



**Department of Computer Science & Engineering
Premier University.**

CSE 482: Contemporary Course of Computer Science
Laboratory.

**Build Your DB Server and Interact
With Your DB Using an App**

Submitted By:

Name	Sajjad Hosen Emon
ID	0222310005101105
Section	C
Semester	7 th
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Remarks

Lab Report

Lab 5: Build Your DB Server and Interact With Your DB Using an App

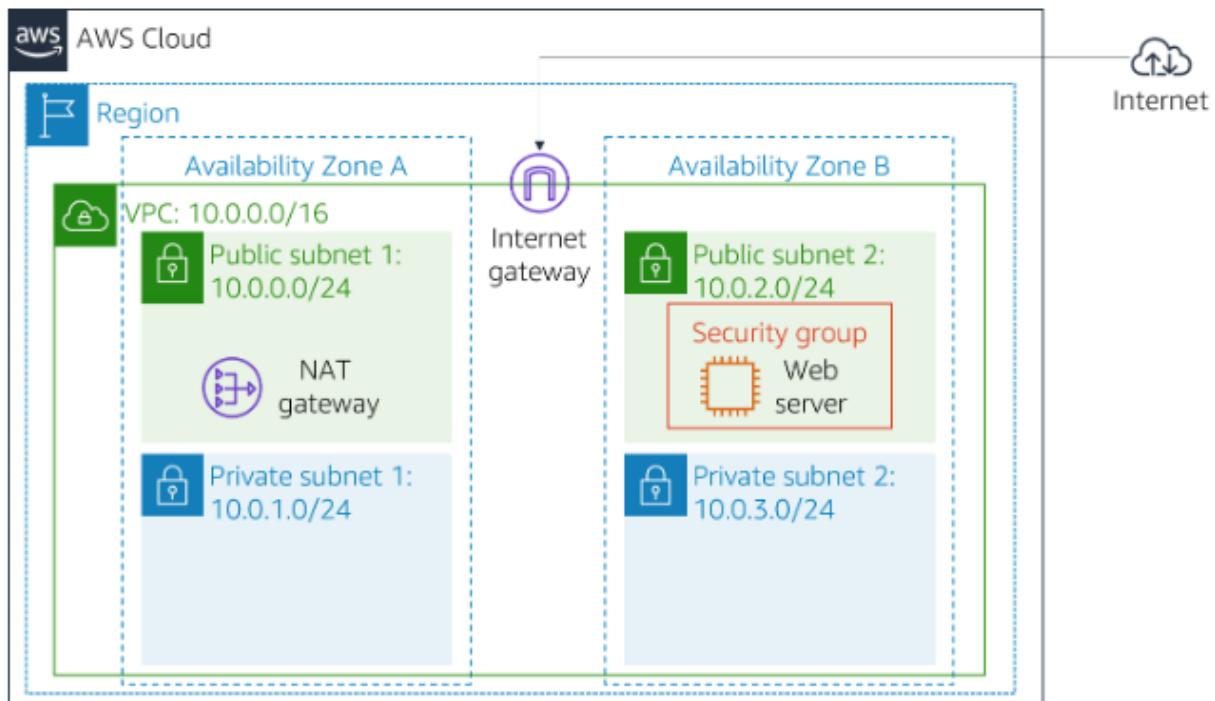
1. Objective

The objective of this lab is to understand how to deploy and manage a relational database in the cloud using Amazon Web Services (AWS). In this lab, a highly available database instance is launched using Amazon Relational Database Service (Amazon RDS), and secure communication between a web server and database server is established. The lab demonstrates how to configure security groups, subnet groups, and Multi-AZ deployment to ensure high availability and data durability. It also provides practical experience in connecting a web application running on Amazon EC2 to an RDS database and performing database operations through an application interface.

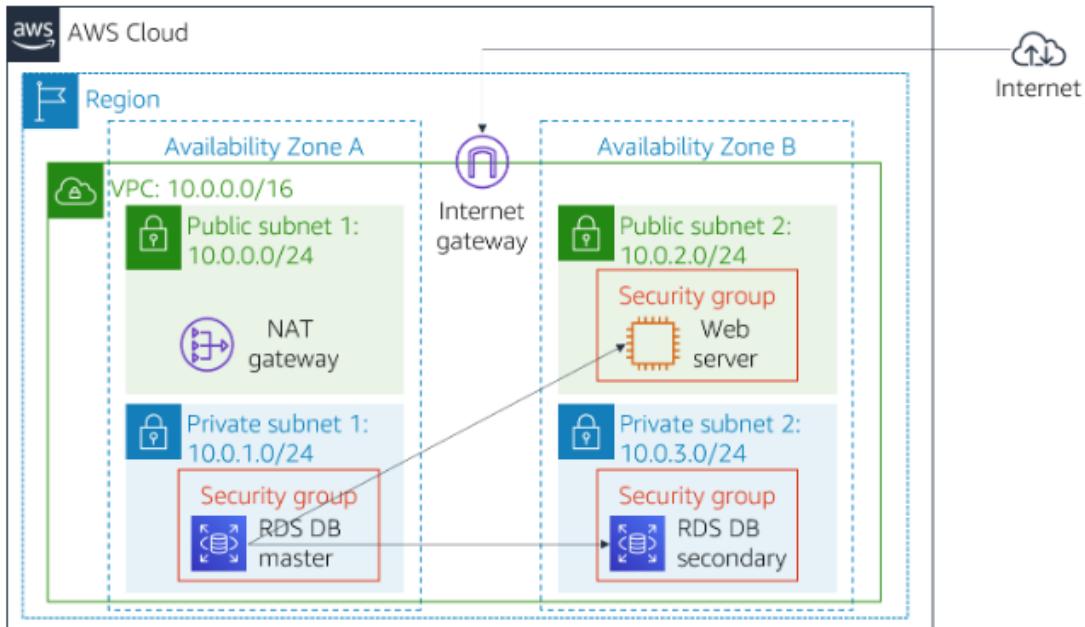
2. Scenario

At the beginning of the lab, a Lab VPC and a web server instance were already provided, but no database was available for storing application data. The task was to create a secure and highly available relational database inside the same VPC and connect it with the web application. To achieve this, a database security group was created to allow controlled access from the web server. A DB subnet group was configured across multiple Availability Zones to support Multi-AZ deployment. Then, a MySQL database instance was launched using Amazon RDS. Finally, the web application was configured with the database endpoint and credentials to perform CRUD operations, verifying successful integration between the application and the database.

When you start the lab, the following infrastructure is provided:



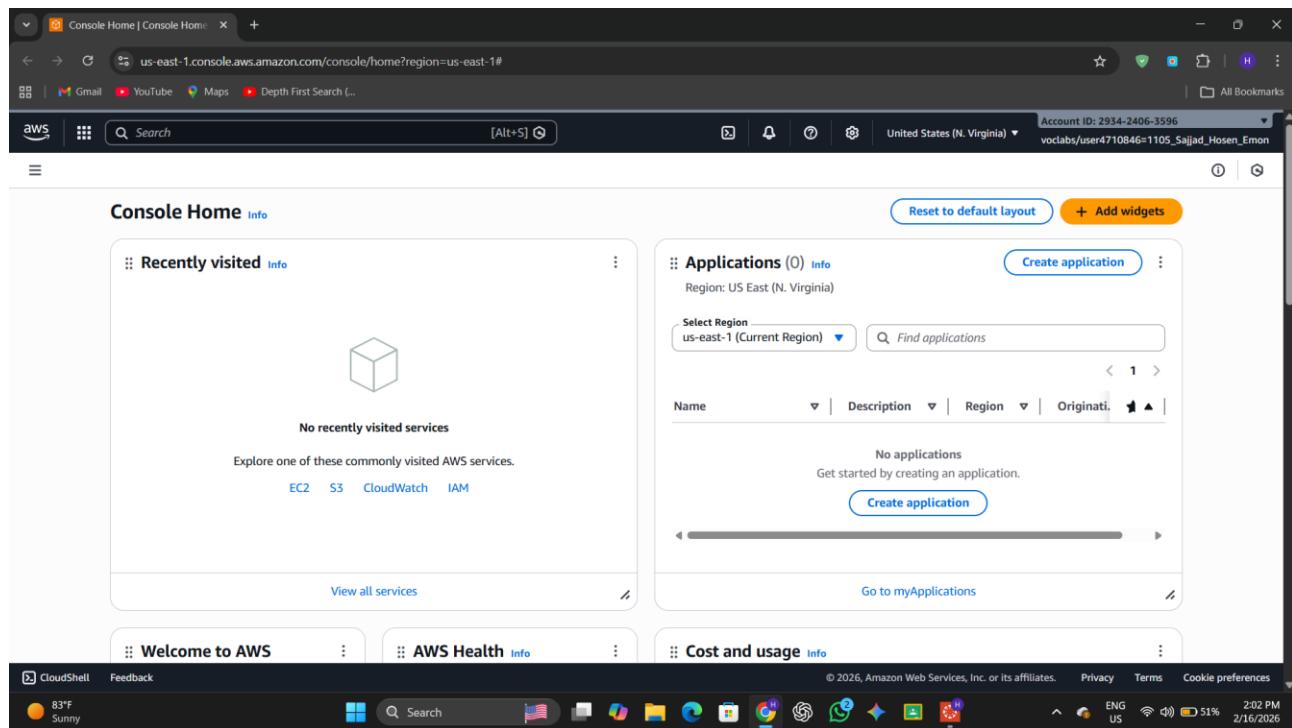
By the end of the lab, you will have this infrastructure:



3. Working Procedure

Task 1: Create Security Group

1. Open AWS Console and go to VPC service.



2. Click Security Groups and choose Create Security Group.

Security Groups (5) Info

Name	Security group ID	Security group name	VPC ID	Description
-	sg-06d18a5f5b33ed88c	default	vpc-015241c1a00b897bf	default VPC security
Web Security Group	sg-0e8289c5e5e85b12d	Web Security Group	vpc-015638af0cca6b3bd	Enable HTTP access
-	sg-0ddbcf18e7c91bda8e	default	vpc-015638af0cca6b3bd	default VPC security
-	sg-075c958750e7d9797	WorkEc2SecurityGroup	vpc-015241c1a00b897bf	VPC Security Group
-	sg-0e52a08d27c23ecc6	default	vpc-047da3a2efcc9b91c	default VPC security

Select a security group

3. Enter DB Security Group as name and select Lab VPC.

Create security group Info

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.

Basic details

Security group name Info
DB Security Group
Name cannot be edited after creation.

Description Info
Permit access from Web Security Group

VPC Info
vpc-015638af0cca6b3bd (Lab VPC)

Inbound rules Info
This security group has no inbound rules.
Add rule

Outbound rules Info

4. Add inbound rule for MySQL/Aurora (Port 3306).

5. Select Web Security Group as the source.

6. Click Create Security Group.

Inbound rules

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	Custom (sg-0e8289c5e5e85b12d)	sg-0e8289c5e5e85b12d

Outbound rules

Type	Protocol	Port range	Destination	Description - optional
All traffic	All	All	Custom (0.0.0.0/0)	0.0.0.0/0

sg-0d5ad73f36afb3b64 - DB Security Group

Details

Security group name	Security group ID	Description	VPC ID
DB Security Group	sg-0d5ad73f36afb3b64	Permit access from Web Security Group	vpc-015638af0cca6b3bd

Inbound rules (1)

Name	Security group rule ID	IP version	Type	Protocol	Port range
-	sgr-0aeef71a8eca8fe290	-	MySQL/Aurora	TCP	3306

Task 2: Create DB Subnet Group

1. Open RDS service from AWS Console.

The screenshot shows the AWS RDS Dashboard for the US East (N. Virginia) region. On the left, a sidebar lists various RDS services: Databases, Query editor, Performance insights, Snapshots, Exports in Amazon S3, Automated backups, Reserved instances, Proxies, Subnet groups, Parameter groups, Option groups, Custom engine versions, Zero-ETL integrations, Events, and Event subscriptions. The main content area is titled 'Resources' and displays usage statistics for DB Instances (0/40), DB Clusters (0/40), Reserved instances (0/40), Snapshots (0), and Recent events (0). A 'Create a database' section is present, along with sections for 'Explore Aurora & RDS' (estimated duration: 2-5 minutes) and 'Recommended for you' (including links for DR strategy, cross-region DR, and backup/restore). The bottom navigation bar includes CloudShell, Feedback, and various system icons.

2. Click Subnet Groups and choose Create DB Subnet Group.

The screenshot shows the 'Subnet groups' page within the AWS RDS interface. The sidebar on the left remains the same as the previous dashboard. The main area is titled 'Subnet groups (0)' and features a search bar and filter options for Name, Description, Status, and VPC. It displays a message: 'No db subnet groups' and 'You don't have any db subnet groups.' Below this is a prominent blue 'Create DB subnet group' button. The bottom navigation bar is identical to the previous screenshot.

3. Enter DB-Subnet-Group as name and select Lab VPC.

The screenshot shows the 'Create DB subnet group' page in the AWS RDS console. The 'Subnet group details' section is visible, containing fields for 'Name' (DB-Subnet-Group), 'Description' (DB Subnet Group), and 'VPC' (Lab VPC (vpc-015638af0cca6b3bd) - 4 Subnets, 2 Availability Zones). Below this, the 'Add subnets' section shows 'Availability Zones' (us-east-1a and us-east-1b selected) and 'Subnets' (empty).

4. Select Availability Zones us-east-1a and us-east-1b.

The screenshot shows the 'Create DB subnet group' page in the AWS RDS console. The 'Subnet group details' section is visible, containing fields for 'Name' (DB Subnet Group), 'Description' (DB Subnet Group), and 'VPC' (Lab VPC (vpc-015638af0cca6b3bd) - 4 Subnets, 2 Availability Zones). Below this, the 'Add subnets' section shows 'Availability Zones' (us-east-1a and us-east-1b selected) and 'Subnets' (empty). A note at the bottom states: 'For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.'

5. Add subnets 10.0.1.0/24 and 10.0.3.0/24.

Availability Zones
Choose the Availability Zones that include the subnets you want to add.

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.

For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.

Availability zone	Subnet name	Subnet ID	CIDR block
us-east-1a	Private Subnet 1	subnet-0dbdb14c4fa392b00	10.0.1.0/24
us-east-1b	Private Subnet 2	subnet-0f52733cc62e8a62b	10.0.3.0/24

6. Click Create.

Successfully created DB-Subnet-Group. View subnet group

Name	Description	Status	VPC
db-subnet-group	DB Subnet Group	Complete	vpc-015638af0cca6b3bd

Task 3: Create RDS DB Instance

1. Go to Databases in RDS and click Create Database.

Databases | Aurora and RDS | us-east-1.console.aws.amazon.com/rds/home?region=us-east-1#database:

Aurora and RDS > Databases

Databases (0)

Filter by databases

DB identifier Status Role Engine Upgrade rollout order Region ... Size

No resources

Create database

2. Select MySQL engine and choose Dev/Test template.

Create database | Aurora and RDS | us-east-1.console.aws.amazon.com/rds/home?region=us-east-1#launch-dbinstance:

Aurora and RDS > Databases > Create database

Choose a database creation method

Full configuration
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type [Info](#)

Aurora (MySQL Compatible)

Aurora (PostgreSQL Compatible)

MySQL

PostgreSQL

MariaDB

Oracle

Microsoft SQL Server

IBM Db2

The screenshot shows the 'Create database' wizard for Aurora and RDS. In the 'Engine version' section, MySQL 8.4.7 is selected. Under 'Show only versions that support the Multi-AZ DB cluster', the 'Info' link is visible. In the 'Templates' section, 'Dev/Test' is selected, indicated by a blue outline. Other options like 'Production' and 'Free tier' are also shown.

3. Enable Multi-AZ deployment option.

4. Set DB identifier as lab-db.

The screenshot shows the 'Create database' wizard with the 'Settings' section active. Under 'DB instance identifier', 'lab-db' is typed into the input field. In the 'Credentials Settings' section, 'main' is listed as the master username. Under 'Credentials management', 'Self managed' is selected, indicated by a blue outline. Other options like 'Managed in AWS Secrets Manager - most secure' and 'Auto generate password' are also shown.

5. Enter username main and password lab-password.

The screenshot shows the 'Create database' page in the AWS RDS console. The 'Master username' field is set to 'main'. The 'Self managed' password option is selected, indicating the user will create their own password. The 'Master password' field contains a masked password. Below these fields, there's a section for 'Additional credentials settings' which includes 'Database authentication options' and 'Password authentication'. The bottom of the screen shows the Windows taskbar with various pinned icons like Gmail, YouTube, Maps, and Depth First Search.

6. Choose db.t3.micro instance class.

7. Set storage type as General Purpose SSD (20 GB).

The screenshot shows the 'Create database' page in the AWS RDS console. Under 'Instance type', 'db.t3.micro' is selected. In the 'Storage' section, 'General Purpose SSD (gp3)' is chosen for the storage type. The 'Allocated storage' is set to 20 GiB, and 'Provisioned IOPS' is set to 3000. The 'Storage throughput' is set to 125 MiBps. The bottom of the screen shows the Windows taskbar with various pinned icons like Gmail, YouTube, Maps, and Depth First Search.

8. Select Lab VPC and attach DB Security Group.

9. Enter initial database name as lab.

10. Disable automatic backups, encryption, and enhanced monitoring.

The screenshot shows the 'Create database' configuration page for Aurora and RDS. The database identifier is set to 'default:mysql-8-4'. Under the 'Backup' section, 'Enable automated backup' is unchecked. In the 'Backup tags' section, 'Copy tags to automated backup' is also unchecked. Under 'Maintenance', 'Enable auto minor version upgrade' is checked. The 'Maintenance window' dropdown is set to 'No preference'. At the bottom right, there are 'Create database' and 'Cancel' buttons.

11. Click Create Database and wait until status becomes Available.

The screenshot shows the 'Databases' page in the Aurora and RDS section. A modal window titled 'Creating database lab-db' is open, stating 'Your database might take a few minutes to launch. You can use settings from lab-db to simplify configuration of suggested database add-ons while we finish creating your DB for you.' Below the modal, the 'Databases (1)' table lists the database 'lab-db' with a status of 'Creating'. The table has columns for DB identifier, Status, Role, Engine, Upgrade rollout order, Region, and Size. On the left sidebar, the 'Databases' section is expanded, showing options like Query editor, Performance insights, Snapshots, and Reserved instances. At the bottom right, there are 'View connection details' and 'Create database' buttons.

Successfully created database **lab-db**

You can use settings from lab-db to simplify configuration of suggested database add-ons while we finish creating your DB for you.

lab-db

Summary

DB identifier	Status	Role	Engine	Recommendations
lab-db	Modifying	Instance	MySQL Community	
CPU	Class	Current activity	Region & AZ	
	db.t3.micro	0 Connections	us-east-1b	

Logs & events Configuration Zero-ETL integrations Maintenance & backups Data migrations Tags Recommendations

Connect using | Info

Code snippets
Use when connecting through SDK, APIs, or third-party tools including agents.

CloudShell
Use for a quick access to AWS CLI that launches directly from the AWS Management Console.

Endpoints
Use when connecting through any IDE interface.

Internet access gateway IAM Authentication

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CloudShell Feedback 83°F Sunny 2:43 PM ENG US 23% 2/16/2026

12. Copy the Endpoint from Connectivity & Security section.

Code snippets

Use when connecting through SDK, APIs, or third-party tools including agents.

CloudShell

Use for a quick access to AWS CLI that launches directly from the AWS Management Console.

Endpoints

Use when connecting through any IDE interface.

Internet access gateway

Programming language MySQL (macOS) Endpoint type Instance endpoint

Connection steps

Follow the steps below to paste the code of each step in your tool and run the commands. The snippets dynamically reflect the authentication configuration.

```
1 mysql -h lab-db.crk4iek6w04q.us-east-1.rds.amazonaws.com -P 3306 -u main -p'<Enter_DB_Password>' --ssl-verify-server-cert --ssl-ca=certs/global-bundle.pem lab
```

Connected compute resources (0)

CloudShell Feedback 83°F Sunny 2:49 PM ENG US 18% 2/16/2026

Task 4: Connect Web Application to Database

1. Copy Web Server Public IP from AWS Details.

A message will appear explaining that the application is running a command to copy information to the database. After a few seconds the application will display an **Address Book**.
The Address Book application is using the RDS database to store information.

38. Test the web application by adding, editing and removing contacts.
The data is being persisted to the database and is automatically replicating to the second Availability Zone.

Submitting your work

39. To record your progress, choose **Submit** at the top of these instructions.

40. When prompted, choose **Yes**.
After a couple of minutes, the grades panel appears and shows you how many points you earned for each task. If the results don't display after a couple of minutes, choose **Grades** at the top of these instructions.

Tip: You can submit your work multiple times. After you change your work, choose **Submit** again. Your last submission is recorded for this lab.

Cloud Access

AWS CLI: Show

Cloud Labs

Remaining session time: 00:48:30(49 minutes)
Session started at: 2026-02-15T23:57:57-0800
Session to end at: 2026-02-16T01:27:57-0800

Accumulated lab time: 00:41:00 (41 minutes)

(1) ips -- public:54.84.141.133, private:10.0.2.30 (2) ips --
public:3.80.47.49, private:10.0.0.132

SSH key Show Download PEM Download PPK

AWS SSO Download URL

SecretKey gLOGLfryc7flGUR5a1z43qWh++ClioGO2RZOM5CI

WebServer 54.84.141.133

BastionHost 3.80.47.49

Region us-east-1

AccessKey AKIA We're detecting a poor network connection, which can prevent some features from working. Please try refreshing the page.

2. Open the IP address in a web browser.

83°F Sunny

Search

ENG US 3:05 PM 2/16/2026

lab-db - Database Details | Aurora | Welcome to AWS Technical Es... | +

Not secure 54.84.141.133

Gmail YouTube Maps Depth First Search ..

AWS Load Test RDS

Meta-Data	Value
InstanceId	i-00623481d8f73482d
Availability Zone	us-east-1b

Current CPU Load: 4%

3. Click the RDS link on the application page.
4. Enter the RDS Endpoint in Endpoint field.
5. Enter database name lab.
6. Enter username main and password lab-password.



7. Click Submit to connect the database.

The screenshot shows a web browser window with the URL `54.84.141.133/rds.php`. The page title is "AWS Technical Essentials v4.1". The main content is a form for connecting to a database:

Endpoint	lab-db.crk4lek6w04q.us-east-1.rds.amazonaws.com
Database	lab
Username	main
Password

Below the form is a "Submit" button.

8. Add, edit, and delete contacts to test database interaction.

The screenshot shows a web browser window with the URL `3.85.4.95/rds.php?mode=add`. The page title is "AWS Technical Essentials v4.1". The main content is titled "Address Book" and displays a message: "Entry has been removed". Below this is a table of contacts:

Last name	First name	Phone	Email	Admin
Doe	Jane	010-110-1101	janed@someotheraddress.org	Edit Remove
Johnson	Roberto	123-456-7890	robertoj@someaddress.com	Edit Remove

The screenshot shows a web browser window with the URL `3.85.4.95/rds.php?mode=add`. The page title is "AWS Technical Essentials v4.1". The main content is titled "Address Book" and displays a heading "Add Contact". Below this is a form with four input fields: "Last Name" (sajjad), "First Name" (hosen), "Phone" (01824010930), and "Email" (sajjadhosse868@gmail.com). A "Submit" button is at the bottom of the form. Below the form is a table of contacts:

Last name	First name	Phone	Email	Admin
Doe	Jane	010-110-1101	janed@someotheraddress.org	Edit Remove
Johnson	Roberto	123-456-7890	robertoj@someaddress.com	Edit Remove

A screenshot of a web browser window. The address bar shows the URL `3.85.4.95/rds.php`. The page content is titled "Address Book". It features a table with columns: Last name, First name, Phone, Email, and Admin. The table contains three rows of data. At the bottom right of the table is a link "Add Contact". The browser's toolbar at the top includes icons for Gmail, YouTube, Maps, Depth First Search, and All Bookmarks.

Last name	First name	Phone	Email	Admin
Doe	Jane	010-110-1101	janed@someotheraddress.org	Edit Remove
Johnson	Roberto	123-456-7890	roberto@someaddress.com	Edit Remove
sajjad	hosen	01824010930	sajjadhosse868@gmail.com	Edit Remove

When load Current CPU Load 100%

A screenshot of a web browser window. The address bar shows the URL `3.85.4.95/rds.php`. The page content displays a table of system meta-data with columns: Meta-Data and Value. It shows two entries: InstanceId and Availability Zone. Below the table, a message states "Current CPU Load: 100%". The browser's toolbar at the top includes icons for Gmail, YouTube, Maps, Depth First Search, and All Bookmarks.

Meta-Data	Value
InstanceId	i-01d660d5fb2d6ee91
Availability Zone	us-east-1b

Current CPU Load: 100%

9. Total Score

The screenshot shows the Vocareum interface with the following details:

- Top bar: 00:32, Start Lab, End Lab, AWS Details, Details, Submit, Submission Report, Grades.
- Total score: 20/20
- Task details:
 - Task 1 - Security Group created: 5/5
 - Task 2 - DB subnet group: 5/5
 - Task 3 - DB created: 5/5
 - Task 4 - App connected to DB: 5/5
- Bottom bar: 9:49 PM

10. Report Submission:

The screenshot shows the Submission Report page with the following details:

- Top bar: prkbench - Vocareum, AWS, 00:00, Start Lab, End Lab, AWS Details, Details, Submit, Submission Report.
- Section: Submission Report
- Content:

```
[Executed at: Mon Feb 16 7:46:48 PST 2026]
gradeFile = /mnt/vocwork5/grader/eee_G_2692329 asn4967437_7 asn4967438_1 /tmp/temp_uf_02162026/.47p6mfb3apo93cmq7SB
reportFile = /mnt/vocwork5/grader/eee_G_2692329 asn4967437_7 asn4967438_1 /tmp/temp_uf_02162026/.6r9ql1ifratdeUlt8SJ
/mnt/vocwork5/grader/eee_G_2692329 asn4967437_7 asn4967438_1 /tmp/temp_uf_02162026/.47p6mfb3apo93cmq7SB
Started: 2026-02-16 07:46:39
region: us-east-1
profile: default

Evaluating Task 1 - Security Group created
Web Security Group ID (for comparison): sg-02dd754e9b7f0290d
DB Security Group found
DB Security Group ID: sg-021994ddb4dbfb32
inbound_rule: 3306
source_inbound_rule: sg-02dd754e9b7f0290d
Task 1 - Success! The DB security group was created and was properly configured.

Evaluating Task 2 - DB Subnet Group
subnet_1_0_id: subnet-0434b86a3bc94af7d
```
- Grade summary: 20/20
- Grades for tasks:
 - Task 1: 5/5
 - Task 2: 5/5
 - Task 3: 5/5
 - Task 4: 5/5
- Notes:
 - Uncheck **Enable automatic backups**.
 - Uncheck **Enable encryption**
 - This will turn off backups, which is not normally recommended, but will make the database deploy faster for this lab.
- Action: 29. Choose **Create database**.

The screenshot shows a 'Submission Report' window from the Vocareum Workbench. The report details the success of four tasks:

- Evaluating Task 2 - DB Subnet Group: Success! The DB subnet group was created and was properly configured.
- Evaluating Task 3 - Database Created: Success! The DB was created and appears to be properly configured.
- Evaluating Task 4 - Web App Connected: Success! The web application is connected to the database.

Task 2 details:
subnet_1_0_id: subnet-0434b86a3bc9af7d
subnet_3_0_id: subnet-0f5b436a2a677ae03
Lab VPC ID: vpc-06edc95d6f935372
us-east-1b Subnet found in db-subnet-group configuration with proper 10.0.3.0/24 cidr
us-east-1a Subnet found in db-subnet-group configuration with proper 10.0.1.0/24 cidr.
db-subnet-group properly created in Lab VPC
Task 2 - Success! The DB subnet group was created and was properly configured.

Task 3 details:
Database Created
Database Endpoint: lab-db.cimv3pvhpft.us-east-1.rds.amazonaws.com
Database Subnet Group: db-subnet-group
Task 3 - Success! The DB was created and appears to be properly configured.

Task 4 details:
instance_public_ip: 3.85.4.95
url: http://3.85.4.95/rds.php
website_status: 200
Web App Connected and address book table found on rds.php page

At the bottom, there are configuration options for the database instance:

- Uncheck Enable automatic backups.**
- Uncheck Enable encryption**
- This will turn off backups, which is not normally recommended, but will make the database deploy faster for this lab.

Step 29: Choose **Create database**.
Your database will now be launched.

• If you receive an error that mentions "not authorized to perform: iam:CreateRole", make sure you unchecked **Enable Enhanced monitoring** in the previous step.

4. Conclusion

In this lab, a secure and highly available MySQL database was successfully deployed using Amazon RDS. Proper networking and security configurations were implemented to allow controlled communication between the EC2 web server and the database. The Multi-AZ deployment ensured high availability and data replication across Availability Zones. Finally, the web application was connected to the database, and CRUD operations were performed successfully, demonstrating real-world cloud-based application and database integration.