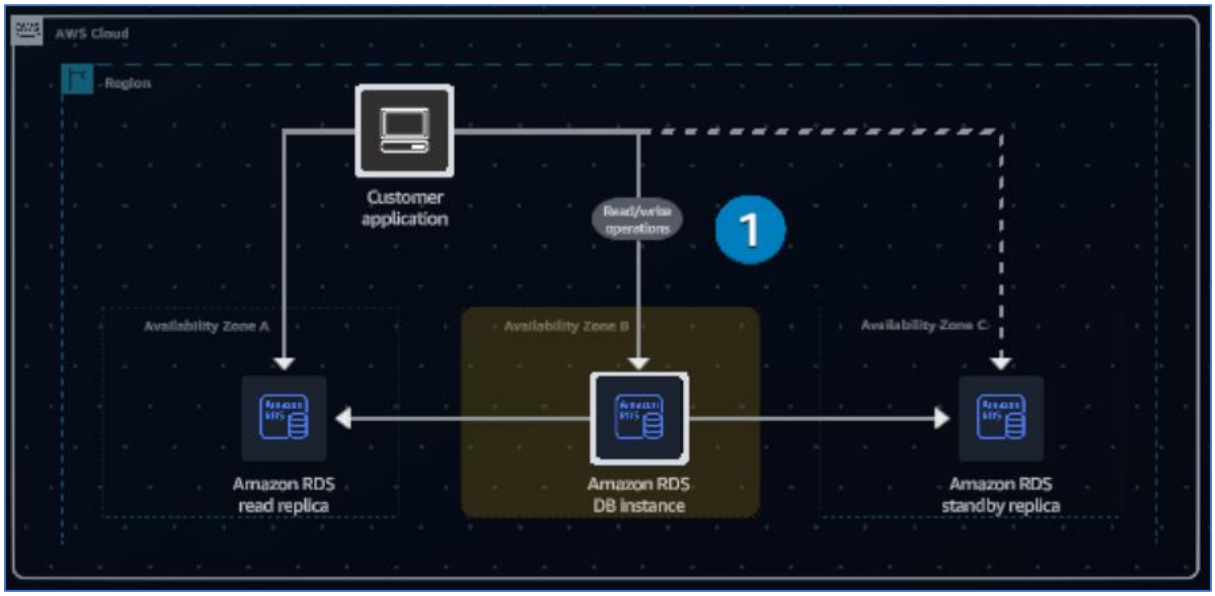
AMAZON RDS INSTANCE PROVISIONING AND MANAGEMENT

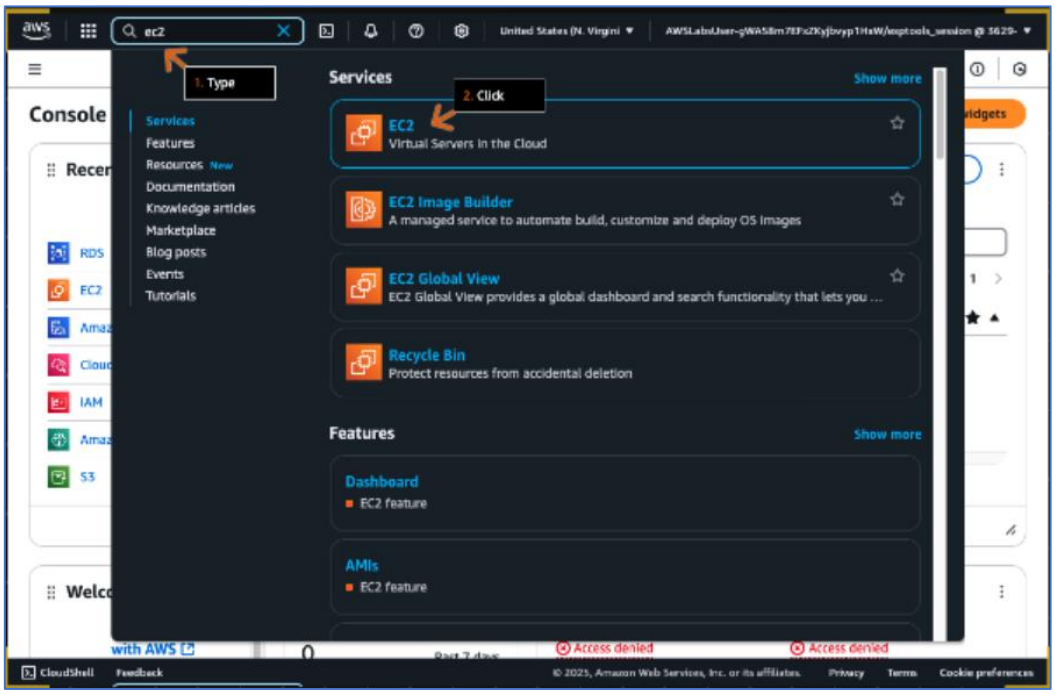
Objectives:

- Create an Amazon RDS DB instance.
- Enable backups for your database.
- Enable multiple AZs for your Amazon RDS deployment.
- Create an Amazon RDS read replica.

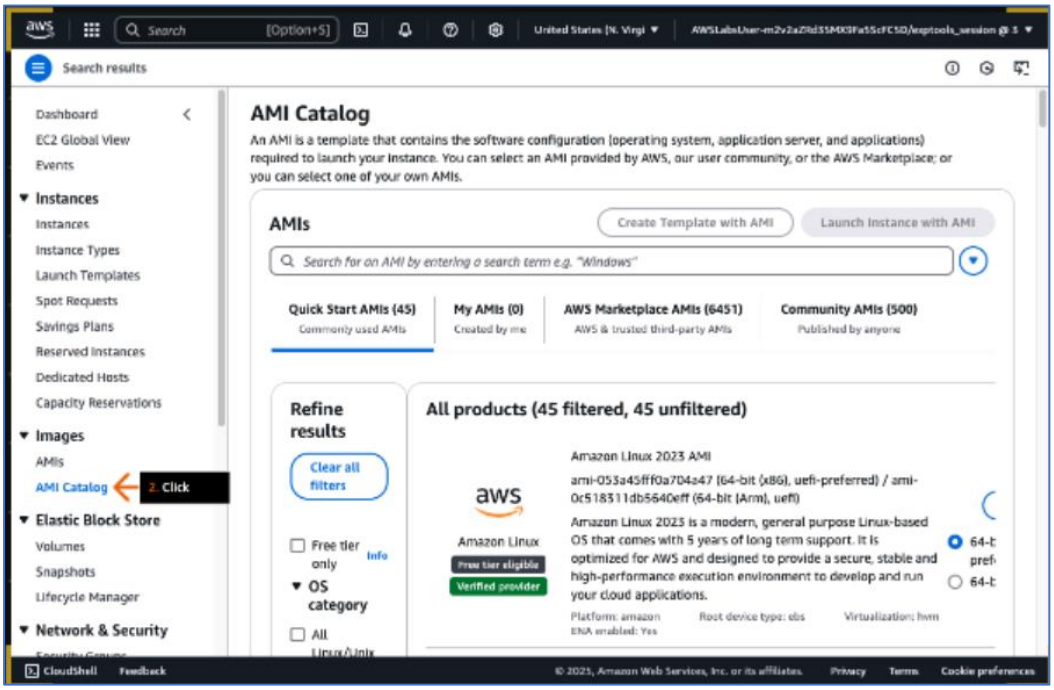


Steps / Procedures / Instructions:

- In the top navigation bar search box, type: ec2
- In the search results, under Services, click EC2.

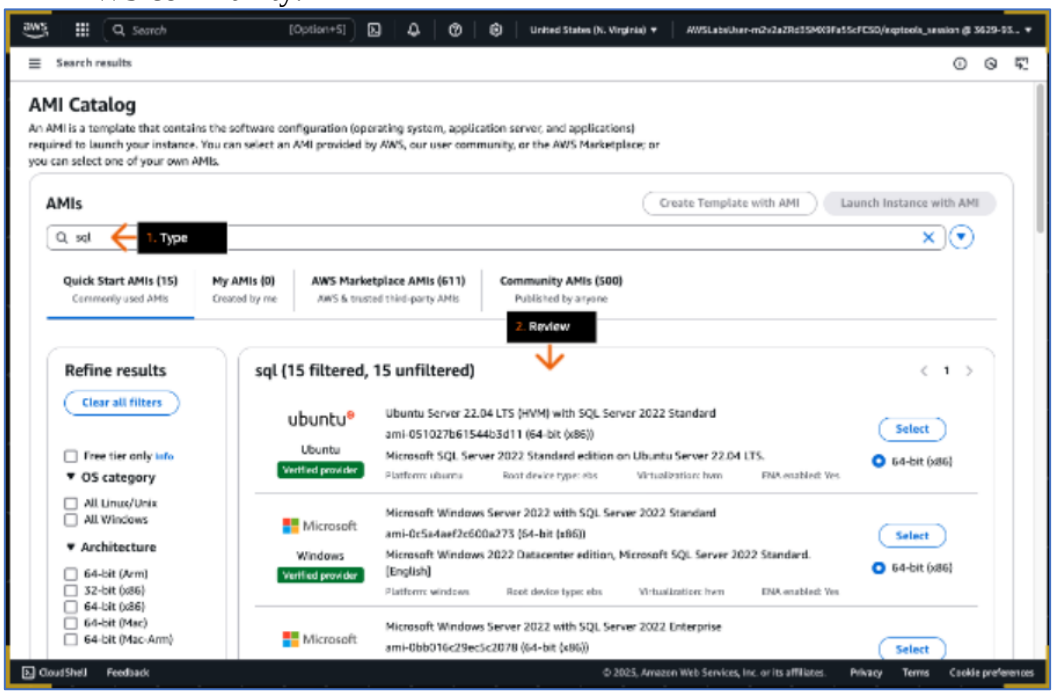


- In the left navigation pane, click AMI Catalog.



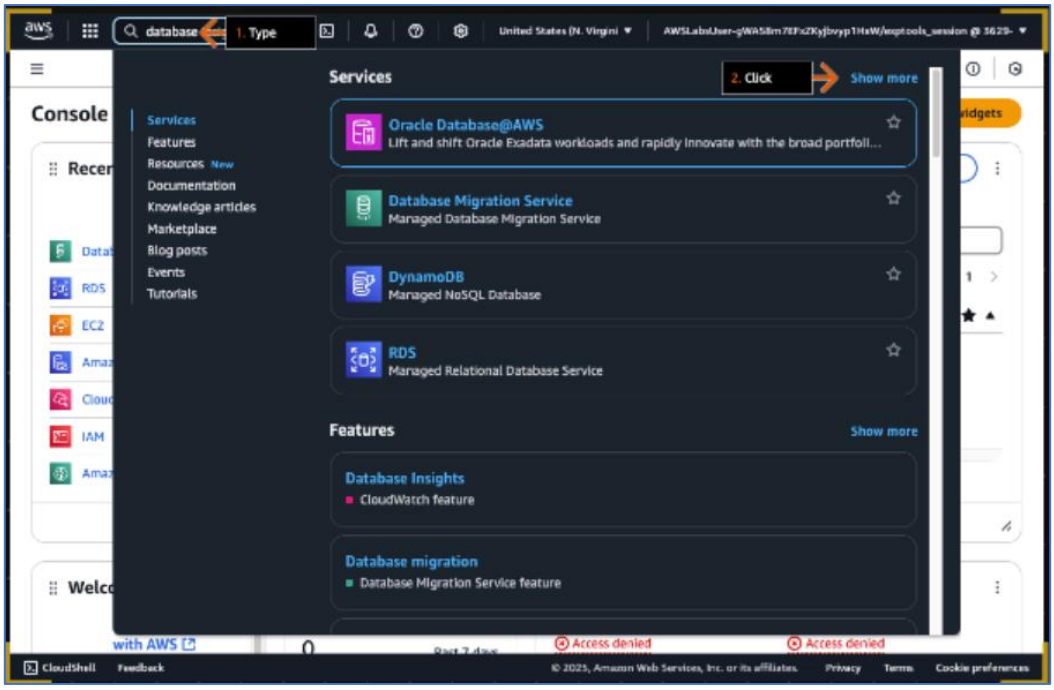
An Amazon Machine Image (AMI) is an image that provides the software that is required to set up and boot an EC2 instance. AMIs might also include software packages such as database servers, offering a hosted database option in addition to the managed options provided by other AWS services.

- In the AMIs search box, type: sql and press Enter.
- On the Quick Start AMIs tab, review the available AMIs on Amazon EC2.
    - Depending on your requirements, you can find AMIs provided directly by AWS, through trusted third-parties in the AWS Marketplace, or through the AWS community.

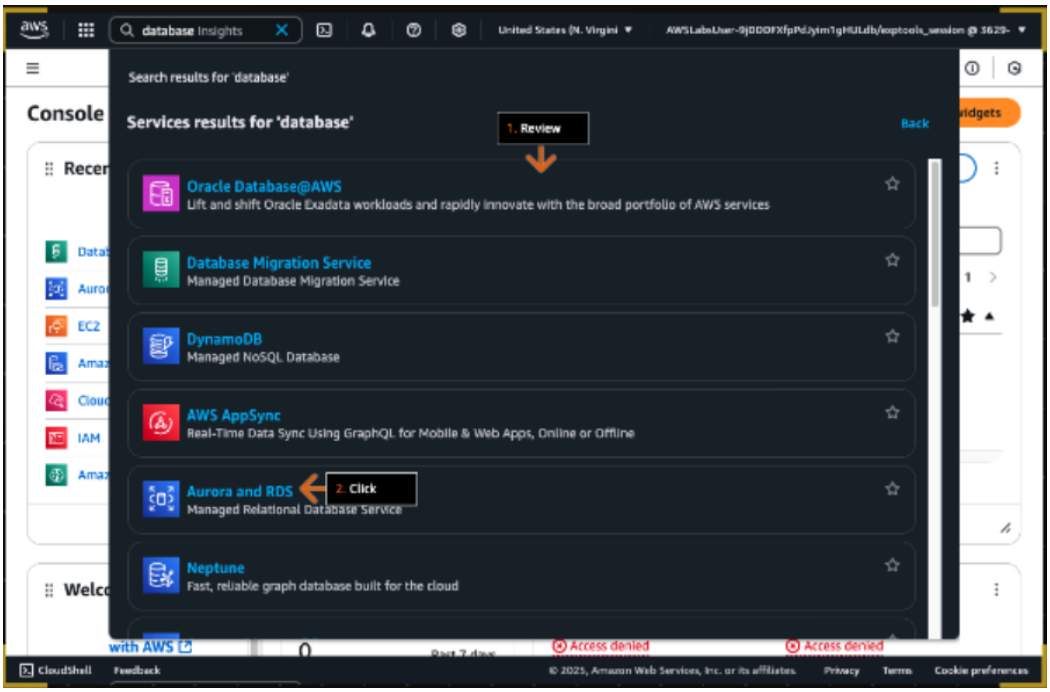


When hosting a database on an EC2 instance, AWS handles the physical infrastructure, hardware, and operating system installation, but you remain responsible for managing the instance, database management, query optimization, and customer data. Managed solutions such as Amazon Relational Database Service (Amazon RDS) aim to remove these tasks, the trade-off being customization options.

- In the top navigation bar search box, type: database
- In the search results, click Show more.

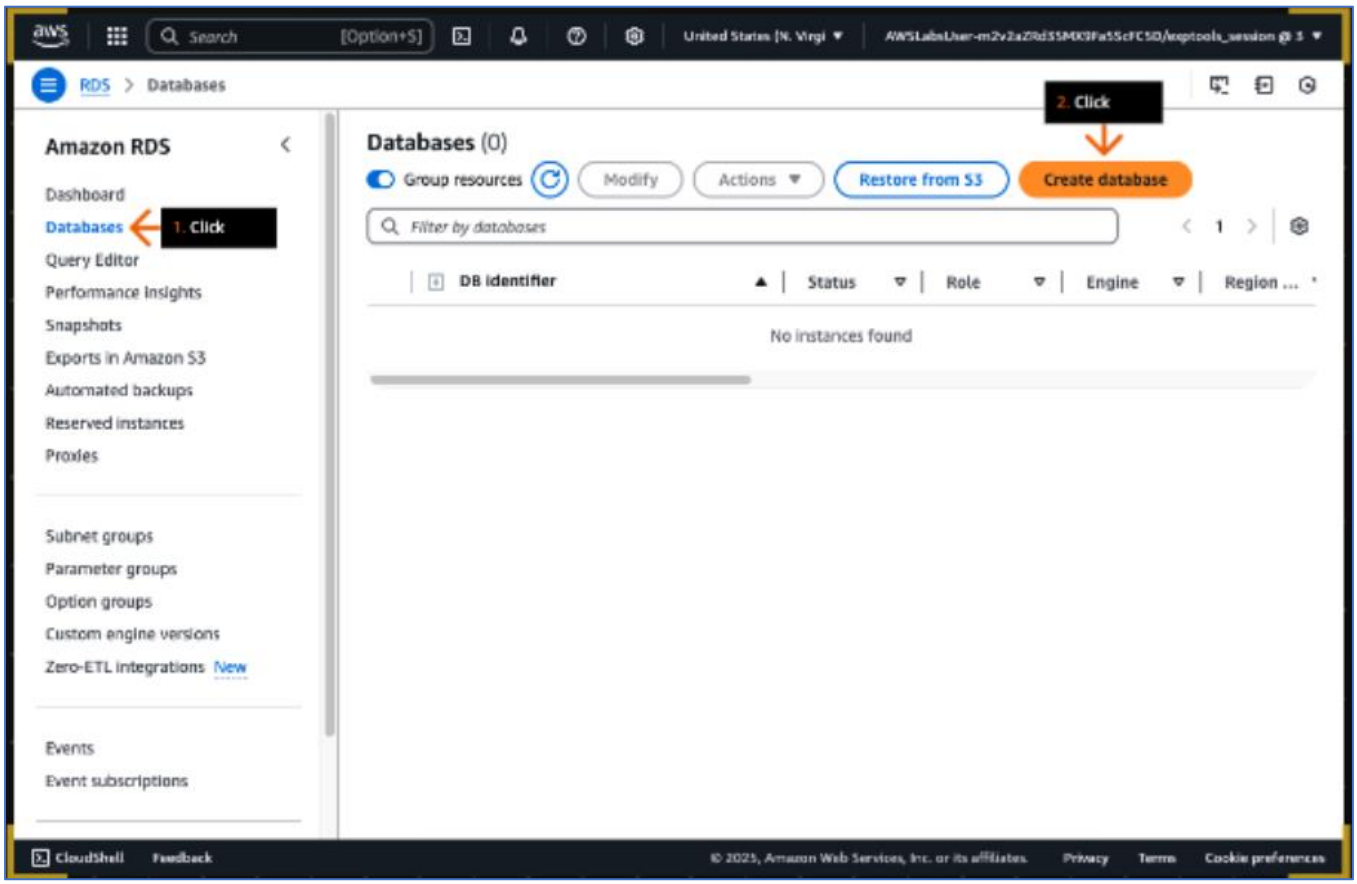


- Review the list of available database options.
- Click Aurora and RDS.



AWS provides a comprehensive portfolio of database services for different use cases. Relational databases such as Amazon RDS provide structured, SQL-based data management that is ideal for applications that require complex queries and transactions. Non-relational databases, such as Amazon DynamoDB, offer flexible, schema-less storage suitable for rapidly changing data and large-scale applications. Memory databases, such as Amazon MemoryDB, deliver ultra-fast data access by storing data in-memory, optimizing performance for real-time applications.

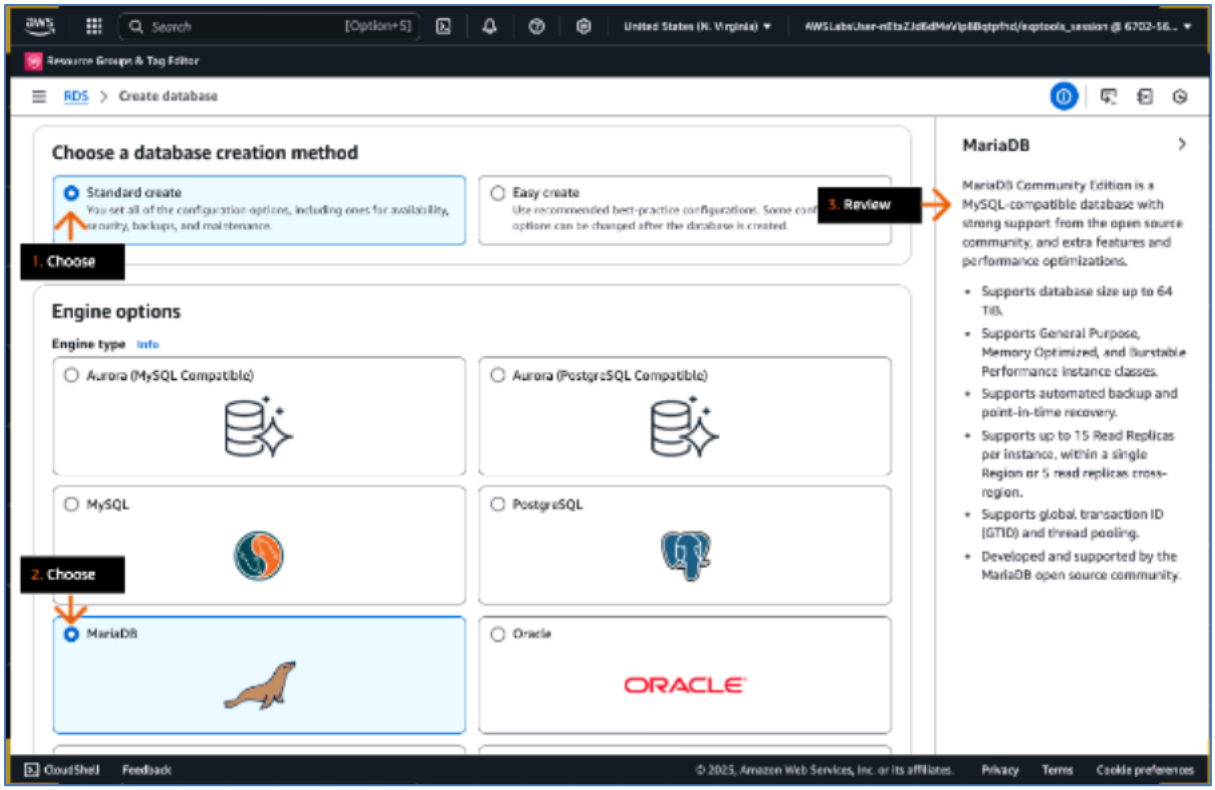
- In the left navigation pane, click Databases.
- In the Databases section, click Create database.



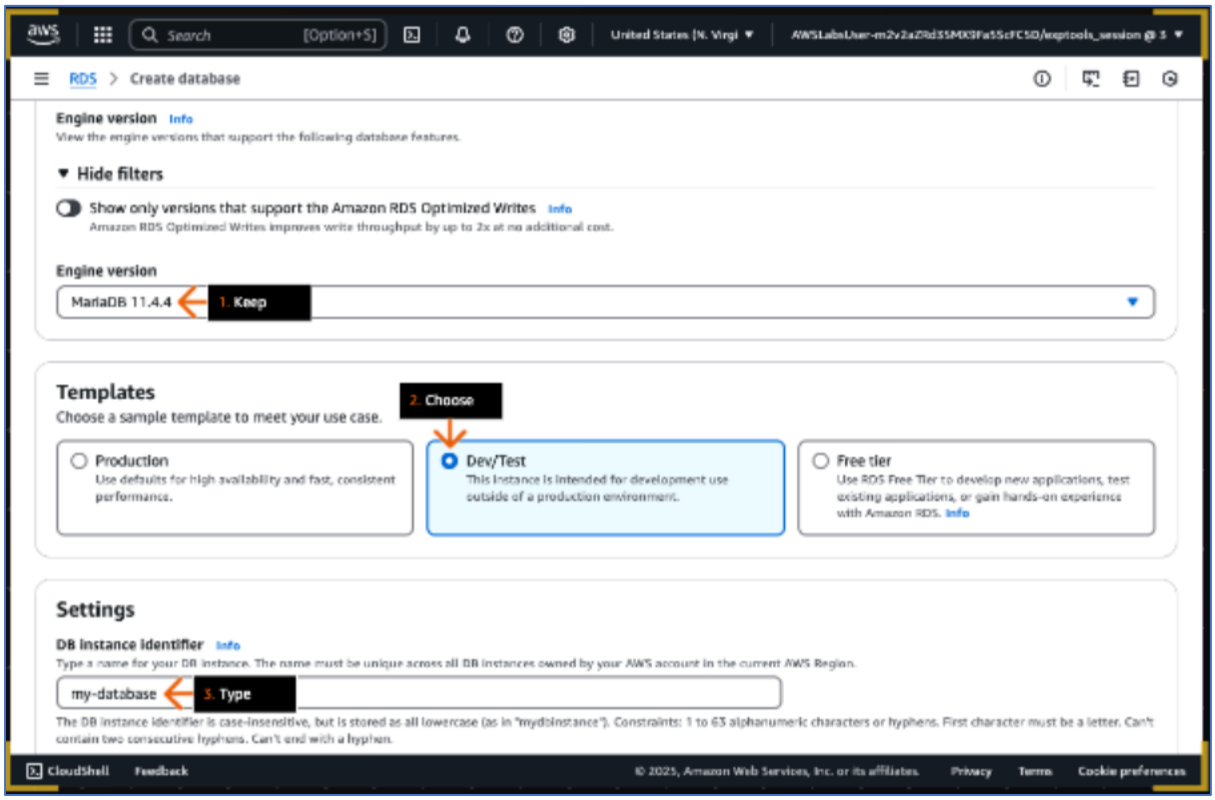
Amazon RDS is a web service that helps you set up, operate, and scale relational databases in the cloud. It provides cost-efficient and resizable capacity while automating time-consuming administration tasks such as hardware provisioning, database setup, patching, and backups.

- For Choose a database creation method, choose Standard create.
- For Engine type, choose MariaDB.
- In the right side panel, review the MariaDB description.

Amazon RDS offers several different open source and commercial database (DB) engines.

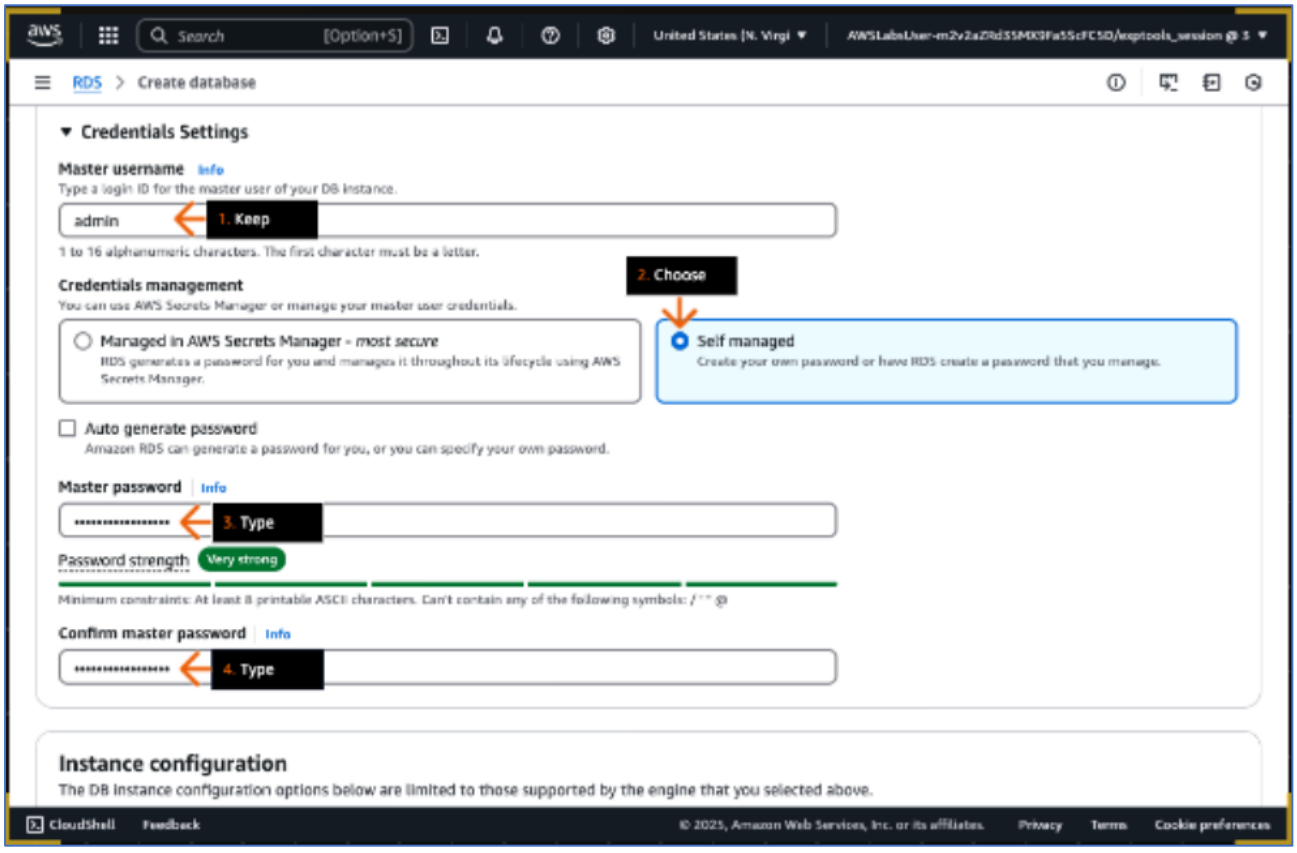


- For Engine version, keep the provided default MariaDB version.
- For Templates, choose Dev/Test.
- For DB instance identifier, type: my-database



Engine versions come in two types: major versions and minor versions. Major versions are supported for at least 3 years after their initial offering by Amazon RDS. Minor versions are typically supported for at least 1 year after initial offering. These versions are periodically deprecated when they reach community end of life or when they no longer receive software fixes or security updates.

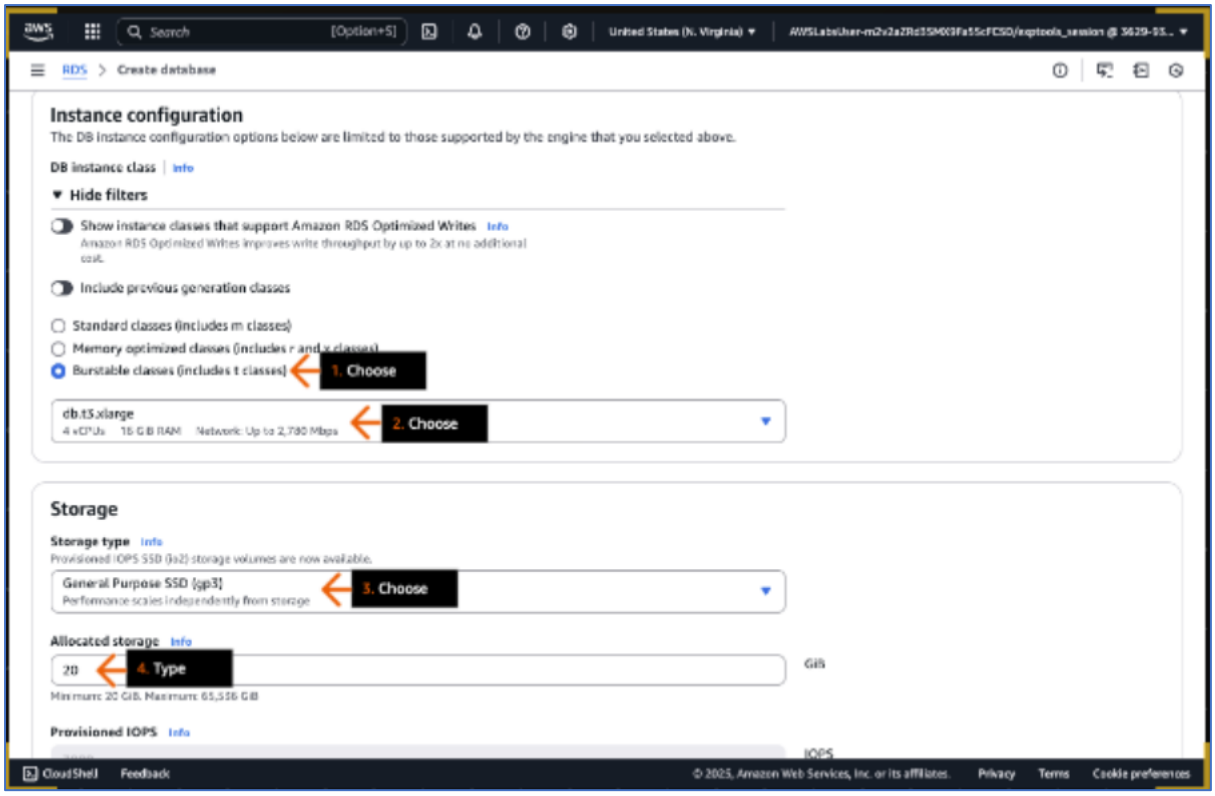
- Under Credential settings, for Master username, keep the default choice of admin.
- For Credentials management, choose Self managed.
- For Master password, type: ILoveLearning!123
- For Confirm master password, type the password again.



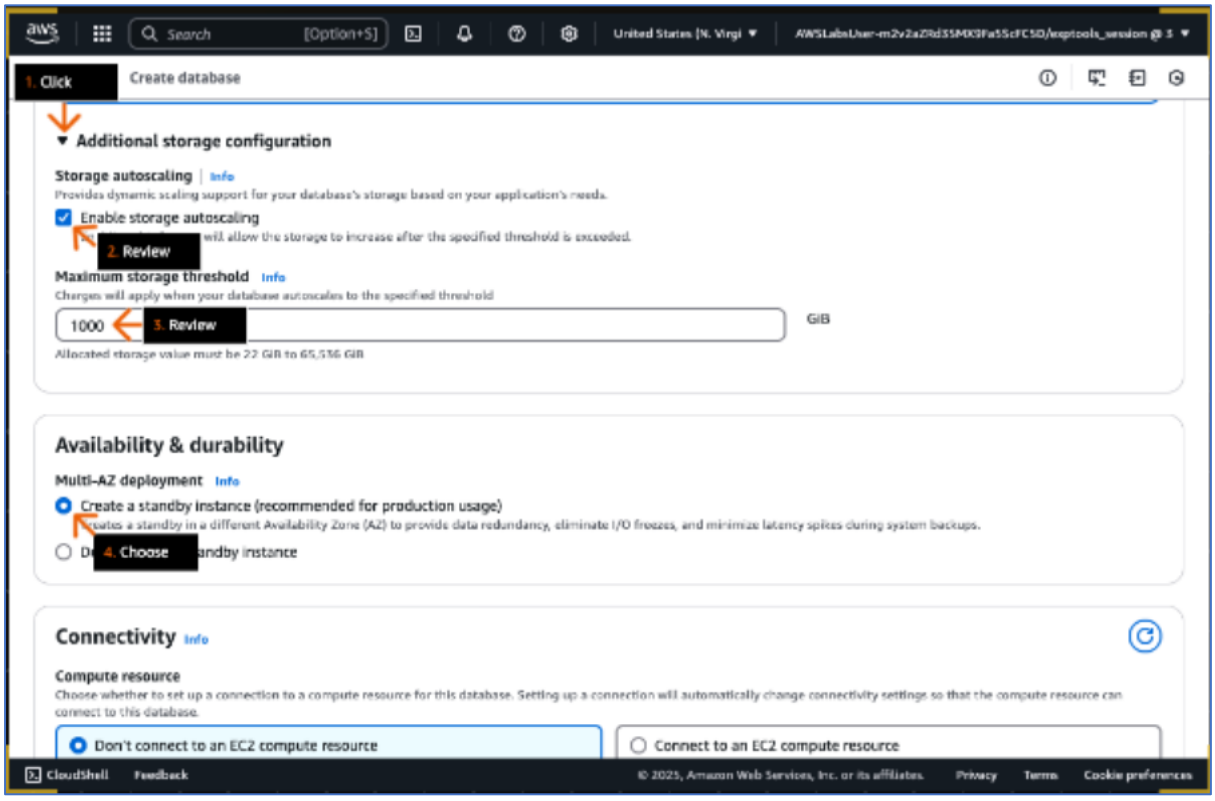
For production workloads, we recommend using AWS Secrets Manager for credential management. With Secrets Manager, you can store and manage various types of secrets, including database credentials, passwords, third-party API keys, and arbitrary text.

- In the Instance configuration section, for DB instance class, choose Burstable classes.
- Below that, on the dropdown menu list, choose db.t3.xlarge.
- For Storage type, choose General Purpose SSD (gp3).
- For Allocated storage, type: 20

Amazon RDS provides a selection of instance types optimized to fit different relational database use cases. Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give you the flexibility to choose the appropriate mix of resources for your database.

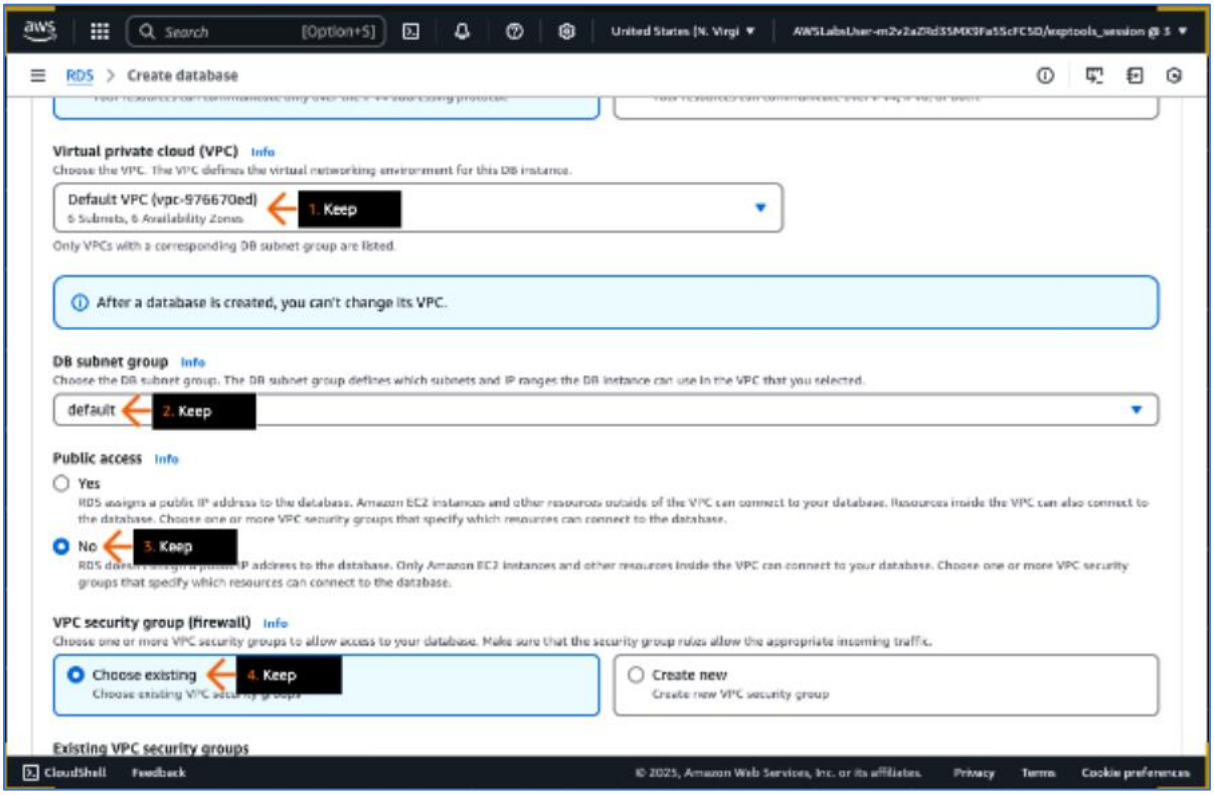


- Click to expand Additional storage configuration.
- Review to confirm that the default option, Enable storage autoscaling, is selected.
- For Maximum storage threshold, review to confirm that the default threshold, 1000 GiB, is selected.
- For Multi-AZ deployment, choose Create a standby instance.



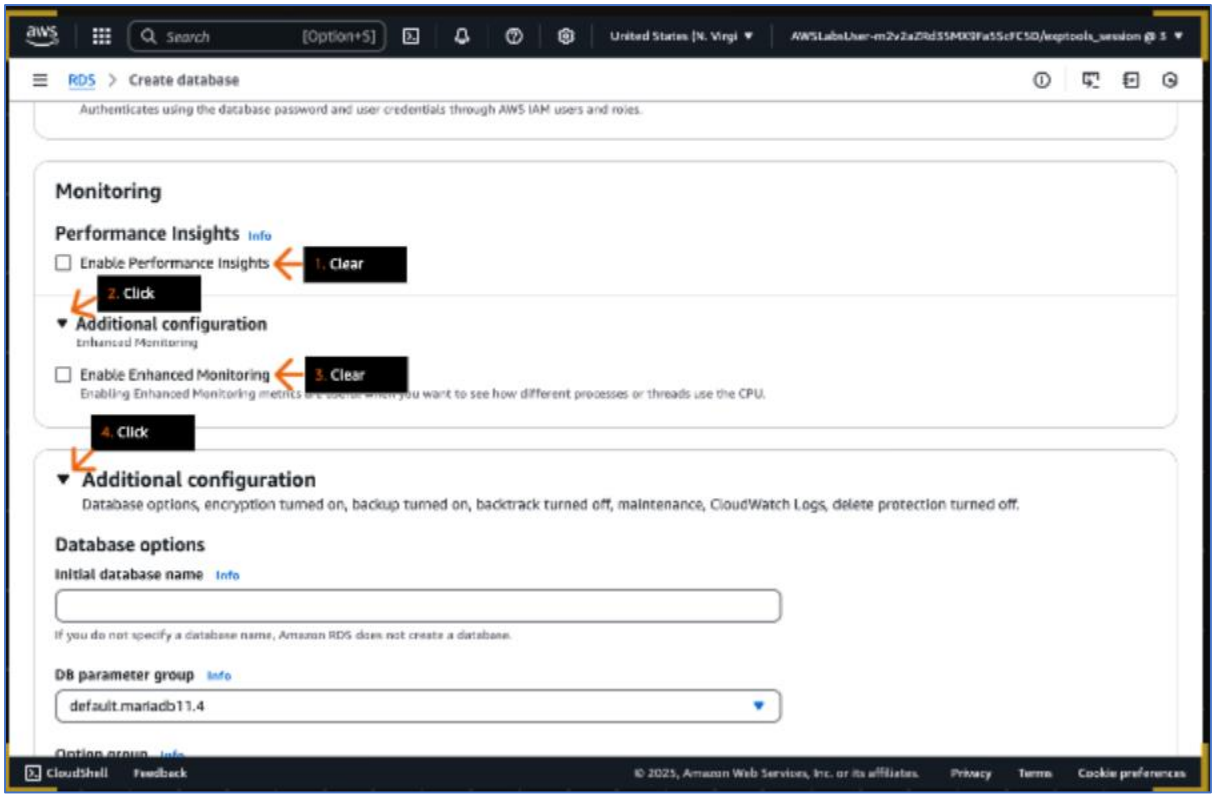
A standby instance is a synchronously maintained copy of the primary RDS DB instance that is automatically provisioned and maintained by Amazon RDS in a different Availability Zone (AZ). This replica serves as high availability and failover support for the primary RDS instance.

- For Virtual private cloud (VPC), keep the default choice of Default VPC.
- For DB subnet group, keep the default setting.
- For Public access, keep the default choice of No.
- For VPC security group (firewall), keep the default choice of Choose existing.

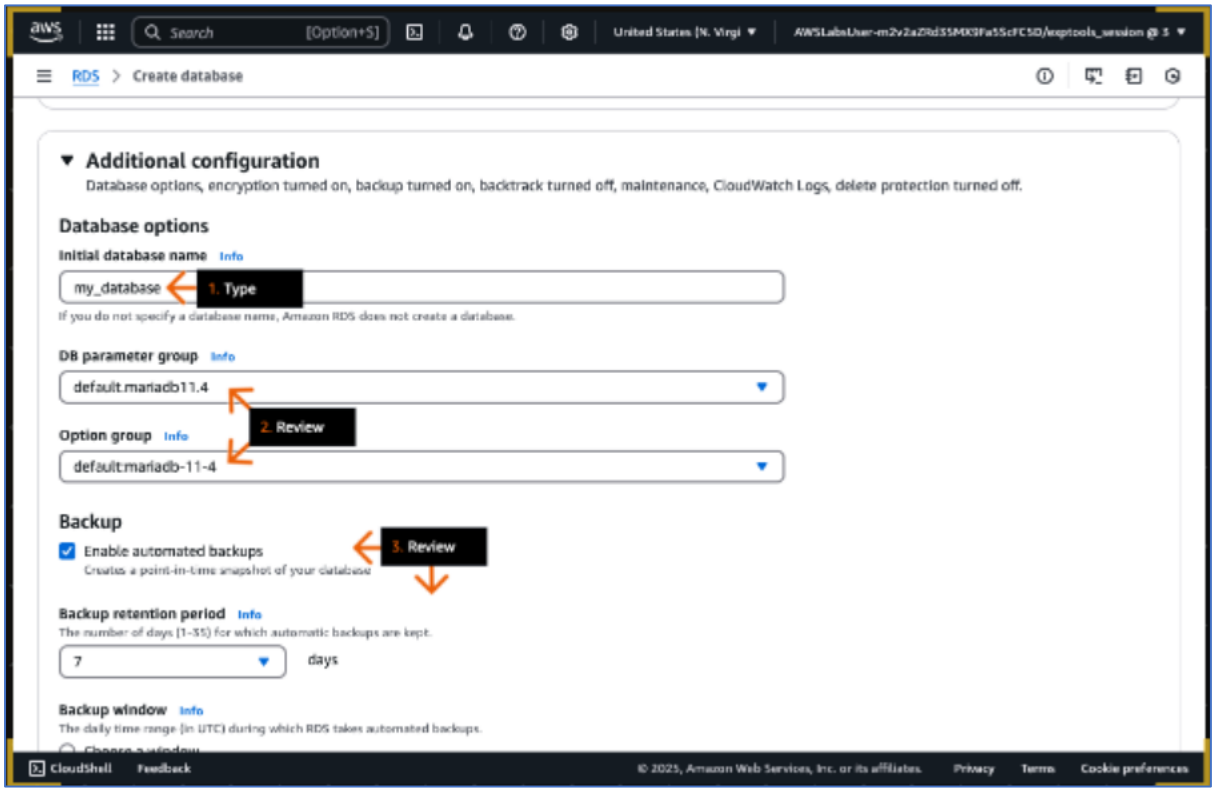


Amazon RDS helps you control network access to your database. You can also run your RDS DB instances in a virtual private cloud (VPC). This way, you can isolate your database instances and connect to your existing IT infrastructure through an industry standard encrypted IPsec VPN.

- In the Monitoring section, clear the checkbox to deselect Enable Performance Insights.
- Click to expand Additional configuration.
- Clear the checkbox to deselect Enable Enhanced Monitoring.
  - If either Performance Insights or Enhanced Monitoring are enabled, you'll get a permissions error when you try to create the database.
- Click to expand the Additional configuration section.

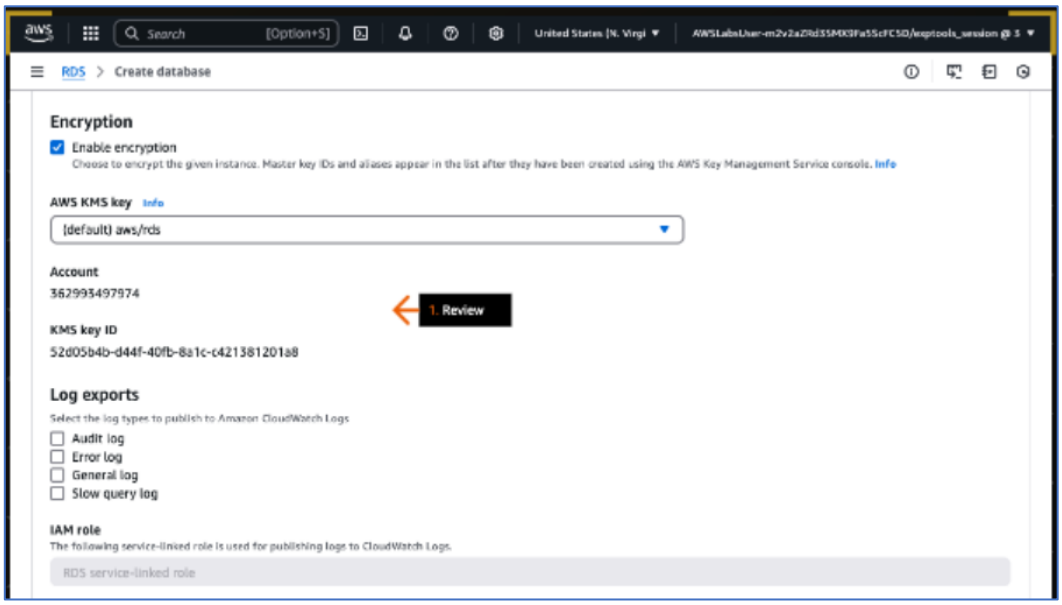


- For Initial database name, type: my_database
- For DB parameter group and Option group, review the default options.
- Under Backup, review the default options.



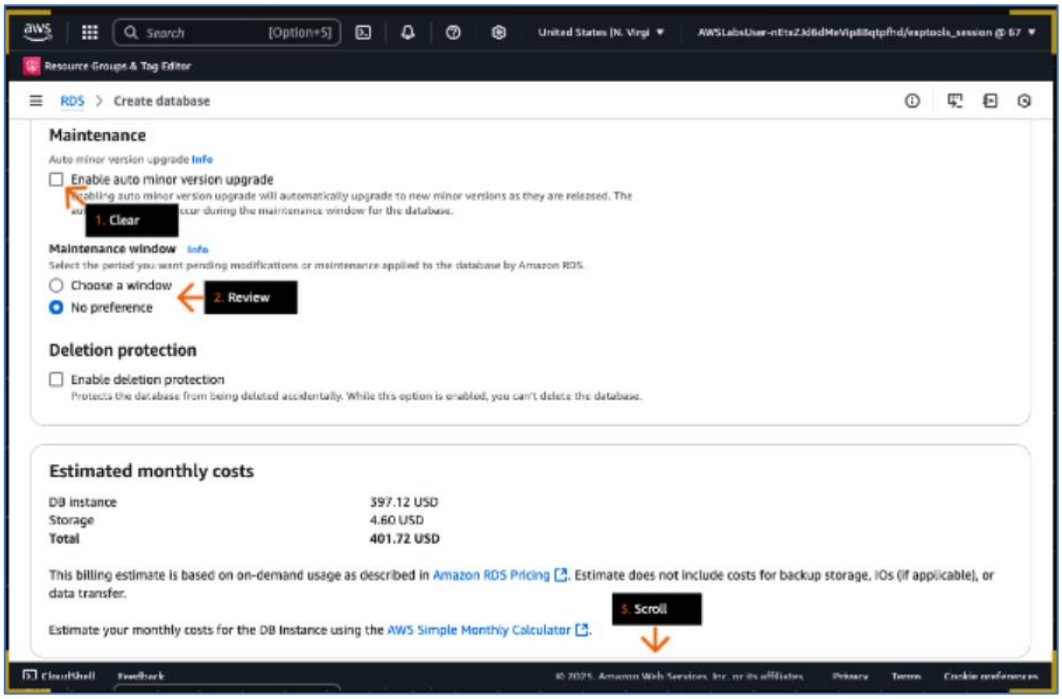
For AWS to successfully provision an RDS DB instance for you, you must first specify an initial database name. If you fail to specify an initial database, your instance can still be provisioned, but it might not work properly.

- Under Encryption, review the default encryption options.



Amazon RDS provides encryption at rest capabilities to protect data stored in database instances. When encryption is enabled, the data stored at rest, disk I/O, and snapshots are all encrypted using AES-256 bit encryption.

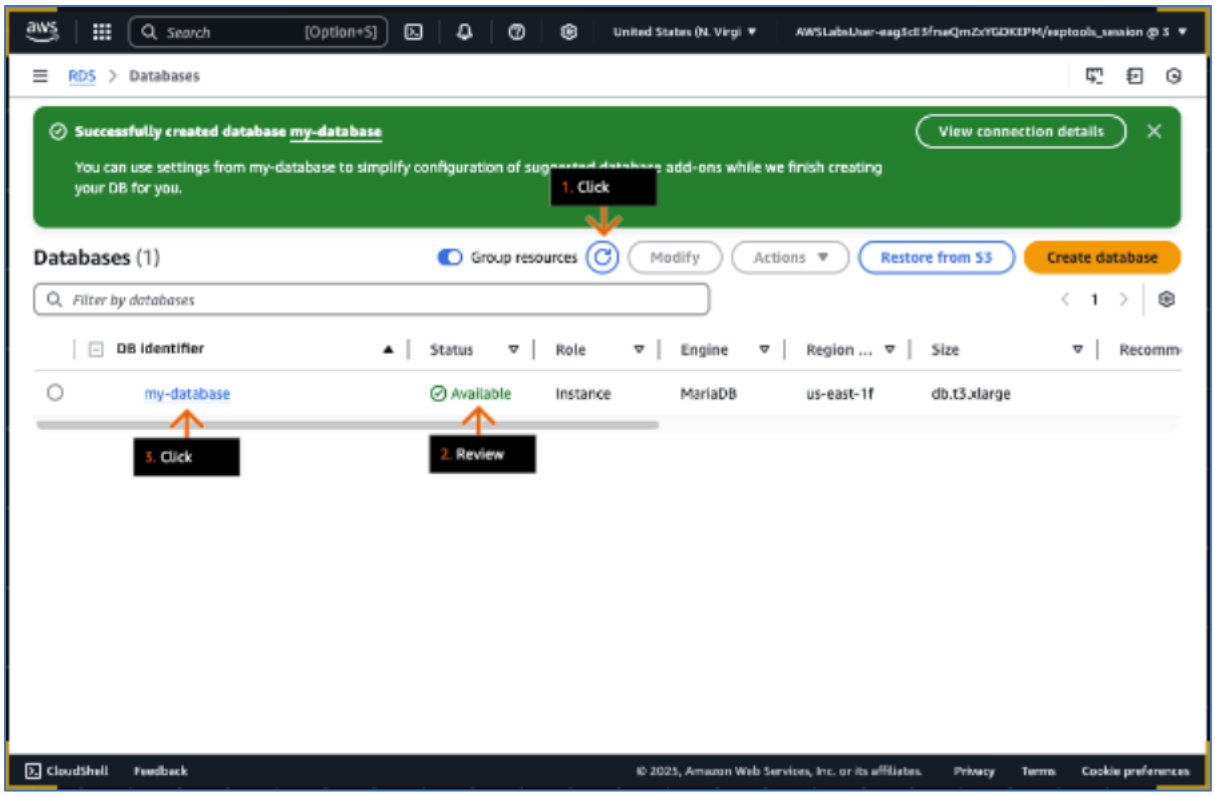
- For Maintenance, clear the checkbox to deselect Enable auto minor version upgrade.
- For Maintenance window, review the default choice of No preference.
- Scroll down to the bottom of the page, and then click Create database .



When AWS determines a new engine minor version contains significant bug fixes, they schedule automatic upgrades for instances that have auto minor version upgrade enabled. AWS also announces upgrades on the Amazon RDS Forum with customer email notifications at least 30 days in advance.

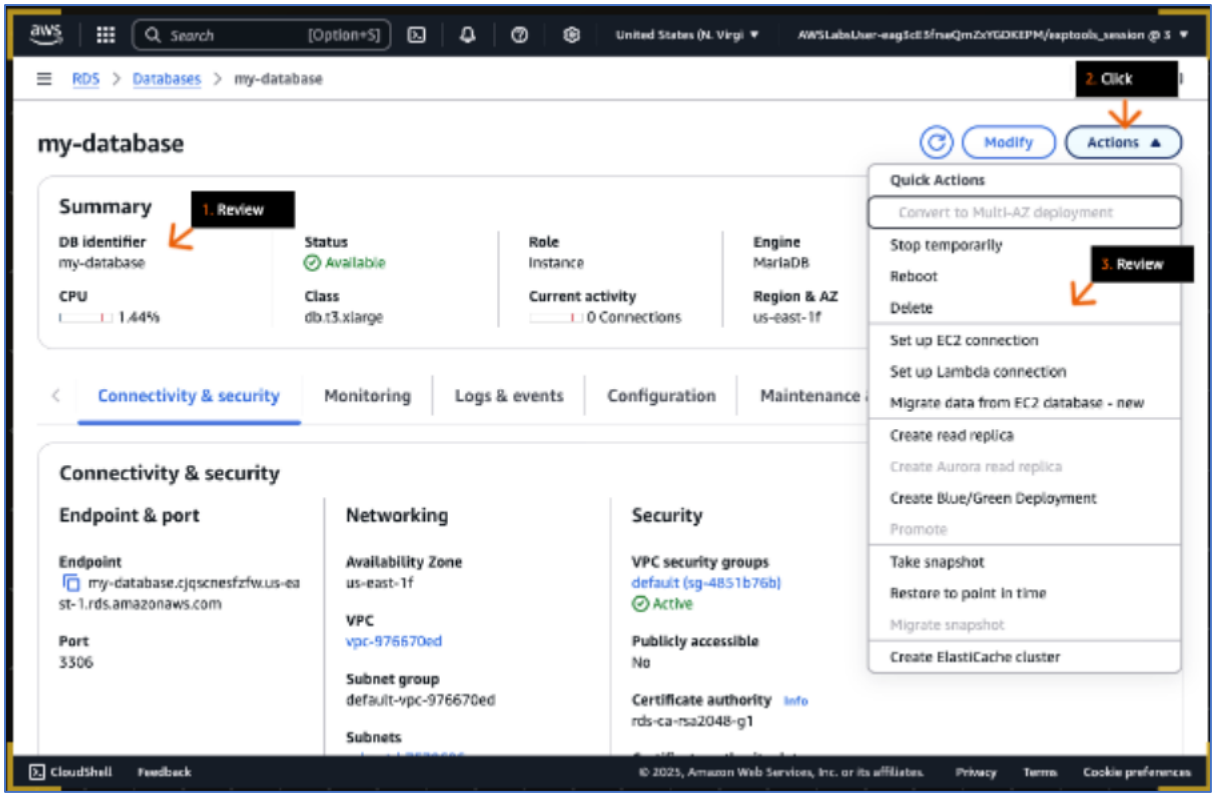
  - If any pop-up boxes appear (offering add-ons), close them.
  - The RDS DB instance takes 5-10 minutes to be created.
  - After the database is created, the status shows Modifying.

- Wait 5-10 additional minutes after the database is created, and then click the Databases refresh icon.
- Under Status, review to confirm that the status is Available.
  - If the status hasn't changed to Available, continue to click the refresh icon every few minutes until it does.
- Click my-database.

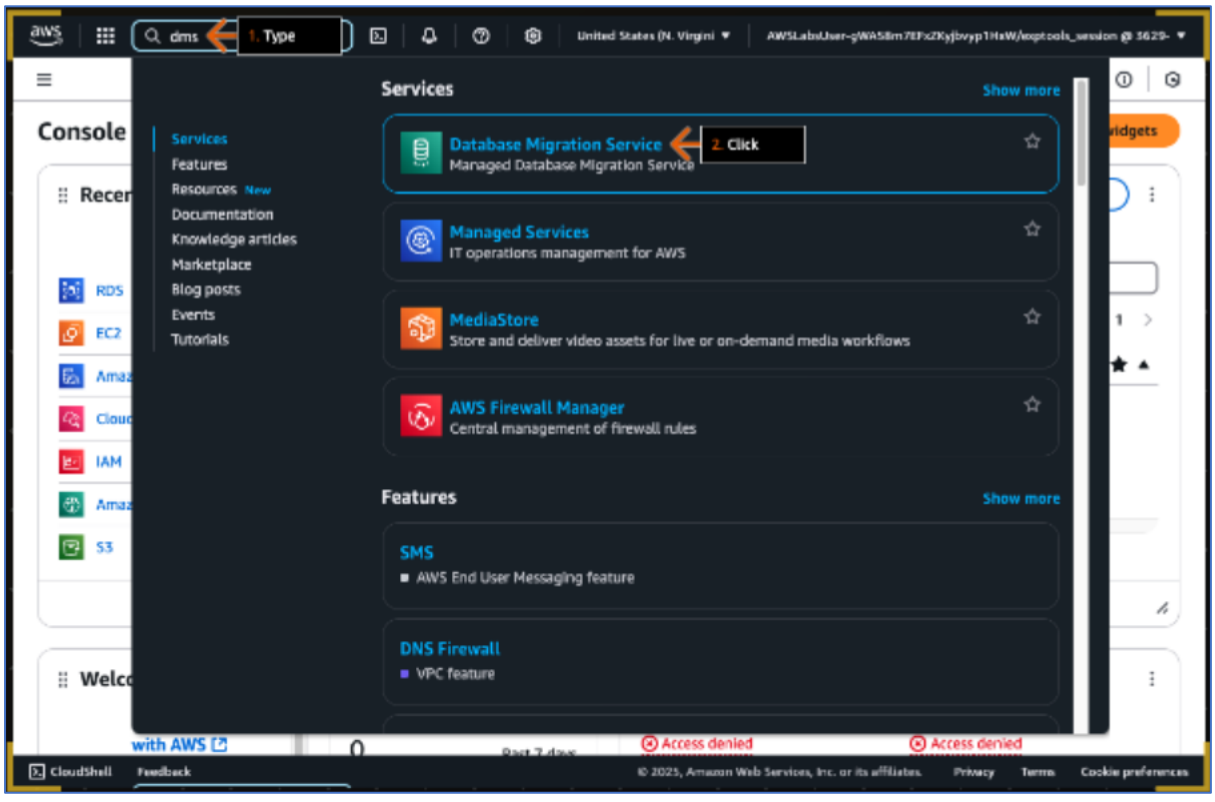


- In the Summary section, under DB identifier, review the identifier.
- Click Actions to expand the dropdown list.
- Review the different options.

An Amazon RDS read replica is a read-only copy of a source database instance that uses asynchronous replication to stream database changes. You can create one or more replicas of a given source DB instance and serve high-volume application read traffic to your replicas, thereby increasing aggregate read throughput.



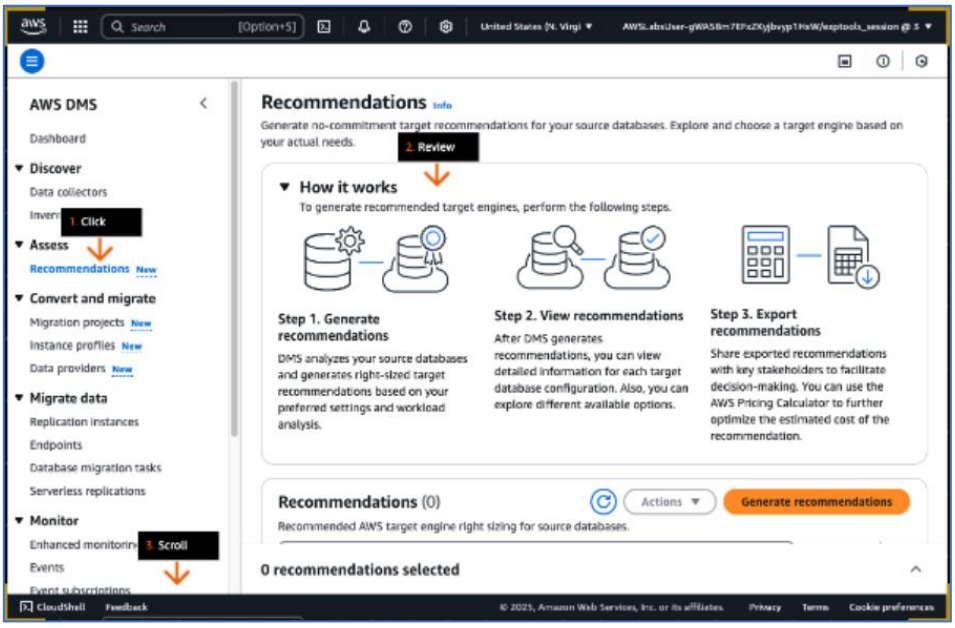
- In the top navigation bar search box, type: dms
- In the search results, under Services, click Database Migration Service.



AWS Database Migration Service (AWS DMS) is a web service that helps you migrate data between different data stores. The service provides secure and user-friendly database

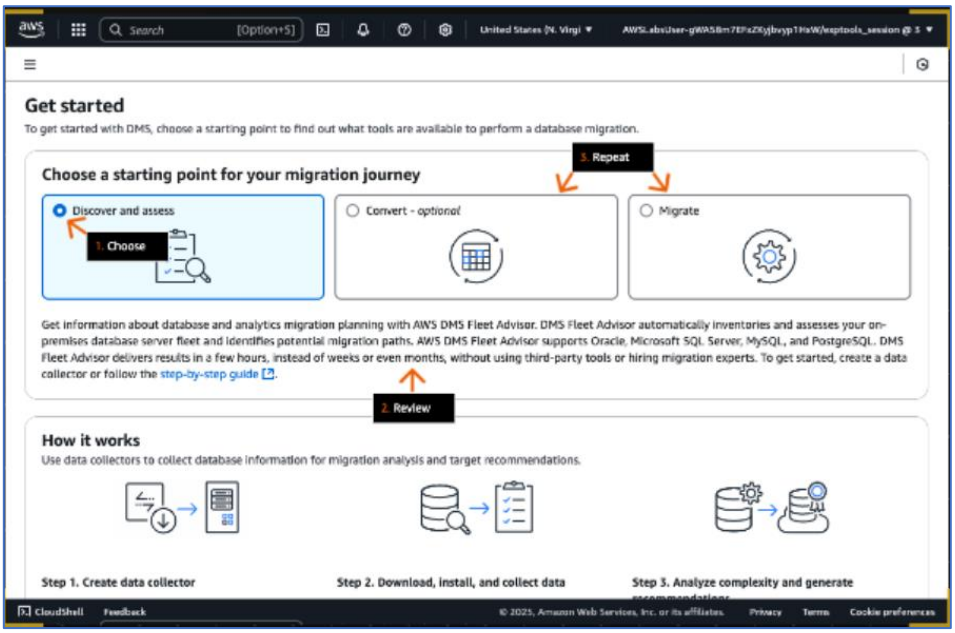
migrations, keeping source databases fully operational during the migration process to minimize application downtime.

- In the left navigation pane, click Recommendations.
- Review the How it works section.
- In the left navigation pane, scroll down and click Getting started .



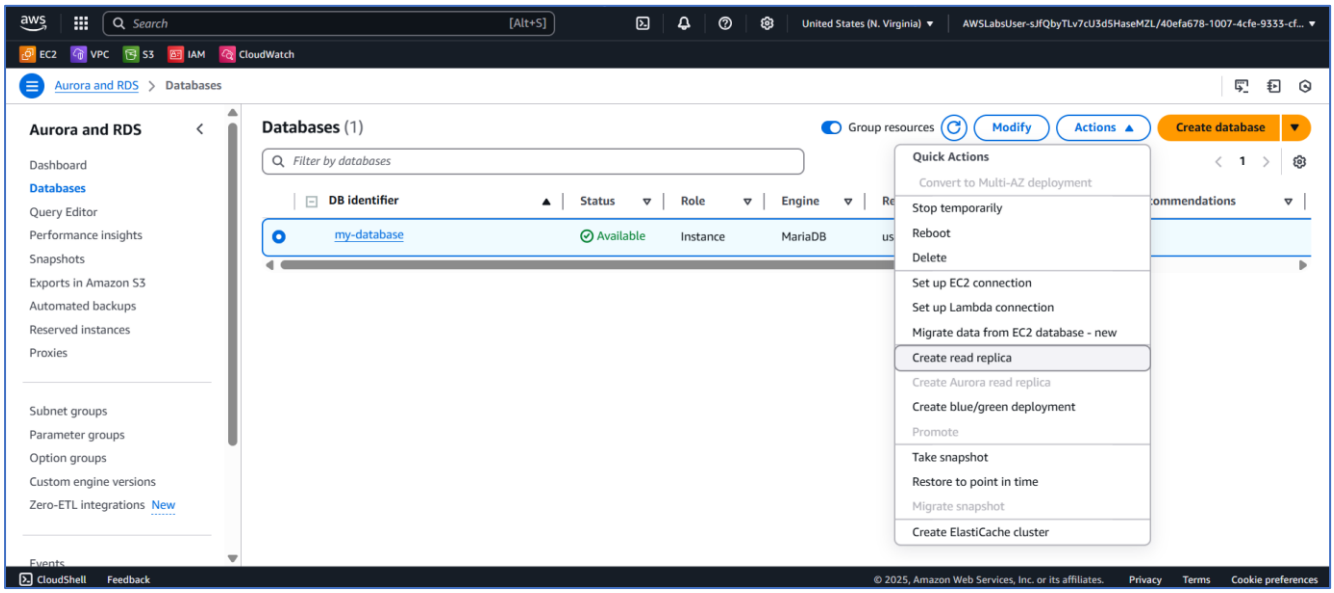
AWS DMS can handle migrations between data stores by using the same or different database engines. The service supports a wide range of database types, including relational databases, data warehouses, and NoSQL databases.

- For Choose a starting point ..., choose Discover and assess.
- Below that, review the description.
- Repeat for the Convert and Migrate options.

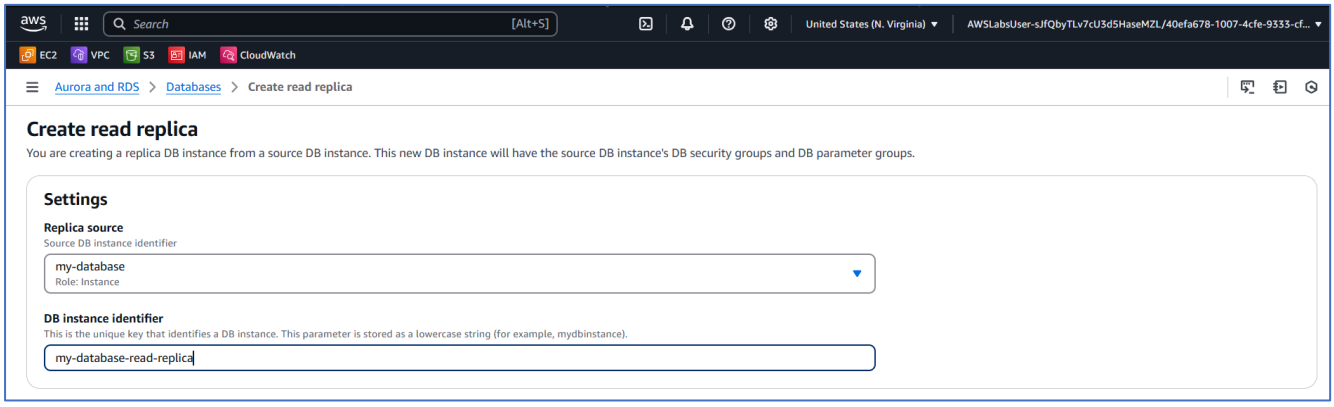


Creating a Read Replica for RDS Database:

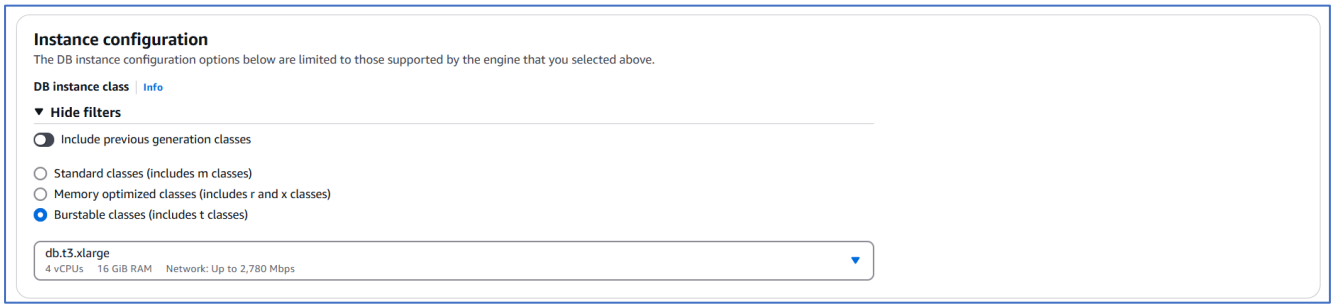
- In the AWS Management Console, search for and select the **RDS** service.
- From the RDS dashboard, click on **Databases** in the side menu.
- Locate and select your primary database (e.g., **my-database**) from the list.
- Click on the **Actions** dropdown menu and select **Create read replica**.



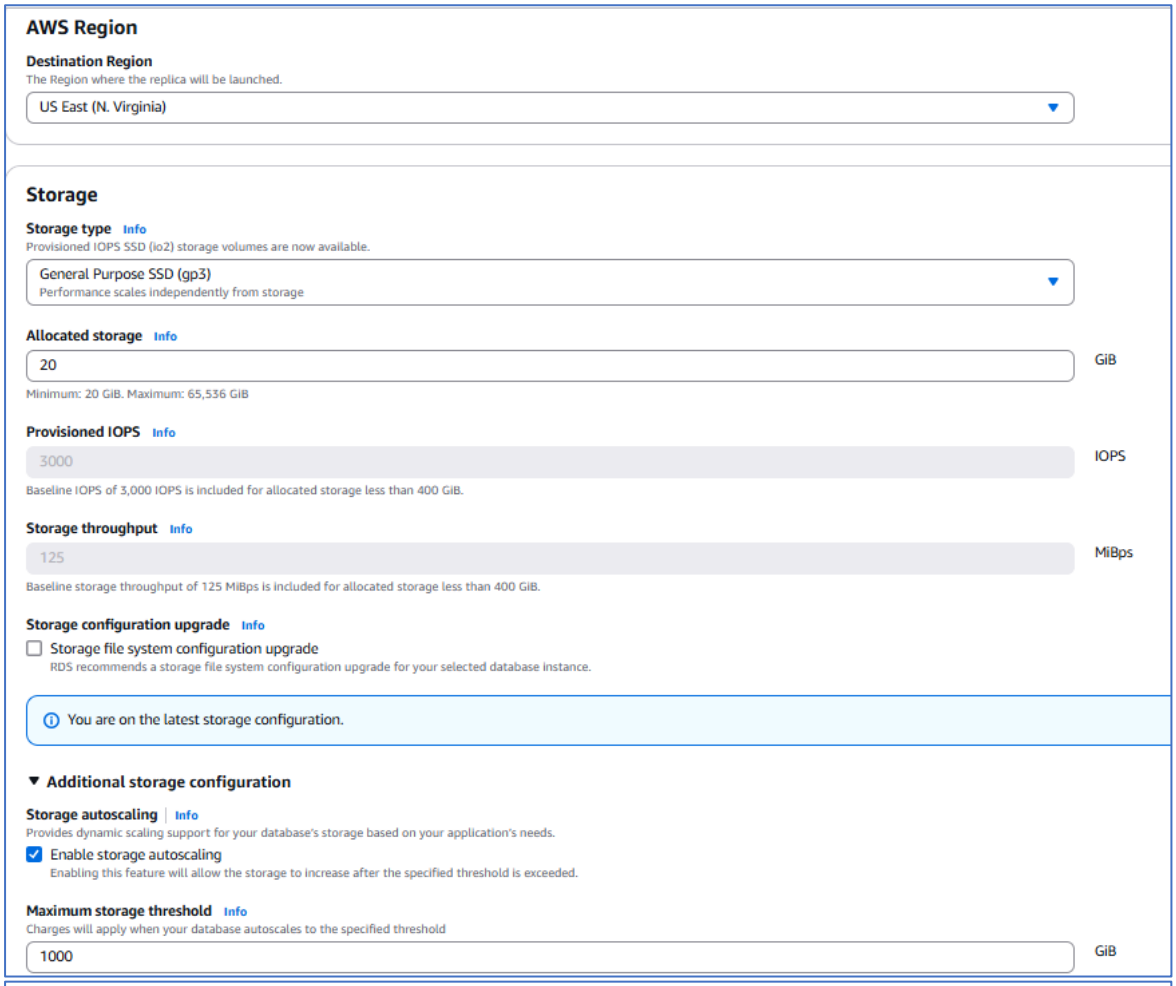
- In the **DB instance identifier** field, enter **my-database-read-replica**.

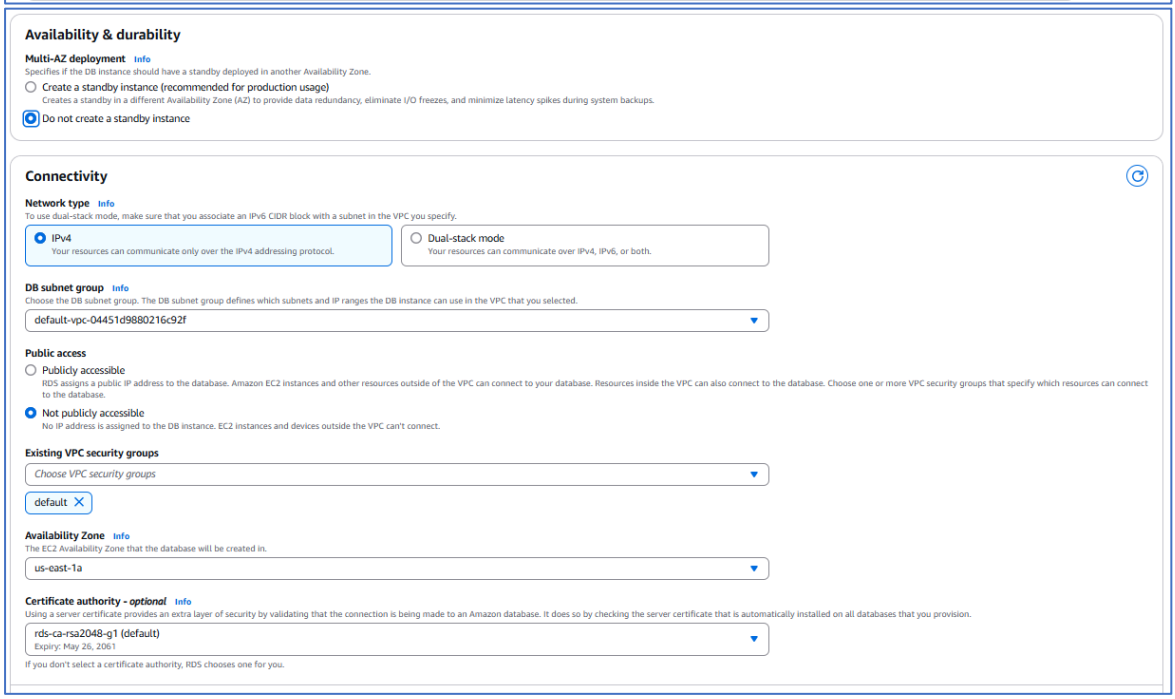


- In the Instance configuration, Select the appropriate instance class (e.g., **db.t3.xlarge**) based on your requirements.

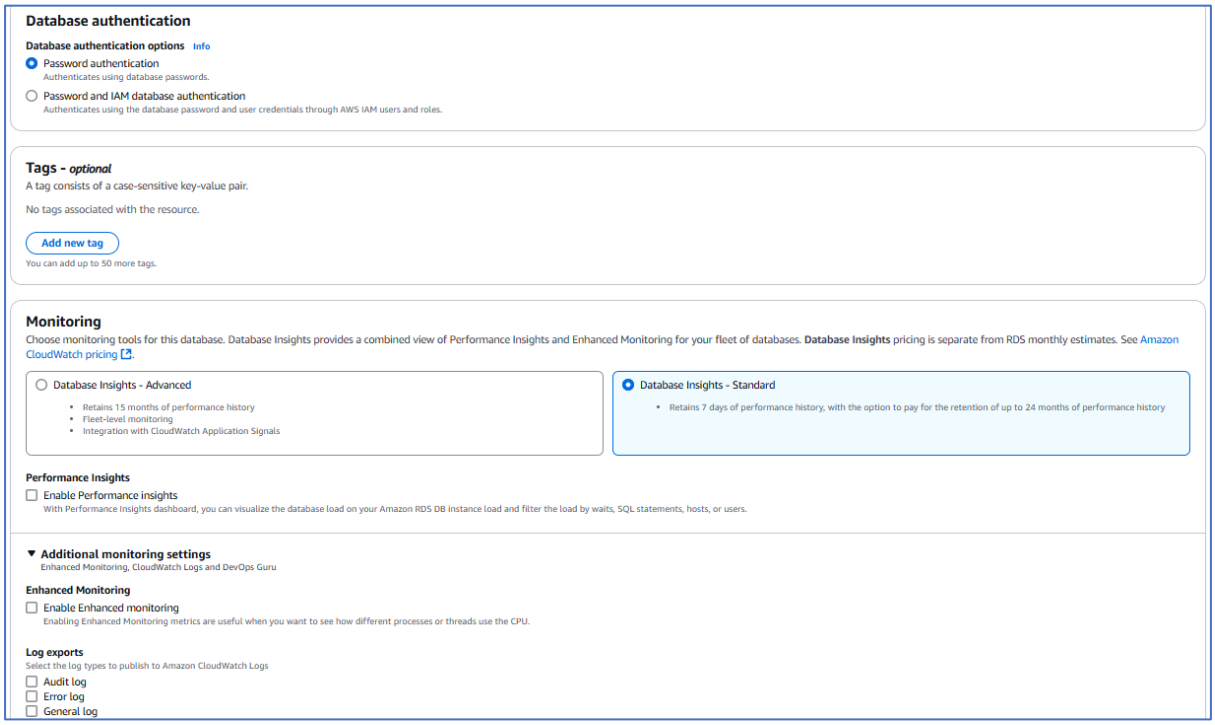


- Under Availability & Durability, select Do not create a standby instance and choose the availability zone as us-east-1a (which should be different from the availability zone of the original database).
- You can configure other settings as needed, or leave them at their default values.

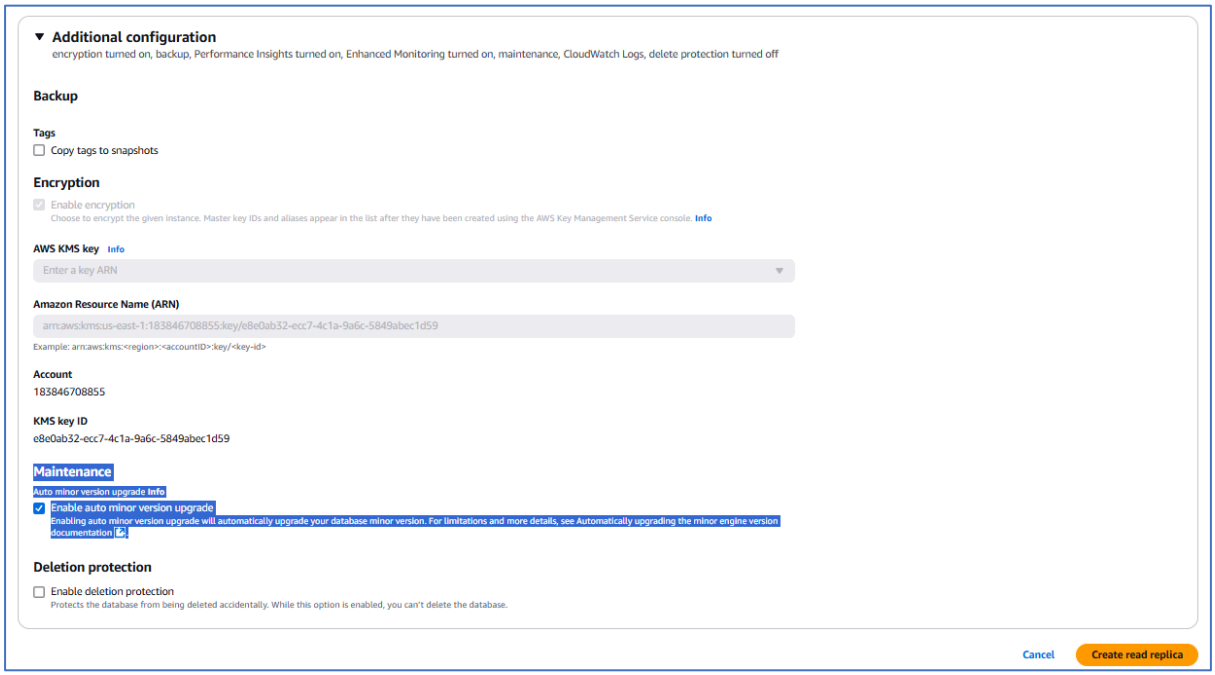




- Under Monitoring, deselect **Enable Performance Insights**.
- In Additional Monitoring Settings, deselect **Enable Enhanced Monitoring**.



- Under Maintenance, deselect **Enable auto minor version upgrade**. This will prevent the automatic upgrade of your database's minor version.
- Click on **Create read replica** to initiate the process.



Conclusion:

In this process, we successfully created an Amazon RDS DB instance, ensuring that it is backed up for data safety. By enabling multiple Availability Zones (AZs), we enhanced the availability and durability of the database, minimizing the risk of downtime. Additionally, the creation of a read replica ensures better read scalability and load balancing for high-traffic applications. These steps contribute to a robust, highly available, and scalable database infrastructure, which is essential for maintaining optimal performance and reliability in cloud-based applications.