# CS621 2019 Week 6 – Self Assessment

Mapping Starbucks in the United States

There are no CA marks associated with this exercise. However, it is strongly advised that you complete this exercise for your own learning. These techniques will be used very frequently in CS621 for the remainder of the semester.

On Moodle for Week 6 you will find a very large SQL file with a table of data and associated INSERT statements for ALL Locations of Starbucks cafes in the United States of America. There are over 15,000 insert statements in this table. Also on Moodle for Week 6 you will find an ESRI Shapefile for the United States which is downloadded from the US Census Bureau. The map of both datasets are shown below. The US States of Alaska and Porto Rico are not included in this Shapefile. Both datasets are represented in EPSG:4326. You are encouraged to use https://epsg.io/2163 for any distance-based calculations.
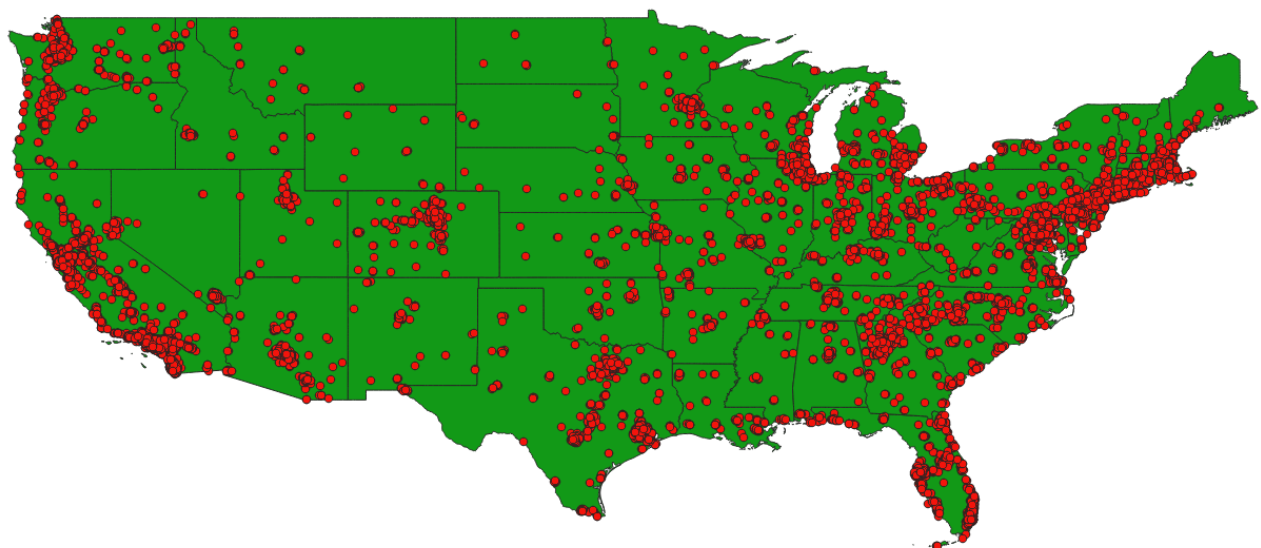
This self assessment exercise will test your understanding of what we have learned with QGIS for visualisation. It will also test some concepts in other aspects of Spatial Databases and SQL.

Before you attempt the questions below you will perform two steps.
1. You will run the SQL file for the Starbucks Cafe locations in your PGAdmin
2. You will use DB Manage to IMPORT the SHAPEFILE representing the 49 states shown above. Please note for QGIS 2.X users you should not click the box that indicates that multipart geometries are created as single part geometries (Part 2 of Thursday's lecture).

A) Develop a TRANSACTION block where **you DELETE all cafes in New York state and California State**. The *state* column in the Starbucks Cafe table will represent the official name of each US state where the cafe is located. Run the TRANSACTION as shown in the lectures. Create a VIEW with a simple SQL statement to display ALL of the data in the Starbucks cafes left in the database on a map within QGIS.

B) Write an appropriate **ST_Dwithin** based query which displays all of the starbucks cafes within 5KM of the approximate center of Central Park in New York city. You will need to find the latitude longitude of Central Park yourself for this question. You can use **ST_Distance** if you wish.

C) Write an appropriate **ST_Contains** spatial join query which displays all of the Starbucks cafes which are in Texas or Florida state. You should create a VIEW for this query. Within QGIS you should use an appropriate background map (from Quick Map Services) and the Shapefile to display the outputs of this analysis. Use the *graduated classification* in QGIS to change the color of the points representing the Starbucks Cafes in this output by considering the value of **the 'rating' column** in the Starbucks Cafe table. Please note that you MUST use an ST_Contains query to perform a Point-in-Polygon analysis despite the fact that there is a state column in the starbucks table.

D) The geographic center of the contiguous states of the USA is often cited as Latitude/Longitude **(39.828175, -98.5795)** in EPSG:4326. This is about about 4km northwest of the center of Lebanon, Kansas. **Find the 300 geographically closest Starbuck cafes to this location.** Create a VIEW in the database for this query. Use QGIS to make an appropriate visualisation of this piece of spatial analysis. Export your map as an image. In SQL if you only want to display the first X rows in the ResultsSet of a query then you simply put the keyword LIMIT X at the end of the query. For example LIMIT 200 will only return 200 rows in the resultset.

E) Can we use some spatial analysis to consider visualising the establishment of Starbuck cafes over time? Using the SQL file provided above RESTORE your Starbucks table by running the SQL file again so that we now have all of the Starbucks data in the table. **Create TWO seperate views to represent the following**. (1) All of the Starbucks cafes which were established in 1994 (the *yearEst* column) and (2) All of the Starbucks cafes which were established in 2016. Using QGIS's DB Manger display BOTH of these views on the United States Shapefile above with an appropriate baselayer map layer from Quick Map Services. Choose the color of the point features in both views appropriately so that a user can see the difference between the 1994 and 2016 locations.