answer – 30.1

1605023

a. Find the relational representation (schema) of this xml data.

b. Compare xml and relational models.

Solution (a)

Here, we have the following relations:

i. one-to-one relation between purchase order and purchaser

ii. one-to-one relation between purchase order and supplier

iii. many-to-many relation between purchase order and item.

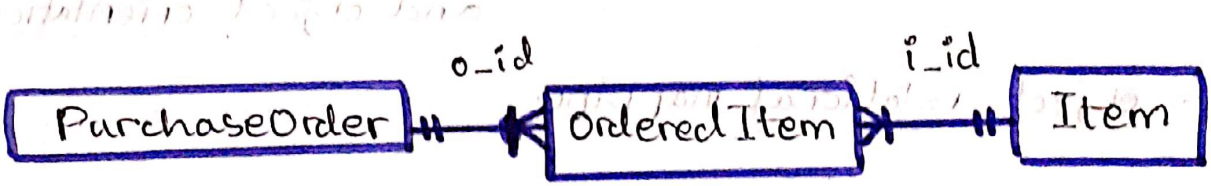
Considering these relations, we have found the following schemata:

i. PurchaseOrder (id, p_name, p_address, s_name, s_address, total cost)

ii. Item (id, description, per unit cost/price)

iii. orderedItem (o_id, i_id, quantity, total price)

We have the following relation here:



(b)

xml	relational models
i. schemaless	i. have schema
ii. no joining in query processing	ii. joining takes place
iii. occupies a lot of memory	iii. occupy relatively less memory

Ans.

answer – 30.2

1605023

a. Define SQL schema for the following using type inheritance.

A car-rental company maintains a database for all vehicles in its current fleet. For each vehicle, it includes the vehicle identification number, license number, manufacturer, model, date of purchase, and color. Special data are included for certain types of vehicles:

i. Trucks: cargo, capacity.
ii. Sports Cars: horsepower, renter age requirement
iii. Vans: number of passengers
iv. Off-road vehicles: ground clearance, drivetrain (four- or two-wheel drive)

b. Insert one tuple in each table.

Solution

(a) At first, we will create a type "Vehicle" and then, several other types namely "Truck", "SportsCar", "Van", "off-road vehicle" under the type "vehicle".

=> create type Vehicle
(ID varchar(20) primary key,
L_num varchar(20),
manufacturer varchar(30),
model varchar(20),
P_date Date,
color varchar(20)) ref from(ID);

=> create type Truck under Vehicle
(cargo varchar(20),
capacity Number);

=> create type SportsCar under Vehicle
(horsepower Number,
r_age_req varchar(30));

=> create type Van under Vehicle
(p_capacity integer);

=> create type off_road vehicle under vehicle
(g_clearance Number,
drivetrain varchar(20));

Now, we will create a table "vehicles" of type "vehicle".

=> create table vehicles of vehicle ; following oracle syntax

Then, we will create four more tables corresponding to the different vehicle types using table inheritance of "vehicles".

=> create table trucks of Truck
under vehicles ;

=> create table sportscars of Sportscar
under vehicles ;

=> create table vans of Van
under vehicles ;

=> create table off-road vehicles of Off-road Vehicle
under vehicles ;

(b)

i. insert into Trucks(ID, l_num, ---, cargo, capacity)
values ("T1", "2301", ---, "medium", 2,000) ;

ii. insert into Sportscars(ID, l_num, ---, hp, r_age_req)
values ("T2", "2302", ---, 50, "whatever it is") ;

iii. insert into vans(ID, l_num, ---, p_capacity)
values ("T3", "2303", ----, 10) ;

iv. insert into Off-road vehicles(ID, l_num, ---, drivetrain)
values ("T4", "2304", ---, "whatever it is (2)") ;

Ans.

answer – 31.1

1605023

Select dept_name, head->name, head->address
from departments;

Write the output of the above SQL expression.

Solution

('CSE', 'Atique', 'CSE, BUET') or

```
{
  'dept_name': 'CSE',
  'head': {
     'name': 'Atique',
     'address': 'CSE, BUET'
  }
}
```

Ans.

answer – 31.2

Create type Customer with attributes c-id, name, street, and city. Use reference type for c-id. Insert the following records into customer table.

('c001', 'Arif', 'North', 'Dhalca')
('c002', 'Abdullah', 'South', 'Dhalca')

Create another type account with attributes acc-id, type, owner where owner is reference type and refers to customer table. Insert an account with acc-id = 'A001' and type = 'savings'. The owner of the account is Abdullah.

Implement the above using:

a. c-id as reference

b. system-generated reference

c. Compare the performance of the above implementation with the same with foreign key reference.

Solution

=> create type Customer
(c-id varchar(20) primary key,
name varchar(20),
street varchar(30),
city varchar(30))
ref from(c-id);

=> create table customers of Customer;

=> insert into customers
values ('c001','Arif','North','Dhaka');

=> insert into customers
values ('c002','Abdullah','South','Dhaka');

=> create type Account
(acc-id varchar(20) primary key,
type varchar(20), owner ref(Customer) scope customers);

=> create table accounts of Account;

(a) => insert into accounts values ('A001','savings','c002');

(b) => insert into accounts values ('A001','Savings',null);

=> update accounts
set owner = (select ref(c) from customers as c where c-id='c002')
where acc-id = 'A001';

(c) we have to bring two corresponding tables to memory and do joining operation in relational model where foreign key reference is used. On the other hand, we do not have to do any explicit joining in object-relational model since tuples are linked via references. Hence, we simply bring corresponding tuples to memory and carry out further operations. Therefore, the later is more efficient.

Ans.

recording ১৭৩৩

answer – 32.1

1605023

Compare DBMS query processing with IR query processing.

Solution

In DBMS SQL query, selection decision is made based on the true/false value of keyword comparison in "where" statement. Only those records/documents with true value are selected and fetched from DB.

On the other hand, in IR query, selection decision does not depend on the true/false value of keyword comparison. Instead, a relevance score is computed for each document against a keyword using certain formula. Then, a sorted order of documents based on the score is generated where doc with higher score gets priority in the list. This list is the IR search result.

Ans.

answer – 32.2

A document d is given as follows:

A person has NID, name, street, city, thana, district and age. A person may be an employee with special attributes as salary and qualification (highest degree). An employee may be, government or private. For govt. employees, special attributes are ministry and designation. For non-govt. employees, special attributes are company name and position. National team is formed with the attributes as, id, team leader, game, organizing country, and date. The attribute team leader is reference type that refers to person. You have to define NID as reference.

a. Find TF(d, attribute)

b. Why logarithmic function has been considered instead of linear function in TF(d,t)?

Solution

(a) $TF(d, attribute) = \log\left(1 + \frac{n(d, attribute)}{n(d)}\right) = \log\left(1 + \frac{5}{86}\right)$.
(considering stop words as well)

(b) Consider a scenario where there are n occurrences of term t in doc d_1 and 2n occurrences of t in another doc d_2. We don't want to put 2x relevance on d_2 than d_1. So, we use logarithmic function to calculate $TF(d, t)$ instead of linear function.

Ans.

answer – 32.3

A document d_1 is given as follows:

A person has NID, name, street, city, thana, district and age. A person may be an employee with special attributes as salary and qualification (highest degree). An employee may be government or private. For govt. employees, special attributes are ministry and designation. For non-govt. employees, special attributes are company name and position.

Another document d_2 is given as follows:

Define SQL schema for the following using type inheritance.
A car-rental company maintains a database for all vehicles in its current fleet. For all vehicles, it includes the vehicle identification number, license number, manufacturer, model, date of purchase, and color.

a. Find IDF (attribute).

b. Find IDF (for).

Solution,

(a) $IDF(attribute) = \frac{1}{n(attribute)} = \frac{1}{1} = 1$

(b) $IDF(for) = \frac{1}{n(for)} = \frac{1}{2} = 0.5$

Ans.

answer – 32.4

1605023

A document d1 is given as follows:

A person has NID, name, street, city, thana, district and age. A person may be an employee with special attributes as salary and qualification (highest degree). An employee may be, government or private. For govt. employees, special attributes are ministry and designation. For non-govt. employees, special attributes are company name and position./

Another document d2 is given as follows:

Define SQL schema for the following using type inheritance.
A car-rental company maintains a database for all vehicles in its current fleet. For all vehicles, it includes the vehicle identification number, license number, manufacturer, model, date of purchase, and color./

a. Find relerance r(d1, {attribute, salary}).
b. Find relerance r(d2, {attribute, salary}).
c. Find ranking of the query {attribute, salary}.

Solution

(a) $r(d1, \{attribute, salary\}) = TF(d_1, attribute) \times IDF(attribute) + TF(d_1, salary) \times IDF(salary)$

$= \log\{1 + \frac{3}{52}\} + \log\{1+\frac{1}{52}\} = \log 55/52 + \log 53/52.$

(b) $r(d_2, \{attribute, salary\}) = TF(d_2, attribute) \times IDF(attribute) + TF(d_2, salary) \times IDF(salary)$

$= \log(1+\frac{0}{41}) \times 1/1 + \log(1+\frac{0}{41}) \times \frac{1}{1} = 0+0 = 0$

(c) Here, $r(d_1, \{attribute, salary\}) = \log\frac{55}{52} + \log\frac{53}{52}$.

$r(d_2, \{attribute, salary\}) = 0.$

So, $r_1 > r_2$ and $d_1 > d_2$. Ans.