## Normalisation:

Normalisation is the process of organising the data in different tables. Data is stored in multiple tables to avoid redundancy and data anomalies.
We need to perform Normalization on our database to reduce Data Redundancy. It minimizes redundancy using certain rules or sets of rules.
There are many types of normal forms, although we are going to focus on 1Nf, 2NF, 3NF and BCNF (also known as 3.5 NF).

The most commonly used normal forms are:

1. First normal form(1NF)
2. Second normal form(2NF)
3. Third normal form(3NF)
4. Boyce & Codd normal form (BCNF)

**Types of Normal Forms:**

1. **First Normal Form (1NF):** This is Step 1 of the Normalisation Process.
   For a Relation/table to justify 1NF it needs to satisfy 4 basic conditions:
   - Each attribute should contain atomic values. (i.e. No multivalued attributes)
   - Each Value stored in an attribute should be of the same type.
   - All the attributes in a table should have unique names.
   - The order of the data stored in the table doesn't matter.

2. **Second Normal Form:** For a Relation/table to justify 2NF it needs to satisfy 2 rules:
   - It should be in First Normal Form.
   - It should not have any partial dependencies i.e. when a nonprime attribute is derivable from only a part of a candidate key.

3. **Boyce-Codd Normal Form (BCNF):** It is an extension of 3NF and is also known as the 3.5 Normal Form.
   For a table to be in the Boyce-Codd Normal Form, it should satisfy 2 rules:
   - It should be in the Third Normal Form.
   - A prime attribute shouldn't be dependent on a non-prime attribute. (i.e. if M⟶ N, then M is a superkey)

## Denormalization:

It is the opposite of Normalisation. Normalisation is breaking the data and organising it in different tables whereas denormalisation is combining the data. Denormalisation combines the data and organises it in a single table. Denormalization is the process of adding redundant data in the normalised relational database to optimise the performance.

Benefits of denormalisation:

1. Faster data read operations
2. Simpler and more accessible to query
3. High data availability
4. Requires less computation
5. Reduced network calls
6. High data accessibility

Challenges of denormalisation:

1. Slow write operations
2. Increases complexity
3. Wastage of memory
4. Data inconsistency

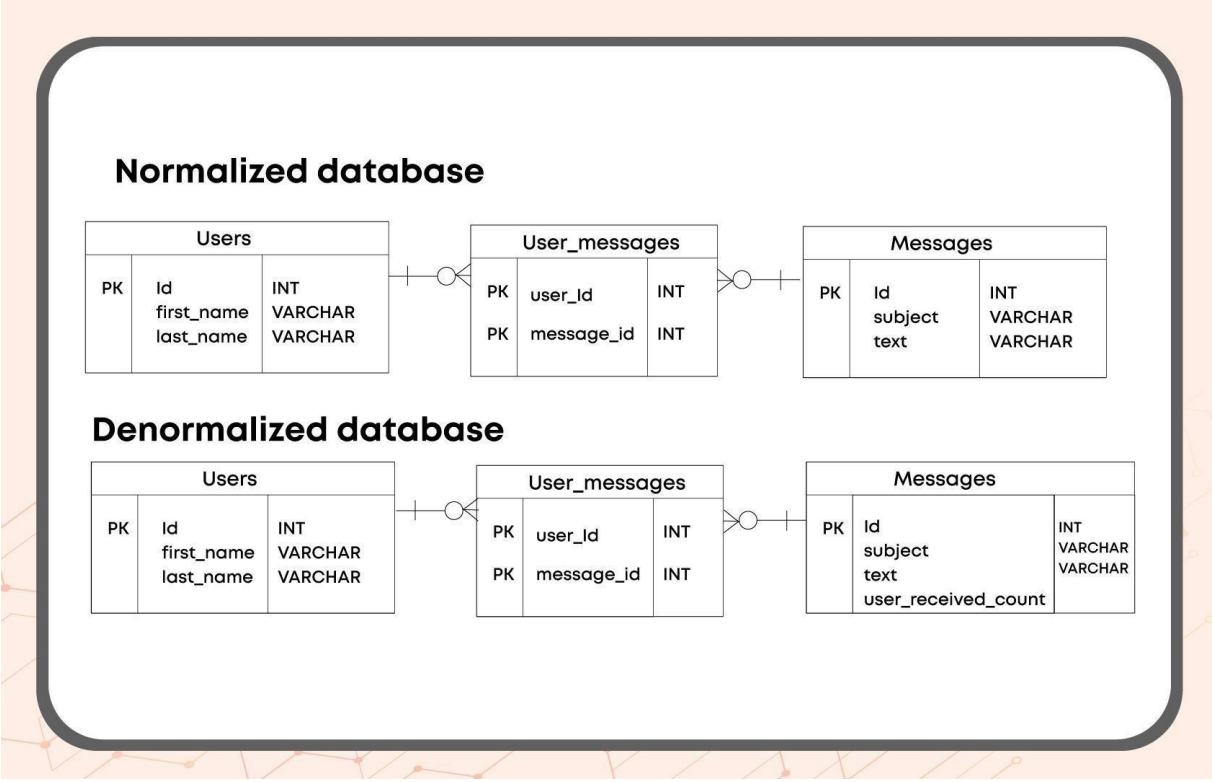


Fig: Normalization vs Denormalization