

University of Calgary
Department of Computer Science
CPSC 471 Database Management Systems
Sample Quiz#3 –Winter 2021

Part I. Consider the following relation and corresponding set of functional dependencies:

$R(E_1, E_2, E_3, E_4, E_5, E_6, E_7, E_8, E_9, E_{10}, E_{11}, E_{12})$

$F = \{ E_1E_5 \rightarrow E_2E_3, E_4E_5 \rightarrow E_2E_9, E_2 \rightarrow E_7E_{12}, E_{12}E_8 \rightarrow E_3E_9, \\ E_5E_8 \rightarrow E_7E_9E_{10}, E_6E_9 \rightarrow E_3E_{11}E_{12} \}$

- (05) a) Is $E_1E_4E_5E_6E_8E_{12}$ a super key for relation R? Justify your answer.
(05) b) Is E_{10} functionally dependent on $E_1E_2E_5E_7$? Justify your answer; if yes then specify whether it is partial or full functional dependent? If NO then clearly mention why? (only yes/no answer has no value)
(10) c) Find F minimal? show all steps of your work.
(10) d) Is the following decomposition of R lossless join decomposition? Is this decomposition dependency preserving? Justify your answer by showing all steps of your work for both LJD and DP.

$R_1(E_2, E_7, E_8, E_9, E_{10}) \quad R_2(E_1, E_3, E_4, E_5, E_6) \quad R_3(E_1, E_2, E_7, E_{12}) \quad \text{and} \quad R_4(E_5, E_6, E_9, E_{10}, E_{11})$

Part II. The following tables include information about **terrorists**, the cities where they **lived**, their **friends**, terrorist **organizations**, planned **attacks**, terrorists to **participate** in each attack and **victims** from each attack with type of effect as injured or killed; a terrorist may be member in more than one organization, and we record the date he/she joined. A terrorist may have friends who may not be terrorists; for each friend, we keep sin, date and city of the last meeting with the terrorist. Note that nationality is a country and sin is social insurance number. Assume these tables are stored in XML document “terror.XML”.

Terrorist(Tsin, name, nationality, age, gender, occupation)
Organization(org-name, leader-sin, city, date-started)
Members(Tsin, org-name, date-joined)
Lives-in(Tsin, city, From, To) // “From” and “To” are dates

Friends(Tsin, Fsin, date, city)
Attack(code, city, country, time, date)
Participants(Tsin, code, role)
Victims(code, Vsin, effect)

Code the following queries (a and b) using XQuery:

- (5) a) Find names of terrorists who participated in at least one attack in a city where they lived?
(5) b) Find leader-sin of organizations located in cities where no attack took place?