SE305 Database System Technology

Assignment 2

Due：Tuesday, Sep 25, 2018

1. Consider the relational database of Figure 1.

employee (employee_name, street,city)
works (employee_name, company_name,salary)
company (company_name, city)
manages (employee_name, manager_name)

Give an expression in the relational algebra for each request:

a. Give all employees of First Bank Corporation a 10 percent salary raise.

b. Delete all tuples in the works relation for employees of Small Bank Corporation.

Give an expression in SQL for each of the following queries.

a. Modify the database so that Jones now lives in Newtown.

b. Give all managers of First Bank Corporation a 10 percent raise unless the salary becomes greater than $100,000; in such case, give only a 3 percent raise.

2. Consider the employee database of Figure 1, where the primary keys are underlined. Give an expression in SQL for each of the following queries.

   a. Find the names and cities of residence of all employees who work for First Bank Corporation.

   b. Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.

   c. Find all employees in the database who do not work for First Bank Corporation.

   d. Find all employees in the database who earn more than each employee of Small Bank Corporation.

   e. Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.

3. Consider the relational schema

   student (student_id,student_nam)
   registered (student_id,course_id)

   Write an SQL query to list the student-id and name of each student along with the total

number of courses that the student is registered for. Students who are not registered for any course must also be listed, with the number of registered courses shown as 0.

4. Suppose you are given a relation grade points(grade, points), which provides a conversion from letter grades in the takes relation to numeric scores; for example an "A" grade could be specified to correspond to 4 points, an "A−" to 3.7 points, a "B+" to 3.3 points, a "B" to 3 points, and so on. The grade points earned by a student for a course offering (section) is defined as the number of credits for the course multiplied by the numeric points for the grade that the student received. Given the above relation, and our university schema, write each of the following queries in SQL. You can assume for simplicity that no takes tuple has the null value for grade.
   a. Find the total grade-points earned by the student with ID 12345, across all courses taken by the student.
   b. Find the grade-point average (GPA) for the above student, that is, the total grade-points divided by the total credits for the associated courses.
   c. Find the ID and the grade-point average of every student.

5. A book store uses a relational database with the following schema (primary key attributes are underlined):
   Customer-schema = (cust_num, name, address, phonenum)

   Book-schema = (ISBN, author, title, pubdate, price)

   Publisher-schema = (name, address, phonenum, fax)

   Purchased-schema = (cust_num, ISBN, pdate)

   Publishes-schema = (ISBN, name)

Relation *purchased* keeps track of books that a customer has purchased. Relation *publishes* keeps track of which publisher publishes each book. An ISBN is a string that uniquely identifies a book.

(a) Express each of the following queries in SQL:

i. Find the names of all customers who have purchased a book published by Addison-Wesley

(Addison-Wesley is the name of a publisher.) The result of your query must not contain any duplicates.

ii. Find the author and title of all books that have the same price as the book with ISBN 0-07-044756-X.

iii. Find the number of books published by each publisher. The result of your query must have three attributes: the name and address of the publisher, and the number of books published by that publisher.

(b) Does this schema allow the same book to be published by multiple publishers? Justify your answer.