To understand Relational Algebra

SELECT Operation

SELECT operation is used to select a *subset* of the tuples from a relation that satisfy a **selection condition**. It is a filter that keeps only those tuples that satisfy a qualifying condition – those satisfying the condition are selected while others are discarded.

Example: To select the EMPLOYEE tuples whose department number is four or those whose salary is greater than $30,000 the following notation is used:

$$\sigma_{\mathrm{DNO}=4}\ (Employee)$$

PROJECT Operation

This operation selects certain *columns* from the table and discards the other columns. The PROJECT creates a vertical partitioning – one with the needed columns (attributes) containing results of the operation and other containing the discarded Columns.

Example: To list each employee's first and last name and salary, the following is used:

$$\pi_{fname,lastname,sal}(Employee)$$

The project operation *removes any duplicate tuples,* so the result of the project operation is a set of tuples and hence a valid relation.

RENAME Operation

$$\rho_{s(b1,b2...)}(R)$$

is a renamed relation S based on R with column names b1,b2….

$$\rho_{s}(R)$$

is a renamed relation S based on R

$\rho_{(b1,b2....)}(R)$ **is a renamed relation with column names b1,b2…..**

- **UNION Operation**

The result of this operation, denoted by $R \cup S$, is a relation that includes all tuples that are either in R or in S or in both R and S. Duplicate tuples are eliminated.

INTERSECTION OPERATION

The result of this operation, denoted by $R \cap S$ S, is a relation that includes all tuples that are in both R and S

MINUS

The result of this operation, denoted by R - S, is a relation that includes all tuples that are in R but not in S

CARTESIAN PRODUCT

This operation is used to combine tuples from two relations in a combinatorial fashion. In general, the result of R(A1, A2, . . ., An) x S(B1, B2, . . ., Bm) is a relation Q with degree n + m attributes Q(A1, A2, . . ., An, B1, B2, . . ., Bm), in that order. The resulting relation Q has one tuple for each combination of tuples—one from R and one from S.

JOIN OPERATION The general form of a join operation on two relations R(A1, A2, . . ., An) and S(B1, B2, . . ., Bm) is:

$$R \bowtie_{\text{<join condition>}} S$$

EQUIJOIN Operation

The most common use of join involves join conditions with equality comparisons only. Such a join, where the only comparison operator used is =, is called an EQUIJOIN. In the result of an EQUIJOIN we always have one or more pairs of attributes (whose names need not be identical) that have *identical values* in every tuple.

The JOIN seen in the previous example was EQUIJOIN