INTRO TO SQL SESSION 1

SEP 5 18, 2023 – MAY 4TH 2023

WEEK 1: APRIL 28 & APRIL 24TH

INSTRUCTOR: SYLVIA VARGAS SQLSYLVIA@GMAIL.COM

LINKEDIN: HTTPS://WWW.LINKEDIN.COM/IN/SYLVIAVARGAS/

BLOG: HTTPS://SYLVIAVARGAS.COM/

BLOG (IN PROGRESS): HTTP://SHESATECHIE.ORG/

ALL SLIDES ON GITHUB: HTTPS://GITHUB.COM/SQLSYLVIA/GDI-SQL

GDI'S INTRO TO SQL

- This class will focus on understanding how to use SQL and its basic syntax.
- Topics in this course will include: querying and aggregating data in individual tables, querying multiple related tables (JOINs), and writing subqueries.
- In this course, online SQL database tools will be used to teach students how to write queries. No installation is required.

WELCOME

Girl Develop It is here to provide affordable and accessible programs to learn software through mentorship and hands-on instructions.

- Code of Conduct - https://girldevelopit.com/code-of-conduct/

- **Some Rules:**
  - We are here for you!
  - Every question is important. Ask questions!
  - Help each other
  - Have fun

Welcome!

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Our code of conduct

Some rules

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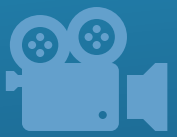
TELL US ABOUT YOURSELF

Who are you?

What's your experience level with SQL?

What do you hope to get out of the class?



What is your favorite movie and how many times have you watched it?

Tell Us About Yourself

- Who are you?
- What's your experience level with SQL?
- What do you hope to get out of the class?
- What is your favorite movie, and how many times have you watched it?

Please fill out the following form so we can collect this information so we can use it to create class database for use in week 3 of our class. GDI Intro SQL class- Tell us about yourself

ABOUT ME

Checkout my LinkedIn page - https://www.linkedin.com/in/sylviavargas/

Retired as from Microsoft as a Sr Data Scientist

40+ year of experience in Tech and SQL working as a developer, manager, and Data Scientist in a number of companies. Including Disney, Merrill Lynch, Boeing

My favorite movie is a three way tie between West Side Story, Hamilton and Encanto

About Me

- Retired Sr Data scientist with Microsoft 12/28/2022!
- 40+ years of experience with SQL.
- Worked in tech for over 41 years as a developer, manager and data scientist in a number of companies.

  Check out my LinkedIn profile Sylvia Vargas
- Favorite movie is a three way tie between "West Side Story", "Hamilton" and "Encanto"

CLASS OUTCOMES

- As a compliment to the Database Design Class, you will learn the same terminology as the Database Design Class.
- You will have hands-on experience and support.
- By the end of the class, you will be able to query and modify data as well as tables.

- This is a compliment to the database design class
- We'll be using the same terminology and building on those concepts
- But we'll be hands-on

By the end of the class, you will be able to query and modify a

Plan for the week 1: CRUD

- What's a database? What's SQL?
- How to query a database:
  - Select statement (from statement)
    - Select, Distinct
    - Count
  - Group By, Order By
  - Clauses
    - Where
    - Like
  - Joins(Inner/Outer Left/Right)
  - Practice

PLAN FOR WEEK 1

- What's a database? What is SQL?

- Basics of how to query a database?

- 1. BASIC SELECT Statement
  - SELECT and FROM commands
  - COUNT command
- 2. ORDER BY clause
- 3. WHERE clause
- 4. LIKE clause
- 5. GROUP BY and HAVING
- 4. JOINS – Inner, Left and Right outer joins

PRACTICE

PLAN FOR WEEK 2

Subqueries

How to modify a database?

- Creating a table
- Inserting and Updating data in a table
- Deleting Rows versus Deleting Tables

Optimize Queries

PRACTICE

PLAN FOR WEEK 3

Special Projects

- New database
- More Practice and Mentoring

GDI Survey

Plan for the week 2: CRUD

- Super-awesome bonus round:
  - Subqueries
- Practice
- How to modify a database
  - Creating a table
  - Udating a table with rows
  - Deleting Rows VS Deleting Tables
- Optimizing queries
- Resources and links
- Practice

Plan for the week 3: Projects

- Special Projects
- GDI Survey

What's a relational database?

A virtual organized collection of structured information stored electronically that makes data available to people and computers across the organization.

The language of relational databases (1/2)

- Database: A group of data organized in a logical way (Similar to an Excel workbook, but more structured)
  - Schema: Layout of the database, sometimes interchangeable with database (Excel workbook + name of workbook)
  - Table: A subset of a database (Excel worksheet)
    - Rows (records) and columns (fields): Parts of a table
- CRUD (Create, Read, Update, Delete): How you change the databases and tables in the database

- **Relational Data Model** : Data related to each other are stored a certain way and "point" to each other (Like Excel cell references)

The language of relational databases (2/2)

- **Database keys (primary and foreign):** The pointers in each table that can link to other tables

- **Indexes:** Make databases easier to search

- **RDBMS systems:** Types of relational databases that have all the properties of relational data models: MySQL, Oracle, Access, Postgres
- SQL is also used in Big Data systems like AWS/Redshift, Azure SQL with Synapse, PySpark/SparkSQL.

- **Queries:** How to ask questions of the tables and databases

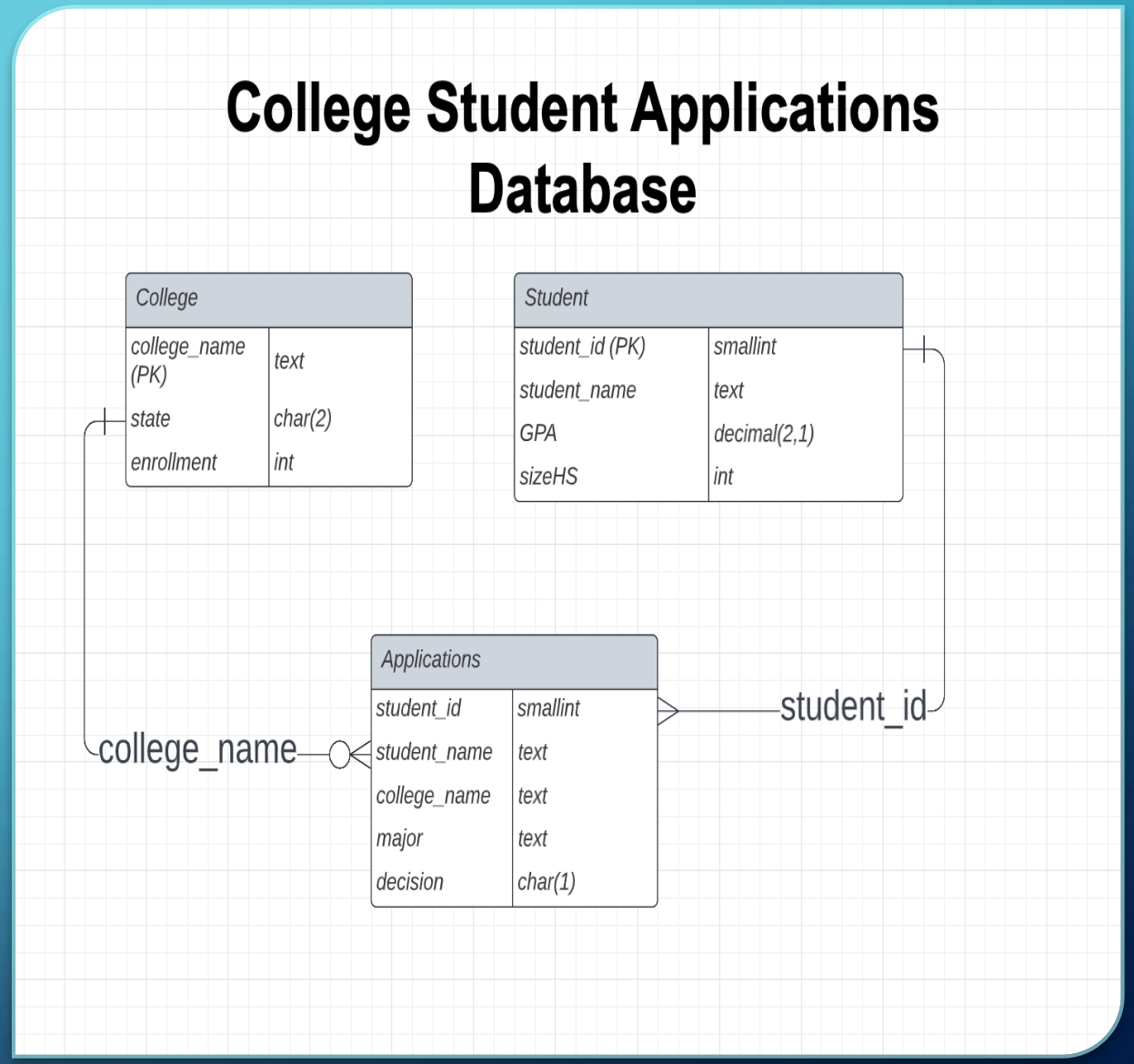
Databases, schemas, and tables

DB Schema → Table → Row → Value

Excel File → Workbook → Row → Cell

WHAT'S A RELATIONAL DATABASE

- *Excel spreadsheets you can join without Vlookups? NO!*
- A relational database is a type of database that stores and provides access to data points that are related to one another.
- Relational databases are based on the relational model, an intuitive, straightforward way of representing data in tables. In a relational database, each row in the table is a record with a unique ID called the key.



DIFFERENT FLAVORS OF SQL

How do you say that you want a can of Coca-Cola?
Coke, soda or pop?

How do you write SQL?

- Every SQL query starts with a SELECT statement.
- But every SQL database vendor has a different "enhancements".

All different flavors of the same language

WHAT'S SQL

- It's the language that the database speaks to bring you back data
- Has a lot of words similar to English, but they have their own meaning as keywords.

```
SELECT user_name,  SUM(total_purchases)
FROM billing_database.user_table
WHERE user_name LIKE 'Henderson%'
    AND billing_month = 'January'
GROUP BY user_name;
```

Databases, schemas, and tables

The goal of this class is to make you comfortable with

DATABASE AND CRUD

- In the 1980s as relational databases were being created, the acronym CRUD was developed to define 4 basic operations.
  - Create: INSERT, CREATE
    Commands to create a table and add data of rows to a table.
  - Read: SELECT
    Picking specific information from your table
  - Update: UPDATE, ALTER
    Changing specific information in your table
  - Delete: DELETE, DROP, TRUNCATE
    Command to remove tables and/or data from the database.

Databases and CRUD

In the 1980s, as relational databases were being created, the acronym CRUD was developed to define the 4 basic operations of storing data: **Create**, **Read**, **Update** and **Delete**

- Create : INSERT, CREATE
  - Create Table and Adding(INSERT) rows to your table
- Read: SELECT
  - Picking specific information from your table
- Update: UPDATE, ALTER
  - Changing specific information in your table

What can you do with SQL?

The power is in the relationship between data sets. The business value is knowing SQL is that you can change the DATA into INFORMATION for you and businesses to make informed decisions.

- How many customers do we have in Los Angeles?
- What's that person's Facebook and Twitter handle?
- Did profits go up or down this quarter?
- How many users are clicking on our new site?

Body of a SQL statement: SQL clauses and required order

1 SELECT	selects variables
2 FROM	opens datasets/table
3 WHERE	restricts observations
4 GROUP BY	groups observations
5 HAVING	restricts groups
6 ORDER BY	sorts results

Let's develop it!

Let's get started reading tables!
First go to https://github.com/sqlsylvia/GDI-SQL for the online databases we will be using.

LET'S START!

Go to https://github.com/sqlsylvia/GDI-SQL

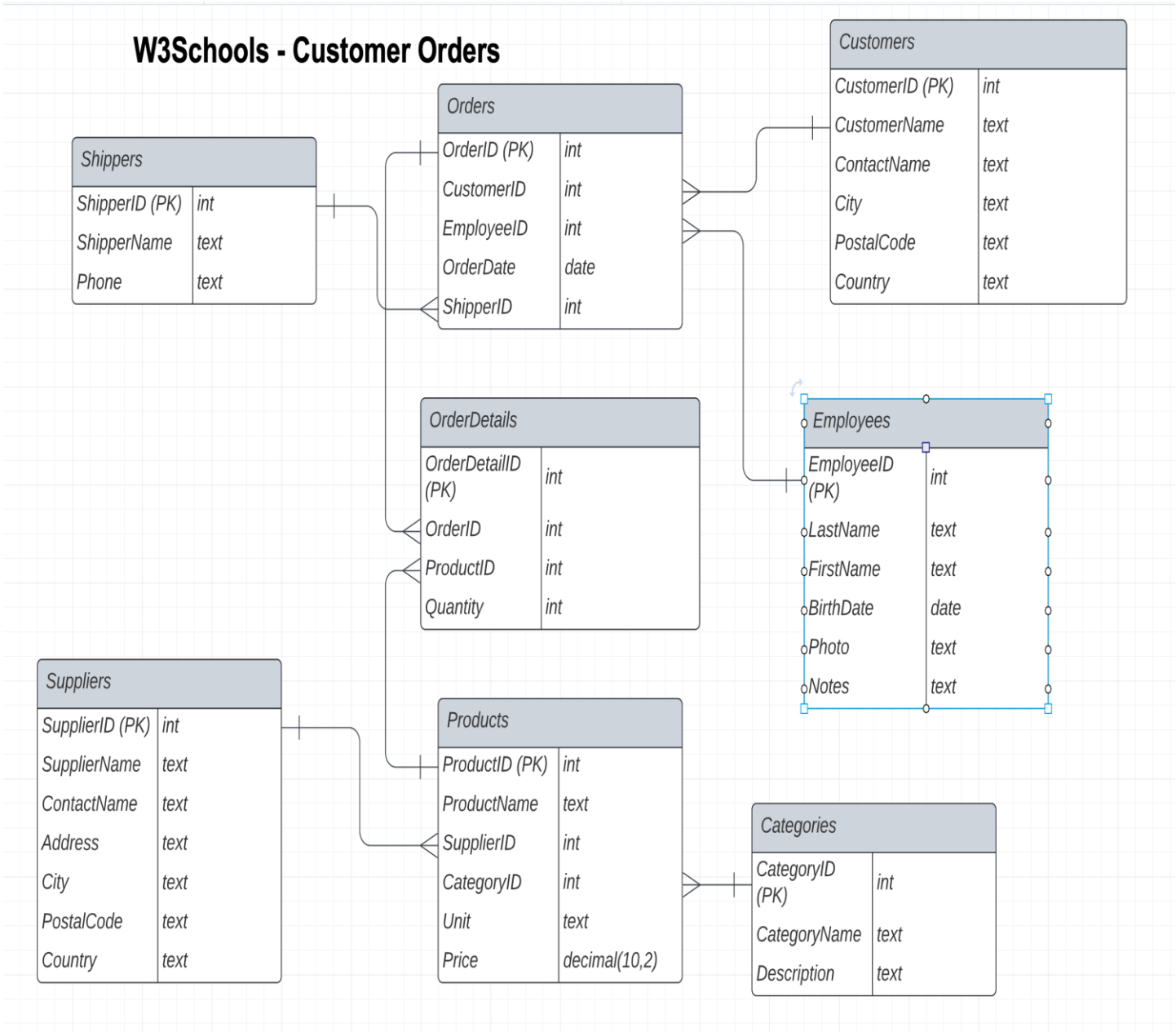
Practicing

ONLINE SQL TOOLS

- W3Schools has a SQL database to query - https://www.w3schools.com/sql/trysql.asp?filename=trysql_editor
- DB Fiddle is a site used by companies to assess SQL skills, but it is also an easy way to learning to using SQL as well as create tables. https://www.db-fiddle.com/f/6eXpPSRFQgzdKUCjSsbSF4/9
- REPLIT.com is another way to learn SQL using SQLLite.
  I have created some examples for you to learn with.
  https://replit.com/@sqlSylvia/GDI-SQLIntro

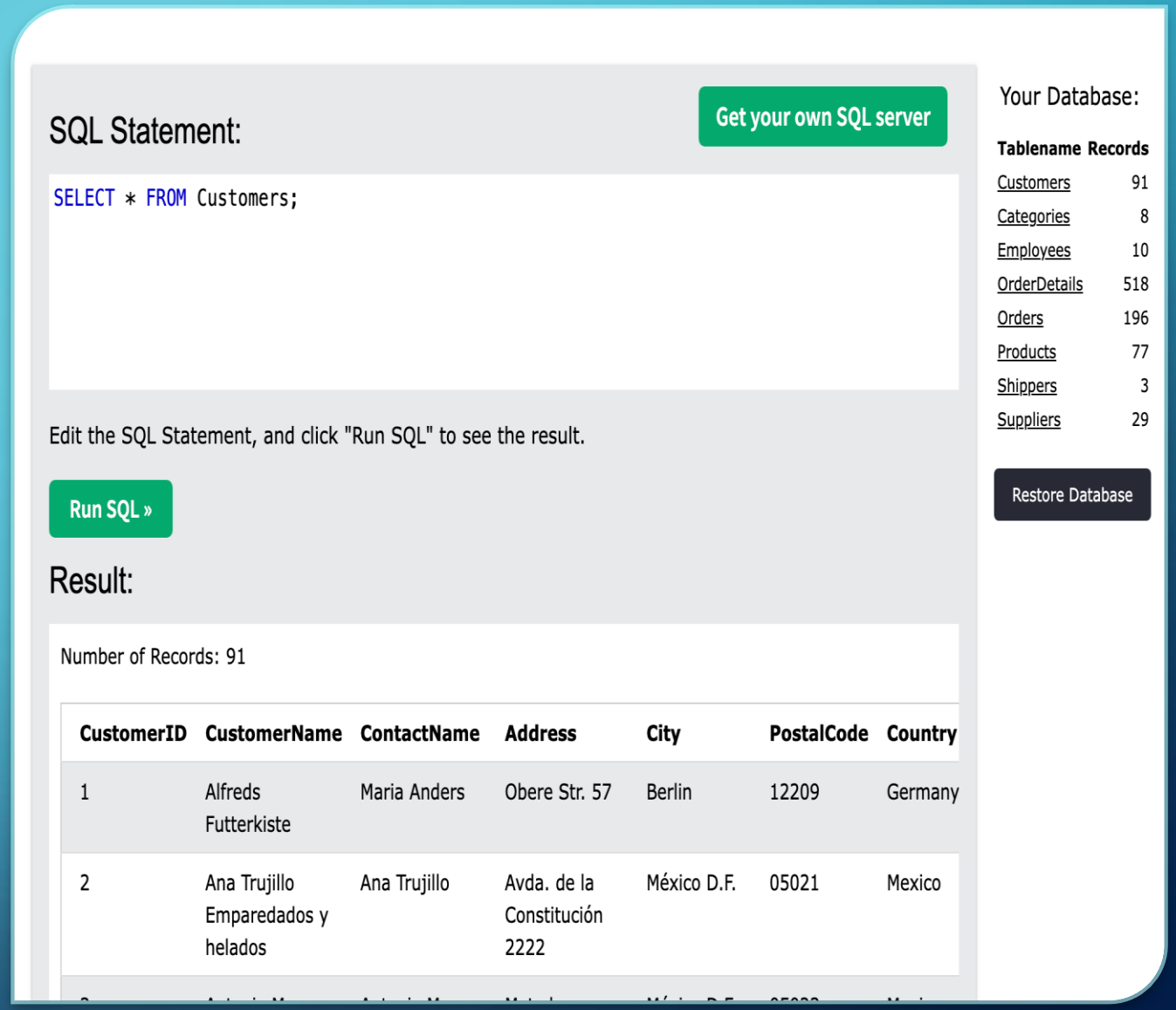
W3 SCHOOLS – DATA BASE

- In your browser open the following url to work with a SQL database in W3Schools.
- https://www.w3schools.com/sql/trysql.asp?filename=trysql_editor



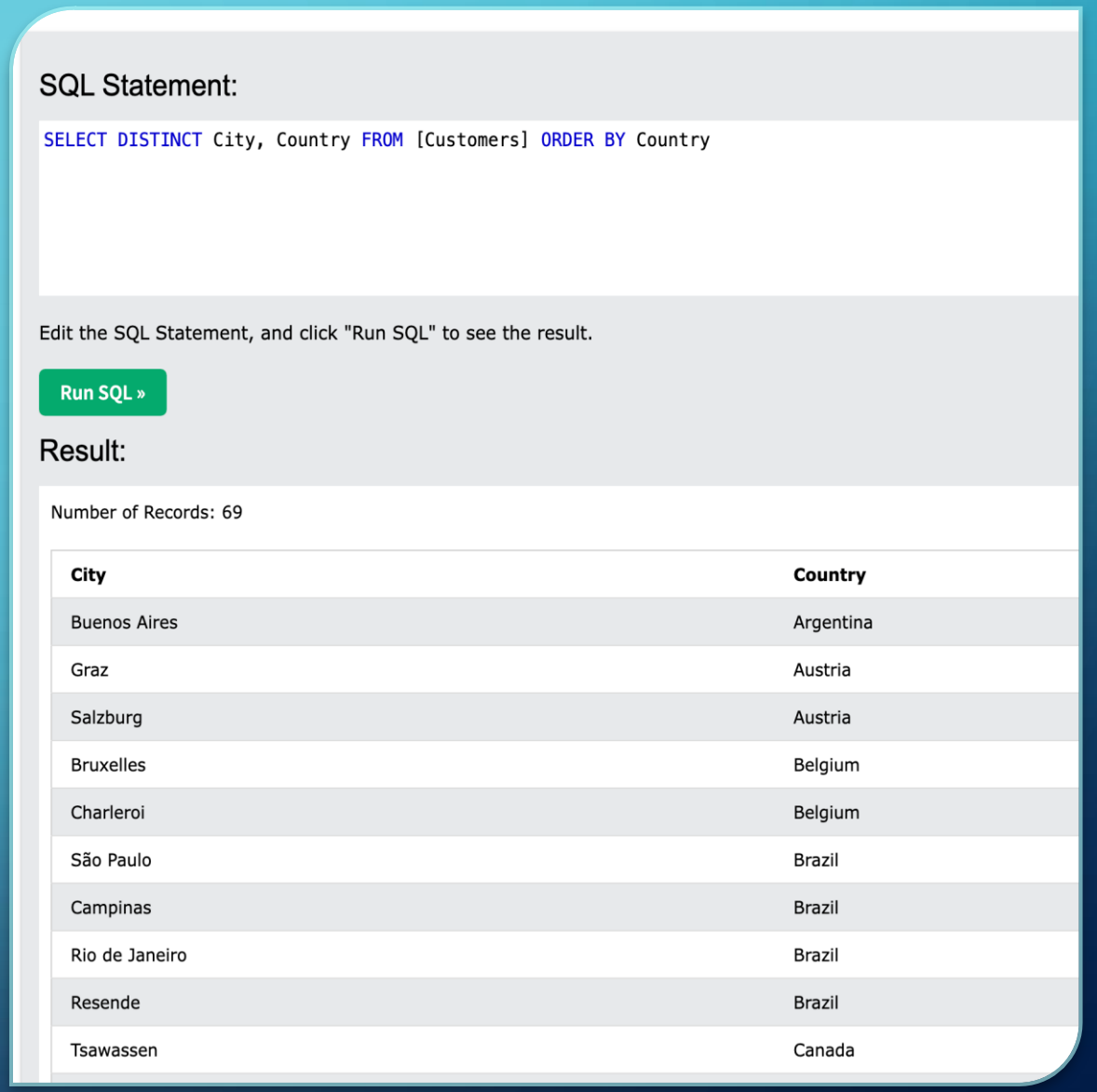
SELECT * FROM <TABLE>

- SELECT **statement is used to select data from a database.**
- **The** FROM **command is used to specify which table to select data from.**
- * is used to return all columns of data in the table.
- The absence of a **WHERE** command means return all rows.



SELECT DISTINCT AND ORDER BY

- The DISTINCT clause returns only UNIQUE records (removes duplicate records).
- ORDER BY sorts the results in alphabetical or numeric order depending on table fields/columns in the SELECT statement
- Try the following
  - SELECT DISTINCT City, Country
    FROM [Customers]
    ORDER BY COUNTRY



SQL Statement:

```
SELECT DISTINCT City, Country FROM [Customers] ORDER BY Country
```

Edit the SQL Statement, and click "Run SQL" to see the result.

Run SQL »

Result:

Number of Records: 69

City	Country
Buenos Aires	Argentina
Graz	Austria
Salzburg	Austria
Bruxelles	Belgium
Charleroi	Belgium
São Paulo	Brazil
Campinas	Brazil
Rio de Janeiro	Brazil
Resende	Brazil
Tsawassen	Canada

SQL AGGREGATE FUNCTIONS

SQL function	returns
AVG()	the mean average of the elements in the column
COUNT()	the total number of elements in the column
DISTINCT()	the number of distinct values across the column
MAX()	the largest-value element in the column
MIN()	the smallest-value element in the column
SUM()	the arithmetic total of all values in the column

- TRY the following in Customer Orders Database
- SELECT MAX(OrderDate) , COUNT(*) FROM [Orders]
- SELECT MIN(Price), MAX(Price) , AVG(PRICE) FROM [Products]
- SELECT DISTINCT Country FROM [Customers]

USING THE WHERE CLAUSE

The WHERE clause is used to returns the rows meeting the criteria

Try the following and let's discuss your results

- SELECT * from Suppliers WHERE Country = "USA"
- SELECT * FROM [Customers] where City = "London"
- SELECT * FROM [Products] Where Price >= 18
- SELECT * FROM [OrderDetails] where Quantity < 5

SQL OPERATORS: AND, OR, NOT

SQL Operators are used within the WHERE Statement and CASE Statement.

Let's focus on WHERE Statement

```
SELECT * FROM Customers
        WHERE Country = "Argentina" OR
Country = "Venezuela"
```

```
SELECT * FROM Customers
        WHERE Country = "Venezuela" AND
PostalCode = 5022
```

LIKE CLAUSE

- The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.
- There are two wildcards often used in conjunction with the LIKE operator:
- The percent sign (%) represents zero, one, or multiple characters
- The underscore sign (_) represents one, single character

JOIN – JOINING TABLES

- A JOIN combines columns from one or more tables to a new table.
  - INNER JOIN – returns each row in the two joined tables that have matching column values
  - LEFT OUTER JOIN - The result of a **left outer join** (or simply **left join**) for tables A and B always contains all rows of the "left" table (A), even if the join-condition does not find any matching row in the "right" table (B).
  - RIGHT OUTER JOIN - A **right outer join** (or **right join**) closely resembles a left outer join, except with the treatment of the tables reversed.
  - FULL OUTER JOIN - combines the effect of applying both left and right outer joins. Where rows in the FULL OUTER JOINed tables do not match, the result set will have NULL values for every column of the table that lacks a matching row. For those rows that do match, a single row will be produced in the result set (containing columns populated from both tables).
  - CROSS JOIN – returns the Cartesian product of rows from tables in the join.
    In other words, it will produce rows that combine each row from the first table with each row from the second table.

INNER JOIN EXAMPLE

```
SELECT ORDERID ,
SUM(OrderDetails.Quantity *
                Products.Price )
FROM [OrderDetails]
JOIN [Products]
    ON OrderDetails.ProductID =
        Products.ProductID
GROUP BY ORDERID
```

SQL Statement:

```
SELECT ORDERID, SUM(OrderDetails.Quantity * Products.Price)
FROM [OrderDetails]
JOIN [Products]
    ON OrderDetails.ProductID = Products.ProductID
GROUP BY ORDERID
```

Edit the SQL Statement, and click "Run SQL" to see the result.

Run SQL »

Result:

Number of Records: 196

OrderID	SUM(OrderDetails.Quantity * Products.Price)
10248	566
10249	2329.25
10250	2267.25
10251	839.5
10252	4662.5
10253	1806
10254	781.5
10255	3115.75
10256	648
10257	1400.5

JOINS: OUTER LEFT/RIGHT

```
SELECT Customers.CustomerName,  count(Orders.OrderID)
    FROM [Customers]
    LEFT JOIN [Orders] ON Orders.CustomerID = Customers.CustomerID
    GROUP BY Customers.CustomerName
```

ACTION: Re-write this statement using RIGHT JOIN

WEEK 1: PRACTICE ASSIGNMENT

- Using the W3Schools Database answer the following questions:
  1. Which customer has the most number of Orders?
  2. Which customer has spent the most money in Orders?
  3. Are there any employees that went to Boston College? Who?
  4. How many products are there by category? List out CategoryName, and number of products?
  5. How many orders used “Speedy Express” Shipper?

What other insights can you provide?

LEARNING ANG PRACTICING: SQL RESOURCES

- Online Databases for learning
  - https://www.w3schools.com/sql/trysql.asp?filename=trysql_editor
  - The following 2 databases are the same schema, but in.
    - https://www.db-fiddle.com/f/6eXpPSRFQgzdKUCjSsbSF4/9 – No login required but you need to save you work elsewhere for backup.
    - https://replit.com/@sqlSylvia/GDI-SQLIntro. - replit you need an account to save your work

- SQL Reference information
  - https://www.w3schools.com/sql/default.asp
  - https://www.tutorialspoint.com/sql/index.htm