Loading and Viewing a County SQL Database
Version 4 – 8/4/2022

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Downloading Data Files

1. The installation process of Microsoft SQL Express does not include network connectivity, you must store SQL databases and queries in a local file system. We recommend a file structure similar to the following screenshot.
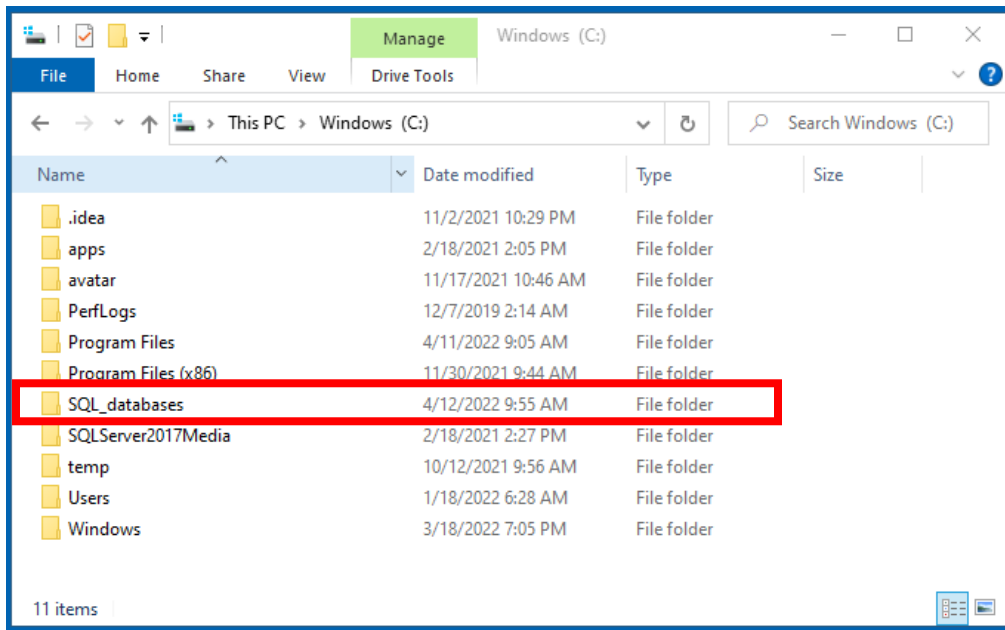
2. Create a folder called **SQL_databases**. Within that folder create two folders called **ORION_County_DB** and **Query_Scripts** (you will need this folder later).
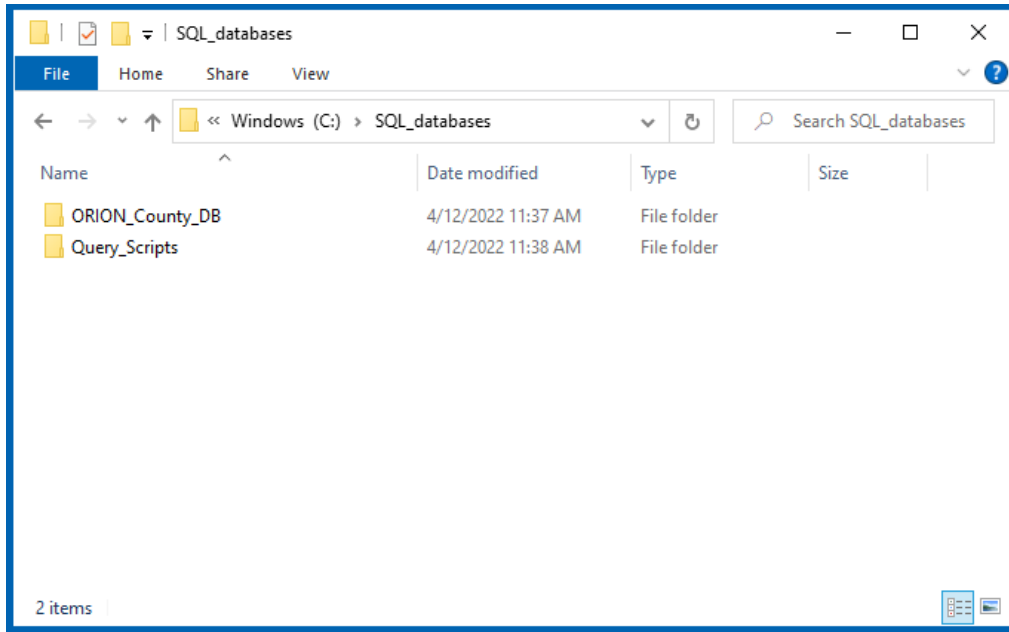
3. Within a browser, go to Montana State Library FTP, within the SQL database directory, download the **BEGIN HERE.ZIP** and unzip it into a folder called **Documentation**. There is a **Revised Data Dictionary.xlsx** & **Orion Data File Diagram.pdf** within that folder that will be handy to reference from time to time in the future.

4. The county directories are listed by the county number (often referred to as the county license plate number), see a complete list of the counties here. Click on the **COUNTY [county number].ZIP** to download the SQL database for that county. Move or save that zip file to your **ORION_County_DB** folder.

    a. There is a Statewide directory (**STATE_WIDE.ZIP**) but it will run incredibly slow using Microsoft SQL Express. The speed will depend on how many records you need to pull. An example of when you'd want to use the Statewide SQL database is to pull a table from 2-5 counties (i.e. residential buildings for Madison, Gallatin & Park counties).

5. You'll need to extract the zip file you previous saved into your **ORION_County_DB** folder. You can either extract the zip file with the default Windows tools that will create a folder to extract the content to or use 7zip to use the method **Extract Here** to copy the file to the base folder of **ORION_County_DB**. Either method will work fine. The below screenshot shows the folder after the zip file was extracted (COUNTY5 is Lewis & Clark County). Feel free to rename this folder to the county name or to something more recognizable.
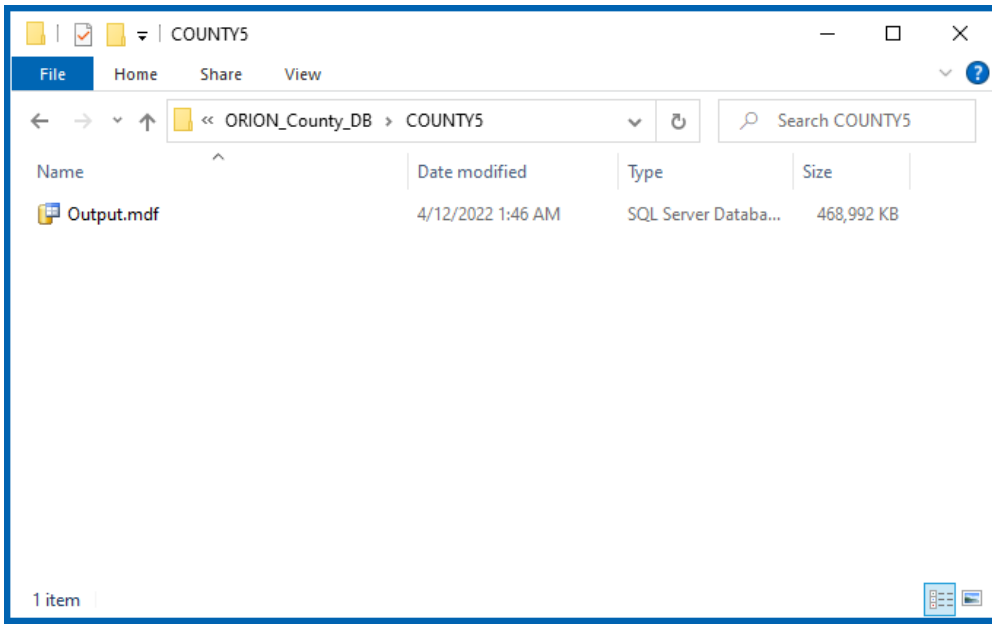
Loading SQL Data Files in SQL Server Express

1. Open Microsoft SQL Server Management Studio (SSMS)
   a. Go to **Start>Microsoft SQL Server Tools 18>SQL Server Management Studio**
      i. Or you may have a desktop icon
   b. Run the program as administration by right clicking **More>Run as Administration**
   i. Or right-click **Run as Administration** if on the desktop
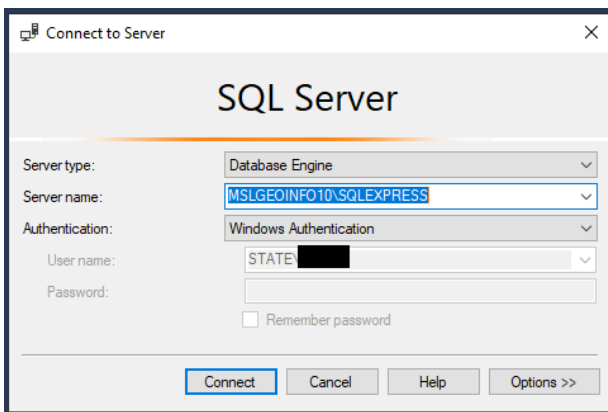
2. You should the screen above. By default, your server name should appear as *Your Computer Name\SQLEXPRESS*. Click **Connect** and you should be connected to the SSMS.
   a. If you receive an error, it may be related to your server name.
   b. Try entering in as the Server name <u>either</u>:
      i. LocalHost\SQLExpress
      ii. LocalHost

c. If there's still issues, you can try clicking the dropdown menu for Server name and then click **browser for more..>**. Expand **Database Engine** and you should see your local server name. Click on it and then click Ok.
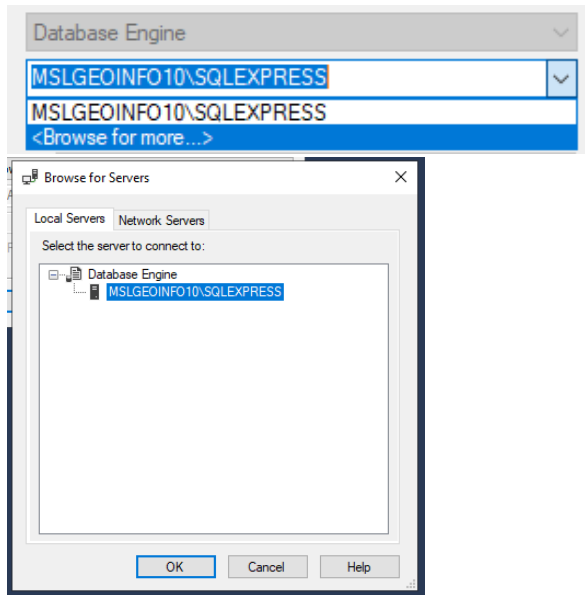

3. Attaching a county SQL database file
   a. Once connected to SSMS, you will see a similar view as the screenshot below:
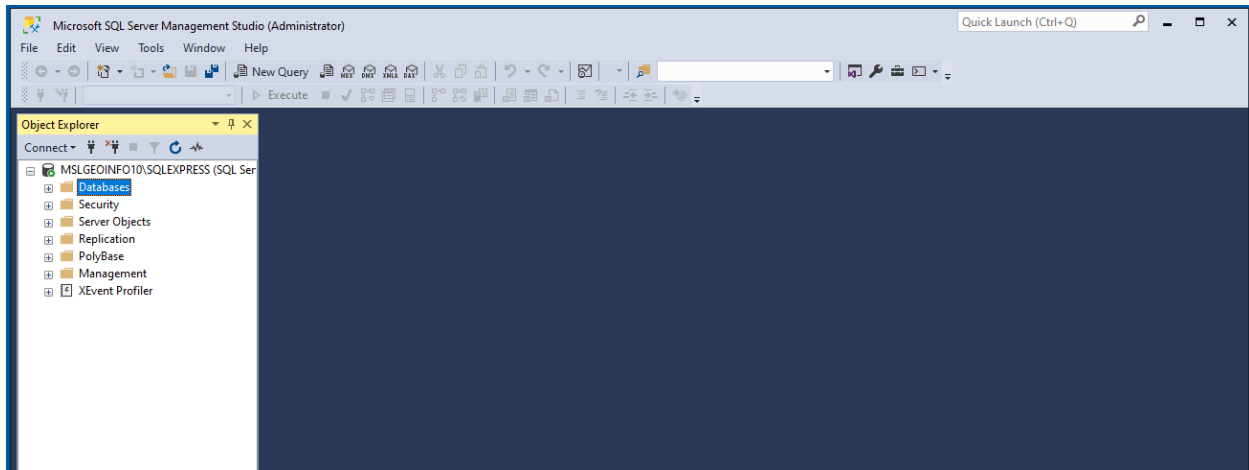
   b. Right click on the **Databases** folder (on the left side of SSMS navigation screen) and click on **Attach**.
   c. Click the **Add** button. Navigate to your SQL_databases/Orion_County_DB folder (or whatever you decided to call it in Downloading Data Files > Step 1.) and expand the county database you downloaded. In the county folder, you will find a file with and **.mdf** extension.
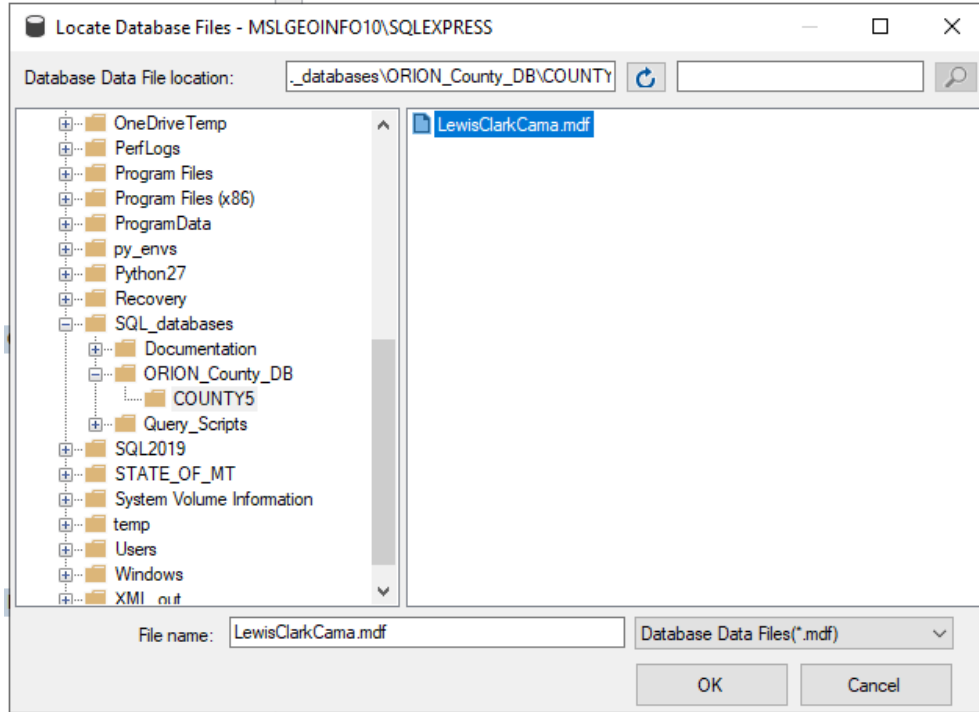
d. By default, this file will be named County **Output.mdf**. You can rename these files within the Windows/File Explorer window to **LewisClarkCama.mdf**, (as shown in the screenshot above) or to the county you are working with.

e. In the previous screenshot we **renamed (prior to attaching)** the .mdf file to something more recognizable than just "Output". Click on desired file you want to attach and then click **OK**.

f. At this point, you should see the screen below:
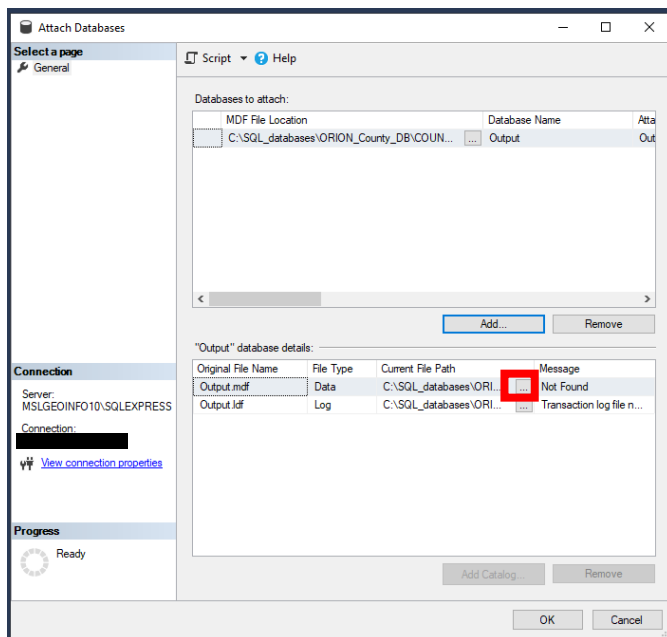
g. Click on the box outlined in red. This will take you back to your original local database folder. Click **on the file with the .mdf extension** – in this case we had called the file **LewisClarkCama.mdf** and click **Ok**.

h. At this point your screen should look like the following screen below:
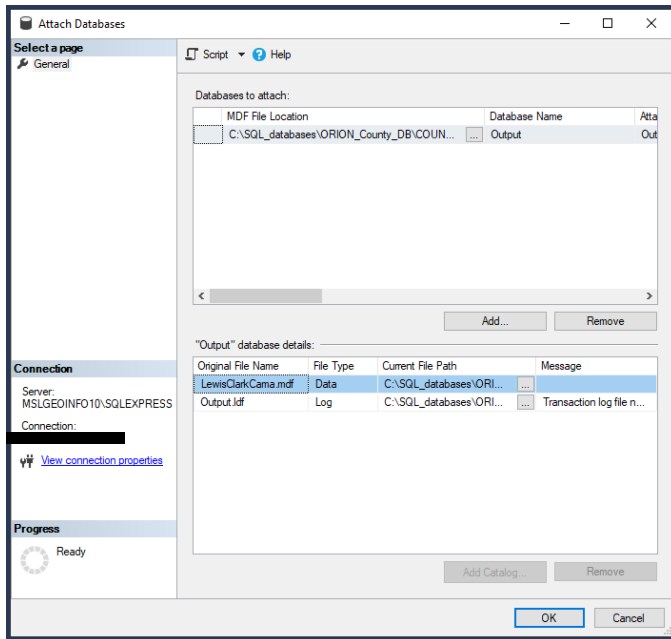
i. Click on the Output box, highlighted in red (below) under the Attach As column and rename this to county name you're working with (i.e. LewisClarkCama).
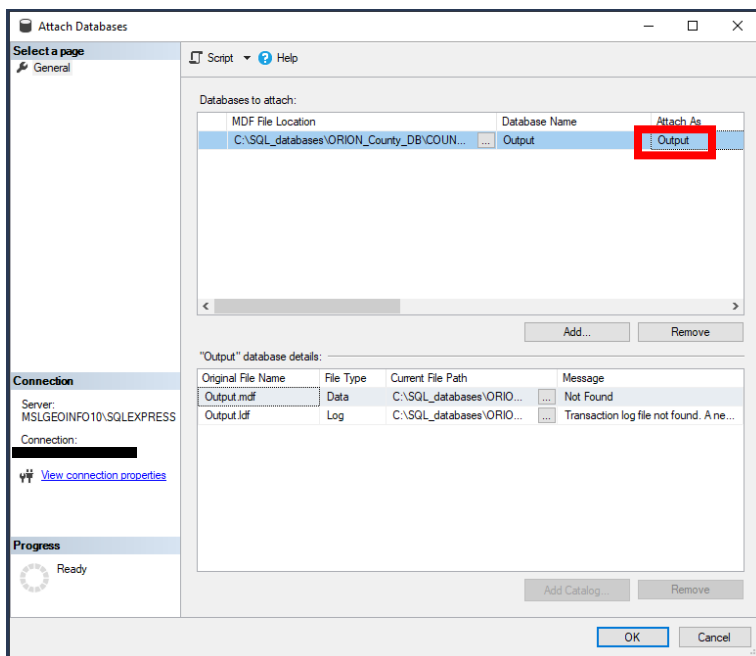

j. Click on the **Output_log.ldf** box outlined in green. At this point there is no log file associated with the database. When you click on the box the **Remove** button highlighted by the purple box will activate. Click **Remove**. Click **OK**.
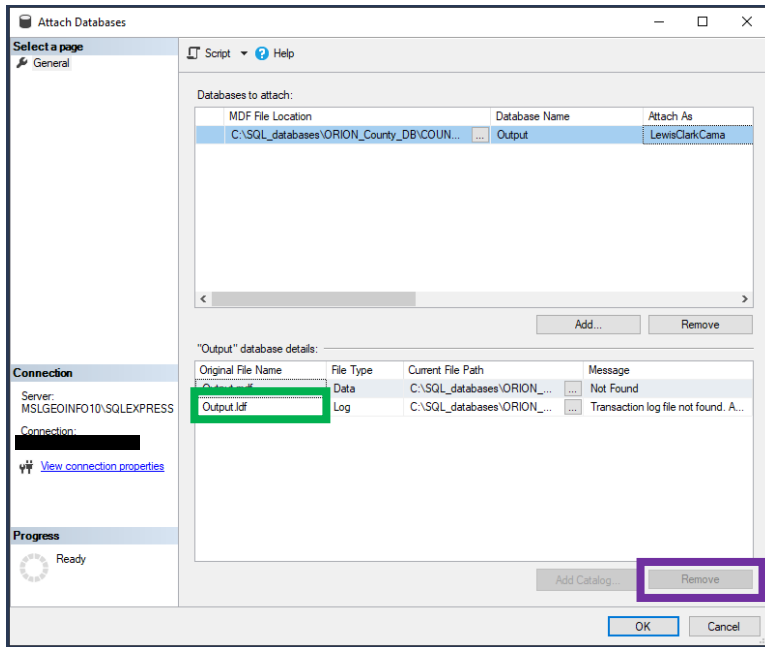
k. If you expand your database folder on the left, you will see that the database is attached with the name you chose to rename the database in step 3d (or if you didn't rename it will be "Output").
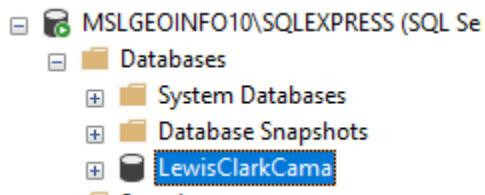

l. If you encounter an error, like the error prompt below, it may mean you did not run the program as administrator, see **Step 1b**.
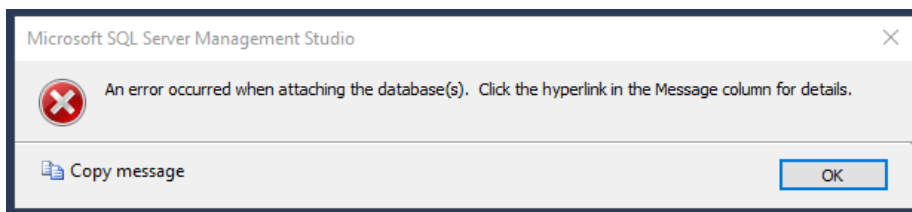
Opening the Database and Performing some Basic Queries

1. Within SQL Management Studio, expand the county database you just attached to by clicking the plus sign. Expand the Tables folder and you will see a list of database tables starting with **dbo.[table name]** (you can do this in left hand pane as shown or by double clicking the county database and Tables in the left-hand pane).
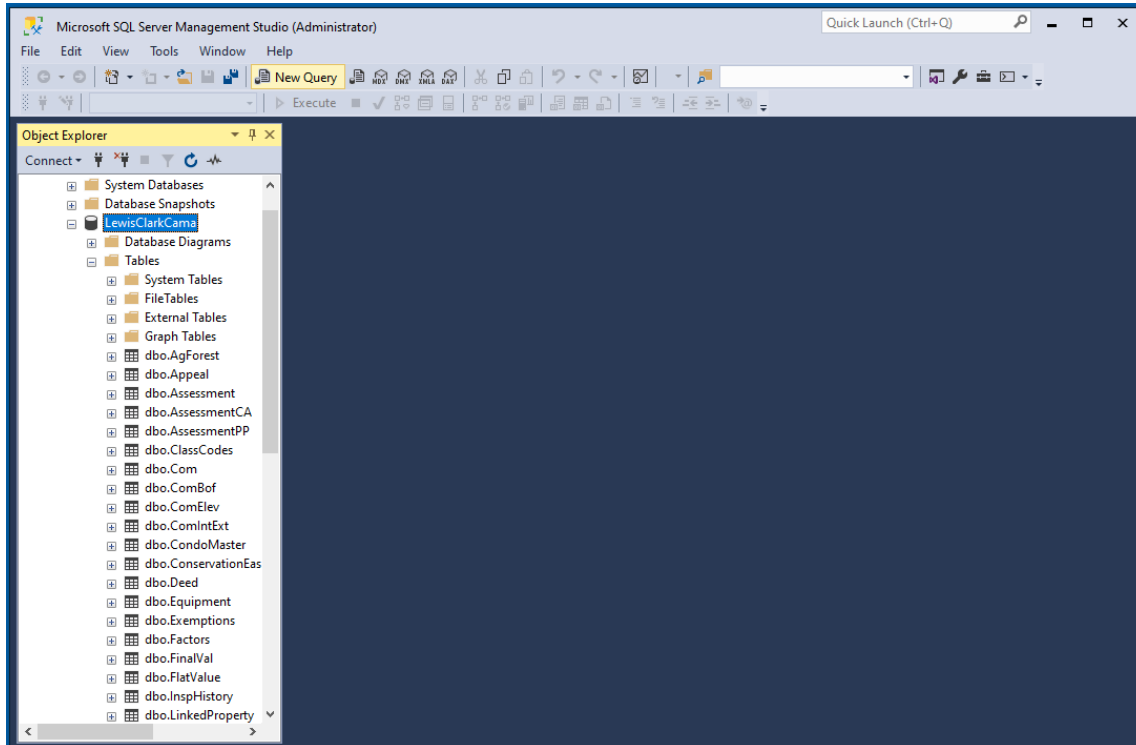
2. Right click on any of the tables and click on **Select top 1000 Rows**. The contents of the table will display in a manner similar to most databases you may be familiar with.

3. To create a simple query, click **New Query** on the toolbar (button is highlight in red below).
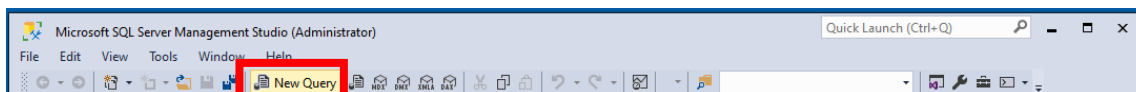
   a. When setting up a SQL statement, you always want to start with Select * from [table]. By putting this in the statement, it will select every column in the table. Unless you only want to display certain fields, then you wouldn't put an asterisk (*).
   b. An example of this is Select * from Res. If you are only connected to one database, it should auto-populated the 'Res' portion and know what table you're talking about. In other cases, you may need to lead with the database name (i.e. LewisClarkCama.dbo.Res) to complete the first line of the statement.

> i. If you hover over 'Res' it should spell out the full name of the table

c. Next, you need to add a 'Where' clause. This is prompting the SQL statement to ask basic questions and the results will provide in a table below. For example, if you want to know how many residential structures are built the year 2000 and after (meaning greater than or equal to), you could set up your where clause like this: **Where YearBuilt >= 2000 And TaxYear = '2022'**.

d. Click **Execute** to view the results of query.

e. Results will vary depending on the county database you have attached. Below is a screenshot of the results from the Lewis & Clark Cama database.

f. As you can see from the above table, there are 8,091 rows, which means there are that many houses built the year 2000 and later.

g. Continue to add to this query if you wanted to know how many of those residents where single-family homes which the code within the database is 'SFR'.


h. Expanding on this query further, if you wanted how many houses were built the year 2000 and later, that were a single-family home and had a metal roof.

i. For additional help on creating additional SQL statements, see the SQL Helpful Resources section on the last page of these tutorial.

```
SQLQuery1.sql - M...STATE\cwb374 (54))*  ⊕  ✕
   ⊟Select * From Res
    Where (YearBuilt >= 2000 And ResType = 'SFR' And RoofMaterial_Desc ='5 - Metal') And TaxYear = '2022'
```

Creating a Database View

1. There are two purposes for creating a database view: (1) is to limit the number of fields that you see with the results table and (2) is to join other tables together and pull off certain fields that you are interested in for a property or building.

2. The Montana State Library provides for download a small number of "canned" database views. If you downloaded the **BEGINHERE.zip** you should already have a Query_Scripts folder. If you do not already have this folder, download the **QueryScripts.zip** on the Montana State Library FTP.

3. In either scenario you acquired the query scripts, copy the **.sql files** (should be seven files) into your **Query Scripts** folder that you created in Downloading Data Files > Step 2.
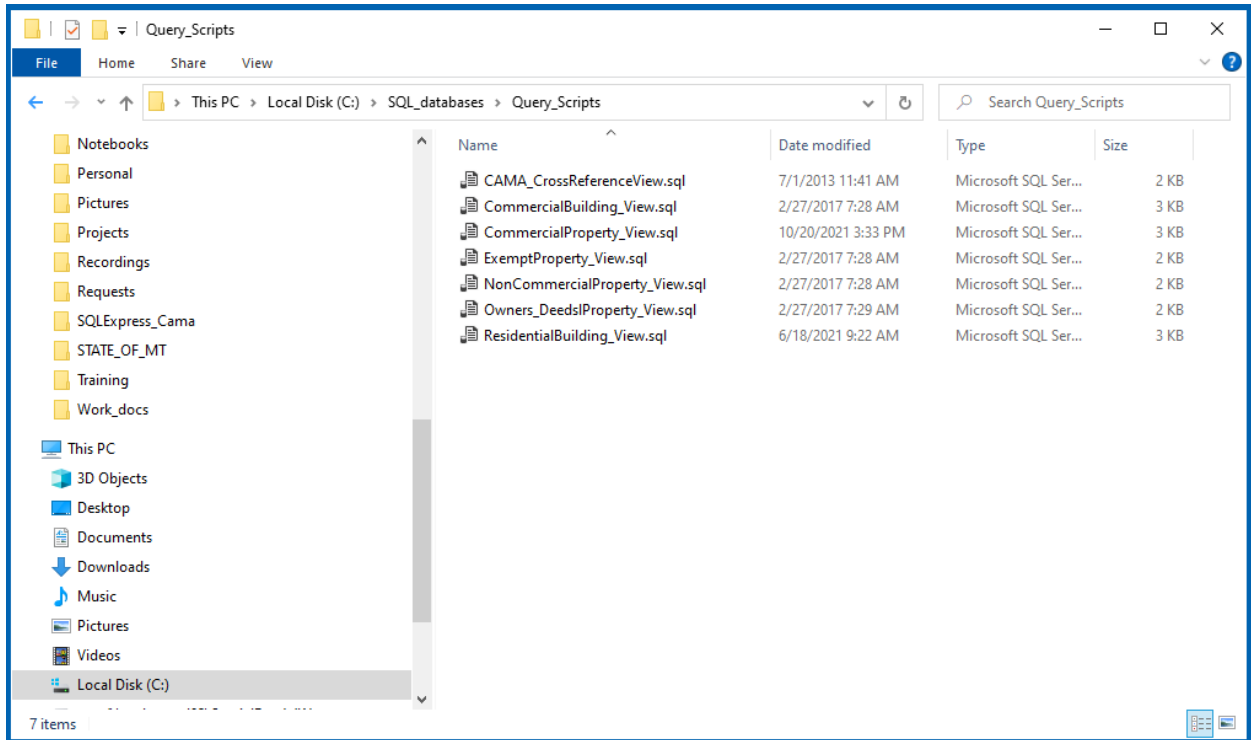

4. For this example, we will import the **ResidentialBuilding_View.sql** file. Within SQL Management Studio, click **File>Open>File** and navigate to your Query_Scripts folder. Select the **ResidentialBuilding_View.sql** file or any of the other files if it suits your purpose better and click **Open**. At this point you may (ignore this warning if you do not) see the query with a lot of red underlines as in the screenshot below. The red underlines

indicate an error in the query. That is because the query is not attached to your county database but to the master database (see red box).
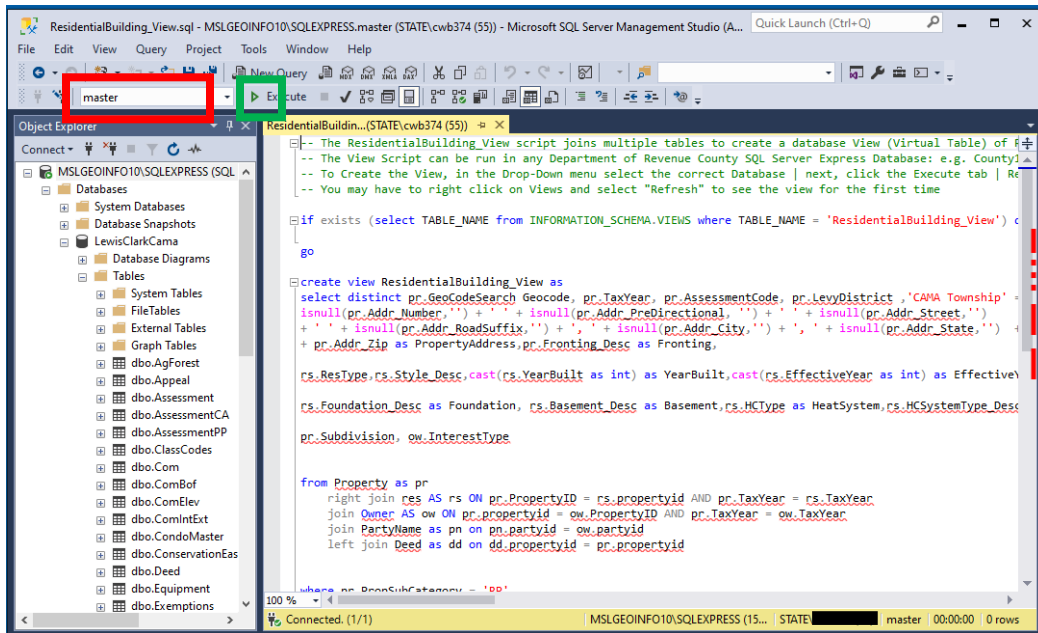
5. Click the dropdown arrow where you see "master" and change it to your county database. The red underlines should disappear indicating that the script is good to run. Click **Execute** – the green box on the screenshot above. You should see a message that says **Command(s) completed successfully.**

6. A new view table is created from the previous result. Expand the Views folder to see **dbo.Residental_View**. If you don't see this view table, right-click on the Views folder and click Refresh.

7. Right-click on the **dbo.Residental_View** and click on **Select Top 100 Rows** to open it. This view shows information about every residential building that the Department of Revenue has information on for the county.
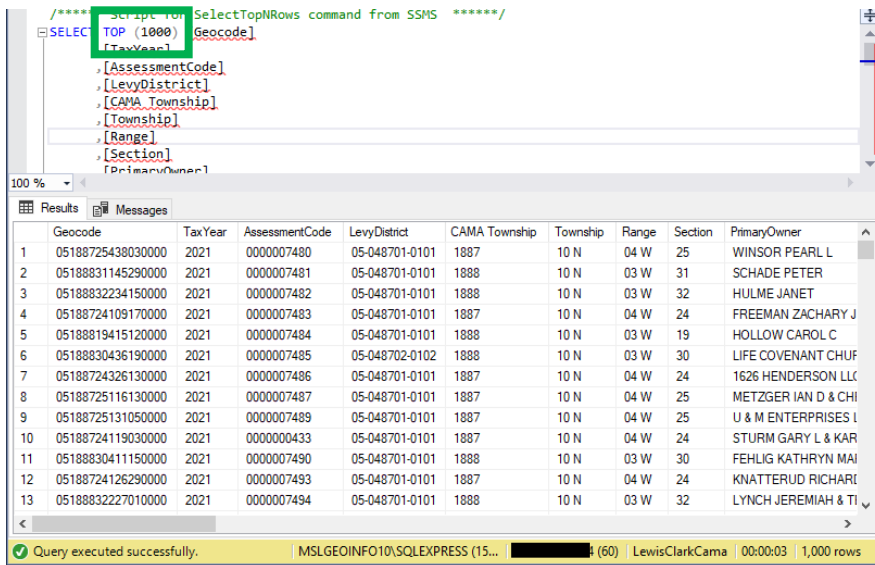
8. To open the entire results for the residential building view, change the query within green box you see in the upper screenshot. Remove **TOP (1000)** from the SQL statement, similar to the screenshot below.
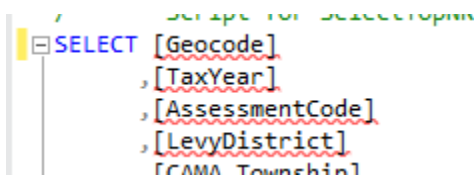
9. Click **Execute** to view the results.

10. In the example above, the total number of residential buildings in the county are **20,985**.
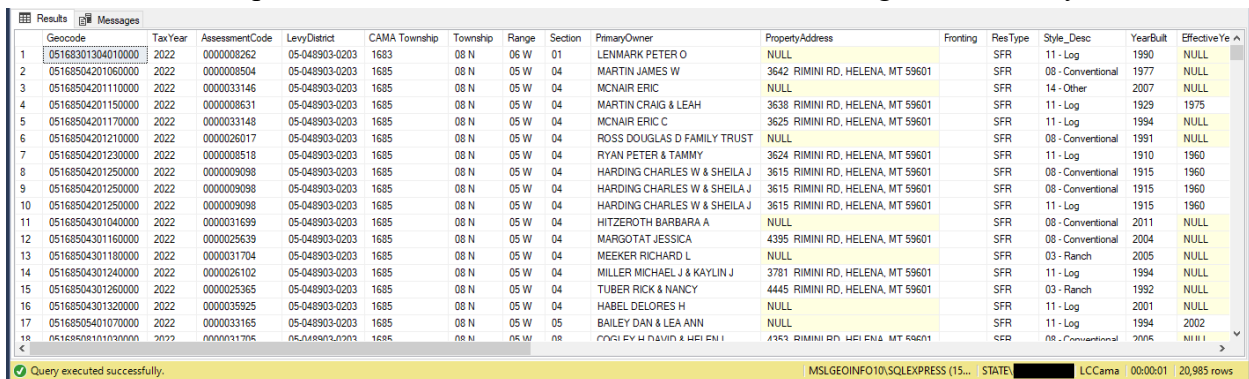
11. Similar to the example outlines in the previous section, "Performing some basic queries", you can add to this script to answer certain questions.

12. The question you may want answered is how many residential structures were built before 1970, have 3 or more bedrooms and do not have a metal roof.

```
        ,[Basement]
        ,[HeatSystem]
        ,[HeatType]
        ,[HeatFuel]
        ,[Subdivision]
        ,[InterestType]
    FROM [LewisClarkCama].[dbo].[ResidentialBuilding_View]
    WHERE YearBuilt < 1970 AND Bedrooms >= 3 AND RoofMaterial <> '5 - Metal'
```

13. The table returned **4,059** records

SQL Helpful Resources

1. W3Schools - SQL Tutorial: https://www.w3schools.com/sql/
2. Codecademy - Learn SQL: https://www.codecademy.com/learn/learn-sql
3. Learn SQL: https://learnsql.com/
4. Khan Academy - Intro to SQL: https://www.khanacademy.org/computing/computer-programming/sql
5. SQLZoo: https://sqlzoo.net/wiki/SQL_Tutorial

Contact Information

I'd like to thank you for going through this tutorial document and I hope you found it helpful. If you have any additional questions, feel free to reach out to me and I'd be happy to set up a teleconference meeting to answer your questions or to discuss potential solutions you may be experiencing. My contact information is below:

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