

# AWS PROJECT 2

## Deploying Amazon RDS Multi A-Z and read Replica, Stimulate Failover

### Step-1: Create EC2 Instance

The screenshot shows the 'Step 3: Configure Instance Details' page of the AWS Launch Instance Wizard. The page is divided into several sections:

- Elastic Inference:** A checkbox labeled 'Add an Elastic Inference accelerator' is unchecked. Below it, a link says 'Additional charges apply.'
- Credit specification:** A dropdown menu is set to 'Unlimited'. Below it, a link says 'Additional charges may apply.'
- File systems:** Two buttons are present: 'Add file system' and 'Create new file system'.
- Advanced Details:** This section is expanded and contains several options:
  - Enclave:** A checkbox labeled 'Enable' is unchecked.
  - Metadata accessible:** A dropdown menu is set to 'Enabled'.
  - Metadata version:** A dropdown menu is set to 'V1 and V2 (token optional)'.
  - Metadata token response hop limit:** A dropdown menu is set to '1'.
  - User data:** A radio button labeled 'As text' is selected. Below it, a text area contains the following code:

```
#!/bin/bash -ex
yum install mysql -y
```

At the bottom right of the page, there are four buttons: 'Cancel', 'Previous', 'Review and Launch' (highlighted in blue), and 'Next: Add Storage'.

The screenshot shows the AWS EC2 Management Console. On the left is a navigation sidebar with options like 'EC2 Dashboard', 'Events', 'Tags', 'Limits', 'Instances', 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances', 'Dedicated Hosts', 'Scheduled Instances', 'Capacity Reservations', 'Images', 'AMIs', and 'Elastic Block Store'. The main area is titled 'Instances (1)' and contains a table with the following data:

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
<input type="checkbox"/>	MyRdsEC2Se...	i-046d9f67cc3859ca1	Running	t2.micro	2/2 checks ...	No alarms +	us-east-1c	ec2-34-207-147...

Below the table, there is a message that says 'Select an instance above'.

The screenshot shows the AWS Management Console interface. The left sidebar contains navigation options like 'EC2 Dashboard', 'Events', 'Tags', 'Limits', 'Instances', 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances', 'Dedicated Hosts', 'Scheduled Instances', 'Capacity Reservations', 'Images', 'AMIs', 'Elastic Block Store', and 'Volumes'. The main content area displays the 'Instances (1/1)' page. A table lists the instance 'MyRdsEC2Server' with ID 'i-046d9f67cc3859ca1', state 'Running', type 't2.micro', and '2/2 checks passed'. Below the table, the 'Details' tab for instance 'i-046d9f67cc3859ca1 (MyRdsEC2Server)' is active, showing summary information: Instance ID, Instance state (Running), Instance type (t2.micro), Public IPv4 address (34.207.147.234), Public IPv4 DNS (ec2-34-207-147-234.compute-1.amazonaws.com), Private IPv4 addresses (172.31.25.25), Private IPv4 DNS (ip-172-31-25-25.ec2.internal), and VPC ID (vpc-5c1ada21).

## Step-2: Create Security group for EC2 Instances

The screenshot shows the AWS Management Console interface for the 'Security Groups' page. The left sidebar contains navigation options like 'AMIs', 'Elastic Block Store', 'Volumes', 'Snapshots', 'Lifecycle Manager', 'Network & Security', 'Security Groups', 'Elastic IPs', 'Placement Groups', 'Key Pairs', 'Network Interfaces', 'Load Balancing', 'Load Balancers', 'Target Groups', 'Auto Scaling', 'Launch Configurations', and 'Auto Scaling Groups'. The main content area displays the 'sg-0e29e11d6cfe6ccfd - MyEC2Server-sg' page. The 'Details' tab is active, showing summary information: Security group name (MyEC2Server-sg), Security group ID (sg-0e29e11d6cfe6ccfd), Description (Security for ec2 server to connect with RDS), VPC ID (vpc-5c1ada21), Owner (255576724072), Inbound rules count (2 Permission entries), and Outbound rules count (1 Permission entry). Below the details, the 'Inbound rules' tab is active, showing a table with two rules for SSH access on port 22.

Type	Protocol	Port range	Source	Description - optional
SSH	TCP	22	0.0.0.0/0	-
SSH	TCP	22	::/0	-

## Step-3: Create Security group for RDS Instances

The screenshot shows the 'Create security group' page in the AWS Management Console. The page title is 'Create security group' with an 'info' link. Below the title, a note states: 'A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.'

The 'Basic details' section contains three fields:

- Security group name:** 'rds-maz-SG'. A note below indicates 'Name cannot be edited after creation.'
- Description:** 'Security group for RDS Aurora'.
- VPC:** 'vpc-5c1ada21'.

The 'Inbound rules' section shows a table with one rule:

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	Custom 0.0.0.0/0	

At the bottom of the console window, the taskbar shows the Windows Start menu, search bar, and various application icons. The system clock indicates 12:41 on 04-01-2021.

The screenshot shows the 'Details' page for the security group 'sg-0ceff0a8fb4e65fa7 - rds-maz-SG'. The breadcrumb navigation is 'EC2 > Security Groups > sg-0ceff0a8fb4e65fa7 - rds-maz-SG'. The 'Actions' menu is visible in the top right.

The 'Details' section displays the following information:

Property	Value
Security group name	rds-maz-SG
Security group ID	sg-0ceff0a8fb4e65fa7
Description	Security group for RDS Aurora
VPC ID	vpc-5c1ada21
Owner	255576724072
Inbound rules count	1 Permission entry
Outbound rules count	1 Permission entry

Below the details, there are tabs for 'Inbound rules', 'Outbound rules', and 'Tags'. The 'Inbound rules' tab is active, showing a table with one rule:

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	0.0.0.0/0	-

At the bottom of the console window, the taskbar shows the Windows Start menu, search bar, and various application icons. The system clock indicates 12:41 on 04-01-2021.

EC2 Management Console

Instances | EC2 Management Console

console.aws.amazon.com/ec2/v2/home?region=us-east-1#ModifyInboundSecurityGroupRules:securityGroupId=sg-0ceff0a8fb4e65fa7

Services

Search for services, features, marketplace products, and docs

EC2 > Security Groups > sg-0ceff0a8fb4e65fa7 - rds-maz-SG > Edit inbound rules

### Edit inbound rules

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

**Inbound rules**

Type: MySQL/Aurora Protocol: TCP Port range: 3306 Source: Custom Description - optional

0.0.0.0/0 172.31.25.25/32

Add rule

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.

Cancel Preview changes Save rules

EC2 Management Console

Instances | EC2 Management Console

console.aws.amazon.com/ec2/v2/home?region=us-east-1#SecurityGroup:group-id=sg-0ceff0a8fb4e65fa7

Services

Search for services, features, marketplace products, and docs

EC2 > Security Groups > sg-0ceff0a8fb4e65fa7 - rds-maz-SG

### sg-0ceff0a8fb4e65fa7 - rds-maz-SG

Details

Security group name	Security group ID	Description	VPC ID
rds-maz-SG	sg-0ceff0a8fb4e65fa7	Security group for RDS Aurora	vpc-5c1ada21
Owner	Inbound rules count	Outbound rules count	
255576724072	2 Permission entries	1 Permission entry	

Inbound rules Outbound rules Tags

Inbound rules

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	0.0.0.0/0	-
MySQL/Aurora	TCP	3306	172.31.25.25/32	-

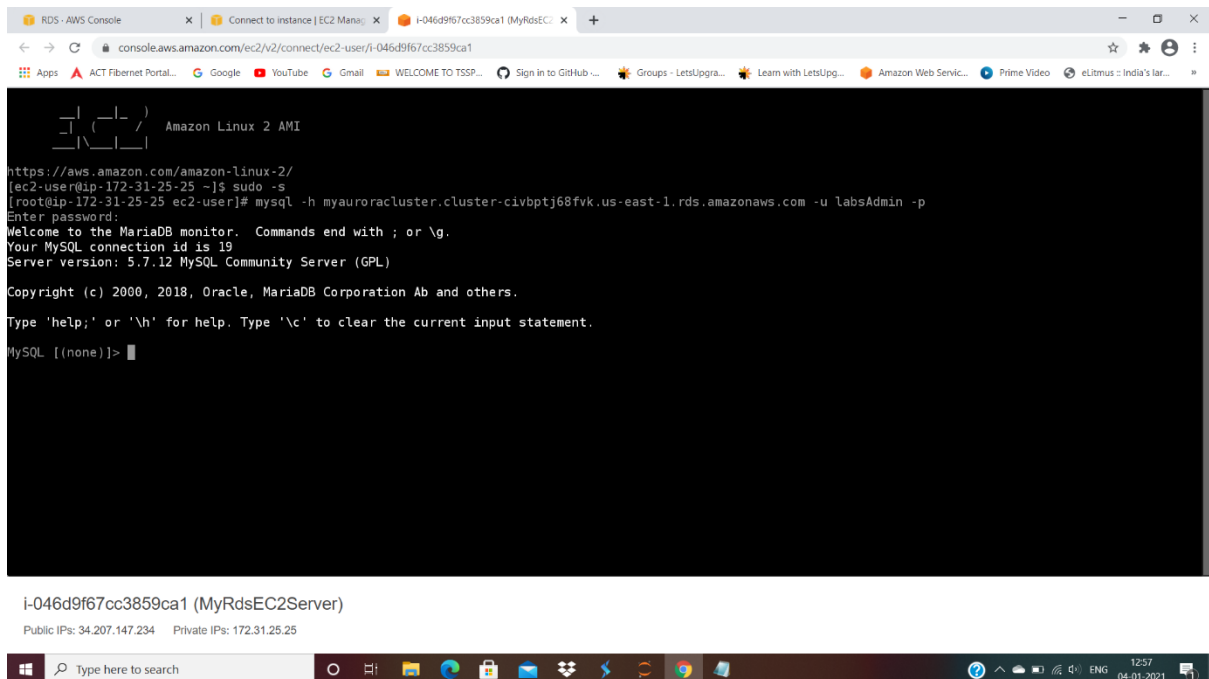
Edit inbound rules

[illegible]

The screenshot displays the AWS RDS console interface. On the left, a navigation sidebar lists various RDS features. The main panel shows the 'Databases' section with a table of existing databases. The table includes columns for the database identifier, its role, the engine type, the region and availability zone, the instance size, the current status, and the CPU usage percentage. Three databases are currently visible: a regional Aurora MySQL cluster and two instance-level databases, all in the us-east-1 region.

DB Identifier	Role	Engine	Region & AZ	Size	Status	CPU
myauroracluster	Regional	Aurora MySQL	us-east-1	2 instances	Available	-
myauroracluster-instance-1	Writer	Aurora MySQL	us-east-1b	db.t3.small	Available	7.00%
myauroracluster-instance-1-us-east-1c	Reader	Aurora MySQL	us-east-1c	db.t3.small	Available	6.00%

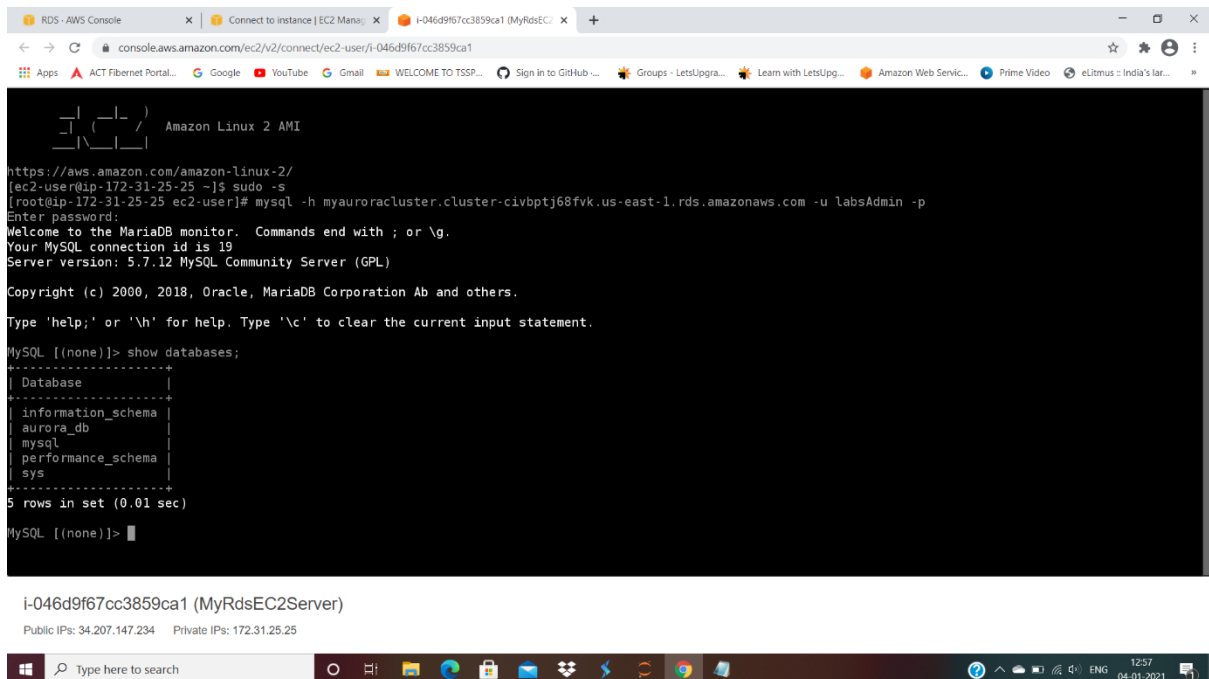
**Step-5:** Connect to the RDS database instance (using its endpoint) from your local machine.



The screenshot shows a terminal window titled "Amazon Linux 2 AMI". The user has executed the following commands: `https://aws.amazon.com/amazon-linux-2/`, `[ec2-user@ip-172-31-25-25 ~]$ sudo -s`, and `[root@ip-172-31-25-25 ec2-user]# mysql -h myauroacluster.cluster-ciwbptj68fvk.us-east-1.rds.amazonaws.com -u labsAdmin -p`. The MySQL prompt shows the connection is successful, displaying the MySQL version (5.7.12) and the server name (MySQL Community Server (GPL)). The prompt is `MySQL [(none)]>`.

i-046d9f67cc3859ca1 (MyRdsEC2Server)  
Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

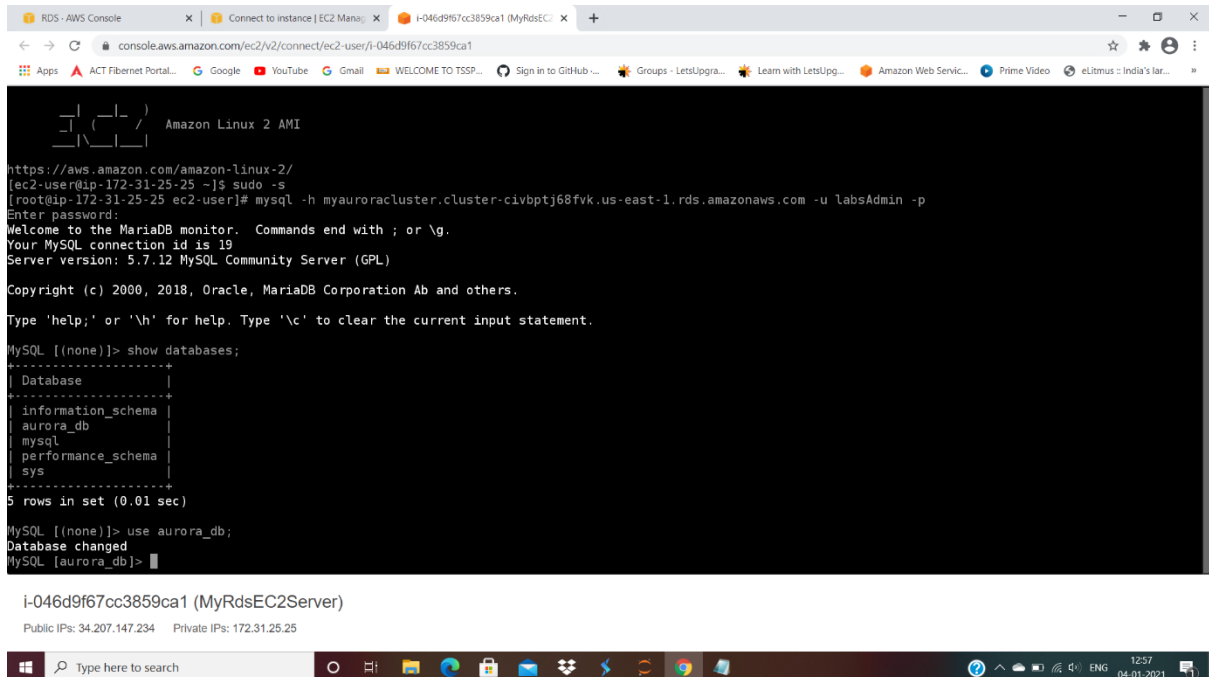
**show databases;**



The screenshot shows the same terminal window as before, but now the user has entered the command `MySQL [(none)]> show databases;`. The output displays a list of databases: `information_schema`, `aurora_db`, `mysql`, `performance_schema`, and `sys`. The prompt is `MySQL [(none)]>`.

i-046d9f67cc3859ca1 (MyRdsEC2Server)  
Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

## use auroro db;



```
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-25-25 ~]$ sudo -s
[root@ip-172-31-25-25 ec2-user]# mysql -h myaurocluster.cluster-civbptj68fvk.us-east-1.rds.amazonaws.com -u labsAdmin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 5.7.12 MySQL Community Server (GPL)

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

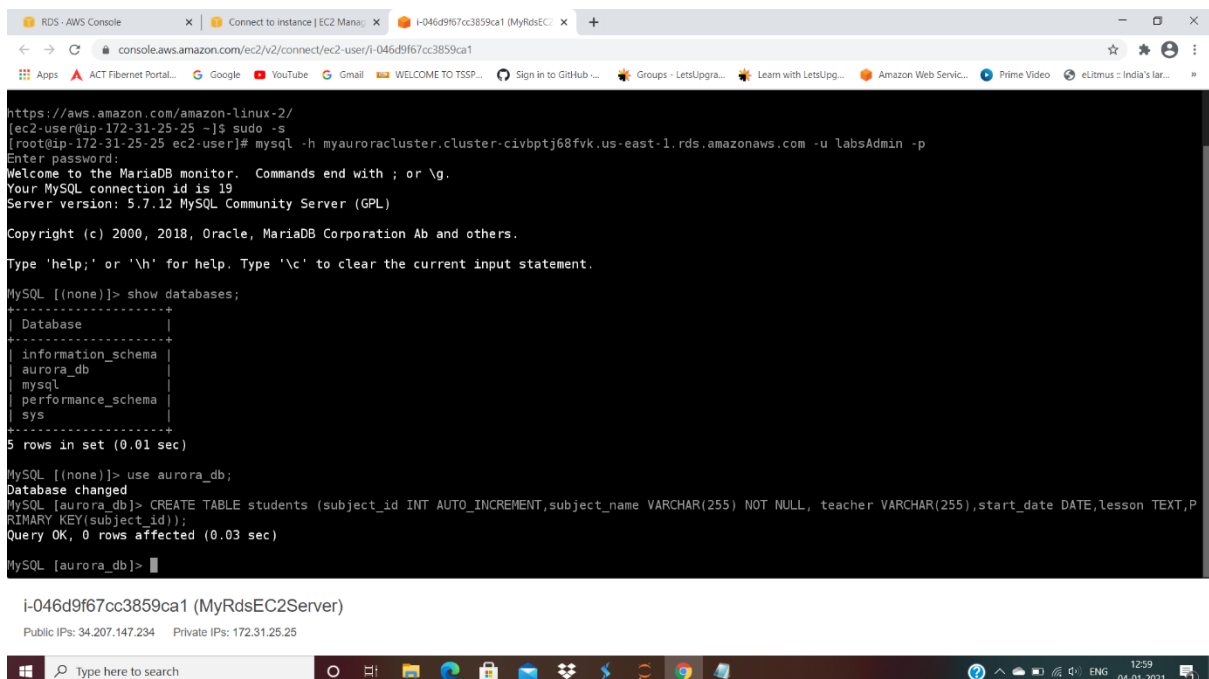
MySQL [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| aurora_db |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

MySQL [(none)]> use aurora_db;
Database changed
MySQL [aurora_db]>
```

i-046d9f67cc3859ca1 (MyRdsEC2Server)

Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

**Step-6 :**CREATE TABLE students ( subject\_id INT AUTO\_INCREMENT,  
subject\_name VARCHAR(255) NOT NULL, teacher  
VARCHAR(255),start\_date DATE, lesson TEXT,PRIMARY KEY  
(subject\_id));



```
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-25-25 ~]$ sudo -s
[root@ip-172-31-25-25 ec2-user]# mysql -h myaurocluster.cluster-civbptj68fvk.us-east-1.rds.amazonaws.com -u labsAdmin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 5.7.12 MySQL Community Server (GPL)

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| aurora_db |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

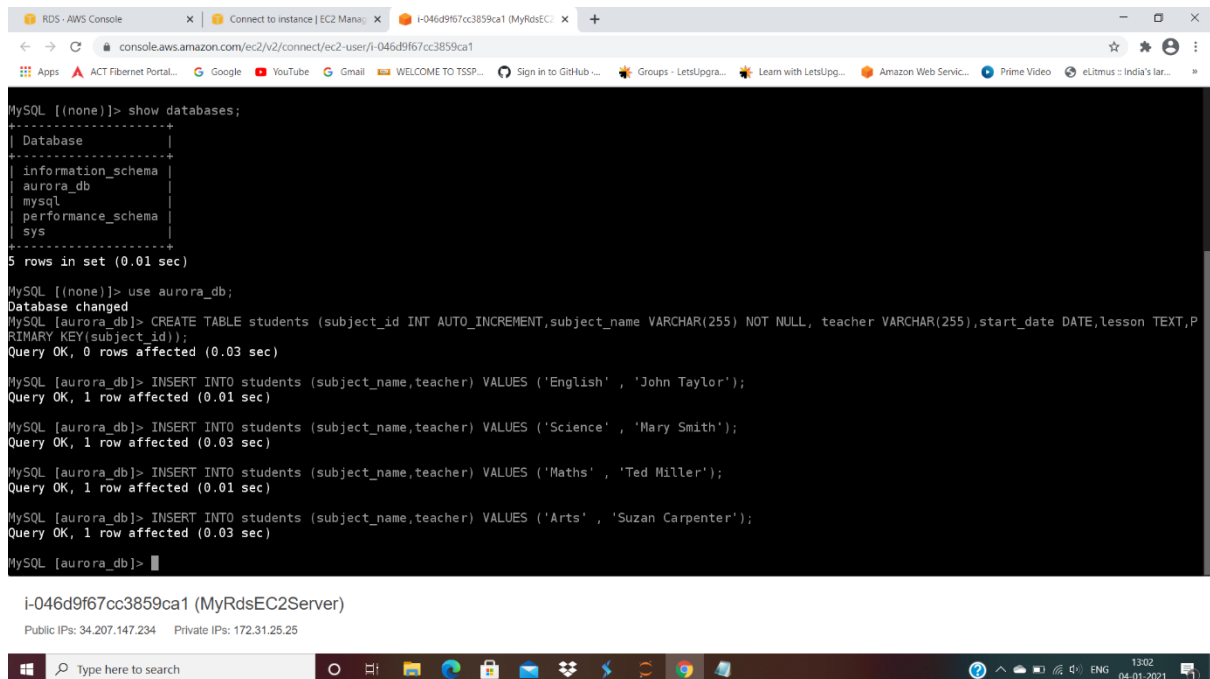
MySQL [(none)]> use aurora_db;
Database changed
MySQL [aurora_db]> CREATE TABLE students (subject_id INT AUTO_INCREMENT,subject_name VARCHAR(255) NOT NULL, teacher VARCHAR(255),start_date DATE,lesson TEXT,PRIMARY KEY(subject_id));
Query OK, 0 rows affected (0.03 sec)

MySQL [aurora_db]>
```

i-046d9f67cc3859ca1 (MyRdsEC2Server)

Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

## Step-7: Insert data into the table:



The screenshot shows a terminal window connected to an AWS RDS instance. The terminal displays the following commands and output:

```
MySQL [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| aurora_db |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

MySQL [(none)]> use aurora_db;
Database changed
MySQL [aurora_db]> CREATE TABLE students (subject_id INT AUTO_INCREMENT,subject_name VARCHAR(255) NOT NULL, teacher VARCHAR(255),start_date DATE,lesson TEXT,PRIMARY KEY(subject_id));
Query OK, 0 rows affected (0.03 sec)

MySQL [aurora_db]> INSERT INTO students (subject_name,teacher) VALUES ('English' , 'John Taylor');
Query OK, 1 row affected (0.01 sec)

MySQL [aurora_db]> INSERT INTO students (subject_name,teacher) VALUES ('Science' , 'Mary Smith');
Query OK, 1 row affected (0.03 sec)

MySQL [aurora_db]> INSERT INTO students (subject_name,teacher) VALUES ('Maths' , 'Ted Miller');
Query OK, 1 row affected (0.01 sec)

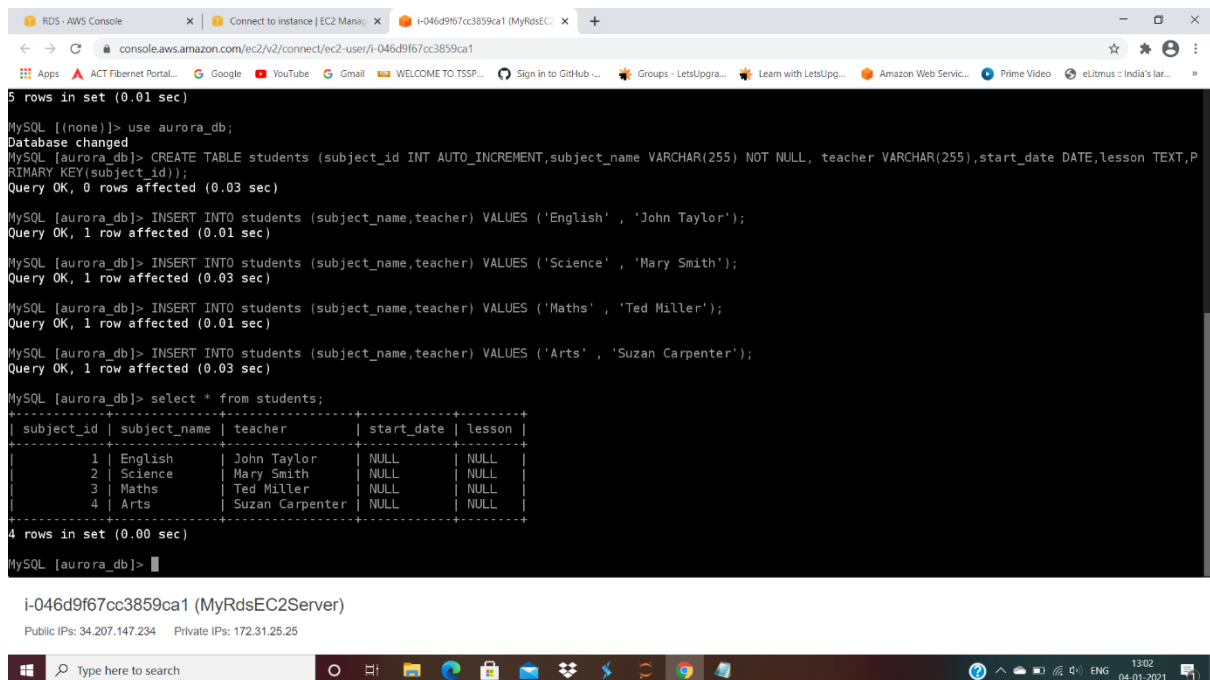
MySQL [aurora_db]> INSERT INTO students (subject_name,teacher) VALUES ('Arts' , 'Suzan Carpenter');
Query OK, 1 row affected (0.03 sec)

MySQL [aurora_db]>
```

Below the terminal window, the instance details are shown:

i-046d9f67cc3859ca1 (MyRdsEC2Server)  
Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

## select \* from students;



The screenshot shows the same terminal window as before, but now displaying the query to select all data from the 'students' table:

```
MySQL [aurora_db]> select * from students;
+-----+-----+-----+-----+-----+
| subject_id | subject_name | teacher | start_date | lesson |
+-----+-----+-----+-----+-----+
| 1 | English | John Taylor | NULL | NULL |
| 2 | Science | Mary Smith | NULL | NULL |
| 3 | Maths | Ted Miller | NULL | NULL |
| 4 | Arts | Suzan Carpenter | NULL | NULL |
+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

MySQL [aurora_db]>
```

Below the terminal window, the instance details are shown:

i-046d9f67cc3859ca1 (MyRdsEC2Server)  
Public IPs: 34.207.147.234 Private IPs: 172.31.25.25



## Step-8: Testing the Failover Condition

The screenshot shows the Amazon RDS console interface. On the left is a navigation menu with options like Dashboard, Databases, Query Editor, etc. The main area displays the 'Related' tab for a specific database instance. A table lists the database instances:

DB identifier	Role	Engine	Region & AZ	Size	Status	CPU
myauroracluster	Regional	Aurora MySQL	us-east-1	2 instances	Available	-
myauroracluster-instance-1	Writer	Aurora MySQL	us-east-1b	db.t3.small	Available	7.00%
myauroracluster-instance-1-us-east-1c	Reader	Aurora MySQL	us-east-1c	db.t3.small	Available	6.00%

Below the table, the 'Connectivity & security' section provides details:

- Endpoint & port:** Endpoint: myauroracluster-instance-1-us-east-1c.civbptj68fvk.us-east-1.rds.amazonaws.com, Port: 3306
- Networking:** Availability zone: us-east-1c, VPC: vpc-5c1ada21, Subnet group
- Security:** VPC security groups: rds-maz-SG (sg-0ceff0a8fb4e65fa7) (active), Public accessibility: Yes

The screenshot shows a terminal window with the following output:

```
ERROR 1045 (28000): Access denied for user 'labsAdmin'@'172.31.25.25' (using password: YES)
[root@ip-172-31-25-25 ec2-user]# mysql -h myauroracluster-instance-1-us-east-1c.civbptj68fvk.us-east-1.rds.amazonaws.com -u labsAdmin -p
Enter password:
ERROR 1045 (28000): Access denied for user 'labsAdmin'@'172.31.25.25' (using password: YES)
[root@ip-172-31-25-25 ec2-user]# mysql -h myauroracluster-instance-1-us-east-1c.civbptj68fvk.us-east-1.rds.amazonaws.com -u labsAdmin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 14
Server version: 5.7.12 MySQL Community Server (GPL)

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| aurora_db |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

MySQL [(none)]> use aurora_db;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MySQL [aurora_db]>
```

Below the terminal output, the instance identifier `i-046d9f67cc3859ca1 (MyRdsEC2Server)` is displayed, along with its Public and Private IP addresses.

```
mysql
performance_schema
sys
5 rows in set (0.01 sec)

MySQL [(none)]> use aurora_db;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MySQL [aurora_db]> show tables;
+-----+
| Tables_in_aurora_db |
+-----+
| students             |
+-----+
1 row in set (0.00 sec)

MySQL [aurora_db]> select * from students;
+-----+
| subject_id | subject_name | teacher      | start_date | lesson |
+-----+
| 1          | English     | John Taylor  | NULL       | NULL   |
| 2          | Science     | Mary Smith   | NULL       | NULL   |
| 3          | Maths       | Ted Miller   | NULL       | NULL   |
| 4          | Arts        | Suzan Carpenter | NULL       | NULL   |
| 5          | Spanish     | Isabella     | NULL       | NULL   |
+-----+
5 rows in set (0.00 sec)

MySQL [aurora_db]>
```

i-046d9f67cc3859ca1 (MyRdsEC2Server)

Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

**Step-9: INSERT INTO students(subject\_name, teacher) VALUES ('Spanish', 'Isabella');**

**select \* from students;**

```
Query OK, 1 row affected (0.01 sec)

MySQL [aurora_db]> INSERT INTO students (subject_name, teacher) VALUES ('Arts', 'Suzan Carpenter');
Query OK, 1 row affected (0.03 sec)

MySQL [aurora_db]> select * from students;
+-----+
| subject_id | subject_name | teacher      | start_date | lesson |
+-----+
| 1          | English     | John Taylor  | NULL       | NULL   |
| 2          | Science     | Mary Smith   | NULL       | NULL   |
| 3          | Maths       | Ted Miller   | NULL       | NULL   |
| 4          | Arts        | Suzan Carpenter | NULL       | NULL   |
+-----+
4 rows in set (0.00 sec)

MySQL [aurora_db]> INSERT INTO students (subject_name, teacher) VALUES ('Spanish', 'Isabella');
Query OK, 1 row affected (0.01 sec)

MySQL [aurora_db]> select * from students;
+-----+
| subject_id | subject_name | teacher      | start_date | lesson |
+-----+
| 1          | English     | John Taylor  | NULL       | NULL   |
| 2          | Science     | Mary Smith   | NULL       | NULL   |
| 3          | Maths       | Ted Miller   | NULL       | NULL   |
| 4          | Arts        | Suzan Carpenter | NULL       | NULL   |
| 5          | Spanish     | Isabella     | NULL       | NULL   |
+-----+
5 rows in set (0.01 sec)

MySQL [aurora_db]>
```

i-046d9f67cc3859ca1 (MyRdsEC2Server)

Public IPs: 34.207.147.234 Private IPs: 172.31.25.25

