

The Relational Algebra:-

Question:-

Consider the following relational database schema consisting of the four relation schemas:

passenger (pid, pname, pgender, agency, aid, aname, a city) (pty)
 flight (fid, fdate, time, src, dest)
 booking (pid, aid, fid, fdate)

1. Get complete details of all flights to New Delhi.

(flight)
 $\sigma_{\text{dest} = \text{"New Delhi"}}$

2. Get the details about all flights from Chennai to New-Delhi.

(flight)
 $\sigma_{\text{src} = \text{"Chennai"} \wedge \text{dest} = \text{"New Delhi"}}$

c) Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020.

$\pi_{\text{fid}} \left[\sigma_{\text{pid} = 123 \wedge \text{dest} = \text{"Chennai"} \wedge \text{f-date} = \text{"06/11/2020"}} \left[(\text{booking}) \bowtie (\text{flights}) \right] \right]$

$\pi_{\text{fid}} \left[\sigma_{\text{pid} = 123 \wedge \text{dest} = \text{"Chennai"} \wedge \text{f-date} = \text{"06/11/2020"}} \left[(\text{booking}) \bowtie (\text{flights}) \right] \right]$

d) find the passenger name of passengers who have booked at least one flight.

$\pi_{\text{pname}} \left((\text{booking}) \bowtie (\text{passenger}) \right)$

pid, aid, fid, fdate, pname, pgender, pcity

e) Find the passenger names for those who do not have any bookings in any flights.

$$\frac{\pi_{p.id}(\text{passenger}) - \pi_{p.id}(\text{Booking})}{L} \quad \begin{matrix} A-B \\ \text{items present in A but not in B} \end{matrix}$$

$$\pi_{p.name} (L \bowtie \text{passenger})$$

f) Find the agency names for agencies that located in the same city as passengers with passenger id 123.

Here we perform equi join.

$$\pi_{a.name} (\text{agency} \bowtie_{a.city = a.city} \pi_{p.id=123}(\text{passenger}))$$

g) Get the details of flights that are scheduled on both ~~side~~ dates 01/12/2020 and 02/12/2020 at 16:00 hours.

$$\pi_{\text{date}=01/12/2020 \wedge \text{time}=16:00 \text{ hours}} (\text{flight})$$

$$\pi_{\text{date}=02/12/2020 \wedge \text{time}=16:00 \text{ hours}} (\text{flight})$$

h) Get the details of flights that scheduled on either of the dates 01/12/2020 on 02/12/2020 on both at 16:00 hours.

$$\left[\begin{array}{l} \pi_{\text{date}=01/12/2020 \wedge \text{time}=16:00 \text{ hours}} (\text{flight}) \\ \cup \\ \pi_{\text{date}=02/12/2020 \wedge \text{time}=16:00 \text{ hours}} (\text{flight}) \end{array} \right]$$

i) Find the agency names for agencies who don't have any bookings ~~also~~ for passengers with id 123.

$\sigma_{\text{agency} \neq \text{jet}} \left[\pi_{\text{agency}} \left(R_1 \right) \right] \cap \left[\sigma_{\text{id}=123} \left(\text{booking} \right) \right]$

name.

j) Find the details of all male passengers who are associated with jet agency.

$\sigma_{\text{gender}=\text{male}} \left(\text{passenger} \right) \cap \left(\text{booking} \right)$

$\sigma_{\text{agency}=\text{'jet agency'}} \left[\left(\text{passenger} \right) \cap \left(\text{booking} \right) \cap \left(\text{agency} \right) \right]$

\wedge
 name = "jet agency"
 gender = "male"
 agency

SQL and Relational Algebra short exercises solved.

1) Consider relation $R_1(A, B, C)$ and $R_2(B, D)$ where number of tuples in R_1 , $T(R_1) = 25$ and number of

~~SQL and Relational Algebra~~
tuples in R_2 , $T(R_2) = 40$.

~~Answer~~
and B is the key for R_1 .

How many tuples $R_1 \bowtie R_2$ will give?

Ans: 40.

B is the foreign key in R_2 . The permissible values for attribute B in R_2 are the values that are stored in attribute B of R_1 . The value of B can be duplicated. Hence result is all the tuples of R_2 .

A	B	C	D
1	2	3	4
4	5	6	7
7	8	9	10
10	11	12	13

A	B	C	D
1	2	3	4
4	5	6	7
7	8	9	10
10	11	12	13

2) Write the following query in relational algebra.

for relations $R(a, b)$ and $S(c, d)$: select a, d from $R \bowtie S$ where $R.a > 10$ and $R.b = S.c$

Answer:- $\pi_{a,d} \left[\sigma_{a > 10} (R \bowtie_{R.b = S.c} S) \right]$

3) Write the following relational Algebra expression in SQL for relations

students (reg no, name, age) and

stu_tour_regd. (reg no, name, tour_amt)

$(\sigma_{age > 20}(\text{students})) \cap \pi_{regno, name}(\text{stu_tour_regd})$

(select regno, name from students (where age > 20) EXCEPT (select regno, name, from stu_tour_regd))

4) For relation Student (reg, name, dept) suppose dept can be one of [ite, cse, ece, mech, civil]. If number of tuples in relation Student is 1000. then what is the size estimate of the query $\sigma_{dept = 'physics'}(\text{Student})$?

Ans: physics is not one of dept. So, Ans will be 0.

5) How exactly the relational algebra expression $R \bowtie S$ can be expressed using only the basic relational algebra operators?

Ans: $\sigma_{\emptyset}(R \times S)$.

* Any reality show has at least two or more participants.

Draw an ER diagram for the given Scenario:

Suppose that you are designing a schema to record information about reality shows database needs to record the following information:

- for each reality show, its name, basic info and participants name.

- For each producer, the company name, company country. A show is produced by exactly one producer.

And one producer produces exactly one show.

- For each television, its name, start year, head office. A television may broadcast multiple shows. Each show is broadcasted by exactly one television.

For each user, his/her username, password and age. A user may rate multiple shows and a show may be rated by multiple users. Each rating a score of 0 to 10.

