

CSIT115/CSIT815 Data Management and Security
Laboratory 8
8 May 2018

Scope

This laboratory includes a task related to implementation of domain consistency constraints.

Important messages

Please read the messages listed below before implementation of a task included in a specification of Laboratory 8.

More implementation related information can be found in "How to ... ?" Cookbook available through Moodle or at:

<http://www.uow.edu.au/~jrg/115/COOKBOOK>.

The outcomes of Laboratory 8 are due by **Saturday, 26 May, 2018, 10.00 pm (sharp)**.

Laboratory 8 contributes to 2% of the total evaluation in the subject.

A submission procedure is explained at the end of this document.

Only one submission of Laboratory 8 is allowed and only one submission per student is accepted. Please make sure that you submit the correct files.

A submission that contains an incorrect file attached is treated as a correct submission with all consequences coming from the evaluation of the file attached.

Compressed (zipped, rared, tared, etc) files will not be evaluated.

A submission marked by Moodle as "late" is treated as a late submission no matter how many seconds it is late.

The reports from processing of SQL scripts must return NO ERRORS ! A solution with the errors is worth no marks !

A policy regarding late submissions is included in CSIT115/815 Subject Outline.

Prologue

Download the files `dbcreate.sql`, `dbdrop.sql`, `dbload.sql`, and `dbschema.pdf`. Copy the files to your USB drive or email the files to yourself such that you can access all of them either through command line interface `mysql` or graphical user interface MySQL Workbench.

Connect to MySQL database server either through command line interface `mysql` or graphical user interface MySQL Workbench.

When connected, select a database `csit115` with a command `use csit115`.

It is strongly recommended to process SQL script file `dbdrop.sql` to drop all relational tables used for implementation of the previous assessment task.

To create the relational tables of a sample database, process SQL script `dbcreate.sql`.

To load data into the relational tables created in the previous step process SQL script `dbload.sql`.

To list the names of relational tables created, use a command `show tables`.

To list a structure of a relational table `<table-name>` use a command `describe <table-name>`.

Use a pdf viewer to open a file `dbschema.pdf` with a conceptual schema of the sample database. The green blobs represent the relational tables that implement the classes of objects and associations.

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

Tasks

Task 1 (2 marks)

At the moment MySQL database server does not enforce domain consistency constraints also called as CHECK constraints. The specifications of domain constraints can be appended to CREATE/ALTER TABLE statements, however the constraints are not enforced during the manipulations on data.

It is possible to enforce a discreet domain consistency constraints, i.e. a domain constraint on enumerable and finite domains, with a lookup relational table and a foreign key over a discreet domain referencing primary key in a lookup relational table. For example, if a skill level must be a positive integer number less or equal to 9 then it is possible to create a lookup table SLEVELS(slevel) with primary key (slevel) and to fill it with the values 1, 2, 3, 4, 5, 6, 7, 8, and 9. Then, it is possible to create a foreign key (slevel) in a relational table SPOSSESSED (or SNEEDED) that references a primary key (slevel) in a relational table SLEVELS. Due to a referential integrity constraint any new value of slevel in SPOSSESSED (or SNEEDED) must be included in SLEVELS(slevel) and in such a way it is restricted to the values 1, 2, 3, 4, 5, 6, 7, 8, and 9.

In this task we use the same technique to enforce a domain consistency constraint on two columns in a relational table APPLICANT.

Implement SQL script `solution1.sql` that performs the following actions.

- (1) Add to a relational table APPLICANT a column `totskills` that supposed to contain the total number of skills possessed by each applicant. Assume, that each applicant can provide information about at most 5 skills possessed.
- (2) Fill a new column `totskills` in a relational table APPLICANT with the values consistent with the present contents of the database. Remember about the applicants that have no skills.
- (3) Add to a relational table APPLICANT a column `interview` that contains an evaluation of interview each applicant passed through. An evaluation of interview is equal to -1 if the total number of skills is equal to 0 and otherwise it is a positive integer number less or equal to 10.
- (4) Fill a new column `interview` with the numbers consistent with a constraint determined in step (3). Note, that any number consistent with a constraint determined in step (3) is acceptable.
- (5) Implement automatic verification of a consistency constraint expressed in the steps (1) and (3) and saying that:
 - a value in a column `totskills` must be either 0 or it must be a positive integer number less or equal to 5 and

- a value in a column `interview` must be equal to -1 if a value in a column `totskills` is equal to 0 and otherwise it must be a positive integer number less or equal to 10.

Your implementation of automatic verification of the consistency constraint must use a technique explained in above.

- (5) Implement 2 SQL statements that verify your implementation of the consistency constraint. Processing of the first SQL statement must correctly validate against the consistency constraint. Processing of the second statement must return an error from validation against the consistency constraint. It is the only error message that is allowed in processing of your script.

Hints

- (1) It is recommended to follow a technique explained above to enforce a consistency constraint. To do so, you must create a new relational table that consists of two columns `totskills` and `interview`. A primary key in such table must be `(totskills, interview)`. Then, you have to fill a new relational table with all acceptable combinations of the values in the columns `totskills` and `interview`. And finally, you have to add an appropriate foreign key to a relational table `APPLICANT`.
- (2) An interesting problem is how to fill a new relational table with all acceptable combinations of the values without a large number of `INSERT` statements. A solution to this problem is included in a presentation 13 `SELECT` Statement (3).

When ready connect a command line interface to MySQL database server and process a script `solution1.sql`. A report from processing must be saved in a file `solution1.rpt`.

Deliverables

A file `solution1.rpt` with a report from processing of SQL script `solution1.sql`. The report must be created with the command line interface `mysql`, the report **MUST NOT** include any errors (except validation of SQL statement against the implemented consistency constraint in step (5)), and the report must list all SQL statements processed. Submission of a file with a different name and/or different extension and/or different type and without listing of SQL statements scores no marks.

Submission

Note, that you have only one submission. So, make it absolutely sure that you submit correct files with the correct contents. No other submission is possible !

Submit a file **solution1.rpt** through Moodle in the following way:

- (1) Access Moodle at **<http://moodle.uowplatform.edu.au/>**
- (2) To login use a **Login** link located in the right upper corner the Web page or in the middle of the bottom of the Web page
- (3) When logged select a site **CSIT115/DPIT115/CSIT815 (S118) Data Management & Security**
- (4) Scroll down to a section **Submissions**
- (5) Click at a link **In this place you can submit the outcomes of Laboratory 8**
- (6) Click at a button **Add Submission**
- (7) Move a file **solution1.rpt** into an area **You can drag and drop files here to add them**. You can also use a link **Add...**
- (8) Click at a button **Save changes**
- (9) Click at a button **Submit assignment**
- (10) Click at the checkbox with a text attached: **By checking this box, I confirm that this submission is my own work, ...** in order to confirm the authorship of your submission
- (11) Click at a button **Continue**

It is expected that a problem included within **Laboratory 8** will be solved **individually without any cooperation** with 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 that assessment task.

End of specification