

## Insert, Update, and Delete Data in a Database

### Scenario

The database operations team has created a relational database called **world** containing three tables: **city**, **country**, and **countrylanguage**. You have to validate the configuration of the database by running **INSERT**, **UPDATE**, and **DELETE** statements on the **country** table.

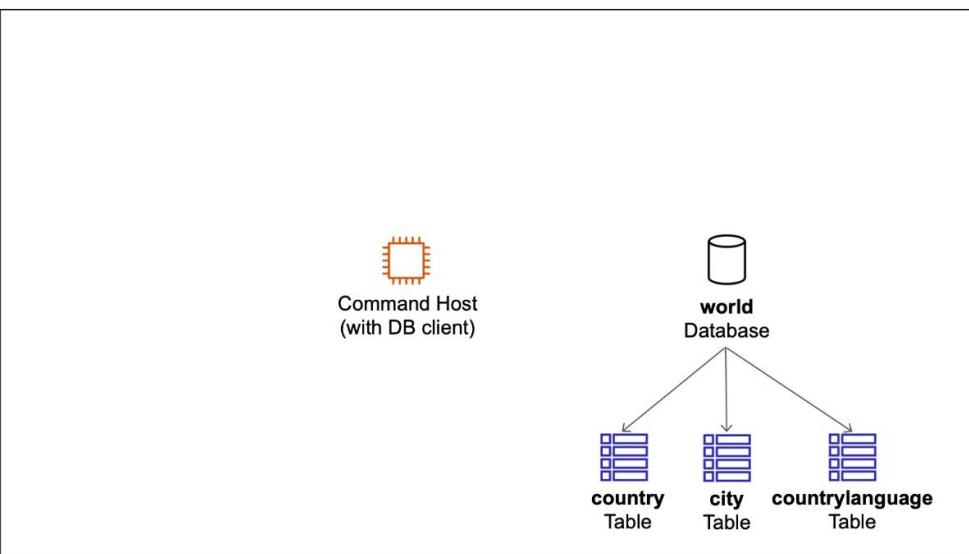
### Lab overview and objectives

This lab demonstrates how to insert, update, delete, and import rows of data using structured query language (SQL).

After completing this lab, you will be able to:

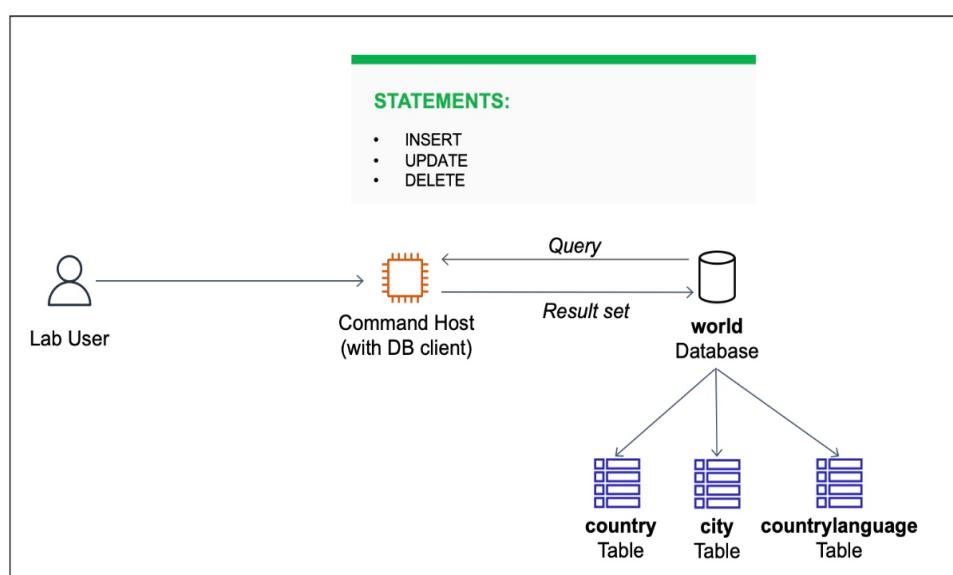
- Insert rows into a table
- Update rows in a table
- Delete rows from a table
- Import rows from a database backup file

When you start this lab, the following resources are already created for you:



A Command Host instance and world database containing three tables

At the end of this lab, your architecture will look like the following example:



A lab user is connected to a database instance. Insert, Update, and Delete operations are shown.

Sample data in this course is taken from Statistics Finland, general regional statistics, February 4, 2022.

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## 1. Connect to a database

```
sh-4.2$ sudo su
[root@ip-10-1-11-78 ~]# cd /home/ec2-user/
[root@ip-10-1-11-78 ec2-user]# mysql -u root --password='re:St@rt!9'
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 15
Server version: 10.5.29-MariaDB MariaDB Server

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

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

MariaDB [(none)]> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| world |
+-----+
4 rows in set (0.003 sec)

MariaDB [(none)]>
```

I connected to a database

Here's what happened:

1. Accessed the Command Host: I went to the AWS Management Console and chose the EC2 instance labeled "Command Host".
2. Connected to the instance: I used the Session Manager tab to connect to the instance and opened a terminal window.
3. Configured the terminal: I ran commands to set up the terminal and access the required tools.
4. Connected to the database: I used the mysql command with a username (root) and password (re:St@rt!9) to connect to the database instance.
5. Viewed existing databases: Ran the SHOW DATABASES; command to see the currently available databases.

What this means:

- I'm now connected to a database instance and can interact with it using SQL commands.
- I've seen the existing databases and can work with them as needed.

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## 2. Insert data into a table

```
+-----+
| information_schema |
| mysql |
| performance_schema |
| world |
+-----+
4 rows in set (0.003 sec)

MariaDB [(none)]> SELECT * FROM world.country;
Empty set (0.001 sec)

MariaDB [(none)]> INSERT INTO world.country VALUES ('IRL','Ireland','Europe','British Islands',70273.00,1921,3775100,76.8,75921.00,73132.00,'Ireland/ire','Republic',1447,'IE');
Query OK, 1 row affected (0.003 sec)

MariaDB [(none)]>
MariaDB [(none)]> INSERT INTO world.country VALUES ('AUS','Australia','Oceania','Australia and New Zealand',7741220.00,1901,18886000,79.8,351182.00,392911.00,'Australia','Constitutional Monarchy, Federation',135,'AU');
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]>
MariaDB [(none)]> SELECT * FROM world.country WHERE Code IN ('IRL', 'AUS');
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Code | Name      | Continent | Region           | SurfaceArea | IndepYear | Population | LifeExpectancy | GNP       | GNPold    | LocalName   | GovernmentForm |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| AUS | Australia | Oceania   | Australia and New Zealand | 7741220.00 | 1901 | 18886000 | 79.8 | 351182.00 | 392911.00 | Australia | Constitutional Monarchy, Federation |
| IRL | Ireland   | Europe     | British Islands          | 70273.00   | 1921 | 3775100  | 76.8 | 75921.00  | 73132.00  | Ireland/ire | Republic |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.000 sec)

MariaDB [(none)]>
```

I added data to a table

Here's what happened:

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1. Checked if the table exists: Ran a command SELECT \* FROM world.country; to see if the country table is there and what data it contains.
2. Inserted new data: Used the INSERT INTO command to add two new countries to the country table:
  - Ireland (IRL)
  - Australia (AUS)
3. Verified the data: Ran another command (SELECT \* FROM world.country WHERE Code IN ('IRL', 'AUS')); to check if the two new rows were successfully added.

What this means:

- The country table now has two new rows with data about Ireland and Australia.
- The data includes information like: country code, name, continent, region, population, lifeexpectancy, gnp, gnpold, localname, government, capital and code2.

The table above on how it looks like now:

Everything looks good!

---

### 3. Update rows in a table

```
MariaDB [(none)]> UPDATE world.country SET Population = 0;
Query OK, 2 rows affected (0.001 sec)
Rows matched: 2 Changed: 2 Warnings: 0

MariaDB [(none)]> SELECT * FROM world.country;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Code | Name      | Continent | Region          | SurfaceArea | IndepYear | Population | LifeExpectancy | GNP        | GNPOld     | LocalName   | GovernmentForm |
|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| AUS | Australia | Oceania   | Australia and New Zealand | 7741220.00 | 1901    | 0          | 79.8       | 351182.00 | 392911.00 | Australia   | Constitutional Monarchy, Federation |
| IRL | Ireland   | Europe    | British Islands           | 70273.00   | 1921    | 0          | 76.8       | 75921.00  | 73132.00   | Ireland/Ire | Republic    |
|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.000 sec)

MariaDB [(none)]> UPDATE world.country SET Population = 100, SurfaceArea = 100;
Query OK, 2 rows affected (0.001 sec)
Rows matched: 2 Changed: 2 Warnings: 0

MariaDB [(none)]> SELECT * FROM world.country;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Code | Name      | Continent | Region          | SurfaceArea | IndepYear | Population | LifeExpectancy | GNP        | GNPOld     | LocalName   | GovernmentForm |
|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| AUS | Australia | Oceania   | Australia and New Zealand | 100.00    | 1901    | 100       | 79.8       | 351182.00 | 392911.00 | Australia   | Constitutional Monarchy, Federation |
| IRL | Ireland   | Europe    | British Islands           | 100.00    | 1921    | 100       | 76.8       | 75921.00  | 73132.00   | Ireland/Ire | Republic    |
|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.000 sec)

MariaDB [(none)]>
```

I updated data in a table

Here's what happened:

1. I updated the population of all countries: Ran an UPDATE statement to set the Population column to 0 for all rows in the country table.
2. Verified the update: Ran a SELECT statement to see the updated data, and indeed, the Population column for both countries (Australia and Ireland) was set to 0.
3. Updated multiple columns: Ran another UPDATE statement to set both the Population and SurfaceArea columns to 100 for all rows in the country table.
4. Verified the update again: Ran another SELECT statement to see the updated data, and indeed, both the Population and SurfaceArea columns for both countries were updated to 100.

What this means is:

- The data in the country table was modified using UPDATE statements.
- Without a WHERE clause, the UPDATE statement affects all rows in the table.
- I can use SELECT statements to verify that the data was updated correctly.

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The table now looks like the one above:

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### 4. Delete rows from a table

```
2 rows in set (0.000 sec)

MariaDB [(none)]> SET FOREIGN_KEY_CHECKS = 0;
Query OK, 0 rows affected (0.000 sec)

MariaDB [(none)]> DELETE FROM world.country;
Query OK, 2 rows affected (0.001 sec)

MariaDB [(none)]> SELECT * FROM world.country;
Empty set (0.000 sec)

MariaDB [(none)]>
```

Deleted rows from a table

Here's what happened:

1. Foreign key checks were disabled using SET FOREIGN\_KEY\_CHECKS = 0; to temporarily bypass data consistency checks between tables.
2. All rows were deleted from the country table using DELETE FROM world.country;. Without a WHERE clause, all rows were affected.
3. The deletion was verified using SELECT \* FROM world.country; to confirm all rows were deleted.

What this means:

- All data in the country table is gone.
- The table is now empty, with no rows.

Important note:

- Using DELETE statements without a WHERE clause can be risky, as it deletes all rows in the table.
- Backing up data before making large changes is a good practice.

The table is now empty, and the SELECT statement should return no results.

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### 5. Import data using an SQL file

```
MariaDB [(none)]> QUIT;
Bye
[root@ip-10-1-11-180 ec2-user]# ls /home/ec2-user/world.sql
/home/ec2-user/world.sql
[root@ip-10-1-11-180 ec2-user]# ls logs
logs world.sql
[root@ip-10-1-11-180 ec2-user]# mysql -u root --password='re:St@rt!9' < /home/ec2-user/world.sql
[root@ip-10-1-11-180 ec2-user]# USE world;
bash: USE: command not found
[root@ip-10-1-11-180 ec2-user]# SHOW TABLES;
bash: SHOW: command not found
[root@ip-10-1-11-180 ec2-user]# mysql -u root --password='re:St@rt!9'
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 16
Server version: 10.5.29-MariaDB MariaDB Server

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

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

MariaDB [(none)]> USE world;
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
MariaDB [world]> SHOW TABLES;
+-----+
| Tables_in_world |
+-----+
| city           |
| country        |
| countrylanguage |
+-----+
3 rows in set (0.000 sec)

MariaDB [world]>
```

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MariaDB [world]> SELECT * FROM country;										
Code	Name	Continent	Region	GovernmentForm	SurfaceArea	IndepYear	Population	LifeExpectancy	GNP	GN
ABW	Aruba	North America	Caribbean	193.00	NULL	103000	78.4	828.00		
793.00	Aruba	Nonmetropolitan Territory of The Netherlands	Southern and Central Asia	129	AW	1919	22720000	45.9	5976.00	
AFG	Afghanistan	Asia	Islamic Emirate	1	AF					
NULL	Afghanistan	Republic		56	AO					
AGO	Angola	Africa	Central Africa	1246700.00	1975	12878000	38.3	6648.00		
7984.00	Angola	Republic		96.00	AI					
AIA	Anguilla	Dependent Territory of the UK		62	AL					
NULL	Anguilla	Europe	Southern Europe	28748.00	1912	3401200	76.1	63.20		
ALB	Albania	Republic		34	AL					
2500.00	Shqipëria	Europe	Parliamentary Coprincipality	468.00	1278	78000	83.5	1630.00		
AND	Andorra	North America	Caribbean	55	AD					
NULL	Andorra	Republic		800.00	NULL	217000	74.7	1941.00		
ANT	Netherlands Antilles	Asia	Middle East	83600.00	1971	2441000	74.1	37966.00		
NULL	Nederlandse Antillen	Emirate Federation		65	AE					
ARE	United Arab Emirates	South America	Federal Republic	69	AR					
36946.00	United Arab Emirates	Republic		69	AR					
ARG	Argentina	Asia	Middle East	29800.00	1991	3520000	66.4	1813.00		
23310.00	Argentina	Republic		126	AM					
ARM	Armenia	Oceania	Polynesia	199.00	NULL	68000	75.1	334.00		
1627.00	Hajastan	US Territory		54	AS					
ASM	American Samoa	Antarctica	Antarctica	13120000.00	NULL	0	NULL	0.00		
NULL	Amerika Samoa	Co-administrated		7780	AQ					
ATA	Antarctica	Antarctica	Antarctica	NULL	TF					
NULL	-	Nonmetropolitan Territory of France		442	TI					
ATF	French Southern territories	North America	Caribbean	1981	68000	70.5	612.00			
NULL	Terres australes fran�aises	Constitutional Monarchy		63	AG					
ATG	Antigua and Barbuda	Europe	Western Europe	83859.00	1918	8091800	77.7	211860.00	2	
584.00	Antigua and Barbuda	Parliamentary Monarchy		2831	1962	180000	69.2	141.00		
AUT	Austria	Asia	Middle East	527968.00	1918	18112000	59.8	6041.00		
WSM	Samoa	Republic		1780	YE					
157.00	Samoa	Europe	Southern Europe	102173.00	1918	10640000	72.4	17000.00		
YEM	Yemen	Federal Republic		1792	YU					
5729.00	Al-Yaman	Africa	Southern Africa	1221037.00	1910	40377000	51.1	116729.00	1	
YUG	Yugoslavia	Republic		716	ZA					
NULL	Jugoslavia	Africa	Eastern Africa	752618.00	1964	9169000	37.2	3377.00		
ZAF	South Africa	Republic		3162	ZM					
29092.00	South Africa	Africa	Eastern Africa	390757.00	1980	11669000	37.8	5951.00		
ZMB	Zambia	Republic		4068	ZW					
3922.00	Zambia									
ZWE	Zimbabwe									
8670.00	Zimbabwe									

MariaDB [world]>				
MariaDB [world]> SELECT * FROM city;				
ID	Name	Countrycode	District	Population
1	Kabul	AFG	Kabol	1780000
2	Qandahar	AFG	Qandahar	237500
3	Herat	AFG	Herat	186800
4	Mazar-e-Sharif	AFG	Balkh	127800
5	Amsterdam	NLD	Noord-Holland	731200
6	Rotterdam	NLD	Zuid-Holland	593321
7	Haag	NLD	Zuid-Holland	440900
8	Utrecht	NLD	Utrecht	234323
9	Eindhoven	NLD	Noord-Brabant	201843
10	Tilburg	NLD	Noord-Brabant	193238
11	Groningen	NLD	Groningen	172701
12	Breda	NLD	Noord-Brabant	160398
13	Apeldoorn	NLD	Gelderland	153491
14	Nijmegen	NLD	Gelderland	152463
15	Enschede	NLD	Overijssel	149544
16	Haarlem	NLD	Noord-Holland	149772
17	Almere	NLD	Flevoland	142465
18	Arnhem	NLD	Gelderland	138020
19	Zaanstad	NLD	Noord-Holland	135621
20	s-Hertogenbosch	NLD	Noord-Brabant	129170
21	Amersfoort	NLD	Utrecht	126270
22	Maastricht	NLD	Limburg	122087
23	Dordrecht	NLD	Zuid-Holland	119811
24	Leiden	NLD	Zuid-Holland	117196
25	Haarlemmermeer	NLD	Noord-Holland	110722
26	Zoetermeer	NLD	Zuid-Holland	110214
27	Emmen	NLD	Drenthe	105853
28	Zwolle	NLD	Overijssel	105819
29	Ede	NLD	Gelderland	101574
30	Delft	NLD	Zuid-Holland	95268
31	Heerlen	NLD	Limburg	95052

Imported data from an SQL file

Here's what happened:

- Exited the MySQL terminal: The MySQL terminal was closed using the QUIT; command.
- Verified the SQL file: The world.sql file was confirmed to be present in the /home/ec2-user/ directory.
- Imported data from the SQL file: The mysql command was used to execute the SQL statements in the world.sql file, which:
  - Added two new tables (city and countrylanguage) to the database.
  - Inserted data into all three tables (country, city, and countrylanguage).
- Reconnected to the database: The MySQL terminal was reopened and connected to the database.
- Verified the tables and data: The SHOW TABLES; command was used to confirm the presence of the three tables, and SELECT \* FROM country; was used to verify that data was loaded successfully into the country table.

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What this means:

- The database now has three tables with sample data.
- The country table has been populated with more entries.
- The city and countrylanguage tables have been created and populated with data.

The SQL file was used to quickly and efficiently load sample data into the database

I needed to view data in two tables. Here's what I did:

MariaDB [world]> SELECT * FROM city;				
ID	Name	CountryCode	District	Population
1	Kabul	AFG	Kabol	1780000
2	Qandahar	AFG	Qandahar	237500
3	Herat	AFG	Herat	186800
4	Mazar-e-Sharif	AFG	Balkh	127800
5	Amsterdam	NLD	Noord-Holland	731200
6	Rotterdam	NLD	Zuid-Holland	593321
7	Haag	NLD	Zuid-Holland	440900
8	Utrecht	NLD	Utrecht	234323
9	Eindhoven	NLD	Noord-Brabant	201843
10	Tilburg	NLD	Noord-Brabant	193238
11	Groningen	NLD	Groningen	172701
12	Breda	NLD	Noord-Brabant	160398
13	Apeidoorn	NLD	Gelderland	153491
14	Nijmegen	NLD	Gelderland	152463
15	Enschede	NLD	Overijssel	149544
16	Haarlem	NLD	Noord-Holland	148772
17	Almere	NLD	Flevoland	142465
18	Arnhem	NLD	Gelderland	138020
19	Zaanstad	NLD	Noord-Holland	135621
20	's-Hertogenbosch	NLD	Noord-Brabant	129170
21	Amersfoort	NLD	Utrecht	126270
22	Maastricht	NLD	Limburg	122087
23	Dordrecht	NLD	Zuid-Holland	119811
24	Leiden	NLD	Zuid-Holland	117196
25	Haarlemmermeer	NLD	Noord-Holland	110722
26	Zoetermeer	NLD	Zuid-Holland	110214
27	Emmen	NLD	Drenthe	105853
28	Zwolle	NLD	Overijssel	105819
29	Ede	NLD	Gelderland	101574
30	Delft	NLD	Zuid-Holland	95268
31	Heerlen	NLD	Limburg	95052
4074	Gaza	PSE	Gaza	353632
4075	Khan Yunis	PSE	Khan Yunis	123175
4076	Hebron	PSE	Hebron	119401
4077	Jabaliya	PSE	North Gaza	113901
4078	Nabulus	PSE	Nablus	100231
4079	Rafah	PSE	Rafah	92020

Viewed city table data: I ran SELECT \* FROM city; to see the data in the city table.

MariaDB [world]> SELECT * FROM countrylanguage;				
CountryCode	Language	IsOfficial	Percentage	
ABW	Dutch	T	5.3	
ABW	English	F	9.5	
ABW	Vaupiamento	F	76.7	
ABW	Spanish	F	7.4	
AFG	Balochi	F	0.9	
AFG	Dari	T	32.1	
AFG	Pashto	T	52.4	
AFG	Turkmenian	F	1.9	
AFG	Uzbek	F	8.8	
AGO	Ambo	F	2.4	
AGO	Chokwe	F	4.2	
AGO	Kongo	F	13.2	
AGO	Tauchi	F	2.4	
ZWE	English	T	2.2	
ZWE	Ndebele	F	16.2	
ZWE	Nyanja	F	2.2	
ZWE	Shona	F	72.1	

Viewed countrylanguage table data: I ran SELECT \* FROM countrylanguage; to see the data in the countrylanguage table.

Why?

- To check if the data was imported correctly into these tables.

By running these commands, I'll be able to see the data in the city and countrylanguage tables.

## **Conclusion**

I have completed database tasks successfully:

1. Inserted rows: Added new data to a table.
2. Updated rows: Changed existing data in a table.
3. Deleted rows: Removed data from a table.
4. Imported rows: Loaded data from a backup file into the database.

I completed these tasks and now have hands-on experience with basic database operations!

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