Homework 3

- **Description** : Create the database schema and insert tuples into the relation. Formulate SQL queries for the questions. Use the **MySQL** database.

- **Submission items** :

  - **sql script files (p1.sql, p2.sql, p6.sql~p8.sql)** : a **text file containing all of the sql commands** for the homework. The sql commands include table creation, insertion, update, deletion and querying. Also in each script file, additionally include **sql commands (describe, select * ...) to show before/after results of your homework**, as described below.

    - files for each problem : **p1.sql, p2.sql, p6.sql~p8.sql** (*problemnumber*.sql)

    - **p1.sql** (need to **update**) and **p2.sql** may be used from HW2 with some update

    - after each subproblem in problem 1, use "**describe tablename**" and also **"show create table *tablename*"** to show the created table result.

    - **at the end of problem 2,** run the **select *** result for **each** table **only 1 time**

    - **for each subproblem in problem 7**, (1) first show the **before result** (run select * ...)**, (2) then run the problem SQL,** (3) and finally show **the after result** (run select * ...)

    - **for each subproblem in problem 8**, use "**describe tablename**" and **"select * ... "** to show the modified table result.

    - **Do NOT include the CREATE DATABASE, USE DATABASE** commands in the sql scripts

  - **doc (or hwp or pdf) report** : containing **sql commands** for each problem and **screen capture (.gif) of execution results** (showing **sql** and **query results)**.

- **Submission method (only online submission though cyberclass)** :

  - **Online files** : Cyber class : submit as **zip file** with file name of "studentID.zip"

- **Deadline : May 31st (Monday) 11 pm**

- **Evaluation and Penalties**

  - Late penalty : 20% deduction of points every day. No late submission allowed after 5 days.

  - Any submission of wrong files are responsibility of student. New submissions on the cyber classroom that are late will be counted as late submission and will be considered with late penalty.

- Any missing item that is required for submission will get 0 points. Example) no sql script, no report with capture of result, etc.

- Detail evaluation criteria for each problem is set by professor and TAs.

● **Database Schema explanation**

The following database schema involves an example concerning World War II capital ships. It involves the following relations. Use appropriate data types for each attribute.

- Classes (class, type, country, numGuns, bore, displacement)

- Ships (name, class, launched)

- Battles (name, beginDate, endDate) : Attributes beginDate and endDate are **DATE** type

- Outcomes (ship, battle, result)

Ships are built in "classes" from the same design, and the class is usually named for the first ship of that class. 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.

The following figures give some sample data for these four relations. Note that, all ships are included in the **Ships** relation and only the ones that engaged in battles are recorded in the **Outcomes** relation.

class	type	country	numGuns	bore	displacement
Bismarck	bb	Germany	8	15	42000
Iowa	bb	USA	9	16	46000
Kongo	bc	Japan	8	14	32000
North Carolina	bb	USA	9	16	37000
Renown	bc	Gt. Britain	6	15	32000
Revenge	bb	Gt. Britain	8	15	29000
Tennessee	bb	USA	12	14	32000
Yamato	bb	Japan	9	18	65000

(a) Sample data for relation **Classes**

name	beginDate	endDate
North Atlantic	5/24/41	5/27/41

Guadalcanal	11/15/42	11/15/42
North Cape	12/26/43	12/26/43
Surigao Strait	10/25/44	10/25/44

(b) Sample data for relation **Battles**

ship	battle	result
Bismarck	North Atlantic	sunk
California	Surigao Strait	ok
Duke of York	North Cape	ok
Duke of York	Surigao Strait	ok
Fuso	Surigao Strait	sunk
Hood	North Atlantic	sunk
King George V	North Atlantic	ok
Kirishima	Guadalcanal	sunk
Prince of Wales	North Atlantic	damaged
Prince of Wales	North Cape	ok
Scharnhorst	North Cape	sunk
South Dakota	Guadalcanal	damaged
Tennessee	Surigao Strait	sunk
Washington	Guadalcanal	ok
West Virginia	Surigao Strait	ok
Yamashiro	Surigao Strait	ok

(c) Sample data for relation **Outcomes**

name	class	launched
Prince of Wales	Tennessee	1921
Bismarck	Bismarck	1915
Duke of York	Kongo	1914
Iowa	Iowa	1943
Kirishima	Kongo	1915
Kongo	Kongo	1913
Fuso	Iowa	1943
Yamashiro	Yamato	1942
California	Iowa	1943
North Carolina	North Carolina	1941
Renown	Renown	1916
Hood	Renown	1916
Scharnhorst	Revenge	1916
Revenge	Revenge	1916
King George V	Revenge	1916

South Dakota	Revenge	1916
Tennessee	Tennessee	1920
Washington	North Carolina	1941
West Virginia	Iowa	1943
Yamato	Yamato	1941

(d) Sample data for relation **Ships**

- **Problems**

The p1.sql and p2.sql for the following problems 1 and 2 may be the files submitted in HW2 with a little change for problem 7 (c).

1. Based on the informal schema and sample data shown above, write the following **table creation** declarations in SQL. **Primary keys** and **foreign keys** need to be specified as well for all tables. **Include ON DELETE CASCADE for problem 7(c).** After each subproblem in problem 1 use "**describe** *tablename*" and also **"show create table *tablename*"** to show the created table result.

Make this into script file "**p1.sql**". (including describe commands)

a) A suitable schema for relation **Classes**.

b) A suitable schema for relation **Ships**. The *launched* column may use an integer type.

c) A suitable schema for relation **Battles**. Use the **DATE** type for beginDate and endDate.

d) A suitable schema for relation **Outcomes**.

2. Write the following **insert SQL queries** to create the contents shown in the above sample. Carefully consider the correct **orders of the insert** into the tables Battles, Classes, Outcomes, Ships based on the **foreign key** relationship. After the final subproblem (d) of problem 2, show the **final result of all of the inserts** by running the **select *** result for **each** table.

Make this into script file "**p2.sql**". (including select * commands)

a) Inserts for first relation

b) Inserts for second relation

c) Inserts for third relation

d) Inserts for fourth relation

6. Write the following SQL queries involving **subqueries** based on the above database schema. You should **use at least one sub query** in each of your answers and **write each query in two significantly different ways** (e.g., each way should use different sets of the operators EXISTS, IN, ALL, SOME, ANY and may be combined with NOT). **Do NOT** use **nested subqueries** in **WITH** and **FROM** clause.

Make this into script file "p6.sql".

a) Find the countries whose ships had the largest number of guns.

b) Find the classes of ships where at least one of the ships in the class was damaged in a battle.

c) Find the names of the ships with a 16-inch bore.

d) Find the battles in which ships of the Kongo class participated.

e) Find the names of the ships whose number of guns was the largest for those ships of the same bore.

7. Write the following SQL queries involving **modifications** based on the above database schema. Show the **before** and **after** results (select * ...) of the contents of the modified relations. The script should show (1) the **before result** (select * ...), (2) **run the problem SQL**, (3) the **after result** (select * ...) for each subproblem. Each subproblem should be **executed one after another** (i.e. you **do NOT need to initialize the database after each subproblem**).

You **MAY USE nested subqueries** in **WITH** and **FROM** clause.

Make this into script file "p7.sql".

a) The two British battlecruisers of the Nelson class - Nelson and Rodney - were both launched in 1927, had eight 16-inch guns, and a displacement, of 34,000 tons. Insert these facts into the database.

b) There are three battleships of the Italian Vittorio Veneto class. Two of them are named Vittorio Veneto, and Italia, which were both launched in 1940. The third ship of that class, named Roma, was launched in 1942. The Italian Vittorio Veneto class has nine 15-inch guns and a displacement of 41,000 tons. Insert these facts into the database.

c) Delete from Ships all ships sunk in the Surigao Strait battle. Also delete from the Outcomes table as well. **(This should use ON DELETE CASCADE so that you can use just one query. Also need to modify p1.sql)**

d) Modify the Classes relation so that gun bores are measured in centimeters (one inch = 2.5 centimeters) and displacements are measured in metric tons (one metric ton = 1.1 tons).

e) Modify the Outcomes relation where ships that have 8 guns will all have the result damaged.

f) Modify the begin date of the North Atlantic battle to 4/24/41.

g) Delete all ships that have classes with fewer than three ships.

8. Write the following SQL queries involving **schema modifications** based on the above database schema. After each subproblem in problem 8, use "**describe tablename**" and **"select * … "** to show the modified table result.

Make this into script file "p8.sql".

a) An alteration to your Classes relation from 1-(a) to delete the attribute **bore**.

b) An alteration to your Ships relation from 1-(b) to include the attribute **company** and set the value to **ShipCompany**.