Second Normal Form (2NF)

A relation is in Second Normal Form (2NF) if:

->it is in First Normal Form and

->it has no partial dependency

If a non-key attribute can be determined from a proper subset of the candidate key, then the relation is said to have a partial dependency.

| Subject Taught | Teacher ID | Teacher Age |
| --- | --- | --- |
| Mathematics | 181 | 37 |
| Social Sciences | 11 | 29 |
| English | 181 | 37 |
| Physics | 27 | 45 |
| Chemistry | 27 | 45 |

Example:

->The above table follows 1NF

->Teacher Age is a non-key attribute(as it cannot be used as an identifier-since two people can have the same age), is dependent on Teacher-id which is a proper subset of the candidate key.

->Converting this to 2NF

| Teacher ID | Teacher Age |
| --- | --- |
| 181 | 37 |
| 11 | 29 |
| 27  ---------- | 45  ------------ |
| Subject Taught | Teacher ID |
| Mathematics | 181 |
| Social Sciences | 11 |
| English | 181 |
| Physics | 27 |
| Chemistry | 27 |

Third Normal Form (3NF) :

A relation is in Third Normal Form(3NF):

->it is in 2NF

->it has no transitive-dependency for all the non-key attributes.

->a realtion with a functional dependency of A->B is in 3NF if one of these condition is true

->A is a superkey

->B is a prime attribute

| Employee ID | Employee Name | Employee State | Employee Country | Employee ZIP |
| --- | --- | --- | --- | --- |
| 1267 | Sam Holland | California | USA | 421005 |
| 4582 | Joe Dunphy | Texas | USA | 560051 |
| 2362 | Harry Williams | Florida | USA | 690087 |
| 1260 | Alexa Stewart | Alaska | USA | 798423 |

Primary key:Employee ID

Non key attributes: Employee name, Employee State, Employee Country, Employee Zip.

Converting it into 3NF:

| Employee ID | Employee Name | Employee ZIP |
| --- | --- | --- |
| 1267 | Sam Holland | 421005 |
| 4582 | Joe Dunphy | 560051 |
| 2362 | Harry Williams | 690087 |
| 1260  --------- | Alexa Stewart  -------- | 798423  ------ |
| Employee ZIP | Employee State | Employee Country |
| 421005 | California | USA |
| 560051 | Texas | USA |
| 690087 | Florida | USA |
| 798423 | Alaska | USA |