COSC265 Lab Test 2017

Time allowed: 90 min
Total marks: 100
Worth: 20%
Open book

There are 4 questions. It is highly recommended that you attempt question 4 only after you have finished all other questions.

Your answers should be clear and concise - material not relevant to the question will earn no marks whether or not it is correct.

- **Create a text file named with your usercode (e.g. *abc12.txt*), and include in it, by writing directly and/or copy and paste from your SQL environment:**
  - **all SQL statements that you execute to answer the questions, and**
  - **any query results or data showing the correctness of your SQL statements.**

- **Remember to keep saving your work as you go, as it will be impossible to retrieve your work from Oracle once you have logged out**

- **Make sure that you label each SQL statement submitted with the question number and letter (e.g. 1a).**

- **Include enough detail in your answer to show that what you have done is correct.**

- **You must submit your answer text file via Learn.**

- **Make sure that you submit all the work that you've done.**

The Achievements database contains information regarding creatures who achieve skills. The database holds information on creatures, skills, achievements (creatures achieving skills), and towns (also known as cities; used as the residence town of creatures and the test town for achievements). Specific attributes are discussed below.

- The TOWN (city) table stores the unique id for each town, plus the full town name
- The CREATURE table stores the unique id for each creature, plus its name, type and residence town.
- The SKILL table stores the unique code for each skill, plus its description and a weighting factor.
- The ACHIEVEMENT table stores creature/skill pairs, specifically storing a creature id (who has achieved the skill), a skill code (what skill was achieved by that creature), a score (the level at which the skill was achieved; 1-best, 2-good, 3-fair), and the testing town location.

Before working to answer the following questions, you need to

1) **Run the Oracle script (*achievements-script.sql*) which contains the statements to create and populate four tables of this database.**
2) **Execute the SQL command: *set autocommit on***

The SQL create table statements, showing the attributes for each table, foreign key relationships, and other constraints follow:

```
create table Town
  (T_id            varchar(2),
   T_name          varchar(20)      not null,
   primary key (T_id) );

create table Creature
  (C_id            smallint    ,
   C_name          varchar(15)    not null,
   C_type          varchar(10)    not null,
   reside_t_id     varchar(2),
   primary key (C_id),
   constraint fk_cr_to foreign key (reside_t_id) references Town(T_id) on delete set null );

create table Skill
  (S_code          char,
   S_desc          varchar(15)     not null,
   S_weight        number,
   primary key (S_code)  );

create table Achievement
  (C_id            smallint        references Creature(C_id),
   S_code          char            references Skill(S_code),
   Score           smallint        not null,
   Test_T_id       varchar(2)      references Town(T_id),
   primary key (C_id, S_code),
   constraint fk_ac_cr foreign key (C_id) references Creature (C_id) on delete set null,
   constraint fk_ac_sk foreign key (S_code) references Skill (S_code)  on delete set null,
   constraint fk_ac_to foreign key (test_t_id) references Town (T_id) on delete set null  );
```

Question 1: 25 marks total

1a. (10 marks) Write a single SQL statement to create a JobSkill table, which holds a job name (e.g. SWDeveloper, Lifeguard, or SystemsAnalyst) and a single letter skill code (e.g. S, F, C, or D), plus a third attribute to hold a Rank value (a number such as 1, 2 or 3) for the ranked importance of the skill for that job. Both the job name and the skill code are to be used as the primary key.

1b. (5 marks) Correct the following SQL statements to properly insert the included data into the JobSkill table you just created, and include the corrected statements in your answer file.
NOTE: These statements are also in the file *misc.sql*; you can copy and paste them into your solutions file and then correct them to save some typing time.
NOTE: be sure to execute these statements in SQL once you have corrected them.

```
INSERT INTO JobSkill VALUES (SWDeveloper, 'C', 2);
INSERT INTO JobSkill VALUES (SWDeveloper, 'D', 3);
INSERT INTO JobSkill VALUES (SWDeveloper, 'T', 1);
INSERT INTO JobSkill VALUES (Lifeguard, 'F', 2);
INSERT INTO JobSkill VALUES (Lifeguard, 'S', 1);
```

1c. (5 marks) Write and execute a single SQL statement to show how many rows are now in the JobSkill table.

1d. (5 marks) Write a single SQL statement to change Gollum's name to Smeagol in the Creature table.

Question 2: 50 marks total

2a. (10 marks) Write a single SQL statement to find the name of each creature who has achieved a skill where the skill weight was less than or equal to 0.5. Display the names in alphabetical order, without duplicates.
NOTE: You must use JOIN clauses only for this question (you may not use any nested sub-queries.)

2b. (10 marks) Answer the same question as in 2a., but using only nested subqueries..
NOTE: You must use nested sub-queries only for this question (you may not use any joins.)

2c. (10 marks) Write a single SQL statement to generate a list of each type of creature in the database, a count of the number of the achieved skills that have been achieved by all creatures of that type, and the average achievement score (NOT skill weight) for those achievements. Order your results by the achievement count in descending order.
NOTE: you do NOT have to format the numeric results.
NOTE: your count should include **all** achieved skills by the creatures of a type, even if the same skill is achieved by multiple creatures of that type. For example, if a skill was achieved by two different creatures of type ‘person’, the count should include both of those achievements.

2d. (10 marks) Write a single SQL statement to find each pair of two different skill codes where both skills were achieved at score 2. Remove all duplicate pairs, including exact duplicates (e.g. A B and A B are consider exact duplicate pairs) and all interchanged order pairs (e.g. A B and B A are an example of an interchanged duplicate pair.)

2e. (10 marks) Write a single SQL statement to list each creature (by id) and the count of their achieved skills, in order by creature id. Make sure that all creatures are included in the result regardless of the number of achievements.

Question 3: 20 marks total

3a. (8 marks) Define a view ACH_VIEW that includes the following achievement-related information: creature id, creature name, creature type, achievement skill code, achievement score, and skill description for that achievement

3b. (4 marks) Write a single SQL statement to display all information from this view, but only for the rows for creatures 1 through 4 inclusive.

3c. (8 marks) We could try inserting a new creature and achievement in a single SQL insert statement by using the Ach_View view instead of working with the Creature and Achievements tables directly. Try to execute the following statement (also in *misc.sql* for copy/paste)

```
INSERT INTO Ach_View (C_id, C_Name, C_Type, S_Code, Score)
  VALUES (9, 'Fanghorn', 'Ent', 'W', 3);
```

However, this statement fails, as the joined view is not updatable.
So, your task here is to write an SQL trigger to successfully accomplish the above task of updating two tables when a user tries the view-based insert above.
NOTE: Re-execute the Insert statement above to test your trigger and make sure that the trigger fires correctly.

Question 4: 5 marks total

NOTE: This is a relatively low mark but more difficult question; **it is recommended that you work on this question only after you have completed all of the other questions.**
4. (5 marks) Write one or more SQL statements to generate a list of the creatures, by id, who have achieved all software developer skills (as would be listed in the JobSkill table you created and populated above.)