

Tutorial 9 (SC2207-CZ2007)

SQL

Classroom Exercise

1. Consider the following schema of a product database:

Parts(pid: integer, pname: string, color: string)

Suppliers(sid: integer, sname: string, address: string)

Catalog(sid: integer, pid: integer, price: real)

The Catalog records that some Supplier sid supplies Part pid at a given price. Formulate each of the following integrity constraints as an SQL assertion.

(i) No Supplier may supply red and green Parts.

(ii) For all Parts, no other Supplier has a lower price than the Supplier with “sid” = 1.

2. Consider the relation R (A, B, C, D, E). Write one or more CREATE TRIGGER statement(s) in SQL99 that can be used to impose an FD constraint $AB \twoheadrightarrow C$.

3. An airline stores information about its flights and ticket sales in a relational database with the following schema (primary keys are underlined):

FLIGHT (FLIGHTNO, DAY, MONTH, YEAR, NUMSEATS, PRICE)

PASSENGERS (PASSENGERID, NAME, ADDRESS)

BOOKING (BREF, FLIGHTNO, DAY, MONTH, YEAR, PASSENGER)

The (FLIGHTNO, DAY, MONTH, YEAR) attribute of BOOKING is a foreign key into the FLIGHT relation. Also, PASSENGER attribute of BOOKING is a foreign key into the PASSENGERS relation. You can assume the number of seats for a flight must be between 50 and 200. When details of a new flight are added to the database, a default price of 2000 SGD is used unless another price is given.

When there are fewer than 20 seats remaining on a flight on a particular day then the airline's policy is to set the price of remaining seats on that flight to 4000 SGD. Write a trigger to implement this policy. You may assume that bookings cannot be cancelled.

4. A database system used by a university's examinations office has the following relations:

Exams (course, examDate, examTime)

Students (studentId, name)

registeredFor (student, course, examDate)

Attribute course is a six-character course code. A course cannot have more than one exam on the same date, and that exam will either be in the morning ('AM') or in the afternoon ('PM'). Attribute examDate is a date (e.g. '2014-12-18') and examTime is either 'AM' or 'PM'.

If a clash occurs for a student, special arrangements will be made for the student to sit the exam at another time on the same date. For example, if the clash is with another 'AM' exam, then a special exam will be arranged for that student in the afternoon ('PM'), and vice versa.

Write a trigger in SQL99 that, when a student registers for an exam that is at the same time on the same date as another exam for which they are already registered, adds a row to relation SpecialExams(student, course, examDate, examTime). Here, examTime should be the time of the specially arranged exam ('AM' or 'PM').

A row should be added to the registeredFor relation even when the student will sit a special exam.

5. Consider a database with the following two tables with obvious meanings:

course(course_id, course_name, no_credit),

registration(student_id, course_id, grade).

Note that the underlined attributes are keys of the tables. Write the triggers for imposing the following foreign key constraint specified in the CREATE TABLE statement for registration:

FOREIGN KEY (course id) REFERENCES course ON DELETE CASCADE.

Critical Thinking Exercise

6. Consider the following schema containing bank account information.

Primary Keys are in bold.

CUSTOMERS (**customer_name**, address)

ACCOUNTS (**account_number**, balance)

ACCOUNT_OWNERS (**customer_name**, **account_number**)

Write an assertion such that for every customer at least one of the following conditions holds true:

- He (or she) is owner of at most 5 accounts
- The sum of the balance of various accounts he (or she) owns is greater than \$50,000.