**Normalization**

Normalization split a large table into smaller tables and define relationships between them to increases the clarity in organizing data.Normalization was developed by IBM researcher E.F. Codd In the 1970s.

**Browser : -** [**https://www.guru99.com/database-normalization.html**](https://www.guru99.com/database-normalization.html)

There are 6 types of Normalization Form :-

1. 1NF (First Normal Form)
2. 2NF (Second Normal Form)
3. 3NF (Third Normal Form)
4. BCNF (Boyce-Codd Normal Form)
5. 4NF (Fourth Normal Form)
6. 5NF (Fifth Normal Form)

**1NF - (NORAML FORM)**

Each table cell should contain a single value.

Each record needs to be unique.

|  |  |  |  |
| --- | --- | --- | --- |
| **Full Name** | **Physical Address** | **Movies Rented** | **Salutation** |
| Janet jones | First Street plot No 4 | Pirates of the Caribbean | Ms. |
| Janet jones | First Street plot No 4 | Clash of the Titan | Ms. |
| Robert Phil | 3rd Street 34 | Forgetting Sarah Marshal | Mr. |
| Robert Phil | 3rd Street 34 | Daddy’s Little Girl | Mr. |
| Robert Phil | 5th Avenue | Clash of the Titan | Mr. |

Example of 1NF in DBMS

**Second Normal Form (2NF)**

Rule 1- Be in 1NF

Rule 2- Single Column Primary Key that does not functionally dependent on any subset of candidate key relation

It is clear that we can’t move forward to make our simple database in 2nd Normalization form unless we partition the table above.

|  |  |  |  |
| --- | --- | --- | --- |
| **Membership Id** | **Full Names** | **Physical Address** | **Salutation** |
| 1 | Janet jones | First Street plot No 4 | Ms. |
| 2 | Robert Phil | 3rd Street 34 | Mr. |
| 3 | Robert Phil | 5th Avenue | Mr. |

|  |  |
| --- | --- |
| **Membership Id** | **Movies Rented** |
| 1 | Pirates of the Caribbean |
| 1 | Clash of the Titan |
| 2 | Forgetting Sarah Marshal |
| 2 | Daddy’s Little Girl |
| 3 | Clash of the Titan |

**Third Normal Form (3NF)**

Rule 1- Be in 2NF

Rule 2- Has no transitive functional dependencies

To move our 2NF table into 3NF, we again need to again divide our table.

**3NF Example**

Below is a 3NF example in SQL database:

|  |  |  |  |
| --- | --- | --- | --- |
| **Membership Id** | **Full Names** | **Physical Address** | **Salutation** |
| 1 | Janet jones | First Street plot No 4 | 2 |
| 2 | Robert Phil | 3rd Street 34 | 1 |
| 3 | Robert Phil | 5th Avenue | 1 |

|  |  |
| --- | --- |
| **Membership Id** | **Movies Rented** |
| 1 | Pirates of the Caribbean |
| 1 | Clash of the Titan |
| 2 | Forgetting Sarah Marshal |
| 2 | Daddy’s Little Girl |
| 3 | Clash of the Titan |

|  |  |
| --- | --- |
| **Salutation Id** | **Salutation** |
| 1 | Mr. |
| 2 | Ms. |
| 3 | Mrs. |
| 4 | Dr. |

**Boyce-Codd Normal Form (BCNF)**

Even when a database is in 3rd Normal Form, still there would be anomalies resulted if it has more than one **Candidate**Key.

Sometimes is BCNF is also referred as **3.5 Normal Form.**

**Fourth Normal Form (4NF)**

If no database table instance contains two or more, independent and multivalued data describing the relevant entity, then it is in 4th Normal Form.

**Fifth Normal Form (5NF)**

A table is in 5th Normal Form only if it is in 4NF and it cannot be decomposed into any number of smaller tables without loss of data.

**Sixth Normal Form (6NF) Proposed**

6th Normal Form is not standardized, yet however, it is being discussed by database experts for some time. Hopefully, we would have a clear & standardized definition for 6th Normal Form in the near future…