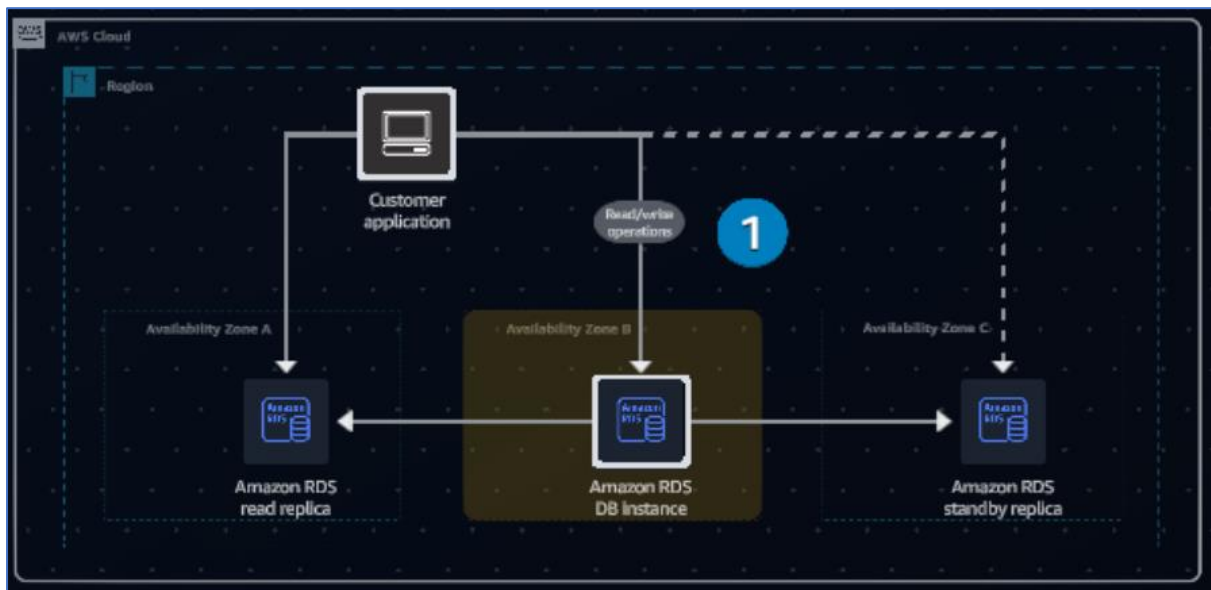


AMAZON RDS INSTANCE PROVISIONING AND MANAGEMENT

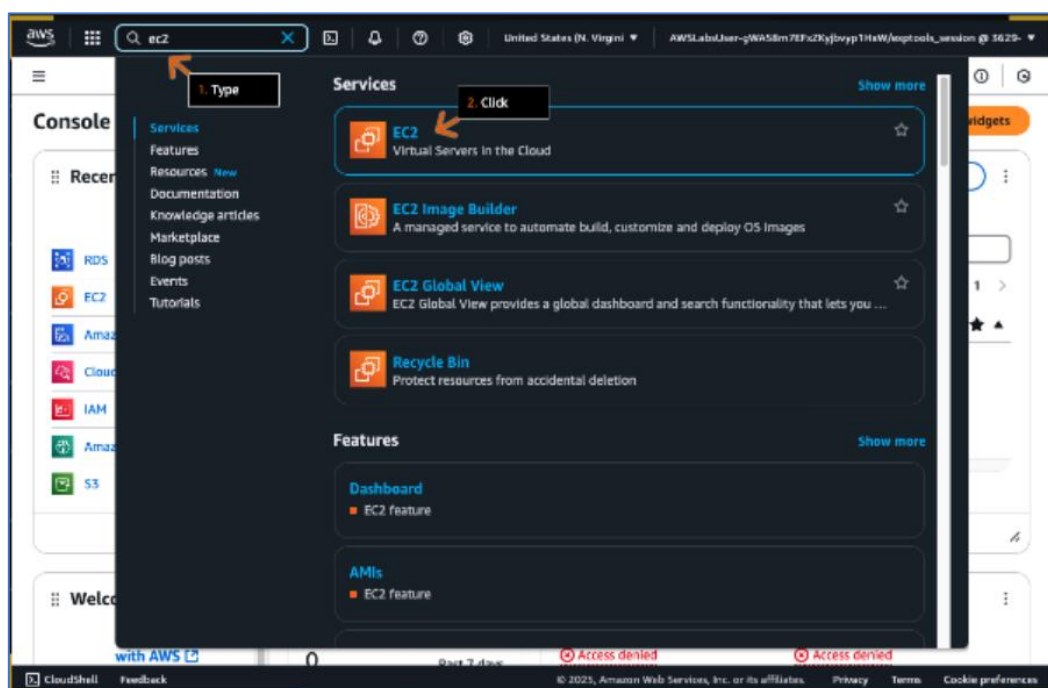
Objectives:

- 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.

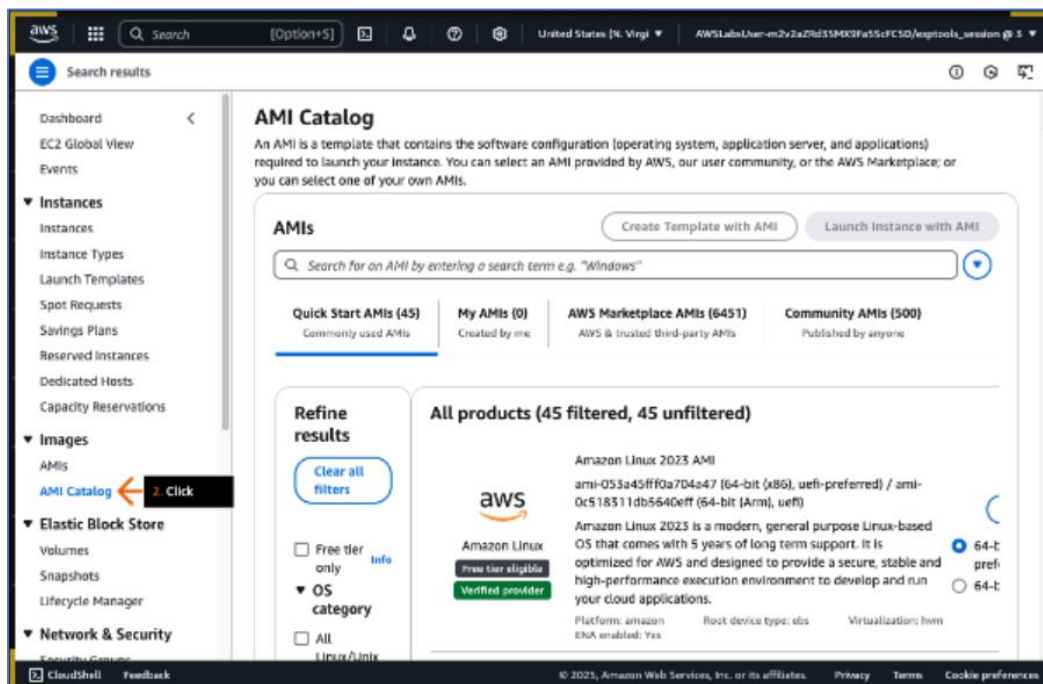


Steps / Procedures / Instructions:

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

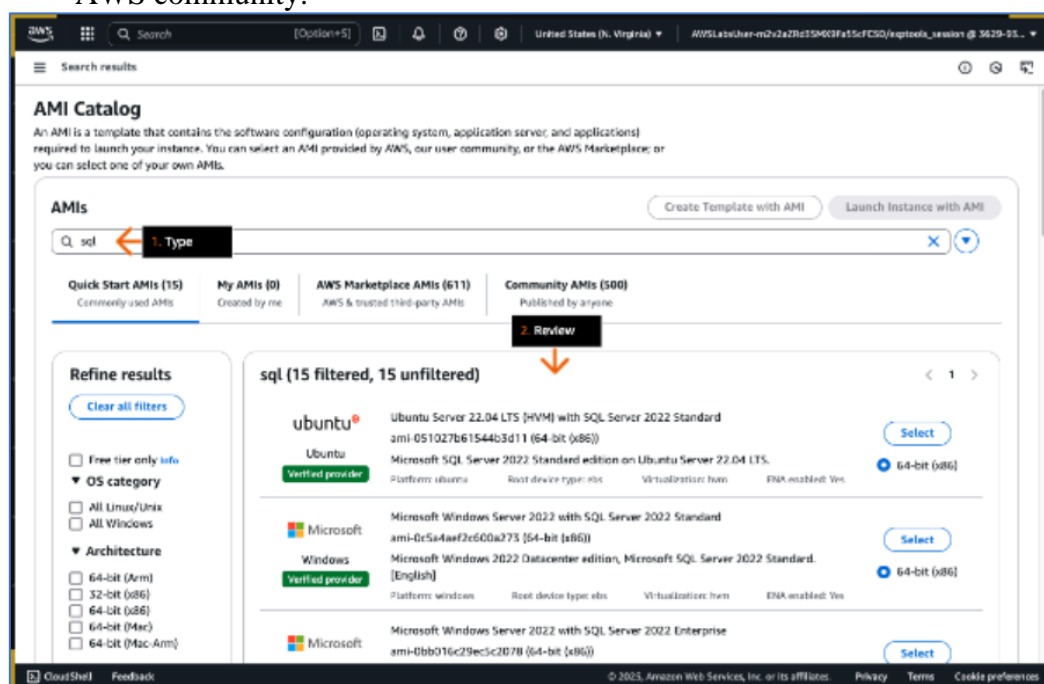


- In the left navigation pane, click AMI Catalog.



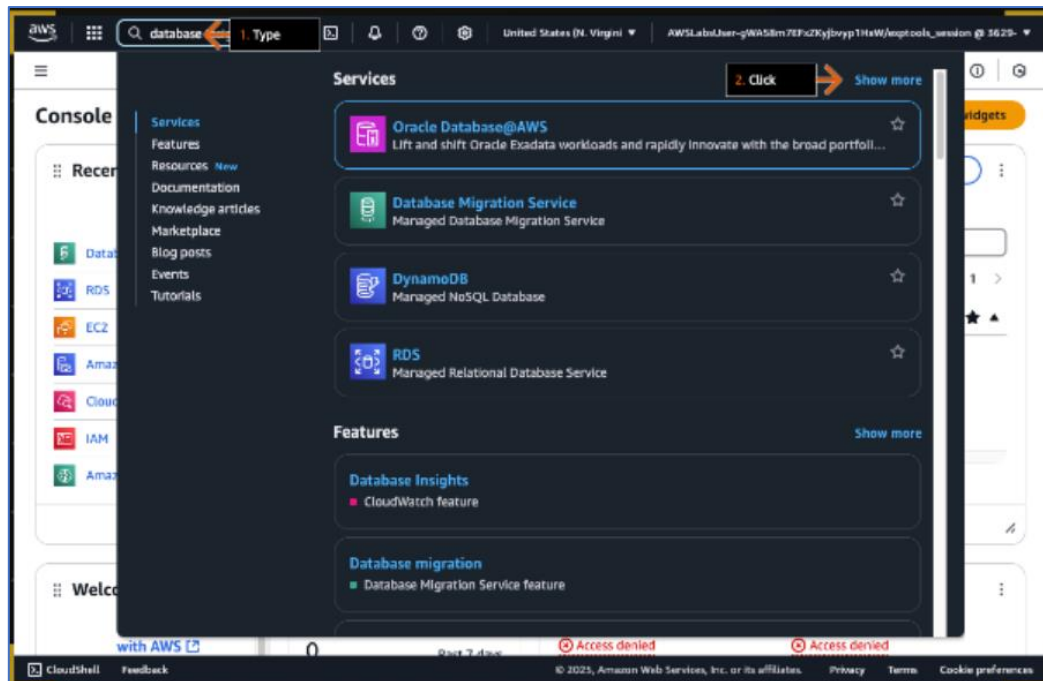
An Amazon Machine Image (AMI) is an image that provides the software that is required to set up and boot an EC2 instance. AMIs might also include software packages such as database servers, offering a hosted database option in addition to the managed options provided by other AWS services.

- 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.

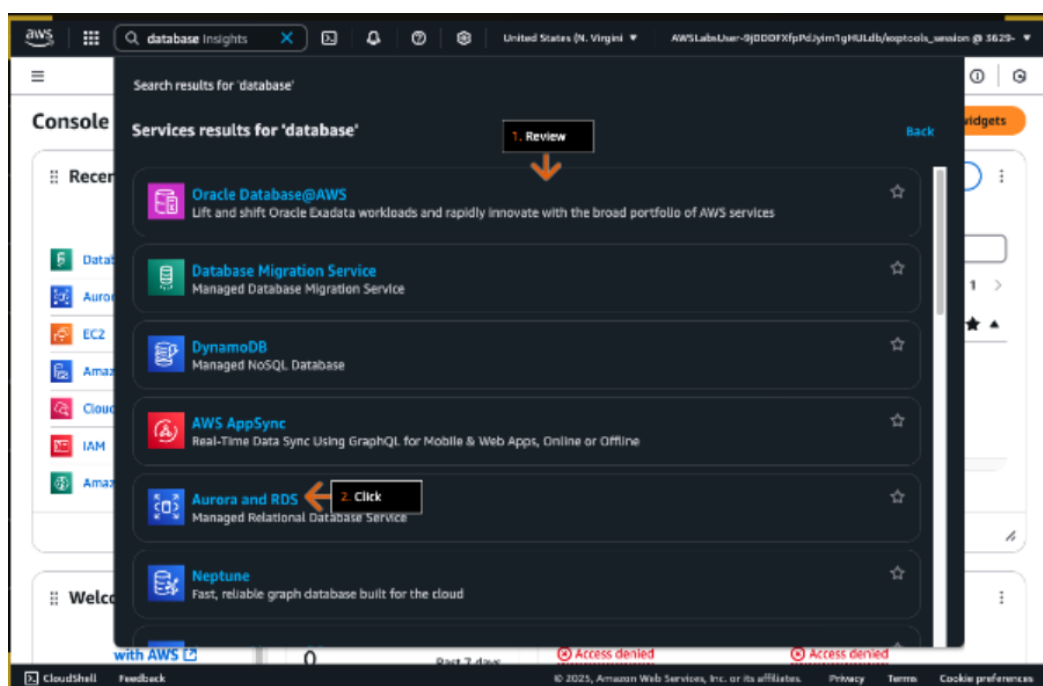


When hosting a database on an EC2 instance, AWS handles the physical infrastructure, hardware, and operating system installation, but you remain responsible for managing the instance, database management, query optimization, and customer data. Managed solutions such as Amazon Relational Database Service (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.

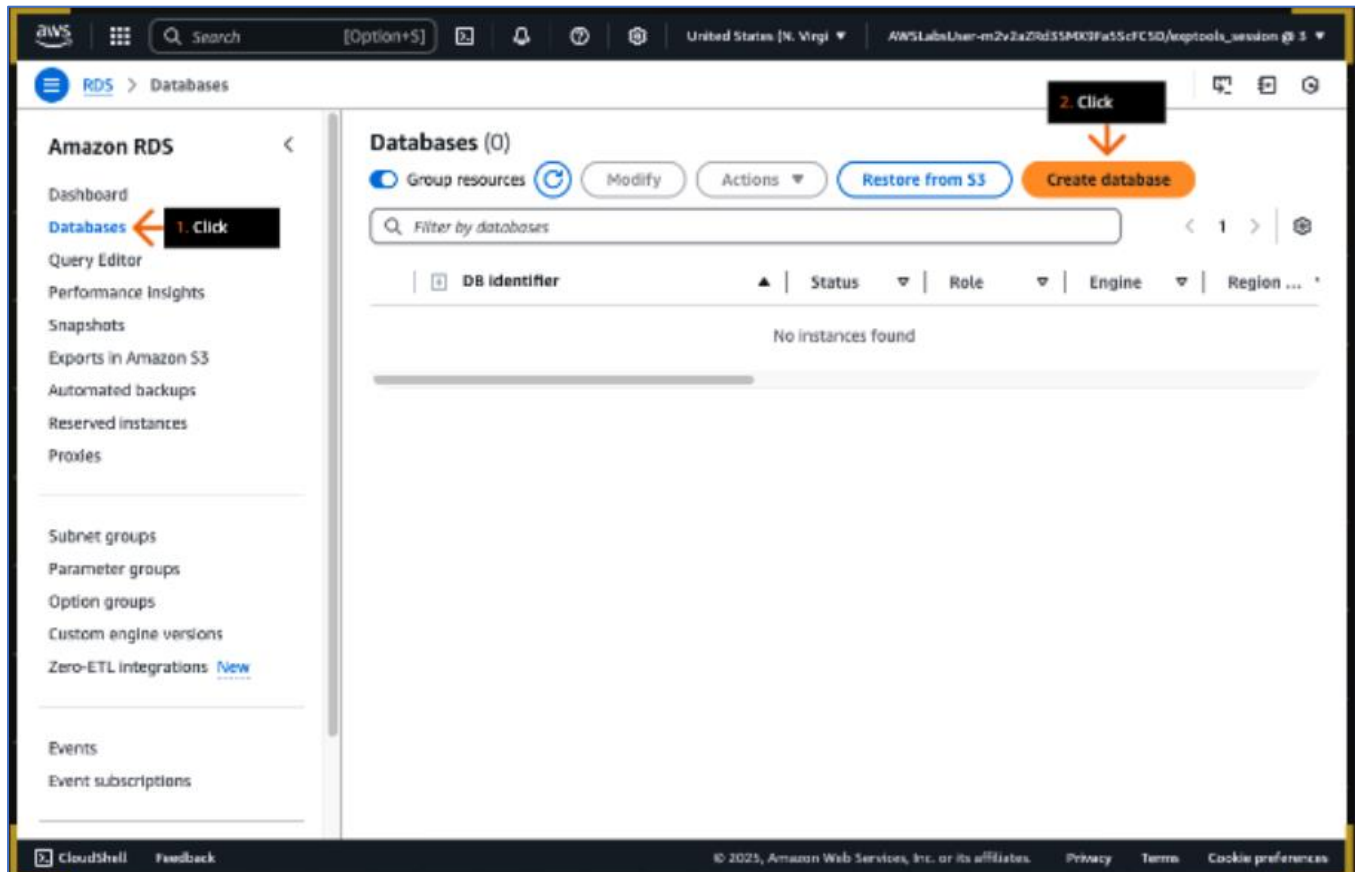


- Review the list of available database options.
- Click Aurora and RDS.



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.

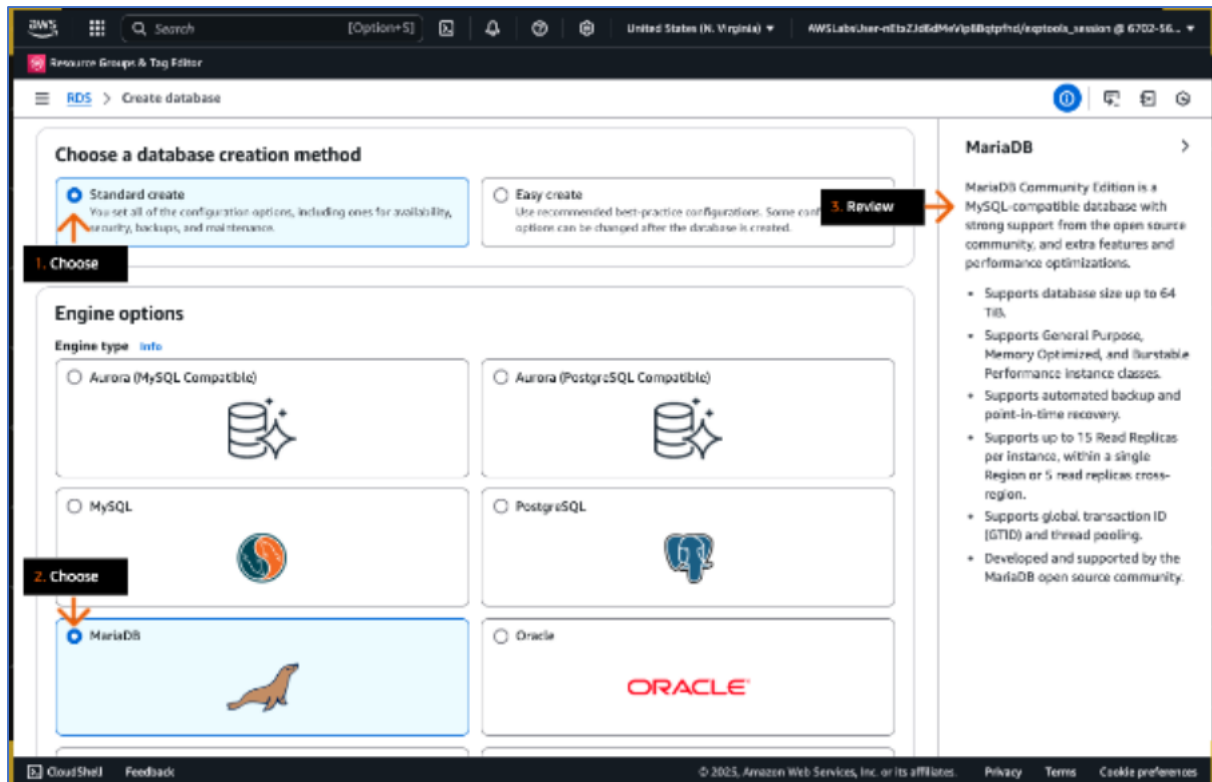
- In the left navigation pane, click Databases.
- In the Databases section, click Create database.



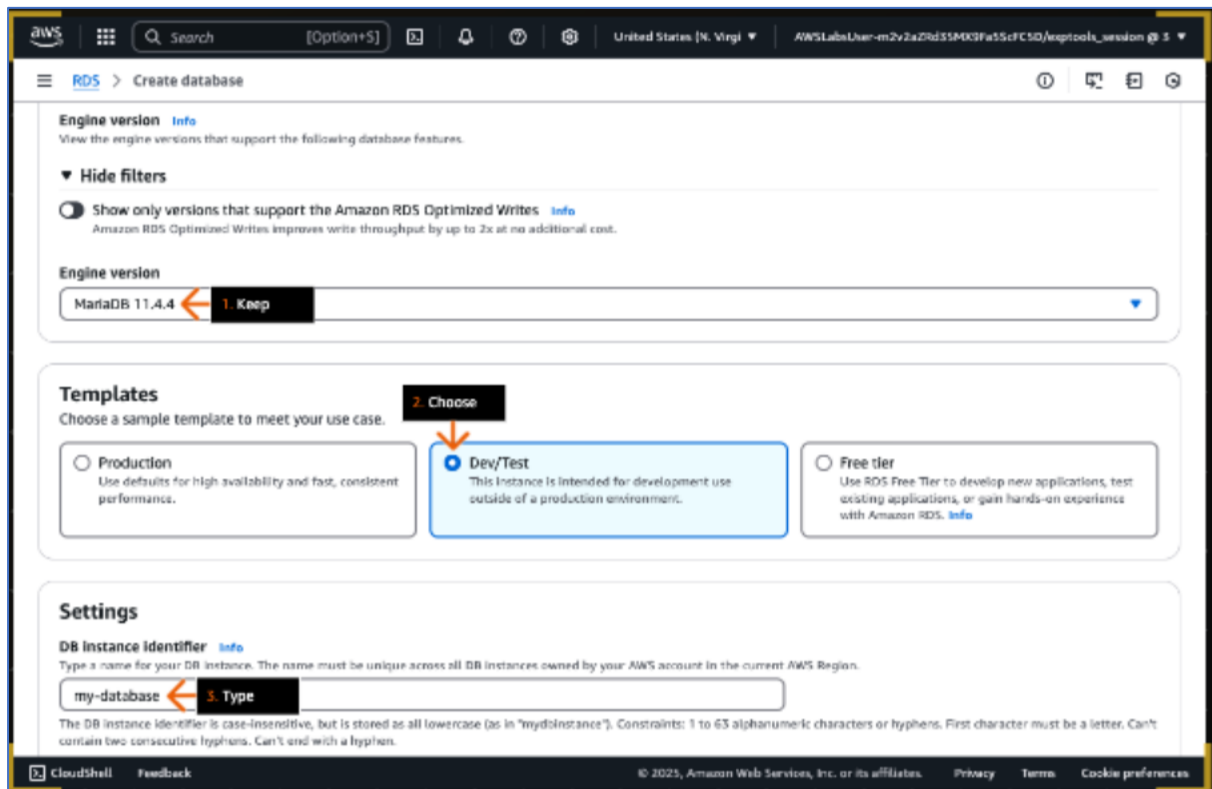
Amazon RDS is a web service that helps you set up, operate, and scale relational databases in the cloud. It provides cost-efficient and resizable capacity while automating time-consuming administration tasks such as hardware provisioning, database setup, patching, and backups.

- 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.

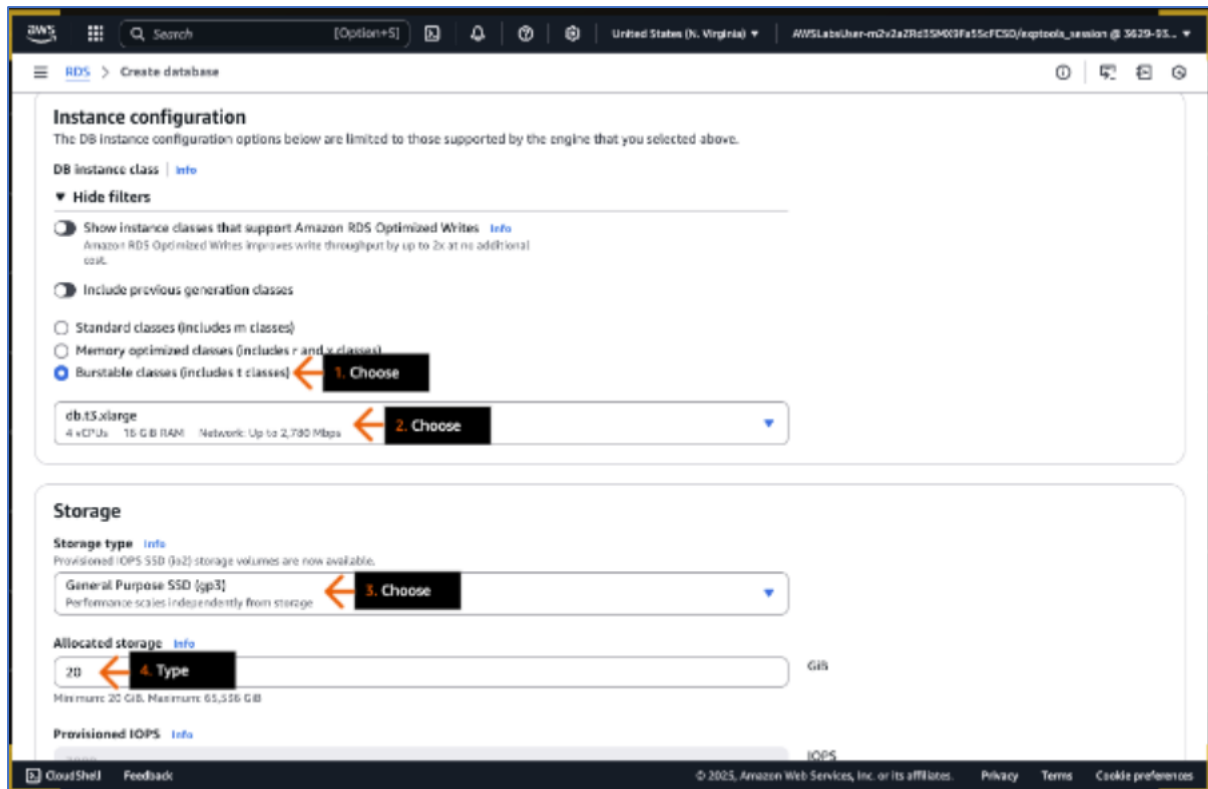
- Under Credential settings, for Master username, keep the default choice of admin.
- For Credentials management, choose Self managed.
- For Master password, type: ILoveLearning!123
- For Confirm master password, type the password again.

The screenshot shows the AWS RDS 'Create database' console. The 'Credentials Settings' section is expanded. Under 'Master username', the value 'admin' is entered, with an annotation '1. Keep' pointing to it. Under 'Credentials management', the 'Self managed' option is selected, with an annotation '2. Choose' pointing to it. The 'Master password' field is masked with '3. Type' annotation, and the 'Confirm master password' field is also masked with '4. Type' annotation. The password strength is shown as 'Very strong'.

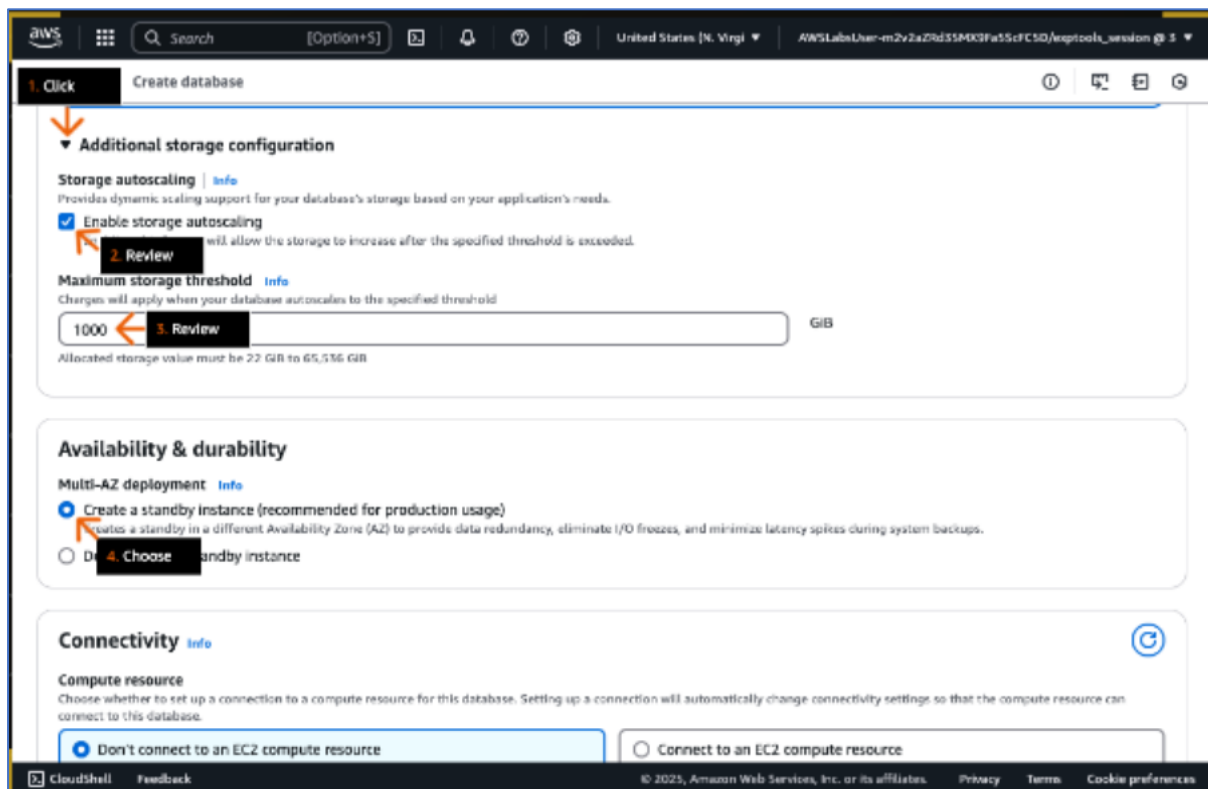
For production workloads, we recommend using AWS Secrets Manager for credential management. With Secrets Manager, you can store and manage various types of secrets, including database credentials, passwords, third-party API keys, and arbitrary text.

- 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.



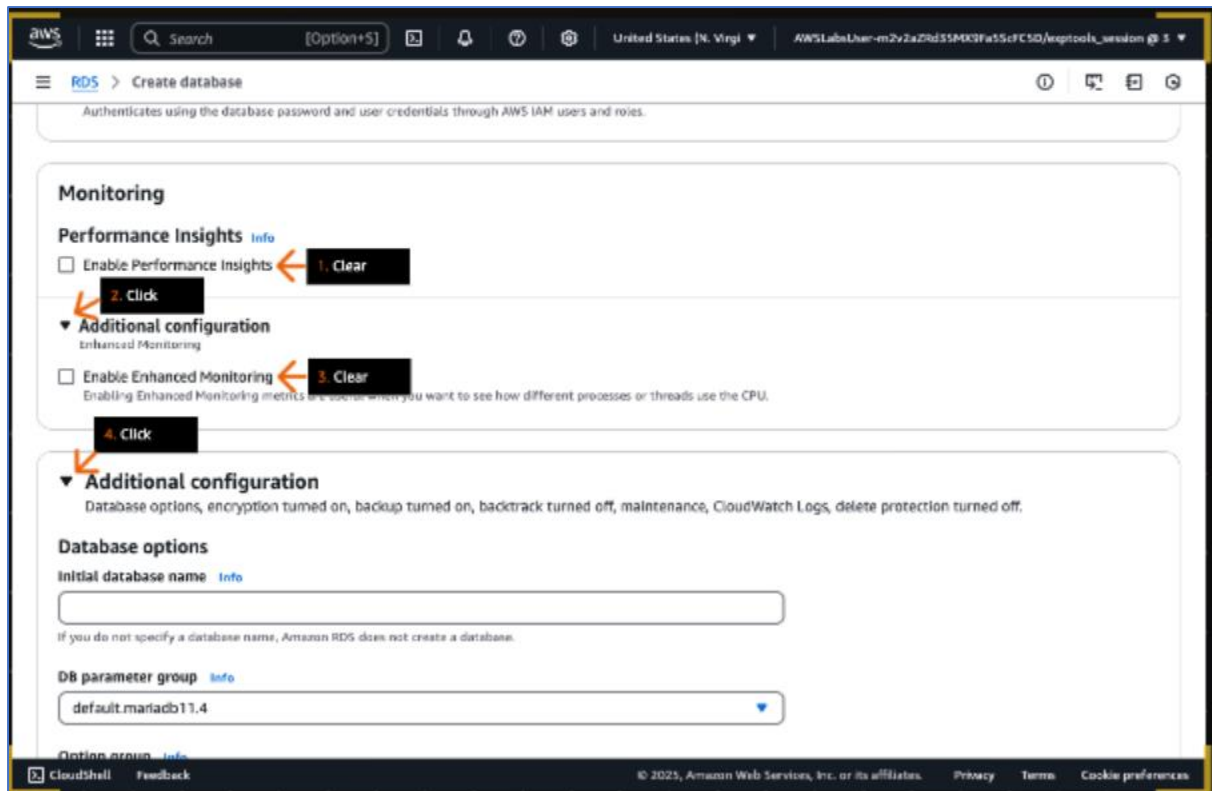
A standby instance is a synchronously maintained copy of the primary RDS DB instance that is automatically provisioned and maintained by Amazon RDS in a different Availability Zone (AZ). This replica serves as high availability and failover support for the primary RDS instance.

- 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.

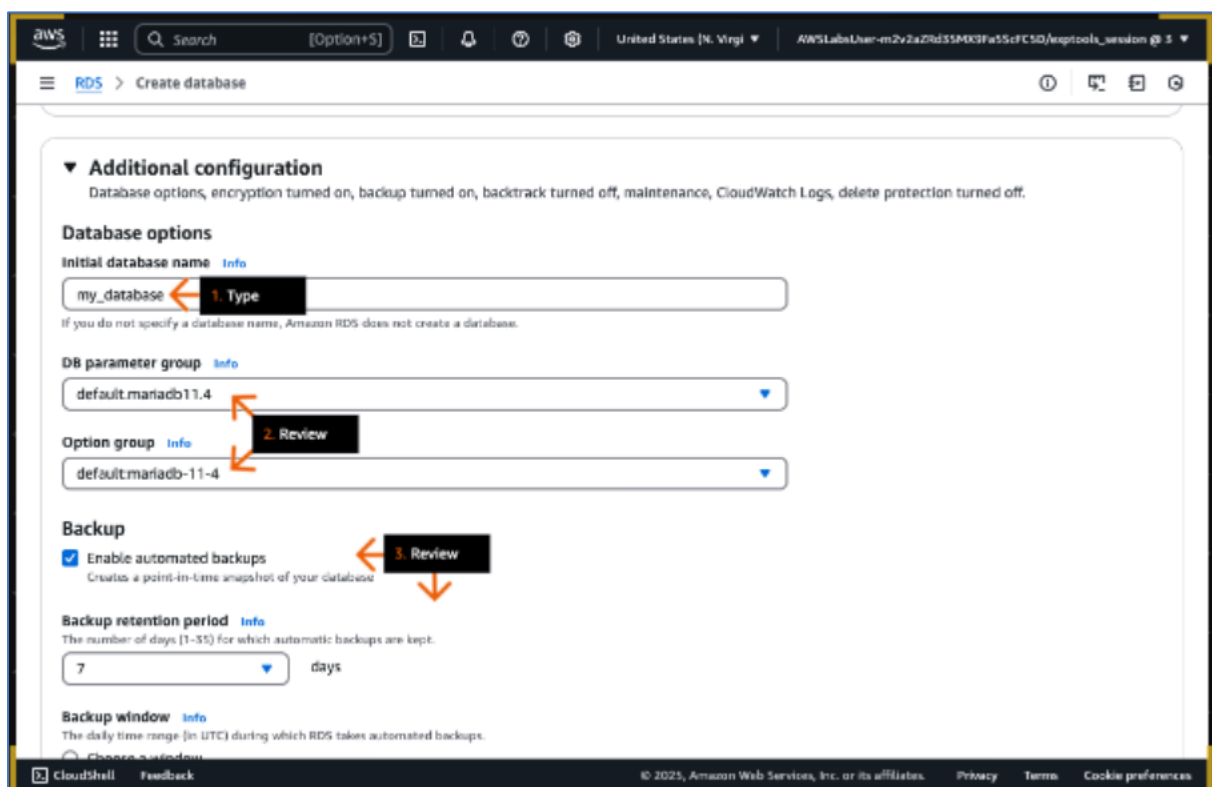
The screenshot displays the 'Create database' interface in the AWS Management Console. It features several configuration sections with dropdown menus and radio buttons. Red arrows and numbered labels (1-4) highlight the default or recommended settings: 'Default VPC (vpc-976670ed)' for the VPC, 'default' for the DB subnet group, 'No' for public access, and 'Choose existing' for the VPC security group. Each of these selections has a 'Keep' button next to it. The interface also includes informational text boxes and a footer with navigation links like 'CloudShell' and 'Feedback'.

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.

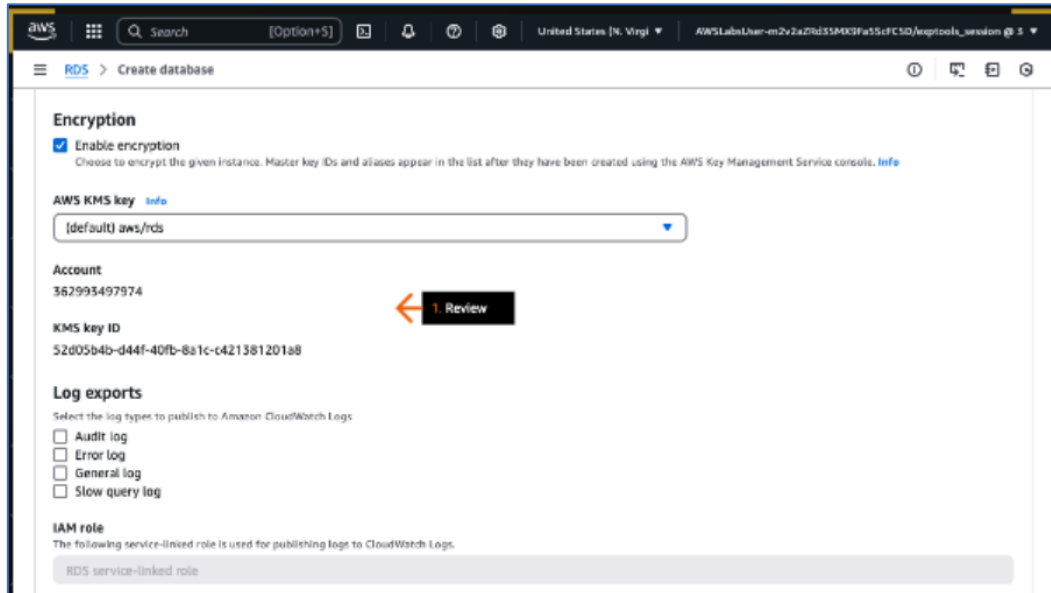


- For Initial database name, type: my_database
- For DB parameter group and Option group, review the default options.
- Under Backup, review the default options.



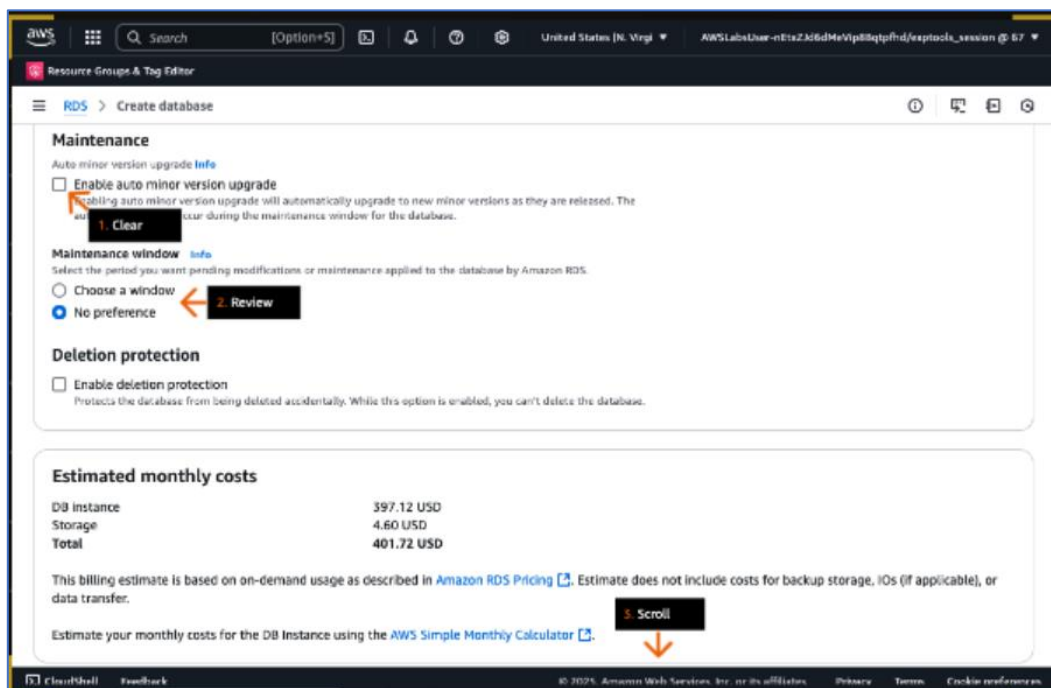
For AWS to successfully provision an RDS DB instance for you, you must first specify an initial database name. If you fail to specify an initial database, your instance can still be provisioned, but it might not work properly.

- Under Encryption, review the default encryption options.



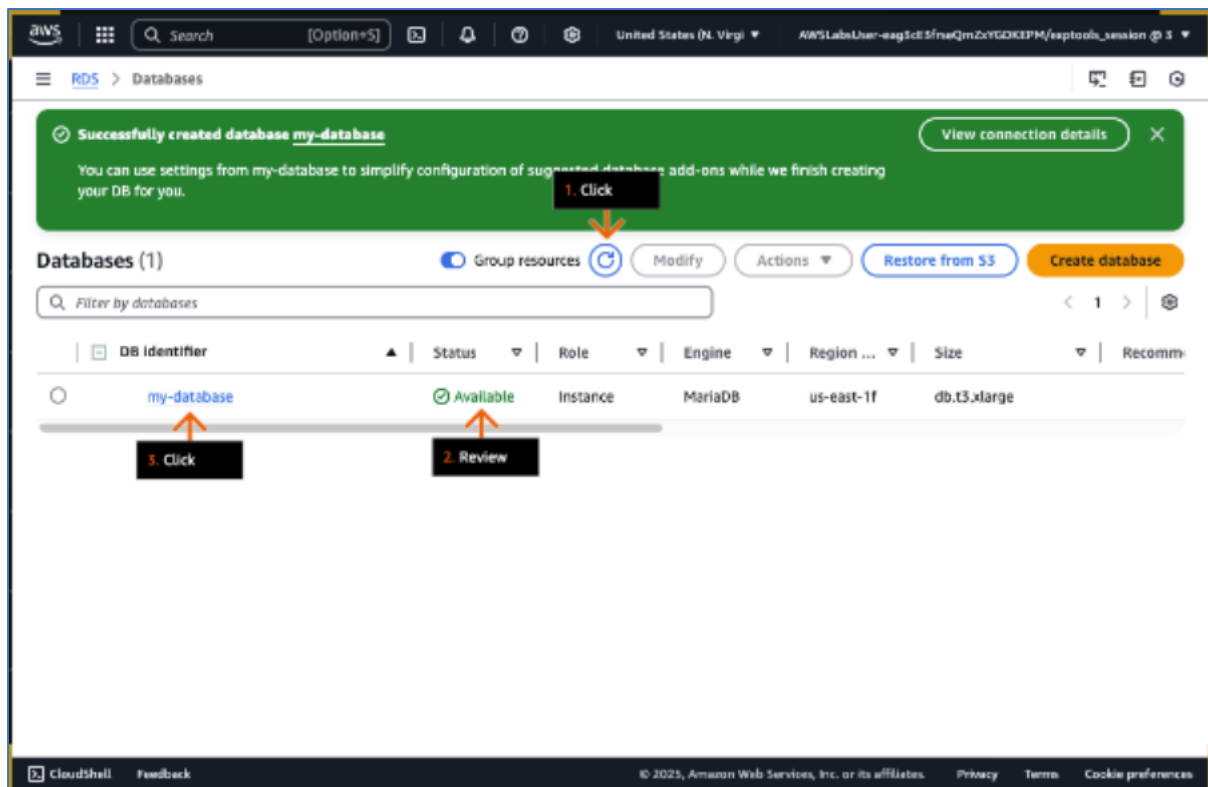
Amazon RDS provides encryption at rest capabilities to protect data stored in database instances. When encryption is enabled, the data stored at rest, disk I/O, and snapshots are all encrypted using AES-256 bit encryption.

- 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 .



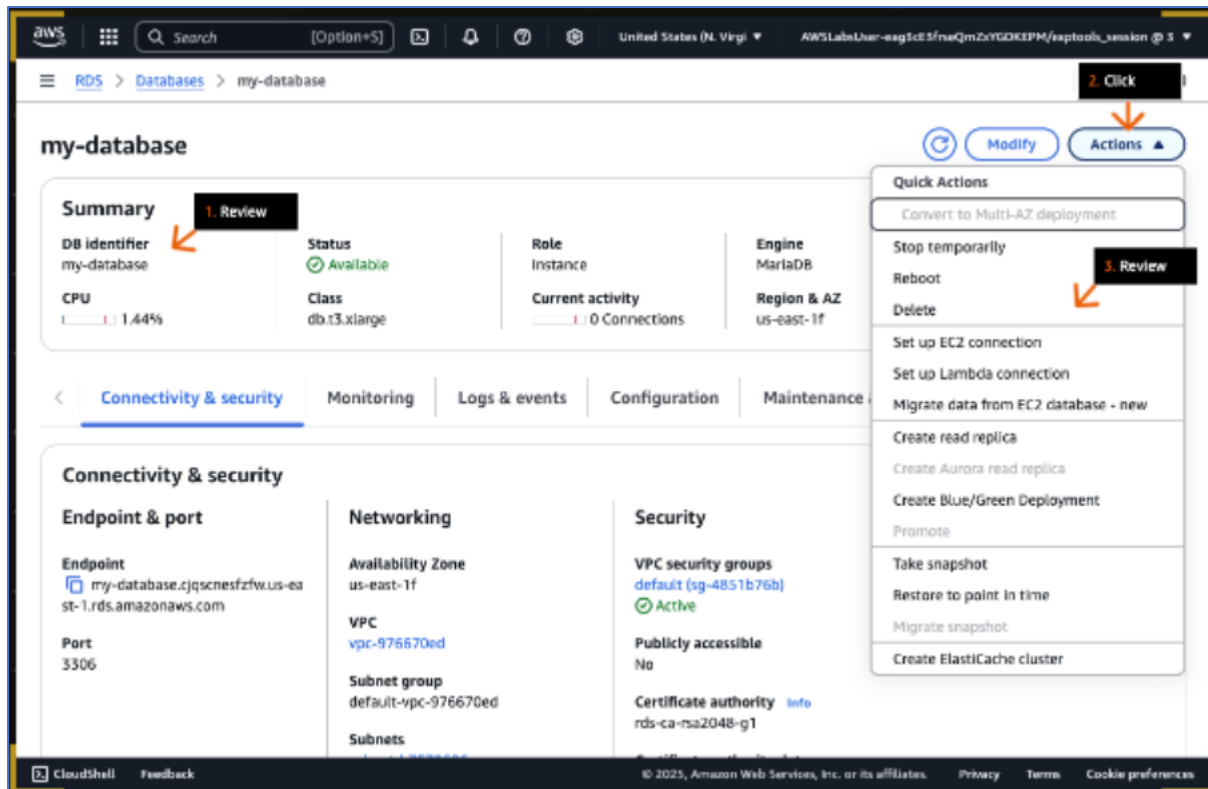
When AWS determines a new engine minor version contains significant bug fixes, they schedule automatic upgrades for instances that have auto minor version upgrade enabled. AWS also announces upgrades on the Amazon RDS Forum with customer email notifications at least 30 days in advance.

- 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.

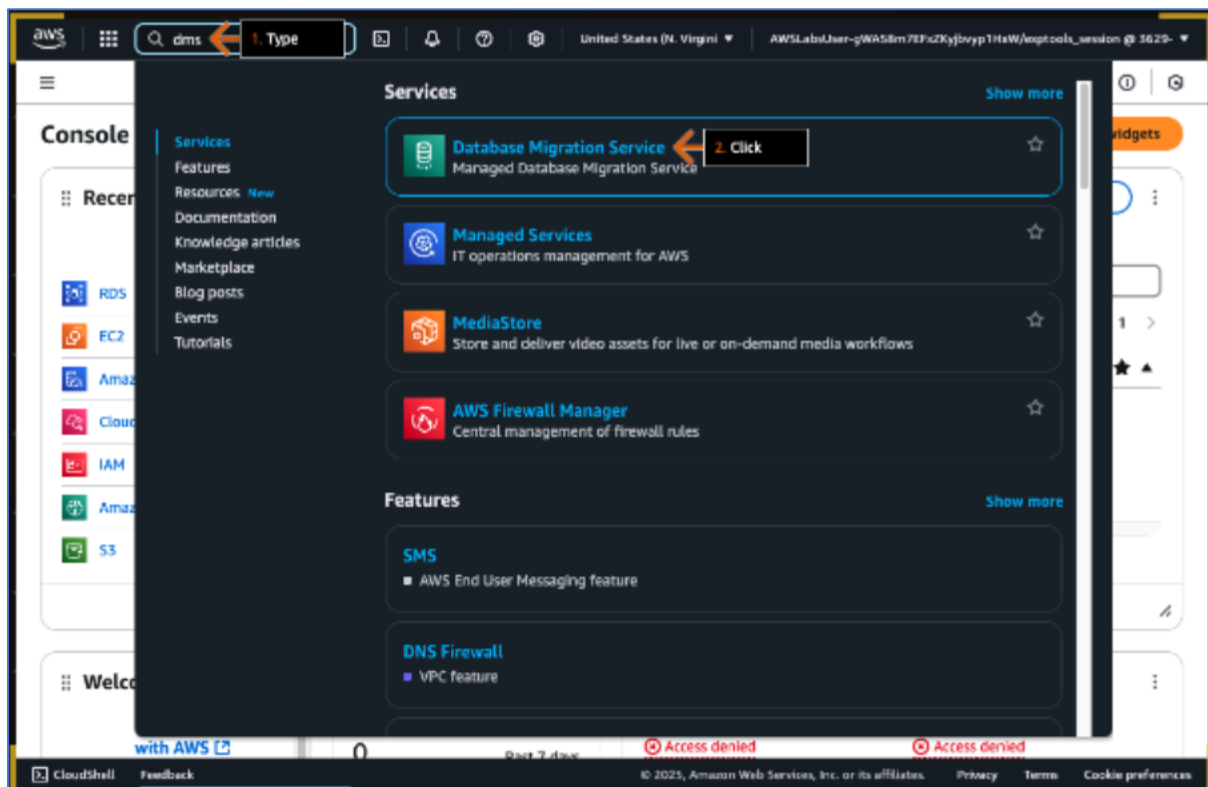


- In the Summary section, under DB identifier, review the identifier.
- Click Actions to expand the dropdown list.
- Review the different options.

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.



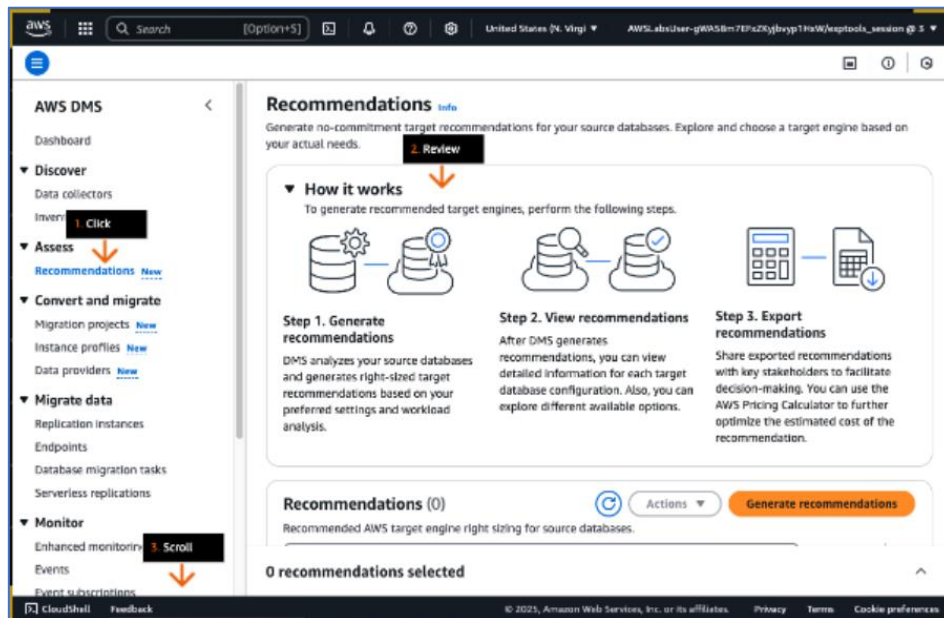
- In the top navigation bar search box, type: dms
- In the search results, under Services, click Database Migration Service.



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

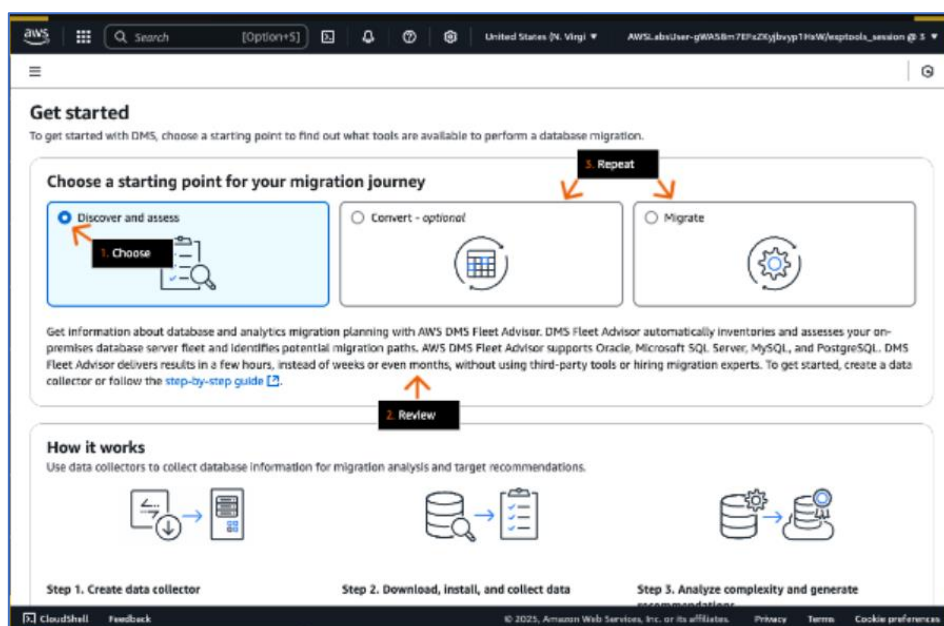
migrations, keeping source databases fully operational during the migration process to minimize application downtime.

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



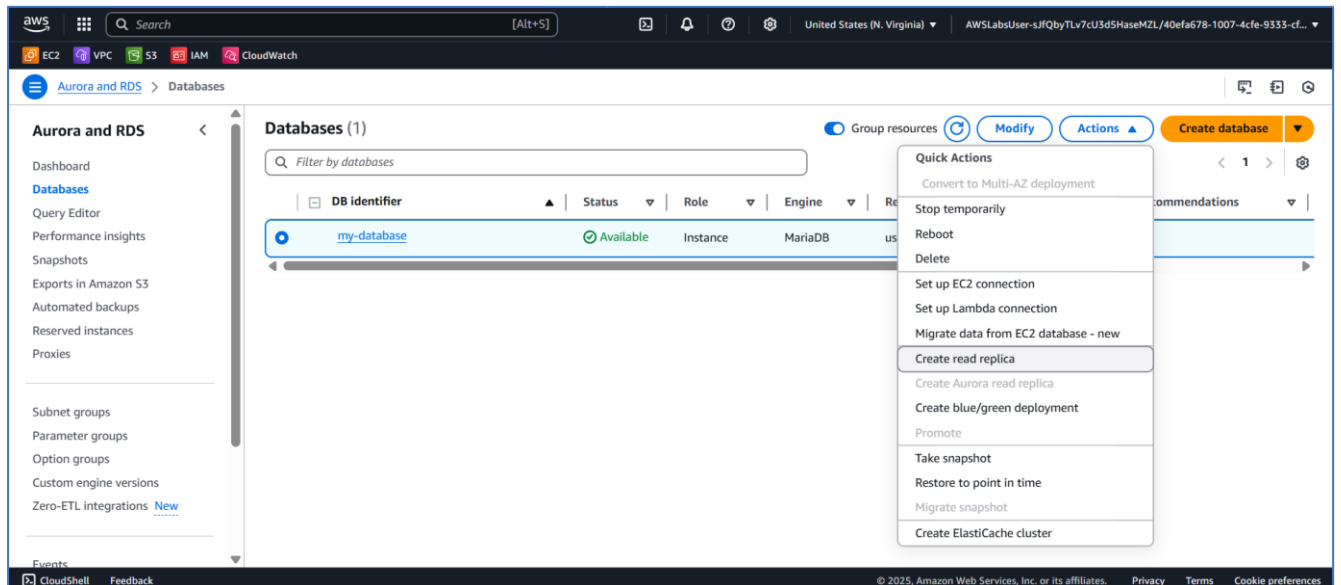
AWS DMS can handle migrations between data stores by using the same or different database engines. The service supports a wide range of database types, including relational databases, data warehouses, and NoSQL databases.

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

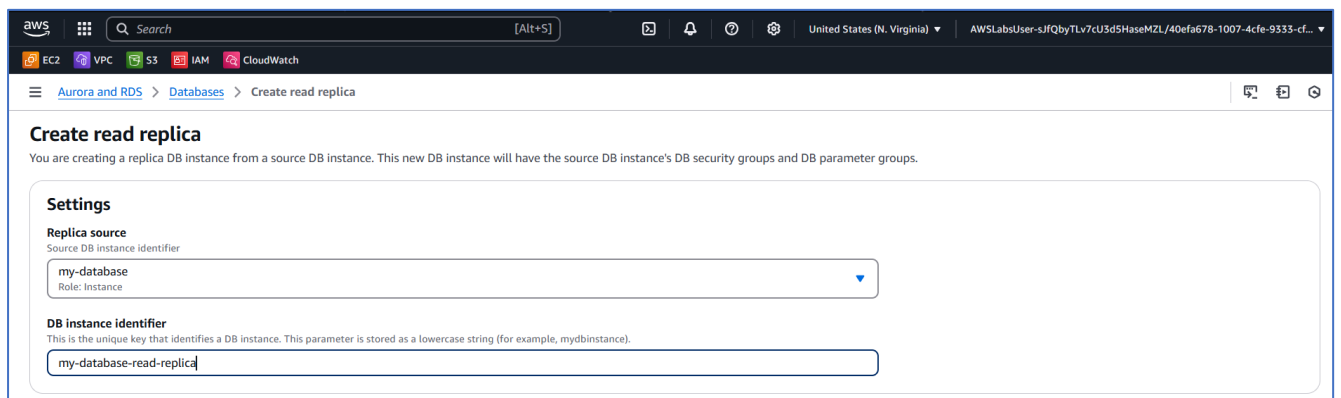


Creating a Read Replica for RDS Database:

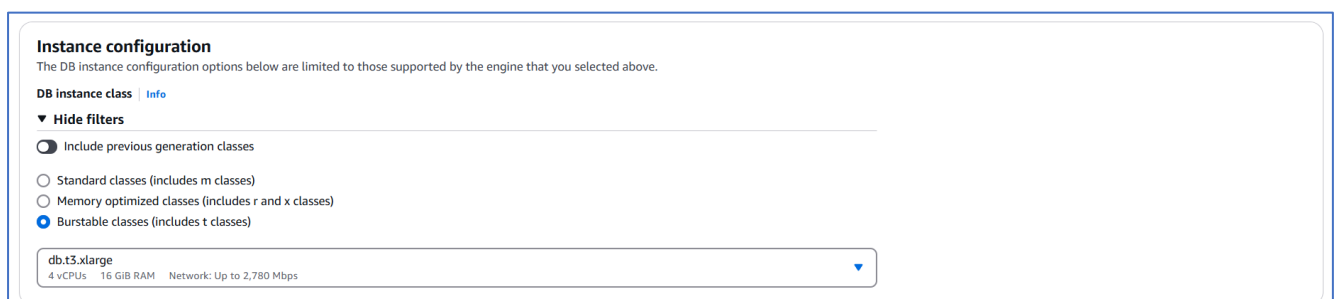
- In the AWS Management Console, search for and select the **RDS** service.
- From the RDS dashboard, click on **Databases** in the side menu.
- Locate and select your primary database (e.g., **my-database**) from the list.
- Click on the **Actions** dropdown menu and select **Create read replica**.



- 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.

AWS Region

Destination Region
The Region where the replica will be launched.

US East (N. Virginia) ▼

Storage

Storage type [Info](#)
Provisioned IOPS SSD (io2) storage volumes are now available.

General Purpose SSD (gp3)
Performance scales independently from storage ▼

Allocated storage [Info](#)

20 GiB

Minimum: 20 GiB. Maximum: 65,536 GiB

Provisioned IOPS [Info](#)

3000 IOPS

Baseline IOPS of 3,000 IOPS is included for allocated storage less than 400 GiB.

Storage throughput [Info](#)

125 MiBps

Baseline storage throughput of 125 MiBps is included for allocated storage less than 400 GiB.

Storage configuration upgrade [Info](#)

☐ Storage file system configuration upgrade
RDS recommends a storage file system configuration upgrade for your selected database instance.

[i](#) You are on the latest storage configuration.

▼ **Additional storage configuration**

Storage autoscaling [Info](#)
Provides dynamic scaling support for your database's storage based on your application's needs.

☒ Enable storage autoscaling
Enabling this feature will allow the storage to increase after the specified threshold is exceeded.

Maximum storage threshold [Info](#)
Charges will apply when your database autoscales to the specified threshold

1000 GiB

Availability & durability

Multi-AZ deployment [Info](#)
Specifies if the DB instance should have a standby deployed in another Availability Zone.

☐ Create a standby instance (recommended for production usage)
Creates a standby in a different Availability Zone (AZ) to provide data redundancy, eliminate I/O freezes, and minimize latency spikes during system backups.

☒ Do not create a standby instance

Connectivity

Network type [Info](#)
To use dual-stack mode, make sure that you associate an IPv6 CIDR block with a subnet in the VPC you specify.

☒ IPv4
Your resources can communicate only over the IPv4 addressing protocol.
 ☐ Dual-stack mode
Your resources can communicate over IPv4, IPv6, or both.

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-04451d9880216c92f ▼

Public access

☐ Publicly accessible
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.

☒ Not publicly accessible
No IP address is assigned to the DB instance. EC2 instances and devices outside the VPC can't connect.

Existing VPC security groups

Choose VPC security groups ▼

default ✕

Availability Zone [Info](#)
The EC2 Availability Zone that the database will be created in.

us-east-1a ▼

Certificate authority - optional [Info](#)
Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-rsa2048-g1 (default)
 Expiry: May 26, 2061 ▼

If you don't select a certificate authority, RDS chooses one for you.

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

Database authentication

Database authentication options [Info](#)

☒ Password authentication
Authenticates using database passwords.

☐ Password and IAM database authentication
Authenticates using the database password and user credentials through AWS IAM users and roles.

Tags - optional

A tag consists of a case-sensitive key-value pair.

No tags associated with the resource.

[Add new tag](#)

You can add up to 50 more tags.

Monitoring

Choose monitoring tools for this database. Database Insights provides a combined view of Performance Insights and Enhanced Monitoring for your fleet of databases. **Database Insights** pricing is separate from RDS monthly estimates. See [Amazon CloudWatch pricing](#).

☐ Database Insights - Advanced

- Retains 15 months of performance history
- Fleet-level monitoring
- Integration with CloudWatch Application Signals

☒ Database Insights - Standard

- Retains 7 days of performance history, with the option to pay for the retention of up to 24 months of performance history

Performance Insights

☐ Enable Performance Insights
With Performance Insights dashboard, you can visualize the database load on your Amazon RDS DB instance load and filter the load by waits, SQL statements, hosts, or users.

Additional monitoring settings
Enhanced Monitoring, CloudWatch Logs and DevOps Guru

Enhanced Monitoring

☐ Enable Enhanced monitoring
Enabling Enhanced Monitoring metrics are useful when you want to see how different processes or threads use the CPU.

Log exports
Select the log types to publish to Amazon CloudWatch Logs

☐ Audit log

☐ Error log

☐ General log

- 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.

Additional configuration

encryption turned on, backup, Performance Insights turned on, Enhanced Monitoring turned on, maintenance, CloudWatch Logs, delete protection turned off

Backup

Tags

☐ Copy tags to snapshots

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](#)

AWS KMS key [Info](#)

Enter a key ARN

Amazon Resource Name (ARN)

arn:aws:kms:us-east-1:183846708855:key/e8e0ab32-ec7-4c1a-9a6c-5849abec1d59

Example: arn:aws:kms:<region>:<accountID>:key/<key-id>

Account

183846708855

KMS key ID

e8e0ab32-ec7-4c1a-9a6c-5849abec1d59

Maintenance

Auto minor version upgrade [Info](#)

☒ Enable auto minor version upgrade
Enabling auto minor version upgrade will automatically upgrade your database minor version. For limitations and more details, see [Automatically upgrading the minor engine version documentation](#).

Deletion protection

☐ Enable deletion protection
Protects the database from being deleted accidentally. While this option is enabled, you can't delete the database.

[Cancel](#)
[Create read replica](#)

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.