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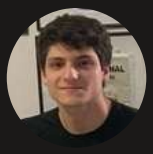
Fetch Data with AWS Lambda

Nicolás Aversa



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Introducing Today's Project!

In this project, I will demonstrate how to build a serverless data pipeline using AWS Lambda and DynamoDB. I'm doing this project to learn scalable cloud architecture—where applications handle millions of requests without managing servers!

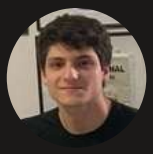
Tools and concepts

Services I used were DynamoDB, Lambda, and IAM. Key concepts I learnt include Lambda functions, Lambda function tests, and inline policy writing.

Project reflection

This project took me approximately one hour and a half. The most challenging part was attaching the necessary permissions to my Lambda execution role so it could read items from my DynamoDB table. It was most rewarding to see the Lambda function test return the expected output.

I did this project today to continue my Three-Tier Web App by integrating a DynamoDB table into the architecture. This project met my goals, and I'm excited to finalize the series by combining all components into one unified solution!



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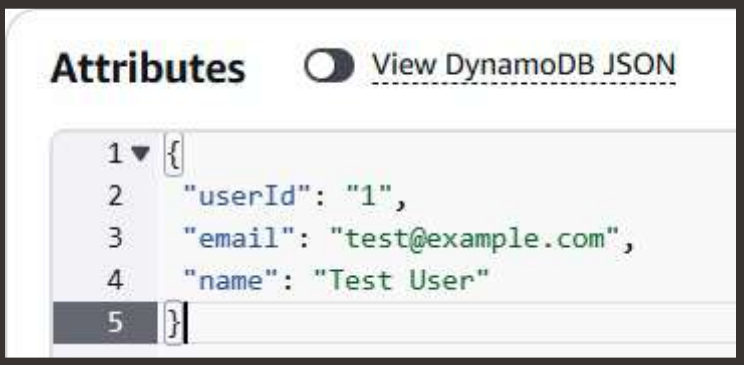
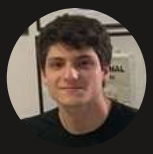
Project Setup

To set up my project, I created a database using Amazon DynamoDB. The partition key acts as the primary identifier for each record, which means DynamoDB uses it to physically distribute data across partitions for high scalability.

In my DynamoDB table, I added a new item for my UserData table. DynamoDB is schemaless, which means you can add attributes as you need, and every item in your database can have a different set of attributes.





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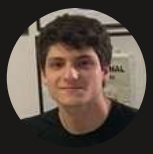
AWS Lambda

AWS Lambda is a service that lets you run code without needing to manage any computers/servers - Lambda will manage them for you. I'm using Lambda in this project to create a function that retrieves user data from my DynamoDB table.



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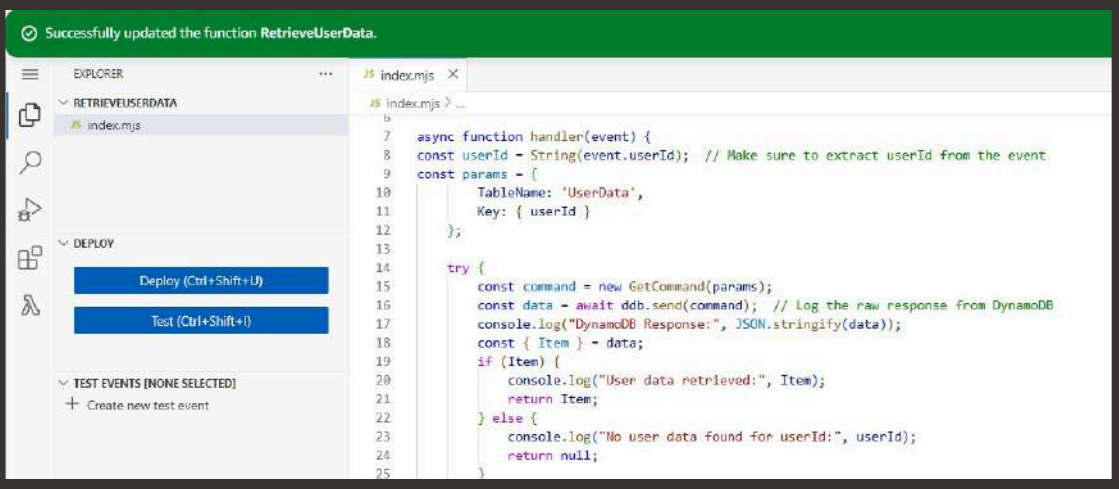
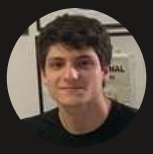
AWS Lambda Function

My Lambda function has an execution role, which is an IAM role for my Lambda function. It defines what the function is allowed to do, e.g. accessing other AWS services like DynamoDB. By default, the role grants basic permissions for writing logs to CloudWatch.

My Lambda function will take a userId as input, grab the corresponding data from the UserData table, and return it to the user.

The code uses AWS SDK, which is a set of tools that let developers build apps that interact with AWS. It's like a library of pre-written code that lets you use AWS services without having to write all the code yourself. It gives you functions and classes that simplify common tasks, like creating an S3 bucket or launching an EC2 instance. My code uses SDK to let JavaScript interact with DynamoDB.





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Function Testing

To test whether my Lambda function works, I wrote a test event that asks my Lambda function to search for an item in my DynamoDB table. The item needs to have a userId of 1. The test is written in JSON, since it is an easy format for Lambda to understand and work with. If the test is successful, I'd see the data of the item with a userId of 1.

The test displayed a 'success' because the function itself could run (there are no errors with the code) but the function's response was actually an error because I haven't given it explicit permission to access my DynamoDB table. This means DynamoDB is currently blocking off my Lambda function from reading the table's items!

```
{
  "name": "AccessDeniedException",
  "$fault": "client",
  "$metadata": {
    "httpStatusCode": 400,
    "requestId": "H09I4J2FMAHI1RLROQ4UDDLO2RVV4KQNSO5AEMVJF66Q9ASUAAJG",
    "attempts": 1,
    "totalRetryDelay": 0
  },
  "__type": "com.amazon.coral.service#AccessDeniedException",
```

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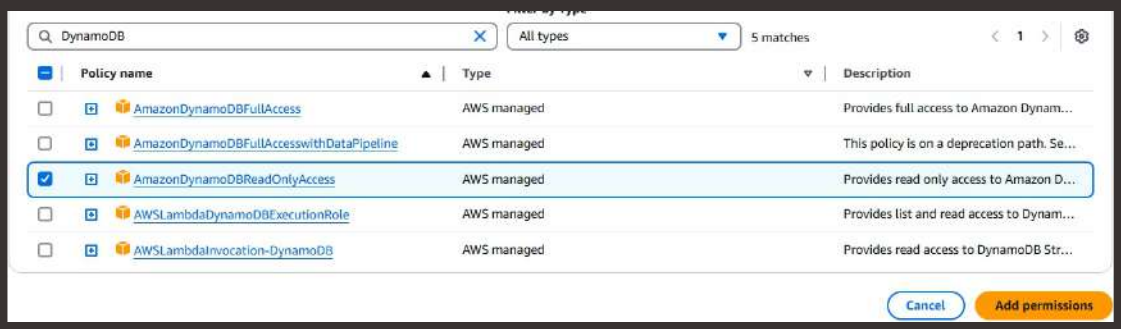
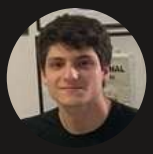
Function Permissions

To resolve the AccessDenied error I headed back to the error message because it tells me exactly which permissions the Lambda function lacks.

There were five DynamoDB permission policies I could choose from, but I didn't pick 'AWSLambdaDynamoDBExecutionRole' or 'AWSLambdaInvocation-DynamoDB' because they lacked the GetItem permission.

I also didn't pick 'AmazonDynamoDBFullAccess' because my Lambda function only needs to read data, so I don't need this level of access. Granting this permission when you don't need it can make your resources less secure. 'AmazonDynamoDBReadOnlyAccess' was the right choice because it grants the right level of access I need for this task: read data from my DynamoDB table.





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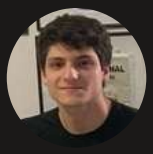
Final Testing and Reflection

To validate my new permission settings, I re-ran the Lambda function test. The results were succesful because the response showed the user data with a userId of 1 from my DynamoDB table.

Web apps are a popular use case of using Lambda and DynamoDB. For example, I could help customers find products, get product information or see their order history by fetching data from DynamoDB. Also, it can help social media apps fetch user profiles or automatically retrieve all content (e.g. videos or images) linked with a profile.



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Enahancing Security

For my project extension, I challenged myself to remove the 'AmazonDynamoDBReadOnlyAccess' policy and use an inline policy instead. This will allow for more granular control. In this case, I only want my Lambda function to access the UserData table, so an inline policy is more secure. It will allow me to take out the unnecessary permissions that ReadOnlyAccess is still giving me.

To create the permission policy, I used JSON because it is a more efficient solution since I'm already familiar with policy writing.

When updating a Lambda function's permission policies, you could risk introducing security vulnerabilities or breaking existing integrations if policies are too permissive or overly restrictive. I validated that my Lambda function still works by running the test again!

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