

CSCI235/CSCI835 Database Systems
Laboratory 2
10 August 2020

Scope

This laboratory includes the tasks related to discovering nontrivial functional dependencies in the relational schemas and the derivations of minimal keys from the given sets of functional dependencies.

The outcomes of the laboratory work are due by **Saturday 22 August, 2020, 7.00 pm (sharp)**.

Please read very carefully information listed below.

This laboratory contributes to 1% of the total evaluation in the subject.

A submission procedure is explained at the end of specification.

This laboratory consists of 2 tasks and specification of each task starts from a new page.

It is recommended to solve the problems before attending a laboratory class in order 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 (zipped, gzipped, rared, tared, 7-zipped, lhzed, ... etc) is not allowed. The compressed files will not be evaluated.

All files left on Moodle in a state "Draft (not submitted) " will not be evaluated.

It is expected that all tasks included within **Laboratory 2** 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 the assessment task.

Tasks

Task 1 (0.4 mark)

Read and analyze the relational schemas listed below. For each one of the relational schemas find all nontrivial functional dependencies valid in the schemas. Then, for each schema, explain which functional dependencies cause the redundancies (if any).

`STUDENT(snumber, first-name, last-name, ccode)`

A relational table `STUDENT` contains information about the students and the courses enrolled by the students. A course (`ccode`) is enrolled by more than one students (`snumber`) and each student enrolls several course. Student number (`snumber`) uniquely identifies each students and course code (`ccode`) uniquely identifies each course. The first (`first-name`) and the last (`last-name`) names describe the students.

`HOTEL(name, city, capacity, enumber, salary)`

A relational table `HOTEL` contains information about the hotels and employees working in the hotels. A hotel is identified by a pair of attributes (`name, city`) and it is also described by the total number of rooms available (`capacity`). Each employee is identified by employee number (`enumber`) and it is described by a salary (`salary`).

`WAREHOUSE(wname, address, part, quantity)`

A relational table `WAREHOUSE` contains information about the names of warehouses (`wname`) located at the given addresses (`address`). Each warehouse is located at one address and there is only one warehouse at each address. Parts (`part`) are stored in a warehouse. A quantity of each part is determined by a value of attribute `quantity`.

`LIBRARY(cnumber, title, price, isbn)`

A relational table `LIBRARY` contains information about the books available from a library. Each copy of a book is uniquely identified by call number (`cnumber`). A book has one title (`title`) and one price (`price`). International system book number (`isbn`) is commonly used to uniquely identify a book.

Deliverables

A file `solution1.pdf` with the lists of nontrivial functional dependencies valid in each one of the relational schemas described above and with the explanations which functional dependencies cause the redundancies (if any).

Task 2 (0.6 mark)

Perform the following steps and save the outcomes in a file `solution2.pdf`.

- (1) Consider a relational schema $R(A, B, C, D, E)$ and the following set of functional dependencies valid in the schema,

$$\{A \rightarrow B, C \rightarrow A\}$$

List all derivations of functional dependencies that lead to the identification of minimal keys. List all minimal keys valid in a relational schema. Note, that a schema can have more than one minimal key.

- (2) Consider a relational schema $R(A, B, C, D, E)$ and the following set of functional dependencies valid in the schema,

$$\{A \rightarrow E, E \rightarrow C, CD \rightarrow A\}$$

List all derivations of functional dependencies that lead to the identification of minimal keys. List all minimal keys valid in a relational schema. Note, that a schema can have more than one minimal key.

- (3) Consider a relational schema $R(A, B, C, D, E)$ and the following set of functional dependencies valid in the schema,

$$\{D \rightarrow A, DA \rightarrow B, DE \rightarrow ABC\}$$

List all derivations of functional dependencies that lead to the identification of minimal keys. List all minimal keys valid in a relational schema. Note, that a schema can have more than one minimal key.

Deliverables

A file `solution2.pdf` with the derivations of functional dependencies that lead to the identification of minimal keys in the steps listed above and with the lists of minimal keys and for each schema.

Note, that the "educated guesses" of minimal keys score no marks. You must provide the correct and complete derivations for each one of the minimal keys found.

Submission

Submit the files **solution1.pdf** and **solution2.pdf** 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 **CSCI835/CSCI235 (S220) Database Systems**
- (4) Scroll down to a section **SUBMISSIONS**
- (5) Click at a link **In this place you can submit the outcomes of Laboratory 2**
- (6) Click at a button **Add Submission**
- (7) Move a file **solution1.pdf** into an area **You can drag and drop files here to add them**. You can also use a link **Add...**
- (8) Repeat a step (7) for a file **solution2.pdf**.
- (9) Click at a button **Save changes**
- (10) Click at a button **Submit assignment**
- (11) 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.
- (12) Click at a button **Continue**

End of specification