Problems because of Redundancy

Students

Sid	Sname	Cid	Cname	Fid	Fname	Salary	
S_1	A	C_1	C	F_1	X	5K	Updation Anomaly
S_2	B	C_1	C	F_1	X	5K	
S_3	A	C_1	C	F_1	X	5K	
~~S_4~~	~~C~~	~~C_2~~	~~C++~~	~~F_2~~	~~Y~~	~~10K~~	Deletion Anomaly
XX	XX	C3	Java	F_3	Y	15K	Insertion Anomaly

Dummy

* Updation Anomaly : Update all redundant copies.

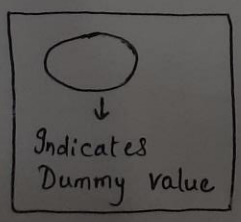
  Ex: F_1 : 5K to 7K

* Deletion Anomaly : because of deletion of some data, it force to delete (loss) other data.

  Ex: Student : (S_4, C) left the Institute

* Insertion Anomaly : Because of insertion of some data forced to insert unexisted data.

  Ex: one faculty join having specialization in Java : F3 - Y - 15K - C3 - Java



To avoid these three problems

: Splitting relations into two or more sub relations

Sid	Sname	Cid
S1	A	C1
S2	B	C1
S3	A	C1
S4	C	C2

deletion

Fid	Fname	Cid	Cname	Sal
F1	X	C1	C	5K
F2	Y	C2	C++	10K
F3	Y	C3	Java	15K

7K updation

insertion

Join

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This is the introduction of join operation.

- Cross Join
- Natural Join
- Inner Join
- Outer Join

  - Left Outer Join
  - Right Outer Join
  - Full Outer Join

Ex. We have two relational schema $R_1(AB)$ and $R_2(BC)$ as follows:—

$R_1(AB)$

A	B
1	1
2	1
3	2

$R_2(BC)$

B	C
1	1
1	2
2	1

Cross Join (Cross-Product)

$R_1 \times R_2$

A	B	B	C	
1	1	1	1	✓
1	1	1	2	✓
1	1	2	1	✗
2	1	1	1	✓
2	1	1	2	✓
2	1	2	1	✗
3	2	1	1	✗
3	2	1	2	✗
3	2	2	1	✓

Natural Join

$R_1 \bowtie R_2$

A	B	C
1	1	1
1	1	2
2	1	1
2	1	2
3	2	1

only those rows are selected whose common attributes have same values. That is known as Natural Join.

Note: Common name of attributes must be present, then only we can apply Natural Join.

- Natural Left outer join

  :→ Every time at first cross-join performs then left-table's contents display, which is not even joined.

- Natural Right Outer Join

  :→ At first do Cross-join

  then Rest if any in Right table should also be displayed.

- Natural Full outer join

  :→ At first Cross-join
  then left table's Content
  then Right table's Content

Example

R_1

A	B
1	2
2	3
5	6

R_2

B	C
2	5
4	6
6	9

X

⇓

Cross-join

	A	B	B	C
✓	1	2	2	5
X	1	2	4	6
X	1	2	6	9
X	2	3	2	5
X	2	3	4	6
X	2	3	6	9
X	5	6	2	5
X	5	6	4	6
✓	5	6	6	9

Result of above tables

① Natural Join

A	B	C
1	2	5
5	6	9

② Natural Left Outer Join

A	B	C
1	2	5
5	6	9
2	3	Null

③ Natural Right Outer Join

A	B	C
1	2	5
5	6	9
Null	4	6

④ Natural Full outer Join

A	B	C
1	2	5
5	6	9
2	3	Null
Null	4	6

SQL: Select * from R1 naturaljoin R2 ;

Note: In natural join we are not allowed to write any condition. By default it matches same attribute name with equality operator.

In this case attribute 'B' is common in both the tables, so it performs equality in both.

⊡ Normal Join

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Perform Cross Join & follow Condition

R1

A	B
1	a
2	b
3	c
4	d
5	e
6	f

R2

C	D
1	g
2	h
3	i
7	j
8	k
9	l

For Ex:

Select * from (R1 join R2 ON A=C);

Output would be

A	B	C	D
1	a	1	g
2	b	2	h
3	c	3	i

⊡ Inner join

Ex Select * from (R1 Inner join R2 ON R1.A = R2.C);

A	B	C	D
1	a	1	g
2	b	2	h
3	c	3	i

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Note that data type of A must be the same as C.

⊛ In case of Natural join we don't have to specify Cond^{n}. So, we can't apply natural join if Common column is not present.

most important interview Question: while Using Inner join we can join table if datatype of Column matches.

⊡ Left Outer join

Eg: (Select * from R1 left Outer join R2 ON R1.A = R2.C)

A	B	C	D
1	a	1	g
2	b	2	h
3	c	3	i
4	d	Null	Null
5	e	Null	Null
6	f	Null	Null

⊡ Right Outer join: Eg

(Select * from R1 Right Outer Join R2 R1.A = R2.C)

A	B	C	D
1	a	1	g
2	b	2	h
3	c	3	i
Null	Null	7	j
Null	Null	8	K
Null	Null	9	l

⊡ Full outer join: Eg:

(Select * from R1 Full Outer join R2 R1.A = R2.C)

A	B	C	D
1	a	1	g
2	b	2	h
3	c	3	i
4	d	Null	Null
5	e	Null	Null
6	f	Null	Null
Null	Null	7	j
Null	Null	8	K
Null	Null	9	l

Questions

Can we perform SQL like the following ?

(1) Select * from (R_1 Inner join R_2 ON $R_1.A > R_2.C$);

(2) Select * from (R_1 left outer join R_2 ON $R_1.A < R_2.C$);

(3) Select * from (R_1 Right outer join R_2 ON $R_1.A < R_2.C$);

Yes OR NO

**** (Run it and save it in your notes)

*** Diff. between Inner join & Natural join.

Note: when we use "=" operator in Condition, known as equi join.