

## CSCI235 – Database Systems 2024 S2 Implementation Task 1

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### Scope

The Implementation of Task 1 is related to the contents of topic on functional dependency and normalization.

This Implementation is due by Thursday, 25 April 2024, 9:00 pm Singapore time. This task is worth 3% of the total assessment for the subject.

Only electronic submission through Moodle at:

<https://moodle.uowplatform.edu.au/>

is accepted. All email submission will be deleted and mark 0 (“zero”) will be awarded.

The submission procedure is explained at the end of this specification.

### Specification

#### Task 1 (1.5 marks)

Consider the relational schemas given below and the respective sets of functional dependencies valid in the schemas.

$R = (P, Q, R, S, T, U, V, W)$

Fd:  $RW \rightarrow V$

$P \rightarrow QR$

$T \rightarrow P$

$U \rightarrow TV$

- i. Determine the highest normal form, which is valid for a schema. **Justify your answer.** Justification must include the derivations of minimal keys from the functional dependencies and testing the validity of all normal forms (2NF, 3NF, BCNF) against the relational schemas, minimal keys, and functional dependencies.
- ii. If a schema is not in BCNF, then decompose it into a *minimum number of schemas* so that each one of them is in BCNF. **Justify your answer.**

**Provide justification of each answer. A solution with no comprehensive justification scores no marks!**

## **Deliverable**

A file Task1Solution.pdf with the solutions of the problems included in Task 1.

Submission of a file with a different name and/or different extension and/or different type scores no marks!

## **Task 2 (1.5 marks)**

Read the following specification of sample database domain.

Consider the relation  $R$ , which has attributes that hold schedules of courses and sections at a university:

$R(courseCode, sessionNum, offeringDept, creditHours, courseLevel, lectNum, semester, year, dayHours, roomNum, NumOfStudent)$ .

Suppose that the following functional dependencies hold on  $R$ :

- $courseCode \rightarrow offeringDept, creditHours, courseLevel$
- $courseCode, sessionNum, semester, year \rightarrow dayHours, roomNum, numOfStudent, lectNum$
- $roomNum, dayHours, semester, year \rightarrow lectNum, courseCode, sessionNum$

- Determine what is the highest normal form the relational schema conforms to. Justify your choice.
- Your next task is to decompose the relational schema into the smallest number of relational schemas, and each of the relational schema is normalized.

## **Deliverable**

A file Task2Solution.pdf with a list of the relational schemas obtained from the decomposition. Each relational schema must have attached a list of nontrivial functional and/or multivalued dependencies valid in the schema and a justification why the schema is normalized.

## Submissions

This assignment is due by 9:00 pm (21:00 hours) Sunday, 28 April 2024, Singapore time.

Submit the files **Task1Solution.pdf** and **Task2Solution.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 successfully logged in, select a site CSCI235 (SP224) Database Systems
- 4) Scroll down to the section "Implementation Task 1 Submission link", and click at the link.
- 5) Click at a button Add Submission
- 6) Move the file that you want to submit into an area of submission. If you have more than one files to submit, you can drag and drop the remaining files here to add them. You can also use a link *Add...*
- 7) Click at the button "Save changes",
- 8) Click at the check box to confirm authorship of your submission and click at the button "Continue".
- 9) When you are satisfied, remember to click at a button Submit assignment.

**A policy regarding late submissions is included in the subject outline. Only one submission per student is accepted.**

Implementation Task 1 is an individual assignment, and it is expected that all its tasks will be solved individually without any cooperation with the other students. Plagiarism is treated seriously. Students involved will likely receive zero. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or over e-mail.