CS4400 Introduction to Database Systems
"Autograder" / Testing Script for Phase 3 Project (v10/Friday, November 29, 2019)

This update includes significant changes to the functionality of the script – see steps (4) through (9).

Introduction
This SQL script has been provided to you to assist in the development of your eventual Phase 3 submission, and Phase 4 submission if desired. Though we've referred to this script as an "autograder", it's much more helpful to think of it simply as an aid for your development and testing. It is NOT the comprehensive suite of tests that we will use for the final evaluation of your project on Demo Day – we will almost certainly add additional tests. Also, this script displays the differences between your results and the expected results, but it doesn't display a final score. The exact scoring rubric will be determined later in accordance with the final testing script, but this is the basic intent for the general distribution of points/scores:

- [0 – 60] out of 100 points: Your system provides the correct answers for queries based on the initial dataset; no filtering required.
- [50 – 70] out of 100 points: Your system provides the correct answers for the queries based on the initial dataset with various combinations of filtered values.
- [60 – 90] out of 100 points: Your system provides the correct answers for the filtered and unfiltered queries, and also implements the required modification queries while maintaining data integrity.
- [80 – 100] out of 100 points: Your system supports filtered queries and modification queries correctly, and also implements the logical constraints indicated in the project requirements.

General Overview of the Testing Script
You can use this script by loading it into a tab/window in MySQL Workbench, and then executing the script just like we executed queries and exercises during the term. The script calls your stored procedures and loads the resulting data into a newly created table called **`magic44_test_results`**. It then compares the test results with the expected results stored in the **`magic44_answers`** table. Once the script has finished, you can use the **`magic44_count_differences`** and **`magic44_content_differences`** views to examine the differences between your results and the expected results for a correct system.

The **`magic44_count_differences`** view identifies test results that differ in terms of the number of rows being output, while the **`magic44_content_differences`** view (similar to the **`magic44_scoring`** table from earlier versions) identifies differences between the attribute values in the rows themselves.

- Empty **`magic44_count_differences`** and **`magic44_content_differences`** view results are ideal – it means that your system is producing the exact same answers that are expected by an otherwise correct system, with the exception of sorting (the current script doesn't evaluate sorting correctness).

- On the other hand, if the program does display differences, then the most important thing is not to panic. This is an excellent opportunity to examine the differences, and then analyze your system to determine which aspects need to be changed to correct the issues. These troubleshooting skills can be very valuable during the demo session as well, and for your future problem-solving challenges in general.

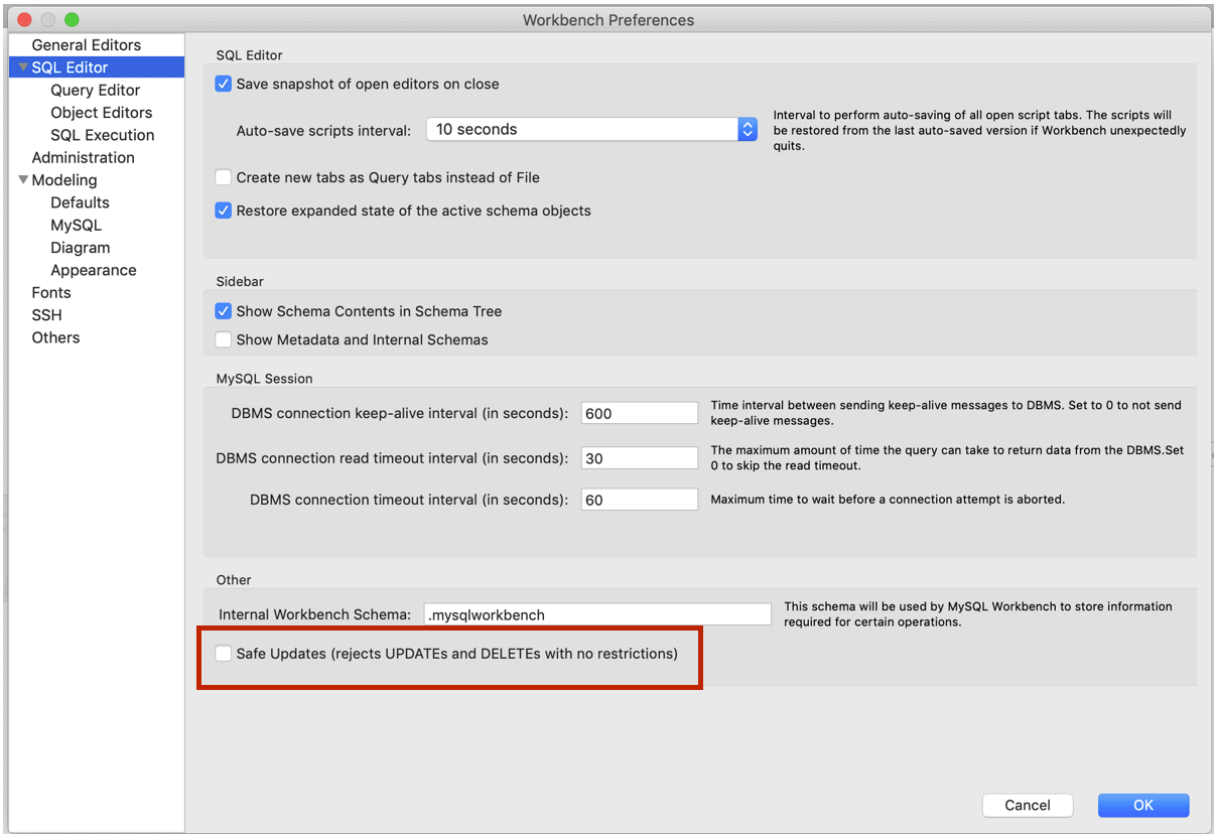
Remember that this script doesn't include all of the tests that will be used during the demo session, so you should test those other aspects of the system on your own as thoroughly as possible.

Recommendations for Using the Script (and Development & Testing in General):

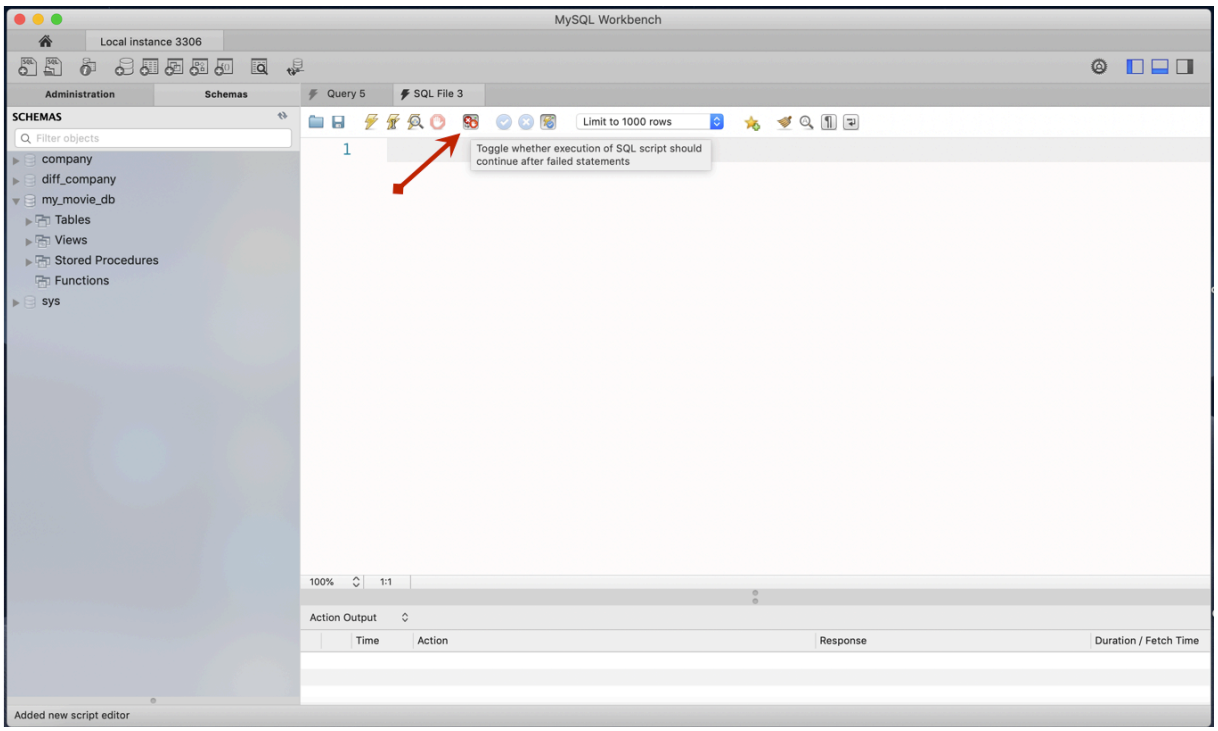
- Consider developing a **`reset_initial_data()`** stored procedure that deletes the current data from your tables and then reloads the initial dataset. This is very helpful when developing your modification queries, and saves time as opposed to having to reload a copy of your "initial state database" from a file.
- If you are allowing the testing script to execute fully and produce multiple errors, then consider focusing on the "earlier" testing errors first. Achieving success on earlier tests (e.g., showing that the basic table structures are solid and that the initial data is loaded correctly) is essential to demonstrating that the more advanced functionality (e.g., modification queries and handling of logical constraints) is also correct.
- You are allowed to create other database structures to support your stored procedures. One example includes creating views. Some of the queries that you'll create may seem relatively large and very complicated, involving the nesting of two or more levels of queries. One way to ease the complexity is to develop the "nested query portions" of the larger queries as separate views. If a query is saved as a view, then you can reference that view inside a larger query (i.e., "virtual table") as if it were a real table. Good examples include using the view as "source data" as part of the FROM clause, or to generate a list of values as part of an IN or a NOT IN clause.
- The Action Output section below the Result Grid might contain useful information for troubleshooting. If you encounter one or more errors during the testing of your script, then there's a good chance that one or more of your stored procedures simply didn't execute correctly to completion. You should work to ensure that your stored procedures execute correctly and consistently before being concerned with the numbers of rows and row content.

How to Use the Testing Script

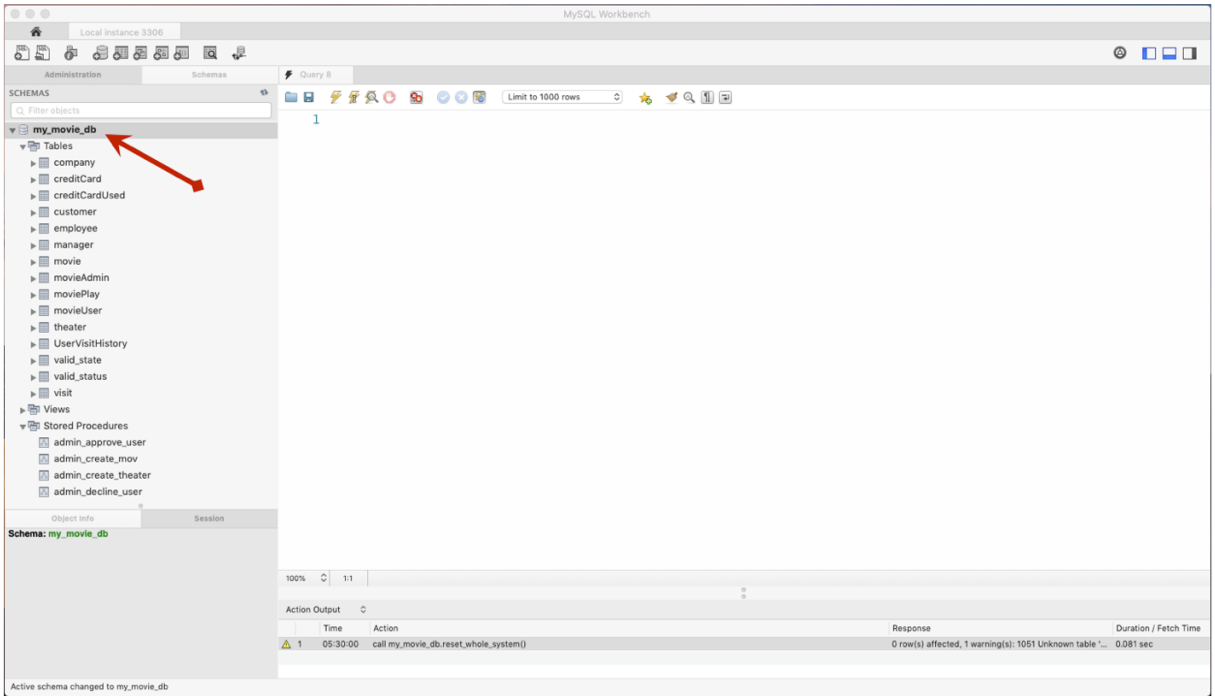
(1) Deactivate the "Safe Update" feature in the SQL Editors in MySQL Workbench. This will prevent the MySQL Workbench system from "interfering" with your (possibly unrestricted) modification queries.



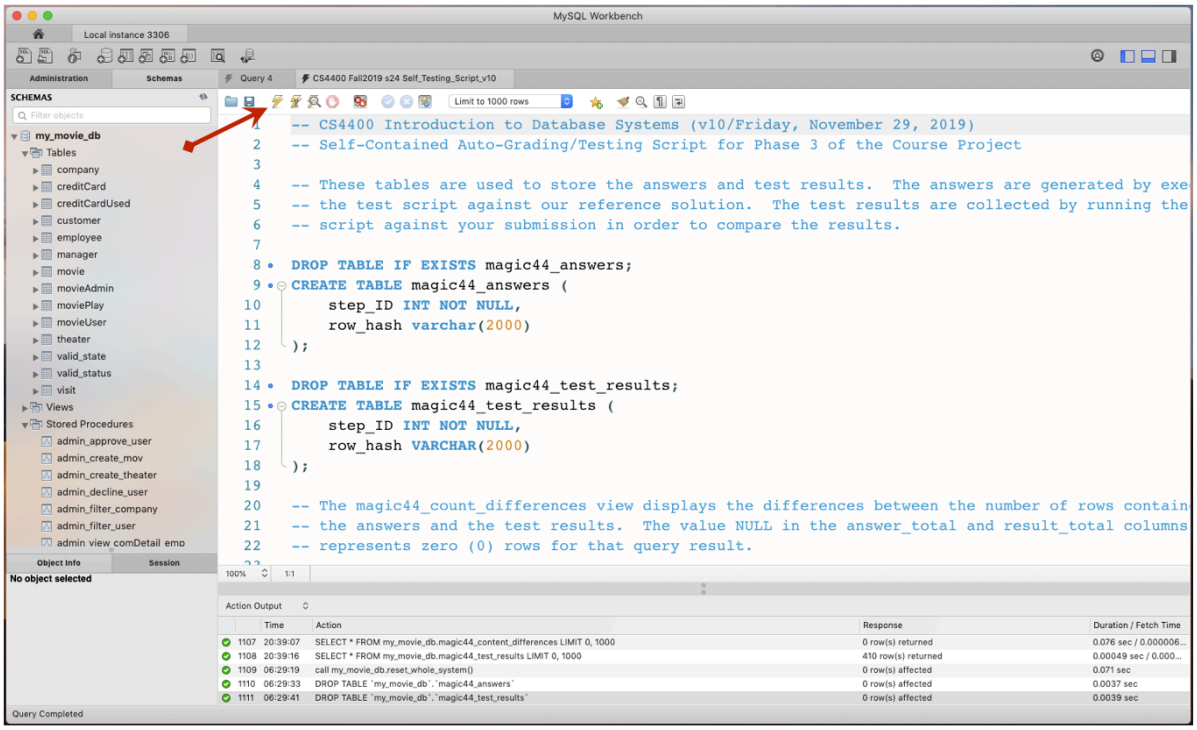
(2) Take a look at the “Continue Script Execution on Error” switch in MySQL Workbench. In early runs, you might prefer to have the script stop immediately when the first error is encountered. In later runs, though, you might prefer to continue running and examine all of the errors once the script has finished.



(3) Make sure that your database: (a) is loaded and highlighted; and, (b) contains the initial dataset. If your database does not contain the initial dataset, then it will likely fail most – if not all – of the test cases. Also, "***my_movie_db***" is just the name for the database in this instructional example. Make sure that your database uses the correct team naming conventions for your database per the Phase 3 Instructions. The name of the database should not impact the execution of this script, but it might impact some of our other testing systems.

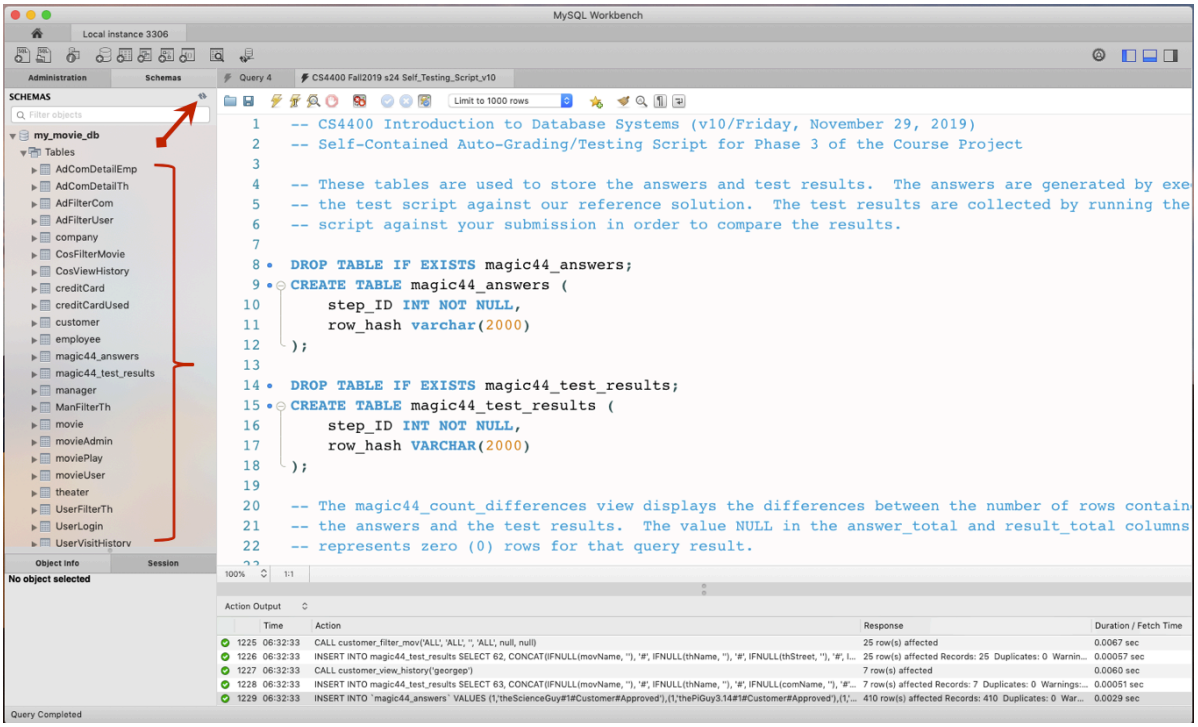


(4) You can either: (a) select "RUN SQL Script" to execute the tests directly from the file; or, (b) you can select "Open SQL Script" to load the file contents into a new tab/window (as shown below) and execute the tests.

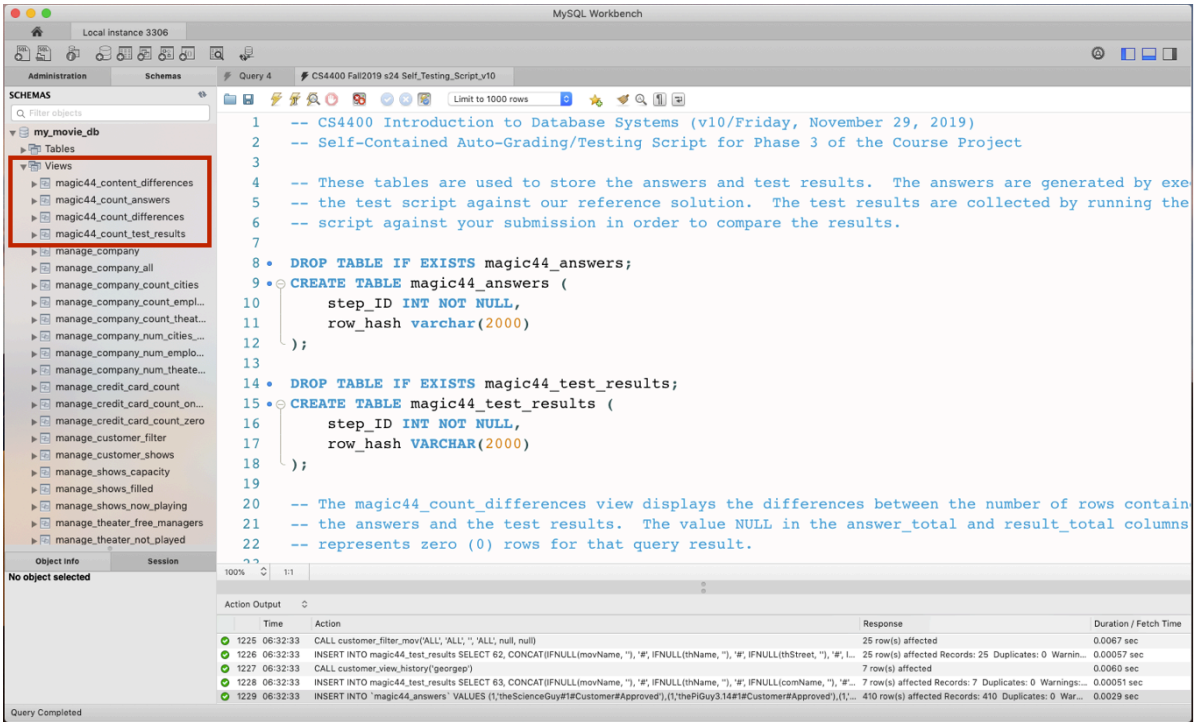


If your program encounters errors, then the testing script might not have been fully completed (depending on your "Continue Script Execution" settings). Check the Action Output section [located near the bottom of the MySQL Workbench window] for the error(s), make corrections as needed, and try again.

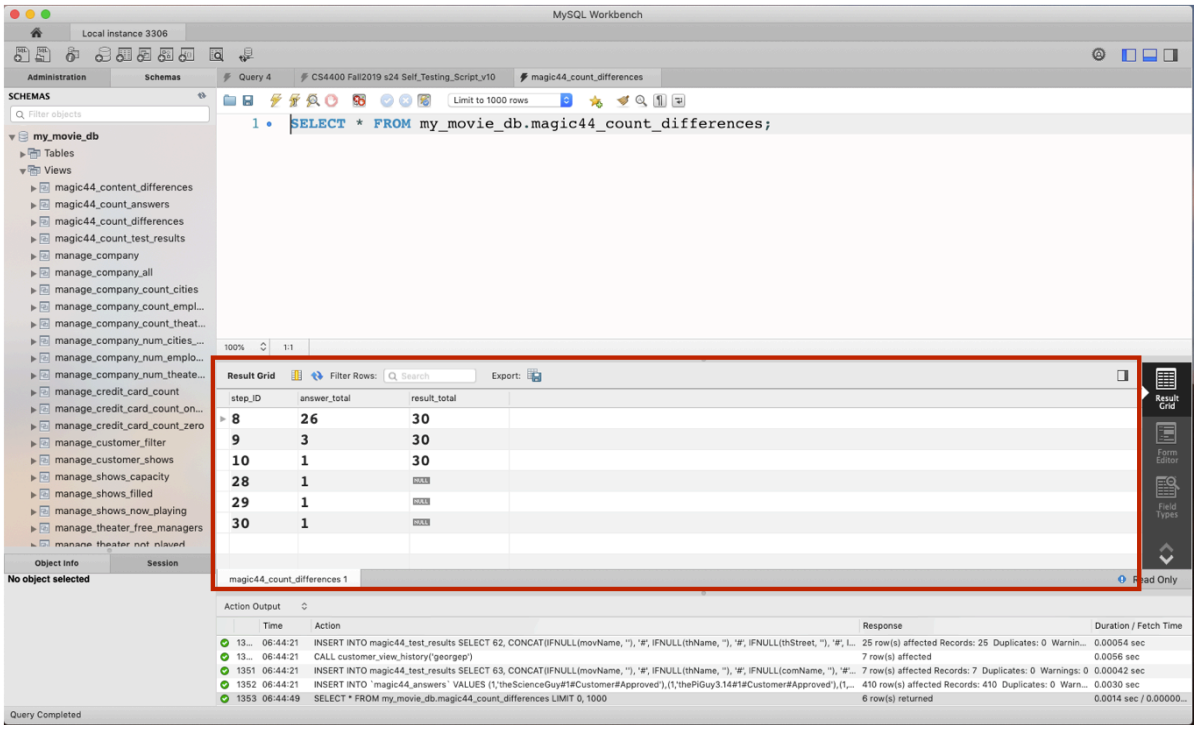
(5) Be sure to refresh your view of the tables after the script has stopped. Note that there should be some extra tables present, including the **`magic44_answers`** and **`magic44_test_results`** tables that contain the current and expected testing results.



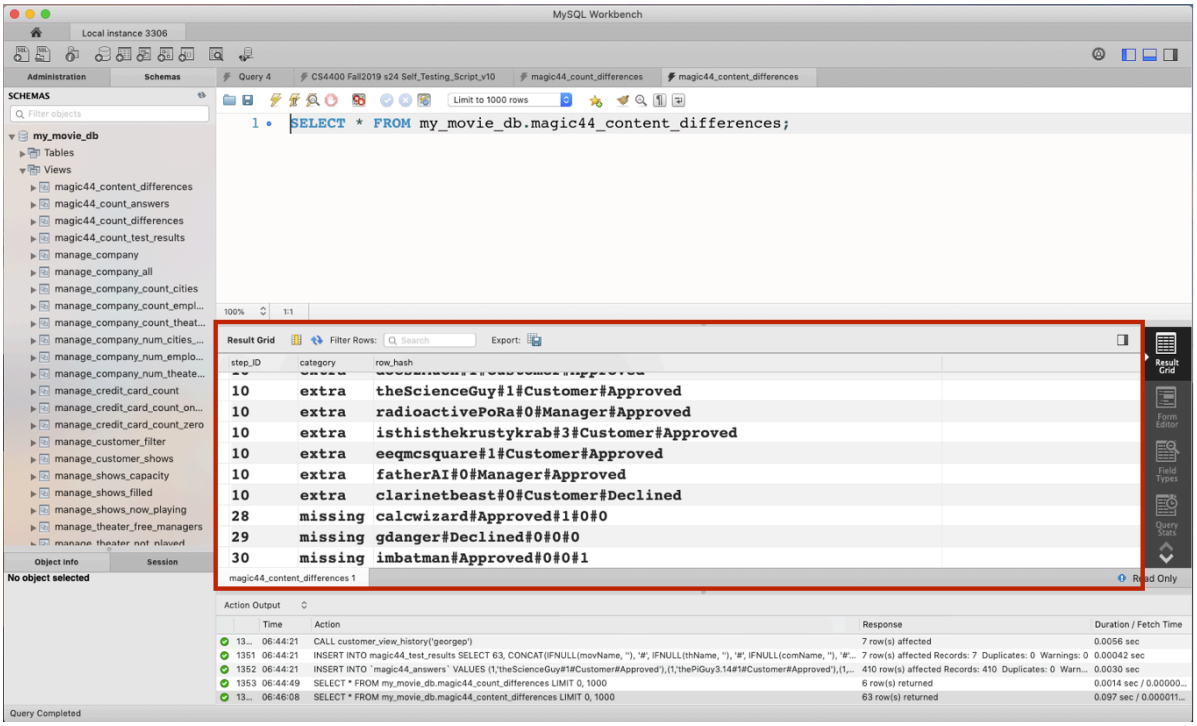
(6) The tables contain the raw data, and the script also generates four views: two primary views and two supporting views. The **`magic44_count_differences`** and **`magic44_content_differences`** views provide information about how your data compares to the test results. An empty table means that no significant differences (perhaps besides sort order) were detected.



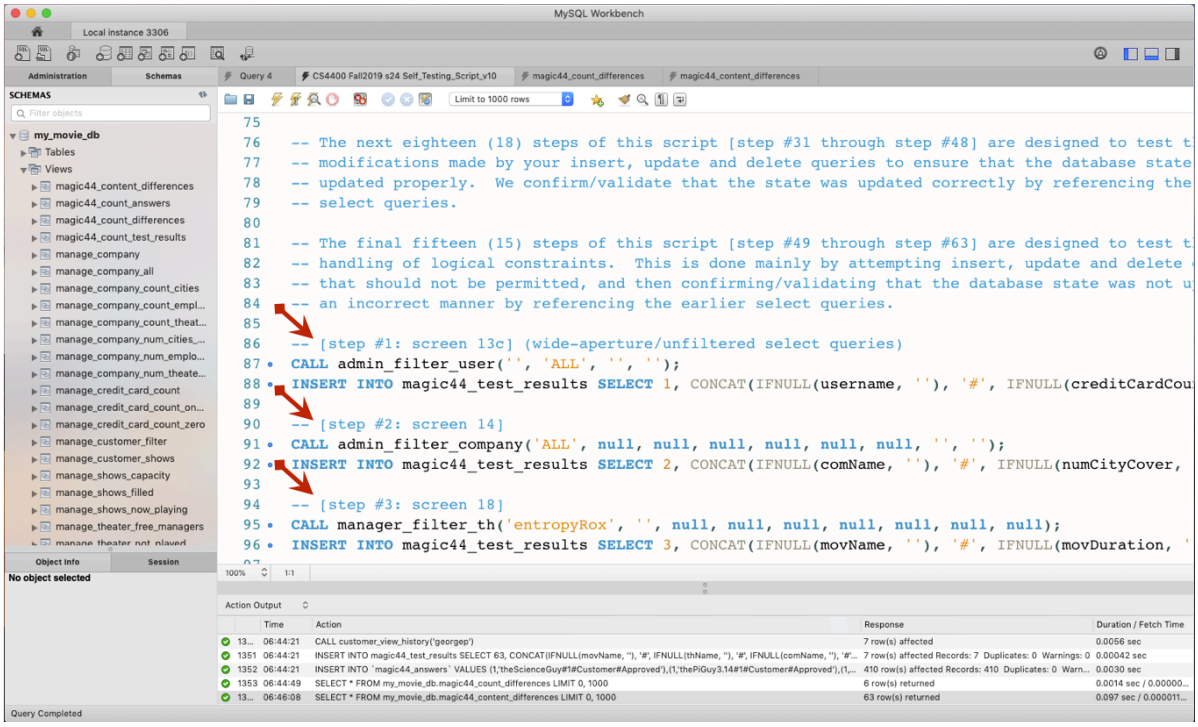
(7) The **`magic44_count_differences`** view provides information about the number of rows in your test results compared to the number of expected number of rows. A **`NULL`** value in the answer_total or result_total columns means "zero rows" – effectively that the empty table was produced as the answer. An empty table is not necessarily incorrect, but if all of your queries are producing empty tables, then there might be a deeper problem with your query.



(8) The **`magic44_content_differences`** view provides information about the attribute values in each row of the results tables compared to the number of expected number of rows. The attribute values of the row are "hashed" into a single string separated by the pound sign delimiter ('#'). Any **`NULL`**s in the attribute values are replaced by blank strings or zeros in the row hash depending on the resulting data type.



(9) Finally, you can scroll down the testing script to see the actual calls that are being made to your stored procedures.



Good luck as you finish the development and testing of your system.