**Relational Algebra**

The basic set of operations for the formal relational model is the relational algebra. These operations enable a user to specify basic retrieval requests as relational algebra expressions.

A sequence of relational algebra operations forms a relational algebra expression, whose result will also be a relation that represents the result of a database query (or retrieval request).

**Importance of relational algebra**

The relational algebra is very important for several reasons. First, it provides a formal foundation for relational model operations. Second, it is used as a basis for implementing and optimizing queries in the query processing and optimization modules that are integral parts of relational database management systems (RDBMSs).

**Operations in Relational Algebra**

The relational algebra is often considered to be an integral part of the relational data model. Its operations can be divided into two groups. One group includes set operations from mathematical set theory. These are applicable because each relation is defined to be a set of tuples in the formal relational model. Set operations include UNION, INTERSECTION, SET DIFFERENCE, and CARTESIAN PRODUCT (also known as CROSS PRODUCT).

The other group consists of operations developed specifically for relational databases. They are SELECT, PROJECT, and JOIN.

First, we describe the SELECT and PROJECT operations because they are unary operations that operate on single relations. Then we discuss set operations, JOIN and other complex binary operations, which operate on two tables by combining related tuples (records) based on join conditions.

The COMPANY relational database shown in Figure 5.6 is used for our examples.













