

DATABASE - THIRD NORMAL FORM 3NF

A table is in third normal form when the following conditions are met:

- It is in second normal form.
- All nonprimary fields are dependent on the primary key.

The dependency of nonprimary fields is between the data. For example, in the below table, street name, city, and state are unbreakably bound to the zip code.

```
CREATE TABLE CUSTOMERS(
    CUST_ID      INT          NOT NULL,
    CUST_NAME    VARCHAR (20)  NOT NULL,
    DOB          DATE,
    STREET        VARCHAR(200),
    CITY          VARCHAR(100),
    STATE         VARCHAR(100),
    ZIP           VARCHAR(12),
    EMAIL_ID     VARCHAR(256),
    PRIMARY KEY (CUST_ID)
);
```

The dependency between zip code and address is called a transitive dependency. To comply with third normal form, all you need to do is move the Street, City, and State fields into their own table, which you can call the Zip Code table:

```
CREATE TABLE ADDRESS(
    ZIP          VARCHAR(12),
    STREET       VARCHAR(200),
    CITY          VARCHAR(100),
    STATE         VARCHAR(100),
    PRIMARY KEY (ZIP)
);
```

Next, alter the CUSTOMERS table as follows:

```
CREATE TABLE CUSTOMERS(
    CUST_ID      INT          NOT NULL,
    CUST_NAME    VARCHAR (20)  NOT NULL,
    DOB          DATE,
    ZIP           VARCHAR(12),
    EMAIL_ID     VARCHAR(256),
    PRIMARY KEY (CUST_ID)
);
```

The advantages of removing transitive dependencies are mainly twofold. First, the amount of data duplication is reduced and therefore your database becomes smaller.

The second advantage is data integrity. When duplicated data changes, there's a big risk of updating only some of the data, especially if it's spread out in a number of different places in the database. For example, if address and zip code data were stored in three or four different tables, then any changes in zip codes would need to ripple out to every record in those three or four tables.