EPAM University Programs DevOps L1 course Database Administration

PART 1

1. Download MySQL server for your OS on VM.

https://dev.mysql.com/downloads/repo/yum/

https://dev.mysql.com/doc/refman/8.0/en/linux-installation-yum-repo.html#yum-install-compatibility-el7

2. Install MySQL server on VM.

2.1 yum install -y mysql80-community-release-el7-7.noarch.rpm

```
[root@k8s-01-master ~]# yum install -y mysql80-community-release-el7-7.noarch.rpm
Loaded plugins: fastestmirror
Examining mysql80-community-release-el7-7.noarch.rpm: mysql80-community-release-el7-7.noarch
Marking mysql80-community-release-el7-7.noarch.rpm to be installed
Resolving Dependencies
--> Running transaction check
---> Package mysql80-community-release.noarch 0:el7-7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package                       Arch         Version       Repository                                    Size
================================================================================
Installing:
 mysql80-community-release     noarch       el7-7         /mysql80-community-release-el7-7.noarch       10 k

Transaction Summary
================================================================================
Install  1 Package

Total size: 10 k
Installed size: 10 k
Downloading packages:
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : mysql80-community-release-el7-7.noarch                                                    1/1
  Verifying  : mysql80-community-release-el7-7.noarch                                                    1/1

Installed:
  mysql80-community-release.noarch 0:el7-7

Complete!
[root@k8s-01-master ~]#
```

2.2 yum repolist all | grep mysql

```
[root@k8s-01-master ~]# yum repolist all | grep mysql
mysql-cluster-7.5-community/x86_64            MySQL Cluster 7.5 C disabled
mysql-cluster-7.5-community-source            MySQL Cluster 7.5 C disabled
mysql-cluster-7.6-community/x86_64            MySQL Cluster 7.6 C disabled
mysql-cluster-7.6-community-source            MySQL Cluster 7.6 C disabled
mysql-cluster-8.0-community/x86_64            MySQL Cluster 8.0 C disabled
mysql-cluster-8.0-community-debuginfo/x86_64  MySQL Cluster 8.0 C disabled
mysql-cluster-8.0-community-source            MySQL Cluster 8.0 C disabled
mysql-connectors-community/x86_64             MySQL Connectors Co enabled:    206
mysql-connectors-community-debuginfo/x86_64   MySQL Connectors Co disabled
mysql-connectors-community-source             MySQL Connectors Co disabled
mysql-tools-community/x86_64                  MySQL Tools Communi enabled:     94
mysql-tools-community-debuginfo/x86_64        MySQL Tools Communi disabled
mysql-tools-community-source                  MySQL Tools Communi disabled
mysql-tools-preview/x86_64                    MySQL Tools Preview disabled
mysql-tools-preview-source                    MySQL Tools Preview disabled
mysql57-community/x86_64                      MySQL 5.7 Community disabled
mysql57-community-source                      MySQL 5.7 Community disabled
mysql80-community/x86_64                      MySQL 8.0 Community enabled:    367
mysql80-community-debuginfo/x86_64            MySQL 8.0 Community disabled
mysql80-community-source                      MySQL 8.0 Community disabled
```

2.3 yum repolist enabled | grep "mysql.*-community.*"

mysql-connectors-community/x86_64 MySQL Connectors Community
206

mysql-tools-community/x86_64   MySQL Tools Community   94

2.4 sudo yum-config-manager --enable mysql80-community

```
[root@k8s-01-master ~]# sudo yum-config-manager --enable mysql80-community
Loaded plugins: fastestmirror
=========================================== repo: mysql80-community ============================================
[mysql80-community]
async = True
bandwidth = 0
base_persistdir = /var/lib/yum/repos/x86_64/7
baseurl = http://repo.mysql.com/yum/mysql-8.0-community/el/7/x86_64
cache = 0
cachedir = /var/cache/yum/x86_64/7/mysql80-community
check_config_file_age = True
compare_providers_priority = 80
cost = 1000
deltarpm_metadata_percentage = 100
deltarpm_percentage =
enabled = 1
enablegroups = True
exclude =
failovermethod = priority
ftp_disable_epsv = False
gpgcadir = /var/lib/yum/repos/x86_64/7/mysql80-community/gpgcadir
gpgcakey =
gpgcheck = True
gpgdir = /var/lib/yum/repos/x86_64/7/mysql80-community/gpgdir
gpgkey = file:///etc/pki/rpm-gpg/RPM-GPG-KEY-mysql-2022,
    file:///etc/pki/rpm-gpg/RPM-GPG-KEY-mysql
hdrdir = /var/cache/yum/x86_64/7/mysql80-community/headers
http_caching = all
includepkgs =
ip_resolve =
keepalive = True
keepcache = False
mddownloadpolicy = sqlite
mdpolicy = group:small
mediaid =
metadata_expire = 21600
metadata_expire_filter = read-only:present
metalink =
minrate = 0
mirrorlist =
mirrorlist_expire = 86400
name = MySQL 8.0 Community Server
old_base_cache_dir =
password =
persistdir = /var/lib/yum/repos/x86_64/7/mysql80-community
pkgdir = /var/cache/yum/x86_64/7/mysql80-community/packages
proxy = False
proxy_dict =
proxy_password =
proxy_username =
repo_gpgcheck = False
retries = 10
skip_if_unavailable = False
ssl_check_cert_permissions = True
sslcacert =
sslclientcert =
sslclientkey =
sslverify = True
throttle = 0
timeout = 30.0
ui_id = mysql80-community/x86_64
ui_repoid_vars = releasever,
    basearch
username =
```

2.5 sudo yum install mysql-community-server

```
[root@k8s-01-master ~]# sudo yum install mysql-community-server
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirror.lanet.network
 * epel: mirror.lanet.network
 * extras: mirror.lanet.network
 * updates: mirror.lanet.network
mysql-connectors-community                                                    | 2.6 kB  00:00:00
mysql-tools-community                                                         | 2.6 kB  00:00:00
mysql80-community                                                             | 2.6 kB  00:00:00
Resolving Dependencies
--> Running transaction check
---> Package mysql-community-server.x86_64 0:8.0.31-1.el7 will be installed
--> Processing Dependency: mysql-community-common(x86-64) = 8.0.31-1.el7 for package: mysql-community-server-8.0.31-
1.el7.x86_64
--> Processing Dependency: mysql-community-icu-data-files = 8.0.31-1.el7 for package: mysql-community-server-8.0.31-
1.el7.x86_64
--> Processing Dependency: mysql-community-client(x86-64) >= 8.0.11 for package: mysql-community-server-8.0.31-1.el7
.x86_64
--> Running transaction check
---> Package mysql-community-client.x86_64 0:8.0.31-1.el7 will be installed
--> Processing Dependency: mysql-community-client-plugins = 8.0.31-1.el7 for package: mysql-community-client-8.0.31-
1.el7.x86_64
--> Processing Dependency: mysql-community-libs(x86-64) >= 8.0.11 for package: mysql-community-client-8.0.31-1.el7.x
86_64
---> Package mysql-community-common.x86_64 0:8.0.31-1.el7 will be installed
---> Package mysql-community-icu-data-files.x86_64 0:8.0.31-1.el7 will be installed
--> Running transaction check
---> Package mariadb-libs.x86_64 1:5.5.68-1.el7 will be obsoleted
--> Processing Dependency: libmysqlclient.so.18()(64bit) for package: 2:postfix-2.10.1-9.el7.x86_64
--> Processing Dependency: libmysqlclient.so.18(libmysqlclient_18)(64bit) for package: 2:postfix-2.10.1-9.el7.x86_64
---> Package mysql-community-client-plugins.x86_64 0:8.0.31-1.el7 will be installed
---> Package mysql-community-libs.x86_64 0:8.0.31-1.el7 will be obsoleting
--> Running transaction check
---> Package mysql-community-libs-compat.x86_64 0:8.0.31-1.el7 will be obsoleting
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================================================
 Package                           Arch            Version            Repository          Size
================================================================================================================
Installing:
 mysql-community-libs              x86_64          8.0.31-1.el7       mysql80-community    1.5 M
     replacing  mariadb-libs.x86_64 1:5.5.68-1.el7
 mysql-community-libs-compat       x86_64          8.0.31-1.el7       mysql80-community    670 k
     replacing  mariadb-libs.x86_64 1:5.5.68-1.el7
 mysql-community-server            x86_64          8.0.31-1.el7       mysql80-community     64 M
Installing for dependencies:
 mysql-community-client            x86_64          8.0.31-1.el7       mysql80-community     16 M
 mysql-community-client-plugins    x86_64          8.0.31-1.el7       mysql80-community    2.5 M
 mysql-community-common            x86_64          8.0.31-1.el7       mysql80-community    647 k
 mysql-community-icu-data-files    x86_64          8.0.31-1.el7       mysql80-community    2.1 M

Transaction Summary
================================================================================================================
Install  3 Packages (+4 Dependent packages)

Total download size: 88 M
Is this ok [y/d/N]: y
Downloading packages:
warning: /var/cache/yum/x86_64/7/mysql80-community/packages/mysql-community-client-plugins-8.0.31-1.el7.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 3a79bd29: NOKEY           ]  0.0 B/s | 760 kB  --:--:-- ETA
Public key for mysql-community-client-plugins-8.0.31-1.el7.x86_64.rpm is not installed
(1/7): mysql-community-client-plugins-8.0.31-1.el7.x86_64.rpm                                    | 2.5 MB  00:00:00
(2/7): mysql-community-common-8.0.31-1.el7.x86_64.rpm                                            | 647 kB  00:00:00
(3/7): mysql-community-icu-data-files-8.0.31-1.el7.x86_64.rpm                                    | 2.1 MB  00:00:00
(4/7): mysql-community-libs-8.0.31-1.el7.x86_64.rpm                                              | 1.5 MB  00:00:00
(5/7): mysql-community-client-8.0.31-1.el7.x86_64.rpm                                            |  16 MB  00:00:02
(6/7): mysql-community-libs-compat-8.0.31-1.el7.x86_64.rpm                                       | 670 kB  00:00:00
(7/7): mysql-community-server-8.0.31-1.el7.x86_64.rpm                                            |  64 MB  00:00:05
----------------------------------------------------------------------------------------------------------------
Total                                                                                  11 MB/s |  88 MB  00:00:08
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-mysql-2022
Importing GPG key 0x3A79BD29:
 Userid     : "MySQL Release Engineering <mysql-build@oss.oracle.com>"
 Fingerprint: 859b e8d7 c586 f538 430b 19c2 467b 942d 3a79 bd29
 Package    : mysql80-community-release-el7-7.noarch (@/mysql80-community-release-el7-7.noarch)
 From       : /etc/pki/rpm-gpg/RPM-GPG-KEY-mysql-2022
Is this ok [y/N]: y
```

2.6 `systemctl start mysqld`

`systemctl status mysqld`

```
Installed:
  mysql-community-libs.x86_64 0:8.0.31-1.el7                 mysql-community-libs-compat.x86_64 0:8.0.31-1.el7                  mysql-community-server.x86_64 0:8.0.31-1.el7

Dependency Installed:
  mysql-community-client.x86_64 0:8.0.31-1.el7     mysql-community-client-plugins.x86_64 0:8.0.31-1.el7     mysql-community-common.x86_64 0:8.0.31-1.el7     mysql-community-icu-data-files.x86_64 0:8.0.31-1.el7

Replaced:
  mariadb-libs.x86_64 1:5.5.68-1.el7

Complete!
[root@k8s-01-master ~]# systemctl start mysqld
[root@k8s-01-master ~]# systemctl status mysqld
• mysqld.service - MySQL Server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; vendor preset: disabled)
   Active: active (running) since Tue 2022-10-25 16:43:10 EEST; 8s ago
     Docs: man:mysqld(8)
           http://dev.mysql.com/doc/refman/en/using-systemd.html
  Process: 32281 ExecStartPre=/usr/bin/mysqld_pre_systemd (code=exited, status=0/SUCCESS)
 Main PID: 32361 (mysqld)
   Status: "Server is operational"
    Tasks: 39
   Memory: 457.6M
   CGroup: /system.slice/mysqld.service
           └─32361 /usr/sbin/mysqld

Oct 25 16:43:05 k8s-01-master systemd[1]: Starting MySQL Server...
Oct 25 16:43:10 k8s-01-master systemd[1]: Started MySQL Server.
[root@k8s-01-master ~]#
```

2.7 `sudo grep 'temporary password' /var/log/mysqld.log`

2022-10-25T13:43:07.419433Z 6 [Note] [MY-010454] [Server] A temporary password is generated for root@localhost: Z>c4;&?z<bCy

2.8 `mysql -uroot -p`

2.9 Change the root password as soon as possible by logging in with the generated, temporary password

```
mysql> ALTER USER 'root'@'localhost' IDENTIFIED BY 'MyNewPass4!';
```

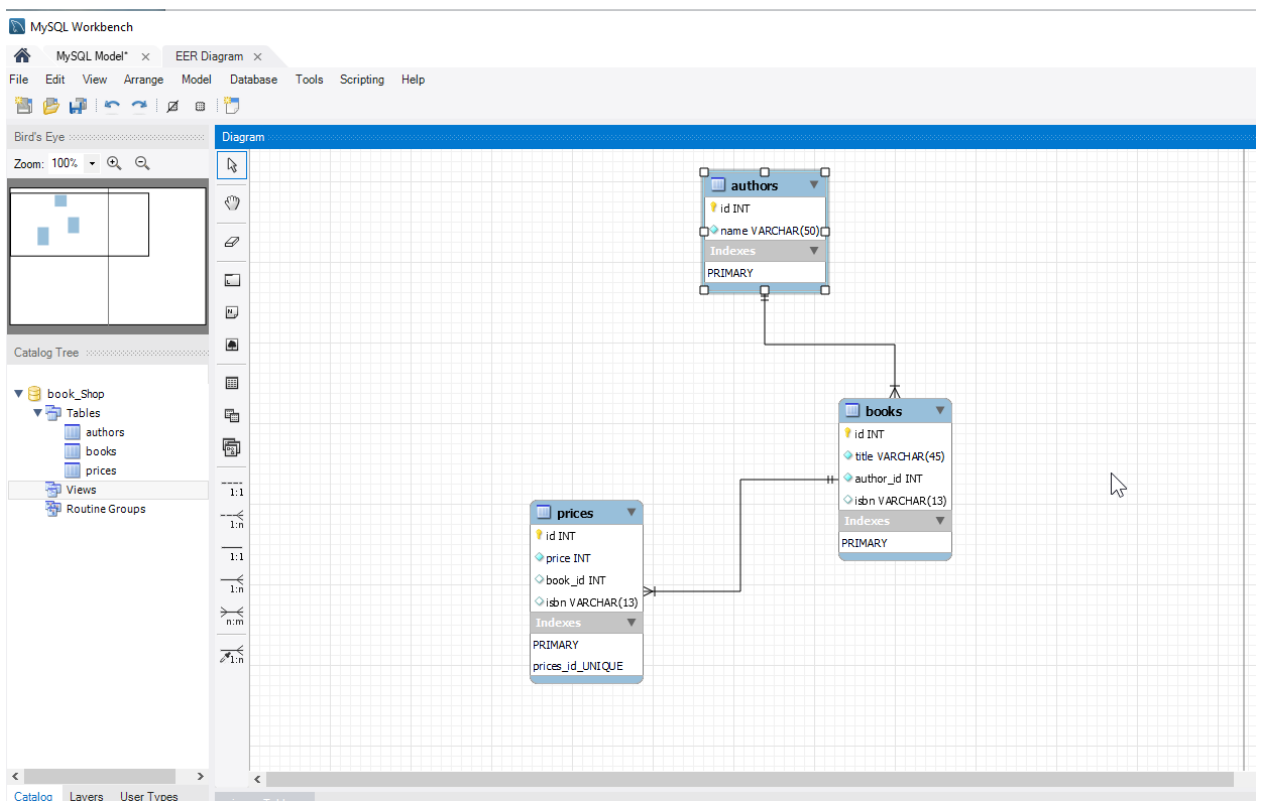!!! After password changes – exit and enter with new password !!!

2.10 create user - sqladmin

CREATE USER 'sqladmin'@'localhost' IDENTIFIED BY '123QWEasd!';

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

My database "book_Shop" has three tables: authors, books and prices

Author has book or some books and books have prices.

show databases;

show tables in books;

4.1 create database book_Shop;

```
mysql> create database books;
Query OK, 1 row affected (0.01 sec)

mysql> show tables  in books;
Empty set (0.00 sec)

mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| books              |
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.00 sec)

mysql>
```

4.2 use book_Shop;

4.3 create tables:

CREATE TABLE authors (id INT NOT NULL AUTO_INCREMENT,name
VARCHAR(50) NOT NULL,PRIMARY KEY (id));

CREATE TABLE books (id INT NOT NULL AUTO_INCREMENT,title VARCHAR(50) NOT
NULL,isbn VARCHAR(13) NULL,PRIMARY KEY (id));

CREATE TABLE prices (id INT NOT NULL AUTO_INCREMENT,price INT NOT
NULL,isbn VARCHAR(13) NULL,PRIMARY KEY (id));

```
mysql> show tables in book_Shop;
+--------------------+
| Tables_in_book_Shop |
+--------------------+
| authors            |
| books              |
| prices             |
+--------------------+
3 rows in set (0.00 sec)

mysql>
```

4.4 Altering tables

ALTER TABLE books ADD COLUMN author_id INT NULL AFTER isbn;

ALTER TABLE books ADD INDEX FK_books_authors_idx (author_id ASC);

ALTER TABLE books ADD CONSTRAINT FK_books_authors FOREIGN KEY (author_id) REFERENCES authors (id);

ALTER TABLE prices ADD COLUMN book_id INT NULL AFTER isbn;

ALTER TABLE prices ADD INDEX FK_prices_books_idx (book_id ASC);

ALTER TABLE prices ADD CONSTRAINT FK_prices_books FOREIGN KEY (book_id) REFERENCES books (id);

5. Fill in tables.

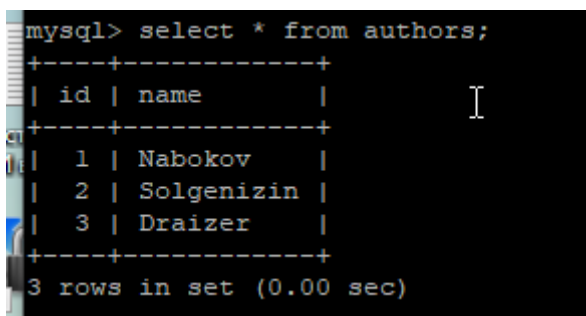5.1 Inserting data rows

INSERT INTO authors (name) VALUES ('Nabokov');

INSERT INTO authors (name) VALUES ('Solgenizin');

INSERT INTO authors (name) VALUES ('Draizer');

select * from authors;

INSERT INTO books (title, author_id, isbn) VALUES ('Lolita', 1, '9789544005276');

INSERT INTO books (title, author_id, isbn) VALUES ('Archipilag Gulag', 2, '9789544005576');

INSERT INTO books (title, author_id, isbn) VALUES ('American tragedy', 3, '9789544014276');

select * from books;

```
mysql> select * from books;
+----+-----------------+----------------+-----------+
| id | title           | isbn           | author_id |
+----+-----------------+----------------+-----------+
|  1 | Lolita          | 9789544005276  |         1 |
|  2 | Archipilag Gulag| 9789544005576  |         2 |
|  3 | American tragedy| 9789544014276  |         3 |
+----+-----------------+----------------+-----------+
3 rows in set (0.00 sec)

mysql>
```

INSERT INTO prices (price, book_id, isbn) VALUES ('500', 1, '9789544005276');

INSERT INTO prices (price, book_id, isbn) VALUES ('800', 2, '9789544005576');

INSERT INTO prices (price, book_id, isbn) VALUES ('600', 3, '9789544014276');

select * from prices;

```
mysql> select * from prices;
+----+-------+----------------+---------+
| id | price | isbn           | book_id |
+----+-------+----------------+---------+
|  1 | 500   | 9789544005276  |       1 |
|  2 | 800   | 9789544005576  |       2 |
|  3 | 600   | 9789544014276  |       3 |
+----+-------+----------------+---------+
3 rows in set (0.00 sec)

mysql>
```

SELECT * FROM books;

SELECT * FROM authors;

Select * from pices;

6. select name from authors **where** id=2;

```
mysql> select name from authors where id=2;
+-----------+
| name      |
+-----------+
| Solgenizin |
+-----------+
1 row in set (0.00 sec)

mysql>
```

6.1 UPDATE ROWS

update books set pages = 500 **where** id = 2;

```
mysql> select * from books;
+----+-----------------+---------------+-----------+-------+
| id | title           | isbn          | author_id | pages |
+----+-----------------+---------------+-----------+-------+
|  1 | Lolita          | 9789544005276 |         1 |   500 |
|  2 | Archipilag Gulag | 9789544005576 |         2 |   500 |
|  3 | American tragedy | 9789544014276 |         3 |   800 |
|  4 | Stories         | 9789544005276 |         1 |   500 |
+----+-----------------+---------------+-----------+-------+
4 rows in set (0.00 sec)
```

6.2 select pages from books where pages = 500 **group by** pages;

```
mysql> select pages from books where pages = 500 group by pages;
+-------+
| pages |
+-------+
|   500 |
+-------+
1 row in set (0.00 sec)
```

select count(pages) from books where pages = 500 **group by** pages;

```
mysql> select count(pages) from books where pages = 500 group by pages;
+--------------+
| count(pages) |
+--------------+
|            3 |
+--------------+
1 row in set (0.00 sec)
```

6.3 select title, pages from books order by title, pages;

```
mysql> select title, pages from books order by title, pages;
+-----------------+-------+
| title           | pages |
+-----------------+-------+
| American tragedy |   800 |
| Archipilag Gulag |   500 |
| Lolita          |   500 |
| Stories         |   500 |
+-----------------+-------+
4 rows in set (0.00 sec)

mysql>
```

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

These SQL commands are mainly categorized into four categories as:
1. DDL – Data Definition Language
2. DQI – Data Query Language
3. DML – Data Manipulation Language
4. DCL – Data Control Language

ALTER TABLE authors ADD COLUMN age_of_living INT NULL AFTER name;

create database pats;

show databases;

use pats;

```
mysql> create database pats;
Query OK, 1 row affected (0.01 sec)

mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| book_Shop          |
| information_schema |
| mysql              |
| pats               |
| performance_schema |
| sys                |
+--------------------+
6 rows in set (0.00 sec)

mysql> use pats;
Database changed
```

CREATE TABLE cats (id INT NOT NULL AUTO_INCREMENT,name VARCHAR(50) NOT NULL,PRIMARY KEY (id));

INSERT INTO cats (name) VALUES ('Kubik');

drop tables cats;

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 'test'@'localhost' IDENTIFIED BY '123QWEasd!';

GRANT CREATE, ALTER, INSERT, SELECT, REFERENCES, RELOAD on *book_Shop* TO 'test'@'localhost' WITH GRANT OPTION;

INSERT INTO authors (name) VALUES ('Stoik');

```
[root@k8s-01-master ~]# mysql -utest -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 11
Server version: 8.0.31 MySQL Community Server - GPL

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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>
mysql>
mysql> use book_Shop;
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 in book_Shop;
+---------------------+
| Tables_in_book_Shop |
+---------------------+
| authors             |
| books               |
| prices              |
+---------------------+
3 rows in set (0.00 sec)

mysql> INSERT INTO author (name) VALUES ('Stoik');
ERROR 1146 (42S02): Table 'book_Shop.author' doesn't exist
mysql> INSERT INTO authors (name) VALUES ('Stoik');
Query OK, 1 row affected (0.01 sec)

mysql> use book_Shop;^C
mysql> select * from authors;
+----+------------+---------------+
| id | name       | age_of_living |
+----+------------+---------------+
|  1 | Nabokov    |          NULL |
|  2 | Solgenizin |          NULL |
|  3 | Draizer    |          NULL |
|  4 | Stoik      |          NULL |
+----+------------+---------------+
4 rows in set (0.00 sec)
```

update authors set age_of_living = 68 where id = 4;

ERROR 1142 (42000): UPDATE command denied to user 'test'@'localhost' for table 'authors'

mysql>

[root@k8s-01-master ~]# mysql -uroot -p

Enter password:

mysql> GRANT UPDATE on *.* TO 'test'@'localhost' WITH GRANT OPTION;

Query OK, 0 rows affected (0.01 sec)

[root@k8s-01-master ~]# mysql -utest -p

Enter password:

use book_Shop;

mysql> update authors set age_of_living = 68 where id = 4;

Query OK, 1 row affected (0.00 sec)

```
[root@k8s-01-master ~]# mysql -utest -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 13
Server version: 8.0.31 MySQL Community Server - GPL

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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> update authors set age_of_living = 68 where id = 4;
ERROR 1046 (3D000): No database selected
mysql> use book_Shop;
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> update authors set age_of_living = 68 where id = 4;
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> select * from authors;
+----+------------+---------------+
| id | name       | age_of_living |
+----+------------+---------------+
|  1 | Nabokov    |          NULL |
|  2 | Solgenizin |          NULL |
|  3 | Draizer    |          NULL |
|  4 | Stoik      |            68 |
+----+------------+---------------+
4 rows in set (0.00 sec)

mysql>
```

9. Make a selection from the main table DB MySQL.

mysql> show tables in book_Shop;

```
mysql> show tables in book_Shop;
+--------------------+
| Tables_in_book_Shop |
+--------------------+
| authors            |
| books              |
| prices             |
+--------------------+
3 rows in set (0.00 sec)

mysql>
```