

Lab Manual

CS130L – Database Systems Lab

Lab No: 03

Topic: MySQL Workbench Environment

Class: BSAI

Semester: II-A

Session: Spring, 2024

Lab Instructor: Asra Masood

Lab Date: 29th Feb, 2024

Lab Time: 8:00 - 11:00



Air University Islamabad

FACULTY OF COMPUTING & ARTIFICIAL INTELLIGENCE

Department of Creative Technologies

Instructions

Submission: Use proper naming convention for your submission file. Name the submission file as Lab_NO_DEGREE_ROLLNUM (e.g. Lab_01_BSAI_00000). Submit the file on Google Classroom within the deadline. Failure to submit according to the above format would result in deduction of 10% marks. Submissions on the email will not be accepted.

Plagiarism: Plagiarism cases will be dealt with strictly. If found plagiarized, both the involved parties will be awarded zero marks in the assignment, all of the remaining assignments, or even an F grade in the course. Copying from the internet is the easiest way to get caught!

Deadline: The deadlines to submit the assignment are hard. Late submission with marks deduction will be accepted according to the course policy shared by the instructor. Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

Comments: Comment your code properly. Write your name and roll number (as a block comment) at the beginning of the solution to each problem.

Tip: For timely completion of the assignment, start as early as possible. Furthermore, work smartly - as some of the problems can be solved using smarter logic.

1. Note: Follow the given instructions to the letter, failing to do so will result in a zero.



Objectives

In this lab, you will learn to:

- Get familiarize with MySQL and Workbench environment
- Load or unload a database in MySQL through MySQL Workbench
- Explore structure of tables in a database

Concepts

Introduction:

Data is a collection of raw facts and figures. It is being processed to obtain useful information to assist organization in taking better decisions. Database is an organized collection of related data. In order to manage the databases, **Database Management Systems (DBMS)** or **Database Systems** offer sets of program and tools to efficiently access and manage the databases.

Relational data model is used to model the databases in Database Systems in the form of *relation* (table) comprising of tuples (*rows*) and attributes (*columns*). Primary key is the unique identifier for the relation and foreign key is used for referential purposes by the relation to include or refer to other relations data.

Structured Query Language (SQL) is used to access and modify the relational database. It's the most widely used query language supported by modern database management systems. SQL is a nonprocedural language.

Tools/Software Requirement

Tools	Purpose
MySQL Community Server (8.3)	Freely downloadable version of the world's most popular open source database
MySQL Workbench (8.0)	MySQL Workbench provides a graphical tool for working with MySQL Servers and databases

MySQL:

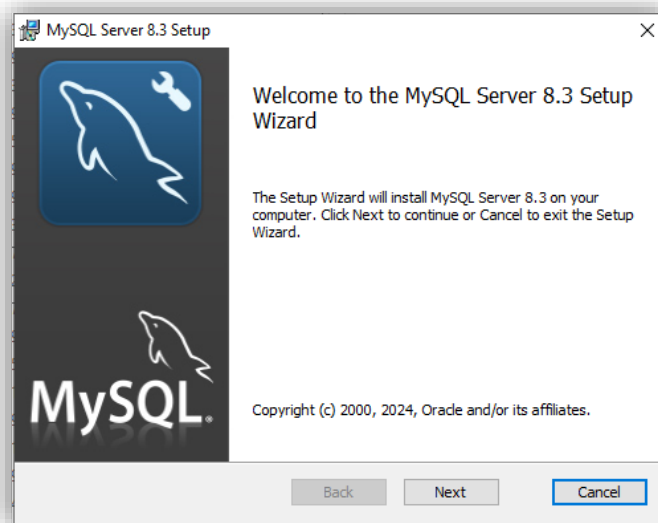
MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter My, and "SQL", the acronym for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language that programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.



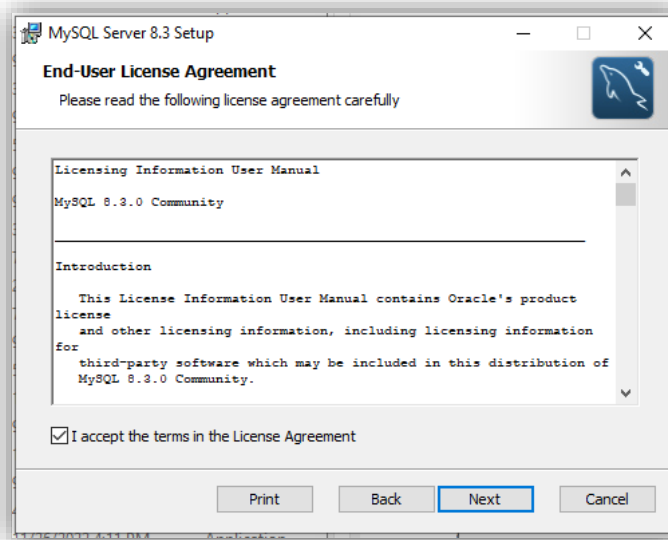
MySQL is free and open-source software under the terms of the GNU General Public License, and is also available under a variety of proprietary licenses. MySQL was owned and sponsored by the Swedish company MySQL AB, which was bought by Sun Microsystems (now Oracle Corporation).

Installation:

1. Download MySQL community server Windows (x86, 64-bit), MSI Installer from:
<https://dev.mysql.com/downloads/mysql/>
2. Run the downloaded file:



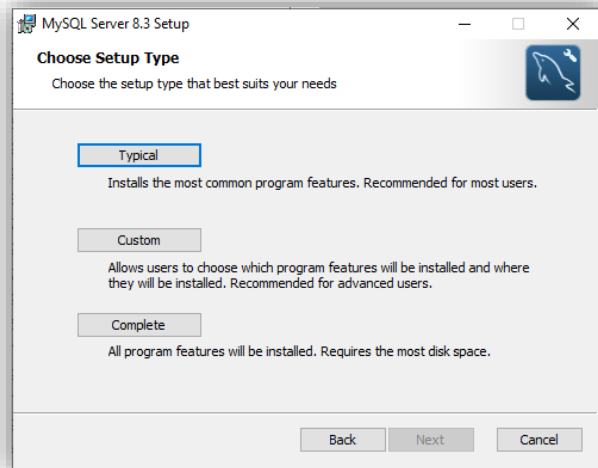
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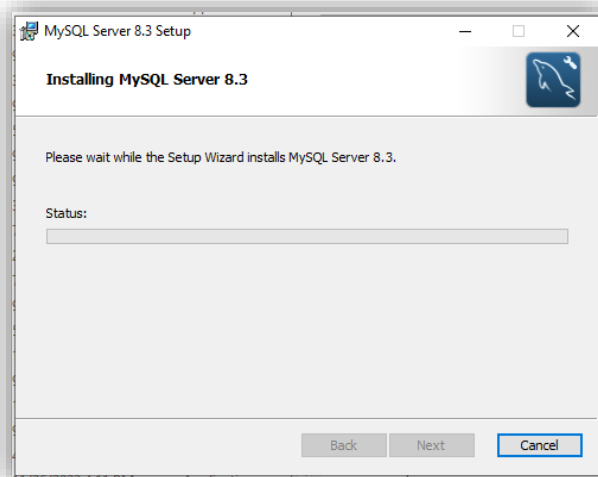
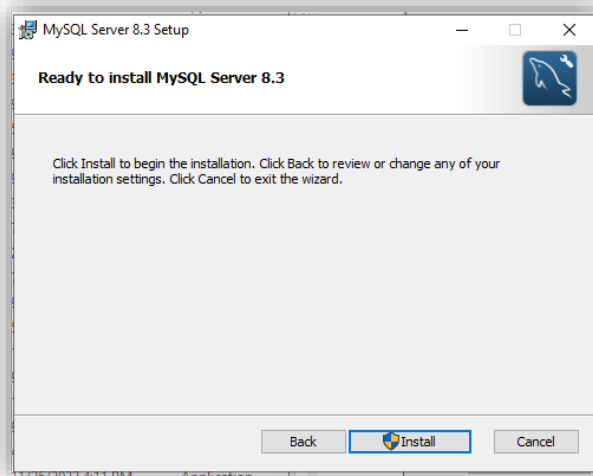
Select I accept the terms in the License Agreement and then select next on the above window.



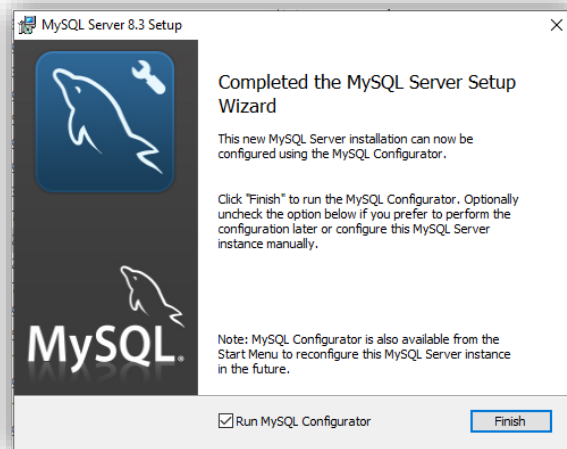
Select Typical on the window below:



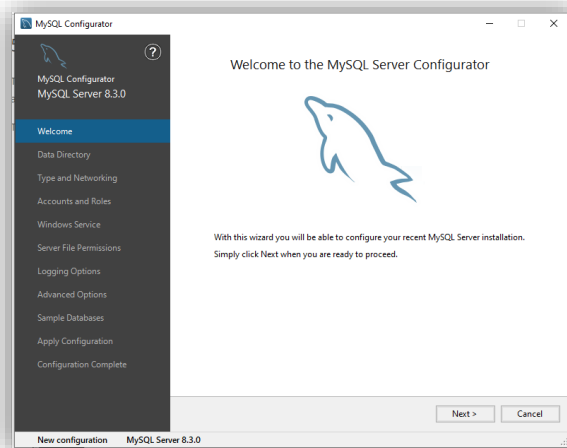
Select install on the window below:



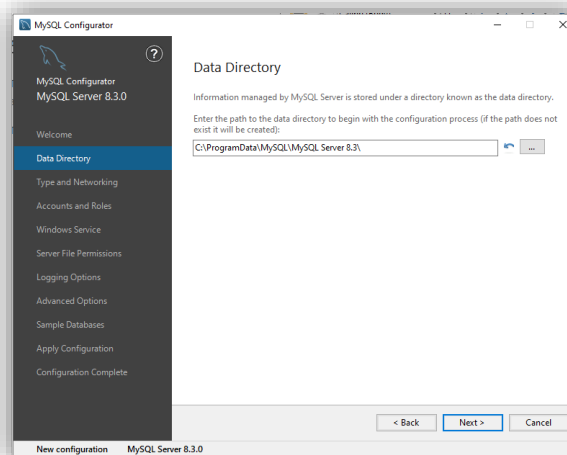
Select finish on the window below:



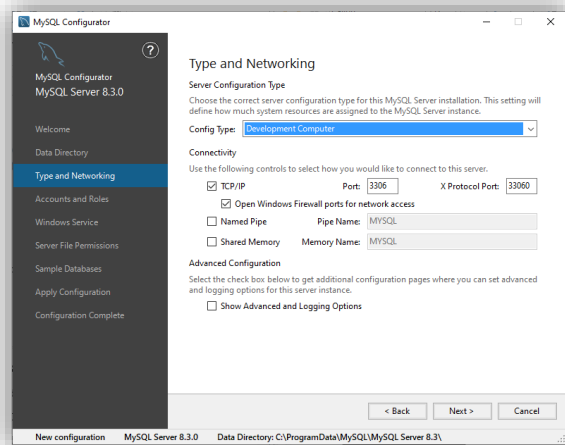
After Installation run MySQL Configurator from start menu.



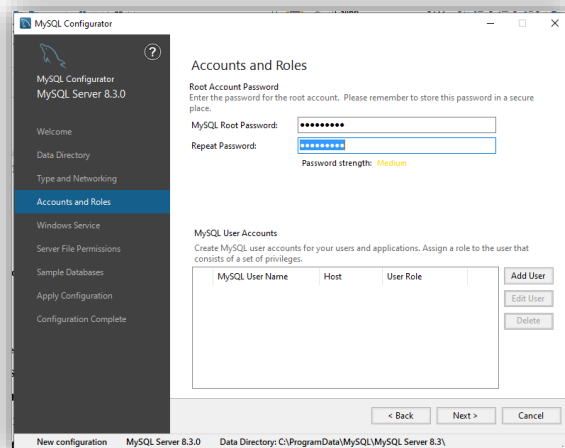
Select the data directory or use default directory:



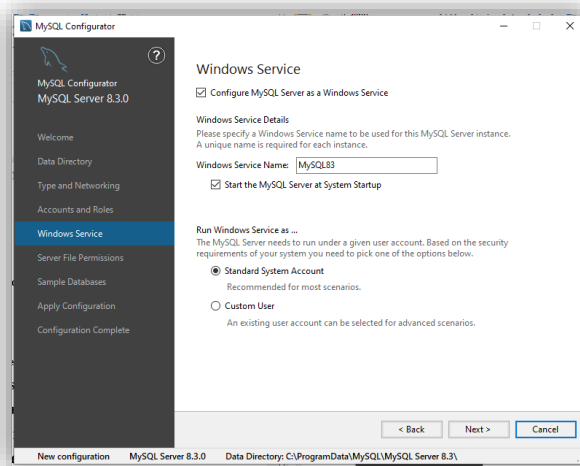
Select next on the window below:

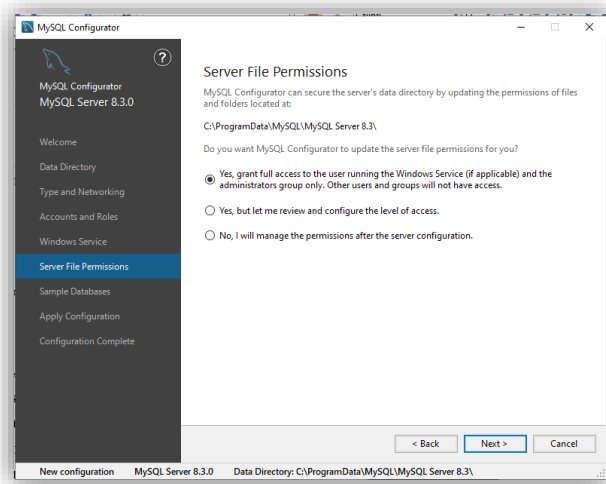


Enter the root password of your choice and select next:

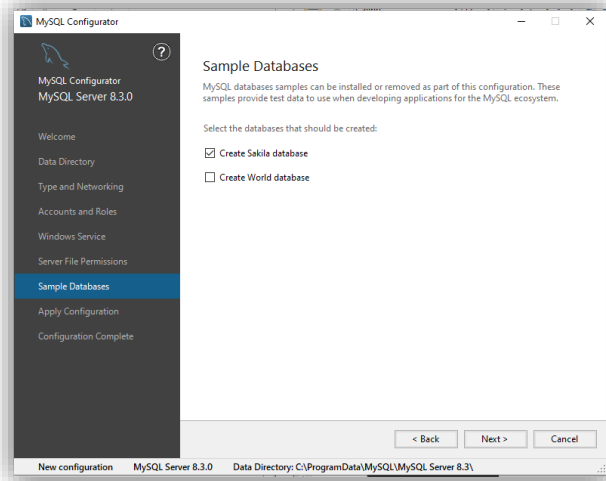


Select next on Windows service menu window:

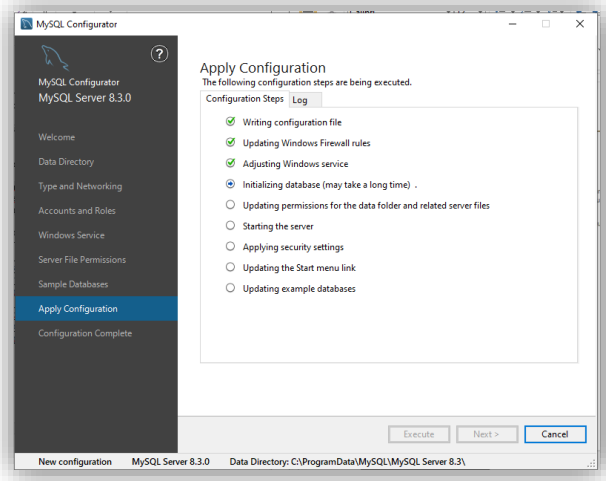




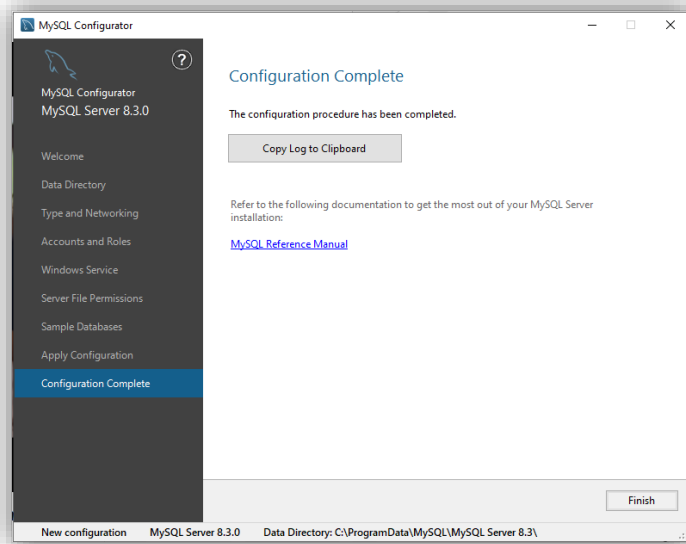
Select create Sakila database and select next:



Select Execute:



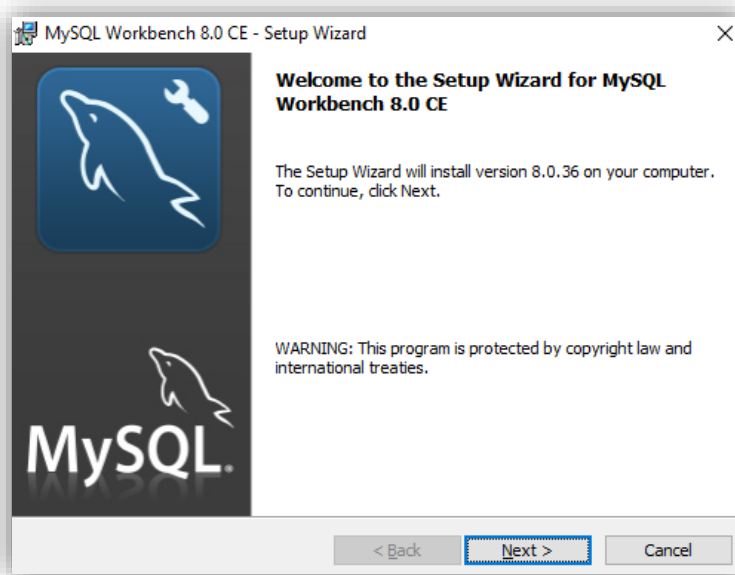
Select finish:

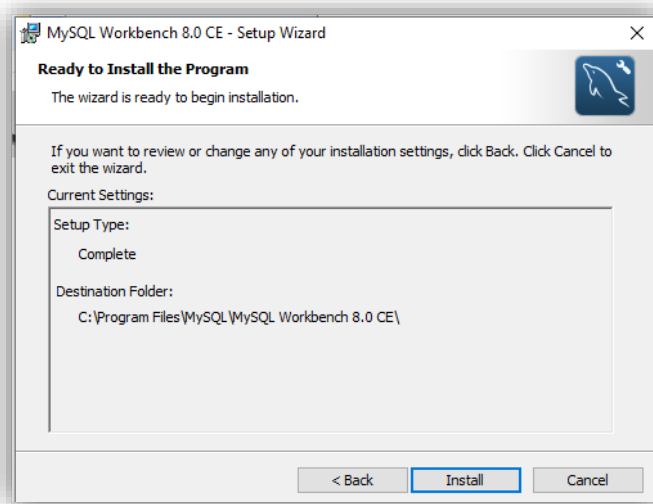
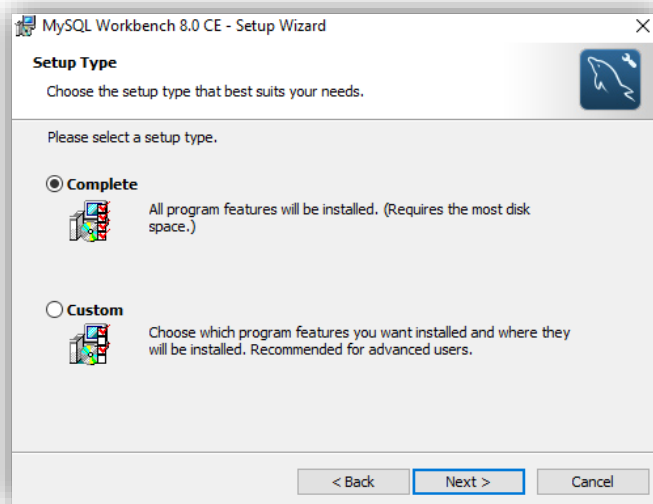
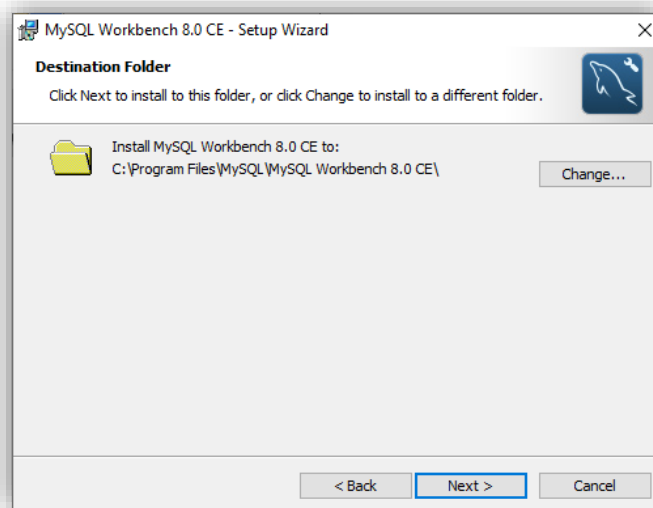


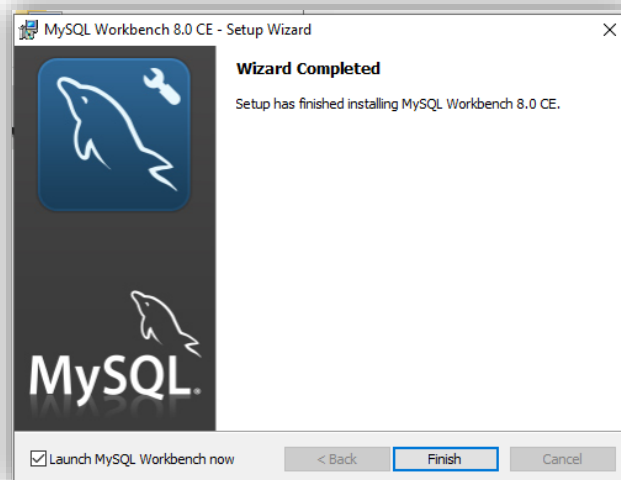
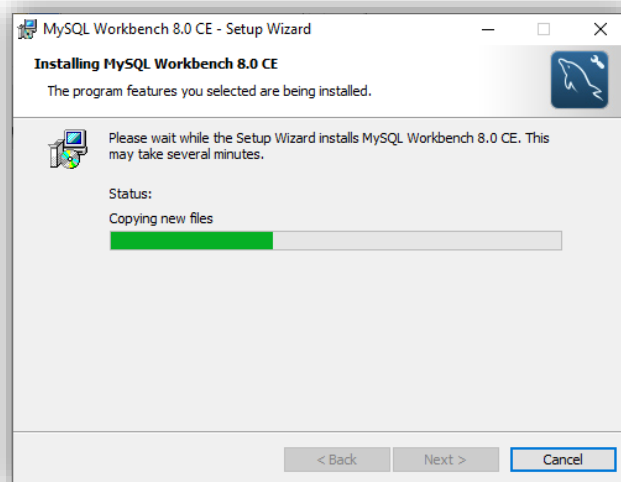
MySQL Workbench:

MySQL Workbench is a visual database design tool that integrates SQL development, administration, database design, creation and maintenance into a single integrated development environment for the MySQL database system. MySQL Workbench is available on Windows, Linux and Mac OS X.

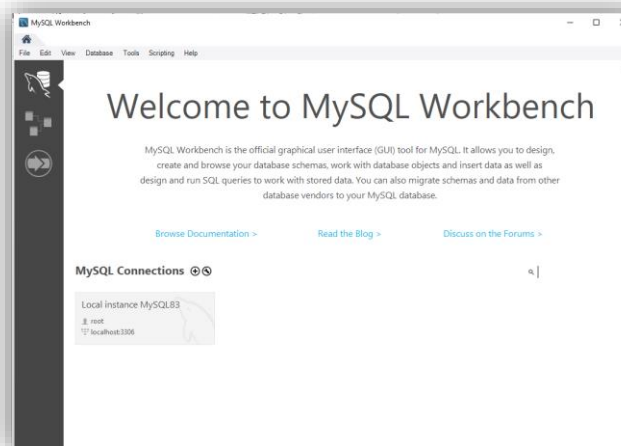
1. Download MySQL Workbench from: <https://dev.mysql.com/downloads/workbench/>
2. Run the downloaded file and follow the steps shown below:





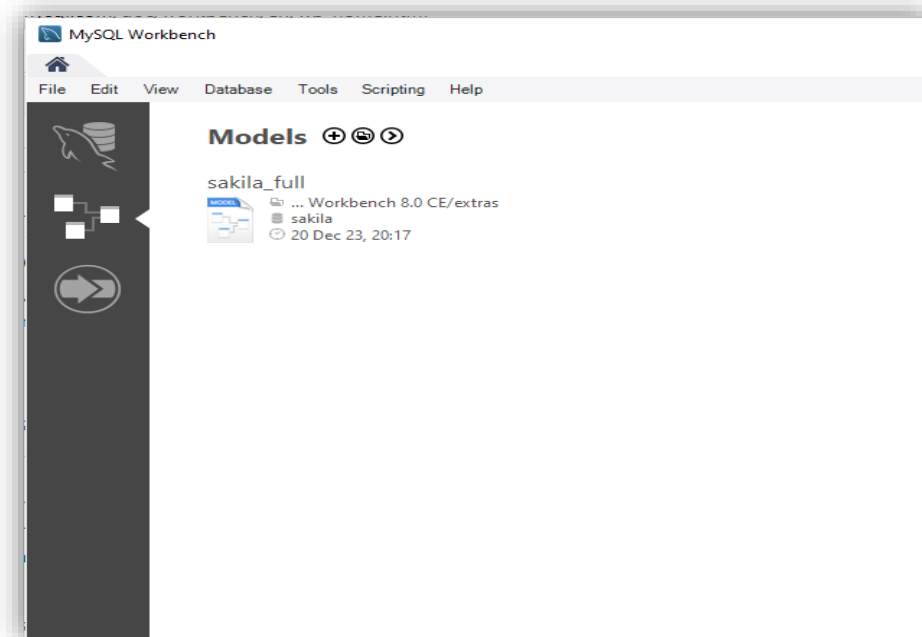


3. Run MySQL Workbench from start menu, home screen tab will be displayed as shown below:



As depicted in the following figure, a home-screen side panel enables you to toggle between MySQL Connections (selected in the figure) and Models within the home tab. The last option in the side panel opens the MySQL Workbench Migration Wizard in a new tab.

- a) The connections view in the side panel, when selected, displays a list of established connections to local and remote instances of MySQL. It enables you to load, configure, group, and view information about each MySQL connection.
- b) The models view in the side panel, when selected, displays your most recently used models. As the next figure shows, each entry lists the date and time that the model was last opened and shows its associated database.

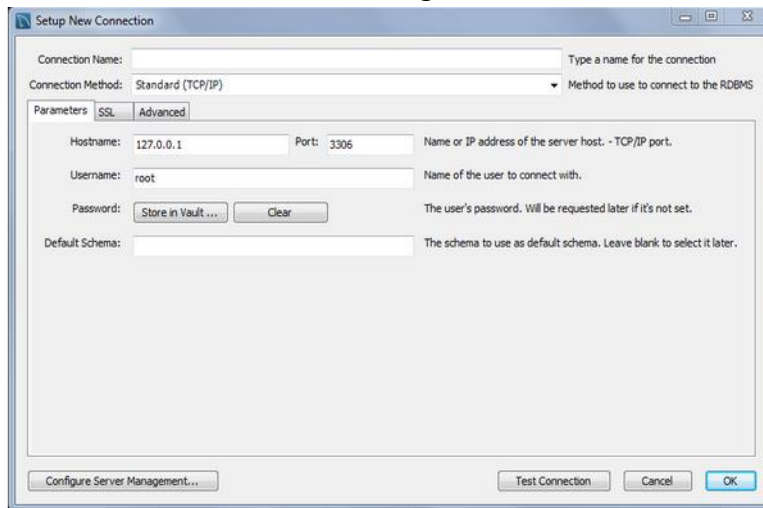


To the right of the Models title are the following options:

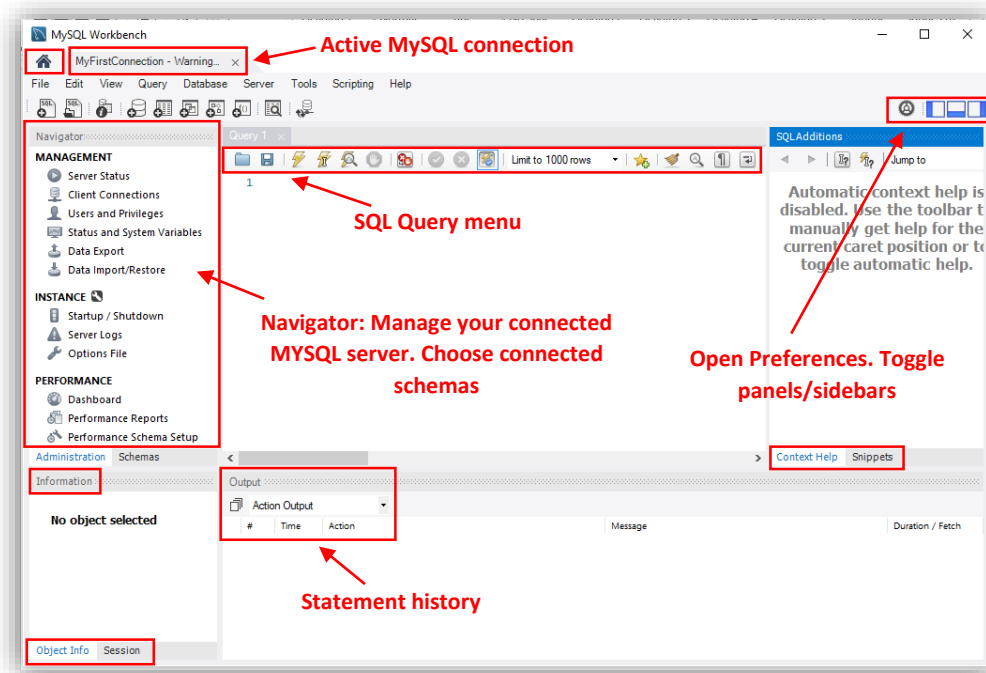
- Plus-sign button (+) adds a new model.
 - Folder button (see the figure that follows) enables you to browse for and open saved models.
 - More button (>) opens a context menu with additional commands, such as Create EER Model from Database.
- c) The migration view in the side panel, when selected, opens the Migration tab and displays an overview of prerequisites for using the wizard. From the Migration tab, you can start a migration process, open the ODBC administrator, or view documentation.

Making connection with MySQL Server:

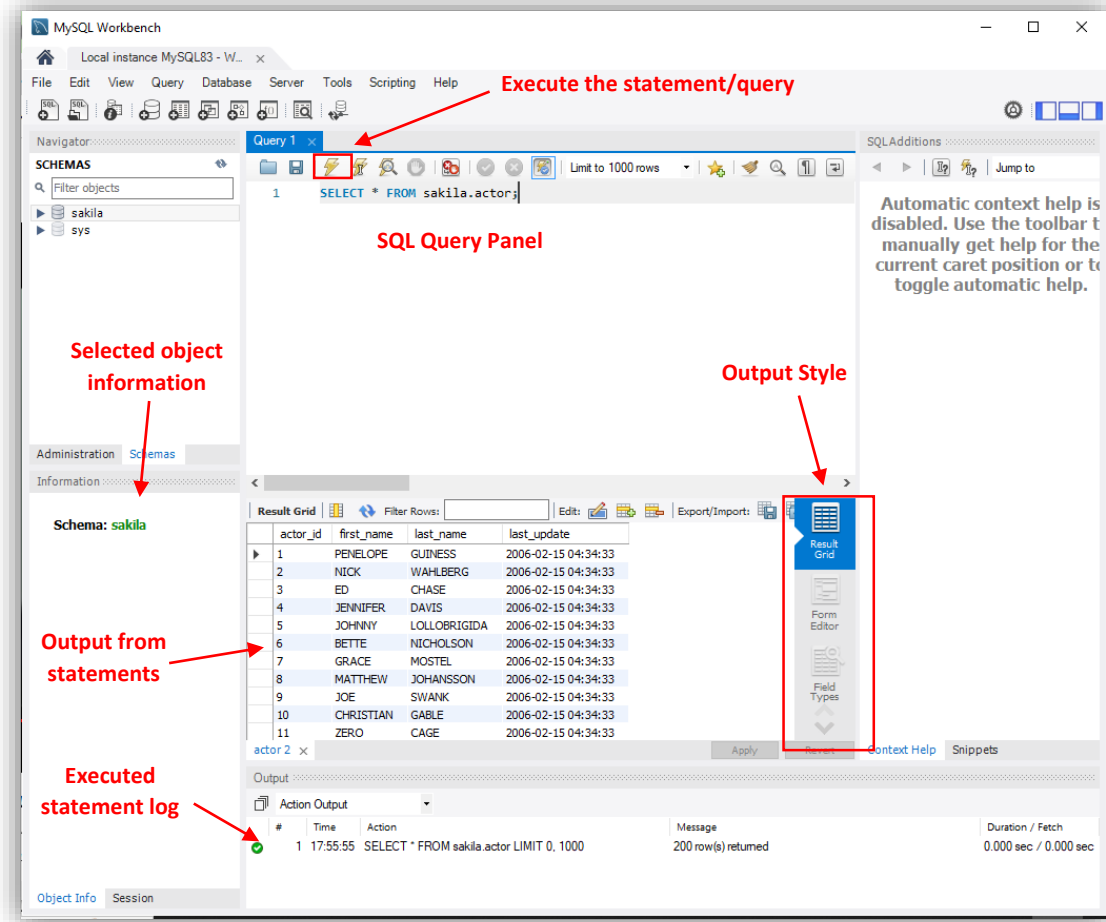
1. To administer your MySQL Server, you must first create a MySQL connection. Creating a MySQL connection is often the first action performed after installing MySQL Workbench.
2. To add a connection, click the [+] icon to the right of the MySQL Connections label on Home Window. This opens the Setup New Connection form. Fill out the connection detail as shown in Figure below:



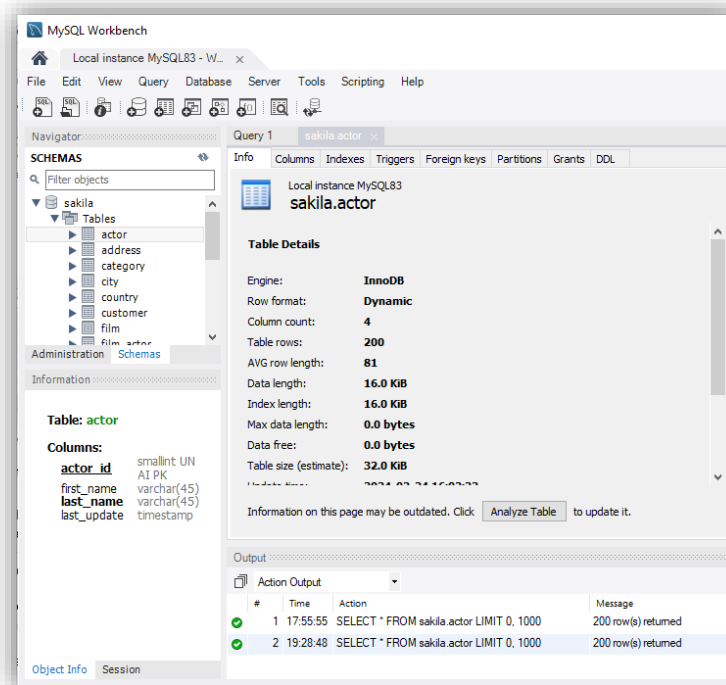
3. Define the Connection Name value as MyFirstConnection. Click OK. The connection will appear in MySQL Connections list on Home Window.
4. Select the MyFirstConnection from Home Window, this opens the SQL Editor screen as shown in Figure below:



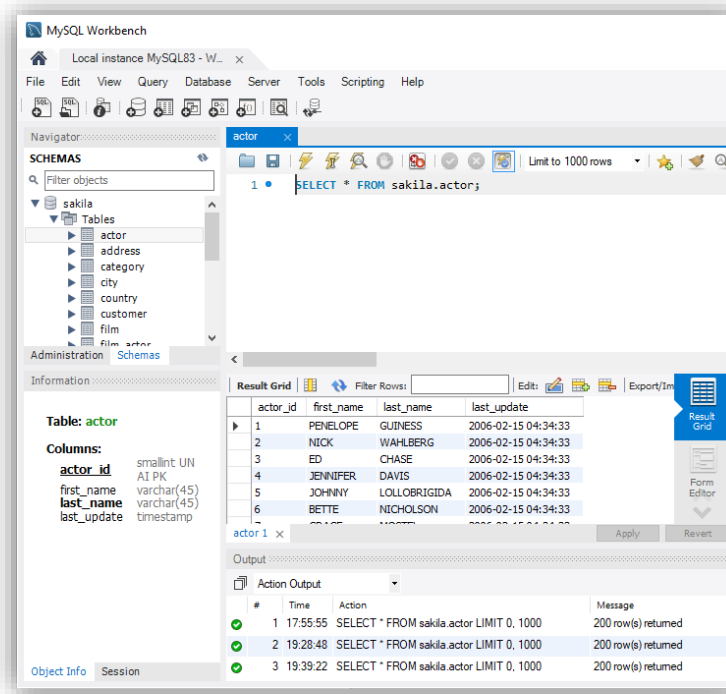
5. Write the following query : ***SELECT * FROM sakila.actor;***



6. Select schemas below navigator.
7. Expand the Sakila database. Among the listed categories, expand Tables. You will see list of tables (relations) in Sakila database.
8. Right click on a table and explore the second option Table Inspector. It opens a new tab showing relation schema, attribute names and other metadata.



9. Afterwards right click on the same table and explore the first option: Select Rows. It will open another tab for navigating through the contents of the relation.



10. The data view supports many different options such as sorting on a column by selecting its header, searching contents, deleting a row, adding another, or exporting the contents to an external file. You can play with these options.

SQL is a structure query language which is not a full featured programming language, it is only a data sublanguage, which has commands for data definition and processing. Data definition commands are Data Definition Language (DDL) while data processing commands are Data Modification Language (DML). We will use some commands with Sakila Schema to get basic idea about SQL. We will design our own database and learn these commands later on.

When we are working on any schema, we need to set that schema as default.

Right click on 'sakila' and select option 'set as default schema' from menu.

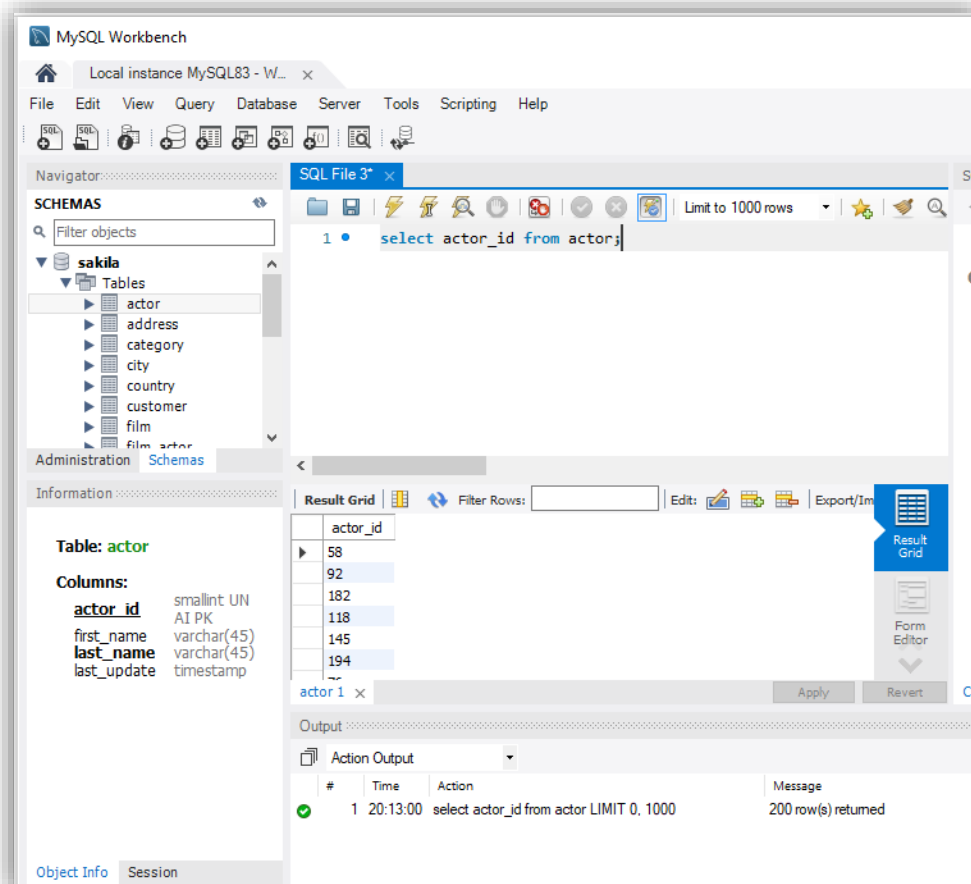
Expand 'Sakila' there are further tabs as tables, views etc. Expand 'Tables'

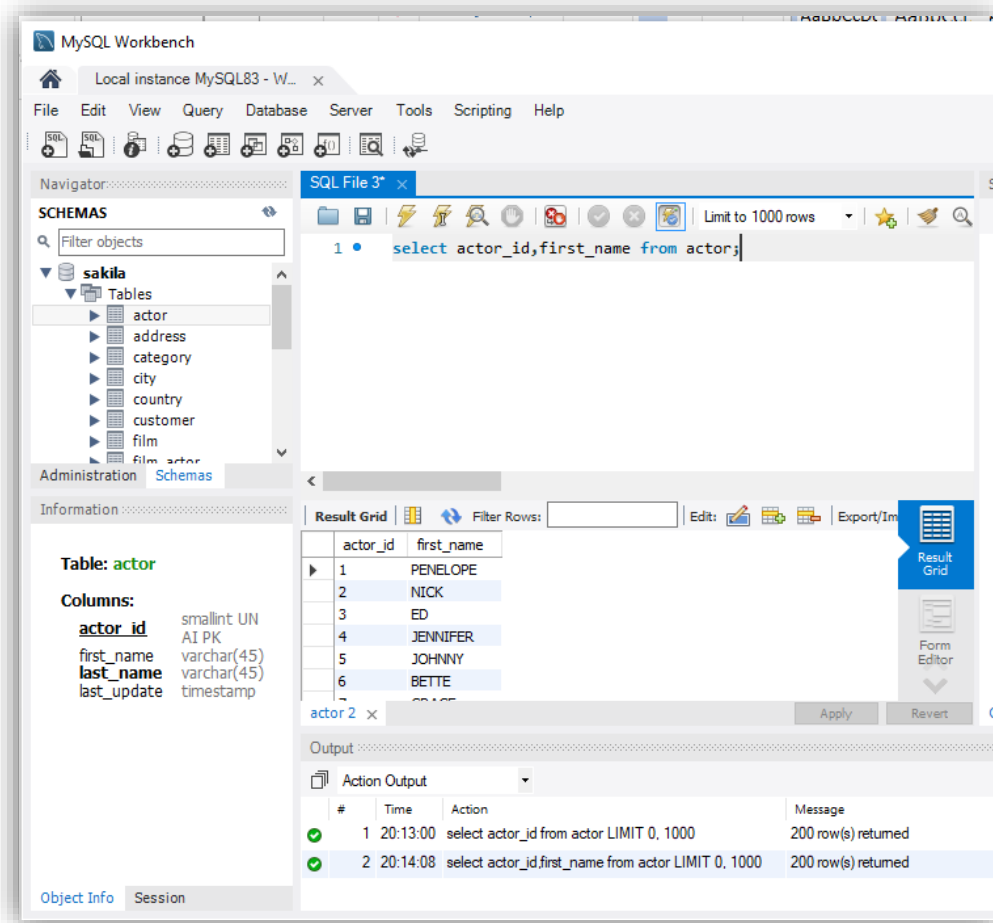
You will find various tables including actor, class, catogory etc. All these tables have data stored. You can retrieve or update data using SQL commands .When you want to retrieve some data from a table. Select statement will be most commonly used statement.

Syntax of Select statement is:

Select Column_name **From** Table _name;

You can select multiple columns separated with commas or single column.





You can create your own table too into sakila database using following syntax

Create Table sakila.table name (Column name datatype constraints, column 2 name data type constraints);

*Data type is actually type of data which we would be going to insert in a column ,in database there can be int, text, varchar and many other data type each one has different range.

*constraint with each column is not necessary, it is only applicable if any constraint is available. You can also insert data in existing table using 'INSERT INTO ' commands.

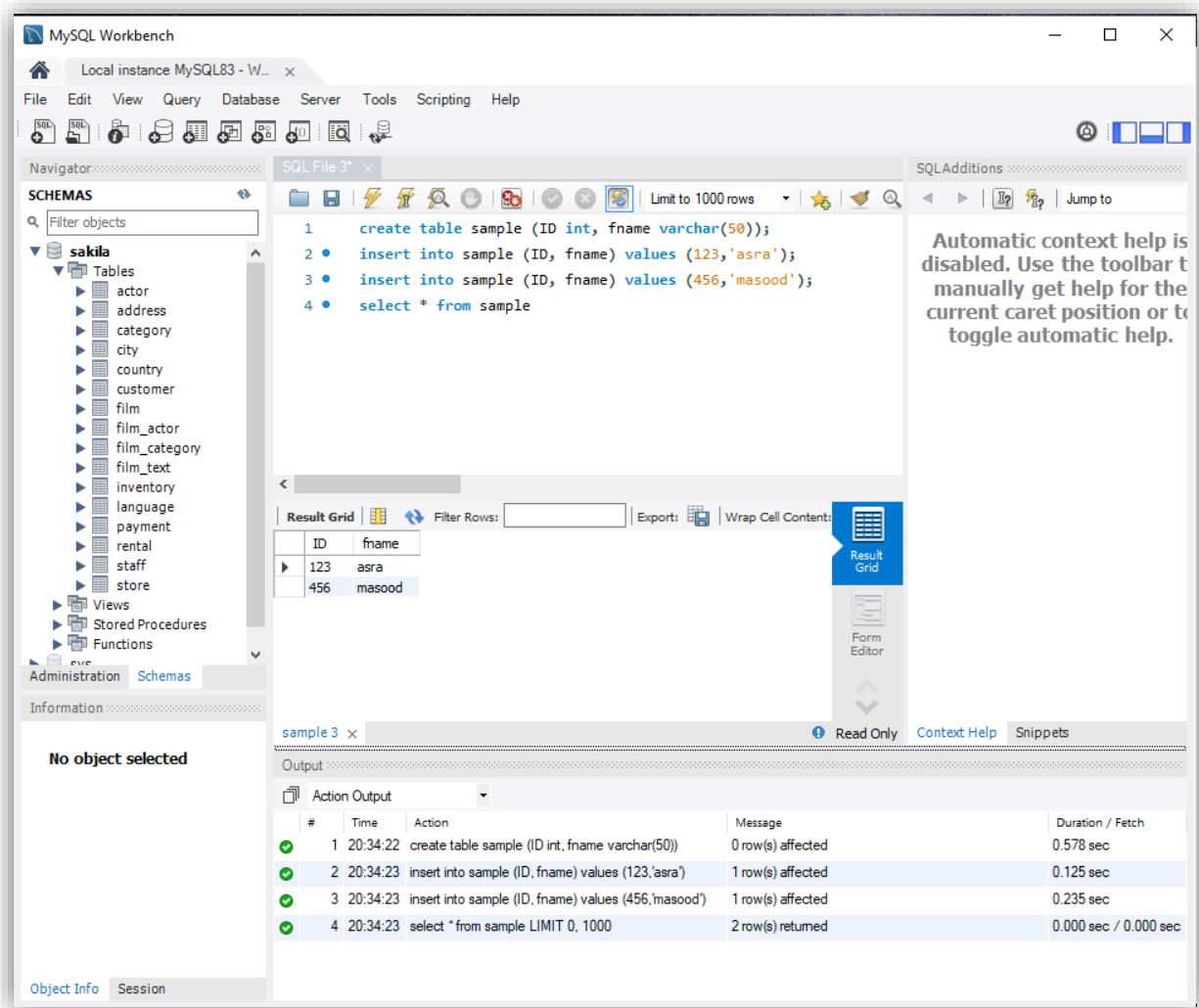
Syntax for 'INSERT INTO command is

INSERT INTO table name (column 1, column 2...)VALUES(value 1, value 2....)

We need to follow the order in which column names are given as wrong order can cause wrong data values insertion.

Some sample queries and their output is given below:





Lab Task:

1. Add table "Class" to "Sakila" database created in Task 1 and set the following fields as:

Column Name	Data Type	Column Properties
Class_ID	INT	PK, NN
Semester	INT	None
Student_Name	VARCHAR(25)	None

2. Add data of some students of your class in Class table created above.

