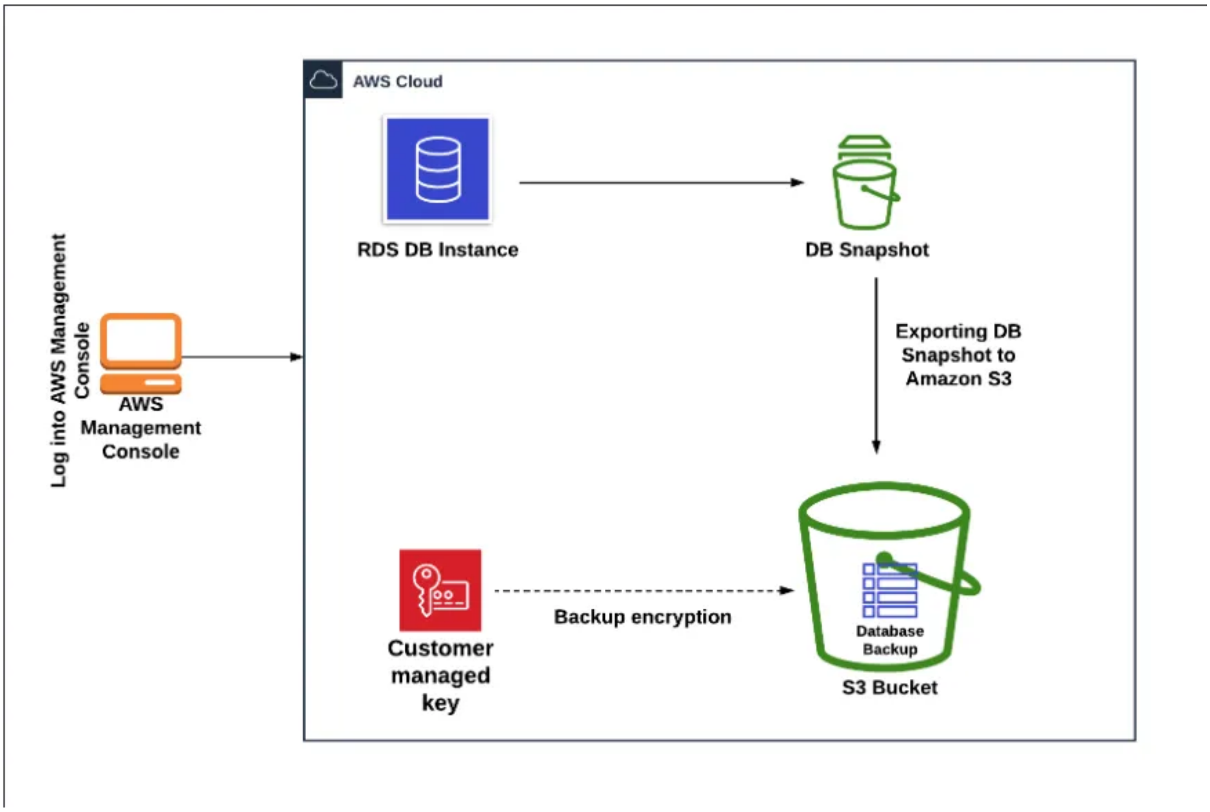
Exporting RDS Snapshot to S3



Introduction:

Today we will learn about exporting RDS Snapshot to S3 bucket.

For this, we have to create an Amazon S3 bucket with the required IAM permissions and create a KMS key for server-side encryption. After that we will export the snapshot via Console or CLI commands.

Here we will practise creating an Amazon RDS DB Instance, Amazon S3 Bucket, and AWS KMS Key.

1. The data that is exported to S3 is always in the Apache Parquet format. Parquet format is 2 times faster to export and consumes up to 6 times less storage in Amazon S3 compared to test formats.
2. The exported data can be analyzed by other AWS services like Amazon Sagemaker, Amazon EMR, and Amazon Athena.

We can export all kinds of RDS data to an S3 bucket where it is done via manual backup automated backup or AWS Backup service.

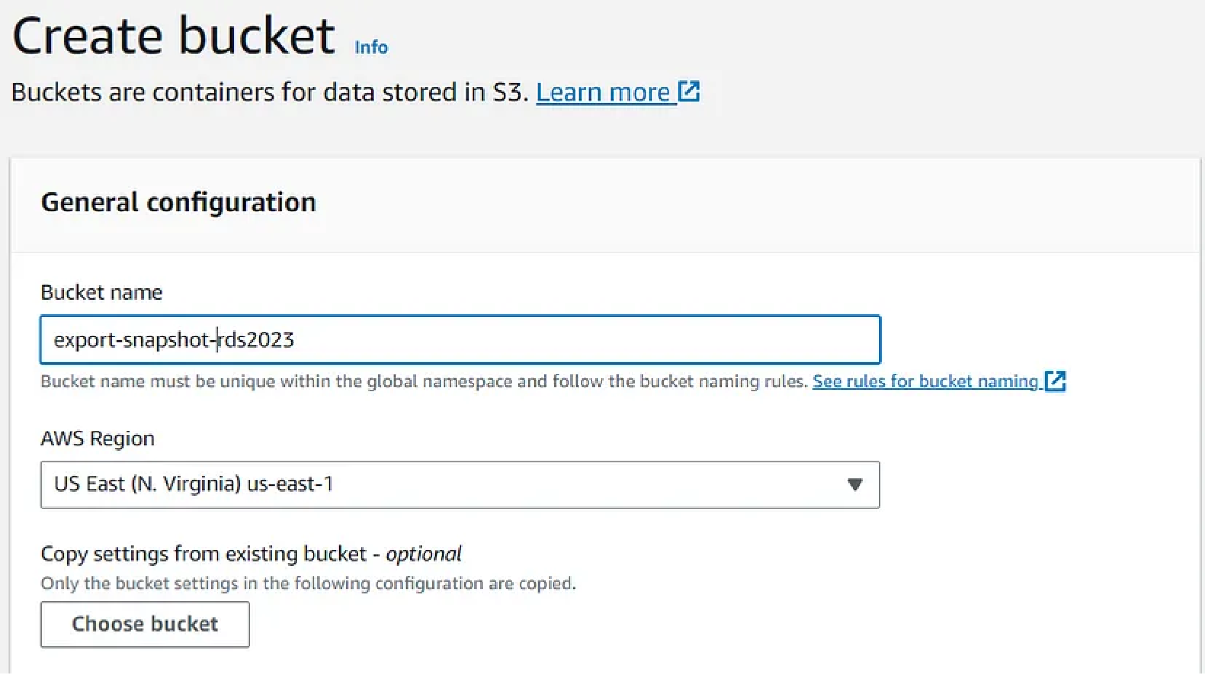
Prerequisites:
To download the MySql GUI Tool, To download it, go to the Download MySQL Workbench page. Based on your OS, select the respective option under Generally Available (GA) Releases. Download and Install.

Task 1. Create an S3 bucket for storing RDS Snapshot

Go to Services and click on S3 under Storages, On the S3 Page, click on Create bucket and fill in the bucket details.

➥ Bucket name: Enter *export-snapshot-rds123*

- Note: S3 bucket name is globally unique, choose a name that is available.
- Region: Select US East (N. Virginia) us-east-1
- Create bucket



Create bucket Info

Buckets are containers for data stored in S3. Learn more

General configuration

Bucket name

export-snapshot-rds2023

Bucket name must be unique within the global namespace and follow the bucket naming rules. See rules for bucket naming

AWS Region

US East (N. Virginia) us-east-1

Copy settings from existing bucket - *optional*

Only the bucket settings in the following configuration are copied.

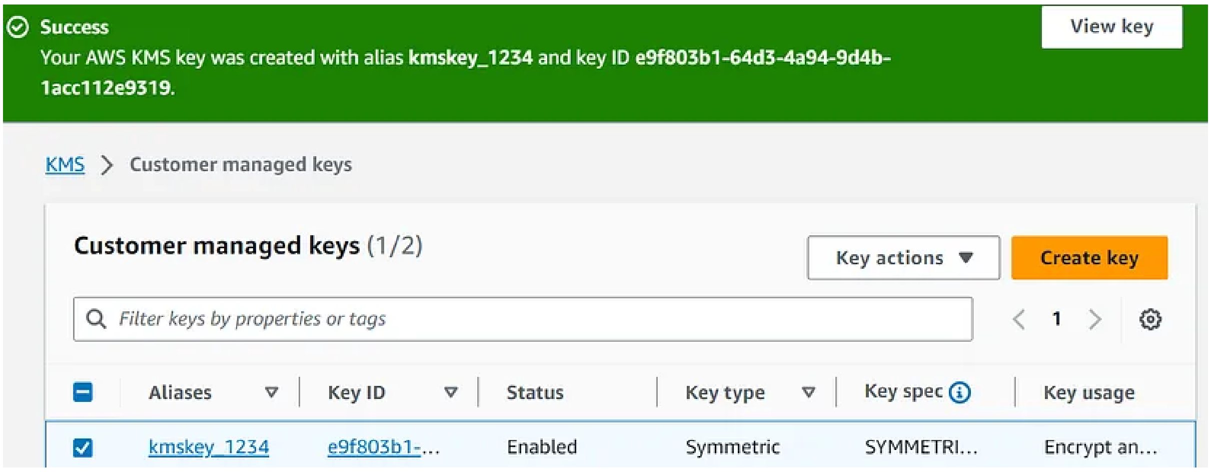
Task 2. Lets Create KMS Keys

➥ Go to Services menu on the top. Click on Key Management Service under the Security, Identity, & Compliance section.

In the KMS console, navigate to Customer managed keys and click on Create Key.

- Select the Key Type as Symmetric and click on Next.

- Under the Add Labels, give the following details:
- Alias: Enter kmskey_1234(Change the name, if there is a key present with the same name)
- Description: Enter *Used for RDS Snapshot exports to S3 of the "database-demo" DB Instance*
- Click on Next.
- Leave Define key administrative permissions as default and click on Next.
- Leave Define key usage permissions as default and click on Next.
- Click on the Finish button.
- Click on the created KMS key. Copy the ARN and keep it for future reference.



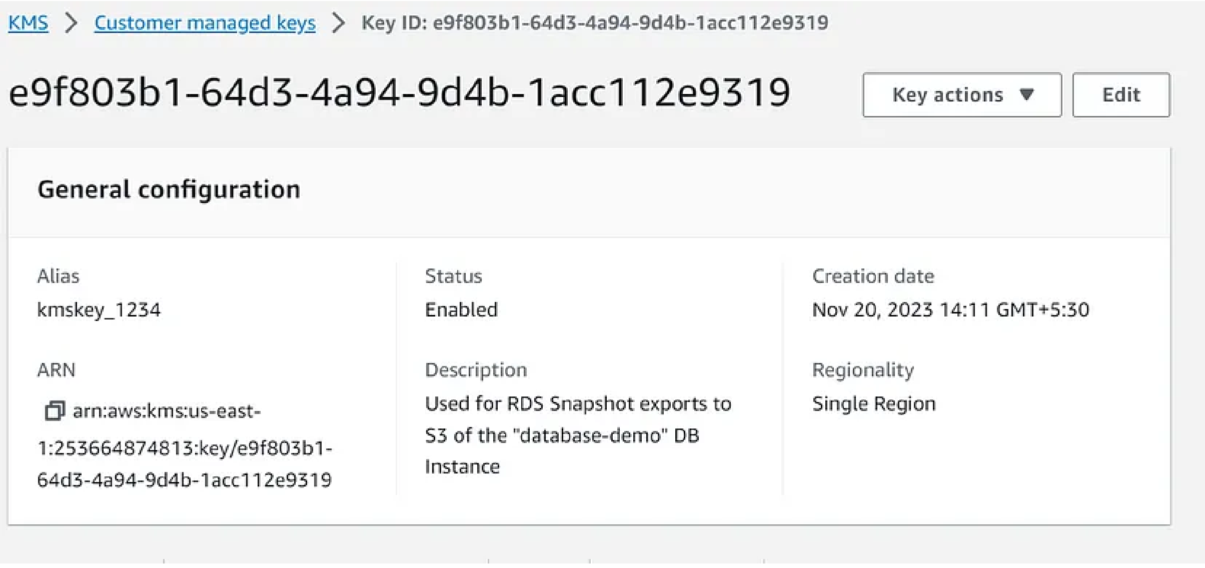
Success

Your AWS KMS key was created with alias **kmskey_1234** and key ID **e9f803b1-64d3-4a94-9d4b-1acc112e9319**.

KMS > Customer managed keys

Customer managed keys (1/2)

☐	Aliases	Key ID	Status	Key type	Key spec	Key usage
☑	kmskey_1234	e9f803b1-...	Enabled	Symmetric	SYMMETRI...	Encrypt an...



KMS > Customer managed keys > Key ID: e9f803b1-64d3-4a94-9d4b-1acc112e9319
Key actions ▼
Edit

e9f803b1-64d3-4a94-9d4b-1acc112e9319

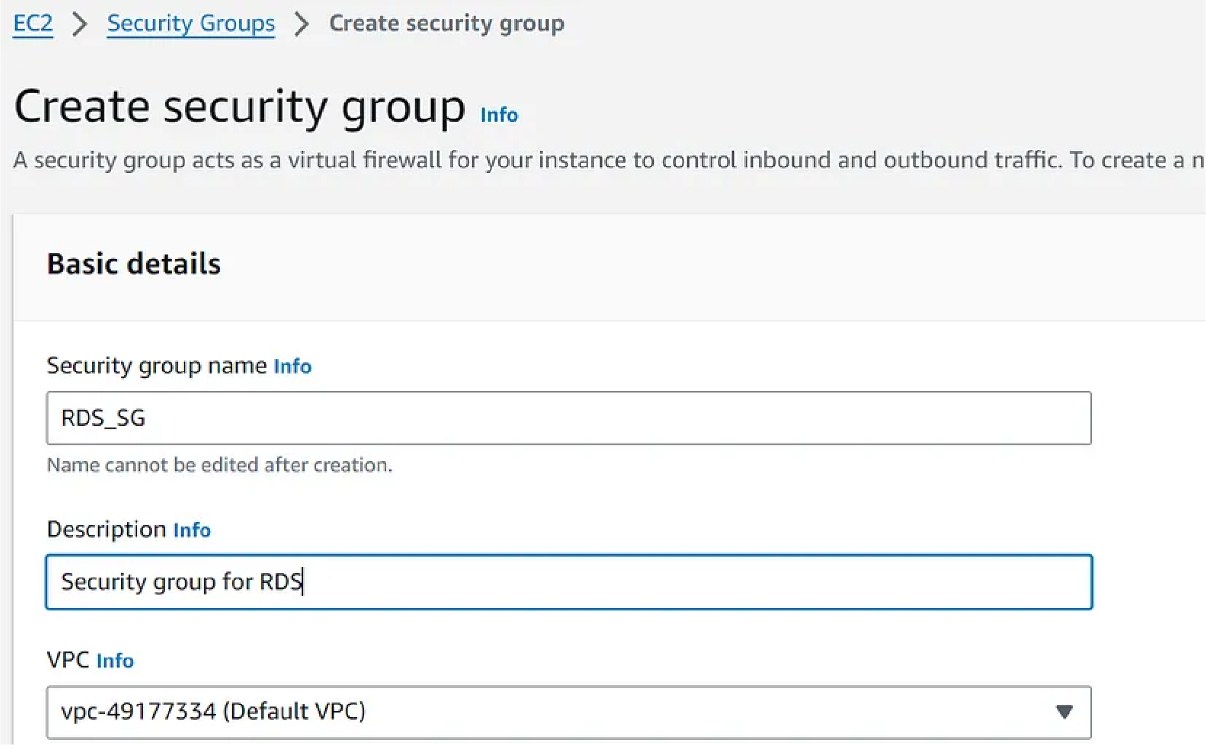
General configuration

Alias kmskey_1234	Status Enabled	Creation date Nov 20, 2023 14:11 GMT+5:30
ARN arn:aws:kms:us-east-1:253664874813:key/e9f803b1-64d3-4a94-9d4b-1acc112e9319	Description Used for RDS Snapshot exports to S3 of the "database-demo" DB Instance	Regionality Single Region

Task 3. Lets create security group for RDS DB Instance

➥ Go to the Services menu, under the Compute section, click on EC2

- On the left panel menu, select the security group under the Network & Security section.
- Click on create security group
- Give security group name as RDS_SG
- Description as “Security group for RDS”



EC2 > Security Groups > Create security group

Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a n

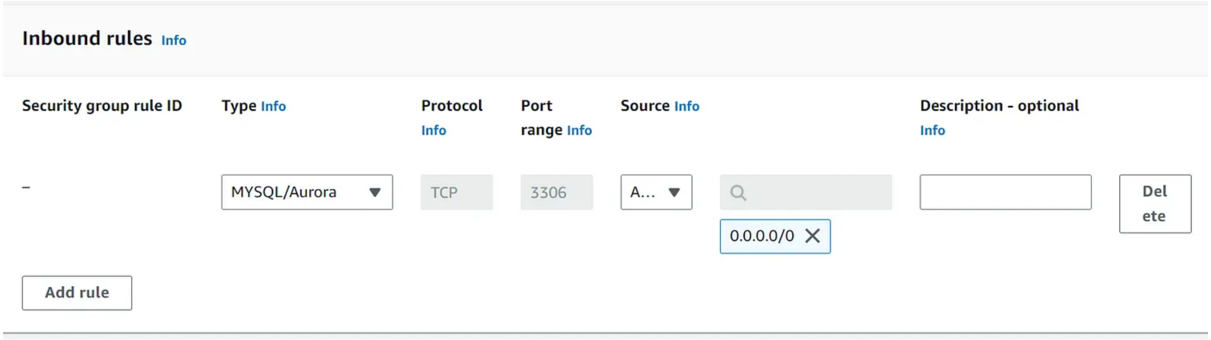
Basic details

Security group name Info: RDS_SG

Name cannot be edited after creation.

Description Info: Security group for RDS

VPC Info: vpc-49177334 (Default VPC)



Inbound rules Info

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info		Description - optional Info	
–	MYSQL/Aurora	TCP	3306	A...	0.0.0.0/0		Delete

- In the inbound rules
- Type: Select MYSQL/Aurora
- Source: Select Custom
- In the textbox add 0.0.0.0/0
- Click on create Security Group

Task 4. Create an Amazon RDS DB Instance

➥ Go to the Services menu at the top left corner and click on RDS present under the Database section.

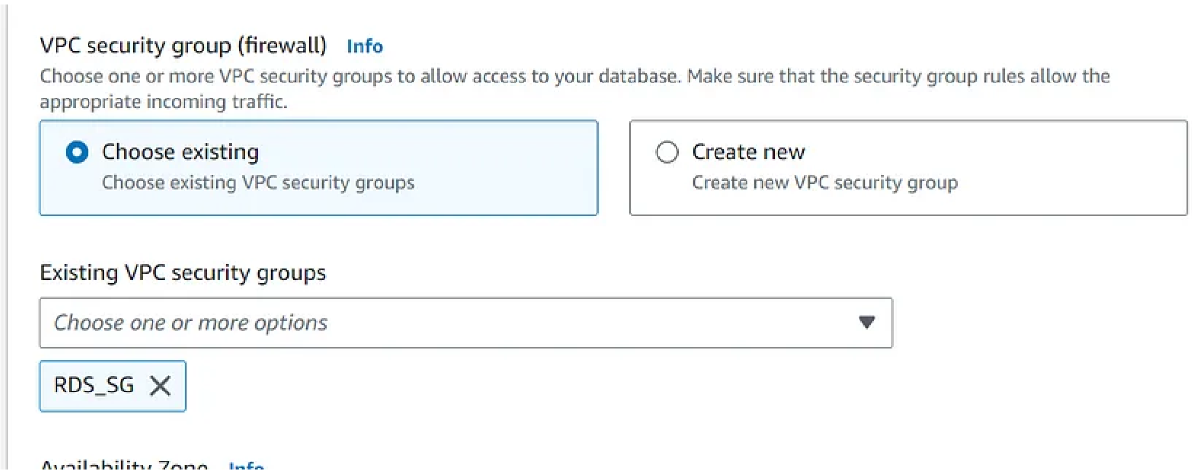
- Click on the Create database button
- Click on the option Standard create
- Engine options, select MySQL engine type
- Under Templates, select Free tier option.
- Under Settings, provide the following details.
- DB cluster identifier: Enter: labdatabase
- Master username: Enter admin
- Master password: Enter Admin*123*
- Confirm password: Enter Admin*123*

Note — Make sure the master and confirm passwords should be the same. Make a note of the username and password for later use.

- Under DB instance class, select Burstable classes (including t classes) and select db.t3.micro
- Under Storage,
- Storage type: General Purpose (SSD)
- Allocated storage: 20

- Uncheck Enable storage autoscaling
- Under Connectivity:
- Network & Security
- Virtual Private Cloud (VPC): default VPC
- Subnet group: default
- Public accessibility: Choose Yes (Important)
- VPC security groups: Select Choose existing

  Remove the default one and select *RDS_SG* instead.



VPC security group (firewall) Info

Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate incoming traffic.

● Choose existing
Choose existing VPC security groups

○ Create new
Create new VPC security group

Existing VPC security groups

Choose one or more options ▼

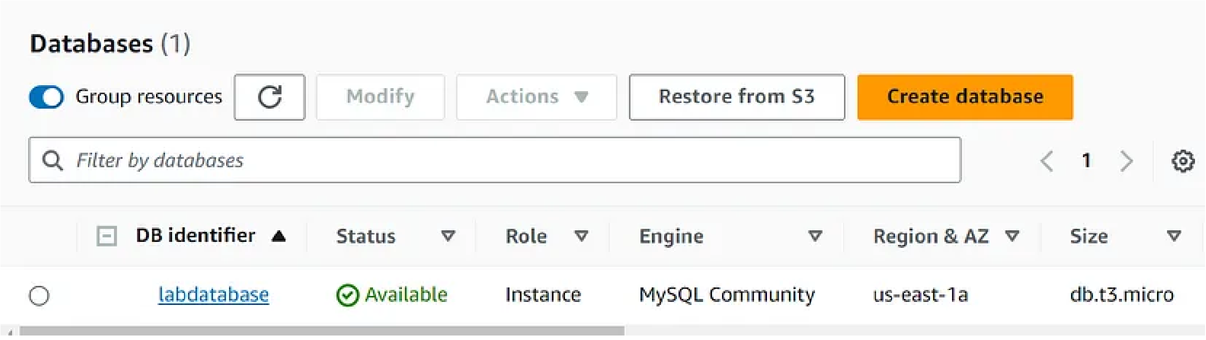
RDS_SG ✕

Availability Zone Info

- Availability zone: default No Preference
- Leave Database Authentication as default.
- Expand the Additional configuration.

▶ Additional configuration

- In the displayed layout provide the following values under Database options.
- Initial database name: Enter *demodb*
- Leave DB parameter group and Option group as default.
- Under Backup, uncheck Enable automated backups.
- Leave other settings as default.
- Uncheck Deletion protection.
- Click on Create database button to create the database. This process does take time between 5–10 minutes.
- Once the database is created the status changes to Available.



Databases (1)

	DB identifier ▲	Status	Role	Engine	Region & AZ	Size
○	labdatabase	✓ Available	Instance	MySQL Community	us-east-1a	db.t3.micro

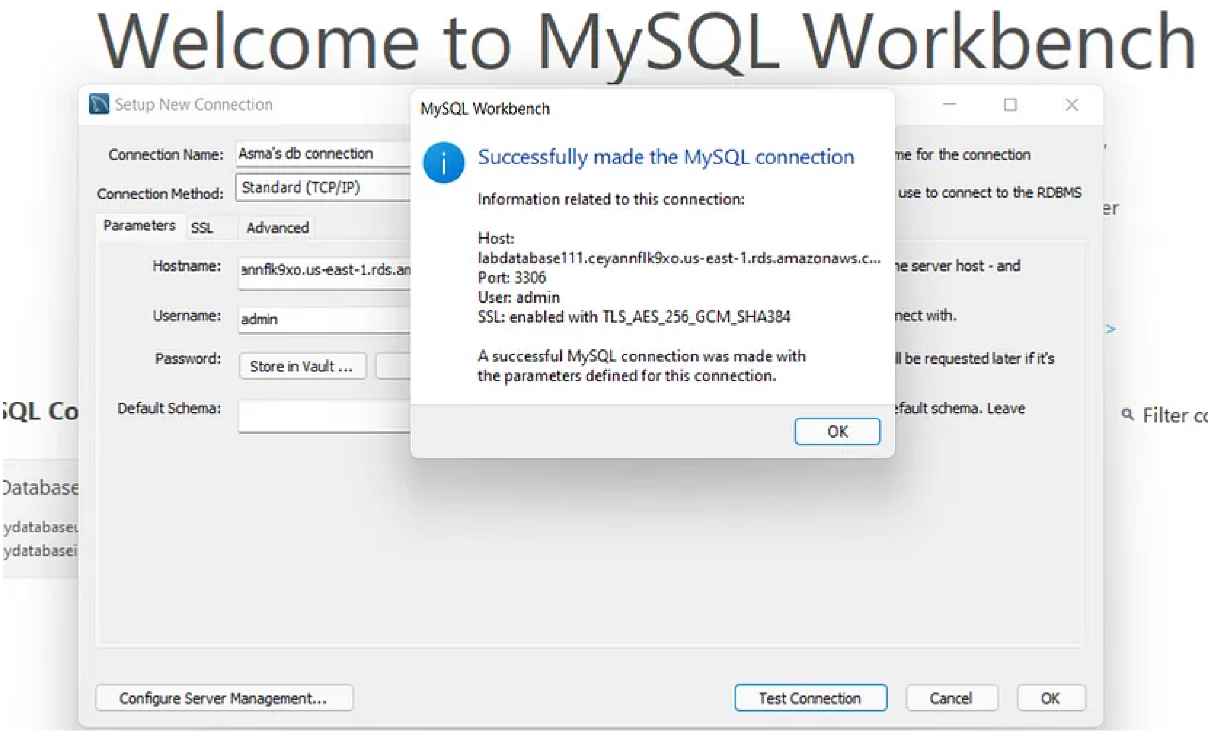
Task 5. Connect to the RDS Database using the MySQL Workbench

Now we will connect to a database on a MySQL DB instance using MySQL monitor commands. One GUI-based application you can use to connect is MySQL workbench, which you have already downloaded and installed based on instructions in the prerequisite section.

➥ To connect to a database on a DB instance using MySQL monitor, find the endpoint (DNS name) and port number for your DB Instance.

- Navigate to Databases and click on the created demo-db.
- Under the Connectivity & security section, copy and note the endpoint and port.
- Endpoint: labdatabase.cq8cqq2aweg7.us-east-1.rds.amazonaws.com
- Port: 3306
- You need both the endpoint and the port number to connect to the DB instance.
- Open MySQL Workbench. Click on the MYSQL Connection plus icon.
- Connection Name: Enter a sample name *MyDBConnection*.
- Host Name: Enter the endpoint: mydatabaseinstance.cdegnvsebaim.us-east-1.rds.amazonaws.com
- Port: 3306
- Username: Enter *admin*
- Password: Click on Store in the keychain and enter a password — *Admin123*. Click on Ok.

- After successfully connecting and opening the database, you can create tables and perform various queries over the connected database.



Connection Name: Asma's db connection

Connection Method: Standard (TCP/IP)

Hostname: annfk9xo.us-east-1.rds.an

Username: admin

Password: Store in Vault ...

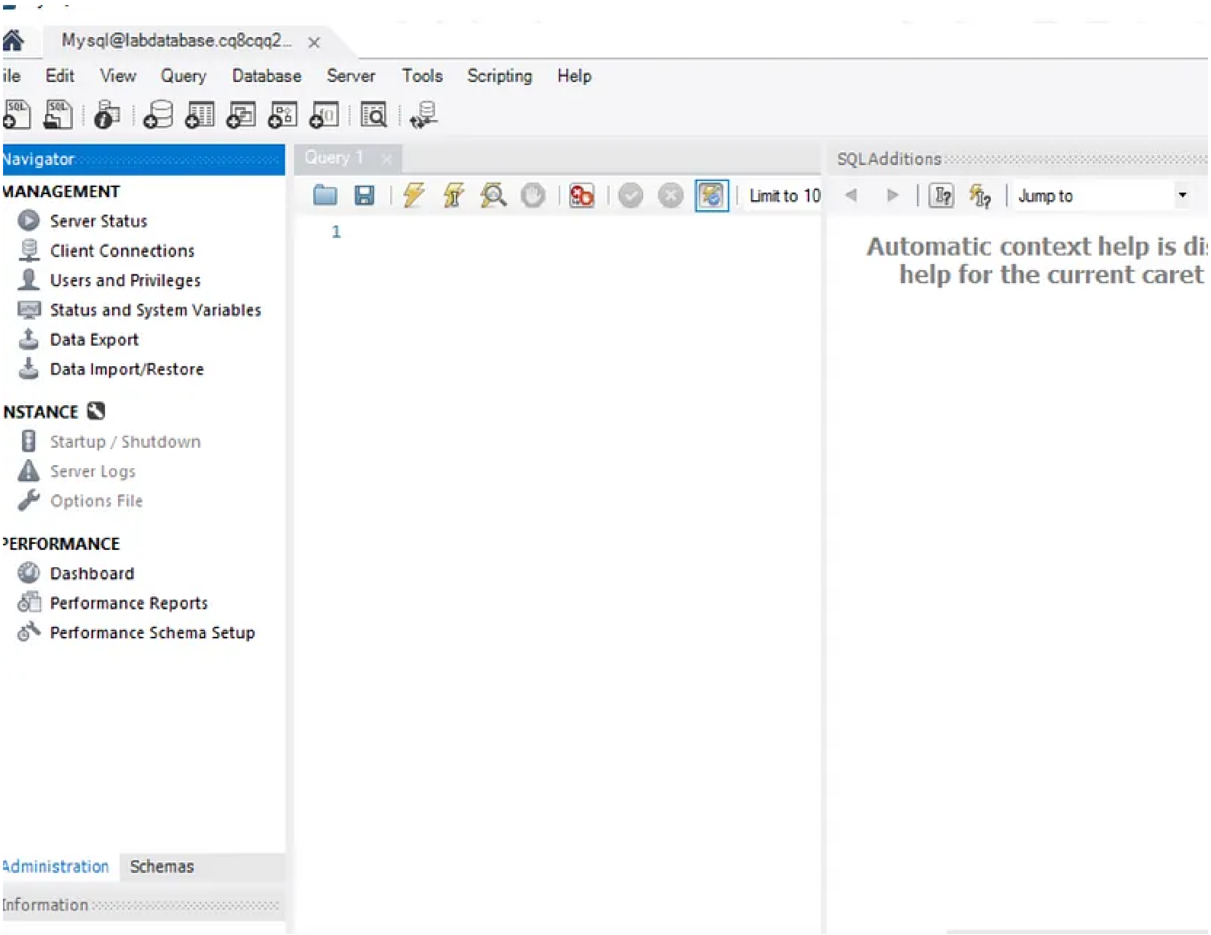
Default Schema:

Successfully made the MySQL connection

Information related to this connection:

Host:
labdatabase111.ceyannflk9xo.us-east-1.rds.amazonaws.c...
Port: 3306
User: admin
SSL: enabled with TLS_AES_256_GCM_SHA384

A successful MySQL connection was made with
the parameters defined for this connection.

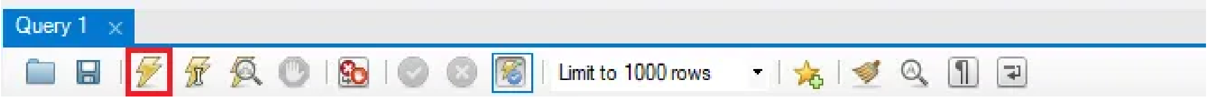


Automatic context help is di
help for the current caret

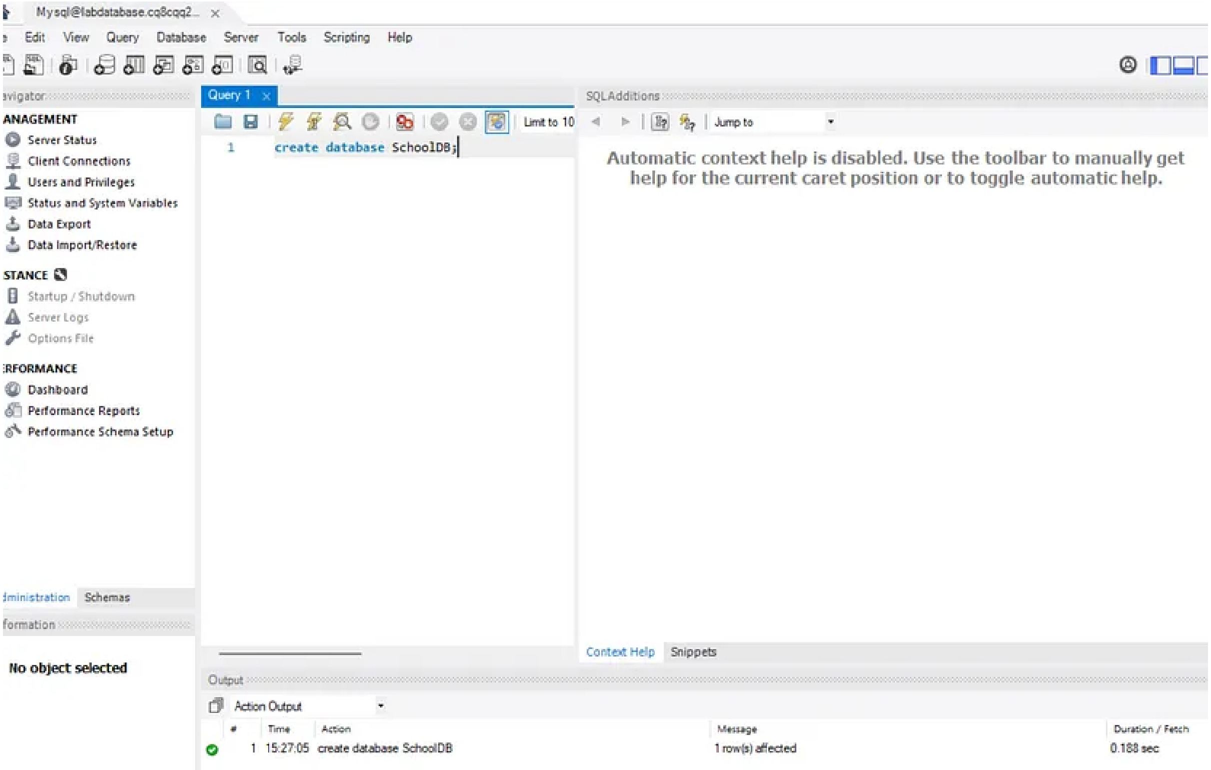
Task 6. Create a sample database and a table

➥ In the SQL Editor, let us create a sample database and a table for demo purposes.

- Note: After executing every command, it is necessary to clear the editor and proceed to the next command.
- For executing the command press the icon as shown below in the image.



- To see the changes after every execution, click on the Refresh button, right to the SCHEMAS.
- Note: Please copy-paste the SQL queries carefully, double-check, and remove extra whitespaces.
- Create a database:



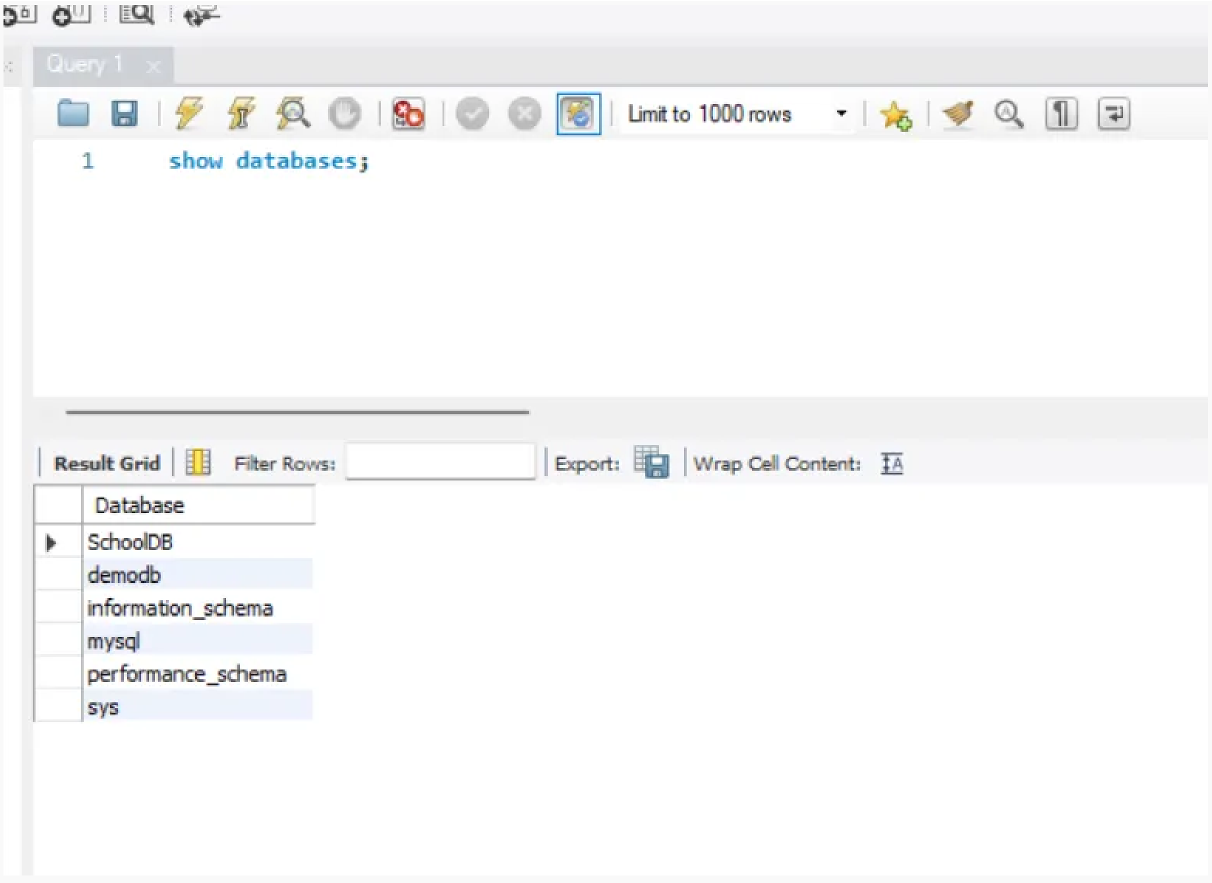
```
create database SchoolDB;
```

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

```
1  15:27:05  create database SchoolDB    1 row(s) affected    0.188 sec
```

```
CREATE DATABASE SchoolDB;
```

```
show databases;
```



```
show databases;
```

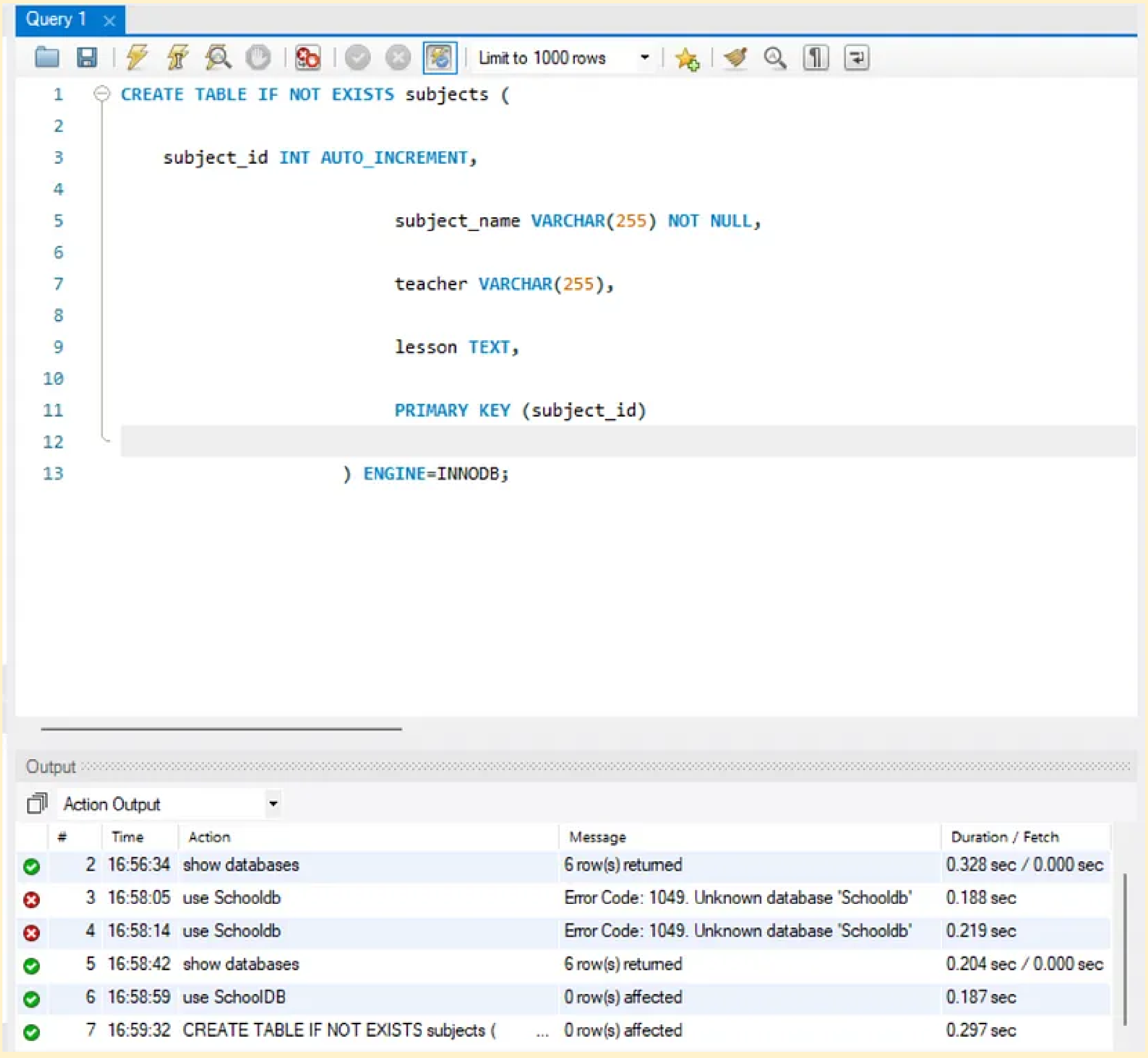
Database
SchoolDB
demodb
information_schema
mysql
performance_schema
sys

- Switch to the database named SchoolDB.

```
use Schooldb;
```

. Create a sample table consisting of Subjects.

```
CREATE TABLE IF NOT EXISTS subjects (
  subject_id INT AUTO_INCREMENT,
                subject_name VARCHAR(255) NOT NULL,
                teacher VARCHAR(255),
                lesson TEXT,
                PRIMARY KEY (subject_id)
             ) ENGINE=INNODB;
```



```
CREATE TABLE IF NOT EXISTS subjects (

    subject_id INT AUTO_INCREMENT,

                          subject_name VARCHAR(255) NOT NULL,

                          teacher VARCHAR(255),

                          lesson TEXT,

                          PRIMARY KEY (subject_id)

                      ) ENGINE=INNODB;
```

	#	Time	Action	Message	Duration / Fetch
✓	2	16:56:34	show databases	6 row(s) returned	0.328 sec / 0.000 sec
✗	3	16:58:05	use Schooldb	Error Code: 1049. Unknown database 'Schooldb'	0.188 sec
✗	4	16:58:14	use Schooldb	Error Code: 1049. Unknown database 'Schooldb'	0.219 sec
✓	5	16:58:42	show databases	6 row(s) returned	0.204 sec / 0.000 sec
✓	6	16:58:59	use SchoolDB	0 row(s) affected	0.187 sec
✓	7	16:59:32	CREATE TABLE IF NOT EXISTS subjects (...	0 row(s) affected	0.297 sec

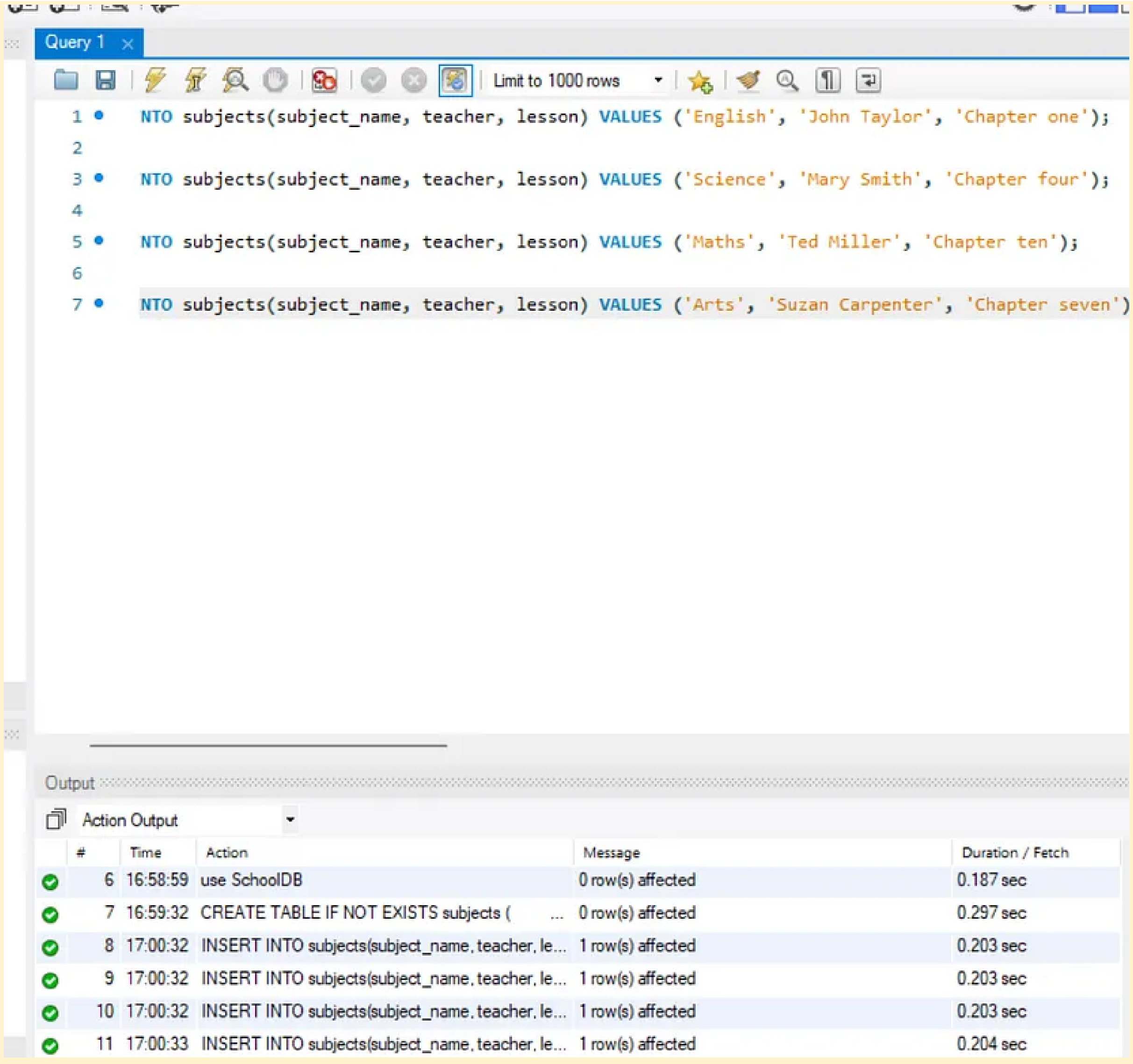
Insert some details into the table executing one after the other:

```
INSERT INTO subjects(subject_name, teacher, lesson) VALUES
('English', 'John Taylor', 'Chapter one');
```

```
INSERT INTO subjects(subject_name, teacher, lesson) VALUES
('Science', 'Mary Smith', 'Chapter four');
```

```
INSERT INTO subjects(subject_name, teacher, lesson) VALUES
('Maths', 'Ted Miller', 'Chapter ten');
```

```
INSERT INTO subjects(subject_name, teacher, lesson) VALUES
('Arts', 'Suzan Carpenter', 'Chapter seven');
```



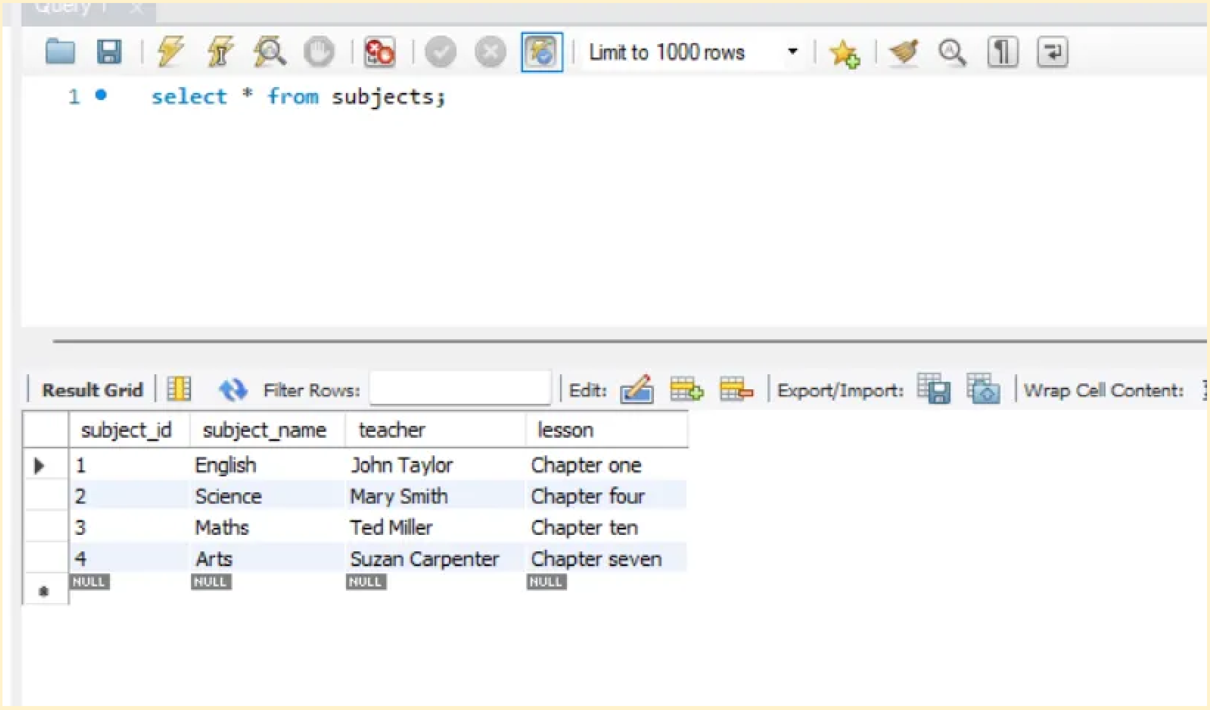
```
NTO subjects(subject_name, teacher, lesson) VALUES ('English', 'John Taylor', 'Chapter one');

NTO subjects(subject_name, teacher, lesson) VALUES ('Science', 'Mary Smith', 'Chapter four');

NTO subjects(subject_name, teacher, lesson) VALUES ('Maths', 'Ted Miller', 'Chapter ten');

NTO subjects(subject_name, teacher, lesson) VALUES ('Arts', 'Suzan Carpenter', 'Chapter seven')
```

	#	Time	Action	Message	Duration / Fetch
✓	6	16:58:59	use SchoolDB	0 row(s) affected	0.187 sec
✓	7	16:59:32	CREATE TABLE IF NOT EXISTS subjects (...	0 row(s) affected	0.297 sec
✓	8	17:00:32	INSERT INTO subjects(subject_name, teacher, le...	1 row(s) affected	0.203 sec
✓	9	17:00:32	INSERT INTO subjects(subject_name, teacher, le...	1 row(s) affected	0.203 sec
✓	10	17:00:32	INSERT INTO subjects(subject_name, teacher, le...	1 row(s) affected	0.203 sec
✓	11	17:00:33	INSERT INTO subjects(subject_name, teacher, le...	1 row(s) affected	0.204 sec



```
select * from subjects;
```

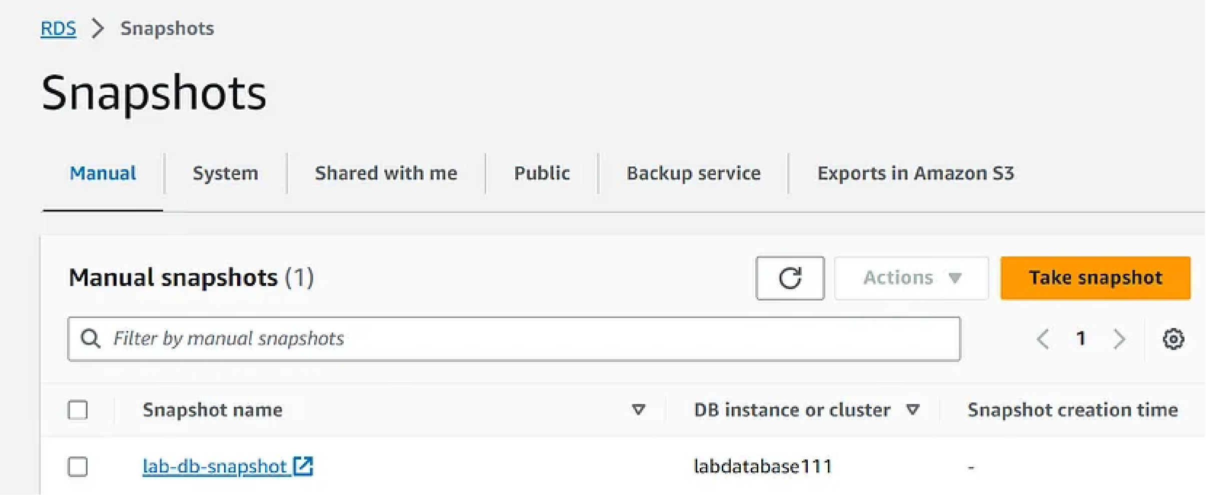
subject_id	subject_name	teacher	lesson
1	English	John Taylor	Chapter one
2	Science	Mary Smith	Chapter four
3	Maths	Ted Miller	Chapter ten
4	Arts	Suzan Carpenter	Chapter seven
NULL	NULL	NULL	NULL

We have created a sample database and table. Close the database connection by clicking on the x symbol.

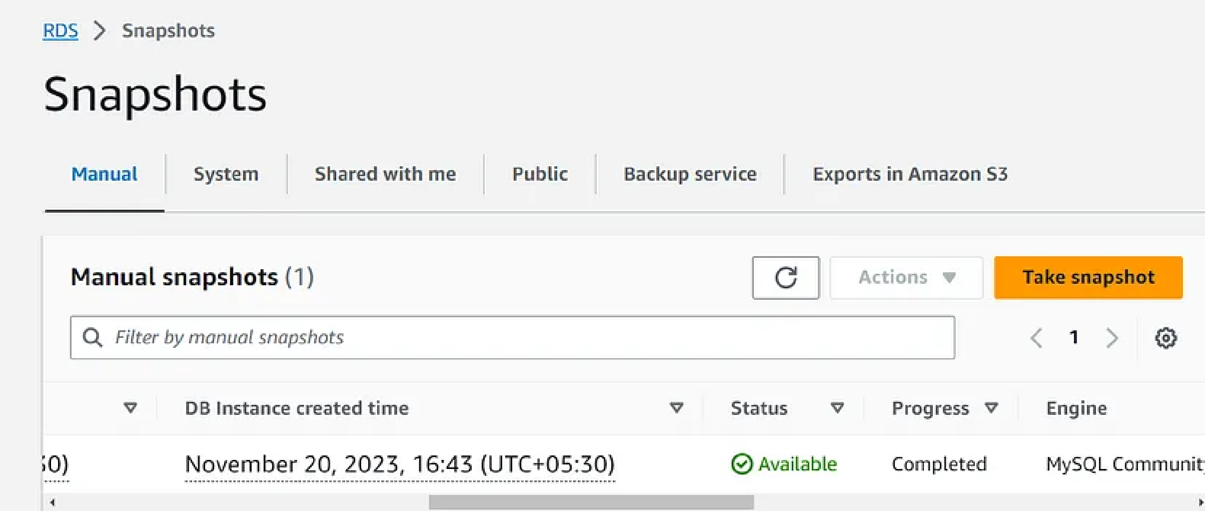
Task 7: Take a Snapshot from the existing DB Instance

➥ Let us take a snapshot of the database.

1. Select the created DB Instance and click on Actions.
2. Click Take snapshot from the options.
3. Give a name to the snapshot, lab-db-snapshot (give a unique name for validation report purposes) and click on the Take snapshot button.
4. The snapshot creation takes 3–5 minutes. Refresh after some time, the snapshot creation status will be Available.



□	Snapshot name	DB instance or cluster	Snapshot creation time
□	lab-db-snapshot	labdatabase111	-

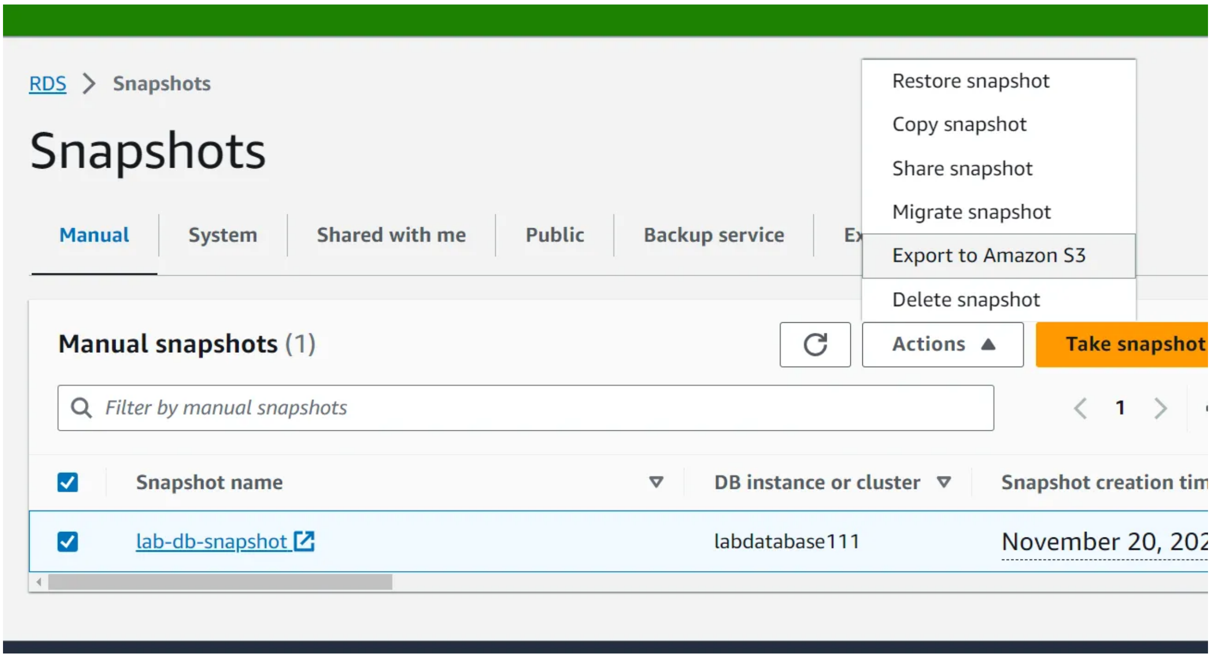


	DB Instance created time	Status	Progress	Engine
;0)	November 20, 2023, 16:43 (UTC+05:30)	✓ Available	Completed	MySQL Communit

Task 8: Export the DB snapshot to S3

➥ Let us export the snapshot to S3.

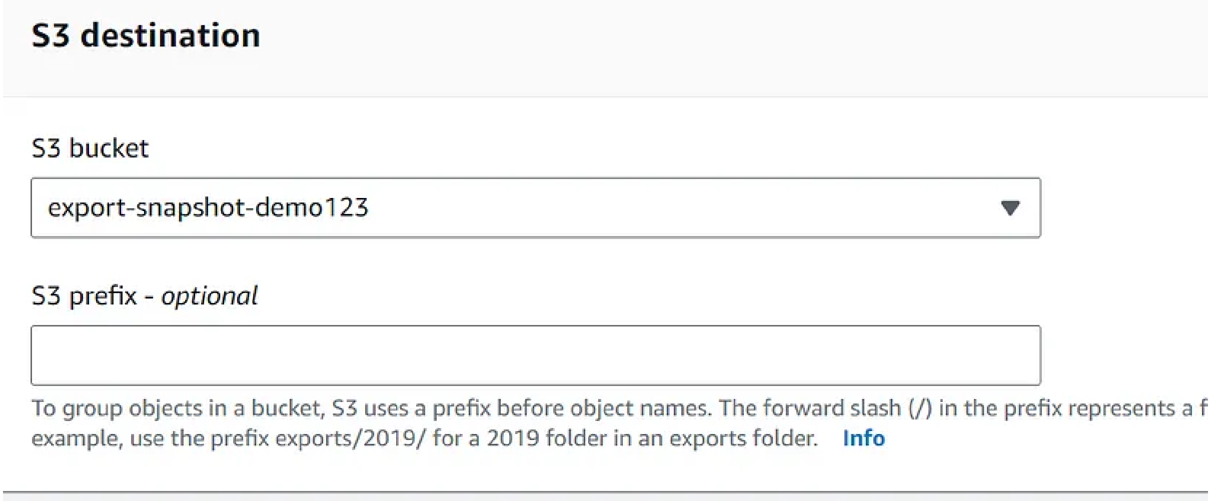
1. Select the created snapshot and click on the Actions.
2. Click on Export to Amazon S3 from the options.



☑	Snapshot name	DB instance or cluster	Snapshot creation tim
☑	lab-db-snapshot	labdatabase111	November 20, 202

Under Settings, give a name to identify the export:

- Export Identifier: Enter snap-export-s3
- Leave the Exported data as default.
- Under the S3 destination, select the created S3 from the drop-down.
- Under IAM Role, choose to create a new role from the drop-down and give a name to the role as export-iam-role.
- Note: Do not select any other IAM role present. Choose to create a new role only.



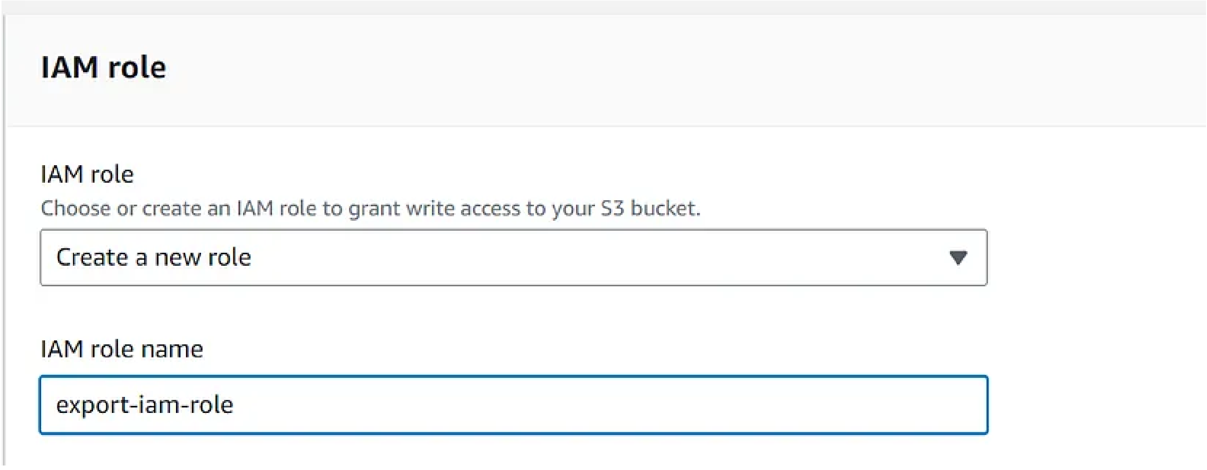
S3 destination

S3 bucket

export-snapshot-demo123

S3 prefix - *optional*

To group objects in a bucket, S3 uses a prefix before object names. The forward slash (/) in the prefix represents a f
example, use the prefix exports/2019/ for a 2019 folder in an exports folder. Info



IAM role

IAM role

Choose or create an IAM role to grant write access to your S3 bucket.

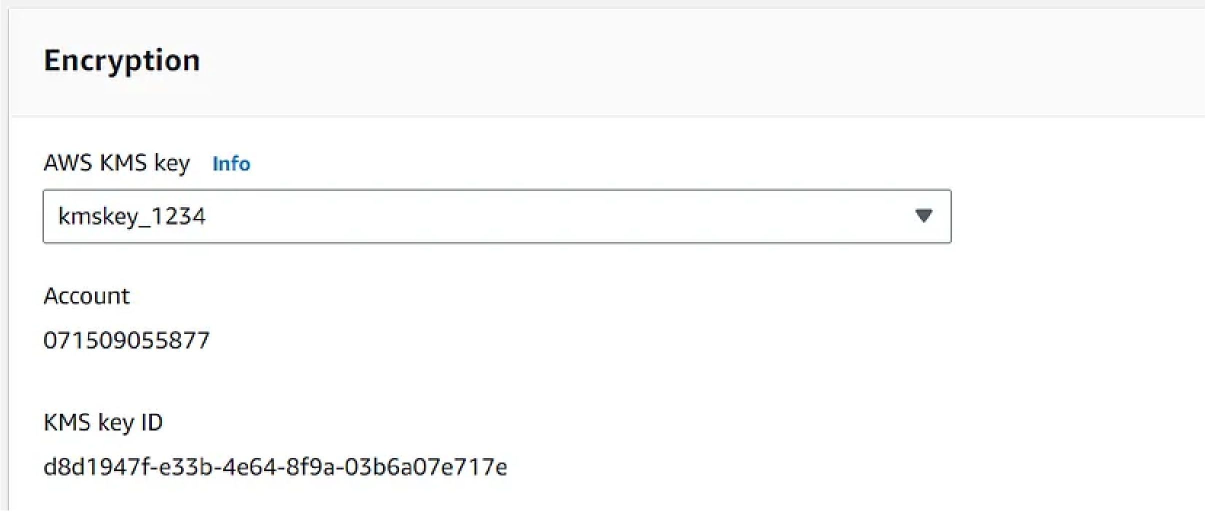
Create a new role

IAM role name

export-iam-role

Select the created KMS key from the drop-down or enter the ARN that we noted while creating the key.

- Note: There may be other keys present, select the one you created in previous steps.



Encryption

AWS KMS key

kmskey_1234

Account

071509055877

KMS key ID

d8d1947f-e33b-4e64-8f9a-03b6a07e717e

Review all the settings and click on Export to Amazon S3.

- This may take upto 20–25 minutes as it is exporting the whole database. You can see a Complete status once the export is done.

Note: You will be seeing other exports also in the Export to Amazon S3 tab. The reason is, we cannot delete them. Ignore the other exports done, if you see them.

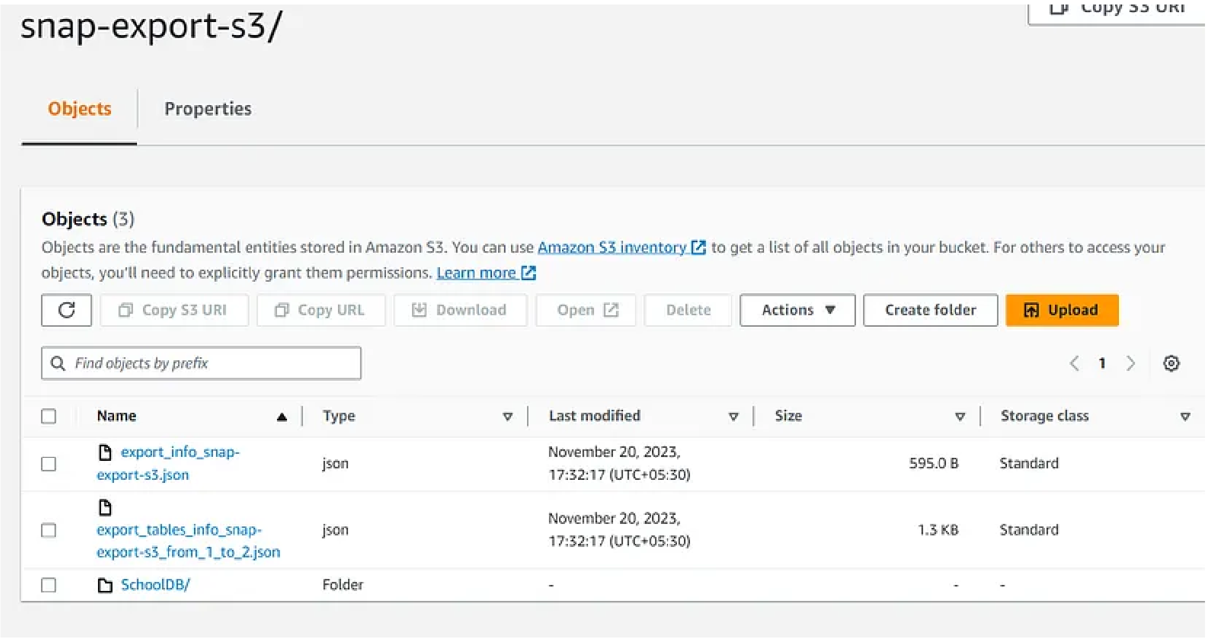
Task 9. Check the exported data in Amazon S3

- Once the export is completed, navigate to the created S3 Bucket.
- You will be able to see a folder with the name of the export identifier.
- When clicked on that, you can see 2 JSON files.

- The First JSON file is the final report of the export task.
- The Second JSON file gives us information about the individual table including overall size and the data type mappings.
- You can see the SchoolDB database we created earlier.
- The First JSON file is the final report of the export task.

In this way, we can export the snapshots to S3.

Cross-Region Snapshot Exports: By default, you can export an RDS DB snapshot to an S3 bucket in the same AWS Region. However, if you need to export the snapshot to an S3 bucket in a different AWS Region, you can leverage the AWS Data Pipeline service. It allows you to create a pipeline that copies the snapshot to a different region.



snap-export-s3/

Objects (3)

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

□	Name	Type	Last modified	Size	Storage class
□	export_info_snap-export-s3.json	json	November 20, 2023, 17:32:17 (UTC+05:30)	595.0 B	Standard
□	export_tables_info_snap-export-s3_from_1_to_2.json	json	November 20, 2023, 17:32:17 (UTC+05:30)	1.3 KB	Standard
□	SchoolDB/	Folder	-	-	-

This is how the RDS snapshot is successfully exported to S3 bucket.

Don’t forget to delete the RDS database and S3 bucket to prevent you from incurring costs.

Dear Friends, Thank you for reading all the way through. I hope you liked the blog.