Using Geography in SQL Server

This assignment will use **AdventureWorks**. We will explore using the capabilities built-in to SQL Server for locations and mapping. This is at an introductory level.

In SSMS, look at the table **Person.Address**. Notice the column **SpatialLocation** with a data type of **geography**. Look at the data in this table. **SpatialLocation** is stored as hexadecimal. It uses ellipsoidal (round-earth) data including GPS latitude and longitude coordinates.

When data is inserted into a geography data type it is encoded using a Spatial Reference Identifier (SRID), a system defined by the European Petroleum Survey Group (EPSG) standard. The data in AdventureWorks was encoded with SRID 4326 which is very common. This standard identifies the units of measure used in the location. SRID uses meters and a specific GPS system.

This assignment will walk you through translating the SpatialLocation in Person.Address into information that can be used by Google maps and then creating a personal Google map containing the home addresses of AdventureWorks employees.

1. The first step is to create a user-defined function. This class does not usually cover this; however, I thought it would add a little something to this assignment. User-defined functions are used the same as built-in functions such as COUNT() and SUM(); however, instead of counting, the function does whatever you have designed it to do. This function will have two parameters, a first name and a last name and will return the names in the format last name, first name, for example **Williams, Therese**. Use the following query code to create the function. Do not be concerned if you have syntax errors. Intellisense is frequently wrong with working with creating functions and procedures. It is true that the CREATE FUNCTION statement must be the first and the only statement in a batch but it is OK to have others before or after it if you only highlight the complete CREATE FUNCTION statement (all of the below) when you execute. There is more information about batches in step 7. (This was also in the Chapter 7 SQL file on D2L.)

```
CREATE FUNCTION uf_LNFN (@FN nvarchar(50), @LN nvarchar(50)) RETURNS nvarchar(102)
BEGIN
    RETURN RTRIM(@LN) + ', ' + @FN
END
```

2. Use the function in a SELECT query by executing the following code:

```
SELECT dbo.uf_LNFN('John','Smith')
```

3. (10 points) Use the function to create a list of employees with their name called EmployeeName, the name of their current department called Department, and their job title. Put the columns in the order listed.

> **Answer #1**
> **Copy/Paste the query as word keeping the color-coding.**
> **Use the Snipping Tool to capture the Results area (including the status bar) of your query and paste it.**

4. (10 points) Modify the previous query and add in, after the previous columns, the City, PostalCode and SpatialLocation of the employee's **home** address. You will need to join two additional tables to do this. You may hardcode the AddressType.

> **Answer #2**
> **Copy/Paste the query as word keeping the color-coding.**
> **Use the Snipping Tool to capture the Results area (including the status bar) of your query and paste it.**

5. (10 points) Modify the previous query and add two columns after the City. They will be

    SpatialLocation.Lat AS Latitude,
    SpatialLocation.Long AS Longitude

    .Lat and **.Long** are built-in methods that will return the Latitude/Longitude of the geography data type.

> **Answer #3**
> **Copy/Paste the query as word keeping the color-coding.**
> **Use the Snipping Tool to capture the Results area (including the status bar) of your query and paste it.**

6. (10 points) Modify the previous query to insert the results into a temporary table. Do not paste results from a SELECT on the temp table. Paste the results from executing the query.

> **Answer #4**
> **Copy/Paste the query as word keeping the color-coding.**
> **Use the Snipping Tool to capture the Results area (including the status bar) of your query and paste it.**

7. (10 points) Also, this class does not typically cover making changes to the structure of tables. However, we need to make a change to the temp table. Execute the following query (substituting the name of your temporary table.)

```
ALTER TABLE #t
    ADD Distance float
```

We also want to put information into this column. To do this, we need a variable. For the variable to be active when it is used in the UPDATE query, we will execute a **batch** – multiple statements that must be executed together. Execute the following statements by either highlighting all of them and executing or putting them into a query window by themselves.

```
DECLARE @g geography
SET @g = geography::STGeomFromText('POINT(-122.136626 47.642275)', 4326)
UPDATE #t
    SET Distance = SpatialLocation.STDistance(@g)/1609.344
```

The first statement declares a variable. The second statement uses a provided method to set the value of the variable to a hexadecimal number representing the geography value, using Latitude and Longitude of an address that I decided would be the AdventureWorks Office. It is an address in Redmond, WA. The UPDATE statement changes the value of the Distance column in the temporary table to the difference in distance from the employee's home (SpatialLocation) and this variable. Remember earlier that I said SRID 4326,

which AdventureWorks is using for encoding the geography data type, returns meters for distance. Dividing that value by 1609.344 gives miles.

Select the following columns from your temporary table (in this order);

EmployeeName
Department
City
Latitude
Longitude
Distance

Answer #5
**Copy/Paste the query as word keeping the color-coding.**
Use the Snipping Tool to capture the Results area (including the status bar) of your query and paste it.

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8. (10 points) Export the results from the previous query as a .csv file. Open the CSV file with Excel. Insert a row at the beginning and add the column names from Answer 5. Insert a row after this and add EmployeeName of AdventureWorks, Latitude of 47.642275 and Longitude of -122.136626 and Distance of 0. (This is the office). Save this as a **.CSV**.

**Answer #6**
Use the Snipping Tool to capture the first 20 rows or so of the Excel spreadsheet and paste it.

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9. (10 points) In a web browser, go to mymaps.google.com. You may have to be logged in with a google account to do this. Your UCO email should be an active google account. Click **Create a New Map**. You should see the following:
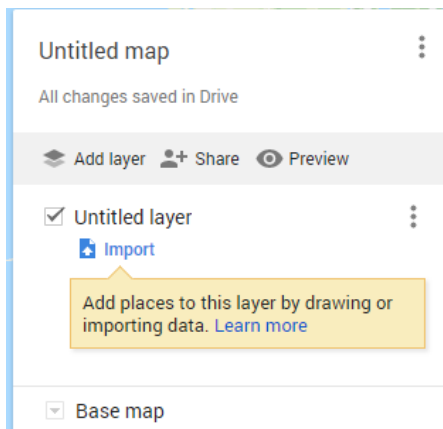
Click Import. Drag your CSV file from Answer 6 to the window.

You should see the following with Latitude and Longitude marked.
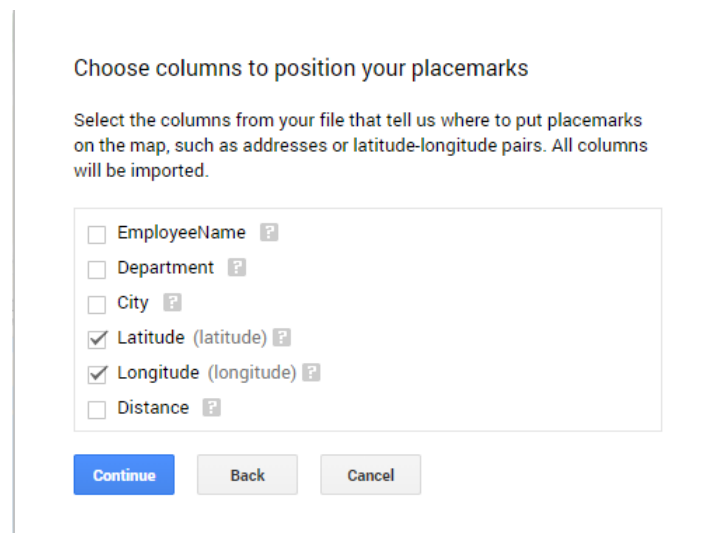
After you have continued, the following will be displayed. Choose EmployeeName to title your markers and Finish.

Choose a column to title your markers

Pick a column to use as the title for the placemarks, such as the name of the location or person.

- ● EmployeeName ?
- ○ Department ?
- ○ City ?
- ○ Latitude ?
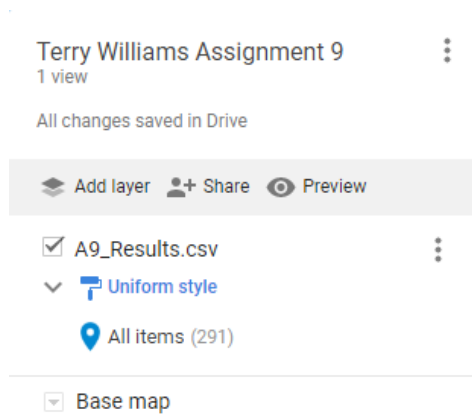- ○ Longitude ?
- ○ Distance ?

[Finish] [Back] [Cancel]

The map will be loaded with your locations. Click on the marker that is between AR and TN. You will see information about that location.

Answer #7
Use the Snipping Tool to capture the Popup Window and the icon that goes with it and paste it.

10. (10 points) In the navigation box in the upper left corner, change the name of the Untitled map to your name Assignment 9, see0 example below. In the layer using your CSV file, click ON the style (Uniform style). In the Set Labels dropdown choose EmployeeName as the label. In the Group Places by dropdown, choose Style by Data Column: Department. You will now see a list of departments in the navigation box.

Terry Williams Assignment 9
1 view

All changes saved in Drive

- ◆ Add layer ≗+ Share ◉ Preview

- ☑ A9_Results.csv
- ∨ ⌙ Uniform style
- 📍 All items (291)

- ▽ Base map

Answer #8
Use the Snipping Tool to capture the entire 'navigation' box and paste it.

11. (10 points) Click on Research and Development and zoom the map in until you can see all the markers for this department. There are 4 in Washington State and 1 in the San Francisco area. Then click on the paint can that will be to the right when you hover over the department in the navigation bar. Choose an icon besides the default. Close the popup box. The last department listed is Other/No Value. This is AdventuresWorks office. Change the icon to a something other than the default. If you go to More Icons, you will find a person on a bicycle under sports! Zoom in until you can see this icon along with surrounding area. Also make it a color other than grey so that it is more visible. It should be where Whidbey Island is still visible in the north and Maury Island is visible in the south.

Answer #9
Use the Snipping Tool to capture the entire Google window and paste it.

12. (10 points) Zoom in closer until you can see the names of employees around the AdventureWorks office.

    Find Lori Kane to the slight southeast and across the lake from AdventureWorks. Click on her icon. Notice the Distance from AdventureWorks (4.43). Underneath the search bar at the top are some icons for tools. Click on the ruler to measure. Click on AdventureWorks, then click twice on the tip of the icon for Lori Kane. Depending on exactly where you clicked, you will see approximately 4.43 miles. Our measure is "as the crow flies." We don't know what algorithms are being used by Google but it is pretty close!

    If you were to get directions for traveling in a car, the distance would be different. You can use the icon that looks like a fork in the road next to the ruler to get directions. This will add a layer to your map.

    Click on the Layer Option icon ⋮ for the directions and choose step-by-step directions. This will give you the distance. Big difference!

Answer #10
Use the Snipping Tool to capture the entire Google window and paste it.

13. Submit your PDF to Assignment 8.