IST769 Lab A

# A Gentle Review of Relational Databases

In this lab we will learn review relational database and SQL concepts with a keen emphasis on those that are important to this course.

### Learning Outcomes

At the end of this lab, you should be able to:

* write SQL using common table expressions, aggregates, and window functions and differentiate as to when to use each.
* read a query plan and create an index to force an index scan over a table scan.
* Demonstrate the fundamentals of transaction management.

### Pre-Requisites

1. Before you begin make sure you’ve connected to the Azure Lab environment. To learn more on how to connect to your Azure Virtual Machine, see: <https://answers.syr.edu/display/ischool/Azure+Lab+Services+--+Students>   
   Windows Login: **localadmin**

Windows Password: **SU44orange!**

1. Give your desktop a couple of minutes to ensure docker is started. The docker desktop window should show “Engine Running” in the bottom left. That is how you know your Virtual Machine is ready to start the lab.  
   Diagram

   Description automatically generated with medium confidence
2. Open a terminal. **Windows Start Button 🡪 Terminal**Graphical user interface

   Description automatically generated
3. In the terminal, switch to the learn-databases folder, type:  
   **cd learn-databases**The prompt should now read **learn-databases>**
4. Start the database environment from IST659, type:  
   **docker-compose up -d**
5. When the command prompt returns, you can now check to see if the mssql database service is running, type:  
   **docker-compose ps mssql**

You should see the output showing the STATUS of running:  


You can now connect to the database using Azure Data Studio

1. Launch Azure Data Studio **Windows Start Button 🡪 Azure Data Studio**  
   Graphical user interface

   Description automatically generated
2. Connect to the mssql database service.
   1. First click the new connection button: 
   2. Connection Type: **Microsoft SQL Server**
   3. Server: **localhost**
   4. Authentication Type: **SQL Login**
   5. User Name: **sa**
   6. Password: **SU2orange!**
   7. Click **Connect**
   8. If a Connect Error displays, click **Enable Trust Server Certificate**
3. When you are connected you will see solid green dot next to your connect under **SERVERS**.   
   
4. Keyboard shortcuts for the query window:
   1. To open up a query window press **CTRL+N**
   2. To execute a query press **F5**
   3. You can also highlight with the mouse and press **F5**  to execute only portions of the code in the window.
   4. To view the query plan graph press **CTRL+L**
5. For this lab we will use the **Northwind** database. For each query window, make sure the database is set to **northwind**. For example:  
   

You are now ready to start the lab

## Part 1: The Refresher course

In this section, we will write some queries in SQL. Place each query in its own window.

1. List the Product ID, Category ID, product name and product unit price for products that are not discontinued.
2. Join the categories table so that you display the category name in the first query.
3. Produce a query displaying the category ID, category name, and average product unit price.
4. Next, combine queries 2 and 3 with a join. Join on category ID so you can display product id, category id, product name, product unit price, and average product unit price, then subtract the unit price from the average.
   1. HINT: Use a common table expression WITH clause to create two named queries then use them as tables to join for the last query.
5. Re-write the query in 4 to use a window function instead of 3 queries.
6. Compare the query plans of 4 and 5. Are they the same?
7. What is a good index candidate for query 4 or 5? How would it improve the performance of the query?

# Lab Problem Set

Answer each question from part 1 pasting your code in the submission template. Complete your reflection and hand in your work!

**IMPORTANT:**

1. When you are finished with the lab, execute:

docker-compose down

1. From the terminal in the **learn-databases** folder to turn off the IST659 lab environment. We will not need it for the remainder of the semester.
2. Close all windows.
3. Shut down your Azure Lab instance.