**NORMALIZATION TECHNIQUES**

**Normalization** is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly & deletion anomaly.

1. **First Normal Form (1NF):**

According to 1NF

-Each table cell should contain a single value.

-Each record needs to be unique.

Example-

Assume the table having details of author and the books written by that author.

|  |  |  |
| --- | --- | --- |
| **Author\_id** | **Author\_name** | **Books** |
| **1** | **Vaishali** | **Database Principles,C++** |
| **2** | **Naina** | **Java Principles** |

Here the column Books has multiple values which is not allowed according to 1NF.

Above table in 1NF-

|  |  |  |
| --- | --- | --- |
| **Author\_id** | **Author\_name** | **Books** |
| **1** | **Vaishali** | **Database Principles** |
| **1** | **Vaishali** | **C++** |
| **2** | **Naina** | **Java Principles** |

In this table there is no multivalue in any column and all records are unique.

1. **Second Normal Form(2NF)**

According to 2NF

-Table should be in 1NF

-Minimal super key is primary key

So the above table is in 1NF but not in 2NF as it has not a single column primary key.

To make the table complies with 2NF we can break it in two tables like this:

|  |  |
| --- | --- |
| **Author\_id** | **Author\_name** |
| **1** | **Vaishali** |
| **2** | **Naina** |

**Table 1.1**

|  |  |
| --- | --- |
| **Author\_id** | **Books** |
| **1** | **Database Principles** |
| **1** | **C++** |
| **2** | **Java Principles** |

**Table 1.2**

In table 1.2 Author\_id is the foreign key.

1. **Third Normal Form(3NF)**

-should be in 2NF

-has no transitive functional dependencies.

|  |  |  |  |
| --- | --- | --- | --- |
| **Author\_id** | **Book\_id** | **Book\_name** | **Subject** |
| **1** | **1** | **Database Principles** | **Database** |
| **1** | **2** | **C++** | **Programming** |
| **2** | **3** | **Java Principles** | **Programming** |

**Functional Dependency-**A transitive functional dependency is when changing a non –key column ,might cause any of other non key columns to change.

So in above table Author id and book id are primary key but book id alone is describing book which is violating functional dependency.

The above table is not in 3NF so to convert it in 3NF.

|  |  |  |
| --- | --- | --- |
| **Book\_id** | **Book\_name** | **Subject\_id** |
| **1** | **Database\_Principles** | **1** |
| **2** | **C++** | **2** |
| **3** | **Java Principles** | **2** |

**Table 1.1**

|  |  |
| --- | --- |
| **Subject\_id** | **Subject\_name** |
| **1** | **Database** |
| **2** | **Programming** |

**Table 1.2**

|  |  |
| --- | --- |
| **Author\_id** | **Book\_id** |
| **1** | **1** |
| **1** | **2** |
| **2** | **3** |

**Table 1.3**