Database Management Systems

Practice Problem Set III: Relational Calculus

Q1. Consider the following three relations:

Enrol(student, course) : students enrolled in a course

Teaches(teacher, course) : teacher of courses

Likes(student, teacher) : student likes a teacher

Define the following using i. tuple calculus, ii. domain calculus, iii. QBE, iv. datalog.

a) Happy Student (H): at least one of the courses a student H is taking is taught by a teacher she/he likes

b) Very Happy Student (V) : all the courses a student V is taking are taught by teachers she/he likes

c) Sad Student (S) : none of the courses a student S is taking are taught by teachers she/he likes

Q2. Consider the database schema as follows:

LIKES(person, food_item);

FREQUENTS(person, restaurant);

SERVES(restaurant, food_item, cost);

Restaurants can serve many food_items, persons can frequent many restaurants, and they can like many food_items. However, a restaurant cannot serve the same food_item at different costs.

Write the following queries in tuple relational calculus, domain relational calculus and relational algebra.

i. Find restaurant that serve some food_item that Joe likes.

ii. Find persons who frequent restaurants where they can get a food_item for less than Rs. 100

iii. Find persons who like at least one expensive food_item that Joe likes. Expensive means: is served at more than Rs 100.

iv. Find persons who like some food_item but do not frequent any restaurant.

v. Find all persons who frequent a restaurant that serves at least 2 food_items they like, and one of them for at most Rs. 100.