AWSOME DAY
ONLINE CONFERENCE

Module 4: Databases

SQL and NoSQL Databases

	SQL	NoSQL
Data Storage	Rows and Columns	Key-Value
Schemas	Fixed	Dynamic
Querying	Using SQL	Focused on collection of documents
Scalability	Vertical	Horizontal

SQL

ISBN	Title	Author	Format
9182932465265	Cloud Computing Concepts	Wilson, Joe	Paperback
3142536475869	The Database Guru	Gomez, Maria	eBook

NoSQL

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{
        ISBN: 9182932465265,
        Title: “Cloud Computing Concepts”,
        Author: “Wilson, Joe”,
        Format: “Paperback”
}
```

Data Storage Considerations

- No one size fits all.
- Analyze your data requirements by considering:
  - ✓ Data formats
  - ✓ Data size
  - ✓ Query frequency
  - ✓ Data access speed
  - ✓ Data retention period

Amazon Relational Database Service (RDS)

Amazon RDS

- Cost-efficient and **resizable capacity**
- Manages time-consuming **database administration** tasks
- Access to the full capabilities of **Amazon Aurora**, **MySQL**, **MariaDB**, **Microsoft SQL Server**, **Oracle**, and **PostgreSQL** databases

Amazon RDS

- Simple and **fast to deploy**
- Manages common database administrative tasks
- **Compatible** with your applications
- Fast, predictable performance
- Simple and **fast to scale**
- Secure
- Cost-effective

MySQL

PostgreSQL

Microsoft SQL Server

MariaDB

Amazon Aurora

ORACLE

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DB Instances

- DB Instances are the basic building blocks of Amazon RDS.
- They are an **isolated database environment** in the cloud.
- They can **contain multiple user-created databases**.

How Amazon RDS Backups Work

Automatic Backups:

- Restore your database to a point in time.
- Are enabled by default.
- Let you choose a retention period up to 35 days.

Manual Snapshots:

- Let you build a new database instance from a snapshot.
- Are initiated by the user.
- Persist until the user deletes them.
- Are stored in Amazon S3.

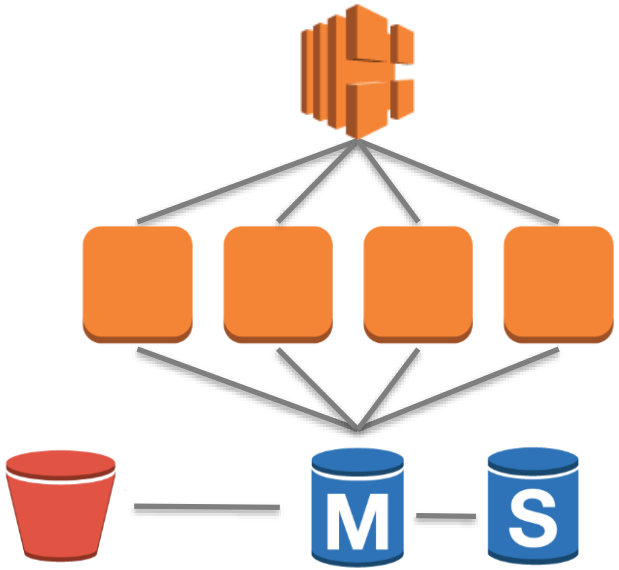
Cross-Region Snapshots

- Are a **copy** of a **database** snapshot stored in a **different AWS Region**.
- Provide a backup for disaster **recovery**.
- Can be used as a **base** for **migration** to a different region.

Amazon RDS Security

- Run your DB instance in an **Amazon VPC**.
- Use **IAM policies** to grant access to RDS resources.
- Use **Security Groups**.
- Use Secure Socket Layer (**SSL**) connections with DB instances
- (Amazon Aurora, Oracle, MySQL, MariaDB, PostgreSQL, Microsoft SQL Server).
- Use RDS **encryption** to secure instances and snapshots at rest.
- Use network encryption and transparent data encryption (**TDE**) with Oracle DB and Microsoft SQL Server instances.
- Use security features of your DB engine to **control access** to DB instance.

A Resilient, Durable Application Architecture



Elastic Load Balancing load balancer instance

Application, in Amazon EC2 instances

Amazon RDS database instances: Master and Multi-AZ standby

DB snapshots in Amazon S3

Amazon RDS Best Practices

- **Monitor** your memory, CPU, and storage usage.
- Use **Multi-AZ** deployments to automatically provision and maintain synchronous standby in a different Availability Zone.
- Enable **automatic backups**.
- Set the **backup window** to occur during the daily low in WriteIOPS.
- To increase the I/O capacity of a DB instance:
  - Migrate to a DB instance class with high I/O capacity.
  - Convert from standard storage to provisioned IOPS storage and use a DB instance class optimized for **provisioned IOPS**.
  - Provision additional throughput capacity (if using provisioned IOPS storage).
- If your client application is caching the DNS data of your DB instances, set a TTL of less than 30 seconds.
- **Test** failover for your DB instance.

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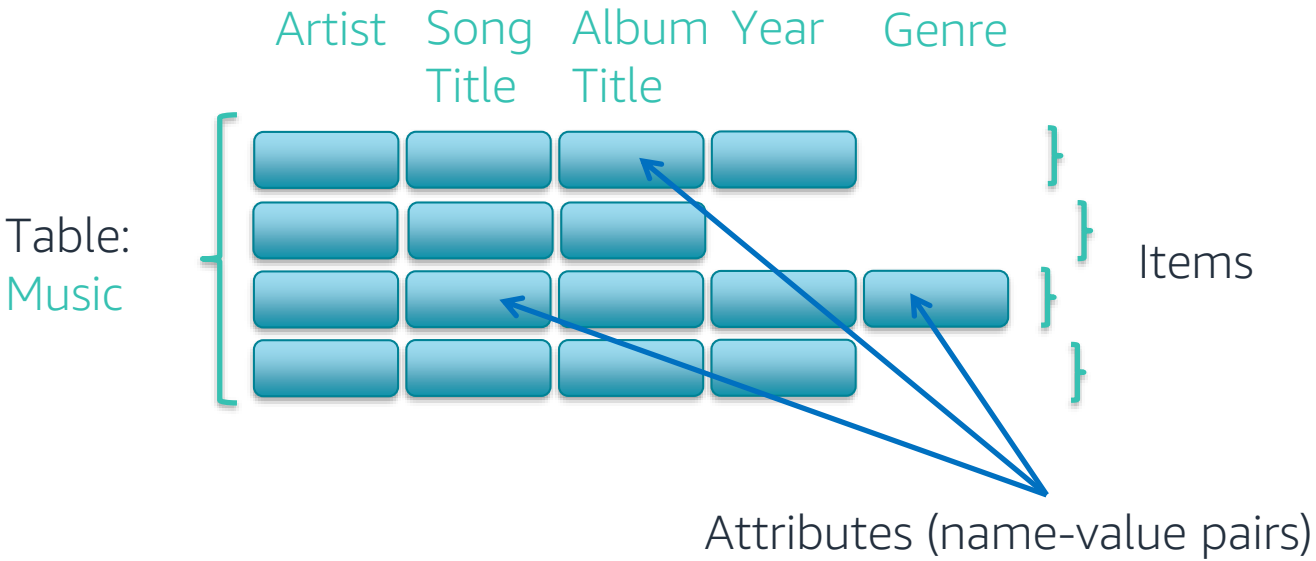
Amazon DynamoDB

Amazon DynamoDB

- Allows you to store any amount of data with **no limits.**
- Provides fast, predictable performance using **SSDs.**
- Allows you to easily provision and change the **request capacity** needed for each table.
- Is a **fully managed**, **NoSQL** database service.

DynamoDB Data Model



Primary Keys

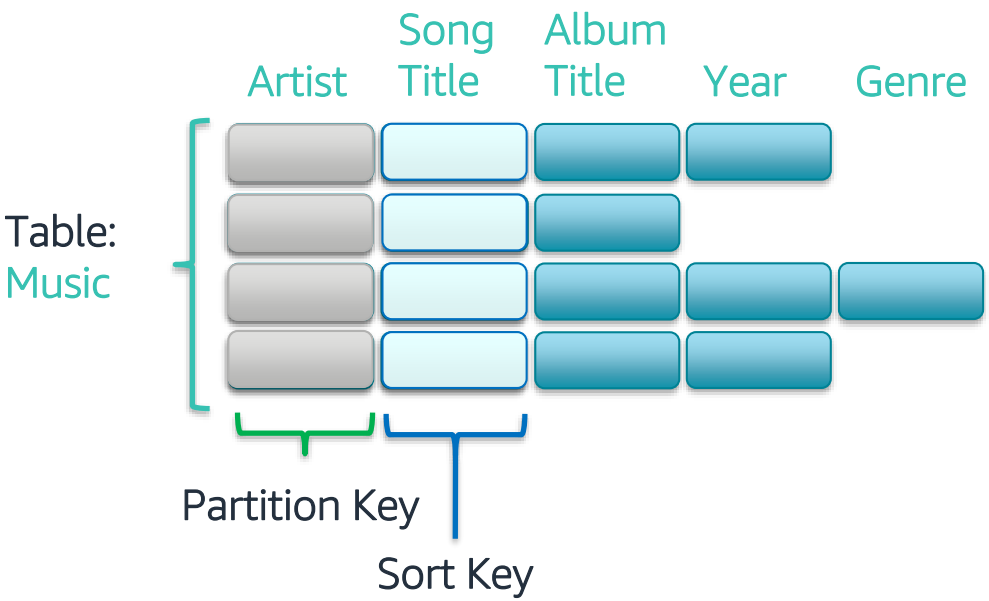


Table: Music
Partition Key: Artist
Sort Key: Song Title

Provisioned Throughput

- You specify how much **provisioned throughput capacity** you need for reads and writes.
- Amazon DynamoDB allocates the necessary machine resources to meet your needs.

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Supported Operations

- Query:
  - Query a table using the partition key and an optional sort key filter.
  - If the table has a secondary index, query using its key.
  - It is the **most efficient way to retrieve items** from a table or secondary index.
- Scan:
  - You can scan a table or secondary index.
  - Scan reads every item – **slower than querying**.
- You can use conditional expressions in both Query and Scan operations.

Database Considerations

If You Need	Consider Using
A relational database service with minimal administration	**Amazon RDS** • Choice of Amazon Aurora, MySQL, MariaDB, Microsoft SQL Server, Oracle, or PostgreSQL database engines • Scale compute and storage • Multi-AZ availability 
A fast, highly scalable NoSQL database service	**Amazon DynamoDB** • Extremely fast performance • Seamless scalability and reliability • Low cost 
A database you can manage on your own	Your choice of **AMIs** on Amazon EC2 and Amazon EBS that provide scale compute and storage, complete control over instances, and more. 

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