PDPM

Indian Institute of Information Technology, Design and Manufacturing Jabalpur

Mid Sem – February 20, 2013
CS 203 Database Design and Management

MM: 75 **Time: 2 Hours**

1. [10] Match the following terms and definitions:

___composite attribute	(a). uniquely identifies entity instances
___ unary relationship	(b). relates instances of a single entity type
___ weak entity	(c). specifies maximum and minimum number of instances
___ attribute	(d). association between entity types
___ entity	(e). collection of similar entities
___ relationship type	(f). number of participating entity types in relationship
___cardinality constraint	(g). property of an entity
___ degree	(h). can be broken into component parts
___ identifier	(i). depends on the existence of another entity type
___ entity type	(j). person, place, object, concept, event

2. [10] Differentiate with example
   a. Logical data independence and Physical data independence
   b. Host language and DSL

3. [5] Consider the following six relations for an order-processing database application in a company:

   CUSTOMER (Cust#, Cname, City)
   ORDER (Order#, Odate, Cust#, Ord_Amt)
   ORDER_ITEM (Order#, Item#, Qty)
   ITEM (Item#, Unit_price)
   SHIPMENT (Order#, Warehouse#, Ship_date)
   WAREHOUSE (Warehouse#, City)

   Here, Ord_Amt refers to total dollar amount of an order; Odate is the date the order was placed; Ship_date is the date an order is shipped from the warehouse. Assume that an order can be shipped from several warehouses. Specify foreign keys for this schema.

4. [5] For the Supplier-Part database discussed in the class, write a relational algebra expression to get all pairs of supplier numbers such that the two suppliers are located in the same city.

5. [10] Consider the following three relations:

Car (model, year, serial, color)

Makes (maker, model)

Owns (owner, serial)

A tuple in Car represents a specific car of a given model, made in a given year, with a serial number and color. A tuple in Makes specifies that a maker company makes cars of a certain model. A tuple in Owns specifies that an owner owns the car with a given serial number.
A given instance is:

Car

model	year	serial	color
AB55	1970	441	black
AB99	1980	559	white
XY12	1990	651	cream
MM10	2000	761	white
MN10	2001	821	red

Makes

maker	model
Hyundai	AB55
Hyundai	AB99
Toyota	XY12
Porche	MM10
Ferrari	MN10

Owns

owner	serial
Ravi	441
Seema	651
Reena	651
Pushkin	761
Pushkin	821

Perform the following operations (with reasons), in the given order, on this schema and show the instances of these relations:

a. Insert <Mitesh, 652> in Owns
b. Insert <XY30, 2001, 867, red > in Car
c. Insert <Lotus, DB10 > in Makes
d. Delete <Hyundai, AB99> from Makes
e. Update MN10 model of Ferrari as MN11 in Makes

6. [10] Write the following queries in relational algebra on the database schema given in question 3:
   a. List the Order# and Ship_date for all orders shipped from Warehouse number 'W5'.
   b. List the Warehouse information from which the Customer named 'Raunak Shah' was supplied her orders. Produce a listing: Order#, Warehouse#.

c. Produce a listing CUSTNAME, #OFORDERS, AVG_ORDER_AMT, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
d. List the orders that were not shipped within 30 days of ordering.
e. List the Order# for orders that were shipped from all warehouses that the company has in Jamshedpur.

7. [10] Consider the following scenario. (5 bonus marks for the perfect model)
   - There are televisions series, which have names, networks and production companies, and are identified by the name and network.
   - A television series has one or more episodes, identified by episode number. Episodes also have a title and a length. No episode can exist without a corresponding television series.
   - There are also movies. A movie is identified by its name and the year it was released. It also has a studio.
   - An actor is identified by name and birth date, and also has a nationality.
   - A writer is also identified by name and birth data, and also has a literary agency that represents him or her.
   - An actor can appear as a "regular" on a television series, a guest star on an episode, and a performer in a movie.
   - An episode has a writer, and a movie has a writer.

   Draw an ER diagram that represents this scenario. Be sure to mark the key attributes and include cardinality constraints on relationships.

8. [10] Suppose relation R(A,B,C) has the following tuples:

A	B	C
1	5	3
4	5	3
4	2	8
5	2	3
1	5	8

and relation S(A,B,C) has the following tuples:

A	B	C
5	2	3
5	2	4
4	2	8
1	5	3

Compute the following:
a. (R - S) union (S - R)
b. theta-join of R and S with the condition R.B = S.B AND R.A < S.C

9. [5] For the following Questions, modify ER diagram from Question 7 to handle the following changes in the scenario. Do each scenario as a separate change from the original diagram. You only need to show the parts of the diagram that change.
    a. Television series run for one or more seasons and each episode is associated with a particular season.
    b. A movie can be a sequel to another movie.
    c. An actor plays a particular character in a television series, episode or movie.