

# MySQL & MySQL Workbench Tutorial

**A presentation on MySQL and using the MySQL  
Workbench database software tool.**

**This presentation assumes a basic knowledge  
of relational databases.**

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# Objectives

- Define MySQL and MySQL Workbench
- Install MySQL Workbench
- Learn how to create tables with two different methods
  1. Create tables in the live database
    1. If this method is chosen, Forward Engineering can be done, but it is more difficult
  2. Create an entire database using the Forward Engineering tool in MySQL Workbench
    1. Good for those who need the entire database in a single model quickly
  3. Perhaps by beginning with forward engineering, it can be a good idea to further create tables using the single-table creation feature. Editing the model and redoing Forward Engineering is highly recommended.

# Definitions

- MySQL: an open-source relational database management system with a client-server model. This system allows users to store, manage and manipulate data.
- MySQL Workbench: a tool to access MySQL. It has a nice GUI for making tables, creating foreign keys, and making simple tables quickly.

# MySQL

- MySQL functionalities:
- Creating tables individually
- Creating tables using the MySQL Workbench Forward Engineering tool
- Creating database tables which can relate to one another using foreign keys to emulate use cases and business requirements via cardinalities (not covered in this presentation).

# MySQL Resources

- Tutorials on MySQL using MySQL Workbench
- 1-hour video:
  - <https://www.youtube.com/watch?v=9ylj9NR0Lcg>
- 11-minute video:
  - <https://www.youtube.com/watch?v=2bW3HuaAUcY>
- I did not create, nor do I own these videos.

# MySQL Documentation

- MySQL Documentation
  - <https://dev.mysql.com/doc/>
- MySQL Workbench Documentation
  - <https://dev.mysql.com/doc/workbench/en/>

# How to install/setup MySQL Workbench

- Download for macOS (**recommended**):
  - <https://dev.mysql.com/doc/mysql-osx-excerpt/5.7/en/osx-installation-pkg.html>
- Download for Windows:
  - <https://dev.mysql.com/doc/workbench/en/wb-installing-windows.html>

# Installing MySQL Workbench on macOS

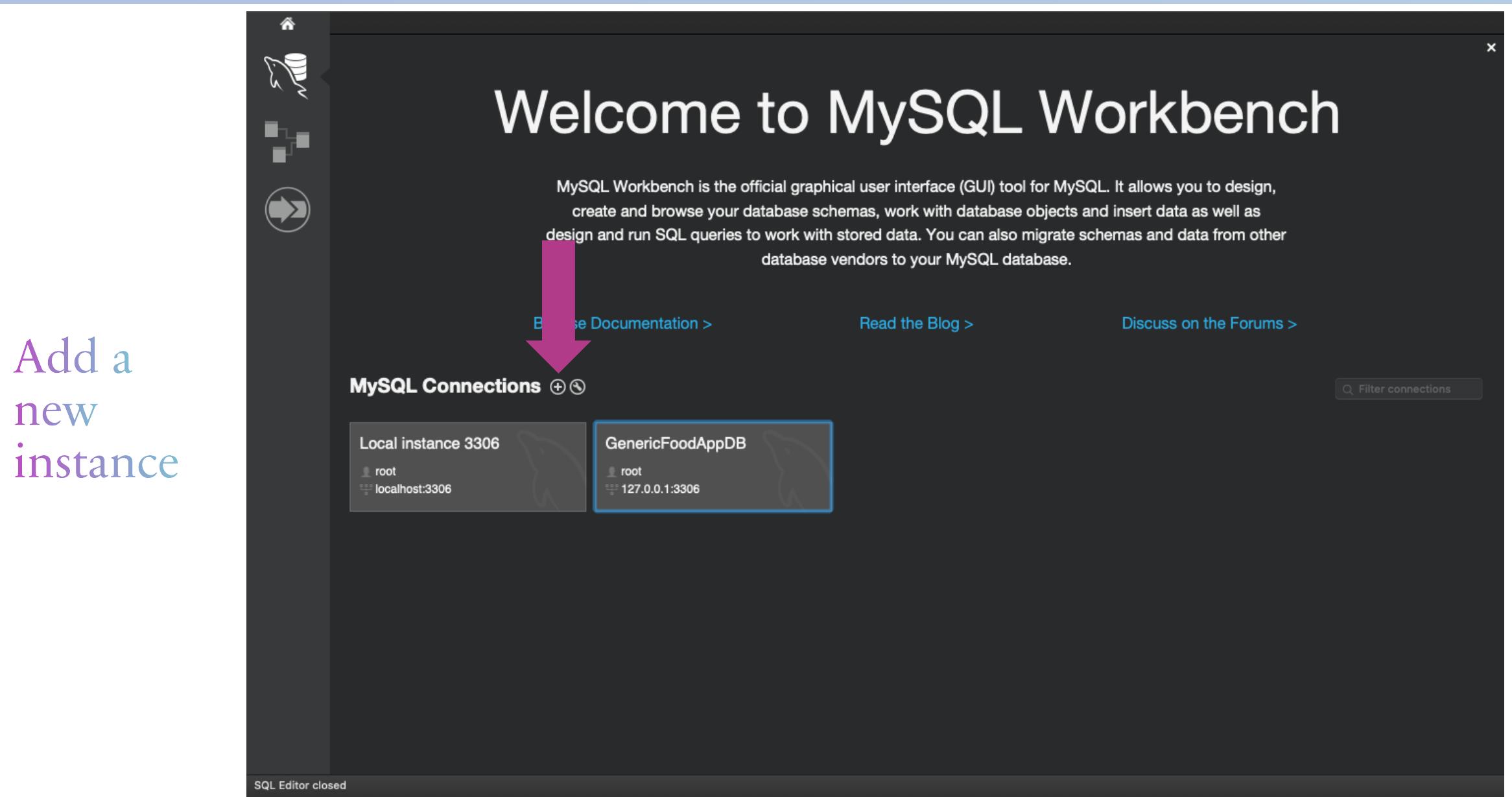
- Click on MySQL Community Server
- Select macOS
- Download your macOS DMG file (you don't need to register).
- Download, run and install
- System Preferences -> MySQL
- Click Start MySQL Server

# Installing MySQL Workbench on macOS

- Click MySQL Workbench
- Select macOS
- Download your macOS DMG file.
- Once the DMG file is finished downloading, run it and install it.
- Drag the app icon into the application folder.
- Open MySQL Workbench

# Installing MySQL Workbench on Windows

- Download for Windows:
  - <https://dev.mysql.com/doc/workbench/en/wb-installing-windows.html>
- This link is a great resource for installing. Follow the guide here.
- Download the DMG file, run it and choose Develop Default.
- Choose Standalone MySQL Server / Classic MySQL Replication (default). Continue with the link above for more on installation process.



Add a  
new  
instance

# Create a password

- It is important not to forget this password. It can be difficult to reset.
- The username is 'root' by default.
- localhost:3306
- Choose **Configure Server Management...**

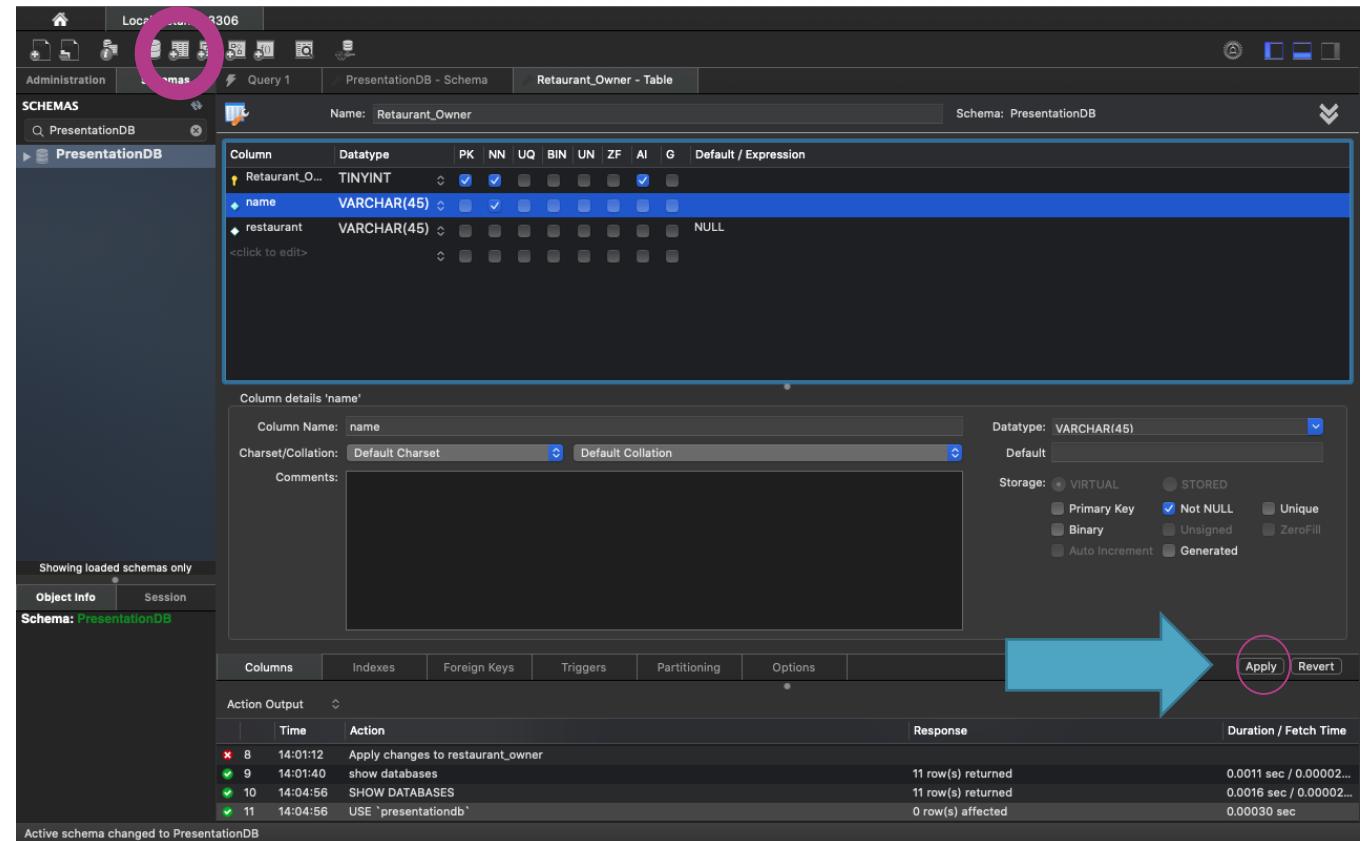
# Two Methods for creating tables

- **1.** Creating tables one at a time using MySQL Workbench
- **2.** Forward engineering the entire database using MySQL Workbench
- **Please note that all database table creation will be done using the MySQL Workbench software tool.**

# Creating tables one at a time

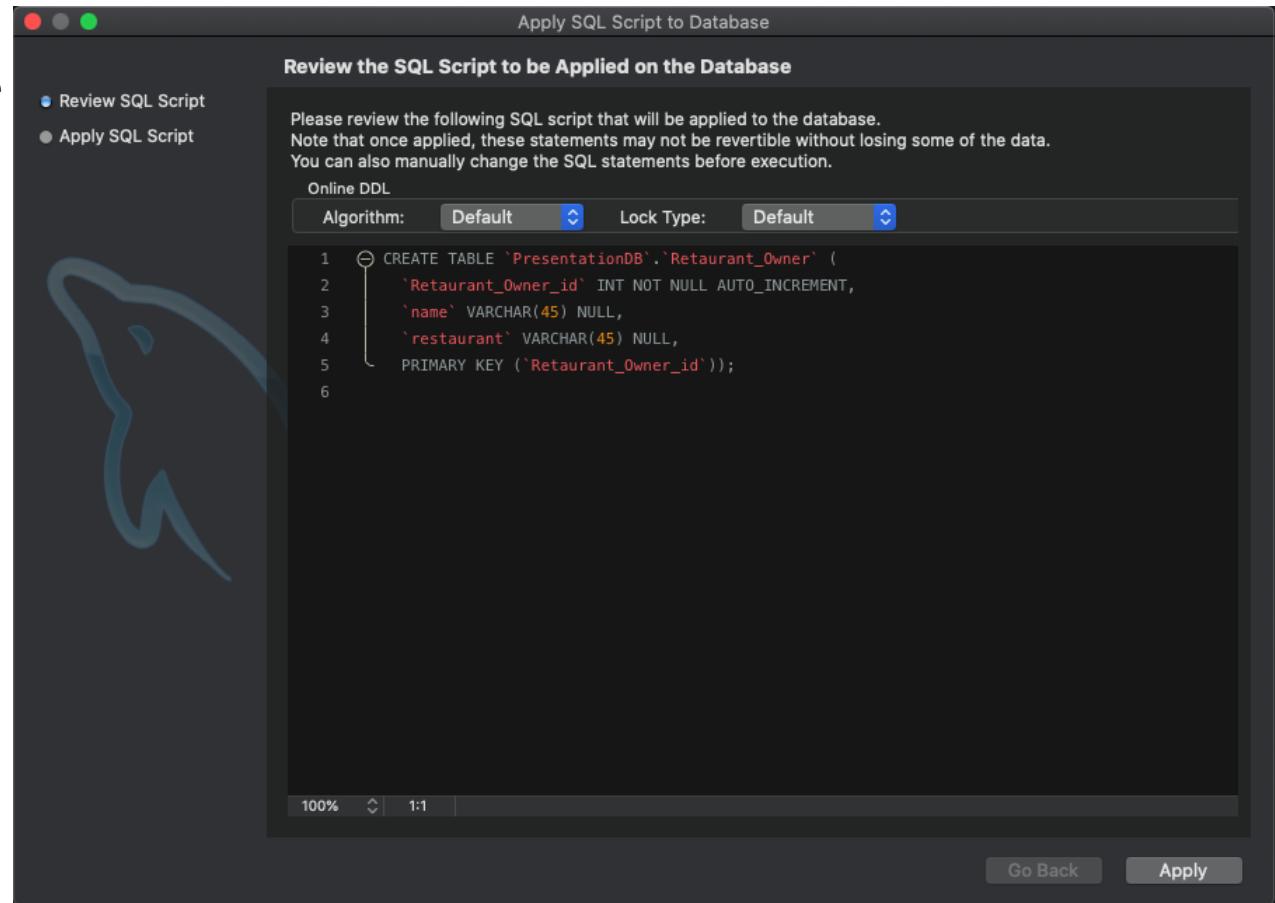
Process in general:

- Click create table in the top left corner, see purple circle →
- Add the table's primary key: use consistent naming such as Restaurant\_Owner\_id
- Make sure the primary key has options set: Primary Key (PK), Not Null (NN), and autoincrement (AI).
- Change datatype of Primary Key to TINYINT to save on storage
- Add columns and change datatypes and options as needed
- Press apply



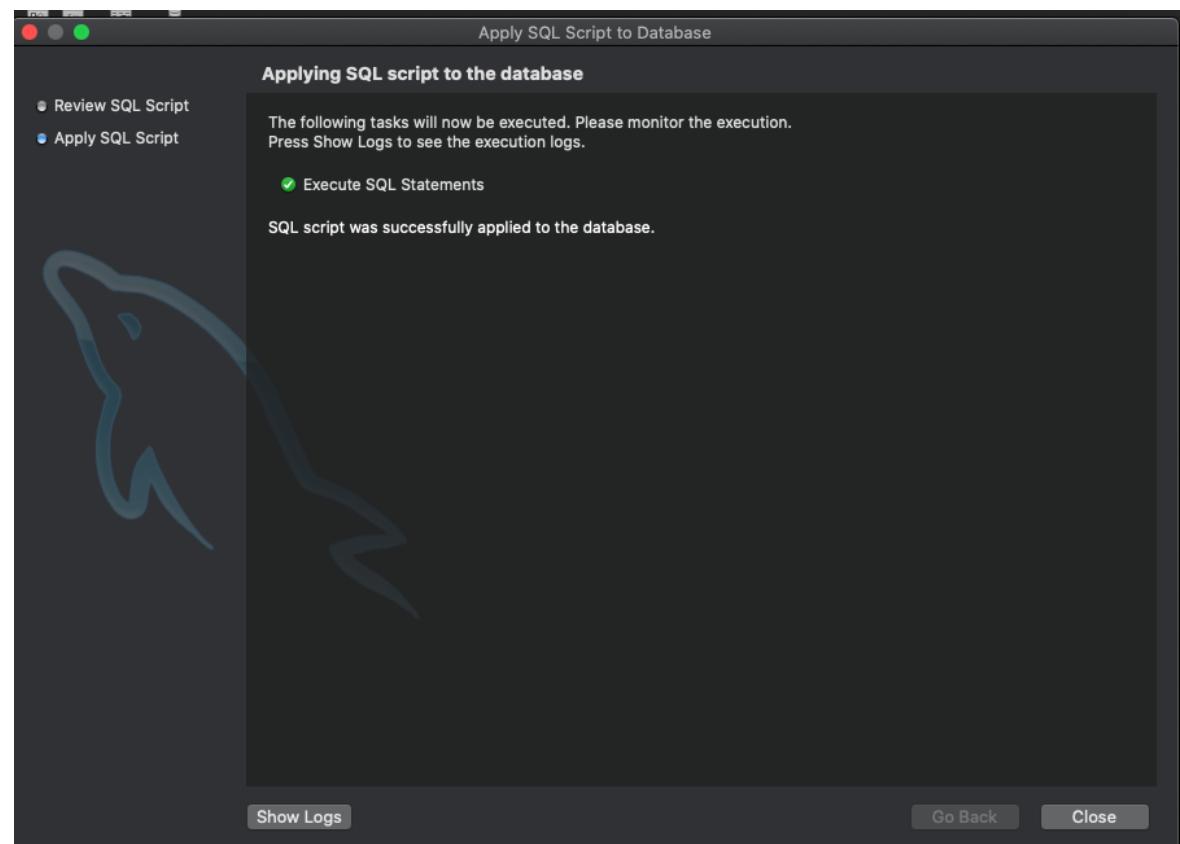
# Copy the script

- Copy the script by simply highlighting the code and right click to copy.
  - We will use this later
- If everything looks good, hit apply again.



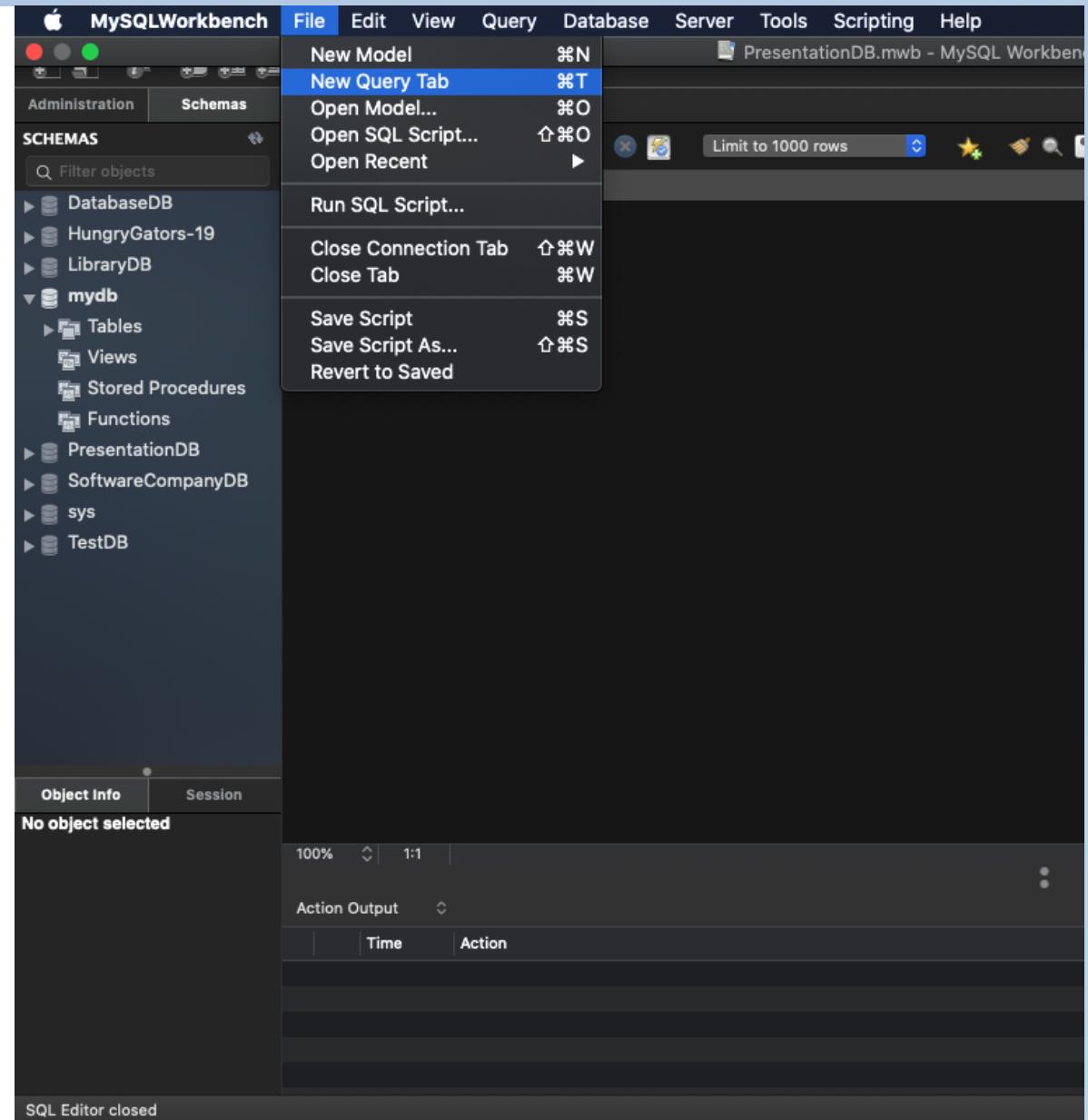
# Verify success

- You should see this screen, hit 'close'.
- If you get an error, check the table again to make sure there are no bugs, and retry.

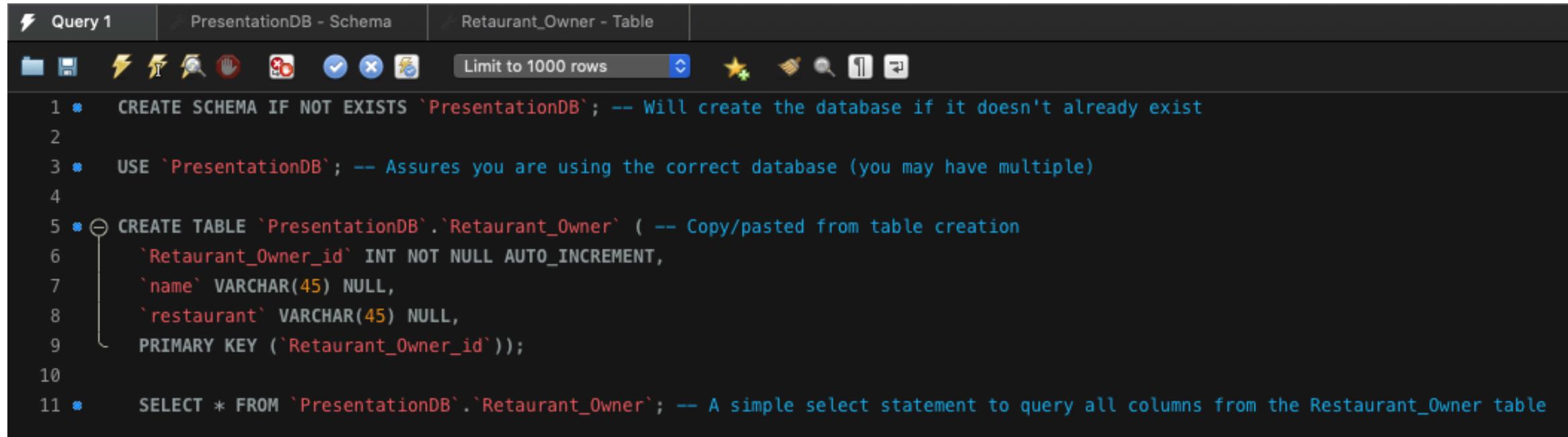


# Open a new query tab

- Create a new query tab by navigating to your instance and selecting
  - File > New Query Tab
- This will allow us to paste in our script and use the table as we please.



# Selecting from a table



```
⚡ Query 1 | PresentationDB - Schema | Restaurant_Owner - Table
☰ ⚡ 🔍 🖌️ ✎ ⚡ ✅ ✖️ 📁 | Limit to 1000 rows | ⚡ 🔍 🖌️ ✎ ⚡ ✅ ✖️ 📁
1 • CREATE SCHEMA IF NOT EXISTS `PresentationDB`; -- Will create the database if it doesn't already exist
2
3 • USE `PresentationDB`; -- Assures you are using the correct database (you may have multiple)
4
5 • CREATE TABLE `PresentationDB`.`Restaurant_Owner` ( -- Copy/pasted from table creation
6     `Restaurant_Owner_id` INT NOT NULL AUTO_INCREMENT,
7     `name` VARCHAR(45) NULL,
8     `restaurant` VARCHAR(45) NULL,
9     PRIMARY KEY (`Restaurant_Owner_id`));
10
11 • SELECT * FROM `PresentationDB`.`Restaurant_Owner`; -- A simple select statement to query all columns from the Restaurant_Owner table
```

- By adding lines 1, 3, and 11 in addition to pasting our table, we can successfully create a database and query our table we've just created.
- Run the query by pressing the lightning bolt, and the database is running on your local instance (check for errors in the action output).
- This script can be pasted into the **mysql>** shell to put this database onto the cloud.

# Forward Engineering in MySQL Workbench

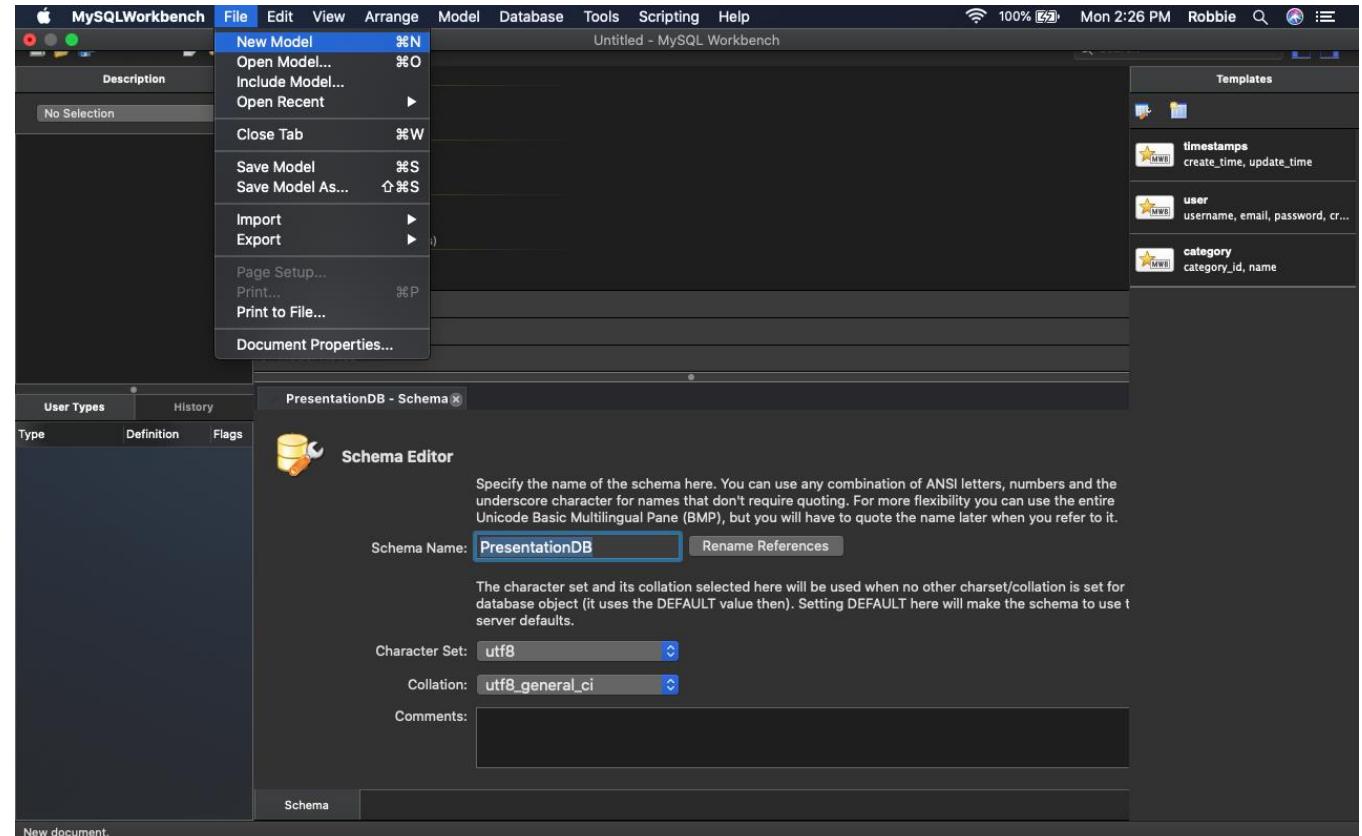
- Forward Engineering -
  - A tool for schema creation in MySQL Workbench:
    - Enables you to easily create a script of your database model using the MySQL Workbench GUI. Errors are still possible, and initial debugging of the schema should happen in the GUI rather than the code itself.
  - You can
    - Export a script
    - Alter an existing database
    - Create a new database
      - (This tutorial will focus on creating a new database)
- More on Forward Engineering

# Workflow for Forward Engineering in MySQL Workbench

- Recommended workflow
  - Create tables and foreign keys in the GUI.
  - If the Forward Engineering process fails, find the errors in the MySQL Workbench GUI (perhaps a primary key is not set to NN or PK).
  - Repeat the forward engineering process again until all green dots are shown at the end (more on this later).
    - **Note that issues may still occur if/when FE process passes with all green dots if proper Entity Relationship practice is not followed.**
- More on Forward Engineering

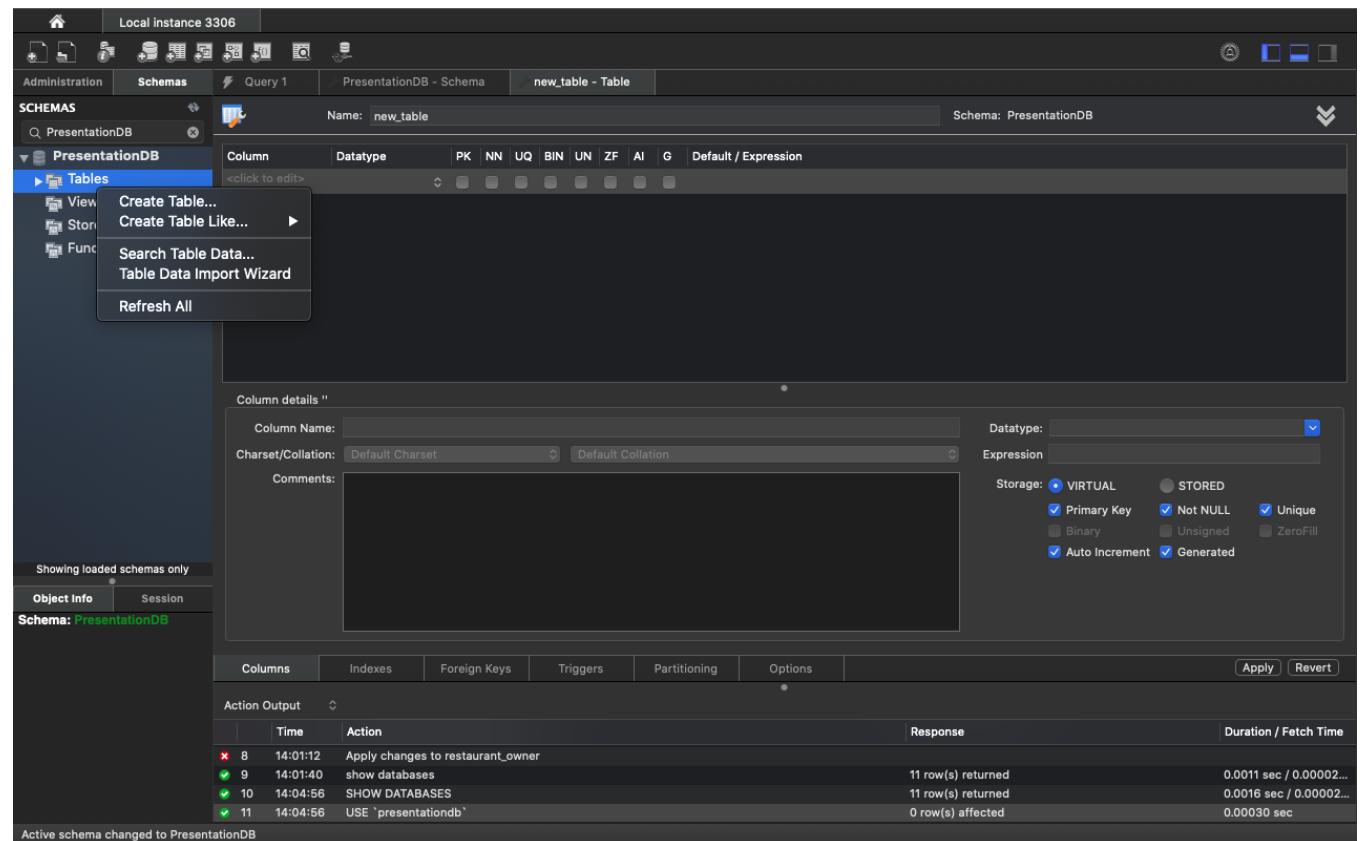
# Forward Engineering : Creating a model

- Create a new model
  - File > New Model
  - Or command N on macOS
- Name your DB in the Schema Editor



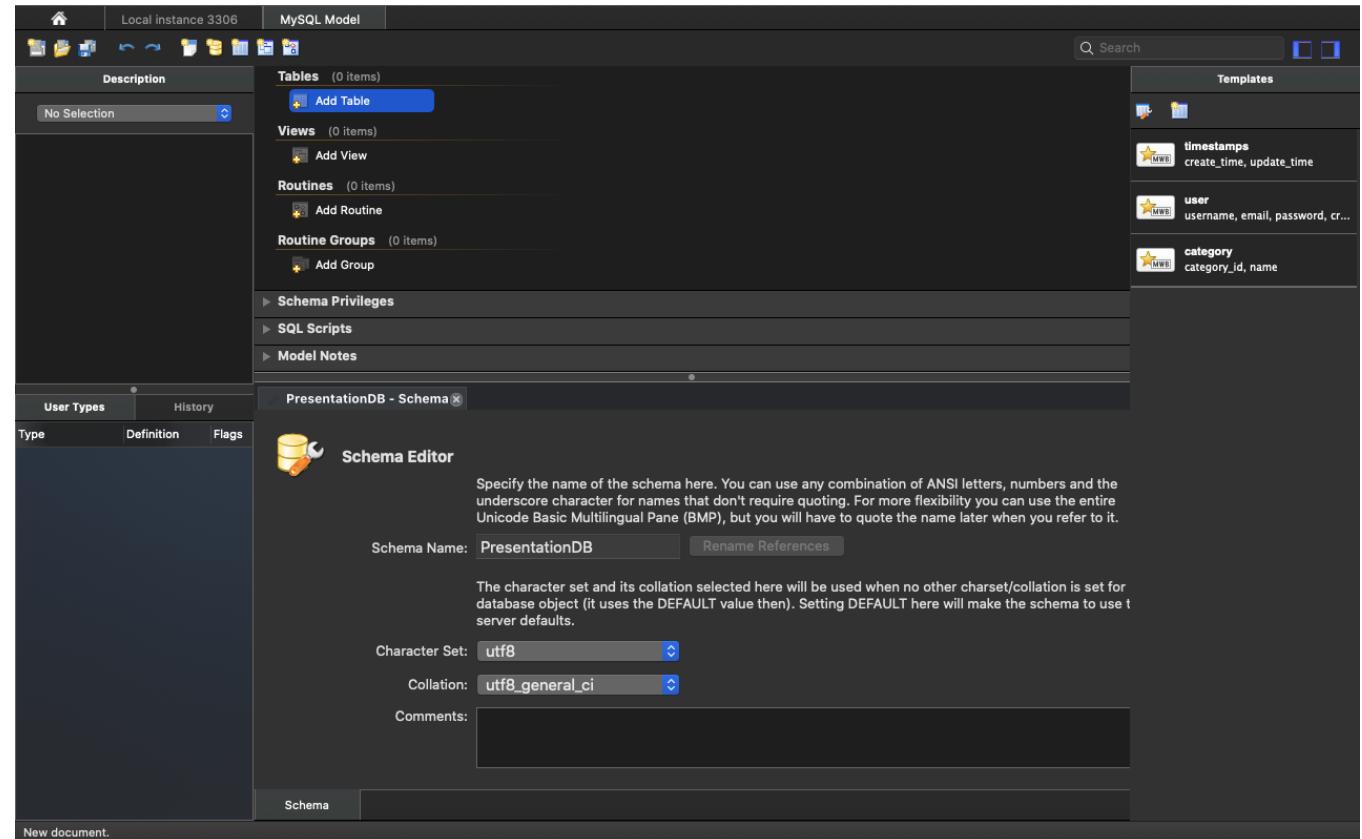
# Forward Engineering: Table creation

- Create a new table
- Tables > Create Table...



# Forward Engineering: Another way to add tables

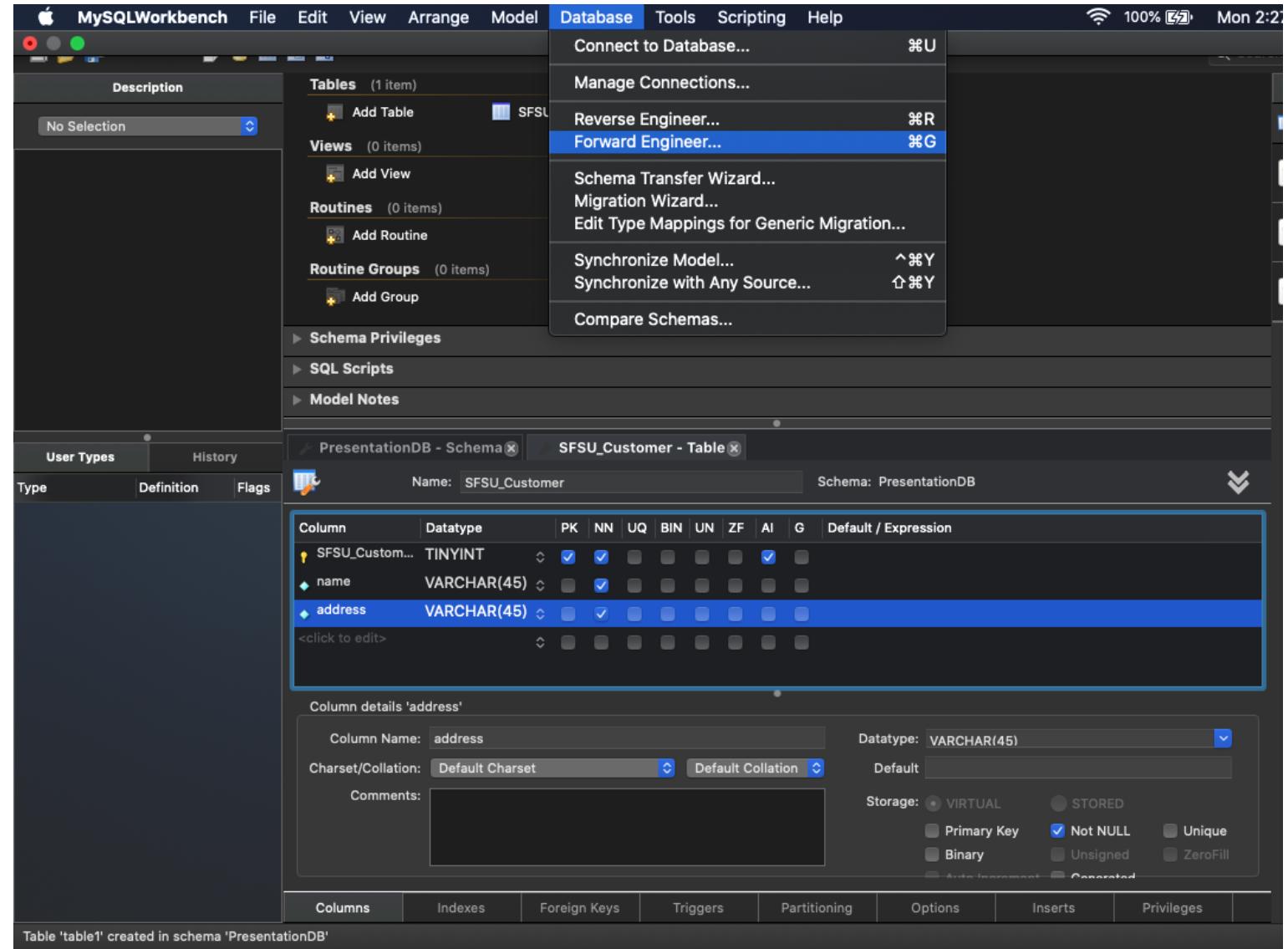
- MySQL Model > Add Table



# A similar process for creating tables

## Process in general:

- Add the table's primary key: use consistent naming such as **SFSU\_Customer\_id**
- Make sure the primary key has options set: Primary Key(PK), Not Null (NN), and autoincrement (AI).
- Change datatype of PK to TINYINT to save on storage
- Add columns and change datatypes and options as needed
- Database > Forward Engineer...

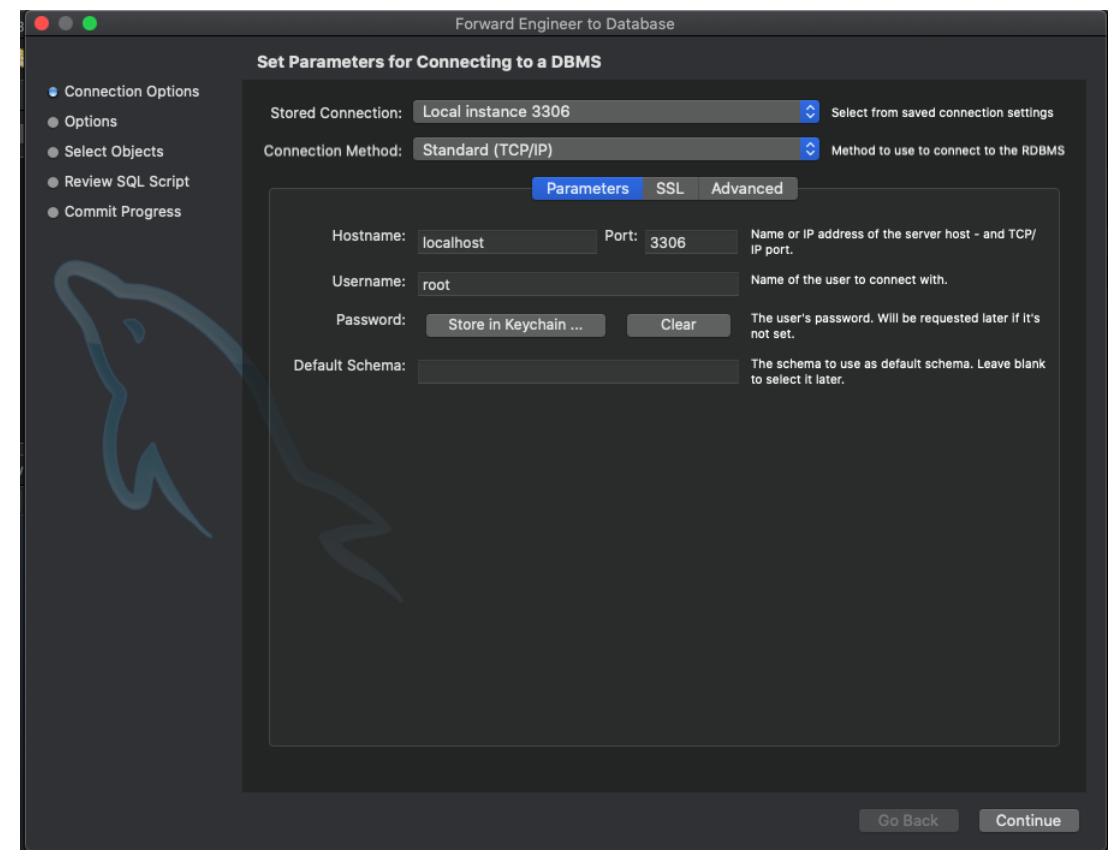


# Hit Continue

- For the purposes of this class, these options aren't important.

- **Continue**

- More on Forward Engineering

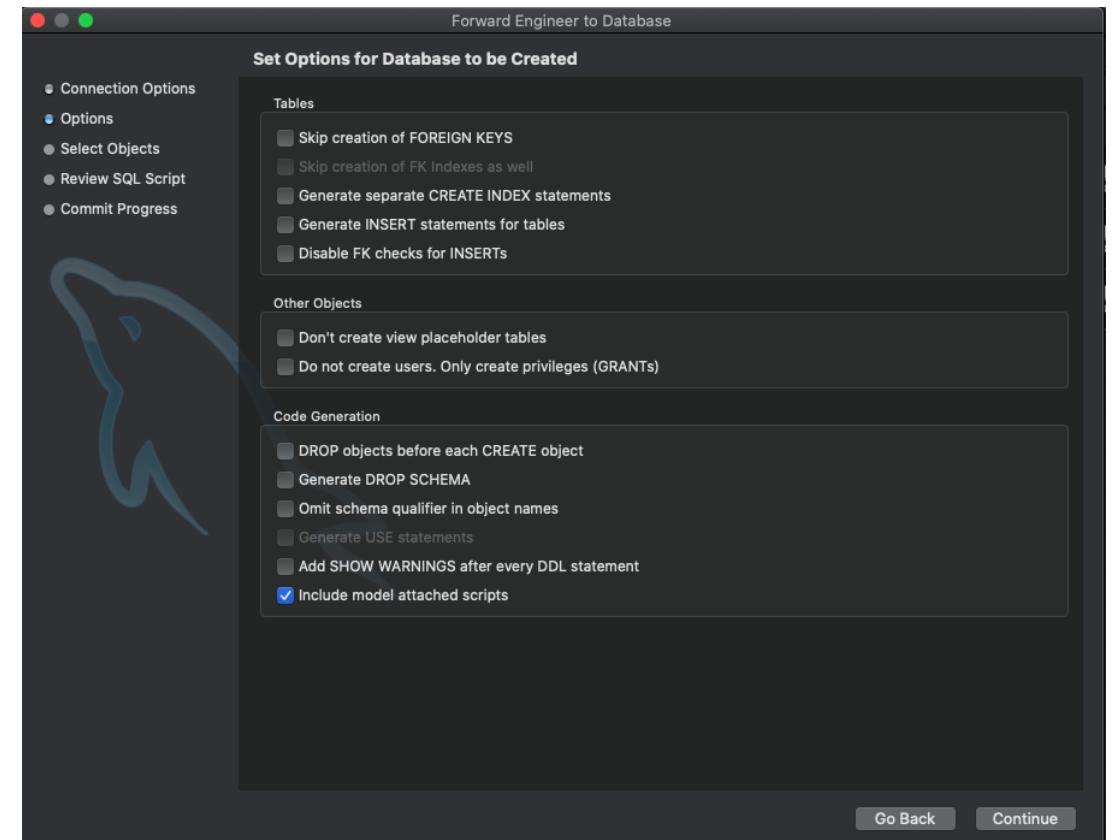


# Hit Continue Again

- For the purposes of this class, these options aren't important.

## Continue

- More on Forward Engineering

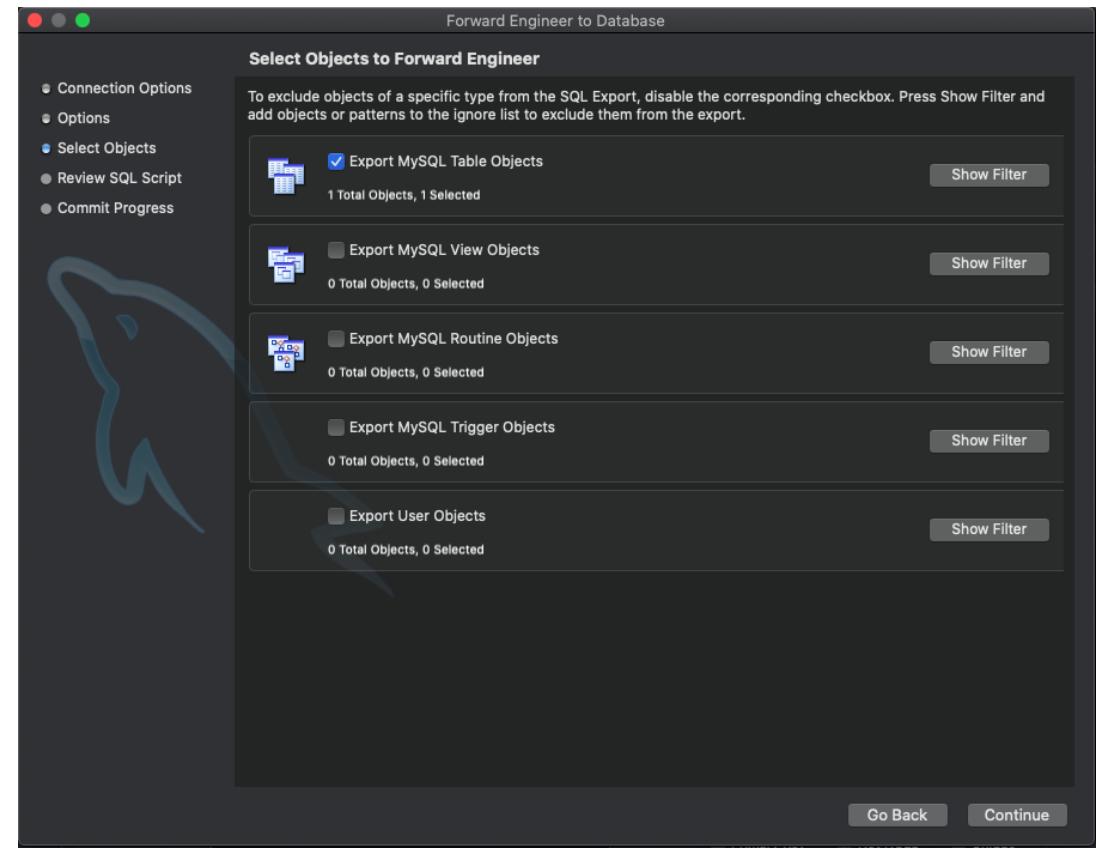


# Continue

- For the purposes of this class, these options aren't important.

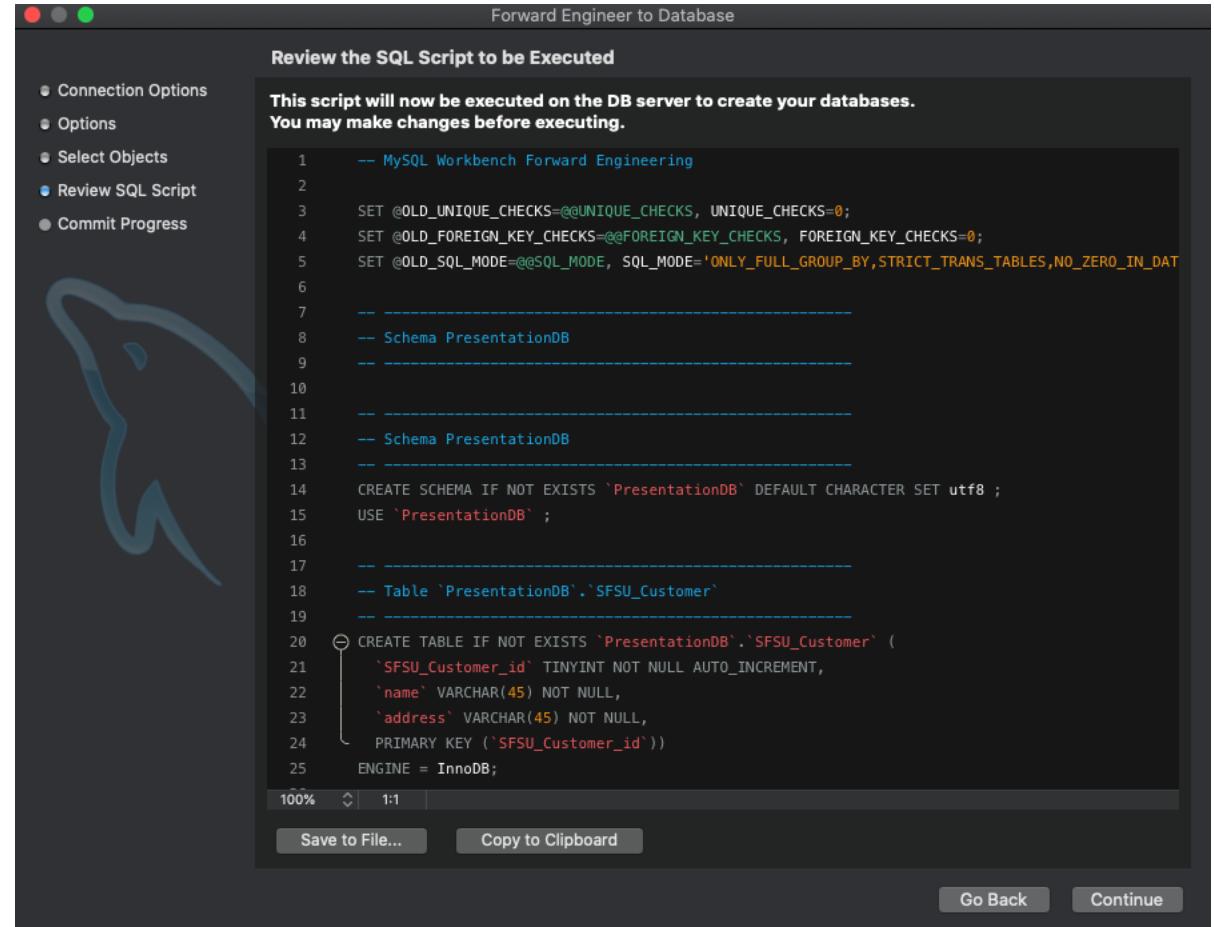
- **Continue**

- More on Forward Engineering



# Forward Engineering: A database ready to run

- **Copy to Clipboard**
- **Continue**
  - Check the next screen for errors, you may have some and the script will not be ready to run.
  - Just like magic, your database is complete

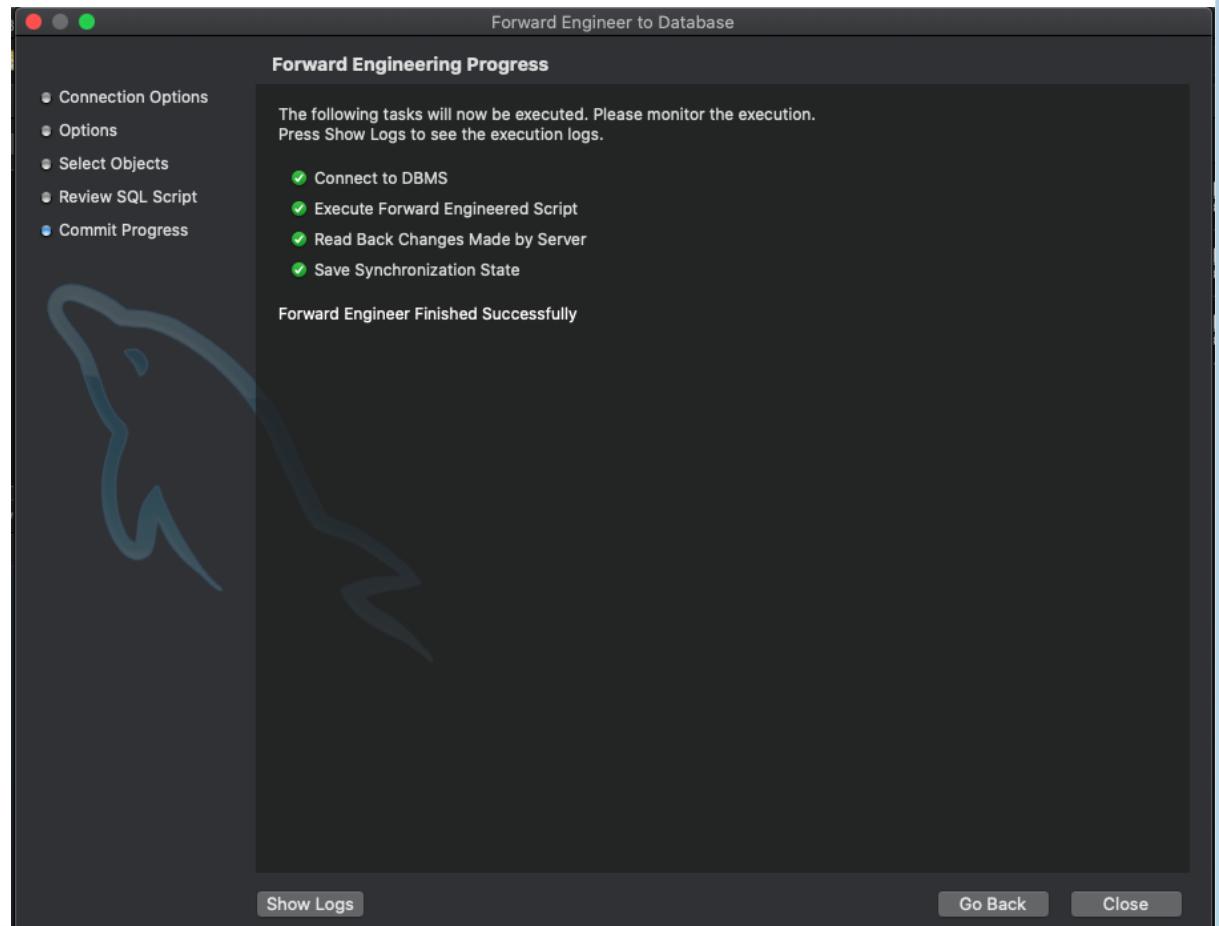


The screenshot shows the "Forward Engineer to Database" interface in MySQL Workbench. The main window title is "Review the SQL Script to be Executed". It displays a SQL script intended for execution on a DB server to create databases. The script includes code to set session variables, create a schema named "PresentationDB", and create a table named "SFSU\_Customer" with columns for id, name, and address. The interface includes a sidebar with options like Connection Options, Options, Select Objects, Review SQL Script, and Commit Progress. At the bottom, there are buttons for Save to File..., Copy to Clipboard, Go Back, and Continue.

```
-- MySQL Workbench Forward Engineering
SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0;
SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0;
SET @OLD_SQL_MODE=@SQL_MODE, SQL_MODE='ONLY_FULL_GROUP_BY,STRICT_TRANS_TABLES,NO_ZERO_IN_DATE,NO_ZERO_DATE,NO_ENGINE_SUBSTITUTION';
-- Schema PresentationDB
CREATE SCHEMA IF NOT EXISTS `PresentationDB` DEFAULT CHARACTER SET utf8 ;
USE `PresentationDB` ;
-- Table `PresentationDB`.`SFSU_Customer`
CREATE TABLE IF NOT EXISTS `PresentationDB`.`SFSU_Customer` (
  `SFSU_Customer_id` TINYINT NOT NULL AUTO_INCREMENT,
  `name` VARCHAR(45) NOT NULL,
  `address` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`SFSU_Customer_id`)
)
ENGINE = InnoDB;
```

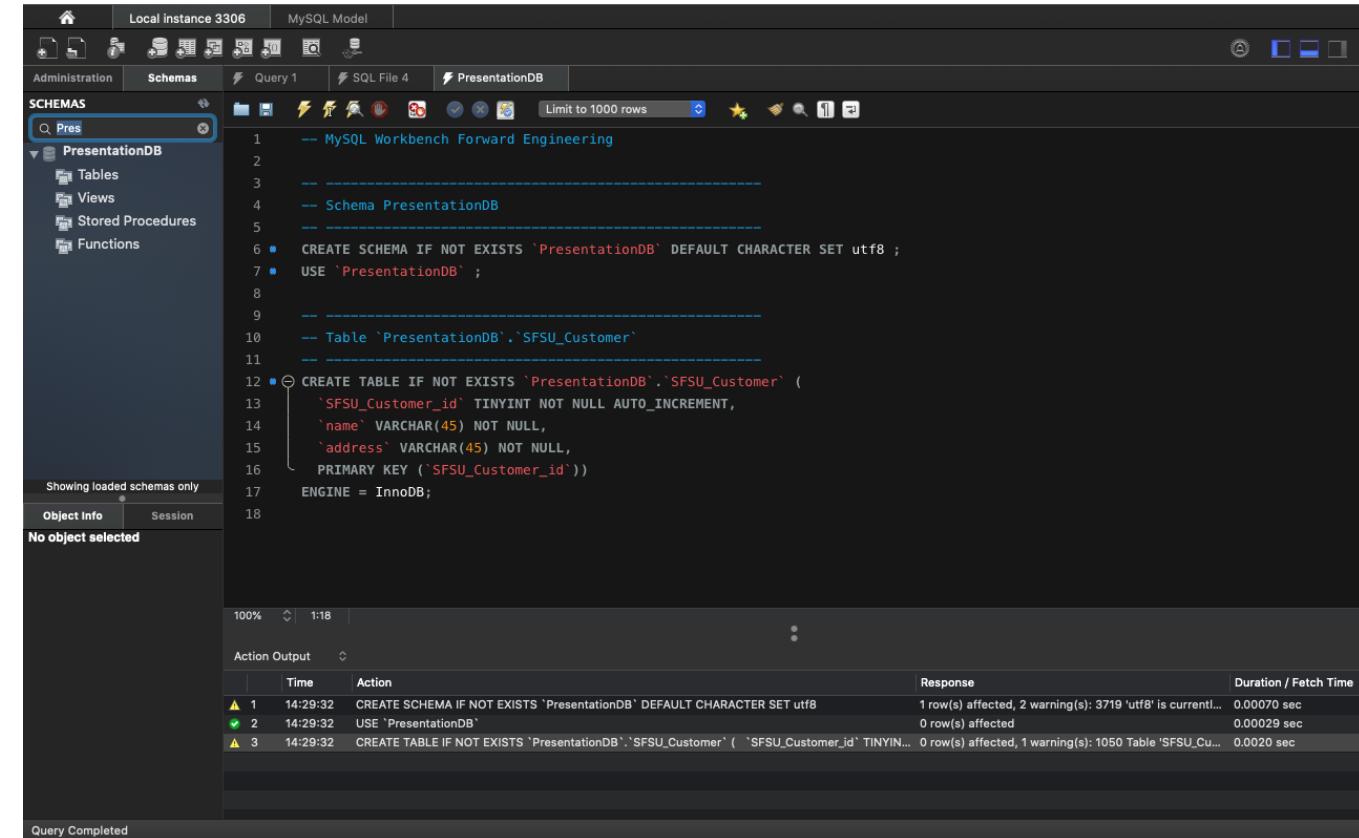
# Forward Engineering: Progress

- **Green dots?**
  - You're set
- **Red dots?**
  - Return to table creation and see what could be wrong, fix it, and return to the forward engineering process. This is the basic workflow.
  - **It is strongly recommended that you do not attempt to fix the MySQL code line-by-line.**



Paste in the copied code from Forward Engineering into a new query tab, press the left lightning bolt, your database is now running on your local instance.

- Repository
- <https://github.com/RobertAldenFreeman/mysql-presentation-repository.git>
- Checkout to master



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

- Left Panel (Schemas):** Shows the "PresentationDB" schema expanded, displaying Tables, Views, Stored Procedures, and Functions.
- Central Panel (Query Editor):** Displays the SQL code for creating the "PresentationDB" schema and the "SFSU\_Customer" table. The code is:

```
-- MySQL Workbench Forward Engineering

-- 
-- Schema: PresentationDB
-- 
-- 
CREATE SCHEMA IF NOT EXISTS `PresentationDB` DEFAULT CHARACTER SET utf8 ;
USE `PresentationDB` ;

-- 
-- Table `PresentationDB`.`SFSU_Customer`

CREATE TABLE IF NOT EXISTS `PresentationDB`.`SFSU_Customer` (
  `SFSU_Customer_id` TINYINT NOT NULL AUTO_INCREMENT,
  `name` VARCHAR(45) NOT NULL,
  `address` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`SFSU_Customer_id`)
) ENGINE = InnoDB;
```
- Action Output:** Shows the results of the three actions taken at 14:29:32:

Time	Action	Response	Duration / Fetch Time
14:29:32	CREATE SCHEMA IF NOT EXISTS `PresentationDB` DEFAULT CHARACTER SET utf8	1 row(s) affected, 2 warning(s): 3719 'utf8' is currently... 0.00070 sec	
14:29:32	USE `PresentationDB`	0 row(s) affected 0.00029 sec	
14:29:32	CREATE TABLE IF NOT EXISTS `PresentationDB`.`SFSU_Customer` ( `SFSU_Customer_id` TINYIN... 0 row(s) affected, 1 warning(s): 1050 Table 'SFSU_Cu... 0.0020 sec		

# Questions

- Please feel free to ask any questions about MySQL or MySQL Workbench
- 10-minutes

# References

- 1-hour MySQL video:
  - <https://www.youtube.com/watch?v=9ylj9NR0Lcg>
- 11-minute MySQL video:
  - <https://www.youtube.com/watch?v=2bW3HuaAUcY>
- MySQL Workbench Documentation
  - <https://dev.mysql.com/doc/>
  - <https://dev.mysql.com/doc/workbench/en/>
- Download MySQL Workbench for macOS (**recommended to use macOS if possible**):
  - <https://dev.mysql.com/doc/mysql-osx-excerpt/5.7/en/osx-installation-pkg.html>
- Download MySQL Workbench for Windows:
  - <https://dev.mysql.com/doc/workbench/en/wb-installing-windows.html>

# Ask me for help

- Please feel free to reach out to me for high-level questions about MySQL Workbench, I would be happy to help.
- For further information on creating relational databases using MySQL Workbench and foreign keys, see
  - <https://dev.mysql.com/doc/workbench/en/wb-table-editor-foreign-keys-tab.html>
- You can reach out to me by email:
  - robertfreeman6092@gmail.com

Thank you!