UNIT 2

Lecture 20

Insert, Delete and Update in Relational Algebra

Insert

- To insert data into a relation, we either specify a tuple to be inserted or write a query whose result is a set of tuples to be inserted.
- Obviously, the attribute values for inserted tuples must be members of the attribute's domain.
- Similarly, tuples inserted must be of the correct arity. The relational algebra expresses an insertion by

$$r \leftarrow r \cup E$$

- where r is a relation and E is a relational-algebra expression.
- We express the insertion of a single tuple by letting E be a constant relation containing one tuple.

Insert

Q.1 Write a query to insert a student with details (7, 'DINESH', 5, 'CSE', 44, 121)

RA : STUDENT ← STUDENT ∪ {(7, "DINESH", 5, "CSE", 44, 121)}

SQL : insert into student values (7, 'DINESH', 5, 'CSE', 44, 121);

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123
7	DINESH	5	CSE	44	121

Insert

Q.2 Write a query to insert students with details (7, 'DINESH', 5, 'CSE', 44, 121) and (8, 'BHAWNANI', 7, 'CSE', 84, 122)

RA : STUDENT ← STUDENT

∪ {(7, "DINESH", 5, "CSE", 44, 121), (8, "BHAWNANI", 7, "CSE", 84, 122)}

SQL : insert into student values (7, 'DINESH', 5, 'CSE', 44, 121), (8, 'BHAWNANI', 7, 'CSE', 84, 122);

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123
7	DINESH	5	CSE	44	121
8	BHAWNANI	7	CSE	84	122

Insert

Q.3 Write a query to insert students from student table to stud table whose branch is 'CSE'.

RA : STUD ← STUD ∪ $\sigma_{branch\ =\ "CSE"}$ (STUDENT)

SQL : insert into stud select * from student where branch = 'CSE';

STUD

Rollno	Sname	Sem	Branch	Marks	Pno
11	ABC	3	CSE	43	121
12	XYZ	5	CSE	56	122

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123
7	DINESH	5	CSE	44	121

STUD

Rollno	Sname	Sem	Branch	Marks	Pno
11	ABC	3	CSE	43	121
12	XYZ	5	CSE	56	122
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123

Insert

Q.4 Write a query to insert students from student table to stud table whose branch is ‘CSE’.

RA : STUD ← STUD ∪ $\Pi_{rollno, sname, sem, branch}(\sigma_{branch = "CSE"}(STUDENT))$

SQL : insert into stud select distinct rollno, sname, sem, branch from student where branch = ‘CSE’;

STUD

Rollno	Sname	Sem	Branch
11	ABC	3	CSE
12	XYZ	5	CSE

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123
7	DINESH	5	CSE	44	121

STUD

Rollno	Sname	Sem	Branch
11	ABC	3	CSE
12	XYZ	5	CSE
1	RAM	3	CSE
2	SHYAM	5	CSE
3	MOHAN	7	CSE

Insert

Q.5 Write a query to insert student's details with their project details to studproj table.

RA : STUDPROJ ← STUDPROJ ∪ (STUDENT ⋈ PROJECT)

SQL : insert into studproj select * from student natural join project;

STUDPROJ

Pno	Rollno	Sname	Sem	Branch	Marks	Pname	Duration
121	11	ABC	3	CSE	34	P1	10

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

STUDPROJ

Pno	Rollno	Sname	Sem	Branch	Marks	Pname	Duration
121	11	ABC	3	CSE	34	P1	10
121	1	RAM	3	CSE	40	P1	10
122	2	SHYAM	5	CSE	50	P2	20
123	3	MOHAN	7	CSE	55	P3	30
121	4	GOPAL	5	IT	65	P1	10
122	5	RINKI	3	MECH	40	P2	20
123	6	PINKI	3	ETC	90	P3	30

Insert

Q.6 Write a query to insert student's details with their project details which are working in project 'P2' to studproj table.

RA : STUDPROJ ← STUDPROJ ∪ $\sigma_{pname\ =\ "P2"}$ (STUDENT ⋈ PROJECT)

SQL : insert into studproj select * from student natural join project where pname = 'P2';

STUDPROJ

Pno	Rollno	Sname	Sem	Branch	Marks	Pname	Duration
121	11	ABC	3	CSE	34	P1	10

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

STUDPROJ

Pno	Rollno	Sname	Sem	Branch	Marks	Pname	Duration
121	11	ABC	3	CSE	34	P1	10
122	2	SHYAM	5	CSE	50	P2	20
122	5	RINKI	3	MECH	40	P2	20

Insert

Q.7 Write a query to insert student's name along with their project names to studproj table.

RA : STUDPROJ ← STUDPROJ ∪ ⊓ $_{sname,\ pname}$ (STUDENT ⋈ PROJECT)

SQL : insert into studproj select distinct sname, pname from student natural join project;

STUDPROJ

Sname	Pname
ABC	P1

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

STUDPROJ

Sname	Pname
ABC	P1
RAM	P1
SHYAM	P2
MOHAN	P3
GOPAL	P1
RINKI	P2
PINKI	P3

Delete

- We express a delete request in much the same way as a query.
- However, instead of displaying tuples to the user, we remove the selected tuples from the database.
- We can delete only whole tuples; we cannot delete values on only particular attributes.
- In relational algebra a deletion is expressed by

$$r \leftarrow r - E$$

- where r is a relation and E is a relational-algebra query.

Delete

Q.1 Write a query to delete all the students from CSE branch.

RA : STUDENT ← STUDENT − $\sigma_{branch = "CSE"}$ (STUDENT)

SQL : delete from student where branch = 'CSE';

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Delete

Q.2 Write a query to delete all the students from CSE branch and having sem value 3.

RA : STUDENT ← STUDENT − $\sigma_{branch = "CSE" \wedge sem = 3}$ (STUDENT)

SQL : delete from student where branch = 'CSE' and sem = 3;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Delete

Q.3 Write a query to delete all the students from student table who are in stud table.

RA : STUDENT ← STUDENT – STUD

SQL : delete from student where (rollno, sname, sem, branch, marks, pno) in (select * from stud);

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUD

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Delete

Q.4 Write a query to delete all the students from student table who are in stud table with branch value as ‘CSE’.

RA : STUDENT ← STUDENT − $\sigma_{branch = "CSE"}$ (STUD)

SQL : delete from student where (rollno, sname, sem, branch, marks, pno) in (select * from stud where branch = ‘CSE’);

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUD

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	IT	50	122
3	MOHAN	7	MECH	55	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Delete

Q.5 Write a query to delete all the students from student table who are in stud table with branch value as ‘CSE’.

RA : STUDENT ← STUDENT − $\Pi_{rollno, sname, sem, branch}(\sigma_{branch = "CSE"}(STUD))$

SQL : delete from student where (rollno, sname, sem, branch) in (select distinct rollno, sname, sem, branch from stud where branch = ‘CSE’);

STUDENT

Rollno	Sname	Sem	Branch
1	RAM	3	CSE
2	SHYAM	5	CSE
3	MOHAN	7	CSE
4	GOPAL	5	IT
5	RINKI	3	MECH
6	PINKI	3	ETC

STUD

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	IT	50	122
3	MOHAN	7	MECH	55	123

STUDENT

Rollno	Sname	Sem	Branch
2	SHYAM	5	CSE
3	MOHAN	7	CSE
4	GOPAL	5	IT
5	RINKI	3	MECH
6	PINKI	3	ETC

Delete

Q.5 Write a query to delete all the students from student table who are working in project ‘P2’.

RA : STUDENT ← STUDENT − $\Pi_{rollno, sname, sem, branch, marks, pno}(\sigma_{pname = "P2"}(STUDENT \bowtie PROJECT))$

SQL : delete from student where pno in (select pno from project where pname = ‘P2’);

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
6	PINKI	3	ETC	90	123

Delete

Q.6 Write a query to delete all the students from student table.

RA : STUDENT ← STUDENT – STUDENT

SQL : delete from student;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno

Update

- In certain situations, we may wish to change a value in a tuple without changing *all* values in the tuple.
- We can use the generalized-projection operator to do this task:

$$r \leftarrow \Pi_{F1,\, F2,\ldots,\, Fn}\,(r)$$

- where each F_i is either the i^{th} attribute of r, if the i^{th} attribute is not updated, or, if the attribute is to be updated, F_i is an expression, involving only constants and the attributes of r, that gives the new value for the attribute.
- If we want to select some tuples from r and to update only them, we can use the following expression; here, P denotes the selection condition that chooses which tuples to update:

$$r \leftarrow \Pi_{F1,\, F2,\, \ldots,Fn}\,(\sigma_P\,(r))\ \cup\ (r - \sigma_P\,(r))$$

Update

Q.1 Write a query to increase the sem value by 1 to all the students.

RA : STUDENT ← $\Pi_{rollno,\ sname,\ sem\ +\ 1,\ branch,\ marks,\ pno}$ (STUDENT)

SQL : update student set sem = sem + 1;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	4	CSE	40	121
2	SHYAM	6	CSE	50	122
3	MOHAN	8	CSE	55	123
4	GOPAL	6	IT	65	121
5	RINKI	4	MECH	40	122
6	PINKI	4	ETC	90	123

Update (Incorrect Query)

Q.2 Write a query to update the branch value to ‘IT’ whose name is ‘SHYAM’.

RA : STUDENT ← $\Pi_{\text{rollno, sname, sem, "IT", marks, pno}}(\sigma_{\text{sname = "SHYAM"}}(\text{STUDENT}))$

SQL : update student set branch = ‘IT’ where sname = ‘SHYAM’;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	IT	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Update (Correct Query)

Q.2 Write a query to update the branch value to ‘IT’ whose name is ‘SHYAM’.

RA : STUDENT ← $\Pi_{\text{rollno, sname, sem, "IT" , marks, pno}}(\sigma_{\text{sname} = \text{"SHYAM"}}(\text{STUDENT}))$

$\cup\ \sigma_{\text{sname} \neq \text{"SHYAM"}}(\text{STUDENT})$

SQL : update student set branch = ‘IT’ where sname = ‘SHYAM’;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	IT	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Update

Q.3 Write a query to update the branch value to ‘IT’ and sem value to 6 whose name is ‘SHYAM’.

RA : STUDENT ← $\Pi_{\text{rollno, sname, 6, "IT" , marks, pno}}(\sigma_{\text{sname} = \text{"SHYAM"}}(\text{STUDENT}))$

$\cup\ \sigma_{\text{sname} \neq \text{"SHYAM"}}(\text{STUDENT})$

SQL : update student set branch = ‘IT’, sem = 6 where sname = ‘SHYAM’;

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	6	IT	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Update

Q.4 Write a query to increase the sem value by 1 to all CSE students and decrease the sem value by 1 to all the MECH students.

$$\text{RA : STUDENT} \leftarrow \Pi_{\text{rollno, sname, sem + 1, branch, marks, pno}} (\sigma_{\text{branch = "CSE"}} (\text{STUDENT}))$$
$$\cup \Pi_{\text{rollno, sname, sem – 1, branch, marks, pno}} (\sigma_{\text{branch = "MECH"}} (\text{STUDENT}))$$
$$\cup (\text{STUDENT} - \sigma_{\text{branch = "CSE"}} (\text{STUDENT}) - \sigma_{\text{branch = "MECH"}} (\text{STUDENT}))$$

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	6	IT	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Update

Q.4 Write a query to increase the sem value by 1 to all CSE students and decrease the sem value by 1 to all the MECH students.

```
SQL : update student set sem =
        (case when branch = 'CSE' then sem + 1
              when branch = 'MECH' then sem - 1
              else sem
        end);
```

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	6	IT	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

Update

Q.5 Write a query to increase 10% of the marks to those students who are working in project “P2”.

RA : $STUDENT \leftarrow \sqcap_{rollno,\ sname,\ sem,\ branch,\ marks*1.1,\ pno} (\sigma_{pname = "P2"} (STUDENT \bowtie PROJECT))$
$\cup (STUDENT - \sqcap_{rollno,\ sname,\ sem,\ branch,\ marks,\ pno} (\sigma_{pname = "P2"} (STUDENT \bowtie PROJECT))$

SQL : update student set marks = marks * 1.1 where pno in (select pno from project where pname = ‘P2’)

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

STUDENT

Rollno	Sname	Sem	Branch	Marks	Pno
1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	55	122
3	MOHAN	7	CSE	55	123
4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	44	122
6	PINKI	3	ETC	90	123

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The link for my youtube channel is

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