

CSIT115 Data Management and Security

Assignment 3

Due date: Friday 24 May 2024, 8:00 pm

Scope

This assignment is related to application of SELECT statement with WITH clause, application of advanced data manipulation statements of SQL, implementation of discretionary access control, and verification of complex logical consistency constraint.

Please carefully read the following instructions.

- This assignment contributes to **16%** of the total evaluation for the subject CSIT115.
 - The outcomes of the assignment work are due by **Friday 24 May 2024, 8:00 pm (sharp)**.
 - A submission procedure is explained at the end of the specification.
 - This assignment consists of **4 tasks** and the specification of each task starts from a new page.
 - It is recommended to solve the problems before attending the laboratory classes to efficiently use supervised laboratory time.
 - A submission marked by Moodle as ‘*Late*’ is treated as a late submission no matter how many seconds it is late.
 - A policy regarding late submissions is included in the subject outline.
 - A submission of compressed files (e.g., *zipped*, *gzipped*, *tared*, and *7-zipped*) is not allowed. The compressed files will not be evaluated.
 - An implementation that does not compile due to one or more syntactical or processing errors scores no marks.
 - It is expected that all tasks included in **Assignment 3** will be solved **individually without any cooperation** from the other students. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or office hours. Plagiarism will result in a **FAIL** grade being recorded for the assessment task.
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Prologue

You must complete this prologue task before you start working on the tasks. It includes information about the sample database used in the tasks, and references where to get help. You may use a virtual machine with MySQL or MySQL Workbench to MySQL Community Server. All technical details on how to start and how to use a virtual machine are explained in the ‘*Software resources*’ section on the subject Moodle Site.

Step 1: Download the files *dbcreate.sql*, *dbdrop.sql*, and *dbload.sql* from the ‘Sample database’ section on the Moodle Site.

- *dbcreate.sql* can be used to create the relational tables of the sample database.
- *dbdrop.sql* can be used to drop the tables of the sample database.
- *dbload.sql* can be used to load data into the sample database.

Step 2: Connect to MySQL database server either through command line interface *mysql* or graphical user interface MySQL Workbench.

When connected, select the database ‘*csit115*’ by running the following command: *use csit115*.

Step 3: Create the relational tables of a sample database by running the SQL script *dbcreate.sql*.

Step 4: Load data into the relational tables by processing the SQL script *dbload.sql*.

Step 5: If necessary, refresh the database by executing the SQL script *dbdrop.sql*.

No report is expected from the implementation of the actions listed above.

Tasks

Task 1 (3 marks)

It is recommended to complete this task by the end of Week 10.

Please download the template file *solution1.sql* from Moodle Site and insert into the file your implementations of the following DML statements of SQL.

Note: You are **not allowed** to modify and/or drop any consistency constraints. Also note that to implement some of the modifications listed below you may need **more than one** DML statement of SQL. We assume that we have disabled safe update that SQL can execute DML statements anywhere.

Your implementation must directly follow a comment with a specification of a subtask.

1.1 (1 mark) Increase the salary by 20 for all employees in the department COMPUTING.

1.2 (1 mark) The department SPORTS has been closed. Delete its information from the relational table DEPARTMENT. You do not need to delete the employees and projects managed by this department. Set no department number (i.e., null value) in PROJECT and EMPLOYEE. Note that, you may need to temporarily disable the foreign key constraints before updating the tables.

1.3 (1 mark) The employee *Angelina* (enumber = ‘00500’) has been appointed as the manager of *Department 2* (dnumber = 2). Increase her salary by 50. She now becomes the supervisor of all employees in *Department 2*.

When ready, please execute the SQL script *solution1.sql* and save a report from the processing of the script in a file *solution1.rpt*.

Deliverables

- A report file, named *solution1.rpt*, generated from processing the SQL script *solution1.sql*.
- The report must be created with the command line interface *mysql*.

- The report **must not** include any errors.
 - The report **must list all** SQL statements processed with the results, and all comments from *solution1.sql*. Marks will be deducted for the missing comments.
 - Submission of a file with a different name and/or different extension and/or different type scores **no marks**.
 - A report that contains no listing of processed SQL statements scores **no marks**, and a report that contains errors of any kind also scores **no marks**.
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Task 2 (5 marks)

It is recommended to complete this task by the end of Week 10.

Please download the template file *solution2.sql* from the Moodle Site and insert into the file the implementations of the following queries as SELECT statements of SQL.

Your implementation must directly follow a comment with a specification of a subtask.

- 2.1 (1 mark)** Find the total hours of employees working on the project '1001'.
- 2.2 (1 mark)** Find the average salary of all employees in the department ACCOUNTING.
- 2.3 (1 mark)** Find the name and the total number of employees of each department, excluding the departments that have no employees.
- 2.4 (1 mark)** Find the names of all departments which are managing a total project budget great than 20,000.
- 2.5 (1 mark)** Count number of employees who have supervisors and their project hours are greater than 20.

When ready, please execute the SQL script *solution2.sql* and save a report from the processing of the script in a file *solution2.rpt*.

Deliverables

- A report file, named *solution2.rpt*, generated from processing the SQL script *solution2.sql*.
 - The report must be created with the command line interface *mysql*.
 - The report **must not** include any errors.
 - The report **must list all** SQL statements processed with the results, and all comments from *solution2.sql*. Marks will be deducted for the missing comments.
 - Submission of a file with a different name and/or different extension and/or different type scores **no marks**.
 - A report that contains no listing of processed SQL statements scores **no marks**, and a report that contains errors of any kind also scores **no marks**.
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Task 3 (4 marks)

It is recommended to complete this task by the end of Week 11.

Please download the template file *solution3.sql* from Moodle Site and insert into the file your implementations of the following DML statements of SQL. Note that you may need more than one SQL statement to implement a single step listed below.

Your implementation must directly follow a comment with a specification of a subtask.

- 3.1 (1 mark)** Find the names of employees and the budgets of the projects they are working on. We only consider the project with budgets greater than or equal to \$50,000. You are required to implement a single SELECT statement using the **WITH clause**.

Note: You may need to implement a join query where no more than two tables are joined at a time. The first subquery joins the relational tables PROJECT and WORKSON. The second subquery joins the outcomes of the first subquery with the relational table EMPLOYEE. Finally, a SELECT statement can be used to find the project budgets and department names using the results obtained from the second subquery.

For details about SELECT statements with WITH clause, please refer to the lecture notes ‘16-Views’ and the Cookbook (Recipe 7.4).

- 3.2 (1 mark)** Use **relational views** to implement the same query as the subtask 3.1.

- 3.3 (1 mark)** Insert into the table EMPLOYEE a new employee whose number is ‘10001’ and department is EDUCATION (other information is up to you). Update the table DEPARTMENT to reflect that this employee has been appointed as the manager of the department COMPUTING.

- 3.4 (1 mark)** Find all cases that violate the following consistency constraint: “*An employee who is a manager of a department must be a member of the same department*”.

Your script **must** list the outcomes of verification of the consistency constraint as a single column table with the following messages: *Employee <insert employee number here> currently manages Department #<insert name of department here>, but he/she is a member of Department #<Insert name of department here>.*

The outcomes are sorted in **ascending** order according to the employee numbers.

You may need the function CONCAT to create the messages above. Note that you do not need to eliminate the violations of consistency constraint listed above.

When ready, please execute the SQL script *solution3.sql* and save a report from the processing of the script in a file *solution3.rpt*.

Deliverables

- A report file, named *solution3.rpt*, generated from processing the SQL script *solution3.sql*.
- The report must be created with the command line interface *mysql*.
- The report **must not** include any errors.
- The report **must list all** SQL statements processed with the results, and all comments from *solution3.sql*. Marks will be deducted for the missing comments.
- Submission of a file with a different name and/or different extension and/or different type scores

no marks.

- A report that contains no listing of processed SQL statements scores **no marks**, and a report that contains errors of any kind also scores **no marks**.

Task 4 (4 marks)

It is recommended to complete this task by the end of Week 12.

Please download the template file *solution4.sql* from Moodle Site and insert into the file your implementations of the following DML statements of SQL.

Your implementation must directly follow a comment with a specification of a subtask.

- 4.1 (1 mark)** Create a new user with a name the same as a prefix of your UOW email account. The passwords are up to you.
- 4.2 (1 mark)** Grant this user all privileges to all tables in the database '*csit115*'. Note that the privileges must be granted such that the new users are able to grant the privileges to other users.
- 4.3 (1 mark)** Display the granted privileges and roles for the user, then display all users are existing in the database server.
- 4.4 (1 mark)** Revoke the user's privilege for inserting data into all tables. Display the updated user's privileges.

When ready, please execute the SQL script *solution4.sql* and save a report from the processing of the script in a file *solution4.rpt*.

Deliverables

- A report file, named *solution4.rpt*, generated from processing the SQL script *solution4.sql*.
- The report must be created with the command line interface *mysql*.
- The report **must not** include any errors.
- The report **must list all** SQL statements processed with the results, and all comments from *solution4.sql*. Marks will be deducted for the missing comments.
- Submission of a file with a different name and/or different extension and/or different type scores **no marks**.
- A report that contains no listing of processed SQL statements scores **no marks**, and a report that contains errors of any kind also scores **no marks**.

Submission

Note that you have only one submission. Please ensure that you submit correct files with the correct contents and correct types. No other submission is possible.

Followings are the steps to submit your files through the Moodle:

Step 1: Access the Moodle at <http://moodle.uowplatform.edu.au>, then select the site '*CSIT115 (S124)*'

Data Management and Security'.

Step 2: Navigate to the section '*Assignment and Submissions*' and click on the link '*In this place you can submit the outcomes of Assignment 3*'.

Step 3: Click on the button '*Add Submission*', and then upload the file *solution1.rpt*. You can drag and drop your file here to add them.

Step 4: Repeat *Step 3* for the other files: *solution2.rpt*, *solution3.rpt*, and *solution4.rpt*.

Step 5: Confirm the authorship of your submission by clicking on the checkbox '*By checking this box, I confirm that this submission is my own work*'.

Step 6: Click on the button '*Save changes*'.

End of specification