Lab: DynamoDB

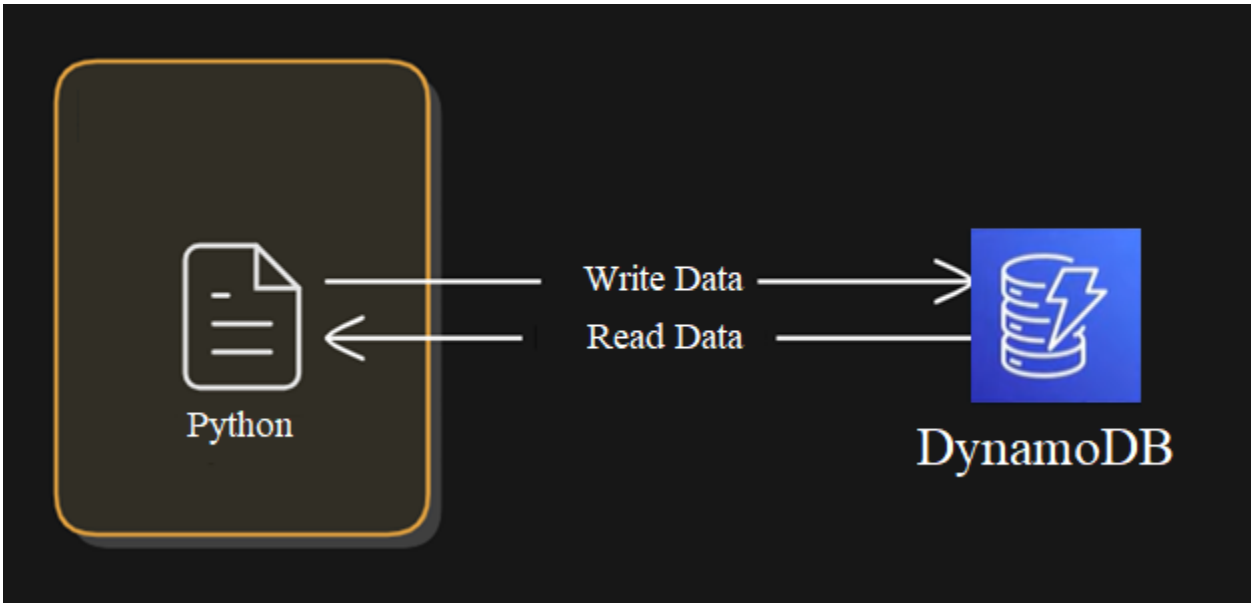
Lab overview and objectives

In this lab, you will use Amazon DynamoDB to store and query data.

You will learn to use both **AWS Management Console** and **AWS SDK for Python (Boto3)** to work with DynamoDB.

After completing this lab, you should be able to:

- Create a new DynamoDB table, add data to the table and query the data from the **AWS Management Console**.
- Add data to a **DynamoDB** table and query data from **DynamoDB** table using **AWS SDK for Python (Boto3)**.



Scenario

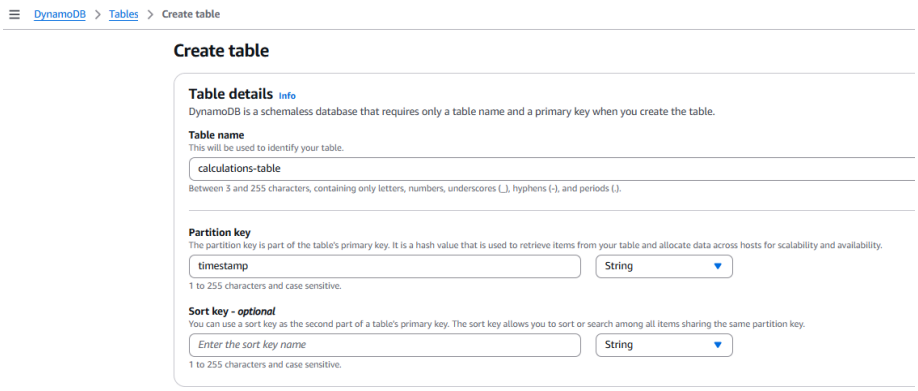
You will create a DynamoDB table that will store calculator calculations.

Accessing the AWS Management Console

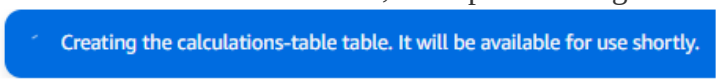
For this lab, we will use the **AWS Academy learner lab** and the **AWS Management Console**.

Task 1: Create a DynamoDB Table

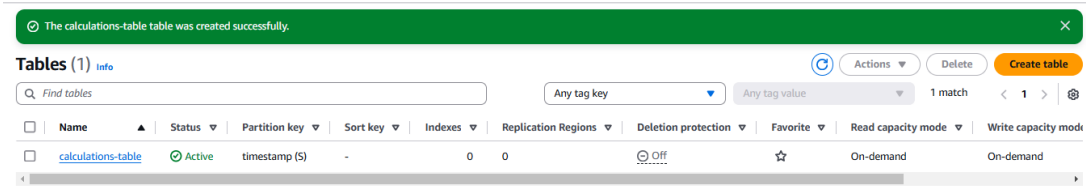
1. In the AWS Console search box to the right of **Services**, search for and choose **DynamoDB** to open the **DynamoDB** console.
2. Choose **Create table**.
3. In the **Create table** screen, configure these settings:
    - Table name: `calculations-table`
    - Partition key name: `timestamp`.



4. Choose **Create table**.
5. The table will now be created, this operation might take a few minutes.

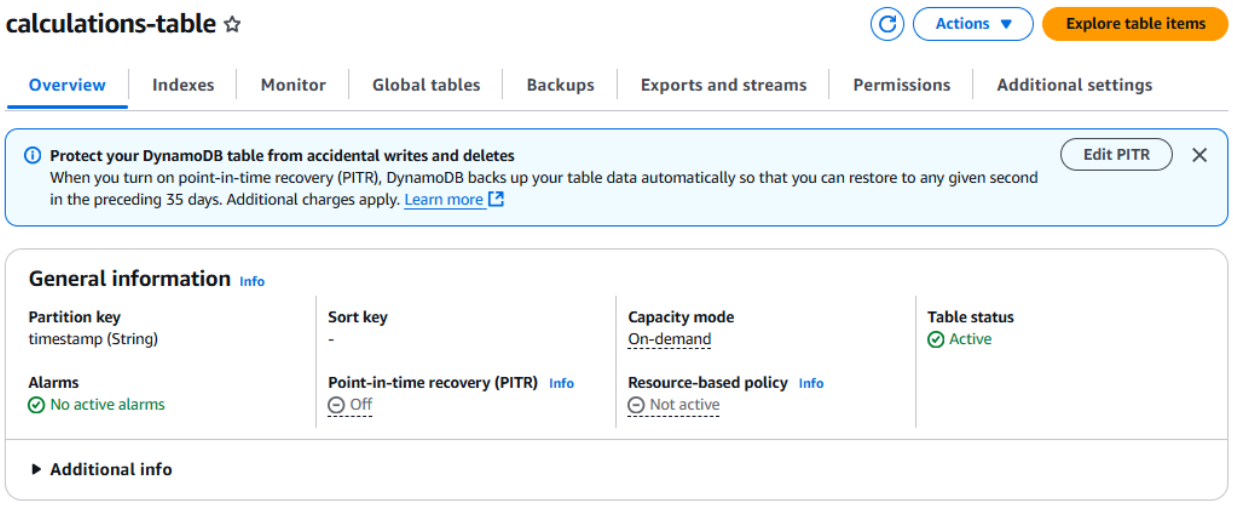


6. Once the table is ready to use, the following message will appear:



Task 2: Create and Explore table items using AWS Console

1. Select the table `calculations-table`, the `calculations-table` screen will open.

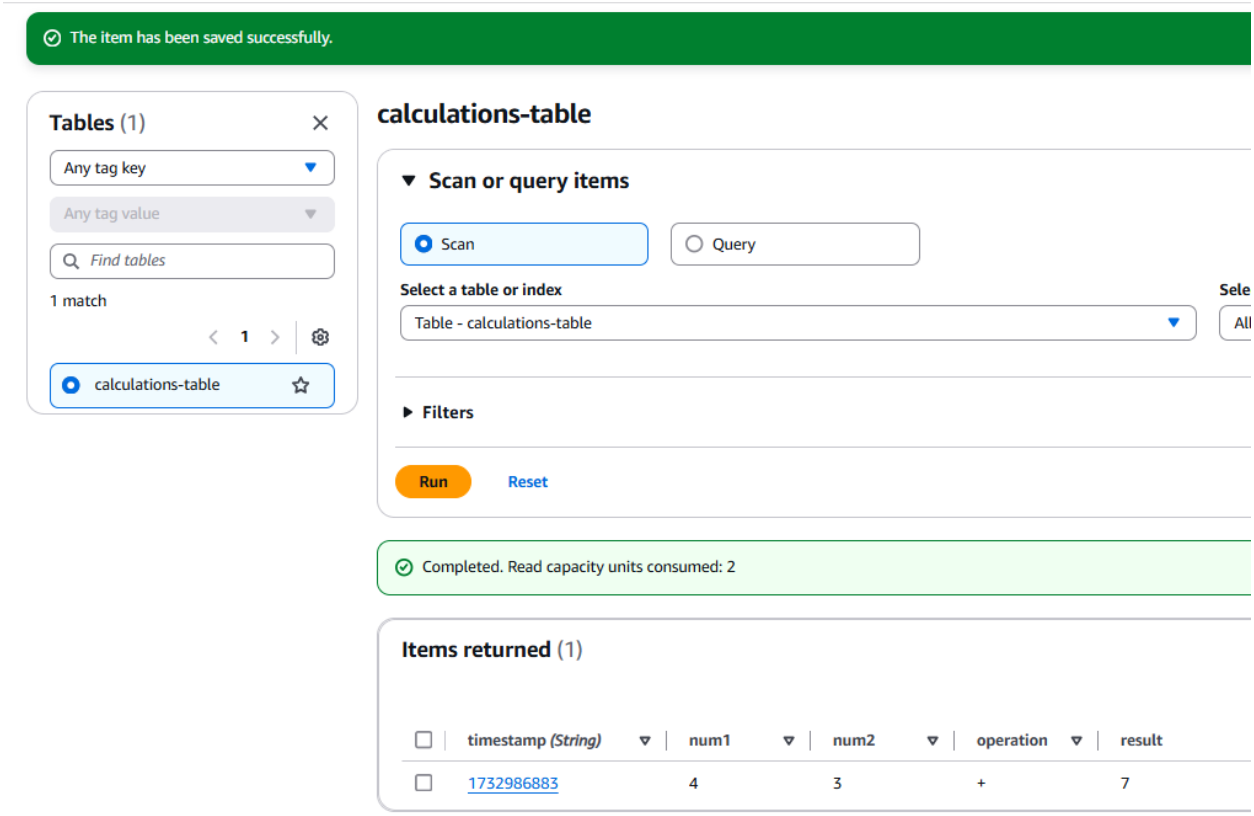


2. Choose the **Actions** drop down and select **Create item**. The **Create item** screen will open. Add the following information and press **Create item**:

Note 1: To get the current timestamp, you can use your preferred programming language or visit a site that provides it, such as: https://www.utctime.net/utc-timestamp

Note 2: To add a new value, press **Add new attribute** and select the desired attribute type.

3. The item should be created, and the following screen will appear:



Task 3: Create and Explore table items using AWS SDK for Python (Boto3)

In this task, you will interact with DynamoDB using Boto3. Python knowledge is required.

1. *Create a Python script that interacts with an AWS DynamoDB table. The script should be able to write an item to the table and read all items from the table.*
    1.1 Setup AWS Credentials:
        - *Use the boto3 library to create a session with your AWS credentials.*
        - *As we use a temp session, you will need to use: **AWS_ACCESS_KEY_ID**, **AWS_SECRET_ACCESS_KEY**, and **AWS_SESSION_TOKEN***
        - *Ensure you have the necessary permissions to access DynamoDB.*
        - *We will use region 'us-east-1'*

    2.1 Create a DynamoDB Client:
        - *Initialize a DynamoDB client using the session created.*

    3.1 Write an Item to the Table:
        - *Write a function write_item_to_table that adds an item to the DynamoDB table named calculations-table. The item should include the following attributes:*
            - *timestamp: Current timestamp in ISO format.*
            - *num1: A number (e.g., 5).*
            - *num2: A number (e.g., 3).*
            - *operation: A string representing the operation (e.g., '*').*
            - *result: The result of the operation (e.g., 15 for multiplication).*

    4.1 Read Items from the Table:
        - *Write a function read_items_from_table that reads all items from the calculations-table and prints them (Optional: Print also in a formatted JSON structure).*

    5.1 Execute the Functions:
        - *Call the write_item_to_table function to add an item to the table.*
        - *Call the read_items_from_table function to read and print all items from the table.*

2. Alternatively, copy the following code, and paste it in your IDE:
   Note: Replace **YOUR_AWS_ACCESS_KEY_ID**, **YOUR_AWS_SECRET_ACCESS_KEY**, and **YOUR_AWS_SESSION_TOKEN** with your actual AWS credentials, similarly, replace the region-name with the region-name you are using.

```
import boto3
import json
from datetime import datetime

# Create a session using your AWS credentials
session = boto3.Session(
    aws_access_key_id='YOUR_AWS_ACCESS_KEY_ID',
    aws_secret_access_key='YOUR_AWS_SECRET_ACCESS_KEY',
    aws_session_token='YOUR_AWS_SESSION_TOKEN',
    region_name='us-east-1'
)
# Create a DynamoDB client
dynamodb = session.client('dynamodb')

# Function to write items from the calc-history table
def write_item_to_table():
    # Add data to the calc-history table
    response = dynamodb.put_item(
        TableName='calculations-table',
        Item={
            'timestamp': {'S': datetime.now().isoformat()},
            'num1': {'N': '5'},
            'num2': {'N': '3'},
            'operation': {'S': '*'},
            'result':  {'N': str(5*3)}
        }
    )
    print("Data added to calc-history table:", response)

# Function to read items from the calc-history table
def read_items_from_table():
    response = dynamodb.scan(TableName='calculations-table')
    items = response.get('Items', [])
    for item in items:
        print(item)
        print(json.dumps(item, indent=4))

# Call the function to write item
write_item_to_table()
# Call the function to read items
read_items_from_table()
```

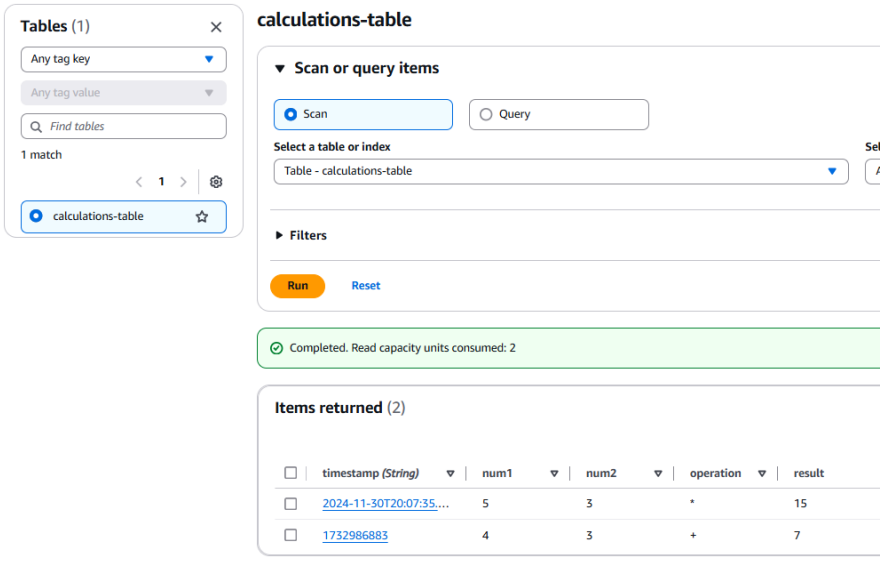
3. Install boto3 module.
   Verify if boto3 is installed, in your terminal run:
   pip show boto3
   if you're getting a warning: WARNING: Package(s) not found: boto3
   You should install boto3 by running the following command in your terminal:
   pip install boto3
4. Run the code. You should get the following successful reply:

Data added to calc-history table: {'ResponseMetadata': {'RequestId': 'FG9EAU0P5QLKDDSIHQKPLLCCFVVV4KQNSO5AEMVJF66Q9ASUAAJG', 'HTTPStatusCode': 200, 'HTTPHeaders': {'server': 'Server', 'date': 'Sat, 30 Nov 2024 18:07:38 GMT', 'content-type': 'application/x-amz-json-1.0', 'content-length': '2', 'connection': 'keep-alive', 'x-amzn-requestid': 'FG9EAU0P5QLKDDSIHQKPLLCCFVVV4KQNSO5AEMVJF66Q9ASUAAJG', 'x-amz-crc32': '2745614147'}, 'RetryAttempts': 0}}

{'result': {'N': '15'}, 'operation': {'S': '*'}, 'num2': {'N': '3'}, 'num1': {'N': '5'}, 'timestamp': {'S': '2024-11-30T20:07:35.431889'}}
{
  "result": {
    "N": "15"
  },
  "operation": {
    "S": "*"
  },
  "num2": {
    "N": "3"
  },
  "num1": {
    "N": "5"
  },
  "timestamp": {
    "S": "2024-11-30T20:07:35.431889"
  }
}
{'result': {'N': '7'}, 'operation': {'S': '+'}, 'num2': {'N': '3'}, 'num1': {'N': '4'}, 'timestamp': {'S': '1732986883'}}
{
  "result": {
    "N": "7"
  },
  "operation": {
    "S": "+"
  },
  "num2": {
    "N": "3"
  },
  "num1": {
    "N": "4"
  },
  "timestamp": {
    "S": "1732986883"
  }
}

Task 4: Explore the new item created using AWS SDK (Boto3) from the AWS Console

1. In the AWS Console search box to the right of **Services**, search for and choose **DynamoDB** to open the **DynamoDB** console.
2. In the left menu, select **Tables** menu and select the calculations-table.
3. Press the **Explore table items** option. You should now see both the item you added manually from the AWS console and the item added from your Python script.



Task 5: Explore the new item created using AWS Lambda using SDK (Boto3)

In this task, you will interact with DynamoDB using an **AWS Lambda** function. Both Python knowledge and **AWS Lambda** function are required to finish this task.

1. *Create an AWS Lambda function, that will support HTTP GET Method, and it will read a **DynamoDB** table. It will get the table name from a parameter called table_name and will return all table content.*

   Alternatively, use the following code, in your lambda function:

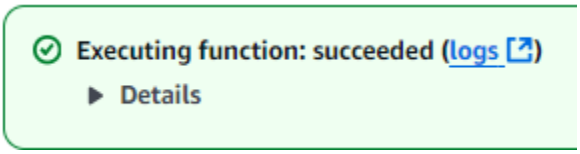
```
import json
import boto3
```

```
def lambda_handler(event, context):
    # Get the table name from queryStringParameters in the event
    table_name = event.get('queryStringParameters', {}).get('table_name')

    if not table_name:
        return {
            "statusCode": 400,
            "body": json.dumps({"error": "table_name is required"})
        }

    # Create a DynamoDB client
    dynamodb = boto3.client('dynamodb')

    try:
        # Scan the table
        response = dynamodb.scan(TableName=table_name)
        items = response.get('Items', [])

        return {
            "statusCode": 200,
            "body": json.dumps({"items": items})
        }
    except Exception as e:
        return {
            "statusCode": 500,
            "body": json.dumps({"error": str(e)})
        }
```

2. Click **Test** tab, and update the following JSON in the **Event JSON** panel:

```
{
  "queryStringParameters": {
    "table_name": "calculations-table"
  }
}
```

3. Click **Test**. The function will execute and should finish successfully:



4. Click the **Details** drop down and inspect the execution. You should see the response, summary, and log output.

Activity complete

Congratulations! You have successfully completed the activity.