CS & IT ENGINEERING

Database Management System

Query Language

DPP – 03 *Discussion Notes*

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01 Question

02 Discussion

Q.1

Consider the following relational algebra query on relations A (p, q, r) and B (q, r):

$\pi_p(A) - \pi_p((\pi_p(A) \times \pi_{q,r}(B) - \pi_{p,q,r}(A))$

The above query is equivalent to?

[MCQ]

A. $A \cap B$

B. $A \cup B$

C. $A - B$

D. $A \div B$

$\Pi_{AB}(R) / \Pi_B(S) \Rightarrow \Pi_A(R) - \Pi_A[\Pi_A(R) \times \Pi_B(S) - \Pi_{AB}(R)]$

$\Pi_p(A) - \Pi_p[\Pi_p(A) \times \Pi_{qr}(B) - \Pi_{pqr}(A)]$

Ans (D)

Q.2

Consider the following SQL query.

SELECT DISITNCT $P_1, P_2, P_3 .... P_n$ ≡ Projection [π]

FROM $R_1, R_2, R_3 ..... R_m$ ≡ Cross Product [×]

WHERE Q ≡ Selection [σ]

Which of the following relational algebra query is equivalent to above SQL query? [MCQ]

A. $\pi_{P1, P2, P3 .... Pn}(\sigma_Q (R_1 \bowtie R_2 \bowtie R_3 \bowtie ..... \bowtie R_m))$ → Natural Join

B. $\pi_{P1, P2, P3 .... Pn}((R_1 \times R_2 \times R_3 \times ..... \times R_m)$ → σ_Q is missing

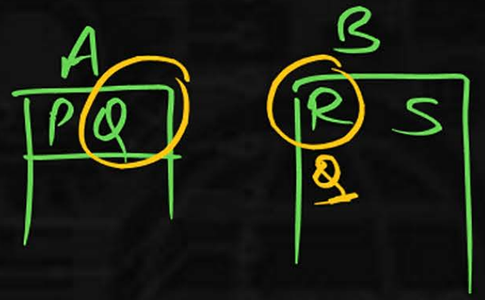
C. $\sigma_{P1, P2, P3 .... Pn}(\pi_Q (R_1 \bowtie R_2 \bowtie R_3 \bowtie ..... \bowtie R_m))$ ⇒ Condition Applied on Selection σ_Q.

D. $\pi_{P1, P2, P3 .... Pn}(\sigma_Q (R_1 \times R_2 \times R_3 \times ..... \times R_m))$

Ans (D).

Q.3

Consider the following equivalencies between expressions of relational algebra, each involving relations A(P, Q) and B (R, S). Assume that there is no foreign key, A attribute to table can be NULL, all attributes are of integer types which of the following equivalencies is/are TRUE? [MCQ]



A. $\pi_{P,Q}(A \times B) = A$

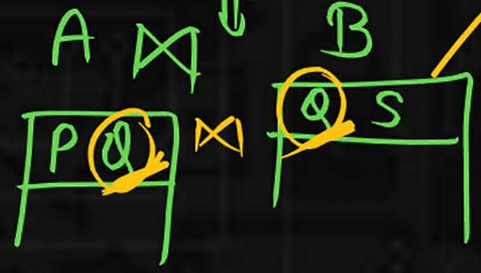
B. $A - \rho_{T(P,Q)}(B) = \rho_{T(P,Q)}(B - (\rho_{T(R,S)}(A)))$

A − B is Different Answer

B − A is Different Answer.

C. $\pi_{P,Q,S}(A \bowtie_{Q=R} B) = A \bowtie (\rho_{T(Q,S)}(B))$

Same as Q = R



Now Q Become Common Attribute Natural Join select the tuple which satisfy equality condition on common Attribute

D. None of the above

Ans (C).

A(PQ) B(RS)

Here B is Non empty, its Not Mentioned)

Here B is empty. $A \times b = \phi$

$A \times B =$ Empty.

$\Pi_{PQ}(A \times B) \neq A$

© $\Pi_{PQS}(A \bowtie_{Q=R} B)$

$\Pi_{PQS}\left[\sigma_{Q=R}(A \times B)\right]$

Q.4

Consider the table which contains the data shown below.

Sailors (SailID, SailName, Rating, Age)

Reserves (SailID, BoatID, Date)

Boats(BoatID, BoatName, Color)

Ans (1)

[NAT]

Sailors

SailID	SailName	Rating	Age
1	Ram	5	35
2	Shaym	9	22
3	Ramesh	10	19
4	Suresh	3	NULL
5	Akhil	NULL	35

Reserves

SailID	BoatID	Date
1	4	2017-03-15
1	5	2017-04-15
3	2	2014-04-15
4	4	2018-01-01
5	1	2017-12-25

Boats

BoatID	BoatName	Color
1	Lake	Red
2	Fish	Yellow
3	Clipper	Green
4	Yatch	Green
5	Fish	Yellow
6	Clipper	red

and the following relational algebra query.

π_{BoatID} ($\sigma_{Age = 35 \text{ and } rating \geq 5}$ (sailors) $\bowtie$ Reserves) $\cap$ π_{BoatID} ($\sigma_{Rating < 5}$ (Sailors) $\bowtie$Reserves)

The number of rows returned by the above query is ____1 Ans.

Sailors ⋈ Reserve

Sid	sname	s.Rating	s.age
1	Ram	5	35

Π_{Boatid}(Sailor ⋈ Reserve)

Sid	Sname	s.Rating	s.age	Boat id	Date
1	Ram	5	35	4	2017-03-15
1	Ram	5	35	5	2017-04-15

Query 1 output

Boat id
4
5

Π_{Boatid} (. . —)

Sid	sname	s.Rating	s.age	Boat id	Date
4	Suresh	3	NULL	4	2018-01-01

Query: Rating < 5

Sid	sname	Rating	Age
4	Suresh	3	Null

O/P of Query 2

Boat id
4

Boatid
4
5

∩

Boat id
4

⇒ (4) ⇒ 1 Tuple

Q.5

Consider the relation schemas w(P, Q, R), *x* (S, P, T) , y(P, Q, R, S, T) and z (R, S, T). A query that uses additional operators of relational algebra. $((w \times x) \cap y) \div z$.

What will be the result set if we write this query using only the basic operators of relational algebra? [MCQ]

A. Result set of the basic operator's query will be greater than the result set of given query.

B. Result set will only consist of attributes P and Q.

C. Some of the operations in query cannot be performed due to incompatible relation schemas

Ans (C).

D. Query cannot be written by only using basic operations.

$W(PQR) \quad X(SPT) \quad Y(PQRST) \quad Z(RST)$

$$((W * X) \cap Y) \div Z$$

$W(PQR)$ $X(SPT)$

$\Downarrow$

n_1 Tuple n_2 Tuple

3 Attribute 3 Attribute

$W \circledast X =$ $n_1 \times n_2$ Tuple

$C_1 + C_2$ Attribute

6 Attribute 5 Attribute

$WX(PQRSPT) \quad \cap Y \ (PQRST)$

Not Possible

(Because Arity (# of Attribute) Not Same.

Not Compitable.

Q.6

[MSQ]

Consider the following relational table A

A				
P	Q	R	S	T
p_1	q_1	r_1	s_1	t_1
p_2	q_2	r_2	s_2	t_2

Also, consider the decomposition of the relation A into relations A_1 = (P, Q, R) and A_2 = (R, S, T) which of the following is/are correct based on the above relations?

A. $\pi_{A1}(A) \bowtie \pi_{A2}(A) = A$

B. $\pi_{A1}(A) \bowtie \pi_{A2}(A) \neq A$

C. $PQ \rightarrow T$ is true in the table $\pi_{A1}(A) \bowtie \pi_{A2}(A)$

D. None of the above

Ans (A) & (C)

$A_1(PQR)$

P	Q	R
P_1	q_1	r_1
P_2	q_2	r_2

$A_2(RST)$

R	S	T
r_1	s_1	t_1
r_2	s_2	t_2

$\Pi_{A_1}(A) \bowtie \Pi_{A_2}(A) = A$ Correct

$\Pi_{PQRST}\left[\sigma_{A_1.R=A_2.R}(A_1 \times A_2)\right]$

P	Q	R	S	T
P_1	q_1	r_1	s_1	t_1
P_2	q_2	r_2	s_2	t_2

$\equiv A$

$PQ \rightarrow T$ True in $\Pi_{A_1}(A) \bowtie \Pi_{A_2}(A)$

Q.7

Which of the following relational algebra expression is/are always holds correct? [MSQ]

A. $(X \bowtie Y) \bowtie Z = (Z \bowtie X) \bowtie Y$

B. $\sigma_A(\sigma_B(X)) = \sigma_B(\sigma_A(X))$

C. $\pi_A(\pi_B(X)) = \pi_B(\pi_A(X))$

D. None of the above

A: CGPA > 8

B: Branch = 'CS'

$\sigma_{\text{Branch='CS'}}(\sigma_{\text{CGPA}>8}(\text{Student}))$

B: Sid Sname

A: Sid

Only (A) & (B)

Q.8

Consider the following Database

Tool (ToolID, Brand, Price)

Jobsite (Location, compensation, Task)

ToolBox(ToolBoxID, location)→location is a foreign key to jobsite.

Holds(ToolBoxID, ToolID) →ToolBoxID is a foreign key to ToolBox.

ToolID is a foreign key to Tool.

And consider the following SQL query.

SELECT DISTINCT T. ToolID

FROM Tool T, Holds H, ToolBox B, Jobsite J

WHERE T. ToolID = H.ToolId AND H.ToolBoxID = B. ToolBoxID AND B. location = J. location AND J. Task = 'welding'

Which of the following would be an equivalent relational algebra query?

(Foreign key is NOT NULL attributes).

[MSQ]

A. π_{ToolID} (Tool ⋈ Holds ⋈ ToolBox ⋈ $\sigma_{\text{task = 'welding'}}$(jobsite))

B. π_{ToolID} ($\sigma_{\text{task = 'welding'}}$ (Tool ⋈ (Holds ⋈ Tool Box) ⋈ Jobsite)

C. $\sigma_{\text{task = 'welding'}}$ (π_{ToolID} (Tool) ⋈ Holds ⋈ Tool Box ⋈ Jobsite)

D. None of the above

Tool id then Not Possible to Apply the Condition $\sigma_{\text{task = welding}}$

Ans (A) & (B)

Q.9

Consider the following two relations A(P, Q) and B(R, S). Which of the following statement is/are TRUE? [MSQ]

A(PQ) B(RS)

P=R ⇒ A.P=B.R

A. The cardinality of $(A \bowtie_{P = R} B)$ is always larger than or equal to the size of $(A \bowtie_{P = R \text{ and } Q=S} B)$.

B. The cardinality of $(A \bowtie_{P = R \text{ and } Q \neq S} B)$ is always larger than or equal to the size of $(A \bowtie_{P = R \text{ and } Q = S} B)$.

C. These two-expression $(\sigma_{P = 5} (A \bowtie_{Q=R} B))$ and $(\sigma_{P = 5} (A) \bowtie_{Q=R} B)$ are always equivalent.

D. These two expressions $(A \times B) - (A \bowtie_{Q = R} B)$ and $(A \bowtie_{Q \neq R} B)$ are always equivalent.

A, C & (D)

@ $A \bowtie_{P=R} B$

⇓

We getting the tuples in which only $P=R$.

(Less Restrictions)

⇓

gives More tuples

$A \bowtie_{P=R \text{ AND } Q=S} B$

⇓

We are getting the tuples in which $P=R$ and $Q=S$

Both condition satisfy.

(More Restriction)

(b)

eg

A

P	Q
1	2
3	5

B

R	S
1	2
3	5

$\sigma(P=R \text{ and } Q \neq S)$

$\sigma_{P=R \text{ and } Q=S}$

give more Tuples

© $A(PQ)$ $B(RS)$

$\sigma_{P=5}(A \bowtie_{Q=R} B)$

$\sigma_{P=5}(A) \bowtie_{Q=R} B$


THANK YOU GW
SOLDIERS !