UNIT 2

Lecture 22
Relational Algebra
Questions with solutions

Question 2

Consider following schemas and solve the following queries in relational algebra :

emp (ename, street, city)

works (ename, company_name, salary)

company (company_name, city)

1. Display name of all employees who works for the company "Satyam".

2. Display name, street, and city of employees those who working for company "Satyam".

3. Find the name of person who live in the same city and same street as that of "Mr. Rahul".

4. Find name of all employees in this database who lives in the same cities as the company for which they work.

5. Find all companies located in every city in which "Infosys" is located. (Infosys is a company).

[CSVTU May 2012, May 2010]

1. Display name of all employees who works for the company "Satyam".

emp (ename, street, city)

works (ename, company_name, salary)

company (company_name, city)

RA : $\prod_{ename} (\sigma_{company\_name\ =\ "Satyam"} (Works))$

SQL : Select distinct ename from works where company_name = 'Satyam';

2. Display name, street, and city of employees those who working for company "Satyam".

emp (ename, street, city)

works (ename, company_name, salary)

company (company_name, city)

RA : $\Pi_{ename,\ street,\ city}(emp \bowtie (\sigma_{company\_name\ =\ "Satyam"}(works)))$

RA : $\Pi_{ename,\ street,\ city}(\sigma_{company\_name\ =\ "Satyam"}(emp \bowtie works))$

SQL : Select distinct ename, street, city from emp natural join works where company_name = 'Satyam';

3. Find the name of person who live in the same city and same street as that of "Mr. Rahul".

emp (ename, street, city)
works (ename, company_name, salary)
company (company_name, city)

RA : $\Pi_{e1.ename} (\sigma_{e1.street = e2.street \wedge e1.city = e2.city \wedge e2.ename = \text{"Mr. Rahul"}} (\rho_{e1}(emp) \times \rho_{e2}(emp)))$

SQL : select distinct e1.ename from emp e1, emp e2 where e1.street = e2.street and e1.city = e2.city and e2.ename = 'Mr. Rahul';

SQL > select distinct ename from emp where (street, city) in (select street, city from emp where ename = 'Mr. Rahul');

4. Find name of all employees in this database who lives in the same cities as the company for which they work.

emp (ename, street, city)

works (ename, company_name, salary)

company (company_name, city)

RA : $\Pi_{e.\ ename}$ ($\sigma_{e.\ ename\ =\ w.\ ename\ \wedge\ c.\ company\_name\ =\ w.\ company\_name\ \wedge\ e.\ city\ =\ c.\ city}$ (ρ_e (emp) $\times$ ρ_w (works) $\times$ ρ_c (company)))

RA : Π_{ename} ($emp \bowtie works \bowtie company$)

SQL : select distinct ename from emp natural join works natural join company;

5. Find all companies located in every city in which "Infosys" is located. (Infosys is a company).

emp (ename, street, city)

works (ename, company_name, salary)

company (company_name, city)

RA : $company \div \Pi_{city}(\sigma_{company\_name = "Infosys"}(company))$

SQL : Select distinct company_name from company a where

not exists (select * from company b where company_name = 'Infosys' and

not exists (select * from company c where a.company_name = c.company_name and b.city = c.city));

Question 3

Given the following relational schemas :

STUDENT (sid, sname, department, city)
TEACHER (tid, tname, department, city, salary)
TEACHES (sid, tid)

Write relational algebra expression for the following queries :

1. Find all students who live in the same city as their teacher who teaches them.

2. Find all teacher names from department of Computer Sciences, giving them 10% increment on their salary amount.

3. Find total number of students from each department.

4. Find the average salary of each department.

5. Delete all the students who have come from Kanpur city.

[CSVTU Dec 2009]

1. Find all students who live in the same city as their teacher who teaches them.

STUDENT (sid, sname, department, city)
TEACHER (tid, tname, department, city, salary)
TEACHES (sid, tid)

RA : $\Pi_{s.sname} (\sigma_{s.sid = t1.sid \wedge t1.tid = t2.tid \wedge s.city = t2.city} (\rho_s (STUDENT) \times \rho_{t1} (TEACHES) \times \rho_{t2} (TEACHER)))$

RA : $\Pi_{sname} (STUDENT \bowtie TEACHES \bowtie TEACHER)$

SQL : select distinct sname from student natural join teaches natural join teacher;

2. Find all teacher names from department of Computer Sciences, giving them 10% increment on their salary amount.

STUDENT (sid, sname, department, city)
TEACHER (tid, tname, department, city, salary)
TEACHES (sid, tid)

RA : TEACHER ← $\sqcap_{tid, tname, department, city, salary * 1.1}(\sigma_{department =}$ "Computer Sciences" $(TEACHER)) \cup (TEACHER - \sigma_{department =}$ "Computer Sciences" $(TEACHER))$

SQL > update teacher set salary = salary * 1.1 where department = 'Computer Sciences';

3. Find total number of students from each department.

STUDENT (sid, sname, department, city)

TEACHER (tid, tname, department, city, salary)

TEACHES (sid, tid)

RA : department $\mathcal{G}_{\text{count (sid)}}$(STUDENT)

SQL > select department, count(sid) from student group by department;

4. Find the average salary of each department.

STUDENT (sid, sname, department, city)
TEACHER (tid, tname, department, city, salary)
TEACHES (sid, tid)

RA : department $\mathcal{G}$ avg (salary)(TEACHER)

SQL > select department, avg (salary) from teacher group by department;

5. Delete all the students who have come from Kanpur city.

STUDENT (sid, sname, department, city)
TEACHER (tid, tname, department, city, salary)
TEACHES (sid, tid)

RA : STUDENT ← $STUDENT - \sigma_{city = \text{"Kanpur"}}(STUDENT)$

SQL > delete from student where city = 'Kanpur';

Question 4

Write SQL query for each of the following :

(i)   Create table named as Std-Rec with columns – Rollno, Name, ContactNo, Dept.

(ii) Add one column (Address) to table Std-Rec.

(iii) Add primary key constraint to table Std-Rec.

(iv) Insert the following records into the table :

101	Shankar	1234567	Religion	Madurai
102	Vivek	8910111	Mythology	Kolkata
103	Arvind	2131415	Science	Kolkata

[CSVTU Dec 2012]

Question 4

Write SQL query for each of the following :

(i) Create table named as Std-Rec with columns – Rollno, Name, ContactNo, Dept.

Ans. Create table Std-Rec

      (RollNo Number(3),

      Name Varchar2(20),

      ContactNo Number(10),

      Dept Varchar2(20));

Question 4

Write SQL query for each of the following :

(ii) Add one column (Address) to table Std-Rec.

SQL > alter table Std-Rec add column Address Varchar2(20));

Question 4

Write SQL query for each of the following :

(iii) Add primary key constraint to table Std-Rec.

SQL > Alter table Std-Rec add primary key (Rollno);

SQL > alter table Std-Rec add constraint pkey primary key (Rollno);

Question 4

Write SQL query for each of the following :

(iv) Insert the following records into the table :

101	Shankar	1234567	Religion	Madurai
102	Vivek	8910111	Mythology	Kolkata
103	Arvind	2131415	Science	Kolkata

SQL > insert into Std-Rec values

(101, 'Shankar', 1234567, 'Religion', 'Madurai'),

(102, 'Vivek', 8910111, 'Mythology', 'Kolkata'),

(103, 'Arvind', 2131415, 'Science', 'Kolkata');

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(i)   Find name of workers whose address contains character 's' in their names third position.

(ii) Find average gross_sal of the workers from the above schema who belong to address 'DELHI'.

(iii) Count all the records from the given schema.

(iv) Display different addresses and ids from the schema worker where name is in descending order.

(v)   Change the value of ids to another value whose address belong to 'BILASPUR'.

(vi) Find the highest gross_sal of workers whose name is 'Sunil'.

(vii) Find the names of workers whose address starts with character 'S' also id is 101.

[CSVTU Dec 2013]

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(i)   Find name of workers whose address contains character 's' in their names third position.

SQL > select distinct name from worker where address like '_ _ s%';

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(ii) Find average gross_sal of the workers from the above schema who belong to address 'DELHI'.

SQL > select avg (gross_sal) from worker where address = 'DELHI';

SQL > select avg (gross_sal) from worker where address like '%DELHI%';

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(iii) Count all the records from the given schema.

SQL > select count(*) from worker;

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(iv) Display different addresses and ids from the schema worker where name is in descending order.

SQL > select address, id, name from worker order by name desc;

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(v) Change the value of ids to another value whose address belong to 'BILASPUR'.

SQL > update worker set id = 100 where address = 'BILASPUR';

SQL > update worker set id = 100 where address like '%BILASPUR%';

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(vi) Find the highest gross_sal of workers whose name is 'Sunil'.

SQL > select max (gross_sal) from worker where name = 'Sunil';

SQL > select max (gross_sal) from worker where sname like '%Sunil%';

Question 5

Given a schema Worker (name, address, id, total_sal, gross_sal), Find SQL queries for :

(vii) Find the names of workers whose address starts with character 'S' also id is 101.

SQL > select name from worker where address like 'S%' and id = 101;

For Video lecture on this topic please subscribe to my youtube channel.

The link for my youtube channel is

https://www.youtube.com/channel/UCRWGtE76JlTp1iim6aOTRuw?sub_confirmation=1