Laboratory 5 - MySQL

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I. Connecting to the database

Starting server:

```
.\mysqld --console
```

In other terminal:

```
.\mysql
```

Trying to see the databases.

```
SHOW DATABASES;
```

Result:

```
+--------------------+
| Database           |
+--------------------+
| information_schema |
+--------------------+
1 row in set (0.00 sec)
```

Logging to the root:

```
.\mysql -u root
```

The result was help page cause the password was required.

I changed the password with

```
.\mysqladmin -u root -pala password "***"
```

```
.\mysql -u root -p***
```

Result after trying `SHOW DATABASES` one more time:

```
+----------------------+
| Tables_in_university |
+----------------------+
| allocations          |
| classrooms           |
| employees            |
| grades               |
| institutes           |
| majors               |
| positions            |
| projects             |
| salaries             |
| schedules            |
| students             |
| subject_types        |
| subjects             |
| teams                |
+----------------------+
14 rows in set (0.01 sec)
```

Checking `COLUMNS` in `UNIVERSITY` database:

```
USE university;
SHOW TABLES;
SHOW COLUMNS FROM majors;
```

Result:

```
+--------------+-------------+------+-----+---------+-------+
| Field        | Type        | Null | Key | Default | Extra |
+--------------+-------------+------+-----+---------+-------+
| MAJOR_ID     | smallint(6) | NO   |     | NULL    |       |
| MAJOR_NAME   | char(30)    | YES  |     | NULL    |       |
| INSTITUTE_ID | smallint(6) | NO   |     | NULL    |       |
+--------------+-------------+------+-----+---------+-------+
```

II. Data loading

Creating new table:

```
CREATE DATABASE laboratory; # (1)
USE laboratory;             # (2)
\. crcasdat.sql             # (3)
\. casdat_dump.sql          # (4)
```

Results:

```
(1) Query OK, 1 row affected (0.01 sec)
(2) Database changed
(3) Query OK, 0 rows affected (0.01 sec)
(4) Query OK, 0 rows affected (0.00 sec) * many_times
```

Exporting data to file:

```
SELECT * FROM casdat INTO OUTFILE 'casdat.dump';
```

Result:

```
Query OK, 76211 rows affected (0.07 sec)
```

Clearing and reloading the data:

```
TRUNCATE casdat; # (1)
LOAD DATA INFILE 'casdat.dump' INTO TABLE casdat; # (2)
```

```
(1) Query OK, 0 rows affected (0.01 sec)
(2) Query OK, 76211 rows affected (0.10 sec)
    Records: 76211  Deleted: 0  Skipped: 0  Warnings: 0
```

III. Enums and Sets

`ENUM` lets you pick one predefined value (selecting a single day: 'mon'). Invalid entries are rejected.

`SET` allows multiple values ('mon,tue'), while ignoring invalid parts.

Creating `ENUM` table:

```
CREATE TABLE classes(
    idc INT,
    day ENUM('mon','tue','wed','thu','fri','sat','sun')
);
```

Result:

```
Query OK, 0 rows affected (0.01 sec)
```

Testing `ENUM` behavior:

```
INSERT INTO classes VALUES (1, 'mon'), (2, 'tue'); #(1)
INSERT INTO classes VALUES (3, 'xyz'); #(2)
INSERT INTO classes VALUES (4, 'tue,wed'); #(3)
INSERT INTO classes VALUES (5, 5); #(4)
```

Result:

```
(1) Query OK, 2 rows affected (0.00 sec)
    Records: 2  Duplicates: 0  Warnings: 0
(2) Query OK, 1 row affected, 1 warning (0.00 sec)
(3) Query OK, 1 row affected, 1 warning (0.00 sec)
(4) Query OK, 1 row affected (0.00 sec)
```

Creating `SET` table:

```
CREATE TABLE classes_set(
  ido INT,
  day SET('mon','tue','wed','thu','fri','sat','sun')
);
```

Result:

```
Query OK, 0 rows affected (0.01 sec)
```

Testing `SET` behavior:

```
INSERT INTO classes_set VALUES (1, 'mon,tue'); #(1)
INSERT INTO classes_set VALUES (2, 'mon,aaa'); #(2)
```

Result:

```
(1) Query OK, 1 row affected (0.00 sec)
(2) Query OK, 1 row affected, 1 warning (0.00 sec)
```

Updating set:

```
UPDATE classes_set SET day='sat' WHERE FIND_IN_SET('mon', day);
```

Result:

```
Query OK, 2 rows affected (0.00 sec)
Rows matched: 2  Changed: 2  Warnings: 0
```

IV. Storage Engines

- `MyISAM` - fast but lacks transactions.
- `InnoDB` - supports rollbacks and is reliable for critical data.
- `MEMORY` - stores data in RAM for speed, but everything vanishes on restart.

```
SHOW TABLE STATUS WHERE Name='casdat';
```

Result:

```
+--------+--------+---------+------------+-------+----------------+-------------+
| Name   | Engine | Version | Row_format | Rows  | Avg_row_length | Data_length |
+--------+--------+---------+------------+-------+----------------+-------------+
| casdat | MyISAM |      10 | Dynamic    | 76211 |            107 |     8177520 |
+--------+--------+---------+------------+-------+----------------+-------------+
```

```
+-----------------+--------------+-----------+----------------+---------------------+
| Max_data_length | Index_length | Data_free | Auto_increment | Create_time         |
+-----------------+--------------+-----------+----------------+---------------------+
| 281474976710655 |         1024 |         0 |           NULL | 2025-05-14 12:26:19 |
+-----------------+--------------+-----------+----------------+---------------------+
```

```
+---------------------+------------+-------------------+----------+----------------+
| Update_time         | Check_time | Collation         | Checksum | Create_options |
+---------------------+------------+-------------------+----------+----------------+
| 2025-05-14 12:28:12 | NULL       | latin1_swedish_ci |     NULL |                |
+---------------------+------------+-------------------+----------+----------------+
```

Creating test tables and inserting test data:

```
CREATE TABLE students(ids INT, name VARCHAR(20), gender CHAR(1)); #(1)
CREATE TABLE employees(ids INT, name VARCHAR(20), gender CHAR(1)); #(2)

INSERT INTO students VALUES(1, 'Smith', 'M'); #(3)
INSERT INTO employees VALUES(1, 'Mushroom', 'M'); #(4)
```

Result:

```
(1) Query OK, 0 rows affected (0.01 sec)
(2) Query OK, 0 rows affected (0.01 sec)
(3) Query OK, 1 row affected (0.01 sec)
(4) Query OK, 1 row affected (0.01 sec)
```

Changing storage engines:

```
ALTER TABLE students ENGINE=InnoDB;
```

Result:

```
Query OK, 1 row affected (0.02 sec)
Records: 1  Duplicates: 0  Warnings: 0
```

Testing transactions:

```
BEGIN; #(1)
UPDATE students SET gender='F' WHERE ids=1; #(2)
UPDATE employees SET gender='F' WHERE ids=1; #(3)
ROLLBACK; #(4)
```

Result:

```
(1) Query OK, 0 rows affected (0.00 sec)
(2) Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0
(3) Query OK, 1 row affected (0.00 sec)
    Rows matched: 1  Changed: 1  Warnings: 0
(4) Query OK, 0 rows affected, 1 warning (0.01 sec)
```

Test Memory engine:

```
ALTER TABLE students ENGINE=MEMORY; #(1)
INSERT INTO students VALUES(2, 'Test', 'M'); #(2)
```

Result:

```
(1) Query OK, 1 row affected (0.01 sec)
    Records: 1  Duplicates: 0  Warnings: 0
(2) Query OK, 1 row affected (0.00 sec)
```

Conclusions

This laboratories explored practical `MySQL` console operations, from basic authentication to data handling. We tested `ENUM/SET` constraints and compared storage engines: `MyISAM` for speed, `InnoDB` for transactions and `MEMORY` for temporary data.