

Databases

- Databases are critical components of applications as they are used to store and retrieve data
- To maintain Databases, organizations employ
 - Database Administrators
 - Backup
 - Restore
 - Replications
 - Performance Tuning
 - Schema changes
 - Database Engine Patching
 - OS Administrators
 - Patching
 - Backup & Recovery
 - Storage Administrators
 - Network Attached Storage setup, management
 - handling storage needs
- Databases on cloud offer the following
 - Database as a Service
 - In this case we specify the db engine, cloud will create the database
 - administrative activities are simplified
 - Not all database engines are supported and not all versions.
 - Run Database on Virtual Machines
 - This is almost same as on-prem

Types of Databases

- Relational Databases (RDBMS):
 - Examples: Microsoft SQL Server, PostgreSQL, Oracle, MySQL, IBM DB2
 - Data is logically represented in the form of tables (Rows and Columns)
 - To query the database and interact with Database a formal language called as SQL is used.
 - Purpose:
 - for structured data with predefined schema
 - Ideal for complex queries and transactions such as financial systems, CRM, ERP..
- Document Databases (NOSQL):
 - Examples: MongoDB
 - Flexible schemas for unstructured and semi structured data.
 - Purpose:
 - suitable for big data, real time webapps, content management etc.
- Column-Family Stores
 - Examples: Cassandra
 - stores data in columns rather than rows
 - Purpose:

- Excellent for handling large volumes of data across distributed systems (big data applications)
- Key Value stores:
 - Examples: etcd
 - Stores the data in the form of key value pairs
- Cache Database:
 - These are key value stores
 - They store the data in memory for ultra fast access
 - Used for caching, session management, analytics, high speed transactions
 - Examples:
 - Redis
 - Memcached
- Time-Series Databases:
 - Examples: Influx, Timescale DB
 - Purpose:
 - Optimized for storing and querying time-stamped data or time series data
 - Ideal for IoT, real time analytics
- Graph Databases:
 - Examples: Neo4j
 - Purpose:
 - Excellent for applications involving complex relationships such as
 - social networks
 - recommendataion systems
 - fraud detections
- DataWarehouses:
 - This is a centralized repository designed to store large volumes of structure data from multiple sources
 - Examples:
 - Terradata
 - Datastage

Azure Database Offerings

- Azure SQL Database:
 - This is a PaaS offering for Microsoft SQL server database
- Azure SQL for mysql
 - This is a PaaS offering for mySQL server database
- Azure SQL for Postgres
 - This is a PaaS offering for PostgreSQL server database
- Azure Cosmos DB
 - This is for NoSQL Databases. The same service can be used for
 - key value
 - Column
 - Document
 - Graph
 - Cosmos DB allows you to select the type of the database based on API while creating
- Azure Synapse Analytics: This for datawarehouse

- Azure Cache for Redis: Cache Database

AWS Database Offerings

- AWS RDS (Relational Database Services):
 - This is Database as a Service for following engines
 - SQL Server
 - Oracle
 - MySQL
 - PostgreSQL
 - IBM DB2 (newly added supported)
 - Aurora for mysql
 - Aurora for PostgreSQL
- Aws DynamoDB: Flexible NoSQL Database
- Elastic Cache: (Cache Databases)
 - Redis
 - Memcached
- MemoryDb for Redis (Cache Database - Redis)
- DocumentDB: MongoDB for AWS
- KeySpace: Cassandra for AWS
- Neptune: Graph Database
- Timestream: Time series Databases
- Redshift: Datawarehouse by AWS
- QuantumDb: LedgerDatabase by AWS

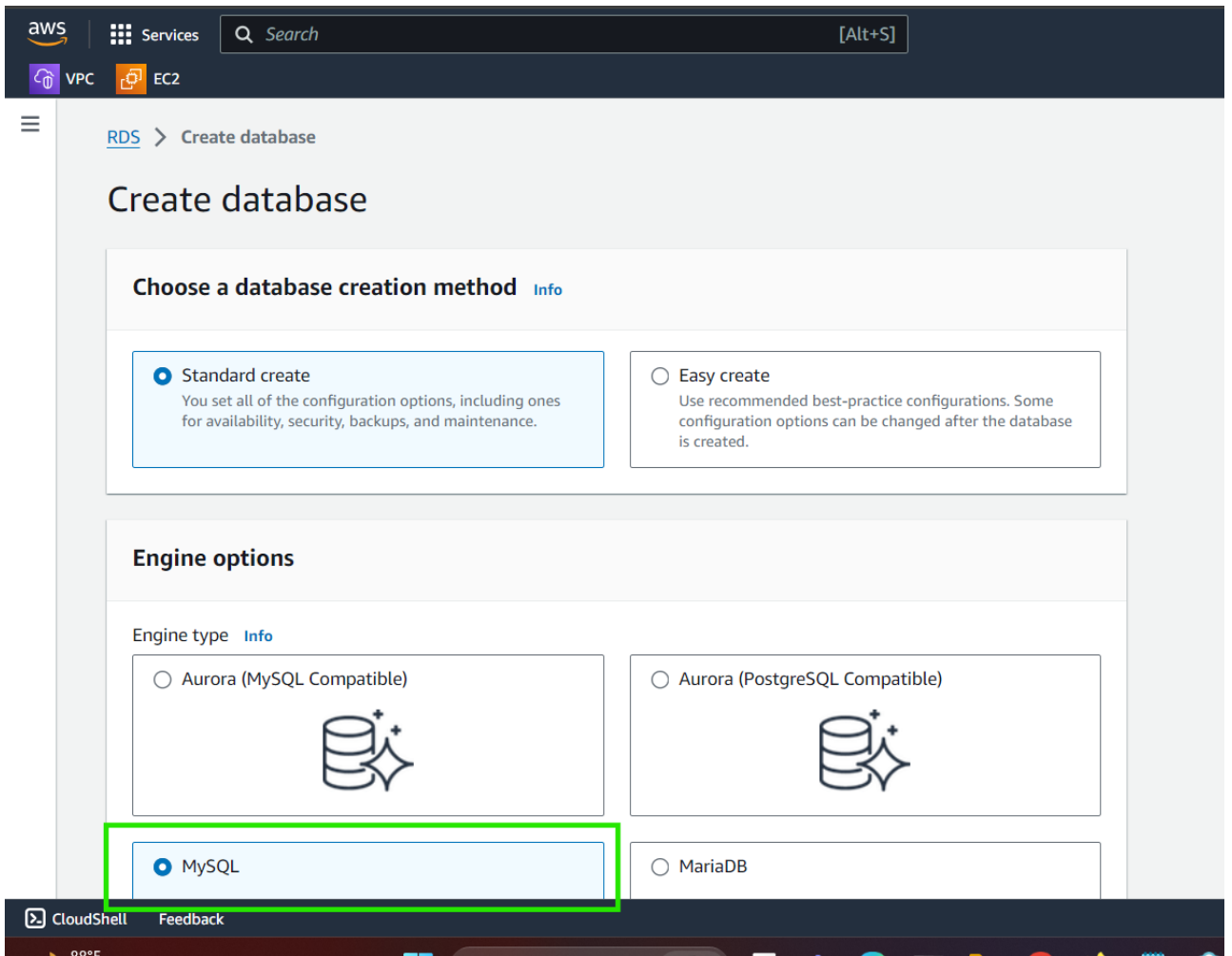
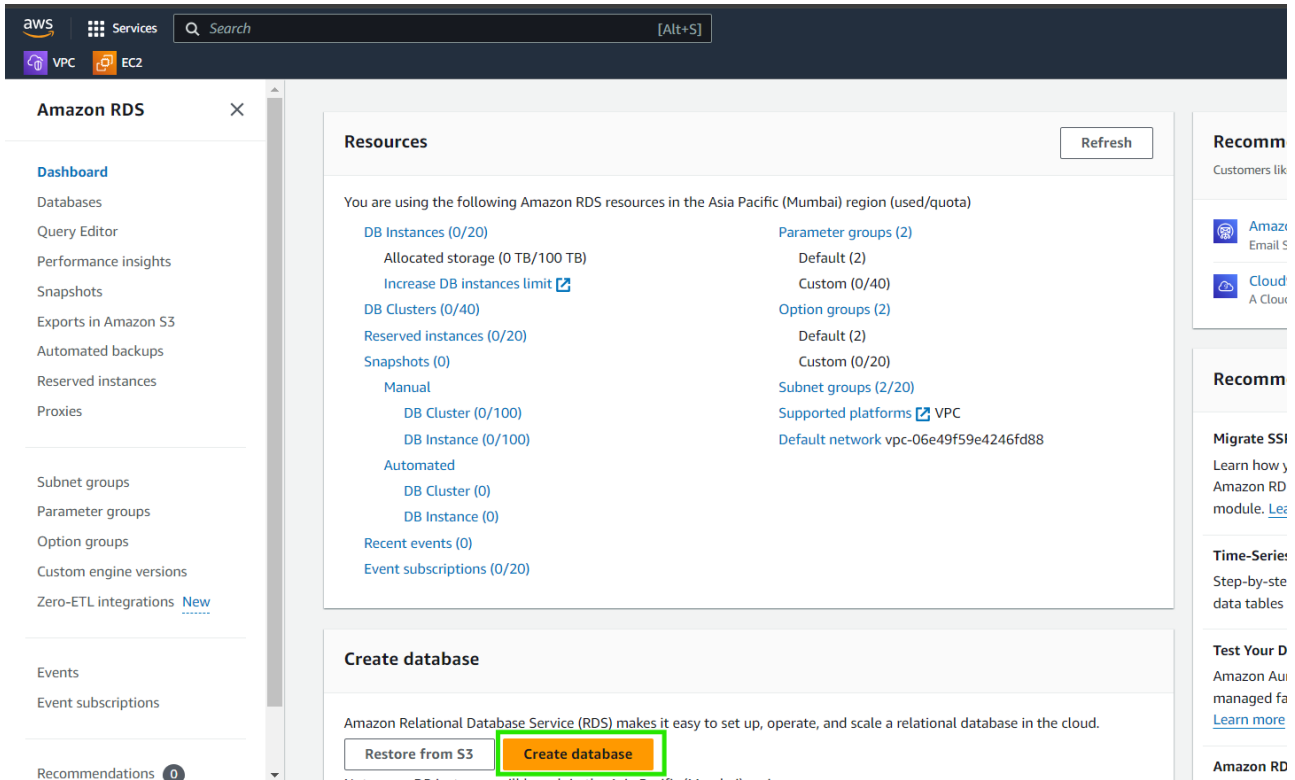
AWS RDS Instance Quick Start

- Free tier:

The screenshot shows the AWS Free Tier page. The navigation bar includes 'Products', 'Solutions', 'Pricing', 'Documentation', 'Learn', 'Partner Network', and 'AWS Marketplace'. The main content area is titled 'AWS Free Tier' and includes an 'Overview' section with a 'Free Tier Categories' dropdown menu. Under 'Product Categories', the 'Database' option is selected. The right-hand side of the page displays the 'Free Tier' offer for 'Amazon RDS' with '750 Hours' of usage per month. The specific instance types 'db.t2.micro, db.t3.micro, and db.t4g.micro' are highlighted in a green box. Other details include '12 MONTHS FREE', '20 GB of General Purpose (SSD) database storage', and '20 GB of storage for database backups and DB Snapshots'.

- Lets create an AWS Single AZ RDS instance for mysql
 - We need to create a security group

- Screenshot



Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show versions that support the Amazon RDS Optimized Writes [Info](#)
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine Version
MySQL 8.0.35

Enable RDS Extended Support [Info](#)
Amazon RDS Extended Support is a [paid offering](#). By selecting this option, you consent to being charged for this offering if you are running your database major version past the RDS end of standard support date for that version. Check the end of standard support date for your major version in the [RDS for MySQL documentation](#).

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](#)

Availability and durability

Settings

DB instance identifier [Info](#)
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.
ltfreetierdbfordemo

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ **Credentials Settings**

Master username [Info](#)
Type a login ID for the master user of your DB instance.
admin

1 to 16 alphanumeric characters. The first character must be a letter.

Credentials management
You can use AWS Secrets Manager or manage your master user credentials.

Managed in AWS Secrets Manager - *most secure*
RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager.

Self managed
Create your own password or have RDS create a password that you manage.

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

Master password [Info](#)
.....

Minimum constraints: At least 8 printable ASCII characters. Can't contain any of the following symbols: / ! " @

Instance configuration

The DB instance configuration options below are limited to those supported by the engine that you selected above.

DB instance class [Info](#)

▼ Hide filters

- Show instance classes that support Amazon RDS Optimized Writes [Info](#)
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.
- Include previous generation classes
- Standard classes (includes m classes)
- Memory optimized classes (includes r and x classes)
- Burstable classes (includes t classes)

db.t4g.micro
2 vCPUs 1 GiB RAM Network: 2,085 Mbps ▼

Storage

Storage type [Info](#)

Provisioned IOPS SSD (io2) storage volumes are now available.

General Purpose SSD (gp2)
Baseline performance determined by volume size ▼

Allocated storage [Info](#)

20 GiB

The minimum value is 20 GiB and the maximum value is 6,144 GiB

i After you modify the storage for a DB instance, the status of the DB instance will be in storage-optimization. Your instance will remain available as the storage-optimization operation completes. [Learn more](#)

► Storage autoscaling

Connectivity [Info](#)



Compute resource

Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.

- Don't connect to an EC2 compute resource**
Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.
- Connect to an EC2 compute resource**
Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC) [Info](#)

Choose the VPC. The VPC defines the virtual networking environment for this DB instance.

Default VPC (vpc-06e49f59e4246fd88)
3 Subnets, 3 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

i After a database is created, you can't change its VPC.

DB subnet group [Info](#)

Choose the DB subnet group. The DB subnet group defines which subnets and IP ranges the DB instance can use in the VPC that you selected.

default-vpc-06e49f59e4246fd88
3 Subnets, 3 Availability Zones

Public access [Info](#)

- Yes**
RDS assigns a public IP address to the database. Amazon EC2 instances and other resources outside of the VPC can connect to your database. Resources inside the VPC can also connect to the database. Choose one or more VPC security groups that specify which resources can connect to the database.
- No**
RDS doesn't assign a public IP address to the database. Only Amazon EC2 instances and other resources inside the VPC can connect to your database. Choose one or more VPC security groups that specify which resources can connect to the database.

VPC security group (firewall) [Info](#)

Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate incoming traffic.

- Choose existing**
Choose existing VPC security groups
- Create new**
Create new VPC security group

Existing VPC security groups

Choose one or more options

rdssg X

Availability Zone [Info](#)

No preference

RDS Proxy

RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

- Create an RDS Proxy [Info](#)**
RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Proxy pricing](#).

▼ Additional configuration

Database options, encryption turned on, backup turned off, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Database options

Initial database name [Info](#)

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

DB parameter group [Info](#)

Option group [Info](#)

Backup

Enable automated backups

Creates a point-in-time snapshot of your database

Encryption

Enable encryption

Choose to encrypt the given instance. Master key IDs and aliases appear in the list after they have been created using the AWS Key Management Service console. [Info](#)

Estimated monthly costs

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, db.t3.micro or db.t4g.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

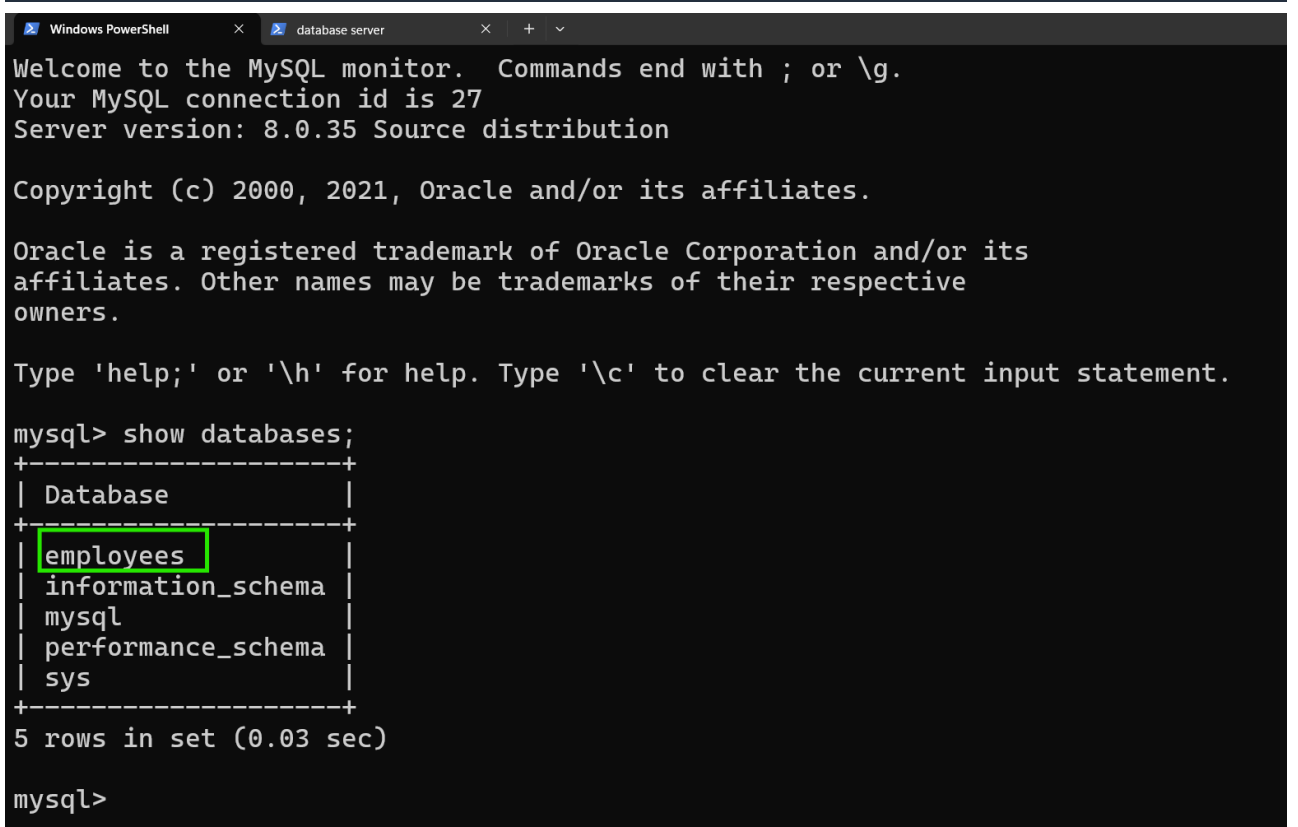
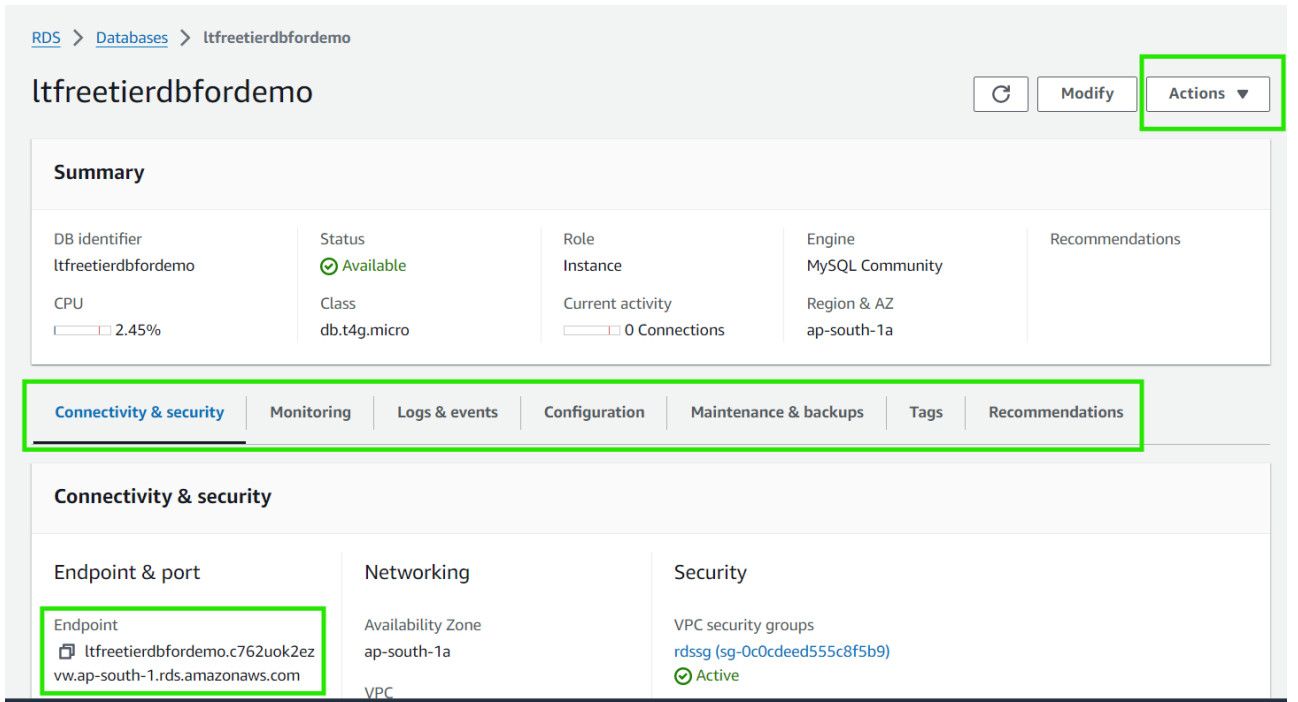
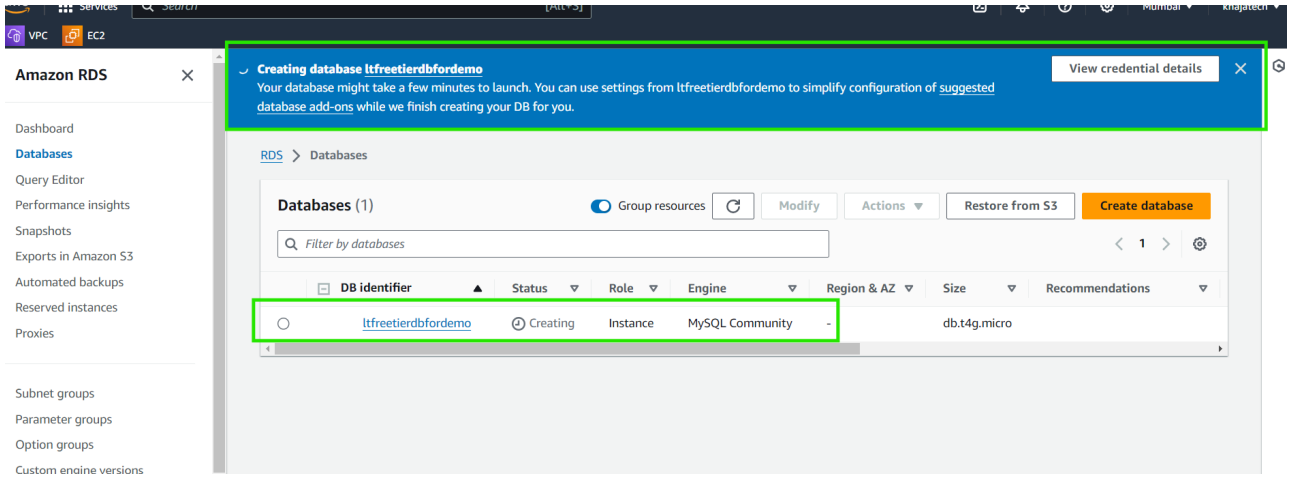
[Learn more about AWS Free Tier.](#) [↗](#)

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the [Amazon RDS Pricing page.](#) [↗](#)

i You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.

Cancel

Create database



- Now lets delete the db instance

The screenshot shows the AWS RDS console interface for a database instance named 'ltfreetierdbfordemo'. The 'Actions' dropdown menu is open, and the 'Delete' option is highlighted with a green box. The console displays the following information:

Summary

DB identifier ltfreetierdbfordemo	Status Available	Role Instance	Engine MySQL Community
CPU 2.45%	Class db.t4g.micro	Current activity 0 Connections	Region & AZ ap-south-1a

Connectivity & security



Endpoint & port Endpoint ltfreetierdbfordemo.c762uok2ezvw.ap-south-1.rds.amazonaws.com	Networking Availability Zone ap-south-1a	Security VPC security groups rdssg (sg-0c0cdeed555c8f5b9) Active
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Quick Actions - New

- Convert to Multi-AZ deployment
- Turn on backups
- Stop temporarily
- Reboot
- Delete**
- Set up EC2 connection
- Set up Lambda connection
- Create read replica
- Create Aurora read replica
- Create Blue/Green Deployment - new
- Promote
- Take snapshot
- Restore to point in time
- Migrate snapshot
- Create RDS Proxy
- Create ElastiCache cluster - new

Delete ltfreetierdbfordemo instance ✕

Permanently delete **ltfreetierdbfordemo** DB instance. You can't undo this action.


 Proceeding with this action will delete the instance with all its content and can affect related resources. [Learn more](#) 

Create final snapshot
Determines whether a final DB Snapshot is created before the DB instance is deleted.

I acknowledge that upon instance deletion, automated backups, including system snapshots and point-in-time recovery, will no longer be available.

To avoid accidental deletion provide additional written consent.

To confirm deletion, type *delete me* into the field.

 We strongly recommend taking a final snapshot before instance deletion since after your instance is deleted, automated backups will no longer be available.

Cancel Delete

Azure SQL for mysql Quick start

- Free tier for mysql



The screenshot shows the Azure pricing page for free services. A search filter 'mysql' is applied, and the results are displayed in a table. The 'Azure Database for MySQL' row is highlighted with a green border, indicating it is the free tier.

Service	Description	Free	Search
Azure Attestation	Verify the identity and security posture of trusted platform modules and trusted execution environments.	Free	mysql
Azure Cosmos DB	Build modern apps at any scale using a fast NoSQL database with open APIs.	400 request units per-second provisioned throughput with 25 GB storage	1/2
Azure Cosmos DB	Build modern apps at any scale using a fast NoSQL database with open APIs.	1,000 request units per-second provisioned throughput with 25 GB storage	Always
Azure Database for MySQL	Host a fully managed, scalable MySQL database in Azure.	750 hours of Flexible Server—Burstable B1MS Instance, 32 GB storage, and 32 GB backup storage	12 months
Azure Database for PostgreSQL	Build intelligent, scalable apps with fully managed database for PostgreSQL.	750 hours of Flexible Server—Burstable B1MS Instance, 32 GB storage, and 32 GB backup storage	12 months
Azure DevOps	Build apps in any language using Git repos, CI/CD, and build and release automation.	5 users with unlimited private Git repos	Always

- [Refer Here](#) for Quick start