**First Normal Form (1NF) in Relational Databases**

The **First Normal Form (1NF)** is a property of a relational database that ensures the structure of a table adheres to specific rules to eliminate redundancy and improve data integrity.

**Rules for 1NF**

1. **Atomicity of Data (No Multivalued Attributes):**  
   Each column should contain only atomic (indivisible) values. This means a column cannot contain sets, lists, or arrays.
   * **Example:**  
     Not in 1NF:

| **StudentID** | **Name** | **Subjects** |
| --- | --- | --- |
| 1 | Alice | Math, Science |

* + In 1NF:

| **StudentID** | **Name** | **Subject** |
| --- | --- | --- |
| 1 | Alice | Math |
| 1 | Alice | Science |

1. **Uniqueness of Rows:**  
   Each row in a table must be uniquely identifiable using a primary key.
2. **Column Uniqueness:**  
   Each column must represent one and only one type of data. For example, a column named "Phone Numbers" shouldn't store both home and mobile phone numbers as separate entries.

**First Normal Form in ER Diagrams**

When designing **Entity-Relationship (ER) Diagrams**, ensuring 1NF compliance involves structuring entities and their attributes such that:

* Each attribute in an entity is atomic.
* There are no repeating groups or arrays within attributes.

**Steps to Represent 1NF in an ER Diagram**

1. **Identify Multivalued Attributes:**  
   Split them into separate entities or relationships.
2. **Create Weak Entities if Necessary:**  
   Use weak entities to represent dependent information like multivalued or repeating data.
3. **Use Relationships for Associations:**  
   For one-to-many or many-to-many relationships, use connecting entities or associative tables.
   * **Example:**  
     A "Student" entity with multivalued "Subjects" attribute can be split as:
     + Student(StudentID, Name)
     + Subject(SubjectID, SubjectName)
     + StudentSubject(StudentID, SubjectID) (associative entity for many-to-many relationship)

This ensures the design adheres to 1NF and aligns with best practices for database normalization.