**Normalization**

1. Decompose a large & complex table into smaller and easy table.
2. Remove anomalies and simple design technique.
3. The normal form is used to reduce redundancy from the database table.
4. Easy maintenance , Durability and long life.
5. Normalization is the process of organizing the data in the database.
6. Step by step process.

Youtube :- <https://www.youtube.com/@TheCrazyProgrammer123/search?query=normalization>

## 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)**

1. A table should hold atomic values.
2. Remove multi valued attributes, composite attributes.

|  |  |  |
| --- | --- | --- |
| STD | NAME | COURSE |
| 1 | RAJ | DBMS,OS,CN |
| 2 | JYOTI | DBMS |
| 3 | HARSH | CN,CAD |

|  |  |  |
| --- | --- | --- |
| STD | NAME | COURSE |
| 1 | RAJ | DBMS |
| 1 | RAJ | OS |
| 1 | RAJ | CN |
| 2 | JYOTI | DBMS |
| 3 | HARSH | CN |
| 3 | HARSH | CAD |

**Normal Table Example - 1NF**

**2NF - (NORMAL FORM)**

1. A table should be 1NF.
2. All non – key attributes must fully functionally dependent on key – attributes (primary key).

|  |  |  |  |
| --- | --- | --- | --- |
| STD | NAME | COURSE ID | C. NAME |
| 1 | RAJ | 24 | DBMS |
| 2 | JYOTI | 47 | CN |
| 3 | HARSH | 38 | CAD |

**1NF Example -**

|  |  |  |
| --- | --- | --- |
| SID | NAME | COURSE ID |
| 24 | 1 | RAJ |
| 47 | 2 | JYOTI |
| 38 | 3 | HARSH |

|  |  |
| --- | --- |
| COURSE ID | C. NAME |
| RAJ | DBMS |
| JYOTI | CN |
| HARSH | CAD |

**2NF**

**3NF - (NORMAL FORM)**

1. A table should be in 2NF.
2. A table should not hold transitive dependency**.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SID | NAME | CITY | STATE | ZIP |
| 1 | RAJ | JAIPUR | RAJ | 42619 |
| 2 | JYOTI | JAIPUR | RAJ | 42619 |
| 3 | HARSH | JODHPUR | RAJ | 76891 |
| 4 | AJAY | MUMBAI | MAHARASHTRA | 21987 |
| 5 | VIKAS | PATNA | BIHAR | 56327 |

|  |  |  |
| --- | --- | --- |
| SID | NAME | ZIP |
| 1 | RAJ | 42619 |
| 2 | JYOTI | 42619 |
| 3 | HARSH | 76891 |
| 4 | AJAY | 21987 |
| 5 | VIKAS | 56327 |

|  |  |  |
| --- | --- | --- |
| ZIP | CITY | STATE |
| 42619 | JAIPUR | RAJ |
| 76891 | JODHPUR | RAJ |
| 21987 | MUMBAI | MAHARASHTRA |
| 56327 | PATNA | BIHAR |

**BCNF - (NORMAL FORM)**

1. A table should be in 3rd NF.
2. For any non trival functional dependency.

|  |  |  |  |
| --- | --- | --- | --- |
| SID | NAME | BID | BNAME |
| 1 | RAJ | 87 | HINDI |
| 2 | JYOTI | 115 | ENGLISH |
| 3 | HARSH | 397 | COMPUTER |

|  |  |  |
| --- | --- | --- |
| SID | NAME | BID |
| 1 | RAJ | 87 |
| 2 | JYOTI | 115 |
| 3 | HARSH | 397 |

|  |  |
| --- | --- |
| BID | BNAME |
| 87 | HINDI |
| 115 | ENGLISH |
| 397 | COMPUTER |

**4NF - (NORAML FORM)**

1. A table should be in BCNF.
2. No multi value dependency allowed.

|  |  |  |
| --- | --- | --- |
| SID | COURSE | SPORTS |
| 1 | DBMS | CRICKET |
| 1 | CN | TENNIS |
| 3 | DSA | FOOTBALL |
| 4 | DE | CRICKET |

|  |  |
| --- | --- |
| SID | SPORTS |
| 1 | CRICKET |
| 1 | TENNIS |
| 3 | FOOTBALL |
| 4 | CRICKET |

|  |  |
| --- | --- |
| SID | COURSE |
| 1 | DBMS |
| 1 | CN |
| 3 | DSA |
| 4 | DE |

**5NF - (NORAML FORM)**

1. A table should be in 4NF.
2. No join dependency allowed.
3. Decomposition should be loss-less.

|  |  |  |
| --- | --- | --- |
| COURSE | FACULTY | CLASS |
| MATH | JOHN | 11 |
| HINDI | JOHN | 11 |
| HINDI | VIJAY | 12 |
| MATH | RASHMI | 11 |

|  |  |
| --- | --- |
| CLASS | COURSE |
| 11 | MATH |
| 11 | HINDI |
| 12 | HINDI |
| 11 | MATH |

|  |  |
| --- | --- |
| COURSE | FACULTY |
| MATH | JOHN |
| HINDI | JOHN |
| HINDI | VIJAY |
| MATH | RASHMI |

|  |  |
| --- | --- |
| FACULTY | CLASS |
| JOHN | 11 |
| JOHN | 11 |
| VIJAY | 12 |
| RASHMI | 11 |