Relational Algebra

- It is a formal language of interaction with RDBMS. Its primary operations are:

1. Selection (σ)
2. Projection (π)
3. Union (∪)
4. Intersection (∩)
5. Minus or Difference (-)
6. Cartesian Product (×)
7. Join (⋈)
8. Rename (ρ)

Example : Consider `STUDENT` relation(Table)

RollNo	Name	City
1	A	DDN
2	B	MRT
3	C	MRT
4	A	HRD

Projection (π)

- This operation is used to select vertical columns from the relation(table)(vertical slicing).

$\pi_{rollNo}(STUDENT)$

this will give

ROLLNO
1
2
3
4

SQL : `SELECT rollNo FROM STUDENT;`

Selection (σ)

- This operation is used to display horizontal rows from of the relation(table)(horizontal slicing).

$\sigma_{city=HRD}(STUDENT)$

rollNo	Name	City

rollNo	Name	City
4	A	HRD

Question : Display names of Students who are from MRT.

Solution: First `σ(select)` then `π(project)`

- 1st all details of student who are from `mrt` will be extracted from table `σ(select)`
- then out of this only `name` will be extracted `π(project)`

$\pi_{name}(\sigma_{city=MRT}(STUDENT)$

Output will be =>

name
B
C

Union (∪)

- Used to display elements all elements without duplicates.

Suppose

`P = {A, B, C}`

`Q ={A, D}`

then, `P ∪ Q = {A, B, C, D}`

SQL : `SELECT * FROM table1 UNION SELECT * FROM table2;`

Intersection (∩)

- Used to display elements common to both sets.

taking same example, `P ∩ Q = {A}`

SQL : `SELECT * FROM table1 INTERSECT SELECT * FROM table2;`

Minus or Difference (-)

- Used to display elements of first set after removing second set elements.

taking same example, `P - Q = {B, C}`

SQL : `SELECT * FROM table1 MINUS SELECT * FROM table2;`