

IT3061 – Massive Data Processing and Cloud Computing

Year 3, Semester 2

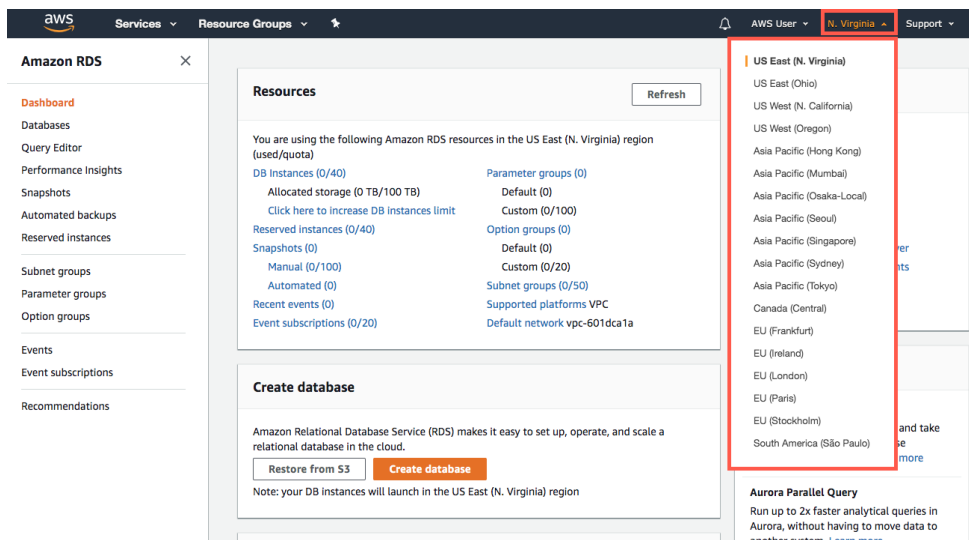
Practical Sheet 4

Database Services – Amazon Relational Database Service (RDS)

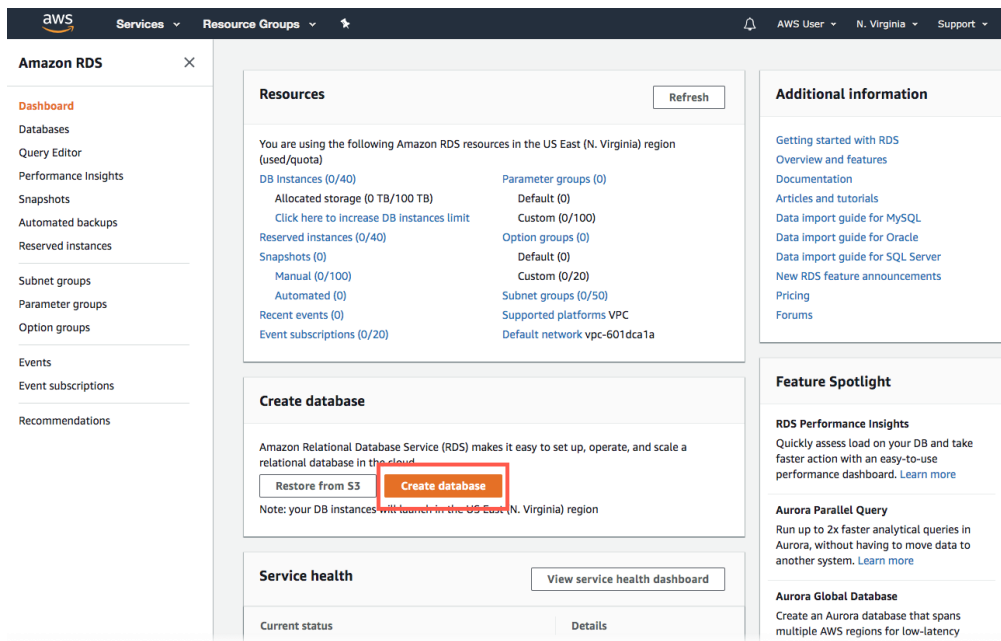
Create a MySQL DB instance

In this practical, we will use Amazon RDS to create a MySQL DB Instance with db.t2.micro DB instance class, 20 GB of storage, and automated backups enabled with a retention period of one day. As a reminder, all of this is free tier eligible.

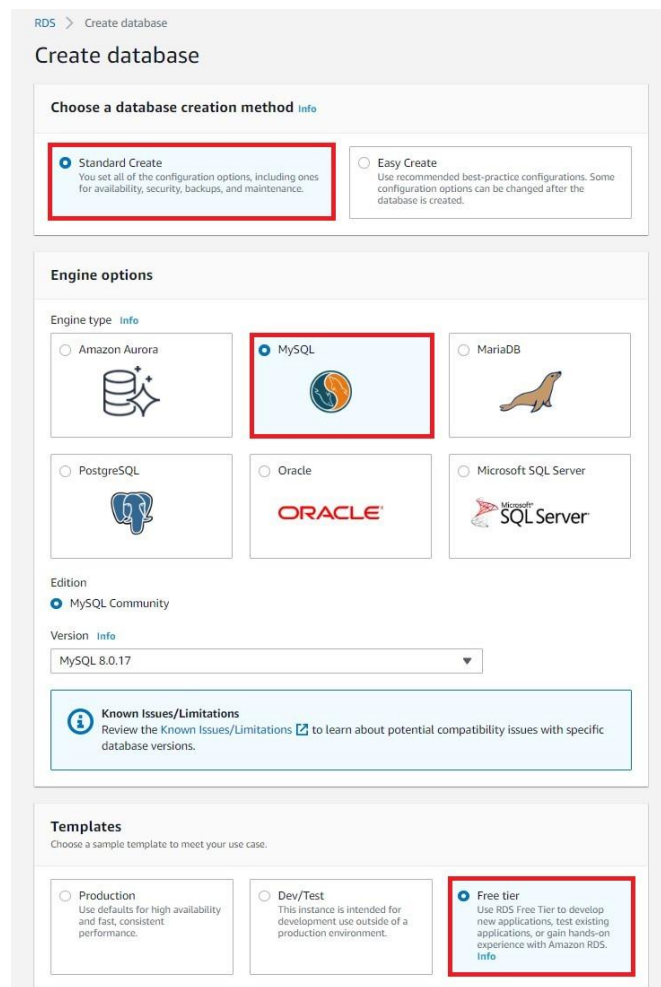
1. Open AWS Management Console and select **Amazon RDS** service.
2. In the top right corner of the Amazon RDS console, select the **Region** in which you want to create the DB instance.



3. In the **Create database** section, choose **Create database**.



4. You now have options to select your engine. For this practical, click the **MySQL** icon, leave the default value of edition and engine version, and select the **Free Tier** template.



5. You will now configure your DB instance. The list below shows the example settings you can use for this practical:

Settings:

✓ **DB instance identifier:**

Type a name for the DB instance that is unique for your account in the Region that you selected. For this practical, we will name it rds-mysql-test.

✓ **Master username:**

Type a username that you will use to log in to your DB instance. We will use masterUsername in this example.

✓ **Master password:**

Type a password that contains from 8 to 41 printable ASCII characters (excluding /, ", and @) for your master user password.

✓ **Confirm password:**

Retype your password

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.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens (1 to 15 for SQL Server). 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.

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), " (double quote) and @ (at sign).

Confirm password [Info](#)

DB instance size

DB instance class [Info](#)
Choose a DB instance class that meets your processing power and memory requirements. The DB instance class options below are limited to those supported by the engine you selected above.

- Standard classes (includes m classes)
- Memory Optimized classes (includes r and x classes)
- Burstable classes (includes t classes)**

1 vCPUs 1 GiB RAM Not EBS Optimized ▼

☒ **Include previous generation classes**

Instance specifications:

✓ ***DB instance class:***

Select *db.t2.micro* --- 1vCPU, 1 GiB RAM. This equates to 1 GB memory and 1 vCPU.

✓ ***Storage type:***

Select *General Purpose (SSD)*.

✓ ***Allocated storage:***

Select the default of 20 to allocate 20 GB of storage for your database.

You can scale up to a maximum of 64 TB with Amazon RDS for MySQL.

✓ ***Enable storage autoscaling:***

If your workload is cyclical or unpredictable, you would enable storage autoscaling to enable RDS to automatically scale up your storage when needed. This option does not apply to this practical.

✓ ***Multi-AZ deployment:***

Note that you will have to pay for Multi-AZ deployment. Using a Multi-AZ deployment will automatically provision and maintain a synchronous standby replica in a different Availability Zone.

The screenshot displays the 'Storage' and 'Availability & durability' sections of the Amazon RDS console. In the 'Storage' section, the 'Storage type' dropdown is set to 'General Purpose (SSD)', and the 'Allocated storage' is set to '20' GiB. Below this, the 'Storage autoscaling' section shows an unchecked checkbox for 'Enable storage autoscaling'. In the 'Availability & durability' section, the 'Multi-AZ deployment' section shows two radio button options: 'Create a standby instance (recommended for production usage)' and 'Do not create a standby instance'. The first option is selected.

Storage

Storage type [Info](#)

General Purpose (SSD)

Allocated storage

20 GiB

(Minimum: 20 GiB, Maximum: 16384 GiB) Higher allocated storage [may improve](#) IOPS performance.

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 once the specified threshold is exceeded.

Availability & durability

Multi-AZ deployment [Info](#)

☒ 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

6. You are now on the Connectivity section where you can provide information that RDS needs to launch your MySQL DB instance. The list below shows settings for our example DB instance.

Connectivity

- **Virtual Private Cloud (VPC):**
Select **Default VPC**.

Additional connectivity configurations

- **Subnet group:**
Choose the **default** subnet group.
- **Public accessibility:**
Choose **Yes**. This will allocate an IP address for your database instance so that you can directly connect to the database from your own device.
- **VPC security groups:**
Select **Create new VPC security group**. This will create a security group that will allow connection from the IP address of the device that you are currently using to the database created.
- **Availability zone:**
Choose **No preference**.
- **Port:**
Leave the default value of 3306.

The screenshot shows the 'Connectivity' configuration page in the AWS Management Console. The 'Virtual private cloud (VPC)' is set to 'Default VPC (vpc-0265bc69)'. A warning box states: 'After a database is created, you can't change the VPC selection.' Under 'Additional connectivity configuration', the 'Subnet group' is 'default-vpc-0265bc69'. The 'Publicly accessible' option is set to 'Yes' (highlighted with a red box). The 'VPC security group' section shows 'Create new' selected (also highlighted with a red box), with the 'New VPC security group name' field empty. The 'Availability Zone' is 'No preference' and the 'Database port' is '3306'.

Connectivity

Virtual private cloud (VPC) [Info](#)
VPC that defines the virtual networking environment for this DB instance.

Default VPC (vpc-0265bc69)

Only VPCs with a corresponding DB subnet group are listed.

After a database is created, you can't change the VPC selection.

Additional connectivity configuration

Subnet group [Info](#)
DB subnet group that defines which subnets and IP ranges the DB instance can use in the VPC you selected.

default-vpc-0265bc69

Publicly accessible [Info](#)

☒ Yes
Amazon EC2 instances and devices outside the VPC can connect to your database. Choose one or more VPC security groups that specify which EC2 instances and devices inside the VPC can connect to the database.

☐ No
RDS will not assign a public IP address to the database. Only Amazon EC2 instances and devices inside the VPC can connect to your database.

VPC security group
Choose one or more RDS security groups to allow access to your database. Ensure that the security group rules allow incoming traffic from EC2 instances and devices outside your VPC. (Security groups are required for publicly accessible databases.)

☐ Choose existing
Choose existing VPC security groups

☒ Create new
Create new VPC security group

New VPC security group name
Enter VPC security group name

Availability Zone [Info](#)
No preference

Database port [Info](#)
TCP/IP port that the database will use for application connections.

3306

In the Additional configurations section:

Database options

- ***Database name:***
Type a database name that is 1 to 64 alpha-numeric characters. If you do not provide a name, Amazon RDS will not automatically create a database on the DB instance you are creating.
- ***DB parameter group:***
Leave the default value.
- ***Option group:***
Leave the default value. Amazon RDS uses option groups to enable and configure additional features.

Encryption

This option is not available in the Free Tier.

Backup

- Backup retention period:
You can choose the number of days to retain the backup you take. For this practical, set this value to ***1 day***.
- Backup window:
Use the default of ***No preference***.

Monitoring

- Enhanced Monitoring:
Select ***Disable enhanced monitoring*** to stay within the free tier. Enabling enhanced monitoring will give you metrics in real time for the operating system (OS) that your DB instance runs on.

▼ **Additional configuration**
Database options, backup enabled, backtrack disabled, Enhanced Monitoring disabled, maintenance, CloudWatch Logs, delete protection disabled

Database options

Initial database name [Info](#)
dbname
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](#)
defaultmysql-8-0 ▼

Backup
Creates a point in time snapshot of your database

☒ **Enable automatic backups**
Enabling backups will automatically create backups of your database during a certain time window.

⚠ Please note that automated backups are currently supported for InnoDB storage engine only. If you are using MyISAM, refer to details [here](#).

Backup retention period [Info](#)
Choose the number of days that RDS should retain automatic backups for this instance.
1 day ▼

Backup window [Info](#)
Select the period you want automated backups of the database to be created by Amazon RDS.

☐ Select window
☒ No preference

☒ Copy tags to snapshots

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

☐ Error log
☐ General log
☐ Slow query log

IAM role
The following service-linked role is used for publishing logs to CloudWatch Logs.
RDS Service Linked Role

ⓘ Ensure that General, Slow Query, and Audit Logs are turned on. Error logs are enabled by default. [Learn more](#)

Maintenance

- **Auto minor version upgrade:**
Select **Enable auto minor version upgrade** to receive automatic updates when they become available.
- **Maintenance Window:**
Select **No preference**.

Deletion protection

Clear **Enable deletion** protection for this practical. When this option is enabled, you're prevented from accidentally deleting the database.

Click **Create Database**.

Maintenance

Auto minor version upgrade [Info](#)

☒ **Enable auto minor version upgrade**
 Enabling auto minor version upgrade will automatically upgrade to new minor versions as they are released. The automatic upgrades occur during the maintenance window for the database.

Maintenance window [Info](#)
 Select the period you want pending modifications or maintenance applied to the database by Amazon RDS.

☐ Select window

☒ No preference

Deletion protection

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

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 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](#).

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

7. Your DB Instance is now being created. Click ***View Your DB Instances.***

RDS > Create database

Your DB instance is being created.
 Note: Your instance may take a few minutes to launch.

Connecting to your DB instance

Once Amazon RDS finishes provisioning your DB instance, you can use a SQL client application or utility to connect to the instance.
[Learn about connecting to your DB instance](#)

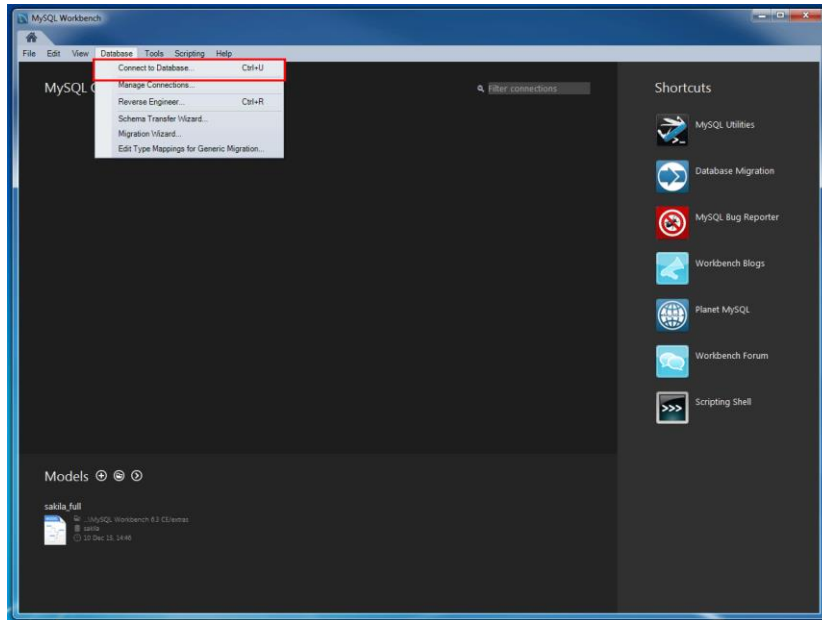
All DB instances

View DB instance details

The new DB instance appears in the list of DB instances on the RDS console. The DB instance will have a status of creating until the DB instance is created and ready for use. When the state changes to available, you can connect to a database on the DB instance.

Connect to the MySQL Database using a SQL Client

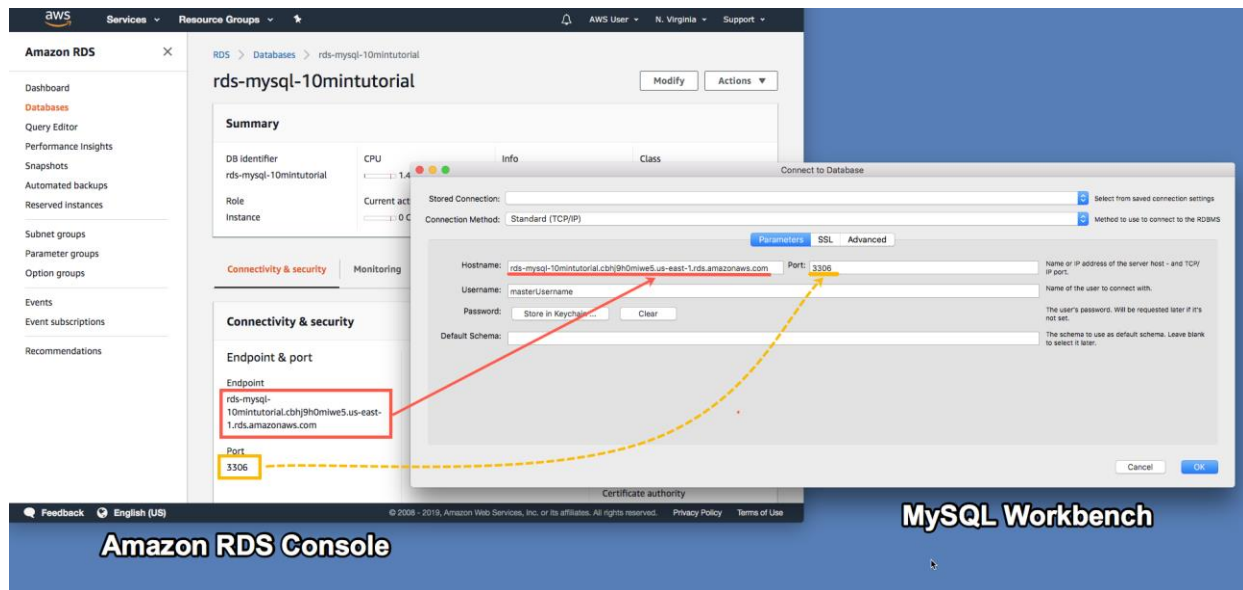
1. In this step, we will connect to the database you created using MySQL Workbench.
2. Launch the MySQL Workbench application and go to Database > Connect to Database (Ctrl+U) from the menu bar.



3. A dialog box appears. Enter the following:

- **Hostname:**
You can find your hostname on the Amazon RDS console.
- **Port:**
The default value should be 3306.
- **Username:**
Type in the username you created for the Amazon RDS database.
- **Password:**
Click *Store in Vault* (or *Store in Keychain* on macOS) and enter the password that you used when creating the Amazon RDS database.

Click OK.



4. You are now connected to the database! On the MySQL Workbench, you will see various schema objects available in the database. Now you can start creating tables, insert data, and run queries.

