Database Management System – cs422 DE

Assignment 4 – Week 5

This assignment is based on lecture 5 (chapter 14).

- Submit your *own work* on time. No credit will be given if the assignment is submitted after the due date.
- Note that the completed assignment should be submitted in .doc, .docx, .rtf or .pdf format only.
- In MCQs, if you think that your answer needs more explanation to get credit then please write it down.
- You are encouraged to discuss these questions in the Sakai forum.

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(1) Every time attribute A appears, it is matched with the same value of attribute B, but not the same value of attribute C. Therefore, it is true that:

A. A → B
B. A → C
C. A → (B, C)
D. (B,C) → A

ANS: A

(2) A table is in 2NF if the table is in 1NF and what other condition is met?

A. There are no functional dependencies.
B. There are no null values in primary key fields.
C. There are no repeating groups.
D. There are no attributes that are not functionally dependent on the relation's primary key.

ANS: D

(3) Consider a relation : EmpData(<u>empcode</u>, name, street, city, state, pincode)
For any pincode, there is only one city and state. Also, for given street, city and state, there is just one pincode. In normalization terms, EmpData is a relation in

A. 1 NF only
B. 2 NF and hence also in 1 NF
C. 3NF and hence also in 2NF and 1NF
D. None of the above

ANS: A

(4) Consider a relation R = (A,B,C,D) with the following FDs:
AB → C, C → D, and D → A
(a) List all candidate keys of R.
ANS: AB, CB, DB

(b) Is R in 3NF?
ANS: No

(5) Consider a relation R = (A,B,C,D) with the following FDs:
A → B, A → C, A → D, C → B and C → D
Is there any transitive dependency? If yes, then how to get rid of it?
ANS: Yes. Remove it by decomposing R into R1(A,C) and R2(C,B,D).

(6) Describe the types of update anomalies that may occur in a relation that has redundant data. (Review question 14.3 from the book)
ANS: update anomaly, insertion anomaly, deletion anomaly.

(7) Describe the concept of full functional dependency and describe how this concept relates to 2NF. Provide an example to illustrate your answer. (Review question 14.10 from the book)
ANS: Full functional dependency means the attribute depends on the entire key. A relation is in 2NF when all non-key attributes are fully functionally dependent on the whole primary key

(8) Describe the concept of transitive dependency and describe how this concept relates to 3NF. Provide an example to illustrate your answer. (Review question 14.11 from the book)
ANS: transitive dependency means a non-key attribute depends indirectly on the primary key. Removing these yields 3NF

(9) Solve exercise 14.14 (a, b, c) on page 390 from the course text book (5th edition).
For the 4th edition users, the question is 13.14 (a,b,c)
(a) ANS:
PatientNumber -> FullName, BedNumber, WardNumber, WardName
WardNumber -> WardName
DrugNumber -> Name, Description
(PatientNumber, DrugNumber, StartDate) -> Dosage, MethodOfAdmin, UnitsPerDay, FinishDate

(b) ANS:
PATIENT(PatientNumber, FullName, BedNumber, WardNumber)
WARD(WardNumber, WardName)
DRUG(DrugNumber, Name, Description)
MEDICATION(PatientNumber, DrugNumber, StartDate,
Dosage, MethodOfAdmin, UnitsPerDay, FinishDate)

(c) ANS:
Keys:
PATIENT: PK = PatientNumber
WARD: PK = WardNumber
DRUG: PK = DrugNumber
MEDICATION: PK = (PatientNumber, DrugNumber, StartDate)

Foreign keys:
MEDICATION.PatientNumber → PATIENT
MEDICATION.DrugNumber → DRUG
PATIENT.WardNumber → WARD

(10) Solve exercise 14.15 (a, b, c) on page 391 from the course text book (5th edition).
For the 4th edition users, the question is 13.15 (a,b,c)
(a) ANS: Table suffers from update, insertion, and deletion anomalies because dentist/patient/surgery information is redundantly stored.

(b) ANS:

staffNo -> dentistName
patNo -> patName
(staffNo, appointmentDate) -> surgeryNo
(patNo, appointmentDate, appointmentTime) -> staffNo
(staffNo, appointmentDate, appointmentTime) -> patNo

(c) ANS:

DENTIST(staffNo, dentistName)
PATIENT(patNo, patName)
SURGERY_ALLOCATION(staffNo, appointmentDate, surgeryNo)
APPOINTMENT(patNo, staffNo, appointmentDate, appointmentTime)