Cardinality of Relationships in RDBMS

In relational database management systems (RDBMS), cardinality refers to the uniqueness of data values contained in a column (attribute) of a database table. It is an important concept in understanding relationships between tables. There are several types of relationships defined by their cardinality:

1. One-to-One (1:1): In this type of relationship, each record in one table corresponds to exactly one record in another table. This can be used to split data into two tables for performance, security, or clarity reasons.

- Example: A person and their unique passport. Each person has one passport, and each passport is assigned to one person.

2. One-to-Many (1:N): This is the most common type of relationship. Here, a single record in one table can be associated with one or more records in another table.

- Example: A single customer can place multiple orders. Therefore, the Customer table has a one-to-many relationship with the Orders table.

3. Many-to-One (N:1): This is essentially the inverse of the one-to-many relationship. Multiple records in one table are associated with a single record in another table.

- Example: Many students (in a Students table) can enroll in one course (in a Courses table).

4. Many-to-Many (N:M): In this type of relationship, multiple records in one table are associated with multiple records in another table. This usually requires a third table, known as a junction table or associative entity, to manage the relationships.

- Example: Students and courses where a student can enroll in multiple courses, and a course

can have multiple students. The junction table (often named Enrollments) would manage this many-to-many relationship.

Representing Cardinality in an ERD (Entity-Relationship Diagram)

- One-to-One: Usually represented by a single line between two entities with a "1" near both ends.
- One-to-Many: Represented by a line connecting the two entities with a "1" near the entity with the single record and a "*" (or "N") near the entity with multiple records.
- Many-to-Many: Represented by lines connecting each of the entities to the junction table, often with "*" (or "N") near both ends of the line.

Understanding and defining the correct cardinality of relationships in your database schema is crucial for ensuring data integrity, optimizing query performance, and maintaining clear data relationships.