

ITCS393 Database Systems Lab

Installing and Starting Using DBMS

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Learning Outcomes

- **Demonstrate** ability to create a database based on given requirements using SQL DDL commands.
- **Demonstrate** ability to manage a given database using SQL DML commands.
- **Demonstrate** ability to retrieve database using QL commands.

Lecturers



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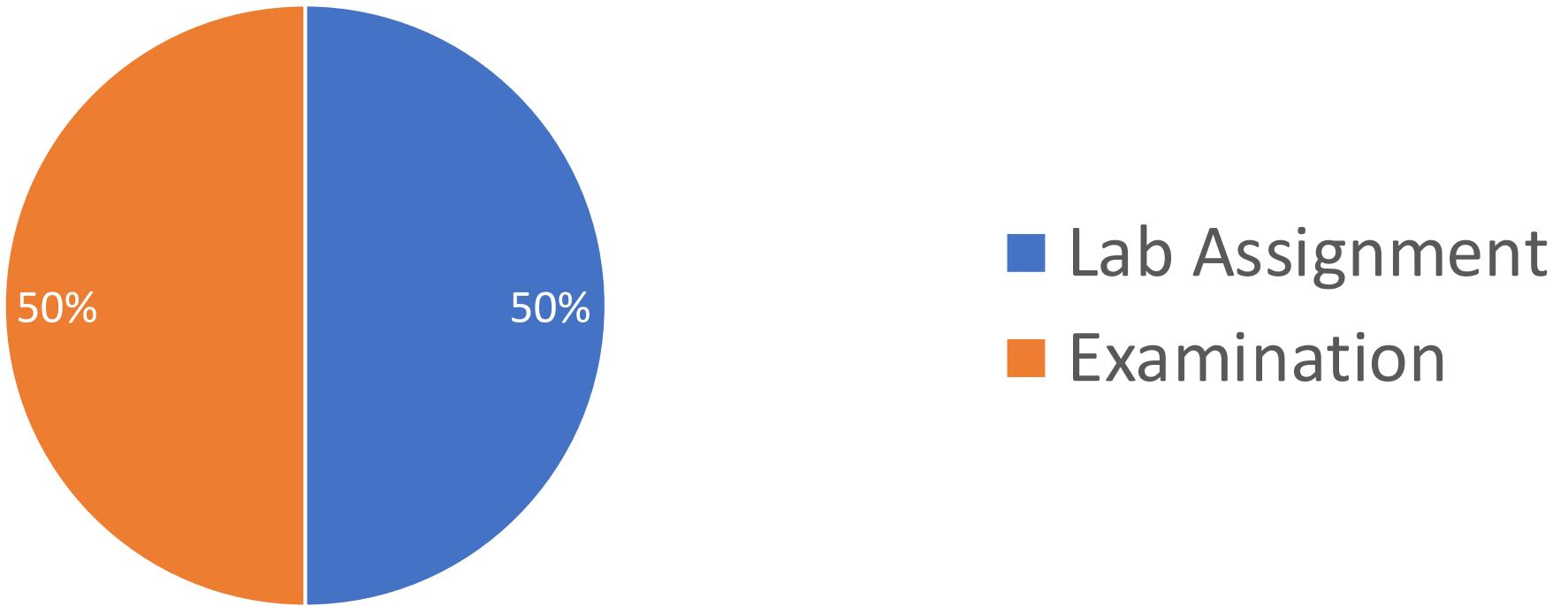
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How to get 'A' ?

Assessment



Database Vocabulary

Database, Table, Field, Record, Key, Relation

DATABASE

= A collection of data on a specific topic stored in an organized manner

Rep

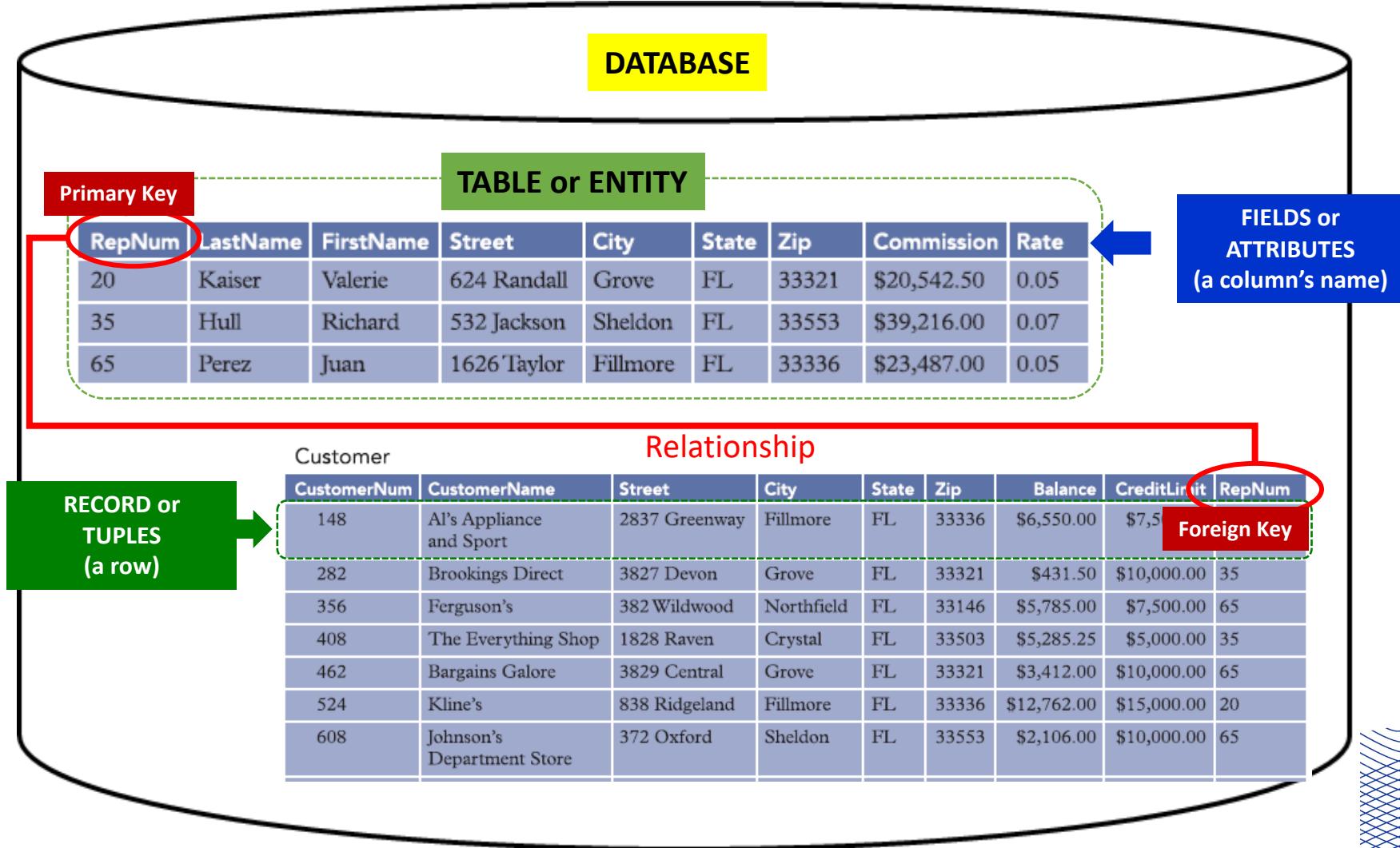
RepNum	LastName	FirstName	Street	City	State	Zip	Commission	Rate
20	Kaiser	Valerie	624 Randall	Grove	FL	33321	\$20,542.50	0.05
35	Hull	Richard	532 Jackson	Sheldon	FL	33553	\$39,216.00	0.07
65	Perez	Juan	1626 Taylor	Fillmore	FL	33336	\$23,487.00	0.05

Customer

CustomerNum	CustomerName	Street	City	State	Zip	Balance	CreditLimit	RepNum
148	Al's Appliance and Sport	2837 Greenway	Fillmore	FL	33336	\$6,550.00	\$7,500.00	20
282	Brookings Direct	3827 Devon	Grove	FL	33321	\$431.50	\$10,000.00	35
356	Ferguson's	382 Wildwood	Northfield	FL	33146	\$5,785.00	\$7,500.00	65
408	The Everything Shop	1828 Raven	Crystal	FL	33503	\$5,285.25	\$5,000.00	35
462	Bargains Galore	3829 Central	Grove	FL	33321	\$3,412.00	\$10,000.00	65
524	Kline's	838 Ridgeland	Fillmore	FL	33336	\$12,762.00	\$15,000.00	20
608	Johnson's Department Store	372 Oxford	Sheldon	FL	33553	\$2,106.00	\$10,000.00	65

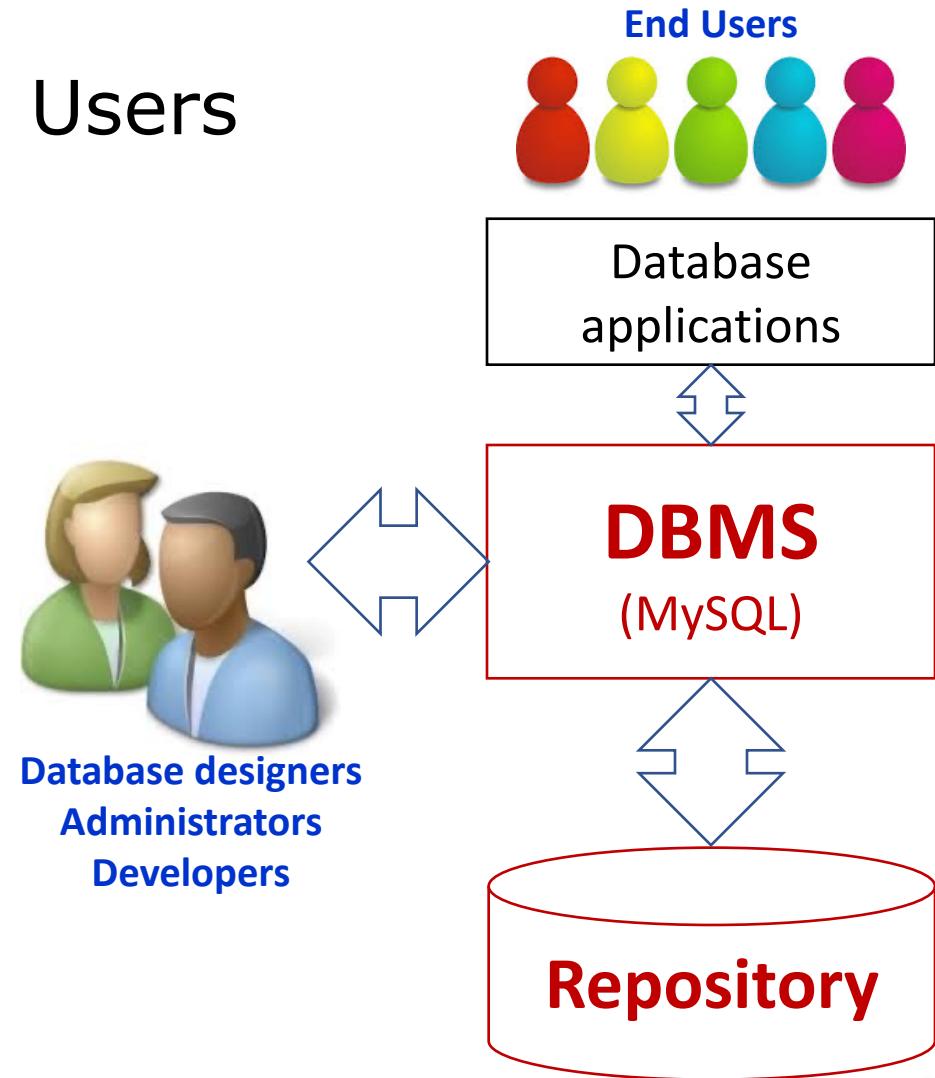
Database Vocabulary (cont.)

Database, Table, Field, Record, Key, Relation



Background Knowledge

- DBMS, DB and Users



Role and Career Path



Database Designer



Database Administrator

Outline of Lab #1

1.0 *Connect* to Database

1.1 *Create* a database user account

1.2 *Create* a new database

1.3 *Delete* an existing database

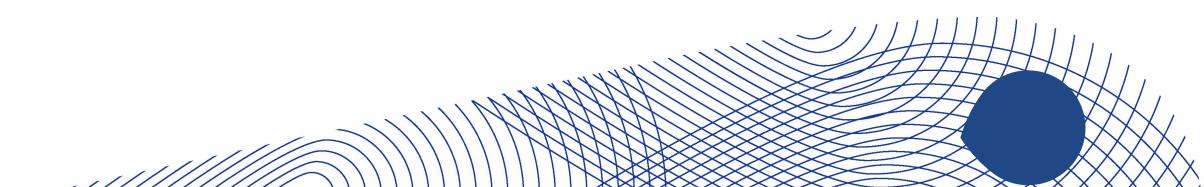
1.4 *Create* a new table within a database

1.5 *Delete* an existing table

1.6 *Insert* a new record into a table

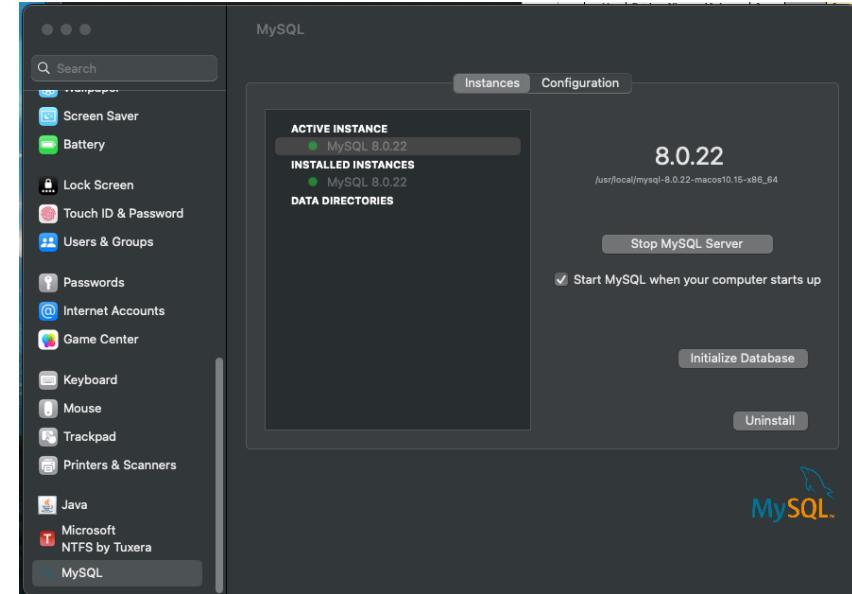
1.7 *Update* an existing record

1.8 *Delete* an existing record



1.0 Connect to Database

- Firstly, you need to install MySQL Server and MySQL Workbench (Please consult with the slide MySQL)
- Next, you need to ensure that your MySQL service is running.
 - For macOS, you can check it in the System Setting.
 - For Windows, you can check it in the Services.



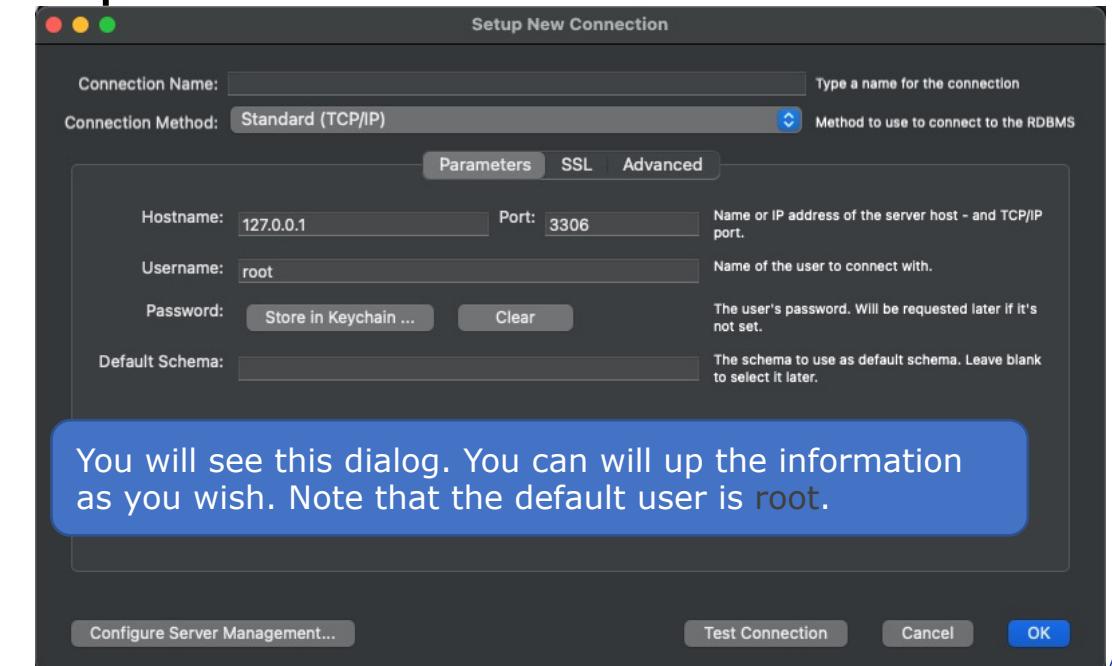
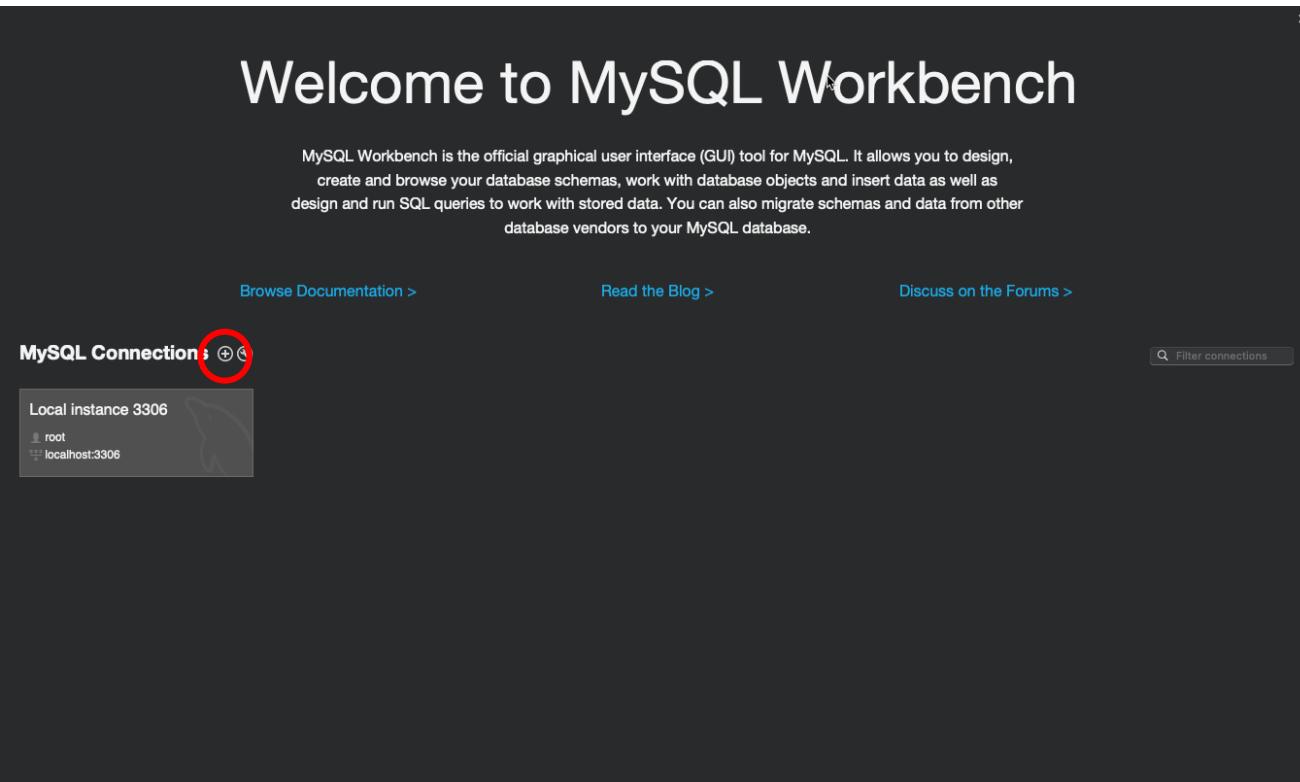
1.0 Connect to Database (cont.)

- Then we will start MySQL Workbench.
- On the first GUI of Workbench, you will see the local instance connection.



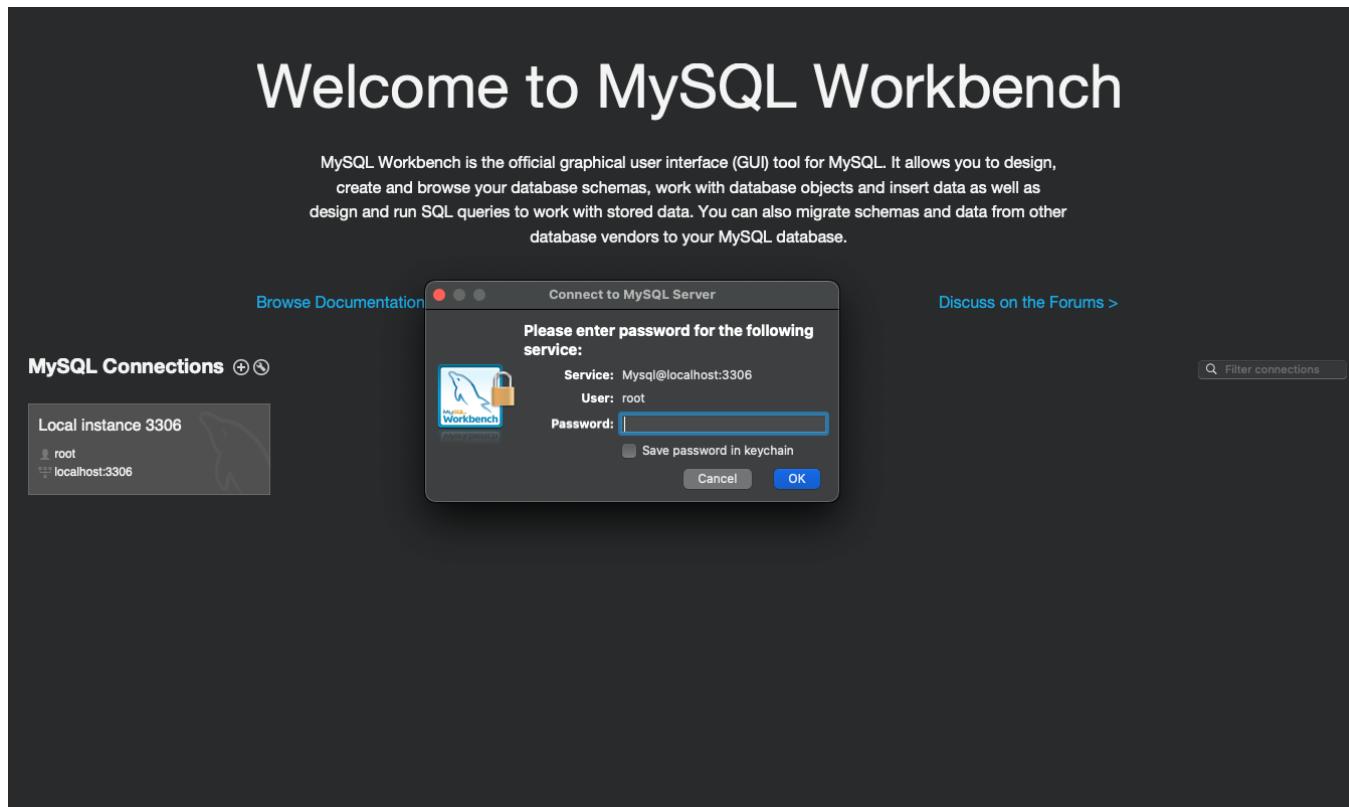
1.0 Connect to Database (cont.)

- However, if you cannot see the local instance connection,
 - You need to ensure that the MySQL Server is running.
 - You can create the connection via “plus” button.



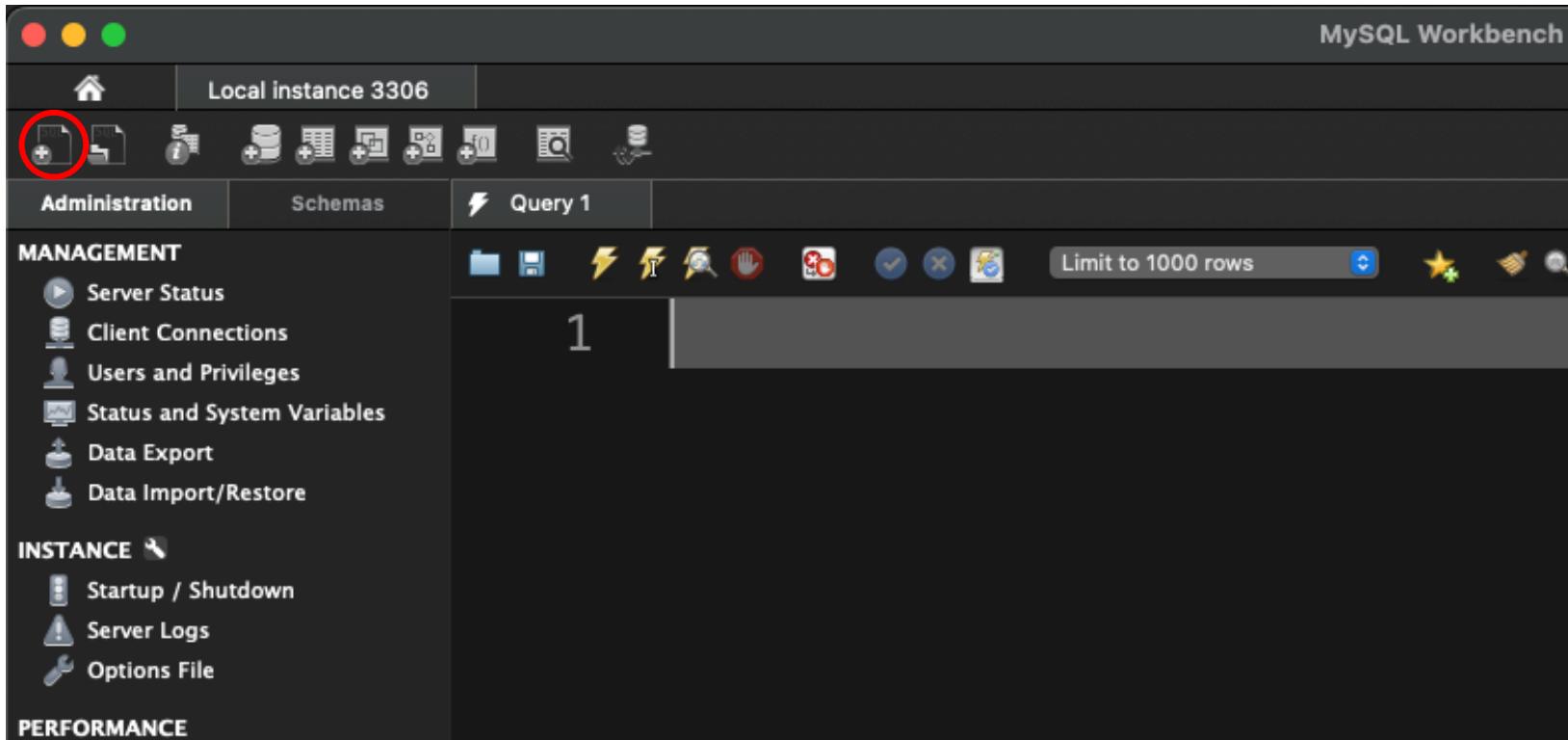
1.0 Connect to Database (cont.)

- After the connection is created, you now can connect to the database using your username (Default: root)



1.1 – 1.8 Using SQL to manage MySQL Server

Open New Query Window



1.1 Create a database user account

- The full command to create user can be found [here](#).
(Link:
<https://dev.mysql.com/doc/refman/8.0/en/create-user.html>)
- In this lab, we will create sample users and assign role to them.

1.1 Create a database user account

- Syntax

```
CREATE USER <username>@<server>
IDENTIFIED BY <password>;
```

- Example

```
CREATE USER 'ITCS393'@'localhost'
IDENTIFIED BY 'itcs393';
```

1.1 Create a database user account (cont.)

- Next, we are going to grant privileges to a user.
- In order to do that,
 - We can directly grant privileges to a user or
 - We can create role and assignment the role to a user.
- You can observe all privileges from [here](#). (Link: <https://dev.mysql.com/doc/refman/8.0/en/privileges-provided.html>)

1.1 Create a database user account (cont.)

- GRANT Syntax

```
GRANT priv_type [(column_list)] [, priv_type  
[(column_list)]] ... ON [object_type] priv_level TO  
user_or_role [, user_or_role] ... [WITH GRANT OPTION]  
[AS user [WITH ROLE DEFAULT | NONE | ALL | ALL EXCEPT  
role [, role] ... | role [, role] ... ] ] }
```

- Example

```
GRANT ALL ON *.* TO 'ITCS393'@'localhost';
```

This statement grants all privileges on any databases and tables to the user "ITCS393"

1.1 Create a database user account (cont.)

- You can GRANT different privileges on different databases and tables

```
GRANT priv_type [(column_list)] [,  
priv_type [(column_list)]] ...  
ON [database].[table]  
TO user_or_role [, user_or_role] ...
```

1.2 Create a new database

- Full Syntax

```
CREATE { DATABASE | SCHEMA } [ IF NOT EXISTS ]  
db_name [ create_option ] ...  
  
create_option: [ DEFAULT ] { CHARACTER SET [=]  
charset_name | COLLATE [=] collation_name |  
ENCRYPTION [=] { 'Y' | 'N' } }
```

- Simple Syntax

```
CREATE { DATABASE | SCHEMA } [ IF NOT EXISTS ]  
db_name
```

1.2 Create a new database (cont.)

- Example

```
CREATE DATABASE IF NOT EXISTS ITCS393DB;
```



The screenshot shows the MySQL Workbench interface with the following details:

- Database: Local instance 3306
- Database Name: ITCS393DB
- Schema Details:
 - Default collation: utf8mb4_0900_ai_ci
 - Default characterset: utf8mb4
 - Table count: 0
 - Database size (rough estimate): 0.0 bytes
- Navigation tabs: Info, Tables, Columns, Indexes, Triggers, Views, Stored Procedures, Functions, Grants

1.2 Create a new database (cont.)

- Use a database or change the current database to another database that you are working with

```
USE database_name;
```

- Show all available databases

```
SHOW DATABASES;
```

1.3 Delete an existing database

- Syntax

```
DROP { DATABASE | SCHEMA } [ IF EXISTS ] db_name
```

- Example

```
DROP DATABASE IF EXISTS ITCS393DB;
```

1.4 Create a new table

- The full syntax for creating a table can be found [here](#).
(Link:
<https://dev.mysql.com/doc/refman/8.0/en/create-table.html>)
- Common Syntax

```
CREATE TABLE [table name] (
    ColumnName1 data type [constraint]
    [, ColumnName2 data type [constraint]]
    [ PRIMARY KEY (column2 [,column2]) ] REFERENCES
    tablename [, CONSTRAINT ConstraintName ]
);
```

1.4 Create a new table (cont.)

- Example

Note that when you want to use any commands, you need to ensure that you are selecting the correct database.

```
USE ITCS393DB;  
CREATE TABLE Staff (  
    StaffID int,  
    LastName varchar(255),  
    FirstName varchar(255),  
    Address varchar(255),  
    City varchar(255)  
);
```

1.4 Create a new table (cont.)

- SQL Constraints

- SQL constraints are used to specify rules for the data in a table
- Used when create or modify table.
- **NOT NULL** - a column cannot store NULL value
- **UNIQUE** - each row for a column must have a unique value
- **PRIMARY KEY** – a column or more columns have a unique identity and cannot be NULL value. (NOT NULL and UNIQUE constraints)

1.4 Create a new table (cont.)

- SQL Constraints
 - **FOREIGN KEY** - the referential integrity of the data in one table to match values in another table
 - A FOREIGN KEY in a table points to a PRIMARY KEY in another table
 - CONSTRAINT FK_PerOrders FOREIGN KEY (PID) REFERENCES Persons(PID)
 - **CHECK** - the value in a column meets a specific condition
 - For example, gender column can be M or F
 - CONSTRAINT chk_PersonGender CHECK (Gender in ('M', 'F'))

1.5 Delete an existing table

- Syntax

```
DROP TABLE table_name
```

- Example

```
DROP TABLE Staff;
```

1.6 Insert a new record into a table

- Syntax

```
INSERT INTO tablename (Column1, Column2,...,ColumnN)  
VALUES (value1, value2, ..., valueN)
```

- Example

```
INSERT INTO Staff  
VALUES (999, 'Sawangphol', 'Wudhichart', 'MUICT', 'Salaya');
```

Result Grid   Filter Rows:  Search

StaffID	LastName	FirstName	Address	City
999	Sawangphol	Wudhichart	MUICT	Salaya

1.6 Insert a new record into a table (cont.)

- If you do not want to insert database, which consists of all columns, you need to specify columns.
- Example

```
INSERT INTO Staff(StaffID, LastName, FirstName)  
VALUES ('998', 'Jidapa', 'Kraisangka');
```

Result Grid					
	StaffID	LastName	FirstName	Address	City
▶	999	Sawangphol	Wudhichart	MUICT	Salaya
	998	Jidapa	Kraisangka	NULL	NULL

1.6 Insert a new record into a table (cont.)

- You can insert multiple data as once.
- Example

```
INSERT INTO Staff(StaffID, LastName, FirstName)  
VALUES ('997', 'Petch', 'Sajjacholapunt'),  
       ('996', 'Pisit', 'Praiwattana');
```

	StaffID	LastName	FirstName	Address	City
▶	999	Sawangphol	Wudhichart	MUICT	Salaya
	998	Jidapa	Kraisangka	NULL	NULL
	997	Petch	Sajjacholapunt	NULL	NULL
	996	Pisit	Praiwattana	NULL	NULL

1.7 Update an existing record

- Syntax

```
UPDATE tablename  
SET columnname = expression [, columnname = expression]  
[WHERE conditionlist];
```

- Example

```
UPDATE Staff  
SET Address = 'ICT, Mahidol';
```

```
UPDATE Staff  
SET City = 'Phayathai'  
WHERE StaffID = 997;
```

StaffID	LastName	FirstName	Address	City
999	Sawangphol	Wudhichart	ICT, Mahidol	Salaya
998	Jidapa	Kraisangka	ICT, Mahidol	NULL
997	Petch	Sajjacholapunt	ICT, Mahidol	NULL
996	Pisit	Praiwattana	ICT, Mahidol	NULL

StaffID	LastName	FirstName	Address	City
999	Sawangphol	Wudhichart	ICT, Mahidol	Salaya
998	Jidapa	Kraisangka	ICT, Mahidol	NULL
997	Petch	Sajjacholapunt	ICT, Mahidol	Phayathai
996	Pisit	Praiwattana	ICT, Mahidol	NULL

1.8 Delete an existing record

- Syntax

```
DELETE FROM tablename  
[WHERE conditionlist];
```

- Example

```
DELETE FROM Staff  
WHERE StaffID = 996;
```

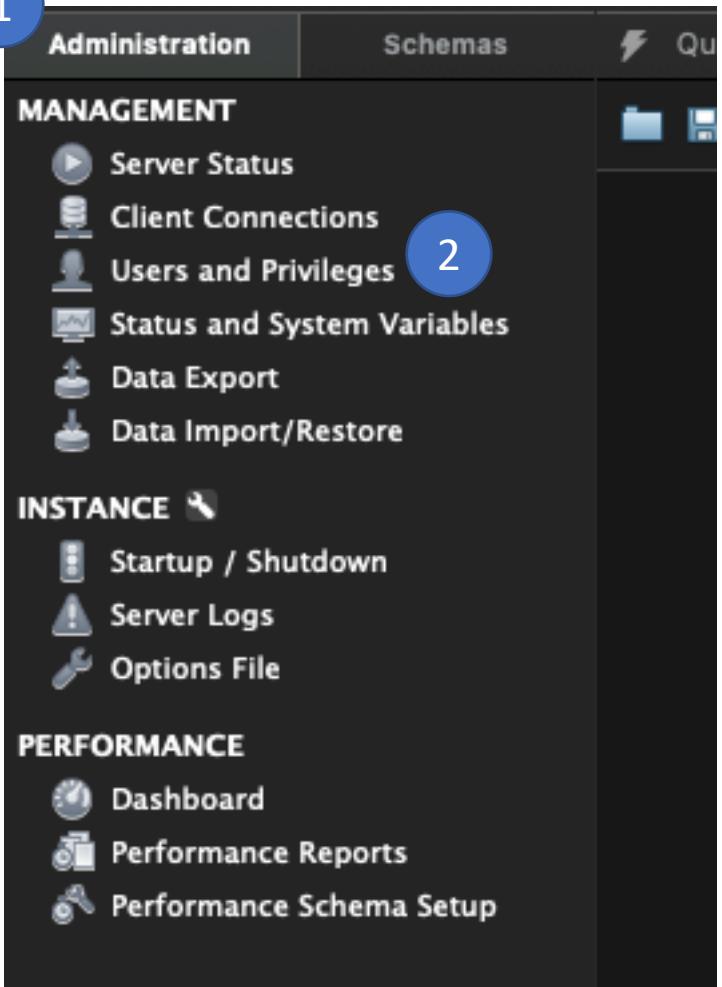
Result Grid					
	StaffID	LastName	FirstName	Address	City
▶	999	Sawangphol	Wudhichart	ICT, Mahidol	Salaya
	998	Jidapa	Kraisangka	ICT, Mahidol	NULL
	997	Petch	Sajjacholapunt	ICT, Mahidol	Phayathai

1.1 - 1.8 Using MySQL Workbench

1.1 Create a database user account

- Select Administration tab > Users and Privileges

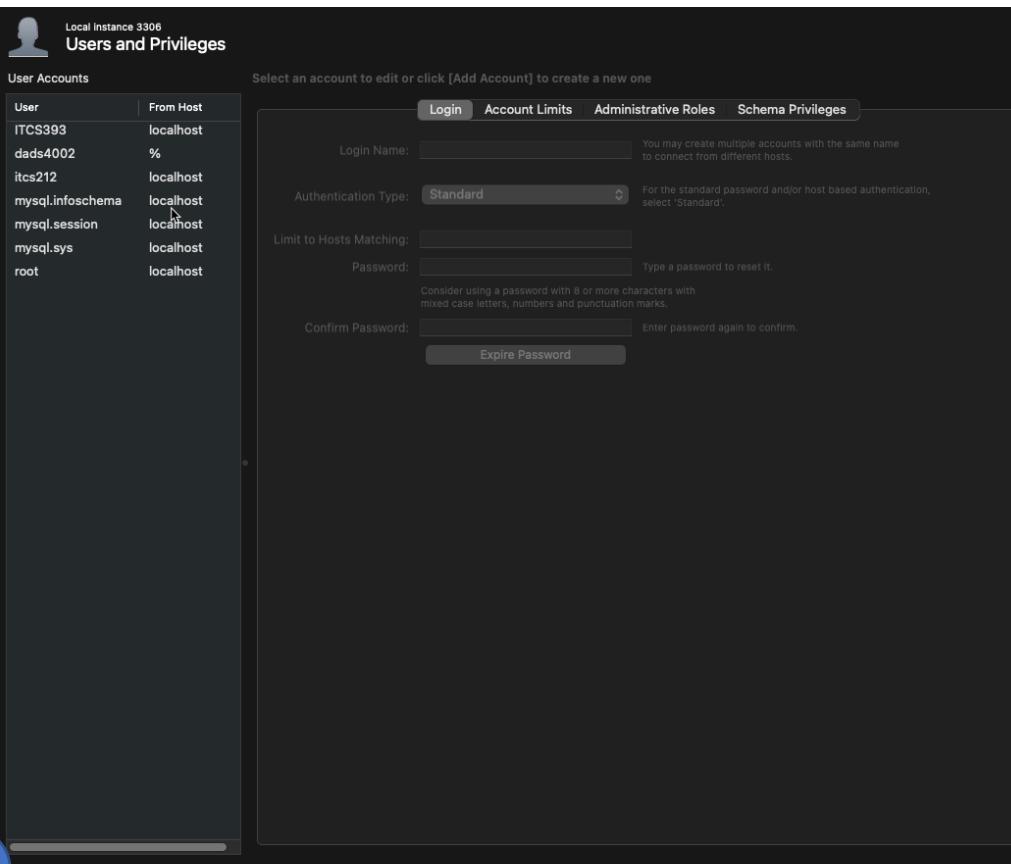
1



The screenshot shows the MySQL Workbench Administration interface. The 'Administration' tab is selected. In the 'MANAGEMENT' section, the 'Users and Privileges' option is highlighted with a blue circle containing the number '2'. The 'User Accounts' table lists several accounts:

User	From Host
ITCS393	localhost
dads4002	%
its212	localhost
mysql.infoschema	localhost
mysql.session	localhost
mysql.sys	localhost
root	localhost

2



The screenshot shows the 'Users and Privileges' creation dialog for 'Local Instance 3306'. The 'Login' tab is selected. The 'Login Name:' field is empty. The 'Authentication Type:' dropdown is set to 'Standard'. The 'Password:' field is empty, with a note: 'Type a password to reset it. Consider using a password with 8 or more characters with mixed case letters, numbers and punctuation marks.' The 'Confirm Password:' field is also empty. A 'Expire Password' button is at the bottom.

3

1.1 Create a database user account (cont.)

- Put your student id as Login name
- Put your password
- Change host to localhost

Details for account newuser@%

Login Account Limits Administrative Roles Schema Privileges

Login Name: 6588999 You may create multiple accounts with the same name to connect from different hosts.

Authentication Type: Standard For the standard password and/or host based authentication, select 'Standard'.

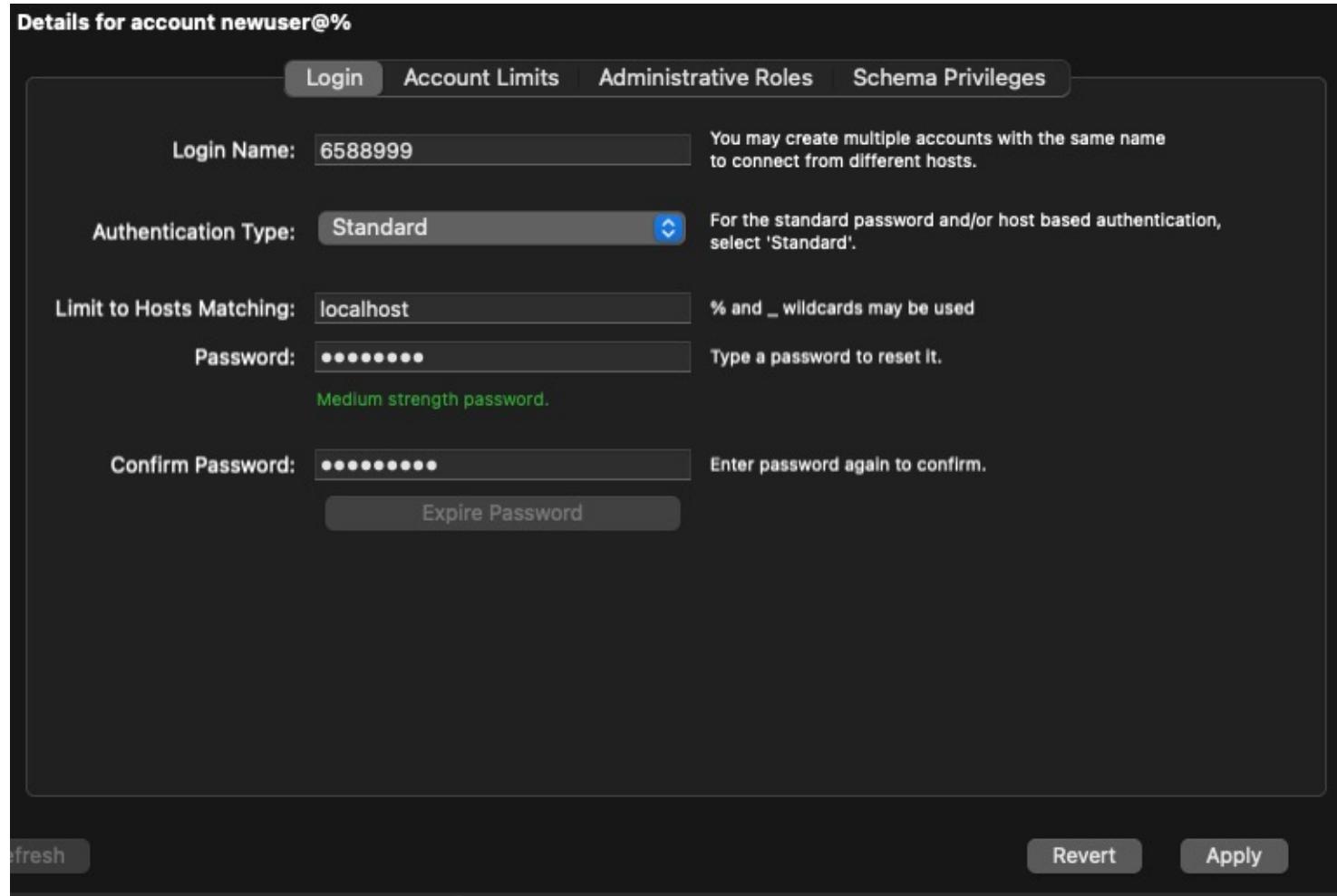
Limit to Hosts Matching: localhost % and _ wildcards may be used

Password: Type a password to reset it.

Confirm Password: Enter password again to confirm.

Expire Password

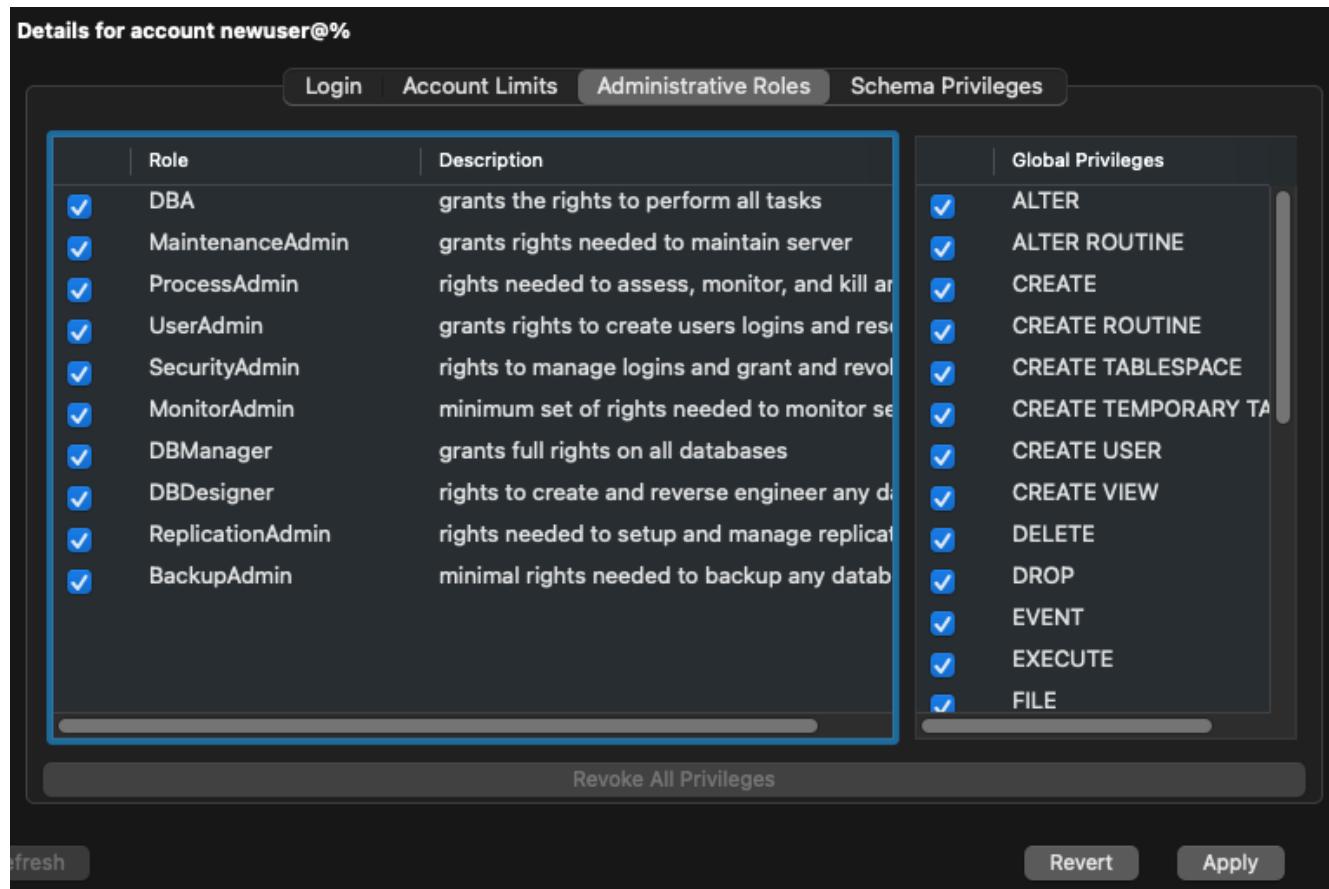
Refresh Revert Apply



You need to remember your password.

1.1 Create a database user account (cont.)

- Next, you are going to grant privileges for the created user.
 - Role
 - Privileges
- Please select **DBA**.
- Then click on **Apply**.
- Now, you can try your new user.



1.1 Create a database user account (cont.)

- You can also grant privileges at the database level.

Details for account 6588999@localhost

Login Account Limits Administrative Roles Schema Privileges

Schema | Privileges

Schema and Host fields may use % and _ wildcards.
The server will match specific entries before wildcarded ones.

Revoke All Privileges Delete Entry Add Entry...

Object Rights

- SELECT
- INSERT
- UPDATE
- DELETE
- EXECUTE
- SHOW VIEW

DDL Rights

- CREATE
- ALTER
- REFERENCES
- INDEX
- CREATE VIEW
- CREATE ROUTINE
- ALTER ROUTINE
- EVENT
- DROP
- TRIGGER

Other Rights

- GRANT OPTION
- CREATE TEMPORARY TABLES
- LOCK TABLES

Unselect All Select "ALL"

fresh Revert Apply



1.1 Create a database user account (cont.)

- You can also grant privileges at the database level.

Details for account 6588999@localhost

Login Account Limits Administrative Roles Schema Privileges

Schema	Privileges
ITCS393DB	ALTER, ALTER ROUTINE, CREATE, CREATE ROUTINE, CREATE TEMPORARY TABLES, CREATE VIEW, CREATE TABLE, CREATE INDEX, CREATE PROCEDURE, CREATE FUNCTION, CREATE VIEW, CREATE ROUTINE, CREATE TEMPORARY TABLE, CREATE TABLE, CREATE INDEX, CREATE PROCEDURE, CREATE FUNCTION, CREATE EVENT, DROP, TRIGGER

Schema and Host fields may use % and _ wildcards.
The server will match specific entries before wildcarded ones.

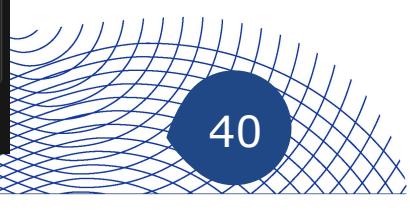
Revoke All Privileges Delete Entry Add Entry...

The user '6588999'@'localhost' will have the following access rights to the schema 'ITCS393DB':

Object Rights	DDL Rights	Other Rights
<input checked="" type="checkbox"/> SELECT <input checked="" type="checkbox"/> INSERT <input checked="" type="checkbox"/> UPDATE <input checked="" type="checkbox"/> DELETE <input checked="" type="checkbox"/> EXECUTE <input checked="" type="checkbox"/> SHOW VIEW	<input checked="" type="checkbox"/> CREATE <input checked="" type="checkbox"/> ALTER <input checked="" type="checkbox"/> REFERENCES <input checked="" type="checkbox"/> INDEX <input checked="" type="checkbox"/> CREATE VIEW <input checked="" type="checkbox"/> CREATE ROUTINE <input checked="" type="checkbox"/> ALTER ROUTINE <input checked="" type="checkbox"/> EVENT <input checked="" type="checkbox"/> DROP <input checked="" type="checkbox"/> TRIGGER	<input type="checkbox"/> GRANT OPTION <input checked="" type="checkbox"/> CREATE TEMPORARY TABLES <input checked="" type="checkbox"/> LOCK TABLES

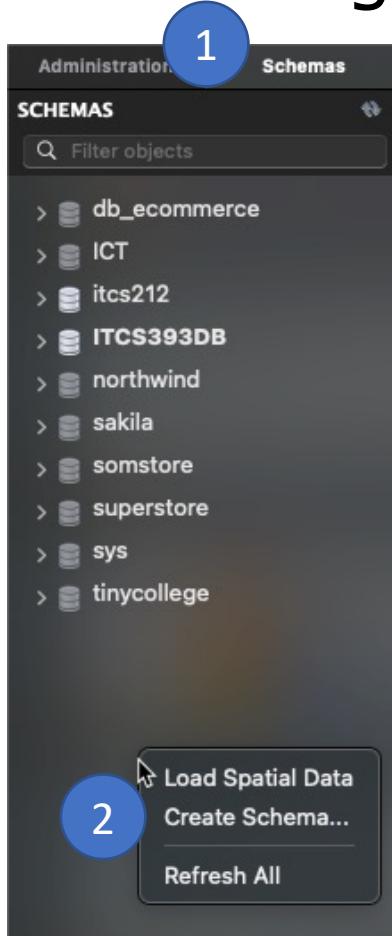
Unselect All Select "ALL" Revert Apply

refresh



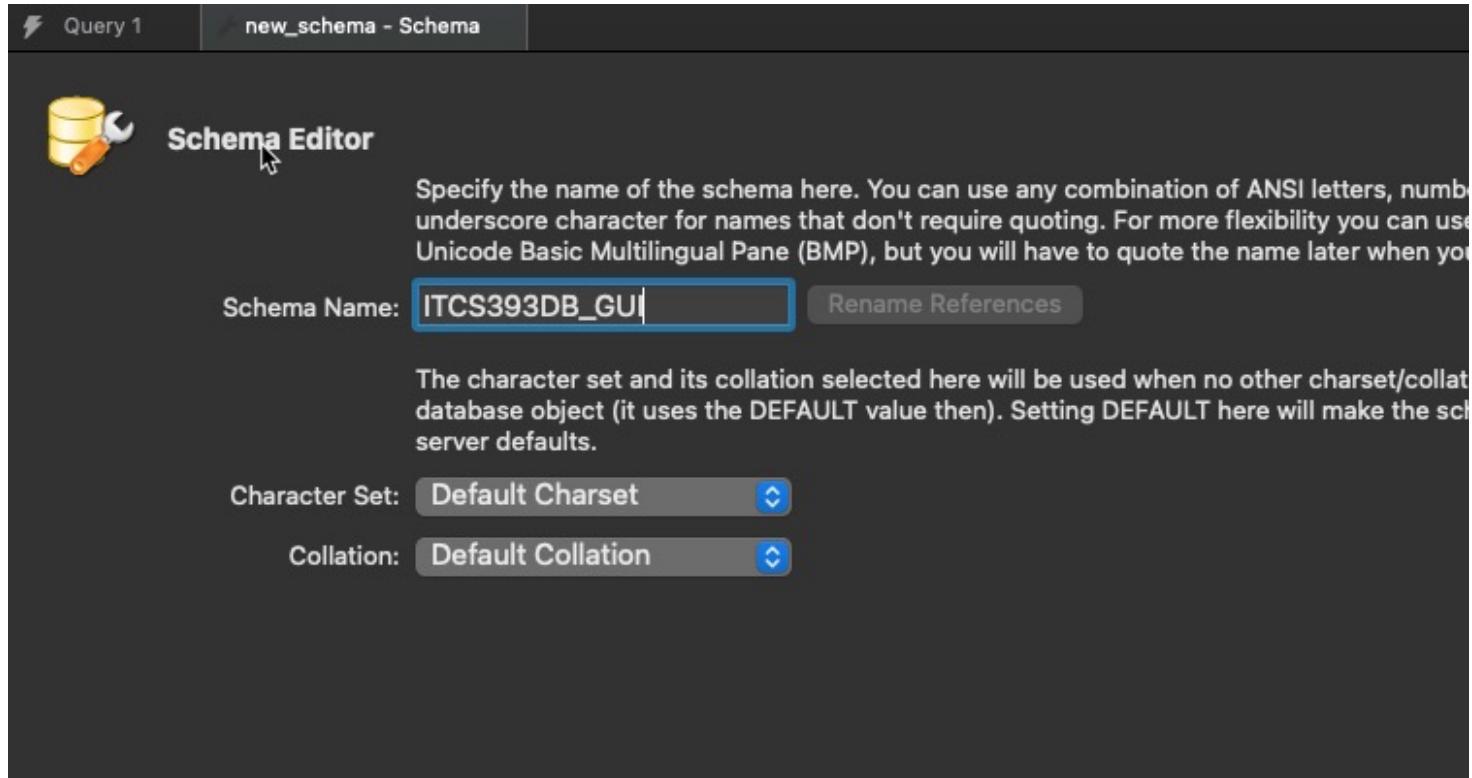
1.2 Create a new database

- Go to Schemas tab > Click right > Create Schema



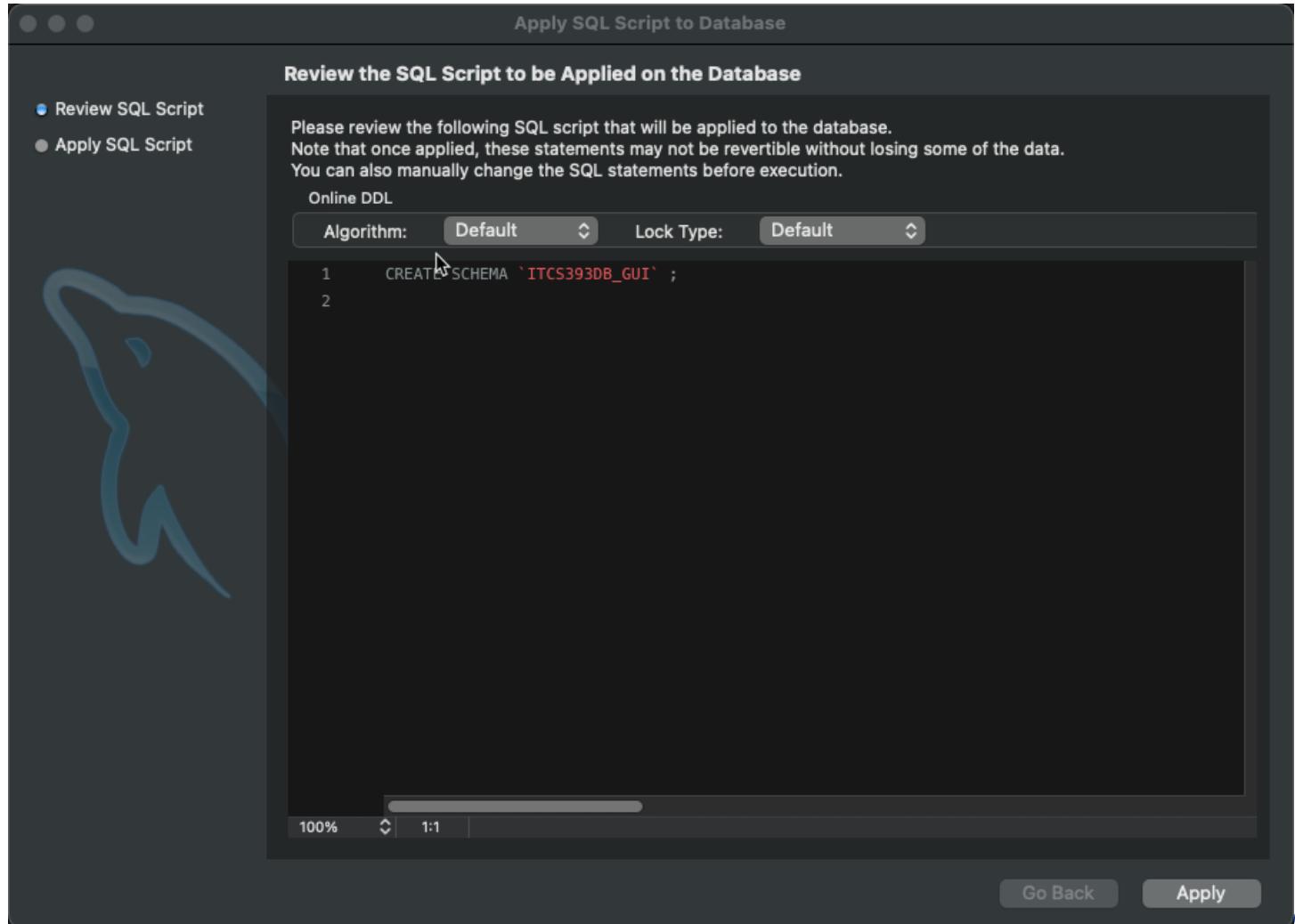
1.2 Create a new database (cont.)

- New schema editor
- After filling in the name of database, you need to click **Apply**.



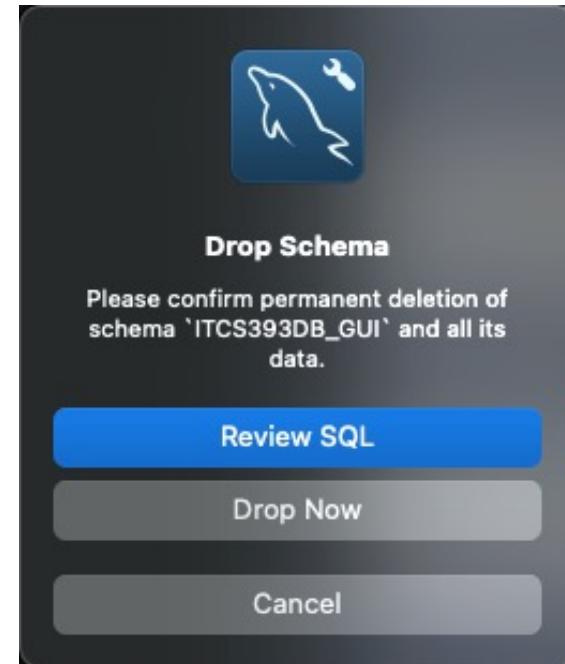
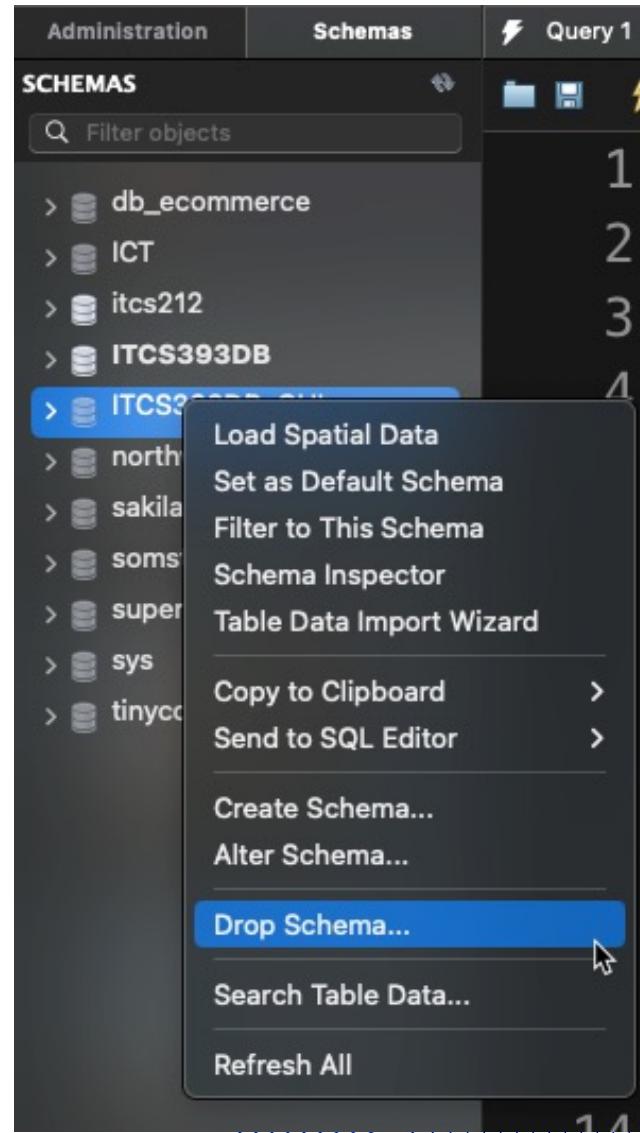
1.2 Create a new database (cont.)

- It will show the SQL Script.
- You can select **Apply**.



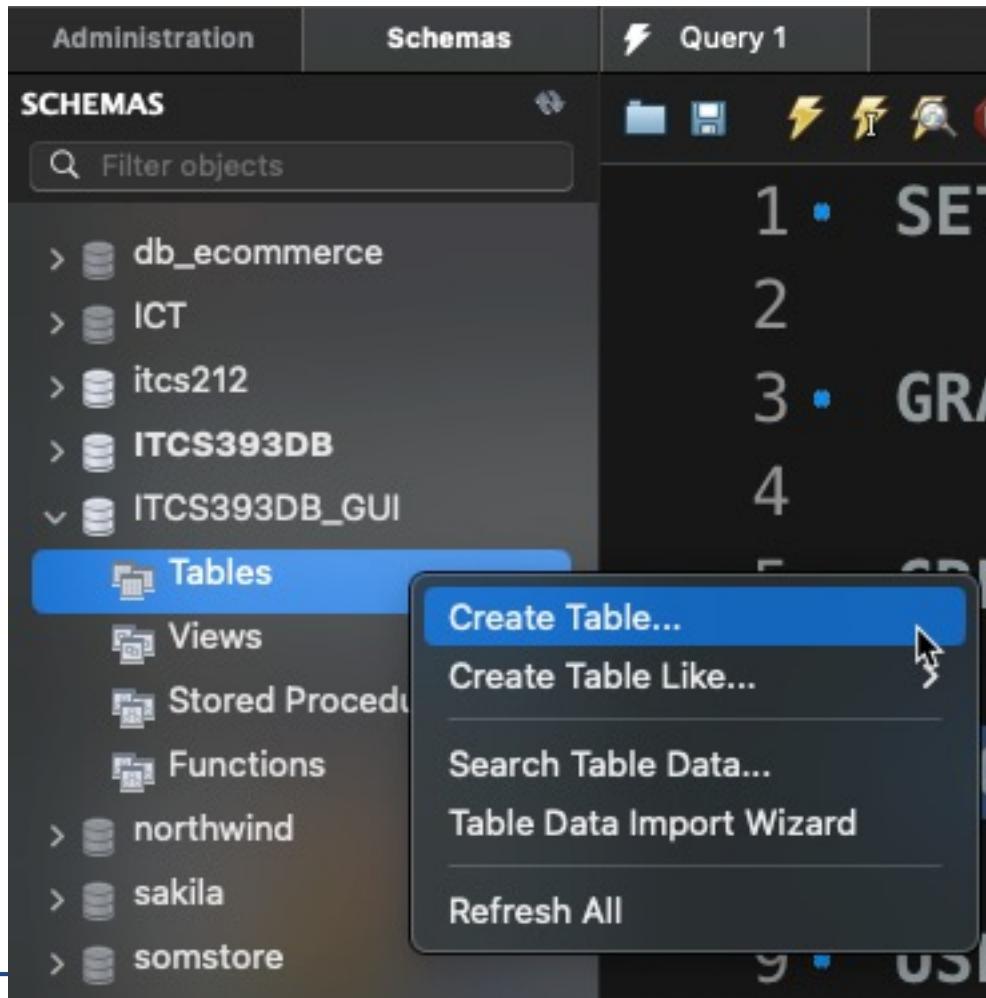
1.3 Delete an existing database

- Click right on the database that you want to delete > Drop Schema.
- Next, you can click **Drop Now**.



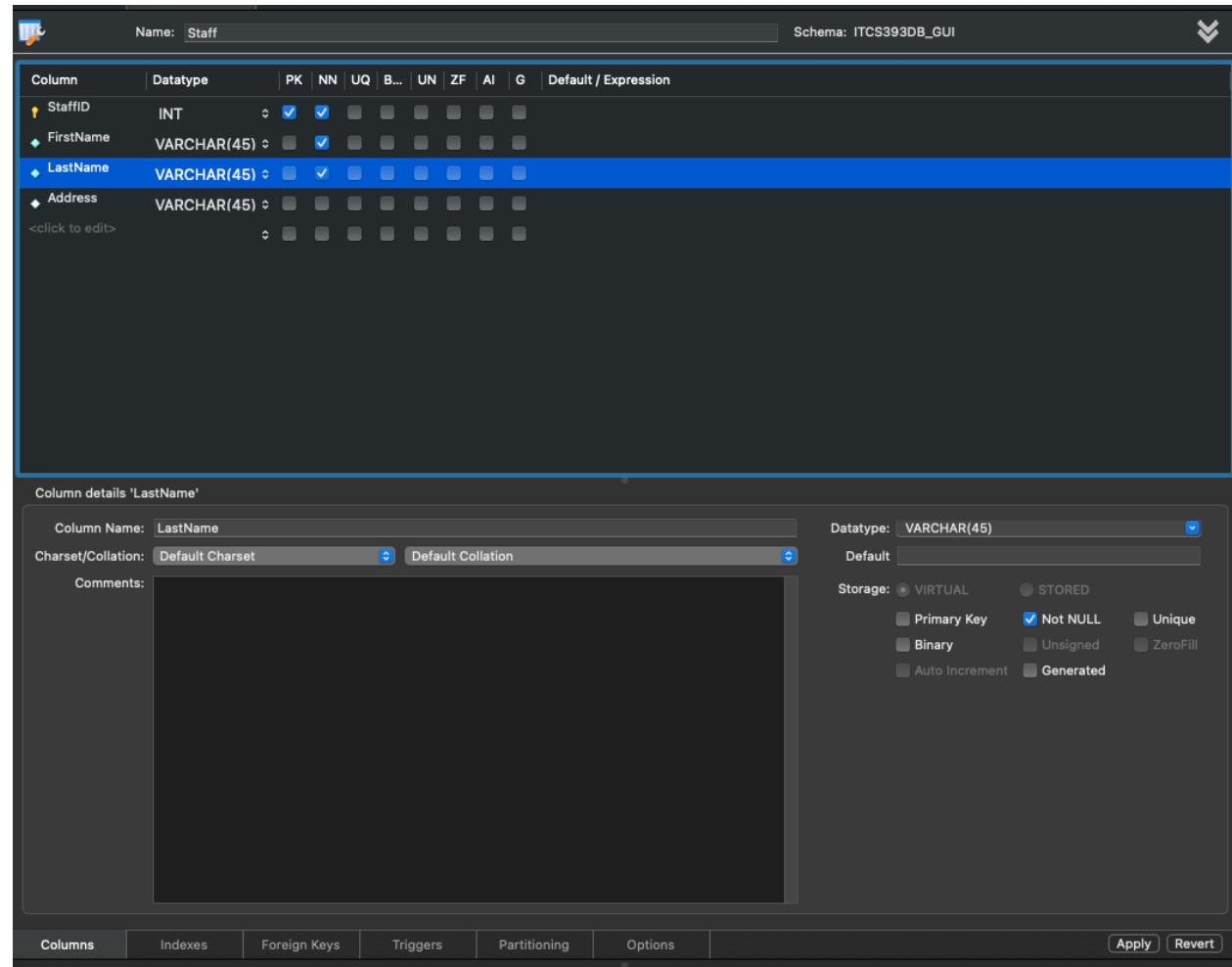
1.4 Create a new table

- Select the database > click right on Tables > Create Tables.



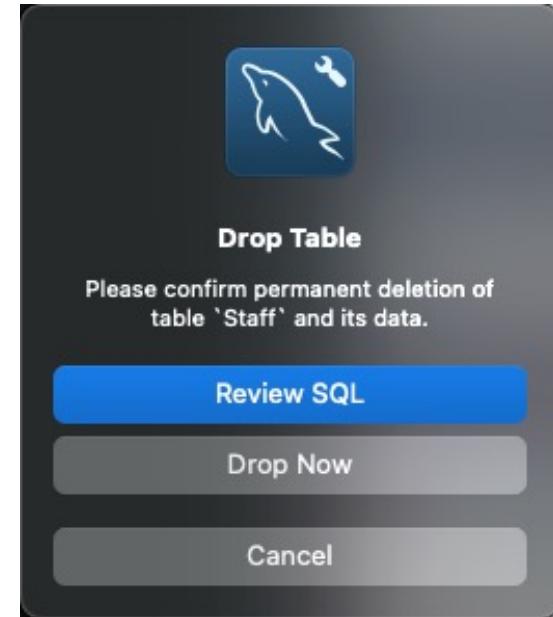
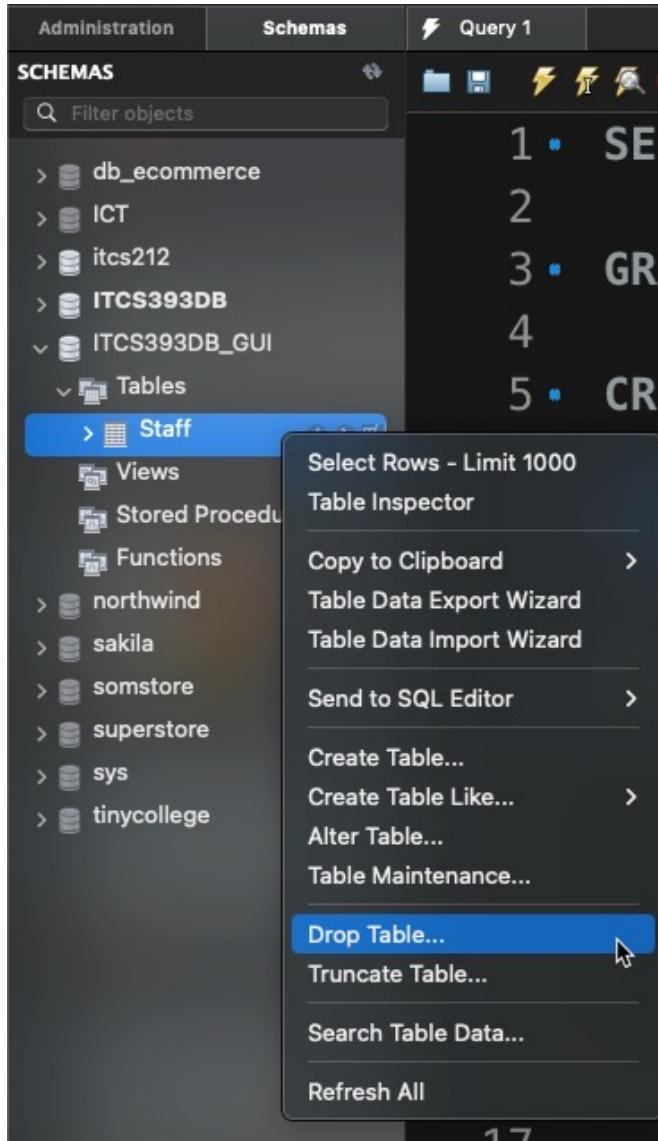
1.4 Create a new table (cont.)

- Next, we can configure the new table.
- After that, you can click **Apply**.
- Then it will show SQL for you to confirm.



1.5 Delete an existing table

- Click right on the table that will be deleted > Drop Table.
- Next, you can click **Drop Now**.





THANKS
FOR YOUR
ATTENTION
ANY
QUESTIONS?