Delhi Technological University
Department of Applied Mathematics

MC209 Database Management System AY(2024-25)

Q1.
The Hudson Engineering Group (HEG) has contacted you to create a conceptual model whose application will meet the expected database requirements of the company's training program. The description of the operating requirement is given below-
The HEG has 12 instructors and can handle up to 30 trainees per class. HEG offers five advanced technology courses each of which may generate several classes. If a class has fewer than 10 trainees, it will be cancelled. Therefore it is possible for a course not to generate any classes. Each class is taught by one instructor. Each instructor may teach up to two classes or may be assigned to do research only. Each trainee may take up to two classes per year. Draw the ER diagram for this situation.

i Identify the entities. Take suitable attributes for each one of them.

ii Identify relationships between/among entities.

iii Specify the cardinality constraints, participation constraints and min, max constraint for each relation.

iv Specify the assumptions made if any.

Write the SQL and relational Albraic Query for all the case studies given below
Q2
Customer (CustID, email, Name, Phone, ReferrerID)
Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)
BicycleModel (ModelNo, Manufacturer, Style)
Service (StartDate, BicycleID, EndDate)
a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) List all the customers who have the bicycles manufactured by manufacturer "Honda".
c) List the bicycles purchased by the customers who have been referred by customer "C1".
d) List the manufacturer of red colored bicycles.
e) List the models of the bicycles given for service.

Q3.

Consider a fictitious, simplified, Twitter-like setting, with the following specifications:

Users post ’tweets’ that is short pieces of text. They may tag their tweets with zero or more tags of their own choice. For example a user tweeting about the G20 summit may decide to use the tag ’G20’ (prefixed by a ’sharp’ sign: #G20, if we follow the convention imposed by the twitter site). A user ’u’ may follow zero or more other users, which means that their ’tweets’ are visible to user ’u’ when he/she logs in.

For the above setting, we will use the following schema:

• Person (pname, city, street) - Assume the pname is unique

• Follows (pname1, pname2) - Person pname1 follows person pname2

• Tweets (tid, ttitle, ttext) - Tweet with tid has title ttitle and text ttext

• PersonTweets (pname, tid, ts) - Person pname posted tweet tid at timestamp ts

• TweetTag (tid, tagname) - Tweet tid had tagname in its list of tags.

We now want to extract some information from the database using the power of relationalAlgebra / Sql. For each of the following questions write half of the queries (three in numbers) in relation algebra and other half (three in numbers) in SQL. You can make your own choice

1.1 Find all the people (pname) who posted a tweet with tag ‘Obama’.

1.2 Find all the different, distinct tags ever used.

1.3 Find all the tags ‘Bob Smith’ uses in his tweets. (i.e. Bob’s tweeting interests)

1.4 Find all the tags ‘Bob Smith’ reads in the tweets of the people he follows. (i.e. Bob’s reading interests)

1.5 Find the total number of tweets each individual has posted.

1.6 Find all the people (pname) from ‘Pittsburgh’ who used the tag ‘G20’

Q4

Given the following schema definitions:

message (message_id, subject, body)

sent_to(message_id, email, senddate)

customer (email, name, family_size, address)

For each case below, fill in the blanks such that the SQL queries correspond to the English language queries stated.

1- Find the names and emails of all customers who have sent the message with subject "Happy New Year"
2- Find the names and common addresses of all pairs of customers who claim to have a famlily size 2 and and have the same address.
3- Find the names of all customers and their family size whose family size is at least 50% more than the average family size. Sort the results by family size.
4- Find all customers each having a family size different from the total number of customers having the same address as him or her. (6 pts)

Q5

SHOP(Shop_No, Shop_name, Address, owner)
ITEM(I-No, I-Name)
SUPPLIED(I-No, C_No, Shop_No, Date, Price)
REQUIRES(C_No, I-No)
CUSTOMER(C_No, C_Name,C_Address)
SUPPLIED relation gives data about items supplied by a shop to a customer and REQUIRES relation gives data about items required by a customer. Primary keys of each relation is underlined.

a. Write DDL statements to create these tables. Specify the Primary and Foreign Key constraints.
b. Write query statements for the following queries in SQL-
    a. names of customers who have been supplied items of maximum total value.
    b. Names of customers who are supplied all the items from only "Ji ndal Stores".
    c. List of shop owners who supplied some item to the address "Krishna Nivas, MG Road".