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Scale your applications with DynamoDB

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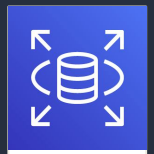
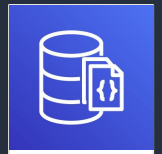
AWS Database Services



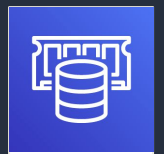
Amazon RDS

Managed Relational Database Service
Postgres, MariaDB, Oracle, MySQL & SQL Server



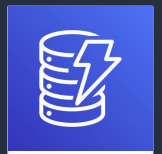
Amazon DocumentDB

Fully MongoDB Compatible Document Database



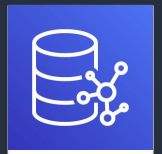
Amazon Elasticache

In-Memory Key Value Store



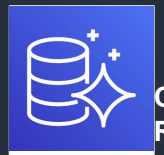
Amazon DynamoDB

Fully Managed Key-Value and Document Database



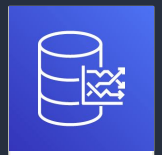
Amazon Neptune

Fully Managed Graph Database



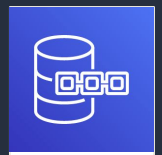
Amazon Aurora

Cloud-Native Relational Database



Amazon Timestream

Fully Managed Time Series Database

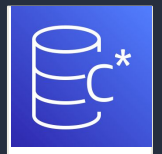


Amazon QLDB

Fully Managed Ledger Database

Amazon MemoryDB for Redis

Fully managed, Redis-compatible, in-memory database service



Amazon Keyspaces

Apache Cassandra–compatible database service

SQL vs NoSQL

SQL	NoSQL
Optimized for Storage	Optimized for Compute
Structured and Strict adherence, Table, Data types etc. (Normalized)	Distributed and non relational (no foreign keys)
Vertical scaling (Add memory, disk , CPU as required)	Horizontal Scaling
Designed for Random Access Pattern	**Designed for Strict Access Pattern**
Fetch criteria is not critical for DB design. Query is an after thought	Access pattern should be defined before we design the table

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Amazon DynamoDB

- Key-Value and Document Database
- Query Driven
- Support eventual & strong consistency
- Can handle One trillion requests per day with single-digit ms latency

Fully managed

Consistently fast at any Scale

Secur
e

Integrates with AWS Lambda, Amazon Redshift, and more

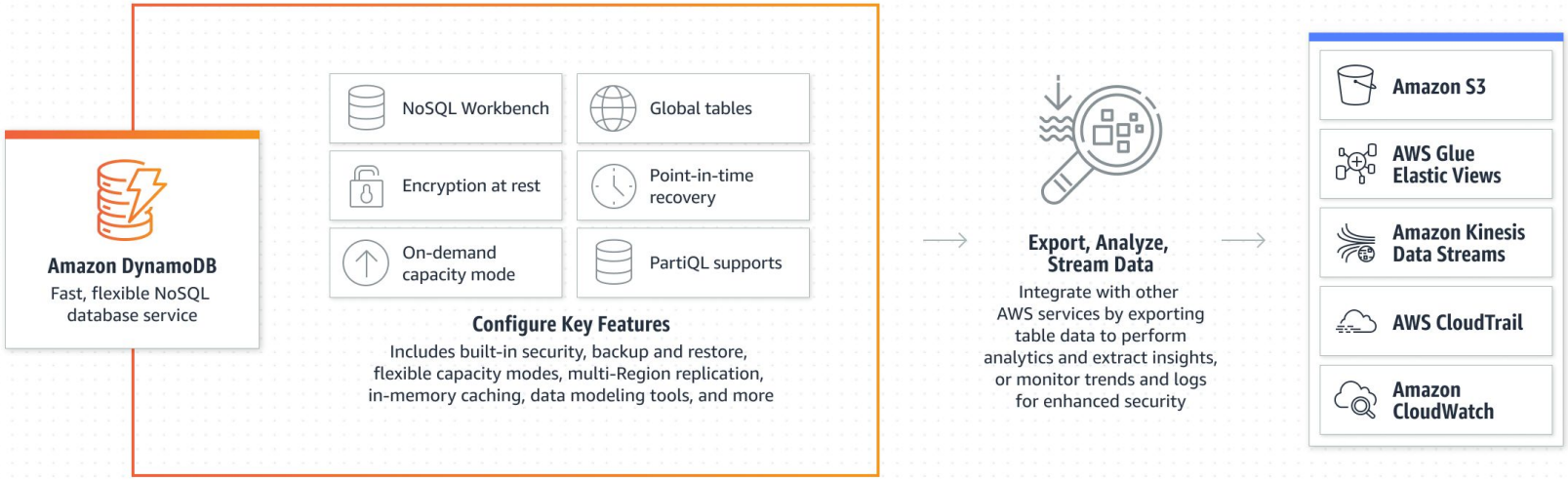
Cost-effective

Journey of SnapChat

- 300 million daily active users
- 5 Billion+ snaps per day
- 400 TB of data
- 900+ EKS Clusters running

https://www.youtube.com/watch?v=Cgv0kfp_6xQ

How DynamoDB works



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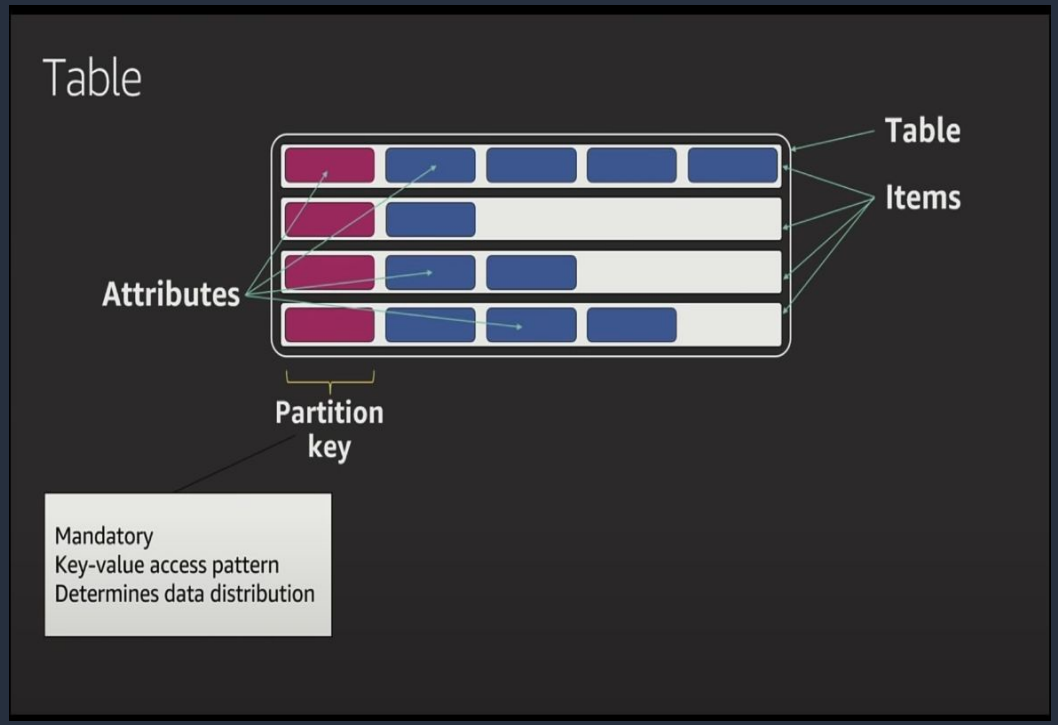
Understanding DynamoDB

DynamoDB components



Tables

- DynamoDB stores data in tables.
- A table is a collection of data.

Items

- Each table contains zero or more items.
- An item is a group of attributes that is uniquely identifiable
- Maximum item size in DynamoDB is 400 KB

Attributes

- Each item is composed of one or more attributes.
- An attribute is a fundamental data element

DynamoDB Primary Key

Simple Primary Key (Partition key)

- Composed of one attribute - partition key.
- Partition key value is input to an internal hash function.
- The output from the hash function determines the partition in which the item will be stored.
- No two items can have the same partition key value.

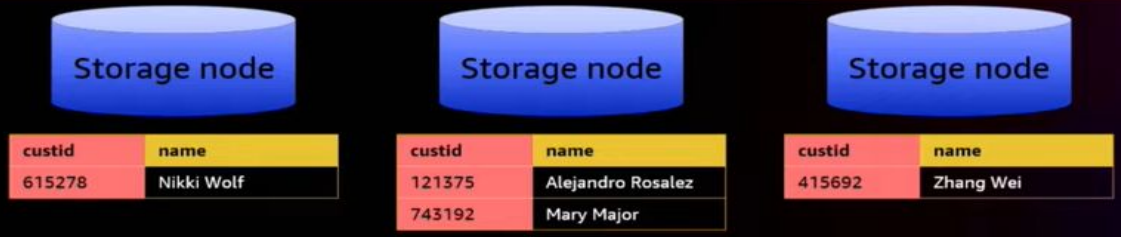
Composite Primary Key (Partition key and sort key)

- Composite primary key, composed of two attributes. the partition key, and the sort key.
- Partition key value is input to an internal hash function.
- The output from the hash function determines the partition in which the item will be stored.
- Possible for two items to have the same partition key value. However, those two items must have different sort key values.

DynamoDB – Horizontal scale

- All data is stored in tables , must have a partition key
- A table of hypothetical customers

custid	name	occupation		
121375	Alejandro Rosalez	musician	instruments: [guitar, violin]	band: “Brave Bards”
743192	Mary Major	educator	area: physics	qual: PhD
615278	Nikki Wolf	pilot	level: ATP	type: [B777-200, B767]
415692	Zhang Wei	pilot	level: commercial	type: [PA28, C172, C152]



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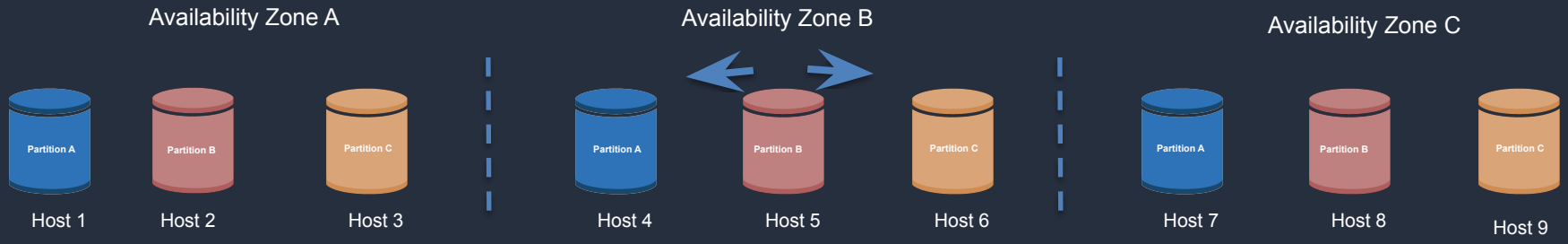
Highly available and durable

OrderId: 1
CustomerId: 1
ASIN: [B00X4WHP5E]

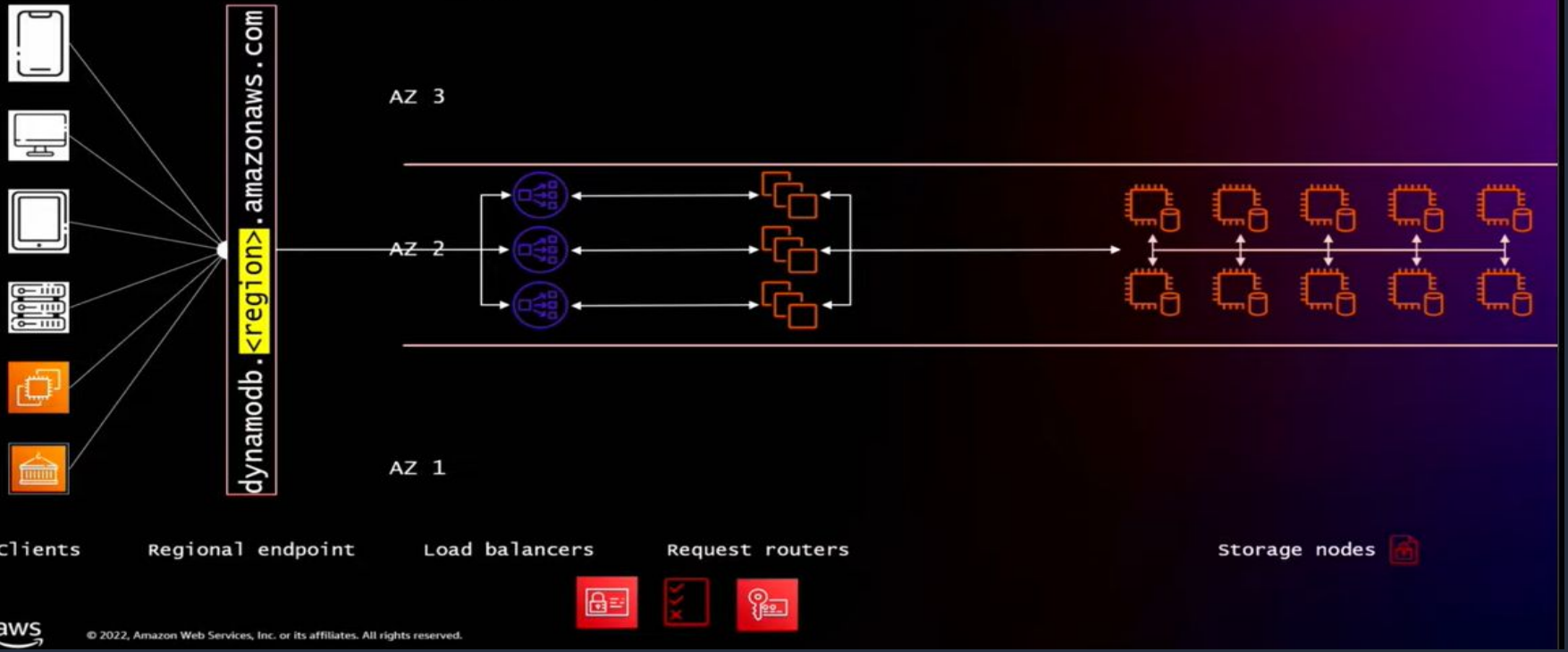
hash(1) = 7B

3-way replication

Data is always replicated to three Availability Zones



DynamoDB – High-level architecture



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Provisioning DynamoDB

WCU (Write Capacity Units)

- 1 write capacity unit (WCU) = 1 write of up to 1 KB/s.
- 2 WCUs = 1 transactional write request (one write per second) for items up to 1 KB.
- For writes greater than 1 KB, total number of writes required = (total item size / 1 KB) rounded up

RCU (Read Capacity Units)

- 1 read capacity unit (RCU) = 1 strongly consistent read of up to 4 KB/s or 2 eventually consistent reads of up to 4 KB/s per read.
- 2 RCUs = 1 transactional read request (one read per second) for items up to 4 KB.
- For reads on items greater than 4 KB, total number of reads required = (total item size / 4 KB) rounded up.

DynamoDB Indices

Global secondary index

- An index with a partition key and sort key that can be different from those on the base table.
- Can be created after the base table is created
- Separate RCU and WCU to be provisioned

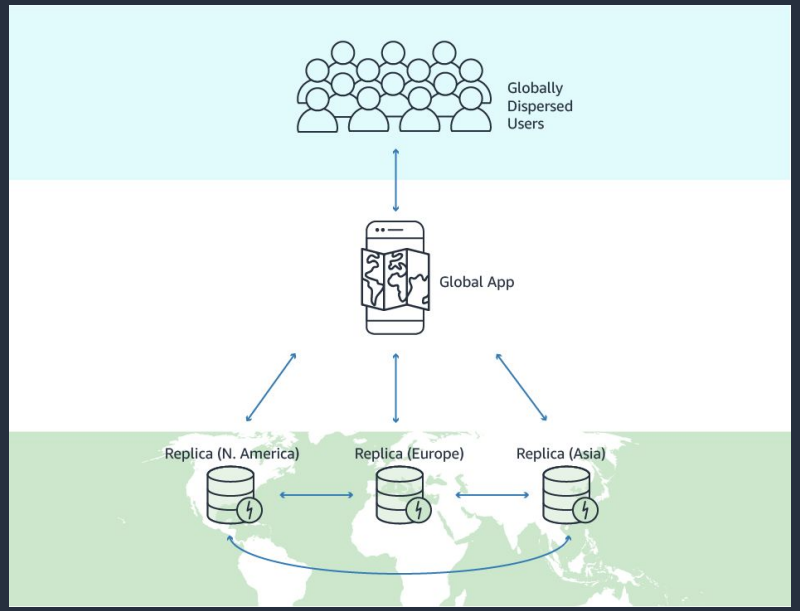
Local secondary index

- An index that has the same partition key as the table, but a different sort key.
- Should be created during table creation
- Uses the RCU and WCU of base table

Each table in DynamoDB has a quota of 20 global secondary indexes (default quota) and 5 local secondary indexes per table.

Global Tables

fully-managed, multi-master, multi-region, multi active database



- Read and write locally, access your data globally
- single-digit-millisecond latency for your globally distributed application
- Replication happens for all attributes and no projection of attributes

Data Modeling Process

- Create your Entity relationship diagram
- List out the access patterns (read and write access patterns)
- Design your primary keys to handle your access patterns
- Define Indices to facilitate additional access patterns

Demo

References

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- https://www.youtube.com/watch?v=yvBR71D0nAQ
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Q&A

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Thank you!

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