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COSC 571
1/28/15

Homework 1

Chapter 1:

1.3) List six major steps that you would take in setting up a database for a particular enterprise:

1.8) List four significant differences between a file-processing system and a DBMS:

1.9) Explain the concept of physical data independence, and its importance in database systems.

1.11) List at least two reasons why database systems support data manipulation using a declarative query language such as SQL, instead of just providing a a library of C or C++ functions to carry out data manipulation.

1.12) Explain what problems are caused by the design of the table in Figure 1.4.

Chapter 2:

2.6) Consider the following expressions, which use the result of a relational algebra operation as the input to another operation. For each expression, explain in words what the expression does.

a. $\sigma_{year \geq 2009}$ (takes) $\bowtie$ student

b. $\sigma_{year \geq 2009}$ (takes $\bowtie$ student)

c. $\Pi_{ID, name, course\_id}$ (student $\bowtie$ takes)

2.9) Consider the bank database of Figure 2.15.

a. What are the appropriate primary keys?

b. Given your choice of primary keys, identify appropriate foreign keys.

      branch (branch_name, branch_city, assets)

      customer (customer_name, customer_street, customer_city)

      loan (loan_number, branch_name, amount)

      borrower (customer_name, loan_number)

      account (account_number, branch_name, balance)

      depositor (customer_name, account_number)

2.10) Consider the advisor relation shown in Figure 2.8, with s_id as the primary key of advisor. Suppose a student can have more than one advisor. Then, would s_id still be a primary key of the advisor relation? If not, what should the primary key of advisor be?

2.13) Consider the bank database of Figure 2.15. Give an expression in the relational algebra for each of the following queries:

a. Find all loan numbers with a loan value greater than $10,000.

b. Find the names of all depositors who have an account with a value greater than $6,000.

c. Find the names of all depositors who have an account with a value greater than $6,000 at the "Uptown" branch.

2.16) Differentiate between the following

a) Superkey vs. candidate key

b) Primary key vs. foreign key

c) Schema vs. instance d) Procedural vs. non-procedural query languages

e) Selection vs. projection operations

Chapter 3:

3.25) DDL/DML written exercise.

      a. Write SQL DDL statements corresponding to the schema in Fig. 3.18 (Insurance database) in the textbook. Make any reasonable assumptions about the data types and be sure to declare primary and foreign keys.

      b. Write SQL DDL/DML statements to do the following:

i. Alter any one table to include a new, meaningful attribute.

ii. Insert one tuple each into each of the tables. Make sure the data follows all integrity constraints.

iii. Delete one tuple from any table (do not delete all tuples).

iv. Update any one tuple from any table.