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Exercises: chapter one:

Question:

1. what does "data independence" mean and which two forms of data independence exist?

1 answer: data independence: ability to change an schema at the one level without changing the next higher level. two forms.
physical data independence: changing storage structure indexes (internal schema without changing logical schema or app.

2. which is the main concept of the relational model.

answer: The concept of the relational model is the relational (a table - a set of tuples (rows) over attributes (colum) manipulated by relational algebra: keys identify tuples and foreign keys capture

3. what does the employee table represent the real world? what does the row in this table with the data for Ann Jones represent?

answer: An employee table represents the real-world the set of employee entity the row with Ann Jones's data represent one specific employee instance (Ann Jones and her attribute value at that time.

4. what does the works-no table represent in the real world (and relational to the other tables of the sample database)?

answer: the works-no table represent the real-world assignment relationship between employee and projects (a many to many associative relation) Each row says " employee E works on project p (often with attributes like hours/role).

Question:

5. Let book be a Table with the columns: isbn and title. Assuming That isbn is unque and There are no identical title, answer The following questions: a) is title a key of The table?

b) Does isbn functionally depend on title?

c) Is The book table in 3NF?

answer: book (isbn, title) with isbn unique and title unique.

a). is title key? yes uniqueness → title - isbn, title, so title is a (candidate) key (minimal and identify row)

b). Does isbn functionally denpend on title? yes Beeuse title are unique, title - isbn holds.

c). is The Table in 3NF? yes (in fact BCNF). The The only FDs are isbn - title and title - isbn

6. Let odor be a table with The following column: order-no, customer-no discount if The column customer-no is functionally dependent on order-no and The column discount is functionally dependent on on customer-on, answer The following questions and explain in detail your answer!

a. is order-no a key of The Table?

b. is customer-no a key of The Table

answer: order (order. no, customer-no and discount) with FDs.

order-no → customer. no and customer → discount

Hence by trasitive. order-no → discount.

a). is order-no key? yes orde-no all determain all attribut (customer-n and-discount), so it is condidute key.

b). is a customer-no key? NO because custome-no does nat determain order-no so it is does not determine all attribute.

Question

7. Let company be a table with the following columns: company_no location. Each company has one or more locations. in witch normal forms is the company table.

Answer: company (company_no, location) with one company having many locations: keys and deps: The natural key is company_n, location) NO non prime attributes: not nontrivial FD like company_no → location (since multiple locations).

normal form: BCNF: but not 4NF because there is a nontrivial MVD Company_no → location where a company_no is it'n superkey

8. Let supplier be a table with following columns: supplier_no, article, city The key of table is the combination of the first two column. Each supplier delevers several articles, and each article is delevred by several suppliers. There is only one supplier each city Answer the following Questions:

a). in which normal form is the supplier table.

b). How you can resolve the exsisting functional dependence.

Answer: supplier (supplier_no, article, city) key = (supplier_no, article), and "only one supplier in each city" ⇒ supplier_no → city.

a). Normal Form: violates 2NF (partial dependency: non-prime city depends on part of the composite key supplier_no) so it is 1NF

b Resolve FDs (dependence): supplier (suplier_no, city) - key supplier_no (BCNF) supply (supplier_no, article) key (supplier_no article) - key (BCNF) This remove the partial dependence

9. Let R (A, B, C) be a relation with the function dependency B=>C (The underlined attribute A and build the composite ke and the arbribut C is funcbranally dependent on B) in which normal form is the relation R?

-Answer: R(A,B,C) with key (A,B) and FD B→C.
C (non-prime) depends on part of the key (B) => partial dependency.
Normal form: 1NF (violates 2NF, hence also 3NF/BCNF)

10. Let (A,B,C) be a relation with functional dependency C=>B. (The underlined attribute A and B build the composite key, and the attribute B is functionally dependent on C.) in which normal form is the relation R?

-Answer: R(A,B,C) with key (A,B) and FD C→B.
no partial dependency of a non-prime on part of key (only non-prime is C.) Normal form: 3NF, but not BCNF (since C is not a superkey).