CS 3380 Lab Assignment 3

1 Directions

This assignment must be completed by **Sunday, February 15th at 11:59 PM**. You must upload your PHP code to Blackboard. The uploaded file should be named `lab3.php`. Your code must also be hosted on your Babbage account. Your lab 3 submission should be reachable and functional through the following URL:

`http://babbage.cs.missouri.edu/~<pawprint>/cs3380/lab3/lab3.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 Goals

- Loading the world database from a dump file.

- Writing queries in PostgreSQL against the world database

- Single Table Queries

- Multiple Table Queries (INNER JOIN)

- Use WHERE clause restrictions in queries

- Use DISTINCT

- Use LIMIT and OFFSET

3 Tasks

3.1 Download

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

```
mkdir ~/public_html/cs3380/lab3
cd ~/public_html/cs3380/lab3
wget http://babbage.cs.missouri.edu/~klaricm/ss15/cs3380/lab3/lab3.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 lab3.sql` to run the commands contained within the SQL file.

3.2 Inspect the Data

Importing the data should have created three tables within a schema named `lab3`. In the same way that a directory holds files on a filesystem, a schema contains tables in a database. You can use the `\dn` command to see the list of schemas in your database.

The `\dt` command shows a list of all tables in the schemas currently in your search path. Your search path can be modified with the command:

```
SET search_path = lab3;
```

Issuing the \dt shows that the `lab3` schema contains the following tables:

```
klaricm=> \dt
             List of relations
 Schema |       Name       | Type  |  Owner
--------+------------------+-------+---------
 lab3   | city             | table | klaricm
 lab3   | country          | table | klaricm
 lab3   | country_language | table | klaricm
(3 rows)
```

You can then use the \d command followed by a table name to view the table definition. An example follows.

```
klaricm=> \d city
                           Table "lab3.city"
    Column    |         Type          |              Modifiers
--------------+-----------------------+-------------------------------------
 id           | integer               | not null
 name         | character varying(35) | not null default ''::character varying
 country_code | character(3)          | not null default ''::bpchar
 district     | character varying(20) | not null default ''::character varying
 population   | integer               | not null default 0
Indexes:
    "city_pkey" PRIMARY KEY, btree (id)
Foreign-key constraints:
    "city_country_code_fkey" FOREIGN KEY (country_code) REFERENCES country(country_code)
```

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

```
SELECT * FROM lab3.city;
```

3.3 Implementation

You will be responsible for creating a PHP script that allows a user to execute one of the following 12 queries by selecting from a drop down box and clicking a button. Your code must contain the SQL for 12 hard-coded queries. 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 an string containing a SQL statement, execute it and write out the HTML table.

Your PHP page must show an indication of the number of rows returned by the query and a table of query results for the following 12 queries. For reference, I provide the number of results that should be returned by each query.

1. Find the district and population of all cities named Springfield. Sort results from most populous to least populous. (3 results)

2. Find the name, district, and population of each city in Brazil (country code BRA). Order results by city name alphabetically. (250 results)

3. Find the name, continent, and surface area of the smallest countries by surface area. Order by surface area with smallest first. Return only 20 countries. (20 results)

4. Find the name, continent, form of government, and GNP of all countries having a GNP greater than 200,000. Sort the output by the name of the country in alphabetical order from A to Z. (23 results)

5. Find the 10 countries with the 10th through 19th best life expectancy rates. You should use `WHERE life_expectancy IS NOT NULL` to remove null values when querying this table. (10 results)

6. Find all city names that start with the letter B and ends in the letter s. Results should be ordered from largest to smallest population, but do not display the population field. (12 results)

7. Return the name, name of the country, and city population of each city in the world having population greater than 6,000,000. Order results by the city population with the most populous first. (20 results)

8. Find the country name, language name and percent of speakers of all unofficial languages spoken in countries of population greater than 50,000,000 population. Order results by percent of speakers with the most spoken language first. (165 results)

9. Find the name, independence year, and region of all countries where English is an official language. Order results by region ascending and alphabetize the results within each region by country name. (44 results)

10. For each country display the capital city name and the percentage of the population that lives in the capital for each country. Sort the results from largest percentage to smallest percentage. (Hint: Don't be surprised if there are some countries with a percentage greater than 100% due to errors in the data.) (232 results)

11. Find all official languages, the country for which it is spoken, and the percentage of speakers (percentage of speakers is calculated as percentage spoken times country population divided by 100). Order results by the total number of speakers with the most popular language first. (238 results)

12. Find the name, region, GNP, old GNP, and real change in GNP for the countries who have most improved their relative wealth. the real change in GNP is defined as (gnp - gnp_old)/gnp_old. Order results by real change with the most improved country first. Also, this data is missing some entries for gnp and gnp_old. Filter these missing entries out by only returning countries where `gnp IS NOT NULL` and `gnp_old IS NOT NULL`. (178 results)

4   Comparison

You can compare your version with a working copy found at:
   http://babbage.cs.missouri.edu/~klaricm/fs14/cs3380/lab3/lab3.php