

Assignment 2: Relational Model

Course ISE 322: Database Systems

Due December 2, 2009

1 Question 1: Exercise 3.8 (18 points / 3 points each)

Answer each of the following questions briefly. The questions are based on the following relational schema:

$\text{Emp}(\underline{\text{eid}}:\text{integer}, \text{ename}:\text{string}, \text{age}:\text{integer}, \text{salary}:\text{real})$
 $\text{Works}(\underline{\text{eid}}:\text{integer}, \underline{\text{did}}:\text{integer}, \text{pct_time}:\text{integer})$
 $\text{Dept}(\underline{\text{did}}:\text{integer}, \text{dname}:\text{string}, \text{budget}:\text{real}, \text{managerid}:\text{integer})$

1. Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dept tuple?
2. Write the SQL statements required to create the preceding relations, including appropriate versions of all primary and foreign key integrity constraints.
3. Define the Dept relation in SQL so that every department is guaranteed to have a manager.
4. Write an SQL statement to add John Doe as an employee with $\text{eid} = 101$, $\text{age} = 32$ and $\text{salary} = 15,000$.
5. Write an SQL statement to give every employee a 10 percent raise.
6. Write an SQL statement to delete the Toy department. Given the referential integrity constraints you chose for this schema, explain what happens when this statement is executed.

2 Question 2: Exercise 3.12 (25 points)

Consider the scenario from Question 1 (Exercise 2.2) in Assignment 1, where you designed an ER diagram for a university database. Write SQL statements to create the corresponding relations and capture as many of the constraints as possible. If you cannot capture some constraints, explain why. The constraints are reproduced below for your convenience.

1. Professors can teach the same course in several semesters, and each offering must be recorded.
2. Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions).
3. Every professor must teach some course
4. Every professor teaches exactly one course (no more, no less).
5. Every professor teaches exactly one course (no more, no less) and every course must be taught by some professor.

6. Now suppose that certain courses can be taught by a team of professors jointly, but it is possible that no one professor in a team can teach the course. Model this situation, introducing additional entity sets and relationship sets if necessary.

Note that your solution to this question need not depend on the ER diagram you created for the assignment.

3 Question 3: Exercise 3.14 (25 points)

Consider the scenario from Question 2 (Exercise 2.4) in Assignment 1, where you designed an ER diagram for a university database. Write SQL statements to create the corresponding relations and capture as many of the constraints as possible. If you cannot capture some constraints, explain why. The constraints are reproduced below for your convenience.

A company database needs to store information about employees (identified by *ssn*, with *salary* and *phone* as attributes), departments (identified by *dno*, with *dname* and *budget* as attributes), and children of employees (with *name* and *age* as attributes). Employees *work* in departments; each department is *managed by* an employee; a child must be identified uniquely by *name* when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.