

First Normal Form

In this lesson, we will take a look at first normal form with some examples.

We'll cover the following ^

- First normal form (1NF)
 - Example 1
 - Example 2

First normal form (1NF)

First normal form (1NF) states that the domain of an attribute must include only **atomic** (simple, indivisible) values and that the value of any attribute in a tuple must be a single value from the domain of that attribute. Hence, 1NF disallows having a set of values, a tuple of values, or a combination of both as an attribute value for a single tuple. The only attribute values permitted by 1NF are single atomic (or indivisible) values. In other words, if a relation contains a multi-valued attribute, it violates 1NF.

To make things more clear, let's consider the following examples.

Example 1

STUDENT Relation

| Roll_No | Name | Course |
|---------|---------|------------------------------------|
| 101 | Micheal | Databases, Operating Systems |
| 102 | Huber | Computer Networks, Data Structures |

| | | |
|--|--|-----------------|
| | | Data Structures |
|--|--|-----------------|

The STUDENT relation is not in 1NF because of the multi-valued attribute **Course**. To convert this table into 1NF, we must make sure that the values for the **Course** attribute are atomic. This can be seen below

| Roll_No | Name | Course |
|---------|---------|-------------------|
| 101 | Micheal | Databases |
| 101 | Micheal | Operating Systems |
| 102 | Huber | Computer Networks |
| 102 | Huber | Data Structures |

Now this table is in 1NF.

Example 2

STUDENT Relation

| Roll_No | Name | Phone |
|---------|--------|--------------------------------|
| 101 | Felix | (123) 456-7890 |
| 102 | Giorno | (456) 686-7821, (789) 316-9880 |
| 103 | Tom | NULL |

Again we can see that the second student has two phone numbers in a single tuple which violates 1NF. The table can be seen in the first normal form below:

| Roll_No | Name | Phone |
|---------|--------|----------------|
| 101 | Felix | (123) 456-7890 |
| 102 | Giorno | (456) 686-7821 |
| 102 | Giorno | (789) 316-9880 |
| 103 | Tom | NULL |

In the next lesson, we will look at how the second normal form reduces data redundancy.