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ADVANCE DEVOPS CASE STUDY REPORT

CASE STUDY TOPIC:

Case Study No:19:Building a Serverless REST API

• **Concepts Used:** AWS Lambda, API Gateway, DynamoDB

• **Problem Statement:** "Create a simple serverless REST API using AWS Lambda and API Gateway to manage user data in a DynamoDB table. The API should support adding a new user and retrieving user details."

• **Tasks:**

- Create a DynamoDB table to store user data.
- Write two Lambda functions: one for adding a user to the table and another for retrieving user details by ID. o Set up an API Gateway to trigger these Lambda functions based on HTTP methods (POST for adding and GET for retrieving).
- Test the API using curl or Postman.

INTRODUCTION:

Case Study Overview:

- This case study focuses on building a serverless REST API using AWS Lambda, API Gate way, and DynamoDB. The goal is to manage user data effectively by creating a simple, scalable, and efficient solution without the need for traditional server management**.**

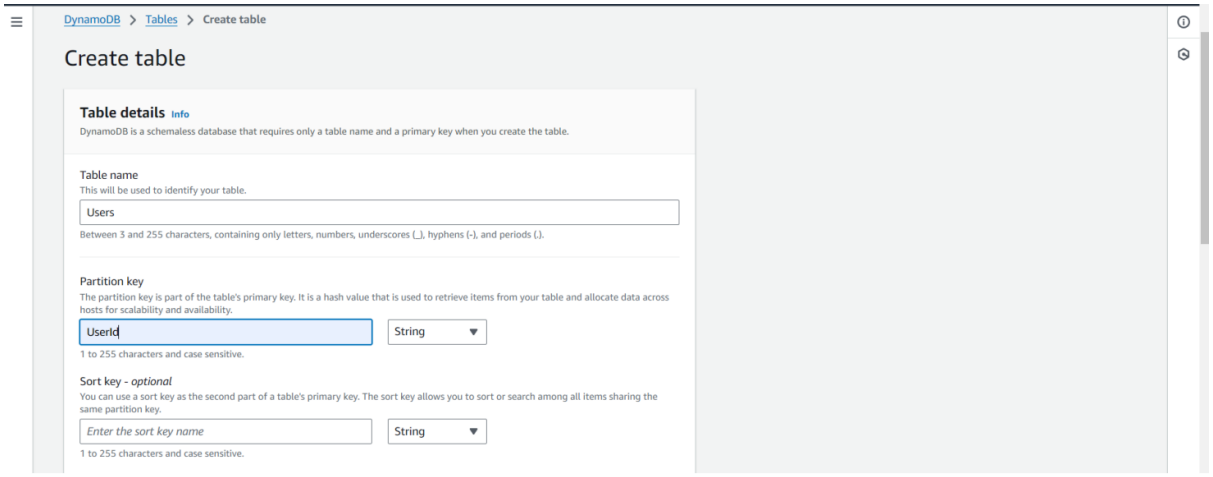
Key Feature and Application:

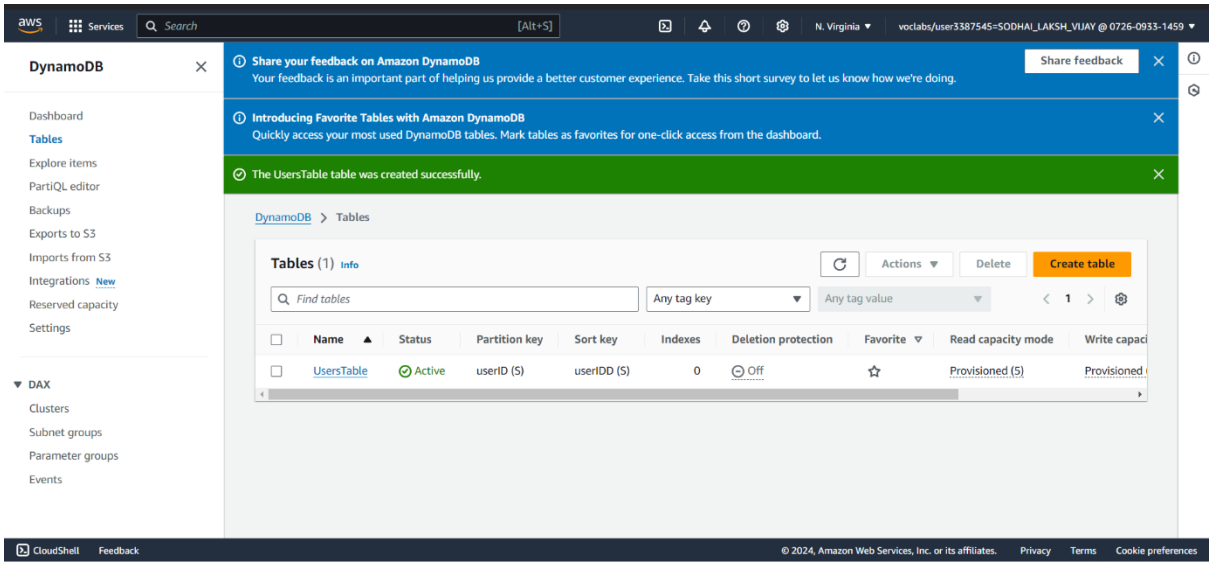
- **Unique Feature:** The serverless architecture eliminates the need for server provisioning and management. It scales automatically based on demand, reducing costs and operational complexity.
- **Practical Use:** This setup is ideal for applications requiring scalable APIs with minimal infrastructure management, such as mobile backends, microservices, and realtime data processing.

1.Step-by-Step Explanation:

Step 1: Initial Setup - Creating a DynamoDB Table

- **Log in to AWS Management Console.**
- **Open DynamoDB from the services.**
- **Create a Table:**
  - Table Name: Users
  - Partition Key: UserId (String)
  - Leave other settings as default.
  - Click Create Table



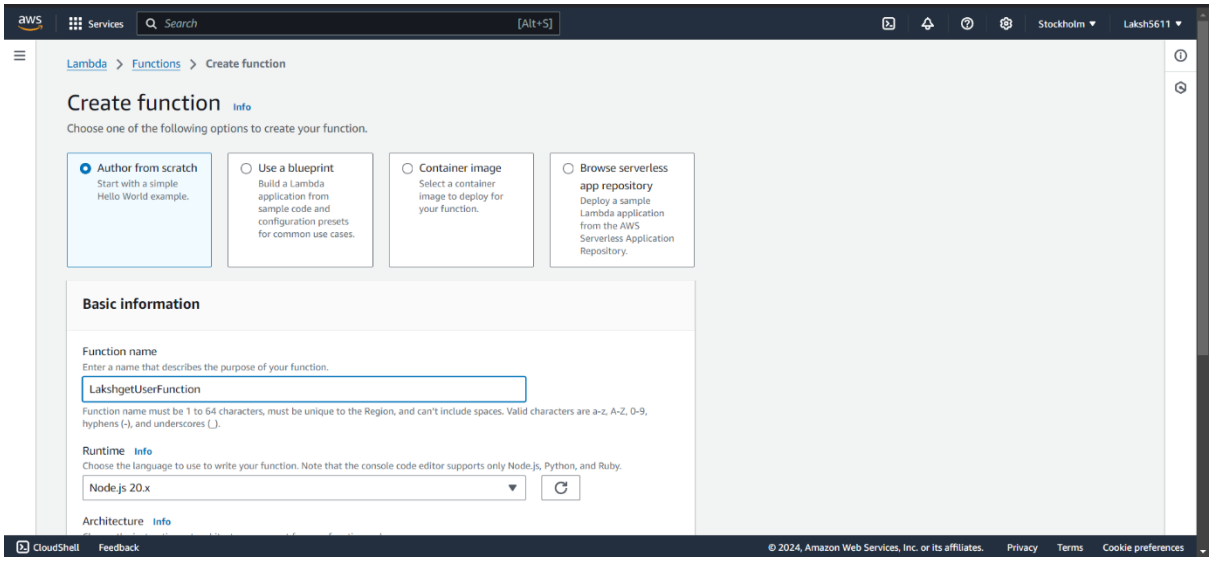


Step 2: Creating AWS Lambda Functions

Creating addUserFunction

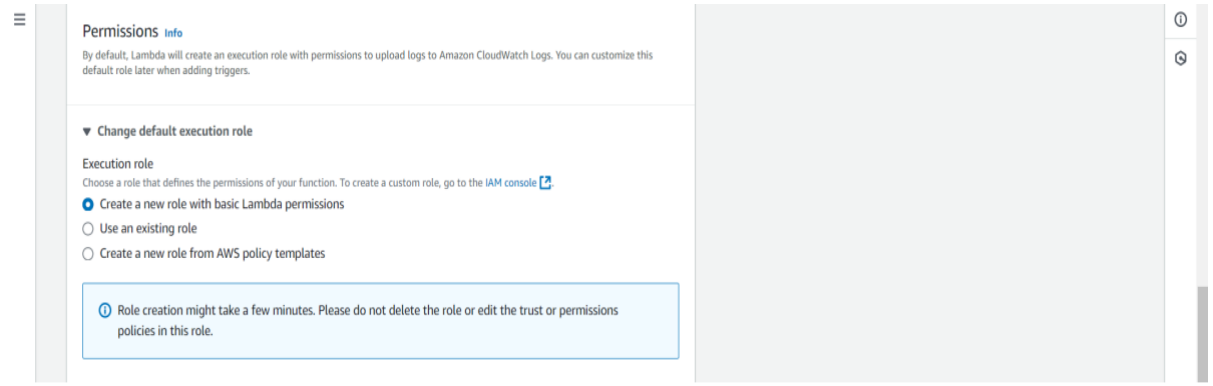
1. **Open AWS Lambda from the services.**
2. **Click Create Function.**
3. **Choose Author from scratch**

- Function Name: addUserFunction
- Runtime: Python 3.12

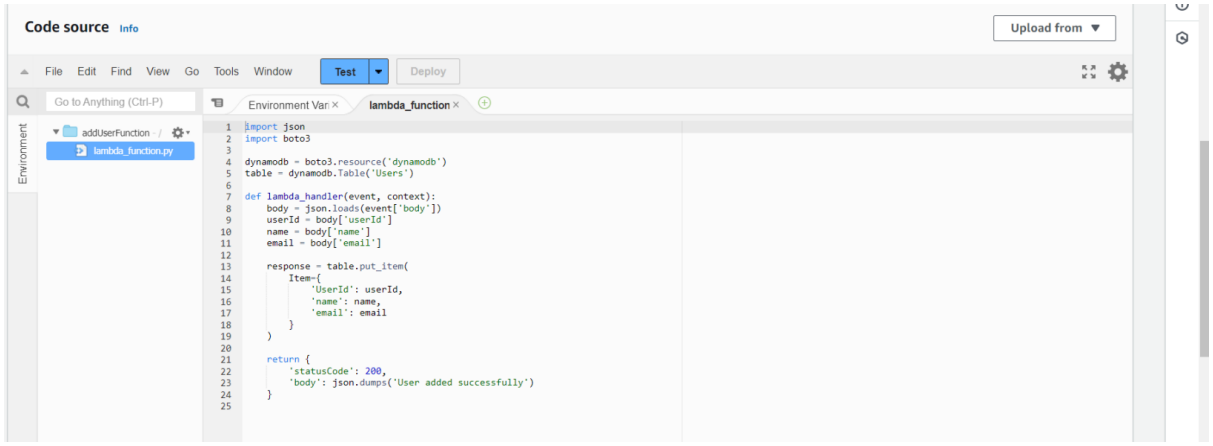


4. Create new role with permission to access DynamoDB.

5. Click Create Function

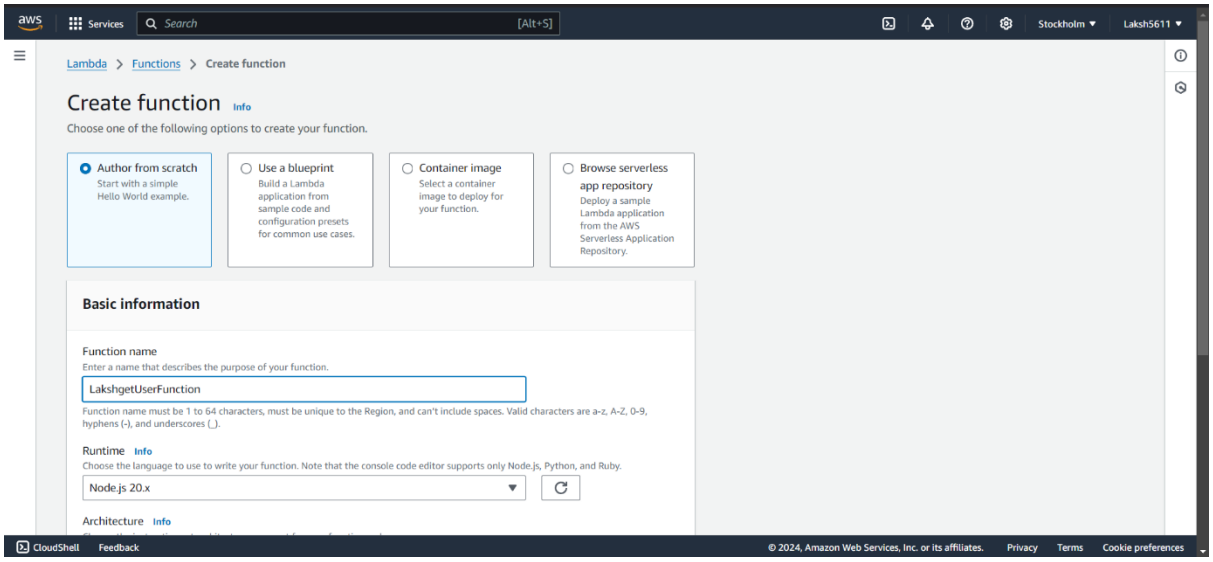


Code for addUserFunction:

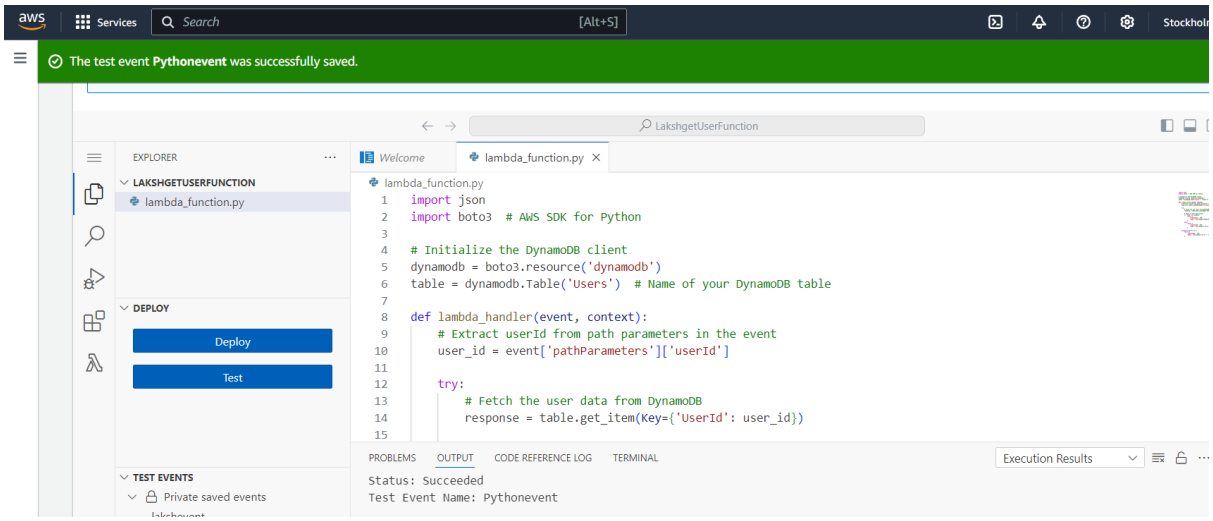


Creating getUserFunction

1. Repeat the process to create another Lambda function.
    - Function Name: getUserFunction
    - Runtime:Python 3.X
    - Select the same execution role that has DynamoDB access



Code for getUserFunction:

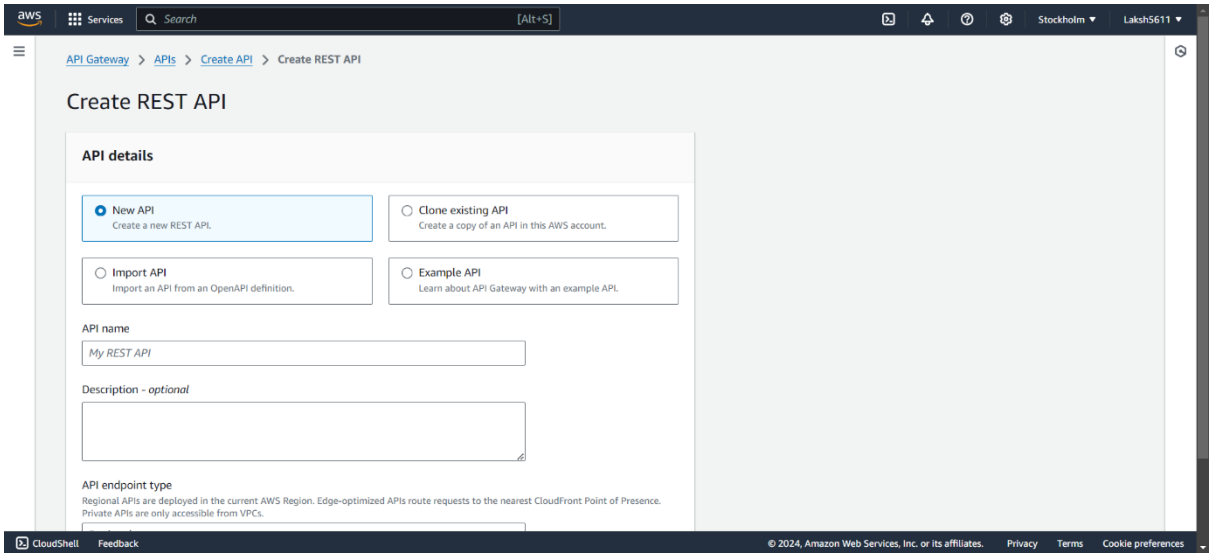


Output-

```
PROBLEMS  OUTPUT  CODE REFERENCE LOG  TERMINAL                                                    Execution Results

Status: Succeeded
Test Event Name: Pythonevent

Response:
{
  "statusCode": 500,
  "body": "{\"error\": \"An error occurred (AccessDeniedException) when calling the GetItem operation: User:
  arn:aws:sts::650251692479:assumed-role/LakshgetUserFunction-role-fvf61xez/LakshgetUserFunction is not authorized to perform:
  dynamodb:GetItem on resource: arn:aws:dynamodb:eu-north-1:650251692479:table/Users because no identity-based policy allows the
  dynamodb:GetItem action\"}"
}

Function Logs:
START RequestId: 2eb7eb3f-2508-4242-9d12-16c708749a16 Version: $LATEST
END RequestId: 2eb7eb3f-2508-4242-9d12-16c708749a16
REPORT RequestId: 2eb7eb3f-2508-4242-9d12-16c708749a16  Duration: 639.34 ms Billed Duration: 640 ms Memory Size: 128 MB Max
Memory Used: 78 MB  Init Duration: 473.13 ms

Request ID: 2eb7eb3f-2508-4242-9d12-16c708749a16
```

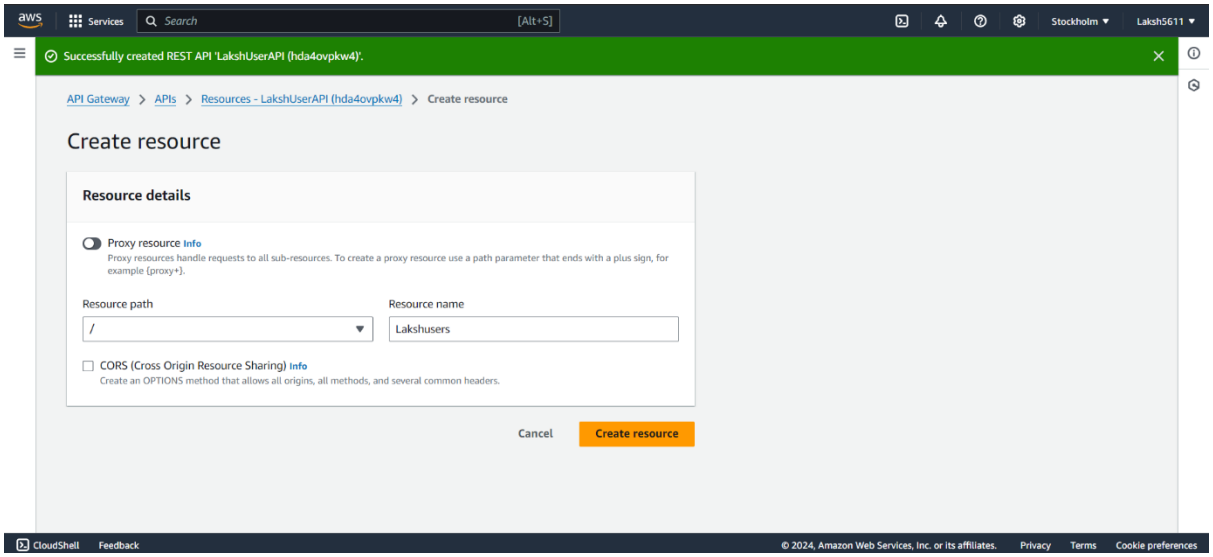
Step 3: API Gateway Configuration Creating the API

1. Open API Gateway from the services.
2. Click Create API.
3. Choose HTTP API or REST API.
4. Name it (e.g., UserAPI).

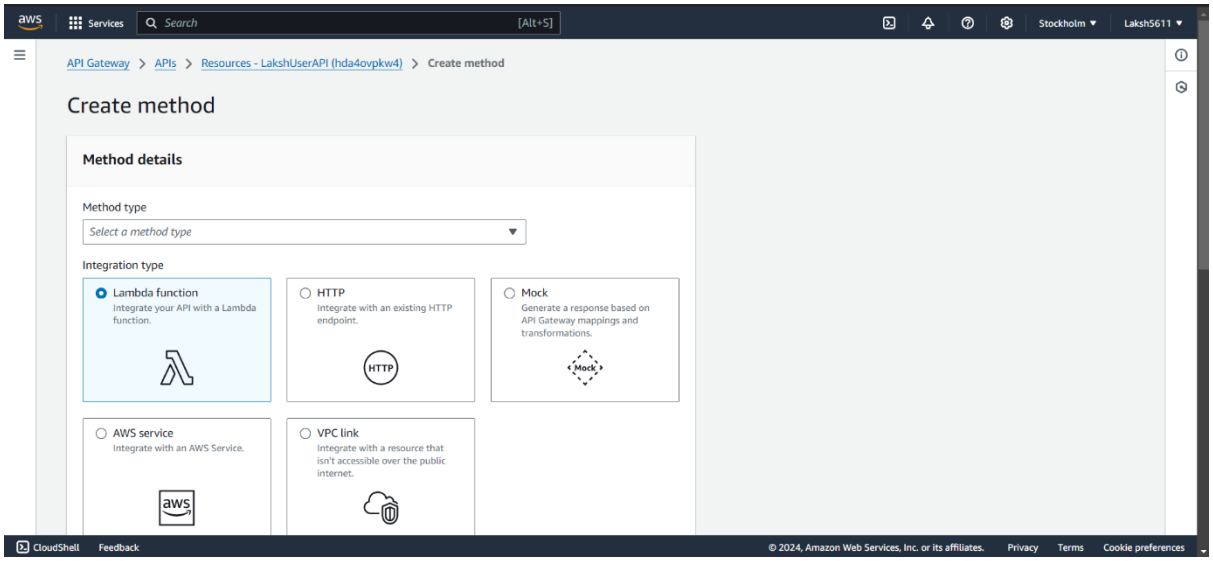


Creating POST Method for Adding User

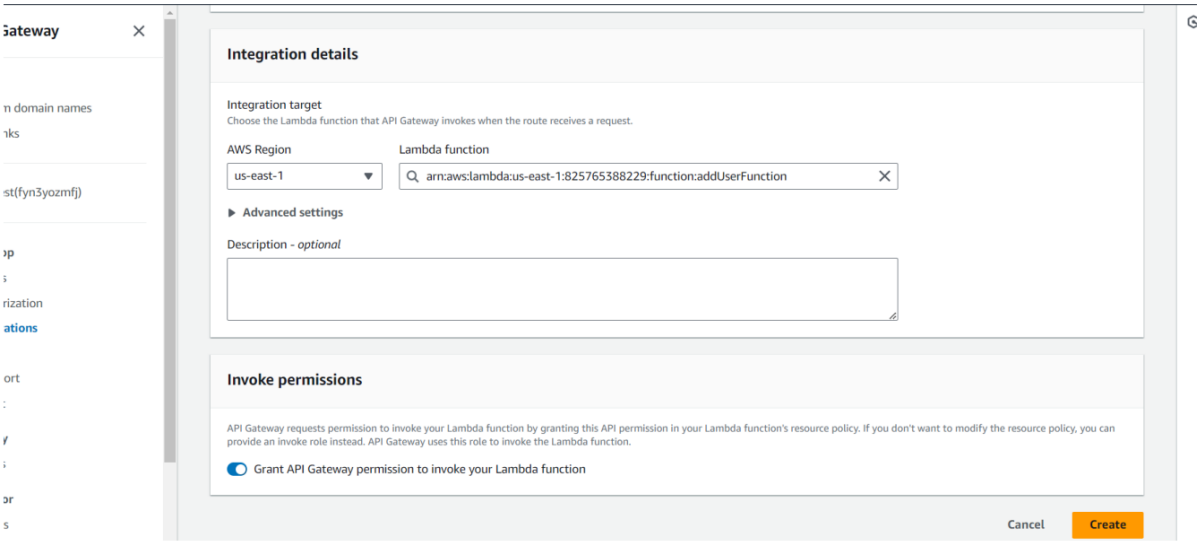
1. Inside API Gateway, click Actions > Create Resource.
2. Provide a Resource Name (e.g., user).
3. Keep the Resource Path as /user.
4. Click Actions > Create Method.
5. Select POST.



6. Under Integration Type, choose Lambda Function

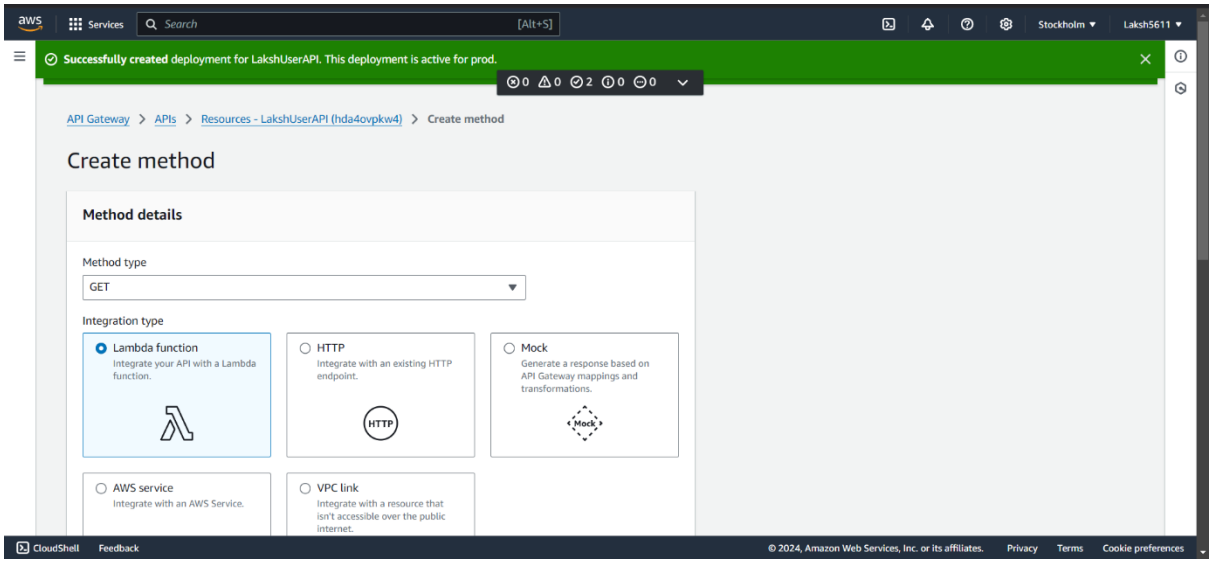


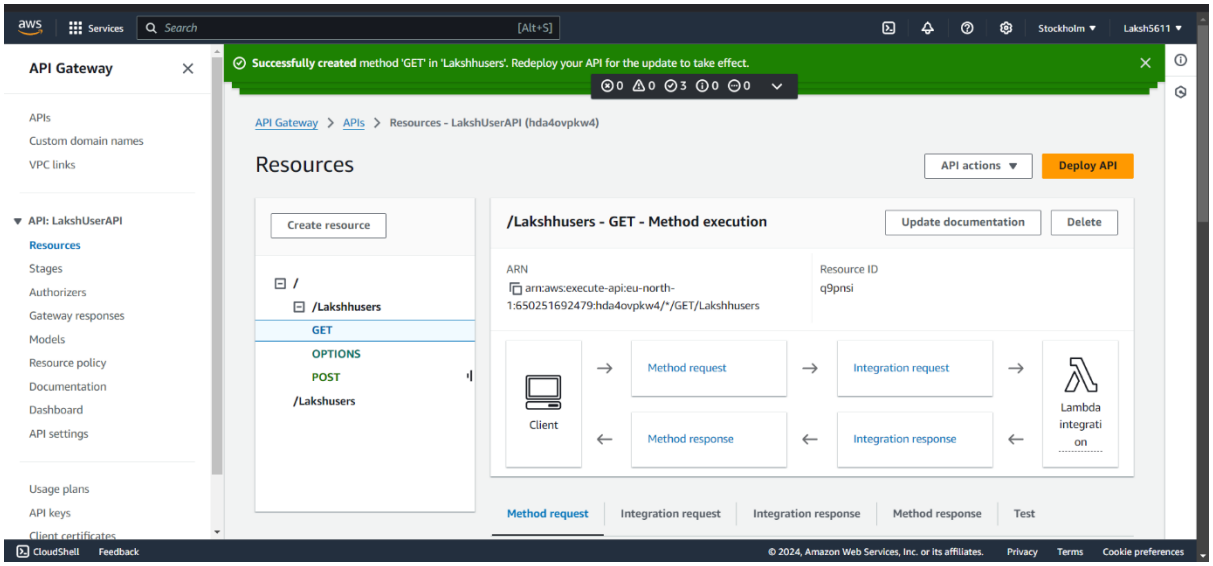
7. Select the addUserFunction Lambda function.
8. Click create.



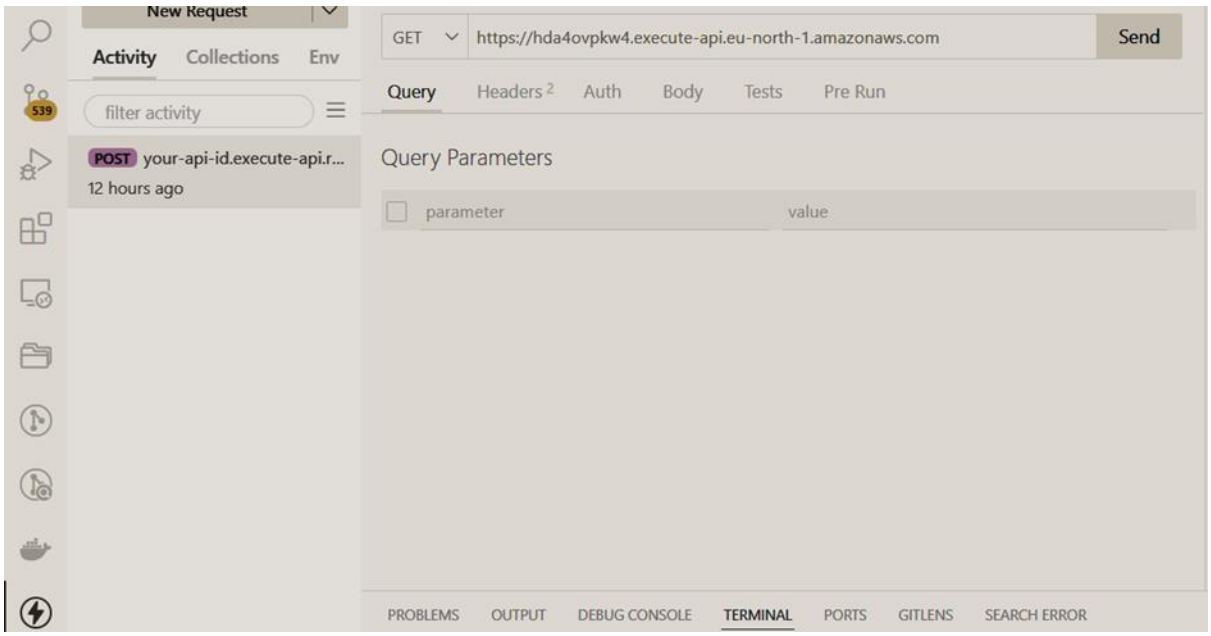
Creating GET Method for Retrieving User by ID

1. Under Actions, select Create Method.
2. Choose GET.
3. Under Integration Type, choose Lambda Function.
4. Select the getUserFunction Lambda function.
5. Set Path Parameters (e.g., /user/{userId}).
6. Click Create.

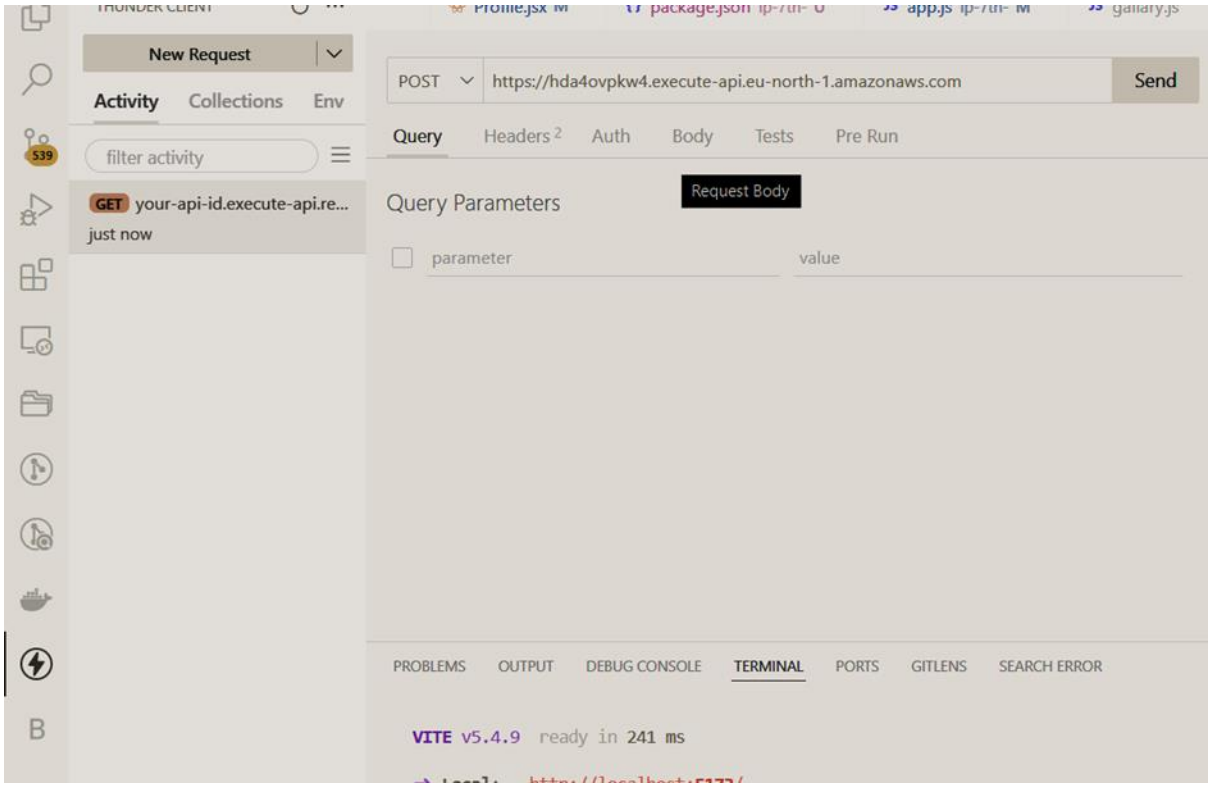




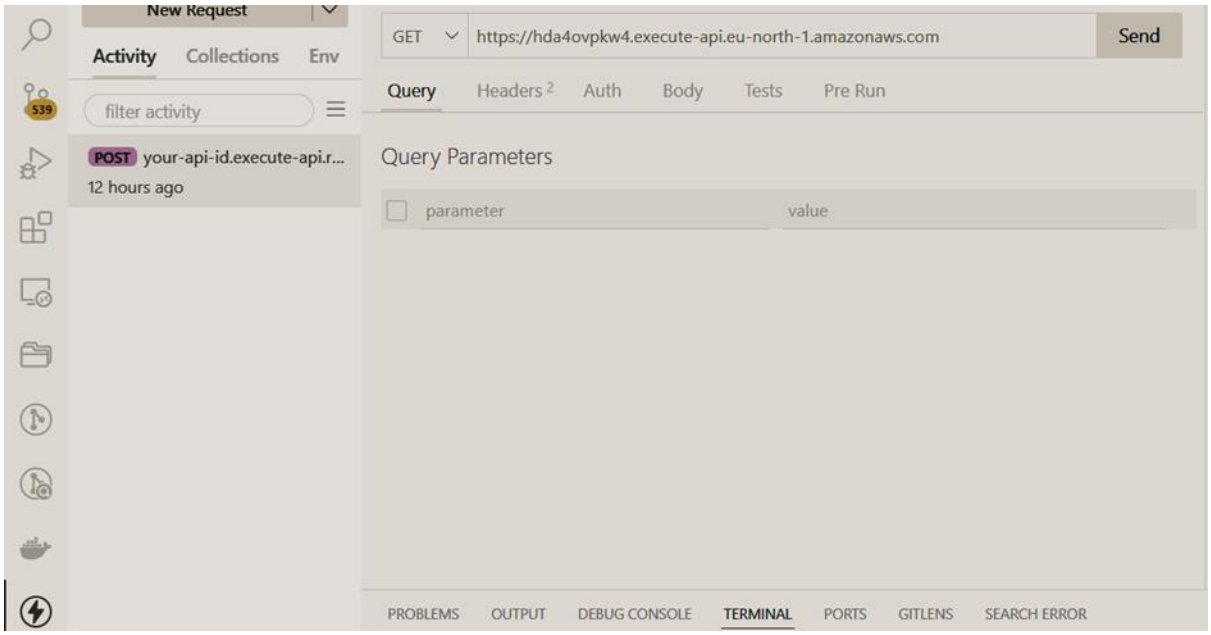
Testing the api on Thunder Client(V.S. Code):



Post request to add data to the dynamo table



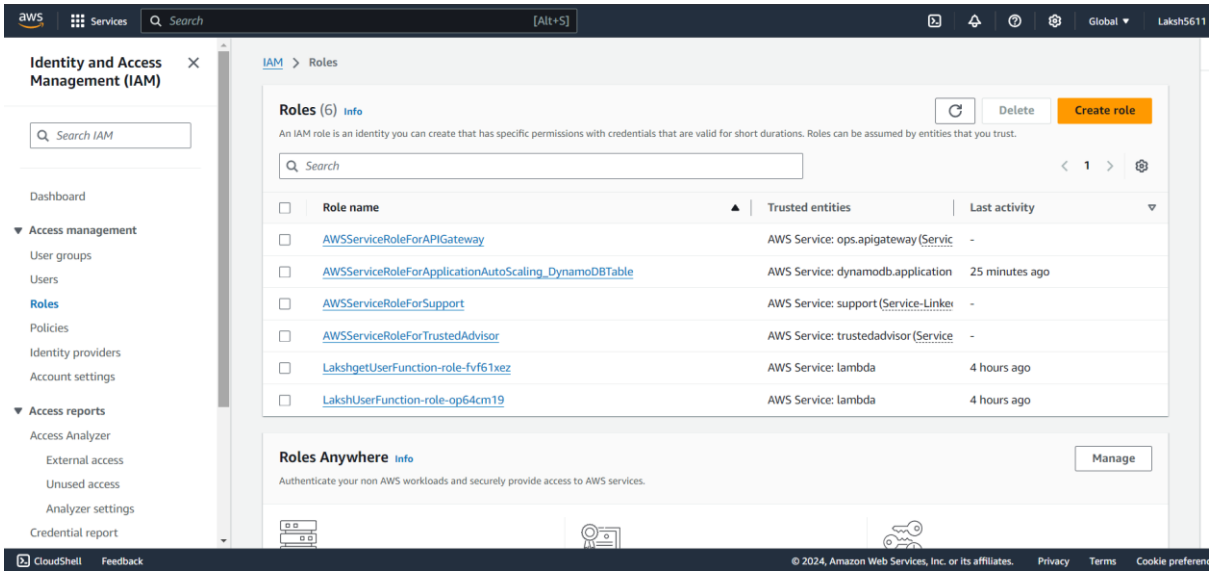
Get request to fetch the user data from table

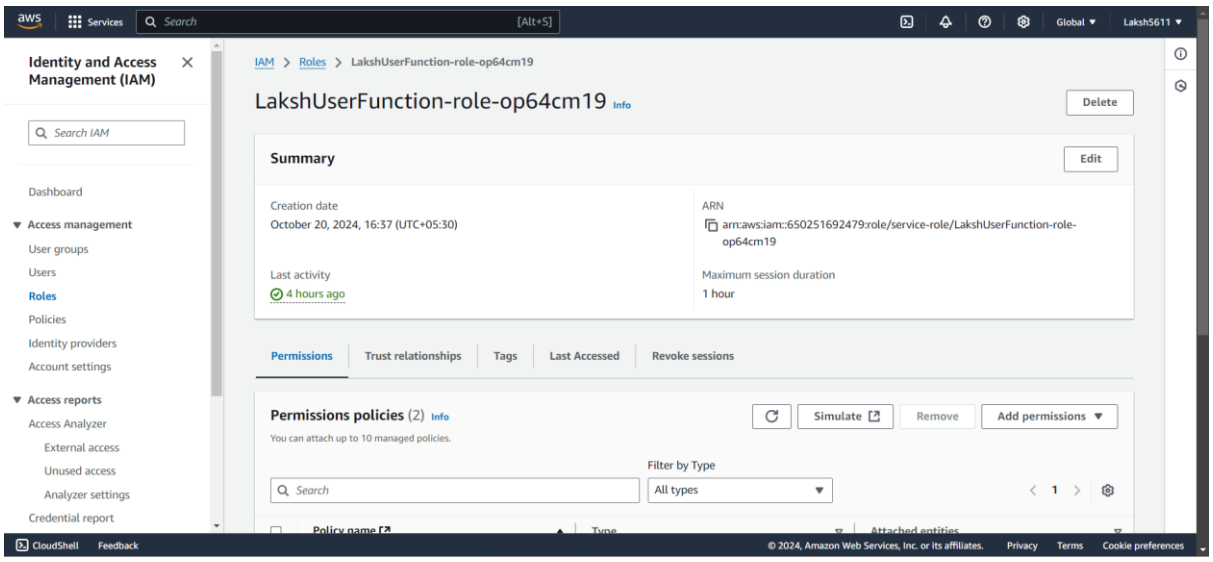


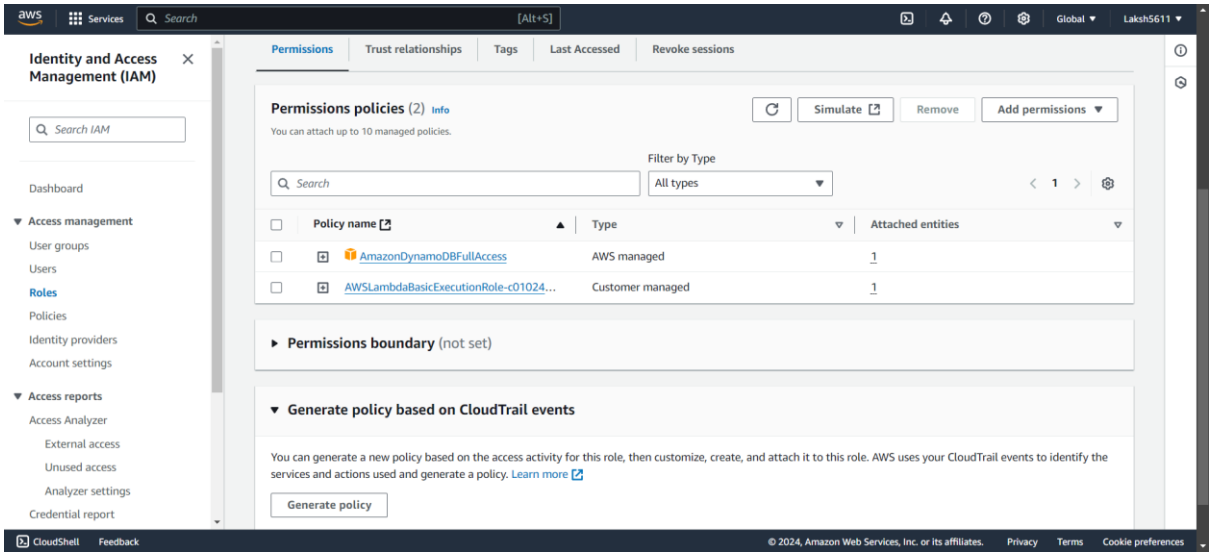
Trying to fetch the data not present in the table

Guidelines

- **Ensure IAM roles have correct permissions:**
  - Attach DynamoDBAccessPolicy with actions: dynamodb:PutItem and dynamodb:Get Item
  - Attach AWSLambdaBasicExecutionRole for logging.







Problems I Faced During execution :

Problem 1: Permissions Error

- **Issue: Encountered Access Denied Exception when the Lambda function tried to perform operations on DynamoDB.**
- **Solution: Updated the IAM role to include the necessary permissions.**

Attached the following policy:

```
{
 "Version": "2012-10-17",
 "Statement": [
 {
     "Effect": "Allow",
     "Action": [
                  "dynamodb:PutItem",
                  "dynamodb:GetItem"
                ],
 "Resource": "arn:aws:dynamodb:us-east-1:825765388229:table/Users"
}
 ]
 }
```

Problem 2: DynamoDB Validation Error

- Issue: Encountered ValidationException due to missing UserId key in the item.
- Solution: Ensured the UserId key in the item matched the DynamoDB table's partition key:

javascript

Copy const params = {

TableName: 'Users',

Item: {

'UserId': userId,

'name': name,

'email': email

}

};

Conclusion:

In this case study, I have successfully built a Serverless REST API using AWS Lambda, API Gate way, and DynamoDB. The key features include the serverless architecture that eliminates the need for server management, and the scalability and cost-efficiency provided by AWS services.

Throughout the project, we tackled several challenges, including configuring permissions, ensuring correct setup of the Lambda functions, and managing costs. By leveraging these technologies, we demonstrated how to efficiently manage user data with minimal overhead and high reliability.

This project showcases the practical application of cloud-

native solutions in building robust and scalable APIs, emphasizing the importance of proper configuration and diligent cost management.

The implementation of this Serverless REST API is a testament to the power of cloud services in creating efficient, scalable, and cost-effective solutions for modern applications