

Databases

Module 5

Units

5.1 Explore Databases in AWS

5.2 Amazon Relational Database Service (RDS)

5.3 Amazon introduction to Amazon DynamoDB

5.4 Choose the Right AWS Database Service

5.5 Hands-on Lab: Implement and Manage Amazon RDS

OVERVIEW : MODULE 05

Databases

Learning Outcomes

- Overview of storage solutions catering to diverse needs of users
- Understanding the significance of AWS storage in cloud computing
- Understanding the characteristics and use cases of block storage
- In-depth exploration of object storage within the AWS ecosystem
- Introduction to file storage in AWS
- Understanding scenarios where file storage is suitable

Lesson Learning Outcomes

- ✓ Differentiate between various types of databases available on AWS, including relational databases (Amazon RDS), NoSQL databases (Amazon DynamoDB), and in-memory databases (Amazon ElastiCache)
- ✓ Gain proficiency in Amazon RDS for managing and deploying relational databases
- ✓ Understand the significance of in-memory databases, exemplified by Amazon ElastiCache, for optimizing performance and reducing latency in data retrieval

LESSON OVERVIEW

MODULE 5 DATABASES

Lesson 5.1 Explore Databases in AWS

- AWS Database Overview

5.1

Explore Databases in AWS

A high-performing database is crucial to any organization. Databases support the internal operations of companies and store interactions with customers and suppliers

Explore Databases in AWS

AWS Database Overview

Amazon RDS

Managed Relational Database Service



Amazon DynamoDB

Managed NoSQL Database



Amazon DocumentDB

Fully-managed MongoDB-compatible Database



ElastiCache

In-Memory Cache



Explore Databases in AWS

SUMMARY

- ✓ Understanding of database solutions catering to diverse needs of users
- ✓ Discussing variety of AWS Managed Relational Databases
- ✓ Also gain knowledge regarding Non-Relational database like DynamoDB and DocumentDB
- ✓ Understanding database in-memory cache service

Explore Databases in AWS

Resources

- ✓ <https://aws.amazon.com/products/databases/>
- ✓ <https://aws.amazon.com/rds/>
- ✓ <https://docs.aws.amazon.com/whitepapers/latest/aws-overview/database.html>

Lesson Learning Outcomes

- ✓ The fundamental concepts of Amazon RDS, including its role as a managed relational database service that simplifies database administration tasks
- ✓ Gain knowledge of the various relational database engines supported by Amazon RDS, such as MySQL, PostgreSQL, Oracle, Microsoft SQL Server, and Amazon Aurora
- ✓ Understand high availability configurations in RDS, including multi-AZ deployments and the automatic failover mechanism for enhanced database availability
- ✓ Master backup and restore strategies in RDS, including automated backups, manual snapshots, and point-in-time recovery to ensure data durability and recoverability

LESSON OVERVIEW

MODULE 5 DATABASES

Lesson 5.2 Amazon Relational Database Service (RDS)

- Amazon RDS Overview
- Database Instances
- Storage on Amazon RDS
- Backup Data

5.2

Amazon Relational Database Service (RDS)

With Amazon Relational Database Service (Amazon RDS), you can focus on tasks that differentiate your application instead of infrastructure-related tasks, like provisioning, patching, scaling, and restoring

Amazon Relational Database Service (RDS)

Amazon RDS overview

Amazon RDS

Amazon RDS is a managed database service customers can use to create and manage relational databases in the cloud without the operational burden of traditional database management

- **Commercial:** Oracle, SQL Server, IBM Db2
- **Open source:** MySQL, PostgreSQL, MariaDB
- **Cloud native:** Aurora

Amazon Relational Database Service (RDS)

Database Instances

DB Instance Type

- Standard classes
- Memory optimized classes
- Burstable Classes

- ☒ Standard classes (includes m classes)
- ☐ Memory optimized classes (includes r and x classes)
- ☐ Burstable classes (includes t classes)

db.m6gd.large (supports Amazon RDS Optimized Writes)

2 vCPUs 8 GiB RAM Network: 4,750 Mbps



db.m5.large (supports Amazon RDS Optimized Writes)

2 vCPUs 8 GiB RAM Network: 4,750 Mbps

db.m5.xlarge (supports Amazon RDS Optimized Writes)

4 vCPUs 16 GiB RAM Network: 4,750 Mbps

db.m5.2xlarge (supports Amazon RDS Optimized Writes)

8 vCPUs 32 GiB RAM Network: 4,750 Mbps

db.m5.4xlarge (supports Amazon RDS Optimized Writes)

16 vCPUs 64 GiB RAM Network: 4,750 Mbps

db.m5.8xlarge (supports Amazon RDS Optimized Writes)

32 vCPUs 128 GiB RAM Network: 6,800 Mbps

db.m5.12xlarge (supports Amazon RDS Optimized Writes)

48 vCPUs 192 GiB RAM Network: 9,500 Mbps

db.m5.16xlarge (supports Amazon RDS Optimized Writes)

64 vCPUs 256 GiB RAM Network: 13,600 Mbps

db.m5.24xlarge (supports Amazon RDS Optimized Writes)

96 vCPUs 384 GiB RAM Network: 19,000 Mbps

Amazon Relational Database Service (RDS)

Storage on Amazon RDS

DB Storage

- GP2 (SSD)
- GP3 (SSD)
- IOPS io1(SSD)
- Magnetic

Storage

Storage type [Info](#)

General Purpose SSD (gp2)

Baseline performance determined by volume size



General Purpose SSD (gp2)

Baseline performance determined by volume size



General Purpose SSD (gp3)

Performance scales independently from storage

Provisioned IOPS SSD (io1)

Flexibility in provisioning I/O

Magnetic

Limited to a maximum of 1,000 IOPS (not recommended)

Amazon Relational Database Service (RDS)

Backup data

DB Auto Backup

- Default 1 to 35 days

Backup

☒ Enable automated backups

Creates a point-in-time snapshot of your database

Backup retention period [Info](#)

The number of days (1-35) for which automatic backups are kept.

days

Backup window [Info](#)

The daily time range (in UTC) during which RDS takes automated backups.

☒ Choose a window

☐ No preference

Start time

 : UTC

Duration

 hours

☒ Copy tags to snapshots

Amazon Relational Database Service (RDS)

SUMMARY

- ✓ Exploring Relational Database in AWS
- ✓ Understanding Database instance type
- ✓ Debase Storage type and Scaling
- ✓ How take automatic backup

Amazon Relational Database Service (RDS)

Resources

- <https://aws.amazon.com/products/databases/>
- <https://aws.amazon.com/rds/>
- <https://docs.aws.amazon.com/whitepapers/latest/aws-overview/database.html>

Lesson Learning Outcomes

- ✓ The fundamental concepts of NoSQL databases and comprehend the advantages and use cases that make Amazon DynamoDB a prominent choice
- ✓ Gain familiarity with the core components of DynamoDB, including tables, items, and attributes, and understand how data is organized in this fully managed NoSQL database service
- ✓ Understand DynamoDB's ability to scale horizontally to handle varying workloads and its seamless performance scalability as demands on the database increase

LESSON OVERVIEW

MODULE 5 DATABASES

Lesson 5.3 Amazon Introduction to Amazon DynamoDB

- DynamoDB Overview
- DynamoDB Core Components
- DynamoDB Use Cases

5.3

Amazon Introduction to Amazon DynamoDB

With Amazon DynamoDB, you have a fully managed service that handles the operations work

Amazon Introduction to Amazon DynamoDB

DynamoDB Overview

Amazon DynamoDB

DynamoDB is a fully managed NoSQL database service that provides fast and predictable performance with seamless scalability



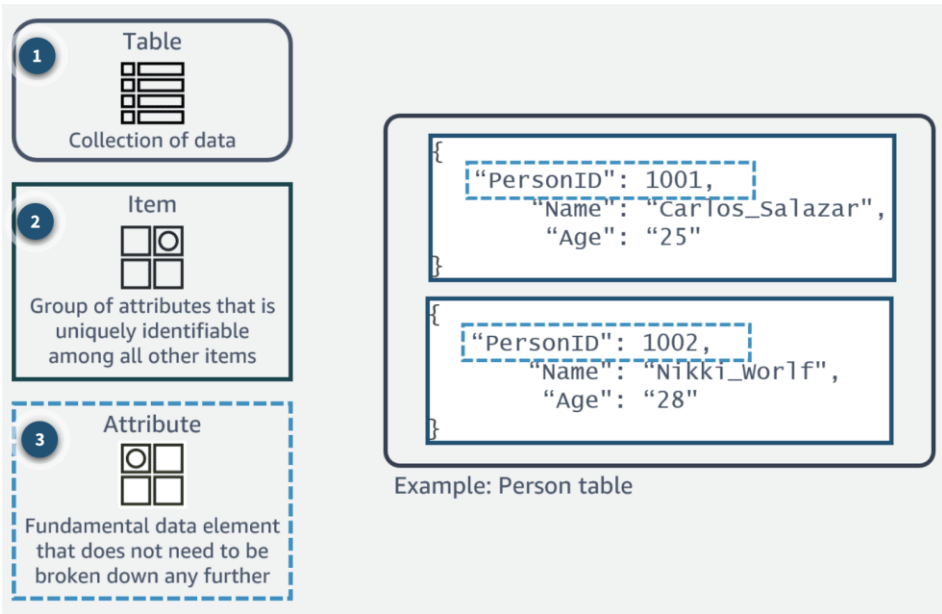
Amazon Introduction to Amazon DynamoDB

DynamoDB Core Components

Components

In AWS DynamoDB, tables, items, and attributes are the core components that you work with.

A table is a collection of items, and each item is a collection of attributes



Amazon Introduction to Amazon DynamoDB

DynamoDB Use Cases

Use Cases

DynamoDB is a fully managed service that handles the operations work. You can offload the administrative burdens of operating and scaling distributed databases to AWS

Industry Type	Use Cases
Ad Tech	<ul style="list-style-type: none"> User events, clickstreams, and impression data store Metadata store for assets In-memory caching for most popular items
Banking and Finance	<ul style="list-style-type: none"> Entity Resolution System and Real-time Fraud detection Transactions Event-driven transaction processing
Retail	<ul style="list-style-type: none"> Shopping carts and workflow engines For Customer profiles and accounts For inventory tracking system
Gaming	<ul style="list-style-type: none"> Game States Leadersboard and Player's data storage Player's session history store

Amazon Introduction to Amazon DynamoDB

SUMMARY

- ✓ Understanding the AWS DynamoDB
- ✓ Gaining concept of insides components of DynamoDB
- ✓ When to use AWS DynamoDB

Amazon Introduction to Amazon DynamoDB

Resources

- ✓ <https://aws.amazon.com/dynamodb/>
- ✓ <https://docs.aws.amazon.com/amazondynamodb/latest/developerguide/GettingStartedDynamoDB.html>

Lesson Learning Outcomes

- ✓ Develop an understanding of the factors influencing the choice of an AWS database service, considering requirements such as data model, scalability, performance, and consistency
- ✓ Develop the ability to analyse diverse use cases and match them to the most suitable AWS database service based on specific requirements, including read and write patterns, data volume, and complexity
- ✓ Evaluate performance considerations, including throughput, latency, and response times, to select a database service that aligns with the performance needs of the application

LESSON OVERVIEW

MODULE 5 DATABASES

Lesson 5.4 Choose the Right AWS Database Service

- Which Database Should We Use ?

5.4

Choose the Right AWS Database Service

Choose the database service that is the best fit for the job to help you optimize scale, performance, and costs when designing applications.

Choose the Right AWS Database Service

Which Database Should We Use ?

AWS Service(s)	Database Type	Use Cases
Amazon RDS, Aurora, Amazon Redshift	Relational	Traditional applications, ERP, CRM, ecommerce
DynamoDB	Key-value	High-traffic web applications, ecommerce systems, gaming applications
Amazon ElastiCache for Memcached, Amazon ElastiCache for Redis	In-memory	Caching, session management, gaming leaderboards, geospatial applications
Amazon DocumentDB	Document	Content management, catalogs, user profiles

Choose the Right AWS Database Service

SUMMARY

- ✓ Understand the specific requirements of the application or use case.
- ✓ Evaluate factors such as data structure, volume, and access pattern

Choose the Right AWS Database Service

Resources

- ✓ <https://aws.amazon.com/blogs/database/?nc=sn&loc=4>
- ✓ <https://aws.amazon.com/products/databases/>



5.5

Hands-On Lab

Implement and manage Amazon RDS