WHAT IS DATABASE ?

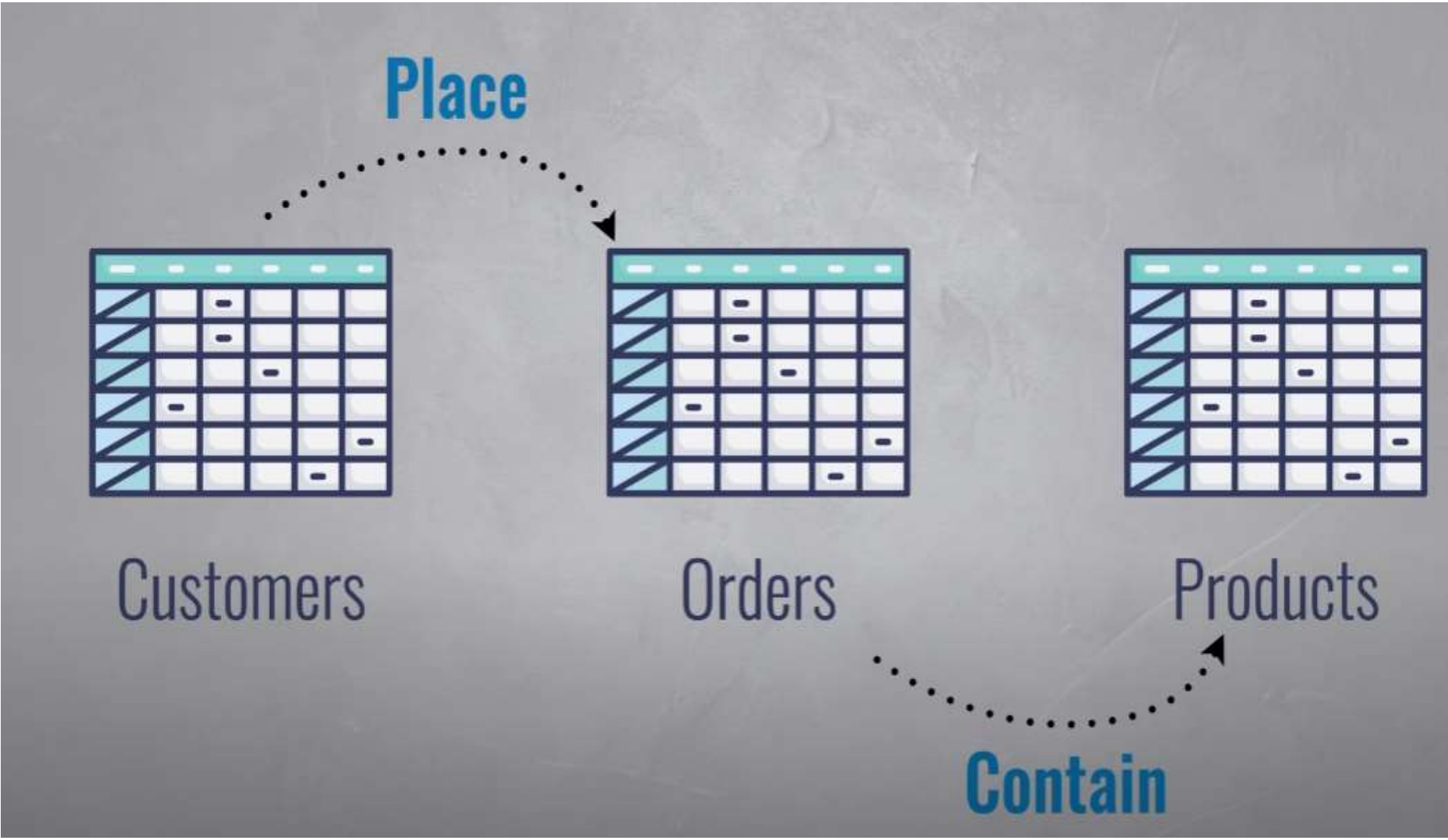
The database is an organized collection of structured data to make it easily accessible, manageable and update. In simple words, you can say, a database in a place where the data is stored. The best analogy is the library. The library contains a huge collection of books of different genres, here the library is database and books are the data.

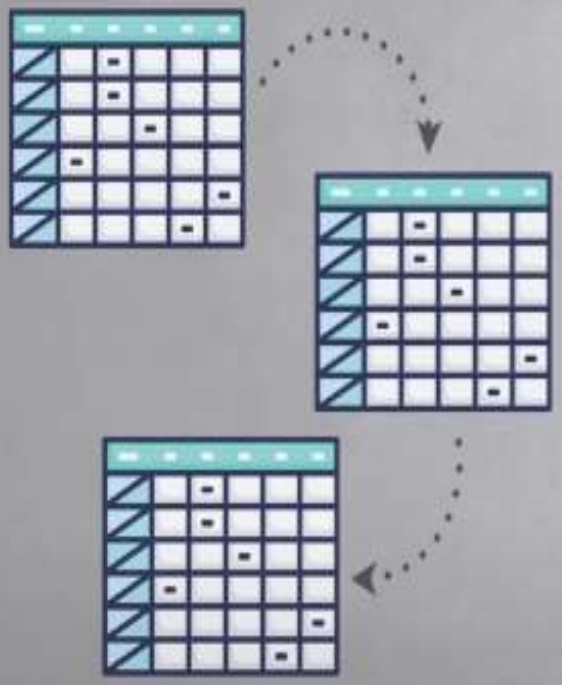
1.In the early 1980s, Relational databases became very popular, which was followed by object-oriented databases later on.

2.More recently, NoSQL databases came up as a response to the growth of the internet and the need for faster speed and processing of unstructured data.

3.Today, we have cloud databases and self-driving databases that are creating a new ground when it comes to how data is collected, stored, managed, and utilized.

RELATIONAL DATABASES



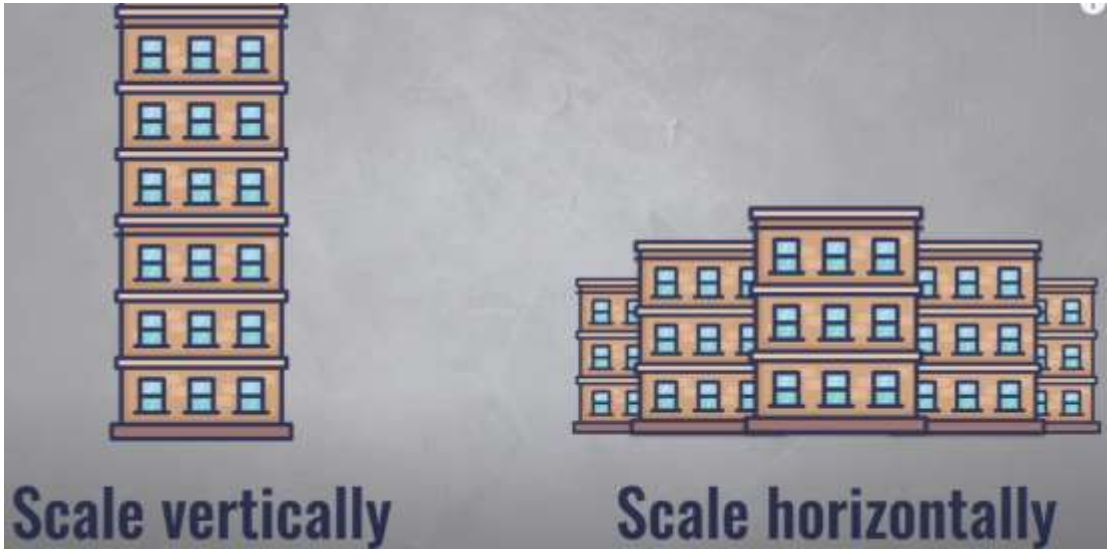


Data consistency

Hard to scale

Resource intensive

DIFFERENCE BETWEEN SQL AND NOSQL



Key	Value
194252165973	MacBook Pro 13"
42406659611	USB Microphone
36000341362	Hand Sanitizer
36196308002	Toilet paper

Key	Value
194252165973	{ name: "MacBook Pro 13" price: $1032.21, description: "laptop" }
42406659611	USB Microphone
36000341362	Hand Sanitizer
36196308002	Toilet paper

Amazon Relational Database Service (RDS)

Amazon RDS makes it easy to set up, operate and scale the relational database in the cloud. When you do time consumming administrative tasks on the cloud, such as hardware establishment, database setup, recovery, and backups, Amazon RDS makes your work easier. It offers cost-efficient and resizable capacity. By using Amazon RDS, you are free to focus on your applications so that you can give them the fast performance, high availability, security and compatibility they require.

Types of Relational Database

There are six different database engines that come under AWS database. These engines include:

- SQL Server, if you need to manage, query, and structure the data in the database, this is one of the primary services to do so
- Oracle server is used to store large amounts of data, which include text, data, video etc.
- MySQL Server is a database service that provides multi-user access to support many storage engines
- PostgreSQL Server stores a larger amount of data in the open-source environment than Oracle does
- Amazon Aurora is also a relational database compatible with MySQL and PostgreSQL servers. It is five times faster as compared to the MySQL database and three times faster than PostgreSQL database
- Maria DB is another open source relational database

RDS Features

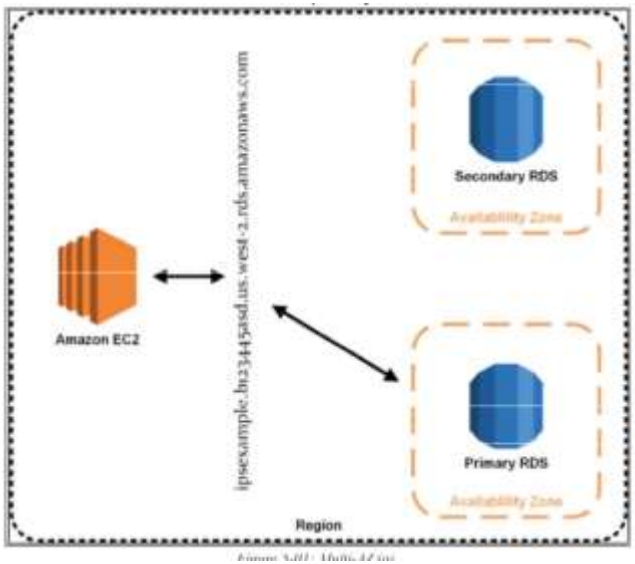
There are two main key features of RDS, which are:

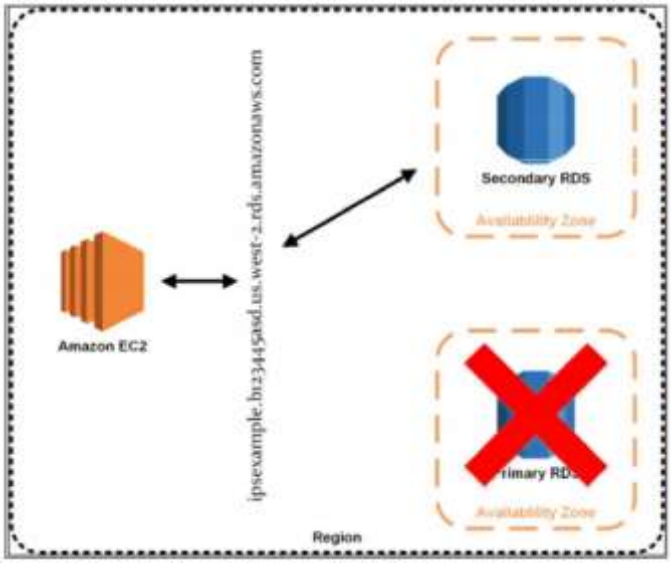
- Multi-AZ
- Read Replicas

- Loss of availability in a primary Availability Zone
- Loss of network connectivity to a primary database
- Compute unit failure on the primary database
- Storage failure on the primary database

Multi-AZ

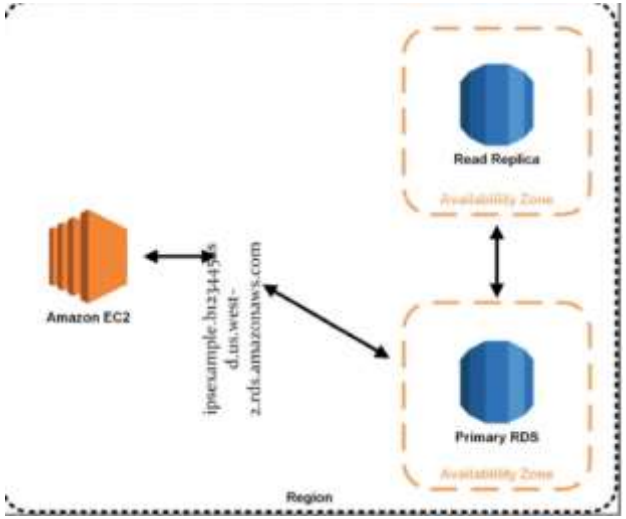
Multi-AZ is one of the essential features of Amazon RDS that allows the user to have an exact copy of the user's production database in another availability zone. In that, you can have RDS instances in multiple availability zones. This is especially designed for disaster recovery. Disaster Recovery is a mandatory plan adopted by any IT organization to protect its IT majors. It keeps the running applications remain available during the recovery period and does not harm any other services. It is mostly used in mission critical workloads to maintain the HA and built-in failover to secondary database in case of primary database failure. In Multi-AZ, Amazon RDS creates a primary instance in one availability zone and a secondary in another availability zone.

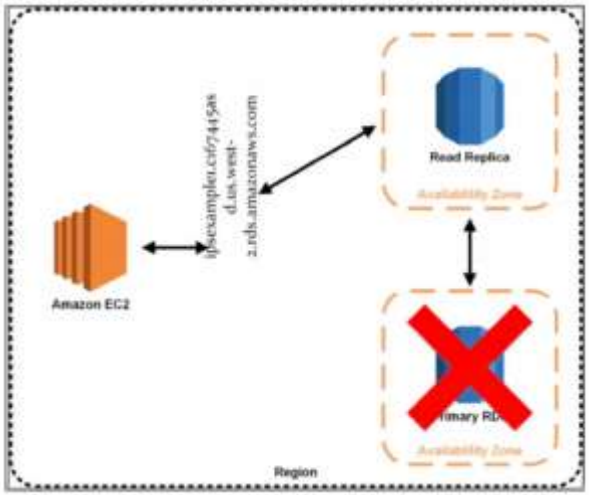


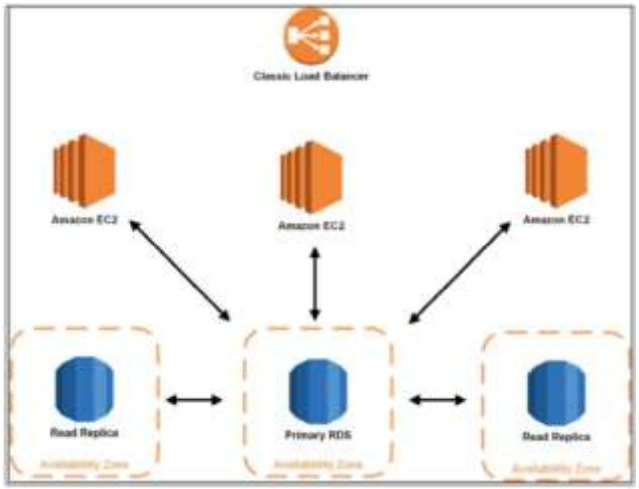


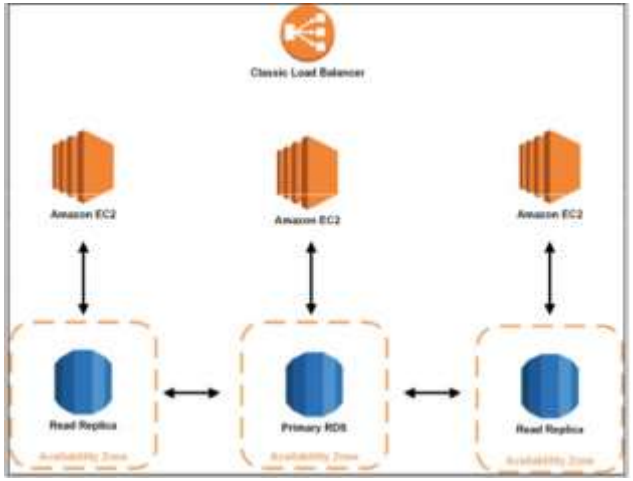
Read Replicas

Read replicas is another critical scaling technology for increasing the overall number of transactions and offload read transaction of the primary database. There are multiple replicas of the production database that allow EC2 instances to read traffic from replicas (copies of the database). So, there is no performance head while reading database from replicas of RDS.









DynamoDB

Amazon DynamoDB is a flexible and speedy NoSQL database service for all applications. It provides consistent, single-digit millisecond latency at any scale. It is a fully managed database and supports both key-value and document data models. Its flexible data model and reliable performance make it a great fit for web, mobile, gaming, Internet of Things(IoT), ad-tech, and many other applications. It is a durable database that has built-in security, backups and restores, and in-memory caching. DynamoDB can accommodate over 10 trillion requests a day and can handle peaks of over 20 million requests a day.

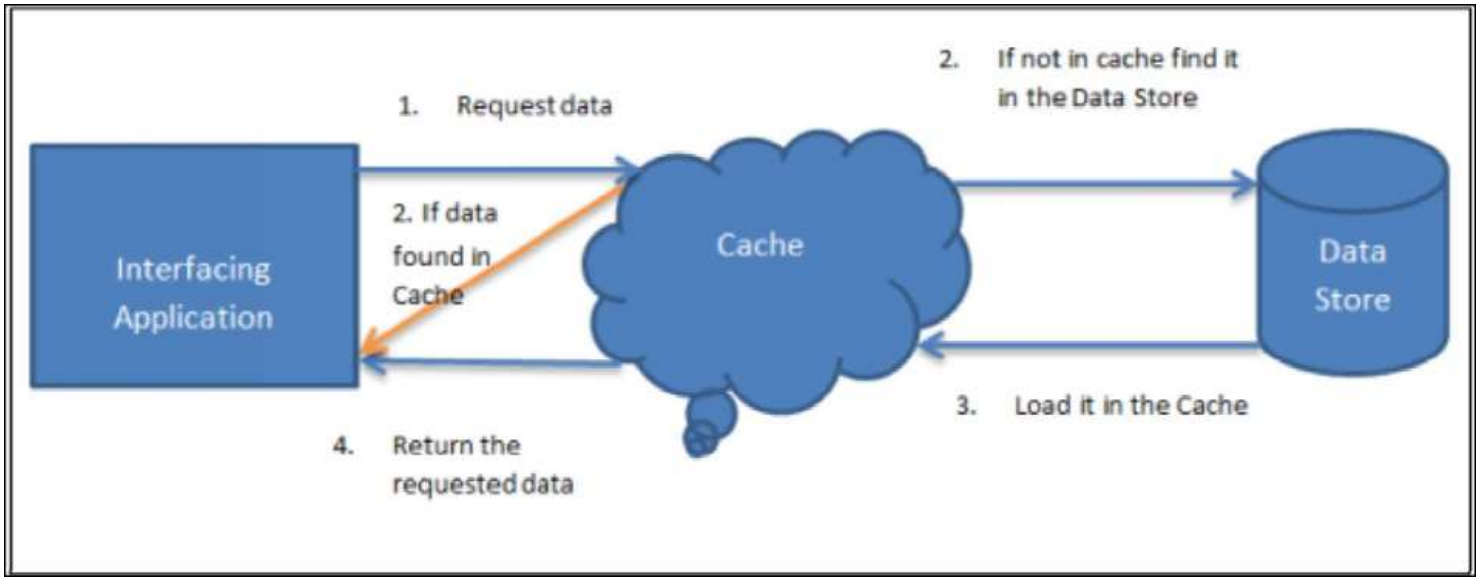
DynamoDB stores files and data on SSD storage and because of that, it is very fast. DynamoDB spreads across three geographically distinct locations (datacenters) and avoids any single point of failure if any of these locations become unavailable. It also has a choice of two consistency models;

DynamoDB benefits

Amazon DynamoDB has six benefits, which are as follows;

- Fast, consistent performance
- Highly scalable
- Fully managed
- Event-driven programming
- Fine-grained access control
- Flexible

Amazon ElastiCache is a web service that helps us to store in-memory or cached data in a cloud by efficiently deploying, operating and scaling cache clusters. This service also increases the performance of the application by quickly fetching information from in-memory data stores. To optimize the performance of your application, caching is one of the best tools for less frequently accessed data. Querying a database is expensive as compared to retrieving data from the in-cache. The in-memory Cache improves application performance by giving frequent access to the data or storing data.



RDS > Create database

Create database

Choose a database creation method Info

- (●) **Standard create**
  You set all of the configuration options, including ones for availability, security, backups, and maintenance.
- ( ) **Easy create**
  Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type Info

- ( ) Amazon Aurora
- (●) MySQL
- ( ) MariaDB
- ( ) PostgreSQL
- ( ) Oracle
- ( ) Microsoft SQL Server

Version

MySQL 8.0.20

Templates

Choose a sample template to meet your use case.

- Production
  Use defaults for high availability and fast, consistent performance.
- Dev/Test
  This instance is intended for development use outside of a production environment.
- Free tier
  Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. Info

Master username Info

Type a login ID for the master user of your DB instance.

mydatabase

1 to 16 alphanumeric characters. First character must be a letter

Auto generate a password

Amazon RDS can generate a password for you, or you can specify your own password

Master password Info

••••••••

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote), "(double quote) and @ (at sign).

Confirm password Info

••••••••

Database options

Initial database name Info

mydatabase

If you do not specify a database name, Amazon RDS does not create a database.

DB parameter group Info

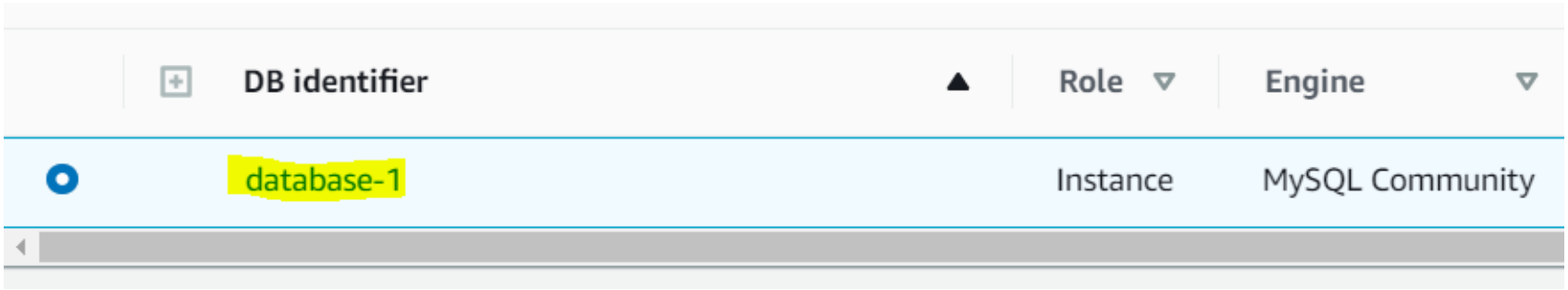
default.mysql8.0

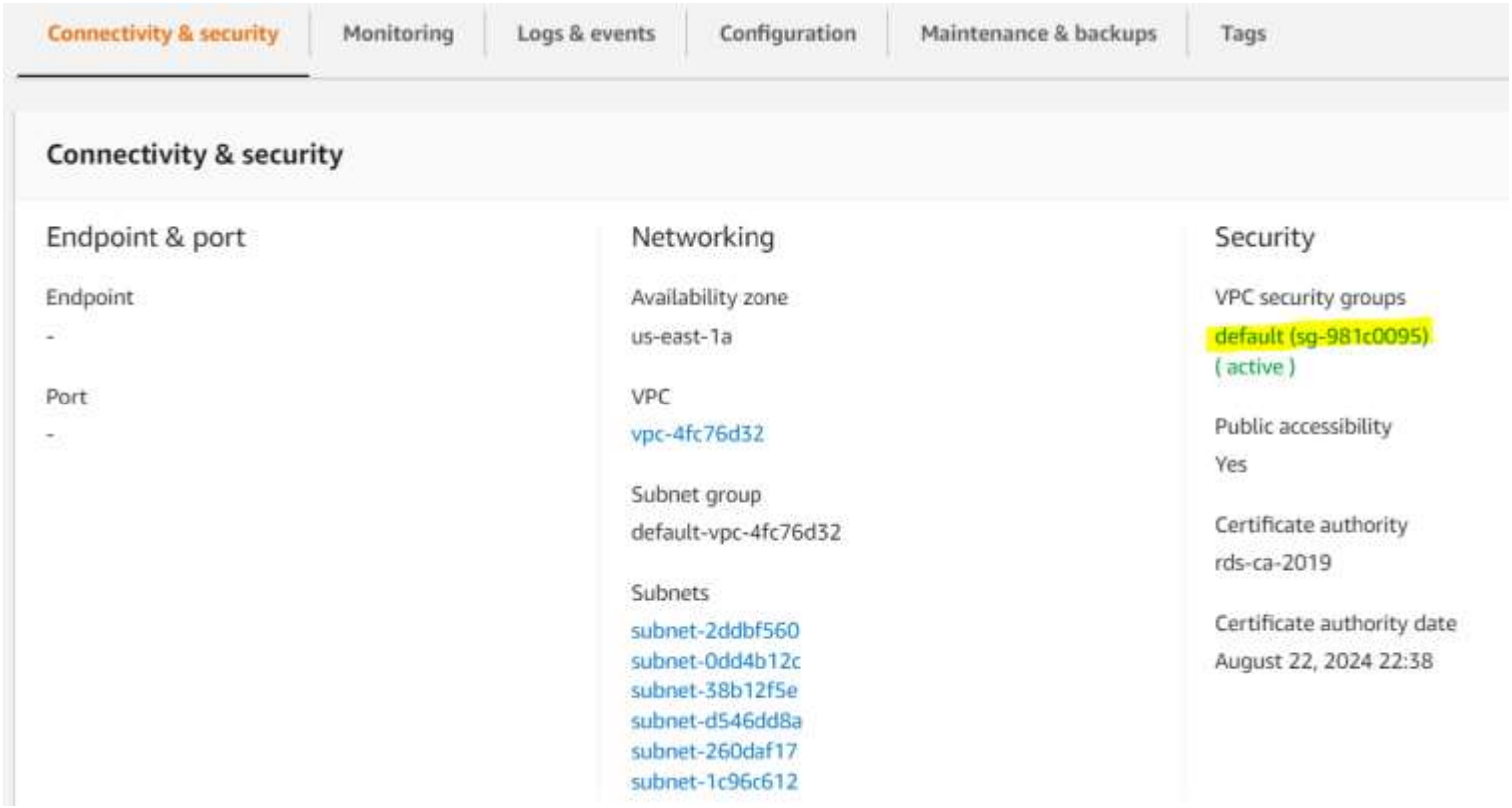
Option group Info

default:mysql-8-0

The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free:

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.


DB identifier
Role
Engine
database-1
Instance
MySQL Community


Connectivity & security
Monitoring
Logs & events
Configuration
Maintenance & backups
Tags
Connectivity & security
Endpoint & port
Endpoint
-
Port
-
Networking
Availability zone
us-east-1a
VPC
vpc-4fc76d32
Subnet group
default-vpc-4fc76d32
Subnets
subnet-2ddbf560
subnet-0dd4b12c
subnet-38b12f5e
subnet-d546dd8a
subnet-260daf17
subnet-1c96c612
Security
VPC security groups
default (sg-981c0095)
(active)
Public accessibility
Yes
Certificate authority
rds-ca-2019
Certificate authority date
August 22, 2024 22:38

Inbound rules (2)

Edit inbound rules

Type	Protocol	Port range	Source	Description - optional
All traffic	All	All	sg-981c0095 / default	–
MYSQL/Aurora	TCP	3306	0.0.0.0/0	–

DB identifier	Role	Engine	Region & AZ	Size	Status	CPU
database-1	Instance	MySQL Community	us-east-1a	db.t2.micro	Available	-

Connectivity & security

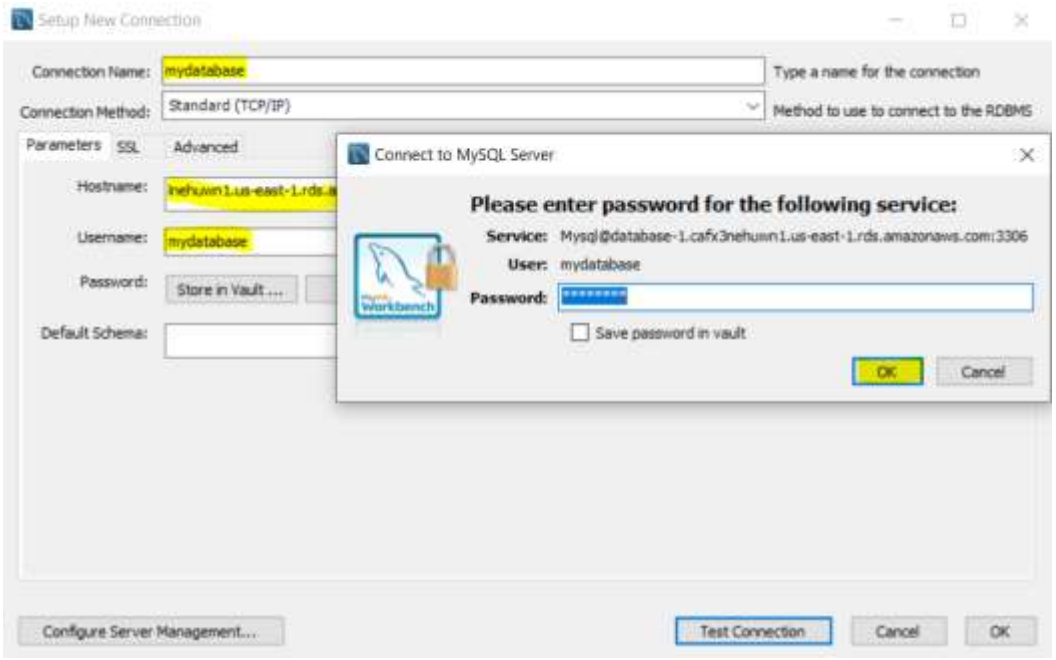
Endpoint & port

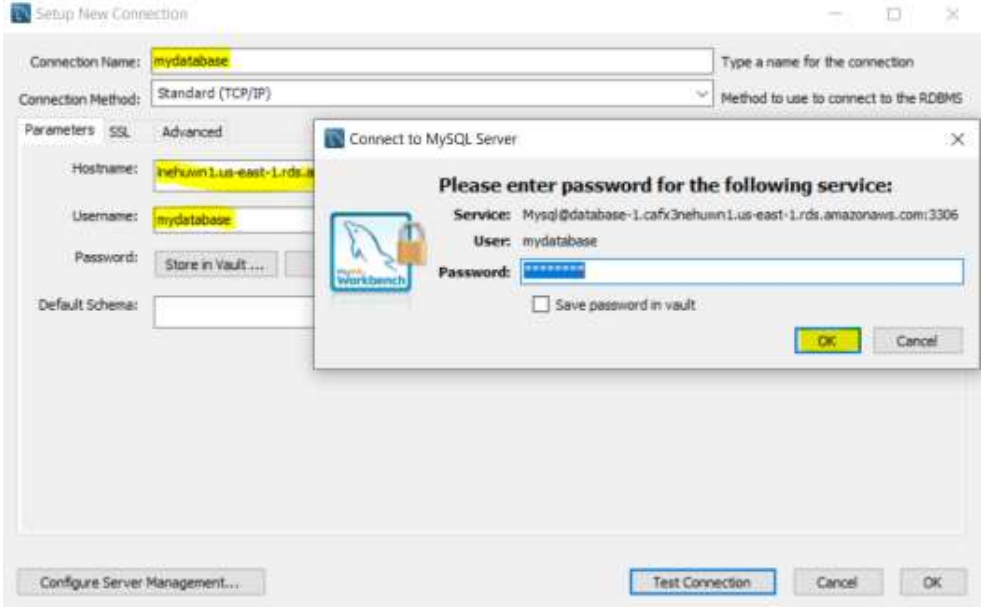
Endpoint

database-1.cafx3nehuwn1.us-east-1.rds.amazonaws.com

Port

3306


Setup New Connection
Connection Name:
mydatabase
Type a name for the connection
Connection Method:
Standard (TCP/IP)
Method to use to connect to the RDBMS
Parameters
SSL
Advanced
Hostname:
Username:
mydatabase
Password:
Store in Vault ...
Default Schema:
Connect to MySQL Server
Please enter password for the following service:
Service: Mysql@database-1.cafx3nehuwn1.us-east-1.rds.amazonaws.com:3306
User: mydatabase
Password:
Save password in vault
OK
Cancel
Configure Server Management...
Test Connection
Cancel
OK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Password:
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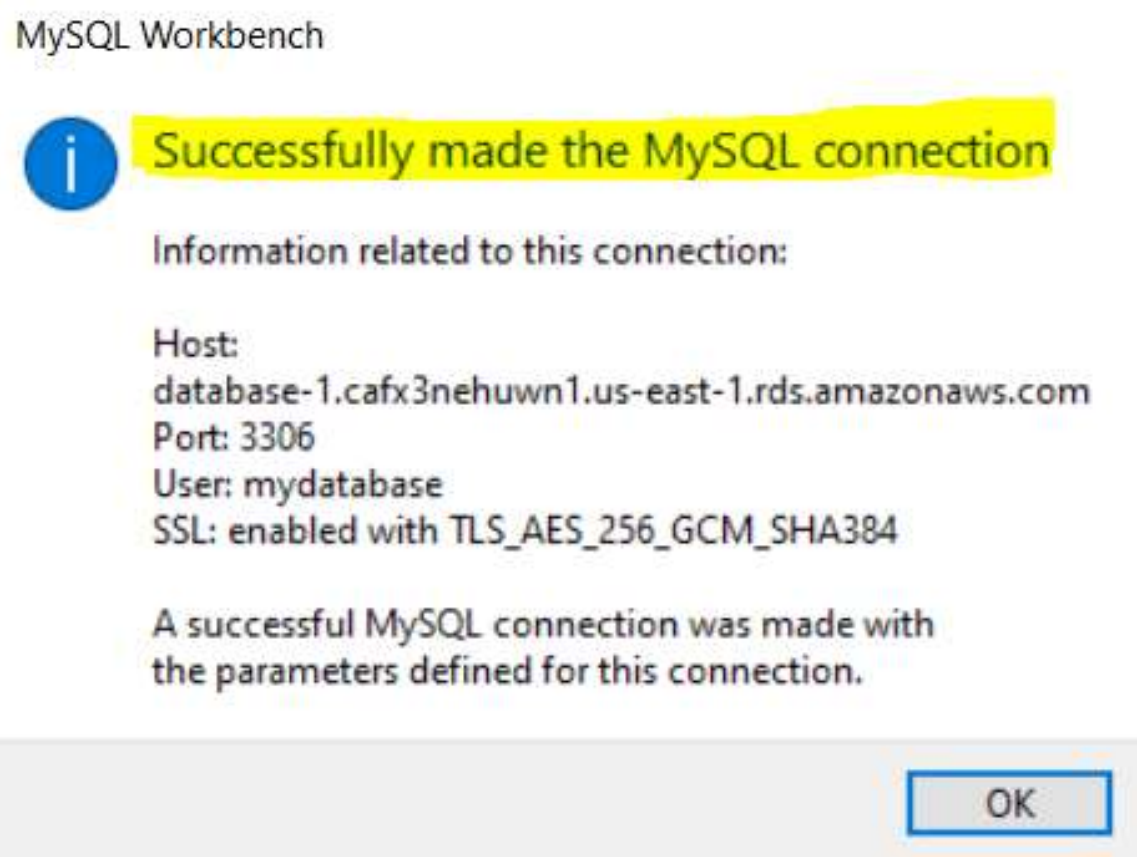
Test Connection
Cancel
OK


MySQL Workbench
Successfully made the MySQL connection
Information related to this connection:
Host:
database-1.cafx3nehuwn1.us-east-1.rds.amazonaws.com
Port: 3306
User: mydatabase
SSL: enabled with TLS_AES_256_GCM_SHA384
A successful MySQL connection was made with
the parameters defined for this connection.
OK