MYSQL DATABASE ADMINISTRATION

★★★★★ *With Top-Rated SQL Instructor* ***John Pauler***

MAVEN ANALYTICS

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COURSE STRUCTURE

This is a **project-based course**, for students looking for a *practical*, *hands-on*, and *highly engaging* approach to learning MySQL database administration

Additional resources include:

- **Downloadable Ebook** to serve as a helpful reference when you're offline or on the go
- **Quizzes** & **Homework Exercises** to test and reinforce key concepts, with step-by-step solutions
- **Bonus Projects** to test your abilities and apply the skills developed throughout the course

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COURSE OUTLINE

1	**Introduction & Setup**	*Discuss relational databases, download MySQL Community Server and Workbench, and create the project databases*
2	**Creating Schemas & Tables**	*Create and delete schemas, tables, and columns using the Workbench Editor, and by running SQL code*
3	**Inserting, Updating & Deleting**	*Insert data into tables, and update or delete specific records based on logical criteria you specify*
4	**Database Design**	*Learn about table relationships, primary and foreign keys, and how to properly normalize a database*

[MID-COURSE PROJECT]

5	**Advanced DBA Concepts**	*Create stored procedures, triggers, and indexes, and learn how to implement unique and non-NULL constraints*
6	**Managing Users & Permissions**	*Grant access to additional users and prescribe what they can and cannot do within the database*

[FINAL PROJECT]

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INTRODUCING THE **COURSE PROJECT**

THE **SITUATION**

You have just been hired by a small database consulting shop. You will be working on projects for various clients to help them get their databases built and optimized for business

THE **BRIEF**

As a member of the consulting team, you will be asked to perform database services for various clients.

Sometimes you will work with existing databases and tables to make small improvements, and other times you will need to set up a database for clients from the ground up.

THE **OBJECTIVE**

Use MySQL Workbench to:

- *Create databases and tables your clients will need to run their businesses*
- *Use your knowledge of database best practices to implement and optimize database design principles*
- *Update records, create indexes, triggers, and stored procedures, and manage users and permissions*

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SETTING EXPECTATIONS

1. You'll learn **MySQL Database Administration** using **MySQL Workbench**
   - *In your career, you may use other "flavors" of SQL (T-SQL, PL/SQL, PostgreSQL, etc.)*
   - *Each flavor is very similar. The principles you learn here will apply universally, but syntax will vary slightly*

2. We will focus on the **creation and maintenance of databases**
   - *We will design and create schemas and tables from scratch, and alter existing tables to improve them*

3. This course is for **SQL Beginners** and **Data Analysts** interested in DBA skills
   - *This course starts with the basics; if you're already an expert DBA, this course will not be appropriate for you*
   - *If you've already mastered the basics, feel free to skip ahead to the parts of the course that feel relevant to you*

4. We will **NOT** go deep on **data analysis** *(that's another course)*
   - *This course will focus on beginner-level Database Administration concepts, like creating and maintaining databases*
   - *We offer separate courses that focus on using SQL for data analysis and business intelligence (beginner + expert-level)*

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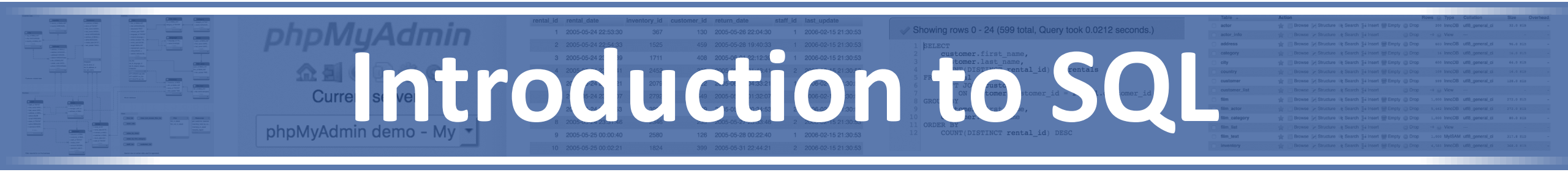

Introduction to SQL

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BRIEF HISTORY OF SQL

- SQL stands for **Structured Query Language**, and was designed in the early 1970s at IBM to manipulate and retrieve data stored in a **relational database management system** (*RDMS*)

- There is a **universal standard** for SQL set by the International Organization for Standards and the American National Standards Institute (*ANSI*), with updates released every **~3-5 years**

- Vendors are constantly adding new features on top of the standards, which creates different "*flavors*" of SQL (***MySQL, PostgreSQL, SQLite, etc.***)

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COMMON FLAVORS OF SQL

HEY THIS IS IMPORTANT!

These flavors of SQL are much more *similar* than they are different – all are based on the same universal standard, with slight variations in syntax.

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POPULAR **MySQL EDITORS**

Mac, Windows, Linux	*Web App (works on any OS)*	*Windows only*	*Mac only*

HEY THIS IS IMPORTANT!

We'll be practicing **MySQL** using **MySQL Workbench**, but rather than thinking "*I learned MySQL*" or "*I can use Workbench*", you should think "***I'm learning SQL***". Period. You'll be able to use the concepts and syntax you learn here universally.

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RELATIONAL DATABASES

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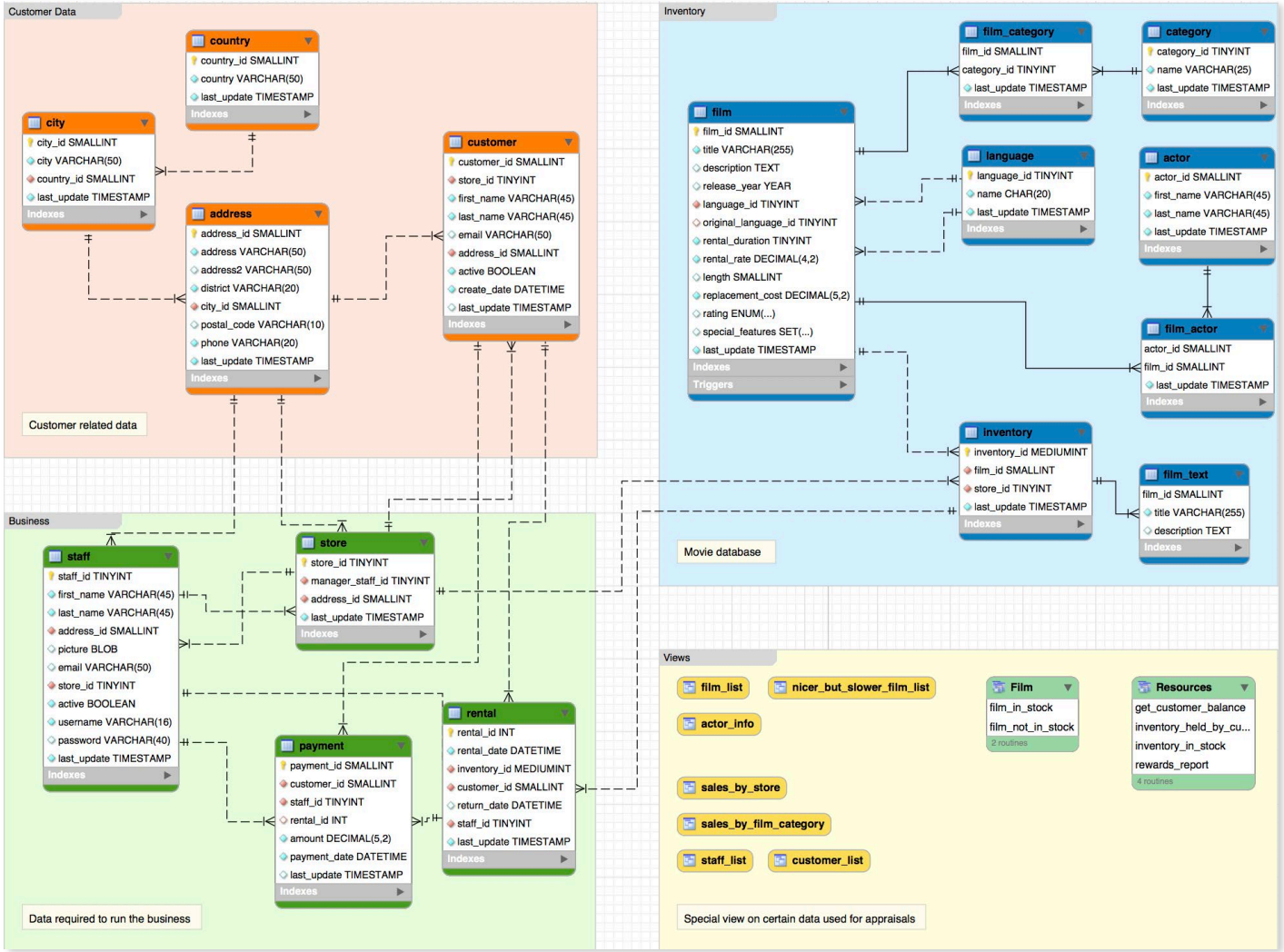
A DATABASE CAN CONTAIN **MANY RELATED TABLES**



- The database on the left includes **16 related tables**, containing information about:
  - **Customers** (*Name, Address, etc.*)
  - **Business** (*Staff, Rentals, etc.*)
  - **Inventory** (*Films, Categories, etc.*)
- We'll start by using MySQL to create and modify **individual tables**, then later in the course we will get into **database design** and discuss optimal table relationships

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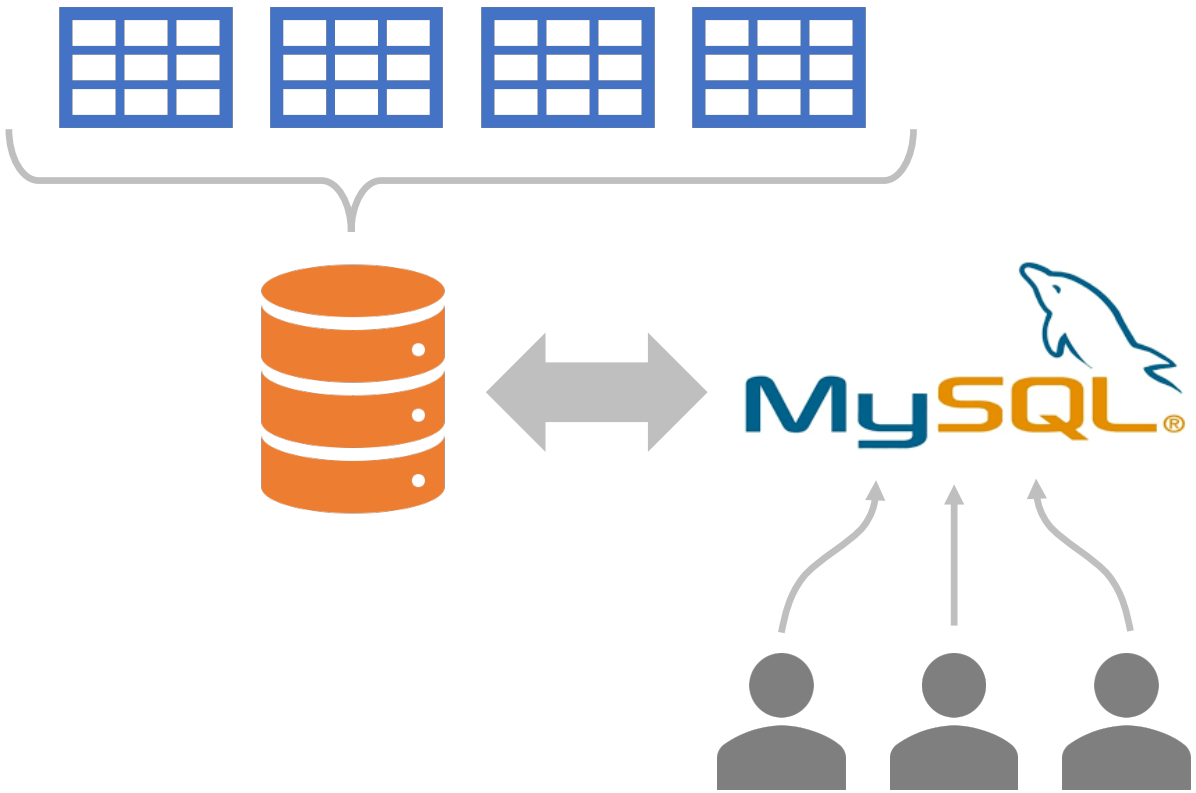
RELATIONAL DATABASE MANAGEMENT SYSTEMS



- Relational databases consist of data stored in multiple **tables**
- **Relational database management systems** *(RDBMS)* serve as an interface to access and manage relational databases, using SQL
- RDBMS administrators can grant access to **users** and set specific roles and permissions

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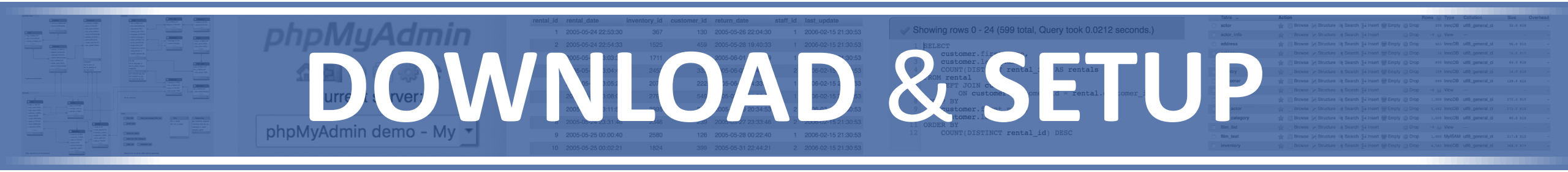

DOWNLOAD & SETUP

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MySQL DOWNLOAD & SETUP – **OVERVIEW**

Step 1	**Download Community Server**	*This allows SQL to run on your machine*
Step 2	**Download MySQL Workbench**	*This is the program we'll use as our RDBMS (it's intuitive, and works across operating systems)*
Step 3	**Connect Workbench to Server**	*We'll get you connected to the server so you can use Workbench to start managing your schemas*
Step 4	**Review Workbench Interface**	*We'll take a quick tour of the Workbench interface to get you familiar with the layout and key components*
Step 5	**Create the Databases**	*We'll run a quick SQL script to build some schemas and tables we'll be exploring throughout the course (this part is easy!)*

HEY THIS IS IMPORTANT!

If you took one of my other courses, and have already installed Community Server and MySQL Workbench, then you can skip ahead to creating the databases. No need to re-install. Whatever version you have is great.

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STEP 1: COMMUNITY SERVER (MAC)

HEY THIS IS IMPORTANT!

If you took one of my other courses, and have already installed Community Server and MySQL Workbench, then you can skip ahead to creating the database. No need to re-install. Whatever version you have is great.

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MySQL COMMUNITY SERVER – **MAC DOWNLOAD GUIDE**

1. Go to https://dev.mysql.com/downloads and download **MySQL Community Server**

2. Select the **MacOS** operating system, and download the **DMG Archive** version
   - ***Note**: you'll likely see a later version than the one shown (just download the latest)*

3. No need to Login or Sign Up, just click "***No thanks, just start my download***"

4. Find the install file in your downloads, then double click to run the installer package

5. Click through each install step, leaving defaults unless you need customized settings
   - ***Note**: Make sure to store your **root password** somewhere, you'll need this later!*

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MySQL COMMUNITY SERVER – **MAC DOWNLOAD GUIDE**

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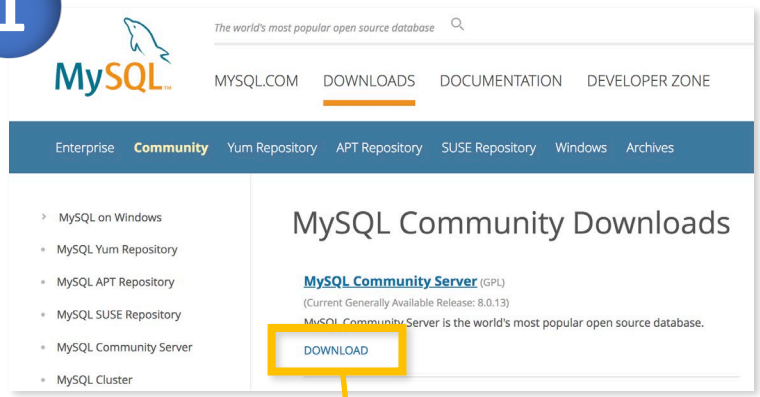

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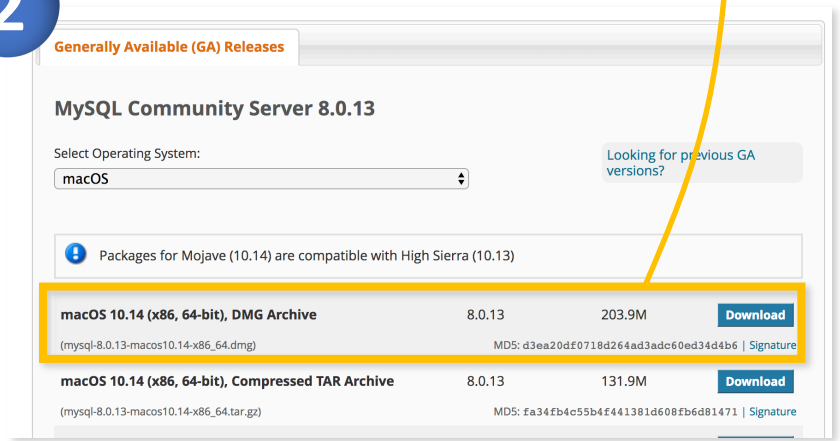

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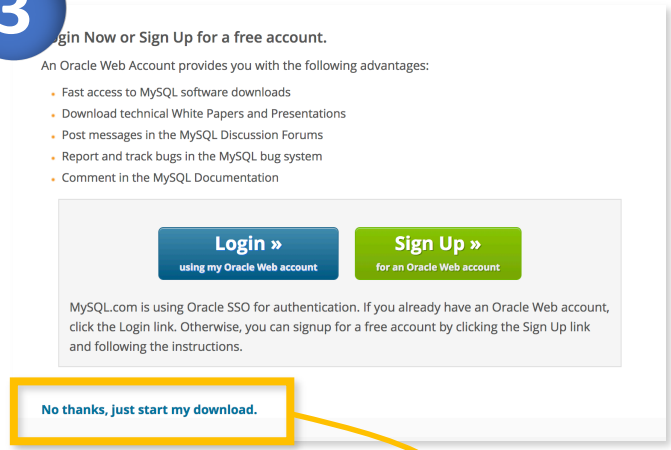

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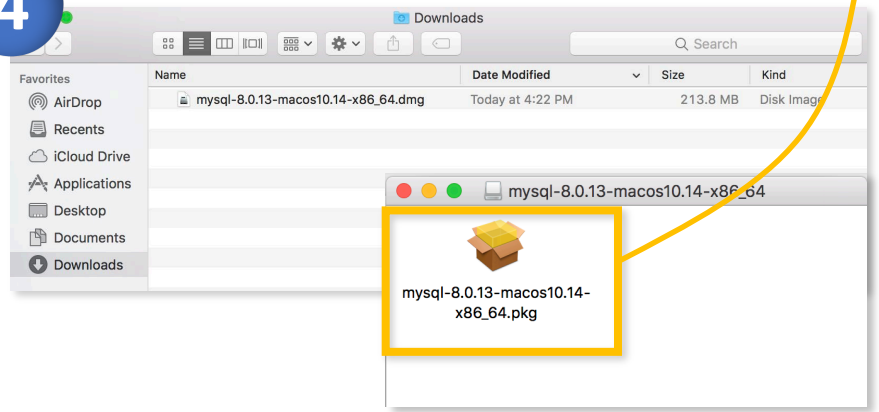

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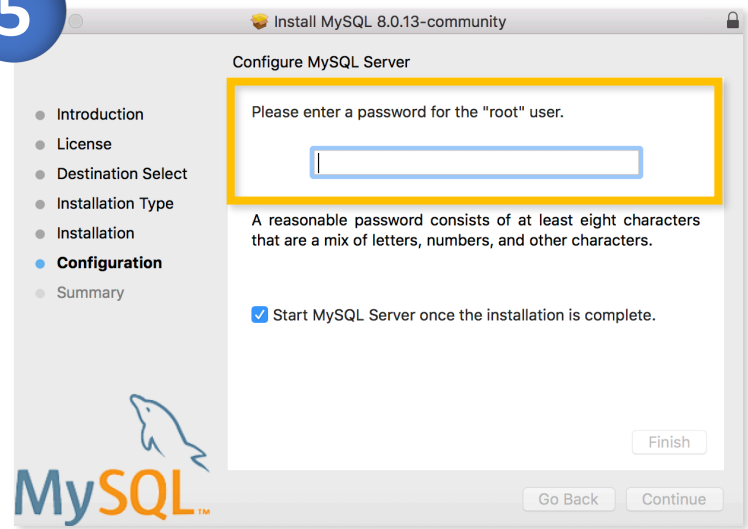

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STEP 1: COMMUNITY SERVER (PC)

HEY THIS IS IMPORTANT!

If you took one of my other courses, and have already installed Community Server and MySQL Workbench, then you can skip ahead to creating the database. No need to re-install. Whatever version you have is great.

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MySQL COMMUNITY SERVER – **PC DOWNLOAD GUIDE**

1. Go to https://dev.mysql.com/downloads and download **MySQL Community Server**

2. Select the **Microsoft Windows** operating system, and the **Installer MSI** download
   - ***Note**: On the download page you may see two versions: select **mysql-installer-web-community** if you are connected to the internet, and keep in mind that you may see a later version than the one shown (just download the latest)*

3. No need to Login or Sign Up, just click "***No thanks, just start my download***"

4. Find the install file in your downloads, then double click to run the installer package

5. Click through each install step, leaving defaults unless you need customized settings
   - ***Note**: Make sure to store your **root password** somewhere, you'll need this later!*

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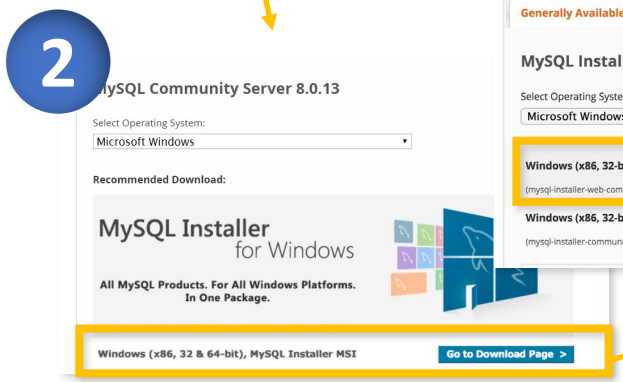
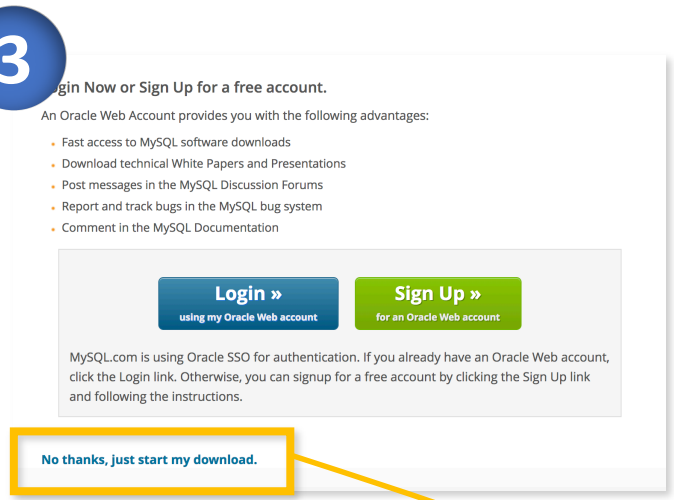
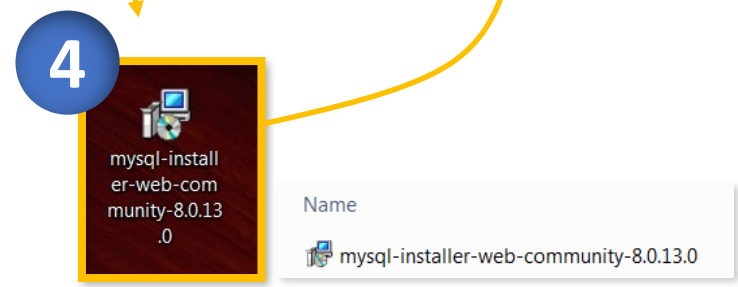
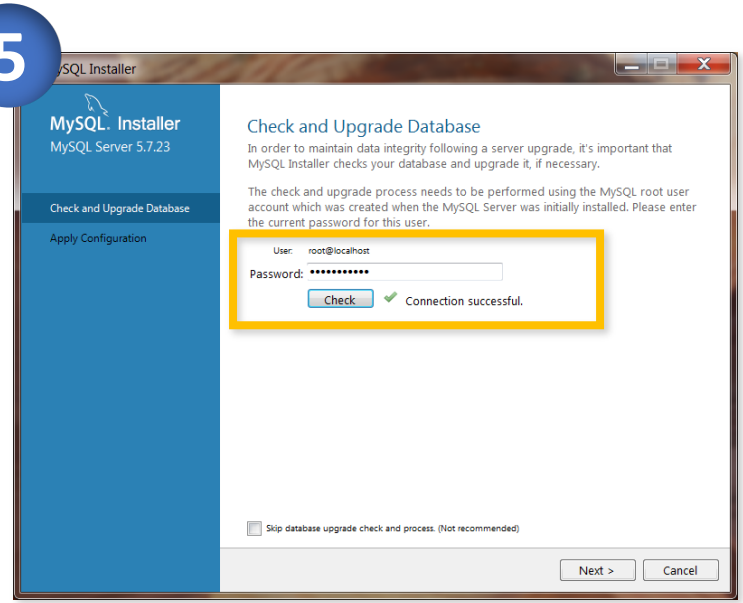
MySQL COMMUNITY SERVER – **PC DOWNLOAD GUIDE**









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STEP 2: MySQL WORKBENCH (MAC)

HEY THIS IS IMPORTANT!

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MySQL WORKBENCH – **MAC DOWNLOAD GUIDE**

1. Go to https://dev.mysql.com/downloads/workbench, scroll down to **Generally Available (GA) Releases**, and select the **MacOS** operating system

2. We'll be using version **8.0.16** for this course, so you can either click ***"Looking for previous GA versions?"*** to search for the same one, or simply download the latest available

3. No need to Login or Sign Up, just click "***No thanks, just start my download***"

4. Find the install file in your downloads, click the MySQL Workbench logo (*with the dolphin*) and drag it into your **Applications** folder

5. Look for MySQL workbench in your list of applications, double click to launch, then proceed to ***Step 3: Connecting to the server***

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MySQL WORKBENCH – **MAC DOWNLOAD GUIDE**

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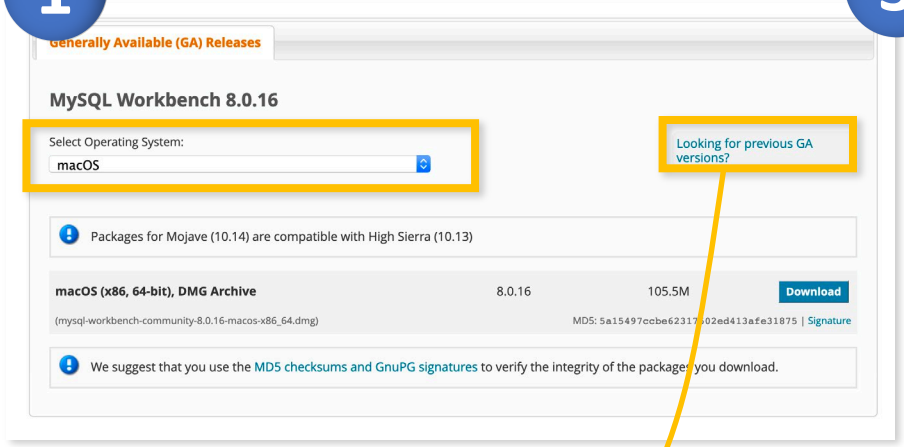
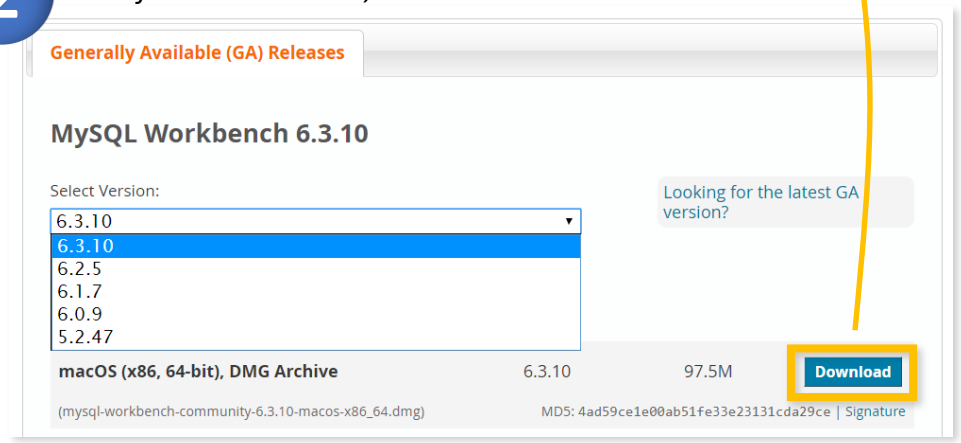


2 *Look for version **8.0.16**, or download the latest*



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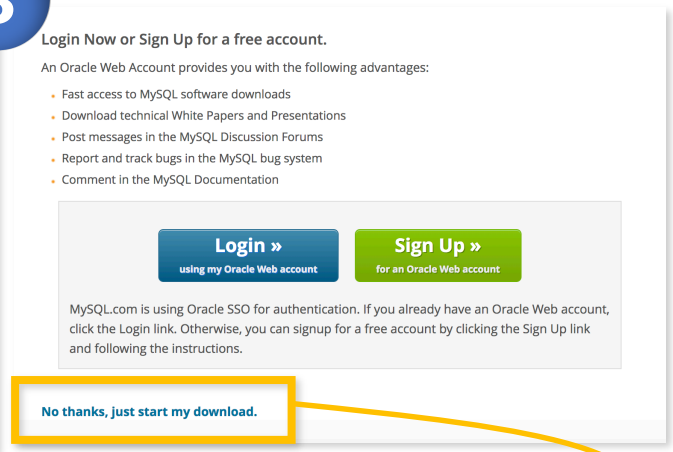

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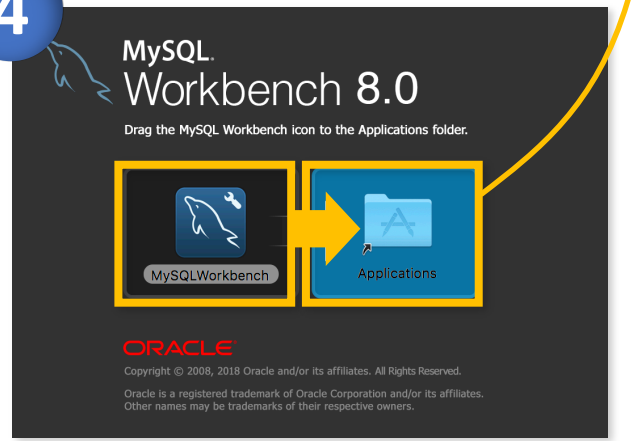

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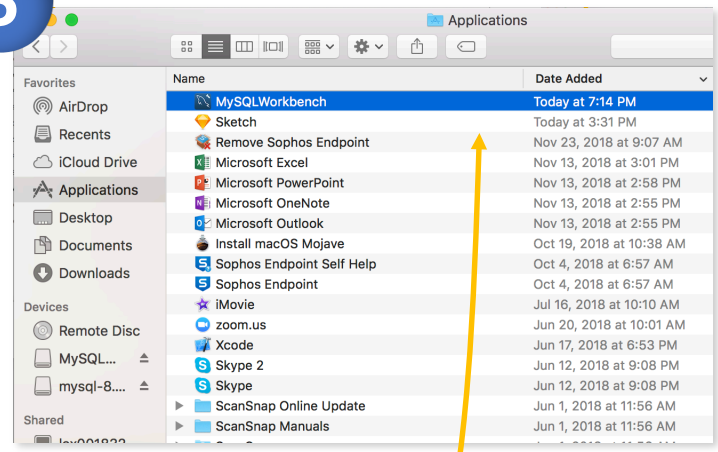

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STEP 2: MySQL WORKBENCH (PC)

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MySQL WORKBENCH – **PC DOWNLOAD GUIDE**

1. Go to https://dev.mysql.com/downloads/workbench, scroll down to **Generally Available (GA) Releases**, and select the **Microsoft Windows** operating system

2. We'll be using version **8.0.13** for this course, so you can either click ***"Looking for previous GA versions?"*** to search for the same one, or simply download the latest available

3. No need to Login or Sign Up, just click "***No thanks, just start my download***"

4. Find the install file in your downloads, double click to run the installation process, and stick with default settings unless you need a custom configuration

5. Look for MySQL workbench in your list of programs, double click to launch, then proceed to ***Step 3: Connecting to the server***

   - ***Note:*** *You may see a warning if you aren't on* ***Windows 10+****, but most older systems (i.e. Windows 7) should be compatible*

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MySQL WORKBENCH – **PC DOWNLOAD GUIDE**

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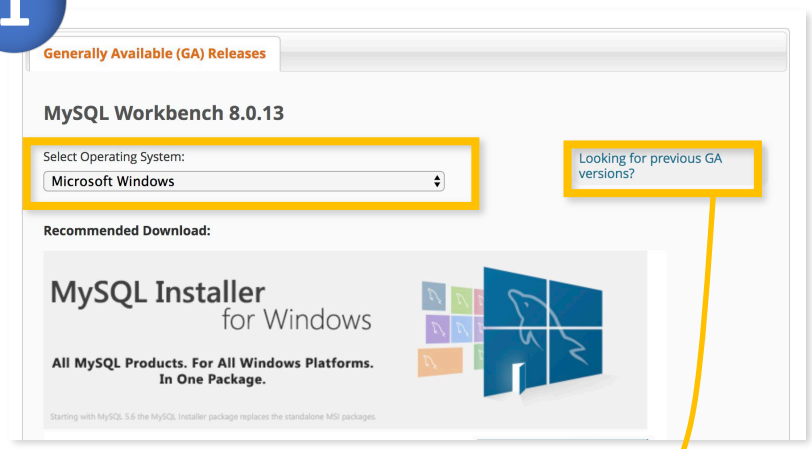

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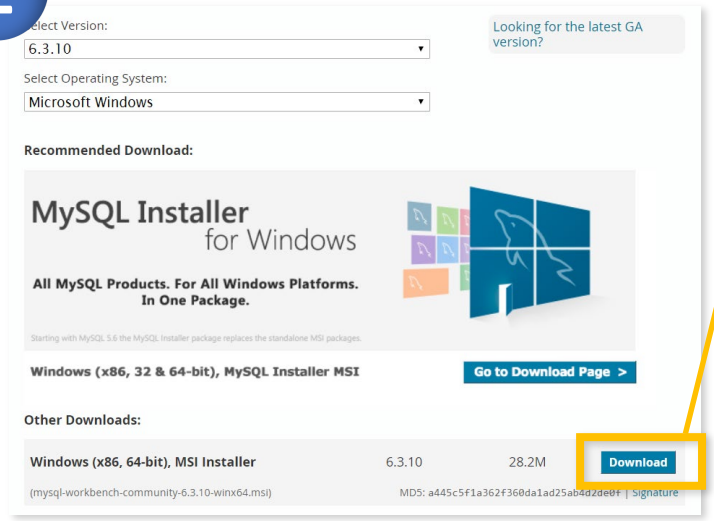

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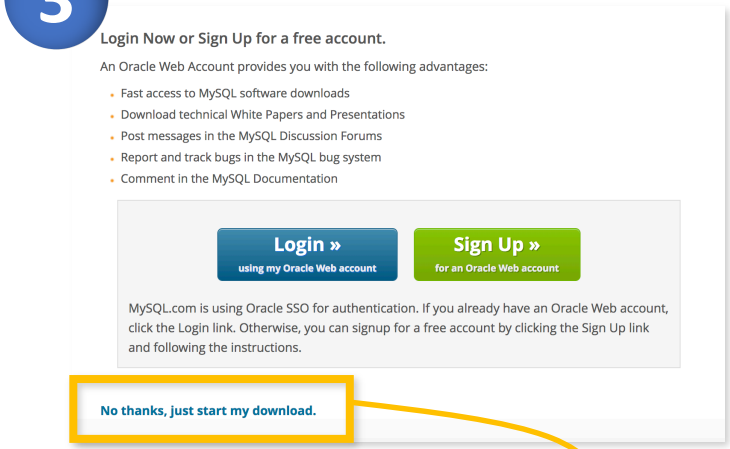

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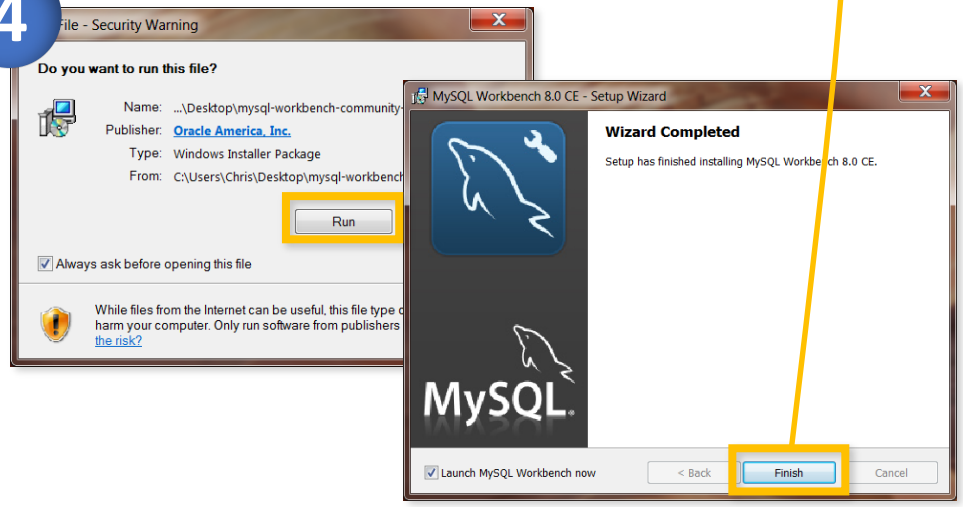

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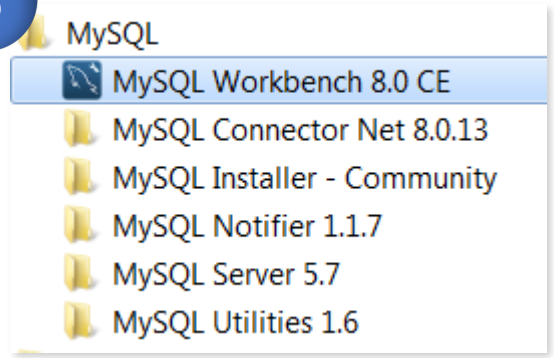

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STEP 3: CONNECTING TO THE SERVER

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CONNECTING TO THE SERVER

1. After launching Workbench, check the **MySQL Connections** section on the welcome page
   - *If you see a connection already, right-click to **Edit Connection**, otherwise click the **plus sign (+)** to add a new one*

2. Name the connection "**mavenmovies**", confirm that the Username is "**root**", and click **OK**

3. Once you see the **mavenmovies** connection on your welcome screen, simply click the tile and enter your **root password** to complete the connection

Fun Fact!

Maven Movies is the name of the database I used when I made my first course. I always name my connections 'mavenmovies' as tribute. **It does not matter what you name your connection. Name it anything you want!**

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CONNECTING TO THE SERVER

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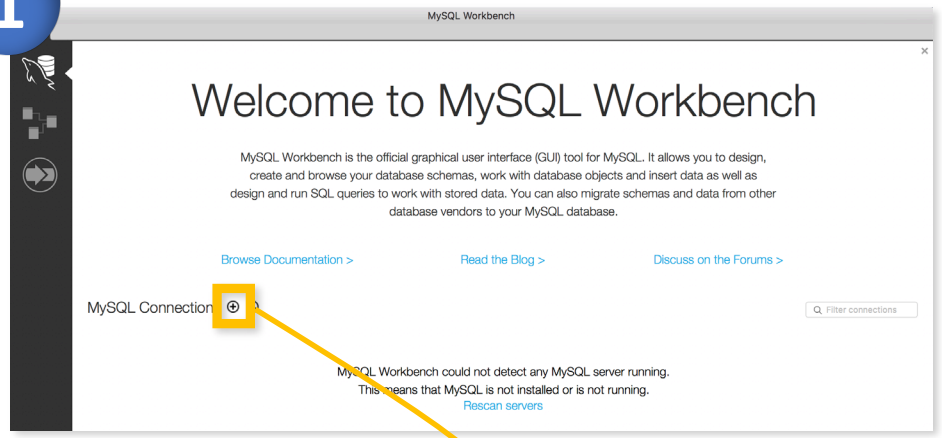

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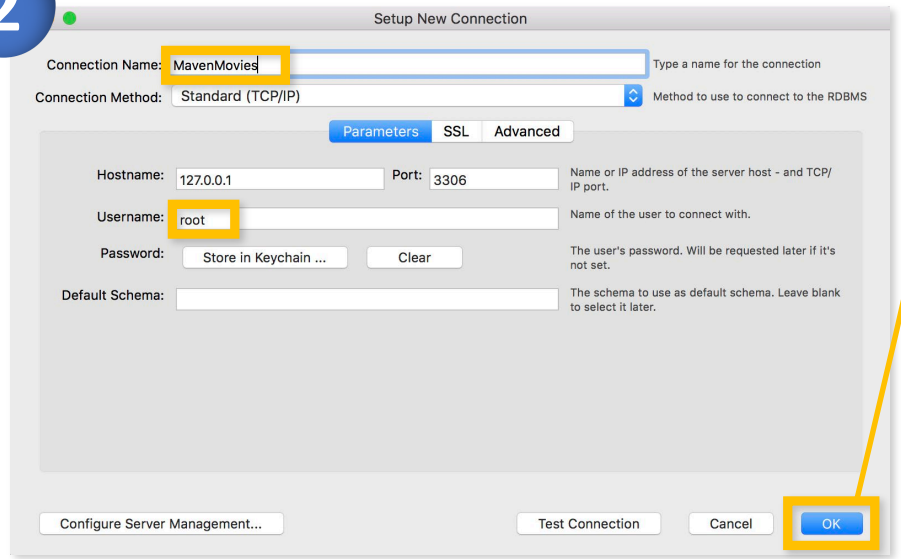

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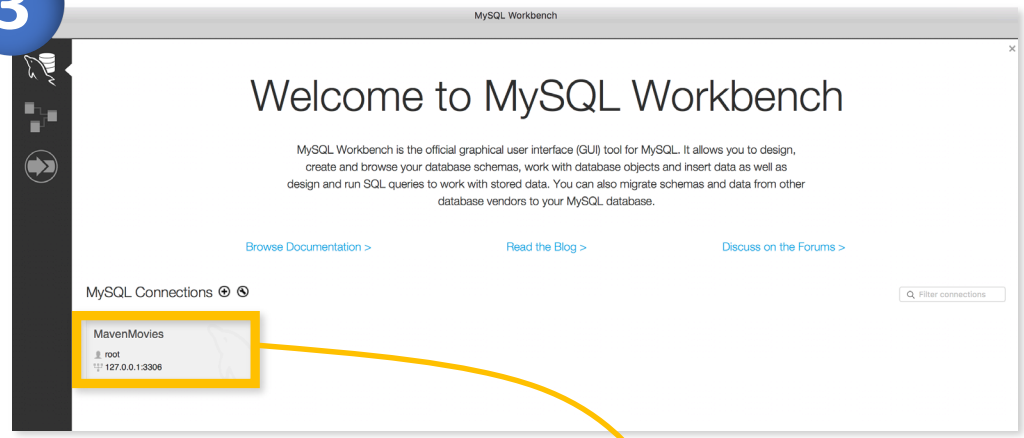

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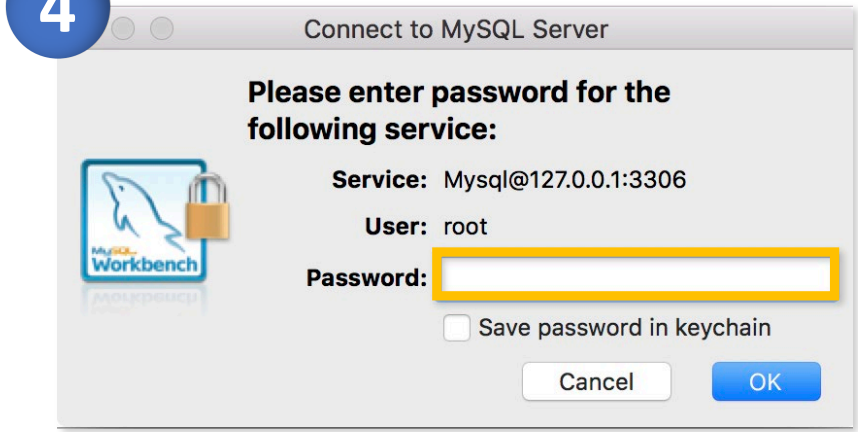

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STEP 4: MySQL WORKBENCH INTERFACE

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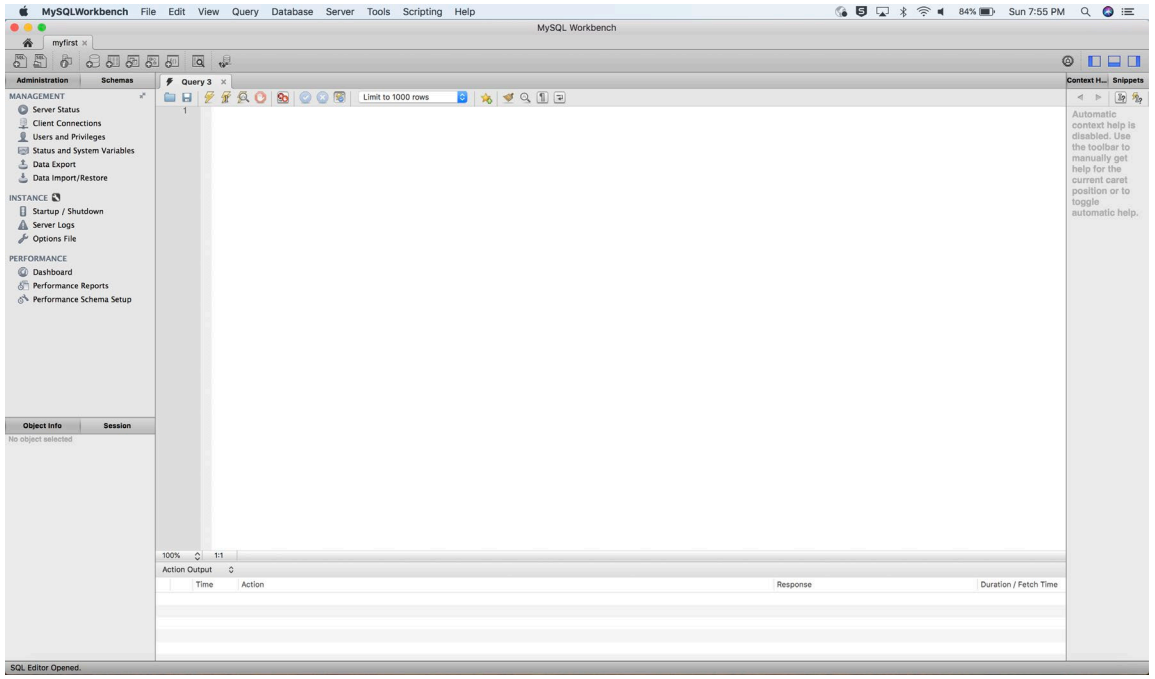
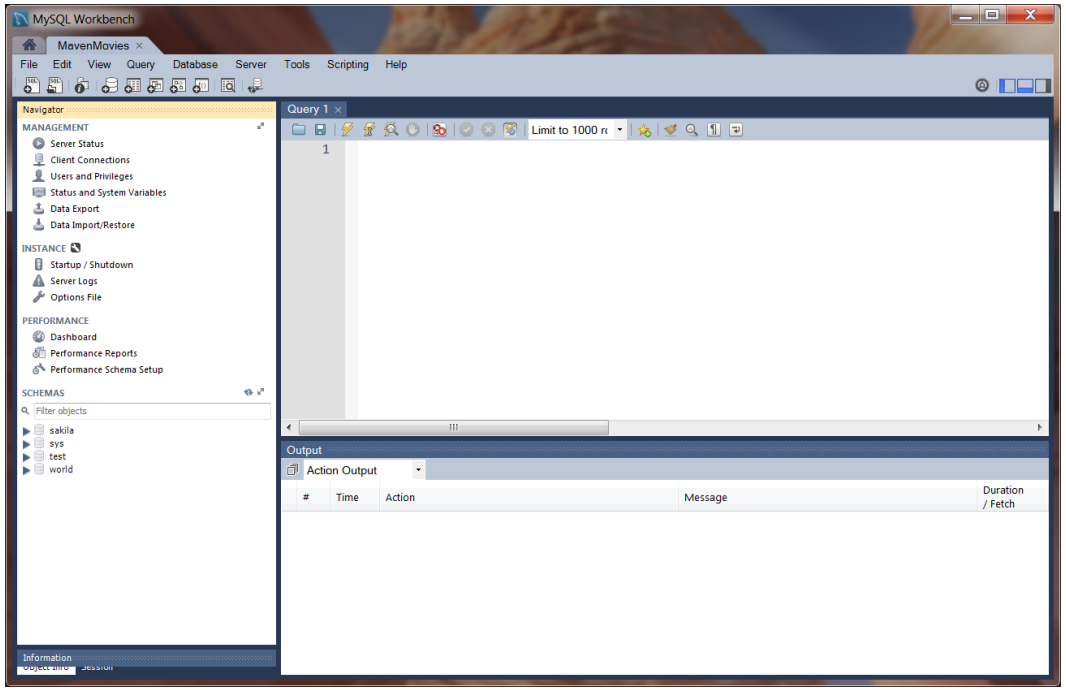
MySQL WORKBENCH INTERFACE (**MAC** VS. **PC**)

Mac interface



PC interface



HEY THIS IS IMPORTANT!

Workbench looks slightly different on **Mac** vs. **PC**, but everything you need is found in the same place. While the course is recorded on a Mac, but you should have no problem keeping up on a PC

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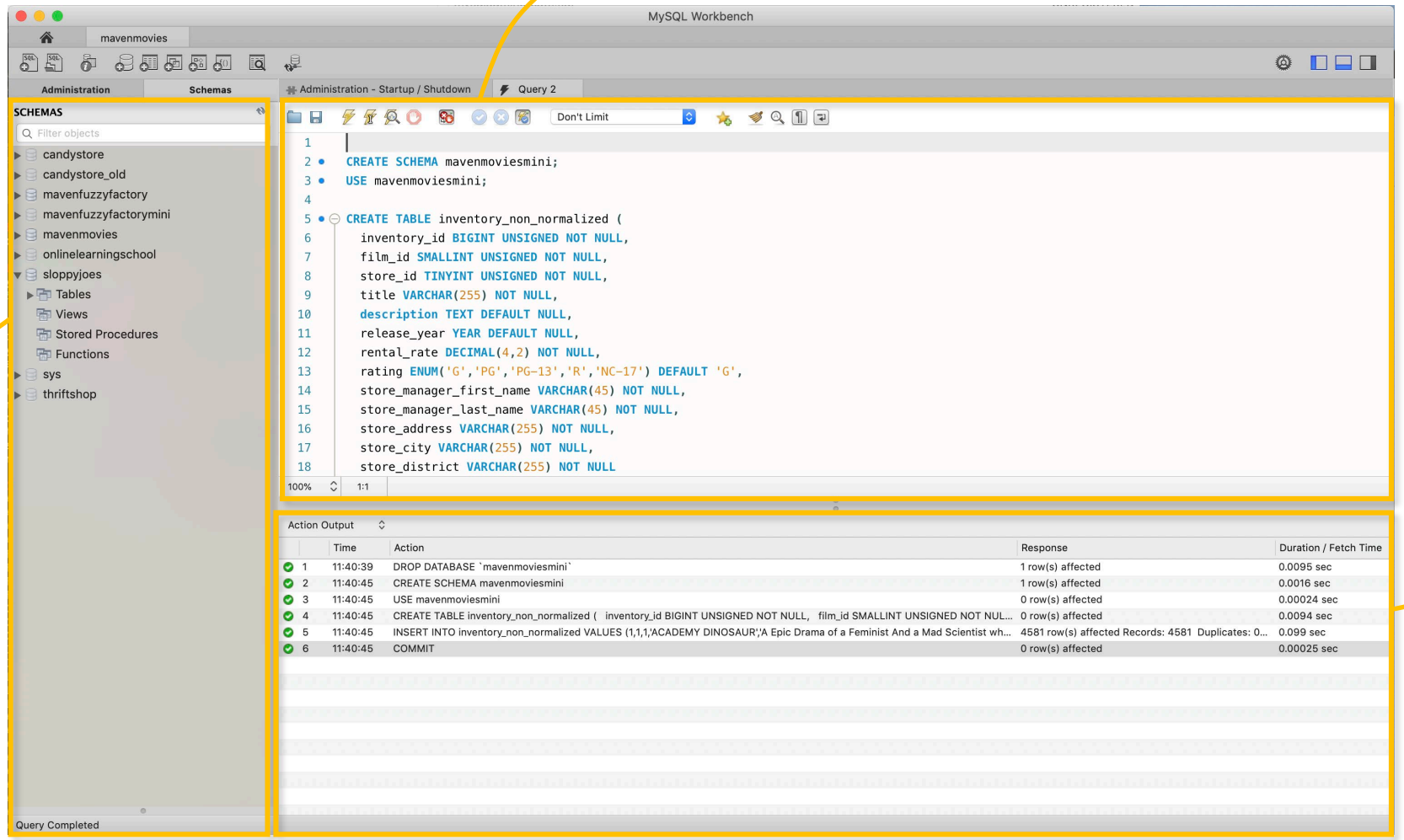
QUICK TOUR: THE WORKBENCH INTERFACE

Query Editor Window

This is where you write and run your code

Schemas Tab

Here you can view tables and views in your schemas



Action Output

*This is a summary of actions taken by the server (**TIP**: the **Response** column is great for troubleshooting!)*

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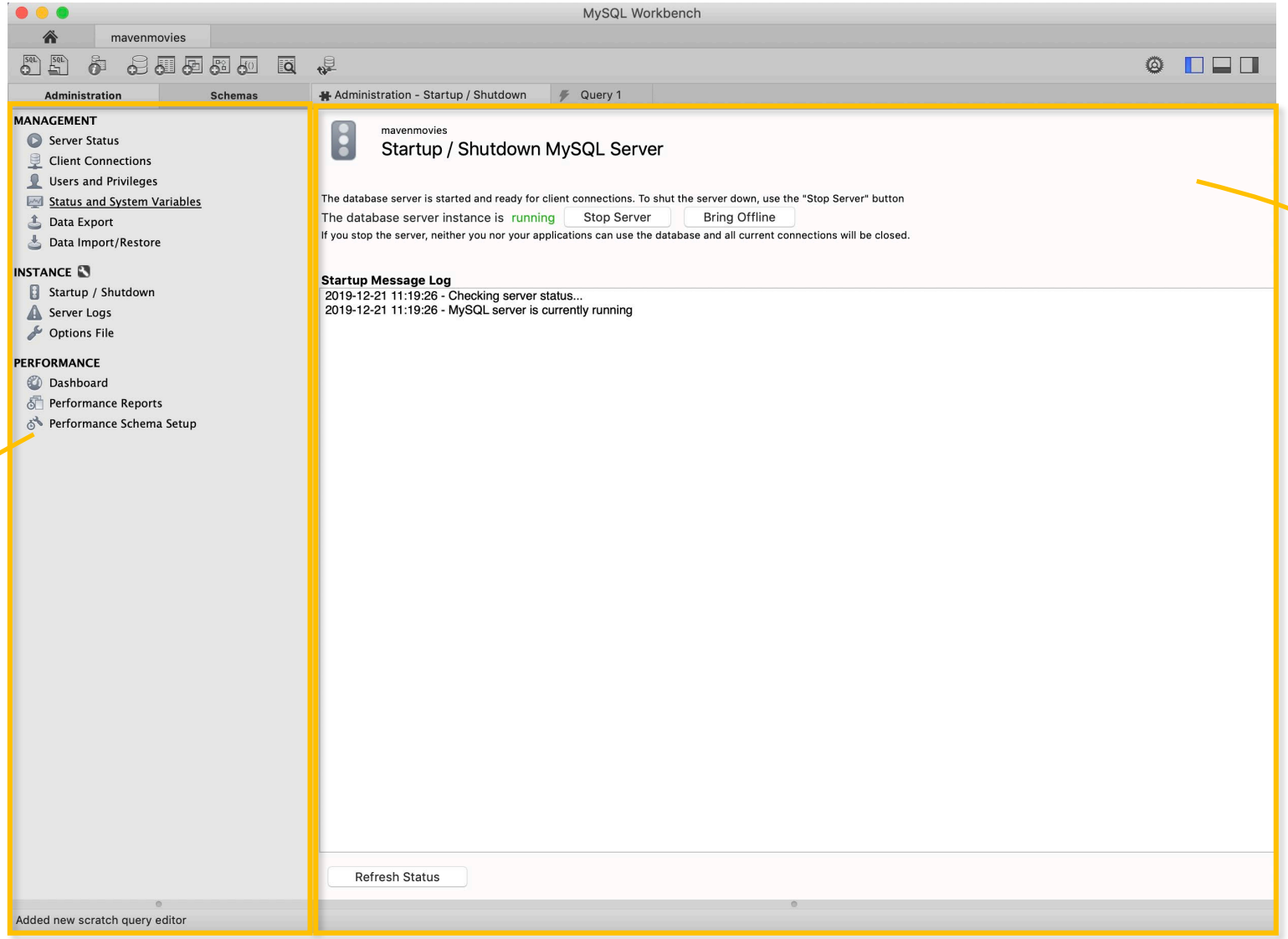
QUICK TOUR: THE WORKBENCH INTERFACE



Administration Tab

Here you can select the Management, Instance, and Performance tools

Tool Tabs

This is where the various Management, Instance, and Performance tools show up after they are selected in the Administration Tab.

Note: these show up as additional tabs alongside tabs you have open for SQL query editing. They co-exist in the same section of Workbench, even thought their functions are different

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STEP 5: CREATING THE DATABASES

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CREATING YOUR INITIAL SCHEMAS

1. In MySQL Workbench, click ***File*** from the top menu, then select ***Run SQL Script***

2. Navigate to the ***createmavenconsulting.sql*** file provided in the course resources
   - *This code will automatically generate the databases that we'll be exploring throughout the course*

3. After running the code, confirm the following:
   1. *You see results in the **Action Output** window, with **green check marks** and no errors in the **Response** column*
   2. *When you refresh the **Schemas** list, you should see a number of new schemas:*
      - ***candystore** & **candystore_old***
      - ***mavenfuzzyfactorymini** & **mavenmoviesmini***
      - ***onlinelearningschool***
      - ***sloppyjoes***
      - ***sys** (this one is built-in)*
      - ***thriftshop***

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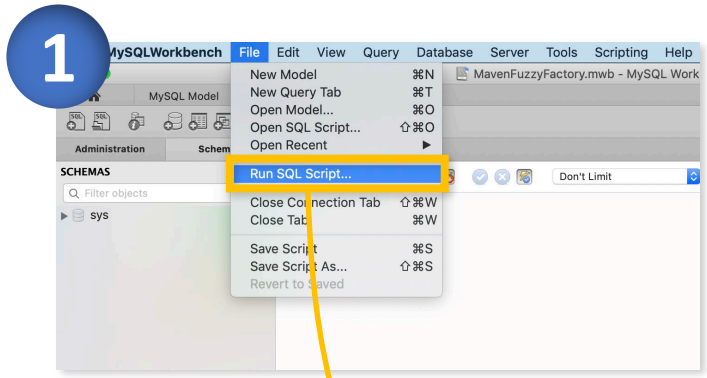
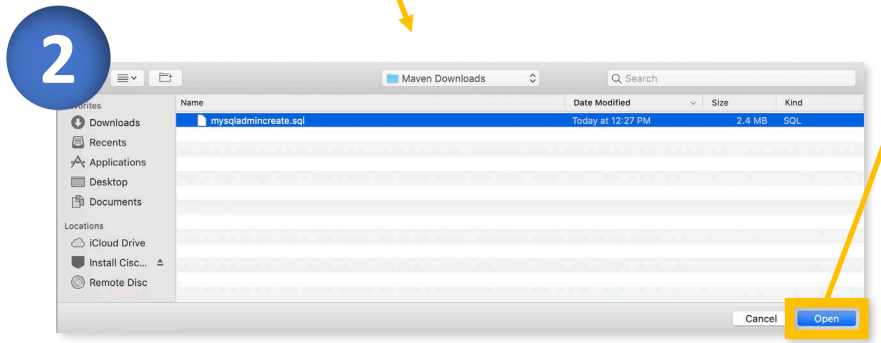
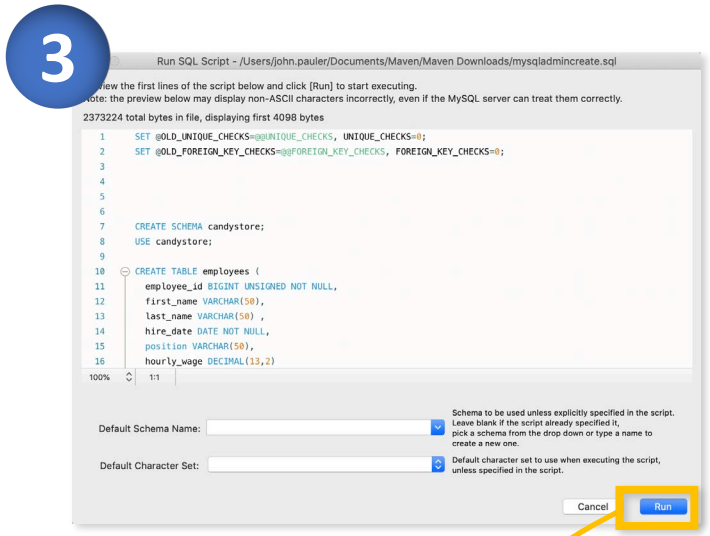
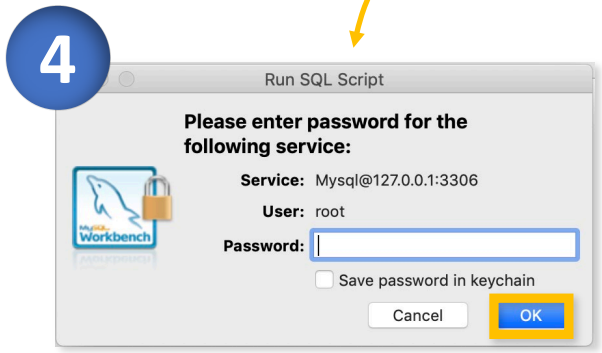
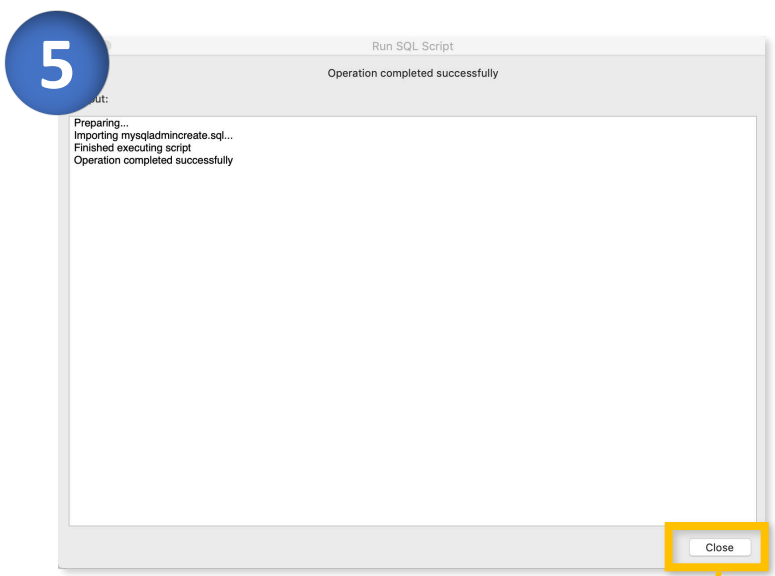
CREATING THE DATABASE

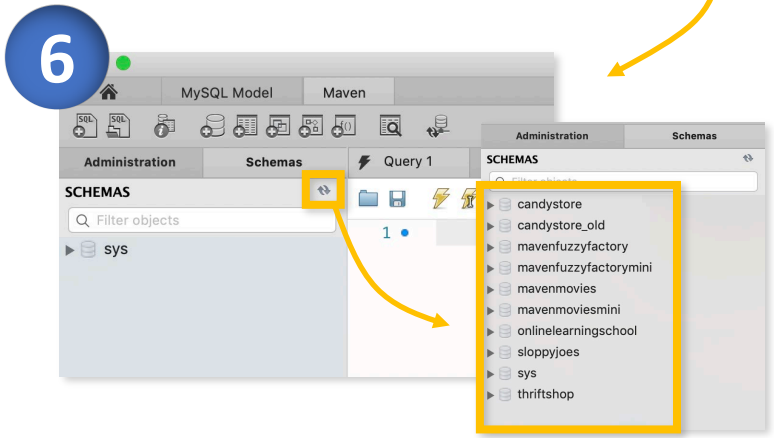












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CREATING, ALTERING & DELETING SCHEMAS AND TABLES

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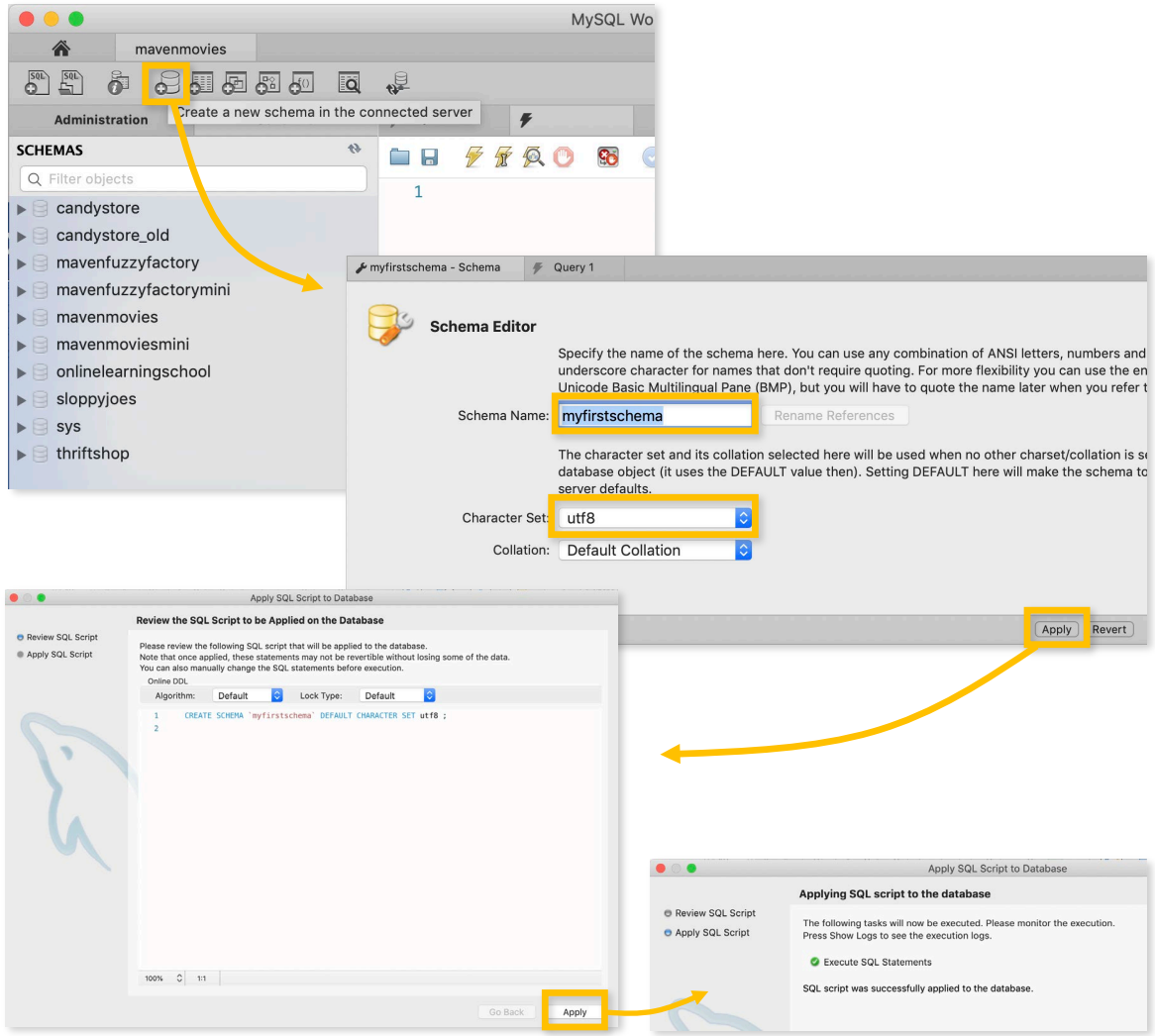
CREATE SCHEMA W/ UI

- In MySQL, the terms '**Schema**' and '**Database**' will be used interchangeably to discuss a collection of data tables which relate to one another
- We can create a new schema using Workbench's user interface tools, with just a few quick clicks
- Whether we create schemas using the UI tools or using code is a matter of preference

MySQL WORKBENCH TOOLS IN ACTION:



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CREATE SCHEMA W/ CODE

- We can also create a new schema using a simple SQL create statement
- When we use SQL code, we can choose the same options for our schema as when we use the UI
- Whether we create schemas using the UI tools or using code is a matter of preference

MySQL QUERY IN ACTION:

```
CREATE SCHEMA myfirstcodeschema;
```

ACTION OUTPUT:

Action Output

	Time	Action
1	14:14:25	CREATE SCHEMA myfirstcodeschema

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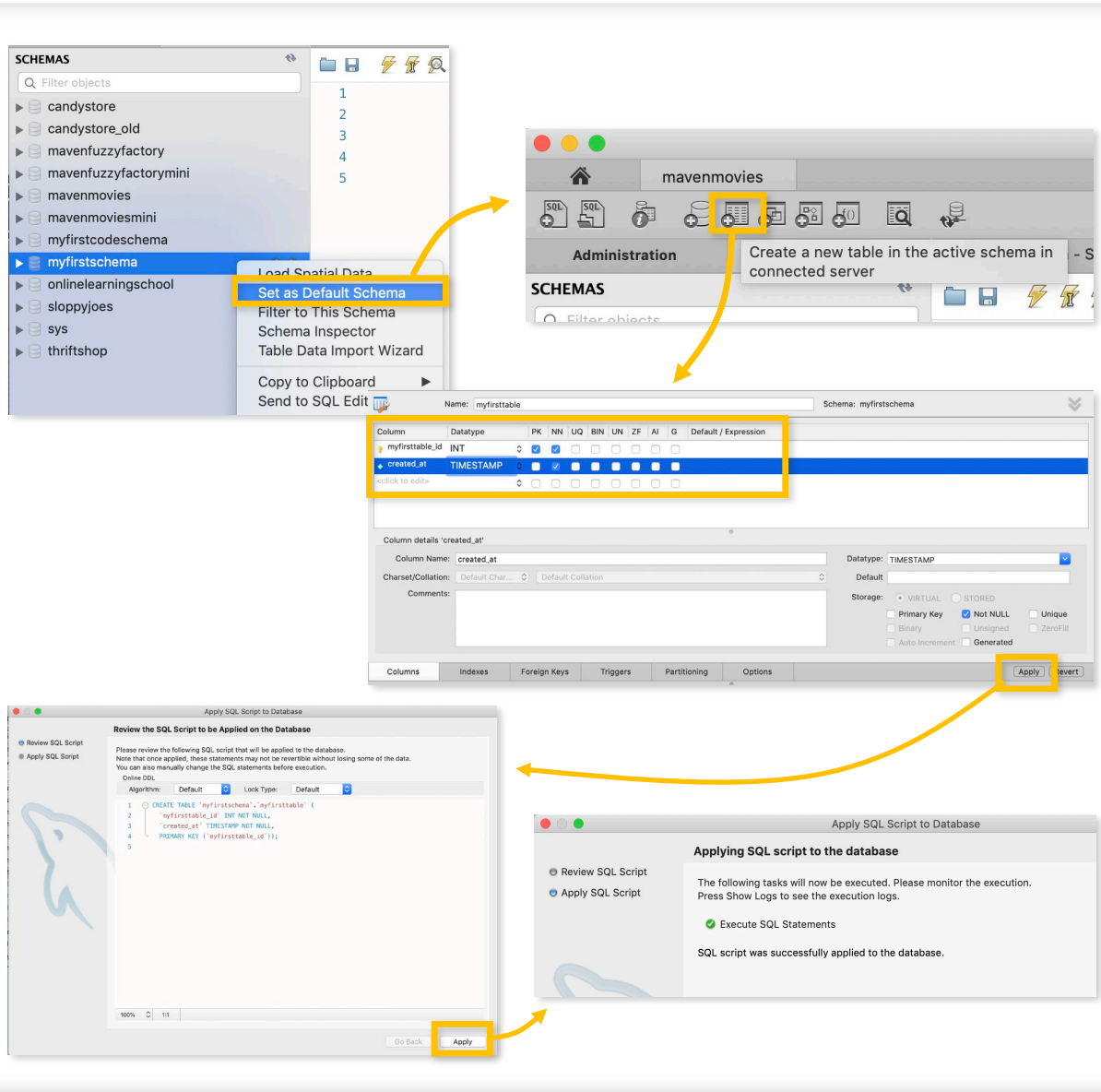
CREATE TABLE W/ UI

- After our schema is created, we can begin populating our schema with tables that will contain records of data
- Just like when we created our schemas, we can create tables using Workbench's UI tools, or we can do it with code (again, this is a matter of preference)

MySQL WORKBENCH TOOLS IN ACTION:



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CREATE TABLE W/ CODE

- After our schema is created, we can begin populating our schema with tables that will contain records of data
- Creating a new table with code typically involves:
  - Selecting a schema to add the table to
  - Giving the new table a name
  - Specifying which columns to include
  - Setting data formats and types

MySQL QUERY IN ACTION:

```
1
2   USE myfirstcodeschema; -- specifying the schema to use
3
4   CREATE TABLE myfirstcodetable (
5     myfirstcodetable_id BIGINT NOT NULL,
6     my_character_field VARCHAR(50),
7     my_text_field TEXT,
8     my_created_at TIMESTAMP
9   );
10
```

ACTION OUTPUT:

Action Output

	Time	Action	Response
1	14:59:51	USE myfirstcodeschema	0 row(s) affected
2	14:59:54	CREATE TABLE myfirstcodetable (myfirstcodetable_i...	0 row(s) affected

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COMMON MySQL DATA TYPES

Data Type	Specifications
TINYINT	*Integer (-128 to 127)*
SMALLINT	*Integer (-32768 to 32767)*
MEDIUMINT	*Integer (-8388608 to 8388607)*
INT	*Integer (-2147483648 to 2147483647)*
BIGINT	*Integer (-9223372036854775808 to 9223372036854775807)*
FLOAT	*Decimal (precise to 23 digits)*
DOUBLE	*Decimal (23 to 53 digits)*
DECIMAL	*Decimal (to 65 digits – most precise)*

Data Type	Specifications
CHAR	*String (0 – 255)*
VARCHAR	*String (0 – 255)*
TINYTEXT	*String (0 – 255)*
TEXT	*String (0 – 65535)*
DATE	*YYYY-MM-DD*
DATETIME	*YYYY-MM-DD HH:MM:SS*
TIMESTAMP	*YYYYMMDDHHMMSS*
ENUM	*One of a number of preset options*

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NEW MESSAGE

From: **Tom Strawberry** *(your first client)*

Subject: **Help Creating New Schema & 2 Tables**

Hi there,

We're hoping that you can help us start tracking our marketing spend better. Could you please:

1. Create a new schema, called '**toms_marketing_stuff**'
2. Add a table called '**publishers**', with two columns: '**publisher_id**' (integer) and '**publisher_name**' (up to 65 chars)
3. Add another table called '**publisher_spend**' with '**publisher_id**' (integer), '**month**' (date), and **spend** (decimal)

Thanks, Tom

Reply Forward

Helpful Tips

- Create the schema however you feel more comfortable, with SQL code or using Workbench's UI tools (**it would be good if you know how to do it both ways**)
- **Create one of the tables with code, and create the other using Workbench's UI tools** (we'll walk through both in the solution video)
- If you get stuck creating the schema or tables, **go back and watch the videos again.**
- If you get an error that says 'schema already exists' or 'table already exists', it's because you already did it.
- If you have problems with the data types, see the slide on common data types in the previous lecture. Also, **get comfortable Googling 'MySQL data types'.**

TEST YOUR SKILLS: **CREATE SCHEMAS & TABLES**

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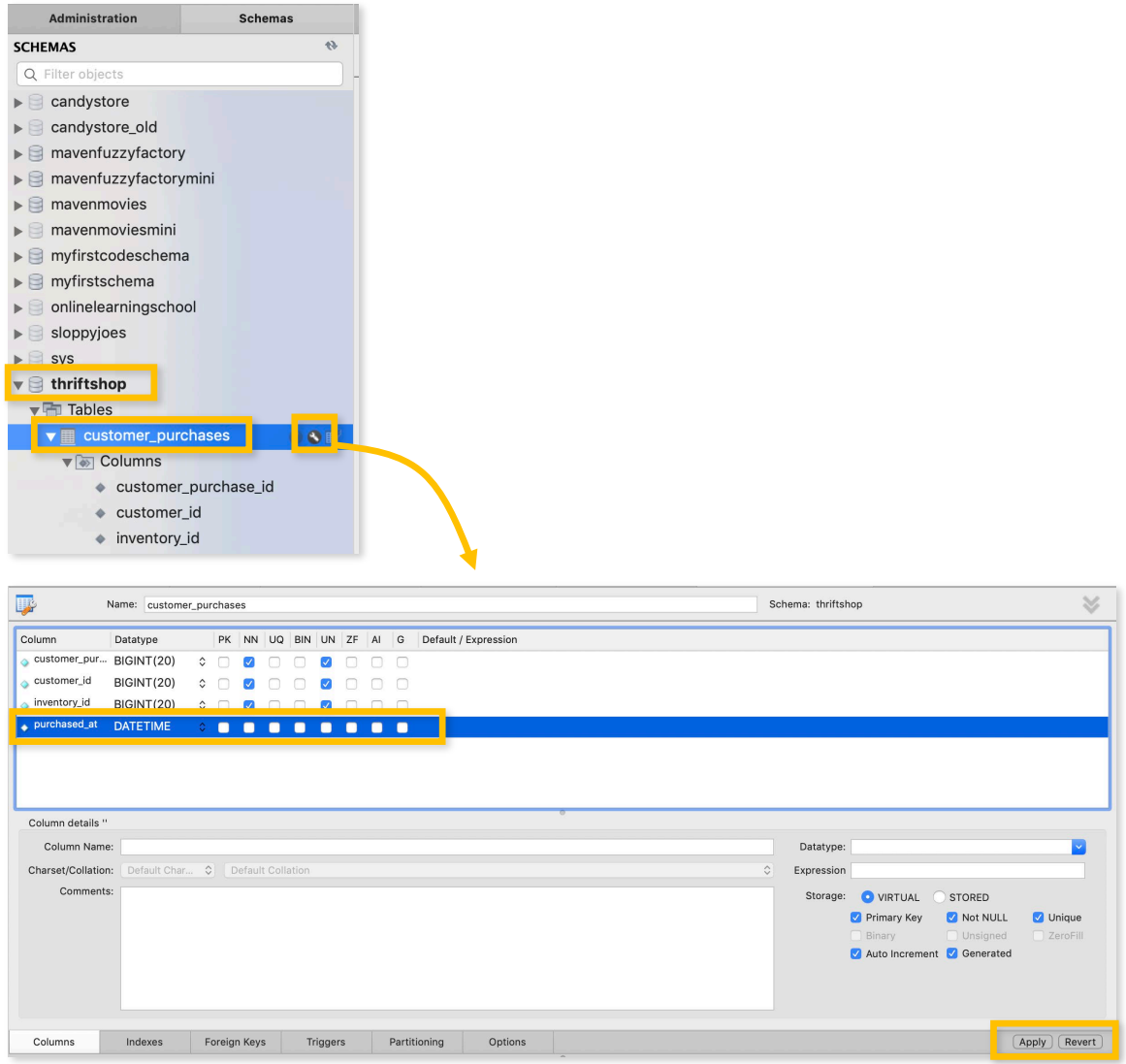
ADD & DROP COLUMNS W/ UI

- In addition to creating new tables which are fully defined, we can also add or drop columns from existing tables
- Just like when we created schemas and tables, altering tables can be done either with the UI tools, or by using SQL code
- Workbench makes it very easy to quickly define or modify the options for your columns in the UI

MySQL WORKBENCH TOOLS IN ACTION:



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ALTER TABLE W/ CODE

- We can use SQL code to alter tables by adding and dropping columns
- We specify **ALTER TABLE** tablename, and then we can either **ADD** or **DROP** a column
- When we **ADD** a column, we must also specify its data type
- Optionally when we **ADD** a column, we may specify where it should appear, by using **FIRST** or **AFTER**

MySQL QUERY IN ACTION:

```
SELECT * FROM customer_purchases; -- just to see what's here to start

ALTER TABLE customer_purchases
DROP COLUMN customer_id; -- maybe this needs to get dropped for privacy

ALTER TABLE customer_purchases
ADD COLUMN purchase_amount DECIMAL(6,2) AFTER customer_purchase_id;
-- after is optional

SELECT * FROM customer_purchases; -- what's here at the end
```

ACTION OUTPUT:

Result Grid Filter Rows: Search Export:

customer_purchase_id	purchase_amount	inventory_id	purchased_at
1	NULL	3	NULL
2	NULL	2	NULL
3	NULL	4	NULL
4	NULL	7	NULL
5	NULL	5	NULL
6	NULL	1	NULL
7	NULL	6	NULL
8	NULL	8	NULL
9	NULL	9	NULL
10	NULL	3	NULL
11	NULL	2	NULL
12	NULL	6	NULL

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NEW MESSAGE

From: **Amy Baker** *(owns the candy store)*

Subject: **Help Updating A Database Table**

Hi,

I have some basic tables set up in my '**candystore**' schema, but I need some help updating some of the tables before my employees can get access and start using this more widely.

1. Can you **remove the hourly_wage column from the employees table**? (I need it hidden before I can share out)

2. Can you **add a column to the employees table called 'avg_customer_rating'**? (decimal to one digit)

Thanks!

Reply Forward

Helpful Tips

If you've done everything correctly, your table should go from this…

Result Grid Filter Rows: Search Export:

employee_id	first_name	last_name	hire_date	position	hourly_wage
1	Jim	John	2018-01-15	Manager	35.00
2	Wayland	Smithers	2018-01-15	Assistant Manager	30.00
3	Elizabeth	Boop	2019-02-01	Clerk	20.00
4	Margaret	Simpson	2019-02-01	Clerk	22.00
5	Lawrence	Bird	2019-12-15	Clerk	16.00
6	Santos	Halper	2019-12-15	Clerk	15.00

To this…

Result Grid Filter Rows: Search Export:

employee_id	first_name	last_name	hire_date	position	avg_customer_rating
1	Jim	John	2018-01-15	Manager	NULL
2	Wayland	Smithers	2018-01-15	Assistant Manager	NULL
3	Elizabeth	Boop	2019-02-01	Clerk	NULL
4	Margaret	Simpson	2019-02-01	Clerk	NULL
5	Lawrence	Bird	2019-12-15	Clerk	NULL
6	Santos	Halper	2019-12-15	Clerk	NULL

TEST YOUR SKILLS: **ALTERING TABLES**

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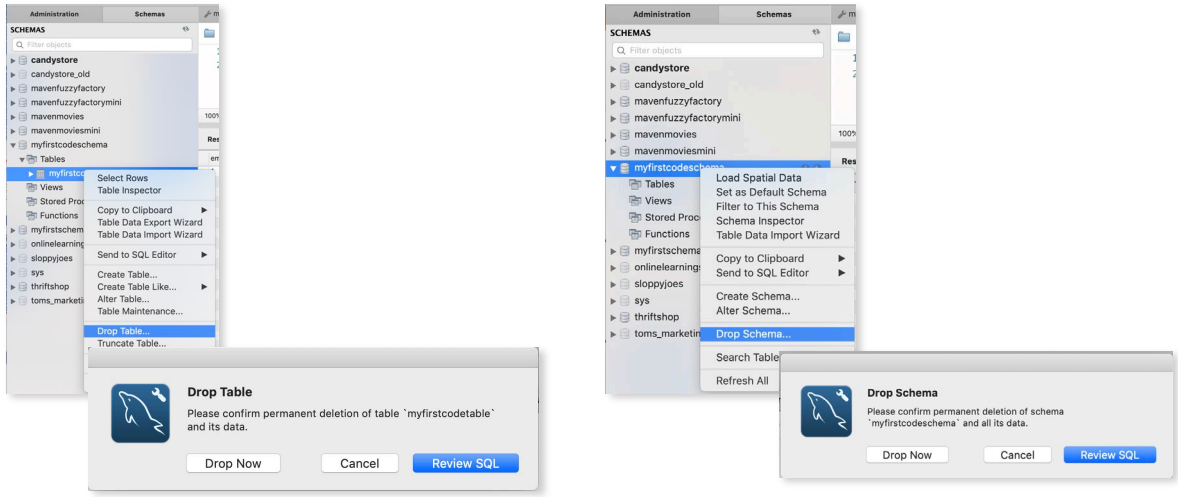
DROP SCHEMAS & TABLES

- **BE CAREFUL!** Dropping schemas and tables that your company needs is a quick way to lose friends at the office ☹
- Ideally, your permissions will be set up so that most employees can access data, some can **CREATE** tables, and only a limited few can **DROP** tables or schemas
- Workbench makes it very easy to **DROP** schemas and tables, through the UI, or with SQL code

MySQL WORKBENCH TOOLS IN ACTION:



MySQL QUERY IN ACTION:

```
USE myfirstschema; -- sets the schema

DROP TABLE myfirsttable; -- drops the table

DROP SCHEMA myfirstschema; -- drops the schema
```

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NEW MESSAGE

From: **Amy Baker** *(owns the candy store)*

Subject: **Need to Delete a Table and a Schema**

Hi,

We're almost ready to share our '**candystore**' schema for all employees to use. Can you please help me with the following?

1. **Drop the table 'candy_products'**. I don't want my employees knowing my margins.
2. **Drop the schema 'candystore_old'.** This is an old copy that is now out of date, so we don't need to maintain it.

Thanks!
-Amy

Reply Forward

Warning!!

HEY THIS IS IMPORTANT!

Be extremely careful when dropping tables and columns.

DROP the wrong table or schema at work, and it could be bad news for your relationships and career.

DROP a table you'll need later in this course, and you'll need to go back to the beginning and reinstall. Just don't do it. Be careful!!

TEST YOUR SKILLS: **DELETING TABLES & SCHEMAS**

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INSERTING, UPDATING & DELETING RECORDS

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INSERTING NEW RECORDS

- MySQL makes it easy to insert additional records into a table using an **INSERT INTO** statement
- We can insert one row at a time, or we can batch insert many rows in one single SQL statement
- We may choose to specify values for every column in our **INSERT INTO** statement, or we may omit values for some columns. If we omit values, MySQL places the default value for that column

MySQL QUERY IN ACTION:

```
USE thriftshop; -- sets the schema

SELECT * FROM inventory; -- just to see what's already there

INSERT INTO inventory (inventory_id, item_name, number_in_stock) VALUES
(10,'wolf skin hat',1);
```

(Another) MySQL QUERY IN ACTION:

```
-- this time we will batch insert
-- we will also not name the columns (this is optional)
INSERT INTO inventory VALUES
(11,'fur fox skin',1),
(12,'plaid button up shirt',8),
(13,'flannel zebra jammies',6);
```

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UPDATING RECORDS

- We can update the values of one or more records using an **UPDATE** statement
- Our **UPDATE** statement will always require a **SET** clause, which tells the server what values to set
- In most cases, we will also use a **WHERE** clause (optional) to specify which records to update. If we do not use a **WHERE** clause, the **UPDATE** will process on all records

MySQL QUERY IN ACTION:

```
UPDATE inventory
SET number_in_stock = 0 -- these are sold out
WHERE inventory_id = 9; -- only do this for id #9
```

(ANOTHER) MySQL QUERY IN ACTION:

```
-- this time we'll do it for two records simultaneously!
UPDATE inventory
SET number_in_stock = 0 -- these are sold out
WHERE inventory_id IN(1,9); -- update 2 records at once
```

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NEW MESSAGE

From: **Amy Baker** *(owns the candy store)*

Subject: **Help Updating Some Data Records**

Hi,

Exciting news! I have hired two new employees, who both started on March 15th, 2020. They are both clerks. Their names are **Charles Munger** and **William Gates**. Could you add them to the employees table for me?

Could you also update the **avg_customer_rating** column? The average ratings for employees 1-6 are **4.8**, **4.6**, **4.75**, **4.9**, **4.75**, and **4.2**, respectively. The two new clerks are both at **5.0**.

Thank you so much!

Reply Forward

Result Preview

Result Grid Filter Rows: Search Edit: Export/Im

employee_id	first_name	last_name	hire_date	position	avg_customer_rating
1	Jim	John	2018-01-15	Manager	4.80
2	Wayland	Smithers	2018-01-15	Assistant Manager	4.60
3	Elizabeth	Boop	2019-02-01	Clerk	4.75
4	Margaret	Simpson	2019-02-01	Clerk	4.90
5	Lawrence	Bird	2019-12-15	Clerk	4.75
6	Santos	Halper	2019-12-15	Clerk	4.20
7	Charles	Munger	2020-03-15	Clerk	5.00
8	William	Gates	2020-03-15	Clerk	5.00

TEST YOUR SKILLS: **INSERTING & UPDATING RECORDS**

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DELETE RECORDS

- MySQL allows us to target one or more records to **DELETE FROM** a given data table
- We will do this using the **DELETE FROM** statement, followed by the tablename
- As with **UPDATE** statements, we will usually want to specify which records to delete using a **WHERE** clause
- If we do not specify a **WHERE** clause, **DELETE FROM** will delete ALL records

MySQL QUERY IN ACTION:

```
-- deleting ski blankets, no longer stocked
DELETE FROM inventory
WHERE inventory_id = 7
```

ACTION OUTPUT:

inventory_id	item_name	number_in_stock
1	fur coat	0
2	mocassins	4
3	velour jumpsuit	12
4	house slippers	6
5	brown leather jacket	3
6	broken keyboard	6
7	ski blanket	1
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

inventory_id	item_name	number_in_stock
1	fur coat	0
2	mocassins	4
3	velour jumpsuit	12
4	house slippers	6
5	brown leather jacket	3
6	broken keyboard	6
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

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TRUNCATE TABLE

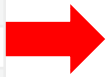
- If we want to remove all records from a table but preserve the table structure, we can do that using **TRUNCATE TABLE**
- When we use **TRUNCATE TABLE**, the data is removed but the column names, data types, column order, and any constraints placed on the table are all preserved
- **TRUNCATE TABLE** is very similar to using **DELETE** without a **WHERE** clause (but there are differences)

MySQL QUERY IN ACTION:

```sql
USE thriftshop;

-- just to see what's in there
SELECT *
FROM customers;

-- truncating the table
TRUNCATE TABLE customers;

-- now, seeing what's there once more
SELECT *
FROM customers;
```

ACTION OUTPUT:

customer_id	first_name	last_name
1	Mack	Lewis
2	Ryan	More
3	Brooklyn	Haggerty
4	Tim	Grinnell
5	Ray	Bridwell
6	Ben	Dalton



customer_id	first_name	last_name

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DDL, DML, DQL, DCL & DTL

DATA DEFINITION LANGUAGE (DDL)	Used to create or modify the structure of a database Examples: **CREATE, ALTER, DROP, TRUNCATE**
DATA MANIPULATION LANGUAGE (DML)	Used to add, modify, or delete data records Examples: **INSERT, UPDATE, DELETE**
DATA QUERY LANGUAGE (DQL)	Used to query data *(often considered part of DML)* Examples: **SELECT, SHOW, HELP**
DATA CONTROL LANGUAGE (DCL)	Used to grant and revoke permissions Examples: **GRANT, REVOKE**
DATA TRANSACTION LANGUAGE (DTL)	Used to manage transactions Examples: **START TRANSACTION, COMMIT, ROLLBACK**

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NEW MESSAGE

From: **Amy Baker** *(owns the candy store)*

Subject: **Help Deleting Some Data**

Hi,

I have a situation I need your help with. One of my employees, **Margaret Simpson**, was recently caught generating fake customer reviews to boost her score. I would like you to…

1. **Delete her record from the employees table**
2. **Remove all data from the customer reviews table but preserve the table structure** (we want to start fresh)

Thank you!
-Amy

Reply Forward

Helpful Hints

- Make sure you do not drop either of the two tables. You just want to remove records for this exercise, without impacting the table structure
- For the second part of Amy's ask, you should end up with a table containing column headers but no data records

TEST YOUR SKILLS: **DELETING DATA**

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DATABASE DESIGN

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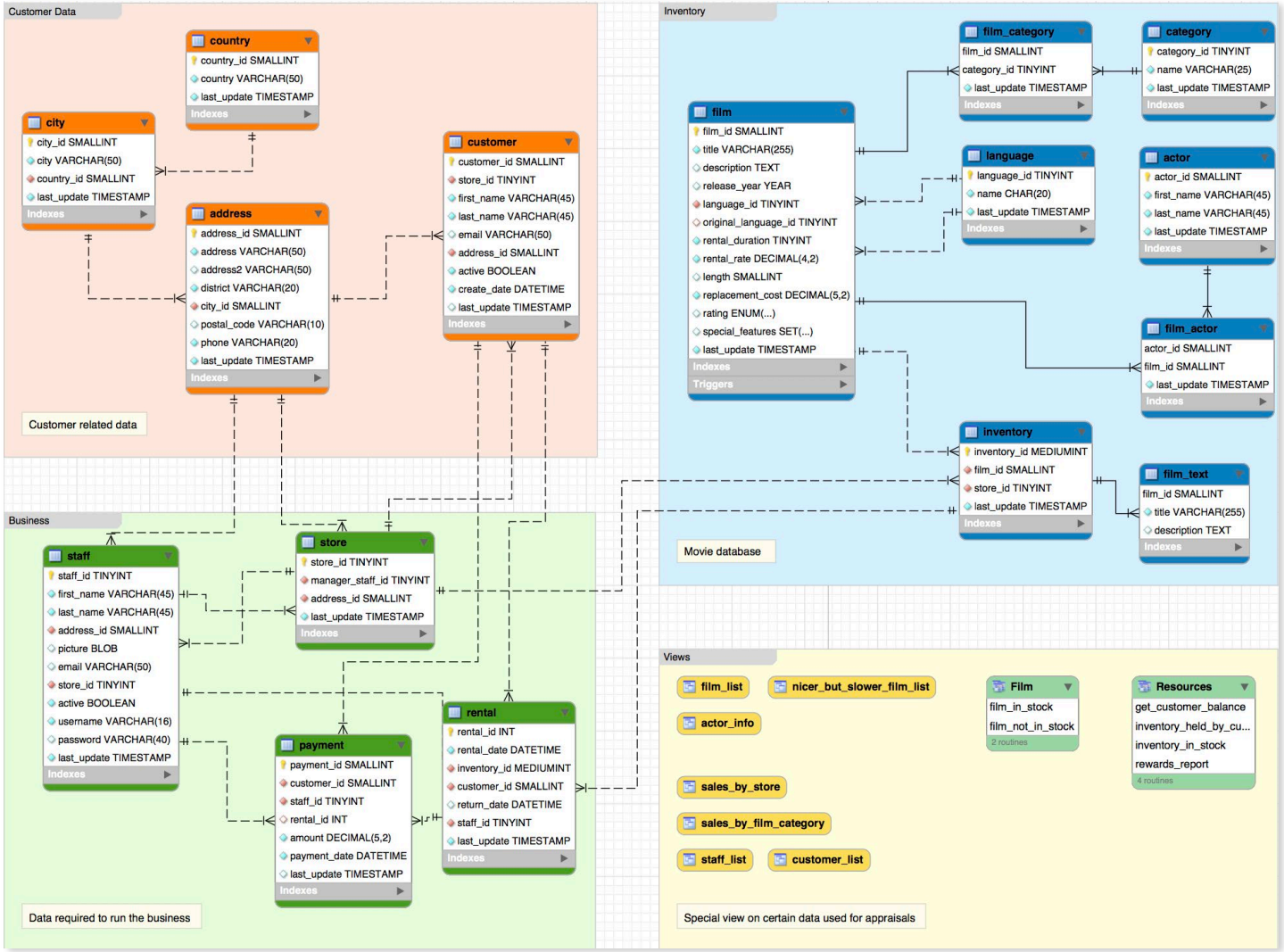
DATABASE DESIGN IS ABOUT STRUCTURING TABLES & RELATIONSHIPS



In this case the database includes **16 related tables**, containing information about:

- **Customers** (*Name, Address, etc.*)
- **Business** (*Staff, Rentals, etc.*)
- **Inventory** (*Films, Categories, etc.*)

Now we are ready to start talking about optimal database design, how tables relate to each other, and how to properly normalize a database.

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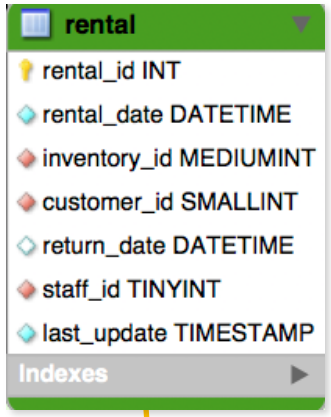
EACH TABLE CONTAINS **ROWS** & **COLUMNS**



Tables contain information organized into **columns** (*or fields*) and **rows** (*or records*)

In this case, our **Rental** table contains **7 columns** and **10 rows**:

- Each **column** contains an attribute related to our film rentals (*rental/return date, customer ID, etc.*)
- Each **row** corresponds to **one specific rental** (*which film was rented, when, who rented it, etc.*)

rental_id	rental_date	inventory_id	customer_id	return_date	staff_id	last_update
1	2005-05-24 22:53:30	367	130	2005-05-26 22:04:30	1	2006-02-15 21:30:53
2	2005-05-24 22:54:33	1525	459	2005-05-28 19:40:33	1	2006-02-15 21:30:53
3	2005-05-24 23:03:39	1711	408	2005-06-01 22:12:39	1	2006-02-15 21:30:53
4	2005-05-24 23:04:41	2452	333	2005-06-03 01:43:41	2	2006-02-15 21:30:53
5	2005-05-24 23:05:21	2079	222	2005-06-02 04:33:21	1	2006-02-15 21:30:53
6	2005-05-24 23:08:07	2792	549	2005-05-27 01:32:07	1	2006-02-15 21:30:53
7	2005-05-24 23:11:53	3995	269	2005-05-29 20:34:53	2	2006-02-15 21:30:53
8	2005-05-24 23:31:46	2346	239	2005-05-27 23:33:46	2	2006-02-15 21:30:53
9	2005-05-25 00:00:40	2580	126	2005-05-28 00:22:40	1	2006-02-15 21:30:53
10	2005-05-25 00:02:21	1824	399	2005-05-31 22:44:21	2	2006-02-15 21:30:53

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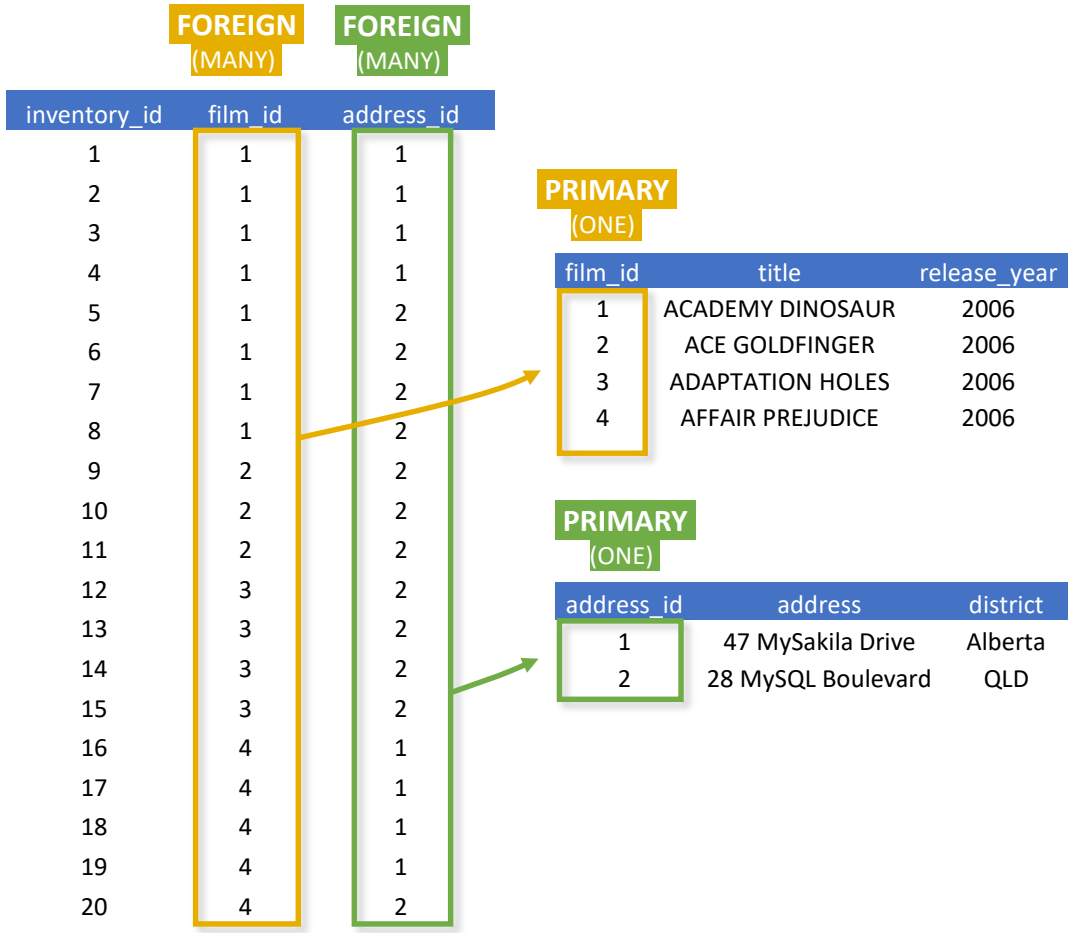
TABLE **RELATIONSHIPS** & **CARDINALITY**

Cardinality refers to the **uniqueness of values** in a column (*or attribute*) of a table and is commonly used to describe how two tables relate (***one-to-one***, ***one-to-many***, *or* ***many-to-many***). For now, here are the key points to grasp:



- **Primary keys** are **unique**
  - *They **cannot** repeat, so there is only **one** instance of each primary key value in a column*
- **Foreign keys** are **non-unique**
  - *They **can** repeat, so there may be **many** instances of each foreign key value in a column*
- We can create a **one-to-many** relationship by connecting a **foreign key** in one table to a **primary key** in another

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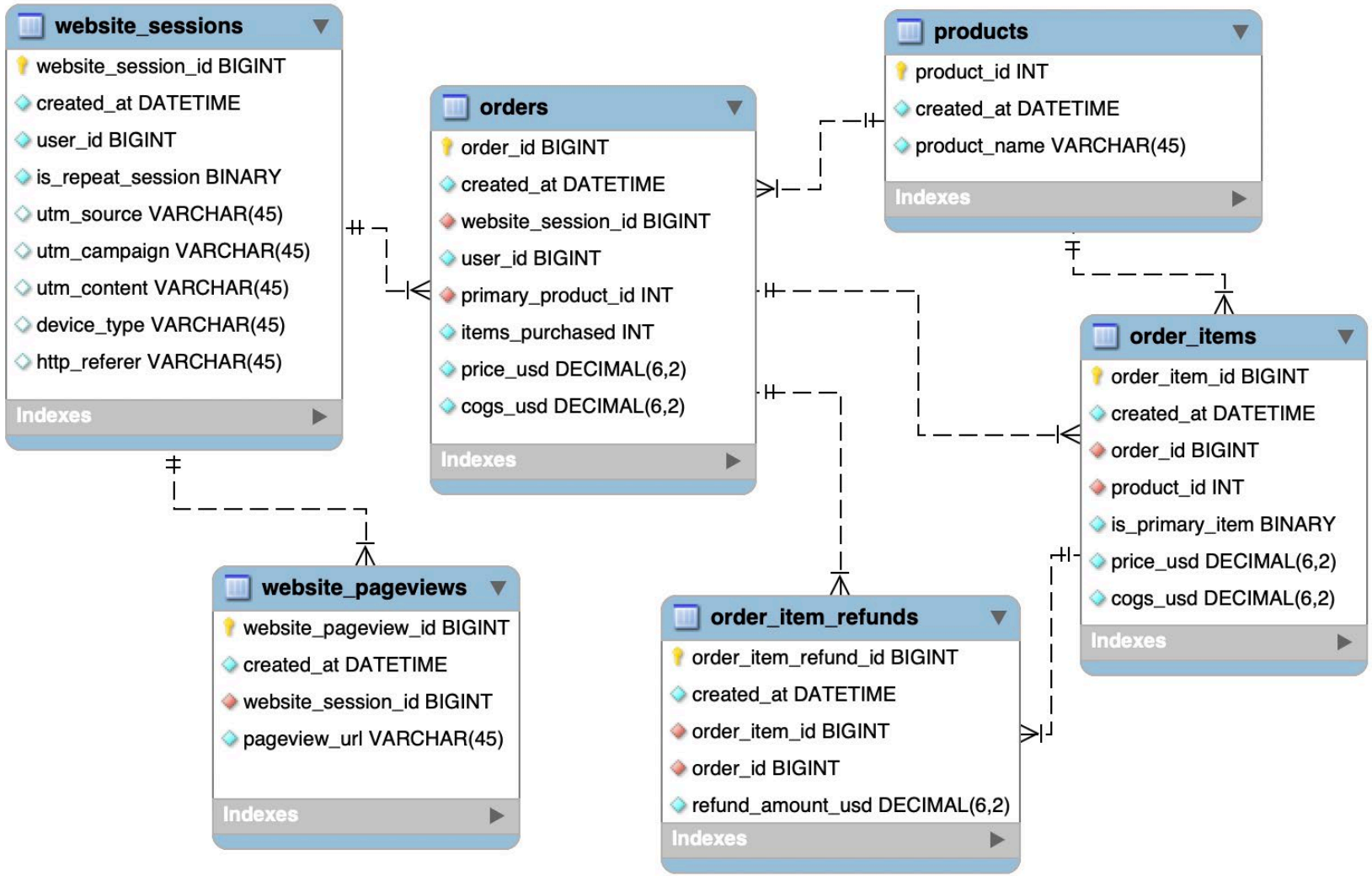
MAVEN FUZZY FACTORY DATABASE



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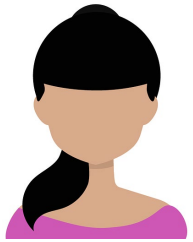

NEW MESSAGE

From: **Emily Trapp** *(Owner, Online School)*

Subject: **Help Understanding My Tables**

Hey!

Would you be able to help me out? I have 3 tables in my '**onlinelearningschool**' schema and would like to understand how they are related. For each table, could you please:

1) **Tell me what the primary key is, and whether there are any foreign keys**

2) **Explain how the tables relate to each other and what type of relationship exists** (one-to-one, one-to-many, etc.)

Thank you!

Reply Forward

Helpful Hint

```
-- run these simple queries to see what's in there

USE onlinelearningschool;


SELECT * FROM courses;


SELECT * FROM course_ratings;


SELECT * FROM course_ratings_summaries;
```

TEST YOUR SKILLS: **UNDERSTANDING RELATIONSHIPS**

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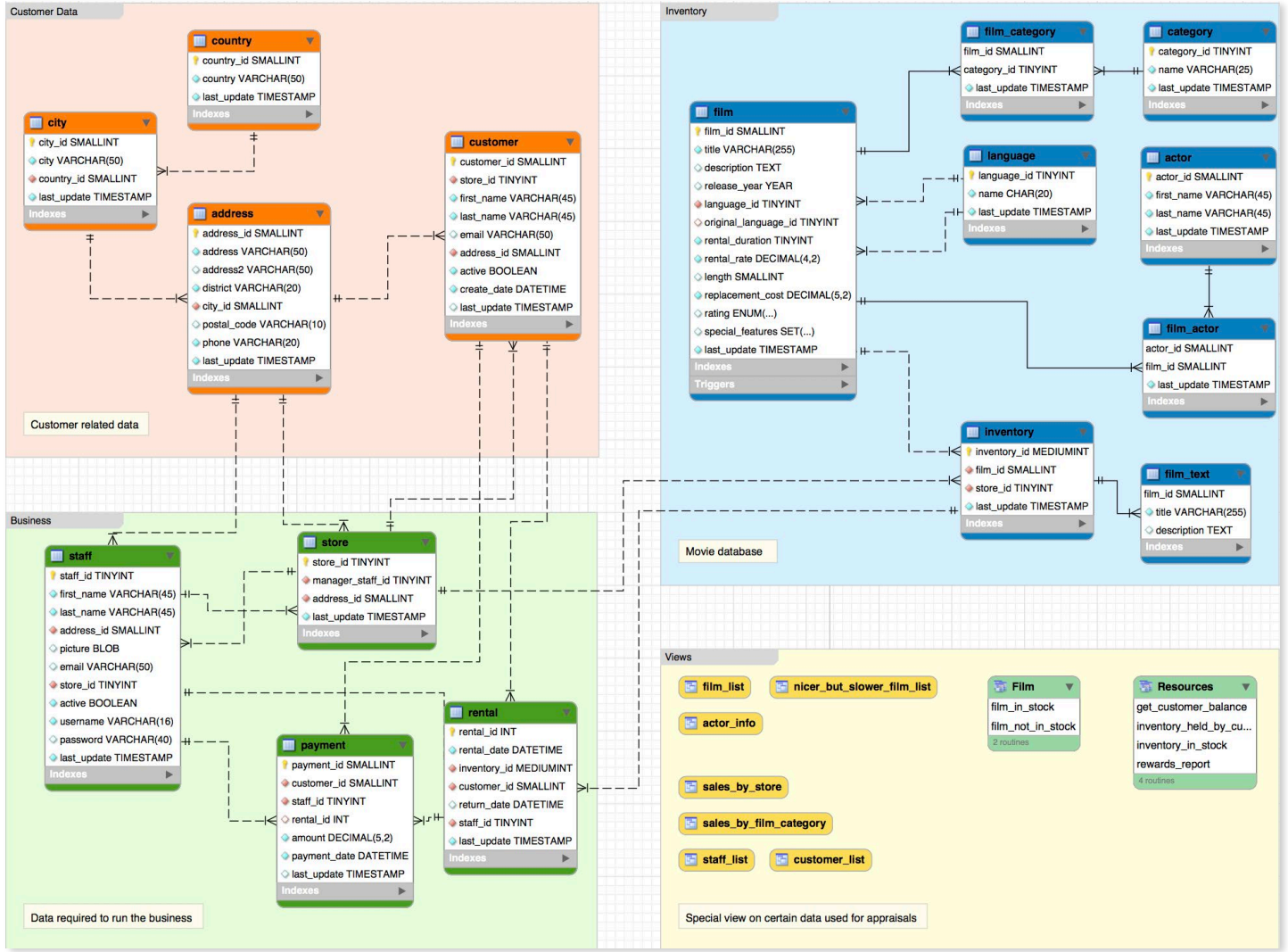
A DATABASE CAN CONTAIN **MANY RELATED TABLES**



In this case the database includes **16 related tables**, containing information about:

- **Customers** (*Name, Address, etc.*)
- **Business** (*Staff, Rentals, etc.*)
- **Inventory** (*Films, Categories, etc.*)

We'll start by using MySQL to create and modify **individual tables**, then later in the course we will get into **database design** and discuss optimal table relationships.

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DATABASE **NORMALIZATION**

Normalization is the process of structuring the tables and columns in a relational database to **minimize redundancy** and **preserve data integrity**. Benefits of normalization include:

- **Eliminating duplicate data** *(this makes storage and query processing more efficient)*
- **Reducing errors and anomalies** *(restrictions around data structure help to prevent human errors)*

inventory_id	title	release_year	store_address	store_district
1	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
2	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
3	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
4	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
5	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
6	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
7	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
8	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
9	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
10	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
11	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
12	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
13	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
14	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
15	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
16	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
17	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
18	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
19	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
20	AFFAIR PREJUDICE	2006	28 MySQL Boulevard	QLD

HEY THIS IS IMPORTANT!

If you **don't normalize** your database, you end up with tables that look like this, with lots and lots of duplicate values.

This may not seem like a lot for the 20 records shown, but can have a *significant* impact as your database scales.

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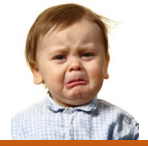
NORMALIZATION: MULTIPLE RELATED TABLES

In practice, normalization involves breaking out data from a **single merged table** into **multiple related tables**

- Instead of storing redundant information about each store and film in a single table (*like the one one the left*), we create **new tables containing a *single record* for each unique value**, and link to those tables using a simple id



Not normalized:

inventory_id	title	release_year	store_address	store_district
1	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
2	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
3	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
4	ACADEMY DINOSAUR	2006	47 MySakila Drive	Alberta
5	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
6	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
7	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
8	ACADEMY DINOSAUR	2006	28 MySQL Boulevard	QLD
9	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
10	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
11	ACE GOLDFINGER	2006	28 MySQL Boulevard	QLD
12	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
13	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
14	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
15	ADAPTATION HOLES	2006	28 MySQL Boulevard	QLD
16	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
17	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
18	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
19	AFFAIR PREJUDICE	2006	47 MySakila Drive	Alberta
20	AFFAIR PREJUDICE	2006	28 MySQL Boulevard	QLD

Normalized!

inventory_id	film_id	address_id
1	1	1
2	1	1
3	1	1
4	1	1
5	1	2
6	1	2
7	1	2
8	1	2
9	2	2
10	2	2
11	2	2
12	3	2
13	3	2
14	3	2
15	3	2
16	4	1
17	4	1
18	4	1
19	4	1
20	4	2

film_id	title	release_year
1	ACADEMY DINOSAUR	2006
2	ACE GOLDFINGER	2006
3	ADAPTATION HOLES	2006
4	AFFAIR PREJUDICE	2006

address_id	address	district
1	47 MySakila Drive	Alberta
2	28 MySQL Boulevard	QLD

*We now have **single records** containing all of the information about our films and addresses – no more redundancy!*

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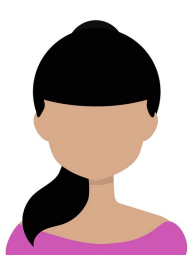

NEW MESSAGE

From: **Emily Trapp** *(Owner, Online School)*

Subject: **Help Understanding My Tables**

Hey!

I could use some help again. I heard about this concept of database “normalization”, but need your expertise.

Would you be able to look at my three tables and tell me if they are already normalized?

If any table is NOT normalized, **could you give me direction on how I could restructure the data to normalize my database?**

Thank you!

Reply Forward

Helpful Hint

```
-- run these simple queries to see what's in there

USE onlinelearningschool;


SELECT * FROM courses;


SELECT * FROM course_ratings;


SELECT * FROM course_ratings_summaries;
```

TEST YOUR SKILLS: **DATABASE NORMALIZATION**

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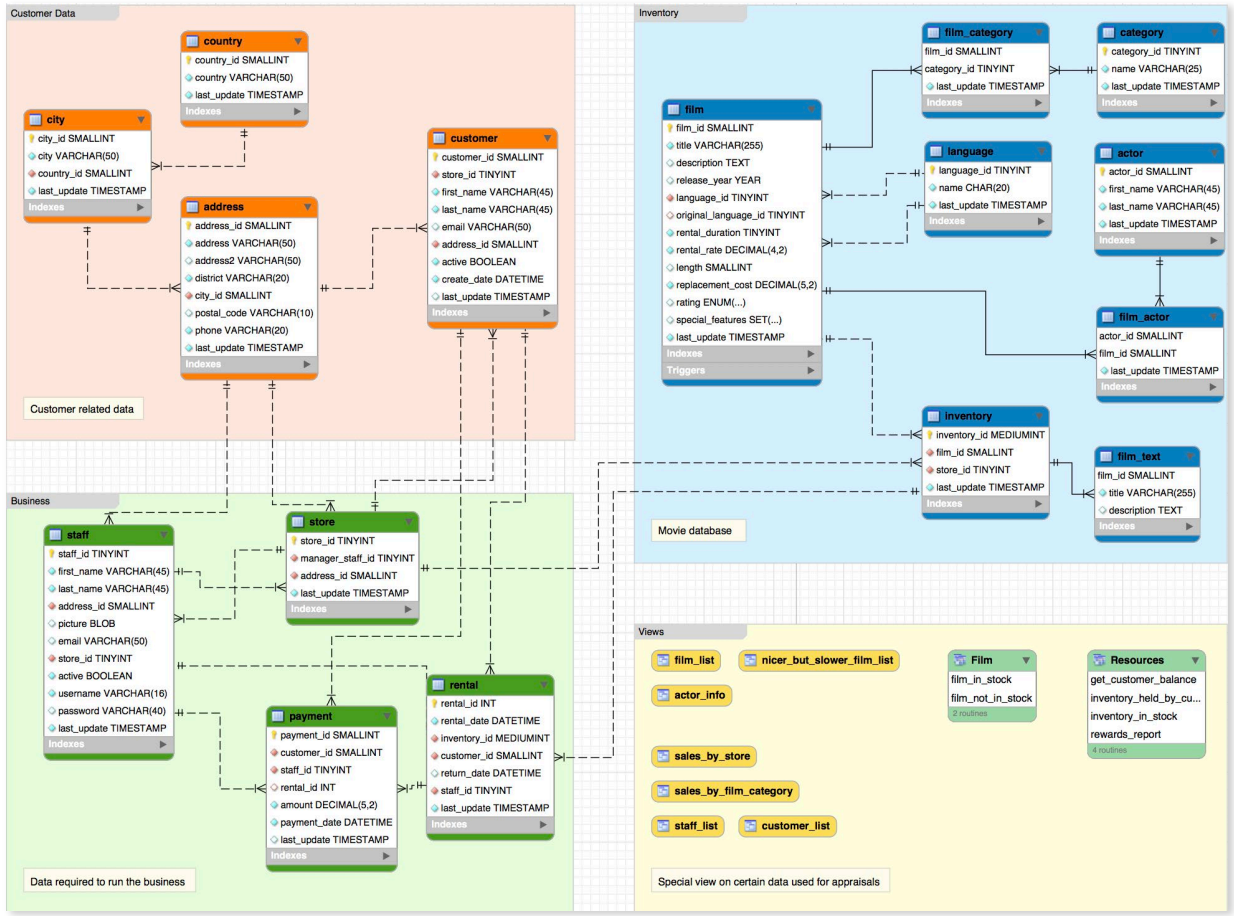
ENHANCED ENTITY RELATIONSHIP (EER) MODELS

As we designing our databases, it can be helpful to create **EER diagrams** to visually model the relationships between tables and the constraints within those tables

EER diagrams can help us map out things like:

- *Which tables are in the database*
- *Which columns exist in each table*
- *The data types of the various columns*
- *Primary and foreign keys within tables*
- *Relationship cardinality between tables*
- *Constraints on columns (i.e. Non-NULL)*



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MINI EXAMPLE: **RELATIONSHIP DIAGRAMS**

Consider the two tables shown below:

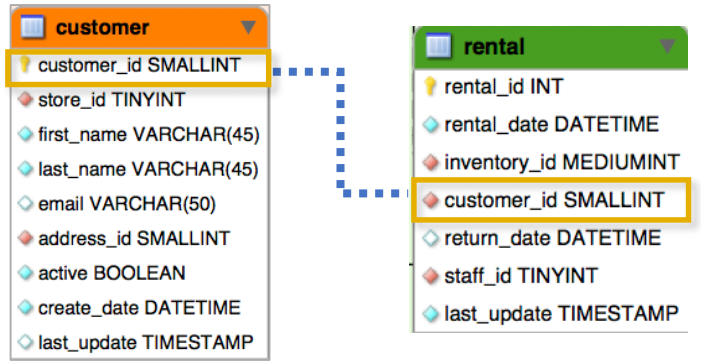
- The **Customer** table below contains details about each customer, identified by a unique **customer_id** *(the table's **primary key**)*
- The **Rental** table contains records of each rental, and includes a non-unique **customer_id** field since customers may rent films on multiple occasions *(this is one of the table's **foreign keys**)*

***Customer** table:*

customer_id	store_id	first_name	last_name	email	address_id	active	create_date
1	1	MARY	SMITH	MARY.SMITH@sakilacustomer.org	5	1	2006-02-14 22:04:36
2	1	PATRICIA	JOHNSON	PATRICIA.JOHNSON@sakilacustomer.org	6	1	2006-02-14 22:04:36
3	1	LINDA	WILLIAMS	LINDA.WILLIAMS@sakilacustomer.org	7	1	2006-02-14 22:04:36
4	2	BARBARA	JONES	BARBARA.JONES@sakilacustomer.org	8	1	2006-02-14 22:04:36
5	1	ELIZABETH	BROWN	ELIZABETH.BROWN@sakilacustomer.org	9	1	2006-02-14 22:04:36
6	2	JENNIFER	DAVIS	JENNIFER.DAVIS@sakilacustomer.org	10	1	2006-02-14 22:04:36
7	1	MARIA	MILLER	MARIA.MILLER@sakilacustomer.org	11	1	2006-02-14 22:04:36
8	2	SUSAN	WILSON	SUSAN.WILSON@sakilacustomer.org	12	1	2006-02-14 22:04:36
9	2	MARGARET	MOORE	MARGARET.MOORE@sakilacustomer.org	13	1	2006-02-14 22:04:36

***Rental** table:*

rental_id	rental_date	inventory_id	customer_id	return_date	staff_id	last_update
1	2005-05-24 22:53:30	367	130	2005-05-26 22:04:30	1	2006-02-15 21:30:53
2	2005-05-24 22:54:33	1525	459	2005-05-28 19:40:33	1	2006-02-15 21:30:53
3	2005-05-24 23:03:39	1711	408	2005-06-01 22:12:39	1	2006-02-15 21:30:53
4	2005-05-24 23:04:41	2452	333	2005-06-03 01:43:41	2	2006-02-15 21:30:53
5	2005-05-24 23:05:21	2079	222	2005-06-02 04:33:21	1	2006-02-15 21:30:53
6	2005-05-24 23:08:07	2792	549	2005-05-27 01:32:07	1	2006-02-15 21:30:53
7	2005-05-24 23:11:53	3995	269	2005-05-29 20:34:53	2	2006-02-15 21:30:53
8	2005-05-24 23:31:46	2346	239	2005-05-27 23:33:46	2	2006-02-15 21:30:53
9	2005-05-25 00:00:40	2580	126	2005-05-28 00:22:40	1	2006-02-15 21:30:53



*We can diagram table relationships in Workbench to **understand how the records in each table relate***

***NOTE:** This isn't required, but serves as a helpful reference*

PRO TIP:

*When you explore a database for the first time, **diagram your relationships** to understand your table structure*

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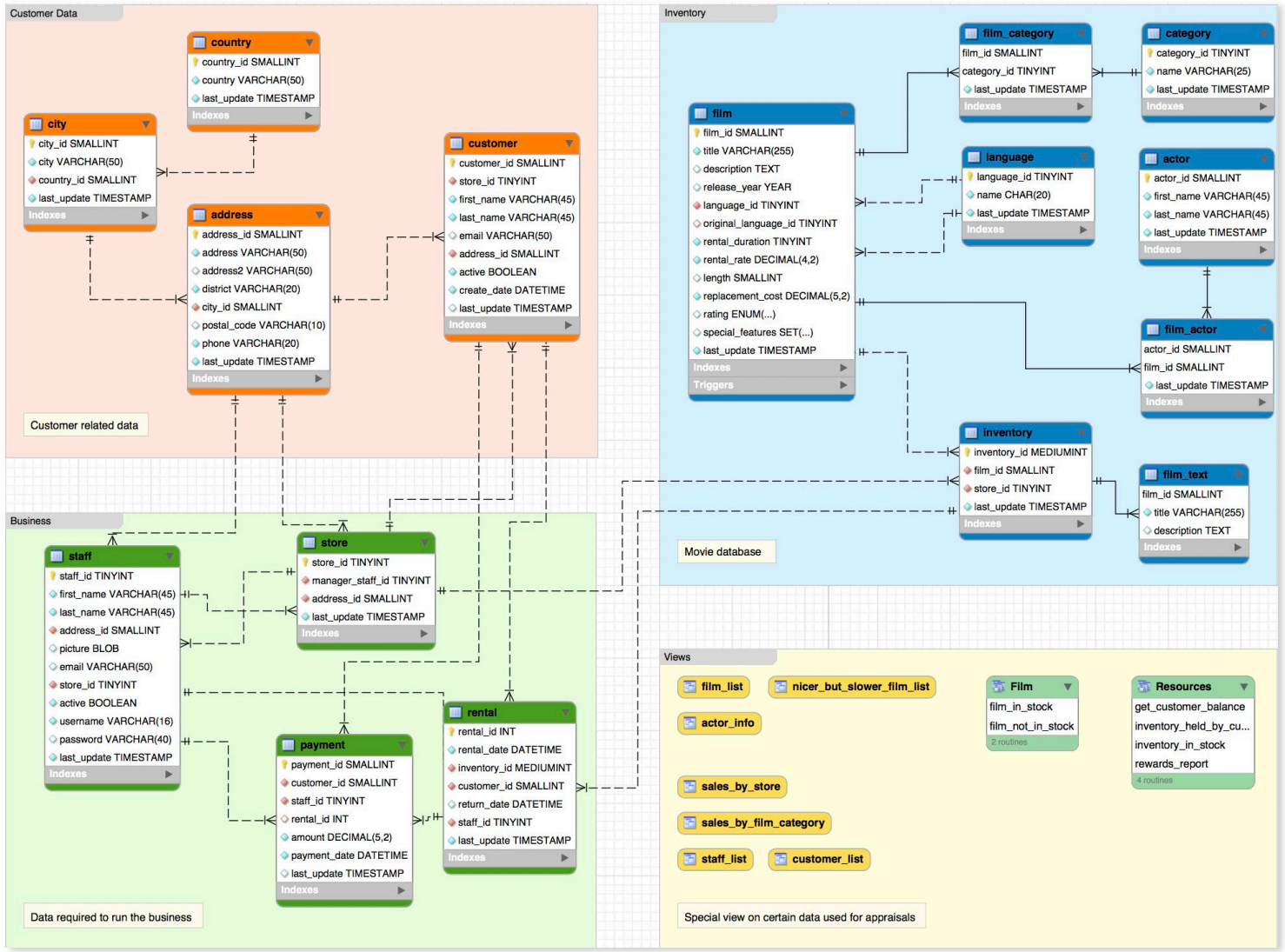
EER DIAGRAM EXAMPLE: **MAVEN MOVIES** DATABASE



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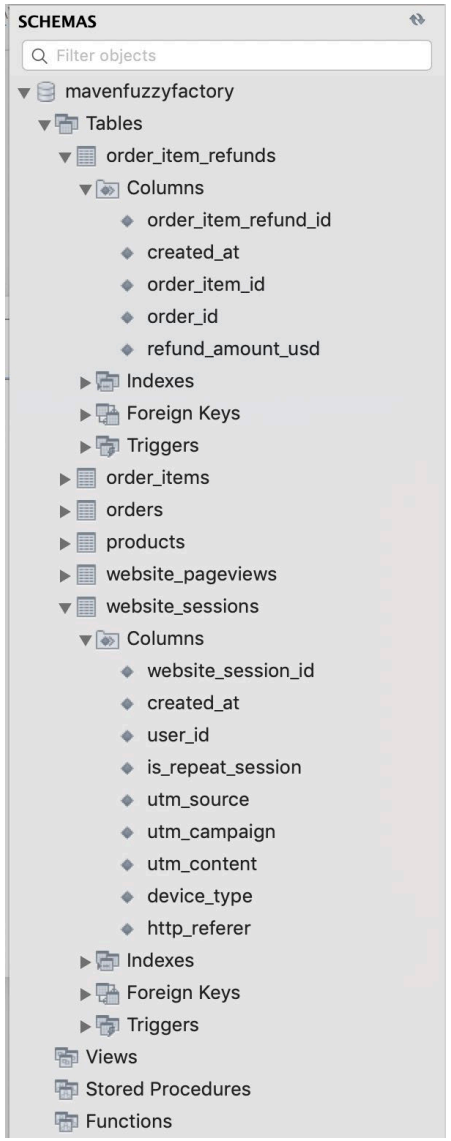
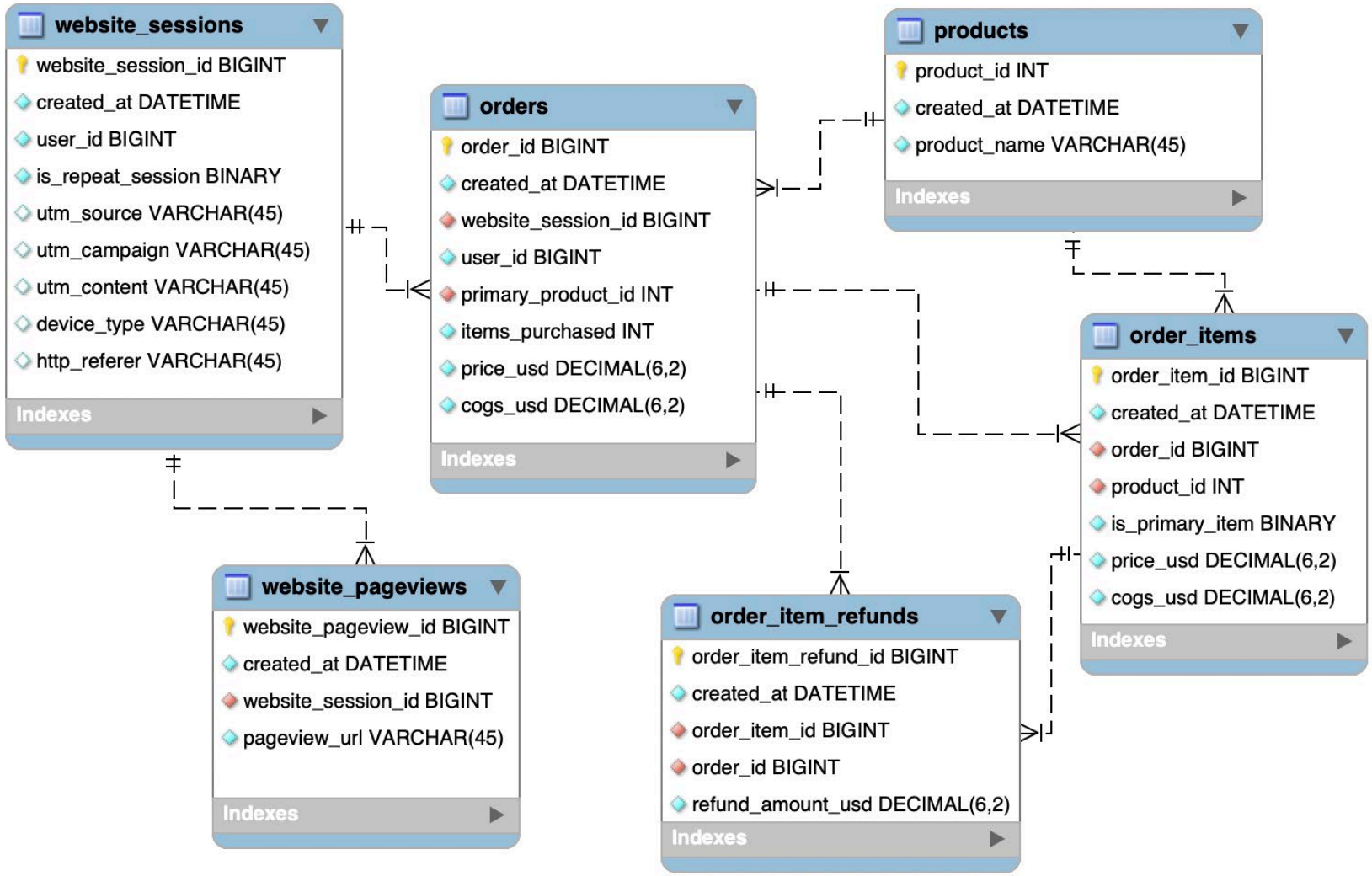
ANOTHER EXAMPLE: **MAVEN FUZZY FACTORY** DATABASE





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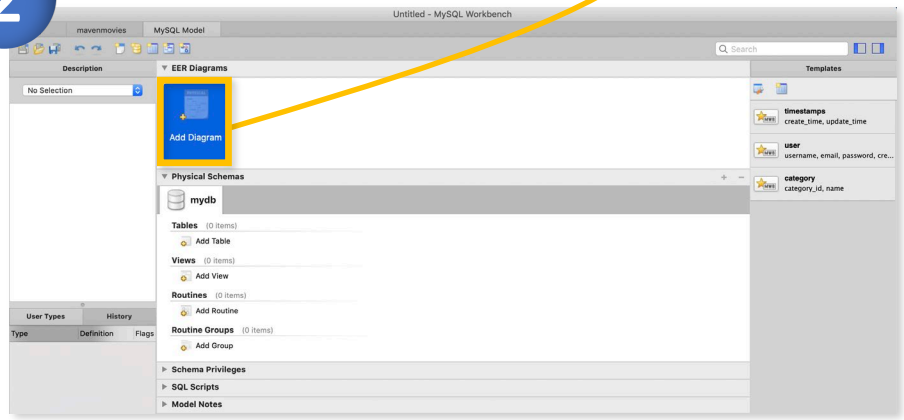
CREATE AN EER DIAGRAM FROM SCRATCH

1

2



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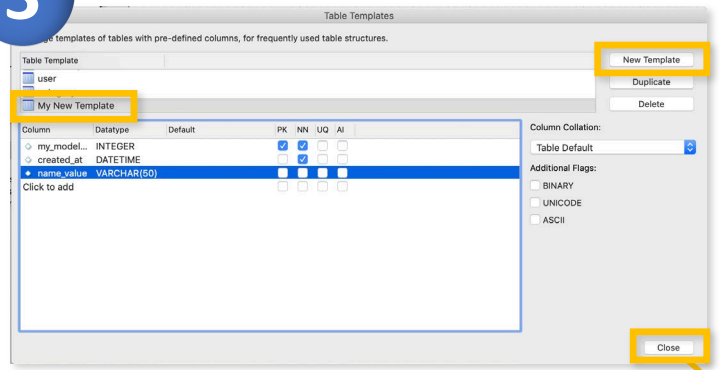
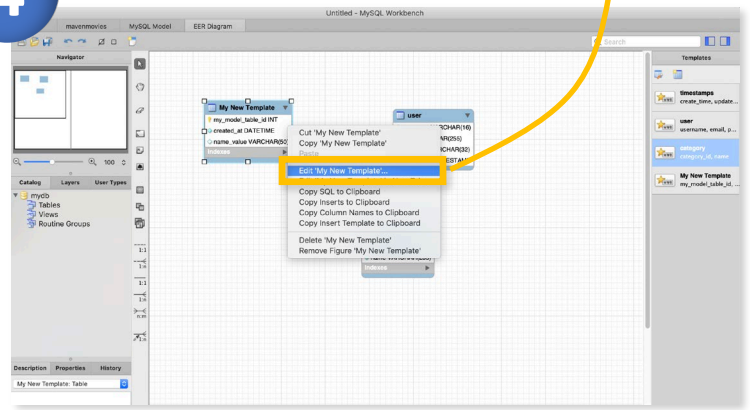
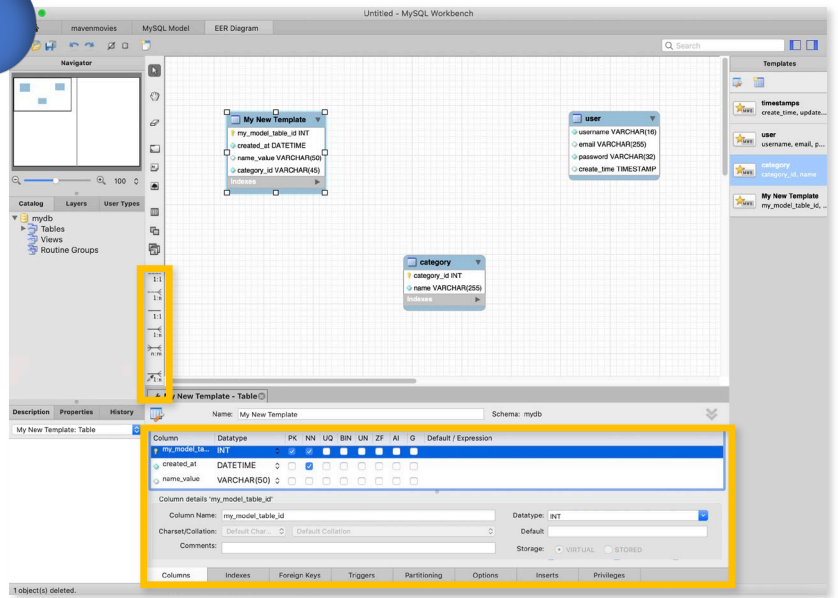


4



5



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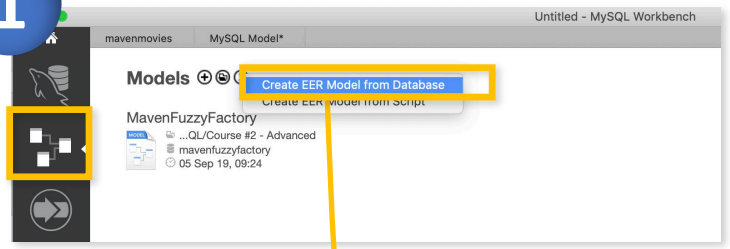
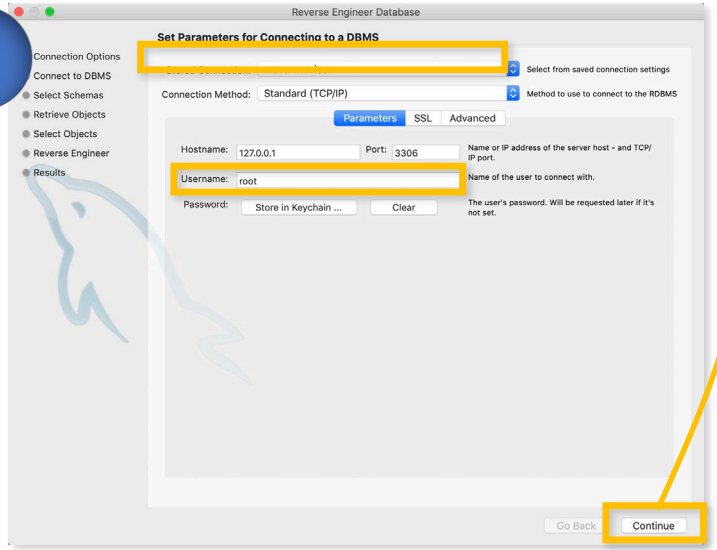
CREATE AN EER DIAGRAM FROM EXISTING SCHEMA

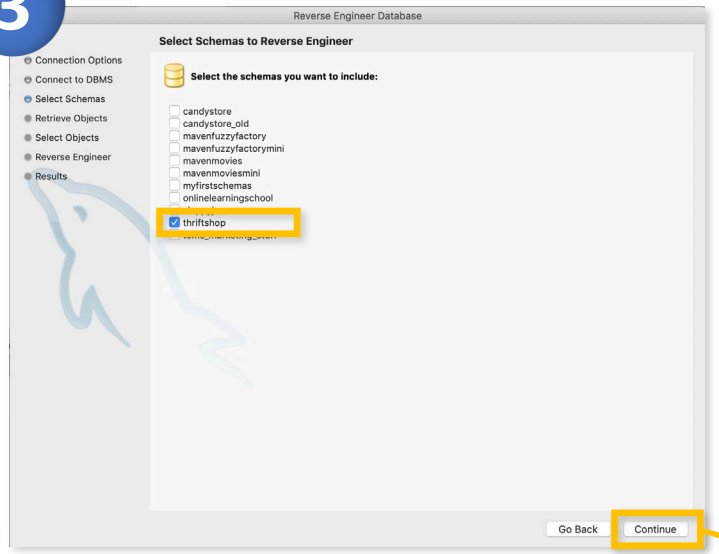
1



2



3



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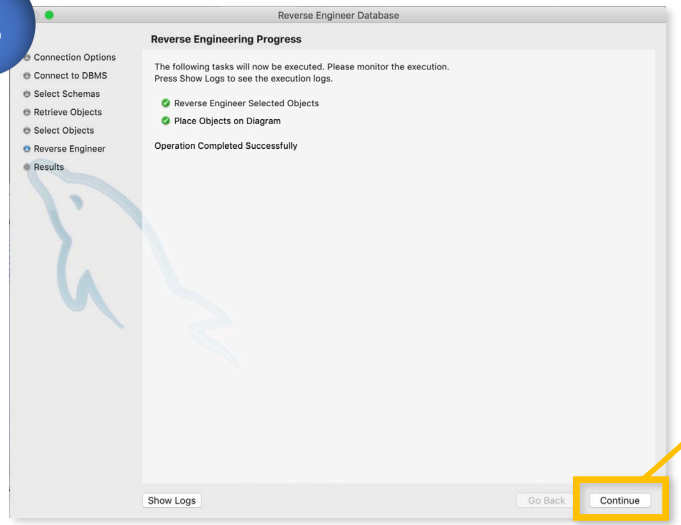

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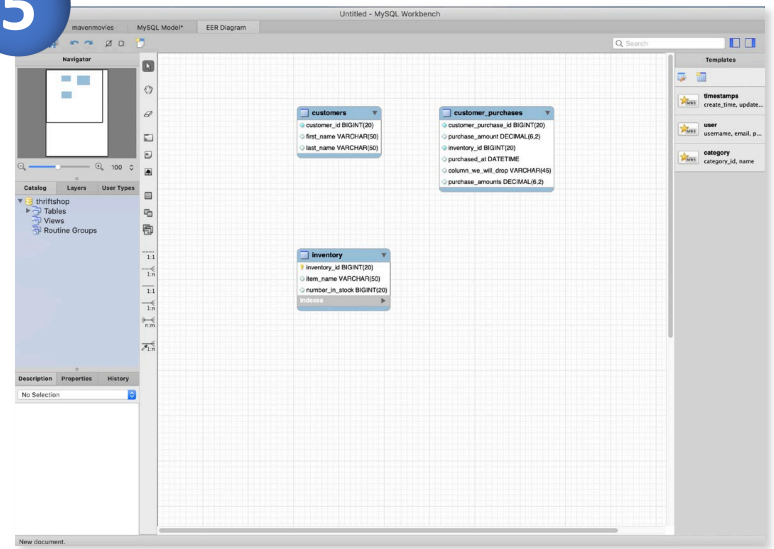

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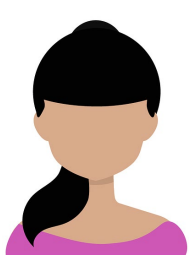

NEW MESSAGE

From: **Emily Trapp** *(Owner, Online School)*

Subject: **Help Creating an EER Diagram**

Hey again!

I would like to have a better visual representation of the database so I can share it with our new employees as we start to scale.

Could you plese **build an EER diagram of the onlinelearningschool schema?** If you could map the relationships that would be awesome.

Thank you!
-Emily

Reply Forward

Helpful Hint

```
-- run these simple queries to see what's in there

USE onlinelearningschool;


SELECT * FROM courses;


SELECT * FROM course_ratings;


SELECT * FROM course_ratings_summaries;
```

TEST YOUR SKILLS: **BUILDING EER DIAGRAMS**

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INTRODUCING THE **MID COURSE PROJECT**

THE SITUATION

A new client, the owner of the Maven Movies DVD rental business, has reached out to you for help restructuring their non-normalized database.

THE OBJECTIVE

Use Your MySQL Database Administration skills to:

Design a better set of tables to store the data in the existing schema. Explain to the owner why the current system is not optimized for scale, and how you propose to improve it. Then, **create a new schema with your ideal specifications and populate it with data.**

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MID COURSE PROJECT QUESTIONS

1. **Take a look at the *mavenmoviesmini* schema. What do you notice about it? How many tables are there? What does the data represent? What do you think the current schema?**

~ 1:10

2. **If you wanted to break out the data from the *inventory_non_normalized* table into multiple tables, how many tables do you think would be ideal? What would you name those tables?**

~ 4:30

3. **Based on your answer from question #2, create a new schema with the tables you think will best serve this data set. You can use SQL code or Workbench's UI tools (whichever you feel more comfortable with).**

~ 8:10

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MID COURSE PROJECT QUESTIONS

4 **Next, use the data from the original schema to populate the tables in your newly optimized schema**
*(**TIP:** Revisit the video on database normalization again if you get stuck)*

~ 17:45

5 **Make sure your new tables have the proper primary keys defined and that applicable foreign keys are added. Add any constraints you think should apply to the data as well *(unique, non-NULL, etc.)***

~ 24:50

6 **Finally, after doing all of this technical work, write a brief summary of what you have done, in a way that your non-technical client can understand. Communicate what you did, and why your new schema design is better.**

~ 26:05

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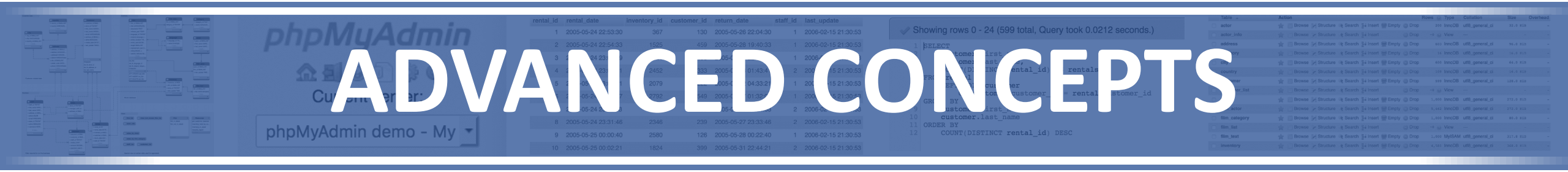

ADVANCED CONCEPTS

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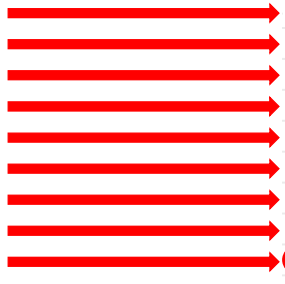
USING INDEXES

From MySQL.com:

The best way to improve the performance of SELECT operations is to create indexes on one or more of the columns that are tested in the query. The index entries act like pointers to the table rows, allowing the query to quickly determine which rows match a condition in the WHERE clause, and retrieve the other column values for those rows. All MySQL data types can be indexed.

Searching Without an Index



inventory_id	item_name	number_in_stock
1	fur coat	0
2	mocassins	4
3	velour jumpsuit	12
4	house slippers	6
5	brown leather jacket	3
6	broken keyboard	6
7	ski blanket	1
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

Using an Index

inventory_id	item_name	number_in_stock
1	fur coat	0
2	mocassins	4
3	velour jumpsuit	12
4	house slippers	6
5	brown leather jacket	3
6	broken keyboard	6
7	ski blanket	1
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

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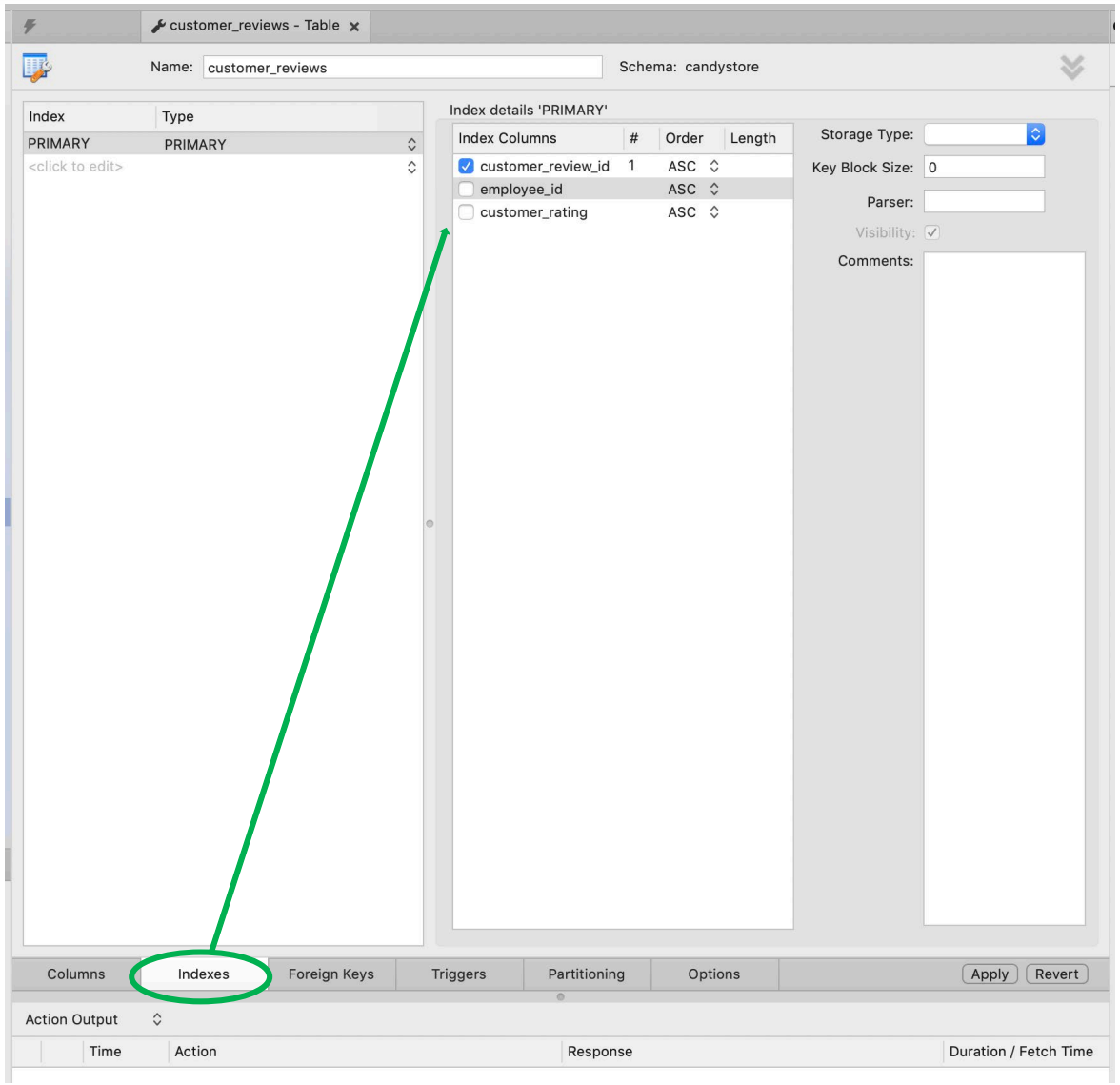
CREATING AN INDEX

- Workbench makes it easy to manage indexes via the UI tools
- We can add, and delete indexes through the UI, or we can do it with SQL code
- Note that in MySQL, the Primary Key and any Foreign Key you create on a table is always an index automatically

MySQL Workbench in Action



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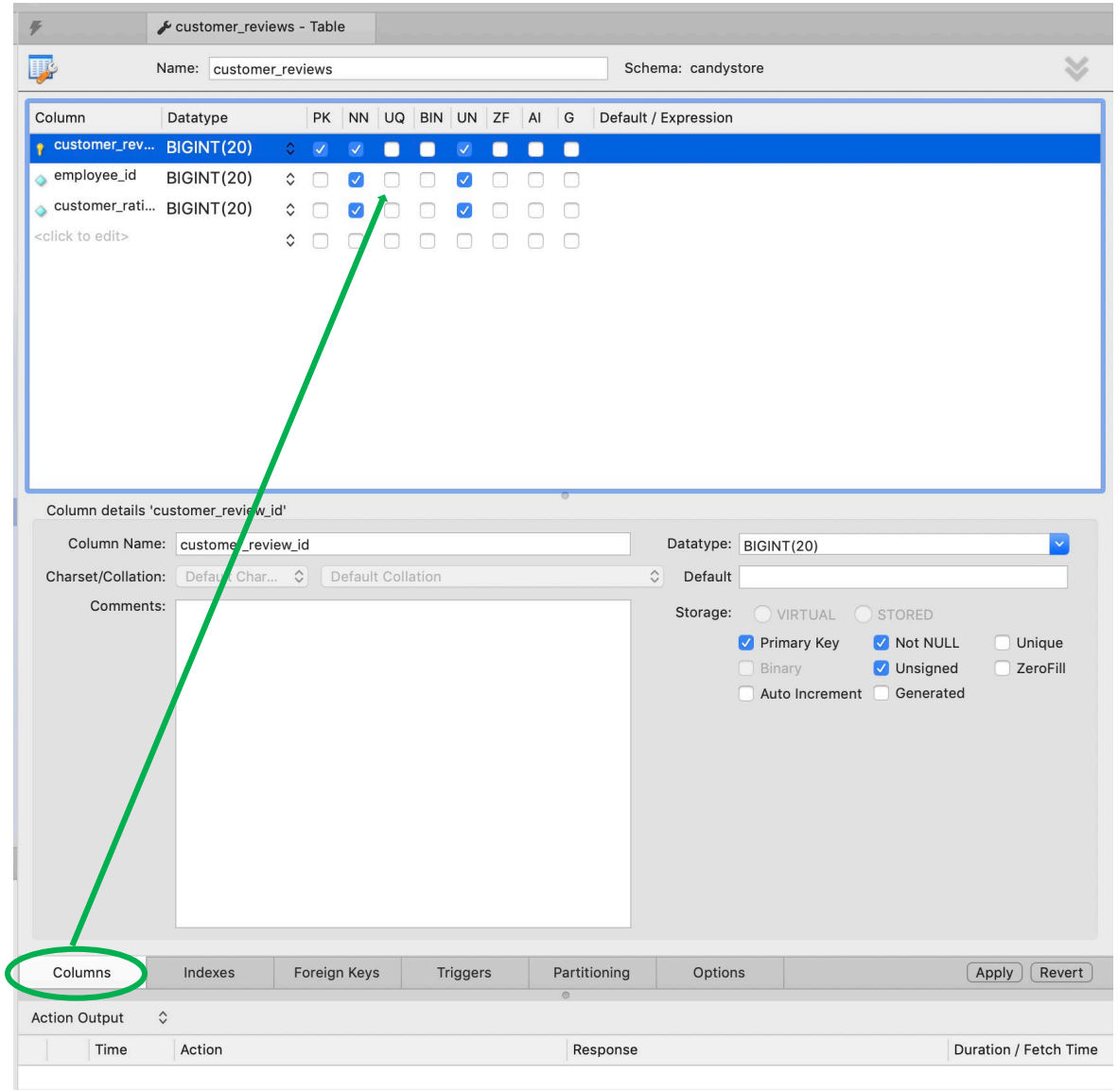
UNIQUE CONSTRAINT

- We can prescribe which columns in our tables we allow to have repeating values, and which columns must be unique
- Adding a unique constraint is easy via Workbench's UI or using SQL code
- Including a unique constraint on columns that should not repeat is a good way to ensure data integrity, and is a good best practice

MySQL Workbench in Action



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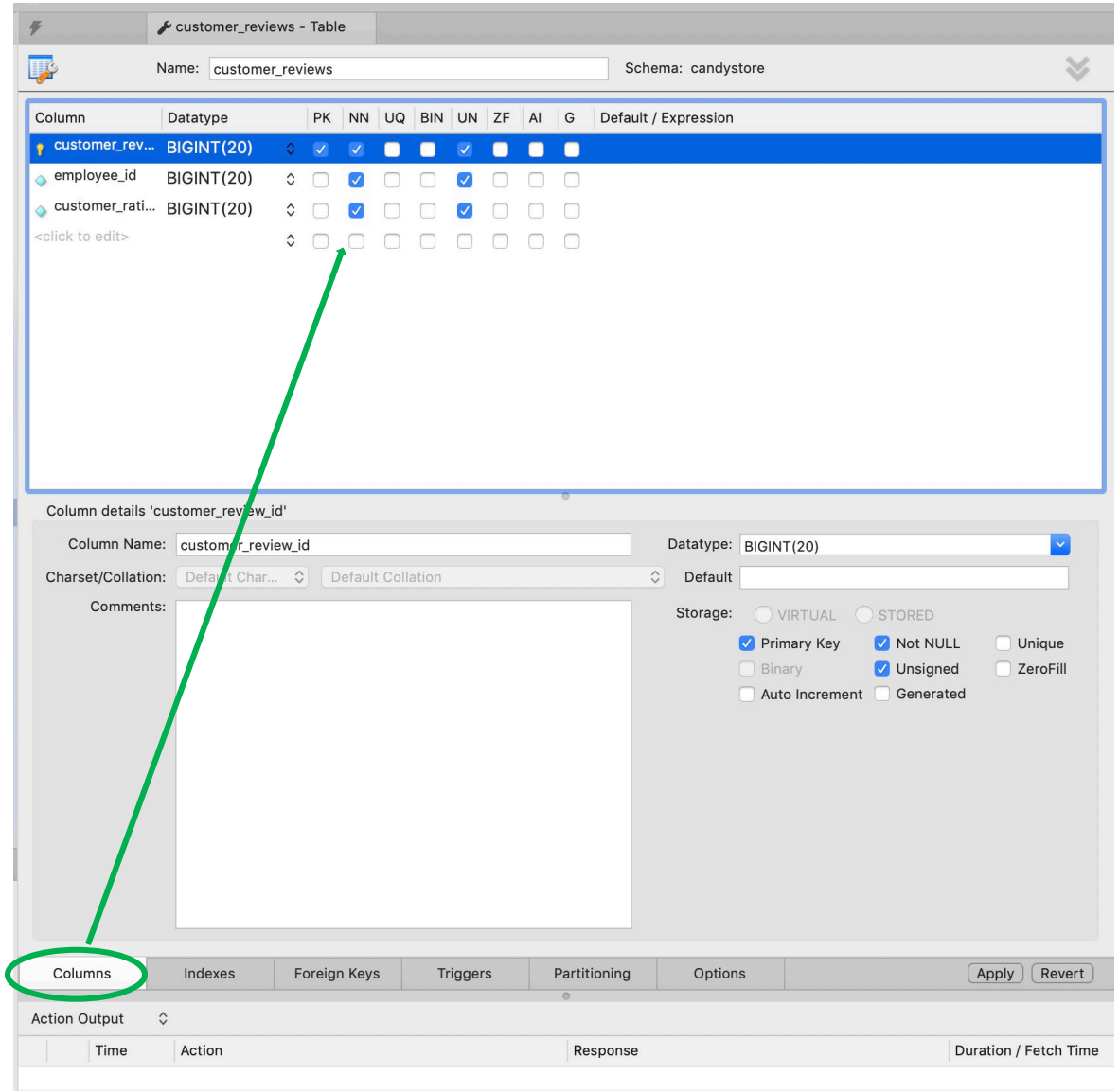
NON-NULL CONSTRAINT

- We may want certain columns to be populated with a value for every single record that ever gets written
- We can prescribe this by applying a NON-NULL constraint to a certain column, which requires all records to have a value in that column
- If the NON-NULL constraint is on a column, and someone tries to INSERT a record without including a value for the column, the INSERT will fail

MySQL Workbench in Action



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NEW MESSAGE

From: **Joe Tidyman** *(Owner, Sloppy Joe's)*

Subject: **Help Optimizing Database for Scale**

Hi there…

We are about to scale up our operations and open up a very large number of restaurants in a short amount of time.

Could you help me set up our database so it can scale with data integrity? I think we'll need to set up keys, indexes, and constraints to make sure the data quality is protected as we ramp up and the data sets get huge.

Can you help!?!?
-Joe

Reply Forward

Helpful Hint

```
-- run these queries to see what's in there

USE sloppyjoes;

SELECT * FROM customer_orders ;

SELECT * FROM menu_items;

SELECT * FROM staff;
```

TEST YOUR SKILLS: **INDEXES, KEYS, CONSTRAINTS**

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STORED PROCEDURES

- MySQL gives us the ability to store and call frequently used queries on the server. These are then referred to as ‘Procedures’, or commonly ‘Stored Procedures’
- Benefits include more efficient query writing and query performance, and ability to share complex procedures more easily between Analysts and other database users

MySQL Workbench in Action

```
USE thriftshop;

-- changing the delimiter
DELIMITER //
-- creating the procedure
CREATE PROCEDURE sp_selectAllInventory()
BEGIN
    SELECT * FROM inventory;
END //
-- changing the delimiter back to the default
DELIMITER ;

-- calling the procedure that we have created
CALL sp_selectAllInventory();

-- if we later want to  DROP the procedure, we can use the this...
-- DROP PROCEDURE IF EXISTS sp_selectAllInventory();
```

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NEW MESSAGE

From: **Joe Tidyman** *(Owner, Sloppy Joe's)*

Subject: **Help Creating a Stored Procedure**

Hi there…

As we scale up, I would like a very quick way to query how many orders each of our staff members has served, all-time.

I am not a database pro, so I need this to be as simple as possible. Something like the following would be ideal…

CALL sp_staffOrdersServed;

Can you help?
-Joe

Reply Forward

Helpful Hint

```
-- HINT: this is the query you want to imbed in a stored procedure
SELECT
    staff_id,
    COUNT(order_id) AS orders_served
FROM customer_orders
GROUP BY staff_id
```

TEST YOUR SKILLS: **STORED PROCEDURES**

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TRIGGERS

- MySQL allows us to create Triggers, where we can prescribe certain actions on a table to trigger one or more other actions to occur
- We may prescribe that our triggered action occurs either BEFORE or AFTER an INSERT, UPDATE, or a DELETE
- Triggers are a very common way to make sure related tables remain in sync as they are updated over time

MySQL Workbench in Action

```
CREATE TRIGGER purchaseUpdateInventory
AFTER INSERT ON customer_purchases
FOR EACH ROW
    UPDATE inventory
        -- subtracting an item for each purchase
        SET number_in_stock = number_in_stock - 1
    WHERE inventory_id = NEW.inventory_id;

INSERT INTO customer_purchases VALUES
(13,NULL,3,NULL), -- inventory_id = 3, velour jumpsuit
(14,NULL,4,NULL) -- inventory_id = 4, house slippers
;

SELECT * FROM inventory;
```

*Result Preview (SELECT * FROM inventory)*

Result Grid — Filter Rows: Search

inventory_id	item_name	number_in_stock
1	fur coat	0
2	mocassins	4
3	velour jumpsuit	12
4	house slippers	6
5	brown leather jacket	3
6	broken keyboard	6
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

Result Grid — Filter Rows: Search

inventory_id	item_name	number_in_stock
1	fur coat	0
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3	velour jumpsuit	11
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5	brown leather jacket	3
6	broken keyboard	6
8	kneeboard	2
9	pro wings sneakers	0
10	wolf skin hat	1
11	fur fox skin	1
12	plaid button up shirt	8
13	flannel zebra jammies	6

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NEW MESSAGE

From: **Joe Tidyman** *(Owner, Sloppy Joe's)*

Subject: **Help Creating Triggers**

Hi there…

Is there any way we could automatically update the number of orders served in the staff table anytime we serve another order and a record is written to the customer_orders table?

Is this even possible?
-Joe

Reply Forward

Helpful Hint

```
-- use this to see the # of orders_served before updates
SELECT * FROM staff;

-- then, create your trigger

-- then, insert these 4 records into custoner_orders
INSERT INTO customer_orders VALUES
(21, 1, 10.98),
(22, 2, 5.99),
(23, 2, 7.99),
(24, 2, 12.97);

-- finally, query the staff table again
-- if you did this right, orders_served has increased
SELECT * FROM staff
```

TEST YOUR SKILLS: **TRIGGERS**

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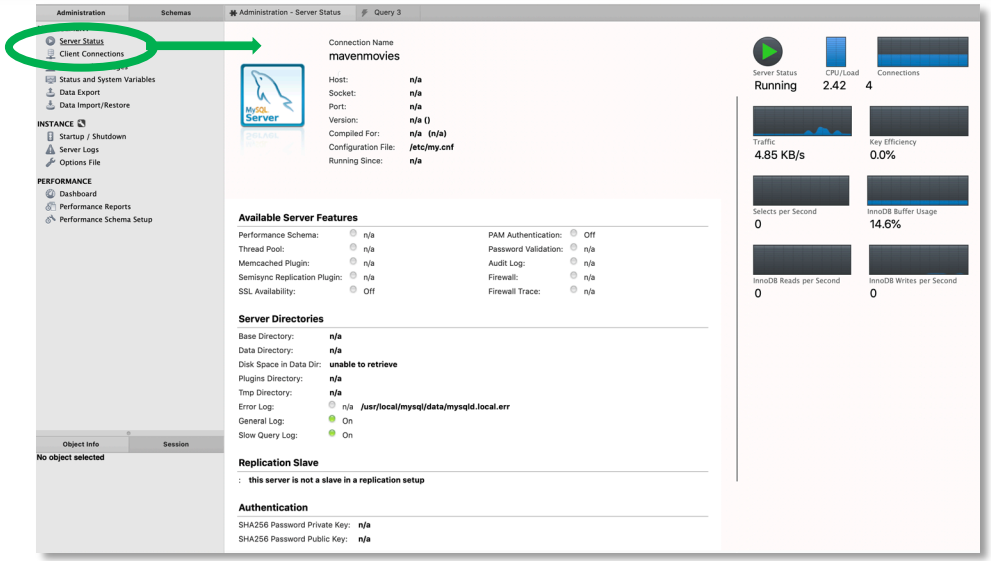
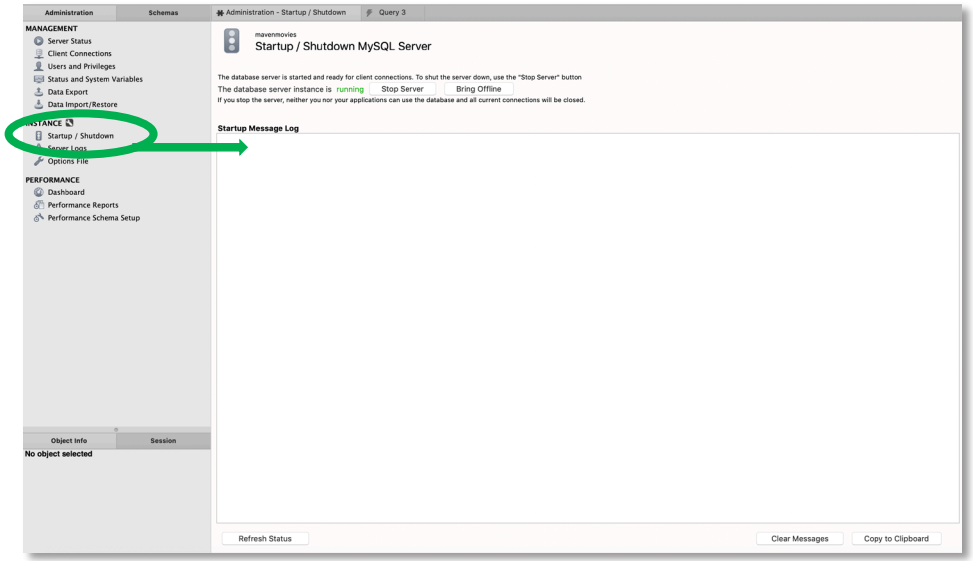
SERVER MANAGEMENT

- The Administration tab gives us options to monitor and control the status of the MySQL Server we are connected to
- The Server Status view gives us a quick view of our Server
- The Startup / Shutdown tool allows us to Start or Stop our database instance

MySQL Workbench in Action





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NEW MESSAGE

From: **Joe Tidyman** *(Owner, Sloppy Joe's)*

Subject: **Is Our Server Stuck?**

Hi again…

It seems like our database might be stuck, or out of sync?

I talked with another business owner who said the server can sometimes get stuck and need to be restarted by a Database Administrator. Can you check the status of the server and re-start it for us?

-Joe

Reply Forward

Helpful Hint

```
/*
for the purpose  of this exercise,  pretend the server
on your machine is the server in question
*/

-- check the status of your server

-- IF it's stopped, start it
-- IF it's already running, stop it, then start it

/*
NOTE: depending on the settings of your machine,
you may need to enter both your root user password,
AND possibly also your system password
    (the one you use to log in to your machine)
*/
```

TEST YOUR SKILLS: **SERVER MANAGEMENT**

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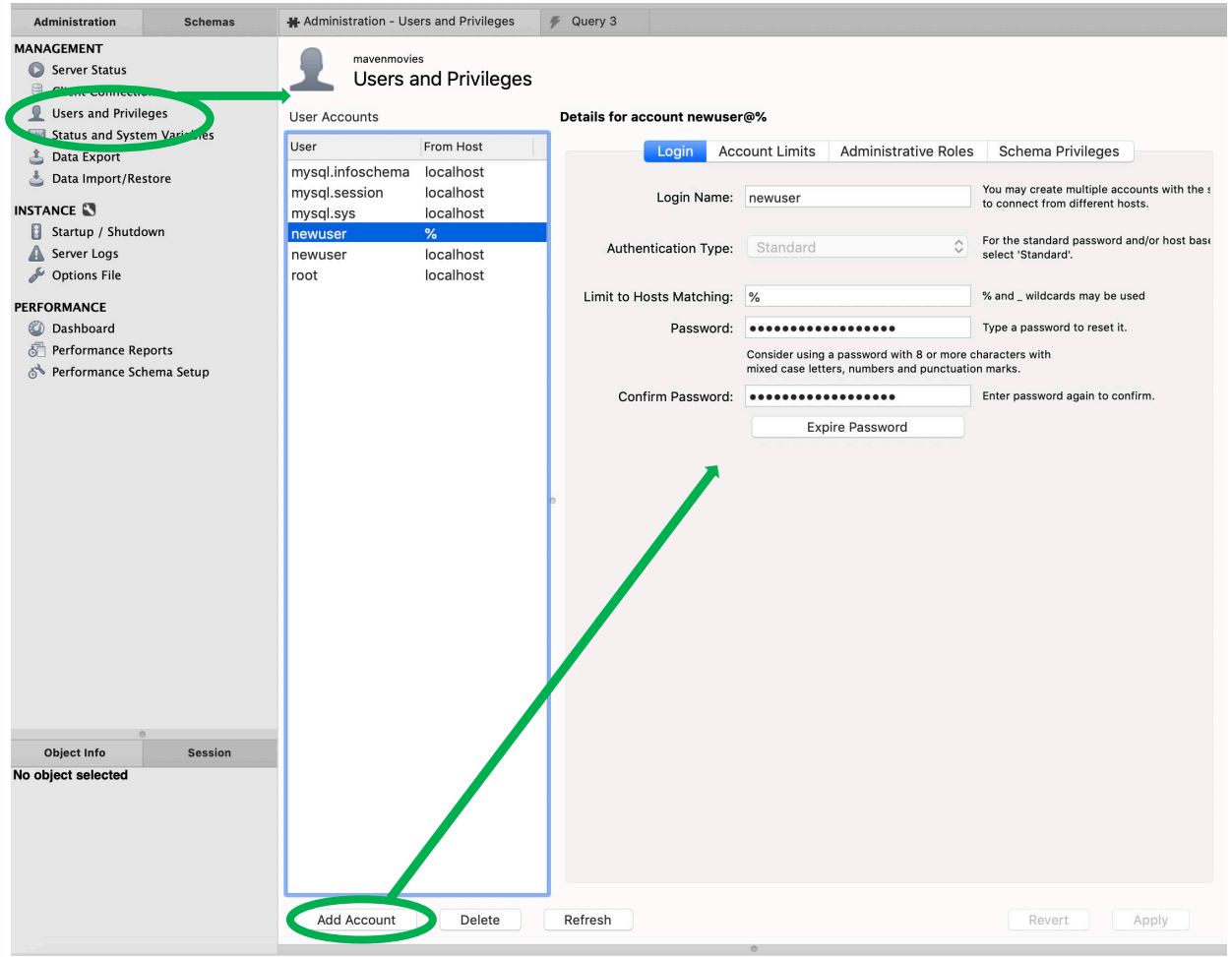
USER MANAGEMENT

- Workbench makes it easy for us to add Users and to manage their Privileges
- Users can be granted varying levels of permissions. At one end of the spectrum, you could create a User that can only SELECT, and at the other end of the spectrum is the DBA role, which carries all privileges

MySQL Workbench in Action



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NEW MESSAGE

From: **Joe Tidyman** *(Owner, Sloppy Joe's)*

Subject: **Help Creating 2 New Users**

Hi there…

Hoping you could help us out with one more thing. I would like to create two new Users who can access our database…

User: DataGuru, DBA-level privileges, Password: ChangeMe!

User: Analyst, SELECT only privileges, Password: ChangeMe!

Thank you!!

-Joe

Reply Forward

Helpful Hint

```
-- REMEMBER: restrict access and permissions to just what is needed
```

TEST YOUR SKILLS: **USER MANAGEMENT**

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INTRODUCING THE **FINAL COURSE PROJECT**

THE SITUATION

A new client, Bubs Glover, the owner of Bubs' Bigtime Baby Booties, has reached out to you for help building his business a database from the ground up.

THE OBJECTIVE

Use Your MySQL Database Administration skills to:

Design a database from scratch, which will capture information about Bubs' customers, the purchases they make, his products, and his employees.

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FINAL COURSE PROJECT QUESTIONS

1

~ 0:37

Bubs wants you to track information on his customers (first name, last name, email), his employees (first name, last name, start date, position held), his products, and the purchases customers make (which customer, when it was purchased, for how much money). Think about how many tables you should create. Which data goes in which tables? How should the tables relate to one another?

2

~ 4:50

Given the database design you came up with, use Workbench to create an EER diagram of the database. Include things like primary keys and foreign keys, and anything else you think you should have in the tables. Make sure to use reasonable data types for each column.

3

~ 15:50

Create a schema called bubsbooties. Within that schema, create the tables that you have diagramed out. Make sure they relate to each other, and that they have the same reasonable data types you selected previously.

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FINAL COURSE PROJECT QUESTIONS

4 **Add any constraints you think your tables' columns should have. Think through which columns need to be unique, which ones are allowed to have NULL values, etc.**

~ 24:05

5 **Insert at least 3 records of data into each table. The exact values do not matter, so feel free to make them up. Just make sure that the data you insert makes sense, and that the tables tie together.**

~ 28:40

6 **Create two users and give them access to the database. The first user, TuckerReilly, will be the DBA, and should get full database administrator privileges. The second user, EllaBrody, is an Analyst, and only needs read access.**

~ 40:10

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