



## **Immersion Day**

*Getting Started with Amazon RDS*

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**January 2019**

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## Overview

Amazon RDS is a web service that makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, freeing you up to focus on your applications and business.



This lab has a prerequisite of *Immersion Day – Getting Started with EC2* in order to complete. This part of the lab will demonstrate configuring a previously created web server in the *Immersion Day – Getting Started with EC2* lab to use RDS for its Relational Database Management System (RDBMS) needs.

## Add a VPC Instance Security Group

**Prerequisite:** Immersion Day – Getting Started with EC2

The RDS servers have the same security model as Amazon EC2 overall: trust nothing. A common use of an RDS instance in a VPC is to share data with an application server running in an EC2 instance in the same VPC and that is accessed by a client application outside the VPC. To this end, we'll need to utilize a VPC security group to allow this access.

If you've already completed the instructions in the "Immersion Day – Getting Started with EC2" lab manual, you'll have an existing EC2 instance with an existing security group. The name of the security group will be "[Initials] – Immersion Day Web Tier." Let's create a new VPC security group for our database tier that only allows traffic from our web tier.

1. Sign into the AWS Management Console and open the Amazon VPC service at <https://console.aws.amazon.com/vpc>. **\*\* Important!** Make sure that the region shown in the upper-right of the console, is the same region where you created the EC2 instance in the first lab \*\*
2. In the left-hand side menu, click on **Security Groups** under the Security heading and then click **Create Security Group**
3. For **Security Group Name** enter "[Initials] – Immersion Day DB Tier" and then enter a short **Description**
4. For VPC, set this to the same VPC you used when you created the EC2 instance. If you're unsure what this was, go to <https://console.aws.amazon.com/ec2>, select your instance, and under the **Description** details in the lower-half of the screen take note of the VPC ID (on the right-hand side after Public and Private IP and DNS information)

[Security Groups](#) > Create security group

### Create security group

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group fill in the fields below.

Security group name*	<input type="text" value="GE - Immersion Day DB Tier"/>	
Description*	<input type="text" value="Immersion Day DB Tier"/>	
VPC	<input type="text" value="vpc-552e893c"/>	

\* Required

[Cancel](#) [Create](#)

5. Click **Create**
6. After your VPC Security Group is created, click **Close**
7. Find the Security Group you just created in the list of security groups and select it
8. In the lower-half of the window, click on **Inbound Rules** and then **Edit Rules**
9. Click **Add Rule**
10. For **Type**, select **MySQL/Aurora** from the drop-down list which will select TCP as the protocol and set the port to 3306
11. Under **Source**, to the right of the box set to Custom, type “sg” which should display a selectable list of your security groups. Select the security group you used for the EC2 instance – “[Initials] – Immersion Day Web Tier”
12. In the Description box, type something like “Allow MySQL connections from the Web Tier SG”
13. Click **Save rules** and then click **Close**

[Security Groups](#) > Edit inbound rules

## Edit inbound rules

Inbound rules control the incoming traffic that's allowed to reach the instance.

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	Description ⓘ
MYSQL/... ▼	TCP	3306	Custom ▼ sg-0bcf1eb7085306912	:tions from the Web Tier SG

**Add Rule**

Allow MySQL connections from the Web Tier SG

NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.

\* Required

[Cancel](#) [Save rules](#)

## Launch an RDS Instance

Now that our VPC security group is ready, let's configure and launch a MySQL RDS Instance.

1. Sign into the AWS Management Console and open the Amazon RDS console at <https://console.aws.amazon.com/rds>.
2. Click on **Create database** or **Get Started Now**

The screenshot shows the Amazon RDS console interface. On the left is a navigation sidebar with the title 'Amazon RDS' and a close button. The sidebar lists several menu items: 'Dashboard' (highlighted in orange), 'Databases', 'Performance Insights', 'Snapshots', 'Automated backups', 'Reserved instances', 'Subnet groups', 'Parameter groups', 'Option groups', 'Events', 'Event subscriptions', and 'Recommendations' (which has a badge with the number '2'). The main content area is titled 'Resources' and includes a 'Refresh' button. It contains a summary of resources in the 'US East (Ohio)' region, including links for DB Instances (1/40), Parameter groups (4), Option groups (3), Subnet groups (1/50), and others. Below this is a 'Create database' section with a descriptive paragraph about Amazon RDS and two buttons: 'Restore from S3' and 'Create database'. The 'Create database' button is highlighted with a red rectangular border. A note at the bottom states: 'Note: your DB instances will launch in the US East (Ohio) region'.

**Amazon RDS** ×

**Resources** Refresh

You are using the following Amazon RDS resources in the US East (Ohio) region (used/quota)

<a href="#">DB Instances (1/40)</a>	<a href="#">Parameter groups (4)</a>
Allocated storage (30.00 GB/100.00 TB)	Default (4)
<a href="#">Click here to increase DB instances limit</a>	Custom (0/100)
<a href="#">Reserved instances (0/40)</a>	<a href="#">Option groups (3)</a>
<a href="#">Snapshots (44)</a>	Default (3)
<a href="#">Manual (1/100)</a>	Custom (0/20)
<a href="#">Automated (0)</a>	<a href="#">Subnet groups (1/50)</a>
<a href="#">Recent events (10)</a>	<a href="#">Supported platforms</a> VPC
<a href="#">Event subscriptions (0/20)</a>	<a href="#">Default network</a> vpc-552e893c

**Create database**

Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale a relational database in the cloud.







[Restore from S3](#) [Create database](#)

Note: your DB instances will launch in the US East (Ohio) region

- We will be using a MySQL database, so choose MySQL from the available engines.

## Select engine

### Engine options

<input type="radio"/> Amazon Aurora 	<input checked="" type="radio"/> MySQL 	<input type="radio"/> MariaDB 
<input type="radio"/> PostgreSQL 	<input type="radio"/> Oracle 	<input type="radio"/> Microsoft SQL Server 

- At the bottom of the page, check **Only enable options eligible for RDS Free Usage Tier**, and then click **Next**. (Note: this is not recommended for production databases, as this option will disable options such as Multi-AZ deployments or read replicas, but it is OK for the purposes of this lab.)

☒ Only enable options eligible for RDS Free Usage Tier [Info](#)


- Fill out the DB Instance details with the following information and click **Next**:

- DB Engine Version: Select version "5.7.x" (select the latest available 5.7 release)
- DB Instance Class: db.t2.micro
- Allocated Storage: 20 GB
- DB Instance Identifier: awssdb
- Master Username: awssuser
- Master Password: awsspassword


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DB engine version [Info](#)

MySQL 5.7.22 ▼

 **Known Issues/Limitations**

Review the [Known Issues/Limitations](#) to learn about potential compatibility issues with specific database versions.

 **Free tier**

The Amazon RDS Free Tier provides a single db.t2.micro instance as well as up to 20 GiB of storage, allowing new AWS customers to gain hands-on experience with Amazon RDS. Learn more about the RDS Free Tier and the instance restrictions [here](#).

☒ Only enable options eligible for RDS Free Usage Tier [Info](#)

DB instance class [Info](#)

db.t2.micro — 1 vCPU, 1 GiB RAM ▼

Multi-AZ deployment [Info](#)

☐ Create replica in different zone  
Creates a replica in a different Availability Zone (AZ) to provide data redundancy, eliminate I/O freezes, and minimize latency spikes during system backups.

☒ No

Storage type [Info](#)

General Purpose (SSD) ▼

Allocated storage

20

GiB

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



## Getting Started with Amazon RDS

### Settings

**DB instance identifier** [Info](#)

Specify a name that is unique for all DB instances owned by your AWS account in the current region.

DB instance identifier is case insensitive, but stored as all lower-case, as in "myddbinstance". Must contain from 1 to 63 alphanumeric characters or hyphens (1 to 15 for SQL Server). First character must be a letter. Cannot end with a hyphen or contain two consecutive hyphens.

**Master username** [Info](#)

Specify an alphanumeric string that defines the login ID for the master user.

Master Username must start with a letter. Must contain 1 to 16 alphanumeric characters.

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

Master Password must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".

**Confirm password** [Info](#)

6. In **Configure Advanced Settings**, fill out *Network & Security* with the following information:

- VPC: Default VPC
- Subnet Group: default
- Public Accessibility: No
- Availability Zone: No Preference
- VPC Security Group(s): Select *Choose existing VPC security groups*, then pick [Initials] – Immersion Day DB Tier

### Network & Security

**Virtual Private Cloud (VPC)** [Info](#)

VPC defines the virtual networking environment for this DB instance.

Default VPC (vpc-0eb99f75)

Only VPCs with a corresponding DB subnet group are listed.

**Subnet group** [Info](#)

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

default

**Public accessibility** [Info](#)

☐ Yes

EC2 instances and devices outside of the VPC hosting the DB instance will connect to the DB instances. You must also select one or more VPC security groups that specify which EC2 instances and devices can connect to the DB instance.

☒ No

DB instance will not have a public IP address assigned. No EC2 instance or devices outside of the VPC will be able to connect.

**Availability zone** [Info](#)

No preference

**VPC security groups**

Security groups have rules authorizing connections from all the EC2 instances and devices that need to access the DB instance.

☐ Create new VPC security group

☒ Choose existing VPC security groups

Choose VPC security groups

ABC - immersion Day DB Tier

- Under *Database Options*, enter a DB name called “*immersionday*” and accept the defaults for *database port*, *parameter group*, *option group* and *IAM DB authentication*. Leave the default options for the rest of the configuration groups (*Encryption*, *Backup*, *Monitoring*, *Log exports* and *Maintenance*).

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**Database options**

Database name

immersionday

Note: If no database name is specified then no initial MySQL database will be created on the DB instance.

Database port

TCP/IP port the DB instance will use for application connections.

3306

DB parameter group [Info](#)

default.mysql5.7

Option group [Info](#)

default:mysql-5-7

IAM DB authentication [Info](#)

☐ Enable IAM DB authentication

Manage your database user credentials through AWS IAM users and roles.

☒ Disable

- Review your settings and click **Create database**.
- Click **View DB Instance Details**
- In the RDS Dashboard, monitor your new DB instance until the status changes from “creating” to “backing up” to “available”.



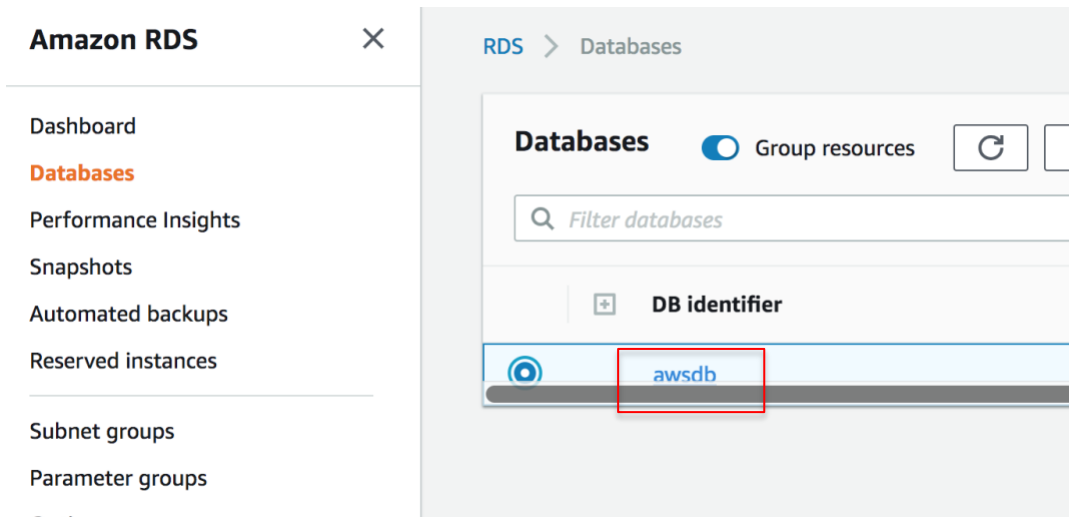
*Note: This may take up to 5 minutes as the database is being created and backed up.*

## Configure Web Server to Leverage RDS

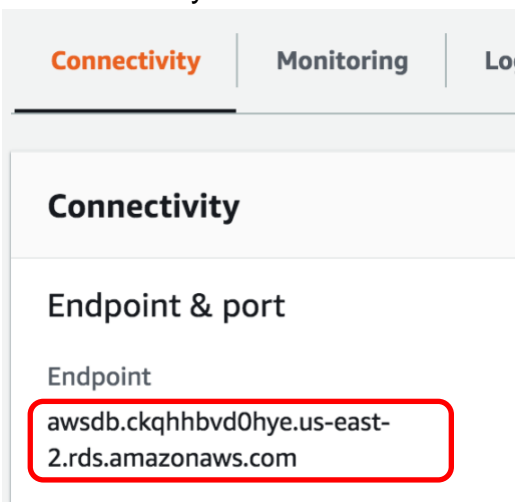
Prerequisite: Immersion Day – Getting Started with EC2

We provided an example database table and sample code for creating a simple address book. Before configuring your instance, you will need to get the URL for your database endpoint.

1. In the RDS console, click on **Databases** and then click on the name of the database (awsdb) to bring up the database information



2. Scroll down to the **Connectivity** section and check the value under *Endpoint*. Take note of this because you will need it in the next step.



3. Navigate to the browser tab connected to web application you launched previously in the *Immersion Day – Getting Started with EC2* lab (or open a new tab and reconnect to your web server's URL). If you need to find the webserver DNS name look at your instance details in the EC2 console at <https://console.aws.amazon.com/ec2>.
4. Once you browse to the web application page in your browser, click on **RDS**. You should see a prompt to enter the DB endpoint (do not include :3306 at the end of the DB endpoint), database (*immersionday*), username (*awsuser*), and password (*awspassword*). Complete the form and then click the **Submit** button.



amazon web services

LOAD TEST RDS

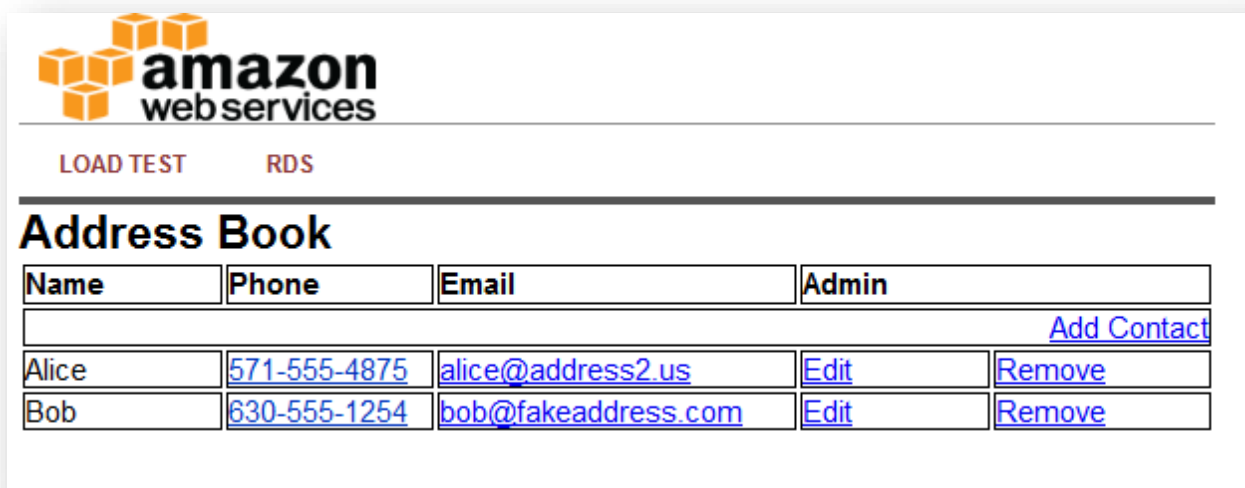
Endpoint:

Database:

Username:

Password:

5. When complete, you will be redirected to a simple page displaying all of the information from the database you just created.



amazon web services

LOAD TEST RDS

### Address Book

Name	Phone	Email	Admin
Alice	<a href="tel:571-555-4875">571-555-4875</a>	<a href="mailto:alice@address2.us">alice@address2.us</a>	<a href="#">Edit</a>
Bob	<a href="tel:630-555-1254">630-555-1254</a>	<a href="mailto:bob@fakeaddress.com">bob@fakeaddress.com</a>	<a href="#">Edit</a>

[Add Contact](#) [Remove](#)

This is a very basic example of a simple address book interacting with a MySQL database managed by AWS. RDS can support much more complicated relational database scenarios, but we hope this simple example will suffice to demonstrate the point.

Feel free to play around with the address book and add/edit/remove content from your RDS database by using the **Add Contact**, **Edit**, and **Remove** links in the Address Book.

Great Job: You have successfully deployed and utilized an AWS managed MySQL database!!!

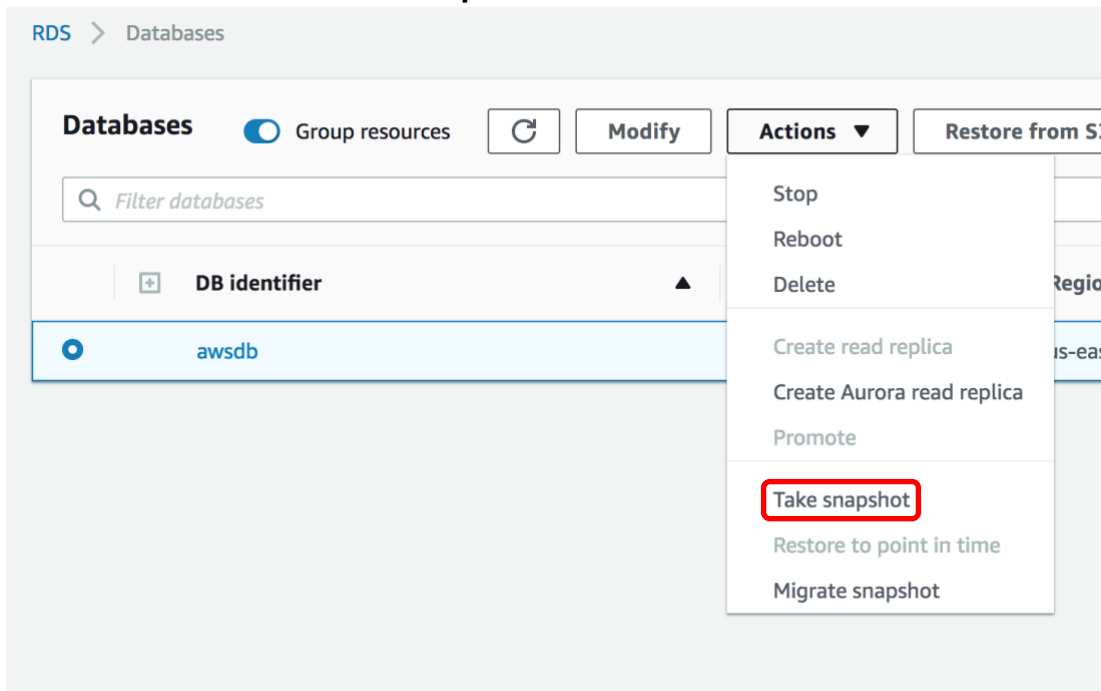
If you have time, continue with the optional exercises in the appendix.

## Appendix – Additional RDS Features

### Create an RDS Snapshot

Now is a good time to take a snapshot of your RDS database. Taking a snapshot enables you to back up your DB Instance in a known state as frequently as you wish, and then restore to that specific state at any time.

In the RDS section of the of the AWS management console, select your RDS database, click on **Actions** and select **Take snapshot**:



The next screen will ask you for a name. Enter **mysnapshot** and click **Take snapshot**.

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**Settings**  
To take a snapshot of this DB instance you must provide a name for the snapshot.

**DB instance**  
The unique key that identifies a DB instance. This parameter isn't case-sensitive.  
awsdb

**Snapshot name**  
The Identifier for the DB Snapshot.

Cancel **Take Snapshot**

**Note:** Using single-instance RDS results in brief I/O suspension on the database that can last from a few seconds to a few minutes, depending on the size and class of your DB instance. Multi-AZ DB instances are not affected by this I/O suspension since the backup is taken on the standby. Of course, our example database is so small that the I/O suspension is most likely not even noticeable.

DB snapshots show up under the **Snapshots** link on the left side of the screen. Notice that you can easily launch new RDS instances from any previous snapshot!

**Amazon RDS** X

Dashboard  
Databases  
Performance Insights  
**Snapshots**  
Automated backups  
Reserved instances

RDS > Snapshots

**Snapshots (1)**

Owned by Me

Actions

Take

<input checked="" type="checkbox"/>	Snapshot	DB instance or cluster
<input checked="" type="checkbox"/>	mysnapshot	awsdb

Restore Snapshot

Copy Snapshot

Share Snapshot

Migrate snapshot

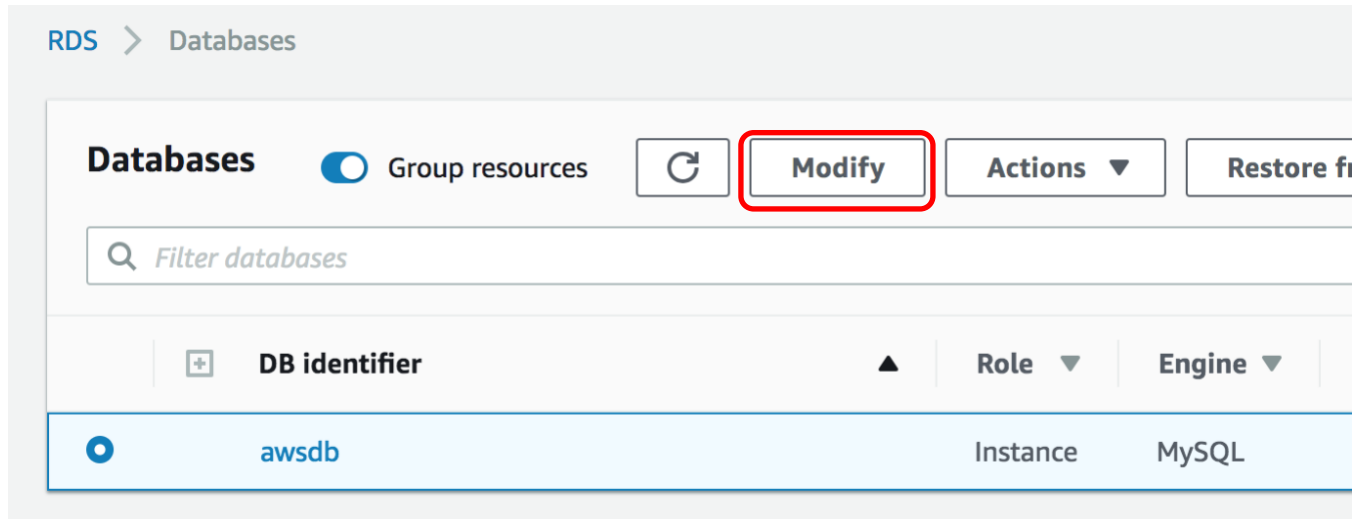
Delete Snapshot



### Modify RDS Instance Size

Scaling up and down with RDS is simple. You can grow the database or change the underlying server size, etc. – all from the AWS Console.

Select your RDS DB database, and then click **Modify**.



Try changing to a different instance size (by changing the *DB Instance Class*), and if you want, also grow the database at the same time (by changing *Allocated Storage*). Scroll down to the bottom of the page, reviewing the other modifications that you can make, and then click **Continue**.

In the next screen, select the option to “**Apply Immediately**” – otherwise changes will be queued for the next maintenance window. Then click **Modify DB Instance**.



**Tip:** You can change instance sizes up or down at any time. However, you cannot shrink a database once you grow it.

In most cases, scaling storage doesn't require any outage and doesn't degrade performance of the server. For changing the instance type, there will be a short outage. If you have Multi-AZ configured, the standby instance will be modified first, RDS will then failover to the standby, and the primary instance will then be modified, reducing the time of the outage to the time that it takes to failover to the standby.

# Modify DB Instance: awsdb

## Instance specifications

### DB engine version

Version number of the database engine to be used for this instance.

MySQL 5.7.23 ▼

### DB instance class

Contains the compute and memory capacity of the DB instance.

db.t2.small — 1 vCPU, 2 GiB RAM ▼

db.t2.micro — 1 vCPU, 1 GiB RAM

db.t2.small — 1 vCPU, 2 GiB RAM

db.t2.medium — 2 vCPU, 4 GiB RAM

db.t2.large — 2 vCPU, 8 GiB RAM

db.t2.xlarge — 4 vCPU, 16 GiB RAM

### Multi-AZ deployment

Specifies if the DB instance should have a standby deployed in another availability zone.

☐ Yes

☒ No

### Storage type

General Purpose (SSD) ▼

### Allocated storage

30

GiB

This instance supports multiple storage ranges between 20 and 16384 GiB. [See all](#)

### Scheduling of modifications

When to apply modifications

☐ Apply during the next scheduled maintenance window

Current maintenance window: sun:09:58-sun:10:28

☒ Apply immediately

The modifications in this request and any pending modifications will be asynchronously applied as soon as possible, regardless of the maintenance window setting for this database instance.



#### Potential unexpected downtime

If you choose to apply changes immediately, please note that any changes in the pending modifications queue are also applied. If any of the pending modifications require downtime, choosing this option can cause