Amazon DynamoDB

❖ AMAZON DYNAMODB:

- Amazon DynamoDB is a fast and flexible NoSQL database service for all applications that need consistent, single digit millisecond latency at any scale. It is not a relational database.
- It is a fully managed cloud database and supports both document and **key-value store models.**
- Integrated with IAM for security, authorization and administration.
- Low cost and auto scaling capabilities.
- It provides on-demand backup capability. It allows you to create full backups of your tables for long-term retention and archival for regulatory compliance needs.
- You can create on-demand backups and enable point-in-time recovery for your Amazon DynamoDB tables.
- Point-in-time recovery helps protect your tables from accidental write or delete operations. With point-in-time recovery, you can restore a table to any point in time during the last 35 days.

➢ HIGH AVAILABILITY AND DURABILITY:

- DynamoDB automatically spreads the data and traffic for your tables over a sufficient number of servers to handle your throughput and storage requirements, while maintaining consistent and fast performance.
- Data is stored on solid-state disks (SSDs) and is automatically replicated across multiple Availability Zones in an AWS Region, providing built-in high availability and data durability.
- You can use global tables to keep DynamoDB tables in sync across regions.

➢ USE CASES:

- Develop software applications
- Create media metadata stores
- Deliver seamless retail experiences
- Scale gaming platforms

➢ FREE TIER:

- 25 GB of storage
- up to 200 million read/write requests per month

➢ DYNAMODB ARCHITECTURE:

- SSD storage
- Replicated in three facilities (NOTE: Not AZ)
- Supports cross-region replication
- Unlimited capacity
- User chooses performance capability via read/write capacity units

➢ DYNAMODB COMPONENTS:

- Tables
- Items (Rows)
- Attributes (Fields in Key/Value pairs)
    - Simple: First name: John
    - Nested: Address: {
    - Number:123
    - Street: Main
    - City: Anywhere

➢ PRIMARY KEY:

- The primary key uniquely identifies each item in the table, so that no two items can have the same key.
- DynamoDB supports two different kinds of primary keys:

PARTITION KEY:
- A simple primary key, composed of one attribute known as the partition key.

PARTITION KEY AND SORT KEY:
- places items on same storage
- Referred to as a composite primary key, this type of key is composed of two attributes. The first attribute is the partition key, and the second attribute is the sort key.

➢ **SECONDARY INDEX:**

- A secondary index lets you query the data in the table using an alternate key, in addition to queries against the primary key.
- DynamoDB doesn't require that you use indexes, but they give your applications more flexibility when querying your data.
- DynamoDB supports two kinds of indexes:

   GLOBAL SECONDARY INDEX:
   - An index with a partition key and sort key that can be different from those on the table.

   LOCAL SECONDARY INDEX:
   - An index that has the same partition key as the table, but a different sort key.

➢ **DYNAMODB -PROVISIONED THROUGHPUT:**

- Table must have provisioned read and write capacity units
- Read Capacity Units (RCU): throughput for reads ($0.00013 per RCU)
- 1 RCU = 1 strongly consistent read of 4 KB per second
- 1 RCU = 2 eventually consistent read of 4 KB per second
- Write Capacity Units (WCU): throughput for writes ($0.00065 per WCU)
- 1 WCU = 1 write of 1 KB per second
- Throughput can be exceeded temporarily using "burst credit"
- If burst credit are empty, you'll get a "Provisioned Throughput Exception".
- It's then advised to do an exponential back-off retry

➢ **DYNAMODB ACCELERATOR (DAX):**

- Seamless cache for DynamoDB, no application rewrite
- Writes go through DAX to DynamoDB
- Micro second latency for cached reads & queries
- Solves the Hot Key problem (too many reads)
- 5 minutes TTL for cache by default
- Up to 10 nodes in the cluster
- Multi AZ (3 nodes minimum recommended for production)
- Secure (Encryption at rest with KMS, VPC, IAM, CloudTrail…)