

Cycle 08 AWS Homework

TABLE CREATION:

```
import boto3

dynamodb = boto3.resource('dynamodb')

table = dynamodb.create_table(
    TableName='mytable',
    KeySchema=[
        {
            'AttributeName': 'UserID',
            'KeyType': 'HASH' # Partition key
        },
        {
            'AttributeName': 'Timestamp',
            'KeyType': 'RANGE' # Sort key
        }
    ],
    AttributeDefinitions=[
        {
            'AttributeName': 'UserID',
            'AttributeType': 'S' # String
        },
        {
            'AttributeName': 'Timestamp',
            'AttributeType': 'S' # String
        }
    ],
    BillingMode='PAY_PER_REQUEST'
)

# Wait for table creation
```

```
table.wait_until_exists()
print("Table 'mytable' has been created and is ready.")
```

TO INSERT AN ELEMENT:

```
import boto3

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')

# Create/insert an item
table.put_item(
    Item={
        'UserID': 'user123',
        'Timestamp': '2025-08-27T17:30:00',
        'address': '123 Main St',
        'login_count': 1,
        'status': 'active'
    }
)
```

1. Scan vs Query

Scan

- Reads **every item** in the table.
- Applies filters afterwards to remove non-matching results.
- Very costly and slow for large tables because it touches all partitions.
- Metrics: "ScannedCount" shows how many items DynamoDB actually read (much higher than returned count).

Query

- Reads only items that share the specified **partition key**.
- Can further narrow results using conditions on the sort key (`begins_with` , `between` , `=` , `<` , `>` etc.).

- Ordered results by default based on the sort key.
- Far more efficient and cheaper than Scan when you know the partition key.

Learning Point: Always use **Query** when you can supply the partition key. Use **Scan** only when you must search across all partitions.

CODE:

```
from boto3.dynamodb.conditions import Key, Attr
import boto3

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')

# Scan operation with filter
response_scan = table.scan(
    FilterExpression=Attr('UserID').eq('user123')
)
print("Scan results:", response_scan['Items'])

# Query operation (recommended)
response_query = table.query(
    KeyConditionExpression=Key('UserID').eq('user123')
)
print("Query results:", response_query['Items'])
```

SCREENSHOTS:

```
File Edit Selection View Go Run ... Search
table creation.py X Untitled-1
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> table creation.py ...
1 import boto3
2
3 dynamodb = boto3.resource('dynamodb')
4
5 table = dynamodb.create_table(
6     TableName='mytable',
7     KeySchema=[
8         {
9             'AttributeName': 'UserID',
10            'KeyType': 'HASH' # Partition key
11        },
12        {
13            'AttributeName': 'Timestamp',
14            'KeyType': 'RANGE' # Sort key
15        }
16    ],
17    AttributeDefinitions=[
18        {
19            'AttributeName': 'UserID',
20            'AttributeType': 'S' # String
21        }
22    ]
23 )
24
25
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundle\libs\debugpy\launcher' '62841' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\table creation.py'
Table 'mytable' has been created and is ready.
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
```

Home work Cycle 08 * Practice * List tables | Amazon DynamoDB

ap-south-1.console.aws.amazon.com/dynamodbv2/home?region=ap-south-1#tables

aws Search [Alt+S] Account ID: 8459-5873-9988 CHETAN

DynamoDB > Tables

DynamoDB

- Dashboard
- Tables**
- Explore items
- PartiQL editor
- Backups
- Exports to S3
- Imports from S3
- Integrations
- Reserved capacity
- Settings

DAX

- Clusters
- Subnet groups
- Parameter groups
- Events

Tables (1) Info

Find tables Any tag key Any tag value

	Name	Status	Partition key	Sort key	Indexes	Replication Regions	Deletion protection	Favorite	Read capacity
<input type="checkbox"/>	mytable	Active	UserID (S)	Timestamp (S)	0	0	Off		On-demand

```
File Edit Selection View Go Run ... Search
table creation.py scan and query.py to insert item.py X
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> to insert item.py ...
1 import boto3
2
3 dynamodb = boto3.resource('dynamodb')
4 table = dynamodb.Table('mytable')
5
6 # Create/insert an item
7 table.put_item(
8     Item={
9         'UserID': 'user123',
10        'Timestamp': '2025-08-27T17:30:00',
11        'address': '123 Main St',
12        'login_count': 1,
13        'status': 'active'
14    }
15 )
16
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Scan results: []
Query results: []
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> c:: cd 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825'; & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundle\libs\debugpy\launcher' '60455' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\to insert item.py'
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
```

Home work Cycle 08 \ Practice Items | Amazon DynamoDB M...

ap-south-1.console.aws.amazon.com/dynamodbv2/home?region=ap-south-1#item-explorer?maximize=true&table=mytable

aws Search [Alt+S] Asia Pacific (Mumbai) Account ID: 8459-5873-9988 CHETAN

DynamoDB > Explore items > mytable

DynamoDB

- Dashboard
- Tables
- Explore items
- PartiQL editor
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▼ DAX

- Clusters
- Subnet groups
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Any tag key

Any tag value

Find tables

< 1 >

mytable

▼ Scan or query items

☒ Scan ☐ Query

Select a table or index

Table - mytable

Select attribute projection

All attributes

Filters - optional

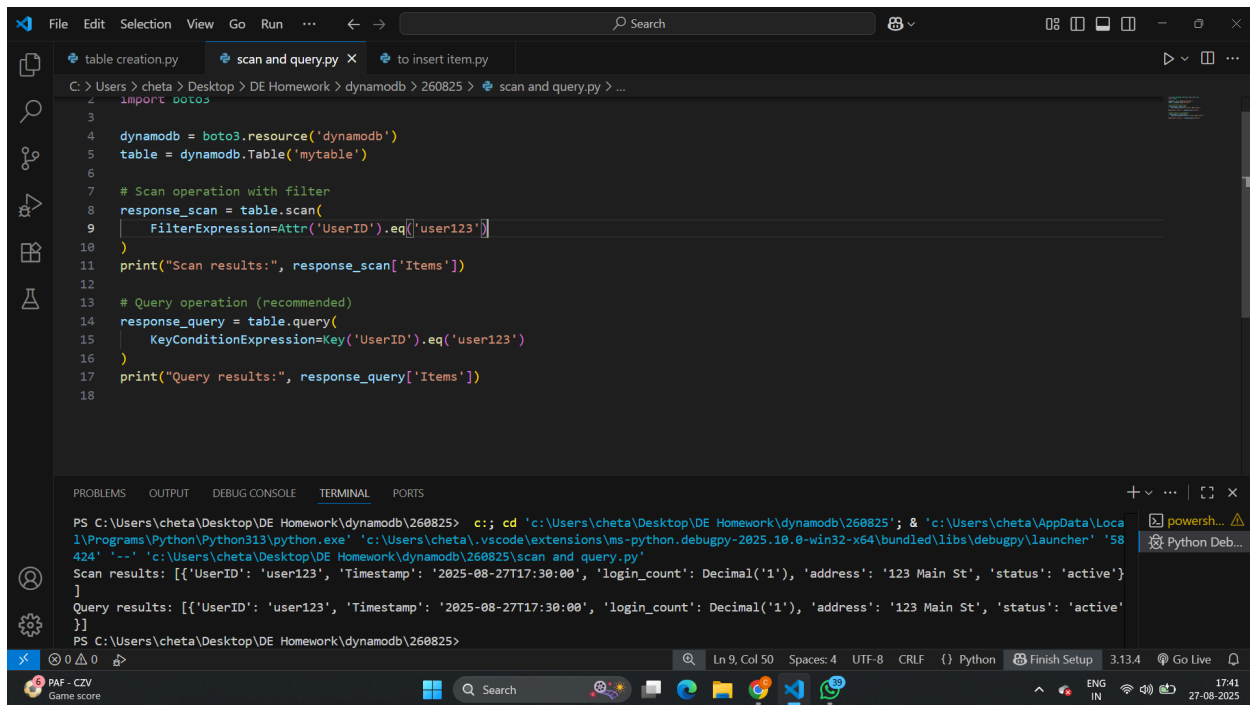
Run Reset

Completed - Items returned: 1 - Items scanned: 1 - Efficiency: 100% - RCUs consumed: 2

Table: mytable - Items returned (1)

Scan started on August 27, 2025, 17:41:32

	UserID (String)	Timestamp (String)	address	login_count	status
	user123	2025-08-27T17:30:00	123 Main St	1	active



```
File Edit Selection View Go Run ... Search
table creation.py scan and query.py to insert item.py
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> scan and query.py
4 import boto3
5
6
7 dynamodb = boto3.resource('dynamodb')
8 table = dynamodb.Table('mytable')
9
10 # Scan operation with filter
11 response_scan = table.scan(
12     FilterExpression=Attr('UserID').eq('user123')
13 )
14 print("Scan results:", response_scan['Items'])
15
16 # Query operation (recommended)
17 response_query = table.query(
18     KeyConditionExpression=Key('UserID').eq('user123')
19 )
20 print("Query results:", response_query['Items'])
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```

```

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')

# Update: Add a new attribute (address) and increment a numeric one (login_count)
table.update_item(
    Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
    UpdateExpression="SET address = :addr ADD login_count :inc",
    ExpressionAttributeValues={
        ':addr': '456 Main St',
        ':inc': 2
    }
)

# Conditional Update: Only if item exists (this checks if the attribute exists)
table.update_item(
    Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
    UpdateExpression="SET last_login = :ts",
    ExpressionAttributeValues={
        ':ts': '2025-08-27T17:10:00'
    },
    ConditionExpression=Attr('UserID').exists()
)

```

SCREENSHOTS:

```

File Edit Selection View Go Run ... Search
table creation.py scan and query.py to insert item.py update and delete.py X
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> update and delete.py ...
5 table = dynamodb.Table('mytable')
6
7 # Update: Add a new attribute (address) and increment a numeric one (login_count)
8 table.update_item(
9     Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
10    UpdateExpression="SET address = :addr ADD login_count :inc",
11    ExpressionAttributeValues={
12        ':addr': '456 Main St',
13        ':inc': 2
14    }
15)
16
17 # Conditional Update: Only if item exists (this checks if the attribute exists)
18 table.update_item(
19     Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
20    UpdateExpression="SET last_login = :ts",
21    ExpressionAttributeValues={
22        ':ts': '2025-08-27T17:10:00'
23    },
24    ConditionExpression=Attr('UserID').exists()
25)

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
 botoecore.errorfactory.ConditionalCheckFailedException: An error occurred (ConditionalCheckFailedException) when calling the DeleteItem operation: The conditional request failed
 PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
 PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
 PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> c:; cd 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825'; & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\.vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundled\libs\debugpy\launcher' '60512' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\update and delete.py'
 PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>

Home work Cycle 08 * Practice Edit item | Amazon DynamoDB

ap-south-1.console.aws.amazon.com/dynamodbv2/home?region=ap-south-1#edit-item?itemMode=2&pk=user123&route=ROUTE_ITEM_EXPLORER&sk=2025-08-27T17%3A30%3A00&tab...

Search [Alt+S] Account ID: 8459-5873-9988 CHETAN

DynamoDB > Explore items: mytable > Edit item

Edit item Form | JSON view

You can add, remove, or edit the attributes of an item. You can nest attributes inside other attributes up to 32 levels deep. [Learn more](#)

Attributes Add new attribute

Attribute name	Value	Type	
UserID - Partition key	user123	String	
Timestamp - Sort key	2025-08-27T17:30:00	String	
address	456 Main St	String	Remove
last_login	2025-08-27T17:10:00	String	Remove
login_count	7	Number	Remove
status	active	String	Remove

Cancel Save Save and close

Delete Item

- Removes a specific item by its partition key and sort key.
- You can request to return the deleted item back for confirmation.

- Supports **conditional deletes**, e.g., only delete if "Status = PENDING."
- This ensures you don't delete important records accidentally.

Learning Point: Conditional updates and deletes are critical for data integrity in concurrent environments.

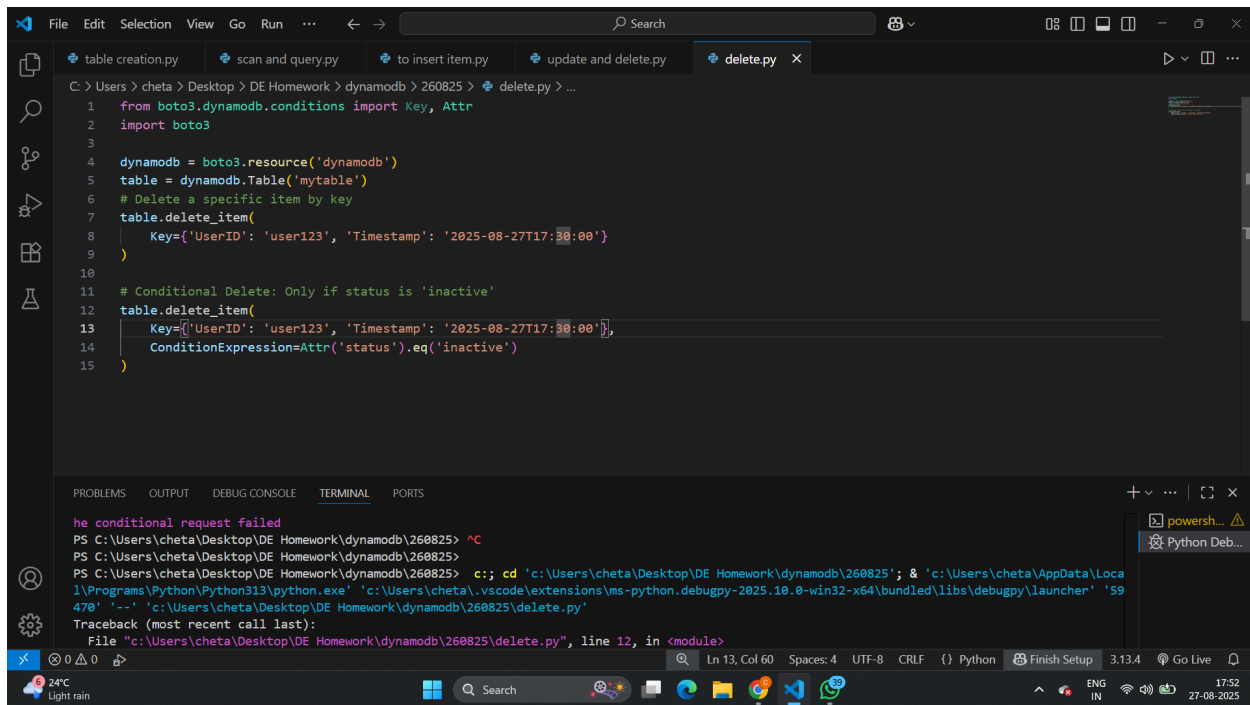
CODE:

```
from boto3.dynamodb.conditions import Key, Attr
import boto3

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')
# Delete a specific item by key
table.delete_item(
    Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'}
)

# Conditional Delete: Only if status is 'inactive'
table.delete_item(
    Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
    ConditionExpression=Attr('status').eq('inactive')
)
```

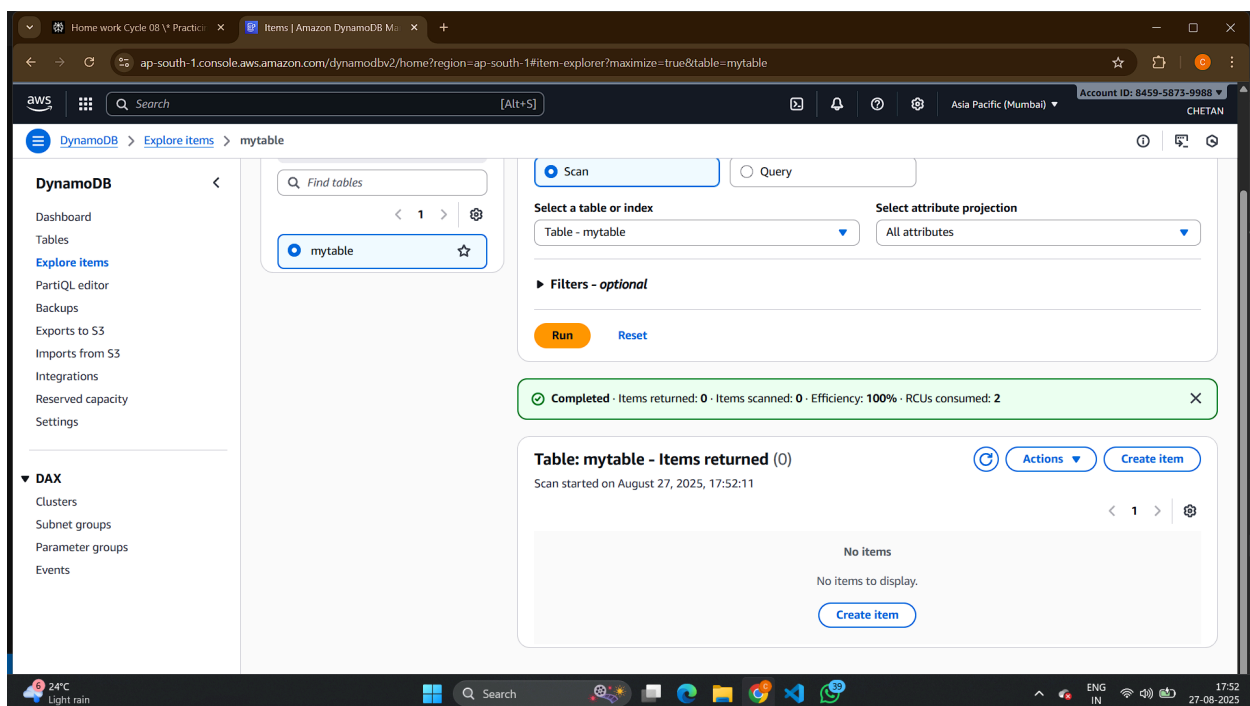
SCREENSHOTS:



```
1 from boto3.dynamodb.conditions import Key, Attr
2 import boto3
3
4 dynamodb = boto3.resource('dynamodb')
5 table = dynamodb.Table('mytable')
6 # Delete a specific item by key
7 table.delete_item(
8     Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'}
9 )
10
11 # Conditional Delete: Only if status is 'inactive'
12 table.delete_item(
13     Key={'UserID': 'user123', 'Timestamp': '2025-08-27T17:30:00'},
14     ConditionExpression=Attr('status').eq('inactive')
15 )
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
he conditional request failed
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> c: cd "c:\Users\cheta\Desktop\DE Homework\dynamodb\260825"; & "c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe" "c:\Users\cheta\.vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundle\libs\debugpy\launcher" '59470' '--' "c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\delete.py"
Traceback (most recent call last):
  File "c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\delete.py", line 12, in <module>
```



3. Mastering Query Operation

With a table that has a **composite key** (partition key + sort key), three common query patterns are:

1. All items for a single partition key

- Retrieves everything belonging to one user or entity.
- Results are sorted by the sort key.
- You can choose ascending (oldest first) or descending (newest first).

2. Items where the sort key begins with a prefix

- Useful for time-based or code-based sort keys.
- Example: if sort key stores timestamps in `YYYY-MM-DD` format, `begins_with("2025-08-")` fetches all items in August 2025.

3. Items where the sort key is between two values

- Ideal for ranges (dates, numbers, ordered strings).
- Example: get all orders between `2025-08-01` and `2025-08-31`.
- The `between` operator is inclusive of both boundaries.

Learning Point: Queries are the backbone of DynamoDB access patterns. Understanding how to leverage partition key equality + sort key conditions is essential.

CODE:

```
from boto3.dynamodb.conditions import Key
import boto3

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')

# 1. Get all items for partition key 'user123'
response_all = table.query(
    KeyConditionExpression=Key('UserID').eq('user123')
)
print("All items for user123:")
```

```

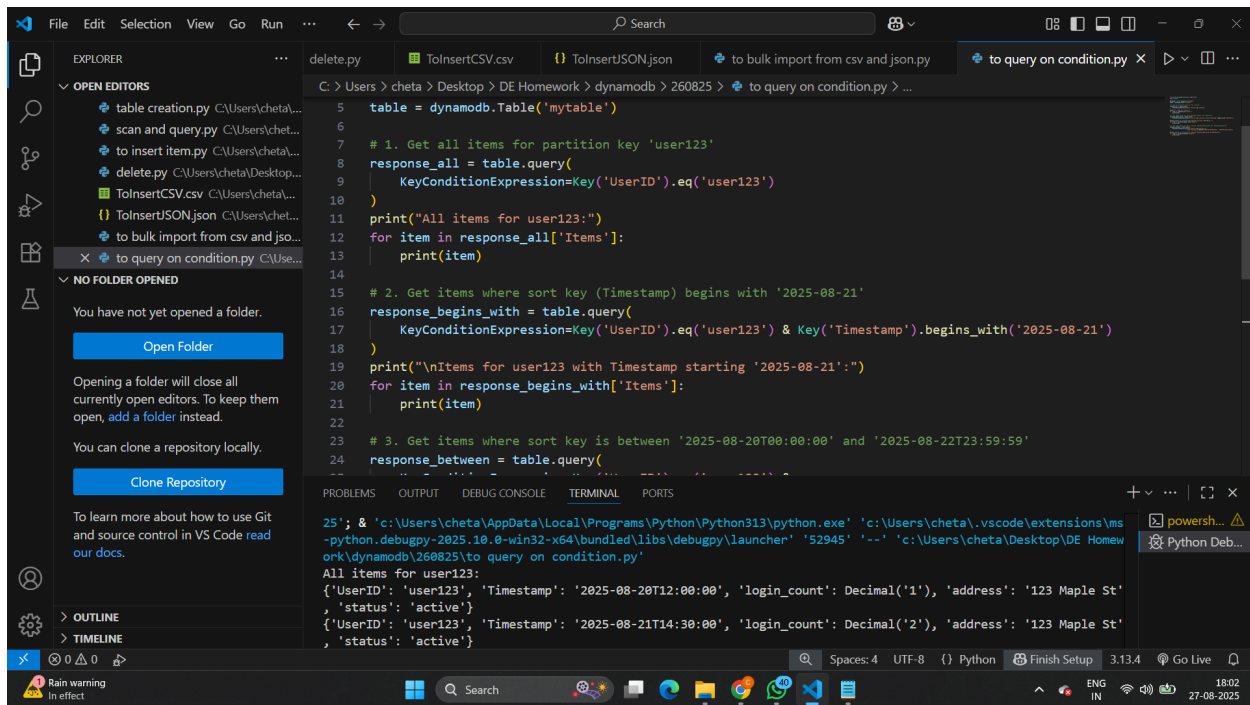
for item in response_all['Items']:
    print(item)

# 2. Get items where sort key (Timestamp) begins with '2025-08-21'
response_begins_with = table.query(
    KeyConditionExpression=Key('UserID').eq('user123') & Key('Timestamp').b
egins_with('2025-08-21')
)
print("\nItems for user123 with Timestamp starting '2025-08-21':")
for item in response_begins_with['Items']:
    print(item)

# 3. Get items where sort key is between '2025-08-20T00:00:00' and '2025-08-22T23:59:59'
response_between = table.query(
    KeyConditionExpression=Key('UserID').eq('user123') &
    Key('Timestamp').between('2025-08-20T00:00:00', '2025-08-22T23:59:59')
)
print("\nItems for user123 with Timestamp between 2025-08-20 and 2025-08-22:")
for item in response_between['Items']:
    print(item)

```

SCREESHOTS:



4. Bulk Insertion from CSV and JSON

- **Why important:** In real scenarios, data often exists in external files (logs, exports, or seed data). Instead of inserting one by one, bulk loading saves time.
- **CSV Loading:**
 - Each row in the file maps to one DynamoDB item.
 - Columns must include the partition key and sort key.
 - Numeric fields may need conversion from text to number.
- **JSON Loading:**
 - Two common formats:
 1. **Array of objects** (`[0, 0, 0]`) → loop through the list.
 2. **JSON Lines** (one object per line) → read and load line by line.
 - Each object must contain the required keys.

- **Best Practice:** Use DynamoDB's **batch writer**, which automatically handles batching and retries unprocessed items.

Learning Point: Bulk loading teaches efficiency and is a first step towards building ETL (Extract, Transform, Load) pipelines.

CODE:

```
import csv
import json
import boto3

dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('mytable')

# Bulk insert from CSV
with open('ToInsertCSV.csv', 'r') as csvfile:
    reader = csv.DictReader(csvfile)
    with table.batch_writer() as batch:
        for row in reader:
            # Convert string numbers to integers where necessary
            row['login_count'] = int(row['login_count'])
            batch.put_item(Item=row)

# Bulk insert from JSON
with open('ToInsertJSON.json', 'r') as jsonfile:
    items = json.load(jsonfile)
    with table.batch_writer() as batch:
        for item in items:
            batch.put_item(Item=item)
```

SCREENSHOTS:

The screenshot shows the VS Code interface with the Explorer sidebar on the left. The Explorer shows a project structure with files like 'table creation.py', 'scan and query.py', 'to insert item.py', 'delete.py', 'TolInsertCSV.csv', 'TolInsertJSON.json', and 'import csv Untitled-1'. The main editor displays the 'TolInsertCSV.csv' file with the following content:

```
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> TolInsertCSV.csv > data
1 UserID,timestamp,address,login_count,status
2 user123,2025-08-20T12:00:00,123 Maple St,1,active
3 user123,2025-08-21T14:30:00,123 Maple St,2,active
4 user456,2025-08-22T09:45:00,789 Oak St,1,inactive
5
```

The bottom panel shows the TERMINAL window with the following commands and output:

```
ork\dynamodb\260825>update and delete.py'
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> c:j cd 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825'; & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\.vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundle\libs\debugpy\launcher' '50142' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\delete.py'
Traceback (most recent call last):
```

The screenshot shows the VS Code interface with the Explorer sidebar on the left. The Explorer shows a project structure with files like 'table creation.py', 'scan and query.py', 'to insert item.py', 'delete.py', 'TolInsertCSV.csv', 'TolInsertJSON.json', and 'import csv Untitled-1'. The main editor displays the 'TolInsertJSON.json' file with the following content:

```
C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> TolInsertJSON.json > ...
1 [
2   {
3     "UserID": "user789",
4     "Timestamp": "2025-08-23T08:00:00",
5     "address": "456 Pine St",
6     "login_count": 1,
7     "status": "active"
8   },
9   {
10    "UserID": "user789",
11    "Timestamp": "2025-08-24T10:15:00",
12    "address": "456 Pine St",
13    "login_count": 2,
14    "status": "active"
15  }
16 ]
17
```

The bottom panel shows the TERMINAL window with the following commands and output:

```
ork\dynamodb\260825>update and delete.py'
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> ^C
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>
PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> c:j cd 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825'; & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\.vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundle\libs\debugpy\launcher' '50142' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\delete.py'
Traceback (most recent call last):
```

```
1 import csv
2 import json
3 import boto3
4
5 dynamodb = boto3.resource('dynamodb')
6 table = dynamodb.Table('mytable')
7
8 # Bulk insert from CSV
9 with open('ToInsertCSV.csv', 'r') as csvfile:
10     reader = csv.DictReader(csvfile)
11     with table.batch_writer() as batch:
12         for row in reader:
13             # Convert string numbers to integers where necessary
14             row['login_count'] = int(row['login_count'])
15             batch.put_item(Item=row)
16
17 # Bulk insert from JSON
18 with open('ToInsertJSON.json', 'r') as jsonfile:
19     items = json.load(jsonfile)
20     with table.batch_writer() as batch:
```

calling the DeleteItem operation: The conditional request failed

PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825> cd 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825'; & 'c:\Users\cheta\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\cheta\.vscode\extensions\ms-python.debugpy-2025.10.0-win32-x64\bundled\libs\debugpy\launcher' '50885' '--' 'c:\Users\cheta\Desktop\DE Homework\dynamodb\260825\to bulk import from csv and json.py'

PS C:\Users\cheta\Desktop\DE Homework\dynamodb\260825>

Completed · Items returned: 5 · Items scanned: 5 · Efficiency: 100% · RCUs consumed: 2

Table: mytable - Items returned (5)

Scan started on August 27, 2025, 18:01:00

	UserID (String)	Timestamp (String)	address	login_count	status
<input type="checkbox"/>	user123	2025-08-20T12:00:00	123 Maple St	1	active
<input type="checkbox"/>	user123	2025-08-21T14:30:00	123 Maple St	2	active
<input type="checkbox"/>	user789	2025-08-23T08:00:00	456 Pine St	1	active
<input type="checkbox"/>	user789	2025-08-24T10:15:00	456 Pine St	2	active
<input type="checkbox"/>	user456	2025-08-22T09:45:00	789 Oak St	1	inactive