
# AWS Solution Architect

# Databases

# Learning Objectives

By the end of this lesson, you will be able to:

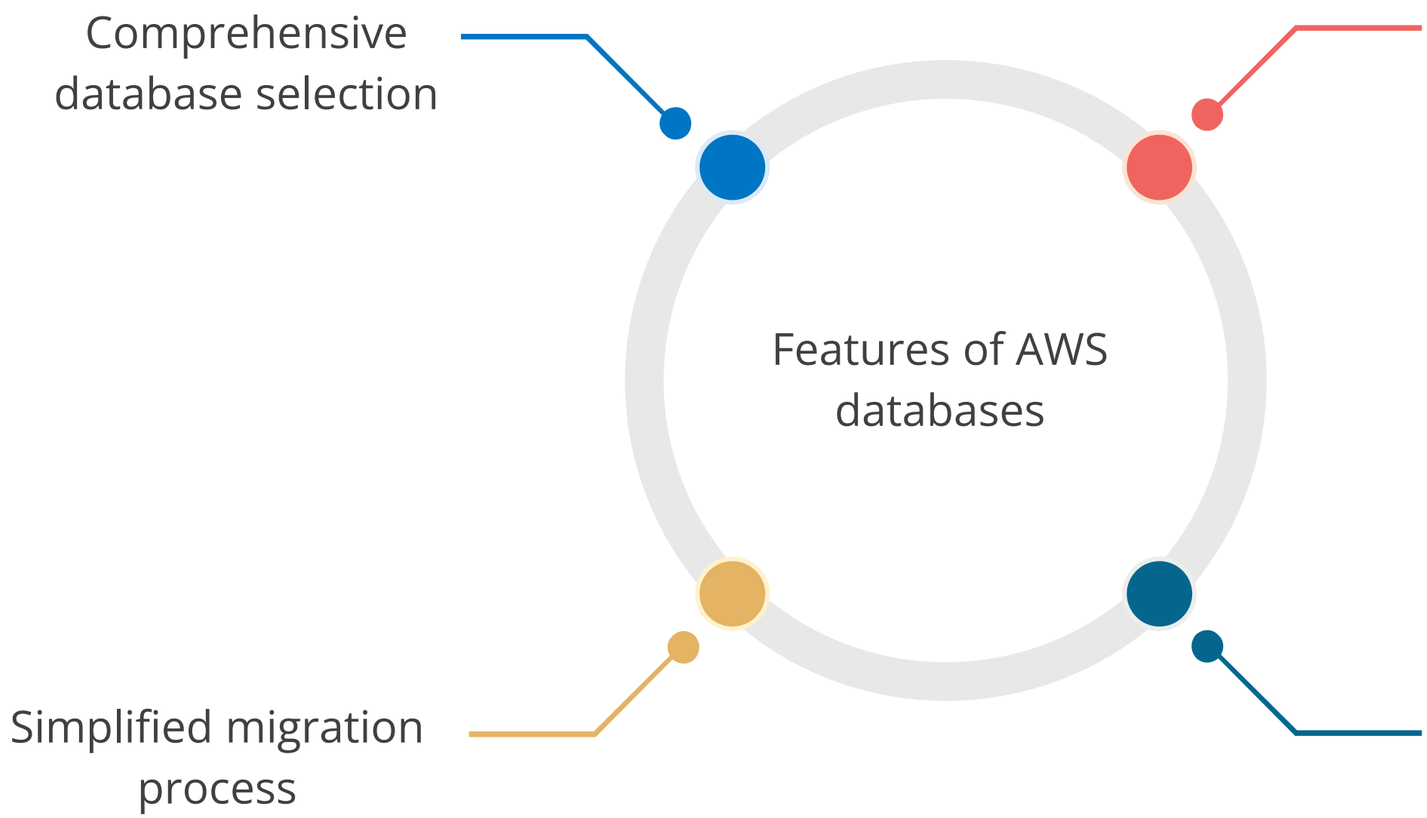
- Create and manage a MySQL database for efficient data storage and retrieval
- Set up and utilize a DynamoDB database to handle NoSQL data and achieve scalability
- Establish DynamoDB global table replicas for data redundancy, ensuring high availability and fault tolerance
- Utilize Redshift for data warehousing and perform analytical queries to extract valuable insights from your data

TECHNOLOGY

# Introduction to Databases

# Databases: Overview

AWS provides a broad selection of purpose-built databases to help save, grow, and build a robust cloud database.



# Types of AWS Databases

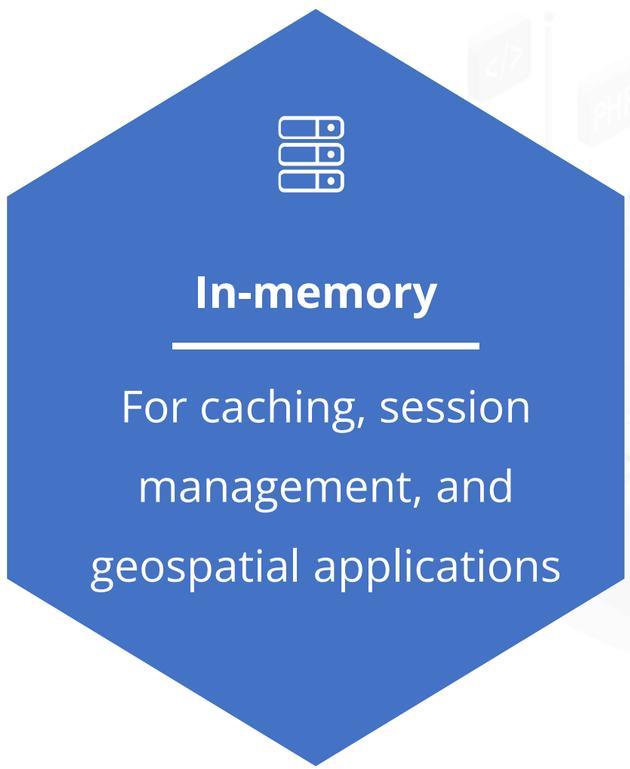
AWS databases can be categorized into:

**Relational**

For traditional applications, ERP, CRM, and e-commerce

**Key-value**

For high-traffic web applications, e-commerce, and gaming applications



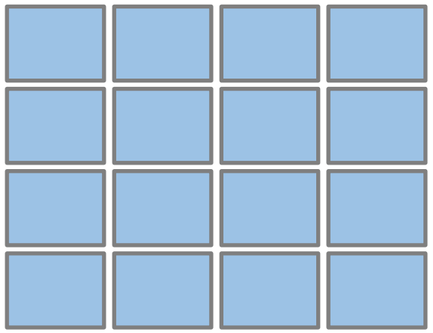
**In-memory**

For caching, session management, and geospatial applications

# Relational Databases

It is also known as SQL databases, are the most common type of databases.

Structured data

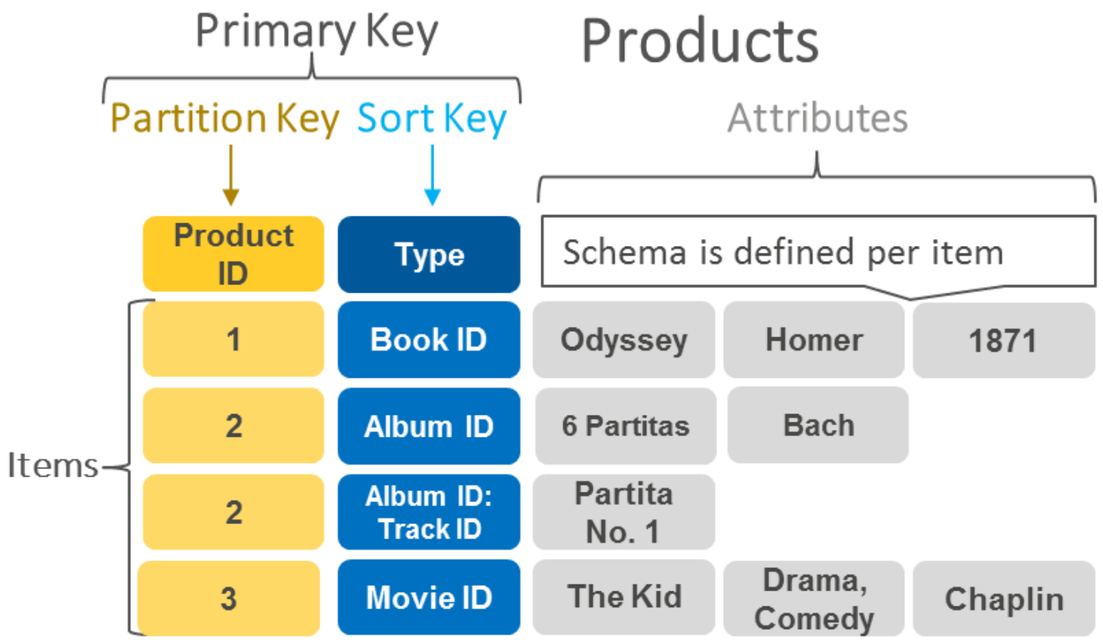




They are used to store structured data in a set of tables that are formally described.

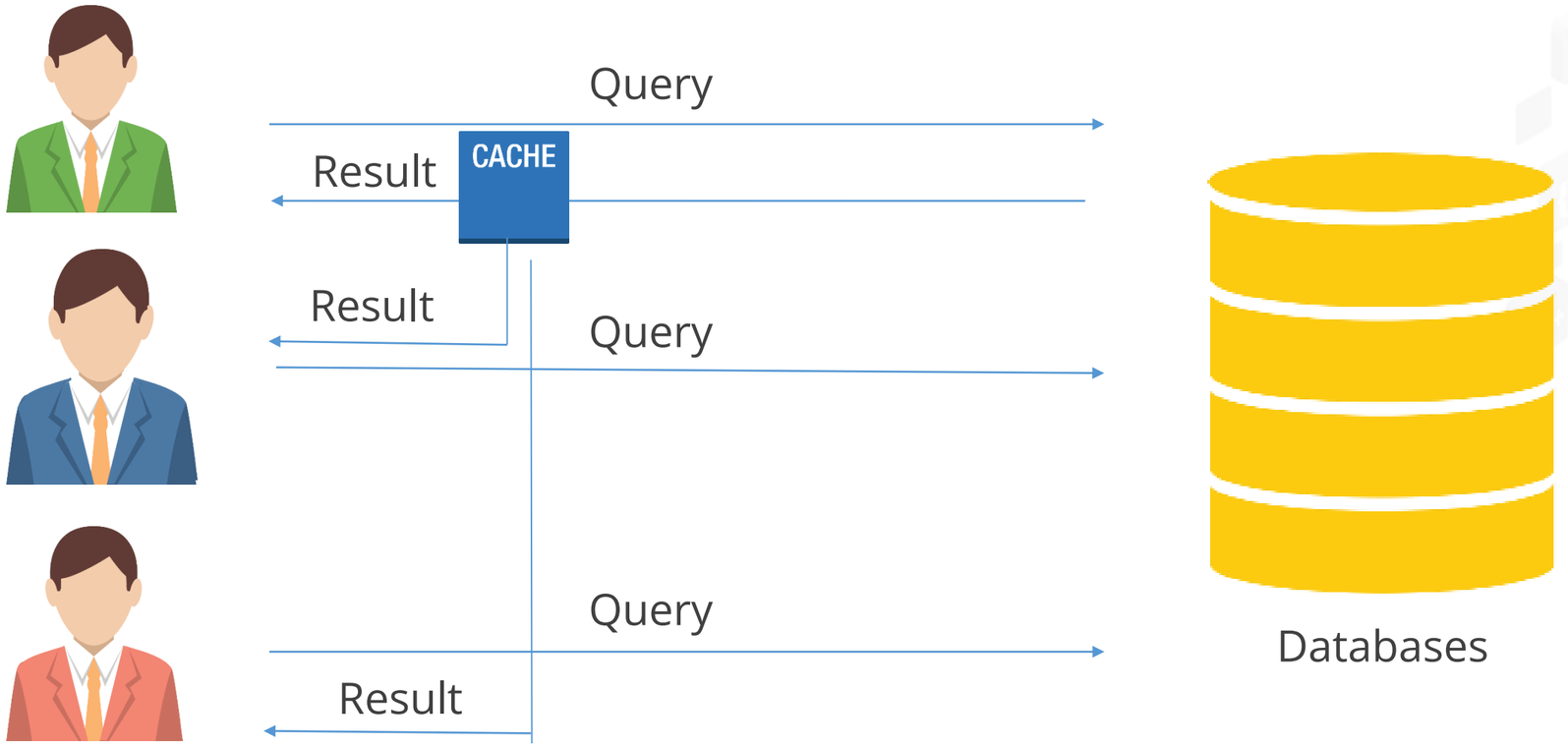
# Key-Value Databases

It is a type of non-relational database that utilizes a key-value method for storing data. These databases are used in high-traffic and high-computing applications.



# In-Memory Databases

It uses cache-based storage to reduce the database infrastructure load and enhance user response time.



# Quick Check


You need to choose an AWS database service for an application that requires a fully managed, highly available relational database with support for complex queries and transactions. Which service should you use?

A. Amazon DynamoDB

B. Amazon RDS

C. Amazon Redshift

D. Amazon Neptune

# Amazon Relational Database Service (RDS)

# Amazon RDS

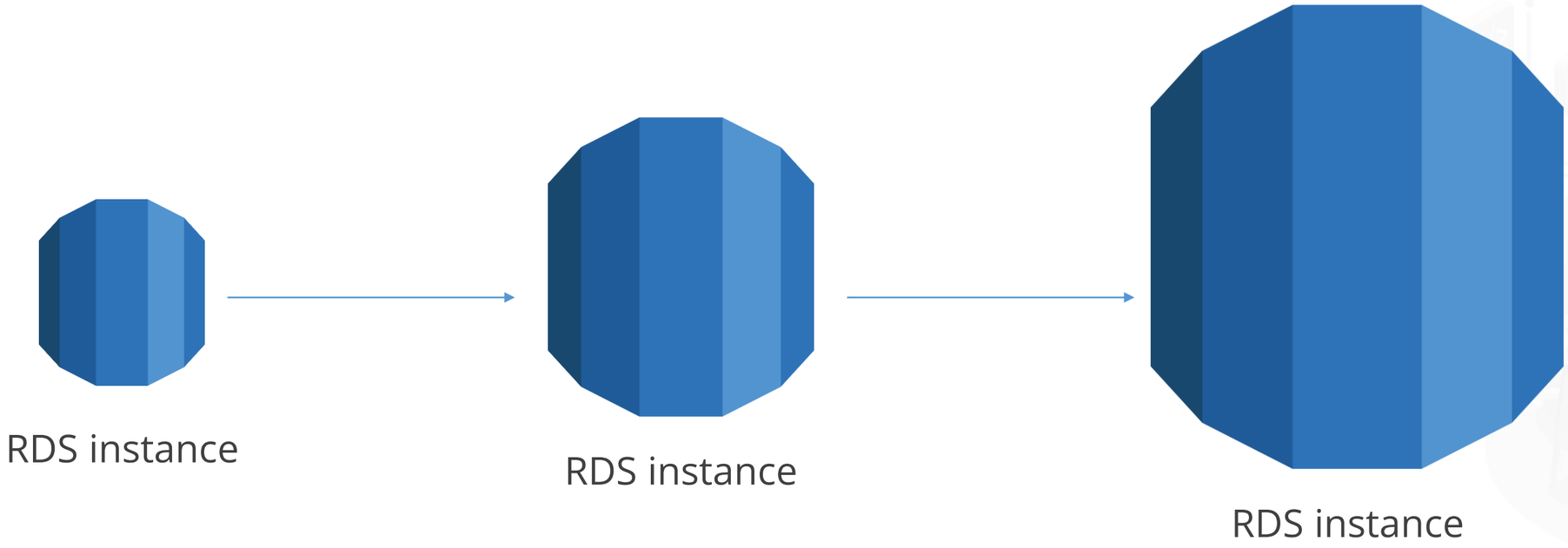
Amazon Relational Database Service (Amazon RDS) simplifies the process of setting up, operating, and scaling a relational database in the AWS cloud.

Here are some of the benefits of Amazon RDS:

- Ease of administration
- Scalability
- Security
- Cost-effectiveness
- Fast performance

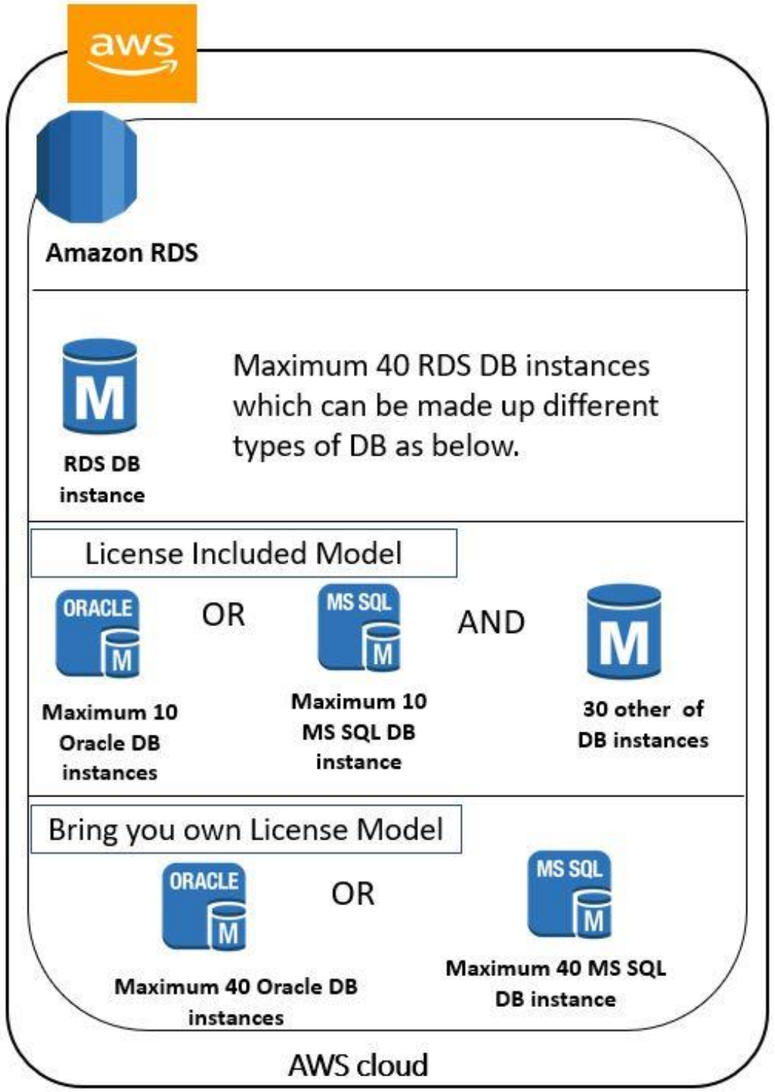
# Amazon RDS

It enables users to scale the compute and memory resources of their deployments up to 32 vCPUs and 244 GiB of RAM.




Scaling operations usually finish within minutes.

# DB Instance




- A DB instance, the fundamental building block of Amazon RDS, is a standalone database environment that runs in the Cloud.
- Users can create multiple databases within a DB instance and access them using standard client tools and applications.

# RDS classes

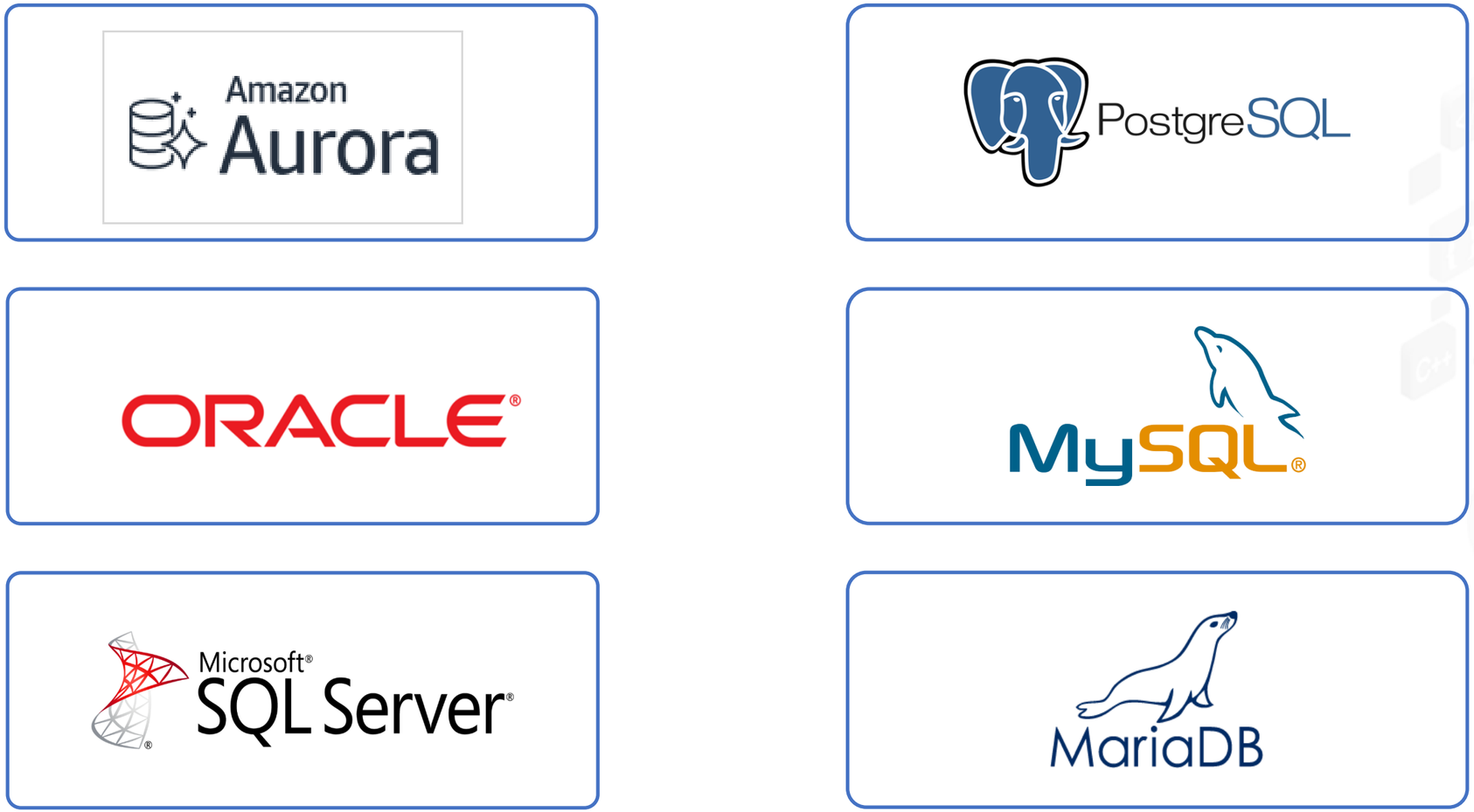
It determines the computation and memory capacity of an Amazon RDS DB instance.

They can be categorized into three types:

- General-purpose
- Memory-optimized
- Burstable performance

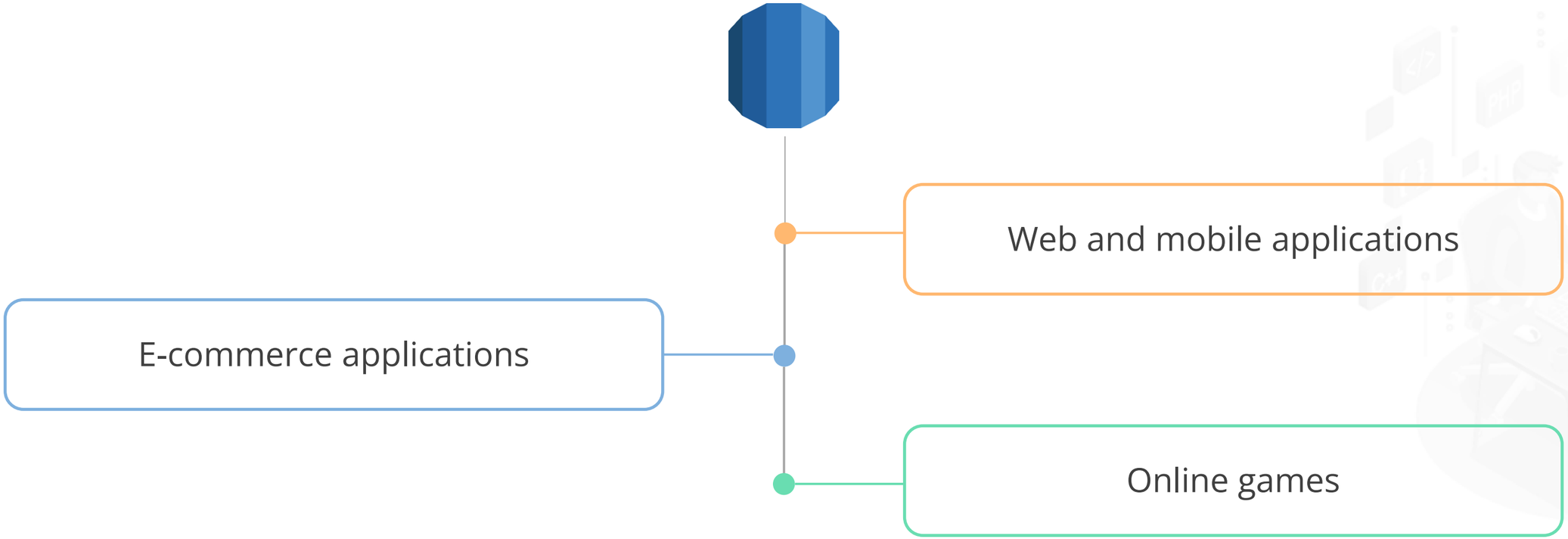
# Amazon RDS Database Engines

Amazon RDS supports several database engines:



# Use Cases of Amazon RDS

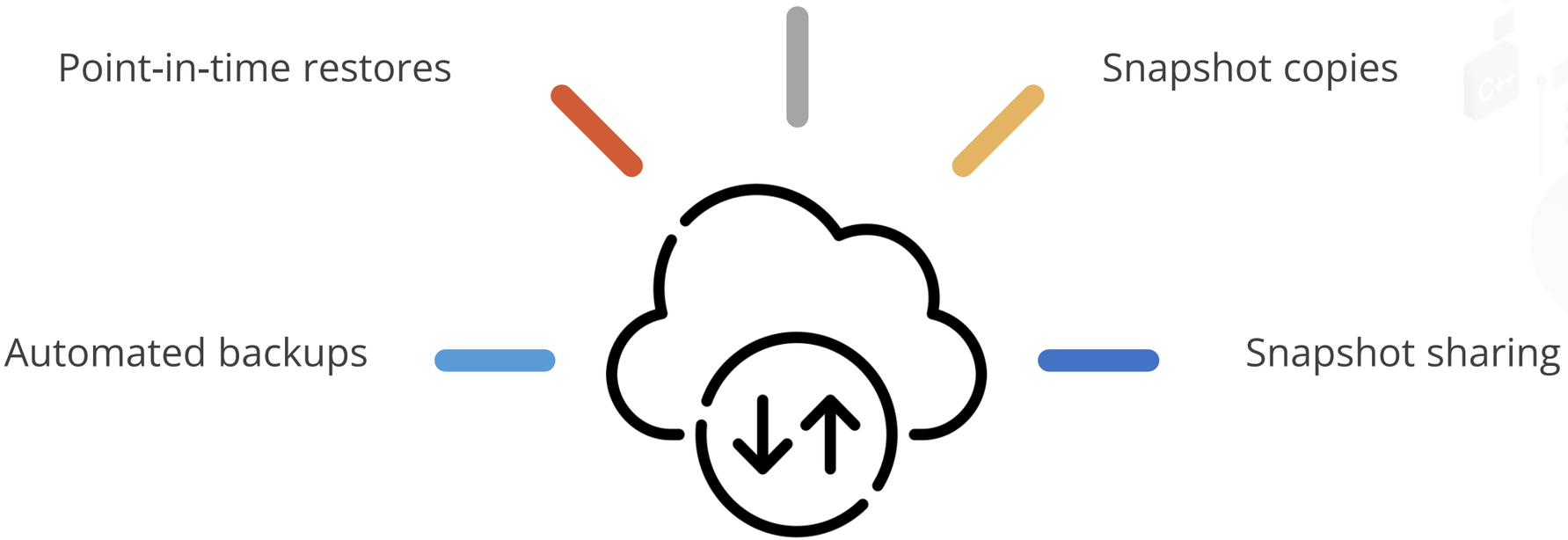
Amazon RDS is commonly used for:



# Amazon RDS Backups

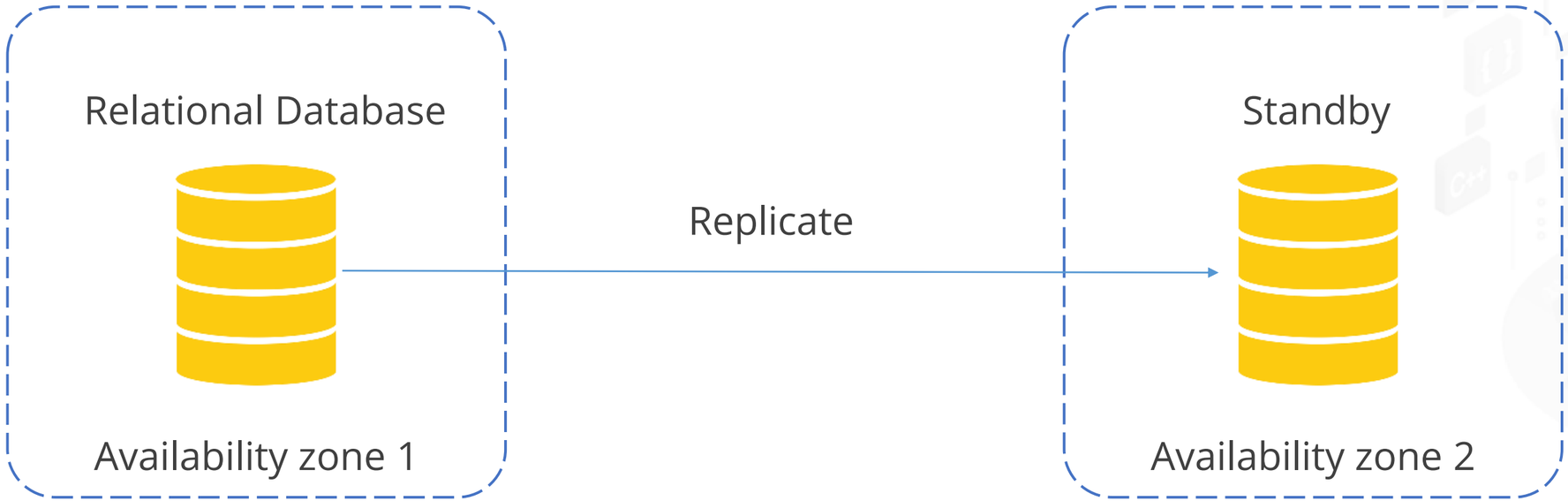
It automatically creates and securely stores backups of database instances in Amazon S3 for a specified retention period.

The types of Amazon RDS backups are:



# Multi-Availability Zone Deployments

It synchronously replicate data to a standby instance in a different Availability Zone.

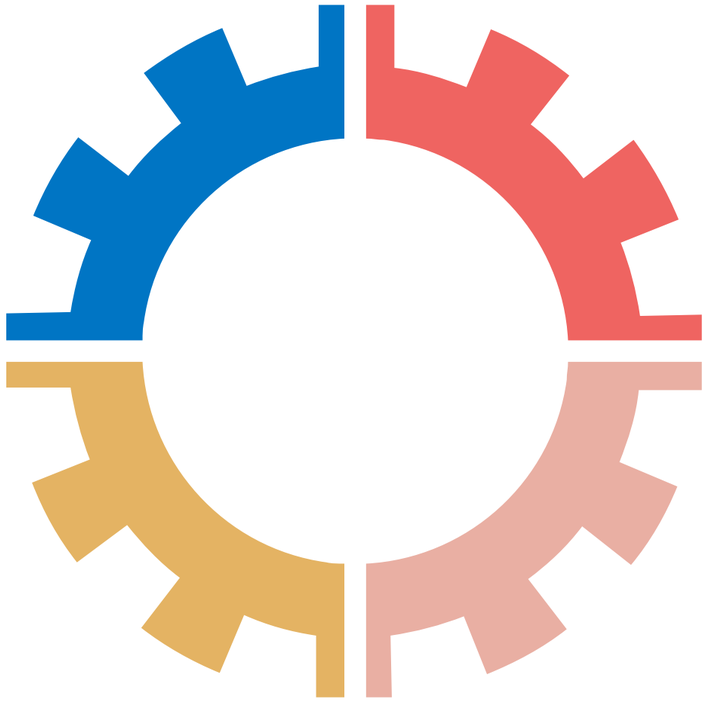


# Multi-Availability Zone Deployments

Here are some benefits of multi-availability zone deployments:

**Enhanced durability:**
The replica of the data stays up-to-date with the primary database.

**Stable performance:**
Multi-AZ deployments do not suspend I/O activity on your primary during backup.



**Increased availability:**
If an Availability Zone fails, the backup is ready in less than 30 seconds.

**Automatic failover:**
Amazon RDS automatically initiates a failover to the up-to-date standby.

# DynamoDB

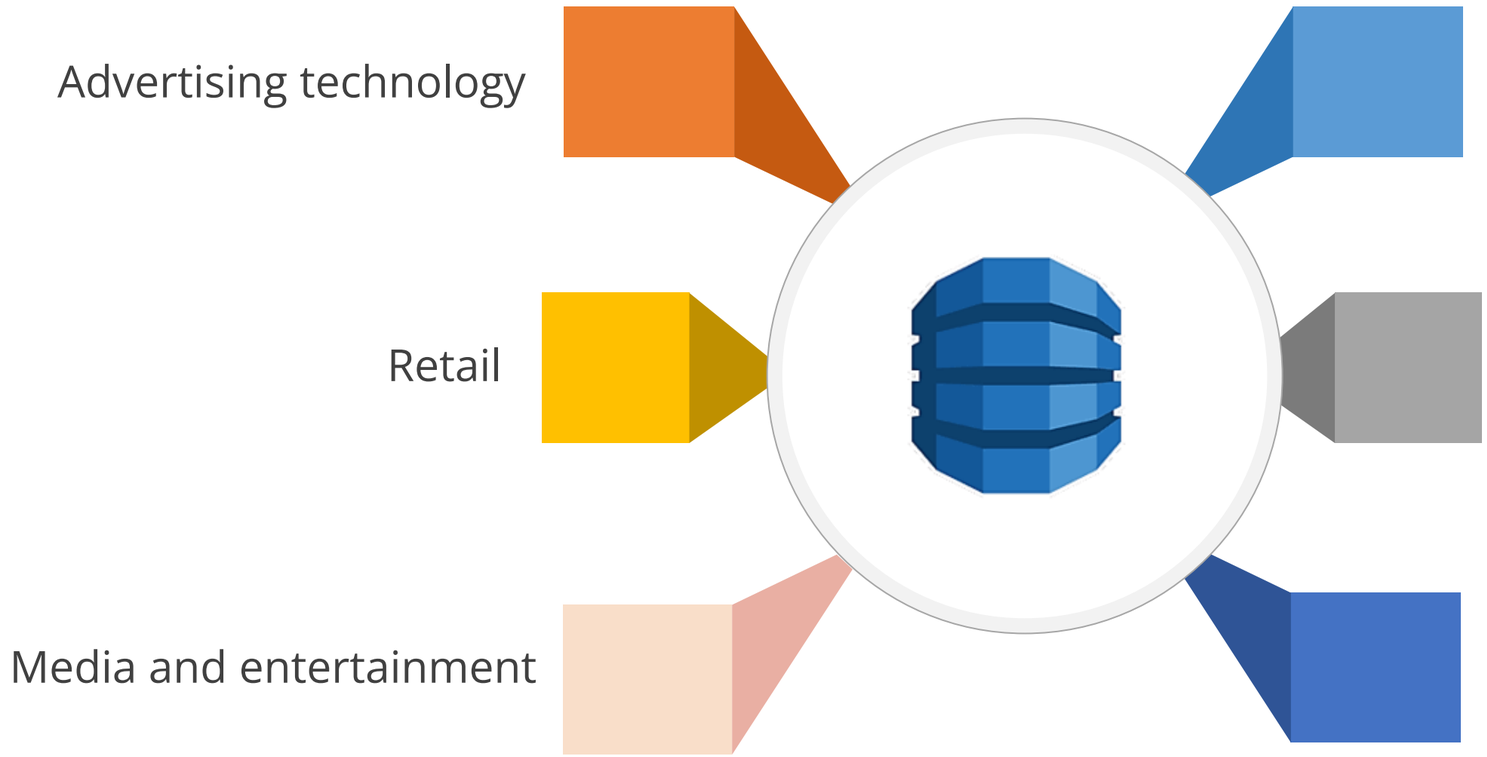
# Amazon DynamoDB

It is a fully managed NoSQL database service. It offers:

- Fast and predictable performance
- Scalability without effort
- Enterprise readiness

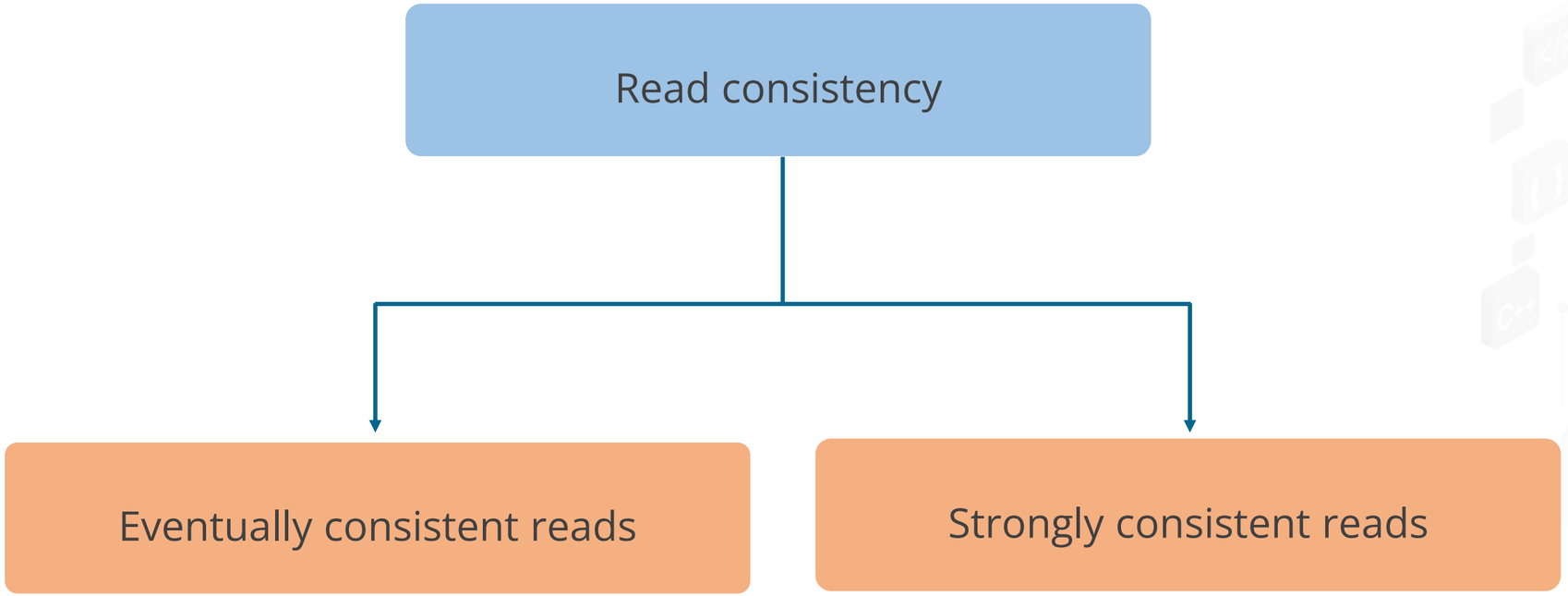
# Amazon DynamoDB: Use Cases

Amazon DynamoDB is widely used in:



# Amazon DynamoDB: Read Consistency

Amazon DynamoDB provides two types of read consistency:



# Implementing Database Operations in DynamoDB

**Duration:15 min**

**Problem Statement:**

You have been assigned a task to create a database table using DynamoDB to store and read items in a database.

**Outcome:**

You will be able to create a database table that can store and read items using the DynamoDB console.

**Note:** Refer to the demo document for detailed steps:
01_Implementing_Database_Operations_in_DynamoDB

ASSISTED PRACTICE

# Assisted Practice: Guidelines

**Steps to be followed are:**

1. Create a table
2. Store and read the items

# Creating a Replica of DynamoDB

**Duration:15 min**

**Problem Statement:**

You have been assigned a task to create a global table replica and make data available across different regions using DynamoDB for improving data accessibility and enhancing application performance in geographically dispersed environments.

**Outcome:**

You will be able to set up a global table replica and make data available across different regions using DynamoDB.

**Note:** Refer to the demo document for detailed steps:
02_Creating_a_Replica_of_DynamoDB

ASSISTED PRACTICE

# Assisted Practice: Guidelines

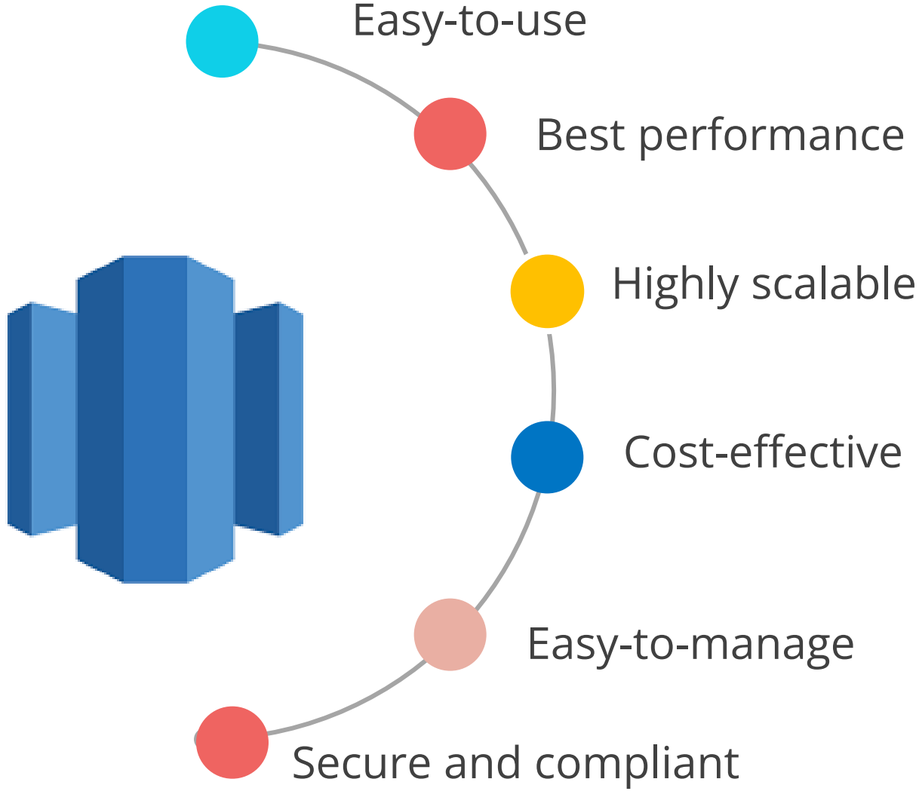
**Steps to be followed are:**

1. Create a replica in DynamoDB

# Amazon Redshift

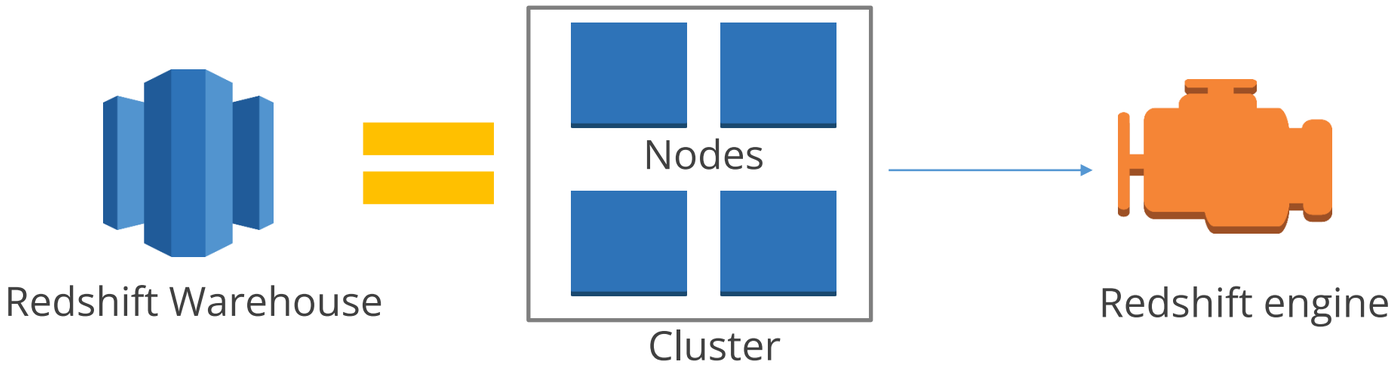
# Amazon Redshift

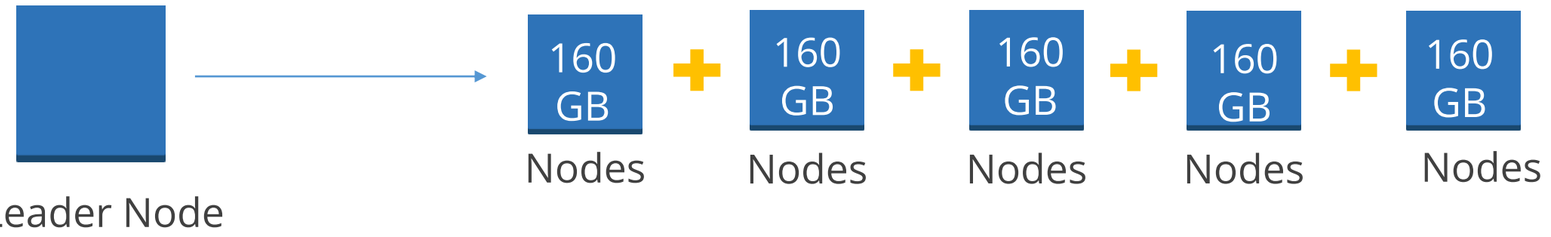
It is a fully managed, petabyte-scale data warehouse service in the cloud.
The benefits of Amazon Redshift are as follows:



# Amazon Redshift Clusters

It is a collection of computing resources called nodes. Nodes are organized into a group called a cluster. Each cluster runs an Amazon Redshift engine and contains one or more databases.

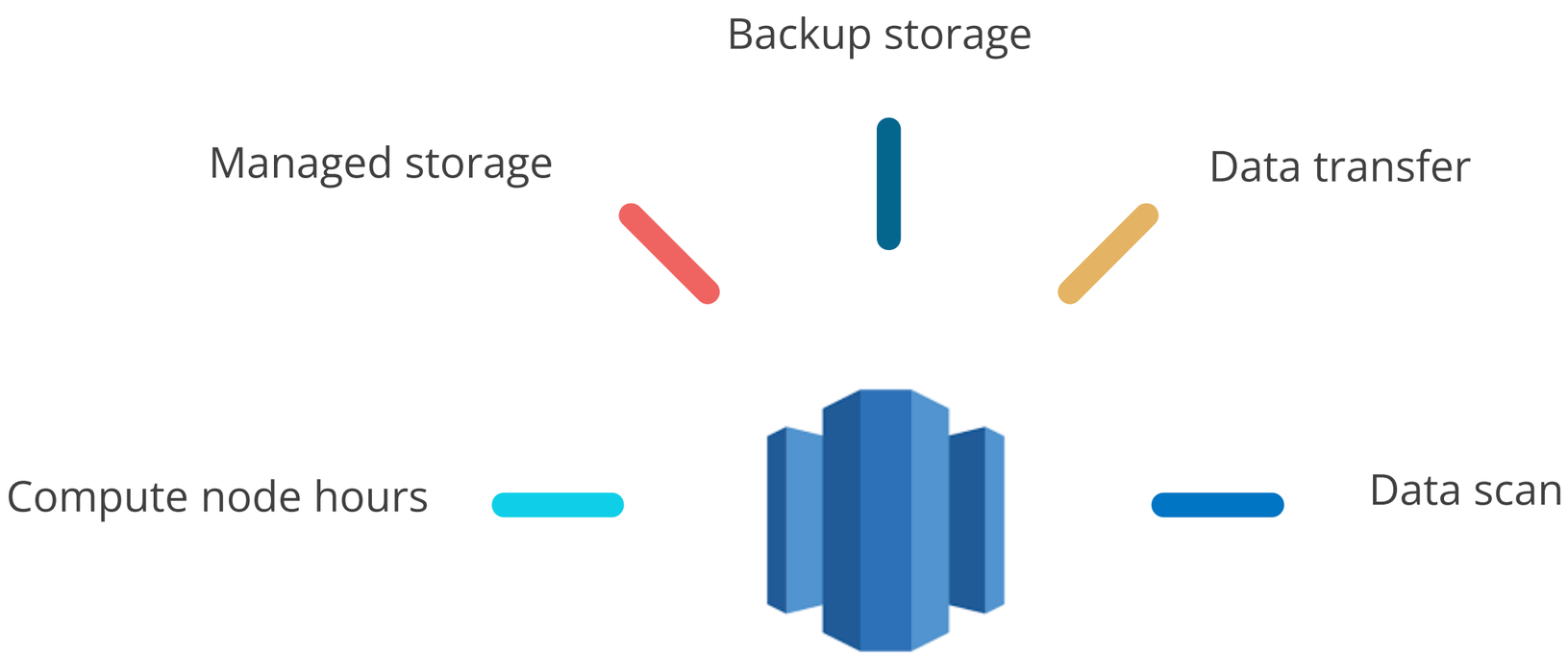



Massive Parallel Processing

# Amazon Redshift Costs

The following are the costs associated with Amazon Redshift:



# Amazon Redshift: Use Cases

The use cases of Amazon Redshift:

- Data analytics as a service
- Session store
- Streaming data analytics
- Real-time analytics

# Configuring Query Data Using Redshift Query Editor

**Duration:15 min**

**Problem Statement:**

You have been assigned a task to create a table in Amazon Redshift and access the Redshift Query Editor.

**Outcome:**

You will be able to create a table in Amazon Redshift, configure it, and perform queries using the Redshift Query Editor.

**Note:** Refer to the demo document for detailed steps:
03_Configuring_Query_Data_Using_Redshift_Query_Editor

ASSISTED PRACTICE

# Assisted Practice: Guidelines

**Steps to be followed are:**

1. Create a table in Redshift

# Creating a RDS MySQL Database

**Duration:15 min**

**Problem Statement:**

You have been assigned a task to demonstrate the process of creating an Amazon RDS MySQL database using the AWS Management Console.

**Outcome:**

You will be able to demonstrate the process of creating an Amazon RDS MySQL database using the AWS Management Console, configure the database settings, manage users, and understand the fundamental tasks required for its operation.

**Note:** Refer to the demo document for detailed steps:
04_Creating_a_RDS_MYSQL_Database

ASSISTED PRACTICE

# Assisted Practice: Guidelines

**Steps to be followed are:**

1. Create a RDS database

# Quick Check


You need to analyze large datasets using SQL-based queries and require a fully managed data warehouse solution that can scale to petabytes of data. Which AWS service should you choose?

A. Amazon RDS

B. Amazon DynamoDB

C. Amazon Redshift

D. Amazon Aurora

# Key Takeaways

- Amazon RDS supports several database options including Amazon Aurora, Oracle, Microsoft SQL Server, PostgreSQL, MySQL, and MariaDB.
- Amazon DynamoDB is a NoSQL database service, offering fast, predictable performance and seamless scalability.
- Amazon ElastiCache is a web service that simplifies the deployment, operation, and scaling of an in-memory data store.
- Amazon DocumentDB is designed for managing and scaling JSON formatted data.

TECHNOLOGY

# Thank You



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