

# CS 3380 Lab Assignment 6

## 1 Directions

This assignment must be completed by **Sunday, October 12th at 11:59 PM**. You must upload your PHP code to Blackboard. The uploaded file should be named `lab6.php`. Your code must also be hosted on your Babbage account. Your lab 6 submission should be reachable and functional through the following URL:

`http://babbage.cs.missouri.edu/~<pawprint>/cs3380/lab6/lab6.php`

If that URL does not work you will lose points. Late submissions, either for the files or the URL, will not be accepted.

## 2 Tasks

### 2.1 Download

Begin by downloading an SQL dump file by executing the following commands in your terminal:

```
mkdir ~/public_html/cs3380/lab6
cd ~/public_html/cs3380/lab6
wget http://babbage.cs.missouri.edu/~klaricm/fs14/cs3380/lab6/lab6.sql
```

Note that you might not be able to copy-paste the above commands. You may need to type them manually into your terminal.

Next, run the `psql` command to login to your database. Then issue the command `\i lab6.sql` to run the commands contained within the SQL file.

### 2.2 Inspect the Data

The `lab6.sql` file will create three tables within the `lab6` schema. These tables will be identical to those used in earlier lab assignments. We're creating them in a separate schema for this assignment, so we be sure that we have a fresh copy of the data. If you write queries against your lab 4 dataset, you **might not get correct results** if you have removed or edited records.

Recall, to write SQL queries that reference tables held within schemas simply qualifying the table name with the schema name. A simple example follows.

```
SELECT * FROM lab6.city;
```

### 2.3 Implementation

You will be responsible for creating a PHP script that allows a user to execute one of the following 8 queries by selecting from a drop down box and clicking a button. The code should connect to the database and execute the appropriate query based on what is selected in the drop down box.

Be smart about how you code this. It should not take a large amount of PHP code to complete this assignment. For example, my code for this assignment is around 125 lines. You could write a PHP function that accepts a string containing a SQL statement, execute it and write out the HTML table.

Hint: If you haven't caught on already, you should recycle your PHP code from lab 2.

Your PHP page must show the number of records returned and a table of query results for the following 8 queries:

1. List the minimum, maximum and average surface area of all countries in the database

2. List the total population, total surface area and total GNP by region; order the results from largest to smallest GNP.
3. Generate a list of all forms of government with the count of how many countries have that form of government. Also, list the most recent year in which any country became independent with that form of government. The results should be ordered by decreasing count. For situations when multiple forms of government have the same count, sort these in descending order by the most recent year of independence. (Note: Some countries may have NULL for the independence year. Those countries should not be considered when finding the earliest independence year.)
4. For each country with at least one hundred cities in the database, list the total number of cities it contains. Order the results in ascending order of the number of cities.
5. List the country name, it's population, and the sum of the populations of all cities in that country. Add a fourth field to your query that calculates the percent of urban population for each country. (For the purposes of this example, assume that the sum of the populations of all cities listed for a country represent that country's entire urban population.) Order the results of this query in increasing order of urban population percentage.
6. For each country, list the largest population of any of its cities and the name of that city. Order the results in decreasing order of city populations.
7. List the countries in descending order beginning with the country with the largest number of cities in the database and ending with the country with the smallest number of cities in the database. Cities that have the same number of cities should be sorted alphabetically from A to Z.
8. For each country with 8-12 languages, list the number of languages spoken, in descending order by number of languages as well as the name of the capital for that country.
9. Using SQL window functions, write a query that calculates a running total of the sum of all city populations with each country. This running total should be calculated by accumulating the city populations from largest to smallest. The resulting output should be sorted first by country name and secondarily by the running total column. Also display the city name and city population in each row.
10. Again, using window functions rank the popularity of each language within each country. We'll assume that the percent of speakers of a language in the country is a measure of it's popularity. For each record, show the name of the country, the name of the language and it's popularity rank. The most popular language should be ranked 1, the second most popular 2, etc.

## 2.4 Using Subqueries

You may find it useful to write a query that uses a subquery in your table expression. An example follows:

```
SELECT c1.country_code, language, max_pct
FROM lab6.country_language AS c1,
(
    SELECT country_code, MAX(percentage) AS max_pct
    FROM lab6.country_language
    GROUP BY country_code
) AS zzz
WHERE c1.country_code = zzz.country_code
AND c1.percentage = zzz.max_pct
ORDER BY country_code;
```

## 3 Comparison

You can compare your version with a working copy found at:

<http://babbage.cs.missouri.edu/~klaricm/fs14/cs3380/lab6/lab6.php>