

PART 1

1. Download MySQL server for your OS on VM

2. Install MySQL server on VM

```
sudo apt-get update
```

```
sudo apt-get install mysql-server
```

```
sudo apt-get install mysql-client
```

```
sudo mysql -u root
```

3. Select a subject area and describe the database schema, (minimum 3 tables)

4. Create a database on the server through the console

```
CREATE DATABASE osi;
```

```
USE osi;
```

```
CREATE TABLE osi_level (id INT AUTO_INCREMENT PRIMARY KEY, name VARCHAR(20), information_type VARCHAR(20));
```

```
CREATE TABLE protocols (id INT AUTO_INCREMENT PRIMARY KEY, fk_osi int, FOREIGN KEY (fk_osi) REFERENCES osi_level(id), abbreviation VARCHAR(10), name VARCHAR(100));
```

```
CREATE TABLE hardware (id INT AUTO_INCREMENT PRIMARY KEY, fk_osi int, FOREIGN KEY (fk_osi) REFERENCES osi_level(id), name VARCHAR(100));
```

5. Fill in tables

```
INSERT INTO osi_level VALUES (null, 'physical', 'bit');
```

```
INSERT INTO osi_level VALUES (null, 'data-link', 'frame');
```

```
INSERT INTO osi_level VALUES (null, 'network', 'packet');
```

```
INSERT INTO osi_level VALUES (null, 'transport', 'segment');
```

```
INSERT INTO osi_level VALUES (null, 'session', 'data');
```

```
INSERT INTO osi_level VALUES (null, 'presentation', 'data');
```

```
INSERT INTO osi_level VALUES (null, 'application', 'data');
```

```
INSERT INTO protocols VALUES (null, 1, 'Bluetooth', 'blue — синий и tooth — зуб');
```

```
INSERT INTO protocols VALUES (null, 1, 'IEEE.802.11', 'Wi-Fi');
```

```
INSERT INTO protocols VALUES (null, 2, 'Ethernet', 'Ethernet');
```

```
INSERT INTO protocols VALUES (null, 2, 'PPPoE', 'Point-to-point protocol over Ethernet');
```

```
INSERT INTO protocols VALUES (null, 3, 'IP', 'Internet Protocol');
```

```
INSERT INTO protocols VALUES (null, 3, 'ICMP', 'Internet Control Message Protocol');
```

```

INSERT INTO protocols VALUES (null, 4, 'TCP', 'Transmission Control Protocol');
INSERT INTO protocols VALUES (null, 4, 'UDP', 'User Datagram Protocol');
INSERT INTO protocols VALUES (null, 5, 'net BIOS', 'Network Basic Input or Output System ');
INSERT INTO protocols VALUES (null, 5, 'PPTP', 'Point-to-Point Tunneling Protocol');
INSERT INTO protocols VALUES (null, 6, 'SSL', 'Secure Sockets Layer');
INSERT INTO protocols VALUES (null, 6, 'TLS', 'Transport Layer Security');
INSERT INTO protocols VALUES (null, 7, 'HTTP', 'HyperText Transfer Protocol');
INSERT INTO protocols VALUES (null, 7, 'FTP', 'File Transfer Protocol');

```

```

mysql> select * from protocols;
+----+-----+-----+-----+
| id | fk_osi | abbreviation | name |
+----+-----+-----+-----+
| 2 | 1 | Bluetooth | blue – синий и tooth – зуб |
| 3 | 2 | Ethernet | Ethernet |
| 4 | 2 | PPPoE | Point-to-point protocol over Ethernet |
| 5 | 3 | IP | Internet Protocol |
| 6 | 3 | ICMP | Internet Control Message Protocol |
| 7 | 4 | TCP | Transmission Control Protocol |
| 8 | 4 | UDP | User Datagram Protocol |
| 9 | 5 | net BIOS | Network Basic Input or Output System |
| 10 | 5 | PPTP | Point-to-Point Tunneling Protocol |
| 11 | 6 | SSL | Secure Sockets Layer |
| 12 | 6 | TLS | Transport Layer Security |
| 13 | 7 | HTTP | HyperText Transfer Protocol |
| 14 | 7 | FTP | File Transfer Protocol |
| 15 | 2 | Ethernet | Ethernet |
| 16 | 2 | PPPoE | Point-to-point protocol over Ethernet |
| 17 | 3 | IP | Internet Protocol |
| 18 | 3 | ICMP | Internet Control Message Protocol |
| 19 | 4 | TCP | Transmission Control Protocol |
| 20 | 4 | UDP | User Datagram Protocol |
| 21 | 5 | net BIOS | Network Basic Input or Output System |
| 22 | 5 | PPTP | Point-to-Point Tunneling Protocol |
| 23 | 6 | SSL | Secure Sockets Layer |
| 24 | 6 | TLS | Transport Layer Security |
| 25 | 7 | HTTP | HyperText Transfer Protocol |
| 26 | 7 | FTP | File Transfer Protocol |
+----+-----+-----+-----+
25 rows in set (0,00 sec)

mysql>

```

```

INSERT INTO hardware VALUES (null, 1, 'Концентратор');
INSERT INTO hardware VALUES (null, 1, 'Повторитель');
INSERT INTO hardware VALUES (null, 2, 'Сетевой мост');
INSERT INTO hardware VALUES (null, 2, 'Коммутатор');
INSERT INTO hardware VALUES (null, 2, 'Точка доступа');
INSERT INTO hardware VALUES (null, 3, 'Маршрутизатор');
INSERT INTO hardware VALUES (null, 3, 'Сетевой шлюз');
INSERT INTO hardware VALUES (null, 2, 'Межсетевой экран');

```

```

mysql> select * from hardware;
+----+-----+-----+
| id | fk_osi | name |
+----+-----+-----+
| 1 | 1 | Концентратор |
| 2 | 1 | Повторитель |
| 3 | 2 | Сетевой мост |
| 4 | 2 | Коммутатор |
| 5 | 2 | Точка доступа |
| 6 | 3 | Маршрутизатор |
| 7 | 3 | Сетевой шлюз |
| 8 | 2 | Межсетевой экран |
+----+-----+-----+
8 rows in set (0,00 sec)

```

6. Construct and execute SELECT operator with WHERE, GROUP BY and ORDER BY

```
select * from protocols where fk_osi = 5;
```

```
mysql> select * from protocols where fk_osi = 5;
+-----+-----+-----+-----+
| id | fk_osi | abbreviation | name |
+-----+-----+-----+-----+
| 9 | 5 | net BIOS | Network Basic Input or Output System |
| 10 | 5 | PPTP | Point-to-Point Tunneling Protocol |
| 21 | 5 | net BIOS | Network Basic Input or Output System |
| 22 | 5 | PPTP | Point-to-Point Tunneling Protocol |
+-----+-----+-----+-----+
4 rows in set (0,00 sec)
```

select * from osi_level order by information_type;

```
mysql> select * from osi_level order by information_type;
+-----+-----+-----+
| id | name | information_type |
+-----+-----+-----+
| 1 | physical | bit |
| 5 | session | data |
| 6 | presentation | data |
| 7 | application | data |
| 2 | data-link | frame |
| 3 | network | packet |
| 4 | transport | segment |
+-----+-----+-----+
7 rows in set (0,00 sec)
```

select count(fk_osi) from hardware group by fk_osi order by count(fk_osi) desc;

```
mysql> select count(fk_osi) from hardware group by fk_osi order by count(fk_osi) desc;
+-----+
| count(fk_osi) |
+-----+
| 4 |
| 2 |
| 2 |
+-----+
3 rows in set (0,00 sec)
```

7. Execute other different SQL queries DDL, DML, DCL

7.1 DDL

ALTER TABLE protocols MODIFY COLUMN name VARCHAR(110);

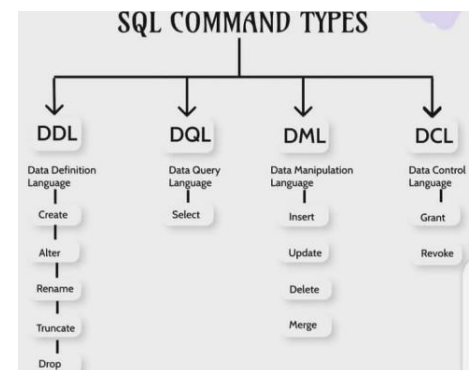
7.2 DML

DELETE FROM protocols where id = 2;

7.3 DCL

GRANT ALL PRIVILEGES ON *.* TO 'user1'@'localhost' WITH

-> GRANT OPTION;



8. Create a database of new users with different privileges. Connect to the database as a new user and verify that the privileges allow or deny certain actions

create user 'user1'@'localhost' identified by 'password';

grant all privileges on *.* to 'user1'@'localhost' with grant option;

sudo mysql -u user1 -p

```
mysql> insert into hardware values ('null',5,'test');
ERROR 1366 (HY000): Incorrect integer value: 'null' for column 'id' at row 1
mysql> insert into hardware values (null,5,'test');
Query OK, 1 row affected (0,00 sec)

mysql> select * from hardware;
+----+-----+-----+
| id | fk_osi | name      |
+----+-----+-----+
| 1  | 1      | Концентратор |
| 2  | 1      | Повторитель  |
| 3  | 2      | Сетевой мост  |
| 4  | 2      | Коммутатор   |
| 5  | 2      | Точка доступа |
| 6  | 3      | Маршрутизатор |
| 7  | 3      | Сетевой шлюз  |
| 8  | 2      | Межсетевой экран |
| 9  | 5      | test         |
+----+-----+-----+
9 rows in set (0,00 sec)
```

create user 'user2'@'localhost' identified by 'password';

grant select on *.* to 'user2'@'localhost' with grant option;

```
mysql> select * from hardware;
+----+-----+-----+
| id | fk_osi | name      |
+----+-----+-----+
| 1  | 1      | Концентратор |
| 2  | 1      | Повторитель  |
| 3  | 2      | Сетевой мост  |
| 4  | 2      | Коммутатор   |
| 5  | 2      | Точка доступа |
| 6  | 3      | Маршрутизатор |
| 7  | 3      | Сетевой шлюз  |
| 8  | 2      | Межсетевой экран |
| 9  | 5      | test         |
+----+-----+-----+
9 rows in set (0,00 sec)

mysql> delete from hardware where id = 9;
ERROR 1142 (42000): DELETE command denied to user 'user2'@'localhost' for table 'hardware'
mysql>
```

9. Make a selection from the main table DB MySQL

```
ams@ams-virtual-machine: ~
mysql> select * from db /r;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '/r' at line 1
mysql> select * from db \G;
***** 1. row *****
Host: localhost
  Db: performance_schema
User: mysql.session
Select_priv: Y
Insert_priv: N
Update_priv: N
Delete_priv: N
Create_priv: N
Drop_priv: N
Grant_priv: N
References_priv: N
Index_priv: N
Alter_priv: N
Create_tmp_table_priv: N
Lock_tables_priv: N
Create_view_priv: N
Show_view_priv: N
Create_routine_priv: N
Alter_routine_priv: N
Execute_priv: N
Event_priv: N
Trigger_priv: N
***** 2. row *****
Host: localhost
  Db: sys
User: mysql.sys
Select_priv: N
Insert_priv: N
Update_priv: N
Delete_priv: N
Create_priv: N
Drop_priv: N
Grant_priv: N
References_priv: N
Index_priv: N
Alter_priv: N
Create_tmp_table_priv: N
Lock_tables_priv: N
Create_view_priv: N
Show_view_priv: N
Create_routine_priv: N
Alter_routine_priv: N
```

PART 2

10. Make backup of your database.

```
sudo mysqldump -u root osi >osi_dump.sql
```

11. Delete the table and/or part of the data in the table.

```
Database changed
mysql> show tables;
+-----+
| Tables_in_osi1 |
+-----+
| hardware       |
| osi_level      |
| protocols      |
+-----+
3 rows in set (0,00 sec)

mysql> drop table hardware;
Query OK, 0 rows affected (0,17 sec)

mysql> show tables;
+-----+
| Tables_in_osi1 |
+-----+
| osi_level      |
| protocols      |
+-----+
2 rows in set (0,00 sec)
```

12. Restore your database.

```
sudo mysql -u root osi1 < osi_dump.sql
```

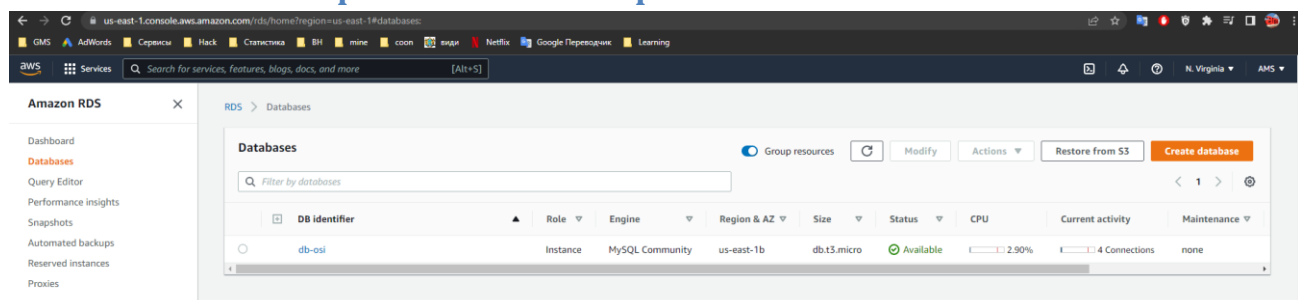
```
mysql> use osi1;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+-----+
| Tables_in_osi1 |
+-----+
| hardware       |
| osi_level      |
| protocols      |
+-----+
3 rows in set (0,00 sec)
```

13. Transfer your local database to RDS AWS.

14. Connect to your database.

15. Execute SELECT operator similar step 6.



nyoua.wontbench

File Edit View Query Database Server Tools Scripting Help

Navigation: Administration - Data Import/Res... hardware

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

SCHEMAS: Filter objects

os: Tables hardware osi_level protocols Views Stored Procedures Functions sys

Table: hardware Columns: id int AI PK, fk_osi int, name varchar(100)

Result Grid: Filter Rows: 6400 Export/Import: Wrap Cell Content: 12

id	fk_osi	name
1	1	Кочетовское
2	1	Покровское
3	2	Серебряный
4	2	Комаровское
5	2	Товарищеское
6	3	Мариновское
7	3	Серебряный
8	2	Хорошее
9	5	test

Output: Action Output Message Duration / Fetch

#	Time	Action	Message	Duration / Fetch
1	15:08:11	show databases	5 row(s) returned	0.141 sec / 0.000 sec
2	15:08:36	use osi	0 row(s) affected	0.125 sec
3	15:08:36	show tables	3 row(s) returned	0.140 sec / 0.000 sec
4	15:08:47	select * from hardware LIMIT 0, 1000	9 row(s) returned	0.141 sec / 0.000 sec
5	15:12:22	SELECT * FROM osi hardware LIMIT 0, 1000	9 row(s) returned	0.750 sec / 0.000 sec

Navigator: SCHEMAS Filter objects

os: Tables hardware osi_level protocols Views Stored Procedures Functions sys

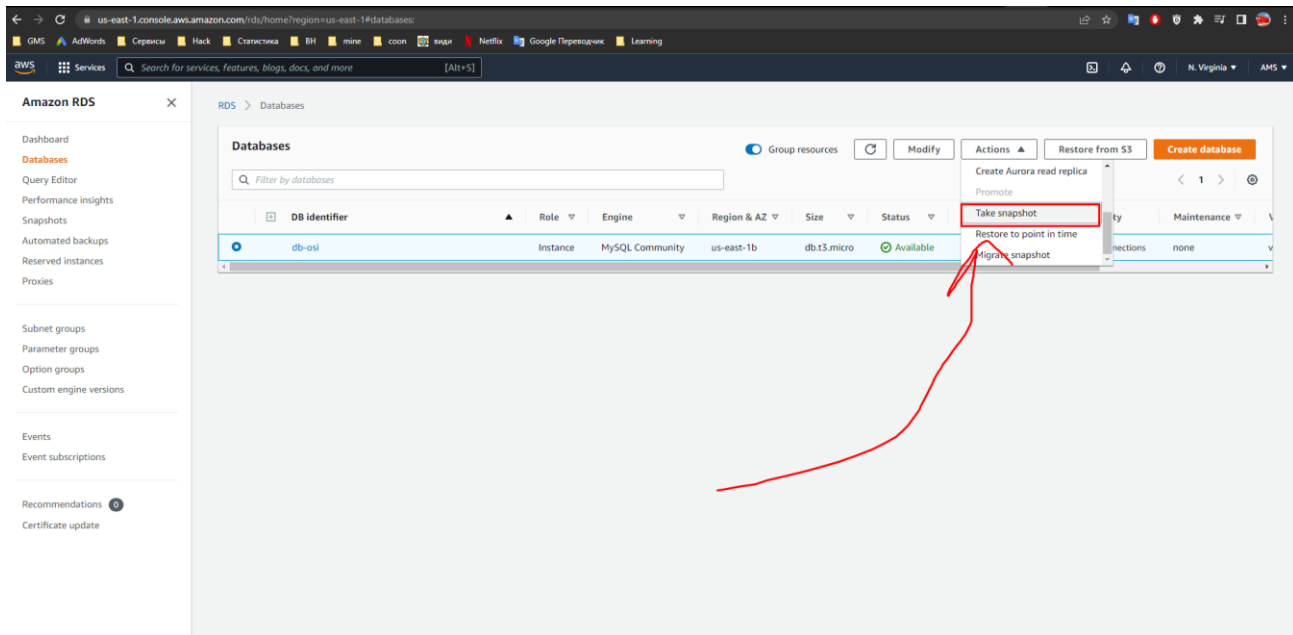
Query 1 Administration - Data Import/Res... hardware Limit to 1000 rows

```
1 select count(fk_osi) from hardware group by fk_osi order by count(fk_osi) desc;
```

Result Grid: Filter Rows: Export: Wrap Cell Content: 12

count(fk_osi)
4
2
2
1

16.Create the dump of your database.



Take DB snapshot

This feature is currently supported for InnoDB storage engine only. If you are using MyISAM, refer to details [here](#).

Settings

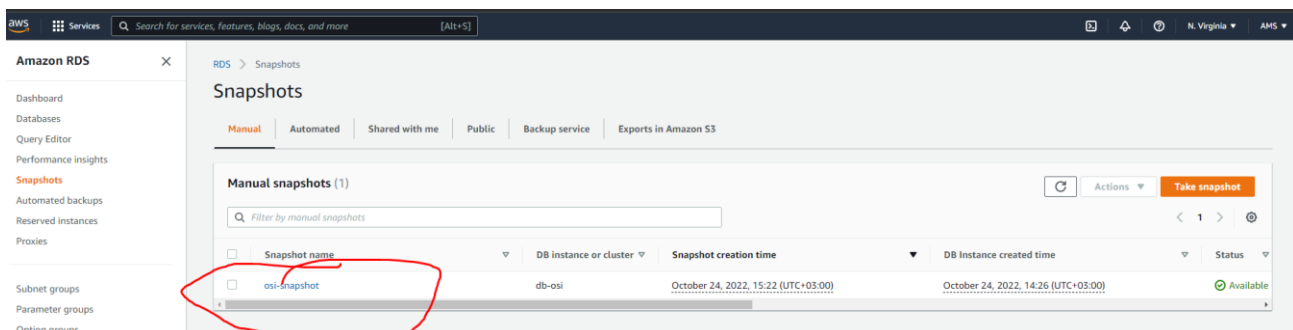
To take a snapshot of this DB instance you must provide a name for the snapshot.

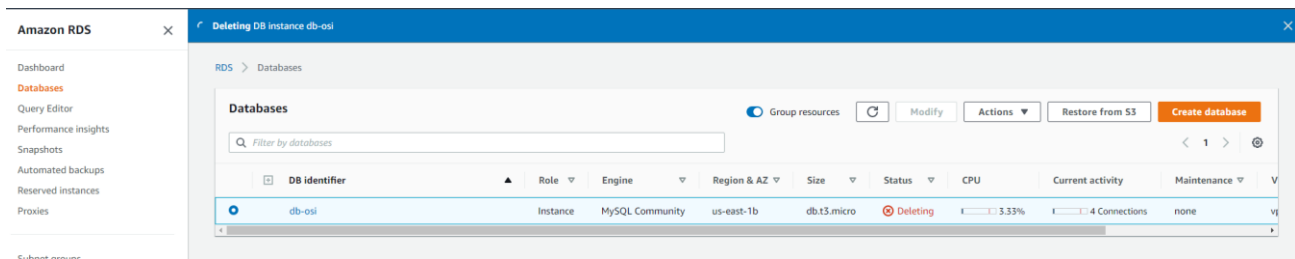
DB instance
The unique key that identifies a DB instance. This parameter isn't case-sensitive.

db-osi

Snapshot name
The identifier for the DB snapshot.

[Cancel](#) [Take snapshot](#)





`mysql -h restored-osi.chb8jqght4za.us-east-1.rds.amazonaws.com -u admin -p`

```
ams@ams-virtual-machine:~$ sudo mysql -h restored-osi.chb8jqght4za.us-east-1.rds.amazonaws.com -u admin -p
[sudo] password for ams:
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 75
Server version: 8.0.30 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
```

PART 3 – MongoDB

17. Create a database. Use the use command to connect to a new database (If it doesn't exist, Mongo will create it when you write to it).

`sudo systemctl start mongod`

`use test;`

18. Create a collection. Use `db.createCollection` to create a collection. I'll leave the subject up to you. Run `show dbs` and `show collections` to view your database and collections.

`db.students.insertMany([`

`{title: 'Masha', years: 20, languages: ['English', 'French']},`

`{title: 'Petr', years: 30, languages: ['Polish', 'Ukrainian']},`

`{title: 'Simona', years: 20, languages: ['German', 'French', 'Italian']}`

`])`

```
>>> show dbs;
admin    102 kB
config   111 kB
local    73.7 kB
test     123 kB
test>
>>> show collections;
books
movies
students
test>
>>> |
```


19. Create some documents. Insert a couple of documents into your collection. I'll leave the subject matter up to you, perhaps cars or hats.

```
>>> db.students.find();
[
  {
    _id: ObjectId("635906c644a54e9dcac16c39"),
    title: 'Masha',
    years: 20,
    languages: [ 'English', 'French' ]
  },
  {
    _id: ObjectId("635906c644a54e9dcac16c3a"),
    title: 'Petr',
    years: 30,
    languages: [ 'Polish', 'Ukrainian' ]
  },
  {
    _id: ObjectId("635906c644a54e9dcac16c3b"),
    title: 'Simona',
    years: 20,
    languages: [ 'German', 'French', 'Italian' ]
  }
]
```

20. Use find() to list documents out

```
db.students.find( { "years": 20 } );
```

```
>>> db.students.find( { "years": 20 } );
[
  {
    _id: ObjectId("63590fdf8f8df37b73e3237a"),
    title: 'Masha',
    years: 20,
    languages: [ 'English', 'French' ]
  },
  {
    _id: ObjectId("63590fdf8f8df37b73e3237c"),
    title: 'Simona',
    years: 20,
    languages: [ 'German', 'French', 'Italian' ]
  }
]
```