CSP 609 - PG SOFTWARE LAB
Lab Assignment 3

Submission Deadline: Feb 6 2018 8:00pm
Total Weightage of the Assignment: 8%

General Instructions:

- All specifications must be strictly followed. Failure to do so may lead to substantial loss of points.
- It is important to go through the relevant reading material, there may be a viva in the following week on topics related to this lab assignment.
- All submissions must be made on the Moodle site of the course.
- You may use the internet for searching the syntax of the SQL commands.
- **Each submission must have the name and roll number of the student.**
- For each of queries, you are expected to load few tuples (e.g., 4-5) using the insert command into your schema and then run your SQL (select based) query. This would help you in self-evaluating your SQL based on the results obtained.
- **However, care must be taken that your SQL queries are general and conceptually correct so that they give the right answer on any arbitrary dataset.**
- **Substantial points would be deducted if the correctness of your answer (the SQL query) turns out to be limited to your (or just a few) dataset.**
- **Make sure there are no errors in the SQL queries you submit to us for evaluation.**

Important Links:

- SQL tutorial: https://www.w3schools.com/sql/
- Spooling the results in PostgreSQL: https://dzone.com/articles/spooling-queries-with-results-in-psql

Question 1:
Step 1: Create the following schema in your database:

Classes (**class**, type, country, numGuns, bore, displacement)
Ships (**name**, class, yearlaunched)
Battles (**name,** year)
Outcomes (ship, battle, result)

Ships are built in "classes" from the same design. The relation Classes records the name of the class, the type ('bb' for battleship or 'bc' for battlecruiser), the country that built the ship, the number of main guns, the bore (diameter of the gun barrel, in inches) of the main guns, and the displacement (weight, in tons). Relation Ships records the name of the ship, the name of its class, and the year in which the ship was launched. Relation Battles gives the name and date of battles involving these ships, and relation Outcomes gives the result (sunk, damaged, or ok) for each ship in each battle.

1. The underlined attributes are the primary keys of the corresponding relation.
2. ‘Class’ attribute in the **Ships** relation refers to the ‘class’ attribute in the **Classes** relation.
3. ‘Ship’ attribute in the **Outcomes** relation refers the ‘name’ attribute in the **Ships** relation.
4. ‘Battle’ attribute in the **Outcomes** relation refers to the ‘name’ attribute in the **Battles** relation.

Following data may be useful in evaluating the correctness of the queries. This data is just a suggestion and by no means exhaustive. You may put more data in the tables.

Classes

Class	**Type**	**Country**	**numGuns**	**bore**	**Displacement**
Kongo	bc	USA	12	16	1000
Virat	bb	India	10	28	2000
Eagle	bb	USA	15	19	1700

Ships

Name	**Class**	**Year**
ABC123	Virat	2001
ABC149	Virat	2005
FGP123	Kongo	2000
KOP190	Kongo	1999
KOP122	Kongo	1990
EAG999	Eagle	1995
EAG111	Eagle	1993
EAG119	Eagle	1994

Battles

Name	**Year**
Gulf	2006
Yemen	2014
French	2011

Outcomes

Ship	Battle	Result
ABC123	Yemen	OK
ABC149	Gulf	Damaged
EAG999	Yemen	Sunk
KOP122	French	Sunk

Step 2:
Write and sql query for each of the following select queries. Use the results obtained to self-evaluate the correctness of the queries. Care must be taken such that your SQL queries are general and conceptually correct so that they give the right answer on any arbitrary dataset.
Use the concept of subquery for each of the following queries. For each query write answers in two significantly different ways (e.g., using different sets of the operators EXISTS, IN, ALL, and ANY, NOT).

1. Find the countries whose ships had the largest number of guns.
2. Find the classes of ships, at least one of which was sunk in a battle.
3. Find the names of the ships with a 16-inch bore.
4. Find the battles in which ships of the Kongo class participated.

Step 3:
Write and sql query for each of the following select queries. Use the results obtained to self-evaluate the correctness of the queries. Care must be taken such that your SQL queries are general and conceptually correct so that they give the right answer on any arbitrary dataset.

1. Find the number of battleship classes.
2. Find the average number of guns present in battleships. Note that there can multiple ships inside a battleship class. Your query must consider the number of ships for each class.
3. Find for each class the number of ships of that class sunk in battle.
4. Find for each class the year in which the first ship of that class was launched.

Things to be submitted:
Text file containing the following:

a. SQL commands for creating the schema.
b. SQL commands for inserting the data.
c. SQL commands the results for each of the select queries mentioned in Step 2 and Step 3.