Homework

- **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 ~ p5.sql)** : a **text file containing all of the sql commands** for the homework. The sql commands include table creation, insertion, and querying. Also in each script file, additionally include **sql commands (describe, select * ...) to show results of your homework**, as described below
    - files for each problem : **p1.sql ~ p5.sql** (*problemnumber*.sql)
    - after each subproblem in problem 1, use "**describe tablename**" to show the created table result.
    - **at the end of problem 2,** run the **select *** result for **each** table **only 1 time**
    - **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 13th (Wednesday) 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**

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. After each subproblem in problem 1 use "**describe 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

3. Write the following simple SQL queries involving single relations based on the above database schema. Do NOT use nested subqueries in WITH and FROM clause.

Make this into script file "**p3.sql**".

a) Find the class name and country for all classes with at least 10 guns.

b) Find the class name, number of guns, and bore where the number of guns is not 9 and the bore is less than 16, and also show the result in ascending order determined by the displacement first, and the bore second, and the number of guns third.

c) Find all the countries that made a battlecruiser.

d) Find the names of all ships launched after 1918, but call (rename) the resulting column *newship*.

e) Find the names of all ships whose name consists of three or more words (e.g., King George V).

4. Write the following SQL queries based on the above database schema. Do NOT use nested subqueries in WITH and FROM clause.

Make this into script file “**p4.sql**”.

a) Find the ships name and weight which are heavier than 35,000 tons, in the order of the weight and secondarily the ship name.

b) Find the classes that have only one ship as a member of that class.

c) List all ship names without duplicates where ships are the class of Renown or participated in the battle of North Atlantic or the launched year is before 1919.

d) List all the ship names based on the ascending order of the displacement and secondarily the name of the ship.

e) List the **ship names** and the **month and year** (in the format of MM-YYYY) of the **begin date and end date** of the battle that they participated in where such battles occurred within the two year period of 1942 to 1943.

5. Write the following SQL queries involving **aggregate** functions based on the above database schema. Do NOT use nested subqueries in WITH and FROM clause.

Make this into script file “**p5.sql**”.

a) Find the number of battleship classes.

b) Find the average number of guns of battleships. This is the average among all battleships in the Ships relation.

c) Find for each class the year in which the first ship of that class was launched.

d) Find for each class with at least three ships, the number of ships of that class sunk in battle.

e) Find for each battle, the total number of guns of all of the ships participating in the battle.