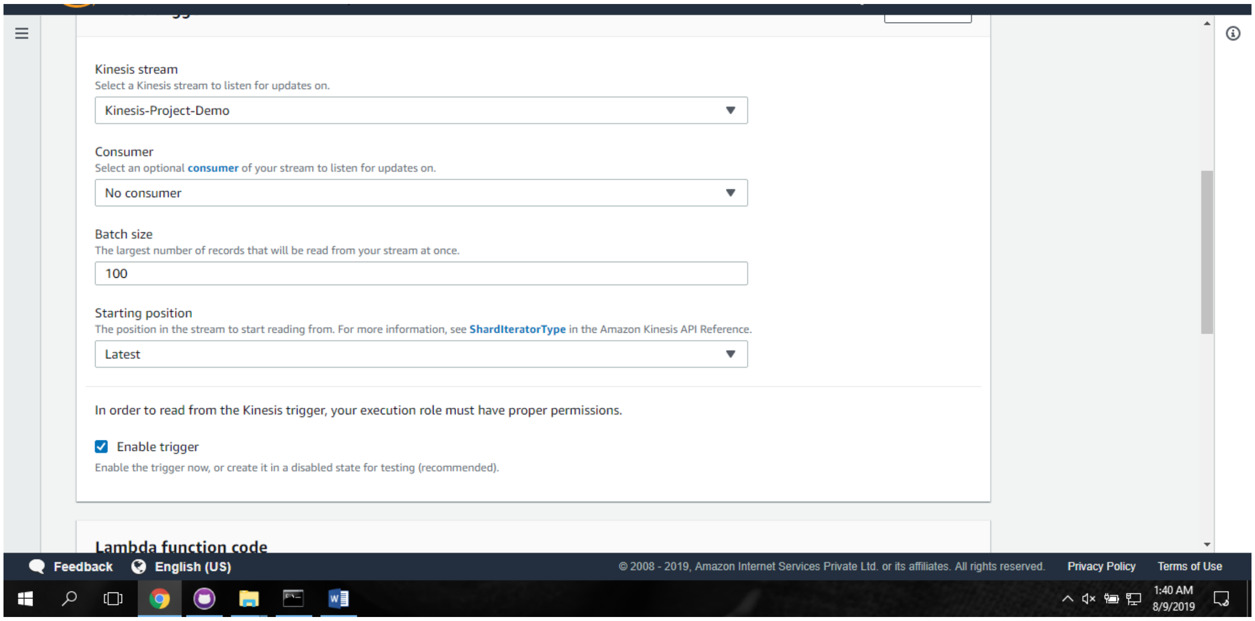

Kinesis stream

Select a Kinesis stream to listen for updates on.

Kinesis-Project-Demo

Consumer

Select an optional consumer of your stream to listen for updates on.

No consumer

Batch size

The largest number of records that will be read from your stream at once.

100

Starting position

The position in the stream to start reading from. For more information, see ShardIteratorType in the Amazon Kinesis API Reference.

Latest

In order to read from the Kinesis trigger, your execution role must have proper permissions.

☑ Enable trigger

Enable the trigger now, or create it in a disabled state for testing (recommended).

Lambda function code

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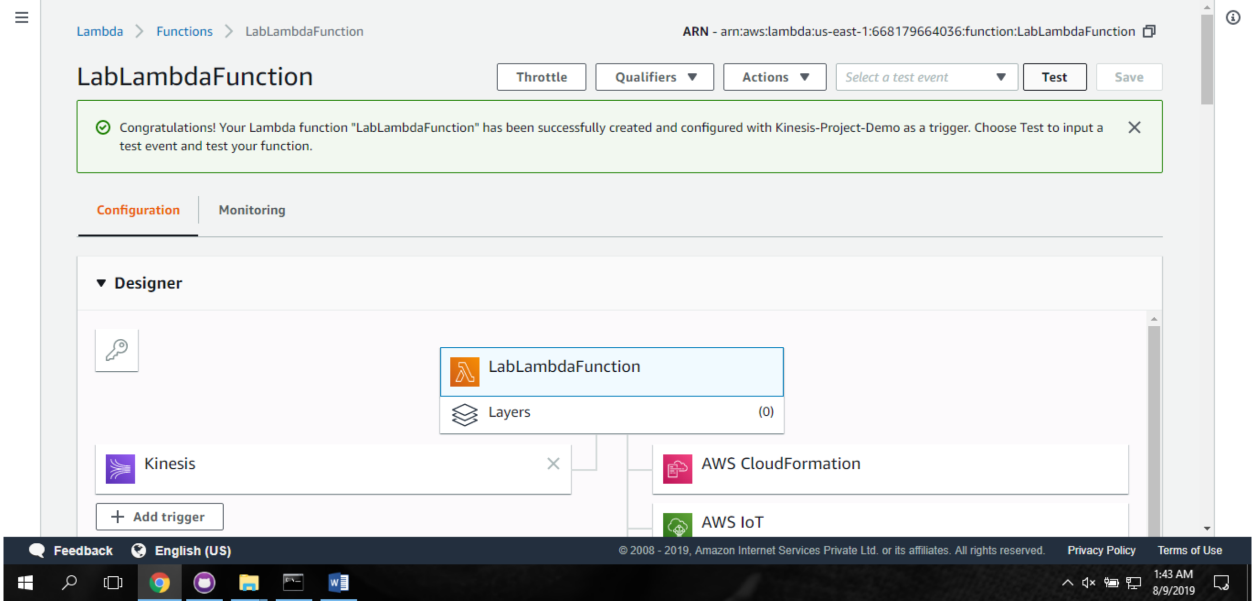
Select the appropriate parameters, review the code, and click on Create Function.

Testing the Lambda Function



ARN - arn:aws:lambda:us-east-1:668179664036:function:LabLambdaFunction

LabLambdaFunction

Congratulations! Your Lambda function "LabLambdaFunction" has been successfully created and configured with Kinesis-Project-Demo as a trigger. Choose Test to input a test event and test your function.

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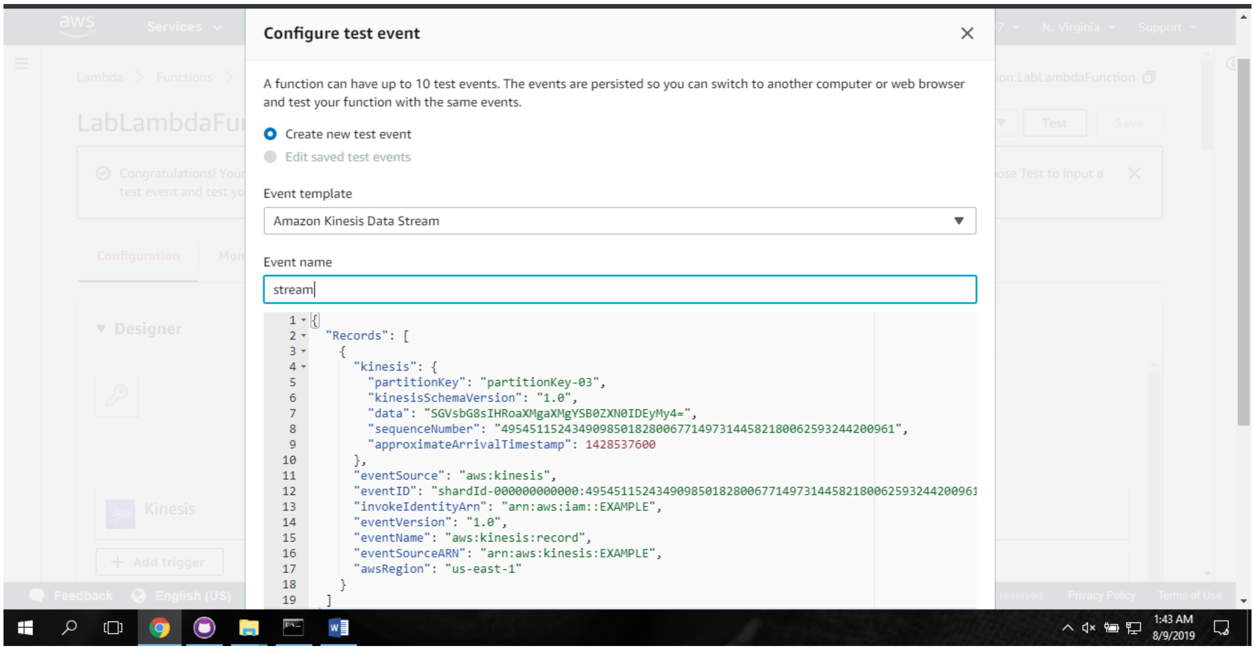
Click on Test button.



A function can have up to 10 test events. The events are persisted so you can switch to another computer or web browser and test your function with the same events.

● Create new test event

○ Edit saved test events

Event template: Amazon Kinesis Data Stream

Event name: stream

```
{
  "Records": [
    {
      "kinesis": {
        "partitionKey": "partitionKey-03",
        "kinesisSchemaVersion": "1.0",
        "data": "SGVsbG8sIHRoaXMgaXMgYSB0ZXN0IDEyMy4=",
        "sequenceNumber": "49545115243490985018280067714973144582180062593244200961",
        "approximateArrivalTimestamp": 1428537600
      },
      "eventSource": "aws:kinesis",
      "eventID": "shardId-000000000000:49545115243490985018280067714973144582180062593244200961
      "invokeIdentityArn": "arn:aws:iam::EXAMPLE",
      "eventVersion": "1.0",
      "eventName": "aws:kinesis:record",
      "eventSourceARN": "arn:aws:kinesis:EXAMPLE",
      "awsRegion": "us-east-1"
    }
  ]
```

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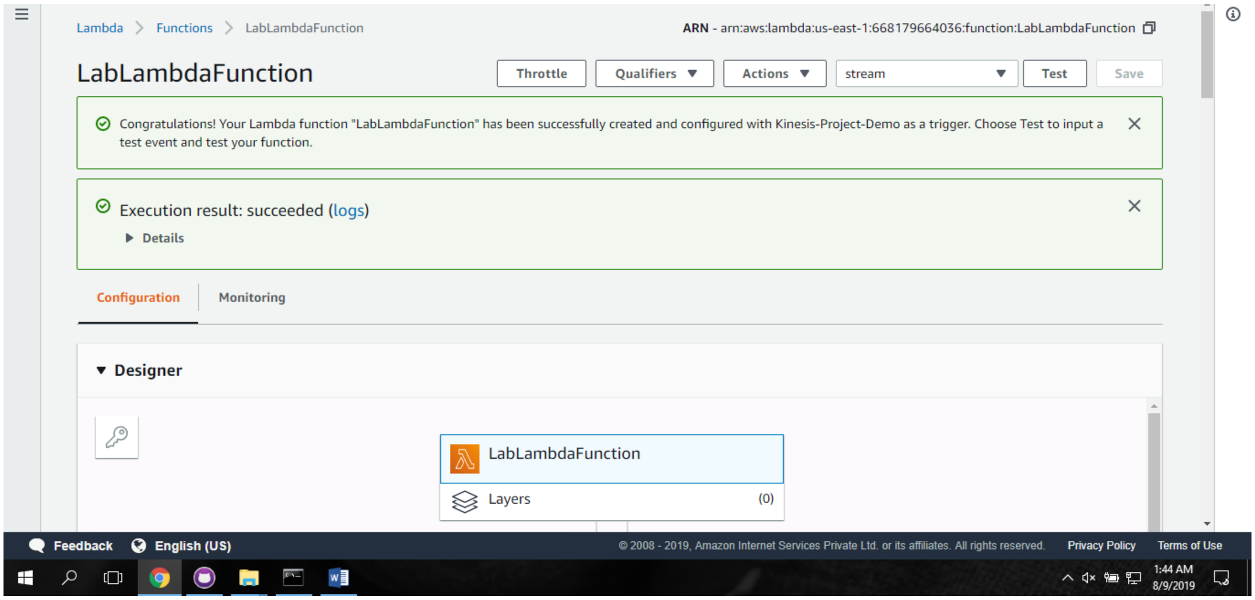
Click on Create and the Test button again.



ARN - arn:aws:lambda:us-east-1:668179664036:function:LabLambdaFunction

LabLambdaFunction

Congratulations! Your Lambda function "LabLambdaFunction" has been successfully created and configured with Kinesis-Project-Demo as a trigger. Choose Test to input a test event and test your function.

Execution result: succeeded (logs)

▶ Details

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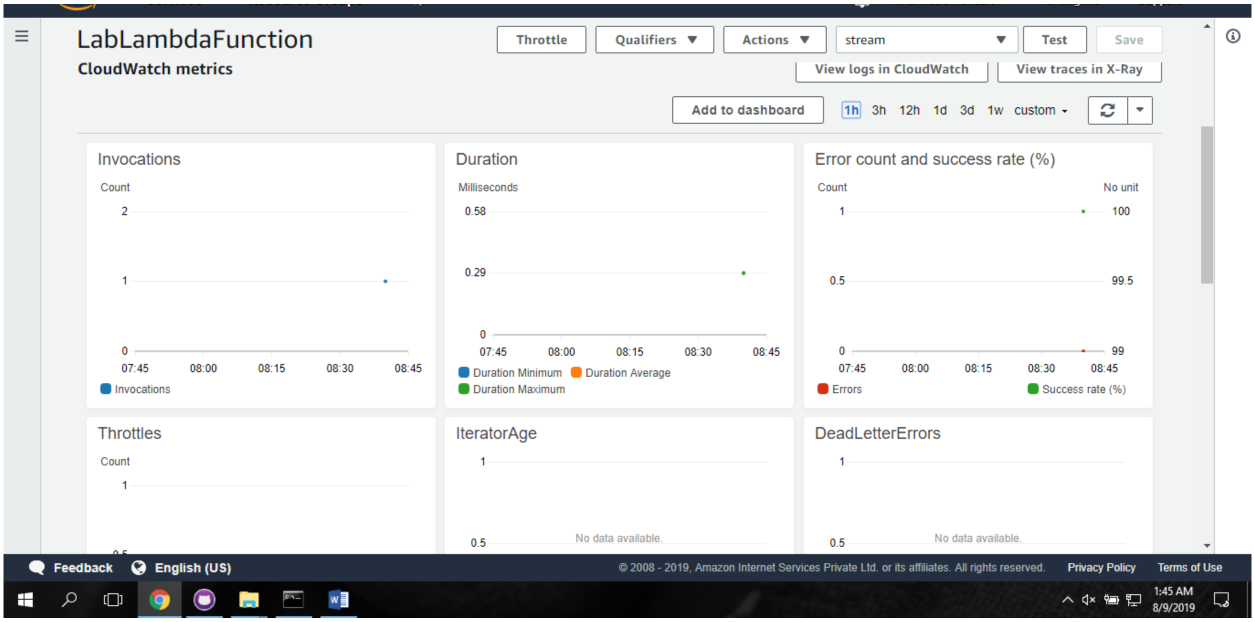

LabLambdaFunction

CloudWatch metrics

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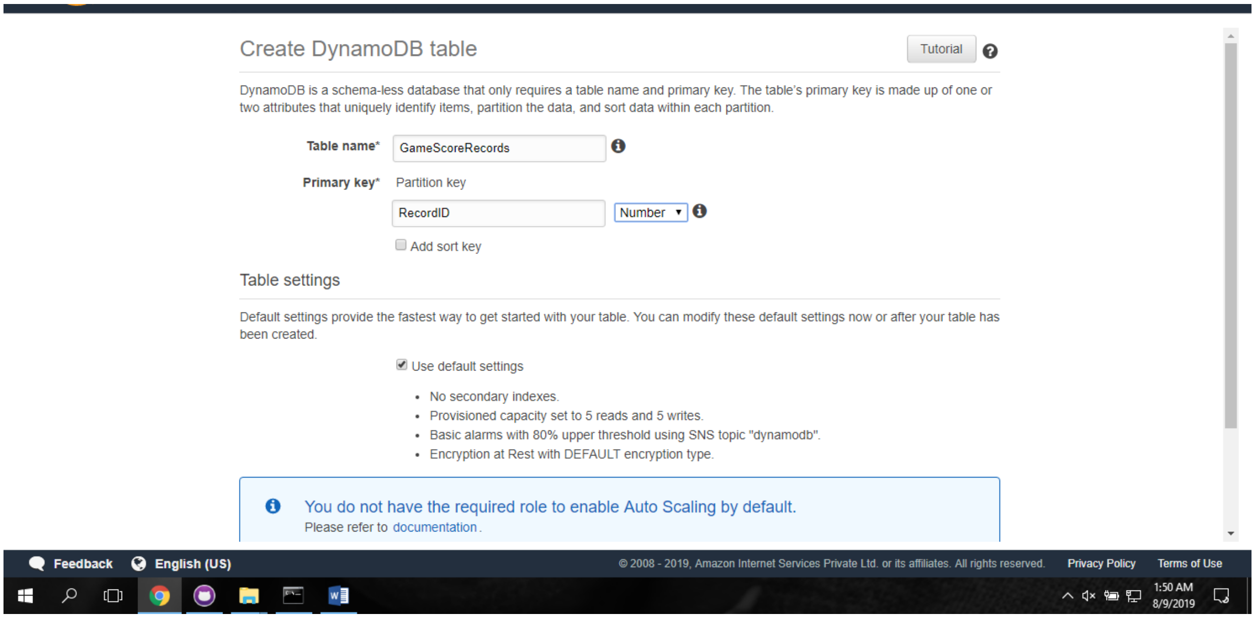
Click on Monitoring to get the detailed CloudWatch reports pertaining to the Test function.

Creating Tables in DynamoDB



Create DynamoDB table

DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

Table name* GameScoreRecords

Primary key* Partition key

RecordID Number

□ Add sort key

Table settings

Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.

☑ Use default settings

- No secondary indexes.
- Provisioned capacity set to 5 reads and 5 writes.
- Basic alarms with 80% upper threshold using SNS topic "dynamodb".
- Encryption at Rest with DEFAULT encryption type.

You do not have the required role to enable Auto Scaling by default.
Please refer to documentation.

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Create a DynamoDB table with the appropriate parameters.

Create another DynamoDB table.

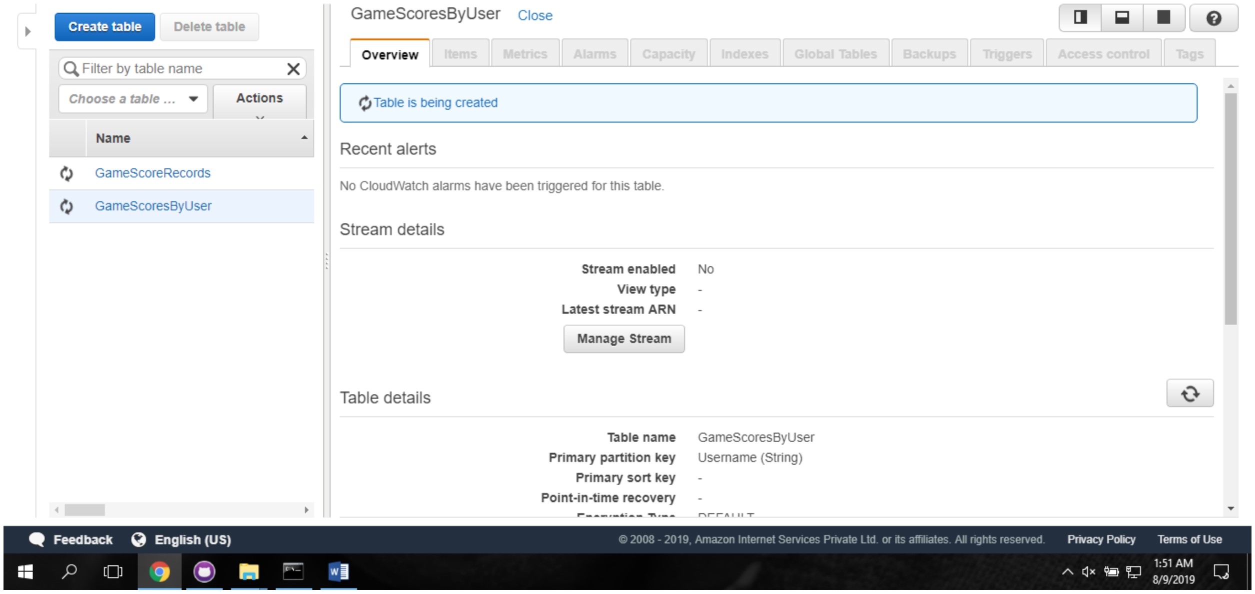


Table is being created

Recent alerts

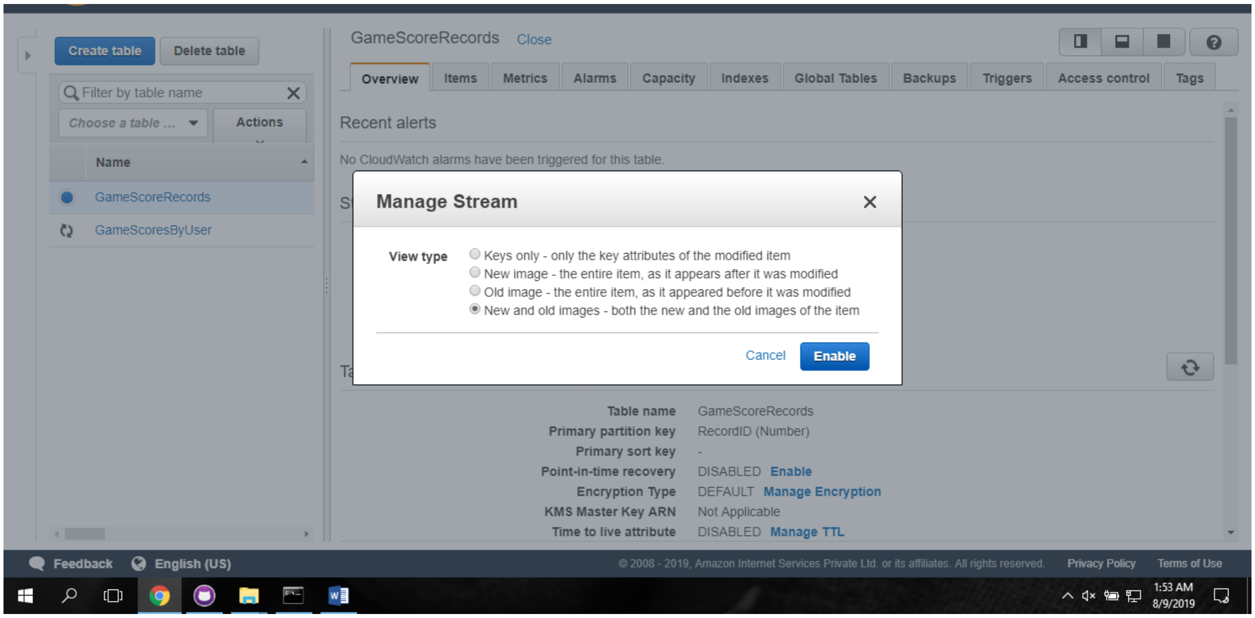
No CloudWatch alarms have been triggered for this table.

Stream details

Stream enabled No
View type -
Latest stream ARN -

Table details

Table name GameScoresByUser
Primary partition key Username (String)
Primary sort key -
Point-in-time recovery -
Encryption Type DEFAULT



No CloudWatch alarms have been triggered for this table.

Manage Stream

View type
○ Keys only - only the key attributes of the modified item
○ New image - the entire item, as it appears after it was modified
○ Old image - the entire item, as it appeared before it was modified
● New and old images - both the new and the old images of the item

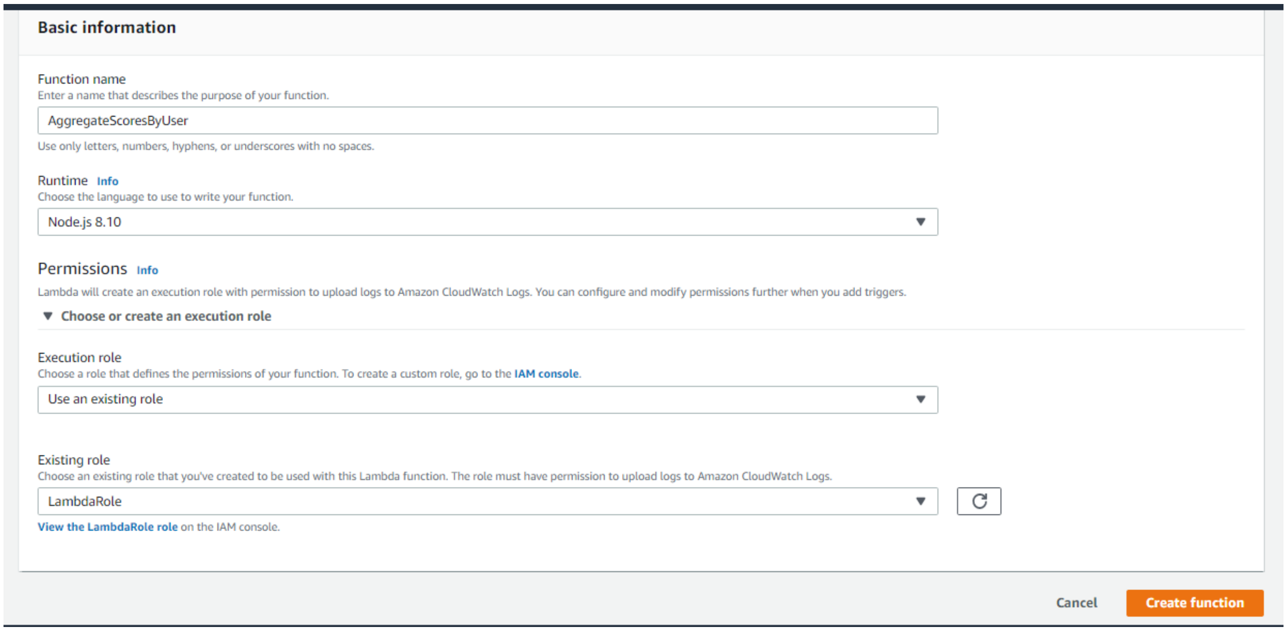
Table name	GameScoreRecords
Primary partition key	RecordID (Number)
Primary sort key	-
Point-in-time recovery	DISABLED Enable
Encryption Type	DEFAULT Manage Encryption
KMS Master Key ARN	Not Applicable
Time to live attribute	DISABLED Manage TTL

After the tables are ready, select the first table and click on Manage Stream from the Overview tab of the table. Select the appropriate option and click on Enable.

Create a Lambda Function

Edit the previously created IAM Role, and attach AmazonDynamoDBFullAccess Policy.

Create a Lambda Function.



Basic information

Function name
Enter a name that describes the purpose of your function.
AggregateScoresByUser
Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime Info
Choose the language to use to write your function.
Node.js 8.10

Permissions Info
Lambda will create an execution role with permission to upload logs to Amazon CloudWatch Logs. You can configure and modify permissions further when you add triggers.
▼ Choose or create an execution role

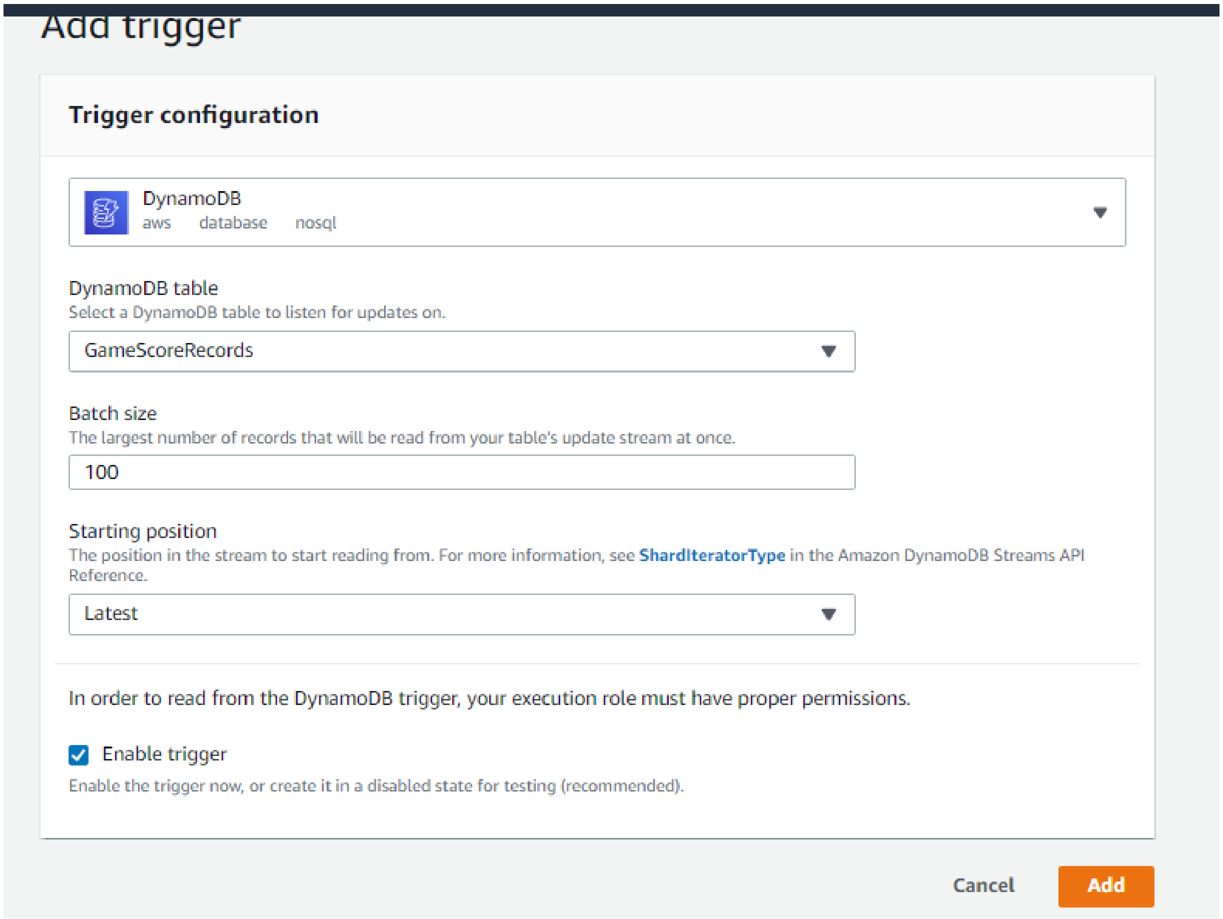
Execution role
Choose a role that defines the permissions of your function. To create a custom role, go to the IAM console.
Use an existing role

Existing role
Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.
LambdaRole
View the LambdaRole role on the IAM console.

Scroll down to the Code editor. In the index.js part, paste the following code:

https://pastebin.com/TV8C9r6j

Click on Add Trigger button.



Add trigger

Trigger configuration

DynamoDB
aws database nosql

DynamoDB table
Select a DynamoDB table to listen for updates on.

GameScoreRecords

Batch size
The largest number of records that will be read from your table's update stream at once.

100

Starting position
The position in the stream to start reading from. For more information, see ShardIteratorType in the Amazon DynamoDB Streams API Reference.

Latest

In order to read from the DynamoDB trigger, your execution role must have proper permissions.

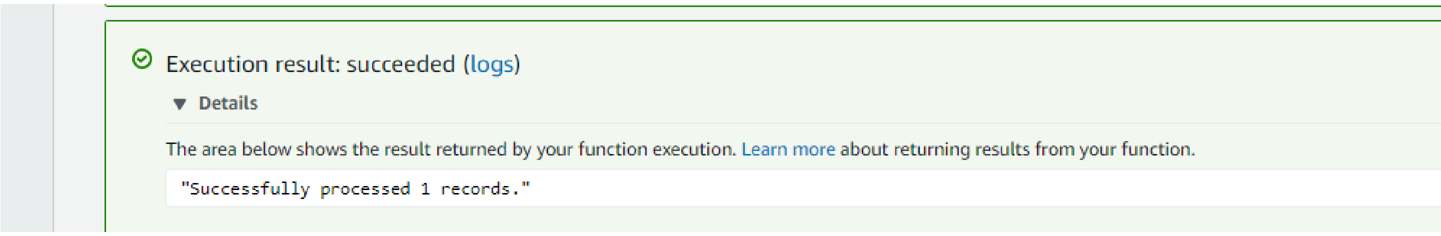
☑ Enable trigger
Enable the trigger now, or create it in a disabled state for testing (recommended).

Click on Test button.

In the code editor that appears, paste the following code:

https://pastebin.com/cw0jTEgi

Click on the Test button again.



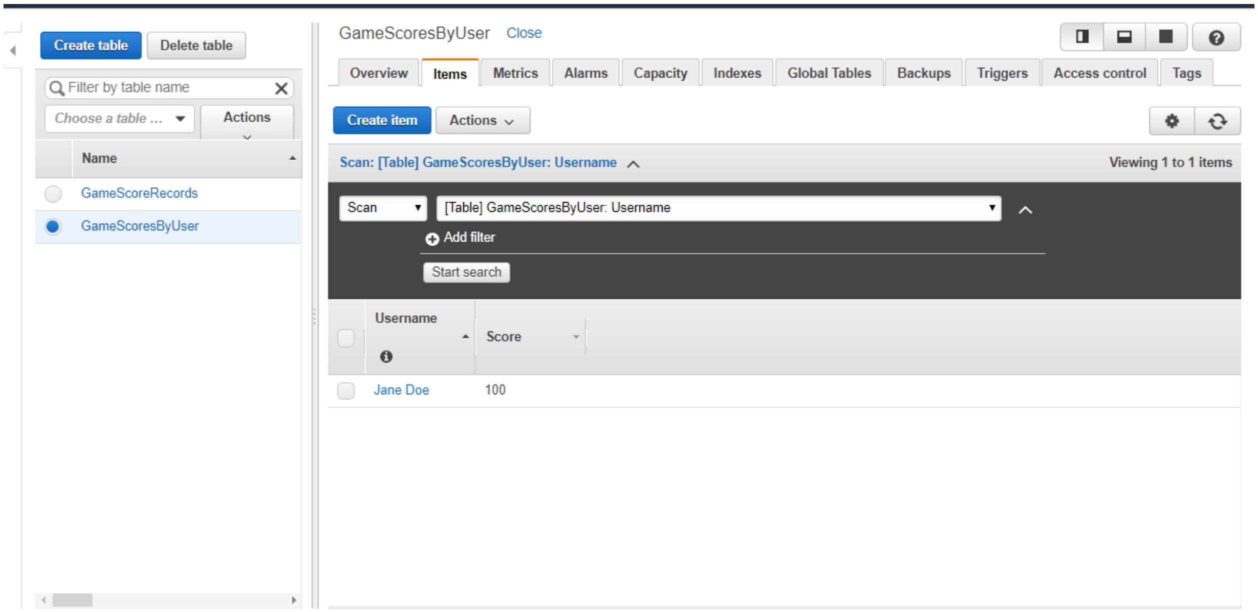
Execution result: succeeded (logs)

▼ Details

The area below shows the result returned by your function execution. Learn more about returning results from your function.

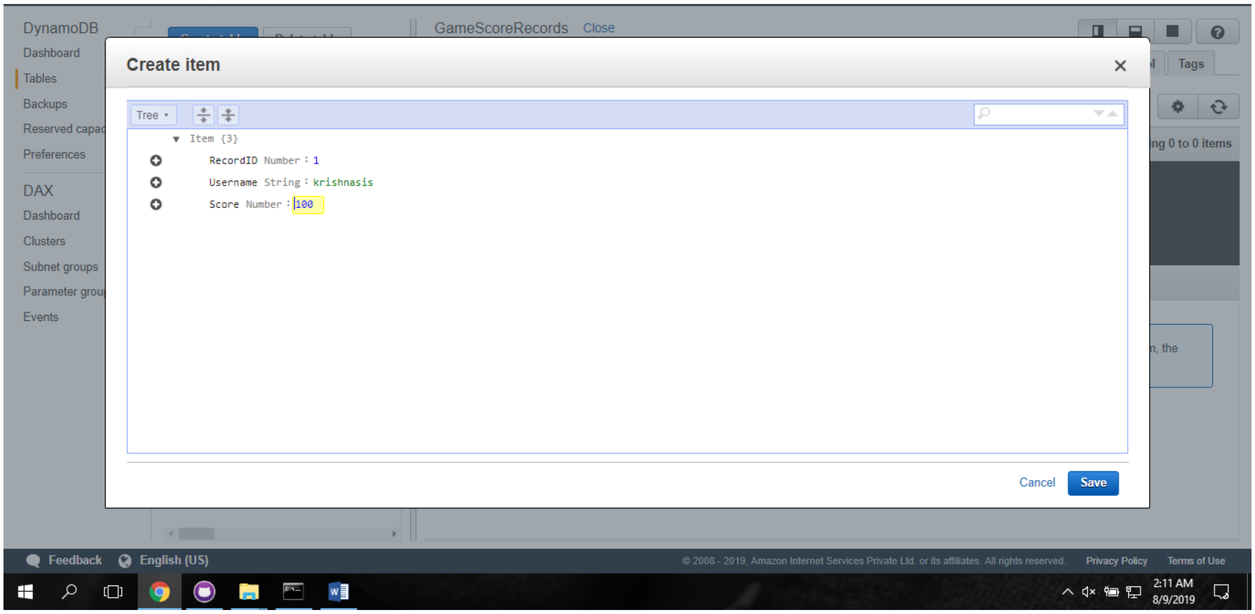
```
"Successfully processed 1 records."
```

Navigate to the DynamoDB tables and click on the table that we entered the test data into. You will see the data is reflecting in the table.



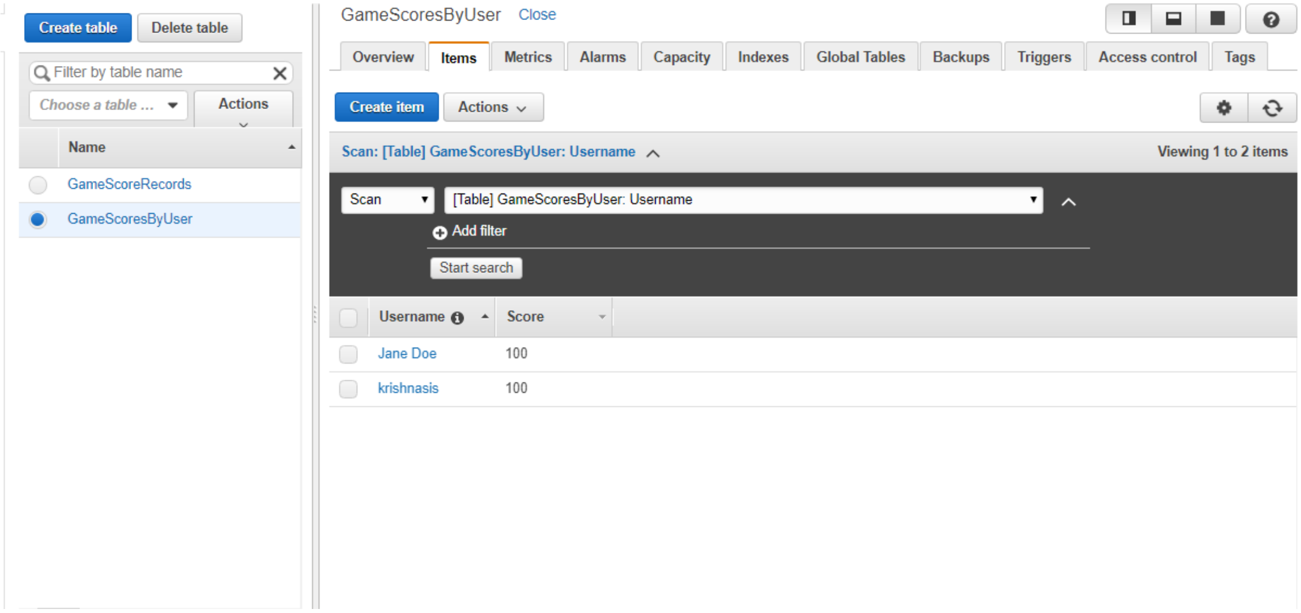
Username	Score
Jane Doe	100

Create an item in the other table, to test if the Lambda function is working or not.



```
▾ Item {3}
    RecordID Number : 1
    Username String : krishnasis
    Score Number : 100
```

Navigate to the other table, the record will reflect there as well. This shows that the Lambda function works properly.



Username	Score
Jane Doe	100
krishnasis	100

Thank You