Purdue University
Computer Science Department
CS 448: Introduction to Database Systems
Prof: Bharat Bhargava

CS 448 – Homework #2, Due: 09/21/2017, before class

Reference: Fundamentals of Database Systems, Elmasri and Navathe, 6th or 7th Edition.

Question 1
What are the main phases of database design? What needs to be done by the user and what needs to be done by the database administrator? What is involved in physical database design?

Question 2
What is a user transaction? What properties must be maintained for a transaction by the database system?

Question 3
Problem 5.11. (a) (f) (k) (page 170 in 7th edition)
Or
Problem 3.11. (a) (f) (k) (page 80 in 6th edition)

Suppose that each of the following Update operations is applied directly to the database state shown in Figure 5.6 in 7th edition (or Figure 3.6 in 6th edition). Discuss *all* integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints.

a. Insert <'Robert', 'F', 'Scott', '943775543', '1972-06-21', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1> into EMPLOYEE.

f. Delete the WORKS_ON tuples with Essn = '333445555'.

k. Modify the Hours attribute of the WORKS_ON tuple with Essn = '999887777' and Pno = 10 to '5.0'.

Question 4
Problem 5.18. (page 170 in 7th edition)
Or
Problem 3.18. (page 80 in 6th edition)

Database design often involves decisions about the storage of
attributes. For example, a Social Security number can be stored as
one attribute or split into three attributes (one for each of the three
hyphen-delineated groups of numbers in a Social Security number—
XXX-XX-XXXX). However, Social Security numbers are usually
represented as just one attribute. The decision is based on how the
database will be used. This exercise asks you to think about specific
situations where dividing the SSN is useful.

Question 5
Problem 6.13 (page 205 in 7th edition)
Or
Problem 4.13 (page 114 in 6th edition)

6.13. Write SQL update statements to do the following on the database schema
shown in Figure 1.2.

a. Insert a new student, <'Johnson', 25, 1, 'Math'>, in the database.

b. Change the class of student 'Smith' to 2.

c. Insert a new course, <'Knowledge Engineering', 'cs4390', 3, 'cs'>.

d. Delete the record for the student whose name is 'Smith' and whose stu-
dent number is 17.

Question 6
Problem 8.34. (c) (d) (page 286 in 7th edition)
Or
Problem 6.34. (c) (d) (page 192 in 6th edition)

8.34. Specify and execute the following queries in relational algebra (RA) using the RA interpreter on the COMPANY database schema in Figure 5.5.

(c) List names of employees who are directly supervised by Franklin Wang

(d) List names of employees who work on every project