RELATIONAL ALGEBRA

Relational Algebra is **procedural query language**, which **takes Relation** as input and **generate relation** as output.

Projection (π)

Projection is used to **project required column** data from a relation.

R

(A	B	C)
1	2	4
2	2	3
3	2	3
4	3	4

Π b, c (R)

B	C
2	4
2	3
3	4

*by default projection **removes duplicate data.**

Selection (σ)

Selection is used to **select required tuples** of the relations.

π (σ (c>3) R)

(Select tuples from R where c is greater than 3)

```
A  B  C
-----
1  2  4
4  3  4
```

Cross Product (X)

Cross product between two relations A and B (A X B) will result **all the attributes of A followed by each attribute of B**. Each record of A will pair with every record of B.

```
      A                                    B
    (Name    Age   Sex )                (Id    Course)
    ------------------                  -------------
    Ram     14    M                      1      DS
    Sona    15    F                      2      DBMS
    Kim     20    M
```

```
     A X B
  Name    Age    Sex    Id    Course
--------------------------------
  Ram     14     M       1     DS
  Ram     14     M       2     DBMS
  Sona    15     F       1     DS
  Sona    15     F       2     DBMS
  Kim     20     M       1     DS
  Kim     20     M       2     DBMS
```

*If A has 'n' tuples and B has 'm' tuples then A X B will have 'n*m' tuples.

Natural Join (⋈)

Natural join is a binary operator. Natural join between two or more relations will result set of all combination of tuples **where they have equal common attribute**.

```
            Emp                                Dep
   (Name    Id    Dept_name )           (Dept_name    Manager)
   ------------------------            ---------------------
     A      120     IT                    Sale       Y
     B      125     HR                    Prod       Z
     C      110     Sale                  IT         A
     D      111     IT
```

```
Emp ⋈ Dep

Name    Id    Dept_name    Manager
-----------------------------
A      120    IT           A
```

C	110	Sale	Y
D	111	IT	A

Rename (ρ)

Rename is a unary operation used for renaming attributes of a relation.
ρ (a/b) R will **rename the attribute 'b'** of relation **by 'a'** .