Integrity Constraints

Integrity constraints are rules defined in a database to ensure that the data stored remains accurate, consistent, and meaningful throughout its lifetime. Since databases are shared by many users and applications, these constraints prevent invalid data from being entered and help maintain the correctness of the database even when multiple operations occur. These constraints are discussed below.

a) Entity Integrity Constraint

This is one of the most fundamental integrity constraints. This rule states that every relation must have a primary key and that the primary key value cannot be null. The primary key uniquely identifies each record in a table, so allowing null or duplicate values would make it impossible to distinguish one record from another. Entity integrity therefore ensures that every tuple in a relation represents a real, identifiable entity.

b) Referential Integrity Constraint

Referential integrity maintains consistency between related tables. This rule states that a foreign key in one relation must either be null or match an existing primary key value in the related relation. Referential integrity ensures that relationships between tables remain valid. For example, if a student is registered for a course, the course referenced must actually exist in the course table. This prevents situations where records refer to non-existent data.

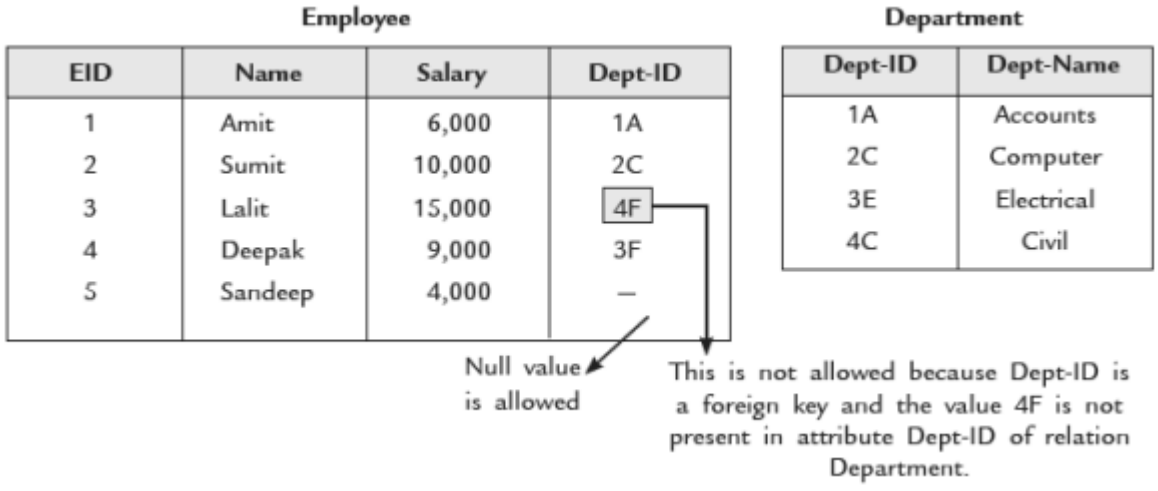

Fig 1: Referential Integrity

c) Domain constraints

Domain constraints restrict the values that an attribute can take. These constraints define the data type, size, format, and allowable range of values for each attribute. For instance, an age attribute may be restricted to integer values within a specific range, and a date attribute must follow a valid date format. Domain constraints help ensure that values stored in the database are meaningful and appropriate.

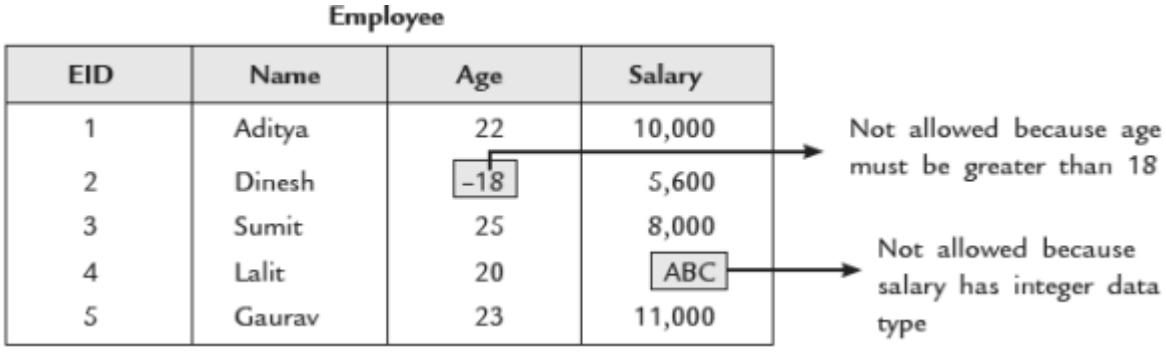

Fig 2: Domain Constraints

d) Key Constraints

In any relation R, if attribute A is primary key then A must have unique value or you can say that primary key attribute must have unique value. Duplicate values in primary key are invalid.

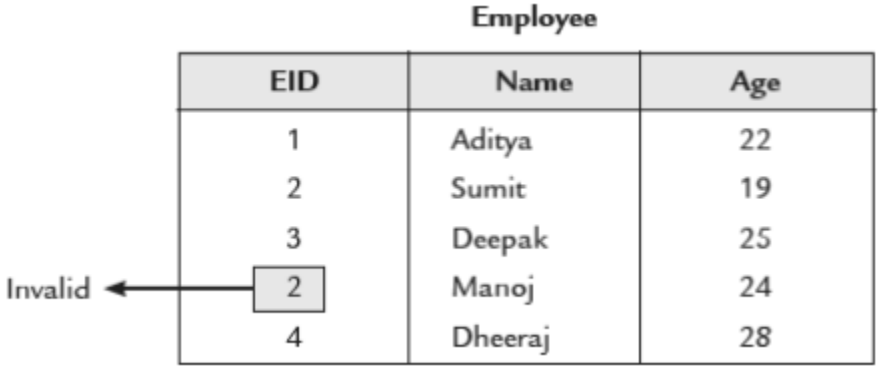

Fig 3: Key Constraints

e) Tuple Uniqueness Constraints

In any relation R, all tuples in relation R must have distinct values. In other words, duplicate tuples within a single relation are not allowed.

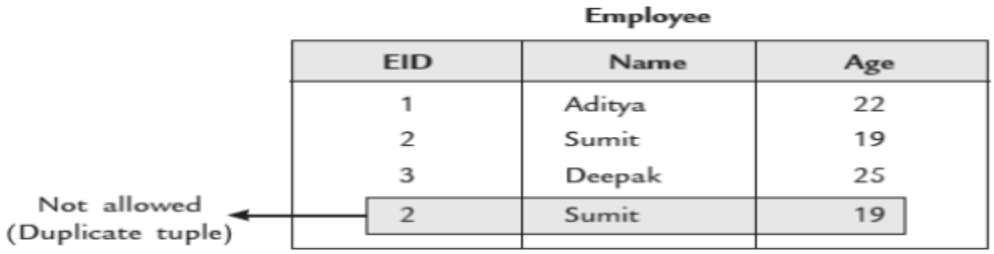

Fig 4: Tuple Uniqueness Constraints