

CSCI3308 Software Development Methods and Tools

Homework #3 -- SQL

Overview

This homework is worth 60 points. It is due on Sunday, March 18, at 11:55 p.m. Late submissions will be penalized 20% during a 3-day grace period up until Wednesday, March 21, 11:55 p.m. After that time, no late work will be accepted. Your homework submission should be via the link found in the Homework section of the week where you got this file.

This homework will give you hands-on practice in working with SQL (Structured Query Language.) In this homework you will create a database and populate it using scripts provided. The database you create will then be used for various queries/problems in this homework.

Objectives

1. Become familiar with SQL language & syntax for SELECT queries, DDL and DML
2. Become familiar with a tool of your choice for building and submitting queries (whether command mode or GUI.)
3. Successfully run the scripts necessary to create a sample database consisting of 8 tables, verify that your database is correctly built.
4. Use SQL your database to answer the assigned problems.

Step One: Downloading and Installing MySQL

For this homework assignment you will need to download and install MySQL on your computer. How you do this will depend on what type of computer you have and what Operating System it is running. You will want to download MySQL Community Server 5.7.* (The current release number changes from time to time. Use the most recent. As of this writing, it is 5.7.21.

Do NOT download “MySQL Cluster” software. That is a much different product.

This page (below) contains online documentation links where you can find help with the download and install if you need it.

The download you need can be found here: choose the download file that matches your computer’s OS and version.

<https://dev.mysql.com/downloads/mysql/>

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Step Two: Choose Your Preferred Query Editor Tool

In order to create SQL queries and run them against your MySQL database, you will need a tool or a “window” through which you can create and execute queries, and then view/copy/export the answer set.

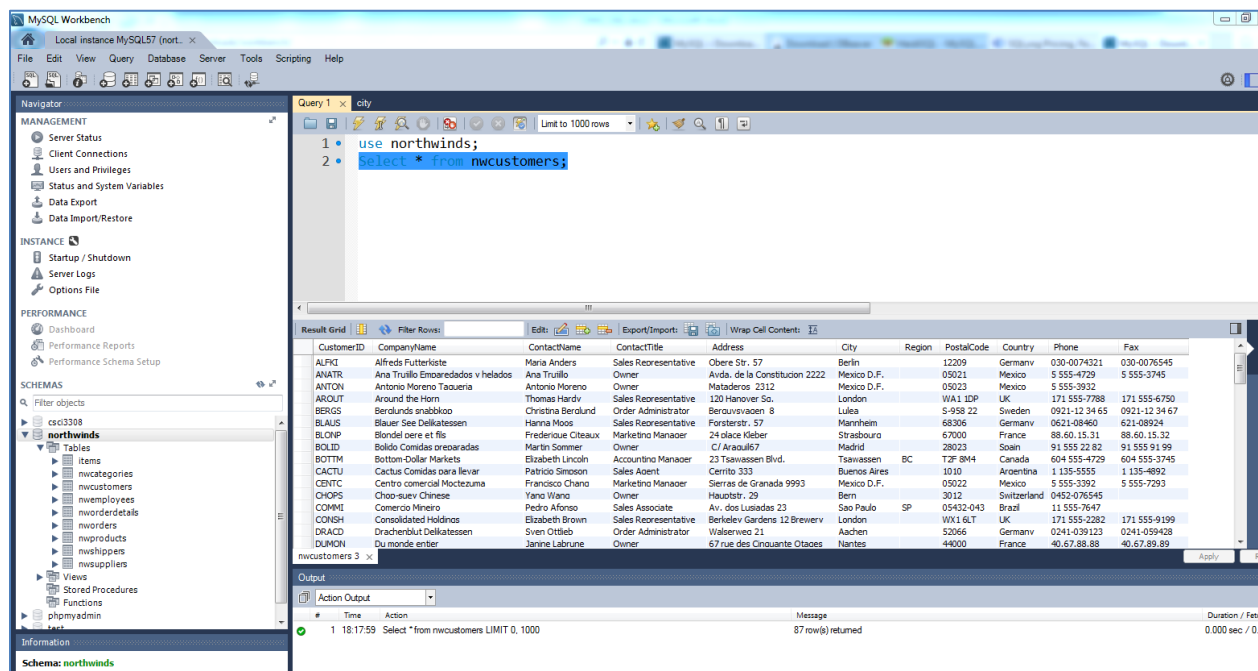
The default is the `mysqld` command line interface. This comes with MySQL and is similar to using the Linux shell. If you choose to do your queries via the MySQL command line interface, you do not need to download/install any query tool.

However, managing and running queries against MySQL databases is simpler, faster and easier if you use a GUI (graphic user interface) tool. There are many available.

You have seen your instructor use **SQLYog** in class. It is a great tool, but it only works on a Windows PC. It comes with a free 14-day trial. SQLYog can be downloaded here:

<https://www.webyog.com/product/sqlvog>

You can use **MySQL Workbench**. You have seen your instructor use MySQL Workbench in class to generate SQL to create tables. It is free. You can use MySQL Workbench to build and submit queries against your database. It is available here: <https://dev.mysql.com/downloads/workbench/> They offer versions for Windows, Linux, MAC. Here is an example of what the MySQL Workbench query editor looks like.



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A great open source alternative is **DBeaver**. The community edition is free and it comes with versions for many different OS builds and works fine with MySQL. <https://dbeaver.jkiss.org/download/>

Another alternative for MAC users is **DataGrip**. <https://www.jetbrains.com/datagrip/> They offer a free 30-day trial, and a special free edition for students that you can sign up for.

Creating the Tables

Once you have selected your query editor, you need to download some scripts from Moodle and create your database and tables, and then load the tables with data.

Before you can create your database, you need to make sure that your instance of MySQL is running. Then using your query editor, you must connect to the MySQL instance.

Creating the database is simple. You can simply tell MySQL `"create database northwinds;"` and it will do the rest. For this homework, you can let MySQL take all defaults. Once you create your database, tell SQL `"use northwinds;"` so it knows which database to run your queries against. When you first create your database it will be empty and contains no tables.

Next, we will create the **TABLES**. The SQL statements to create the tables for your Homework3 database can be found on the Moodle site with the other Homework files. We will be using the sample database called "Northwinds".

The Northwinds database consists of 8 tables. The HW3_scripts folder contains 9 script files, one for creating each table, and one to verify that everything worked OK. (These scripts are all named xxxxxxxx.txt.)

- Suppliers
- Shippers
- Customers
- Employees
- Products
- Categories
- Orders
- Order_details

To complete this homework, you must open up each of these 8 script files, copy the SQL statements, paste the SQL statements into your query editor and execute the script.

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Note: The script begins with a command to DROP the table before it creates it. This allows you to run the script over and over as needed. The VERY FIRST time you run this script, it will get an error when it tries to DROP the table because the table does not yet exist. Don't worry if you see this error the first time you execute the script.

Note: GUI Query Editor Users: After you run some queries to create your tables, you might expect the new tables to immediately appear under the "object explorer" on the left side of your GUI query editor. They will eventually show up, but to see them appear right away, you will need to click on the "refresh" icon (if your tool has one.) If this icon does not appear, then click somewhere within your "object explorer" and the newly created tables should appear.

If you are using the command line editor, you can enter `SHOW TABLES` and MySQL will show you all the tables in your database.

After creating all 8 tables, run the "verify" script. You should see the following tables and row counts for each.

table_name	table_rows
nwcategories	8
nwcustomers	87
nwemployees	9
nworderdetails	2155
nworders	830
nwproducts	77
nwshippers	3
nwsuppliers	29

Preparing Your Homework Submission

Your results for this homework assignment should be captured in a document (such as a .txt file, MS Word or similar tool.) Use the link found in the Homework Assignment section in the Moodle site to submit your work for grading. If you are doing PAIR PROGRAMMING on this assignment, please be sure to identify the name of your programming partner on your submission. You must EACH submit your own results document for this homework.

You must turn in BOTH your SQL and your ANSWER SET (One file with only SQL queries. The other with queries and answer set). Save your SQL Query files as **HW3.sql** and change permissions to make it executable.

For each problem where a multi-row answer set is created, the number of rows you should expect in your answer set is listed. Some queries will produce NO answer set.

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Query Problems

For this homework you must create and execute queries against the Northwinds database to fulfill the requirements listed below. For each query requirement the number of rows to expect in your answer set is listed in parentheses.

1. Create an alphabetical listing (Last Name, First Name) of all employees not living in the USA who have been employed with Northwinds for at least 5 years as of today. (3)
2. Prepare a **Reorder List** for products currently in stock. (Products in stock have at least one unit in inventory.) Show Product ID, Name, Quantity in Stock and Unit Price for products whose inventory level is at or below the reorder level. (17)
3. What is the name and unit price of the most expensive product sold by Northwinds? Use a sub query. (1)
4. Create a list of the products in stock which have an inventory value (the number of units in stock multiplied by the unit price) over \$2000. Show the answer set columns as Product ID, Product Name and "Total Inventory Value" in order of descending inventory value (highest to lowest.) (13)
5. List the country and a count of Orders for all the orders that shipped outside the USA during September 2013 in ascending country sequence. (9)
6. List the `CustomerID` and `CompanyName` of the customers who have more than 20 orders. (3)
7. Create a Supplier Inventory report (by Supplier ID) showing the total value of their inventory in stock. ("value of inventory" = `UnitsInStock * UnitPrice`.) List only those suppliers from whom Northwinds receives more than 3 different items. (4)
8. Create a SUPPLIER PRICE LIST showing the Supplier `CompanyName`, `ProductName` and `UnitPrice` for all products from suppliers located in the United States of America. Sort the list in order from HIGHEST price to LOWEST price. (12)
9. Create an EMPLOYEE ORDER LIST showing, in alphabetical order (by full name), the `LastName`, `FirstName`, `Title`, `Extension` and Number of Orders for each employee who has more than 100 orders. (4)
10. Create an ORDERS EXCEPTION LIST showing the `CustomerID` and the `CompanyName` of all customers who have no orders on file. (2)

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11. Create an OUT OF STOCK LIST showing the Supplier `CompanyName`, Supplier `ContactName`, Product `CategoryName`, `CategoryDescription`, `ProductName` and `UnitsOnOrder` for all products that are out of stock (`UnitsInStock = 0`). (5)
12. List the `productname`, `suppliername`, `supplier country` and `UnitsInStock` for all the products that come in a bottle or bottles. (11 or 12 depending on your assumptions...)
13. Create a NEW table named "Top_Items" with the following columns: `ItemID` (integer), `ItemCode` (integer), `ItemName` (varchar(40)), `InventoryDate` (DATE), `SupplierID` (integer), `ItemQuantity` (integer) and `ItemPrice` (decimal (9,2)). None of these columns can be NULL. Include a PRIMARY KEY constraint on `ItemID`. (No answer set needed.)
14. Populate the new table "Top_Items" using these columns from the `nwProducts` table.
 `ProductID` → `ItemID`
 `CategoryID` → `ItemCode`
 `ProductName` → `ItemName`
 Today's date → `Inventory Date`
 `UnitsInStock` → `ItemQuantity`
 `UnitPrice` → `ItemPrice`
 `SupplierID` → `SupplierID`
for those products whose inventory value is greater than \$2,500. (No answer set needed.)
(HINT: the inventory value of an Item is `ItemPrice` times `ItemQuantity`.)
15. Delete the rows in `Top_Items` for suppliers from Canada. (2 rows deleted. No answer set needed.)
16. Add a new column to the `Top_Items` table called `InventoryValue` ((decimal (9,2))) after the inventory date. No answer set needed.
17. Update the `Top_Items` table, setting the `InventoryValue` column equal to `ItemPrice` times `ItemQuantity`. (No answer set needed.)
18. Drop the `Top_Items` table. No answer set needed.